

Square One Drive Extension Municipal Class Environmental Assessment
Environmental Study Report

Appendix B Transportation and Traffic Analysis Report

Appendix B TRANSPORTATION AND TRAFFIC ANALYSIS
REPORT

FINAL DRAFT Transportation and Traffic Analysis Report

Square One Drive Extension Class
EA



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City of Mississauga

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June, 2017

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1.0 INTRODUCTION

The City of Mississauga (the City) is undertaking a Class Environmental Assessment (EA) for the extension of Square One Drive from Confederation Parkway westerly to Rathburn Road. The Study Area is shown in **Figure 1**.

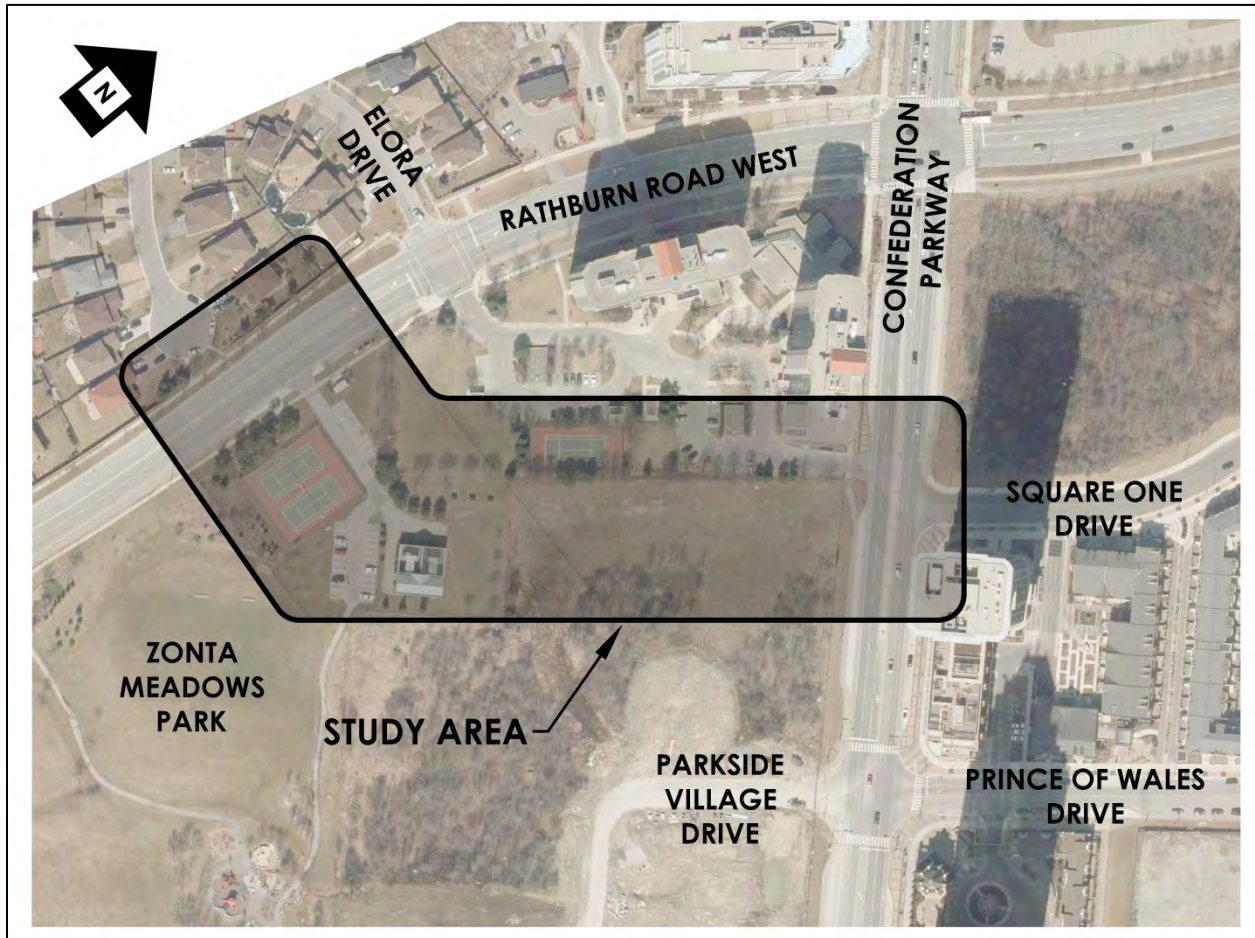


Figure 1 – Study Area

To properly assess the traffic impacts of a potential extension, an expanded Study Area was considered for the traffic analysis. This included the following intersections:

- Rathburn Road at Elora Drive (east);
- Rathburn Road at Elora Drive (west);
- Rathburn Road at Confederation Parkway;
- Rathburn Road at Living Arts Drive;

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- Rathburn Road at Duke of York Boulevard;
- Square One Drive at Living Arts Drive; and
- Square One Drive at Duke of York Boulevard.

This report focuses on the transportation and traffic conditions that contribute to the need and justification for the extension of Square One Drive. It describes the various tasks and methodology for the review and assessment of existing conditions, traffic forecasts, and operational performance of the Study Area intersections. The key components of the transportation and traffic analysis include:

- Detailed description of the existing roadway, intersections, transit routes, and facilities for active transportation;
- Traffic operations assessment for existing conditions at key intersections;
- Determination of growth trends within the Study Area based on the City's travel demand model forecasts. The resultant growth indicators assist in the development of forecasts for the 2021, 2031 and 2041 horizon years;
- Traffic operations assessment for future conditions; and
- Summary of transportation deficiencies and mitigation measures, which have been considered in the development of alternative solutions and alternative designs for improvements to Square One Drive.

A separate **Safety Performance Report** has also been conducted, which includes an examination of the collision history as well as a field view to identify where geometric or physical roadway conditions may contribute to safety issues or concerns.

2.0 EXISTING CONDITIONS

2.1 ROADS AND TRAFFIC CONTROL

All of the Study Area roads operate under the jurisdiction of the City. Using the City's Official Plan (OP) Schedule 5 – Long Term Road Network map as a reference, the characteristics of the roads and intersections within the Study Area are described below:

- Square One Drive is a two-lane east-west minor collector road. Within the Study Area, it has a posted speed limit of 30 km/h.
 - An unsignalized intersection is formed with Confederation Parkway, with the westbound approach operating under stop control. It is noted that movements at this unsignalized intersection are limited to right-in/right-out as Confederation Parkway is divided by a median;
 - A signalized intersection is formed with Living Arts Drive, with auxiliary left turn lanes provided on all approaches. Pedestrian signals and delineated crosswalks are provided on all approaches of the intersection; and
 - A single-lane roundabout is formed with Duke of York Boulevard. The northbound, southbound, and eastbound intersection approaches are all single lane approaches, whereas the westbound approach has an auxiliary right turn lane. Delineated pedestrian crosswalks are provided on all approaches of the intersection.
- Rathburn Road is a four-lane east-west road with two travel lanes in each direction. It is classified as a major collector with a posted maximum speed limit of 50 km/h.
- Elora Drive is a two-lane local road with one travel lane in each direction. It forms a crescent with Rathburn Road forming two signalized intersections, Elora Drive (west) and Elora Drive (east) approximately 425 m apart. For the section of Elora Drive north of Rathburn Road, there is no posted speed limit and it is assumed that the statutory 50 km/h speed limit governs. South of Rathburn, the posted maximum speed limit on Elora Drive is 40 km/h as there is a school located nearby. At Elora Drive (west), auxiliary left turn lanes are provided on all intersection approaches. Additionally, auxiliary right turn lanes are provided on the eastbound, westbound, and northbound approaches. At Elora Drive (east) auxiliary left turn lanes are provided on the eastbound and westbound approaches. The northbound intersection approach provides access for a residential condominium development. Pedestrian signals and delineated crosswalks are provided on all approaches at both of the intersections;
- Confederation Parkway is a four-lane north-south road with two travel lanes in each direction. It is classified as a major collector with a posted maximum speed limit of 50 km/h.

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A signalized intersection is formed with Rathburn Road, with auxiliary left turn lanes provided on all intersection approaches. Pedestrian signals and delineated crosswalks are provided on all approaches of the intersection;

- Living Arts Drive is a two-lane north-south road with one travel lane in each direction. Within our Study Area no maximum speed limit signage is evident. Therefore, it is assumed that the statutory 50 km/h governs. A signalized intersection is formed with Rathburn Road, with auxiliary left turn lanes provided on all intersection approaches. An auxiliary right turn lane is also provided on the northbound approach. Pedestrian signals and delineated crosswalks are provided on all approaches at both of the intersections;
- Duke of York Boulevard is a north-south road. South of Square One Drive to Prince of Wales Drive it is a four-lane road with one travel lane in each direction, where on-street parking is permitted in the curbside lane. North of Square One Drive, Duke of York Boulevard transitions to two travel lanes in each direction. No posted maximum speed limit signage is evident within the Study Area. Therefore, it is assumed that the statutory 50 km/h governs. A signalized intersection is formed with Rathburn Road, with auxiliary left turn lanes provided on all approaches. Auxiliary right turn lanes are also provided on the eastbound and southbound intersection approaches. Pedestrian signals and delineated crosswalks are provided on all approaches at both of the intersections;

2.2 TRANSIT

The Study Area roads are served by several Mississauga MiWay transit routes and several GO Transit routes. Reference to the MiWay website was made at the time of writing.

The City Centre Transit Terminal is located on Rathburn Road east of Duke of York Boulevard at Station Gate Road. This bus terminal is a connection point for accessing various routes and access to various GO stations.

The transit routes serving the Study Area road network include the following:

- 6 Credit Woodlands;
- 8 Cawthra;
- 9 Rathburn-Millers Grove;
- 20 Rathburn;
- 26 Burnhamthorpe;
- 28 Confederation;
- 61/61A Mavis;

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- 66 McLaughlin; and
- 91 Hillcrest-Cooksville GO.

School buses were observed on Rathburn Road West, Elora Drive and Confederation Parkway. Bus stops and shelters are located along the boulevards of the Study Area roads.

2.3 ACTIVE TRANSPORTATION

2.3.1 Overall Active Transportation Summary

Active Transportation conditions within the Study Area were observed during a walking site visit on Thursday, January 21, 2016 between the hours of 8:00 a.m. and 10:00 a.m. Observations were recorded at locations throughout the Study Area using Pedestrian and Bicycle Road Safety Audit prompt lists to record existing conditions for active transportation.

Low levels of pedestrian activity were observed within the Study Area. One cyclist was observed riding eastbound in the curb lane on Rathburn Road West. Low volumes of motor vehicle traffic were observed on Square One Drive and moderate to low levels of motor vehicle traffic throughout other roadways in the Study Area. Occasional midblock crossings by pedestrians occurred between Duke of York Boulevard and Living Arts Drive along delineated (concrete) pathways through the median. The posted speed limit in this location is 30 km/h and motor vehicles were observed to be travelling at slow speeds. Some motorists using the roundabout at Duke of York Boulevard appeared to demonstrate confusion around pedestrian priority at crossings but yielded at the last minute. Obstructions were observed on boulevard bicycle paths due to snow storage, construction activities and one permanent installation.

2.3.2 General Observations

2.3.2.1 Pedestrian Facilities

Sidewalks are present on all roadway corridors throughout the Study Area and provide a clearway width that is comfortable for two people passing in opposite directions. Sidewalk clear widths range from 1.5 m to 2.6 m. However, there is one exception with a short stretch of narrow sidewalk (1.42 m) on the north side of Rathburn Road West and Elora Drive (east). For the most part, furniture zones are clearly defined along corridors with exceptions at intersections along Rathburn Road West. Sidewalks along Square One Drive between Duke of York Boulevard and Living Arts Drive are at the same level as the roadway and this location is intended to function as a semi-shared facility with delineated sidewalks and roadways designed for low traffic speeds and frequent midblock pedestrian crossings (indicated by a change in surface material and texture). Motor vehicles were observed encroaching on the sidewalk area at the Sheridan College building on the south-west corner of Duke of York Boulevard and Square One Drive, for short-term parking and pick-up / drop-off activity.

2.3.2.2 Bicycle Facilities

Painted bicycle lanes (1.7 m wide) are present on Confederation Parkway within the Study Area. These lanes pass through the Study Area and terminate at Queensway West to the south (where they connect to an east-west boulevard multi-use trail), and Eglinton Avenue West to the north. Bicycle lane markings include painted outer lines and symbols (white) along corridors. There are no markings indicating the location of the bicycle lane through intersections. There are no other dedicated bicycle-only facilities in the Study Area.

Bicycle parking was observed adjacent to the Sheridan College building along Square One Drive. No bicycles were parked at this location during the time of the site visit.

2.3.2.3 Shared Use Facilities (Multi-Use Trails)

A shared boulevard multi-use trail (MUT) is present in the Study Area along the South / South-East boulevard of Rathburn Road West. Shared pathway signage is present indicating that trails are intended for the use of bicycles and pedestrians although the trail is adjacent to a sidewalk (sidewalks are intended for pedestrians and only permit children's size bicycles (wheels 50 cm/20 inches or less in diameter)). The MUT varies in width from 3.0 to 3.3 m wide with a solid yellow directional dividing line at intersection approaches. The MUT is not integrated with intersection crossings and merges with the sidewalk at intersection approaches. Signage that indicates cyclists must dismount and walk across intersections are located on traffic signal poles located at or near to the centre of trail approaches to intersections. Signage at Rathburn Road West and Duke of York Boulevard indicates that the MUT continues south along the west boulevard to access Sheridan College campus. This section of MUT is not integrated with the roundabout and merges with the sidewalk north of the intersection with Square One Drive.

2.3.2.4 Pedestrian Activity

Low to moderate pedestrian activity was observed on all corridors with the highest concentration of pedestrians observed entering and exiting the Sheridan College building at the south-west corner of Square One Drive and Duke of York Boulevard. The majority of these pedestrians were observed travelling to/from the east along Square One Drive and the south along Duke of York Boulevard.

2.3.2.5 Bicycle Activity

One bicycle was observed riding in the curb lane along Rathburn Road West. Obstructions observed in the boulevard multi-use trail may explain the cyclist's preference for using the curb lane.

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2.3.3 Detailed Observations

Detailed observations were recorded at locations throughout the Study Area using the Pedestrian and Bicycle Road Safety Audit prompt lists to analyze existing conditions for active transportation. The detailed findings and observations are attached in **Appendix A**.

2.3.4 Pedestrian Delay Analysis

The calculation of average pedestrian delay was based on the effective green time provided for the pedestrian phase and the intersection cycle length. The equation below was utilized to calculate the average pedestrian delay based upon literature contained within the 2000 Highway Capacity Manual.

$$d_p = \frac{(c - g_{walk})^2}{2 * c}$$

Where:

- d_p = average pedestrian delay (seconds/person);
- g_{walk} = effective walk time provided during pedestrian phase (seconds); and
- c = cycle length (seconds)

Guidance for calculating the effective walk time is based upon research that shows pedestrians will typically continue to enter the intersection during the first few seconds of the pedestrian flashing do no walk interval which increases the effective walk time for pedestrians. A conservative estimate for this extra time is provided (4.0 seconds).

Field observations did not indicate unusual or illegal pedestrian behaviour, nor that a larger effective walk time would be required to indicate actual pedestrian behavior. Therefore, 4.0 seconds was understood to be an appropriate estimate.

The 2000 Highway Capacity Manual provides level-of-service (LOS) criteria based on pedestrian delay for pedestrians at signalized intersections. Letter grades are provided and the likelihood of non-compliance that is estimated based on the amount of delay incurred by pedestrians. **Table 1** shows the LOS criteria for pedestrian delay at signalized intersections.

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Table 1 LOS Criteria for Pedestrians at Signalized Intersections	
Level of Service (LOS)	Pedestrian Delay (seconds / person)
A	0 – 10 seconds
B	> 10 – 20 seconds
C	> 20 – 30 seconds
D	> 30 – 40 seconds
E	> 40 – 60 seconds
F	> 60 seconds

Based upon signal timing plans provided by the City, pedestrian delay was calculated at each signalized Study Area intersection. The results are summarized in **Table 2**.

Table 2 Pedestrian Delay at Signalized Study Area Intersections							
Intersection	Approach	AM Peak Hour		Mid-Day Peak Hour		PM Peak Hour	
		Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
Elora Drive (west) / Rathburn Road	N-S	54	LOS E	18	LOS B	20	LOS B
	E-W	59	LOS E	22	LOS C	24	LOS C
Elora Drive (east) / Rathburn Road	N-S	56	LOS E	19	LOS B	22	LOS C
	E-W	59	LOS E	22	LOS C	24	LOS C
Living Arts Drive / Rathburn Road	N-S	59	LOS E	46	LOS E	59	LOS E
	E-W	59	LOS E	46	LOS E	59	LOS E
Duke of York Boulevard / Rathburn Road	N-S	43	LOS E	43	LOS E	56	LOS E
	E-W	43	LOS E	43	LOS E	56	LOS E
Living Arts Drive / Square One Drive	N-S	29	LOS C	29	LOS C	29	LOS C
	E-W	29	LOS C	29	LOS C	29	LOS C

During the peak hours, pedestrians will typically experience 30 seconds to less than one minute of delay, waiting to cross at signalized intersections within the Study Area.

2.4 TRAFFIC VOLUMES

The majority of traffic data within the Study Area was provided by the City of Mississauga. Traffic Survey Analysis (TSA) Inc. was contracted to update a turning movement count at the intersection of Elora Drive (east) at Rathburn Road, in addition to performing a GPS travel time survey along Rathburn Road.

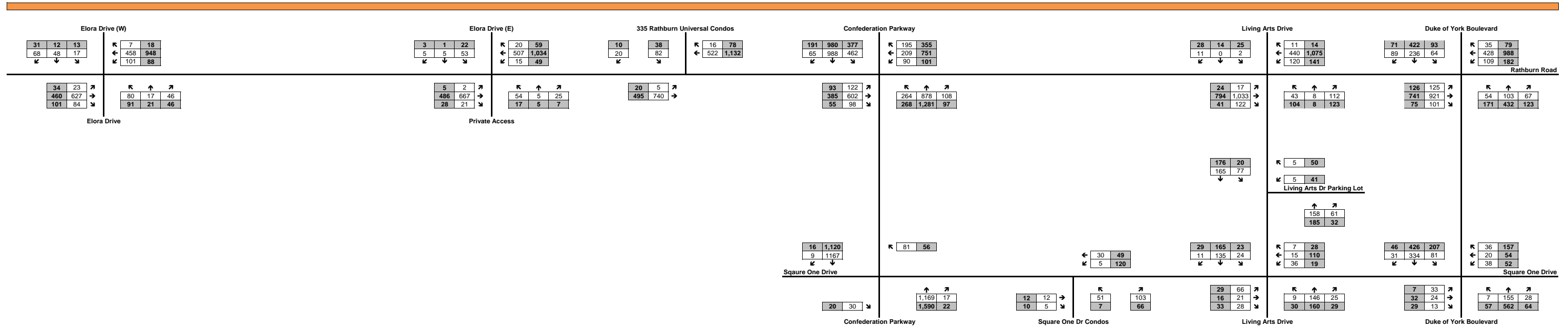
The traffic data consisted of intersection turning movement counts at the eight Study Area intersections for the a.m., mid-day and p.m. peak periods including volume, vehicle classification,

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and crossing pedestrians. In addition, signal timing plans and collision data were provided by City staff.

The existing base year a.m. and p.m. peak hour traffic volumes for the Study Area were adjusted and balanced between adjacent intersections and is shown in **Figure 2**. All traffic data has been included for reference in **Appendix B**.



AM Peak Hour 123
 PM Peak Hour 123

Figure 2
 Existing Base Year Traffic

2.5 ANALYSIS

An analysis of existing conditions was undertaken for the Study Area. To assess the operations a micro-simulation model was developed using PTV's VISSIM 8.00. A detailed calibration/validation report documenting the development of the model is provided for reference in **Appendix C**.

The quality of intersection operations is typically measured in terms of level of service (LOS) during the peak hour periods as defined by the *Highway Capacity Manual (HCM)*. The LOS is evaluated on the basis of average delay per vehicle and includes deceleration delay, queue move-up time, stopped delay, and final acceleration delay. For signalized intersections, the LOS ranges from LOS A for 10 second average delay or less to LOS F for delays greater than 80 seconds as shown in **Table 3**.

Table 3 LOS Criteria for Signalized Intersections	
Level of Service (LOS)	Delay (seconds / vehicle)
A	0 – 10 seconds
B	> 10 – 20 seconds
C	> 20 – 35 seconds
D	> 35 – 55 seconds
E	> 55 – 80 seconds
F	> 80 seconds

The LOS criteria for unsignalized and roundabout intersections are somewhat different from the criteria for signalized intersections primarily because different transportation facilities result in different driver expectations. The expectation is that a signalized intersection is designed to carry higher traffic volumes and therefore drivers would expect to experience greater delay than at an unsignalized intersection. The delay values for unsignalized/roundabout intersections range from 10 seconds or less for LOS A to greater than 50 seconds for LOS F as shown in **Table 4**.

Table 4 LOS Criteria for Unsignalized/Roundabout Intersections	
Level of Service (LOS)	Delay (seconds / vehicle)
A	0 – 10 seconds
B	> 10 – 15 seconds
C	> 15 – 25 seconds
D	> 25 – 35 seconds
E	> 35 – 50 seconds
F	> 50 seconds

Acceptable intersection operations are generally considered to be LOS D or better, and for left turn movements, a LOS E is acceptable during peak hours.

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The results of the analysis for the intersections overall are presented in **Table 5**. Detailed analysis results at the individual movement level for existing conditions are provided for reference in **Appendix D**.

Table 5 Existing Base Year Conditions Intersection Peak Hour Level of Service Analysis				
Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Delay (s)	LOS	Delay (s)
Elora Drive (west) / Rathburn Road <i>Signalized</i>	B	12.6	B	15.1
Elora Drive (east) / Rathburn Road <i>Signalized</i>	A	9.1	B	18.6
Confederation Parkway / Rathburn Road <i>Signalized</i>	D	43.9	E	56.7
Living Arts Drive / Rathburn Road <i>Signalized</i>	B	17.1	C	30.4
Duke of York Boulevard / Rathburn Road <i>Signalized</i>	C	24.9	D	35.5
Confederation Parkway / Square One Drive <i>Unsignalized – Critical WBR movement</i>	A	8.9	F	163.9
Living Arts Drive / Square One Drive <i>Signalized</i>	B	12.3	B	12.5
Duke of York Boulevard / Square One Drive <i>Roundabout</i>	A	6.2	B	11.4

For existing conditions in the a.m. peak hour, the Study Area intersections operate at acceptable levels of service. However, the Confederation Parkway at Rathburn Road intersection southbound left turn movement is approaching capacity as it operates at LOS E. In the p.m. peak hour, a number of movements operate with long delays:

- At the Confederation Parkway at Rathburn Road intersection, the westbound through and southbound left turn movements operate at LOS E and LOS F, respectively;
- At the Confederation Parkway at Square One Drive intersection, the westbound right turn movement operates at LOS F, primarily due to queue blockages from the Confederation Parkway at Rathburn Road intersection; and
- At the Duke of York Boulevard at Rathburn Road intersection, the eastbound left-turn movement operates at LOS F.

A site visit was completed on Tuesday March 22nd, 2016 to observe traffic operations during the a.m. and p.m. peak hours. Unfortunately, Square One Drive was closed between Duke of York Boulevard and Living Arts Drive for construction at Sheridan College during the site visit. However,

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this would likely result in marginally higher traffic volumes and worse operations on Rathburn Road during this time. The traffic observations were generally consistent with the analysis results and the model animations.

A substantial number of vehicles are processed through the intersection of Confederation Parkway at Rathburn Road, approximately 4,100 and 4,950 vehicles during the a.m. and p.m. peak hour, respectively. A large portion of the vehicular traffic is northbound and southbound on Confederation Parkway, in addition to moderate peak hour directional flows along Rathburn Road. It was observed during the a.m. peak hour that vehicles would be processed through this intersection with all movements operating well. The only exception would be that the southbound left-turn movement would often generate a queue that would extend beyond the available storage. While this occurred repeatedly in the a.m. peak hour, this queue would clear within the cycle.

During the p.m. peak hours, this intersection appeared to be approaching capacity. The southbound left-turn movement was observed to occasionally extend beyond the available storage. In some instances, vehicles queuing for the southbound left-turn movement would occasionally block the inner through lane. There appears to be little room for signal optimization as this movement competes for green time with the westbound through movement along Rathburn Road.

At the Duke of York Boulevard at Rathburn Road intersection it was observed during the p.m. peak hour that the eastbound left-turn movement operates with long delays. This is a result of a combination of a high left-turning volume and a limited number of gaps in the westbound through traffic.

South of Rathburn Road on Confederation Parkway and Living Arts Drive, as well as on the open portion of Square One Drive, drivers generally experienced minimal delays. No operational issues were observed in this area although a small number of drivers were observed to circulate a number of times looking for parking.

3.0 FUTURE TRAVEL DEMAND FORECASTING

In order to develop traffic forecasts for the future 2021, 2031, and 2041 horizon years, model outputs were obtained from the City's EMME travel demand forecasting model. The City uses the "Simplified GTA Model" which was developed by Peter Dalton Inc. The model is calibrated based on the 2011 Transportation Tomorrow Survey (TTS) and validated by several data sources including the TTS, cordon and automatic traffic recorder traffic data.

Over the next 25 years, there are a number of changes proposed to the transportation network both within and around the Study Area captured in the model. Through discussions with the City of Mississauga, the following transportation changes and their associated horizon years were identified:

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1. 2021 horizon year

- Extension of Living Arts Drive to Centre View Drive;
- Hurontario LRT with associated lane reductions on Hurontario Street, Duke of York Boulevard, Burnhamthorpe Road, and changes to intersection control and operations; and
- New roadways associated with the Amacon, Rogers, and other developments.

2. 2031 horizon year

- New roadways associated with new development south of Burnhamthorpe Road.

3. 2041 horizon year

- New north service road on the north side of Highway 403;
- Extension of Duke of York Boulevard and City Centre Drive over Highway 403;
- Removal of the loop ramp from eastbound Rathburn Road to northbound Hurontario Street;
- Extension of Centre View Drive to Hurontario Street;
- Extension of Square One Drive east of Hurontario Street;
- Lane additions on Burnhamthorpe Road east of Hurontario Street;
- Removal of Highway 403 EB off-ramp at Hurontario Street; and
- Reconfiguration of Highway 403 WB off-ramp at Mavis Road to connect to the new north service road.

Substantial development is expected within and adjacent to the Study Area in the downtown area. A summary of the model population and employment values for the 2011, 2021, 2031, and 2041 scenarios are shown in **Table 6**.

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Table 6 Model Population and Employment Values		
Scenario	Population	Employment
2011	31,860	21,250
2021	49,080 (4.4% p.a. from 2011)	26,910 (2.4% p.a. from 2011)
2031	65,430 (2.9% p.a. from 2021)	32,210 (1.8% p.a. from 2021)
2041	74,760 (2.3% p.a. from 2031)	37,570 (1.6% p.a. from 2031)

Using volume plots from the City's model, traffic volumes were compared at a screenline level. As might be expected based on the increase of population and employment values in the model, traffic volumes across each of the screenlines generally exhibited robust growth ranging from 1% to 2% per annum (p.a.) between each of the horizon years. The growth rates applied to the existing a.m. and p.m. peak hour traffic volumes follow:

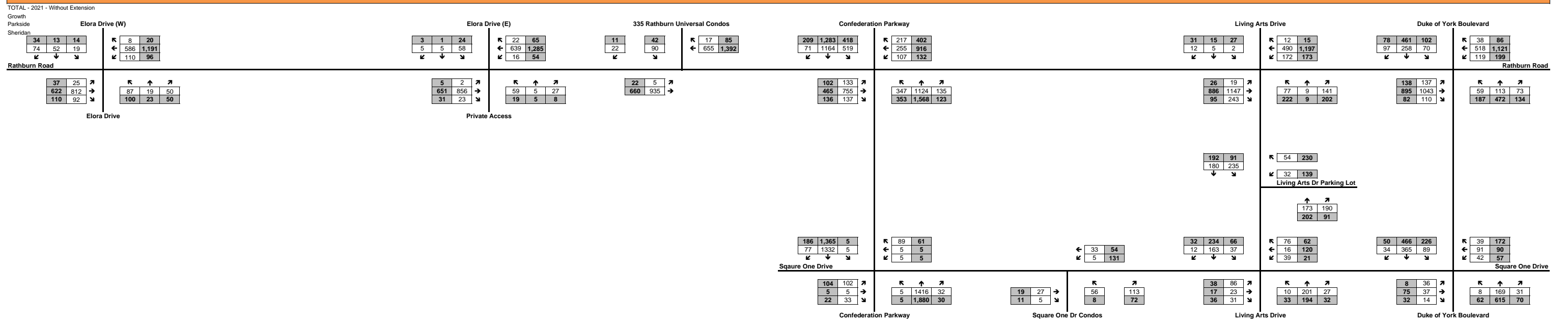
- From 2011 to 2021, 1.5% p.a. for east-west and north-south traffic;
- From 2021 to 2031, 1.25% p.a. for east-west and north-south traffic; and
- From 2031 to 2041, 1.5% p.a. for east-west and north-south traffic.

Additional traffic expected to be generated by Sheridan College Phase 2 and the Amacon lands (but not captured in the model) were manually added to the traffic forecasts. Collectively, these network changes along with the future changes in population and employment, and Sheridan College and Amacon developments, represent the Do Nothing scenario.

For the scenarios with the extension of Square One Drive to Rathburn Road, traffic was manually reassigned to the extension in a logical fashion. The full details of the forecasting methodology have been detailed in a technical memorandum attached in **Appendix E**.

The resulting future traffic forecasts, including traffic associated with the Amacon lands and Sheridan College are shown in the following figures:

- **Figure 3** – 2021 Future Traffic – No Extension of Square One Drive;
- **Figure 4** – 2021 Future Traffic – With Extension of Square One Drive;
- **Figure 5** – 2031 Future Traffic – No Extension of Square One Drive;
- **Figure 6** – 2031 Future Traffic – With Extension of Square One Drive;
- **Figure 7** – 2041 Future Traffic – No Extension of Square One Drive; and
- **Figure 8** – 2041 Future Traffic – With Extension of Square One Drive.



AM Peak Hour 123
PM Peak Hour 123

Figure 3
2021 Future Traffic - No Extension of Square One Drive

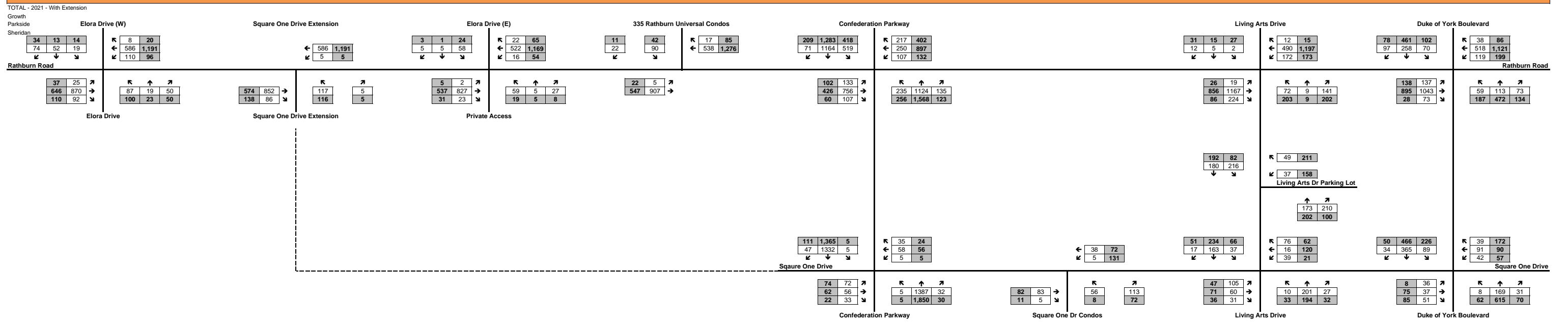
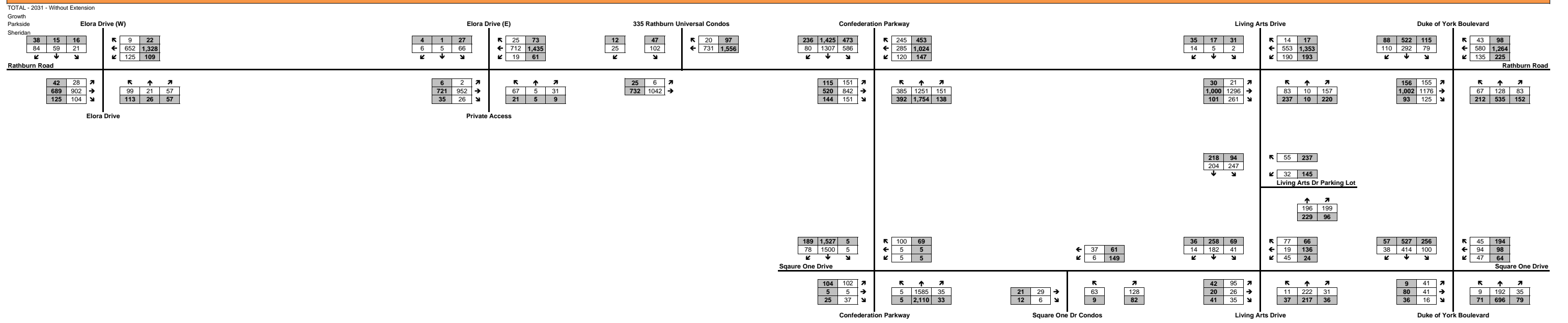


Figure 4
2021 Future Traffic - With Extension of Square One Drive



AM Peak Hour 123
PM Peak Hour 123

Figure 5
2031 Future Traffic - No Extension of Square One Drive

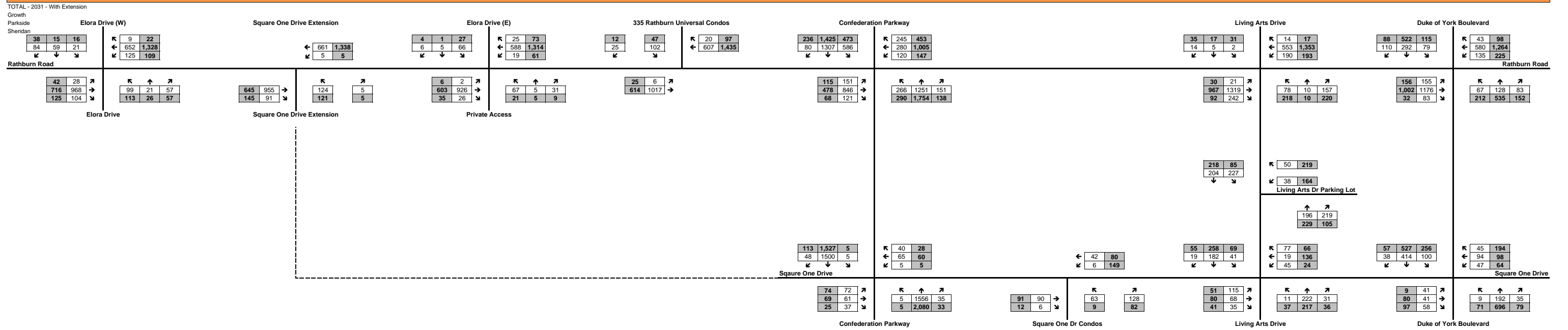
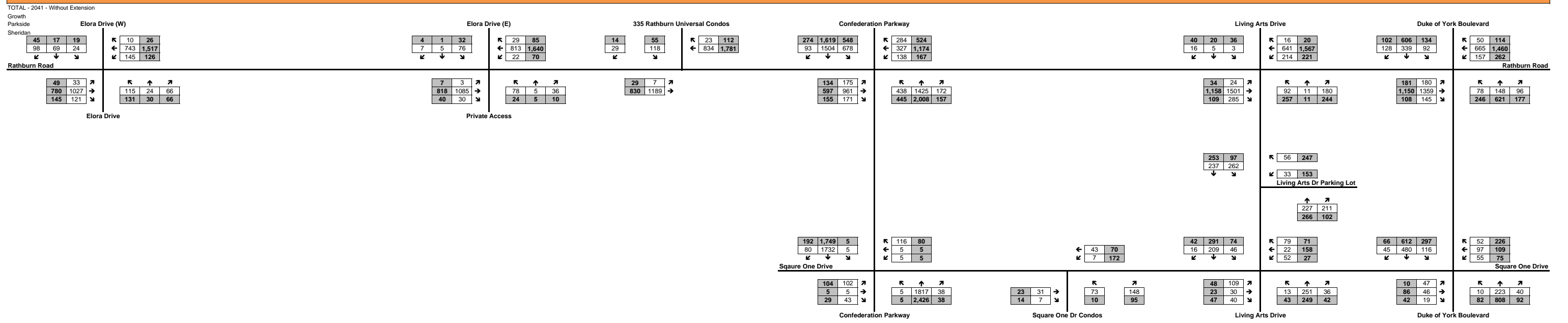


Figure 6
 2031 Future Traffic - With Extension of Square One Drive



AM Peak Hour 123
PM Peak Hour 123

Figure 7
2041 Future Traffic - No Extension of Square One Drive

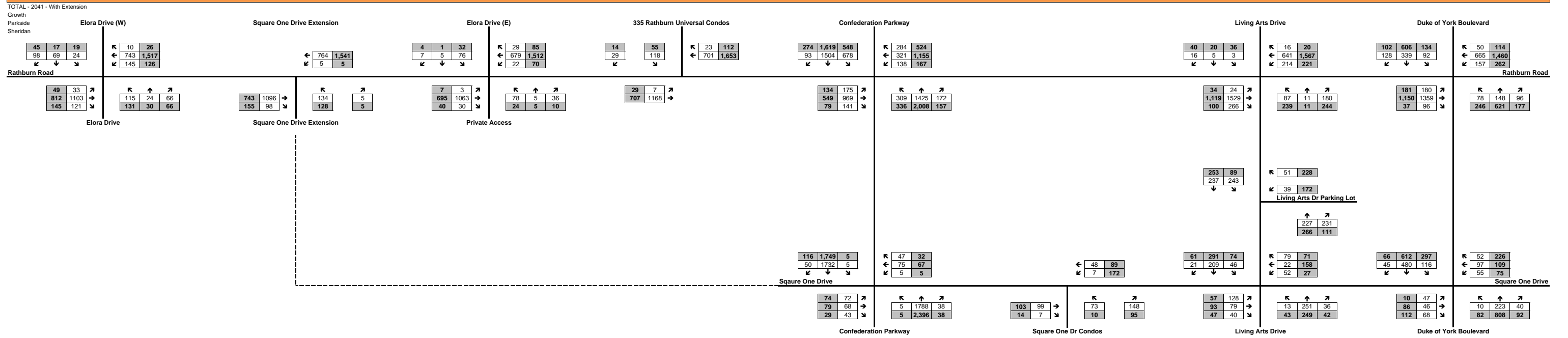


Figure 8
2041 Future Traffic - With Extension of Square One Drive

4.0 FUTURE SCENARIO ANALYSIS

4.1 DO NOTHING SCENARIO

The Do Nothing scenario (Scenario 1) comprises all the planned transportation network improvements expected to be in place by each the respective horizon years as detailed in Section 3.0. It also assumes:

- The partial extension of Square One Drive as an access road to the Amacon development, but not to Rathburn Road;
- Converting the unsignalized intersection of Confederation Parkway at Square One Drive to signal control; and
- Reassigning the traffic from the 330/350 Rathburn condominium access on Confederation Parkway to use the extension of Square One Drive.

The VISSIM analysis results are presented in **Table 7**. Detailed intersection results are attached in **Appendix F**.

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Table 7 Do Nothing Future Conditions Intersection Peak Hour Level of Service Analysis												
Intersection	2021				2031				2041			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)
Elora Drive (west) / Rathburn Road <i>Signalized</i>	B	12.5	B	12.6	B	13.8	B	13.3	B	13.8	B	13.7
Elora Drive (east) / Rathburn Road <i>Signalized</i>	A	8.3	B	17.8	A	8.5	B	12.7	A	9.5	B	10.2
Confederation Parkway / Rathburn Road <i>Signalized</i>	D	52.4	E	61.5	E	55.1	E	61.9	E	62.7	E	62.0
Living Arts Drive / Rathburn Road <i>Signalized</i>	C	20.2	D	46.5	C	25.5	E	59.8	C	31.5	E	62.5
Duke of York Boulevard / Rathburn Road <i>Signalized</i>	C	28.7	E	59.7	C	29.1	F	87.5	C	29.4	F	89.9
Confederation Parkway / Square One Drive <i>Signalized</i>	D	35.9	D	45.9	D	45.9	D	47.0	D	47.6	D	48.3
Living Arts Drive / Square One Drive <i>Signalized</i>	B	13.2	B	12.5	B	13.2	B	12.5	B	13.4	B	14.2
Duke of York Boulevard / Square One Drive <i>Signalized</i>	B	16.5	C	25.2	B	17.0	D	49.3	B	16.8	E	64.2

For the 2021 horizon year, long delays are experienced at the Confederation Parkway at Rathburn Road and Duke of York Boulevard at Rathburn Road intersections in the p.m. peak hour.

For the 2031 horizon year, the delays at these intersections are exacerbated. Furthermore, the Confederation Parkway at Rathburn Road intersection operates at LOS E during the a.m. peak hour and the Living Arts Drive at Rathburn Road intersection operates at LOS E during the p.m. peak hour.

For the 2041 horizon year, the delays at these intersections are further exacerbated. Additionally, the Duke of York Boulevard at Square One Drive intersection operates at LOS E during the p.m. peak hour.

4.1.1 Model Reliability

Within the VISSIM model, it was observed that long delays and resulting queues begin to form at the Confederation Parkway at Rathburn Road intersection. In the 2021 horizon year, these queues generally do not extend to the adjacent intersections. In the 2031 and 2041 horizon years, these queues lengthen and negatively impact traffic operations at the intersections of Confederation Parkway at Square One Drive, Living Arts Drive at Rathburn Road, and Duke of York Boulevard at Rathburn Road.

However, in the 2031 and 2041 horizon years, the model results become unreliable and incomparable due to the increased forecast demands in these horizon years exceeding the transportation network’s capacity. The vehicles which do not enter the network are not processed along each of the intersections on their route are described as the latent vehicle demand. As a result, the analysis results falsely suggest fewer delays are experienced and better traffic operations would be realized than what would actually occur. A summary of the network performance measures is shown in **Table 8**.

Table 8 Do Nothing Scenario Network Performance Measures						
Measure of Effectiveness	2021		2031		2041	
	AM	PM	AM	PM	AM	PM
Total System Delay (Hours)	220.8	437.0	305.4	571.9	358.1	632.2
Total System Travel Time (Hours)	342.2	602.9	431.9	739.6	498.1	803.7
Average Vehicle Delay (sec/veh)	120.6	197.7	159.2	255.7	177.1	275.5
Vehicles Processed	6,589	7,958	6,906	8,051	7,281	8,262
Latent Vehicle Demand	58	543	838	1,420	1,164	2,641
% Overcapacity	0.9%	6.8%	12.1%	17.6%	16.0%	32.0%

In the 2021 horizon year, virtually all of the vehicle demand is loaded onto the network, while in the 2031 and 2041 horizon years, a substantial portion of the traffic is not able to enter the network. As an example of the unreliability of the data, looking at the total delay between the 2031 and 2041 horizon years in the p.m. peak hour, it would be incorrect to assume that the total delay merely increases by 10%. Not only does the total delay increase by 10%, but an additional 1,221 vehicles are not able to enter the network. Assuming that all of the latent vehicle demand was able to enter the model network, the delays would be substantially larger.

Another cause of the unreliability of these model results is the exponential relationship between volume and delay when working at the above-capacity conditions, particularly in the 2031 and 2041 horizon years. This exponential relationship results in dramatic changes in the vehicle delay experienced even when changes in the number of vehicles are minimal between model runs and scenarios. This can create a false impression that one particular scenario will result in substantially improved traffic operations when the reality is that the change is negligible.

As a result, discussion of the analysis results for the various scenarios will focus on the 2021 horizon year although the results of the 2031 and 2041 horizon years will continue to be presented for completeness. A separate analysis to assess the capacity of the Square One Drive at Rathburn Road and Confederation Parkway intersections for the longer term horizon years is documented in **Section 4.6**.

4.2 EXTENSION WITH SIGNAL

The Extension with Signal scenario (Scenario 2) comprises all the planned transportation network improvements expected to be in place by each the respective horizon years as detailed in Section 3.0. It also assumes:

- The extension of Square One Drive to Rathburn Road with the new intersection under signal control;
- Converting the unsignalized intersection of Confederation Parkway at Square One Drive to signal control; and
- Reassigning the traffic from the 330/350 Rathburn condominium access on Confederation Parkway to use the extension of Square One Drive.

The analysis results are presented in **Table 9**. Detailed intersection results are attached in **Appendix F**.

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Table 9 Extension With Signal Scenario Intersection Peak Hour Level of Service Analysis												
Intersection	2021				2031				2041			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)
Elora Drive (west) / Rathburn Road <i>Signalized</i>	B	12.5	B	15.6	B	15.1	B	14.7	B	15.0	B	13.5
Elora Drive (east) / Rathburn Road <i>Signalized</i>	B	11.3	B	16.3	A	9.9	B	13.6	B	10.6	B	10.9
Square One Drive Ext. / Rathburn Road <i>Signalized</i>	B	14.2	B	11.0	B	14.2	B	10.7	C	15.1	A	9.0
Confederation Parkway / Rathburn Road <i>Signalized</i>	D	50.9	E	61.5	D	54.0	E	59.8	E	56.8	E	61.1
Living Arts Drive / Rathburn Road <i>Signalized</i>	C	20.2	D	50.1	C	25.2	E	56.5	C	26.6	E	60.5
Duke of York Boulevard / Rathburn Road <i>Signalized</i>	C	29.1	E	66.2	C	29.3	F	80.7	C	29.3	F	89.2
Confederation Parkway / Square One Drive <i>Signalized</i>	C	31.2	D	44.5	D	43.5	D	44.1	D	47.1	D	45.3
Living Arts Drive / Square One Drive <i>Signalized</i>	B	14.2	B	13.7	B	13.6	B	14.5	B	14.2	B	15.0
Duke of York Boulevard / Square One Drive <i>Signalized</i>	B	16.5	C	22.7	B	17.3	D	39.4	B	17.4	E	55.5

For the 2021 horizon year in the a.m. peak hour, all of the intersections generally operate at acceptable levels of service. In the p.m. peak hour, the Confederation Parkway at Rathburn Road and the Duke of York at Rathburn Road intersections operate with longer delays.

The network performance measures for this scenario are summarized in **Table 10**.

Table 10 Extension With Signal Scenario Network Performance Measures						
Measure of Effectiveness	2021		2031		2041	
	AM	PM	AM	PM	AM	PM
Total System Delay (Hours)	215.6	438.3	300.0	548.9	348.6	618.2
Total System Travel Time (Hours)	336.9	603.6	427.0	718.9	482.1	790.5
Average Vehicle Delay (sec/veh)	117.9	198.9	155.2	242.0	169.8	266.9
Vehicles Processed	6,585	7,937	6,959	8,166	7,389	8,337
Latent Vehicle Demand	45	548	451	1,300	1,108	2,581
% Overcapacity	0.7%	6.9%	6.5%	15.9%	15.0%	31.0%

Similar to the Do Nothing scenario, virtually all of the traffic demand is loaded onto the network in the 2021 horizon year, but the latent vehicle demand begins to dramatically increase in the 2031 and 2041 horizon years which results in the issues detailed in Section 4.1.1.

4.3 EXTENSION WITH ROUNDABOUT

The Extension with Roundabout scenario (Scenario 3) comprises all the planned transportation network improvements expected to be in place by each of the respective horizon years as detailed in Section 3.0. It also assumes:

- The extension of Square One Drive to Rathburn Road with the new intersection as a roundabout;
- Converting the unsignalized intersection of Confederation Parkway at Square One Drive to signal control; and
- Reassigning the traffic from the 330/350 Rathburn condominium access on Confederation Parkway to use the extension of Square One Drive.

The analysis results are presented in **Table 11**. Detailed intersection results are attached in **Appendix F**.

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Table 11 Extension With Roundabout Scenario Intersection Peak Hour Level of Service Analysis												
Intersection	2021				2031				2041			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)
Elora Drive (west) / Rathburn Road <i>Signalized</i>	B	12.8	B	16.9	B	14.0	B	13.8	B	14.0	B	14.0
Elora Drive (east) / Rathburn Road <i>Signalized</i>	A	9.5	B	13.9	A	9.1	B	12.4	A	9.9	B	10.2
Square One Drive Ext. / Rathburn Road <i>Roundabout</i>	A	3.5	A	4.0	A	4.2	A	4.1	A	4.7	A	4.3
Confederation Parkway / Rathburn Road <i>Signalized</i>	D	51.5	E	61.0	D	54.0	E	62.6	E	57.1	E	61.1
Living Arts Drive / Rathburn Road <i>Signalized</i>	B	19.1	D	50.3	C	25.5	E	68.6	C	26.4	E	61.9
Duke of York Boulevard / Rathburn Road <i>Signalized</i>	C	26.1	E	67.8	C	26.4	F	88.1	C	26.6	F	88.5
Confederation Parkway / Square One Drive <i>Signalized</i>	C	32.4	D	42.9	D	43.4	D	45.6	D	46.6	D	45.7
Living Arts Drive / Square One Drive <i>Signalized</i>	B	14.1	B	13.8	B	13.6	B	18.3	B	14.3	B	14.6
Duke of York Boulevard / Square One Drive <i>Signalized</i>	B	16.4	C	24.2	B	17.4	D	44.1	B	17.5	D	51.6

For the 2021 horizon year in the a.m. peak hour, all of the intersections generally operate at acceptable levels of service. In the p.m. peak hour, the Confederation Parkway at Rathburn Road and the Duke of York at Rathburn Road intersections operate with longer delays.

The network performance measures for this scenario are summarized in **Table 12**.

Table 12 Extension With Roundabout Scenario Network Performance Measures						
Measure of Effectiveness	2021		2031		2041	
	AM	PM	AM	PM	AM	PM
Total System Delay (Hours)	204.4	448.6	292.3	577.8	340.2	613.7
Total System Travel Time (Hours)	328.4	616.8	423.3	746.0	477.5	787.7
Average Vehicle Delay (sec/veh)	111.5	202.8	150.9	264.0	165.4	266.2
Vehicles Processed	6,597	7,965	6,972	7,878	7,406	8,300
Latent Vehicle Demand	24	527	415	1,605	1,072	2,619
% Overcapacity	0.4%	6.6%	6.0%	20.4%	14.5%	31.6%

Similar to the previous scenarios, virtually all of the traffic demand is loaded onto the network in the 2021 horizon year, but the latent vehicle demand begins to dramatically increase in the 2031 and 2041 horizon years which results in the issues detailed in Section 4.1.1.

4.4 EXTENSION WITH SIGNAL AND RIGHT IN/RIGHT OUT

The previous scenarios with Square One Drive extended to Rathburn Road would result in the creation of a new signalized intersection at Square One Drive and Rathburn Road in close proximity (approximately 50 m) to the existing intersection of Rathburn Road and Elora Drive (east). Based on the analysis completed, it should be noted that the maximum queues for the westbound left-turn movement at the proposed Square One Drive and Rathburn Road intersection (particularly in the p.m. peak hour) have the potential to extend to the adjacent intersection at Rathburn Road and Elora Drive (east). Furthermore, there are a number of other operational and safety issues that these closely spaced intersections create, including:

- Clarity and conspicuity of signal heads at each of the intersections referring to a driver's ability to identify which signal heads apply to which intersection creating a safety issue. While this can be partially addressed with optically programmable signal heads, this in itself creates an ongoing maintenance issue;
- Limited potential to coordinate signal timings along the Rathburn Road corridor;
- Increased potential for queue blockages;
- Increased potential for collisions; and
- Reduced speed and capacity along Rathburn Road.

Therefore, the extension scenarios were considered with the additional modification of converting the Elora Drive (east) intersection to an unsignalized right in/right out. Left turn movements from Elora Drive (east) would divert to the Elora Drive (west) intersection, and left turn movements from 330/350 Rathburn Road would divert to a new mid-block access to the proposed Square One Drive extension.

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The results of the analysis for the Extension with Signal and Right In/Right Out scenario (Scenario 4) are presented in **Table 13**. The results for intersections whose traffic volumes are unchanged are not shown. Detailed intersection results are attached in **Appendix F**.

Table 13 Extension With Signal and Right In/Right Out Scenario Intersection Peak Hour Level of Service Analysis												
Intersection	2021				2031				2041			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)
Elora Drive (west) / Rathburn Road <i>Signalized</i>	B	12.9	B	16.2	B	14.0	B	14.6	B	14.0	B	13.4
Elora Drive (east) / Rathburn Road <i>Unsignalized – NBR</i>	A	0.6	A	1.4	A	0.7	A	1.5	A	1.0	A	1.5
Square One Drive Ext. / Rathburn Road <i>Signalized</i>	B	14.4	B	11.1	B	14.7	B	11.0	C	15.1	A	9.3
Confederation Parkway / Rathburn Road <i>Signalized</i>	D	49.8	E	60.0	D	53.2	E	63.6	E	55.5	E	61.4

For the 2021 horizon year in the a.m. peak hour, all of the intersections generally operate at acceptable levels of service. In the p.m. peak hour, the Confederation Parkway at Rathburn Road intersection operates with longer delays. Even with the additional traffic diverted to the Elora Drive (west) and Square One Drive intersections with Rathburn Road, these intersections operate at good levels of service.

The network performance measures for this scenario are summarized in **Table 14**.

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Table 14 Extension With Signal and Right In/Right Out Scenario Network Performance Measures						
Measure of Effectiveness	2021		2031		2041	
	AM	PM	AM	PM	AM	PM
Total System Delay (Hours)	199.3	422.5	296.4	554.1	338.9	614.3
Total System Travel Time (Hours)	321.5	589.9	424.6	721.2	474.7	786.4
Average Vehicle Delay (sec/veh)	108.4	190.0	152.8	247.6	163.3	264.9
Vehicles Processed	6,616	8,009	6,983	8,056	7,470	8,348
Latent Vehicle Demand	29	490	434	1,420	1,038	2,586
% Overcapacity	0.4%	6.1%	6.2%	17.6%	13.9%	31.0%

Similar to the previous scenarios, virtually all of the traffic demand is loaded onto the network in the 2021 horizon year, but the latent vehicle demand begins to dramatically increase in the 2031 and 2041 horizon years which results in the issues detailed in Section 4.1.1.

4.5 EXTENSION WITH ROUNDABOUT AND RIGHT IN/RIGHT OUT

The results of the analysis for the Extension with Roundabout and Right In/Right Out scenario (Scenario 5) are presented in **Table 15**. The results for intersections whose traffic volumes are unchanged are not shown. Detailed intersection results are attached in **Appendix F**.

Table 15 Extension With Roundabout and Right In/Right Out Scenario Intersection Peak Hour Level of Service Analysis												
Intersection	2021				2031				2041			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)
Elora Drive (west) / Rathburn Road <i>Signalized</i>	B	12.9	B	16.2	B	14.0	B	14.6	B	14.0	B	13.5
Elora Drive (east) / Rathburn Road <i>Unsignalized – NBR</i>	A	0.8	A	1.1	A	0.9	A	1.2	A	1.1	A	1.1
Square One Drive Ext. / Rathburn Road <i>Roundabout</i>	A	4.4	A	4.0	A	5.4	A	4.5	A	6.9	A	4.5
Confederation Parkway / Rathburn Road <i>Signalized</i>	D	51.7	E	59.7	D	54.0	E	60.0	E	56.2	E	60.4

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For the 2021 horizon year in the a.m. peak hour, all of the intersections generally operate at acceptable levels of service. In the p.m. peak hour, the Confederation Parkway at Rathburn Road intersection operates with longer delays. Even with the additional traffic diverted to the Elora Drive (west) and Square One Drive intersections with Rathburn Road, these intersections operate at good levels of service.

The network performance measures for this scenario are summarized in **Table 16**.

Table 16 Extension With Roundabout and Right In/Right Out Scenario Network Performance Measures						
Measure of Effectiveness	2021		2031		2041	
	AM	PM	AM	PM	AM	PM
Total System Delay (Hours)	205.6	423.7	289.1	538.4	334.0	607.4
Total System Travel Time (Hours)	330.3	593.9	420.6	711.9	473.0	782.1
Average Vehicle Delay (sec/veh)	112.3	189.9	149.2	235.2	161.6	262.5
Vehicles Processed	6,591	8,034	6,976	8,242	7,441	8,330
Latent Vehicle Demand	23	468	405	1,277	1,039	2,603
% Overcapacity	0.3%	5.8%	5.8%	15.5%	14.0%	31.2%

Similar to the previous scenarios, virtually all of the traffic demand is loaded onto the network in the 2021 horizon year, but the latent vehicle demand begins to dramatically increase in the 2031 and 2041 horizon years which results in the issues detailed in Section 4.1.1.

4.6 SUPPLEMENTARY INTERSECTION ANALYSIS

In order to more reliably assess the capacity of the signalized and roundabout intersection options at the intersection of Square One Drive at Rathburn Road and the required lane configuration of the Square One Drive at Confederation Parkway intersection, particularly for the longer term horizon years, a level of service analysis was undertaken using Synchro for the signalized intersections and Sidra Intersection for the roundabout. These analyses examine this intersection individually and therefore would not be impacted by the traffic operations at the adjacent intersections.

The results of the Synchro analysis are shown in **Table 17**, **Table 18**, and **Table 19**, for the horizon years 2021, 2031, and 2041, respectively. Detailed Synchro outputs are attached in **Appendix G**.

A level-of-service (LOS) analysis was undertaken for the projected 2021, 2031, and 2041 total traffic volumes using Trafficware Synchro 9.1 software. This software implements the methods of the 2000/2010 Highway Capacity Manual. The key parameters of the analysis include:

- Assumed future lane configurations;
- Assumed 2.0% heavy vehicle percentage;

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- Peak hour factor (PHF) of 1.0; and
- Synchro default values for all other inputs.

Table 17 2021 Future Traffic Peak Hour Level of Service Analysis										
Intersection	Approach/Movement		AM Peak Hour				PM Peak Hour			
			LOS	Delay ¹	v/c ²	Q ³	LOS	Delay ¹	v/c ²	Q ³
Square One Drive/ Rathburn Road	EB	Dual Thru	B	16	0.42	82	A	9	0.25	40
		Right	B	12	0.08	13	A	8	0.10	10
	WB	Left	B	12	0.04	6	A	9	0.11	11
		Dual Thru	B	14	0.27	49	B	12	0.50	94
	NB	Left/Right	D	40	0.34	60	D	47	0.34	52
	Overall Intersection			B	17	0.39	-	B	13	0.46
Square One Drive/ Confederation Parkway	EB	Left	D	52	0.30	33	E	59	0.37	35
		Thru/Right	D	50	0.22	33	E	55	0.28	34
	WB	Left	D	47	0.02	5	D	51	0.03	5
		Thru/Right	D	50	0.23	34	D	55	0.26	33
	NB	Left	A	6	0.02	2	A	5	0.02	2
		Thru-Thru/Right	B	10	0.56	104	B	11	0.70	150
	SB	Left	A	6	0.03	2	A	5	0.05	2
		Thru-Thru/Right	B	10	0.54	100	A	8	0.51	85
	Overall Intersection			B	14	0.50	-	B	13	0.65

¹ Delay in seconds; ² v/c greater than 0.85 and LOS E/F is highlighted (if any); ³ 95th percentile queue length in metres;

Table 18 2031 Future Traffic Peak Hour Level of Service Analysis										
Intersection	Approach/Movement		AM Peak Hour				PM Peak Hour			
			LOS	Delay ¹	v/c ²	Q ³	LOS	Delay ¹	v/c ²	Q ³
Square One Drive/ Rathburn Road	EB	Dual Thru	B	16	0.47	93	A	8	0.27	42
		Right	B	12	0.08	14	A	7	0.10	10
	WB	Left	B	12	0.09	7	A	8	0.13	11
		Dual Thru	B	14	0.30	55	B	11	0.54	104
	NB	Left/Right	D	41	0.37	66	D	51	0.40	56
	Overall Intersection			B	17	0.44	-	B	13	0.51
Square One Drive/ Confederation Parkway	EB	Left	D	55	0.33	33	E	62	0.42	35
		Thru/Right	D	53	0.27	37	E	59	0.34	39
	WB	Left	D	48	0.02	5	D	53	0.03	5
		Thru/Right	D	53	0.29	39	E	58	0.31	36
	NB	Left	A	6	0.03	2	A	4	0.03	1

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		Thru-Thru/Right	B	10	0.61	119	B	12	0.77	181
	SB	Left	A	6	0.03	2	A	6	0.07	2
		Thru-Thru/Right	B	10	0.60	114	A	8	0.60	106
	Overall Intersection			B	14	0.56	-	B	13	0.72

¹ Delay in seconds; ² v/c greater than 0.85 and LOS E/F is highlighted (if any); ³ 95th percentile queue length in metres;

Table 19 2041 Future Traffic Peak Hour Level of Service Analysis										
Intersection	Approach/Movement		AM Peak Hour				PM Peak Hour			
			LOS	Delay ¹	v/c ²	Q ³	LOS	Delay ¹	v/c ²	Q ³
Square One Drive/ Rathburn Road	EB	Dual Thru	C	26	0.64	143	A	9	0.31	50
		Right	B	18	0.10	20	A	7	0.11	12
	WB	Left	C	21	0.19	11	A	8	0.17	13
		Dual Thru	C	22	0.42	82	B	13	0.62	130
	NB	Left/Right	D	37	0.57	112	D	52	0.42	60
	Overall Intersection			C	26	0.61	-	B	14	0.58
Square One Drive/ Confederation Parkway	EB	Left	E	59	0.39	34	E	65	0.45	36
		Thru/Right	E	56	0.34	42	E	62	0.42	45
	WB	Left	D	50	0.03	5	D	54	0.03	6
		Thru/Right	E	57	0.38	46	E	61	0.38	40
	NB	Left	A	5	0.04	2	A	4	0.04	1
		Thru-Thru/Right	B	11	0.69	145	B	16	0.88	262
	SB	Left	A	6	0.04	2	A	7	0.09	2
		Thru-Thru/Right	B	11	0.67	138	A	9	0.68	132
Overall Intersection			B	14	0.64	-	B	16	0.82	-

¹ Delay in seconds; ² v/c greater than 0.85 and LOS E/F is highlighted (if any); ³ 95th percentile queue length in metres;

The Synchro capacity analysis results indicate and provide confirmation that in event that the projected total traffic volumes are fully realized on the Study Area road network and 100% of the projected volumes enter the noted intersections, resulting traffic operations would be acceptable and function within capacity. The only exception would be that under the 2041 horizon year the northbound through movement at Square One Drive at Confederation Parkway would be approaching capacity during the p.m. peak hour.

Due to the close proximity of the Elora Drive (east) at Rathburn Road intersection the eastbound and westbound queues generated at the intersection of Square One Drive at Rathburn Road were investigated further. It is noted that the largest eastbound queues are generated during the a.m. peak hour and the conversely the largest westbound queues are generated during the p.m. peak hour. The 2041 eastbound queue is recorded as 143 m. This would not encroach or block the driveway entrance to Corpus Christi School. The westbound queues are recorded to be 94 m, 104 m and, 130 m under the 2021, 2031, and 2041 horizon, respectively. The

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approximate spacing distance between Square One Drive at Rathburn Road and Elora Drive (east) at Rathburn Road is 50 m. Therefore, it can be concluded that the westbound queue would encroach and possibly extend through the Elora Drive (east) intersection. The potential implications that may result due to the queue blockage would include delaying outbound vehicle movements from Elora Drive (east) and from the opposite condominium driveway.

A LOS analysis was similarly undertaken for the projected 2021, 2031, and 2041 traffic volumes at the intersection of Square One Drive at Rathburn Road to determine the operations under a roundabout configuration using Sidra Solutions Intersections 6.1 software. The key parameters of the analysis include:

- Two-lane roundabout with two approach lanes on the eastbound and westbound Rathburn Road approaches. Square One Drive would be a single lane approach;
- Assumed 2.0% heavy vehicle percentage;
- Peak hour factor (PHF) of 1.0;
- The environmental factor represents a calibration factor for capacity. The default value of 1.2 was adjusted to 1.0 under future conditions. This adjustment represents drivers becoming comfortable and familiar with the usage and function of a roundabout; and
- Sidra default values for all other inputs.

The results of the Sidra analysis are shown in **Table 20** for the horizon years 2021, 2031, and 2041. Detailed Sidra outputs are attached in **Appendix G**.

Table 20 Square One Drive/Rathburn Road - Roundabout Peak Hour Level of Service Analysis										
Year	Approach/Movement		AM Peak Hour				PM Peak Hour			
			LOS	Delay ¹	v/c ²	Q ³	LOS	Delay ¹	v/c ²	Q ³
2021	EB	Thru-Thru/Right	A	3.0	0.31	13	A	3.1	0.24	9
	WB	Left/Thru-Thru	A	3.3	0.22	10	A	3.4	0.42	23
	NB	Left/Right	B	11.8	0.20	6	B	11.0	0.14	4
	Overall Intersection		A	4.0	0.31	-	A	3.8	0.42	-
2031	EB	Thru-Thru/Right	A	3.0	0.35	16	A	3.2	0.27	11
	WB	Left/Thru-Thru	A	3.5	0.25	12	A	3.5	0.47	28
	NB	Left/Right	B	12.1	0.23	7	B	11.2	0.16	4
	Overall Intersection		A	4.1	0.35	-	A	3.9	0.47	-
2041	EB	Thru-Thru/Right	A	3.0	0.40	19	A	3.2	0.31	14
	WB	Left/Thru-Thru	A	3.5	0.29	14	A	3.6	0.55	36
	NB	Left/Right	B	12.6	0.27	8	B	11.5	0.17	5
	Overall Intersection		A	4.1	0.40	-	A	4.0	0.55	-

¹ Delay in seconds; ² v/c greater than 0.85 and LOS E/F is highlighted (if any); ³ 95th percentile queue length in metres;

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The Sidra roundabout analysis results indicate that the intersection of Square One Drive at Rathburn Road as a roundabout will function and operate well with the anticipated projected future total traffic volumes.

As the eastbound and westbound directions are not metered by traffic signal control this results in shorter queues recorded on Rathburn Road at the intersection with Square One Drive. The largest westbound queue recorded was 36 m during the p.m. peak hour under the 2041 horizon year.

An additional point in regards to the roundabout configuration worth noting is that the roundabout provides an opportunity for drivers destined to the east to continue using the Elora Drive (east) intersection facilitated by U-turn movements rather than being rerouted to the Elora Drive (west) intersection.

4.6.1 Queue Interaction

Subsequently, additional analysis was undertaken to determine whether the intersection of Square One Drive and Rathburn Road should be a signalized intersection or a roundabout. The additional analysis also provides indication whether the adjacent intersection of Elora Drive (east) and Rathburn Road should remain as a full moves signalized intersection or be converted to a right-in/right-out only if the intersection of Square One Drive and Rathburn Road is either signalized or a roundabout.

The analysis was conducted using Synchro SimTraffic which models the flows and interactions of the adjacent intersections. For the SimTraffic simulations, a 15-minute seeding interval and a one-hour analysis period were defined. The results generated represent an average of five simulation runs.

The 95th percentile queue results are summarized below in **Tables 21 - 23** for the adjacent intersections along Rathburn Road. It is noted that the results for the 2041 horizon are less reliable than the 2021 and 2031 horizon years as the intersection of Confederation Parkway at Rathburn Road in the SimTraffic model becomes overcapacity and does not accurately report operational conditions. It is also worth noting that with such significant delays along Confederation Parkway, drivers would find alternate routes to reduce their travel time.

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Table 21 Confederation Parkway/Rathburn Road 95 th Percentile Queues (EB Approach)						
Scenario	2021		2031		2041	
	AM	PM	AM	PM	AM	PM
Signal at Square One Drive and Signal at Elora Drive(east)	101 m	49 m	100 m	59 m	98 m	163 m
Signal at Square One Drive and RI/RO at Elora Drive(east)	88 m	53 m	96 m	55 m	100 m	95 m
Roundabout at Square One Drive and Signal at Elora Drive (east)	82 m	54 m	84 m	57 m	101 m	110 m
Roundabout at Square One Drive and RI/RO at Elora Drive (east)	108 m	64 m	111 m	64 m	129 m	102 m

Table 22 Elora Drive (east)/Rathburn Road 95 th Percentile Queues (EB Approach)						
Scenario	2021		2031		2041	
	AM	PM	AM	PM	AM	PM
Signal at Square One Drive and Signal at Elora Drive(east)	18 m	39 m	8 m	40 m	38 m	72 m
Signal at Square One Drive and RI/RO at Elora Drive(east)	-	-	-	-	-	-
Roundabout at Square One Drive and Signal at Elora Drive (east)	80 m	44 m	83 m	44 m	83 m	52 m
Roundabout at Square One Drive and RI/RO at Elora Drive (east)	-	-	-	-	-	-

Table 23 Square One Drive Extension/Rathburn Road 95 th Percentile Queues (WB Approach)						
Scenario	2021		2031		2041	
	AM	PM	AM	PM	AM	PM
Signal at Square One Drive and Signal at Elora Drive(east)	31 m	53 m	40 m	43 m	46 m	51 m
Signal at Square One Drive and RI/RO at Elora Drive(east)	39 m	31 m	42 m	17 m	37 m	92 m
Roundabout at Square One Drive and Signal at Elora Drive (east)	11 m	27 m	12 m	31 m	11 m	26 m
Roundabout at Square One Drive and RI/RO at Elora Drive (east)	12 m	18 m	13 m	19 m	12 m	21 m

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The 95th percentile queue length summaries above indicate that queuing deficiencies are anticipated in the 2041 p.m. peak hour of the “Signal at Square One Drive and Signal at Elora Drive(east)” scenario and during the a.m. peak hour at all horizon years in the “Roundabout at Square One Drive and Signal at Elora Drive (east)” scenario. For the scenario of “Roundabout at Square One Drive and Signal at Elora Drive (east)”, eastbound queues from the signalized intersection of Elora Drive (east) will reach back to the roundabout during the a.m. peak hour. No queues are recorded along the EB approach to Elora Drive (east) and Rathburn Road intersection with a right-in/right-out constructed at Elora Drive (east) due to free movement conditions along the eastbound and westbound approaches.

5.0 SCENARIO EVALUATION

The various scenarios were evaluated on the results of the 2021 horizon year analysis. The results have been summarized within **Table 24**. A summary of the comparison between scenarios is shown in **Table 25**.

Table 24 2021 Scenario Summary				
No	Scenario	Peak Hour	Total Delay (Hours)	Total Travel Time (Hours)
1	Do Nothing	AM	220.8	342.2
		PM	437.0	602.9
2	Extension with Signalized Intersection	AM	215.6	336.9
		PM	438.3	603.6
3	Extension with Roundabout Intersection	AM	204.4	328.4
		PM	448.6	616.8
4	Extension with Signalized Intersection & Right In/Right Out	AM	199.3	321.5
		PM	422.5	589.9
5	Extension with Roundabout Intersection & Right In/Right Out	AM	205.6	330.3
		PM	423.7	593.9

Table 25 2021 Scenario Comparison				
No	Scenario	Peak Hour	Total System Delay (Hours)	Total System Travel Time (Hours)
1	Do Nothing vs. Extension with Signalized Intersection (2-1)	AM	-5.2	-5.3
			-2%	-2%
		PM	1.3	0.7
2		AM	0%	0%
			-16.4	-13.8
			-7%	-4%

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	Do Nothing vs. Extension with Roundabout Intersection (3-1)	PM	11.6 3%	13.9 2%
3	Do Nothing vs. Ext with Signalized Intersection & RIRO (4-1)	AM	-21.5 -10%	-20.7 -6%
		PM	-14.5 -3%	-13.0 -2%
4	Do Nothing vs. Ext. with Roundabout & RIRO (5-1)	AM	-15.2 -7%	-11.9 -3%
		PM	-13.3 -3%	-9 -1%

When comparing the 2021 extension of Square One Drive to Rathburn Road scenarios (signal and roundabout) with the Do Nothing scenario, the total delay and travel time show minimal differences, generally a change less than 5%. In general, any reductions in delay and travel time seem to be somewhat offset by the presence of a second intersection control (whether it be signal or roundabout) on Rathburn Road.

Comparing the 2021 extension of Square One Drive to Rathburn Road scenarios (signal and roundabout) with the right in/right out conversion to the Do Nothing scenarios, a modest decrease in delay in the a.m. peak hour is observed. However, in the p.m. peak hour, and for the travel time in the a.m. and p.m. peak hours, the difference, while negative, is minimal.

It might be expected that the traffic diversions would result in more pronounced reductions in the travel time and delay comparisons. However, differences due to the random nature of vehicle arrivals between model runs, the variability in delay due to the at-capacity operations and the number of other intersections within the Study Area tend to obfuscate the impact of the extension.

The extension of Square One Drive to Rathburn Road would assist in shifting some traffic away from the busiest intersection in the Study Area, Confederation Parkway at Rathburn Road and would create a modest reduction in vehicle delays. While the extension is not intended to serve as either a major thoroughfare or a primary east-west route for downtown Mississauga, it could provide network redundancy in emergency situations. The extension would also assist in creating a finer street grid and transportation network at a human scale while providing additional pedestrian and cyclist network connections.

6.0 CONCLUSIONS

The conclusions of the Transportation and Traffic Analysis Report are as follows:

- a) existing conditions are generally characterized by good levels of service at the Study Area intersections although the Confederation Parkway at Rathburn Road intersection is approaching capacity;
- b) in the 2021 horizon year in the p.m. peak hour, a number of intersections are operating with longer delays and approaching capacity;
- c) in the 2031 horizon year, the forecast traffic demands exceed the transportation network capacity by 5% and 15% in the a.m. and p.m. peak hours, respectively, which results in unreliable results in the microsimulation model;
- d) in the 2041 horizon year, the forecast traffic demands exceed the transportation network capacity by 15% and 30% in the a.m. and p.m. peak hours, respectively, which results in unreliable results in the microsimulation model;
- e) with the extension of Square One Drive, total system delay and travel time would generally experience a minimal reduction;
 - a. it should be noted that the extension of Square One Drive (including creation of a new intersection at Rathburn Road and conversion of the existing unsignalized intersection with Confederation Parkway to signal control) would fulfill multiple City planning objectives for the Study Area, including the Strategic Plan, Mississauga Official Plan, Downtown Core Area Local Plan/MOPA8, Downtown 21 Master Plan, Mississauga Cycling Plan, and Public Art Master Plan, through the creation of both an urban-scale street network within, and a gateway to, downtown Mississauga.
- f) with the extension of Square One Drive and the conversion of the Elora Drive (east) at Rathburn Road intersection to an unsignalized right in/right out only, an increased reduction in total system delay and travel time would be experienced;
- g) even with the additional traffic diverted to Square One Drive and Elora Drive (west) with the conversion of the Elora Drive (east) at Rathburn Road intersection to an unsignalized right in/right out only intersection, the intersections of Square One Drive and Elora Drive (west) with Rathburn Road would operate at acceptable levels of service; and
- h) it is recommended that the proposed Square One Drive and Rathburn Road intersection be constructed as a roundabout.

APPENDIX A
ACTIVE TRANSPORTATION MEMORANDUM

To: File: 165011005 From: Pauline Craig
Markham ON Office
File: 165011005 Date: January 25, 2016

Reference: Square One Drive Extension EA, City of Mississauga - Site Visit to Observe Active Transportation Conditions

Active Transportation conditions within the Square One Drive Extension study area were observed during a walking site visit on Thursday, January 21, 2016; between 8:00 am and 10:00 am. Observations were recorded at locations throughout the study area using Pedestrian and Bicycle Road Safety Audit prompt lists to record existing conditions for active transportation.

1.0 Summary:

Low levels of pedestrian activity were observed within the study area. One cyclist was observed riding northbound in the curb lane on Rathburn Road West. Low volumes of motor vehicle traffic were observed on Square One Drive and moderate to low levels of motor vehicle traffic throughout the study area. Occasional midblock crossings by pedestrians occurred between Duke of York Boulevard and Living Arts Drive along delineated (concrete) pathways through the median. The posted speed limit in this location is 30km/hr and motor vehicles were observed to be travelling at slow speeds. Some motorists using the roundabout at Duke of York Boulevard appeared to demonstrate confusion around pedestrian priority at crossings but yielded at the last minute. Obstructions were observed on boulevard bicycle paths due to snow storage, construction activities and one permanent installation.

2.0 General Observations:

2.1 Weather:

- Conditions were cloudy, little to no wind, minus 4 degrees Celsius.

2.2 Pedestrian Facilities

• **Sidewalks**

Sidewalks are present on all roadway corridors throughout the study area and provide a clearway width that is comfortable for two people passing in opposite directions. Sidewalk clear widths range from 1.5m to 2.6m, however there is one exception with a short stretch of narrow sidewalk (1.42m) on the north side of Rathburn Road West and Elora Drive / 300-350 Rathburn Road West Driveway. For the most part, furniture zones are clearly defined along corridors with exceptions at intersections along Rathburn Road West. Sidewalks along Square One Drive between Duke of York Boulevard and Living Arts Drive are at the same level as the roadway and this location is intended to function as a semi-shared facility with delineated sidewalks and roadways designed for low traffic speeds and frequent midblock pedestrian crossings (indicated by a change in surface material and texture). Motor vehicles were observed encroaching on the sidewalk area at the Sheridan College building on the south-west corner of Duke of York Boulevard and Square One Drive, for short-term parking and pick-up / drop-off activity. One vehicle was observed driving onto the sidewalk and across the front entrance of the building to access Duke of York Boulevard south without driving through the roundabout.

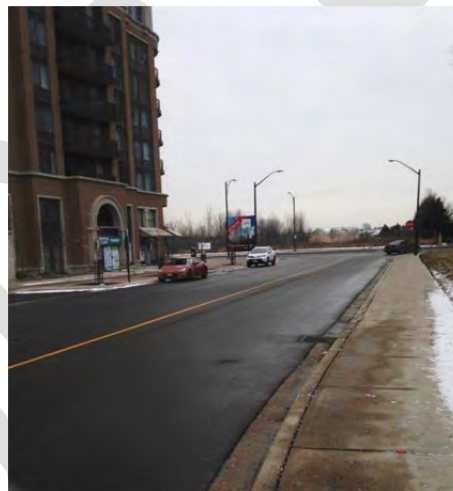
Reference: Square One Drive Extension EA, City of Mississauga - Site Visit to Observe Active Transportation Conditions

Figure 1 shows typical sidewalk cross sections along Square One Drive between Duke of York Boulevard and Living Arts Drive; and east of Confederation Parkway;

Figure 1A: Typical cross section of Square One Drive between Duke of York Boulevard and Living Arts Drive showing rolled curbs, sidewalks at road level, and mid-block pedestrian crossing activity



Figure 1B: Typical cross section of Square One Drive between Living Arts Drive and Confederation Parkway



2.3 Bicycle Facilities:

Painted bicycle lanes (1.7 m wide) are present on Confederation Parkway within the study area. These lanes pass through the study area and terminate at Queensway West to the south (where they connect to an east-west boulevard multi-use trail), and Eglinton Avenue West to the north. Bicycle lane markings include painted outer lines and symbols (white) along corridors. There are no markings indicating the location of the bicycle lane through intersections. There are no other dedicated bicycle-only facilities in the study area.

Bicycle parking was observed adjacent to the Sheridan College building along Square One Drive. No bicycles were parked at this location during the time of the site visit.

2.4 Shared Use Facilities (Multi-Use Paths)

Reference: Square One Drive Extension EA, City of Mississauga - Site Visit to Observe Active Transportation Conditions

A shared boulevard multi-use path (MUP) is present in the study area along the South / South-East boulevard of Rathburn Road West. Shared pathway signage is present indicating that trails are intended for the use of bicycles and pedestrians although the trail is adjacent to a sidewalk (sidewalks are intended for pedestrians and only permit children's size bicycles (wheels 50 cm (20 inches) or less in diameter). The MUP varies in width from 3.0 to 3.3 m wide with a solid yellow directional dividing line at intersection approaches. The MUP is not integrated with intersection crossings and merges with the sidewalk at intersection approaches. Traffic signal poles are located at or near to the centre of trail approaches to intersections bearing signage that indicates cyclists must dismount and walk across intersections. Signage at Rathburn Road West and Duke of York Boulevard indicates that the MUP continues south along the west boulevard to access Sheridan College campus. This section of MUP is not integrated with the roundabout and merges with the sidewalk north of the intersection with Square One Drive.

2.5 Transit Facilities

Mississauga Transit MiWay bus routes pass through the study area along Rathburn Road West (Routes 61, 9 & 20), Living Arts Drive (Route 6), Duke of York Boulevard (several routes converge) and Confederation Parkway (Route 28). City Centre Transit terminal is located immediately east of the study area providing connections to 26 weekday bus routes and to GO Transit's inter-regional service. School buses were observed on Rathburn Road West, Elora Drive and Confederation Parkway. Bus stops and shelters are located along the boulevard

2.6 Pedestrian Activity

Low pedestrian activity was observed on all corridors with the highest concentration of pedestrians observed entering and exiting the Sheridan College building at the SW corner of Square One Drive and Duke of York Boulevard. The majority of these pedestrians were observed travelling to-from the east along Square One Drive and the south along Duke of York Boulevard.

2.7 Bicycle Activity

As illustrated in Figure 2, one bicycle was observed riding in the curb lane on Rathburn Road West. Obstructions observed in the boulevard multi-use path may explain the cyclist's preference for using the curb lane (see detailed observations in in Table 1).

Figure 2: Cyclist riding in the curb lane on Rathburn Road West




Reference: Square One Drive Extension EA, City of Mississauga - Site Visit to Observe Active Transportation Conditions

3.0 Detailed Observations:

The following detailed observations were recorded at locations throughout the study area using Pedestrian and Bicycle Road Safety Audit prompt lists to analyze existing conditions for active transportation. Table 1 summarizes the detailed observations of the active transportation environment and conditions paying close attention to the intersection locations of reported pedestrian collisions between 2009 and 2013.

TABLE 1 Detailed Observations of Existing AT Facilities

INTERSECTION / SEGMENT	OBSERVATIONS
<p>Duke of York and Square One Drive</p>  <p>Although signage and pavement markings are present two instances of driver confusion with pedestrian priority observed</p>  <p>Vehicles observed parking on sidewalk at Sheridan College building and driving across sidewalk to access Duke of York Boulevard (southbound) – (google image)</p>	<ul style="list-style-type: none"> • <u>Pedestrian Crossings</u>: high visibility pavement markings and pedestrian priority signage is present at all pedestrian crossings. • <u>Curb Ramps</u>: channelized ramps are present at all pedestrian crossings oriented along the crossing. No tactile walking surface indicators (TWSIs) are not present at pedestrian crossings. Guide lines are present at all curb ramps. • <u>Crossing control</u>: Pedestrian priority is clearly indicated with signage and high visibility pavement markings (zebra markings) clearly show pedestrian crossing locations however, some driver confusion observed with regard to pedestrian priority at roundabout crossing. • <u>Sidewalk encroachment</u>: Vehicles observed parking and driving on sidewalks and boulevard area at SW corner of Duke of York and Square One Drive.




Reference: Square One Drive Extension EA, City of Mississauga - Site Visit to Observe Active Transportation Conditions

INTERSECTION / SEGMENT	OBSERVATIONS
<p data-bbox="214 445 706 476">Living Arts Drive and Square One Drive</p>  <p data-bbox="214 865 571 896">No tactile pavers or guide lines</p>  <p data-bbox="214 1285 790 1337">Guide lines on NW corner are not aligned with the direction of pedestrian crossing</p>	<ul style="list-style-type: none"> <li data-bbox="906 445 1534 604">• <u>Pedestrian Crossings</u>: High visibility pavement markings (zebra) are present on 3 legs of the intersection. Contrast paving (concrete) is present on east leg of intersection; pedestrian signals and push buttons on all corners. <li data-bbox="906 611 1534 831">• <u>Curb Ramps</u>: channelized ramps are present on SE and NE corners, depressed curbs on NW and SW corners. No TWSIs present. Guide lines on curb ramps are present at NW and SW corners and in E-W direction only on NE corner. Guide lines at NW corner are not in line with the direction of travel. <li data-bbox="906 837 1485 896">• <u>Lighting</u>: Light standards are present on all corners <li data-bbox="906 903 1534 1157">• <u>Bicycle facilities</u>: no bicycle facilities are present along Square One Drive between Duke of York Boulevard and Confederation Boulevard. Conditions range from shared lane (single file) between Duke of York and Living Arts Drive, to wide shared curb lane between Living Arts Drive and Confederation Parkway.

Reference: Square One Drive Extension EA, City of Mississauga - Site Visit to Observe Active Transportation Conditions

INTERSECTION / SEGMENT	OBSERVATIONS
<p data-bbox="214 447 805 478">Confederation Parkway and Square One Drive</p>  <p data-bbox="214 919 812 982">No tactile pavers / guide lines no pedestrian crossing markings</p>  <p data-bbox="214 1491 812 1547">Uneven asphalt surface and ice patches along east sidewalk</p>	<ul style="list-style-type: none"> • <u>Pedestrian Crossings</u>: No pavement markings are present across Square One Drive at this intersection • <u>Curb Ramps</u>: channelized ramps are present on SE and NE corners. No TWSIs or guide lines present. • <u>Lighting</u>: Light standards are present on NE and SE corners and on west side of Confederation Parkway • <u>Median</u>: Median provides refuge for crossing pedestrians • <u>Sidewalks</u>: north-bound sidewalk (east boulevard) has uneven asphalt surface with ice build-up in some locations. • <u>Bike Lanes</u>: on Confederation Parkway are adjacent to on-street parking lay-bys in this area increasing risk of cyclists riding in parked car door zone; no bicycle lane markings (chevrons or other markings) indicate the presence of a bicycle lane crossing the intersection.



Reference: Square One Drive Extension EA, City of Mississauga - Site Visit to Observe Active Transportation Conditions

INTERSECTION / SEGMENT	OBSERVATIONS
<p data-bbox="214 445 799 508">Rathburn Road West and Elora Drive / 300-350 Rathburn Road West Driveway Access</p>  <p data-bbox="230 924 880 1008">No high visibility pavement markings, no tactile pavers or guide lines, traffic light pole in trail pathway with sign indicating users must dismount</p>  <p data-bbox="230 1423 500 1570">Permanent obstruction along MUP, north of Elora Drive / 300-350 Rathburn Road West Driveway Access</p>  <p data-bbox="571 1423 831 1554">Shared pathway signage although sidewalk is adjacent to trail</p>	<ul style="list-style-type: none"> <li data-bbox="906 445 1546 604">• <u>Pedestrian Crossings</u>: Pavement markings at the intersection are parallel lines – no high visibility markings (zebra markings); pedestrian signals and push buttons present on all corners. <li data-bbox="906 609 1546 735">• <u>MUP Crossings</u>: trail merges with sidewalk, surface material change to concrete; traffic light pole is located in centre of pathway with signage indicating dismount and walk <li data-bbox="906 739 1546 865">• <u>Curb Ramps</u>: depressed curbs at NW and SW corners, channelized curb ramps at NE and SE corners. No TWSIs at crossings, guide lines are present at NW and NE corners only <li data-bbox="906 869 1546 995">• <u>Curb Radii</u>: wide curb radii allow turning vehicles to travel at higher speeds. School bus observed encroaching onto sidewalk while making a EB to SB right turn <li data-bbox="906 999 1546 1159">• <u>MUP</u>: no snow clearance from MUP south of intersection; obstruction (bollard) observed north of intersection creates potential crash hazard; shared pathway although sidewalk is present. <li data-bbox="906 1163 1546 1255">• <u>Lighting</u>: no light standard at SW corner of the intersection may impact visibility in this location in dark conditions.


Reference: Square One Drive Extension EA, City of Mississauga - Site Visit to Observe Active Transportation Conditions

INTERSECTION / SEGMENT		OBSERVATIONS
Rathburn Road West and Confederation Parkway		<ul style="list-style-type: none"> • <u>Pedestrian Crossings</u>: High visibility pavement markings are present at all legs of the intersection; pedestrian signals and push buttons at all corners. • <u>Sidewalks</u>: temporary obstruction (snow fence) observed encroaching on Rathburn Road West south sidewalk; rough asphalt surface on Confederation parkway East side sidewalk • <u>Curb Ramps</u>: Depressed curb on NE corner, channelized curb ramps on all other corners. No TWSIs present. Guide lines present on all ramps. • <u>MUP</u>: narrows to 2.3 m width at SW approach to intersection; temporary obstruction due to snow/ice storage east of intersection. • <u>Lighting</u>: light standards at all corners of intersection situated close to curb and oriented over roadway along Confederation Parkway (trail runs behind light standards)
		
Temporary obstruction observed along south sidewalk east of Confederation Parkway	Rough asphalt surface on Confederation Parkway east sidewalk (South of Rathburn Road West)	
		
MUP narrows at intersection	Temporary obstruction caused by ice on Rathburn MUP east of Confederation Parkway.	

Reference: Square One Drive Extension EA, City of Mississauga - Site Visit to Observe Active Transportation Conditions

INTERSECTION / SEGMENT	OBSERVATIONS
<p data-bbox="214 445 735 476">Rathburn Road West and Living Arts Drive</p>  <p data-bbox="214 879 867 936">Uneven asphalt surface on sidewalk ; pedestrian crossing pavement markings absent. Tactile pavers not present</p>  <p data-bbox="316 1440 781 1472">No snow clearance on multi-use trail</p>	<ul style="list-style-type: none"> <li data-bbox="906 445 1533 604">• <u>Pedestrian Crossings:</u> High visibility pavement markings are present at all legs of the intersection except for the south leg (recent construction); Pedestrian Signals and push buttons at all corners. <li data-bbox="906 611 1588 737">• <u>Sidewalks:</u> temporary asphalt sidewalk on south side of Rathburn Road West east of intersection with uneven surface; sidewalk on Living Arts Drive (south of Rathburn Road West) on east side only <li data-bbox="906 743 1588 869">• <u>Curb Ramps:</u> Depressed curb on SE and SW corner, channelized ramps on NE and NW corners. TWSIs present on SW corner only. Guide lines present on NE and NW ramps. <li data-bbox="906 875 1487 961">• <u>MUP:</u> Trail terminates at intersection and merges with sidewalk, dismount and walk signage posted. <li data-bbox="906 968 1568 1094">• <u>Lighting:</u> light standards at all corners of intersection situated close to curb and oriented over roadway along Confederation Parkway (trail runs behind light standards) <li data-bbox="906 1100 922 1121">•

Reference: Square One Drive Extension EA, City of Mississauga - Site Visit to Observe Active Transportation Conditions

INTERSECTION / SEGMENT	OBSERVATIONS
<p>Rathburn Road West and Duke of York Boulevard</p>  <p>Temporary obstruction and parked vehicle observed along boulevard multi-use path</p>	<ul style="list-style-type: none"> • <u>Pedestrian Crossings</u>: high visibility pavement markings at all pedestrian crossings; pedestrian signals and push buttons at all corners. Asphalt repair partially obscuring markings on south leg of intersection. • <u>Sidewalks</u>: west sidewalk/MUP on Duke of York Boulevard (south of intersection) is obstructed by construction (staging area). • <u>Curb Ramps</u>: Depressed curbs on SW and SE corner, channelized ramps on NW and NE corners. TWSIs on SE corner only; guide lines on SW and NE corner, missing on NW corner. • <u>MUP</u>: Temporary obstruction (fence) and parked vehicle on MUP west of Duke of York Boulevard; temporary asphalt surfacing removes delineation of sidewalk from MUP; MUP terminates at intersection and merges with sidewalk, dismount and walk signage posted • <u>Lighting</u>: light standard at all corners of intersection situated close to curb and oriented over roadway along Confederation Parkway (trail runs behind light standards)
 <p>Sidewalk and MUP not delineated due to temporary asphalt resurfacing adjacent to construction</p>	
 <p>No tactile pavers or guide lines</p>	

Reference: Square One Drive Extension EA, City of Mississauga - Site Visit to Observe Active Transportation Conditions

STANTEC CONSULTING LTD.

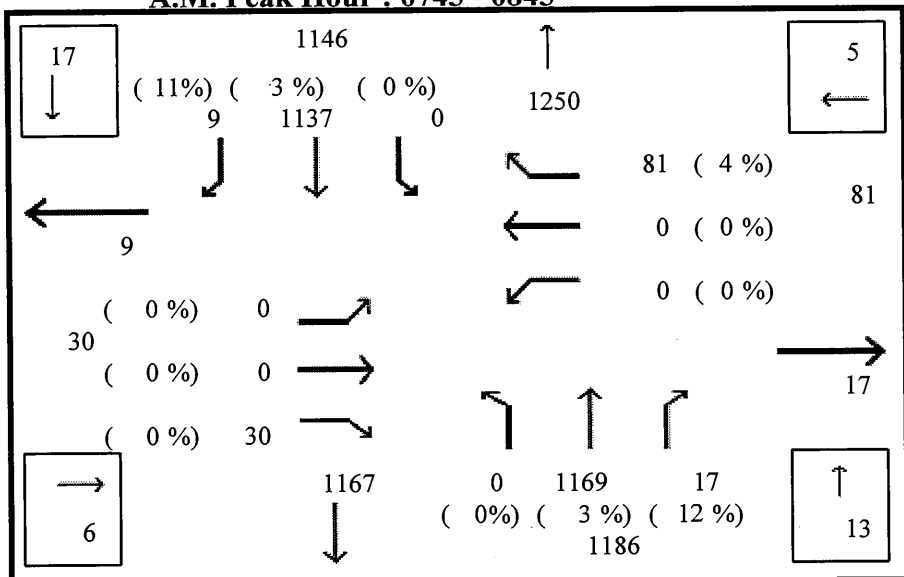
Pauline Craig, BSc. MES
Active Transportation Specialist
Pauline.Craig@stantec.com

DRAFT

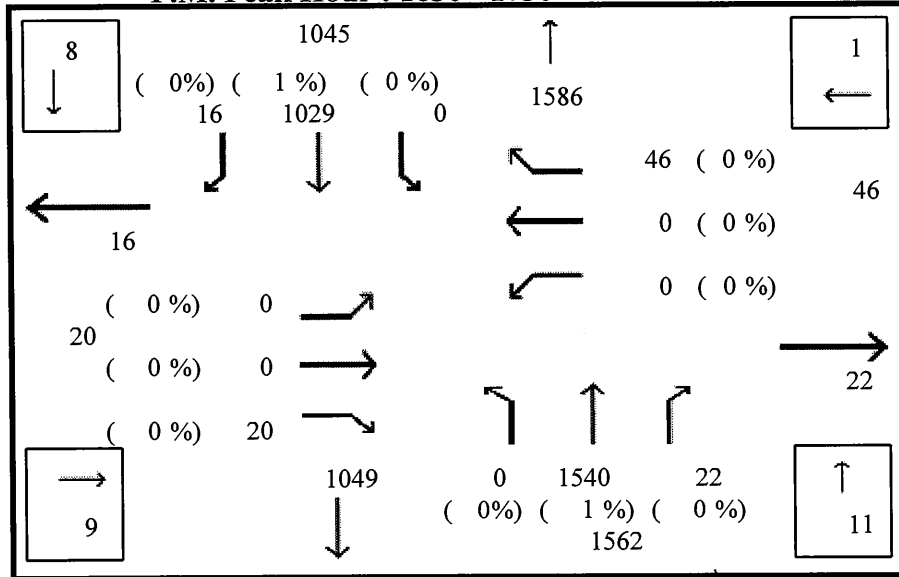
APPENDIX B
TRAFFIC DATA

APPENDIX B1
TURNING MOVEMENT COUNTS

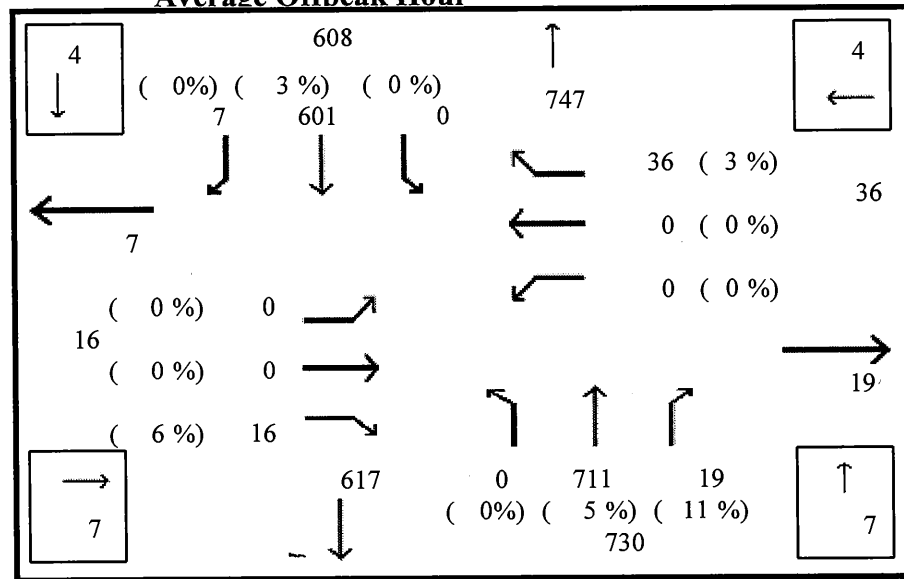
A.M. Peak Hour : 0745 - 0845



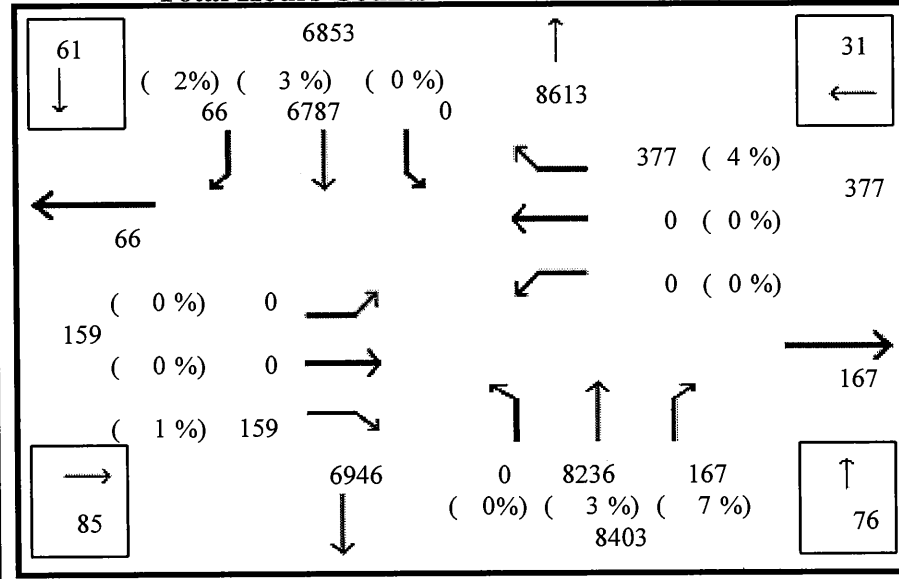
P.M. Peak Hour : 1630 - 1730



Average Offpeak Hour



Total Hours Counts



Note: North is at the top of the page

Value in (parenthesis) indicates truck/heavy vehicle percentages

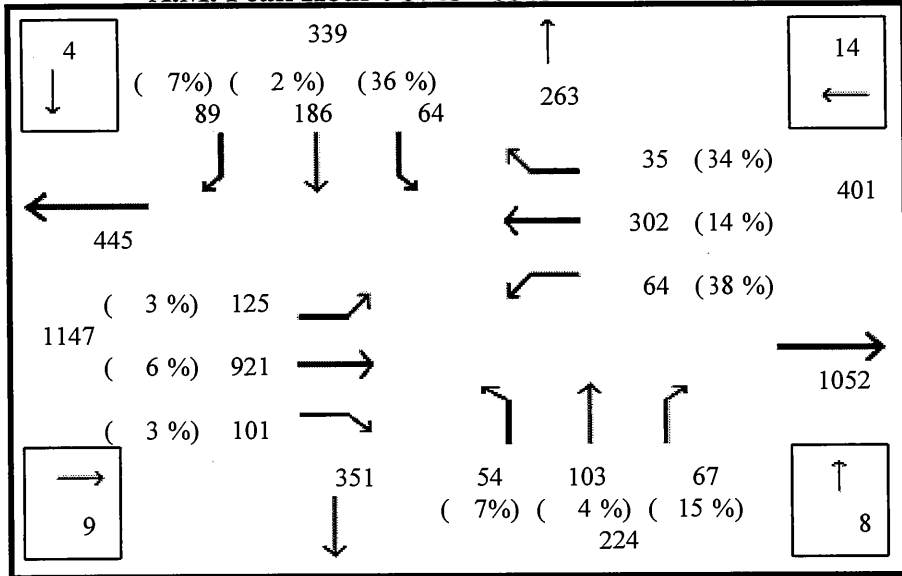
CONFEDERATION PKY/SQUARE ONE DR

Count Date : Tuesday October 20 2015

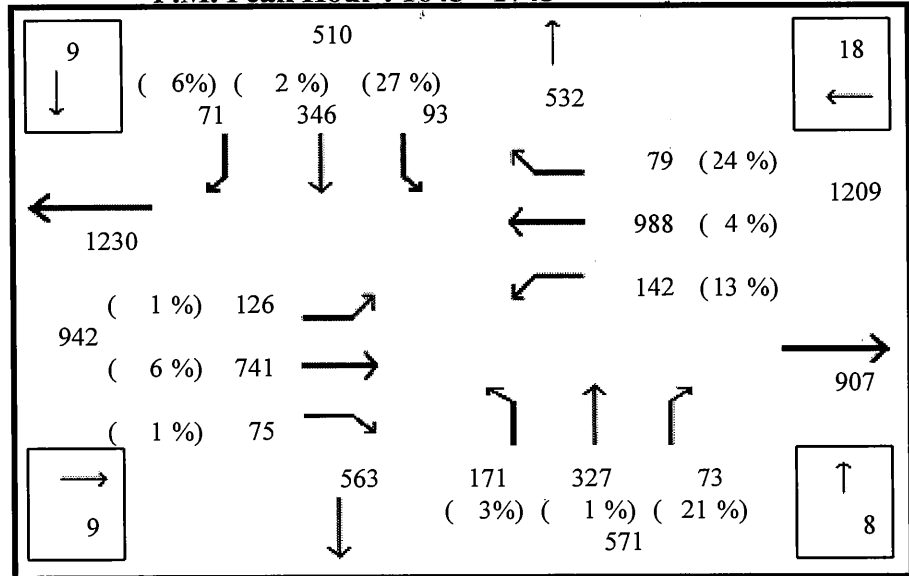
CON-SQU-10-N

Time Ending	NORTHBOUND					SOUTHBOUND					EASTBOUND					WESTBOUND					All Vehicles
	LT	Thru	RT	Trk	Peds.	LT	Thru	R	Trk	Peds.	LT	Thru	RT	Trk	Peds.	LT	Thru	RT	Trk	Peds.	
07:15	0	116	4	9	1	0	168	1	1	0	0	0	6	0	0	0	0	7	0	1	312
07:30	0	159	3	12	1	0	213	0	7	1	0	0	5	0	0	0	0	12	2	0	413
07:45	0	207	1	8	2	0	235	1	6	0	0	0	8	0	0	0	0	15	2	3	483
08:00	0	264	2	9	0	0	280	1	10	3	0	0	8	0	3	0	0	14	2	2	590
08:15	0	251	4	9	5	0	271	1	7	1	0	0	6	0	5	0	0	20	0	3	569
08:30	0	322	2	13	0	0	288	0	10	0	0	0	8	0	6	0	0	25	1	1	669
08:45	0	294	7	9	1	0	265	6	7	1	0	0	8	0	3	0	0	19	0	7	615
09:00	0	281	5	12	2	0	254	0	6	2	0	0	4	0	4	0	0	19	0	5	581
AM Total Hr	0	1894	28	81	12	0	1974	10	54	8	0	0	53	0	21	0	0	131	7	22	
AM Peak Hour																					
07:45 - 08:45	0	1131	15	40	6	0	0	30	0	17	0	0	78	3	13	0	1104	8	34	5	
*****	****	*****	****	****	****	****	*****	****	****	****	****	****	****	****	****	****	*****	****	****	****	****
11:15	0	112	4	8	1	0	103	2	5	1	0	0	1	0	0	0	0	11	0	2	246
11:30	0	135	2	6	1	0	129	4	6	1	0	0	5	0	0	0	0	14	0	5	301
11:45	0	168	3	9	3	0	162	0	2	1	0	0	7	0	1	0	0	12	0	2	363
12:00	0	163	4	5	5	0	152	1	5	1	0	0	4	0	3	0	0	7	1	2	342
12:15	0	175	3	6	4	0	147	2	3	0	0	0	1	0	3	0	0	5	1	0	343
12:30	0	128	4	6	0	0	102	1	4	2	0	0	3	0	0	0	0	4	0	2	252
12:45	0	179	5	15	2	0	173	1	3	1	0	0	3	0	0	0	0	11	0	1	390
13:00	0	165	6	11	1	0	160	0	4	3	0	0	8	0	0	0	0	10	0	1	364
13:15	0	205	7	6	0	0	166	1	5	1	0	0	5	0	0	0	0	9	0	1	404
13:30	0	228	7	12	0	0	151	0	5	2	0	0	2	0	1	0	0	8	0	4	413
13:45	0	192	4	13	4	0	147	4	6	0	0	0	3	1	5	0	0	8	0	2	378
14:00	0	184	5	9	1	0	155	5	8	0	0	0	4	1	1	0	0	7	0	0	378
offpeak Tot Vol	0	2034	54	106	22	0	1747	21	56	13	0	0	46	2	14	0	0	106	2	22	
offpeak Hr Avg	0	678	18	35	7	0	582	7	18	4	0	0	15	0	4	0	0	35	0	7	
*****	****	*****	****	****	****	****	*****	****	****	****	****	****	****	****	****	****	*****	****	****	****	****
15:15	0	305	3	19	8	0	169	0	8	0	0	0	7	0	5	0	0	7	0	0	518
15:30	0	249	9	8	4	0	164	2	6	3	0	0	7	0	0	0	0	11	1	0	457
15:45	0	328	3	12	14	0	353	1	4	1	0	0	5	0	0	0	0	15	0	0	721
16:00	0	226	11	16	5	0	224	1	9	1	0	0	6	0	1	0	0	9	2	2	504
16:15	0	377	9	13	4	0	236	1	8	0	0	0	2	0	8	0	0	5	0	4	651
16:30	0	312	9	11	1	0	233	2	4	2	0	0	2	0	2	0	0	6	0	4	579
16:45	0	397	6	8	3	0	241	10	6	0	0	0	3	0	0	0	0	15	0	2	686
17:00	0	417	5	7	2	0	263	2	3	0	0	0	4	0	2	0	0	6	0	1	707
17:15	0	363	6	2	2	0	268	1	3	1	0	0	8	0	3	0	0	12	0	4	663
17:30	0	344	5	2	2	0	243	3	2	0	0	0	5	0	3	0	0	13	0	4	617
17:45	0	359	4	2	3	0	257	3	8	0	0	0	5	0	0	0	0	16	1	2	655
18:00	0	353	4	2	3	0	242	8	3	2	0	0	4	0	2	0	0	11	1	9	628
PM Total Hr	0	4030	74	102	51	0	2893	34	64	10	0	0	58	0	26	0	0	126	5	32	
PM Peak Hour																					
16:30 - 17:30	0	1521	22	19	9	0	0	20	0	8	0	0	46	0	11	0	1015	16	14	1	
*****	****	*****	****	****	****	****	*****	****	****	****	****	****	****	****	****	****	*****	****	****	****	****

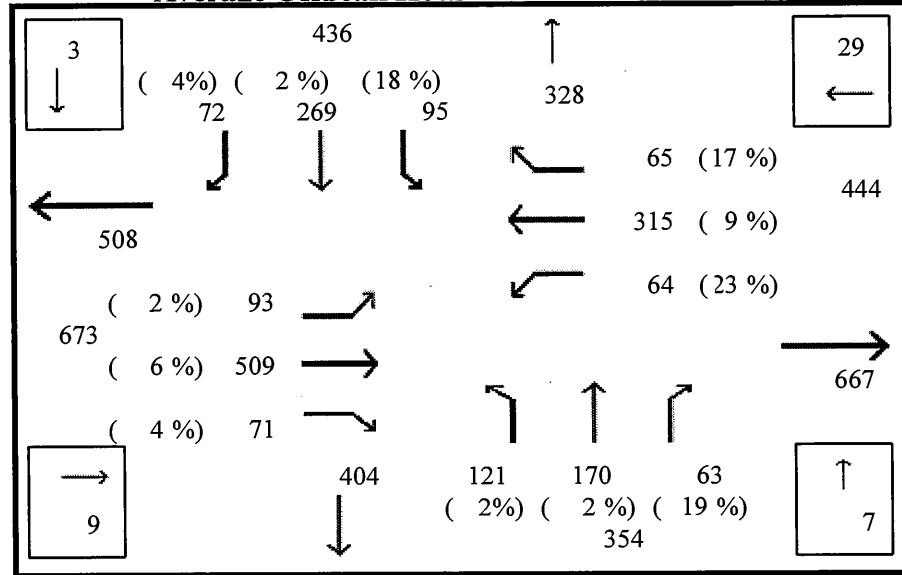
A.M. Peak Hour : 0745 - 0845



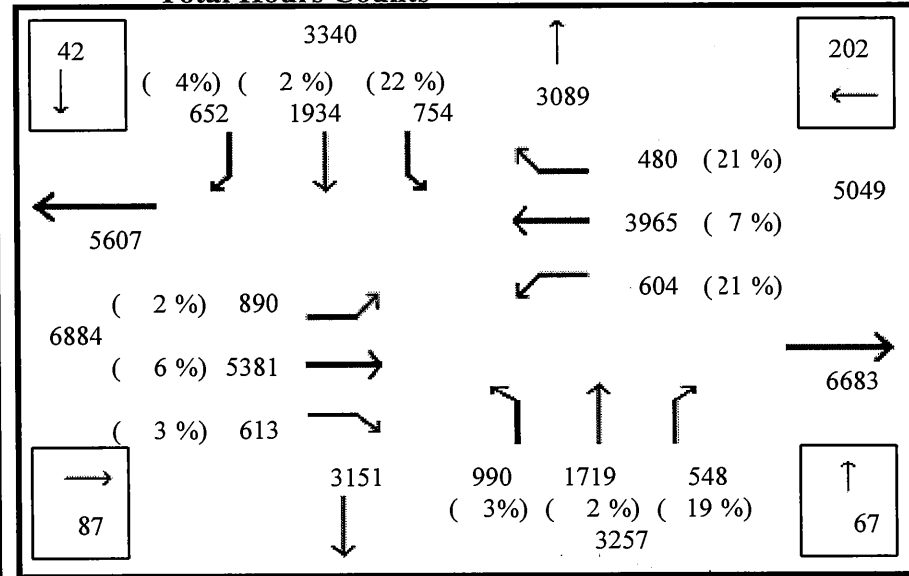
P.M. Peak Hour : 1645 - 1745



Average Offpeak Hour



Total Hours Counts



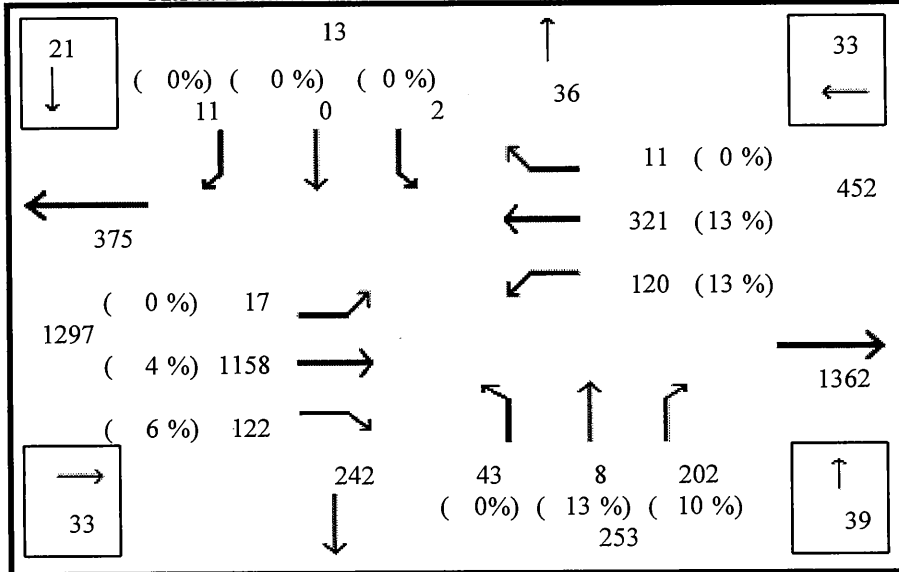
Note: North is at the top of the page

Value in (parenthesis) indicates truck/heavy vehicle percentages

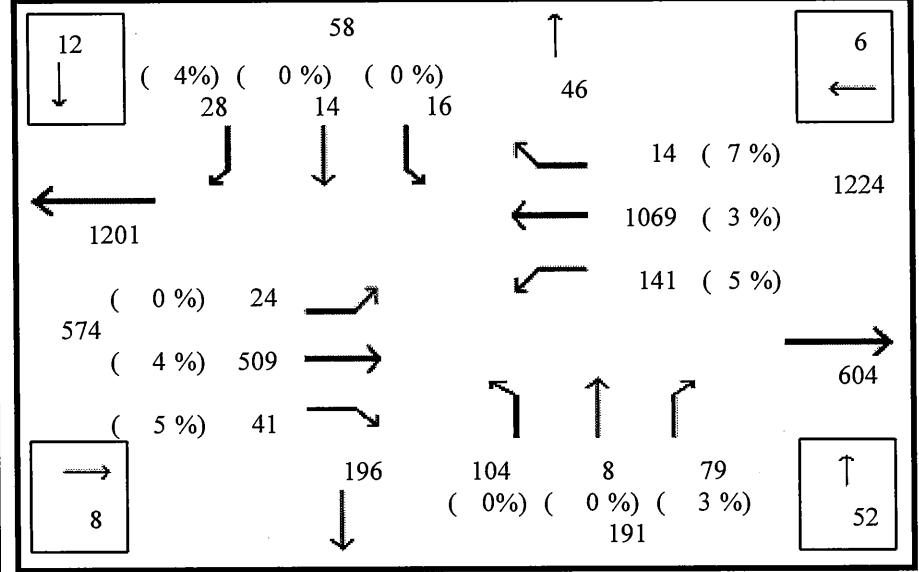
DUKE OF YORK BLVD/RATHBURN RD W
Count Date : Thursday October 22 2015
DUK-RAT-01-S

Time Ending	NORTHBOUND					SOUTHBOUND					EASTBOUND					WESTBOUND					All Vehicles	
	LT	Thru	RT	Trk	Peds.	LT	Thru	R	Trk	Peds.	LT	Thru	RT	Trk	Peds.	LT	Thru	RT	Trk	Peds.		
07:15	5	10	5	2	5	8	28	18	8	1	27	175	8	10	0	7	66	8	12	1	397	
07:30	3	31	5	3	0	10	20	29	10	1	34	230	7	11	0	1	87	3	13	1	497	
07:45	16	31	10	6	0	22	47	17	4	3	39	179	15	20	1	11	56	2	16	3	491	
08:00	17	23	12	3	1	14	39	29	9	3	43	238	15	17	0	6	88	6	21	4	580	
08:15	12	31	16	5	1	9	54	19	6	4	20	203	27	16	0	8	44	3	18	1	491	
08:30	12	18	11	8	6	6	41	12	9	3	25	212	29	14	2	15	60	8	17	2	497	
08:45	9	27	18	2	1	12	48	23	9	4	33	213	27	15	2	11	68	6	22	1	543	
09:00	24	22	7	9	4	7	46	16	7	4	37	214	31	11	3	7	68	5	18	3	529	
AM Total Hr	98	193	84	38	18	88	323	163	62	23	258	1664	159	114	8	66	537	41	137	16		
AM Peak Hour																						
07:45 - 08:45	50	99	57	18	9	121	866	98	62	4	40	260	23	78	8	41	182	83	33	14		
*****	****	*****	****	****	****	****	*****	****	***	****	****	****	***	****	****	****	****	****	****	****	****	
11:15	12	20	10	1	2	17	38	17	6	3	24	119	10	2	1	7	37	11	11	2	342	
11:30	18	43	16	4	2	26	61	22	5	1	21	144	20	13	0	15	78	10	17	1	513	
11:45	29	43	9	5	3	13	84	14	7	11	37	102	20	10	1	4	68	14	15	3	474	
12:00	26	31	15	5	3	19	100	13	6	6	19	139	17	2	0	12	76	14	11	0	505	
12:15	37	43	20	3	1	12	73	30	5	2	27	155	10	15	0	18	90	13	10	0	561	
12:30	27	49	12	5	1	13	39	18	6	6	20	117	27	10	0	12	59	26	13	1	453	
12:45	31	49	16	4	2	42	95	14	9	5	24	103	5	12	2	12	87	13	13	2	529	
13:00	28	35	9	4	5	28	54	24	8	12	11	102	25	11	0	19	66	20	10	2	454	
13:15	33	36	11	7	0	18	68	19	5	17	32	120	10	10	0	10	83	12	12	0	486	
13:30	39	53	12	3	0	14	55	12	9	5	18	96	13	9	1	10	64	7	13	4	427	
13:45	35	45	14	6	3	20	65	11	7	10	15	110	21	7	3	16	75	12	15	3	474	
14:00	44	53	11	5	5	12	57	14	7	11	25	127	29	9	3	14	82	12	19	3	520	
offpeak Tot Vol	359	500	155	52	27	234	789	208	80	89	273	1434	207	110	11	149	865	164	159	21		
offpeak Hr Avg	119	166	51	17	9	78	263	69	26	29	91	478	69	36	3	49	288	54	53	7		
*****	****	*****	****	****	****	****	*****	****	***	****	****	****	***	****	****	****	****	****	****	****	****	
15:15	23	58	24	9	8	15	33	28	8	15	21	111	21	10	1	10	95	12	11	8	489	
15:30	30	56	16	6	5	30	54	16	5	9	26	143	12	12	0	6	120	13	11	0	556	
15:45	67	116	22	6	0	54	58	36	12	8	44	250	18	6	0	16	187	15	26	2	933	
16:00	45	99	21	6	6	23	47	32	5	11	24	189	21	8	2	22	124	15	13	3	694	
16:15	52	101	17	6	3	26	51	18	12	9	30	185	19	11	0	22	201	15	19	2	785	
16:30	45	79	13	4	6	18	58	22	3	8	26	134	22	10	0	20	188	15	14	3	671	
16:45	42	85	19	2	2	10	57	18	6	9	15	105	27	6	6	13	185	16	17	2	623	
17:00	42	69	13	8	2	20	91	19	11	4	29	176	15	9	1	33	238	16	21	0	810	
17:15	47	93	11	5	2	15	95	15	9	4	38	170	18	10	2	26	236	10	15	2	813	
17:30	43	88	18	5	3	16	74	17	8	7	32	175	26	15	2	33	227	21	20	3	818	
17:45	34	73	16	6	2	17	78	16	9	3	26	176	15	12	4	32	245	13	23	3	791	
18:00	38	81	15	4	3	19	85	17	7	3	27	165	14	11	5	29	238	12	22	2	784	
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PM Total Hr	508	998	205	67	42	263	781	254	95	90	338	1979	228	120	23	262	2284	173	212	30		
PM Peak Hour																						
16:45 - 17:45	166	323	58	24	9	125	697	74	46	9	124	946	60	79	8	68	338	67	37	18		

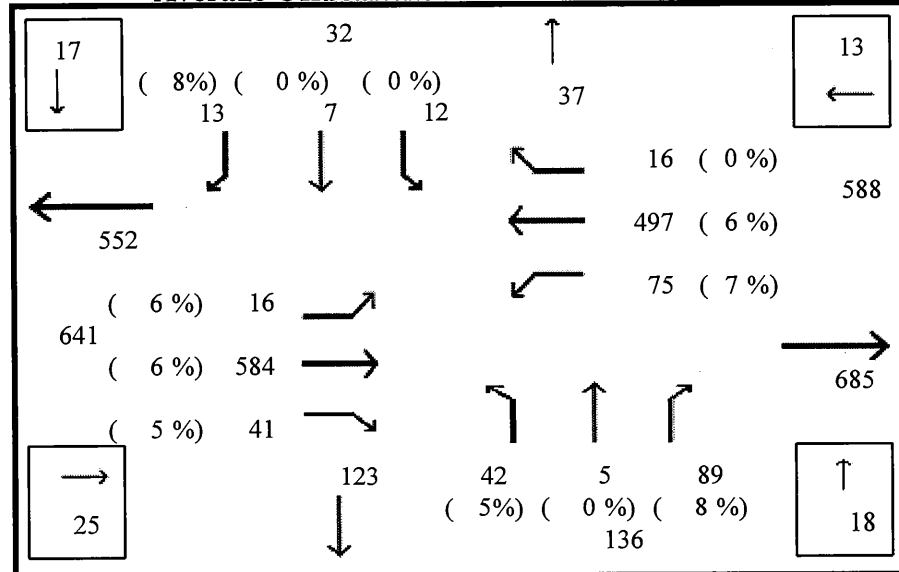
A.M. Peak Hour : 0745 - 0845



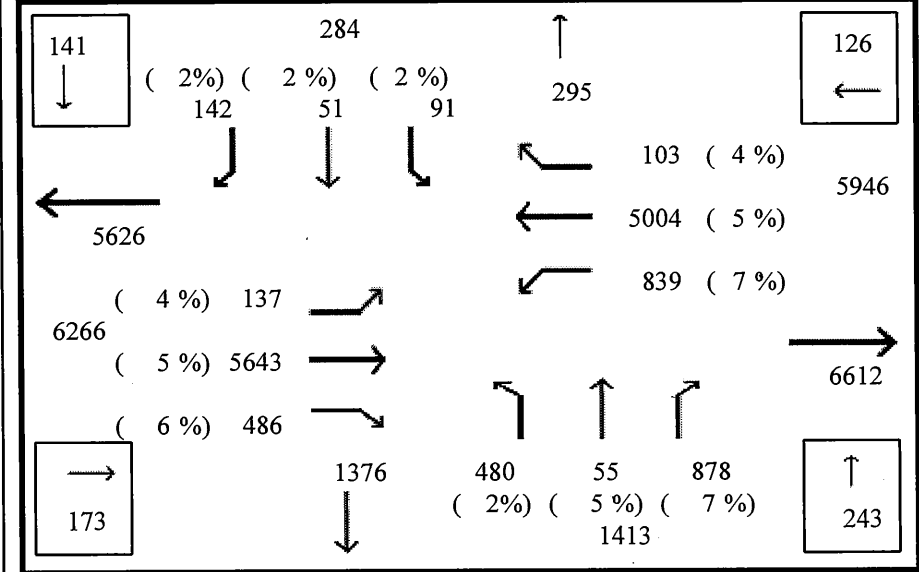
P.M. Peak Hour : 1615 - 1715



Average Offpeak Hour



Total Hours Counts



Note: North is at the top of the page

Value in (parenthesis) indicates truck/heavy vehicle percentages

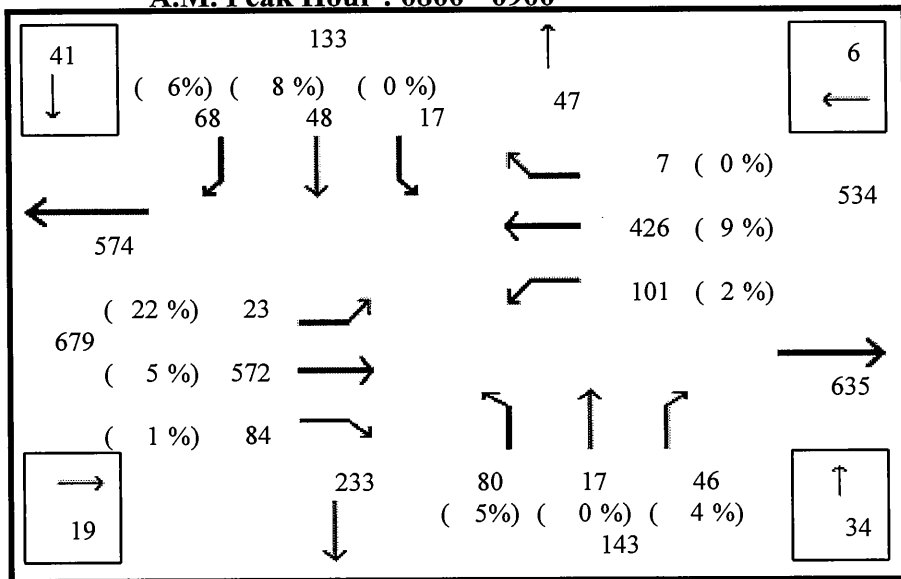
LIVING ARTS DR/RATHBURN RD W/UNNAMED UCOM

Count Date : Thursday October 15 2015

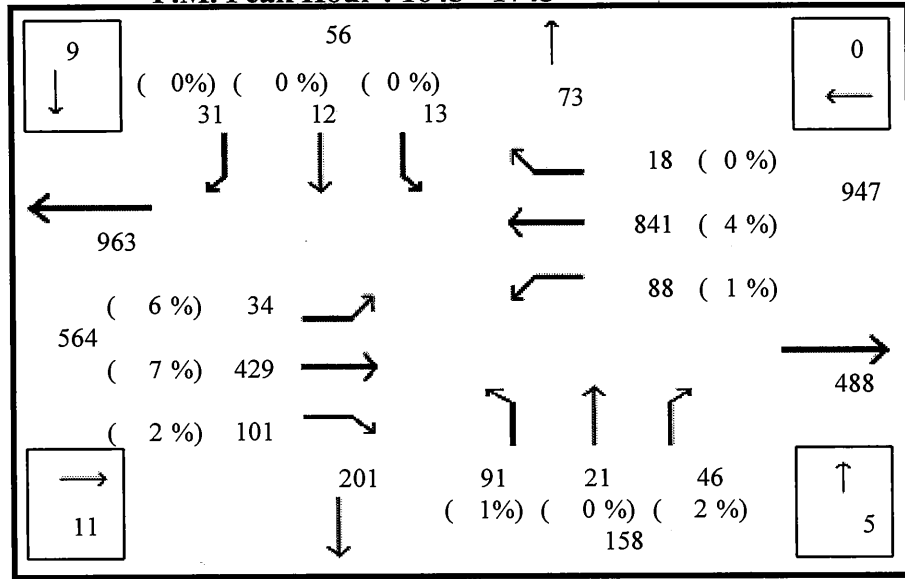
LIV-RAT-UNN-12-N

Time Ending	NORTHBOUND					SOUTHBOUND					EASTBOUND					WESTBOUND					All Vehicles
	LT	Thru	RT	Trk	Peds.	LT	Thru	R	Trk	Peds.	LT	Thru	RT	Trk	Peds.	LT	Thru	RT	Trk	Peds.	
07:15	5	2	29	1	5	0	0	2	0	0	4	196	15	12	3	11	83	3	10	5	373
07:30	8	2	31	3	6	0	0	1	0	6	4	269	22	14	7	19	78	3	11	7	465
07:45	9	3	37	3	7	1	0	3	0	8	3	251	38	14	5	21	86	2	14	10	485
08:00	11	2	45	7	6	1	0	4	0	6	5	268	35	14	4	24	78	4	13	11	511
08:15	10	1	42	5	7	0	0	2	0	7	3	299	31	11	5	29	76	3	13	8	525
08:30	10	2	48	5	11	0	0	3	0	9	4	271	27	16	7	25	58	2	16	11	487
08:45	12	2	47	4	9	1	0	2	0	11	5	271	22	15	5	27	66	2	16	9	492
09:00	14	2	49	5	9	1	0	2	0	13	3	251	25	14	9	31	71	3	18	11	489
AM Total Hr	79	16	328	33	60	4	0	19	0	60	31	2076	215	110	45	187	596	22	111	72	
AM Peak Hour																					
07:45 - 08:45	43	7	182	21	33	17	1109	115	56	21	105	278	11	58	39	2	0	11	0	33	
*****	****	*****	****	****	****	****	*****	****	***	****	****	*****	***	*****	****	****	*****	****	****	****	
11:15	8	2	18	3	7	4	1	1	1	1	0	134	9	3	6	25	82	1	6	4	298
11:30	7	0	16	4	5	1	1	1	0	4	4	123	10	8	5	15	85	1	7	8	283
11:45	6	1	15	2	10	6	1	5	1	5	3	125	7	9	7	13	90	4	10	5	298
12:00	14	0	25	1	12	2	1	3	0	4	4	144	10	13	10	25	131	4	10	8	387
12:15	15	2	32	3	9	1	4	2	0	2	4	126	5	8	6	22	112	2	5	6	343
12:30	10	1	18	1	6	1	0	2	0	2	4	118	13	12	3	14	114	5	10	5	323
12:45	12	1	25	3	12	2	0	5	1	1	4	139	18	6	2	13	105	5	6	4	345
13:00	8	2	22	2	1	2	7	1	1	6	6	142	10	14	3	33	120	6	11	3	387
13:15	8	1	16	7	8	1	0	5	0	2	3	132	6	10	2	14	124	4	8	1	339
13:30	9	2	22	0	3	4	2	4	0	4	1	151	10	10	3	13	141	3	17	4	389
13:45	11	1	18	0	2	4	0	2	0	4	8	156	11	8	2	11	141	8	13	4	392
14:00	13	2	22	0	2	9	3	8	0	4	4	163	9	7	3	11	151	6	11	3	419
Offpeak Tot Vol	121	15	249	26	77	37	20	39	4	39	45	1653	118	108	52	209	1396	49	114	55	
Offpeak Hr Avg	40	5	83	8	25	12	6	13	1	13	15	551	39	36	17	69	465	16	38	18	
*****	****	*****	****	****	****	****	*****	****	***	****	****	*****	***	*****	****	****	*****	****	****	****	
15:15	14	2	12	2	3	0	2	7	0	2	4	153	8	11	1	18	185	0	7	2	425
15:30	35	6	29	2	5	9	4	14	0	0	7	218	13	10	1	25	206	2	8	21	588
15:45	14	2	18	2	3	6	3	5	1	6	1	125	18	5	5	18	151	1	9	14	379
16:00	8	0	28	5	3	1	0	9	0	0	8	157	12	5	6	41	244	2	9	6	529
16:15	25	0	20	2	4	3	5	6	0	5	1	145	10	11	1	31	188	4	14	6	465
16:30	24	1	7	1	3	4	5	5	0	1	9	140	11	8	2	30	297	1	13	10	556
16:45	14	3	25	0	3	5	5	8	0	1	3	117	10	6	4	29	228	6	10	23	469
17:00	35	2	26	1	0	5	3	8	1	2	8	121	10	6	4	42	267	3	11	11	549
17:15	31	2	19	0	2	2	1	6	0	2	4	111	8	2	2	33	243	3	8	8	473
17:30	28	1	15	1	3	3	1	4	0	1	3	110	9	10	16	55	233	1	10	2	484
17:45	24	2	22	0	5	7	1	5	0	0	5	121	9	13	1	33	232	3	9	9	486
18:00	18	0	16	2	2	3	0	4	0	7	3	115	7	9	1	26	263	2	8	4	476
PM Total Hr	270	21	237	18	36	48	30	81	2	27	56	1633	125	96	44	381	2737	28	116	116	
PM Peak Hour																					
16:15 - 17:15	104	8	77	2	8	24	489	39	22	12	134	1035	13	42	52	16	14	27	1	6	
*****	****	*****	****	****	****	****	*****	****	***	****	****	*****	***	*****	****	****	*****	****	****	****	

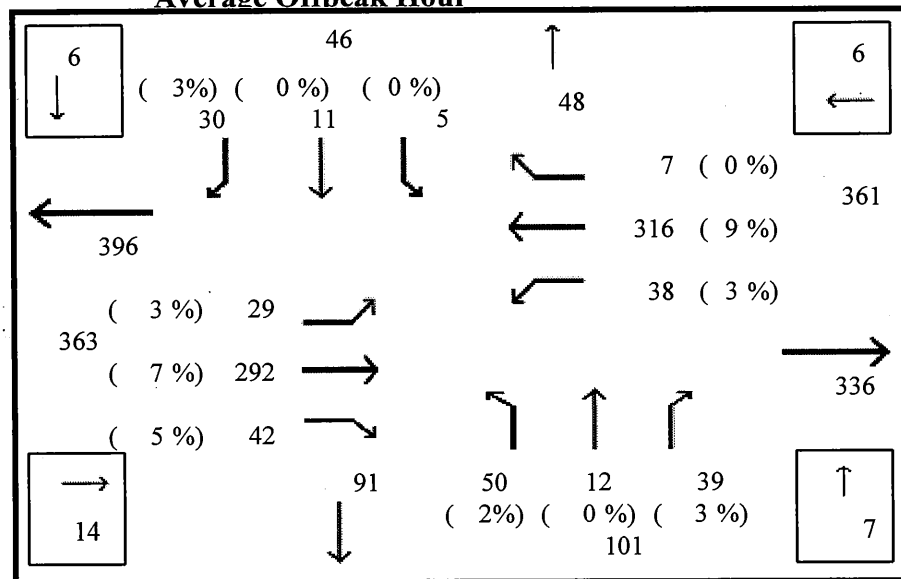
A.M. Peak Hour : 0800 - 0900



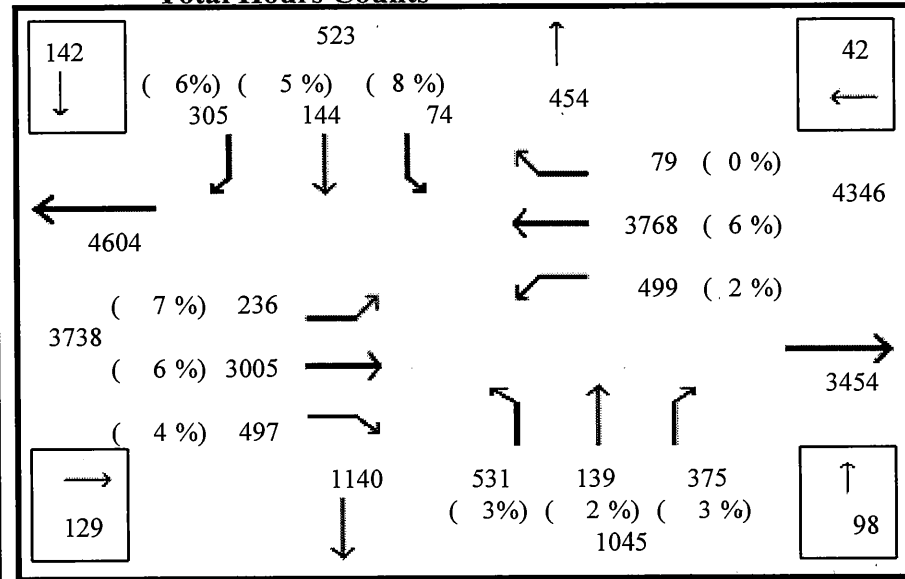
P.M. Peak Hour : 1645 - 1745



Average Offpeak Hour

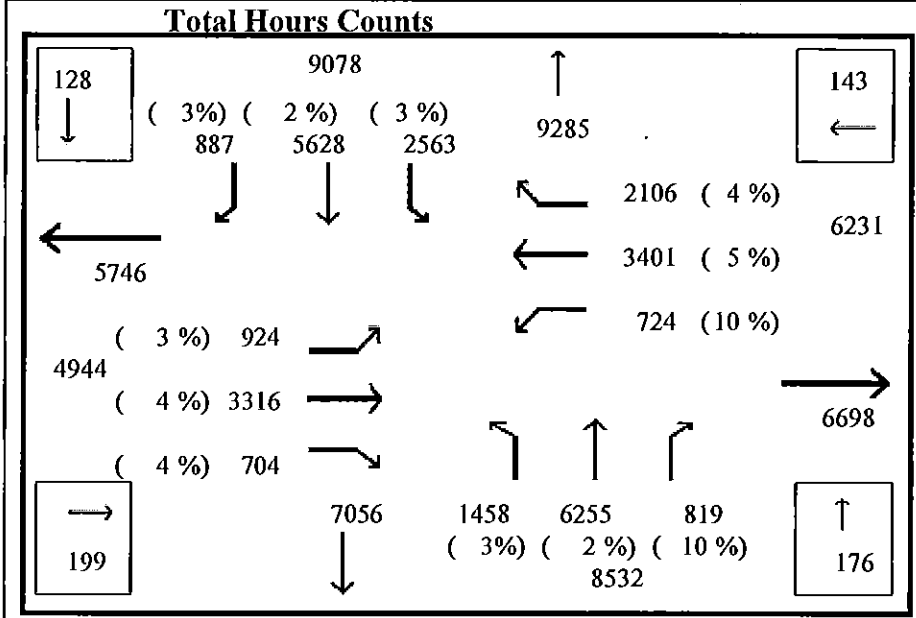
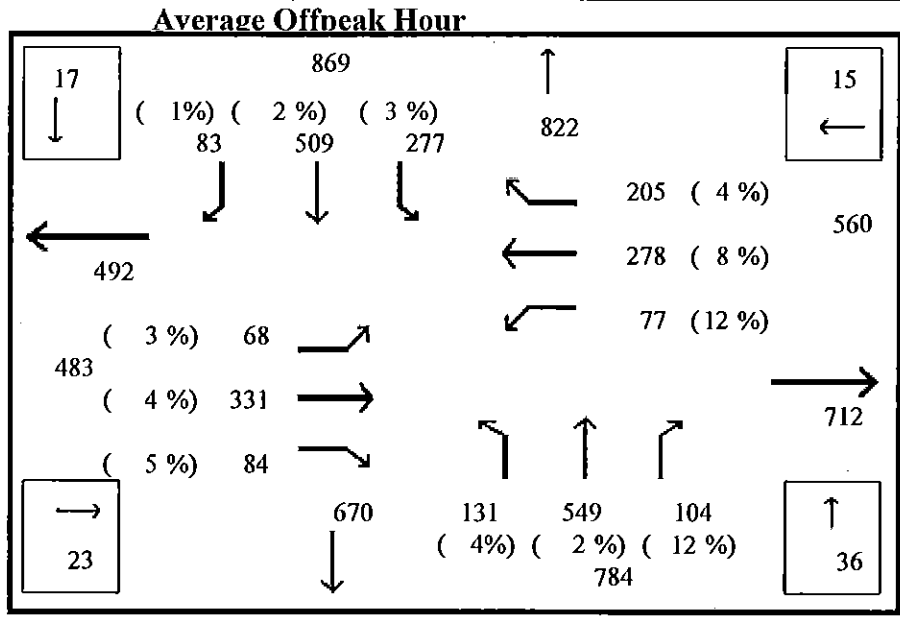
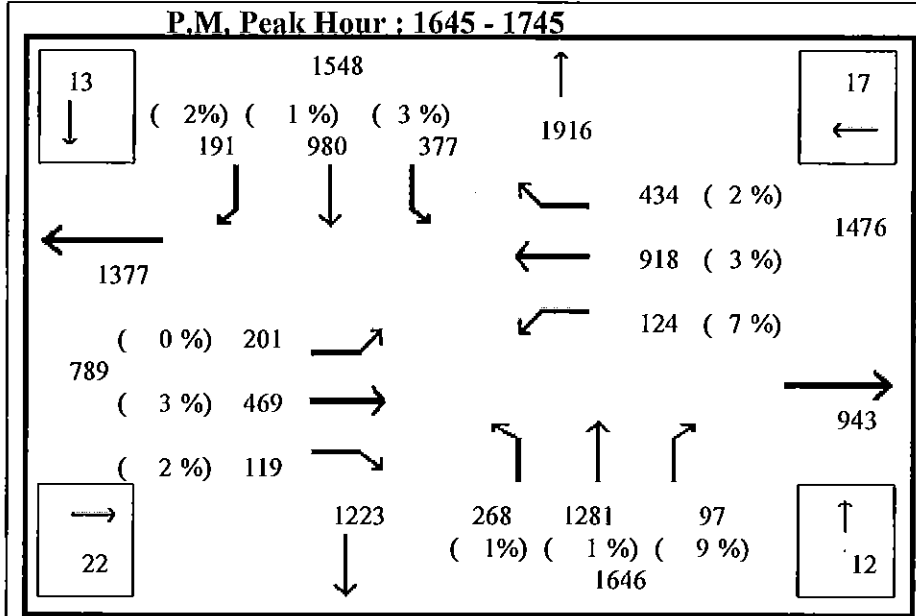
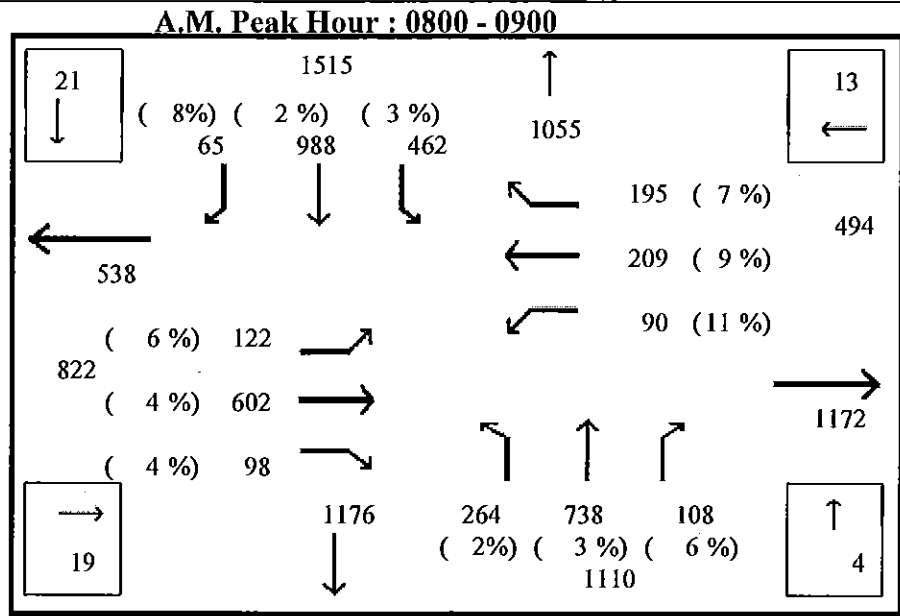


Total Hours Counts



Note: North is at the top of the page

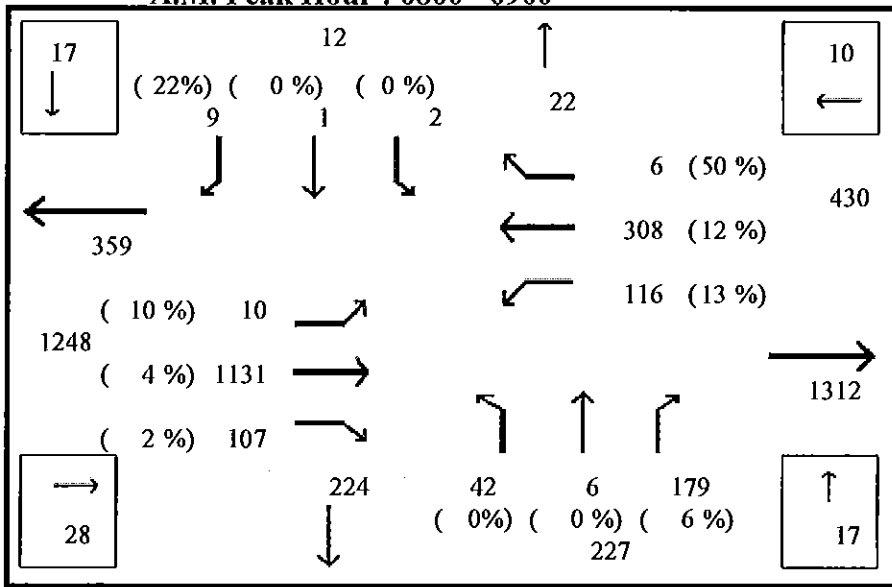
Value in (parenthesis) indicates truck/heavy vehicle percentages



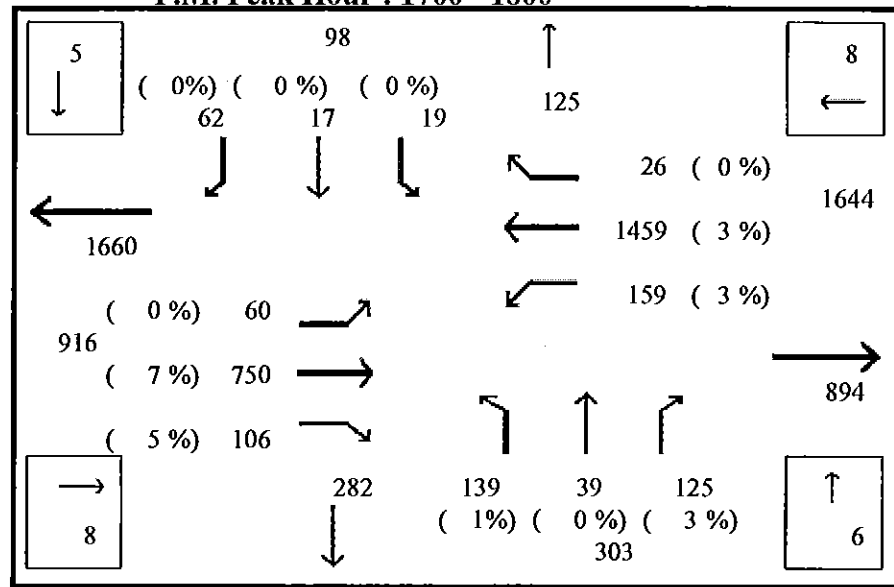
Note: North is at the top of the page

Value in (parenthesis) indicates truck/heavy vehicle percentages

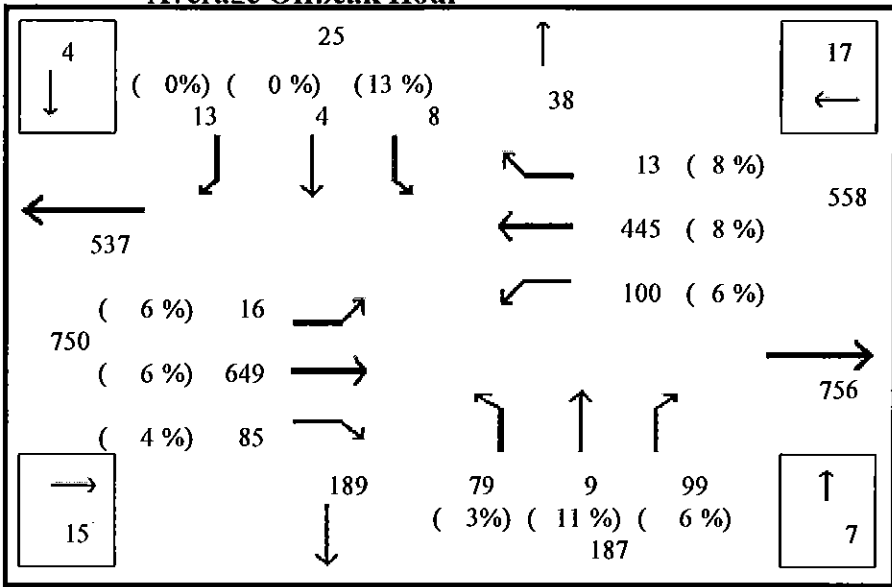
A.M. Peak Hour : 0800 - 0900



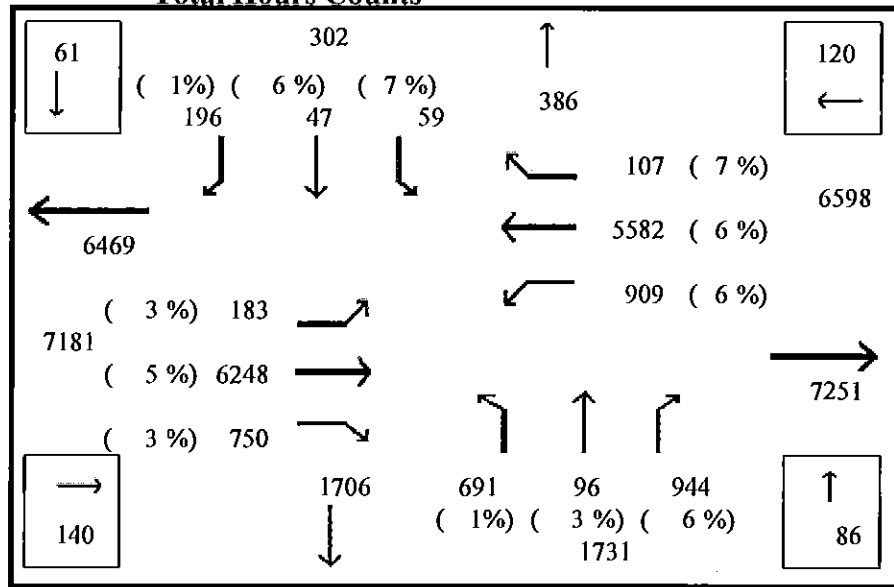
P.M. Peak Hour : 1700 - 1800



Average Offpeak Hour



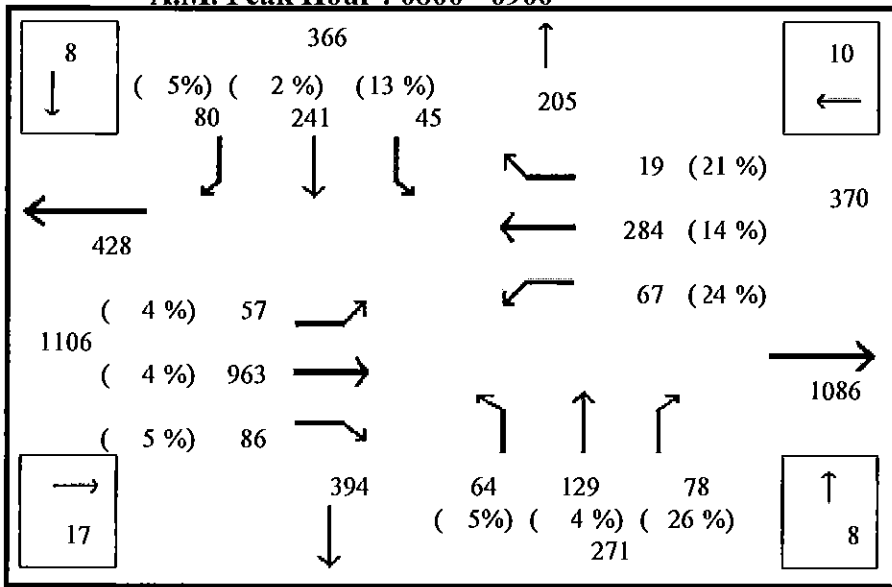
Total Hours Counts



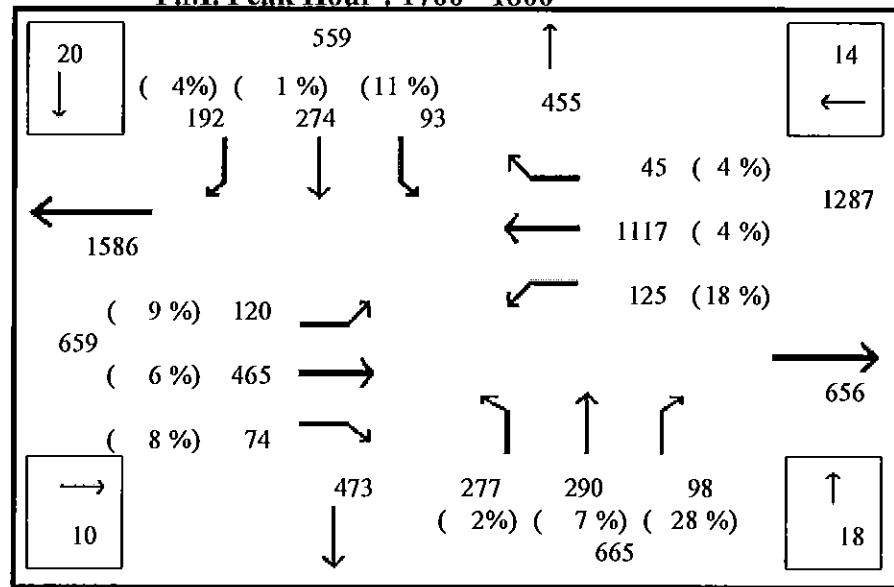
Note: North is at the top of the page

Value in (parenthesis) indicates truck/heavy vehicle percentages

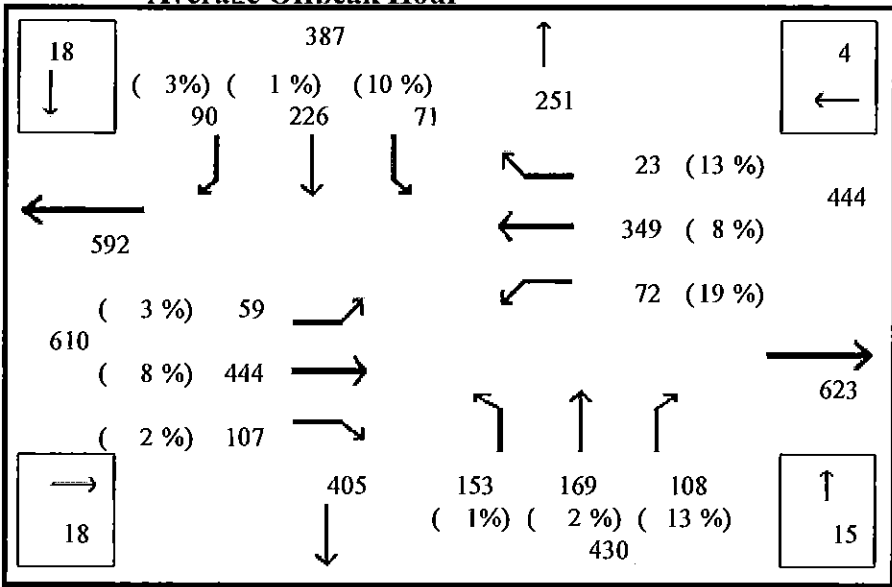
A.M. Peak Hour : 0800 - 0900



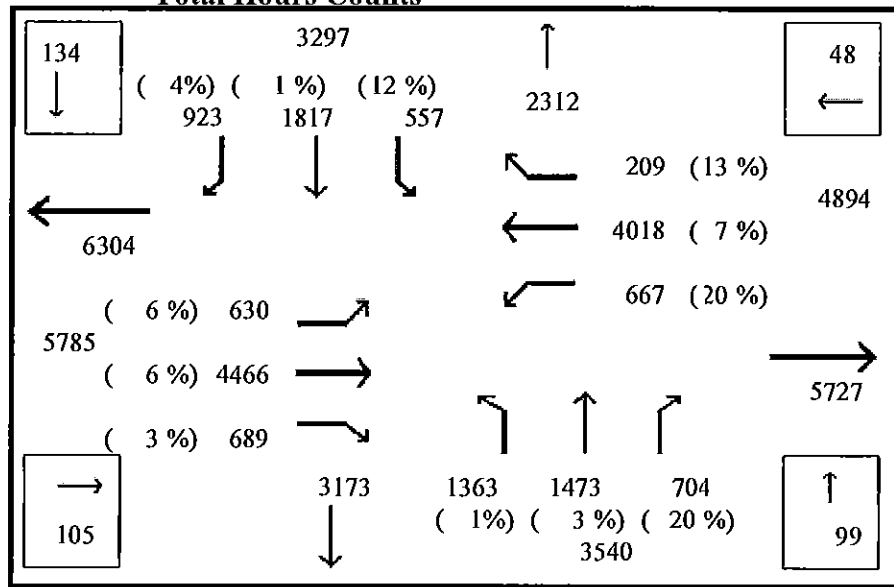
P.M. Peak Hour : 1700 - 1800



Average Offpeak Hour



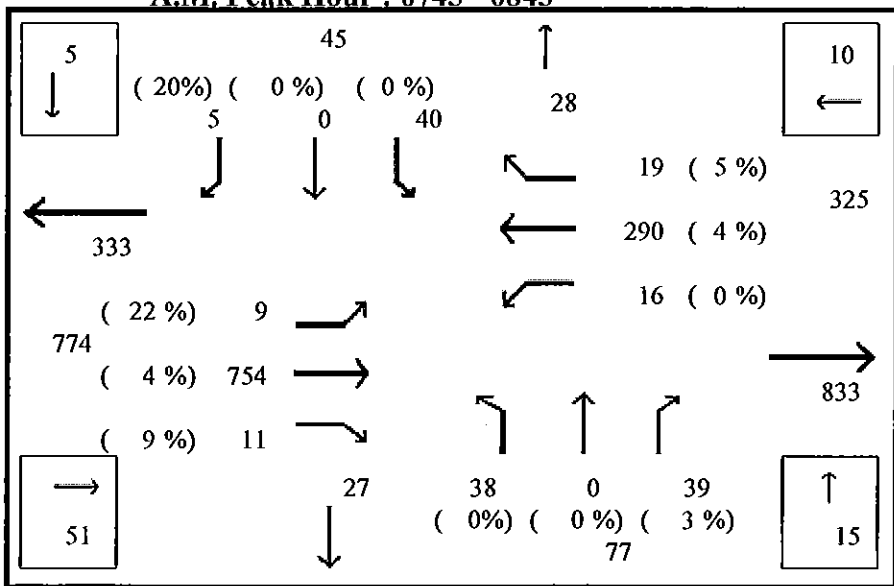
Total Hours Counts



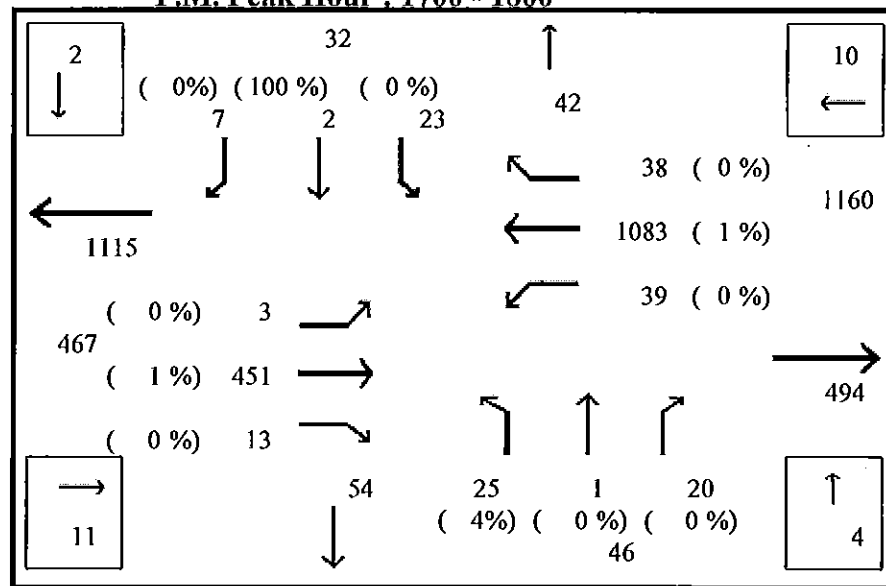
Note: North is at the top of the page

Value in (parenthesis) indicates truck/heavy vehicle percentages

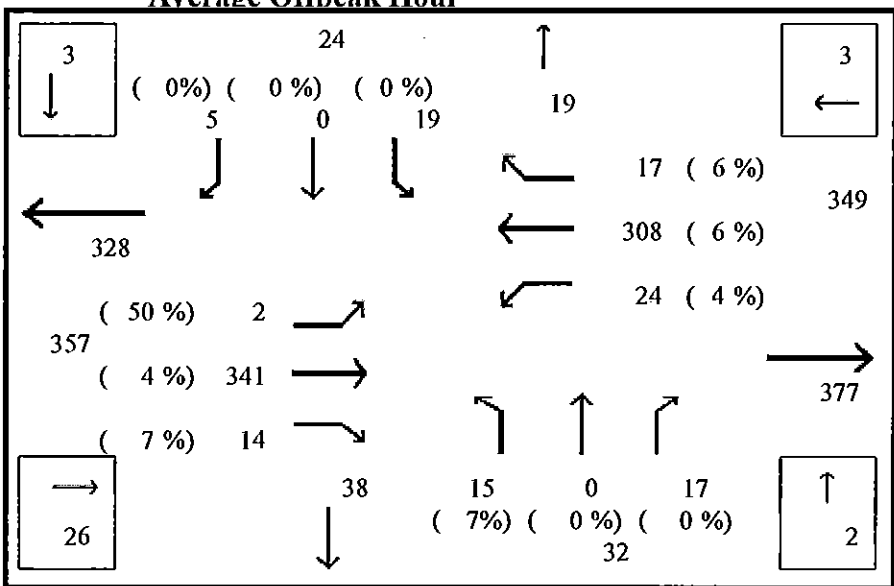
A.M. Peak Hour : 0745 - 0845



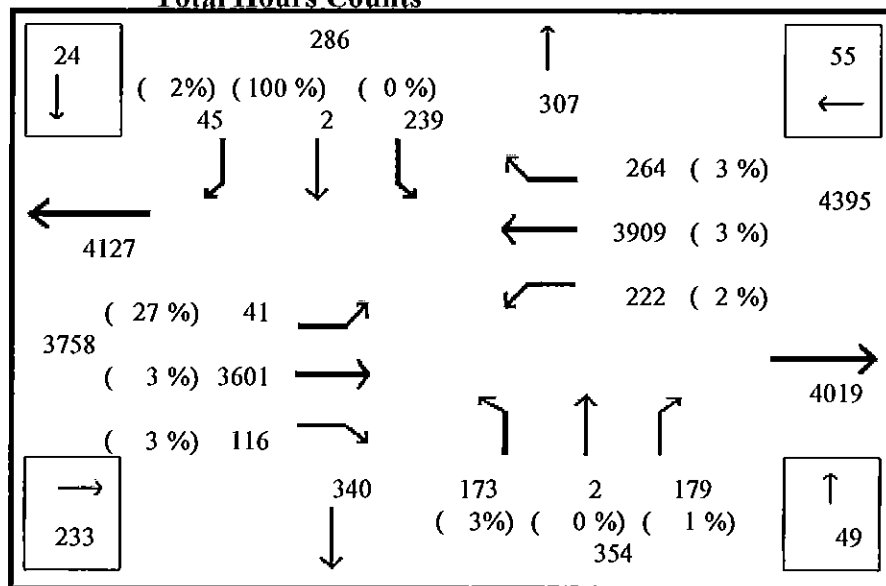
P.M. Peak Hour : 1700 - 1800



Average Offpeak Hour

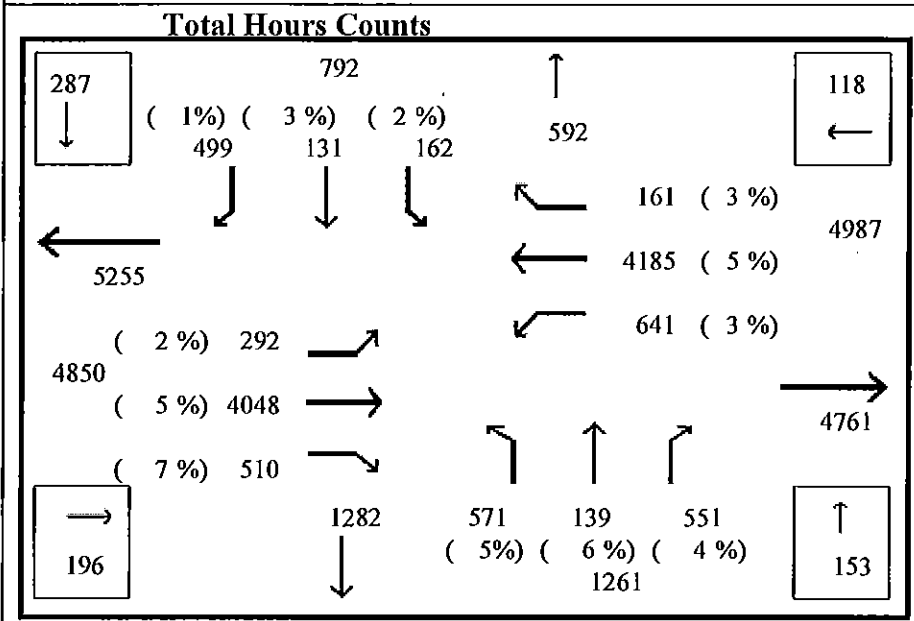
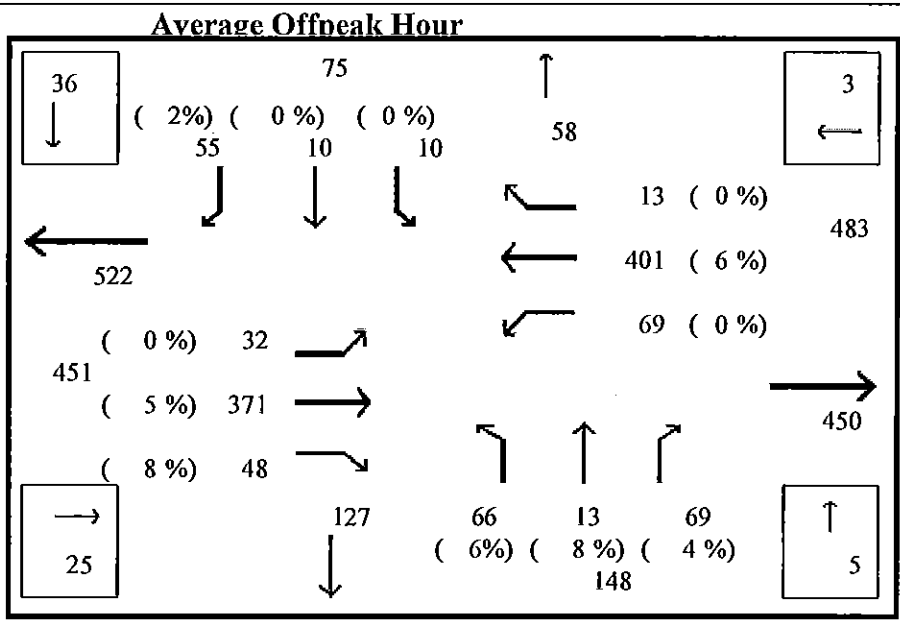
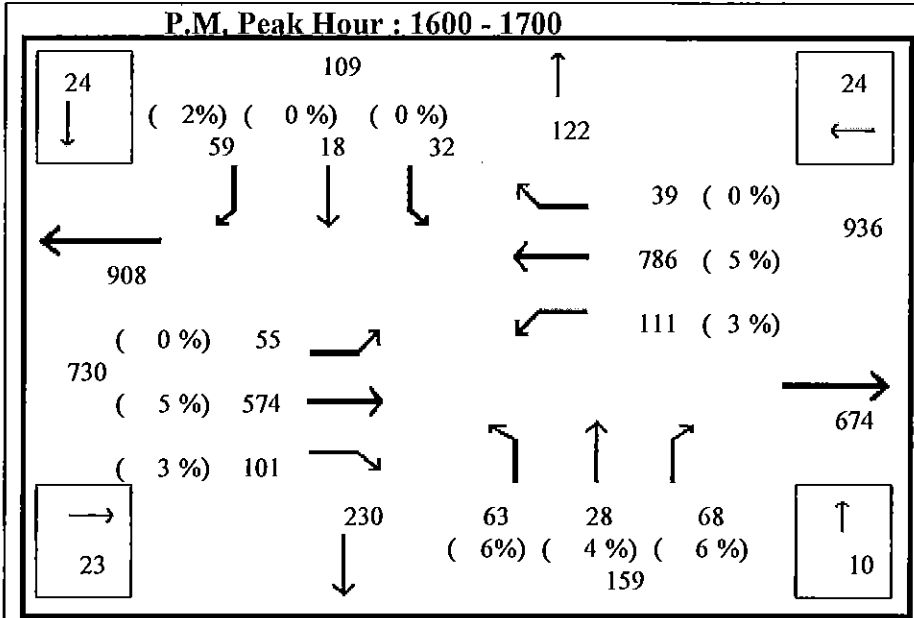
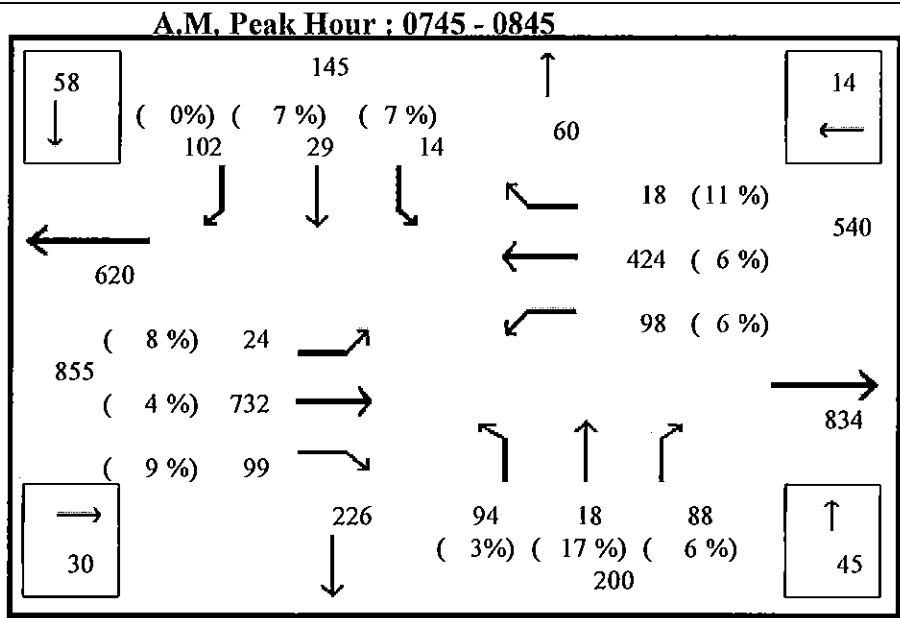


Total Hours Counts



Note: North is at the top of the page

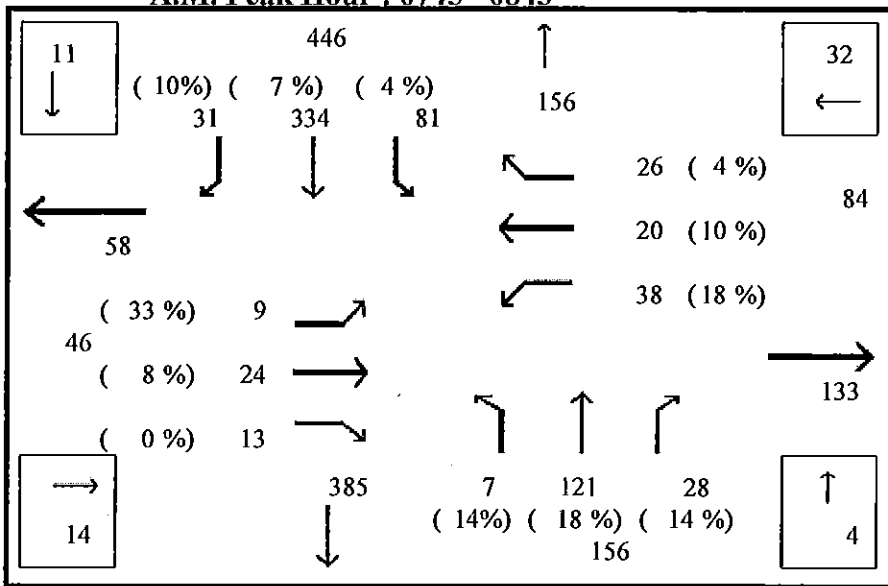
Value in (parenthesis) indicates truck/heavy vehicle percentages



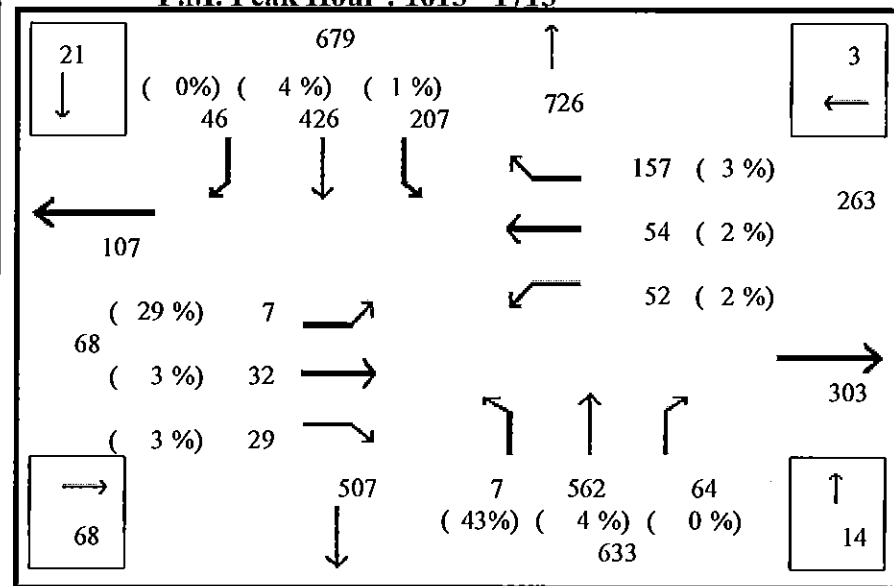
Note: North is at the top of the page

Value in (parenthesis) indicates truck/heavy vehicle percentages

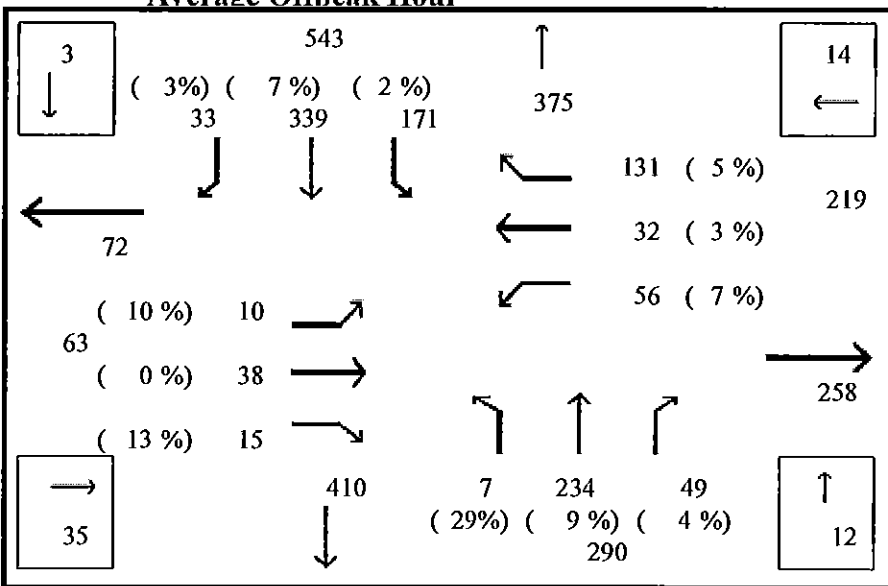
A.M. Peak Hour : 0745 - 0845



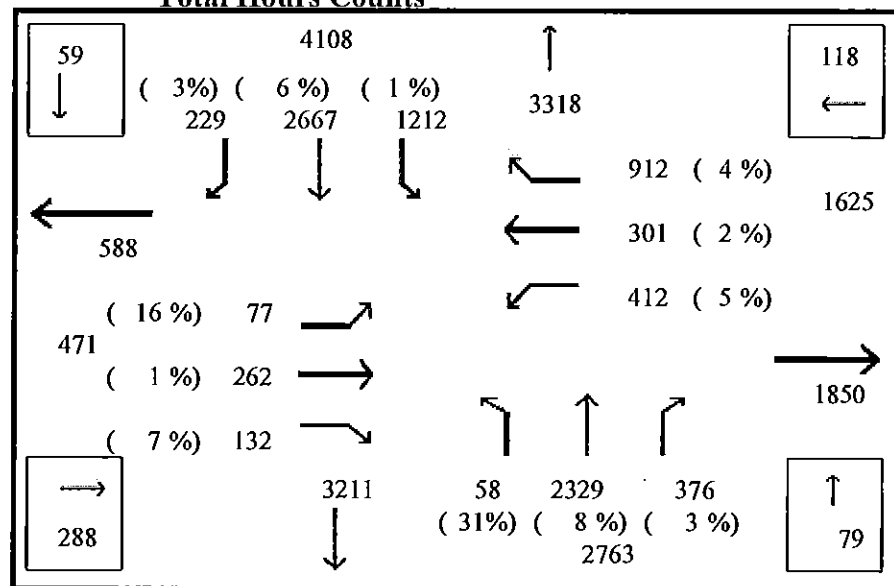
P.M. Peak Hour : 1615 - 1715



Average Offpeak Hour



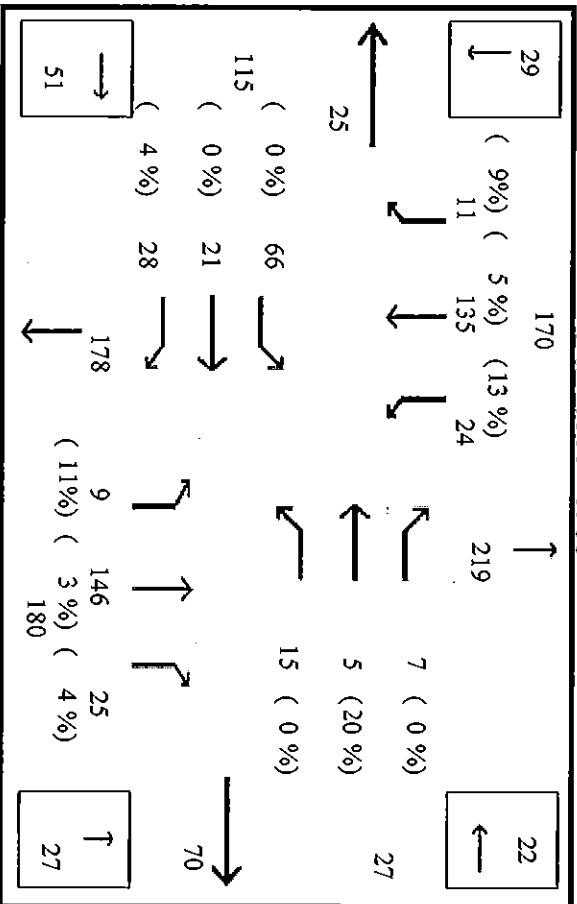
Total Hours Counts



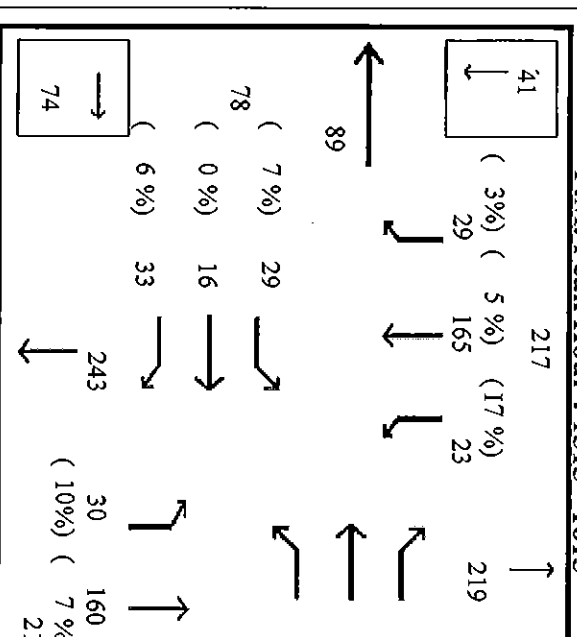
Note: North is at the top of the page

Value in (parenthesis) indicates truck/heavy vehicle percentages

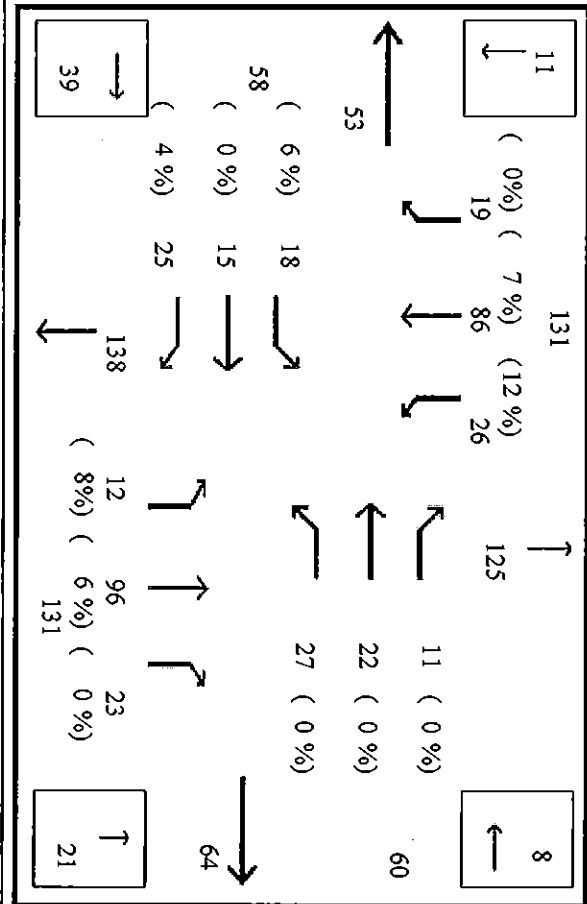
A.M. Peak Hour : 0800 - 0900



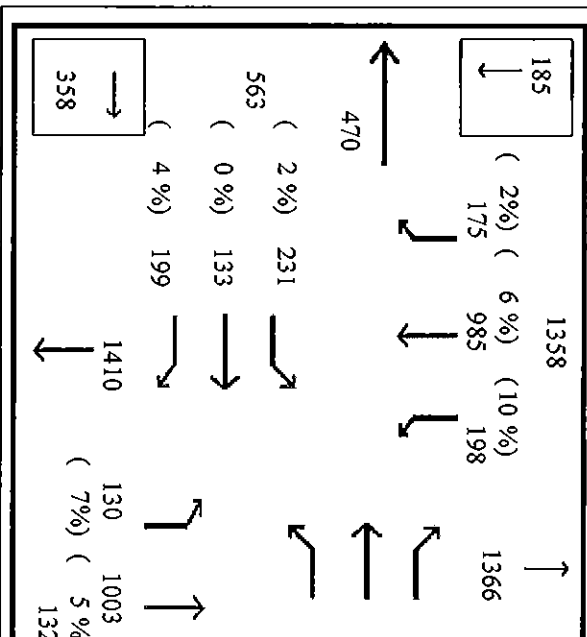
P.M. Peak Hour : 1515 - 1615



Average Offpeak Hour



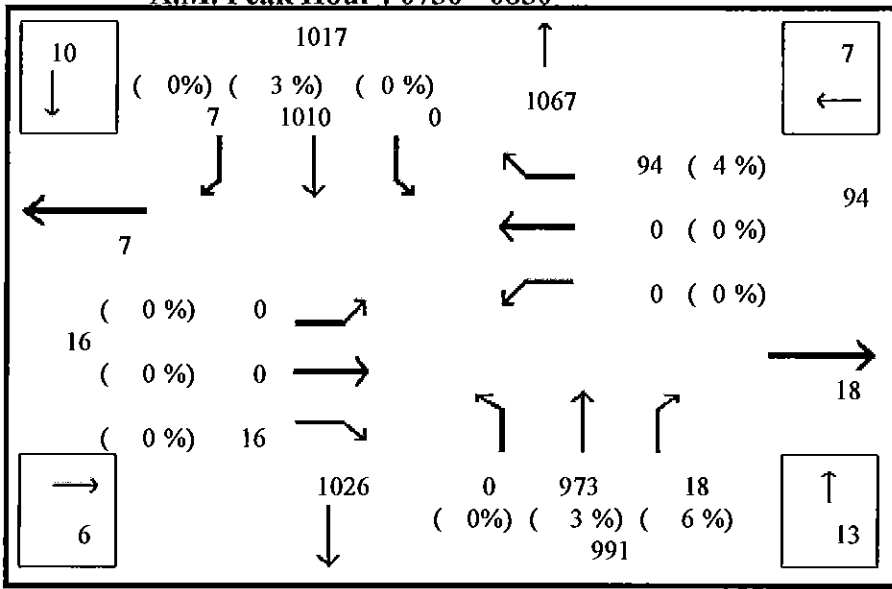
Total Hours Counts



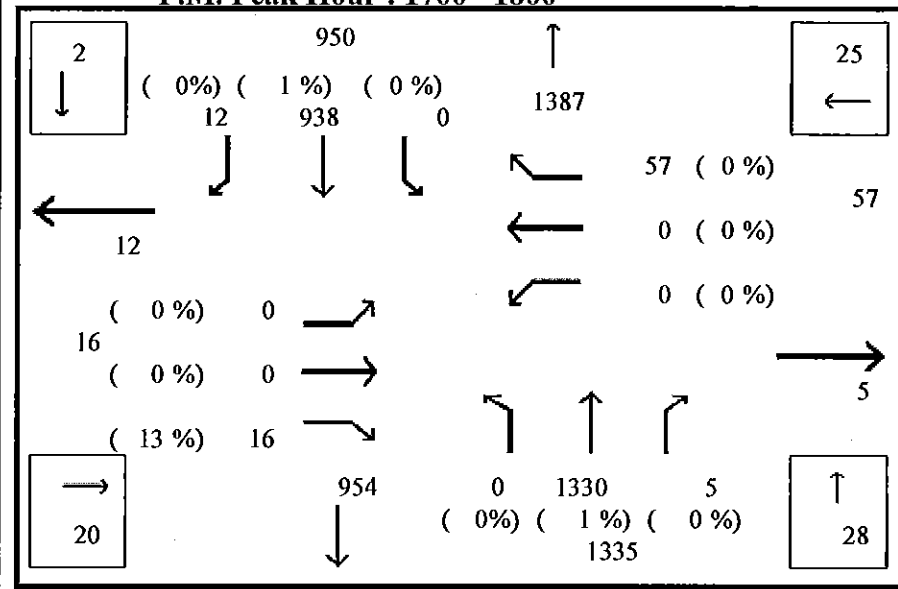
Note: North is at the top of the page

Value in (parenthesis) indicates truck/heavy vehicle percentages

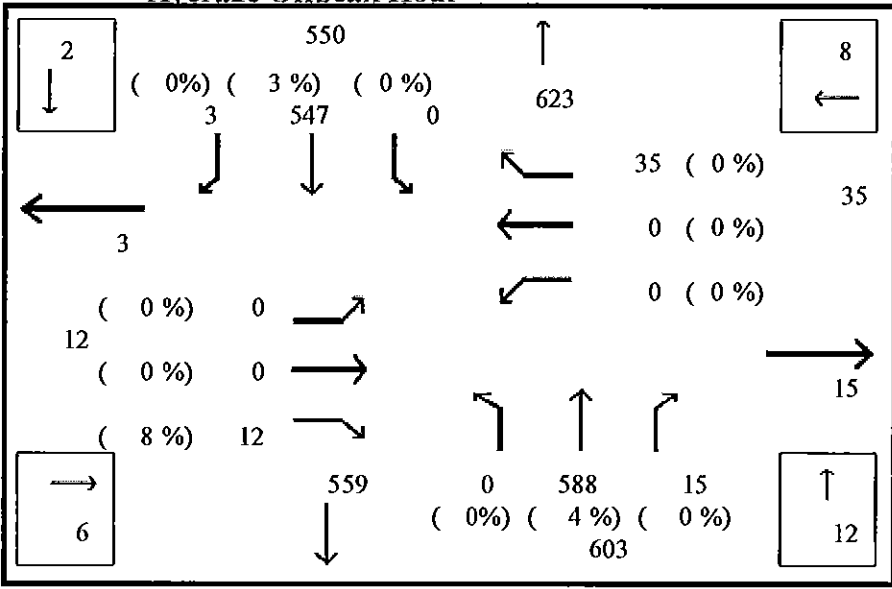
A.M. Peak Hour : 0730 - 0830



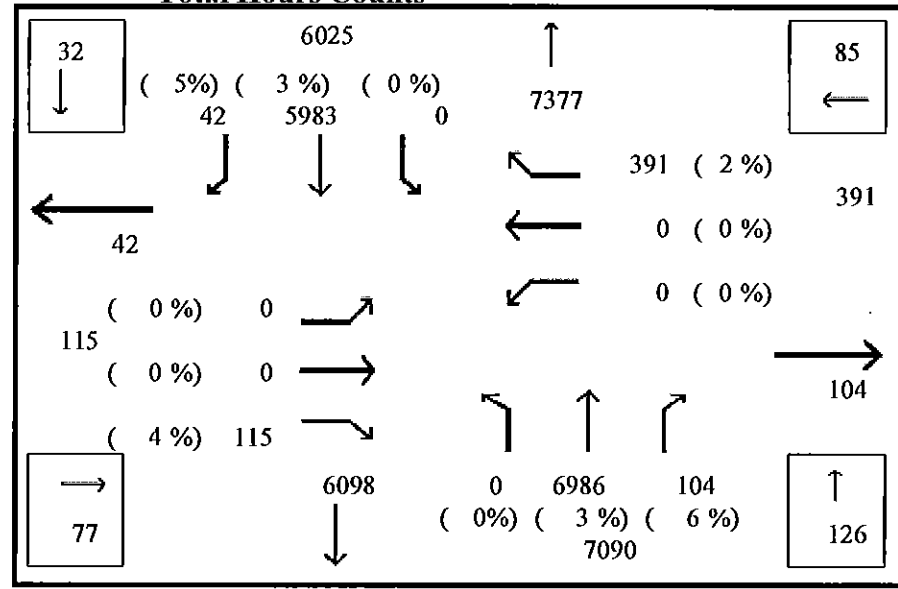
P.M. Peak Hour : 1700 - 1800



Average Offpeak Hour



Total Hours Counts



Note: North is at the top of the page

Value in (parenthesis) indicates truck/heavy vehicle percentages

Rathburn Road & Elora Drive (East)

Morning Peak Diagram

Specified Period

From: 6:00:00

To: 9:00:00

One Hour Peak

From: 8:00:00

To: 9:00:00

Municipality: Mississauga
Site #: 000000012
Intersection: Rathburn Road & Elora Drive (East)
TFR File #: 1
Count date: 23-Feb-2016

Weather conditions:
 Clear
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Rathburn Road runs W/E

North Leg Total: 80
 North Entering: 58
 North Peds: 4
 Peds Cross: \bowtie

Heavys	0	0	2	2
Trucks	0	0	2	2
Cars	5	0	49	54
Totals	5	0	53	



Heavys	2
Trucks	1
Cars	19
Totals	22

East Leg Total: 1091
 East Entering: 359
 East Peds: 4
 Peds Cross: \bowtie

Heavys	Trucks	Cars	Totals
16	7	360	383

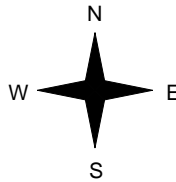


Elora Drive (East)

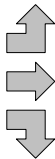
Cars	Trucks	Heavys	Totals
18	1	1	20
302	6	16	324
14	1	0	15
334	8	17	



Rathburn Road



Heavys	Trucks	Cars	Totals
1	0	1	2
13	3	638	654
0	0	21	21
14	3	660	



Rathburn Road



Peds Cross: \bowtie
 West Peds: 7
 West Entering: 677
 West Leg Total: 1060

Cars	35	Cars	53	0	25	78
Trucks	1	Trucks	1	0	0	1
Heavys	0	Heavys	0	0	0	0
Totals	36	Totals	54	0	25	



Driveway



Cars	Trucks	Heavys	Totals
712	5	15	732

Peds Cross: \bowtie
 South Peds: 39
 South Entering: 79
 South Leg Total: 115

Comments

Rathburn Road & Elora Drive (East)

Mid-day Peak Diagram

Specified Period

From: 11:30:00

To: 13:30:00

One Hour Peak

From: 11:30:00

To: 12:30:00

Municipality: Mississauga
Site #: 000000012
Intersection: Rathburn Road & Elora Drive (East)
TFR File #: 1
Count date: 23-Feb-2016

Weather conditions:
 Clear
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Rathburn Road runs W/E

North Leg Total: 50
 North Entering: 26
 North Peds: 0
 Peds Cross: \bowtie

Heavys	0	0	0	0
Trucks	0	0	0	0
Cars	2	0	24	26
Totals	2	0	24	



Heavys	1
Trucks	1
Cars	22
Totals	24

East Leg Total: 792
 East Entering: 385
 East Peds: 4
 Peds Cross: \bowtie

Heavys	19
Trucks	5
Cars	336
Totals	360

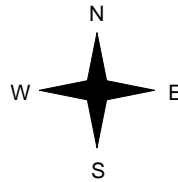


Elora Drive (East)

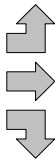
Cars	21	Trucks	1	Heavys	1	Totals	23
Cars	315	Trucks	5	Heavys	19	Totals	339
Cars	21	Trucks	2	Heavys	0	Totals	23
Cars	357	Trucks	8	Heavys	20	Totals	



Rathburn Road



Heavys	0
Trucks	0
Cars	1
Totals	1
Heavys	9
Trucks	3
Cars	352
Totals	364
Heavys	0
Trucks	0
Cars	18
Totals	18
Heavys	9
Trucks	3
Cars	371
Totals	



Rathburn Road



Cars	395	Trucks	3	Heavys	9	Totals	407
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Peds Cross: \bowtie
 West Peds: 2
 West Entering: 383
 West Leg Total: 743

Cars	39	Cars	19	0	19	38
Trucks	2	Trucks	0	0	0	0
Heavys	0	Heavys	0	0	0	0
Totals	41	Totals	19	0	19	



Driveway



Peds Cross: \bowtie
 South Peds: 9
 South Entering: 38
 South Leg Total: 79

Comments

Rathburn Road & Elora Drive (East)

Afternoon Peak Diagram

Specified Period

From: 15:00:00

To: 18:00:00

One Hour Peak

From: 17:00:00

To: 18:00:00

Municipality: Mississauga
Site #: 000000012
Intersection: Rathburn Road & Elora Drive (East)
TFR File #: 1
Count date: 23-Feb-2016

Weather conditions:
 Clear
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Rathburn Road runs W/E

North Leg Total: 90
 North Entering: 26
 North Peds: 4
 Peds Cross: \bowtie

Heavys	0	0	0	0
Trucks	0	0	0	0
Cars	3	1	22	26
Totals	3	1	22	



Heavys	0
Trucks	0
Cars	64
Totals	64

East Leg Total: 1433
 East Entering: 906
 East Peds: 4
 Peds Cross: \bowtie

Heavys	Trucks	Cars	Totals
18	4	796	818

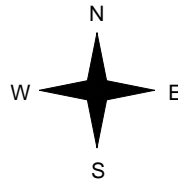


Elora Drive (East)

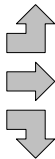
Cars	Trucks	Heavys	Totals
59	0	0	59
777	3	18	798
48	1	0	49
884	4	18	



Rathburn Road



Heavys	Trucks	Cars	Totals
0	0	5	5
12	1	485	498
0	0	28	28
12	1	518	



Rathburn Road



Peds Cross: \bowtie
 West Peds: 7
 West Entering: 531
 West Leg Total: 1349

Cars	77
Trucks	1
Heavys	0
Totals	78



Cars	16	0	7	23
Trucks	1	0	0	1
Heavys	0	0	0	0
Totals	17	0	7	

Peds Cross: \bowtie
 South Peds: 12
 South Entering: 24
 South Leg Total: 102

Comments

Rathburn Road & Elora Drive (East)

Total Count Diagram

Municipality: Mississauga
Site #: 000000012
Intersection: Rathburn Road & Elora Drive (East)
TFR File #: 1
Count date: 23-Feb-2016

Weather conditions:
 Clear
Person(s) who counted:

**** Signalized Intersection ****

Major Road: Rathburn Road runs W/E

North Leg Total: 511
 North Entering: 236
 North Peds: 20
 Peds Cross: \times

Heavys	0	0	6	6
Trucks	0	0	4	4
Cars	32	1	193	226
Totals	32	1	203	



Heavys	12
Trucks	9
Cars	254
Totals	275

East Leg Total: 7548
 East Entering: 3873
 East Peds: 33
 Peds Cross: \times

Heavys	Trucks	Cars	Totals
134	40	3486	3660

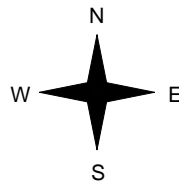


Elora Drive (East)

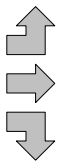
Cars	Trucks	Heavys	Totals
227	9	8	244
3274	36	134	3444
179	6	0	185
3680	51	142	



Rathburn Road



Heavys	Trucks	Cars	Totals
4	0	26	30
112	12	3201	3325
1	0	154	155
117	12	3381	



Rathburn Road



Peds Cross: \times
 West Peds: 29
 West Entering: 3510
 West Leg Total: 7170

Cars	334
Trucks	6
Heavys	1
Totals	341



Cars	180	1	144	325
Trucks	4	0	3	7
Heavys	0	0	0	0
Totals	184	1	147	

Driveway



Cars	Trucks	Heavys	Totals
3538	19	118	3675

Peds Cross: \times
 South Peds: 147
 South Entering: 332
 South Leg Total: 673

Comments

Rathburn Road & Elora Drive (East) Traffic Count Summary

Intersection: Rathburn Road & Elora Drive (East)													Count Date: 23-Feb-2016		Municipality: Mississauga	
North Approach Totals						South Approach Totals										
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds	North/South Total Approaches	Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds				
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total					
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0				
7:00:00	15	0	5	20	0	52	7:00:00	18	0	14	32	4				
8:00:00	32	0	7	39	1	91	8:00:00	24	0	28	52	6				
9:00:00	53	0	5	58	4	137	9:00:00	54	0	25	79	39				
12:00:00	13	0	1	14	0	36	12:00:00	8	0	14	22	1				
13:00:00	24	0	4	28	2	59	13:00:00	18	0	13	31	12				
15:00:00	6	0	0	6	5	28	15:00:00	10	0	12	22	8				
16:00:00	16	0	4	20	1	57	16:00:00	18	1	18	37	30				
17:00:00	22	0	3	25	3	58	17:00:00	17	0	16	33	35				
18:00:00	22	1	3	26	4	50	18:00:00	17	0	7	24	12				
Totals:	203	1	32	236	20	568		184	1	147	332	147				
East Approach Totals						West Approach Totals										
Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds	East/West Total Approaches	Hour Ending	Includes Cars, Trucks, & Heavys				Total Peds				
	Left	Thru	Right	Grand Total				Left	Thru	Right	Grand Total					
6:00:00	0	0	0	0	0	0	6:00:00	0	0	0	0	0				
7:00:00	1	107	2	110	2	339	7:00:00	0	225	4	229	1				
8:00:00	4	257	18	279	1	802	8:00:00	4	511	8	523	1				
9:00:00	15	324	20	359	4	1036	9:00:00	2	654	21	677	7				
12:00:00	14	169	13	196	0	421	12:00:00	0	216	9	225	1				
13:00:00	19	338	23	380	4	728	13:00:00	5	324	19	348	1				
15:00:00	12	166	7	185	2	353	15:00:00	1	161	6	168	4				
16:00:00	24	543	41	608	14	999	16:00:00	7	353	31	391	0				
17:00:00	47	742	61	850	2	1268	17:00:00	6	383	29	418	7				
18:00:00	49	798	59	906	4	1437	18:00:00	5	498	28	531	7				
Totals:	185	3444	244	3873	33	7383		30	3325	155	3510	29				
Calculated Values for Traffic Crossing Major Street																
Hours Ending:	7:00	8:00	9:00	12:00		13:00	16:00	17:00	18:00							
Crossing Values:	36	58	118	22		47	49	48	51							

APPENDIX B2
SIGNAL TIMING PLANS

08:12 USER 12/3 PRINT DAILY INT REP, INT 48 96 206 213 334 703, AS 1-3

DAILY INTERSECTION REPORT FOR ACT SCH 1 (MON TUE WED THU FRI)

INT	TIME	SELECTION PLANS IN USE					ALTERNATES						
		MODE	CYC LEN	OFF NO.	SPLT NO.	SPEC FUNC	DUP ISEC	MODE	CYC LEN	OFF NO.	SPLT NO.	SPEC FUNC	DUP ISEC
48	00:00	/	/	/	/	/	/	LO	101	2	2	4	
48	07:00	1/1	/	/	/	1/1	/	CC	80	1	1	1	1082
48	09:00	1/1	/	/	/	1/1	/	CC	80	2	2	2	1082
48	16:00	1/1	/	/	/	1/1	/	CC	80	3	3	3	1082
48	18:30	1/1	/	/	/	1/1	/	CC	80	2	2	2	1082
96	00:00	/	/	/	/	/	/	LO	101	2	2	2	
96	07:00	1/1	/	/	/	1/1	/	CC	140	1	1	1	
96	09:00	1/1	/	/	/	1/1	/	CC	130	2	2	2	
96	16:00	1/1	/	/	/	1/1	/	CC	140	3	3	3	
96	18:30	1/1	/	/	/	1/1	/	CC	130	2	2	2	
206	00:00	/	/	/	/	/	/	LO	101	2	2	2	
206	07:00	1/1	/	/	/	1/1	/	CC	140	1	1	1	
206	07:45	1/1	/	/	/	1/1	/	CC	140	1	1	4	
206	09:00	1/1	/	/	/	1/1	/	CC	65	2	2	2	
206	16:00	1/1	/	/	/	1/1	/	CC	70	3	3	3	
206	18:30	1/1	/	/	/	1/1	/	CC	65	2	2	2	
213	00:00	/	/	/	/	/	/	LO	101	2	2	2	
213	07:00	1/1	/	/	/	1/1	/	CC	115	1	1	1	1055
213	09:00	1/1	/	/	/	1/1	/	CC	115	2	2	2	1055
213	16:00	1/1	/	/	/	1/1	/	CC	140	3	3	3	1055
213	18:30	1/1	/	/	/	1/1	/	CC	115	2	2	3	1055
334	00:00	/	/	/	/	/	/	LO	101	2	2	2	
334	07:00	1/1	/	/	/	1/1	/	CC	140	1	1	1	
334	07:45	1/1	/	/	/	1/1	/	CC	140	1	1	4	
334	09:00	1/1	/	/	/	1/1	/	CC	65	2	2	2	
334	16:00	1/1	/	/	/	1/1	/	CC	70	3	3	3	
334	18:30	1/1	/	/	/	1/1	/	CC	65	2	2	2	
703	00:00	/	/	/	/	/	/	LO	101	2	2	4	
703	07:00	1/1	/	/	/	1/1	/	CC	140	1	1	1	
703	09:00	1/1	/	/	/	1/1	/	CC	115	2	2	2	1055
703	16:00	1/1	/	/	/	1/1	/	CC	140	3	3	3	1055
703	18:30	1/1	/	/	/	1/1	/	CC	115	2	2	2	1055

DAILY INTERSECTION REPORT FOR ACT SCH 2 (SAT)

48	00:00	/	/	/	/	/	/	LO	101	2	2	4	
48	09:00	1/1	/	/	/	1/1	/	CC	80	2	2	2	
96	00:00	/	/	/	/	/	/	LO	101	2	2	2	
96	09:00	1/1	/	/	/	1/1	/	CC	130	2	2	2	
206	00:00	/	/	/	/	/	/	LO	101	2	2	2	
206	09:00	1/1	/	/	/	1/1	/	CC	65	2	2	2	
213	00:00	/	/	/	/	/	/	LO	101	2	2	2	
213	09:00	1/1	/	/	/	1/1	/	CC	115	2	2	3	1055
334	00:00	/	/	/	/	/	/	LO	101	2	2	2	
334	09:00	1/1	/	/	/	1/1	/	CC	65	2	2	2	
703	00:00	/	/	/	/	/	/	LO	101	2	2	4	
703	09:00	1/1	/	/	/	1/1	/	CC	115	2	2	2	1055

DAILY INTERSECTION REPORT FOR ACT SCH 3 (SUN HOL)

INT	TIME	SELECTION PLANS IN USE					ALTERNATES					
		MODE	CYC LEN	OFF NO.	SPLT NO.	SPEC FUNC	DUP ISEC	MODE	CYC LEN	OFF NO.	SPLT NO.	SPEC FUNC
48	00:00	/	/	/	/	/	LO	101	2	2	2	
48	10:00	1/1	/	/	/	1/1	CC	80	2	2	2	
48	23:00	/	/	/	/	/	LO	101	2	2	2	
96	00:00	/	/	/	/	/	LO	101	2	2	2	
96	10:00	1/1	/	/	/	1/1	CC	130	2	2	2	
206	00:00	/	/	/	/	/	LO	101	2	2	2	
206	10:00	1/1	/	/	/	1/1	CC	65	2	2	2	
206	23:00	/	/	/	/	/	LO	101	2	2	2	
213	00:00	/	/	/	/	/	LO	101	2	2	2	
213	10:00	1/1	/	/	/	1/1	CC	115	2	2	3	1055
213	23:00	/	/	/	/	/	LO	101	2	2	2	
334	00:00	/	/	/	/	/	LO	101	2	2	2	
334	10:00	1/1	/	/	/	1/1	CC	65	2	2	2	
334	23:00	/	/	/	/	/	LO	101	2	2	2	
703	00:00	/	/	/	/	/	LO	101	2	2	4	
703	10:00	1/1	/	/	/	1/1	CC	115	2	2	2	1055
703	23:00	/	/	/	/	/	LO	101	2	2	4	

08:14 USER 12/3 PRINT CDT 48 96 206 213 334 703

CYCLE DEFINITION TABLE: 48

PHASE	DIR	VEH MIN	PED MIN	PED CLEAR	AMBER	ALL RED	COMM DELAY	SPECIAL FEATURE	STREET NAME
1							1		
2	NS		8	11	4	3	1	C	LIVING ARTS
3							1		
4	EW		8	12	4	4	1		SQUARE ONE DR
5							1		
6							1		
7							1		
8							1		

VALID SPECIAL FUNCTIONS (Y/N)

1	2	3	1&2	1&3	2&3	ALL
Y	Y	Y	Y	Y	Y	Y

CYCLE DEFINITION TABLE: 96

PHASE	DIR	VEH MIN	PED MIN	PED CLEAR	AMBER	ALL RED	COMM DELAY	SPECIAL FEATURE	STREET NAME
1							1		
2	EB		11	17	4	4	1	C	RATHBURN RD
3	SBL	5			3		1		CONFEDERATION
4	NB		10	14	4	4	1		CONFEDERATION
5	EBL	5			3		1		RATHBURN RD
6	WB		11	17	4	4	1	C	RATHBURN RD
7	NBL	5			3		1		CONFEDERATION
8	SB		10	14	4	4	1		CONFEDERATION

VALID SPECIAL FUNCTIONS (Y/N)

1	2	3	1&2	1&3	2&3	ALL
Y	Y	Y	Y	Y	Y	Y

CYCLE DEFINITION TABLE: 206

PHASE	DIR	VEH MIN	PED MIN	PED CLEAR	AMBER	ALL RED	COMM DELAY	SPECIAL FEATURE	STREET NAME
1							1		
2	EW		8	11	4	3	1	C	RATHBURN ROAD
3							1		
4	NS		11	16	4	3	1		ELORA DRIVE
5							1		
6							1		
7							1		
8							1		

VALID SPECIAL FUNCTIONS (Y/N)

1	2	3	1&2	1&3	2&3	ALL
Y	Y	Y	Y	Y	Y	Y

CYCLE DEFINITION TABLE: 213

PHASE	DIR	VEH MIN	PED MIN	PED CLEAR	AMBER	ALL RED	COMM DELAY	SPECIAL FEATURE	STREET NAME
1	WBL	5			3		1		RATHBURN
2	EB		11	16	4	4	1	C	RATHBURN
3	SBL	5			3		1		DUKE OF YORK
4	NB		11	16	4	4	1		DUKE OF YORK
5							1		
6	WB		11	16	4	4	1	C	RATHBURN
7	NBL	5			3		1		DUKE OF YORK

CYCLE DEFINITION TABLE: 213

PHASE	DIR	VEH MIN	PED MIN	PED CLEAR	AMBER	ALL RED	COMM DELAY	SPECIAL FEATURE	STREET NAME
8	SB		11	16	4	4	1		DUKE OF YORK
VALID SPECIAL FUNCTIONS(Y/N)									
1	2	3	1&2	1&3	2&3	ALL			
Y	Y	Y	Y	Y	Y	Y			

CYCLE DEFINITION TABLE: 334

PHASE	DIR	VEH MIN	PED MIN	PED CLEAR	AMBER	ALL RED	COMM DELAY	SPECIAL FEATURE	STREET NAME
1							1		
2	EW		8	10	4	2	1	C	RATHBURN RD
3							1		
4	NS		13	18	4	2	1		ELORA DR
5							1		
6							1		
7							1		
8							1		
VALID SPECIAL FUNCTIONS(Y/N)									
1	2	3	1&2	1&3	2&3	ALL			
Y	Y	Y	Y	Y	Y	Y			

CYCLE DEFINITION TABLE: 703

PHASE	DIR	VEH MIN	PED MIN	PED CLEAR	AMBER	ALL RED	COMM DELAY	SPECIAL FEATURE	STREET NAME
1	WBL	5			3		1		RATHBURN RD
2	EW		8	9	4	3	1	C	RATHBURN RD
3							1		
4	NS		8	12	4	3	1		LIVING ARTS DR
5							1		
6							1		
7							1		
8							1		
VALID SPECIAL FUNCTIONS(Y/N)									
1	2	3	1&2	1&3	2&3	ALL			
Y	Y	Y	Y	Y	Y	Y			

08:15 USER 12/3 PRINT SPF 1-4, INT 48 96 206 213 334 703

SPECIAL FUNCTIONS

INTERSECTION 48 LIVING ARTS@ SQ ONE

SPECIAL IN(Y)/OUT(N)

FUNCTION #	1	2	3	
	NA	PED	CAL	PHASE OMIT SPF2 Y=ON
1	Y	Y	N	
2	Y	Y	N	
3	Y	Y	N	
4	Y	N	N	

INTERSECTION 96 RATHBURN @ CONFED

	NA	EBL	CAL	PHASE OMIT BUT SPF2 Y=ON
1	Y	Y	N	
2	Y	Y	N	
3	Y	N	N	
4	N	N	N	

INTERSECTION 206 RATHBURN@ELORA/CONDO

	NA	PED	CAL	PHASE OMIT BUT SPF2 Y=ON
1	Y	N	N	
2	Y	N	N	
3	Y	N	N	
4	Y	Y	N	

INTERSECTION 213 RATHBURN@DUKEOFYORK

	WBL	PED	CFT	PHASE OMIT
1	N	N	N	
2	N	N	N	
3	N	N	Y	
4	N	N	N	

INTERSECTION 334 RATHBURN @ ELORA

	NA	PED	CAL	PHASE OMIT BUT SPF2 Y=ON
1	Y	N	N	
2	Y	N	N	
3	Y	N	N	
4	Y	Y	N	

INTERSECTION 703 RATHBURN@LIVING ARTS

	WBL	PED	CFT	PHASE OMIT BUT SPF2 Y=ON
1	N	N	Y	
2	N	N	Y	
3	N	N	Y	
4	N	N	N	

08:16 USER 12/3 PRINT SPLIT 1-3, INT 48 96 206 213 334 703

SPLIT TABLE

INTERSECTION 48				LIVING ARTS@ SQ ONE															
TABLE NO.	(SPLIT)			PHASE NUMBER								(MAX SPLIT)				PHASE NUMBER			
NO.	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8			
		NS		EW															
1		61		39						0		0							
2		61		39						0		0							
3		61		39						0		0							
INTERSECTION 96				RATHBURN @ CONFED															
		EB	SBL	NB	EBL	WB	NBL	SB											
1		45	18	37	0	45	18	37		0	0	0	0	0	0	0			
2		44	13	43	0	44	13	43		0	0	0	0	0	0	0			
3		48	12	40	12	36	12	40		0	0	0	19	0	0	0			
INTERSECTION 206				RATHBURN@ELORA/CONDO															
		EW		NS															
1		73		27						0		0							
2		43		57						0		0							
3		47		53						0		0							
INTERSECTION 213				RATHBURN@DUKEOFYORK															
		WBL	EB	SBL	NB	WB	NBL	SB											
1		11	45	10	34	56	10	34	15	0	0	0		0	0	0			
2		16	35	11	38	51	14	35	21	0	0	0		0	0	0			
3		11	39	11	39	50	18	32	18	0	0	0		0	0	0			
INTERSECTION 334				RATHBURN @ ELORA															
		EW		NS															
1		71		29						0		0							
2		38		62						0		0							
3		42		58						0		0							
INTERSECTION 703				RATHBURN@LIVING ARTS															
		WBL	EW	NS															
1		9	71	20					15	0		0							
2		11	64	25					15	0		0							
3		10	60	30					16	0		0							

08:16 USER 12/3 PRINT OFFSET 1-3, INT 48 96 206 213 334 703

OFFSET TABLE

INTERSECTION	48	LIVING ARTS@ SQ ONE
OFFSET #	OFFSET %	
1	58	
2	58	
3	58	
INTERSECTION	96	RATHBURN @ CONFED
1	37	
2	31	
3	2	
INTERSECTION	206	RATHBURN@ELORA/CONDO
1	0	
2	17	
3	10	
INTERSECTION	213	RATHBURN@DUKEOFYORK
1	60	
2	58	
3	81	
INTERSECTION	334	RATHBURN @ ELORA
1	79	
2	94	
3	34	
INTERSECTION	703	RATHBURN@LIVING ARTS
1	41	
2	48	
3	0	

APPENDIX B3
COLLISION DATA

Location	Years					Total	Average	PM Peak Vol Ent	Daily Vol Ent	Avg Rate/MVE	Expected Collisions (Severe)	Excess Collisions	Expected Collisions (PDO)	Excess Collisions	Environmental Condition													Impact Type										Classification																
	2009	2010	2011	2012	2013										Clear	Clear	Rain	Rain	Snow	Snow	Freezing Rain	Freezing Rain	Drifting Snow	Drifting Snow	Strong Wind	Strong Wind	Fog, Mist, Smoke	Fog, Mist, Smoke	Other	Other	Approaching	Approaching	Angle	Angle	Rear End	Rear End	Sideswipe	Sideswipe	Turning	Turning	SMV-Other	SMV-Other	Other	Other	Fatal	Fatal	Non-Fatal	Non-Fatal	PDO	PDO	Non-Report	Non-Report	Other	Other
Intersection Collisions																																																						
Rathburn Drive @ Elora Drive East	4	3	2	1	7	17	3.4	1487	16522	0.6	0	2	1	14	13	76%	2	12%	1	6%	0	0%	0	0%	1	6%	0	0%	0	0%	3	18%	4	24%	6	35%	1	6%	3	18%	0	0%	0	0%	0	0%	2	12%	15	88%	0	0%	0	0%
Rathburn Drive @ Confederation Parkway	11	20	11	15	15	72	14.4	5459	60656	0.7	3	9	19	39	55	76%	11	15%	6	8%	0	0%	0	0%	0	0%	0	0%	11	15%	11	15%	24	33%	8	11%	15	21%	1	1%	2	3%	1	1%	11	15%	58	81%	2	3%	0	0%		
Rathburn Drive @ Living Arts Drive	2	7	7	2	1	19	3.8	2047	22744	0.5	0	2	2	15	15	79%	3	16%	1	5%	0	0%	0	0%	0	0%	0	0%	2	11%	4	21%	5	26%	4	21%	3	16%	0	0%	1	5%	0	0%	2	11%	17	89%	0	0%	0	0%		
Rathburn Drive @ Duke of York Boulevard	12	15	18	19	14	78	15.6	3232	35911	1.2	1	6	8	62	57	73%	17	22%	2	3%	1	1%	0	0%	0	0%	1	1%	7	9%	17	22%	13	17%	16	21%	22	28%	1	1%	2	3%	0	0%	7	9%	70	90%	1	1%	0	0%		
Square One Drive @ Confederation Parkway	0	0	1	1	0	2	0.4	2673	29700	0.0	0	1	1	0	2	100%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	50%	1	50%	0	0%	0	0%	0	0%	0	0%	1	50%	1	50%	0	0%	0	0%				
Square One Drive @ Duke of York Boulevard	0	0	2	4	4	10	2.0	1643	18256	0.3	0	0	2	7	8	80%	1	10%	0	0%	1	10%	0	0%	0	0%	0	0%	1	10%	1	10%	4	40%	3	30%	1	10%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%				
Mid-Block Collisions																																																						
Rathburn Drive																																																						
between Elora Drive and Confederation Parkway	1	0	4	2	0	7	1.4	1800	19994	0.2					5	71%	1	14%	1	14%	0	0%	0	0%	0	0%	0	0%	0	0%	1	14%	4	57%	1	14%	1	14%	0	0%	0	0%	0	0%	2	29%	5	71%	0%	0%	0	0%		
between Confederation Parkway and Living Arts Drive	0	2	4	1	0	7	1.4	2097	23300	0.2					6	86%	0	0%	1	14%	0	0%	0	0%	0	0%	0	0%	0	0%	2	29%	4	57%	0	0%	0	0%	0	0%	1	14%	0	0%	2	29%	5	71%	0%	0%	0	0%		
between Living Arts Drive and Duke of York Boulevard	0	1	0	2	0	3	0.6	2000	22222	0.1					3	100%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	2	67%	1	33%	0	0%	0	0%	0	0%	0	0%	1	33%	2	67%	0%	0%	0	0%		
Confederation Parkway																																																						
between Rathburn Road and Square One Drive	1	2	1	2	2	8	1.6	2750	30556	0.1					4	50%	4	50%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	1	13%	5	63%	0	0%	2	25%	0	0%	0	0%	0	0%	3	38%	5	63%	0%	0%	0	0%		
Duke of York Boulevard																																																						
between Rathburn Road and Square One Drive	3	4	1	4	4	16	3.2	1270	14106	0.6					14	88%	0	0%	1	6%	0	0%	0	0%	0	0%	0	0%	3	19%	5	31%	4	25%	0	0%	3	19%	0	0%	1	6%	0	0%	1	6%	15	94%	0%	0%	0	0%		
* Assumed PM Peak Hour/AADT Factor = 8.0%																																																						
* AADT data unavailable:																																																						

APPENDIX B4
TRAVEL TIME DATA

AM Peak Hour

								EB
Direction	Road Section	1	2	3	4	5	6	Avg
EB	Elora W - Elora E	0:00:29 52.68	0:00:30 51.64	0:00:27 54.65	0:00:28 55.20	0:00:28 56.69	0:00:28 55.13	0:00:28 54.33
	Elora E - Confederation	0:00:48 14.90	0:00:18 39.01	0:00:45 15.62	0:00:48 14.96	0:00:44 15.01	0:00:49 14.08	0:00:42 18.93
	Confederation - Living Arts	0:00:17 42.00	0:00:14 47.92	0:00:14 46.83	0:00:15 45.85	0:00:14 48.35	0:00:16 45.50	0:00:15 46.08
	Living Arts - Duke of York	0:00:16 42.48	0:00:21 33.82	0:00:20 33.55	0:00:14 47.13	0:00:13 55.71	0:00:13 52.59	0:00:16 44.21

Total EB T
0:01:41

								WB
Direction	Road Section	1	2	3	4	5	6	Avg
WB	Duke of York - Living Arts	0:00:21 33.93	0:00:17 40.65	0:00:32 23.15	0:00:16 43.81	0:00:42 17.10		0:00:26 31.73
	Living Arts - Confederation	0:00:18 37.77	0:00:24 28.19	0:00:14 47.23	0:00:22 29.54	0:00:14 46.14		0:00:18 37.77
	Confederation - Elora E	0:00:15 45.54	0:00:15 49.27	0:00:14 50.49	0:00:15 49.02	0:00:15 49.80		0:00:15 48.82
	Elora E - Elora W	0:00:37 41.84	0:00:29 51.82	0:00:38 40.80	0:00:30 50.67	0:00:39 39.18		0:00:35 44.86

Total WB T
0:01:33

PM Peak Hour

		EB					
Direction	Road Section	1	2	3	4	5	Avg
EB	Elora W - Elora E	0:00:48	0:00:55	0:00:31	0:00:30	0:01:10	0:00:47
		32.45	28.01	51.11	53.23	22.18	37.40
	Elora E - Confederation	0:00:17	0:00:15	0:00:13	0:01:33	0:00:52	0:00:38
		40.21	47.43	51.87	7.31	14.64	32.29
	Confederation - Living Arts	0:00:13	0:00:13	0:00:13	0:00:19	0:00:16	0:00:15
		53.51	53.94	52.65	37.51	42.25	47.97
	Living Arts - Duke of York	0:01:15	0:00:58	0:01:08	0:00:15	0:01:33	0:01:02
		9.87	12.28	10.88	46.92	7.58	17.50

Total EB T
0:02:41

		WB					
Direction	Road Section	1	2	3	4	5	Avg
WB	Duke of York - Living Arts	0:00:27	0:01:07	0:01:07	0:01:12		0:00:58
		26.09	10.92	10.34	10.41		14.44
	Living Arts - Confederation	0:00:44	0:01:59	0:01:35	0:01:54		0:01:33
		15.32	5.61	6.96	5.91		8.45
	Confederation - Elora E	0:00:50	0:00:14	0:00:14	0:00:55		0:00:33
		14.98	52.25	51.27	13.49		33.00
	Elora E - Elora W	0:00:27	0:01:06	0:00:47	0:00:29		0:00:42
		55.99	23.50	33.17	53.33		41.50

Total WB T
0:03:47

APPENDIX C

VISSIM CALIBRATION REPORT

VISSIM Model Development and Calibration – Technical Report

Square One Drive EA
City of Mississauga



Prepared for:
City of Mississauga

Prepared by:
Stantec Consulting Ltd.

April 2016

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1.0 PROJECT BACKGROUND

The purpose of this technical report is to document the development of the VISSIM micro-simulation model for the Class Environmental Assessment (EA) Study for the Square One Drive Extension.

The project consists of the extension of Square One Drive from Confederation Parkway west connecting to Rathburn Road.

Using the VISSIM micro-simulation software package (Version 8.00), a model will be developed to conduct analysis on existing conditions and to assess future alternatives of the extension.

2.0 MODEL DEVELOPMENT

The Federal Highway Administration's (FHWA) document "*Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modelling Software – July 2004*" was referenced as a guideline for the development of the VISSIM model. As outline and simplified by the FHWA document four important steps must be completed before calibrating and validating a VISSIM model:

1. Project Scope
2. Data Collection
3. Base Model Development
4. Error Checking

2.1 PROJECT SCOPE

The study area limits of the project extend from Elora Drive West at Rathburn Road easterly to Duke of York Boulevard at Rathburn Road, and extend south to Square One Drive.

Figure 1 illustrates the limits of the study area.

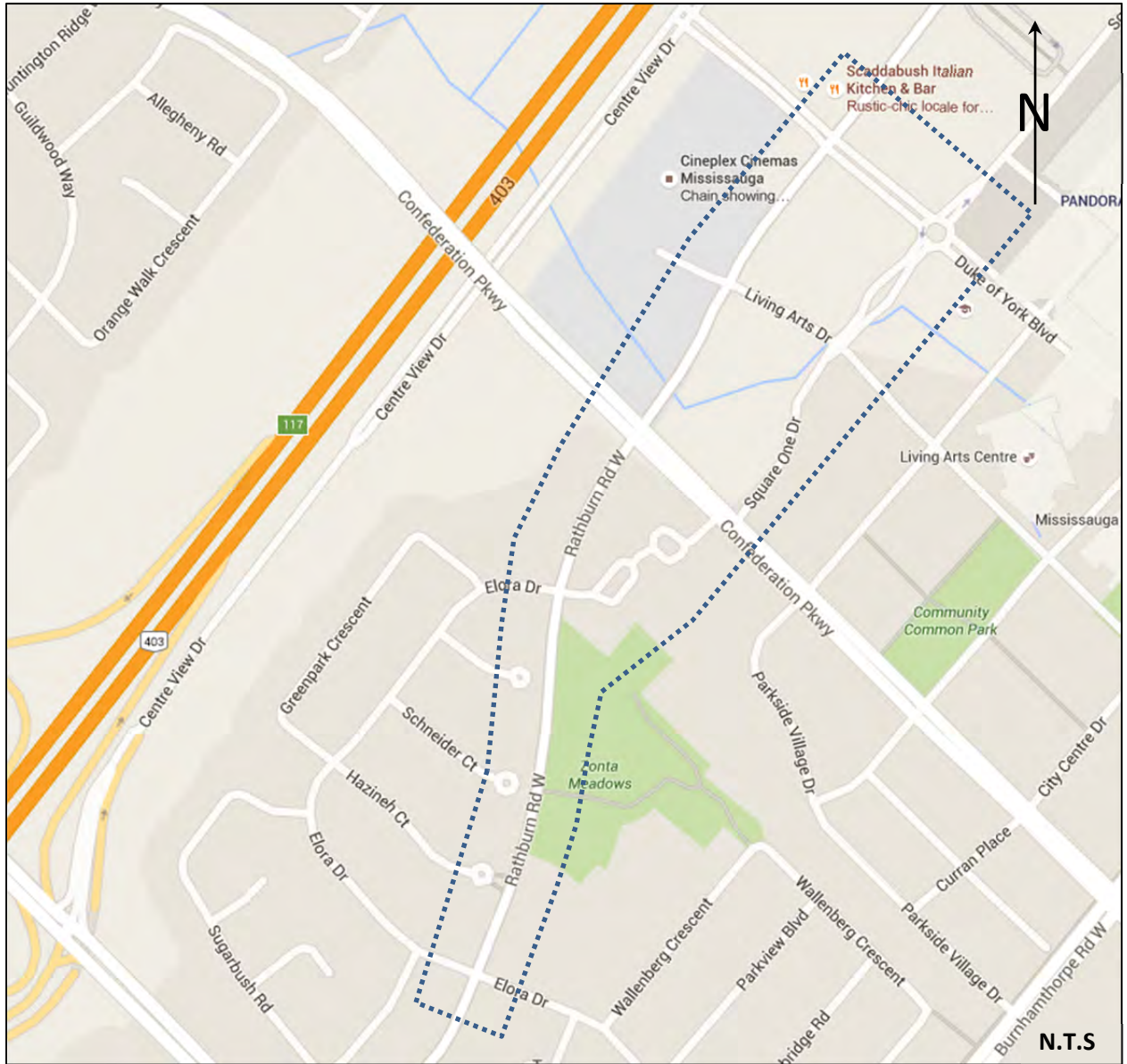
2.2 DATA COLLECTION

Data collection was required to provide input parameters and output measures of performance for calibration and validation of the micro-simulation model. A majority of the traffic data was provided by the City of Mississauga. Other data was directly collected from the field. For the development of the VISSIM model, intersection turning movement counts, posted speeds, travel time surveys, and intersection signal timing plan data was provided and/or collected.

2.3 BASE MODEL DEVELOPMENT

The next step in the development of a VISSIM model is the development of the base model that will be used for calibration and development of subsequent scenarios (i.e., assessment of alternatives). The base model development involved creating and coding the geometric network over a high-quality aerial image of the study area. The road network was coded with VISSIM's default "urban (motorized)" link behavior.

Once the geometric network was created, desired and reduced speeds were coded into the network. The desired speeds were based on the maximum posted speed limits in the field. Reduced speeds for turns are based on industry accepted values. The speeds coded within the model are tabulated below in **Table 1** and **Table 2**.



Study Area

Figure 1
Study Area
Mississauga, Ontario

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Road	Desired Speed
Rathburn Road	Maximum posted = 50 km/h
Square One Drive	Maximum posted = 30 km/h
Confederation Parkway	Maximum posted = 50 km/h
Living Arts Drive	Maximum posted = 50 km/h
Duke of York Boulevard	Maximum posted = 50 km/h

Table 1 – Desired Speeds

Turn Direction	Reduced Speed Area Zone
Left-Turn (Passenger Vehicle)	30 km/h
Left-Turn (Heavy Vehicle/Bus)	25 km/h
Right-Turn (Passenger Vehicle)	15 km/h
Right-Turn (Heavy Vehicle/Bus)	12 km/h

Table 2 – Turn Speeds

Intersection control was then coded within the model per the signal timing plans provided. Right-turns on red were coded where allowed in the field using the software's feature.

Conflict points and priority rules were next coded into the VISSIM model. Conflict points were coded in locations where links/connectors cross and have the potential for vehicles to cross paths. The default parameters were used for conflict points. Priority rules were incorporated into the model at certain locations where a conflict point would not accurately replicate the behavior of conflicting vehicles.

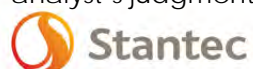
From the traffic data, an origin-destination matrix was formulated for the VISSIM network to determine the model's vehicle inputs and outputs. The matrix was utilized in coding the vehicle inputs as well as vehicle routing decisions. Vehicle inputs were coded into the model by an hourly flow rate and vehicle compositions. The existing weekday a.m. and p.m. peak hour matrices have been provided for reference in **Attachment A**.

2.4 ERROR CHECKING

The error checking portion of the model development process is focused on fixing large coding errors before the time-consuming calibration and validation process begins. Error checking is a process that involves a detailed review of the coded data and a review of the animation.

All coded data which includes geometry, speeds, signal timing plan data, and traffic volumes were reviewed by the model developer/analyst and by a quality control reviewer.

The detailed review of the simulation animation was conducted to determine if any locations within the model where conflict points or priority rules are missing, where signal timings may not be functioning correctly, or if any other locations where general coding parameters may have been missed or coded incorrectly. Some parameters in the model were adjusted based on the analyst's judgment to accurately capture the interactions of the vehicles on the network as part



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of this review. A list of the parameter adjustments has been provided for reference in **Attachment B**.

3.0 CALIBRATION/VALIDATION

3.1 MODEL PARAMETERS

The calibration of a model is a fundamental process as it is necessary to ensure that the model is a true representation that will successfully replicate actual traffic operations. The calibration and validation of the model also provides a level of confidence to which results can be ascertained. The calibration process involves the adjustment of model parameters, which is done iteratively until an accurate representation of the prevailing roadway network is achieved.

Calibration parameters can be separated into two categories, system calibration parameters and operational calibration parameters. System calibration involves the investigation of model input assumptions (vehicle inputs, vehicle routing, etc.) and operational calibration focuses on detailed driver behavior characteristics that affect the overall traffic operations in the model.

Within the system calibration stage, the goal is to verify and check all assumptions of inputs associated with the model. The objective is to identify where uncertainties were introduced in the base model and to determine their effect on the overall system operations. System calibration parameters includes the assumptions made on vehicle route choice, traffic demand inputs, traffic compositions, study area boundaries, and the temporal distribution of demand and routing. Additionally, the input data such as signal timings, roadway speed distributions, and roadway geometry characteristics are also checked for consistency between the other model inputs.

Within the operational calibration stage, the model parameters that affect the overall traffic operations of the network are modified. Operational calibration consists of modifying the detailed driver behavior parameters that affect the overall capacity of the transportation facilities, aggressiveness of drivers, and locations for lane changing. The adjustment of these parameters is essential for modeling freeway bottlenecks and local driving behavior that can affect the overall traffic flow, speeds, capacity, and congestion. Parameters may include car following characteristics (headway, standstill distance, safety distance), lane changing accepted deceleration rates, route lane change distances, and lane selection. The operational calibration stage requires the model time and resources to complete.

Validation is defined as the process of comparing simulated model results with field observed data to determine the accuracy of the simulation model. The goal of model validation is to identify parameter settings in the simulation model which produce outputs that match field data. Parameters are adjusted until an acceptable match is converged upon between the observed field data and the results of the modelled existing conditions. It is the final step in the iterative calibration process. Based on the calibration/validation targets set, the validation check determines how closely the model is to replicating the actual study area. Visual inspection of the simulation model is undertaken during this stage. If the calibration/validation targets are not met, the system and operational calibration process is revisited in order to make

more modifications to the model. Data should be evaluated to determine the best parameters to modify during the next iteration.

Once a model is calibrated and validated, it can then be utilized with confidence to analyze future scenarios which may include modifications to trip distribution, travel demand, or changes in the geometry of the roadway.

3.2 DETERMINATION OF CALIBRATION/VALIDATION TARGETS

The measures of effectiveness (MOE's) selected include intersection turning movement volumes, travel time, and vehicle speeds.

Targets are used to determine if the calibration process has reached a level of acceptability between the simulated model and the field measures of effectiveness. Within the FHWA's document "*Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modelling Software – July 2004*" under section 5.6 Calibration Targets, the calibration targets detailed for travel times and visual audits as listed within Table 4 were utilized. In addition, other industry standard targets have been summarized below.

- Achieve 80% for the majority of the compared TMC (Turning Movement Count) data sets with an overall GEH value < 5;
- Verify that no signification link, intersection approach or turning movement flows have a GEH value of greater than 10.0;
- An absolute variation between the modelled and observed data or not more than 25%;
- Journey times within the network are within 15% (or 1.0 minute, if higher) for greater than 85% of cases; and
- Individual link speeds, visually acceptable speed-flow relationship to the analyst's satisfaction.

3.3 BASE MODEL CALIBRATION RESULTS

3.3.1 Flow Comparisons

The calibration/validation process involved an assessment and comparison between the modelled and observed turning movement volumes at intersections. As part of the flow comparison, the GEH statistic was utilized as criteria for determining how well the results matched. The GEH statistic is a modified Chi-Square statistic that incorporates both relative and absolute differences.

The GEH statistic is computed as follows:



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$$GEH = \sqrt{\frac{(M - O)^2}{0.5 * (M + O)}}$$

Where:

- M: Simulated/Modelled Flows
O: Observed Flows

GEH values provide an indication of the goodness of fit as outlined below:

- GEH < 5 Flows can be considered a good fit
5 < GEH < 10 Flows may require further investigation
GEH > 10 Flows cannot be considered to be a good fit

A comparison of modelled and observed flows was conducted for individual turning movement volumes at the study area intersections. The modelled traffic volumes as well as the simulation outputs were obtained as a mean of multiple computer model runs. Averaged results provide a proper representation as this kind of micro-simulation analysis is a stochastic process in which every computer run represents a single observation. A complete experiment therefore consisted of multiple computer runs, whose outputs were averaged to obtain the final modelled results that were then compared with the observed data.

The comparison of existing observed and modelled intersection traffic volumes is summarized in **Table 3** and **Table 4**. Full intersection turning movement volume comparison tables have been provided for reference in **Attachment C**.

Intersection	AM Peak Hour			
	Observed	Modelled	% Diff	GEH
Elora Drive W/Rathburn Road	1,576	1,578	0.1%	0.1
Elora Drive E/Rathburn Road	1,369	1,372	0.2%	0.1
Confederation Parkway/Rathburn Road	4,081	4,117	0.9%	0.6
Living Arts Drive/Rathburn Road	1,919	1,951	1.7%	0.7
Duke of York Boulevard/Rathburn Road	2,332	2,337	0.2%	0.1
Confederation Parkway/Square One Drive	2,473	2,481	0.3%	0.2
Living Arts Drive/Square One Drive	523	543	3.8%	0.9
Duke of York Boulevard/Square One Drive	800	852	6.5%	1.8
Total Intersections	8			
# of Intersections GEH < 5	8			
% of Intersections GEH < 5	100%			

Table 3 – Comparison of Total Volumes at Study Area Intersections – AM Peak Hour



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Intersection	PM Peak Hour			
	Observed	Modelled	% Diff	GEH
Elora Drive W/Rathburn Road	1,863	1,823	-2.1%	0.9
Elora Drive E/Rathburn Road	1,711	1,663	-2.8%	1.2
Confederation Parkway/Rathburn Road	4,934	4,688	-5.0%	3.5
Living Arts Drive/Rathburn Road	2,391	2,234	-6.6%	3.3
Duke of York Boulevard/Rathburn Road	3,503	3,459	-1.3%	0.7
Confederation Parkway/Square One Drive	2,824	2,733	-3.2%	1.7
Living Arts Drive/Square One Drive	671	619	-7.7%	2.0
Duke of York Boulevard/Square One Drive	1,693	1,723	1.8%	0.7
Total Intersections	8			
# of Intersections GEH < 5	8			
% of Intersections GEH < 5	100%			

Table 4 – Comparison of Total Volumes at Study Area Intersections – PM Peak Hour

The overall intersection flows are matched acceptably well. GEH values for all intersections are below the target of 5. Additionally, all intersection approaches and turning movements register GEH values within the specified targets.

3.3.2 Travel Time Comparisons

Travel time survey data was collected along Rathburn Road in each direction. A travel-time study was conducted via the test vehicle method, in which the analyst performs measurements while in a moving vehicle within traffic streams. Automatic data collection equipment was utilized to aid with the collection process. A GPS unit was used to track the position and speed of the test vehicles as it travelled along the corridor. The travel-time study was conducted on Tuesday, April 5, 2016. In total, 12 test runs were conducted for the eastbound and westbound directions, respectively.

The following table excerpt from the ITE publication, *“Manual of Transportation Engineering Studies 2nd Edition – 1998”* was referenced to evaluate the collected travel time data. Within the document it recommends the minimum number of test runs to perform for travel-time and delay studies to achieve a specified confidence levels in the collected data.

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R	Minimum Sample Size <i>n</i> for Specified Permitted Error ϵ									
	Confidence Level: 99.73%					Confidence Level: 95%				
Mph (kph)	1 (1.6)	2 (3.2)	3 (4.8)	4 (6.4)	5 (8.0)	1 (1.6)	2 (3.2)	3 (4.8)	4 (6.4)	5 (8.0)
1 (1.6)	6	5	4	4	4	4	3	3	3	3
2 (3.2)	9	6	5	5	4	6	4	3	3	3
3 (4.8)	13	8	6	5	5	8	5	4	4	3
4 (6.4)	17	9	7	6	6	10	6	5	4	4
5 (8.0)	21	11	8	7	6	12	7	5	4	4
6 (9.7)	26	13	9	8	7	15	8	6	5	4
7 (11.3)	32	15	10	8	7	18	9	6	5	5
8 (12.9)	37	17	12	9	8	21	10	7	6	5
9 (14.5)	43	19	13	10	9	21	11	8	6	5
10 (16.1)	50	21	14	11	9	27	12	8	7	6

Table 5 – Minimum Number of Test Runs for Travel-Time and Delay Studies

Evaluation of the data indicated that the travel-time surveys provide a reasonable level of confidence for the travel time and speed in the corridor. The data was also compared to a travel-time run spot check undertaken in the field and was found to be comparable.

In the eastbound and westbound directions 22 test runs were made respectively, for a difference in maximum and minimum running speeds of 5 mph (8.0 kph), and at a desired permitted error of ± 2 mph (3.2 kph), with a resulting confidence level of 99.73% being achieved from the travel-time survey runs conducted. Alternatively, for a difference in maximum and minimum running speeds of 10 mph (16.1 kph), and at a permitted error of ± 4 mph (6.4 kph), a confidence level of 99.73% is also achieved from the travel-time survey runs conducted.

The travel-time survey comparison results are summarized in **Table 6** and **Table 7** below. The calibration targets for travel times to be achieved are that journey times through the corridor should be within 15% (or 1.0 minute, if higher) for greater than 85% of cases.

Direction	Road Section: Rathburn Road	AM Travel Time [mm:ss]		
		Observed	Modelled	Difference
EB	Elora Drive W – Elora Drive E	00:28	00:29	+00:01
	Elora Drive E – Confederation Parkway	00:42	00:47	+00:05
	Confederation Parkway – Living Arts Drive	00:15	00:39	+00:24
	Living Arts Drive – Duke of York Boulevard	00:16	00:40	+00:24
	Total	01:41	02:35	+00:54
WB	Duke of York Boulevard – Living Arts Drive	00:26	00:26	-
	Living Arts Drive – Confederation Parkway	00:18	00:43	+00:25
	Confederation Parkway – Elora Drive E	00:15	00:23	+00:08
	Elora Drive E – Elora Drive W	00:35	00:37	+00:02
	Total	01:34	02:09	+00:35

Table 6 – Comparison of Modelled and Observed Travel Times – AM Peak Hour



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Direction	Road Section: Rathburn Road	PM Travel Time [mm:ss]		
		Observed	Modelled	Difference
EB	Elora Drive W – Elora Drive E	00:47	00:51	+00:04
	Elora Drive E – Confederation Parkway	00:38	00:42	+00:04
	Confederation Parkway – Living Arts Drive	00:15	00:25	+00:10
	Living Arts Drive – Duke of York Boulevard	01:02	00:52	-00:10
	Total	02:42	02:50	+00:08
WB	Duke of York Boulevard – Living Arts Drive	00:58	00:53	-00:05
	Living Arts Drive – Confederation Parkway	01:33	01:16	-00:17
	Confederation Parkway – Elora Drive E	00:33	00:33	-
	Elora Drive E – Elora Drive W	00:42	00:43	+00:01
	Total	03:46	03:25	-00:21

Table 7 – Comparison of Modelled and Observed Travel Times – PM Peak Hour

The modelled travel times are within the target calibration criteria. The eastbound and westbound journey times through the study area are within the 15% or within 1.0 minute for all cases.

3.4 VALIDATION

Based on the calibration targets established and visual inspections undertaken in the field, it was determined that the VISSIM model has been successfully calibrated. The base model will be utilized as the foundation for other VISSIM models developed for this project.

ATTACHMENT A
TRIP MATRICES

AM Matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total Exiting	
																			Target	
Rathburn West	1		23	84	2	21	5	75	51	2	2	5	43	10	34	50	323	4	734	734
Elora W North	2	68		48	0	0	0	5	5	0	0	0	1	1	0	0	5	0	133	133
Elora W South	3	80	17		0	0	0	20	16	0	0	1	0	1	0	1	7	0	143	143
Elora E North	4	5	0	0		0	0	8	6	0	0	0	0	2	0	2	35	0	58	58
Private Access	5	54	0	0	0		0	5	10	0	0	0	0	0	0	0	10	0	79	79
335 Rathburn Condo	6	19	0	1	0	0		9	8	0	0	0	5	2	0	0	58	0	102	102
Confederation North	7	45	0	20	0	0	0		990	0	2	0	12	63	0	15	348	20	1515	1515
Confederation South	8	229	0	0	5	0	0	785		0	1	6	0	0	30	0	114	16	1186	1186
Square One West	9	0	0	0	0	0	0	0	30		0	0	0	0	0	0	0	0	30	30
Square One Dr Condos	10	13	0	0	0	0	0	45	0	0		2	30	2	35	4	19	4	154	154
Living Arts North	11	3	0	0	0	0	0	3	5	0	0		0	0	0	1	1	0	13	13
Living Arts South	12	19	0	0	2	2	0	16	0	0	1	6		25	34	0	65	10	180	180
Living Arts Parking Lot	13	1	0	0	0	0	0	2	0	0	0	0	2		0	2	2	1	10	10
Duke of York North	14	25	1	5	0	0	0	5	45	1	0	0	13	0		180	64	50	389	389
Duke of York South	15	20	0	0	0	0	0	49	0	0	0	0	0	2	90		1	28	190	190
Rathburn East	16	25	6	70	11	11	16	163	31	6	0	11	75	20	35	92		0	572	572
Square One East	17	0	0	5	2	2	0	5	0	0	4	5	18	10	5	38	0		94	94
Total Entering		606	47	233	22	36	21	1195	1197	9	10	36	199	138	263	385	1052	133		5582
Target		606	47	233	22	36	21	1195	1197	9	10	36	199	138	263	385	1052	133		5582

PM Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total Exiting		
																			Target	
Rathburn West	1		34	101	5	28	20	50	25	5	5	3	5	5	55	30	204	20	595	595
Elora W North	2	31		12	0	0	0	5	5	0	0	1	0	0	2	0	0	0	56	56
Elora W South	3	91	21		0	0	0	25	5	0	0	3	3	0	3	3	4	0	158	158
Elora E North	4	3	0	0		1	0	3	5	0	0	0	2	0	2	2	8	0	26	26
Private Access	5	17	0	0	0		0	5	2	0	0	0	0	0	0	0	0	0	24	24
335 Rathburn Condo	6	10	0	0	0	0		5	8	0	0	5	0	0	5	5	10	0	48	48
Confederation North	7	161	0	10	10	10	0		969	11	0	2	30	15	33	23	239	35	1548	1548
Confederation South	8	182	5	0	5	5	5	1277		0	10	10	2	5	1	0	100	5	1612	1612
Square One West	9	0	0	0	0	0	0	0	20		0	0	0	0	0	0	0	0	20	20
Square One Dr Condos	10	3	0	0	0	0	0	4	0	0		5	22	9	11	0	7	12	73	73
Living Arts North	11	14	0	0	0	0	0	4	10	0	14		0	0	0	5	15	5	67	67
Living Arts South	12	2	3	0	0	5	5	60	0	0	30	2		5	6	0	72	29	219	219
Living Arts Parking Lot	13	12	2	2	0	0	0	33	0	0	5	1	20		0	11	5	0	91	91
Duke of York North	14	10	0	0	0	0	0	35	26	0	32	0	51	5		207	93	127	586	586
Duke of York South	15	39	0	0	0	0	0	43	0	0	14	0	0	0	323		200	64	683	683
Rathburn East	16	449	8	55	35	19	38	177	65	0	12	5	75	0	79	169		0	1186	1249
Square One East	17	46	0	21	9	10	30	3	0	0	8	9	7	8	117	52	0		320	263
Total Entering	1070	73	201	64	78	98	1729	1140	16	130	46	217	52	637	507	957	297			7318
Target	1070	73	201	64	78	98	1729	1140	16	130	46	217	52	637	507	957	303			7318

ATTACHMENT B
VISSIM PARAMETERS

Vehicle Inputs

Volumes (Truck %) As calculated from TMC data - 2% Commercial - Overall Network
 Length of auto (default)
 Length of heavy truck (default)

Functions

Maximum acceleration (default)
 Desired acceleration (default)
 Maximum deceleration (default)
 Desired deceleration (default)

Routing

Static - Turning movements
 Distribution based on developed OD Matrix

Desired Speed and Reduced Speed

Arterials/Roads	Rathburn Road	Posted speed limit (50 km/h)
	Square One Drive	Posted speed limit (30 km/h)
	Confederation Parkway	Posted speed limit (50 km/h)
	Living Arts Drive	Posted speed limit (50 km/h)
	Duke of York Boulevard	Posted speed limit (50 km/h)
Reduced Speed Right Turns	Auto:	15 - 20 km/h (linear)
	Truck:	12 - 15 km/hr (linear)
Reduced Speed Left Turns	Auto:	25 - 30 km/h (linear)
	Truck:	20 - 25 km/h (linear)

Conflict Area/Priority Rules

Priority Rule	Right Turning		
	Min. Gap Time: 3.0 s; Min. Headway: 5.0 m; Max. Speed: 180 km/h		default
Conflict Areas			

**Driving Behaviour Parameter Sets
 Urban (motorized)**

Following

Car Following Model - Wiedemann 74

Look ahead distance
 min.: 0.00 m default
 max.: 250.00 m default
 Observed vehicles = 4 default

Look back distance
 min.: 0.00 m default
 max.: 150.00 m default

Temporary lack of attention
 Duration: 0.00 s default
 Probability: 0.00% default

Smooth closeup behaviour Checked On
 Standstill distance for static obstacles Checked off default

Model Parameters:
 Average standstill distance: 1.50
 Additive part of safety distance 1.50
 Multiplic. Part of safety distance 2.50

Lane Change

Free lane selection

Necessary lane change (route)
 Own Trailing vehicle
 Max deceleration -4.00 m/s² -3.00 m/s²
 -1 m/s² per distance 100.00 m 100.00 m
 Accepted deceleration -1.00 m/s² -1.00 m/s²

Wait time before diffusion 30.00 s
 min. headway (front/rear) 0.50 m
 Safety distance reduction factor 0.50
 Max deceleration for coop braking -3.00 m/s²

Overtake reduced speed areas Checked On
 Advanced merging Checked On

Lateral (defaults)

Signal Control (defaults)

APPENDIX C

VISSIM CALIBRATION REPORT

VISSIM Model Development and Calibration – Technical Report

Square One Drive EA
City of Mississauga



Prepared for:
City of Mississauga

Prepared by:
Stantec Consulting Ltd.

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Using the VISSIM micro-simulation software package (Version 8.00), a model will be developed to conduct analysis on existing conditions and to assess future alternatives of the extension.

2.0 MODEL DEVELOPMENT

The Federal Highway Administration's (FHWA) document "*Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modelling Software – July 2004*" was referenced as a guideline for the development of the VISSIM model. As outline and simplified by the FHWA document four important steps must be completed before calibrating and validating a VISSIM model:

1. Project Scope
2. Data Collection
3. Base Model Development
4. Error Checking

2.1 PROJECT SCOPE

The study area limits of the project extend from Elora Drive West at Rathburn Road easterly to Duke of York Boulevard at Rathburn Road, and extend south to Square One Drive.

Figure 1 illustrates the limits of the study area.

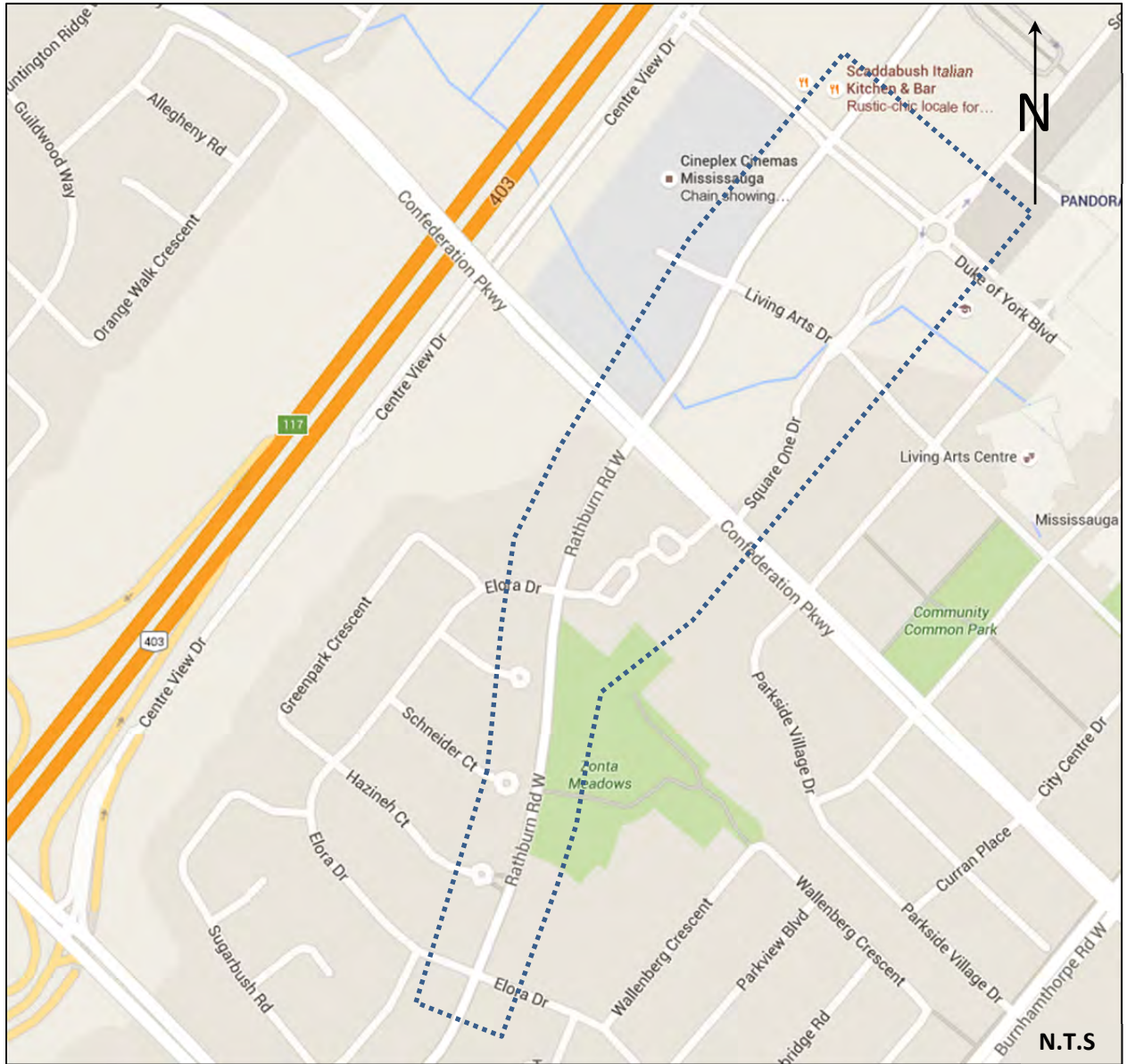
2.2 DATA COLLECTION

Data collection was required to provide input parameters and output measures of performance for calibration and validation of the micro-simulation model. A majority of the traffic data was provided by the City of Mississauga. Other data was directly collected from the field. For the development of the VISSIM model, intersection turning movement counts, posted speeds, travel time surveys, and intersection signal timing plan data was provided and/or collected.

2.3 BASE MODEL DEVELOPMENT

The next step in the development of a VISSIM model is the development of the base model that will be used for calibration and development of subsequent scenarios (i.e., assessment of alternatives). The base model development involved creating and coding the geometric network over a high-quality aerial image of the study area. The road network was coded with VISSIM's default "urban (motorized)" link behavior.

Once the geometric network was created, desired and reduced speeds were coded into the network. The desired speeds were based on the maximum posted speed limits in the field. Reduced speeds for turns are based on industry accepted values. The speeds coded within the model are tabulated below in **Table 1** and **Table 2**.



Study Area

Figure 1
Study Area
Mississauga, Ontario

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Road	Desired Speed
Rathburn Road	Maximum posted = 50 km/h
Square One Drive	Maximum posted = 30 km/h
Confederation Parkway	Maximum posted = 50 km/h
Living Arts Drive	Maximum posted = 50 km/h
Duke of York Boulevard	Maximum posted = 50 km/h

Table 1 – Desired Speeds

Turn Direction	Reduced Speed Area Zone
Left-Turn (Passenger Vehicle)	30 km/h
Left-Turn (Heavy Vehicle/Bus)	25 km/h
Right-Turn (Passenger Vehicle)	15 km/h
Right-Turn (Heavy Vehicle/Bus)	12 km/h

Table 2 – Turn Speeds

Intersection control was then coded within the model per the signal timing plans provided. Right-turns on red were coded where allowed in the field using the software's feature.

Conflict points and priority rules were next coded into the VISSIM model. Conflict points were coded in locations where links/connectors cross and have the potential for vehicles to cross paths. The default parameters were used for conflict points. Priority rules were incorporated into the model at certain locations where a conflict point would not accurately replicate the behavior of conflicting vehicles.

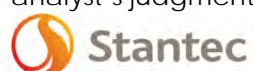
From the traffic data, an origin-destination matrix was formulated for the VISSIM network to determine the model's vehicle inputs and outputs. The matrix was utilized in coding the vehicle inputs as well as vehicle routing decisions. Vehicle inputs were coded into the model by an hourly flow rate and vehicle compositions. The existing weekday a.m. and p.m. peak hour matrices have been provided for reference in **Attachment A**.

2.4 ERROR CHECKING

The error checking portion of the model development process is focused on fixing large coding errors before the time-consuming calibration and validation process begins. Error checking is a process that involves a detailed review of the coded data and a review of the animation.

All coded data which includes geometry, speeds, signal timing plan data, and traffic volumes were reviewed by the model developer/analyst and by a quality control reviewer.

The detailed review of the simulation animation was conducted to determine if any locations within the model where conflict points or priority rules are missing, where signal timings may not be functioning correctly, or if any other locations where general coding parameters may have been missed or coded incorrectly. Some parameters in the model were adjusted based on the analyst's judgment to accurately capture the interactions of the vehicles on the network as part



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of this review. A list of the parameter adjustments has been provided for reference in **Attachment B**.

3.0 CALIBRATION/VALIDATION

3.1 MODEL PARAMETERS

The calibration of a model is a fundamental process as it is necessary to ensure that the model is a true representation that will successfully replicate actual traffic operations. The calibration and validation of the model also provides a level of confidence to which results can be ascertained. The calibration process involves the adjustment of model parameters, which is done iteratively until an accurate representation of the prevailing roadway network is achieved.

Calibration parameters can be separated into two categories, system calibration parameters and operational calibration parameters. System calibration involves the investigation of model input assumptions (vehicle inputs, vehicle routing, etc.) and operational calibration focuses on detailed driver behavior characteristics that affect the overall traffic operations in the model.

Within the system calibration stage, the goal is to verify and check all assumptions of inputs associated with the model. The objective is to identify where uncertainties were introduced in the base model and to determine their effect on the overall system operations. System calibration parameters includes the assumptions made on vehicle route choice, traffic demand inputs, traffic compositions, study area boundaries, and the temporal distribution of demand and routing. Additionally, the input data such as signal timings, roadway speed distributions, and roadway geometry characteristics are also checked for consistency between the other model inputs.

Within the operational calibration stage, the model parameters that affect the overall traffic operations of the network are modified. Operational calibration consists of modifying the detailed driver behavior parameters that affect the overall capacity of the transportation facilities, aggressiveness of drivers, and locations for lane changing. The adjustment of these parameters is essential for modeling freeway bottlenecks and local driving behavior that can affect the overall traffic flow, speeds, capacity, and congestion. Parameters may include car following characteristics (headway, standstill distance, safety distance), lane changing accepted deceleration rates, route lane change distances, and lane selection. The operational calibration stage requires the model time and resources to complete.

Validation is defined as the process of comparing simulated model results with field observed data to determine the accuracy of the simulation model. The goal of model validation is to identify parameter settings in the simulation model which produce outputs that match field data. Parameters are adjusted until an acceptable match is converged upon between the observed field data and the results of the modelled existing conditions. It is the final step in the iterative calibration process. Based on the calibration/validation targets set, the validation check determines how closely the model is to replicating the actual study area. Visual inspection of the simulation model is undertaken during this stage. If the calibration/validation targets are not met, the system and operational calibration process is revisited in order to make

more modifications to the model. Data should be evaluated to determine the best parameters to modify during the next iteration.

Once a model is calibrated and validated, it can then be utilized with confidence to analyze future scenarios which may include modifications to trip distribution, travel demand, or changes in the geometry of the roadway.

3.2 DETERMINATION OF CALIBRATION/VALIDATION TARGETS

The measures of effectiveness (MOE's) selected include intersection turning movement volumes, travel time, and vehicle speeds.

Targets are used to determine if the calibration process has reached a level of acceptability between the simulated model and the field measures of effectiveness. Within the FHWA's document "*Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modelling Software – July 2004*" under section 5.6 Calibration Targets, the calibration targets detailed for travel times and visual audits as listed within Table 4 were utilized. In addition, other industry standard targets have been summarized below.

- Achieve 80% for the majority of the compared TMC (Turning Movement Count) data sets with an overall GEH value < 5;
- Verify that no signification link, intersection approach or turning movement flows have a GEH value of greater than 10.0;
- An absolute variation between the modelled and observed data or not more than 25%;
- Journey times within the network are within 15% (or 1.0 minute, if higher) for greater than 85% of cases; and
- Individual link speeds, visually acceptable speed-flow relationship to the analyst's satisfaction.

3.3 BASE MODEL CALIBRATION RESULTS

3.3.1 Flow Comparisons

The calibration/validation process involved an assessment and comparison between the modelled and observed turning movement volumes at intersections. As part of the flow comparison, the GEH statistic was utilized as criteria for determining how well the results matched. The GEH statistic is a modified Chi-Square statistic that incorporates both relative and absolute differences.

The GEH statistic is computed as follows:



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$$GEH = \sqrt{\frac{(M - O)^2}{0.5 * (M + O)}}$$

Where:

- M: Simulated/Modelled Flows
O: Observed Flows

GEH values provide an indication of the goodness of fit as outlined below:

- GEH < 5 Flows can be considered a good fit
5 < GEH < 10 Flows may require further investigation
GEH > 10 Flows cannot be considered to be a good fit

A comparison of modelled and observed flows was conducted for individual turning movement volumes at the study area intersections. The modelled traffic volumes as well as the simulation outputs were obtained as a mean of multiple computer model runs. Averaged results provide a proper representation as this kind of micro-simulation analysis is a stochastic process in which every computer run represents a single observation. A complete experiment therefore consisted of multiple computer runs, whose outputs were averaged to obtain the final modelled results that were then compared with the observed data.

The comparison of existing observed and modelled intersection traffic volumes is summarized in **Table 3** and **Table 4**. Full intersection turning movement volume comparison tables have been provided for reference in **Attachment C**.

Intersection	AM Peak Hour			
	Observed	Modelled	% Diff	GEH
Elora Drive W/Rathburn Road	1,576	1,578	0.1%	0.1
Elora Drive E/Rathburn Road	1,369	1,372	0.2%	0.1
Confederation Parkway/Rathburn Road	4,081	4,117	0.9%	0.6
Living Arts Drive/Rathburn Road	1,919	1,951	1.7%	0.7
Duke of York Boulevard/Rathburn Road	2,332	2,337	0.2%	0.1
Confederation Parkway/Square One Drive	2,473	2,481	0.3%	0.2
Living Arts Drive/Square One Drive	523	543	3.8%	0.9
Duke of York Boulevard/Square One Drive	800	852	6.5%	1.8
Total Intersections	8			
# of Intersections GEH < 5	8			
% of Intersections GEH < 5	100%			

Table 3 – Comparison of Total Volumes at Study Area Intersections – AM Peak Hour

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Intersection	PM Peak Hour			
	Observed	Modelled	% Diff	GEH
Elora Drive W/Rathburn Road	1,863	1,823	-2.1%	0.9
Elora Drive E/Rathburn Road	1,711	1,663	-2.8%	1.2
Confederation Parkway/Rathburn Road	4,934	4,688	-5.0%	3.5
Living Arts Drive/Rathburn Road	2,391	2,234	-6.6%	3.3
Duke of York Boulevard/Rathburn Road	3,503	3,459	-1.3%	0.7
Confederation Parkway/Square One Drive	2,824	2,733	-3.2%	1.7
Living Arts Drive/Square One Drive	671	619	-7.7%	2.0
Duke of York Boulevard/Square One Drive	1,693	1,723	1.8%	0.7
Total Intersections	8			
# of Intersections GEH < 5	8			
% of Intersections GEH < 5	100%			

Table 4 – Comparison of Total Volumes at Study Area Intersections – PM Peak Hour

The overall intersection flows are matched acceptably well. GEH values for all intersections are below the target of 5. Additionally, all intersection approaches and turning movements register GEH values within the specified targets.

3.3.2 Travel Time Comparisons

Travel time survey data was collected along Rathburn Road in each direction. A travel-time study was conducted via the test vehicle method, in which the analyst performs measurements while in a moving vehicle within traffic streams. Automatic data collection equipment was utilized to aid with the collection process. A GPS unit was used to track the position and speed of the test vehicles as it travelled along the corridor. The travel-time study was conducted on Tuesday, April 5, 2016. In total, 12 test runs were conducted for the eastbound and westbound directions, respectively.

The following table excerpt from the ITE publication, *“Manual of Transportation Engineering Studies 2nd Edition – 1998”* was referenced to evaluate the collected travel time data. Within the document it recommends the minimum number of test runs to perform for travel-time and delay studies to achieve a specified confidence levels in the collected data.

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R	Minimum Sample Size <i>n</i> for Specified Permitted Error ϵ									
	Confidence Level: 99.73%					Confidence Level: 95%				
Mph (kph)	1 (1.6)	2 (3.2)	3 (4.8)	4 (6.4)	5 (8.0)	1 (1.6)	2 (3.2)	3 (4.8)	4 (6.4)	5 (8.0)
1 (1.6)	6	5	4	4	4	4	3	3	3	3
2 (3.2)	9	6	5	5	4	6	4	3	3	3
3 (4.8)	13	8	6	5	5	8	5	4	4	3
4 (6.4)	17	9	7	6	6	10	6	5	4	4
5 (8.0)	21	11	8	7	6	12	7	5	4	4
6 (9.7)	26	13	9	8	7	15	8	6	5	4
7 (11.3)	32	15	10	8	7	18	9	6	5	5
8 (12.9)	37	17	12	9	8	21	10	7	6	5
9 (14.5)	43	19	13	10	9	21	11	8	6	5
10 (16.1)	50	21	14	11	9	27	12	8	7	6

Table 5 – Minimum Number of Test Runs for Travel-Time and Delay Studies

Evaluation of the data indicated that the travel-time surveys provide a reasonable level of confidence for the travel time and speed in the corridor. The data was also compared to a travel-time run spot check undertaken in the field and was found to be comparable.

In the eastbound and westbound directions 22 test runs were made respectively, for a difference in maximum and minimum running speeds of 5 mph (8.0 kph), and at a desired permitted error of ± 2 mph (3.2 kph), with a resulting confidence level of 99.73% being achieved from the travel-time survey runs conducted. Alternatively, for a difference in maximum and minimum running speeds of 10 mph (16.1 kph), and at a permitted error of ± 4 mph (6.4 kph), a confidence level of 99.73% is also achieved from the travel-time survey runs conducted.

The travel-time survey comparison results are summarized in **Table 6** and **Table 7** below. The calibration targets for travel times to be achieved are that journey times through the corridor should be within 15% (or 1.0 minute, if higher) for greater than 85% of cases.

Direction	Road Section: Rathburn Road	AM Travel Time [mm:ss]		
		Observed	Modelled	Difference
EB	Elora Drive W – Elora Drive E	00:28	00:29	+00:01
	Elora Drive E – Confederation Parkway	00:42	00:47	+00:05
	Confederation Parkway – Living Arts Drive	00:15	00:39	+00:24
	Living Arts Drive – Duke of York Boulevard	00:16	00:40	+00:24
	Total	01:41	02:35	+00:54
WB	Duke of York Boulevard – Living Arts Drive	00:26	00:26	-
	Living Arts Drive – Confederation Parkway	00:18	00:43	+00:25
	Confederation Parkway – Elora Drive E	00:15	00:23	+00:08
	Elora Drive E – Elora Drive W	00:35	00:37	+00:02
	Total	01:34	02:09	+00:35

Table 6 – Comparison of Modelled and Observed Travel Times – AM Peak Hour



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Direction	Road Section: Rathburn Road	PM Travel Time [mm:ss]		
		Observed	Modelled	Difference
EB	Elora Drive W – Elora Drive E	00:47	00:51	+00:04
	Elora Drive E – Confederation Parkway	00:38	00:42	+00:04
	Confederation Parkway – Living Arts Drive	00:15	00:25	+00:10
	Living Arts Drive – Duke of York Boulevard	01:02	00:52	-00:10
	Total	02:42	02:50	+00:08
WB	Duke of York Boulevard – Living Arts Drive	00:58	00:53	-00:05
	Living Arts Drive – Confederation Parkway	01:33	01:16	-00:17
	Confederation Parkway – Elora Drive E	00:33	00:33	-
	Elora Drive E – Elora Drive W	00:42	00:43	+00:01
	Total	03:46	03:25	-00:21

Table 7 – Comparison of Modelled and Observed Travel Times – PM Peak Hour

The modelled travel times are within the target calibration criteria. The eastbound and westbound journey times through the study area are within the 15% or within 1.0 minute for all cases.

3.4 VALIDATION

Based on the calibration targets established and visual inspections undertaken in the field, it was determined that the VISSIM model has been successfully calibrated. The base model will be utilized as the foundation for other VISSIM models developed for this project.

ATTACHMENT A
TRIP MATRICES

AM Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total Exiting		
																			Target	
Rathburn West	1		23	84	2	21	5	75	51	2	2	5	43	10	34	50	323	4	734	734
Elora W North	2	68		48	0	0	0	5	5	0	0	0	1	1	0	0	5	0	133	133
Elora W South	3	80	17		0	0	0	20	16	0	0	1	0	1	0	1	7	0	143	143
Elora E North	4	5	0	0		0	0	8	6	0	0	0	0	2	0	2	35	0	58	58
Private Access	5	54	0	0	0		0	5	10	0	0	0	0	0	0	0	10	0	79	79
335 Rathburn Condo	6	19	0	1	0	0		9	8	0	0	0	5	2	0	0	58	0	102	102
Confederation North	7	45	0	20	0	0	0		990	0	2	0	12	63	0	15	348	20	1515	1515
Confederation South	8	229	0	0	5	0	0	785		0	1	6	0	0	30	0	114	16	1186	1186
Square One West	9	0	0	0	0	0	0	0	30		0	0	0	0	0	0	0	0	30	30
Square One Dr Condos	10	13	0	0	0	0	0	45	0	0		2	30	2	35	4	19	4	154	154
Living Arts North	11	3	0	0	0	0	0	3	5	0	0		0	0	0	1	1	0	13	13
Living Arts South	12	19	0	0	2	2	0	16	0	0	1	6		25	34	0	65	10	180	180
Living Arts Parking Lot	13	1	0	0	0	0	0	2	0	0	0	0	2		0	2	2	1	10	10
Duke of York North	14	25	1	5	0	0	0	5	45	1	0	0	13	0		180	64	50	389	389
Duke of York South	15	20	0	0	0	0	0	49	0	0	0	0	0	2	90		1	28	190	190
Rathburn East	16	25	6	70	11	11	16	163	31	6	0	11	75	20	35	92		0	572	572
Square One East	17	0	0	5	2	2	0	5	0	0	4	5	18	10	5	38	0		94	94
Total Entering	606	47	233	22	36	21	1195	1197	9	10	36	199	138	263	385	1052	133			5582
Target	606	47	233	22	36	21	1195	1197	9	10	36	199	138	263	385	1052	133			5582

PM Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total Exiting		
																			Target	
Rathburn West	1		34	101	5	28	20	50	25	5	5	3	5	5	55	30	204	20	595	595
Elora W North	2	31		12	0	0	0	5	5	0	0	1	0	0	2	0	0	0	56	56
Elora W South	3	91	21		0	0	0	25	5	0	0	3	3	0	3	3	4	0	158	158
Elora E North	4	3	0	0		1	0	3	5	0	0	0	2	0	2	2	8	0	26	26
Private Access	5	17	0	0	0		0	5	2	0	0	0	0	0	0	0	0	0	24	24
335 Rathburn Condo	6	10	0	0	0	0		5	8	0	0	5	0	0	5	5	10	0	48	48
Confederation North	7	161	0	10	10	10	0		969	11	0	2	30	15	33	23	239	35	1548	1548
Confederation South	8	182	5	0	5	5	5	1277		0	10	10	2	5	1	0	100	5	1612	1612
Square One West	9	0	0	0	0	0	0	0	20		0	0	0	0	0	0	0	0	20	20
Square One Dr Condos	10	3	0	0	0	0	0	4	0	0		5	22	9	11	0	7	12	73	73
Living Arts North	11	14	0	0	0	0	0	4	10	0	14		0	0	0	5	15	5	67	67
Living Arts South	12	2	3	0	0	5	5	60	0	0	30	2		5	6	0	72	29	219	219
Living Arts Parking Lot	13	12	2	2	0	0	0	33	0	0	5	1	20		0	11	5	0	91	91
Duke of York North	14	10	0	0	0	0	0	35	26	0	32	0	51	5		207	93	127	586	586
Duke of York South	15	39	0	0	0	0	0	43	0	0	14	0	0	0	323		200	64	683	683
Rathburn East	16	449	8	55	35	19	38	177	65	0	12	5	75	0	79	169		0	1186	1249
Square One East	17	46	0	21	9	10	30	3	0	0	8	9	7	8	117	52	0		320	263
Total Entering	1070	73	201	64	78	98	1729	1140	16	130	46	217	52	637	507	957	297			7318
Target	1070	73	201	64	78	98	1729	1140	16	130	46	217	52	637	507	957	303			7318

ATTACHMENT B
VISSIM PARAMETERS

Vehicle Inputs

Volumes (Truck %) As calculated from TMC data - 2% Commercial - Overall Network
 Length of auto (default)
 Length of heavy truck (default)

Functions

Maximum acceleration (default)
 Desired acceleration (default)
 Maximum deceleration (default)
 Desired deceleration (default)

Routing

Static - Turning movements
 Distribution based on developed OD Matrix

Desired Speed and Reduced Speed

Arterials/Roads	Rathburn Road	Posted speed limit (50 km/h)
	Square One Drive	Posted speed limit (30 km/h)
	Confederation Parkway	Posted speed limit (50 km/h)
	Living Arts Drive	Posted speed limit (50 km/h)
	Duke of York Boulevard	Posted speed limit (50 km/h)
Reduced Speed Right Turns	Auto:	15 - 20 km/h (linear)
	Truck:	12 - 15 km/hr (linear)
Reduced Speed Left Turns	Auto:	25 - 30 km/h (linear)
	Truck:	20 - 25 km/h (linear)

Conflict Area/Priority Rules

Priority Rule	Right Turning		
	Min. Gap Time: 3.0 s; Min. Headway: 5.0 m; Max. Speed: 180 km/h		default
Conflict Areas			

**Driving Behaviour Parameter Sets
 Urban (motorized)**

Following

Car Following Model - Wiedemann 74

Look ahead distance

min.:	0.00 m	default
max.:	250.00 m	default
Observed vehicles =	4	default

Look back distance

min.:	0.00 m	default
max.:	150.00 m	default

Temporary lack of attention

Duration:	0.00 s	default
Probability:	0.00%	default

Smooth closeup behaviour Checked On
 Standstill distance for static obstacles Checked off default

Model Parameters:

Average standstill distance:	1.50
Additive part of safety distance	1.50
Multiplic. Part of safety distance	2.50

Lane Change

Free lane selection

Necessary lane change (route)

	Own	Trailing vehicle
Max deceleration	-4.00 m/s ²	-3.00 m/s ²
-1 m/s ² per distance	100.00 m	100.00 m
Accepted deceleration	-1.00 m/s ²	-1.00 m/s ²

Wait time before diffusion 30.00 s
 min. headway (front/rear) 0.50 m
 Safety distance reduction factor 0.50
 Max deceleration for coop braking -3.00 m/s²

Overtake reduced speed areas Checked On
 Advanced merging Checked On

Lateral (defaults)

Signal Control (defaults)

ATTACHMENT C
FULL TMC TABLES

APPENDIX D

DETAILED TMC RESULTS

APPENDIX D
DETAILED TMC RESULTS
EXISTING

APPENDIX E
FORECASTING MEMORANDUM

To: File From: Steven Kwan
Adrian Soo
Markham, ON Markham, ON

File: 165011005 Date: April 28, 2016

**Reference: Square One Drive Extension Class EA
Traffic Forecasting**

1.0 Introduction and Background

This memo documents the methodology and analysis undertaken to develop the future traffic forecasts for the Square One Drive Extension Class EA. The traffic analysis Study Area is shown in **Figure 1**.

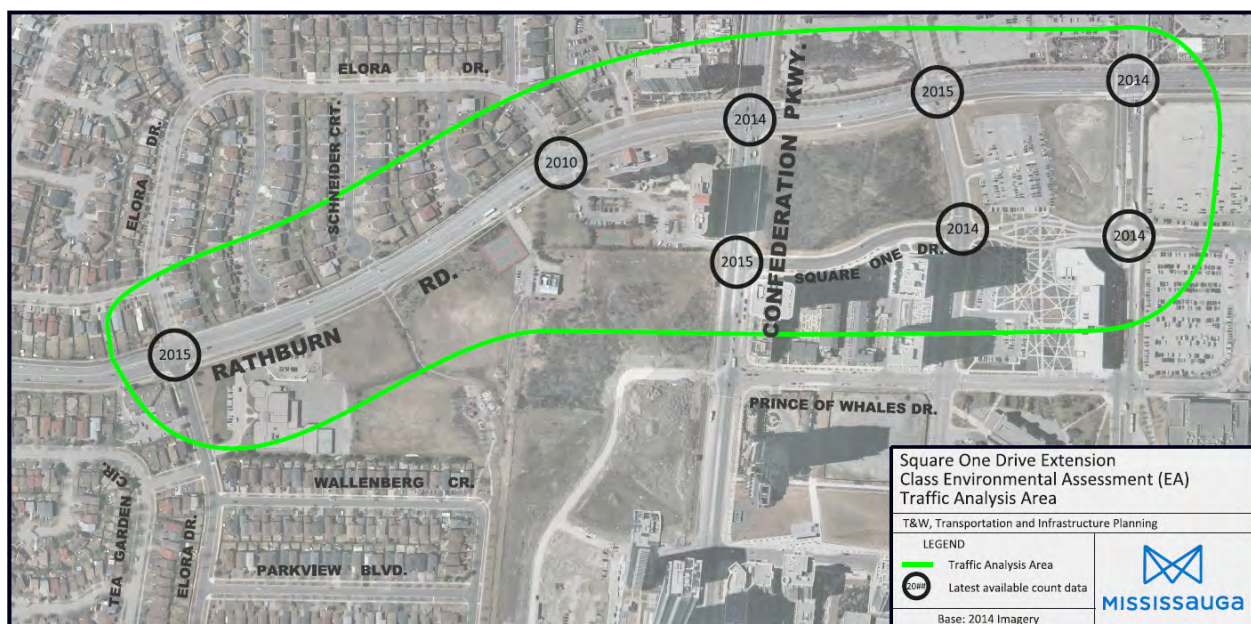


Figure 1 – Traffic Analysis Study Area

Traffic forecasts were developed for the following scenarios:

- 2021 no extension of Square One Drive to Rathburn Road (all other planned improvements);
- 2031 no extension of Square One Drive to Rathburn Road (all other planned improvements);
- 2041 no extension of Square One Drive to Rathburn Road (all other planned improvements);
- 2021 extension of Square One Drive to Rathburn Road;
- 2031 extension of Square One Drive to Rathburn Road; and

**Reference: Square One Drive Extension Class EA
Traffic Forecasting**

- 2041 extension of Square One Drive to Rathburn Road.

2.0 Macro-Modelling

The City of Mississauga's EMME/3 model was used to assist in developing future traffic forecasts. The City uses the "Simplified GTA Model" which was developed by Peter Dalton Inc. The EMME model is calibrated and validated based on the 2011 Transportation Tomorrow Survey (TTS), cordon and ATR traffic counts.

The major transportation network changes and the associated horizon year are summarized as follows:

1. 2021 horizon year (with and without the extension of Square One Drive)
 - Extension of Living Arts Drive to Centre View Drive;
 - Hurontario LRT with associated lane reductions on Hurontario Street, Duke of York Boulevard, Burnhamthorpe Road, and changes to intersection control and operations; and
 - New roadways associated with the Amacon, Rogers, and other developments.
2. 2031 horizon year (with and without the extension of Square One Drive)
 - New roadways associated with new development south of Burnhamthorpe Road.
3. 2041 horizon year (with and without the extension of Square One Drive)
 - New north service road on the north side of Highway 403;
 - Extension of Duke of York Boulevard and City Centre Drive over Highway 403;
 - Removal of the loop ramp from eastbound Rathburn Road to northbound Hurontario Street;
 - Extension of Centre View Drive to Hurontario Street;
 - Extension of Square One Drive east of Hurontario Street;
 - Lane additions on Burnhamthorpe Road east of Hurontario Street;
 - Removal of Highway 403 EB off-ramp at Hurontario Street; and
 - Reconfiguration of Highway 403 WB off-ramp at Mavis Road to connect to the new north service road.

**Reference: Square One Drive Extension Class EA
 Traffic Forecasting**

Substantial development is expected within and adjacent to the Study Area in the downtown area. A summary of the model population and employment values for the 2011, 2021, 2031, and 2041 scenarios are shown in **Table 1**.

Table 1 Model Population and Employment Values		
Scenario	Population	Employment
2011	31,860	21,250
2021	49,080 (4.4% p.a. from 2011)	26,910 (2.4% p.a. from 2011)
2031	65,430 (2.9% p.a. from 2021)	32,210 (1.8% p.a. from 2021)
2041	74,760 (2.3% p.a. from 2031)	37,570 (1.6% p.a. from 2031)

3.0 Future Traffic Forecast Development

In order to develop growth rates for roadways within the Study Area, screenline volumes were compared between the 2011 base model volumes and the 2021, 2031, and 2041 model volumes, both with and without the extension of Square One Drive. These included vertical screenlines to assess east-west travel along Centre View Drive, Rathburn Road, Square One Drive, and Burnhamthorpe Road at the following locations:

- V1 – West of Confederation Parkway;
- V2 – West of Living Arts Drive; and
- V3 – West of Duke of York Boulevard.

Horizontal screenlines were used to assess north-south travel along Confederation Parkway, Living Arts Drive, and Duke of York Boulevard at the following locations:

- H1 – North of Rathburn Road;
- H2 – North of Square One Drive; and
- H3 – North of Burnhamthorpe Road

The total traffic volumes for each screenline were compared to the volumes in the preceding horizon year in order to develop a per annum growth rate. The growth rates for two-way traffic between the 2021, 2031 and 2041 horizon years for the with and without the extension of Square One Drive scenarios are summarized in **Table 2**. The detailed calculation tables with individual directional link volumes are attached in **Appendix A** for reference.

**Reference: Square One Drive Extension Class EA
Traffic Forecasting**

Table 2 Two-Way Traffic Screenline Growth Rates												
Screenline	2011 to 2021				2021 to 2031				2031 to 2041			
	AM		PM		AM		PM		AM		PM	
	No Ext	w/ Ext	No Ext	w/ Ext	No Ext	w/ Ext	No Ext	w/ Ext	No Ext	w/ Ext	No Ext	w/ Ext
V1	1.1%	0.9%	2.2%	1.7%	1.3%	1.1%	1.1%	1.6%	1.2%	1.2%	1.3%	1.2%
V2	0.4%	0.4%	1.7%	1.4%	1.5%	1.0%	1.3%	1.6%	1.2%	1.5%	1.1%	1.2%
V3	-0.1%	0.0%	0.8%	0.6%	1.6%	1.2%	1.4%	1.8%	1.4%	1.6%	1.8%	1.6%
H1	1.4%	1.4%	2.3%	2.1%	1.1%	1.1%	1.5%	1.5%	1.9%	1.9%	1.7%	1.8%
H2	1.7%	1.3%	2.3%	2.1%	1.3%	1.3%	1.9%	1.7%	1.9%	2.1%	2.0%	2.0%
H3	-0.5%	-0.9%	0.4%	0.3%	0.9%	1.0%	1.5%	1.1%	1.1%	1.1%	1.2%	1.5%

Based on the calculated growth rates, there is minimal difference between the growth rates in the no extension of Square One Drive scenario and with the extension of Square One Drive scenario. This suggests that the extension of Square One Drive would primarily serve a collector road function, providing access to local developments rather than an arterial road function serving traffic travelling through the Study Area.

As might be expected based on the increase of population and employment values in the model, traffic volumes across each of the screenlines generally exhibit robust growth ranging from 1% to 2% per annum (p.a.) between each of the horizon years. The growth rates applied to the existing a.m. and p.m. peak hour traffic volumes shown in **Figure 2** follow:

- From 2011 to 2021, 1.5% p.a. for east-west and north-south traffic;
- From 2021 to 2031, 1.25% p.a. for east-west and north-south traffic;
- From 2031 to 2041, 1.5% p.a. for east-west and north-south traffic.

Sheridan College Phase 2 and the Amacon lands are two of the major developments within the Study Area expected to be developed by the 2021 horizon year. In order to capture the transportation impact of these developments, the site traffic generated by the Sheridan College Phase 2 development was obtained from the previously completed Traffic Impact Assessment by BA Group, dated August 20, 2015. Site traffic for the Amacon lands was generated based on the Amacon estimate of 2,700 residential units, 80,000 ft² (7,400 m²) of commercial office space and 70,000 ft² (6,500 m²) of commercial retail space using rates from the ITE *Trip Generation* manual.

In order to avoid double counting the increase in traffic due to these developments, no change was made to the population and employment values for the associated zones in the City's model from the 2011 scenario. The trip generation calculations and site traffic assignments are attached in **Appendix A** for reference. It should be noted that some traffic associated with both of these developments was assigned to the extension of Square One Drive in that particular scenario.

**Reference: Square One Drive Extension Class EA
Traffic Forecasting**

Other traffic volumes in the Study Area were manually reassigned to account for the extension of Square One Drive and the impacts on land access. These adjustments were applied in the following fashion:

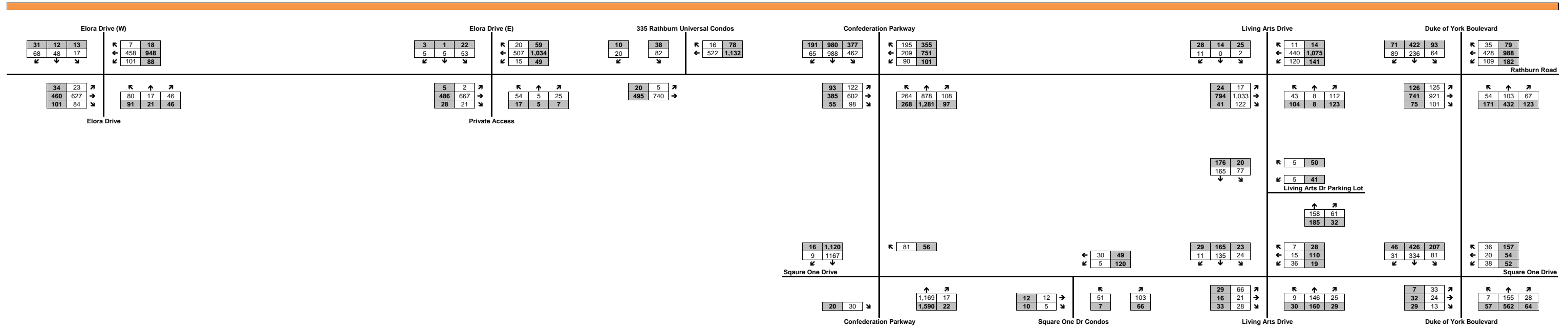
- In order to account for the redistribution of traffic due to the extension of Square One Drive to Rathburn Road, 60% of the traffic making the westbound right-turn movement at the Confederation Parkway at Square One Drive intersection was reassigned to the westbound through movement. The same value was then subtracted from the northbound left-turn movement at the Confederation Parkway at Rathburn Road intersection and the westbound through movements at the Rathburn Road at Elora Drive intersections. This diversion percentage was selected based on existing traffic patterns, traffic observations, and model information.
- While it is relatively easy to identify westbound vehicles on Square One Drive potentially destined for Rathburn Road, it is more challenging to identify vehicles in the opposite direction, i.e. eastbound on Rathburn Road to Square One Drive due to the turning restrictions at the Confederation Parkway at Square One Drive intersection. Consequently, these vehicle volumes were estimated by reversing the westbound through volume in the opposite peak hour. For example, 40 and 50 westbound through vehicles in the a.m. and p.m. peak hours, respectively, would become 50 and 40 eastbound through vehicles in the a.m. and p.m. peak hours, respectively at the Confederation Parkway at Square One Drive intersection. This value was then subtracted from the eastbound through movement at the Confederation Parkway at Rathburn Road intersection, the Living Arts Drive at Rathburn Road intersection, and eastbound right-turn movement at the Duke of York Boulevard at Rathburn Road intersection.
- For the existing condominium development in the southwest quadrant of the Confederation Parkway at Rathburn Road intersection, traffic associated with the Confederation Parkway access was reassigned to an assumed mid-block connection to the extension of Square One Drive.
- For movements which traffic was not manually reassigned to and would expected to be extremely low, i.e. the westbound left-turn movement from Rathburn Road to Square One Drive, a nominal placeholder value of 5 vehicles per hour was used instead of showing 0 vehicles per hour.

The resulting future traffic forecasts, including traffic associated with the Amacon lands and Sheridan College are shown in the following figures:

- **Figure 3** – 2021 Future Traffic – No Extension of Square One Drive;
- **Figure 4** – 2021 Future Traffic – With Extension of Square One Drive;
- **Figure 5** – 2031 Future Traffic – No Extension of Square One Drive;
- **Figure 6** – 2031 Future Traffic – With Extension of Square One Drive;

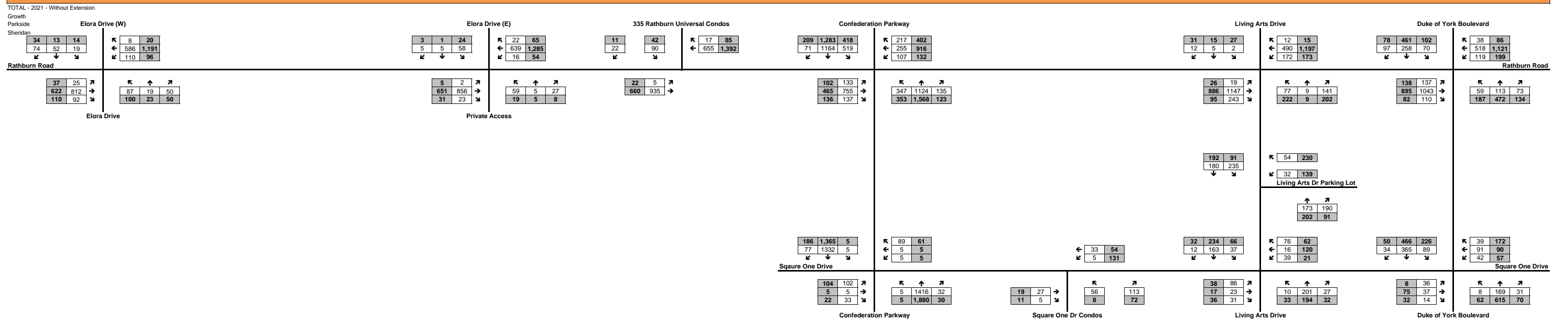
**Reference: Square One Drive Extension Class EA
Traffic Forecasting**

- **Figure 7** – 2041 Future Traffic – No Extension of Square One Drive; and
- **Figure 8** – 2041 Future Traffic – With Extension of Square One Drive.



AM Peak Hour 123
 PM Peak Hour 123

Figure 2
 Existing Base Year Traffic



AM Peak Hour 123
PM Peak Hour 123

Figure 3
2021 Future Traffic - No Extension of Square One Drive

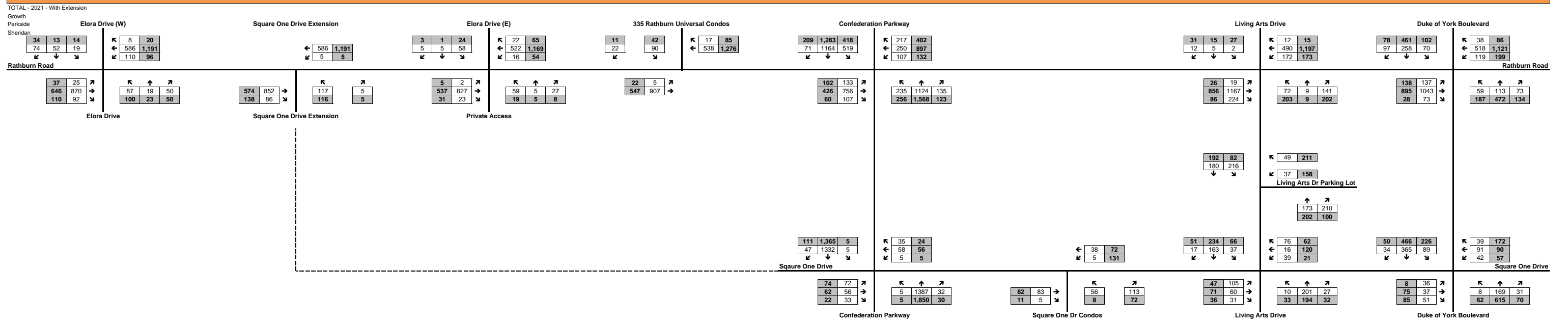
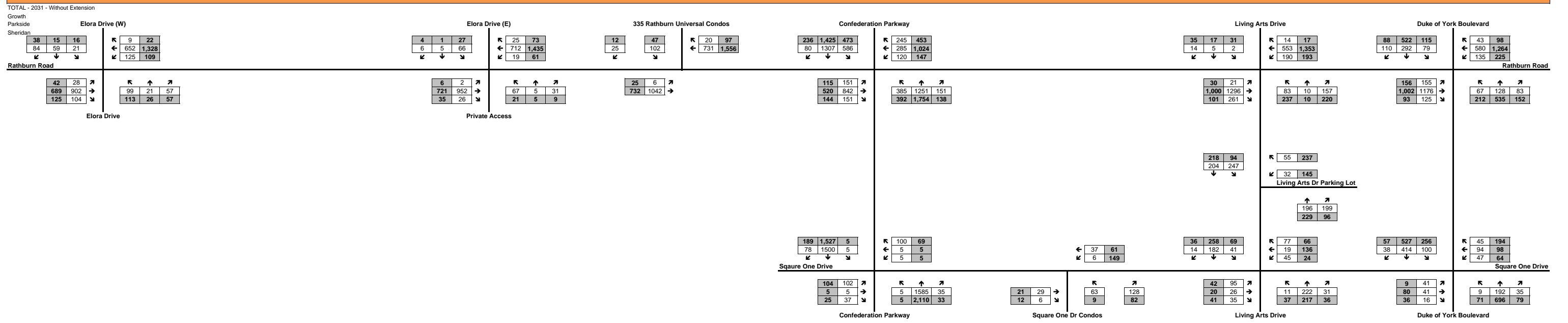


Figure 4
2021 Future Traffic - With Extension of Square One Drive



AM Peak Hour 123
PM Peak Hour 123

Figure 5
2031 Future Traffic - No Extension of Square One Drive

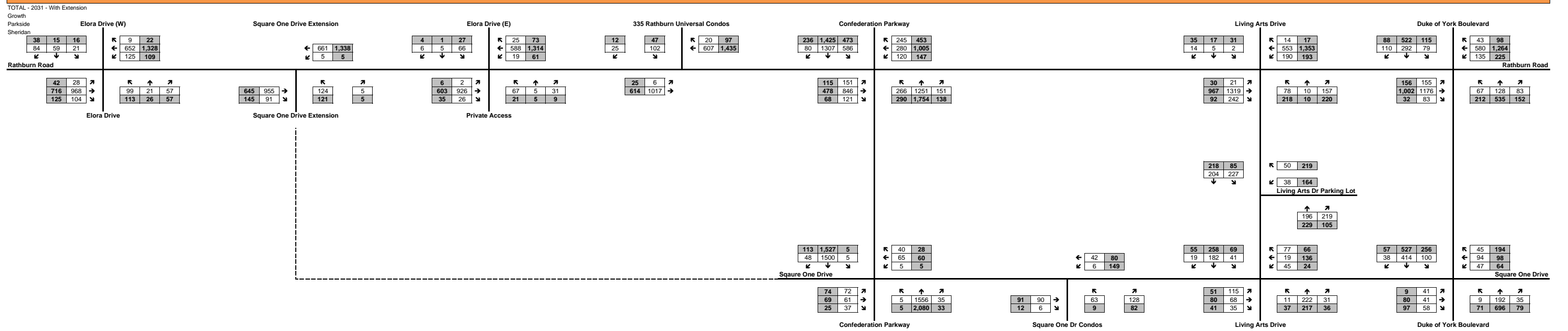
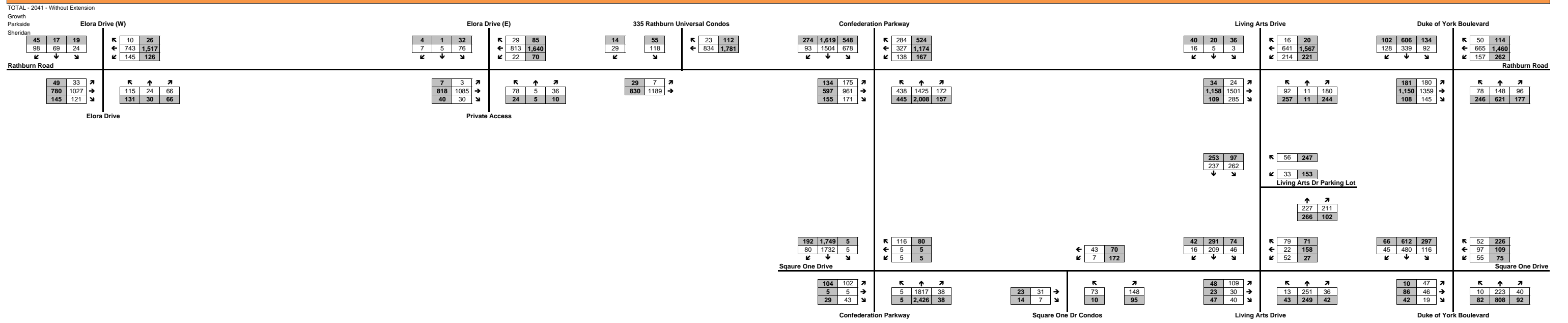


Figure 6
 2031 Future Traffic - With Extension of Square One Drive



AM Peak Hour 123
PM Peak Hour 123

Figure 7
2041 Future Traffic - No Extension of Square One Drive

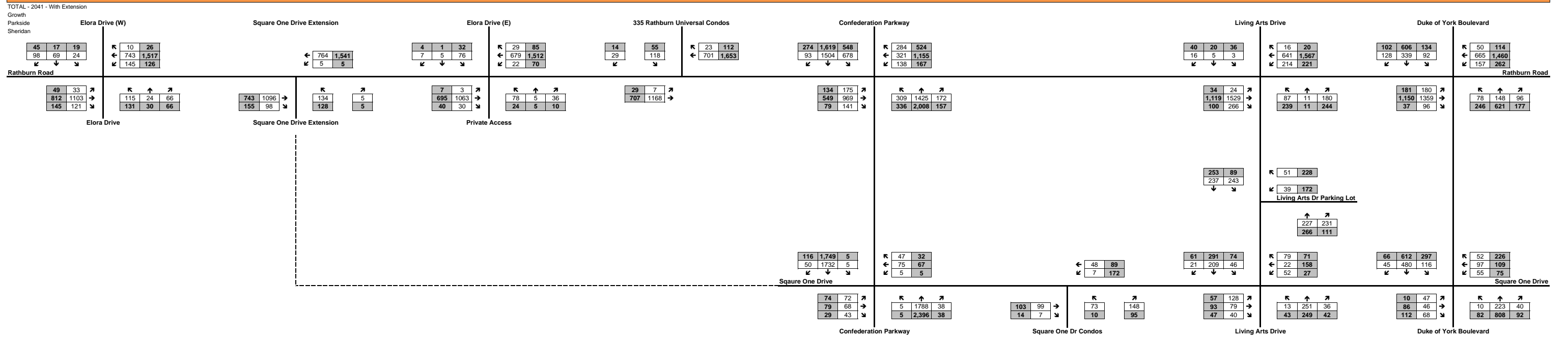


Figure 8
 2041 Future Traffic - With Extension of Square One Drive

Appendix A

2011 Existing		Horizontal Screenline					
Road	Direction	AM Peak Hour			PM Peak Hour		
		North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)	North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)
Confederation Parkway	NB	706	538	553	1290	1044	684
	SB	1317	870	680	975	707	665
	2-Way	2023	1408	1233	2265	1751	1349
Living Arts Drive	NB	-	48	369	-	70	265
	SB	-	240	223	-	97	286
	2-Way	0	288	592	0	167	551
Duke of York Boulevard	NB	237	193	501	230	224	72
	SB	326	284	114	329	187	359
	2-Way	563	477	615	559	411	431
Total	NB	943	779	1423	1520	1338	1021
	SB	1643	1394	1017	1304	991	1310
	2-Way	2586	2173	2440	2824	2329	2331

2021 No Extension of S1D		Horizontal Screenline					
Road	Direction	AM Peak Hour			PM Peak Hour		
		North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)	North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)
Confederation Parkway	NB	861	703	553	1416	1158	656
	SB	1356	1126	633	1173	1023	645
	2-Way	2217	1829	1186	2589	2181	1301
Living Arts Drive	NB	200	213	210	341	217	314
	SB	178	154	282	342	170	328
	2-Way	378	367	623	559	380	642
Duke of York Boulevard	NB	117	106	449	176	175	62
	SB	271	272	52	189	189	416
	2-Way	388	378	501	389	364	478
Total	NB	1178	1022	1343	1809	1543	1032
	SB	1805	1552	967	1728	1382	1389
	2-Way	2983	2574	2310	3537	2925	2421

2031 No Extension of S1D		Horizontal Screenline					
Road	Direction	AM Peak Hour			PM Peak Hour		
		North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)	North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)
Confederation Parkway	NB	893	795	598	1517	1235	656
	SB	1514	1194	597	1307	1225	719
	2-Way	2407	1989	1195	2824	2460	1375
Living Arts Drive	NB	247	255	346	270	282	408
	SB	199	201	321	374	252	354
	2-Way	446	456	667	644	534	762
Duke of York Boulevard	NB	145	133	573	237	242	147
	SB	339	357	83	396	300	512
	2-Way	484	490	656	633	542	659
Total	NB	1285	1183	1517	2024	1759	1211
	SB	2052	1752	1001	2077	1777	1585
	2-Way	3337	2935	2518	4101	3536	2796

2041 No Extension of S1D		Horizontal Screenline					
Road	Direction	AM Peak Hour			PM Peak Hour		
		North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)	North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)
Confederation Parkway	NB	989	1050	703	1405	1354	667
	SB	1305	1214	614	1238	1291	726
	2-Way	2294	2264	1317	2643	2645	1393
Living Arts Drive	NB	464	301	400	509	336	469
	SB	503	298	432	561	381	448
	2-Way	967	599	832	1070	717	917
Duke of York Boulevard	NB	246	221	586	608	508	267
	SB	536	454	75	549	443	564
	2-Way	782	675	661	1157	951	831
Total	NB	1699	1572	1689	2522	2198	1403
	SB	2344	1966	1121	2348	2115	1738
	2-Way	4043	3538	2810	4870	4313	3141

2021 No Extension of S1D		Horizontal Screenline					
Road	Direction	AM Peak Hour			PM Peak Hour		
		North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)	North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)
Confederation Parkway	NB	2.0%	2.7%	0.0%	0.9%	1.0%	-0.4%
	SB	0.3%	2.6%	-0.7%	1.9%	3.8%	-0.3%
	2-Way	0.9%	2.7%	-0.4%	1.3%	2.2%	-0.4%
Living Arts Drive	NB	-	16.1%	-0.8%	-	11.6%	1.7%
	SB	-	-4.3%	2.4%	-	5.8%	1.4%
	2-Way	-	-	0.5%	-	8.6%	1.5%
Duke of York Boulevard	NB	-6.8%	-5.8%	-1.1%	-2.6%	-2.4%	-1.5%
	SB	-1.8%	-0.4%	-7.5%	-4.3%	0.1%	1.5%
	2-Way	-3.7%	-2.3%	-2.0%	-3.6%	-1.2%	1.0%
Total	NB	2.3%	2.8%	-0.6%	1.8%	1.4%	0.1%
	SB	0.9%	1.1%	-0.5%	2.9%	3.4%	0.6%
	2-Way	1.4%	1.7%	-0.5%	2.3%	2.3%	0.4%

2031 No Extension of S1D		Horizontal Screenline					
Road	Direction	AM Peak Hour			PM Peak Hour		
		North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)	North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)
Confederation Parkway	NB	0.4%	1.2%	0.8%	0.7%	0.6%	0.0%
	SB	1.1%	0.6%	-0.6%	1.1%	1.8%	1.1%
	2-Way	0.8%	0.8%	0.1%	0.9%	1.2%	0.6%
Living Arts Drive	NB	2.1%	1.8%	0.1%	2.2%	3.0%	2.7%
	SB	1.1%	2.7%	1.3%	0.9%	4.0%	0.8%
	2-Way	1.7%	2.2%	0.7%	1.4%	3.5%	1.7%
Duke of York Boulevard	NB	2.2%	2.3%	2.5%	3.0%	3.3%	9.0%
	SB	2.3%	2.8%	4.8%	6.4%	4.7%	2.1%
	2-Way	2.2%	2.6%	2.7%	5.0%	4.1%	3.3%
Total	NB	0.9%	1.5%	1.2%	1.1%	1.3%	1.6%
	SB	1.3%	1.2%	0.3%	1.9%	2.5%	1.3%
	2-Way	1.1%	1.3%	0.9%	1.5%	1.9%	1.5%

2041 No Extension of S1D		Horizontal Screenline					
Road	Direction	AM Peak Hour			PM Peak Hour		
		North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)	North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)
Confederation Parkway	NB	1.0%	2.8%	1.6%	-0.8%	0.9%	0.2%
	SB	-1.5%	0.2%	0.3%	-0.5%	0.5%	0.1%
	2-Way	-0.5%	1.3%	1.0%	-0.7%	0.7%	0.1%
Living Arts Drive	NB	6.5%	1.7%	1.5%	6.5%	1.8%	1.4%
	SB	9.7%	4.0%	3.0%	4.1%	4.2%	2.4%
	2-Way	8.0%	2.8%	2.2%	5.2%	3.0%	1.9%
Duke of York Boulevard	NB	5.4%	5.2%	0.2%	9.9%	7.7%	6.1%
	SB	4.7%	2.4%	-1.0%	3.3%	4.0%	1.0%
	2-Way	4.9%	3.3%	0.1%	6.2%	5.8%	2.3%
Total	NB	2.8%	2.9%	1.1%	2.2%	2.3%	1.5%
	SB	1.3%	1.2%	1.1%	1.2%	1.8%	0.9%
	2-Way	1.9%	1.9%	1.1%	1.7%	2.0%	1.2%

2011 Existing		Horizontal Screenline					
Road	Direction	AM Peak Hour			PM Peak Hour		
		North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)	North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)
Confederation Parkway	NB	706	538	553	1290	1044	684
	SB	1317	870	680	975	707	665
	2-Way	2023	1408	1233	2265	1751	1349
Living Arts Drive	NB	-	48	369	-	70	265
	SB	-	240	223	-	97	286
	2-Way	0	288	592	0	167	551
Duke of York Boulevard	NB	237	193	501	230	224	72
	SB	326	284	114	329	187	359
	2-Way	563	477	615	559	411	431
Total	NB	943	779	1423	1520	1338	1021
	SB	1643	1394	1017	1304	991	1310
	2-Way	2586	2173	2440	2824	2329	2331

2021 With Extension of S11		Horizontal Screenline					
Road	Direction	AM Peak Hour			PM Peak Hour		
		North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)	North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)
Confederation Parkway	NB	836	666	546	1418	1114	666
	SB	1360	1054	641	1174	1033	664
	2-Way	2196	1720	1187	2592	2147	1330
Living Arts Drive	NB	211	235	181	340	298	-
	SB	161	145	241	326	184	330
	2-Way	372	380	365	581	365	628
Duke of York Boulevard	NB	117	97	414	159	157	63
	SB	273	273	54	205	392	392
	2-Way	390	370	468	364	347	455
Total	NB	1164	998	1300	1758	1452	1027
	SB	1794	1472	936	1407	1386	1386
	2-Way	2958	2470	2236	3463	2859	2413

2031 With Extension of S11		Horizontal Screenline					
Road	Direction	AM Peak Hour			PM Peak Hour		
		North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)	North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)
Confederation Parkway	NB	896	791	581	1522	1245	638
	SB	1496	1125	577	1286	1159	678
	2-Way	2392	1916	1158	2808	2404	1316
Living Arts Drive	NB	234	258	248	368	248	412
	SB	205	178	354	353	218	347
	2-Way	439	436	722	601	466	759
Duke of York Boulevard	NB	160	144	536	236	244	126
	SB	323	327	64	360	270	497
	2-Way	483	471	600	596	514	623
Total	NB	1290	1193	1485	2006	1737	1176
	SB	2024	1630	995	1999	1647	1522
	2-Way	3314	2823	2480	4005	3384	2698

2041 With Extension of S11		Horizontal Screenline					
Road	Direction	AM Peak Hour			PM Peak Hour		
		North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)	North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)
Confederation Parkway	NB	974	1053	685	1401	1324	665
	SB	1313	1135	626	1237	1261	732
	2-Way	2287	2188	1311	2638	2585	1397
Living Arts Drive	NB	488	340	397	535	333	482
	SB	471	326	400	526	351	445
	2-Way	959	666	797	1061	684	927
Duke of York Boulevard	NB	246	218	568	566	458	255
	SB	527	411	99	543	409	552
	2-Way	773	629	667	1109	867	807
Total	NB	1708	1611	1650	2502	2115	1402
	SB	2311	1872	1125	2306	2021	1729
	2-Way	4019	3483	2775	4808	4136	3131

2021 With Extension of S1D		Horizontal Screenline					
Road	Direction	AM Peak Hour			PM Peak Hour		
		North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)	North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)
Confederation Parkway	NB	1.7%	2.2%	-0.1%	1.0%	0.7%	-0.3%
	SB	0.3%	1.9%	-0.6%	1.9%	3.9%	0.0%
	2-Way	0.8%	2.0%	-0.4%	1.4%	2.1%	-0.1%
Living Arts Drive	NB	-	17.2%	-0.8%	-	10.0%	1.2%
	SB	-	-4.9%	0.8%	-	6.6%	1.4%
	2-Way	-	-	-0.2%	-	8.1%	1.3%
Duke of York Boulevard	NB	-6.8%	-6.6%	-1.9%	-3.6%	-3.5%	-1.3%
	SB	-1.8%	-0.4%	-7.2%	-4.6%	0.2%	0.9%
	2-Way	-3.6%	-2.5%	-2.7%	-4.2%	-1.7%	0.5%
Total	NB	2.1%	2.5%	-0.9%	1.5%	0.8%	0.1%
	SB	0.9%	0.5%	-0.8%	2.7%	3.6%	0.6%
	2-Way	1.4%	1.3%	-0.9%	2.1%	2.1%	0.3%

2031 With Extension of S1D		Horizontal Screenline					
Road	Direction	AM Peak Hour			PM Peak Hour		
		North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)	North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)
Confederation Parkway	NB	0.7%	1.7%	0.6%	0.7%	1.1%	-0.4%
	SB	1.0%	0.7%	-1.0%	0.9%	1.2%	0.2%
	2-Way	0.9%	1.1%	-0.2%	0.8%	1.1%	-0.1%
Living Arts Drive	NB	-	0.9%	0.8%	-	3.2%	3.3%
	SB	-	2.1%	3.9%	-	1.7%	0.5%
	2-Way	-	1.4%	2.2%	-	2.5%	1.9%
Duke of York Boulevard	NB	3.2%	4.0%	2.6%	4.0%	4.5%	7.2%
	SB	1.7%	1.8%	1.7%	5.8%	3.6%	2.4%
	2-Way	2.2%	2.4%	2.5%	5.1%	4.0%	3.2%
Total	NB	1.0%	1.8%	1.3%	1.3%	1.8%	1.4%
	SB	1.2%	1.0%	0.6%	1.6%	1.6%	0.9%
	2-Way	1.1%	1.3%	1.0%	1.5%	1.7%	1.1%

2041 With Extension of S1D		Horizontal Screenline					
Road	Direction	AM Peak Hour			PM Peak Hour		
		North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)	North of Rathburn Road (H1)	North of Square One Drive (H2)	North of Burnhamthorpe Road (H3)
Confederation Parkway	NB	0.8%	2.9%	1.7%	-0.8%	0.6%	0.4%
	SB	-1.3%	0.1%	0.8%	-0.4%	0.8%	0.8%
	2-Way	-0.4%	1.3%	1.2%	-0.6%	0.7%	0.6%
Living Arts Drive	NB	-	2.8%	0.8%	-	3.0%	1.6%
	SB	-	6.2%	1.2%	-	4.9%	2.5%
	2-Way	-	4.3%	1.0%	-	3.9%	2.0%
Duke of York Boulevard	NB	4.4%	4.2%	0.6%	9.1%	6.5%	7.3%
	SB	5.0%	2.3%	4.5%	4.2%	4.2%	1.1%
	2-Way	4.8%	2.9%	1.1%	6.4%	5.4%	2.6%
Total	NB	2.8%	3.0%	1.1%	2.2%	2.0%	1.8%
	SB	1.3%	1.4%	1.2%	1.4%	2.1%	1.3%
	2-Way	1.9%	2.1%	1.1%	1.8%	2.0%	1.5%

2011 Existing		Vertical Screenlines					
Road	Direction	AM Peak Hour			PM Peak Hour		
		West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)	West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)
Centre View Drive	EB	1261	1261	1261	352	352	352
	WB	236	236	236	1009	1009	1009
	2-Way	1497	1497	1497	1361	1361	1361
Rathburn Road	EB	535	687	501	161	84	46
	WB	151	23	57	602	504	472
	2-Way	686	710	558	763	588	518
Square One Drive	EB	-	0	32	-	0	14
	WB	-	23	2	-	274	12
	2-Way	0	23	34	0	274	26
Burnhamthorpe Road	EB	1506	1574	1412	900	851	801
	WB	848	808	791	1568	1526	1454
	2-Way	2354	2382	2203	2468	2377	2255
Total	EB	3302	3522	3206	1413	1287	1213
	WB	1235	1090	1086	3179	3313	2947
	2-Way	4537	4612	4292	4592	4600	4160

2021 No Extension of S1D		Vertical Screenlines					
Road	Direction	AM Peak Hour			PM Peak Hour		
		West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)	West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)
Centre View Drive	EB	1302	1302	1190	530	530	387
	WB	342	342	207	1085	1085	1067
	2-Way	1644	1644	1397	1615	1615	1454
Rathburn Road	EB	481	450	435	185	60	55
	WB	137	34	21	665	647	459
	2-Way	618	484	456	850	707	514
Square One Drive	EB	148	231	103	56	183	24
	WB	63	37	2	184	191	6
	2-Way	211	268	58	287	374	30
Burnhamthorpe Road	EB	1503	1484	1419	1276	1142	1037
	WB	1061	911	905	1686	1597	1478
	2-Way	2564	2395	2324	2962	2739	2515
Total	EB	3434	3467	3100	2094	1915	1503
	WB	1603	1324	1135	3620	3520	3010
	2-Way	5037	4791	4235	5714	5435	4513

2031 No Extension of S1D		Vertical Screenlines					
Road	Direction	AM Peak Hour			PM Peak Hour		
		West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)	West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)
Centre View Drive	EB	1278	1278	1165	676	676	489
	WB	394	394	232	1152	1152	1069
	2-Way	1672	1672	1397	1828	1828	1558
Rathburn Road	EB	552	662	260	604	121	109
	WB	180	68	41	666	728	568
	2-Way	732	730	645	926	849	677
Square One Drive	EB	233	212	62	165	184	22
	WB	109	54	2	299	190	6
	2-Way	342	266	64	464	374	28
Burnhamthorpe Road	EB	1769	1794	1774	1405	1388	1252
	WB	1203	1075	1080	1722	1749	1666
	2-Way	2972	2869	2854	3127	3137	2918
Total	EB	3832	3946	3605	2506	2369	1872
	WB	1886	1591	1355	3839	3819	3309
	2-Way	5718	5537	4960	6345	6188	5181

2041 No Extension of S1D		Vertical Screenlines					
Road	Direction	AM Peak Hour			PM Peak Hour		
		West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)	West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)
Centre View Drive	EB	1619	1511	1402	1402	1402	1336
	WB	154	154	85	688	688	674
	2-Way	1773	1773	1596	2090	2090	2010
Rathburn Road	EB	744	817	789	402	377	246
	WB	201	122	97	682	762	593
	2-Way	945	939	886	1084	1139	839
Square One Drive	EB	330	157	293	106	7	7
	WB	158	82	9	352	118	37
	2-Way	488	239	37	645	224	44
Burnhamthorpe Road	EB	1804	1909	1877	1618	1570	1496
	WB	1423	1356	1291	1763	1847	1794
	2-Way	3227	3265	3168	3381	3417	3290
Total	EB	4497	4502	4502	3715	3455	3085
	WB	1936	1714	1482	3485	3415	3098
	2-Way	6433	6216	5687	7200	6870	6183

2021 No Extension of S1D		Vertical Screenlines					
Road	Direction	AM Peak Hour			PM Peak Hour		
		West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)	West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)
Centre View Drive	EB	0.3%	0.3%	-0.6%	4.2%	4.2%	1.0%
	WB	3.8%	3.8%	-1.3%	0.7%	0.7%	0.6%
	2-Way	0.9%	0.9%	-0.7%	1.7%	1.7%	0.7%
Rathburn Road	EB	-1.1%	-4.1%	-1.4%	1.4%	-3.3%	1.8%
	WB	-1.0%	4.0%	-9.5%	1.0%	2.5%	-0.3%
	2-Way	-1.0%	-3.8%	-2.0%	1.1%	1.9%	-0.1%
Square One Drive	EB	-	-	5.8%	-	-	5.5%
	WB	-	4.9%	0.0%	-	-3.5%	-6.7%
	2-Way	-	27.8%	5.5%	-	3.2%	1.4%
Burnhamthorpe Road	EB	0.0%	-0.6%	0.0%	3.6%	3.0%	2.6%
	WB	2.3%	1.2%	1.4%	0.7%	0.5%	0.2%
	2-Way	0.9%	0.1%	0.5%	1.8%	1.4%	1.1%
Total	EB	0.4%	-0.2%	0.4%	4.0%	4.1%	2.2%
	WB	2.6%	2.0%	0.4%	1.3%	0.6%	0.2%
	2-Way	1.1%	0.4%	-0.1%	2.2%	1.7%	0.8%

2031 No Extension of S1D		Vertical Screenlines					
Road	Direction	AM Peak Hour			PM Peak Hour		
		West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)	West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)
Centre View Drive	EB	-0.2%	-0.2%	-0.2%	2.5%	2.5%	2.4%
	WB	1.4%	1.4%	1.1%	0.6%	0.6%	0.6%
	2-Way	0.2%	0.2%	0.0%	1.2%	1.2%	0.7%
Rathburn Road	EB	1.4%	3.9%	3.3%	3.5%	7.3%	7.1%
	WB	2.8%	7.2%	6.9%	0.0%	1.2%	2.8%
	2-Way	1.7%	4.2%	3.5%	0.9%	1.8%	2.8%
Square One Drive	EB	4.6%	-0.9%	1.0%	4.8%	0.1%	-0.9%
	WB	5.6%	3.9%	0.0%	5.0%	-0.1%	0.0%
	2-Way	4.9%	-0.1%	1.0%	4.9%	0.0%	-0.7%
Burnhamthorpe Road	EB	1.6%	1.9%	2.3%	1.0%	2.0%	1.9%
	WB	1.3%	1.7%	1.8%	0.2%	0.9%	1.2%
	2-Way	1.5%	1.8%	2.1%	0.5%	1.4%	1.5%
Total	EB	1.1%	1.3%	1.5%	1.8%	2.2%	2.2%
	WB	1.6%	1.9%	1.8%	0.6%	0.8%	1.0%
	2-Way	1.3%	1.5%	1.6%	1.1%	1.3%	1.4%

2041 No Extension of S1D		Vertical Screenlines					
Road	Direction	AM Peak Hour			PM Peak Hour		
		West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)	West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)
Centre View Drive	EB	2.4%	2.4%	2.6%	7.6%	7.6%	10.6%
	WB	-9.0%	-9.0%	-9.6%	-5.0%	-5.0%	-4.5%
	2-Way	0.6%	0.6%	1.3%	1.3%	1.3%	2.6%
Rathburn Road	EB	3.0%	2.1%	2.7%	4.5%	12.0%	8.5%
	WB	1.1%	6.0%	9.0%	0.2%	0.5%	0.4%
	2-Way	2.6%	2.5%	3.2%	1.6%	3.0%	2.2%
Square One Drive	EB	3.5%	-3.0%	-7.6%	5.9%	-5.4%	-10.8%
	WB	3.8%	4.3%	16.2%	1.6%	-4.7%	20.0%
	2-Way	3.6%	-1.1%	-5.3%	3.3%	-5.0%	4.6%
Burnhamthorpe Road	EB	0.2%	0.6%	0.6%	1.4%	1.2%	1.8%
	WB	1.7%	2.3%	1.8%	0.2%	0.5%	0.7%
	2-Way	0.8%	1.3%	1.0%	0.8%	0.9%	1.2%
Total	EB	1.6%	1.3%	1.6%	4.0%	3.8%	5.1%
	WB	0.3%	0.7%	0.9%	-1.0%	-1.1%	-0.7%
	2-Way	1.2%	1.2%	1.4%	1.3%	1.1%	1.8%

2011 Existing		Vertical Screenlines					
Road	Direction	AM Peak Hour			PM Peak Hour		
		West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)	West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)
Centre View Drive	EB	1261	1261	1261	352	352	352
	WB	236	236	236	1009	1009	1009
	2-Way	1497	1497	1497	1361	1361	1361
Rathburn Road	EB	535	687	501	161	84	46
	WB	151	23	57	602	504	472
	2-Way	686	710	558	763	588	518
Square One Drive	EB	-	0	32	-	0	14
	WB	-	23	2	-	274	12
	2-Way	0	23	34	0	274	26
Burnhamthorpe Road	EB	1506	1574	1412	900	851	801
	WB	848	808	791	1568	1526	1454
	2-Way	2354	2382	2203	2468	2377	2255
Total	EB	3302	3522	3206	1413	1287	1213
	WB	1235	1096	1086	3179	3313	2947
	2-Way	4537	4612	4292	4592	4600	4160

2021 With Extension of S1D		Vertical Screenlines					
Road	Direction	AM Peak Hour			PM Peak Hour		
		West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)	West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)
Centre View Drive	EB	1266	1266	1167	517	517	389
	WB	334	334	184	1032	1032	1049
	2-Way	1600	1600	1351	1549	1549	1438
Rathburn Road	EB	400	454	446	163	54	59
	WB	113	33	26	494	547	390
	2-Way	513	487	472	657	601	449
Square One Drive	EB	161	246	101	180	20	20
	WB	65	33	2	208	220	7
	2-Way	226	279	69	309	400	27
Burnhamthorpe Road	EB	1577	1536	1453	1233	1126	1042
	WB	1053	919	1590	1677	1590	1474
	2-Way	2630	2455	2388	2910	2716	2516
Total	EB	3404	3502	3133	2014	1877	1510
	WB	1565	1319	1147	3411	3389	2920
	2-Way	4969	4821	4280	5425	5266	4430

2031 With Extension of S1D		Vertical Screenlines					
Road	Direction	AM Peak Hour			PM Peak Hour		
		West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)	West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)
Centre View Drive	EB	1209	1209	1082	633	633	479
	WB	393	393	1140	1140	1092	1092
	2-Way	1602	1602	1319	1773	1773	1571
Rathburn Road	EB	455	602	596	124	124	128
	WB	177	57	43	687	741	588
	2-Way	632	659	639	937	865	716
Square One Drive	EB	264	207	72	161	184	18
	WB	99	41	1	286	192	17
	2-Way	363	248	73	447	376	35
Burnhamthorpe Road	EB	1782	1762	1443	1384	1384	1260
	WB	1187	1064	1057	1751	1750	1691
	2-Way	2969	2826	2799	3194	3134	2951
Total	EB	3710	3780	3492	2487	2325	1885
	WB	1856	1555	1338	3864	3823	3388
	2-Way	5566	5335	4830	6351	6148	5273

2041 With Extension of S1D		Vertical Screenlines					
Road	Direction	AM Peak Hour			PM Peak Hour		
		West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)	West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)
Centre View Drive	EB	1605	1521	1387	1387	1342	1342
	WB	198	198	98	717	717	664
	2-Way	1803	1803	1619	2104	2104	2006
Rathburn Road	EB	620	818	731	363	380	265
	WB	183	124	92	593	711	592
	2-Way	803	942	823	956	1091	857
Square One Drive	EB	350	160	300	118	5	5
	WB	150	87	7	361	163	48
	2-Way	500	247	67	661	281	53
Burnhamthorpe Road	EB	1773	1884	1870	1611	1566	1477
	WB	1367	1314	1296	1798	1865	1814
	2-Way	3140	3198	3166	3409	3431	3291
Total	EB	4348	4467	4467	3651	3451	3089
	WB	1898	1723	1493	3469	3456	3118
	2-Way	6246	6190	5675	7130	6907	6207

2021 With Extension of S1D		Vertical Screenlines					
Road	Direction	AM Peak Hour			PM Peak Hour		
		West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)	West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)
Centre View Drive	EB	0.0%	0.0%	-0.8%	3.9%	3.9%	1.0%
	WB	3.5%	3.5%	-2.5%	0.2%	0.2%	0.4%
	2-Way	0.7%	0.7%	-1.0%	1.3%	1.3%	0.6%
Rathburn Road	EB	-2.9%	-4.1%	-1.2%	0.1%	-4.3%	2.5%
	WB	-2.9%	-3.7%	-7.5%	-2.0%	0.8%	-1.9%
	2-Way	-2.9%	-3.7%	-1.7%	-1.5%	0.2%	-1.4%
Square One Drive	EB	-	-	7.7%	-	-	3.6%
	WB	-	3.7%	0.0%	-	-2.2%	-5.2%
	2-Way	-	28.3%	7.3%	-	3.9%	0.4%
Burnhamthorpe Road	EB	0.5%	-0.2%	0.3%	3.2%	2.8%	2.7%
	WB	2.2%	1.3%	1.7%	0.7%	0.4%	0.1%
	2-Way	1.1%	0.3%	0.8%	1.7%	1.3%	1.1%
Total	EB	0.3%	-0.1%	-0.2%	3.6%	3.8%	2.2%
	WB	2.4%	1.9%	0.5%	0.7%	0.2%	-0.1%
	2-Way	0.9%	0.4%	0.0%	1.7%	1.4%	0.6%

2031 With Extension of S1D		Vertical Screenlines					
Road	Direction	AM Peak Hour			PM Peak Hour		
		West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)	West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)
Centre View Drive	EB	-0.5%	-0.5%	-0.8%	2.0%	2.0%	2.1%
	WB	1.6%	1.6%	1.0%	1.0%	1.0%	0.4%
	2-Way	0.0%	0.0%	-0.2%	1.4%	1.4%	0.9%
Rathburn Road	EB	1.3%	2.9%	1.3%	4.4%	8.7%	8.1%
	WB	4.6%	5.6%	5.2%	3.4%	3.1%	4.2%
	2-Way	2.1%	3.1%	3.1%	3.6%	3.7%	4.8%
Square One Drive	EB	5.1%	-1.7%	0.7%	4.8%	0.2%	-1.0%
	WB	4.3%	2.2%	-6.7%	3.2%	-1.4%	9.3%
	2-Way	4.9%	-1.2%	0.6%	3.8%	-0.6%	2.6%
Burnhamthorpe Road	EB	1.2%	1.4%	1.8%	1.6%	2.1%	1.9%
	WB	1.2%	1.5%	1.2%	0.4%	1.0%	1.4%
	2-Way	1.2%	1.4%	1.6%	0.9%	1.4%	1.6%
Total	EB	0.9%	0.8%	1.1%	2.1%	2.2%	2.2%
	WB	1.7%	1.7%	1.6%	1.3%	1.2%	1.5%
	2-Way	1.1%	1.0%	1.2%	1.6%	1.6%	1.8%

2041 With Extension of S1D		Vertical Screenlines					
Road	Direction	AM Peak Hour			PM Peak Hour		
		West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)	West of Confederation Parkway (V1)	West of Living Arts Drive (V2)	West of Duke of York Boulevard (V3)
Centre View Drive	EB	2.9%	2.9%	3.5%	8.2%	8.2%	10.9%
	WB	-6.6%	-6.6%	-8.5%	-4.5%	-4.5%	-4.9%
	2-Way	1.2%	1.2%	2.1%	1.7%	1.7%	2.5%
Rathburn Road	EB	3.1%	3.1%	2.1%	3.8%	11.9%	7.5%
	WB	8.1%	7.9%	-0.4%	-1.5%	-0.4%	0.1%
	2-Way	2.4%	3.6%	2.6%	0.2%	2.3%	1.8%
Square One Drive	EB	2.9%	-2.5%	-1.8%	6.4%	-4.3%	-12.0%
	WB	4.2%	7.8%	21.5%	2.4%	-1.6%	10.9%
	2-Way	3.3%	0.0%	-0.9%	4.0%	-2.9%	4.2%
Burnhamthorpe Road	EB	-0.1%	0.7%	0.7%	1.1%	1.2%	1.6%
	WB	1.4%	2.1%	0.3%	0.6%	0.7%	0.7%
	2-Way	0.6%	1.2%	1.2%	0.7%	0.9%	1.1%
Total	EB	1.6%	1.7%	1.8%	3.9%	4.0%	5.1%
	WB	0.2%	1.0%	1.1%	-1.1%	-1.0%	-0.8%
	2-Way	1.2%	1.5%	1.6%	1.2%	1.2%	1.6%

Development: Parkside Village
 Future Development

Estimated total number of residential units = 2,700 units
 Estimated total GFA of commercial office space = 80,000 SF
 Estimated total GFA of commercial retail space = 70,000 SF

Trip Formulae								
Land Use	LUC	Units/Size	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Residential Units	230	2700	122	599	721	601	296	897
Office	710	80000	141	19	160	30	139	168
Retail	820	70000	78	47	125	227	245	472
Sub-total			341	665	1,007	858	681	1,537
Transit Reduction 20%			68	133	201	172	136	307
			272	532	805	686	545	1,229

20% transit reduction
 TTS data - ward 4 existing transit usage ranges from 8 - 15% depending on direction in the am peak period.
 Assume a 20% transit reduction for future trip generation reference file saved on directory

Distribution to be based on existing amacon report

Excerpt from 2004 Sernas Transtech - Traffic Study

SITE TRIP DISTRIBUTION

The distribution of the site originating trips, both external and internal to Mississauga, were estimated using 2001 TTS data for the GTA. This resulted in approximately 32% of the morning destinations being external to Mississauga. The site is within the City Centre District and in the geographical centre of the City. The survey data records that for the City Centre zones, 68% of the trips remain within Mississauga.

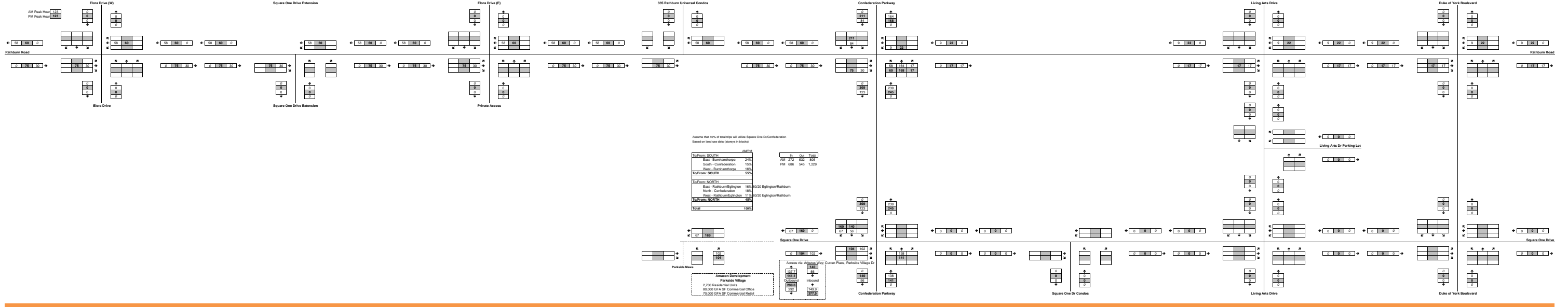
Site traffic would predominantly use Confederation Parkway upon its construction between Burnhamthorpe Road and Rathburn Road (scheduled for 2004). It is planned for an extension over Highway 403 to Eglinton Avenue and McLaughlin Road in 2008. At that time the development would be about 25% built-out and in the interim would not have a significant impact within the existing road network. Ultimately, the orientations to the north and south are estimated at 45 and 55%, respectively. The directional distribution ratios and resulting trips are shown in Table 2.

**Table 2
 SITE TRIP DISTRIBUTION**

To/from South:	Ratio*	AM Peak Hour	
		Inbound	Outbound
East - Burnhamthorpe	24%	67	327
South - Confederation	15%	42	204
West - Burnhamthorpe	16%	45	218
Total	55%	154	749
To/from North:	Ratio*	AM Peak Hour	
East - Rathburn/Eglinton	16%	45	218
North - Confederation	18%	50	245
West - Rathburn/Eglinton	11%	31	150
Total	45%	126	613
To/from South:	Ratio*	PM Peak Hour	
East - Burnhamthorpe	24%	320	156
South - Confederation	15%	200	99
West - Burnhamthorpe	16%	213	105
Total	55%	733	362
To/from North:	Ratio*	PM Peak Hour	
East - Rathburn/Eglinton	16%	213	105
North - Confederation	18%	240	118
West - Rathburn/Eglinton	11%	147	72
Total	45%	600	295

* Based on TTS 2001 survey data resulting in 32% external and 68% internal Mississauga trips

Petition Top Generation - WITHOUT SQUARE ONE DR EXTENSION TO RATHBURN

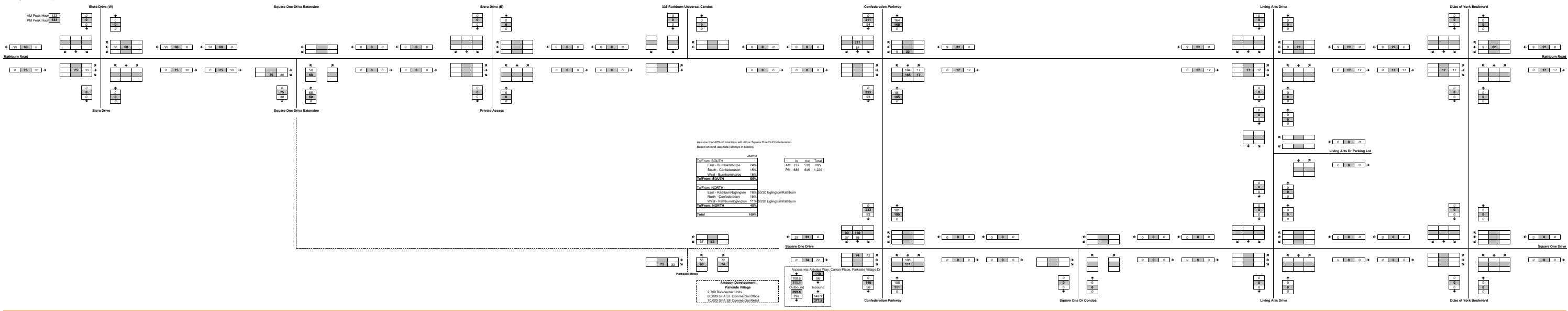


Assumes that 40% of total trips will utilize Square One Dr/Confederation
Based on land use data (shown in blocks)

DIRECTION		AM		PM	
	EST. TRIPS	EST. TRIPS	EST. TRIPS	EST. TRIPS	EST. TRIPS
TO/FROM SOUTH					
East - Burnhamthorpe	24%	272	532	805	
South - Confederation	15%	171	334	505	
West - Burnhamthorpe	16%	184	358	542	
TOTAL SOUTH	55%	627	1224	1852	
TO/FROM NORTH					
East - Burnhamthorpe	18%	207	403	610	
North - Confederation	18%	207	403	610	
West - Burnhamthorpe	11%	128	256	384	
TOTAL NORTH	47%	542	1062	1604	
TOTAL	98%	1169	2286	3456	

Approved Development
Parkside Village
2,700 Residential Units
80,000 GFA SF Commercial Office
70,000 GFA SF Commercial Retail

Access via Alternative Way
Current Place, Parkside Village Dr
150' x 150' x 150' x 150'



Assumes that 40% of total trips will utilize Square One Dr/Confederation
Based on land use data (shown in blocks)

2010		In	Out	Total
TotFleet SOUTH				
East - Burnhamthorpe	24%	AM 272	532	805
South - Confederation	13%	PM 448	148	1,223
West - Burnhamthorpe	19%			
TotFleet SOUTH				50%
TotFleet NORTH				
East - Burnhamthorpe	18%	8000	Eglinton/Bathurst	
North - Confederation	13%			
West - Burnhamthorpe	11%	8000	Eglinton/Bathurst	
TotFleet NORTH				50%
Total				100%

Approved Development
Parkside Village
2,700 Residential Units
80,000 GFA SF Commercial Office
70,000 GFA SF Commercial Retail

Access via Adelaide Way
Current Place, Parkside Village Dr
Inbound
Outbound
1,100
1,100
2,200

Trip Generation at Sheridan College HMC Campus

	In	Out	Total
AM	275	75	350
PM	125	270	395

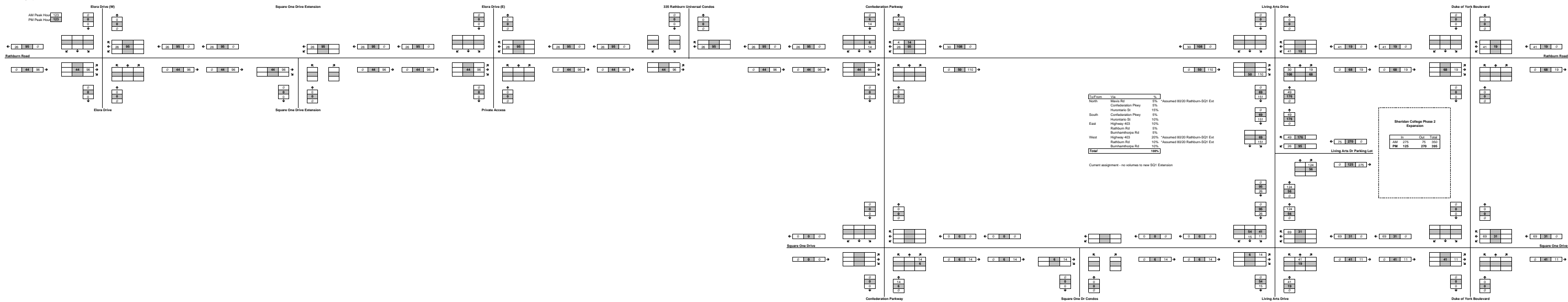
Distribution

To/From	Via	%
North	Mavis Rd	5%
	Confederation Pkwy	5%
	Hurontario St	15%
South	Confederation Pkwy	5%
	Hurontario St	10%
East	Highway 403	10%
	Rathburn Rd	5%
	Burnhamthorpe Rd	5%
West	Highway 403	20%
	Rathburn Rd	10%
	Burnhamthorpe Rd	10%
		100%

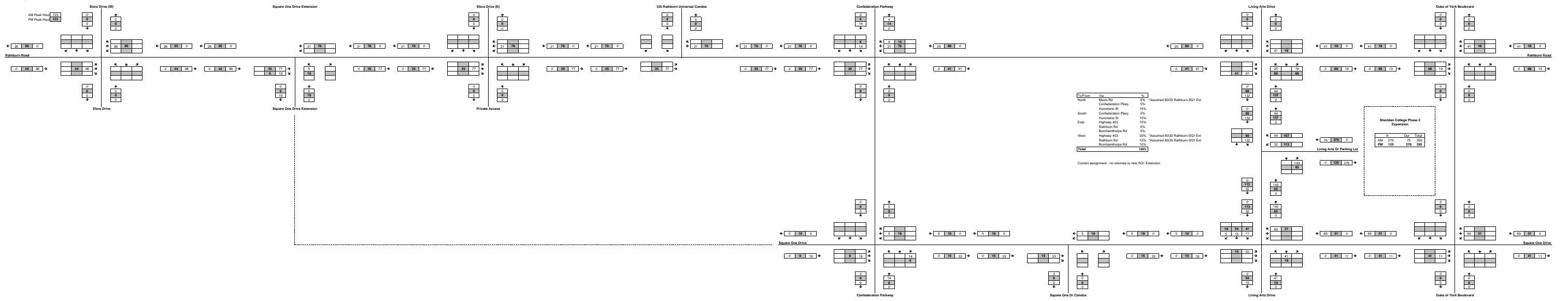


SHERIDAN COLLEGE PEAK HOUR TRIP DISTRIBUTION

Shedden College Trip Generation - WITHOUT SQUARE ONE DR EXTENSION TO RATHBURN



Sheridan College Trip Generation - WITH SQUARE ONE DR EXTENSION TO RATHBURN



APPENDIX F
DETAILED TMC RESULTS
FUTURE CONDITIONS

APPENDIX F1
DETAILED TMC RESULTS
DO NOTHING

APPENDIX F2
DETAILED TMC RESULTS
T-INTERSECTION

500 Living Arts Drive - Rathburn Road -- Signalized Intersection

Movement	PM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	26	21	1.0	57.96	E	1.3	22.0
EBT	856	711	5.2	47.89	D	38.2	146.6
EBR	86	90	0.4	37.07	D	38.0	146.5
WBL	173	115	4.8	35.80	D	3.4	40.5
WBT	1197	1121	2.2	59.98	E	103.7	214.1
WBR	15	15	0.0	51.14	D	103.1	213.6
NBL	203	88	9.5	46.78	D	5.2	49.7
NBT	9	7	0.7	50.43	D	10.6	69.0
NBR	202	172	2.2	17.12	B	9.8	68.8
SBL	27	30	0.6	55.75	E	2.6	21.8
SBT	15	19	1.0	34.96	C	2.6	21.8
SBR	31	32	0.2	22.81	C	1.4	21.1
ALL	2840	2421	8.2	50.06	D	-	-

TMC GEH Summary			Total Intersection GEH Summary		
PM GEH			PM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
0	1	0			
1	0	0			
1	0	0			
1	0	0			
0	0	0			
0	1	0			
1	0	0			
1	0	0			
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0	1	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
0	1	0	0	1	0

600 Living Arts Drive - Square One Drive -- Signalized Intersection

Movement	PM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	47	30	2.7	33.46	C	1.1	15.7
EBT	71	64	0.9	25.18	C	2.4	32.6
EBR	36	14	4.4	6.41	A	2.2	32.1
WBL	21	59	6.0	26.16	C	2.1	28.8
WBT	120	121	0.1	25.17	C	4.7	54.4
WBR	62	33	4.2	13.38	B	3.8	53.8
NBL	33	28	0.9	0.93	A	0.0	4.8
NBT	194	198	0.3	9.18	A	2.3	38.4
NBR	32	27	0.9	4.13	A	0.8	52.2
SBL	66	48	2.4	11.51	B	0.5	17.2
SBT	234	195	2.7	8.14	A	2.4	40.7
SBR	51	63	1.6	4.09	A	2.0	40.3
ALL	967	880	2.9	13.74	B	-	-

TMC GEH Summary			Total Intersection GEH Summary		
PM GEH			PM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
1	0	0			
0	1	0			
1	0	0			
1	0	0			
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1	0	0			
1	0	0			
1	0	0	1	0	0

700 Duke of York Boulevard - Rathburn Road -- Signalized Intersection

Movement	PM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	138	106	2.9	263.98	F	60.7	192.7
EBT	895	716	6.3	36.97	D	43.2	188.4
EBR	28	78	6.9	21.05	C	43.2	188.4
WBL	199	210	0.8	38.04	D	11.5	126.5
WBT	1121	1077	1.3	65.90	E	90.8	176.1
WBR	86	88	0.2	46.69	D	90.5	175.8
NBL	187	127	4.8	106.56	F	23.9	153.9
NBT	472	517	2.0	49.32	D	33.6	160.4
NBR	134	146	1.0	40.54	D	33.3	160.0
SBL	102	103	0.1	86.93	F	11.5	118.6
SBT	461	433	1.3	99.62	F	68.5	150.7
SBR	78	90	1.3	91.72	F	68.2	150.4
ALL	3901	3691	3.4	66.23	E	-	-

TMC GEH Summary			Total Intersection GEH Summary		
PM GEH			PM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
0	1	0			
0	1	0			
1	0	0			
1	0	0			
1	0	0			
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1	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

800 Duke of York Boulevard - Square One Drive -- Signalized Intersection

Movement	PM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	8	4	1.6	40.70	D	4.2	35.8
EBT	75	75	0.0	29.63	C	4.2	35.8
EBR	85	59	3.1	15.34	B	9.4	49.8
WBL	57	47	1.4	31.53	C	1.9	23.2
WBT	90	61	3.3	32.39	C	7.5	74.1
WBR	172	194	1.6	27.64	C	9.3	88.8
NBL	62	64	0.3	23.41	C	1.1	22.0
NBT	615	615	0.0	23.88	C	34.9	271.3
NBR	70	70	0.0	20.24	C	36.4	285.8
SBL	226	183	3.0	32.80	C	6.1	65.5
SBT	466	452	0.7	14.62	B	11.6	138.0
SBR	50	87	4.5	11.78	B	14.5	146.9
ALL	1976	1911	1.5	22.68	C	-	-

TMC GEH Summary			Total Intersection GEH Summary		
PM GEH			PM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
0	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
0	0	0			
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1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

2728 Square One Drive Extension - Rathburn Road-- Signalized Intersection

Movement	PM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL							
EBT	574	519	2.4	11.52	B	5.0	59.2
EBR	138	164	2.1	5.28	A	0.5	35.6
WBL	5	5	0.0	1.22	A	0.0	0.0
WBT	1191	1004	5.6	10.71	B	10.5	99.2
WBR							
NBL	116	111	0.5	20.43	C	3.4	56.7
NBT							
NBR	5	6	0.4	13.01	B	5.1	66.2
SBL							
SBT							
SBR							
ALL	2029	1809	5.0	11.03	B	-	-

TMC GEH Summary			Total Intersection GEH Summary		
PM GEH			PM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
0	0	0			
0	1	0			
1	0	0			
1	0	0			
			0	1	0

500 Living Arts Drive - Rathburn Road -- Signalized Intersection							
Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	21	13	1.9	31.52	C	0.4	9.7
EBT	1319	1115	5.8	29.30	C	56.3	191.5
EBR	242	268	1.6	35.65	D	56.1	191.4
WBL	190	142	3.7	20.43	C	3.5	46.8
WBT	553	610	2.4	15.89	B	9.6	71.7
WBR	14	16	0.5	14.27	B	9.1	71.2
NBL	78	28	6.9	59.72	E	2.5	21.7
NBT	10	11	0.3	51.28	D	3.6	30.5
NBR	157	138	1.6	10.50	B	2.3	30.2
SBL	2	2	0.0	47.75	D	0.2	6.4
SBT	5	1	2.3	38.67	D	0.2	6.4
SBR	14	14	0.0	5.41	A	0.0	5.9
ALL	2605	2358	5.0	25.17	C	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
0	1	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
0	1	0			
1	0	0			
1	0	0			
0	0	0			
1	0	0			
0	0	0			
1	0	0			
0	0	0			
1	0	0	1	0	0

600 Living Arts Drive - Square One Drive -- Signalized Intersection							
Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	115	51	7.0	27.80	C	1.9	22.9
EBT	68	114	4.8	25.09	C	4.7	43.1
EBR	35	29	1.1	12.91	B	4.2	42.6
WBL	45	48	0.4	28.94	C	1.6	25.4
WBT	19	27	1.7	25.82	C	1.6	35.5
WBR	77	111	3.5	8.90	A	1.1	34.8
NBL	11	34	4.8	0.83	A	0.0	4.7
NBT	222	193	2.0	9.74	A	2.4	35.8
NBR	31	34	0.5	5.45	A	1.8	35.4
SBL	41	38	0.5	12.28	B	0.4	13.4
SBT	182	181	0.1	8.41	A	2.2	41.2
SBR	19	8	3.0	3.92	A	1.7	40.8
ALL	865	868	0.1	13.64	B	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
0	1	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

700 Duke of York Boulevard - Rathburn Road -- Signalized Intersection							
Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	155	107	4.2	37.92	D	5.5	37.3
EBT	1176	1101	2.2	33.39	C	41.1	193.5
EBR	83	36	6.1	22.71	C	41.1	193.5
WBL	135	155	1.7	28.68	C	5.2	44.8
WBT	580	585	0.2	21.06	C	11.8	77.7
WBR	43	41	0.3	17.77	B	11.7	77.4
NBL	67	75	0.9	26.79	C	2.6	30.0
NBT	128	177	4.0	32.47	C	6.7	39.6
NBR	83	35	6.2	17.92	B	6.5	39.3
SBL	79	80	0.1	25.85	C	2.7	25.9
SBT	292	308	0.9	37.80	D	16.5	87.6
SBR	110	109	0.1	9.65	A	16.4	87.4
ALL	2931	2809	2.3	29.29	C	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
0	1	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
0	1	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

800 Duke of York Boulevard - Square One Drive -- Signalized Intersection							
Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	41	75	4.5	34.83	C	4.9	44.5
EBT	41	41	0.0	33.10	C	4.9	44.5
EBR	58	66	1.0	13.74	B	0.2	21.5
WBL	47	44	0.4	30.14	C	1.6	18.4
WBT	94	114	2.0	32.03	C	5.8	45.5
WBR	45	20	4.4	20.00	C	0.2	21.0
NBL	9	33	5.2	13.72	B	0.4	15.3
NBT	192	189	0.2	11.53	B	3.3	53.0
NBR	35	34	0.2	7.51	A	6.9	69.2
SBL	100	89	1.1	13.49	B	1.3	25.0
SBT	414	371	2.2	12.17	B	7.0	99.9
SBR	38	39	0.2	9.82	A	9.6	108.8
ALL	1114	1115	0.0	17.26	B	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
0	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
0	1	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

2728 Square One Drive Extension - Rathburn Road-- Signalized Intersection							
Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL							
EBT	955	871	2.8	13.02	B	9.9	98.2
EBR	91	118	2.6	6.11	A	0.5	43.9
WBL	5	5	0.0	29.13	C	0.1	5.1
WBT	661	592	2.8	10.83	B	5.8	81.3
WBR							
NBL	124	120	0.4	46.13	D	8.8	65.1
NBT							
NBR	5	6	0.4	24.81	C	13.8	75.5
SBL							
SBT							
SBR							
ALL	1841	1712	3.1	14.20	B	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
0	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

Project: Square One Drive EA
Project # 1650-11005
Task: Traffic Analysis
Summary of Intersection TMCs and LOS
2041 - T Intersection - AM

Elora Drive West - Rathburn Road -- Signalized Intersection							
Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	33	34	0.2	14.72	B	0.4	13.5
EBT	1103	1034	2.1	9.99	A	9.2	81.4
EBR	121	124	0.3	5.06	A	9.2	81.4
WBL	145	130	1.3	36.37	D	6.3	51.0
WBT	743	618	4.8	9.76	A	5.3	64.8
WBR	10	9	0.3	2.66	A	5.3	64.8
NBL	115	103	1.1	43.24	D	6.5	45.7
NBT	24	25	0.2	37.07	D	2.2	32.9
NBR	66	65	0.1	12.09	B	2.2	34.9
SBL	24	25	0.2	33.25	C	1.1	17.4
SBT	69	69	0.0	39.05	D	6.2	53.7
SBR	98	69	3.2	39.05	D	6.2	53.7
ALL	2551	2305	5.0	15.02	B	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
0	0	0			
1	0	0			
			1	0	0

Elora Drive East - Rathburn Road -- Signalized Intersection							
Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	3	1	1.4	2.16	A	0.0	0.0
EBT	1063	994	2.2	7.24	A	6.1	96.8
EBR	30	0	7.7	0.00	A	5.6	96.2
WBL	22	19	0.7	6.02	A	0.1	10.5
WBT	679	550	5.2	8.39	A	4.5	65.4
WBR	29	24	1.0	5.36	A	4.0	65.1
NBL	78	75	0.3	45.53	D	5.2	41.8
NBT	5		3.2		A		
NBR	36	39	0.5	4.32	A	4.7	41.2
SBL	76	73	0.3	42.54	D	4.7	37.3
SBT	5		3.2		A		
SBR	7	6	0.4	24.21	C	3.4	36.7
ALL	2033	1781	5.8	10.61	B	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
0	1	0			
1	0	0			
0	1	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
			0	1	0

Confederation Parkway - Rathburn Road -- Signalized Intersection							
Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	175	171	0.3	39.58	D	9.0	97.2
EBT	969	926	1.4	37.00	D	40.5	114.5
EBR	141	137	0.3	33.93	C	40.1	114.3
WBL	138	130	0.7	136.19	F	30.0	135.2
WBT	321	281	2.3	36.93	D	25.3	134.4
WBR	284	320	2.1	34.62	C	24.9	134.1
NBL	309	235	4.5	44.14	D	22.1	143.1
NBT	1425	1044	10.8	58.54	E	90.8	144.0
NBR	172	182	0.8	60.28	E	91.2	144.6
SBL	678	384	12.8	139.87	F	421.9	508.6
SBT	1504	969	15.2	52.74	D	430.7	508.6
SBR	93	66	3.0	45.16	D	430.6	508.6
ALL	6209	4845	18.3	56.78	E	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
0	0	1			
1	0	0			
0	0	1			
0	0	1			
1	0	0			
			0	0	1

Confederation Parkway - Square One Drive -- Signalized Intersection							
Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	72	72	0.0	22.72	C	1.5	23.6
EBT	68	67	0.1	44.37	D	5.0	40.0
EBR	43	36	1.1	21.31	C	7.8	51.5
WBL	5	5	0.0	86.47	F	29.9	59.0
WBT	75	74	0.1	68.03	E	29.9	59.0
WBR	47	100	6.2	117.79	F	38.3	69.1
NBL	5	4	0.5	49.41	D	0.0	3.6
NBT	1788	1298	12.5	76.25	E	205.2	265.9
NBR	38	45	1.1	62.95	E	213.6	274.7
SBL	5	3	1.0	52.75	D	0.0	2.6
SBT	1732	1199	13.9	10.88	B	18.5	152.6
SBR	50	33	2.6	13.34	B	18.5	152.6
ALL	3928	2936	16.9	47.09	D	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
0	0	0			
1	0	0			
1	0	0			
0	0	0			
1	0	0			
0	1	0			
1	0	0			
0	0	1			
1	0	0			
1	0	0			
0	0	1			
1	0	0			
			0	0	1

APPENDIX F3
DETAILED TMC RESULTS
ROUNDBOUT INTERSECTION

Elora Drive West - Rathburn Road -- Signalized Intersection							
Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	25	25	0.0	12.73	B	0.3	11.4
EBT	870	823	1.6	9.10	A	6.6	68.6
EBR	92	91	0.1	4.37	A	6.6	68.6
WBL	110	110	0.0	22.86	C	3.0	38.1
WBT	586	556	1.3	9.34	A	5.0	48.4
WBR	8	7	0.4	2.78	A	5.0	48.4
NBL	87	78	1.0	43.07	D	4.8	41.7
NBT	19	17	0.5	39.83	D	1.7	27.1
NBR	50	55	0.7	10.22	B	1.6	29.1
SBL	19	19	0.0	35.72	D	1.0	12.4
SBT	52	52	0.0	38.88	D	4.6	39.2
SBR	74	73	0.1	16.58	B	4.2	39.7
ALL	1992	1906	1.9	12.82	B	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
0	0	0			
1	0	0			
1	0	0			
0	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
0	0	0			
0	0	0			
1	0	0			
1	0	0	1	0	0

Elora Drive East - Rathburn Road -- Signalized Intersection							
Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	2	1	0.8	5.87	A	0.0	1.1
EBT	827	782	1.6	5.09	A	4.0	36.1
EBR	23	0	6.8	0.00	A	3.4	36.7
WBL	16	16	0.0	16.83	B	0.2	11.5
WBT	522	503	0.8	8.53	A	4.1	54.3
WBR	22	18	0.9	6.20	A	3.6	53.8
NBL	59	61	0.3	47.02	D	4.3	36.2
NBT							
NBR	27	28	0.2	6.08	A	4.3	36.0
SBL	58	55	0.4	39.19	D	3.3	30.0
SBT							
SBR	5	4	0.5	24.34	C	2.2	29.5
ALL	1561	1468	2.4	9.50	A	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
0	1	0			
0	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

Confederation Parkway - Rathburn Road -- Signalized Intersection							
Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	133	125	0.7	37.28	D	5.8	58.3
EBT	756	723	1.2	37.82	D	31.5	112.1
EBR	107	111	0.4	34.61	C	31.0	111.9
WBL	107	105	0.2	64.63	E	7.9	61.9
WBT	250	222	1.8	32.89	C	15.1	93.4
WBR	217	252	2.3	27.71	C	14.6	93.1
NBL	235	233	0.1	40.54	D	16.8	126.6
NBT	1124	1036	2.7	54.42	D	92.0	142.8
NBR	135	175	3.2	53.33	D	92.5	143.4
SBL	519	452	3.0	98.46	F	290.0	507.8
SBT	1164	1075	2.7	51.92	D	275.8	507.8
SBR	71	75	0.5	50.04	D	275.5	508.7
ALL	4818	4584	3.4	51.52	D	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

Confederation Parkway - Square One Drive -- Signalized Intersection							
Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	72	71	0.1	18.29	B	1.2	21.5
EBT	56	50	0.8	30.59	C	2.7	26.5
EBR	33	30	0.5	15.39	B	2.3	26.0
WBL	5	5	0.0	68.55	E	17.2	57.3
WBT	58	58	0.0	69.21	E	17.2	57.3
WBR	35	83	6.2	82.02	F	16.1	56.1
NBL	5	6	0.4	38.51	D	0.1	4.0
NBT	1387	1297	2.5	50.06	D	90.2	232.4
NBR	32	47	2.4	39.52	D	96.7	241.2
SBL	5	5	0.0	48.51	D	0.0	3.6
SBT	1332	1248	2.3	10.44	B	18.0	152.2
SBR	47	36	1.7	9.76	A	18.0	152.2
ALL	3067	2936	2.4	32.39	C	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
1	0	0			
0	0	0			
0	0	0			
0	1	0			
1	0	0			
1	0	0			
1	0	0			
0	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

500 Living Arts Drive - Rathburn Road -- Signalized Intersection

Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	19	11	2.1	16.47	B	0.2	6.8
EBT	1167	1052	3.5	20.17	C	32.4	189.0
EBR	224	264	2.6	26.99	C	32.3	188.9
WBL	172	125	3.9	17.88	B	2.5	35.5
WBT	490	545	2.4	13.98	B	7.9	60.4
WBR	12	14	0.6	11.74	B	7.4	59.9
NBL	72	26	6.6	55.39	E	2.1	21.1
NBT	9	10	0.3	47.04	D	3.4	29.4
NBR	141	125	1.4	8.14	A	2.2	29.1
SBL	2	2	0.0	39.93	D	0.2	7.6
SBT	5	1	2.3	58.70	E	0.2	7.6
SBR	12	13	0.3	6.01	A	0.0	7.1
ALL	2325	2188	2.9	19.05	B	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
0	1	0			
1	0	0			
1	0	0			
0	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

600 Living Arts Drive - Square One Drive -- Signalized Intersection

Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	105	50	6.2	26.90	C	1.8	30.1
EBT	60	100	4.5	26.69	C	4.2	42.5
EBR	31	26	0.9	9.77	A	3.8	42.0
WBL	39	42	0.5	29.43	C	1.4	19.0
WBT	16	23	1.6	25.65	C	1.8	39.8
WBR	76	109	3.4	10.57	B	1.4	39.1
NBL	10	29	4.3	0.81	A	0.0	5.9
NBT	201	177	1.7	10.61	B	2.4	38.8
NBR	27	25	0.4	5.68	A	1.8	38.5
SBL	37	33	0.7	11.18	B	0.4	12.2
SBT	163	162	0.1	8.57	A	2.0	34.3
SBR	17	8	2.5	2.84	A	1.5	33.9
ALL	782	784	0.1	14.12	B	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
0	1	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

700 Duke of York Boulevard - Rathburn Road -- Signalized Intersection

Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	137	95	3.9	30.37	C	3.9	39.5
EBT	1043	1039	0.1	33.30	C	35.1	172.9
EBR	73	36	5.0	19.14	B	35.1	172.9
WBL	119	137	1.6	27.56	C	4.3	44.2
WBT	518	524	0.3	8.23	A	5.0	54.5
WBR	38	39	0.2	17.33	B	4.8	54.1
NBL	59	65	0.8	24.06	C	2.1	27.4
NBT	113	154	3.5	32.21	C	5.8	36.3
NBR	73	33	5.5	14.09	B	5.6	36.0
SBL	70	71	0.1	26.36	C	2.6	26.0
SBT	258	273	0.9	37.07	D	14.4	72.5
SBR	97	95	0.2	10.12	B	14.2	72.2
ALL	2598	2561	0.7	26.11	C	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
0	1	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
0	1	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

800 Duke of York Boulevard - Square One Drive -- Signalized Intersection

Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	36	63	3.8	35.09	D	4.1	34.3
EBT	37	38	0.2	29.78	C	4.1	34.3
EBR	51	54	0.4	11.48	B	0.2	10.7
WBL	42	38	0.6	29.01	C	1.4	17.2
WBT	91	111	2.0	30.20	C	5.1	39.1
WBR	39	17	4.2	18.91	B	0.0	0.0
NBL	8	29	4.9	18.69	B	0.5	16.5
NBT	169	170	0.1	9.99	A	2.4	35.2
NBR	31	29	0.4	6.95	A	5.7	51.4
SBL	89	82	0.8	13.20	B	1.2	28.2
SBT	365	329	1.9	11.25	B	5.8	75.0
SBR	34	35	0.2	8.70	A	8.1	83.9
ALL	992	995	0.1	16.35	B	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

2728 Square One Drive Extension - Rathburn Road-- Roundabout Intersection

Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL							
EBT	852	778	2.6	3.33	A	0.3	40.7
EBR	86	109	2.3	3.00	A	0.3	40.7
WBL	5	5	0.0	2.44	A	0.2	21.0
WBT	586	565	0.9	1.18	A	0.2	21.0
WBR							
NBL	117	110	0.7	16.65	C	1.9	39.5
NBT							
NBR	5	6	0.4	12.51	B	1.9	39.5
SBL							
SBT							
SBR							
ALL	1651	1573	1.9	3.50	A	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
0	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

APPENDIX F4
DETAILED TMC RESULTS
T-INTERSECTION (RIRO)

APPENDIX F5
DETAILED TMC RESULTS
ROUNDBOUT INTERSECTION (RIRO)

500 Living Arts Drive - Rathburn Road -- Signalized Intersection

Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	21	12	2.2	28.74	C	0.3	9.0
EBT	1254	1111	4.2	28.96	C	51.9	191.0
EBR	242	266	1.5	34.44	C	51.7	190.9
WBL	190	142	3.7	19.96	B	3.2	44.7
WBT	553	610	2.4	16.43	B	10.1	68.3
WBR	14	16	0.5	15.63	B	9.6	67.8
NBL	78	28	6.9	60.96	E	2.6	21.7
NBT	10	11	0.3	47.98	D	3.5	30.5
NBR	157	138	1.6	10.73	B	2.3	30.2
SBL	2	2	0.0	49.72	D	0.2	6.4
SBT	1	1	0.0	38.94	D	0.2	6.4
SBR	14	14	0.0	6.08	A	0.0	5.9
ALL	2536	2351	3.7	24.98	C	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
0	1	0			
1	0	0			
1	0	0			
0	0	0			
0	0	0			
0	0	0			
1	0	0	1	0	0

600 Living Arts Drive - Square One Drive -- Signalized Intersection

Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	115	52	6.9	28.33	C	2.0	27.8
EBT	68	113	4.7	25.48	C	4.6	40.1
EBR	35	29	1.1	11.96	B	4.1	39.6
WBL	45	48	0.4	29.89	C	1.7	24.7
WBT	19	27	1.7	26.13	C	1.7	35.5
WBR	77	111	3.5	8.98	A	1.2	34.8
NBL	11	34	4.8	0.79	A	0.0	4.9
NBT	222	193	2.0	9.76	A	2.4	35.8
NBR	31	34	0.5	5.49	A	1.8	35.4
SBL	41	37	0.6	13.08	B	0.4	11.3
SBT	182	180	0.1	8.41	A	2.1	31.9
SBR	19	9	2.7	4.60	A	1.5	31.5
ALL	865	867	0.1	13.81	B	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
0	1	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

700 Duke of York Boulevard - Rathburn Road -- Signalized Intersection

Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	155	105	4.4	34.20	C	4.8	37.9
EBT	1176	1100	2.3	33.17	C	39.8	183.5
EBR	83	35	6.2	21.74	C	39.8	183.5
WBL	135	155	1.7	29.23	C	5.4	45.3
WBT	580	586	0.2	8.23	A	5.6	63.9
WBR	43	42	0.2	18.33	B	5.5	63.5
NBL	67	75	0.9	26.82	C	2.6	30.0
NBT	128	177	4.0	32.37	C	6.6	39.2
NBR	83	35	6.2	17.90	B	6.4	38.8
SBL	79	80	0.1	25.79	C	2.7	26.6
SBT	292	308	0.9	37.68	D	16.5	88.0
SBR	110	109	0.1	10.14	B	16.4	87.8
ALL	2931	2807	2.3	26.40	C	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
0	1	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
0	1	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

800 Duke of York Boulevard - Square One Drive -- Signalized Intersection

Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL	41	75	4.5	34.62	C	5.0	46.7
EBT	41	42	0.2	32.31	C	5.0	46.7
EBR	58	63	0.6	14.67	B	0.3	23.6
WBL	47	44	0.4	30.09	C	1.6	18.4
WBT	94	114	2.0	32.03	C	5.8	45.5
WBR	45	20	4.4	20.06	C	0.2	21.0
NBL	9	33	5.2	13.96	B	0.4	15.3
NBT	192	189	0.2	11.53	B	3.3	53.0
NBR	35	34	0.2	7.52	A	6.9	69.2
SBL	100	88	1.2	15.10	B	1.4	25.9
SBT	414	370	2.2	12.27	B	7.2	104.1
SBR	38	39	0.2	9.67	A	9.7	113.0
ALL	1114	1111	0.1	17.46	B	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
0	1	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

2728 Square One Drive Extension - Rathburn Road-- Roundabout Intersection

Movement	AM						
	Obs	Modelled	GEH	Delay	LOS	Avg Q	Max Q
EBL							
EBT	952	913	1.3	4.60	A	1.4	64.1
EBR	91	117	2.5	3.94	A	1.4	64.1
WBL	19	22	0.7	3.98	A	0.4	26.8
WBT	594	594	0.0	1.66	A	0.4	26.8
WBR							
NBL	191	184	0.5	21.98	C	5.1	59.8
NBT							
NBR	5	6	0.4	17.42	C	5.1	59.8
SBL							
SBT							
SBR							
ALL	1852	1836	0.4	5.38	A	-	-

TMC GEH Summary			Total Intersection GEH Summary		
AM GEH			AM GEH		
1-5	5-10	>10	1-5	5-10	>10
1	0	0			
1	0	0			
1	0	0			
0	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0			
1	0	0	1	0	0

APPENDIX G
SUPPLEMENTARY INTERSECTION ANALYSIS

Queues

4: Square One Drive Extension & Rathburn Road

5/17/2016



Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Group Flow (vph)	910	86	21	586	181
v/c Ratio	0.42	0.09	0.07	0.27	0.34
Control Delay	15.8	7.5	12.6	13.8	40.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	15.8	7.5	12.6	13.8	40.1
Queue Length 50th (m)	67.7	5.7	2.3	38.8	38.9
Queue Length 95th (m)	82.1	12.9	6.3	49.1	59.9
Internal Link Dist (m)	76.0			244.8	62.4
Turn Bay Length (m)		15.0	15.0		
Base Capacity (vph)	2147	974	298	2147	537
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.42	0.09	0.07	0.27	0.34

Intersection Summary

HCM Signalized Intersection Capacity Analysis

4: Square One Drive Extension & Rathburn Road

5/17/2016



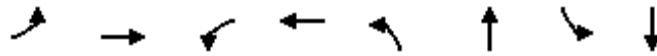
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↵	↑↑	↵	
Traffic Volume (vph)	910	86	21	586	176	5
Future Volume (vph)	910	86	21	586	176	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	
Flt Protected	1.00	1.00	0.95	1.00	0.95	
Satd. Flow (prot)	3579	1601	1789	3579	1789	
Flt Permitted	1.00	1.00	0.26	1.00	0.95	
Satd. Flow (perm)	3579	1601	497	3579	1789	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	910	86	21	586	176	5
RTOR Reduction (vph)	0	14	0	0	1	0
Lane Group Flow (vph)	910	72	21	586	180	0
Turn Type	NA	Perm	Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	84.0	84.0	84.0	84.0	42.0	
Effective Green, g (s)	84.0	84.0	84.0	84.0	42.0	
Actuated g/C Ratio	0.60	0.60	0.60	0.60	0.30	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	
Lane Grp Cap (vph)	2147	960	298	2147	536	
v/s Ratio Prot	c0.25			0.16	c0.10	
v/s Ratio Perm		0.05	0.04			
v/c Ratio	0.42	0.08	0.07	0.27	0.34	
Uniform Delay, d1	15.0	11.7	11.7	13.4	38.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.2	0.5	0.3	1.7	
Delay (s)	15.6	11.9	12.2	13.7	39.8	
Level of Service	B	B	B	B	D	
Approach Delay (s)	15.3			13.7	39.8	
Approach LOS	B			B	D	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Queues

7: Confederation Parkway & Square One Drive

5/17/2016



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	72	89	5	93	5	1419	5	1379
v/c Ratio	0.30	0.26	0.02	0.27	0.02	0.56	0.03	0.54
Control Delay	53.0	40.4	47.0	41.1	6.2	10.5	6.2	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.0	40.4	47.0	41.1	6.2	10.5	6.2	10.2
Queue Length 50th (m)	17.4	16.6	1.2	17.6	0.4	88.8	0.4	84.5
Queue Length 95th (m)	32.6	32.7	5.1	34.0	1.7	104.4	1.7	99.7
Internal Link Dist (m)		90.3		72.5		92.3		89.8
Turn Bay Length (m)	15.0		15.0		15.0		15.0	
Base Capacity (vph)	243	345	244	345	211	2549	199	2545
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.26	0.02	0.27	0.02	0.56	0.03	0.54

Intersection Summary

HCM Signalized Intersection Capacity Analysis

7: Confederation Parkway & Square One Drive

5/17/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕		↖	↗	
Traffic Volume (vph)	72	56	33	5	58	35	5	1387	32	5	1332	47
Future Volume (vph)	72	56	33	5	58	35	5	1387	32	5	1332	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.94		1.00	1.00		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)	1789	1779		1789	1777		1789	3566		1789	3560	
Flt Permitted	0.70	1.00		0.70	1.00		0.16	1.00		0.15	1.00	
Satd. Flow (perm)	1312	1779		1317	1777		295	3566		279	3560	
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)	72	56	33	5	58	35	5	1387	32	5	1332	47
RTOR Reduction (vph)	0	15	0	0	15	0	0	1	0	0	2	0
Lane Group Flow (vph)	72	74	0	5	78	0	5	1418	0	5	1377	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)	26.0	26.0		26.0	26.0		100.0	100.0		100.0	100.0	
Effective Green, g (s)	26.0	26.0		26.0	26.0		100.0	100.0		100.0	100.0	
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.71	0.71		0.71	0.71	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Lane Grp Cap (vph)	243	330		244	330		210	2547		199	2542	
v/s Ratio Prot		0.04			0.04			c0.40			0.39	
v/s Ratio Perm	c0.05			0.00			0.02			0.02		
v/c Ratio	0.30	0.22		0.02	0.23		0.02	0.56		0.03	0.54	
Uniform Delay, d1	49.1	48.4		46.6	48.5		5.8	9.5		5.8	9.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.1	1.6		0.2	1.7		0.2	0.9		0.2	0.8	
Delay (s)	52.2	50.0		46.7	50.2		6.0	10.4		6.1	10.2	
Level of Service	D	D		D	D		A	B		A	B	
Approach Delay (s)		51.0			50.0			10.4			10.1	
Approach LOS		D			D			B			B	

Intersection Summary

HCM 2000 Control Delay	13.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues

4: Square One Drive Extension & Rathburn Road

5/17/2016



Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Group Flow (vph)	598	138	59	1191	140
v/c Ratio	0.25	0.12	0.11	0.50	0.34
Control Delay	9.4	2.8	8.8	12.2	47.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	9.4	2.8	8.8	12.2	47.7
Queue Length 50th (m)	31.9	3.1	5.4	79.3	32.5
Queue Length 95th (m)	40.2	10.0	10.9	94.2	52.4
Internal Link Dist (m)	76.0			244.8	62.4
Turn Bay Length (m)		15.0	15.0		
Base Capacity (vph)	2403	1108	522	2403	409
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.25	0.12	0.11	0.50	0.34

Intersection Summary

HCM Signalized Intersection Capacity Analysis

4: Square One Drive Extension & Rathburn Road

5/17/2016



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↵	↑↑	↵	
Traffic Volume (vph)	598	138	59	1191	135	5
Future Volume (vph)	598	138	59	1191	135	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	
Flt Protected	1.00	1.00	0.95	1.00	0.95	
Satd. Flow (prot)	3579	1601	1789	3579	1788	
Flt Permitted	1.00	1.00	0.41	1.00	0.95	
Satd. Flow (perm)	3579	1601	779	3579	1788	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	598	138	59	1191	135	5
RTOR Reduction (vph)	0	34	0	0	1	0
Lane Group Flow (vph)	598	104	59	1191	139	0
Turn Type	NA	Perm	Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	94.0	94.0	94.0	94.0	32.0	
Effective Green, g (s)	94.0	94.0	94.0	94.0	32.0	
Actuated g/C Ratio	0.67	0.67	0.67	0.67	0.23	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	
Lane Grp Cap (vph)	2403	1074	523	2403	408	
v/s Ratio Prot	0.17			c0.33	c0.08	
v/s Ratio Perm		0.07	0.08			
v/c Ratio	0.25	0.10	0.11	0.50	0.34	
Uniform Delay, d1	9.1	8.1	8.2	11.3	45.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.2	0.4	0.7	2.3	
Delay (s)	9.3	8.3	8.6	12.1	47.4	
Level of Service	A	A	A	B	D	
Approach Delay (s)	9.1			11.9	47.4	
Approach LOS	A			B	D	

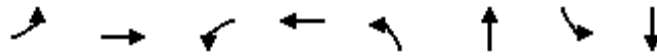
Intersection Summary

HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Queues

7: Confederation Parkway & Square One Drive

5/17/2016



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	74	84	5	80	5	1880	5	1376
v/c Ratio	0.37	0.30	0.03	0.29	0.02	0.70	0.05	0.51
Control Delay	59.7	49.2	51.4	47.2	4.8	11.0	5.6	7.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.7	49.2	51.4	47.2	4.8	11.0	5.6	7.9
Queue Length 50th (m)	18.7	18.1	1.2	16.6	0.3	127.8	0.3	72.0
Queue Length 95th (m)	34.7	34.4	5.3	32.7	1.5	149.5	1.6	84.7
Internal Link Dist (m)		90.3		72.5		92.3		89.8
Turn Bay Length (m)	15.0		15.0		15.0		15.0	
Base Capacity (vph)	199	280	198	280	234	2679	110	2681
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.30	0.03	0.29	0.02	0.70	0.05	0.51

Intersection Summary

HCM Signalized Intersection Capacity Analysis

7: Confederation Parkway & Square One Drive

5/17/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	62	22	5	56	24	5	1850	30	5	1365	11
Future Volume (vph)	74	62	22	5	56	24	5	1850	30	5	1365	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.95		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1809		1789	1799		1789	3570		1789	3574	
Flt Permitted	0.70	1.00		0.70	1.00		0.17	1.00		0.08	1.00	
Satd. Flow (perm)	1328	1809		1323	1799		312	3570		146	3574	
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)	74	62	22	5	56	24	5	1850	30	5	1365	11
RTOR Reduction (vph)	0	9	0	0	11	0	0	1	0	0	1	0
Lane Group Flow (vph)	74	75	0	5	69	0	5	1879	0	5	1376	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)	21.0	21.0		21.0	21.0		105.0	105.0		105.0	105.0	
Effective Green, g (s)	21.0	21.0		21.0	21.0		105.0	105.0		105.0	105.0	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.75	0.75		0.75	0.75	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Lane Grp Cap (vph)	199	271		198	269		234	2677		109	2680	
v/s Ratio Prot		0.04			0.04			c0.53			0.38	
v/s Ratio Perm	c0.06			0.00			0.02			0.03		
v/c Ratio	0.37	0.28		0.03	0.26		0.02	0.70		0.05	0.51	
Uniform Delay, d1	53.6	52.8		50.8	52.6		4.4	9.2		4.5	7.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.3	2.5		0.2	2.3		0.2	1.6		0.8	0.7	
Delay (s)	58.8	55.3		51.0	54.9		4.6	10.8		5.3	7.8	
Level of Service	E	E		D	D		A	B		A	A	
Approach Delay (s)		56.9			54.7			10.8			7.8	
Approach LOS		E			D			B			A	

Intersection Summary

HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	74.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues

4: Square One Drive Extension & Rathburn Road

5/17/2016



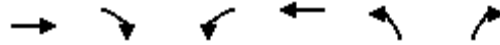
Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Group Flow (vph)	1021	91	24	661	196
v/c Ratio	0.47	0.09	0.09	0.30	0.37
Control Delay	16.0	7.6	12.7	13.7	41.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	16.0	7.6	12.7	13.7	41.6
Queue Length 50th (m)	77.7	6.2	2.7	44.1	43.0
Queue Length 95th (m)	93.4	13.5	7.1	55.0	65.5
Internal Link Dist (m)	76.0			244.8	62.4
Turn Bay Length (m)		15.0	15.0		
Base Capacity (vph)	2172	985	258	2172	525
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.47	0.09	0.09	0.30	0.37

Intersection Summary

HCM Signalized Intersection Capacity Analysis

4: Square One Drive Extension & Rathburn Road

5/17/2016



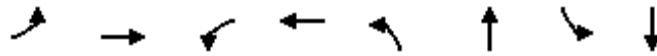
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↑	↑↑	↑	↑
Traffic Volume (vph)	1021	91	24	661	191	5
Future Volume (vph)	1021	91	24	661	191	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	
Flt Protected	1.00	1.00	0.95	1.00	0.95	
Satd. Flow (prot)	3579	1601	1789	3579	1790	
Flt Permitted	1.00	1.00	0.23	1.00	0.95	
Satd. Flow (perm)	3579	1601	427	3579	1790	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1021	91	24	661	191	5
RTOR Reduction (vph)	0	13	0	0	1	0
Lane Group Flow (vph)	1021	78	24	661	195	0
Turn Type	NA	Perm	Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	85.0	85.0	85.0	85.0	41.0	
Effective Green, g (s)	85.0	85.0	85.0	85.0	41.0	
Actuated g/C Ratio	0.61	0.61	0.61	0.61	0.29	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	
Lane Grp Cap (vph)	2172	972	259	2172	524	
v/s Ratio Prot	c0.29			0.18	c0.11	
v/s Ratio Perm		0.05	0.06			
v/c Ratio	0.47	0.08	0.09	0.30	0.37	
Uniform Delay, d1	15.1	11.4	11.4	13.3	39.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.2	0.7	0.4	2.0	
Delay (s)	15.9	11.5	12.2	13.6	41.3	
Level of Service	B	B	B	B	D	
Approach Delay (s)	15.5			13.6	41.3	
Approach LOS	B			B	D	

Intersection Summary			
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	50.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Queues

7: Confederation Parkway & Square One Drive

5/17/2016



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	72	98	5	105	5	1591	5	1548
v/c Ratio	0.33	0.31	0.02	0.33	0.03	0.61	0.03	0.60
Control Delay	55.7	43.6	48.8	44.7	5.8	10.5	5.8	10.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.7	43.6	48.8	44.7	5.8	10.5	5.8	10.2
Queue Length 50th (m)	17.7	19.2	1.2	21.0	0.3	101.9	0.3	97.2
Queue Length 95th (m)	33.3	36.6	5.2	38.8	1.6	119.4	1.7	113.8
Internal Link Dist (m)		90.3		72.5		92.3		89.8
Turn Bay Length (m)	15.0		15.0		15.0		15.0	
Base Capacity (vph)	220	320	224	320	172	2600	161	2596
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.31	0.02	0.33	0.03	0.61	0.03	0.60

Intersection Summary

HCM Signalized Intersection Capacity Analysis

7: Confederation Parkway & Square One Drive

5/17/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕		↖	↗	
Traffic Volume (vph)	72	61	37	5	65	40	5	1556	35	5	1500	48
Future Volume (vph)	72	61	37	5	65	40	5	1556	35	5	1500	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.94		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1777		1789	1776		1789	3567		1789	3562	
Flt Permitted	0.68	1.00		0.69	1.00		0.13	1.00		0.12	1.00	
Satd. Flow (perm)	1288	1777		1306	1776		237	3567		222	3562	
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)	72	61	37	5	65	40	5	1556	35	5	1500	48
RTOR Reduction (vph)	0	16	0	0	16	0	0	1	0	0	2	0
Lane Group Flow (vph)	72	82	0	5	89	0	5	1590	0	5	1546	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)	24.0	24.0		24.0	24.0		102.0	102.0		102.0	102.0	
Effective Green, g (s)	24.0	24.0		24.0	24.0		102.0	102.0		102.0	102.0	
Actuated g/C Ratio	0.17	0.17		0.17	0.17		0.73	0.73		0.73	0.73	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Lane Grp Cap (vph)	220	304		223	304		172	2598		161	2595	
v/s Ratio Prot		0.05			0.05			c0.45			0.43	
v/s Ratio Perm	c0.06			0.00			0.02			0.02		
v/c Ratio	0.33	0.27		0.02	0.29		0.03	0.61		0.03	0.60	
Uniform Delay, d1	50.9	50.4		48.2	50.6		5.3	9.3		5.3	9.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.9	2.2		0.2	2.4		0.3	1.1		0.4	1.0	
Delay (s)	54.8	52.6		48.4	53.0		5.6	10.4		5.6	10.1	
Level of Service	D	D		D	D		A	B		A	B	
Approach Delay (s)		53.5			52.8			10.4			10.1	
Approach LOS		D			D			B			B	

Intersection Summary

HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues

4: Square One Drive Extension & Rathburn Road

5/17/2016



Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Group Flow (vph)	672	145	66	1338	147
v/c Ratio	0.27	0.13	0.13	0.54	0.40
Control Delay	8.5	2.6	8.1	11.5	51.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	8.5	2.6	8.1	11.5	51.3
Queue Length 50th (m)	34.0	3.5	5.7	87.9	35.3
Queue Length 95th (m)	42.3	10.1	11.4	103.6	56.2
Internal Link Dist (m)	76.0			244.8	62.4
Turn Bay Length (m)		15.0	15.0		
Base Capacity (vph)	2479	1140	498	2479	371
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.27	0.13	0.13	0.54	0.40

Intersection Summary

HCM Signalized Intersection Capacity Analysis

4: Square One Drive Extension & Rathburn Road

5/17/2016



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↓	↑↑	↓	↓
Traffic Volume (vph)	672	145	66	1338	142	5
Future Volume (vph)	672	145	66	1338	142	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	
Flt Protected	1.00	1.00	0.95	1.00	0.95	
Satd. Flow (prot)	3579	1601	1789	3579	1788	
Flt Permitted	1.00	1.00	0.38	1.00	0.95	
Satd. Flow (perm)	3579	1601	719	3579	1788	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	672	145	66	1338	142	5
RTOR Reduction (vph)	0	31	0	0	1	0
Lane Group Flow (vph)	672	114	66	1338	146	0
Turn Type	NA	Perm	Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	97.0	97.0	97.0	97.0	29.0	
Effective Green, g (s)	97.0	97.0	97.0	97.0	29.0	
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.21	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	
Lane Grp Cap (vph)	2479	1109	498	2479	370	
v/s Ratio Prot	0.19			c0.37	c0.08	
v/s Ratio Perm		0.07	0.09			
v/c Ratio	0.27	0.10	0.13	0.54	0.40	
Uniform Delay, d1	8.1	7.1	7.3	10.5	47.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.2	0.6	0.8	3.1	
Delay (s)	8.4	7.3	7.8	11.4	51.1	
Level of Service	A	A	A	B	D	
Approach Delay (s)	8.2			11.2	51.1	
Approach LOS	A			B	D	

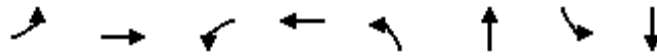
Intersection Summary

HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues

7: Confederation Parkway & Square One Drive

5/17/2016



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	74	94	5	88	5	2113	5	1640
v/c Ratio	0.42	0.37	0.03	0.35	0.03	0.77	0.07	0.60
Control Delay	63.3	53.2	53.2	50.2	4.6	12.0	6.4	8.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.3	53.2	53.2	50.2	4.6	12.0	6.4	8.3
Queue Length 50th (m)	19.0	21.1	1.2	18.7	0.3	155.2	0.3	90.6
Queue Length 95th (m)	35.3	38.9	5.4	35.6	1.4	181.4	1.6	106.3
Internal Link Dist (m)		90.3		72.5		92.3		89.8
Turn Bay Length (m)	15.0		15.0		15.0		15.0	
Base Capacity (vph)	178	254	177	255	168	2729	74	2711
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.37	0.03	0.35	0.03	0.77	0.07	0.60

Intersection Summary

HCM Signalized Intersection Capacity Analysis

7: Confederation Parkway & Square One Drive

5/17/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↕		↖	↗	
Traffic Volume (vph)	74	69	25	5	60	28	5	2080	33	5	1527	113
Future Volume (vph)	74	69	25	5	60	28	5	2080	33	5	1527	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.95		1.00	1.00		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)	1789	1808		1789	1794		1789	3570		1789	3542	
Flt Permitted	0.70	1.00		0.70	1.00		0.12	1.00		0.05	1.00	
Satd. Flow (perm)	1318	1808		1311	1794		221	3570		99	3542	
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)	74	69	25	5	60	28	5	2080	33	5	1527	113
RTOR Reduction (vph)	0	10	0	0	12	0	0	1	0	0	4	0
Lane Group Flow (vph)	74	84	0	5	76	0	5	2112	0	5	1636	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)	19.0	19.0		19.0	19.0		107.0	107.0		107.0	107.0	
Effective Green, g (s)	19.0	19.0		19.0	19.0		107.0	107.0		107.0	107.0	
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.76	0.76		0.76	0.76	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Lane Grp Cap (vph)	178	245		177	243		168	2728		75	2707	
v/s Ratio Prot		0.05			0.04			c0.59			0.46	
v/s Ratio Perm	c0.06			0.00			0.02			0.05		
v/c Ratio	0.42	0.34		0.03	0.31		0.03	0.77		0.07	0.60	
Uniform Delay, d1	55.4	54.9		52.5	54.6		4.0	9.5		4.1	7.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	7.0	3.8		0.3	3.3		0.3	2.2		1.7	1.0	
Delay (s)	62.4	58.7		52.8	57.9		4.3	11.7		5.8	8.2	
Level of Service	E	E		D	E		A	B		A	A	
Approach Delay (s)		60.3			57.7			11.7			8.2	
Approach LOS		E			E			B			A	

Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	81.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues

4: Square One Drive Extension & Rathburn Road

5/17/2016



Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Group Flow (vph)	1172	98	27	764	403
v/c Ratio	0.64	0.12	0.19	0.42	0.59
Control Delay	26.5	13.4	22.8	21.9	34.1
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	26.5	13.4	22.8	21.9	34.1
Queue Length 50th (m)	120.1	10.0	3.9	66.9	78.2
Queue Length 95th (m)	142.7	19.8	10.7	82.3	111.9
Internal Link Dist (m)	76.0			244.8	62.4
Turn Bay Length (m)		15.0	15.0		
Base Capacity (vph)	1840	835	141	1840	687
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.64	0.12	0.19	0.42	0.59

Intersection Summary

HCM Signalized Intersection Capacity Analysis

4: Square One Drive Extension & Rathburn Road

5/17/2016



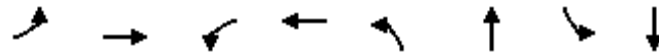
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↵	↑↑	↵	
Traffic Volume (vph)	1172	98	27	764	191	212
Future Volume (vph)	1172	98	27	764	191	212
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.93	
Flt Protected	1.00	1.00	0.95	1.00	0.98	
Satd. Flow (prot)	3579	1601	1789	3579	1709	
Flt Permitted	1.00	1.00	0.15	1.00	0.98	
Satd. Flow (perm)	3579	1601	275	3579	1709	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1172	98	27	764	191	212
RTOR Reduction (vph)	0	12	0	0	28	0
Lane Group Flow (vph)	1172	86	27	764	375	0
Turn Type	NA	Perm	Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	72.0	72.0	72.0	72.0	54.0	
Effective Green, g (s)	72.0	72.0	72.0	72.0	54.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.39	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	
Lane Grp Cap (vph)	1840	823	141	1840	659	
v/s Ratio Prot	c0.33			0.21	c0.22	
v/s Ratio Perm		0.05	0.10			
v/c Ratio	0.64	0.10	0.19	0.42	0.57	
Uniform Delay, d1	24.6	17.5	18.3	21.0	33.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.7	0.3	3.0	0.7	3.5	
Delay (s)	26.3	17.7	21.3	21.7	37.4	
Level of Service	C	B	C	C	D	
Approach Delay (s)	25.6			21.7	37.4	
Approach LOS	C			C	D	

Intersection Summary			
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Queues

7: Confederation Parkway & Square One Drive

5/17/2016



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	72	111	5	122	5	1826	5	1782
v/c Ratio	0.39	0.38	0.03	0.41	0.04	0.69	0.04	0.67
Control Delay	59.9	47.8	50.6	49.5	5.6	11.2	5.8	10.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.9	47.8	50.6	49.5	5.6	11.2	5.8	10.8
Queue Length 50th (m)	18.1	23.0	1.2	25.9	0.3	124.5	0.3	118.4
Queue Length 95th (m)	34.2	41.8	5.3	45.9	1.6	145.2	1.6	138.4
Internal Link Dist (m)		90.3		72.5		92.3		89.8
Turn Bay Length (m)	15.0		15.0		15.0		15.0	
Base Capacity (vph)	186	294	195	294	126	2651	115	2649
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.38	0.03	0.41	0.04	0.69	0.04	0.67

Intersection Summary

HCM Signalized Intersection Capacity Analysis

7: Confederation Parkway & Square One Drive

5/17/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	68	43	5	75	47	5	1788	38	5	1732	50
Future Volume (vph)	72	68	43	5	75	47	5	1788	38	5	1732	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.94		1.00	0.94		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1774		1789	1775		1789	3567		1789	3563	
Flt Permitted	0.63	1.00		0.66	1.00		0.09	1.00		0.08	1.00	
Satd. Flow (perm)	1186	1774		1247	1775		169	3567		157	3563	
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)	72	68	43	5	75	47	5	1788	38	5	1732	50
RTOR Reduction (vph)	0	16	0	0	16	0	0	1	0	0	2	0
Lane Group Flow (vph)	72	95	0	5	106	0	5	1825	0	5	1780	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)	22.0	22.0		22.0	22.0		104.0	104.0		104.0	104.0	
Effective Green, g (s)	22.0	22.0		22.0	22.0		104.0	104.0		104.0	104.0	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.74	0.74		0.74	0.74	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Lane Grp Cap (vph)	186	278		195	278		125	2649		116	2646	
v/s Ratio Prot		0.05			0.06			c0.51			0.50	
v/s Ratio Perm	c0.06			0.00			0.03			0.03		
v/c Ratio	0.39	0.34		0.03	0.38		0.04	0.69		0.04	0.67	
Uniform Delay, d1	52.9	52.6		49.9	52.9		4.8	9.5		4.8	9.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.0	3.3		0.2	3.9		0.6	1.5		0.7	1.4	
Delay (s)	58.9	55.9		50.2	56.8		5.4	11.0		5.5	10.6	
Level of Service	E	E		D	E		A	B		A	B	
Approach Delay (s)		57.1			56.6			11.0			10.6	
Approach LOS		E			E			B			B	

Intersection Summary

HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Queues

4: Square One Drive Extension & Rathburn Road

5/17/2016



Lane Group	EBT	EBR	WBL	WBT	NBL
Lane Group Flow (vph)	775	155	75	1541	157
v/c Ratio	0.31	0.14	0.17	0.62	0.42
Control Delay	8.8	3.2	8.6	13.0	52.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	8.8	3.2	8.6	13.0	52.0
Queue Length 50th (m)	40.6	4.9	6.7	111.3	37.9
Queue Length 95th (m)	49.8	11.8	13.0	130.4	60.0
Internal Link Dist (m)	76.0			244.8	62.4
Turn Bay Length (m)		15.0	15.0		
Base Capacity (vph)	2479	1138	439	2479	371
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.31	0.14	0.17	0.62	0.42

Intersection Summary

HCM Signalized Intersection Capacity Analysis

4: Square One Drive Extension & Rathburn Road

5/17/2016



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↵	↑↑	↵	
Traffic Volume (vph)	775	155	75	1541	152	5
Future Volume (vph)	775	155	75	1541	152	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0	7.0	7.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	
Flt Protected	1.00	1.00	0.95	1.00	0.95	
Satd. Flow (prot)	3579	1601	1789	3579	1789	
Flt Permitted	1.00	1.00	0.34	1.00	0.95	
Satd. Flow (perm)	3579	1601	635	3579	1789	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	775	155	75	1541	152	5
RTOR Reduction (vph)	0	29	0	0	1	0
Lane Group Flow (vph)	775	126	75	1541	156	0
Turn Type	NA	Perm	Perm	NA	Prot	
Protected Phases	2			6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	97.0	97.0	97.0	97.0	29.0	
Effective Green, g (s)	97.0	97.0	97.0	97.0	29.0	
Actuated g/C Ratio	0.69	0.69	0.69	0.69	0.21	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	
Lane Grp Cap (vph)	2479	1109	439	2479	370	
v/s Ratio Prot	0.22			c0.43	c0.09	
v/s Ratio Perm		0.08	0.12			
v/c Ratio	0.31	0.11	0.17	0.62	0.42	
Uniform Delay, d1	8.4	7.2	7.5	11.6	48.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.2	0.8	1.2	3.5	
Delay (s)	8.8	7.4	8.3	12.8	51.7	
Level of Service	A	A	A	B	D	
Approach Delay (s)	8.5			12.6	51.7	
Approach LOS	A			B	D	

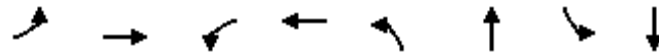
Intersection Summary

HCM 2000 Control Delay	13.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Queues

7: Confederation Parkway & Square One Drive

5/17/2016



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	74	108	5	99	5	2434	5	1865
v/c Ratio	0.45	0.45	0.03	0.41	0.04	0.88	0.09	0.68
Control Delay	65.7	57.0	54.2	53.7	4.6	16.7	8.0	9.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.7	57.0	54.2	53.7	4.6	16.7	8.0	9.2
Queue Length 50th (m)	19.2	25.1	1.2	21.9	0.3	221.0	0.3	112.7
Queue Length 95th (m)	35.7	44.6	5.5	40.3	1.4	261.5	1.8	132.0
Internal Link Dist (m)		90.3		72.5		92.3		89.8
Turn Bay Length (m)	15.0		15.0		15.0		15.0	
Base Capacity (vph)	166	242	159	242	123	2755	54	2738
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.45	0.03	0.41	0.04	0.88	0.09	0.68

Intersection Summary

HCM Signalized Intersection Capacity Analysis

7: Confederation Parkway & Square One Drive

5/17/2016



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	79	29	5	67	32	5	2396	38	5	1749	116
Future Volume (vph)	74	79	29	5	67	32	5	2396	38	5	1749	116
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.95		1.00	1.00		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)	1789	1808		1789	1792		1789	3570		1789	3545	
Flt Permitted	0.69	1.00		0.66	1.00		0.08	1.00		0.04	1.00	
Satd. Flow (perm)	1298	1808		1238	1792		159	3570		70	3545	
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)	74	79	29	5	67	32	5	2396	38	5	1749	116
RTOR Reduction (vph)	0	10	0	0	12	0	0	1	0	0	3	0
Lane Group Flow (vph)	74	98	0	5	87	0	5	2433	0	5	1862	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)	18.0	18.0		18.0	18.0		108.0	108.0		108.0	108.0	
Effective Green, g (s)	18.0	18.0		18.0	18.0		108.0	108.0		108.0	108.0	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.77	0.77		0.77	0.77	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Lane Grp Cap (vph)	166	232		159	230		122	2754		54	2734	
v/s Ratio Prot		0.05			0.05			c0.68			0.53	
v/s Ratio Perm	c0.06			0.00			0.03			0.07		
v/c Ratio	0.45	0.42		0.03	0.38		0.04	0.88		0.09	0.68	
Uniform Delay, d1	56.4	56.2		53.4	55.9		3.8	11.5		3.9	7.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.4	5.6		0.4	4.7		0.6	4.6		3.4	1.4	
Delay (s)	64.8	61.8		53.7	60.5		4.4	16.0		7.3	9.1	
Level of Service	E	E		D	E		A	B		A	A	
Approach Delay (s)		63.0			60.2			16.0			9.1	
Approach LOS		E			E			B			A	

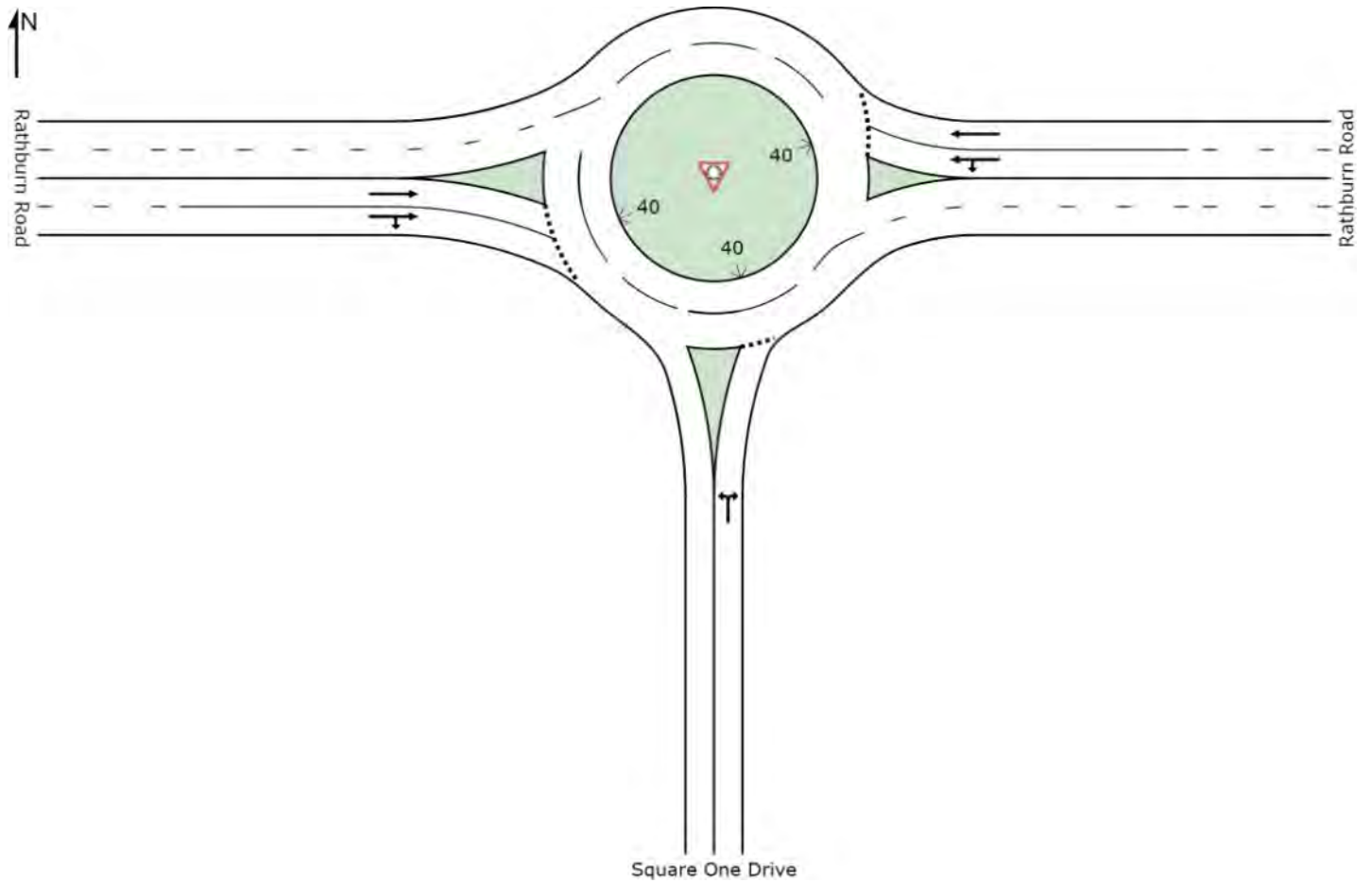
Intersection Summary

HCM 2000 Control Delay	16.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	89.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

SITE LAYOUT

 Site: 2021 - S1D/Rathburn - AM

New Site
Roundabout



LANE SUMMARY

 Site: 2021 - S1D/Rathburn - AM

New Site
Roundabout

Lane Use and Performance													
	Demand Flows		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %						Veh	Dist m				
South: Square One Drive													
Lane 1 ^d	181	2.0	886	0.204	100	11.8	LOS B	0.8	5.7	Full	500	0.0	0.0
Approach	181	2.0		0.204		11.8	LOS B	0.8	5.7				
East: Rathburn Road													
Lane 1	276	2.0	1284	0.215	100	3.8	LOS A	1.3	9.5	Full	500	0.0	0.0
Lane 2 ^d	334	2.0	1556	0.215	100	3.0	LOS A	1.4	9.9	Full	500	0.0	0.0
Approach	610	2.0		0.215		3.3	LOS A	1.4	9.9				
West: Rathburn Road													
Lane 1	462	2.0	1479	0.312	100	3.0	LOS A	1.8	12.8	Full	500	0.0	0.0
Lane 2 ^d	534	2.0	1712	0.312	100	3.0	LOS A	1.8	13.0	Full	500	0.0	0.0
Approach	996	2.0		0.312		3.0	LOS A	1.8	13.0				
Intersection	1787	2.0		0.312		4.0	LOS A	1.8	13.0				

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE SUMMARY

 Site: 2021 - S1D/Rathburn - PM

New Site
Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist m				
South: Square One Drive													
Lane 1 ^d	140	2.0	972	0.144	100	11.0	LOS B	0.6	4.0	Full	500	0.0	0.0
Approach	140	2.0		0.144		11.0	LOS B	0.6	4.0				
East: Rathburn Road													
Lane 1	566	2.0	1347	0.420	100	3.9	LOS A	3.2	22.7	Full	500	0.0	0.0
Lane 2 ^d	684	2.0	1628	0.420	100	3.0	LOS A	3.3	23.4	Full	500	0.0	0.0
Approach	1250	2.0		0.420		3.4	LOS A	3.3	23.4				
West: Rathburn Road													
Lane 1	344	2.0	1408	0.244	100	3.1	LOS A	1.3	9.2	Full	500	0.0	0.0
Lane 2 ^d	392	2.0	1603	0.244	100	3.2	LOS A	1.3	9.4	Full	500	0.0	0.0
Approach	736	2.0		0.244		3.1	LOS A	1.3	9.4				
Intersection	2126	2.0		0.420		3.8	LOS A	3.3	23.4				

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE SUMMARY

 Site: 2031 - S1D/Rathburn - AM

New Site
Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist m				
South: Square One Drive													
Lane 1 ^d	196	2.0	852	0.230	100	12.1	LOS B	0.9	6.5	Full	500	0.0	0.0
Approach	196	2.0		0.230		12.1	LOS B	0.9	6.5				
East: Rathburn Road													
Lane 1	311	2.0	1265	0.246	100	3.9	LOS A	1.6	11.2	Full	500	0.0	0.0
Lane 2 ^d	379	2.0	1538	0.246	100	3.0	LOS A	1.6	11.7	Full	500	0.0	0.0
Approach	690	2.0		0.246		3.5	LOS A	1.6	11.7				
West: Rathburn Road													
Lane 1	516	2.0	1471	0.351	100	3.0	LOS A	2.1	15.2	Full	500	0.0	0.0
Lane 2 ^d	596	2.0	1701	0.351	100	3.0	LOS A	2.2	15.5	Full	500	0.0	0.0
Approach	1112	2.0		0.351		3.0	LOS A	2.2	15.5				
Intersection	1998	2.0		0.351		4.1	LOS A	2.2	15.5				

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE SUMMARY

 Site: 2031 - S1D/Rathburn - PM

New Site
Roundabout

Lane Use and Performance													
	Demand Flows		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %						Veh	Dist m				
South: Square One Drive													
Lane 1 ^d	147	2.0	941	0.156	100	11.2	LOS B	0.6	4.4	Full	500	0.0	0.0
Approach	147	2.0		0.156		11.2	LOS B	0.6	4.4				
East: Rathburn Road													
Lane 1	634	2.0	1337	0.474	100	4.0	LOS A	3.8	27.4	Full	500	0.0	0.0
Lane 2 ^d	768	2.0	1619	0.474	100	3.0	LOS A	4.0	28.2	Full	500	0.0	0.0
Approach	1402	2.0		0.474		3.5	LOS A	4.0	28.2				
West: Rathburn Road													
Lane 1	382	2.0	1398	0.273	100	3.1	LOS A	1.5	10.8	Full	500	0.0	0.0
Lane 2 ^d	435	2.0	1593	0.273	100	3.2	LOS A	1.5	11.0	Full	500	0.0	0.0
Approach	817	2.0		0.273		3.2	LOS A	1.5	11.0				
Intersection	2366	2.0		0.474		3.9	LOS A	4.0	28.2				

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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LANE SUMMARY

 Site: 2041 - S1D/Rathburn - AM

New Site
Roundabout

Lane Use and Performance													
	Demand Flows		Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %						Veh	Dist m				
South: Square One Drive													
Lane 1 ^d	217	2.0	814	0.267	100	12.6	LOS B	1.1	7.8	Full	500	0.0	0.0
Approach	217	2.0		0.267		12.6	LOS B	1.1	7.8				
East: Rathburn Road													
Lane 1	356	2.0	1238	0.288	100	4.0	LOS A	1.9	13.6	Full	500	0.0	0.0
Lane 2 ^d	435	2.0	1513	0.288	100	3.2	LOS A	2.0	14.3	Full	500	0.0	0.0
Approach	791	2.0		0.288		3.5	LOS A	2.0	14.3				
West: Rathburn Road													
Lane 1	588	2.0	1477	0.398	100	3.0	LOS A	2.6	18.7	Full	500	0.0	0.0
Lane 2 ^d	682	2.0	1713	0.398	100	3.0	LOS A	2.7	19.0	Full	500	0.0	0.0
Approach	1270	2.0		0.398		3.0	LOS A	2.7	19.0				
Intersection	2278	2.0		0.398		4.1	LOS A	2.7	19.0				

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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Project: \\CD1215-F01\work_group\01650\active\165011005 - Square_One_Drive\17_traffic\Sidra Analysis\lanl_s1d_rath_20160518.sip6

LANE SUMMARY

 Site: 2041 - S1D/Rathburn - PM

New Site
Roundabout

Lane Use and Performance													
	Demand Flows			Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue		Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
	Total veh/h	HV %	Cap. veh/h					Veh	Dist m				
South: Square One Drive													
Lane 1 ^d	157	2.0	900	0.174	100	11.5	LOS B	0.7	5.0	Full	500	0.0	0.0
Approach	157	2.0		0.174		11.5	LOS B	0.7	5.0				
East: Rathburn Road													
Lane 1	730	2.0	1323	0.552	100	4.2	LOS A	5.0	35.3	Full	500	0.0	0.0
Lane 2 ^d	886	2.0	1606	0.552	100	3.2	LOS A	5.1	36.3	Full	500	0.0	0.0
Approach	1616	2.0		0.552		3.6	LOS A	5.1	36.3				
West: Rathburn Road													
Lane 1	434	2.0	1385	0.314	100	3.2	LOS A	1.8	13.2	Full	500	0.0	0.0
Lane 2 ^d	496	2.0	1580	0.314	100	3.2	LOS A	1.9	13.5	Full	500	0.0	0.0
Approach	930	2.0		0.314		3.2	LOS A	1.9	13.5				
Intersection	2703	2.0		0.552		4.0	LOS A	5.1	36.3				

Level of Service (LOS) Method: Delay (HCM 2000).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay per lane.

Intersection and Approach LOS values are based on average delay for all lanes.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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Project: \\CD1215-F01\work_group\01650\active\165011005 - Square_One_Drive\17_traffic\Sidra Analysis\lanl_s1d_rath_20160518.sip6

Intersection: 2: Private/Elora Drive E & Rathburn Road

Movement	NB	SB
Directions Served	R	R
Maximum Queue (m)	16.9	8.7
Average Queue (m)	5.6	1.6
95th Queue (m)	13.9	7.0
Link Distance (m)	52.2	77.9
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	WB	WB	NB
Directions Served	T	TR	LT	T	LR
Maximum Queue (m)	26.3	13.3	14.8	7.0	25.7
Average Queue (m)	5.2	1.1	3.3	0.3	12.0
95th Queue (m)	18.0	7.0	11.6	3.7	21.7
Link Distance (m)	82.1	82.1	71.0	71.0	66.5
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Confederation Parkway & Square One Drive

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)	36.1	63.7	15.1	57.5	31.6	118.6	120.1	31.5	118.1	122.2
Average Queue (m)	16.0	19.7	1.6	24.7	1.8	111.6	111.6	1.6	91.8	91.1
95th Queue (m)	31.1	42.2	8.8	48.9	15.7	133.9	134.2	13.8	133.3	135.2
Link Distance (m)		102.9		85.3		108.3	108.3		113.8	113.8
Upstream Blk Time (%)		0				65	68		3	3
Queuing Penalty (veh)		0				0	0		23	20
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	30	27		35		67			25	
Queuing Penalty (veh)	27	19		2		3			1	

Intersection: 10: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	61.5	108.7	112.4	91.6	82.5	89.5	94.9	123.7	121.1	96.4	91.5	90.3
Average Queue (m)	28.6	75.8	75.7	80.9	36.7	45.9	76.8	115.1	114.4	86.7	43.5	36.5
95th Queue (m)	53.6	107.5	107.9	105.0	74.8	93.9	123.9	138.2	137.3	105.5	93.4	87.8
Link Distance (m)		175.6	175.6	82.4	82.4	82.4		113.8	113.8	83.1	83.1	83.1
Upstream Blk Time (%)				66	2	10		36	38	67	8	6
Queuing Penalty (veh)				0	0	0		265	284	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)		0					1	48				
Queuing Penalty (veh)		0					8	114				

Network Summary

Network wide Queuing Penalty: 766

Intersection: 2: Private DW/Elora Drive E & Rathburn Road

Movement	NB	SB
Directions Served	R	R
Maximum Queue (m)	8.1	8.6
Average Queue (m)	1.9	1.0
95th Queue (m)	7.4	5.5
Link Distance (m)	60.0	61.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	WB	WB	NB
Directions Served	T	TR	LT	T	LR
Maximum Queue (m)	20.9	16.6	21.3	18.6	30.0
Average Queue (m)	4.8	1.8	6.7	1.5	10.8
95th Queue (m)	16.0	9.1	17.9	11.4	21.2
Link Distance (m)	82.1	82.1	70.6	70.6	66.5
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Confederation Parkway & Square One Drive

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)	39.5	54.9	11.3	39.8	33.1	123.1	125.5	8.6	111.4	114.6
Average Queue (m)	17.9	19.7	1.8	17.4	2.0	114.2	114.4	0.6	81.8	82.0
95th Queue (m)	35.2	39.5	7.6	34.3	16.8	119.0	120.0	4.1	120.3	122.7
Link Distance (m)		102.9		85.1		108.3	108.3		113.4	113.4
Upstream Blk Time (%)						70	70		0	0
Queuing Penalty (veh)						0	0		1	2
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	32	25	1	28		67			20	
Queuing Penalty (veh)	27	19	0	1		3			1	

Intersection: 11: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	56.8	71.2	74.9	119.8	124.1	128.1	94.9	126.2	125.2	133.1	129.5	123.8
Average Queue (m)	25.4	41.1	41.6	48.8	118.4	120.5	69.6	116.7	116.0	122.4	109.6	83.2
95th Queue (m)	46.8	61.8	64.1	120.4	125.2	124.0	123.4	121.1	120.1	131.8	161.9	155.0
Link Distance (m)		178.2	178.2	115.2	115.2	115.2		113.4	113.4	118.0	118.0	118.0
Upstream Blk Time (%)				5	49	78		34	36	71	25	12
Queuing Penalty (veh)				0	0	0		329	347	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)							2	46				
Queuing Penalty (veh)							18	117				

Network Summary

Network wide Queuing Penalty: 865

Queuing and Blocking Report
2031 AM

9/23/2016

Intersection: 2: Private DW/Elora Drive E & Rathburn Road

Movement	NB	SB
Directions Served	R	R
Maximum Queue (m)	19.5	9.0
Average Queue (m)	6.1	1.7
95th Queue (m)	14.5	7.4
Link Distance (m)	52.3	81.8
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	WB	WB	NB
Directions Served	T	TR	LT	T	LR
Maximum Queue (m)	37.2	22.9	18.4	17.3	37.1
Average Queue (m)	7.1	1.3	4.0	0.6	15.4
95th Queue (m)	23.5	9.8	13.2	7.8	28.2
Link Distance (m)	82.1	82.1	70.7	70.7	66.5
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Confederation Parkway & Square One Drive

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)	38.4	62.3	16.3	58.3	33.2	121.2	119.8	41.5	117.8	121.8
Average Queue (m)	16.9	23.7	2.0	26.1	2.6	113.3	113.0	2.7	92.1	94.7
95th Queue (m)	32.7	45.7	10.9	49.1	18.9	117.2	118.2	17.8	128.6	130.5
Link Distance (m)		102.9		85.2		108.3	108.3		115.2	115.2
Upstream Blk Time (%)						66	63		2	2
Queuing Penalty (veh)						0	0		12	18
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	31	33	0	37	0	68			22	
Queuing Penalty (veh)	30	24	0	2	0	3			1	

Intersection: 10: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	81.2	119.2	121.9	113.0	108.7	102.6	94.9	126.8	120.4	151.8	144.7	145.8
Average Queue (m)	33.0	83.3	83.3	93.2	52.5	51.6	81.2	117.8	117.0	143.2	133.4	83.3
95th Queue (m)	58.6	109.4	110.7	133.4	101.9	100.4	121.8	121.9	119.2	147.4	181.0	169.4
Link Distance (m)		177.5	177.5	105.4	105.4	105.4		115.2	115.2	137.8	137.8	137.8
Upstream Blk Time (%)				57	4	3		37	39	72	26	8
Queuing Penalty (veh)				0	0	0		309	324	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)	0	1					2	50				
Queuing Penalty (veh)	0	1					12	134				

Network Summary

Network wide Queuing Penalty: 870

Intersection: 2: Private DW/Elora Drive E & Rathburn Road

Movement	WB	NB	SB
Directions Served	T	R	R
Maximum Queue (m)	3.4	8.2	8.8
Average Queue (m)	0.1	2.1	1.0
95th Queue (m)	2.4	8.0	5.6
Link Distance (m)	180.5	41.3	76.7
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	WB	WB	NB
Directions Served	T	TR	LT	T	LR
Maximum Queue (m)	29.0	12.1	21.7	23.8	24.2
Average Queue (m)	5.2	1.1	7.7	1.6	10.8
95th Queue (m)	17.7	7.3	18.7	12.0	19.7
Link Distance (m)	82.1	82.1	66.3	66.3	66.5
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Confederation Parkway & Square One Drive

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)	39.8	63.4	10.1	50.2	39.6	124.1	122.6	34.4	109.6	110.8
Average Queue (m)	20.5	26.5	0.9	22.2	2.7	114.1	114.0	1.9	76.4	79.3
95th Queue (m)	38.4	51.7	5.5	40.9	20.0	118.8	118.2	14.0	113.2	114.2
Link Distance (m)		102.9		85.3		108.3	108.3		115.3	115.3
Upstream Blk Time (%)						71	68		0	0
Queuing Penalty (veh)						0	0		0	2
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	37	37	0	35		66		0	19	
Queuing Penalty (veh)	35	27	0	2		3		2	1	

Intersection: 10: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	64.7	71.6	69.4	126.2	134.2	136.1	94.9	125.5	121.7	167.7	164.0	164.7
Average Queue (m)	34.4	43.1	43.1	60.5	125.1	127.6	76.8	117.9	117.3	159.4	154.3	112.8
95th Queue (m)	64.2	61.6	61.8	140.4	134.1	132.1	123.5	122.0	120.2	163.1	192.7	195.6
Link Distance (m)		180.5	180.5	121.9	121.9	121.9		115.3	115.3	154.1	154.1	154.1
Upstream Blk Time (%)				9	48	78		33	35	79	39	6
Queuing Penalty (veh)				0	0	0		358	383	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)							4	46				
Queuing Penalty (veh)							38	133				

Network Summary

Network wide Queuing Penalty: 985

Intersection: 2: Private DW/Elora Drive E & Rathburn Road/Rathburn Road

Movement	NB	SB
Directions Served	R	R
Maximum Queue (m)	13.6	8.4
Average Queue (m)	5.6	1.5
95th Queue (m)	12.6	6.7
Link Distance (m)	46.7	73.1
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	WB	WB	NB
Directions Served	T	TR	LT	T	LR
Maximum Queue (m)	52.1	32.2	18.6	8.5	40.3
Average Queue (m)	10.4	2.4	3.1	0.3	17.9
95th Queue (m)	34.0	14.8	12.1	4.5	31.2
Link Distance (m)	82.1	82.1	67.4	67.4	66.5
Upstream Blk Time (%)	0				
Queuing Penalty (veh)	0				
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Confederation Parkway & Square One Drive

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)	39.8	70.2	15.0	50.9	5.2	120.5	121.9	8.2	113.8	114.4
Average Queue (m)	21.2	30.1	1.4	27.9	0.3	113.4	113.5	0.5	80.3	81.0
95th Queue (m)	39.3	58.1	8.2	46.0	2.9	116.5	117.0	4.0	114.3	115.4
Link Distance (m)		102.9		85.3		108.3	108.3		115.1	115.1
Upstream Blk Time (%)		0				69	68		0	0
Queuing Penalty (veh)		0				0	0		3	2
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	38	39		47		69		0	21	
Queuing Penalty (veh)	42	28		2		3		1	1	

Intersection: 10: Confederation Parkway & Rathburn Road/Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	112.8	137.0	139.7	104.5	100.4	103.0	94.9	126.9	125.0	125.1	116.6	114.1
Average Queue (m)	38.8	95.1	95.3	100.0	54.6	58.1	79.1	117.9	117.3	116.0	85.8	39.0
95th Queue (m)	78.6	126.7	129.4	105.0	114.1	114.8	121.1	122.3	121.1	120.3	156.8	98.7
Link Distance (m)		178.2	178.2	96.1	96.1	96.1		115.1	115.1	110.4	110.4	110.4
Upstream Blk Time (%)				93	9	9		40	42	78	17	1
Queuing Penalty (veh)				0	0	0		379	398	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)		3					8	53				
Queuing Penalty (veh)		6					56	163				

Network Summary

Network wide Queuing Penalty: 1083

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	WB	WB	NB
Directions Served	T	TR	LT	T	LR
Maximum Queue (m)	29.2	16.8	25.3	23.4	24.4
Average Queue (m)	6.6	2.3	8.7	1.1	11.8
95th Queue (m)	20.0	10.9	20.8	8.6	21.6
Link Distance (m)	82.1	82.1	70.6	70.6	66.5
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Confederation Parkway & Square One Drive

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)	38.2	106.8	9.7	88.0	6.8	122.7	120.9	8.8	24.3	30.4
Average Queue (m)	36.2	103.9	0.6	84.7	0.5	113.3	113.4	1.0	8.9	9.7
95th Queue (m)	37.9	108.7	8.2	90.3	3.6	116.8	117.4	5.3	20.4	23.9
Link Distance (m)		102.9		85.3		108.3	108.3		116.1	116.1
Upstream Blk Time (%)		100		100		60	57			
Queuing Penalty (veh)		0		0		0	0			
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	100			100		58			4	
Queuing Penalty (veh)	108			5		3			0	

Intersection: 10: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	99.6	80.0	84.0	89.3	103.7	109.9	94.9	126.4	123.8	158.3	156.4	149.0
Average Queue (m)	55.4	51.1	52.1	30.7	96.4	101.1	75.9	118.5	118.0	149.8	146.6	93.7
95th Queue (m)	101.9	73.4	76.4	72.0	108.7	105.2	123.3	122.5	120.9	154.0	173.2	178.2
Link Distance (m)		179.3	179.3	95.6	95.6	95.6		116.1	116.1	144.4	144.4	144.4
Upstream Blk Time (%)				2	35	76		49	50	78	38	6
Queuing Penalty (veh)				0	0	0		611	628	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)	2						5	62				
Queuing Penalty (veh)	4						53	207				

Intersection: 12: Private DW/Elora Drive E & Rathburn Road

Movement	NB	SB
Directions Served	R	R
Maximum Queue (m)	9.1	10.6
Average Queue (m)	2.4	1.1
95th Queue (m)	8.8	6.1
Link Distance (m)	54.2	63.7
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 1620

Intersection: 2: Private/Elora Drive E & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LTR
Maximum Queue (m)	13.8	86.1	73.4	9.3	19.8	29.4	30.6	19.1	31.7
Average Queue (m)	0.6	52.8	42.6	1.9	4.4	11.1	12.8	5.1	12.4
95th Queue (m)	8.0	80.0	70.2	7.2	13.9	23.8	25.7	14.0	26.9
Link Distance (m)		71.9	71.9		171.9	171.9	52.0	52.0	77.9
Upstream Blk Time (%)		2	0						
Queuing Penalty (veh)		8	1						
Storage Bay Dist (m)	40.0			40.0					
Storage Blk Time (%)		13							
Queuing Penalty (veh)		0							

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	WB	WB	NB
Directions Served	T	TR	LT	T	LR
Maximum Queue (m)	23.2	5.7	15.7	6.9	24.7
Average Queue (m)	6.4	0.3	2.7	0.2	10.0
95th Queue (m)	18.7	3.5	10.5	4.8	19.7
Link Distance (m)	83.2	83.2	71.9	71.9	66.5
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Confederation Parkway & Square One Drive

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)	35.4	43.8	10.2	46.3	33.2	118.1	119.6	23.4	119.9	118.6
Average Queue (m)	17.2	19.2	1.2	22.0	1.7	113.3	113.3	1.2	98.7	98.0
95th Queue (m)	32.2	37.7	6.1	40.4	13.7	116.2	116.8	11.2	133.6	132.6
Link Distance (m)		102.9		85.3		108.3	108.3		113.8	113.8
Upstream Blk Time (%)						66	68		4	4
Queuing Penalty (veh)						0	0		29	24
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	31	23	0	35		67			25	
Queuing Penalty (veh)	27	16	0	2		3			1	

Intersection: 10: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	44.7	92.6	93.6	92.7	83.1	89.2	94.9	123.2	118.8	96.3	89.6	92.6
Average Queue (m)	19.2	57.2	57.8	85.7	33.6	44.1	76.8	116.8	116.1	87.6	55.4	50.5
95th Queue (m)	38.0	81.0	81.8	94.1	74.0	94.9	123.3	120.2	118.4	96.0	103.2	100.5
Link Distance (m)		171.9	171.9	82.4	82.4	82.4		113.8	113.8	83.1	83.1	83.1
Upstream Blk Time (%)				92	2	8		36	38	67	10	9
Queuing Penalty (veh)				0	0	0		266	282	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)							1	48				
Queuing Penalty (veh)							8	113				

Network Summary

Network wide Queuing Penalty: 782

Intersection: 2: Private DW/Elora Drive E & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LTR
Maximum Queue (m)	8.3	52.9	35.4	54.7	75.4	79.8	13.3	9.1	13.9
Average Queue (m)	0.9	26.3	16.1	10.0	53.8	56.3	3.1	1.3	5.0
95th Queue (m)	4.7	43.9	31.1	33.8	74.1	76.2	10.4	6.2	13.5
Link Distance (m)		71.5	71.5		174.8	174.8	59.8	59.8	61.6
Upstream Blk Time (%)		0							
Queuing Penalty (veh)		0							
Storage Bay Dist (m)	40.0			40.0					
Storage Blk Time (%)		1			10				
Queuing Penalty (veh)		0			5				

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	WB	WB	NB
Directions Served	T	TR	LT	T	LR
Maximum Queue (m)	14.9	7.0	40.7	42.4	23.8
Average Queue (m)	2.3	0.2	8.5	3.7	8.3
95th Queue (m)	10.3	3.0	27.4	22.2	17.9
Link Distance (m)	83.2	83.2	71.5	71.5	66.5
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Confederation Parkway & Square One Drive

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)	37.8	54.2	11.4	43.1	31.5	123.1	124.0	24.9	113.4	113.2
Average Queue (m)	20.0	21.6	1.4	19.7	3.0	114.0	114.4	1.4	81.1	81.5
95th Queue (m)	36.7	43.5	6.9	37.4	21.3	118.6	120.1	11.5	120.1	118.7
Link Distance (m)		102.9		85.1		108.3	108.3		113.4	113.4
Upstream Blk Time (%)						71	71		0	0
Queuing Penalty (veh)						0	0		2	3
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	36	31	1	31	0	67		0	20	
Queuing Penalty (veh)	30	23	1	2	1	3		1	1	

Intersection: 11: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	49.4	60.6	62.1	120.0	128.0	131.3	94.9	122.6	119.1	131.2	131.8	127.6
Average Queue (m)	23.5	34.9	34.6	47.7	118.3	120.9	67.5	116.3	115.8	122.8	110.8	84.9
95th Queue (m)	45.5	53.1	53.7	117.5	127.1	125.6	122.7	119.7	118.2	132.7	161.1	153.8
Link Distance (m)		174.8	174.8	115.2	115.2	115.2		113.4	113.4	118.0	118.0	118.0
Upstream Blk Time (%)				5	44	77		34	36	70	26	16
Queuing Penalty (veh)				0	0	0		333	349	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)							1	46				
Queuing Penalty (veh)							5	117				

Network Summary

Network wide Queuing Penalty: 877

Intersection: 2: Private DW/Elora Drive E & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LTR
Maximum Queue (m)	6.3	86.3	80.1	10.3	13.9	19.0	40.4	15.1	38.9
Average Queue (m)	0.5	53.8	44.0	2.3	2.3	7.6	15.1	5.4	15.8
95th Queue (m)	3.7	82.8	70.4	7.8	8.4	17.1	31.0	14.2	31.7
Link Distance (m)		71.6	71.6		173.7	173.7	52.1	52.1	81.8
Upstream Blk Time (%)		2	1				0		
Queuing Penalty (veh)		10	3				0		
Storage Bay Dist (m)	40.0			40.0					
Storage Blk Time (%)		12							
Queuing Penalty (veh)		0							

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	WB	NB
Directions Served	T	TR	LT	LR
Maximum Queue (m)	33.4	14.4	15.6	29.0
Average Queue (m)	8.6	0.9	3.1	11.8
95th Queue (m)	23.2	6.4	11.5	23.6
Link Distance (m)	83.2	83.2	71.6	66.5
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 7: Confederation Parkway & Square One Drive

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)	39.4	53.0	15.0	58.8	33.2	123.3	121.5	33.8	117.4	121.1
Average Queue (m)	17.8	22.6	1.2	25.1	1.8	113.8	113.5	1.9	94.6	96.4
95th Queue (m)	33.7	44.1	7.8	44.1	15.3	118.6	117.2	13.8	126.2	127.7
Link Distance (m)		102.9		85.2		108.3	108.3		115.2	115.2
Upstream Blk Time (%)				0		68	69		2	3
Queuing Penalty (veh)				0		0	0		12	20
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	31	29		41		68		0	22	
Queuing Penalty (veh)	30	21		2		3		3	1	

Intersection: 10: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	53.1	87.9	88.3	112.8	111.2	115.9	94.9	124.9	121.1	152.7	147.4	142.9
Average Queue (m)	24.5	59.6	60.8	105.9	59.4	57.0	80.2	117.6	117.1	143.1	131.4	76.0
95th Queue (m)	47.6	83.0	83.6	127.6	124.3	116.7	123.6	121.2	119.6	147.8	181.4	153.6
Link Distance (m)		173.7	173.7	105.4	105.4	105.4		115.2	115.2	137.8	137.8	137.8
Upstream Blk Time (%)				84	9	5		39	41	76	24	1
Queuing Penalty (veh)				0	0	0		324	344	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)							1	52				
Queuing Penalty (veh)							9	138				

Network Summary

Network wide Queuing Penalty: 919

Intersection: 2: Private DW/Elora Drive E & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LTR
Maximum Queue (m)	8.6	51.9	47.1	54.5	74.2	78.3	17.5	8.0	19.9
Average Queue (m)	1.2	28.5	19.8	13.3	55.2	60.4	4.1	1.6	5.9
95th Queue (m)	5.9	44.1	36.0	41.1	74.4	78.4	12.7	6.8	15.4
Link Distance (m)		67.3	67.3		177.2	177.2	41.1	41.1	76.7
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	40.0			40.0					
Storage Blk Time (%)		1			11				
Queuing Penalty (veh)		0			7				

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	WB	WB	NB
Directions Served	T	TR	LT	T	LR
Maximum Queue (m)	19.7	12.2	45.9	45.2	24.4
Average Queue (m)	3.6	0.4	10.3	4.8	10.3
95th Queue (m)	13.9	6.5	30.7	24.9	20.4
Link Distance (m)	83.2	83.2	67.3	67.3	66.5
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Confederation Parkway & Square One Drive

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)	39.8	58.2	8.7	44.1	39.9	122.3	124.1	18.2	110.4	116.4
Average Queue (m)	19.8	23.7	1.0	22.8	2.4	114.0	114.2	1.4	75.9	77.8
95th Queue (m)	37.5	44.7	5.3	39.6	18.6	118.2	119.1	9.4	115.7	116.5
Link Distance (m)		102.9		85.3		108.3	108.3		115.3	115.3
Upstream Blk Time (%)						70	70		0	0
Queuing Penalty (veh)						0	0		0	2
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	33	35		35	0	66		0	18	
Queuing Penalty (veh)	31	26		2	1	3		1	1	

Intersection: 10: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	59.5	61.0	61.5	126.5	130.8	132.9	94.9	125.0	125.4	165.7	165.6	164.4
Average Queue (m)	28.5	38.2	37.8	60.2	124.6	126.8	74.8	118.1	117.9	159.0	156.7	115.8
95th Queue (m)	54.4	56.5	55.3	139.7	135.1	129.8	124.0	122.5	122.0	164.6	180.7	201.0
Link Distance (m)		177.2	177.2	121.9	121.9	121.9		115.3	115.3	154.1	154.1	154.1
Upstream Blk Time (%)				7	48	76		34	36	76	41	12
Queuing Penalty (veh)				0	0	0		366	389	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)							3	46				
Queuing Penalty (veh)							24	134				

Network Summary

Network wide Queuing Penalty: 987

Intersection: 2: Private DW/Elora Drive E & Rathburn Road/Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LTR
Maximum Queue (m)	5.6	83.3	78.5	12.7	22.6	25.8	43.8	17.8	45.8
Average Queue (m)	0.3	58.2	48.4	2.4	4.3	9.0	17.8	5.7	18.9
95th Queue (m)	2.8	83.1	75.6	9.3	14.5	21.5	35.9	13.8	36.7
Link Distance (m)		68.4	68.4		175.6	175.6	46.6	46.6	73.1
Upstream Blk Time (%)		3	1				0		
Queuing Penalty (veh)		16	6				0		
Storage Bay Dist (m)	40.0			40.0					
Storage Blk Time (%)		14							
Queuing Penalty (veh)		0							

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	WB	WB	NB
Directions Served	T	TR	LT	T	LR
Maximum Queue (m)	52.3	34.6	15.6	8.8	29.3
Average Queue (m)	13.1	2.2	2.8	0.3	12.6
95th Queue (m)	34.8	16.6	10.6	4.5	23.7
Link Distance (m)	83.2	83.2	68.4	68.4	66.5
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Confederation Parkway & Square One Drive

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)	39.8	67.3	15.0	62.9	26.4	120.0	120.2	8.1	117.5	117.4
Average Queue (m)	19.6	26.3	1.5	28.6	1.3	113.6	113.6	0.9	79.9	81.4
95th Queue (m)	35.8	53.1	8.7	51.8	13.1	117.3	117.0	5.1	119.3	120.5
Link Distance (m)		102.9		85.3		108.3	108.3		115.1	115.1
Upstream Blk Time (%)						68	69		1	0
Queuing Penalty (veh)						0	0		6	4
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	35	33	0	44	0	69		0	20	
Queuing Penalty (veh)	39	24	0	2	0	3		2	1	

Intersection: 10: Confederation Parkway & Rathburn Road/Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	79.3	104.3	110.5	106.4	100.6	101.4	94.9	125.7	123.8	122.5	117.1	114.4
Average Queue (m)	26.5	66.6	68.0	99.5	49.2	52.2	80.6	117.7	117.1	115.8	91.9	52.9
95th Queue (m)	55.5	97.3	100.9	107.6	106.7	106.7	122.2	121.6	120.9	119.3	155.4	117.6
Link Distance (m)		175.6	175.6	96.1	96.1	96.1		115.1	115.1	110.4	110.4	110.4
Upstream Blk Time (%)				91	8	5		41	43	81	21	1
Queuing Penalty (veh)				0	0	0		389	408	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)		1					4	53				
Queuing Penalty (veh)		1					25	165				

Network Summary

Network wide Queuing Penalty: 1092

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	WB	WB	NB
Directions Served	T	TR	LT	T	LR
Maximum Queue (m)	18.4	5.9	37.2	33.6	25.2
Average Queue (m)	4.3	0.5	8.4	2.9	10.8
95th Queue (m)	14.7	5.1	26.1	19.1	20.7
Link Distance (m)	83.2	83.2	71.6	71.6	66.5
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Confederation Parkway & Square One Drive

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)	37.2	104.0	1.6	89.5	24.9	118.7	120.9	8.8	22.5	26.4
Average Queue (m)	36.2	103.2	0.1	85.0	1.0	113.3	113.6	0.8	9.1	10.1
95th Queue (m)	38.0	108.5	1.3	90.3	10.8	116.8	117.2	4.6	19.6	24.0
Link Distance (m)		102.9		85.3		108.3	108.3		115.5	115.5
Upstream Blk Time (%)		100		100		58	57			
Queuing Penalty (veh)		0		0		0	0			
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	100			100		58			3	
Queuing Penalty (veh)	108			5		3			0	

Intersection: 10: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	100.7	74.6	80.7	96.5	102.5	108.6	94.9	129.3	124.8	159.2	155.6	151.4
Average Queue (m)	61.8	48.9	49.5	31.3	94.8	100.9	78.8	118.2	117.4	149.9	146.3	98.6
95th Queue (m)	110.0	69.2	69.1	73.5	112.1	104.4	120.4	123.1	121.1	154.8	171.2	180.9
Link Distance (m)		174.1	174.1	95.6	95.6	95.6		115.5	115.5	144.4	144.4	144.4
Upstream Blk Time (%)				3	35	76		48	50	82	34	5
Queuing Penalty (veh)				0	0	0		607	626	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)	2						5	61				
Queuing Penalty (veh)	5						54	206				

Intersection: 12: Private DW/Elora Drive E & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LTR
Maximum Queue (m)	8.9	59.5	48.5	40.6	68.2	67.2	18.8	10.4	19.0
Average Queue (m)	1.4	34.5	23.9	7.0	42.2	43.7	5.3	2.1	6.6
95th Queue (m)	6.6	52.0	39.9	23.5	62.2	67.2	14.5	8.4	16.4
Link Distance (m)		71.6	71.6		174.1	174.1	53.8	53.8	63.7
Upstream Blk Time (%)		0							
Queuing Penalty (veh)		0							
Storage Bay Dist (m)	40.0			40.0					
Storage Blk Time (%)		3			7				
Queuing Penalty (veh)		0			5				

Network Summary

Network wide Queuing Penalty: 1619

Intersection: 2: Private/Elora Drive E & Rathburn Road

Movement	EB	NB	SB
Directions Served	TR	R	R
Maximum Queue (m)	1.2	18.1	8.8
Average Queue (m)	0.0	5.4	1.7
95th Queue (m)	0.8	13.8	7.2
Link Distance (m)	80.9	52.0	77.9
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB
Directions Served	T	T	R	L	T	T	LR
Maximum Queue (m)	93.0	82.5	39.9	13.7	39.8	41.5	66.6
Average Queue (m)	63.2	44.2	11.0	2.6	16.3	22.2	32.3
95th Queue (m)	89.6	77.0	32.2	10.1	33.6	38.9	60.3
Link Distance (m)	90.2	90.2			80.9	80.9	68.4
Upstream Blk Time (%)	1	0					1
Queuing Penalty (veh)	0	0					0
Storage Bay Dist (m)			15.0	15.0			
Storage Blk Time (%)		23	0	1	15		
Queuing Penalty (veh)		19	2	2	2		

Intersection: 7: Confederation Parkway & Square One Drive

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)	38.6	53.3	15.7	44.2	33.1	117.5	124.4	25.0	119.5	120.1
Average Queue (m)	18.2	23.4	1.5	21.9	1.5	113.1	113.3	2.2	95.1	94.4
95th Queue (m)	35.0	44.9	9.0	39.0	13.4	115.3	119.2	16.8	135.5	136.7
Link Distance (m)		102.9		85.3		108.3	108.3		113.8	113.8
Upstream Blk Time (%)						68	68		4	3
Queuing Penalty (veh)						0	0		25	24
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	31	28	1	36		67			25	
Queuing Penalty (veh)	28	20	1	2		3			1	

Intersection: 10: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	52.8	92.1	93.5	91.7	75.9	87.1	94.9	124.6	120.9	96.7	88.9	91.1
Average Queue (m)	26.5	64.1	62.9	85.7	31.0	40.0	75.6	117.0	116.2	87.7	55.7	50.2
95th Queue (m)	47.8	87.6	86.8	95.1	67.0	84.9	123.0	121.1	119.2	96.9	102.0	102.2
Link Distance (m)		175.6	175.6	82.4	82.4	82.4		113.8	113.8	83.1	83.1	83.1
Upstream Blk Time (%)				89	1	4		36	38	65	9	9
Queuing Penalty (veh)				0	0	0		268	285	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)							1	49				
Queuing Penalty (veh)							3	114				

Network Summary

Network wide Queuing Penalty: 800

Intersection: 2: Private DW/Elora Drive E & Rathburn Road

Movement	NB	SB
Directions Served	R	R
Maximum Queue (m)	7.8	8.7
Average Queue (m)	2.2	1.1
95th Queue (m)	7.9	5.8
Link Distance (m)	59.7	61.6
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB
Directions Served	T	T	R	L	T	T	LR
Maximum Queue (m)	69.5	48.6	25.3	18.5	27.5	32.8	62.4
Average Queue (m)	34.9	17.1	8.7	6.3	11.1	18.5	28.9
95th Queue (m)	58.5	39.1	19.7	15.7	23.9	30.9	50.6
Link Distance (m)	90.2	90.2			80.7	80.7	68.4
Upstream Blk Time (%)	0						0
Queuing Penalty (veh)	0						0
Storage Bay Dist (m)			15.0	15.0			
Storage Blk Time (%)		8	1	2	5		
Queuing Penalty (veh)		11	2	10	3		

Intersection: 7: Confederation Parkway & Square One Drive

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)	37.7	49.1	15.0	47.2	29.8	119.9	123.0	7.7	108.0	112.1
Average Queue (m)	18.5	20.0	1.8	17.7	2.2	113.7	113.8	0.5	79.3	80.7
95th Queue (m)	33.9	39.4	9.1	36.9	18.3	117.0	118.1	3.8	114.6	114.2
Link Distance (m)		102.9		85.1		108.3	108.3		113.4	113.4
Upstream Blk Time (%)						71	70		0	0
Queuing Penalty (veh)						0	0		0	0
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	34	29	0	27		66			20	
Queuing Penalty (veh)	28	22	0	1		3			1	

Intersection: 11: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	49.9	61.5	57.4	119.5	127.8	130.3	94.9	123.5	118.7	132.7	125.6	128.9
Average Queue (m)	24.5	33.9	31.2	51.5	118.1	121.2	71.9	116.6	115.9	123.3	112.3	83.3
95th Queue (m)	45.4	52.6	52.0	126.2	130.1	126.1	123.8	120.4	118.3	127.7	156.9	154.2
Link Distance (m)		178.2	178.2	115.2	115.2	115.2		113.4	113.4	118.0	118.0	118.0
Upstream Blk Time (%)				5	44	77		33	36	72	26	13
Queuing Penalty (veh)				0	0	0		325	348	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)							1	46				
Queuing Penalty (veh)							7	117				

Network Summary

Network wide Queuing Penalty: 880

Intersection: 2: Private DW/Elora Drive E & Rathburn Road

Movement	EB	NB	SB
Directions Served	TR	R	R
Maximum Queue (m)	1.4	16.6	9.0
Average Queue (m)	0.0	6.1	1.4
95th Queue (m)	1.0	14.5	6.7
Link Distance (m)	80.5	52.1	81.8
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB
Directions Served	T	T	R	L	T	T	LR
Maximum Queue (m)	94.8	93.2	40.0	14.0	38.4	41.6	72.7
Average Queue (m)	69.8	51.4	11.2	3.2	17.6	24.5	37.6
95th Queue (m)	102.0	87.1	31.8	11.0	35.5	41.9	65.4
Link Distance (m)	90.2	90.2			80.5	80.5	68.4
Upstream Blk Time (%)	2	1					1
Queuing Penalty (veh)	0	0					0
Storage Bay Dist (m)			15.0	15.0			
Storage Blk Time (%)		23	0	1	18		
Queuing Penalty (veh)		21	2	2	4		

Intersection: 7: Confederation Parkway & Square One Drive

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)	39.8	56.3	15.0	49.2	33.2	116.9	120.8	41.5	117.6	119.2
Average Queue (m)	15.8	23.4	1.4	22.6	2.2	113.2	113.4	2.3	93.0	94.4
95th Queue (m)	32.8	44.8	8.2	42.7	18.1	115.1	116.6	17.2	129.0	130.6
Link Distance (m)		102.9		85.2		108.3	108.3		115.2	115.2
Upstream Blk Time (%)						68	68		2	2
Queuing Penalty (veh)						0	0		14	18
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	22	33		32		67		0	22	
Queuing Penalty (veh)	21	24		2		3		2	1	

Intersection: 10: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	64.0	100.4	98.3	112.3	110.3	112.3	94.9	123.7	121.8	151.5	148.7	146.2
Average Queue (m)	28.8	68.1	66.4	103.2	48.6	46.7	75.3	117.6	117.2	143.2	129.8	80.3
95th Queue (m)	53.8	95.5	94.6	133.1	112.8	106.2	122.7	121.1	120.0	147.2	188.0	163.9
Link Distance (m)		177.5	177.5	105.4	105.4	105.4		115.2	115.2	137.8	137.8	137.8
Upstream Blk Time (%)				85	6	2		37	39	75	25	3
Queuing Penalty (veh)				0	0	0		308	328	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)	0	0					1	50				
Queuing Penalty (veh)	0	0					9	133				

Network Summary

Network wide Queuing Penalty: 893

Queuing and Blocking Report
2031 PM

9/27/2016

Intersection: 2: Private DW/Elora Drive E & Rathburn Road

Movement	WB	NB	SB
Directions Served	T	R	R
Maximum Queue (m)	2.7	9.4	8.7
Average Queue (m)	0.1	1.8	1.2
95th Queue (m)	1.9	7.4	6.0
Link Distance (m)	180.5	41.1	76.7
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB
Directions Served	T	T	R	L	T	T	LR
Maximum Queue (m)	72.9	58.7	32.0	16.9	26.7	31.0	59.5
Average Queue (m)	37.0	21.1	8.7	5.8	9.8	16.5	29.8
95th Queue (m)	62.0	44.6	23.0	14.4	22.9	29.1	52.7
Link Distance (m)	90.2	90.2			76.4	76.4	68.4
Upstream Blk Time (%)							0
Queuing Penalty (veh)							0
Storage Bay Dist (m)			15.0	15.0			
Storage Blk Time (%)		10	1	1	4		
Queuing Penalty (veh)		14	3	8	3		

Intersection: 7: Confederation Parkway & Square One Drive

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)	39.7	56.1	16.3	52.9	39.8	122.5	121.5	5.2	111.5	114.5
Average Queue (m)	20.0	24.6	1.8	22.9	1.8	113.9	113.8	0.7	79.0	81.3
95th Queue (m)	37.6	47.9	9.1	43.0	16.5	118.1	117.5	4.5	110.0	112.7
Link Distance (m)		102.9		85.3		108.3	108.3		115.3	115.3
Upstream Blk Time (%)						69	70		0	0
Queuing Penalty (veh)						0	0		0	1
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	36	33	0	38		65			19	
Queuing Penalty (veh)	33	25	0	2		3			1	

Intersection: 10: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	48.2	59.8	56.1	127.5	133.5	134.0	94.9	127.6	122.0	167.4	164.2	159.9
Average Queue (m)	23.3	37.9	35.9	55.9	125.2	127.2	76.6	118.0	117.6	159.6	156.8	116.5
95th Queue (m)	40.7	55.2	53.1	133.3	132.8	130.8	123.4	122.6	120.8	164.2	178.8	194.1
Link Distance (m)		180.5	180.5	121.9	121.9	121.9		115.3	115.3	154.1	154.1	154.1
Upstream Blk Time (%)				8	48	78		33	36	80	39	8
Queuing Penalty (veh)				0	0	0		356	387	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)							2	46				
Queuing Penalty (veh)							18	133				

Network Summary

Network wide Queuing Penalty: 988

Queuing and Blocking Report
2041 AM

9/27/2016

Intersection: 2: Private DW/Elora Drive E & Rathburn Road/Rathburn Road

Movement	NB	SB
Directions Served	R	R
Maximum Queue (m)	15.4	8.2
Average Queue (m)	5.7	1.3
95th Queue (m)	13.0	6.2
Link Distance (m)	46.5	73.1
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB
Directions Served	T	T	R	L	T	T	LR
Maximum Queue (m)	96.4	92.0	40.0	20.5	35.0	39.7	70.6
Average Queue (m)	76.3	58.8	11.8	3.6	19.0	23.5	43.6
95th Queue (m)	105.9	89.0	34.8	13.1	33.1	37.0	71.3
Link Distance (m)	90.2	90.2			77.4	77.4	68.4
Upstream Blk Time (%)	4	1					2
Queuing Penalty (veh)	0	0					0
Storage Bay Dist (m)			15.0	15.0			
Storage Blk Time (%)		24	1	1	19		
Queuing Penalty (veh)		24	3	3	4		

Intersection: 7: Confederation Parkway & Square One Drive

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)	37.6	81.0	23.7	61.6	33.2	123.9	121.6	23.4	114.4	117.0
Average Queue (m)	18.9	29.7	2.0	29.7	2.3	113.9	113.2	1.1	79.3	81.9
95th Queue (m)	35.6	58.9	11.3	50.5	17.3	118.4	116.9	10.9	121.6	122.9
Link Distance (m)		102.9		85.3		108.3	108.3		115.1	115.1
Upstream Blk Time (%)						70	68		0	1
Queuing Penalty (veh)						0	0		2	5
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	31	40	0	48	0	69			21	
Queuing Penalty (veh)	35	29	1	2	0	3			1	

Intersection: 10: Confederation Parkway & Rathburn Road/Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	55.2	99.2	102.2	108.2	101.4	102.4	94.9	128.6	122.1	124.1	116.5	113.6
Average Queue (m)	29.4	72.6	71.8	100.5	48.9	46.6	77.8	118.0	117.3	115.9	89.1	46.0
95th Queue (m)	50.5	100.2	100.4	105.3	110.8	101.7	122.4	123.2	120.1	119.9	159.0	111.3
Link Distance (m)		178.2	178.2	96.1	96.1	96.1		115.1	115.1	110.4	110.4	110.4
Upstream Blk Time (%)				97	11	4		40	42	79	18	1
Queuing Penalty (veh)				0	0	0		381	401	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)		0					7	53				
Queuing Penalty (veh)		0					47	163				

Network Summary

Network wide Queuing Penalty: 1105

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB
Directions Served	T	T	R	L	T	T	LR
Maximum Queue (m)	75.4	55.8	31.2	39.7	87.0	89.2	65.2
Average Queue (m)	39.3	22.8	9.1	13.1	71.0	70.3	30.1
95th Queue (m)	62.9	46.0	22.2	34.3	89.4	92.1	52.5
Link Distance (m)	90.2	90.2			80.7	80.7	68.4
Upstream Blk Time (%)					2	3	0
Queuing Penalty (veh)					20	22	0
Storage Bay Dist (m)			15.0	15.0			
Storage Blk Time (%)		9	1	6	22		
Queuing Penalty (veh)		14	2	49	16		

Intersection: 7: Confederation Parkway & Square One Drive

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)	38.6	104.9	8.0	91.9	15.0	120.7	120.4	9.4	22.2	23.2
Average Queue (m)	36.6	102.8	0.3	86.1	1.3	113.7	113.5	1.1	8.4	8.0
95th Queue (m)	38.8	106.1	5.7	91.2	11.2	117.2	117.1	6.0	18.7	20.8
Link Distance (m)		102.9		85.3		108.3	108.3		115.6	115.6
Upstream Blk Time (%)		100		100		61	59			
Queuing Penalty (veh)		0		0		0	0			
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	100			100		58		1	4	
Queuing Penalty (veh)	108			5		3		5	0	

Intersection: 10: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	83.8	104.2	94.2	89.0	104.3	111.2	94.9	126.0	123.7	159.2	156.5	152.7
Average Queue (m)	49.9	54.7	52.1	27.9	95.5	100.9	79.0	118.3	117.9	150.1	144.5	102.2
95th Queue (m)	95.3	85.5	78.5	66.8	112.4	104.9	123.7	122.3	122.6	154.6	178.1	184.7
Link Distance (m)		176.8	176.8	95.6	95.6	95.6		115.6	115.6	144.4	144.4	144.4
Upstream Blk Time (%)				1	35	76		49	49	81	40	4
Queuing Penalty (veh)				0	0	0		611	615	0	0	0
Storage Bay Dist (m)	110.0							65.0				
Storage Blk Time (%)	1							10	61			
Queuing Penalty (veh)	4							105	205			

Intersection: 12: Private DW/Elora Drive E & Rathburn Road

Movement	EB	EB	WB	WB	NB	SB
Directions Served	T	TR	T	TR	R	R
Maximum Queue (m)	2.7	2.4	21.3	26.9	8.9	10.4
Average Queue (m)	0.1	0.1	2.1	3.3	2.4	1.0
95th Queue (m)	1.9	1.7	11.2	15.6	8.7	5.8
Link Distance (m)	80.7	80.7	176.8	176.8	53.6	63.7
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Network Summary

Network wide Queuing Penalty: 1785

Intersection: 2: Private/Elora Drive E & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LTR
Maximum Queue (m)	3.1	21.3	18.2	8.4	19.9	26.9	38.2	15.4	33.3
Average Queue (m)	0.1	8.0	5.8	1.4	4.7	10.3	12.5	5.0	13.4
95th Queue (m)	1.7	18.4	15.5	6.2	14.0	22.5	27.9	13.3	27.6
Link Distance (m)		80.9	80.9		171.9	171.9	52.0	52.0	78.0
Upstream Blk Time (%)							0		
Queuing Penalty (veh)							0		
Storage Bay Dist (m)	40.0			40.0					
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB
Directions Served	T	T	R	L	T	T	LR
Maximum Queue (m)	95.0	89.4	40.0	16.0	33.9	32.4	65.0
Average Queue (m)	65.2	46.6	11.1	4.6	16.4	16.4	32.6
95th Queue (m)	93.2	78.0	32.5	13.6	30.2	31.1	56.6
Link Distance (m)	90.2	90.2			80.9	80.9	68.4
Upstream Blk Time (%)	1	0					0
Queuing Penalty (veh)	0	0					0
Storage Bay Dist (m)			15.0	15.0			
Storage Blk Time (%)		22	0	2	15		
Queuing Penalty (veh)		19	1	7	3		

Intersection: 7: Confederation Parkway & Square One Drive

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)	35.9	42.4	15.0	49.8	33.2	123.0	120.1	34.5	117.8	119.5
Average Queue (m)	17.7	19.6	1.4	23.3	1.7	113.7	113.5	2.2	97.4	96.3
95th Queue (m)	32.5	36.3	8.3	40.1	13.7	117.9	117.5	16.0	131.8	132.5
Link Distance (m)		102.9		85.3		108.3	108.3		113.8	113.8
Upstream Blk Time (%)						67	68		3	4
Queuing Penalty (veh)						0	0		22	25
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	31	27		38		67		1	25	
Queuing Penalty (veh)	28	20		2		3		5	1	

Intersection: 10: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	51.0	104.9	106.9	91.5	82.2	87.0	94.9	125.1	119.9	95.9	93.4	91.1
Average Queue (m)	26.5	68.3	69.6	86.2	28.7	37.5	73.4	117.0	116.0	88.3	54.9	49.8
95th Queue (m)	46.4	97.1	100.9	91.1	67.5	82.5	124.1	121.5	118.5	92.2	102.0	99.2
Link Distance (m)		171.9	171.9	82.4	82.4	82.4		113.8	113.8	83.1	83.1	83.1
Upstream Blk Time (%)				95	1	3		36	38	68	7	7
Queuing Penalty (veh)				0	0	0		268	286	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)		0					1	49				
Queuing Penalty (veh)		0					6	114				

Network Summary

Network wide Queuing Penalty: 811

Intersection: 2: Private DW/Elora Drive E & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LTR
Maximum Queue (m)	4.1	45.7	35.8	54.8	80.3	80.4	14.8	11.6	18.2
Average Queue (m)	0.5	21.5	10.2	10.6	51.9	54.1	4.0	1.5	4.5
95th Queue (m)	3.2	38.9	25.2	34.8	77.0	76.9	12.1	7.0	13.7
Link Distance (m)		80.7	80.7		174.8	174.8	59.8	59.8	61.6
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	40.0			40.0					
Storage Blk Time (%)		1			10				
Queuing Penalty (veh)		0			5				

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB
Directions Served	T	T	R	L	T	T	LR
Maximum Queue (m)	75.2	49.0	26.7	31.0	56.8	56.3	62.7
Average Queue (m)	36.5	17.6	8.6	8.6	30.4	31.0	29.0
95th Queue (m)	60.3	38.2	18.6	22.9	52.6	53.1	52.4
Link Distance (m)	90.2	90.2			80.7	80.7	68.4
Upstream Blk Time (%)	0						0
Queuing Penalty (veh)	0						0
Storage Bay Dist (m)			15.0	15.0			
Storage Blk Time (%)		6	1	4	24		
Queuing Penalty (veh)		9	2	22	14		

Intersection: 7: Confederation Parkway & Square One Drive

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)	37.3	61.6	17.4	49.6	31.6	121.9	121.4	49.8	108.9	113.1
Average Queue (m)	18.5	23.0	1.6	18.4	1.4	113.9	113.7	4.1	76.2	77.7
95th Queue (m)	35.7	47.9	9.1	36.8	14.5	118.1	117.4	23.7	111.2	113.3
Link Distance (m)		102.9		85.1		108.3	108.3		113.4	113.4
Upstream Blk Time (%)						71	68		0	0
Queuing Penalty (veh)						0	0		1	1
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	32	28	0	31		67		0	20	
Queuing Penalty (veh)	27	21	0	2		3		2	1	

Intersection: 11: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	55.2	52.6	51.6	119.0	123.6	130.5	94.9	124.7	120.7	132.4	126.1	126.4
Average Queue (m)	25.9	33.6	33.5	49.3	118.1	121.0	76.6	116.5	115.9	123.1	107.3	77.3
95th Queue (m)	47.7	47.8	49.0	118.7	126.7	125.9	125.9	120.4	118.7	130.0	163.5	151.7
Link Distance (m)		174.8	174.8	115.2	115.2	115.2		113.4	113.4	118.0	118.0	118.0
Upstream Blk Time (%)				6	44	77		34	36	73	21	11
Queuing Penalty (veh)				0	0	0		332	348	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)							2	46				
Queuing Penalty (veh)							14	117				

Network Summary

Network wide Queuing Penalty: 920

Intersection: 2: Private DW/Elora Drive E & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LTR
Maximum Queue (m)	1.6	12.1	11.1	10.5	14.7	20.1	37.6	15.7	43.8
Average Queue (m)	0.1	1.5	1.7	2.2	2.7	8.0	15.6	5.2	17.5
95th Queue (m)	1.2	6.9	7.5	7.7	9.7	18.4	30.7	13.9	34.1
Link Distance (m)		80.5	80.5		173.7	173.7	52.1	52.1	81.8
Upstream Blk Time (%)							0		
Queuing Penalty (veh)							0		
Storage Bay Dist (m)	40.0			40.0					
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB
Directions Served	T	T	R	L	T	T	LR
Maximum Queue (m)	96.0	92.2	40.0	25.4	42.7	42.8	68.1
Average Queue (m)	73.2	51.4	10.1	5.3	23.6	24.5	36.6
95th Queue (m)	105.0	85.6	31.2	16.2	39.2	39.6	61.7
Link Distance (m)	90.2	90.2			80.5	80.5	68.4
Upstream Blk Time (%)	3	0					0
Queuing Penalty (veh)	0	0					0
Storage Bay Dist (m)			15.0	15.0			
Storage Blk Time (%)		22	0	3	24		
Queuing Penalty (veh)		20	2	9	6		

Intersection: 7: Confederation Parkway & Square One Drive

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)	39.5	62.3	13.2	49.3	14.6	118.8	120.8	22.7	117.9	119.2
Average Queue (m)	17.4	24.2	0.8	24.2	0.8	113.4	113.5	1.3	95.2	97.8
95th Queue (m)	34.1	47.3	7.1	43.1	8.3	116.2	117.6	10.9	129.6	129.3
Link Distance (m)		102.9		85.2		108.3	108.3		115.2	115.2
Upstream Blk Time (%)						65	69		2	2
Queuing Penalty (veh)						0	0		14	17
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	31	31		41	0	68			22	
Queuing Penalty (veh)	30	22		2	1	3			1	

Intersection: 10: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	67.6	101.5	107.7	111.2	109.9	113.3	94.9	124.6	120.6	151.6	146.3	143.1
Average Queue (m)	29.6	68.5	69.3	109.0	54.2	54.4	80.1	117.5	117.1	143.3	134.3	82.3
95th Queue (m)	55.3	96.0	99.8	114.6	119.6	112.8	124.5	120.9	119.5	147.0	179.0	159.7
Link Distance (m)		173.7	173.7	105.4	105.4	105.4		115.2	115.2	137.8	137.8	137.8
Upstream Blk Time (%)				94	8	4		38	41	77	29	3
Queuing Penalty (veh)				0	0	0		321	345	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)		0					2	52				
Queuing Penalty (veh)		0					11	139				

Network Summary

Network wide Queuing Penalty: 942

Intersection: 2: Private DW/Elora Drive E & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LTR
Maximum Queue (m)	7.6	46.5	35.8	47.8	73.5	78.0	17.4	8.0	20.6
Average Queue (m)	1.7	20.6	11.2	10.4	52.3	56.6	5.0	1.8	5.8
95th Queue (m)	6.8	40.1	27.1	31.3	72.1	75.6	13.7	7.1	15.3
Link Distance (m)		76.4	76.4		177.2	177.2	41.1	41.1	76.7
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	40.0			40.0					
Storage Blk Time (%)		0			10				
Queuing Penalty (veh)		0			6				

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB
Directions Served	T	T	R	L	T	T	LR
Maximum Queue (m)	71.0	58.4	28.4	29.6	51.1	52.6	64.9
Average Queue (m)	38.6	19.6	8.7	9.2	23.1	24.1	29.2
95th Queue (m)	61.3	44.0	21.5	21.6	42.6	42.3	53.1
Link Distance (m)	90.2	90.2			76.4	76.4	68.4
Upstream Blk Time (%)	0						0
Queuing Penalty (veh)	0						0
Storage Bay Dist (m)			15.0	15.0			
Storage Blk Time (%)		9	1	7	17		
Queuing Penalty (veh)		13	3	45	11		

Intersection: 7: Confederation Parkway & Square One Drive

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)	39.7	57.4	8.8	47.5	29.9	123.8	124.2	18.2	114.1	115.9
Average Queue (m)	19.3	23.5	0.8	21.1	1.7	114.0	114.1	1.1	73.3	77.2
95th Queue (m)	35.8	47.9	4.6	38.3	16.5	118.8	119.2	10.7	112.8	116.6
Link Distance (m)		102.9		85.3		108.3	108.3		115.3	115.3
Upstream Blk Time (%)						71	70		0	0
Queuing Penalty (veh)						0	0		1	2
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	33	34		37		66		0	18	
Queuing Penalty (veh)	31	25		2		3		2	1	

Intersection: 10: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	61.9	63.7	64.5	126.0	128.2	135.1	94.9	124.8	122.1	166.7	167.4	160.7
Average Queue (m)	30.4	38.5	37.5	52.0	125.1	127.7	73.1	117.8	117.4	159.3	156.1	114.4
95th Queue (m)	60.6	59.0	56.8	128.0	133.2	132.1	124.0	121.6	120.5	162.9	181.5	199.0
Link Distance (m)		177.2	177.2	121.9	121.9	121.9		115.3	115.3	154.1	154.1	154.1
Upstream Blk Time (%)				5	49	76		33	35	78	38	8
Queuing Penalty (veh)				0	0	0		361	386	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)	0						2	46				
Queuing Penalty (veh)	1						16	133				

Network Summary

Network wide Queuing Penalty: 1043

Intersection: 2: Private DW/Elora Drive E & Rathburn Road/Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LTR
Maximum Queue (m)	1.4	40.3	45.7	7.9	17.3	26.0	44.3	14.2	49.6
Average Queue (m)	0.0	12.8	22.6	1.7	3.9	8.3	19.3	5.1	18.8
95th Queue (m)	1.0	29.5	38.4	6.8	12.5	19.6	38.1	12.5	36.2
Link Distance (m)		77.4	77.4		175.6	175.6	46.6	46.6	73.1
Upstream Blk Time (%)							0		
Queuing Penalty (veh)							0		
Storage Bay Dist (m)	40.0			40.0					
Storage Blk Time (%)		0							
Queuing Penalty (veh)		0							

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB
Directions Served	T	T	R	L	T	T	LR
Maximum Queue (m)	96.3	98.8	40.0	37.3	49.2	50.8	74.2
Average Queue (m)	90.9	80.3	16.2	7.1	29.6	29.5	60.4
95th Queue (m)	105.4	107.4	41.8	22.0	45.6	45.3	85.7
Link Distance (m)	90.2	90.2			77.4	77.4	68.4
Upstream Blk Time (%)	16	7					11
Queuing Penalty (veh)	0	0					0
Storage Bay Dist (m)			15.0	15.0			
Storage Blk Time (%)		34	1	7	28		
Queuing Penalty (veh)		34	4	28	7		

Intersection: 7: Confederation Parkway & Square One Drive

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)	39.8	72.7	21.2	56.3	25.0	123.3	119.6	31.6	114.1	114.8
Average Queue (m)	20.1	27.2	1.5	28.7	1.2	113.6	113.4	1.6	74.9	76.4
95th Queue (m)	37.5	55.0	10.0	50.6	12.9	117.9	116.8	13.4	113.2	114.2
Link Distance (m)		102.9		85.3		108.3	108.3		115.1	115.1
Upstream Blk Time (%)		0				69	69		0	0
Queuing Penalty (veh)		0				0	0		3	3
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	39	34		43		69			20	
Queuing Penalty (veh)	43	25		2		3			1	

Intersection: 10: Confederation Parkway & Rathburn Road/Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	58.7	101.6	101.1	105.2	99.4	95.4	94.9	128.3	121.3	122.2	118.8	114.6
Average Queue (m)	28.3	68.5	69.5	99.9	37.8	42.8	75.8	117.8	117.1	115.6	91.3	49.2
95th Queue (m)	49.7	97.1	97.6	105.2	91.2	92.8	122.4	123.0	119.8	118.6	156.0	118.2
Link Distance (m)		175.6	175.6	96.1	96.1	96.1		115.1	115.1	110.4	110.4	110.4
Upstream Blk Time (%)				96	5	2		41	43	81	19	1
Queuing Penalty (veh)				0	0	0		388	406	0	0	0
Storage Bay Dist (m)	110.0						65.0					
Storage Blk Time (%)		0					2	54				
Queuing Penalty (veh)		0					16	166				

Network Summary

Network wide Queuing Penalty: 1129

Intersection: 4: Square One Drive Extension & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB
Directions Served	T	T	R	L	T	T	LR
Maximum Queue (m)	83.1	64.6	38.7	37.8	52.6	51.0	66.4
Average Queue (m)	44.6	25.8	10.1	11.8	36.1	35.6	36.3
95th Queue (m)	72.7	52.4	24.3	28.6	50.5	49.7	61.2
Link Distance (m)	90.2	90.2			80.7	80.7	68.4
Upstream Blk Time (%)	0	0					1
Queuing Penalty (veh)	0	0					0
Storage Bay Dist (m)			15.0	15.0			
Storage Blk Time (%)		11	1	8	23		
Queuing Penalty (veh)		17	4	59	17		

Intersection: 7: Confederation Parkway & Square One Drive

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)	37.0	104.7	15.9	90.2	33.2	123.3	123.4	7.0	22.8	26.2
Average Queue (m)	36.3	102.6	0.5	84.6	1.3	114.0	114.0	0.6	9.9	9.2
95th Queue (m)	39.3	109.0	8.0	89.6	13.0	118.5	118.7	4.1	20.1	21.9
Link Distance (m)		102.9		85.3		108.3	108.3		116.1	116.1
Upstream Blk Time (%)		100		100		60	60			
Queuing Penalty (veh)		0		0		0	0			
Storage Bay Dist (m)	15.0		15.0		15.0			15.0		
Storage Blk Time (%)	100			100		58			4	
Queuing Penalty (veh)	108			5		3			0	

Intersection: 10: Confederation Parkway & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	TR
Maximum Queue (m)	94.8	96.8	98.3	99.2	107.3	107.5	94.9	126.0	123.1	155.5	157.3	150.5
Average Queue (m)	60.7	74.8	62.9	34.3	95.0	100.8	77.6	118.6	118.0	149.5	140.4	88.9
95th Queue (m)	124.5	162.6	125.5	80.7	114.8	104.0	122.9	122.6	120.9	153.3	191.5	175.9
Link Distance (m)		174.6	174.6	95.6	95.6	95.6		116.1	116.1	144.4	144.4	144.4
Upstream Blk Time (%)		12	0	3	30	75		49	51	83	33	3
Queuing Penalty (veh)		44	1	0	0	0		617	636	0	0	0
Storage Bay Dist (m)	110.0							65.0				
Storage Blk Time (%)	20							4	62			
Queuing Penalty (veh)	55							40	207			

Intersection: 12: Private DW/Elora Drive E & Rathburn Road

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR	LT	R	LTR
Maximum Queue (m)	19.2	59.6	51.1	37.9	64.6	69.3	16.6	8.8	16.7
Average Queue (m)	2.3	35.4	23.6	6.2	41.0	41.2	5.6	2.1	5.8
95th Queue (m)	15.6	71.9	60.5	19.8	61.4	63.1	14.4	8.1	14.9
Link Distance (m)		80.7	80.7		174.6	174.6	53.4	53.4	63.7
Upstream Blk Time (%)		2	0						
Queuing Penalty (veh)		6	1						
Storage Bay Dist (m)	40.0			40.0					
Storage Blk Time (%)		13			7				
Queuing Penalty (veh)		1			5				

Network Summary

Network wide Queuing Penalty: 1826