# 401 March Road
# Transportation Study

*Prepared By:*

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*Prepared for:*

Starbank Developments 401 Corp.

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File No: 300034580.0000

# Executive Summary

## A. Introduction

Starbank Developments 401 Corp. (Starbank) is currently undergoing the planning process for a proposed commercial plaza to be located at 401 March Road in the community of Kanata in the City of Ottawa. The site is located in the southwest quadrant of the intersection of March Road and Station Road / Carling Avenue. The proposed development includes the following:

- 2,400 square foot (SF) fast food restaurant with drive-through window (A&W);
- 2,695 SF coffee / doughnut shop with drive through window (Tim Horton's);
- 4,000 SF office building; and
- Gas station with 10 pumps including a convenience store and car wash.

The total proposed gross floor area is 13,995 SF, which includes the gas station and car wash. Please note that tenants have been indicated, but that may change.

Access to the plaza is proposed via three unsignalized driveways:

- One full movement driveway on Station Road opposite an existing driveway to the north;
- One right-in / right-out only driveway on March Road mid-way along the site frontage; and
- A right-out only driveway on March Road at the southerly limit of the site.

R.J. Burnside & Associates Limited (Burnside) was retained to prepare this Transportation Study for the purposes of a Zoning and Site Plan Application (Site Plan Control) as part of the development planning process. This study has been undertaken in accordance with the City of Ottawa's *Transportation Impact Assessment Guidelines (2006)*.

## B. Conclusions

**Intersection Operations**

Under existing 2013 traffic conditions, study intersections are operating with excess capacity and will continue to do so under 2019 total traffic conditions with the development in place.

However, northbound queues on March Road during the AM Peak Hour appear to be currently reaching 302 m, which results in the queue extending through and south of the

signalized intersection to the commercial plaza on the south side of the tracks. This does not occur during any of the other peak hours. This length of queue has been observed in the field, but the traffic signal to the plaza to the south was also observed “metering” the queue. In other words, the queue appears to not regularly block the southerly traffic signal. Under 2019 conditions this queue is predicted to reach 346 m without the development. With signal timing optimization the queue is predicted to be shortened to 317 m under total conditions.

Based on our analysis, there are no required road improvements.

## Site Plan Review

A truck access analysis, using a WB-20 truck design vehicle, was conducted for trucks accessing the proposed gas station for the purposes of refuelling the underground fuel tanks. The analysis illustrates that the proposed site and access configuration accommodates the WB-20 turning movements through the site. The analysis confirms the necessity of the two driveways on March Road for fuel truck access.

The on-site and off-site operations have been reviewed. It is our opinion that the site is well designed to accommodate and facilitate all modes of travel. The site design will also encourage non-vehicle modes by providing good integration with the external road network. Transit will continue to operate well within the vicinity of the site, with a stop provided along the frontage of the site on March Road. We do not anticipate the site to notably contribute to the potential for weaving, merging, or diverging concerns.

## Proposed Driveways

The driveway locations and type were developed in consultation with City staff and comply with the Private Approach By-law 2003-447, with the exception of the throat width of the right-in / right-out only driveway on March Road. The By-law requires a maximum width of 9.0m at the property line. The proposed throat width is approximately 12 m. A variance may be required.

## Parking Supply and Drive-Through

The proposed parking supply of 90 spaces for the development will exceed the Zoning By-law’s requirements by 32 spaces. The Zoning By-law also requires a minimum of five (5) bicycle parking spaces, which will be provided.

The spaces provided for queuing for the car wash and restaurants either meet or exceed the By-law’s requirements.

## Transportation Demand Management

The site is currently well served by transit along its frontage, sidewalks on March Road and a bicycle lane on both sides of March Road. The following transportation demand management plan elements are proposed to be incorporated into the site:

- Internal sidewalk connections to the existing sidewalk network on March Road, which in turn will provide access to the existing transit routes in the neighbourhood.
- Pedestrian access in the form of paved walkways, marked pedestrian crossings, and wheelchair / stroller accessible ramps to be provided internally to facilitate the flow of pedestrians throughout the site.
- Areas designated for short-term bicycle parking will be clearly marked and located close to each building entrance. Bicycle parking will be protected from the elements by use of an overhead canopy, well lit and easily accessible. Access will be provided via the site's driveways and internal pedestrian pathways to the existing bicycle lanes on March Road.

In addition, the planned Bus Rapid Transit route along March Road, between Highway 417 and Maxwell Bridge Road, will further encourage walk-in traffic and a reduction in vehicle and parking demand.

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# 1.0 Introduction

## 1.1 Background

Starbank Developments 401 Corp. (Starbank) is currently undergoing the planning process for a proposed commercial plaza located at 401 March Road in the community of Kanata in the City of Ottawa. The site is located in the southwest quadrant of the intersection of March Road and Station Road / Carling Avenue. The site location is shown in **Figure 1.**

The proposed development includes the following:

- 2,400 square foot ("SF") fast food restaurant with drive-through window (A&W);
- 2,695 SF coffee / doughnut shop with drive through window (Tim Horton's);
- 4,000 SF office building; and
- Gas station with 10 pumps including a convenience store and car wash.

The total proposed gross floor area is 13,995 SF, which includes the gas station and car wash. Potential tenant names are shown for some uses; however, the tenants may change.

Access to the plaza is proposed via three unsignalized driveways:

- One full movement driveway on Station Road opposite an existing driveway to the north (west driveway to 413 March Road);
- One right-in / right-out only driveway on March Road mid-way along the site frontage; and
- A right-out only driveway on March Road at the southerly limit of the site.

R.J. Burnside & Associates Limited (Burnside) was retained to prepare this Transportation Study for the purposes of a Zoning and Site Plan Application (Site Plan Control) as part of the development planning process. This study has been undertaken in accordance with the City of Ottawa's *Transportation Impact Assessment Guidelines (2006)*. Under the guidelines, a Transportation Impact Study is required.

## 1.2 Scope of Work

The purpose of the study is to analyze intersection operations for the following scenarios:

- 2013 existing traffic conditions;

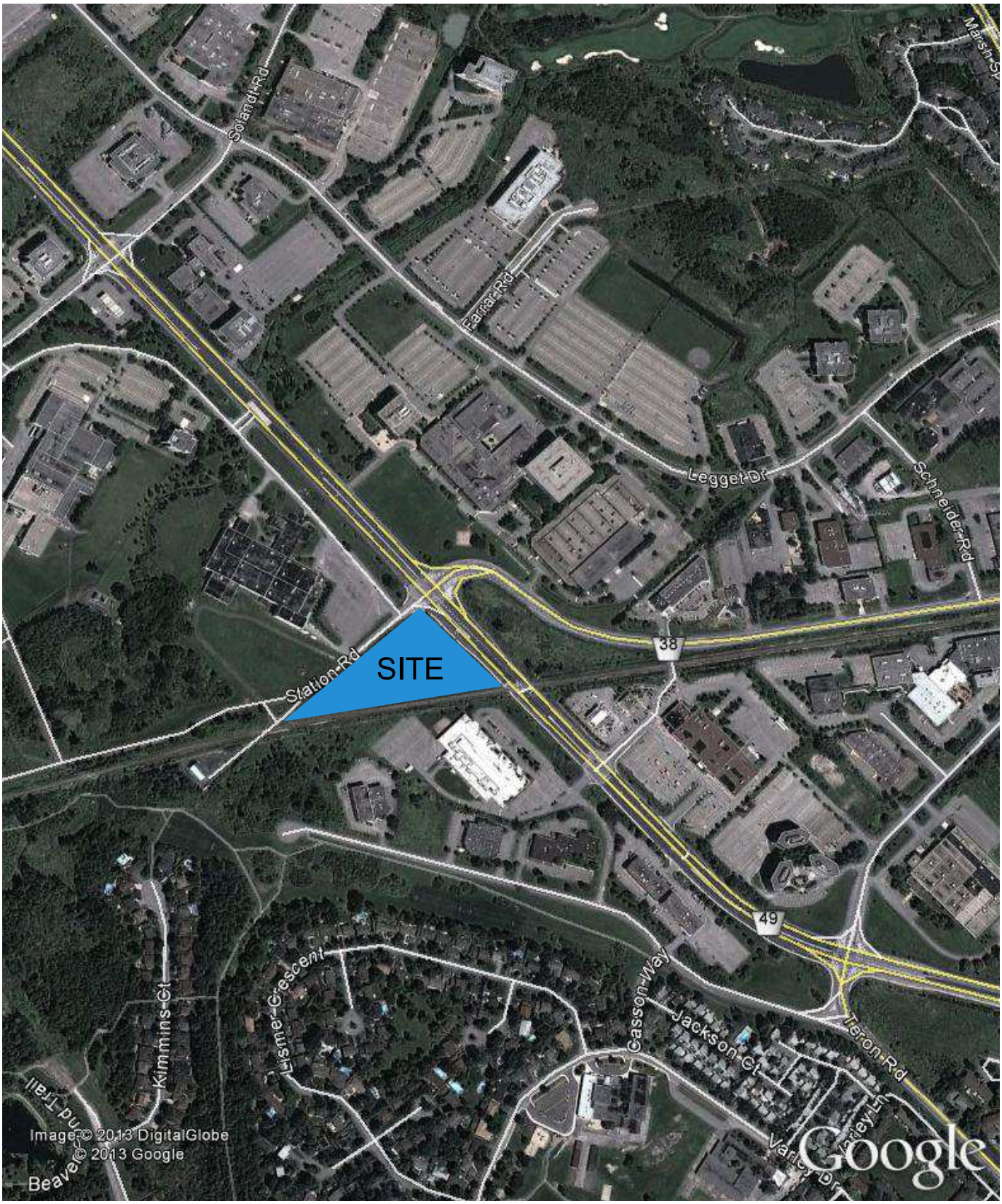


FIGURE 1
SITE LOCATION

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- 2019 (Buildout in 2014 +5years) background traffic conditions (includes yearly traffic growth + background developments); and
- 2019 total traffic conditions (Buildout in 2014 +5years, includes 2019 background traffic + proposed development traffic).

The weekday AM and PM, and Saturday midday peak hour operating conditions for the above scenarios was analyzed for the following intersections:

- March Road @ Station Road / Carling Avenue; and
- Proposed Site Driveways.

## 1.3 Study Methodology

The Transportation Study was completed using the following methodology:

- Reviewed the site plan and determine the proposed land uses.
- Collected existing traffic counts at the intersections of March Road and Carling Avenue / Station Road, and Station Road and an existing driveway.
- Analyzed existing intersection capacity and identified any infrastructure deficits, if any.
- Used a traffic growth rate to estimate background traffic volumes.
- Analyzed background traffic conditions and assess the capacity of the existing infrastructure, including method of traffic control, required to accommodate background traffic volumes.
- Projected future traffic generated by the proposed land use and assign to the future road network.
- Analyzed total traffic conditions and assess the capacity of the existing infrastructure, including method of traffic control, to accommodate combined traffic volumes.
- Reviewed truck movements through the site.
- Reviewed the parking requirements.
- Prepared a Transportation Demand Management (TDM) plan for the development.

## 1.4 Intersection Analysis Methodology

Intersection operations were assessed for the site driveways and intersections in the study area using the software program Synchro, Version 8, which employs methodology from the ***Highway Capacity Manual (HCM2010)*** published by the Transportation Research Board National Research Council.

The results of the analysis contained herein reflect the City of Ottawa's (City) criterion, which directly relates the volume to capacity (v/c) ratio of a signalized intersection to a level of service (LoS) rating. These relationships are summarized below:

| LEVEL OF SERVICE | VOLUME TO CAPACITY RATIO |
|---|---|
| A | 0 to 0.60 |
| B | 0.61 to 0.70 |
| C | 0.71 to 0.80 |
| D | 0.81 to 0.90 |
| E | 0.91 to 1.00 |
| F | > 1.00 |

Furthermore, the City of Ottawa's *Transportation Impact Assessment Guidelines (2006)* state that:

> "The V/C ratio for an intersection is defined as the sum of equivalent volumes for all critical movements divided by the sum of capacities for all critical movements assuming that the V/C ratios for critical movements can be equalized. In cases where minimum pedestrian phase times prevent equalizing the level of service for critical movements, then the V/C ratio for the most heavily saturated critical movement should be considered as the V/C ratio for the intersection.
>
> Intersection evaluations should identify:
>
> - Signalized Intersections – V/C ratios for the overall intersection, as defined above, and individual movements; and
> - Unsignalized Intersections - Level of service (LOS) where the LOS is between A and E; V/C where capacity is based on gap analysis if intersection LOS is F.
>
> Mitigation measures in the form of the addition of lane capacity and/or signal timing/ phasing adjustments will be required where V/C ratios for signalized intersections exceed 0.90, as defined above, except in the Urban Core, where 1.0 is acceptable."

# 2.0 Existing Conditions

## 2.1 Site Context

The site, triangular in shape, is located in the southwest quadrant of the intersection of March Road and Station Road / Carling Avenue in the community of Kanata, and is bound by Station Road to the north, March Road to the east, and a rail line to the south-west. March Road is a major north-south arterial within the community of Kanata and north of Highway 417. March Road connects with Highway 417 via an interchange approximately 3 km to the south.

The community of Kanata north of Highway 417 has three (3) distinct areas through which March Road traverses: a northerly residential area, a southerly residential area which borders the highway, and a central commercial-industrial area within which the subject site is located. This commercial-industrial area is bordered by the residential areas to the north and the south, and 'greenfields' and open space to the east and the west, as shown in **Figure 1**.

## 2.2 Existing Road Network

The road network is described below and is illustrated in **Figure 2**. All roads are under the jurisdiction of the City.

March Road — March Road is a north-south arterial with a 4 lane urban cross section with curb and gutter. The posted speed limit is 80 km/h. Bicycle lanes are provided on both sides. Parking is prohibited on both sides of the roadway. Sidewalks are provided on both sides of the road south of Carling Avenue/Station Road and only the east side north of there.

Carling Avenue — Carling Avenue is an east-west arterial with a 2 lane rural cross section with paved shoulders and turn lanes provided at intersections. The posted speed limit is 60 km/h. Sidewalks or bicycle lanes are not provided. Parking is permitted on both sides of the roadway, except within the vicinity of March Road.

Station Road — Station Road is an east-west local road with a 2 lane rural cross section with no shoulders. The assumed speed limit is 50 km/h. Sidewalks or bicycle lanes are not provided. There are no posted parking restrictions.

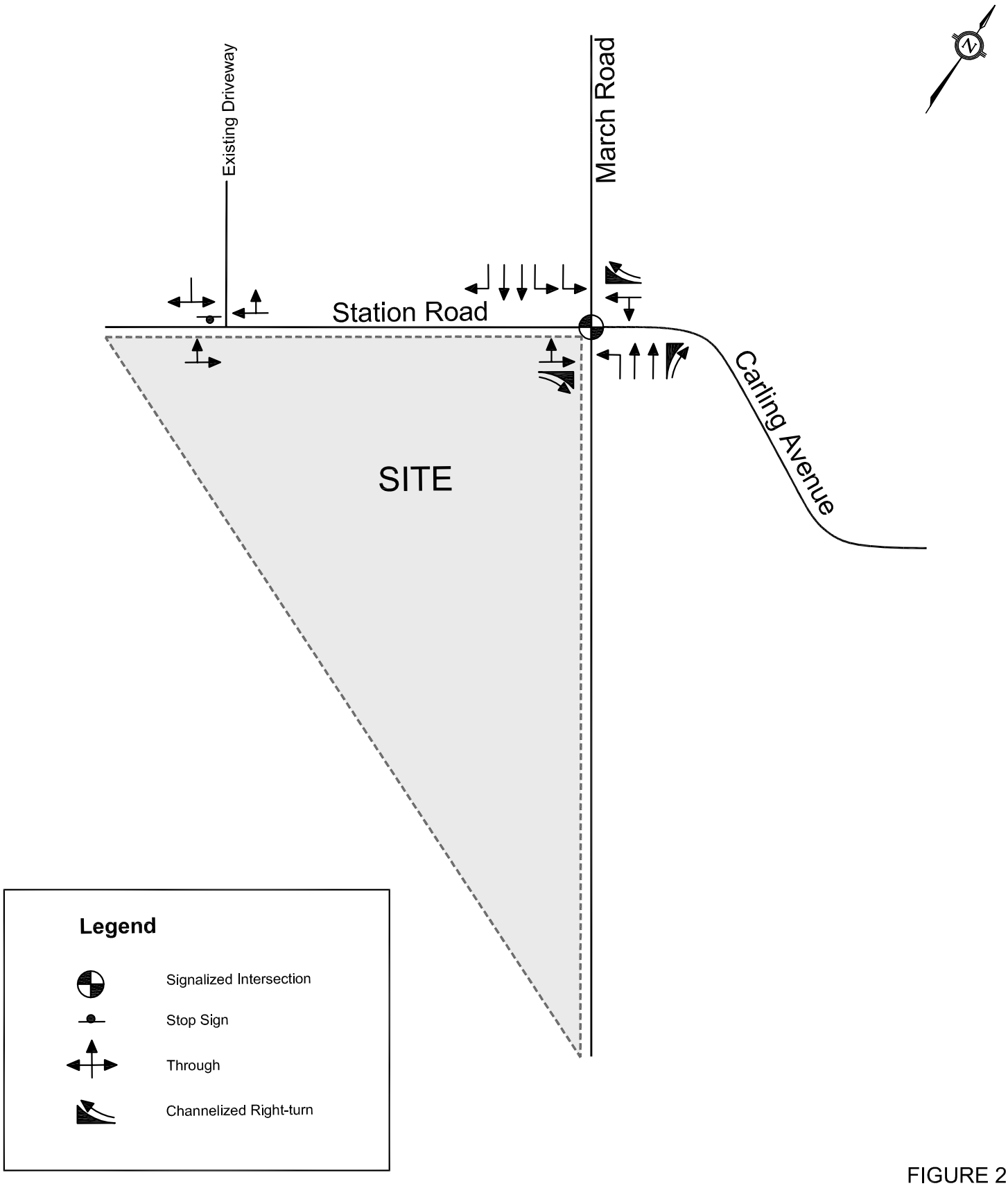


FIGURE 2
EXISTING ROAD NETWORK

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## 2.3 Transit Service

OC Transpo operates three surface bus routes in the vicinity of the site, as summarized in **Table 1**. Bus stops are located on the southerly leg of March Road for both the northbound and southbound directions at Station Road / Carling Avenue.

**Table 1: Transit Service Summary**

| Route # | Description | Operating Hours | Headway |
|---|---|---|---|
| #60 | AM - Kanata to Downtown<br>PM - Downtown to Kanata | Weekday Peak Periods | 15 minutes |
| #93 | Kanata North/LeBreton to Lincoln Fields | Weekdays 5:00:00 A.M. to 12:00 A.M.<br>Weekends 6:30:00 A.M. to 12:00 A.M. | 10 to 30 minutes<br>30 minutes |
| #181 | AM - Herzberg Road to Eagleson Station<br>PM - Eagleson Station to Herzberg Road | AM Departure – 7:35:00 A.M.<br>PM Departure – 5:05:00 P.M. | 2 Trips Daily |

## 2.4 Existing Traffic Volumes

Traffic count data was collected for the study by the Traffic Information Group at the intersections of March Road and Carling Avenue / Station Road, and Station Road and an existing driveway to 413 March Road, which is anticipated to be opposite the proposed site's driveway. Traffic operations were observed during data collection to note any problems or potential concerns; however, no notable occurrences were observed. Details of the turning movement counts are summarized in **Table 2**. Existing traffic volumes are shown in **Figure 3**.

**Table 2: Turning movement Count Summary**

| Date of Surveys | Periods | Times |
|---|---|---|
| Thursday, October 17, 2013 | Weekday AM | 4:00:00 P.M. to 6:00:00 P.M. |
| Friday, October 18, 2013 | Weekday PM | 7:00:00 A.M. to 9:00:00 A.M. |
| Saturday, October 19, 2013 | Saturday Midday | 11:00:00 A.M. to 3:00:00 P.M. |

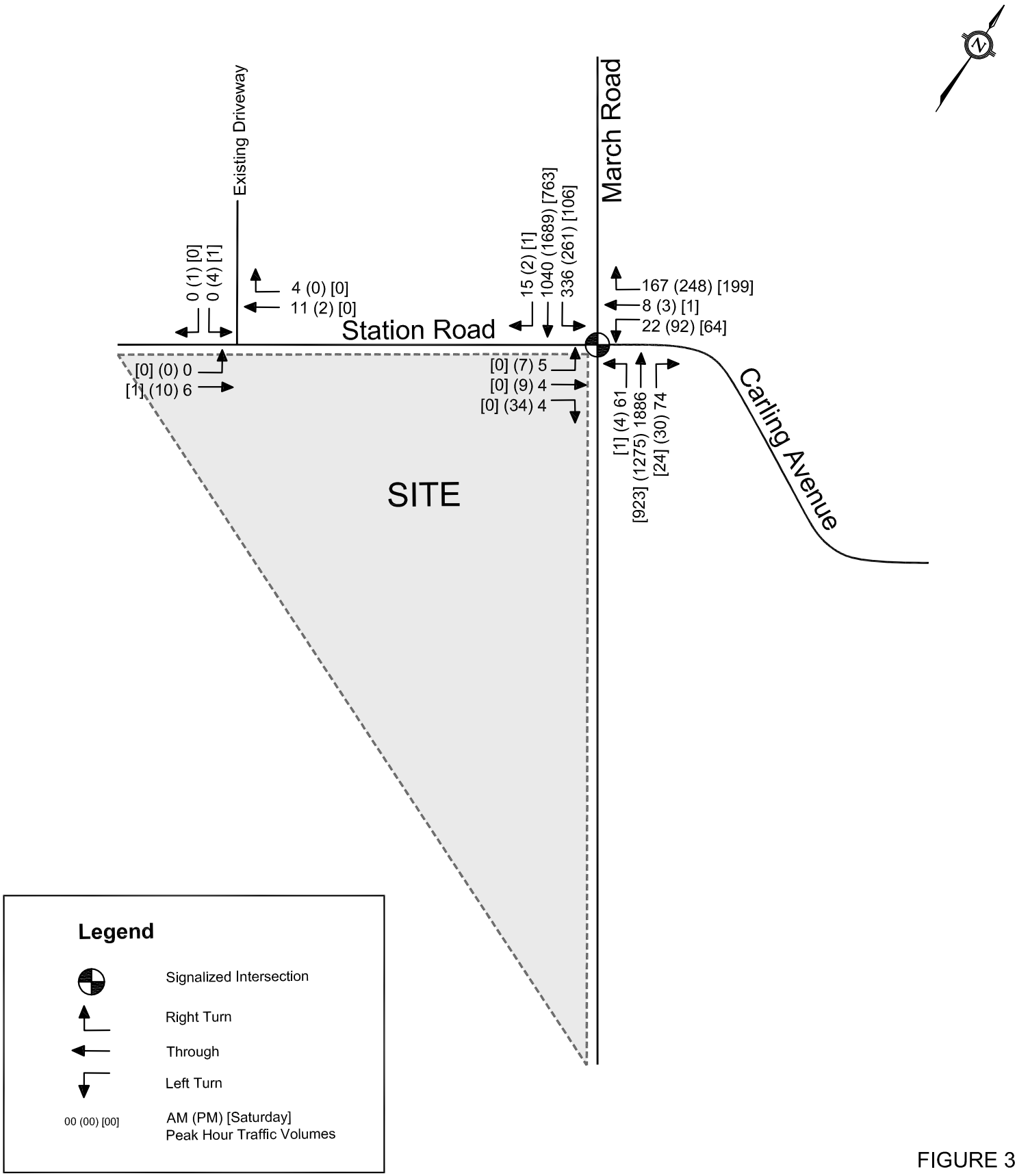


FIGURE 3
EXISTING TRAFFIC VOLUMES

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## 2.5 Existing Traffic Operations

Existing traffic operations were assessed based on the existing traffic volumes shown in **Figure 3** and the existing road network shown in **Figure 2.** Existing operations are summarized in **Table 3** and **Table 4** for signalized and unsignalized intersections, respectively. Detailed Synchro reports are provided in **Appendix A**.

**Table 3: Existing Signalized Intersection Operations**

| Intersection & Movement | | Weekday AM Peak Hour | | | Weekday PM Peak Hour | | | Saturday Midday Peak Hour | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | LOS | v/c | 95th | LOS | v/c | 95th | LOS | v/c | 95th |
| **March Road at Carling Avenue** | | | | | | | | | | |
| | Overall | C | 0.79 | | C | 0.74 | | A | 0.46 | |
| Eastbound | Left - Through | A | 0.08 | 7.6 | A | 0.10 | 10.9 | A | 0.00 | 0.0 |
| | Right turn | A | 0.00 | 0.0 | A | 0.02 | 0.0 | A | 0.00 | 0.0 |
| Westbound | Left - Through | A | 0.33 | 17.6 | B | 0.67 | 42.4 | A | 0.43 | 24.2 |
| | Right turn | A | 0.12 | 21.3 | A | 0.18 | 23.7 | A | 0.13 | 18.7 |
| Northbound | Left turn | A | 0.53 | 29.7 | A | 0.22 | 4.8 | A | 0.04 | 1.8 |
| | Through | D | 0.87 | 301.7 | B | 0.66 | 178.8 | A | 0.47 | 74.4 |
| | Right turn | A | 0.05 | 5.7 | A | 0.02 | 0.0 | A | 0.02 | 0.0 |
| Southbound | Left turn | B | 0.70 | 57.9 | B | 0.67 | 49.8 | A | 0.36 | 17.9 |
| | Through | A | 0.45 | 87.3 | C | 0.72 | 224.1 | A | 0.34 | 51.4 |
| | Right turn | A | 0.01 | 0.0 | A | 0.00 | 0.0 | A | 0.00 | 0.0 |

*Notes: v/c – volume to capacity ratio, LOS – level of service, 95th – 95th Percentile Queue in metres

Under existing conditions the signalized intersection of March Road and Carling Avenue is operating with excess capacity. All movements are operating with volume to capacity ratios of 0.87 or better, and with level of service D or better during all peak hours.

However, northbound queues during the AM Peak Hour appear to be currently reaching 301.7 m, which results in the queue extending through and south of the signalized intersection to the commercial plaza on the south side of the tracks. This does not occur during any of the other peak hours. This length of queue has been observed in the field, but the traffic signal to the plaza to the south was also observed “metering” the queue. In other words, the queue appears to not regularly block the southerly traffic signal.

**Table 4: Existing Unsignalized Intersection Operations**

| Intersection & Movement | | Weekday AM Peak Hour | | Weekday PM Peak Hour | | Saturday Midday Peak Hour | |
|---|---|---|---|---|---|---|---|
| | | LOS | 95th | LOS | 95th | LOS | 95th |
| **Station Road at Existing Driveway to 413 March Road** | | | | | | | |
| Southbound | Left-right | A | 0.0 | A | 0.2 | A | 0.0 |

*Notes: LOS – level of service, 95th – 95th Percentile Queue in metres, only critical movements are shown.

All critical movements at the unsignalized intersection of Station Road and the existing driveway to 413 March Road, are operating with level of service A.

# 3.0 2019 Background Traffic Conditions

## 3.1 Planned Road Network / Transit Improvements

The City's Transportation Master Plan (TMP) proposes a new 6.25 kilometre long bus rapid transit (BRT) line along March Road between Highway 417 and Maxwell Bridge Road. An Environmental Assessment for the route was recently completed and the City plans on building the first phase, between Highway 417 and Solandt Road, by 2031. The balance of the route is planned for after 2031. However, funding for the project has yet to be confirmed and therefore it is assumed that implementation will not occur by the 2019 horizon year. Accordingly, this future BRT line has not been considered in the analysis.

## 3.2 Background Traffic Volumes

### 3.2.1 General Background Traffic Growth

Based on a review of historical traffic volumes along March Road, it was determined that historical traffic growth along March Road has been negative. This finding was also noted in the report ***886 March Road McDonald's Transportation Study***, dated March 2013, prepared by HDR Corporation. However, a 1% per annum growth rate was applied in that study, which was accepted by the City. Therefore, we have applied a 1% per annum growth rate to all movements, except for movements to and from Station Road.

### 3.2.2 Background Development Traffic

One background development was identified for inclusion in this report based on a review of development applications available on the City's website. Site traffic volumes from the report ***1131 Teron Road Transportation Impact Study***, dated March 27, 2012, prepared by D.J. Halpenny & Associates Ltd., were included in the background traffic projections and are shown in **Figure 4**.

The resulting 2019 background traffic volumes are shown in **Figure 5**.

## 3.3 Background Traffic Operations

Background traffic operations for 2019 were assessed based on the background traffic volumes as shown in **Figure 5** and the road network as shown in **Figure 2**. Background operations are summarized in **Table 5** and **Table 6** for signalized and unsignalized intersections, respectively. Detailed Synchro reports are provided in **Appendix B**.

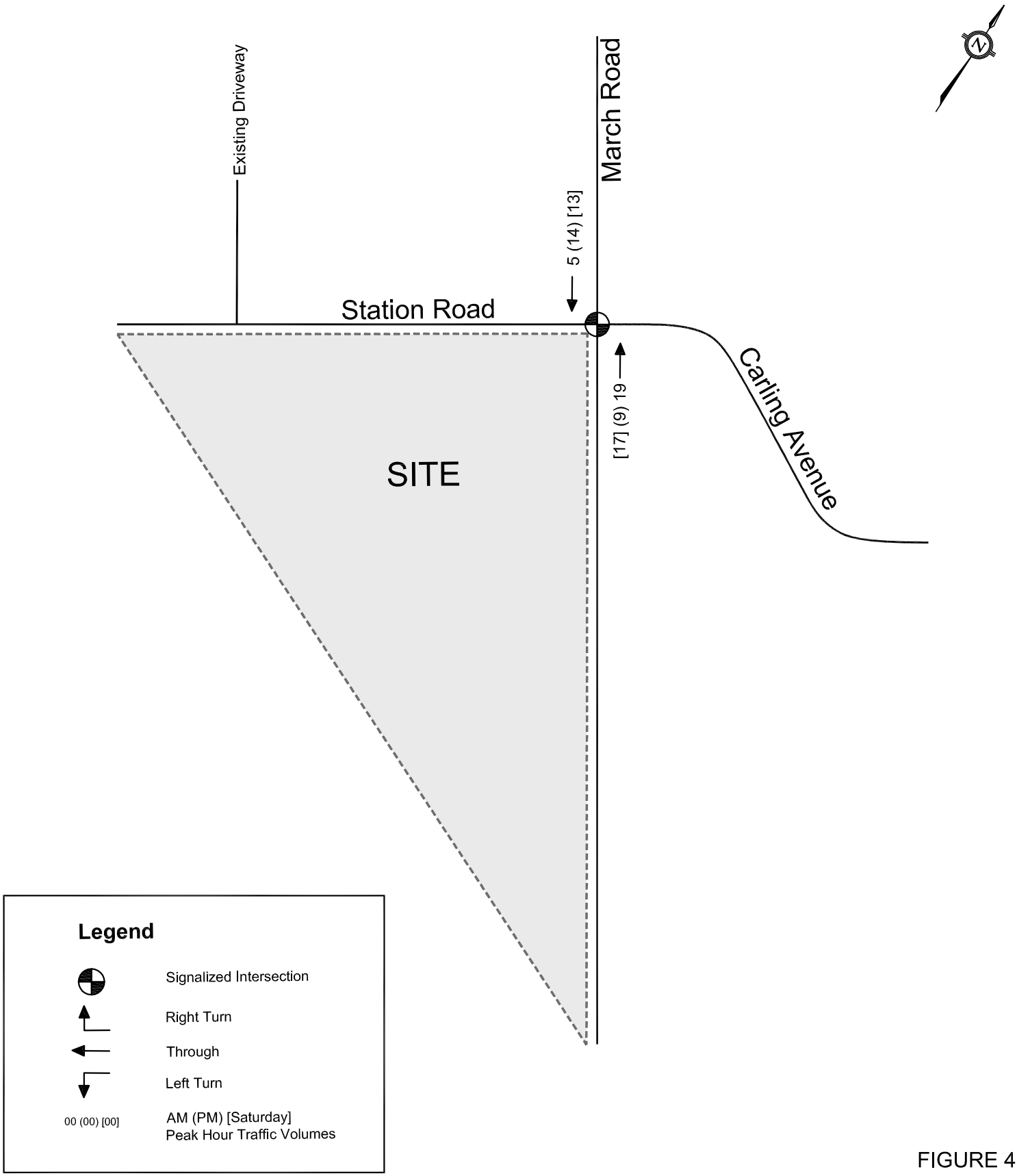


FIGURE 4
BACKGROUND DEVELOPMENT TRAFFIC VOLUMES

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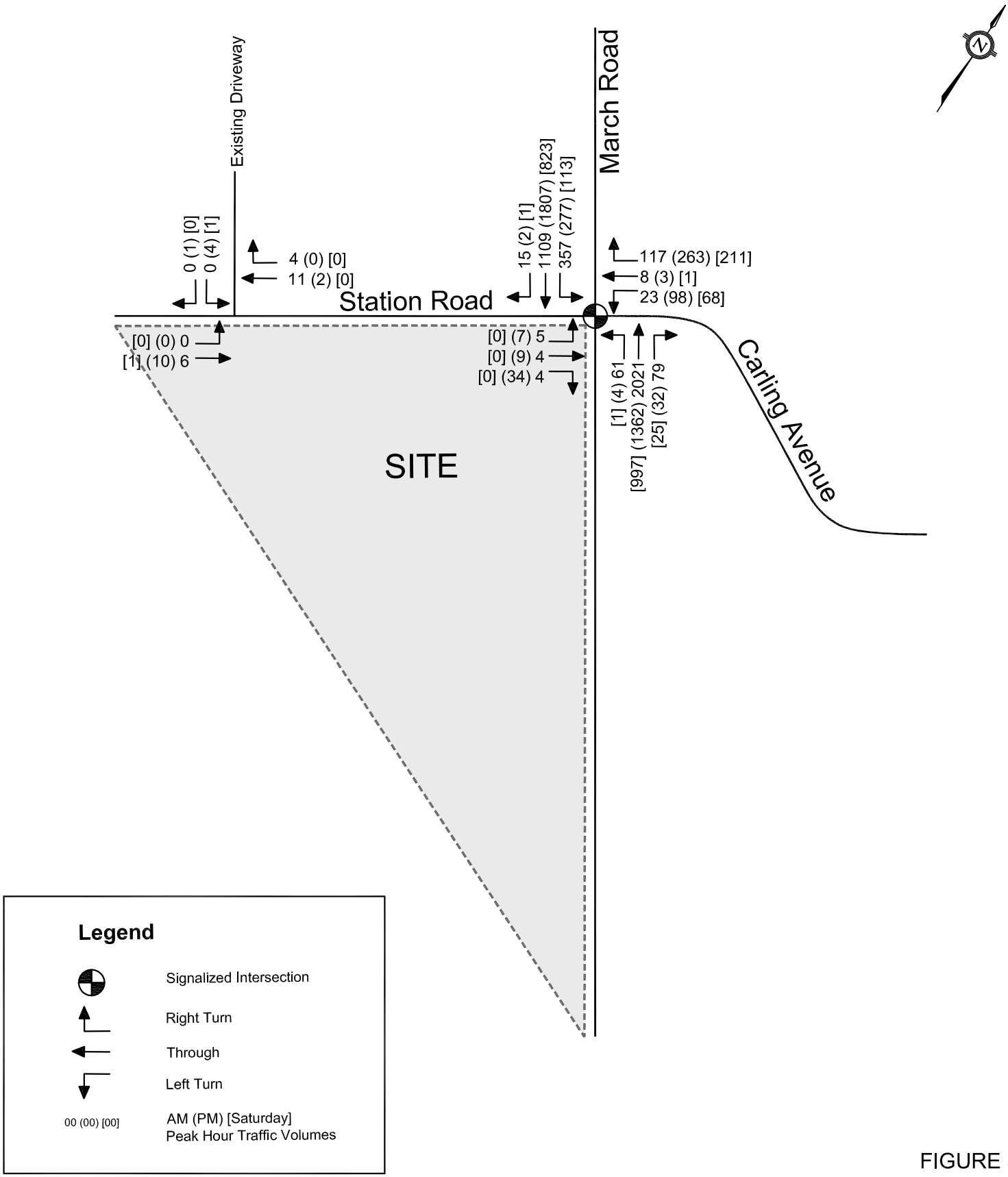


FIGURE 5
2019 BACKGROUND TRAFFIC VOLUMES

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**Table 5: Background Traffic Signalized Intersection Operations**

| Intersection & Movement | | Weekday AM Peak Hour | | | Weekday PM Peak Hour | | | Saturday Midday Peak Hour | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | LOS | v/c | 95th | LOS | v/c | 95th | LOS | v/c | 95th |
| **March Road @ Carling Avenue** | | | | | | | | | | |
| | Overall | D | 0.89 | | D | 0.83 | | A | 0.52 | |
| Eastbound | Left - Through | A | 0.14 | 7.7 | A | 0.09 | 10.8 | A | 0.00 | 0.0 |
| | Right turn | A | 0.00 | 0.0 | A | 0.02 | 0.0 | A | 0.00 | 0.0 |
| Westbound | Left - Through | A | 0.58 | 18.3 | C | 0.71 | 44.9 | A | 0.55 | 25.2 |
| | Right turn | A | 0.13 | 0.0 | A | 0.19 | 0.0 | A | 0.14 | 0.0 |
| Northbound | Left turn | A | 0.54 | 29.7 | A | 0.24 | 4.8 | A | 0.05 | 1.8 |
| | Through | E | 0.97 | 359.0 | C | 0.77 | 220.6 | A | 0.52 | 88.4 |
| | Right turn | A | 0.06 | 0.0 | A | 0.03 | 0.0 | A | 0.02 | 0.0 |
| Southbound | Left turn | B | 0.69 | 61.1 | B | 0.70 | 52.4 | A | 0.39 | 18.8 |
| | Through | A | 0.48 | 98.2 | D | 0.83 | 310.3 | A | 0.38 | 59.4 |
| | Right turn | A | 0.01 | 0.0 | A | 0.00 | 0.0 | A | 0.00 | 0.0 |

*Notes: v/c – volume to capacity ratio, LOS – level of service, 95th – 95th Percentile Queue in metres

Under 2019 background conditions, the signalized intersection of March Road and Carling Avenue will operate with excess capacity. All movements will operate with volume to capacity ratios of 0.94 or better and with level of service E or better during all peak hours. The weekday AM peak hour signal timing was optimized. The northbound through movement will be approaching capacity under background conditions.

However, the northbound queue during the AM Peak Hour is predicted to reach 359m by 2019, which is 57.3 m longer than under existing conditions. As noted previously, this results in the queue extending through and south of the signalized intersection to the commercial plaza on the south side of the tracks. This does not occur during any of the other peak hours.

**Table 6: Background Traffic Unsignalized Intersection Operations**

| Intersection & Movement | | Weekday AM Peak Hour | | Weekday PM Peak Hour | | Saturday Midday Peak Hour | |
|---|---|---|---|---|---|---|---|
| | | LOS | 95th | LOS | 95th | LOS | 95th |
| **Station Road at Existing Driveway to 413 March Road** | | | | | | | |
| Southbound | Left-right | A | 0.0 | A | 0.2 | A | 0.0 |

*Notes: LOS – level of service, 95th – 95th Percentile Queue in metres, only critical movements are shown.

Under 2019 background conditions all movements at the unsignalized intersection of Station Road and the existing driveway to 413 March Road will operate with level of service A.

# 4.0 Site Traffic

## 4.1 Site Plan

The proposed development consists of the following:

- 2,400 square foot ("SF") fast food restaurant with drive-through window (A&W);
- 2,695 SF coffee / doughnut shop with drive through window (Tim Horton's);
- 4,000 SF office building; and
- Gas station with 10 pumps including a convenience store and car wash.

The total proposed gross floor area is 13,995 SF, which includes the gas station and car wash. Although potential tenant names are provided, these could change.

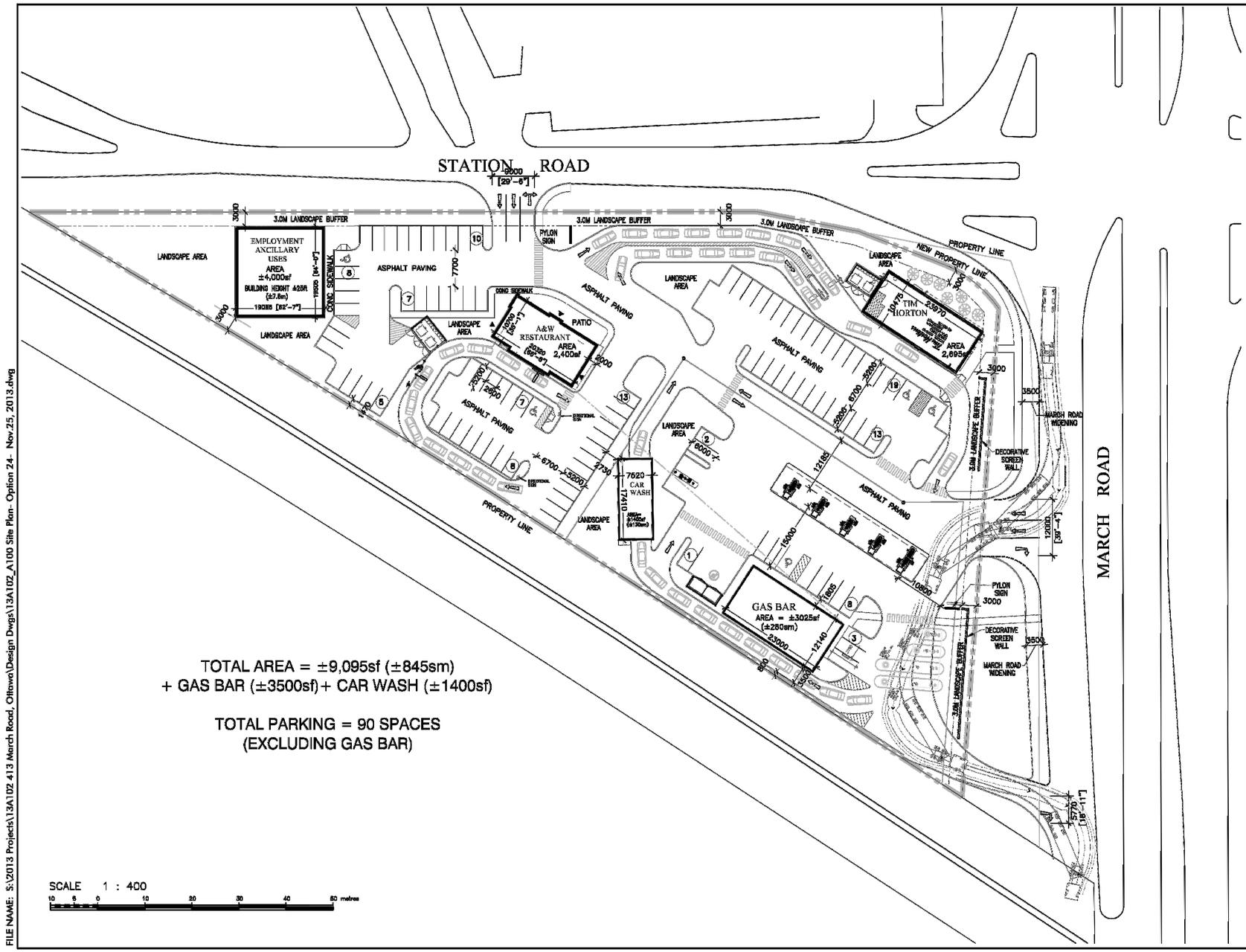
Access to the plaza is proposed via three unsignalized driveways:

- One full movement driveway on Station Road opposite an existing driveway to the north;
- One right-in / right-out only driveway on March Road mid-way along the site frontage; and
- A right-out only driveway on March Road at the southerly limit of the site.

Under existing conditions the eastbound right-turn at the intersection of March Road and Carling Avenue / Station Road is channelized and is provided with a southbound acceleration lane which terminates approximately midway along the site frontage on March Road. Since there is a proposed driveway at this location, the acceleration lane would end at this proposed driveway. Thus, there would be no southbound acceleration lanes for the site driveways along March Road. We have assumed this configuration in our total conditions analysis. The site plan is shown in **Figure 6**. The site is expected to be occupied within 2014 with no phasing. A total of 93 parking spaces are proposed.

## 4.2 Site Traffic Generation

Trip generation for site traffic was based on information in the publication ***Trip Generation Manual, 9th Edition***, published by the Institute of Transportation Engineers (ITE). Land Use Codes used for each use as shown on **Figure 6** are summarized below in **Table 7**.

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Project:
**413 MARCH ROAD**

STARBANK GROUP OF COMPANIES
413 MARCH ROAD
OTTAWA-CARLETON ONTARIO

Drawing Title:
**SITE PLAN**
**OPTION 24**

| Drawn By: | Checked By: | Date Checked: | Project No: 13A102 |
|---|---|---|---|
| Date Plotted: Nov 25, 2013 - 11:21am | | | Scale: 1:750 |
| Drawing No.: A100-24 | | | Revision No.: |

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FIGURE 6
SITE PLAN
300034580

**Table 7: ITE Trip Generation Land Uses**

| Component | ITE Land Use | ITE Code |
|---|---|---|
| A&W Restaurant | Food Restaurant With Drive-Through Window | LUC 934 |
| Tim Horton's | Coffee / Doughnut Shop With Drive Through Window | LUC 937 |
| Gas Bar | Gasoline / Service Station with Convenience Market and Car Wash | LUC 946 |
| Employment Ancillary Uses | Single Tenant Office Building | LUC 715 |

*LUC – Land Use Code

New site trips and pass-by site trips were examined. Pass-by trips are trips that are already on the road network, stop at the site, and then continue en route to their destination. These trips are different from new trips, because the purpose of new trips is exclusively to visit the site. New trips plus pass-by trips result in total trips. Pass-by was not assumed for the office component. Pass-by percentages were based on ITE data provided in ***Trip Generation Manual, 9th Edition***.

Given the complementary nature of the plaza business-wise, it would be expected that there would be a considerable amount of interaction between the proposed uses. Interaction trips reduce the number of gross trips because it assumes that visitors to the plaza go to more than one of the on-site amenities, thus reducing the number of total trips. In order to provide a conservative approach to the traffic analysis, interaction trips have not been considered.

The projected site traffic generated by the proposed development, as well as pass-by assumptions, for each peak period, is summarized in **Table 8**.

**Table 8: Site Traffic Generation**

| Land Use | Units | Weekday AM Peak Hour | Weekday PM Peak Hour | Saturday Midday Peak Hour |
|---|---|---|---|---|
| **Food Restaurant With Drive-Through Window (LUC 934) – 2,400 SF** | | | | |
| Trip rate | veh / 1000 SF | 45.42 | 32.50 | 59.17 |
| Total trips | veh / h | 109 | 78 | 142 |
| Inbound trips | | 56 | 41 | 72 |
| Outbound trips | | 53 | 37 | 70 |
| Pass-by trips (**50%**) | | -56 | -40 | -72 |
| New trips | | 53 | 38 | 70 |
| Inbound trips | | 28 | 21 | 36 |
| Outbound trips | | 25 | 17 | 34 |

**Table 8: Site Traffic Generation Continued**

| Land Use | Units | Weekday AM Peak Hour | Weekday PM Peak Hour | Saturday Midday Peak Hour |
|---|---|---|---|---|
| **Coffee / Doughnut Shop With Drive Through Window (LUC 937) – 2,695 SF** | | | | |
| Trip rate | veh / 1000 SF | 100.56 | 42.67 | 75.32 |
| Total trips | veh / h | 271 | 115 | 203 |
| Inbound trips | | 138 | 58 | 102 |
| Outbound trips | | 133 | 58 | 102 |
| Pass-by trips (**50%**) | | -136 | -58 | -102 |
| New trips | | 135 | 57 | 101 |
| Inbound trips | | 70 | 29 | 51 |
| Outbound trips | | 65 | 29 | 51 |
| **Gasoline / Service Station with Convenience Market and Car Wash (LUC 946) – 10 Fueling Positions** | | | | |
| Trip rate | veh / position | 11.80 | 13.90 | 18.00 |
| Total trips | veh / h | 118 | 139 | 180 |
| Inbound trips | | 60 | 71 | 90 |
| Outbound trips | | 58 | 68 | 90 |
| Pass-by trips (**60%**) | | -72 | -84 | -108 |
| New trips | | 46 | 55 | 72 |
| Inbound trips | | 24 | 29 | 36 |
| Outbound trips | | 22 | 26 | 36 |
| **Single Tenant Office Building (LUC 715) – 4,000 SF** | | | | |
| Trip rate | veh / 1000 SF | 7.25 | 10.25 | - * |
| Total trips | veh / h | 29 | 41 | - |
| Inbound trips | | 26 | 6 | - |
| Outbound trips | | 3 | 35 | - |
| **Total Trip Generation – 13,995 SF** | | | | |
| Trip rate | veh / 1000 SF | 37.66 | 26.66 | 39.30 |
| Total trips | veh / h | 527 | 373 | 525 |
| Inbound trips | | 280 | 176 | 264 |
| Outbound trips | | 247 | 198 | 262 |
| Pass-by trips | | -264 | -182 | -282 |
| Inbound trips | | -132 | -91 | -141 |
| Outbound trips | | -132 | -91 | -141 |
| New trips | | 263 | 191 | 243 |
| Inbound trips | | 148 | 85 | 123 |
| Outbound trips | | 115 | 107 | 121 |

* It is assumed that there will be little to no traffic on weekends.

The projected net site traffic will be an additional 263, 191, and 243 new two-way trips during the weekday AM, PM, and Saturday midday peak hours, respectively.

## 4.3 Site Traffic Distribution and Assignment

The distribution of new site traffic was based on existing traffic patterns, the existing road network, and knowledge of the area. The projected distribution is summarized in **Table 9**.

**Table 9: Site Traffic Distribution**

| To/From | Via | Distribution | |
|---|---|---|---|
| | | Commercial | Office |
| North | March Road | 35% | 25% |
| South | March Road | 50% | 60% |
| East | Carling Avenue | 10% | 15% |
| West | Station Road | 5% | - |
| | Total | 100% | 100% |

A separate distribution for new site trips was determined for the commercial uses and the office use. The commercial distribution assumed a potential catchment area for plaza customers based on the local area of the community of Kanata. For the office component, a higher distribution to/from the south and a lesser distribution to/from the north reflected the larger potential employment catchment area, which includes the entire City. Thus more employment traffic would plausibly use Highway 417 and Carling Avenue.

Commercial pass-by trips were distributed and assigned according to existing traffic patterns.

New site traffic volumes are shown in **Figure 7**, pass-by traffic volumes are shown in **Figure 8**, and the resulting total site trips are shown in **Figure 9**.

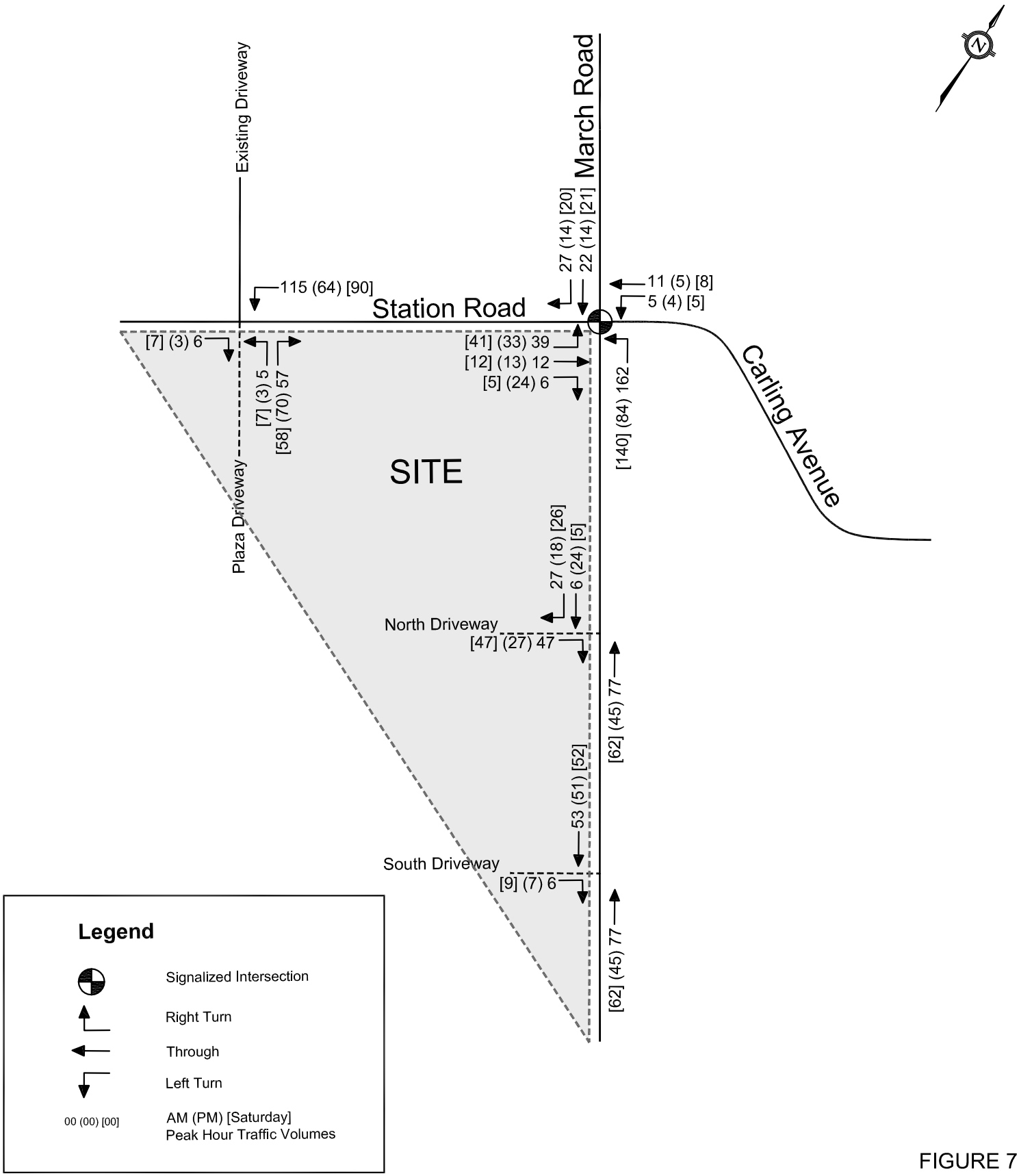


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FIGURE 7
NEW SITE TRAFFIC VOLUMES



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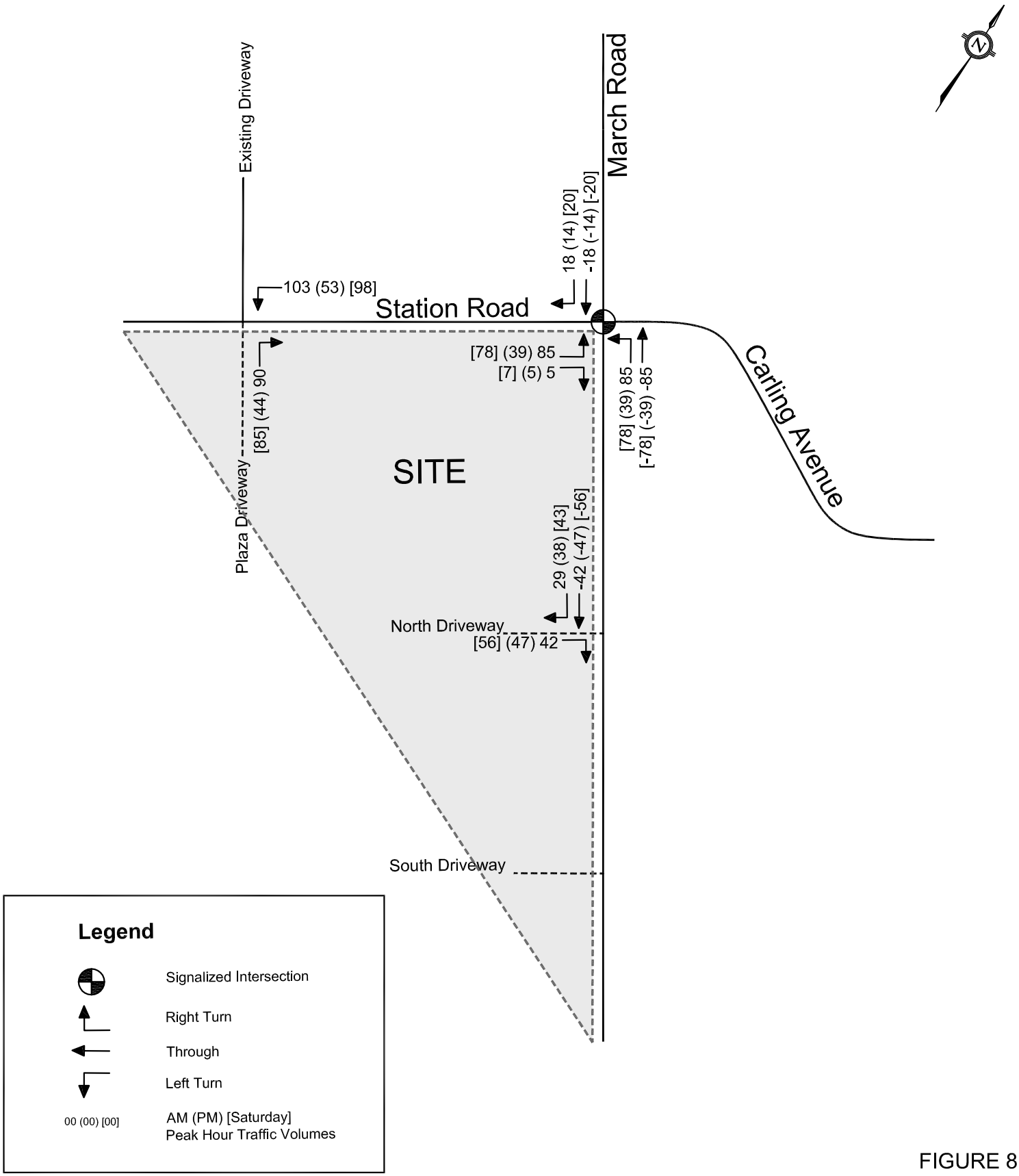


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FIGURE 8
PASS-BY SITE TRAFFIC VOLUMES



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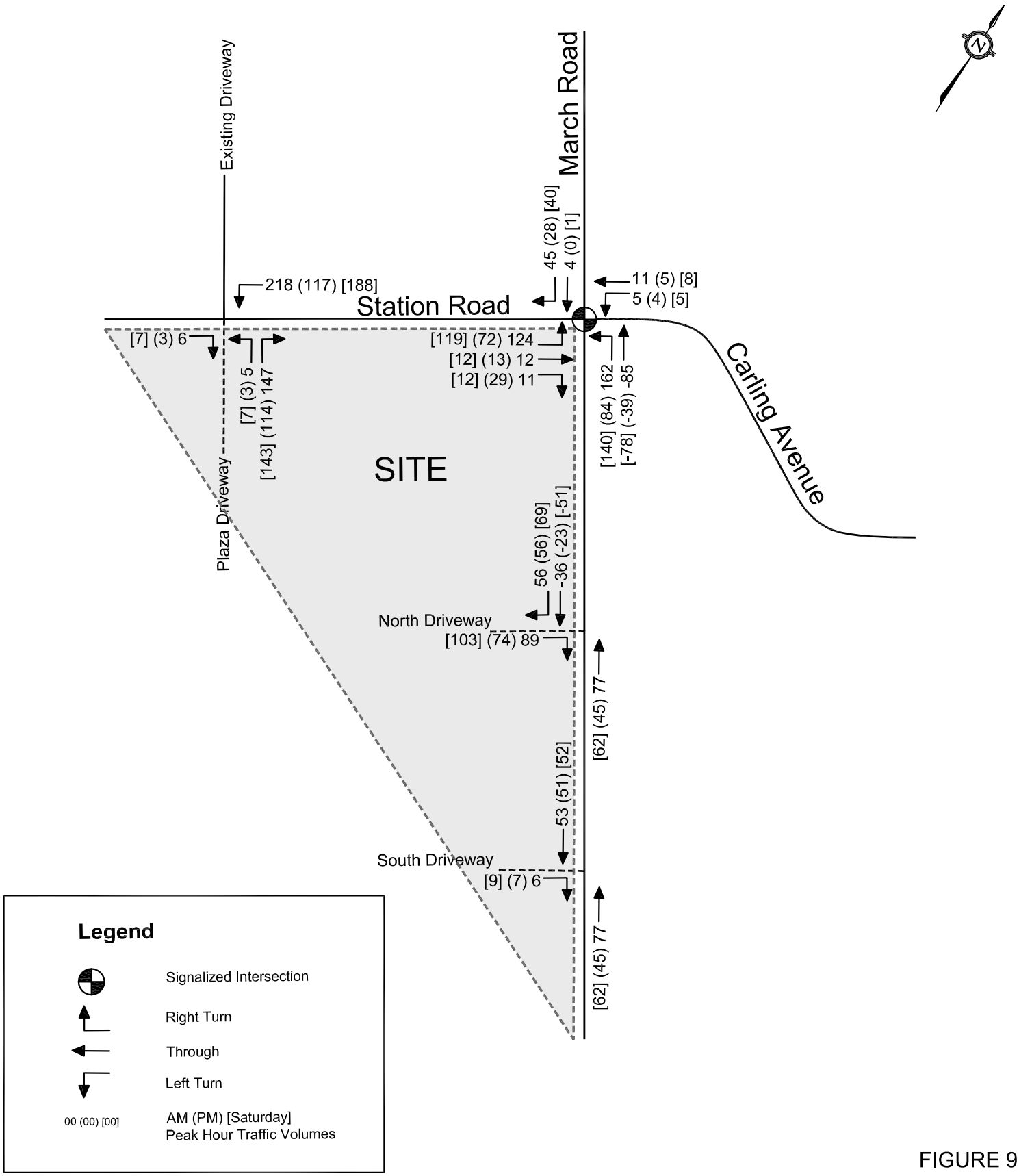


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FIGURE 9
TOTAL SITE TRAFFIC VOLUMES

# 5.0 2019 Total Traffic Conditions

Total traffic volumes are shown in **Figure 10**, which are comprised of background traffic volumes as shown in **Figure 5** plus the total site traffic volumes shown in **Figure 9**.

## 5.1 2019 Total Traffic Operations

Total traffic operations are summarized in **Table 10** and **Table 11** for signalized and unsignalized intersections, respectively. Detailed reports are provided in **Appendix C**.

**Table 10: Total Traffic Signalized Intersection Operations**

| Intersection & Movement | | Weekday AM Peak Hour | | | Weekday PM Peak Hour | | | Saturday Midday Peak Hour | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | LOS | v/c | 95th | LOS | v/c | 95th | LOS | v/c | 95th |
| **March Road @ Carling Avenue** | | | | | | | | | | |
| Overall | | E | 0.96 | | E | 0.92 | | B | 0.61 | |
| Eastbound | Left - Through | C | 0.79 | 62.4 | B | 0.65 | 44.2 | B | 0.66 | 40.2 |
| | Right turn | A | 0.01 | 0.0 | A | 0.05 | 0.0 | A | 0.01 | 0.0 |
| Westbound | Left - Through | A | 0.34 | 24.1 | C | 0.78 | 48.8 | A | 0.45 | 26.9 |
| | Right turn | A | 0.13 | 0.0 | A | 0.19 | 0.0 | A | 0.14 | 0.0 |
| Northbound | Left turn | C | 0.80 | 86.8 | B | 0.63 | 46.9 | B | 0.62 | 44.4 |
| | Through | E | 0.99 | 340.4 | C | 0.76 | 207.1 | A | 0.54 | 94.1 |
| | Right turn | A | 0.06 | 0.0 | A | 0.03 | 0.0 | A | 0.02 | 0.0 |
| Southbound | Left turn | E | 0.96 | 104.1 | C | 0.72 | 52.3 | A | 0.39 | 18.8 |
| | Through | B | 0.65 | 166.9 | E | 0.95 | 334.3 | A | 0.53 | 89.3 |
| | Right turn | A | 0.05 | 0.0 | A | 0.02 | 0.0 | A | 0.03 | 0.0 |

*Notes: v/c – volume to capacity ratio, LOS – level of service, 95th – 95th Percentile Queue in metres

Under 2019 total conditions the signalized intersection of March Road and Carling Avenue will operate with excess capacity. All movements will operate with volume to capacity ratios of 0.99 or better, and with level of service E or better during all peak hours. The weekday AM peak hour signal timing was optimized.

With some signal timing optimization, the northbound queue during the AM Peak Hour, is predicted to drop to 340.4 m, which is 38.7 m longer than under existing conditions, but 18.6 m shorter than under 2019 background conditions.

Development traffic is only expected to contribute 3% of Total traffic volumes in the northbound queue. Therefore, background traffic growth is the main contributor to the lengthening of these queues.

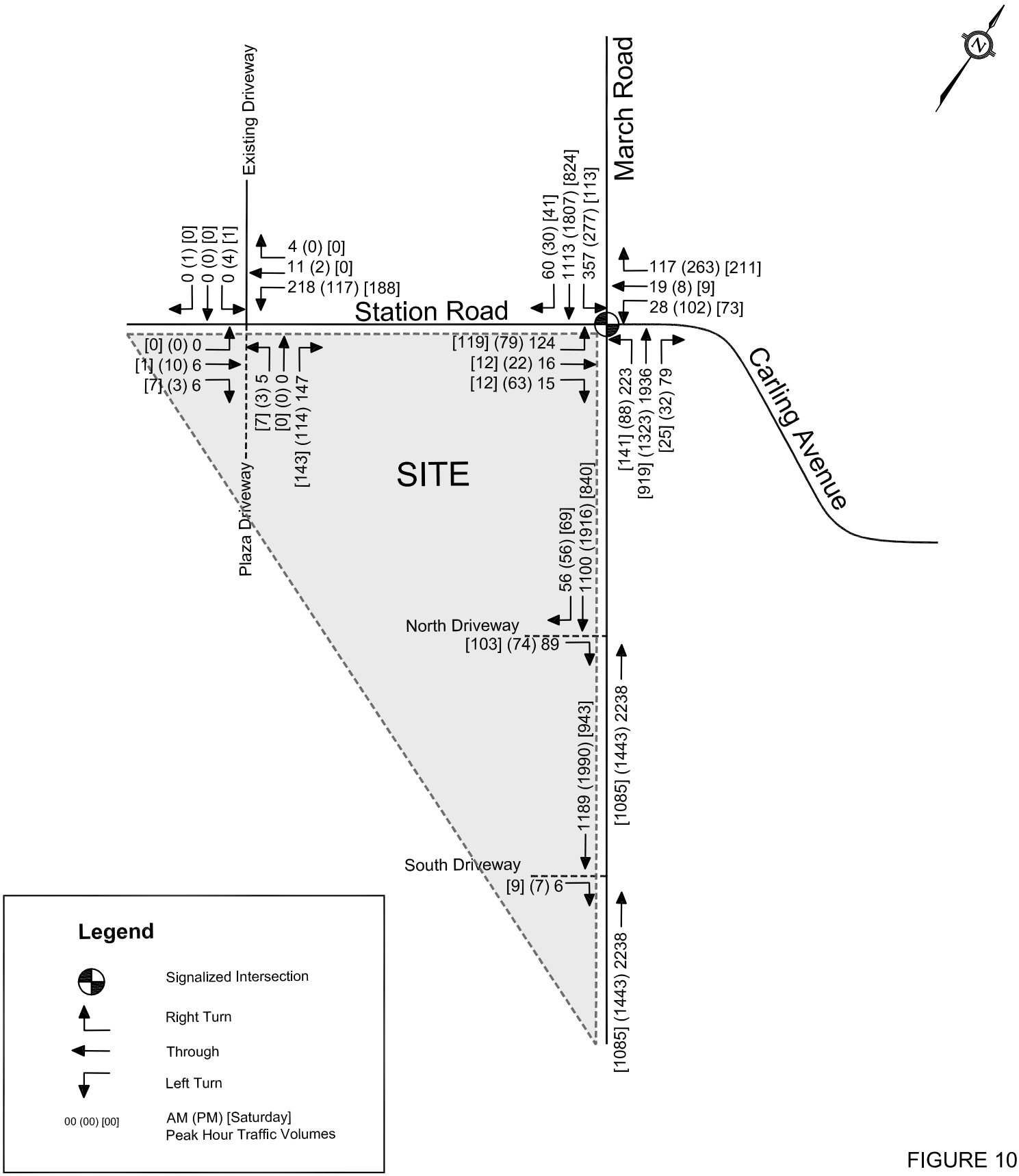


FIGURE 10
TOTAL TRAFFIC VOLUMES

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**Table 11: Total Traffic Unsignalized Intersection Operations**

| Intersection & Movement | | Weekday AM Peak Hour | | Weekday PM Peak Hour | | Saturday Midday Peak Hour | |
|---|---|---|---|---|---|---|---|
| | | LOS | 95th | LOS | 95th | LOS | 95th |
| **Station Road at Driveway** | | | | | | | |
| Westbound | Left-through-right | A | 7.0 | A | 3.0 | A | 5.3 |
| Northbound | Left-through-right | A | 5.1 | A | 3.3 | A | 4.9 |
| Southbound | Left-through-right | A | 0.0 | A | 0.4 | A | 0.2 |
| **March Road at North Driveway** | | | | | | | |
| Eastbound | Right turn | A | 3.1 | A | 4.6 | A | 3.2 |
| **March Road at South Driveway** | | | | | | | |
| Eastbound | Right turn | A | 0.2 | A | 0.4 | A | 0.3 |

*Notes: LOS – level of service, 95th – 95th Percentile Queue, only critical movements are shown.

Under 2019 total conditions all movements at unsignalized site driveways will operate with level of service A or better.

# 6.0 On-Site Design and Operations

A review was conducted of the site plan to assess the proposed configuration of driveways and parking lot layout from an operations perspective. The site plan appears to be well designed to accommodate vehicle, pedestrian, and cyclist movements throughout the site. Also reviewed were drive-through operations, parking requirements, truck access and transportation demand management measures.

## 6.1 Drive-Through Operations

We have reviewed the City of Ottawa Zoning By-law No. 2008-250 Part 4 – Parking, Queuing and Loading Provisions. The queuing requirements for each use are summarized below in **Table 12**.

**Table 12: Drive-Through Facility Minimum Number of Queuing Spaces**

| By-law Land Use | Site Land Use | Required Spaces | | Provided Spaces | |
|---|---|---|---|---|---|
| | | Leading to | Leaving | Leading to | Leaving |
| Car Wash (conveyor or automatic type) | Car Wash | 10 before/in each wash bay | 1 after each wash bay (if a through bay) | 10 | 3 |
| Restaurant (with order board) | Tim Horton's | 7 before/at order board | and a minimum total of 11 | 18 | 10 |
| | A&W | | | 7 | 5 |

*Note: According to the Zoning By-law, each queuing space must be 3 metres wide and at least 5.7 metres long.

The spaces provided for queuing for the car wash and restaurants either meet or exceed the By-law's requirements.

## 6.2 Proposed Driveways

The driveway locations and type were developed in consultation with City staff and comply with the Private Approach By-law 2003-447, with the exception of the throat width of the right-in / right-out only driveway on March Road. The By-law requires a maximum width of 9.0 m at the property line. The proposed throat width is approximately 12 m. A variance may be required.

## 6.3 Parking Supply Requirements

The City of Ottawa's Zoning By-law 2008-250 was reviewed for vehicle and bicycle parking requirements. Bicycle parking must be provided at a rate of 1 space per 250 $m^2$. Therefore, a minimum of 5 spaces is required. The By-Law's vehicle parking requirements are summarized in **Table 13**.

**Table 13: Zoning By-law 2008-250 Vehicle Parking Requirements**

| Land Use | By-law Term | By-law Parking Rates | Floor Area ($m^2$) | Spaces Required |
|---|---|---|---|---|
| Tim Horton's Restaurant | Restaurant – Fast Food | 10 spaces / 100 $m^2$ | 250 | 25 |
| | Drive-Thru Credit | -20% | n/a | -5 |
| A&W Restaurant | Restaurant – Fast Food | 10 spaces / 100 $m^2$ | 223 | 23 |
| | Drive-Thru Credit | -20% | n/a | -4 |
| Convenience Mart | Convenience Store | 3.4 spaces / 100 $m^2$ | 281 | 10 |
| Gas Station with Drive-Thru Car Wash | Gas Bar and Car Wash | None required | n/a | 0 |
| Office | Office | 2.4 spaces / 100 $m^2$ | 372 | 9 |
| | | **Totals** | 1,126 $m^2$ | 58 |
| | | | **Proposed Supply** | 90 |
| | | | **Difference** | +32 |

Based on the Zoning By-law, there will be a surplus of 32 parking spaces.

## 6.4 Truck Access Analysis

A swept path analysis, using a WB-20 truck design vehicle, was conducted for trucks accessing the proposed gas station for the purposes of refuelling the underground tanks. It is anticipated that the truck will access the site via the northerly driveway on March Road, and exit via the southerly driveway on March Road. The swept path analysis is shown in **Figure 11**.

## 6.5 Traffic Demand Management Plan

### 6.5.1 Pedestrian Access

Pedestrian access in the form of paved walkways, marked pedestrian crossings, and wheelchair / stroller accessible ramps will be provided internally to facilitate the flow of pedestrians throughout the site. Sidewalks are currently provided on the March Road frontage. Internal pedestrian walkways will connect seamlessly with the sidewalk on March Road to facilitate pedestrian movement to and from the surrounding neighbourhoods.

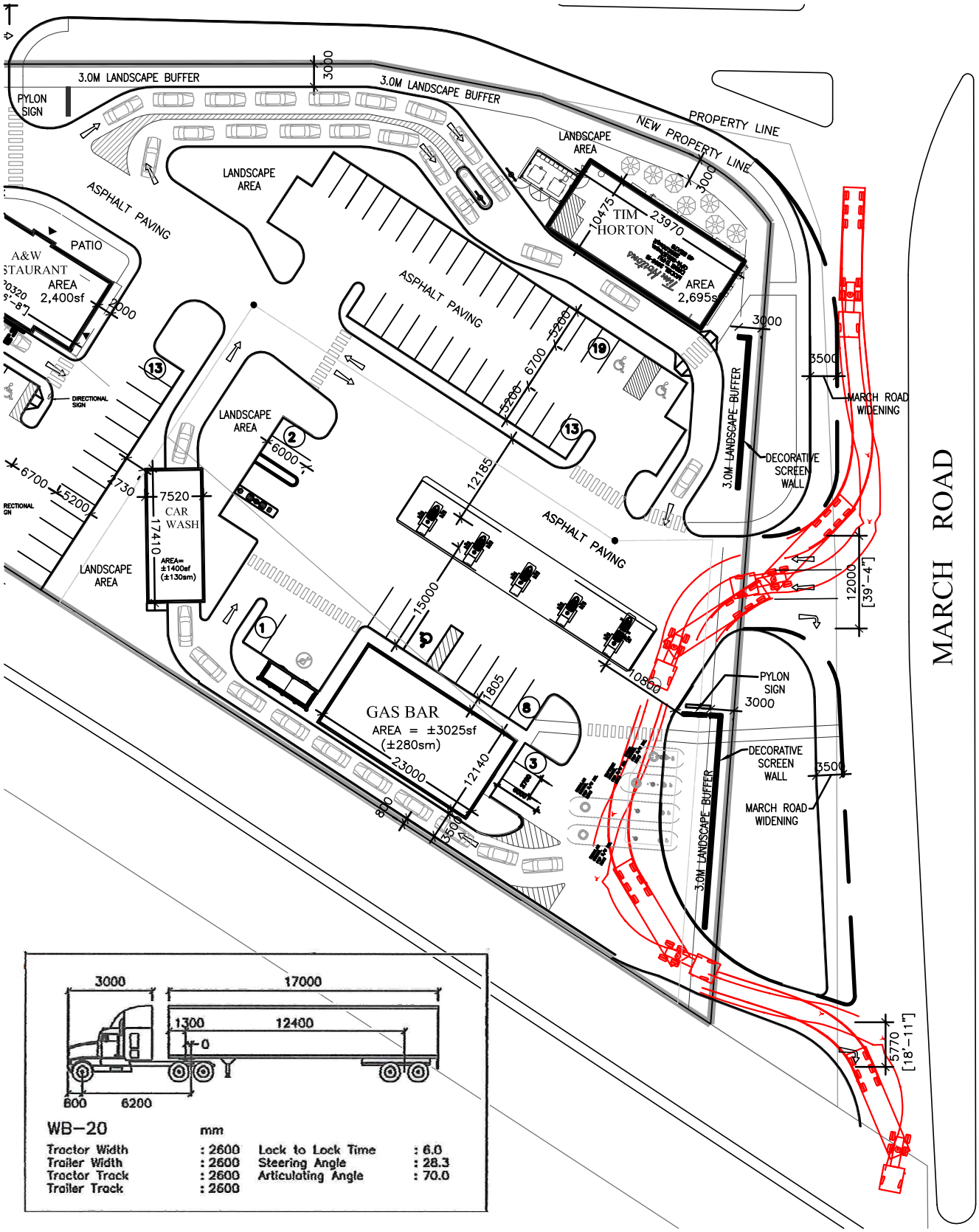


FIGURE 11
SWEPT PATH ANALYSIS

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### 6.5.2 Access to Local Transit

As discussed in Section 2.3, transit is available along March Road, which has sidewalks to which internal pedestrian access will be connected. In addition, a Bus Rapid Transit route is planned along March Road, between Highway 417 and Maxwell Bridge Road.

### 6.5.3 Bicycle Accommodation

Areas designated for short-term bicycle parking will be clearly marked and located close to each building entrance. Bicycle parking will be protected from the elements by use of an overhead canopy, well lit and easily accessible. Access will be provided via the site's driveways and internal pedestrian pathways to the existing bicycle lanes on March Road.

### 6.5.4 Implementation

We recommend concentrating on encouraging alternative modes of travel such as bicycling and walking, by providing good internal and external connectivity for these modes, and accommodation for bicycle parking.

# 7.0 Off-Site Design and Operations

## 7.1 System Operations and Safety

A high level review of traffic operations and safety was undertaken, in relation to the proposed plaza and its integration with the existing road network. Vehicle-pedestrian and vehicle-cycle conflicts, weaving, merging and diverging, corner clearances, sight-distances, and access conflicts have been reviewed.

### 7.1.1 Vehicle-Pedestrian & Vehicle-Cyclist Conflicts

Existing peak hour pedestrian and cyclist volumes at the intersection of March Road and Carling Avenue / Station Road are summarized in **Table 14**.

**Table 14: Pedestrian & Cyclist Peak Hour Volumes - March Road at Station Road**

| Mode | Weekday AM Peak Hour | Weekday PM Peak Hour | Saturday Midday Peak Hour |
|---|---|---|---|
| Pedestrians | 19 | 21 | 1 |
| Cyclists | 7 | 17 | 0 |

As shown, pedestrians and cyclists are currently using this intersection, and it is operating acceptably with the existing geometry and timing parameters (walk and flashing don't walk times). The development will undoubtedly increase these volumes.

Internal walkways leading to the sidewalks surrounding the property will provide access to the plaza from the surrounding roads to help minimize unexpected conflict points. Stop bars at driveways should be clearly marked.

Cyclist activity is in the area during the week, encouraged by the bicycle lanes provided along March Road. Cyclists operations would be expected to continue. The bicycle lane along March Road would be maintained.

### 7.1.2 Weaving & Merging & Diverging

The potential for weaving exists between the westbound left-turn movement at the intersection of March Road and Carling Avenue / Station Road, and the southbound right-turn movement at the North Driveway on March Road, when these turns are consecutively performed by the same vehicle. This may occur as the westbound left-turning vehicles must quickly merge to the right once they enter southbound traffic flow. Site traffic volumes show only 5, 4, and 5 vehicles performing this manoeuvre during the weekday AM, PM, and Saturday midday peak hours, respectively. These numbers are very low and represent less than 1 vehicle performing this manoeuver every cycle. Due

to the low frequency we do not believe this will be a large concern. In addition, drivers have a choice to avoid this maneuver and continue westbound and access the site via the Station Road driveway.

Potential merging and diverging concerns may occur due to the channelized eastbound right-turn at the intersection of March Road and Carling Avenue / Station Road. This right-turn has a dedicated acceleration lane that currently extends more than half way down the easterly frontage of the site. However, the purpose of this lane appears to be to accommodate southbound buses along March Road while in layby at the 'far-side' bus stop on the southerly leg, rather than to functionally provide an acceleration lane for eastbound to southbound vehicles. The proposed site design will reduce the length of this lane; however, it would still be large enough to hold buses in layby. Because the purpose of the lane is to shelter buses while in layby, this would create no operational concerns since vehicles should still be able to yield and merge with southbound traffic safely.

### 7.1.3 Corner Clearances & Sight Distances

Based on a high-level review of the site plan and proposed driveways, we do not anticipate any concerns.

### 7.1.4 Access Conflicts

We do not anticipate any specific access conflicts.

## 7.2 Non-Auto Modes

It is evident that there is already notable pedestrian and cyclist activity in this area; particularly during weekdays. This is likely a result of the immediate area being largely commercial and employment driven. It is expected that the nearby employment land uses will generate walk-in trips to the plaza. In fact, it is expected that the planned Bus Rapid Transit route along March Road, between Highway 417 and Maxwell Bridge Road, will further encourage walk-in traffic as well as a reduction in vehicle and parking demand.

Bicycle lanes are provided along March Road and sidewalks are provided on both sides of March Road south of Station Road/Carling Avenue and on the east side, north of Station Road/Carling Avenue. We expect these factors to also encourage non-auto modes.

Transit is already provided directly in front of the site. We do not anticipate the site having any detrimental impact on transit operations. As discussed, a transit vehicle can

still be accommodated in layby along the frontage of the site even with the reduced lane length. Transit vehicles will stop directly in front of the site, at a location to which sidewalks will provide access directly into the site.

## 7.3 Community Impacts

The potential for neighbourhood infiltration is low because there are no nearby residential uses and the site is located at the intersection of two arterial roadways. However, infiltration is plausible to and from the west along Station Road. It is possible that employment uses to the north may use Station Road to access the site, rather than use March Road. However, Station Road is not paved west of March Road, and appears to be primarily used for maintenance access to the rail line and a hydro substation to the west. We believe this would discourage any infiltration or cut-through. In addition, existing volumes along Station Road are very low.

## 7.4 March Road Railway Crossing

Since the existing northbound queues at Carling Avenue / Station Road extend south of the railway crossing on March Road, consideration should be given to adding a “Do Not Stop Across Tracks” sign for north bound traffic mounted just south of the tracks.

# 8.0 Conclusions

## 8.1 Intersection Operations

Under existing 2013 traffic conditions, study intersections are operating with excess capacity and will continue to do so under 2019 total traffic conditions with the development in place.

However, northbound queues on March Road during the AM Peak Hour appear to be currently reaching 302 m, which results in the queue extending through and south of the signalized intersection to the commercial plaza on the south side of the tracks. This does not occur during any of the other peak hours. This length of queue has been observed in the field, but the traffic signal to the plaza to the south was also observed “metering” the queue. In other words, the queue appears to not regularly block the southerly traffic signal. Under 2019 conditions this queue is predicted to reach 346 m without the development. With signal timing optimization the queue is predicted to be shortened to 317 m under total conditions.

Based on our analysis, there are no required road improvements other than optimizing the weekday AM peak hour traffic signal cycle at the March Road / Station Road / Carling Avenue intersection, which would be required for 2019 background traffic operations in any case.

## 8.2 Site Plan Review

A truck access analysis, using a WB-20 truck design vehicle, was conducted for trucks accessing the proposed gas station for the purposes of refuelling the underground fuel tanks. The analysis illustrates that the proposed site and access configuration accommodates the WB-20 turning movements through the site. The analysis confirms the necessity of the two driveways on March Road for fuel truck access.

The on-site and off-site operations have been reviewed. It is our opinion that the site is well designed to accommodate and facilitate all modes of travel. The site design will also encourage non-vehicle modes by providing good integration with the external road network. Transit will continue to operate well within the vicinity of the site, with a stop provided along the frontage of the site on March Road. We do not anticipate the site to notably contribute to the potential for weaving, merging, or diverging concerns.

## 8.3 Proposed Driveways

The driveway locations and type were developed in consultation with City staff and comply with the Private Approach By-law 2003-447, with the exception of the throat

width of the right-in / right-out only driveway on March Road. The By-law requires a maximum width of 9.0m at the property line. The proposed throat width is approximately 12m. A variance may be required.

## 8.4 Parking and Drive-Through

The proposed parking supply of 90 spaces for the development will exceed the Zoning By-law's requirements by 32 spaces. The Zoning By-law also requires a minimum of 5 bicycle parking spaces, which will be provided. The spaces provided for queuing for the car wash and restaurants either meet or exceed the By-law's requirements.

## 8.5 Transportation Demand Management

The site is currently well served by transit along its frontage, sidewalks on March Road and a bicycle lane on both sides of March Road. The following transportation demand management plan elements are proposed to be incorporated into the site:

- Internal sidewalk connections to the existing sidewalk network on March Road, which in turn will provide access to the existing transit routes in the neighbourhood.
- Pedestrian access in the form of paved walkways, marked pedestrian crossings, and wheelchair / stroller accessible ramps to be provided internally to facilitate the flow of pedestrians throughout the site.
- Areas designated for short-term bicycle parking will be clearly marked and located close to each building entrance. Bicycle parking will be protected from the elements by use of an overhead canopy, well lit and easily accessible. Access will be provided via the site's driveways and internal pedestrian pathways to the existing bicycle lanes on March Road.

In addition, the planned Bus Rapid Transit route along March Road, between Highway 417 and Maxwell Bridge Road, will further encourage walk-in traffic and a reduction in vehicle and parking demand.

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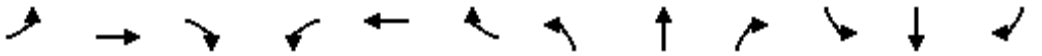
# Appendix A
# Existing Traffic Operations



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 5 | 4 | 4 | 22 | 8 | 167 | 61 | 1886 | 74 | 336 | 1040 | 15 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 6.4 | 6.4 | | 6.4 | 6.4 | 6.6 | 6.5 | 6.5 | 6.6 | 6.5 | 6.5 |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frpb, ped/bikes | | 1.00 | 0.99 | | 1.00 | 0.98 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | 0.97 |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 0.97 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | | 1522 | 919 | | 1378 | 1441 | 1772 | 3579 | 1431 | 3506 | 3444 | 1243 |
| Flt Permitted | | 0.84 | 1.00 | | 0.78 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | | 1315 | 919 | | 1110 | 1441 | 1772 | 3579 | 1431 | 3506 | 3444 | 1243 |
| Peak-hour factor, PHF | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Adj. Flow (vph) | 5 | 4 | 4 | 23 | 8 | 172 | 63 | 1944 | 76 | 346 | 1072 | 15 |
| RTOR Reduction (vph) | 0 | 0 | 4 | 0 | 0 | 158 | 0 | 0 | 29 | 0 | 0 | 5 |
| Lane Group Flow (vph) | 0 | 9 | 0 | 0 | 31 | 14 | 63 | 1944 | 47 | 346 | 1072 | 10 |
| Confl. Peds. (#/hr) | 6 | | 2 | 2 | | 6 | 4 | | 7 | 7 | | 4 |
| Confl. Bikes (#/hr) | | | | | | | | | 6 | | | 1 |
| Heavy Vehicles (%) | 40% | 0% | 75% | 46% | 0% | 11% | 3% | 2% | 11% | 1% | 6% | 27% |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | | 10.9 | 10.9 | | 10.9 | 10.9 | 8.8 | 81.2 | 81.2 | 18.4 | 90.8 | 90.8 |
| Effective Green, g (s) | | 10.9 | 10.9 | | 10.9 | 10.9 | 8.8 | 81.2 | 81.2 | 18.4 | 90.8 | 90.8 |
| Actuated g/C Ratio | | 0.08 | 0.08 | | 0.08 | 0.08 | 0.07 | 0.62 | 0.62 | 0.14 | 0.70 | 0.70 |
| Clearance Time (s) | | 6.4 | 6.4 | | 6.4 | 6.4 | 6.6 | 6.5 | 6.5 | 6.6 | 6.5 | 6.5 |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | 110 | 77 | | 93 | 120 | 119 | 2235 | 893 | 496 | 2405 | 868 |
| v/s Ratio Prot | | | | | | | 0.04 | c0.54 | | c0.10 | 0.31 | |
| v/s Ratio Perm | | 0.01 | 0.00 | | c0.03 | 0.01 | | | 0.03 | | | 0.01 |
| v/c Ratio | | 0.08 | 0.00 | | 0.33 | 0.12 | 0.53 | 0.87 | 0.05 | 0.70 | 0.45 | 0.01 |
| Uniform Delay, d1 | | 54.9 | 54.6 | | 56.1 | 55.1 | 58.6 | 20.1 | 9.5 | 53.1 | 8.6 | 6.0 |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 0.3 | 0.0 | | 2.1 | 0.5 | 4.2 | 5.0 | 0.1 | 4.3 | 0.6 | 0.0 |
| Delay (s) | | 55.3 | 54.6 | | 58.2 | 55.6 | 62.8 | 25.0 | 9.6 | 57.4 | 9.2 | 6.0 |
| Level of Service | | E | D | | E | E | E | C | A | E | A | A |
| Approach Delay (s) | | 55.1 | | | 56.0 | | | 25.6 | | | 20.8 | |
| Approach LOS | | E | | | E | | | C | | | C | |

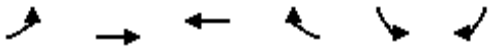
| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 25.5 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.79 | | |
| Actuated Cycle Length (s) | 130.0 | Sum of lost time (s) | 19.5 |
| Intersection Capacity Utilization | 90.5% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 9 | 4 | 31 | 172 | 63 | 1944 | 76 | 346 | 1072 | 15 |
| v/c Ratio | 0.08 | 0.03 | 0.33 | 0.62 | 0.46 | 0.87 | 0.08 | 0.70 | 0.44 | 0.02 |
| Control Delay | 55.6 | 0.2 | 65.5 | 17.9 | 67.6 | 26.3 | 2.3 | 60.8 | 9.7 | 0.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 55.6 | 0.2 | 65.5 | 17.9 | 67.6 | 26.3 | 2.3 | 60.8 | 9.7 | 0.1 |
| Queue Length 50th (m) | 2.2 | 0.0 | 7.7 | 0.0 | 15.7 | 198.8 | 0.0 | 44.0 | 57.9 | 0.0 |
| Queue Length 95th (m) | 7.6 | 0.0 | 17.6 | 21.3 | 29.7 | #301.7 | 5.7 | 57.9 | 87.3 | 0.0 |
| Internal Link Dist (m) | 105.8 | | 201.6 | | | 100.1 | | | 300.6 | |
| Turn Bay Length (m) | | 30.0 | | 50.0 | 100.0 | | 90.0 | 180.0 | | 30.0 |
| Base Capacity (vph) | 278 | 262 | 235 | 441 | 209 | 2235 | 924 | 502 | 2440 | 905 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.03 | 0.02 | 0.13 | 0.39 | 0.30 | 0.87 | 0.08 | 0.69 | 0.44 | 0.02 |

Intersection Summary

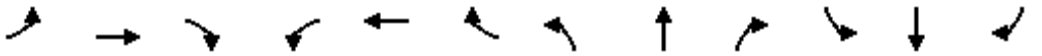
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 0 | 6 | 6 | 2 | 0 | 0 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 |
| Hourly flow rate (vph) | 0 | 10 | 10 | 3 | 0 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | 130 | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 14 | | | | 22 | 12 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 14 | | | | 22 | 12 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 100 | 100 |
| cM capacity (veh/h) | 1618 | | | | 999 | 1074 |

| Direction, Lane # | EB 1 | WB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 10 | 14 | 0 |
| Volume Left | 0 | 0 | 0 |
| Volume Right | 0 | 3 | 0 |
| cSH | 1618 | 1700 | 1700 |
| Volume to Capacity | 0.00 | 0.01 | 0.00 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 |
| Lane LOS | | | A |
| Approach Delay (s) | 0.0 | 0.0 | 0.0 |
| Approach LOS | | | A |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 0.0 | | |
| Intersection Capacity Utilization | 6.7% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |



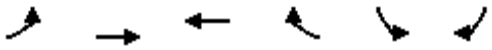
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 7 | 9 | 34 | 92 | 3 | 248 | 4 | 1275 | 30 | 261 | 1689 | 2 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | 6.4 | 6.4 | | 6.4 | 6.4 | 6.6 | 6.5 | 6.5 | 6.6 | 6.5 | 6.5 |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frpb, ped/bikes | | 1.00 | 0.97 | | 1.00 | 0.98 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | 0.96 |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 0.98 | 1.00 | | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | | 1664 | 1592 | | 1597 | 1605 | 1825 | 3544 | 1357 | 3471 | 3614 | 1564 |
| Flt Permitted | | 0.86 | 1.00 | | 0.72 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | | 1470 | 1592 | | 1205 | 1605 | 1825 | 3544 | 1357 | 3471 | 3614 | 1564 |
| Peak-hour factor, PHF | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Adj. Flow (vph) | 8 | 10 | 37 | 101 | 3 | 273 | 4 | 1401 | 33 | 287 | 1856 | 2 |
| RTOR Reduction (vph) | 0 | 0 | 32 | 0 | 0 | 236 | 0 | 0 | 13 | 0 | 0 | 1 |
| Lane Group Flow (vph) | 0 | 18 | 5 | 0 | 104 | 37 | 4 | 1401 | 20 | 287 | 1856 | 1 |
| Confl. Peds. (#/hr) | 1 | | 7 | 7 | | 1 | 5 | | 8 | 8 | | 5 |
| Confl. Bikes (#/hr) | | | 2 | | | 2 | | | 1 | | | 12 |
| Heavy Vehicles (%) | 29% | 0% | 0% | 14% | 0% | 0% | 0% | 3% | 17% | 2% | 1% | 0% |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | | 16.8 | 16.8 | | 16.8 | 16.8 | 1.3 | 77.7 | 77.7 | 16.0 | 92.4 | 92.4 |
| Effective Green, g (s) | | 16.8 | 16.8 | | 16.8 | 16.8 | 1.3 | 77.7 | 77.7 | 16.0 | 92.4 | 92.4 |
| Actuated g/C Ratio | | 0.13 | 0.13 | | 0.13 | 0.13 | 0.01 | 0.60 | 0.60 | 0.12 | 0.71 | 0.71 |
| Clearance Time (s) | | 6.4 | 6.4 | | 6.4 | 6.4 | 6.6 | 6.5 | 6.5 | 6.6 | 6.5 | 6.5 |
| Vehicle Extension (s) | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | 189 | 205 | | 155 | 207 | 18 | 2118 | 811 | 427 | 2568 | 1111 |
| v/s Ratio Prot | | | | | | | 0.00 | 0.40 | | c0.08 | c0.51 | |
| v/s Ratio Perm | | 0.01 | 0.00 | | c0.09 | 0.02 | | | 0.01 | | | 0.00 |
| v/c Ratio | | 0.10 | 0.02 | | 0.67 | 0.18 | 0.22 | 0.66 | 0.02 | 0.67 | 0.72 | 0.00 |
| Uniform Delay, d1 | | 49.9 | 49.4 | | 54.0 | 50.5 | 63.8 | 17.4 | 10.7 | 54.5 | 11.2 | 5.4 |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 0.2 | 0.0 | | 10.9 | 0.4 | 6.2 | 1.6 | 0.1 | 4.1 | 1.8 | 0.0 |
| Delay (s) | | 50.1 | 49.5 | | 64.8 | 50.9 | 70.0 | 19.0 | 10.7 | 58.6 | 13.0 | 5.4 |
| Level of Service | | D | D | | E | D | E | B | B | E | B | A |
| Approach Delay (s) | | 49.7 | | | 54.7 | | | 19.0 | | | 19.1 | |
| Approach LOS | | D | | | D | | | B | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 22.8 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.74 | | |
| Actuated Cycle Length (s) | 130.0 | Sum of lost time (s) | 19.5 |
| Intersection Capacity Utilization | 82.9% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 18 | 37 | 104 | 273 | 4 | 1401 | 33 | 287 | 1856 | 2 |
| v/c Ratio | 0.09 | 0.13 | 0.67 | 0.62 | 0.05 | 0.66 | 0.04 | 0.67 | 0.68 | 0.00 |
| Control Delay | 47.8 | 1.0 | 73.5 | 11.9 | 60.2 | 20.8 | 0.1 | 62.4 | 11.9 | 0.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 47.8 | 1.0 | 73.5 | 11.9 | 60.2 | 20.8 | 0.1 | 62.4 | 11.9 | 0.0 |
| Queue Length 50th (m) | 4.2 | 0.0 | 25.8 | 0.5 | 1.0 | 118.3 | 0.0 | 36.7 | 99.5 | 0.0 |
| Queue Length 95th (m) | 10.9 | 0.0 | 42.4 | 23.7 | 4.8 | 178.8 | 0.0 | 49.8 | 224.1 | 0.0 |
| Internal Link Dist (m) | 105.8 | | 201.6 | | | 100.1 | | | 300.6 | |
| Turn Bay Length (m) | | 30.0 | | 50.0 | 100.0 | | 90.0 | 180.0 | | 30.0 |
| Base Capacity (vph) | 312 | 405 | 255 | 554 | 272 | 2118 | 844 | 521 | 2714 | 1192 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.06 | 0.09 | 0.41 | 0.49 | 0.01 | 0.66 | 0.04 | 0.55 | 0.68 | 0.00 |

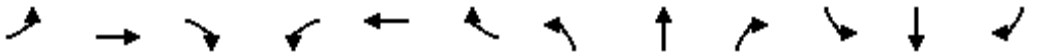
Intersection Summary



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 0 | 10 | 2 | 0 | 4 | 1 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.62 | 0.62 | 0.62 | 0.62 | 0.62 | 0.62 |
| Hourly flow rate (vph) | 0 | 16 | 3 | 0 | 6 | 2 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | 130 | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 3 | | | | 19 | 3 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 3 | | | | 19 | 3 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 99 | 100 |
| cM capacity (veh/h) | 1632 | | | | 1003 | 1086 |

| Direction, Lane # | EB 1 | WB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 16 | 3 | 8 |
| Volume Left | 0 | 0 | 6 |
| Volume Right | 0 | 0 | 2 |
| cSH | 1632 | 1700 | 1019 |
| Volume to Capacity | 0.00 | 0.00 | 0.01 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.2 |
| Control Delay (s) | 0.0 | 0.0 | 8.6 |
| Lane LOS | | | A |
| Approach Delay (s) | 0.0 | 0.0 | 8.6 |
| Approach LOS | | | A |

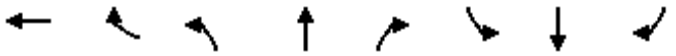
| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | | 2.5 | |
| Intersection Capacity Utilization | | 13.3% | ICU Level of Service A |
| Analysis Period (min) | | 15 | |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 64 | 1 | 199 | 1 | 923 | 24 | 106 | 763 | 1 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | | | | | 6.4 | 6.4 | 6.6 | 6.5 | 6.5 | 6.6 | 6.5 | 6.5 |
| Lane Util. Factor | | | | | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frpb, ped/bikes | | | | | 1.00 | 1.00 | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.98 |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | | | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | | | | | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | | 1778 | 1633 | 1825 | 3579 | 1488 | 3541 | 3614 | 1599 |
| Flt Permitted | | | | | 0.73 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | | 1361 | 1633 | 1825 | 3579 | 1488 | 3541 | 3614 | 1599 |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Adj. Flow (vph) | 0 | 0 | 0 | 68 | 1 | 212 | 1 | 982 | 26 | 113 | 812 | 1 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 187 | 0 | 0 | 11 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 69 | 25 | 1 | 982 | 15 | 113 | 812 | 1 |
| Confl. Peds. (#/hr) | | | | | | | | | 1 | 1 | | |
| Confl. Bikes (#/hr) | | | | | | | | | 6 | | | 1 |
| Heavy Vehicles (%) | 0% | 0% | 0% | 3% | 0% | 0% | 0% | 2% | 8% | 0% | 1% | 0% |
| Turn Type | Perm | | Perm | Perm | NA | Perm | Prot | NA | Perm | Prot | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | | | 2 | | | 6 |
| Actuated Green, G (s) | | | | | 11.3 | 11.3 | 1.2 | 55.8 | 55.8 | 8.4 | 63.0 | 63.0 |
| Effective Green, g (s) | | | | | 11.3 | 11.3 | 1.2 | 55.8 | 55.8 | 8.4 | 63.0 | 63.0 |
| Actuated g/C Ratio | | | | | 0.12 | 0.12 | 0.01 | 0.59 | 0.59 | 0.09 | 0.66 | 0.66 |
| Clearance Time (s) | | | | | 6.4 | 6.4 | 6.6 | 6.5 | 6.5 | 6.6 | 6.5 | 6.5 |
| Vehicle Extension (s) | | | | | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | | 161 | 194 | 23 | 2102 | 874 | 313 | 2396 | 1060 |
| v/s Ratio Prot | | | | | | | 0.00 | c0.27 | | c0.03 | c0.22 | |
| v/s Ratio Perm | | | | | c0.05 | 0.02 | | | 0.01 | | | 0.00 |
| v/c Ratio | | | | | 0.43 | 0.13 | 0.04 | 0.47 | 0.02 | 0.36 | 0.34 | 0.00 |
| Uniform Delay, d1 | | | | | 38.9 | 37.5 | 46.3 | 11.1 | 8.2 | 40.8 | 7.0 | 5.4 |
| Progression Factor | | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | | 1.8 | 0.3 | 0.8 | 0.7 | 0.0 | 0.7 | 0.4 | 0.0 |
| Delay (s) | | | | | 40.7 | 37.8 | 47.1 | 11.9 | 8.2 | 41.5 | 7.3 | 5.4 |
| Level of Service | | | | | D | D | D | B | A | D | A | A |
| Approach Delay (s) | | 0.0 | | | 38.5 | | | 11.8 | | | 11.5 | |
| Approach LOS | | A | | | D | | | B | | | B | |

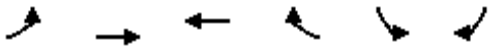
| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 15.1 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.46 | | |
| Actuated Cycle Length (s) | 95.0 | Sum of lost time (s) | 19.5 |
| Intersection Capacity Utilization | 53.4% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group



| Lane Group | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 69 | 212 | 1 | 982 | 26 | 113 | 812 | 1 |
| v/c Ratio | 0.43 | 0.56 | 0.01 | 0.47 | 0.03 | 0.36 | 0.31 | 0.00 |
| Control Delay | 46.9 | 11.5 | 42.0 | 12.5 | 0.0 | 43.6 | 6.1 | 0.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.9 | 11.5 | 42.0 | 12.5 | 0.0 | 43.6 | 6.1 | 0.0 |
| Queue Length 50th (m) | 12.1 | 0.0 | 0.2 | 48.0 | 0.0 | 10.2 | 19.7 | 0.0 |
| Queue Length 95th (m) | 24.2 | 18.7 | 1.8 | 74.4 | 0.0 | 17.9 | 51.4 | 0.0 |
| Internal Link Dist (m) | 201.6 | | | 100.1 | | | 300.6 | |
| Turn Bay Length (m) | | 50.0 | 100.0 | | 90.0 | 180.0 | | 30.0 |
| Base Capacity (vph) | 395 | 624 | 219 | 2103 | 920 | 424 | 2598 | 1182 |
| 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 | 0.17 | 0.34 | 0.00 | 0.47 | 0.03 | 0.27 | 0.31 | 0.00 |

Intersection Summary



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 0 | 1 | 0 | 0 | 1 | 0 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.50 | 0.50 | 0.50 | 0.50 | 0.58 | 0.50 |
| Hourly flow rate (vph) | 0 | 2 | 0 | 0 | 2 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | 130 | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 0 | | | | 2 | 0 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 0 | | | | 2 | 0 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 100 | 100 |
| cM capacity (veh/h) | 1636 | | | | 1026 | 1091 |

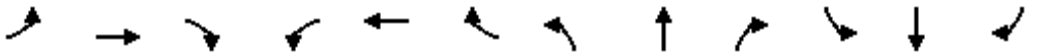
| Direction, Lane # | EB 1 | WB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 2 | 0 | 2 |
| Volume Left | 0 | 0 | 2 |
| Volume Right | 0 | 0 | 0 |
| cSH | 1636 | 1700 | 1026 |
| Volume to Capacity | 0.00 | 0.00 | 0.00 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 |
| Control Delay (s) | 0.0 | 0.0 | 8.5 |
| Lane LOS | | | A |
| Approach Delay (s) | 0.0 | 0.0 | 8.5 |
| Approach LOS | | | A |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 3.9 | | |
| Intersection Capacity Utilization | 13.3% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

# Appendix B
# Background Traffic Operations



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 5 | 4 | 4 | 23 | 8 | 177 | 61 | 2021 | 79 | 357 | 1109 | 15 |
| Ideal Flow (vphpl) | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 |
| Total Lost time (s) | | 6.4 | 4.0 | | 6.4 | 4.0 | 6.6 | 6.5 | 4.0 | 6.6 | 6.5 | 6.5 |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frpb, ped/bikes | | 1.00 | 0.99 | | 1.00 | 0.99 | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.97 |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 0.97 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | | 1442 | 873 | | 1301 | 1375 | 1679 | 3390 | 1372 | 3321 | 3262 | 1178 |
| Flt Permitted | | 0.81 | 1.00 | | 0.77 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | | 1200 | 873 | | 1046 | 1375 | 1679 | 3390 | 1372 | 3321 | 3262 | 1178 |
| Peak-hour factor, PHF | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Adj. Flow (vph) | 5 | 4 | 4 | 24 | 8 | 182 | 63 | 2084 | 81 | 368 | 1143 | 15 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| Lane Group Flow (vph) | 0 | 9 | 4 | 0 | 32 | 182 | 63 | 2084 | 81 | 368 | 1143 | 11 |
| Confl. Peds. (#/hr) | 6 | | 2 | 2 | | 6 | 4 | | 7 | 7 | | 4 |
| Confl. Bikes (#/hr) | | | | | | | | | 6 | | | 1 |
| Heavy Vehicles (%) | 40% | 0% | 75% | 46% | 0% | 11% | 3% | 2% | 11% | 1% | 6% | 27% |
| Turn Type | Perm | NA | Free | Perm | NA | Free | Prot | NA | Free | Prot | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | Free | 8 | | Free | | | Free | | | 6 |
| Actuated Green, G (s) | | 6.9 | 130.0 | | 6.9 | 130.0 | 9.0 | 82.8 | 130.0 | 20.8 | 94.6 | 94.6 |
| Effective Green, g (s) | | 6.9 | 130.0 | | 6.9 | 130.0 | 9.0 | 82.8 | 130.0 | 20.8 | 94.6 | 94.6 |
| Actuated g/C Ratio | | 0.05 | 1.00 | | 0.05 | 1.00 | 0.07 | 0.64 | 1.00 | 0.16 | 0.73 | 0.73 |
| Clearance Time (s) | | 6.4 | | | 6.4 | | 6.6 | 6.5 | | 6.6 | 6.5 | 6.5 |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | 63 | 873 | | 55 | 1375 | 116 | 2159 | 1372 | 531 | 2373 | 857 |
| v/s Ratio Prot | | | | | | | 0.04 | c0.61 | | c0.11 | 0.35 | |
| v/s Ratio Perm | | 0.01 | 0.00 | | c0.03 | 0.13 | | | 0.06 | | | 0.01 |
| v/c Ratio | | 0.14 | 0.00 | | 0.58 | 0.13 | 0.54 | 0.97 | 0.06 | 0.69 | 0.48 | 0.01 |
| Uniform Delay, d1 | | 58.7 | 0.0 | | 60.1 | 0.0 | 58.5 | 22.2 | 0.0 | 51.6 | 7.4 | 4.9 |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 1.0 | 0.0 | | 14.7 | 0.2 | 5.1 | 12.8 | 0.1 | 3.9 | 0.7 | 0.0 |
| Delay (s) | | 59.8 | 0.0 | | 74.8 | 0.2 | 63.6 | 35.0 | 0.1 | 55.5 | 8.1 | 4.9 |
| Level of Service | | E | A | | E | A | E | D | A | E | A | A |
| Approach Delay (s) | | 41.4 | | | 11.4 | | | 34.5 | | | 19.5 | |
| Approach LOS | | D | | | B | | | C | | | B | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 27.6 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.89 | | |
| Actuated Cycle Length (s) | 130.0 | Sum of lost time (s) | 19.5 |
| Intersection Capacity Utilization | 97.0% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

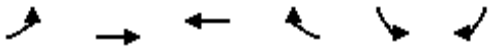
c Critical Lane Group

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 9 | 4 | 32 | 182 | 63 | 2084 | 81 | 368 | 1143 | 15 |
| v/c Ratio | 0.09 | 0.00 | 0.37 | 0.13 | 0.48 | 0.94 | 0.06 | 0.69 | 0.46 | 0.02 |
| Control Delay | 56.1 | 0.0 | 68.0 | 0.2 | 68.5 | 31.6 | 0.1 | 58.6 | 8.9 | 0.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 56.1 | 0.0 | 68.0 | 0.2 | 68.5 | 31.6 | 0.1 | 58.6 | 8.9 | 0.0 |
| Queue Length 50th (m) | 2.2 | 0.0 | 8.0 | 0.0 | 15.7 | ~274.5 | 0.0 | 46.3 | 66.0 | 0.0 |
| Queue Length 95th (m) | 7.7 | 0.0 | 18.3 | 0.0 | 29.7 | #359.0 | 0.0 | 61.1 | 98.2 | 0.0 |
| Internal Link Dist (m) | 105.8 | | 201.6 | | | 100.1 | | | 300.6 | |
| Turn Bay Length (m) | | 30.0 | | 50.0 | 100.0 | | 90.0 | 180.0 | | 30.0 |
| Base Capacity (vph) | 254 | 873 | 221 | 1375 | 198 | 2225 | 1372 | 531 | 2503 | 923 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.04 | 0.00 | 0.14 | 0.13 | 0.32 | 0.94 | 0.06 | 0.69 | 0.46 | 0.02 |

Intersection Summary

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

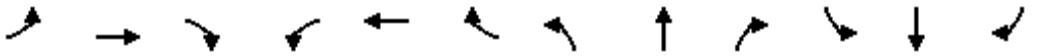
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 0 | 6 | 11 | 4 | 0 | 0 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 |
| Hourly flow rate (vph) | 0 | 10 | 19 | 7 | 0 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | 130 | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 26 | | | | 33 | 22 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 26 | | | | 33 | 22 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 100 | 100 |
| cM capacity (veh/h) | 1601 | | | | 986 | 1060 |

| Direction, Lane # | EB 1 | WB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 10 | 26 | 0 |
| Volume Left | 0 | 0 | 0 |
| Volume Right | 0 | 7 | 0 |
| cSH | 1601 | 1700 | 1700 |
| Volume to Capacity | 0.00 | 0.02 | 0.00 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 |
| Control Delay (s) | 0.0 | 0.0 | 0.0 |
| Lane LOS | | | A |
| Approach Delay (s) | 0.0 | 0.0 | 0.0 |
| Approach LOS | | | A |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | | 0.0 | |
| Intersection Capacity Utilization | | 6.7% | ICU Level of Service A |
| Analysis Period (min) | | 15 | |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 7 | 9 | 34 | 98 | 3 | 263 | 4 | 1362 | 32 | 277 | 1807 | 2 |
| Ideal Flow (vphpl) | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 |
| Total Lost time (s) | | 6.4 | 4.0 | | 6.4 | 4.0 | 6.6 | 6.5 | 4.0 | 6.6 | 6.5 | 6.5 |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frpb, ped/bikes | | 1.00 | 0.99 | | 1.00 | 0.99 | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | 0.96 |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 0.98 | 1.00 | | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | | 1576 | 1525 | | 1513 | 1527 | 1729 | 3357 | 1303 | 3288 | 3424 | 1482 |
| Flt Permitted | | 0.87 | 1.00 | | 0.72 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | | 1396 | 1525 | | 1140 | 1527 | 1729 | 3357 | 1303 | 3288 | 3424 | 1482 |
| Peak-hour factor, PHF | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Adj. Flow (vph) | 8 | 10 | 37 | 108 | 3 | 289 | 4 | 1497 | 35 | 304 | 1986 | 2 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Lane Group Flow (vph) | 0 | 18 | 37 | 0 | 111 | 289 | 4 | 1497 | 35 | 304 | 1986 | 1 |
| Confl. Peds. (#/hr) | 1 | | 7 | 7 | | 1 | 5 | | 8 | 8 | | 5 |
| Confl. Bikes (#/hr) | | | 2 | | | 2 | | | 1 | | | 12 |
| Heavy Vehicles (%) | 29% | 0% | 0% | 14% | 0% | 0% | 0% | 3% | 17% | 2% | 1% | 0% |
| Turn Type | Perm | NA | Free | Perm | NA | Free | Prot | NA | Free | Prot | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | Free | 8 | | Free | | | Free | | | 6 |
| Actuated Green, G (s) | | 17.9 | 130.0 | | 17.9 | 130.0 | 1.3 | 75.5 | 130.0 | 17.1 | 91.3 | 91.3 |
| Effective Green, g (s) | | 17.9 | 130.0 | | 17.9 | 130.0 | 1.3 | 75.5 | 130.0 | 17.1 | 91.3 | 91.3 |
| Actuated g/C Ratio | | 0.14 | 1.00 | | 0.14 | 1.00 | 0.01 | 0.58 | 1.00 | 0.13 | 0.70 | 0.70 |
| Clearance Time (s) | | 6.4 | | | 6.4 | | 6.6 | 6.5 | | 6.6 | 6.5 | 6.5 |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | 192 | 1525 | | 156 | 1527 | 17 | 1949 | 1303 | 432 | 2404 | 1040 |
| v/s Ratio Prot | | | | | | | 0.00 | 0.45 | | c0.09 | c0.58 | |
| v/s Ratio Perm | | 0.01 | 0.02 | | c0.10 | 0.19 | | | 0.03 | | | 0.00 |
| v/c Ratio | | 0.09 | 0.02 | | 0.71 | 0.19 | 0.24 | 0.77 | 0.03 | 0.70 | 0.83 | 0.00 |
| Uniform Delay, d1 | | 49.0 | 0.0 | | 53.6 | 0.0 | 63.9 | 20.6 | 0.0 | 54.0 | 13.7 | 5.8 |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 0.2 | 0.0 | | 14.2 | 0.3 | 7.0 | 3.0 | 0.0 | 5.1 | 3.4 | 0.0 |
| Delay (s) | | 49.2 | 0.0 | | 67.8 | 0.3 | 70.9 | 23.6 | 0.0 | 59.2 | 17.1 | 5.8 |
| Level of Service | | D | A | | E | A | E | C | A | E | B | A |
| Approach Delay (s) | | 16.1 | | | 19.0 | | | 23.2 | | | 22.7 | |
| Approach LOS | | B | | | B | | | C | | | C | |

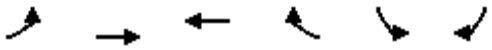
| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 22.4 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.83 | | |
| Actuated Cycle Length (s) | 130.0 | Sum of lost time (s) | 19.5 |
| Intersection Capacity Utilization | 85.2% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 18 | 37 | 111 | 289 | 4 | 1497 | 35 | 304 | 1986 | 2 |
| v/c Ratio | 0.09 | 0.02 | 0.71 | 0.19 | 0.05 | 0.77 | 0.03 | 0.70 | 0.78 | 0.00 |
| Control Delay | 46.7 | 0.0 | 75.8 | 0.3 | 60.5 | 25.8 | 0.0 | 62.8 | 15.3 | 0.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 46.7 | 0.0 | 75.8 | 0.3 | 60.5 | 25.8 | 0.0 | 62.8 | 15.3 | 0.0 |
| Queue Length 50th (m) | 4.1 | 0.0 | 27.6 | 0.0 | 1.0 | 145.9 | 0.0 | 38.9 | 130.5 | 0.0 |
| Queue Length 95th (m) | 10.8 | 0.0 | 44.9 | 0.0 | 4.8 | #220.6 | 0.0 | 52.4 | #310.3 | 0.0 |
| Internal Link Dist (m) | 105.8 | | 201.6 | | | 100.1 | | | 300.6 | |
| Turn Bay Length (m) | | 30.0 | | 50.0 | 100.0 | | 90.0 | 180.0 | | 30.0 |
| Base Capacity (vph) | 296 | 1525 | 242 | 1527 | 258 | 1948 | 1303 | 499 | 2542 | 1119 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.06 | 0.02 | 0.46 | 0.19 | 0.02 | 0.77 | 0.03 | 0.61 | 0.78 | 0.00 |

Intersection Summary

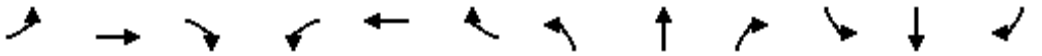
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 0 | 10 | 2 | 0 | 4 | 1 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.62 | 0.62 | 0.62 | 0.62 | 0.62 | 0.62 |
| Hourly flow rate (vph) | 0 | 16 | 3 | 0 | 6 | 2 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | 130 | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 3 | | | | 19 | 3 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 3 | | | | 19 | 3 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 99 | 100 |
| cM capacity (veh/h) | 1632 | | | | 1003 | 1086 |

| Direction, Lane # | EB 1 | WB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 16 | 3 | 8 |
| Volume Left | 0 | 0 | 6 |
| Volume Right | 0 | 0 | 2 |
| cSH | 1632 | 1700 | 1019 |
| Volume to Capacity | 0.00 | 0.00 | 0.01 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.2 |
| Control Delay (s) | 0.0 | 0.0 | 8.6 |
| Lane LOS | | | A |
| Approach Delay (s) | 0.0 | 0.0 | 8.6 |
| Approach LOS | | | A |

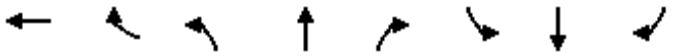
| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 2.5 | | |
| Intersection Capacity Utilization | 13.3% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 0 | 0 | 0 | 68 | 1 | 211 | 1 | 997 | 25 | 113 | 823 | 1 |
| Ideal Flow (vphpl) | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 |
| Total Lost time (s) | | | | | 6.4 | 4.0 | 6.6 | 6.5 | 4.0 | 6.6 | 6.5 | 6.5 |
| Lane Util. Factor | | | | | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frpb, ped/bikes | | | | | 1.00 | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | 0.98 |
| Flpb, ped/bikes | | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | | | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | | | | | 0.95 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | | | | | 1685 | 1547 | 1729 | 3390 | 1413 | 3354 | 3424 | 1515 |
| Flt Permitted | | | | | 0.73 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | | | | | 1289 | 1547 | 1729 | 3390 | 1413 | 3354 | 3424 | 1515 |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Adj. Flow (vph) | 0 | 0 | 0 | 72 | 1 | 224 | 1 | 1061 | 27 | 120 | 876 | 1 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lane Group Flow (vph) | 0 | 0 | 0 | 0 | 73 | 224 | 1 | 1061 | 27 | 120 | 876 | 1 |
| Confl. Peds. (#/hr) | | | | | | | | | 1 | 1 | | |
| Confl. Bikes (#/hr) | | | | | | | | | 6 | | | 1 |
| Heavy Vehicles (%) | 0% | 0% | 0% | 3% | 0% | 0% | 0% | 2% | 8% | 0% | 1% | 0% |
| Turn Type | Perm | | Free | Perm | NA | Free | Prot | NA | Free | Prot | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | Free | 8 | | Free | | | Free | | | 6 |
| Actuated Green, G (s) | | | | | 9.8 | 95.0 | 1.2 | 57.0 | 95.0 | 8.7 | 64.5 | 64.5 |
| Effective Green, g (s) | | | | | 9.8 | 95.0 | 1.2 | 57.0 | 95.0 | 8.7 | 64.5 | 64.5 |
| Actuated g/C Ratio | | | | | 0.10 | 1.00 | 0.01 | 0.60 | 1.00 | 0.09 | 0.68 | 0.68 |
| Clearance Time (s) | | | | | 6.4 | | 6.6 | 6.5 | | 6.6 | 6.5 | 6.5 |
| Vehicle Extension (s) | | | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | | | | 132 | 1547 | 21 | 2034 | 1413 | 307 | 2324 | 1028 |
| v/s Ratio Prot | | | | | | | 0.00 | c0.31 | | c0.04 | c0.26 | |
| v/s Ratio Perm | | | | | c0.06 | 0.14 | | | 0.02 | | | 0.00 |
| v/c Ratio | | | | | 0.55 | 0.14 | 0.05 | 0.52 | 0.02 | 0.39 | 0.38 | 0.00 |
| Uniform Delay, d1 | | | | | 40.5 | 0.0 | 46.3 | 11.1 | 0.0 | 40.7 | 6.6 | 4.9 |
| Progression Factor | | | | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | | | | 4.9 | 0.2 | 0.9 | 1.0 | 0.0 | 0.8 | 0.5 | 0.0 |
| Delay (s) | | | | | 45.5 | 0.2 | 47.3 | 12.0 | 0.0 | 41.5 | 7.0 | 4.9 |
| Level of Service | | | | | D | A | D | B | A | D | A | A |
| Approach Delay (s) | | 0.0 | | | 11.3 | | | 11.8 | | | 11.2 | |
| Approach LOS | | A | | | B | | | B | | | B | |

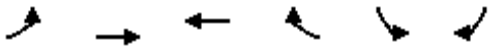
| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 11.5 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.52 | | |
| Actuated Cycle Length (s) | 95.0 | Sum of lost time (s) | 19.5 |
| Intersection Capacity Utilization | 57.1% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group



| Lane Group | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 73 | 224 | 1 | 1061 | 27 | 120 | 876 | 1 |
| v/c Ratio | 0.46 | 0.14 | 0.01 | 0.51 | 0.02 | 0.39 | 0.34 | 0.00 |
| Control Delay | 47.7 | 0.2 | 42.0 | 13.1 | 0.0 | 43.9 | 6.1 | 0.0 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 47.7 | 0.2 | 42.0 | 13.1 | 0.0 | 43.9 | 6.1 | 0.0 |
| Queue Length 50th (m) | 12.8 | 0.0 | 0.2 | 56.3 | 0.0 | 10.8 | 22.9 | 0.0 |
| Queue Length 95th (m) | 25.2 | 0.0 | 1.8 | 88.4 | 0.0 | 18.8 | 59.4 | 0.0 |
| Internal Link Dist (m) | 201.6 | | | 100.1 | | | 300.6 | |
| Turn Bay Length (m) | | 50.0 | 100.0 | | 90.0 | 180.0 | | 30.0 |
| Base Capacity (vph) | 374 | 1547 | 207 | 2079 | 1413 | 402 | 2610 | 1182 |
| 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 | 0.20 | 0.14 | 0.00 | 0.51 | 0.02 | 0.30 | 0.34 | 0.00 |

Intersection Summary



| Movement | EBL | EBT | WBT | WBR | SBL | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 0 | 1 | 0 | 0 | 1 | 0 |
| Sign Control | | Free | Free | | Stop | |
| Grade | | 0% | 0% | | 0% | |
| Peak Hour Factor | 0.50 | 0.50 | 0.50 | 0.50 | 0.58 | 0.50 |
| Hourly flow rate (vph) | 0 | 2 | 0 | 0 | 2 | 0 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | None | None | | | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | 130 | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 0 | | | | 2 | 0 |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 0 | | | | 2 | 0 |
| tC, single (s) | 4.1 | | | | 6.4 | 6.2 |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 2.2 | | | | 3.5 | 3.3 |
| p0 queue free % | 100 | | | | 100 | 100 |
| cM capacity (veh/h) | 1636 | | | | 1026 | 1091 |

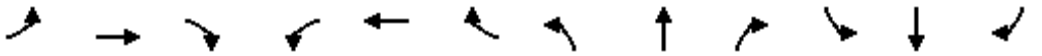
| Direction, Lane # | EB 1 | WB 1 | SB 1 |
|---|---|---|---|
| Volume Total | 2 | 0 | 2 |
| Volume Left | 0 | 0 | 2 |
| Volume Right | 0 | 0 | 0 |
| cSH | 1636 | 1700 | 1026 |
| Volume to Capacity | 0.00 | 0.00 | 0.00 |
| Queue Length 95th (m) | 0.0 | 0.0 | 0.0 |
| Control Delay (s) | 0.0 | 0.0 | 8.5 |
| Lane LOS | | | A |
| Approach Delay (s) | 0.0 | 0.0 | 8.5 |
| Approach LOS | | | A |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 3.9 | | |
| Intersection Capacity Utilization | 13.3% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

# Appendix C
# Total Traffic Operations



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 129 | 16 | 15 | 28 | 19 | 177 | 223 | 1936 | 79 | 357 | 1113 | 60 |
| Ideal Flow (vphpl) | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 |
| Total Lost time (s) | | 6.4 | 4.0 | | 6.4 | 4.0 | 6.6 | 6.5 | 4.0 | 6.6 | 6.5 | 6.5 |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frpb, ped/bikes | | 1.00 | 0.99 | | 1.00 | 0.99 | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.97 |
| Flpb, ped/bikes | | 0.99 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 0.96 | 1.00 | | 0.97 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | | 1669 | 1483 | | 1388 | 1375 | 1695 | 3390 | 1372 | 3321 | 3262 | 1334 |
| Flt Permitted | | 0.71 | 1.00 | | 0.68 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | | 1245 | 1483 | | 969 | 1375 | 1695 | 3390 | 1372 | 3321 | 3262 | 1334 |
| Peak-hour factor, PHF | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 | 0.97 |
| Adj. Flow (vph) | 133 | 16 | 15 | 29 | 20 | 182 | 230 | 1996 | 81 | 368 | 1147 | 62 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29 |
| Lane Group Flow (vph) | 0 | 149 | 15 | 0 | 49 | 182 | 230 | 1996 | 81 | 368 | 1147 | 33 |
| Confl. Peds. (#/hr) | 6 | | 2 | 2 | | 6 | 4 | | 7 | 7 | | 4 |
| Confl. Bikes (#/hr) | | | | | | | | | 6 | | | 1 |
| Heavy Vehicles (%) | 4% | 0% | 3% | 46% | 0% | 11% | 2% | 2% | 11% | 1% | 6% | 12% |
| Turn Type | Perm | NA | Free | Perm | NA | Free | Prot | NA | Free | Prot | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | Free | 8 | | Free | | | Free | | | 6 |
| Actuated Green, G (s) | | 21.2 | 140.0 | | 21.2 | 140.0 | 23.8 | 83.1 | 140.0 | 16.2 | 75.5 | 75.5 |
| Effective Green, g (s) | | 21.2 | 140.0 | | 21.2 | 140.0 | 23.8 | 83.1 | 140.0 | 16.2 | 75.5 | 75.5 |
| Actuated g/C Ratio | | 0.15 | 1.00 | | 0.15 | 1.00 | 0.17 | 0.59 | 1.00 | 0.12 | 0.54 | 0.54 |
| Clearance Time (s) | | 6.4 | | | 6.4 | | 6.6 | 6.5 | | 6.6 | 6.5 | 6.5 |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | 188 | 1483 | | 146 | 1375 | 288 | 2012 | 1372 | 384 | 1759 | 719 |
| v/s Ratio Prot | | | | | | | c0.14 | c0.59 | | 0.11 | 0.35 | |
| v/s Ratio Perm | | c0.12 | 0.01 | | 0.05 | 0.13 | | | 0.06 | | | 0.03 |
| v/c Ratio | | 0.79 | 0.01 | | 0.34 | 0.13 | 0.80 | 0.99 | 0.06 | 0.96 | 0.65 | 0.05 |
| Uniform Delay, d1 | | 57.3 | 0.0 | | 53.1 | 0.0 | 55.8 | 28.1 | 0.0 | 61.6 | 22.9 | 15.2 |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 20.1 | 0.0 | | 1.4 | 0.2 | 14.3 | 18.3 | 0.1 | 34.8 | 1.9 | 0.1 |
| Delay (s) | | 77.3 | 0.0 | | 54.5 | 0.2 | 70.1 | 46.4 | 0.1 | 96.3 | 24.8 | 15.4 |
| Level of Service | | E | A | | D | A | E | D | A | F | C | B |
| Approach Delay (s) | | 70.3 | | | 11.7 | | | 47.1 | | | 41.1 | |
| Approach LOS | | E | | | B | | | D | | | D | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 43.9 | HCM 2000 Level of Service | D |
| HCM 2000 Volume to Capacity ratio | 0.96 | | |
| Actuated Cycle Length (s) | 140.0 | Sum of lost time (s) | 19.5 |
| Intersection Capacity Utilization | 99.1% | ICU Level of Service | F |
| Analysis Period (min) | 15 | | |

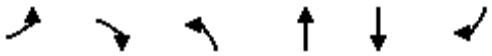
c Critical Lane Group

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 149 | 15 | 49 | 182 | 230 | 1996 | 81 | 368 | 1147 | 62 |
| v/c Ratio | 0.79 | 0.01 | 0.34 | 0.13 | 0.80 | 0.99 | 0.06 | 0.96 | 0.65 | 0.08 |
| Control Delay | 84.8 | 0.0 | 57.6 | 0.2 | 75.7 | 46.5 | 0.1 | 96.6 | 27.0 | 0.2 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 84.8 | 0.0 | 57.6 | 0.2 | 75.7 | 46.5 | 0.1 | 96.6 | 27.0 | 0.2 |
| Queue Length 50th (m) | 40.1 | 0.0 | 12.2 | 0.0 | 61.7 | 274.4 | 0.0 | ~53.4 | 117.2 | 0.0 |
| Queue Length 95th (m) | 62.4 | 0.0 | 24.1 | 0.0 | 86.8 | #340.4 | 0.0 | #104.1 | 166.9 | 0.0 |
| Internal Link Dist (m) | 105.8 | | 201.6 | | | 63.1 | | | 300.6 | |
| Turn Bay Length (m) | | 30.0 | | 50.0 | 100.0 | | 90.0 | 180.0 | | 30.0 |
| Base Capacity (vph) | 240 | 1483 | 186 | 1375 | 365 | 2012 | 1372 | 384 | 1759 | 779 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.62 | 0.01 | 0.26 | 0.13 | 0.63 | 0.99 | 0.06 | 0.96 | 0.65 | 0.08 |

Intersection Summary

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

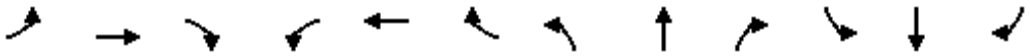
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 0 | 89 | 0 | 2238 | 1100 | 56 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 97 | 0 | 2433 | 1196 | 61 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | | | 87 | |
| pX, platoon unblocked | 0.75 | 0.75 | 0.75 | | | |
| vC, conflicting volume | 2412 | 598 | 1257 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 2219 | 0 | 685 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 88 | 100 | | | |
| cM capacity (veh/h) | 28 | 817 | 681 | | | |

| Direction, Lane # | EB 1 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
|---|---|---|---|---|---|---|
| Volume Total | 97 | 1216 | 1216 | 598 | 598 | 61 |
| Volume Left | 0 | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 97 | 0 | 0 | 0 | 0 | 61 |
| cSH | 817 | 1700 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | 0.12 | 0.72 | 0.72 | 0.35 | 0.35 | 0.04 |
| Queue Length 95th (m) | 3.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Control Delay (s) | 10.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 10.0 | 0.0 | | 0.0 | | |
| Approach LOS | A | | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 0.3 | | |
| Intersection Capacity Utilization | 68.6% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 6 | 6 | 218 | 11 | 4 | 5 | 0 | 147 | 0 | 0 | 0 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.58 | 0.58 | 0.92 | 0.58 | 0.58 | 0.58 | 0.58 | 0.58 | 0.92 | 0.58 | 0.58 | 0.58 |
| Hourly flow rate (vph) | 0 | 10 | 7 | 376 | 19 | 7 | 9 | 0 | 160 | 0 | 0 | 0 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | 130 | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 26 | | | 17 | | | 788 | 791 | 14 | 948 | 791 | 22 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 26 | | | 17 | | | 788 | 791 | 14 | 948 | 791 | 22 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 77 | | | 97 | 100 | 85 | 100 | 100 | 100 |
| cM capacity (veh/h) | 1601 | | | 1600 | | | 253 | 246 | 1066 | 169 | 246 | 1060 |

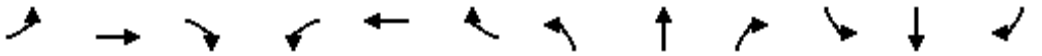
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 |
|---|---|---|---|---|
| Volume Total | 17 | 402 | 168 | 0 |
| Volume Left | 0 | 376 | 9 | 0 |
| Volume Right | 7 | 7 | 160 | 0 |
| cSH | 1601 | 1600 | 916 | 1700 |
| Volume to Capacity | 0.00 | 0.23 | 0.18 | 0.00 |
| Queue Length 95th (m) | 0.0 | 7.0 | 5.1 | 0.0 |
| Control Delay (s) | 0.0 | 7.5 | 9.8 | 0.0 |
| Lane LOS | | A | A | A |
| Approach Delay (s) | 0.0 | 7.5 | 9.8 | 0.0 |
| Approach LOS | | | A | A |

| Intersection Summary | | | | |
|---|---|---|---|---|
| Average Delay | 8.0 | | | |
| Intersection Capacity Utilization | 36.8% | ICU Level of Service | A | |
| Analysis Period (min) | 15 | | | |

| Movement | EBL | EBR | SET | SER | NWL | NWT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 0 | 6 | 1189 | 0 | 0 | 2238 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 7 | 1292 | 0 | 0 | 2433 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | 158 | | | |
| pX, platoon unblocked | 0.76 | 0.76 | | | 0.76 | |
| vC, conflicting volume | 2509 | 646 | | | 1292 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 2349 | 0 | | | 738 | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 100 | 99 | | | 100 | |
| cM capacity (veh/h) | 23 | 819 | | | 652 | |

| Direction, Lane # | EB 1 | SE 1 | SE 2 | NW 1 | NW 2 |
|---|---|---|---|---|---|
| Volume Total | 7 | 646 | 646 | 1216 | 1216 |
| Volume Left | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 7 | 0 | 0 | 0 | 0 |
| cSH | 819 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | 0.01 | 0.38 | 0.38 | 0.72 | 0.72 |
| Queue Length 95th (m) | 0.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| Control Delay (s) | 9.4 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | A | | | | |
| Approach Delay (s) | 9.4 | 0.0 | | 0.0 | |
| Approach LOS | A | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 0.0 | | |
| Intersection Capacity Utilization | 68.6% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 79 | 22 | 63 | 102 | 8 | 263 | 88 | 1323 | 32 | 277 | 1807 | 30 |
| Ideal Flow (vphpl) | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 |
| Total Lost time (s) | | 6.4 | 4.0 | | 6.4 | 4.0 | 6.6 | 6.5 | 4.0 | 6.6 | 6.5 | 6.5 |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frpb, ped/bikes | | 1.00 | 0.99 | | 1.00 | 0.99 | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | 0.96 |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 0.96 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | | 1684 | 1525 | | 1528 | 1527 | 1729 | 3357 | 1303 | 3288 | 3424 | 1480 |
| Flt Permitted | | 0.64 | 1.00 | | 0.64 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | | 1120 | 1525 | | 1016 | 1527 | 1729 | 3357 | 1303 | 3288 | 3424 | 1480 |
| Peak-hour factor, PHF | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 | 0.91 |
| Adj. Flow (vph) | 87 | 24 | 69 | 112 | 9 | 289 | 97 | 1454 | 35 | 304 | 1986 | 33 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13 |
| Lane Group Flow (vph) | 0 | 111 | 69 | 0 | 121 | 289 | 97 | 1454 | 35 | 304 | 1986 | 20 |
| Confl. Peds. (#/hr) | 1 | | 7 | 7 | | 1 | 5 | | 8 | 8 | | 5 |
| Confl. Bikes (#/hr) | | | 2 | | | 2 | | | 1 | | | 12 |
| Heavy Vehicles (%) | 5% | 0% | 0% | 14% | 0% | 0% | 0% | 3% | 17% | 2% | 1% | 0% |
| Turn Type | Perm | NA | Free | Perm | NA | Free | Prot | NA | Free | Prot | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | Free | 8 | | Free | | | Free | | | 6 |
| Actuated Green, G (s) | | 19.9 | 130.0 | | 19.9 | 130.0 | 11.6 | 73.8 | 130.0 | 16.8 | 79.0 | 79.0 |
| Effective Green, g (s) | | 19.9 | 130.0 | | 19.9 | 130.0 | 11.6 | 73.8 | 130.0 | 16.8 | 79.0 | 79.0 |
| Actuated g/C Ratio | | 0.15 | 1.00 | | 0.15 | 1.00 | 0.09 | 0.57 | 1.00 | 0.13 | 0.61 | 0.61 |
| Clearance Time (s) | | 6.4 | | | 6.4 | | 6.6 | 6.5 | | 6.6 | 6.5 | 6.5 |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | 171 | 1525 | | 155 | 1527 | 154 | 1905 | 1303 | 424 | 2080 | 899 |
| v/s Ratio Prot | | | | | | | 0.06 | 0.43 | | c0.09 | c0.58 | |
| v/s Ratio Perm | | 0.10 | 0.05 | | c0.12 | 0.19 | | | 0.03 | | | 0.01 |
| v/c Ratio | | 0.65 | 0.05 | | 0.78 | 0.19 | 0.63 | 0.76 | 0.03 | 0.72 | 0.95 | 0.02 |
| Uniform Delay, d1 | | 51.8 | 0.0 | | 53.0 | 0.0 | 57.1 | 21.4 | 0.0 | 54.3 | 23.8 | 10.1 |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 8.2 | 0.1 | | 22.0 | 0.3 | 7.8 | 3.0 | 0.0 | 5.7 | 11.6 | 0.0 |
| Delay (s) | | 60.0 | 0.1 | | 75.0 | 0.3 | 65.0 | 24.4 | 0.0 | 60.0 | 35.5 | 10.2 |
| Level of Service | | E | A | | E | A | E | C | A | E | D | B |
| Approach Delay (s) | | 37.0 | | | 22.3 | | | 26.3 | | | 38.3 | |
| Approach LOS | | D | | | C | | | C | | | D | |

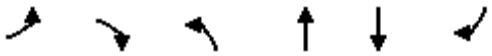
| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 32.6 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.92 | | |
| Actuated Cycle Length (s) | 130.0 | Sum of lost time (s) | 19.5 |
| Intersection Capacity Utilization | 88.7% | ICU Level of Service | E |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 111 | 69 | 121 | 289 | 97 | 1454 | 35 | 304 | 1986 | 33 |
| v/c Ratio | 0.65 | 0.05 | 0.78 | 0.19 | 0.63 | 0.76 | 0.03 | 0.72 | 0.95 | 0.04 |
| Control Delay | 68.0 | 0.1 | 83.3 | 0.3 | 75.4 | 26.4 | 0.0 | 64.1 | 36.8 | 0.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 68.0 | 0.1 | 83.3 | 0.3 | 75.4 | 26.4 | 0.0 | 64.1 | 36.8 | 0.1 |
| Queue Length 50th (m) | 27.0 | 0.0 | 30.1 | 0.0 | 24.1 | 145.1 | 0.0 | 38.9 | 244.6 | 0.0 |
| Queue Length 95th (m) | 44.2 | 0.0 | 48.8 | 0.0 | #46.9 | 207.1 | 0.0 | 53.3 | #334.3 | 0.0 |
| Internal Link Dist (m) | 105.8 | | 201.6 | | | 63.1 | | | 300.6 | |
| Turn Bay Length (m) | | 30.0 | | 50.0 | 100.0 | | 90.0 | 180.0 | | 30.0 |
| Base Capacity (vph) | 237 | 1525 | 215 | 1527 | 164 | 1907 | 1303 | 490 | 2082 | 932 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.47 | 0.05 | 0.56 | 0.19 | 0.59 | 0.76 | 0.03 | 0.62 | 0.95 | 0.04 |

Intersection Summary

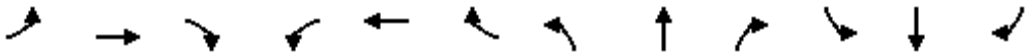
# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 0 | 74 | 0 | 1443 | 1916 | 56 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 80 | 0 | 1568 | 2083 | 61 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | | | 87 | |
| pX, platoon unblocked | 0.43 | 0.43 | 0.43 | | | |
| vC, conflicting volume | 2867 | 1041 | 2143 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 2693 | 0 | 1027 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 83 | 100 | | | |
| cM capacity (veh/h) | 8 | 471 | 292 | | | |

| Direction, Lane # | EB 1 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
|---|---|---|---|---|---|---|
| Volume Total | 80 | 784 | 784 | 1041 | 1041 | 61 |
| Volume Left | 0 | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 80 | 0 | 0 | 0 | 0 | 61 |
| cSH | 471 | 1700 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | 0.17 | 0.46 | 0.46 | 0.61 | 0.61 | 0.04 |
| Queue Length 95th (m) | 4.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Control Delay (s) | 14.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | B | | | | | |
| Approach Delay (s) | 14.2 | 0.0 | | 0.0 | | |
| Approach LOS | B | | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 0.3 | | |
| Intersection Capacity Utilization | 67.4% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 10 | 3 | 117 | 2 | 0 | 3 | 0 | 114 | 4 | 0 | 1 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.62 | 0.62 | 1.00 | 0.62 | 0.62 | 0.62 | 0.62 | 0.62 | 0.92 | 0.62 | 0.62 | 0.62 |
| Hourly flow rate (vph) | 0 | 16 | 3 | 189 | 3 | 0 | 5 | 0 | 124 | 6 | 0 | 2 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | 130 | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 3 | | | 19 | | | 400 | 398 | 18 | 522 | 400 | 3 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 3 | | | 19 | | | 400 | 398 | 18 | 522 | 400 | 3 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 88 | | | 99 | 100 | 88 | 98 | 100 | 100 |
| cM capacity (veh/h) | 1632 | | | 1597 | | | 509 | 476 | 1061 | 376 | 475 | 1086 |

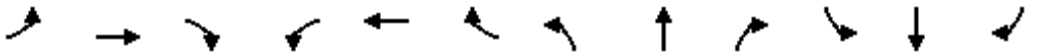
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 |
|---|---|---|---|---|
| Volume Total | 19 | 192 | 129 | 8 |
| Volume Left | 0 | 189 | 5 | 6 |
| Volume Right | 3 | 0 | 124 | 2 |
| cSH | 1632 | 1597 | 1019 | 433 |
| Volume to Capacity | 0.00 | 0.12 | 0.13 | 0.02 |
| Queue Length 95th (m) | 0.0 | 3.0 | 3.3 | 0.4 |
| Control Delay (s) | 0.0 | 7.4 | 9.0 | 13.5 |
| Lane LOS | | A | A | B |
| Approach Delay (s) | 0.0 | 7.4 | 9.0 | 13.5 |
| Approach LOS | | | A | B |

| Intersection Summary | | | | |
|---|---|---|---|---|
| Average Delay | 7.8 | | | |
| Intersection Capacity Utilization | 27.8% | ICU Level of Service | A | |
| Analysis Period (min) | 15 | | | |

| Movement | EBL | EBR | SET | SER | NWL | NWT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 0 | 7 | 1990 | 0 | 0 | 1443 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 8 | 2163 | 0 | 0 | 1568 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | 158 | | | |
| pX, platoon unblocked | 0.42 | 0.42 | | | 0.42 | |
| vC, conflicting volume | 2947 | 1082 | | | 2163 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 2874 | 0 | | | 1004 | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 100 | 98 | | | 100 | |
| cM capacity (veh/h) | 5 | 455 | | | 288 | |

| Direction, Lane # | EB 1 | SE 1 | SE 2 | NW 1 | NW 2 |
|---|---|---|---|---|---|
| Volume Total | 8 | 1082 | 1082 | 784 | 784 |
| Volume Left | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 8 | 0 | 0 | 0 | 0 |
| cSH | 455 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | 0.02 | 0.64 | 0.64 | 0.46 | 0.46 |
| Queue Length 95th (m) | 0.4 | 0.0 | 0.0 | 0.0 | 0.0 |
| Control Delay (s) | 13.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | B | | | | |
| Approach Delay (s) | 13.1 | 0.0 | | 0.0 | |
| Approach LOS | B | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 0.0 | | |
| Intersection Capacity Utilization | 68.1% | ICU Level of Service | C |
| Analysis Period (min) | 15 | | |



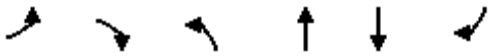
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (vph) | 119 | 12 | 12 | 73 | 9 | 211 | 141 | 919 | 25 | 113 | 824 | 41 |
| Ideal Flow (vphpl) | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 | 1800 |
| Total Lost time (s) | | 6.4 | 4.0 | | 6.4 | 4.0 | 6.6 | 6.5 | 4.0 | 6.6 | 6.5 | 6.5 |
| Lane Util. Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 0.95 | 1.00 | 0.97 | 0.95 | 1.00 |
| Frpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 0.99 | 1.00 | 1.00 | 0.98 |
| Flpb, ped/bikes | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Frt | | 1.00 | 0.85 | | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 |
| Flt Protected | | 0.96 | 1.00 | | 0.96 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (prot) | | 1741 | 1547 | | 1698 | 1547 | 1729 | 3390 | 1413 | 3354 | 3424 | 1515 |
| Flt Permitted | | 0.68 | 1.00 | | 0.64 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 |
| Satd. Flow (perm) | | 1244 | 1547 | | 1143 | 1547 | 1729 | 3390 | 1413 | 3354 | 3424 | 1515 |
| Peak-hour factor, PHF | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 | 0.94 |
| Adj. Flow (vph) | 127 | 13 | 13 | 78 | 10 | 224 | 150 | 978 | 27 | 120 | 877 | 44 |
| RTOR Reduction (vph) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 23 |
| Lane Group Flow (vph) | 0 | 140 | 13 | 0 | 88 | 224 | 150 | 978 | 27 | 120 | 877 | 21 |
| Confl. Peds. (#/hr) | | | | | | | | | 1 | 1 | | |
| Confl. Bikes (#/hr) | | | | | | | | | 6 | | | 1 |
| Heavy Vehicles (%) | 0% | 0% | 0% | 3% | 0% | 0% | 0% | 2% | 8% | 0% | 1% | 0% |
| Turn Type | Perm | NA | Free | Perm | NA | Free | Prot | NA | Free | Prot | NA | Perm |
| Protected Phases | | 4 | | | 8 | | 5 | 2 | | 1 | 6 | |
| Permitted Phases | 4 | | Free | 8 | | Free | | | Free | | | 6 |
| Actuated Green, G (s) | | 16.2 | 95.0 | | 16.2 | 95.0 | 13.3 | 50.6 | 95.0 | 8.7 | 46.0 | 46.0 |
| Effective Green, g (s) | | 16.2 | 95.0 | | 16.2 | 95.0 | 13.3 | 50.6 | 95.0 | 8.7 | 46.0 | 46.0 |
| Actuated g/C Ratio | | 0.17 | 1.00 | | 0.17 | 1.00 | 0.14 | 0.53 | 1.00 | 0.09 | 0.48 | 0.48 |
| Clearance Time (s) | | 6.4 | | | 6.4 | | 6.6 | 6.5 | | 6.6 | 6.5 | 6.5 |
| Vehicle Extension (s) | | 3.0 | | | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | 3.0 |
| Lane Grp Cap (vph) | | 212 | 1547 | | 194 | 1547 | 242 | 1805 | 1413 | 307 | 1657 | 733 |
| v/s Ratio Prot | | | | | | | c0.09 | c0.29 | | 0.04 | 0.26 | |
| v/s Ratio Perm | | c0.11 | 0.01 | | 0.08 | 0.14 | | | 0.02 | | | 0.01 |
| v/c Ratio | | 0.66 | 0.01 | | 0.45 | 0.14 | 0.62 | 0.54 | 0.02 | 0.39 | 0.53 | 0.03 |
| Uniform Delay, d1 | | 36.8 | 0.0 | | 35.4 | 0.0 | 38.5 | 14.6 | 0.0 | 40.7 | 17.0 | 12.8 |
| Progression Factor | | 1.00 | 1.00 | | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| Incremental Delay, d2 | | 7.5 | 0.0 | | 1.7 | 0.2 | 4.7 | 1.2 | 0.0 | 0.8 | 1.2 | 0.1 |
| Delay (s) | | 44.3 | 0.0 | | 37.1 | 0.2 | 43.1 | 15.8 | 0.0 | 41.5 | 18.2 | 12.9 |
| Level of Service | | D | A | | D | A | D | B | A | D | B | B |
| Approach Delay (s) | | 40.6 | | | 10.6 | | | 18.9 | | | 20.7 | |
| Approach LOS | | D | | | B | | | B | | | C | |

| Intersection Summary | | | |
|---|---|---|---|
| HCM 2000 Control Delay | 19.9 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.61 | | |
| Actuated Cycle Length (s) | 95.0 | Sum of lost time (s) | 19.5 |
| Intersection Capacity Utilization | 62.8% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

| Lane Group | EBT | EBR | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|
| Lane Group Flow (vph) | 140 | 13 | 88 | 224 | 150 | 978 | 27 | 120 | 877 | 44 |
| v/c Ratio | 0.66 | 0.01 | 0.45 | 0.14 | 0.62 | 0.54 | 0.02 | 0.39 | 0.53 | 0.06 |
| Control Delay | 51.1 | 0.0 | 41.5 | 0.2 | 49.4 | 17.3 | 0.0 | 43.9 | 20.0 | 0.1 |
| Queue Delay | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total Delay | 51.1 | 0.0 | 41.5 | 0.2 | 49.4 | 17.3 | 0.0 | 43.9 | 20.0 | 0.1 |
| Queue Length 50th (m) | 24.3 | 0.0 | 14.7 | 0.0 | 26.0 | 58.4 | 0.0 | 10.8 | 57.0 | 0.0 |
| Queue Length 95th (m) | 40.2 | 0.0 | 26.9 | 0.0 | 44.4 | 94.1 | 0.0 | 18.8 | 89.3 | 0.0 |
| Internal Link Dist (m) | 105.8 | | 201.6 | | | 63.1 | | | 300.6 | |
| Turn Bay Length (m) | | 30.0 | | 50.0 | 100.0 | | 90.0 | 180.0 | | 30.0 |
| Base Capacity (vph) | 361 | 1547 | 332 | 1547 | 252 | 1804 | 1413 | 402 | 1656 | 792 |
| Starvation Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Reduced v/c Ratio | 0.39 | 0.01 | 0.27 | 0.14 | 0.60 | 0.54 | 0.02 | 0.30 | 0.53 | 0.06 |

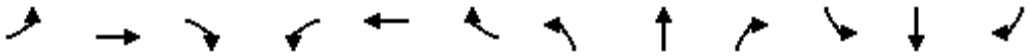
Intersection Summary



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 0 | 103 | 0 | 1085 | 840 | 69 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 112 | 0 | 1179 | 913 | 75 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | | | 87 | |
| pX, platoon unblocked | 0.83 | 0.83 | 0.83 | | | |
| vC, conflicting volume | 1503 | 457 | 988 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1192 | 0 | 571 | | | |
| tC, single (s) | 6.8 | 6.9 | 4.1 | | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | 2.2 | | | |
| p0 queue free % | 100 | 88 | 100 | | | |
| cM capacity (veh/h) | 149 | 898 | 826 | | | |

| Direction, Lane # | EB 1 | NB 1 | NB 2 | SB 1 | SB 2 | SB 3 |
|---|---|---|---|---|---|---|
| Volume Total | 112 | 590 | 590 | 457 | 457 | 75 |
| Volume Left | 0 | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 112 | 0 | 0 | 0 | 0 | 75 |
| cSH | 898 | 1700 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | 0.12 | 0.35 | 0.35 | 0.27 | 0.27 | 0.04 |
| Queue Length 95th (m) | 3.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Control Delay (s) | 9.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | A | | | | | |
| Approach Delay (s) | 9.6 | 0.0 | | 0.0 | | |
| Approach LOS | A | | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 0.5 | | |
| Intersection Capacity Utilization | 37.9% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 0 | 1 | 7 | 188 | 0 | 0 | 7 | 0 | 143 | 1 | 0 | 0 |
| Sign Control | | Free | | | Free | | | Stop | | | Stop | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.50 | 0.50 | 1.00 | 0.62 | 0.50 | 0.50 | 0.62 | 0.62 | 0.92 | 0.58 | 0.62 | 0.50 |
| Hourly flow rate (vph) | 0 | 2 | 7 | 303 | 0 | 0 | 11 | 0 | 155 | 2 | 0 | 0 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | None | | | None | | | | | | | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | 130 | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 0 | | | 9 | | | 612 | 612 | 6 | 767 | 615 | 0 |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 0 | | | 9 | | | 612 | 612 | 6 | 767 | 615 | 0 |
| tC, single (s) | 4.1 | | | 4.1 | | | 7.1 | 6.5 | 6.2 | 7.1 | 6.5 | 6.2 |
| tC, 2 stage (s) | | | | | | | | | | | | |
| tF (s) | 2.2 | | | 2.2 | | | 3.5 | 4.0 | 3.3 | 3.5 | 4.0 | 3.3 |
| p0 queue free % | 100 | | | 81 | | | 97 | 100 | 86 | 99 | 100 | 100 |
| cM capacity (veh/h) | 1636 | | | 1611 | | | 347 | 331 | 1077 | 235 | 330 | 1091 |

| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 |
|---|---|---|---|---|
| Volume Total | 9 | 303 | 167 | 2 |
| Volume Left | 0 | 303 | 11 | 2 |
| Volume Right | 7 | 0 | 155 | 0 |
| cSH | 1636 | 1611 | 943 | 235 |
| Volume to Capacity | 0.00 | 0.19 | 0.18 | 0.01 |
| Queue Length 95th (m) | 0.0 | 5.3 | 4.9 | 0.2 |
| Control Delay (s) | 0.0 | 7.8 | 9.6 | 20.4 |
| Lane LOS | | A | A | C |
| Approach Delay (s) | 0.0 | 7.8 | 9.6 | 20.4 |
| Approach LOS | | | A | C |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 8.3 | | |
| Intersection Capacity Utilization | 33.9% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

| Movement | EBL | EBR | SET | SER | NWL | NWT |
|---|---|---|---|---|---|---|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 0 | 9 | 943 | 0 | 0 | 1085 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 0 | 10 | 1025 | 0 | 0 | 1179 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | 158 | | | |
| pX, platoon unblocked | 0.83 | 0.83 | | | 0.83 | |
| vC, conflicting volume | 1615 | 512 | | | 1025 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 1335 | 10 | | | 626 | |
| tC, single (s) | 6.8 | 6.9 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 100 | 99 | | | 100 | |
| cM capacity (veh/h) | 121 | 889 | | | 792 | |

| Direction, Lane # | EB 1 | SE 1 | SE 2 | NW 1 | NW 2 |
|---|---|---|---|---|---|
| Volume Total | 10 | 512 | 512 | 590 | 590 |
| Volume Left | 0 | 0 | 0 | 0 | 0 |
| Volume Right | 10 | 0 | 0 | 0 | 0 |
| cSH | 889 | 1700 | 1700 | 1700 | 1700 |
| Volume to Capacity | 0.01 | 0.30 | 0.30 | 0.35 | 0.35 |
| Queue Length 95th (m) | 0.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| Control Delay (s) | 9.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| Lane LOS | A | | | | |
| Approach Delay (s) | 9.1 | 0.0 | | 0.0 | |
| Approach LOS | A | | | | |

| Intersection Summary | | | |
|---|---|---|---|
| Average Delay | 0.0 | | |
| Intersection Capacity Utilization | 37.5% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |