Mississauga Road Class EA Study
Transportation and Traffic Analysis Report

Paradigm Transportation Solutions Limited

February 2017

Project Summary

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List of Revisions

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1	11 March 2016	GC/AE/JD/MD	Preliminary Draft to Client
2	27 April 2016	GC/AE/JD/MD	Final Draft to Client
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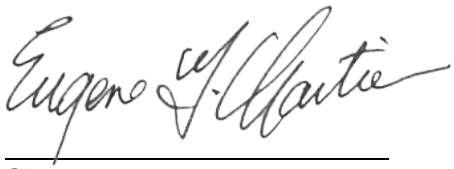
Signatures



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Executive Summary

Study Overview

The Region of Peel has initiated a Schedule C Municipal Class Environmental Assessment (EA) for the proposed widening of Mississauga Road (Regional Road 1) from Financial Drive to Queen Street West (Regional Road 6), and to complete the required updates to technical studies to support amendments to the previously approved Schedule C Municipal Class EA for Mississauga Road from Queen Street West (Regional Road 6) to south of Bovaird Drive (Regional Road 107), in the City of Brampton.

This **Transportation and Traffic Analysis Report** has been prepared to address short and long term transportation needs related to planned growth to the year 2031 within the entire Mississauga Road corridor from Financial Drive to south of Bovaird Drive. Opportunities to better facilitate the movement of vehicles, transit, goods movement, walking and cycling were also reviewed.

Planning Context

Numerous studies, projects and initiatives previously completed or currently underway by the Region and other public agencies provide the planning context for the Mississauga Road Class EA. The 2012 Peel Region Long Range Transportation Plan (LRTP) establishes the need and justification for the widening of Mississauga Road through the Study Area and served as the foundation for the Problem and Opportunity Statement for this Class EA study. Other notable documents include:

- GTA West Corridor Planning and Environmental Assessment Study;
- Halton-Peel Boundary Area Transportation Study (HPBATS);
- Official Plans and Transportation Plans for the Region of Peel and City of Brampton;
- Region of Peel Road Characterization Study, Strategic Goods Movement Network Study and Active Transportation Plan; and
- Other on-going Class EA studies near the Study Area.

Existing Transportation Conditions

The study examined current traffic conditions, operational deficiencies, and constraints experienced by the public travelling on Mississauga Road within the Study Area. The analyses of existing (2015) transportation conditions illustrated that:

- Midblock traffic volumes are approaching or already exceed capacity at locations along Mississauga Road within the Study Area. Specific observations include:
  - During the AM peak hour, the highest peak period v/c ratios occur between Queen Street West and Embleton Road and Embleton Road and Lionhead Golf and Country Club driveway. The v/c ratio exceeds 1.0 for both segments, suggesting that this section of Mississauga Road is over capacity during the morning peak. The segment of Mississauga Road between Williams Parkway and Ostrander Boulevard/Adamsville Road exhibits v/c ratios between 0.83 and 0.88, which infers that this section is approaching capacity during the morning peak.
  - In the PM peak hour, the segment of Mississauga Road between Queen Street West and Lionhead Golf and Country Club driveway again shows v/c ratios exceeding 1.0, suggesting that this section is also over capacity during the afternoon peak. Similarly, the section of Mississauga Road between the signalized commercial driveway and Ostrander Boulevard/Adamsville Road exhibits v/c ratios of 0.89 and 0.90, which infers that this section is also approaching capacity in the afternoon peak.
- All intersections within the Study Area operate with overall acceptable level of service during the AM and PM peak hours. Specific observations include:
  - Mississauga Road at Williams Parkway – During the AM peak hour, the westbound left turn operates with LOS E and a v/c ratio of 0.95.
  - Mississauga Road at Commercial Driveway – The westbound left turn operates with LOS E and a v/c ratio of 0.68 during the AM peak hour and LOS E and a v/c ratio of 0.59 during the PM peak hour. The delay is likely due to the length of green time provided to the higher volume northbound and southbound movements.
  - Mississauga Road at Beacon Hill Drive – The westbound left turn operates with LOS F and a v/c ratio of 0.47 during the AM peak hour and LOS F and a v/c ratio of 0.05 during the PM peak hour. The high delay is likely due to the high traffic volumes on Mississauga Road.
  - Mississauga Road at Ostrander Boulevard/Adamsville Boulevard – During the AM peak hour, the eastbound and westbound left turn movements operate with LOS F (v/c ratio of 0.20) and LOS E (v/c ratio of 0.19), respectively. During the PM peak hour, the westbound left turn movement operates with LOS F and a v/c ratio of 0.16. The relatively poor LOS and low v/c ratios indicate that the delay is likely caused by the high traffic volumes on Mississauga Road.

- Mississauga Road at Queen Street West/River Road – During the AM peak hour, the westbound left turn operates with LOS E and a v/c ratio of 0.99, and the southbound through operates with LOS E and a v/c ratio of 1.07. These two (2) movements effectively exceed capacity. In the PM peak hour, the westbound left turn movement operates at capacity with LOS F and a v/c ratio of 0.97.
- Mississauga Road at Embleton Road – During the AM peak hour, the eastbound shared left-right turn movement operates with LOS E and a v/c ratio of 0.84. The southbound shared through-right turn movement is approaching capacity with a v/c ratio of 0.96, but operates with LOS B. In the PM peak hour, the eastbound shared left-right turn movement has reached capacity with a v/c ratio of 1.0 and operates at LOS F.
- Mississauga Road at Lionhead Golf and Country Club Driveway – During the AM and PM peak hours, the eastbound and westbound movements experience significant delay, likely caused by the length of green time allocated to serve northbound and southbound traffic demand.

- Several individual intersection movements are approaching or exceeding their capacities. Optimizing the signal cycle and phase timings would improve operations during the AM and PM peak hours. However, the southbound through movement at the Mississauga Road and Queen Street West/River Road intersection would still be approaching capacity.
- Potential safety hazards were noted, as follows, with countermeasures proposed:
  - Discontinuities in the active transportation facilities exist;
  - Pavement markings are not easily visible under dark and wet conditions;
  - Small street name signs for minor roadways at unsignalized intersections, which are may be difficult to read for drivers on Mississauga Road before reaching the intersection;
  - Unsignalized intersections allow all movements for minor road vehicles. Given the width of Mississauga Road, and the number of traffic lanes to cross for through and left turn movements, the number and duration of gaps may become insufficient, encouraging drivers to attempt unsafe manoeuvres during short gaps; and
  - Various signage inadequacies were observed, in both the northbound and southbound directions.

Future Transportation Conditions

Future traffic conditions to the year 2031, consistent with the horizon year of the 2012 Region of Peel Long Range Transportation Plan, were forecast to identify operational issues likely to be experienced by the public travelling on roads within the Study Area. The analyses of future transportation conditions illustrated that:

- Midblock traffic volumes are expected to exceed capacity at all locations along Mississauga Road within the Study Area by the year 2031. Even with six (6) lanes, Mississauga Road will be over capacity during the 2031 AM and PM peak hours.
- The intersection operations analyses reflect the forecasted northbound and southbound midblock capacity issues, with several intersections within the Study Area expected to operate with poor levels of service by the year 2031. Specific observations include:
  - Mississauga Road at Williams Parkway – During the AM peak hour the westbound left turn is expected to operate over capacity with a v/c ratio greater than 1.0 and LOS F. During the PM peak hour, the westbound left turn is expected to operate under capacity with a v/c ratio of 0.76, but exhibit delay with LOS E.
  - Mississauga Road at Commercial Driveway – The intersection will operate with overall satisfactory conditions during the AM and PM peak hours under future traffic conditions.
  - Mississauga Road at Beacon Hill Drive – The intersection is expected to operate with overall satisfactory conditions during the AM and PM peak hours under future traffic conditions. However, the southbound and northbound through movements will exceed capacity during the AM and PM peak hours, respectively.
  - Mississauga Road at Ostrander Boulevard/Adamsville Road – The eastbound and westbound movements are expected to operate with LOS F during the AM and PM peak hours under future traffic conditions due to the high northbound and southbound traffic volumes on Mississauga Road.
  - Mississauga Road at Queen Street West/River Road – The westbound left turn movement is expected to operate over capacity with a v/c ratio greater than 1.0 and LOS F during the AM and PM peak hours. The southbound left turn movement is expected to operate with LOS F and a v/c ratio of 0.90 during the PM peak hour.
  - Mississauga Road at Embleton Road – During the AM peak hour, the eastbound shared left-right turn movement is expected to operate near capacity with a v/c ratio of 0.92 and LOS E. The southbound through-right movement is expected to operate over capacity with a v/c ratio greater than 1.0 and LOS F. During the

PM peak hour, the eastbound shared left-right turn movement is expected to operate with a v/c ratio greater than 1.0 and LOS F. The northbound through movement is expected to operate with LOS E and a v/c ratio greater than 1.0.

- Mississauga Road at Lionhead Golf and Country Club Driveway – During the AM and PM peak hours, the eastbound and westbound movements are expected to continue to experience delay caused by northbound and southbound traffic demand.

- The following modifications would improve the intersection operations for the 2031 future traffic conditions:
  - Addition of a second westbound left turn lane at Mississauga Road at Williams Parkway; and
  - Addition of a second westbound left turn lane and optimization of signal cycle length and phase timings to a three-phase operation for Mississauga Road at Queen Street West/River Road.
- The operational effects of widening Mississauga Road to six (6) lanes, but retaining the current four (4) lane cross-section over the Credit River, were assessed through microsimulation analysis using VISSIM. The analyses indicated that traffic operational performance of Mississauga Road and the entire network would be significantly deteriorated if the current cross-section were retained. Specific observations from the modelling include:
  - With four (4) lanes between Queen Street West/River Road and Embleton Road, vehicles in the southbound (peak) direction are constrained at the Queen Street West/River Road intersection during the AM peak hour when Mississauga Road transitions from three (3) to two (2) lanes. The southbound queue at Queen Street West/River Road extends north on Mississauga Road to the limit of the model. This restricts the flow of traffic over the Credit River structure, which does not allow for use of available capacity to the extent possible. The addition of a roundabout at the intersection of Mississauga Road and Embleton Road would not improve the operation.
  - With six (6) lanes between Queen Street West/River Road and Embleton Road, vehicles in the southbound (peak) direction can travel somewhat unabated through the Queen Street West/River Road intersection during the AM peak hour. There is still congestion for southbound traffic due to the high forecasted volumes on Mississauga Road, but vehicles can utilize the full capacity of a six (6) lane structure over the Credit River.

Recommendations

Based on the analyses completed for this study, it is recommended that Mississauga Road be widened to six (6) lanes between Financial Drive and south of Bovaird Drive, with the intersection and road safety improvements

as identified in this report. The study confirmed the recommendations of the 2012 Region of Peel Long Range Transportation Plan and reiterated the need and justification to widen the road.

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1 Introduction

1.1 Overview

The Region of Peel has initiated a Schedule C Municipal Class Environmental Assessment (EA) for the proposed widening of Mississauga Road (Regional Road 1) from Financial Drive to Queen Street West (Regional Road 6), and to complete the required updates to technical studies to support amendments to the previously approved Schedule C Municipal Class EA for Mississauga Road from Queen Street West (Regional Road 6) to south of Bovaird Drive (Regional Road 107), in the City of Brampton.

This **Transportation and Traffic Analysis Report** has been prepared to address short and long term transportation needs related to planned growth to the year 2031 within the entire Mississauga Road corridor from Financial Drive to south of Bovaird Drive. Opportunities to better facilitate the movement of vehicles, transit, goods movement, walking and cycling were also reviewed.

Figure 1.1 illustrates the Study Area for this report.

It is noted that this report will not be finalized until the conclusion of Phase 3 of the Municipal Class EA process, as a component of the analysis examines the anticipated safety performance on the Preferred Alternative Design Concept, which will be further detailed through the preliminary design tasks in later stages of the study.

1.2 Traffic Operations Analysis Approach and Methodology

The transportation need and justification assessment was based on traffic operations analysis conducted for the midblock sections and intersections within the Study Area. The analyses were completed for both existing (2015) and future (2031) conditions during the weekday morning (AM) and afternoon (PM) peak hours to characterize operating conditions and identify locations requiring attention. The methodologies applied for the analyses are described as follows.

1.2.1 Midblock Analysis

For midblock sections, operational performance was characterized based on the volume-to-capacity (v/c) ratio for the link. The v/c ratio provides a measure of traffic volume demand to available capacity, with an at-capacity condition represented by a v/c ratio of 1.00 (i.e. volume demand equals theoretical capacity). A v/c ratio of 0.90 or less was deemed acceptable operation for midblock locations, as road segments with volumes exceeding this threshold would typically be candidates for widening.


107
James Potter Road
Williams Parkway
Bovaird Drive West
107
1
Springbrook
Queen Street West
Heritage Road
Credit River
Credit River
Huttonville
Credit River Bridge
6
Embleton Road
Mississauga Road
Heritage Road
Heritage Road
1
Lion Head Golf Club Road
19
Embleton Road
6
Heritage Road
Financial Drive
N.T.S.
Source: OpenStreetMap

Study Area

The midblock v/c ratios were calculated by dividing the traffic link volume (existing or forecasted) by the theoretical capacity for the subject link (i.e. the maximum hourly rate at which vehicles can be expected reasonably to traverse the section of roadway within a given period, under prevailing roadway, traffic and control conditions). A theoretical capacity of 900 vehicles per hour per lane was assumed for Mississauga Road within the Study Area, as per the Region of Peel travel demand forecasting model.

This value reflects the intended function of the road, and accounts for factors such as: the type and number of local streets and private accesses provided; the presence of pedestrians and crossing locations; and typical driving characteristics for this type of facility.

1.2.2 Intersection Analysis

Intersection Level of Service (LOS) is estimated based on average delay per vehicle and includes deceleration delay, queue move-up time, stopped delay, and final acceleration delay. LOS is a qualitative measure that describes the operating conditions within an intersection, and the perception of those conditions by road users. There are six levels of service defined. Each level has a letter identification from A to F with LOS A representing the best operating conditions and LOS F the worst. **Table 1.1** summarizes the LOS criteria for signalized, stop controlled, and roundabout intersections per the 2000 and 2010 Highway Capacity Manual (HCM 2000 and HCM 2010).

The operational analysis for the signalized and stop controlled intersections was conducted using Synchro Version 9.1, which implements the methods contained in HCM 2000 and HCM 2010. A Synchro network was developed specifically for this study and further refined through the analyses.

TABLE 1.1: INTERSECTION LEVEL OF SERVICE CRITERIA

Level of Service	Average Control Delay per Vehicle (sec/veh)	
	Signalzied Intersections[1]	Stop Controlled[2] and Roundabouts[3]
A	<= 10	<= 10
B	>10 and <= 20	>10 and <= 15
C	> 20 and <= 35	> 15 and <= 25
D	> 35 and <= 55	> 25 and <= 35
E	> 55 and <= 80	> 35 and <= 50
F	> 80	> 50

Source: *1. Highway Capacity Manual, 4th Edition (HCM 2000), Transportation Research Board, Chapter 16: Signalzied Interseections, Exhibit 16-2*

2. HCM 2000, Chapter 17: Unsignalized Intersection, Exhibit 17-2

3. HCM 2000, Chapter 21: Roundabouts, Exhibit 21-1

The operational performance of the signalized and stop controlled intersections within the Study Area was also assessed based on the v/c ratio. For this study, v/c ratios were calculated at each intersection for individual movements and the entire intersection, with a v/c ratio of 0.90 or less considered acceptable operation.

1.3 Report Organization

The remainder of the Transportation and Traffic Analysis Report is organized as follows:

- Section 2 provides the **Planning Context**, summarizing the findings of other studies, projects, and initiatives to be considered in completing the report;
- Section 3 presents the analysis of **Existing Transportation Conditions** for the 2015 base year;
- Section 4 summarizes the analysis of the **Future Transportation Conditions** for the 2031 horizon year; and
- Section 5 provides the **Conclusions and Recommendations** of this report.

2 Planning Context

The following studies, projects and initiatives provide a planning context for the Mississauga Road Class EA:

2.1 Provincial and Inter-Regional

2.1.1 Provincial Growth Plan for the Greater Golden Horseshoe

The Growth Plan for the Greater Golden Horseshoe – Places to Grow was adopted in June 2006 under the provisions of the *Places to Grow Act*, *2005.* The plan provides the framework for implementing the Provincial government's vision for building stronger, prosperous communities by better managing growth to the year 2041 in the burgeoning Greater Toronto and Hamilton Area (GTHA). Since implementation, the plan has been amended to address growth in the County of Simcoe (including the cities of Barrie and Orillia), and provide population and employment forecasts to the year 2041.

The Growth Plan contains specific policies and directives regarding transportation, infrastructure, land use planning, urban form, housing, natural heritage and resource protection to be considered by municipalities in their planning activities. Of interest, the Growth Plan provides direction around where growth can occur, the form of future development, and future population and employment forecasts. The plan, as amended, forecasts the population of the Region of Peel to grow to 1.77 million by 2031, 1.87 million by 2036, and 1.97 million by 2041, for an annual average growth rate of 1.1 per cent. For employment, *Places to Grow* forecasts the number of jobs in the Region to reach 880,000 by 2031, 920,000 by 2036, and 970,000 by 2041, for an annual average growth rate of 1.0 per cent.

The plan also offers guidance regarding transportation system development, envisioning an "integrated transportation network that will allow people choices for easy travel both within and between urban centers." While travel by automobile will remain a significant means of transport, other travel modes, including efficient, convenient and affordable public transit, and walking and cycling, will become more important elements of the urban transportation system.

2.1.2 Metrolinx "The Big Move" – Regional Transportation Plan for the GTHA

Pursuant to the *Metrolinx Act, 2006*, the Province created Metrolinx to develop, fund, coordinate and promote transportation within the GTHA municipalities. In 2008, Metrolinx released its Regional Transportation Plan (RTP) for the GTHA, entitled "The Big Move: Transforming Transportation in the Greater Toronto and Hamilton Area". The plan outlines a 25-year vision for sustainable transportation in the GTHA, and the policies, programs and infrastructure investments required to achieve this vision of a seamless, integrated transportation network.

The Big Move is primarily focused on enhancing and expanding public transit. Near the Study Area, the RTP identifies a few rapid transit initiatives of relevance, including the expansion of Regional Rail on the Kitchener GO Rail line to full-day, two-way service and the provision of Bus Rapid Transit (BRT) on Steeles Avenue in Brampton connecting Lisgar GO Station to Highway 427 along the southern limits of the Mississauga Road EA. The plan also includes policies related to goods movement, active transportation (AT) and transit to be considered in developing and improving infrastructure.

2.1.3 GTA West Transportation Corridor Planning and Environmental Assessment Study

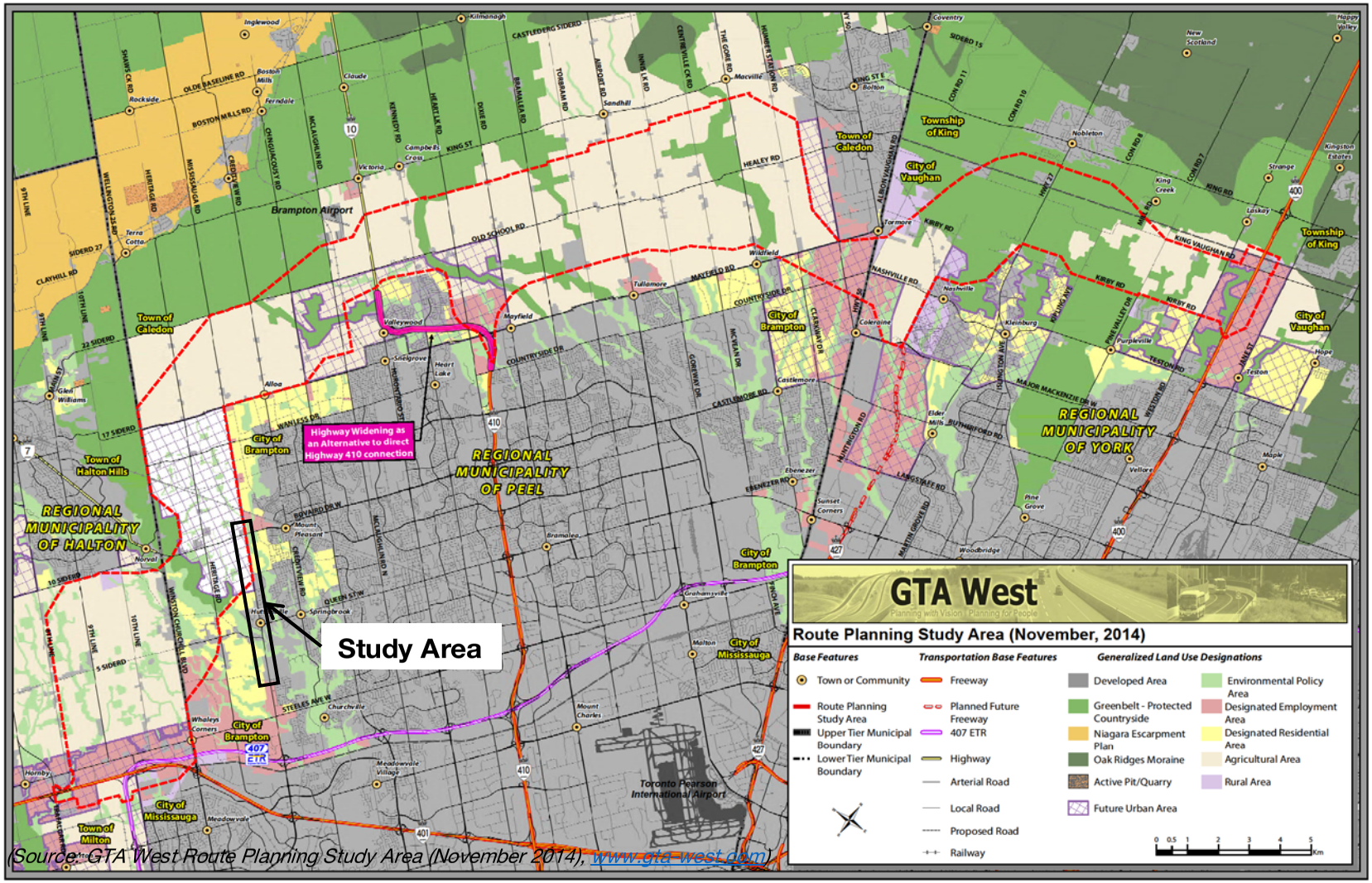
The Ministry of Transportation (MTO) is conducting the Greater Toronto Area (GTA) West Transportation Corridor Planning and Environmental Assessment Study (the GTA West Study) to identify the preferred solution for providing better linkages between Urban Growth Centres in the west part of the GTHA, including Downtown Guelph, Downtown Milton, Brampton City Centre and Vaughan Corporate Centre.

The *GTA West Transportation Development Strategy* (TDS) released in November 2012 recommended a broad range of measures to address future needs in the northwest part of the GTHA, including a new transportation corridor from Highway 400 westerly to Highway 401 east of the Niagara Escarpment. The corridor is proposed to include a six (6) lane freeway (400-series highway) along the north-south section near the Region of Peel and Region of Halton municipal boundary (once known as the Halton/Peel Freeway) and a four (4) lane facility for the east-west segment, with interchanges at major arterial roads. A transitway and potential goods movement priority features are also contemplated. It is noted that the TDS assumed the future widening of several roads near the Study Area as part of the overall transportation network solution, including Mississauga Road.

MTO initiated Stage 2 of the GTA West Study in early 2014. As part of this stage, route alternatives for the new transportation corridor were generated within the Route Planning Study Area shown in **Figure 2.1**. In May 2015, the Ministry released the Refined Short List of Route Alternatives and Potential Interchange Locations for the corridor. **Figure 2.2** shows the routes and interchanges being considered near the Study Area. Potential interchange locations include:

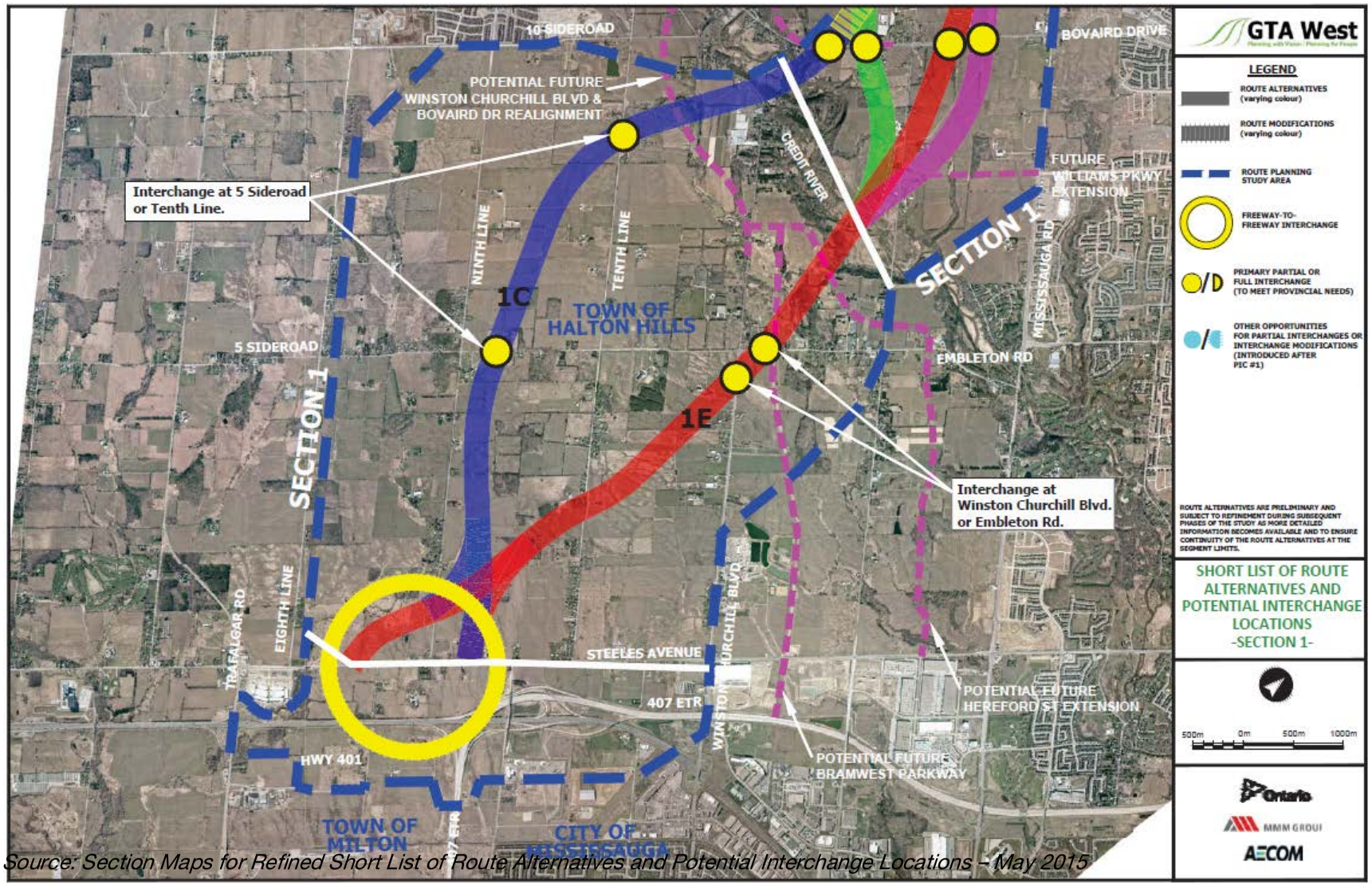
- Winston Churchill Boulevard or Embleton Road;
- Bovaird Drive; and
- Mississauga Road or Mayfield Road.

In December 2015, MTO suspended work on the GTA West Study. As of August 2016, no information regarding the status of the study had been published.



(Source: GTA West Route Planning Study Area (November 2014), www.gta-west.com)

GTA West Corridor – Preliminary Route Planning Study Area (November 2014)



Source: Section Maps for Refined Short List of Route Alternatives and Potential Interchange Locations – May 2015

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GTA West Corridor in the Vicinity of the Study Area

Given the uncertain timing of the GTA West transportation corridor, a sensitivity analysis comparing travel demand forecasts with and without the proposed freeway facility was completed. This cursory assessment indicated a nominal difference in peak direction traffic flows (southbound in the morning and northbound in the afternoon) between scenarios. This suggests that the highway would have limited (if any) influence on the need and justification for widening Mississauga Road. The presence of a GTA West transportation corridor could impact turning movement volumes at intersections, which would have a bearing on storage requirements and resulting auxiliary turn lane lengths. Given the magnitude and inherent uncertainty in future travel forecasts, however, these implications were not considered consequential and do not alter the recommendations of this study. Section 4.1.2 discusses the implications of the proposed transportation corridor further.

2.1.4 Halton-Peel Boundary Area Transportation Study

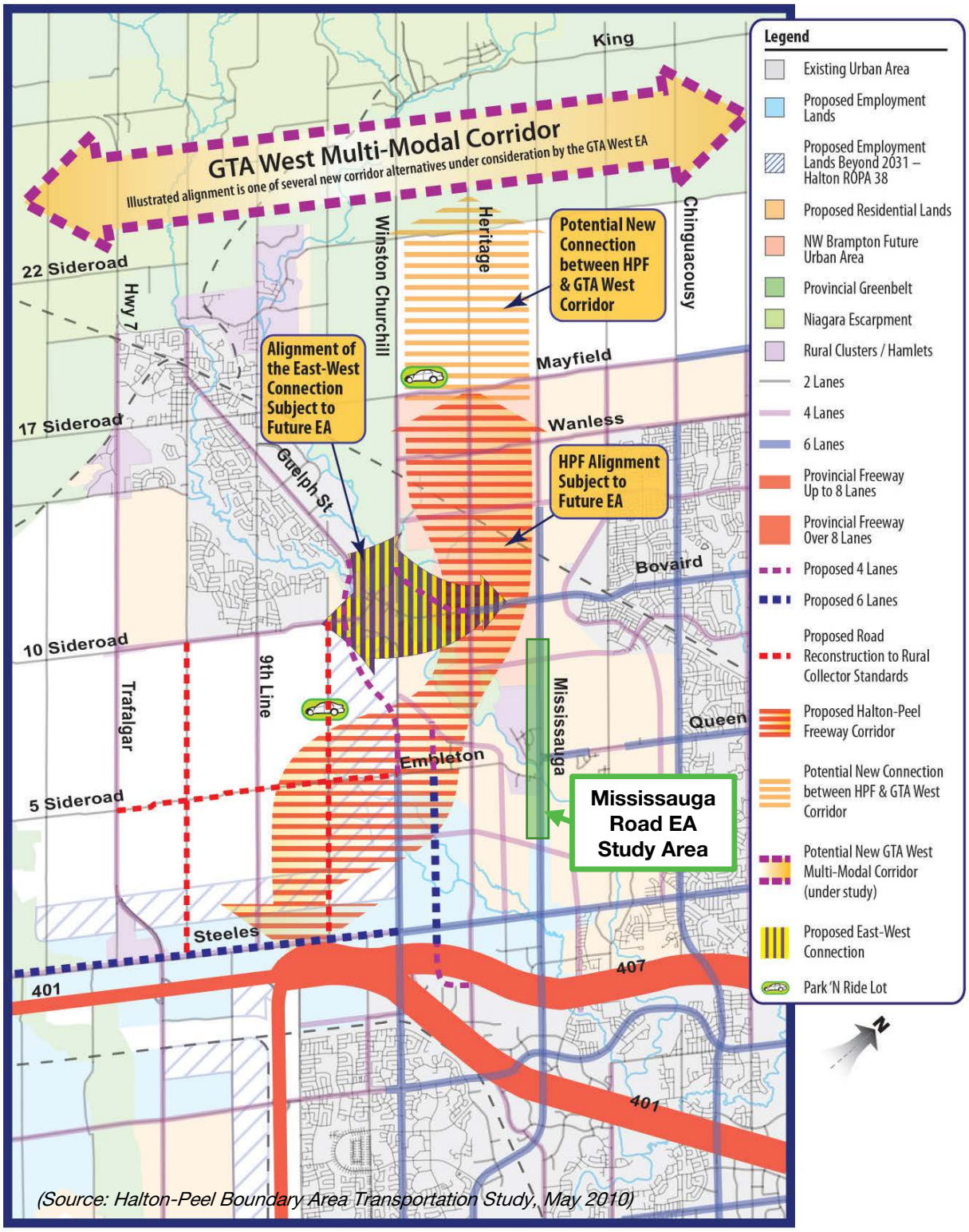
The Halton-Peel Boundary Area Transportation Study (HPBATS) was initiated in response to commitments made by the Region of Halton for the approval of Halton Regional Official Plan Amendment (ROPA) 25. HPBATS was conducted jointly by the Region of Peel, Region of Halton, City of Brampton, Town of Caledon and the Town of Halton Hills to identify a long-term (2021-2031) transportation network to serve future demands in the municipal boundary area. Growth projections from the Growth Plan served as the basis for the demand forecasts.

The HPBATS transportation strategy endorsed by Town, City and Regional Councils in May 2012 includes a range of measures designed to promote changes in travel behaviour in addition to essential infrastructure improvements. The strategy features enhancements to the transit, AT and road networks, and the introduction of Transportation Demand Management (TDM) initiatives.

Figure 2.3 illustrates the recommended transportation network for the Halton/Peel boundary area from HPBATS. The figure illustrates the following improvements near the Study Area. It is recognized that many of these network elements are now captured in the GTA West TDS and municipal transportation plans:

- New Halton/Peel Freeway at eight (8) lanes from Highway 401/407 ETR interchanges west of Ninth Line in Halton Region to Bovaird Drive or Mayfield Road, and potential new north-south connection between Halton/Peel Freeway and GTA West Corridor (north of Mayfield Road)[1];

[1] The Halton/Peel Freeway and the north-south connection are now part of the GTA West Transportation Corridor pursuant to the GTA West EA Study TDS released in November 2012.



Subject to future Environmental Assessment studies

HPBATS Recommended Road Network – 2031

- Proposed east/west connection from Bovaird Drive, west of the proposed Halton-Peel Freeway to Georgetown (subject to future EA studies);
- Widening of Mississauga Road from Highway 407 to Sandalwood Parkway West from two (2) to six (6) lanes;
- Widening of Bovaird Drive, east and west of Mississauga Road from two (2) to six (6) lanes;
- Widening of Heritage Road from Steeles Avenue to Mayfield Road from two (2) to four (4) lanes;
- Widening of Queen Street West on the east approach to Mississauga Road from two (2) to six (6) lanes;
- Widening and extension of Financial Drive through Mississauga Road to the west to four (4) lanes;
- Widening and extension of Williams Parkway from Creditview Road to the proposed Halton-Peel Freeway to four (4) lanes;
- Construction of Sandalwood Parkway West at four (4) lanes from Creditview Road to Winston Churchill Boulevard; and
- Construction of Bram West Parkway at four (4) lanes from Heritage Road to Highway 407 and six (6) lanes from Highway 407 to the proposed Halton-Peel Freeway.

There is also additional planned higher-order transit to be provided by 2031, including:

- Enhanced bus services on Mississauga Road, as well as Main Street/Hurontario Street, Bovaird Drive, Steeles Avenue and Queen Street West; and
- All-day, two-way rail service on the Georgetown GO Rail line.

2.2 Region of Peel

2.2.1 Region of Peel Official Plan

The Region of Peel Official Plan (PROP) guides Regional Council in managing growth and development through interpretation of the intent of Provincial legislation and policies, and providing a long term strategic policy framework. The PROP includes a transportation network and related polices to serve planned growth, including TDM policies and programs to foster travel options and reduce traffic congestion in the Region.

Schedule E (Major Road Network) of the PROP identifies Mississauga Road, Embleton Road, Queen Street West and Bovaird Drive as Major Roads. The plan also designates Mississauga Road and Queen Street West as Other Potential Rapid Transit Corridors on Schedule G (Rapid Transit Corridors). Schedule F (Regional Road Mid-Block Right-of-Way Requirements) denotes a planned road allowance width of 45 m for Mississauga Road in this

vicinity. However, a road allowance width of 50.5 m will be required between Queen Street West and Bovaird Drive due to the number and proximity of intersections, and up to 54 m needed within 245 m of any intersections with dual left turn lanes.

2.2.2 Region of Peel Long Range Transportation Plan

The LRTP provides strategies, policies and plans for roads, transit and TDM to respond to the Region's transportation challenges over the next 20 years. To address these challenges, the 2012 LRTP Update recommends the broad application of TDM strategies aimed at reducing reliance on SOV travel and sets a goal of 14 per cent reduction in congestion by the year 2031 (when compared with the no TDM measures scenario). Strategies outlined in the plan include AT facilities, Smart Commute programs, employer individualized marketing, a high school pilot program, Safe-Active Routes to School initiatives, among others. The LRTP also recommends that public transit be the priority in transportation infrastructure planning and major investments. The plan identifies higher-order transit improvements Mississauga Road, Bovaird Drive, Queen Street West and Steeles Avenue.

Even with these measures in place, road/highway expansion will be necessary to meet future transportation demands. The LRTP specifies a broad list of Regional Road network improvements, including the following road widenings within the Study Area, as referenced in Figures 4.15 and 4.16 of the plan:

- Widening of Mississauga Road between Mayfield Road and Queen Street West to four (4) lanes (2021);
- Widening of Mississauga Road between Queen Street West and Highway 407 to six (6) lanes (2021);
- Widening of Bovaird Drive, east of Mississauga Road to four (4) lanes (2021);
- Widening of Queen Street West east of Mississauga Road to four (4) lanes (2021);
- Widening of Bovaird Drive from 1 km west to east of Mississauga Road (2031);
- Widening of Mississauga Road from future Sandalwood Parkway West to Queen Street West (2031).

The Region is currently in the process of updating the LRTP to the 2041 horizon year, but has not released this work yet.

2.2.3 Region of Peel Road Characterization Study

The Road Characterization Study (RCS) completed in May 2013 provides guidance on how to better reflect the local context and accommodate a broader range of transportation modes and users in the planning and design of Regional Roads. The main objectives of the study were to:

- Improve integration between transportation and land use;
- Support the Region's multi-modal transportation system; and
- Protect and maximize the current/future functionality and efficiency of the Region's arterial roads.

The RCS provides a series of illustrative roadway cross sections to be employed when considering changes to a Regional Road right-of-way. The cross sections reflect different road typologies developed through a context-sensitive solutions approach that responds to current and envisioned future land uses. Recognizing the diverse land use contexts within the Region, the RCS includes a Road Character Matrix and Road Character Map that correlates land use character with associated right-of-way considerations. Using this matrix, the RCS classifies Mississauga Road as a Suburban Connector that supports primarily residential commuter traffic. **Figure 2.4** shows the illustrative roadway cross section for a Suburban Connector.

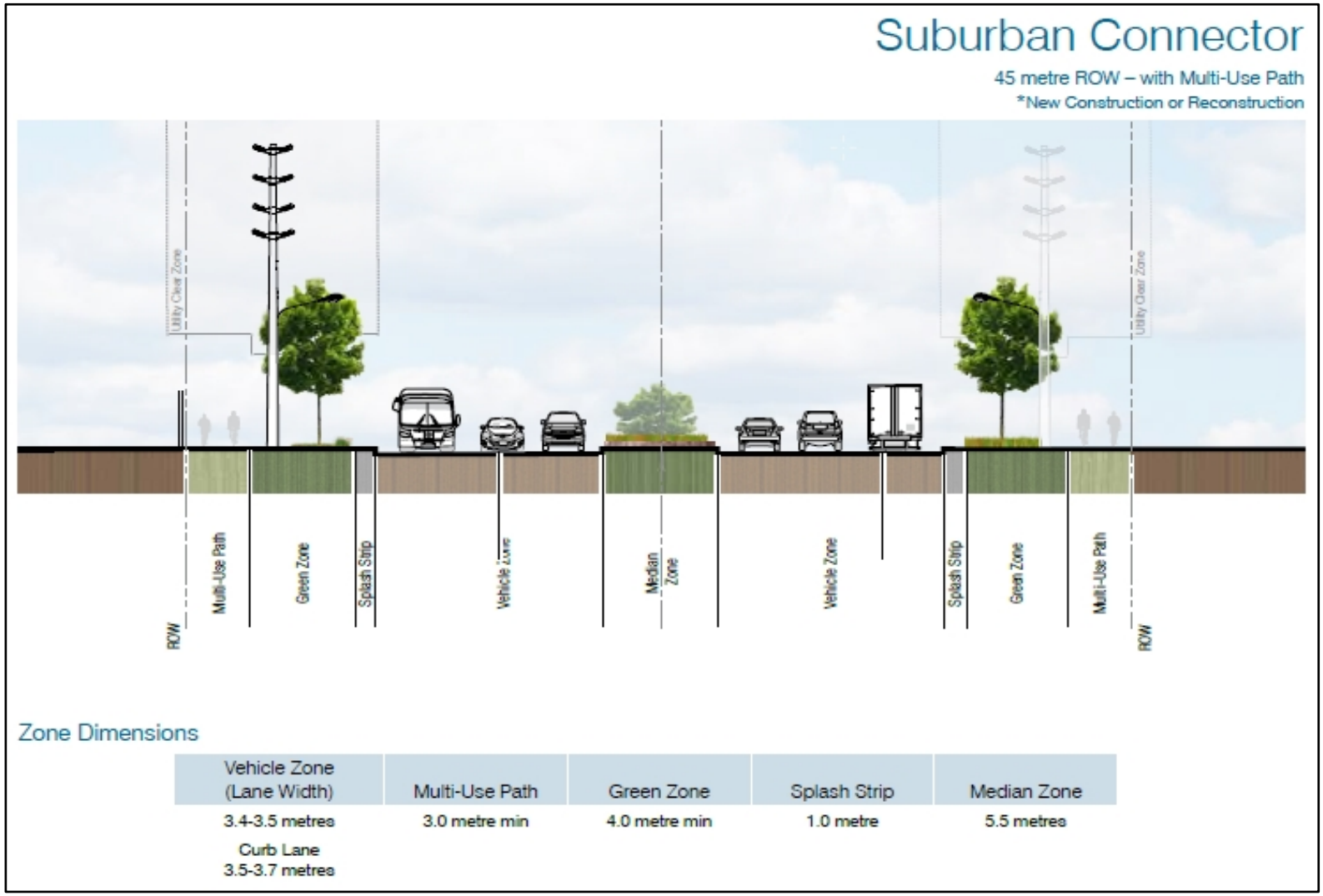
2.2.4 Region of Peel Strategic Goods Movement Network Study

The Strategic Goods Movement Network (SGMN) Study completed in May 2013 developed a systematic, hierarchical truck route network throughout the Region of Peel based on existing truck route networks and volumes, land uses and planning policies, overall network connectivity, trucks origins/destinations, best practices, as well as stakeholder outreach. The study recommends implementing the SGMN through a phased, logical approach that balances the needs of goods movement with local community requirements. This phased strategy includes strengthening the Official Plan to further support goods movement, prioritizing operational management/ capital improvements to support the SGMN, implementing the supportive improvements, and assessing SGMN impacts with ongoing improvements as needed.

The study identifies Mississauga Road, as well as Bovaird Drive and Steeles Avenue just outside the Study Area, as Primary Truck Routes connecting goods manufacturers with destinations and highways.

2.2.5 Region of Peel Active Transportation Plan

The Active Transportation Plan (ATP) completed in November 2011 articulates a vision for AT within the Region of Peel aimed at creating a place where walking, cycling, and rolling are safe, convenient, appealing and accessible for all citizens, especially children, youth, older adults, persons with disabilities and other priority populations. The ATP sets outs policies to support walking and cycling, and recommends infrastructure improvements to expand the existing pedestrian and bike networks, based on the premise that AT facilities should be provided in all Regional Road corridors to facilitate access to adjacent land uses and promote connectivity with the transit system.



(Source: Region of Peel Road Characterization Study, Section 2: Illustrative Cross Sections, May 2013)

Illustrative Roadway Cross-Section for Suburban Connector

Near the Study Area, the ATP identifies the provision of:

- Multi-use trails and sidewalks along Mississauga Road, Bovaird Drive and Queen Street West;
- Sidewalks on both sides of Embleton Road; and

Segregated bike lanes along Mississauga Road from Bovaird Drive to Queen Street West, and on Queen Street West from Mississauga Road to Chinguacousy Road. The ATP does not specify which side of the road the multi-use trails and sidewalks should be located, leaving the specifics regarding type of facility and placement to the implementation phase.

2.2.6 Region of Peel Municipal Class EA Studies

The Region of Peel is conducting or has recently completed the following Class EA studies near the Study Area:

Mississauga Road (Bovaird Drive to Mayfield Road)

The Region completed a Municipal Class EA in 2013 for improvements to Mississauga Road between Bovaird Drive and Mayfield Road. The study recommended:

- Widening of Mississauga Road from two (2) to six (6) lanes from Bovaird Drive to Sandalwood Parkway West, and from two (2) to four (4) lanes from Sandalwood Parkway West to Mayfield Road;
- A rail overpass and a 42 m clear span bridge over Huttonville Creek; and
- Intersection improvements, transit facilities, sidewalk and multi-use trail.

Construction is scheduled for 2019 in the Region's 2016 Ten Year Capital Plan.

The study assumed a 4 per cent per annum traffic growth rate to estimate future travel demand in horizon years 2018 and 2031.

Bovaird Drive (Lake Louise Drive/Worthington Avenue to 1.45 km west of Heritage Road)

The Region completed a Schedule C Municipal Class EA in 2013 for improvements to Bovaird Drive from Lake Louise Drive/Worthington Avenue to 1.45 km west of Heritage Road. The study recommended:

- Widening of Bovaird Drive from two (2) to six (6) lanes east of the North-South Transportation Corridor (now part of the GTA West Transportation Corridor and assumed to cross Bovaird Drive, east of Heritage Road), and from two (2) to four (4) lanes west of the North-South Transportation Corridor with full urbanization; and

- Multi-use trail on the north side of Bovaird Drive and sidewalk on the south, as well as intersection improvements and transit facilities.

Construction of the section east of Mississauga Road is scheduled for 2016-2017 in the Region's 2016 Ten Year Capital Plan. The section of Bovaird Drive, west of Mississauga Road is scheduled for construction in the 2021-2025 period.

The study applied traffic growth rates from the HPBATS 2031 EMME model to estimate future travel demand in horizon years 2021 and 2031. With other planned improvements, especially the GTA West Transportation Corridor, a 1 per cent per annum reduction in traffic volumes east of Mississauga Road and a 2 per cent per annum reduction in traffic volumes west of Mississauga Road were assumed.

Mississauga Road (Queen Street West to Bovaird Drive)

Part of this assignment is to prepare an Addendum to the Municipal Class EA completed by the Region in 2006 for improvements to Mississauga Road between Queen Street West and Bovaird Drive. The original study recommended:

- Widening of Mississauga Road to a five (5) lane semi-urban cross-section by 2015, with six (6) or seven (7) lanes required beyond 2015;
- Intersection improvements to Queen Street West, Williams Parkway and Bovaird Drive; and
- Pedestrian multi-use trail on both sides of Mississauga Road.

Construction is scheduled in the 2021-2025 period in the Region's 2016 Ten Year Capital Plan, subject to the findings of this study.

2.3 City of Brampton

2.3.1 City of Brampton Official Plan (2006)

The City of Brampton's Official Plan (BOP) guides land use decisions in the City by providing goals, objectives, and policies based on the principles of sustainable development. Near the Study Area, the BOP defines the Northwest Brampton Urban Development Area as a mixed-use, transit-oriented community centred on the Mount Pleasant GO Station/multi-modal transit node. This new area will be planned as a compact and complete community with higher density development, consistent with *Places to Grow*.

The BOP supports the development and protection of a North-South Higher Order Transportation Corridor in West Brampton (now part of the GTA West Transportation Corridor). This corridor is proposed to cross the Credit River

and connect Northwest Brampton with the Bram West Secondary Plan and Highway 407.

2.3.2 City of Brampton Transportation Master Plan Update (2015)

The City of Brampton completed the Transportation Master Plan Update (TMPU) in 2015. The TMPU provides sustainable transportation solutions to serve planned growth to the year 2041. The plan is founded on the following major transit improvements: Hurontario-Main Light Rail Transit; two-way, all day GO Rail service to three (3) main stations in Brampton; and expansion of the City's Züm Bus Rapid Transit network.

The TMPU identifies the following municipal road network improvements for horizon years 2021, 2031 and 2041 near the Study Area:

- New four (4) lane road extension of Williams Parkway from Mississauga Road to Heritage Road (2021);
- New four (4) lane road construction (Rivermont Road, formerly known as Riverview Heights) from Steeles Avenue to Winston Churchill Boulevard (2021);
- New six (6) lane road construction of Bram West Parkway from north of Embleton Road to Heritage Road (2021);
- New four (4) lane construction of Financial Drive from Heritage Road to Winston Churchill Boulevard (2021);
- Widening of Heritage Road from Wanless Drive to Steeles Avenue to four (4) lanes (2031);
- Widening of Creditview Road from Bovaird Drive to Mount Pleasant Transit Spine to six (6) lanes (2041); and
- New four (4) lane road construction from Mount Pleasant GO Station to Winston Churchill Boulevard (2041).

The plan identifies the following rapid transit improvements for horizon years 2021 and 2041 near the Study Area:

- Bovaird West Züm from Mount Pleasant GO Station to Queen Street West (implemented in Fall 2015);
- Steeles West Züm from Main Street to Lisgar GO Station (by 2021);
- Queen West Züm from Main Street to Mississauga Road. and to Mount Pleasant GO Station (by 2021);
- Mississauga Züm from Queen Street West to Steeles Avenue West (by 2041); and
- Steeles Bus Rapid Transit between Lisgar GO Station and Highway 427 (Humber College).

The plan identifies the existing and proposed cycling networks near the Study Area, including:

- Existing off-road trail on Mississauga Road from Williams Parkway to south of Steeles Avenue, and on Williams Parkway east of Mississauga Road;
- Proposed bike facilities within the road allowances for Mississauga Road from Williams Parkway to Bovaird Drive, Williams Parkway west of Mississauga Road, Queen Street West, and Embleton Road;
- Proposed off-road trail within the Mississauga Road corridor north of Williams Parkway, Bovaird Drive, Queen Street West, and along the branch of the Credit River that intersects with Mississauga Road in Huttonville.

2.3.3 City of Brampton Municipal Class EA Studies

The City of Brampton is conducting or has recently completed the following Class EA studies near the Study Area:

Heritage Road (Steeles Avenue to Rivermont Road)

The City is assessing the need for improvements within the Heritage Road corridor from Steeles Avenue to future Rivermont Road (formerly Riverview Heights Road), approximately 460 m north of Embleton Road. The study, which is scheduled for completion later this year, is considering a combination of measures to address operational deficiencies and the need for additional north-south capacity, including:

- Widening of Heritage Road from two (2) to four (4) through lanes;
- Intersection improvements (auxiliary lanes, property access relocation, signalization, and/or roundabouts at intersections);
- Improvements at specific locations to improve transit service; and
- TDM measures, such as carpool areas, shuttle buses, and flexible work hours, to support Bus Rapid Transit on Steeles Avenue.

The study assessed future road network requirements based on a screenline analysis using volumes (and capacities) derived from the City of Brampton EMME model for horizon years 2021 and 2031. Screenlines north of Embleton Road, south of Embleton Road, and north of Steeles Avenue were examined.

The analyses showed that existing screenline volumes north and south of Embleton Road approach or meet capacity, while volumes just north of Steeles Avenue are less than capacity. However, in 2021, only the screenline north of Embleton Road is expected to approach capacity, with the other two (2) locations expected to be under capacity. These improved conditions at the screenlines south of Embleton Road are forecast due to added capacity at the following adjacent north-south arterials:

- Winston Churchill Boulevard (widening from two (2) to four (4) through lanes);
- Rivermont Road (new four (4) lane connection); and
- Mississauga Road (widening from four (4) to six (6) through lanes).

By 2031, conditions for all screenline locations are expected to approach or be at capacity again, even with the addition of Bram West Parkway (assuming six (6) through lanes – see below).

Bram West Parkway (Heritage Road to Financial Drive) and Financial Drive (Heritage Road to Winston Churchill Boulevard)

The City is carrying out a Municipal Class EA for a new north-south arterial road, Bram West Parkway from Heritage Road to Financial Drive and the extension of Financial Drive from Heritage Road to Winston Churchill Boulevard. The study, scheduled for completion later in 2016, is recommending the following improvements:

- New Bram West Parkway with six (6) lanes north of Steeles Avenue to Heritage Road, and a partial interchange with Highway 407 at the south, providing access to and from the east. The new road is being planned to have a 55 m right-of-way, 70 km/h posted speed, and signalized intersections at Heritage Road, Steeles Avenue and Financial Drive;
- Financial Drive extension with four (4) through lanes and a continuous two-way centre left turn lane from Heritage Road to Winston Churchill Boulevard. The road is being planned to have a 30 m right-of-way, 50 km/h posted speed, and signalized intersections at Heritage Road and Winston Churchill Boulevard;
- Future Züm bus services on both Bram West Parkway and Financial Drive; and
- Sidewalk along the west side of Bram West Parkway and south side of Financial Drive, and multi-use trails along the east side of Bram West Parkway and north side of Financial Drive.

2.4 Implications for Mississauga Road Class EA

The previous sections have highlighted the considerable growth expected for northwest Brampton over the next 20+ years. Even with improvements to transit and active transportation, road network expansion will be necessary to meet anticipated travel demands.

The widening of Mississauga Road from four (4) to six (6) through lanes within the Study Area has been a common assumption for transportation planning studies completed in the northwest Brampton area over the past 10 years. Even with expansion of this corridor and other planned road improvements, traffic conditions are expected to approach or be at capacity by the year 2031. While it is acknowledged that the widening of Mississauga

Road must be assessed on its own merits pursuant to this Municipal Class EA study, deciding to not proceed with the project would have consequences for road network planning in this area. An alternative road expansion project would be needed to satisfy future demand.

3 Existing Transportation Conditions

This section documents current traffic conditions, operational deficiencies, and constraints experienced by the public travelling on the roads and at the intersections within the Study Area. The operational deficiencies and constraints identified at this stage will be fundamental to the process of defining future problems and opportunities, and establishing need and justification for any improvements in the corridor.

3.1 Road Network

The main roadways within the Study Area include:

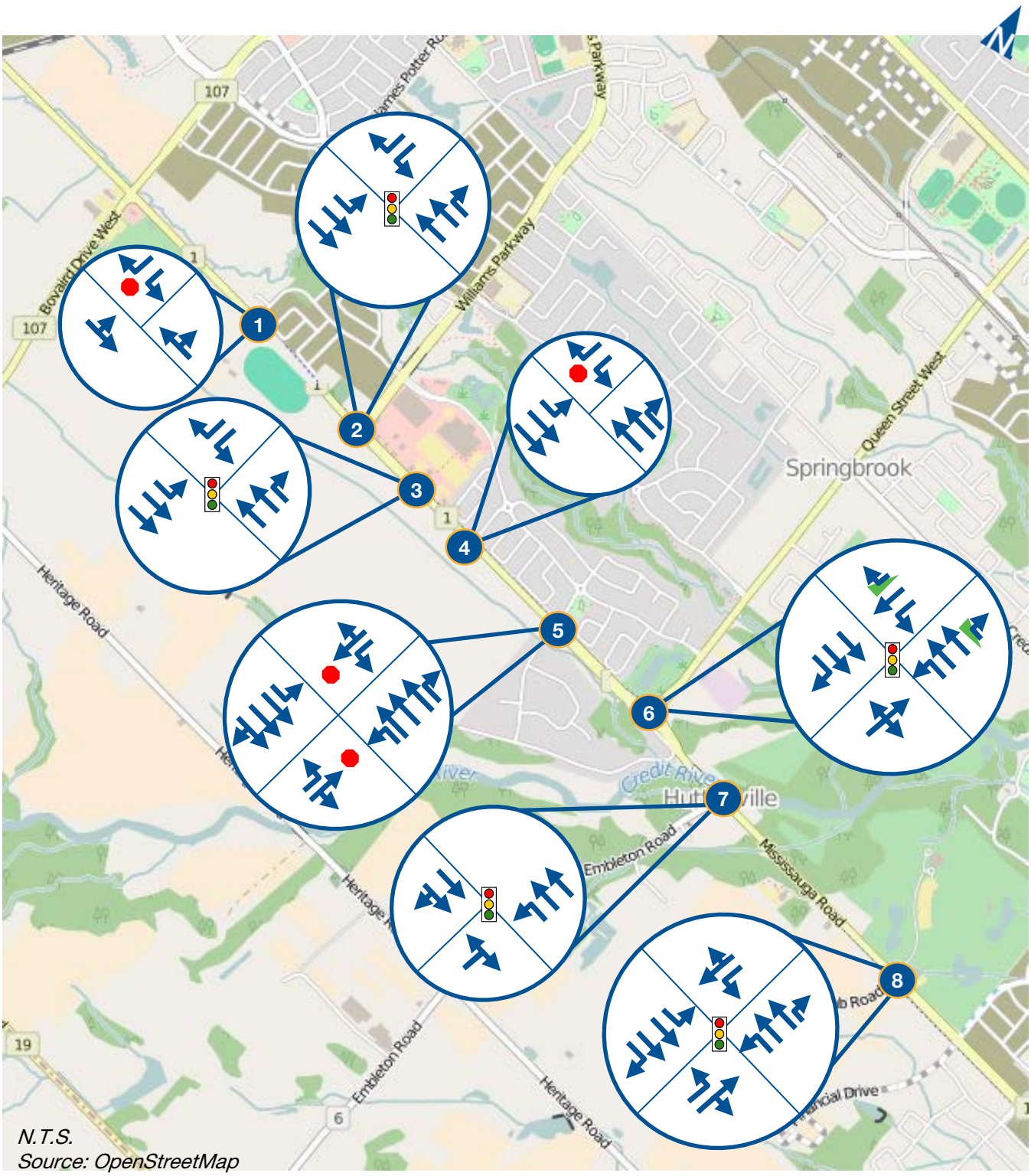
- **Mississauga Road (Peel Regional Road 1)** is a north-south Regional Arterial Road that extends from Caledon in the north, through the City of Brampton, and to the City of Mississauga in the south. Within the Study Area, Mississauga Road has various speed limits (ranging from 50 to 80 km/h), features urban and rural cross-sections, and provides one (1) to three (3) travel lanes per direction, with auxiliary lanes at many intersections.
- **Williams Parkway** is a four (4) lane, east-west City of Brampton Minor Arterial road. Its western terminus is at the signalized intersection with Mississauga Road. Within the Study Area, Williams Parkway has an urban cross-section and a posted speed limit of 60 km/h. The signalized intersection with Mississauga Road features exclusive left and right turn lanes, with an “open” lane to accommodate a through or an additional left turn lane in the future. A proposed extension west past Mississauga Road is planned beyond 2031.
- **Queen Street West (Peel Regional Road 6)** is a two (2) to four (4) lane, east-west Regional Arterial Road that runs east from Mississauga Road to Downtown Brampton. Within the Study Area, Queen Street West has a four (4) lane urban cross-section with a posted speed limit of 60 km/h. Queen Street West extends westerly from Mississauga Road as **River Road**, a local road providing access to the residential area situated west of the signalized intersection.
- **Embleton Road (Peel Regional Road 6)** is a two (2) lane Regional Arterial Road that runs west from Mississauga Road to the Peel-Halton border and continues as 5th Sideroad within Halton Region. Within the Study Area, Embleton Road has a two (2) lane rural cross-section and a posted speed limit of 50 km/h. At its signalized intersection with Mississauga Road, Embleton Road has a shared left-right turn lane and is constrained by a narrow road allowance.

There are also several local roads and driveways that intersect with Mississauga Road within the Study Area:

- **Ostrander Boulevard** and **Adamsville Road** intersect Mississauga Road at an unsignalized intersection north of the Queen Street West/ River Road intersection. These local roads provide access to the residential areas on either side of Mississauga Road.
- **Beacon Hill Drive** intersects with Mississauga Road further to the north at an unsignalized intersection. Beacon Hill Drive provides additional access to the residential lands.
- **Royal West Drive** will intersect with Mississauga Road north of Williams Parkway at an unsignalized intersection. Royal West Drive will be opening to traffic in the near term and will provide access to the new residential subdivision east of Mississauga Road.
- The Credit Ridge Commons commercial plaza has three (3) driveways to Mississauga Road south of Williams Parkway. One (1) driveway is signalized, while the other two (2) entrances are unsignalized.
- The Lionhead Golf and Country Club driveway intersects with Mississauga Road south of Embleton Road at a signalized intersection. The west leg of the intersection currently serves as a construction access road to new residential lands and will provide a local road connection to this area soon.

Figure 3.1 illustrates the existing lane configuration and traffic control at the eight (8) primary intersections within the Study Area. As noted above, the intersections of Mississauga Road with Williams Parkway, the Credit Ridge Commons (commercial) driveway, Queen Street West/River Road, Embleton Road, and the Lionhead Golf and Country Club driveway are all signalized. The Royal West Drive, Beacon Hill Drive and Ostrander Boulevard/ Adamsville Road intersections with Mississauga Road feature two-way stop control.

Table 3.1 and **Table 3.2** summarize the existing intersection and driveway spacing along the east and west sides of Mississauga Road, respectively. The intersection spacing is generally consistent with the Suburban Connector requirements set out in the Region of Peel Road Characterization Study (RCS).



Existing Lane Configuration and Traffic Control

TABLE 3.1: INTERSECTION AND DRIVEWAY SPACING FOR EAST SIDE OF MISSISSAUGA ROAD

Location (Cross Street / Driveway) (m)	Access Type			Distance to Downstream Location (m)	Auxiliary Turn Lanes	Adequate Spacing per RCS?
	Full-Access	Right-in / Right-Out	Left-in / Right-in / Right-out			
Bovaird Drive West	X			60		No
Driveway to 9980 Mississagua Road (Gas Station)	X			40		No
Driveway to 9980 Mississagua Road (Gas Station)	X			210		No
Driveway to Old Pro Driving Range Maintenance	X			462		Yes
Driveway to 9752 Mississauga Road (Residential / Farm)	X			397		Yes
Driveway to 9624 Mississauga Road (Farm)	X			205		Yes
Williams Parkway	X			348	SBL	Yes
Driveway to Credti Ridge Commons (Commercial Plaza)	X			318	SBL	Yes
Beacon Hill Drive	X			18	SBL	No
Driveway to 9330 Mississauga Road (Residential / Farm)	X			214		No
Driveway to 9264 Mississauga Road (Residential)	X			23		No
Driveway to 9234 Mississauga Road (Residential)	X			68		No
Driveway to 9234 Mississauga Road (Residential)	X			19		No
Driveway to 9220 Mississauga Road (Residential)	X			38		No
Driveway to 9210 Mississauga Road (Residential)	X			19		No
Driveway to 9178 Mississauga Road (Residential)	X			90		No
Ostrander Boulevard	X			25	SBL	No
Driveway to 9126 Mississauga Road (Unknown)		X		410		Yes
River Road Access		X		98	SBR	No
River Road	X			430	SBR, SBL	Yes
Driveway to 2100 Embleton Road (Unknown)	X			28		No
Embleton Road	X			300		Yes
Driveway to 8768 Mississauga Road (Residential)	X			290		No
Driveway to 8672 Mississauga Road (Terrace on the Green)	X			63		No
Driveway to 8646 Mississauga Road (Residential)	X			18		No
Driveway to 8636 Mississauga Road (Residential)	X			183		No
Driveway to 8586 Mississauga Road (Residential)	X			50		No
Driveway to 8568 Mississauga Road (Residential)	X			25		No
Driveway to 8562 Mississauga Road (Residential)	X			27		No
Driveway to Great Gulf Sales Presnetation Centre	X			80		No
Lionhead Golf Club Road	X			380	SBR, SBL	Yes
Financial Drive	X				SBL	

TABLE 3.2: INTERSECTION AND DRIVEWAY SPACING FOR WEST SIDE OF MISSISSAUGA ROAD

Location (Cross Street / Driveway) (m)	Access Type			Distance to Downstream Location (m)	Auxiliary Turn Lanes	Adequate Spacing per RCS?
	Full-Access	Right-in / Right-Out	Left-in / Right-in / Right-out			
Financial Drive	X			218	NBR	No
Unopened Access		X		159	NBR	Yes
Driveway to Lionhead Golf and Country Club	X			235	NBR	No
Driveway to 8601 Mississauga Road (Residential)	X			53		No
Driveway to 8619 Mississauga Road (Residential)	X			26		No
Driveway to 8627 Mississauga Road (Residential)	X			30		No
Driveway to 8649 Mississauga Road (Residential)	X			34		No
Driveway to 8651 Mississauga Road (Residential)	X			476		Yes
Driveway to 8811 Mississauga Road (Mahakali Madir Canada Society)	X			74		No
Driveway to 8827 Mississauga Road (Residential)	X			32		No
Driveway to 8837 Mississauga Road (Residential)	X			72		No
Embleton Road	X			183	NBL	No
Driveway to 8921 Mississauga Road (Residential)	X			40		No
Driveway to 8935 Mississauga Road (Residential)	X			34		No
Driveway to 8947 Mississauga Road (Residential)	X			11		No
Driveway to 8951 Mississauga Road (Residential)	X			195		No
Queen Street West	X			544	NBL,NBR	Yes
Adamsville Road	X			487	NBL,NBR	Yes
Beacon Hill Drive	X			316	NBR	Yes
Driveway to Credti Ridge Commons (Commercial Plaza)	X			108	NBR	No
Driveway to Credti Ridge Commons (Commercial Plaza)		X		97	NBR	No
Driveway to Credti Ridge Commons (Commercial Plaza)		X		144	NBR	No
Williams Parkway	X			220	NBR	Yes
Driveway to 9623 Mississauga Road (Residential)	X			13		No
Driveway to 9627 Mississauga Road (Residential)	X			37		No
Driveway to 9641 Mississauga Road (Brampton Georgetown Animal Hospital)	X			360		Yes
Royal West Drive	X			736		Yes
Bovaird Drive West	X				NBL	Yes

3.2 Transit and Active Transportation Network

3.2.1 Transit Network

The City of Brampton (Brampton Transit) currently operates two (2) bus routes within the Study Area, Route 56 Springbrook and Route 60 Mississauga Road. Route 56 Springbrook provides service between the Downtown Brampton Transit Terminal and the Mount Pleasant GO Station. This route runs along Royal West Drive, parallel to Mississauga Road in the residential subdivision to the east, between Williams Parkway and Queen Street West. Service is provided seven (7) days per week as follows:

- Weekday service operates from approximately 6:00 AM to 11:30 PM with headways of generally 30 minutes;
- Saturday service operates from approximately 8:00 AM to 9:00 PM with headways of generally 60 minutes; and
- Sunday service operates from approximately 9:00 AM to 6:00 PM with headway of generally 60 minutes.

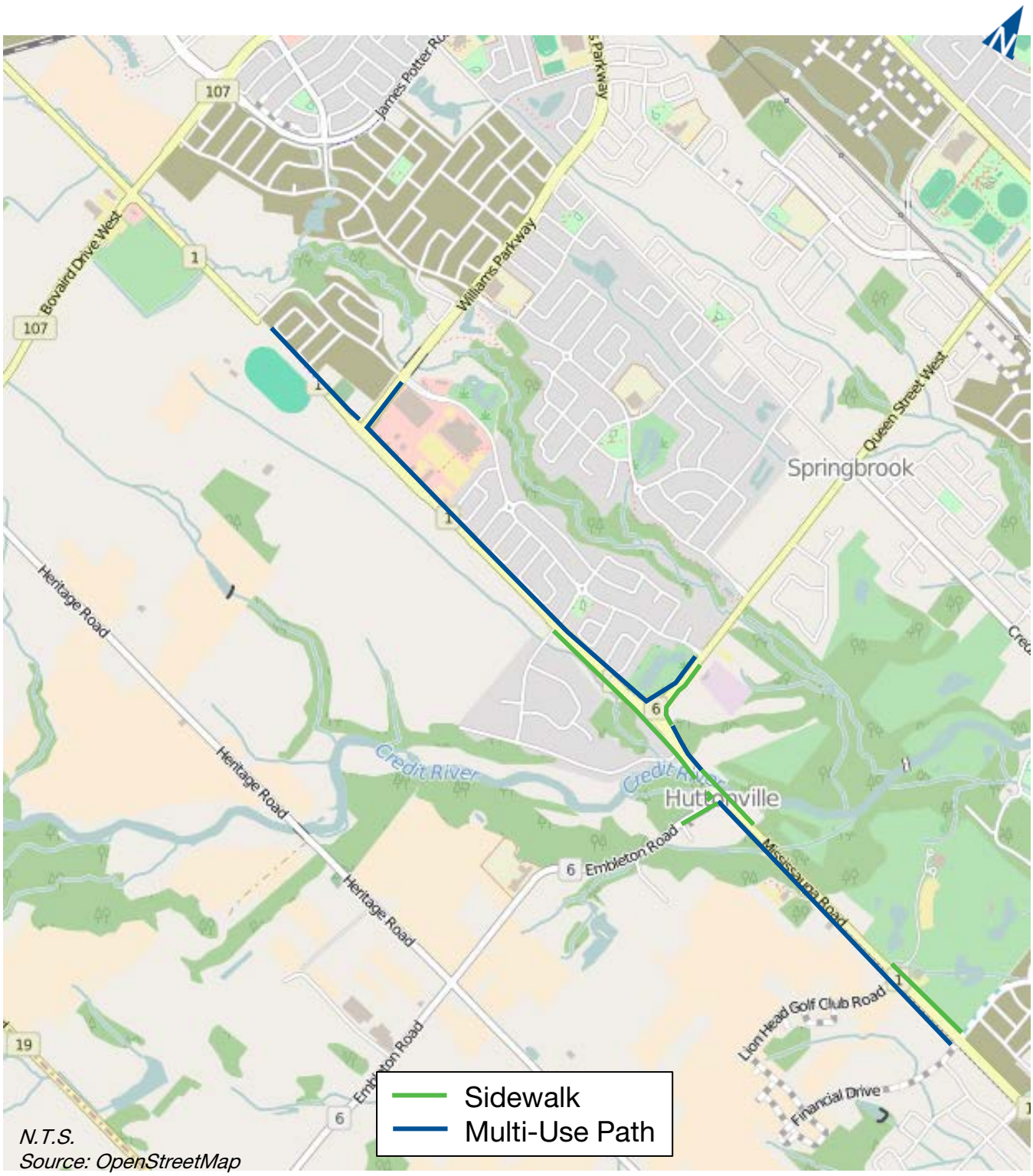
Route 60 Mississauga Road provides service from the Mount Pleasant GO Station to the Creditview Road/Financial Drive/Derry Road employment lands during the peak morning and afternoon periods from Monday to Friday. This peak period weekday service operates from approximately 6:00 to 9:00 AM in the morning and 3:00 to 7:00 PM in the afternoon, with headways of generally 30 minutes.

A westward expansion of Brampton Transit's Züm Bus Rapid Transit service along Queen Street West is planned for 2016. One (1) of the proposed new routes would link the Downtown Brampton Transit Terminal with the Mount Pleasant GO Station via Queen Street West, Mississauga Road, and Bovaird Drive. Within the Study Area, new Züm transit stops will be provided on Mississauga Road at Queen Street West and Williams Parkway.

3.2.2 Active Transportation Network

Active transportation infrastructure within the Study Area differs depending on location due to the variations in cross-section for Mississauga Road. Throughout the area, pedestrian infrastructure is provided along Mississauga Road in the form of either a sidewalk or multi-use trail on a least one (1) side of the road, as illustrated in **Figure 3.2**. Specifically, north of Williams Parkway, the urban cross-section transitions to a rural cross-section and the multi-use trail on the east side of Mississauga Road terminates.

Between Williams Parkway and the signalized commercial driveway, there is a multi-use trail on the east side and no sidewalk on the west side of Mississauga Road. The multi-use trail continues on the east side between the signalized commercial driveway and the Ostrander Boulevard/Adamsville Road intersection.



Existing Active Transportation Network

- From the Ostrander Boulevard/Adamsville Road intersection to the Queen Street West intersection, there is a sidewalk on the west side of Mississauga Road. The multi-use trail continues on the east side.
- Between Queen Street West/River Road and Embleton Road, the sidewalk on the west side is discontinuous and terminates prior to the Credit River Bridge. Along the east side of Mississauga Road, pedestrians are accommodated by either a sidewalk or paved shoulder between Embleton Road and Queen Street West/River Road.
- South of Embleton Road, the sidewalk on the east side ends approximately 165 m south of the intersection of Embleton Road and Mississauga Road. The multi-use trail crosses Mississauga Road at the intersection and continues on the west side of the road.
- At the intersection of Mississauga Road and the Lionhead Golf and Country Club driveway, sidewalk begins on the east side of the road, just north of the intersection, and extends south to the Financial Drive intersection. The multi-use trail continues on the west side of Mississauga Road.

There are no on-street bike lanes on Mississauga Road within the Study Area. Cyclists can use the existing multi-use trail.

3.3 Traffic Volumes

3.3.1 Count Information

The Region of Peel provided midblock and intersection traffic volumes for the Study Area intersections and roads. **Table 3.3** lists the dates of the turning movement counts at the seven (7) primary intersections.

TABLE 3.3: TURNING MOVEMENT COUNTS

Mississauga Road Intersection	Original Count Date	Revised Count Date
Williams Parkway	14 May 2015	18 November 2015
Commercial Driveway	13 June 2013	18 May 2015
Beacon Hill Drive	13 May 2015	13 May 2015
Ostrander Boulevard/Adamsville Road	12 May 2015	18 November 2015
Queen Street West/River Road	6 November 2013	18 November 2015
Embleton Road	6 November 2013	18 November 2015
Lionhead Golf and Country Club	30 April 2015	18 November 2015

As shown in **Table 3.3,** the original data were collected over different years and times, with Mississauga Road under construction during several of the traffic surveys. Thus, observed traffic volumes were found to be inconsistent between intersections within the corridor. Recognizing this situation could adversely affect the analyses, the Region of Peel undertook new turning

movement counts at all Study Area intersections (except for the Beacon Hill Drive intersection) on November 18, 2015. **Appendix A** provides the most current traffic count data.

The recent turning movement counts provided up-to-date traffic volumes with no construction on Mississauga Road, but still exhibited discrepancies between a couple of intersections. To address these inconsistencies, the observed traffic volumes were adjusted and balanced, as illustrated in **Figure 3.2**.

As the intersection of Royal West Drive was not open at the time of the turning movement counts, the traffic volumes were obtained from Figure 20 (Horizon 2013 Total Volumes) of the *Expanded Transportation Impact Assessment (Including GMP Phasing Analysis) Sub-areas 1 & 3, Credit Valley Secondary Plan Report* prepared by MMM Group in January 2004.

3.3.2 Intersection Traffic Volumes

Figure 3.3 shows the balanced existing weekday AM and PM peak hour turning movement volumes.

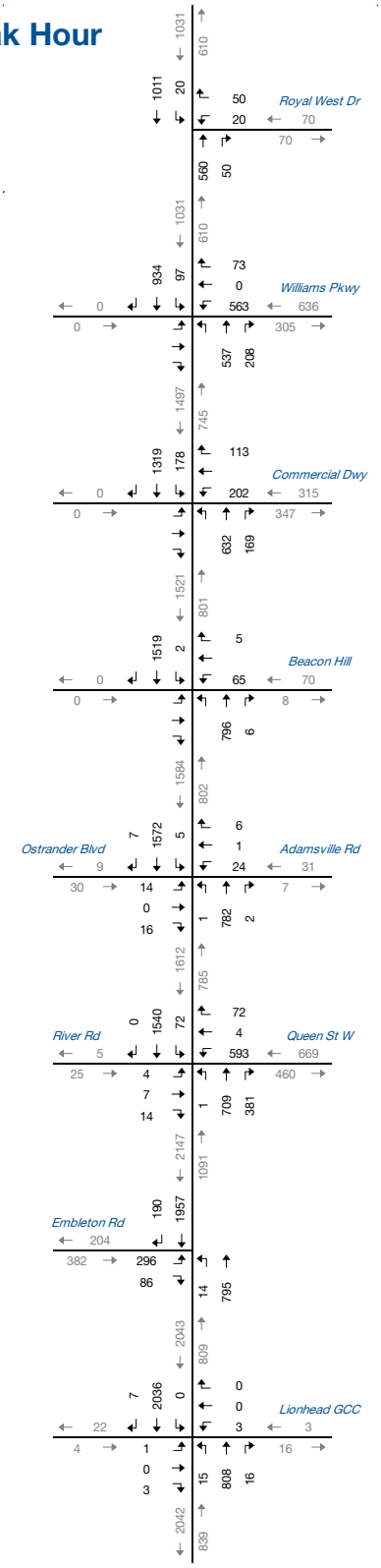
3.3.3 Midblock Traffic Volumes

Table 3.4 shows the midblock daily traffic volumes on Mississauga Road. The daily volumes were derived from the base year PM peak hour traffic volumes shown in **Figure 3.2**. PM peak hour volumes were assumed to be 10 per cent of daily traffic.

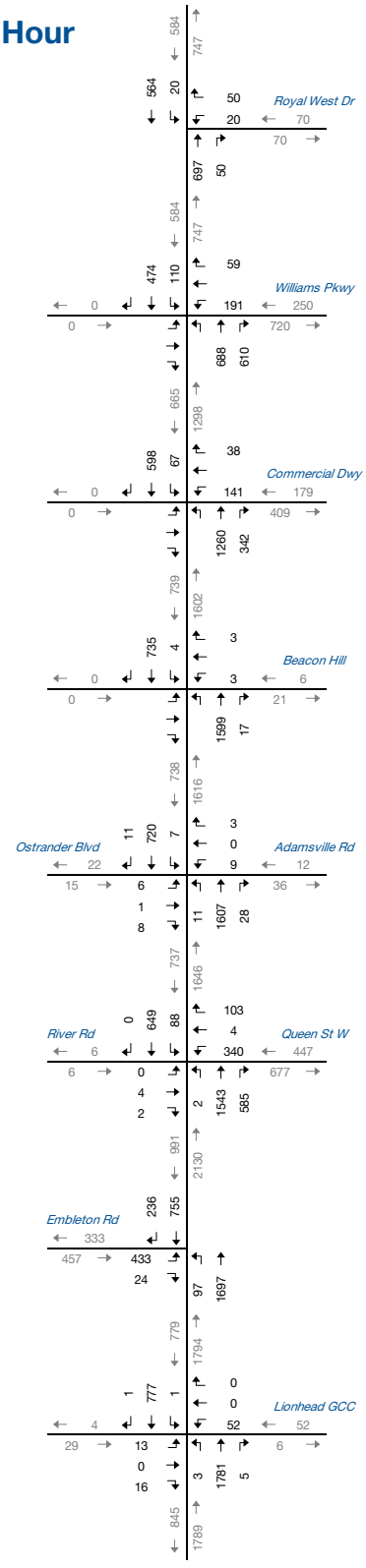
TABLE 3.4: MIDBLOCK DAILY TRAFFIC VOLUMES

Road Section		Vehicles Per Day		
From	To	NB	SB	Two-Way AADT
Bovaird Drive	Williams Parkway	747	584	13,310
Williams Parkway	Commercial Driveway	1,298	665	19,630
Commercial Driveway	Beacon Hill	1,602	739	23,410
Beacon Hill	Ostrander / Adamsville	1,616	738	23,540
Ostrander / Adamsville	Queen	1,646	737	23,830
Queen	Embleton	2,130	991	31,210
Embleton	Lionhead	1,794	779	25,730
Lionhead	Financial	1,789	845	26,340

AM Peak Hour



PM Peak Hour



Balanced Existing Traffic Volumes

3.4 Traffic Operations

3.4.1 Midblock Analysis

Table 3.5 shows the existing 2015 peak direction midblock volume to capacity (v/c) ratios for Mississauga Road based on the traffic volumes shown in **Figure 3.3**.

During the AM peak hour, the highest peak period v/c ratios occur between Queen Street West and Embleton Road and Embleton Road and Lionhead Golf and Country Club driveway. The v/c ratio exceeds 1.0 for both segments, suggesting that this section of Mississauga Road is over capacity during the morning peak. The segment of Mississauga Road between Williams Parkway and Ostrander Boulevard/Adamsville Road exhibits v/c ratios between 0.83 and 0.88, which infers that this section is approaching capacity during the morning peak.

In the PM peak hour, the segment of Mississauga Road between Queen Street West and Lionhead Golf and Country Club driveway again shows v/c ratios exceeding 1.0, suggesting that this section is also over capacity during the afternoon peak. Similarly, the section of Mississauga Road between the signalized commercial driveway and Ostrander Boulevard/Adamsville Road exhibits v/c ratios of 0.89 and 0.90, which infers that this section is also approaching capacity in the afternoon peak.

This congestion on Mississauga Road is consistent with typical commuting patterns in the Greater Toronto Area, with higher southbound demand during the morning peak and greater northbound volumes in the afternoon peak.

3.4.2 Intersection Analysis

Table 3.6 shows the existing intersection operations based on the traffic volumes provided in **Figure 3.3**. The table denotes the existing level of service (LOS), v/c ratios, and 95th percentile queue lengths experienced on roads within the Study Area for the AM and PM peak hours. **Appendix B** provides the detailed Synchro analysis reports.

All intersections within the Study Area operate with overall acceptable level of service during the AM and PM peak hours. Other findings from the analyses include:

- **Mississauga Road at Royal West Drive** – During the AM peak hour, the westbound left turn would operate with LOS E and a v/c ratio of 0.18 if the intersection were open to traffic. The relatively poor LOS and low v/c ratios indicate that the delay is likely caused by the high traffic volumes on Mississauga Road.
- **Mississauga Road at Williams Parkway** – During the AM peak hour, the westbound left turn operates with LOS E and a v/c ratio of 0.95.

TABLE 3.5 EXISTING (2015) MIDBLOCK CAPACITY ANALYSIS

Road Section		Direction	Number of Lanes	Peak Hour Volume	v/c ratio
From	To				
AM Peak Hour					
Bovaird Drive	Williams Parkway	SB	2	1031	0.57
Williams Parkway	Commercial Driveway	SB	2	1497	0.83
Commercial Driveway	Beacon Hill	SB	2	1521	0.85
Beacon Hill	Ostrander / Adamsville	SB	2	1584	0.88
Ostrander / Adamsville	Queen	SB	3	1612	0.60
Queen	Embleton	SB	2	2147	1.19
Embleton	Lionhead	SB	2	2043	1.14
Lionhead	Financial	SB	3	2042	0.76
PM Peak Hour					
Bovaird Drive	Williams Parkway	NB	2	747	0.42
Williams Parkway	Commercial Driveway	NB	2	1298	0.72
Commercial Driveway	Beacon Hill	NB	2	1602	0.89
Beacon Hill	Ostrander / Adamsville	NB	2	1616	0.90
Ostrander / Adamsville	Queen	NB	3	1646	0.61
Queen	Embleton	NB	2	2130	1.18
Embleton	Lionhead	NB	2	1794	1.00
Lionhead	Financial	NB	3	1789	0.66

- **Mississauga Road at Commercial Driveway** – The westbound left turn operates with LOS E and a v/c ratio of 0.68 during the AM peak hour and LOS E and a v/c ratio of 0.59 during the PM peak hour. The delay is likely due to the length of green time provided to the higher volume northbound and southbound movements.
- **Mississauga Road at Beacon Hill Drive** – The westbound left turn operates with LOS F and a v/c ratio of 0.47 during the AM peak hour and LOS F and a v/c ratio of 0.05 during the PM peak hour. The high delay is likely due to the high traffic volumes on Mississauga Road.
- **Mississauga Road at Ostrander Boulevard/Adamsville Boulevard** – During the AM peak hour, the eastbound and westbound left turn movements operate with LOS F (v/c ratio of 0.20) and LOS E (v/c ratio of 0.19), respectively. During the PM peak hour, the westbound left turn movement operates with LOS F and a v/c ratio of 0.16. The relatively poor LOS and low v/c ratios indicate that the delay is likely caused by the high traffic volumes on Mississauga Road.
- **Mississauga Road at Queen Street West/River Road** – During the AM peak hour, the westbound left turn operates with LOS E and a v/c ratio of 0.99, and the southbound through operates with LOS E and a v/c ratio of 1.07. These two (2) movements effectively exceed capacity. In the PM peak hour, the westbound left turn movement operates at capacity with LOS F and a v/c ratio of 0.97.

TABLE 3.6: EXISTING (2015) INTERSECTION OPERATIONS SUMMARY

Analysis Period	Mississauga Road Intersection	Control Type	MOE	Direction / Movement / Approach																	
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Royal West Drive	TWSC	LOS Delay V/C Q					E 45 0.18 5		B 13 0.10 3	**C** **22**		A 0 0.36 0		**A** **0**		A 1 0.02 1		**A** **1**	
	Williams Parkway	TCS	LOS Delay V/C Q					E 69 0.95 219		C 30 0.07 14	**E** **64**		A 8 0.53 25	A 6 0.47 7	**A** **8**	B 15 0.21 23	B 18 0.49 95		**B** **17**	**C** **27**
	Commercial Driveway	TCS	LOS Delay V/C Q					E 59 0.68 75		D 46 0.07 16	**D** **54**		A 2 0.29 8	A 0 0.11 0	**A** **2**	A 4 0.30 9	A 4 0.54 55		**A** **4**	**A** **9**
	Beacon Hill Drive	TWSC	LOS Delay V/C Q					F 52 0.47 17		B 11 0.01 0	**E** **49**		A 0 0.23 0	A 0 0.00 0	**A** **0**	A 10 0.00 0	A 0 0.45 0		**A** **0**	
	Ostrander Boulevard / Adamsville Road	TWSC	LOS Delay V/C Q	F 68 0.20 1	C 20 0.06 0		**E** **42**	E 42 0.19 1	B 12 0.01 0		**E** **36**	F 52 0.01 0	A 0 0.00 0	A 0 0.00 0	**A** **0**	B 12 0.01 0	A 0 0.00 0	A 0 0.00 0	**A** **0**	
	Queen Street West / River Road	TCS	LOS Delay V/C Q		C 20 0.02 7		**C** **20**	E 70 0.99 238	C 20 0.01 3	C 21 0.05 9	**E** **64**	C 25 0.03 0	B 19 0.48 58	A 3 0.26 1	**B** **13**	C 31 0.33 28	E 79 1.07 303	A 0 0.00	**E** **77**	**D** **54**
	Embleton Road	TCS	LOS Delay V/C Q	E 60 0.84 129			**E** **60**					C 24 0.28 9	B 11 0.37 69		**B** **12**		B 16 0.96 175		**B** **16**	**C** **20**
	Lionhead Golf and Country Club	TCS	LOS Delay V/C Q	E 62 0.04 2	E 61 0.00 0		**E** **61**	E 68 0.15 4	A 0 0.00 0		**E** **68**	A 3 0.12 3	A 2 0.30 29	A 1 0.01 0	**A** **2**	A 0 0.00 0	A 4 0.67 124	A 1 0.01 0	**A** **4**	**A** **3**
PM Peak Hour	Royal West Drive	TWSC	LOS Delay V/C Q					D 29 0.12 3		B 15 0.12 3	**C** **19**		A 0 0.44 0		**A** **0**		A 1 0.02 1		**A** **1**	
	Williams Parkway	TCS	LOS Delay V/C Q					D 49 0.53 71		D 42 0.04 12	**D** **47**		B 15 0.29 68	A 1 0.39 57	**A** **8**	A 8 0.22 19	A 7 0.20 29		**A** **7**	**B** **13**
	Commercial Driveway	TCS	LOS Delay V/C Q					E 59 0.59 56		D 49 0.02 10	**E** **57**		B 12 0.52 90	B 15 0.24 28	**B** **13**	A 8 0.21 10	A 5 0.22 34		**A** **5**	**B** **14**
	Beacon Hill Drive	TWSC	LOS Delay V/C Q					F 73 0.05 1		C 19 0.01 0	**E** **46**		A 0 0.47 0	A 0 0.01 0	**A** **0**	B 14 0.01 0	A 0 0.22 0		**A** **0**	
	Ostrander Boulevard / Adamsville Road	TWSC	LOS Delay V/C Q	D 32 0.04 0	C 24 0.05 0		**D** **27**	F 78 0.16 1	C 18 0.01 0		**F** **63**	B 12 0.02 0	A 0 0.00 0	A 0 0.00 0	**A** **0**	C 24 0.04 0	A 0 0.00 0	A 0 0.00 0	**A** **0**	
	Queen Street West / River Road	TCS	LOS Delay V/C Q		D 37 0.01 5		**D** **37**	F 88 0.97 154	D 37 0.01 4	D 38 0.16 26	**E** **76**	F 7..2 0.00 0	A 10 0.68 87	A 4 0.44 9	**A** **8**	D 35 0.56 34	B 13 0.31 88	A 0 0.00 0	**B** **15**	**B** **19**
	Embleton Road	TCS	LOS Delay V/C Q	F 91 1.00 197			**F** **91**					B 13 0.33 23	B 18 0.74 182		**B** **18**		A 4 0.45 15		**A** **4**	**C** **24**
	Lionhead Golf and Country Club	TCS	LOS Delay V/C Q	D 54 0.11 10	D 53 0.01 0		**D** **54**	E 61 0.46 26	A 0 0.00 0		**A** **0**	A 3 0.01 1	A 6 0.65 131	A 3 0.00 0	**A** **6**	A 3 0.01 1	A 4 0.29 37	A 3 0.00 0	**A** **4**	**A** **7**

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage

TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control

RBT - Roundabout

- **Mississauga Road at Embleton Road** – During the AM peak hour, the eastbound shared left-right turn movement operates with LOS E and a v/c ratio of 0.84. The southbound shared through-right turn movement is approaching capacity with a v/c ratio of 0.96, but operates with LOS B. In the PM peak hour, the eastbound shared left-right turn movement has reached capacity with a v/c ratio of 1.0 and operates at LOS F.
- **Mississauga Road at Lionhead Golf and Country Club Driveway** – During the AM and PM peak hours, the eastbound and westbound movements experience significant delay, likely caused by the length of green time allocated to serve northbound and southbound traffic demand.

The existing conditions operational analyses identified several movements approaching or exceeding their capacities. Optimizing the signal cycle and phase timings would improve operations during the AM and PM peak hours. However, the southbound through movement at the Mississauga Road and Queen Street West/River Road intersection would still be approaching capacity.

3.4.3 Traffic Control Signal Justification

The unsignalized intersections of Mississauga Road with Royal West Drive, Beacon Hill Drive and Ostrander Boulevards/Adamsville Road were analyzed to determine if traffic signal control is justified under existing conditions due to the congestion experienced by the eastbound and westbound movements during the AM and PM peak hours. The warrant analysis is based on the methodologies contained in Book 12 of the Ontario Traffic Manual – Traffic Signals (OTM Book 12)[2]. For an existing intersection with existing traffic volumes, a traffic signal is warranted if Justification 1 (both 1A and 1B) or Justification 2 (both 2A and 2B) is 100 per cent satisfied. If 100 per cent satisfaction is not achieved, but the justifications are at least 80 per cent satisfied, then the lesser value of both justifications (A or B) can be used in Justification 3, a combination of volume and delay.

Per OTM Book 12, each of the eight (8) highest hourly volumes in the warrant analysis must meet the compliance threshold values for traffic control signals to be fully justified at either 100 per cent for Justification 1 and 2, or 80 per cent satisfaction for Justification 3. For this analysis, the traffic count data for the two (2) intersections found in **Appendix A** were used.

Appendix C provides the detailed traffic signal warrant analyses completed for the intersections, which indicate that warrants are not met for existing conditions at the intersection of:

[2] Ontario Traffic Manual Book 12, Ministry of Transportation of Ontario, July 2001

- Mississauga Road and Royal West Drive based on:
  - Justification 1 (Minimum Vehicle Volume) – Justification 1A is 86 per cent satisfied, while Justification 1B is only 14 per cent satisfied.
  - Justification 2 (Delay to Cross Traffic) – Justification 2A is 83 per cent satisfied, while Justification 2B is only 13 per cent satisfied.
- Mississauga Road and Beacon Hill Drive based on:
  - Justification 1 (Minimum Vehicle Volume) – Justification 1A is 100 per cent satisfied, while Justification 1B is only 9 per cent satisfied.
  - Justification 2 (Delay to Cross Traffic) – Justification 2A is 100 per cent satisfied, while Justification 2B is only 32 per cent satisfied.
- Mississauga Road and Ostrander Boulevard/Adamsville Road, based on:
  - Justification 1 (Minimum Vehicle Volume) – Justification 1A is 100 per cent satisfied, while Justification 1B is only 20 per cent satisfied.
  - Justification 2 (Delay to Cross Traffic) – Justification 2A is 100 per cent satisfied, while Justification 2B is only 29 per cent satisfied.

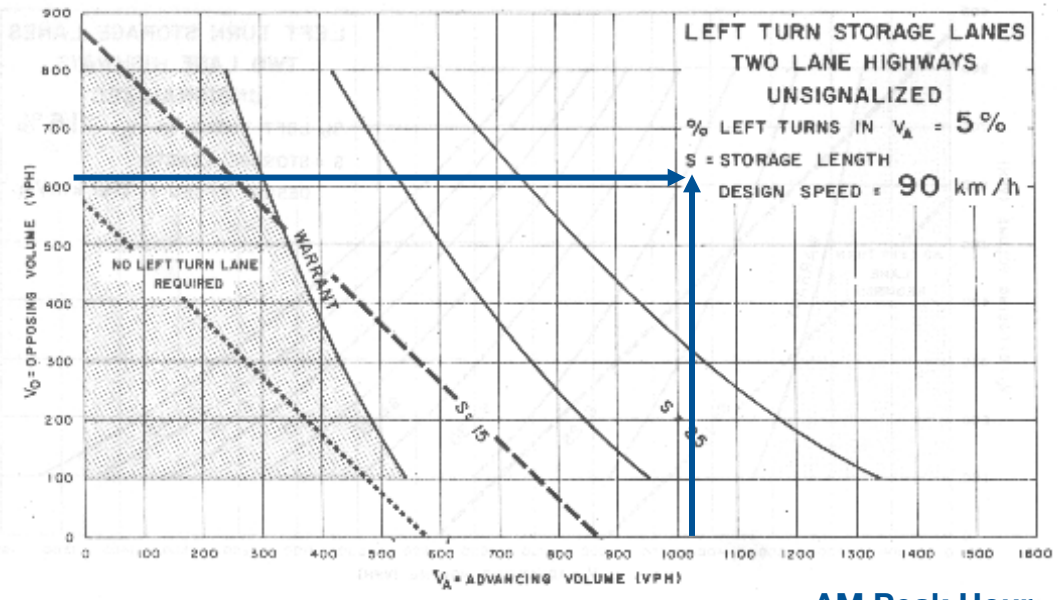
It should be noted that traffic signals are planned for the intersection of Mississauga Road and Beacon Hill Drive with the development on the west side of Mississauga Road. As such, the analyses of the future conditions scenarios in the remainder of this report will assume traffic signals are in place at this intersection.

3.4.4 Auxiliary Turn Lane

The need for auxiliary left turn lanes was reviewed for the intersection of Mississauga Road and Royal West Drive. The warrants for left turn lanes follow the requirements set out in the MTO Geometric Design Standards Manual[3]. A design speed of 90 km/h has been assumed for the analysis (10 km/h over the posted speed limit of 80 km/h in urban conditions).

The percentage of left turning vehicles in the approaching volumes were rounded to the nearest 5 per cent, as nomographs are provided in 5 per cent increments. Based on the traffic volumes shown in **Figure 3.3**, the southbound left turn percentage is estimated to be 2% during the AM peak hour and 3% during the PM peak hour, if the intersection were open to traffic. Assuming a 90 km/h design speed, a southbound left turn lane would be warranted at Mississauga Road and Royal West Drive. **Figure 3.4** depicts the left turn lane warrant nomograph and analysis.

[3] MTO Geometric Design Standards for Ontario Highways, Chapter E, Queens Printer for Ontario, 1981

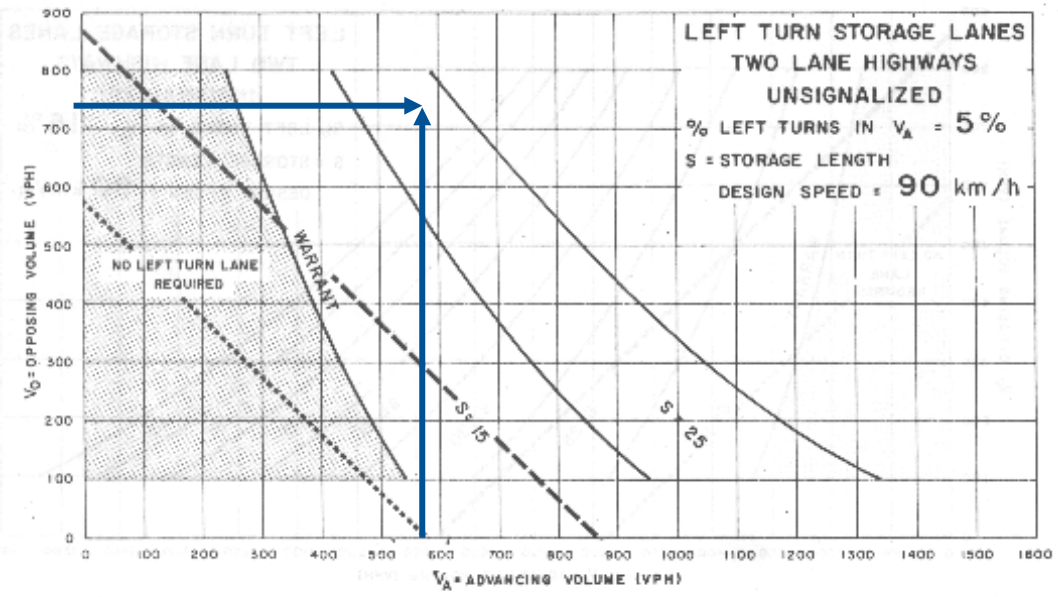


AM Peak Hour

TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

AT-GRADE INTERSECTIONS APPENDIX A



PM Peak Hour

TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

Southbound Left Turn Lane Warrant Nomographs for Mississauga Road at Royal West Drive

Synchro analysis of the Mississauga Road and Royal West Drive intersection with an exclusive left turn lane indicates that the critical level of service for the side street will remain the same. However, the provision of a left turn lane at this intersection will improve overall safety.

3.5 Road Safety

3.5.1 Collision Analysis

The Region of Peel provided collision information for the years 2010 to 2014. During this period, Mississauga Road was reconstructed and widened within the Study Area, significantly changing the character and configuration of the roadway. The data also span three (3) distinct periods for Mississauga Road – pre-construction, during construction, and post-construction – each representing different and unique road conditions. Given the dramatically varying configurations for the road and intersections over this period, it would be inappropriate to draw conclusions regarding the safety performance of the road and propose countermeasures based on this data.

Midblock Segments

Table 3.7 summarizes the collisions by impact type and direction, for each midblock segment from the north end of the Study Area to the south end. As some segments experienced very few collisions, all 58 midblock collisions were analyzed together for the entire length of Mississauga Road in the Study Area.

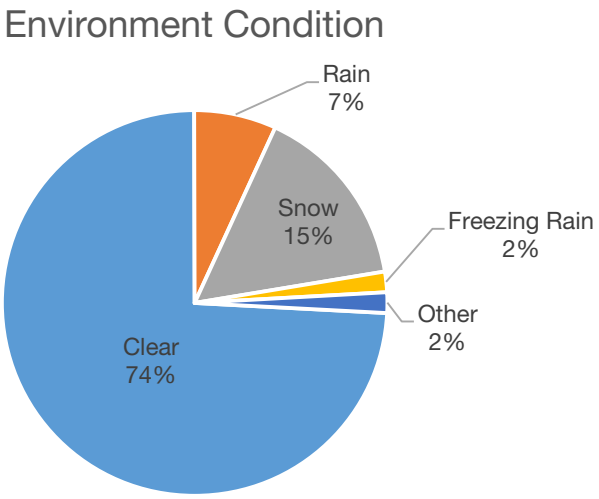
Figure 3.5 shows a summary of the midblock collisions. Most collisions occurred in clear environment conditions (74%) and on dry roads (64%). Only 7% of the collisions occurred while it was raining, and 12% occurred on a wet roadway. Additionally, 17% of the collisions occurred during the winter under the following environment and road surface conditions:

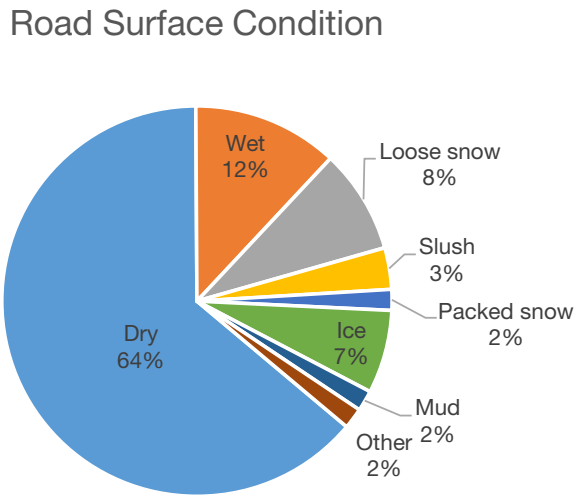
- Environment:
  - Snowing: 15%
  - Freezing rain: 2%
- Road surface:
  - Loose snow: 8%
  - Ice: 7%
  - Slush: 3%
  - Packed snow: 2%.

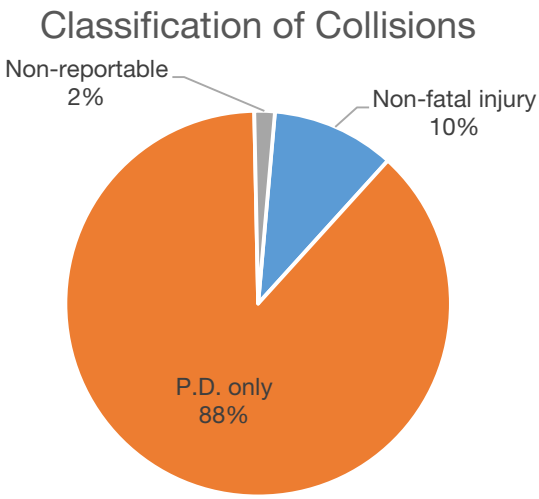
Most collisions were classified as property damage only (88%). A few (10%) caused non-fatal injuries, and one (1) collision (2%) was coded as non-reportable.

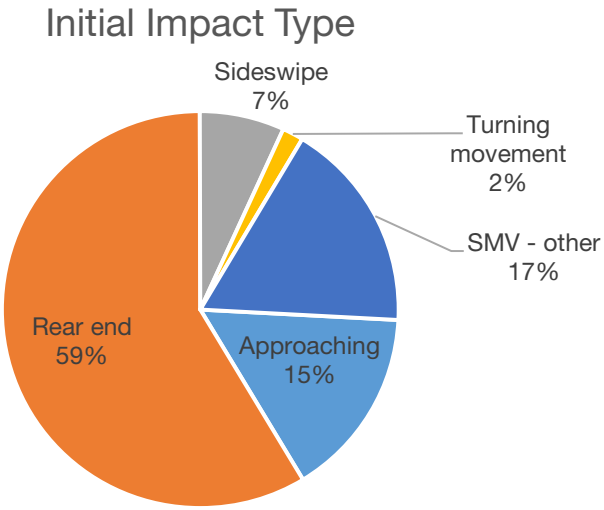
TABLE 3.7: MIDBLOCK SEGMENT COLLISIONS (2010 – 2014)

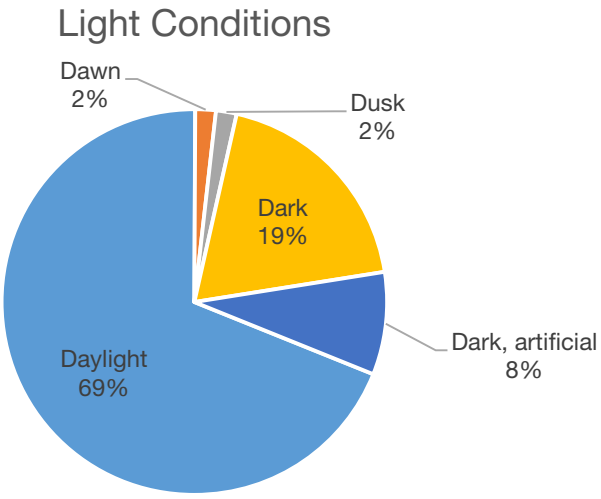
Section Limits	Impact Type	Directions of Vehicles	Number of Collisions
South of Bovaird Drive to Williams Parkway	Approaching	NB/SB	4
	Rear-end	NB	8
	Single motor vehicle	NB	1
		SB	4
	Total		**17**
Williams Parkway to Commercial driveway	Rear-end	NB	1
	Single motor vehicle	SB	2
	Total		**3**
Commercial driveway to Beacon Hill Drive	No collision information provided		
Beacon Hill Drive to Ostrander Boulevard/ Adamsville Road	Approaching	NB/SB	1
	Rear-end	SB	1
	Single motor vehicle	SB	1
	Total		**3**
Ostrander Boulevard/ Adamsville Road to Queen Street West/River Road	Approaching	NB/SB	1
	Rear-end	NB	2
		SB	2
	Total		**5**
Queen Street West/River Road to Embleton Road	Approaching	NB/SB	1
	Rear-end	NB	3
		SB	4
	Sideswipe	SB	2
	Turning movement (at private driveway)	EB/SB	1
	Total		**11**
Embleton Road to Lionhead Golf and Country Club Driveway	Approaching	NB/SB	2
	Rear-end	NB	8
		SB	5
	Sideswipe	NB/NB	1
		NB/SB	1
	Single motor vehicle	SB	2
	Total		**19**
Lionhead Golf and Country Club Driveway to Financial Drive	No collision information provided		

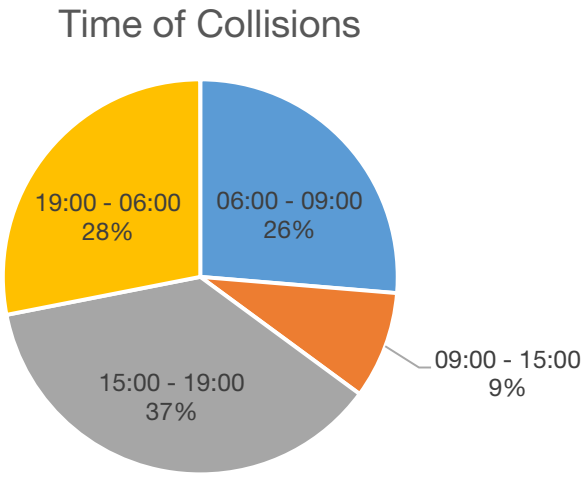












Midblock Collision Analysis Summary

The most common collision types were rear-end (59%), single motor vehicle (17%) and approaching (15%). Other types of collisions included sideswipe (7%) and turning movement (2%).

Most collisions occurred during daylight (69%), with other collisions occurring in dark conditions, with or without artificial lighting (27%), and at dawn or dusk (2% each). Most collisions occurred during the AM and PM peak periods: 26% between 06:00 and 09:00, and 37% between 15:00 and 19:00. The other collisions occurred mostly during the evening/night (28% between 19:00 and 06:00), and a few collisions occurred during the off-peak daytime period (9% between 09:00 and 15:00).

Intersections

Table 3.8 summarizes the collisions by impact type and direction for each intersection from the north end of the Study Area to the south end.

Mississauga Road and Williams Parkway

Figure 3.6 shows the collision analysis summary for the intersection of Mississauga Road and Williams Parkway. Most collisions occurred in clear conditions (76%) and on dry roads (59%). Only 12% occurred in raining conditions or on wet roadways. Winter conditions were present in some of the collisions (snow, 6%; drifting snow, 6%). However, winter road conditions were present in almost a quarter of the collisions (ice, 17%; slush, 6%). An additional 6% of the collisions occurred on loose sand or gravel.

Most collisions were classified as property damage only (76%). The remainder (24%) caused non-fatal injuries. The most common impact types were rear-end (59%) and sideswipe (23%). Other types of collisions included approaching, sideswipe and single motor vehicle (6% each).

Most collisions occurred during daylight conditions (70%). The remaining collisions occurred in dark conditions, with or without artificial lighting (24%) and at dawn (6%). Collisions were almost equally divided between the AM peak period (29%, 06:00-09:00), off-peak daytime period (23%, (09:00-15:00), PM peak period (24%, 15:00-19:00) and evening/night (24%, 19:00-06:00).

Mississauga Road and Beacon Hill Drive

A total of four (4) collisions were recorded at the intersection of Mississauga Road and Beacon Hill Drive for the study period. Two (2) collisions (50%) occurred in clear conditions on dry roads, one (1) in rain and on a wet road (25%), and one (1) in snow conditions with loose snow on the road (25%).

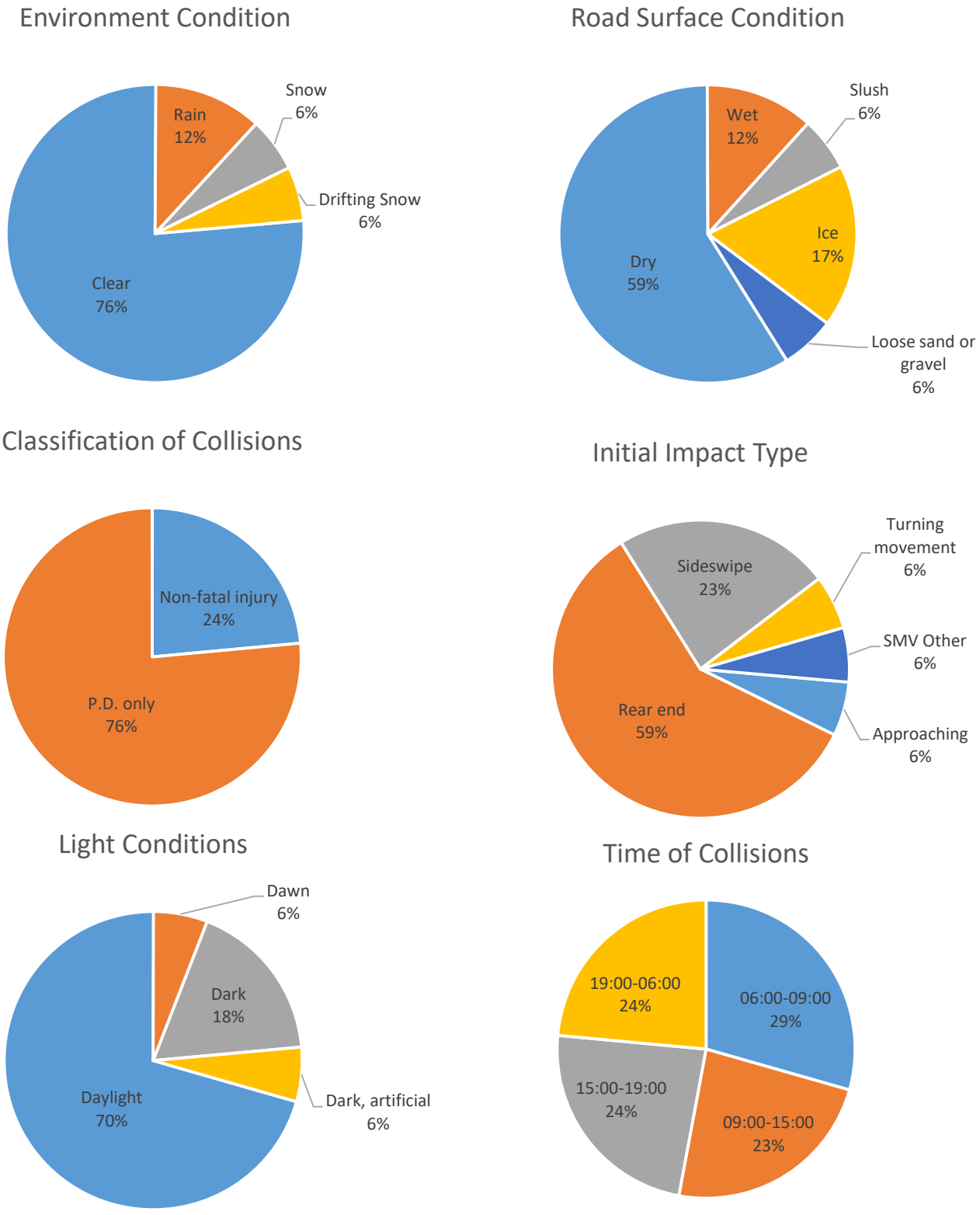
All four (4) collisions were classified as property damage only. The impact type was rear-end for three (3) collisions and turning movement for one (1) collision.

TABLE 3.8: INTERSECTION COLLISIONS (2010 – 2014)

Intersecting Roadway	Impact Type	Directions of Vehicles	Number of Collisions
Williams Parkway	Approaching	NB/SB	1
	Rear-end	NB	2
		SB	5
		EB	1
		WB	2
	Sideswipe	NB/NB	1
		SB/SB	2
		Unknown	1
	Turning movement	NB/SB	1
	Single motor vehicle	WB	1
	Total		**17**
Commercial Driveway	No collision records.		
Beacon Hill Drive	Rear-end	NB	2
		SB	1
	Turning movement	SB/WB	1
	Total		**4**
Ostrander Boulevard/ Adamsville Road	Approaching	NB/SB	1
	Angle	NB/EB	1
	Turning movement	NB/SB	1
	Total		**3**
Queen Street West/River Road	Approaching	NB/SB	1
	Angle	SB/EB	1
		EB/Unknown	1
	Rear-end	NB	2
		SB	4
		WB	2
	Sideswipe	NB/NB	1
	Turning movement	NB/SB	5
		EB/WB	1
		WB/unknown	1
	Single motor vehicle	NB	1
	Total		**20**
Embleton Road	Approaching	NB/SB	1
	Rear-end	NB	6

TABLE 3.8: INTERSECTION COLLISIONS (2010 – 2014)

Intersecting Roadway	Impact Type	Directions of Vehicles	Number of Collisions
		SB	3
	Sideswipe	NB/SB	1
		NB/Unknown	2
		SB/SB	2
	Turning movement	NB/SB	2
	Single motor vehicle	SB	1
	Total		**18**
Lionhead Golf and Country Club Driveway	No collision records		



Collision Analysis Summary for Mississauga Road at Williams Parkway

All four (4) collisions occurred during daylight conditions. Two (2) collisions occurred during the AM peak period (06:00-09:00) and one (1) collision occurred during the PM peak period (15:00-19:00). The fourth collision occurred at "4:25", but given it occurred in daylight conditions in July, it Is believed this collision also occurred during the PM peak period (15:00-19:00).

Mississauga Road and Ostrander Boulevard/Adamsville Road

A total of three (3) collisions were recorded at the intersection of Mississauga Road and Ostrander Boulevard/Adamsville Road for the study period. Two (2) collisions occurred in clear conditions and on dry roads, and one (1) collision occurred in rain and on a wet road.

Two (2) collisions were classified as property damage only, and one (1) caused non-fatal injuries. Impact types were approaching, angle and turning movement (one (1) collision each).

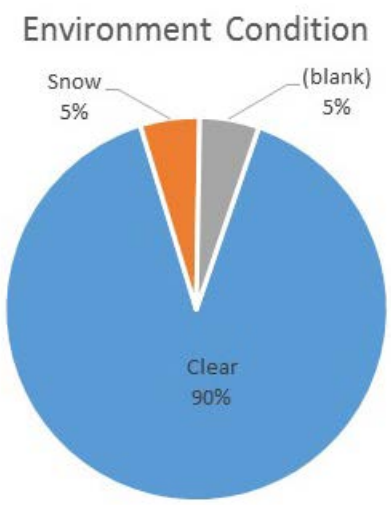
One (1) collision occurred during the daylight in the AM peak period (06:00-09:00). Two (2) collisions occurred in dark conditions during the evening/night period (19:00-00:00).

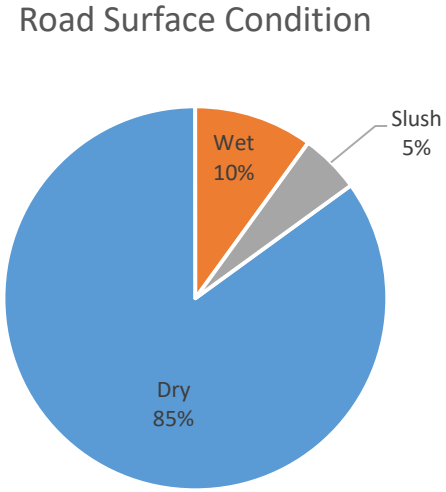
Mississauga Road and Queen Street West/River Road

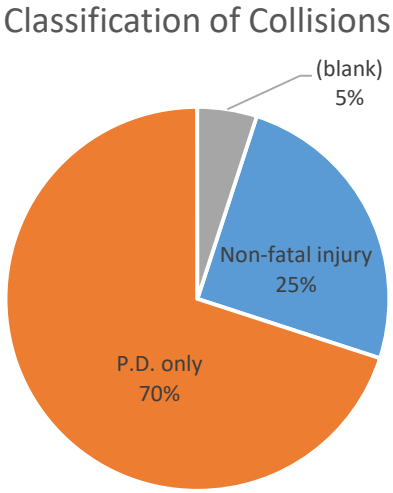
Figure 3.7 shows the collision analysis summary for the intersection of Mississauga Road and Queen Street West. Most collisions occurred in clear conditions (90%) and on dry roads (85%). Only 5% of collisions occurred during snowing conditions. Roads were wet in 10% of the collisions, and winter conditions (slush) were present in 5% of collisions. The environment condition field was left blank in 5% of the collisions.

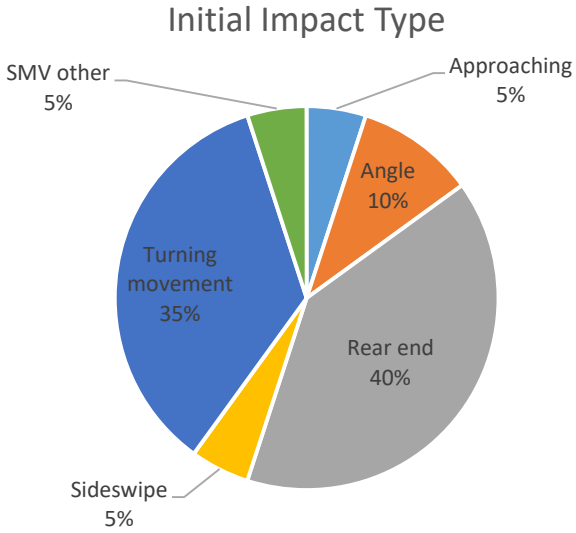
Many collisions (70%) were classified as property damage only, with 25% of collisions causing non-fatal injuries. The classification field was left blank for 5% of the collisions. The most common collision types were rear-end (40%), turning movement (35%), and angle (10%). Other collision types included approaching (5%), sideswipe (5%), and single motor vehicle – other (SMV other, 5%). One (1) collision occurred when a driver manoeuvered to avoid a dog.

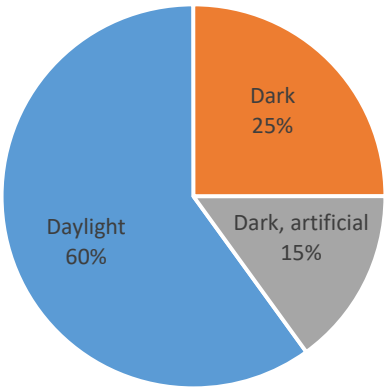
Most collisions occurred during daylight conditions (60%). The remaining collisions occurred during dark collisions, with or without artificial lighting. Collisions were well distributed during the day with 20% in the AM peak period (06:00-09:00), 30% during the off-peak daytime period (09:00-15:00), 30% during the PM peak period (15:00-19:00) and 20% during the evening/night (19:00-06:00).

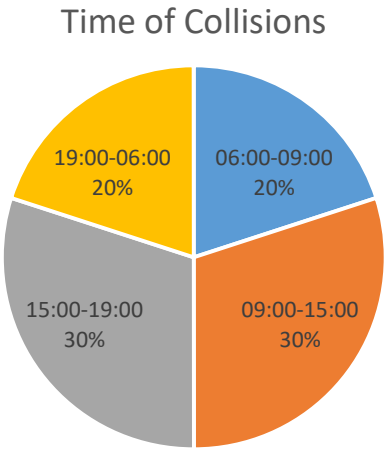












Collision Analysis Summary for Mississauga Road at Queen Street West/River Road

Mississauga Road and Embleton Road

Figure 3.8 shows the collision analysis summary for the intersection of Mississauga Road and Embleton Road. Most collisions occurred in clear conditions (89%) and on dry roads (89 %). Only 5% of collisions occurred during snowing conditions. The environment condition field was left blank for 6% of the collisions. The road surface was wet for 11% of collisions.

Most collisions were classified as property damage only (83%). The remainder (17%) caused non-fatal injuries. The most common impact types were rear-end (50%), sideswipe (28%) and turning movements (11%). Other types of collisions included approaching (5%) and single motor vehicle – other (SMV other, 6%).

Most collisions occurred during daylight conditions, with or without artificial lighting (83%). The remaining collisions occurred in dark conditions (17%). Most collisions occurred during the PM peak period (45%, 15:00-19:00). Other collisions were distributed between the off-peak daytime period (22%, 09:00-15:00), the evening/night (22%, 19:00-06:00) and AM peak period (11%, 06:00-09:00).

Mississauga Road and Lionhead Golf and Country Club Driveway

No collisions were recorded at this intersection.

3.5.2 Geometric Analysis

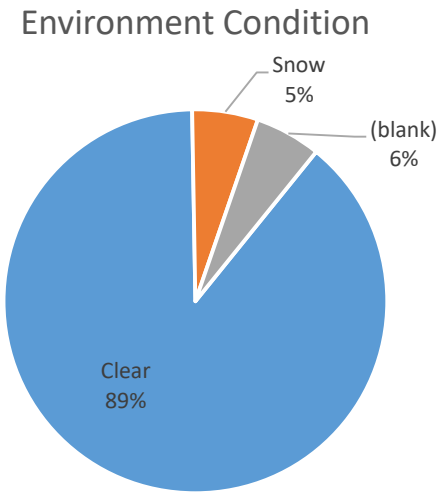
The geometric analysis is based on field reviews completed on 17 December 2015 (daytime) and 21 December 2015 (evening). The field investigation is supplemented with an office review completed using Google Earth imagery, which is limited by the dates of the images, some predating the completion of construction on Mississauga Road in the Study Area.

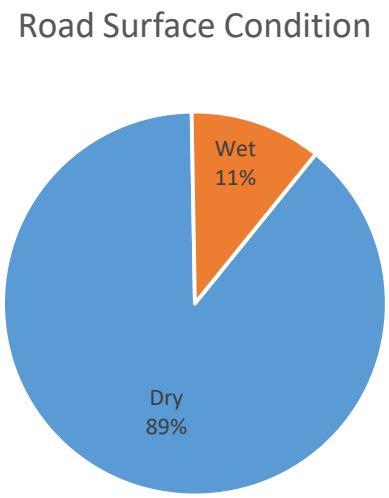
Midblock Cross-Section

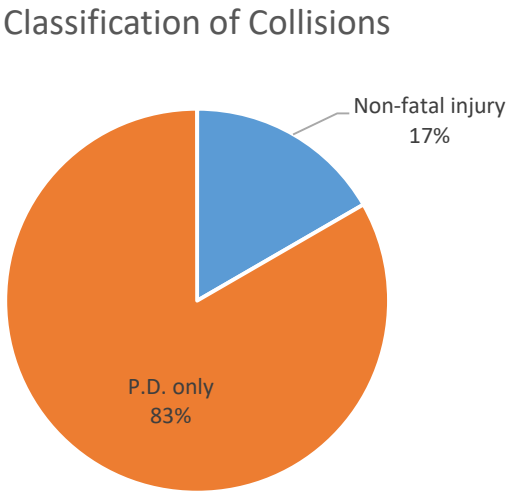
The cross-section of Mississauga Road varies along the length of the Study Area. **Table 3.9** summarizes the various cross-section characteristics, from the north end of the Study Area to the south end.

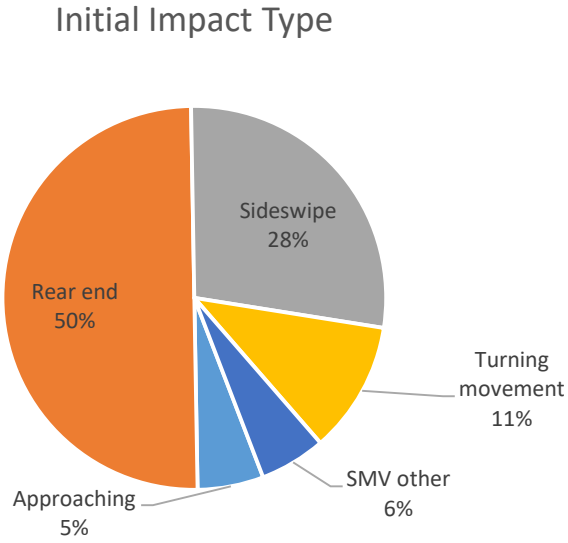
Intersection Lane Configurations

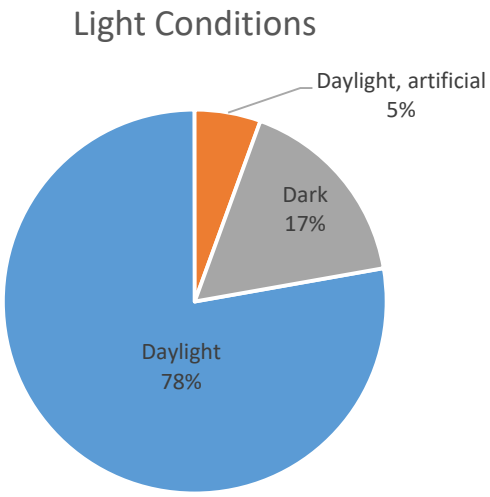
Given that the midblock cross-section varies within the Study Area, the number of lanes on approaches to each intersection vary as well. **Table 3.10** summarizes the lane configuration for each intersection approach, again from the north end to the south end of the Study Area. **Figure 3.1** also depicts this information.

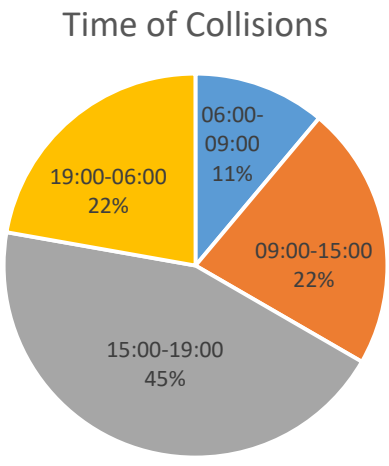












Collision Analysis Summary for Mississauga Road at Embleton Road

TABLE 3.9: MIDBLOCK CROSS-SECTION CHARACTERISTICS

Section Limits	Configuration	Posted Speed	Active Transportation Facilities
South of Bovaird Drive to Williams Parkway	▶Transitions from rural cross-section in the north part (closer to Bovaird Drive) to urban cross-section in the south part (closer to Williams Parkway) ▶Two (2) lanes per direction in urban section ▶One (1) lane per direction in rural section ▶Paved shoulder on east side in rural ▶Gravel shoulder on west side for both sections ▶Ditches on both sides in rural section ▶Painted median in urban section ▶Illumination in urban section ▶No illumination in rural section ▶Pavement of rural in poorer condition	Urban section: 80 km/h South part of rural section: 80 km/h[1] Near Bovaird Drive: 50 km/h	▶Multi-use trail on east side in urban section, ends at the transition to rural section
Williams Parkway to Commercial Driveway	▶Two (2) lanes per direction ▶Two (2) right-in, right-out unsignalized commercial accesses ▶Auxiliary turn lanes at commercial accesses to the east and future development to the west ▶Raised median ▶Gravel shoulder on west side	80 km/h	▶Multi-use trail on east side
Commercial Driveway to Beacon Hill Drive	▶Two (2) lanes per direction ▶Gravel shoulder on west side ▶Painted median	80 km/h	▶Multi-use trail on east side
Beacon Hill Drive to Ostrander Boulevard/ Adamsville Road	▶Two (2) lanes per direction ▶Curb and paved boulevard on west side in south part (Huttonville) ▶Gravel shoulder on west side in north part ▶Painted median	80 km/h	▶Multi-use trail on east side
Ostrander Boulevard/ Adamsville Road to Queen Street West/River Road	▶Three (3) northbound lanes ▶Two (2) southbound lanes ▶Raised median	60 km/h	▶Multi-use trail on east side ▶Sidewalk on west side
Queen Street West/River Road to Embleton Road	▶Two (2) lanes per direction	60 km/h	▶Sidewalk on east side ▶Partial sidewalk on west side, does not connect between the intersections

TABLE 3.9: MIDBLOCK CROSS-SECTION CHARACTERISTICS

Section Limits	Configuration	Posted Speed	Active Transportation Facilities
Embleton Road to Lionhead Golf and Country Club Driveway	▶Two (2) lanes per direction ▶Paved boulevard on east side, width varies	60 km/h	▶Multi-use trail on west side ▶Sidewalk on east side, closer to Embleton Road
Lionhead Golf and Country Club Driveway to Financial Drive	▶Three (3) lanes per direction ▶Auxiliary turn lanes at intersections and entrances ▶Raised median	60 km/h	▶Sidewalk on east side ▶Multi-use trail on west side

Note:

1. The Region will be lowering the posted speed limit to 50 km/h on Mississauga Road from south of Bovaird Drive to Williams Parkway during construction along this segment. Construction is expected to start in the summer 2016 and last until the winter of 2018. Upon completion of construction, the Region intends to reinstate the current 80 km/h posted speed limit.

TABLE 3.10: INTERSECTION LANE CONFIGURATIONS

Location	Northbound	Southbound	Eastbound	Westbound
Williams Parkway (Signalized, 3 legs)	▶Currently restricted access to construction site	▶2 through lanes ▶1 right turn lane, continuous from north of commercial driveway	▶1 left turn lane ▶2 through lanes	▶1 left turn lane ▶1 right turn lane ▶future left or through lane
Commercial Driveway (Signalized, 3 legs)	▶2 through lanes ▶1 right turn lane	▶1 left turn lane ▶2 through lanes		▶No markings ▶1 left turn lane ▶1 right turn lane
Beacon Hill Drive (Unsignalized – Beacon Hill Drive (WB) is stop-controlled, 3 legs, planning for 4 legs)	▶Currently restricted access to construction site	▶1 planned left turn lane ▶2 through lanes ▶1 right turn lane	▶2 through lanes ▶1 left turn lane	▶1 left turn lane ▶1 right turn lane
Ostrander Boulevard/ Adamsville Road (Unsignalized – Ostrander Boulevard (EB) and Adamsville Road (WB) are stop-controlled, 4 legs)	▶1 left turn lane ▶3 through lanes ▶1 right turn lane	▶1 left turn lane ▶2 through lanes ▶1 shared through and right turn lane	▶1 left turn lane ▶1 shared through and right turn lane	▶1 shared left turn and through lane ▶1 right turn lane
Queen Street West/River Road (Signalized, 4 legs)	▶1 left turn lane ▶2 through lanes ▶1 channelized right turn lane	▶1 left turn lane ▶2 through lanes ▶1 right turn lane	▶1 shared right, through and left lane	▶1 left turn lane ▶1 though lane ▶1 channelized right turn lane
Embleton Road (Signalized, 3 legs)	▶2 though lanes ▶1 left turn lane;	▶1 though lane ▶1 shared through and right turn lane	▶1 shared left turn, through and right turn lane	
Lionhead Golf and Country Club Driveway (Signalized, 4 legs)	▶1 left turn lane ▶2 through lanes ▶1 right-turn lane (right most lane exits)	▶1 left turn lane ▶2 through lanes ▶1 shared through and right turn lane	▶1 shared right, through and left lane	▶1 shared left turn and through lane ▶1 shared through and right turn lane

Roadway Alignment

Within the Study Area, Mississauga Road is generally straight and has a few gentle vertical curves. There is a slight horizontal curve near the Mississauga Road and Queen Street West/River Road intersection. Between the Lionhead Golf and Country Club driveway and Queen Street West/River Road, Mississauga Road has two (2) vertical curves following a valley, with the intersection of Mississauga Road and Embleton Road located at the lowest elevation. The vertical curve located between the Lionhead Golf and Country Club driveway and Embleton Road is steeper and visibility over the crest is somewhat reduced.

Lighting

Lighting is provided along the entire length of Mississauga Road within the Study Area, except for the rural section between Williams Parkway and south of Bovaird Drive.

Pavement Condition

Pavement condition was generally good on Mississauga Road throughout the Study Area. For the rural section between Williams Parkway and south of Bovaird Drive, poor pavement conditions were observed, with a noticeable difference between the older and newer pavement surfaces.

Active Transportation

Sidewalks and multi-use trails are provided along the Mississauga Road corridor within the Study Area, but there are gaps in the active transportation network at the following locations:

- Between Williams Parkway and south of Bovaird Drive, where the multi-use trail ends at the transition between urban cross-section (south part of segment) to rural cross-section (north part of segment) on the east side;
- Between Beacon Hill Drive and Ostrander Boulevard/Adamsville road, where the sidewalk ends on the west side, north of Ostrander Boulevard;
- Between Queen Street West/River Road and Embleton Road, where the sidewalk is discontinuous on the west side; and
- Between Embleton Road and the Lionhead Golf and Country Club driveway, where the sidewalk is discontinuous on the east side.

Pavement Markings

Pavement markings along Mississauga Road are generally adequate and visible during the daytime. During the evening site visit (also conducted under rainy conditions), pavement markings were not as easily visible. Only

the pavement markings on the rural section of the segment between Williams Parkway and south of Bovaird Drive were easily visible.

Signing

A review of sign visibility and conspicuity from the driver's perspective was completed during daytime and evening/rain conditions. Signs along Mississauga Road were generally found to be visible and conspicuous during both light and dark conditions.

Sight Distances

Approach and departure sight distances were measured for intersections and accesses along Mississauga Road within the Study Area, and compared to recommended distances set out in the TAC *Geometric Design Guide for Canadian Roads* (GDGCR or the TAC Guide). Approach sight distances were assessed against minimum stopping sight and decision sight distances in the TAC Guide, while departure sight distances were compared to the departure sight distances. The departure sight distances to the right for a left turning vehicle were adjusted based on the number of lanes the left turning vehicle would have to cross, as the TAC Guide provides distances based on two-lane roadways only.

Design speeds were assumed to be 10 km/h over the posted speed limits.

Sight distances were first assessed from the stop bar location. If recommended sight distances were not met from the stop bar, they were observed from the pull-forward position. If the observed sight distances from the pull forward position were greater than the recommended values, the guidelines were met. Sight distances were not measured when they were observed to be clearly greater than recommended in the TAC Guide.

Table 3.11 to **Table 3.22** provide a comparison of the observed sight distances to the sight distances recommended in the TAC Guide. Under the "TAC Guidelines" column, for approaching sight distances the first number represents the stopping sight distance (SSD), while the second number represents the minimum decision sight distance (DSD). If the sight distance was measured to be greater than the stopping sight distance, the guidelines were met. Section 3.5.6 identifies any locations where sight distances are less than recommended. These situations will be addressed further during preliminary design.

TABLE 3.11: SIGHT DISTANCES FOR MISSISSAUGA ROAD AT WILLIAMS PARKWAY

Sight Distance Type	Direction	Design Speed (km/h)	Measured Sight Distance (m)	TAC Guidelines SSD | DSD (m)	Guidelines Met?
Approach	NB	90	-	160 | 270	✓
	SB	90	-	160 | 270	✓
	WB	60	-	90 | 175	✓
Departure	NB looking east	60	110	160	NO[1,3]
	SB looking east	60	110	170	NO[1,3]
	WB looking north	90	55	340	**NO[2,3]**
	WB looking south	90	-	310	✓

Notes:

1. The available sight distance is greater than the distance travelled by an oncoming vehicle in 3 seconds (50 m) and greater than the stopping sight distance for the oncoming vehicle (85 m).

2. The available sight distance is shorter than the distance travelled by an oncoming vehicle in 3 seconds (75 m) and shorter than the stopping sight distance for the oncoming vehicle (170 m).

3. The traffic control signals help to mitigate the sight visibility limitation as they separate the northbound/southbound and westbound movements in time.

TABLE 3.12: SIGHT DISTANCES FOR MISSISSAUGA ROAD AT UNSIGNALIZED COMMERCIAL DRIVEWAY (NORTH)

Sight Distance Type	Direction	Design Speed (km/h)	Measured Sight Distance (m)	TAC Guidelines SSD | DSD (m)	Guidelines Met?
Approach	NB	90	-	160 | 270	✓
Departure	WB looking south	90	-	310	✓

TABLE 3.13: SIGHT DISTANCES FOR MISSISSAUGA ROAD AT UNSIGNALIZED COMMERCIAL DRIVEWAY (SOUTH)

Sight Distance Type	Direction	Design Speed (km/h)	Measured Sight Distance (m)	TAC Guidelines SSD | DSD (m)	Guidelines Met?
Approach	NB	90	-	160 | 270	✓
Departure	WB looking south	90	-	310	✓

TABLE 3.14: SIGHT DISTANCES FOR MISSISSAUGA ROAD AT SIGNALIZED COMMERCIAL DRIVEWAY

Sight Distance Type	Direction	Design Speed (km/h)	Measured Sight Distance (m)	TAC Guidelines SSD | DSD (m)	Guidelines Met?
Approach	NB	90	-	160 | 270	✓
	SB	90	-	160 | 270	✓
	WB	60	90	90 | 175	✓[1]
Departure	NB looking east	60	90	145	✓[2]
	SB looking east	60	90	170	✓[2]
	WB looking north	90	-	340	✓
	WB looking south	90	-	310	✓

Notes:

1. The driveway length is approximately 90 m.

2. The driver can see the full length of the driveway.

TABLE 3.15: SIGHT DISTANCES FOR MISSISSAUGA ROAD AT BEACON HILL DRIVE

Sight Distance Type	Direction	Design Speed (km/h)	Measured Sight Distance (m)	TAC Guidelines SSD | DSD (m)	Guidelines Met?
Approach	NB	90	-	160 | 270	✓
	SB	90	-	160 | 270	✓
	WB	60	-	90 | 175	✓
Departure	WB looking north	90	-	355	✓
	WB looking south	90	145	310	NO[1]

Notes:

1. The available sight distance is greater than the distance travelled by an oncoming vehicle in 3 seconds (75 m) but less than the stopping sight distance for the oncoming vehicle (170 m). Full sight distance for this westbound right turning movement should be provided.

TABLE 3.16: SIGHT DISTANCES FOR MISSISSAUGA ROAD AT OSTRANDER BOULEVARD/ADAMSVILLE ROAD

Sight Distance Type	Direction	Design Speed (km/h)	Measured Sight Distance (m)	TAC Guidelines SSD | DSD (m)	Guidelines Met?
Approach	NB	90	-	160 | 270	✓
	SB	90	-	160 | 270	✓
	EB	60	120	90 | 175	✓
	WB	60	95	90 | 175	✓
Departure	EB looking north	90	190	310	NO[1]
	EB looking south	90	-	355	✓
	WB looking north	90	220	365	NO[1]
	WB looking south	90	-	310	✓

Notes:

1. The available sight distance is greater than the distance travelled by an oncoming vehicle in 3 seconds (75 m) and greater than the stopping sight distance for the oncoming vehicle (170 m). However, as this is a two-way stop controlled intersection, full sight distances for turning movements should be provided.

TABLE 3.17: SIGHT DISTANCES FOR MISSISSAUGA ROAD AT RIVER ROAD

Sight Distance Type	Direction	Design Speed (km/h)	Measured Sight Distance (m)	TAC Guidelines SSD | DSD (m)	Guidelines Met?
Approach	SB	70	-	120 | 200	✓
	EB	60	85	90 | 175	✓[1]
Departure	EB looking north	70	-	200	✓

Notes:

1. The distance from the previous intersection on River Road is approximately 85 m.

TABLE 3.18: SIGHT DISTANCES FOR MISSISSAUGA ROAD AT QUEEN STREET WEST/RIVER ROAD

Sight Distance Type	Direction	Design Speed (km/h)	Measured Sight Distance (m)	TAC Guidelines SSD | DSD (m)	Guidelines Met?
Approach	NB	70	145	120 | 200	✓[1]
	SB	70	165	120 | 200	✓
	EB (from south)	60	85	90 | 175	✓[2]
	EB (from north)	60	-	90 | 175	✓
	WB	70	-	120 | 200	✓
Departure	NB looking east	70	140	200	NO[3]
	NB looking west	60	-	160	[4]
	SB looking east	70	250	200	✓
	SB looking west	60	-	170	[4]
	SB looking south	70	130	140	NO[5]
	EB looking north	70	140	200	NO[3]
	EB looking south	70	160	235	NO[3]
	WB looking north	70	-	225	✓
	WB looking south	70	135	200	NO[3]

Notes:

1. The available sight distance is greater than the stopping sight distance, but less than decision sight distance. That said, any deficiencies in sight visibility will be addressed through the preliminary design phase.

2. The distance from the previous intersection on River Road is approximately 85 m.

3. The available sight distance is greater than the distance travelled by an oncoming vehicle in 3 seconds (58 m) and greater than the stopping sight distance for the oncoming vehicle (110 m).

4. River Road is mainly north/south, with approximately 10 m of storage at the intersection with Mississauga Road.

5. The TAC Guide does not provide specific guidance for assessing the sight distance of approaching vehicles turning left. The guideline distance for the southbound looking south (for southbound left turn movements) is found in the Policy on Geometric Design of Highways and Streets from AASHTO (2001). The protected left turn signal timing phases also help to mitigation any concerns with the southbound left, as they separate the conflicting left turning and through approaching movements in time. That said, any deficiencies in sight visibility will be addressed through the preliminary design phase of this study.

TABLE 3.19: SIGHT DISTANCES FOR MISSISSAUGA ROAD AT EMBLETON ROAD

Sight Distance Type	Direction	Design Speed (km/h)	Measured Sight Distance (m)	TAC Guidelines SSD | DSD (m)	Guidelines Met?
Approach	NB	70	-	120 | 200	✓
	SB	70	-	120 | 200	✓
	EB	60	205	90 | 175	✓
Departure	NB looking west	60	125	120	✓
	SB looking west	60	30	110	NO[1]
	EB looking north	70	-	200	✓
	EB looking south	70	-	215	✓

Notes:

1. The available sight distance is shorter than the distance travelled by an oncoming vehicle in 3 seconds (50 m) and shorter than the stopping sight distance for the oncoming vehicle (85 m). The traffic control signals help to mitigate the sight visibility limitation as they separate the northbound/southbound and eastbound movements in time.

2. Sight distance generally met, but visibility of oncoming vehicles is temporarily lost due to poles.

TABLE 3.20: SIGHT DISTANCES FOR MISSISSAUGA ROAD, HILL BETWEEN EMBLETON ROAD AND LIONHEAD GOLF AND COUNTRY CLUB DRIVEWAY

Sight Distance Type	Direction	Design Speed (km/h)	Measured Sight Distance (m)	TAC Guidelines SSD | DSD (m)	Guidelines Met?
Approach	NB	70	95	140 | 200	**NO[1]**
	SB	70	95	95 | 200	✓

Notes:

1. The available sight distance is shorter than the stopping sight distance required for northbound vehicles.

TABLE 3.21: SIGHT DISTANCES FOR MISSISSAUGA ROAD AT TERRACE ON THE GREEN RESTAURANT DRIVEWAY

Sight Distance Type	Direction	Design Speed (km/h)	Measured Sight Distance (m)	TAC Guidelines SSD | DSD (m)	Guidelines Met?
Approach	NB	70	125	140 | 200	NO[1]
	SB	70	-	95 | 200	✓
Departure	EB looking north	70	-	200	✓
	EB looking south	70	125	225	**NO[2]**

Notes:

1. The available sight distance is shorter than the stopping sight distance required for northbound vehicles. A left turn lane is provided for northbound vehicles turning left onto the Terrace on the Green Restaurant driveway, mitigating the lack of visibility. If the left turn lane is removed, the northbound left movement should be prohibited.

2. The available sight distance for vehicles exiting the driveway is lower than the recommended departure sight distance for a left turn movement.

TABLE 3.22: SIGHT DISTANCES FOR MISSISSAUGA ROAD AT LIONHEAD GOLF AND COUNTRY CLUB DRIVEWAY

Sight Distance Type	Direction	Design Speed (km/h)	Measured Sight Distance (m)	TAC Guidelines SSD | DSD (m)	Guidelines Met?
Approach	NB	70	-	120 | 200	✓
	SB	70	-	120 | 200	✓
Departure	NB looking east	60	45	110	NO[1]
	SB looking east	60	45	180	NO[1]
	WB looking north	70	-	235	✓
	WB looking south	70	-	200	✓

Notes:

1. Site entrance building blocks visibility of vehicles further than 45 m. This is a private property. The traffic control signals help to mitigate the sight visibility limitation as they separate the northbound/southbound and westbound movements in time.

3.5.3 Signage Analysis

Signage was reviewed and compared to the MTO's Ontario Traffic Manuals (OTM) Books 5 – Regulatory Signs, 6 – Warning Signs, and 11 – Pavement, Hazard and Delineation Markings. Roadway Identification Signs are addressed in Section 3.5.4: Human Factors Analysis.

Northbound

Dedicated Left-Turn Lanes:

For consistency, all dedicated left-turn lanes along Mississauga Road should be signed by a

Absence of Truck Entrance Warning Sign:

In the southbound direction, a truck entrance warning sign is located upstream of the Terrace on the Green Restaurant driveway. No such sign was noted for northbound vehicles. A review of the need for both a southbound and northbound truck entrance sign should be completed and signs should be removed or added accordingly.

Hill Located North of the Lionhead Golf and Country Club Driveway:

During the site visits completed in December 2015, a steep hill sign was observed in advance of the hill located north of the Lionhead Gold and Country Club Driveway and south of Embleton Road. The sign indicated a hill of 10%. However, during the November 2016 site visit, this sign was not observed.

A steep hill sign should be installed for northbound drivers, in advance of the hill located north of the Lionhead Gold and Country Club Driveway and south of Embleton Road.

Absence of a School Bus Stop Ahead Warning Sign:

In the southbound direction, a school bus stop ahead warning sign is located south of the intersection with Queen Street West/River Road. No such sign was noted for northbound vehicles. A review of the need for both southbound and northbound school bus stop ahead warning signs should be completed and signs should be removed or added accordingly.

Intersection of Mississauga Road and Beacon Hill Drive:

On the northbound approach to the intersection with Beacon Hill Drive, a dedicated right turn lane is added to the right of the curb lane, with the taper commencing approximately 130 m from the edge of the intersection. There is one right-turn arrow pavement marking, located approximately 25 m from the edge of the intersection. The right turn arrow marking should be located closer to the intersection, at approximately 15 m from the edge of the intersection (as per Figure 27 of OTM Book 11). A second right turn arrow

marking could be located at the beginning of the solid lane line. Additionally, a ground-mounted right turn only lane designation sign could also be added, to provide additional information to drivers.

Southbound

Intersection of Mississauga Road and Queen Street West/River Road:

At the approach to the intersection of Mississauga Road and Queen Street West/River Road, the southbound curb lane becomes a right-turn only lane onto River Road. This is signed with one right turn only lane designation sign, ground-mounted to the right side of the roadway and located approximately 50 m from the stop bar. The sign is supplemented by two right-turn arrow pavement markings, located approximately 15 m and 50 m from the southbound stop bar. However, just upstream of the intersection, a dedicated right-turn lane to the north end of River Road is added to the right of the curb lane, with the taper commencing approximately 170 m north of the southbound stop bar, and the added dedicated right turn lane ending approximately 75 m north of the southbound stop bar. The right turn lane to the north end of River Road is signed with one right turn only lane designation sign, ground-mounted to the right side of the roadway and located approximately 15 m from the edge of the intersection. The sign is supplemented by one right-turn arrow pavement marking, located approximately 15 m from the edge of the intersection.

The combination of the right-turn lane to the north end of River Road and the existing curb lane becoming a right-turn only lane at the signalized intersection with Queens Street West and River Road increases confusion around the lane designation for unfamiliar drivers.

The suggested treatment for this combination of right turn lanes is similar to the approach taken at the northbound approach to the Lionhead Gold and Country Club Driveway. The existing right turn only lane designation sign, located approximately 50 m from the stop bar of the Queen Street West/River Road intersection should be supplemented with the right lane tab sign (Rb-42t). A standard size “right lane exits” sign (non-freeway) (Wa-56R) should also be added upstream of the existing right turn only lane designation sign, but downstream of the intersection with the north end of River Road. A second standard size “right lane exits” sign (non-freeway) (Wa-56R) could also be added upstream of the taper to the right turn lane for the intersection with the north end of River Road.

To help alleviate the possible lane confusion on the approach to this intersection, consideration should be given to an alternate configuration if the intersection is reconstructed. Possible alternate configurations include:

- Closing the intersection of Mississauga Road and the north end of River Road, since access is provided through the signalized intersection of Mississauga Road and Queen Street West/River Road; or

- Continuing the southbound curb lane through the intersection of Mississauga Road and Queen Street West/River Road, allowing for southbound right and through movements in the curb lane, and tapering off the curb lane downstream (south) of the intersection.

Intersection of Mississauga Road and Lionhead Golf Club Road:

On the southbound approach to the intersection with Lionhead Golf Club Road, a dedicated right turn lane is added to the right of the curb lane, with the taper commencing approximately 90 m from the stop bar. There are two (2) right-turn arrow pavement markings, located approximately 15 m and 50 m from the stop bar. A ground-mounted right turn only lane designation sign could also be added, to provide additional information to drivers.

3.5.4 Human Factors Analysis

Mississauga Road for most of the Study Area has recently been reconstructed. Typical conflicts for midblock sections (i.e. lane changes, merging lanes, etc.) and intersections (turning movements, rear ending, etc.) are expected to remain.

Positive guidance is generally provided to both northbound and southbound drivers, but some elements may remain somewhat confusing to unfamiliar drivers. The lane configuration varies between one (1) and three (3) through lanes per direction within the corridor, with lanes added, lanes merging and lanes changing from through lane to turning lane. In addition, the posted speed limit also varies from 60 km/h in the south portion, to 80 km/h in the middle portion, and to 50 km/h in the north end of the Study Area. It is noted that a speed survey was not completed to assess existing conditions.

The size of the street name signs for minor roadways at unsignalized intersections is somewhat small and likely difficult to read for most drivers given the width of Mississauga Road and the posted speed limit. This may cause drivers unfamiliar with the area to complete less safe manoeuvres, such as rapid lane changes and sudden breaking, to turn onto those roadways due to the reduced visibility of the signs.

Unsignalized intersections allow all movements for vehicles on the minor roads, including right turns, through movements (when the intersection has 4 legs) and left turns. Given the number of lanes to cross on Mississauga Road to complete through and left turn movements, the number and duration of gaps between vehicles on Mississauga Road may be or become insufficient. This situation has the potential to cause delays to vehicles on the minor roads and may encourage drivers to attempt unsafe manoeuvres during gaps that are too short to safely allow through or left turn movements from the minor road.

3.5.5 Speed Limits Review

The speed limits for Mississauga Road within the Study Area were reviewed using the recommended posted speed limit evaluation methodology set out

in the TAC *Canadian Guidelines for Establishing Posted Speed Limits*. The Study Area was split into the following three (3) segments based on existing speed limits and roadway characteristics:

North Segment

This segment extends from the beginning of the 80 km/h posted speed limit south of Bovaird Drive to the transition from the two (2) lane to four (4) lane cross-section north of Williams Parkway. This segment currently has a posted speed limit of 80 km/h and a two-lane cross-section. The 85th percentile speed for both directions was observed to be 75 km/h at a location approximately 0.8 km south of Bovaird Drive based on data provided by the Region of Peel.

Figure 3.9 provides the worksheet summarizing the speed limit assessment for this segment. Per the TAC methodology, the recommended posted speed limit as determined by road characteristics should be 80 km/h, consistent with the current limit.

Middle Segment

This segment extends from the transition from the two (2) lane to four (4) lane cross-section north of Williams Parkway to the beginning of the 60 km/h posted speed limit, north of Queen Street West. This segment has a posted speed limit of 80 km/h and a multi-lane cross-section. Most of the segment has two (2) through lanes per direction, although a short stretch at the south end (approximately 400 m) has three (3) through lanes. The 85th percentile speeds for both directions were observed to be 77 km/h at a location approximately 1.1 km north of Queen Street West based on data provided by the Region of Peel.

Figure 3.10 provides the worksheet summarizing the speed limit assessment for this segment. Per the TAC methodology, the recommended posted speed limit as determined by road characteristics should be 70 km/h, which is 10 km/h lower than the current limit.

Based on observed operating speeds, drivers seem comfortable with a posted speed limit of 80 km/h. Reducing the posted speed limit without any other action (e.g., traffic calming) is not expected to affect driver behaviour. A reduction in the posted speed limit would simply increase the number of non-complying drivers. Enforcement could help to reduce operating speeds but its effects would be limited in location and time. Roadway characteristic would need to be modified to achieve a sustained reduction in operating speeds.

For these reasons, the posted speed limit should not be modified now, especially if other roadway characteristics are to remain the same. Operating speeds should be monitored to assess the need for future changes, especially once development begins to intensify in the Study Area. If the roadway is reconstructed in the future, consideration should be given to a change in the posted speed limit at that time, based on the proposed

character of the reconstructed roadway, any changes in operating speeds, development patterns, and identified safety concerns.

South Segment

This segment extends from the beginning of the 60 km/h posted speed limit north of Queen Street West to the south end of the Study Area, south of the Lionhead Golf and Country driveway. This segment has a posted speed limit of 60 km/h and a multi-lane cross-section. Most of the segment has two (2) through lanes per direction, although a short stretch at the north end of (approximately 200 m) has three (3) through lanes. The 85th percentile speeds for both directions were observed to be 71 km/h at a location approximately 1.8 km north of Steeles Avenue based on data provided by the Region of Peel.

Figure 3.11 provides the worksheet summarizing the speed limit assessment for this segment. Per the TAC methodology, the recommended posted speed limit as determined by road characteristics should be 70 km/h, which is 10 km/h higher than the current posted speed limit on this segment.

Based on observed operating speeds, drivers seem comfortable with a posted speed limit of 70 km/h, and the compliance rate with the currently posted 60 km/h limit is only around 40%. However, sight distances available to drivers at the crest of the vertical curve located north of the Lionhead Golf and Country driveway are limited. The sight distance available to northbound drivers is less than the recommended stopping sight distance for a 60 km/h posted speed limit. Increasing the posted speed limit to 70 km/h around the vertical curve crest would therefore not be recommended.

3.5.6 Potential Safety Hazards

The following potential safety hazards were noted:

- Discontinuities in the active transportation facilities, especially between the following intersections:
  - South of Bovaird Drive and Williams Parkway;
  - Beacon Hill Drive and Ostrander Boulevard/Adamsville Road;
  - Queen Street West/River Road and Embleton Road; and
  - Embleton Road and the Lionhead Golf and Country Club driveway.
- Pavement markings are not easily visible under dark and wet conditions;
- Small street name signs for minor roadways at unsignalized intersections, which are may be difficult to read for drivers on Mississauga Road before reaching the intersection;

Automated Speed Limit Guidelines

FORM A - Automated Speed Limit Guidelines Spreadsheet

Version: 10-Apr-09

Name of Corridor:	Mississauga Road (North Segment)				
Segment Evaluated:	South of Bovaird Drive (beginning of 80 km/h)	to	North of Williams Pkwy (begin. of 4-lane cross-section)		
Geographic Region:	City of Brampton				
Road Agency:	Region of Peel				
Road Classification:	Arterial	Length of Corridor:	800	m	
Urban / Rural:	Rural	Design Speed: (Required for Freeway, Expressway, Highway)		km/h	
Divided / Undivided:	Undivided	Current Posted Speed: (For information only)	80	km/h	
Major / Minor:	Major	Prevailing Speed: (85th Percentile - for information only)	75	km/h	
# Through Lanes Per Direction:	1 lane	Policy: (Maximum Posted Speed)			

		RISK	Score
A1	GEOMETRY (Horizontal)	Lower	3
A2	GEOMETRY (Vertical)	Lower	3
A3	AVERAGE LANE WIDTH	Medium	6
B	ROADSIDE HAZARDS	Higher	9
C1	PEDESTRIAN EXPOSURE	Medium	4
C2	CYCLIST EXPOSURE	Higher	9
D	PAVEMENT SURFACE	Medium	6
E1	NUMBER OF INTERSECTIONS WITH PUBLIC ROADS	*Number of Occurrences*	0
	STOP controlled intersection	0	
	Signalized intersection	0	
	Roundabout or traffic circle	0	
	Crosswalk	0	
	Active, at-grade railroad crossing	0	
	Sidestreet STOP-controlled or lane	0	
E2	NUMBER OF INTERSECTIONS WITH PRIVATE ACCESS DRIVEWAYS	*Number of Occurrences*	2
	Left turn movements permitted	3	
	Right-in / Right-out only	0	
E3	NUMBER OF INTERCHANGES	*Number of Occurrences*	0
	Number of interchanges along corridor	0	
F	ON-STREET PARKING	Lower	1

Total Risk Score: 43

Recommended Posted Speed Limit (km/h):

As determined by road characteristics: 80

As determined by policy:

The recommended posted speed limit may be checked against the prevailing speeds of the roadway and the road's safety performance.

Comments:

FORM A

TAC Speed Limit Guidelines Worksheet – North Segment

Automated Speed Limit Guidelines

FORM A - Automated Speed Limit Guidelines Spreadsheet

Version: 10-Apr-09

Name of Corridor:	Mississauga Road (Middle Segment)				
Segment Evaluated:	North of Williams Pkwy (begin. of 4-lane cross-sectio	to	North of Queen St W (beginning of 60 km/h)		
Geographic Region:	City of Brampton				
Road Agency:	Region of Peel				
Road Classification:	Arterial	Length of Corridor:	1,750	m	
Urban / Rural:	Urban	Design Speed: (Required for Freeway, Expressway, Highway)		km/h	
Divided / Undivided:	Divided	Current Posted Speed: (For information only)	80	km/h	
Major / Minor:	Major	Prevailing Speed: (85th Percentile - for information only)	77	km/h	
# Through Lanes Per Direction:	2+ lanes	Policy: (Maximum Posted Speed)			

		RISK	Score
A1	GEOMETRY (Horizontal)	Lower	2
A2	GEOMETRY (Vertical)	Lower	2
A3	AVERAGE LANE WIDTH	Medium	4
B	ROADSIDE HAZARDS	Higher	3
C1	PEDESTRIAN EXPOSURE	Lower	3
C2	CYCLIST EXPOSURE	Lower	3
D	PAVEMENT SURFACE	Lower	1
E1	NUMBER OF INTERSECTIONS WITH PUBLIC ROADS	*Number of Occurrences*	6
	STOP controlled intersection		
	Signalized intersection	2	
	Roundabout or traffic circle	0	
	Crosswalk	0	
	Active, at-grade railroad crossing	0	
	Sidestreet STOP-controlled or lane	2	
E2	NUMBER OF INTERSECTIONS WITH PRIVATE ACCESS DRIVEWAYS	*Number of Occurrences*	8
	Left turn movements permitted	6	
	Right-in / Right-out only	2	
E3	NUMBER OF INTERCHANGES	*Number of Occurrences*	0
	Number of interchanges along corridor	0	
F	ON-STREET PARKING	Lower	3

Total Risk Score: 35

Recommended Posted Speed Limit (km/h):

As determined by road characteristics: 70

As determined by policy:

The recommended posted speed limit may be checked against the prevailing speeds of the roadway and the road's safety performance.

Comments:

FORM A

TAC Speed Limit Guidelines Worksheet – Middle Segment

Automated Speed Limit Guidelines

FORM A - Automated Speed Limit Guidelines Spreadsheet

Version: 10-Apr-09

Name of Corridor:	Mississauga Road (South Segment)				
Segment Evaluated:	North of Queen St W (beginning of 60 km/h)	to	South of Lionhead Golf and Country Entrance		
Geographic Region:	City of Brampton				
Road Agency:	Region of Peel				
Road Classification:	Arterial	Length of Corridor:	1,860	m	
Urban / Rural:	Urban	Design Speed: (Required for Freeway, Expressway, Highway)		km/h	
Divided / Undivided:	Undivided	Current Posted Speed: (For information only)	60	km/h	
Major / Minor:	Major	Prevailing Speed: (85th Percentile - for information only)	71	km/h	
# Through Lanes Per Direction:	2+ lanes	Policy: (Maximum Posted Speed)			

		RISK	Score
A1	GEOMETRY (Horizontal)	Lower	2
A2	GEOMETRY (Vertical)	Higher	6
A3	AVERAGE LANE WIDTH	Medium	4
B	ROADSIDE HAZARDS	Higher	3
C1	PEDESTRIAN EXPOSURE	Lower	3
C2	CYCLIST EXPOSURE	Lower	3
D	PAVEMENT SURFACE	Lower	1
E1	NUMBER OF INTERSECTIONS WITH PUBLIC ROADS	*Number of Occurrences*	8
	STOP controlled intersection	0	
	Signalized intersection	3	
	Roundabout or traffic circle	0	
	Crosswalk	0	
	Active, at-grade railroad crossing	0	
	Sidestreet STOP-controlled or lane	1	
E2	NUMBER OF INTERSECTIONS WITH PRIVATE ACCESS DRIVEWAYS	*Number of Occurrences*	15
	Left turn movements permitted	21	
	Right-in / Right-out only	0	
E3	NUMBER OF INTERCHANGES	*Number of Occurrences*	0
	Number of interchanges along corridor	0	
F	ON-STREET PARKING	Lower	3

Total Risk Score: 48

Recommended Posted Speed Limit (km/h):

As determined by road characteristics: 70

As determined by policy:

The recommended posted speed limit may be checked against the prevailing speeds of the roadway and the road's safety performance.

Comments:

FORM A

TAC Speed Limit Guidelines Worksheet – South Segment

- Unsignalized intersections allow all movements for minor road vehicles. Given the width of Mississauga Road, and the number of traffic lanes to cross for through and left turn movements, the number and duration of gaps may become insufficient, encouraging drivers to attempt unsafe manoeuvres during short gaps;
- Most sight distances are greater than recommended in the TAC Guide. Some of the intersections where sight distances are shorter than recommended are signalized, which helps to mitigate this concern. Locations where recommended sight distances are not met include:
  - The departure sight distance for the westbound right turn movement at the intersection of Mississauga Road and Beacon Hill Drive is less than half of the recommended value for the posted speed limit. The available sight distance is sufficient for a posted speed limit of 40 km/h, which would not be recommended;
  - The departure sight distances for the eastbound right and westbound left turn movements at the intersection of Mississauga Road and Ostrander Boulevard/Adamsville Road is less than the recommended values for the posted speed limit. The available sight distances are sufficient for a posted speed of 50 km/h, which would not be recommended;
  - The sight distance for northbound vehicles driving on Mississauga Road and traversing the crest vertical curve located south of the intersection with the Lionhead Golf and Country Club driveway is less than the recommended stopping sight distance. The available sight distance is sufficient for a posted speed of 40 km/h, which would not be recommended; and
  - Sight distance for vehicles turning left onto Mississauga Road from the driveway of Terrace on the Green Restaurant is less than the recommended value.
- Various signage inadequacies were observed, in both the northbound and southbound directions.

3.5.7 Recommendations to Address Potential Safety Hazards

The following countermeasures are proposed to address the following identified potential safety hazards:

Discontinuities in the Active Transportation Facilities

Discontinuities in the active transportation facilities may encourage pedestrians, cyclists, and other mode users to travel on the shoulders, boulevards or travelled lanes, increasing the potential of conflicts between these vulnerable users and motor vehicles. Consideration should be given to removing the gaps through the reconstruction of Mississauga Road.

Pavement Markings Not Easily Visible Under Dark and Wet Conditions

Per OTM Book 11 – Pavement, Hazard and Delineation Markings:

"*Pavement markings and delineation devices fulfill an important guidance function for drivers, especially at night. They provide drivers with information about their lane position and which lanes are available for use. They provide drivers with a preview of upcoming changes in the roadway, including curves, lane drops, lane narrowings, intersections, crosswalks, and the beginning and end of passing zones. Good delineation generally results in better driver performance and greater driver comfort.*"[4]

Given the recent completion of construction on Mississauga Road in the Study Area, the number of drivers unfamiliar with the roadway may still be significant. Consideration should be given to using retroreflective pavement markings; and/or installing roadway pavement markers.

Small Size of Street Name Signs

The size of street name signs for minor roadways at unsignalized intersections is relatively small, which may be causing delays and uncertainty for drivers preparing for a turning movement at these locations. Consideration should be given to installing larger street names, either at the intersection or in advance of the intersection, to improve navigation information for drivers.

Unsignalized Intersections Allowing All Movements from Minor Road

Drivers on the minor roads travelling through the intersection or making a left turn movement may attempt unsafe manoeuvres as the frequency and duration of gaps decrease. Consideration should be given to:

- Restricting movements at unsignalized intersections, at all times or during peak periods, depending on when the issue arises; and/or
- Signalizing the intersections in the future, should one (1) of the justifications presented in OTM Book 12 – Traffic Signals[5] be satisfied. As noted in Section 3.4.3, warrants are not currently met at these locations.

Sight Distance for Westbound Right Turn Movement at Beacon Hill Drive

Westbound drivers on Beacon Hill Drive making a right turn onto Mississauga Road require sufficient sight distance of oncoming vehicles to safely complete the manoeuvre. Although the collision history does not indicate this movement as being an issue, consideration should be given to:

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[4] OTM Book 11 – Pavement, Hazard and Delineation Markings, March 2000, Section 2.1.

[5] OTM Book 12 – Traffic Signals, March 2012, Section 4.

- Monitoring collisions at the intersection, specifically incidents involving westbound drivers turning right from Beacon Hill Drive onto Mississauga Road; and
- If the movement poses a safety issue in the future, prohibit the movement for a two-way stop control, or prohibit the westbound right turn on red movement if/when the intersection is signalized.

Sight Distances for Eastbound Right and Westbound Left Turn Movements at Ostrander Boulevard/Adamsville Road

Eastbound drivers on Ostrander Boulevard making a right turn onto Mississauga Road and westbound drivers on Adamsville making a left turn onto Mississauga Road require sufficient sight distance of oncoming vehicles to safely complete the manoeuvre. Although the collision history does not indicate either movement as being an issue, consideration should be given to:

- Monitoring collisions at the intersection, specifically incidents involving eastbound drivers turning right from Ostrander Boulevard onto Mississauga Road and westbound drivers turning left onto Mississauga Road; and
- If the either movement poses a safety issue in the future, prohibit the movement(s) for a two-way stop control, verify if a traffic signal would be warranted, and/or prohibit the eastbound right turn on red movement if/when the intersection is signalized.

Vertical Curve South of the Lionhead Golf and Country Club Driveway

If Mississauga Road is reconstructed, consideration should be given to changing the profile of the vertical curve located just south of the intersection with the Lionhead Golf and Country Club driveway. Specifically, consideration should be given to changing the profile of the crest curve located just south of the steep hill (10%, based on signing present in December 2015) to provide northbound and southbound drivers with continuous sight distances at least equal to the stopping sight distance.

Driveway of Terrace on the Green Restaurant

Sight distances for drivers exiting the driveway and turning left onto Mississauga Road do not meet values recommended in the TAC Guide. Consideration should be given to restricting the movements at the driveway to allow northbound left, southbound right, and eastbound right (right in, right out, left in) movements and prohibiting the eastbound left (left out) movement.

Signage

Signage inadequacies were noted in both the northbound and southbound directions. Recommendations to improve compliance with the OTM Books include:

- Review the need for the southbound truck entrance sign, located just north of the Terrace on the Green Restaurant driveway, and for a complementary northbound sign. Remove or add appropriate signs based on the review findings;
- Install a steep hill sign for northbound drivers in advance of the hill located north of the Lionhead Gold and Country Club Driveway and south of Embleton Road;
- Review the need for the southbound school bus stop ahead warning sign, located south of the intersection with Queen Street West/River Road, and for a complementary northbound sign. s Remove or add appropriate signs based on the review findings; and
- On the northbound approach to the intersection with Beacon Hill Drive, relocate the existing right-turn arrow pavement marking closer to the intersection (15 m from the edge of the intersection). Consider adding a second right turn arrow pavement marking adjacent to the beginning of the solid lane line and a ground-mounted right turn only lane designation sign to provide additional information to drivers.

Collision Analysis

As noted above, it would be inappropriate to draw conclusions regarding the safety performance of the road and propose countermeasures based on the historical collision data for Mississauga Road given the dramatically varying configurations for the road and intersections over the study period.

3.5.8 References

American Association of State Highway and Transportation Officials, *A Policy on Geometric Design of Highways and Streets*, Fourth Edition, United States of America, 2001, 905 pages.

Ontario Ministry of Transportation, *Ontario Traffic Manual, Book 5 – Regulatory Signs*, Queen's Printer for Ontario, March 2000, 188 pages.

Ontario Ministry of Transportation, *Ontario Traffic Manual, Book 6 – Warning Signs*, Queen's Printer for Ontario, July 2001, 164 pages.

Ontario Ministry of Transportation, *Ontario Traffic Manual, Book 11 – Pavement, Hazard and Delineation Markings*, Queen's Printer for Ontario, March 2000, 152 pages.

Ontario Ministry of Transportation, *Ontario Traffic Manual, Book 12 – Traffic Signals*, Queen's Printer for Ontario, March 2012, 190 pages.

Transportation Association of Canada, *Canadian Guidelines for Establishing Posted Speed Limits,* December 2009.

Transportation Association of Canada, *Geometric Design Guide for Canadian Roads,* September 1999.

4 Future Transportation Conditions

This section documents forecasted future traffic conditions and operational issues likely to be experienced by the public travelling on roads within the Study Area for the 2031 horizon year.

4.1 Network Assumptions

4.1.1 Road Network Expansion

Section 2 identifies several planned improvements to the arterial road network in and around the Study Area (including the widening Mississauga Road). For this study, the following improvements were assumed:

- Widening of Queen Street West to 6 lanes east of Mississauga Road;
- Opening of the west leg opposite Beacon Hill Drive and signalization of the intersection, as recommended in the *Four X Development Traffic Impact Study – Update, December 19, 2013* prepared by Cole Engineering; and

The extension of Williams Parkway west of Mississauga Road was not assumed for the analyses. The projected date of implementation is beyond the 2031 horizon year of this study as noted in the City of Brampton Transportation Master Plan Update, which identifies the Williams Parkway extension in the 2041 required road network schedule. However, right-of-way should be reserved to allow dual left turn lanes on Mississauga Road as the intersection will be a major junction along the corridor.

4.1.2 GTA West Transportation Corridor

The timetable for construction of the GTA West Transportation Corridor is undefined, as MTO has suspended work on the planning and environmental assessment study at the time of preparing this report. Given the uncertain timing for implementation, it was decided to complete the future transportation condition assessment without consideration for the proposed freeway and its potential implications for traffic volumes and travel patterns on the roads within the Study Area.

A cursory analysis comparing traffic volumes on Mississauga Road with and without the proposed freeway facility indicated a nominal difference in peak direction flows (southbound in the morning and northbound in the afternoon). This suggests the highway would have limited (if any) influence on the need and justification for widening Mississauga Road. The presence of a GTA West transportation corridor could impact turning movement volumes at intersections, which would have a bearing on storage requirements and resulting auxiliary turn lane lengths. Given the magnitude and inherent uncertainty in future travel forecasts, however, these

implications were not considered consequential and do not alter the recommendations of this study.

4.2 Traffic Forecasts

The analysis of future midblock and intersection traffic conditions for the 2031 horizon year is dependent upon forecasted traffic volumes for intersections and roads within the Study Area. Future traffic volumes were determined by applying a background growth factor to existing counts, adding traffic generated by proposed development near the Study Area, and subtracting future trips potentially diverted to other modes. The methodology is described in further detail in the sections that follow.

4.2.1 Background Traffic Growth

The Region of Peel recommended a background traffic growth rate of 3 per cent per annum to forecast future volumes on Study Area roads. The rate was derived principally from the Region's travel demand forecasting model, and verified based on historic traffic counts, population and employment forecasts, and anticipated development patterns. This growth factor accounts for general increases in background traffic on the Study Area road network due to planned development outside the immediate area. Traffic generation attributed to development within the Study Area is captured in Section 4.2.2 below.

Figure 4.1 shows the 2031 AM and PM peak hour forecast traffic volumes based on the background growth rate.

4.2.2 Development Traffic

The *Four X Development Traffic Impact Study – Update, December 19, 2013* report provided information on traffic generated by planned development within and near the Study Area, which includes the following plans and estimated traffic volumes (AM and PM peak hour traffic forecasts in parentheses):

- Osmington Regional Centre in the northwest quadrant of Mississauga Road and Bovaird Drive (1,022 AM/1,858 PM);
- Mount Pleasant Block 51-1 in the northeast quadrant of Mississauga Road and Bovaird Drive (1,223 AM/1,325 PM);
- Bovaird/Creditview Commercial Development in the northeast quadrant of Mississauga Road and Bovaird Drive (96 AM/270 PM);
- Credit Valley No. 2 Secondary School in the northeast quadrant of Mississauga Road and Bovaird Drive (10 AM/18 PM);
- Bluegrass Residential Subdivision in the northeast quadrant of Mississauga Road and Williams Parkway (332 AM/443 PM);
- Helport Residential Subdivision in the southwest quadrant of Mississauga Road and Ashby Field Road (246 AM/328 PM);

- Bram West Village of Riverview Heights in the southwest quadrant of Mississauga Road and Embleton Road (1,210 AM/1,446 PM); and
- Four X Development in the southwest quadrant of Mississauga Road and Williams Parkway (302 AM/403 PM).

Figure 4.2 shows the 2031 AM and PM peak hour traffic volumes generated by planned development that utilize the roads in the Study Area, based on the Four X Development report.

Traffic generated by the proposed Heritage Heights and Heathwood/Cortel developments have not been included in the development background traffic volumes due to uncertainty with the GTA West transportation corridor, ongoing Ontario Municipal Board proceedings, and uncertain land use concepts. The traffic from these two (2) developments can be assumed to be captured within the 3 per cent per annum background growth rate in Section 4.2.1.

4.2.3 Trip Reductions

Trip reductions were applied to account for the projected increase in transit and active transportation mode use for travel in the Study Area. The 2015 City of Brampton Transportation Master Plan Update (TMPU) sets overall modal share targets of 16 per cent for public transit and 6 per cent for active transportation, in addition to 28 per cent for auto passenger travel, for the year 2041. **Figure 4.3** shows the plausible reduction in traffic volumes for the AM and PM peak hours based on the forecasted 2031 vehicle demand, assuming the City's transit and active transportation targets are met by the horizon year of this study. Although these trip reductions may be overly optimistic, a less ambitious non-auto mode share assumption would increase traffic volumes forecast for Mississauga Road.

Per the City's TMPU, the transit mode split goal of 16% is expected to be achieved by 2031 through the introduction of several higher order transit routes in the Study Area and complementary measures to enhance the attractiveness of transit for travel. Planned improvements to transit service that will influence traffic demand in the Mississauga Road corridor include:

- Introduction of two-way, all-day GO Rail service to the three (3) GO stations in Brampton. Brampton Transit routes will service the GO stations to distribute passengers to and from the stations, which will extend the reach of transit in the city by providing convenient connections to other origins and destinations;
- Introduction of a Züm transit corridor on Mississauga Road from Bovaird Drive to Steeles Avenue. This new corridor will connect to a proposed higher order rapid transit service on Steeles Avenue;
- A Züm transfer between the Mississauga Road Züm route and the Queen Street Züm route, which enhances high frequency transit service to Downtown Brampton; and

- Supporting local transit service on north-south parallel routes, providing connectivity to the rapid transit and Züm transit corridors.

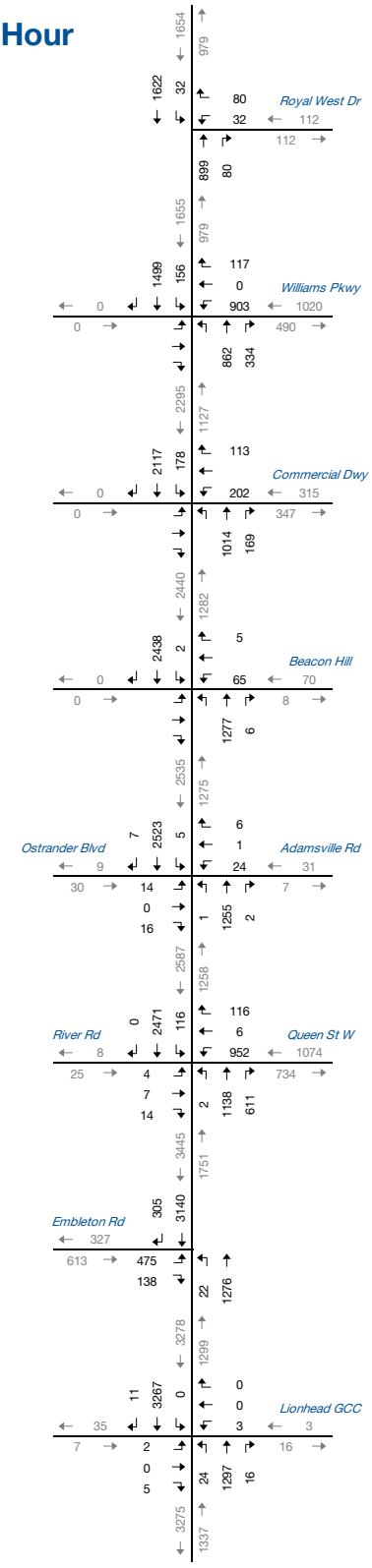
Similarly, the City's TMPU active transportation mode split goal of 6% is expected to be achieved by 2031 through:

- The provision of additional sidewalks, on-street cycle lanes, designated cycling routes, and multi-use trails along key routes and scenic corridors;
- Partnerships with other jurisdictions to promote active transportation use and provide needed infrastructure and services. For example, the Region of Peel Active Transportation Study has recommended the implementation of multi-use trails on Mississauga Road and bicycle lanes on Embleton Road;
- Better integration with public transit services and facilities, like safe and secure bicycle storage at bus stops, buses equipped with bicycle racks, and safe and accessible bus stops; and
- Promoting education, encouragement, engineering and enforcement policies, design features and initiatives that foster active transportation use.

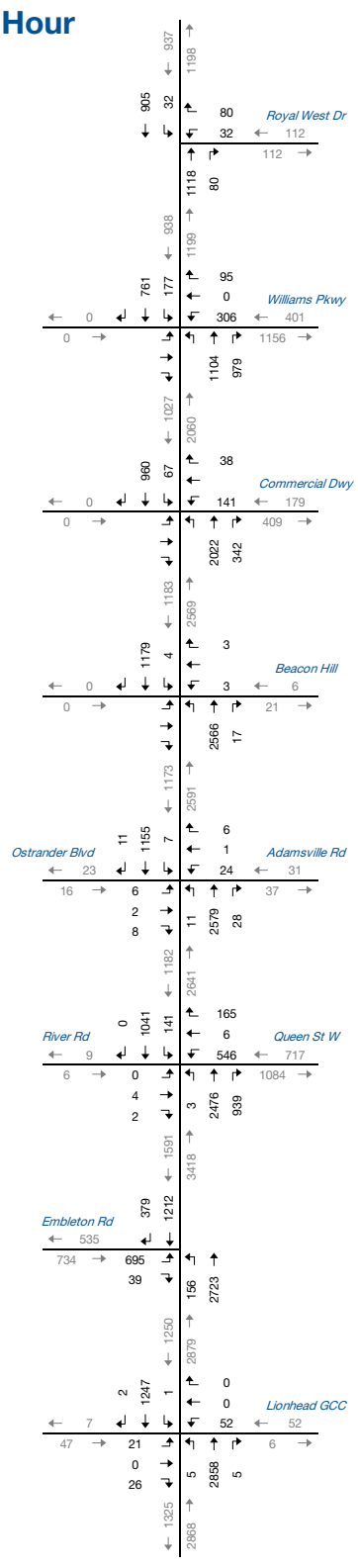
4.2.4 Forecast 2031 Traffic Volumes

Figure 4.4 shows the forecasted 2031 AM and PM peak hour traffic volumes for the Study Area, comprised of background growth, new development-generated travel, and trip reductions. These volumes will provide the basis for the future operations analyses.

AM Peak Hour

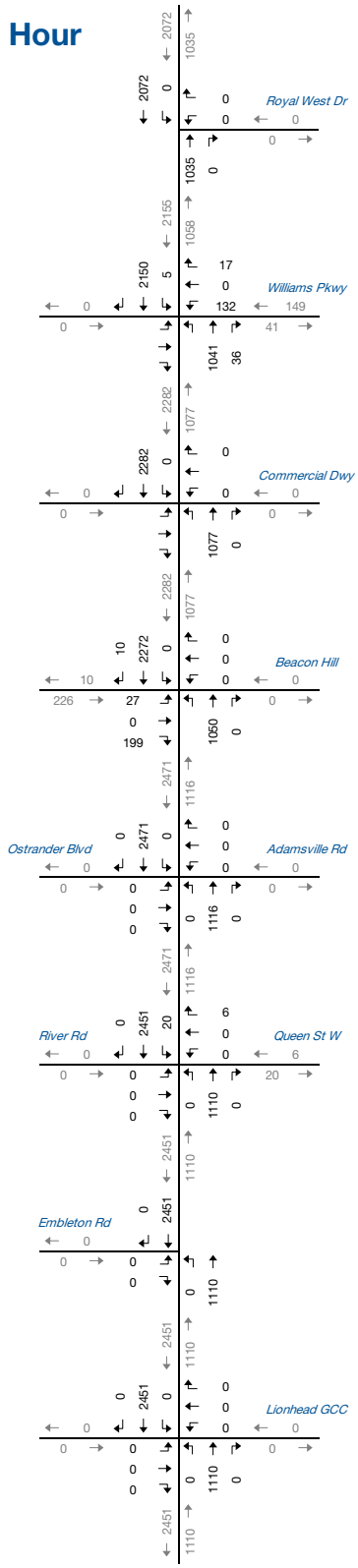


PM Peak Hour

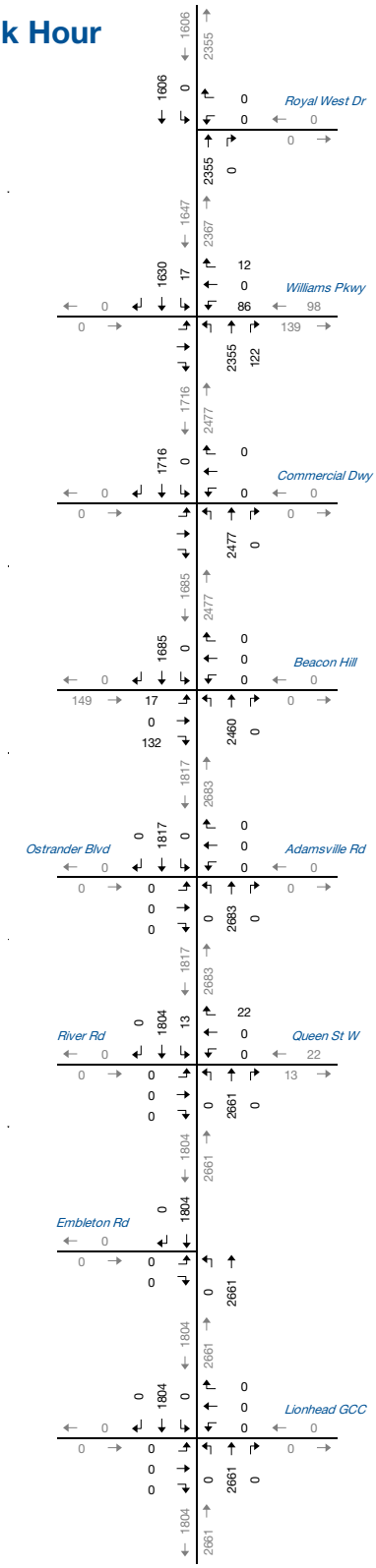


Future (2031) Traffic Growth

AM Peak Hour

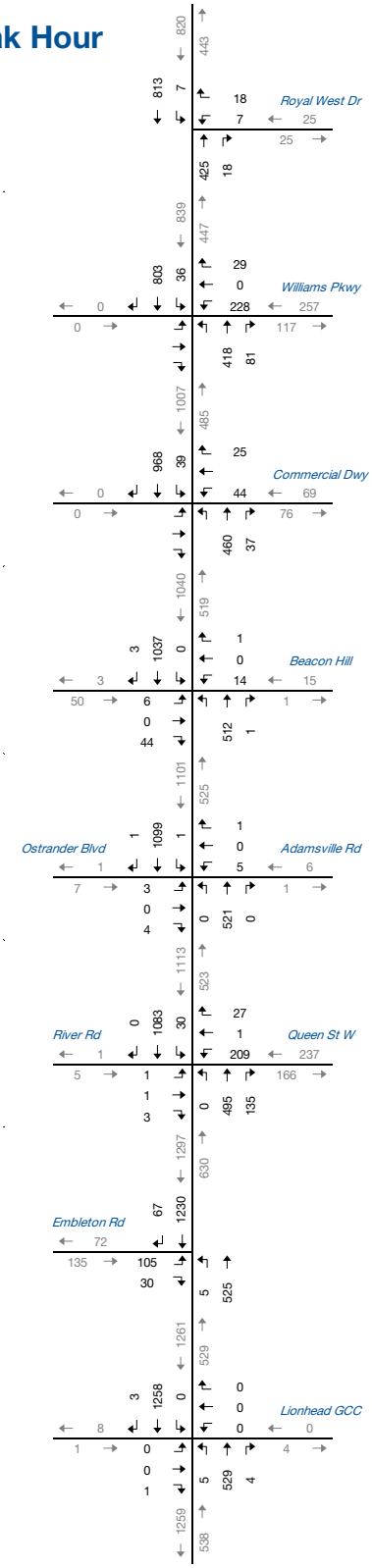


PM Peak Hour

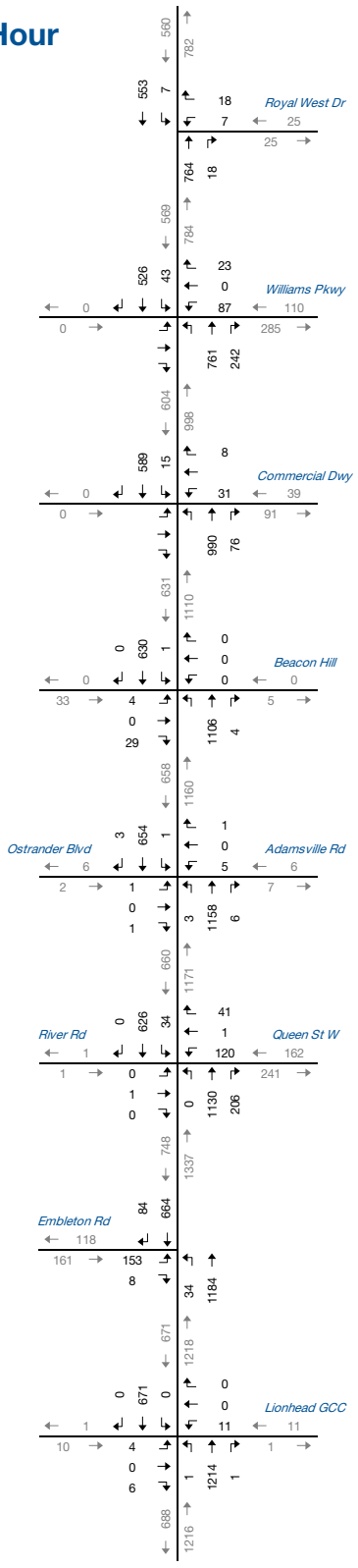


Future (2031) Development Traffic Volumes

AM Peak Hour

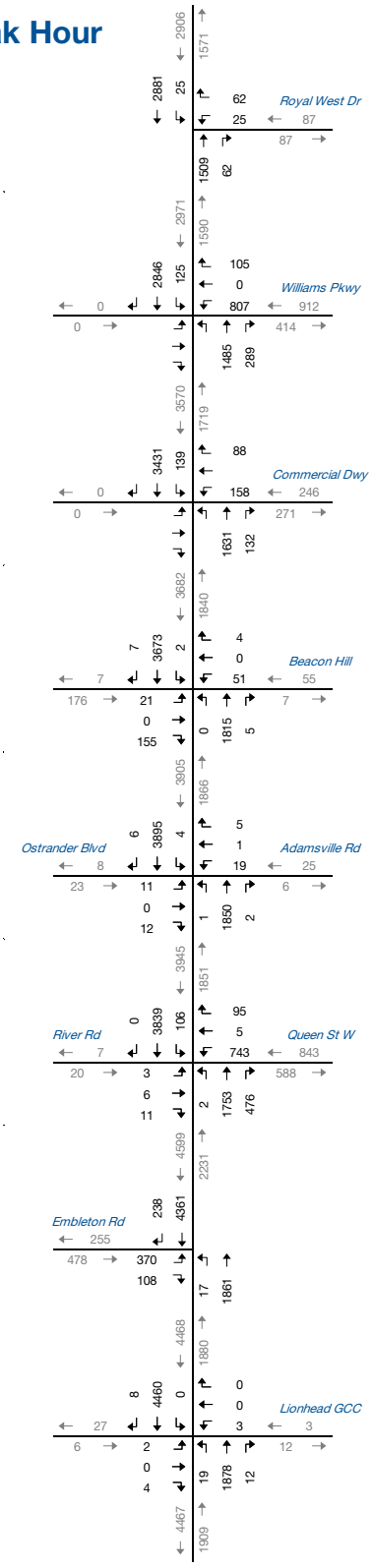


PM Peak Hour

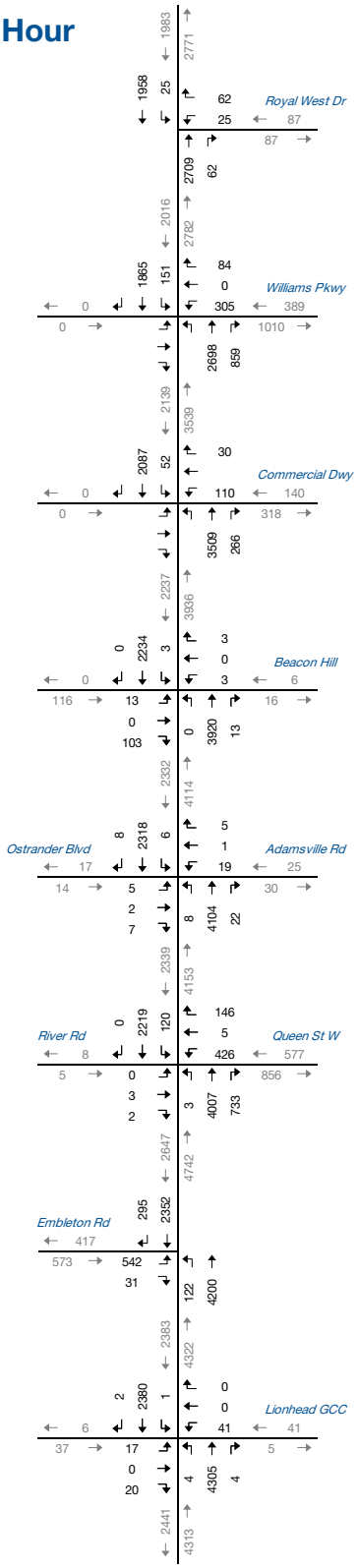


Future (2031) Trip Reductions

AM Peak Hour



PM Peak Hour



Future (2031) Total Traffic Volumes

4.3 Future Traffic Operations

4.3.1 Midblock Analysis

Table 4.1 shows the forecast 2031 peak hour, peak direction midblock traffic volumes and v/c ratios for Mississauga Road. The table indicates that even with 6 lanes, Mississauga Road will be over capacity during the 2031 AM and PM peak hours.

TABLE 4.1: FUTURE (2031) MIDBLOCK CAPACITY ANALYSIS

Road Section		Direction	Number of Lanes	Peak Hour Volume	v/c ratio
From	To				
AM Peak Hour					
Bovaird Drive	Williams Parkway	SB	3	2971	1.10
Williams Parkway	Commercial Driveway	SB	3	3653	1.35
Commercial Driveway	Beacon Hill	SB	3	3589	1.33
Beacon Hill	Ostrander / Adamsville	SB	3	3879	1.44
Ostrander / Adamsville	Queen	SB	3	3926	1.45
Queen	Embleton	SB	3	4593	1.70
Embleton	Lionhead	SB	3	4468	1.65
Lionhead	Financial	SB	3	4467	1.65
PM Peak Hour					
Bovaird Drive	Williams Parkway	NB	3	2782	1.03
Williams Parkway	Commercial Driveway	NB	3	3557	1.32
Commercial Driveway	Beacon Hill	NB	3	3936	1.46
Beacon Hill	Ostrander / Adamsville	NB	3	4114	1.52
Ostrander / Adamsville	Queen	NB	3	4153	1.54
Queen	Embleton	NB	3	4742	1.76
Embleton	Lionhead	NB	3	4322	1.60
Lionhead	Financial	NB	3	4313	1.60

The forecasted midblock traffic volumes for Mississauga Road shown in **Table 4.1** were compared to the 2031 volumes produced by the Region of Peel Long Range Traffic Model (without the GTA West Transportation Corridor). Only the southbound volumes were assessed given that the model forecasts AM peak hour conditions only. **Table 4.2** summarizes the comparison between the forecasted and modelled traffic volumes. The table illustrates that the volumes are somewhat consistent, except for south of Embleton Road, where forecasted volumes are about 1,000 peak hour vehicles higher.

TABLE 4.2: FORECASTED VERSUS MODELLED VOLUMES

Road Section	Forecasted Volumes	Modelled Volumes	Diff	Diff %
South of Bovaird Drive	2971	2938	33	1.1%
South of Williams Parkway	3653	3469	184	5.3%
North of Queen Street	3926	3454	472	13.7%
South of Queen Street	4593	4452	141	3.2%
South of Embleton	4468	3458	1010	29.2%

4.3.2 Intersection Analysis

Table 4.3 summarizes the forecast 2031 intersection traffic operations based on the volumes provided in **Figure 4.4**, assuming six (6) lanes on Mississauga Road and optimized signal timings. The table denotes the expected LOS, v/c ratios, and 95th percentile queues for the intersections in the Study Area for the AM and PM peak hours. **Appendix D** provides the detailed Synchro analysis reports. It is noted that the intersection operations analyses are also intended to assist in determining the lane configuration of the approach roads to satisfactory accommodate forecasted future traffic demand.

The intersection operations analyses reflect the forecasted northbound and southbound midblock capacity issues highlighted in **Table 4.1**, with several intersections within the Study Area expected to operate with poor levels of service by the year 2031. Specific findings noted from the analyses include:

- **Mississauga Road at Royal West Drive** – The westbound movements are expected to operate with LOS F during the AM and PM peak hours under future traffic conditions due to the high northbound and southbound traffic volumes on Mississauga Road.
- **Mississauga Road at Williams Parkway** – During the AM peak hour the westbound left turn is expected to operate over capacity with a v/c ratio greater than 1.0 and LOS F. During the PM peak hour, the westbound left turn is expected to operate under capacity with a v/c ratio of 0.76, but exhibit delay with LOS E.
- **Mississauga Road at Commercial Driveway** – The intersection will operate with overall satisfactory conditions during the AM and PM peak hours under future traffic conditions.
- **Mississauga Road at Beacon Hill Drive** – The intersection is expected to operate with overall satisfactory conditions during the AM and PM peak hours under future traffic conditions. However, the southbound and northbound through movements will exceed capacity during the AM and PM peak hours, respectively.

TABLE 4.3: FUTURE (2031) INTERSECTION OPERATIONS SUMMARY

Analysis Period	Mississauga Road Intersection	Control Type	MOE	Direction / Movement / Approach																	Overall
				Eastbound				Westbound				Northbound				Southbound					
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach		
AM Peak Hour	Royal West Drive	TWSC	LOS					F		B	F		A	A	A	B	A		A		
			Delay					504		13	154		0	0	0	14	0		0		
			V/C					1.16		0.12			0.30	0.04		0.06	0.56				
			Q					26		3			0	0		2	0				
	Williams Parkway	TCS	LOS					F		C	F		C	B	C	B	C		C	E	
			Delay					326		32	292		24	18	23	17	35		34	72	
			V/C					1.61		0.07			0.63	0.19		0.50	0.98				
			Q					364		14			114	15		21	291				
	Commercial Driveway	TCS	LOS					D		D	D		B	A	B	A	C		C	C	
			Delay					51		41	47		12	8	12	10	23		23	20	
			V/C					0.62		0.06			0.53	0.08		0.50	0.97				
			Q					55		14			12	2		11	25				
	Beacon Hill Drive	TCS	LOS	D	D		D	D	D		D	A	A	A	A	A	D	A	D	D	
			Delay	45	54		53	50	44		50	0	6	4	6	4	50	4	50	36	
			V/C	0.11	0.59			0.37	0.00			0.00	0.52	0.00		0.02	1.06	0.00			
			Q	12	50			23	0			0	83	0		1	414	0			
	Ostrander Boulevard / Adamsville Road	TWSC	LOS	F	F		F	F	C		F	F	A	A	A	D	A	A	A		
			Delay	>200	138		>200	>200	21		>200	>200	0	0	3	29	0	0	0		
			V/C	>1.0	0.32			>1.0	0.03			>1.0	0.00	0.00		0.03	0.00	0.00			
			Q	21	7			28	0			20	0	0		0	0	0			
	Queen Street West / River Road	TCS	LOS		C		C	F	C	C	F	C	D	C	D	D	F	A	F	F	
			Delay		26		26	236	26	27	211	31	50	35	44	47	264	0	258	184	
			V/C		0.03			1.40	0.01	0.06		0.08	0.91	0.54		0.72	1.50	0.00			
			Q		9			368	4	12		3	1988	94		45	586	0			
	Embleton Road	TCS	LOS	E			E					D	B		B		F		F	F	
			Delay	74			74					40	19		19		294		294	204	
			V/C	0.92								0.24	0.63				1.58				
			Q	203								5	149				785				
	Lionhead Golf and Country Club	TCS	LOS	E	E		E	E	A		E	B	A	A	A	A	C	A	C	C	
			Delay	61	58		59	65	0		65	16	2	1	2	0	32	1	32	23	
			V/C	0.07	0.00			0.14	0.00			0.33	0.49	0.01		0.00	1.04	0.01			
			Q	3	0			4	0			9	55	0		0	482	0			
PM Peak Hour	Royal West Drive	TWSC	LOS					F		C	F		A	A	A	E	A		A		
			Delay					Err		21	>500		0	0	0	35	0		0		
			V/C					5.37		0.22			0.53	0.04		0.17	0.38				
			Q					Err		7			0	0		5	0				
	Williams Parkway	TCS	LOS					E		D	D		D	C	D	D	B		B	C	
			Delay					56		40	53		42	21	37	53	12		15	30	
			V/C					0.76		0.05			0.98	0.55		0.73	0.56				
			Q					107		13			303	18		68	113				
	Commercial Driveway	TCS	LOS					D		D	D		B	A	B	C	A		A	B	
			Delay					48		42	47		13	6	12	34	6		7	11	
			V/C					0.49		0.02			0.90	0.20		0.39	0.54				
			Q					40		9			72	6		7	83				
	Beacon Hill Drive	TCS	LOS	D	D		D	D	D		D	A	E	A	E	A	A	A	A	D	
			Delay	49	43		46	39	39		39	0	56	4	56	4	6	0	6	38	
			V/C	0.59	0.31			0.01	0.00			0.00	1.08	0.01		0.04	0.67	0.00			
			Q	45	30			3	0			0	412	1		0	49	0			
	Ostrander Boulevard / Adamsville Road	TWSC	LOS	F	D		F	F	C		A	E	A	A	A	F	A	A	A		
			Delay	>200	31		>200	78	18			50	0	0	0	>200	0	0	2		
			V/C	>1.0	0.61			0.16	0.01			0.09	0.00	0.00		0.60	0.00	0.00			
			Q	14	0			1	0			0	0	0		9	0	0			
	Queen Street West / River Road	TCS	LOS		C		C	F	C	C	F	B	F	C	F	F	C	A	C	F	
			Delay		33		33	140	33	35	113	16	233	27	201	81	21	0	24	140	
			V/C		0.01			1.15	0.01	0.21		0.04	1.45	0.74		0.90	0.77	0.00			
			Q		4			189	4	31		1	518	152		52	183	0			
	Embleton Road	TCS	LOS	F			F					D	F		F		D		D	F	
			Delay	166			166					54	159		156		46		46	118	
			V/C	1.22								0.74	1.30				1.00				
			Q	263								47	547				297				
	Lionhead Golf and Country Club	TCS	LOS	D	D		D	E	A		E	A	E	A	E	A	A	A	A	D	
			Delay	53	51		52	57	0		57	4	58	2	57	3	6	2	6	39	
			V/C	0.15	0.01			0.38	0.00			0.05	1.09	0.00		0.02	0.63	0.00			
			Q	11	3			21	0			1	478	0		1	104	0			

MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage

TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control

RBT - Roundabout

- **Mississauga Road at Ostrander Boulevard/Adamsville Road** – The eastbound and westbound movements are expected to operate with LOS F during the AM and PM peak hours under future traffic conditions due to the high northbound and southbound traffic volumes on Mississauga Road.
- **Mississauga Road at Queen Street West/River Road** – The westbound left turn movement is expected to operate over capacity with a v/c ratio greater than 1.0 and LOS F during the AM and PM peak hours. The southbound left turn movement is expected to operate with LOS F and a v/c ratio of 0.90 during the PM peak hour.
- **Mississauga Road at Embleton Road** – During the AM peak hour, the eastbound shared left-right turn movement is expected to operate near capacity with a v/c ratio of 0.92 and LOS E. The southbound through-right movement is expected to operate over capacity with a v/c ratio greater than 1.0 and LOS F. During the PM peak hour, the eastbound shared left-right turn movement is expected to operate with a v/c ratio greater than 1.0 and LOS F. The northbound through movement is expected to operate with LOS E and a v/c ratio greater than 1.0.
- **Mississauga Road at Lionhead Golf and Country Club Driveway** – During the AM and PM peak hours, the eastbound and westbound movements are expected to continue to experience delay caused by northbound and southbound traffic demand.

4.3.3 Traffic Signal Justification

The unsignalized intersections of Mississauga Road at Royal West Drive and Ostrander Boulevard/Adamsville Road was analyzed to determine if traffic signal control is justified under future conditions due to the congestion anticipated for the eastbound and westbound movements during the AM and PM peak hours. The warrant analysis is based on the methodologies contained in OTM Book 12. For an existing intersection with future traffic volumes, a traffic signal is warranted if Justification 1 (both 1A and 1B) or Justification 2 (both 2A and 2B) is 120 per cent satisfied.

Appendix C provides the detailed traffic signal warrant analyses completed for the intersections, which indicates that the warrant is not met for the intersections of:

- Mississauga Road at Royal West Drive based on:
  - Justification 1 (Minimum Vehicle Volume) – Justification 1A met over the 120 per cent, but Justification 1B is only 17 per cent satisfied.
  - Justification 2 (Delay to Cross Traffic) – Justification 2A is met over the 120 per cent, but Justification 2B is only 17 per cent satisfied.
- Mississauga Road at Ostrander Boulevard/Adamsville Road based on:

- Justification 1 (Minimum Vehicle Volume) – Justification 1A met over the 120 per cent, but Justification 1B is only 13 per cent satisfied.
- Justification 2 (Delay to Cross Traffic) – Justification 2A is met over the 120 per cent, but Justification 2B is only19 per cent satisfied.

4.3.4 Intersection Operations with Improvements

The following modifications would improve the intersection operations for the 2031 future traffic conditions:

- Addition of a second westbound left turn lane at Mississauga Road at Williams Parkway, which was also recommend in the *Royal West Developments Inc. CVSP Block 2 Traffic Impact Study* prepared by Read, Voorhees & Associates in October 2008; and
- Addition of a second westbound left turn lane and optimization of signal cycle length and phase timings to a three-phase operation for Mississauga Road at Queen Street West/River Road, assuming this change in operation is feasible from a signal operation perspective.

For the intersection of Mississauga Road and Embleton Road, right-of-way constraints on Embleton Road and the proximity of adjacent buildings limits the potential to add exclusive eastbound turn lanes.

Table 4.4 summarizes the resultant traffic operations for the intersections of Mississauga Road with Williams Parkway and Queen Street West/River Road based on the operational analysis. **Appendix E** provides the detailed Synchro analysis reports. The analyses indicate that with dual left turn lanes, westbound movements at both intersections will operate with acceptable levels of service during the AM and PM peak hours. However, the peak direction movement on Mississauga Road will still operate with congestion and over capacity.

Any outstanding concerns regarding the intersection of Mississauga Road at Queen Street/River Road will be addressed during the public consultation period.

TABLE 4.4: FUTURE (2031) INTERSECTION OPERATIONS SUMMARY WITH IMPROVEMENTS

Analysis Period	Mississauga Road Intersection	Control Type	MOE	Direction / Movement / Approach																	
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Williams Parkway	TCS	LOS					D		C	D		C	B	C	B	C		C	C
			Delay					50		33	48		23	17	22	17	32		31	31
			V/C					0.85		0.07			0.62	0.19		0.50	0.96			
			Q					122		14			114	15		21	291			
	Queen Street West / River Road	TCS	LOS		E		A	E	D	D	E	C	D	C	D	D	F	A	F	F
			Delay		71		7	75	36	37	70	31	45	34	44	50	251	0	246	160
			V/C		0.22			0.96	0.01	0.06		0.08	0.89	0.53		0.72	1.48	0.00		
			Q		14			179	5	10		3	193	91		44	588	0		
PM Peak Hour	Williams Parkway	TCS	LOS					D		D	D		D	C	D	D	A		B	C
			Delay					47		42	46		42	21	37	42	10		12	29
			V/C					0.44		0.05			0.98	0.55		0.59	0.54			
			Q					52		14			303	18		45	91			
	Queen Street West / River Road	TCS	LOS		E		E	E	D	D	D	B	F	D	F	D	C	A	C	F
			Delay		75		75	58	43	44	54	19	295	38	255	38	22	0	23	169
			V/C		0.19			0.77	0.01	0.09		0.04	1.58	0.82		0.55	0.76	0.00		
			Q		6			77	5	18		2	606	208		63	230	0		

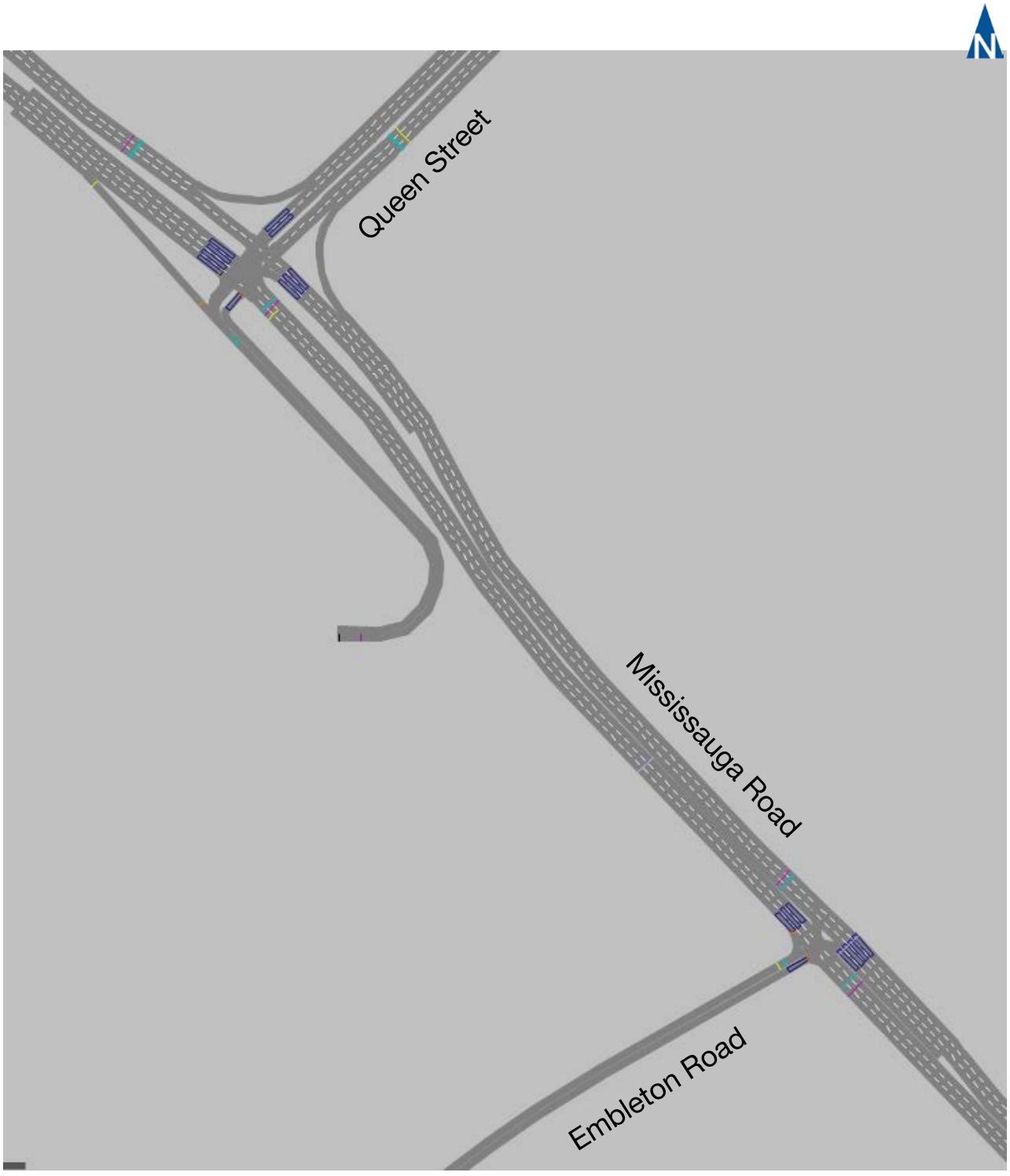
MOE - Measure of Effectiveness
LOS - Level of Service
Delay - Average Delay per Vehicle in Seconds
Q - 95th Percentile Queue Length
Ex. - Existing Available Storage
Avail. - Available Storage
TCS - Traffic Control Signal
TWSC - Two-Way Stop Control
AWSC - All-Way Stop Control
RBT - Roundabout

4.4 Operational Analysis of Credit River Structure Crossing

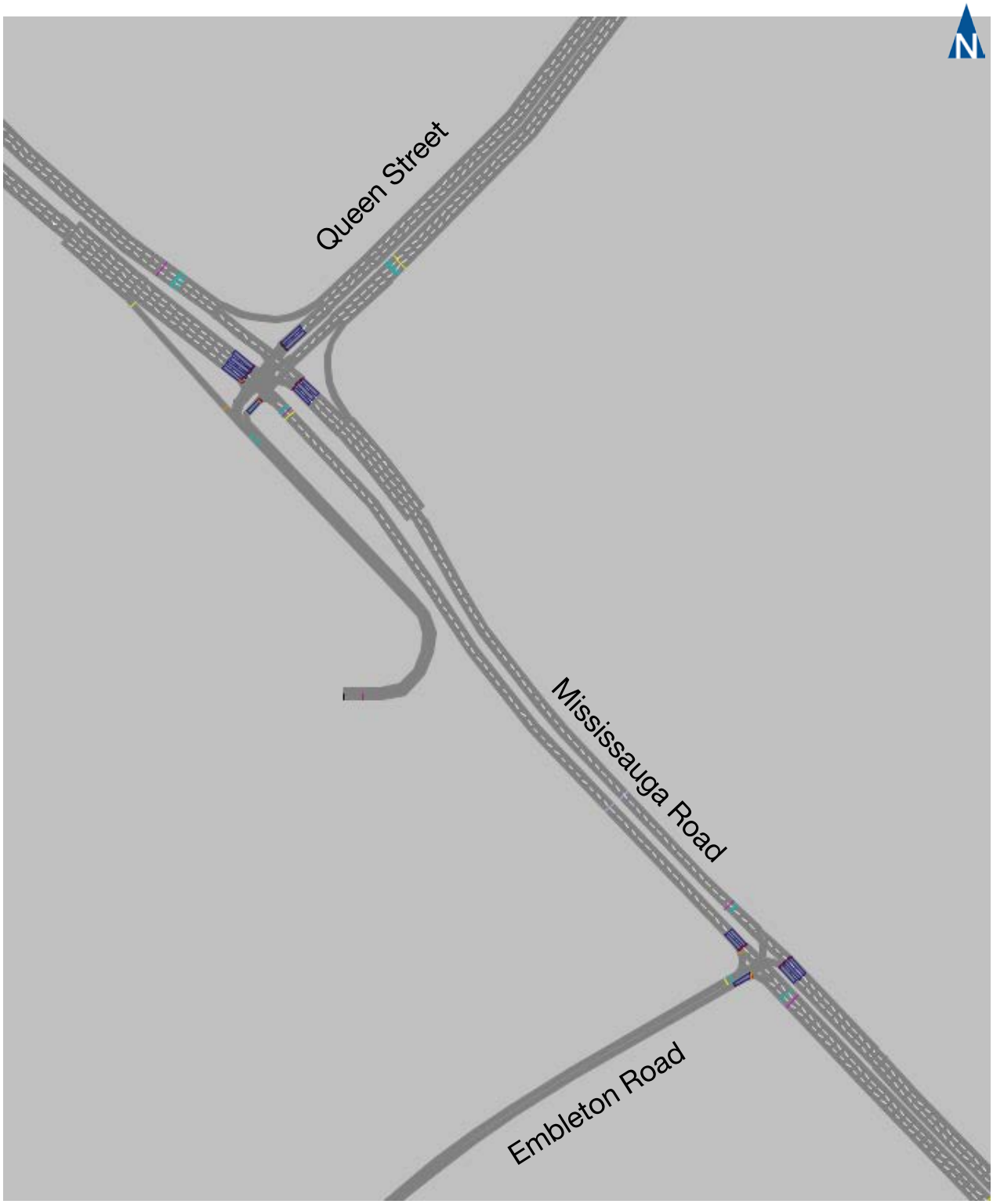
The operational effects of widening Mississauga Road to six (6) lanes, but retaining the current four (4) lane cross-section over the Credit River, were analyzed to assess the implications of this potential strategy to minimize environmental impacts.

Two (2) VISSIM microsimulation model scenarios were developed for the section of Mississauga Road from Ostrander Boulevard/Adamsville Road to the Lionhead Golf and Country Club driveways to analyze this option. One scenario assumed six (6) lanes on Mississauga Road, including the structure over the Credit River, with the intersection configurations denoted above. The other assumed the same lane configuration, except for the section between Queen Street West/River Road and Embleton Road, which retained the existing four (4) lane cross-section. Both scenarios used the forecast 2031 AM peak hour traffic volumes shown in **Figure 3.4** and assumed six (6) lanes for Queen Street West with dual westbound left turn lanes at Mississauga Road. **Figure 4.5** and **Figure 4.6** illustrate the VISSIM model configuration for the scenarios with six (6) and four (4) lanes over the Credit River, respectively.

The following provides an initial assessment of the traffic operations implications of a four (4) lane versus six (6) lane cross-section for Mississauga Road over the Credit River. Note that a comprehensive macro and microsimulation study encompassing a broader study area would be required to provide a more in-depth understanding of changes in traffic patterns and their potential implications with the different bridge configurations.



VISSM Model for Scenario 1 – Six (6) Lanes Over Credit River



VISSM Model for Scenario 2 – Four (4) Lanes Over Credit River

4.4.1 Network Performance

Table 4.5 compares the network performance of the two (2) different scenarios in terms of overall average delay per vehicle, average vehicle speed, total distance travelled for all vehicles, and total travel time for all vehicles. The table indicates that:

- Average delay decreases by 86 seconds and average speed increases by 8 km/h with Mississauga Road widened to six (6) lanes over the Credit River;
- The total distance travelled by all vehicles increases by 4,351 km for the six (6) lane scenario. This indicates that a higher volume of vehicles can travel through the modelled area; and
- Total travel time decreases by 867 minutes with six (6) lanes over the Credit River. This infers that vehicles would be able to travel through the modelled area more quickly, consistent with the decrease in average delay and increase in average speed. Reduced travel time also has a positive benefit for vehicle emissions.

TABLE 4.5: NETWORK PERFORMANCE INDICATORS

Criteria	4 Lanes	6 Lanes	Diff	Diff %
Average Delay / vehicle (seconds)	220	134	-86	61%
Average Speed / vehicle (km/h)	23	31	8	136%
Total Distance Travelled (km)	13208	17559	4351	133%
Total Travel Time (minutes)	35232	34365	-867	98%

4.4.2 Link Performance over Credit River Structure

Table 4.6 summarizes link performance, in terms of vehicle density (number of vehicles per unit length of roadway), average speed, average and maximum queue lengths, and the volume of vehicles, for the section of Mississauga Road between Queen Street West/River Road and Embleton Road. The table, which compares relative traffic performance over the Credit River for the four (4) and six (6) lane scenarios, indicates that:

- In the southbound (peak) direction, vehicle density increases by 11 vehicles per km and average vehicle speed increases by 11 km/h in the southbound (peak) direction with a six (6) lane cross-section;
- The average queue length decreases by 100 m with six (6) lanes over the Credit River; and
- Approximately 1,400 more vehicles can traverse the link segment with if the structure is expanded to six (6) lanes.

TABLE 4.6: LINK PERFORMANCE INDICATORS

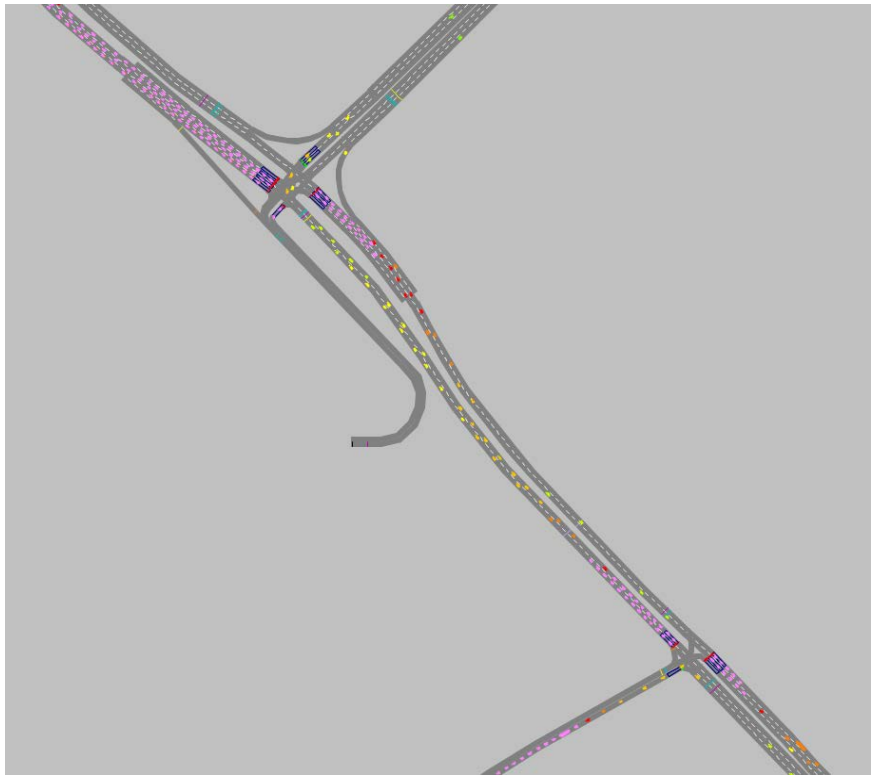
Criteria	4 Lanes	6 Lanes	Diff	Diff %
Density (vehilce / km)				
Southbound	140	150	11	108%
Northbound	63	53	-9	85%
Average Speed (km/h)				
Southbound	18	29	11	159%
Northbound	41	50	9	123%
Average Queue Length (m)				
Southbound	992	892	-100	90%
Northbound	26	12	-14	46%
Volume (vehicles)				
Southbound	2521	3930	1409	156%
Northbound	2517	2470	-47	98%

4.4.3 Observed Conditions

Figure 4.7 and **Figure 4.8** illustrate screen captures from the VISSIM model at 15 minute intervals during the peak hour with four (4) lanes on Mississauga Road between Queen Street West/River Road and Embleton Road. For this scenario, vehicles in the southbound (peak) direction are constrained at the Queen Street West/River Road intersection when Mississauga Road transitions from three (3) to two (2) lanes. The southbound queue at Queen Street West/River Road extends north on Mississauga Road to the limit of the model. This restricts the flow of traffic over the Credit River structure, which does not allow for use of available capacity to the extent possible.

Figure 4.9 and **Figure 4.10** illustrate screen captures from the VISSIM model at 15 minute intervals during the peak hour with six (6) lanes on Mississauga Road between Queen Street West/River Road and Embleton Road. With this scenario, vehicles in the southbound (peak) direction can travel somewhat unabated through the Queen Street West/River Road intersection. There is still congestion for southbound traffic due to the high forecasted volumes on Mississauga Road, but vehicles can utilize the full capacity of a six (6) lane structure over the Credit River.

Although the microsimulation analyses only examined the AM peak hour, PM peak hour conditions are expected to be the reverse of the morning, with congestion at and south of the Embleton Road intersection like Queen Street West/River Road. This congestion would be attributed to the transition of Mississauga Road from three (3) to two (2) lanes in the northbound direction over the Credit River.

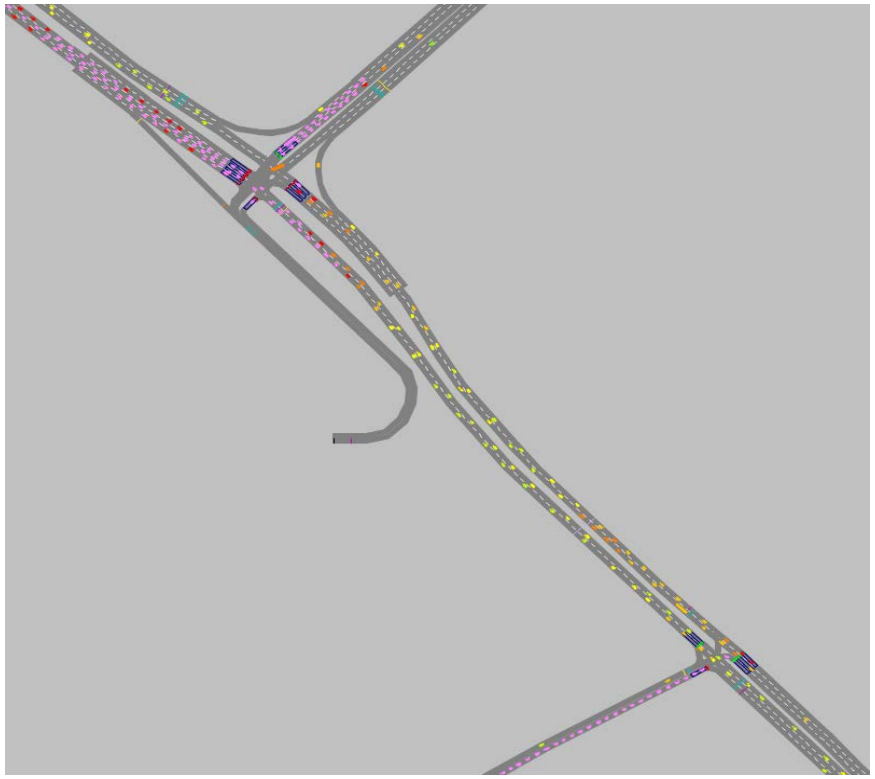


15 Minutes into Peak Hour

30 Minutes into Peak Hour

Screen Captures for Four (4) Lane Section – Part 1

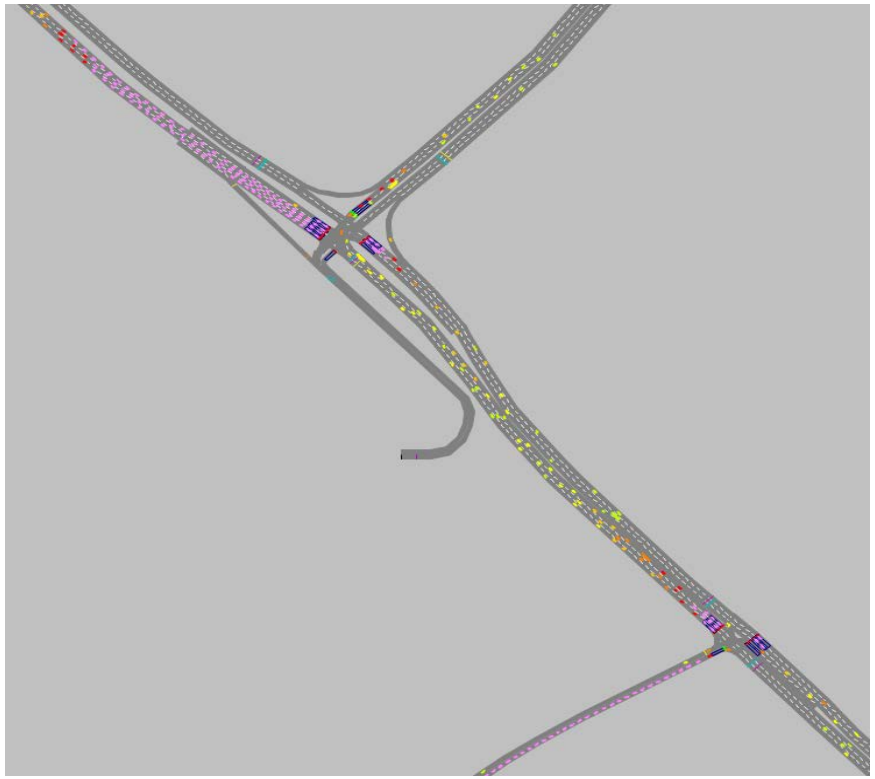
45 Minutes into Peak Hour



End of Peak Hour

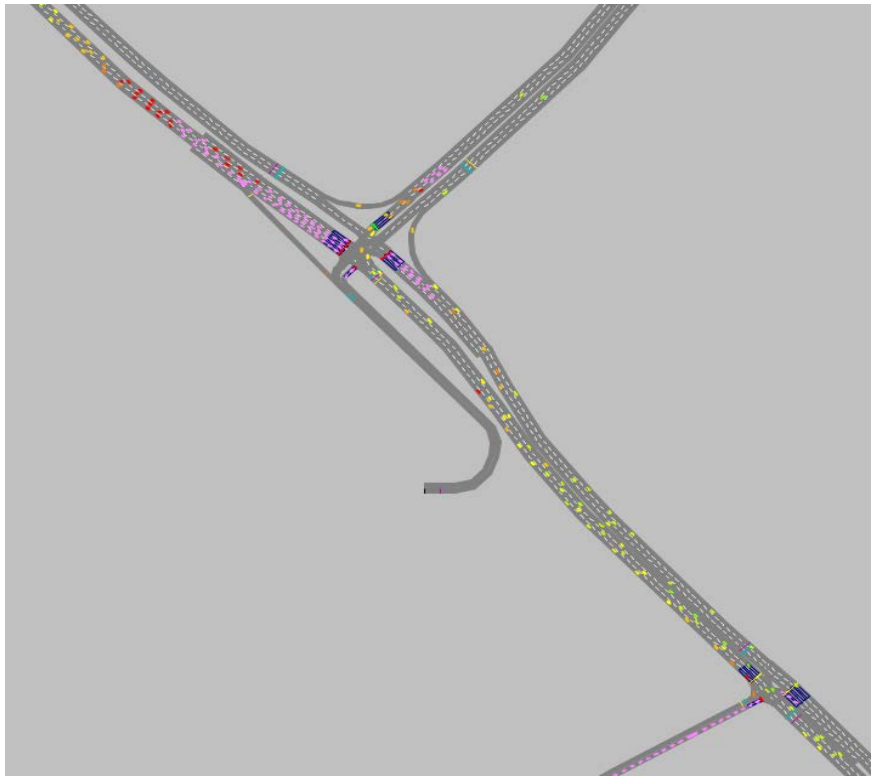
Screen Captures for Four (4) Lane Section – Part 2

15 Minutes into Peak Hour

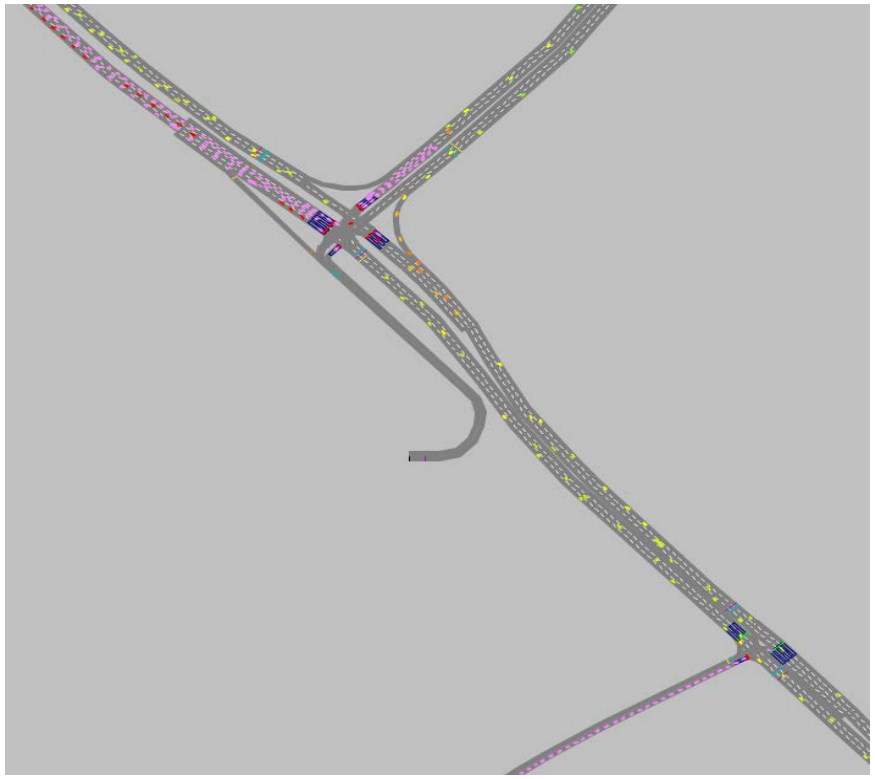


30 Minutes into Peak Hour

Screen Captures for Six (6) Lane Section – Part 1



45 Minutes into Peak Hour



End of Peak Hour

Screen Captures for Six (6) Lane Section – Part 2

4.4.4 Roundabout at Mississauga Road and Embleton Road

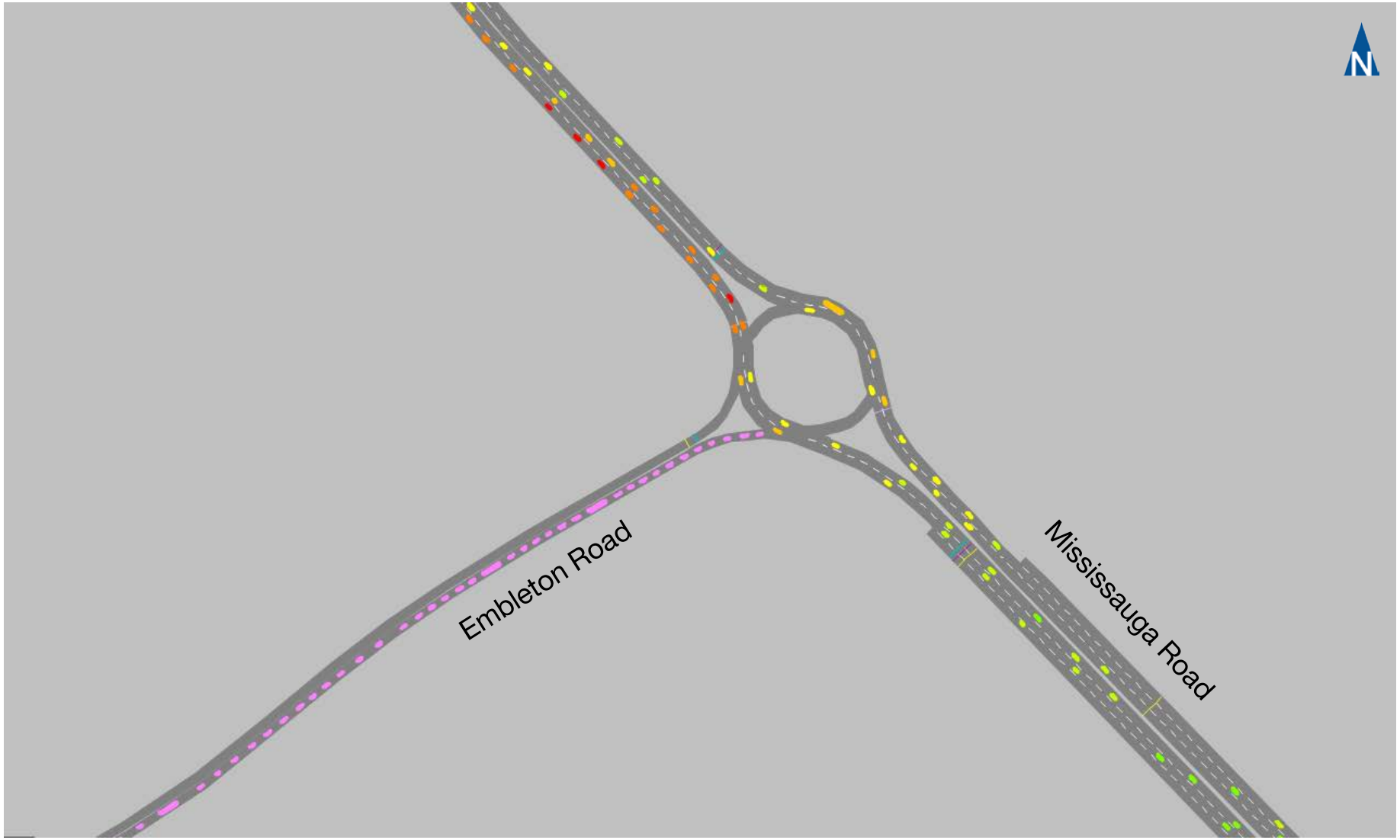
The merit of installing a roundabout at the intersection of Mississauga Road and Embleton Road to maintain a four (4) lane cross-section over the Credit River structure was assessed using VISSIM. A two (2) lane roundabout was modelled at the intersection, which assumed a northbound lane drop from three (3) to two (2) lanes for the northbound direction of Mississauga Road south of the intersection, and a southbound lane drop from three (3) to two (2) lanes south of Queen Street but north of the structure. Both the future AM and PM peak hours were modeled to examine roundabout operations.

During the AM peak hour, the southbound traffic flow on Mississauga Road is very high with a small volume of northbound left turns. This creates a scenario where the southbound traffic flow through the roundabout continues almost uninterrupted. With very few northbound left turns to control the southbound through movements, the traffic from Embleton Road will not have sufficient gaps to proceed safely into the roundabout. This will create congestion and delay on Embleton Road with extremely long queues. In addition to the congestion on Embleton Road, the southbound traffic on Mississauga Road will bottleneck at the lane drop south of Queen Street. Northbound traffic on Mississauga Road will operate with satisfactory operations as there is no interruption within the roundabout due to left turning traffic from Embleton Road.

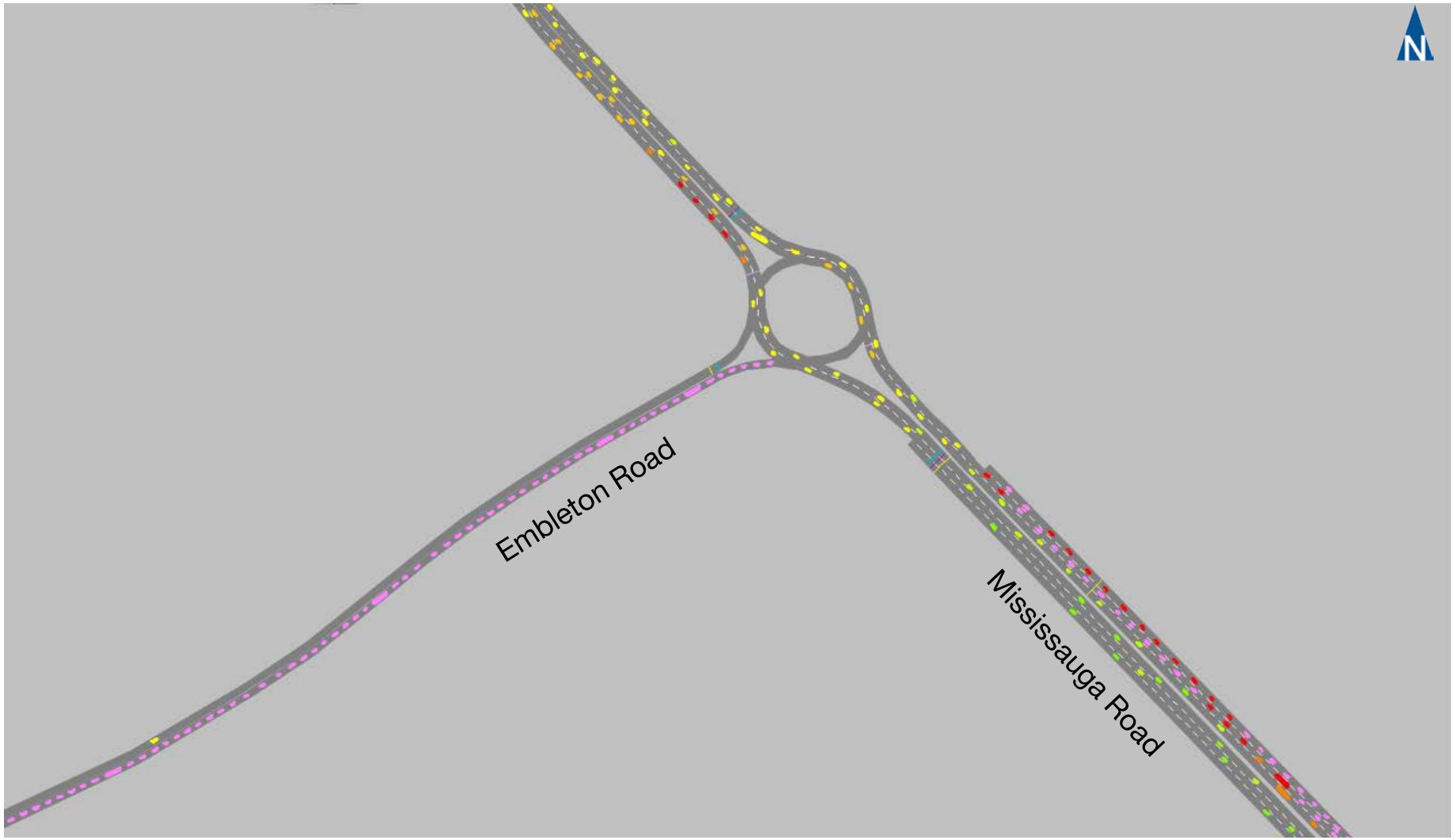
Figure 4.11 illustrates screen captures from the AM peak hour model showing the congestion on Embleton Road.

During the PM peak hour, the same operation will occur as the heavy northbound and southbound through traffic will continue uninterrupted through the roundabout causing delay and congestion on Embleton Road. The northbound traffic on Mississauga Road will bottleneck at the lane drop prior to the roundabout.

Figure 4.12 illustrates a screen capture from the PM peak hour model.



Screen Capture for Roundabout at Embleton Road AM Peak Hour



Screen Capture for Roundabout at Embleton Road PM Peak Hour

5 Conclusions and Recommendations

5.1 Conclusions

The following conclusions are drawn from the information and analyses presented in this report.

5.1.1 Existing (2015) Conditions

- Midblock traffic volumes are approaching or already exceed capacity at locations along Mississauga Road within the Study Area. Specific observations include:
  - During the AM peak hour, the highest peak period v/c ratios occur between Queen Street West and Embleton Road and Embleton Road and Lionhead Golf and Country Club driveway. The v/c ratio exceeds 1.0 for both segments, suggesting that this section of Mississauga Road is over capacity during the morning peak. The segment of Mississauga Road between Williams Parkway and Ostrander Boulevard/Adamsville Road exhibits v/c ratios between 0.83 and 0.88, which infers that this section is approaching capacity during the morning peak.
  - In the PM peak hour, the segment of Mississauga Road between Queen Street West and Lionhead Golf and Country Club driveway again shows v/c ratios exceeding 1.0, suggesting that this section is also over capacity during the afternoon peak. Similarly, the section of Mississauga Road between the signalized commercial driveway and Ostrander Boulevard/Adamsville Road exhibits v/c ratios of 0.89 and 0.90, which infers that this section is also approaching capacity in the afternoon peak.
- All intersections within the Study Area operate with overall acceptable level of service during the AM and PM peak hours. Specific observations include:
  - Mississauga Road at Williams Parkway – During the AM peak hour, the westbound left turn operates with LOS E and a v/c ratio of 0.95.
  - Mississauga Road at Commercial Driveway – The westbound left turn operates with LOS E and a v/c ratio of 0.68 during the AM peak hour and LOS E and a v/c ratio of 0.59 during the PM peak hour. The delay is likely due to the length of green time provided to the higher volume northbound and southbound movements.
  - Mississauga Road at Beacon Hill Drive – The westbound left turn operates with LOS F and a v/c ratio of 0.47 during the AM peak hour and LOS F and a v/c ratio of 0.05 during the PM peak hour. The high delay is likely due to the high traffic volumes on Mississauga Road.

- Mississauga Road at Ostrander Boulevard/Adamsville Boulevard – During the AM peak hour, the eastbound and westbound left turn movements operate with LOS F (v/c ratio of 0.20) and LOS E (v/c ratio of 0.19), respectively. During the PM peak hour, the westbound left turn movement operates with LOS F and a v/c ratio of 0.16. The relatively poor LOS and low v/c ratios indicate that the delay is likely caused by the high traffic volumes on Mississauga Road.
- Mississauga Road at Queen Street West/River Road – During the AM peak hour, the westbound left turn operates with LOS E and a v/c ratio of 0.99, and the southbound through operates with LOS E and a v/c ratio of 1.07. These two (2) movements effectively exceed capacity. In the PM peak hour, the westbound left turn movement operates at capacity with LOS F and a v/c ratio of 0.97.
- Mississauga Road at Embleton Road – During the AM peak hour, the eastbound shared left-right turn movement operates with LOS E and a v/c ratio of 0.84. The southbound shared through-right turn movement is approaching capacity with a v/c ratio of 0.96, but operates with LOS B. In the PM peak hour, the eastbound shared left-right turn movement has reached capacity with a v/c ratio of 1.0 and operates at LOS F.
- Mississauga Road at Lionhead Golf and Country Club Driveway – During the AM and PM peak hours, the eastbound and westbound movements experience significant delay, likely caused by the length of green time allocated to serve northbound and southbound traffic demand.

- Several individual intersection movements are approaching or exceeding their capacities. Optimizing the signal cycle and phase timings would improve operations during the AM and PM peak hours. However, the southbound through movement at the Mississauga Road and Queen Street West/River Road intersection would still be approaching capacity.
- Potential safety hazards were noted, as follows, with countermeasures proposed:
  - Discontinuities in the active transportation facilities exist;
  - Pavement markings are not easily visible under dark and wet conditions;
  - Small street name signs for minor roadways at unsignalized intersections, which are may be difficult to read for drivers on Mississauga Road before reaching the intersection;
  - Unsignalized intersections allow all movements for minor road vehicles. Given the width of Mississauga Road, and the number of traffic lanes to cross for through and left turn movements, the number and duration of gaps may become insufficient,

encouraging drivers to attempt unsafe manoeuvres during short gaps; and

- Various signage inadequacies were observed, in both the northbound and southbound directions.

5.1.2 Future (2031) Conditions

- Midblock traffic volumes are expected to exceed capacity at all locations along Mississauga Road within the Study Area by the year 2031. Even with six (6) lanes, Mississauga Road will be over capacity during the 2031 AM and PM peak hours.
- The intersection operations analyses reflect the forecasted northbound and southbound midblock capacity issues, with several intersections within the Study Area expected to operate with poor levels of service by the year 2031. Specific observations include:
  - Mississauga Road at Williams Parkway – During the AM peak hour the westbound left turn is expected to operate over capacity with a v/c ratio greater than 1.0 and LOS F. During the PM peak hour, the westbound left turn is expected to operate under capacity with a v/c ratio of 0.76, but exhibit delay with LOS E.
  - Mississauga Road at Commercial Driveway – The intersection will operate with overall satisfactory conditions during the AM and PM peak hours under future traffic conditions.
  - Mississauga Road at Beacon Hill Drive – The intersection is expected to operate with overall satisfactory conditions during the AM and PM peak hours under future traffic conditions. However, the southbound and northbound through movements will exceed capacity during the AM and PM peak hours, respectively.
  - Mississauga Road at Ostrander Boulevard/Adamsville Road – The eastbound and westbound movements are expected to operate with LOS F during the AM and PM peak hours under future traffic conditions due to the high northbound and southbound traffic volumes on Mississauga Road.
  - Mississauga Road at Queen Street West/River Road – The westbound left turn movement is expected to operate over capacity with a v/c ratio greater than 1.0 and LOS F during the AM and PM peak hours. The southbound left turn movement is expected to operate with LOS F and a v/c ratio of 0.90 during the PM peak hour.
  - Mississauga Road at Embleton Road – During the AM peak hour, the eastbound shared left-right turn movement is expected to operate near capacity with a v/c ratio of 0.92 and LOS E. The southbound through-right movement is expected to operate over capacity with a v/c ratio greater than 1.0 and LOS F. During the PM peak hour, the eastbound shared left-right turn movement is

expected to operate with a v/c ratio greater than 1.0 and LOS F. The northbound through movement is expected to operate with LOS E and a v/c ratio greater than 1.0.

- Mississauga Road at Lionhead Golf and Country Club Driveway – During the AM and PM peak hours, the eastbound and westbound movements are expected to continue to experience delay caused by northbound and southbound traffic demand.

- The following modifications would improve the intersection operations for the 2031 future traffic conditions:
  - Addition of a second westbound left turn lane at Mississauga Road at Williams Parkway; and
  - Addition of a second westbound left turn lane and optimization of signal cycle length and phase timings to a three-phase operation for Mississauga Road at Queen Street West/River Road.
- The operational effects of widening Mississauga Road to six (6) lanes, but retaining the current four (4) lane cross-section over the Credit River, were assessed through microsimulation analysis using VISSIM. The analyses indicated that traffic operational performance of Mississauga Road and the entire network would be significantly deteriorated if the current cross-section were retained. Specific observations from the modelling include:
  - With four (4) lanes between Queen Street West/River Road and Embleton Road, vehicles in the southbound (peak) direction are constrained at the Queen Street West/River Road intersection during the AM peak hour when Mississauga Road transitions from three (3) to two (2) lanes. The southbound queue at Queen Street West/River Road extends north on Mississauga Road to the limit of the model. This restricts the flow of traffic over the Credit River structure, which does not allow for use of available capacity to the extent possible. The addition of a roundabout at the intersection of Mississauga Road and Embleton Road would not improve the operation.
  - With six (6) lanes between Queen Street West/River Road and Embleton Road, vehicles in the southbound (peak) direction can travel somewhat unabated through the Queen Street West/River Road intersection during the AM peak hour. There is still congestion for southbound traffic due to the high forecasted volumes on Mississauga Road, but vehicles can utilize the full capacity of a six (6) lane structure over the Credit River.

5.2 Recommendations

Based on the analyses completed for this study, it is recommended that Mississauga Road be widened to six (6) lanes between Financial Drive and south of Bovaird Drive, with the intersection and road safety improvements as identified in this report. The study confirmed the recommendations of the

2012 Region of Peel Long Range Transportation Plan and reiterated the need and justification to widen the road.

Appendix A

Existing Traffic Surveys

TMC - Intersection Count Summary

Company name: Trans-Plan Inc.
Company address: 24 Ryerson Avenue, Suite 211,Toronto, Ontario, Canada
Company phone: (647) 931-7383

Site: 00119677
Location: Mississauga Road at Williams Parkway, Brampton
N/S Street: Mississauga Road
E/W Street: Williams Parkway
GPS Coordinates: 43.657896, -79.817598
Date: 18 November 2015
Day of week: Wednesday
Analyst(s): yiwei, Fartash

VEHICLE TRAFFIC

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
18/11/2015 07:00	10	136	0	146	67	0	15	82	0	88	26	114	0	0	0	0	342
18/11/2015 07:15	23	205	0	228	89	0	17	106	0	146	43	189	0	0	0	0	523
18/11/2015 07:30	28	179	0	207	166	0	17	183	0	135	60	195	0	0	0	0	585
18/11/2015 07:45	20	203	0	223	153	0	14	167	0	140	65	205	0	0	0	0	595
Hourly Total	81	723	0	804	475	0	63	538	0	509	194	703	0	0	0	0	2045
18/11/2015 08:00	26	187	0	213	155	0	25	180	0	116	40	156	0	0	0	0	549
18/11/2015 08:15	25	169	0	194	137	0	15	152	0	102	49	151	0	0	0	0	497
18/11/2015 08:30	22	169	0	191	138	0	21	159	0	102	35	137	0	0	0	0	487
18/11/2015 08:45	33	202	0	235	111	0	15	126	0	108	30	138	0	0	0	0	499
Hourly Total	106	727	0	833	541	0	76	617	0	428	154	582	0	0	0	0	2032
18/11/2015 09:00	11	6	0	17	1	0	1	2	0	2	1	3	0	0	0	0	22
18/11/2015 09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	11	6	0	17	1	0	1	2	0	2	1	3	0	0	0	0	22
Grand Total	198	1456	0	1654	1017	0	140	1157	0	939	349	1288	0	0	0	0	4099
Approach %	12	88	0	100	88	0	12	100	0	73	27	100	0	0	0	0	-
Total %	5	36	0	41	25	0	3	28	0	23	9	32	0	0	0	0	-

AM Peak Hour 7:15 AM - 8:15 AM

Vehicle Total	97	774	0	871	563	0	73	636	0	537	208	745	0	0	0	0	2252
Car	97	774	0	871	563	0	65	628	0	482	200	682	0	0	0	0	2181
Truck	0	0	0	0	0	0	8	8	0	55	8	63	0	0	0	0	71
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
18/11/2015 11:00	13	78	0	91	26	0	10	36	0	71	14	85	0	0	0	0	212
18/11/2015 11:15	21	108	0	129	30	0	11	41	0	62	12	74	0	0	0	0	244
18/11/2015 11:30	12	98	0	110	40	0	12	52	0	70	19	89	0	0	0	0	251
18/11/2015 11:45	11	102	0	113	23	0	17	40	0	62	16	78	0	0	0	0	231
Hourly Total	57	386	0	443	119	0	50	169	0	265	61	326	0	0	0	0	938
18/11/2015 12:00	9	104	0	113	31	0	5	36	0	78	27	105	0	0	0	0	254
18/11/2015 12:15	13	110	0	123	24	0	11	35	0	80	26	106	0	0	0	0	264
18/11/2015 12:30	14	100	0	114	38	0	19	57	0	87	24	111	0	0	0	0	282
18/11/2015 12:45	15	102	0	117	18	0	9	27	0	85	23	108	0	0	0	0	252
Hourly Total	51	416	0	467	111	0	44	155	0	330	100	430	0	0	0	0	1052
18/11/2015 13:00	16	91	0	107	23	0	13	36	0	67	28	95	0	0	0	0	238
18/11/2015 13:15	20	95	0	115	32	0	18	50	0	90	27	117	0	0	0	0	282
18/11/2015 13:30	25	87	0	112	26	0	10	36	0	97	27	124	0	0	0	0	272
18/11/2015 13:45	10	107	0	117	31	0	11	42	0	100	34	134	0	0	0	0	293
Hourly Total	71	380	0	451	112	0	52	164	0	354	116	470	0	0	0	0	1085
18/11/2015 14:00	1	1	0	2	0	0	0	0	0	2	1	3	0	0	0	0	5
18/11/2015 14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	1	1	0	2	0	0	0	0	0	2	1	3	0	0	0	0	5
Grand Total	180	1183	0	1363	342	0	146	488	0	951	278	1229	0	0	0	0	3080
Approach %	13	87	0	100	70	0	30	100	0	77	23	100	0	0	0	0	-
Total %	6	38	0	44	11	0	5	16	0	31	9	40	0	0	0	0	-

Midday Peak Hour 1:00 PM - 2:00 PM

Vehicle Total	71	380	0	451	112	0	52	164	0	354	116	470	0	0	0	0	1085
Car	71	331	0	402	102	0	48	150	0	313	105	418	0	0	0	0	970
Truck	0	49	0	49	10	0	4	14	0	41	11	52	0	0	0	0	115
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
18/11/2015 15:00	23	102	0	125	47	0	24	71	0	124	42	166	0	0	0	0	362
18/11/2015 15:15	16	128	0	144	50	0	13	63	0	159	89	248	0	0	0	0	455
18/11/2015 15:30	22	126	0	148	61	0	37	98	0	153	90	243	0	0	0	0	489
18/11/2015 15:45	22	114	0	136	45	0	17	62	0	169	88	257	0	0	0	0	455
Hourly Total	83	470	0	553	203	0	91	294	0	605	309	914	0	0	0	0	1761
18/11/2015 16:00	19	131	0	150	55	0	14	69	0	146	97	243	0	0	0	0	462
18/11/2015 16:15	23	104	0	127	63	0	16	79	0	199	126	325	0	0	0	0	531
18/11/2015 16:30	17	141	0	158	51	0	17	68	0	190	111	301	0	0	0	0	527
18/11/2015 16:45	13	126	0	139	46	0	17	63	0	178	143	321	0	0	0	0	523
Hourly Total	72	502	0	574	215	0	64	279	0	713	477	1190	0	0	0	0	2043
18/11/2015 17:00	27	175	0	202	51	0	14	65	0	189	166	355	0	0	0	0	622
18/11/2015 17:15	43	130	0	173	50	0	12	62	0	167	152	319	0	0	0	0	554
18/11/2015 17:30	27	120	0	147	44	0	11	55	0	166	160	326	0	0	0	0	528
18/11/2015 17:45	36	109	0	145	34	0	8	42	0	161	145	306	0	0	0	0	493
Hourly Total	133	534	0	667	179	0	45	224	0	683	623	1306	0	0	0	0	2197
18/11/2015 18:00	0	14	0	14	0	0	0	0	0	12	4	16	0	0	0	0	30
18/11/2015 18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	14	0	14	0	0	0	0	0	12	4	16	0	0	0	0	30
Grand Total	288	1520	0	1808	597	0	200	797	0	2013	1413	3426	0	0	0	0	6031
Approach %	16	84	0	100	75	0	25	100	0	59	41	100	0	0	0	0	-
Total %	5	25	0	30	10	0	3	13	0	33	23	56	0	0	0	0	-

PM Peak Hour 4:45 PM - 5:45 PM

Vehicle Total	110	551	0	661	191	0	54	245	0	700	621	1321	0	0	0	0	2227
Car	110	518	0	628	191	0	54	245	0	661	611	1272	0	0	0	0	2145
Truck	0	33	0	33	0	0	0	0	0	39	10	49	0	0	0	0	82
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PEDESTRIAN CROSSING

	North East			North West			South West			South East			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
18/11/2015 07:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 07:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 07:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 08:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 08:30:00	0	0	0	0	0	0	0	0	0	2	0	2	2
18/11/2015 08:45:00	2	0	2	0	0	0	0	0	0	1	0	1	3
Hourly Total	2	0	2	0	0	0	0	0	0	3	0	3	5
18/11/2015 09:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 09:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	2	0	2	0	0	0	0	0	0	3	0	3	5

AM Peak Hour 8:00 AM - 9:00 AM

Pedestrians	2	0	2	0	0	0	0	0	0	3	0	3	5

18/11/2015 11:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 11:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 11:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 11:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 12:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 12:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 12:30:00	2	0	2	0	0	0	0	0	0	0	0	0	2
18/11/2015 12:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	2	0	2	0	0	0	0	0	0	0	0	0	2
18/11/2015 13:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 13:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 13:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 13:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 14:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 14:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	2	0	2	0	0	0	0	0	0	0	0	0	2

Midday Peak Hour 11:45 AM - 12:45 PM

Pedestrians	2	0	2	0	0	0	0	0	0	0	0	0	2

	North East			North West			South West			South East			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
18/11/2015 15:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 15:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 15:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 15:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 16:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 16:15:00	0	0	0	0	0	0	0	0	0	0	1	1	1
18/11/2015 16:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 16:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	1	1	1
18/11/2015 17:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0

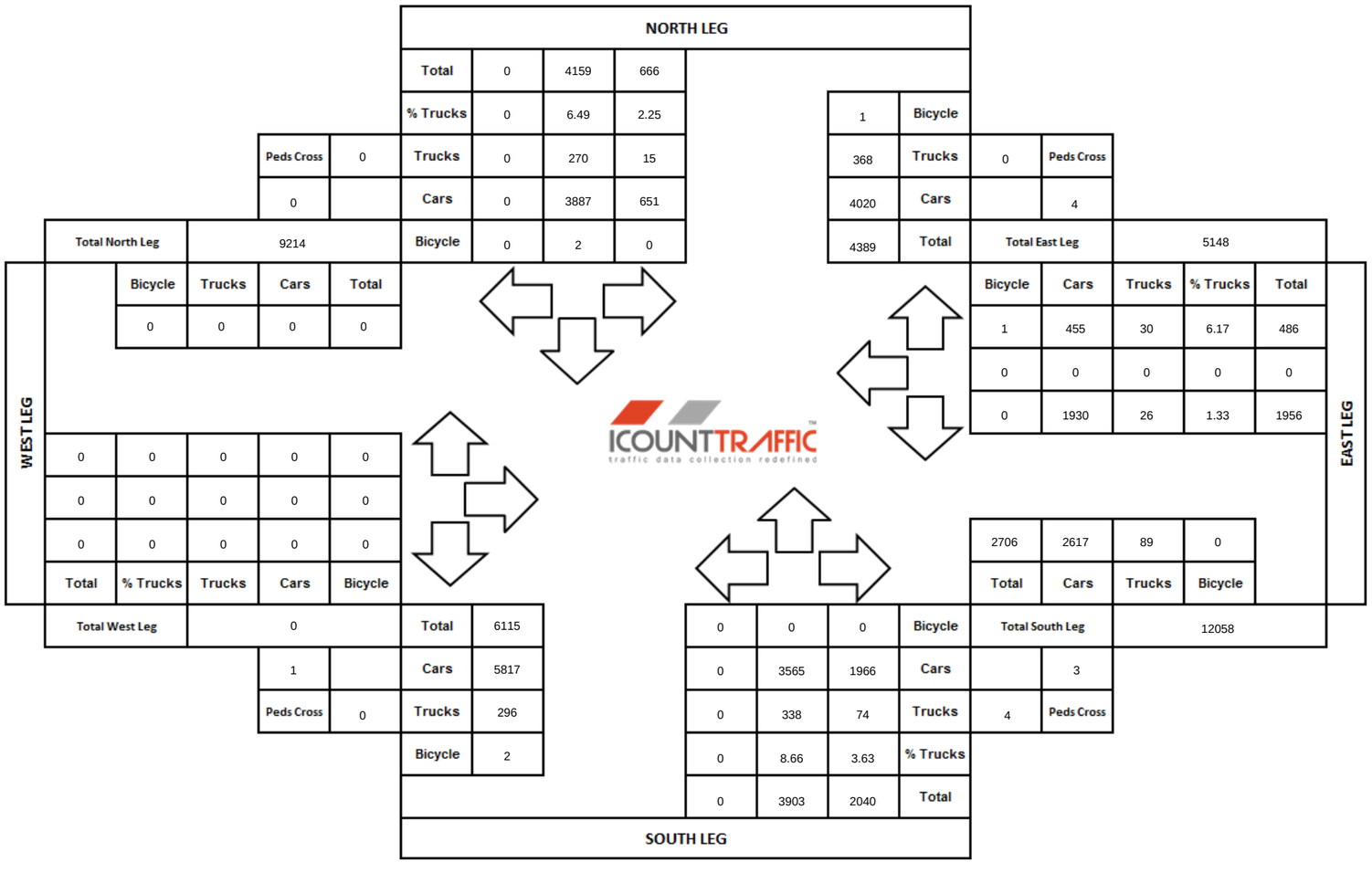
18/11/2015 17:15:00	0	0	0	0	0	0	0	0	0	0	1	1	1
18/11/2015 17:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 17:45:00	0	0	0	0	0	0	1	0	1	1	1	2	3
Hourly Total	0	0	0	0	0	0	1	0	1	1	2	3	4
18/11/2015 18:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 18:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	1	0	1	1	3	4	5

PM Peak Hour 5:00 PM - 6:00 PM

Pedestrians	0	0	0	0	0	0	1	0	1	1	2	3	4

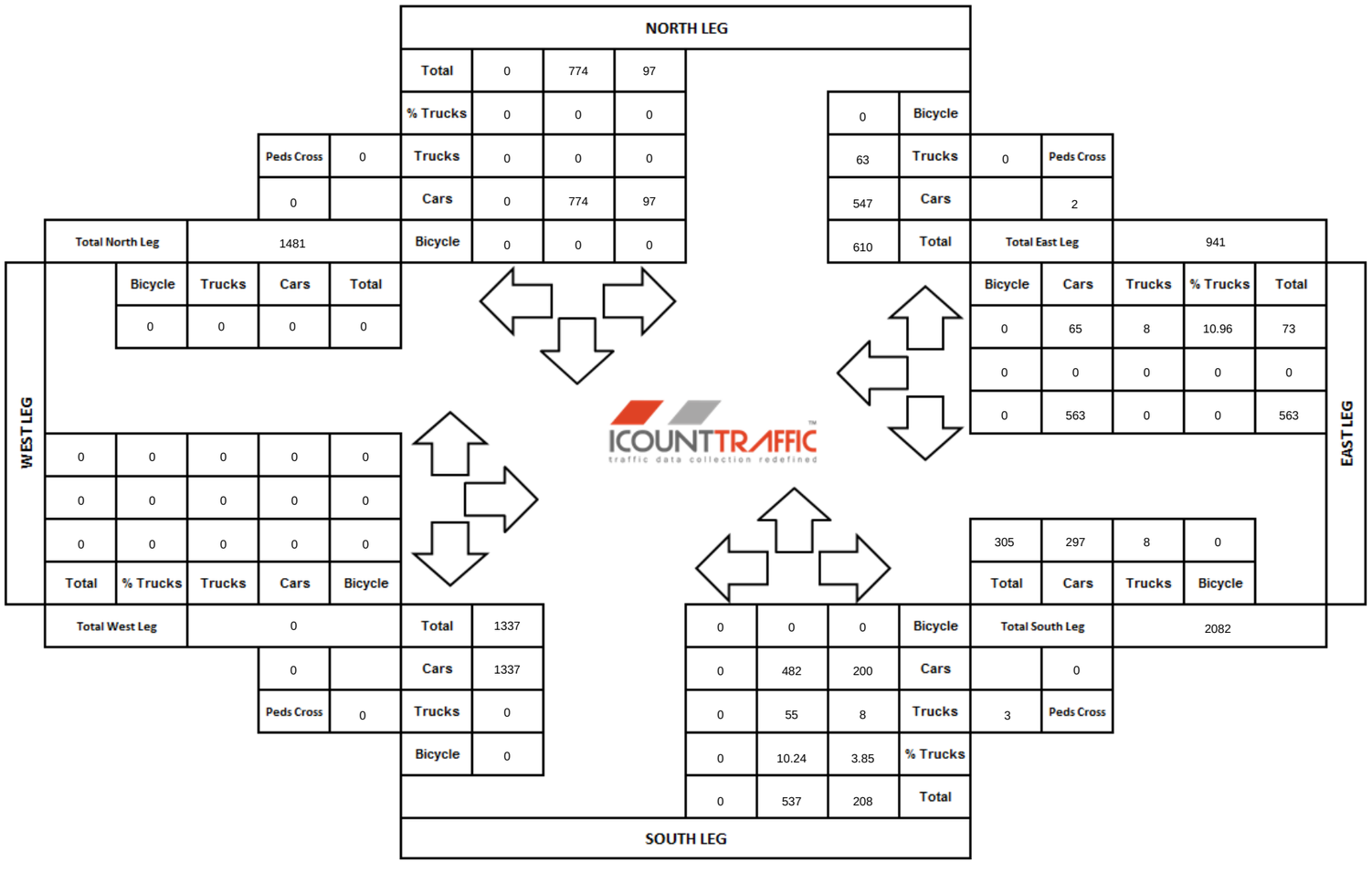
TOTAL TMC COUNT DIAGRAM

City:	**Brampton**	**Weather:**	**Light Rain**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Williams Parkway**	**Count Period:**	**AM, Noon, PM**
GPS Coordinates:	**43.657896, -79.817598**	**Peak Period:**	**7:15 AM - 8:15 AM, 1:00 PM - 2:00 PM, 4:45 PM - 5:45 PM**
Site Number:	**00119677**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**yiwei, Fartash**



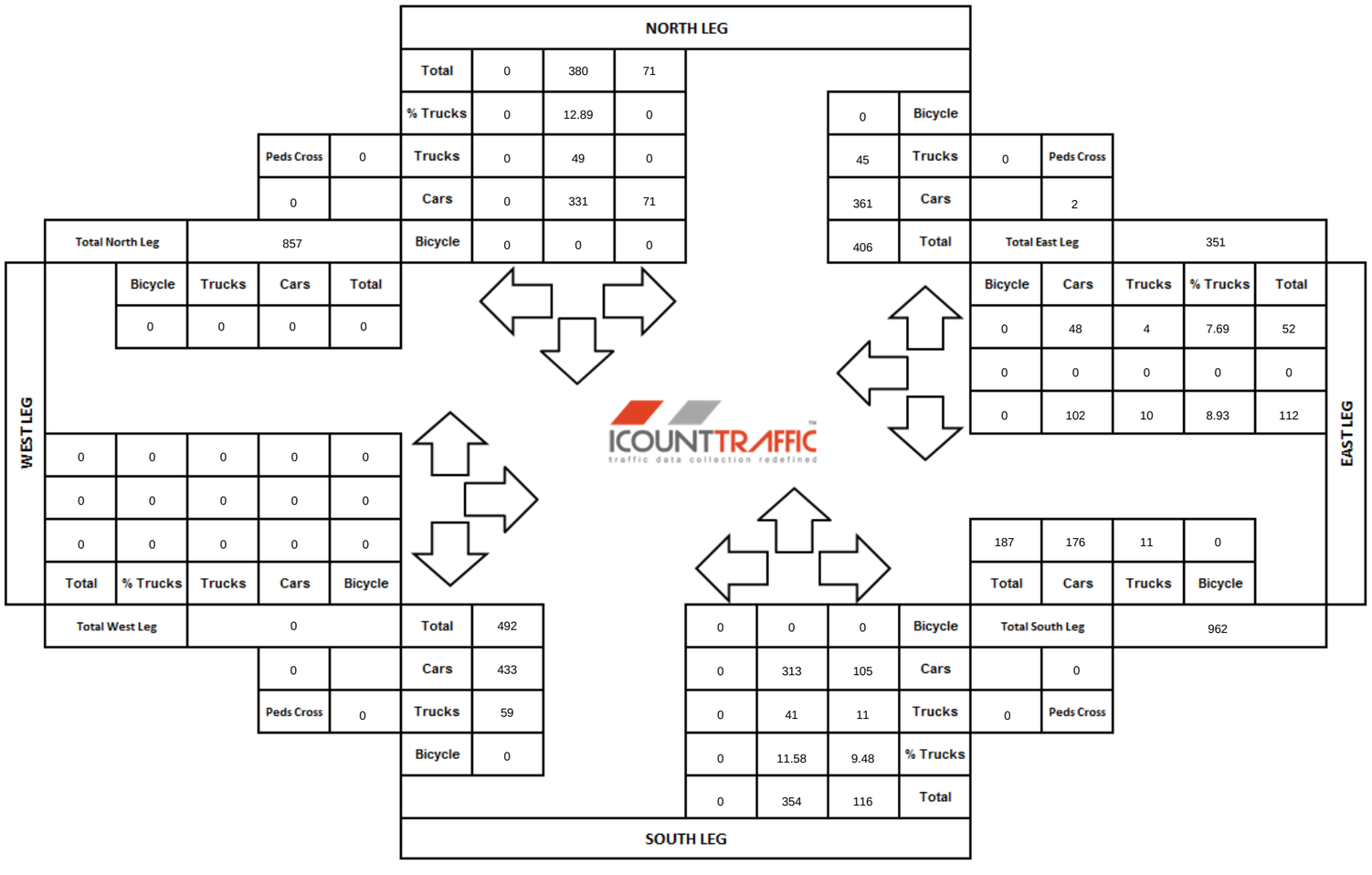
AM Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Light Rain**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Williams Parkway**	**Count Period:**	**AM**
GPS Coordinates:	**43.657896, -79.817598**	**Peak Period:**	**7:15 AM - 8:15 AM**
Site Number:	**00119677**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**yiwei, Fartash**



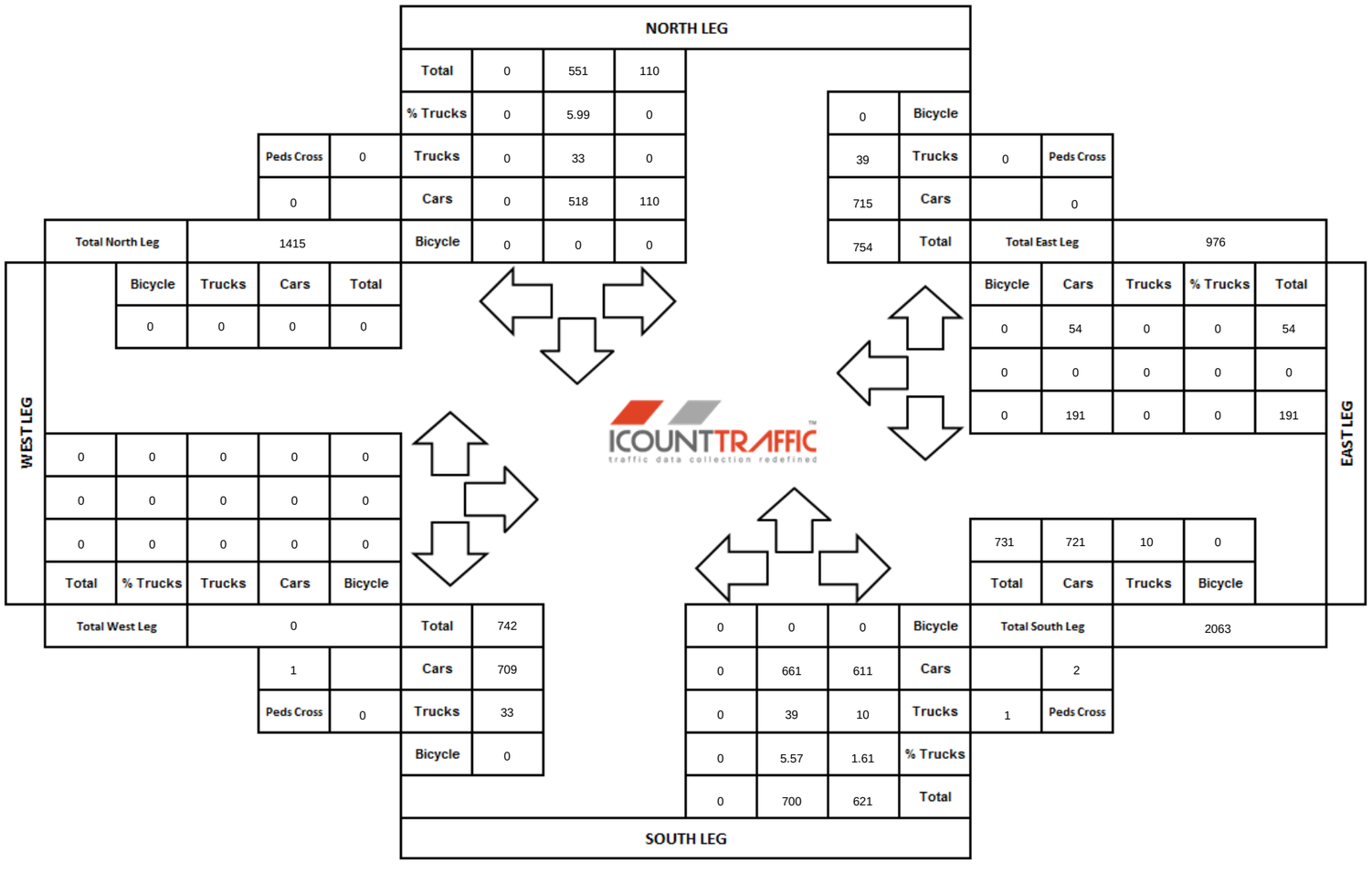
Noon Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Light Rain**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Williams Parkway**	**Count Period:**	**Noon**
GPS Coordinates:	**43.657896, -79.817598**	**Peak Period:**	**1:00 PM - 2:00 PM**
Site Number:	**00119677**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**yiwei, Fartash**



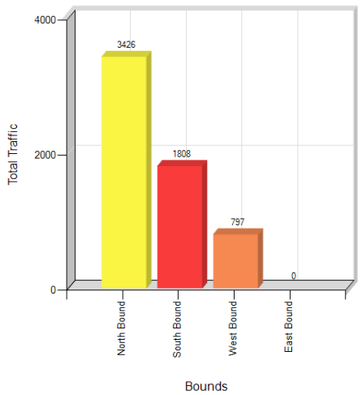
PM Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Light Rain**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Williams Parkway**	**Count Period:**	**PM**
GPS Coordinates:	**43.657896, -79.817598**	**Peak Period:**	**4:45 PM - 5:45 PM**
Site Number:	**00119677**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**yiwei, Fartash**

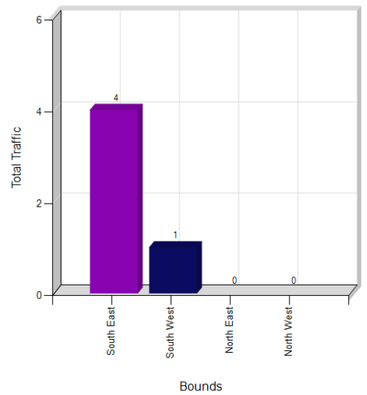


TMC chart data

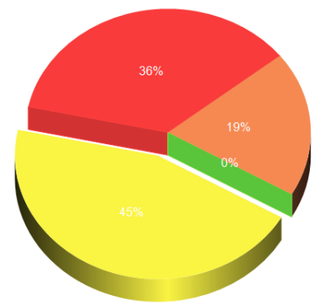
Total Traffic



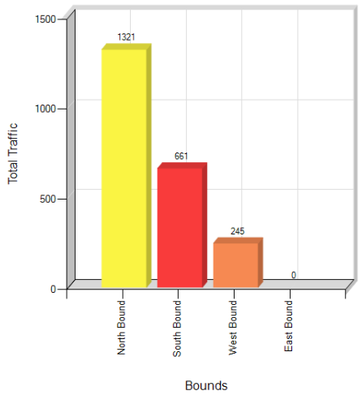
Total Pedestrians



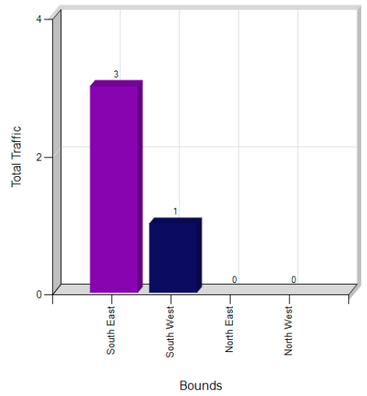
Total Approach



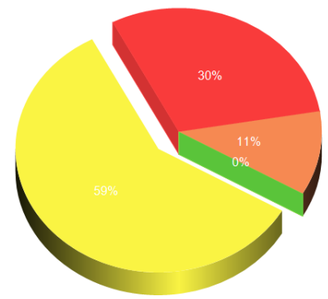
Total Traffic at Peak Hour



Total Pedestrians at Peak Hour



Total Approach at Peak Hour



	SouthBound		NorthEast
	WestBound		NorthWest
	NorthBound		SouthWest
	EastBound		SouthEast

NOTES & IMAGES

North leg Mississauga Road

East leg Williams parkway

South leg Mississauga Road

TMC - Intersection Count Summary

Company name: Trans-Plan Inc.
Company address: 24 Ryerson Avenue, Suite 211,Toronto, Ontario, Canada
Company phone: (647) 931-7383

Site: 00
Location: Mississauga Road at Credit Ridge Commons Driveway, Brampton
N/S Street: Mississauga Road
E/W Street: Credit Ridge Commons Driveway
GPS Coordinates: 43.655886, -79.814667
Date: 18 November 2015
Day of week: Wednesday
Analyst(s): Usman khan

VEHICLE TRAFFIC

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
18/11/2015 07:00	38	163	0	201	9	0	15	24	0	60	26	86	0	0	0	0	311
18/11/2015 07:15	37	193	0	230	7	0	18	25	0	76	14	90	0	0	0	0	345
18/11/2015 07:30	59	151	0	210	16	0	20	36	0	91	17	108	0	0	0	0	354
18/11/2015 07:45	52	296	0	348	18	0	30	48	0	131	18	149	0	0	0	0	545
Hourly Total	186	803	0	989	50	0	83	133	0	358	75	433	0	0	0	0	1555
18/11/2015 08:00	62	165	0	227	33	0	25	58	0	101	32	133	0	0	0	0	418
18/11/2015 08:15	27	192	0	219	27	0	18	45	0	115	25	140	0	0	0	0	404
18/11/2015 08:30	35	185	0	220	50	0	19	69	0	84	40	124	0	0	0	0	413
18/11/2015 08:45	23	240	0	263	15	0	10	25	0	106	11	117	0	0	0	0	405
Hourly Total	147	782	0	929	125	0	72	197	0	406	108	514	0	0	0	0	1640
18/11/2015 09:00	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
18/11/2015 09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	3
Grand Total	333	1588	0	1921	175	0	155	330	0	764	183	947	0	0	0	0	3198
Approach %	17	83	0	100	53	0	47	100	0	81	19	100	0	0	0	0	-
Total %	10	50	0	60	5	0	5	10	0	24	6	30	0	0	0	0	-

AM Peak Hour 7:45 AM - 8:45 AM

Vehicle Total	176	838	0	1014	128	0	92	220	0	431	115	546	0	0	0	0	1780
Car	176	758	0	934	128	0	90	218	0	398	115	513	0	0	0	0	1665
Truck	0	80	0	80	0	0	2	2	0	33	0	33	0	0	0	0	115
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
18/11/2015 11:00	20	66	0	86	16	0	15	31	0	100	30	130	0	0	0	0	247
18/11/2015 11:15	21	56	0	77	13	0	11	24	0	62	29	91	0	0	0	0	192
18/11/2015 11:30	24	71	0	95	33	0	8	41	0	79	36	115	0	0	0	0	251
18/11/2015 11:45	18	67	0	85	19	0	12	31	0	81	33	114	0	0	0	0	230
Hourly Total	83	260	0	343	81	0	46	127	0	322	128	450	0	0	0	0	920
18/11/2015 12:00	13	76	0	89	14	0	6	20	0	84	42	126	0	0	0	0	235
18/11/2015 12:15	22	73	0	95	24	0	6	30	0	75	31	106	0	0	0	0	231
18/11/2015 12:30	16	90	0	106	27	0	11	38	0	93	30	123	0	0	0	0	267
18/11/2015 12:45	25	82	0	107	28	0	8	36	0	90	41	131	0	0	0	0	274
Hourly Total	76	321	0	397	93	0	31	124	0	342	144	486	0	0	0	0	1007
18/11/2015 13:00	7	62	0	69	24	0	6	30	0	61	26	87	0	0	0	0	186
18/11/2015 13:15	10	70	0	80	24	0	4	28	0	79	37	116	0	0	0	0	224
18/11/2015 13:30	20	57	0	77	20	0	6	26	0	78	24	102	0	0	0	0	205
18/11/2015 13:45	29	100	0	129	24	0	15	39	0	94	30	124	0	0	0	0	292
Hourly Total	66	289	0	355	92	0	31	123	0	312	117	429	0	0	0	0	907
18/11/2015 14:00	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	3
18/11/2015 14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	3
Grand Total	225	870	0	1095	269	0	108	377	0	976	389	1365	0	0	0	0	2837
Approach %	21	79	0	100	71	0	29	100	0	72	28	100	0	0	0	0	-
Total %	8	31	0	39	9	0	4	13	0	34	14	48	0	0	0	0	-

Midday Peak Hour 12:00 PM - 1:00 PM

Vehicle Total	76	321	0	397	93	0	31	124	0	342	144	486	0	0	0	0	1007
Car	74	290	0	364	92	0	30	122	0	297	142	439	0	0	0	0	925
Truck	2	31	0	33	1	0	1	2	0	45	2	47	0	0	0	0	82
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
18/11/2015 15:00	14	81	0	95	7	0	15	22	0	129	33	162	0	0	0	0	279
18/11/2015 15:15	27	114	0	141	14	0	12	26	0	219	21	240	0	0	0	0	407
18/11/2015 15:30	14	95	0	109	14	0	7	21	0	188	33	221	0	0	0	0	351
18/11/2015 15:45	15	110	0	125	10	0	5	15	0	183	45	228	0	0	0	0	368
Hourly Total	70	400	0	470	45	0	39	84	0	719	132	851	0	0	0	0	1405
18/11/2015 16:00	22	94	0	116	6	0	11	17	0	208	36	244	0	0	0	0	377
18/11/2015 16:15	8	127	0	135	19	0	5	24	0	166	40	206	0	0	0	0	365
18/11/2015 16:30	13	99	0	112	17	0	5	22	0	222	37	259	0	0	0	0	393
18/11/2015 16:45	26	99	0	125	43	0	19	62	0	178	74	252	0	0	0	0	439
Hourly Total	69	419	0	488	85	0	40	125	0	774	187	961	0	0	0	0	1574
18/11/2015 17:00	20	78	0	98	16	0	9	25	0	242	68	310	0	0	0	0	433
18/11/2015 17:15	24	74	0	98	15	0	17	32	0	167	45	212	0	0	0	0	342
18/11/2015 17:30	35	82	0	117	17	0	26	43	0	203	33	236	0	0	0	0	396
18/11/2015 17:45	19	93	0	112	14	0	24	38	0	195	45	240	0	0	0	0	390
Hourly Total	98	327	0	425	62	0	76	138	0	807	191	998	0	0	0	0	1561
18/11/2015 18:00	3	3	0	6	2	0	2	4	0	3	3	6	0	0	0	0	16
18/11/2015 18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	3	3	0	6	2	0	2	4	0	3	3	6	0	0	0	0	16
Grand Total	240	1149	0	1389	194	0	157	351	0	2303	513	2816	0	0	0	0	4556
Approach %	17	83	0	100	55	0	45	100	0	82	18	100	0	0	0	0	-
Total %	5	25	0	30	4	0	3	7	0	51	11	62	0	0	0	0	-

PM Peak Hour 4:15 PM - 5:15 PM

Vehicle Total	67	403	0	470	95	0	38	133	0	808	219	1027	0	0	0	0	1630
Car	66	389	0	455	94	0	38	132	0	782	219	1001	0	0	0	0	1588
Truck	1	14	0	15	1	0	0	1	0	26	0	26	0	0	0	0	42
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PEDESTRIAN CROSSING

No pedestrian crossing for AM.

18/11/2015 11:00:00	0	0	0	0	0	0	0	0	0	0	1	1	1
18/11/2015 11:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 11:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 11:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	1	1	1
18/11/2015 12:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 12:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 12:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 12:45:00	2	0	2	0	0	0	0	0	0	0	1	1	3
Hourly Total	2	0	2	0	0	0	0	0	0	0	1	1	3
18/11/2015 13:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 13:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 13:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 13:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 14:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 14:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	2	0	2	0	0	0	0	0	0	0	2	2	4

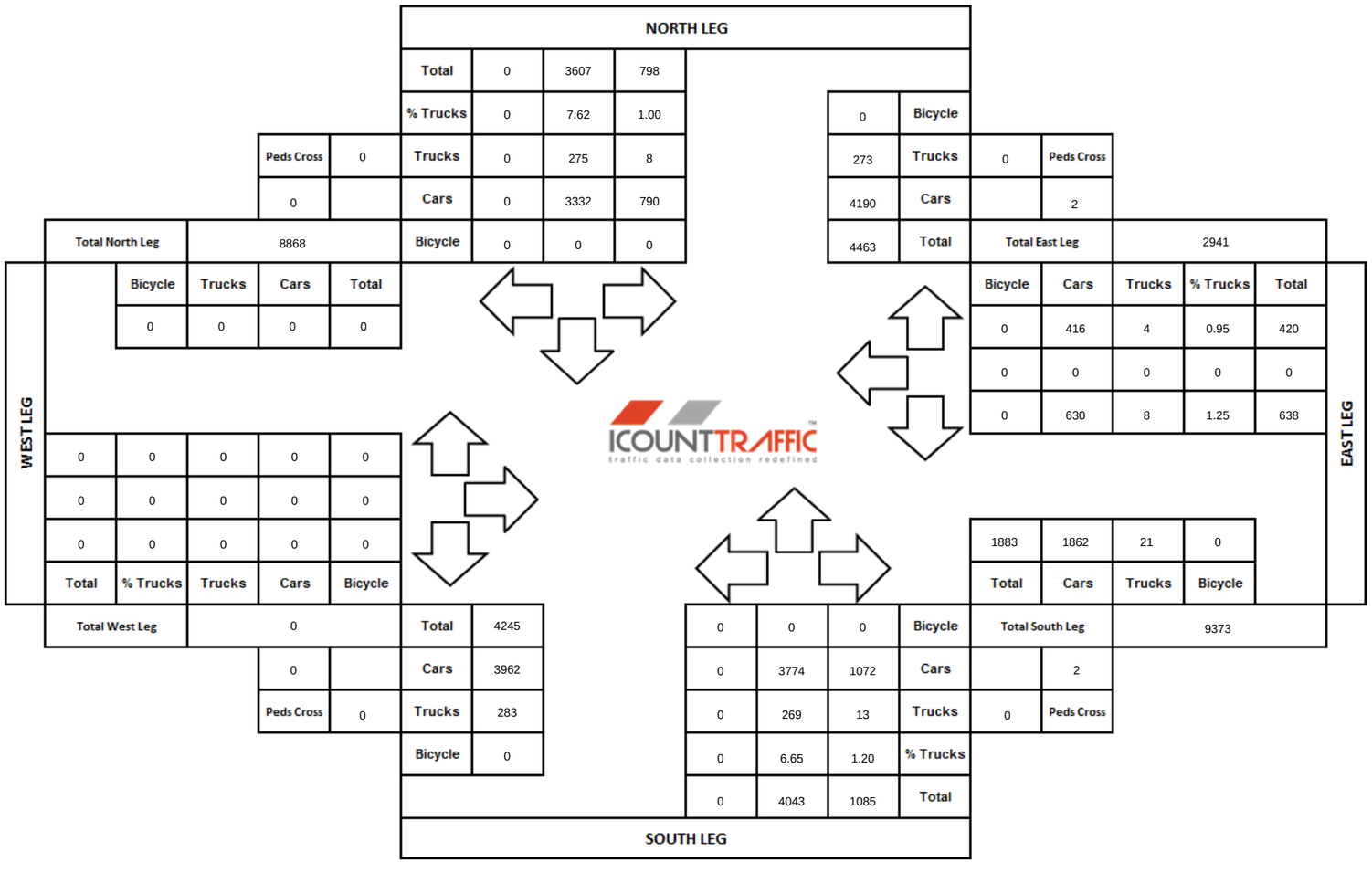
Midday Peak Hour 12:00 PM - 1:00 PM

Pedestrians	2	0	2	0	0	0	0	0	0	0	1	1	3

No pedestrian crossing for PM.

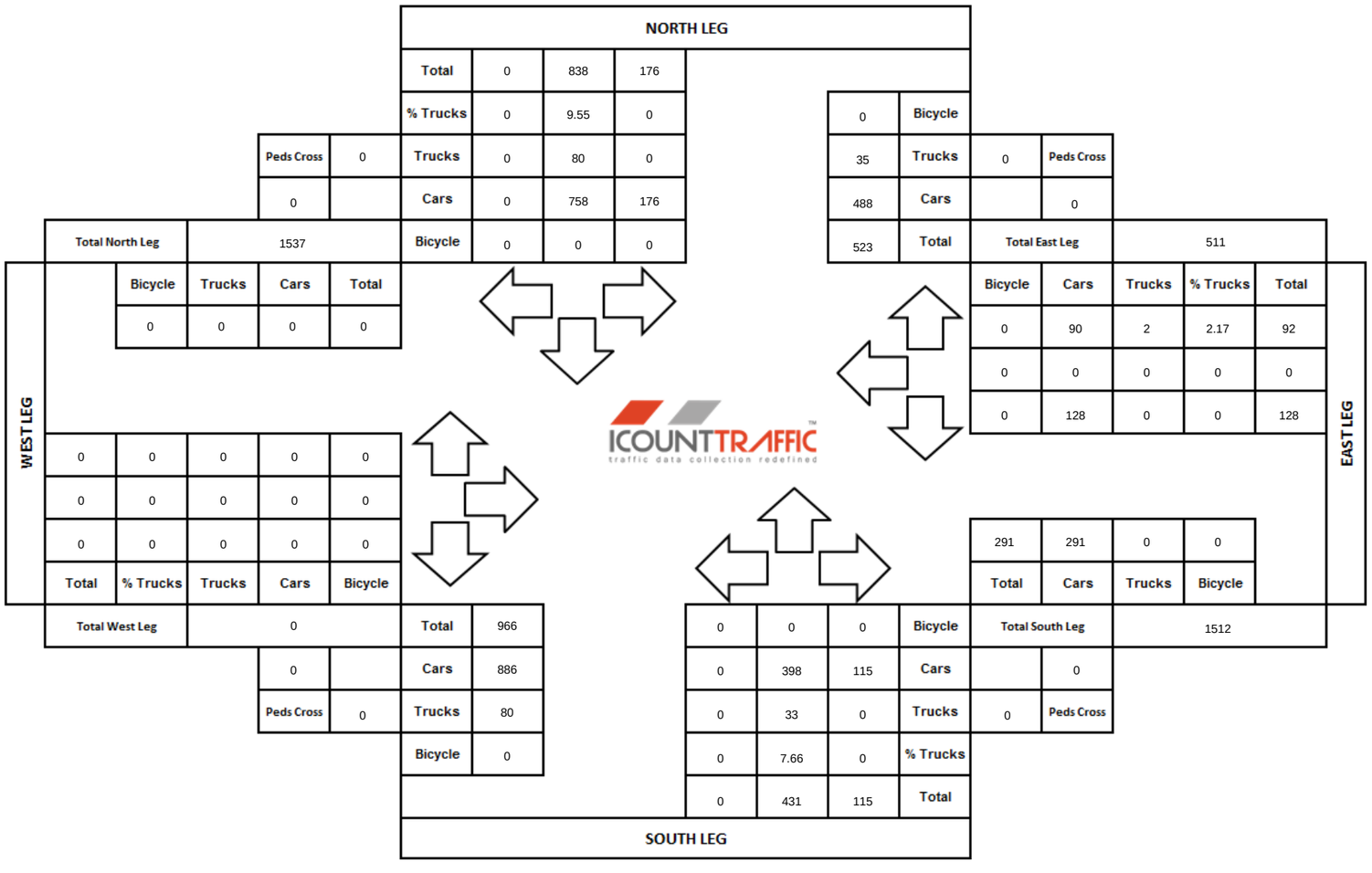
TOTAL TMC COUNT DIAGRAM

City:	**Brampton**	**Weather:**	**Mostly Cloudy/Windy**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Credit Ridge Commons Driveway**	**Count Period:**	**AM, Noon, PM**
GPS Coordinates:	**43.655886, -79.814667**	**Peak Period:**	**7:45 AM - 8:45 AM, 12:00 PM - 1:00 PM, 4:15 PM - 5:15 PM**
Site Number:	**00**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**Usman khan**



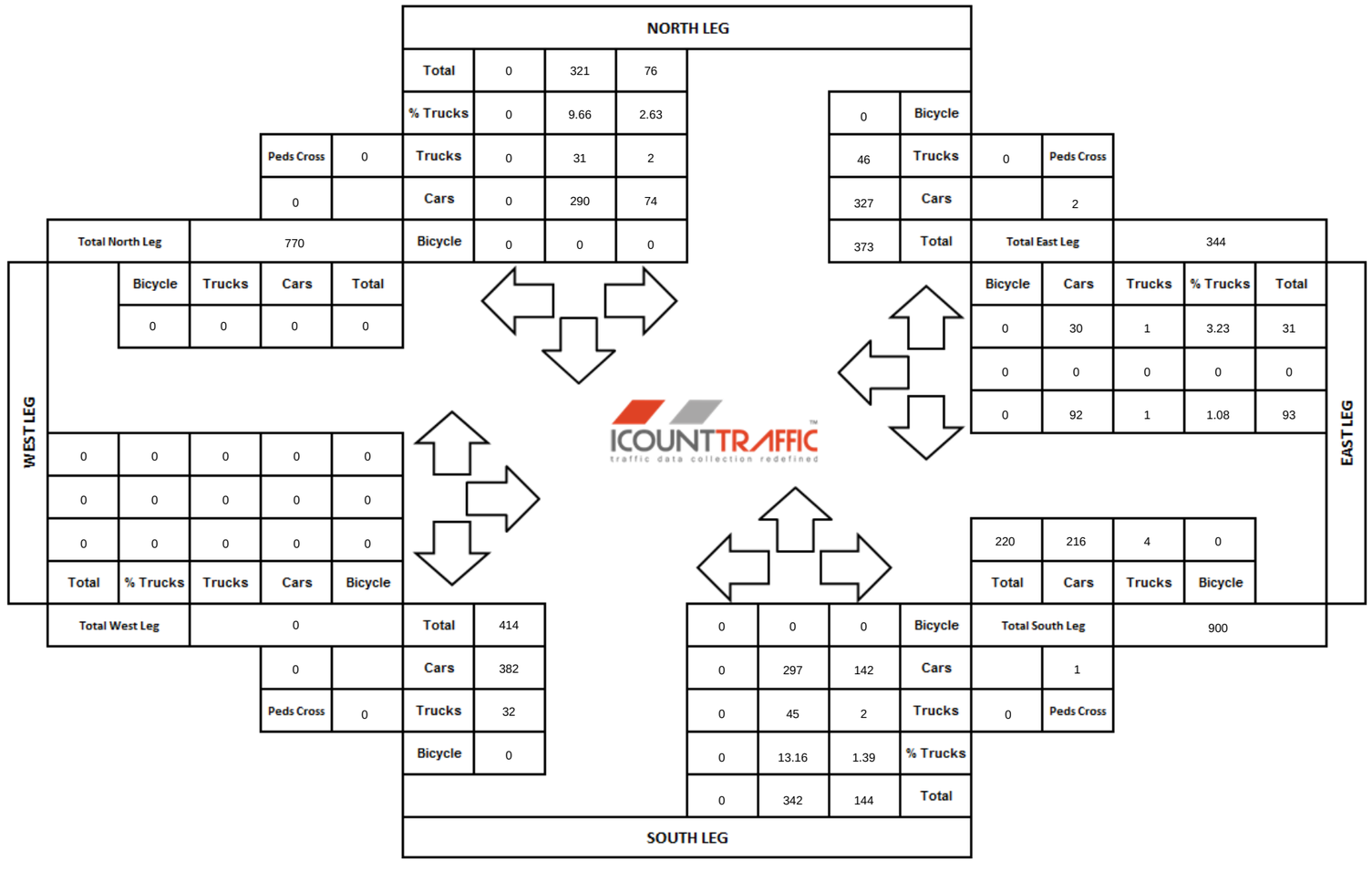
AM Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Mostly Cloudy/Windy**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Credit Ridge Commons Driveway**	**Count Period:**	**AM**
GPS Coordinates:	**43.655886, -79.814667**	**Peak Period:**	**7:45 AM - 8:45 AM**
Site Number:	**00**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**Usman khan**



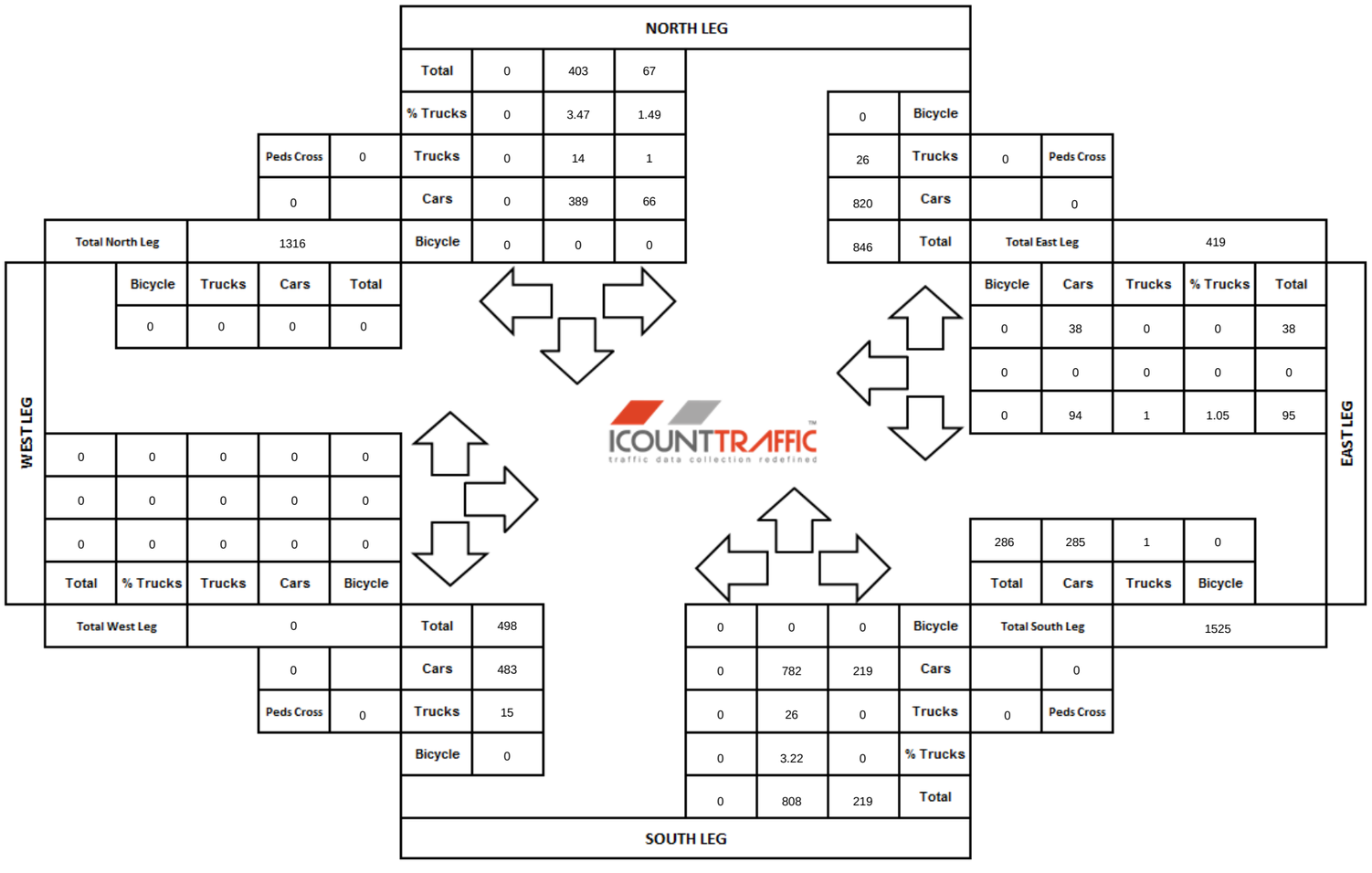
Noon Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Mostly Cloudy/Windy**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Credit Ridge Commons Driveway**	**Count Period:**	**Noon**
GPS Coordinates:	**43.655886, -79.814667**	**Peak Period:**	**12:00 PM - 1:00 PM**
Site Number:	**00**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**Usman khan**



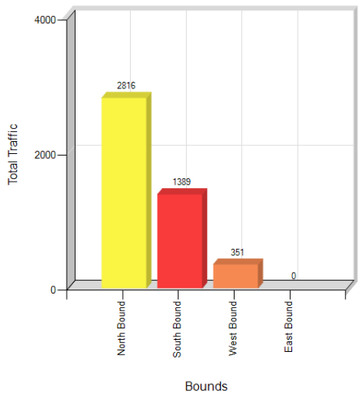
PM Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Mostly Cloudy/Windy**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Credit Ridge Commons Driveway**	**Count Period:**	**PM**
GPS Coordinates:	**43.655886, -79.814667**	**Peak Period:**	**4:15 PM - 5:15 PM**
Site Number:	**00**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**Usman khan**

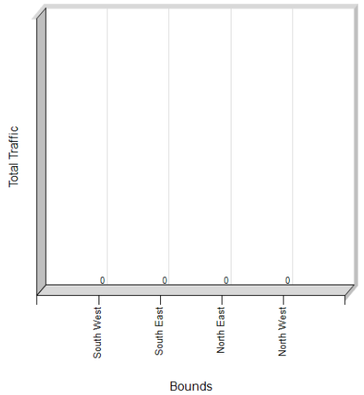


TMC chart data

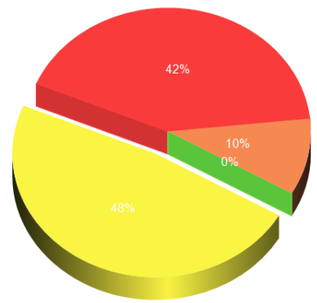
Total Traffic



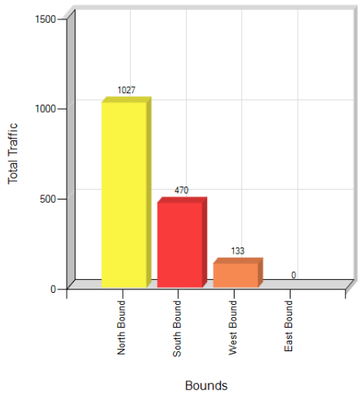
Total Pedestrians



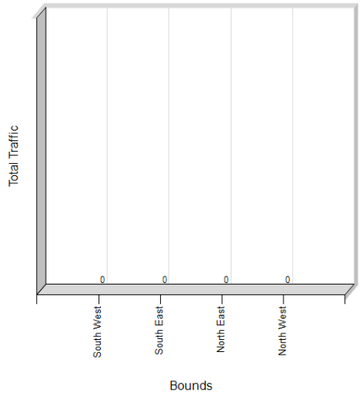
Total Approach



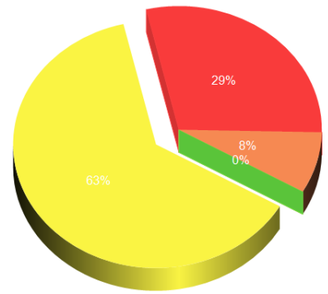
Total Traffic at Peak Hour



Total Pedestrians at Peak Hour



Total Approach at Peak Hour



	SouthBound		NorthEast
	WestBound		NorthWest
	NorthBound		SouthWest
	EastBound		SouthEast

NOTES & IMAGES

TMC - Intersection Count Summary

Company name: Trans-Plan Inc.
Company address: 24 Ryerson Avenue, Suite 211,Toronto, Ontario, Canada
Company phone: (647) 931-7383

Site: 119014
Location: Mississauga Road at Beacon Hill Drive, Brampton
N/S Street: Mississauga Road
E/W Street: Beacon Hill Drive
GPS Coordinates: 43.653518, -79.811688
Date: 13 May 2015
Day of week: Wednesday
Analyst(s): Matthew Le

VEHICLE TRAFFIC

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
13/05/2015 07:00	0	278	0	278	8	0	1	9	0	118	1	119	0	0	0	0	406
13/05/2015 07:15	0	324	0	324	8	0	2	10	0	160	0	160	0	0	0	0	494
13/05/2015 07:30	1	384	0	385	13	0	1	14	0	174	5	179	0	0	0	0	578
13/05/2015 07:45	1	397	0	398	22	0	0	22	0	197	1	198	0	0	0	0	618
Hourly Total	2	1383	0	1385	51	0	4	55	0	649	7	656	0	0	0	0	2096
13/05/2015 08:00	0	413	0	413	22	0	2	24	0	185	0	185	0	0	0	0	622
13/05/2015 08:15	1	321	0	322	14	0	2	16	0	135	2	137	0	0	0	0	475
13/05/2015 08:30	0	345	0	345	15	0	0	15	0	135	1	136	0	0	0	0	496
13/05/2015 08:45	1	323	0	324	11	0	0	11	0	146	3	149	0	0	0	0	484
Hourly Total	2	1402	0	1404	62	0	4	66	0	601	6	607	0	0	0	0	2077
13/05/2015 09:00	0	38	0	38	0	0	0	0	0	8	0	8	0	0	0	0	46
13/05/2015 09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	38	0	38	0	0	0	0	0	8	0	8	0	0	0	0	46
Grand Total	4	2823	0	2827	113	0	8	121	0	1258	13	1271	0	0	0	0	4219
Approach %	0	100	0	100	93	0	7	100	0	99	1	100	0	0	0	0	-
Total %	0	67	0	67	3	0	0	3	0	30	0	30	0	0	0	0	-

AM Peak Hour 7:15 AM - 8:15 AM

Vehicle Total	2	1518	0	1520	65	0	5	70	0	716	6	722	0	0	0	0	2312
Car	1	1377	0	1378	60	0	5	65	0	561	5	566	0	0	0	0	2009
Truck	1	141	0	142	5	0	0	5	0	155	1	156	0	0	0	0	303
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
13/05/2015 11:00	0	114	0	114	4	0	0	4	0	114	3	117	0	0	0	0	235
13/05/2015 11:15	0	178	0	178	0	0	0	0	0	109	0	109	0	0	0	0	287
13/05/2015 11:30	1	146	0	147	2	0	3	5	0	154	1	155	0	0	0	0	307
13/05/2015 11:45	3	192	0	195	3	0	1	4	0	149	2	151	0	0	0	0	350
Hourly Total	4	630	0	634	9	0	4	13	0	526	6	532	0	0	0	0	1179
13/05/2015 12:00	1	168	0	169	1	0	3	4	0	135	4	139	0	0	0	0	312
13/05/2015 12:15	1	144	0	145	7	0	0	7	0	144	2	146	0	0	0	0	298
13/05/2015 12:30	4	223	0	227	7	0	1	8	0	172	1	173	0	0	0	0	408
13/05/2015 12:45	1	179	0	180	1	0	1	2	0	137	0	137	0	0	0	0	319
Hourly Total	7	714	0	721	16	0	5	21	0	588	7	595	0	0	0	0	1337
13/05/2015 13:00	2	151	0	153	2	0	0	2	0	122	2	124	0	0	0	0	279
13/05/2015 13:15	1	183	0	184	4	0	0	4	0	123	1	124	0	0	0	0	312
13/05/2015 13:30	0	154	0	154	2	0	0	2	0	150	8	158	0	0	0	0	314
13/05/2015 13:45	1	167	0	168	1	0	0	1	0	161	3	164	0	0	0	0	333
Hourly Total	4	655	0	659	9	0	0	9	0	556	14	570	0	0	0	0	1238
13/05/2015 14:00	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
13/05/2015 14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Grand Total	15	2000	0	2015	34	0	9	43	0	1670	27	1697	0	0	0	0	3755
Approach %	1	99	0	100	79	0	21	100	0	98	2	100	0	0	0	0	-
Total %	0	53	0	53	1	0	0	1	0	44	1	45	0	0	0	0	-

Midday Peak Hour 11:45 AM - 12:45 PM

Vehicle Total	9	727	0	736	18	0	5	23	0	600	9	609	0	0	0	0	1368
Car	7	576	0	583	16	0	4	20	0	452	9	461	0	0	0	0	1064
Truck	2	151	0	153	2	0	1	3	0	148	0	148	0	0	0	0	304
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
13/05/2015 15:00	1	155	0	156	1	0	0	1	0	195	2	197	0	0	0	0	354
13/05/2015 15:15	1	148	0	149	1	0	4	5	0	198	3	201	0	0	0	0	355
13/05/2015 15:30	2	180	0	182	4	0	0	4	0	265	2	267	0	0	0	0	453
13/05/2015 15:45	1	198	0	199	0	0	0	0	0	286	3	289	0	0	0	0	488
Hourly Total	5	681	0	686	6	0	4	10	0	944	10	954	0	0	0	0	1650
13/05/2015 16:00	2	203	0	205	1	0	3	4	0	338	8	346	0	0	0	0	555
13/05/2015 16:15	1	199	0	200	4	0	0	4	0	344	8	352	0	0	0	0	556
13/05/2015 16:30	1	206	0	207	0	0	2	2	0	453	3	456	0	0	0	0	665
13/05/2015 16:45	0	216	0	216	1	0	1	2	0	543	1	544	0	0	0	0	762
Hourly Total	4	824	0	828	6	0	6	12	0	1678	20	1698	0	0	0	0	2538
13/05/2015 17:00	1	211	0	212	2	0	0	2	0	565	4	569	0	0	0	0	783
13/05/2015 17:15	2	197	0	199	0	0	0	0	0	520	9	529	0	0	0	0	728
13/05/2015 17:30	2	179	0	181	1	0	0	1	0	422	2	424	0	0	0	0	606
13/05/2015 17:45	3	201	0	204	1	0	0	1	0	282	11	293	0	0	0	0	498
Hourly Total	8	788	0	796	4	0	0	4	0	1789	26	1815	0	0	0	0	2615
13/05/2015 18:00	0	5	0	5	0	0	0	0	0	1	0	1	0	0	0	0	6
13/05/2015 18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	5	0	5	0	0	0	0	0	1	0	1	0	0	0	0	6
Grand Total	17	2298	0	2315	16	0	10	26	0	4412	56	4468	0	0	0	0	6809
Approach %	1	99	0	100	62	0	38	100	0	99	1	100	0	0	0	0	-
Total %	0	34	0	34	0	0	0	0	0	65	1	66	0	0	0	0	-

PM Peak Hour 4:30 PM - 5:30 PM

Vehicle Total	4	830	0	834	3	0	3	6	0	2081	17	2098	0	0	0	0	2938
Car	4	704	0	708	3	0	2	5	0	1961	17	1978	0	0	0	0	2691
Truck	0	126	0	126	0	0	1	1	0	120	0	120	0	0	0	0	247
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PEDESTRIAN CROSSING

	North East			North West			South West			South East			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
13/05/2015 07:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
13/05/2015 07:15:00	0	0	0	0	0	0	0	0	0	0	1	1	1
13/05/2015 07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
13/05/2015 07:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	1	1	1
13/05/2015 08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
13/05/2015 08:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
13/05/2015 08:30:00	2	0	2	0	0	0	0	0	0	0	0	0	2
13/05/2015 08:45:00	3	0	3	0	0	0	0	0	0	0	0	0	3
Hourly Total	5	0	5	0	0	0	0	0	0	0	0	0	5
13/05/2015 09:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
13/05/2015 09:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	5	0	5	0	0	0	0	0	0	0	1	1	6

AM Peak Hour 8:00 AM - 9:00 AM

Pedestrians	5	0	5	0	0	0	0	0	0	0	0	0	5

13/05/2015 11:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
13/05/2015 11:15:00	0	0	0	0	0	0	0	0	0	0	1	1	1
13/05/2015 11:30:00	2	0	2	0	0	0	0	0	0	0	3	3	5
13/05/2015 11:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	2	0	2	0	0	0	0	0	0	0	4	4	6
13/05/2015 12:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
13/05/2015 12:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
13/05/2015 12:30:00	1	0	1	0	0	0	0	0	0	0	0	0	1
13/05/2015 12:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	1	0	1	0	0	0	0	0	0	0	0	0	1
13/05/2015 13:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
13/05/2015 13:15:00	1	0	1	0	0	0	0	0	0	0	1	1	2
13/05/2015 13:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
13/05/2015 13:45:00	2	0	2	0	0	0	0	0	0	0	0	0	2
Hourly Total	3	0	3	0	0	0	0	0	0	0	1	1	4
13/05/2015 14:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
13/05/2015 14:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	6	0	6	0	0	0	0	0	0	0	5	5	11

Midday Peak Hour 11:00 AM - 12:00 PM

Pedestrians	2	0	2	0	0	0	0	0	0	0	4	4	6

	North East			North West			South West			South East			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
13/05/2015 15:00:00	0	0	0	0	0	0	0	0	0	0	1	1	1
13/05/2015 15:15:00	0	0	0	0	0	0	0	0	0	0	1	1	1
13/05/2015 15:30:00	0	0	0	0	0	0	0	0	0	0	1	1	1
13/05/2015 15:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	3	3	3
13/05/2015 16:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
13/05/2015 16:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
13/05/2015 16:30:00	4	0	4	0	0	0	0	0	0	0	0	0	4
13/05/2015 16:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	4	0	4	0	0	0	0	0	0	0	0	0	4
13/05/2015 17:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0

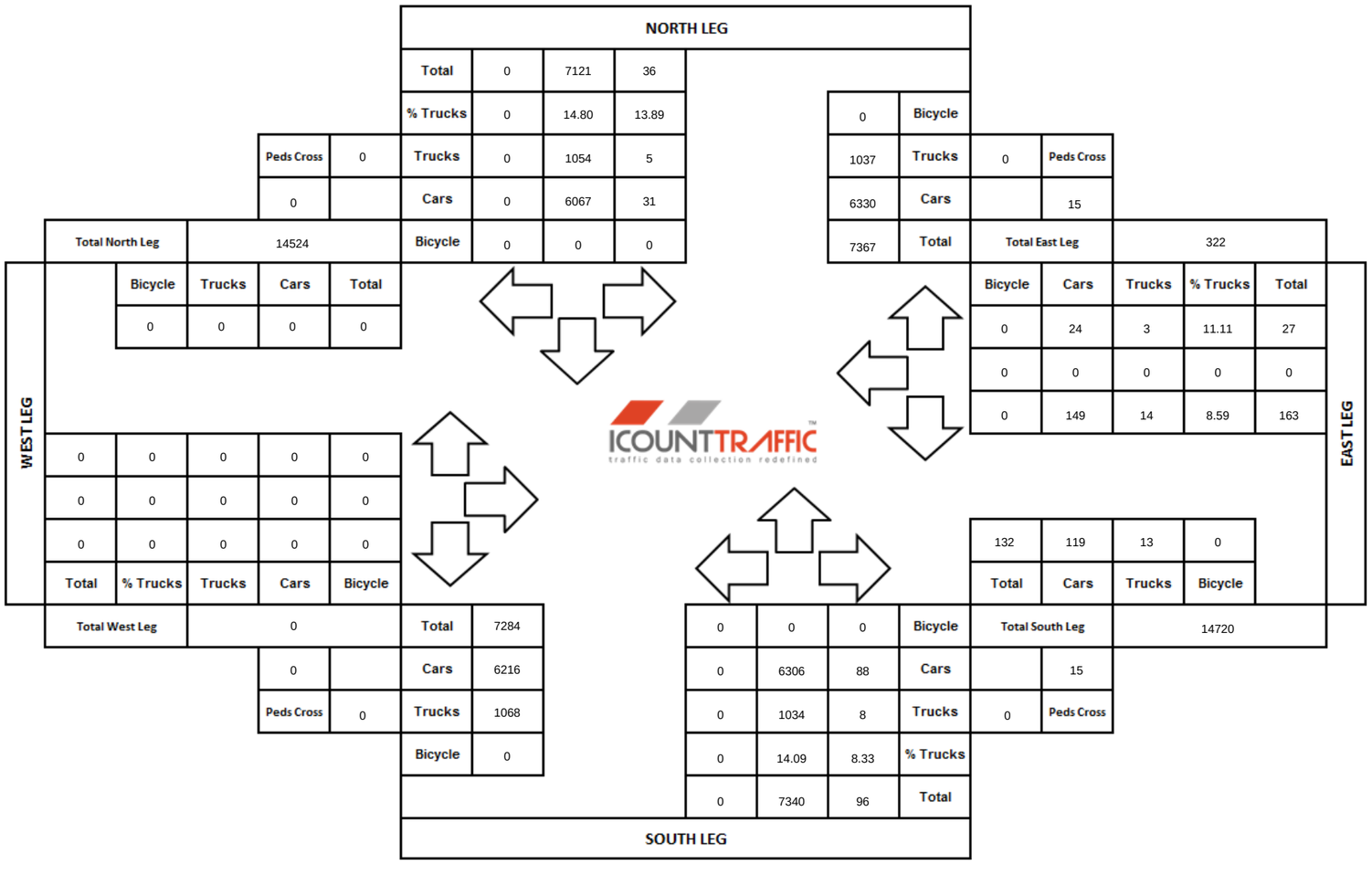
13/05/2015 17:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
13/05/2015 17:30:00	0	0	0	0	0	0	0	0	0	0	5	5	5
13/05/2015 17:45:00	0	0	0	0	0	0	0	0	0	0	1	1	1
Hourly Total	0	0	0	0	0	0	0	0	0	0	6	6	6
13/05/2015 18:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
13/05/2015 18:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	4	0	4	0	0	0	0	0	0	0	9	9	13

PM Peak Hour 5:00 PM - 6:00 PM

Pedestrians	0	0	0	0	0	0	0	0	0	0	6	6	6

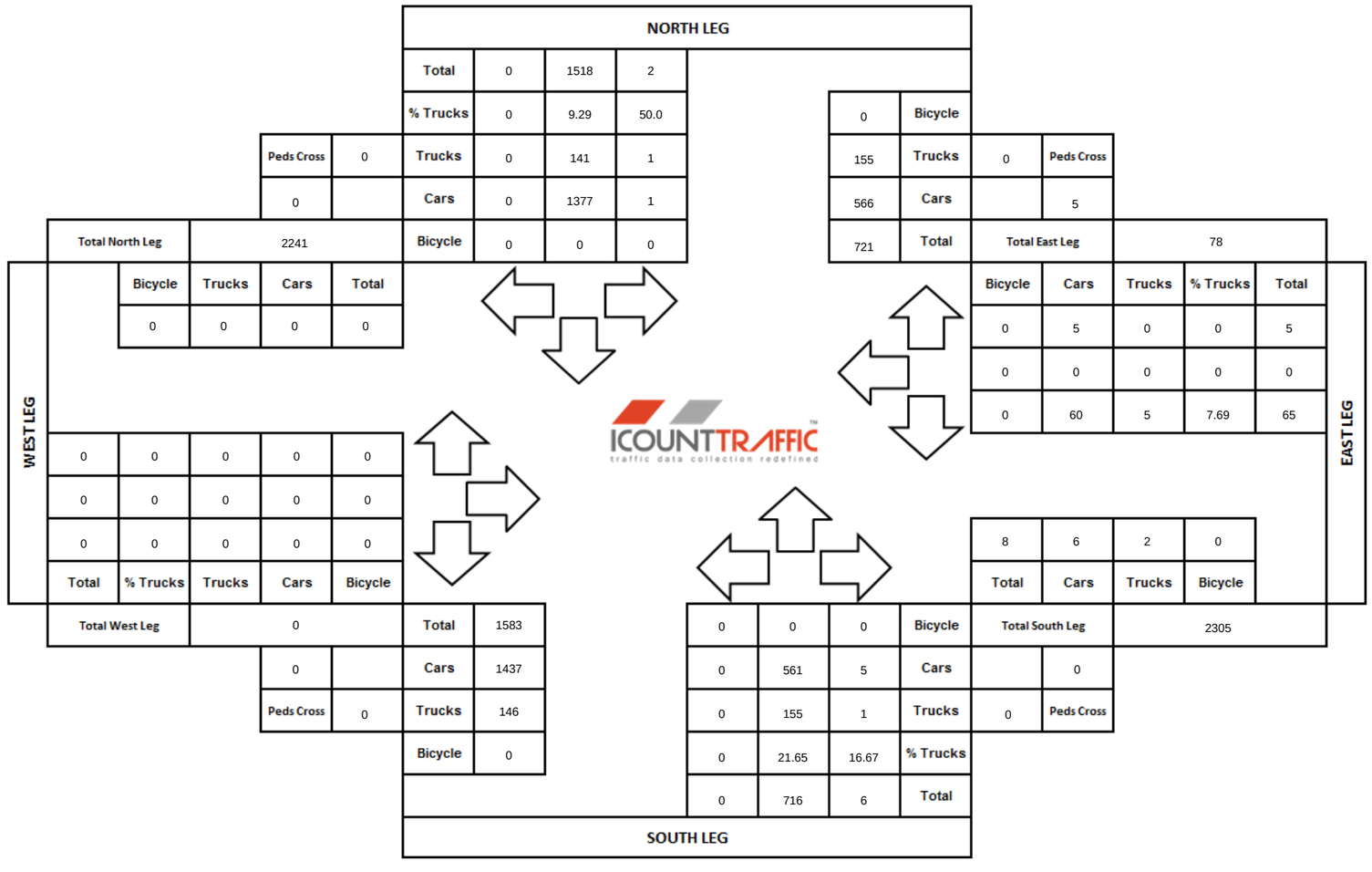
TOTAL TMC COUNT DIAGRAM

City:	**Brampton**	**Weather:**	**Cloudy**
North/South Street:	**Mississauga Road**	**Count Date:**	**13/05/2015**
East/West Street:	**Beacon Hill Drive**	**Count Period:**	**AM, Noon, PM**
GPS Coordinates:	**43.653518, -79.811688**	**Peak Period:**	**7:15 AM - 8:15 AM, 11:45 AM - 12:45 PM, 4:30 PM - 5:30 PM**
Site Number:	**119014**	**Major Road:**	**Mississauga Road**
Control:	**Non signalized**	**Surveyor:**	**Matthew Le**



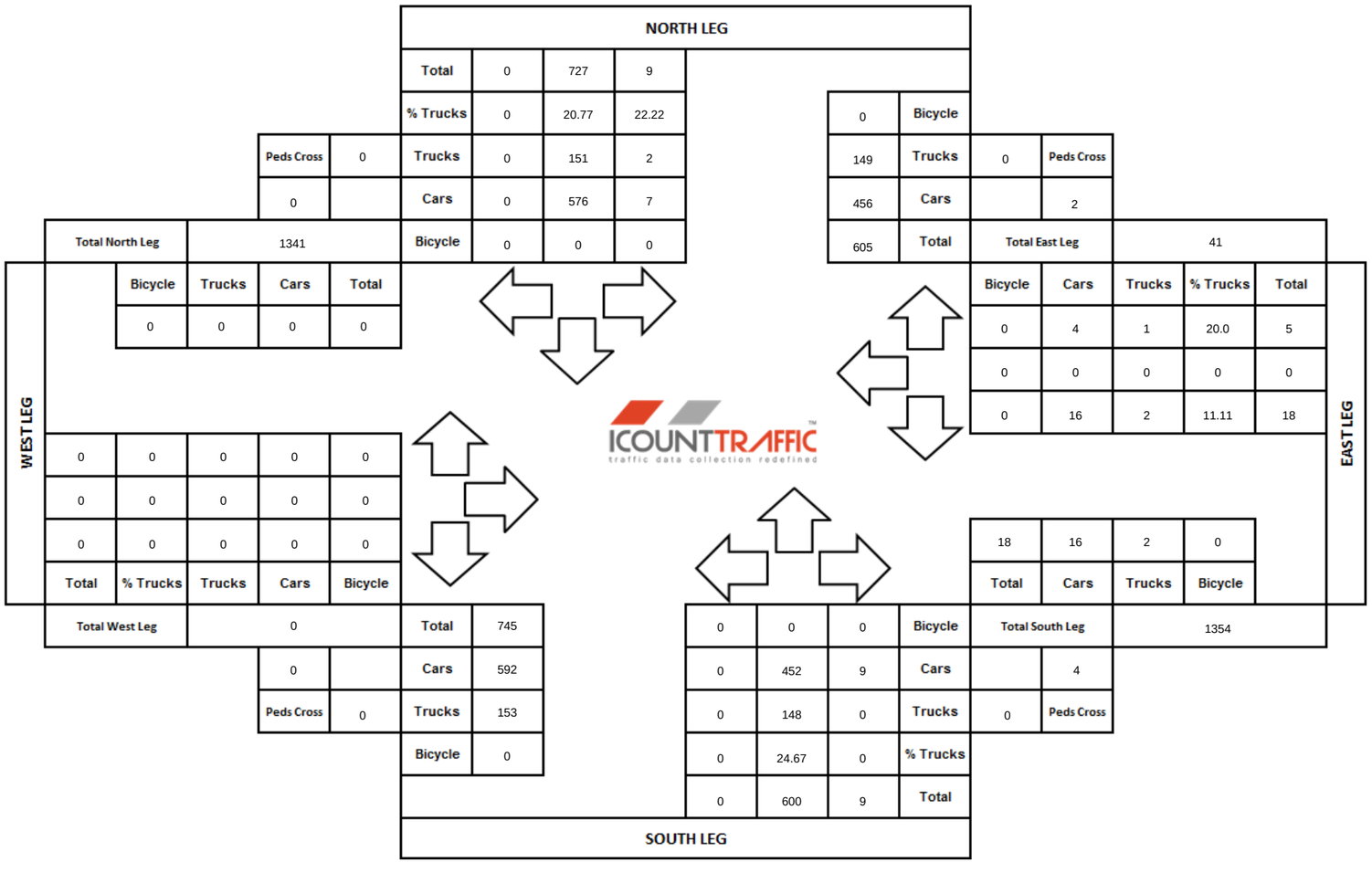
AM Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Cloudy**
North/South Street:	**Mississauga Road**	**Count Date:**	**13/05/2015**
East/West Street:	**Beacon Hill Drive**	**Count Period:**	**AM**
GPS Coordinates:	**43.653518, -79.811688**	**Peak Period:**	**7:15 AM - 8:15 AM**
Site Number:	**119014**	**Major Road:**	**Mississauga Road**
Control:	**Non signalized**	**Surveyor:**	**Matthew Le**



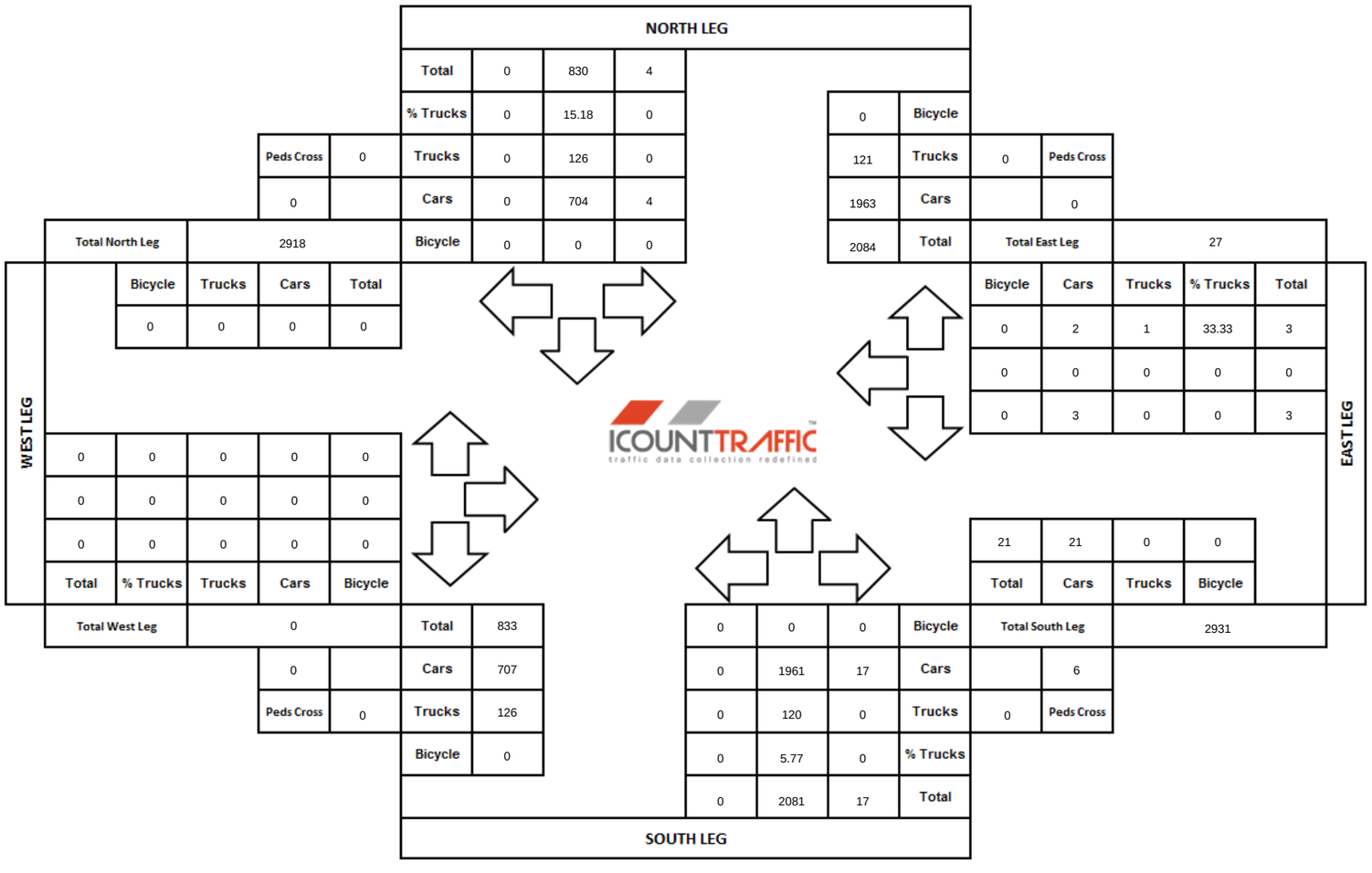
Noon Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Cloudy**
North/South Street:	**Mississauga Road**	**Count Date:**	**13/05/2015**
East/West Street:	**Beacon Hill Drive**	**Count Period:**	**Noon**
GPS Coordinates:	**43.653518, -79.811688**	**Peak Period:**	**11:45 AM - 12:45 PM**
Site Number:	**119014**	**Major Road:**	**Mississauga Road**
Control:	**Non signalized**	**Surveyor:**	**Matthew Le**



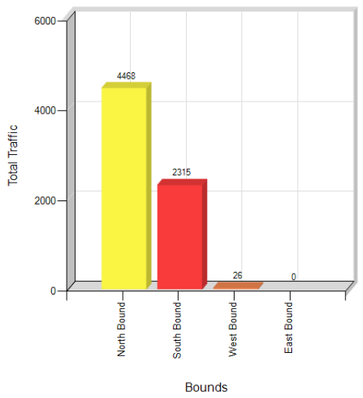
PM Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Cloudy**
North/South Street:	**Mississauga Road**	**Count Date:**	**13/05/2015**
East/West Street:	**Beacon Hill Drive**	**Count Period:**	**PM**
GPS Coordinates:	**43.653518, -79.811688**	**Peak Period:**	**4:30 PM - 5:30 PM**
Site Number:	**119014**	**Major Road:**	**Mississauga Road**
Control:	**Non signalized**	**Surveyor:**	**Matthew Le**

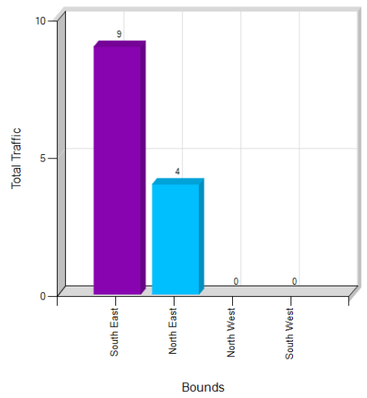


TMC chart data

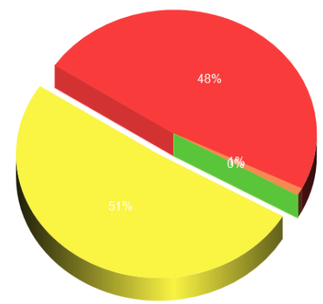
Total Traffic



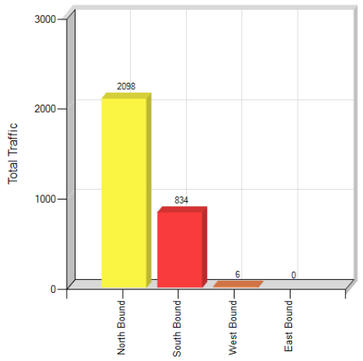
Total Pedestrians



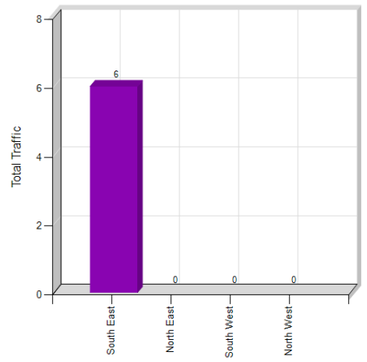
Total Approach



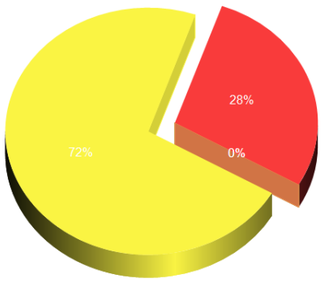
Total Traffic at Peak Hour



Total Pedestrians at Peak Hour



Total Approach at Peak Hour



	SouthBound		NorthEast
	WestBound		NorthWest
	NorthBound		SouthWest
	EastBound		SouthEast

NOTES & IMAGES

North Leg Mississauga Road

East Leg Beacon Hill Drive

West Leg Cleave View Farms

South Leg Mississauga Road

TMC - Intersection Count Summary

Company name: Trans-Plan Inc.
Company address: 24 Ryerson Avenue, Suite 211,Toronto, Ontario, Canada
Company phone: (647) 931-7383

Site: 00118488
Location: Mississauga Road at Ostrander Boulevard/Adamsville, Brampton
N/S Street: Mississauga Road
E/W Street: Ostrander Boulevard/Adamsville
GPS Coordinates: 43.650660, -79.807621
Date: 19 November 2015
Day of week: Thursday
Analyst(s): Andy Wong

VEHICLE TRAFFIC

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
19/11/2015 07:00	1	319	1	321	5	0	0	5	1	141	4	146	2	0	4	6	478
19/11/2015 07:15	2	352	1	355	4	0	0	4	1	165	0	166	3	0	2	5	530
19/11/2015 07:30	1	382	3	386	6	0	2	8	1	195	0	196	4	0	5	9	599
19/11/2015 07:45	1	417	0	418	6	0	2	8	0	181	0	181	5	0	7	12	619
Hourly Total	5	1470	5	1480	21	0	4	25	3	682	4	689	14	0	18	32	2226
19/11/2015 08:00	2	382	2	386	8	1	0	9	0	149	1	150	2	0	2	4	549
19/11/2015 08:15	1	370	2	373	4	0	2	6	0	151	1	152	3	0	2	5	536
19/11/2015 08:30	2	361	1	364	9	0	6	15	1	131	3	135	0	0	4	4	518
19/11/2015 08:45	1	327	1	329	5	0	2	7	0	150	2	152	2	0	4	6	494
Hourly Total	6	1440	6	1452	26	1	10	37	1	581	7	589	7	0	12	19	2097
19/11/2015 09:00	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
19/11/2015 09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	4
Grand Total	11	2914	11	2936	47	1	14	62	4	1263	11	1278	21	0	30	51	4327
Approach %	0	99	0	99	76	2	23	101	0	99	1	100	41	0	59	100	-
Total %	0	67	0	67	1	0	0	1	0	29	0	29	0	0	1	1	-

AM Peak Hour 7:30 AM - 8:30 AM

Vehicle Total	5	1551	7	1563	24	1	6	31	1	676	2	679	14	0	16	30	2303
Car	5	1487	6	1498	23	1	6	30	0	618	2	620	14	0	13	27	2175
Truck	0	64	1	65	1	0	0	1	1	58	0	59	0	0	3	3	128
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
19/11/2015 11:00	1	97	1	99	1	0	1	2	5	100	2	107	2	0	0	2	210
19/11/2015 11:15	4	124	0	128	5	0	0	5	2	121	5	128	2	0	1	3	264
19/11/2015 11:30	1	133	0	134	2	0	1	3	2	111	3	116	3	0	3	6	259
19/11/2015 11:45	2	161	2	165	4	0	0	4	0	105	0	105	5	0	2	7	281
Hourly Total	8	515	3	526	12	0	2	14	9	437	10	456	12	0	6	18	1014
19/11/2015 12:00	1	113	2	116	1	0	2	3	3	135	0	138	0	0	1	1	258
19/11/2015 12:15	2	138	1	141	3	1	0	4	0	131	3	134	1	0	2	3	282
19/11/2015 12:30	0	116	0	116	2	0	3	5	2	107	4	113	3	0	1	4	238
19/11/2015 12:45	1	86	1	88	0	0	0	0	1	155	0	156	1	0	4	5	249
Hourly Total	4	453	4	461	6	1	5	12	6	528	7	541	5	0	8	13	1027
19/11/2015 13:00	0	121	0	121	2	0	2	4	0	138	3	141	2	0	1	3	269
19/11/2015 13:15	2	134	5	141	3	0	0	3	1	140	1	142	2	0	1	3	289
19/11/2015 13:30	1	128	3	132	1	0	3	4	4	121	2	127	2	0	4	6	269
19/11/2015 13:45	0	136	2	138	2	0	0	2	1	123	3	127	1	0	2	3	270
Hourly Total	3	519	10	532	8	0	5	13	6	522	9	537	7	0	8	15	1097
19/11/2015 14:00	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
19/11/2015 14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Grand Total	15	1488	17	1520	26	1	12	39	21	1487	26	1534	24	0	22	46	3139
Approach %	1	98	1	100	67	3	31	101	1	97	2	100	52	0	48	100	-
Total %	0	47	1	48	1	0	0	1	1	47	1	49	1	0	1	2	-

Midday Peak Hour 1:00 PM - 2:00 PM

Vehicle Total	3	519	10	532	8	0	5	13	6	522	9	537	7	0	8	15	1097
Car	3	468	10	481	8	0	5	13	6	479	9	494	6	0	8	14	1002
Truck	0	51	0	51	0	0	0	0	0	43	0	43	1	0	0	1	95
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
19/11/2015 15:00	1	195	0	196	2	0	1	3	4	199	1	204	1	1	2	4	407
19/11/2015 15:15	1	169	4	174	3	0	1	4	5	275	1	281	8	0	2	10	469
19/11/2015 15:30	1	181	1	183	5	0	0	5	2	245	5	252	0	0	1	1	441
19/11/2015 15:45	0	142	2	144	1	0	1	2	3	264	5	272	0	0	3	3	421
Hourly Total	3	687	7	697	11	0	3	14	14	983	12	1009	9	1	8	18	1738
19/11/2015 16:00	2	168	5	175	2	0	0	2	5	253	3	261	0	0	2	2	440
19/11/2015 16:15	2	194	1	197	1	0	1	2	3	349	2	354	0	0	2	2	555
19/11/2015 16:30	0	227	0	227	4	0	0	4	2	359	11	372	3	1	4	8	611
19/11/2015 16:45	2	170	5	177	2	0	1	3	3	375	7	385	1	0	1	2	567
Hourly Total	6	759	11	776	9	0	2	11	13	1336	23	1372	4	1	9	14	2173
19/11/2015 17:00	2	178	5	185	1	0	2	3	5	338	5	348	1	0	2	3	539
19/11/2015 17:15	3	223	1	227	2	0	0	2	1	390	5	396	1	0	1	2	627
19/11/2015 17:30	1	162	2	165	3	0	0	3	5	348	3	356	1	0	1	2	526
19/11/2015 17:45	0	87	1	88	1	0	1	2	3	247	3	253	2	0	0	2	345
Hourly Total	6	650	9	665	7	0	3	10	14	1323	16	1353	5	0	4	9	2037
19/11/2015 18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	15	2096	27	2138	27	0	8	35	41	3642	51	3734	18	2	21	41	5948
Approach %	1	98	1	100	77	0	23	100	1	98	1	100	44	5	51	100	-
Total %	0	35	0	35	0	0	0	0	1	61	1	63	0	0	0	0	-

PM Peak Hour 4:30 PM - 5:30 PM

Vehicle Total	7	798	11	816	9	0	3	12	11	1462	28	1501	6	1	8	15	2344
Car	7	747	11	765	8	0	3	11	11	1443	27	1481	6	1	7	14	2271
Truck	0	51	0	51	1	0	0	1	0	19	1	20	0	0	1	1	73
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PEDESTRIAN CROSSING

	North East			North West			South West			South East			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
19/11/2015 07:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 07:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 07:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 08:15:00	1	0	1	0	0	0	0	0	0	0	0	0	1
19/11/2015 08:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 08:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	1	0	1	0	0	0	0	0	0	0	0	0	1
19/11/2015 09:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 09:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	1	0	1	0	0	0	0	0	0	0	0	0	1

AM Peak Hour 7:30 AM - 8:30 AM

Pedestrians	1	0	1	0	0	0	0	0	0	0	0	0	1

No pedestrian crossing for Noon.

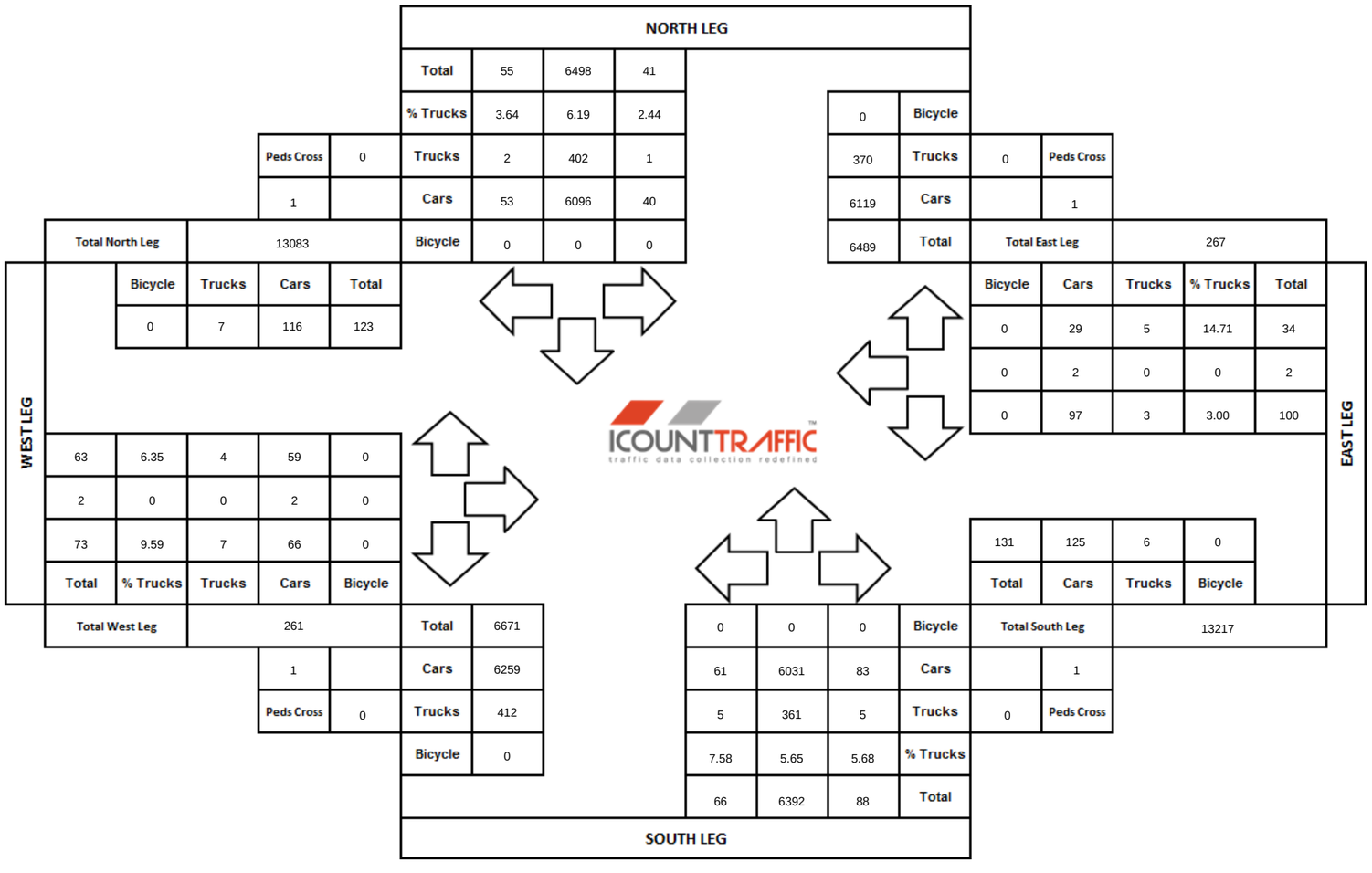
	North East			North West			South West			South East			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
19/11/2015 15:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 15:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 15:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 15:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 16:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 16:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 16:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 16:45:00	0	0	0	0	1	1	1	0	1	0	1	1	3
Hourly Total	0	0	0	0	1	1	1	0	1	0	1	1	3
19/11/2015 17:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 17:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 17:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 17:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 18:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
19/11/2015 18:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	1	1	1	0	1	0	1	1	3

PM Peak Hour 4:00 PM - 5:00 PM

Pedestrians	0	0	0	0	1	1	1	0	1	0	1	1	3

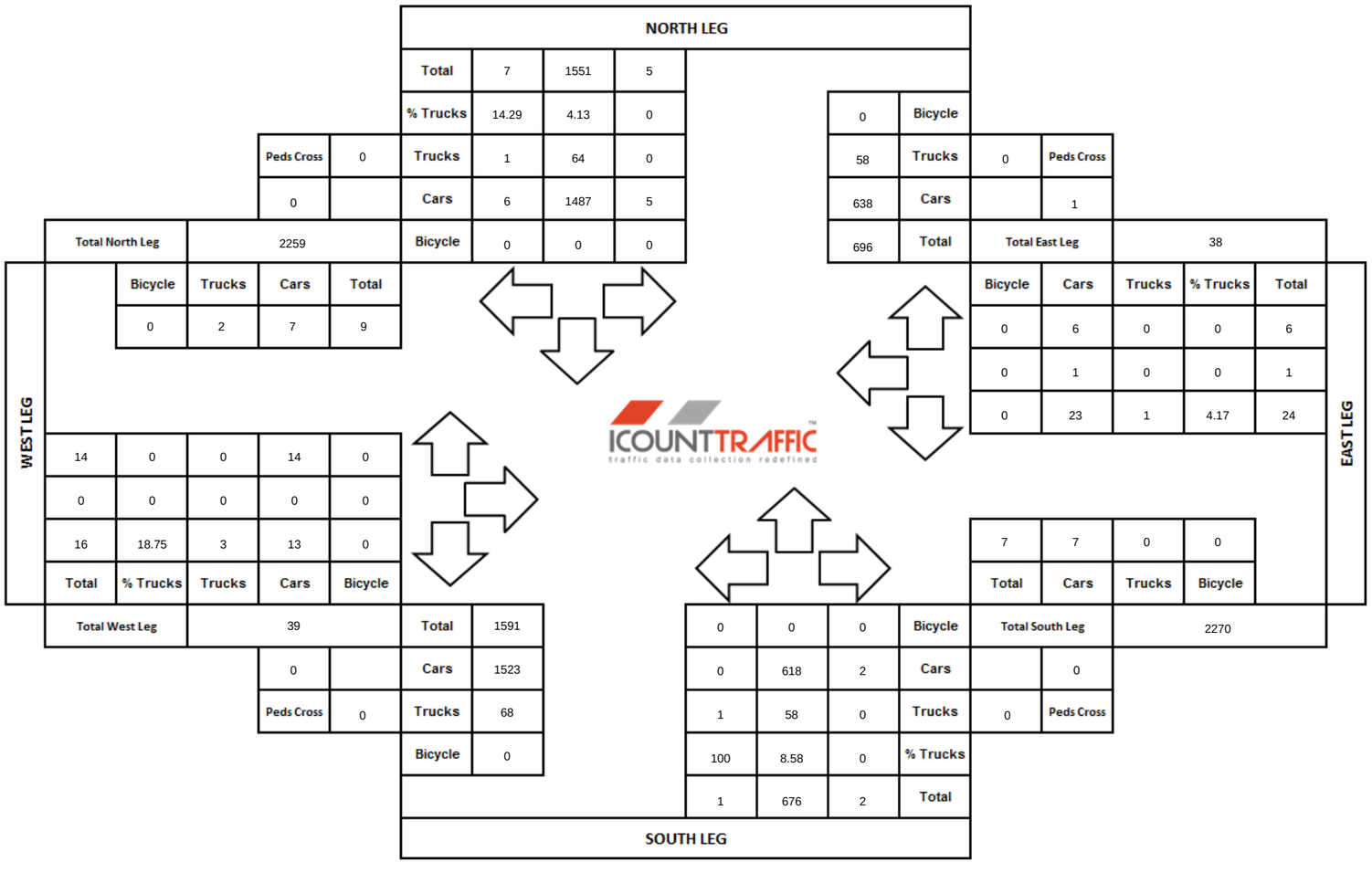
TOTAL TMC COUNT DIAGRAM

City:	**Brampton**	**Weather:**	**Mostly Cloudy/Windy**
North/South Street:	**Mississauga Road**	**Count Date:**	**19/11/2015**
East/West Street:	**Ostrander Boulevard/Adamsville**	**Count Period:**	**AM, Noon, PM**
GPS Coordinates:	**43.650660, -79.807621**	**Peak Period:**	**7:30 AM - 8:30 AM, 1:00 PM - 2:00 PM, 4:30 PM - 5:30 PM**
Site Number:	**00118488**	**Major Road:**	**Mississauga Road**
Control:	**2-way Stop**	**Surveyor:**	**Andy Wong**



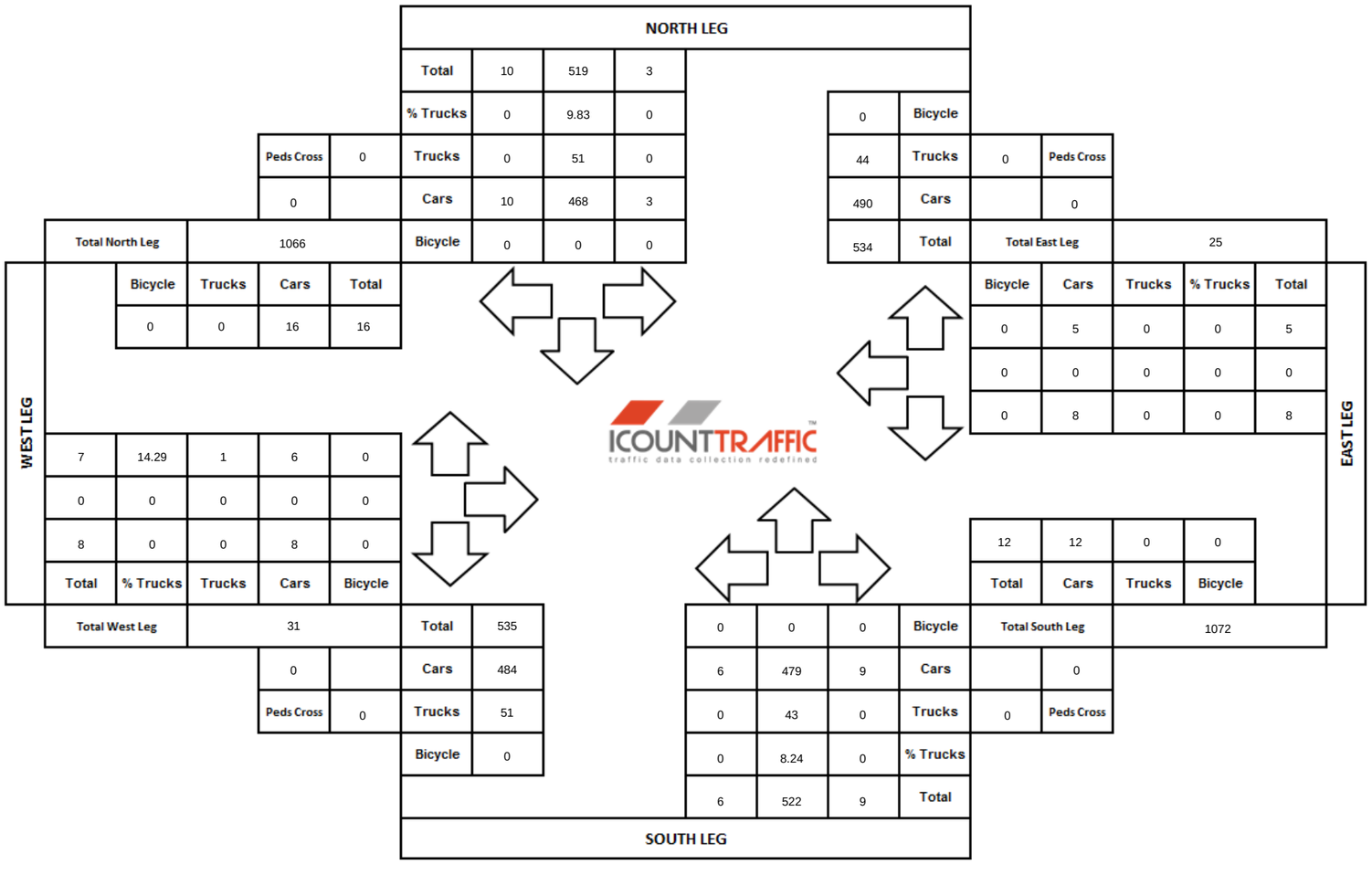
AM Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Mostly Cloudy/Windy**
North/South Street:	**Mississauga Road**	**Count Date:**	**19/11/2015**
East/West Street:	**Ostrander Boulevard/Adamsville**	**Count Period:**	**AM**
GPS Coordinates:	**43.650660, -79.807621**	**Peak Period:**	**7:30 AM - 8:30 AM**
Site Number:	**00118488**	**Major Road:**	**Mississauga Road**
Control:	**2-way Stop**	**Surveyor:**	**Andy Wong**



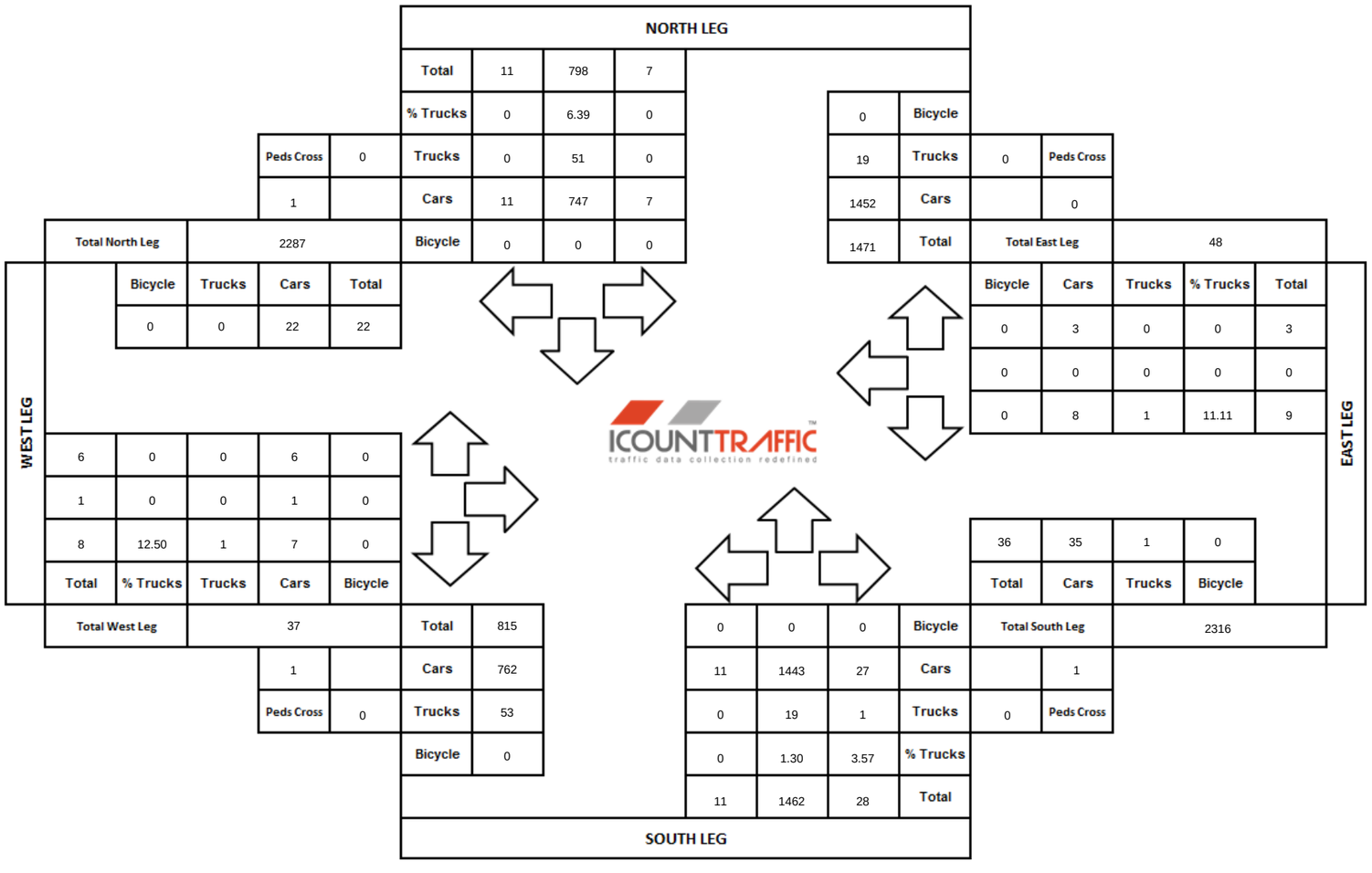
Noon Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Mostly Cloudy/Windy**
North/South Street:	**Mississauga Road**	**Count Date:**	**19/11/2015**
East/West Street:	**Ostrander Boulevard/Adamsville**	**Count Period:**	**Noon**
GPS Coordinates:	**43.650660, -79.807621**	**Peak Period:**	**1:00 PM - 2:00 PM**
Site Number:	**00118488**	**Major Road:**	**Mississauga Road**
Control:	**2-way Stop**	**Surveyor:**	**Andy Wong**



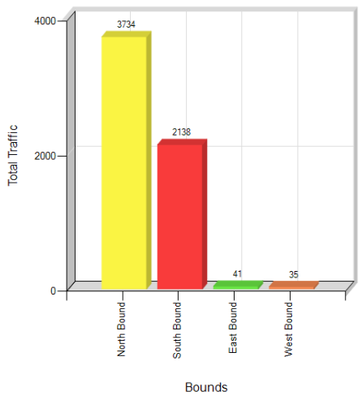
PM Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Mostly Cloudy/Windy**
North/South Street:	**Mississauga Road**	**Count Date:**	**19/11/2015**
East/West Street:	**Ostrander Boulevard/Adamsville**	**Count Period:**	**PM**
GPS Coordinates:	**43.650660, -79.807621**	**Peak Period:**	**4:30 PM - 5:30 PM**
Site Number:	**00118488**	**Major Road:**	**Mississauga Road**
Control:	**2-way Stop**	**Surveyor:**	**Andy Wong**

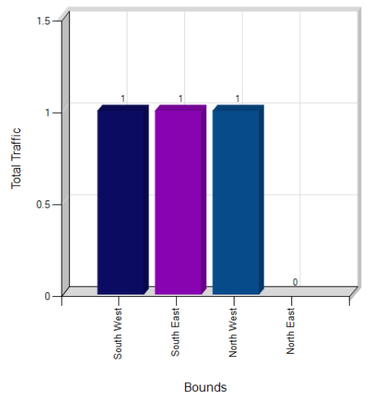


TMC chart data

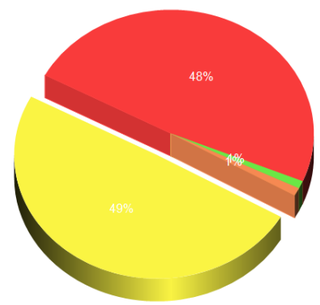
Total Traffic



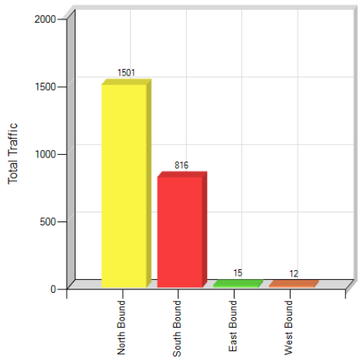
Total Pedestrians



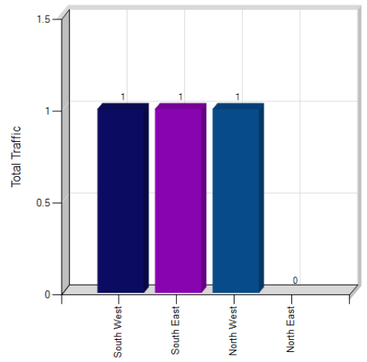
Total Approach



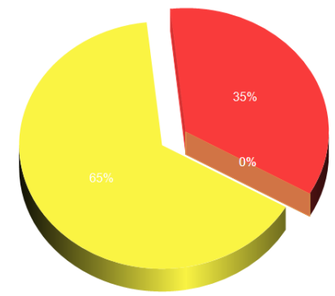
Total Traffic at Peak Hour



Total Pedestrians at Peak Hour



Total Approach at Peak Hour



	SouthBound		NorthEast
	WestBound		NorthWest
	NorthBound		SouthWest
	EastBound		SouthEast

NOTES & IMAGES

(null)

(null)

(null)

(null)

TMC - Intersection Count Summary

Company name: Trans-Plan Inc.
Company address: 24 Ryerson Avenue, Suite 211,Toronto, Ontario, Canada
Company phone: (647) 931-7383

Site: 00117986
Location: Mississauga Road at Queen Street West, Brampton
N/S Street: Mississauga Road
E/W Street: Queen Street West
GPS Coordinates: 43.647524, -79.802530
Date: 18 November 2015
Day of week: Wednesday
Analyst(s): Tyrone Dollano, Aaron

VEHICLE TRAFFIC

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
18/11/2015 07:00	19	255	0	274	97	0	15	112	1	161	47	209	0	0	1	1	596
18/11/2015 07:15	27	341	0	368	121	1	10	132	0	200	72	272	0	1	3	4	776
18/11/2015 07:30	25	394	0	419	160	3	19	182	0	191	82	273	2	1	5	8	882
18/11/2015 07:45	13	394	0	407	168	0	17	185	0	213	107	320	1	1	3	5	917
Hourly Total	84	1384	0	1468	546	4	61	611	1	765	308	1074	3	3	12	18	3171
18/11/2015 08:00	18	382	0	400	120	1	18	139	1	153	115	269	1	5	1	7	815
18/11/2015 08:15	16	370	0	386	145	0	18	163	0	152	77	229	0	0	5	5	783
18/11/2015 08:30	21	352	0	373	141	1	20	162	0	144	72	216	1	0	0	1	752
18/11/2015 08:45	23	325	0	348	95	0	23	118	1	130	72	203	0	1	2	3	672
Hourly Total	78	1429	0	1507	501	2	79	582	2	579	336	917	2	6	8	16	3022
18/11/2015 09:00	0	7	0	7	0	0	0	0	0	5	0	5	0	0	2	2	14
18/11/2015 09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	7	0	7	0	0	0	0	0	5	0	5	0	0	2	2	14
Grand Total	162	2820	0	2982	1047	6	140	1193	3	1349	644	1996	5	9	22	36	6207
Approach %	5	95	0	100	88	1	12	101	0	68	32	100	14	25	61	100	-
Total %	3	45	0	48	17	0	2	19	0	22	10	32	0	0	0	0	-

AM Peak Hour 7:30 AM - 8:30 AM

Vehicle Total	72	1540	0	1612	593	4	72	669	1	709	381	1091	4	7	14	25	3397
Car	59	1462	0	1521	578	3	70	651	0	625	363	988	4	7	13	24	3184
Truck	13	78	0	91	15	1	2	18	1	84	18	103	0	0	1	1	213
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
18/11/2015 11:00	13	91	0	104	40	0	18	58	1	104	41	146	0	0	0	0	308
18/11/2015 11:15	12	128	1	141	41	0	19	60	0	80	29	109	0	1	0	1	311
18/11/2015 11:30	15	127	0	142	40	0	20	60	2	99	36	137	2	2	1	5	344
18/11/2015 11:45	16	111	0	127	37	0	36	73	1	101	27	129	1	1	1	3	332
Hourly Total	56	457	1	514	158	0	93	251	4	384	133	521	3	4	2	9	1295
18/11/2015 12:00	20	124	0	144	35	0	21	56	1	101	31	133	0	1	1	2	335
18/11/2015 12:15	18	128	0	146	41	0	18	59	0	96	41	137	1	0	1	2	344
18/11/2015 12:30	15	132	0	147	49	1	18	68	0	116	46	162	0	0	0	0	377
18/11/2015 12:45	15	116	0	131	32	0	29	61	0	99	42	141	0	0	0	0	333
Hourly Total	68	500	0	568	157	1	86	244	1	412	160	573	1	1	2	4	1389
18/11/2015 13:00	21	110	0	131	36	1	15	52	0	100	42	142	2	0	0	2	327
18/11/2015 13:15	16	135	0	151	48	1	21	70	1	147	38	186	2	0	2	4	411
18/11/2015 13:30	23	116	0	139	38	2	27	67	0	104	37	141	1	0	4	5	352
18/11/2015 13:45	23	118	0	141	43	0	30	73	0	115	38	153	0	0	1	1	368
Hourly Total	83	479	0	562	165	4	93	262	1	466	155	622	5	0	7	12	1458
18/11/2015 14:00	1	1	0	2	3	0	0	3	0	0	0	0	0	0	0	0	5
18/11/2015 14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	1	1	0	2	3	0	0	3	0	0	0	0	0	0	0	0	5
Grand Total	208	1437	1	1646	483	5	272	760	6	1262	448	1716	9	5	11	25	4147
Approach %	13	87	0	100	64	1	36	101	0	74	26	100	36	20	44	100	-
Total %	5	35	0	40	12	0	7	19	0	30	11	41	0	0	0	0	-

Midday Peak Hour 1:00 PM - 2:00 PM

Vehicle Total	83	479	0	562	165	4	93	262	1	466	155	622	5	0	7	12	1458
Car	76	420	0	496	146	4	88	238	1	411	140	552	5	0	7	12	1298
Truck	7	59	0	66	16	0	5	21	0	55	15	70	0	0	0	0	157
Bicycle	0	0	0	0	3	0	0	3	0	0	0	0	0	0	0	0	3

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
18/11/2015 15:00	16	149	0	165	74	1	28	103	0	165	65	230	1	0	0	1	499
18/11/2015 15:15	17	164	0	181	77	0	32	109	2	241	78	321	0	1	0	1	612
18/11/2015 15:30	19	181	0	200	63	1	33	97	0	233	71	304	0	0	0	0	601
18/11/2015 15:45	24	172	0	196	75	1	30	106	1	271	114	386	0	0	1	1	689
Hourly Total	76	666	0	742	289	3	123	415	3	910	328	1241	1	1	1	3	2401
18/11/2015 16:00	21	177	0	198	86	0	29	115	3	292	114	409	2	0	0	2	724
18/11/2015 16:15	17	166	0	183	80	0	36	116	0	332	116	448	0	0	0	0	747
18/11/2015 16:30	31	180	0	211	86	0	36	122	0	316	90	406	0	1	0	1	740
18/11/2015 16:45	18	158	0	176	116	1	28	145	0	364	125	489	0	0	0	0	810
Hourly Total	87	681	0	768	368	1	129	498	3	1304	445	1752	2	1	0	3	3021
18/11/2015 17:00	20	202	0	222	75	1	17	93	0	386	174	560	0	0	1	1	876
18/11/2015 17:15	32	157	0	189	64	0	28	92	2	404	140	546	0	1	1	2	829
18/11/2015 17:30	18	132	0	150	85	2	30	117	0	389	146	535	0	3	0	3	805
18/11/2015 17:45	21	137	0	158	54	0	21	75	0	386	120	506	0	3	0	3	742
Hourly Total	91	628	0	719	278	3	96	377	2	1565	580	2147	0	7	2	9	3252
18/11/2015 18:00	0	5	0	5	0	0	1	1	0	23	7	30	0	0	0	0	36
18/11/2015 18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	5	0	5	0	0	1	1	0	23	7	30	0	0	0	0	36
Grand Total	254	1980	0	2234	935	7	349	1291	8	3802	1360	5170	3	9	3	15	8710
Approach %	11	89	0	100	72	1	27	100	0	74	26	100	20	60	20	100	-
Total %	3	23	0	26	11	0	4	15	0	44	16	60	0	0	0	0	-

PM Peak Hour 4:45 PM - 5:45 PM

Vehicle Total	88	649	0	737	340	4	103	447	2	1543	585	2130	0	4	2	6	3320
Car	86	608	0	694	336	4	101	441	2	1491	574	2067	0	4	2	6	3208
Truck	2	41	0	43	4	0	2	6	0	52	11	63	0	0	0	0	112
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PEDESTRIAN CROSSING

	North East			North West			South West			South East			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
18/11/2015 07:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 07:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 07:45:00	0	0	0	1	0	1	0	0	0	0	0	0	1
Hourly Total	0	0	0	1	0	1	0	0	0	0	0	0	1
18/11/2015 08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 08:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 08:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 08:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 09:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 09:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	1	0	1	0	0	0	0	0	0	1

AM Peak Hour 7:00 AM - 8:00 AM

Pedestrians	0	0	0	1	0	1	0	0	0	0	0	0	1

18/11/2015 11:00:00	0	0	0	0	1	1	0	0	0	0	0	0	1
18/11/2015 11:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 11:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 11:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	1	1	0	0	0	0	0	0	1
18/11/2015 12:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 12:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 12:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 12:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 13:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 13:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 13:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 13:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 14:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 14:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	1	1	0	0	0	0	0	0	1

Midday Peak Hour 11:00 AM - 12:00 PM

Pedestrians	0	0	0	0	1	1	0	0	0	0	0	0	1

	North East			North West			South West			South East			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
18/11/2015 15:00:00	1	0	1	0	0	0	0	0	0	0	0	0	1
18/11/2015 15:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 15:30:00	2	0	2	0	0	0	0	0	0	0	0	0	2
18/11/2015 15:45:00	0	0	0	0	0	0	0	1	1	0	0	0	1
Hourly Total	3	0	3	0	0	0	0	1	1	0	0	0	4
18/11/2015 16:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 16:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 16:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 16:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 17:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0

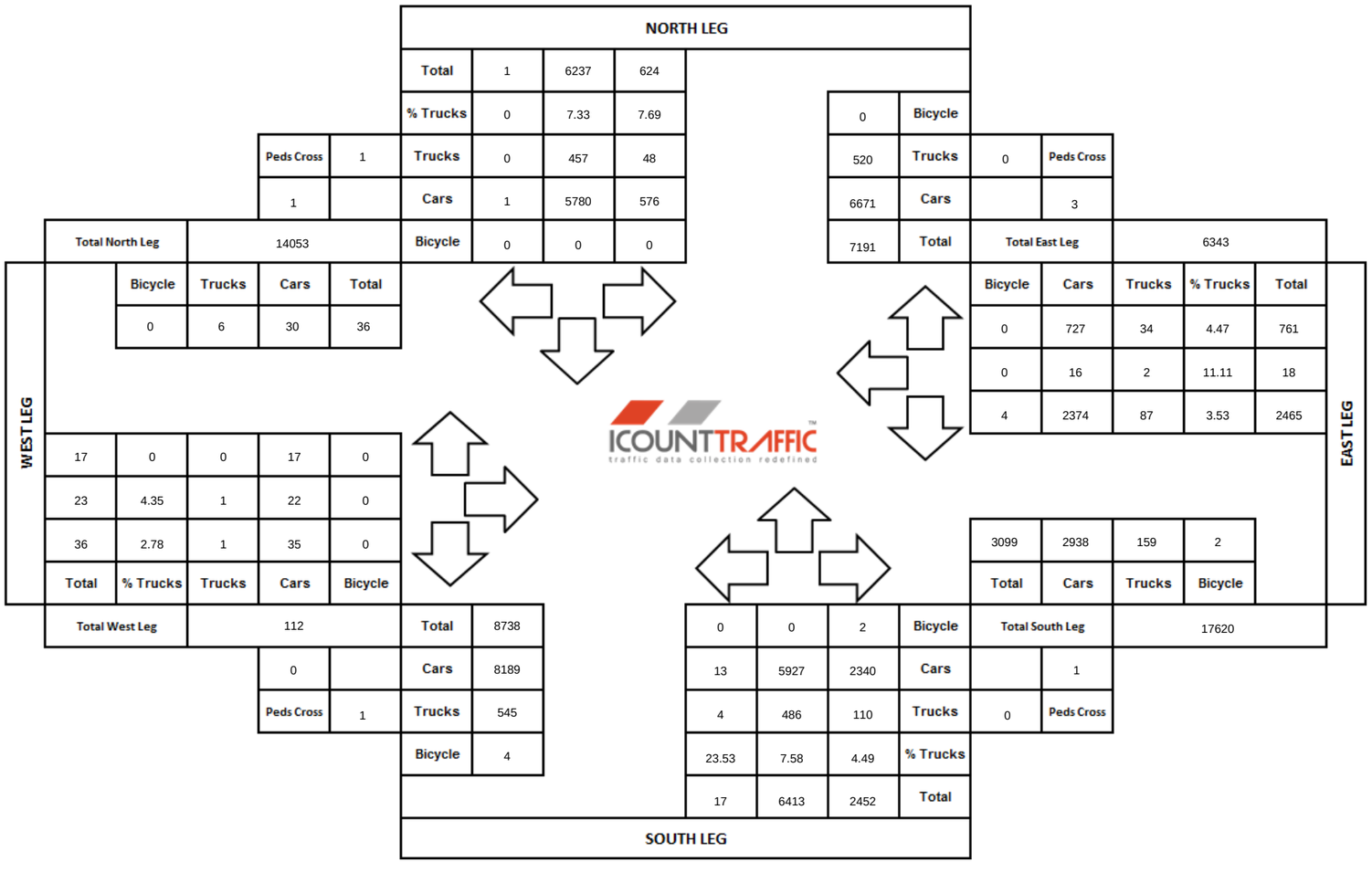
18/11/2015 17:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 17:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 17:45:00	0	0	0	0	0	0	0	0	0	0	1	1	1
Hourly Total	0	0	0	0	0	0	0	0	0	0	1	1	1
18/11/2015 18:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 18:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	3	0	3	0	0	0	0	1	1	0	1	1	5

PM Peak Hour 3:00 PM - 4:00 PM

Pedestrians	3	0	3	0	0	0	0	1	1	0	0	0	4

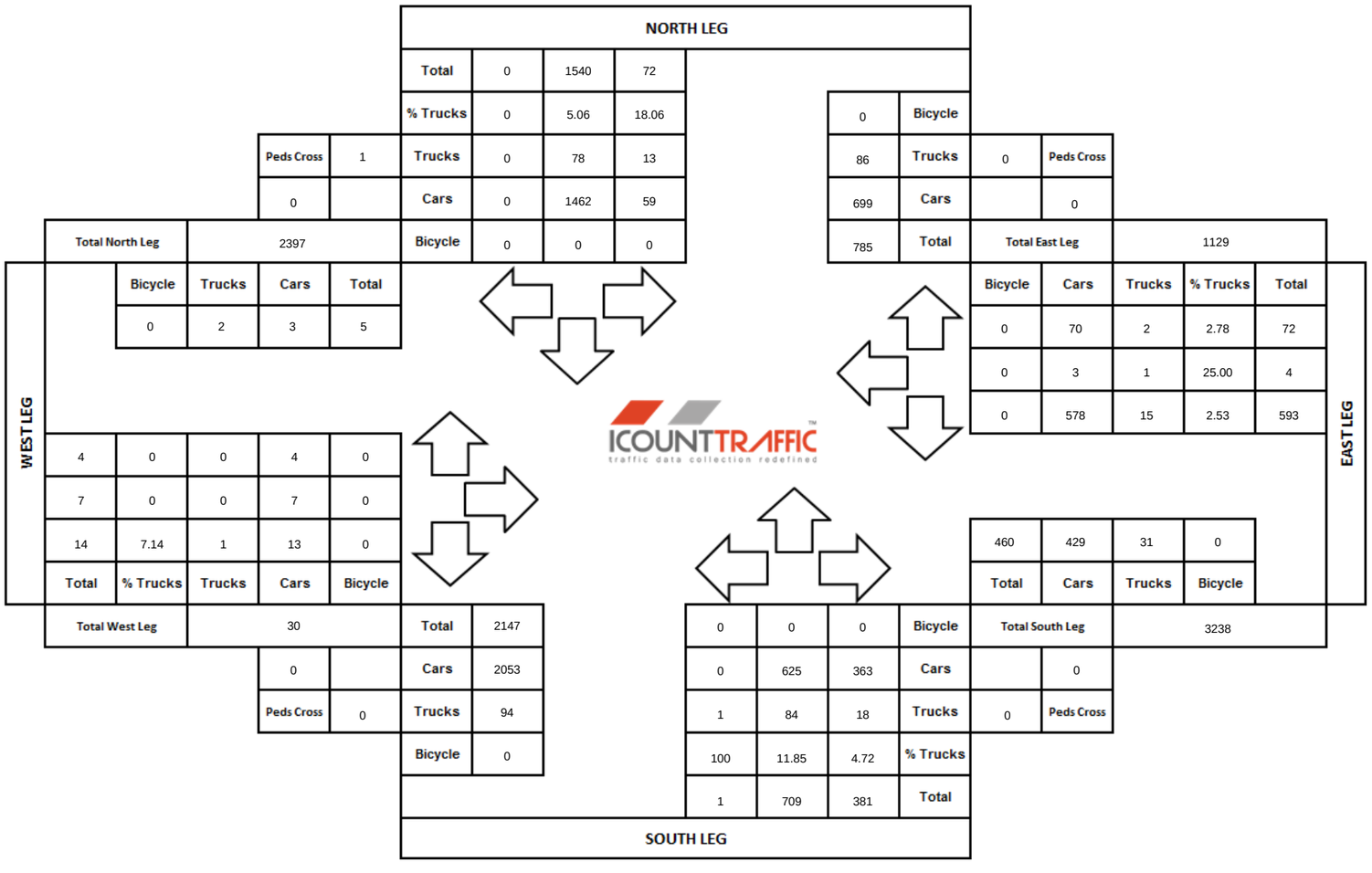
TOTAL TMC COUNT DIAGRAM

City:	**Brampton**	**Weather:**	**Mostly Cloudy**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Queen Street West**	**Count Period:**	**AM, Noon, PM**
GPS Coordinates:	**43.647524, -79.802530**	**Peak Period:**	**7:30 AM - 8:30 AM, 1:00 PM - 2:00 PM, 4:45 PM - 5:45 PM**
Site Number:	**00117986**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**Tyrone Dollano, Aaron**



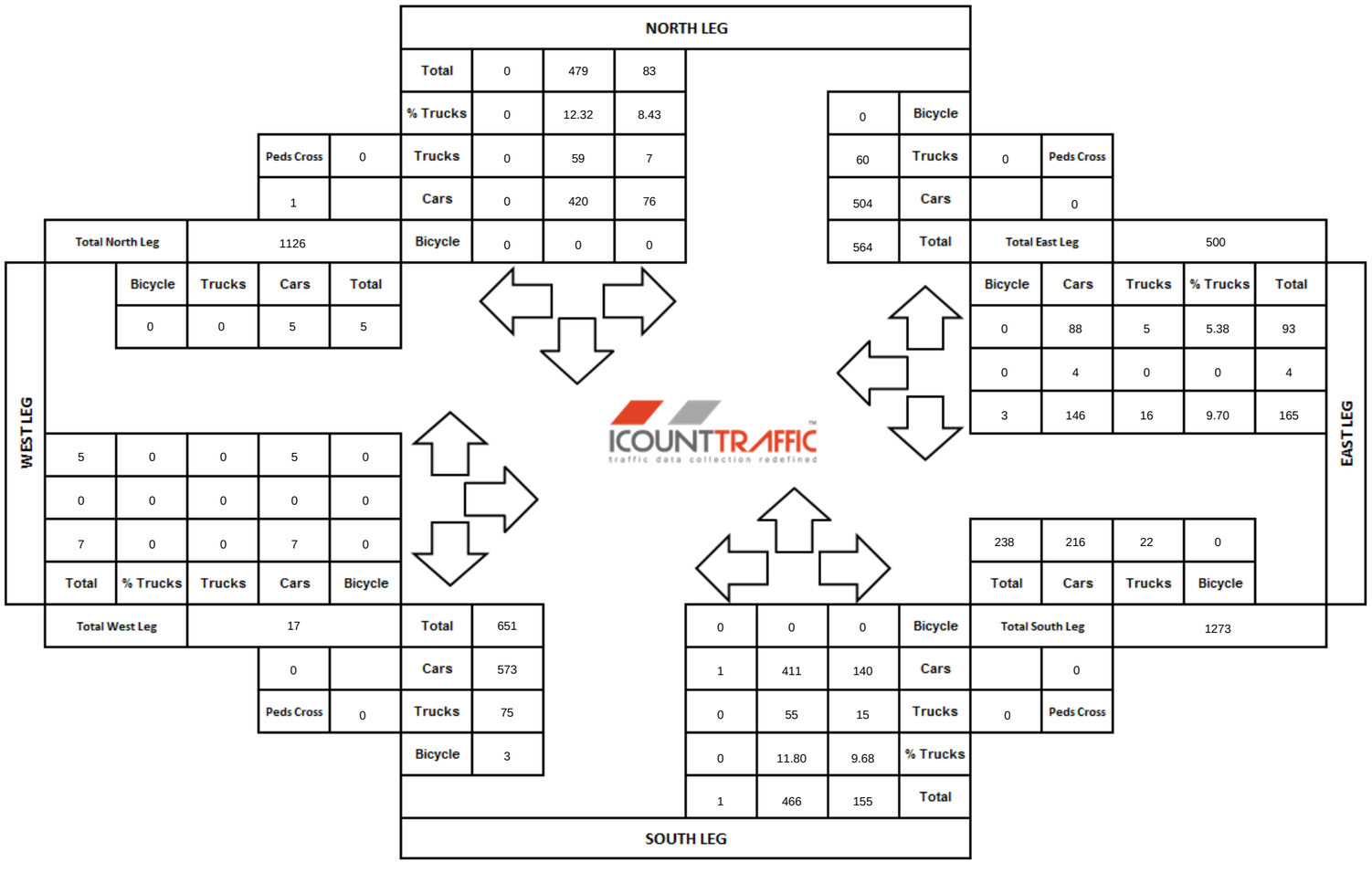
AM Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Mostly Cloudy**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Queen Street West**	**Count Period:**	**AM**
GPS Coordinates:	**43.647524, -79.802530**	**Peak Period:**	**7:30 AM - 8:30 AM**
Site Number:	**00117986**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**Tyrone Dollano, Aaron**



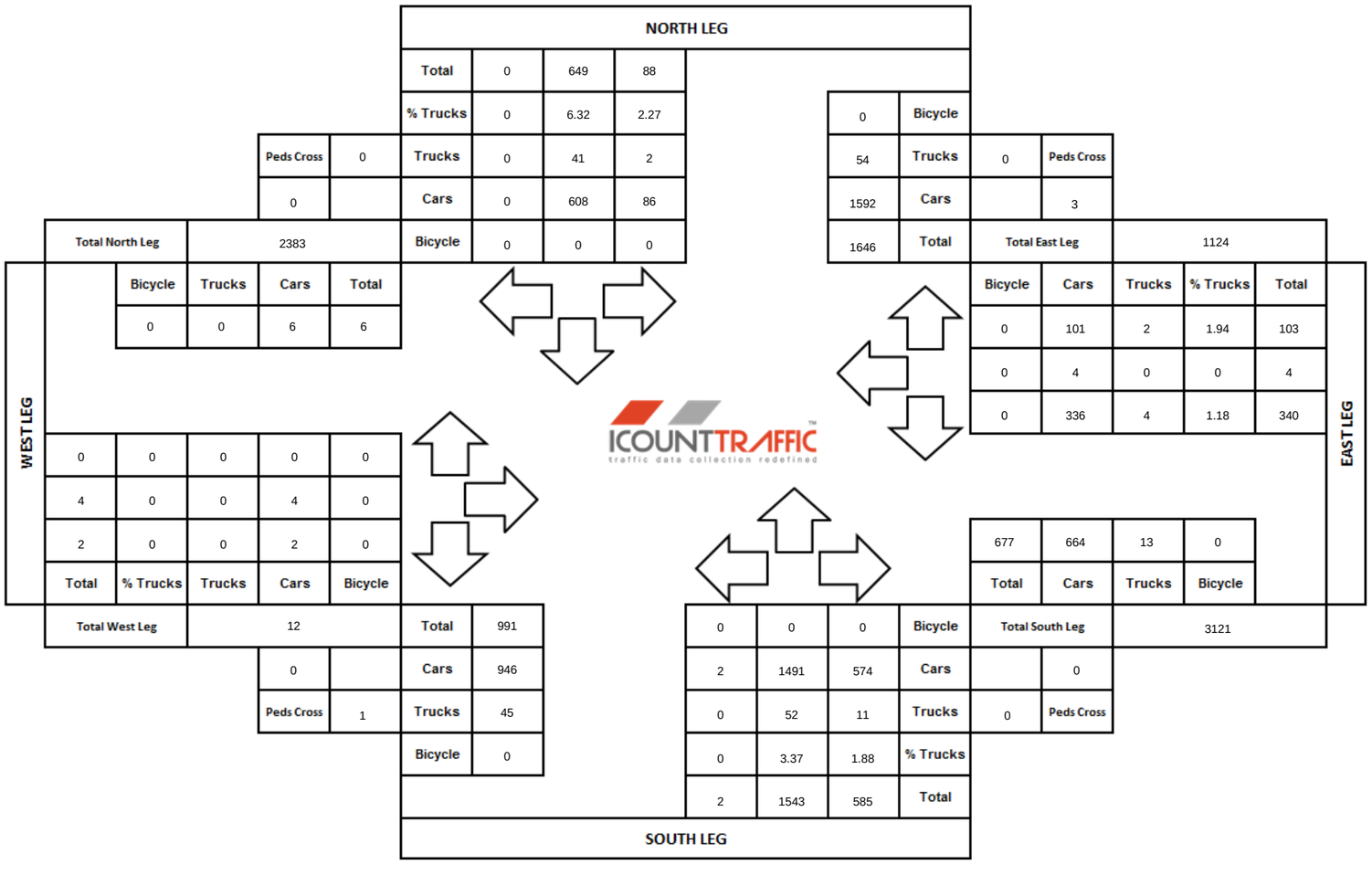
Noon Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Mostly Cloudy**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Queen Street West**	**Count Period:**	**Noon**
GPS Coordinates:	**43.647524, -79.802530**	**Peak Period:**	**1:00 PM - 2:00 PM**
Site Number:	**00117986**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**Tyrone Dollano, Aaron**



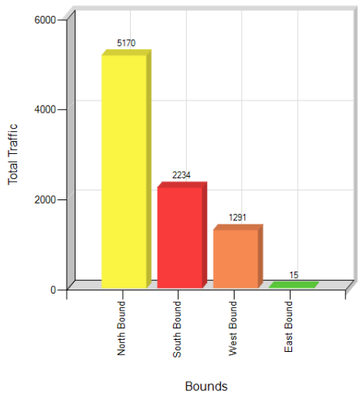
PM Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Mostly Cloudy**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Queen Street West**	**Count Period:**	**PM**
GPS Coordinates:	**43.647524, -79.802530**	**Peak Period:**	**4:45 PM - 5:45 PM**
Site Number:	**00117986**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**Tyrone Dollano, Aaron**

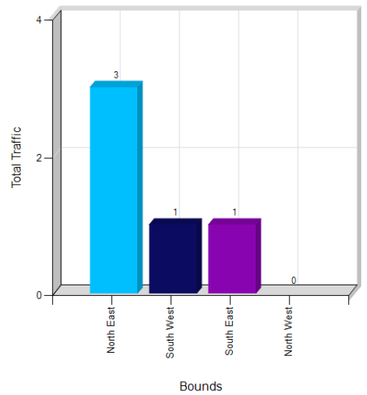


TMC chart data

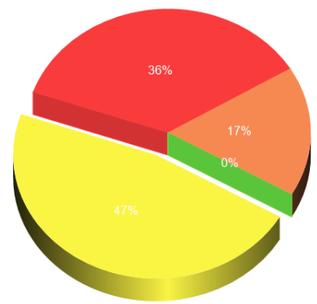
Total Traffic



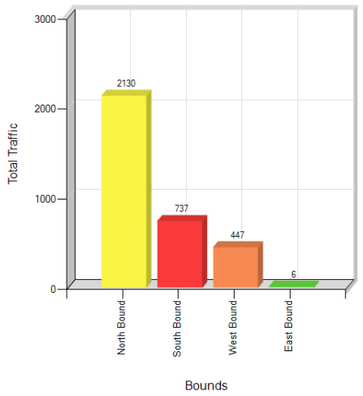
Total Pedestrians



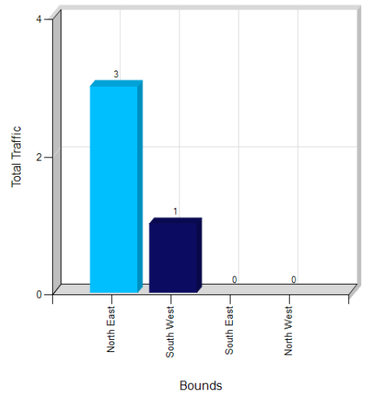
Total Approach



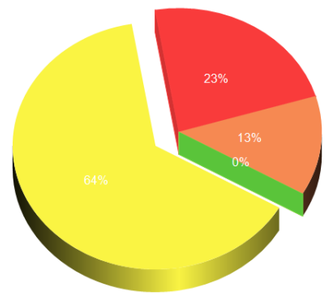
Total Traffic at Peak Hour



Total Pedestrians at Peak Hour



Total Approach at Peak Hour



	SouthBound		NorthEast
	WestBound		NorthWest
	NorthBound		SouthWest
	EastBound		SouthEast

NOTES & IMAGES

(null)

(null)

(null)

TMC - Intersection Count Summary

Company name: Trans-Plan Inc.
Company address: 24 Ryerson Avenue, Suite 100,Toronto, Ontario, Canada
Company phone: (647) 931-7383

Site: 00117781
Location: Mississauga Road at Embleton Road, Brampton
N/S Street: Mississauga Road
E/W Street: Embleton Road
GPS Coordinates: 43.644265, -79.799058
Date: 18 November 2015
Day of week: Wednesday
Analyst(s): Charles Chung

VEHICLE TRAFFIC

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
18/11/2015 07:00	0	315	35	350	0	0	0	0	4	181	0	185	40	0	17	57	592
18/11/2015 07:15	0	392	39	431	0	0	0	0	3	207	0	210	58	0	30	88	729
18/11/2015 07:30	0	500	42	542	0	0	0	0	3	219	0	222	75	0	26	101	865
18/11/2015 07:45	0	525	58	583	0	0	0	0	2	210	0	212	97	0	22	119	914
Hourly Total	0	1732	174	1906	0	0	0	0	12	817	0	829	270	0	95	365	3100
18/11/2015 08:00	0	435	44	479	0	0	0	0	4	190	0	194	93	0	19	112	785
18/11/2015 08:15	0	490	46	536	0	0	0	0	5	166	0	171	66	0	19	85	792
18/11/2015 08:30	0	422	49	471	0	0	0	0	5	171	0	176	51	0	19	70	717
18/11/2015 08:45	0	395	33	428	0	0	0	0	11	141	0	152	37	0	6	43	623
Hourly Total	0	1742	172	1914	0	0	0	0	25	668	0	693	247	0	63	310	2917
18/11/2015 09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	3474	346	3820	0	0	0	0	37	1485	0	1522	517	0	158	675	6017
Approach %	0	91	9	100	0	0	0	0	2	98	0	100	77	0	23	100	-
Total %	0	58	6	64	0	0	0	0	1	25	0	26	9	0	3	12	-

AM Peak Hour 7:30 AM - 8:30 AM

Vehicle Total	0	1950	190	2140	0	0	0	0	14	785	0	799	331	0	86	417	3356
Car	0	1870	190	2060	0	0	0	0	12	709	0	721	325	0	83	408	3189
Truck	0	80	0	80	0	0	0	0	2	76	0	78	6	0	3	9	167
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
18/11/2015 11:00	0	101	12	113	0	0	0	0	0	92	0	92	30	0	4	34	239
18/11/2015 11:15	0	150	17	167	0	0	0	0	3	92	0	95	20	0	6	26	288
18/11/2015 11:30	0	146	18	164	0	0	0	0	7	118	0	125	18	0	6	24	313
18/11/2015 11:45	0	135	30	165	0	0	0	0	7	106	0	113	19	0	5	24	302
Hourly Total	0	532	77	609	0	0	0	0	17	408	0	425	87	0	21	108	1142
18/11/2015 12:00	0	131	13	144	0	0	0	0	4	115	0	119	24	0	3	27	290
18/11/2015 12:15	0	145	21	166	0	0	0	0	4	120	0	124	24	0	4	28	318
18/11/2015 12:30	0	144	26	170	0	0	0	0	5	141	0	146	15	0	8	23	339
18/11/2015 12:45	0	126	15	141	0	0	0	0	1	119	0	120	31	0	5	36	297
Hourly Total	0	546	75	621	0	0	0	0	14	495	0	509	94	0	20	114	1244
18/11/2015 13:00	0	121	23	144	0	0	0	0	0	118	0	118	20	0	2	22	284
18/11/2015 13:15	0	161	27	188	0	0	0	0	7	162	0	169	23	0	3	26	383
18/11/2015 13:30	0	128	27	155	0	0	0	0	6	112	0	118	20	0	3	23	296
18/11/2015 13:45	0	138	27	165	0	0	0	0	5	143	0	148	20	0	3	23	336
Hourly Total	0	548	104	652	0	0	0	0	18	535	0	553	83	0	11	94	1299
18/11/2015 14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	1626	256	1882	0	0	0	0	49	1438	0	1487	264	0	52	316	3685
Approach %	0	86	14	100	0	0	0	0	3	97	0	100	84	0	16	100	-
Total %	0	44	7	51	0	0	0	0	1	39	0	40	7	0	1	8	-

Midday Peak Hour 12:30 PM - 1:30 PM

Vehicle Total	0	552	91	643	0	0	0	0	13	540	0	553	89	0	18	107	1303
Car	0	500	85	585	0	0	0	0	13	475	0	488	85	0	18	103	1176
Truck	0	52	3	55	0	0	0	0	0	65	0	65	3	0	0	3	123
Bicycle	0	0	3	3	0	0	0	0	0	0	0	0	1	0	0	1	4

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
18/11/2015 15:00	0	159	53	212	0	0	0	0	18	195	0	213	33	0	5	38	463
18/11/2015 15:15	0	199	33	232	0	0	0	0	24	257	0	281	70	0	14	84	597
18/11/2015 15:30	0	193	53	246	0	0	0	0	15	284	0	299	41	0	6	47	592
18/11/2015 15:45	0	191	64	255	0	0	0	0	13	328	0	341	59	0	8	67	663
Hourly Total	0	742	203	945	0	0	0	0	70	1064	0	1134	203	0	33	236	2315
18/11/2015 16:00	0	211	62	273	0	0	0	0	16	324	0	340	65	0	4	69	682
18/11/2015 16:15	0	179	69	248	0	0	0	0	16	369	0	385	89	0	8	97	730
18/11/2015 16:30	0	266	79	345	0	0	0	0	16	399	0	415	40	0	2	42	802
18/11/2015 16:45	0	208	70	278	0	0	0	0	25	441	0	466	102	0	3	105	849
Hourly Total	0	864	280	1144	0	0	0	0	73	1533	0	1606	296	0	17	313	3063
18/11/2015 17:00	0	237	77	314	0	0	0	0	28	453	0	481	112	0	6	118	913
18/11/2015 17:15	0	183	50	233	0	0	0	0	22	479	0	501	107	0	6	113	847
18/11/2015 17:30	0	167	52	219	0	0	0	0	22	453	0	475	112	0	9	121	815
18/11/2015 17:45	0	153	30	183	0	0	0	0	17	438	0	455	96	0	3	99	737
Hourly Total	0	740	209	949	0	0	0	0	89	1823	0	1912	427	0	24	451	3312
18/11/2015 18:00	0	0	1	1	0	0	0	0	0	0	0	0	3	0	0	3	4
18/11/2015 18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	1	1	0	0	0	0	0	0	0	0	3	0	0	3	4
Grand Total	0	2346	693	3039	0	0	0	0	232	4420	0	4652	929	0	74	1003	8694
Approach %	0	77	23	100	0	0	0	0	5	95	0	100	93	0	7	100	-
Total %	0	27	8	35	0	0	0	0	3	51	0	54	11	0	1	12	-

PM Peak Hour 4:45 PM - 5:45 PM

Vehicle Total	0	795	249	1044	0	0	0	0	97	1826	0	1923	433	0	24	457	3424
Car	0	750	248	998	0	0	0	0	96	1776	0	1872	429	0	22	451	3321
Truck	0	45	1	46	0	0	0	0	1	50	0	51	3	0	2	5	102
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1

PEDESTRIAN CROSSING

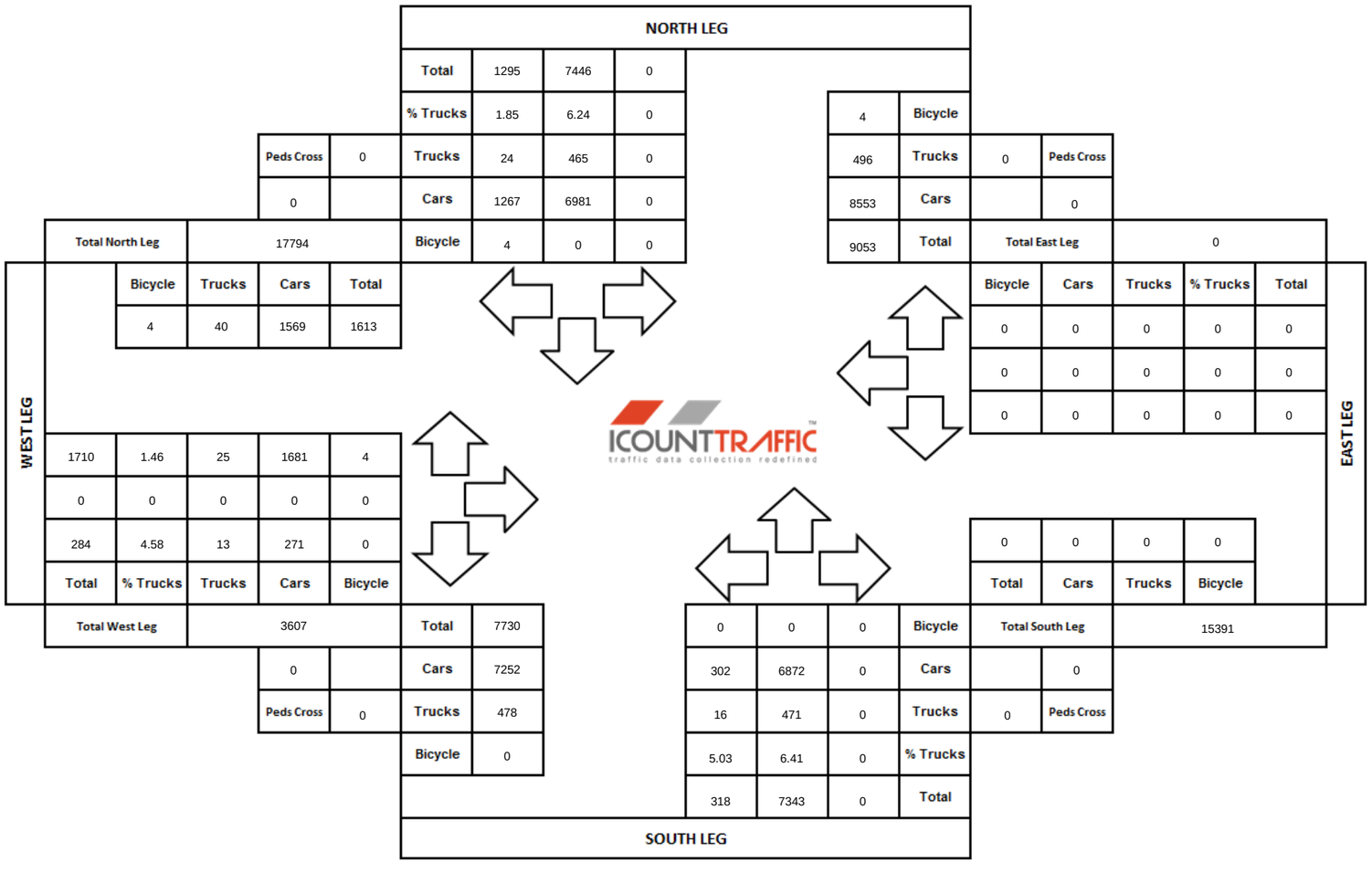
No pedestrian crossing for AM.

No pedestrian crossing for Noon.

No pedestrian crossing for PM.

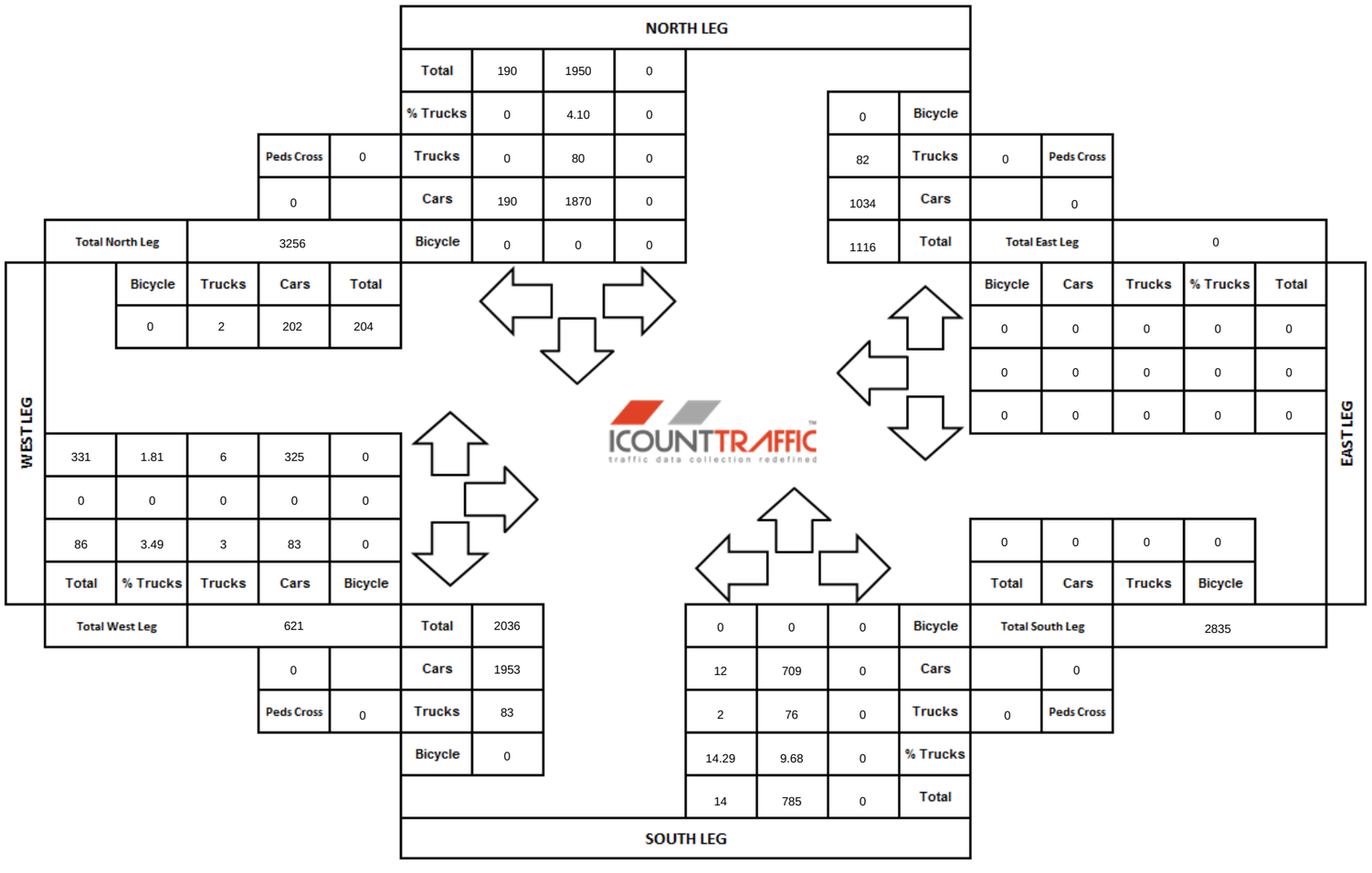
TOTAL TMC COUNT DIAGRAM

City:	**Brampton**	**Weather:**	**Mostly Cloudy**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Embleton Road**	**Count Period:**	**AM, Noon, PM**
GPS Coordinates:	**43.644265, -79.799058**	**Peak Period:**	**7:30 AM - 8:30 AM, 12:30 PM - 1:30 PM, 4:45 PM - 5:45 PM**
Site Number:	**00117781**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**Charles Chung**



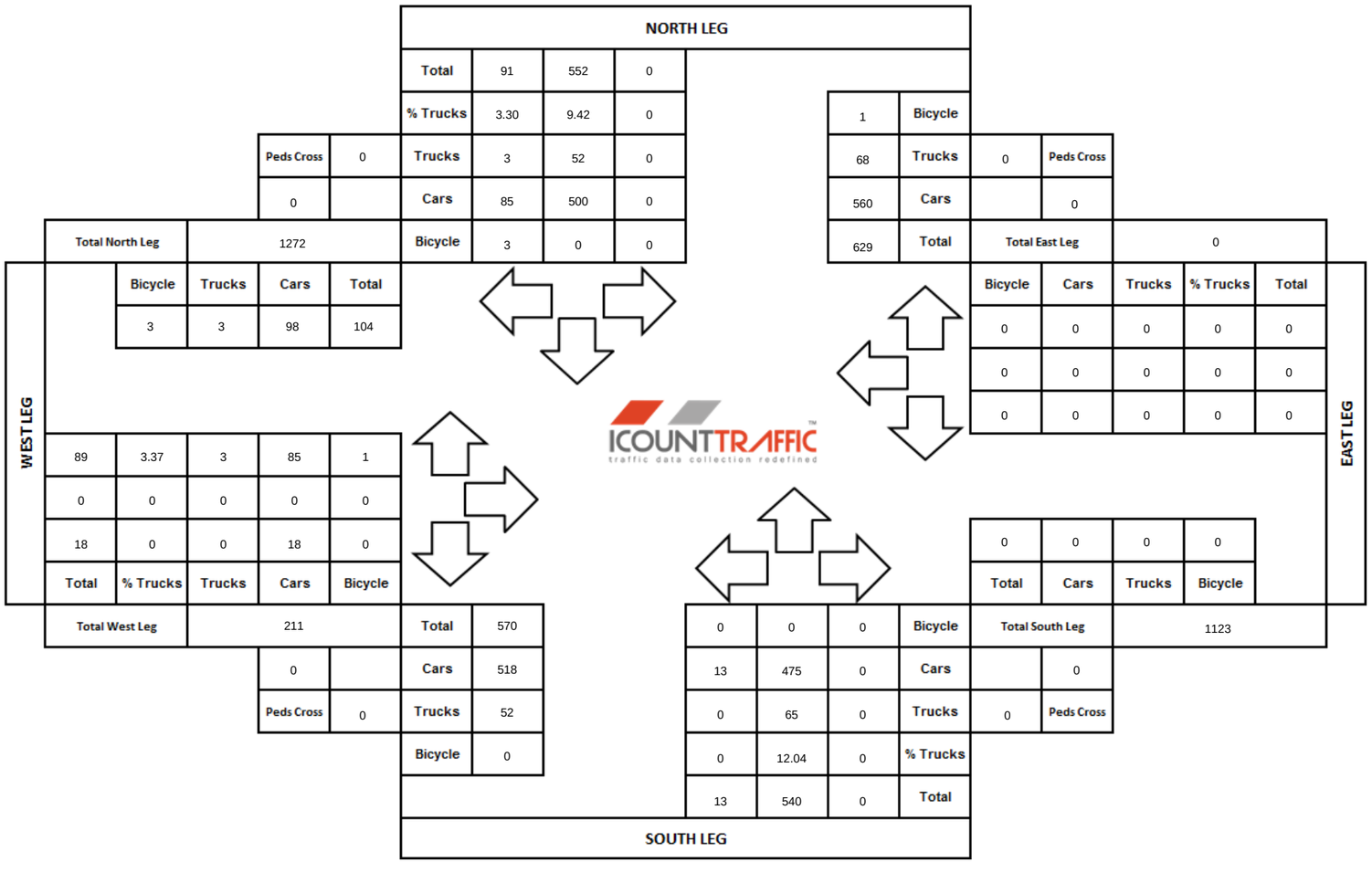
AM Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Mostly Cloudy**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Embleton Road**	**Count Period:**	**AM**
GPS Coordinates:	**43.644265, -79.799058**	**Peak Period:**	**7:30 AM - 8:30 AM**
Site Number:	**00117781**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**Charles Chung**



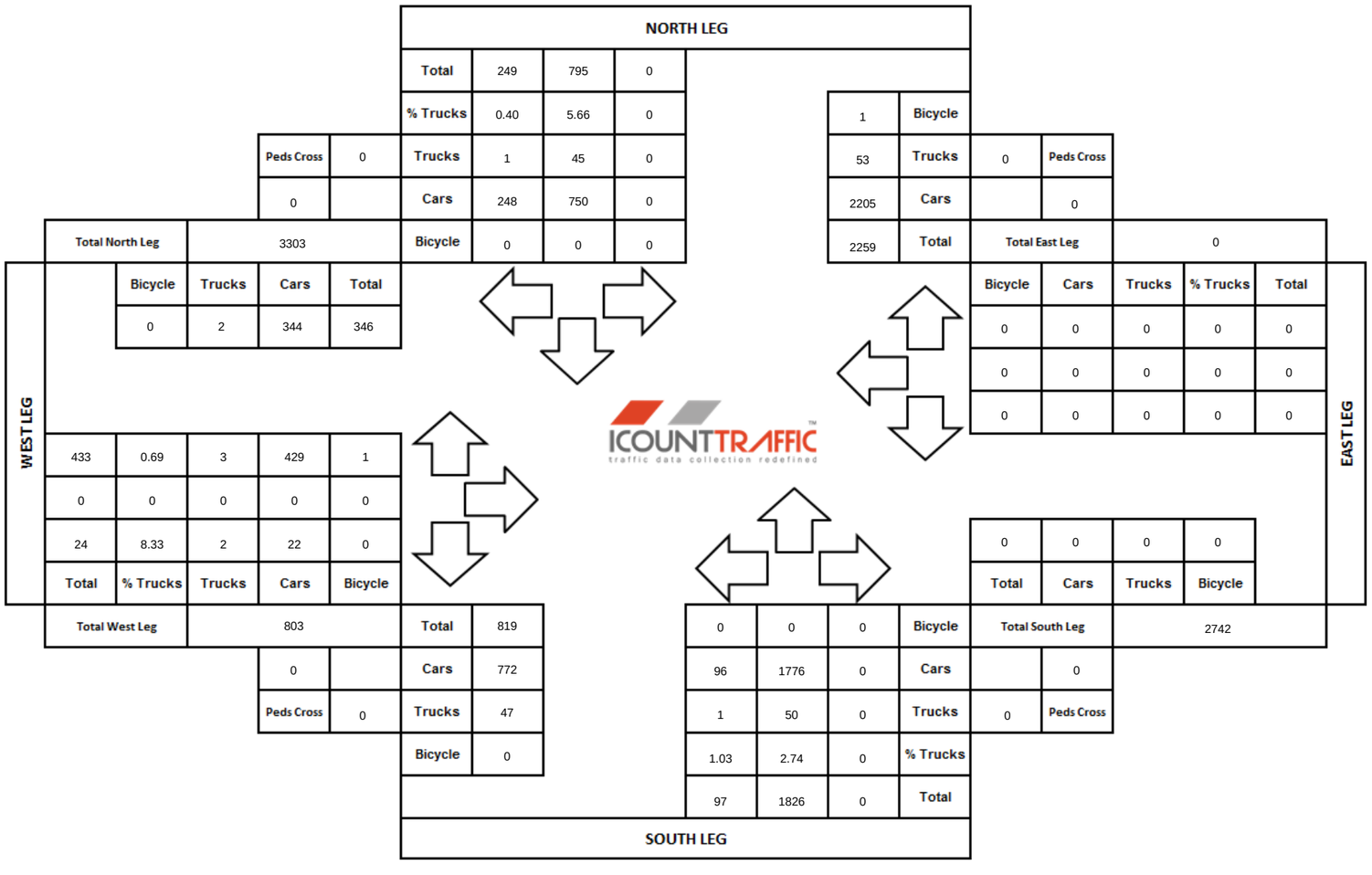
Noon Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Mostly Cloudy**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Embleton Road**	**Count Period:**	**Noon**
GPS Coordinates:	**43.644265, -79.799058**	**Peak Period:**	**12:30 PM - 1:30 PM**
Site Number:	**00117781**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**Charles Chung**



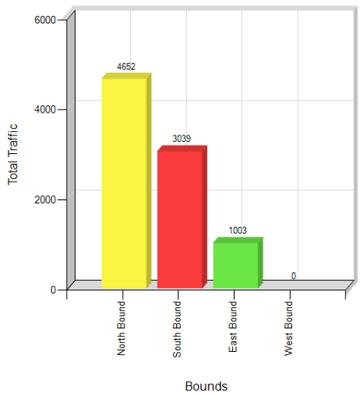
PM Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Mostly Cloudy**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Embleton Road**	**Count Period:**	**PM**
GPS Coordinates:	**43.644265, -79.799058**	**Peak Period:**	**4:45 PM - 5:45 PM**
Site Number:	**00117781**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**Charles Chung**

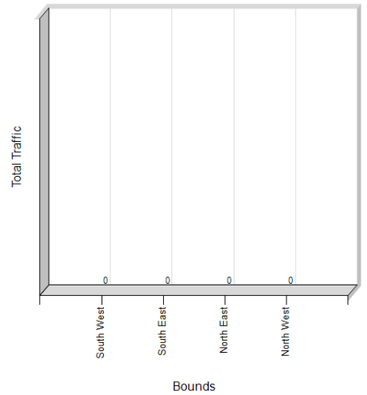


TMC chart data

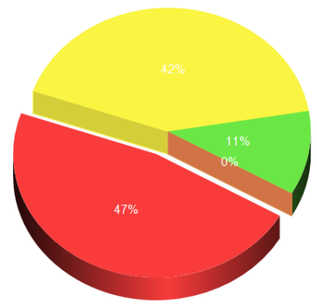
Total Traffic



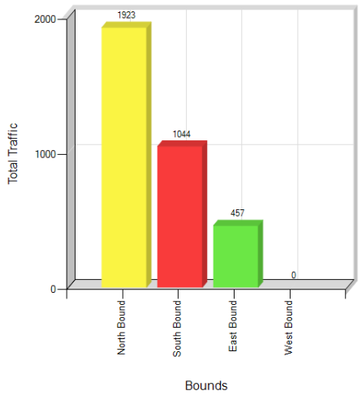
Total Pedestrians



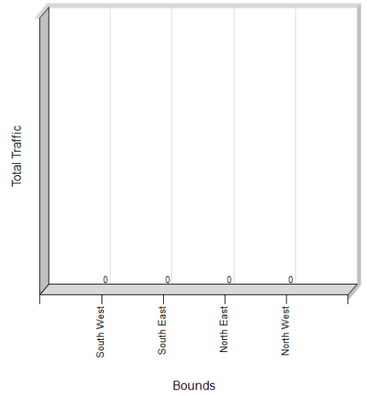
Total Approach



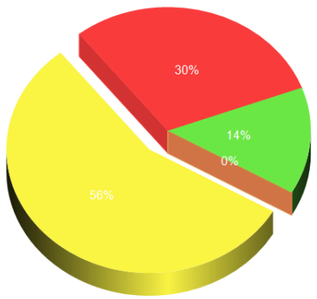
Total Traffic at Peak Hour



Total Pedestrians at Peak Hour



Total Approach at Peak Hour



	SouthBound		NorthEast
	WestBound		NorthWest
	NorthBound		SouthWest
	EastBound		SouthEast

NOTES & IMAGES

South Leg

North leg

West leg

TMC - Intersection Count Summary

Company name: Trans-Plan Inc.
Company address: 24 Ryerson Avenue, Suite 211,Toronto, Ontario, Canada
Company phone: (647) 931-7383

Site: 00116751
Location: Mississauga Road at Lionhead Golf Centre Access, Brampton
N/S Street: Mississauga Road
E/W Street: Lionhead Golf Centre Access
GPS Coordinates: 43.637684, -79.789982
Date: 18 November 2015
Day of week: Wednesday
Analyst(s): Sandy Liu

VEHICLE TRAFFIC

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
18/11/2015 07:00	0	351	8	359	1	0	0	1	7	225	0	232	2	0	0	2	594
18/11/2015 07:15	0	491	3	494	2	0	0	2	6	195	4	205	0	0	0	0	701
18/11/2015 07:30	0	621	2	623	1	0	0	1	2	267	4	273	0	0	0	0	897
18/11/2015 07:45	0	554	0	554	0	0	0	0	4	162	5	171	0	0	1	1	726
Hourly Total	0	2017	13	2030	4	0	0	4	19	849	13	881	2	0	1	3	2918
18/11/2015 08:00	0	544	2	546	0	0	0	0	3	184	3	190	1	0	2	3	739
18/11/2015 08:15	3	219	2	224	1	0	1	2	1	107	2	110	0	0	1	1	337
18/11/2015 08:30	4	463	1	468	1	0	0	1	1	156	12	169	2	0	2	4	642
18/11/2015 08:45	4	469	1	474	0	0	0	0	0	189	8	197	0	0	1	1	672
Hourly Total	11	1695	6	1712	2	0	1	3	5	636	25	666	3	0	6	9	2390
18/11/2015 09:00	0	27	0	27	0	0	0	0	0	7	0	7	0	0	0	0	34
18/11/2015 09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	27	0	27	0	0	0	0	0	7	0	7	0	0	0	0	34
Grand Total	11	3739	19	3769	6	0	1	7	24	1492	38	1554	5	0	7	12	5342
Approach %	0	99	1	100	86	0	14	100	2	96	2	100	42	0	58	100	-
Total %	0	70	0	70	0	0	0	0	0	28	1	29	0	0	0	0	-

AM Peak Hour 7:15 AM - 8:15 AM

Vehicle Total	0	2210	7	2217	3	0	0	3	15	808	16	839	1	0	3	4	3063
Car	0	2095	4	2099	2	0	0	2	14	661	14	689	1	0	3	4	2794
Truck	0	115	3	118	1	0	0	1	1	147	2	150	0	0	0	0	269
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
18/11/2015 11:00	2	119	2	123	4	0	1	5	1	96	7	104	1	0	2	3	235
18/11/2015 11:15	4	105	2	111	3	0	0	3	3	72	7	82	1	0	0	1	197
18/11/2015 11:30	0	134	2	136	8	0	0	8	2	111	9	122	1	0	3	4	270
18/11/2015 11:45	2	147	4	153	4	0	1	5	0	133	9	142	0	0	1	1	301
Hourly Total	8	505	10	523	19	0	2	21	6	412	32	450	3	0	6	9	1003
18/11/2015 12:00	2	150	0	152	3	0	0	3	3	139	7	149	1	0	2	3	307
18/11/2015 12:15	2	105	2	109	2	0	0	2	0	68	5	73	0	0	1	1	185
18/11/2015 12:30	0	128	0	128	8	0	0	8	2	103	4	109	2	0	1	3	248
18/11/2015 12:45	5	132	2	139	6	0	0	6	3	147	6	156	0	0	4	4	305
Hourly Total	9	515	4	528	19	0	0	19	8	457	22	487	3	0	8	11	1045
18/11/2015 13:00	1	158	1	160	8	0	0	8	3	147	0	150	1	0	5	6	324
18/11/2015 13:15	2	141	0	143	3	0	0	3	2	138	6	146	0	0	4	4	296
18/11/2015 13:30	2	127	4	133	6	0	0	6	1	137	4	142	0	0	1	1	282
18/11/2015 13:45	1	136	1	138	2	0	2	4	1	113	2	116	2	0	2	4	262
Hourly Total	6	562	6	574	19	0	2	21	7	535	12	554	3	0	12	15	1164
18/11/2015 14:00	0	7	0	7	0	0	0	0	0	5	0	5	0	0	0	0	12
18/11/2015 14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	7	0	7	0	0	0	0	0	5	0	5	0	0	0	0	12
Grand Total	23	1589	20	1632	57	0	4	61	21	1409	66	1496	9	0	26	35	3224
Approach %	1	97	1	99	93	0	7	100	1	94	4	99	26	0	74	100	-
Total %	1	49	1	51	2	0	0	2	1	44	2	47	0	0	1	1	-

Midday Peak Hour 12:45 PM - 1:45 PM

Vehicle Total	10	558	7	575	23	0	0	23	9	569	16	594	1	0	14	15	1207
Car	10	497	5	512	22	0	0	22	5	502	14	521	0	0	11	11	1066
Truck	0	61	2	63	1	0	0	1	4	67	2	73	1	0	3	4	141
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Interval	SouthBound				WestBound				NorthBound				EastBound				Total
	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	Left	Thru	Right	B. Total	
18/11/2015 15:00	1	142	1	144	10	0	0	10	0	179	1	180	2	0	3	5	339
18/11/2015 15:15	1	227	3	231	16	0	2	18	1	340	1	342	2	0	4	6	597
18/11/2015 15:30	0	211	1	212	12	0	0	12	0	257	3	260	0	0	1	1	485
18/11/2015 15:45	0	219	2	221	11	0	5	16	1	369	1	371	0	0	8	8	616
Hourly Total	2	799	7	808	49	0	7	56	2	1145	6	1153	4	0	16	20	2037
18/11/2015 16:00	0	142	1	143	14	0	2	16	1	321	8	330	1	0	0	1	490
18/11/2015 16:15	0	198	1	199	18	0	0	18	1	386	1	388	1	0	3	4	609
18/11/2015 16:30	2	206	0	208	10	0	0	10	0	407	1	408	1	0	1	2	628
18/11/2015 16:45	1	210	0	211	12	0	1	13	0	410	5	415	3	0	3	6	645
Hourly Total	3	756	2	761	54	0	3	57	2	1524	15	1541	6	0	7	13	2372
18/11/2015 17:00	0	222	0	222	27	0	0	27	1	508	2	511	5	0	9	14	774
18/11/2015 17:15	0	208	1	209	11	0	0	11	2	481	2	485	6	0	4	10	715
18/11/2015 17:30	0	166	0	166	10	0	0	10	0	429	2	431	2	0	2	4	611
18/11/2015 17:45	1	175	0	176	4	0	0	4	0	510	0	510	0	0	1	1	691
Hourly Total	1	771	1	773	52	0	0	52	3	1928	6	1937	13	0	16	29	2791
18/11/2015 18:00	0	4	0	4	0	0	0	0	0	11	0	11	0	0	0	0	15
18/11/2015 18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	4	0	4	0	0	0	0	0	11	0	11	0	0	0	0	15
Grand Total	6	2330	10	2346	155	0	10	165	7	4608	27	4642	23	0	39	62	7215
Approach %	0	99	0	99	94	0	6	100	0	99	1	100	37	0	63	100	-
Total %	0	32	0	32	2	0	0	2	0	64	0	64	0	0	1	1	-

PM Peak Hour 5:00 PM - 6:00 PM

Vehicle Total	1	771	1	773	52	0	0	52	3	1928	6	1937	13	0	16	29	2791
Car	1	694	1	696	51	0	0	51	3	1809	6	1818	13	0	14	27	2592
Truck	0	77	0	77	1	0	0	1	0	119	0	119	0	0	2	2	199
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PEDESTRIAN CROSSING

	North East			North West			South West			South East			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
18/11/2015 07:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 07:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 07:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 07:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 08:15:00	0	0	0	0	0	0	0	0	0	0	2	2	2
18/11/2015 08:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 08:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	2	2	2
18/11/2015 09:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 09:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	0	2	2	2

AM Peak Hour 7:30 AM - 8:30 AM

Pedestrians	0	0	0	0	0	0	0	0	0	0	2	2	2

No pedestrian crossing for Noon.

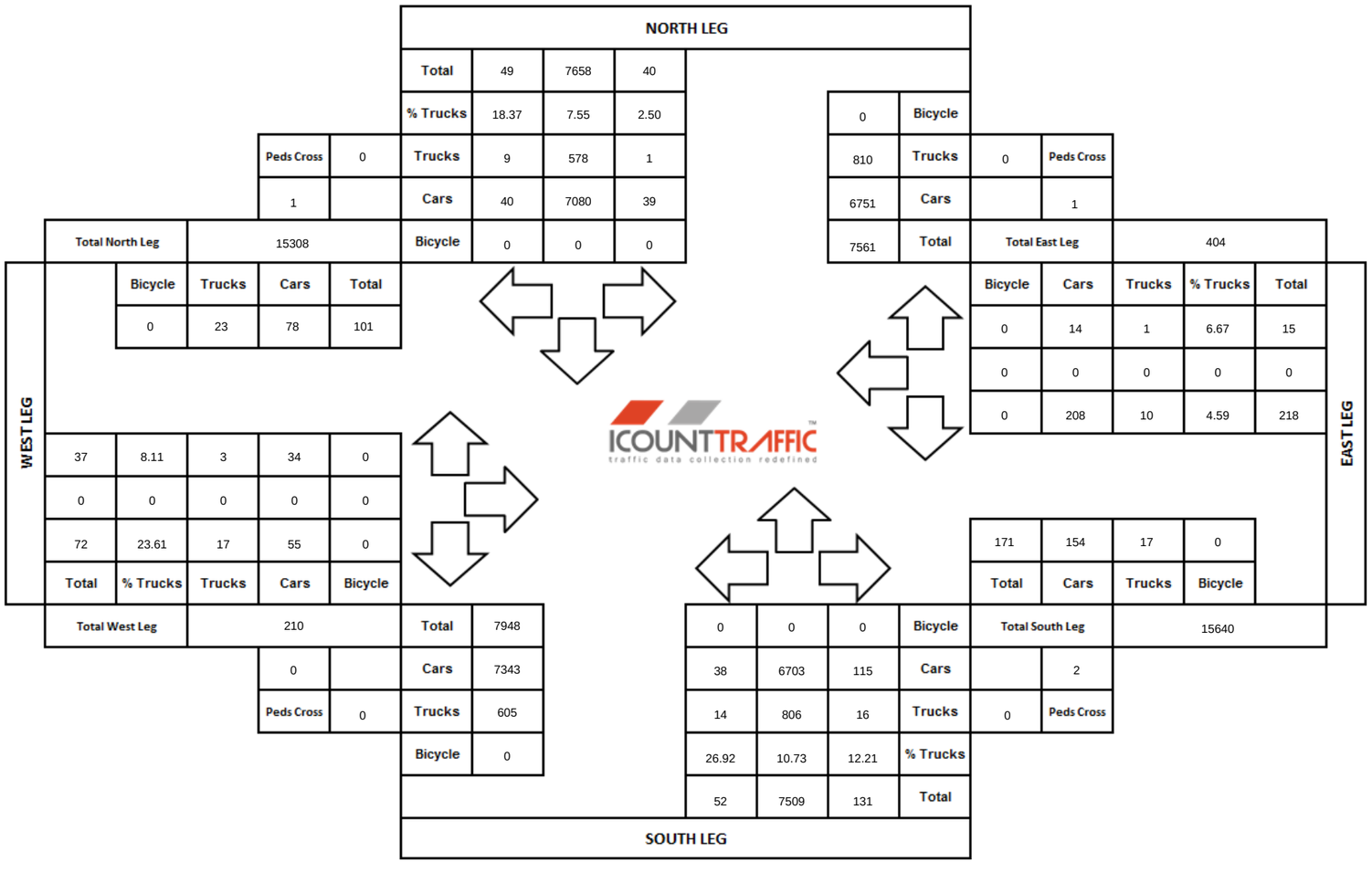
	North East			North West			South West			South East			Total
	Left	Right	Total	Left	Right	Total	Left	Right	Total	Left	Right	Total	
18/11/2015 15:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 15:15:00	1	0	1	0	0	0	0	0	0	0	0	0	1
18/11/2015 15:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 15:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	1	0	1	0	0	0	0	0	0	0	0	0	1
18/11/2015 16:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 16:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 16:30:00	0	0	0	0	1	1	0	0	0	0	0	0	1
18/11/2015 16:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	1	1	0	0	0	0	0	0	1
18/11/2015 17:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 17:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 17:30:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 17:45:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 18:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0
18/11/2015 18:15:00	0	0	0	0	0	0	0	0	0	0	0	0	0
Hourly Total	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total	1	0	1	0	1	1	0	0	0	0	0	0	2

PM Peak Hour 3:00 PM - 4:00 PM

Pedestrians	1	0	1	0	0	0	0	0	0	0	0	0	1

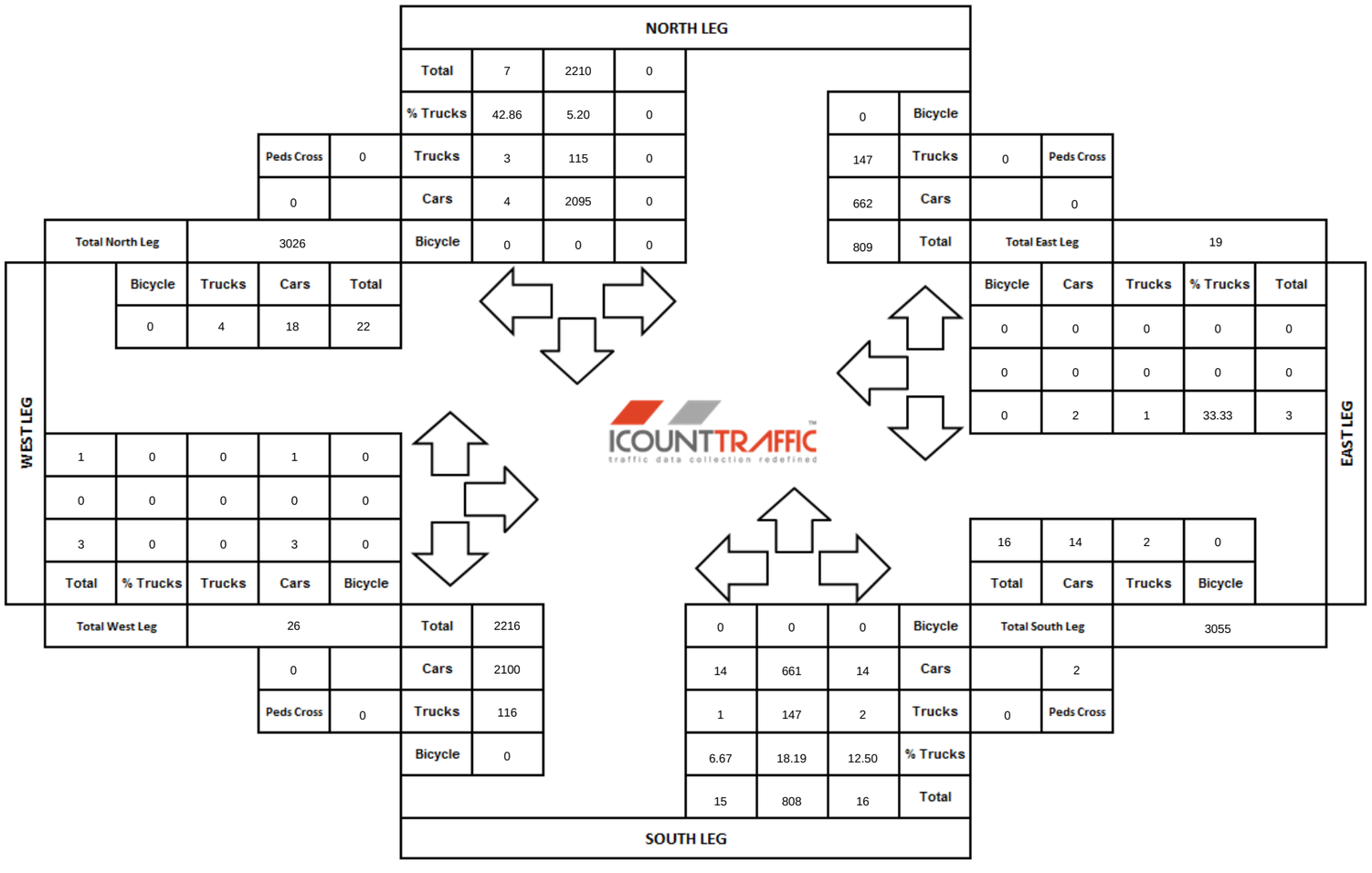
TOTAL TMC COUNT DIAGRAM

City:	**Brampton**	**Weather:**	**Partly Cloudy**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Lionhead Golf Centre Access**	**Count Period:**	**AM, Noon, PM**
GPS Coordinates:	**43.637684, -79.789982**	**Peak Period:**	**7:15 AM - 8:15 AM, 12:45 PM - 1:45 PM, 5:00 PM - 6:00 PM**
Site Number:	**00116751**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**Sandy Liu**



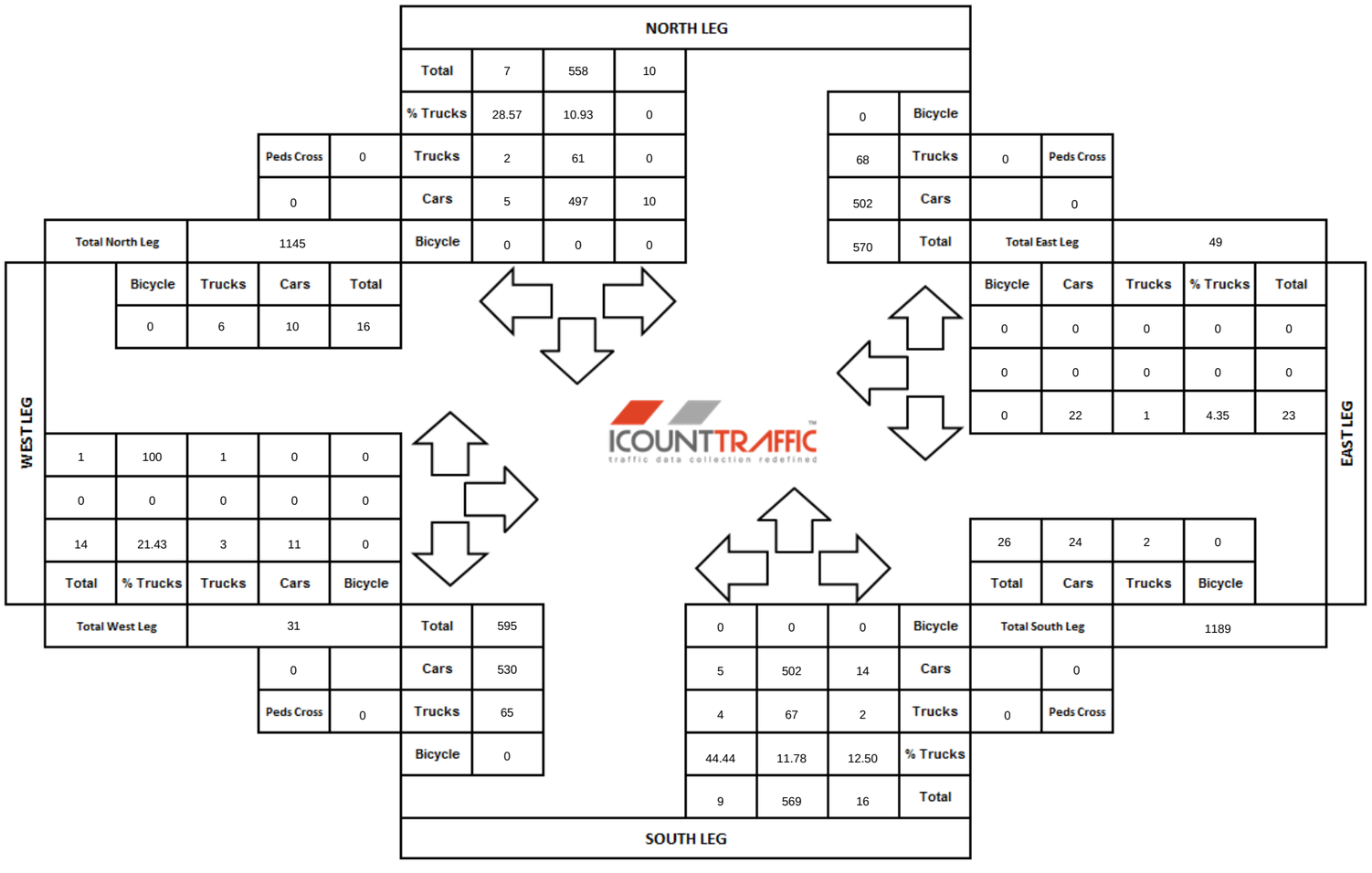
AM Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Partly Cloudy**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Lionhead Golf Centre Access**	**Count Period:**	**AM**
GPS Coordinates:	**43.637684, -79.789982**	**Peak Period:**	**7:15 AM - 8:15 AM**
Site Number:	**00116751**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**Sandy Liu**



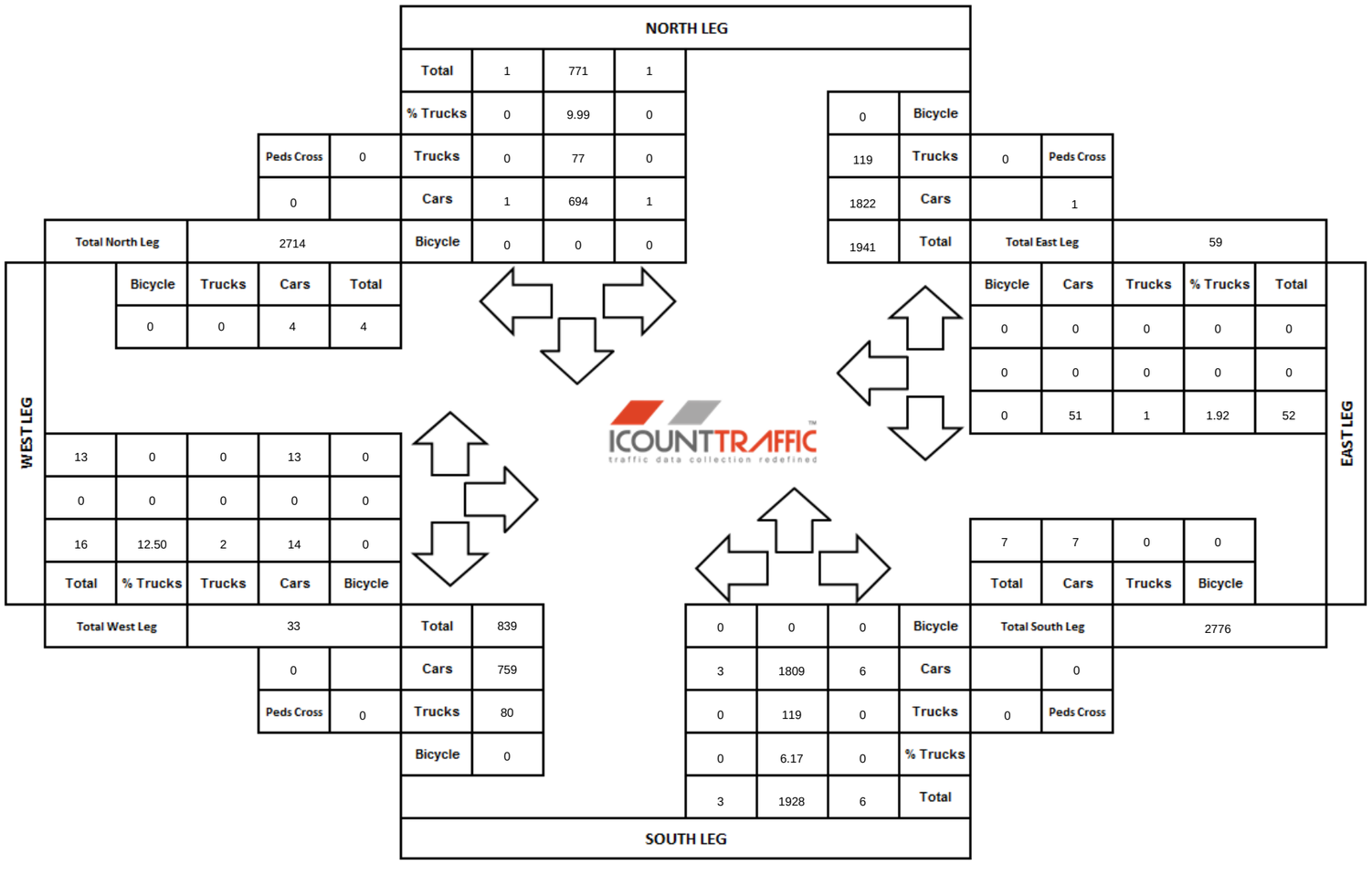
Noon Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Partly Cloudy**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Lionhead Golf Centre Access**	**Count Period:**	**Noon**
GPS Coordinates:	**43.637684, -79.789982**	**Peak Period:**	**12:45 PM - 1:45 PM**
Site Number:	**00116751**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**Sandy Liu**



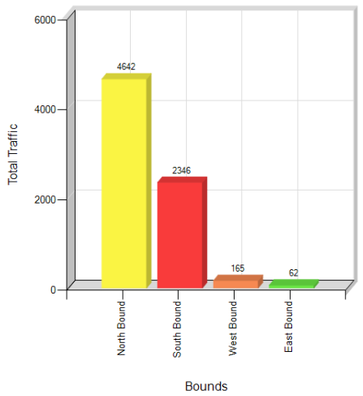
PM Peak Hour Count Diagram

City:	**Brampton**	**Weather:**	**Partly Cloudy**
North/South Street:	**Mississauga Road**	**Count Date:**	**18/11/2015**
East/West Street:	**Lionhead Golf Centre Access**	**Count Period:**	**PM**
GPS Coordinates:	**43.637684, -79.789982**	**Peak Period:**	**5:00 PM - 6:00 PM**
Site Number:	**00116751**	**Major Road:**	**Mississauga Road**
Control:	**Signalized**	**Surveyor:**	**Sandy Liu**

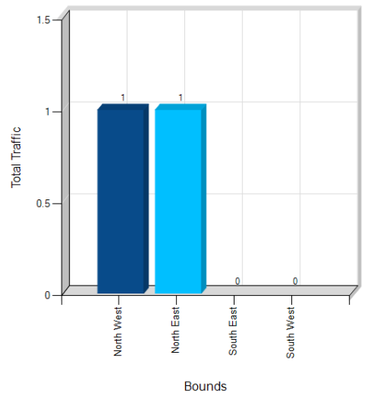


TMC chart data

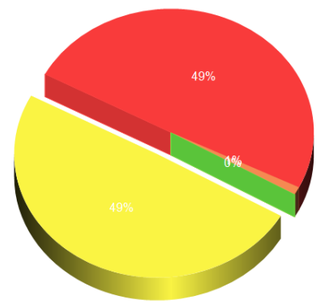
Total Traffic



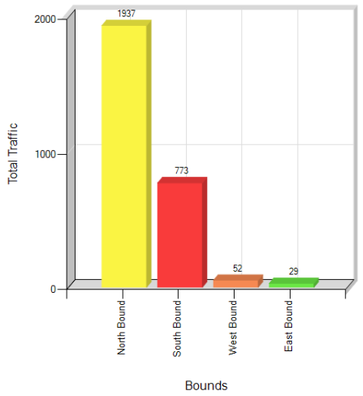
Total Pedestrians



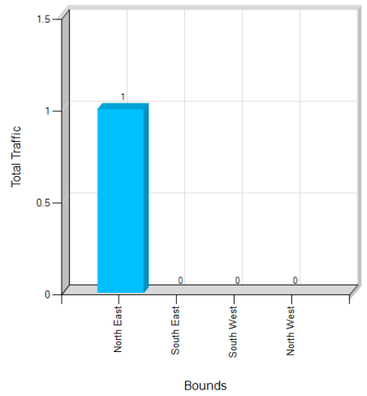
Total Approach



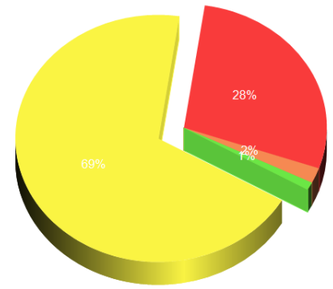
Total Traffic at Peak Hour



Total Pedestrians at Peak Hour



Total Approach at Peak Hour



	SouthBound		NorthEast
	WestBound		NorthWest
	NorthBound		SouthWest
	EastBound		SouthEast

NOTES & IMAGES

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Appendix B

Existing (2015) Intersection Operation Reports

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	563	73	537	208	97	934
Future Volume (vph)	563	73	537	208	97	934
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.7	3.5	3.5	3.7
Total Lost time (s)	6.2	6.2	6.7	6.7	6.7	6.7
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1785	1439	3318	1536	1785	3318
Flt Permitted	0.95	1.00	1.00	1.00	0.43	1.00
Satd. Flow (perm)	1785	1439	3318	1536	807	3318
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	563	73	537	208	97	934
RTOR Reduction (vph)	0	40	0	90	0	0
Lane Group Flow (vph)	563	33	537	118	97	934
Heavy Vehicles (%)	0%	11%	10%	4%	0%	10%
Turn Type	Perm	Perm	NA	Perm	Perm	NA
Protected Phases			2			6
Permitted Phases	8	8		2	6	
Actuated Green, G (s)	43.1	43.1	74.0	74.0	74.0	74.0
Effective Green, g (s)	43.1	43.1	74.0	74.0	74.0	74.0
Actuated g/C Ratio	0.33	0.33	0.57	0.57	0.57	0.57
Clearance Time (s)	6.2	6.2	6.7	6.7	6.7	6.7
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	591	477	1888	874	459	1888
v/s Ratio Prot			0.16			c0.28
v/s Ratio Perm	c0.32	0.02		0.08	0.12	
v/c Ratio	0.95	0.07	0.28	0.14	0.21	0.49
Uniform Delay, d1	42.5	29.7	14.4	13.1	13.7	16.8
Progression Factor	1.00	1.00	0.53	0.47	1.00	1.00
Incremental Delay, d2	26.1	0.1	0.4	0.3	1.0	0.9
Delay (s)	68.6	29.9	8.0	6.4	14.8	17.7
Level of Service	E	C	A	A	B	B
Approach Delay (s)	64.1		7.6			17.4
Approach LOS	E		A			B

Intersection Summary			
HCM 2000 Control Delay	26.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.9
Intersection Capacity Utilization	105.9%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	202	113	632	169	178	1319
Future Volume (vph)	202	113	632	169	178	1319
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.7	3.5	3.5	3.7
Total Lost time (s)	6.3	6.3	6.6	6.6	3.0	6.6
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1785	1566	3380	1597	1785	3318
Flt Permitted	0.95	1.00	1.00	1.00	0.38	1.00
Satd. Flow (perm)	1785	1566	3380	1597	710	3318
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	202	113	632	169	178	1319
RTOR Reduction (vph)	0	94	0	61	0	0
Lane Group Flow (vph)	202	19	632	108	178	1319
Heavy Vehicles (%)	0%	2%	8%	0%	0%	10%
Turn Type	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	8		2	6	
Actuated Green, G (s)	21.7	21.7	82.8	82.8	95.4	95.4
Effective Green, g (s)	21.7	21.7	82.8	82.8	95.4	95.4
Actuated g/C Ratio	0.17	0.17	0.64	0.64	0.73	0.73
Clearance Time (s)	6.3	6.3	6.6	6.6	3.0	6.6
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	297	261	2152	1017	600	2434
v/s Ratio Prot			0.19		0.02	c0.40
v/s Ratio Perm	c0.11	0.01		0.07	0.20	
v/c Ratio	0.68	0.07	0.29	0.11	0.30	0.54
Uniform Delay, d1	50.9	45.7	10.5	9.2	5.4	7.6
Progression Factor	1.00	1.00	0.14	0.01	0.57	0.48
Incremental Delay, d2	8.0	0.2	0.3	0.2	0.4	0.6
Delay (s)	58.9	45.9	1.8	0.2	3.5	4.3
Level of Service	E	D	A	A	A	A
Approach Delay (s)	54.2		1.5			4.2
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	9.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	7	14	593	4	72	1	709	381	72	1540	0
Future Volume (vph)	4	7	14	593	4	72	1	709	381	72	1540	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)		7.4		7.4	7.4	7.4	3.0	6.5	6.5	6.5	6.5	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt		0.92		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1695		1733	1537	1551	892	3259	1521	1513	3476	
Flt Permitted		0.98		0.74	1.00	1.00	0.07	1.00	1.00	0.33	1.00	
Satd. Flow (perm)		1674		1352	1537	1551	66	3259	1521	521	3476	
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)	4	7	14	593	4	72	1	709	381	72	1540	0
RTOR Reduction (vph)	0	8	0	0	0	40	0	0	205	0	0	0
Lane Group Flow (vph)	0	17	0	593	4	32	1	709	176	72	1540	0
Heavy Vehicles (%)	0%	0%	7%	3%	25%	3%	100%	12%	5%	18%	5%	0%
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)		57.6		57.6	57.6	57.6	58.5	58.5	58.5	54.1	54.1	
Effective Green, g (s)		57.6		57.6	57.6	57.6	58.5	58.5	58.5	54.1	54.1	
Actuated g/C Ratio		0.44		0.44	0.44	0.44	0.45	0.45	0.45	0.42	0.42	
Clearance Time (s)		7.4		7.4	7.4	7.4	3.0	6.5	6.5	6.5	6.5	
Vehicle Extension (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Grp Cap (vph)		741		599	681	687	38	1466	684	216	1446	
v/s Ratio Prot					0.00		0.00	c0.22			c0.44	
v/s Ratio Perm		0.01		c0.44		0.02	0.01		0.12	0.14		
v/c Ratio		0.02		0.99	0.01	0.05	0.03	0.48	0.26	0.33	1.07	
Uniform Delay, d1		20.4		35.9	20.2	20.6	30.5	25.1	22.2	25.7	38.0	
Progression Factor		1.00		1.00	1.00	1.00	0.80	0.69	0.08	1.08	0.98	
Incremental Delay, d2		0.0		34.0	0.0	0.1	0.5	1.0	0.8	3.6	41.8	
Delay (s)		20.4		70.0	20.2	20.6	25.0	18.5	2.6	31.3	79.0	
Level of Service		C		E	C	C	C	B	A	C	E	
Approach Delay (s)		20.4			64.3			13.0			76.9	
Approach LOS		C			E			B			E	

Intersection Summary			
HCM 2000 Control Delay	53.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	101.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	296	86	14	795	1957	190
Future Volume (vph)	296	86	14	795	1957	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.7	3.7	3.5
Total Lost time (s)	6.4		6.2	6.2	6.2	
Lane Util. Factor	1.00		1.00	0.95	0.95	
Frt	0.97		1.00	1.00	0.99	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1716		1566	3318	3475	
Flt Permitted	0.96		0.05	1.00	1.00	
Satd. Flow (perm)	1716		79	3318	3475	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	296	86	14	795	1957	190
RTOR Reduction (vph)	8	0	0	0	5	0
Lane Group Flow (vph)	374	0	14	795	2142	0
Heavy Vehicles (%)	2%	3%	14%	10%	4%	0%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	33.7		83.7	83.7	83.7	
Effective Green, g (s)	33.7		83.7	83.7	83.7	
Actuated g/C Ratio	0.26		0.64	0.64	0.64	
Clearance Time (s)	6.4		6.2	6.2	6.2	
Vehicle Extension (s)	5.0		5.0	5.0	5.0	
Lane Grp Cap (vph)	444		50	2136	2237	
v/s Ratio Prot	c0.22			0.24	c0.62	
v/s Ratio Perm			0.18			
v/c Ratio	0.84		0.28	0.37	0.96	
Uniform Delay, d1	45.6		10.1	10.8	21.5	
Progression Factor	1.00		1.00	1.00	0.69	
Incremental Delay, d2	14.8		13.4	0.5	1.5	
Delay (s)	60.4		23.5	11.3	16.4	
Level of Service	E		C	B	B	
Approach Delay (s)	60.4			11.6	16.4	
Approach LOS	E			B	B	

Intersection Summary			
HCM 2000 Control Delay	20.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	92.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	0	3	3	0	0	15	808	16	0	2036	7
Future Volume (vph)	1	0	3	3	0	0	15	808	16	0	2036	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	7.4	7.4		7.4			7.3	7.3	7.3		7.3	7.3
Lane Util. Factor	1.00	1.00		1.00			1.00	0.95	1.00		0.95	1.00
Frt	1.00	0.85		1.00			1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95			0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1785	1633		1342			1668	3093	1426		3476	1117
Flt Permitted	1.00	1.00		1.00			0.08	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1879	1633		1413			148	3093	1426		3476	1117
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)	1	0	3	3	0	0	15	808	16	0	2036	7
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	2	0	0	1
Lane Group Flow (vph)	1	0	0	3	0	0	15	808	14	0	2036	6
Heavy Vehicles (%)	0%	0%	0%	33%	0%	0%	7%	18%	12%	0%	5%	43%
Turn Type	Perm	NA		Perm			Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	1.8	1.8		1.8			109.2	109.2	109.2		109.2	109.2
Effective Green, g (s)	1.8	1.8		1.8			109.2	109.2	109.2		109.2	109.2
Actuated g/C Ratio	0.01	0.01		0.01			0.87	0.87	0.87		0.87	0.87
Clearance Time (s)	7.4	7.4		7.4			7.3	7.3	7.3		7.3	7.3
Vehicle Extension (s)	5.0	5.0		5.0			5.0	5.0	5.0		5.0	5.0
Lane Grp Cap (vph)	26	23		20			128	2686	1238		3019	970
v/s Ratio Prot		0.00						0.26			c0.59	
v/s Ratio Perm	0.00			c0.00			0.10		0.01			0.01
v/c Ratio	0.04	0.00		0.15			0.12	0.30	0.01		0.67	0.01
Uniform Delay, d1	61.1	61.1		61.2			1.2	1.5	1.1		2.6	1.1
Progression Factor	1.00	1.00		1.00			1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.3	0.1		7.2			1.9	0.3	0.0		1.2	0.0
Delay (s)	62.4	61.1		68.4			3.1	1.8	1.1		3.8	1.1
Level of Service	E	E		E			A	A	A		A	A
Approach Delay (s)		61.4			68.4			1.8			3.8	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	3.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	125.7	Sum of lost time (s)	14.7
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	65	5	796	6	2	1519
Future Volume (Veh/h)	65	5	796	6	2	1519
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	65	5	796	6	2	1519
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						314
pX, platoon unblocked	0.82					
vC, conflicting volume	1560	398			802	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1242	398			802	
tC, single (s)	6.8	7.1			4.4	
tC, 2 stage (s)						
tF (s)	3.5	3.4			2.3	
p0 queue free %	53	99			100	
cM capacity (veh/h)	139	577			744	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	65	5	398	398	6	2	760	760
Volume Left	65	0	0	0	0	2	0	0
Volume Right	0	5	0	0	6	0	0	0
cSH	139	577	1700	1700	1700	744	1700	1700
Volume to Capacity	0.47	0.01	0.23	0.23	0.00	0.00	0.45	0.45
Queue Length 95th (m)	17.2	0.2	0.0	0.0	0.0	0.1	0.0	0.0
Control Delay (s)	52.0	11.3	0.0	0.0	0.0	9.9	0.0	0.0
Lane LOS	F	B				A		
Approach Delay (s)	49.1		0.0			0.0		
Approach LOS	E							

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	52.3%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	14	0	16	21	1	6	1	782	2	5	1572	7
Future Vol, veh/h	14	0	16	21	1	6	1	782	2	5	1572	7
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250	-	-	-	-	360	700	-	350	550	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	19	0	0	0	100	9	0	0	4	14
Mvmt Flow	14	0	16	21	1	6	1	782	2	5	1572	7

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1901	2370	790	1423	2373	391	1579	0	0	782	0	0
Stage 1	1586	1586	-	784	784	-	-	-	-	-	-	-
Stage 2	315	784	-	639	1589	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	7.48	6.4	6.5	7.1	7.3	-	-	5.3	-	-
Critical Hdwy Stg 1	7.3	5.5	-	7.3	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.7	5.5	-	6.7	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.8	4	4.09	3.8	4	3.9	4.1	-	-	3.1	-	-
Pot Cap-1 Maneuver	75	35	258	146	35	524	77	-	-	505	-	-
Stage 1	78	170	-	284	407	-	-	-	-	-	-	-
Stage 2	620	407	-	397	169	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	71	34	258	135	34	524	77	-	-	505	-	-
Mov Cap-2 Maneuver	71	34	-	135	34	-	-	-	-	-	-	-
Stage 1	77	168	-	280	402	-	-	-	-	-	-	-
Stage 2	603	402	-	369	167	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	42.3	35.6	0.1	0
HCM LOS	E	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	77	-	-	71	258	119	524	505	-	-
HCM Lane V/C Ratio	0.013	-	-	0.197	0.062	0.185	0.011	0.01	-	-
HCM Control Delay (s)	52.4	-	-	67.8	19.9	42	12	12.2	-	-
HCM Lane LOS	F	-	-	F	C	E	B	B	-	-
HCM 95th %tile Q(veh)	0	-	-	0.7	0.2	0.6	0	0	-	-

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	20	50	560	50	20	1011
Future Volume (Veh/h)	20	50	560	50	20	1011
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	20	50	560	50	20	1011
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1636	585			610	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1636	585			610	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	82	90			98	
cM capacity (veh/h)	110	515			979	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	20	50	610	1031
Volume Left	20	0	0	20
Volume Right	0	50	50	0
cSH	110	515	1700	979
Volume to Capacity	0.18	0.10	0.36	0.02
Queue Length 95th (m)	5.1	2.6	0.0	0.5
Control Delay (s)	44.9	12.7	0.0	0.6
Lane LOS	E	B		A
Approach Delay (s)	21.9		0.0	0.6
Approach LOS	C			

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	563	73	537	208	97	934
v/c Ratio	0.95	0.14	0.28	0.22	0.21	0.49
Control Delay	69.7	10.4	8.1	1.3	15.5	18.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.7	10.4	8.1	1.3	15.5	18.0
Queue Length 50th (m)	146.7	2.4	10.9	0.0	12.4	77.1
Queue Length 95th (m)	#218.7	13.5	25.0	7.2	23.2	94.9
Internal Link Dist (m)	461.7		324.0			457.6
Turn Bay Length (m)				300.0	60.0	
Base Capacity (vph)	601	524	1889	964	459	1889
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.94	0.14	0.28	0.22	0.21	0.49

Intersection Summary

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

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	202	113	632	169	178	1319
v/c Ratio	0.68	0.32	0.29	0.16	0.29	0.54
Control Delay	62.1	9.9	1.9	0.3	3.5	4.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.1	9.9	1.9	0.3	3.5	4.6
Queue Length 50th (m)	51.8	0.0	4.0	0.0	6.6	29.8
Queue Length 95th (m)	74.5	16.1	7.8	0.0	m9.0	m54.8
Internal Link Dist (m)	90.9		290.0			324.0
Turn Bay Length (m)				50.0	150.0	
Base Capacity (vph)	394	433	2153	1078	620	2435
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.26	0.29	0.16	0.29	0.54

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	25	593	4	72	1	709	381	72	1540
v/c Ratio	0.03	0.99	0.01	0.10	0.01	0.48	0.43	0.32	1.02
Control Delay	12.5	70.8	20.2	4.9	15.0	18.7	1.6	32.2	62.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	12.5	70.8	20.2	4.9	15.0	18.7	1.6	32.2	62.6
Queue Length 50th (m)	1.6	155.8	0.6	0.0	0.1	53.4	1.6	12.1	190.2
Queue Length 95th (m)	7.2	#237.8	2.8	9.1	m0.2	58.0	1.3	28.2	#303.6
Internal Link Dist (m)	27.8		347.9			418.5			530.8
Turn Bay Length (m)		45.0			65.0		50.0	100.0	
Base Capacity (vph)	749	599	681	727	75	1466	889	226	1510
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.99	0.01	0.10	0.01	0.48	0.43	0.32	1.02

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	NBL	NBT	SBT
Lane Group Flow (vph)	382	14	795	2147
v/c Ratio	0.84	0.28	0.37	0.96
Control Delay	61.1	29.4	12.1	18.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	61.1	29.4	12.1	18.0
Queue Length 50th (m)	94.2	1.6	50.7	134.2
Queue Length 95th (m)	129.3	8.6	68.8 m	#174.5
Internal Link Dist (m)	267.7		1007.3	418.5
Turn Bay Length (m)		50.0		
Base Capacity (vph)	517	50	2135	2242
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.74	0.28	0.37	0.96

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	WBL	NBL	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	1	3	3	15	808	16	2036	7
v/c Ratio	0.01	0.02	0.03	0.11	0.27	0.01	0.61	0.01
Control Delay	55.0	0.3	55.3	3.0	1.1	0.1	2.4	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.0	0.3	55.3	3.0	1.1	0.1	2.4	0.0
Queue Length 50th (m)	0.3	0.0	0.8	0.0	0.0	0.0	0.0	0.0
Queue Length 95th (m)	2.2	0.0	4.0	2.5	28.8	0.3	124.3	0.0
Internal Link Dist (m)		37.9			349.7		1007.3	
Turn Bay Length (m)	50.0			65.0				55.0
Base Capacity (vph)	612	557	460	142	2975	1373	3344	1076
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	0.00	0.01	0.01	0.11	0.27	0.01	0.61	0.01

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	191	59	688	610	110	474
Future Volume (vph)	191	59	688	610	110	474
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.7	3.5	3.5	3.7
Total Lost time (s)	6.2	6.2	6.7	4.0	6.7	6.7
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1785	1597	3444	1566	1785	3444
Flt Permitted	0.95	1.00	1.00	1.00	0.38	1.00
Satd. Flow (perm)	1785	1597	3444	1566	707	3444
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	191	59	688	610	110	474
RTOR Reduction (vph)	0	47	0	0	0	0
Lane Group Flow (vph)	191	12	688	610	110	474
Heavy Vehicles (%)	0%	0%	6%	2%	0%	6%
Turn Type	Perm	Perm	NA	Free	Perm	NA
Protected Phases			2			6
Permitted Phases	8	8		Free	6	
Actuated Green, G (s)	26.3	26.3	90.8	130.0	90.8	90.8
Effective Green, g (s)	26.3	26.3	90.8	130.0	90.8	90.8
Actuated g/C Ratio	0.20	0.20	0.70	1.00	0.70	0.70
Clearance Time (s)	6.2	6.2	6.7		6.7	6.7
Vehicle Extension (s)	5.0	5.0	5.0		5.0	5.0
Lane Grp Cap (vph)	361	323	2405	1566	493	2405
v/s Ratio Prot			0.20			0.14
v/s Ratio Perm	c0.11	0.01		c0.39	0.16	
v/c Ratio	0.53	0.04	0.29	0.39	0.22	0.20
Uniform Delay, d1	46.3	41.7	7.4	0.0	7.0	6.9
Progression Factor	1.00	1.00	1.96	1.00	1.00	1.00
Incremental Delay, d2	2.7	0.1	0.3	0.6	1.0	0.2
Delay (s)	49.0	41.8	14.7	0.6	8.0	7.0
Level of Service	D	D	B	A	A	A
Approach Delay (s)	47.3		8.1			7.2
Approach LOS	D		A			A

Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.9
Intersection Capacity Utilization	96.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	141	38	1260	342	67	598
Future Volume (vph)	141	38	1260	342	67	598
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.7	3.5	3.5	3.7
Total Lost time (s)	6.3	6.3	6.6	6.6	3.0	6.6
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1785	1597	3544	1597	1767	3544
Flt Permitted	0.95	1.00	1.00	1.00	0.17	1.00
Satd. Flow (perm)	1785	1597	3544	1597	322	3544
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	141	38	1260	342	67	598
RTOR Reduction (vph)	0	33	0	81	0	0
Lane Group Flow (vph)	141	5	1260	261	67	598
Heavy Vehicles (%)	0%	0%	3%	0%	1%	3%
Turn Type	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	8		2	6	
Actuated Green, G (s)	17.4	17.4	89.6	89.6	99.7	99.7
Effective Green, g (s)	17.4	17.4	89.6	89.6	99.7	99.7
Actuated g/C Ratio	0.13	0.13	0.69	0.69	0.77	0.77
Clearance Time (s)	6.3	6.3	6.6	6.6	3.0	6.6
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	238	213	2442	1100	325	2717
v/s Ratio Prot			c0.36		0.01	c0.17
v/s Ratio Perm	c0.08	0.00		0.16	0.15	
v/c Ratio	0.59	0.02	0.52	0.24	0.21	0.22
Uniform Delay, d1	53.0	48.9	9.7	7.5	5.5	4.2
Progression Factor	1.00	1.00	1.15	1.99	1.28	1.15
Incremental Delay, d2	5.9	0.1	0.6	0.4	0.7	0.2
Delay (s)	58.8	49.0	11.8	15.3	7.7	5.1
Level of Service	E	D	B	B	A	A
Approach Delay (s)	56.7		12.6			5.3
Approach LOS	E		B			A

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	4	2	340	4	103	2	1543	585	68	649	0
Future Volume (vph)	0	4	2	340	4	103	2	1543	585	68	649	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)		7.4		7.4	7.4	7.4	3.0	6.5	6.5	6.5	6.5	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt		0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1835		1767	1921	1566	1785	3544	1566	1750	3444	
Flt Permitted		1.00		0.75	1.00	1.00	0.36	1.00	1.00	0.11	1.00	
Satd. Flow (perm)		1835		1402	1921	1566	683	3544	1566	200	3444	
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)	0	4	2	340	4	103	2	1543	585	68	649	0
RTOR Reduction (vph)	0	1	0	0	0	41	0	0	145	0	0	0
Lane Group Flow (vph)	0	5	0	340	4	62	2	1543	440	68	649	0
Heavy Vehicles (%)	0%	0%	0%	1%	0%	2%	0%	3%	2%	2%	6%	0%
Turn Type		NA		Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)		32.6		32.6	32.6	32.6	83.5	83.5	83.5	79.1	79.1	
Effective Green, g (s)		32.6		32.6	32.6	32.6	83.5	83.5	83.5	79.1	79.1	
Actuated g/C Ratio		0.25		0.25	0.25	0.25	0.64	0.64	0.64	0.61	0.61	
Clearance Time (s)		7.4		7.4	7.4	7.4	3.0	6.5	6.5	6.5	6.5	
Vehicle Extension (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Grp Cap (vph)		460		351	481	392	450	2276	1005	121	2095	
v/s Ratio Prot		0.00			0.00		0.00	c0.44			0.19	
v/s Ratio Perm				c0.24		0.04	0.00		0.28	0.34		
v/c Ratio		0.01		0.97	0.01	0.16	0.00	0.68	0.44	0.56	0.31	
Uniform Delay, d1		36.6		48.2	36.6	38.0	8.6	14.7	11.6	15.1	12.3	
Progression Factor		1.00		1.00	1.00	1.00	0.84	0.60	0.26	1.19	0.99	
Incremental Delay, d2		0.0		39.8	0.0	0.4	0.0	1.0	0.8	17.3	0.4	
Delay (s)		36.6		88.0	36.6	38.4	7.2	9.8	3.8	35.2	12.5	
Level of Service		D		F	D	D	A	A	A	D	B	
Approach Delay (s)		36.6			76.1			8.2			14.7	
Approach LOS		D			E			A			B	

Intersection Summary			
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	93.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	433	24	97	1697	755	236
Future Volume (vph)	433	24	97	1697	755	236
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.7	3.7	3.5
Total Lost time (s)	6.4		6.2	6.2	6.2	
Lane Util. Factor	1.00		1.00	0.95	0.95	
Frt	0.99		1.00	1.00	0.96	
Flt Protected	0.95		0.95	1.00	1.00	
Satd. Flow (prot)	1757		1767	3544	3366	
Flt Permitted	0.95		0.25	1.00	1.00	
Satd. Flow (perm)	1757		457	3544	3366	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	433	24	97	1697	755	236
RTOR Reduction (vph)	1	0	0	0	23	0
Lane Group Flow (vph)	456	0	97	1697	968	0
Heavy Vehicles (%)	1%	8%	1%	3%	6%	0%
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Actuated Green, G (s)	33.6		83.8	83.8	83.8	
Effective Green, g (s)	33.6		83.8	83.8	83.8	
Actuated g/C Ratio	0.26		0.64	0.64	0.64	
Clearance Time (s)	6.4		6.2	6.2	6.2	
Vehicle Extension (s)	5.0		5.0	5.0	5.0	
Lane Grp Cap (vph)	454		294	2284	2169	
v/s Ratio Prot	c0.26			c0.48	0.29	
v/s Ratio Perm			0.21			
v/c Ratio	1.00		0.33	0.74	0.45	
Uniform Delay, d1	48.2		10.4	15.8	11.5	
Progression Factor	1.00		1.00	1.00	0.30	
Incremental Delay, d2	43.1		3.0	2.2	0.6	
Delay (s)	91.3		13.4	18.0	4.0	
Level of Service	F		B	B	A	
Approach Delay (s)	91.3			17.7	4.0	
Approach LOS	F			B	A	

Intersection Summary			
HCM 2000 Control Delay	23.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.6
Intersection Capacity Utilization	82.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	13	0	16	52	0	0	3	1781	5	1	777	1
Future Volume (vph)	13	0	16	52	0	0	3	1781	5	1	777	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	7.4	7.4		7.4			7.3	7.3	7.3	7.3	7.3	7.3
Lane Util. Factor	1.00	1.00		1.00			1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.85		1.00			1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95			0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1785	1445		1750			1785	3444	1597	1785	3318	1597
Flt Permitted	0.76	1.00		0.75			0.36	1.00	1.00	0.10	1.00	1.00
Satd. Flow (perm)	1423	1445		1376			671	3444	1597	196	3318	1597
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)	13	0	16	52	0	0	3	1781	5	1	777	1
RTOR Reduction (vph)	0	15	0	0	0	0	0	0	1	0	0	0
Lane Group Flow (vph)	13	1	0	52	0	0	3	1781	4	1	777	1
Heavy Vehicles (%)	0%	0%	13%	2%	0%	0%	0%	6%	0%	0%	10%	0%
Turn Type	Perm	NA		Perm			Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	10.5	10.5		10.5			100.5	100.5	100.5	100.5	100.5	100.5
Effective Green, g (s)	10.5	10.5		10.5			100.5	100.5	100.5	100.5	100.5	100.5
Actuated g/C Ratio	0.08	0.08		0.08			0.80	0.80	0.80	0.80	0.80	0.80
Clearance Time (s)	7.4	7.4		7.4			7.3	7.3	7.3	7.3	7.3	7.3
Vehicle Extension (s)	5.0	5.0		5.0			5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	118	120		114			536	2753	1276	156	2652	1276
v/s Ratio Prot		0.00						c0.52			0.23	
v/s Ratio Perm	0.01			c0.04			0.00		0.00	0.01		0.00
v/c Ratio	0.11	0.01		0.46			0.01	0.65	0.00	0.01	0.29	0.00
Uniform Delay, d1	53.3	52.8		54.9			2.5	5.2	2.5	2.5	3.3	2.5
Progression Factor	1.00	1.00		1.00			1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.1		5.9			0.0	1.2	0.0	0.1	0.3	0.0
Delay (s)	54.1	52.9		60.8			2.6	6.4	2.5	2.6	3.6	2.5
Level of Service	D	D		E			A	A	A	A	A	A
Approach Delay (s)		53.5			60.8			6.4			3.6	
Approach LOS		D			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	125.7	Sum of lost time (s)	14.7
Intersection Capacity Utilization	71.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	3	3	1599	17	4	735
Future Volume (Veh/h)	3	3	1599	17	4	735
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	3	3	1599	17	4	735
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						314
pX, platoon unblocked	0.97					
vC, conflicting volume	1974	800			1616	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1938	800			1616	
tC, single (s)	6.8	7.6			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.6			2.2	
p0 queue free %	95	99			99	
cM capacity (veh/h)	56	270			409	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	3	3	800	800	17	4	368	368
Volume Left	3	0	0	0	0	4	0	0
Volume Right	0	3	0	0	17	0	0	0
cSH	56	270	1700	1700	1700	409	1700	1700
Volume to Capacity	0.05	0.01	0.47	0.47	0.01	0.01	0.22	0.22
Queue Length 95th (m)	1.3	0.3	0.0	0.0	0.0	0.2	0.0	0.0
Control Delay (s)	72.7	18.5	0.0	0.0	0.0	13.9	0.0	0.0
Lane LOS	F	C				B		
Approach Delay (s)	45.6		0.0			0.1		
Approach LOS	E							

Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	0.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	6	1	8	9	0	3	11	1607	28	7	720	11
Future Vol, veh/h	6	1	8	9	0	3	11	1607	28	7	720	11
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250	-	-	-	-	360	700	-	350	550	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	13	11	0	0	0	1	4	0	6	0
Mvmt Flow	6	1	8	9	0	3	11	1607	28	7	720	11

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1405	2369	366	1932	2374	804	731	0	0	1607	0	0
Stage 1	740	740	-	1629	1629	-	-	-	-	-	-	-
Stage 2	665	1629	-	303	745	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	7.36	6.62	6.5	7.1	5.3	-	-	5.3	-	-
Critical Hdwy Stg 1	7.3	5.5	-	7.52	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.7	5.5	-	6.92	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.8	4	4.03	3.91	4	3.9	3.1	-	-	3.1	-	-
Pot Cap-1 Maneuver	150	35	515	63	35	283	533	-	-	201	-	-
Stage 1	304	426	-	65	162	-	-	-	-	-	-	-
Stage 2	382	162	-	604	424	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	142	33	515	58	33	283	533	-	-	201	-	-
Mov Cap-2 Maneuver	142	33	-	58	33	-	-	-	-	-	-	-
Stage 1	298	411	-	64	159	-	-	-	-	-	-	-
Stage 2	370	159	-	573	409	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	27.2	63.1	0.1	0.2
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	533	-	-	142	196	58	283	201	-	-
HCM Lane V/C Ratio	0.021	-	-	0.042	0.046	0.155	0.011	0.035	-	-
HCM Control Delay (s)	11.9	-	-	31.5	24.3	78.1	17.9	23.6	-	-
HCM Lane LOS	B	-	-	D	C	F	C	C	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.1	0.1	0.5	0	0.1	-	-

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	20	50	697	50	20	564
Future Volume (Veh/h)	20	50	697	50	20	564
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	20	50	697	50	20	564
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1326	722			747	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1326	722			747	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	88	88			98	
cM capacity (veh/h)	168	427			861	

Direction, Lane #	WB 1	WB 2	NB 1	SB 1
Volume Total	20	50	747	584
Volume Left	20	0	0	20
Volume Right	0	50	50	0
cSH	168	427	1700	861
Volume to Capacity	0.12	0.12	0.44	0.02
Queue Length 95th (m)	3.2	3.2	0.0	0.6
Control Delay (s)	29.4	14.6	0.0	0.6
Lane LOS	D	B		A
Approach Delay (s)	18.8		0.0	0.6
Approach LOS	C			

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	191	59	688	610	110	474
v/c Ratio	0.53	0.16	0.29	0.48	0.22	0.20
Control Delay	52.3	11.3	14.9	7.9	8.4	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.3	11.3	14.9	7.9	8.4	7.1
Queue Length 50th (m)	46.6	0.0	60.2	48.7	9.5	21.2
Queue Length 95th (m)	71.2	12.0	67.9	57.1	18.7	29.1
Internal Link Dist (m)	461.7		324.0			457.6
Turn Bay Length (m)				300.0	60.0	
Base Capacity (vph)	601	577	2405	1277	492	2405
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.10	0.29	0.48	0.22	0.20

Intersection Summary

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	141	38	1260	342	67	598
v/c Ratio	0.59	0.15	0.51	0.29	0.19	0.22
Control Delay	62.5	15.2	12.9	5.3	5.6	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	62.5	15.2	12.9	5.3	5.6	5.5
Queue Length 50th (m)	36.3	0.0	72.5	13.8	5.1	26.9
Queue Length 95th (m)	56.3	10.2	89.7	28.1	9.9	34.2
Internal Link Dist (m)	90.9		290.0			324.0
Turn Bay Length (m)				50.0	150.0	
Base Capacity (vph)	394	382	2459	1188	351	2717
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.10	0.51	0.29	0.19	0.22

Intersection Summary

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	6	340	4	103	2	1543	585	68	649
v/c Ratio	0.01	0.97	0.01	0.24	0.00	0.68	0.51	0.54	0.30
Control Delay	31.5	89.1	36.8	20.8	6.0	10.0	1.8	38.3	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.5	89.1	36.8	20.8	6.0	10.0	1.8	38.3	11.9
Queue Length 50th (m)	0.8	91.2	0.8	10.1	0.2	74.8	3.1	12.9	48.9
Queue Length 95th (m)	4.5	#153.6	3.9	25.9	m0.2	m87.0	m9.2	#33.6	88.0
Internal Link Dist (m)	27.8		347.9			418.5			530.8
Turn Bay Length (m)		45.0			65.0		50.0	100.0	
Base Capacity (vph)	461	351	481	433	517	2276	1150	126	2159
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.97	0.01	0.24	0.00	0.68	0.51	0.54	0.30

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	NBL	NBT	SBT
Lane Group Flow (vph)	457	97	1697	991
v/c Ratio	1.00	0.33	0.74	0.45
Control Delay	91.1	14.2	18.3	3.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	91.1	14.2	18.3	3.8
Queue Length 50th (m)	~124.0	11.0	153.1	12.7
Queue Length 95th (m)	#196.8	22.8	181.7	m14.5
Internal Link Dist (m)	267.7		1007.3	418.5
Turn Bay Length (m)		50.0		
Base Capacity (vph)	455	295	2284	2191
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.00	0.33	0.74	0.45

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBL	EBT	WBL	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	13	16	52	3	1781	5	1	777	1
v/c Ratio	0.09	0.05	0.39	0.01	0.63	0.00	0.01	0.28	0.00
Control Delay	51.3	0.4	60.9	3.7	6.9	0.0	4.0	3.9	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	0.4	60.9	3.7	6.9	0.0	4.0	3.9	0.0
Queue Length 50th (m)	3.2	0.0	12.9	0.2	90.1	0.0	0.1	24.6	0.0
Queue Length 95th (m)	9.7	0.0	25.8	0.9	130.6	0.0	0.5	37.4	0.0
Internal Link Dist (m)		37.9			349.7			1007.3	
Turn Bay Length (m)	50.0			65.0			30.0		55.0
Base Capacity (vph)	463	589	448	551	2833	1320	160	2729	1320
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	0.03	0.12	0.01	0.63	0.00	0.01	0.28	0.00

Intersection Summary

Appendix C

Traffic Signal Warrants

Signal Warrant Calculation (OTM Book 12)

Horizon Year: Existing (2015)

Region/City/Township: Region of Peel

Major Street: Mississauga Road
Minor Street: Royal West Drive

North / South (Y/N): Y

Number of Approach Lanes (1/2): 2
Tee Intersection Configuration (Y/N): Y
Flow Conditions (R/F): R

Land Use West Side (I/C/R): R
Land Use East Side (I/C/R): R
PM Forecast Only (Y/N): N

Overall Warrant		
150% Satisfied:	NO	Warrant for new intersections with forecast traffic
120% Satisfied:	NO	Warrant for existing intersections with forecast traffic
100% Satisfied:	NO	Warrant for existing intersections with existing traffic

Time Period	MAJOR STREET						MINOR STREET					
	Mississauga Road						***Royal West Drive***					
	NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
AM Peak Hour	0	560	50	20	1011	0	20	0	50	0	0	0
PM Peak Hour	0	697	50	20	564	0	20	0	50	0	0	0

Average Hourly Volumes			
VOLUME	PM	SAT	AHV
1A - All	1,711	1,401	778
1B - Minor	70	70	35
2A - Major	1,641	1,331	743
2B - Cross	20	20	10

WARRANT 1 - MINIMUM VEHICULAR VOLUME

1A	APPROACH LANES	1		2 OR MORE		AVERAGE
	FLOW CONDITION	FREE FLOW	REST. FLOW	FREE FLOW	REST. FLOW	HOUR PERIOD
					X	
	ALL APPROACHES	480	720	600	900	778
		% FULFILLED				86%

1B	APPROACH LANES	1		2 OR MORE		AVERAGE
	FLOW CONDITION	FREE FLOW	REST. FLOW	FREE FLOW	REST. FLOW	HOUR PERIOD
					X	
	MINOR STREET APPROACHES	180	255	180	255	35
		% FULFILLED				14%

WARRANT 2 - DELAY TO CROSS TRAFFIC

2A	APPROACH LANES	1		2 OR MORE		AVERAGE
	FLOW CONDITION	FREE FLOW	REST. FLOW	FREE FLOW	REST. FLOW	HOUR PERIOD
					X	
	MAJOR STREET APPROACHES	480	720	600	900	743
		% FULFILLED				83%

2B	APPROACH LANES	1		2 OR MORE		AVERAGE
	FLOW CONDITION	FREE FLOW	REST. FLOW	FREE FLOW	REST. FLOW	HOUR PERIOD
					X	
	TRAFFIC CROSSING MAJOR STREET	50	75	50	75	10
		% FULFILLED				13%

1A - MINIMUM VEHICULAR VOLUME: Total vehicle volume on all approaches for average day
1B - MINIMUM VEHICULAR VOLUME: Total vehicle volume on minor streets
2A - DELAY TO CROSS TRAFFIC: Total vehicle volume on major street for average day
2B - DELAY TO CROSS TRAFFIC: Total vehicle and pedestrian volume crossing major street: comprising: (1) lefts from both minor street, (2) heaviest through from minor street, (3) 50% of heavier left turn from major street when following criteria met: (a)

Mississauga Road & Beacon Hill

Main Road: Mississauga Road
Does Main Road Run N/S (Y or N)? Y
Side Road: Beacon Hill
Main Street Lanes = 2
T-Intersection (Y or N)? Y
Rural or Urban (R or U)? U

Time Period	Side Road: Beacon Hill							Main Road: Mississauga Road								
	East Approach			West Approach				North Approach			South Approach					
	Left	Through	Right	Left	Through	Right	Total	Left	Through	Right	Left	Through	Right	Total	Pedestrians Crossing	Delayed Pedestrians
7:00 - 8:00	51	0	4	0	0	0	55	2	1383	0	0	649	7	2041	1	0
8:00 - 9:00	62	0	4	0	0	0	66	2	1402	0	0	61	6	1471	5	0
11:00 - 12:00	9	0	4	0	0	0	13	4	630	0	0	526	6	1166	6	0
12:00 - 13:00	16	0	5	0	0	0	21	7	714	0	0	588	7	1316	1	0
13:00 - 14:00	9	0	0	0	0	0	9	4	655	0	0	556	14	1229	4	0
15:00 - 16:00	6	0	4	0	0	0	10	5	681	0	0	944	10	1640	3	0
16:00 - 17:00	6	0	6	0	0	0	12	4	824	0	0	1678	20	2526	4	0
17:00 - 18:00	4	0	0	0	0	0	4	8	788	0	0	1789	26	2611	6	0
Total	**163**	**0**	**27**	**0**	**0**	**0**		**36**	**7077**	**0**	**0**	**6791**	**96**			

Justification 1 - Minimum Vehicle Volume

Time Period	Justification 1A		Justification 1B	
	Total Traffic	Compliance	Cross Traffic	Compliance
7:00 - 8:00	2096	100%	55	22%
8:00 - 9:00	1537	100%	66	26%
11:00 - 12:00	1179	100%	13	5%
12:00 - 13:00	1337	100%	21	8%
13:00 - 14:00	1238	100%	9	4%
15:00 - 16:00	1650	100%	10	4%
16:00 - 17:00	2538	100%	12	5%
17:00 - 18:00	2615	100%	4	2%
>=100%		8		0
>=80%		8		0
Average Compliance		100%		9%

Both 1A and 1B 100% fulfilled each of 8 hours?	**No**
Lesser of 1A or 1B at least 80% fulfilled each of 8 hours?	**No**

Justification 2 - Delay To Cross Traffic

Time Period	Justification 2A		Justification 2B	
	Main Road Traffic	Compliance	Cross Traffic	Compliance
7:00 - 8:00	2041	100%	52	69%
8:00 - 9:00	1471	100%	67	89%
11:00 - 12:00	1166	100%	15	20%
12:00 - 13:00	1316	100%	17	23%
13:00 - 14:00	1229	100%	13	17%
15:00 - 16:00	1640	100%	9	12%
16:00 - 17:00	2526	100%	10	13%
17:00 - 18:00	2611	100%	10	13%
>=100%		8		0
>=80%		8		1
Average Compliance		100%		32%

Both 2A and 2B 100% fulfilled each of 8 hours?	**No**
Lesser of 2A or 2B at least 80% fulfilled each of 8 hours?	**No**

Mississauga Road & Ostrander / Adamsville

Main Road: Mississauga Road
Does Main Road Run N/S (Y or N)? Y
Side Road: Ostrander / Adamsville
Main Street Lanes = 2
T-Intersection (Y or N)? N
Rural or Urban (R or U)? U

Time Period	Side Road							Main Road								
	Ostrander / Adamsville							Mississauga Road								
	East Approach			West Approach				North Approach			South Approach					
	Left	Through	Right	Left	Through	Right	Total	Left	Through	Right	Left	Through	Right	Total	Pedestrians Crossing	Delayed Pedestrians
7:00 - 8:00	14	0	18	21	0	4	57	5	1470	5	3	682	4	2169	0	0
8:00 - 9:00	7	0	12	26	1	10	56	6	1440	6	1	581	7	2041	1	0
11:00 - 12:00	12	0	6	12	0	2	32	8	515	3	9	437	10	982	0	0
12:00 - 13:00	5	0	8	6	1	5	25	4	453	4	6	528	7	1002	0	0
13:00 - 14:00	7	0	8	8	0	5	28	3	519	10	13	522	9	1076	0	0
15:00 - 16:00	9	1	8	11	0	3	32	3	687	7	14	983	12	1706	0	0
16:00 - 17:00	4	1	9	9	0	2	25	6	759	11	13	1336	23	2148	3	0
17:00 - 18:00	5	0	4	7	0	3	19	6	650	9	14	1323	16	2018	0	0
Total	**63**	**2**	**73**	**100**	**2**	**34**		**41**	**6493**	**55**	**73**	**6392**	**88**			

Justification 1 - Minimum Vehicle Volume

Time Period	Justification 1A		Justification 1B	
	Total Traffic	Compliance	Cross Traffic	Compliance
7:00 - 8:00	2226	100%	57	34%
8:00 - 9:00	2097	100%	56	33%
11:00 - 12:00	1014	100%	32	19%
12:00 - 13:00	1027	100%	25	15%
13:00 - 14:00	1104	100%	28	16%
15:00 - 16:00	1738	100%	32	19%
16:00 - 17:00	2173	100%	25	15%
17:00 - 18:00	2037	100%	19	11%
>=100%		8		0
>=80%		8		0
Average Compliance		100%		20%

Both 1A and 1B 100% fulfilled each of 8 hours?	**No**
Lesser of 1A or 1B at least 80% fulfilled each of 8 hours?	**No**

Justification 2 - Delay To Cross Traffic

Time Period	Justification 2A		Justification 2B	
	Main Road Traffic	Compliance	Cross Traffic	Compliance
7:00 - 8:00	2169	100%	35	47%
8:00 - 9:00	2041	100%	35	47%
11:00 - 12:00	982	100%	24	32%
12:00 - 13:00	1002	100%	12	16%
13:00 - 14:00	1076	100%	15	20%
15:00 - 16:00	1706	100%	21	28%
16:00 - 17:00	2148	100%	17	23%
17:00 - 18:00	2018	100%	12	16%
>=100%		8		0
>=80%		8		0
Average Compliance		100%		29%

Both 2A and 2B 100% fulfilled each of 8 hours?	**No**
Lesser of 2A or 2B at least 80% fulfilled each of 8 hours?	**No**

Signal Warrant Calculation (OTM Book 12)

Horizon Year: Future (2031)

Region/City/Township: Region of Peel

Major Street: Mississauga Road
Minor Street: Royal West Drive

North / South (Y/N): Y

Number of Approach Lanes (1/2): 2
Tee Intersection Configuration (Y/N): Y
Flow Conditions (R/F): R

Land Use West Side (I/C/R): R
Land Use East Side (I/C/R): R
PM Forecast Only (Y/N): N

Overall Warrant		
150% Satisfied:	NO	Warrant for new intersections with forecast traffic
120% Satisfied:	NO	Warrant for existing intersections with forecast traffic
100% Satisfied:	NO	Warrant for existing intersections with existing traffic

Time Period	MAJOR STREET						MINOR STREET					
	Mississauga Road						***Royal West Drive***					
	NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
AM Peak Hour	0	1509	62	25	2881	0	25	0	62	0	0	0
PM Peak Hour	0	2709	62	25	1958	0	25	0	62	0	0	0

Average Hourly Volumes			
VOLUME	PM	SAT	AHV
1A - All	4,564	4,841	2,351
1B - Minor	87	87	44
2A - Major	4,477	4,754	2,308
2B - Cross	25	25	13

WARRANT 1 - MINIMUM VEHICULAR VOLUME

	APPROACH LANES	1		2 OR MORE		AVERAGE
1A	FLOW CONDITION	FREE FLOW	REST. FLOW	FREE FLOW	REST. FLOW	HOUR PERIOD
					X	
	ALL APPROACHES	480	720	600	900	2,351
		% FULFILLED				261%

	APPROACH LANES	1		2 OR MORE		AVERAGE
1B	FLOW CONDITION	FREE FLOW	REST. FLOW	FREE FLOW	REST. FLOW	HOUR PERIOD
					X	
	MINOR STREET APPROACHES	180	255	180	255	44
		% FULFILLED				17%

WARRANT 2 - DELAY TO CROSS TRAFFIC

	APPROACH LANES	1		2 OR MORE		AVERAGE
2A	FLOW CONDITION	FREE FLOW	REST. FLOW	FREE FLOW	REST. FLOW	HOUR PERIOD
					X	
	MAJOR STREET APPROACHES	480	720	600	900	2,308
		% FULFILLED				256%

	APPROACH LANES	1		2 OR MORE		AVERAGE
2B	FLOW CONDITION	FREE FLOW	REST. FLOW	FREE FLOW	REST. FLOW	HOUR PERIOD
					X	
	TRAFFIC CROSSING MAJOR STREET	50	75	50	75	13
		% FULFILLED				17%

1A - MINIMUM VEHICULAR VOLUME: Total vehicle volume on all approaches for average day
1B - MINIMUM VEHICULAR VOLUME: Total vehicle volume on minor streets
2A - DELAY TO CROSS TRAFFIC: Total vehicle volume on major street for average day
2B - DELAY TO CROSS TRAFFIC: Total vehicle and pedestrian volume crossing major street: comprising: (1) lefts from both minor street, (2) heaviest through from minor street, (3) 50% of heavier left turn from major street when following criteria met: (a)

Signal Warrant Calculation (OTM Book 12)

Horizon Year: Future (2031)

Region/City/Township: Region of Peel

Major Street: Mississauga Road
Minor Street: Ostrander / Adamsville

North / South (Y/N): Y

Number of Approach Lanes (1/2): 2
Tee Intersection Configuration (Y/N): N
Flow Conditions (R/F): R

Land Use West Side (I/C/R): R
Land Use East Side (I/C/R): R
PM Forecast Only (Y/N): N

Overall Warrant		
150% Satisfied:	NO	Warrant for new intersections with forecast traffic
120% Satisfied:	NO	Warrant for existing intersections with forecast traffic
100% Satisfied:	NO	Warrant for existing intersections with existing traffic

Time Period	MAJOR STREET						MINOR STREET					
	Mississauga Road						*Ostrander / Adamsville*					
	NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
AM Peak Hour	1	1850	2	4	3895	6	19	1	5	11	0	12
PM Peak Hour	8	4104	22	6	2318	8	19	1	5	5	2	7

Average Hourly Volumes			
VOLUME	PM	SAT	AHV
1A - All	5,806	6,505	3,078
1B - Minor	48	39	22
2A - Major	5,758	6,466	3,056
2B - Cross	31	26	14

WARRANT 1 - MINIMUM VEHICULAR VOLUME

	APPROACH LANES	1		2 OR MORE		AVERAGE
1A	FLOW CONDITION	FREE FLOW	REST. FLOW	FREE FLOW	REST. FLOW	HOUR PERIOD
					X	
	ALL APPROACHES	480	720	600	900	3,078
		% FULFILLED				342%

	APPROACH LANES	1		2 OR MORE		AVERAGE
1B	FLOW CONDITION	FREE FLOW	REST. FLOW	FREE FLOW	REST. FLOW	HOUR PERIOD
					X	
	MINOR STREET APPROACHES	120	170	120	170	22
		% FULFILLED				13%

WARRANT 2 - DELAY TO CROSS TRAFFIC

	APPROACH LANES	1		2 OR MORE		AVERAGE
2A	FLOW CONDITION	FREE FLOW	REST. FLOW	FREE FLOW	REST. FLOW	HOUR PERIOD
					X	
	MAJOR STREET APPROACHES	480	720	600	900	3,056
		% FULFILLED				340%

	APPROACH LANES	1		2 OR MORE		AVERAGE
2B	FLOW CONDITION	FREE FLOW	REST. FLOW	FREE FLOW	REST. FLOW	HOUR PERIOD
					X	
	TRAFFIC CROSSING MAJOR STREET	50	75	50	75	14
		% FULFILLED				19%

1A - MINIMUM VEHICULAR VOLUME: Total vehicle volume on all approaches for average day
1B - MINIMUM VEHICULAR VOLUME: Total vehicle volume on minor streets
2A - DELAY TO CROSS TRAFFIC: Total vehicle volume on major street for average day
2B - DELAY TO CROSS TRAFFIC: Total vehicle and pedestrian volume crossing major street: comprising: (1) lefts from both minor street, (2) heaviest through from minor street, (3) 50% of heavier left turn from major street when following criteria met: (a)

Appendix D

Future (2031) Intersection Operation Reports

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	807	105	1485	289	125	2846
Future Volume (vph)	807	105	1485	289	125	2846
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.7	3.5	3.5	3.7
Total Lost time (s)	6.2	6.2	6.7	6.7	4.5	6.7
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.91
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1785	1439	4768	1536	1785	4768
Flt Permitted	0.95	1.00	1.00	1.00	0.10	1.00
Satd. Flow (perm)	1785	1439	4768	1536	191	4768
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	807	105	1485	289	125	2846
RTOR Reduction (vph)	0	75	0	147	0	0
Lane Group Flow (vph)	807	30	1485	142	125	2846
Heavy Vehicles (%)	0%	11%	10%	4%	0%	10%
Turn Type	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	8		2	6	
Actuated Green, G (s)	33.8	33.8	58.9	58.9	73.3	73.3
Effective Green, g (s)	33.8	33.8	58.9	58.9	73.3	73.3
Actuated g/C Ratio	0.28	0.28	0.49	0.49	0.61	0.61
Clearance Time (s)	6.2	6.2	6.7	6.7	4.5	6.7
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	502	405	2340	753	248	2912
v/s Ratio Prot			0.31		0.04	c0.60
v/s Ratio Perm	c0.45	0.02		0.09	0.27	
v/c Ratio	1.61	0.07	0.63	0.19	0.50	0.98
Uniform Delay, d1	43.1	31.6	22.6	17.1	13.9	22.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	282.6	0.2	1.3	0.6	3.3	12.2
Delay (s)	325.7	31.8	23.9	17.7	17.2	34.7
Level of Service	F	C	C	B	B	C
Approach Delay (s)	291.8		22.9			34.0
Approach LOS	F		C			C

Intersection Summary			
HCM 2000 Control Delay	72.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.23		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	110.4%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	158	88	1631	132	139	3431
Future Volume (vph)	158	88	1631	132	139	3431
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.7	3.5	3.5	3.7
Total Lost time (s)	6.3	6.3	6.6	6.6	3.0	6.6
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.91
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1785	1566	4856	1597	1785	4768
Flt Permitted	0.95	1.00	1.00	1.00	0.11	1.00
Satd. Flow (perm)	1785	1566	4856	1597	205	4768
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	158	88	1631	132	139	3431
RTOR Reduction (vph)	0	75	0	49	0	0
Lane Group Flow (vph)	158	13	1631	83	139	3431
Heavy Vehicles (%)	0%	2%	8%	0%	0%	10%
Turn Type	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	8		2	6	
Actuated Green, G (s)	15.7	15.7	69.5	69.5	81.4	81.4
Effective Green, g (s)	15.7	15.7	69.5	69.5	81.4	81.4
Actuated g/C Ratio	0.14	0.14	0.63	0.63	0.74	0.74
Clearance Time (s)	6.3	6.3	6.6	6.6	3.0	6.6
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	254	223	3068	1009	279	3528
v/s Ratio Prot			0.34		0.04	c0.72
v/s Ratio Perm	c0.09	0.01		0.05	0.33	
v/c Ratio	0.62	0.06	0.53	0.08	0.50	0.97
Uniform Delay, d1	44.4	40.7	11.2	7.9	6.6	13.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.6	0.2	0.7	0.2	2.9	10.0
Delay (s)	50.9	41.0	11.9	8.0	9.6	23.2
Level of Service	D	D	B	A	A	C
Approach Delay (s)	47.4		11.6			22.7
Approach LOS	D		B			C

Intersection Summary			
HCM 2000 Control Delay	20.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	85.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	6	11	743	5	95	2	1753	476	106	3839	0
Future Volume (vph)	3	6	11	743	5	95	2	1753	476	106	3839	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)		7.4		7.4	7.4	7.4	6.5	6.5	6.5	4.5	6.5	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.91	
Frt		0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1700		1733	1537	1551	892	4683	1521	1513	4995	
Flt Permitted		0.98		0.74	1.00	1.00	0.07	1.00	1.00	0.06	1.00	
Satd. Flow (perm)		1681		1358	1537	1551	65	4683	1521	103	4995	
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)	3	6	11	743	5	95	2	1753	476	106	3839	0
RTOR Reduction (vph)	0	0	0	0	0	58	0	0	138	0	0	0
Lane Group Flow (vph)	0	20	0	743	5	37	2	1753	338	106	3839	0
Heavy Vehicles (%)	0%	0%	7%	3%	25%	3%	100%	12%	5%	18%	5%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)		54.6		54.6	54.6	54.6	57.5	57.5	57.5	71.5	71.5	
Effective Green, g (s)		54.6		54.6	54.6	54.6	57.5	57.5	57.5	71.5	71.5	
Actuated g/C Ratio		0.39		0.39	0.39	0.39	0.41	0.41	0.41	0.51	0.51	
Clearance Time (s)		7.4		7.4	7.4	7.4	6.5	6.5	6.5	4.5	6.5	
Vehicle Extension (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Grp Cap (vph)		655		529	599	604	26	1923	624	148	2551	
v/s Ratio Prot					0.00			0.37		0.05	c0.77	
v/s Ratio Perm		0.01		c0.55		0.02	0.03		0.22	0.32		
v/c Ratio		0.03		1.40	0.01	0.06	0.08	0.91	0.54	0.72	1.50	
Uniform Delay, d1		26.4		42.7	26.1	26.7	25.1	38.9	31.3	28.8	34.2	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.0		193.2	0.0	0.1	5.7	8.0	3.3	18.5	229.3	
Delay (s)		26.4		235.9	26.1	26.8	30.8	46.9	34.6	47.3	263.5	
Level of Service		C		F	C	C	C	D	C	D	F	
Approach Delay (s)		26.4			211.1			44.2			257.7	
Approach LOS		C			F			D			F	

Intersection Summary			
HCM 2000 Control Delay	183.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.51		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.4
Intersection Capacity Utilization	147.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	370	108	17	1861	4361	238
Future Volume (vph)	370	108	17	1861	4361	238
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.7	3.7	3.5
Total Lost time (s)	6.4		3.0	6.2	6.2	
Lane Util. Factor	1.00		1.00	0.91	0.91	
Frt	0.97		1.00	1.00	0.99	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1716		1566	4768	5014	
Flt Permitted	0.96		0.04	1.00	1.00	
Satd. Flow (perm)	1716		73	4768	5014	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	370	108	17	1861	4361	238
RTOR Reduction (vph)	7	0	0	0	4	0
Lane Group Flow (vph)	471	0	17	1861	4595	0
Heavy Vehicles (%)	2%	3%	14%	10%	4%	0%
Turn Type	Perm		pm+pt	NA	NA	
Protected Phases			5	2	6	
Permitted Phases	4		2			
Actuated Green, G (s)	44.7		92.7	92.7	87.1	
Effective Green, g (s)	44.7		92.7	92.7	87.1	
Actuated g/C Ratio	0.30		0.62	0.62	0.58	
Clearance Time (s)	6.4		3.0	6.2	6.2	
Vehicle Extension (s)	5.0		5.0	5.0	5.0	
Lane Grp Cap (vph)	511		70	2946	2911	
v/s Ratio Prot			0.00	c0.39	c0.92	
v/s Ratio Perm	c0.27		0.14			
v/c Ratio	0.92		0.24	0.63	1.58	
Uniform Delay, d1	51.0		36.0	18.0	31.5	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	23.1		3.8	1.0	262.0	
Delay (s)	74.0		39.8	19.0	293.5	
Level of Service	E		D	B	F	
Approach Delay (s)	74.0			19.2	293.5	
Approach LOS	E			B	F	

Intersection Summary			
HCM 2000 Control Delay	204.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.34		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	15.6
Intersection Capacity Utilization	127.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	0	4	3	0	0	19	1878	12	0	4460	8
Future Volume (vph)	2	0	4	3	0	0	19	1878	12	0	4460	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	7.4	7.4		7.4			7.3	7.3	7.3		7.3	7.3
Lane Util. Factor	1.00	1.00		1.00			1.00	0.91	1.00		0.91	1.00
Frt	1.00	0.85		1.00			1.00	1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00		0.95			0.95	1.00	1.00		1.00	1.00
Satd. Flow (prot)	1785	1633		1342			1668	4445	1426		4995	1117
Flt Permitted	1.00	1.00		1.00			0.04	1.00	1.00		1.00	1.00
Satd. Flow (perm)	1879	1633		1413			68	4445	1426		4995	1117
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)	2	0	4	3	0	0	19	1878	12	0	4460	8
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	2	0	0	1
Lane Group Flow (vph)	2	0	0	3	0	0	19	1878	10	0	4460	7
Heavy Vehicles (%)	0%	0%	0%	33%	0%	0%	7%	18%	12%	0%	5%	43%
Turn Type	Perm	NA		Perm			Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	1.8	1.8		1.8			103.5	103.5	103.5		103.5	103.5
Effective Green, g (s)	1.8	1.8		1.8			103.5	103.5	103.5		103.5	103.5
Actuated g/C Ratio	0.02	0.02		0.02			0.86	0.86	0.86		0.86	0.86
Clearance Time (s)	7.4	7.4		7.4			7.3	7.3	7.3		7.3	7.3
Vehicle Extension (s)	5.0	5.0		5.0			5.0	5.0	5.0		5.0	5.0
Lane Grp Cap (vph)	28	24		21			58	3833	1229		4308	963
v/s Ratio Prot		0.00						0.42			c0.89	
v/s Ratio Perm	0.00			c0.00			0.28		0.01			0.01
v/c Ratio	0.07	0.00		0.14			0.33	0.49	0.01		1.04	0.01
Uniform Delay, d1	58.3	58.2		58.3			1.6	2.0	1.1		8.2	1.1
Progression Factor	1.00	1.00		1.00			1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.3	0.1		6.5			14.4	0.5	0.0		24.0	0.0
Delay (s)	60.5	58.3		64.8			16.0	2.4	1.2		32.2	1.2
Level of Service	E	E		E			B	A	A		C	A
Approach Delay (s)		59.0			64.8			2.5			32.2	
Approach LOS		E			E			A			C	

Intersection Summary			
HCM 2000 Control Delay	23.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.7
Intersection Capacity Utilization	105.1%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	0	155	51	0	4	0	1815	5	2	3673	7
Future Volume (vph)	21	0	155	51	0	4	0	1815	5	2	3673	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.5	3.6	3.5	3.6	3.7	3.5	3.5	3.7	3.6
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	1.00		1.00	1.00			0.91	1.00	1.00	0.91	1.00
Frt	1.00	0.85		1.00	0.85			1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1583		1785	1455			4601	1479	1566	4561	1583
Flt Permitted	0.76	1.00		0.52	1.00			1.00	1.00	0.10	1.00	1.00
Satd. Flow (perm)	1407	1583		968	1455			4601	1479	168	4561	1583
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	21	0	155	51	0	4	0	1815	5	2	3673	7
RTOR Reduction (vph)	0	23	0	0	3	0	0	0	1	0	0	2
Lane Group Flow (vph)	21	132	0	51	1	0	0	1815	4	2	3673	5
Heavy Vehicles (%)	2%	2%	2%	0%	2%	11%	2%	14%	8%	14%	15%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	17.0	17.0		17.0	17.0			91.0	91.0	91.0	91.0	91.0
Effective Green, g (s)	17.0	17.0		17.0	17.0			91.0	91.0	91.0	91.0	91.0
Actuated g/C Ratio	0.14	0.14		0.14	0.14			0.76	0.76	0.76	0.76	0.76
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	5.0	5.0		5.0	5.0			5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	199	224		137	206			3489	1121	127	3458	1200
v/s Ratio Prot		c0.08			0.00			0.39			c0.81	
v/s Ratio Perm	0.01			0.05					0.00	0.01		0.00
v/c Ratio	0.11	0.59		0.37	0.00			0.52	0.00	0.02	1.06	0.00
Uniform Delay, d1	44.9	48.2		46.7	44.2			5.8	3.5	3.5	14.5	3.5
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	6.0		3.5	0.0			0.6	0.0	0.2	35.1	0.0
Delay (s)	45.4	54.2		50.2	44.2			6.3	3.5	3.8	49.6	3.5
Level of Service	D	D		D	D			A	A	A	D	A
Approach Delay (s)		53.2			49.8			6.3			49.5	
Approach LOS		D			D			A			D	

Intersection Summary			
HCM 2000 Control Delay	35.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	99.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	30.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	11	0	12	19	1	5	1	1850	2	4	3895	6
Future Vol, veh/h	11	0	12	19	1	5	1	1850	2	4	3895	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250	-	-	-	-	360	700	-	350	550	-	550
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	19	0	0	0	100	9	0	0	4	14
Mvmt Flow	11	0	12	19	1	5	1	1850	2	4	3895	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	4646	5755	1948	3418	5755	925	3895	0	0	1850	0	0
Stage 1	3903	3903	-	1852	1852	-	-	-	-	-	-	-
Stage 2	743	1852	-	1566	3903	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	7.48	6.4	6.5	7.1	7.3	-	-	5.3	-	-
Critical Hdwy Stg 1	7.3	5.5	-	7.3	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.7	5.5	-	6.7	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.8	4	4.09	3.8	4	3.9	4.1	-	-	3.1	-	-
Pot Cap-1 Maneuver	~ 1	0	38	~ 8	0	236	1	-	-	152	-	-
Stage 1	~ 1	10	-	50	125	-	-	-	-	-	-	-
Stage 2	343	125	-	105	10	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 1	0	38	~ 5	0	236	1	-	-	152	-	-
Mov Cap-2 Maneuver	~ 1	0	-	~ 5	0	-	-	-	-	-	-	-
Stage 1	~ 1	10	-	50	125	-	-	-	-	-	-	-
Stage 2	333	125	-	70	10	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 5160.3	$ 2182.9	2.6	0
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1	-	-	1	38	5	236	152	-	-
HCM Lane V/C Ratio	1	-	-	11	0.316	4	0.021	0.026	-	-
HCM Control Delay (s)	$ 4877.8	-	$	10638.6	138.$	$ 2723.5	20.6	29.3	-	-
HCM Lane LOS	F	-	-	F	F	F	C	D	-	-
HCM 95th %tile Q(veh)	0.6	-	-	2.8	1	3.8	0.1	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	25	62	1509	62	25	2881
Future Volume (Veh/h)	25	62	1509	62	25	2881
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	25	62	1509	62	25	2881
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2519	503			1571	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2519	503			1571	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	88			94	
cM capacity (veh/h)	22	514			416	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4
Volume Total	25	62	503	503	503	62	25	960	960	960
Volume Left	25	0	0	0	0	0	25	0	0	0
Volume Right	0	62	0	0	0	62	0	0	0	0
cSH	22	514	1700	1700	1700	1700	416	1700	1700	1700
Volume to Capacity	1.16	0.12	0.30	0.30	0.30	0.04	0.06	0.56	0.56	0.56
Queue Length 95th (m)	26.3	3.3	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0
Control Delay (s)	504.4	13.0	0.0	0.0	0.0	0.0	14.2	0.0	0.0	0.0
Lane LOS	F	B					B			
Approach Delay (s)	154.2		0.0				0.1			
Approach LOS	F									

Intersection Summary				
Average Delay	3.0			
Intersection Capacity Utilization	65.7%	ICU Level of Service	C	
Analysis Period (min)	15			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	807	105	1485	289	125	2846
v/c Ratio	1.61	0.22	0.64	0.32	0.50	0.98
Control Delay	313.4	7.3	24.2	2.9	16.7	35.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	313.4	7.3	24.2	2.9	16.7	35.1
Queue Length 50th (m)	~286.6	0.0	97.6	0.0	11.5	234.1
Queue Length 95th (m)	#363.9	13.5	114.1	14.5	21.4	#290.5
Internal Link Dist (m)	461.7		324.0			457.6
Turn Bay Length (m)		150.0		300.0	60.0	
Base Capacity (vph)	502	480	2338	900	258	2912
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	1.61	0.22	0.64	0.32	0.48	0.98

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	158	88	1631	132	139	3431
v/c Ratio	0.62	0.30	0.53	0.12	0.49	0.97
Control Delay	54.9	11.3	12.4	1.8	10.5	24.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.9	11.3	12.4	1.8	10.5	24.5
Queue Length 50th (m)	33.6	0.0	72.8	0.0	6.8	236.7
Queue Length 95th (m)	55.1	14.0	86.7	7.3	16.0	#322.7
Internal Link Dist (m)	90.9		290.0			324.0
Turn Bay Length (m)				50.0	150.0	
Base Capacity (vph)	292	329	3065	1056	289	3527
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.27	0.53	0.13	0.48	0.97

Intersection Summary

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

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	20	743	5	95	2	1753	476	106	3839
v/c Ratio	0.03	1.40	0.01	0.14	0.07	0.91	0.62	0.71	1.50
Control Delay	26.7	227.1	26.4	5.5	33.0	47.1	19.7	51.3	257.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	227.1	26.4	5.5	33.0	47.1	19.7	51.3	257.8
Queue Length 50th (m)	3.6	~289.3	0.9	0.0	0.4	174.5	55.1	15.8	~567.8
Queue Length 95th (m)	9.3	#367.9	3.9	11.6	2.8	197.6	94.3	#44.9	#585.7
Internal Link Dist (m)	27.8		347.9			418.5			530.8
Turn Bay Length (m)				50.0	65.0		50.0	100.0	
Base Capacity (vph)	655	529	599	662	27	1923	763	149	2551
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.03	1.40	0.01	0.14	0.07	0.91	0.62	0.71	1.50

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	EBL	NBL	NBT	SBT
Lane Group Flow (vph)	478	17	1861	4599
v/c Ratio	0.92	0.15	0.63	1.55
Control Delay	74.0	13.5	19.6	274.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	74.0	13.5	19.6	274.1
Queue Length 50th (m)	139.6	1.9	133.5	~738.9
Queue Length 95th (m)	#203.4	5.2	149.1	#785.2
Internal Link Dist (m)	267.7		1007.3	418.5
Turn Bay Length (m)		50.0		
Base Capacity (vph)	545	115	2945	2973
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.88	0.15	0.63	1.55

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	EBL	EBT	WBL	NBL	NBT	NBR	SBT	SBR
Lane Group Flow (vph)	2	4	3	19	1878	12	4460	8
v/c Ratio	0.02	0.03	0.03	0.29	0.44	0.01	0.93	0.01
Control Delay	52.0	0.2	52.7	15.2	1.4	0.0	9.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.0	0.2	52.7	15.2	1.4	0.0	9.0	0.0
Queue Length 50th (m)	0.5	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Queue Length 95th (m)	3.3	0.0	4.0	8.8	54.9	0.0	#482.4	0.0
Internal Link Dist (m)		37.9			349.7		1007.3	
Turn Bay Length (m)	50.0			65.0		65.0		55.0
Base Capacity (vph)	454	424	341	65	4269	1371	4797	1074
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	0.00	0.01	0.01	0.29	0.44	0.01	0.93	0.01

Intersection Summary

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

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	21	155	51	4	1815	5	2	3673	7
v/c Ratio	0.11	0.63	0.37	0.02	0.52	0.00	0.02	1.06	0.01
Control Delay	43.4	50.4	52.7	0.2	6.9	0.0	5.5	51.6	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.4	50.4	52.7	0.2	6.9	0.0	5.5	51.6	0.0
Queue Length 50th (m)	4.6	30.2	11.6	0.0	56.0	0.0	0.1	~367.2	0.0
Queue Length 95th (m)	11.8	50.1	23.4	0.0	83.3	0.0	1.0	#413.9	0.1
Internal Link Dist (m)		89.2		165.4	283.5			290.0	
Turn Bay Length (m)	50.0		50.0			100.0	100.0		100.0
Base Capacity (vph)	351	416	242	384	3489	1128	127	3458	1206
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.37	0.21	0.01	0.52	0.00	0.02	1.06	0.01

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	305	84	2698	859	151	1865
Future Volume (vph)	305	84	2698	859	151	1865
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.7	3.5	3.5	3.7
Total Lost time (s)	6.2	6.2	6.7	6.7	4.5	6.7
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.91
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1785	1597	4948	1566	1785	4948
Flt Permitted	0.95	1.00	1.00	1.00	0.05	1.00
Satd. Flow (perm)	1785	1597	4948	1566	98	4948
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	305	84	2698	859	151	1865
RTOR Reduction (vph)	0	65	0	382	0	0
Lane Group Flow (vph)	305	19	2698	477	151	1865
Heavy Vehicles (%)	0%	0%	6%	2%	0%	6%
Turn Type	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	8		2	6	
Actuated Green, G (s)	29.4	29.4	72.2	72.2	87.7	87.7
Effective Green, g (s)	29.4	29.4	72.2	72.2	87.7	87.7
Actuated g/C Ratio	0.23	0.23	0.56	0.56	0.67	0.67
Clearance Time (s)	6.2	6.2	6.7	6.7	4.5	6.7
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	403	361	2748	869	208	3337
v/s Ratio Prot			c0.55		c0.06	0.38
v/s Ratio Perm	c0.17	0.01		0.30	0.43	
v/c Ratio	0.76	0.05	0.98	0.55	0.73	0.56
Uniform Delay, d1	47.0	39.4	28.3	18.5	38.3	11.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.3	0.1	13.4	2.5	14.4	0.7
Delay (s)	56.3	39.5	41.7	21.0	52.7	11.7
Level of Service	E	D	D	C	D	B
Approach Delay (s)	52.7		36.7			14.8
Approach LOS	D		D			B

Intersection Summary			
HCM 2000 Control Delay	30.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	110	30	3509	266	52	2087
Future Volume (vph)	110	30	3509	266	52	2087
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.7	3.5	3.5	3.7
Total Lost time (s)	6.3	6.3	6.6	6.6	3.0	6.6
Lane Util. Factor	1.00	1.00	0.91	1.00	1.00	0.91
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1785	1597	5092	1597	1767	5092
Flt Permitted	0.95	1.00	1.00	1.00	0.05	1.00
Satd. Flow (perm)	1785	1597	5092	1597	94	5092
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	110	30	3509	266	52	2087
RTOR Reduction (vph)	0	25	0	46	0	0
Lane Group Flow (vph)	110	5	3509	220	52	2087
Heavy Vehicles (%)	0%	0%	3%	0%	1%	3%
Turn Type	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	8		2	6	
Actuated Green, G (s)	13.8	13.8	76.3	76.3	83.3	83.3
Effective Green, g (s)	13.8	13.8	76.3	76.3	83.3	83.3
Actuated g/C Ratio	0.13	0.13	0.69	0.69	0.76	0.76
Clearance Time (s)	6.3	6.3	6.6	6.6	3.0	6.6
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	223	200	3531	1107	132	3856
v/s Ratio Prot			c0.69		0.01	c0.41
v/s Ratio Perm	c0.06	0.00		0.14	0.28	
v/c Ratio	0.49	0.02	0.99	0.20	0.39	0.54
Uniform Delay, d1	44.8	42.2	16.6	6.0	29.9	5.5
Progression Factor	1.00	1.00	0.56	0.91	1.00	1.00
Incremental Delay, d2	3.6	0.1	3.3	0.0	4.0	0.5
Delay (s)	48.4	42.3	12.6	5.5	33.9	6.0
Level of Service	D	D	B	A	C	A
Approach Delay (s)	47.1		12.1			6.7
Approach LOS	D		B			A

Intersection Summary			
HCM 2000 Control Delay	11.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.9
Intersection Capacity Utilization	85.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	3	2	426	5	146	3	4007	733	120	2219	0
Future Volume (vph)	1	3	2	426	5	146	3	4007	733	120	2219	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)		7.4		7.4	7.4	7.4	3.0	6.5	6.5	4.5	6.5	
Lane Util. Factor		1.00		1.00	1.00	1.00	1.00	0.91	1.00	1.00	0.91	
Frt		0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1819		1767	1921	1566	1785	5092	1566	1750	4948	
Flt Permitted		0.98		0.75	1.00	1.00	0.06	1.00	1.00	0.06	1.00	
Satd. Flow (perm)		1798		1402	1921	1566	116	5092	1566	106	4948	
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)	1	3	2	426	5	146	3	4007	733	120	2219	0
RTOR Reduction (vph)	0	1	0	0	0	57	0	0	109	0	0	0
Lane Group Flow (vph)	0	5	0	426	5	89	3	4007	624	120	2219	0
Heavy Vehicles (%)	0%	0%	0%	1%	0%	2%	0%	3%	2%	2%	6%	0%
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)		31.6		31.6	31.6	31.6	66.3	65.0	65.0	74.5	70.2	
Effective Green, g (s)		31.6		31.6	31.6	31.6	66.3	65.0	65.0	74.5	70.2	
Actuated g/C Ratio		0.26		0.26	0.26	0.26	0.55	0.54	0.54	0.62	0.59	
Clearance Time (s)		7.4		7.4	7.4	7.4	3.0	6.5	6.5	4.5	6.5	
Vehicle Extension (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Grp Cap (vph)		473		369	505	412	82	2758	848	134	2894	
v/s Ratio Prot					0.00		0.00	c0.79		c0.04	0.45	
v/s Ratio Perm		0.00		c0.30		0.06	0.02		0.40	0.52		
v/c Ratio		0.01		1.15	0.01	0.21	0.04	1.45	0.74	0.90	0.77	
Uniform Delay, d1		32.6		44.2	32.6	34.5	15.7	27.5	21.0	31.7	18.7	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.0		95.9	0.0	0.5	0.4	205.9	5.7	49.7	2.0	
Delay (s)		32.7		140.1	32.7	35.1	16.0	233.4	26.6	81.4	20.7	
Level of Service		C		F	C	D	B	F	C	F	C	
Approach Delay (s)		32.7			112.6			201.3			23.9	
Approach LOS		C			F			F			C	

Intersection Summary			
HCM 2000 Control Delay	140.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.33		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.4
Intersection Capacity Utilization	129.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	542	31	122	4200	2352	295
Future Volume (vph)	542	31	122	4200	2352	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.5	3.7	3.7	3.5
Total Lost time (s)	6.4		4.5	6.2	6.2	
Lane Util. Factor	1.00		1.00	0.91	0.91	
Frt	0.99		1.00	1.00	0.98	
Flt Protected	0.95		0.95	1.00	1.00	
Satd. Flow (prot)	1757		1767	5092	4896	
Flt Permitted	0.95		0.05	1.00	1.00	
Satd. Flow (perm)	1757		99	5092	4896	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	542	31	122	4200	2352	295
RTOR Reduction (vph)	1	0	0	0	12	0
Lane Group Flow (vph)	572	0	122	4200	2635	0
Heavy Vehicles (%)	1%	8%	1%	3%	6%	0%
Turn Type	Perm		pm+pt	NA	NA	
Protected Phases			5	2	6	
Permitted Phases	4		2			
Actuated Green, G (s)	34.6		82.8	82.8	70.3	
Effective Green, g (s)	34.6		82.8	82.8	70.3	
Actuated g/C Ratio	0.27		0.64	0.64	0.54	
Clearance Time (s)	6.4		4.5	6.2	6.2	
Vehicle Extension (s)	5.0		5.0	5.0	5.0	
Lane Grp Cap (vph)	467		165	3243	2647	
v/s Ratio Prot			0.05	c0.82	0.54	
v/s Ratio Perm	c0.33		0.42			
v/c Ratio	1.22		0.74	1.30	1.00	
Uniform Delay, d1	47.7		34.6	23.6	29.7	
Progression Factor	1.00		1.00	1.00	1.00	
Incremental Delay, d2	118.6		18.9	135.2	16.5	
Delay (s)	166.3		53.5	158.8	46.2	
Level of Service	F		D	F	D	
Approach Delay (s)	166.3			155.8	46.2	
Approach LOS	F			F	D	

Intersection Summary			
HCM 2000 Control Delay	118.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.32		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	17.1
Intersection Capacity Utilization	123.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	0	20	41	0	0	4	4305	4	1	2380	2
Future Volume (vph)	17	0	20	41	0	0	4	4305	4	1	2380	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)	7.4	7.4		7.4			7.3	7.3	7.3	7.3	7.3	7.3
Lane Util. Factor	1.00	1.00		1.00			1.00	0.91	1.00	1.00	0.91	1.00
Frt	1.00	0.85		1.00			1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95			0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1785	1445		1750			1785	4948	1597	1785	4768	1597
Flt Permitted	0.76	1.00		0.74			0.05	1.00	1.00	0.04	1.00	1.00
Satd. Flow (perm)	1423	1445		1371			99	4948	1597	78	4768	1597
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)	17	0	20	41	0	0	4	4305	4	1	2380	2
RTOR Reduction (vph)	0	18	0	0	0	0	0	0	1	0	0	0
Lane Group Flow (vph)	17	2	0	41	0	0	4	4305	3	1	2380	2
Heavy Vehicles (%)	0%	0%	13%	2%	0%	0%	0%	6%	0%	0%	10%	0%
Turn Type	Perm	NA		Perm			Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	9.5	9.5		9.5			95.8	95.8	95.8	95.8	95.8	95.8
Effective Green, g (s)	9.5	9.5		9.5			95.8	95.8	95.8	95.8	95.8	95.8
Actuated g/C Ratio	0.08	0.08		0.08			0.80	0.80	0.80	0.80	0.80	0.80
Clearance Time (s)	7.4	7.4		7.4			7.3	7.3	7.3	7.3	7.3	7.3
Vehicle Extension (s)	5.0	5.0		5.0			5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	112	114		108			79	3950	1274	62	3806	1274
v/s Ratio Prot		0.00						c0.87			0.50	
v/s Ratio Perm	0.01			c0.03			0.04		0.00	0.01		0.00
v/c Ratio	0.15	0.01		0.38			0.05	1.09	0.00	0.02	0.63	0.00
Uniform Delay, d1	51.5	50.9		52.5			2.5	12.1	2.4	2.5	4.9	2.4
Progression Factor	1.00	1.00		1.00			1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	0.1		4.6			1.2	45.4	0.0	0.5	0.8	0.0
Delay (s)	52.8	51.0		57.1			3.8	57.5	2.4	2.9	5.7	2.4
Level of Service	D	D		E			A	E	A	A	A	A
Approach Delay (s)		51.9			57.1			57.4			5.7	
Approach LOS		D			E			E			A	

Intersection Summary			
HCM 2000 Control Delay	39.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.7
Intersection Capacity Utilization	104.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	130	0	103	3	0	3	0	3920	13	3	2234	0
Future Volume (vph)	130	0	103	3	0	3	0	3920	13	3	2234	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.6	3.6	3.6	3.5	3.6	3.5	3.6	3.7	3.5	3.5	3.7	3.6
Total Lost time (s)	6.0	6.0		6.0	6.0			6.0	6.0	6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.91	1.00	1.00	0.91	
Frt	1.00	0.85		1.00	0.85			1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1583		1785	1214			4948	1597	1785	4561	
Flt Permitted	0.76	1.00		0.69	1.00			1.00	1.00	0.05	1.00	
Satd. Flow (perm)	1408	1583		1297	1214			4948	1597	93	4561	
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)	130	0	103	3	0	3	0	3920	13	3	2234	0
RTOR Reduction (vph)	0	25	0	0	3	0	0	0	3	0	0	0
Lane Group Flow (vph)	130	78	0	3	0	0	0	3920	10	3	2234	0
Heavy Vehicles (%)	2%	2%	2%	0%	2%	33%	2%	6%	0%	0%	15%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	17.3	17.3		17.3	17.3			80.7	80.7	80.7	80.7	
Effective Green, g (s)	17.3	17.3		17.3	17.3			80.7	80.7	80.7	80.7	
Actuated g/C Ratio	0.16	0.16		0.16	0.16			0.73	0.73	0.73	0.73	
Clearance Time (s)	6.0	6.0		6.0	6.0			6.0	6.0	6.0	6.0	
Vehicle Extension (s)	5.0	5.0		5.0	5.0			5.0	5.0	5.0	5.0	
Lane Grp Cap (vph)	221	248		203	190			3630	1171	68	3346	
v/s Ratio Prot		0.05			0.00			c0.79			0.49	
v/s Ratio Perm	c0.09			0.00					0.01	0.03		
v/c Ratio	0.59	0.31		0.01	0.00			1.08	0.01	0.04	0.67	
Uniform Delay, d1	43.0	41.1		39.2	39.1			14.6	3.9	4.0	7.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	0.80	0.63	
Incremental Delay, d2	6.1	1.5		0.1	0.0			41.7	0.0	1.1	0.9	
Delay (s)	49.1	42.6		39.2	39.1			56.4	3.9	4.3	5.8	
Level of Service	D	D		D	D			E	A	A	A	
Approach Delay (s)		46.2			39.1			56.2			5.8	
Approach LOS		D			D			E			A	

Intersection Summary			
HCM 2000 Control Delay	38.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	99.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Vol, veh/h	5	2	7	19	1	5	8	4104	22	6	2318	8
Future Vol, veh/h	5	2	7	19	1	5	8	4104	22	6	2318	8
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	250	-	-	-	-	360	700	-	350	550	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	13	11	0	0	0	1	4	0	6	0
Mvmt Flow	5	2	7	19	1	5	8	4104	22	6	2318	8

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	3992	6454	1163	5060	6458	2052	2326	0	0	4104	0	0
Stage 1	2334	2334	-	4120	4120	-	-	-	-	-	-	-
Stage 2	1658	4120	-	940	2338	-	-	-	-	-	-	-
Critical Hdwy	6.4	6.5	7.36	6.62	6.5	7.1	5.3	-	-	5.3	-	-
Critical Hdwy Stg 1	7.3	5.5	-	7.52	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.7	5.5	-	6.92	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.8	4	4.03	3.91	4	3.9	3.1	-	-	3.1	-	-
Pot Cap-1 Maneuver	~ 3	0	148	0	0	40	88	-	-	10	-	-
Stage 1	22	71	-	~ 1	8	-	-	-	-	-	-	-
Stage 2	92	8	-	241	71	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 1	0	148	0	0	40	88	-	-	10	-	-
Mov Cap-2 Maneuver	~ 1	0	-	0	0	-	-	-	-	-	-	-
Stage 1	20	28	-	~ 1	7	-	-	-	-	-	-	-
Stage 2	63	7	-	85	28	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 2694.9		0.1	1.5
HCM LOS	F	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	88	-	-	1	148	-	40	10	-	-
HCM Lane V/C Ratio	0.091	-	-	5	0.061	-	0.125	0.6	-	-
HCM Control Delay (s)	50	-	-	$ 7490	30.9	-	107.5	$ 599.5	-	-
HCM Lane LOS	E	-	-	F	D	-	F	F	-	-
HCM 95th %tile Q(veh)	0.3	-	-	1.6	0.2	-	0.4	1.3	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	25	62	2709	62	25	1958
Future Volume (Veh/h)	25	62	2709	62	25	1958
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	25	62	2709	62	25	1958
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	3412	903			2771	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3412	903			2771	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	0	78			83	
cM capacity (veh/h)	5	284			145	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	NB 3	NB 4	SB 1	SB 2	SB 3	SB 4
Volume Total	25	62	903	903	903	62	25	653	653	653
Volume Left	25	0	0	0	0	0	25	0	0	0
Volume Right	0	62	0	0	0	62	0	0	0	0
cSH	5	284	1700	1700	1700	1700	145	1700	1700	1700
Volume to Capacity	5.37	0.22	0.53	0.53	0.53	0.04	0.17	0.38	0.38	0.38
Queue Length 95th (m)	Err	6.5	0.0	0.0	0.0	0.0	4.8	0.0	0.0	0.0
Control Delay (s)	Err	21.2	0.0	0.0	0.0	0.0	35.0	0.0	0.0	0.0
Lane LOS	F	C					E			
Approach Delay (s)	2888.4		0.0				0.4			
Approach LOS	F									

Intersection Summary				
Average Delay	52.1			
Intersection Capacity Utilization	62.8%	ICU Level of Service		B
Analysis Period (min)	15			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	305	84	2698	859	151	1865
v/c Ratio	0.75	0.20	0.98	0.69	0.72	0.56
Control Delay	59.2	8.7	42.0	4.2	46.7	12.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.2	8.7	42.0	4.2	46.7	12.2
Queue Length 50th (m)	77.7	0.0	253.9	0.0	22.4	87.5
Queue Length 95th (m)	106.7	13.1	#302.5	18.4	#68.1	112.6
Internal Link Dist (m)	461.7		324.0			457.6
Turn Bay Length (m)		150.0		300.0	60.0	
Base Capacity (vph)	464	477	2747	1251	210	3337
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.66	0.18	0.98	0.69	0.72	0.56

Intersection Summary

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

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	110	30	3509	266	52	2087
v/c Ratio	0.49	0.13	0.99	0.23	0.33	0.54
Control Delay	51.6	15.9	13.5	2.7	11.0	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.6	15.9	13.5	2.7	11.0	6.4
Queue Length 50th (m)	23.5	0.2	~218.7	5.4	2.1	60.0
Queue Length 95th (m)	40.2	8.9	m72.1	m5.6	#7.0	82.8
Internal Link Dist (m)	90.9		290.0			324.0
Turn Bay Length (m)				50.0	150.0	
Base Capacity (vph)	292	285	3556	1160	157	3854
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.11	0.99	0.23	0.33	0.54

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

m Volume for 95th percentile queue is metered by upstream signal.

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	6	426	5	146	3	4007	733	120	2219
v/c Ratio	0.01	1.15	0.01	0.31	0.02	1.45	0.77	0.89	0.74
Control Delay	28.2	136.2	32.8	18.9	7.7	231.8	20.4	73.5	19.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.2	136.2	32.8	18.9	7.7	231.8	20.4	73.5	19.5
Queue Length 50th (m)	0.7	~124.5	0.9	13.0	0.3	~496.4	95.7	13.0	129.4
Queue Length 95th (m)	4.3	#188.9	4.3	31.4	1.4	#517.6	152.2	#52.0	182.8
Internal Link Dist (m)	27.8		347.9			418.5			530.8
Turn Bay Length (m)					65.0		50.0	100.0	
Base Capacity (vph)	474	369	505	469	162	2758	956	135	2993
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	1.15	0.01	0.31	0.02	1.45	0.77	0.89	0.74

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	EBL	NBL	NBT	SBT
Lane Group Flow (vph)	573	122	4200	2647
v/c Ratio	1.22	0.73	1.30	1.00
Control Delay	158.4	48.5	159.8	45.9
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	158.4	48.5	159.8	45.9
Queue Length 50th (m)	~190.0	15.7	~529.1	249.4
Queue Length 95th (m)	#263.4	#46.5	#546.5	#297.3
Internal Link Dist (m)	267.7		1007.3	418.5
Turn Bay Length (m)		50.0		
Base Capacity (vph)	469	166	3243	2659
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	1.22	0.73	1.30	1.00

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	EBL	EBT	WBL	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group Flow (vph)	17	20	41	4	4305	4	1	2380	2
v/c Ratio	0.13	0.12	0.33	0.05	1.06	0.00	0.02	0.61	0.00
Control Delay	50.8	6.5	57.0	5.0	47.2	0.0	4.0	5.9	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.8	6.5	57.0	5.0	47.2	0.0	4.0	5.9	0.0
Queue Length 50th (m)	3.9	0.0	9.7	0.2	~445.6	0.0	0.1	75.8	0.0
Queue Length 95th (m)	11.2	3.4	21.0	1.3	#479.5	0.0	0.5	103.6	0.0
Internal Link Dist (m)		37.9			349.7			1007.3	
Turn Bay Length (m)	50.0			100.0		100.0	100.0		100.0
Base Capacity (vph)	343	378	331	80	4072	1321	65	3924	1321
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.05	0.12	0.05	1.06	0.00	0.02	0.61	0.00

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	130	103	3	3	3920	13	3	2234
v/c Ratio	0.59	0.38	0.01	0.01	1.08	0.01	0.04	0.67
Control Delay	53.1	31.9	35.7	0.0	58.7	0.7	6.0	6.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	53.1	31.9	35.7	0.0	58.7	0.7	6.0	6.3
Queue Length 50th (m)	27.6	14.8	0.6	0.0	~363.4	0.0	0.1	44.8
Queue Length 95th (m)	44.9	29.6	3.1	0.0	#411.7	0.8	m0.2	48.9
Internal Link Dist (m)		96.0		165.4	283.5			290.0
Turn Bay Length (m)	50.0		50.0			100.0	100.0	
Base Capacity (vph)	384	453	353	352	3630	1179	68	3346
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	0.34	0.23	0.01	0.01	1.08	0.01	0.04	0.67

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

m Volume for 95th percentile queue is metered by upstream signal.

Appendix E

Future (2031) Intersection Operation Reports with Improvements

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	807	105	1485	289	125	2846
Future Volume (vph)	807	105	1485	289	125	2846
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.7	3.5	3.5	3.7
Total Lost time (s)	6.2	6.2	6.7	6.7	4.5	6.7
Lane Util. Factor	0.97	1.00	0.91	1.00	1.00	0.91
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3463	1439	4768	1536	1785	4768
Flt Permitted	0.95	1.00	1.00	1.00	0.10	1.00
Satd. Flow (perm)	3463	1439	4768	1536	195	4768
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	807	105	1485	289	125	2846
RTOR Reduction (vph)	0	76	0	145	0	0
Lane Group Flow (vph)	807	29	1485	144	125	2846
Heavy Vehicles (%)	0%	11%	10%	4%	0%	10%
Turn Type	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	8		2	6	
Actuated Green, G (s)	32.8	32.8	59.9	59.9	74.3	74.3
Effective Green, g (s)	32.8	32.8	59.9	59.9	74.3	74.3
Actuated g/C Ratio	0.27	0.27	0.50	0.50	0.62	0.62
Clearance Time (s)	6.2	6.2	6.7	6.7	4.5	6.7
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	946	393	2380	766	251	2952
v/s Ratio Prot			0.31		0.04	c0.60
v/s Ratio Perm	c0.23	0.02		0.09	0.27	
v/c Ratio	0.85	0.07	0.62	0.19	0.50	0.96
Uniform Delay, d1	41.3	32.3	21.9	16.6	13.3	21.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.3	0.2	1.2	0.5	3.2	10.1
Delay (s)	49.6	32.5	23.1	17.2	16.6	31.7
Level of Service	D	C	C	B	B	C
Approach Delay (s)	47.6		22.1			31.0
Approach LOS	D		C			C

Intersection Summary			
HCM 2000 Control Delay	30.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	88.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	6	11	743	5	95	2	1753	476	106	3839	0
Future Volume (vph)	3	6	11	743	5	95	2	1753	476	106	3839	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)		7.4		7.4	7.4	7.4	6.5	6.5	6.5	4.5	6.5	
Lane Util. Factor		1.00		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	
Frt		0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1700		3362	1537	1551	892	4683	1521	1513	4995	
Flt Permitted		0.99		0.74	1.00	1.00	0.07	1.00	1.00	0.06	1.00	
Satd. Flow (perm)		1700		2634	1537	1551	62	4683	1521	97	4995	
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)	3	6	11	743	5	95	2	1753	476	106	3839	0
RTOR Reduction (vph)	0	5	0	0	0	67	0	0	138	0	0	0
Lane Group Flow (vph)	0	15	0	743	5	28	2	1753	338	106	3839	0
Heavy Vehicles (%)	0%	0%	7%	3%	25%	3%	100%	12%	5%	18%	5%	0%
Turn Type	Split	NA		Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4			8			2		1	6	
Permitted Phases				8		8	2		2	6		6
Actuated Green, G (s)		5.8		42.4	42.4	42.4	61.0	61.0	61.0	75.5	75.5	
Effective Green, g (s)		5.8		42.4	42.4	42.4	61.0	61.0	61.0	75.5	75.5	
Actuated g/C Ratio		0.04		0.29	0.29	0.29	0.42	0.42	0.42	0.52	0.52	
Clearance Time (s)		7.4		7.4	7.4	7.4	6.5	6.5	6.5	4.5	6.5	
Vehicle Extension (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Grp Cap (vph)		68		770	449	453	26	1970	639	148	2600	
v/s Ratio Prot		c0.01			0.00			0.37		0.05	c0.77	
v/s Ratio Perm				c0.28		0.02	0.03		0.22	0.32		
v/c Ratio		0.22		0.96	0.01	0.06	0.08	0.89	0.53	0.72	1.48	
Uniform Delay, d1		67.4		50.6	36.4	37.0	25.1	38.9	31.3	31.2	34.8	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		3.5		24.3	0.0	0.1	5.7	6.5	3.1	18.5	216.6	
Delay (s)		70.9		74.9	36.4	37.1	30.8	45.4	34.4	49.7	251.3	
Level of Service		E		E	D	D	C	D	C	D	F	
Approach Delay (s)		70.9			70.4			43.0			245.9	
Approach LOS		E			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	160.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.29		
Actuated Cycle Length (s)	145.0	Sum of lost time (s)	25.8
Intersection Capacity Utilization	127.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	807	105	1485	289	125	2846
v/c Ratio	0.85	0.22	0.62	0.32	0.49	0.96
Control Delay	51.2	7.3	23.6	2.9	16.1	32.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.2	7.3	23.6	2.9	16.1	32.3
Queue Length 50th (m)	96.6	0.0	97.6	0.0	11.5	234.1
Queue Length 95th (m)	121.5	13.5	114.1	14.5	20.9	#290.5
Internal Link Dist (m)	461.7		324.0			457.6
Turn Bay Length (m)		150.0		300.0	60.0	
Base Capacity (vph)	975	480	2380	911	262	2953
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.22	0.62	0.32	0.48	0.96

Intersection Summary

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

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	20	743	5	95	2	1753	476	106	3839
v/c Ratio	0.19	0.97	0.01	0.18	0.07	0.85	0.59	0.70	1.42
Control Delay	56.1	75.3	42.0	4.8	31.5	41.1	17.7	50.8	220.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	56.1	75.3	42.0	4.8	31.5	41.1	17.7	50.8	220.1
Queue Length 50th (m)	4.4	~132.9	1.2	0.0	0.3	171.4	52.9	16.4	~571.0
Queue Length 95th (m)	13.5	#179.2	5.0	10.0	2.8	193.0	90.6	#44.4	#587.8
Internal Link Dist (m)	27.8		347.9			418.5			530.8
Turn Bay Length (m)				50.0	65.0		50.0	100.0	
Base Capacity (vph)	128	769	448	535	27	2066	804	152	2704
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.97	0.01	0.18	0.07	0.85	0.59	0.70	1.42

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	305	84	2698	859	151	1865
Future Volume (vph)	305	84	2698	859	151	1865
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.5	3.7	3.5	3.5	3.7
Total Lost time (s)	6.2	6.2	6.7	6.7	4.5	6.7
Lane Util. Factor	0.97	1.00	0.91	1.00	1.00	0.91
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3463	1597	4948	1566	1785	4948
Flt Permitted	0.95	1.00	1.00	1.00	0.05	1.00
Satd. Flow (perm)	3463	1597	4948	1566	98	4948
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	305	84	2698	859	151	1865
RTOR Reduction (vph)	0	67	0	382	0	0
Lane Group Flow (vph)	305	17	2698	477	151	1865
Heavy Vehicles (%)	0%	0%	6%	2%	0%	6%
Turn Type	Perm	Perm	NA	Perm	pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	8		2	6	
Actuated Green, G (s)	26.0	26.0	72.2	72.2	91.1	91.1
Effective Green, g (s)	26.0	26.0	72.2	72.2	91.1	91.1
Actuated g/C Ratio	0.20	0.20	0.56	0.56	0.70	0.70
Clearance Time (s)	6.2	6.2	6.7	6.7	4.5	6.7
Vehicle Extension (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Grp Cap (vph)	692	319	2748	869	255	3467
v/s Ratio Prot			c0.55		0.07	c0.38
v/s Ratio Perm	c0.09	0.01		0.30	0.35	
v/c Ratio	0.44	0.05	0.98	0.55	0.59	0.54
Uniform Delay, d1	45.6	42.0	28.3	18.5	36.4	9.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.1	13.4	2.5	5.5	0.6
Delay (s)	46.6	42.2	41.7	21.0	41.9	9.9
Level of Service	D	D	D	C	D	A
Approach Delay (s)	45.6		36.7			12.3
Approach LOS	D		D			B

Intersection Summary			
HCM 2000 Control Delay	29.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	96.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	3	2	426	5	146	3	4007	733	120	2219	0
Future Volume (vph)	1	3	2	426	5	146	3	4007	733	120	2219	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5	3.5	3.7	3.5
Total Lost time (s)		7.4		7.4	7.4	7.4	3.0	6.5	6.5	4.5	6.5	
Lane Util. Factor		1.00		0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	
Frt		0.95		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1819		3429	1921	1566	1785	5092	1566	1750	4948	
Flt Permitted		0.99		0.75	1.00	1.00	0.06	1.00	1.00	0.06	1.00	
Satd. Flow (perm)		1819		2720	1921	1566	112	5092	1566	102	4948	
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)	1	3	2	426	5	146	3	4007	733	120	2219	0
RTOR Reduction (vph)	0	2	0	0	0	116	0	0	95	0	0	0
Lane Group Flow (vph)	0	4	0	426	5	30	3	4007	638	120	2219	0
Heavy Vehicles (%)	0%	0%	0%	1%	0%	2%	0%	3%	2%	2%	6%	0%
Turn Type	Split	NA		Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	4	4			8		5	2		1	6	
Permitted Phases				8		8	2		2	6		6
Actuated Green, G (s)		1.6		27.6	27.6	27.6	68.7	67.4	67.4	84.5	80.2	
Effective Green, g (s)		1.6		27.6	27.6	27.6	68.7	67.4	67.4	84.5	80.2	
Actuated g/C Ratio		0.01		0.20	0.20	0.20	0.51	0.50	0.50	0.63	0.59	
Clearance Time (s)		7.4		7.4	7.4	7.4	3.0	6.5	6.5	4.5	6.5	
Vehicle Extension (s)		5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Lane Grp Cap (vph)		21		556	392	320	73	2542	781	217	2939	
v/s Ratio Prot		c0.00			0.00		0.00	c0.79		c0.05	c0.45	
v/s Ratio Perm				c0.16		0.02	0.02		0.41	0.29		
v/c Ratio		0.19		0.77	0.01	0.09	0.04	1.58	0.82	0.55	0.76	
Uniform Delay, d1		66.1		50.7	42.8	43.6	18.8	33.8	28.6	32.6	20.2	
Progression Factor		1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		9.1		7.3	0.0	0.3	0.5	261.3	9.3	5.1	1.9	
Delay (s)		75.2		58.0	42.9	43.8	19.3	295.1	37.9	37.7	22.0	
Level of Service		E		E	D	D	B	F	D	D	C	
Approach Delay (s)		75.2			54.3			255.1			22.8	
Approach LOS		E			D			F			C	

Intersection Summary			
HCM 2000 Control Delay	169.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.25		
Actuated Cycle Length (s)	135.0	Sum of lost time (s)	25.8
Intersection Capacity Utilization	118.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	305	84	2698	859	151	1865
v/c Ratio	0.44	0.22	0.98	0.69	0.59	0.54
Control Delay	48.0	10.2	42.0	4.2	34.7	10.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	48.0	10.2	42.0	4.2	34.7	10.0
Queue Length 50th (m)	37.5	0.0	253.9	0.0	21.3	80.2
Queue Length 95th (m)	52.2	14.3	#302.5	18.4	44.6	91.0
Internal Link Dist (m)	461.7		324.0			457.6
Turn Bay Length (m)		150.0		300.0	60.0	
Base Capacity (vph)	900	477	2747	1251	257	3467
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.18	0.98	0.69	0.59	0.54

Intersection Summary

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

Lane Group	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	6	426	5	146	3	4007	733	120	2219
v/c Ratio	0.06	0.76	0.01	0.33	0.02	1.45	0.78	0.54	0.68
Control Delay	52.3	60.1	40.8	8.6	9.7	232.3	25.9	30.7	18.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	52.3	60.1	40.8	8.6	9.7	232.3	25.9	30.7	18.1
Queue Length 50th (m)	1.1	58.0	1.1	0.0	0.3	~559.9	121.9	13.2	120.0
Queue Length 95th (m)	6.0	76.5	4.9	18.1	1.8	#606.4	#208.4	#62.9	230.1
Internal Link Dist (m)	27.8		347.9			418.5			530.8
Turn Bay Length (m)					65.0		50.0	100.0	
Base Capacity (vph)	109	612	432	465	160	2762	936	223	3242
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.70	0.01	0.31	0.02	1.45	0.78	0.54	0.68

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

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