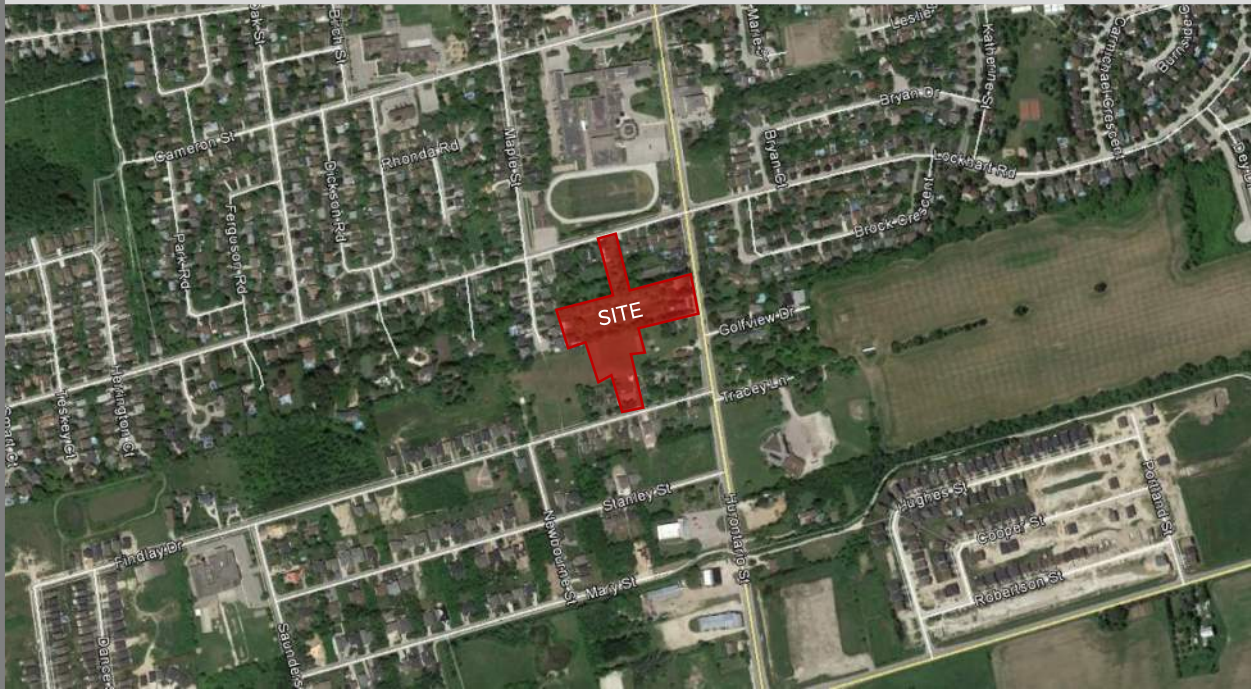


STRAW HAT RESTORATION

# BLACKMOOR GATES

TRAFFIC IMPACT STUDY

17M-01364-00 | May 2018





# BLACKMOOR GATES DEVELOPMENT, COLLINGWOOD TRAFFIC IMPACT STUDY STRAW HAT RESTORATION

PROJECT NO.: OUR REF. NO. 17M-01364-00  
DATE: MAY 10, 2018

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May 10, 2018

John Velick  
Manager, Engineering (Public Works)  
Town of Collingwood  
P.O. Box 157, 97 Hurontario Street  
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Dear Sir:

**Subject: Traffic Impact Study for Blackmoor Gates, Collingwood**

WSP Canada Group Limited (WSP) was retained by Straw Hat Restoration, to prepare a Transportation Impact Study for a proposed residential development with access from Campbell Street near the Hurontario Street & Campbell Street intersection, Collingwood. The report follows the specific directions and scope of work based on the Terms of Reference submitted to the Town on March 22, 2018.

The report focuses on the proposed site access points and analyzes traffic impacts expected at these locations. The report addresses the surrounding road network, transit, active transportation, parking for vehicle and bicycles, as well as loading facilities for the development.

Please do not hesitate to contact us if you have any questions regarding our analysis, conclusions or recommendations. Brett Sears, the project manager for this assignment, can be reached at + 1 905-882-4211 Extension 6573 or [Brett.Sears@wsp.com](mailto:Brett.Sears@wsp.com)

Yours sincerely,

A handwritten signature in blue ink that reads 'Brett Sears'.

**Brett Sears**, MCIP RPP  
Senior Project Manager  
Transportation – Planning & Advisory Services

Encl. TIS Report

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- A- Tis Terms of Reference
- B- Traffic Volume Data
- C- Signal Timing
- D- Level of Service Definitions
- E- Existing Traffic Conditions Analysis
- F- Background Traffic Volumes
- G- Future Background Traffic Conditions Analysis-Synchro Output Sheets
- H- Total Traffic Conditions Analysis Synchro Output Sheets
- I - Background Developments

# EXECUTIVE SUMMARY

WSP Canada Group Limited (WSP) has been retained by Straw Hat Restoration to prepare a Transportation Impact Study (TIS) for the proposed Blackmoor Gates residential development.

A Traffic Impact Study is required by the Town of Collingwood per a Pre-Consultation Meeting held on November 30, 2017 and Letter from Herb Lemon dated November 29, 2017. This report follows the specific direction provided by the Town and the subsequent Terms of Reference submitted on March 22, 2018.

The development is proposed to have 34 detached and semi-detached residential units. Out of the 34 units one detached unit is an already existing residence with access from Hurontario Street. The access to the proposed development is from Campbell Street located on the north of the development. Out of the 34 residential units, two detached residential units shall access from the Findlay Drive located on the south of the proposed site. The development also has an emergency access on to Hurontario Street.

Based on the ITE trip generation calculation method, the development shall generate 9 (inbound), 26 (outbound) vehicular trips during am peak hour and 25(inbound) 14 (outbound) vehicular trips during p.m peakhour. The operational analysis of the intersection within the study area indicates that the intersections operate at acceptable levels of service during the existing and future conditions.

The number of parking spaces required for the development was calculated based on the Towns by-laws. The by-law stipulates 62 parking for the dwelling units and 8 parking spaces for visitors. The proposed development meets this minimum parking requirements.

# 1 INTRODUCTION

WSP Canada Group Limited (WSP) has been retained by Straw Hat Restoration to prepare a Transportation Impact Study (TIS) for the proposed Blackmoor Gates residential development.

The Blackmoor Gates site is bound by Hurontario Street to the east, Campbell Street to the north, Findlay Drive to the south, and Maple Street to the west. **Figure 1.1** illustrates the site location and context.

The analysis in this report is based on the site plan provided to WSP by Straw Hat Restoration and the terms of reference submitted to the Town of Collingwood. The terms of reference for this study are provided in **Appendix A**.

The analysis assesses the transportation impacts associated with the proposed development with consideration to anticipated background developments. The evaluation of the existing multimodal transportation performance (transit, pedestrian, and cycling) is included. A review of the Town's Zoning By-law standards regarding parking and loading supply and potential Transportation Demand Management (TDM) measures will be examined. Improvements to the existing road network, if any, to accommodate the development-related trips will be determined as part of the recommendation.



**Legend**  
Site

- 1 Campbell Street at Hurontario Street (Signalized)
- 2 Campbell Street at Maple Street (Unsignalized)

**FIGURE 1.1**  
Site Location and Context

---

## 1.1 DEVELOPMENT PROPOSAL

The subject site is located on south side of Campbell Street and the west side of Hurontario Street. We understand that the proposed development will consist 34 residential units, including 2 semi-detached units off Findlay Drive and 1 existing single-detached house on Hurontario Street. The development is proposed on 1.70 hectares of land.

---

### 1.1.1 LAND USE

**Table 1.1** summarizes the development characteristics, and **Figure 1.2** illustrates the proposed site plan.

**Table 1.1 Site Characteristics**

| Development Type                                                   | Magnitude |
|--------------------------------------------------------------------|-----------|
| Residential units (Proposed)                                       | 31        |
| Residential units with direct Access from Findlay Drive (Proposed) | 2         |
| Residential unit on Hurontario street (Existing)                   | 1         |

---

### 1.1.2 ACCESS

The Blackmoor Gates site accessed by a new road forming a T-intersection on Campbell Street. The new road will be stop controlled while Campbell Street will continue to be free flow at this location. Further, an emergency access-only is proposed on Hurontario Street. The proposed site accesses are shown in **Figure 1.3**. The two residential units on Findlay Drive will have direct access via driveways to the road and the existing one residential unit on Hurontario Street shall continue to have direct access from Hurontario Street.

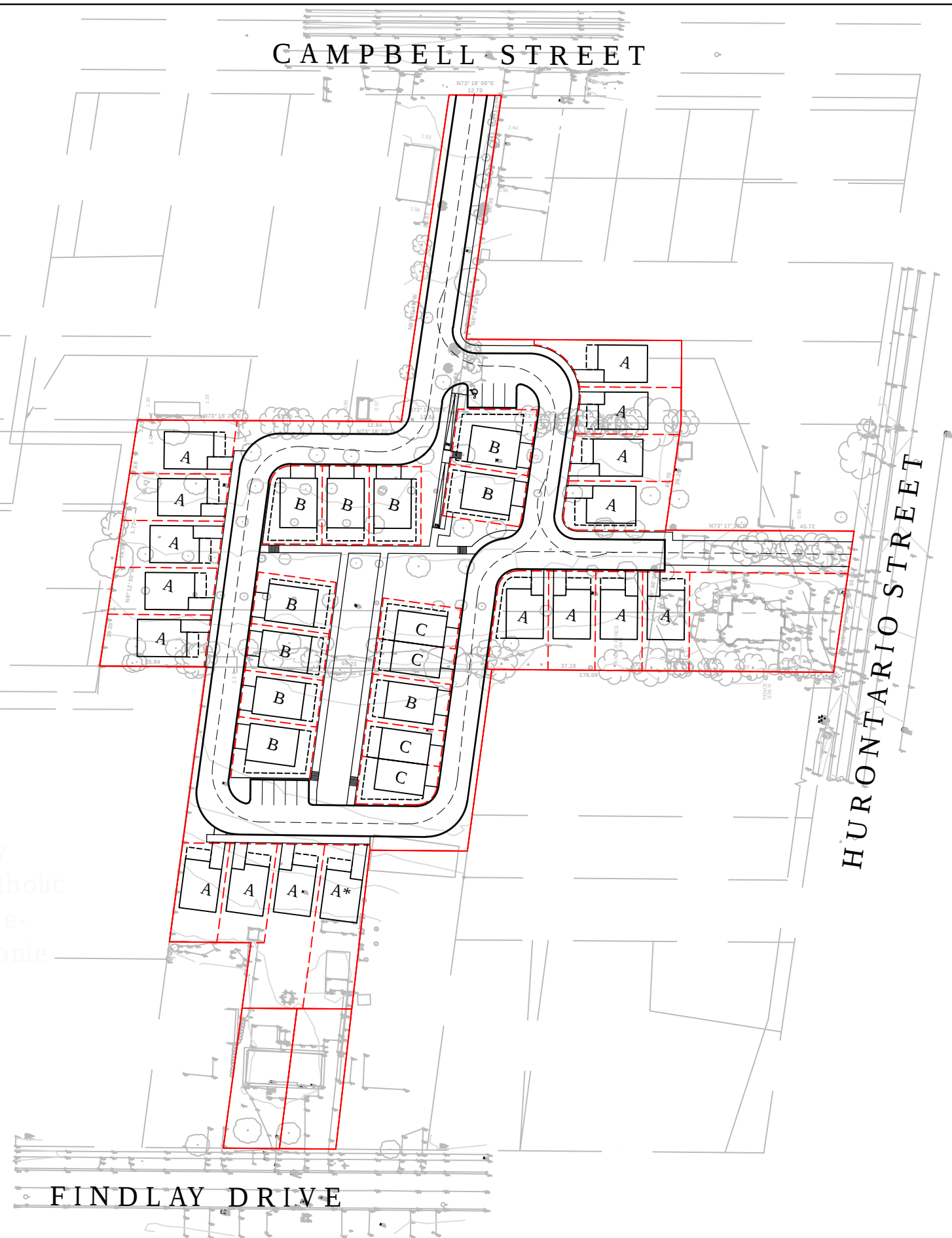
MAPLE STREET

CAMPBELL STREET

HURONTARIO STREET

Elementary  
School Catholic  
Notre-Dame-  
De-La-Huronie

FINDLAY DRIVE

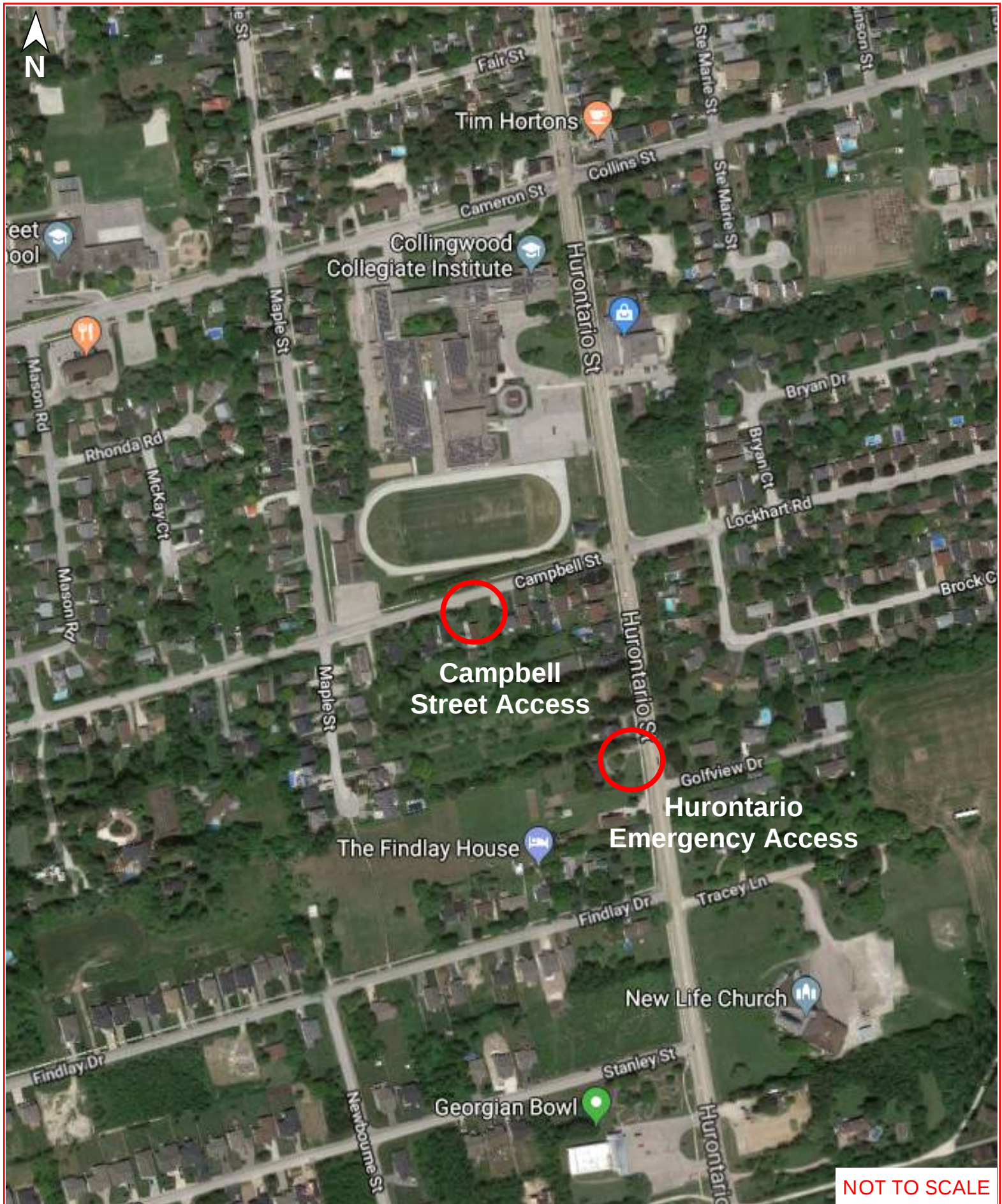


# Concept Sketch

FIGURE 1.2  
Proposed Site Plan

Scale 1 : 1,200  
March 26, 2018





NOT TO SCALE



**FIGURE 1.3**  
Proposed Site Access

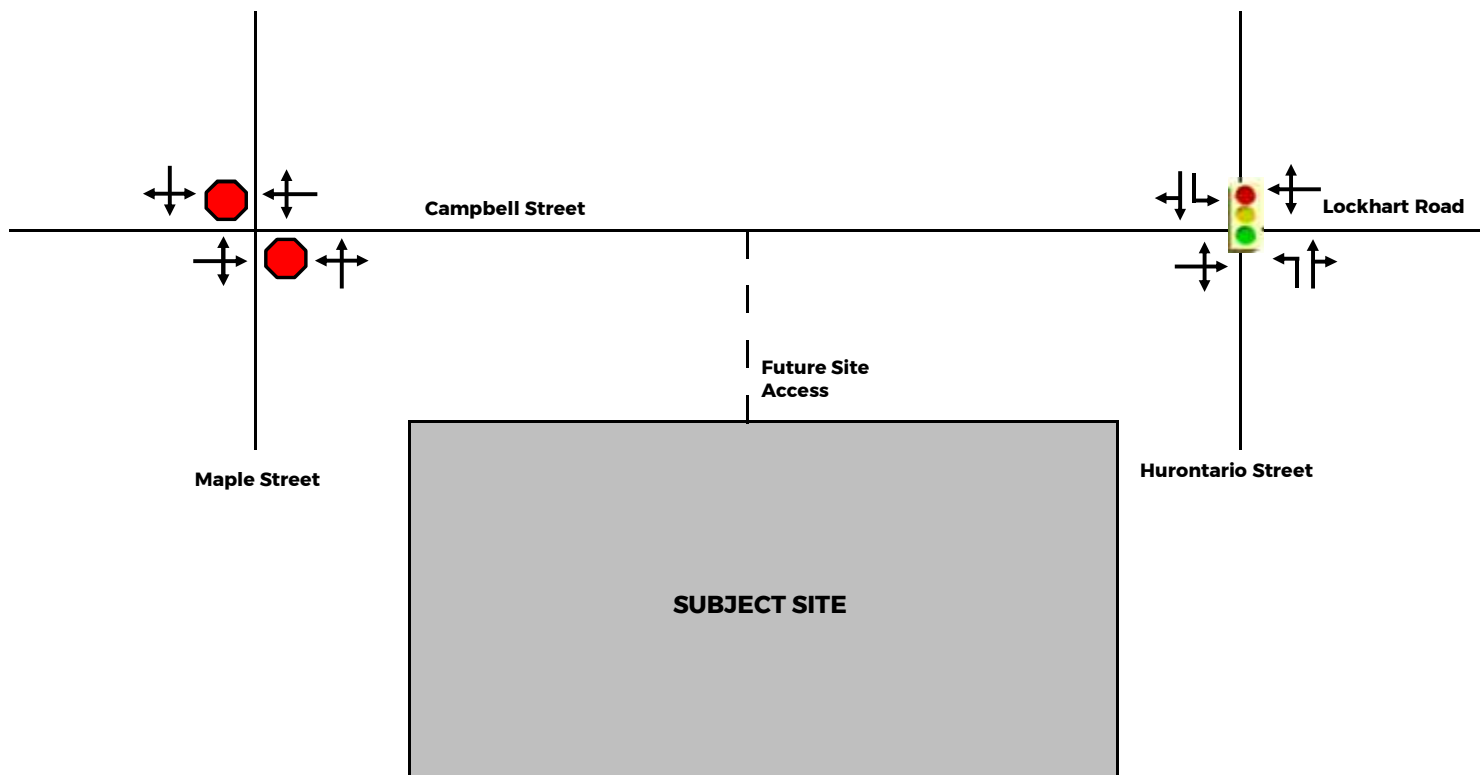
## 2 EXISTING TRANSPORTATION CONDITIONS

---

### 2.1 BOUNDARY ROADWAYS

All roadways within the study area are under the jurisdiction of either the County of Simcoe the Town of Collingwood, and are classified per published County and Municipal Official Plans. The following roadways make up the boundary road network that surrounds the subject site:

- **Hurontario Street** is a north-south arterial road with a 3-lane cross-section between Campbell Street and Findlay Drive. There is one lane in each direction and a centre two way left turn lane. Hurontario Street has a posted speed limit of 50km/h and no on-street parking is permitted. Sidewalks exist on the west side of the street.
- **Campbell Street** is an east-west collector road with a 2-lane cross-section at its intersection with Hurontario Street. There is one lane in each direction. At the intersection with Hurontario Street, the posted speed limit is 50km/h. Sidewalks exist on one side of the street, alternating between the north and south sides of the street.
- **Maple Street** is a north-south collector road with a 2-lane cross-section at its intersection with Campbell Street. At its intersection with Campbell Street, the posted speed limit is 50km/hr and no on street parking is permitted. Sidewalks exist on both sides of the street on the north of Campbell Street and there are no sidewalks south of Campbell Street.
- **Findlay Drive** is an east-west collector road with a 2-lane cross-section at its intersection with Hurontario Street. There is one lane in each direction. At the intersection with Hurontario Street, the posted speed limit is 50km/h and no on street parking is permitted. Sidewalks exist on the north side of the street. **Figure 3.1** illustrates the existing lane configurations of all the above-noted roads along with the types of intersection control currently in operation.



## 2.2 TRAFFIC DATA

Turning movement counts were undertaken by Ontario Traffic Inc. on behalf of WSP and are summarized in **Appendix C**. The counts were undertaken at the site accesses and the study intersections listed in **Table 3.1**.

**Table 2.1: Study Intersections**

| Intersection                        | Intersection Control |
|-------------------------------------|----------------------|
| Hurontario Street & Campbell Street | Signalized           |
| Maple Street & Campbell Street      | Unsignalized         |

In order to analyze the various peak periods associated with the roadway, traffic counts were conducted during the following time periods:

- Thursday, March 22nd, 2018 from 7:00am-9:00am; and
- Thursday, March 22nd, 2018 from 4:00pm-6:00pm.

The signal timing plans for the signalized study intersections were acquired from the Town of Collingwood and are provided in **Appendix D**.

## 2.3 TRANSIT ROUTES

The public transit system of Collingwood is known by the name 'Colltrans'. Three bus routes operate in the city of Collingwood, i.e. the Crosstown Route, the East Route and the West Route. The East Route operates near the development, the existing bus stop served by the East Route is located at Hurontario Street-Lockhart Road intersection and is within 50 m of the development. Commuters may also be able to access the Colltrans buses operating on the West Route at Hurontario Street- Cameron Street intersection located 500 m north of the development

The below table summarizes the transit routes located in the vicinity of the proposed development. **Figure 2.2** reflects the existing transit facilities in the vicinity of the proposed development

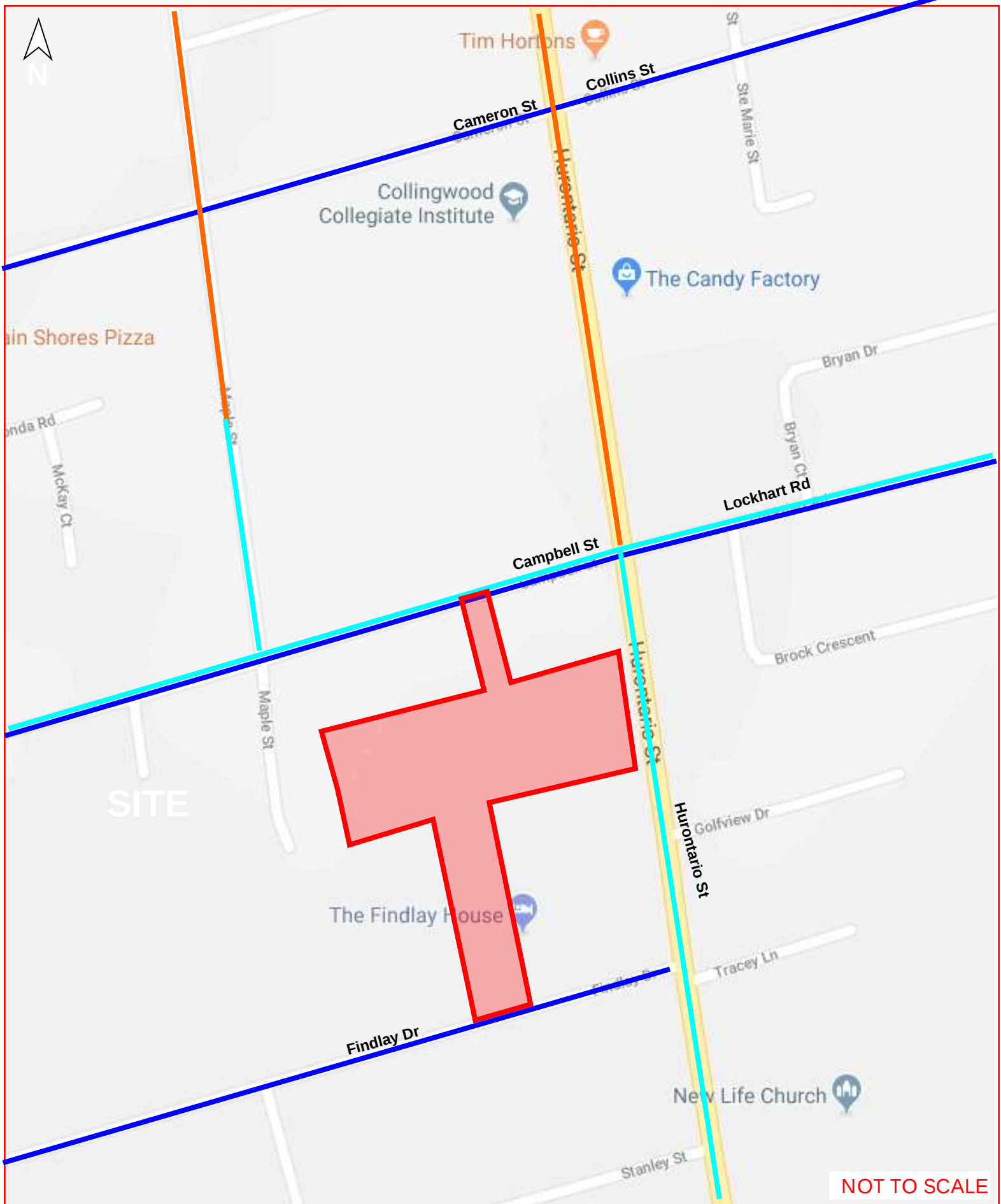
**Table 2.1 Transit Services**

| Route                | Operating Days | Operating hours                                                                     | Frequency                                             |
|----------------------|----------------|-------------------------------------------------------------------------------------|-------------------------------------------------------|
| Colltrans East Route | 7 Days a Week  | Mon to Fri: 6.30 am to 8.30pm<br>Sat: 7.00 am to 5.30 pm<br>Sun: 9.00 am to 4.30pm  | Every 30 mins (Peak hour) & 1.00 Hour (Non-peak hour) |
| Colltran West Route  | 7 Days a Week  | Mon to Fri: 6.30 am to 8.00 pm<br>Sat: 7.00 am to 5.30 pm<br>Sun: 9.00 am to 4.00pm | Every 30 mins (Peak hour) & 1.00 Hour (Non-peak hour) |

## 2.4 ACTIVE TRANSPORTATION

There is a well-connected network of sidewalk within the study area. The sidewalks/multi use lanes are mostly located on one side of the road.

There are no existing bike lanes or cycling tracks along Hurontario Street or Campbell Street. The existing active transportation network is reflected in **Figure 2.2**



### Legend

- Site
- Signed Town Cycling Route
- Sidewalk (one side)
- Sidewalk (both sides)

**FIGURE 2.2**  
**Existing Active Transportation Infrastructure**

---

## 2.5 DATA COLLECTION AND METHODOLOGY

Existing traffic volumes were surveyed on 22 March 2018. Turning movement counts were collected for the weekday a.m. peak and weekday p.m. peak for each of the studied intersections listed below. The study intersections are illustrated in **Figure 2.3**.

- Hurontario Street- Campbell Street (Signalized)
- Campbell Street-Maple Street (Unsignalized)



**Legend**  
Site

● Signalized

● Unsignalized

1. Campbell Street at Hurontario
2. Campbell Street at Maple Street

**FIGURE 2.3**  
Study Area

## 2.6 ANALYSIS METHODOLOGY

Intersections are the critical capacity control points for a transportation network. Key intersections in the Study area have been analyzed to determine the average vehicle delay (level of service) as well as any capacity constraints in select traffic movements (as measured by volume to capacity ratio).

---

### 2.6.1 INTERSECTION CAPACITY ANALYSIS

Capacity analyses were undertaken using the Synchro 9 traffic analysis software to analyze existing traffic conditions in the study area. This software incorporates the methodology outlined in the Highway Capacity Manual (HCM), Transportation Research Board, 2000.

An intersection capacity analysis provides an indication of traffic operations based on calculations of volume-to-capacity (v/c) and delays for individual movements at an intersection. Level of Service (LOS) denoted by letters 'A' through 'D', represent satisfactory traffic operations. LOS denoted by the letters 'E' and 'F' represent congested traffic operations. The Level of Service definitions for signalized and unsignalized intersections are included in **Appendix D**.

The overall level of service has been reported for each intersection. Individual turning movements with volume to capacity ratios of 0.85 or greater have been reported at intersections on the road network.

---

## 2.7 EXISTING TRAFFIC CONDITION ANALYSIS

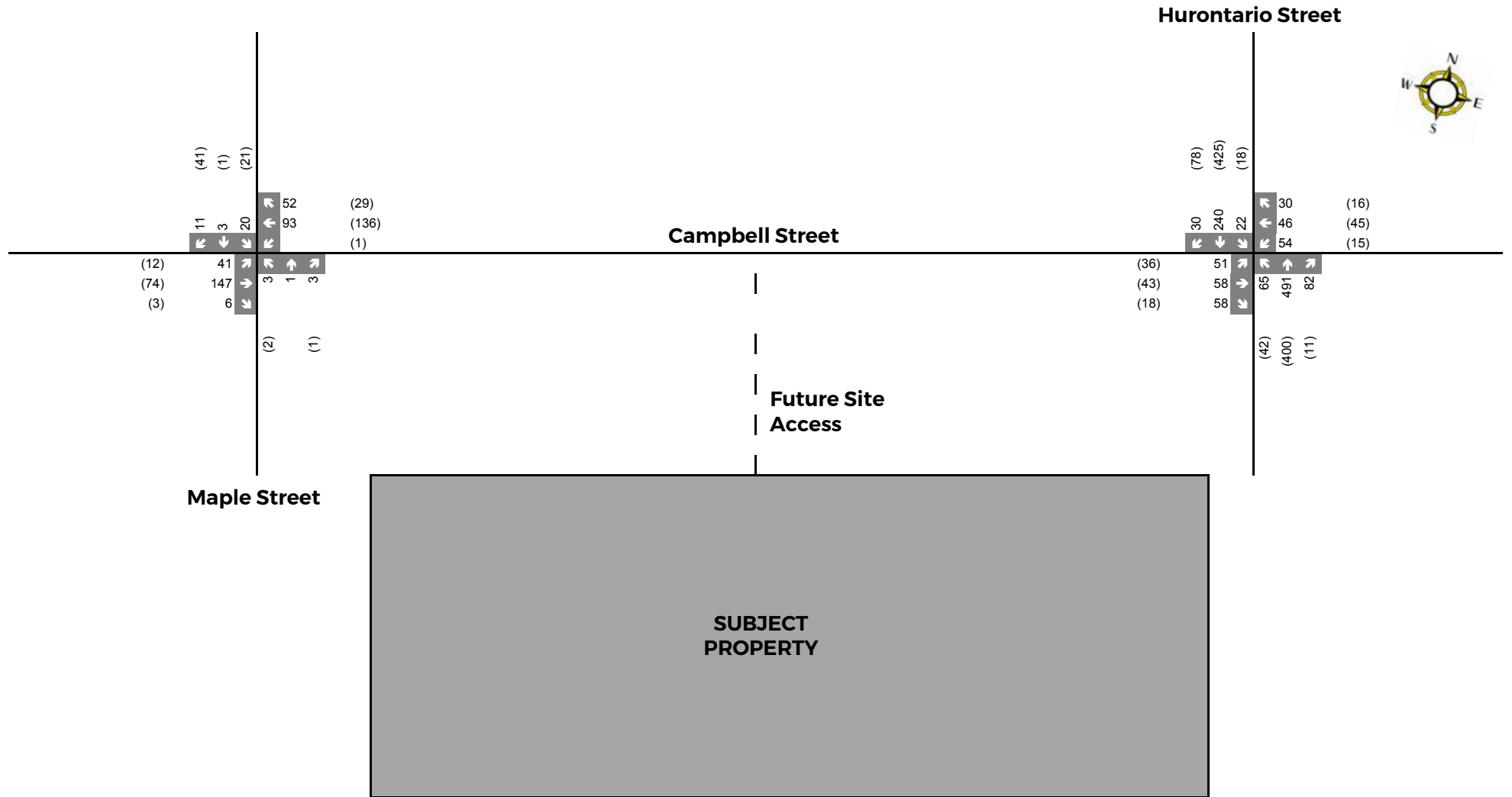
Existing traffic volume data and signal timing and phasing plans were input into the Synchro 9 traffic analysis software to determine existing levels of service and critical movements at the intersections in the study area. These base conditions shall help determine the impacts of the proposed development on the existing transportation network. The existing traffic volumes used in the analysis are shown in **Figure 2-4**. The analysis of existing conditions is summarized **Table 2.2**. Synchro output sheets detailing the analyses are provided in **Appendix E**.

**Table 2.2: Level of Service Analysis for Existing Traffic Conditions**

| Intersection                | Control Type | AM Peak Hour                      |                                       | PM Peak Hour                      |                                       |
|-----------------------------|--------------|-----------------------------------|---------------------------------------|-----------------------------------|---------------------------------------|
|                             |              | LOS <sup>1</sup> Delay in Seconds | Critical Movements <sup>2</sup> (v/c) | LOS <sup>1</sup> Delay in Seconds | Critical Movements <sup>2</sup> (v/c) |
| Hurontario St & Campbell St | Signalized   | B (10.8)                          | --                                    | A (8.4)                           | --                                    |
| Campbell St & Maple St      | Unsignalized | B (11.0)                          | --                                    | B (10.2)                          | --                                    |

Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay. 2. Critical movements are those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection or with an LOS of 'E' or 'F' for an unsignalized intersection. NB = northbound; SB = southbound; EB = eastbound; WB = westbound; L= left; T = through; R = right

Both the intersections operate at acceptable levels of service with minimal delay during the a.m. and p.m. peak hours.



## 3 FUTURE BACKGROUND GROWTH

The assessment of future traffic conditions considers the increase in background volumes and the trips generated by other developments that might also lead to increased traffic volumes on the roads adjacent to the proposed development and reports the future lane configurations.

---

### 3.1 FUTURE BACKGROUND TRAFFIC VOLUMES

The non-site traffic increase is the generalized traffic growth in the study area. For the purposes of this study, a 2% annual traffic growth rate is assumed for background traffic growth. This growth rate is derived from the Environmental Noise Study of the proposed residential development on 1 Lockhart Road. In addition to the background traffic growth, forecast traffic expected to be generated from the following three developments located close to the proposed site are also considered for the analysis, the traffic volumes from these developments were derived based on the data available on the towns web site.

- Liberty Pretty River Estate Phase II
- Mountincroft Subdivision Phase IV
- Eden Oak McNabb Subdivision

Traffic volume contributed by Liberty Pretty Rive Estate development and Mountincroft subdivision on Hurontario- Campbell intersection is assumed based on the trip generation of the development and the existing traffic counts. The Eden Oak Mc Nabb subdivision traffic volume is based on the traffic impact study for the development. The details of the development are provided in Appendix F

---

### 3.2 FUTURE ROADWAY TRANSIT IMPROVEMENT

There are no transit projects foreseen in the near future that would be expected to influence the mode split of the forecast traffic from the proposed development.

---

### 3.3 FUTURE BACKGROUND TRAFFIC CONDITION

The future background traffic, comprising of the three other developments near the study area in addition to the background traffic growth were analyzed using Synchro software. The lane configurations used in the future background traffic analyses are shown in **Figure 3-1**. Future background traffic volumes at study area Intersections are shown in **Figure 3-2**. The intersection volumes were input into Synchro for analysis, with the resulting levels of service and critical movements summarized in **Table 3.1**. The signal timing splits were optimized as necessary with the cycle lengths remaining unchanged to minimize the delays of critical movements. The details of the analyses are provided in **Appendix G**.

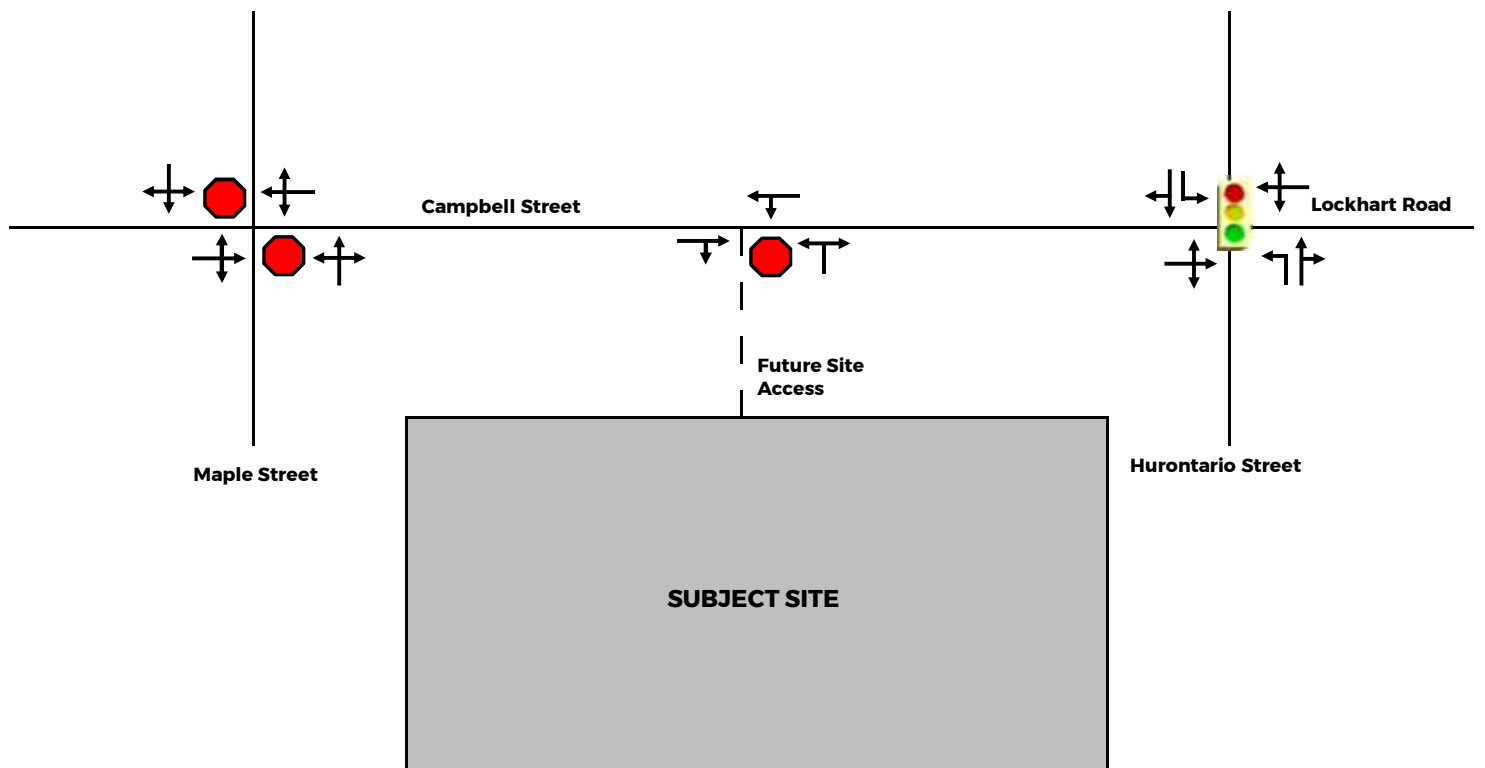
**Table 3.1 : Level of Service Analysis for Background Traffic Conditions**

| Intersection                | Control Type | AM Peak Hour                      |                                       | PM Peak Hour                      |                                       |
|-----------------------------|--------------|-----------------------------------|---------------------------------------|-----------------------------------|---------------------------------------|
|                             |              | LOS <sup>1</sup> Delay in Seconds | Critical Movements <sup>2</sup> (v/c) | LOS <sup>1</sup> Delay in Seconds | Critical Movements <sup>2</sup> (v/c) |
| Hurontario St & Campbell St | Signalized   | B (14.0)                          | —                                     | A (9.7)                           | —                                     |
| Campbell St & Maple St      | Unsignalized | B (11.6)                          | —                                     | B (10.4)                          | —                                     |

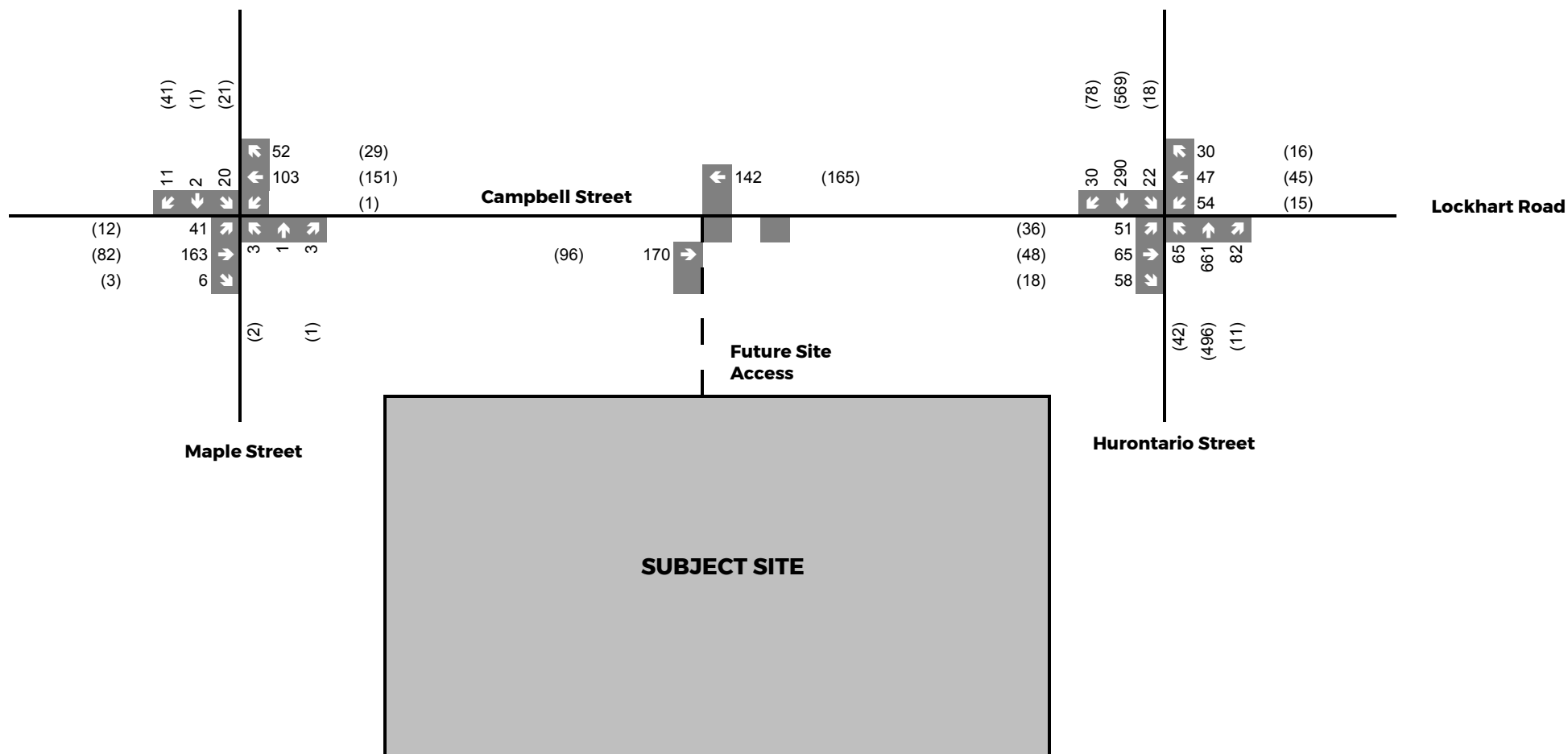
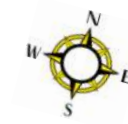
Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay. 2. Critical movements are those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection or with an LOS of 'E' or 'F' for an unsignalized intersection. NB = northbound; SB = southbound; EB = eastbound; WB = westbound; L= left; T = through; R = right

The analysis of future background traffic conditions shows that both intersections are forecast to operate at acceptable levels of service with minimal delay during the a.m. and p.m. peak hours. The overall impact to the traffic operations is marginal with the addition of background development traffic. The traffic study reports of the considered developments do not identify any mitigation measures to the existing road network.

Based on the above, no improvements are recommended under future background conditions.



**Figure 3.1**  
Proposed Lane Configurations



### Legend

xx - Weekday A.M Peak Hour Volumes  
(xx) - Weekday P.M Hour Volumes

**FIGURE 3.2**  
**Future Background Traffic Volumes**

## 4 PROPOSED SITE GENERATED TRAFFIC

### 4.1 PROPOSED TRIP GENERATION

The trip generation associated with the proposed development was based on information provided in the Institute of Transportation Engineers' (ITE) Trip Generation Manual (9th Edition). Residential Land Use Code 210 (Single-Family Detached Housing) was used to estimate the number of trips generated by the development for the Weekday a.m. and p.m. peak hours. The trip generation is based on 34 units. The trip generation for the site is summarized in **Table 4.1**.

**Table 4.1: Trip Generation**

| Use                     | ITE Category<br>(ITE Code)           | Independent variable | Statistics            |        |       |                              |        |       |
|-------------------------|--------------------------------------|----------------------|-----------------------|--------|-------|------------------------------|--------|-------|
|                         |                                      |                      | Weekday A.M Peak hour |        |       | Weekday P.M. Peak Hour       |        |       |
|                         |                                      |                      | Inbd.                 | Outbd. | Total | Inbd.                        | Outbd. | Total |
| Residential Development | Single-Family Detached Housing (210) |                      | $T = 0.7 X + 9.74$    |        |       | $\ln(T) = 0.9 \ln(X) + 0.51$ |        |       |
|                         |                                      | Directional Split    | 26 %                  | 74%    | 100%  | 64%                          | 36%    | 100%  |
|                         |                                      | Trips                | 9                     | 26     | 35    | 25                           | 14     | 39    |

#### 4.1.1 MODAL SPLIT REDUCTION

Considering that the development is a small size development and in order to understand the worst-case scenario of the future operations of the junctions, no trip reduction is attributed to transit or active transportation.

### 4.2 PROPOSED TRIP DISTRIBUTION

The projected distribution for the trips generated by the proposed development is based on the analysis of the traffic counts and acquired knowledge of the town destinations. A manual distribution method is used to assign the trips from the development within the study area.

**Table 4.2: Site Trip Distribution**

| Direction         | A.M.    |          | P.M.    |          |
|-------------------|---------|----------|---------|----------|
|                   | Inbound | Outbound | Inbound | Outbound |
| North             | 7%      | 25%      | 43%     | 23%      |
| South             | 38%     | 30%      | 20%     | 14%      |
| East <sup>#</sup> | 0%      | 0%       | 0%      | 0%       |
| West              | 55%     | 45%      | 37%     | 63%      |
| Total             | 100%    | 100%     | 100%    | 100%     |

# Lockhart Road consist mostly of residential units with no major origin/destination land use.

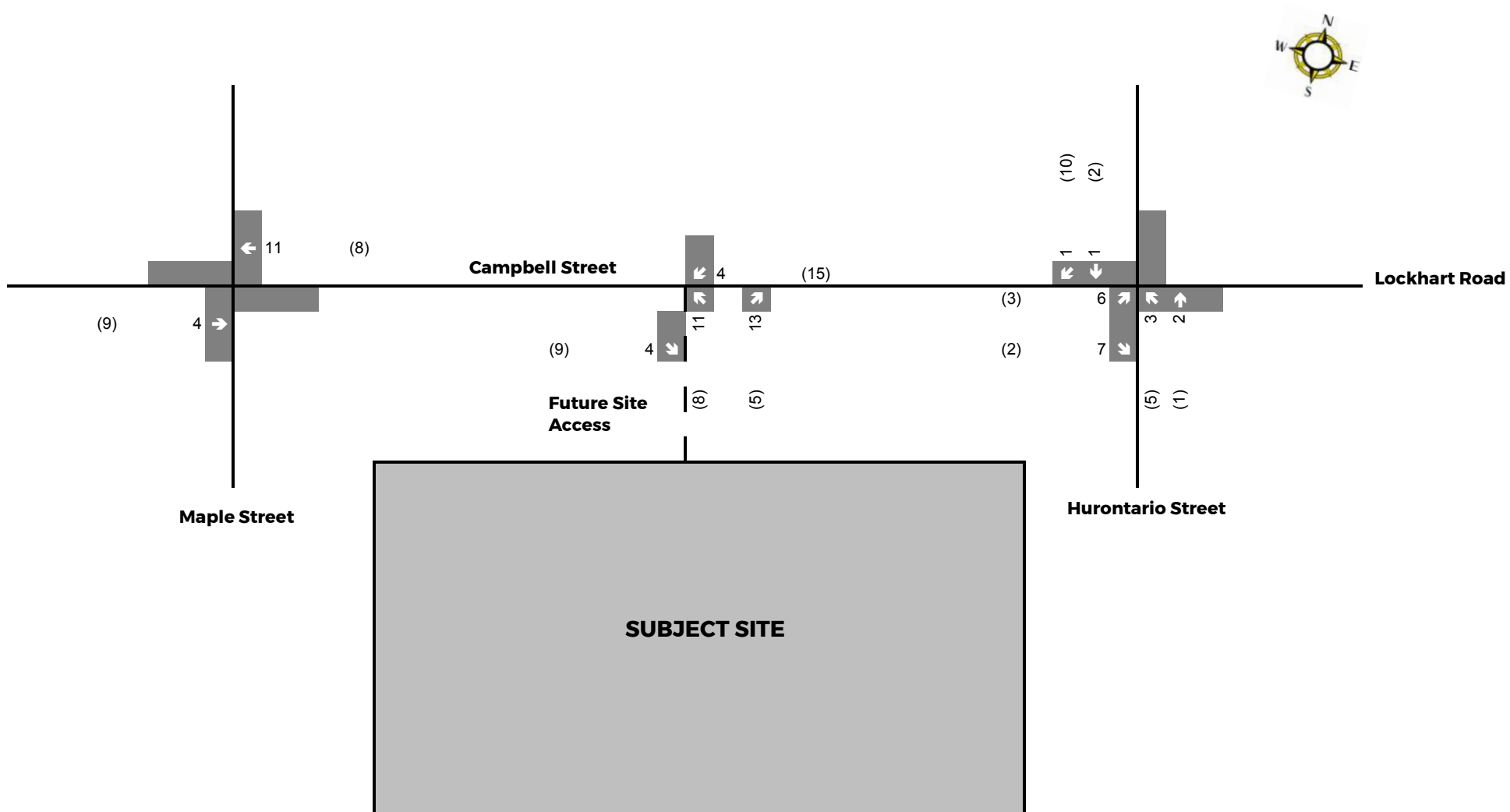
## 4.3 TRIP ASSIGNMENT

The resulting site trips were then assigned to individual roads in the road network based on the distribution described in **Section 4.2**.

As the only everyday vehicular site access is located on the Campbell Street, the movement of vehicles in and out of the development will be at the intersection of Campbell Street and Hurontario Street. The secondary access which is an emergency access is from the Hurontario Street located on the east of the development. This access shall be utilized only in case of an emergency requirement.

The trips to and from the two units on the Findlay Drive and the existing one unit on the Hurontario were assigned to the corresponding street and access on which the residential unit is located.

Vehicular traffic has been assigned to the primary site access for inbound and outbound vehicle trips with respect to the trip distribution assumption. The development related trips are shown on **Figure 4.1**.



### Legend

xx - Weekday A.M Peak Hour Volumes  
(xx) - Weekday P.M Hour Volumes

**FIGURE 4.1**  
Site Generated Traffic Volumes

## 5 TOTAL TRAFFIC CONDITIONS ANALYSIS

The total traffic volumes for the development were determined by adding the site-generated traffic volumes to the background traffic volumes (which include background developments and existing traffic volumes). The total future traffic volumes are presented in **Figure 5.1**. The results are summarized in **Table 5.1**.

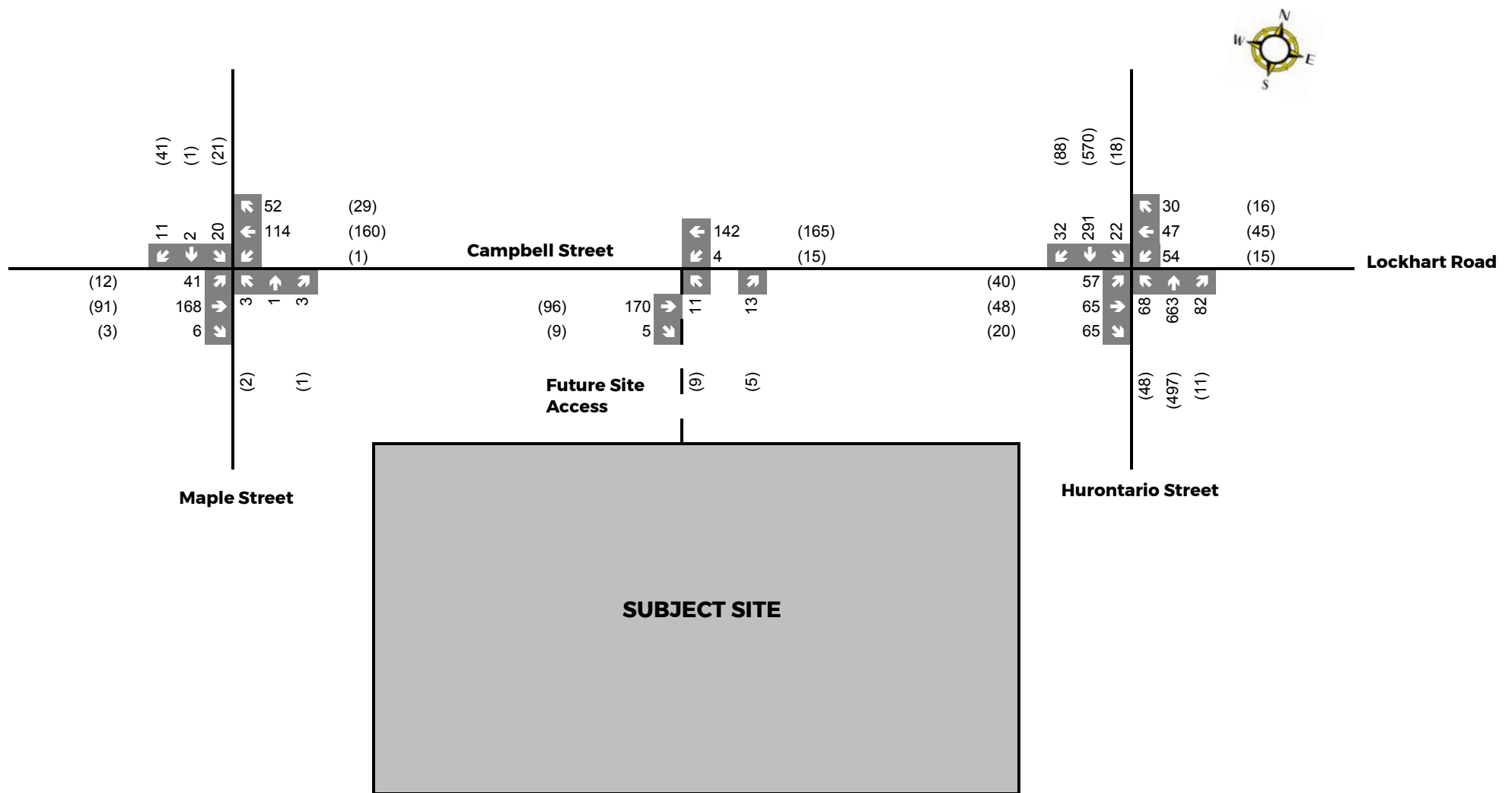
**Table 5.1: Level of Service Analysis for Total Traffic Conditions**

| Intersection                | Control Type | A.M. Peak Hour                    |                                       | P.M. Peak Hour                    |                                       |
|-----------------------------|--------------|-----------------------------------|---------------------------------------|-----------------------------------|---------------------------------------|
|                             |              | LOS <sup>1</sup> Delay in Seconds | Critical Movements <sup>2</sup> (v/c) | LOS <sup>1</sup> Delay in Seconds | Critical Movements <sup>2</sup> (v/c) |
| Hurontario St & Campbell St | Signalized   | B (16.4)                          | —                                     | B (10.0)                          | --                                    |
| Campbell St & Maple St      | Unsignalized | B (11.7)                          | --                                    | B (10.6)                          | —                                     |
| Site Access                 | Unsignalized | B (10.0)                          |                                       | A (9.9)                           |                                       |

Notes: 1. The LOS at an unsignalized intersection is defined by the movement with the highest delay. 2. Critical movements are those with a volume-to-capacity ratio exceeding 0.85 for a signalized intersection or with an LOS of 'E' or 'F' for an unsignalized intersection. NB = northbound; SB = southbound; EB = eastbound; WB = westbound; L = left; T = through; R = right

The analysis shows that all intersections are forecast to operate at acceptable levels of service with minimal delay during the a.m. and p.m. peak hours.

As the overall addition of the proposed development's vehicular traffic to the road network is marginal compared to the existing and background traffic volumes and does not negatively affect the level of service at the study area intersections. No improvements are recommended at these intersections. The configuration of the site driveway at Campbell Street intersection is recommended as a T-intersection with one lane in each direction. Site driveway traffic will stop for Campbell Street traffic. No turn lanes are required on Campbell Street. Northbound right and northbound left turns from the site driveway onto Campbell Street can be accommodated by one shared lane. No additional turning lanes are required on the site driveway.



## Legend

xx - Weekday A.M Peak Hour Volumes  
 (xx) - Weekday P.M Hour Volumes

**FIGURE 5.1**  
 Total Future Traffic Volumes

## 6 AUTO TURN AND SIGHT LINE ANALYSIS

---

### 6.1 AUTO TURN

Auto turn analysis was carried out on the internal roads of the Blackmoor Gates development using the following vehicles:

- Passenger Vehicle (5.6m);
- Fire Truck/ Emergency vehicle, using Fire Truck as specified by the Town;
- Garbage Truck (12m); and
- Medium Size Truck (10m).

**Figure 6.1 to Figure 6.7** reflect the results of the Auto Turn analysis. The geometry of the road including the turning radius are found to be adequate for smooth maneuver of all the above-mentioned vehicles.

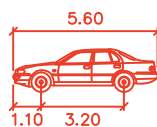
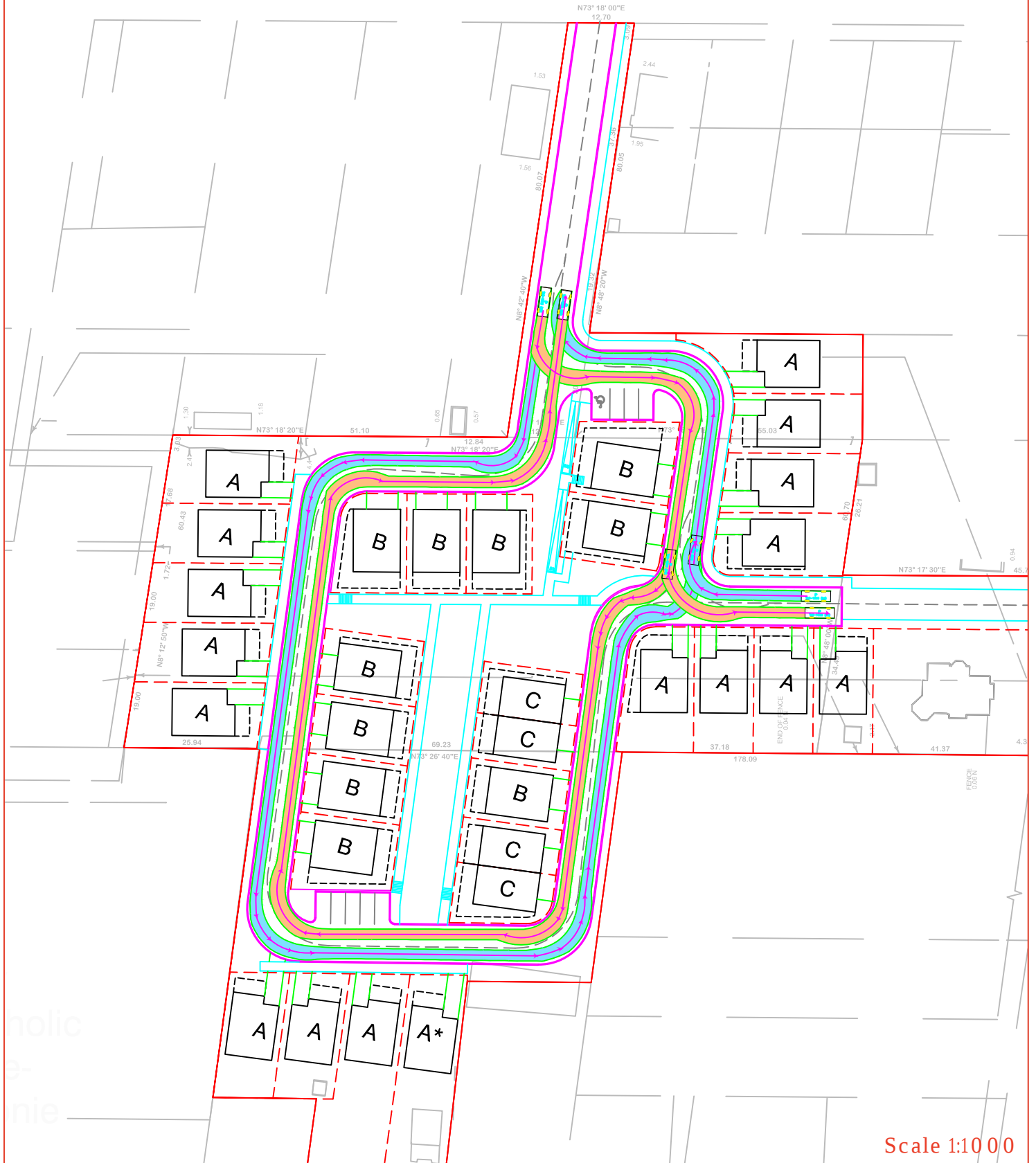
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### 6.2 SIGHT LINE ANALYSIS

The sight line analysis was carried out emergency access only on Hurontario Street to assess any safety of road uses during an emergency at the proposed site. Based on the Town's Development standard, for road with posted speed on 60 Km/hr, the required sight distance is 85m. The sight line analysis indicates that the section of the Hurontario Street adjacent to the development is mostly straight with adequate safe sight distance (more than 85m) is available on the North and South of the emergency access on Hurontario Street. The results of the sight line analysis are represented in **Figure 6.8**.

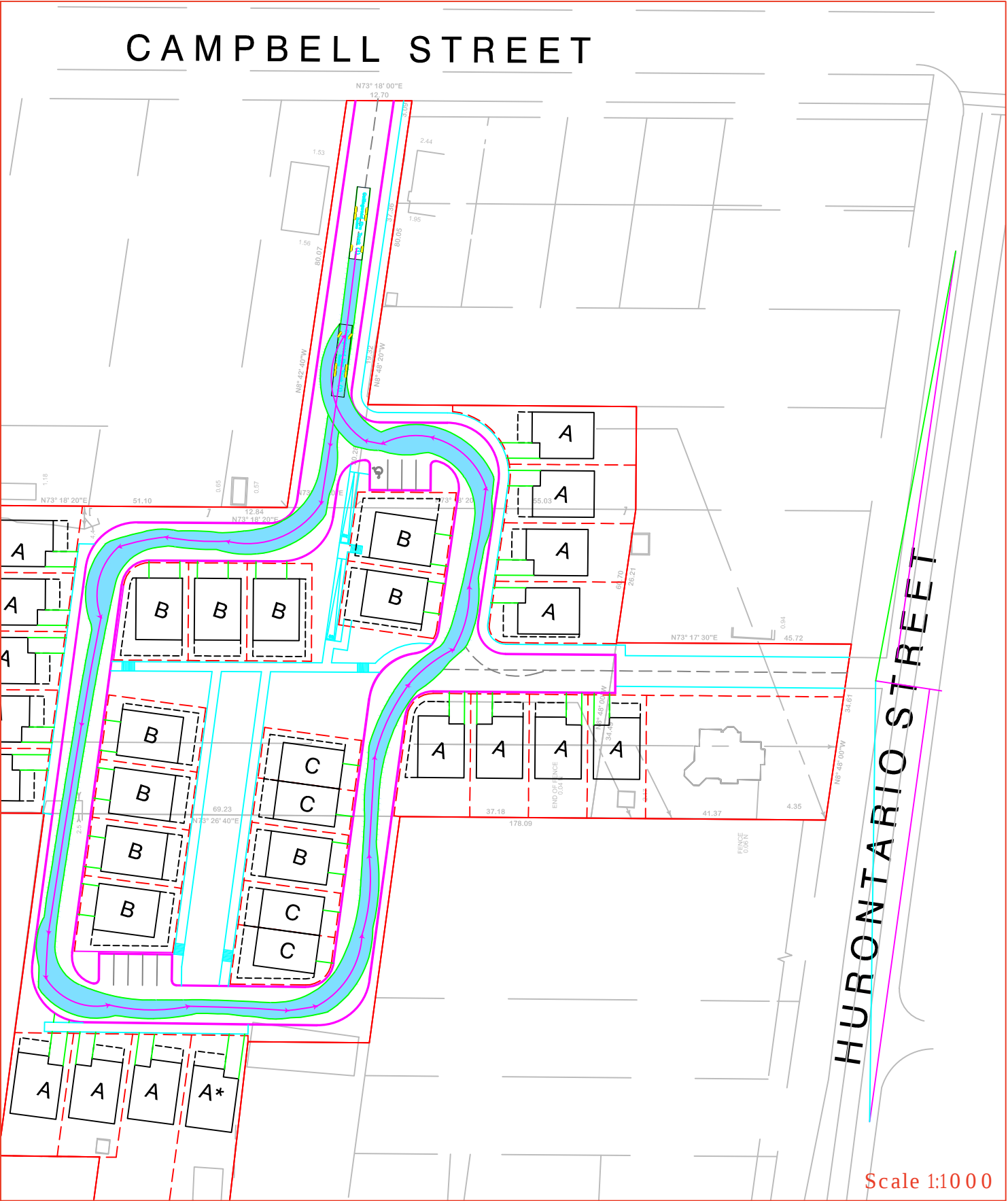
The only vehicle that would be using this access would be an emergency vehicle, and only in the event that the site driveway to Campbell Street was closed. The emergency vehicle would be expected to be using its flashing lights and siren while entering or exiting the emergency access, which would alert other drivers to the presence of the vehicle. There are no analyzed concerns with sight line analysis at the emergency access location on Hurontario Street.

# CAMPBELL STREET



|   |                   |        |        |
|---|-------------------|--------|--------|
| P | Width             | : 2.00 | meters |
|   | Track             | : 2.00 |        |
|   | Lock to Lock Time | : 6.0  |        |
|   | Steering Angle    | : 36.2 |        |

FIGURE 6-1  
Blackmoor Development  
Large Passenger Vehicle Circulation





Collingwood Fire Truck (1)

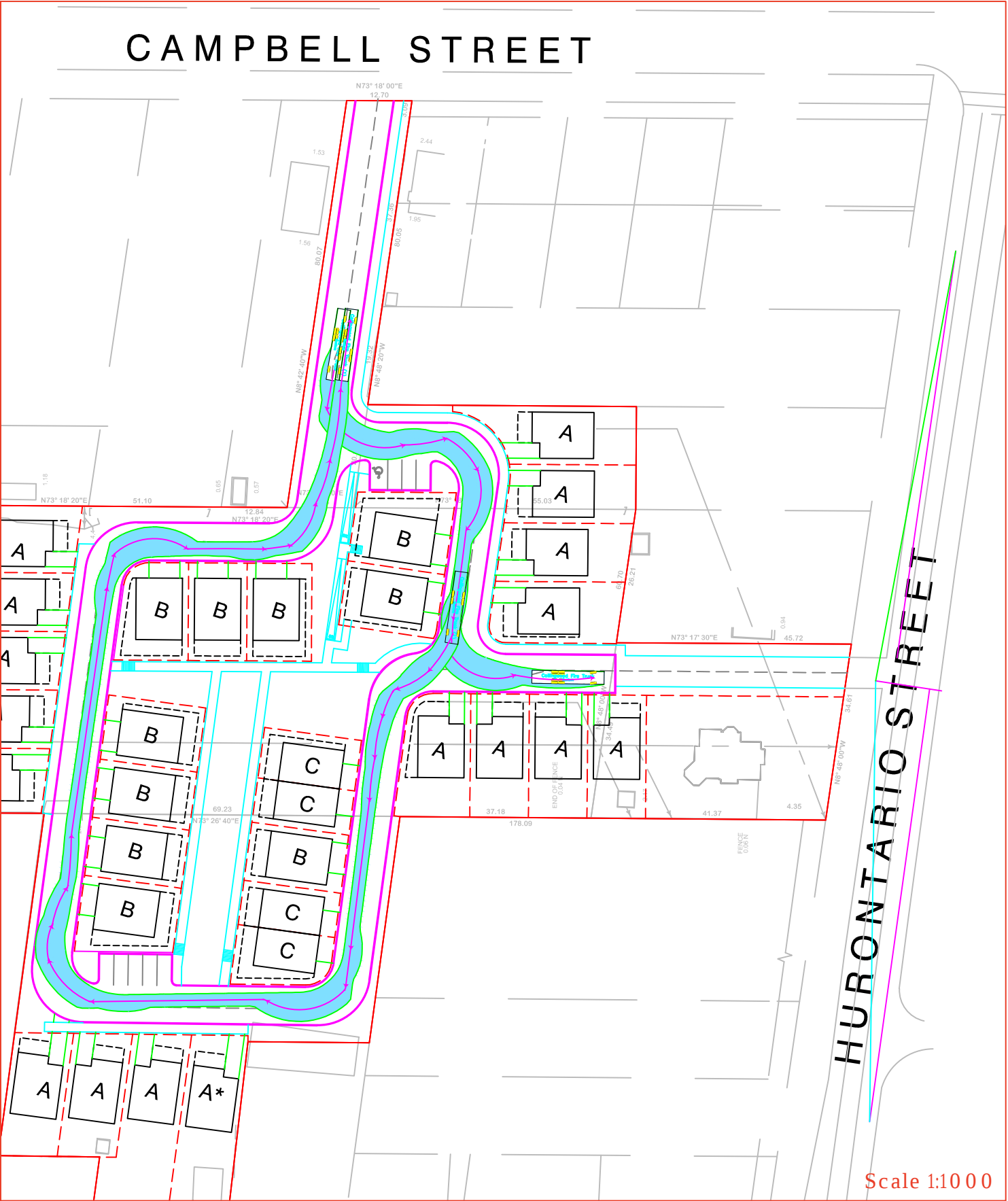
|                   |        |
|-------------------|--------|
|                   | inches |
| Width             | : 99.0 |
| Track             | : 93.0 |
| Lock to Lock Time | : 6.0  |
| Steering Angle    | : 40.0 |

**FIGURE 6-2**

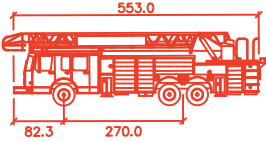
**Blackmoor Development**

**Collingwood Fire Truck Circulation**

**Anticlockwise Movement**



Scale 1:1000

|                            |        |
|----------------------------|--------|
| Collingwood Fire Truck (1) |        |
|                            | inches |
| Width                      | : 99.0 |
| Track                      | : 93.0 |
| Lock to Lock Time          | : 6.0  |
| Steering Angle             | : 40.0 |

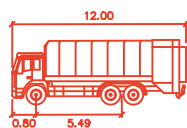
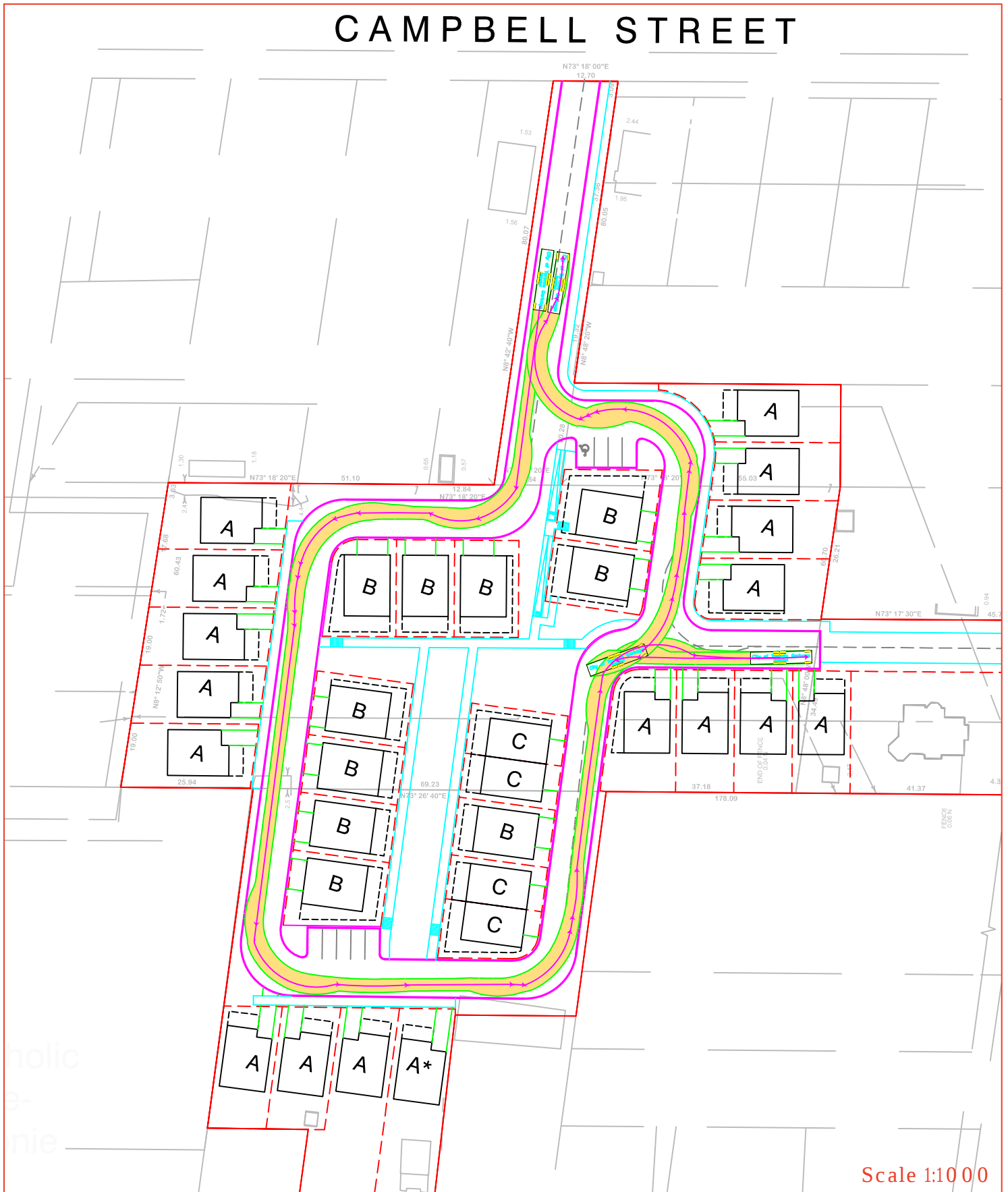
**FIGURE 6-3**

**Blackmoor Development**

**Collingwood Fire Truck Circulation**

**Clockwise Movement**

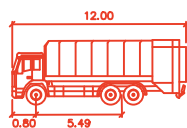
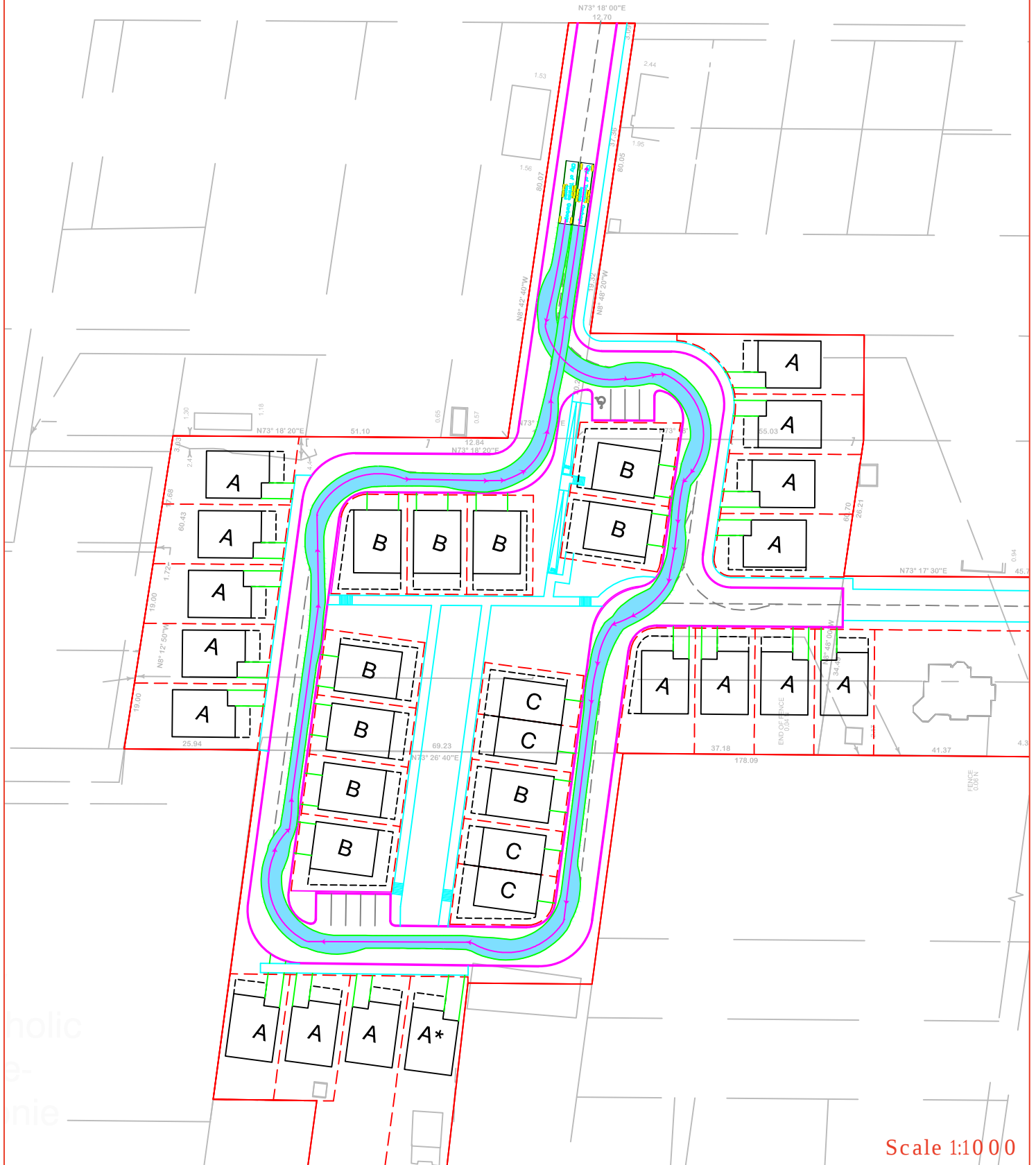
# CAMPBELL STREET



City of Toronto Garbage  
 meters  
 Width : 2.40  
 Track : 2.40  
 Lock to Lock Time : 6.0  
 Steering Angle : 25.9

**FIGURE 6-4**  
 Blackmoor Development  
 Garbage Truck Circulation (Anti-Clockwise)

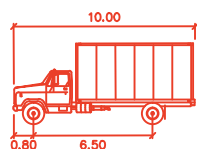
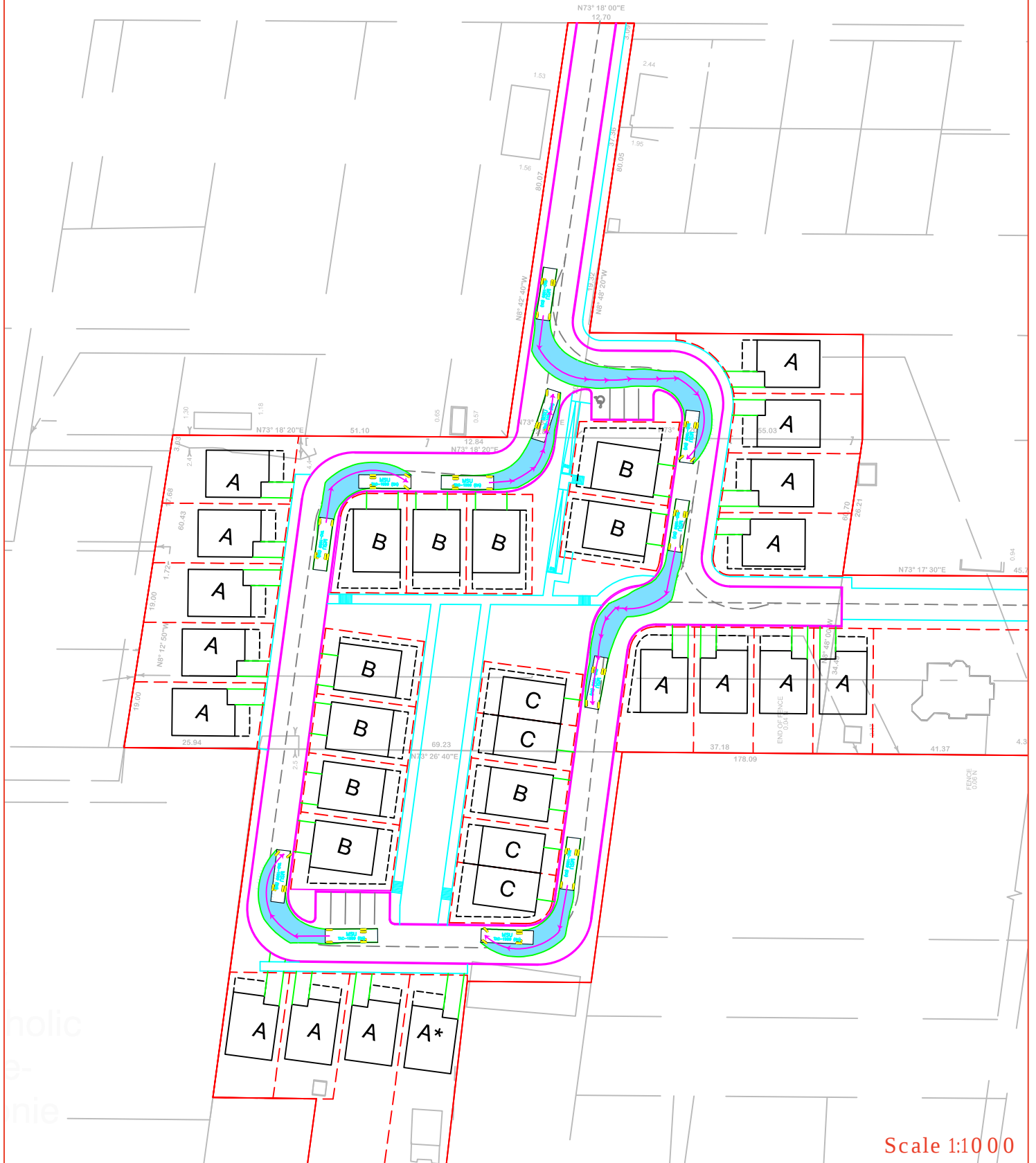
# CAMPBELL STREET



| City of Toronto Garbage |        |
|-------------------------|--------|
|                         | meters |
| Width                   | : 2.40 |
| Track                   | : 2.40 |
| Lock to Lock Time       | : 6.0  |
| Steering Angle          | : 25.9 |

**FIGURE 6-5**  
Blackmoor Development  
Garbage Truck Circulation (Clockwise)

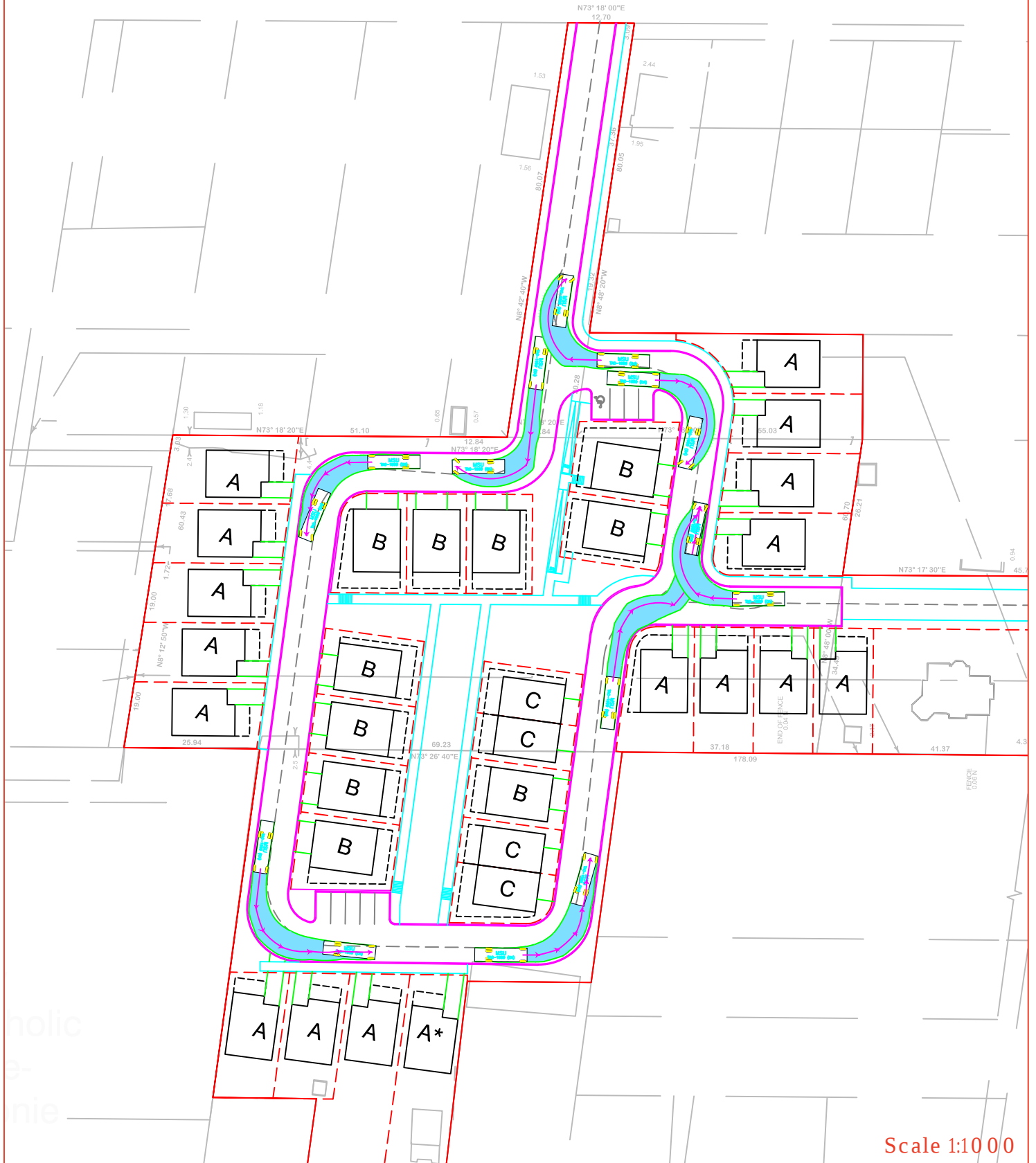
# CAMPBELL STREET



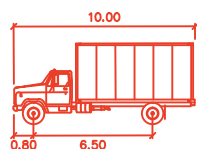
| MSU               | meters |
|-------------------|--------|
| Width             | : 2.60 |
| Track             | : 2.60 |
| Lock to Lock Time | : 6.0  |
| Steering Angle    | : 40.1 |

**FIGURE 6-6**  
**Blackmoor Development**  
**Medium Truck Circulation**  
**(Inside Curb)**

# CAMPBELL STREET

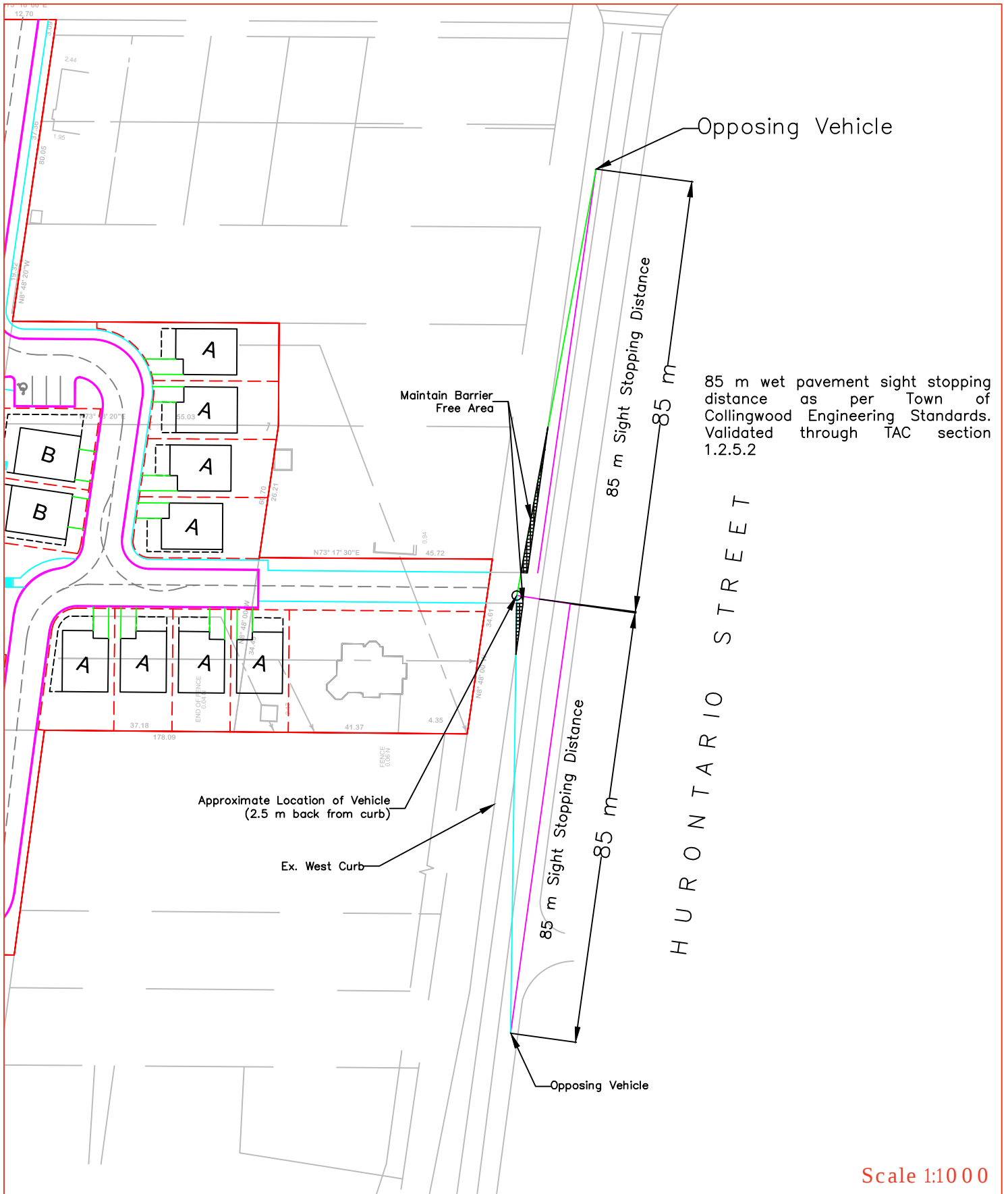


Scale 1:1000



| MSU               | meters |
|-------------------|--------|
| Width             | : 2.60 |
| Track             | : 2.60 |
| Lock to Lock Time | : 6.0  |
| Steering Angle    | : 40.1 |

FIGURE 6-7:  
Blackmoor Development  
Medium Truck Circulation  
(Outside Curb)



## 7 PARKING REQUIREMENTS

### 7.1 APPLICABLE BY-LAW FOR PARKING

The Subject Site is classified in R2 and R2-13 zone (i.e. Residential Second Density) of the Collingwood Zoning By-law. However, to develop the group or cluster development and exception is required (R2-E). The zone permits Single-Detached, Semi- Detached dwelling units. The parking requirements for the development are as stipulated in the Collingwood Zoning By-law.

Figure 7-1:Zoning Map



## 7.2 PARKING REQUIREMENTS

**Table 7.1** summarizes the Zoning By-law minimum parking requirements for the site.

**Table 7.1: Parking Requirements**

| Land Use Component            | Zoning By-law Parking Rate                                                   | Proposed Development (No. of Units) | Parking Spaces Required |
|-------------------------------|------------------------------------------------------------------------------|-------------------------------------|-------------------------|
| Single-Detached Dwelling Unit | 2 spaces per unit                                                            | 27                                  | 54                      |
| Semi- Detached Dwelling Unit  | 2 spaces per unit                                                            | 4                                   | 8                       |
| Visitor Parking               | 0.25 Per Unit                                                                | 31                                  | 8                       |
| Accessible Parking Spaces     | Minimum 3 accessible parking Space                                           |                                     | 3 #                     |
| Bicycle Parking               | 0.5 bicycle spaces per dwelling unit to a total maximum of 20 bicycle spaces | 31                                  | 15                      |

# The total number of residential parking shall include three (3) accessible parking spaces.

## 7.3 PROPOSED PARKING SUPPLY

According to the site statistics dated April 2018, a total of 70 car parking and 16 bicycle parking spaces are provided at the site, as detailed in **Table 7.2**.

**Table 7.2: Proposed Parking Supply**

| Type                          | Subject Site Parking Provided          | Minimum Parking Requirement |
|-------------------------------|----------------------------------------|-----------------------------|
|                               | Parking Supply                         | Parking Demand              |
| Dwelling units                | 62<br>(including 2 accessible parking) | 62                          |
| Visitors parking & Accessible | 8<br>(including 1 accessible parking)  | 8                           |
| Bicycle Parking               | 16                                     | 16                          |

Note: The parking calculation does not include the existing house fronting Hurontario Street, and those proposed on Findlay Drive which has its own independent parking

The development will meet the vehicular parking and bicycling parking requirements of the applicable By-law.

## 8 CONCLUSIONS AND RECOMMENDATIONS

Based on the preceding study, the following conclusions can be made:

- All of the study area intersections are operating at acceptable Levels of Service under existing traffic conditions and signal timing plans.
- All of the study area intersections are forecast to operate at acceptable Levels of Service under future background traffic conditions.
- The proposed development is estimated to generate 9 inbound & 26 outbound trips during a.m. peak hour. Further, during the p.m. peak hour 25 inbound & 14 outbound trips.
- The traffic associated with the proposed development can be accommodated by the road network. No transportation improvements are recommended to accommodate the vehicular traffic forecast to be generated by this development.
- The intersections of Hurontario Street & Campbell Street, and Campbell Street & Maple Street are forecast to operate at acceptable Levels of Service during the a.m. and p.m. peak hours.
- Since the impact to the existing level of service at the study intersection with the introduction of the proposed development traffic is marginal, no improvements are recommended to the Site Accesses.
- A parking supply review was conducted for compliance to Town Zoning By-laws.
- The developer proposes to provide a total of 70 vehicle parking spaces, which meets the required parking demand as per the Zoning By-law.
- The developer proposed to provide 16 bicycle parking spaces to satisfy the required amount bicycle parking spaces;

# APPENDIX

# A

## TIS TERMS OF REFERENCE



March 22, 2018

Herb Lemon

Engineering Technologist  
Town of Collingwood  
P.O. Box 157, 97 Hurontario Street  
Collingwood, Ontario  
L9Y 3Z5

Dear Sir:

**Subject: Traffic Impact Study for Blackmoor Gate Development, Collingwood**

Per our discussion with the Town of Collingwood on February 28, 2018, WSP is pleased to provide this Terms of Reference to prepare a Traffic Impact Study for the planned Blackmoor Gate development in the Town of Collingwood.

The proposed development will consist of a total of 34 detached and semi-detached residential units, with a main access onto Campbell Street and an emergency access onto Hurontario Street.

This scope of work reflects our understanding of what is required to meet the Town's expectations and to receive approval from a traffic perspective.

## **PROPOSED WORK PROGRAM**

The work program includes the following tasks:

### **1) BACKGROUND INFORMATION COLLECTION AND REVIEW**

We will obtain and review information related to the study area from the project team, including the latest site plan in PDF and AutoCAD formats, site development statistics including the number of dwelling units and proposed parking spaces, and the as built drawing for Hurontario Street that is needed for the sight line analysis.

We will also seek to collect the traffic impact study reports from the Town on the following background developments identified by the Town that are currently planned or under construction in the study area:

- Liberty Pretty River Estate Phase Two Residential Subdivision
- Mountaincroft Subdivision Phase 4 Removal of a Holding Provision
- Red-Line Revision to Eden Oak McNabb Subdivision

100 Commerce Valley Drive West  
Thornhill, ON  
Canada L3T 0A1

T: +1 905 882-1100  
F: +1 905 882-0055  
wsp.com

## **2) STUDY AREA**

We will review the characteristics of Campbell Street and Hurontario Street in the immediate area of the development. We will conduct a site visit of the study area and document the relevant characteristics of the subject road network, noting the approximate location of the site access point on Campbell Street and the emergency access point on Hurontario Street. This will include the number of lanes and lane configurations, speed limits, cross-sections and traffic controls. A figure illustrating the study area and pertinent characteristics will be included.

## **3) TRAFFIC DATA COLLECTION**

Per Town direction, we will collect vehicular traffic volume data at the following intersections by conducting turning movement during a typical weekday:

- Campbell Street & Hurontario Street (Signalized);
- Campbell Street & Maple Street (Unsignalized);

We plan to collect these data on March 22, 2018. These data will enable us to identify peak travel volumes on these streets and analyze intersection performance.

## **4) PROPOSED DEVELOPMENT**

We will detail the proposed land use and phasing/completion year and provide an overall site plan illustrating the proposed access locations, the internal road network, building locations, and parking supply.

## **5) FUTURE BACKGROUND TRAFFIC OPERATIONS**

We will undertake the following tasks to determine the future conditions of the two intersections in the study area, namely Campbell Street at Hurontario Street and Campbell Street at Maple Street. This analysis will be done without the Blackmoor Gate development traffic in order to gauge the impacts of adding Blackmoor Gate development traffic in the next work task. The steps include:

- (a) Confirm with the Town any future road improvements within the study area, which are anticipated to be in place within full build out of the proposed development. These may be derived from the traffic reports of surrounding developments;
- (b) Assume a through growth rate of 2% along Hurontario Street and Campbell Street. This growth rate is derived from the 2012 Collingwood Transportation Study, and the 2017 Noise Assessment Report for the development at 1 Lockhart Road;
- (c) Apply the growth rates to the collected traffic volumes;
- (d) Incorporate traffic from other planned developments by estimating the traffic increases related to these other developments (if not available through site specific traffic impact studies) and assign this traffic to the study intersections; and
- (e) Develop the future background traffic forecast for the build-out year horizon, on the basis of the existing traffic volumes, applicable traffic growth rates, and anticipated future traffic related to other developments in the vicinity of the site.

## **6) FUTURE TOTAL TRAFFIC CONDITIONS**

First, we will develop the site trip generation for the weekday a.m. and p.m. peak hours based on the trip generation rates in the Institute of Transportation Engineers (ITE) Trip Generation Manual.

We will then distribute and assign the site-generated traffic to the site driveway on Campbell Street and the two study intersections on the basis of local traffic patterns.

Second, we will complete the future total traffic analysis. This includes the following steps:

- (a) Superimpose the peak hour site-generated traffic onto the future background traffic forecast identified to develop the five year horizon future total peak hour traffic forecast;
- (b) Analyze the future total peak hour traffic conditions based on the forecast volumes;
- (c) Identify the potential delays at the proposed site access and study intersections based on the future total traffic volumes and make recommendations for any improvements, if necessary;
- (d) Re-run the traffic analyses with any recommended improvements to assess the potential relief they may provide.

## **7) 10 YEAR HORIZON CONDITIONS**

After determining the Future Total Traffic conditions at build out, we will reanalyze the road network under background traffic grown using the annual growth rate by 10 years beyond build out of the development, per the Town's specific request.

## **8) SIGHTLINE ASSESSMENT**

The Town requested a sight line analysis of the emergency access point on Hurontario Street. We will determine sight distance requirements based on appropriate standards (Transportation Association of Canada), and the availability of sight distance will be determined from the as-built engineering plans. In the event that the sight distance does not comply with the minimum requirements, mitigating measures will be identified.

## **9) TRAFFIC IMPACTS**

In consideration of the existing traffic volumes and additional site volumes, the Traffic Impact Study will provide a conclusive statement regarding the level of impact of the proposed development on the operations of the adjacent road system. The Traffic Impact Study will also address how the development plan (including the access, parking area and internal circulatory system) is adequate to suit the site traffic.



## **10) DOCUMENTATION**

A Traffic Impact Study report including relevant maps, graphs, tables and figures will be prepared to detail the findings of the Study.

We would appreciate your written approval of this Terms of Reference. If you have any questions or concerns regarding our proposed methodology, please feel free to contact me at 905-882-4211 extension 6573 or at [Brett.Sears@wsp.com](mailto:Brett.Sears@wsp.com).

Yours sincerely,

A handwritten signature in blue ink that reads "Brett Sears". The signature is fluid and cursive.

Brett Sears, MCIP RPP  
Senior Project Manager, Transportation -  
Planning & Advisory Services

# APPENDIX

## B

### TRAFIC VOLUME DATA

# Ontario Traffic Inc.

## Morning Peak Diagram

### Specified Period

**From:** 7:00:00

**To:** 9:00:00

### One Hour Peak

**From:** 8:00:00

**To:** 9:00:00

**Municipality:** Collingwood

**Site #:** 1810700001

**Intersection:** Hurontario St & Campbell St-Lockhart Rd

**TFR File #:** 5

**Count date:** 22-Mar-18

**Weather conditions:**

**Person(s) who counted:**

**\*\* Signalized Intersection \*\***

**Major Road:** Hurontario St runs N/S

North Leg Total: 864

North Entering: 292

North Peds: 20

Peds Cross: 20

|          |    |     |    |     |
|----------|----|-----|----|-----|
| Cyclists | 0  | 1   | 0  | 1   |
| Trucks   | 1  | 18  | 1  | 20  |
| Cars     | 29 | 221 | 21 | 271 |
| Totals   | 30 | 240 | 22 |     |



|          |     |
|----------|-----|
| Cyclists | 8   |
| Trucks   | 37  |
| Cars     | 527 |
| Totals   | 572 |

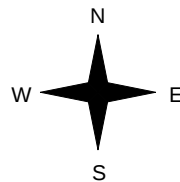
|                 |     |
|-----------------|-----|
| East Leg Total: | 292 |
| East Entering:  | 130 |
| East Peds:      | 5   |
| Peds Cross:     | 5   |

|          |        |      |        |
|----------|--------|------|--------|
| Cyclists | Trucks | Cars | Totals |
| 2        | 5      | 134  | 141    |



Campbell St

|          |        |      |        |
|----------|--------|------|--------|
| Cyclists | Trucks | Cars | Totals |
| 0        | 1      | 50   | 51     |
| 2        | 2      | 54   | 58     |
| 0        | 1      | 57   | 58     |
| 2        | 4      | 161  |        |



Hurontario St

Hurontario St

|      |        |          |        |
|------|--------|----------|--------|
| Cars | Trucks | Cyclists | Totals |
| 27   | 3      | 0        | 30     |
| 42   | 2      | 2        | 46     |
| 44   | 10     | 0        | 54     |
| 113  | 15     | 2        |        |

Lockhart Rd



|      |        |          |        |
|------|--------|----------|--------|
| Cars | Trucks | Cyclists | Totals |
| 147  | 13     | 2        | 162    |

Peds Cross: 20

West Peds: 11

West Entering: 167

West Leg Total: 308

|          |     |          |    |     |    |     |
|----------|-----|----------|----|-----|----|-----|
| Cars     | 322 | Cars     | 63 | 450 | 72 | 585 |
| Trucks   | 29  | Trucks   | 2  | 33  | 10 | 45  |
| Cyclists | 1   | Cyclists | 0  | 8   | 0  | 8   |
| Totals   | 352 | Totals   | 65 | 491 | 82 |     |



|                  |     |
|------------------|-----|
| Peds Cross:      | 20  |
| South Peds:      | 5   |
| South Entering:  | 638 |
| South Leg Total: | 990 |

## Comments

# Ontario Traffic Inc.

## Afternoon Peak Diagram

### Specified Period

From: 16:00:00

To: 18:00:00

### One Hour Peak

From: 17:00:00

To: 18:00:00

**Municipality:** Collingwood

**Site #:** 1810700001

**Intersection:** Hurontario St & Campbell St-Lockhart

**TFR File #:** 5

**Count date:** 22-Mar-18

**Weather conditions:**

**Person(s) who counted:**

**\*\* Signalized Intersection \*\***

**Major Road:** Hurontario St runs N/S

North Leg Total: 973

North Entering: 521

North Peds: 4

Peds Cross: 8

|          |    |     |    |     |
|----------|----|-----|----|-----|
| Cyclists | 1  | 5   | 0  | 6   |
| Trucks   | 1  | 27  | 5  | 33  |
| Cars     | 76 | 393 | 13 | 482 |
| Totals   | 78 | 425 | 18 |     |



|          |     |
|----------|-----|
| Cyclists | 6   |
| Trucks   | 23  |
| Cars     | 423 |
| Totals   | 452 |

East Leg Total: 148

East Entering: 76

East Peds: 8

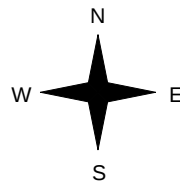
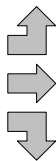
Peds Cross: 8

| Cyclists | Trucks | Cars | Totals |
|----------|--------|------|--------|
| 4        | 1      | 160  | 165    |



Campbell St

| Cyclists | Trucks | Cars | Totals |
|----------|--------|------|--------|
| 0        | 0      | 36   | 36     |
| 3        | 0      | 40   | 43     |
| 1        | 0      | 17   | 18     |
| 4        | 0      | 93   |        |



Hurontario St



| Cars | Trucks | Cyclists | Totals |
|------|--------|----------|--------|
| 13   | 3      | 0        | 16     |
| 42   | 0      | 3        | 45     |
| 12   | 3      | 0        | 15     |
| 67   | 6      | 3        |        |

Lockhart Rd



| Cars | Trucks | Cyclists | Totals |
|------|--------|----------|--------|
| 60   | 9      | 3        | 72     |

Peds Cross: 8

West Peds: 6

West Entering: 97

West Leg Total: 262

|          |     |          |    |     |    |     |
|----------|-----|----------|----|-----|----|-----|
| Cars     | 422 | Cars     | 42 | 374 | 7  | 423 |
| Trucks   | 30  | Trucks   | 0  | 20  | 4  | 24  |
| Cyclists | 6   | Cyclists | 0  | 6   | 0  | 6   |
| Totals   | 458 | Totals   | 42 | 400 | 11 |     |



Peds Cross: 8

South Peds: 5

South Entering: 453

South Leg Total: 911

## Comments

# Ontario Traffic Inc.

## Total Count Diagram

**Municipality:** Collingwood

**Site #:** 1810700001

**Intersection:** Hurontario St & Campbell St-Lockhart Rd

**TFR File #:** 5

**Count date:** 22-Mar-18

**Weather conditions:**

**Person(s) who counted:**

**\*\* Signalized Intersection \*\***

**Major Road:** Hurontario St runs N/S

North Leg Total: 2996

North Entering: 1427

North Peds: 28

Peds Cross: 28

|          |     |      |    |      |
|----------|-----|------|----|------|
| Cyclists | 2   | 12   | 0  | 14   |
| Trucks   | 3   | 71   | 6  | 80   |
| Cars     | 149 | 1141 | 43 | 1333 |
| Totals   | 154 | 1224 | 49 |      |

Cyclists 18

Trucks 103

Cars 1448

Totals 1569

East Leg Total: 632

East Entering: 287

East Peds: 20

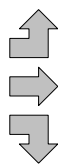
Peds Cross: 20

| Cyclists | Trucks | Cars | Totals |
|----------|--------|------|--------|
| 7        | 7      | 409  | 423    |

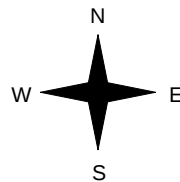


Campbell St

| Cyclists | Trucks | Cars | Totals |
|----------|--------|------|--------|
| 0        | 1      | 121  | 122    |
| 5        | 2      | 169  | 176    |
| 1        | 1      | 133  | 135    |
| 6        | 4      | 423  |        |



Hurontario St



| Cars | Trucks | Cyclists | Totals |
|------|--------|----------|--------|
| 50   | 13     | 0        | 63     |
| 120  | 2      | 5        | 127    |
| 81   | 16     | 0        | 97     |
| 251  | 31     | 5        |        |

Lockhart Rd



| Cars | Trucks | Cyclists | Totals |
|------|--------|----------|--------|
| 316  | 24     | 5        | 345    |

Peds Cross: 28

West Peds: 24

West Entering: 433

West Leg Total: 856

|          |      |
|----------|------|
| Cars     | 1355 |
| Trucks   | 88   |
| Cyclists | 13   |
| Totals   | 1456 |



|          |     |      |     |      |
|----------|-----|------|-----|------|
| Cars     | 140 | 1277 | 104 | 1521 |
| Trucks   | 2   | 89   | 16  | 107  |
| Cyclists | 0   | 18   | 0   | 18   |
| Totals   | 142 | 1384 | 120 |      |

Peds Cross: 20

South Peds: 17

South Entering: 1646

South Leg Total: 3102

**Comments**

# Ontario Traffic Inc.

## Traffic Count Summary

| Intersection: Hurontario St & Campbell St-Lockh |                                   |      |       |                |               | Count Date: 22-Mar-18              |                       | Municipality: Collingwood         |      |       |                |               |  |
|-------------------------------------------------|-----------------------------------|------|-------|----------------|---------------|------------------------------------|-----------------------|-----------------------------------|------|-------|----------------|---------------|--|
| North Approach Totals                           |                                   |      |       |                |               | North/South<br>Total<br>Approaches | South Approach Totals |                                   |      |       |                |               |  |
| Hour<br>Ending                                  | Includes Cars, Trucks, & Cyclists |      |       |                | Total<br>Peds |                                    | Hour<br>Ending        | Includes Cars, Trucks, & Cyclists |      |       |                | Total<br>Peds |  |
|                                                 | Left                              | Thru | Right | Grand<br>Total |               |                                    |                       | Left                              | Thru | Right | Grand<br>Total |               |  |
| 7:00:00                                         | 0                                 | 0    | 0     | 0              | 0             | 0                                  | 7:00:00               | 0                                 | 0    | 0     | 0              | 0             |  |
| 8:00:00                                         | 2                                 | 135  | 11    | 148            | 0             | 354                                | 8:00:00               | 18                                | 170  | 18    | 206            | 0             |  |
| 9:00:00                                         | 22                                | 240  | 30    | 292            | 20            | 930                                | 9:00:00               | 65                                | 491  | 82    | 638            | 5             |  |
| 16:00:00                                        | 0                                 | 3    | 0     | 3              | 0             | 10                                 | 16:00:00              | 2                                 | 4    | 1     | 7              | 0             |  |
| 17:00:00                                        | 7                                 | 421  | 35    | 463            | 4             | 805                                | 17:00:00              | 15                                | 319  | 8     | 342            | 7             |  |
| 18:00:00                                        | 18                                | 425  | 78    | 521            | 4             | 974                                | 18:00:00              | 42                                | 400  | 11    | 453            | 5             |  |
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Count Date: 22-Mar-18      Site #: 1810700001

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**Count Date: 22-Mar-18      Site #: 1810700001**

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# Ontario Traffic Inc.

## Morning Peak Diagram

### Specified Period

**From:** 7:00:00

**To:** 9:00:00

### One Hour Peak

**From:** 8:00:00

**To:** 9:00:00

**Municipality:** Collingwood  
**Site #:** 1810700002  
**Intersection:** Campbell St & Maple St  
**TFR File #:** 3  
**Count date:** 22-Mar-18

**Weather conditions:**

**Person(s) who counted:**

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Campbell St runs W/E

North Leg Total: 127

North Entering: 33

North Peds: 8

Peds Cross:  $\bowtie$

|          |    |   |    |    |
|----------|----|---|----|----|
| Cyclists | 0  | 0 | 0  | 0  |
| Trucks   | 0  | 0 | 0  | 0  |
| Cars     | 11 | 2 | 20 | 33 |
| Totals   | 11 | 2 | 20 |    |



|          |    |
|----------|----|
| Cyclists | 0  |
| Trucks   | 0  |
| Cars     | 94 |
| Totals   | 94 |

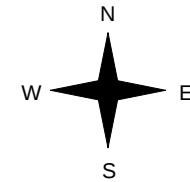
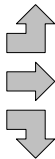
East Leg Total: 315  
 East Entering: 145  
 East Peds: 11  
 Peds Cross:  $\bowtie$

|          |        |      |        |
|----------|--------|------|--------|
| Cyclists | Trucks | Cars | Totals |
| 2        | 3      | 102  | 107    |



Campbell St

|          |        |      |        |
|----------|--------|------|--------|
| Cyclists | Trucks | Cars | Totals |
| 0        | 0      | 41   | 41     |
| 2        | 4      | 141  | 147    |
| 1        | 0      | 5    | 6      |
| 3        | 4      | 187  |        |



Maple St



|      |        |          |        |
|------|--------|----------|--------|
| Cars | Trucks | Cyclists | Totals |
| 52   | 0      | 0        | 52     |
| 88   | 3      | 2        | 93     |
| 0    | 0      | 0        | 0      |
| 140  | 3      | 2        |        |

Campbell St



|      |        |          |        |
|------|--------|----------|--------|
| Cars | Trucks | Cyclists | Totals |
| 164  | 4      | 2        | 170    |

Peds Cross:  $\bowtie$   
 West Peds: 21  
 West Entering: 194  
 West Leg Total: 301

|          |   |
|----------|---|
| Cars     | 7 |
| Trucks   | 0 |
| Cyclists | 1 |
| Totals   | 8 |



|          |   |   |   |   |
|----------|---|---|---|---|
| Cars     | 3 | 1 | 3 | 7 |
| Trucks   | 0 | 0 | 0 | 0 |
| Cyclists | 0 | 0 | 0 | 0 |
| Totals   | 3 | 1 | 3 |   |

Peds Cross:  $\bowtie$   
 South Peds: 11  
 South Entering: 7  
 South Leg Total: 15

## Comments

# Ontario Traffic Inc.

## Afternoon Peak Diagram

### Specified Period

**From:** 16:00:00

**To:** 18:00:00

### One Hour Peak

**From:** 17:00:00

**To:** 18:00:00

**Municipality:** Collingwood

**Site #:** 1810700002

**Intersection:** Campbell St & Maple St

**TFR File #:** 3

**Count date:** 22-Mar-18

**Weather conditions:**

**Person(s) who counted:**

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Campbell St runs W/E

North Leg Total: 104

North Entering: 63

North Peds: 5

Peds Cross:  $\bowtie$

|          |    |   |    |    |
|----------|----|---|----|----|
| Cyclists | 1  | 0 | 0  | 1  |
| Trucks   | 0  | 0 | 0  | 0  |
| Cars     | 40 | 1 | 21 | 62 |
| Totals   | 41 | 1 | 21 |    |



|          |    |
|----------|----|
| Cyclists | 1  |
| Trucks   | 0  |
| Cars     | 40 |
| Totals   | 41 |

East Leg Total: 262

East Entering: 166

East Peds: 1

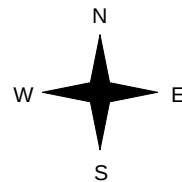
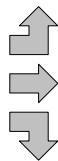
Peds Cross:  $\bowtie$

| Cyclists | Trucks | Cars | Totals |
|----------|--------|------|--------|
| 4        | 1      | 174  | 179    |



Campbell St

| Cyclists | Trucks | Cars | Totals |
|----------|--------|------|--------|
| 0        | 0      | 12   | 12     |
| 4        | 0      | 70   | 74     |
| 0        | 0      | 3    | 3      |
| 4        | 0      | 85   |        |



Maple St



| Cars | Trucks | Cyclists | Totals |
|------|--------|----------|--------|
| 28   | 0      | 1        | 29     |
| 132  | 1      | 3        | 136    |
| 1    | 0      | 0        | 1      |
| 161  | 1      | 4        |        |

Campbell St



| Cars | Trucks | Cyclists | Totals |
|------|--------|----------|--------|
| 92   | 0      | 4        | 96     |

Peds Cross:  $\bowtie$

West Peds: 9

West Entering: 89

West Leg Total: 268

|          |   |
|----------|---|
| Cars     | 5 |
| Trucks   | 0 |
| Cyclists | 0 |
| Totals   | 5 |



|          |   |   |   |   |
|----------|---|---|---|---|
| Cars     | 2 | 0 | 1 | 3 |
| Trucks   | 0 | 0 | 0 | 0 |
| Cyclists | 0 | 0 | 0 | 0 |
| Totals   | 2 | 0 | 1 |   |

Peds Cross:  $\bowtie$

South Peds: 11

South Entering: 3

South Leg Total: 8

## Comments

# Ontario Traffic Inc.

## Total Count Diagram

**Municipality:** Collingwood  
**Site #:** 1810700002  
**Intersection:** Campbell St & Maple St  
**TFR File #:** 3  
**Count date:** 22-Mar-18

**Weather conditions:**  
**Person(s) who counted:**

**\*\* Non-Signalized Intersection \*\***

**Major Road:** Campbell St runs W/E

North Leg Total: 339  
 North Entering: 161  
 North Peds: 16  
 Peds Cross:  $\nlessgtr$

|          |    |   |    |     |
|----------|----|---|----|-----|
| Cyclists | 1  | 0 | 0  | 1   |
| Trucks   | 0  | 0 | 0  | 0   |
| Cars     | 88 | 3 | 69 | 160 |
| Totals   | 89 | 3 | 69 |     |



|          |     |
|----------|-----|
| Cyclists | 1   |
| Trucks   | 0   |
| Cars     | 177 |
| Totals   | 178 |

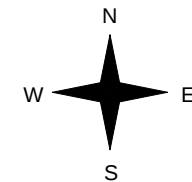
East Leg Total: 863  
 East Entering: 423  
 East Peds: 20  
 Peds Cross:  $\nlessgtr$

|          |     |
|----------|-----|
| Cyclists | 9   |
| Trucks   | 5   |
| Cars     | 403 |
| Totals   | 417 |



Campbell St

|          |     |
|----------|-----|
| Cyclists | 0   |
| Trucks   | 0   |
| Cars     | 75  |
| Totals   | 75  |
| Cyclists | 6   |
| Trucks   | 4   |
| Cars     | 357 |
| Totals   | 367 |
| Cyclists | 1   |
| Trucks   | 0   |
| Cars     | 8   |
| Totals   | 9   |
| Cyclists | 7   |
| Trucks   | 4   |
| Cars     | 440 |
| Totals   | 451 |



Maple St



|          |     |
|----------|-----|
| Cars     | 100 |
| Trucks   | 0   |
| Cyclists | 1   |
| Totals   | 101 |
| Cars     | 308 |
| Trucks   | 5   |
| Cyclists | 6   |
| Totals   | 319 |
| Cars     | 3   |
| Trucks   | 0   |
| Cyclists | 0   |
| Totals   | 3   |
| Cars     | 411 |
| Trucks   | 5   |
| Cyclists | 7   |
| Totals   | 423 |

Campbell St



|          |     |
|----------|-----|
| Cars     | 430 |
| Trucks   | 4   |
| Cyclists | 6   |
| Totals   | 440 |

Peds Cross:  $\nlessgtr$   
 West Peds: 39  
 West Entering: 451  
 West Leg Total: 868

|          |    |
|----------|----|
| Cars     | 14 |
| Trucks   | 0  |
| Cyclists | 1  |
| Totals   | 15 |



|          |    |
|----------|----|
| Cars     | 7  |
| Trucks   | 0  |
| Cyclists | 2  |
| Totals   | 9  |
| Cars     | 2  |
| Trucks   | 0  |
| Cyclists | 0  |
| Totals   | 2  |
| Cars     | 4  |
| Trucks   | 0  |
| Cyclists | 0  |
| Totals   | 4  |
| Cars     | 13 |
| Trucks   | 0  |
| Cyclists | 0  |
| Totals   | 13 |

Peds Cross:  $\nlessgtr$   
 South Peds: 24  
 South Entering: 15  
 South Leg Total: 30

## Comments

# Ontario Traffic Inc.

## Traffic Count Summary

Intersection: Campbell St & Maple St

Count Date: 22-Mar-18

Municipality: Collingwood

| North Approach Totals |                                   |      |       |                |               | North/South<br>Total<br>Approaches | South Approach Totals |                                   |      |       |                |               |
|-----------------------|-----------------------------------|------|-------|----------------|---------------|------------------------------------|-----------------------|-----------------------------------|------|-------|----------------|---------------|
| Hour<br>Ending        | Includes Cars, Trucks, & Cyclists |      |       |                | Total<br>Peds |                                    | Hour<br>Ending        | Includes Cars, Trucks, & Cyclists |      |       |                | Total<br>Peds |
|                       | Left                              | Thru | Right | Grand<br>Total |               |                                    |                       | Left                              | Thru | Right | Grand<br>Total |               |
| 7:00:00               | 0                                 | 0    | 0     | 0              | 0             | 0                                  | 7:00:00               | 0                                 | 0    | 0     | 0              | 0             |
| 8:00:00               | 6                                 | 0    | 1     | 7              | 1             | 9                                  | 8:00:00               | 1                                 | 1    | 0     | 2              | 0             |
| 9:00:00               | 20                                | 2    | 11    | 33             | 8             | 40                                 | 9:00:00               | 3                                 | 1    | 3     | 7              | 11            |
| 16:00:00              | 0                                 | 0    | 0     | 0              | 0             | 0                                  | 16:00:00              | 0                                 | 0    | 0     | 0              | 0             |
| 17:00:00              | 22                                | 0    | 36    | 58             | 2             | 61                                 | 17:00:00              | 3                                 | 0    | 0     | 3              | 2             |
| 18:00:00              | 21                                | 1    | 41    | 63             | 5             | 66                                 | 18:00:00              | 2                                 | 0    | 1     | 3              | 11            |
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# APPENDIX

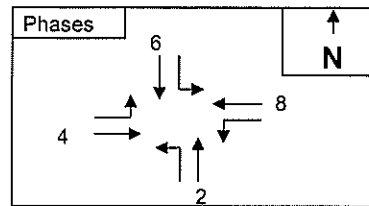
## C SIGNAL TIMING

## Traffic Signal Timing Plan

**Intersection:** Hurontario St / Lockhart Road

**Town/City:** Collingwood, ON

**Date:** 14-Oct-14



Startup of signals to be set to flashing Amber on Hurontario Street (North-South) and flashing Red on Lockhart Road / Campbell Street (East-West).

| Signal Operation       | Hurontario Street Northbound | Campbell Street Eastbound | Hurontario Street Southbound | Lockhart Road Westbound |
|------------------------|------------------------------|---------------------------|------------------------------|-------------------------|
| Phase #                | 2                            | 4                         | 6                            | 8                       |
| Minimum Green (s)      | n/a                          | 7                         | n/a                          | 7                       |
| Vehicle Extension (s)  | n/a                          | 3                         | n/a                          | 3                       |
| Maximum Green (s)      | 30.2                         | 18.3                      | 30.2                         | 18.3                    |
| Amber Clearance (s)    | 3.3                          | 3.3                       | 3.3                          | 3.3                     |
| All Red (s)            | 2.5                          | 2.4                       | 2.5                          | 2.4                     |
| Walk (s)               | 16                           | 7                         | 16                           | 7                       |
| Ped Clearance -FDW (s) | 14                           | 11                        | 14                           | 11                      |

Notes: -Signals operate under semi-actuated control = rest in Green for North/South  
 -Pedestrian phase only provided upon actuation of ped buttons for East-West movement  
 -Based on September 2014 traffic count provided by the Town of Collingwood  
 -Amber Clearance and All Red from OTM Book 12

# APPENDIX

## D

### LEVEL OF SERVICE DEFINITIONS

## LEVEL OF SERVICE DEFINITIONS AT SIGNALIZED INTERSECTIONS<sup>(1)</sup>

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average control delay per vehicle, typically for a 15-min analysis period. The criteria are given in the table below. Delay may be measured in the field or estimated using software such as Highway Capacity Software. Delay is a complex measure and is dependent upon a number of variables, including quality of progression, the cycle length, the green ratio, and the  $v/c$  ratio for the lane group in question.

| <b>Level of Service</b> | <b>Features</b>                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>Control Delay per vehicle (sec)</b> |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| A                       | LOS A describes operations with very low delay, up to 10 sec per vehicle. This level of service occurs when progression is extremely favourable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.                                                                                                                                                | $\leq 10$                              |
| B                       | LOS B describes operations with delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.                                                                                                                                                                                        | $> 10 \text{ and } \leq 20$            |
| C                       | LOS C describes operations with delay greater than 20 and up to 35 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.                                                                   | $> 20 \text{ and } \leq 35$            |
| D                       | LOS D describes operations with delay greater than 35 and up to 55 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, of high $v/c$ ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.                                          | $> 35 \text{ and } \leq 55$            |
| E                       | LOS E describes operations with delay greater than 55 and up to 80 sec per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high $v/c$ ratios. Individual cycle failures are frequent occurrences.                                                                                                          | $> 55 \text{ and } \leq 80$            |
| F                       | LOS F describes operations with delay in excess of 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high $v/c$ ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels. | $> 80$                                 |

(1) Highway Capacity Manual 2000

## LEVEL OF SERVICE DEFINITIONS AT UNSIGNALIZED INTERSECTIONS<sup>(1)</sup>

The level of service criteria for unsignalized intersections are given in the table below. As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation.

| Level of Service | Features                                                                                                                                                                                                                                                                       | Average Total Delay (sec/veh) |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| A                | Little or no traffic delay occurs. Approaches appear open, turning movements are easily made, and drivers have freedom of operation.                                                                                                                                           | $\leq 10$                     |
| B                | Short traffic delays occur. Many drivers begin to feel somewhat restricted in terms of freedom of operation.                                                                                                                                                                   | $> 10$ and $\leq 15$          |
| C                | Average traffic delays occur. Operations are generally stable, but drivers emerging from the minor street may experience difficulty in completing their movement. This may occasionally impact on the stability of flow on the major street.                                   | $> 15$ and $\leq 25$          |
| D                | Long traffic delays occur. Motorists emerging from the minor street experience significant restriction and frustration. Drivers on the major street will experience congestion and delay as drivers emerging from the minor street interfere with the major through movements. | $> 25$ and $\leq 35$          |
| E                | Very long traffic delays occur. Operations approach the capacity of the intersection.                                                                                                                                                                                          | $> 35$ and $\leq 50$          |
| F                | Saturation occurs, with vehicle demand exceeding the available capacity. Very long traffic delays occur.                                                                                                                                                                       | $> 50$                        |

(1) Highway Capacity Manual 2000.

# APPENDIX

## E

### EXISTING TRAFFIC CONDITIONS ANALYSIS

## Lanes, Volumes, Timings

## 4: Hurontario Street &amp; Campbell Street

04/18/2018

|                         | ↖     | →     | ↗    | ↖     | ←     | ↖    | ↖     | ↖     | ↖    | ↖     | ↖     | ↖    |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|
| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  |
| Lane Configurations     |       | ↔     |      |       | ↔     |      | ↔     | ↔     |      | ↔     | ↔     |      |
| Traffic Volume (vph)    | 51    | 58    | 58   | 54    | 46    | 30   | 65    | 491   | 82   | 22    | 240   | 30   |
| Future Volume (vph)     | 51    | 58    | 58   | 54    | 46    | 30   | 65    | 491   | 82   | 22    | 240   | 30   |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |
| Lane Width (m)          | 3.6   | 3.6   | 3.6  | 3.6   | 3.6   | 3.6  | 3.6   | 3.6   | 3.6  | 3.6   | 3.6   | 3.6  |
| Grade (%)               |       | 0%    |      |       | 0%    |      |       | 0%    |      |       | 0%    |      |
| Storage Length (m)      | 0.0   |       | 0.0  | 0.0   |       | 0.0  | 61.0  |       | 0.0  | 50.0  |       | 0.0  |
| Storage Lanes           | 0     |       | 0    | 0     |       | 0    | 1     |       | 0    | 1     |       | 0    |
| Taper Length (m)        | 7.5   |       |      | 7.5   |       |      | 7.5   |       |      | 7.5   |       |      |
| Lane Util. Factor       | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 |
| Ped Bike Factor         |       |       |      |       |       |      |       |       |      |       |       |      |
| Frt                     |       | 0.953 |      |       | 0.969 |      |       | 0.979 |      |       | 0.983 |      |
| Flt Protected           |       | 0.985 |      |       | 0.980 |      | 0.950 |       |      | 0.950 |       |      |
| Satd. Flow (prot)       | 0     | 1749  | 0    | 0     | 1769  | 0    | 1770  | 1824  | 0    | 1770  | 1831  | 0    |
| Flt Permitted           |       | 0.883 |      |       | 0.810 |      | 0.580 |       |      | 0.364 |       |      |
| Satd. Flow (perm)       | 0     | 1567  | 0    | 0     | 1462  | 0    | 1080  | 1824  | 0    | 678   | 1831  | 0    |
| Right Turn on Red       |       |       | Yes  |       |       | Yes  |       |       | Yes  |       |       | Yes  |
| Satd. Flow (RTOR)       |       | 46    |      |       | 26    |      |       | 20    |      |       | 15    |      |
| Link Speed (k/h)        |       | 50    |      |       | 50    |      |       | 50    |      |       | 50    |      |
| Link Distance (m)       |       | 240.3 |      |       | 173.8 |      |       | 184.6 |      |       | 148.9 |      |
| Travel Time (s)         |       | 17.3  |      |       | 12.5  |      |       | 13.3  |      |       | 10.7  |      |
| Confl. Peds. (#/hr)     |       |       |      |       |       |      |       |       |      |       |       |      |
| Confl. Bikes (#/hr)     |       |       |      |       |       |      |       |       |      |       |       |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |
| Growth Factor           | 100%  | 100%  | 100% | 100%  | 100%  | 100% | 100%  | 100%  | 100% | 100%  | 100%  | 100% |
| Heavy Vehicles (%)      | 2%    | 2%    | 2%   | 2%    | 2%    | 2%   | 2%    | 2%    | 2%   | 2%    | 2%    | 2%   |
| Bus Blockages (#/hr)    | 0     | 0     | 0    | 0     | 0     | 0    | 0     | 0     | 0    | 0     | 0     | 0    |
| Parking (#/hr)          |       |       |      |       |       |      |       |       |      |       |       |      |
| Mid-Block Traffic (%)   |       | 0%    |      |       | 0%    |      |       | 0%    |      |       | 0%    |      |
| Adj. Flow (vph)         | 55    | 63    | 63   | 59    | 50    | 33   | 71    | 534   | 89   | 24    | 261   | 33   |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |
| Lane Group Flow (vph)   | 0     | 181   | 0    | 0     | 142   | 0    | 71    | 623   | 0    | 24    | 294   | 0    |
| Number of Detectors     | 1     | 1     |      | 1     | 1     |      | 1     | 0     |      | 1     | 0     |      |
| Detector Template       | Left  |       |      | Left  |       |      |       |       |      |       |       |      |
| Leading Detector (m)    | 2.0   | 7.5   |      | 2.0   | 7.5   |      | 7.5   | 0.0   |      | 7.5   | 0.0   |      |
| Trailing Detector (m)   | 0.0   | -1.5  |      | 0.0   | -1.5  |      | -1.5  | 0.0   |      | -1.5  | 0.0   |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      |
| Protected Phases        |       | 4     |      |       | 8     |      |       | 2     |      |       | 6     |      |
| Permitted Phases        | 4     |       |      | 8     |       |      | 2     |       |      | 6     |       |      |
| Detector Phase          | 4     | 4     |      | 8     | 8     |      | 2     | 2     |      | 6     | 6     |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |
| Minimum Initial (s)     | 7.0   | 7.0   |      | 7.0   | 7.0   |      | 30.2  | 30.2  |      | 30.2  | 30.2  |      |
| Minimum Split (s)       | 23.7  | 23.7  |      | 23.7  | 23.7  |      | 36.0  | 36.0  |      | 36.0  | 36.0  |      |
| Total Split (s)         | 24.0  | 24.0  |      | 24.0  | 24.0  |      | 36.0  | 36.0  |      | 36.0  | 36.0  |      |
| Total Split (%)         | 40.0% | 40.0% |      | 40.0% | 40.0% |      | 60.0% | 60.0% |      | 60.0% | 60.0% |      |
| Maximum Green (s)       | 18.3  | 18.3  |      | 18.3  | 18.3  |      | 30.2  | 30.2  |      | 30.2  | 30.2  |      |
| Yellow Time (s)         | 3.3   | 3.3   |      | 3.3   | 3.3   |      | 3.3   | 3.3   |      | 3.3   | 3.3   |      |
| All-Red Time (s)        | 2.4   | 2.4   |      | 2.4   | 2.4   |      | 2.5   | 2.5   |      | 2.5   | 2.5   |      |
| Lost Time Adjust (s)    |       | 0.0   |      |       | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |

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## Lanes, Volumes, Timings

## 4: Hurontario Street &amp; Campbell Street

04/18/2018

|                         | ↖    | →     | ↗   | ↖    | ←     | ↖   | ↖    | ↖     | ↖   | ↖    | ↖     | ↖   |
|-------------------------|------|-------|-----|------|-------|-----|------|-------|-----|------|-------|-----|
| Lane Group              | EBL  | EBT   | EBR | WBL  | WBT   | WBR | NBL  | NBT   | NBR | SBL  | SBT   | SBR |
| Total Lost Time (s)     |      | 5.7   |     |      | 5.7   |     |      | 5.8   | 5.8 |      | 5.8   | 5.8 |
| Lead/Lag                |      |       |     |      |       |     |      |       |     |      |       |     |
| Lead-Lag Optimize?      |      |       |     |      |       |     |      |       |     |      |       |     |
| Vehicle Extension (s)   | 3.0  | 3.0   |     | 3.0  | 3.0   |     | 0.2  | 0.2   |     | 0.2  | 0.2   |     |
| Minimum Gap (s)         | 3.0  | 3.0   |     | 3.0  | 3.0   |     | 3.0  | 3.0   |     | 3.0  | 3.0   |     |
| Time Before Reduce (s)  | 0.0  | 0.0   |     | 0.0  | 0.0   |     | 0.0  | 0.0   |     | 0.0  | 0.0   |     |
| Time To Reduce (s)      | 0.0  | 0.0   |     | 0.0  | 0.0   |     | 0.0  | 0.0   |     | 0.0  | 0.0   |     |
| Recall Mode             | None | None  |     | None | None  |     | Max  | Max   |     | Max  | Max   |     |
| Walk Time (s)           | 7.0  | 7.0   |     | 7.0  | 7.0   |     | 16.0 | 16.0  |     | 16.0 | 16.0  |     |
| Flash Dont Walk (s)     | 11.0 | 11.0  |     | 11.0 | 11.0  |     | 14.0 | 14.0  |     | 14.0 | 14.0  |     |
| Pedestrian Calls (#/hr) | 0    | 0     |     | 0    | 0     |     | 0    | 0     |     | 0    | 0     |     |
| Act Effect Green (s)    |      | 10.4  |     |      | 10.4  |     | 34.5 | 34.5  |     | 34.5 | 34.5  |     |
| Actuated g/C Ratio      |      | 0.20  |     |      | 0.20  |     | 0.66 | 0.66  |     | 0.66 | 0.66  |     |
| v/c Ratio               |      | 0.52  |     |      | 0.46  |     | 0.10 | 0.52  |     | 0.05 | 0.24  |     |
| Control Delay           |      | 19.5  |     |      | 20.1  |     | 6.4  | 9.0   |     | 6.4  | 6.2   |     |
| Queue Delay             |      | 0.0   |     |      | 0.0   |     | 0.0  | 0.0   |     | 0.0  | 0.0   |     |
| Total Delay             |      | 19.5  |     |      | 20.1  |     | 6.4  | 9.0   |     | 6.4  | 6.2   |     |
| LOS                     |      | B     |     |      | C     |     | A    | A     |     | A    | A     |     |
| Approach Delay          |      | 19.5  |     |      | 20.1  |     |      | 8.7   |     |      | 6.3   |     |
| Approach LOS            |      | B     |     |      | C     |     |      | A     |     |      | A     |     |
| Queue Length 50th (m)   |      | 11.7  |     |      | 10.0  |     | 2.6  | 31.1  |     | 0.9  | 11.4  |     |
| Queue Length 95th (m)   |      | 26.7  |     |      | 23.1  |     | 8.9  | 72.0  |     | 4.1  | 27.7  |     |
| Internal Link Dist (m)  |      | 216.3 |     |      | 149.8 |     |      | 160.6 |     |      | 124.9 |     |
| Turn Bay Length (m)     |      |       |     |      |       |     | 61.0 |       |     | 50.0 |       |     |
| Base Capacity (vph)     |      | 575   |     |      | 526   |     | 709  | 1204  |     | 445  | 1207  |     |
| Starvation Cap Reductn  |      | 0     |     |      | 0     |     | 0    | 0     |     | 0    | 0     |     |
| Spillback Cap Reductn   |      | 0     |     |      | 0     |     | 0    | 0     |     | 0    | 0     |     |
| Storage Cap Reductn     |      | 0     |     |      | 0     |     | 0    | 0     |     | 0    | 0     |     |
| Reduced v/c Ratio       |      | 0.31  |     |      | 0.27  |     | 0.10 | 0.52  |     | 0.05 | 0.24  |     |

## Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 52.6

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.52

Intersection Signal Delay: 10.8

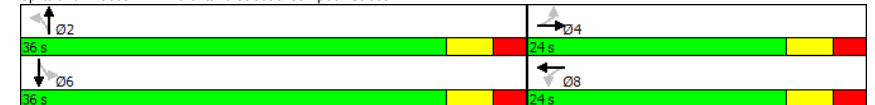
Intersection LOS: B

Intersection Capacity Utilization 74.6%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 4: Hurontario Street &amp; Campbell Street



Existing A.M. Peak Hour 04/13/2018

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# HCM Unsignalized Intersection Capacity Analysis

## 2: Maple Street & Campbell Street

04/18/2018

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--|--|--|--|--|--|--|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               | SBR                                                                               |  |  |  |  |  |  |  |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |  |  |  |  |  |
| Traffic Volume (veh/h)            | 41                                                                                | 147                                                                               | 6                                                                                 | 0                                                                                 | 93                                                                                | 52                                                                                | 3                                                                                 | 1                                                                                 | 3                                                                                 | 20                                                                                | 3                                                                                 | 11                                                                                |  |  |  |  |  |  |  |
| Future Volume (Veh/h)             | 41                                                                                | 147                                                                               | 6                                                                                 | 0                                                                                 | 93                                                                                | 52                                                                                | 3                                                                                 | 1                                                                                 | 3                                                                                 | 20                                                                                | 3                                                                                 | 11                                                                                |  |  |  |  |  |  |  |
| Sign Control                      | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |  |  |  |  |  |  |  |
| Hourly flow rate (vph)            | 45                                                                                | 160                                                                               | 7                                                                                 | 0                                                                                 | 101                                                                               | 57                                                                                | 3                                                                                 | 1                                                                                 | 3                                                                                 | 22                                                                                | 3                                                                                 | 12                                                                                |  |  |  |  |  |  |  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Lane Width (m)                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Walking Speed (m/s)               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Median type                       | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Upstream signal (m)               | 240                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| vC, conflicting volume            | 158                                                                               |                                                                                   |                                                                                   |                                                                                   | 167                                                                               |                                                                                   |                                                                                   |                                                                                   | 396                                                                               | 412                                                                               | 164                                                                               | 386                                                                               |  |  |  |  |  |  |  |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| vCu, unblocked vol                | 158                                                                               |                                                                                   |                                                                                   |                                                                                   | 167                                                                               |                                                                                   |                                                                                   |                                                                                   | 396                                                                               | 412                                                                               | 164                                                                               | 386                                                                               |  |  |  |  |  |  |  |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   |                                                                                   | 7.1                                                                               | 6.5                                                                               | 7.1                                                                               | 6.5                                                                               |  |  |  |  |  |  |  |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   |                                                                                   | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               |  |  |  |  |  |  |  |
| p0 queue free %                   | 97                                                                                |                                                                                   |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   |                                                                                   | 99                                                                                | 100                                                                               | 100                                                                               | 96                                                                                |  |  |  |  |  |  |  |
| cM capacity (veh/h)               | 1422                                                                              |                                                                                   |                                                                                   |                                                                                   | 1411                                                                              |                                                                                   |                                                                                   |                                                                                   | 540                                                                               | 514                                                                               | 881                                                                               | 556                                                                               |  |  |  |  |  |  |  |
|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Volume Total                      | 212                                                                               | 158                                                                               | 7                                                                                 | 37                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Volume Left                       | 45                                                                                | 0                                                                                 | 3                                                                                 | 22                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Volume Right                      | 7                                                                                 | 57                                                                                | 3                                                                                 | 12                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| cSH                               | 1422                                                                              | 1411                                                                              | 642                                                                               | 635                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Volume to Capacity                | 0.03                                                                              | 0.00                                                                              | 0.01                                                                              | 0.06                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Queue Length 95th (m)             | 0.8                                                                               | 0.0                                                                               | 0.3                                                                               | 1.5                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Control Delay (s)                 | 1.8                                                                               | 0.0                                                                               | 10.7                                                                              | 11.0                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Lane LOS                          | A                                                                                 | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Approach Delay (s)                | 1.8                                                                               | 0.0                                                                               | 10.7                                                                              | 11.0                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Approach LOS                      | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Average Delay                     |                                                                                   |                                                                                   |                                                                                   | 2.1                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Intersection Capacity Utilization |                                                                                   |                                                                                   |                                                                                   | 31.8%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Analysis Period (min)             |                                                                                   |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |

## Lanes, Volumes, Timings

## 4: Hurontario Street &amp; Campbell Street

04/18/2018

|                         | ↖     | →     | ↗    | ↖     | ←     | ↖    | ↖     | ↖     | ↖    | ↖     | ↖     | ↖    |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|
| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  |
| Lane Configurations     |       | ↔     |      |       | ↔     |      | ↔     | ↔     |      | ↔     | ↔     |      |
| Traffic Volume (vph)    | 36    | 43    | 18   | 15    | 45    | 16   | 42    | 400   | 11   | 18    | 425   | 78   |
| Future Volume (vph)     | 36    | 43    | 18   | 15    | 45    | 16   | 42    | 400   | 11   | 18    | 425   | 78   |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |
| Lane Width (m)          | 3.6   | 3.6   | 3.6  | 3.6   | 3.6   | 3.6  | 3.6   | 3.6   | 3.6  | 3.6   | 3.6   | 3.6  |
| Grade (%)               |       | 0%    |      |       | 0%    |      |       | 0%    |      |       | 0%    |      |
| Storage Length (m)      | 0.0   |       | 0.0  | 0.0   |       | 0.0  | 61.0  |       | 0.0  | 50.0  |       | 0.0  |
| Storage Lanes           | 0     |       | 0    | 0     |       | 0    | 1     |       | 0    | 1     |       | 0    |
| Taper Length (m)        | 7.5   |       |      | 7.5   |       |      | 7.5   |       |      | 7.5   |       |      |
| Lane Util. Factor       | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 |
| Ped Bike Factor         |       |       |      |       |       |      |       |       |      |       |       |      |
| Frt                     |       | 0.975 |      |       | 0.972 |      |       | 0.996 |      |       | 0.977 |      |
| Flt Protected           |       | 0.982 |      |       | 0.990 |      | 0.950 |       |      | 0.950 |       |      |
| Satd. Flow (prot)       | 0     | 1783  | 0    | 0     | 1792  | 0    | 1770  | 1855  | 0    | 1770  | 1820  | 0    |
| Flt Permitted           |       | 0.844 |      |       | 0.911 |      | 0.427 |       |      | 0.498 |       |      |
| Satd. Flow (perm)       | 0     | 1533  | 0    | 0     | 1649  | 0    | 795   | 1855  | 0    | 928   | 1820  | 0    |
| Right Turn on Red       |       |       | Yes  |       |       | Yes  |       |       | Yes  |       |       | Yes  |
| Satd. Flow (RTOR)       |       | 20    |      |       | 17    |      |       | 3     |      |       | 22    |      |
| Link Speed (k/h)        |       | 50    |      |       | 50    |      |       | 50    |      |       | 50    |      |
| Link Distance (m)       |       | 240.3 |      |       | 173.8 |      |       | 184.6 |      |       | 148.9 |      |
| Travel Time (s)         |       | 17.3  |      |       | 12.5  |      |       | 13.3  |      |       | 10.7  |      |
| Confl. Peds. (#/hr)     |       |       |      |       |       |      |       |       |      |       |       |      |
| Confl. Bikes (#/hr)     |       |       |      |       |       |      |       |       |      |       |       |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |
| Growth Factor           | 100%  | 100%  | 100% | 100%  | 100%  | 100% | 100%  | 100%  | 100% | 100%  | 100%  | 100% |
| Heavy Vehicles (%)      | 2%    | 2%    | 2%   | 2%    | 2%    | 2%   | 2%    | 2%    | 2%   | 2%    | 2%    | 2%   |
| Bus Blockages (#/hr)    | 0     | 0     | 0    | 0     | 0     | 0    | 0     | 0     | 0    | 0     | 0     | 0    |
| Parking (#/hr)          |       |       |      |       |       |      |       |       |      |       |       |      |
| Mid-Block Traffic (%)   |       | 0%    |      |       | 0%    |      |       | 0%    |      |       | 0%    |      |
| Adj. Flow (vph)         | 39    | 47    | 20   | 16    | 49    | 17   | 46    | 435   | 12   | 20    | 462   | 85   |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |
| Lane Group Flow (vph)   | 0     | 106   | 0    | 0     | 82    | 0    | 46    | 447   | 0    | 20    | 547   | 0    |
| Number of Detectors     | 1     | 1     |      | 1     | 1     |      | 1     | 0     |      | 1     | 0     |      |
| Detector Template       | Left  | Thru  |      | Left  | Thru  |      | Left  |       |      | Left  |       |      |
| Leading Detector (m)    | 2.0   | 7.5   |      | 2.0   | 7.5   |      | 7.5   | 0.0   |      | 7.5   | 0.0   |      |
| Trailing Detector (m)   | 0.0   | -1.5  |      | 0.0   | -1.5  |      | -1.5  | 0.0   |      | -1.5  | 0.0   |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      |
| Protected Phases        |       | 4     |      |       | 8     |      |       | 2     |      |       | 6     |      |
| Permitted Phases        | 4     |       |      | 8     |       |      | 2     |       |      | 6     |       |      |
| Detector Phase          | 4     | 4     |      | 8     | 8     |      | 2     | 2     |      | 6     | 6     |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |
| Minimum Initial (s)     | 7.0   | 7.0   |      | 7.0   | 7.0   |      | 30.2  | 30.2  |      | 30.2  | 30.2  |      |
| Minimum Split (s)       | 23.7  | 23.7  |      | 23.7  | 23.7  |      | 36.0  | 36.0  |      | 36.0  | 36.0  |      |
| Total Split (s)         | 24.0  | 24.0  |      | 24.0  | 24.0  |      | 36.0  | 36.0  |      | 36.0  | 36.0  |      |
| Total Split (%)         | 40.0% | 40.0% |      | 40.0% | 40.0% |      | 60.0% | 60.0% |      | 60.0% | 60.0% |      |
| Maximum Green (s)       | 18.3  | 18.3  |      | 18.3  | 18.3  |      | 30.2  | 30.2  |      | 30.2  | 30.2  |      |
| Yellow Time (s)         | 3.3   | 3.3   |      | 3.3   | 3.3   |      | 3.3   | 3.3   |      | 3.3   | 3.3   |      |
| All-Red Time (s)        | 2.4   | 2.4   |      | 2.4   | 2.4   |      | 2.5   | 2.5   |      | 2.5   | 2.5   |      |
| Lost Time Adjust (s)    |       | 0.0   |      |       | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |

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## Lanes, Volumes, Timings

## 4: Hurontario Street &amp; Campbell Street

04/18/2018

|                         | ↖    | →     | ↗   | ↖    | ←     | ↖   | ↖    | ↖     | ↖   | ↖    | ↖     | ↖   |
|-------------------------|------|-------|-----|------|-------|-----|------|-------|-----|------|-------|-----|
| Lane Group              | EBL  | EBT   | EBR | WBL  | WBT   | WBR | NBL  | NBT   | NBR | SBL  | SBT   | SBR |
| Total Lost Time (s)     |      | 5.7   |     |      | 5.7   |     |      | 5.8   | 5.8 |      | 5.8   | 5.8 |
| Lead/Lag                |      |       |     |      |       |     |      |       |     |      |       |     |
| Lead-Lag Optimize?      |      |       |     |      |       |     |      |       |     |      |       |     |
| Vehicle Extension (s)   | 3.0  | 3.0   |     | 3.0  | 3.0   |     | 0.2  | 0.2   |     | 0.2  | 0.2   |     |
| Minimum Gap (s)         | 3.0  | 3.0   |     | 3.0  | 3.0   |     | 3.0  | 3.0   |     | 3.0  | 3.0   |     |
| Time Before Reduce (s)  | 0.0  | 0.0   |     | 0.0  | 0.0   |     | 0.0  | 0.0   |     | 0.0  | 0.0   |     |
| Time To Reduce (s)      | 0.0  | 0.0   |     | 0.0  | 0.0   |     | 0.0  | 0.0   |     | 0.0  | 0.0   |     |
| Recall Mode             | None | None  |     | None | None  |     | Max  | Max   |     | Max  | Max   |     |
| Walk Time (s)           | 7.0  | 7.0   |     | 7.0  | 7.0   |     | 16.0 | 16.0  |     | 16.0 | 16.0  |     |
| Flash Dont Walk (s)     | 11.0 | 11.0  |     | 11.0 | 11.0  |     | 14.0 | 14.0  |     | 14.0 | 14.0  |     |
| Pedestrian Calls (#/hr) | 0    | 0     |     | 0    | 0     |     | 0    | 0     |     | 0    | 0     |     |
| Act Effect Green (s)    |      | 8.6   |     |      | 8.6   |     | 34.5 | 34.5  |     | 34.5 | 34.5  |     |
| Actuated g/C Ratio      |      | 0.17  |     |      | 0.17  |     | 0.68 | 0.68  |     | 0.68 | 0.68  |     |
| v/c Ratio               |      | 0.39  |     |      | 0.28  |     | 0.09 | 0.36  |     | 0.03 | 0.44  |     |
| Control Delay           |      | 19.9  |     |      | 17.6  |     | 5.4  | 6.2   |     | 4.9  | 6.9   |     |
| Queue Delay             |      | 0.0   |     |      | 0.0   |     | 0.0  | 0.0   |     | 0.0  | 0.0   |     |
| Total Delay             |      | 19.9  |     |      | 17.6  |     | 5.4  | 6.2   |     | 4.9  | 6.9   |     |
| LOS                     |      | B     |     |      | B     |     | A    | A     |     | A    | A     |     |
| Approach Delay          |      | 19.9  |     |      | 17.6  |     |      | 6.2   |     |      | 6.8   |     |
| Approach LOS            |      | B     |     |      | B     |     |      | A     |     |      | A     |     |
| Queue Length 50th (m)   |      | 7.2   |     |      | 5.4   |     | 1.5  | 17.6  |     | 0.6  | 22.3  |     |
| Queue Length 95th (m)   |      | 18.3  |     |      | 14.9  |     | 5.6  | 38.5  |     | 3.0  | 49.4  |     |
| Internal Link Dist (m)  |      | 216.3 |     |      | 149.8 |     |      | 160.6 |     |      | 124.9 |     |
| Turn Bay Length (m)     |      |       |     |      |       |     | 61.0 |       |     | 50.0 |       |     |
| Base Capacity (vph)     |      | 564   |     |      | 604   |     | 538  | 1258  |     | 628  | 1240  |     |
| Starvation Cap Reductn  |      | 0     |     |      | 0     |     | 0    | 0     |     | 0    | 0     |     |
| Spillback Cap Reductn   |      | 0     |     |      | 0     |     | 0    | 0     |     | 0    | 0     |     |
| Storage Cap Reductn     |      | 0     |     |      | 0     |     | 0    | 0     |     | 0    | 0     |     |
| Reduced v/c Ratio       |      | 0.19  |     |      | 0.14  |     | 0.09 | 0.36  |     | 0.03 | 0.44  |     |

## Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 50.9

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.44

Intersection Signal Delay: 8.4

Intersection LOS: A

Intersection Capacity Utilization 54.0%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: Hurontario Street &amp; Campbell Street



Existing P.M. Peak Hour 04/13/2018

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# HCM Unsignalized Intersection Capacity Analysis

2: Maple Street & Campbell Street

04/18/2018

|                        |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement               | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               | SBR                                                                               |
| Lane Configurations    |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |
| Traffic Volume (veh/h) | 12                                                                                | 74                                                                                | 3                                                                                 | 1                                                                                 | 136                                                                               | 29                                                                                | 2                                                                                 | 0                                                                                 | 1                                                                                 | 21                                                                                | 1                                                                                 | 41                                                                                |
| Future Volume (Veh/h)  | 12                                                                                | 74                                                                                | 3                                                                                 | 1                                                                                 | 136                                                                               | 29                                                                                | 2                                                                                 | 0                                                                                 | 1                                                                                 | 21                                                                                | 1                                                                                 | 41                                                                                |
| Sign Control           | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   |
| Grade                  | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   |
| Peak Hour Factor       | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph) | 13                                                                                | 80                                                                                | 3                                                                                 | 1                                                                                 | 148                                                                               | 32                                                                                | 2                                                                                 | 0                                                                                 | 1                                                                                 | 23                                                                                | 1                                                                                 | 45                                                                                |
| Pedestrians            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (m)         |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (m/s)    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh) |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type            | None                                                                              |                                                                                   |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median storage (veh)   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (m)    | 240                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume | 180                                                                               |                                                                                   |                                                                                   |                                                                                   | 83                                                                                |                                                                                   |                                                                                   |                                                                                   | 319                                                                               | 290                                                                               | 82                                                                                | 274                                                                               |
| vC1, stage 1 conf vol  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol     | 180                                                                               |                                                                                   |                                                                                   |                                                                                   | 83                                                                                |                                                                                   |                                                                                   |                                                                                   | 319                                                                               | 290                                                                               | 82                                                                                | 274                                                                               |
| tC, single (s)         | 4.1                                                                               |                                                                                   |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   |                                                                                   | 7.1                                                                               | 6.5                                                                               | 6.2                                                                               | 7.1                                                                               |
| tC, 2 stage (s)        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                 | 2.2                                                                               |                                                                                   |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   |                                                                                   | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               |
| p0 queue free %        | 99                                                                                |                                                                                   |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   |                                                                                   | 100                                                                               | 100                                                                               | 97                                                                                | 100                                                                               |
| cM capacity (veh/h)    | 1408                                                                              |                                                                                   |                                                                                   |                                                                                   | 1527                                                                              |                                                                                   |                                                                                   |                                                                                   | 600                                                                               | 615                                                                               | 984                                                                               | 676                                                                               |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
|                        |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
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# APPENDIX

## F

BACKGROUND  
TRAFFIC  
VOLUME

Trip Generation for Mountaincroft Subdivision Phase IV

| Use & Units                     | ITE Category<br>(ITE Code)              | Independent variable | Statistics            |        |       |                              |        |       |
|---------------------------------|-----------------------------------------|----------------------|-----------------------|--------|-------|------------------------------|--------|-------|
|                                 |                                         |                      | Weekday A.M Peak hour |        |       | Weekday P.M. Peak Hour       |        |       |
|                                 |                                         |                      | Inbd.                 | Outbd. | Total | Inbd.                        | Outbd. | Total |
| Residential Development<br>(61) | Single-Family Detached Housing<br>(210) |                      | $T = 0.7 X + 9.74$    |        |       | $\ln(T) = 0.9 \ln(X) + 0.51$ |        |       |
|                                 |                                         | Directional Split    | 26 %                  | 74%    | 100%  | 64%                          | 36%    | 100%  |
|                                 |                                         | Trips                | 14                    | 41     | 55    | 44                           | 25     | 69    |

May 27, 2011  
Our Ref: T10-614

1579669 Ontario Inc.  
c/o Liberty Development Corporation  
1 Steelcase Road West, Unit 8  
Markham, ON L3R 0T3

**Liberty Pretty River Estate  
Phase II**

**Attention: Mr. Wayne Long**

Dear Mr. Long:

**Re: Traffic Brief  
Pretty River Phase 2 Development  
Town of Collingwood**

## 1.0 Introduction

Cole Engineering Group Ltd. ("Cole Engineering") was retained by 1579669 Ontario Inc. (the "Owner") to prepare a Traffic Brief in support of the Pretty River Phase 2 development located in the Town of Collingwood (Town). The proposed residential development is bounded by Poplar Sideroad to the south, a proposed north-south collector roadway to the west, Pretty River Phase 1 to the north and a railway line to the east. The site location is provided in **Figure 1-1**.



**Figure 1-1 Site Location**

## Trip Generation Liberty Pretty River Estate Phase II

### 3.0 Trip Generation

The impact of the development is reviewed through trip generation using data contained in *Trip Generation, 8<sup>th</sup> Edition* published by the Institute of Transportation Engineers (ITE) for *Residential Condominium / Townhouse* (land use 230) and *Single-Family Detached Housing* (land use 210). To obtain a conservative trip generation rate, each parcel was treated as a separate development, and the **equation trip generation** rate was applied. No modal split reduction was applied to the trip generation. The trip generation for the proposed Pretty River Phase 2 development is summarized in **Table 2.1**.

**Table 2.1 – Trip Generation – Subject Site**

| Land Use                                                         | Parameter                    | AM Peak   |           |           | PM Peak   |           |            |
|------------------------------------------------------------------|------------------------------|-----------|-----------|-----------|-----------|-----------|------------|
|                                                                  |                              | IN        | OUT       | TOTAL     | IN        | OUT       | TOTAL      |
| Parcel 1<br>Residential Condominium /<br>Townhouse<br>(90 Units) | Gross Rate<br>(trips / unit) | 0.09      | 0.43      | 0.52      | 0.41      | 0.20      | 0.61       |
|                                                                  | Gross Trips                  | 8         | 39        | 47        | 37        | 18        | 55         |
| Parcel 2<br>Single-Family Detached<br>Housing<br>(21 Units)      | Gross Rate<br>(trips / unit) | 0.29      | 0.85      | 1.14      | 0.78      | 0.46      | 1.24       |
|                                                                  | Gross Trips                  | 6         | 18        | 24        | 16        | 10        | 26         |
| Parcel 3<br>Residential Condominium /<br>Townhouse<br>(41 Units) | Gross Rate<br>(trips / unit) | 0.10      | 0.51      | 0.61      | 0.48      | 0.23      | 0.71       |
|                                                                  | Gross Trips                  | 4         | 21        | 25        | 19        | 10        | 29         |
| <b>Total<br/>(156 Residential Units)</b>                         | <b>New Trips</b>             | <b>18</b> | <b>78</b> | <b>96</b> | <b>72</b> | <b>38</b> | <b>110</b> |

The Pretty River Phase 2 development is expected to generate 96 two-way (18 inbound and 78 outbound) trips during the a.m. peak hour and 110 two-way (72 inbound and 38 outbound) trips during the p.m. peak hour. Of these trips, only 24 trips during the a.m. peak hour and 26 trips during the p.m. peak hour will have direct access to Poplar Sideroad. Based on knowledge and traffic operations in the area, the Parcel 3 access to Poplar Sideroad is expected to operate in an acceptable fashion in an unsignalized traffic configuration as the critical outbound movement is expected to be 16 and 8 trips during the a.m. and p.m. peak hours, respectively.

The remaining 72 (12 inbound and 60 outbound) trips during the a.m. peak hour and 84 (56 inbound and 28 outbound) trips during the p.m. peak hour will have roadway access via either the proposed north-south collector roadway or Hurontario Street and are not expected to add significant delay or reduce expected levels of operations significantly.

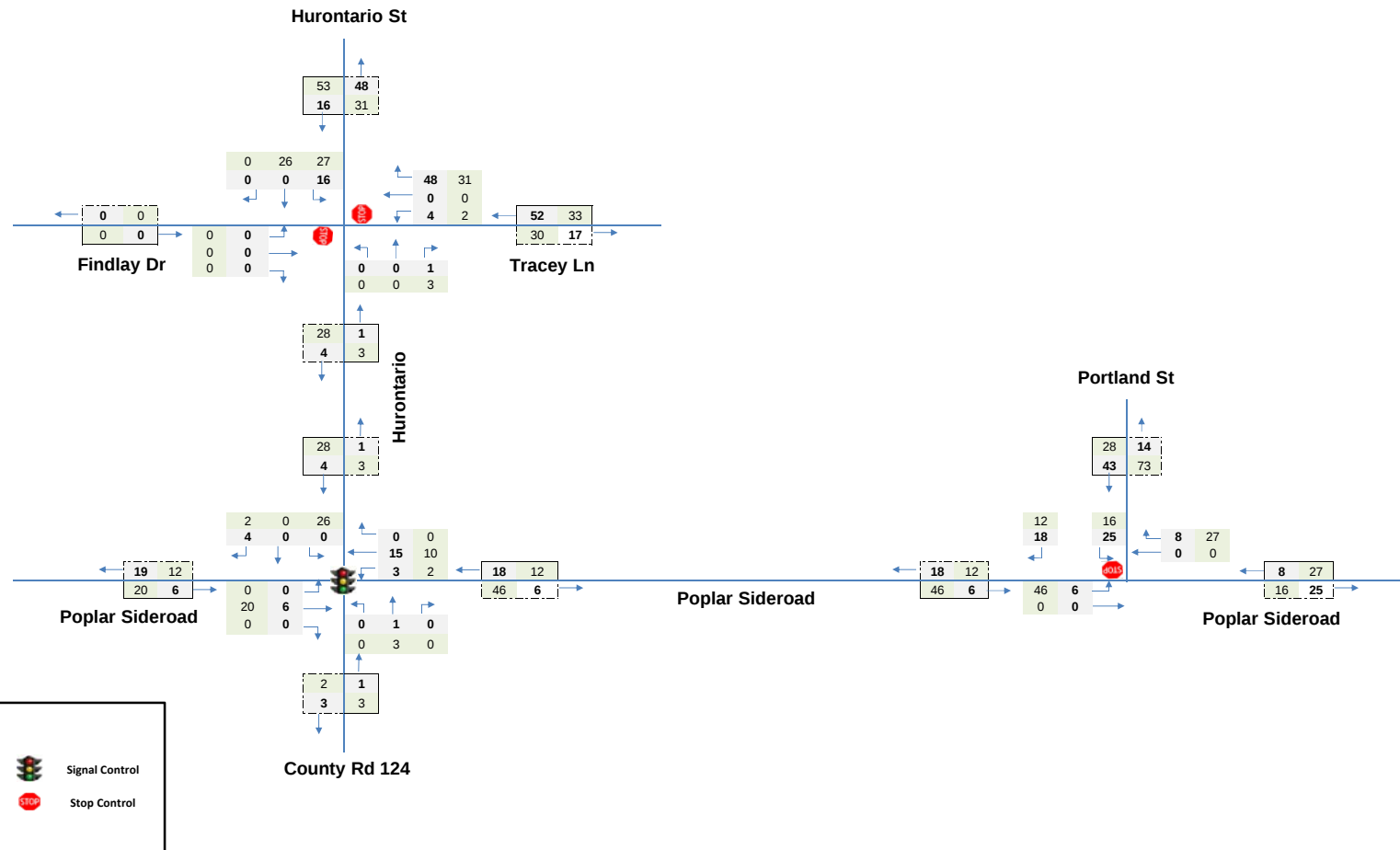


Figure 5-1 Site Traffic Volumes (2021)  
Eden Oak Homes - Proposed Residential Subdivision  
Town of Collingwood  
May 2016

# APPENDIX

## G

FUTURE  
BACKGROUND  
TRAFFIC  
CONDITIONS  
ANALYSIS  
SYCNHRO  
OUTPUT SHEETS

## Lanes, Volumes, Timings

1: Hurontario Street &amp; Campbell Street

04/18/2018

|                         | ←     | →     | ↖    | ↗     | ←     | →    | ↖     | ↗     | ←     | →     | ↖     | ↗    |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|-------|-------|-------|------|
| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR   | SBL   | SBT   | SBR  |
| Lane Configurations     |       | ↔     |      |       | ↔     |      | ↔     | ↔     |       | ↔     | ↔     |      |
| Traffic Volume (vph)    | 51    | 65    | 58   | 54    | 47    | 30   | 65    | 661   | 82    | 22    | 290   | 30   |
| Future Volume (vph)     | 51    | 65    | 58   | 54    | 47    | 30   | 65    | 661   | 82    | 22    | 290   | 30   |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900  | 1900  | 1900  | 1900 |
| Lane Width (m)          | 3.6   | 3.6   | 3.6  | 3.6   | 3.6   | 3.6  | 3.6   | 3.6   | 3.6   | 3.6   | 3.6   | 3.6  |
| Grade (%)               | 0%    |       | 0%   |       | 0%    |      | 0%    |       | 0%    |       | 0%    |      |
| Storage Length (m)      | 0.0   |       | 0.0  | 0.0   |       | 0.0  | 61.0  |       | 0.0   | 50.0  |       | 0.0  |
| Storage Lanes           | 0     |       | 0    | 0     |       | 0    | 1     |       | 0     | 1     |       | 0    |
| Taper Length (m)        | 7.5   |       |      | 7.5   |       |      | 7.5   |       |       | 7.5   |       |      |
| Lane Util. Factor       | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00  | 1.00  | 1.00  | 1.00 |
| Ped Bike Factor         | 0.98  |       |      |       | 0.99  |      | 0.99  |       | 1.00  |       | 1.00  |      |
| Frt                     | 0.955 |       |      |       | 0.969 |      | 0.983 |       |       |       | 0.986 |      |
| Flt Protected           | 0.986 |       |      |       | 0.980 |      | 0.950 |       | 0.950 |       |       |      |
| Satd. Flow (prot)       | 0     | 1725  | 0    | 0     | 1592  | 0    | 1736  | 1730  | 0     | 1719  | 1736  | 0    |
| Flt Permitted           | 0.885 |       |      |       | 0.800 |      | 0.552 |       | 0.241 |       |       |      |
| Satd. Flow (perm)       | 0     | 1536  | 0    | 0     | 1297  | 0    | 1002  | 1730  | 0     | 436   | 1736  | 0    |
| Right Turn on Red       |       |       | Yes  |       |       |      | Yes   |       | Yes   |       | Yes   |      |
| Satd. Flow (RTOR)       | 43    |       |      |       | 26    |      | 15    |       |       |       | 13    |      |
| Link Speed (k/h)        | 50    |       |      |       | 50    |      | 50    |       |       |       | 50    |      |
| Link Distance (m)       | 240.3 |       |      |       | 173.8 |      | 184.6 |       |       |       | 148.9 |      |
| Travel Time (s)         | 17.3  |       |      |       | 12.5  |      | 13.3  |       |       |       | 10.7  |      |
| Confl. Peds. (#/hr)     | 20    |       | 5    |       | 5     |      | 20    |       | 11    |       | 5     |      |
| Confl. Bikes (#/hr)     |       |       |      |       |       |      |       |       |       |       |       |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92  | 0.92  | 0.92  | 0.92 |
| Growth Factor           | 100%  | 100%  | 100% | 100%  | 100%  | 100% | 100%  | 100%  | 100%  | 100%  | 100%  | 100% |
| Heavy Vehicles (%)      | 2%    | 4%    | 2%   | 19%   | 5%    | 10%  | 4%    | 7%    | 13%   | 5%    | 8%    | 4%   |
| Bus Blockages (#/hr)    | 0     | 0     | 0    | 0     | 0     | 0    | 0     | 0     | 0     | 0     | 0     | 0    |
| Parking (#/hr)          |       |       |      |       |       |      |       |       |       |       |       |      |
| Mid-Block Traffic (%)   | 0%    |       |      |       | 0%    |      | 0%    |       | 0%    |       | 0%    |      |
| Adj. Flow (vph)         | 55    | 71    | 63   | 59    | 51    | 33   | 71    | 718   | 89    | 24    | 315   | 33   |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |       |       |       |      |
| Lane Group Flow (vph)   | 0     | 189   | 0    | 0     | 143   | 0    | 71    | 807   | 0     | 24    | 348   | 0    |
| Number of Detectors     | 1     | 1     |      | 1     | 1     |      | 1     | 0     |       | 1     | 0     |      |
| Detector Template       | Left  |       | Left |       |       |      |       |       |       |       |       |      |
| Leading Detector (m)    | 2.0   | 7.5   |      | 2.0   | 7.5   |      | 7.5   | 0.0   |       | 7.5   | 0.0   |      |
| Trailing Detector (m)   | 0.0   | -1.5  |      | 0.0   | -1.5  |      | -1.5  | 0.0   |       | -1.5  | 0.0   |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |       | Perm  | NA    |      |
| Protected Phases        | 4     |       | 8    |       | 8     |      | 2     |       | 6     |       | 6     |      |
| Permitted Phases        | 4     |       | 8    |       | 8     |      | 2     |       | 6     |       | 6     |      |
| Detector Phase          | 4     | 4     |      | 8     | 8     |      | 2     | 2     |       | 6     | 6     |      |
| Switch Phase            |       |       |      |       |       |      |       |       |       |       |       |      |
| Minimum Initial (s)     | 7.0   | 7.0   |      | 7.0   | 7.0   |      | 30.2  | 30.2  |       | 30.2  | 30.2  |      |
| Minimum Split (s)       | 23.7  | 23.7  |      | 23.7  | 23.7  |      | 36.0  | 36.0  |       | 36.0  | 36.0  |      |
| Total Split (s)         | 24.0  | 24.0  |      | 24.0  | 24.0  |      | 36.0  | 36.0  |       | 36.0  | 36.0  |      |
| Total Split (%)         | 40.0% | 40.0% |      | 40.0% | 40.0% |      | 60.0% | 60.0% |       | 60.0% | 60.0% |      |
| Maximum Green (s)       | 18.3  | 18.3  |      | 18.3  | 18.3  |      | 30.2  | 30.2  |       | 30.2  | 30.2  |      |
| Yellow Time (s)         | 3.3   | 3.3   |      | 3.3   | 3.3   |      | 3.3   | 3.3   |       | 3.3   | 3.3   |      |
| All-Red Time (s)        | 2.4   | 2.4   |      | 2.4   | 2.4   |      | 2.5   | 2.5   |       | 2.5   | 2.5   |      |
| Lost Time Adjust (s)    | 0.0   |       |      |       | 0.0   |      | 0.0   |       | 0.0   |       | 0.0   |      |

Future Background A.M. Peak Hour 04/13/2018

Synchro 9 Report  
Page 1

## Lanes, Volumes, Timings

1: Hurontario Street &amp; Campbell Street

04/18/2018

|                         |  |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Lane Group              | EBL                                                                                 | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | WBR                                                                                 | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Total Lost Time (s)     | 5.7                                                                                 |                                                                                     |                                                                                     | 5.7                                                                                 |                                                                                     |                                                                                     | 5.8                                                                                 |                                                                                     | 5.8                                                                                 |                                                                                     | 5.8                                                                                 |                                                                                     |
| Lead/Lag                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lead-Lag Optimize?      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Vehicle Extension (s)   | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 0.2                                                                                 | 0.2                                                                                 |                                                                                     | 0.2                                                                                 | 0.2                                                                                 |                                                                                     |
| Minimum Gap (s)         | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     | 3.0                                                                                 | 3.0                                                                                 |                                                                                     |
| Time Before Reduce (s)  | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Time To Reduce (s)      | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     | 0.0                                                                                 | 0.0                                                                                 |                                                                                     |
| Recall Mode             | None                                                                                | None                                                                                |                                                                                     | None                                                                                | None                                                                                |                                                                                     | Max                                                                                 | Max                                                                                 |                                                                                     | Max                                                                                 | Max                                                                                 |                                                                                     |
| Walk Time (s)           | 7.0                                                                                 | 7.0                                                                                 |                                                                                     | 7.0                                                                                 | 7.0                                                                                 |                                                                                     | 16.0                                                                                | 16.0                                                                                |                                                                                     | 16.0                                                                                | 16.0                                                                                |                                                                                     |
| Flash Dont Walk (s)     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 11.0                                                                                | 11.0                                                                                |                                                                                     | 14.0                                                                                | 14.0                                                                                |                                                                                     | 14.0                                                                                | 14.0                                                                                |                                                                                     |
| Pedestrian Calls (#/hr) | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     | 0                                                                                   | 0                                                                                   |                                                                                     |
| Act Effct Green (s)     | 10.8                                                                                |                                                                                     |                                                                                     | 10.8                                                                                |                                                                                     |                                                                                     | 34.6                                                                                |                                                                                     | 34.6                                                                                |                                                                                     | 34.6                                                                                |                                                                                     |
| Actuated g/C Ratio      | 0.20                                                                                |                                                                                     |                                                                                     | 0.20                                                                                |                                                                                     |                                                                                     | 0.65                                                                                |                                                                                     | 0.65                                                                                |                                                                                     | 0.65                                                                                |                                                                                     |
| v/c Ratio               | 0.55                                                                                |                                                                                     |                                                                                     | 0.50                                                                                |                                                                                     |                                                                                     | 0.11                                                                                |                                                                                     | 0.71                                                                                |                                                                                     | 0.08                                                                                |                                                                                     |
| Control Delay           | 20.4                                                                                |                                                                                     |                                                                                     | 21.6                                                                                |                                                                                     |                                                                                     | 6.7                                                                                 |                                                                                     | 15.0                                                                                |                                                                                     | 7.4                                                                                 |                                                                                     |
| Queue Delay             | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     |                                                                                     | 0.0                                                                                 |                                                                                     | 0.0                                                                                 |                                                                                     | 0.0                                                                                 |                                                                                     |
| Total Delay             | 20.4                                                                                |                                                                                     |                                                                                     | 21.6                                                                                |                                                                                     |                                                                                     | 6.7                                                                                 |                                                                                     | 15.0                                                                                |                                                                                     | 7.4                                                                                 |                                                                                     |
| LOS                     | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     | B                                                                                   |                                                                                     | A                                                                                   |                                                                                     |
| Approach Delay          | 20.4                                                                                |                                                                                     |                                                                                     | 21.6                                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 14.3                                                                                |                                                                                     | 7.1                                                                                 |                                                                                     |
| Approach LOS            | C                                                                                   |                                                                                     |                                                                                     | C                                                                                   |                                                                                     |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |
| Queue Length 50th (m)   | 12.8                                                                                |                                                                                     |                                                                                     | 10.2                                                                                |                                                                                     |                                                                                     | 2.7                                                                                 |                                                                                     | 52.1                                                                                |                                                                                     | 0.9                                                                                 |                                                                                     |
| Queue Length 95th (m)   | 28.3                                                                                |                                                                                     |                                                                                     | 23.8                                                                                |                                                                                     |                                                                                     | 9.3                                                                                 |                                                                                     | #144.6                                                                              |                                                                                     | 4.6                                                                                 |                                                                                     |
| Internal Link Dist (m)  | 216.3                                                                               |                                                                                     |                                                                                     | 149.8                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 160.6                                                                               |                                                                                     | 124.9                                                                               |                                                                                     |
| Turn Bay Length (m)     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 61.0                                                                                |                                                                                     |                                                                                     |                                                                                     | 50.0                                                                                |                                                                                     |
| Base Capacity (vph)     | 559                                                                                 |                                                                                     |                                                                                     | 465                                                                                 |                                                                                     |                                                                                     | 653                                                                                 |                                                                                     | 1133                                                                                |                                                                                     | 284                                                                                 |                                                                                     |
| Starvation Cap Reductn  | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     | 0                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |
| Spillback Cap Reductn   | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     | 0                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |
| Storage Cap Reductn     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     |                                                                                     | 0                                                                                   |                                                                                     | 0                                                                                   |                                                                                     | 0                                                                                   |                                                                                     |
| Reduced v/c Ratio       | 0.34                                                                                |                                                                                     |                                                                                     | 0.31                                                                                |                                                                                     |                                                                                     | 0.11                                                                                |                                                                                     | 0.71                                                                                |                                                                                     | 0.08                                                                                |                                                                                     |

## Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 53.1

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.71

Intersection Signal Delay: 14.0

Intersection LOS: B

Intersection Capacity Utilization 76.9%

ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Hurontario Street &amp; Campbell Street



Future Background A.M. Peak Hour 04/13/2018

Synchro 9 Report  
Page 2

# HCM Unsignalized Intersection Capacity Analysis

## 2: Maple Street & Campbell Street

04/18/2018

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|--|--|--|--|--|--|--|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               | SBR                                                                               |  |  |  |  |  |  |  |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |  |  |  |  |  |  |  |
| Traffic Volume (veh/h)            | 41                                                                                | 163                                                                               | 6                                                                                 | 0                                                                                 | 103                                                                               | 52                                                                                | 3                                                                                 | 1                                                                                 | 3                                                                                 | 20                                                                                | 2                                                                                 | 11                                                                                |  |  |  |  |  |  |  |
| Future Volume (Veh/h)             | 41                                                                                | 163                                                                               | 6                                                                                 | 0                                                                                 | 103                                                                               | 52                                                                                | 3                                                                                 | 1                                                                                 | 3                                                                                 | 20                                                                                | 2                                                                                 | 11                                                                                |  |  |  |  |  |  |  |
| Sign Control                      | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |  |  |  |  |  |  |  |
| Hourly flow rate (vph)            | 45                                                                                | 177                                                                               | 7                                                                                 | 0                                                                                 | 112                                                                               | 57                                                                                | 3                                                                                 | 1                                                                                 | 3                                                                                 | 22                                                                                | 2                                                                                 | 12                                                                                |  |  |  |  |  |  |  |
| Pedestrians                       | 21                                                                                |                                                                                   |                                                                                   | 11                                                                                |                                                                                   |                                                                                   | 11                                                                                |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Lane Width (m)                    | 3.6                                                                               |                                                                                   |                                                                                   | 3.6                                                                               |                                                                                   |                                                                                   | 3.6                                                                               |                                                                                   |                                                                                   | 3.6                                                                               |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Walking Speed (m/s)               | 1.2                                                                               |                                                                                   |                                                                                   | 1.2                                                                               |                                                                                   |                                                                                   | 1.2                                                                               |                                                                                   |                                                                                   | 1.2                                                                               |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Percent Blockage                  | 2                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Median type                       | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Upstream signal (m)               | 240                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| vC, conflicting volume            | 177                                                                               |                                                                                   |                                                                                   |                                                                                   | 195                                                                               |                                                                                   |                                                                                   |                                                                                   | 456                                                                               | 458                                                                               | 202                                                                               | 434                                                                               |  |  |  |  |  |  |  |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| vCu, unblocked vol                | 177                                                                               |                                                                                   |                                                                                   |                                                                                   | 195                                                                               |                                                                                   |                                                                                   |                                                                                   | 456                                                                               | 458                                                                               | 202                                                                               | 434                                                                               |  |  |  |  |  |  |  |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   |                                                                                   | 7.1                                                                               | 6.5                                                                               | 6.2                                                                               | 7.1                                                                               |  |  |  |  |  |  |  |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   |                                                                                   | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               |  |  |  |  |  |  |  |
| p0 queue free %                   | 97                                                                                |                                                                                   |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   |                                                                                   | 99                                                                                | 100                                                                               | 100                                                                               | 96                                                                                |  |  |  |  |  |  |  |
| cM capacity (veh/h)               | 1402                                                                              |                                                                                   |                                                                                   |                                                                                   | 1365                                                                              |                                                                                   |                                                                                   |                                                                                   | 478                                                                               | 478                                                                               | 828                                                                               | 506                                                                               |  |  |  |  |  |  |  |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Volume Total                      | 229                                                                               | 169                                                                               | 7                                                                                 | 36                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Volume Left                       | 45                                                                                | 0                                                                                 | 3                                                                                 | 22                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Volume Right                      | 7                                                                                 | 57                                                                                | 3                                                                                 | 12                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| cSH                               | 1402                                                                              | 1365                                                                              | 584                                                                               | 585                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Volume to Capacity                | 0.03                                                                              | 0.00                                                                              | 0.01                                                                              | 0.06                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Queue Length 95th (m)             | 0.8                                                                               | 0.0                                                                               | 0.3                                                                               | 1.6                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Control Delay (s)                 | 1.7                                                                               | 0.0                                                                               | 11.2                                                                              | 11.6                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Lane LOS                          | A                                                                                 | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Approach Delay (s)                | 1.7                                                                               | 0.0                                                                               | 11.2                                                                              | 11.6                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Approach LOS                      | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Average Delay                     |                                                                                   |                                                                                   |                                                                                   | 2.0                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Intersection Capacity Utilization |                                                                                   |                                                                                   |                                                                                   | 40.2%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |
| Analysis Period (min)             |                                                                                   |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |  |  |  |  |  |  |  |

# HCM Unsignalized Intersection Capacity Analysis

## 2: Maple Street & Campbell Street

04/27/2018

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                 | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                     |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (veh/h)            | 12                                                                                | 82                                                                                | 3                                                                                 | 1                                                                                 | 151                                                                               | 29                                                                                | 2                                                                                   | 0                                                                                   | 1                                                                                   | 21                                                                                  | 1                                                                                   | 41                                                                                  |
| Future Volume (Veh/h)             | 12                                                                                | 82                                                                                | 3                                                                                 | 1                                                                                 | 151                                                                               | 29                                                                                | 2                                                                                   | 0                                                                                   | 1                                                                                   | 21                                                                                  | 1                                                                                   | 41                                                                                  |
| Sign Control                      |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                     | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                     | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 13                                                                                | 89                                                                                | 3                                                                                 | 1                                                                                 | 164                                                                               | 32                                                                                | 2                                                                                   | 0                                                                                   | 1                                                                                   | 23                                                                                  | 1                                                                                   | 45                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (m)                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (m/s)               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       |                                                                                   | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (m)               |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 240                                                                               |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 196                                                                               |                                                                                   |                                                                                   | 92                                                                                |                                                                                   |                                                                                   | 344                                                                                 | 314                                                                                 | 90                                                                                  | 300                                                                                 | 300                                                                                 | 180                                                                                 |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 196                                                                               |                                                                                   |                                                                                   | 92                                                                                |                                                                                   |                                                                                   | 344                                                                                 | 314                                                                                 | 90                                                                                  | 300                                                                                 | 300                                                                                 | 180                                                                                 |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 |
| p0 queue free %                   | 99                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   | 100                                                                                 | 100                                                                                 | 100                                                                                 | 96                                                                                  | 100                                                                                 | 95                                                                                  |
| cM capacity (veh/h)               | 1389                                                                              |                                                                                   |                                                                                   | 1515                                                                              |                                                                                   |                                                                                   | 577                                                                                 | 595                                                                                 | 973                                                                                 | 651                                                                                 | 610                                                                                 | 868                                                                                 |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 105                                                                               | 197                                                                               | 3                                                                                 | 69                                                                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 13                                                                                | 1                                                                                 | 2                                                                                 | 23                                                                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 3                                                                                 | 32                                                                                | 1                                                                                 | 45                                                                                |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 1389                                                                              | 1515                                                                              | 668                                                                               | 777                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.01                                                                              | 0.00                                                                              | 0.00                                                                              | 0.09                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (m)             | 0.2                                                                               | 0.0                                                                               | 0.1                                                                               | 2.3                                                                               |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 1.0                                                                               | 0.0                                                                               | 10.4                                                                              | 10.1                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | A                                                                                 | A                                                                                 | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 1.0                                                                               | 0.0                                                                               | 10.4                                                                              | 10.1                                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      |                                                                                   |                                                                                   | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 2.3                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 23.8%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# Lanes, Volumes, Timings

1: Hurontario Street & Campbell Street

04/18/2018

|                         | ←     | →     | ↖    | ↗     | ←     | →    | ↖     | ↗     | ←    | →     | ↖     | ↗    |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|
| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  |
| Lane Configurations     |       | ↔     |      |       | ↔     |      | ↔     | ↔     |      | ↔     | ↔     |      |
| Traffic Volume (vph)    | 36    | 48    | 18   | 15    | 45    | 16   | 42    | 496   | 11   | 18    | 569   | 78   |
| Future Volume (vph)     | 36    | 48    | 18   | 15    | 45    | 16   | 42    | 496   | 11   | 18    | 569   | 78   |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |
| Lane Width (m)          | 3.6   | 3.6   | 3.6  | 3.6   | 3.6   | 3.6  | 3.6   | 3.6   | 3.6  | 3.6   | 3.6   | 3.6  |
| Grade (%)               | 0%    |       | 0%   |       | 0%    |      | 0%    |       | 0%   |       | 0%    |      |
| Storage Length (m)      | 0.0   |       | 0.0  | 0.0   |       | 0.0  | 61.0  |       | 0.0  | 50.0  |       | 0.0  |
| Storage Lanes           | 0     |       | 0    | 0     |       | 0    | 1     |       | 0    | 1     |       | 0    |
| Taper Length (m)        | 7.5   |       |      | 7.5   |       |      | 7.5   |       |      | 7.5   |       |      |
| Lane Util. Factor       | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 |
| Ped Bike Factor         | 0.99  |       |      |       | 0.99  |      | 1.00  | 1.00  |      | 1.00  |       | 1.00 |
| Frt                     | 0.976 |       |      |       | 0.972 |      |       | 0.997 |      |       | 0.982 |      |
| Flt Protected           | 0.983 |       |      |       | 0.990 |      | 0.950 |       |      | 0.950 |       |      |
| Satd. Flow (prot)       | 0     | 1814  | 0    | 0     | 1686  | 0    | 1805  | 1791  | 0    | 1410  | 1748  | 0    |
| Flt Permitted           |       | 0.850 |      |       | 0.916 |      | 0.323 |       |      | 0.424 |       |      |
| Satd. Flow (perm)       | 0     | 1565  | 0    | 0     | 1558  | 0    | 613   | 1791  | 0    | 627   | 1748  | 0    |
| Right Turn on Red       |       | Yes   |      |       |       | Yes  |       |       | Yes  |       |       | Yes  |
| Satd. Flow (RTOR)       |       | 19    |      |       | 17    |      |       | 3     |      |       | 17    |      |
| Link Speed (k/h)        |       | 50    |      |       | 50    |      |       | 50    |      |       | 50    |      |
| Link Distance (m)       |       | 240.3 |      |       | 173.8 |      |       | 184.6 |      |       | 148.9 |      |
| Travel Time (s)         |       | 17.3  |      |       | 12.5  |      |       | 13.3  |      |       | 10.7  |      |
| Confl. Peds. (#/hr)     | 4     |       | 5    | 5     |       | 4    | 6     |       | 8    | 8     |       | 6    |
| Confl. Bikes (#/hr)     |       |       |      |       |       |      |       |       |      |       |       |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |
| Growth Factor           | 100%  | 100%  | 100% | 100%  | 100%  | 100% | 100%  | 100%  | 100% | 100%  | 100%  | 100% |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 20%   | 0%    | 19%  | 0%    | 5%    | 37%  | 28%   | 7%    | 2%   |
| Bus Blockages (#/hr)    | 0     | 0     | 0    | 0     | 0     | 0    | 0     | 0     | 0    | 0     | 0     | 0    |
| Parking (#/hr)          |       |       |      |       |       |      |       |       |      |       |       |      |
| Mid-Block Traffic (%)   |       | 0%    |      |       | 0%    |      |       | 0%    |      |       | 0%    |      |
| Adj. Flow (vph)         | 39    | 52    | 20   | 16    | 49    | 17   | 46    | 539   | 12   | 20    | 618   | 85   |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |
| Lane Group Flow (vph)   | 0     | 111   | 0    | 0     | 82    | 0    | 46    | 551   | 0    | 20    | 703   | 0    |
| Number of Detectors     | 1     | 1     |      | 1     | 1     |      | 1     | 0     |      | 1     | 0     |      |
| Detector Template       | Left  | Thru  |      | Left  | Thru  |      | Left  |       |      | Left  |       |      |
| Leading Detector (m)    | 2.0   | 7.5   |      | 2.0   | 7.5   |      | 7.5   | 0.0   |      | 7.5   | 0.0   |      |
| Trailing Detector (m)   | 0.0   | -1.5  |      | 0.0   | -1.5  |      | -1.5  | 0.0   |      | -1.5  | 0.0   |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      |
| Protected Phases        |       | 4     |      |       | 8     |      |       | 2     |      |       | 6     |      |
| Permitted Phases        | 4     |       |      | 8     |       |      | 2     |       |      | 6     |       |      |
| Detector Phase          | 4     | 4     |      | 8     | 8     |      | 2     | 2     |      | 6     | 6     |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |
| Minimum Initial (s)     | 7.0   | 7.0   |      | 7.0   | 7.0   |      | 30.2  | 30.2  |      | 30.2  | 30.2  |      |
| Minimum Split (s)       | 23.7  | 23.7  |      | 23.7  | 23.7  |      | 36.0  | 36.0  |      | 36.0  | 36.0  |      |
| Total Split (s)         | 24.0  | 24.0  |      | 24.0  | 24.0  |      | 36.0  | 36.0  |      | 36.0  | 36.0  |      |
| Total Split (%)         | 40.0% | 40.0% |      | 40.0% | 40.0% |      | 60.0% | 60.0% |      | 60.0% | 60.0% |      |
| Maximum Green (s)       | 18.3  | 18.3  |      | 18.3  | 18.3  |      | 30.2  | 30.2  |      | 30.2  | 30.2  |      |
| Yellow Time (s)         | 3.3   | 3.3   |      | 3.3   | 3.3   |      | 3.3   | 3.3   |      | 3.3   | 3.3   |      |
| All-Red Time (s)        | 2.4   | 2.4   |      | 2.4   | 2.4   |      | 2.5   | 2.5   |      | 2.5   | 2.5   |      |
| Lost Time Adjust (s)    |       | 0.0   |      |       | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |

Future Background P.M. Peak Hour 04/13/2018

Synchro 9 Report  
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# Lanes, Volumes, Timings

1: Hurontario Street & Campbell Street

04/18/2018

|                         | ←    | →     | ↖   | ↗    | ←     | →   | ↖     | ↗    | ←   | →    | ↖     | ↗   |
|-------------------------|------|-------|-----|------|-------|-----|-------|------|-----|------|-------|-----|
| Lane Group              | EBL  | EBT   | EBR | WBL  | WBT   | WBR | NBL   | NBT  | NBR | SBL  | SBT   | SBR |
| Total Lost Time (s)     |      | 5.7   |     |      | 5.7   |     | 5.8   | 5.8  |     | 5.8  | 5.8   |     |
| Lead/Lag                |      |       |     |      |       |     |       |      |     |      |       |     |
| Lead-Lag Optimize?      |      |       |     |      |       |     |       |      |     |      |       |     |
| Vehicle Extension (s)   | 3.0  | 3.0   |     | 3.0  | 3.0   |     | 0.2   | 0.2  |     | 0.2  | 0.2   |     |
| Minimum Gap (s)         | 3.0  | 3.0   |     | 3.0  | 3.0   |     | 3.0   | 3.0  |     | 3.0  | 3.0   |     |
| Time Before Reduce (s)  | 0.0  | 0.0   |     | 0.0  | 0.0   |     | 0.0   | 0.0  |     | 0.0  | 0.0   |     |
| Time To Reduce (s)      | 0.0  | 0.0   |     | 0.0  | 0.0   |     | 0.0   | 0.0  |     | 0.0  | 0.0   |     |
| Recall Mode             | None | None  |     | None | None  |     | Max   | Max  |     | Max  | Max   |     |
| Walk Time (s)           | 7.0  | 7.0   |     | 7.0  | 7.0   |     | 16.0  | 16.0 |     | 16.0 | 16.0  |     |
| Flash Dont Walk (s)     | 11.0 | 11.0  |     | 11.0 | 11.0  |     | 14.0  | 14.0 |     | 14.0 | 14.0  |     |
| Pedestrian Calls (#/hr) | 0    | 0     |     | 0    | 0     |     | 0     | 0    |     | 0    | 0     |     |
| Act Effect Green (s)    |      | 8.7   |     |      | 8.7   |     | 34.4  | 34.4 |     | 34.4 | 34.4  |     |
| Actuated g/C Ratio      |      | 0.17  |     |      | 0.17  |     | 0.68  | 0.68 |     | 0.68 | 0.68  |     |
| v/c Ratio               |      | 0.39  |     |      | 0.29  |     | 0.11  | 0.45 |     | 0.05 | 0.59  |     |
| Control Delay           |      | 20.1  |     |      | 17.9  |     | 5.9   | 7.3  |     | 5.3  | 9.3   |     |
| Queue Delay             |      | 0.0   |     |      | 0.0   |     | 0.0   | 0.0  |     | 0.0  | 0.0   |     |
| Total Delay             |      | 20.1  |     |      | 17.9  |     | 5.9   | 7.3  |     | 5.3  | 9.3   |     |
| LOS                     |      | C     |     |      | B     |     | A     | A    |     | A    | A     |     |
| Approach Delay          |      | 20.1  |     |      | 17.9  |     | 7.2   |      |     |      | 9.2   |     |
| Approach LOS            |      | C     |     |      | B     |     | A     |      |     |      | A     |     |
| Queue Length 50th (m)   |      | 7.8   |     |      | 5.4   |     | 1.5   | 24.1 |     | 0.6  | 34.6  |     |
| Queue Length 95th (m)   |      | 19.2  |     |      | 14.8  |     | 5.9   | 52.7 |     | 3.1  | 78.8  |     |
| Internal Link Dist (m)  |      | 216.3 |     |      | 149.8 |     | 160.6 |      |     |      | 124.9 |     |
| Turn Bay Length (m)     |      |       |     |      |       |     | 61.0  |      |     | 50.0 |       |     |
| Base Capacity (vph)     |      | 575   |     |      | 572   |     | 414   | 1211 |     | 423  | 1187  |     |
| Starvation Cap Reductn  |      | 0     |     |      | 0     |     | 0     | 0    |     | 0    | 0     |     |
| Spillback Cap Reductn   |      | 0     |     |      | 0     |     | 0     | 0    |     | 0    | 0     |     |
| Storage Cap Reductn     |      | 0     |     |      | 0     |     | 0     | 0    |     | 0    | 0     |     |
| Reduced v/c Ratio       |      | 0.19  |     |      | 0.14  |     | 0.11  | 0.45 |     | 0.05 | 0.59  |     |

## Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 50.9

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.59

Intersection Signal Delay: 9.7

Intersection LOS: A

Intersection Capacity Utilization 55.1%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Hurontario Street & Campbell Street



Future Background P.M. Peak Hour 04/13/2018

Synchro 9 Report  
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# HCM Unsignalized Intersection Capacity Analysis

## 2: Maple Street & Campbell Street

04/27/2018

|                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                                | NBT                                                                                 | NBR                                                                                 | SBL                                                                                 | SBT                                                                                 | SBR                                                                                 |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                    |  |                                                                                     |                                                                                     |  |                                                                                     |
| Traffic Volume (veh/h)            | 12                                                                                | 82                                                                                | 3                                                                                 | 1                                                                                 | 151                                                                               | 29                                                                                | 2                                                                                  | 0                                                                                   | 1                                                                                   | 21                                                                                  | 1                                                                                   | 41                                                                                  |
| Future Volume (Veh/h)             | 12                                                                                | 82                                                                                | 3                                                                                 | 1                                                                                 | 151                                                                               | 29                                                                                | 2                                                                                  | 0                                                                                   | 1                                                                                   | 21                                                                                  | 1                                                                                   | 41                                                                                  |
| Sign Control                      |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                    | Stop                                                                                |                                                                                     |                                                                                     | Stop                                                                                |                                                                                     |
| Grade                             |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                    | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                               | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 13                                                                                | 89                                                                                | 3                                                                                 | 1                                                                                 | 164                                                                               | 32                                                                                | 2                                                                                  | 0                                                                                   | 1                                                                                   | 23                                                                                  | 1                                                                                   | 45                                                                                  |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (m)                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (m/s)               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       | None                                                                              |                                                                                   |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (m)               | 240                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            | 196                                                                               |                                                                                   |                                                                                   | 92                                                                                |                                                                                   |                                                                                   | 344                                                                                | 314                                                                                 | 90                                                                                  | 300                                                                                 | 300                                                                                 | 180                                                                                 |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                | 196                                                                               |                                                                                   |                                                                                   | 92                                                                                |                                                                                   |                                                                                   | 344                                                                                | 314                                                                                 | 90                                                                                  | 300                                                                                 | 300                                                                                 | 180                                                                                 |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   | 7.1                                                                                | 6.5                                                                                 | 6.2                                                                                 | 7.1                                                                                 | 6.5                                                                                 | 6.2                                                                                 |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   | 3.5                                                                                | 4.0                                                                                 | 3.3                                                                                 | 3.5                                                                                 | 4.0                                                                                 | 3.3                                                                                 |
| p0 queue free %                   | 99                                                                                |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   | 100                                                                                | 100                                                                                 | 100                                                                                 | 96                                                                                  | 100                                                                                 | 95                                                                                  |
| cM capacity (veh/h)               | 1389                                                                              |                                                                                   |                                                                                   | 1515                                                                              |                                                                                   |                                                                                   | 577                                                                                | 595                                                                                 | 973                                                                                 | 651                                                                                 | 610                                                                                 | 868                                                                                 |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 105                                                                               | 197                                                                               | 3                                                                                 | 69                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 13                                                                                | 1                                                                                 | 2                                                                                 | 23                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 3                                                                                 | 32                                                                                | 1                                                                                 | 45                                                                                |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 1389                                                                              | 1515                                                                              | 668                                                                               | 777                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.01                                                                              | 0.00                                                                              | 0.00                                                                              | 0.09                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (m)             | 0.2                                                                               | 0.0                                                                               | 0.1                                                                               | 2.3                                                                               |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 1.0                                                                               | 0.0                                                                               | 10.4                                                                              | 10.1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | A                                                                                 | A                                                                                 | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 1.0                                                                               | 0.0                                                                               | 10.4                                                                              | 10.1                                                                              |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      |                                                                                   |                                                                                   | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                   |                                                                                   | 2.3                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                   |                                                                                   | 23.8%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   |                                                                                    | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Analysis Period (min)             |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

# APPENDIX

# H

TOTAL TRAFFIC  
CONDITIONS  
ANALYSIS SYNCNHRO  
OUTPUT SHEETS.

## Lanes, Volumes, Timings

1: Hurontario Street &amp; Campbell Street

04/18/2018

|                         | ↖     | →     | ↗    | ↖     | ←     | ↖    | ↖     | ↖     | ↖    | ↖     | ↖     | ↖    |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|
| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  |
| Lane Configurations     |       | ↔     |      |       | ↔     |      | ↔     | ↔     |      | ↔     | ↔     |      |
| Traffic Volume (vph)    | 58    | 65    | 66   | 54    | 47    | 30   | 68    | 662   | 82   | 22    | 291   | 32   |
| Future Volume (vph)     | 58    | 65    | 66   | 54    | 47    | 30   | 68    | 662   | 82   | 22    | 291   | 32   |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |
| Lane Width (m)          | 3.6   | 3.6   | 3.6  | 3.6   | 3.6   | 3.6  | 3.6   | 3.6   | 3.6  | 3.6   | 3.6   | 3.6  |
| Grade (%)               | 0%    |       | 0%   |       | 0%    |      | 0%    |       | 0%   |       | 0%    |      |
| Storage Length (m)      | 0.0   |       | 0.0  | 0.0   |       | 0.0  | 61.0  |       | 0.0  | 50.0  |       | 0.0  |
| Storage Lanes           | 0     |       | 0    | 0     |       | 0    | 1     |       | 0    | 1     |       | 0    |
| Taper Length (m)        | 7.5   |       |      | 7.5   |       |      | 7.5   |       |      | 7.5   |       |      |
| Lane Util. Factor       | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 |
| Ped Bike Factor         | 0.98  |       |      |       | 0.99  |      | 0.99  | 1.00  |      | 1.00  |       |      |
| Frt                     | 0.953 |       |      |       | 0.969 |      | 0.983 |       |      | 0.985 |       |      |
| Flt Protected           | 0.985 |       |      |       | 0.980 |      | 0.950 |       |      | 0.950 |       |      |
| Satd. Flow (prot)       | 0     | 1720  | 0    | 0     | 1592  | 0    | 1736  | 1730  | 0    | 1719  | 1734  | 0    |
| Flt Permitted           |       | 0.873 |      |       | 0.788 |      | 0.551 |       |      | 0.213 |       |      |
| Satd. Flow (perm)       | 0     | 1512  | 0    | 0     | 1277  | 0    | 1000  | 1730  | 0    | 385   | 1734  | 0    |
| Right Turn on Red       |       |       | Yes  |       |       | Yes  |       |       | Yes  |       |       | Yes  |
| Satd. Flow (RTOR)       |       | 46    |      |       | 26    |      |       | 15    |      |       | 13    |      |
| Link Speed (k/h)        |       | 50    |      |       | 50    |      |       | 50    |      |       | 50    |      |
| Link Distance (m)       |       | 123.6 |      |       | 173.8 |      |       | 184.6 |      |       | 148.9 |      |
| Travel Time (s)         |       | 8.9   |      |       | 12.5  |      |       | 13.3  |      |       | 10.7  |      |
| Confl. Peds. (#/hr)     | 20    |       | 5    | 5     |       | 20   | 11    |       | 5    | 5     |       | 11   |
| Confl. Bikes (#/hr)     |       |       |      |       |       |      |       |       |      |       |       |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |
| Growth Factor           | 100%  | 100%  | 100% | 100%  | 100%  | 100% | 100%  | 100%  | 100% | 100%  | 100%  | 100% |
| Heavy Vehicles (%)      | 2%    | 4%    | 2%   | 19%   | 5%    | 10%  | 4%    | 7%    | 13%  | 5%    | 8%    | 4%   |
| Bus Blockages (#/hr)    | 0     | 0     | 0    | 0     | 0     | 0    | 0     | 0     | 0    | 0     | 0     | 0    |
| Parking (#/hr)          |       |       |      |       |       |      |       |       |      |       |       |      |
| Mid-Block Traffic (%)   |       | 0%    |      |       | 0%    |      |       | 0%    |      |       | 0%    |      |
| Adj. Flow (vph)         | 63    | 71    | 72   | 59    | 51    | 33   | 74    | 720   | 89   | 24    | 316   | 35   |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |
| Lane Group Flow (vph)   | 0     | 206   | 0    | 0     | 143   | 0    | 74    | 809   | 0    | 24    | 351   | 0    |
| Number of Detectors     | 1     | 1     |      | 1     | 1     |      | 1     | 0     |      | 1     | 0     |      |
| Detector Template       | Left  |       |      | Left  |       |      |       |       |      |       |       |      |
| Leading Detector (m)    | 2.0   | 7.5   |      | 2.0   | 7.5   |      | 7.5   | 0.0   |      | 7.5   | 0.0   |      |
| Trailing Detector (m)   | 0.0   | -1.5  |      | 0.0   | -1.5  |      | -1.5  | 0.0   |      | -1.5  | 0.0   |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      |
| Protected Phases        |       | 4     |      |       | 8     |      |       | 2     |      |       | 6     |      |
| Permitted Phases        | 4     |       |      | 8     |       |      | 2     |       |      | 6     |       |      |
| Detector Phase          | 4     | 4     |      | 8     | 8     |      | 2     | 2     |      | 6     | 6     |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |
| Minimum Initial (s)     | 7.0   | 7.0   |      | 7.0   | 7.0   |      | 30.2  | 30.2  |      | 30.2  | 30.2  |      |
| Minimum Split (s)       | 23.7  | 23.7  |      | 23.7  | 23.7  |      | 36.0  | 36.0  |      | 36.0  | 36.0  |      |
| Total Split (s)         | 24.0  | 24.0  |      | 24.0  | 24.0  |      | 36.0  | 36.0  |      | 36.0  | 36.0  |      |
| Total Split (%)         | 40.0% | 40.0% |      | 40.0% | 40.0% |      | 60.0% | 60.0% |      | 60.0% | 60.0% |      |
| Maximum Green (s)       | 18.3  | 18.3  |      | 18.3  | 18.3  |      | 30.2  | 30.2  |      | 30.2  | 30.2  |      |
| Yellow Time (s)         | 3.3   | 3.3   |      | 3.3   | 3.3   |      | 3.3   | 3.3   |      | 3.3   | 3.3   |      |
| All-Red Time (s)        | 2.4   | 2.4   |      | 2.4   | 2.4   |      | 2.5   | 2.5   |      | 2.5   | 2.5   |      |
| Lost Time Adjust (s)    |       | 0.0   |      |       | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |

Future Total A.M. Peak Hour 04/13/2018

Synchro 9 Report  
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## Lanes, Volumes, Timings

1: Hurontario Street &amp; Campbell Street

04/18/2018

|                         | ↖    | →    | ↗   | ↖     | ←    | ↖   | ↖     | ↖      | ↖   | ↖    | ↖     | ↖   |
|-------------------------|------|------|-----|-------|------|-----|-------|--------|-----|------|-------|-----|
| Lane Group              | EBL  | EBT  | EBR | WBL   | WBT  | WBR | NBL   | NBT    | NBR | SBL  | SBT   | SBR |
| Total Lost Time (s)     |      | 5.7  |     |       | 5.7  |     | 5.8   | 5.8    |     | 5.8  | 5.8   |     |
| Lead/Lag                |      |      |     |       |      |     |       |        |     |      |       |     |
| Lead-Lag Optimize?      |      |      |     |       |      |     |       |        |     |      |       |     |
| Vehicle Extension (s)   | 3.0  | 3.0  |     | 3.0   | 3.0  |     | 0.2   | 0.2    |     | 0.2  | 0.2   |     |
| Minimum Gap (s)         | 3.0  | 3.0  |     | 3.0   | 3.0  |     | 3.0   | 3.0    |     | 3.0  | 3.0   |     |
| Time Before Reduce (s)  | 0.0  | 0.0  |     | 0.0   | 0.0  |     | 0.0   | 0.0    |     | 0.0  | 0.0   |     |
| Time To Reduce (s)      | 0.0  | 0.0  |     | 0.0   | 0.0  |     | 0.0   | 0.0    |     | 0.0  | 0.0   |     |
| Recall Mode             | None | None |     | None  | None |     | Max   | Max    |     | Max  | Max   |     |
| Walk Time (s)           | 7.0  | 7.0  |     | 7.0   | 7.0  |     | 16.0  | 16.0   |     | 16.0 | 16.0  |     |
| Flash Dont Walk (s)     | 11.0 | 11.0 |     | 11.0  | 11.0 |     | 14.0  | 14.0   |     | 14.0 | 14.0  |     |
| Pedestrian Calls (#/hr) | 0    | 0    |     | 0     | 0    |     | 0     | 0      |     | 0    | 0     |     |
| Act Effect Green (s)    |      | 11.4 |     |       | 11.4 |     | 31.5  | 31.5   |     | 31.5 | 31.5  |     |
| Actuated g/C Ratio      | 0.21 |      |     | 0.21  |      |     | 0.58  | 0.58   |     | 0.58 | 0.58  |     |
| v/c Ratio               | 0.58 |      |     | 0.50  |      |     | 0.13  | 0.80   |     | 0.11 | 0.35  |     |
| Control Delay           | 21.3 |      |     | 21.0  |      |     | 7.2   | 19.1   |     | 8.3  | 7.9   |     |
| Queue Delay             | 0.0  |      |     | 0.0   |      |     | 0.0   | 0.0    |     | 0.0  | 0.0   |     |
| Total Delay             | 21.3 |      |     | 21.0  |      |     | 7.2   | 19.1   |     | 8.3  | 7.9   |     |
| LOS                     | C    |      |     | C     |      |     | A     | B      |     | A    | A     |     |
| Approach Delay          | 21.3 |      |     | 21.0  |      |     | 18.1  |        |     |      | 7.9   |     |
| Approach LOS            | C    |      |     | C     |      |     | B     |        |     |      | A     |     |
| Queue Length 50th (m)   | 14.2 |      |     | 10.2  |      |     | 3.0   | 54.7   |     | 1.0  | 15.5  |     |
| Queue Length 95th (m)   | 30.7 |      |     | 23.7  |      |     | 10.2  | #149.9 |     | 5.0  | 37.9  |     |
| Internal Link Dist (m)  | 99.6 |      |     | 149.8 |      |     | 160.6 |        |     |      | 124.9 |     |
| Turn Bay Length (m)     |      |      |     |       |      |     | 61.0  |        |     | 50.0 |       |     |
| Base Capacity (vph)     | 539  |      |     | 447   |      |     | 578   | 1006   |     | 222  | 1008  |     |
| Starvation Cap Reductn  | 0    |      |     | 0     |      |     | 0     | 0      |     | 0    | 0     |     |
| Spillback Cap Reductn   | 0    |      |     | 0     |      |     | 0     | 0      |     | 0    | 0     |     |
| Storage Cap Reductn     | 0    |      |     | 0     |      |     | 0     | 0      |     | 0    | 0     |     |
| Reduced v/c Ratio       | 0.38 |      |     | 0.32  |      |     | 0.13  | 0.80   |     | 0.11 | 0.35  |     |

## Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 54.5

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 16.4

Intersection LOS: B

Intersection Capacity Utilization 79.2%

ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Hurontario Street &amp; Campbell Street



Future Total A.M. Peak Hour 04/13/2018

Synchro 9 Report  
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# HCM Unsignalized Intersection Capacity Analysis

2: Maple Street & Campbell Street

04/18/2018

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               | SBR                                                                               |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |
| Traffic Volume (veh/h)            | 41                                                                                | 168                                                                               | 6                                                                                 | 0                                                                                 | 115                                                                               | 52                                                                                | 3                                                                                 | 1                                                                                 | 3                                                                                 | 20                                                                                | 2                                                                                 | 11                                                                                |
| Future Volume (Veh/h)             | 41                                                                                | 168                                                                               | 6                                                                                 | 0                                                                                 | 115                                                                               | 52                                                                                | 3                                                                                 | 1                                                                                 | 3                                                                                 | 20                                                                                | 2                                                                                 | 11                                                                                |
| Sign Control                      | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 45                                                                                | 183                                                                               | 7                                                                                 | 0                                                                                 | 125                                                                               | 57                                                                                | 3                                                                                 | 1                                                                                 | 3                                                                                 | 22                                                                                | 2                                                                                 | 12                                                                                |
| Pedestrians                       | 21                                                                                |                                                                                   |                                                                                   | 11                                                                                |                                                                                   |                                                                                   | 11                                                                                |                                                                                   |                                                                                   | 8                                                                                 |                                                                                   |                                                                                   |
| Lane Width (m)                    | 3.6                                                                               |                                                                                   |                                                                                   | 3.6                                                                               |                                                                                   |                                                                                   | 3.6                                                                               |                                                                                   |                                                                                   | 3.6                                                                               |                                                                                   |                                                                                   |
| Walking Speed (m/s)               | 1.2                                                                               |                                                                                   |                                                                                   | 1.2                                                                               |                                                                                   |                                                                                   | 1.2                                                                               |                                                                                   |                                                                                   | 1.2                                                                               |                                                                                   |                                                                                   |
| Percent Blockage                  | 2                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   | 1                                                                                 |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (m)               | 240                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 190                                                                               |                                                                                   |                                                                                   |                                                                                   | 201                                                                               |                                                                                   |                                                                                   |                                                                                   | 475                                                                               | 478                                                                               | 208                                                                               | 452                                                                               |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 190                                                                               |                                                                                   |                                                                                   |                                                                                   | 201                                                                               |                                                                                   |                                                                                   |                                                                                   | 475                                                                               | 478                                                                               | 208                                                                               | 452                                                                               |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   |                                                                                   | 7.1                                                                               | 6.5                                                                               | 6.2                                                                               | 7.1                                                                               |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   |                                                                                   | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 3.5                                                                               |
| p0 queue free %                   | 97                                                                                |                                                                                   |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   |                                                                                   | 99                                                                                | 100                                                                               | 100                                                                               | 96                                                                                |
| cM capacity (veh/h)               | 1387                                                                              |                                                                                   |                                                                                   |                                                                                   | 1358                                                                              |                                                                                   |                                                                                   |                                                                                   | 464                                                                               | 466                                                                               | 822                                                                               | 491                                                                               |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Volume Total                      | 235                                                                               | 182                                                                               | 7                                                                                 | 36                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Volume Left                       | 45                                                                                | 0                                                                                 | 3                                                                                 | 22                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Volume Right                      | 7                                                                                 | 57                                                                                | 3                                                                                 | 12                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| cSH                               | 1387                                                                              | 1358                                                                              | 571                                                                               | 570                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Volume to Capacity                | 0.03                                                                              | 0.00                                                                              | 0.01                                                                              | 0.06                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 95th (m)             | 0.8                                                                               | 0.0                                                                               | 0.3                                                                               | 1.6                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Control Delay (s)                 | 1.7                                                                               | 0.0                                                                               | 11.4                                                                              | 11.7                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane LOS                          | A                                                                                 | B                                                                                 |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Approach Delay (s)                | 1.7                                                                               | 0.0                                                                               | 11.4                                                                              | 11.7                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Approach LOS                      | B                                                                                 |                                                                                   |                                                                                   | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     | 2.0                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization | 40.9%                                                                             |                                                                                   |                                                                                   | ICU Level of Service                                                              |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Analysis Period (min)             | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |

Future Total A.M. Peak Hour 04/13/2018

Synchro 9 Report  
Page 1

# HCM Unsignalized Intersection Capacity Analysis

3: Site Driveway & Campbell Street

04/18/2018

|                                   |  |  |  |  |  |      |  |
|-----------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------|--|
| Movement                          | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | NBL                                                                                 | NBR  |  |
| Lane Configurations               |  |                                                                                     |                                                                                     |  |  |      |  |
| Traffic Volume (veh/h)            | 170                                                                                 | 5                                                                                   | 5                                                                                   | 142                                                                                 | 12                                                                                  | 14   |  |
| Future Volume (Veh/h)             | 170                                                                                 | 5                                                                                   | 5                                                                                   | 142                                                                                 | 12                                                                                  | 14   |  |
| Sign Control                      | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                | Stop                                                                                |      |  |
| Grade                             | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  | 0%                                                                                  |      |  |
| Peak Hour Factor                  | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92 |  |
| Hourly flow rate (vph)            | 185                                                                                 | 5                                                                                   | 5                                                                                   | 154                                                                                 | 13                                                                                  | 15   |  |
| Pedestrians                       |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |      |  |
| Lane Width (m)                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |      |  |
| Walking Speed (m/s)               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |      |  |
| Percent Blockage                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |      |  |
| Right turn flare (veh)            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |      |  |
| Median type                       | None                                                                                |                                                                                     |                                                                                     | None                                                                                |                                                                                     |      |  |
| Median storage (veh)              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |      |  |
| Upstream signal (m)               | 124                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |      |  |
| pX, platoon unblocked             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |      |  |
| vC, conflicting volume            |                                                                                     |                                                                                     |                                                                                     | 190                                                                                 | 352                                                                                 | 188  |  |
| vC1, stage 1 conf vol             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |      |  |
| vC2, stage 2 conf vol             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |      |  |
| vCu, unblocked vol                |                                                                                     |                                                                                     |                                                                                     | 190                                                                                 | 352                                                                                 | 188  |  |
| 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                                                                                 | 98                                                                                  | 98   |  |
| cM capacity (veh/h)               |                                                                                     |                                                                                     |                                                                                     | 1384                                                                                | 644                                                                                 | 855  |  |
| Direction, Lane #                 | EB 1                                                                                | WB 1                                                                                | NB 1                                                                                |                                                                                     |                                                                                     |      |  |
| Volume Total                      | 190                                                                                 | 159                                                                                 | 28                                                                                  |                                                                                     |                                                                                     |      |  |
| Volume Left                       | 0                                                                                   | 5                                                                                   | 13                                                                                  |                                                                                     |                                                                                     |      |  |
| Volume Right                      | 5                                                                                   | 0                                                                                   | 15                                                                                  |                                                                                     |                                                                                     |      |  |
| cSH                               | 1700                                                                                | 1384                                                                                | 742                                                                                 |                                                                                     |                                                                                     |      |  |
| Volume to Capacity                | 0.11                                                                                | 0.00                                                                                | 0.04                                                                                |                                                                                     |                                                                                     |      |  |
| Queue Length 95th (m)             | 0.0                                                                                 | 0.1                                                                                 | 0.9                                                                                 |                                                                                     |                                                                                     |      |  |
| Control Delay (s)                 | 0.0                                                                                 | 0.3                                                                                 | 10.0                                                                                |                                                                                     |                                                                                     |      |  |
| Lane LOS                          | A                                                                                   |                                                                                     | B                                                                                   |                                                                                     |                                                                                     |      |  |
| Approach Delay (s)                | 0.0                                                                                 | 0.3                                                                                 | 10.0                                                                                |                                                                                     |                                                                                     |      |  |
| Approach LOS                      | B                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |      |  |
| Intersection Summary              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |      |  |
| Average Delay                     |                                                                                     |                                                                                     |                                                                                     | 0.9                                                                                 |                                                                                     |      |  |
| Intersection Capacity Utilization | 21.5%                                                                               |                                                                                     |                                                                                     | ICU Level of Service                                                                |                                                                                     | A    |  |
| Analysis Period (min)             | 15                                                                                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |      |  |

Future Total A.M. Peak Hour 04/13/2018

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## Lanes, Volumes, Timings

1: Hurontario Street &amp; Campbell Street

04/18/2018

|                         | ↖     | →     | ↗    | ↖     | ←     | ↖    | ↖     | ↖     | ↖    | ↖     | ↖     | ↖    |
|-------------------------|-------|-------|------|-------|-------|------|-------|-------|------|-------|-------|------|
| Lane Group              | EBL   | EBT   | EBR  | WBL   | WBT   | WBR  | NBL   | NBT   | NBR  | SBL   | SBT   | SBR  |
| Lane Configurations     |       | ↔     |      |       | ↔     |      | ↔     | ↔     |      | ↔     | ↔     |      |
| Traffic Volume (vph)    | 40    | 48    | 20   | 15    | 45    | 16   | 48    | 497   | 11   | 18    | 571   | 89   |
| Future Volume (vph)     | 40    | 48    | 20   | 15    | 45    | 16   | 48    | 497   | 11   | 18    | 571   | 89   |
| Ideal Flow (vphpl)      | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 | 1900  | 1900  | 1900 |
| Lane Width (m)          | 3.6   | 3.6   | 3.6  | 3.6   | 3.6   | 3.6  | 3.6   | 3.6   | 3.6  | 3.6   | 3.6   | 3.6  |
| Grade (%)               |       | 0%    |      |       | 0%    |      |       | 0%    |      |       | 0%    |      |
| Storage Length (m)      | 0.0   |       | 0.0  | 0.0   |       | 0.0  | 61.0  |       | 0.0  | 50.0  |       | 0.0  |
| Storage Lanes           | 0     |       | 0    | 0     |       | 0    | 1     |       | 0    | 1     |       | 0    |
| Taper Length (m)        | 7.5   |       |      | 7.5   |       |      | 7.5   |       |      | 7.5   |       |      |
| Lane Util. Factor       | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 | 1.00  | 1.00  | 1.00 |
| Ped Bike Factor         | 0.99  |       |      |       | 0.99  |      | 1.00  | 1.00  |      | 1.00  | 1.00  |      |
| Frt                     | 0.975 |       |      |       | 0.972 |      |       | 0.997 |      |       | 0.980 |      |
| Flt Protected           | 0.982 |       |      |       | 0.990 |      | 0.950 |       |      | 0.950 |       |      |
| Satd. Flow (prot)       | 0     | 1810  | 0    | 0     | 1686  | 0    | 1805  | 1791  | 0    | 1410  | 1745  | 0    |
| Flt Permitted           |       | 0.845 |      |       | 0.921 |      | 0.312 |       |      | 0.422 |       |      |
| Satd. Flow (perm)       | 0     | 1554  | 0    | 0     | 1566  | 0    | 592   | 1791  | 0    | 624   | 1745  | 0    |
| Right Turn on Red       |       |       | Yes  |       |       | Yes  |       |       | Yes  |       |       | Yes  |
| Satd. Flow (RTOR)       |       | 20    |      |       | 17    |      |       | 3     |      |       | 19    |      |
| Link Speed (k/h)        |       | 50    |      |       | 50    |      |       | 50    |      |       | 50    |      |
| Link Distance (m)       |       | 120.7 |      |       | 173.8 |      |       | 184.6 |      |       | 148.9 |      |
| Travel Time (s)         |       | 8.7   |      |       | 12.5  |      |       | 13.3  |      |       | 10.7  |      |
| Confl. Peds. (#/hr)     | 4     |       | 5    | 5     |       | 4    | 6     |       | 8    | 8     |       | 6    |
| Confl. Bikes (#/hr)     |       |       |      |       |       |      |       |       |      |       |       |      |
| Peak Hour Factor        | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 | 0.92  | 0.92  | 0.92 |
| Growth Factor           | 100%  | 100%  | 100% | 100%  | 100%  | 100% | 100%  | 100%  | 100% | 100%  | 100%  | 100% |
| Heavy Vehicles (%)      | 0%    | 0%    | 0%   | 20%   | 0%    | 19%  | 0%    | 5%    | 37%  | 28%   | 7%    | 2%   |
| Bus Blockages (#/hr)    | 0     | 0     | 0    | 0     | 0     | 0    | 0     | 0     | 0    | 0     | 0     | 0    |
| Parking (#/hr)          |       |       |      |       |       |      |       |       |      |       |       |      |
| Mid-Block Traffic (%)   |       | 0%    |      |       | 0%    |      |       | 0%    |      |       | 0%    |      |
| Adj. Flow (vph)         | 43    | 52    | 22   | 16    | 49    | 17   | 52    | 540   | 12   | 20    | 621   | 97   |
| Shared Lane Traffic (%) |       |       |      |       |       |      |       |       |      |       |       |      |
| Lane Group Flow (vph)   | 0     | 117   | 0    | 0     | 82    | 0    | 52    | 552   | 0    | 20    | 718   | 0    |
| Number of Detectors     | 1     | 1     |      | 1     | 1     |      | 1     | 0     |      | 1     | 0     |      |
| Detector Template       | Left  | Thru  |      | Left  | Thru  |      | Left  |       |      | Left  |       |      |
| Leading Detector (m)    | 2.0   | 7.5   |      | 2.0   | 7.5   |      | 7.5   | 0.0   |      | 7.5   | 0.0   |      |
| Trailing Detector (m)   | 0.0   | -1.5  |      | 0.0   | -1.5  |      | -1.5  | 0.0   |      | -1.5  | 0.0   |      |
| Turn Type               | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      | Perm  | NA    |      |
| Protected Phases        |       | 4     |      |       | 8     |      |       | 2     |      |       | 6     |      |
| Permitted Phases        | 4     |       |      | 8     |       |      | 2     |       |      | 6     |       |      |
| Detector Phase          | 4     | 4     |      | 8     | 8     |      | 2     | 2     |      | 6     | 6     |      |
| Switch Phase            |       |       |      |       |       |      |       |       |      |       |       |      |
| Minimum Initial (s)     | 7.0   | 7.0   |      | 7.0   | 7.0   |      | 30.2  | 30.2  |      | 30.2  | 30.2  |      |
| Minimum Split (s)       | 23.7  | 23.7  |      | 23.7  | 23.7  |      | 36.0  | 36.0  |      | 36.0  | 36.0  |      |
| Total Split (s)         | 24.0  | 24.0  |      | 24.0  | 24.0  |      | 36.0  | 36.0  |      | 36.0  | 36.0  |      |
| Total Split (%)         | 40.0% | 40.0% |      | 40.0% | 40.0% |      | 60.0% | 60.0% |      | 60.0% | 60.0% |      |
| Maximum Green (s)       | 18.3  | 18.3  |      | 18.3  | 18.3  |      | 30.2  | 30.2  |      | 30.2  | 30.2  |      |
| Yellow Time (s)         | 3.3   | 3.3   |      | 3.3   | 3.3   |      | 3.3   | 3.3   |      | 3.3   | 3.3   |      |
| All-Red Time (s)        | 2.4   | 2.4   |      | 2.4   | 2.4   |      | 2.5   | 2.5   |      | 2.5   | 2.5   |      |
| Lost Time Adjust (s)    |       | 0.0   |      |       | 0.0   |      | 0.0   | 0.0   |      | 0.0   | 0.0   |      |

Future Total P.M. Peak Hour 04/13/2018

Synchro 9 Report  
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## Lanes, Volumes, Timings

1: Hurontario Street &amp; Campbell Street

04/18/2018

|                         | ↖    | →    | ↗   | ↖     | ←    | ↖   | ↖     | ↖    | ↖   | ↖    | ↖     | ↖   |
|-------------------------|------|------|-----|-------|------|-----|-------|------|-----|------|-------|-----|
| Lane Group              | EBL  | EBT  | EBR | WBL   | WBT  | WBR | NBL   | NBT  | NBR | SBL  | SBT   | SBR |
| Total Lost Time (s)     |      | 5.7  |     |       | 5.7  |     |       | 5.8  | 5.8 |      | 5.8   | 5.8 |
| Lead/Lag                |      |      |     |       |      |     |       |      |     |      |       |     |
| Lead-Lag Optimize?      |      |      |     |       |      |     |       |      |     |      |       |     |
| Vehicle Extension (s)   | 3.0  | 3.0  |     | 3.0   | 3.0  |     | 0.2   | 0.2  |     | 0.2  | 0.2   |     |
| Minimum Gap (s)         | 3.0  | 3.0  |     | 3.0   | 3.0  |     | 3.0   | 3.0  |     | 3.0  | 3.0   |     |
| Time Before Reduce (s)  | 0.0  | 0.0  |     | 0.0   | 0.0  |     | 0.0   | 0.0  |     | 0.0  | 0.0   |     |
| Time To Reduce (s)      | 0.0  | 0.0  |     | 0.0   | 0.0  |     | 0.0   | 0.0  |     | 0.0  | 0.0   |     |
| Recall Mode             | None | None |     | None  | None |     | Max   | Max  |     | Max  | Max   |     |
| Walk Time (s)           | 7.0  | 7.0  |     | 7.0   | 7.0  |     | 16.0  | 16.0 |     | 16.0 | 16.0  |     |
| Flash Dont Walk (s)     | 11.0 | 11.0 |     | 11.0  | 11.0 |     | 14.0  | 14.0 |     | 14.0 | 14.0  |     |
| Pedestrian Calls (#/hr) | 0    | 0    |     | 0     | 0    |     | 0     | 0    |     | 0    | 0     |     |
| Act Effct Green (s)     |      | 8.9  |     |       | 8.9  |     | 34.4  | 34.4 |     | 34.4 | 34.4  |     |
| Actuated g/C Ratio      | 0.17 |      |     | 0.17  |      |     | 0.67  | 0.67 |     | 0.67 | 0.67  |     |
| v/c Ratio               | 0.41 |      |     | 0.29  |      |     | 0.13  | 0.46 |     | 0.05 | 0.61  |     |
| Control Delay           | 20.3 |      |     | 17.7  |      |     | 6.2   | 7.5  |     | 5.4  | 9.8   |     |
| Queue Delay             | 0.0  |      |     | 0.0   |      |     | 0.0   | 0.0  |     | 0.0  | 0.0   |     |
| Total Delay             | 20.3 |      |     | 17.7  |      |     | 6.2   | 7.5  |     | 5.4  | 9.8   |     |
| LOS                     | C    |      |     | B     |      |     | A     | A    |     | A    | A     |     |
| Approach Delay          | 20.3 |      |     | 17.7  |      |     | 7.4   |      |     |      | 9.7   |     |
| Approach LOS            | C    |      |     | B     |      |     | A     |      |     |      | A     |     |
| Queue Length 50th (m)   | 8.2  |      |     | 5.4   |      |     | 1.8   | 24.6 |     | 0.6  | 36.4  |     |
| Queue Length 95th (m)   | 20.0 |      |     | 14.8  |      |     | 6.8   | 53.9 |     | 3.2  | 83.7  |     |
| Internal Link Dist (m)  | 96.7 |      |     | 149.8 |      |     | 160.6 |      |     |      | 124.9 |     |
| Turn Bay Length (m)     |      |      |     |       |      |     | 61.0  |      |     | 50.0 |       |     |
| Base Capacity (vph)     | 570  |      |     | 572   |      |     | 398   | 1207 |     | 420  | 1181  |     |
| Starvation Cap Reductn  | 0    |      |     | 0     |      |     | 0     | 0    |     | 0    | 0     |     |
| Spillback Cap Reductn   | 0    |      |     | 0     |      |     | 0     | 0    |     | 0    | 0     |     |
| Storage Cap Reductn     | 0    |      |     | 0     |      |     | 0     | 0    |     | 0    | 0     |     |
| Reduced v/c Ratio       | 0.21 |      |     | 0.14  |      |     | 0.13  | 0.46 |     | 0.05 | 0.61  |     |

## Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 51.1

Natural Cycle: 60

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.61

Intersection Signal Delay: 10.0

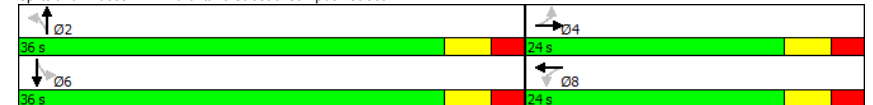
Intersection LOS: B

Intersection Capacity Utilization 60.8%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 1: Hurontario Street &amp; Campbell Street



Future Total P.M. Peak Hour 04/13/2018

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# HCM Unsignalized Intersection Capacity Analysis

2: Maple Street & Campbell Street

04/18/2018

|                                   |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Movement                          | EBL                                                                               | EBT                                                                               | EBR                                                                               | WBL                                                                               | WBT                                                                               | WBR                                                                               | NBL                                                                               | NBT                                                                               | NBR                                                                               | SBL                                                                               | SBT                                                                               | SBR                                                                               |
| Lane Configurations               |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |                                                                                   |  |                                                                                   |
| Traffic Volume (veh/h)            | 12                                                                                | 91                                                                                | 3                                                                                 | 1                                                                                 | 160                                                                               | 29                                                                                | 2                                                                                 | 0                                                                                 | 1                                                                                 | 21                                                                                | 1                                                                                 | 41                                                                                |
| Future Volume (Veh/h)             | 12                                                                                | 91                                                                                | 3                                                                                 | 1                                                                                 | 160                                                                               | 29                                                                                | 2                                                                                 | 0                                                                                 | 1                                                                                 | 21                                                                                | 1                                                                                 | 41                                                                                |
| Sign Control                      | Free                                                                              |                                                                                   |                                                                                   | Free                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   | Stop                                                                              |                                                                                   |                                                                                   |
| Grade                             | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   | 0%                                                                                |                                                                                   |                                                                                   |
| Peak Hour Factor                  | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              | 0.92                                                                              |
| Hourly flow rate (vph)            | 13                                                                                | 99                                                                                | 3                                                                                 | 1                                                                                 | 174                                                                               | 32                                                                                | 2                                                                                 | 0                                                                                 | 1                                                                                 | 23                                                                                | 1                                                                                 | 45                                                                                |
| Pedestrians                       |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane Width (m)                    |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Walking Speed (m/s)               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Percent Blockage                  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Right turn flare (veh)            |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median type                       | None                                                                              |                                                                                   |                                                                                   | None                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Median storage (veh)              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Upstream signal (m)               | 240                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| pX, platoon unblocked             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC, conflicting volume            | 206                                                                               |                                                                                   |                                                                                   |                                                                                   | 102                                                                               |                                                                                   |                                                                                   |                                                                                   | 364                                                                               | 334                                                                               | 100                                                                               | 320                                                                               |
| vC1, stage 1 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vC2, stage 2 conf vol             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| vCu, unblocked vol                | 206                                                                               |                                                                                   |                                                                                   |                                                                                   | 102                                                                               |                                                                                   |                                                                                   |                                                                                   | 364                                                                               | 334                                                                               | 100                                                                               | 320                                                                               |
| tC, single (s)                    | 4.1                                                                               |                                                                                   |                                                                                   |                                                                                   | 4.1                                                                               |                                                                                   |                                                                                   |                                                                                   | 7.1                                                                               | 6.5                                                                               | 6.2                                                                               | 7.1                                                                               |
| tC, 2 stage (s)                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| tF (s)                            | 2.2                                                                               |                                                                                   |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   |                                                                                   | 3.5                                                                               | 4.0                                                                               | 3.3                                                                               | 4.0                                                                               |
| p0 queue free %                   | 99                                                                                |                                                                                   |                                                                                   |                                                                                   | 100                                                                               |                                                                                   |                                                                                   |                                                                                   | 100                                                                               | 100                                                                               | 96                                                                                | 100                                                                               |
| cM capacity (veh/h)               | 1377                                                                              |                                                                                   |                                                                                   |                                                                                   | 1503                                                                              |                                                                                   |                                                                                   |                                                                                   | 559                                                                               | 580                                                                               | 960                                                                               | 632                                                                               |
| Direction, Lane #                 | EB 1                                                                              | WB 1                                                                              | NB 1                                                                              | SB 1                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Volume Total                      | 115                                                                               | 207                                                                               | 3                                                                                 | 69                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Volume Left                       | 13                                                                                | 1                                                                                 | 2                                                                                 | 23                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Volume Right                      | 3                                                                                 | 32                                                                                | 1                                                                                 | 45                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| cSH                               | 1377                                                                              | 1503                                                                              | 650                                                                               | 762                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Volume to Capacity                | 0.01                                                                              | 0.00                                                                              | 0.00                                                                              | 0.09                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Queue Length 95th (m)             | 0.2                                                                               | 0.0                                                                               | 0.1                                                                               | 2.4                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Control Delay (s)                 | 0.9                                                                               | 0.0                                                                               | 10.6                                                                              | 10.2                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Lane LOS                          | A                                                                                 | A                                                                                 | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Approach Delay (s)                | 0.9                                                                               | 0.0                                                                               | 10.6                                                                              | 10.2                                                                              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Approach LOS                      |                                                                                   |                                                                                   |                                                                                   | B                                                                                 | B                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Summary              |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Average Delay                     |                                                                                   |                                                                                   |                                                                                   | 2.2                                                                               |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Intersection Capacity Utilization |                                                                                   |                                                                                   |                                                                                   | 24.3%                                                                             | ICU Level of Service                                                              |                                                                                   |                                                                                   | A                                                                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |
| Analysis Period (min)             |                                                                                   |                                                                                   |                                                                                   | 15                                                                                |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |

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# HCM Unsignalized Intersection Capacity Analysis

3: Site Driveway & Campbell Street

04/18/2018

|                                   |  |  |  |  |  |  |
|-----------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Movement                          | EBT                                                                                 | EBR                                                                                 | WBL                                                                                 | WBT                                                                                 | NBL                                                                                 | NBR                                                                                 |
| Lane Configurations               |  |                                                                                     |                                                                                     |  |  |                                                                                     |
| Traffic Volume (veh/h)            | 96                                                                                  | 9                                                                                   | 16                                                                                  | 165                                                                                 | 9                                                                                   | 6                                                                                   |
| Future Volume (Veh/h)             | 96                                                                                  | 9                                                                                   | 16                                                                                  | 165                                                                                 | 9                                                                                   | 6                                                                                   |
| Sign Control                      | Free                                                                                |                                                                                     |                                                                                     | Free                                                                                | Stop                                                                                |                                                                                     |
| Grade                             | 0%                                                                                  |                                                                                     |                                                                                     | 0%                                                                                  | 0%                                                                                  |                                                                                     |
| Peak Hour Factor                  | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                | 0.92                                                                                |
| Hourly flow rate (vph)            | 104                                                                                 | 10                                                                                  | 17                                                                                  | 179                                                                                 | 10                                                                                  | 7                                                                                   |
| Pedestrians                       |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Lane Width (m)                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Walking Speed (m/s)               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Percent Blockage                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Right turn flare (veh)            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Median type                       | None                                                                                |                                                                                     | None                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Median storage veh)               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Upstream signal (m)               | 121                                                                                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| pX, platoon unblocked             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC, conflicting volume            |                                                                                     |                                                                                     | 114                                                                                 | 322                                                                                 |                                                                                     | 109                                                                                 |
| vC1, stage 1 conf vol             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vC2, stage 2 conf vol             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| vCu, unblocked vol                |                                                                                     |                                                                                     | 114                                                                                 | 322                                                                                 |                                                                                     | 109                                                                                 |
| tC, single (s)                    |                                                                                     |                                                                                     | 4.1                                                                                 | 6.4                                                                                 |                                                                                     | 6.2                                                                                 |
| tC, 2 stage (s)                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| tF (s)                            |                                                                                     |                                                                                     | 2.2                                                                                 | 3.5                                                                                 |                                                                                     | 3.3                                                                                 |
| p0 queue free %                   |                                                                                     |                                                                                     | 99                                                                                  | 98                                                                                  |                                                                                     | 99                                                                                  |
| cM capacity (veh/h)               |                                                                                     |                                                                                     | 1475                                                                                | 664                                                                                 |                                                                                     | 945                                                                                 |
| Direction, Lane #                 | EB 1                                                                                | WB 1                                                                                | NB 1                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Volume Total                      | 114                                                                                 | 196                                                                                 | 17                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| Volume Left                       | 0                                                                                   | 17                                                                                  | 10                                                                                  |                                                                                     |                                                                                     |                                                                                     |
| Volume Right                      | 10                                                                                  | 0                                                                                   | 7                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| cSH                               | 1700                                                                                | 1475                                                                                | 756                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Volume to Capacity                | 0.07                                                                                | 0.01                                                                                | 0.02                                                                                |                                                                                     |                                                                                     |                                                                                     |
| Queue Length 95th (m)             | 0.0                                                                                 | 0.3                                                                                 | 0.6                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Control Delay (s)                 | 0.0                                                                                 | 0.7                                                                                 | 9.9                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Lane LOS                          | A                                                                                   |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Approach Delay (s)                | 0.0                                                                                 | 0.7                                                                                 | 9.9                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Approach LOS                      |                                                                                     |                                                                                     | A                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Intersection Summary              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| Average Delay                     |                                                                                     |                                                                                     | 1.0                                                                                 |                                                                                     |                                                                                     |                                                                                     |
| Intersection Capacity Utilization |                                                                                     |                                                                                     | 26.2%                                                                               | ICU Level of Service                                                                | A                                                                                   |                                                                                     |
| Analysis Period (min)             |                                                                                     |                                                                                     | 15                                                                                  |                                                                                     |                                                                                     |                                                                                     |

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