# **FX**

### 869 Brant-Waterloo Road

### **Traffic Impact Study FINAL REPORT**

### 2081788 Ontario Corporation & Broos Properties

April 6, 2018



HDR Corporation 100 York Blvd, Suite 300 Richmond Hill, ON L4B 1J8



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# 1 Introduction

The Official Plan of the Township of North Dumfries (the "Township") identifies the Ayr Urban Area as a primary focus for growth and development within the Township to the year 2031. Much of Township's recent residential developments have been centered around the Ayr Urban Area. In line with the Town's future growth plans, 869 Brant-Waterloo Road is a proposed residential development located in the community of Ayr within the Township in the Region of Waterloo (the "Region").

HDR Corporation has been retained by Broos Properties Ltd. to undertake a traffic study to support this development, which will consist of 302 single family detached units, 108 townhouse units, and 75 townhouse units in medium density residential blocks at full build-out. The site is located at the northeast quadrant of Swan Street and Brant-Waterloo Road as shown in **Exhibit 1**.

The development is expected to occur in phases, with the estimated build-out year of 2026. This report assesses the traffic impacts of the proposed development on existing and proposed intersections within the study area road network in the early phase of the development and after full build-out. This traffic study has been prepared in accordance with the Region of Waterloo Transportation Impact Study (TIS) guidelines and the Region of Waterloo Requirement for Capacity Analysis.



**Exhibit 1 Site Location** 

#### 1.1 Scope of Work

The scope of work for the traffic study was proposed as per discussions with Broos Properties and incorporates comments from the Township; as well as, a review of the study area considered in the 2013 traffic impact study for the adjacent Hilltop Estates Subdivision (Hilltop TIS), which was developed in consultation with the Township and Region. Following is a summary of the proposed scope submitted to the Township and Region and analyzed in this report:

- Existing 2018 Traffic Conditions
- 2020 Background traffic conditions (includes road growth and traffic from approved or under construction background developments in the immediate area)
- 2020 Phase 1 traffic conditions with 139 units from the proposed development
- 2031 Background traffic conditions (includes road growth and traffic from approved or under construction background developments in the immediate area)
- 2031 Total traffic conditions (2031 background plus the proposed development)
- **Time Periods** Time periods that were analyzed are the development peak hours, which include:
  - Weekday AM peak hour (between 7:00 AM and 9:00 AM)
  - Weekday PM peak hour (between 4:00 PM and 6:00 PM)
- **Intersections** It should be noted that during Phase 1, this study assumes that there will be no connections to Swan Street via Leslie Davis Street, and to Brant-Waterloo Road via internal road network. A connection to Brant-Waterloo Road will be assumed in the 2031 scenarios through the internal road network; the need for a connection to Swan Street via Leslie Davis Street may be considered if capacity or operational issues are found at the intersection of Swan Street and Hilltop Drive. As such, the intersections analyzed for capacity purposes include:

External Road Network

- Robert Woolner Street and Leslie Davis Street
- Robert Woolner Street and Howard Marshall Street
- Robert Woolner Street and Gourlay Farm Lane
- Hilltop Drive and Howard Marshall Street
- Swan Street and Hilltop Drive
- Swan Street and Stanley Street
- Swan Street and Leslie Davis Drive
- Stanley Street and Northumberland Street
- Wrigley Road and Hilltop Drive
- Brant-Waterloo Road and Street A
- Brant-Waterloo Road and Robert Woolner Street
- Brant-Waterloo Road and Swan Street

Internal Road Network

- Leslie Davis Street and Street A as a traffic circle based on the BA Group's traffic calming study<sup>1</sup>
- Robert Woolner Street and Street A
- Robert Woolner Street /Street F and Freer Dr

### 1.2 Intersection Operations and Analysis Methodology

Intersection operations were assessed for the site driveways and study intersections using the software program Synchro 9, Traffic Signal Coordination Software Version 9, which employs methodologies from the *Highway Capacity Manual (HCM 2000 and HCM 2010)* published by the Transportation Research Board National Research Council. There are currently no signalized intersection present in the existing road network within the study area. However, if a signalized intersection is warranted in under future conditions within the study area, Synchro can analyze both signalized and unsignalized intersections in a road corridor or network taking into account the spacing, interaction, queues and operations between intersections.

The two-way un-signalized intersection analysis considers two separate measures:

- the capacity of the critical movements, which is based on a volume to capacity ratio; and
- the level of service for the critical movements, which is based on the average control delay per vehicle for the various critical movements within the intersection.

The signalized intersection analysis also considers two separate measures of performance:

- the capacity of all intersection movements, which is based on a volume to capacity ratio; and
- the level of service for all intersection movements, which is based on the average control delay per vehicle for the various movements through the intersection and overall.

Level of service (LOS) is based on the average control delay per vehicle for a given movement. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between 'A' and 'F', with 'F' being the longest delay. The volume to capacity (v/c) ratio is a measure of the degree of capacity utilized at an intersection.

## 2 Existing Conditions

#### 2.1 Site Context

The subject site is located in the northeast quadrant of Swan Street and Brant-Waterloo Road in a Designated Greenfield Area within the boundaries of the Ayr Urban Area. In the immediate area, the site is currently surrounded by agricultural lands to the south and the east, and existing residential development to the north. The Hilltop Estates Subdivision, also part of the Designated Greenfield Area borders the site on the west is currently under development. Due to the greenfield nature of the site, the existing road network and intersections in the study area are external to the site. The intersections within the study area are unsignalized and stop sign controlled.

<sup>&</sup>lt;sup>1</sup> *Hilltop Subdivision 30T-14301 Stage 4 Traffic Calming Study.* BA Group. September 2017.

### 2.2 Existing Road Network

The study area road network is comprised of regional roads, as well as local roads serving the existing residential areas to the north of the site. The road network is described below and is also illustrated in **Exhibit 2**.

| Northumberland<br>Street (Regional<br>Road 58)                                       | Northumberland Street is a two-lane undivided arterial road which runs in a north south direction and with connection to Highway 401 to the north of community of Ayr. The road primarily provides access to residences and businesses along the corridor. Northumberland Street is under the jurisdiction of the Region of Waterloo and maintains a posted speed limit of 50 km/h. In the study area, Northumberland Street is identified as a main street neighborhood connector <sup>2</sup> . It forms an unsignalized "T"-intersection with Stanley Street controlled by stop signs on the southbound and westbound approaches. Each approach has shared movements, with the exception of the auxiliary westbound right-turn lane. There is a driveway for businesses on the south side of Stanley Street. Retail businesses line the west side of the southbound approach and north side of the westbound approach, which are served by angled parking spots on the respective sides. |
|--|---|
| Stanley Street-<br>Main Street-Scott<br>Street-Wrigley<br>Road (Regional<br>Road 49) | Stanley Street, Main Street, Scott Street and Wrigley Road generally form<br>the east-west two-lane undivided Regional Road 49, also under the<br>jurisdiction of the Region of Waterloo. Stanley Street is a main street<br>neighbourhood connector, Main Street and Scott Street are main street rural<br>connectors, and Wrigley Road is a rural connector2. Since there is no<br>posted speed limit within the study area, it is assumed that the statutory 50<br>km/h limit applies.   |
| Swan Street  | Swan Street is a north-south two lane undivided road that is a continuation of Northumberland Street to the south of Stanley Street. This regional road is classified as a main street neighbourhood connector from its "T"-intersection with Stanley Street to approximately 150m south of the intersection, beyond which it becomes a main street rural connector. From the southern limits of the Ayr community towards Brant-Waterloo Road, the road is classified as a rural connector. This road has a posted speed limit of 50 km/h through the study area, which increases to 80 km/h beyond the limits of the Ayr community. At the "T"-intersection with Stanley Street, there is stop control on the northbound approach. There are no auxiliary left-turn or right-turn lanes on Swan Street or Stanley Street.   |

<sup>&</sup>lt;sup>2</sup> Regional Road Classification. *Context Sensitive Regional Transportation Corridor Design Guidelines*. Region of Waterloo. March 2013.

- Hilltop Drive Hilltop Drive is a two lane undivided local road providing direct access to residential properties to the north of the subject site. The road runs east from its "T"-intersection with Swan Street with stop-control on the east leg. It then curves and runs north to another "T-"intersection with Wrigley Road. The south leg of this intersection is stop-controlled. Shared turn lanes are present on the eastbound and northbound approaches while an auxiliary left turn lane is provided on the westbound approach. The speed limit is assumed to be the statutory 50 km/h limit.
- Howard Marshall Street Howard Marshall Street is a two lane undivided local road within the residential subdivision to the north of the subject site providing driveway access to residential properties. It runs in a north-south direction forms an all-way stop-controlled intersection with Hilltop Drive on the east-west portion of Hilltop Drive. It is assumed that the statutory speed limit of 50 km/h also applies to this road.
- Brant-WaterlooBrant-Waterloo is the boundary road between the two jurisdictions of RegionRoadof Waterloo and the County of Brant. It is an east-west undivided road with a<br/>gravel surface type within the study area and without a posted speed limit.<br/>The assumed speed limit is 50 km/h. The road intersects with Swan Street<br/>and two-way stop control is provided on the Brant-Waterloo Road<br/>approaches.

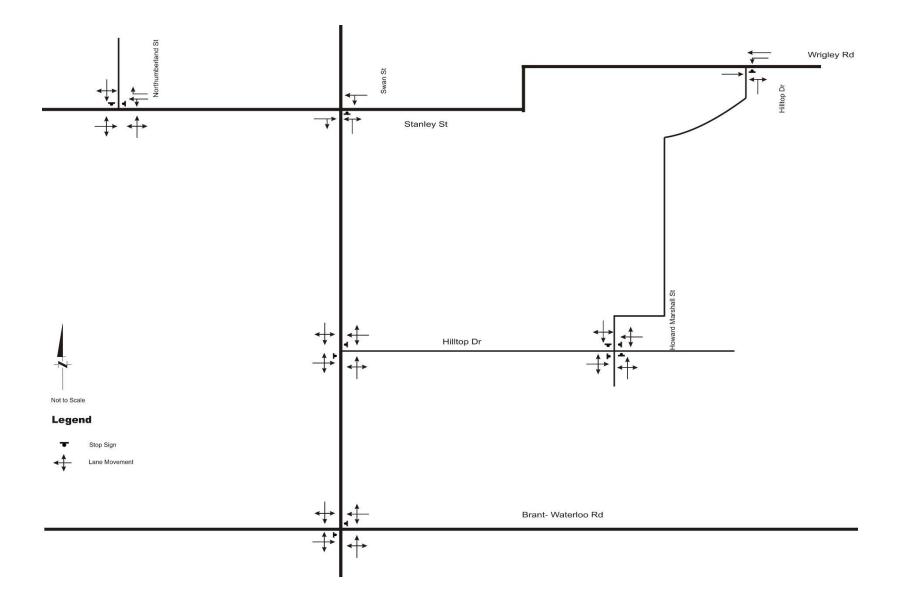


Exhibit 2 Existing Road Network

### 2.3 Active Transportation and Transit

Pedestrian facilities are present along one or both sides of the roads in the study area road network as described below:

- There are sidewalks on the both sides of Northumberland Drive.
- There are sidewalks on both sides of the street along Stanley Street, on the west side along Main Street, and on the south street of Scott Street and Wrigley Road ending just east of Hilltop Drive.
- Sidewalk is provided on the west side of Swan Street from Stanley Street southerly to Mitchell Street. South of Mitchel Street, sidewalk is provided on the east side down to Hilltop Drive. There are no sidewalks south of Hilltop Drive.
- There is a sidewalk on the south/west side of Hilltop Drive from Swan Street to Wrigley Road.
- There is a sidewalk on the west side of Howard Marshall Street.

Study area intersections generally do not have marked pedestrian crossings, except on some approaches at the intersections of Stanley Street with Northumberland and Swan Street.

There are no existing cycling routes within the study area as per the Township's Official Plan. Cyclists may be accommodated on Northumberland Street, Stanley-Scott-Wrigley Road and Swan Street where shoulders are present since the Official Plan designates these routes as planned cycling routes. In addition, the Region is undertaking a project to upgrade watermain and sanitary sewers beneath Northumberland Street, Stanley Street and Swan Street, presenting an opportunity for road reconstruction with enhanced pedestrian and cycling facilities<sup>3</sup>. The planned improvements include:

- New on-road cycling lanes on each side of Swan from Hilltop Drive northerly to past Mitchell Street;
- Shared use on-road cycling facilities including potential "sharrows", which are pavement markings along the center of travel lanes advising drivers to share the road with cyclists:
  - o On Northumberland Street from Stanley Street northerly to Hall Street;
  - o On Stanley Street from Northumberland Street to easterly to St. Andrew Street; and,
  - o On Swan Street from Stanley Street northerly to Mitchell Street
- Construction of a new concrete sidewalk on the east side of Swan Street from Stanley Street to the existing sidewalk located midway between both intersections of Mitchell Street and Swan Street;
- Removal of the existing sidewalk on the west side of Swan Street;

Although a parking study is not considered within the scope of this traffic impact study, it is noted that part of the reconstruction project described above also includes replacing the existing angled parking on North on Northumberland Street and Stanley Street with on-road parallel parking. The proposed development will not impact this replacement plan.

<sup>&</sup>lt;sup>3</sup> *Future Construction Projects.* Regional Council. January 11, 2017. <u>http://www.regionofwaterloo.ca/en/gettingAround/FutureConstructionProjects.asp</u>

There is no transit service within the study area or within the designated Ayr Urban Area and the Township.

### 2.4 Modal Split

The Hilltop TIS presented the modal split for the Hilltop Estates Subdivision based on 2006 Transportation Tomorrow Survey (TTS). Similarly, the modal split for the subject site (869 Brant-Waterloo Road) may considered to be represented by the modal split for residential trips to and from the Town of North Dumfries (2006 TTS Zone 7494). A review of 2011 TTS data confirmed that the following modal splits presented in the Hilltop TIS remain consistent in the more recent survey data.

| Modal Split To/From TTS Zone 7494 |      |  |  |  |  |  |
|-----------------------------------|------|--|--|--|--|--|
| Mode Choice                       | %    |  |  |  |  |  |
| Auto                              | 80%  |  |  |  |  |  |
| Transit                           | 0%   |  |  |  |  |  |
| School Bus                        | 13%  |  |  |  |  |  |
| Walk                              | 5%   |  |  |  |  |  |
| Cycle                             | 2%   |  |  |  |  |  |
| Total                             | 100% |  |  |  |  |  |

It is worth noting that although the non-auto mode choices such as walking and cycling add up to 7%, no reductions are considered necessary for Institute of Transportation Engineers (ITE) trip generation rates used in the analysis for the subject site. ITE trip generation rates are developed in locations with little to no transit service or Travel Demand Management programs, which are in line with the existing modal share for the subject site.

### 2.5 Existing Traffic Volumes

Turning movement counts were performed on behalf of HDR by Traffic Survey Analysis Inc. for the weekday AM and PM peak periods (7:00 AM to 9:00 AM, and 4:00 PM to 6:00 PM) at all existing intersections in the study area excepting Brant Waterloo Road and Swan Street. These hours represent peak traffic generation time for residential developments as well as the peak period of adjacent street traffic. The counts were performed on Thursday, January 18th, 2018.

Following the data collection, the existing intersection of Brant Waterloo Road with Swan Street was included in the scope of the study (after receiving comments from the Township). The present year (2018) traffic volumes at this intersection were based on 2013 turning movement counts presented in the Hilltop TIS and a growth rate of 1.5% per annum for the study area traffic. Detailed discussions of the growth rate are presented in **Section 3.2**.

Existing traffic volumes are shown in **Exhibit 3** and detailed data is provided in **Appendix A**.

| Northumberland/ Stanley |    |               |     |     |     |     |     | Swan/         | Stanley |    |    |
|-------------------------|----|---------------|-----|-----|-----|-----|-----|---------------|---------|----|----|
|                         |    |               |     |     |     |     |     |               |         |    |    |
|                         |    |               |     |     |     |     |     |               |         |    |    |
| 70                      | •  | 207           | •   | 254 | 200 |     |     |               |         |    |    |
| 78                      | 9  | 387           | 1.  | 351 | 208 |     |     |               |         |    |    |
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| 2                       | 0  | ļ             | 1   | 13  | 4   | 379 | 134 | ļ             | 197     |    | 12 |
|                         |    |               |     |     |     |     |     |               |         |    |    |

| Howard Marshall/Hilltop |    |          |    |    |    |  |  |  |  |
|-------------------------|----|----------|----|----|----|--|--|--|--|
|                         |    |          |    |    |    |  |  |  |  |
| 3                       | 1  |          | t  | 0  | 0  |  |  |  |  |
| 10                      | 2  |          | ←  | 33 | 29 |  |  |  |  |
| ┙                       | Ļ  | ST       | t  | 3  | 13 |  |  |  |  |
| 4                       | 2  | Ĺ        | 4  | 1  | H  |  |  |  |  |
| 40                      | 21 | <b>→</b> | 25 | 3  | 9  |  |  |  |  |
| 34                      | 12 | ļ        | 28 | 1  | 2  |  |  |  |  |

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Exhibit 3 Existing Traffic Volumes

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|----|----|-----------|----------|----|---------|
|    |    | пштор/    | Wrigley  |    |         |
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| 34 | 89 | <b>→</b>  | 51       |    | 103     |
| 60 | 25 | ļ         | 39       |    | 28      |
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### 2.6 Existing Traffic Operations

The existing traffic operations were assessed based on the existing traffic counts and supplementary data from Hilltop TIS as shown **Exhibit 3**. This included heavy vehicle percentages derived from the available traffic counts.

The existing road network and intersection controls depicted in **Exhibit 2** were modeled in the Synchro network. It is noted that HCM methodologies do not allow the assessment of the unusual intersection control at the Northumberland Street and Stanley Street/Private Drive. This intersection has a stop control on the southbound and westbound approaches, with the eastbound approach free flowing.

To address this issue, the intersection was modeled as a two-way stop-controlled intersection. Stop control was assumed on the southbound approach, as per existing conditions, and on the northbound approach since it's a private driveway fronting a regional road at the subject intersection.

This analysis method may overestimate the delays for the north and south approaches, and especially so for the heavy southbound volumes because westbound traffic will be considered free-flowing; consequently it may underestimate delays for the westbound traffic, which would otherwise be required to make full stops at the intersection for minor street movements. However, the westbound right turn is modeled as a channelized right-turn stop control as per field conditions, and considering that the westbound through volumes are low, the delays to southbound left turns may be considered to be within reason in the proxy intersection control configuration.

In the Synchro model the respective link speeds within the road network were coded, along with default lane widths of 3.5m at the intersection approaches as per the Region of Waterloo's Capacity Analysis Requirements<sup>4</sup>. The Capacity Analysis requirements also provide values for parameters including the Peak Hour Factor (PHF of 0.9 for all movements), and saturation flow values specified for different lane configurations. All other inputs for the models were kept at the Synchro default values.

Intersection operations are summarized in **Table 1**. Detailed Synchro reports are provided in **Appendix B**.

|                     | Intersection              |     | Veekday A.N | I. Peak | K                     | V   | Veekday P.N | I. Peak | K Contraction of the second se |
|---------------------|---------------------------|-----|-------------|---------|-----------------------|-----|-------------|---------|--|
| Approach / Movement |                           | LOS | Delays (s)  | v/c     | 95 <sup>th</sup><br>Q | LOS | Delays (s)  | v/c     | 95 <sup>th</sup><br>Q  |
|                     | Swan @ Hilltop            |     |             |         |                       |     |             |         |  |
| EB                  | Left/Through/Right        | В   | 12          | 0.01    | <1                    | В   | 15          | 0       | <1   |
| WB                  | Left/Through/Right        | В   | 10          | 0.14    | 4                     | В   | 11          | 0.12    | 3  |
| NB                  | Left/Through/Right        |     | 0           | 0       | 0                     |     | 0           | 0       | 0  |
| SB                  | Left/Through/Right        | А   | 2           | 0.02    | <1                    | А   | 3           | 0.07    | 2  |
| Но                  | Howard Marshall @ Hilltop |     |             |         |                       |     |             |         |  |
| EB                  | Left/Through/Right        | А   | 7           | 0.04    | -                     | А   | 7           | 0.09    | -  |
| WB                  | Left/Through/Right        | А   | 7           | 0.05    | -                     | А   | 7           | 0.05    | -  |

#### Table 1: 2018 Existing Traffic Operations

<sup>4</sup> Transportation Impact Studies (TIS) Requirements for Capacity Analysis, Roundabouts, Signal Warrants. Region of Waterloo.

|         | Intersection                | V      | Veekday A.N | I. Peak              | (                     | ١         | Veekday P.N     | I. Peak | 1                     |
|---------|-----------------------------|--------|-------------|----------------------|-----------------------|-----------|-----------------|---------|-----------------------|
| Ар      | proach / Movement           | LOS    | Delays (s)  | v/c                  | 95 <sup>th</sup><br>Q | LOS       | Delays (s)      | v/c     | 95 <sup>th</sup><br>Q |
| NB      | Left/Through/Right          | А      | 7           | 0.05                 | -                     | А         | 8               | 0.04    | -                     |
| SB      | Left/Through/Right          | А      | 7           | 0.01                 | -                     | А         | 7               | 0       | -                     |
| Nort    | humberland @ Stanley        |        |             |                      |                       |           |                 |         |                       |
| EB      | Left/Through/Right          | А      | 6           | 0.04                 | <1                    | А         | 5               | 0.04    | 1                     |
| WB      | Left/Through                | А      | 0           | 0                    | 0                     | А         | 0               | 0       | 0                     |
| WB      | Right                       | -      | 0           | 0.23                 | 0                     | -         | 0               | 0.14    | 0                     |
| NB      | Left/Through/Right          | А      | 10          | 0                    | <1                    | В         | 10              | 0.03    | <1                    |
| SB      | Left/Through/Right          | В      | 11          | 0.25                 | 8                     | С         | 23              | 0.74    | 51                    |
|         | Hilltop @ Wrigley           |        |             |                      |                       |           |                 |         |                       |
| EB      | Through                     | -      | 0           | 0.07                 | 0                     | -         | 0               | 0.06    | 0                     |
| WB      | Left                        | А      | 8           | 0.02                 | <1                    | А         | 8               | 0.07    | 2                     |
| WB      | Through                     | -      | 0           | 0.03                 | 0                     | -         | 0               | 0.05    | 0                     |
| NB      | Left/Right                  | В      | 10          | 0.2                  | 6                     | В         | 11              | 0.1     | 3                     |
|         | Swan @ Stanley              |        |             |                      |                       |           |                 |         |                       |
| EB      | Through/Right               | -      | 0           | 0.11                 | 0                     | -         | 0               | 0.28    | 0                     |
| WB      | Left/Through                | А      | 3           | 0.02                 | <1                    | А         | 3               | 0.02    | <1                    |
| NB      | Left/Right                  | В      | 14          | 0.48                 | 20                    | В         | 14              | 0.38    | 13                    |
| Sw      | an @ Brant-Waterloo         |        |             |                      |                       |           |                 |         |                       |
| EB      | Left/Through/Right          | А      | 9           | 0.01                 | <1                    | В         | 11              | 0.02    | <1                    |
| WB      | Left/Through/Right          | А      | 9           | 0.01                 | <1                    | А         | 10              | 0.01    | <1                    |
| NB      | Left/Through/Right          | А      | 0           | 0                    | 0                     | А         | 0               | 0       | 0                     |
| SB      | Left/Through/Right          | А      | 1           | 0                    | <1                    | А         | 0               | 0       | <1                    |
| OS - Le | vel of Service v/c – Volume | to Can | acity Ratio | 95 <sup>th</sup> O - | 95 <sup>th</sup> ne   | ercentile | aueue lenath ir | metres  |                       |

LOS – Level of Service v/c – Volume to Capacity Ratio  $95^{th} Q - 95^{th}$  percentile queue length in metres

Under existing conditions all movements at all study intersections are operating well with LOS C or better and with volume to capacity ratios of 0.74 or lower indicating that the intersections are operating well and with residual capacity.

The existing intersections within the study area generally do not feature turning movement storage lanes. As such, all 95<sup>th</sup> percentile queues are accommodated in the shared lanes at intersection approaches. Synchro reports that the longest queues under existing conditions may occur at the southbound approach of Northumberland Street and Stanley Street. However, 95<sup>th</sup> percentile queue of 51 metres will not stretch to the nearest upstream intersection.

# 3 Future Background Conditions

### 3.1 Future Road Network

As described in **Section 2.3**, improvements are planned for the active transportation facilities within the study area, which are supportive of the Town of North Dumfries' "Downtown Ayr: Strategic Action Plan for Revitalization". No other public information is currently available on planned construction projects by the Region within the Town. However, during the development of the Hilltop TIS, the

Region provided the input regarding future improvements, which have been incorporated into the TIS for the subject site. These are listed as follows:

- According to the Region<sup>5</sup> a new southbound left-turn lane from Swan Street to Hilltop Drive is planned for construction within the near future. In addition, the Hilltop TIS also assumed an opposing northbound left-turn lane to serve the development to the west of Swan Street. As such, the existing road network was modified with the above planned improvements for analysis in both the 2020 and 2031 future planning horizons.
- Hilltop TIS also proposed for an all-way stop control at the intersection of Northumberland Street and Stanley Street by the 2027 as a mitigation measure for the study area background growth and additional site traffic generated by the Hilltop Estates Subdivision. Therefore, the 2031 study area road network for the current 869 Brant-Waterloo Road study includes the implementation of an all-way stop control at the intersection of Northumberland Street and Stanley Street.

#### 3.2 Background Traffic Growth

Background traffic growth for the study area was based on the assumptions made in the Hilltop TIS. Insufficient data historical data was available to confirm the assumed 1.5% per annum growth rate in the Hilltop TIS. However, since this growth rate was discussed with the Region staff during the preconsultation meeting for the Hilltop TIS and considered to be applicable to all vehicle movements, the current study maintained consistent assumptions.

Future background growth for the 2020 and 2031 horizon years are shown in **Exhibit 4** and **Exhibit 5**.

<sup>&</sup>lt;sup>5</sup> *Hilltop Estates Subdivision Stage 4, Ayr Traffic Impact Study.* Stantec. November 2013.

| 81       10         18       8         ←       ↓         64       59 | 157 ← 1<br>└ ⊕ ● ↓ 2 | ey<br>62 215<br>5 38<br>2 2<br>↑ r→<br>2 2<br>4 5 |   | <b>52</b> 41<br><b>91</b> 139                |    | Stanley<br>↓<br>↓<br>↓<br>↓<br>325<br>203 | 45<br>21                             | 52<br>24<br>┌→<br>18<br>13             |                                |                                       |                       |                                 |                             |                                | 36<br>62 |
|--|----------------------|---|---|--|----|---|--------------------------------------|--|--------------------------------|---------------------------------------|-----------------------|---------------------------------|-----------------------------|--------------------------------|----------|
|  |                      |   | • | 6 200<br>0 106<br>⊷ ↓<br>1 3                 | 90 | /Hilltop<br>1.<br>● Γ<br>← 0<br>0<br>0    | 73<br>32<br>↑<br>138<br>115          | 48<br>24<br>Γ <sup>+</sup><br>10<br>32 | 4<br>11<br>+J<br>5<br>42<br>36 | Howar<br>2<br>3<br>↓<br>3<br>22<br>13 | rd Mar<br>J<br>→<br>J | shall/Hil<br>←<br>↓<br>26<br>29 | 0<br>34<br>4<br>1<br>4<br>2 | 0<br>30<br>14<br>r→<br>10<br>3 |          |
|  |                      |   | • | B<br>5 172<br>4 72<br>↓<br>7 3<br>3 0<br>4 5 | 6  | 1<br>←<br>● ↓                             | wan<br>6<br>5<br>0<br>↑<br>99<br>120 | 5<br>3<br>0<br>1<br>3<br>3             |                                |                                       |                       |                                 |                             |                                |          |

Exhibit 4 2020 Background Growth Traffic Volumes

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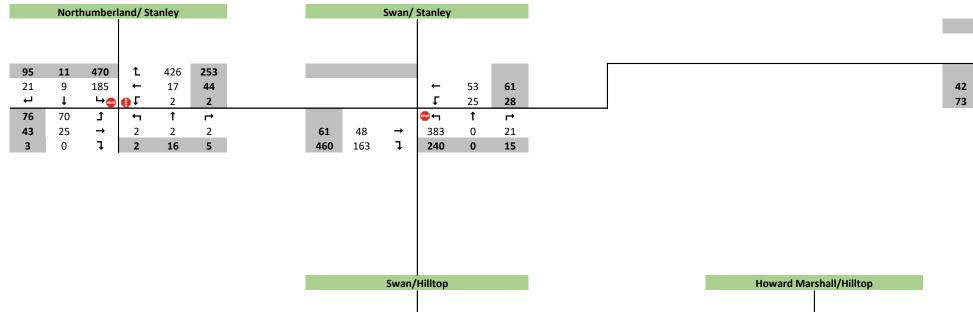
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Stop Sign

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|    |    |          | +<br>ሙ←1 | 24 | 94<br>Γ |
| 36 | 92 | <b>→</b> | 53       |    | 107     |
| 62 | 26 | ļ        | 41       |    | 29      |
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| <b>]</b> | 38  | 28 |
| 4        | 1   | ₽  |
| 0        | 162 | 11 |
| 0        | 135 | 38 |
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| PM        | Х    |
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Brant-Waterloo / Swan

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|   | 8<br>3 | 3<br>0 | 1∎<br>→ |           | 117 | <br>→<br>3 |

Exhibit 5 2031 Background Growth Traffic Volumes

|   | H   | lilltop/ | Wrigley | 1  |     |
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| _ |     |          |         | 28 | 111 |
|   |     |          | stop 🕇  |    | ⊢   |
|   | 109 | →<br>_   | 62      |    | 125 |
|   | 31  | ļ        | 48      |    | 34  |
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### 3.3 Background Developments

The Hilltop Estates Subdivision located to the west of the subject site is currently under development. As per Hilltop TIS, the proposed development will consist of 391 total residential units, occupying a total footprint of 22.93 hectares at full built-out. The detailed breakdown of the proposed residential types are listed below:

- 30 Residential Condominiums
- 78 Townhouses
- 34 Semi-Detached Homes
- 249 Single Family Detached Homes

#### 3.3.1 2020 Horizon Year

The Hilltop Estates Subdivision is expected to be developed in phases with full-build out in 2022. Hilltop TIS considered 2021 as an interim year for analysis purposes. The site trips in the 2021 interim year were based on the completion of the first two phases by 2020, totaling 295 units. These interim year site trips were extracted for use in the current study as described below.

Latest information from the Hilltop developers indicates that Phase 1 of Hilltop is yet to commence and will likely occur in 2019. The extent of the Phase 1 development of Hilltop Estates Subdivision is shown in **Exhibit 6**. Phase 1 will include 108 to 120 units. Therefore, for the 2020 horizon year in the present study for 869 Brant-Waterloo Road, Phase 1 of the Hilltop Estates Subdivision is considered to be a background development. As a conservative approach, 120 units are assumed to be completed by 2020, representing 41% of the expected 2021 interim site trips (from 295 units) generated in the Hilltop TIS<sup>6</sup>.

**Exhibit 7** shows the site trips expected to be generated by Hilltop Estates Subdivision in 2020 based on 41% of the Hilltop TIS 2021 interim year site traffic volumes.

Exhibit 8 shows the total background traffic in 2020 for the 869 Brant-Waterloo Road site.

It should be noted that vehicular access to Phase 1 of the Hilltop Estates Subdivision is provided from the intersections of Robert Woolner Street and Howard Marshall Road, and Leslie Davis Street and Swan Street.

#### 3.3.2 2031 Horizon Year

By the 2031 horizon year in the current study, Hilltop Estates Subdivision is assumed to be fully built and occupied, and contributing to the 2031 total background traffic. The Hilltop site traffic<sup>7</sup> was added to the 2031 background traffic growth in **Exhibit 5**.

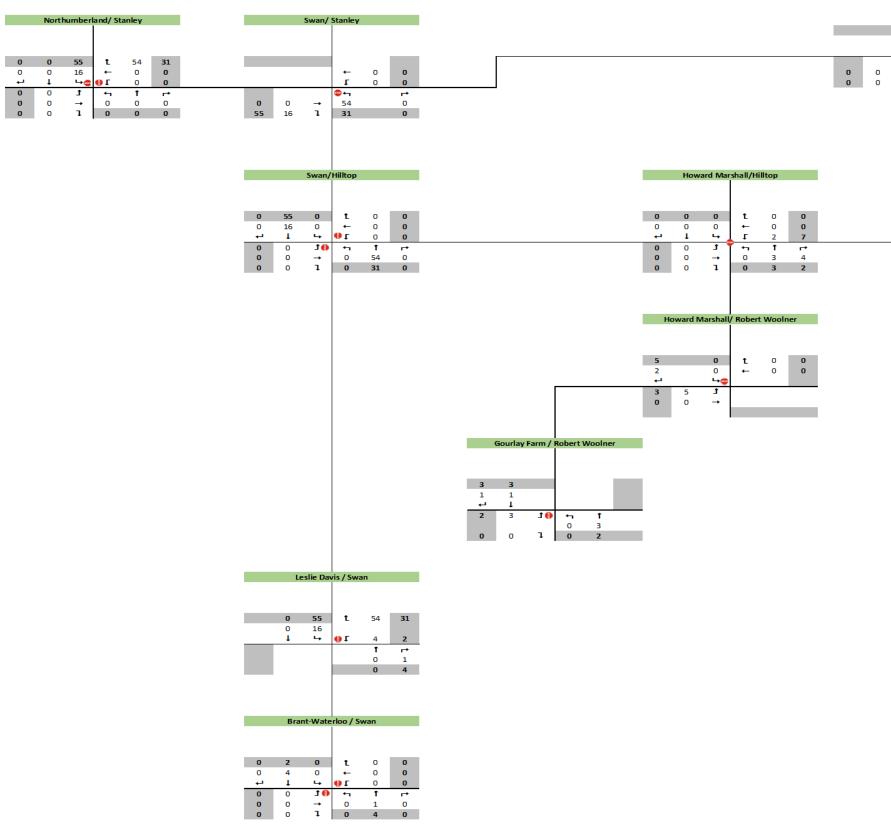
Exhibit 9 shows the total background traffic in 2031 for the 869 Brant-Waterloo Road site.

<sup>&</sup>lt;sup>6</sup> Figure 6. *Hilltop Estates Subdivision Stage 4, Ayr Traffic Impact Study*. Stantec. November 2013.

<sup>&</sup>lt;sup>7</sup> Figure 7. *Hilltop Estates Subdivision Stage 4, Ayr Traffic Impact Study*. Stantec. November 2013.



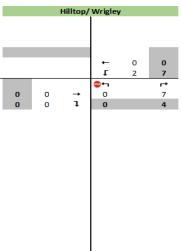
**Exhibit 6 Hilltop Phase 1 Development Extent** 

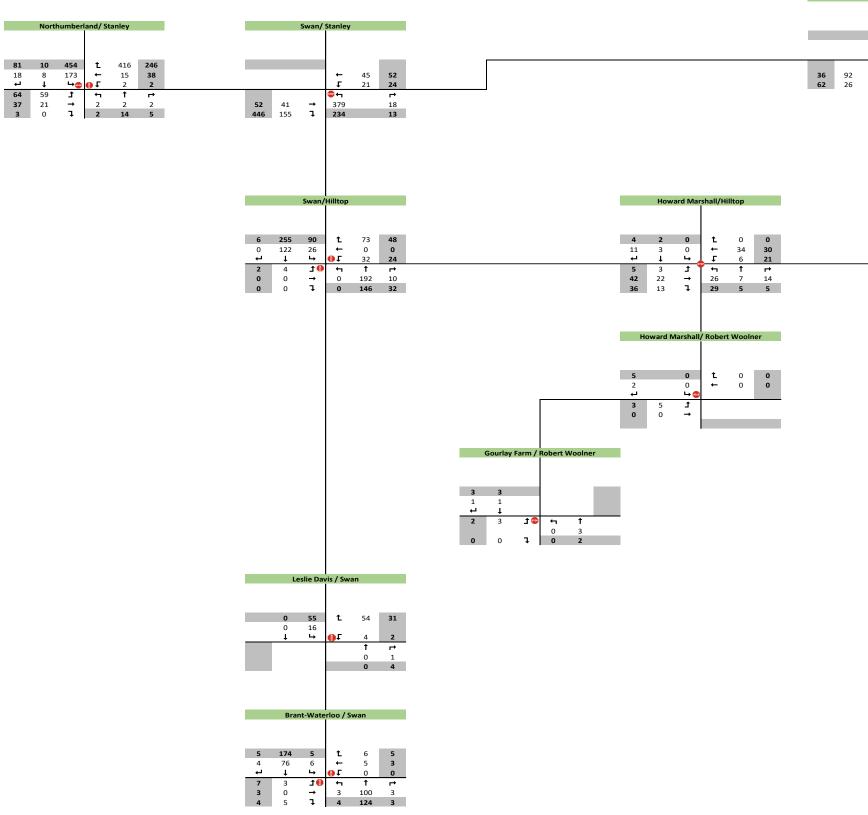


| LEGEND    |      |  |  |  |  |  |  |
|-----------|------|--|--|--|--|--|--|
| AM        | Х    |  |  |  |  |  |  |
| PM        | Х    |  |  |  |  |  |  |
| Stop Sign | STOP |  |  |  |  |  |  |

Exhibit 7 Hilltop Phase 1 Site Traffic

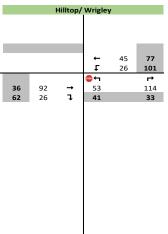
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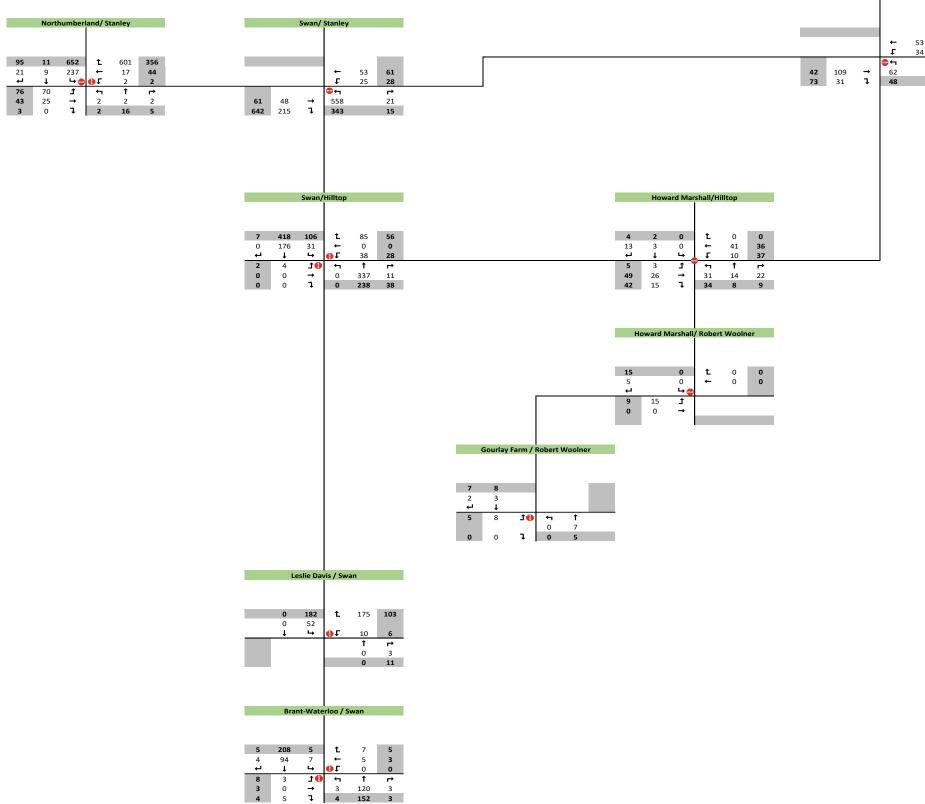




| LEGEND    |      |  |  |  |  |  |
|-----------|------|--|--|--|--|--|
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| PM        | Х    |  |  |  |  |  |
| Stop Sign | STOP |  |  |  |  |  |

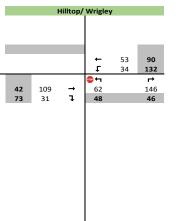
Exhibit 8 2020 Total Background Traffic





| LEGEND    |      |  |  |  |  |  |  |
|-----------|------|--|--|--|--|--|--|
| AM        | Х    |  |  |  |  |  |  |
| PM        | Х    |  |  |  |  |  |  |
| Stop Sign | STOP |  |  |  |  |  |  |

Exhibit 9 2031 Total Background Traffic



### 3.4 Future Background Traffic Operations

#### 3.4.1 2020 Horizon

Traffic operations were assessed under future 2020 background traffic conditions based on the future road network discussed in **Section 3.1** Future Road Network and traffic volumes presented in **Exhibit 4**. Intersection operations are summarized in **Table 2**. Detailed Synchro reports are provided in **Appendix C**. Similar to existing conditions, the Region's Capacity Analysis requirements were maintained.

|     | Intersection            | V   | Veekday A.M   | I. Peal |                       | V   | Veekday P.N   | I. Pea | k                     |
|-----|-------------------------|-----|---------------|---------|-----------------------|-----|---------------|--------|-----------------------|
| Ар  | oproach / Movement      | LOS | Delays<br>(s) | v/c     | 95 <sup>th</sup><br>Q | LOS | Delays<br>(s) | v/c    | 95 <sup>th</sup><br>Q |
|     | Swan @ Hilltop          |     |               |         |                       |     |               |        |                       |
| EB  | Left/Through/Right      | В   | 13            | 0.01    | <1                    | С   | 17            | 0.01   | <1                    |
| WB  | WB Left/Through/Right   |     | 11            | 0.17    | 5                     | В   | 12            | 0.14   | 4                     |
| NB  | Left                    | -   | 0             | 0       | 0                     | -   | 0             | 0      | 0                     |
| NB  | Through/Right           | -   | 0             | 0.13    | 0                     | -   | 0             | 0.12   | 0                     |
| SB  | Left                    | А   | 8             | 0.02    | <1                    | А   | 8             | 0.07   | 2                     |
| SB  | Through/Right           | -   | 0             | 0.08    | 0                     | -   | 0             | 0.17   | 0                     |
| Hov | vard Marshall @ Hilltop |     |               |         |                       |     |               |        |                       |
| EB  | Left/Through/Right      | А   | 7             | 0.05    | -                     | А   | 7             | 0.1    | -                     |
| WB  | Left/Through/Right      | А   | 7             | 0.05    | -                     | А   | 8             | 0.06   | -                     |
| NB  | Left/Through/Right      | А   | 7             | 0.06    | -                     | А   | 8             | 0.05   | -                     |
| SB  | Left/Through/Right      | А   | 7             | 0.02    | -                     | А   | 7             | 0.01   | -                     |
| Nor | thumberland @ Stanley   |     |               |         |                       |     |               |        |                       |
| EB  | Left/Through/Right      | Α   | 6             | 0.04    | 1                     | А   | 5             | 0.05   | 1                     |
| WB  | Left/Through            | А   | 1             | 0       | 0                     | А   | 0             | 0      | 0                     |
| WB  | Right                   | -   | 0             | 0.27    | 0                     | -   | 0             | 0.16   | 0                     |
| NB  | Left/Through/Right      | А   | 10            | 0.01    | <1                    | В   | 10            | 0.03   | <1                    |
| SB  | Left/Through/Right      | В   | 12            | 0.29    | 9                     | E   | 36            | 0.88   | 82                    |
|     | Hilltop @ Wrigley       |     |               |         |                       |     |               |        |                       |
| EB  | Through                 | -   | 0             | 0.08    | 0                     | -   | 0             | 0.06   | 0                     |
| WB  | Left                    | А   | 8             | 0.02    | <1                    | А   | 8             | 0.08   | 2                     |
| WB  | Through                 | -   | 0             | 0.03    | 0                     | -   | 0             | 0.05   | 0                     |
| NB  | Left/Right              | В   | 10            | 0.21    | 6                     | В   | 11            | 0.12   | 3                     |
|     | Swan @ Stanley          |     |               |         |                       |     |               |        |                       |
| EB  | Through/Right           | -   | 0             | 0.13    | 0                     | -   | 0             | 0.33   | 0                     |
| WB  | Left/Through            | Α   | 3             | 0.02    | <1                    | А   | 3             | 0.03   | <1                    |
| NB  | Left/Right              | С   | 16            | 0.59    | 29                    | С   | 17            | 0.47   | 19                    |
| Sv  | van @ Brant-Waterloo    |     |               |         |                       |     |               |        |                       |
| EB  | Left/Through/Right      | А   | 9             | 0.01    | <1                    | В   | 11            | 0.02   | <1                    |
| WB  | Left/Through/Right      | А   | 10            | 0.02    | <1                    | А   | 10            | 0.01   | <1                    |
| NB  | Left/Through/Right      | А   | 0             | 0       | 0                     | А   | 0             | 0      | <1                    |

Table 2: Future 2020 Background Traffic Operations

|                 | Intersection                      | V       | Veekday A.M   | I. Peal              | k                     | V          | Veekday P.N    | I. Peal | k                     |
|-----------------|-----------------------------------|---------|---------------|----------------------|-----------------------|------------|----------------|---------|-----------------------|
| Ар              | proach / Movement                 | LOS     | Delays<br>(s) | v/c                  | 95 <sup>th</sup><br>Q | LOS        | Delays<br>(s)  | v/c     | 95 <sup>th</sup><br>Q |
| SB              | Left/Through/Right                | А       | 1             | 0                    | <1                    | А          | 0              | 0       | <1                    |
| Rob             | oert Woolner @ Howard<br>Marshall |         |               |                      |                       |            |                |         |                       |
| EB              | Left/Through                      | А       | 7             | 0                    | <1                    | А          | 7              | 0       | 0                     |
| WB              | WB Through/Right                  |         | 0             | 0                    | 0                     | -          | 0              | 0       | 0                     |
| SB Left/Right   |                                   | А       | 8             | 0                    | 0                     | А          | 8              | 0.01    | <1                    |
| S               | Swan @ Leslie Davis               |         |               |                      |                       |            |                |         |                       |
| WB              | Left/Right                        | А       | 9             | 0.06                 | 1                     | А          | 9              | 0.03    | <1                    |
| NB              | Through/Right                     | -       | 0             | 0                    | 0                     | -          | 0              | 0       | 0                     |
| SB              | Left/Through                      | А       | 7             | 0.01                 | <1                    | А          | 7              | 0.04    | <1                    |
| Robert          | Woolner @ Gourlay Farm            |         |               |                      |                       |            |                |         |                       |
| EB              | EB Left/Right                     |         | 9             | 0                    | <1                    | А          | 9              | 0       | 0                     |
| NB Left/Through |                                   | -       | 0             | 0                    | 0                     | -          | 0              | 0       | 0                     |
| SB              | Through/Right                     | -       | 0             | 0                    | 0                     | -          | 0              | 0       | 0                     |
| LOS – Lev       | vel of Service v/c – Volume t     | o Capac | ity Ratio 9   | 95 <sup>th</sup> Q - | 95 <sup>th</sup> pei  | rcentile c | ueue length in | metres  |                       |

Under future 2020 background conditions all movements at all study intersections will operate well with LOS C or better, excepting the southbound left turn movement from Northumberland Street to Stanley Street. The delays expected for this movement are expected to increase to over 35 seconds leading to a LOS E. The 95<sup>th</sup> percentile queue for this movement may extend 82 metres but will not block any upstream intersections. The highest volume to capacity ratio (0.88) is expected at this movement as well. However, all intersections will continue to operate well and with residual capacity.

#### 3.4.2 2031 Horizon

Traffic operations were assessed under future 2031 background traffic conditions based on the future road network discussed in **Section 3.1** and traffic volumes presented in **Exhibit 5**. Intersection operations are summarized in **Table 3**. Detailed Synchro reports are provided in **Appendix C**. Similar to existing conditions, the Region's Capacity Analysis Requirements were followed.

|    | Intersections             |     | Veekday A.N   | I. Peal | (                | V   | Weekday P.M. Peak |      |                  |  |
|----|---------------------------|-----|---------------|---------|------------------|-----|-------------------|------|------------------|--|
| A  | oproach / Movement        | LOS | Delays<br>(s) | v/c     | 95 <sup>th</sup> | LOS | Delays<br>(s)     | v/c  | 95 <sup>th</sup> |  |
|    | Swan @ Hilltop            |     |               |         |                  |     |                   |      |                  |  |
| EB | EB Left/Through/Right     |     | 18            | 0.01    | <1               | D   | 25                | 0.01 | <1               |  |
| WB | WB Left/Through/Right     |     | 14            | 0.25    | 8                | С   | 17                | 0.23 | 7                |  |
| NB | NB Left                   |     | 0             | 0       | 0                |     | 0                 | 0    | 0                |  |
| NB | Through/Right             | -   | 0             | 0.23    | 0                |     | 0                 | 0.18 | 0                |  |
| SB | Left                      | А   | 8             | 0.03    | <1               | А   | 8                 | 0.09 | 2                |  |
| SB | SB Through/Right          |     | 0             | 0.12    | 0                |     | 0                 | 0.28 | 0                |  |
| Ho | Howard Marshall @ Hilltop |     |               |         |                  |     |                   |      |                  |  |
| EB | Left/Through/Right        | А   | 7             | 0.06    | -                | А   | 7                 | 0.12 | -                |  |

#### Table 3: Future 2031 Background Traffic Operations

| Inte                  | ersections                  | N             | Veekday A.M | I. Peal              | ĸ                    | Weekday P.M. Peak |                |                  |     |
|-----------------------|-----------------------------|---------------|-------------|----------------------|----------------------|-------------------|----------------|------------------|-----|
| Approa                | LOS                         | Delays<br>(s) | v/c         | 95 <sup>th</sup>     | LOS                  | Delays<br>(s)     | v/c            | 95 <sup>th</sup> |     |
| WB Left/Through/Right |                             | А             | 8           | 0.07                 | -                    | А                 | 8              | 0.1              | -   |
| NB L                  | eft/Through/Right           | А             | 8           | 0.08                 | -                    | А                 | 8              | 0.07             | - 1 |
| SB L                  | eft/Through/Right           | А             | 7           | 0.02                 | -                    | А                 | 7              | 0.01             | -   |
| Northumb              | erland @ Stanley            |               |             |                      |                      |                   |                |                  |     |
| EB L                  | eft/Through/Right           | А             | 9           | 0.14                 | -                    | В                 | 11             | 0.23             | -   |
| WB                    | Left/Through                | В             | 8           | 0.03                 | - 1                  | А                 | 10             | 0.09             | -   |
| WB                    | Right                       |               | 11          | 0.59                 | -                    |                   | 8              | 0.35             | -   |
| NB L                  | eft/Through/Right           | А             | 7           | 0.01                 | -                    | А                 | 9              | 0.04             | -   |
| SB L                  | eft/Through/Right           | А             | 10          | 0.36                 | -                    | F                 | 77             | 1.08             | -   |
| Hillto                | p @ Wrigley                 |               |             |                      |                      |                   |                |                  |     |
| EB                    | Through                     | -             | 0           | 0.09                 | 0                    | -                 | 0              | 0.08             | 0   |
| WB                    | Left                        | А             | 8           | 0.03                 | <1                   | А                 | 8              | 0.1              | 3   |
| WB                    | Through                     | -             | 0           | 0.03                 | 0                    | -                 | 0              | 0.06             | 0   |
| NB                    | Left/Right                  | В             | 11          | 0.28                 | 9                    | В                 | 12             | 0.16             | 4   |
| Swa                   |                             |               |             |                      |                      |                   |                |                  |     |
| EB                    | Through/Right               | -             | 0           | 0.17                 | 0                    | -                 | 0              | 0.46             | 0   |
| WB                    | Left/Through                | А             | 3           | 0.02                 | <1                   | А                 | 3              | 0.04             | <1  |
| NB                    | Left/Right                  | E             | 44          | 0.93                 | 97                   | E                 | 40             | 0.83             | 62  |
| Swan @                | Brant-Waterloo              |               |             |                      |                      |                   |                |                  |     |
| EB L                  | eft/Through/Right           | А             | 9           | 0.01                 | <1                   | В                 | 11             | 0.03             | <1  |
| WB L                  | eft/Through/Right           | А             | 10          | 0.02                 | <1                   | В                 | 10             | 0.01             | <1  |
| NB L                  | eft/Through/Right           | А             | 0           | 0                    | 0                    | А                 | 0              | 0                | <1  |
| SB L                  | eft/Through/Right           | А             | 1           | 0.01                 | <1                   | А                 | 0              | 0                | <1  |
|                       | oolner @ Howard<br>Marshall |               |             |                      |                      |                   |                |                  |     |
| EB                    | Left/Through                | А             | 7           | 0.01                 | <1                   | А                 | 7              | 0.01             | <1  |
| WB                    | Through/Right               | -             | 0           | 0                    | 0                    |                   | 0              | 0                | 0   |
| SB                    | Left/Right                  | А             | 8           | 0.01                 | <1                   | А                 | 8              | 0.02             | <1  |
| Swan                  | @ Leslie Davis              |               |             |                      |                      |                   |                |                  |     |
| WB                    | Left/Right                  | А             | 9           | 0.19                 | 5                    | А                 | 9              | 0.12             | 3   |
| NB                    | Through/Right               | -             | 0           | 0                    | 0                    | -                 | 0              | 0.01             | 0   |
| SB                    | Left/Through                | А             | 7           | 0.04                 | <1                   | А                 | 8              | 0.13             | 3   |
| Robert Wool           | ner @ Gourlay Farm          |               |             |                      |                      |                   |                |                  |     |
| EB                    | Left/Right                  | А             | 9           | 0.01                 | <1                   | А                 | 9              | 0.01             | <1  |
| NB                    | Left/Through                | -             | 0           | 0                    | 0                    | -                 | 0              | 0                | 0   |
| SB                    | Through/Right               | -             | 0           | 0                    | 0                    | -                 | 0              | 0                | 0   |
| LOS – Level of S      | Service v/c – Volume t      | o Capac       | ity Ratio 9 | 95 <sup>th</sup> Q - | 95 <sup>th</sup> per | centile q         | ueue length ir | metres           |     |

Under future 2031 background conditions, the two intersections of Stanley Street with Northumberland Street and with Swan Street will deteriorate considerably. All movements at the other intersections remain in acceptable standing with LOS D or better, and with reserve capacity. At the intersection of Swan Street and Stanley Street, the northbound approach is expected to experience delays over 35 seconds in both AM and PM peak periods and operate with LOS E. At the intersection of Northumberland Street and Stanley Street, the southbound approach is expected to experience very high delays exceeding 75 seconds in the PM Peak hour. The volumes expected at this approach, primarily due to left turning vehicles, will exceed the available capacity.

Hilltop TIS showed that the southbound approach at this intersection would operate with long delays (and LOS F) and at capacity by 2027, even with the proposed improvement of an all-way stop control. Therefore, it may be implied that any additional background growth following 2027 conditions would result in unacceptable conditions. A sensitivity analysis was completed assuming no background traffic growth from 2018 existing conditions to 2031, and by assuming a minimal background growth rate of 0.5%. Both cases show that the critical movement at this intersection will operate beyond capacity, at LOS F and with delays exceeding 120 seconds. Similar above capacity conditions will persist for the adjacent intersection of Stanley Street and Swan Street.

Based on the above analysis and sensitivity tests on background growth rates, any new site traffic from the subject site of 869 Brant-Waterloo Road is expected to exacerbate the situation. However, no alternative routes for traffic travelling to and from the north are available to the planned developments within in the Ayr Urban Area. As such, the following sections detail the expected operations in the study area road network with the additional traffic from the subject site of 869 Brant-Waterloo Road.

# 4 Site Characteristics

#### 4.1 Site Plan and Access

Broos Properties Ltd. is proposing to construct 302 single family units, 108 townhouse units, and 75 townhouse units in medium density residential blocks within the subject site at 869 Brant-Waterloo Road. The proposed development is expected to be carried out in the following four phases:

- Phase 1 construction starts in 2018
- Phase 2 construction starts in 2020
- Phase 3 construction starts in 2022
- Phase 4 construction starts in 2024
- Full build-out and occupied by 2026

Sketch plans showing the subject site at 869 Brant-Waterloo Road at Phase 1 development and fullbuild are presented in **Exhibit 10.** The draft plan for the entire subdivision at 869 Brant-Waterloo Road is presented in **Exhibit 11.** 

During Phase 1, access to the subject site will consist of connections to Howard Marshall Street and Freer Street via Robert Woolner Street and Street H, respectively. No connection is provided to Swan Street via Leslie Davis Street although the adjacent Hilltop Estates Subdivision considers the intersection of Leslie Davis Street and Swan Street to be complete by 2020. The new intersections and respective traffic control devices within the internal road network of the subject site are as listed below:

- Robert Woolner Drive & Howard Marshall Street stop-control on southbound approach
- Robert Woolner Drive /Street F & Freer Street stop-control on southbound approach
- Robert Woolner Drive & Gourlay Farm Lane stop-control on eastbound approach

 Leslie Davis & Street A – traffic circle with yield-control at all approaches (see Section 7 for further details)

At full build-out, new access to the subject site include:

- Robert Woolner Street & Leslie Davie Street
- Robert Woolner Street & Brant-Waterloo Road, and
- Brant Waterloo Road & Street A.

Additional intersections and their control types under full build-out are listed below:

- Robert Woolner Drive & Leslie Davis Street traffic circle with yield-control at all approaches
- Brant-Waterloo Road & Robert Woolner Drive stop-control on southbound approach
- Brant-Waterloo Road & Street A stop-control on southbound approach

#### 4.2 Site Vehicular Traffic Trip Generation

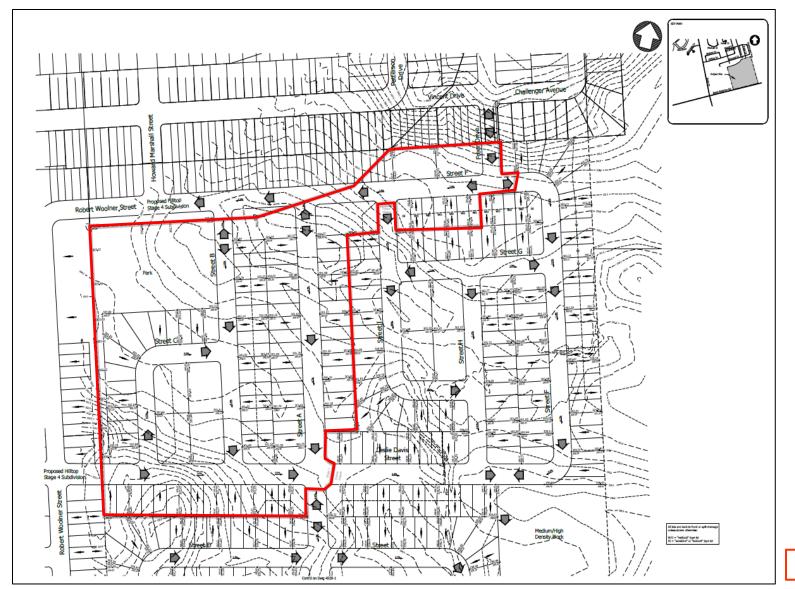
The trip generation for the residential development was based on information in the Trip Generation Manual, 9th Edition by the Institute of Transportation Engineers ("ITE"):

- The "Single-Family Detached Housing" land use code 210 was used to generate trips for the proposed detached houses.
- The "Residential Condominium/Townhouse" land use code 230 was used to generate trips for the proposed townhouse units.

The site trip generation was based on fitted curve equations for the respective land uses, using the fixed variable "dwelling units" and in/out percentage splits. The resulting vehicular traffic generation for the proposed residential units for the AM and PM peak hour is summarized in **Table 4**.

| Land Use               | LUC # | Units      | A.I    | M. Peak | Hour  | P.M. Peak Hour |     |       |
|------------------------|-------|------------|--------|---------|-------|----------------|-----|-------|
| Land Use               | LUC # | Units      | In     | Out     | Total | In             | Out | Total |
| Phase 1 (2020)         |       |            |        |         |       |                |     |       |
| Single Family Detached | 210   | 87         | 19     | 55      | 73    | 62             | 35  | 97    |
| Townhouse              | 230   | 52         | 5      | 26      | 31    | 35             | 21  | 56    |
| Total                  | 139   | 24         | 81     | 104     | 97    | 56             | 153 |       |
|                        | Fu    | ll Build-o | ut (20 | 26)     |       |                |     |       |
| Single Family Detached | 210   | 302        | 59     | 166     | 224   | 189            | 107 | 296   |
| Townhouse 230          |       | 183        | 15     | 70      | 85    | 64             | 37  | 101   |
| Total                  | 485   | 74         | 236    | 309     | 253   | 144            | 397 |       |

#### **Table 4 Site Traffic Generation**



Extent of Phase 1

Exhibit 10 Proposed Development and Phasing



**Exhibit 11 Draft Plan of Subdivision** 

### 4.3 Site Traffic Distribution and Assignment

The distribution of site trips provided in the Hilltop TIS was reviewed against existing traffic patterns and 2011 TTS data. Minor changes in the trip distribution are suggested for the current study and is summarized in **Table 5**.

| To/From | Via   | %  |
|---------|---|----|
| North   | Hilltop Drive – Swan Street – Northumberland Street   | 80 |
| South   | Brant Waterloo Road – Swan Street                     | 8  |
| East    | Howard Marshall Street – Hilltop Drive – Wrigley Road | 12 |

Table 5: Trip Distribution

The site traffic assignments in Phase 1 in 2020 and at full build-out in 2031 are shown in **Exhibit 12** and **Exhibit 13**. The total traffic volumes include background traffic and the site traffic generated by the proposed development. The resulting future total traffic volumes for 2020 and 2031 horizon years are shown in **Exhibit 14** and **Exhibit 15**.

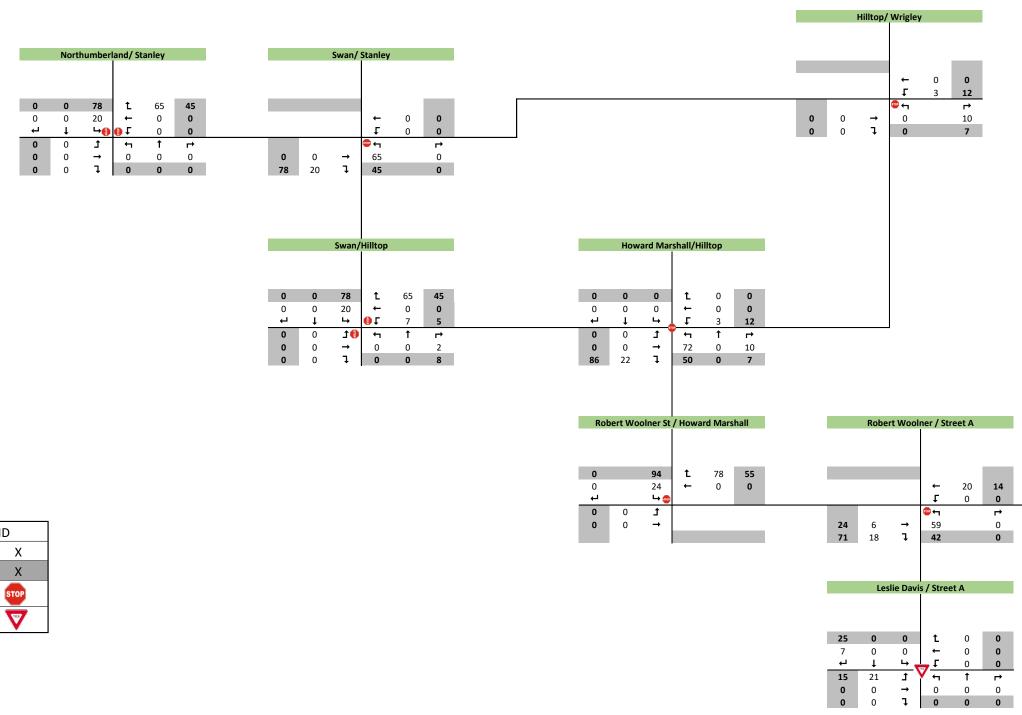


Exhibit 12 Site Generated Traffic Volumes in Phase 1 (2020)

LEGEND

AM

ΡM

Stop Sign

Yield Sign

| Robert Woolner / Freer |   |               |   |   |   |  |  |  |  |
|------------------------|---|---------------|---|---|---|--|--|--|--|
|                        |   |               |   |   |   |  |  |  |  |
|                        |   |               |   |   |   |  |  |  |  |
| 5                      |   | 0             | t | 0 | 0 |  |  |  |  |
| 2                      |   | 0             | - | 0 | Ő |  |  |  |  |
| ے<br>ب                 |   |               | • | 0 | U |  |  |  |  |
|                        |   | 4015          |   |   |   |  |  |  |  |
| 3                      | 5 | t             |   |   |   |  |  |  |  |
| 0                      | 0 | $\rightarrow$ |   |   |   |  |  |  |  |
|                        |   |               |   |   |   |  |  |  |  |

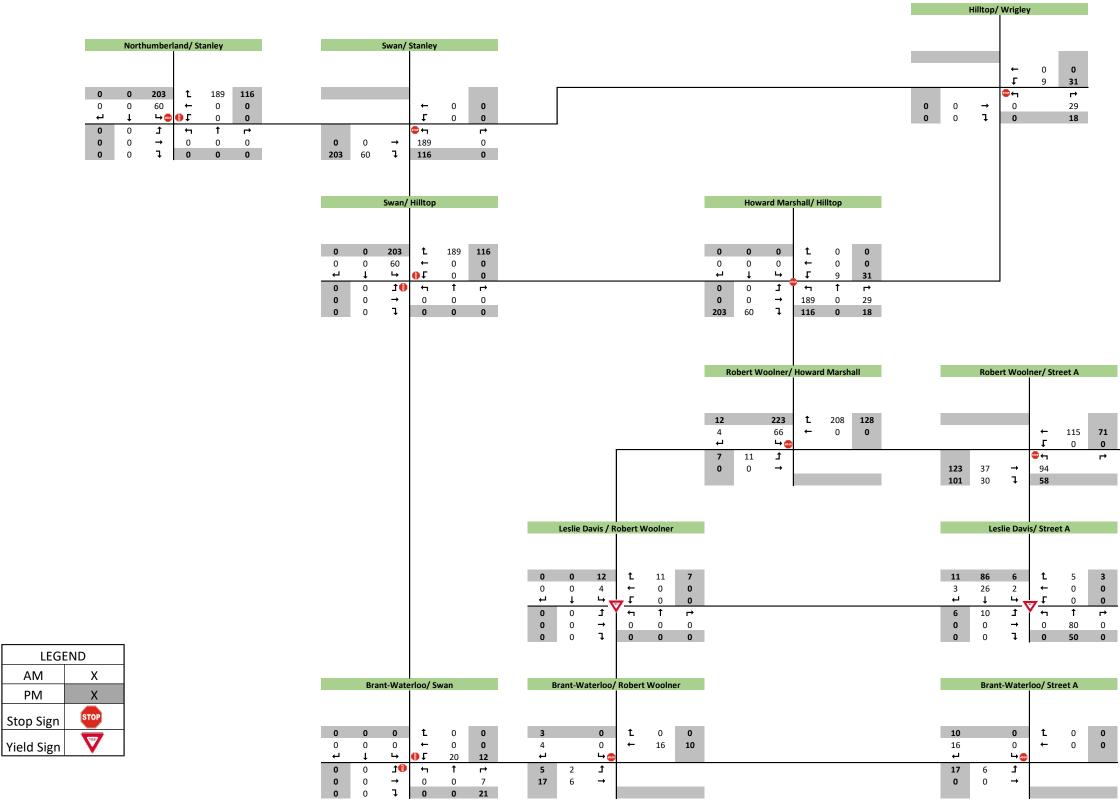


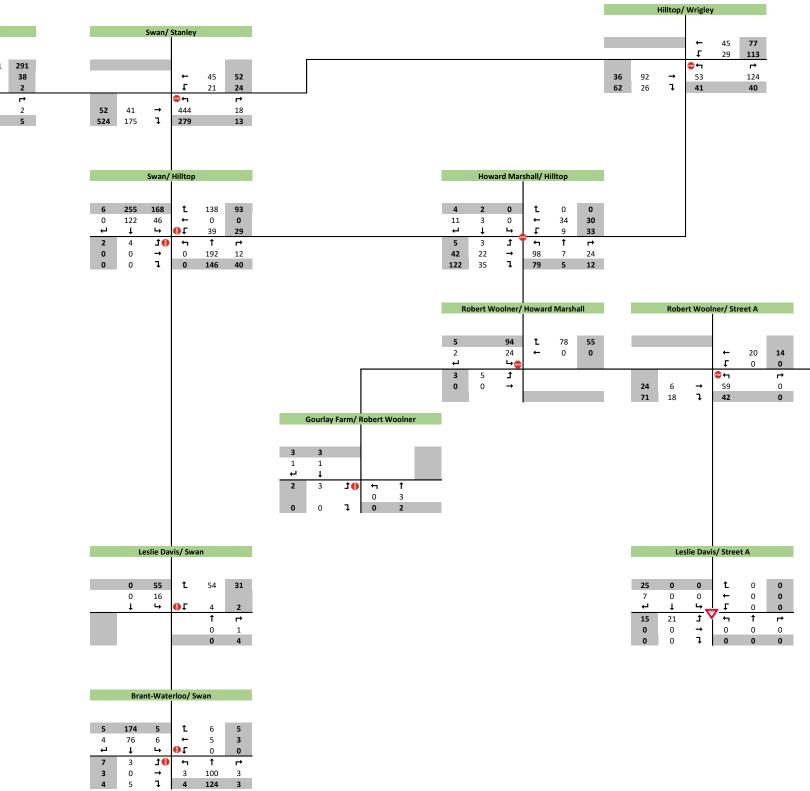
Exhibit 13 Site Generated Traffic Volumes at Full Build-out

AM

ΡM

| F       | Robert V | Voolner  | (Street F)/ Freer |     |    |  |
|---------|----------|----------|-------------------|-----|----|--|
|         |          |          |                   |     |    |  |
|         |          |          |                   |     |    |  |
| <br>0   |          | 0        | t                 | 0   | 0  |  |
| <br>0   |          | 0        | +                 | 115 | 71 |  |
| <br>Ļ,  |          | -→ @     |                   |     |    |  |
| 0       | 0        | t        |                   |     |    |  |
| <br>123 | 37       | <b>→</b> |                   |     |    |  |
|         |          |          |                   |     |    |  |

April 6, 2018 | 29



|    | Northumberland/ Stanley |          |       |     |     |   |  |  |  |  |  |
|----|-------------------------|----------|-------|-----|-----|---|--|--|--|--|--|
|    |                         |          |       |     |     |   |  |  |  |  |  |
|    |                         |          |       |     |     |   |  |  |  |  |  |
| 81 | 10                      | 532      | t     | 481 | 291 | È |  |  |  |  |  |
| 01 | 10                      | 552      | L.    | 401 | 291 | Ŀ |  |  |  |  |  |
| 18 | 8                       | 193      | +     | 15  | 38  |   |  |  |  |  |  |
| ₽  | t                       | ∽∞       | 🛯 🖓 🚺 | 2   | 2   |   |  |  |  |  |  |
| 64 | 59                      | t        | ţ     | 1   | t   |   |  |  |  |  |  |
| 37 | 21                      | <b>→</b> | 2     | 2   | 2   |   |  |  |  |  |  |
| 3  | 0                       | ļ        | 2     | 14  | 5   |   |  |  |  |  |  |

Exhibit 14 2020 Total Traffic Volumes

LEGEND

Х

Х

STOP

V

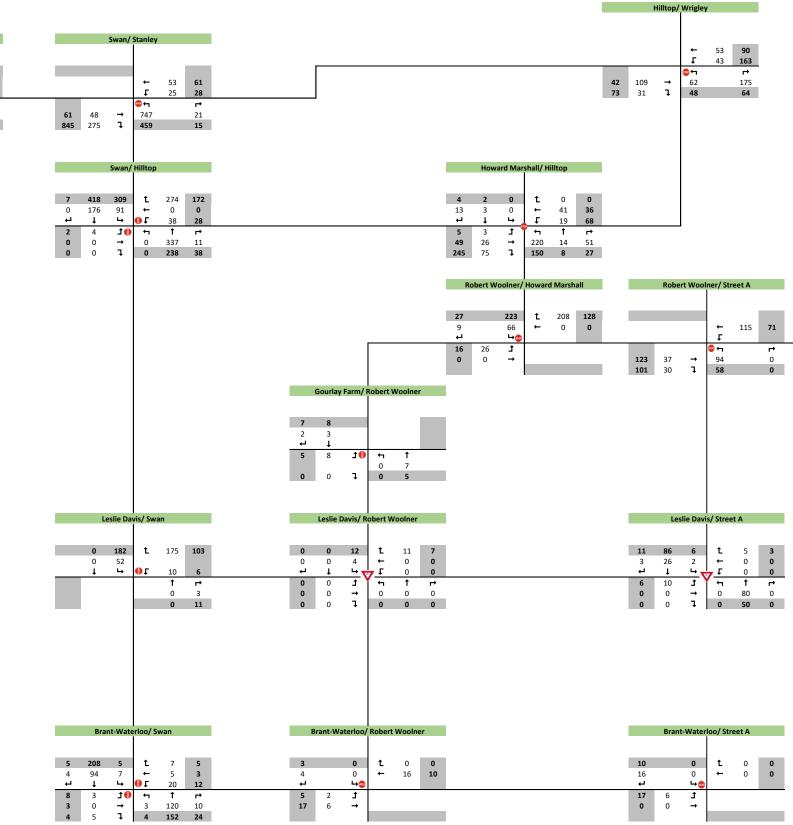
AM

ΡM

Stop Sign

Yield Sign

| R | obert V | Voolner  | (Street | F) / Free | er |
|---|---------|----------|---------|-----------|----|
|   |         |          |         |           |    |
|   |         |          |         |           |    |
| 5 |         | 0        | Ĺ       | 0         | 0  |
| 2 |         | 0        | ←       | 0         | 0  |
| ц |         |          |         |           |    |
| 3 | 5       | t        |         |           |    |
| 0 | 0       | <b>→</b> |         |           |    |
|   |         |          |         |           |    |



|    | Northumberland/ Stanley |          |            |     |     |  |  |  |  |  |
|----|-------------------------|----------|------------|-----|-----|--|--|--|--|--|
|    |                         |          |            |     |     |  |  |  |  |  |
|    |                         |          |            |     |     |  |  |  |  |  |
| 95 | 11                      | 855      | Ĺ          | 790 | 472 |  |  |  |  |  |
| 21 | 9                       | 297      | +          | 17  | 44  |  |  |  |  |  |
| Ч  | Ļ                       |          | <b>0</b> ₽ | 2   | 2   |  |  |  |  |  |
| 76 | 70                      | t        | ţ          | t   | t,  |  |  |  |  |  |
| 43 | 25                      | <b>→</b> | 2          | 2   | 2   |  |  |  |  |  |
| 3  | 0                       | Ţ        | 2          | 16  | 5   |  |  |  |  |  |

| LEGEND     |      |  |  |  |  |
|------------|------|--|--|--|--|
| AM         | Х    |  |  |  |  |
| PM         | Х    |  |  |  |  |
| Stop Sign  | STOP |  |  |  |  |
| Yield Sign |      |  |  |  |  |

Exhibit 15 2031 Total Traffic Volume

|    | R  | obert V | Voolner  | (Street F) / Freer |     |    |  |  |
|----|----|---------|----------|--------------------|-----|----|--|--|
|    |    |         |          |                    |     |    |  |  |
|    | n  |         | •        | •                  | 0   | 0  |  |  |
|    | J  |         | 0        | L L                | U   | U  |  |  |
| (  | C  |         | 0        | +                  | 115 | 71 |  |  |
| •  | -  |         |          |                    |     |    |  |  |
|    |    |         |          |                    |     |    |  |  |
| 12 | 23 | 37      | <b>→</b> |                    |     |    |  |  |
|    | D  | 0       | Ţ        |                    |     |    |  |  |

# 5 Future Traffic Operations

#### 5.1.1 2020 Horizon

Traffic operations were assessed under future 2020 total traffic conditions, based on the traffic volumes shown in **Exhibit 3** and the existing road network with the described modifications presented in **Section 3.1**. Intersection operations are summarized in **Table 6**. Detailed Synchro reports are provided in **Appendix D**.

| Intersection<br>Approach / Movement |                    | Weekday A.M. Peak |               |      |                  | Weekday P.M. Peak |               |      |                  |
|-------------------------------------|--------------------|-------------------|---------------|------|------------------|-------------------|---------------|------|------------------|
|                                     |                    | LOS               | Delays<br>(s) | v/c  | 95 <sup>th</sup> | LOS               | Delays<br>(s) | v/c  | 95 <sup>th</sup> |
| Swan @ Hilltop                      |                    |                   |               |      |                  |                   |               |      |                  |
| EB                                  | Left/Through/Right | С                 | 16            | 0.01 | <1               | С                 | 23            | 0.01 | <1               |
| WB                                  | Left/Through/Right | В                 | 12            | 0.27 | 8                | В                 | 14            | 0.25 | 7                |
| NB                                  | Left               | -                 | 0             | 0    | 0                | -                 | 0             | 0    | 0                |
| NB                                  | Through/Right      | -                 | 0             | 0.13 | 0                | -                 | 0             | 0.12 | 0                |
| SB                                  | Left               | А                 | 8             | 0.04 | <1               | А                 | 3             | 0.13 | 4                |
| SB                                  | Through/Right      | -                 | 0             | 0.08 | 0                |                   | 0             | 0.17 | 0                |
| Howard Marshall @ Hilltop           |                    |                   |               |      |                  |                   |               |      |                  |
| EB                                  | Left/Through/Right | А                 | 7             | 0.07 | -                | А                 | 8             | 0.2  | -                |
| WB                                  | Left/Through/Right | А                 | 8             | 0.06 | -                | А                 | 8             | 0.09 | -                |
| NB                                  | Left/Through/Right | А                 | 8             | 0.17 | - 1              | А                 | 8             | 0.14 | -                |
| SB                                  | Left/Through/Right | А                 | 7             | 0.02 | -                | А                 | 7             | 0.01 | -                |
| Northumberland @ Stanley            |                    |                   |               |      |                  |                   |               |      |                  |
| EB                                  | Left/Through/Right | А                 | 6             | 0.04 | 1                | А                 | 5             | 0.05 | 1                |
| WB                                  | Left/Through       | А                 | 1             | 0    | 0                | А                 | 0             | 0    | 0                |
| WB                                  | Right              | -                 | 0             | 0.31 | 0                | -                 | 0             | 0.19 | 0                |
| NB                                  | Left/Through/Right | А                 | 10            | 0.01 | <1               | В                 | 10            | 0.03 | <1               |
| SB                                  | Left/Through/Right | В                 | 12            | 0.32 | 11               | F                 | 63            | 1.01 | 127              |
| Hilltop @ Wrigley                   |                    |                   |               |      |                  |                   |               |      |                  |
| EB                                  | Through            | -                 | 0             | 0.08 | 0                | -                 | 0             | 0.06 | 0                |
| WB                                  | Left               | А                 | 8             | 0.02 | <1               | А                 | 8             | 0.08 | 2                |
| WB                                  | Through            | -                 | 0             | 0.03 | 0                | -                 | 0             | 0.05 | 0                |
| NB                                  | Left/Right         | В                 | 10            | 0.23 | 7                | В                 | 11            | 0.13 | 3                |
| Swan @ Stanley                      |                    |                   |               |      |                  |                   |               |      |                  |
| EB                                  | Through/Right      | -                 | 0             | 0.14 | 0                | -                 | 0             | 0.38 | 0                |
| WB                                  | Left/Through       | А                 | 3             | 0.02 | <1               | А                 | 3             | 0.03 | <1               |
| NB                                  | Left/Right         | С                 | 20            | 0.69 | 43               | С                 | 21            | 0.59 | 29               |
| Swan @ Brant-Waterloo               |                    |                   |               |      |                  |                   |               |      |                  |
| EB                                  | Left/Through/Right | А                 | 9             | 0.01 | <1               | В                 | 11            | 0.02 | <1               |
| WB                                  | Left/Through/Right | А                 | 10            | 0.02 | <1               | А                 | 10            | 0.01 | <1               |
| NB                                  | Left/Through/Right | А                 | 0             | 0    | 0                | А                 | 0             | 0    | <1               |

#### Table 6: Future 2020 Total Traffic Operations

| Intersection                        | V       | Veekday A.M   | I. Peal               | ٢                   | V         | Veekday P.M    | I. Peal | ĸ                |
|-------------------------------------|---------|---------------|-----------------------|---------------------|-----------|----------------|---------|------------------|
| Approach / Movement                 | LOS     | Delays<br>(s) | v/c                   | 95 <sup>th</sup>    | LOS       | Delays<br>(s)  | v/c     | 95 <sup>th</sup> |
| SB Left/Through/Right               | Α       | 1             | 0                     | <1                  | А         | 0              | 0       | <1               |
| Robert Woolner @ Howard<br>Marshall |         |               |                       |                     |           |                |         |                  |
| EB Left/Through                     | А       | 7             | 0                     | <1                  | А         | 7              | 0       | 0                |
| WB Through/Right                    | -       | 0             | 0.05                  | 0                   | -         | 0              | 0.04    | 0                |
| SB Left/Right                       | А       | 9             | 0.03                  | <1                  | А         | 9              | 0.11    | 3                |
| Swan @ Leslie Davis                 |         |               |                       |                     |           |                |         |                  |
| WB Left/Right                       | А       | 9             | 0.06                  | 1.4                 | А         | 9              | 0.03    | <1               |
| NB Through/Right                    | -       | 0             | 0                     | 0                   | -         | 0              | 0       | 0                |
| SB Left/Through                     | А       | 7             | 0.01                  | <1                  | А         | 7              | 0.04    | <1               |
| Robert Woolner @ Gourlay Farm       |         |               |                       |                     |           |                |         |                  |
| EB Left/Right                       | А       | 9             | 0                     | <1                  | А         | 9              | 0       | 0                |
| NB Left/Through                     | -       | 0             | 0                     | 0                   | -         | 0              | 0       | 0                |
| SB Through/Right                    | -       | 0             | 0                     | 0                   | -         | 0              | 0       | 0                |
| Robert Woolner /Street F @ Freer    |         |               |                       |                     |           |                |         |                  |
| EB Left/Through                     | А       | 7             | 0                     | <1                  | А         | 7              | 0       | 0                |
| WB Through/Right                    | -       | 0             | 0                     | 0                   | -         | 0              | 0       | 0                |
| SB Left/Right                       | А       | 8             | 0                     | 0                   | А         | 8              | 0.01    | <1               |
| Robert Woolner @ Street A           |         |               |                       |                     |           |                |         |                  |
| EB Through/Right                    | -       | 0             | 0.02                  | 0                   | -         | 0              | 0.06    | 0                |
| WB Left/Through                     | -       | 0             | 0                     | 0                   | -         | 0              | 0       | 0                |
| NB Left/Right                       | А       | 9             | 0.07                  | 2                   | А         | 9              | 0.05    | 1                |
| Leslie Davis @ Street A             |         |               |                       |                     |           |                |         |                  |
| EB Left/Through/Right               | А       | 7             | 0.03                  | -                   | А         | 7              | 0.02    | -                |
| WB Left/Through/Right               | А       | 7             | 0                     | -                   | А         | 7              | 0       | -                |
| NB Left/Through/Right               | А       | 7             | 0                     | -                   | А         | 7              | 0       | - 1              |
| SB Left/Through/Right               | А       | 6             | 0.01                  | -                   | А         | 7              | 0.03    | -                |
| LOS – Level of Service v/c – Volume | o Capac | ity Ratio 9   | 95 <sup>th</sup> – 95 | <sup>th</sup> perce | ntile que | ue length in m | etres   |                  |

Under future 2020 total conditions most movements at all study intersections will operate at LOS C or better and with volume to capacity ratios of 0.69 or lower, indicating that intersections will operate well and with residual capacity. Only the southbound approach at the intersection of Northumberland Street and Stanley Street will operate at LOS F and volume to capacity ratio 1.01, indicating high delays and at-capacity conditions for the movement. The 95<sup>th</sup> percentile queue for this movement will extend to 127 metres north of the intersection.

#### 5.1.2 2031 Horizon

Traffic operations were assessed under future 2031 total traffic conditions, based on the traffic volumes shown in **Exhibit 13** and the future road network discussed in **Section 3.1**. Intersection operations are summarized in **Table 7**. Detailed Synchro reports are provided in **Appendix D**.

|      | Intersection                     | N N | /eekday A.M   | I. Peal | (                | V   | Veekday P.N   | I. Peal | k                |
|------|----------------------------------|-----|---------------|---------|------------------|-----|---------------|---------|------------------|
| Ар   | proach / Movement                | LOS | Delays<br>(s) | v/c     | 95 <sup>th</sup> | LOS | Delays<br>(s) | v/c     | 95 <sup>th</sup> |
|      | Swan @ Hilltop                   |     |               |         |                  |     |               |         |                  |
| EB   | Left/Through/Right               | E   | 42            | 0.04    | 1                | F   | 80            | 0.04    | 1                |
| WB   | Left/Through/Right               | С   | 20            | 0.6     | 30               | D   | 29            | 0.61    | 29               |
| NB   | Left                             | -   | 0             | 0       | 0                | -   | 0             | 0       | 0                |
| NB   | Through/Right                    | -   | 0             | 0.23    | 0                | -   | 0             | 0.18    | 0                |
| SB   | Left                             | А   | 8             | 0.09    | 2                | А   | 9             | 0.27    | 8                |
| SB   | Through/Right                    | -   | 0             | 0.12    | 0                | -   | 0             | 0.28    | 0                |
| Нои  | vard Marshall @ Hilltop          |     |               |         |                  |     |               |         |                  |
| EB   | Left/Through/Right               | А   | 8             | 0.14    | -                | А   | 10            | 0.4     | -                |
| WB   | Left/Through/Right               | А   | 8             | 0.09    | -                | А   | 9             | 0.16    | -                |
| NB   | Left/Through/Right               | В   | 10            | 0.39    | -                | В   | 10            | 0.3     | -                |
| SB   | Left/Through/Right               | А   | 7             | 0.02    | -                | А   | 8             | 0.01    | -                |
| Nort | humberland @ Stanley             |     |               |         |                  |     |               |         |                  |
| EB   | Left/Through/Right               | А   | 9             | 0.15    | -                | В   | 11            | 0.23    | -                |
| WB   | Left/Through                     | С   | 8             | 0.03    | -                | А   | 10            | 0.09    | -                |
| WB   | Right                            |     | 17            | 0.78    | -                |     | 9             | 0.47    | -                |
| NB   | Left/Through/Right               | А   | 8             | 0.01    | -                | А   | 9             | 0.04    | -                |
| SB   | Left/Through/Right               | В   | 11            | 0.44    | -                | F   | 194           | 1.4     | -                |
|      | Hilltop @ Wrigley                |     |               |         |                  |     |               |         |                  |
| EB   | Through                          | -   | 0             | 0.09    | 0                | -   | 0             | 0.08    | 0                |
| WB   | Left                             | А   | 8             | 0.03    | <1               | А   | 8             | 0.12    | 3                |
| WB   | Through                          | -   | 0             | 0.03    | 0                | -   | 0             | 0.06    | 0                |
| NB   | Left/Right                       | В   | 11            | 0.32    | 10               | В   | 12            | 0.19    | 5                |
|      | Swan @ Stanley                   |     |               |         |                  |     |               |         |                  |
| EB   | Through/Right                    | -   | 0             | 0.21    | 0                | -   | 0             | 0.6     | 0                |
| WB   | Left/Through                     | А   | 3             | 0.02    | <1               | А   | 4             | 0.04    | 1                |
| NB   | Left/Right                       | F   | 163           | 1.29    | 256              | F   | 177           | 1.29    | 178              |
| Sn   | an @ Brant-Waterloo              |     |               |         |                  |     |               |         |                  |
| EB   | Left/Through/Right               | А   | 9             | 0.01    | <1               | В   | 12            | 0.03    | <1               |
| WB   | Left/Through/Right               | В   | 10            | 0.05    | 1                | В   | 11            | 0.04    | <1               |
| NB   | Left/Through/Right               | А   | 0             | 0       | 0                | А   | 0             | 0       | <1               |
| SB   | Left/Through/Right               | А   | 1             | 0.01    | <1               | А   | 0             | 0       | <1               |
| Rob  | ert Woolner @ Howard<br>Marshall |     |               |         |                  |     |               |         |                  |
| EB   | Left/Through                     | А   | 8             | 0.02    | <1               | А   | 8             | 0.01    | 0                |
| WB   | Through/Right                    | -   | 0             | 0.14    | 0                | -   | 0             | 0.08    | 0                |
| SB   | Left/Right                       | А   | 10            | 0.1     | 3                | В   | 11            | 0.31    | 10               |
| S    | Swan @ Leslie Davis              |     |               |         |                  |     |               |         |                  |
| WB   | Left/Right                       | А   | 9             | 0.19    | 5                | А   | 9             | 0.12    | 3                |
| NB   | Through/Right                    | -   | 0             | 0       | 0                | -   | 0             | 0.01    | 0                |

#### Table 7: Future 2031 Total Traffic Operations

| Intersection                          | N       | /eekday A.M   | I. Peal               | (                   | V         | Veekday P.N     | I. Peal | K                |
|---------------------------------------|---------|---------------|-----------------------|---------------------|-----------|-----------------|---------|------------------|
| Approach / Movement                   | LOS     | Delays<br>(s) | v/c                   | 95 <sup>th</sup>    | LOS       | Delays<br>(s)   | v/c     | 95 <sup>th</sup> |
| SB Left/Through                       | А       | 7             | 0.04                  | <1                  | А         | 8               | 0.13    | 3                |
| Robert Woolner @ Gourlay Farm         |         |               |                       |                     |           |                 |         |                  |
| EB Left/Right                         | А       | 9             | 0.01                  | <1                  | А         | 9               | 0.01    | <1               |
| NB Left/Through                       | -       | 0             | 0                     | 0                   | -         | 0               | 0       | 0                |
| SB Through/Right                      | -       | -             | 0                     | 0                   | -         | -               | 0.01    | 0                |
| Robert Woolner /Street F @ Freer      |         |               |                       |                     |           |                 |         |                  |
| EB Left/Through                       | -       | 0             | 0                     | 0                   | -         | 0               | 0       | 0                |
| WB Through/Right                      | -       | 0             | 0.08                  | 0                   | -         | 0               | 0.05    | 0                |
| SB Left/Right                         | А       | 0             | 0                     | 0                   | А         | 0               | 0       | 0                |
| Robert Woolner @ Street A             |         |               |                       |                     |           |                 |         |                  |
| EB Through/Right                      | -       | 0             | 0.04                  | 0                   | -         | 0               | 0.15    | 0                |
| WB Left/Through                       | -       | 0             | 0                     | 0                   | -         | 0               | 0       | 0                |
| NB Left/Right                         | В       | 10            | 0.13                  | 3                   | В         | 11              | 0.09    | 2.2              |
| Leslie Davis @ Street A               |         |               |                       |                     |           |                 | 1       |                  |
| EB Left/Through/Right                 | А       | 8             | 0.01                  | -                   | А         | 8               | 0.01    | -                |
| WB Left/Through/Right                 | А       | 7             | 0.01                  | -                   | А         | 7               | 0       | -                |
| NB Left/Through/Right                 | А       | 7             | 0.1                   | -                   | А         | 7               | 0.06    | -                |
| SB Left/Through/Right                 | А       | 7             | 0.04                  | -                   | А         | 8               | 0.13    | -                |
| Leslie Davis @ Robert Woolner         |         |               |                       |                     |           |                 |         |                  |
| EB Left/Through/Right                 | А       | 7             | 0                     | -                   | А         | 7               | 0       | -                |
| WB Left/Through/Right                 | А       | 6             | 0.01                  | -                   | А         | 6               | 0.01    | -                |
| NB Left/Through/Right                 | А       | 7             | 0                     | -                   | А         | 7               | 0       | -                |
| SB Left/Through/Right                 | А       | 7             | 0                     | -                   | А         | 7               | 0.01    | -                |
| Brant-Waterloo @ Robert Woolner       |         |               |                       |                     |           |                 |         |                  |
| EB Left/Through                       | А       | 2             | 0                     | 0                   | А         | 2               | 0       | <1               |
| WB Through/Right                      | -       | 0             | 0.01                  | 0                   | -         | 0               | 0.01    | 0                |
| SB Left/Right                         | А       | 8             | 0                     | <1                  | А         | 8               | 0       | <1               |
| Brant-Waterloo @ Street A             |         |               |                       |                     |           |                 |         |                  |
| EB Left/Through                       | А       | 7             | 0                     | <1                  | А         | 7               | 0.01    | <1               |
| WB Through/Right                      | -       | 0             | 0                     | 0                   | -         | 0               | 0       | 0                |
| SB Left/Right                         | А       | 8             | 0.02                  | <1                  | А         | 8               | 0.01    | <1               |
| LOS – Level of Service v/c – Volume t | o Capac | ity Ratio 9   | 95 <sup>th</sup> – 95 | <sup>th</sup> perce | ntile que | eue length in m | netres  |                  |

Under future 2031 total conditions, the two intersections identified as operating at unacceptable conditions under 2031 background conditions become worse:

- At the intersection of Northumberland Street and Stanley Street, the southbound left turn volumes are particularly high during the PM peak hour and are expected to experience delays of 194 seconds. The volume at the approach will exceed the available capacity.
- Long delays close to or exceeding 200 seconds will also be experienced by the northbound approach at the intersection of Stanley Street and Swan Street during both peak periods. In both peak periods, the northbound left turn is a critical movement at the intersection.

Other movements at the study area intersections are expected to continue to operate at LOS D or better and with volume to capacity ratios of 0.78 or lower, indicating that intersections will operate well and with residual capacity. Only the eastbound movement at the intersection of Swan Street and Hilltop Drive, representing vehicles exiting the private driveway (west leg) will experience long delays and LOS E or F in the peak periods due to limited gaps in the high north-south through movement to complete turning movements. However, the volumes are very low in both peak periods.

## 6 Road Network Improvements Analysis

## 6.1 Signal Warrant Analysis

The analysis of 2031 future total traffic conditions indicate that the southbound approach of the intersection of Northumberland Street and Stanley Street will not operate at desirable LOS and is subject to higher volumes than the available capacity. An all-way stop control is already warranted at this intersection in 2027 as per the recommendations in the Hilltop TIS.

In 2031, the adjacent intersection of Swan Street is also expected to experience operational constraints on the northbound approach. Based on the guidelines presented in the **Ontario Traffic Manual – Book 5, Regulatory Signs**, an all-way stop control may not be considered at the intersection of Swan Street and Stanley Street as well, since it is less than 250 metres east of the intersection of Northumberland Street and Stanley Street. Based on these findings and constraints a traffic signal warrant analysis was completed to evaluate the potential for installation of traffic signals at the intersection of Northumberland and Stanley Street.

Signal warrants for future 2031 total conditions for the existing intersection of Northumberland Street and Stanley Street was completed as per the most recent version of Section 4.10a of the **Ontario Traffic Manual - Book 12, Traffic Signals** (March 2012), based on the Region's Capacity Analysis Requirements. Although the preferred approach is using eight-hour volume projections and evaluation against Justification 1, 2 or 3, there was insufficient data to confirm the hourly variation in traffic during the off-peak period.

Justification 7 – Projected Volumes in OTM Book 12 provides a method to determine whether a traffic signal is justified for future developments using the Average Hourly Volume (AHV). The Average Hourly Volume is calculated using the AM and PM Peak hour volumes determined for the future planning horizon.

Justification 7 considers minimum vehicular volume and delay to cross traffic, similar to Justification 1 and 2, but requires 120 percent compliance for both cases for an existing intersection to warrant a traffic signal. Results for the intersections are summarized in **Table 8**.

|               |                             | Minimum                        |           | Compliance |          |
|---------------|-----------------------------|--------------------------------|-----------|------------|----------|
| Justification | Description                 | Requirement<br>1 Lane Highways | Secti     | onal       | Entire % |
|               |                             | <b>Restricted Flow</b>         | Numerical | %          |          |
|               | A. Vehicle volume, all      |                                |           |            |          |
| 1. Minimum    | approaches                  | 720                            | 715       | 99%        |          |
| Vehicular     | (average hour)              |                                |           |            |          |
| Volume        | B. Vehicle volume, along    |                                |           |            | 98%      |
|               | minor streets               | 170                            | 166       | 98%        |          |
|               | (average hour)              |                                |           |            |          |
|               | A. Vehicle volume, major    |                                |           |            |          |
|               | street (average             | 720                            | 548       | 76%        |          |
| 2. Delay to   | hour)                       |                                |           |            |          |
| cross         | B. Combined vehicle and     |                                |           |            | 76%      |
| traffic       | pedestrian                  |                                |           |            |          |
|               | volume crossing artery from | 75                             | 295       | 393%       |          |
|               | minor streets               |                                |           |            |          |
|               | (average hour)              |                                |           |            |          |

Table 8: Signal Warrant - OTM Book 12 Justification 7

For an existing intersection to warrant a traffic signal under future conditions, both Justification 1 and 2 must be satisfied by 120% compliance. Only Justification 2B compliance (393%) satisfies the 120% requirement while Justification 2A remains well below the requirement, confirming that Justification 2 Delay to Cross Traffic is not satisfied. Therefore, for the intersection of Northumberland Street and Stanley Street, since Justification 1 and 2 are not at or above 120%, the installation of a traffic signal is not warranted in 5 years after full build-out.

### 6.2 Other Improvements

Consideration was given to auxiliary lanes at the two intersections of Stanley Street with Northumberland Street and Swan Street, and determined that they did not provide operational benefits to either intersection during the peak hours. In addition, due to the built up surroundings of the intersections, property takes may be required to accommodate any potential auxiliary lanes. Hence, no auxiliary lane warrant analysis is included in this document.

An alternative that may be considered in place of a traffic signal at the intersection of Northumberland Street and Stanley Street is a single-lane roundabout. A roundabout may provide gateway characteristic to the downtown Ayr area and potential capacity improvements. However, a roundabout may require a large footprint and incur additional costs for construction. To consider a roundabout the Region requires an Intersection Control Study to evaluate the feasibility of implementing a roundabout at a particular location in comparison to other forms of traffic control. Prior to undertaking such a study, the Region also requires the completion of an Initial Screening Form.

## 7 Traffic Calming

In 2014, BA Group conducted a Traffic Calming Study using the expected daily traffic volumes generated from the Hilltop Estates Subdivision and the subject site of the current study at 869 Brant-Waterloo Road. The study reviewed the potential for higher vehicle speeds on internal roadways

within the Hilltop Estates Subdivision and based on an evaluation of potential traffic calming measures, recommended traffic circles with mountable islands as the preferred alternative at the following internal intersections:

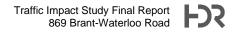
- Leslie Davis Street and Robert Woolner Street
- Vincent Drive and Gourlay Farm Lane

The recommended traffic circles are expected to reduce vehicle speeds, but ensure less of an impact on emergency service response times. The BA study assumes that Leslie Davis Street provides Hilltop Estates Subdivision with connections to Swan Street as well as to the subject site at 869 Brant-Waterloo Road, thereby carrying the highest volumes of traffic in the internal road network. Implementation of the traffic circle at the intersection of Leslie Davis Street and Robert Woolner Street will reduce long straight sections of Leslie Davis Street, and reduce the potential for high speeds for the expected traffic on this road.

In the current study for the subject site at 869 Brant-Waterloo Road, a traffic circle is also recommended at the intersection of Leslie Davis Street and Street A, located east of Robert Woolner Street. Although the analysis presented in this study indicates that a direct connection to Swan Street through the Hilltop Estates Division is not necessary to support the site generated trips, traffic calming benefits of a traffic circle can be still recognized on Leslie Davis Street since long straight sections of the roadway will be reduced.

As such, the traffic analysis completed in the current study includes a traffic circle with yield control on all approaches at the intersection of Leslie Davis Street and Robert Woolner Street. The functional design for the proposed traffic circle has been completed, replicating the design provided in the BA Study, and is shown in **Exhibit 16**. The proposed traffic circle includes the following:

- 7m Inscribed Circle Diameter for the traffic circle
- 7m of pavement around the circle
- Sidewalk on the west side of Street A and pedestrian crossings on the eastbound and northbound approaches



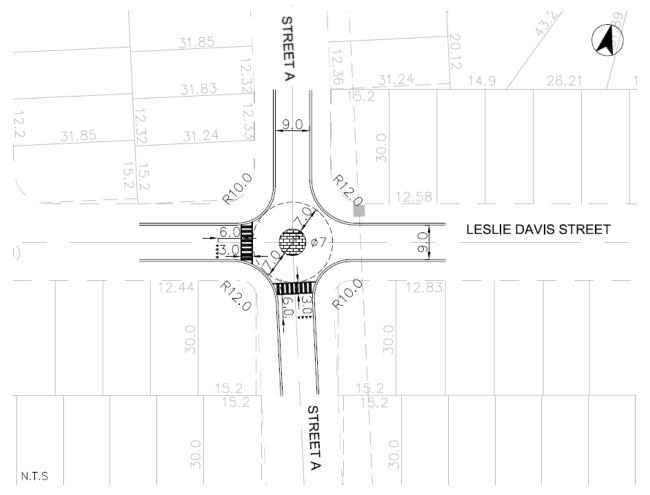


Exhibit 16 Functional Design of Traffic Circle at Leslie Davis Drive and Street A

## 8 Conclusions & Recommendations

The key findings of the study are summarized below:

- Under existing conditions all intersections and movements operate at acceptable levels.
- With the latent background traffic growth and addition of background developments, namely
  from Hilltop Estates Subdivision, the future road network is mostly able to accommodate
  traffic in the 2020 and 2027 horizon years. The only intersection that is expected to reach
  capacity conditions is the intersection of Northumberland and Stanley Street in the 2031 PM
  Peak hour, due to heavy southbound left turns. The intersection of Stanley Street and Swan
  Street will continue to operate with reserve capacity and the northbound approach will
  operate at LOS E.
- Traffic generated from the subject site at 869 Brant-Waterloo Road and distributed to the future road network in Phase 1 (2020) and at 5 years from full build-out (2031) will result in added volumes at the critical intersections of Northumberland Street and Stanley Street, and Stanley Street and Swan Street. As a result, the southbound approach at the intersection of Northumberland and Stanley Street will reach capacity conditions in 2020, and additionally, the northbound approach at the intersection of Swan Street and Stanley Street is expected to experience above capacity conditions by 2031. However, since the intersection of Northumberland Street and Stanley Street is expected to remain unchanged from the unusual existing configuration in 2020, the delays for southbound vehicles may be lower than indicated by the proxy analysis of a two-way stop controlled intersection (refer to Section for details). We believe the reported delays will be lower given the conservative analysis method.
- In year 2020, the proposed 869 Brant-Waterloo Road development will only add 9-13% to the southbound approach at the intersection of Northumberland and Stanley Street and 14-15% to the northbound approach at the intersection of Swan Street and Stanley Street, relative to existing and background traffic.
- A signal warrant analysis at the intersection of Northumberland Street and Stanley Street is **not warranted** under 2031 total traffic conditions based on Ontario Traffic Manual Book 12.
- The intersection of Stanley Street and Swan Street located 88 metres east of the intersection of Northumberland Street and Stanley Street, and therefore was not considered an ideal location for another all-way stop controlled intersection.
- All movements at the remaining intersections will continue to perform within LOS D or better and with reserve capacity under both 2020 and 2031 total traffic conditions.
- The proposed development traffic can be accommodated on the existing road network (using Howard Marshall and Hilltop Drive to access either Swan Street or Wrigley Road) for both Phase 1 and for the ultimate build-out in 2031. The analysis has demonstrated that the proposed development does not rely on a connection to Swan Street via Leslie Davis Street in Phase 1 or in 2031 (although the connection will be available). This is because the intersections of Hilltop drive and Swan Street, and Hilltop Drive and Howard Marshall Street are expected to operate within acceptable levels of service and with reserve capacity when subjected to all site traffic generated from the proposed development at 869 Brant-Waterloo

Road. The proposed development will also not have any major traffic volumes distributed to Brant-Waterloo Road.

• At full build-out of the proposed site, most internal intersections are expected to have stop control on the minor approach. The intersection of Leslie Davis Street and Street A is proposed to be a traffic circle and provide traffic calming for the internal road network of the proposed development.

Based on the findings above, Phase 1 of the proposed development will not require any physical external or internal road network improvements.

For the 2031 horizon year representing 5 years from full build-out of the proposed site, it is expected that the site traffic will add incremental delays at the critical intersections of Northumberland Street and Stanley Street and Stanley Street and Swan Street. However, there are no other alternative routes for trips to and from the north via Swan Street. Physical improvements such as the addition of auxiliary lanes at the critical intersections are not expected to mitigate the 2031 traffic operating conditions.

A traffic signal is not warranted at the intersection of Northumberland Street and Stanley Street under forecast 2031 conditions.

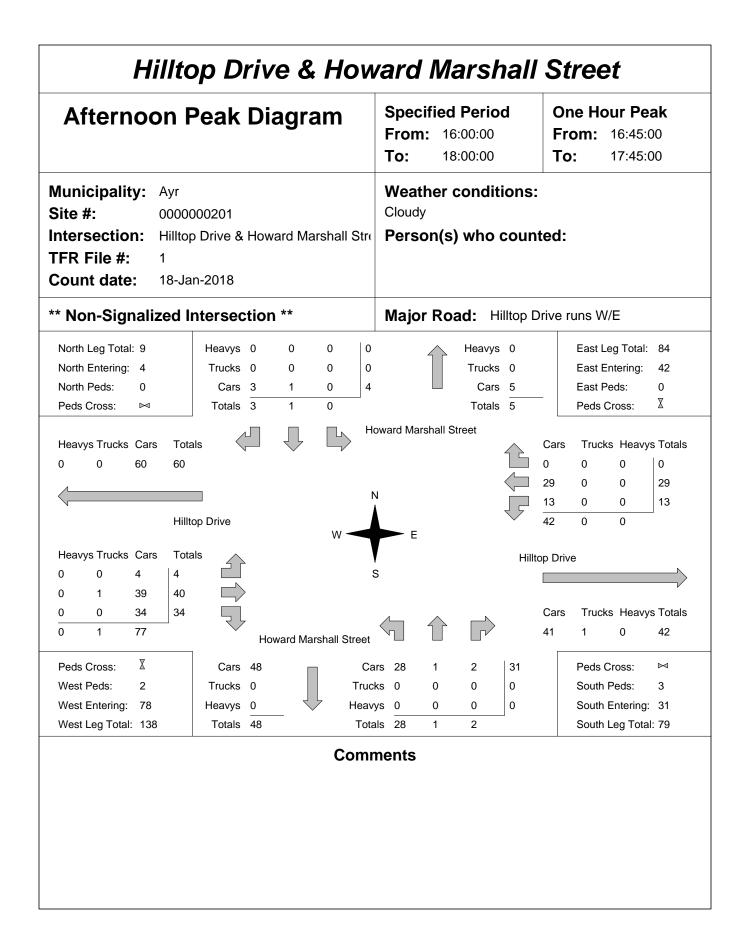
In year 2031, the proposed 869 Brant-Waterloo Road development will only add 18-21% to the southbound approach at the intersection of Northumberland and Stanley Street and 24-25% to the northbound approach at the intersection of Swan Street and Stanley Street, relative to existing and background traffic.

However, it is recommended that the future traffic volumes be monitored to confirm operating conditions and re-evaluate the necessity for signalization or any other road/intersection improvements. A full Intersection Control Study based on the Region's guidelines may be required to address issues that arise as traffic continues to increase at the critical intersections due to background growth within the Ayr Urban Area.

## Appendix A

**Turning Movement Counts** 

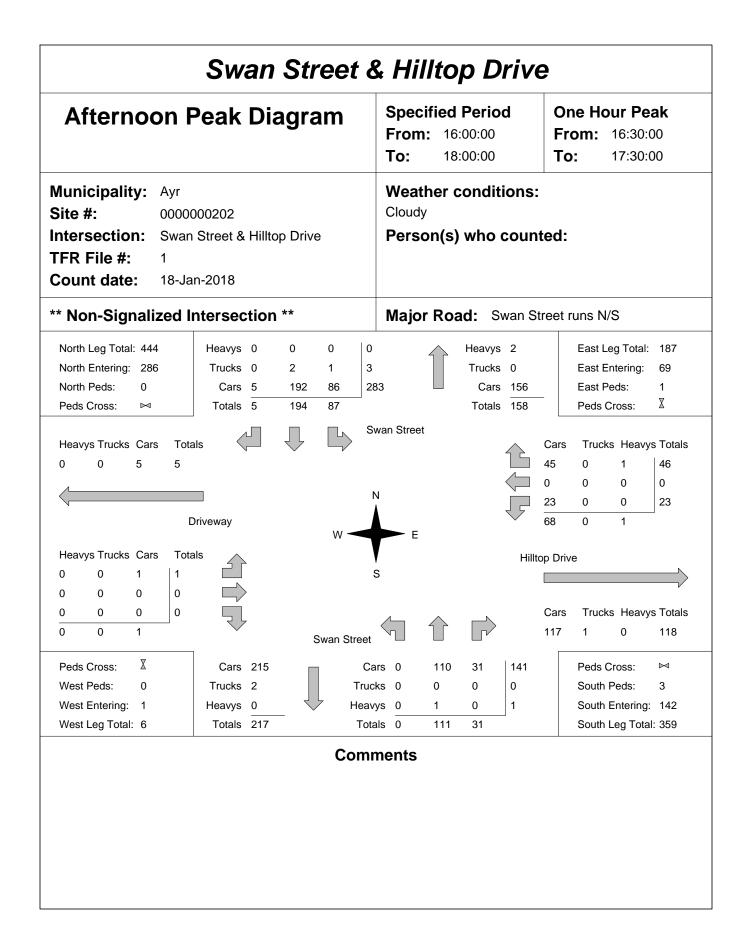
|                              | Hilltop Dr<br>ys 0<br>ks 0<br>rs 5<br>lls 5 | rive runs<br>Ea<br>Ea<br>Pe   | ast Leg Total<br>ast Entering:<br>ast Peds:<br>eds Cross:<br>rucks Heave                            | 36<br>0<br>X  |
|------------------------------|---|---|---|---|
| Heavy<br>Truck<br>Ca<br>Tota | ys 0<br>ks 0<br>rs 5<br>                    | Ea<br>Ea<br>Ea<br>Pe<br>Cars T  | ast Leg Total<br>ast Entering:<br>ast Peds:<br>eds Cross:<br>rucks Heave                            | 36<br>0<br>X  |
| Truck<br>Ca<br>Tota          | ks 0<br>rs 5<br>ils 5                       | Ea<br>Ea<br>Pe<br>Cars T  | ast Entering:<br>ast Peds:<br>eds Cross:<br>rucks Heav  | 36<br>0<br>X  |
| d Marshall Street            | ~ 스   |   |   | ys Totals   |
|                              | ~ 스   |   |   | ys Totals   |
|                              | 4   | 0 0   |   | 0   |
|                              |   | 32 1  | -   | 33  |
|                              |   | 3 0<br>35 1   | -   | 3   |
| E                            |   |   |   |   |
|                              | Hillto                                      | p Drive   |   |   |
|                              | l   |   |   |   |
| A 1                          |   | Cars T  | rucks Heav  | ys Totals   |
|                              | >   | 27 1  | 2   | 30  |
| 24 3 8                       | 35  | Pe  | eds Cross:  | $\mathbb{X}$  |
| 1 0 0                        | 1   | So  | outh Peds:  | 6   |
| 0 0 1                        | 1   |   | -   |   |
| 25 3 9                       |   | So  | outh Leg Tota   | al: 54  |
| 2                            |   | E       Hillto         Hillto       Hilto         Hillt | E Hilltop Drive<br>Cars T<br>27 1<br>24 3 8 35<br>0 0 1<br>25 3 9 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 | E       Hilltop Drive         Cars       Trucks Heav         27       1       2         24       3       8       35       Peds Cross:         24       3       8       35       South Peds:         0       0       1       South Entering       South Leg Tota |

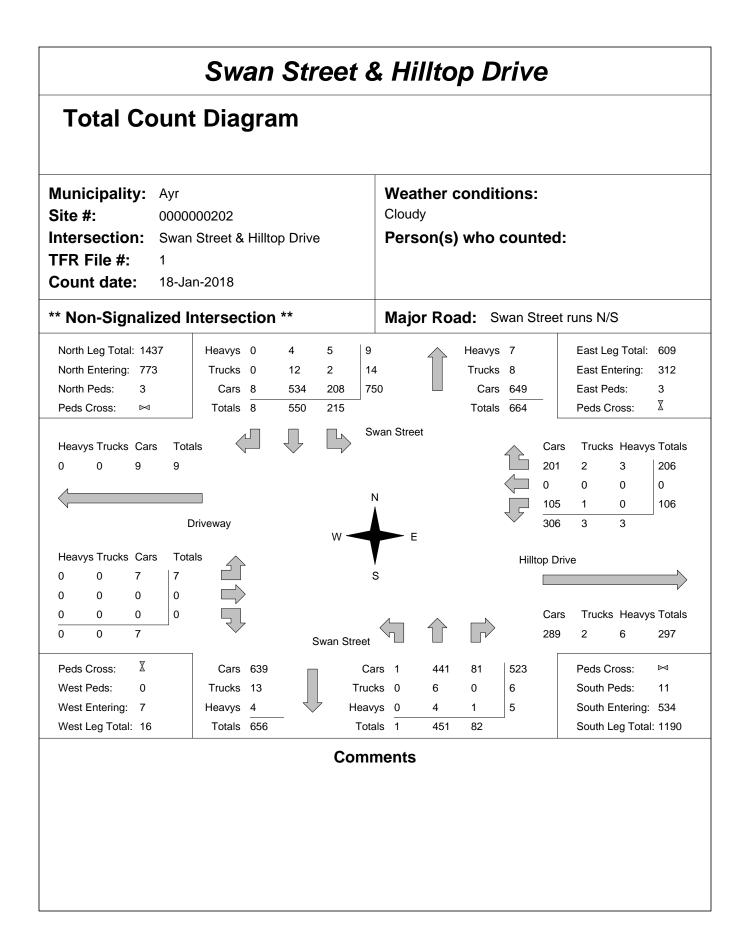


#### Hilltop Drive & Howard Marshall Street **Total Count Diagram** Weather conditions: Municipality: Ayr Site #: Cloudy 000000201 Intersection: Person(s) who counted: Hilltop Drive & Howard Marshall Stre TFR File #: 1 Count date: 18-Jan-2018 \*\* Non-Signalized Intersection \*\* Major Road: Hilltop Drive runs W/E North Leg Total: 44 Heavys 1 0 0 1 Heavys 2 East Leg Total: 258 Trucks 0 0 Trucks 0 North Entering: 29 0 0 East Entering: 134 North Peds: 0 Cars 22 6 0 28 Cars 13 East Peds: 1 X Totals 23 Totals 15 Peds Cross: 6 0 Peds Cross: ⋈ Howard Marshall Street Ъ Totals Trucks Heavys Totals Heavys Trucks Cars Cars 2 5 219 226 0 0 0 0 105 3 1 109 Ν 25 0 0 25 Hilltop Drive 130 3 1 w Heavys Trucks Cars Totals Hilltop Drive 2 0 8 10 S 2 3 99 104 0 100 101 Trucks Heavys Totals 1 Cars 5 3 3 3 207 118 124 Howard Marshall Street X Peds Cross: Peds Cross: $\bowtie$ Cars 131 Cars 92 5 19 116 West Peds: 11 Trucks 0 Trucks 2 0 0 2 South Peds: 45 1 West Entering: 215 Heavys 1 Heavys 0 0 1 South Entering: 119 West Leg Total: 441 Totals 94 South Leg Total: 251 Totals 132 5 20 **Comments**

|   | Hilltop Drive & Howard Marshall Street         Traffic Count Summary         Intersection: Hilltop Drive & Howard Marshall St         Count Date: 18-Jan-2018 |                                |                                |                                |                                    |                                  |   |                                |                                   |                                |                                |                             |  |
|---|---|--------------------------------|--------------------------------|--------------------------------|------------------------------------|----------------------------------|---|--------------------------------|-----------------------------------|--------------------------------|--------------------------------|-----------------------------|--|
| Intersection:   | Hilltop D   | rive & H                       |                                |                                |                                    | Date: 18-Jan-20                  |   | <sup>cipality:</sup> Ay        | r                                 |                                |                                |                             |  |
|   | North   | n Appro                        | ach Tot                        | als                            |                                    |                                  |   |                                |                                   | ach Tot                        |                                |                             |  |
|   | Include   | es Cars, T                     | rucks, & H                     |                                | Tatal                              | North/South                      |   | Include                        | es Cars, T                        | rucks, & H                     | ,                              | Tatal                       |  |
| Hour<br>Ending  | Left  | Thru                           | Right                          | Grand<br>Total                 | Total<br>Peds                      | Total<br>Approaches              | Hour<br>Ending  | Left                           | Thru                              | Right                          | Grand<br>Total                 | Total<br>Peds               |  |
| 7:00:00<br>8:00:00<br>9:00:00<br>16:00:00<br>17:00:00<br>18:00:00 | 0<br>0<br>0<br>0  | 0<br>2<br>3<br>0<br>1<br>0     | 0<br>8<br>6<br>0<br>6<br>3     | 0<br>10<br>9<br>0<br>7<br>3    | 0<br>0<br>0<br>0                   | 0<br>43<br>43<br>0<br>26<br>36   | 7:00:00<br>8:00:00<br>9:00:00<br>16:00:00<br>17:00:00<br>18:00:00 | 0<br>23<br>24<br>0<br>16<br>31 | 0<br>4<br>0<br>0<br>1             | 0<br>6<br>10<br>0<br>3<br>1    | 0<br>33<br>34<br>0<br>19<br>33 | 0<br>4<br>29<br>0<br>9<br>3 |  |
| Totals:   |   |                                | 23<br>ach Tota<br>rucks, & H   |                                | 0                                  | 148<br>East/West                 |   | 94<br>Wes                      | 5<br><b>t Appro</b><br>es Cars, T | 20<br>ach Tota<br>rucks, & H   | 119<br>als<br>eavys            | 45                          |  |
| Hour<br>Ending  | Left  | Thru                           | Right                          | Grand<br>Total                 | Total<br>Peds                      | Total<br>Approaches              | Hour<br>Ending  | Left                           | Thru                              | Right                          | Grand<br>Total                 | Total<br>Peds               |  |
| 7:00:00<br>8:00:00<br>9:00:00<br>16:00:00<br>17:00:00<br>18:00:00 | 0<br>3<br>0<br>10<br>12   | 0<br>33<br>19<br>0<br>33<br>24 | 0<br>0<br>0<br>0<br>0<br>0     | 0<br>36<br>19<br>0<br>43<br>36 | 0<br>0<br>0<br>0<br>1<br>0         | 0<br>68<br>51<br>0<br>113<br>117 | 7:00:00<br>8:00:00<br>9:00:00<br>16:00:00<br>17:00:00<br>18:00:00 | 0<br>1<br>3<br>0<br>3<br>3     | 0<br>20<br>18<br>0<br>30<br>36    | 0<br>11<br>11<br>0<br>37<br>42 | 0<br>32<br>32<br>0<br>70<br>81 | 0<br>3<br>5<br>0<br>1<br>2  |  |
| Totals:<br>Hours En<br>Crossing                                   |   | 109<br>7:00<br>0               | 0<br><b>Calc</b><br>8:00<br>30 | 134<br>ulated V<br>9:00<br>32  | 1<br><b>/alues f</b><br>16:00<br>0 | 349<br>or Traffic Cr             | <b>ossing M</b><br>17:00<br>19                                    | 10<br>ajor Stre<br>17:00<br>55 | <u>104</u><br>eet<br>18:00<br>34  | 101<br>18:00<br>54             | 215                            | 11                          |  |

| Site #:       000000202         Intersection:       Swan Street & Hilltop Drive         TFR File #:       1         Count date:       18-Jan-2018         ** Non-Signalized Intersection **         North Leg Total:       333         North Entering:       127         North Peds:       1         Peds Cross:       Image: Colspan="2">Image: Colspan="2">Swar         0       0         Heavys Trucks Cars       Totals         0       0         Driveway       N | Weathe<br>Cloudy<br>Person(<br>Major R | (s) who<br>Road:<br>Heavy<br>Truck<br>Ca | Swan St                       | reet ru       | INS N/S<br>East Leg<br>East Ente<br>East Ped<br>Peds Cro<br>Trucks | Total:<br>ering:<br>ds:<br>oss: | 135<br>101<br>1<br>X |
|--|--|--|-------------------------------|---------------|--|---------------------------------|----------------------|
| North Leg Total: 333Heavys0325North Entering:127Trucks050117North Peds:1Cars09423117Peds Cross: $\bowtie$ Totals010225SwarHeavys Trucks CarsTotals $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ 0000 $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ DrivewayDriveway $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$   | In Street                              | Heavy<br>Trucł<br>Ca                     | ys 1<br>ks 4<br>rs <u>201</u> | Cars          | East Leg<br>East Ente<br>East Ped<br>Peds Cro                      | Total:<br>ering:<br>ds:<br>oss: | 101<br>1             |
| North Entering:127Trucks0505North Peds:1 $Cars$ 09423117Peds Cross: $\bowtie$ Totals010225SwarHeavys TrucksCarsTotals $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ 00000 $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$ DrivewayDrivewayDriveway $\checkmark$ $\checkmark$ $\checkmark$ $\checkmark$   |  | Truck                                    | ks 4<br>rs <u>201</u>         | Cars          | East Ente<br>East Ped<br>Peds Cro                                  | ering:<br>ls:<br>oss:           | 101<br>1             |
| Heavys Trucks Cars Totals  |  |  |                               |               | Trucks   |                                 |                      |
| Driveway   |  |  |                               |               | 1  | neavys                          | s Totals<br>  70     |
|  | F F                                    |  | F                             | 0<br>30<br>98 | 1  | 0<br>0<br>1                     | 0<br>31              |
| Heavys Trucks Cars Totals  |  |  | Hillto                        | op Drive      |  |                                 |                      |
| 0 0 3 3 S<br>0 0 0 0 S   |  |  |                               |               |  |                                 | $ \rightarrow $      |
| 0 0 0 0<br>0 0 3 Swan Street   |  |  | >                             | Cars<br>31    | Trucks<br>0  | Heavys<br>3                     | s Totals<br>34       |
| Peds Cross: X Cars 124 Cars  | 0 13                                   | 30 8                                     | 138                           |               | Peds Cro   | DSS:                            | $\boxtimes$          |
| West Peds: 0 Trucks 6 Trucks   |  |  | 3                             |               | South Pe   |                                 | 7                    |
| West Entering:3Heavys3HeavysWest Leg Total:3TotalsTotalsTotals   |  | 1<br>33 9                                | 1                             |               | South Er<br>South Le   | -                               |                      |
|  |  | 50 3                                     |                               |               |  | y i olai                        | . 210                |
| Comme  | ents                                   |  |                               |               |  |                                 |                      |





|   |                    |                    |                       |                      | _                | et & H                             | -   |                         | ve                   |                       |                      |                  |
|---|--------------------|--------------------|-----------------------|----------------------|------------------|------------------------------------|---|-------------------------|----------------------|-----------------------|----------------------|------------------|
|   |                    |                    |                       |                      |                  | ount S                             |   |                         |                      |                       |                      |                  |
| Intersection:                             |                    |                    |                       |                      | Count E          | <sup>ate:</sup> 18-Jan-20          | )18 <sup>Munic</sup>                      | <sup>cipality:</sup> Ay |                      |                       |                      |                  |
|   |                    |                    | ach Tot<br>rucks, & H |                      |                  |                                    |   |                         |                      | ach Tot<br>rucks, & H |                      |                  |
| Hour<br>Ending                            | Left               | Thru               | Right                 | Grand<br>Total       | Total<br>Peds    | North/South<br>Total<br>Approaches | Hour<br>Ending                            | Left                    | Thru                 | Right                 | Grand<br>Total       | Total<br>Peds    |
| 7:00:00<br>8:00:00<br>9:00:00<br>16:00:00 | 0<br>24<br>32<br>0 | 0<br>90<br>99<br>0 | 0<br>0<br>0<br>0      | 0<br>114<br>131<br>0 | 0<br>1<br>0<br>0 | 0<br>252<br>253<br>0               |   | 0<br>0<br>1<br>0        | 0<br>130<br>108<br>0 | 0<br>8<br>13<br>0     | 0<br>138<br>122<br>0 | 0<br>7<br>0<br>0 |
| 17:00:00<br>18:00:00                      | 77<br>82           | 180<br>181         | 3<br>5                | 260<br>268           | 02               |                                    | 17:00:00<br>18:00:00                      | 0<br>0                  | 101<br>112           | 22<br>39              | 123<br>151           | 22               |
| Totals:                                   |                    |                    | 8<br>ach Tota         |                      | 3                | 1307                               |   |                         |                      | 82<br>ach Tota        |                      | 11               |
| Hour                                      | Include            | es Cars, T         | rucks, & H            | ,                    | Total            | East/West                          | Hour                                      | Include                 | es Cars, T           | rucks, & H            | eavys<br>Grand       | Total            |
| Hour<br>Ending                            | Left               | Thru               | Right                 | Grand<br>Total       | Total<br>Peds    | Total<br>Approaches                | Hour<br>Ending                            | Left                    | Thru                 | Right                 | Total                | Total<br>Peds    |
| 7:00:00<br>8:00:00<br>9:00:00<br>16:00:00 | 0<br>35<br>25<br>0 | 0<br>0<br>0<br>0   | 0<br>73<br>58<br>0    | 0<br>108<br>83<br>0  | 0<br>1<br>0<br>0 | 0<br>111<br>86<br>0                | 7:00:00<br>8:00:00<br>9:00:00<br>16:00:00 | 0<br>3<br>3<br>0        | 0<br>0<br>0<br>0     | 0<br>0<br>0<br>0      | 0<br>3<br>3<br>0     | 0<br>0<br>0<br>0 |
| 17:00:00<br>18:00:00                      | 27<br>19           | 0<br>0             | 37<br>38              | 64<br>57             | 02               | 64<br>58                           | 17:00:00<br>18:00:00                      | 01                      | 0<br>0               | 0<br>0                | 0<br>1               | 0<br>0           |
| Totals:                                   | 106                | 0                  | 206<br>Calc           | 312<br>ulated V      | 3<br>/alues f    | 319<br>or Traffic Cr               |   | 7<br>aior Stre          | <u>0</u>             | 0                     | 7                    | 0                |
| Hours En<br>Crossing                      |                    | 0:00<br>0          | 0:00<br>0             | 7:00<br>0            | 8:00<br>46       |                                    | 9:00<br>28                                | 16:00<br>0              | 17:00<br>29          | 18:00<br>24           |                      |                  |

| Morning   | Pea                                     | ak Di                              | iagra     | am     |                                    | Specif<br>From:<br>To: | Fr                 | One Hour Peak           From:         7:30:00           To:         8:30:00 |                |   |                  |                     |
|---|---|------------------------------------|-----------|--------|------------------------------------|------------------------|--------------------|---|----------------|---|------------------|---------------------|
| Site #:<br>ntersection:<br>FFR File #:  | Ayr<br>000000<br>Wrigley<br>1<br>18-Jan | y Road &                           | & Hilltop | Drive  |                                    | Cloudy                 | er cono<br>n(s) wh |   |                |   |                  |                     |
| * Non-Signaliz  | zed In                                  | tersec                             | tion **   |        |                                    | Major                  | Road:              | Wrigley   | / Road         | runs W                                      | //E              |                     |
|   |   |                                    |           |        |                                    |                        |                    |   |                | East Leg<br>East Ent<br>East Peo<br>Peds Cr | tering:<br>ds:   | 258<br>66<br>0<br>∑ |
| Heavys Trucks Cars  |   | 5                                  |           |        |                                    |                        |                    |   | Cars           | Trucks                                      | Heavys           | Totals              |
| 0 1 93  | 94<br>Wrigley                           | ]<br>v Pood                        |           |        | N                                  |                        |                    | ŢŢ  | 42<br>22<br>64 | 1<br>0<br>1                                 | 0 1              | 43<br>23            |
|   |   |                                    |           | V      | v 🔶                                | E                      |                    |   |                | -   | I                |                     |
| Heavys Trucks Cars  | Totals                                  | 5                                  |           |        | ▼<br>S                             |                        |                    | Wi  | rigley Ro      | ad  |                  |                     |
| 0         5         84           1         0         24           1         5         108 | 89<br>25                                |                                    |           | Hillto | p Drive                            | ۲_<br>۲_               |                    |   | Cars<br>186    | Trucks<br>5                                 | Heavys<br>1      | Totals<br>192       |
| Peds Cross: X<br>West Peds: 0<br>West Entering: 114<br>West Leg Total: 208                |   | Cars<br>Trucks<br>Heavys<br>Totals | 0<br>2    |        | Cars<br>Trucks<br>Heavys<br>Totals | 0                      | 10<br>0<br>1<br>10 | 0<br>1  |                | Peds Cr<br>South P<br>South E<br>South Le   | eds:<br>ntering: |                     |
|   |   |                                    |           |        | Commo                              | onte                   |                    |   |                |   |                  |                     |

|   | Wrigley  | Road               | & Hillt                                 | top D                                 | rive            |   |                  |                      |  |  |  |
|---|--|--------------------|---|---------------------------------------|-----------------|---|------------------|----------------------|--|--|--|
| Afternoon   | Peak Diag                                      | jram               |   | <b>d Period</b><br>6:00:00<br>8:00:00 | F               | One Hour Peak           From:         16:30:00           To:         17:30:00 |                  |                      |  |  |  |
| Intersection: Wri TFR File #: 1                           | 00000203<br>gley Road & Hilltop<br>Jan-2018    | Drive              | Weather<br>Cloudy<br>Person(s           |                                       | -               | -   |                  |                      |  |  |  |
| ** Non-Signalized   | Intersection **                                |                    | Major Ro                                | oad: Wrig                             | gley Roa        | d runs W  | /E               |                      |  |  |  |
|   |  |                    |   |                                       |                 | East Leg<br>East Ent<br>East Peo<br>Peds Cro                                  | ering:<br>ds:    | 227<br>165<br>0<br>∑ |  |  |  |
| Heavys Trucks Cars T                                      | otals  |                    |   |                                       | Cars            | Trucks  | Heavys           | s Totals             |  |  |  |
| < <u></u>   | 13<br>rigley Road                              |                    | N                                       | ł                                     | 74<br>91<br>165 | 0<br>0<br>0   | 0<br>0<br>0      | 74<br>91             |  |  |  |
| Heavys Trucks Cars T                                      | otals  | W                  | E                                       |                                       | Wrigley R       | oad   |                  |                      |  |  |  |
| $ \begin{array}{cccccccccccccccccccccccccccccccccccc$     |  | Hilltop Drive      | s                                       |                                       | Cars<br>61      | Trucks  | Heavys<br>0      | Totals<br>62         |  |  |  |
| Peds Cross:∑West Peds:0West Entering:94West Leg Total:207 | Cars 151<br>Trucks 0<br>Heavys 0<br>Totals 151 | Ca<br>Truc<br>Heav | ars 39<br>ks 0<br>ys <u>0</u><br>als 39 | 1                                     | 56<br>I         | Peds Cro<br>South Pe<br>South Er<br>South Le                                  | eds:<br>ntering: |                      |  |  |  |
|   |  | Comr               | nents                                   |                                       |                 |   |                  |                      |  |  |  |

| Wrigley Road  | & Hilltop Drive   |
|---|---|
| Total Count Diagram   |   |
| Municipality:AyrSite #:000000203Intersection:Wrigley Road & Hilltop DriveTFR File #:1Count date:18-Jan-2018 | Weather conditions:<br>Cloudy<br>Person(s) who counted:   |
| ** Non-Signalized Intersection **   | Major Road: Wrigley Road runs W/E   |
|   | East Leg Total: 783<br>East Entering: 377<br>East Peds: 1<br>Peds Cross: <sup>ℤ</sup>   |
| Heavys Trucks Cars Totals<br>4 2 319 325  | Cars Trucks Heavys Totals   |
| Wrigley Road  | $ \begin{array}{cccccccccccccccccccccccccccccccccccc$   |
| Heavys Trucks Cars Totals   | Wrigley Road  |
| 2 2 149 153<br>6 8 335 Hilltop Drive  | Cars Trucks Heavys Totals<br>391 10 5 406   |
| West Peds:     1     Trucks     5     Trucks       West Entering:     349     Heavys     4     Heavys       | Ins       142       205       347       Peds Cross:       ⋈         ks       0       4       4       South Peds:       13         ys       1       1       2       South Entering:       353         als       143       210       South Leg Total:       701 |
| Comr  | nents   |
|   |   |

|                      |              |         |                          |                                |                               | ad & H<br>ount S           | -                    |                         | ive                        |                        |                |               |
|----------------------|--------------|---------|--------------------------|--------------------------------|-------------------------------|----------------------------|----------------------|-------------------------|----------------------------|------------------------|----------------|---------------|
| Intersection:        | Vrialev      | Road &  |                          |                                |                               | <sup>vate:</sup> 18-Jan-20 |                      | cipality: Ay            | r                          |                        |                |               |
|                      |              |         | ach Tot                  |                                |                               |                            |                      |                         |                            | ach Tot                | als            |               |
|                      |              |         | rucks, & H               |                                |                               | North/South                |                      |                         |                            | rucks, & H             |                |               |
| Hour<br>Ending       | Left         | Thru    | Right                    | Grand<br>Total                 | Total<br>Peds                 | Total<br>Approaches        | Hour<br>Ending       | Left                    | Thru                       | Right                  | Grand<br>Total | Total<br>Peds |
| 7:00:00              | 0            | 0       | 0                        | 0                              | 0                             | 0                          | 7:00:00              | 0                       | 0                          | 0                      | 0              | 0             |
| 8:00:00<br>9:00:00   | 0<br>0       | 0<br>0  | 0<br>0                   | 0<br>0                         | 0<br>0                        | 142<br>100                 | 8:00:00<br>9:00:00   | 43<br>44                | 0<br>0                     | 99<br>56               | 142<br>100     | 4<br>5        |
| 16:00:00             | 0            | 0       | 0                        | 0                              | 0                             | 001                        | 16:00:00             | 44                      | 0                          | 0                      | 0              | 0             |
| 17:00:00             | 0            | 0       | 0                        | 0                              | 0                             | 66                         | 17:00:00             | 32                      | 0                          | 34                     | 66             | 1             |
| 18:00:00             | 0            | 0       | 0                        | 0                              | 0                             | 45                         | 18:00:00             | 24                      | 0                          | 21                     | 45             | 3             |
|                      |              |         |                          |                                |                               |                            |                      |                         |                            |                        |                |               |
| Totals:              | 0            | 0       | 0                        | 0                              | 0                             | 353                        |                      | 143                     | 0                          | 210                    | 353            | 13            |
|                      |              |         | ach Tota<br>rucks, & H   |                                |                               |                            |                      |                         |                            | ach Tota<br>rucks, & H |                |               |
| Hour                 | Left         | Thru    |                          | Grand                          | Total                         | East/West<br>Total         | Hour                 | Left                    | Thru                       |                        | Grand          | Total         |
| Ending<br>7:00:00    | 0            | 0       | Right<br>0               | Total<br>0                     | Peds<br>0                     | Approaches<br>0            | Ending<br>7:00:00    | 0                       | 0                          | Right<br>0             | Total<br>0     | Peds<br>0     |
| 8:00:00              | 15           | 36      | Ő                        | 51                             | ŏ                             | 137                        | 8:00:00              | Ő                       | 68                         | 18                     | 86             | ŏ             |
| 9:00:00              | 26           | 32      | 0                        | 58                             | 1                             | 142                        | 9:00:00              | 0                       | 56                         | 28                     | 84             | 0             |
| 16:00:00<br>17:00:00 | 0<br>70      | 0<br>62 | 0                        | 0<br>132                       | 0<br>0                        | 0<br>220                   | 16:00:00<br>17:00:00 | 0<br>0                  | 0<br>36                    | 0<br>52                | 0<br>88        | 0<br>1        |
| 18:00:00             | 84           | 52      | 0                        | 136                            | 0                             | 227                        | 18:00:00             | 0                       | 36                         | 55                     | 91             | ò             |
|                      |              |         |                          |                                |                               |                            |                      |                         |                            |                        |                |               |
| Totals:<br>Hours En  | 195<br>ding: | 182     | 0<br><b>Calc</b><br>8:00 | <u>377</u><br>ulated V<br>9:00 | 1<br><b>/alues f</b><br>16:00 | 726<br>or Traffic Cr       | ossing Ma<br>17:00   | 0<br>ajor Stre<br>17:00 | <u>196</u><br>eet<br>18:00 | 153                    | 349            | 1             |
| Crossing             |              |         | 43                       | 9.00<br>45                     | 0.00                          |                            | 133                  | 33                      | 24                         |                        |                |               |

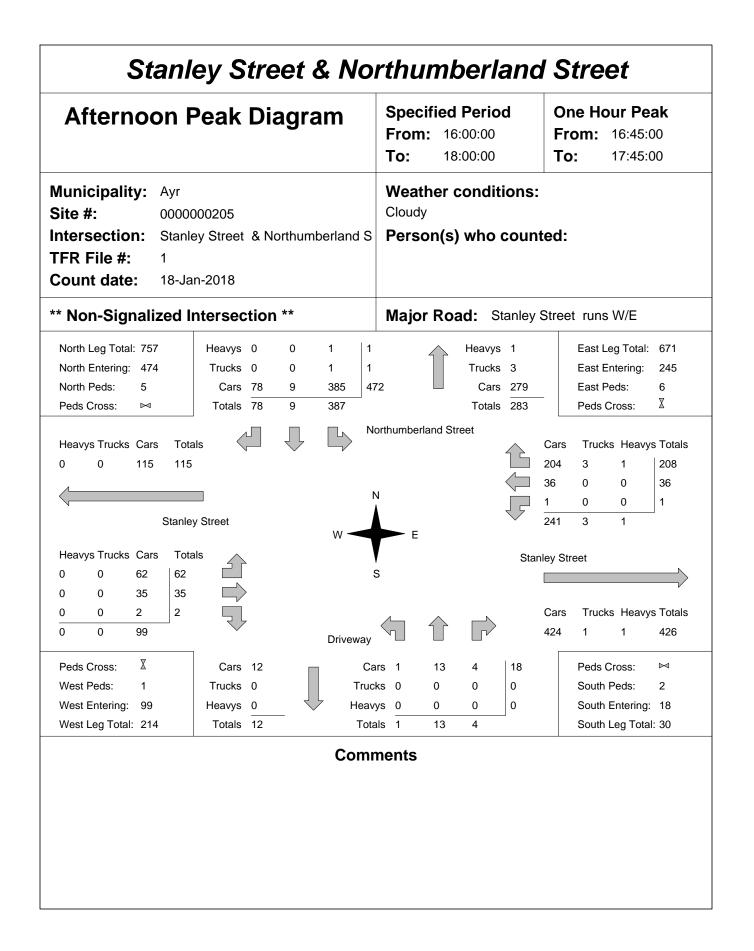
|  | Swan Street   | & Stanle  | y Stre                     | et       |   |                     |
|--|---|---|----------------------------|----------|---|---------------------|
| Morning  | Peak Diagram  | Specified           From:         7:0           To:         9:0 |                            |          | ne Hour Pe<br>om: 7:30:0<br>o: 8:30:0                           | 0                   |
| Site #: 0<br>Intersection: S<br>TFR File #: 1              | yr<br>000000204<br>stanley Street & Swan Street<br>8-Jan-2018 | Weather c<br>Cloudy<br>Person(s)                                |                            |          |   |                     |
| ** Non-Signalize   | ed Intersection **  | Major Roa   | d: Stanley                 | Stree    | t runs W/E  |                     |
|  |   |   |                            |          | East Leg Total:<br>East Entering:<br>East Peds:<br>Peds Cross:  | 119<br>63<br>0<br>∑ |
| Heavys Trucks Cars<br>5 3 350                              | Totals<br>358   |   |                            | Cars     | Trucks Heavy  | vs Totals           |
| <u>/</u>   |   | N   |                            | 41       | 1 1   | 43                  |
| \<br>{   | Stanley Street  |   |                            | 20<br>61 | 0 0   | 20                  |
|  | W -   | E   |                            |          |   |                     |
| Heavys Trucks Cars   | Totals  | V<br>S  | Star                       | nley Str | reet  |                     |
| 1 2 36<br>5 7 122  | 39<br>134   |   |                            | Cars     | Trucks Heavy  |                     |
| 6 9 158  | Swan St   | eet 🔨   |                            | 51       | 3 2   | 56                  |
| Peds Cross:IWest Peds:1West Entering:173West Leg Total:531 | Cars 142<br>Trucks 7<br>Heavys 5<br>Totals 154                | Cars 309<br>Frucks 2<br>leavys <u>4</u><br>Totals 315           | 15 324<br>1 3<br>1 5<br>17 |          | Peds Cross:<br>South Peds:<br>South Entering:<br>South Leg Tota |                     |
|  | C/  | mments  |                            |          |   |                     |

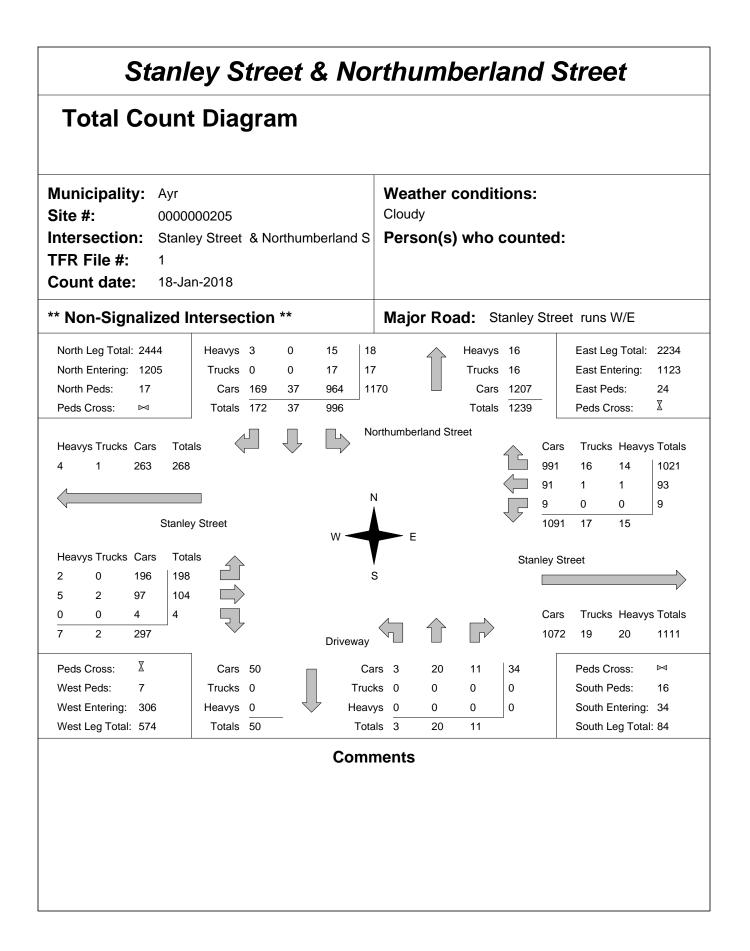
| unicipality: Ayr   te #: 000000204   tersection: Stanley Street & Swan Street   FR File #: 1   ount date: 18-Jan-2018   Non-Signalized Intersection ** Heavys Trucks Cars Totals 4 242 247 Stanley Street Heavys Trucks Cars Totals 0 50 50 1 378 379 | Cloudy<br>Person | er condit<br>n(s) who<br>Road: S | coun    | ted:<br>Stree<br>Cars | East L<br>East E<br>East P<br>Peds C<br>Truck<br>0<br>0 | eg Total:<br>ntering:<br>eds:                           | 73<br>0<br>X              |
|---|------------------|----------------------------------|---------|-----------------------|---|---|---------------------------|
| Heavys Trucks Cars Totals<br>4 242 247<br>Stanley Street<br>Heavys Trucks Cars Totals   | E                | Road: S                          | Stanley | Cars<br>50<br>23      | East L<br>East E<br>East P<br>Peds C<br>Truck<br>0<br>0 | eg Total:<br>ntering:<br>eds:<br>Cross:<br>S Heavy<br>0 | 73<br>0<br>X<br>vs Totals |
| 4 242 247<br>Stanley Street<br>W<br>Heavys Trucks Cars Totals   | E                |                                  | Į.      | 50<br>23              | East E<br>East P<br>Peds C<br>Truck<br>0<br>0           | ntering:<br>eds:<br>Cross:<br>s Heavy<br>0              | 73<br>0<br>X<br>vs Totals |
| 4 242 247<br>Stanley Street<br>W<br>Heavys Trucks Cars Totals   | E                |                                  | Ŷŀ      | 50<br>23              | 0<br>0  | 0   | 50                        |
| Stanley Street<br>Heavys Trucks Cars Totals   | E                |                                  | ↓<br>↓  | 23                    | 0   |   |                           |
| Heavys Trucks Cars Totals   | r –              |                                  |         | 23                    | -   | 0   | 23                        |
| Heavys Trucks Cars Totals   | r –              |                                  |         | 73                    | 0   | 0   |                           |
| 0 50 50   |                  |                                  | 0       |                       |   |   |                           |
|   |                  |                                  | Star    | nley Str              | eet   |   |                           |
| Z Z   |                  |                                  |         | Cars                  | Truck   | s Heavy   | s Totals                  |
| 0 1 428 Swan Street   |                  |                                  |         | 62                    | 0   | 0   | 62                        |
| Peds Cross: X Cars 401 Ca   | s 192            | 12                               | 204     |                       | Peds C  | Cross:  | $\bowtie$                 |
| Vest Peds: 1 Trucks 1 Truck   |                  | 0                                | 4       |                       | South   |   | 1                         |
| Vest Entering:     429     Heavys     0     Vest Leg Total:     676     Totals     402     Totals   | s 1<br>s 197     | 0                                | 1       |                       |   | Entering:<br>Leg Tota                                   |                           |
| -   |                  | .2                               |         |                       | Couli   |   |                           |
| Comn  | nents            |                                  |         |                       |   |   |                           |
|   |                  |                                  |         |                       |   |   |                           |
|   |                  |                                  |         |                       |   |   |                           |
|   |                  |                                  |         |                       |   |   |                           |

| 15  18  1075  1108 $I = 174  3  3  180$ $F = 174  3  3  180$  | Site #:O000000204Intersection:Stanley Street & Swan StreetCloudyPerson(s) who counted:TER File #:1Count date:18-Jan-2018Major Road:Stanley Street runs W/EEast Leg Total:483Cars TotalsCars TotalsStanley StreetNNCars Trucks Heavys TotalsStanley StreetNMeavys Trucks Cars TotalsStanley StreetNNCars 973Trucks 16Peds Cross:XCars 973Trucks 16Peds Cross:XSuch Peds:10South Entering:20East Peds:3171Stanley StreetCars 973Trucks 16Peds Cross:XCars 973Trucks 16Peds Cross:Meavys 12219South Entering:106Such Entering:20Cars 973Trucks  | Total Count  | t Diagram          |                     |                        |            |          |                              |          |  |  |   |  |  |  |
|---|--|--|--------------------|---------------------|------------------------|------------|----------|------------------------------|----------|--|--|---|--|--|--|
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $  | $\begin{array}{c c c c c c c c c c c c c c c c c c c $   | Site #:00000Intersection:StanleTFR File #:1  | ey Street & Swan S | treet               | Cloudy                 |            |          |                              |          |  |  |   |  |  |  |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | $\begin{array}{c} \text{East Entering: } 250\\ \text{East Peds: } 3\\ \text{Peds Cross: } \overline{X}\\ \end{array}$  | * Non-Signalized I   | ntersection **     |                     | Major Roa              | ad: Stanle | y Stree  | et runs W/E                  |          |  |  |   |  |  |  |
| 15 18 1075 1108<br>Stanley Street<br>Heavys Trucks Cars Totals<br>3 3 165 171<br>19 18 1069<br>Peds Cross: $\overline{X}$<br>West Peds: 6<br>West Leg Total: 2214<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$<br>$\overline{X}$ | 15 18 1075 1108<br>Stanley Street<br>Heavys Trucks Cars Totals<br>3 3 165 171<br>19 18 1069<br>Peds Cross: $X$<br>West Peds: 6<br>West Leg Total: 2214<br>Cars 973<br>Trucks 16<br>Heavys 16<br>Totals 1005<br>Cars 973<br>Trucks 15<br>Heavys 12<br>Totals 928<br>Cars 928        |  |                    |                     |                        |            |          | East Entering:<br>East Peds: | 250<br>3 |  |  |   |  |  |  |
| 15 18 1075 1108<br>Stanley Street<br>Heavys Trucks Cars Totals<br>3 3 165 171<br>19 18 1069<br>Peds Cross: $\overline{X}$<br>West Peds: 6<br>West Leg Total: 2214<br>Cars 973<br>Cars 973<br>Cars 973<br>Trucks 16<br>Heavys $12$<br>2<br>7<br>12<br>2<br>116<br>12<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>116<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>1105<br>110  | 15 18 1075 1108<br>Stanley Street<br>Heavys Trucks Cars Totals<br>3 3 165 171<br>19 18 1069<br>Peds Cross: $\overline{X}$<br>West Peds: 6<br>West Leg Total: 2214<br>Cars 973<br>Trucks 16<br>Heavys 16<br>Totals 1005<br>Cars 973<br>Trucks 15<br>Heavys 12<br>Totals 928<br>Cars | Heavys Trucks Cars Tota  | als                |                     |                        |            | Cars     | Trucks Heavy                 | s Totals |  |  |   |  |  |  |
| N<br>Stanley StreetN<br>$43$ 70Stanley Street $69$ 10Stanley StreetStanley StreetCarsTrucks Heavys Totals<br>221Peds Cross:MPeds Cross:MSwan StreetStanley StreetCarsTrucks 16Trucks 16Frucks 154Nest Leg Total: 2214Stanley StreetCarsStanley StreetCarsTrucks 16News 16Frucks 154News 16Stanley StreetCarsStanley StreetCarsTrucks 16News 16Frucks 16News 16Stanley StreetSouth Peds: 10South Peds: 20South Leg Total: 1995 </td <td>N<math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>0</math><math>1</math><math>1</math><math>0</math><math>1</math><math>1</math><math>0</math><math>1</math><math>1</math>00000000000000000000<th <="" colspan="6" td=""><td>-</td><td>8</td><td></td><td></td><td>4</td><td></td><td></td><td></td></th></td>  | N $1$ $0$ $1$ $1$ $0$ $1$ $1$ $0$ $1$ $1$ 00000000000000000000 <th <="" colspan="6" td=""><td>-</td><td>8</td><td></td><td></td><td>4</td><td></td><td></td><td></td></th>   | <td>-</td> <td>8</td> <td></td> <td></td> <td>4</td> <td></td> <td></td> <td></td> |                    |                     |                        |            |          | -                            | 8        |  |  | 4 |  |  |  |
| Stanley StreetStanley StreetHeavys Trucks Cars Totals33165171161590419181069Peds Cross: $\mathbb{X}$ West Peds:6West Entering:1106West Leg Total:2214Cars973Trucks16Heavys12161005Totals1005Totals1005Totals92862   | Stanley StreetHeavys Trucks CarsTotals33165161590419181069Peds Cross: $\mathbb{X}$ Cars973Trucks16Mest Peds:6West Leg Total:22141061005Totals1005 </td <td><u>/</u></td> <td></td> <td>Ν</td> <td>J</td> <td></td> <td></td> <td></td> <td></td>   | <u>/</u>   |                    | Ν                   | J                      |            |          |                              |          |  |  |   |  |  |  |
| Heavys Trucks Cars Totals<br>3 3 165<br>16 15 904<br>19 18 1069<br>Peds Cross: X<br>West Entering: 1106<br>West Leg Total: 2214<br>Cars 973<br>Trucks 16<br>Heavys 16<br>Totals 1005<br>Totals 928<br>Cars 901<br>Totals 928<br>Cars 901<br>Totals 928<br>Cars 973<br>Trucks Heavys Totals<br>Stanley Street<br>Cars Trucks Heavys Totals<br>221<br>7<br>5<br>233<br>Cars 977<br>Peds Cross: M<br>South Peds: 10<br>South Leg Total: 1995   | Heavys Trucks Cars Totals<br>3 3 165<br>16 15 904<br>19 18 1069<br>Peds Cross: X<br>W F E<br>S<br>Stanley Street<br>Cars Trucks Heavys Totals<br>Swan Street<br>Cars Trucks Heavys Totals<br>Swan Street<br>Cars Trucks Heavys Totals<br>221 7 5 233<br>Cars 973<br>Trucks 16<br>Heavys 16<br>Heavys 16<br>Heavys 12<br>2 1<br>14<br>South Peds: 10<br>South Entering: 990<br>South Leg Total: 2214  | Staple   |                    | ·                   |                        |            |          |                              | 70       |  |  |   |  |  |  |
| $\begin{array}{cccccccccccccccccccccccccccccccccccc$  | 3       3       165       171       Image: stress of the str   | Stante   | Sueer              | w <                 | E                      |            | 243      | 4 5                          |          |  |  |   |  |  |  |
| 3       3       165       171 </td <td>3       3       165       171       Image: constraint of the constrain</td> <td>Heavys Trucks Cars Tota</td> <td>als</td> <td></td> <td></td> <td>Sta</td> <td>anley St</td> <td>reet</td> <td></td>   | 3       3       165       171       Image: constraint of the constrain   | Heavys Trucks Cars Tota  | als                |                     |                        | Sta        | anley St | reet                         |          |  |  |   |  |  |  |
| 16       15       904       935       Image: Carse of the carse of t   | 16       15       904       935       Image: Carse of the carse of t  | 0 0 405 474  |                    | ę                   | 6                      |            |          |                              |          |  |  |   |  |  |  |
| 19       18       1069       Swan Street       221       7       5       233         Peds Cross:       X       Cars       973       Cars       901       56       957       Peds Cross:       M         West Peds:       6       Trucks       16       Trucks       15       4       19       South Peds:       10         West Entering:       1106       Heavys       16       Totals       1005       Totals       928       62       14       South Leg Total:       1990         South Leg Total:       2214       Totals       1005       Totals       928       62       South Leg Total:       1995   | 19       18       1069       Swan Street       221       7       5       233         Peds Cross:       X       Cars       973       Cars       901       56       957       Peds Cross:       M         West Peds:       6       Trucks       16       Trucks       15       4       19       South Peds:       10         West Entering:       1106       Heavys       16       Totals       1005       Totals       928       62       South Leg Total:       1990   |  |                    |                     |                        |            | Cars     | Trucks Heavy                 | s Totals |  |  |   |  |  |  |
| Peds Cross:XCars973Cars90156957Peds Cross:>West Peds:6Trucks16Trucks15419South Peds:10West Entering:1106Heavys16Heavys12214South Leg Total:990West Leg Total:2214Totals1005Totals92862South Leg Total:1995  | Peds Cross:XCars973Cars90156957Peds Cross: $\bowtie$ West Peds:6Trucks16Trucks15419South Peds:10West Entering:1106Heavys16Heavys12214South Leg Total:1990West Leg Total:2214Totals1005Totals92862South Leg Total:1995  |  |                    | <b>a a</b> <i>i</i> | $\langle \neg \rangle$ |            |          |                              |          |  |  |   |  |  |  |
| West Peds:6Trucks16Trucks15419South Peds:10West Entering:1106Heavys16Heavys12214South Entering:990West Leg Total:2214Totals1005Totals92862South Leg Total:1995  | West Peds:6Trucks16Trucks15419South Peds:10West Entering:1106Heavys16Heavys12214South Entering:990West Leg Total:2214Totals1005Totals92862South Leg Total:1995   |  | ]                  |                     |                        |            |          |                              |          |  |  |   |  |  |  |
| West Entering:1106Heavys16Heavys12214South Entering:990West Leg Total:2214Totals1005Totals92862South Leg Total:1995   | West Entering:1106Heavys16Heavys12214South Entering:990West Leg Total:2214Totals1005Totals92862South Leg Total:1995  |  |                    |                     |                        |            |          |                              |          |  |  |   |  |  |  |
| West Leg Total:     2214     Totals     1005     Totals     928     62     South Leg Total:     1995  | West Leg Total:     2214     Totals     1005     Totals     928     62     South Leg Total:     1995   |  |                    |                     |                        |            |          |                              |          |  |  |   |  |  |  |
|   |  | -  |                    |                     |                        |            |          | -                            |          |  |  |   |  |  |  |
| Comments  | Comments   |  |                    | 0                   |                        |            |          |                              |          |  |  |   |  |  |  |
|   |  |  |                    | Comn                | nents                  |            |          |                              |          |  |  |   |  |  |  |
|   |  |  |                    |                     |                        |            |          |                              |          |  |  |   |  |  |  |
|   |  |  |                    |                     |                        |            |          |                              |          |  |  |   |  |  |  |
|   |  |  |                    |                     |                        |            |          |                              |          |  |  |   |  |  |  |
|   |  |  |                    |                     |                        |            |          |                              |          |  |  |   |  |  |  |
|   |  |  |                    |                     |                        |            |          |                              |          |  |  |   |  |  |  |

|                      |                 |            |               |                |               | t & Sta<br>ount S          |                  | -              | reet          |             |                |               |
|----------------------|-----------------|------------|---------------|----------------|---------------|----------------------------|------------------|----------------|---------------|-------------|----------------|---------------|
| Intersection:        | Stanley Stanley | Street &   |               |                |               | <sup>vate:</sup> 18-Jan-20 |                  | unicipality: A | vr            |             |                |               |
|                      | North           | n Appro    | ach Tot       | als            |               |                            |                  |                | th Appro      | oach Tot    | als            |               |
|                      | Include         | es Cars, T | rucks, & H    |                | <b>T</b> ( )  | North/South                |                  |                | les Cars, T   |             | eavys          | <b>-</b>      |
| Hour<br>Ending       | Left            | Thru       | Right         | Grand<br>Total | Total<br>Peds | Total<br>Approaches        | Hour<br>Ending   | Left           | Thru          | Right       | Grand<br>Total | Total<br>Peds |
| 7:00:00              | 0               | 0          | 0             | 0              | 0             | 0                          | 7:00:0           |                | -             | 0           | 0              | 0             |
| 8:00:00<br>9:00:00   | 0<br>0          | 0<br>0     | 0<br>0        | 0<br>0         | 0<br>0        | 315<br>265                 | 8:00:0<br>9:00:0 |                |               | 17<br>18    | 315<br>265     | 2<br>4        |
| 16:00:00             | 0               | Ő          | Ő             | Ő              | Ő             | 0                          |                  |                |               | 0           | 0              | 0             |
| 17:00:00             | 0               | 0          | 0             | 0              | 0             |                            | 17:00:0          |                |               | 15          | 214            | 3             |
| 18:00:00             | 0               | 0          | 0             | 0              | 0             | 196                        | 18:00:0          | 00 184         | . 0           | 12          | 196            | 1             |
| Totals:              | 0<br>East       | 0          | 0<br>ach Tota | 0              | 0             | 990                        |                  | 928            | 0<br>St Appro | 62          | 990            | 10            |
|                      |                 |            | rucks, & H    |                |               | East/West                  |                  |                | les Cars, T   |             |                |               |
| Hour<br>Ending       | Left            | Thru       | Right         | Grand<br>Total | Total<br>Peds | Total<br>Approaches        | Hour<br>Ending   | Left           | Thru          | Right       | Grand<br>Total | Total<br>Peds |
| 7:00:00              | 0               | 0          | 0             | 0              | 0             | 0                          | 7:00:0           |                | -             | 0           | 0              | 0             |
| 8:00:00<br>9:00:00   | 18<br>15        | 45<br>38   | 0<br>0        | 63<br>53       | 0<br>0        | 198<br>228                 | 8:00:0<br>9:00:0 |                | -             | 110<br>138  | 135<br>175     | 4             |
| 16:00:00             | 0               | 0          | 0             | 0              | 0             | 0                          | 16:00:0          |                |               | 0           | 0              | Ö             |
| 17:00:00             | 15              | 53         | 0             | 68<br>66       | 3             |                            |                  |                | -             | 312         | 373            | 0<br>1        |
| 18:00:00             | 22              | 44         | 0             | 00             | 0             | 489                        | 18:00:0          |                | 48            | 375         | 423            | 1             |
| Totals:              | 70              | 180        | 0             | 250            | 3             | 1356                       |                  | C              | 171           | 935         | 1106           | 6             |
|                      |                 |            |               |                |               | or Traffic Cr              | ossing           |                |               |             |                |               |
| Hours En<br>Crossing |                 | 7:00<br>0  | 8:00<br>302   | 9:00<br>248    | 16:00<br>0    |                            | 17:0<br>20       |                |               | 18:00<br>71 |                |               |

| Weather conditions                             | :  |
|--|--|
| Person(s) who cou                              | nted:  |
| Major Road: Stanley                            | / Street runs W/E  |
| Heavys 5<br>Trucks 3<br>Cars 401<br>Totals 409 | East Leg Total: 539<br>East Entering: 366<br>East Peds: 3<br>Peds Cross: X   |
| orthumberland Street                           |  |
|  | Cars Trucks Heavys Totals<br>343 3 5 351   |
|  | 14 0 0 14  |
|  | 1 0 0 1  |
| F F  | 358 3 5  |
| Sta  | anley Street   |
| 6  |  |
|  | V  |
| $ \land \land \land$                           | Cars Trucks Heavys Totals  |
|  | 156 10 7 173   |
| rs 1 1 1   3                                   | Peds Cross: 🛛 🖂  |
| xs 0 0 0                                       | South Peds: 3  |
|  | South Entering: 3  |
| ls 1 1 1                                       | South Leg Total: 11  |
|  | Trucks 3<br>Cars 401<br>Totals 409<br>orthumberland Street<br>E<br>Standard Street<br>E<br>E<br>Standard Street<br>E<br>E<br>Standard Street<br>E<br>E<br>E<br>E<br>E<br>E<br>E<br>E |





|   | S                                  | tanl                           | -                                     |  |                                     | North<br>count S                   |   |                                 | nd S                              | tree                                | et                             |                            |
|---|------------------------------------|--------------------------------|---------------------------------------|--|-------------------------------------|------------------------------------|---|---------------------------------|-----------------------------------|-------------------------------------|--------------------------------|----------------------------|
| Intersection:   | Stanley Stanley                    | Street &                       |                                       |  |                                     | Date: 18-Jan-20                    |   | <sup>cipality:</sup> Ay         | r                                 |                                     |                                |                            |
|   |                                    |                                | ach Tot                               |  |                                     |                                    |   | Sout                            | h Appro                           | ach Tot                             | als                            |                            |
| -   | Include                            | es Cars, T                     | rucks, & H                            |  | Tatal                               | North/South                        |   | Include                         | es Cars, T                        | rucks, & H                          |                                | Tatal                      |
| Hour<br>Ending  | Left                               | Thru                           | Right                                 | Grand<br>Total                         | Total<br>Peds                       | Total<br>Approaches                | Hour<br>Ending  | Left                            | Thru                              | Right                               | Grand<br>Total                 | Total<br>Peds              |
| 7:00:00<br>8:00:00<br>9:00:00<br>16:00:00<br>17:00:00<br>18:00:00 | 0<br>120<br>151<br>0<br>347<br>378 | 0<br>4<br>10<br>0<br>13<br>10  | 0<br>16<br>27<br>0<br>55<br>74        | 0<br>140<br>188<br>0<br>415<br>462     | 0<br>1<br>4<br>0<br>9<br>3          | 0<br>141<br>192<br>0<br>427<br>479 | 7:00:00<br>8:00:00<br>9:00:00<br>16:00:00<br>17:00:00<br>18:00:00 | 0<br>0<br>1<br>0<br>1<br>1      | 0<br>1<br>0<br>6<br>13            | 0<br>0<br>3<br>0<br>5<br>3          | 0<br>1<br>4<br>0<br>12<br>17   | 0<br>3<br>7<br>0<br>4<br>2 |
| Totals:   |                                    |                                | 172<br><b>ach Tot</b> a<br>rucks, & H | eavys                                  | 17                                  | 1239<br>East/West                  |   |                                 |                                   | 11<br><b>ach Tota</b><br>rucks, & H | eavys                          | 16                         |
| Hour<br>Ending  | Left                               | Thru                           | Right                                 | Grand<br>Total                         | Total<br>Peds                       | Total<br>Approaches                | Hour<br>Ending  | Left                            | Thru                              | Right                               | Grand<br>Total                 | Total<br>Peds              |
| 7:00:00<br>8:00:00<br>9:00:00<br>16:00:00<br>17:00:00<br>18:00:00 | 0<br>0<br>1<br>0<br>3<br>5         | 0<br>15<br>13<br>0<br>38<br>27 | 0<br>334<br>272<br>0<br>222<br>193    | 0<br>349<br>286<br>0<br>263<br>225     | 0<br>5<br>4<br>0<br>9<br>6          | 0<br>419<br>355<br>0<br>337<br>318 | 7:00:00<br>8:00:00<br>9:00:00<br>16:00:00<br>17:00:00<br>18:00:00 | 0<br>54<br>44<br>0<br>45<br>55  | 0<br>16<br>23<br>0<br>29<br>36    | 0<br>0<br>2<br>0<br>0<br>2          | 0<br>70<br>69<br>0<br>74<br>93 | 0<br>0<br>5<br>0<br>1<br>1 |
| Totals:<br>Hours En<br>Crossing                                   |                                    | 93<br>7:00<br>0                | 1021<br><b>Calc</b><br>8:00<br>129    | <u>1123</u><br>ulated V<br>9:00<br>171 | 24<br><b>/alues f</b><br>16:00<br>0 | 1429<br>or Traffic Cr              | <b>ossing M</b><br>17:00<br>371                                   | 198<br>ajor Stre<br>17:00<br>99 | <u>104</u><br>eet<br>18:00<br>399 | 4<br>18:00<br>101                   | 306                            | 7                          |

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## Appendix B

Synchro Reports 2018 Existing Conditions

#### HCM Unsignalized Intersection Capacity Analysis 1: Swan & Hilltop

|                                   | ٠    | +    | 1     | 4    | Ļ           | *          | 1    | t    | 1    | 1    | ţ    | ~    |
|-----------------------------------|------|------|-------|------|-------------|------------|------|------|------|------|------|------|
| Movement                          | EBL  | EBT  | EBR   | WBL  | WBT         | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations               |      | \$   |       |      | \$          |            |      | \$   |      |      | \$   |      |
| Traffic Volume (veh/h)            | 3    | 0    | 0     | 31   | 0           | 70         | 0    | 133  | 9    | 25   | 102  | 0    |
| Future Volume (Veh/h)             | 3    | 0    | 0     | 31   | 0           | 70         | 0    | 133  | 9    | 25   | 102  | 0    |
| Sign Control                      |      | Stop |       |      | Stop        |            |      | Free |      |      | Free |      |
| Grade                             |      | 0%   |       |      | 0%          |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor                  | 0.90 | 0.90 | 0.90  | 0.90 | 0.90        | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)            | 3    | 0    | 0     | 34   | 0           | 78         | 0    | 148  | 10   | 28   | 113  | 0    |
| Pedestrians                       |      |      |       |      | 1           |            |      | 7    |      |      | 1    |      |
| Lane Width (m)                    |      |      |       |      | 3.5         |            |      | 3.5  |      |      | 3.5  |      |
| Walking Speed (m/s)               |      |      |       |      | 1.1         |            |      | 1.1  |      |      | 1.1  |      |
| Percent Blockage                  |      |      |       |      | 0           |            |      | 1    |      |      | 0    |      |
| Right turn flare (veh)            |      |      |       |      |             |            |      |      |      |      |      |      |
| Median type                       |      |      |       |      |             |            |      | None |      |      | None |      |
| Median storage veh)               |      |      |       |      |             |            |      |      |      |      |      |      |
| Upstream signal (m)               |      |      |       |      |             |            |      |      |      |      |      |      |
| pX, platoon unblocked             |      |      |       |      |             |            |      |      |      |      |      |      |
| vC, conflicting volume            | 401  | 328  | 120   | 330  | 323         | 155        | 113  |      |      | 159  |      |      |
| vC1, stage 1 conf vol             |      |      |       |      |             |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol             |      |      |       |      |             |            |      |      |      |      |      |      |
| vCu, unblocked vol                | 401  | 328  | 120   | 330  | 323         | 155        | 113  |      |      | 159  |      |      |
| tC, single (s)                    | 7.1  | 6.5  | 6.2   | 7.1  | 6.5         | 6.2        | 4.1  |      |      | 4.2  |      |      |
| tC, 2 stage (s)                   |      |      |       |      |             |            |      |      |      |      |      |      |
| tF (s)                            | 3.5  | 4.0  | 3.3   | 3.5  | 4.0         | 3.3        | 2.2  |      |      | 2.3  |      |      |
| p0 queue free %                   | 99   | 100  | 100   | 94   | 100         | 91         | 100  |      |      | 98   |      |      |
| cM capacity (veh/h)               | 505  | 581  | 931   | 613  | 585         | 892        | 1489 |      |      | 1383 |      |      |
| Direction, Lane #                 | EB 1 | WB 1 | NB 1  | SB 1 |             |            |      |      |      |      |      |      |
| Volume Total                      | 3    | 112  | 158   | 141  |             |            |      |      |      |      |      |      |
| Volume Left                       | 3    | 34   | 0     | 28   |             |            |      |      |      |      |      |      |
| Volume Right                      | 0    | 78   | 10    | 20   |             |            |      |      |      |      |      |      |
| cSH                               | 505  | 783  | 1489  | 1383 |             |            |      |      |      |      |      |      |
|                                   | 0.01 | 0.14 | 0.00  | 0.02 |             |            |      |      |      |      |      |      |
| Volume to Capacity                | 0.01 | 3.8  | 0.0   | 0.02 |             |            |      |      |      |      |      |      |
| Queue Length 95th (m)             | 12.2 | 10.4 | 0.0   | 1.7  |             |            |      |      |      |      |      |      |
| Control Delay (s)                 |      |      | 0.0   |      |             |            |      |      |      |      |      |      |
| Lane LOS                          | B    | B    | 0.0   | A    |             |            |      |      |      |      |      |      |
| Approach Delay (s)                | 12.2 | 10.4 | 0.0   | 1.7  |             |            |      |      |      |      |      |      |
| Approach LOS                      | В    | В    |       |      |             |            |      |      |      |      |      |      |
| Intersection Summary              |      |      |       |      |             |            |      |      |      |      |      |      |
| Average Delay                     |      |      | 3.5   |      |             |            |      |      |      |      |      |      |
| Intersection Capacity Utilization | n    |      | 34.6% | IC   | CU Level of | of Service |      |      | А    |      |      |      |
| Analysis Period (min)             |      |      | 15    |      |             |            |      |      |      |      |      |      |

#### HCM Unsignalized Intersection Capacity Analysis 2: Howard Marshall & Hilltop

| 02/12/2018 | 5 |
|------------|---|
|------------|---|

|                               | ٨     | +    | *     | 4     | Ļ         | *          | 1    | 1    | 1    | 1    | ţ    | ~    |
|-------------------------------|-------|------|-------|-------|-----------|------------|------|------|------|------|------|------|
| Movement                      | EBL   | EBT  | EBR   | WBL   | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |       | \$   |       |       | \$        |            |      | \$   |      |      | \$   |      |
| Sign Control                  |       | Stop |       |       | Stop      |            |      | Stop |      |      | Stop |      |
| Traffic Volume (vph)          | 2     | 21   | 12    | 3     | 33        | 0          | 25   | 3    | 9    | 0    | 2    | 10   |
| Future Volume (vph)           | 2     | 21   | 12    | 3     | 33        | 0          | 25   | 3    | 9    | 0    | 2    | 10   |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90  | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 2     | 23   | 13    | 3     | 37        | 0          | 28   | 3    | 10   | 0    | 2    | 11   |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  | SB 1  |           |            |      |      |      |      |      |      |
| Volume Total (vph)            | 38    | 40   | 41    | 13    |           |            |      |      |      |      |      |      |
| Volume Left (vph)             | 2     | 3    | 28    | 0     |           |            |      |      |      |      |      |      |
| Volume Right (vph)            | 13    | 0    | 10    | 11    |           |            |      |      |      |      |      |      |
| Hadj (s)                      | -0.10 | 0.02 | 0.04  | -0.51 |           |            |      |      |      |      |      |      |
| Departure Headway (s)         | 4.0   | 4.1  | 4.1   | 3.6   |           |            |      |      |      |      |      |      |
| Degree Utilization, x         | 0.04  | 0.05 | 0.05  | 0.01  |           |            |      |      |      |      |      |      |
| Capacity (veh/h)              | 890   | 868  | 848   | 972   |           |            |      |      |      |      |      |      |
| Control Delay (s)             | 7.1   | 7.3  | 7.3   | 6.6   |           |            |      |      |      |      |      |      |
| Approach Delay (s)            | 7.1   | 7.3  | 7.3   | 6.6   |           |            |      |      |      |      |      |      |
| Approach LOS                  | А     | А    | Α     | А     |           |            |      |      |      |      |      |      |
| Intersection Summary          |       |      |       |       |           |            |      |      |      |      |      |      |
| Delay                         |       |      | 7.2   |       |           |            |      |      |      |      |      |      |
| Level of Service              |       |      | А     |       |           |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | ation |      | 21.0% | IC    | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |       |      | 15    |       |           |            |      |      |      |      |      |      |

# HCM Unsignalized Intersection Capacity Analysis 21: Northumberland & Stanley

|                                 | ٨    | -    | 7     | 1    | +         | *          | 1    | 1    | 1    | *    | ţ    | ~    |
|---------------------------------|------|------|-------|------|-----------|------------|------|------|------|------|------|------|
| Movement                        | EBL  | EBT  | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations             |      | 4    |       |      | ÷.        | 1          |      | 4    |      |      | 4    |      |
| Traffic Volume (veh/h)          | 57   | 20   | 0     | 1    | 14        | 351        | 1    | 1    | 1    | 152  | 7    | 17   |
| Future Volume (Veh/h)           | 57   | 20   | 0     | 1    | 14        | 351        | 1    | 1    | 1    | 152  | 7    | 17   |
| Sign Control                    |      | Free |       |      | Free      |            |      | Stop |      |      | Stop |      |
| Grade                           |      | 0%   |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor                | 0.90 | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)          | 63   | 22   | 0     | 1    | 16        | 390        | 1    | 1    | 1    | 169  | 8    | 19   |
| Pedestrians                     |      | 1    |       |      | 3         |            |      | 3    |      |      | 1    |      |
| Lane Width (m)                  |      | 3.5  |       |      | 3.5       |            |      | 3.5  |      |      | 3.5  |      |
| Walking Speed (m/s)             |      | 1.1  |       |      | 1.1       |            |      | 1.1  |      |      | 1.1  |      |
| Percent Blockage                |      | 0    |       |      | 0         |            |      | 0    |      |      | 0    |      |
| Right turn flare (veh)          |      |      |       |      |           |            |      |      |      |      |      |      |
| Median type                     |      | None |       |      | None      |            |      |      |      |      |      |      |
| Median storage veh)             |      |      |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)             |      |      |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked           |      |      |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume          | 17   |      |       | 25   |           |            | 193  | 170  | 28   | 172  | 170  | 18   |
| vC1, stage 1 conf vol           |      |      |       |      |           |            |      |      | •    |      |      |      |
| vC2, stage 2 conf vol           |      |      |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol              | 17   |      |       | 25   |           |            | 193  | 170  | 28   | 172  | 170  | 18   |
| tC, single (s)                  | 4.1  |      |       | 4.1  |           |            | 7.1  | 6.5  | 6.2  | 7.1  | 6.5  | 6.2  |
| tC, 2 stage (s)                 |      |      |       |      |           |            |      | 0.0  | 0.2  |      | 0.0  | 0.2  |
| tF (s)                          | 2.2  |      |       | 2.2  |           |            | 3.5  | 4.0  | 3.3  | 3.5  | 4.0  | 3.3  |
| p0 queue free %                 | 96   |      |       | 100  |           |            | 100  | 100  | 100  | 78   | 99   | 98   |
| cM capacity (veh/h)             | 1612 |      |       | 1598 |           |            | 723  | 695  | 1047 | 759  | 695  | 1064 |
| ,                               |      |      |       |      | 05 /      |            | 120  | 000  | 1047 | 100  | 000  | 1004 |
| Direction, Lane #               | EB 1 | WB 1 | WB 2  | NB 1 | SB 1      |            |      |      |      |      |      |      |
| Volume Total                    | 85   | 17   | 390   | 3    | 196       |            |      |      |      |      |      |      |
| Volume Left                     | 63   | 1    | 0     | 1    | 169       |            |      |      |      |      |      |      |
| Volume Right                    | 0    | 0    | 390   | 1    | 19        |            |      |      |      |      |      |      |
| cSH                             | 1612 | 1598 | 1700  | 795  | 778       |            |      |      |      |      |      |      |
| Volume to Capacity              | 0.04 | 0.00 | 0.23  | 0.00 | 0.25      |            |      |      |      |      |      |      |
| Queue Length 95th (m)           | 0.9  | 0.0  | 0.0   | 0.1  | 7.6       |            |      |      |      |      |      |      |
| Control Delay (s)               | 5.5  | 0.4  | 0.0   | 9.5  | 11.2      |            |      |      |      |      |      |      |
| Lane LOS                        | А    | А    |       | А    | В         |            |      |      |      |      |      |      |
| Approach Delay (s)              | 5.5  | 0.0  |       | 9.5  | 11.2      |            |      |      |      |      |      |      |
| Approach LOS                    |      |      |       | А    | В         |            |      |      |      |      |      |      |
| Intersection Summary            |      |      |       |      |           |            |      |      |      |      |      |      |
| Average Delay                   |      |      | 3.9   |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utilizati | on   |      | 43.9% | IC   | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)           |      |      | 15    |      |           |            |      |      |      |      |      |      |

|                                   | -     | 7    | *     | +    | 1         | 1          |
|-----------------------------------|-------|------|-------|------|-----------|------------|
| Movement                          | EBT   | EBR  | WBL   | WBT  | NBL       | NBR        |
| Lane Configurations               | 1     |      | ٦     | 1    | Y         |            |
| Traffic Volume (veh/h)            | 89    | 25   | 23    | 43   | 51        | 103        |
| Future Volume (Veh/h)             | 89    | 25   | 23    | 43   | 51        | 103        |
| Sign Control                      | Free  |      |       | Free | Stop      |            |
| Grade                             | 0%    |      |       | 0%   | 0%        |            |
| Peak Hour Factor                  | 0.90  | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       |
| Hourly flow rate (vph)            | 99    | 28   | 26    | 48   | 57        | 114        |
| Pedestrians                       |       |      |       |      | 3         |            |
| Lane Width (m)                    |       |      |       |      | 3.5       |            |
| Walking Speed (m/s)               |       |      |       |      | 1.1       |            |
| Percent Blockage                  |       |      |       |      | 0         |            |
| Right turn flare (veh)            |       |      |       |      |           |            |
| Median type                       | None  |      |       | None |           |            |
| Median storage veh)               |       |      |       |      |           |            |
| Upstream signal (m)               |       |      |       |      |           |            |
| pX, platoon unblocked             |       |      |       |      |           |            |
| vC, conflicting volume            |       |      | 130   |      | 216       | 116        |
| vC1, stage 1 conf vol             |       |      |       |      |           |            |
| vC2, stage 2 conf vol             |       |      |       |      |           |            |
| vCu, unblocked vol                |       |      | 130   |      | 216       | 116        |
| tC, single (s)                    |       |      | 4.1   |      | 6.4       | 6.2        |
| tC, 2 stage (s)                   |       |      |       |      |           |            |
| tF (s)                            |       |      | 2.2   |      | 3.5       | 3.3        |
| p0 queue free %                   |       |      | 98    |      | 93        | 88         |
| cM capacity (veh/h)               |       |      | 1439  |      | 761       | 936        |
| Direction, Lane #                 | EB 1  | WB 1 | WB 2  | NB 1 |           |            |
| Volume Total                      | 127   | 26   | 48    | 171  |           |            |
| Volume Left                       | 0     | 26   | 0     | 57   |           |            |
| Volume Right                      | 28    | 0    | 0     | 114  |           |            |
| cSH                               | 1700  | 1439 | 1700  | 869  |           |            |
| Volume to Capacity                | 0.07  | 0.02 | 0.03  | 0.20 |           |            |
| Queue Length 95th (m)             | 0.0   | 0.4  | 0.0   | 5.5  |           |            |
| Control Delay (s)                 | 0.0   | 7.5  | 0.0   | 10.2 |           |            |
| Lane LOS                          |       | А    |       | В    |           |            |
| Approach Delay (s)                | 0.0   | 2.7  |       | 10.2 |           |            |
| Approach LOS                      |       |      |       | В    |           |            |
| Intersection Summary              |       |      |       |      |           |            |
| Average Delay                     |       |      | 5.2   |      |           |            |
| Intersection Capacity Utilization | ation |      | 24.6% | IC   | U Level c | of Service |
| Analysis Period (min)             |       |      | 15    |      |           |            |
| <b>,</b> ,                        |       |      |       |      |           |            |

|                               | -     | 7    | *     | -      | 1         | 1          |   |
|-------------------------------|-------|------|-------|--------|-----------|------------|---|
| Movement                      | EBT   | EBR  | WBL   | WBT    | NBL       | NBR        |   |
| Lane Configurations           | 1     | 2011 |       | 4      | Y         |            | _ |
| Traffic Volume (veh/h)        | 39    | 134  | 20    | 43     | 315       | 17         |   |
| Future Volume (Veh/h)         | 39    | 134  | 20    | 43     | 315       | 17         |   |
| Sign Control                  | Free  | 101  | 23    | Free   | Stop      |            |   |
| Grade                         | 0%    |      |       | 0%     | 0%        |            |   |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90   | 0.90      | 0.90       |   |
| Hourly flow rate (vph)        | 43    | 149  | 22    | 48     | 350       | 19         |   |
| Pedestrians                   | 1     |      |       |        | 4         |            |   |
| Lane Width (m)                | 3.5   |      |       |        | 3.5       |            |   |
| Walking Speed (m/s)           | 1.1   |      |       |        | 1.1       |            |   |
| Percent Blockage              | 0     |      |       |        | 0         |            |   |
| Right turn flare (veh)        | v     |      |       |        | v         |            |   |
| Median type                   | None  |      |       | None   |           |            |   |
| Median storage veh)           | Homo  |      |       | 110110 |           |            |   |
| Upstream signal (m)           |       |      |       |        |           |            |   |
| pX, platoon unblocked         |       |      |       |        |           |            |   |
| vC, conflicting volume        |       |      | 196   |        | 214       | 122        |   |
| vC1, stage 1 conf vol         |       |      |       |        |           |            |   |
| vC2, stage 2 conf vol         |       |      |       |        |           |            |   |
| vCu, unblocked vol            |       |      | 196   |        | 214       | 122        |   |
| tC, single (s)                |       |      | 4.1   |        | 6.4       | 6.3        |   |
| tC, 2 stage (s)               |       |      |       |        |           |            |   |
| tF (s)                        |       |      | 2.2   |        | 3.5       | 3.4        |   |
| p0 queue free %               |       |      | 98    |        | 54        | 98         |   |
| cM capacity (veh/h)           |       |      | 1384  |        | 760       | 916        |   |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  |        |           |            |   |
| Volume Total                  | 192   | 70   | 369   |        |           |            |   |
| Volume Left                   | 0     | 22   | 350   |        |           |            |   |
| Volume Right                  | 149   | 0    | 19    |        |           |            |   |
| cSH                           | 1700  | 1384 | 767   |        |           |            |   |
| Volume to Capacity            | 0.11  | 0.02 | 0.48  |        |           |            |   |
| Queue Length 95th (m)         | 0.0   | 0.4  | 20.1  |        |           |            |   |
| Control Delay (s)             | 0.0   | 2.5  | 14.0  |        |           |            |   |
| Lane LOS                      |       | A    | В     |        |           |            |   |
| Approach Delay (s)            | 0.0   | 2.5  | 14.0  |        |           |            |   |
| Approach LOS                  |       |      | В     |        |           |            |   |
| Intersection Summary          |       |      |       |        |           |            |   |
| Average Delay                 |       |      | 8.4   |        |           |            |   |
| Intersection Capacity Utiliza | ation |      | 46.1% | IC     | U Level c | of Service |   |
| Analysis Period (min)         |       |      | 15    |        |           |            |   |
|                               |       |      |       |        |           |            |   |

#### HCM Unsignalized Intersection Capacity Analysis 35: Swan & Brant-Waterloo

|                               | ٨     | +    | 1     | 4    | Ļ         | •          | 1    | Ť    | 1    | 1    | ţ    | ~    |
|-------------------------------|-------|------|-------|------|-----------|------------|------|------|------|------|------|------|
| Movement                      | EBL   | EBT  | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |       | 4    |       |      | 4         |            |      | 4    |      |      | \$   |      |
| Traffic Volume (veh/h)        | 2     | 0    | 4     | 0    | 4         | 5          | 2    | 96   | 2    | 5    | 69   | 3    |
| Future Volume (Veh/h)         | 2     | 0    | 4     | 0    | 4         | 5          | 2    | 96   | 2    | 5    | 69   | 3    |
| Sign Control                  |       | Stop |       |      | Stop      |            |      | Free |      |      | Free |      |
| Grade                         |       | 0%   |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 2     | 0    | 4     | 0    | 4         | 6          | 2    | 107  | 2    | 6    | 77   | 3    |
| Pedestrians                   |       |      |       |      |           |            |      |      |      |      |      |      |
| Lane Width (m)                |       |      |       |      |           |            |      |      |      |      |      |      |
| Walking Speed (m/s)           |       |      |       |      |           |            |      |      |      |      |      |      |
| Percent Blockage              |       |      |       |      |           |            |      |      |      |      |      |      |
| Right turn flare (veh)        |       |      |       |      |           |            |      |      |      |      |      |      |
| Median type                   |       |      |       |      |           |            |      | None |      |      | None |      |
| Median storage veh)           |       |      |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)           |       |      |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked         |       |      |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume        | 210   | 204  | 78    | 206  | 204       | 108        | 80   |      |      | 109  |      |      |
| vC1, stage 1 conf vol         |       |      |       |      |           |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol         |       |      |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol            | 210   | 204  | 78    | 206  | 204       | 108        | 80   |      |      | 109  |      |      |
| tC, single (s)                | 7.1   | 6.5  | 6.2   | 7.1  | 6.5       | 6.2        | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)               |       |      | •     |      |           |            |      |      |      |      |      |      |
| tF (s)                        | 3.5   | 4.0  | 3.3   | 3.5  | 4.0       | 3.3        | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %               | 100   | 100  | 100   | 100  | 99        | 99         | 100  |      |      | 100  |      |      |
| cM capacity (veh/h)           | 740   | 693  | 988   | 749  | 692       | 938        | 1531 |      |      | 1494 |      |      |
| ,                             |       |      |       |      | 002       | 000        | 1001 |      |      | 1101 |      |      |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  | SB 1 |           |            |      |      |      |      |      |      |
| Volume Total                  | 6     | 10   | 111   | 86   |           |            |      |      |      |      |      |      |
| Volume Left                   | 2     | 0    | 2     | 6    |           |            |      |      |      |      |      |      |
| Volume Right                  | 4     | 6    | 2     | 3    |           |            |      |      |      |      |      |      |
| cSH                           | 888   | 821  | 1531  | 1494 |           |            |      |      |      |      |      |      |
| Volume to Capacity            | 0.01  | 0.01 | 0.00  | 0.00 |           |            |      |      |      |      |      |      |
| Queue Length 95th (m)         | 0.2   | 0.3  | 0.0   | 0.1  |           |            |      |      |      |      |      |      |
| Control Delay (s)             | 9.1   | 9.4  | 0.1   | 0.5  |           |            |      |      |      |      |      |      |
| Lane LOS                      | А     | А    | А     | А    |           |            |      |      |      |      |      |      |
| Approach Delay (s)            | 9.1   | 9.4  | 0.1   | 0.5  |           |            |      |      |      |      |      |      |
| Approach LOS                  | А     | А    |       |      |           |            |      |      |      |      |      |      |
| Intersection Summary          |       |      |       |      |           |            |      |      |      |      |      |      |
| Average Delay                 |       |      | 1.0   |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | ition |      | 17.9% | IC   | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |       |      | 15    |      |           |            |      |      |      |      |      |      |

#### HCM Unsignalized Intersection Capacity Analysis 1: Swan & Hilltop

|                                | ٨    | +    | 1     | 4    | Ļ         | *          | 1    | t    | 1    | 1    | ţ    | ~    |
|--------------------------------|------|------|-------|------|-----------|------------|------|------|------|------|------|------|
| Movement                       | EBL  | EBT  | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations            |      | \$   |       |      | \$        |            |      | \$   |      |      | \$   |      |
| Traffic Volume (veh/h)         | 1    | 0    | 0     | 23   | 0         | 46         | 0    | 111  | 31   | 87   | 194  | 5    |
| Future Volume (Veh/h)          | 1    | 0    | 0     | 23   | 0         | 46         | 0    | 111  | 31   | 87   | 194  | 5    |
| Sign Control                   |      | Stop |       |      | Stop      |            |      | Free |      |      | Free |      |
| Grade                          |      | 0%   |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor               | 0.90 | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)         | 1    | 0    | 0     | 26   | 0         | 51         | 0    | 123  | 34   | 97   | 216  | 6    |
| Pedestrians                    |      |      |       |      | 1         |            |      | 3    |      |      |      |      |
| Lane Width (m)                 |      |      |       |      | 3.5       |            |      | 3.5  |      |      |      |      |
| Walking Speed (m/s)            |      |      |       |      | 1.1       |            |      | 1.1  |      |      |      |      |
| Percent Blockage               |      |      |       |      | 0         |            |      | 0    |      |      |      |      |
| Right turn flare (veh)         |      |      |       |      |           |            |      |      |      |      |      |      |
| Median type                    |      |      |       |      |           |            |      | None |      |      | None |      |
| Median storage veh)            |      |      |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)            |      |      |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked          |      |      |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume         | 604  | 571  | 222   | 557  | 557       | 141        | 222  |      |      | 158  |      |      |
| vC1, stage 1 conf vol          |      |      |       |      |           |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol          |      |      |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol             | 604  | 571  | 222   | 557  | 557       | 141        | 222  |      |      | 158  |      |      |
| tC, single (s)                 | 7.1  | 6.5  | 6.2   | 7.1  | 6.5       | 6.2        | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)                |      |      |       |      |           |            |      |      |      |      |      |      |
| tF (s)                         | 3.5  | 4.0  | 3.3   | 3.5  | 4.0       | 3.3        | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %                | 100  | 100  | 100   | 94   | 100       | 94         | 100  |      |      | 93   |      |      |
| cM capacity (veh/h)            | 370  | 404  | 820   | 419  | 411       | 906        | 1359 |      |      | 1433 |      |      |
| Direction, Lane #              | EB 1 | WB 1 | NB 1  | SB 1 |           |            |      |      |      |      |      |      |
| Volume Total                   | 1    | 77   | 157   | 319  |           |            |      |      |      |      |      |      |
| Volume Left                    | 1    | 26   | 0     | 97   |           |            |      |      |      |      |      |      |
| Volume Right                   | 0    | 51   | 34    | 6    |           |            |      |      |      |      |      |      |
| cSH                            | 370  | 651  | 1359  | 1433 |           |            |      |      |      |      |      |      |
| Volume to Capacity             | 0.00 | 0.12 | 0.00  | 0.07 |           |            |      |      |      |      |      |      |
| Queue Length 95th (m)          | 0.1  | 3.0  | 0.0   | 1.7  |           |            |      |      |      |      |      |      |
| Control Delay (s)              | 14.8 | 11.3 | 0.0   | 2.8  |           |            |      |      |      |      |      |      |
| Lane LOS                       | В    | В    |       | А    |           |            |      |      |      |      |      |      |
| Approach Delay (s)             | 14.8 | 11.3 | 0.0   | 2.8  |           |            |      |      |      |      |      |      |
| Approach LOS                   | В    | В    |       |      |           |            |      |      |      |      |      |      |
| Intersection Summary           |      |      |       |      |           |            |      |      |      |      |      |      |
| Average Delay                  |      |      | 3.2   |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utilizat | tion |      | 42.9% | IC   | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)          |      |      | 15    |      |           |            |      |      |      |      |      |      |

#### HCM Unsignalized Intersection Capacity Analysis 2: Howard Marshall & Hilltop

| 02/12/2018 | 3 |
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|                               | ٨     | +    | *     | 1     | Ļ         | *          | 1    | Ť    | 1    | 1    | ţ    | ~    |
|-------------------------------|-------|------|-------|-------|-----------|------------|------|------|------|------|------|------|
| Movement                      | EBL   | EBT  | EBR   | WBL   | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |       | \$   |       |       | \$        |            |      | \$   |      |      | \$   |      |
| Sign Control                  |       | Stop |       |       | Stop      |            |      | Stop |      |      | Stop |      |
| Traffic Volume (vph)          | 4     | 40   | 34    | 13    | 29        | 0          | 28   | 1    | 2    | 0    | 1    | 3    |
| Future Volume (vph)           | 4     | 40   | 34    | 13    | 29        | 0          | 28   | 1    | 2    | 0    | 1    | 3    |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90  | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 4     | 44   | 38    | 14    | 32        | 0          | 31   | 1    | 2    | 0    | 1    | 3    |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  | SB 1  |           |            |      |      |      |      |      |      |
| Volume Total (vph)            | 86    | 46   | 34    | 4     |           |            |      |      |      |      |      |      |
| Volume Left (vph)             | 4     | 14   | 31    | 0     |           |            |      |      |      |      |      |      |
| Volume Right (vph)            | 38    | 0    | 2     | 3     |           |            |      |      |      |      |      |      |
| Hadj (s)                      | -0.26 | 0.06 | 0.15  | -0.45 |           |            |      |      |      |      |      |      |
| Departure Headway (s)         | 3.8   | 4.1  | 4.3   | 3.8   |           |            |      |      |      |      |      |      |
| Degree Utilization, x         | 0.09  | 0.05 | 0.04  | 0.00  |           |            |      |      |      |      |      |      |
| Capacity (veh/h)              | 936   | 858  | 799   | 920   |           |            |      |      |      |      |      |      |
| Control Delay (s)             | 7.1   | 7.4  | 7.5   | 6.8   |           |            |      |      |      |      |      |      |
| Approach Delay (s)            | 7.1   | 7.4  | 7.5   | 6.8   |           |            |      |      |      |      |      |      |
| Approach LOS                  | А     | А    | А     | А     |           |            |      |      |      |      |      |      |
| Intersection Summary          |       |      |       |       |           |            |      |      |      |      |      |      |
| Delay                         |       |      | 7.3   |       |           |            |      |      |      |      |      |      |
| Level of Service              |       |      | А     |       |           |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | tion  |      | 23.8% | IC    | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |       |      | 15    |       |           |            |      |      |      |      |      |      |

|                               | ٨     | <b>→</b> | 7     | *    | +          | *          | 1    | 1    | 1    | 4    | ŧ    | 4    |
|-------------------------------|-------|----------|-------|------|------------|------------|------|------|------|------|------|------|
| Movement                      | EBL   | EBT      | EBR   | WBL  | WBT        | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |       | 4        |       |      | र्स        | 1          |      | 4    |      |      | 4    |      |
| Traffic Volume (veh/h)        | 62    | 35       | 2     | 1    | 36         | 208        | 1    | 13   | 4    | 387  | 9    | 78   |
| Future Volume (Veh/h)         | 62    | 35       | 2     | 1    | 36         | 208        | 1    | 13   | 4    | 387  | 9    | 78   |
| Sign Control                  |       | Free     |       |      | Free       |            |      | Stop |      |      | Stop |      |
| Grade                         |       | 0%       |       |      | 0%         |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor              | 0.90  | 0.90     | 0.90  | 0.90 | 0.90       | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 69    | 39       | 2     | 1    | 40         | 231        | 1    | 14   | 4    | 430  | 10   | 87   |
| Pedestrians                   |       | 1        |       |      | 6          |            |      | 2    |      |      | 5    |      |
| Lane Width (m)                |       | 3.5      |       |      | 3.5        |            |      | 3.5  |      |      | 3.5  |      |
| Walking Speed (m/s)           |       | 1.1      |       |      | 1.1        |            |      | 1.1  |      |      | 1.1  |      |
| Percent Blockage              |       | 0        |       |      | 1          |            |      | 0    |      |      | 0    |      |
| Right turn flare (veh)        |       |          |       |      |            |            |      |      |      |      |      |      |
| Median type                   |       | None     |       |      | None       |            |      |      |      |      |      |      |
| Median storage veh)           |       |          |       |      |            |            |      |      |      |      |      |      |
| Upstream signal (m)           |       |          |       |      |            |            |      |      |      |      |      |      |
| pX, platoon unblocked         |       |          |       |      |            |            |      |      |      |      |      |      |
| vC, conflicting volume        | 45    |          |       | 43   |            |            | 315  | 227  | 48   | 242  | 228  | 46   |
| vC1, stage 1 conf vol         |       |          |       |      |            |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol         |       |          |       |      |            |            |      |      |      |      |      |      |
| vCu, unblocked vol            | 45    |          |       | 43   |            |            | 315  | 227  | 48   | 242  | 228  | 46   |
| tC, single (s)                | 4.1   |          |       | 4.1  |            |            | 7.1  | 6.5  | 6.2  | 7.1  | 6.5  | 6.2  |
| tC, 2 stage (s)               |       |          |       |      |            |            |      |      |      |      |      |      |
| tF (s)                        | 2.2   |          |       | 2.2  |            |            | 3.5  | 4.0  | 3.3  | 3.5  | 4.0  | 3.3  |
| p0 queue free %               | 96    |          |       | 100  |            |            | 100  | 98   | 100  | 36   | 98   | 92   |
| cM capacity (veh/h)           | 1569  |          |       | 1576 |            |            | 556  | 642  | 1019 | 668  | 641  | 1024 |
| Direction, Lane #             | EB 1  | WB 1     | WB 2  | NB 1 | SB 1       |            |      |      |      |      |      |      |
| Volume Total                  | 110   | 41       | 231   | 19   | 527        |            |      |      |      |      |      |      |
| Volume Left                   | 69    | 1        | 0     | 1    | 430        |            |      |      |      |      |      |      |
| Volume Right                  | 2     | 0        | 231   | 4    | 87         |            |      |      |      |      |      |      |
| cSH                           | 1569  | 1576     | 1700  | 690  | 708        |            |      |      |      |      |      |      |
| Volume to Capacity            | 0.04  | 0.00     | 0.14  | 0.03 | 0.74       |            |      |      |      |      |      |      |
| Queue Length 95th (m)         | 1.0   | 0.0      | 0.0   | 0.6  | 51.1       |            |      |      |      |      |      |      |
| Control Delay (s)             | 4.8   | 0.2      | 0.0   | 10.4 | 23.4       |            |      |      |      |      |      |      |
| Lane LOS                      | A     | A        | 0.0   | B    | C          |            |      |      |      |      |      |      |
| Approach Delay (s)            | 4.8   | 0.0      |       | 10.4 | 23.4       |            |      |      |      |      |      |      |
| Approach LOS                  | 4.0   | 0.0      |       | B    | C          |            |      |      |      |      |      |      |
| Intersection Summary          |       |          |       |      |            |            |      |      |      |      |      |      |
| Average Delay                 |       |          | 14.0  |      |            |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | ation |          | 59.3% | IC   | CU Level o | of Service |      |      | В    |      |      |      |
| Analysis Period (min)         |       |          | 15    |      |            |            |      |      | -    |      |      |      |
|                               |       |          |       |      |            |            |      |      |      |      |      |      |

|                                   | -    | 7    | 1     | -        | 1         | 1          |
|-----------------------------------|------|------|-------|----------|-----------|------------|
| Movement                          | EBT  | EBR  | WBL   | WBT      | NBL       | NBR        |
| Lane Configurations               | 1    |      | ٢     | 1        | Y         |            |
| Traffic Volume (veh/h)            | 34   | 60   | 91    | 74       | 39        | 28         |
| Future Volume (Veh/h)             | 34   | 60   | 91    | 74       | 39        | 28         |
| Sign Control                      | Free |      |       | Free     | Stop      |            |
| Grade                             | 0%   |      |       | 0%       | 0%        |            |
| Peak Hour Factor                  | 0.90 | 0.90 | 0.90  | 0.90     | 0.90      | 0.90       |
| Hourly flow rate (vph)            | 38   | 67   | 101   | 82       | 43        | 31         |
| Pedestrians                       |      |      |       |          | 2         |            |
| Lane Width (m)                    |      |      |       |          | 3.5       |            |
| Walking Speed (m/s)               |      |      |       |          | 1.1       |            |
| Percent Blockage                  |      |      |       |          | 0         |            |
| Right turn flare (veh)            |      |      |       |          | •         |            |
| Median type                       | None |      |       | None     |           |            |
| Median storage veh)               |      |      |       | Tionio   |           |            |
| Upstream signal (m)               |      |      |       |          |           |            |
| pX, platoon unblocked             |      |      |       |          |           |            |
| vC, conflicting volume            |      |      | 107   |          | 358       | 74         |
| vC1, stage 1 conf vol             |      |      |       |          | 000       |            |
| vC2, stage 2 conf vol             |      |      |       |          |           |            |
| vCu, unblocked vol                |      |      | 107   |          | 358       | 74         |
| tC, single (s)                    |      |      | 4.1   |          | 6.4       | 6.2        |
| tC, 2 stage (s)                   |      |      |       |          | 5.1       | J.E        |
| tF (s)                            |      |      | 2.2   |          | 3.5       | 3.3        |
| p0 queue free %                   |      |      | 93    |          | 93        | 97         |
| cM capacity (veh/h)               |      |      | 1494  |          | 600       | 992        |
| Direction, Lane #                 | EB 1 | WB 1 | WB 2  | NB 1     |           |            |
| Volume Total                      | 105  | 101  | 82    | 74       |           |            |
| Volume Left                       | 0    | 101  | 02    | 43       |           |            |
| Volume Right                      | 67   | 0    | 0     | 43<br>31 |           |            |
| cSH                               | 1700 | 1494 | 1700  | 719      |           |            |
| Volume to Capacity                | 0.06 | 0.07 | 0.05  | 0.10     |           |            |
|                                   | 0.00 | 1.7  | 0.05  | 2.6      |           |            |
| Queue Length 95th (m)             | 0.0  | 7.6  | 0.0   | 10.6     |           |            |
| Control Delay (s)                 | 0.0  |      | 0.0   |          |           |            |
| Lane LOS                          | 0.0  | A    |       | B        |           |            |
| Approach Delay (s)                | 0.0  | 4.2  |       | 10.6     |           |            |
| Approach LOS                      |      |      |       | В        |           |            |
| Intersection Summary              |      |      |       |          |           |            |
| Average Delay                     |      |      | 4.3   |          |           |            |
| Intersection Capacity Utilization | tion |      | 22.9% | IC       | U Level c | of Service |
| Analysis Period (min)             |      |      | 15    |          |           |            |

|   | -     | 7    | 1     | -    | 1         | 1         |  |
|---|-------|------|-------|------|-----------|-----------|--|
| Movement                                | EBT   | EBR  | WBL   | WBT  | NBL       | NBR       |  |
| Lane Configurations                     | ţ,    |      |       | 4    | M         |           |  |
| Traffic Volume (veh/h)                  | 50    | 379  | 23    | 50   | 197       | 12        |  |
| Future Volume (Veh/h)                   | 50    | 379  | 23    | 50   | 197       | 12        |  |
| Sign Control                            | Free  |      |       | Free | Stop      |           |  |
| Grade                                   | 0%    |      |       | 0%   | 0%        |           |  |
| Peak Hour Factor                        | 0.90  | 0.90 | 0.90  | 0.90 | 0.90      | 0.90      |  |
| Hourly flow rate (vph)                  | 56    | 421  | 26    | 56   | 219       | 13        |  |
| Pedestrians                             | 1     |      |       |      | 1         |           |  |
| Lane Width (m)                          | 3.5   |      |       |      | 3.5       |           |  |
| Walking Speed (m/s)                     | 1.1   |      |       |      | 1.1       |           |  |
| Percent Blockage                        | 0     |      |       |      | 0         |           |  |
| Right turn flare (veh)                  |       |      |       |      |           |           |  |
| Median type                             | None  |      |       | None |           |           |  |
| Median storage veh)                     |       |      |       |      |           |           |  |
| Upstream signal (m)                     |       |      |       |      |           |           |  |
| pX, platoon unblocked                   |       |      |       |      |           |           |  |
| vC, conflicting volume                  |       |      | 478   |      | 376       | 268       |  |
| vC1, stage 1 conf vol                   |       |      |       |      |           |           |  |
| vC2, stage 2 conf vol                   |       |      |       |      |           |           |  |
| vCu, unblocked vol                      |       |      | 478   |      | 376       | 268       |  |
| tC, single (s)                          |       |      | 4.1   |      | 6.4       | 6.2       |  |
| tC, 2 stage (s)                         |       |      |       |      |           |           |  |
| tF (s)                                  |       |      | 2.2   |      | 3.5       | 3.3       |  |
| p0 queue free %                         |       |      | 98    |      | 64        | 98        |  |
| cM capacity (veh/h)                     |       |      | 1094  |      | 611       | 775       |  |
| Direction, Lane #                       | EB 1  | WB 1 | NB 1  |      |           |           |  |
| Volume Total                            | 477   | 82   | 232   |      |           |           |  |
| Volume Left                             | 0     | 26   | 219   |      |           |           |  |
| Volume Right                            | 421   | 0    | 13    |      |           |           |  |
| cSH                                     | 1700  | 1094 | 618   |      |           |           |  |
| Volume to Capacity                      | 0.28  | 0.02 | 0.38  |      |           |           |  |
| Queue Length 95th (m)                   | 0.0   | 0.6  | 13.2  |      |           |           |  |
| Control Delay (s)                       | 0.0   | 2.8  | 14.3  |      |           |           |  |
| Lane LOS                                |       | A    | В     |      |           |           |  |
| Approach Delay (s)                      | 0.0   | 2.8  | 14.3  |      |           |           |  |
| Approach LOS                            |       |      | В     |      |           |           |  |
| Intersection Summary                    |       |      |       |      |           |           |  |
| Average Delay                           |       |      | 4.5   |      |           |           |  |
| Intersection Capacity Utilization       | ation |      | 49.3% | IC   | U Level c | f Service |  |
| Analysis Period (min)                   |       |      | 15    |      |           |           |  |
| , · · · · · · · · · · · · · · · · · · · |       |      |       |      |           |           |  |

#### HCM Unsignalized Intersection Capacity Analysis 35: Swan & Brant-Waterloo

|                               | ٨     | +    | 1     | 4    | Ļ         | •          | 1    | Ť    | 1    | 1    | ţ    | ~    |
|-------------------------------|-------|------|-------|------|-----------|------------|------|------|------|------|------|------|
| Movement                      | EBL   | EBT  | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |       | 4    |       |      | 4         |            |      | \$   |      |      | 4    |      |
| Traffic Volume (veh/h)        | 6     | 2    | 3     | 0    | 2         | 4          | 3    | 116  | 2    | 4    | 166  | 4    |
| Future Volume (Veh/h)         | 6     | 2    | 3     | 0    | 2         | 4          | 3    | 116  | 2    | 4    | 166  | 4    |
| Sign Control                  |       | Stop |       |      | Stop      |            |      | Free |      |      | Free |      |
| Grade                         |       | 0%   |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 7     | 2    | 3     | 0    | 2         | 4          | 3    | 129  | 2    | 4    | 184  | 4    |
| Pedestrians                   |       |      |       |      |           |            |      |      |      |      |      |      |
| Lane Width (m)                |       |      |       |      |           |            |      |      |      |      |      |      |
| Walking Speed (m/s)           |       |      |       |      |           |            |      |      |      |      |      |      |
| Percent Blockage              |       |      |       |      |           |            |      |      |      |      |      |      |
| Right turn flare (veh)        |       |      |       |      |           |            |      |      |      |      |      |      |
| Median type                   |       |      |       |      |           |            |      | None |      |      | None |      |
| Median storage veh)           |       |      |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)           |       |      |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked         |       |      |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume        | 335   | 331  | 186   | 334  | 332       | 130        | 188  |      |      | 131  |      |      |
| vC1, stage 1 conf vol         |       |      |       |      |           |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol         |       |      |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol            | 335   | 331  | 186   | 334  | 332       | 130        | 188  |      |      | 131  |      |      |
| tC, single (s)                | 7.1   | 6.5  | 6.2   | 7.1  | 6.5       | 6.2        | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)               |       |      |       |      |           |            |      |      |      |      |      |      |
| tF (s)                        | 3.5   | 4.0  | 3.3   | 3.5  | 4.0       | 3.3        | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %               | 99    | 100  | 100   | 100  | 100       | 100        | 100  |      |      | 100  |      |      |
| cM capacity (veh/h)           | 616   | 589  | 861   | 617  | 588       | 925        | 1398 |      |      | 1467 |      |      |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  | SB 1 |           |            |      |      |      |      |      |      |
| Volume Total                  | 12    | 6    | 134   | 192  |           |            |      |      |      |      |      |      |
| Volume Left                   | 7     | 0    | 3     | 4    |           |            |      |      |      |      |      |      |
| Volume Right                  | 3     | 4    | 2     | 4    |           |            |      |      |      |      |      |      |
| cSH                           | 658   | 777  | 1398  | 1467 |           |            |      |      |      |      |      |      |
| Volume to Capacity            | 0.02  | 0.01 | 0.00  | 0.00 |           |            |      |      |      |      |      |      |
| Queue Length 95th (m)         | 0.4   | 0.2  | 0.0   | 0.1  |           |            |      |      |      |      |      |      |
| Control Delay (s)             | 10.6  | 9.7  | 0.2   | 0.2  |           |            |      |      |      |      |      |      |
| Lane LOS                      | В     | A    | A     | A    |           |            |      |      |      |      |      |      |
| Approach Delay (s)            | 10.6  | 9.7  | 0.2   | 0.2  |           |            |      |      |      |      |      |      |
| Approach LOS                  | В     | A    | 0.2   | 0.2  |           |            |      |      |      |      |      |      |
| Intersection Summary          |       |      |       |      |           |            |      |      |      |      |      |      |
| Average Delay                 |       |      | 0.7   |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | ition |      | 27.1% | IC   | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |       |      | 15    | .0   | 5 _0.01   |            |      |      | 7.   |      |      |      |
|                               |       |      |       |      |           |            |      |      |      |      |      |      |

### Appendix C

Synchro Reports

2020 and 2031 Future Background Conditions

|                                   | ٠    | +    | 1     | 4    | ł         | *          | •    | Ť    | 1    | 1    | ţ    | ~    |
|-----------------------------------|------|------|-------|------|-----------|------------|------|------|------|------|------|------|
| Movement                          | EBL  | EBT  | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations               |      | 4    |       |      | 4         |            | ٦    | T.   |      | 7    | T.   |      |
| Traffic Volume (veh/h)            | 4    | 0    | 0     | 32   | 0         | 73         | 0    | 192  | 10   | 26   | 122  | 0    |
| Future Volume (Veh/h)             | 4    | 0    | 0     | 32   | 0         | 73         | 0    | 192  | 10   | 26   | 122  | 0    |
| Sign Control                      |      | Stop |       |      | Stop      |            |      | Free |      |      | Free |      |
| Grade                             |      | 0%   |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor                  | 0.90 | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)            | 4    | 0    | 0     | 36   | 0         | 81         | 0    | 213  | 11   | 29   | 136  | 0    |
| Pedestrians                       |      |      |       |      | 1         |            |      | 3    |      |      |      |      |
| Lane Width (m)                    |      |      |       |      | 3.5       |            |      | 3.5  |      |      |      |      |
| Walking Speed (m/s)               |      |      |       |      | 1.1       |            |      | 1.1  |      |      |      |      |
| Percent Blockage                  |      |      |       |      | 0         |            |      | 0    |      |      |      |      |
| Right turn flare (veh)            |      |      |       |      |           |            |      |      |      |      |      |      |
| Median type                       |      |      |       |      |           |            |      | None |      |      | None |      |
| Median storage veh)               |      |      |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)               |      |      |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked             |      |      |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume            | 488  | 419  | 139   | 416  | 414       | 220        | 136  |      |      | 225  |      |      |
| vC1, stage 1 conf vol             |      |      |       |      |           |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol             |      |      |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol                | 488  | 419  | 139   | 416  | 414       | 220        | 136  |      |      | 225  |      |      |
| tC, single (s)                    | 7.1  | 6.5  | 6.2   | 7.1  | 6.5       | 6.2        | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)                   |      |      |       |      |           |            |      |      |      |      |      |      |
| tF (s)                            | 3.5  | 4.0  | 3.3   | 3.5  | 4.0       | 3.3        | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %                   | 99   | 100  | 100   | 93   | 100       | 90         | 100  |      |      | 98   |      |      |
| cM capacity (veh/h)               | 437  | 517  | 912   | 539  | 520       | 822        | 1461 |      |      | 1354 |      |      |
| Direction, Lane #                 | EB 1 | WB 1 | NB 1  | NB 2 | SB 1      | SB 2       |      |      |      |      |      |      |
| Volume Total                      | 4    | 117  | 0     | 224  | 29        | 136        |      |      |      |      |      |      |
| Volume Left                       | 4    | 36   | 0     | 0    | 29        | 0          |      |      |      |      |      |      |
| Volume Right                      | 0    | 81   | 0     | 11   | 0         | 0          |      |      |      |      |      |      |
| cSH                               | 437  | 708  | 1700  | 1700 | 1354      | 1700       |      |      |      |      |      |      |
| Volume to Capacity                | 0.01 | 0.17 | 0.00  | 0.13 | 0.02      | 0.08       |      |      |      |      |      |      |
| Queue Length 95th (m)             | 0.2  | 4.5  | 0.0   | 0.0  | 0.5       | 0.0        |      |      |      |      |      |      |
| Control Delay (s)                 | 13.3 | 11.1 | 0.0   | 0.0  | 7.7       | 0.0        |      |      |      |      |      |      |
| Lane LOS                          | В    | В    |       |      | А         |            |      |      |      |      |      |      |
| Approach Delay (s)                | 13.3 | 11.1 | 0.0   |      | 1.4       |            |      |      |      |      |      |      |
| Approach LOS                      | В    | В    |       |      |           |            |      |      |      |      |      |      |
| Intersection Summary              |      |      |       |      |           |            |      |      |      |      |      |      |
| Average Delay                     |      |      | 3.1   |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utilization | on   |      | 33.4% | IC   | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)             |      |      | 15    |      |           |            |      |      |      |      |      |      |

#### HCM Unsignalized Intersection Capacity Analysis 5: Howard Marshall & Hilltop

|                               | ٨     | +    | *     | 1     | Ļ         | *          | 1    | Ť    | 1    | 1    | ţ    | ~    |
|-------------------------------|-------|------|-------|-------|-----------|------------|------|------|------|------|------|------|
| Movement                      | EBL   | EBT  | EBR   | WBL   | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |       | \$   |       |       | \$        |            |      | \$   |      |      | \$   |      |
| Sign Control                  |       | Stop |       |       | Stop      |            |      | Stop |      |      | Stop |      |
| Traffic Volume (vph)          | 3     | 22   | 13    | 6     | 34        | 0          | 26   | 7    | 14   | 0    | 3    | 11   |
| Future Volume (vph)           | 3     | 22   | 13    | 6     | 34        | 0          | 26   | 7    | 14   | 0    | 3    | 11   |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90  | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 3     | 24   | 14    | 7     | 38        | 0          | 29   | 8    | 16   | 0    | 3    | 12   |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  | SB 1  |           |            |      |      |      |      |      |      |
| Volume Total (vph)            | 41    | 45   | 53    | 15    |           |            |      |      |      |      |      |      |
| Volume Left (vph)             | 3     | 7    | 29    | 0     |           |            |      |      |      |      |      |      |
| Volume Right (vph)            | 14    | 0    | 16    | 12    |           |            |      |      |      |      |      |      |
| Hadj (s)                      | -0.09 | 0.03 | -0.02 | -0.48 |           |            |      |      |      |      |      |      |
| Departure Headway (s)         | 4.0   | 4.1  | 4.1   | 3.7   |           |            |      |      |      |      |      |      |
| Degree Utilization, x         | 0.05  | 0.05 | 0.06  | 0.02  |           |            |      |      |      |      |      |      |
| Capacity (veh/h)              | 879   | 855  | 853   | 954   |           |            |      |      |      |      |      |      |
| Control Delay (s)             | 7.2   | 7.3  | 7.3   | 6.7   |           |            |      |      |      |      |      |      |
| Approach Delay (s)            | 7.2   | 7.3  | 7.3   | 6.7   |           |            |      |      |      |      |      |      |
| Approach LOS                  | А     | А    | А     | А     |           |            |      |      |      |      |      |      |
| Intersection Summary          |       |      |       |       |           |            |      |      |      |      |      |      |
| Delay                         |       |      | 7.2   |       |           |            |      |      |      |      |      |      |
| Level of Service              |       |      | А     |       |           |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | tion  |      | 19.5% | IC    | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |       |      | 15    |       |           |            |      |      |      |      |      |      |

|                               | ٨     | -    | 7     | 1    | +          | *          | 1    | 1    | 1    | 4    | Ŧ    | ~    |
|-------------------------------|-------|------|-------|------|------------|------------|------|------|------|------|------|------|
| Movement                      | EBL   | EBT  | EBR   | WBL  | WBT        | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |       | 4    |       |      | र्भ        | 1          |      | 4    |      |      | 4    |      |
| Traffic Volume (veh/h)        | 59    | 21   | 0     | 2    | 15         | 416        | 2    | 2    | 2    | 173  | 8    | 18   |
| Future Volume (Veh/h)         | 59    | 21   | 0     | 2    | 15         | 416        | 2    | 2    | 2    | 173  | 8    | 18   |
| Sign Control                  |       | Free |       |      | Free       |            |      | Stop |      |      | Stop |      |
| Grade                         |       | 0%   |       |      | 0%         |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90 | 0.90       | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 66    | 23   | 0     | 2    | 17         | 462        | 2    | 2    | 2    | 192  | 9    | 20   |
| Pedestrians                   |       | 1    |       |      | 6          |            |      | 2    |      |      | 5    |      |
| Lane Width (m)                |       | 3.5  |       |      | 3.5        |            |      | 3.5  |      |      | 3.5  |      |
| Walking Speed (m/s)           |       | 1.1  |       |      | 1.1        |            |      | 1.1  |      |      | 1.1  |      |
| Percent Blockage              |       | 0    |       |      | 1          |            |      | 0    |      |      | 0    |      |
| Right turn flare (veh)        |       |      |       |      |            |            |      |      |      |      |      |      |
| Median type                   |       | None |       |      | None       |            |      |      |      |      |      |      |
| Median storage veh)           |       |      |       |      |            |            |      |      |      |      |      |      |
| Upstream signal (m)           |       |      |       |      |            |            |      |      |      |      |      |      |
| pX, platoon unblocked         |       |      |       |      |            |            |      |      |      |      |      |      |
| vC, conflicting volume        | 22    |      |       | 25   |            |            | 204  | 183  | 31   | 190  | 183  | 23   |
| vC1, stage 1 conf vol         |       |      |       |      |            |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol         |       |      |       |      |            |            |      |      |      |      |      |      |
| vCu, unblocked vol            | 22    |      |       | 25   |            |            | 204  | 183  | 31   | 190  | 183  | 23   |
| tC, single (s)                | 4.1   |      |       | 4.1  |            |            | 7.1  | 6.5  | 6.2  | 7.1  | 6.5  | 6.2  |
| tC, 2 stage (s)               |       |      |       |      |            |            |      |      |      |      |      |      |
| tF (s)                        | 2.2   |      |       | 2.2  |            |            | 3.5  | 4.0  | 3.3  | 3.5  | 4.0  | 3.3  |
| p0 queue free %               | 96    |      |       | 100  |            |            | 100  | 100  | 100  | 74   | 99   | 98   |
| cM capacity (veh/h)           | 1600  |      |       | 1600 |            |            | 708  | 680  | 1042 | 736  | 680  | 1054 |
| Direction, Lane #             | EB 1  | WB 1 | WB 2  | NB 1 | SB 1       |            |      |      |      |      |      |      |
| Volume Total                  | 89    | 19   | 462   | 6    | 221        |            |      |      |      |      |      |      |
| Volume Left                   | 66    | 2    | 0     | 2    | 192        |            |      |      |      |      |      |      |
| Volume Right                  | 0     | 0    | 462   | 2    | 20         |            |      |      |      |      |      |      |
| cSH                           | 1600  | 1600 | 1700  | 781  | 754        |            |      |      |      |      |      |      |
| Volume to Capacity            | 0.04  | 0.00 | 0.27  | 0.01 | 0.29       |            |      |      |      |      |      |      |
| Queue Length 95th (m)         | 1.0   | 0.0  | 0.0   | 0.2  | 9.3        |            |      |      |      |      |      |      |
| Control Delay (s)             | 5.5   | 0.8  | 0.0   | 9.6  | 11.7       |            |      |      |      |      |      |      |
| Lane LOS                      | A     | A    | 0.0   | A    | В          |            |      |      |      |      |      |      |
| Approach Delay (s)            | 5.5   | 0.0  |       | 9.6  | 11.7       |            |      |      |      |      |      |      |
| Approach LOS                  |       | 0.0  |       | A    | В          |            |      |      |      |      |      |      |
| Intersection Summary          |       |      |       |      |            |            |      |      |      |      |      |      |
| Average Delay                 |       |      | 4.0   |      |            |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | ation |      | 49.5% | IC   | CU Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |       |      | 15    |      |            |            |      |      |      |      |      |      |

|                               | <b>→</b> | 7    | 1     | +    | 1         | 1         |
|-------------------------------|----------|------|-------|------|-----------|-----------|
| Movement                      | EBT      | EBR  | WBL   | WBT  | NBL       | NBR       |
| Lane Configurations           | 1        |      | ٦     | 1    | ¥         |           |
| Traffic Volume (veh/h)        | 92       | 26   | 26    | 45   | 53        | 114       |
| Future Volume (Veh/h)         | 92       | 26   | 26    | 45   | 53        | 114       |
| Sign Control                  | Free     |      |       | Free | Stop      |           |
| Grade                         | 0%       |      |       | 0%   | 0%        |           |
| Peak Hour Factor              | 0.90     | 0.90 | 0.90  | 0.90 | 0.90      | 0.90      |
| Hourly flow rate (vph)        | 102      | 29   | 29    | 50   | 59        | 127       |
| Pedestrians                   |          |      |       |      | 2         |           |
| Lane Width (m)                |          |      |       |      | 3.5       |           |
| Walking Speed (m/s)           |          |      |       |      | 1.1       |           |
| Percent Blockage              |          |      |       |      | 0         |           |
| Right turn flare (veh)        |          |      |       |      | v         |           |
| Median type                   | None     |      |       | None |           |           |
| Median storage veh)           | None     |      |       | None |           |           |
| Upstream signal (m)           |          |      |       |      |           |           |
| pX, platoon unblocked         |          |      |       |      |           |           |
| vC, conflicting volume        |          |      | 133   |      | 226       | 118       |
| vC1, stage 1 conf vol         |          |      | 100   |      | 220       | 110       |
| vC2, stage 2 conf vol         |          |      |       |      |           |           |
| vCu, unblocked vol            |          |      | 133   |      | 226       | 118       |
| tC, single (s)                |          |      | 4.1   |      | 6.4       | 6.2       |
| tC, 2 stage (s)               |          |      | 7.1   |      | 0.4       | 0.2       |
| tF (s)                        |          |      | 2.2   |      | 3.5       | 3.3       |
| p0 queue free %               |          |      | 98    |      | 92        | 3.3<br>86 |
| cM capacity (veh/h)           |          |      | 1437  |      | 92<br>749 | 934       |
|                               |          |      |       |      | 749       | 904       |
| Direction, Lane #             | EB 1     | WB 1 | WB 2  | NB 1 |           |           |
| Volume Total                  | 131      | 29   | 50    | 186  |           |           |
| Volume Left                   | 0        | 29   | 0     | 59   |           |           |
| Volume Right                  | 29       | 0    | 0     | 127  |           |           |
| cSH                           | 1700     | 1437 | 1700  | 866  |           |           |
| Volume to Capacity            | 0.08     | 0.02 | 0.03  | 0.21 |           |           |
| Queue Length 95th (m)         | 0.0      | 0.5  | 0.0   | 6.2  |           |           |
| Control Delay (s)             | 0.0      | 7.6  | 0.0   | 10.3 |           |           |
| Lane LOS                      |          | А    |       | В    |           |           |
| Approach Delay (s)            | 0.0      | 2.8  |       | 10.3 |           |           |
| Approach LOS                  |          |      |       | В    |           |           |
| Intersection Summary          |          |      |       |      |           |           |
| Average Delay                 |          |      | 5.4   |      |           |           |
| Intersection Capacity Utiliza | ation    |      | 25.6% | IC   | U Level c | f Service |
| Analysis Period (min)         |          |      | 15    | 10   |           |           |
|                               |          |      | 15    |      |           |           |

|                                   | -     | 7        | 4            | -       | 1         | 1          |
|-----------------------------------|-------|----------|--------------|---------|-----------|------------|
| Movement                          | EBT   | EBR      | WBL          | WBT     | NBL       | NBR        |
| Lane Configurations               | ţ,    |          |              | ۹.      | Y         |            |
| Traffic Volume (veh/h)            | 41    | 155      | 21           | 45      | 379       | 18         |
| Future Volume (Veh/h)             | 41    | 155      | 21           | 45      | 379       | 18         |
| Sign Control                      | Free  |          |              | Free    | Stop      |            |
| Grade                             | 0%    |          |              | 0%      | 0%        |            |
| Peak Hour Factor                  | 0.90  | 0.90     | 0.90         | 0.90    | 0.90      | 0.90       |
| Hourly flow rate (vph)            | 46    | 172      | 23           | 50      | 421       | 20         |
| Pedestrians                       | 1     |          |              |         | 1         |            |
| Lane Width (m)                    | 3.5   |          |              |         | 3.5       |            |
| Walking Speed (m/s)               | 1.1   |          |              |         | 1.1       |            |
| Percent Blockage                  | 0     |          |              |         | 0         |            |
| Right turn flare (veh)            | Ŭ     |          |              |         | v         |            |
| Median type                       | None  |          |              | None    |           |            |
| Median storage veh)               | Tione |          |              | 1 tonio |           |            |
| Upstream signal (m)               |       |          |              |         |           |            |
| pX, platoon unblocked             |       |          |              |         |           |            |
| vC, conflicting volume            |       |          | 219          |         | 230       | 133        |
| vC1, stage 1 conf vol             |       |          | 210          |         | 200       | 100        |
| vC2, stage 2 conf vol             |       |          |              |         |           |            |
| vCu, unblocked vol                |       |          | 219          |         | 230       | 133        |
| tC, single (s)                    |       |          | 4.1          |         | 6.4       | 6.3        |
| tC, 2 stage (s)                   |       |          |              |         | 0.1       | 0.0        |
| tF (s)                            |       |          | 2.2          |         | 3.5       | 3.4        |
| p0 queue free %                   |       |          | 98           |         | 44        | 98         |
| cM capacity (veh/h)               |       |          | 1361         |         | 746       | 905        |
| Direction, Lane #                 | EB 1  | WB 1     | NB 1         |         |           |            |
| Volume Total                      | 218   | 73       | 441          |         |           |            |
| Volume Left                       | 0     | 23       | 441          |         |           |            |
| Volume Right                      | 172   | 0        | 20           |         |           |            |
| cSH                               | 1700  | 1361     | 752          |         |           |            |
| Volume to Capacity                | 0.13  | 0.02     | 0.59         |         |           |            |
|                                   | 0.13  | 0.02     | 29.4         |         |           |            |
| Queue Length 95th (m)             | 0.0   | 2.5      | 29.4<br>16.3 |         |           |            |
| Control Delay (s)<br>Lane LOS     | 0.0   | 2.5<br>A | 10.5<br>C    |         |           |            |
|                                   | 0.0   |          | 16.3         |         |           |            |
| Approach Delay (s)                | 0.0   | 2.5      | 10.3<br>C    |         |           |            |
| Approach LOS                      |       |          | U            |         |           |            |
| Intersection Summary              |       |          |              |         |           |            |
| Average Delay                     |       |          | 10.1         |         |           |            |
| Intersection Capacity Utilization | on    |          | 51.4%        | IC      | U Level c | of Service |
| Analysis Period (min)             |       |          | 15           |         |           |            |

|                               | ٦     | +    | Ļ      | •    | 4          | 4          |
|-------------------------------|-------|------|--------|------|------------|------------|
| Movement                      | EBL   | EBT  | WBT    | WBR  | SBL        | SBR        |
| Lane Configurations           |       | र्भ  | ħ      |      | Y          |            |
| Traffic Volume (veh/h)        | 5     | 0    | 0      | 0    | 0          | 2          |
| Future Volume (Veh/h)         | 5     | 0    | 0      | 0    | 0          | 2          |
| Sign Control                  |       | Free | Free   |      | Stop       |            |
| Grade                         |       | 0%   | 0%     |      | 0%         |            |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90   | 0.90 | 0.90       | 0.90       |
| Hourly flow rate (vph)        | 6     | 0    | 0      | 0    | 0          | 2          |
| Pedestrians                   | · ·   | , ,  | , ,    | Ū    | Ū          | -          |
| Lane Width (m)                |       |      |        |      |            |            |
| Walking Speed (m/s)           |       |      |        |      |            |            |
| Percent Blockage              |       |      |        |      |            |            |
| Right turn flare (veh)        |       |      |        |      |            |            |
| Median type                   |       | None | None   |      |            |            |
| Median storage veh)           |       | None | NONC   |      |            |            |
| Upstream signal (m)           |       |      |        |      |            |            |
| pX, platoon unblocked         |       |      |        |      |            |            |
| vC, conflicting volume        | 0     |      |        |      | 12         | 0          |
| vC1, stage 1 conf vol         | U     |      |        |      | 12         | U          |
| vC2, stage 2 conf vol         |       |      |        |      |            |            |
| vCu, unblocked vol            | 0     |      |        |      | 12         | 0          |
| tC, single (s)                | 4.1   |      |        |      | 6.4        | 6.2        |
| tC, 2 stage (s)               | 4.1   |      |        |      | 0.4        | 0.2        |
| tF (s)                        | 2.2   |      |        |      | 3.5        | 3.3        |
| p0 queue free %               | 100   |      |        |      | 3.5<br>100 | 3.3<br>100 |
|                               | 1623  |      |        |      | 100        | 100        |
| cM capacity (veh/h)           |       |      |        |      | 1004       | COUL       |
| Direction, Lane #             | EB 1  | WB 1 | SB 1   |      |            |            |
| Volume Total                  | 6     | 0    | 2      |      |            |            |
| Volume Left                   | 6     | 0    | 0      |      |            |            |
| Volume Right                  | 0     | 0    | 2      |      |            |            |
| cSH                           | 1623  | 1700 | 1085   |      |            |            |
| Volume to Capacity            | 0.00  | 0.00 | 0.00   |      |            |            |
| Queue Length 95th (m)         | 0.1   | 0.0  | 0.0    |      |            |            |
| Control Delay (s)             | 7.2   | 0.0  | 8.3    |      |            |            |
| Lane LOS                      | А     |      | А      |      |            |            |
| Approach Delay (s)            | 7.2   | 0.0  | 8.3    |      |            |            |
| Approach LOS                  |       |      | А      |      |            |            |
| Intersection Summary          |       |      |        |      |            |            |
| Average Delay                 |       |      | 7.5    |      |            |            |
| Intersection Capacity Utiliza | ation |      | 13.3%  | IC   | Ulevelo    | of Service |
| Analysis Period (min)         |       |      | 15.578 | 10   |            |            |
|                               |       |      | 15     |      |            |            |

## HCM Unsignalized Intersection Capacity Analysis 51: Swan & Brant-Waterloo

|                               | ٨     | +    | 1     | 4    | Ļ         | •          | 1    | Ť    | 1    | 1    | ţ    | ~    |
|-------------------------------|-------|------|-------|------|-----------|------------|------|------|------|------|------|------|
| Movement                      | EBL   | EBT  | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |       | 4    |       |      | 4         |            |      | 4    |      |      | 4    |      |
| Traffic Volume (veh/h)        | 3     | 0    | 5     | 0    | 5         | 6          | 3    | 100  | 3    | 6    | 76   | 4    |
| Future Volume (Veh/h)         | 3     | 0    | 5     | 0    | 5         | 6          | 3    | 100  | 3    | 6    | 76   | 4    |
| Sign Control                  |       | Stop |       |      | Stop      |            |      | Free |      |      | Free |      |
| Grade                         |       | 0%   |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 3     | 0    | 6     | 0    | 6         | 7          | 3    | 111  | 3    | 7    | 84   | 4    |
| Pedestrians                   |       |      |       |      |           |            |      |      |      |      |      |      |
| Lane Width (m)                |       |      |       |      |           |            |      |      |      |      |      |      |
| Walking Speed (m/s)           |       |      |       |      |           |            |      |      |      |      |      |      |
| Percent Blockage              |       |      |       |      |           |            |      |      |      |      |      |      |
| Right turn flare (veh)        |       |      |       |      |           |            |      |      |      |      |      |      |
| Median type                   |       |      |       |      |           |            |      | None |      |      | None |      |
| Median storage veh)           |       |      |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)           |       |      |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked         |       |      |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume        | 228   | 220  | 86    | 224  | 220       | 112        | 88   |      |      | 114  |      |      |
| vC1, stage 1 conf vol         |       |      |       |      |           |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol         |       |      |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol            | 228   | 220  | 86    | 224  | 220       | 112        | 88   |      |      | 114  |      |      |
| tC, single (s)                | 7.1   | 6.5  | 6.2   | 7.1  | 6.5       | 6.2        | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)               |       |      |       |      |           |            |      |      |      |      |      |      |
| tF (s)                        | 3.5   | 4.0  | 3.3   | 3.5  | 4.0       | 3.3        | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %               | 100   | 100  | 99    | 100  | 99        | 99         | 100  |      |      | 100  |      |      |
| cM capacity (veh/h)           | 717   | 677  | 978   | 727  | 677       | 946        | 1520 |      |      | 1488 |      |      |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  | SB 1 |           |            |      |      |      |      |      |      |
| Volume Total                  | 9     | 13   | 117   | 95   |           |            |      |      |      |      |      |      |
| Volume Left                   | 3     | 0    | 3     | 7    |           |            |      |      |      |      |      |      |
| Volume Right                  | 6     | 7    | 3     | 4    |           |            |      |      |      |      |      |      |
| cSH                           | 872   | 799  | 1520  | 1488 |           |            |      |      |      |      |      |      |
| Volume to Capacity            | 0.01  | 0.02 | 0.00  | 0.00 |           |            |      |      |      |      |      |      |
| Queue Length 95th (m)         | 0.2   | 0.4  | 0.0   | 0.1  |           |            |      |      |      |      |      |      |
| Control Delay (s)             | 9.2   | 9.6  | 0.2   | 0.6  |           |            |      |      |      |      |      |      |
| Lane LOS                      | А     | А    | А     | А    |           |            |      |      |      |      |      |      |
| Approach Delay (s)            | 9.2   | 9.6  | 0.2   | 0.6  |           |            |      |      |      |      |      |      |
| Approach LOS                  | А     | А    |       |      |           |            |      |      |      |      |      |      |
| Intersection Summary          |       |      |       |      |           |            |      |      |      |      |      |      |
| Average Delay                 |       |      | 1.2   |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | ation |      | 19.2% | IC   | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |       |      | 15    |      |           |            |      |      |      |      |      |      |

|                              | 4        | *    | t     | 1    | 1        | ţ          |
|------------------------------|----------|------|-------|------|----------|------------|
| Movement                     | WBL      | WBR  | NBT   | NBR  | SBL      | SBT        |
| Lane Configurations          | ¥        |      | 4     |      |          | र्स        |
| Traffic Volume (veh/h)       | 4        | 54   | 0     | 1    | 16       | 0          |
| Future Volume (Veh/h)        | 4        | 54   | 0     | 1    | 16       | 0          |
| Sign Control                 | Stop     |      | Free  |      |          | Free       |
| Grade                        | 0%       |      | 0%    |      |          | 0%         |
| Peak Hour Factor             | 0.90     | 0.90 | 0.90  | 0.90 | 0.90     | 0.90       |
| Hourly flow rate (vph)       | 4        | 60   | 0     | 1    | 18       | 0          |
| Pedestrians                  | •        | 00   | Ŭ     | •    | 10       | Ŭ          |
| Lane Width (m)               |          |      |       |      |          |            |
| Walking Speed (m/s)          |          |      |       |      |          |            |
| Percent Blockage             |          |      |       |      |          |            |
| Right turn flare (veh)       |          |      |       |      |          |            |
| Median type                  |          |      | None  |      |          | None       |
| Median storage veh)          |          |      | NONE  |      |          | None       |
| Upstream signal (m)          |          |      |       |      |          |            |
|                              |          |      |       |      |          |            |
| pX, platoon unblocked        | 36       | 0    |       |      | 4        |            |
| vC, conflicting volume       | 30       | U    |       |      | 1        |            |
| vC1, stage 1 conf vol        |          |      |       |      |          |            |
| vC2, stage 2 conf vol        | 00       | 0    |       |      | 4        |            |
| vCu, unblocked vol           | 36       | 0    |       |      | 1        |            |
| tC, single (s)               | 6.4      | 6.2  |       |      | 4.1      |            |
| tC, 2 stage (s)              | <u> </u> |      |       |      |          |            |
| tF (s)                       | 3.5      | 3.3  |       |      | 2.2      |            |
| p0 queue free %              | 100      | 94   |       |      | 99       |            |
| cM capacity (veh/h)          | 965      | 1084 |       |      | 1622     |            |
| Direction, Lane #            | WB 1     | NB 1 | SB 1  |      |          |            |
| Volume Total                 | 64       | 1    | 18    |      |          |            |
| Volume Left                  | 4        | 0    | 18    |      |          |            |
| Volume Right                 | 60       | 1    | 0     |      |          |            |
| cSH                          | 1076     | 1700 | 1622  |      |          |            |
| Volume to Capacity           | 0.06     | 0.00 | 0.01  |      |          |            |
| Queue Length 95th (m)        | 1.4      | 0.0  | 0.3   |      |          |            |
| Control Delay (s)            | 8.6      | 0.0  | 7.2   |      |          |            |
| Lane LOS                     | А        |      | А     |      |          |            |
| Approach Delay (s)           | 8.6      | 0.0  | 7.2   |      |          |            |
| Approach LOS                 | А        |      |       |      |          |            |
| Intersection Summary         |          |      |       |      |          |            |
| Average Delay                |          |      | 8.2   |      |          |            |
| Intersection Capacity Utiliz | ation    |      | 18.1% | IC   | Ulevelo  | of Service |
| Analysis Period (min)        |          |      | 15    | .0   | 5 201010 |            |
|                              |          |      | 10    |      |          |            |

|   | ۶      | *    | •     | 1      | Ŧ          | ~          |
|---|--------|------|-------|--------|------------|------------|
| Movement                                      | EBL    | EBR  | NBL   | NBT    | SBT        | SBR        |
| Lane Configurations                           | Y      |      |       | र्भ    | 4          |            |
| Traffic Volume (veh/h)                        | 3      | 0    | 0     | 3      | 1          | 1          |
| Future Volume (Veh/h)                         | 3      | 0    | 0     | 3      | 1          | 1          |
| Sign Control                                  | Stop   |      |       | Free   | Free       |            |
| Grade   | 0%     |      |       | 0%     | 0%         |            |
| Peak Hour Factor                              | 0.90   | 0.90 | 0.90  | 0.90   | 0.90       | 0.90       |
| Hourly flow rate (vph)                        | 3      | 0    | 0     | 3      | 1          | 1          |
| Pedestrians                                   |        |      |       |        |            |            |
| Lane Width (m)                                |        |      |       |        |            |            |
| Walking Speed (m/s)                           |        |      |       |        |            |            |
| Percent Blockage                              |        |      |       |        |            |            |
| Right turn flare (veh)                        |        |      |       |        |            |            |
| Median type                                   |        |      |       | None   | None       |            |
| Median storage veh)                           |        |      |       | 110110 | 110110     |            |
| Upstream signal (m)                           |        |      |       |        |            |            |
| pX, platoon unblocked                         |        |      |       |        |            |            |
| vC, conflicting volume                        | 4      | 2    | 2     |        |            |            |
| vC1, stage 1 conf vol                         |        | -    | -     |        |            |            |
| vC2, stage 2 conf vol                         |        |      |       |        |            |            |
| vCu, unblocked vol                            | 4      | 2    | 2     |        |            |            |
| tC, single (s)                                | 6.4    | 6.2  | 4.1   |        |            |            |
| tC, 2 stage (s)                               | 0.1    | 0.2  |       |        |            |            |
| tF (s)  | 3.5    | 3.3  | 2.2   |        |            |            |
| p0 queue free %                               | 100    | 100  | 100   |        |            |            |
| cM capacity (veh/h)                           | 1017   | 1083 | 1620  |        |            |            |
|   |        |      |       |        |            |            |
| Direction, Lane #                             | EB 1   | NB 1 | SB 1  |        |            |            |
| Volume Total                                  | 3      | 3    | 2     |        |            |            |
| Volume Left                                   | 3      | 0    | 0     |        |            |            |
| Volume Right                                  | 0      | 0    | 1     |        |            |            |
| cSH   | 1017   | 1620 | 1700  |        |            |            |
| Volume to Capacity                            | 0.00   | 0.00 | 0.00  |        |            |            |
| Queue Length 95th (m)                         | 0.1    | 0.0  | 0.0   |        |            |            |
| Control Delay (s)                             | 8.5    | 0.0  | 0.0   |        |            |            |
| Lane LOS                                      | А      |      |       |        |            |            |
| Approach Delay (s)                            | 8.5    | 0.0  | 0.0   |        |            |            |
| Approach LOS                                  | А      |      |       |        |            |            |
| Intersection Summary                          |        |      |       |        |            |            |
| Average Delay                                 |        |      | 3.2   |        |            |            |
| Intersection Capacity Utiliz                  | zation |      | 13.3% | IC     | CU Level o | of Service |
| Analysis Period (min)                         |        |      | 15    |        |            |            |
| , <u>, , , , , , , , , , , , , , , , , , </u> |        |      |       |        |            |            |

|                               | ٨    | +    | 7     | 4    | +         | *          | 1    | 1    | 1    | 1    | Ŧ    | ~    |
|-------------------------------|------|------|-------|------|-----------|------------|------|------|------|------|------|------|
| Movement                      | EBL  | EBT  | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |      | 4    |       |      | 4         |            | ሻ    | ţ,   |      | ٦    | 1+   |      |
| Traffic Volume (veh/h)        | 2    | 0    | 0     | 24   | 0         | 48         | 0    | 146  | 32   | 90   | 255  | 6    |
| Future Volume (Veh/h)         | 2    | 0    | 0     | 24   | 0         | 48         | 0    | 146  | 32   | 90   | 255  | 6    |
| Sign Control                  |      | Stop |       |      | Stop      |            |      | Free |      |      | Free |      |
| Grade                         |      | 0%   |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor              | 0.90 | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 2    | 0    | 0     | 27   | 0         | 53         | 0    | 162  | 36   | 100  | 283  | 7    |
| Pedestrians                   |      |      |       |      | 1         |            |      | 3    |      |      |      |      |
| Lane Width (m)                |      |      |       |      | 3.5       |            |      | 3.5  |      |      |      |      |
| Walking Speed (m/s)           |      |      |       |      | 1.1       |            |      | 1.1  |      |      |      |      |
| Percent Blockage              |      |      |       |      | 0         |            |      | 0    |      |      |      |      |
| Right turn flare (veh)        |      |      |       |      |           |            |      |      |      |      |      |      |
| Median type                   |      |      |       |      |           |            |      | None |      |      | None |      |
| Median storage veh)           |      |      |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)           |      |      |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked         |      |      |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume        | 702  | 686  | 290   | 667  | 671       | 181        | 290  |      |      | 199  |      |      |
| vC1, stage 1 conf vol         |      |      |       |      |           |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol         |      |      |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol            | 702  | 686  | 290   | 667  | 671       | 181        | 290  |      |      | 199  |      |      |
| tC, single (s)                | 7.1  | 6.5  | 6.2   | 7.1  | 6.5       | 6.2        | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)               |      |      |       |      |           |            |      |      |      |      |      |      |
| tF (s)                        | 3.5  | 4.0  | 3.3   | 3.5  | 4.0       | 3.3        | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %               | 99   | 100  | 100   | 92   | 100       | 94         | 100  |      |      | 93   |      |      |
| cM capacity (veh/h)           | 315  | 346  | 752   | 353  | 352       | 861        | 1283 |      |      | 1384 |      |      |
| Direction, Lane #             | EB 1 | WB 1 | NB 1  | NB 2 | SB 1      | SB 2       |      |      |      |      |      |      |
| Volume Total                  | 2    | 80   | 0     | 198  | 100       | 290        |      |      |      |      |      |      |
| Volume Left                   | 2    | 27   | 0     | 0    | 100       | 0          |      |      |      |      |      |      |
| Volume Right                  | 0    | 53   | 0     | 36   | 0         | 7          |      |      |      |      |      |      |
| cSH                           | 315  | 579  | 1700  | 1700 | 1384      | 1700       |      |      |      |      |      |      |
| Volume to Capacity            | 0.01 | 0.14 | 0.00  | 0.12 | 0.07      | 0.17       |      |      |      |      |      |      |
| Queue Length 95th (m)         | 0.1  | 3.6  | 0.0   | 0.0  | 1.8       | 0.0        |      |      |      |      |      |      |
| Control Delay (s)             | 16.5 | 12.2 | 0.0   | 0.0  | 7.8       | 0.0        |      |      |      |      |      |      |
| Lane LOS                      | С    | В    |       |      | А         |            |      |      |      |      |      |      |
| Approach Delay (s)            | 16.5 | 12.2 | 0.0   |      | 2.0       |            |      |      |      |      |      |      |
| Approach LOS                  | С    | В    |       |      |           |            |      |      |      |      |      |      |
| Intersection Summary          |      |      |       |      |           |            |      |      |      |      |      |      |
| Average Delay                 |      |      | 2.7   |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | tion |      | 35.0% | IC   | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |      |      | 15    |      |           |            |      |      |      |      |      |      |
| ,                             |      |      |       |      |           |            |      |      |      |      |      |      |

#### HCM Unsignalized Intersection Capacity Analysis 5: Howard Marshall & Hilltop

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|-------------------------------|-------|------|-------|-------|-----------|------------|------|------|------|------|------|------|
| Movement                      | EBL   | EBT  | EBR   | WBL   | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |       | \$   |       |       | \$        |            |      | \$   |      |      | \$   |      |
| Sign Control                  |       | Stop |       |       | Stop      |            |      | Stop |      |      | Stop |      |
| Traffic Volume (vph)          | 5     | 42   | 36    | 21    | 30        | 0          | 29   | 5    | 5    | 0    | 2    | 4    |
| Future Volume (vph)           | 5     | 42   | 36    | 21    | 30        | 0          | 29   | 5    | 5    | 0    | 2    | 4    |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90  | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 6     | 47   | 40    | 23    | 33        | 0          | 32   | 6    | 6    | 0    | 2    | 4    |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  | SB 1  |           |            |      |      |      |      |      |      |
| Volume Total (vph)            | 93    | 56   | 44    | 6     |           |            |      |      |      |      |      |      |
| Volume Left (vph)             | 6     | 23   | 32    | 0     |           |            |      |      |      |      |      |      |
| Volume Right (vph)            | 40    | 0    | 6     | 4     |           |            |      |      |      |      |      |      |
| Hadj (s)                      | -0.25 | 0.08 | 0.06  | -0.40 |           |            |      |      |      |      |      |      |
| Departure Headway (s)         | 3.8   | 4.2  | 4.3   | 3.9   |           |            |      |      |      |      |      |      |
| Degree Utilization, x         | 0.10  | 0.06 | 0.05  | 0.01  |           |            |      |      |      |      |      |      |
| Capacity (veh/h)              | 922   | 844  | 805   | 891   |           |            |      |      |      |      |      |      |
| Control Delay (s)             | 7.2   | 7.5  | 7.5   | 6.9   |           |            |      |      |      |      |      |      |
| Approach Delay (s)            | 7.2   | 7.5  | 7.5   | 6.9   |           |            |      |      |      |      |      |      |
| Approach LOS                  | А     | А    | А     | А     |           |            |      |      |      |      |      |      |
| Intersection Summary          |       |      |       |       |           |            |      |      |      |      |      |      |
| Delay                         |       |      | 7.4   |       |           |            |      |      |      |      |      |      |
| Level of Service              |       |      | А     |       |           |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | ation |      | 24.9% | IC    | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |       |      | 15    |       |           |            |      |      |      |      |      |      |

|                                | ٨    | -    | 7     | •    | +         | *          | 1    | 1    | 1    | 4    | ţ    | 4    |
|--------------------------------|------|------|-------|------|-----------|------------|------|------|------|------|------|------|
| Movement                       | EBL  | EBT  | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations            |      | 4    |       |      | र्भ       | 1          |      | 4    |      |      | 4    |      |
| Traffic Volume (veh/h)         | 64   | 37   | 3     | 2    | 38        | 246        | 2    | 14   | 5    | 454  | 10   | 81   |
| Future Volume (Veh/h)          | 64   | 37   | 3     | 2    | 38        | 246        | 2    | 14   | 5    | 454  | 10   | 81   |
| Sign Control                   |      | Free |       |      | Free      |            |      | Stop |      |      | Stop |      |
| Grade                          |      | 0%   |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor               | 0.90 | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)         | 71   | 41   | 3     | 2    | 42        | 273        | 2    | 16   | 6    | 504  | 11   | 90   |
| Pedestrians                    |      | 1    |       |      | 6         |            |      | 2    |      |      | 5    |      |
| Lane Width (m)                 |      | 3.5  |       |      | 3.5       |            |      | 3.5  |      |      | 3.5  |      |
| Walking Speed (m/s)            |      | 1.1  |       |      | 1.1       |            |      | 1.1  |      |      | 1.1  |      |
| Percent Blockage               |      | 0    |       |      | 1         |            |      | 0    |      |      | 0    |      |
| Right turn flare (veh)         |      |      |       |      |           |            |      |      |      |      |      |      |
| Median type                    |      | None |       |      | None      |            |      |      |      |      |      |      |
| Median storage veh)            |      |      |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)            |      |      |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked          |      |      |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume         | 47   |      |       | 46   |           |            | 329  | 238  | 50   | 256  | 239  | 48   |
| vC1, stage 1 conf vol          |      |      |       |      |           |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol          |      |      |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol             | 47   |      |       | 46   |           |            | 329  | 238  | 50   | 256  | 239  | 48   |
| tC, single (s)                 | 4.1  |      |       | 4.1  |           |            | 7.1  | 6.5  | 6.2  | 7.1  | 6.5  | 6.2  |
| tC, 2 stage (s)                |      |      |       |      |           |            |      |      |      |      |      |      |
| tF (s)                         | 2.2  |      |       | 2.2  |           |            | 3.5  | 4.0  | 3.3  | 3.5  | 4.0  | 3.3  |
| p0 queue free %                | 95   |      |       | 100  |           |            | 100  | 97   | 99   | 23   | 98   | 91   |
| cM capacity (veh/h)            | 1567 |      |       | 1572 |           |            | 541  | 632  | 1016 | 651  | 631  | 1021 |
| Direction, Lane #              | EB 1 | WB 1 | WB 2  | NB 1 | SB 1      |            |      |      |      |      |      |      |
| Volume Total                   | 115  | 44   | 273   | 24   | 605       |            |      |      |      |      |      |      |
| Volume Left                    | 71   | 2    | 0     | 2    | 504       |            |      |      |      |      |      |      |
| Volume Right                   | 3    | 0    | 273   | 6    | 90        |            |      |      |      |      |      |      |
| cSH                            | 1567 | 1572 | 1700  | 687  | 687       |            |      |      |      |      |      |      |
| Volume to Capacity             | 0.05 | 0.00 | 0.16  | 0.03 | 0.88      |            |      |      |      |      |      |      |
| Queue Length 95th (m)          | 1.1  | 0.0  | 0.0   | 0.8  | 81.9      |            |      |      |      |      |      |      |
| Control Delay (s)              | 4.7  | 0.3  | 0.0   | 10.4 | 36.2      |            |      |      |      |      |      |      |
| Lane LOS                       | A    | A    |       | В    | E         |            |      |      |      |      |      |      |
| Approach Delay (s)             | 4.7  | 0.0  |       | 10.4 | 36.2      |            |      |      |      |      |      |      |
| Approach LOS                   |      |      |       | В    | E         |            |      |      |      |      |      |      |
| Intersection Summary           |      |      |       |      |           |            |      |      |      |      |      |      |
| Average Delay                  |      |      | 21.4  |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utilizat | tion |      | 64.5% | IC   | U Level c | of Service |      |      | С    |      |      |      |
| Analysis Period (min)          |      |      | 15    |      |           |            |      |      |      |      |      |      |

| MovementEBTEBRWBLWBTNBLNBRLane ConfigurationsImage: Additional system of the system of   |
|--|
| Lane Configurations         Image: Configuration of the image: Configuration of th |
| Traffic Volume (veh/h)         36         62         101         77         41         33           Future Volume (Veh/h)         36         62         101         77         41         33           Sign Control         Free         Free         Stop         Grade         0%         0%           Grade         0%         0%         0%         0%         0%           Peak Hour Factor         0.90         0.90         0.90         0.90         0.90           Hourly flow rate (vph)         40         69         112         86         46         37           Pedestrians         2         2         2         2         2         2         2         2         2         2         2         2         2         2         3 </td   |
| Future Volume (Veh/h)         36         62         101         77         41         33           Sign Control         Free         Free         Stop         Grade         0%         1.1         1         0%         Right turn flare (veh)         0         0%  |
| Sign Control         Free         Free         Stop           Grade         0%         0%         0%           Peak Hour Factor         0.90         0.90         0.90         0.90           Hourly flow rate (vph)         40         69         112         86         46         37           Pedestrians         2  |
| Grade         0%         0%         0%           Peak Hour Factor         0.90  |
| Peak Hour Factor         0.90  |
| Hourly flow rate (vph)         40         69         112         86         46         37           Pedestrians         2  |
| Pedestrians2Lane Width (m)3.5Walking Speed (m/s)1.1Percent Blockage0Right turn flare (veh)1  |
| Lane Width (m)3.5Walking Speed (m/s)1.1Percent Blockage0Right turn flare (veh)   |
| Walking Speed (m/s)1.1Percent Blockage0Right turn flare (veh)0   |
| Percent Blockage 0<br>Right turn flare (veh)   |
| Right turn flare (veh)   |
|  |
|  |
| Median storage veh)  |
| Upstream signal (m)  |
| pX, platoon unblocked  |
| vC, conflicting volume 111 386 76  |
| vC1, stage 1 conf vol  |
| vC2, stage 2 conf vol  |
| vCu, unblocked vol 111 386 76  |
| tC, single (s) 4.1 6.4 6.2   |
| tC, 2 stage (s)  |
| tF (s) 2.2 3.5 3.3   |
| p0 queue free % 92 92 96   |
| cM capacity (veh/h) 1489 573 988   |
|  |
|  |
| Volume Total 109 112 86 83   |
| Volume Left 0 112 0 46   |
| Volume Right 69 0 0 37   |
| cSH 1700 1489 1700 705   |
| Volume to Capacity 0.06 0.08 0.05 0.12   |
| Queue Length 95th (m) 0.0 1.9 0.0 3.0  |
| Control Delay (s) 0.0 7.6 0.0 10.8   |
| Lane LOS A B   |
| Approach Delay (s) 0.0 4.3 10.8  |
| Approach LOS B   |
| Intersection Summary   |
| Average Delay 4.5  |
| Intersection Capacity Utilization 23.9% ICU Level of Service   |
| Analysis Period (min) 15   |

|                               | -     | 7    | 4     | -      | 1         | 1          |
|-------------------------------|-------|------|-------|--------|-----------|------------|
| Movement                      | EBT   | EBR  | WBL   | WBT    | NBL       | NBR        |
| Lane Configurations           | 4Î    |      |       | र्स    | ¥         |            |
| Traffic Volume (veh/h)        | 52    | 446  | 24    | 52     | 234       | 13         |
| Future Volume (Veh/h)         | 52    | 446  | 24    | 52     | 234       | 13         |
| Sign Control                  | Free  |      |       | Free   | Stop      |            |
| Grade                         | 0%    |      |       | 0%     | 0%        |            |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90   | 0.90      | 0.90       |
| Hourly flow rate (vph)        | 58    | 496  | 27    | 58     | 260       | 14         |
| Pedestrians                   | 1     |      |       |        | 1         |            |
| Lane Width (m)                | 3.5   |      |       |        | 3.5       |            |
| Walking Speed (m/s)           | 1.1   |      |       |        | 1.1       |            |
| Percent Blockage              | 0     |      |       |        | 0         |            |
| Right turn flare (veh)        | •     |      |       |        | Ū         |            |
| Median type                   | None  |      |       | None   |           |            |
| Median storage veh)           |       |      |       | 110110 |           |            |
| Upstream signal (m)           |       |      |       |        |           |            |
| pX, platoon unblocked         |       |      |       |        |           |            |
| vC, conflicting volume        |       |      | 555   |        | 420       | 307        |
| vC1, stage 1 conf vol         |       |      | 000   |        | 120       | 001        |
| vC2, stage 2 conf vol         |       |      |       |        |           |            |
| vCu, unblocked vol            |       |      | 555   |        | 420       | 307        |
| tC, single (s)                |       |      | 4.1   |        | 6.4       | 6.2        |
| tC, 2 stage (s)               |       |      |       |        | 0.1       | 0.2        |
| tF (s)                        |       |      | 2.2   |        | 3.5       | 3.3        |
| p0 queue free %               |       |      | 97    |        | 55        | 98         |
| cM capacity (veh/h)           |       |      | 1025  |        | 575       | 737        |
|                               |       |      |       |        | 010       |            |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  |        |           |            |
| Volume Total                  | 554   | 85   | 274   |        |           |            |
| Volume Left                   | 0     | 27   | 260   |        |           |            |
| Volume Right                  | 496   | 0    | 14    |        |           |            |
| cSH                           | 1700  | 1025 | 582   |        |           |            |
| Volume to Capacity            | 0.33  | 0.03 | 0.47  |        |           |            |
| Queue Length 95th (m)         | 0.0   | 0.6  | 19.1  |        |           |            |
| Control Delay (s)             | 0.0   | 2.9  | 16.6  |        |           |            |
| Lane LOS                      |       | А    | С     |        |           |            |
| Approach Delay (s)            | 0.0   | 2.9  | 16.6  |        |           |            |
| Approach LOS                  |       |      | С     |        |           |            |
| Intersection Summary          |       |      |       |        |           |            |
| Average Delay                 |       |      | 5.2   |        |           |            |
| Intersection Capacity Utiliza | ation |      | 56.4% | IC     | U Level c | of Service |
| Analysis Period (min)         |       |      | 15    |        |           |            |
|                               |       |      |       |        |           |            |

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|-------------------------------|-------|----------|-------|------|-----------|------------|
| Movement                      | EBL   | EBT      | WBT   | WBR  | SBL       | SBR        |
| Lane Configurations           |       | é.       | t,    |      | Y         |            |
| Traffic Volume (veh/h)        | 3     | 0        | 0     | 0    | 0         | 5          |
| Future Volume (Veh/h)         | 3     | 0        | 0     | 0    | 0         | 5          |
| Sign Control                  |       | Free     | Free  |      | Stop      |            |
| Grade                         |       | 0%       | 0%    |      | 0%        |            |
| Peak Hour Factor              | 0.90  | 0.90     | 0.90  | 0.90 | 0.90      | 0.90       |
| Hourly flow rate (vph)        | 3     | 0        | 0     | 0    | 0         | 6          |
| Pedestrians                   |       |          |       |      |           |            |
| Lane Width (m)                |       |          |       |      |           |            |
| Walking Speed (m/s)           |       |          |       |      |           |            |
| Percent Blockage              |       |          |       |      |           |            |
| Right turn flare (veh)        |       |          |       |      |           |            |
| Median type                   |       | None     | None  |      |           |            |
| Median storage veh)           |       | 110110   | 10110 |      |           |            |
| Upstream signal (m)           |       |          |       |      |           |            |
| pX, platoon unblocked         |       |          |       |      |           |            |
| vC, conflicting volume        | 0     |          |       |      | 6         | 0          |
| vC1, stage 1 conf vol         | Ū     |          |       |      | U         | U          |
| vC2, stage 2 conf vol         |       |          |       |      |           |            |
| vCu, unblocked vol            | 0     |          |       |      | 6         | 0          |
| tC, single (s)                | 4.1   |          |       |      | 6.4       | 6.2        |
| tC, 2 stage (s)               | 7.1   |          |       |      | 0.4       | 0.2        |
| tF (s)                        | 2.2   |          |       |      | 3.5       | 3.3        |
| p0 queue free %               | 100   |          |       |      | 100       | 99         |
| cM capacity (veh/h)           | 1623  |          |       |      | 1014      | 1085       |
|                               |       |          |       |      | T         | 1000       |
| Direction, Lane #             | EB 1  | WB 1     | SB 1  |      |           |            |
| Volume Total                  | 3     | 0        | 6     |      |           |            |
| Volume Left                   | 3     | 0        | 0     |      |           |            |
| Volume Right                  | 0     | 0        | 6     |      |           |            |
| cSH                           | 1623  | 1700     | 1085  |      |           |            |
| Volume to Capacity            | 0.00  | 0.00     | 0.01  |      |           |            |
| Queue Length 95th (m)         | 0.0   | 0.0      | 0.1   |      |           |            |
| Control Delay (s)             | 7.2   | 0.0      | 8.3   |      |           |            |
| Lane LOS                      | А     |          | А     |      |           |            |
| Approach Delay (s)            | 7.2   | 0.0      | 8.3   |      |           |            |
| Approach LOS                  |       |          | А     |      |           |            |
| Intersection Summary          |       |          |       |      |           |            |
| Average Delay                 |       |          | 8.0   |      |           |            |
| Intersection Capacity Utiliza | ation |          | 13.3% | IC   | U Level o | of Service |
| Analysis Period (min)         |       |          | 15    |      |           |            |
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## HCM Unsignalized Intersection Capacity Analysis 51: Swan & Brant-Waterloo

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|-----------------------------------|------|------|-------|------|-----------|------------|------|------|------|------|------|------|
| Movement                          | EBL  | EBT  | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations               |      | 4    |       |      | 4         |            |      | 4    |      |      | 4    |      |
| Traffic Volume (veh/h)            | 7    | 3    | 4     | 0    | 3         | 5          | 4    | 124  | 3    | 5    | 174  | 5    |
| Future Volume (Veh/h)             | 7    | 3    | 4     | 0    | 3         | 5          | 4    | 124  | 3    | 5    | 174  | 5    |
| Sign Control                      |      | Stop |       |      | Stop      |            |      | Free |      |      | Free |      |
| Grade                             |      | 0%   |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor                  | 0.90 | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)            | 8    | 3    | 4     | 0    | 3         | 6          | 4    | 138  | 3    | 6    | 193  | 6    |
| Pedestrians                       |      |      |       |      |           |            |      |      |      |      |      |      |
| Lane Width (m)                    |      |      |       |      |           |            |      |      |      |      |      |      |
| Walking Speed (m/s)               |      |      |       |      |           |            |      |      |      |      |      |      |
| Percent Blockage                  |      |      |       |      |           |            |      |      |      |      |      |      |
| Right turn flare (veh)            |      |      |       |      |           |            |      |      |      |      |      |      |
| Median type                       |      |      |       |      |           |            |      | None |      |      | None |      |
| Median storage veh)               |      |      |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)               |      |      |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked             |      |      |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume            | 363  | 357  | 196   | 361  | 358       | 140        | 199  |      |      | 141  |      |      |
| vC1, stage 1 conf vol             |      | 001  | 100   | 001  | 000       |            | 100  |      |      |      |      |      |
| vC2, stage 2 conf vol             |      |      |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol                | 363  | 357  | 196   | 361  | 358       | 140        | 199  |      |      | 141  |      |      |
| tC, single (s)                    | 7.1  | 6.5  | 6.2   | 7.1  | 6.5       | 6.2        | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)                   |      | 0.0  | 0.2   | 7.1  | 0.0       | 0.2        |      |      |      |      |      |      |
| tF (s)                            | 3.5  | 4.0  | 3.3   | 3.5  | 4.0       | 3.3        | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %                   | 99   | 99   | 100   | 100  | 99        | 99         | 100  |      |      | 100  |      |      |
| cM capacity (veh/h)               | 587  | 568  | 850   | 590  | 567       | 914        | 1385 |      |      | 1455 |      |      |
|                                   |      |      |       |      | 507       | 514        | 1000 |      |      | 1400 |      |      |
| Direction, Lane #                 | EB 1 | WB 1 | NB 1  | SB 1 |           |            |      |      |      |      |      |      |
| Volume Total                      | 15   | 9    | 145   | 205  |           |            |      |      |      |      |      |      |
| Volume Left                       | 8    | 0    | 4     | 6    |           |            |      |      |      |      |      |      |
| Volume Right                      | 4    | 6    | 3     | 6    |           |            |      |      |      |      |      |      |
| cSH                               | 635  | 759  | 1385  | 1455 |           |            |      |      |      |      |      |      |
| Volume to Capacity                | 0.02 | 0.01 | 0.00  | 0.00 |           |            |      |      |      |      |      |      |
| Queue Length 95th (m)             | 0.6  | 0.3  | 0.1   | 0.1  |           |            |      |      |      |      |      |      |
| Control Delay (s)                 | 10.8 | 9.8  | 0.2   | 0.3  |           |            |      |      |      |      |      |      |
| Lane LOS                          | В    | А    | Α     | А    |           |            |      |      |      |      |      |      |
| Approach Delay (s)                | 10.8 | 9.8  | 0.2   | 0.3  |           |            |      |      |      |      |      |      |
| Approach LOS                      | В    | А    |       |      |           |            |      |      |      |      |      |      |
| Intersection Summary              |      |      |       |      |           |            |      |      |      |      |      |      |
| Average Delay                     |      |      | 0.9   |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utilization | n    |      | 28.5% | IC   | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)             |      |      | 15    |      |           |            |      |      |      |      |      |      |

|                              | 4               | ×    | Ť           | 1    | 1         | ţ          |
|------------------------------|-----------------|------|-------------|------|-----------|------------|
| Movement                     | WBL             | WBR  | NBT         | NBR  | SBL       | SBT        |
| Lane Configurations          | ¥               |      | t,          |      |           | र्स        |
| Traffic Volume (veh/h)       | 2               | 31   | 0           | 4    | 55        | 0          |
| Future Volume (Veh/h)        | 2               | 31   | 0           | 4    | 55        | 0          |
| Sign Control                 | Stop            |      | Free        |      |           | Free       |
| Grade                        | 0%              |      | 0%          |      |           | 0%         |
| Peak Hour Factor             | 0.90            | 0.90 | 0.90        | 0.90 | 0.90      | 0.90       |
| Hourly flow rate (vph)       | 2               | 34   | 0           | 4    | 61        | 0          |
| Pedestrians                  |                 |      |             | -    |           | -          |
| Lane Width (m)               |                 |      |             |      |           |            |
| Walking Speed (m/s)          |                 |      |             |      |           |            |
| Percent Blockage             |                 |      |             |      |           |            |
| Right turn flare (veh)       |                 |      |             |      |           |            |
| Median type                  |                 |      | None        |      |           | None       |
| Median storage veh)          |                 |      | 110110      |      |           | 110110     |
| Upstream signal (m)          |                 |      |             |      |           |            |
| pX, platoon unblocked        |                 |      |             |      |           |            |
| vC, conflicting volume       | 124             | 2    |             |      | 4         |            |
| vC1, stage 1 conf vol        | 127             | 2    |             |      | т         |            |
| vC2, stage 2 conf vol        |                 |      |             |      |           |            |
| vCu, unblocked vol           | 124             | 2    |             |      | 4         |            |
| tC, single (s)               | 6.4             | 6.2  |             |      | 4.1       |            |
| tC, 2 stage (s)              | U. <del>T</del> | 0.2  |             |      | 7.1       |            |
| tF (s)                       | 3.5             | 3.3  |             |      | 2.2       |            |
| p0 queue free %              | 100             | 97   |             |      | 96        |            |
| cM capacity (veh/h)          | 838             | 1082 |             |      | 1618      |            |
| ,                            |                 |      | <b>a-</b> ( |      | 1010      |            |
| Direction, Lane #            | WB 1            | NB 1 | SB 1        |      |           |            |
| Volume Total                 | 36              | 4    | 61          |      |           |            |
| Volume Left                  | 2               | 0    | 61          |      |           |            |
| Volume Right                 | 34              | 4    | 0           |      |           |            |
| cSH                          | 1065            | 1700 | 1618        |      |           |            |
| Volume to Capacity           | 0.03            | 0.00 | 0.04        |      |           |            |
| Queue Length 95th (m)        | 0.8             | 0.0  | 0.9         |      |           |            |
| Control Delay (s)            | 8.5             | 0.0  | 7.3         |      |           |            |
| Lane LOS                     | А               |      | А           |      |           |            |
| Approach Delay (s)           | 8.5             | 0.0  | 7.3         |      |           |            |
| Approach LOS                 | А               |      |             |      |           |            |
| Intersection Summary         |                 |      |             |      |           |            |
| Average Delay                |                 |      | 7.4         |      |           |            |
| Intersection Capacity Utiliz | ation           |      | 19.7%       | IC   | U Level o | of Service |
| Analysis Period (min)        | -               |      | 15          |      |           |            |
|                              |                 |      |             |      |           |            |

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|-------------------------------|-------|------|-------|--------|------------|------------|
| Movement                      | EBL   | EBR  | NBL   | NBT    | SBT        | SBR        |
| Lane Configurations           | Y     |      |       | र्भ    | 4î         |            |
| Traffic Volume (veh/h)        | 2     | 0    | 0     | 2      | 3          | 3          |
| Future Volume (Veh/h)         | 2     | 0    | 0     | 2      | 3          | 3          |
| Sign Control                  | Stop  |      |       | Free   | Free       |            |
| Grade                         | 0%    |      |       | 0%     | 0%         |            |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90   | 0.90       | 0.90       |
| Hourly flow rate (vph)        | 2     | 0    | 0     | 2      | 3          | 3          |
| Pedestrians                   |       |      |       |        |            |            |
| Lane Width (m)                |       |      |       |        |            |            |
| Walking Speed (m/s)           |       |      |       |        |            |            |
| Percent Blockage              |       |      |       |        |            |            |
| Right turn flare (veh)        |       |      |       |        |            |            |
| Median type                   |       |      |       | None   | None       |            |
| Median storage veh)           |       |      |       | 110110 | 110110     |            |
| Upstream signal (m)           |       |      |       |        |            |            |
| pX, platoon unblocked         |       |      |       |        |            |            |
| vC, conflicting volume        | 6     | 4    | 6     |        |            |            |
| vC1, stage 1 conf vol         | U     | т    | U     |        |            |            |
| vC2, stage 2 conf vol         |       |      |       |        |            |            |
| vCu, unblocked vol            | 6     | 4    | 6     |        |            |            |
| tC, single (s)                | 6.4   | 6.2  | 4.1   |        |            |            |
| tC, 2 stage (s)               | т.,   | 0.2  | т. I  |        |            |            |
| tF (s)                        | 3.5   | 3.3  | 2.2   |        |            |            |
| p0 queue free %               | 100   | 100  | 100   |        |            |            |
| cM capacity (veh/h)           | 1015  | 1079 | 1615  |        |            |            |
|                               |       |      |       |        |            |            |
| Direction, Lane #             | EB 1  | NB 1 | SB 1  |        |            |            |
| Volume Total                  | 2     | 2    | 6     |        |            |            |
| Volume Left                   | 2     | 0    | 0     |        |            |            |
| Volume Right                  | 0     | 0    | 3     |        |            |            |
| cSH                           | 1015  | 1615 | 1700  |        |            |            |
| Volume to Capacity            | 0.00  | 0.00 | 0.00  |        |            |            |
| Queue Length 95th (m)         | 0.0   | 0.0  | 0.0   |        |            |            |
| Control Delay (s)             | 8.6   | 0.0  | 0.0   |        |            |            |
| Lane LOS                      | А     |      |       |        |            |            |
| Approach Delay (s)            | 8.6   | 0.0  | 0.0   |        |            |            |
| Approach LOS                  | А     |      |       |        |            |            |
| Intersection Summary          |       |      |       |        |            |            |
| Average Delay                 |       |      | 1.7   |        |            |            |
| Intersection Capacity Utiliza | ation |      | 13.3% | IC     | CU Level o | of Service |
| Analysis Period (min)         |       |      | 15    |        |            |            |
|                               |       |      | 10    |        |            |            |

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|-----------------------------------|------|------|-------|------|-----------|------------|------|------|------|------|------|------|
| Movement                          | EBL  | EBT  | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations               |      | 4    |       |      | 4         |            | ሻ    | Þ    |      | 7    | 1.   |      |
| Traffic Volume (veh/h)            | 4    | 0    | 0     | 38   | 0         | 85         | 0    | 337  | 11   | 31   | 176  | 0    |
| Future Volume (Veh/h)             | 4    | 0    | 0     | 38   | 0         | 85         | 0    | 337  | 11   | 31   | 176  | 0    |
| Sign Control                      |      | Stop |       |      | Stop      |            |      | Free |      |      | Free |      |
| Grade                             |      | 0%   |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor                  | 0.90 | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)            | 4    | 0    | 0     | 42   | 0         | 94         | 0    | 374  | 12   | 34   | 196  | 0    |
| Pedestrians                       |      |      |       |      | 1         |            |      | 3    |      |      |      |      |
| Lane Width (m)                    |      |      |       |      | 3.5       |            |      | 3.5  |      |      |      |      |
| Walking Speed (m/s)               |      |      |       |      | 1.1       |            |      | 1.1  |      |      |      |      |
| Percent Blockage                  |      |      |       |      | 0         |            |      | 0    |      |      |      |      |
| Right turn flare (veh)            |      |      |       |      |           |            |      |      |      |      |      |      |
| Median type                       |      |      |       |      |           |            |      | None |      |      | None |      |
| Median storage veh)               |      |      |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)               |      |      |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked             |      |      |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume            | 732  | 651  | 199   | 648  | 645       | 381        | 196  |      |      | 387  |      |      |
| vC1, stage 1 conf vol             |      |      |       |      |           |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol             |      |      |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol                | 732  | 651  | 199   | 648  | 645       | 381        | 196  |      |      | 387  |      |      |
| tC, single (s)                    | 7.1  | 6.5  | 6.2   | 7.1  | 6.5       | 6.2        | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)                   |      |      |       |      |           |            |      |      |      |      |      |      |
| tF (s)                            | 3.5  | 4.0  | 3.3   | 3.5  | 4.0       | 3.3        | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %                   | 99   | 100  | 100   | 89   | 100       | 86         | 100  |      |      | 97   |      |      |
| cM capacity (veh/h)               | 285  | 379  | 845   | 376  | 382       | 668        | 1389 |      |      | 1181 |      |      |
| Direction, Lane #                 | EB 1 | WB 1 | NB 1  | NB 2 | SB 1      | SB 2       |      |      |      |      |      |      |
| Volume Total                      | 4    | 136  | 0     | 386  | 34        | 196        |      |      |      |      |      |      |
| Volume Left                       | 4    | 42   | 0     | 0    | 34        | 0          |      |      |      |      |      |      |
| Volume Right                      | 0    | 94   | 0     | 12   | 0         | 0          |      |      |      |      |      |      |
| cSH                               | 285  | 539  | 1700  | 1700 | 1181      | 1700       |      |      |      |      |      |      |
| Volume to Capacity                | 0.01 | 0.25 | 0.00  | 0.23 | 0.03      | 0.12       |      |      |      |      |      |      |
| Queue Length 95th (m)             | 0.3  | 7.5  | 0.0   | 0.0  | 0.7       | 0.0        |      |      |      |      |      |      |
| Control Delay (s)                 | 17.8 | 13.9 | 0.0   | 0.0  | 8.1       | 0.0        |      |      |      |      |      |      |
| Lane LOS                          | С    | В    |       |      | А         |            |      |      |      |      |      |      |
| Approach Delay (s)                | 17.8 | 13.9 | 0.0   |      | 1.2       |            |      |      |      |      |      |      |
| Approach LOS                      | С    | В    |       |      |           |            |      |      |      |      |      |      |
| Intersection Summary              |      |      |       |      |           |            |      |      |      |      |      |      |
| Average Delay                     |      |      | 3.0   |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utilization |      |      | 44.0% | IC   | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)             |      |      | 15    |      |           |            |      |      |      |      |      |      |

#### HCM Unsignalized Intersection Capacity Analysis 5: Howard Marshall & Hilltop

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|-------------------------------|-------|------|-------|-------|-----------|------------|------|------|------|------|------|------|
| Movement                      | EBL   | EBT  | EBR   | WBL   | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |       | \$   |       |       | \$        |            |      | \$   |      |      | \$   |      |
| Sign Control                  |       | Stop |       |       | Stop      |            |      | Stop |      |      | Stop |      |
| Traffic Volume (vph)          | 3     | 26   | 15    | 10    | 41        | 0          | 31   | 14   | 22   | 0    | 3    | 13   |
| Future Volume (vph)           | 3     | 26   | 15    | 10    | 41        | 0          | 31   | 14   | 22   | 0    | 3    | 13   |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90  | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 3     | 29   | 17    | 11    | 46        | 0          | 34   | 16   | 24   | 0    | 3    | 14   |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  | SB 1  |           |            |      |      |      |      |      |      |
| Volume Total (vph)            | 49    | 57   | 74    | 17    |           |            |      |      |      |      |      |      |
| Volume Left (vph)             | 3     | 11   | 34    | 0     |           |            |      |      |      |      |      |      |
| Volume Right (vph)            | 17    | 0    | 24    | 14    |           |            |      |      |      |      |      |      |
| Hadj (s)                      | -0.10 | 0.04 | -0.04 | -0.49 |           |            |      |      |      |      |      |      |
| Departure Headway (s)         | 4.1   | 4.2  | 4.1   | 3.7   |           |            |      |      |      |      |      |      |
| Degree Utilization, x         | 0.06  | 0.07 | 0.08  | 0.02  |           |            |      |      |      |      |      |      |
| Capacity (veh/h)              | 862   | 838  | 846   | 935   |           |            |      |      |      |      |      |      |
| Control Delay (s)             | 7.3   | 7.5  | 7.5   | 6.8   |           |            |      |      |      |      |      |      |
| Approach Delay (s)            | 7.3   | 7.5  | 7.5   | 6.8   |           |            |      |      |      |      |      |      |
| Approach LOS                  | А     | А    | Α     | А     |           |            |      |      |      |      |      |      |
| Intersection Summary          |       |      |       |       |           |            |      |      |      |      |      |      |
| Delay                         |       |      | 7.4   |       |           |            |      |      |      |      |      |      |
| Level of Service              |       |      | А     |       |           |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | tion  |      | 22.5% | IC    | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |       |      | 15    |       |           |            |      |      |      |      |      |      |

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|---------------------------------|------|------|-------|-------|-----------|------------|------|------|------|------|------|------|
| Movement                        | EBL  | EBT  | EBR   | WBL   | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations             |      | \$   |       |       | ŧ         | 1          |      | \$   |      |      | \$   |      |
| Sign Control                    |      | Stop |       |       | Stop      |            |      | Stop |      |      | Stop |      |
| Traffic Volume (vph)            | 70   | 25   | 0     | 2     | 17        | 601        | 2    | 2    | 2    | 237  | 9    | 21   |
| Future Volume (vph)             | 70   | 25   | 0     | 2     | 17        | 601        | 2    | 2    | 2    | 237  | 9    | 21   |
| Peak Hour Factor                | 0.90 | 0.90 | 0.90  | 0.90  | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)          | 78   | 28   | 0     | 2     | 19        | 668        | 2    | 2    | 2    | 263  | 10   | 23   |
| Direction, Lane #               | EB 1 | WB 1 | WB 2  | NB 1  | SB 1      |            |      |      |      |      |      |      |
| Volume Total (vph)              | 106  | 21   | 668   | 6     | 296       |            |      |      |      |      |      |      |
| Volume Left (vph)               | 78   | 2    | 0     | 2     | 263       |            |      |      |      |      |      |      |
| Volume Right (vph)              | 0    | 0    | 668   | 2     | 23        |            |      |      |      |      |      |      |
| Hadj (s)                        | 0.19 | 0.02 | -0.58 | -0.13 | 0.13      |            |      |      |      |      |      |      |
| Departure Headway (s)           | 4.8  | 4.8  | 3.2   | 4.4   | 4.4       |            |      |      |      |      |      |      |
| Degree Utilization, x           | 0.14 | 0.03 | 0.59  | 0.01  | 0.36      |            |      |      |      |      |      |      |
| Capacity (veh/h)                | 697  | 695  | 1118  | 770   | 798       |            |      |      |      |      |      |      |
| Control Delay (s)               | 8.6  | 7.9  | 10.8  | 7.4   | 9.8       |            |      |      |      |      |      |      |
| Approach Delay (s)              | 8.6  | 10.7 |       | 7.4   | 9.8       |            |      |      |      |      |      |      |
| Approach LOS                    | А    | В    |       | Α     | А         |            |      |      |      |      |      |      |
| Intersection Summary            |      |      |       |       |           |            |      |      |      |      |      |      |
| Delay                           |      |      | 10.2  |       |           |            |      |      |      |      |      |      |
| Level of Service                |      |      | В     |       |           |            |      |      |      |      |      |      |
| Intersection Capacity Utilizati | ion  |      | 62.9% | IC    | U Level o | of Service |      |      | В    |      |      |      |
| Analysis Period (min)           |      |      | 15    |       |           |            |      |      |      |      |      |      |

|   | 1         | 1          |
|---|-----------|------------|
| Movement EBT EBR WBL WBT  | NBL       | NBR        |
| Lane Configurations   | Y         |            |
| Traffic Volume (veh/h) 109 31 34 53   | 62        | 146        |
| Future Volume (Veh/h) 109 31 34 53  | 62        | 146        |
| Sign Control Free Free  | Stop      |            |
| Grade 0% 0%   | 0%        |            |
| Peak Hour Factor 0.90 0.90 0.90 0.90  | 0.90      | 0.90       |
| Hourly flow rate (vph) 121 34 38 59   | 69        | 162        |
| Pedestrians   | 2         |            |
| Lane Width (m)  | 3.5       |            |
| Walking Speed (m/s)   | 1.1       |            |
| Percent Blockage  | 0         |            |
| Right turn flare (veh)  | v         |            |
| Median type None None   |           |            |
| Median storage veh)   |           |            |
| Upstream signal (m)   |           |            |
| pX, platoon unblocked   |           |            |
| vC, conflicting volume 157  | 275       | 140        |
| vC1, stage 1 conf vol   | 210       | 110        |
| vC2, stage 2 conf vol   |           |            |
| vCu, unblocked vol 157  | 275       | 140        |
| tC, single (s) 4.1  | 6.4       | 6.2        |
| tC, 2 stage (s)   | •         | •          |
| tF (s) 2.2  | 3.5       | 3.3        |
| p0 queue free % 97  | 90        | 82         |
| cM capacity (veh/h) 1408  | 698       | 909        |
| Direction, Lane # EB 1 WB 1 WB 2 NB 1   |           |            |
| Volume Total         155         38         59         231  |           |            |
| Volume Left 0 38 0 69   |           |            |
|   |           |            |
| Volume Right         34         0         0         162           cSH         1700         1408         1700         834                            |           |            |
|   |           |            |
|   |           |            |
| Queue Length 95th (m)         0.0         0.6         0.0         8.6           Control Dolary (a)         0.0         7.6         0.0         11.0 |           |            |
| Control Delay (s) 0.0 7.6 0.0 11.0  |           |            |
| Lane LOS A B  |           |            |
| Approach Delay (s) 0.0 3.0 11.0   |           |            |
| Approach LOS B  |           |            |
| Intersection Summary  |           |            |
| Average Delay 5.8   |           |            |
|   | J Level c | of Service |
| Analysis Period (min) 15  |           |            |

|                               | <b>→</b> | 7    | 1     | -    | 1         | 1          |
|-------------------------------|----------|------|-------|------|-----------|------------|
| Movement                      | EBT      | EBR  | WBL   | WBT  | NBL       | NBR        |
| Lane Configurations           | 4Î       |      |       | र्स  | ¥         |            |
| Traffic Volume (veh/h)        | 48       | 215  | 25    | 53   | 558       | 21         |
| Future Volume (Veh/h)         | 48       | 215  | 25    | 53   | 558       | 21         |
| Sign Control                  | Free     |      |       | Free | Stop      |            |
| Grade                         | 0%       |      |       | 0%   | 0%        |            |
| Peak Hour Factor              | 0.90     | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       |
| Hourly flow rate (vph)        | 53       | 239  | 28    | 59   | 620       | 23         |
| Pedestrians                   | 1        |      |       |      | 1         |            |
| Lane Width (m)                | 3.5      |      |       |      | 3.5       |            |
| Walking Speed (m/s)           | 1.1      |      |       |      | 1.1       |            |
| Percent Blockage              | 0        |      |       |      | 0         |            |
| Right turn flare (veh)        | -        |      |       |      | -         |            |
| Median type                   | None     |      |       | None |           |            |
| Median storage veh)           |          |      |       |      |           |            |
| Upstream signal (m)           |          |      |       |      |           |            |
| pX, platoon unblocked         |          |      |       |      |           |            |
| vC, conflicting volume        |          |      | 293   |      | 290       | 174        |
| vC1, stage 1 conf vol         |          |      |       |      |           |            |
| vC2, stage 2 conf vol         |          |      |       |      |           |            |
| vCu, unblocked vol            |          |      | 293   |      | 290       | 174        |
| tC, single (s)                |          |      | 4.1   |      | 6.4       | 6.3        |
| tC, 2 stage (s)               |          |      |       |      | 0.1       | 0.0        |
| tF (s)                        |          |      | 2.2   |      | 3.5       | 3.4        |
| p0 queue free %               |          |      | 98    |      | 10        | 97         |
| cM capacity (veh/h)           |          |      | 1279  |      | 687       | 859        |
|                               |          |      |       |      | 001       |            |
| Direction, Lane #             | EB 1     | WB 1 | NB 1  |      |           |            |
| Volume Total                  | 292      | 87   | 643   |      |           |            |
| Volume Left                   | 0        | 28   | 620   |      |           |            |
| Volume Right                  | 239      | 0    | 23    |      |           |            |
| cSH                           | 1700     | 1279 | 692   |      |           |            |
| Volume to Capacity            | 0.17     | 0.02 | 0.93  |      |           |            |
| Queue Length 95th (m)         | 0.0      | 0.5  | 97.2  |      |           |            |
| Control Delay (s)             | 0.0      | 2.7  | 43.7  |      |           |            |
| Lane LOS                      |          | A    | E     |      |           |            |
| Approach Delay (s)            | 0.0      | 2.7  | 43.7  |      |           |            |
| Approach LOS                  |          |      | Е     |      |           |            |
| Intersection Summary          |          |      |       |      |           |            |
| Average Delay                 |          |      | 27.7  |      |           |            |
| Intersection Capacity Utiliza | ation    |      | 67.7% | IC   | U Level c | of Service |
| Analysis Period (min)         |          |      | 15    |      |           |            |
| <b>, , , , , , , , , ,</b>    |          |      |       |      |           |            |

|                                 | ٨    | +    | Ļ        | •    | 1         | 4            |
|---------------------------------|------|------|----------|------|-----------|--------------|
| Movement                        | EBL  | EBT  | WBT      | WBR  | SBL       | SBR          |
| Lane Configurations             |      | र्स  | ţ,       |      | Y         |              |
| Traffic Volume (veh/h)          | 15   | 0    | 0        | 0    | 0         | 5            |
| Future Volume (Veh/h)           | 15   | 0    | 0        | 0    | 0         | 5            |
| Sign Control                    |      | Free | Free     | ·    | Stop      | Ū            |
| Grade                           |      | 0%   | 0%       |      | 0%        |              |
| Peak Hour Factor                | 0.90 | 0.90 | 0.90     | 0.90 | 0.90      | 0.90         |
| Hourly flow rate (vph)          | 17   | 0.50 | 0.30     | 0.50 | 0.50      | 6            |
| Pedestrians                     | 17   | U    | U        | U    | U         | U            |
| Lane Width (m)                  |      |      |          |      |           |              |
| Walking Speed (m/s)             |      |      |          |      |           |              |
|                                 |      |      |          |      |           |              |
| Percent Blockage                |      |      |          |      |           |              |
| Right turn flare (veh)          |      | Nere | Ness     |      |           |              |
| Median type                     |      | None | None     |      |           |              |
| Median storage veh)             |      |      |          |      |           |              |
| Upstream signal (m)             |      |      |          |      |           |              |
| pX, platoon unblocked           |      |      |          |      |           |              |
| vC, conflicting volume          | 0    |      |          |      | 34        | 0            |
| vC1, stage 1 conf vol           |      |      |          |      |           |              |
| vC2, stage 2 conf vol           |      |      |          |      |           |              |
| vCu, unblocked vol              | 0    |      |          |      | 34        | 0            |
| tC, single (s)                  | 4.1  |      |          |      | 6.4       | 6.2          |
| tC, 2 stage (s)                 |      |      |          |      |           |              |
| tF (s)                          | 2.2  |      |          |      | 3.5       | 3.3          |
| p0 queue free %                 | 99   |      |          |      | 100       | 99           |
| cM capacity (veh/h)             | 1623 |      |          |      | 969       | 1085         |
| Direction, Lane #               | EB 1 | WB 1 | SB 1     |      |           |              |
| Volume Total                    | 17   | 0    | 6        |      |           |              |
| Volume Left                     | 17   | 0    | 0        |      |           |              |
| Volume Right                    | 0    | 0    | 6        |      |           |              |
| cSH                             | 1623 | 1700 | 1085     |      |           |              |
| Volume to Capacity              | 0.01 | 0.00 | 0.01     |      |           |              |
| Queue Length 95th (m)           | 0.2  | 0.0  | 0.1      |      |           |              |
| Control Delay (s)               | 7.2  | 0.0  | 8.3      |      |           |              |
| Lane LOS                        | A    | 0.0  | 0.0<br>A |      |           |              |
| Approach Delay (s)              | 7.2  | 0.0  | 8.3      |      |           |              |
| Approach LOS                    | 1.2  | 0.0  | 0.5<br>A |      |           |              |
| ••                              |      |      |          |      |           |              |
| Intersection Summary            |      |      | 7 5      |      |           |              |
| Average Delay                   |      |      | 7.5      |      |           | ( <b>0</b> · |
| Intersection Capacity Utilizati | ion  |      | 13.3%    | IC   | U Level c | ot Service   |
| Analysis Period (min)           |      |      | 15       |      |           |              |

## HCM Unsignalized Intersection Capacity Analysis 51: Swan & Brant-Waterloo

|                               | ٠    | +    | 1     | 4    | Ļ         | •          | 1    | Ť    | 1    | 1    | ţ    | ~    |
|-------------------------------|------|------|-------|------|-----------|------------|------|------|------|------|------|------|
| Movement                      | EBL  | EBT  | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |      | 4    |       |      | 4         |            |      | 4    |      |      | 4    |      |
| Traffic Volume (veh/h)        | 3    | 0    | 5     | 0    | 5         | 7          | 3    | 120  | 3    | 7    | 94   | 4    |
| Future Volume (Veh/h)         | 3    | 0    | 5     | 0    | 5         | 7          | 3    | 120  | 3    | 7    | 94   | 4    |
| Sign Control                  |      | Stop |       |      | Stop      |            |      | Free |      |      | Free |      |
| Grade                         |      | 0%   |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor              | 0.90 | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 3    | 0    | 6     | 0    | 6         | 8          | 3    | 133  | 3    | 8    | 104  | 4    |
| Pedestrians                   |      |      |       |      |           |            |      |      |      |      |      |      |
| Lane Width (m)                |      |      |       |      |           |            |      |      |      |      |      |      |
| Walking Speed (m/s)           |      |      |       |      |           |            |      |      |      |      |      |      |
| Percent Blockage              |      |      |       |      |           |            |      |      |      |      |      |      |
| Right turn flare (veh)        |      |      |       |      |           |            |      |      |      |      |      |      |
| Median type                   |      |      |       |      |           |            |      | None |      |      | None |      |
| Median storage veh)           |      |      |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)           |      |      |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked         |      |      |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume        | 274  | 264  | 106   | 268  | 264       | 134        | 108  |      |      | 136  |      |      |
| vC1, stage 1 conf vol         |      |      |       |      |           |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol         |      |      |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol            | 274  | 264  | 106   | 268  | 264       | 134        | 108  |      |      | 136  |      |      |
| tC, single (s)                | 7.1  | 6.5  | 6.2   | 7.1  | 6.5       | 6.2        | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)               |      |      |       |      |           |            |      |      |      |      |      |      |
| tF (s)                        | 3.5  | 4.0  | 3.3   | 3.5  | 4.0       | 3.3        | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %               | 100  | 100  | 99    | 100  | 99        | 99         | 100  |      |      | 99   |      |      |
| cM capacity (veh/h)           | 668  | 640  | 954   | 680  | 639       | 920        | 1495 |      |      | 1461 |      |      |
| Direction, Lane #             | EB 1 | WB 1 | NB 1  | SB 1 |           |            |      |      |      |      |      |      |
| Volume Total                  | 9    | 14   | 139   | 116  |           |            |      |      |      |      |      |      |
| Volume Left                   | 3    | 0    | 3     | 8    |           |            |      |      |      |      |      |      |
| Volume Right                  | 6    | 8    | 3     | 4    |           |            |      |      |      |      |      |      |
| cSH                           | 835  | 774  | 1495  | 1461 |           |            |      |      |      |      |      |      |
| Volume to Capacity            | 0.01 | 0.02 | 0.00  | 0.01 |           |            |      |      |      |      |      |      |
| Queue Length 95th (m)         | 0.2  | 0.4  | 0.0   | 0.1  |           |            |      |      |      |      |      |      |
| Control Delay (s)             | 9.4  | 9.7  | 0.2   | 0.6  |           |            |      |      |      |      |      |      |
| Lane LOS                      | А    | А    | А     | А    |           |            |      |      |      |      |      |      |
| Approach Delay (s)            | 9.4  | 9.7  | 0.2   | 0.6  |           |            |      |      |      |      |      |      |
| Approach LOS                  | А    | А    |       |      |           |            |      |      |      |      |      |      |
| Intersection Summary          |      |      |       |      |           |            |      |      |      |      |      |      |
| Average Delay                 |      |      | 1.1   |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | tion |      | 21.2% | IC   | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |      |      | 15    |      |           |            |      |      |      |      |      |      |

|                                   | 4        | *     | t    | 1         | 1          | Ŧ    |
|-----------------------------------|----------|-------|------|-----------|------------|------|
| Movement                          | WBL      | WBR   | NBT  | NBR       | SBL        | SBT  |
| Lane Configurations               | ¥        |       | 4    |           | -          | et.  |
| Traffic Volume (veh/h)            | 10       | 175   | 0    | 3         | 52         | 0    |
| Future Volume (Veh/h)             | 10       | 175   | 0    | 3         | 52         | 0    |
| Sign Control                      | Stop     |       | Free | Ū         |            | Free |
| Grade                             | 0%       |       | 0%   |           |            | 0%   |
| Peak Hour Factor                  | 0.90     | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 |
| Hourly flow rate (vph)            | 11       | 194   | 0.00 | 3         | 58         | 0.00 |
| Pedestrians                       | 11       | 134   | U    | 0         | 50         | U    |
| Lane Width (m)                    |          |       |      |           |            |      |
| Walking Speed (m/s)               |          |       |      |           |            |      |
|                                   |          |       |      |           |            |      |
| Percent Blockage                  |          |       |      |           |            |      |
| Right turn flare (veh)            |          |       | Mare |           |            | Nore |
| Median type                       |          |       | None |           |            | None |
| Median storage veh)               |          |       |      |           |            |      |
| Upstream signal (m)               |          |       |      |           |            |      |
| pX, platoon unblocked             |          | -     |      |           | _          |      |
| vC, conflicting volume            | 118      | 2     |      |           | 3          |      |
| vC1, stage 1 conf vol             |          |       |      |           |            |      |
| vC2, stage 2 conf vol             |          |       |      |           |            |      |
| vCu, unblocked vol                | 118      | 2     |      |           | 3          |      |
| tC, single (s)                    | 6.4      | 6.2   |      |           | 4.1        |      |
| tC, 2 stage (s)                   |          |       |      |           |            |      |
| tF (s)                            | 3.5      | 3.3   |      |           | 2.2        |      |
| p0 queue free %                   | 99       | 82    |      |           | 96         |      |
| cM capacity (veh/h)               | 847      | 1083  |      |           | 1619       |      |
| Direction, Lane #                 | WB 1     | NB 1  | SB 1 |           |            |      |
| Volume Total                      | 205      | 3     | 58   |           |            |      |
| Volume Left                       | 11       | 0     | 58   |           |            |      |
| Volume Right                      | 194      | 3     | 0    |           |            |      |
| cSH                               | 1067     | 1700  | 1619 |           |            |      |
| Volume to Capacity                | 0.19     | 0.00  | 0.04 |           |            |      |
| Queue Length 95th (m)             | 5.4      | 0.0   | 0.8  |           |            |      |
| Control Delay (s)                 | 9.2      | 0.0   | 7.3  |           |            |      |
| Lane LOS                          | A        | 0.0   | A    |           |            |      |
| Approach Delay (s)                | 9.2      | 0.0   | 7.3  |           |            |      |
| Approach LOS                      | 3.2<br>A | 0.0   | 7.0  |           |            |      |
|                                   | , (      |       |      |           |            |      |
| Intersection Summary              |          |       | 0.7  |           |            |      |
| 0 ,                               |          | 8.7   |      |           | ( Q )      |      |
| Intersection Capacity Utilization |          | 28.5% | IC   | U Level o | of Service |      |
| Analysis Period (min)             |          |       | 15   |           |            |      |

|                        | ٨    | *     | •    | 1          | Ļ          |      |
|------------------------|------|-------|------|------------|------------|------|
| Movement               | EBL  | EBR   | NBL  | NBT        | SBT        | SBR  |
| Lane Configurations    | Y    |       |      | र्भ        | 4          |      |
| Traffic Volume (veh/h) | 8    | 0     | 0    | 7          | 3          | 2    |
| Future Volume (Veh/h)  | 8    | 0     | 0    | 7          | 3          | 2    |
| Sign Control           | Stop |       |      | Free       | Free       |      |
| Grade                  | 0%   |       |      | 0%         | 0%         |      |
| Peak Hour Factor       | 0.90 | 0.90  | 0.90 | 0.90       | 0.90       | 0.90 |
| Hourly flow rate (vph) | 9    | 0     | 0    | 8          | 3          | 2    |
| Pedestrians            |      |       |      |            |            |      |
| Lane Width (m)         |      |       |      |            |            |      |
| Walking Speed (m/s)    |      |       |      |            |            |      |
| Percent Blockage       |      |       |      |            |            |      |
| Right turn flare (veh) |      |       |      |            |            |      |
| Median type            |      |       |      | None       | None       |      |
| Median storage veh)    |      |       |      | 110110     | 110110     |      |
| Upstream signal (m)    |      |       |      |            |            |      |
| pX, platoon unblocked  |      |       |      |            |            |      |
| vC, conflicting volume | 12   | 4     | 5    |            |            |      |
| vC1, stage 1 conf vol  | 14   | т     | U    |            |            |      |
| vC2, stage 2 conf vol  |      |       |      |            |            |      |
| vCu, unblocked vol     | 12   | 4     | 5    |            |            |      |
| tC, single (s)         | 6.4  | 6.2   | 4.1  |            |            |      |
| tC, 2 stage (s)        | V.7  | 5.2   | 7.1  |            |            |      |
| tF (s)                 | 3.5  | 3.3   | 2.2  |            |            |      |
| p0 queue free %        | 99   | 100   | 100  |            |            |      |
| cM capacity (veh/h)    | 1008 | 1080  | 1616 |            |            |      |
|                        |      |       |      |            |            |      |
| Direction, Lane #      | EB 1 | NB 1  | SB 1 |            |            |      |
| Volume Total           | 9    | 8     | 5    |            |            |      |
| Volume Left            | 9    | 0     | 0    |            |            |      |
| Volume Right           | 0    | 0     | 2    |            |            |      |
| cSH                    | 1008 | 1616  | 1700 |            |            |      |
| Volume to Capacity     | 0.01 | 0.00  | 0.00 |            |            |      |
| Queue Length 95th (m)  | 0.2  | 0.0   | 0.0  |            |            |      |
| Control Delay (s)      | 8.6  | 0.0   | 0.0  |            |            |      |
| Lane LOS               | А    |       |      |            |            |      |
| Approach Delay (s)     | 8.6  | 0.0   | 0.0  |            |            |      |
| Approach LOS           | А    |       |      |            |            |      |
| Intersection Summary   |      |       |      |            |            |      |
| Average Delay 3.5      |      |       |      |            |            |      |
|                        |      | 13.3% | IC   | CU Level o | of Service |      |
| Analysis Period (min)  |      |       | 15   |            |            |      |
|                        |      |       |      |            |            |      |

| Lane Configurations         4         5         5         7         5         7           Traffic Volume (veh/h)         2         0         0         28         0         56         0         238         38         106         418           Sign Control         Stop         Stop         Free         Free         Free         Free         Free         Free         Free         Free         0% <th></th> <th>۶</th> <th><b>→</b></th> <th>*</th> <th>•</th> <th>Ŧ</th> <th>*</th> <th>1</th> <th>1</th> <th>1</th> <th>1</th> <th>ŧ</th> <th>~</th>      |                        | ۶    | <b>→</b> | *     | •    | Ŧ                    | *    | 1    | 1    | 1    | 1    | ŧ    | ~    |
|---|------------------------|------|----------|-------|------|----------------------|------|------|------|------|------|------|------|
| Traffic Volume (veh/h)       2       0       0       28       0       56       0       238       38       106       418         Future Volume (Veh/h)       2       0       0       28       0       56       0       238       38       106       418         Future Volume (Veh/h)       2       0       0       28       0       56       0       238       38       106       418         Grade       0%  | Movement               | EBL  | EBT      | EBR   | WBL  | WBT                  | WBR  | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Future Volume (Veh/h)         2         0         0         28         0         56         0         238         38         106         418           Sign Control         Stop         Stop         Free         F   |                        |      | 4        |       |      | 4                    |      | ٦    | ţ,   |      | ٦    | ţ,   |      |
| Sign Control         Stop         Free         Free         Free           Grade         0%         0   |                        | 2    |          | 0     | 28   |                      | 56   | 0    | 238  | 38   | 106  | 418  | 7    |
| Grade         0%         0%         0%         0%         0%         0%           Peak Hour Factor         0.90         0   | Future Volume (Veh/h)  | 2    | 0        | 0     | 28   | 0                    | 56   | 0    | 238  | 38   | 106  | 418  | 7    |
| Peak Hour Factor         0.90   | Sign Control           |      | Stop     |       |      | Stop                 |      |      | Free |      |      | Free |      |
| Hourly flow rate (vph)       2       0       0       31       0       62       0       264       42       118       464         Pedestrians       1       3       3.5       3.7       3.7       3.7       3.7       3.7       3.7       3.7       3.7       4.1       4.1       4.1       4.1       4.1       4.1       4.1       4.1       4.1       4.1       4.1       4.1   | Grade                  |      | 0%       |       |      | 0%                   |      |      | 0%   |      |      | 0%   |      |
| Pedestrians         1         3           Lane Witht (m)         3.5         3.5           Walking Speed (m/s)         1.1         1.1           Percent Blockage         0         0           Right turn flare (veh)         None         None           Median storage veh)         Upstream signal (m)         None         None           pX, platoon unblocked         -         -         -           vC, conflicting volume         1030         1011         471         989         994         286         472         307           vC1, stage 1 conf vol         -   | Peak Hour Factor       | 0.90 | 0.90     | 0.90  | 0.90 | 0.90                 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Lane Width (m)       3.5       3.5         Walking Speed (m/s)       1.1       1.1         Percent Blockage       0       0         Right turn flare (veh)       None       None         Median type       None       None         Median storage veh)       Upstream signal (m)       None       None         pX, platoon unblocked       vC, conflicting volume       1030       1011       471       989       994       286       472       307         vC1, stage 1 conf vol       vC2, stage 2 conf vol       vC2, stage 1 conf vol       vC2, stage 2 conf vol       vC1       4.1 <t< td=""><td>Hourly flow rate (vph)</td><td>2</td><td>0</td><td>0</td><td>31</td><td>0</td><td>62</td><td>0</td><td>264</td><td>42</td><td>118</td><td>464</td><td>8</td></t<> | Hourly flow rate (vph) | 2    | 0        | 0     | 31   | 0                    | 62   | 0    | 264  | 42   | 118  | 464  | 8    |
| Walking Speed (m/s)       1.1       1.1         Percent Blockage       0       0         Right turn flare (veh)       None       None         Median storage veh)       Upstream signal (m)       None       None         yz, platoon unblocked       vC, conflicting volume       1030       1011       471       989       994       286       472       307         vC1, stage 1 conf vol       vC, stage 2 conf vol       vCu, unblocked vol       1030       1011       471       989       994       286       472       307         vC1, stage 1 conf vol       vCu, unblocked vol       1030       1011       471       989       994       286       472       307         vC1, stage 1 conf vol       vCu, unblocked vol       1030       1011       471       989       994       286       472       307         vC1, stage 1 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol       vC2       222       20       307         tC2, stage 2 (s)       T.1       6.5       6.2       7.1       6.5       6.2       4.1       4.1         tC2, stage 2 (s)       T.1       0.0       3.3       3.5       4.0       3.3       2.2       2.2       2.0<  | Pedestrians            |      |          |       |      | 1                    |      |      | 3    |      |      |      |      |
| Percent Blockage         0         0           Right turn flare (veh)         None         None           Median storage veh)         Upstream signal (m)         None         None           Upstream signal (m)         pX, platoon unblocked         vc. conflicting volume         1030         1011         471         989         994         286         472         307           vC1, stage 1 conf vol         vc2, stage 2 conf vol         vc1         41.1         4.1         4.1         4.1         4.1         102, 24.2         207         90         94         286         472         307         1011         4.1         4.1         1011         4.1         4.1         1011         4.1         4.1         1011         4.1         1011         4.1         1011         4.1         1011         4.1         1011         4.1         1011         4.1         1011         4.1         1011         4.1         1011         4.1         1011         4.1         1011         4.1         1011         4.1         1011         4.1         1011         4.1         1011         4.1         1011         4.1         1011         4.1   | Lane Width (m)         |      |          |       |      | 3.5                  |      |      | 3.5  |      |      |      |      |
| Right turn flare (veh)       None       None       None         Median storage veh)       Upstream signal (m)       None       None       None         pX, platoon unblocked       1030       1011       471       989       994       286       472       307         vC1, stage 1 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol       vC2, stage 1       4.1       4.1         vC2, stage 1 conf vol       vC1, assige 1       6.5       6.2       7.1       6.5       6.2       4.1       4.1         tC, stage 1 conf vol       vC2, stage (s)       tf (s)       3.5       4.0       3.3       2.2       2.2       2.0         p0 queue free %       99       100       100       85       100       92       100       91         cM capacity (veh/h)       182       219       595       211       224       752       1100       1264         Direction, Lane #       EB 1       WB 1       NB 1       NB 2       SB 1       SB 2       Volume 1264       Volume 1264       Volume 1264       1700       1264       1700       1264       1264       1264       1264       1264       1264       1264       1264   | Walking Speed (m/s)    |      |          |       |      | 1.1                  |      |      | 1.1  |      |      |      |      |
| Median type         None         None           Median storage veh)         Upstream signal (m)         None         None           yz, platoon unblocked         vc, conflicting volume         1030         1011         471         989         994         286         472         307           vC1, stage 1 conf vol         vc2, stage 2 conf vol         vc1         4.1         4.1           tC, sigle (s)         7.1         6.5         6.2         7.1         6.5         6.2         2.2         2.2         2.2         p0 queue free %         99         100         100         85         100         92         100         91         cdx capacity (veh/h)         182         219         595         211         224         752         1100         1264           Direction, Lane #         EB 1         WB 1         NB 2         SB 1         SB 2         Volume 10         1264         100         1264           Volume Left         2         31         0         0         118         0         100         1264         1700         1264         1700         1264         1700         1264  | Percent Blockage       |      |          |       |      | 0                    |      |      | 0    |      |      |      |      |
| Median storage veh)       Upstream signal (m)         pX, platoon unblocked       vC, conficting volume       1030       1011       471       989       994       286       472       307         vC, conficting volume       1030       1011       471       989       994       286       472       307         vCL, stage 1 conf vol       vC2, stage 2 conf vol       vCu, unblocked vol       1030       1011       471       989       994       286       472       307         vCL, stage 1 conf vol       vC2, stage 2 conf vol       vCu, unblocked vol       1030       1011       471       989       994       286       472       307         vCL, stage (s)       T.1       6.5       6.2       7.1       6.5       6.2       4.1       4.1         tC, 2 stage (s)       T       T       595       211       224       752       1100       1264         Direction, Lane #       EB1       WB1       NB 1       NB 2       SB 1       SB 2       SB 2       Volume rotal       2       93       0       306       118       472       Volume rotal       2       93       0       148       0       Volume rotal       0       18       0.9   | Right turn flare (veh) |      |          |       |      |                      |      |      |      |      |      |      |      |
| Upstream signal (m)       pX, platoon unblocked         vC, conflicting volume       1030       1011       471       989       994       286       472       307         vC1, stage 1 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol       vC1       stage 1 conf vol       vC2, stage 1 conf vol         vC2, stage 2 conf vol       vC1       1030       1011       471       989       994       286       472       307         vC2, stage 2 conf vol       vC2, stage 1 conf vol       vC2, stage 1 conf vol       stage 1 conf vol       4.1       4.1         vC2, stage (s)       r       6.5       6.2       7.1       6.5       6.2       4.1       4.1         tC, single (s)       3.5       4.0       3.3       3.5       4.0       3.3       2.2       2.2         D0 queue free %       99       100       100       85       100       92       100       1264         Direction, Lane #       EB 1       WB 1       NB 1       NB 2       SB 1       SB 2       Volume Right       0       62       0       42       0       8       cSH       SU       VOlume Right       0       62       0       42       0       8       CSH   | Median type            |      |          |       |      |                      |      |      | None |      |      | None |      |
| pX, platoon unblocked       vC, conflicting volume       1030       1011       471       989       994       286       472       307         vC1, stage 1 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol       vC1, unblocked vol       1030       1011       471       989       994       286       472       307         vC2, stage 2 conf vol       vC2, stage 2 conf vol       vC1, unblocked vol       1030       1011       471       989       994       286       472       307         tC, single (s)       7.1       6.5       6.2       4.1       4.1       4.1         tC, 2 stage (s)            3.3       2.2       2.2       2.2         p0 queue free %       99       100       100       85       100       92       100       91       264         Direction, Lane #       EB1       WB1       NB1       NB2       SB1       SB2       Volume Total       2       93       0       306       118       472       Volume Total       2       31       0       0       118       0       Volume Right       0       62       0       42       0       8   | Median storage veh)    |      |          |       |      |                      |      |      |      |      |      |      |      |
| pX, platoon unblocked       vC, conflicting volume       1030       1011       471       989       994       286       472       307         vC1, stage 1 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol       vC1, unblocked vol       1030       1011       471       989       994       286       472       307         vC2, stage 2 conf vol       vC2, stage 2 conf vol       vC1, unblocked vol       1030       1011       471       989       994       286       472       307         tC, single (s)       7.1       6.5       6.2       4.1       4.1       4.1         tC, 2 stage (s)            3.3       2.2       2.2       2.2         p0 queue free %       99       100       100       85       100       92       100       91       264         Direction, Lane #       EB1       WB1       NB1       NB2       SB1       SB2       Volume Total       2       93       0       306       118       472       Volume Total       2       31       0       0       118       0       Volume Right       0       62       0       42       0       8   |                        |      |          |       |      |                      |      |      |      |      |      |      |      |
| vC, conflicting volume 1030 1011 471 989 994 286 472 307<br>vC1, stage 1 conf vol<br>vC2, stage 2 conf vol<br>vC2, unblocked vol 1030 1011 471 989 994 286 472 307<br>tC, single (s) 7.1 6.5 6.2 7.1 6.5 6.2 4.1 4.1<br>tC, 2 stage (s)<br>tF (s) 3.5 4.0 3.3 3.5 4.0 3.3 2.2 2.2<br>p0 queue free % 99 100 100 85 100 92 100 91<br>cM capacity (veh/h) 182 219 595 211 224 752 1100 1264<br><u>Direction, Lane # EB 1 WB 1 NB 1 NB 2 SB 1 SB 2</u><br>Volume Total 2 93 0 306 118 472<br>Volume Right 0 62 0 42 0 8<br>cSH 182 405 1700 1700 1264 1700<br>Volume to Capacity 0.01 0.23 0.00 0.18 0.09 0.28<br>Queue Length 95th (m) 0.3 6.6 0.0 0.0 2.3 0.0<br>Control Delay (s) 25.0 16.5 0.0 0.1 8<br>Approach LOS D C<br><u>Intersection Summary</u><br>Average Delay <u>2.6</u><br>Intersection Capacity Utilization 46.3% ICU Level of Service A  |                        |      |          |       |      |                      |      |      |      |      |      |      |      |
| vC1, stage 1 conf vol       vC2, stage 2 conf vol         vCu, unblocked vol       1030       1011       471       989       994       286       472       307         tC, single (s)       7.1       6.5       6.2       7.1       6.5       6.2       4.1       4.1         tC, 2 stage (s)   |                        | 1030 | 1011     | 471   | 989  | 994                  | 286  | 472  |      |      | 307  |      |      |
| vC2, stage 2 conf vol         vCu, unblocked vol       1030       1011       471       989       994       286       472       307         tC, single (s)       7.1       6.5       6.2       7.1       6.5       6.2       4.1       4.1         tC, single (s)       7.1       6.5       6.2       7.1       6.5       6.2       4.1       4.1         tC, single (s)       7.1       6.5       6.2       7.1       6.5       6.2       4.1       4.1         tC, stage (s)       .       .       .       .       .       .       .       .       .         p0 queue free %       .99       100       100       85       100       92       100       . <td></td>   |                        |      |          |       |      |                      |      |      |      |      |      |      |      |
| vCu, unblocked vol       1030       1011       471       989       994       286       472       307         tC, single (s)       7.1       6.5       6.2       7.1       6.5       6.2       4.1       4.1         tC, 2 stage (s)   |                        |      |          |       |      |                      |      |      |      |      |      |      |      |
| tC, 2 stage (s)         tF (s)       3.5       4.0       3.3       3.5       4.0       3.3       2.2       2.2         p0 queue free %       99       100       100       85       100       92       100       91         cM capacity (veh/h)       182       219       595       211       224       752       1100       1264         Direction, Lane #       EB 1       WB 1       NB 1       NB 2       SB 1       SB 2         Volume Total       2       93       0       306       118       472         Volume Total       2       93       0       306       118       472         Volume Edft       2       31       0       0       118       0         Volume Right       0       62       0       42       0       8         cSH       182       405       1700       1700       1264       1700         Volume to Capacity       0.01       0.23       0.00       0.18       0.09       0.28         Queue Length 95th (m)       0.3       6.6       0.0       0.0       8.1       0.0         Lane LOS       D       C       A       Approa   | vCu, unblocked vol     | 1030 | 1011     | 471   | 989  | 994                  | 286  | 472  |      |      | 307  |      |      |
| tC, 2 stage (s)         tF (s)       3.5       4.0       3.3       3.5       4.0       3.3       2.2       2.2         p0 queue free %       99       100       100       85       100       92       100       91         cM capacity (veh/h)       182       219       595       211       224       752       1100       1264         Direction, Lane #       EB 1       WB 1       NB 1       NB 2       SB 1       SB 2         Volume Total       2       93       0       306       118       472         Volume Left       2       31       0       0       118       0         Volume Right       0       62       0       42       0       8         cSH       182       405       1700       1700       1264       1700         Volume to Capacity       0.01       0.23       0.00       0.18       0.09       0.28         Queue Length 95th (m)       0.3       6.6       0.0       0.0       8.1       0.0         Lane LOS       D       C       A       Approach Delay (s)       25.0       16.5       0.0       1.6         Approach LOS       D </td <td>tC, single (s)</td> <td>7.1</td> <td>6.5</td> <td>6.2</td> <td>7.1</td> <td>6.5</td> <td>6.2</td> <td>4.1</td> <td></td> <td></td> <td>4.1</td> <td></td> <td></td>   | tC, single (s)         | 7.1  | 6.5      | 6.2   | 7.1  | 6.5                  | 6.2  | 4.1  |      |      | 4.1  |      |      |
| tF (s)       3.5       4.0       3.3       3.5       4.0       3.3       2.2       2.2         p0 queue free %       99       100       100       85       100       92       100       91         cM capacity (veh/h)       182       219       595       211       224       752       1100       1264         Direction, Lane #       EB 1       WB 1       NB 1       NB 2       SB 1       SB 2         Volume Total       2       93       0       306       118       472         Volume Left       2       31       0       0       118       0         Volume Right       0       62       0       42       0       8         cSH       182       405       1700       1264       1700         Volume to Capacity       0.01       0.23       0.00       0.18       0.09       0.28         Queue Length 95th (m)       0.3       6.6       0.0       0.0       2.3       0.0         Control Delay (s)       25.0       16.5       0.0       1.6       Approach LOS       D       C         Average Delay       25.0       16.5       0.0       1.6       Average   |                        |      |          |       |      |                      |      |      |      |      |      |      |      |
| p0 queue free %         99         100         100         85         100         92         100         91           cM capacity (veh/h)         182         219         595         211         224         752         1100         1264           Direction, Lane #         EB 1         WB 1         NB 1         NB 2         SB 1         SB 2           Volume Total         2         93         0         306         118         472           Volume Left         2         31         0         0         118         0           Volume Right         0         62         0         42         0         8           CSH         182         405         1700         1700         1264         1700           Volume to Capacity         0.01         0.23         0.00         0.18         0.09         0.28           Queue Length 95th (m)         0.3         6.6         0.0         0.0         2.3         0.0           Lane LOS         D         C         A         Approach Delay (s)         25.0         16.5         0.0         1.6           Approach LOS         D         C         A         Intersection Capacity Utilization   |                        | 3.5  | 4.0      | 3.3   | 3.5  | 4.0                  | 3.3  | 2.2  |      |      | 2.2  |      |      |
| Direction, Lane #         EB 1         WB 1         NB 1         NB 2         SB 1         SB 2           Volume Total         2         93         0         306         118         472           Volume Left         2         31         0         0         118         0           Volume Right         0         62         0         42         0         8           cSH         182         405         1700         1700         1264         1700           Volume to Capacity         0.01         0.23         0.00         0.18         0.09         0.28           Queue Length 95th (m)         0.3         6.6         0.0         0.0         2.3         0.0           Control Delay (s)         25.0         16.5         0.0         0.0         8.1         0.0           Lane LOS         D         C         A         Approach Delay (s)         25.0         16.5         0.0         1.6           Approach LOS         D         C         A         Approach LOS         D         C           Intersection Summary         2.6         Intersection Capacity Utilization         46.3%         ICU Level of Service         A  |                        | 99   | 100      | 100   | 85   | 100                  | 92   | 100  |      |      | 91   |      |      |
| Volume Total         2         93         0         306         118         472           Volume Left         2         31         0         0         118         0           Volume Right         0         62         0         42         0         8           cSH         182         405         1700         1264         1700         Volume to Capacity         0.01         0.23         0.00         0.18         0.09         0.28           Queue Length 95th (m)         0.3         6.6         0.0         0.0         2.3         0.0         Control Delay (s)         25.0         16.5         0.0         0.0         8.1         0.0           Lane LOS         D         C         A         Approach Delay (s)         25.0         16.5         0.0         1.6           Approach LOS         D         C         A         Approach LOS         D         C           Intersection Summary         2.6         Intersection Capacity Utilization         46.3%         ICU Level of Service         A   | cM capacity (veh/h)    | 182  | 219      | 595   | 211  | 224                  | 752  | 1100 |      |      | 1264 |      |      |
| Volume Left         2         31         0         0         118         0           Volume Right         0         62         0         42         0         8           cSH         182         405         1700         1264         1700           Volume to Capacity         0.01         0.23         0.00         0.18         0.09         0.28           Queue Length 95th (m)         0.3         6.6         0.0         0.0         2.3         0.0           Control Delay (s)         25.0         16.5         0.0         0.0         8.1         0.0           Lane LOS         D         C         A         Approach Delay (s)         25.0         16.5         0.0         1.6           Approach LOS         D         C         A         Approach LOS         D         C         A           Average Delay         2.6         Intersection Summary         2.6         A         A  | Direction, Lane #      | EB 1 | WB 1     | NB 1  | NB 2 | SB 1                 | SB 2 |      |      |      |      |      |      |
| Volume Right       0       62       0       42       0       8         cSH       182       405       1700       1264       1700         Volume to Capacity       0.01       0.23       0.00       0.18       0.09       0.28         Queue Length 95th (m)       0.3       6.6       0.0       0.0       2.3       0.0         Control Delay (s)       25.0       16.5       0.0       0.0       8.1       0.0         Lane LOS       D       C       A       Approach Delay (s)       25.0       16.5       0.0       1.6         Approach LOS       D       C       A       Approach LOS       D       C       A         Average Delay       2.6       Itersection Capacity Utilization       46.3%       ICU Level of Service       A  | Volume Total           | 2    | 93       | 0     | 306  | 118                  | 472  |      |      |      |      |      |      |
| cSH       182       405       1700       1700       1264       1700         Volume to Capacity       0.01       0.23       0.00       0.18       0.09       0.28         Queue Length 95th (m)       0.3       6.6       0.0       0.0       2.3       0.0         Control Delay (s)       25.0       16.5       0.0       0.0       8.1       0.0         Lane LOS       D       C       A         Approach Delay (s)       25.0       16.5       0.0       1.6         Approach LOS       D       C       A         Average Delay       2.6       1         Intersection Capacity Utilization       46.3%       ICU Level of Service       A  | Volume Left            | 2    | 31       | 0     | 0    | 118                  | 0    |      |      |      |      |      |      |
| Volume to Capacity         0.01         0.23         0.00         0.18         0.09         0.28           Queue Length 95th (m)         0.3         6.6         0.0         0.0         2.3         0.0           Control Delay (s)         25.0         16.5         0.0         0.0         8.1         0.0           Lane LOS         D         C         A         Approach Delay (s)         25.0         16.5         0.0         1.6           Approach Delay (s)         25.0         16.5         0.0         1.6         A           Approach LOS         D         C  | Volume Right           | 0    | 62       | 0     | 42   | 0                    | 8    |      |      |      |      |      |      |
| Queue Length 95th (m)         0.3         6.6         0.0         0.0         2.3         0.0           Control Delay (s)         25.0         16.5         0.0         0.0         8.1         0.0           Lane LOS         D         C         A           Approach Delay (s)         25.0         16.5         0.0         1.6           Approach LOS         D         C         Intersection Summary           Average Delay         2.6         ICU Level of Service         A  | cSH                    | 182  | 405      | 1700  | 1700 | 1264                 | 1700 |      |      |      |      |      |      |
| Control Delay (s)         25.0         16.5         0.0         0.0         8.1         0.0           Lane LOS         D         C         A         A         Approach Delay (s)         25.0         16.5         0.0         1.6         A         Approach LOS         D         C         Intersection Summary         2.6         Intersection Capacity Utilization         46.3%         ICU Level of Service         A         A  | Volume to Capacity     | 0.01 | 0.23     | 0.00  | 0.18 | 0.09                 | 0.28 |      |      |      |      |      |      |
| Lane LOS     D     C     A       Approach Delay (s)     25.0     16.5     0.0     1.6       Approach LOS     D     C     Intersection Summary       Intersection Summary     2.6       Intersection Capacity Utilization     46.3%     ICU Level of Service     A   | Queue Length 95th (m)  | 0.3  | 6.6      | 0.0   | 0.0  | 2.3                  | 0.0  |      |      |      |      |      |      |
| Approach Delay (s)       25.0       16.5       0.0       1.6         Approach LOS       D       C       Intersection Summary         Intersection Summary       2.6       Intersection Capacity Utilization       46.3%       ICU Level of Service       A  | Control Delay (s)      | 25.0 | 16.5     | 0.0   | 0.0  | 8.1                  | 0.0  |      |      |      |      |      |      |
| Approach LOS     D     C       Intersection Summary     2.6       Intersection Capacity Utilization     46.3%       ICU Level of Service     A  | Lane LOS               | D    | С        |       |      | А                    |      |      |      |      |      |      |      |
| Intersection Summary     2.6       Average Delay     2.6       Intersection Capacity Utilization     46.3%     ICU Level of Service     A   | Approach Delay (s)     | 25.0 | 16.5     | 0.0   |      | 1.6                  |      |      |      |      |      |      |      |
| Average Delay     2.6       Intersection Capacity Utilization     46.3%     ICU Level of Service     A  | Approach LOS           | D    | С        |       |      |                      |      |      |      |      |      |      |      |
| Intersection Capacity Utilization 46.3% ICU Level of Service A  | Intersection Summary   |      |          |       |      |                      |      |      |      |      |      |      |      |
| Intersection Capacity Utilization 46.3% ICU Level of Service A  | Average Delay          |      |          | 2.6   |      |                      |      |      |      |      |      |      |      |
|   |                        |      |          | 46.3% | IC   | ICU Level of Service |      |      |      | А    |      |      |      |
| Analysis Period (min) 15  | Analysis Period (min)  |      |          | 15    |      |                      |      |      |      |      |      |      |      |

|                                   | ٨     | +    | *     | 4     | Ļ         | *          | 1    | Ť    | 1    | 1    | ţ    | ~    |
|-----------------------------------|-------|------|-------|-------|-----------|------------|------|------|------|------|------|------|
| Movement                          | EBL   | EBT  | EBR   | WBL   | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations               |       | 4    |       |       | \$        |            |      | \$   |      |      | \$   |      |
| Sign Control                      |       | Stop |       |       | Stop      |            |      | Stop |      |      | Stop |      |
| Traffic Volume (vph)              | 5     | 49   | 42    | 37    | 36        | 0          | 34   | 8    | 9    | 0    | 2    | 4    |
| Future Volume (vph)               | 5     | 49   | 42    | 37    | 36        | 0          | 34   | 8    | 9    | 0    | 2    | 4    |
| Peak Hour Factor                  | 0.90  | 0.90 | 0.90  | 0.90  | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)            | 6     | 54   | 47    | 41    | 40        | 0          | 38   | 9    | 10   | 0    | 2    | 4    |
| Direction, Lane #                 | EB 1  | WB 1 | NB 1  | SB 1  |           |            |      |      |      |      |      |      |
| Volume Total (vph)                | 107   | 81   | 57    | 6     |           |            |      |      |      |      |      |      |
| Volume Left (vph)                 | 6     | 41   | 38    | 0     |           |            |      |      |      |      |      |      |
| Volume Right (vph)                | 47    | 0    | 10    | 4     |           |            |      |      |      |      |      |      |
| Hadj (s)                          | -0.25 | 0.10 | 0.03  | -0.40 |           |            |      |      |      |      |      |      |
| Departure Headway (s)             | 3.9   | 4.2  | 4.3   | 4.0   |           |            |      |      |      |      |      |      |
| Degree Utilization, x             | 0.12  | 0.10 | 0.07  | 0.01  |           |            |      |      |      |      |      |      |
| Capacity (veh/h)                  | 907   | 829  | 790   | 859   |           |            |      |      |      |      |      |      |
| Control Delay (s)                 | 7.4   | 7.7  | 7.6   | 7.0   |           |            |      |      |      |      |      |      |
| Approach Delay (s)                | 7.4   | 7.7  | 7.6   | 7.0   |           |            |      |      |      |      |      |      |
| Approach LOS                      | А     | А    | Α     | А     |           |            |      |      |      |      |      |      |
| Intersection Summary              |       |      |       |       |           |            |      |      |      |      |      |      |
| Delay                             |       |      | 7.5   |       |           |            |      |      |      |      |      |      |
| Level of Service                  |       |      | А     |       |           |            |      |      |      |      |      |      |
| Intersection Capacity Utilization | tion  |      | 26.8% | IC    | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)             |       |      | 15    |       |           |            |      |      |      |      |      |      |

# HCM Unsignalized Intersection Capacity Analysis 21: Stanley & Northumberland

|                                | ٠    | +    | *     | 4     | Ŧ         | *          | 1    | Ť    | 1    | 1    | ţ    | ~    |
|--------------------------------|------|------|-------|-------|-----------|------------|------|------|------|------|------|------|
| Movement                       | EBL  | EBT  | EBR   | WBL   | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations            |      | \$   |       |       | ŧ         | 1          |      | \$   |      |      | \$   |      |
| Sign Control                   |      | Stop |       |       | Stop      |            |      | Stop |      |      | Stop |      |
| Traffic Volume (vph)           | 76   | 43   | 3     | 2     | 44        | 356        | 2    | 16   | 5    | 652  | 11   | 95   |
| Future Volume (vph)            | 76   | 43   | 3     | 2     | 44        | 356        | 2    | 16   | 5    | 652  | 11   | 95   |
| Peak Hour Factor               | 0.90 | 0.90 | 0.90  | 0.90  | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)         | 84   | 48   | 3     | 2     | 49        | 396        | 2    | 18   | 6    | 724  | 12   | 106  |
| Direction, Lane #              | EB 1 | WB 1 | WB 2  | NB 1  | SB 1      |            |      |      |      |      |      |      |
| Volume Total (vph)             | 135  | 51   | 396   | 26    | 842       |            |      |      |      |      |      |      |
| Volume Left (vph)              | 84   | 2    | 0     | 2     | 724       |            |      |      |      |      |      |      |
| Volume Right (vph)             | 3    | 0    | 396   | 6     | 106       |            |      |      |      |      |      |      |
| Hadj (s)                       | 0.11 | 0.01 | -0.60 | -0.12 | 0.10      |            |      |      |      |      |      |      |
| Departure Headway (s)          | 6.0  | 6.1  | 3.2   | 5.3   | 4.6       |            |      |      |      |      |      |      |
| Degree Utilization, x          | 0.23 | 0.09 | 0.35  | 0.04  | 1.08      |            |      |      |      |      |      |      |
| Capacity (veh/h)               | 586  | 571  | 1114  | 652   | 773       |            |      |      |      |      |      |      |
| Control Delay (s)              | 10.8 | 9.7  | 7.9   | 8.5   | 76.9      |            |      |      |      |      |      |      |
| Approach Delay (s)             | 10.8 | 8.1  |       | 8.5   | 76.9      |            |      |      |      |      |      |      |
| Approach LOS                   | В    | А    |       | А     | F         |            |      |      |      |      |      |      |
| Intersection Summary           |      |      |       |       |           |            |      |      |      |      |      |      |
| Delay                          |      |      | 48.3  |       |           |            |      |      |      |      |      |      |
| Level of Service               |      |      | Е     |       |           |            |      |      |      |      |      |      |
| Intersection Capacity Utilizat | ion  |      | 80.3% | IC    | U Level o | of Service |      |      | D    |      |      |      |
| Analysis Period (min)          |      |      | 15    |       |           |            |      |      |      |      |      |      |

|                              | -      | 7    | 1         | -    | 1         | 1          |
|------------------------------|--------|------|-----------|------|-----------|------------|
| Movement                     | EBT    | EBR  | WBL       | WBT  | NBL       | NBR        |
| Lane Configurations          | ٨      |      | ۲         | •    | Y         |            |
| Traffic Volume (veh/h)       | 42     | 73   | 132       | 90   | 48        | 46         |
| Future Volume (Veh/h)        | 42     | 73   | 132       | 90   | 48        | 46         |
| Sign Control                 | Free   |      |           | Free | Stop      |            |
| Grade                        | 0%     |      |           | 0%   | 0%        |            |
| Peak Hour Factor             | 0.90   | 0.90 | 0.90      | 0.90 | 0.90      | 0.90       |
| Hourly flow rate (vph)       | 47     | 81   | 147       | 100  | 53        | 51         |
| Pedestrians                  |        | •    |           |      | 2         | •.         |
| Lane Width (m)               |        |      |           |      | 3.5       |            |
| Walking Speed (m/s)          |        |      |           |      | 1.1       |            |
| Percent Blockage             |        |      |           |      | 0         |            |
| Right turn flare (veh)       |        |      |           |      | v         |            |
| Median type                  | None   |      |           | None |           |            |
| Median storage veh)          | NOTIC  |      |           | None |           |            |
| Upstream signal (m)          |        |      |           |      |           |            |
| pX, platoon unblocked        |        |      |           |      |           |            |
| vC, conflicting volume       |        |      | 130       |      | 484       | 90         |
| vC1, stage 1 conf vol        |        |      | 150       |      | 404       | 30         |
| vC2, stage 2 conf vol        |        |      |           |      |           |            |
| vCu, unblocked vol           |        |      | 130       |      | 484       | 90         |
| tC, single (s)               |        |      | 4.1       |      | 6.4       | 6.2        |
| tC, 2 stage (s)              |        |      | 4.1       |      | 0.4       | 0.2        |
| tF (s)                       |        |      | 2.2       |      | 3.5       | 3.3        |
| p0 queue free %              |        |      | 2.2<br>90 |      | 89        | 95         |
| cM capacity (veh/h)          |        |      | 1465      |      | 490       | 972        |
|                              |        |      |           |      | 430       | 512        |
| Direction, Lane #            | EB 1   | WB 1 | WB 2      | NB 1 |           |            |
| Volume Total                 | 128    | 147  | 100       | 104  |           |            |
| Volume Left                  | 0      | 147  | 0         | 53   |           |            |
| Volume Right                 | 81     | 0    | 0         | 51   |           |            |
| cSH                          | 1700   | 1465 | 1700      | 648  |           |            |
| Volume to Capacity           | 0.08   | 0.10 | 0.06      | 0.16 |           |            |
| Queue Length 95th (m)        | 0.0    | 2.5  | 0.0       | 4.3  |           |            |
| Control Delay (s)            | 0.0    | 7.7  | 0.0       | 11.6 |           |            |
| Lane LOS                     |        | А    |           | В    |           |            |
| Approach Delay (s)           | 0.0    | 4.6  |           | 11.6 |           |            |
| Approach LOS                 |        |      |           | В    |           |            |
| Intersection Summary         |        |      |           |      |           |            |
| Average Delay                |        |      | 4.9       |      |           |            |
| Intersection Capacity Utiliz | zation |      | 27.1%     | IC   | U Level o | of Service |
| Analysis Period (min)        |        |      | 15        |      |           |            |
|                              |        |      |           |      |           |            |

|                               | -     | 7    | 4     | +            | 1         | 1          |
|-------------------------------|-------|------|-------|--------------|-----------|------------|
| Movement                      | EBT   | EBR  | WBL   | WBT          | NBL       | NBR        |
| Lane Configurations           | 4     |      |       | <del>د</del> | ¥         |            |
| Traffic Volume (veh/h)        | 61    | 642  | 28    | 61           | 343       | 15         |
| Future Volume (Veh/h)         | 61    | 642  | 28    | 61           | 343       | 15         |
| Sign Control                  | Free  |      |       | Free         | Stop      |            |
| Grade                         | 0%    |      |       | 0%           | 0%        |            |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90         | 0.90      | 0.90       |
| Hourly flow rate (vph)        | 68    | 713  | 31    | 68           | 381       | 17         |
| Pedestrians                   | 1     |      |       |              | 1         |            |
| Lane Width (m)                | 3.5   |      |       |              | 3.5       |            |
| Walking Speed (m/s)           | 1.1   |      |       |              | 1.1       |            |
| Percent Blockage              | 0     |      |       |              | 0         |            |
| Right turn flare (veh)        | v     |      |       |              | v         |            |
| Median type                   | None  |      |       | None         |           |            |
| Median storage veh)           |       |      |       | 110110       |           |            |
| Upstream signal (m)           |       |      |       |              |           |            |
| pX, platoon unblocked         |       |      |       |              |           |            |
| vC, conflicting volume        |       |      | 782   |              | 556       | 426        |
| vC1, stage 1 conf vol         |       |      | 102   |              | 000       | 720        |
| vC2, stage 2 conf vol         |       |      |       |              |           |            |
| vCu, unblocked vol            |       |      | 782   |              | 556       | 426        |
| tC, single (s)                |       |      | 4.1   |              | 6.4       | 6.2        |
| tC, 2 stage (s)               |       |      | 7.1   |              | 0.4       | 0.2        |
| tF (s)                        |       |      | 2.2   |              | 3.5       | 3.3        |
| p0 queue free %               |       |      | 96    |              | 20        | 97         |
| cM capacity (veh/h)           |       |      | 844   |              | 475       | 633        |
|                               | /     |      |       |              | 110       | 000        |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  |              |           |            |
| Volume Total                  | 781   | 99   | 398   |              |           |            |
| Volume Left                   | 0     | 31   | 381   |              |           |            |
| Volume Right                  | 713   | 0    | 17    |              |           |            |
| cSH                           | 1700  | 844  | 480   |              |           |            |
| Volume to Capacity            | 0.46  | 0.04 | 0.83  |              |           |            |
| Queue Length 95th (m)         | 0.0   | 0.9  | 61.8  |              |           |            |
| Control Delay (s)             | 0.0   | 3.2  | 39.6  |              |           |            |
| Lane LOS                      |       | А    | E     |              |           |            |
| Approach Delay (s)            | 0.0   | 3.2  | 39.6  |              |           |            |
| Approach LOS                  |       |      | E     |              |           |            |
| Intersection Summary          |       |      |       |              |           |            |
| Average Delay                 |       |      | 12.6  |              |           |            |
| Intersection Capacity Utiliza | ation |      | 77.6% | IC           | U Level o | of Service |
| Analysis Period (min)         |       |      | 15    |              |           |            |
|                               |       |      |       |              |           |            |

|                                | ٠    | +    | Ŧ      | *    | 4       | 4          |
|--------------------------------|------|------|--------|------|---------|------------|
| Movement                       | EBL  | EBT  | WBT    | WBR  | SBL     | SBR        |
| Lane Configurations            |      | ŧ    | ţ,     |      | Y       |            |
| Traffic Volume (veh/h)         | 9    | 0    | 0      | 0    | 0       | 15         |
| Future Volume (Veh/h)          | 9    | 0    | 0      | 0    | 0       | 15         |
| Sign Control                   |      | Free | Free   |      | Stop    |            |
| Grade                          |      | 0%   | 0%     |      | 0%      |            |
| Peak Hour Factor               | 0.90 | 0.90 | 0.90   | 0.90 | 0.90    | 0.90       |
| Hourly flow rate (vph)         | 10   | 0    | 0      | 0    | 0       | 17         |
| Pedestrians                    | 10   | Ŭ    | Ŭ      | Ŭ    | Ű       |            |
| Lane Width (m)                 |      |      |        |      |         |            |
| Walking Speed (m/s)            |      |      |        |      |         |            |
| Percent Blockage               |      |      |        |      |         |            |
| Right turn flare (veh)         |      |      |        |      |         |            |
| Median type                    |      | None | None   |      |         |            |
| Median storage veh)            |      | NULL |        |      |         |            |
| Upstream signal (m)            |      |      |        |      |         |            |
| pX, platoon unblocked          |      |      |        |      |         |            |
| vC, conflicting volume         | 0    |      |        |      | 20      | 0          |
| vC1, stage 1 conf vol          | U    |      |        |      | 20      | U          |
|                                |      |      |        |      |         |            |
| vC2, stage 2 conf vol          | 0    |      |        |      | 20      | 0          |
| vCu, unblocked vol             | 0    |      |        |      |         |            |
| tC, single (s)                 | 4.1  |      |        |      | 6.4     | 6.2        |
| tC, 2 stage (s)                | 0.0  |      |        |      | 25      | 2.2        |
| tF (s)                         | 2.2  |      |        |      | 3.5     | 3.3        |
| p0 queue free %                | 99   |      |        |      | 100     | 98         |
| cM capacity (veh/h)            | 1623 |      |        |      | 991     | 1085       |
| Direction, Lane #              | EB 1 | WB 1 | SB 1   |      |         |            |
| Volume Total                   | 10   | 0    | 17     |      |         |            |
| Volume Left                    | 10   | 0    | 0      |      |         |            |
| Volume Right                   | 0    | 0    | 17     |      |         |            |
| cSH                            | 1623 | 1700 | 1085   |      |         |            |
| Volume to Capacity             | 0.01 | 0.00 | 0.02   |      |         |            |
| Queue Length 95th (m)          | 0.1  | 0.0  | 0.4    |      |         |            |
| Control Delay (s)              | 7.2  | 0.0  | 8.4    |      |         |            |
| Lane LOS                       | А    |      | А      |      |         |            |
| Approach Delay (s)             | 7.2  | 0.0  | 8.4    |      |         |            |
| Approach LOS                   |      |      | А      |      |         |            |
| Intersection Summary           |      |      |        |      |         |            |
| Average Delay                  |      |      | 7.9    |      |         |            |
| Intersection Capacity Utilizat | ion  |      | 13.3%  | IC   | Ulevelo | of Service |
| Analysis Period (min)          |      |      | 15.570 | 10   |         |            |
|                                |      |      | 15     |      |         |            |

## HCM Unsignalized Intersection Capacity Analysis 51: Swan & Brant-Waterloo

|                               | ٨    | +    | 1     | 4    | Ļ         | •          | 1    | t    | 1    | *    | ţ    | ~    |
|-------------------------------|------|------|-------|------|-----------|------------|------|------|------|------|------|------|
| Movement                      | EBL  | EBT  | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |      | 4    |       |      | 4         |            |      | 4    |      |      | 4    |      |
| Traffic Volume (veh/h)        | 8    | 3    | 4     | 0    | 3         | 5          | 4    | 152  | 3    | 5    | 208  | 5    |
| Future Volume (Veh/h)         | 8    | 3    | 4     | 0    | 3         | 5          | 4    | 152  | 3    | 5    | 208  | 5    |
| Sign Control                  |      | Stop |       |      | Stop      |            |      | Free |      |      | Free |      |
| Grade                         |      | 0%   |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor              | 0.90 | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 9    | 3    | 4     | 0    | 3         | 6          | 4    | 169  | 3    | 6    | 231  | 6    |
| Pedestrians                   |      |      |       |      |           |            |      |      |      |      |      |      |
| Lane Width (m)                |      |      |       |      |           |            |      |      |      |      |      |      |
| Walking Speed (m/s)           |      |      |       |      |           |            |      |      |      |      |      |      |
| Percent Blockage              |      |      |       |      |           |            |      |      |      |      |      |      |
| Right turn flare (veh)        |      |      |       |      |           |            |      |      |      |      |      |      |
| Median type                   |      |      |       |      |           |            |      | None |      |      | None |      |
| Median storage veh)           |      |      |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)           |      |      |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked         |      |      |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume        | 432  | 426  | 234   | 430  | 428       | 170        | 237  |      |      | 172  |      |      |
| vC1, stage 1 conf vol         | 102  | 120  | 201   | 100  | .20       |            | 201  |      |      |      |      |      |
| vC2, stage 2 conf vol         |      |      |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol            | 432  | 426  | 234   | 430  | 428       | 170        | 237  |      |      | 172  |      |      |
| tC, single (s)                | 7.1  | 6.5  | 6.2   | 7.1  | 6.5       | 6.2        | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)               | 7.1  | 0.0  | 0.2   | 7.1  | 0.0       | 0.2        |      |      |      | 1.1  |      |      |
| tF (s)                        | 3.5  | 4.0  | 3.3   | 3.5  | 4.0       | 3.3        | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %               | 98   | 99   | 100   | 100  | 99        | 99         | 100  |      |      | 100  |      |      |
| cM capacity (veh/h)           | 528  | 520  | 810   | 531  | 519       | 879        | 1342 |      |      | 1417 |      |      |
|                               |      |      |       |      | 010       | 015        | 1072 |      |      | 1717 |      |      |
| Direction, Lane #             | EB 1 | WB 1 | NB 1  | SB 1 |           |            |      |      |      |      |      |      |
| Volume Total                  | 16   | 9    | 176   | 243  |           |            |      |      |      |      |      |      |
| Volume Left                   | 9    | 0    | 4     | 6    |           |            |      |      |      |      |      |      |
| Volume Right                  | 4    | 6    | 3     | 6    |           |            |      |      |      |      |      |      |
| cSH                           | 577  | 714  | 1342  | 1417 |           |            |      |      |      |      |      |      |
| Volume to Capacity            | 0.03 | 0.01 | 0.00  | 0.00 |           |            |      |      |      |      |      |      |
| Queue Length 95th (m)         | 0.6  | 0.3  | 0.1   | 0.1  |           |            |      |      |      |      |      |      |
| Control Delay (s)             | 11.4 | 10.1 | 0.2   | 0.2  |           |            |      |      |      |      |      |      |
| Lane LOS                      | В    | В    | А     | А    |           |            |      |      |      |      |      |      |
| Approach Delay (s)            | 11.4 | 10.1 | 0.2   | 0.2  |           |            |      |      |      |      |      |      |
| Approach LOS                  | В    | В    |       |      |           |            |      |      |      |      |      |      |
| Intersection Summary          |      |      |       |      |           |            |      |      |      |      |      |      |
| Average Delay                 |      |      | 0.8   |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | tion |      | 31.0% | IC   | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |      |      | 15    |      |           |            |      |      |      |      |      |      |
|                               |      |      |       |      |           |            |      |      |      |      |      |      |

|                               | 4     | *    | t            | 1    | 1          | ŧ          |   |
|-------------------------------|-------|------|--------------|------|------------|------------|---|
| Movement                      | WBL   | WBR  | NBT          | NBR  | SBL        | SBT        |   |
| Lane Configurations           | Y     |      | ¢Î,          |      |            | 4          | Ĩ |
| Traffic Volume (veh/h)        | 6     | 103  | 0            | 11   | 182        | 0          |   |
| Future Volume (Veh/h)         | 6     | 103  | 0            | 11   | 182        | 0          |   |
| Sign Control                  | Stop  |      | Free         |      |            | Free       |   |
| Grade                         | 0%    |      | 0%           |      |            | 0%         |   |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90         | 0.90 | 0.90       | 0.90       |   |
| Hourly flow rate (vph)        | 7     | 114  | 0            | 12   | 202        | 0          |   |
| Pedestrians                   |       |      |              |      |            |            |   |
| Lane Width (m)                |       |      |              |      |            |            |   |
| Walking Speed (m/s)           |       |      |              |      |            |            |   |
| Percent Blockage              |       |      |              |      |            |            |   |
| Right turn flare (veh)        |       |      |              |      |            |            |   |
| Median type                   |       |      | None         |      |            | None       |   |
| Median storage veh)           |       |      |              |      |            |            |   |
| Upstream signal (m)           |       |      |              |      |            |            |   |
| pX, platoon unblocked         |       |      |              |      |            |            |   |
| vC, conflicting volume        | 410   | 6    |              |      | 12         |            |   |
| vC1, stage 1 conf vol         | VIT   | v    |              |      | 14         |            |   |
| vC2, stage 2 conf vol         |       |      |              |      |            |            |   |
| vCu, unblocked vol            | 410   | 6    |              |      | 12         |            |   |
| tC, single (s)                | 6.4   | 6.2  |              |      | 4.1        |            |   |
| tC, 2 stage (s)               | т.,   | 0.2  |              |      | т. I       |            |   |
| tF (s)                        | 3.5   | 3.3  |              |      | 2.2        |            |   |
| p0 queue free %               | 99    | 89   |              |      | 87         |            |   |
| cM capacity (veh/h)           | 523   | 1077 |              |      | 1607       |            |   |
|                               |       |      | 0 <b>-</b> / |      | 1007       |            |   |
| Direction, Lane #             | WB 1  | NB 1 | SB 1         |      |            |            |   |
| Volume Total                  | 121   | 12   | 202          |      |            |            |   |
| Volume Left                   | 7     | 0    | 202          |      |            |            |   |
| Volume Right                  | 114   | 12   | 0            |      |            |            |   |
| cSH                           | 1015  | 1700 | 1607         |      |            |            |   |
| Volume to Capacity            | 0.12  | 0.01 | 0.13         |      |            |            |   |
| Queue Length 95th (m)         | 3.1   | 0.0  | 3.3          |      |            |            |   |
| Control Delay (s)             | 9.0   | 0.0  | 7.6          |      |            |            |   |
| Lane LOS                      | А     |      | А            |      |            |            |   |
| Approach Delay (s)            | 9.0   | 0.0  | 7.6          |      |            |            |   |
| Approach LOS                  | А     |      |              |      |            |            |   |
| Intersection Summary          |       |      |              |      |            |            |   |
| Average Delay                 |       |      | 7.8          |      |            |            |   |
| Intersection Capacity Utiliza | ation |      | 30.6%        | IC   | CU Level o | of Service |   |
| Analysis Period (min)         |       |      | 15           |      |            |            |   |
|                               |       |      | 10           |      |            |            |   |

|                               | ٨     | *    | •      | 1    | Ŧ          | ~       |
|-------------------------------|-------|------|--------|------|------------|---------|
| Movement                      | EBL   | EBR  | NBL    | NBT  | SBT        | SBR     |
| Lane Configurations           | Y     |      |        | र्भ  | 4          |         |
| Traffic Volume (veh/h)        | 5     | 0    | 0      | 5    | 8          | 7       |
| Future Volume (Veh/h)         | 5     | 0    | 0      | 5    | 8          | 7       |
| Sign Control                  | Stop  |      |        | Free | Free       |         |
| Grade                         | 0%    |      |        | 0%   | 0%         |         |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90   | 0.90 | 0.90       | 0.90    |
| Hourly flow rate (vph)        | 6     | 0    | 0      | 6    | 9          | 8       |
| Pedestrians                   |       |      |        |      |            |         |
| Lane Width (m)                |       |      |        |      |            |         |
| Walking Speed (m/s)           |       |      |        |      |            |         |
| Percent Blockage              |       |      |        |      |            |         |
| Right turn flare (veh)        |       |      |        |      |            |         |
| Median type                   |       |      |        | None | None       |         |
| Median storage veh)           |       |      |        |      |            |         |
| Upstream signal (m)           |       |      |        |      |            |         |
| pX, platoon unblocked         |       |      |        |      |            |         |
| vC, conflicting volume        | 19    | 13   | 17     |      |            |         |
| vC1, stage 1 conf vol         |       |      |        |      |            |         |
| vC2, stage 2 conf vol         |       |      |        |      |            |         |
| vCu, unblocked vol            | 19    | 13   | 17     |      |            |         |
| tC, single (s)                | 6.4   | 6.2  | 4.1    |      |            |         |
| tC, 2 stage (s)               |       |      |        |      |            |         |
| tF (s)                        | 3.5   | 3.3  | 2.2    |      |            |         |
| p0 queue free %               | 99    | 100  | 100    |      |            |         |
| cM capacity (veh/h)           | 998   | 1067 | 1600   |      |            |         |
| Direction, Lane #             | EB 1  | NB 1 | SB 1   |      |            |         |
| Volume Total                  | 6     | 6    | 17     |      |            |         |
| Volume Left                   | 6     | 0    | 0      |      |            |         |
| Volume Right                  | 0     | 0    | 8      |      |            |         |
| cSH                           | 998   | 1600 | 1700   |      |            |         |
| Volume to Capacity            | 0.01  | 0.00 | 0.01   |      |            |         |
| Queue Length 95th (m)         | 0.1   | 0.0  | 0.0    |      |            |         |
| Control Delay (s)             | 8.6   | 0.0  | 0.0    |      |            |         |
| Lane LOS                      | A     | 0.0  | 0.0    |      |            |         |
| Approach Delay (s)            | 8.6   | 0.0  | 0.0    |      |            |         |
| Approach LOS                  | A     | 0.0  | 0.0    |      |            |         |
| Intersection Summary          |       |      |        |      |            |         |
| Average Delay                 |       |      | 1.8    |      |            |         |
| Intersection Capacity Utiliza | ation |      | 13.3%  | IC   | CU Level o | fSonioo |
| Analysis Period (min)         | auon  |      | 15.5 % | IC.  |            |         |
| Analysis Fenou (mm)           |       |      | 15     |      |            |         |

### Appendix D

Synchro Reports 2020 and 2031 Future Total Conditions

### HCM Unsignalized Intersection Capacity Analysis 1: Hilltop & Swan

|                                  | ٠    | <b>→</b> | 7     | 4    | +         | *          | 1    | Ť    | 1    | 4    | ŧ    | ~    |
|----------------------------------|------|----------|-------|------|-----------|------------|------|------|------|------|------|------|
| Movement                         | EBL  | EBT      | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations              |      | 4        |       |      | 4         |            | ሻ    | Þ    |      | 7    | 1.   |      |
| Traffic Volume (veh/h)           | 4    | 0        | 0     | 39   | 0         | 138        | 0    | 192  | 12   | 46   | 122  | 0    |
| Future Volume (Veh/h)            | 4    | 0        | 0     | 39   | 0         | 138        | 0    | 192  | 12   | 46   | 122  | 0    |
| Sign Control                     |      | Stop     |       |      | Stop      |            |      | Free |      |      | Free |      |
| Grade                            |      | 0%       |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor                 | 0.90 | 0.90     | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)           | 4    | 0        | 0     | 43   | 0         | 153        | 0    | 213  | 13   | 51   | 136  | 0    |
| Pedestrians                      |      |          |       |      | 1         |            |      | 3    |      |      |      |      |
| Lane Width (m)                   |      |          |       |      | 3.5       |            |      | 3.5  |      |      |      |      |
| Walking Speed (m/s)              |      |          |       |      | 1.1       |            |      | 1.1  |      |      |      |      |
| Percent Blockage                 |      |          |       |      | 0         |            |      | 0    |      |      |      |      |
| Right turn flare (veh)           |      |          |       |      |           |            |      |      |      |      |      |      |
| Median type                      |      |          |       |      |           |            |      | None |      |      | None |      |
| Median storage veh)              |      |          |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)              |      |          |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked            |      |          |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume           | 604  | 465      | 139   | 462  | 458       | 220        | 136  |      |      | 227  |      |      |
| vC1, stage 1 conf vol            |      |          |       |      |           |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol            |      |          |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol               | 604  | 465      | 139   | 462  | 458       | 220        | 136  |      |      | 227  |      |      |
| tC, single (s)                   | 7.1  | 6.5      | 6.2   | 7.1  | 6.5       | 6.2        | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)                  |      |          |       |      |           |            |      |      |      |      |      |      |
| tF (s)                           | 3.5  | 4.0      | 3.3   | 3.5  | 4.0       | 3.3        | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %                  | 99   | 100      | 100   | 91   | 100       | 81         | 100  |      |      | 96   |      |      |
| cM capacity (veh/h)              | 326  | 479      | 912   | 497  | 483       | 821        | 1461 |      |      | 1352 |      |      |
| Direction, Lane #                | EB 1 | WB 1     | NB 1  | NB 2 | SB 1      | SB 2       |      |      |      |      |      |      |
| Volume Total                     | 4    | 196      | 0     | 226  | 51        | 136        |      |      |      |      |      |      |
| Volume Left                      | 4    | 43       | 0     | 0    | 51        | 0          |      |      |      |      |      |      |
| Volume Right                     | 0    | 153      | 0     | 13   | 0         | 0          |      |      |      |      |      |      |
| cSH                              | 326  | 718      | 1700  | 1700 | 1352      | 1700       |      |      |      |      |      |      |
| Volume to Capacity               | 0.01 | 0.27     | 0.00  | 0.13 | 0.04      | 0.08       |      |      |      |      |      |      |
| Queue Length 95th (m)            | 0.3  | 8.4      | 0.0   | 0.0  | 0.9       | 0.0        |      |      |      |      |      |      |
| Control Delay (s)                | 16.2 | 11.9     | 0.0   | 0.0  | 7.8       | 0.0        |      |      |      |      |      |      |
| Lane LOS                         | С    | В        |       |      | А         |            |      |      |      |      |      |      |
| Approach Delay (s)               | 16.2 | 11.9     | 0.0   |      | 2.1       |            |      |      |      |      |      |      |
| Approach LOS                     | С    | В        |       |      |           |            |      |      |      |      |      |      |
| Intersection Summary             |      |          |       |      |           |            |      |      |      |      |      |      |
| Average Delay                    |      |          | 4.6   |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utilizatio | n    |          | 38.6% | IC   | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)            |      |          | 15    |      |           |            |      |      |      |      |      |      |

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|                               | ٨     | +    | *     | 1     | Ļ         | •          | 1    | Ť    | 1    | *    | ţ    | ~    |
|-------------------------------|-------|------|-------|-------|-----------|------------|------|------|------|------|------|------|
| Movement                      | EBL   | EBT  | EBR   | WBL   | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |       | \$   |       |       | \$        |            |      | \$   |      |      | \$   |      |
| Sign Control                  |       | Stop |       |       | Stop      |            |      | Stop |      |      | Stop |      |
| Traffic Volume (vph)          | 3     | 22   | 35    | 9     | 34        | 0          | 98   | 7    | 24   | 0    | 3    | 11   |
| Future Volume (vph)           | 3     | 22   | 35    | 9     | 34        | 0          | 98   | 7    | 24   | 0    | 3    | 11   |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90  | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 3     | 24   | 39    | 10    | 38        | 0          | 109  | 8    | 27   | 0    | 3    | 12   |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  | SB 1  |           |            |      |      |      |      |      |      |
| Volume Total (vph)            | 66    | 48   | 144   | 15    |           |            |      |      |      |      |      |      |
| Volume Left (vph)             | 3     | 10   | 109   | 0     |           |            |      |      |      |      |      |      |
| Volume Right (vph)            | 39    | 0    | 27    | 12    |           |            |      |      |      |      |      |      |
| Hadj (s)                      | -0.23 | 0.04 | 0.07  | -0.48 |           |            |      |      |      |      |      |      |
| Departure Headway (s)         | 4.1   | 4.4  | 4.2   | 3.8   |           |            |      |      |      |      |      |      |
| Degree Utilization, x         | 0.07  | 0.06 | 0.17  | 0.02  |           |            |      |      |      |      |      |      |
| Capacity (veh/h)              | 845   | 790  | 821   | 901   |           |            |      |      |      |      |      |      |
| Control Delay (s)             | 7.4   | 7.6  | 8.1   | 6.9   |           |            |      |      |      |      |      |      |
| Approach Delay (s)            | 7.4   | 7.6  | 8.1   | 6.9   |           |            |      |      |      |      |      |      |
| Approach LOS                  | А     | А    | А     | А     |           |            |      |      |      |      |      |      |
| Intersection Summary          |       |      |       |       |           |            |      |      |      |      |      |      |
| Delay                         |       |      | 7.8   |       |           |            |      |      |      |      |      |      |
| Level of Service              |       |      | А     |       |           |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | tion  |      | 25.9% | IC    | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |       |      | 15    |       |           |            |      |      |      |      |      |      |

# HCM Unsignalized Intersection Capacity Analysis 21: Stanley & Northumberland

|                                | ٨    | -    | 7     | 1    | +         | *          | 1    | 1    | 1    | 4    | Ļ    | ~    |
|--------------------------------|------|------|-------|------|-----------|------------|------|------|------|------|------|------|
| Movement                       | EBL  | EBT  | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations            |      | 4    |       |      | र्स       | 1          |      | 4    |      |      | 4    |      |
| Traffic Volume (veh/h)         | 59   | 21   | 0     | 2    | 15        | 481        | 2    | 2    | 2    | 193  | 8    | 18   |
| Future Volume (Veh/h)          | 59   | 21   | 0     | 2    | 15        | 481        | 2    | 2    | 2    | 193  | 8    | 18   |
| Sign Control                   |      | Free |       |      | Free      |            |      | Stop |      |      | Stop |      |
| Grade                          |      | 0%   |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor               | 0.90 | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)         | 66   | 23   | 0     | 2    | 17        | 534        | 2    | 2    | 2    | 214  | 9    | 20   |
| Pedestrians                    |      | 1    |       |      | 6         |            |      | 2    |      |      | 5    |      |
| Lane Width (m)                 |      | 3.5  |       |      | 3.5       |            |      | 3.5  |      |      | 3.5  |      |
| Walking Speed (m/s)            |      | 1.1  |       |      | 1.1       |            |      | 1.1  |      |      | 1.1  |      |
| Percent Blockage               |      | 0    |       |      | 1         |            |      | 0    |      |      | 0    |      |
| Right turn flare (veh)         |      |      |       |      |           |            |      |      |      |      |      |      |
| Median type                    |      | None |       |      | None      |            |      |      |      |      |      |      |
| Median storage veh)            |      |      |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)            |      |      |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked          |      |      |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume         | 22   |      |       | 25   |           |            | 204  | 183  | 31   | 190  | 183  | 23   |
| vC1, stage 1 conf vol          |      |      |       |      |           |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol          |      |      |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol             | 22   |      |       | 25   |           |            | 204  | 183  | 31   | 190  | 183  | 23   |
| tC, single (s)                 | 4.1  |      |       | 4.1  |           |            | 7.1  | 6.5  | 6.2  | 7.1  | 6.5  | 6.2  |
| tC, 2 stage (s)                |      |      |       |      |           |            |      |      |      |      |      |      |
| tF (s)                         | 2.2  |      |       | 2.2  |           |            | 3.5  | 4.0  | 3.3  | 3.5  | 4.0  | 3.3  |
| p0 queue free %                | 96   |      |       | 100  |           |            | 100  | 100  | 100  | 71   | 99   | 98   |
| cM capacity (veh/h)            | 1600 |      |       | 1600 |           |            | 708  | 680  | 1042 | 736  | 680  | 1054 |
| Direction, Lane #              | EB 1 | WB 1 | WB 2  | NB 1 | SB 1      |            |      |      |      |      |      |      |
| Volume Total                   | 89   | 19   | 534   | 6    | 243       |            |      |      |      |      |      |      |
| Volume Left                    | 66   | 2    | 0     | 2    | 214       |            |      |      |      |      |      |      |
| Volume Right                   | 0    | 0    | 534   | 2    | 20        |            |      |      |      |      |      |      |
| cSH                            | 1600 | 1600 | 1700  | 781  | 752       |            |      |      |      |      |      |      |
| Volume to Capacity             | 0.04 | 0.00 | 0.31  | 0.01 | 0.32      |            |      |      |      |      |      |      |
| Queue Length 95th (m)          | 1.0  | 0.0  | 0.0   | 0.2  | 10.7      |            |      |      |      |      |      |      |
| Control Delay (s)              | 5.5  | 0.8  | 0.0   | 9.6  | 12.1      |            |      |      |      |      |      |      |
| Lane LOS                       | A    | A    | 0.0   | A    | В         |            |      |      |      |      |      |      |
| Approach Delay (s)             | 5.5  | 0.0  |       | 9.6  | 12.1      |            |      |      |      |      |      |      |
| Approach LOS                   | 0.0  | 0.0  |       | A    | B         |            |      |      |      |      |      |      |
| Intersection Summary           |      |      |       |      |           |            |      |      |      |      |      |      |
| Average Delay                  |      |      | 3.9   |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utilizat | tion |      | 53.9% | IC   | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)          |      |      | 15    |      |           |            |      |      |      |      |      |      |

|                               | -     | 7    | *     | +    | 1         | 1         |
|-------------------------------|-------|------|-------|------|-----------|-----------|
| Movement                      | EBT   | EBR  | WBL   | WBT  | NBL       | NBR       |
| Lane Configurations           | 1     |      | ٦     | 1    | Y         |           |
| Traffic Volume (veh/h)        | 92    | 26   | 29    | 45   | 53        | 124       |
| Future Volume (Veh/h)         | 92    | 26   | 29    | 45   | 53        | 124       |
| Sign Control                  | Free  |      |       | Free | Stop      |           |
| Grade                         | 0%    |      |       | 0%   | 0%        |           |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90 | 0.90      | 0.90      |
| Hourly flow rate (vph)        | 102   | 29   | 32    | 50   | 59        | 138       |
| Pedestrians                   |       |      |       |      | 2         |           |
| Lane Width (m)                |       |      |       |      | 3.5       |           |
| Walking Speed (m/s)           |       |      |       |      | 1.1       |           |
| Percent Blockage              |       |      |       |      | 0         |           |
| Right turn flare (veh)        |       |      |       |      |           |           |
| Median type                   | None  |      |       | None |           |           |
| Median storage veh)           |       |      |       | -    |           |           |
| Upstream signal (m)           |       |      |       |      |           |           |
| pX, platoon unblocked         |       |      |       |      |           |           |
| vC, conflicting volume        |       |      | 133   |      | 232       | 118       |
| vC1, stage 1 conf vol         |       |      |       |      |           |           |
| vC2, stage 2 conf vol         |       |      |       |      |           |           |
| vCu, unblocked vol            |       |      | 133   |      | 232       | 118       |
| tC, single (s)                |       |      | 4.1   |      | 6.4       | 6.2       |
| tC, 2 stage (s)               |       |      |       |      |           |           |
| tF (s)                        |       |      | 2.2   |      | 3.5       | 3.3       |
| p0 queue free %               |       |      | 98    |      | 92        | 85        |
| cM capacity (veh/h)           |       |      | 1437  |      | 742       | 934       |
| Direction, Lane #             | EB 1  | WB 1 | WB 2  | NB 1 |           |           |
| Volume Total                  | 131   | 32   | 50    | 197  |           |           |
| Volume Left                   | 0     | 32   | 0     | 59   |           |           |
| Volume Right                  | 29    | 0    | 0     | 138  |           |           |
| cSH                           | 1700  | 1437 | 1700  | 867  |           |           |
| Volume to Capacity            | 0.08  | 0.02 | 0.03  | 0.23 |           |           |
| Queue Length 95th (m)         | 0.0   | 0.5  | 0.0   | 6.6  |           |           |
| Control Delay (s)             | 0.0   | 7.6  | 0.0   | 10.4 |           |           |
| Lane LOS                      |       | А    |       | В    |           |           |
| Approach Delay (s)            | 0.0   | 3.0  |       | 10.4 |           |           |
| Approach LOS                  |       |      |       | В    |           |           |
| Intersection Summary          |       |      |       |      |           |           |
| Average Delay                 |       |      | 5.6   |      |           |           |
| Intersection Capacity Utiliza | ation |      | 26.4% | IC   | U Level c | f Service |
| Analysis Period (min)         |       |      | 15    |      |           |           |
| <b>j</b> = = = <b>=</b> ()    |       |      |       |      |           |           |

|                               | -     | 7    | 1     | -            | 1         | 1          |
|-------------------------------|-------|------|-------|--------------|-----------|------------|
| Movement                      | EBT   | EBR  | WBL   | WBT          | NBL       | NBR        |
| Lane Configurations           | ţ,    |      |       | <del>د</del> | ¥         |            |
| Traffic Volume (veh/h)        | 41    | 175  | 21    | 45           | 444       | 18         |
| Future Volume (Veh/h)         | 41    | 175  | 21    | 45           | 444       | 18         |
| Sign Control                  | Free  |      |       | Free         | Stop      |            |
| Grade                         | 0%    |      |       | 0%           | 0%        |            |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90         | 0.90      | 0.90       |
| Hourly flow rate (vph)        | 46    | 194  | 23    | 50           | 493       | 20         |
| Pedestrians                   | 1     |      |       |              | 1         |            |
| Lane Width (m)                | 3.5   |      |       |              | 3.5       |            |
| Walking Speed (m/s)           | 1.1   |      |       |              | 1.1       |            |
| Percent Blockage              | 0     |      |       |              | 0         |            |
| Right turn flare (veh)        | •     |      |       |              |           |            |
| Median type                   | None  |      |       | None         |           |            |
| Median storage veh)           |       |      |       |              |           |            |
| Upstream signal (m)           |       |      |       |              |           |            |
| pX, platoon unblocked         |       |      |       |              |           |            |
| vC, conflicting volume        |       |      | 241   |              | 241       | 144        |
| vC1, stage 1 conf vol         |       |      |       |              |           |            |
| vC2, stage 2 conf vol         |       |      |       |              |           |            |
| vCu, unblocked vol            |       |      | 241   |              | 241       | 144        |
| tC, single (s)                |       |      | 4.1   |              | 6.4       | 6.3        |
| tC, 2 stage (s)               |       |      |       |              |           |            |
| tF (s)                        |       |      | 2.2   |              | 3.5       | 3.4        |
| p0 queue free %               |       |      | 98    |              | 33        | 98         |
| cM capacity (veh/h)           |       |      | 1336  |              | 735       | 892        |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  |              |           |            |
| Volume Total                  | 240   | 73   | 513   |              |           |            |
| Volume Left                   | 0     | 23   | 493   |              |           |            |
| Volume Right                  | 194   | 0    | 20    |              |           |            |
| cSH                           | 1700  | 1336 | 740   |              |           |            |
| Volume to Capacity            | 0.14  | 0.02 | 0.69  |              |           |            |
| Queue Length 95th (m)         | 0.0   | 0.4  | 42.9  |              |           |            |
| Control Delay (s)             | 0.0   | 2.5  | 20.1  |              |           |            |
| Lane LOS                      | 0.0   | A    | C     |              |           |            |
| Approach Delay (s)            | 0.0   | 2.5  | 20.1  |              |           |            |
| Approach LOS                  | 0.0   | 2.0  | C     |              |           |            |
| Intersection Summary          |       |      |       |              |           |            |
| Average Delay                 |       |      | 12.7  |              |           |            |
| Intersection Capacity Utiliza | ation |      | 56.7% | 10           | U Level c | f Service  |
|                               | auon  |      |       | IC           |           | or Service |
| Analysis Period (min)         |       |      | 15    |              |           |            |

| Ine Configurations       Image: Configurations       Image: Configurations       Image: Configurations         affic Volume (veh/h)       5       0       0       78       24       2         gn Control       Free       Free       Stop       20       2         ade       0%       0%       0%       0%       24       2         protein factor       0.90       <   |                        | ٨    | +    | Ļ    | •    | 1         | ~          |  |
|---|------------------------|------|------|------|------|-----------|------------|--|
| Ine Configurations       Image: Configuration of the second | Movement               | EBL  | EBT  | WBT  | WBR  | SBL       | SBR        |  |
| affic Volume (veh/h)       5       0       0       78       24       2         gn Control       Free       Free       Stop       24       2         gade       0%       0%       0%       0%       0%       24       2         gade       0       0.90   | Lane Configurations    |      |      |      |      |           |            |  |
| thure Volume (Veh/h)         5         0         0         78         24         2           gn Control         Free         Free         Stop         Image: Stop  | Traffic Volume (veh/h) | 5    |      |      | 78   |           | 2          |  |
| gn Control         Free         Free         Stop           rade         0%         0%         0%         0%           pack Hour Factor         0.90         0.90         0.90         0.90         0.90           pack Hour Factor         0.90         0.90         0.90         0.90         0.90           pack Hour Factor         0.90         0.90         0.90         0.90         0.90           pack Hour Factor         0         87         27         2           pack Hour Factor         None         None         None         Sector           pack Hour Factor         None         None         None         Sector           pack Hour Factor         None         None         None         Sector  |                        |      |      | 0    |      |           |            |  |
| ade         0%         0%         0%           aak Hour Factor         0.90 <t< td=""><td>Sign Control</td><td></td><td>Free</td><td>Free</td><td></td><td>Stop</td><td></td><td></td></t<>  | Sign Control           |      | Free | Free |      | Stop      |            |  |
| bask Hour Factor         0.90   | Grade                  |      | 0%   | 0%   |      |           |            |  |
| burly flow rate (vph)         6         0         87         27         2           adestrians<br>ine Width (m)<br>alking Speed (m/s)<br>ercent Blockage<br>ght turn flare (veh)<br>edian storage veh)  | Peak Hour Factor       | 0.90 |      |      | 0.90 |           | 0.90       |  |
| adestrians<br>ine Width (m)<br>alking Speed (m/s)<br>preent Blockage<br>ght turn flare (veh)<br>edian type None None<br>edian type Solution<br>softream signal (m)<br>(, platoon unblocked<br>C, conflicting volume 87 56 44<br>1, stage 1 conf vol<br>22, stage 2 conf vol<br>20, unblocked vol 87 56 44<br>, single (s) 4.1 6.4 6.2<br>, 2 stage (s)<br>(s) 2.2 3.5 3.3<br>0 queue free % 100 97 100<br>A capacity (veh/h) 1509 948 1027<br>rection, Lane # EB 1 WB 1 SB 1<br>olume Total 6 87 29<br>olume Right 0 87 2<br>H 1509 1700 953<br>olume Loft 6 0 27<br>olume Right 0 87 2<br>H 1509 1700 953<br>olume Log A A<br>poroach Delay (s) 7.4 0.0 8.9<br>ine LOS A A<br>tersection Summary<br>rerage Delay 2.5<br>ICU Level of Service   | Hourly flow rate (vph) |      |      |      |      |           |            |  |
| alking Speed (m/s)         arcent Blockage         ght turn flare (veh)         edian type       None         edian storage veh)         ostream signal (m)         (x, platoon unblocked         2, conflicting volume       87         56       44         2, stage 1 conf vol         22, stage 2 conf vol         Cu, unblocked vol       87         2, stage 2 (s)         (s)       2.2         3.5       3.3         0 queue free %       100         97       100         M capacity (veh/h)       1509         948       1027         rection, Lane #         EB 1       WB 1       SB 1         Dume Total       6       87       29         Dume Total       6       87       29         Dume Eft       0       87       2         SH       1509       1700       953         Dume to Capacity       0.00       0.07         portrol Delay (s)       7.4       0.0       8.9         une LOS       A       A         oproach LOS       A       A         oproach LOS   | Pedestrians            |      |      |      |      |           |            |  |
| alking Speed (m/s)         arcent Blockage         ght turn flare (veh)         edian type       None         edian storage veh)         ostream signal (m)         (x, platoon unblocked         2, conflicting volume       87         56       44         2, stage 1 conf vol         22, stage 2 conf vol         Cu, unblocked vol       87         2, stage 2 (s)         (s)       2.2         (s)       2.2         3.5       3.3         0 queue free %       100         97       100         M capacity (veh/h)       1509         948       1027         rection, Lane #       EB 1       WB 1         SB1       SB1         olume Total       6       87         0       87       2         SH       1509       1700         953       950       1700         954       1509       1700         953       91700       953         9104       1509       170         954       1509       1700         955       7.4       0.0         9104 </td <td>Lane Width (m)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>  | Lane Width (m)         |      |      |      |      |           |            |  |
| arcent Blockage         ght turn flare (veh)         edian type       None         edian type       None         edian storage veh)         sstream signal (m)         K, platoon unblocked         C, conflicting volume       87         S, tage 1 conf vol         S2, stage 2 conf vol         Cu, unblocked vol       87         S4, single (s)       4.1         (s)       2.2         Olume Left       6         0       87         0.00       0.05         0.01       0.0         0.21       0.0         0.21       0.0   | Walking Speed (m/s)    |      |      |      |      |           |            |  |
| ght turn flare (veh)         None         None         None           edian storage veh)         ostream signal (m)         .         .         .           Systeam signal (m)         .         .         .         .         .           Systeam signal (m)         .         .         .         .         .         .           Systeam signal (m)         .  | Percent Blockage       |      |      |      |      |           |            |  |
| edian type         None         None           edian storage veh)         ostream signal (m)  | Right turn flare (veh) |      |      |      |      |           |            |  |
| edian storage veh)         postream signal (m)         K, platoon unblocked         C, conflicting volume       87         C, stage 1 conf vol         S2, stage 2 conf vol         Cu, unblocked vol       87         Single (s)       4.1         , single (s)       4.1         , single (s)       4.1         (s)       2.2         , 2 stage (s)       (s)         (s)       2.2         (s)       7.4         polume Total       6         6       87         polume Right       0         0.0       0.05         0.01       0.0         0.02       0.03         ueue Length 95th (m)       0.1         0.1       0.0   | Median type            |      | None | None |      |           |            |  |
| bestream signal (m)       K, platoon unblocked         C, conflicting volume       87       56       44         C1, stage 1 conf vol       22, stage 2 conf vol       22, stage 2 conf vol       22, stage 2 conf vol         Cu, unblocked vol       87       56       44         c, single (s)       4.1       6.4       6.2         c, 2 stage (s)       (s)       2.2       3.5       3.3         0 queue free %       100       97       100         M capacity (veh/h)       1509       948       1027         rection, Lane #       EB 1       WB 1       SB 1         olume Total       6       87       29         olume Right       0       87       2         SH       1509       1700       953         olume Right       0       87       2         SH       1509       1700       953         olume to Capacity       0.00       0.05       0.03         ueue Length 95th (m)       0.1       0.0       0.7         optroach Delay (s)       7.4       0.0       8.9         optroach LOS       A       A       A         optroach LOS       A       A       A  | Median storage veh)    |      |      |      |      |           |            |  |
| K, platoon unblocked         C, conflicting volume       87       56       44         C1, stage 1 conf vol         C2, stage 2 conf vol         Cu, unblocked vol       87       56       44         single (s)       4.1       6.4       6.2         , 2 stage (s)       (s)       2.2       3.5       3.3         Oqueue free %       100       97       100         M capacity (veh/h)       1509       948       1027         rection, Lane #       EB 1       WB 1       SB 1         olume Total       6       87       29         olume Right       0       87       2         SH       1509       1700       953         olume to Capacity       0.00       0.05       0.03         ueue Length 95th (m)       0.1       0.0       0.7         ontrol Delay (s)       7.4       0.0       8.9         oproach Delay (s)       7.4       0.0       8.9         oproach LOS       A       A         oproach LOS       A       A         oproach LOS       A       A         oproach LOS       A       A         oproach LOS       A   | Upstream signal (m)    |      |      |      |      |           |            |  |
| C, conflicting volume       87       56       44         C1, stage 1 conf vol       22, stage 2 conf vol       56       44         C2, stage 2 conf vol       87       56       44         Cu, unblocked vol       87       6.4       6.2         C3, stage (s)       6.4       6.2       6.4       6.2         (s)       2.2       3.5       3.3       0         Queue free %       100       97       100         M capacity (veh/h)       1509       948       1027         rection, Lane #       EB 1       WB 1       SB 1         plume Total       6       87       29         plume Left       6       0       27         plume Right       0       87       2         SH       1509       1700       953         plume to Capacity       0.00       0.05       0.03         ueue Length 95th (m)       0.1       0.0       8.9         nne LOS       A       A       A         oproach Delay (s)       7.4       0.0       8.9         oproach LOS       A       A       A         tersection Summary       2.5       ICU Level of Service <td>pX, platoon unblocked</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>  | pX, platoon unblocked  |      |      |      |      |           |            |  |
| C1, stage 1 conf vol         C2, stage 2 conf vol         Cu, unblocked vol       87         Single (s)       4.1         , single (s)       4.1         (s)       2.2         (s)       2.2         (s)       2.2         (s)       97         0 queue free %       100         100       97         A capacity (veh/h)       1509         948       1027         rection, Lane #       EB 1       WB 1         SB 1       SB 1         olume Total       6       87         olume Right       0       87         0.0       87       2         SH       1509       1700         Dume to Capacity       0.00       0.05         Outme to Capacity       0.00       0.07         ontrol Delay (s)       7.4       0.0       8.9         oproach Delay (s)       7.4       0.0       8.9         oproach LOS       A       A       A         verage Delay       2.5       1CU Level of Service  | vC, conflicting volume | 87   |      |      |      | 56        | 44         |  |
| 22, stage 2 conf vol       87       56       44         2, single (s)       4.1       6.4       6.2         3, single (s)       2.2       3.5       3.3         2, a stage (s)       97       100       97       100         3.5       3.3       97       100       97       100         A capacity (veh/h)       1509       948       1027       100         rection, Lane #       EB 1       WB 1       SB 1       100       100         plume Total       6       87       29       100       100         plume Right       0       87       2       100       <   | vC1, stage 1 conf vol  |      |      |      |      |           |            |  |
| Cu, unblocked vol       87       56       44         , single (s)       4.1       6.4       6.2         , 2 stage (s)       .   | vC2, stage 2 conf vol  |      |      |      |      |           |            |  |
| , 2 stage (s)       3.5       3.3         (s)       2.2       3.5       3.3         0 queue free %       100       97       100         A capacity (veh/h)       1509       948       1027         rection, Lane #       EB 1       WB 1       SB 1         olume Total       6       87       29         olume Left       6       0       27         olume Right       0       87       2         SH       1509       1700       953         olume to Capacity       0.00       0.05       0.03         ueue Length 95th (m)       0.1       0.0       8.9         one LOS       A       A       A         oproach LOS       A       A       A         opproach LOS       A       A       A         verage Delay       2.5       ICU Level of Service  | vCu, unblocked vol     | 87   |      |      |      | 56        | 44         |  |
| (s)       2.2       3.5       3.3         0 queue free %       100       97       100         0 queue free %       100       97       100         A capacity (veh/h)       1509       948       1027         rection, Lane #       EB 1       WB 1       SB 1         olume Total       6       87       29         olume Left       6       0       27         olume Right       0       87       2         SH       1509       1700       953         olume to Capacity       0.00       0.05       0.03         ueue Length 95th (m)       0.1       0.0       0.7         ontrol Delay (s)       7.4       0.0       8.9         oproach Delay (s)       7.4       0.0       8.9         oproach LOS       A       A         tersection Summary       2.5       ICU Level of Service  | tC, single (s)         | 4.1  |      |      |      | 6.4       | 6.2        |  |
| (s)         2.2         3.5         3.3           0 queue free %         100         97         100           A capacity (veh/h)         1509         948         1027           rection, Lane #         EB 1         WB 1         SB 1           olume Total         6         87         29           olume Left         6         0         27           olume Right         0         87         2           SH         1509         1700         953           olume to Capacity         0.00         0.05         0.03           ueue Length 95th (m)         0.1         0.0         0.7           ontrol Delay (s)         7.4         0.0         8.9           oproach Delay (s)         7.4         0.0         8.9           oproach LOS         A         A           tersection Summary         2.5         ICU Level of Service  | tC, 2 stage (s)        |      |      |      |      |           |            |  |
| O queue free %         100         97         100           A capacity (veh/h)         1509         948         1027           rection, Lane #         EB 1         WB 1         SB 1           olume Total         6         87         29           olume Left         6         0         27           olume Right         0         87         2           SH         1509         1700         953           olume to Capacity         0.00         0.05         0.03           ueue Length 95th (m)         0.1         0.0         0.7           ontrol Delay (s)         7.4         0.0         8.9           oproach Delay (s)         7.4         0.0         8.9           oproach LOS         A         A           tersection Summary         2.5         ICU Level of Service  | tF (s)                 | 2.2  |      |      |      | 3.5       | 3.3        |  |
| A capacity (veh/h)         1509         948         1027           rection, Lane #         EB 1         WB 1         SB 1         SB 1           olume Total         6         87         29         29           olume Left         6         0         27         27           olume Right         0         87         2         2           SH         1509         1700         953         2           olume to Capacity         0.00         0.05         0.03         2           ueue Length 95th (m)         0.1         0.0         0.7         2           ontrol Delay (s)         7.4         0.0         8.9         3           oproach Delay (s)         7.4         0.0         8.9         3           oproach LOS         A         A         A           tersection Summary         2.5         ICU Level of Service   | p0 queue free %        | 100  |      |      |      | 97        | 100        |  |
| blume Total         6         87         29           blume Left         6         0         27           blume Right         0         87         2           SH         1509         1700         953           blume to Capacity         0.00         0.05         0.03           ueue Length 95th (m)         0.1         0.0         0.7           bontrol Delay (s)         7.4         0.0         8.9           oproach Delay (s)         7.4         0.0         8.9           oproach LOS         A         A           tersection Summary         2.5         ICU Level of Service   | cM capacity (veh/h)    | 1509 |      |      |      | 948       | 1027       |  |
| Solume Left         6         0         27           SH         1509         1700         953           SH         1509         1700         953           Sume to Capacity         0.00         0.05         0.03           ueue Length 95th (m)         0.1         0.0         0.7           pontrol Delay (s)         7.4         0.0         8.9           une LOS         A         A           oproach Delay (s)         7.4         0.0         8.9           oproach LOS         A         A           tersection Summary         2.5         ICU Level of Service   | Direction, Lane #      | EB 1 | WB 1 | SB 1 |      |           |            |  |
| Olume Right         0         87         2           SH         1509         1700         953           Olume to Capacity         0.00         0.05         0.03           Jueue Length 95th (m)         0.1         0.0         0.7           Ontrol Delay (s)         7.4         0.0         8.9           Ame LOS         A         A           Oproach Delay (s)         7.4         0.0         8.9           Oproach Delay (s)         7.4         0.0         8.9           Oproach LOS         A         A           Verage Delay         2.5         ICU Level of Service   | Volume Total           | 6    | 87   | 29   |      |           |            |  |
| SH       1509       1700       953         plume to Capacity       0.00       0.05       0.03         ueue Length 95th (m)       0.1       0.0       0.7         pontrol Delay (s)       7.4       0.0       8.9         ane LOS       A       A         pproach Delay (s)       7.4       0.0       8.9         pproach LOS       A       A         tersection Summary       2.5         tersection Capacity Utilization       15.6%       ICU Level of Service  | Volume Left            | 6    | 0    | 27   |      |           |            |  |
| olume to Capacity         0.00         0.05         0.03           ueue Length 95th (m)         0.1         0.0         0.7           ontrol Delay (s)         7.4         0.0         8.9           one LOS         A         A           oproach Delay (s)         7.4         0.0         8.9           oproach Delay (s)         7.4         0.0         8.9           oproach LOS         A         A           tersection Summary         2.5         1000000000000000000000000000000000000   | Volume Right           | 0    | 87   | 2    |      |           |            |  |
| ueue Length 95th (m)         0.1         0.0         0.7           pontrol Delay (s)         7.4         0.0         8.9           une LOS         A         A           oproach Delay (s)         7.4         0.0         8.9           oproach Delay (s)         7.4         0.0         8.9           oproach LOS         A         A           tersection Summary         2.5         1000000000000000000000000000000000000   | cSH                    | 1509 | 1700 | 953  |      |           |            |  |
| ueue Length 95th (m)         0.1         0.0         0.7           pontrol Delay (s)         7.4         0.0         8.9           une LOS         A         A           oproach Delay (s)         7.4         0.0         8.9           oproach Delay (s)         7.4         0.0         8.9           oproach LOS         A         A           tersection Summary         2.5         1000000000000000000000000000000000000   | Volume to Capacity     | 0.00 | 0.05 | 0.03 |      |           |            |  |
| ontrol Delay (s) 7.4 0.0 8.9<br>ne LOS A A<br>oproach Delay (s) 7.4 0.0 8.9<br>oproach LOS A<br>tersection Summary<br>verage Delay 2.5<br>tersection Capacity Utilization 15.6% ICU Level of Service  | Queue Length 95th (m)  | 0.1  | 0.0  | 0.7  |      |           |            |  |
| ine LOS A A<br>oproach Delay (s) 7.4 0.0 8.9<br>oproach LOS A<br>tersection Summary<br>verage Delay 2.5<br>tersection Capacity Utilization 15.6% ICU Level of Service   |                        | 7.4  | 0.0  | 8.9  |      |           |            |  |
| pproach Delay (s) 7.4 0.0 8.9<br>pproach LOS A<br>tersection Summary<br>verage Delay 2.5<br>tersection Capacity Utilization 15.6% ICU Level of Service  | Lane LOS               |      |      | А    |      |           |            |  |
| A tersection Summary verage Delay tersection Capacity Utilization   | Approach Delay (s)     |      | 0.0  |      |      |           |            |  |
| verage Delay 2.5<br>tersection Capacity Utilization 15.6% ICU Level of Service  | Approach LOS           |      |      |      |      |           |            |  |
| tersection Capacity Utilization 15.6% ICU Level of Service  | Intersection Summary   |      |      |      |      |           |            |  |
| tersection Capacity Utilization 15.6% ICU Level of Service  | Average Delay          |      |      | 2.5  |      |           |            |  |
|   |                        | tion |      |      | IC   | U Level o | of Service |  |
|   | Analysis Period (min)  |      |      | 15   |      |           |            |  |

|                               | ۶     | +    | Ļ     | *    | *       | ~          |
|-------------------------------|-------|------|-------|------|---------|------------|
| Movement                      | EBL   | EBT  | WBT   | WBR  | SBL     | SBR        |
| Lane Configurations           |       | र्स  | ţ,    |      | ¥       |            |
| Traffic Volume (veh/h)        | 5     | 0    | 0     | 0    | 0       | 2          |
| Future Volume (Veh/h)         | 5     | 0    | 0     | 0    | 0       | 2          |
| Sign Control                  |       | Free | Free  |      | Stop    |            |
| Grade                         |       | 0%   | 0%    |      | 0%      |            |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90 | 0.90    | 0.90       |
| Hourly flow rate (vph)        | 6     | 0    | 0     | 0    | 0       | 2          |
| Pedestrians                   | •     | Ŭ    | •     | •    | ·       | -          |
| Lane Width (m)                |       |      |       |      |         |            |
| Walking Speed (m/s)           |       |      |       |      |         |            |
| Percent Blockage              |       |      |       |      |         |            |
| Right turn flare (veh)        |       |      |       |      |         |            |
| Median type                   |       | None | None  |      |         |            |
| Median storage veh)           |       | None | None  |      |         |            |
| Upstream signal (m)           |       |      |       |      |         |            |
| pX, platoon unblocked         |       |      |       |      |         |            |
| vC, conflicting volume        | 0     |      |       |      | 12      | 0          |
| vC1, stage 1 conf vol         | 0     |      |       |      | 12      | U          |
| vC2, stage 2 conf vol         |       |      |       |      |         |            |
| vCu, unblocked vol            | 0     |      |       |      | 12      | 0          |
| tC, single (s)                | 4.1   |      |       |      | 6.4     | 6.2        |
| tC, 2 stage (s)               | 7.1   |      |       |      | 0.4     | 0.2        |
|                               | 2.2   |      |       |      | 3.5     | 3.3        |
| tF (s)<br>p0 queue free %     | 100   |      |       |      | 100     | 100        |
|                               | 1623  |      |       |      | 1004    | 1085       |
| cM capacity (veh/h)           | 1023  |      |       |      | 1004    | 1005       |
| Direction, Lane #             | EB 1  | WB 1 | SB 1  |      |         |            |
| Volume Total                  | 6     | 0    | 2     |      |         |            |
| Volume Left                   | 6     | 0    | 0     |      |         |            |
| Volume Right                  | 0     | 0    | 2     |      |         |            |
| cSH                           | 1623  | 1700 | 1085  |      |         |            |
| Volume to Capacity            | 0.00  | 0.00 | 0.00  |      |         |            |
| Queue Length 95th (m)         | 0.1   | 0.0  | 0.0   |      |         |            |
| Control Delay (s)             | 7.2   | 0.0  | 8.3   |      |         |            |
| Lane LOS                      | А     |      | А     |      |         |            |
| Approach Delay (s)            | 7.2   | 0.0  | 8.3   |      |         |            |
| Approach LOS                  |       |      | А     |      |         |            |
| Intersection Summary          |       |      |       |      |         |            |
| Average Delay                 |       |      | 7.5   |      |         |            |
| Intersection Capacity Utiliza | ation |      | 13.3% | IC   | Ulevelo | of Service |
| Analysis Period (min)         |       |      | 15    |      |         |            |
|                               |       |      | 10    |      |         |            |

|                               | <b>→</b> | 7    | 1      | -    | 1         | 1          |
|-------------------------------|----------|------|--------|------|-----------|------------|
| Movement                      | EBT      | EBR  | WBL    | WBT  | NBL       | NBR        |
| Lane Configurations           | 4î       |      |        | र्स  | ¥         |            |
| Traffic Volume (veh/h)        | 6        | 18   | 0      | 20   | 59        | 0          |
| Future Volume (Veh/h)         | 6        | 18   | 0      | 20   | 59        | 0          |
| Sign Control                  | Free     |      |        | Free | Stop      |            |
| Grade                         | 0%       |      |        | 0%   | 0%        |            |
| Peak Hour Factor              | 0.90     | 0.90 | 0.90   | 0.90 | 0.90      | 0.90       |
| Hourly flow rate (vph)        | 7        | 20   | 0      | 22   | 66        | 0          |
| Pedestrians                   |          |      | -      |      |           | -          |
| Lane Width (m)                |          |      |        |      |           |            |
| Walking Speed (m/s)           |          |      |        |      |           |            |
| Percent Blockage              |          |      |        |      |           |            |
| Right turn flare (veh)        |          |      |        |      |           |            |
| Median type                   | None     |      |        | None |           |            |
| Median storage veh)           | None     |      |        | None |           |            |
| Upstream signal (m)           |          |      |        |      |           |            |
| pX, platoon unblocked         |          |      |        |      |           |            |
| vC, conflicting volume        |          |      | 27     |      | 39        | 17         |
| vC1, stage 1 conf vol         |          |      | 21     |      | 39        | 17         |
| vC2, stage 2 conf vol         |          |      |        |      |           |            |
| vCu, unblocked vol            |          |      | 27     |      | 39        | 17         |
|                               |          |      | 4.1    |      | 6.4       | 6.2        |
| tC, single (s)                |          |      | 4.1    |      | 0.4       | 0.2        |
| tC, 2 stage (s)               |          |      | 2.2    |      | 3.5       | 3.3        |
| tF (s)                        |          |      | 100    |      | 3.5<br>93 | 3.3<br>100 |
| p0 queue free %               |          |      |        |      |           |            |
| cM capacity (veh/h)           |          |      | 1587   |      | 973       | 1062       |
| Direction, Lane #             | EB 1     | WB 1 | NB 1   |      |           |            |
| Volume Total                  | 27       | 22   | 66     |      |           |            |
| Volume Left                   | 0        | 0    | 66     |      |           |            |
| Volume Right                  | 20       | 0    | 0      |      |           |            |
| cSH                           | 1700     | 1587 | 973    |      |           |            |
| Volume to Capacity            | 0.02     | 0.00 | 0.07   |      |           |            |
| Queue Length 95th (m)         | 0.0      | 0.0  | 1.7    |      |           |            |
| Control Delay (s)             | 0.0      | 0.0  | 9.0    |      |           |            |
| Lane LOS                      |          |      | А      |      |           |            |
| Approach Delay (s)            | 0.0      | 0.0  | 9.0    |      |           |            |
| Approach LOS                  |          |      | А      |      |           |            |
| Intersection Summary          |          |      |        |      |           |            |
| Average Delay                 |          |      | 5.1    |      |           |            |
| Intersection Capacity Utiliza | ation    |      | 13.5%  | IC   | U Level o | f Service  |
| Analysis Period (min)         |          |      | 15.578 | 10   |           |            |
|                               |          |      | 15     |      |           |            |

### HCM Unsignalized Intersection Capacity Analysis 47: Leslie Davis & Street A

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|--------------------------------|------|-------|-------|-------|-----------|------------|------|-------|------|------|-------|------|
| Movement                       | EBL  | EBT   | EBR   | WBL   | WBT       | WBR        | NBL  | NBT   | NBR  | SBL  | SBT   | SBR  |
| Lane Configurations            |      | \$    |       |       | \$        |            |      | 4     |      |      | 4     |      |
| Sign Control                   |      | Yield |       |       | Yield     |            |      | Yield |      |      | Yield |      |
| Traffic Volume (vph)           | 21   | 0     | 0     | 0     | 0         | 0          | 0    | 0     | 0    | 0    | 0     | 7    |
| Future Volume (vph)            | 21   | 0     | 0     | 0     | 0         | 0          | 0    | 0     | 0    | 0    | 0     | 7    |
| Peak Hour Factor               | 0.90 | 0.90  | 0.90  | 0.90  | 0.90      | 0.90       | 0.90 | 0.90  | 0.90 | 0.90 | 0.90  | 0.90 |
| Hourly flow rate (vph)         | 23   | 0     | 0     | 0     | 0         | 0          | 0    | 0     | 0    | 0    | 0     | 8    |
| Direction, Lane #              | EB 1 | WB 1  | NB 1  | SB 1  |           |            |      |       |      |      |       |      |
| Volume Total (vph)             | 23   | 0     | 0     | 8     |           |            |      |       |      |      |       |      |
| Volume Left (vph)              | 23   | 0     | 0     | 0     |           |            |      |       |      |      |       |      |
| Volume Right (vph)             | 0    | 0     | 0     | 8     |           |            |      |       |      |      |       |      |
| Hadj (s)                       | 0.23 | 0.00  | 0.00  | -0.57 |           |            |      |       |      |      |       |      |
| Departure Headway (s)          | 4.1  | 3.9   | 4.0   | 3.4   |           |            |      |       |      |      |       |      |
| Degree Utilization, x          | 0.03 | 0.00  | 0.00  | 0.01  |           |            |      |       |      |      |       |      |
| Capacity (veh/h)               | 860  | 900   | 900   | 1050  |           |            |      |       |      |      |       |      |
| Control Delay (s)              | 7.3  | 6.9   | 7.0   | 6.4   |           |            |      |       |      |      |       |      |
| Approach Delay (s)             | 7.3  | 0.0   | 0.0   | 6.4   |           |            |      |       |      |      |       |      |
| Approach LOS                   | А    | A     | Α     | A     |           |            |      |       |      |      |       |      |
| Intersection Summary           |      |       |       |       |           |            |      |       |      |      |       |      |
| Delay                          |      |       | 7.0   |       |           |            |      |       |      |      |       |      |
| Level of Service               |      |       | А     |       |           |            |      |       |      |      |       |      |
| Intersection Capacity Utilizat | ion  |       | 13.3% | IC    | U Level o | of Service |      |       | А    |      |       |      |
| Analysis Period (min)          |      |       | 15    |       |           |            |      |       |      |      |       |      |

## HCM Unsignalized Intersection Capacity Analysis 51: Swan & Brant-Waterloo

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|-------------------------------|------|------------|-------|------|-----------|--------------|------|------|------|------|------|------|
| Movement                      | EBL  | EBT        | EBR   | WBL  | WBT       | WBR          | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |      | 4          |       |      | 4         |              |      | 4    |      |      | 4    |      |
| Traffic Volume (veh/h)        | 3    | 0          | 5     | 0    | 5         | 6            | 3    | 100  | 3    | 6    | 76   | 4    |
| Future Volume (Veh/h)         | 3    | 0          | 5     | 0    | 5         | 6            | 3    | 100  | 3    | 6    | 76   | 4    |
| Sign Control                  |      | Stop       |       |      | Stop      |              |      | Free |      |      | Free |      |
| Grade                         |      | 0%         |       |      | 0%        |              |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor              | 0.90 | 0.90       | 0.90  | 0.90 | 0.90      | 0.90         | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 3    | 0          | 6     | 0    | 6         | 7            | 3    | 111  | 3    | 7    | 84   | 4    |
| Pedestrians                   |      |            |       |      |           |              |      |      |      |      |      |      |
| Lane Width (m)                |      |            |       |      |           |              |      |      |      |      |      |      |
| Walking Speed (m/s)           |      |            |       |      |           |              |      |      |      |      |      |      |
| Percent Blockage              |      |            |       |      |           |              |      |      |      |      |      |      |
| Right turn flare (veh)        |      |            |       |      |           |              |      |      |      |      |      |      |
| Median type                   |      |            |       |      |           |              |      | None |      |      | None |      |
| Median storage veh)           |      |            |       |      |           |              |      |      |      |      |      |      |
| Upstream signal (m)           |      |            |       |      |           |              |      |      |      |      |      |      |
| pX, platoon unblocked         |      |            |       |      |           |              |      |      |      |      |      |      |
| vC, conflicting volume        | 228  | 220        | 86    | 224  | 220       | 112          | 88   |      |      | 114  |      |      |
| vC1, stage 1 conf vol         |      |            |       |      |           |              |      |      |      |      |      |      |
| vC2, stage 2 conf vol         |      |            |       |      |           |              |      |      |      |      |      |      |
| vCu, unblocked vol            | 228  | 220        | 86    | 224  | 220       | 112          | 88   |      |      | 114  |      |      |
| tC, single (s)                | 7.1  | 6.5        | 6.2   | 7.1  | 6.5       | 6.2          | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)               |      |            |       |      |           |              |      |      |      |      |      |      |
| tF (s)                        | 3.5  | 4.0        | 3.3   | 3.5  | 4.0       | 3.3          | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %               | 100  | 100        | 99    | 100  | 99        | 99           | 100  |      |      | 100  |      |      |
| cM capacity (veh/h)           | 717  | 677        | 978   | 727  | 677       | 946          | 1520 |      |      | 1488 |      |      |
| Direction, Lane #             | EB 1 | WB 1       | NB 1  | SB 1 | -         |              |      |      |      |      |      |      |
| Volume Total                  | 9    | 13         | 117   | 95   |           |              |      |      |      |      |      |      |
| Volume Left                   | 3    | 0          | 3     | 7    |           |              |      |      |      |      |      |      |
| Volume Right                  | 6    | 7          | 3     | 4    |           |              |      |      |      |      |      |      |
| cSH                           | 872  | 799        | 1520  | 1488 |           |              |      |      |      |      |      |      |
| Volume to Capacity            | 0.01 | 0.02       | 0.00  | 0.00 |           |              |      |      |      |      |      |      |
| Queue Length 95th (m)         | 0.01 | 0.02       | 0.00  | 0.00 |           |              |      |      |      |      |      |      |
| Control Delay (s)             | 9.2  | 0.4<br>9.6 | 0.0   | 0.1  |           |              |      |      |      |      |      |      |
| , ( )                         |      |            |       |      |           |              |      |      |      |      |      |      |
| Lane LOS                      | A    | A          | A     | A    |           |              |      |      |      |      |      |      |
| Approach Delay (s)            | 9.2  | 9.6        | 0.2   | 0.6  |           |              |      |      |      |      |      |      |
| Approach LOS                  | А    | А          |       |      |           |              |      |      |      |      |      |      |
| Intersection Summary          |      |            |       |      |           |              |      |      |      |      |      |      |
| Average Delay                 |      |            | 1.2   |      |           | ( <b>0</b> · |      |      |      |      |      |      |
| Intersection Capacity Utiliza | tion |            | 19.2% | IC   | U Level o | of Service   |      |      | A    |      |      |      |
| Analysis Period (min)         |      |            | 15    |      |           |              |      |      |      |      |      |      |

|                              | 4        | ×    | t     | 1    | 1        | ţ          |
|------------------------------|----------|------|-------|------|----------|------------|
| Movement                     | WBL      | WBR  | NBT   | NBR  | SBL      | SBT        |
| Lane Configurations          | ¥        |      | 4     |      |          | र्स        |
| Traffic Volume (veh/h)       | 4        | 54   | 0     | 1    | 16       | 0          |
| Future Volume (Veh/h)        | 4        | 54   | 0     | 1    | 16       | 0          |
| Sign Control                 | Stop     |      | Free  |      |          | Free       |
| Grade                        | 0%       |      | 0%    |      |          | 0%         |
| Peak Hour Factor             | 0.90     | 0.90 | 0.90  | 0.90 | 0.90     | 0.90       |
| Hourly flow rate (vph)       | 4        | 60   | 0     | 1    | 18       | 0          |
| Pedestrians                  | •        | 00   | Ŭ     | •    | 10       | Ŭ          |
| Lane Width (m)               |          |      |       |      |          |            |
| Walking Speed (m/s)          |          |      |       |      |          |            |
| Percent Blockage             |          |      |       |      |          |            |
| Right turn flare (veh)       |          |      |       |      |          |            |
| Median type                  |          |      | None  |      |          | None       |
| Median storage veh)          |          |      | NONE  |      |          | NONE       |
| Upstream signal (m)          |          |      |       |      |          |            |
|                              |          |      |       |      |          |            |
| pX, platoon unblocked        | 36       | 0    |       |      | 4        |            |
| vC, conflicting volume       | 30       | 0    |       |      | 1        |            |
| vC1, stage 1 conf vol        |          |      |       |      |          |            |
| vC2, stage 2 conf vol        | 00       | 0    |       |      | 4        |            |
| vCu, unblocked vol           | 36       | 0    |       |      | 1        |            |
| tC, single (s)               | 6.4      | 6.2  |       |      | 4.1      |            |
| tC, 2 stage (s)              | <u> </u> |      |       |      |          |            |
| tF (s)                       | 3.5      | 3.3  |       |      | 2.2      |            |
| p0 queue free %              | 100      | 94   |       |      | 99       |            |
| cM capacity (veh/h)          | 965      | 1084 |       |      | 1622     |            |
| Direction, Lane #            | WB 1     | NB 1 | SB 1  |      |          |            |
| Volume Total                 | 64       | 1    | 18    |      |          |            |
| Volume Left                  | 4        | 0    | 18    |      |          |            |
| Volume Right                 | 60       | 1    | 0     |      |          |            |
| cSH                          | 1076     | 1700 | 1622  |      |          |            |
| Volume to Capacity           | 0.06     | 0.00 | 0.01  |      |          |            |
| Queue Length 95th (m)        | 1.4      | 0.0  | 0.3   |      |          |            |
| Control Delay (s)            | 8.6      | 0.0  | 7.2   |      |          |            |
| Lane LOS                     | А        |      | А     |      |          |            |
| Approach Delay (s)           | 8.6      | 0.0  | 7.2   |      |          |            |
| Approach LOS                 | А        |      |       |      |          |            |
| Intersection Summary         |          |      |       |      |          |            |
| Average Delay                |          |      | 8.2   |      |          |            |
| Intersection Capacity Utiliz | ation    |      | 18.1% | IC   | Ulevelo  | of Service |
| Analysis Period (min)        |          |      | 15    | .0   | 5 201010 |            |
|                              |          |      | 10    |      |          |            |

|                              | ٨           | *    | •     | 1      | Ļ          | 4          |
|------------------------------|-------------|------|-------|--------|------------|------------|
| Movement                     | EBL         | EBR  | NBL   | NBT    | SBT        | SBR        |
| Lane Configurations          | Y           |      |       | र्भ    | 4          |            |
| Traffic Volume (veh/h)       | 3           | 0    | 0     | 3      | 1          | 1          |
| Future Volume (Veh/h)        | 3           | 0    | 0     | 3      | 1          | 1          |
| Sign Control                 | Stop        |      |       | Free   | Free       |            |
| Grade                        | 0%          |      |       | 0%     | 0%         |            |
| Peak Hour Factor             | 0.90        | 0.90 | 0.90  | 0.90   | 0.90       | 0.90       |
| Hourly flow rate (vph)       | 3           | 0    | 0     | 3      | 1          | 1          |
| Pedestrians                  | -           | -    | -     | -      |            |            |
| Lane Width (m)               |             |      |       |        |            |            |
| Walking Speed (m/s)          |             |      |       |        |            |            |
| Percent Blockage             |             |      |       |        |            |            |
| Right turn flare (veh)       |             |      |       |        |            |            |
| Median type                  |             |      |       | None   | None       |            |
| Median storage veh)          |             |      |       | 110110 | 110110     |            |
| Upstream signal (m)          |             |      |       |        |            |            |
| pX, platoon unblocked        |             |      |       |        |            |            |
| vC, conflicting volume       | 4           | 2    | 2     |        |            |            |
| vC1, stage 1 conf vol        | <b>T</b>    | L    | 2     |        |            |            |
| vC2, stage 2 conf vol        |             |      |       |        |            |            |
| vCu, unblocked vol           | 4           | 2    | 2     |        |            |            |
| tC, single (s)               | 6.4         | 6.2  | 4.1   |        |            |            |
| tC, 2 stage (s)              | <b>т.</b> 0 | 0.2  | т. I  |        |            |            |
| tF (s)                       | 3.5         | 3.3  | 2.2   |        |            |            |
| p0 queue free %              | 100         | 100  | 100   |        |            |            |
| cM capacity (veh/h)          | 1017        | 1083 | 1620  |        |            |            |
|                              |             |      |       |        |            |            |
| Direction, Lane #            | EB 1        | NB 1 | SB 1  |        |            |            |
| Volume Total                 | 3           | 3    | 2     |        |            |            |
| Volume Left                  | 3           | 0    | 0     |        |            |            |
| Volume Right                 | 0           | 0    | 1     |        |            |            |
| cSH                          | 1017        | 1620 | 1700  |        |            |            |
| Volume to Capacity           | 0.00        | 0.00 | 0.00  |        |            |            |
| Queue Length 95th (m)        | 0.1         | 0.0  | 0.0   |        |            |            |
| Control Delay (s)            | 8.5         | 0.0  | 0.0   |        |            |            |
| Lane LOS                     | А           |      |       |        |            |            |
| Approach Delay (s)           | 8.5         | 0.0  | 0.0   |        |            |            |
| Approach LOS                 | А           |      |       |        |            |            |
| Intersection Summary         |             |      |       |        |            |            |
| Average Delay                |             |      | 3.2   |        |            |            |
| Intersection Capacity Utiliz | ation       |      | 13.3% | IC     | CU Level o | of Service |
| Analysis Period (min)        |             |      | 15    |        |            |            |
|                              |             |      | 10    |        |            |            |

### HCM Unsignalized Intersection Capacity Analysis 1: Hilltop & Swan

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|-----------------------------------|------|------|-------|------|-----------|------------|------|------|------|------|------|------|
| Movement                          | EBL  | EBT  | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations               |      | \$   |       |      | \$        |            | ٦    | ¢Î,  |      | 7    | ¢Î,  |      |
| Traffic Volume (veh/h)            | 2    | 0    | 0     | 29   | 0         | 93         | 0    | 146  | 40   | 168  | 255  | 6    |
| Future Volume (Veh/h)             | 2    | 0    | 0     | 29   | 0         | 93         | 0    | 146  | 40   | 168  | 255  | 6    |
| Sign Control                      |      | Stop |       |      | Stop      |            |      | Free |      |      | Free |      |
| Grade                             |      | 0%   |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor                  | 0.90 | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)            | 2    | 0    | 0     | 32   | 0         | 103        | 0    | 162  | 44   | 187  | 283  | 7    |
| Pedestrians                       |      |      |       |      | 1         |            |      | 3    |      |      |      |      |
| Lane Width (m)                    |      |      |       |      | 3.5       |            |      | 3.5  |      |      |      |      |
| Walking Speed (m/s)               |      |      |       |      | 1.1       |            |      | 1.1  |      |      |      |      |
| Percent Blockage                  |      |      |       |      | 0         |            |      | 0    |      |      |      |      |
| Right turn flare (veh)            |      |      |       |      |           |            |      |      |      |      |      |      |
| Median type                       |      |      |       |      |           |            |      | None |      |      | None |      |
| Median storage veh)               |      |      |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)               |      |      |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked             |      |      |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume            | 926  | 868  | 290   | 845  | 849       | 185        | 290  |      |      | 207  |      |      |
| vC1, stage 1 conf vol             |      |      |       |      |           |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol             |      |      |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol                | 926  | 868  | 290   | 845  | 849       | 185        | 290  |      |      | 207  |      |      |
| tC, single (s)                    | 7.1  | 6.5  | 6.2   | 7.1  | 6.5       | 6.2        | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)                   |      |      |       |      |           |            |      |      |      |      |      |      |
| tF (s)                            | 3.5  | 4.0  | 3.3   | 3.5  | 4.0       | 3.3        | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %                   | 99   | 100  | 100   | 87   | 100       | 88         | 100  |      |      | 86   |      |      |
| cM capacity (veh/h)               | 198  | 253  | 752   | 254  | 259       | 856        | 1283 |      |      | 1375 |      |      |
| Direction, Lane #                 | EB 1 | WB 1 | NB 1  | NB 2 | SB 1      | SB 2       |      |      |      |      |      |      |
| Volume Total                      | 2    | 135  | 0     | 206  | 187       | 290        |      |      |      |      |      |      |
| Volume Left                       | 2    | 32   | 0     | 0    | 187       | 0          |      |      |      |      |      |      |
| Volume Right                      | 0    | 103  | 0     | 44   | 0         | 7          |      |      |      |      |      |      |
| cSH                               | 198  | 548  | 1700  | 1700 | 1375      | 1700       |      |      |      |      |      |      |
| Volume to Capacity                | 0.01 | 0.25 | 0.00  | 0.12 | 0.14      | 0.17       |      |      |      |      |      |      |
| Queue Length 95th (m)             | 0.2  | 7.3  | 0.0   | 0.0  | 3.6       | 0.0        |      |      |      |      |      |      |
| Control Delay (s)                 | 23.4 | 13.7 | 0.0   | 0.0  | 8.0       | 0.0        |      |      |      |      |      |      |
| Lane LOS                          | С    | В    |       |      | А         |            |      |      |      |      |      |      |
| Approach Delay (s)                | 23.4 | 13.7 | 0.0   |      | 3.1       |            |      |      |      |      |      |      |
| Approach LOS                      | С    | В    |       |      |           |            |      |      |      |      |      |      |
| Intersection Summary              |      |      |       |      |           |            |      |      |      |      |      |      |
| Average Delay                     |      |      | 4.1   |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utilization | tion |      | 42.1% | IC   | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)             |      |      | 15    |      |           |            |      |      |      |      |      |      |

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|-------------------------------|-------|------|-------|-------|-----------|------------|------|------|------|------|------|------|
| Movement                      | EBL   | EBT  | EBR   | WBL   | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |       | \$   |       |       | \$        |            |      | \$   |      |      | \$   |      |
| Sign Control                  |       | Stop |       |       | Stop      |            |      | Stop |      |      | Stop |      |
| Traffic Volume (vph)          | 5     | 42   | 122   | 33    | 30        | 0          | 79   | 5    | 12   | 0    | 2    | 4    |
| Future Volume (vph)           | 5     | 42   | 122   | 33    | 30        | 0          | 79   | 5    | 12   | 0    | 2    | 4    |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90  | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 6     | 47   | 136   | 37    | 33        | 0          | 88   | 6    | 13   | 0    | 2    | 4    |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  | SB 1  |           |            |      |      |      |      |      |      |
| Volume Total (vph)            | 189   | 70   | 107   | 6     |           |            |      |      |      |      |      |      |
| Volume Left (vph)             | 6     | 37   | 88    | 0     |           |            |      |      |      |      |      |      |
| Volume Right (vph)            | 136   | 0    | 13    | 4     |           |            |      |      |      |      |      |      |
| Hadj (s)                      | -0.43 | 0.11 | 0.09  | -0.40 |           |            |      |      |      |      |      |      |
| Departure Headway (s)         | 3.8   | 4.5  | 4.5   | 4.2   |           |            |      |      |      |      |      |      |
| Degree Utilization, x         | 0.20  | 0.09 | 0.14  | 0.01  |           |            |      |      |      |      |      |      |
| Capacity (veh/h)              | 911   | 769  | 748   | 792   |           |            |      |      |      |      |      |      |
| Control Delay (s)             | 7.8   | 7.9  | 8.3   | 7.2   |           |            |      |      |      |      |      |      |
| Approach Delay (s)            | 7.8   | 7.9  | 8.3   | 7.2   |           |            |      |      |      |      |      |      |
| Approach LOS                  | А     | А    | Α     | А     |           |            |      |      |      |      |      |      |
| Intersection Summary          |       |      |       |       |           |            |      |      |      |      |      |      |
| Delay                         |       |      | 7.9   |       |           |            |      |      |      |      |      |      |
| Level of Service              |       |      | А     |       |           |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | tion  |      | 35.4% | IC    | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |       |      | 15    |       |           |            |      |      |      |      |      |      |

# HCM Unsignalized Intersection Capacity Analysis 21: Stanley & Northumberland

|                                    | ٨        | -        | 7     | 1         | +          | *          | 1    | 1    | 1    | 4    | Ŧ    | 4    |
|------------------------------------|----------|----------|-------|-----------|------------|------------|------|------|------|------|------|------|
| Movement                           | EBL      | EBT      | EBR   | WBL       | WBT        | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations                |          | 4        |       |           | र्स        | 1          |      | 4    |      |      | 4    |      |
| Traffic Volume (veh/h)             | 64       | 37       | 3     | 2         | 38         | 291        | 2    | 14   | 5    | 532  | 10   | 81   |
| Future Volume (Veh/h)              | 64       | 37       | 3     | 2         | 38         | 291        | 2    | 14   | 5    | 532  | 10   | 81   |
| Sign Control                       |          | Free     |       |           | Free       |            |      | Stop |      |      | Stop |      |
| Grade                              |          | 0%       |       |           | 0%         |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor                   | 0.90     | 0.90     | 0.90  | 0.90      | 0.90       | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)             | 71       | 41       | 3     | 2         | 42         | 323        | 2    | 16   | 6    | 591  | 11   | 90   |
| Pedestrians                        |          | 1        |       |           | 6          |            |      | 2    |      |      | 5    |      |
| Lane Width (m)                     |          | 3.5      |       |           | 3.5        |            |      | 3.5  |      |      | 3.5  |      |
| Walking Speed (m/s)                |          | 1.1      |       |           | 1.1        |            |      | 1.1  |      |      | 1.1  |      |
| Percent Blockage                   |          | 0        |       |           | 1          |            |      | 0    |      |      | 0    |      |
| Right turn flare (veh)             |          |          |       |           |            |            |      |      |      |      |      |      |
| Median type                        |          | None     |       |           | None       |            |      |      |      |      |      |      |
| Median storage veh)                |          |          |       |           |            |            |      |      |      |      |      |      |
| Upstream signal (m)                |          |          |       |           |            |            |      |      |      |      |      |      |
| pX, platoon unblocked              |          |          |       |           |            |            |      |      |      |      |      |      |
| vC, conflicting volume             | 47       |          |       | 46        |            |            | 329  | 238  | 50   | 256  | 239  | 48   |
| vC1, stage 1 conf vol              |          |          |       |           |            |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol              |          |          |       |           |            |            |      |      |      |      |      |      |
| vCu, unblocked vol                 | 47       |          |       | 46        |            |            | 329  | 238  | 50   | 256  | 239  | 48   |
| tC, single (s)                     | 4.1      |          |       | 4.1       |            |            | 7.1  | 6.5  | 6.2  | 7.1  | 6.5  | 6.2  |
| tC, 2 stage (s)                    |          |          |       |           |            |            |      |      |      |      |      |      |
| tF (s)                             | 2.2      |          |       | 2.2       |            |            | 3.5  | 4.0  | 3.3  | 3.5  | 4.0  | 3.3  |
| p0 queue free %                    | 95       |          |       | 100       |            |            | 100  | 97   | 99   | 9    | 98   | 91   |
| cM capacity (veh/h)                | 1567     |          |       | 1572      |            |            | 541  | 632  | 1016 | 651  | 631  | 1021 |
| Direction, Lane #                  | EB 1     | WB 1     | WB 2  | NB 1      | SB 1       |            |      |      |      |      |      |      |
| Volume Total                       | 115      | 44       | 323   | 24        | 692        |            |      |      |      |      |      |      |
| Volume Left                        | 71       | 2        | 020   | 2         | 591        |            |      |      |      |      |      |      |
| Volume Right                       | 3        | 0        | 323   | 6         | 90         |            |      |      |      |      |      |      |
| cSH                                | 1567     | 1572     | 1700  | 687       | 682        |            |      |      |      |      |      |      |
| Volume to Capacity                 | 0.05     | 0.00     | 0.19  | 0.03      | 1.01       |            |      |      |      |      |      |      |
| Queue Length 95th (m)              | 1.1      | 0.00     | 0.19  | 0.03      | 127.1      |            |      |      |      |      |      |      |
| <b>2</b> ( <i>i</i>                | 4.7      | 0.0      | 0.0   | 10.4      | 62.6       |            |      |      |      |      |      |      |
| Control Delay (s)<br>Lane LOS      | 4.7<br>A | 0.3<br>A | 0.0   | 10.4<br>B | 62.6<br>F  |            |      |      |      |      |      |      |
|                                    | 4.7      | 0.0      |       | ы<br>10.4 | г<br>62.6  |            |      |      |      |      |      |      |
| Approach Delay (s)<br>Approach LOS | 4.7      | 0.0      |       | 10.4<br>B | 02.0<br>F  |            |      |      |      |      |      |      |
|                                    |          |          |       |           |            |            |      |      |      |      |      |      |
| Intersection Summary               |          |          | 26.0  |           |            |            |      |      |      |      |      |      |
| Average Delay                      | tion     |          | 36.8  |           |            | f Consist  |      |      | 0    |      |      |      |
| Intersection Capacity Utiliza      |          |          | 69.8% | IC        | CU Level c | DI SEIVICE |      |      | С    |      |      |      |
| Analysis Period (min)              |          |          | 15    |           |            |            |      |      |      |      |      |      |

|                                   | -       | 7    | 4     | -    | 1         | 1          |
|-----------------------------------|---------|------|-------|------|-----------|------------|
| Movement                          | EBT     | EBR  | WBL   | WBT  | NBL       | NBR        |
| Lane Configurations               | 1       |      | ۲     | •    | Y         |            |
| Traffic Volume (veh/h)            | 36      | 62   | 113   | 77   | 41        | 40         |
| Future Volume (Veh/h)             | 36      | 62   | 113   | 77   | 41        | 40         |
| Sign Control                      | Free    |      |       | Free | Stop      |            |
| Grade                             | 0%      |      |       | 0%   | 0%        |            |
| Peak Hour Factor                  | 0.90    | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       |
| Hourly flow rate (vph)            | 40      | 69   | 126   | 86   | 46        | 44         |
| Pedestrians                       |         |      |       |      | 2         |            |
| Lane Width (m)                    |         |      |       |      | 3.5       |            |
| Walking Speed (m/s)               |         |      |       |      | 1.1       |            |
| Percent Blockage                  |         |      |       |      | 0         |            |
| Right turn flare (veh)            |         |      |       |      |           |            |
| Median type                       | None    |      |       | None |           |            |
| Median storage veh)               | 1 tonio |      |       | Home |           |            |
| Upstream signal (m)               |         |      |       |      |           |            |
| pX, platoon unblocked             |         |      |       |      |           |            |
| vC, conflicting volume            |         |      | 111   |      | 414       | 76         |
| vC1, stage 1 conf vol             |         |      |       |      |           | 10         |
| vC2, stage 2 conf vol             |         |      |       |      |           |            |
| vCu, unblocked vol                |         |      | 111   |      | 414       | 76         |
| tC, single (s)                    |         |      | 4.1   |      | 6.4       | 6.2        |
| tC, 2 stage (s)                   |         |      |       |      | 5.1       | 5.2        |
| tF (s)                            |         |      | 2.2   |      | 3.5       | 3.3        |
| p0 queue free %                   |         |      | 92    |      | 92        | 96         |
| cM capacity (veh/h)               |         |      | 1489  |      | 547       | 988        |
|                                   |         |      |       |      | 011       | 000        |
| Direction, Lane #                 | EB 1    | WB 1 | WB 2  | NB 1 |           |            |
| Volume Total                      | 109     | 126  | 86    | 90   |           |            |
| Volume Left                       | 0       | 126  | 0     | 46   |           |            |
| Volume Right                      | 69      | 0    | 0     | 44   |           |            |
| cSH                               | 1700    | 1489 | 1700  | 699  |           |            |
| Volume to Capacity                | 0.06    | 0.08 | 0.05  | 0.13 |           |            |
| Queue Length 95th (m)             | 0.0     | 2.1  | 0.0   | 3.3  |           |            |
| Control Delay (s)                 | 0.0     | 7.6  | 0.0   | 10.9 |           |            |
| Lane LOS                          |         | A    |       | В    |           |            |
| Approach Delay (s)                | 0.0     | 4.5  |       | 10.9 |           |            |
| Approach LOS                      |         |      |       | В    |           |            |
| Intersection Summary              |         |      |       |      |           |            |
| Average Delay                     |         |      | 4.7   |      |           |            |
| Intersection Capacity Utilization | ation   |      | 25.1% | IC   | U Level c | of Service |
| Analysis Period (min)             |         |      | 15    |      |           |            |
| <b>, , , , , , , , , ,</b>        |         |      |       |      |           |            |

|                               | <b>→</b> | 7    | 1     | -    | 1         | 1          |
|-------------------------------|----------|------|-------|------|-----------|------------|
| Movement                      | EBT      | EBR  | WBL   | WBT  | NBL       | NBR        |
| Lane Configurations           | ¢        |      |       | 4    | M         |            |
| Traffic Volume (veh/h)        | 52       | 524  | 24    | 52   | 279       | 13         |
| Future Volume (Veh/h)         | 52       | 524  | 24    | 52   | 279       | 13         |
| Sign Control                  | Free     |      |       | Free | Stop      |            |
| Grade                         | 0%       |      |       | 0%   | 0%        |            |
| Peak Hour Factor              | 0.90     | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       |
| Hourly flow rate (vph)        | 58       | 582  | 27    | 58   | 310       | 14         |
| Pedestrians                   | 1        |      |       |      | 1         |            |
| Lane Width (m)                | 3.5      |      |       |      | 3.5       |            |
| Walking Speed (m/s)           | 1.1      |      |       |      | 1.1       |            |
| Percent Blockage              | 0        |      |       |      | 0         |            |
| Right turn flare (veh)        |          |      |       |      |           |            |
| Median type                   | None     |      |       | None |           |            |
| Median storage veh)           |          |      |       |      |           |            |
| Upstream signal (m)           |          |      |       |      |           |            |
| pX, platoon unblocked         |          |      |       |      |           |            |
| vC, conflicting volume        |          |      | 641   |      | 463       | 350        |
| vC1, stage 1 conf vol         |          |      |       |      |           |            |
| vC2, stage 2 conf vol         |          |      |       |      |           |            |
| vCu, unblocked vol            |          |      | 641   |      | 463       | 350        |
| tC, single (s)                |          |      | 4.1   |      | 6.4       | 6.2        |
| tC, 2 stage (s)               |          |      |       |      |           |            |
| tF (s)                        |          |      | 2.2   |      | 3.5       | 3.3        |
| p0 queue free %               |          |      | 97    |      | 43        | 98         |
| cM capacity (veh/h)           |          |      | 952   |      | 542       | 697        |
| Direction, Lane #             | EB 1     | WB 1 | NB 1  |      |           |            |
| Volume Total                  | 640      | 85   | 324   |      |           |            |
| Volume Left                   | 0        | 27   | 310   |      |           |            |
| Volume Right                  | 582      | 0    | 14    |      |           |            |
| cSH                           | 1700     | 952  | 547   |      |           |            |
| Volume to Capacity            | 0.38     | 0.03 | 0.59  |      |           |            |
| Queue Length 95th (m)         | 0.0      | 0.7  | 29.1  |      |           |            |
| Control Delay (s)             | 0.0      | 3.0  | 20.7  |      |           |            |
| Lane LOS                      | 0.0      | A    | C     |      |           |            |
| Approach Delay (s)            | 0.0      | 3.0  | 20.7  |      |           |            |
| Approach LOS                  | 0.0      |      | C     |      |           |            |
| Intersection Summary          |          |      |       |      |           |            |
| Average Delay                 |          |      | 6.6   |      |           |            |
| Intersection Capacity Utiliza | ation    |      | 64.7% | IC   | U Level c | of Service |
| Analysis Period (min)         |          |      | 15    | 10   | 2 201010  |            |
|                               |          |      | 15    |      |           |            |

|                                   | ٠      | +    | Ļ     | *    | 1         | ~          |  |
|-----------------------------------|--------|------|-------|------|-----------|------------|--|
| Movement                          | EBL    | EBT  | WBT   | WBR  | SBL       | SBR        |  |
| Lane Configurations               |        | र्स  | t,    |      | Y         |            |  |
| Traffic Volume (veh/h)            | 3      | 0    | 0     | 55   | 94        | 5          |  |
| Future Volume (Veh/h)             | 3      | 0    | 0     | 55   | 94        | 5          |  |
| Sign Control                      |        | Free | Free  |      | Stop      |            |  |
| Grade                             |        | 0%   | 0%    |      | 0%        |            |  |
| Peak Hour Factor                  | 0.90   | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       |  |
| Hourly flow rate (vph)            | 3      | 0    | 0     | 61   | 104       | 6          |  |
| Pedestrians                       |        |      |       |      |           |            |  |
| Lane Width (m)                    |        |      |       |      |           |            |  |
| Walking Speed (m/s)               |        |      |       |      |           |            |  |
| Percent Blockage                  |        |      |       |      |           |            |  |
| Right turn flare (veh)            |        |      |       |      |           |            |  |
| Median type                       |        | None | None  |      |           |            |  |
| Median storage veh)               |        |      |       |      |           |            |  |
| Upstream signal (m)               |        |      |       |      |           |            |  |
| pX, platoon unblocked             |        |      |       |      |           |            |  |
| vC, conflicting volume            | 61     |      |       |      | 36        | 30         |  |
| vC1, stage 1 conf vol             |        |      |       |      |           |            |  |
| vC2, stage 2 conf vol             |        |      |       |      |           |            |  |
| vCu, unblocked vol                | 61     |      |       |      | 36        | 30         |  |
| 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    |      |       |      | 89        | 99         |  |
| cM capacity (veh/h)               | 1542   |      |       |      | 974       | 1044       |  |
| Direction, Lane #                 | EB 1   | WB 1 | SB 1  |      | -         | -          |  |
| Volume Total                      |        | 61   | 110   |      |           |            |  |
|                                   | 3<br>3 |      | 104   |      |           |            |  |
| Volume Left                       | 3<br>0 | 0    |       |      |           |            |  |
| Volume Right                      |        | 61   | 6     |      |           |            |  |
| cSH<br>Valume te Canacitu         | 1542   | 1700 | 978   |      |           |            |  |
| Volume to Capacity                | 0.00   | 0.04 | 0.11  |      |           |            |  |
| Queue Length 95th (m)             | 0.0    | 0.0  | 2.9   |      |           |            |  |
| Control Delay (s)                 | 7.3    | 0.0  | 9.1   |      |           |            |  |
| Lane LOS                          | A      | 0.0  | A     |      |           |            |  |
| Approach Delay (s)                | 7.3    | 0.0  | 9.1   |      |           |            |  |
| Approach LOS                      |        |      | А     |      |           |            |  |
| Intersection Summary              |        |      |       |      |           |            |  |
| Average Delay                     |        |      | 5.9   |      |           |            |  |
| Intersection Capacity Utilization | on     |      | 16.5% | IC   | U Level o | of Service |  |
| Analysis Period (min)             |        |      | 15    |      |           |            |  |

|                              | ٦                                     | +                                     | Ļ     | *    | *          | ~          |
|------------------------------|---------------------------------------|---------------------------------------|-------|------|------------|------------|
| Movement                     | EBL                                   | EBT                                   | WBT   | WBR  | SBL        | SBR        |
| Lane Configurations          |                                       | र्स                                   | Þ     |      | ¥          |            |
| Traffic Volume (veh/h)       | 3                                     | 0                                     | 0     | 0    | 0          | 5          |
| Future Volume (Veh/h)        | 3                                     | 0                                     | 0     | 0    | 0          | 5          |
| Sign Control                 |                                       | Free                                  | Free  |      | Stop       |            |
| Grade                        |                                       | 0%                                    | 0%    |      | 0%         |            |
| Peak Hour Factor             | 0.90                                  | 0.90                                  | 0.90  | 0.90 | 0.90       | 0.90       |
| Hourly flow rate (vph)       | 3                                     | 0                                     | 0     | 0    | 0          | 6          |
| Pedestrians                  | , , , , , , , , , , , , , , , , , , , | , , , , , , , , , , , , , , , , , , , | , ,   | •    | ·          | ,          |
| Lane Width (m)               |                                       |                                       |       |      |            |            |
| Walking Speed (m/s)          |                                       |                                       |       |      |            |            |
| Percent Blockage             |                                       |                                       |       |      |            |            |
| Right turn flare (veh)       |                                       |                                       |       |      |            |            |
| Median type                  |                                       | None                                  | None  |      |            |            |
| Median storage veh)          |                                       | None                                  | None  |      |            |            |
| Upstream signal (m)          |                                       |                                       |       |      |            |            |
| pX, platoon unblocked        |                                       |                                       |       |      |            |            |
| vC, conflicting volume       | 0                                     |                                       |       |      | 6          | 0          |
| vC1, stage 1 conf vol        | 0                                     |                                       |       |      | 0          | U          |
| vC2, stage 2 conf vol        |                                       |                                       |       |      |            |            |
| vCu, unblocked vol           | 0                                     |                                       |       |      | 6          | 0          |
| tC, single (s)               | 4.1                                   |                                       |       |      | 6.4        | 6.2        |
|                              | 4.1                                   |                                       |       |      | 0.4        | 0.2        |
| tC, 2 stage (s)              | 2.2                                   |                                       |       |      | 3.5        | 3.3        |
| tF (s)                       | 2.2                                   |                                       |       |      | 3.5<br>100 | 3.3<br>99  |
| p0 queue free %              | 1623                                  |                                       |       |      | 100        |            |
| cM capacity (veh/h)          | 1023                                  |                                       |       |      | 1014       | 1085       |
| Direction, Lane #            | EB 1                                  | WB 1                                  | SB 1  |      |            |            |
| Volume Total                 | 3                                     | 0                                     | 6     |      |            |            |
| Volume Left                  | 3                                     | 0                                     | 0     |      |            |            |
| Volume Right                 | 0                                     | 0                                     | 6     |      |            |            |
| cSH                          | 1623                                  | 1700                                  | 1085  |      |            |            |
| Volume to Capacity           | 0.00                                  | 0.00                                  | 0.01  |      |            |            |
| Queue Length 95th (m)        | 0.0                                   | 0.0                                   | 0.1   |      |            |            |
| Control Delay (s)            | 7.2                                   | 0.0                                   | 8.3   |      |            |            |
| Lane LOS                     | А                                     |                                       | А     |      |            |            |
| Approach Delay (s)           | 7.2                                   | 0.0                                   | 8.3   |      |            |            |
| Approach LOS                 |                                       |                                       | А     |      |            |            |
| Intersection Summary         |                                       |                                       |       |      |            |            |
| Average Delay                |                                       |                                       | 8.0   |      |            |            |
| Intersection Capacity Utiliz | ation                                 |                                       | 13.3% | IC   | U Level o  | of Service |
| Analysis Period (min)        |                                       |                                       | 15    |      |            |            |
|                              |                                       |                                       | 10    |      |            |            |

|                              | -     | 7    | 4     | +    | 1         | 1          |
|------------------------------|-------|------|-------|------|-----------|------------|
| Movement                     | EBT   | EBR  | WBL   | WBT  | NBL       | NBR        |
| Lane Configurations          | ţ,    |      |       | र्भ  | ¥         |            |
| Traffic Volume (veh/h)       | 24    | 71   | 0     | 14   | 42        | 0          |
| Future Volume (Veh/h)        | 24    | 71   | 0     | 14   | 42        | 0          |
| Sign Control                 | Free  |      |       | Free | Stop      |            |
| Grade                        | 0%    |      |       | 0%   | 0%        |            |
| Peak Hour Factor             | 0.90  | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       |
| Hourly flow rate (vph)       | 27    | 79   | 0     | 16   | 47        | 0          |
| Pedestrians                  |       |      |       |      |           | -          |
| Lane Width (m)               |       |      |       |      |           |            |
| Walking Speed (m/s)          |       |      |       |      |           |            |
| Percent Blockage             |       |      |       |      |           |            |
| Right turn flare (veh)       |       |      |       |      |           |            |
| Median type                  | None  |      |       | None |           |            |
| Median storage veh)          | None  |      |       | None |           |            |
| Upstream signal (m)          |       |      |       |      |           |            |
| pX, platoon unblocked        |       |      |       |      |           |            |
| vC, conflicting volume       |       |      | 106   |      | 82        | 66         |
| vC1, stage 1 conf vol        |       |      | 100   |      | 02        | 00         |
| vC2, stage 2 conf vol        |       |      |       |      |           |            |
| vCu, unblocked vol           |       |      | 106   |      | 82        | 66         |
| tC, single (s)               |       |      | 4.1   |      | 6.4       | 6.2        |
| tC, 2 stage (s)              |       |      | 7.1   |      | 0.4       | 0.2        |
| tF (s)                       |       |      | 2.2   |      | 3.5       | 3.3        |
| p0 queue free %              |       |      | 100   |      | 95        | 100        |
| cM capacity (veh/h)          |       |      | 1485  |      | 95<br>919 | 997        |
| ,                            |       |      |       |      | 313       | 551        |
| Direction, Lane #            | EB 1  | WB 1 | NB 1  |      |           |            |
| Volume Total                 | 106   | 16   | 47    |      |           |            |
| Volume Left                  | 0     | 0    | 47    |      |           |            |
| Volume Right                 | 79    | 0    | 0     |      |           |            |
| cSH                          | 1700  | 1485 | 919   |      |           |            |
| Volume to Capacity           | 0.06  | 0.00 | 0.05  |      |           |            |
| Queue Length 95th (m)        | 0.0   | 0.0  | 1.2   |      |           |            |
| Control Delay (s)            | 0.0   | 0.0  | 9.1   |      |           |            |
| Lane LOS                     |       |      | А     |      |           |            |
| Approach Delay (s)           | 0.0   | 0.0  | 9.1   |      |           |            |
| Approach LOS                 |       |      | А     |      |           |            |
| Intersection Summary         |       |      |       |      |           |            |
| Average Delay                |       |      | 2.5   |      |           |            |
| Intersection Capacity Utiliz | ation |      | 16.5% | IC   | U Level c | of Service |
| Analysis Period (min)        |       |      | 15    | 10   |           |            |
|                              |       |      | 10    |      |           |            |

### HCM Unsignalized Intersection Capacity Analysis 47: Leslie Davis & Street A

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|                                 | ٠    | <b>→</b> | 1     | 4     | +         | *          | 1    | 1     | 1    | *    | Ŧ     | ~    |
|---------------------------------|------|----------|-------|-------|-----------|------------|------|-------|------|------|-------|------|
| Movement                        | EBL  | EBT      | EBR   | WBL   | WBT       | WBR        | NBL  | NBT   | NBR  | SBL  | SBT   | SBR  |
| Lane Configurations             |      | \$       |       |       | \$        |            |      | 4     |      |      | 4     |      |
| Sign Control                    |      | Yield    |       |       | Yield     |            |      | Yield |      |      | Yield |      |
| Traffic Volume (vph)            | 15   | 0        | 0     | 0     | 0         | 0          | 0    | 0     | 0    | 0    | 0     | 25   |
| Future Volume (vph)             | 15   | 0        | 0     | 0     | 0         | 0          | 0    | 0     | 0    | 0    | 0     | 25   |
| Peak Hour Factor                | 0.90 | 0.90     | 0.90  | 0.90  | 0.90      | 0.90       | 0.90 | 0.90  | 0.90 | 0.90 | 0.90  | 0.90 |
| Hourly flow rate (vph)          | 17   | 0        | 0     | 0     | 0         | 0          | 0    | 0     | 0    | 0    | 0     | 28   |
| Direction, Lane #               | EB 1 | WB 1     | NB 1  | SB 1  |           |            |      |       |      |      |       |      |
| Volume Total (vph)              | 17   | 0        | 0     | 28    |           |            |      |       |      |      |       |      |
| Volume Left (vph)               | 17   | 0        | 0     | 0     |           |            |      |       |      |      |       |      |
| Volume Right (vph)              | 0    | 0        | 0     | 28    |           |            |      |       |      |      |       |      |
| Hadj (s)                        | 0.23 | 0.00     | 0.00  | -0.57 |           |            |      |       |      |      |       |      |
| Departure Headway (s)           | 4.2  | 4.0      | 4.0   | 3.4   |           |            |      |       |      |      |       |      |
| Degree Utilization, x           | 0.02 | 0.00     | 0.00  | 0.03  |           |            |      |       |      |      |       |      |
| Capacity (veh/h)                | 848  | 900      | 900   | 1056  |           |            |      |       |      |      |       |      |
| Control Delay (s)               | 7.3  | 7.0      | 7.0   | 6.5   |           |            |      |       |      |      |       |      |
| Approach Delay (s)              | 7.3  | 0.0      | 0.0   | 6.5   |           |            |      |       |      |      |       |      |
| Approach LOS                    | A    | Α        | Α     | А     |           |            |      |       |      |      |       |      |
| Intersection Summary            |      |          |       |       |           |            |      |       |      |      |       |      |
| Delay                           |      |          | 6.8   |       |           |            |      |       |      |      |       |      |
| Level of Service                |      |          | А     |       |           |            |      |       |      |      |       |      |
| Intersection Capacity Utilizati | on   |          | 13.3% | IC    | U Level o | of Service |      |       | А    |      |       |      |
| Analysis Period (min)           |      |          | 15    |       |           |            |      |       |      |      |       |      |

## HCM Unsignalized Intersection Capacity Analysis 51: Swan & Brant-Waterloo

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|-------------------------------|------|------|-------|------|---------|------------|------|------|------|------|------|------|
| Movement                      | EBL  | EBT  | EBR   | WBL  | WBT     | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |      | 4    |       |      | 4       |            |      | 4    |      |      | 4    |      |
| Traffic Volume (veh/h)        | 7    | 3    | 4     | 0    | 3       | 5          | 4    | 124  | 3    | 5    | 174  | 5    |
| Future Volume (Veh/h)         | 7    | 3    | 4     | 0    | 3       | 5          | 4    | 124  | 3    | 5    | 174  | 5    |
| Sign Control                  |      | Stop |       |      | Stop    |            |      | Free |      |      | Free |      |
| Grade                         |      | 0%   |       |      | 0%      |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor              | 0.90 | 0.90 | 0.90  | 0.90 | 0.90    | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 8    | 3    | 4     | 0    | 3       | 6          | 4    | 138  | 3    | 6    | 193  | 6    |
| Pedestrians                   |      |      |       |      |         |            |      |      |      |      |      |      |
| Lane Width (m)                |      |      |       |      |         |            |      |      |      |      |      |      |
| Walking Speed (m/s)           |      |      |       |      |         |            |      |      |      |      |      |      |
| Percent Blockage              |      |      |       |      |         |            |      |      |      |      |      |      |
| Right turn flare (veh)        |      |      |       |      |         |            |      |      |      |      |      |      |
| Median type                   |      |      |       |      |         |            |      | None |      |      | None |      |
| Median storage veh)           |      |      |       |      |         |            |      |      |      |      |      |      |
| Upstream signal (m)           |      |      |       |      |         |            |      |      |      |      |      |      |
| pX, platoon unblocked         |      |      |       |      |         |            |      |      |      |      |      |      |
| vC, conflicting volume        | 363  | 357  | 196   | 361  | 358     | 140        | 199  |      |      | 141  |      |      |
| vC1, stage 1 conf vol         |      |      |       |      |         |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol         |      |      |       |      |         |            |      |      |      |      |      |      |
| vCu, unblocked vol            | 363  | 357  | 196   | 361  | 358     | 140        | 199  |      |      | 141  |      |      |
| tC, single (s)                | 7.1  | 6.5  | 6.2   | 7.1  | 6.5     | 6.2        | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)               |      |      |       |      |         |            |      |      |      |      |      |      |
| tF (s)                        | 3.5  | 4.0  | 3.3   | 3.5  | 4.0     | 3.3        | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %               | 99   | 99   | 100   | 100  | 99      | 99         | 100  |      |      | 100  |      |      |
| cM capacity (veh/h)           | 587  | 568  | 850   | 590  | 567     | 914        | 1385 |      |      | 1455 |      |      |
| Direction, Lane #             | EB 1 | WB 1 | NB 1  | SB 1 |         |            |      |      |      |      |      |      |
| Volume Total                  | 15   | 9    | 145   | 205  |         |            |      |      |      |      |      |      |
| Volume Left                   | 8    | 0    | 4     | 6    |         |            |      |      |      |      |      |      |
| Volume Right                  | 4    | 6    | 3     | 6    |         |            |      |      |      |      |      |      |
| cSH                           | 635  | 759  | 1385  | 1455 |         |            |      |      |      |      |      |      |
| Volume to Capacity            | 0.02 | 0.01 | 0.00  | 0.00 |         |            |      |      |      |      |      |      |
| Queue Length 95th (m)         | 0.6  | 0.3  | 0.1   | 0.1  |         |            |      |      |      |      |      |      |
| Control Delay (s)             | 10.8 | 9.8  | 0.2   | 0.3  |         |            |      |      |      |      |      |      |
| Lane LOS                      | B    | A    | A     | A    |         |            |      |      |      |      |      |      |
| Approach Delay (s)            | 10.8 | 9.8  | 0.2   | 0.3  |         |            |      |      |      |      |      |      |
| Approach LOS                  | B    | A    | 0.2   | 0.0  |         |            |      |      |      |      |      |      |
| Intersection Summary          |      |      |       |      |         |            |      |      |      |      |      |      |
| Average Delay                 |      |      | 0.9   |      |         |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | tion |      | 28.5% | IC   | Ulevelo | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |      |      | 15    |      |         |            |      |      | Λ    |      |      |      |
|                               |      |      | 10    |      |         |            |      |      |      |      |      |      |

| Lane Configurations         Y         ↓   |                        | 1     | *    | t     | 1    | 4         | ŧ          |  |
|---|------------------------|-------|------|-------|------|-----------|------------|--|
| Traffic Volume (veh/h)       2       31       0       4       55       0         Future Volume (Veh/h)       2       31       0       4       55       0         Sign Control       Stop       Free       Free       Free       Grade       0%       0%       0%         Peak Hour Factor       0.90  | Movement               | WBL   | WBR  | NBT   | NBR  | SBL       | SBT        |  |
| Traffic Volume (veh/h)       2       31       0       4       55       0         Future Volume (Veh/h)       2       31       0       4       55       0         Sign Control       Stop       Free       Free       Free       Grade       0%       0%       0%         Peak Hour Factor       0.90  | Lane Configurations    | Y     |      | ¢Î,   |      |           | é.         |  |
| Sign Control         Stop         Free         Free           Grade         0%         0%         0%           Grade         0%         0%         0%           Peak Hour Factor         0.90         0.90         0.90         0.90         0.90           Hourly flow rate (vph)         2         34         0         4         61         0           Pedestrians  | Traffic Volume (veh/h) |       | 31   |       | 4    | 55        |            |  |
| Grade         0%         0%         0%           Peak Hour Factor         0.90         0.90         0.90         0.90         0.90         0.90           Hourly flow rate (vph)         2         34         0         4         61         0           Pedestrians         Lane Width (m)         Values  | Future Volume (Veh/h)  | 2     | 31   | 0     | 4    | 55        | 0          |  |
| Grade         0%         0%         0%           Peak Hour Factor         0.90         0.90         0.90         0.90         0.90         0.90           Hourly flow rate (vph)         2         34         0         4         61         0           Pedestrians         Lane Width (m)         Values  | Sign Control           | Stop  |      | Free  |      |           | Free       |  |
| Hourly flow rate (vph)       2       34       0       4       61       0         Pedestrians       Lane Width (m)       Walking Speed (m/s)       Velocity       Velocity </td <td>Grade</td> <td></td> <td></td> <td>0%</td> <td></td> <td></td> <td>0%</td> <td></td> | Grade                  |       |      | 0%    |      |           | 0%         |  |
| Pedestrians         Lane Width (m)         Walking Speed (m/s)         Percent Blockage         Right turn flare (veh)         Median storage veh)         Upstream signal (m)         pX, platoon unblocked         vC, conflicting volume       124         VC, stage 1 conf vol         vCu, unblocked vol       124         VCu, stage 2 conf vol         vCu, unblocked vol       124         VC, stage 2 conf vol         vCu, unblocked vol       124         VC, stage 2 conf vol         vCu, unblocked vol       124         VC, stage 3       6.4         F(s)       3.5         JO queue free %       100         JO queue free %       100         Volume Total       36         Volume Total       36         Volume Right       34         Volume Right       34         Volume to Capacity       0.03         Volume to Capacity       0.3         Queue Length 95th (m)       0.8         Volume to Capacity       0.3         Right       35         Mat       0         SB       0.0         Control Delay (s)   | Peak Hour Factor       | 0.90  | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       |  |
| Pedestrians         Lane Width (m)         Walking Speed (m/s)         Percent Blockage         Right turn flare (veh)         Median storage veh)         Upstream signal (m)         pX, platoon unblocked         vC, conflicting volume       124         VC1, stage 1 conf vol         vC2, stage 2 conf vol         vC4, unblocked vol       124         VC4, stage 1 conf vol         vC2, stage 2 conf vol         vC4, stage (s)         EF (s)       3.5         90 queue free %       100         97       96         CM capacity (veh/h)       838         1082       1618         Direction, Lane #       WB 1       NB 1         Volume Total       36       4         Volume Right       34       4         Volume Right       34       4         Volume to Capacity       0.03       0.04         Queue Length 95th (m)       0.8       0.0       0.9         Control Delay (s)       8.5       0.0       7.3         Lane LOS       A       A       A         Approach LOS       A       A       A         Approach LOS  | Hourly flow rate (vph) | 2     | 34   | 0     | 4    | 61        | 0          |  |
| Walking Speed (m/s)         Percent Blockage         Right turn flare (veh)         Median type       None         Median storage veh)         Upstream signal (m)         px, platoon unblocked         vC, conflicting volume       124       2       4         vC1, stage 1 conf vol         vC2, stage 2 conf vol         vC2, stage 1 conf vol       2       4         vC2, stage 2 conf vol         vC4, unblocked vol       124       2       4         L7, stage 1 conf vol       2       4       4         vC2, stage 2 conf vol       2       4       4         VC2, stage (s)       6.4       6.2       4.1       6         L7, stage (s)       8.5       3.3       2.2       p0 queue free %       100       97       96         CM capacity (veh/h)       838       1082       1618       1618       1618       1618         Direction, Lane #       WB 1       NB 1       SB 1       1618       1618       1618       1618       1618       1618       1618       1618       1618       1618       1618       1618       1618       1618       1618       16161       1618       16161  | Pedestrians            |       |      |       |      |           |            |  |
| Walking Speed (m/s)         Percent Blockage         Right turn flare (veh)         Median type       None         Median storage veh)         Upstream signal (m)         pX, platoon unblocked         vC, conflicting volume       124       2       4         vC1, stage 1 conf vol         vC2, stage 2 conf vol         vC2, stage 1 conf vol       2       4         vC2, stage 2 conf vol         vC4, unblocked vol       124       2       4         L7, stage 1 conf vol       2       4       4         vC2, stage 2 conf vol       2       4       4         VC2, stage (s)       164       6.2       4.1       6         L7, stage (s)       3.5       3.3       2.2       p0 queue free %       100       97       96         CM capacity (veh/h)       838       1082       1618       1618       1618       1618         Direction, Lane #       WB 1       NB 1       SB 1       1618       1618       1618       1618       1618       1618       1618       1618       1618       1618       1618       1618       1618       1618       1618       1614       1615       1700  | Lane Width (m)         |       |      |       |      |           |            |  |
| Weedian type       None       None         Median type       None       None         Median type       None       None         Median storage veh)       Upstream signal (m)       px, platoon unblocked       vC, conflicting volume       124       2       4         vC1, stage 1 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol       vC2, stage (s)  | Walking Speed (m/s)    |       |      |       |      |           |            |  |
| Right turn flare (veh)         None         None           Median storage veh)         Upstream signal (m)         None         None           yX, platoon unblocked         VC, conflicting volume         124         2         4           vC1, stage 1 conf vol         vC2, stage 2 conf vol         vC2, stage 2 conf vol         vC2, stage 2 conf vol           vC2, stage 2 conf vol         vC4, unblocked vol         124         2         4           C5, single (s)         6.4         6.2         4.1         C           C7, stage (s)         T         96         100         97         96           vC1 capacity (veh/h)         838         1082         1618         1618           Direction, Lane #         WB 1         NB 1         SB 1         Volume Total         36         4         61           Volume Total         36         4         61         Volume to Capacity         0.03         0.00         0.04           Queue Length 95th (m)         0.8         0.0         0.9         Control Delay (s)         8.5         0.0         7.3           Lane LOS         A         A         A         A         Approach LOS         A         A           Approach LOS         A  | Percent Blockage       |       |      |       |      |           |            |  |
| Median storage veh)       Upstream signal (m)         pX, platoon unblocked       vC, conflicting volume       124       2       4         vC1, stage 1 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol         vC2, stage 2 conf vol       vC2, stage 2 conf vol       4       100       124       2       4         VC, single (s)       6.4       6.2       4.1       100       124       2       4         VC, stage (s)       T       100       97       96       96       96       96       96       96       97       96       96       96       97       96       96       97       96       96       97       96       96       97       97 <td< td=""><td>Right turn flare (veh)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>   | Right turn flare (veh) |       |      |       |      |           |            |  |
| Median storage veh)       Upstream signal (m)         pX, platoon unblocked       vC, conflicting volume       124       2       4         vC1, stage 1 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol         vC2, stage 2 conf vol       vC2, stage 2 conf vol       4       2       4         VC, single (s)       6.4       6.2       4.1       4         C, single (s)       6.4       6.2       4.1       4         C, stage (s)       T       96       97       96         p0 queue free %       100       97       96       97       96         cM capacity (veh/h)       838       1082       1618       1618         Direction, Lane #       WB 1       NB 1       SB 1       1618       1618         Volume Total       36       4       61       1618 <t< td=""><td>Median type</td><td></td><td></td><td>None</td><td></td><td></td><td>None</td><td></td></t<>   | Median type            |       |      | None  |      |           | None       |  |
| pX, platoon unblocked         vC, conflicting volume       124       2       4         vC1, stage 1 conf vol         vC2, stage 2 conf vol         vCu, unblocked vol       124       2       4         tC, single (s)       6.4       6.2       4.1         tC, 2 stage (s)       tr       4       4         tF (s)       3.5       3.3       2.2         p0 queue free %       100       97       96         cdm capacity (veh/h)       838       1082       1618         Direction, Lane #       WB 1       NB 1       SB 1         Volume Total       36       4       61         Volume Left       2       0       61         Volume Right       34       4       0         cSH       1065       1700       1618         Volume to Capacity       0.03       0.00       0.04         Queue Length 95th (m)       0.8       0.0       0.9         Control Delay (s)       8.5       0.0       7.3         Lane LOS       A       A       A         Approach LOS       A       A         Approach LOS       A       A         Approach   | Median storage veh)    |       |      |       |      |           |            |  |
| pX, platoon unblocked         vC, conflicting volume       124       2       4         vC1, stage 1 conf vol         vC2, stage 2 conf vol         vCu, unblocked vol       124       2       4         tC, single (s)       6.4       6.2       4.1         tC, 2 stage (s)       100       97       96         tF (s)       3.5       3.3       2.2         p0 queue free %       100       97       96         cdm capacity (veh/h)       838       1082       1618         Direction, Lane #       WB 1       NB 1       SB 1         Volume Total       36       4       61         Volume Left       2       0       61         Volume Right       34       4       0         cSH       1065       1700       1618         Volume to Capacity       0.03       0.00       0.04         Queue Length 95th (m)       0.8       0.0       0.9         Control Delay (s)       8.5       0.0       7.3         Lane LOS       A       A       A         Approach LOS       A       A         Approach LOS       A       A         Appro   | Upstream signal (m)    |       |      |       |      |           |            |  |
| vC1, stage 1 conf vol         vC2, stage 2 conf vol         vCu, unblocked vol       124       2       4         tC, single (s)       6.4       6.2       4.1         tC, 2 stage (s)   | pX, platoon unblocked  |       |      |       |      |           |            |  |
| vC2, stage 2 conf vol         vCu, unblocked vol       124       2       4         tC, single (s)       6.4       6.2       4.1         tC, 2 stage (s)   | vC, conflicting volume | 124   | 2    |       |      | 4         |            |  |
| vCu, unblocked vol       124       2       4         tC, single (s)       6.4       6.2       4.1         tC, 2 stage (s)   | vC1, stage 1 conf vol  |       |      |       |      |           |            |  |
| tC, single (s)       6.4       6.2       4.1         tC, 2 stage (s)       100       97       96         p0 queue free %       100       97       96         p0 queue free %       100       97       96         cM capacity (veh/h)       838       1082       1618         Direction, Lane #       WB 1       NB 1       SB 1         Volume Total       36       4       61         Volume Left       2       0       61         Volume Right       34       4       0         cSH       1065       1700       1618         Volume to Capacity       0.03       0.00       0.04         Queue Length 95th (m)       0.8       0.0       0.9         Control Delay (s)       8.5       0.0       7.3         Lane LOS       A       A       A         Approach Delay (s)       8.5       0.0       7.3         Approach LOS       A       A       A         Average Delay       7.4       ICU Level of Service  | vC2, stage 2 conf vol  |       |      |       |      |           |            |  |
| tC, 2 stage (s)         tF (s)       3.5       3.3       2.2         p0 queue free %       100       97       96         cM capacity (veh/h)       838       1082       1618         Direction, Lane #       WB 1       NB 1       SB 1         Volume Total       36       4       61         Volume Left       2       0       61         Volume Right       34       4       0         cSH       1065       1700       1618         Volume to Capacity       0.03       0.00       0.04         Queue Length 95th (m)       0.8       0.0       0.9         Control Delay (s)       8.5       0.0       7.3         Lane LOS       A       A         Approach LOS       A       A         Approach LOS       A       A         Average Delay       7.4       ICU Level of Service  | vCu, unblocked vol     | 124   | 2    |       |      | 4         |            |  |
| IF (s)       3.5       3.3       2.2         p0 queue free %       100       97       96         cM capacity (veh/h)       838       1082       1618         Direction, Lane #       WB 1       NB 1       SB 1         Volume Total       36       4       61         Volume Total       36       4       61         Volume Right       34       4       0         cSH       1065       1700       1618         Volume to Capacity       0.03       0.00       0.04         Queue Length 95th (m)       0.8       0.0       0.9         Control Delay (s)       8.5       0.0       7.3         Lane LOS       A       A         Approach Delay (s)       8.5       0.0       7.3         Approach LOS       A       A         Average Delay       7.4       ICU Level of Service  | tC, single (s)         | 6.4   | 6.2  |       |      | 4.1       |            |  |
| p0 queue free %         100         97         96           cM capacity (veh/h)         838         1082         1618           Direction, Lane #         WB 1         NB 1         SB 1           Volume Total         36         4         61           Volume Left         2         0         61           Volume Right         34         4         0           cSH         1065         1700         1618           Volume to Capacity         0.03         0.00         0.04           Queue Length 95th (m)         0.8         0.0         0.9           Control Delay (s)         8.5         0.0         7.3           Lane LOS         A         A           Approach Delay (s)         8.5         0.0         7.3           Approach LOS         A         A           Average Delay         7.4         ICU Level of Service   | tC, 2 stage (s)        |       |      |       |      |           |            |  |
| CM capacity (veh/h)         838         1082         1618           Direction, Lane #         WB 1         NB 1         SB 1           Volume Total         36         4         61           Volume Left         2         0         61           Volume Right         34         4         0           cSH         1065         1700         1618           Volume to Capacity         0.03         0.00         0.04           Queue Length 95th (m)         0.8         0.0         0.9           Control Delay (s)         8.5         0.0         7.3           Lane LOS         A         A           Approach Delay (s)         8.5         0.0         7.3           Approach LOS         A         A           Average Delay         7.4         ICU Level of Service   | tF (s)                 | 3.5   | 3.3  |       |      | 2.2       |            |  |
| Direction, Lane #         WB 1         NB 1         SB 1           Volume Total         36         4         61           Volume Left         2         0         61           Volume Right         34         4         0           cSH         1065         1700         1618           Volume to Capacity         0.03         0.00         0.04           Queue Length 95th (m)         0.8         0.0         0.9           Control Delay (s)         8.5         0.0         7.3           Lane LOS         A         A           Approach Delay (s)         8.5         0.0         7.3           Approach LOS         A         A           Average Delay         7.4         ICU Level of Service   | p0 queue free %        | 100   | 97   |       |      | 96        |            |  |
| Volume Total         36         4         61           Volume Left         2         0         61           Volume Right         34         4         0           cSH         1065         1700         1618           Volume to Capacity         0.03         0.00         0.04           Queue Length 95th (m)         0.8         0.0         0.9           Control Delay (s)         8.5         0.0         7.3           Lane LOS         A         A           Approach Delay (s)         8.5         0.0         7.3           Approach LOS         A         A           Average Delay         7.4         ICU Level of Service  | cM capacity (veh/h)    | 838   | 1082 |       |      | 1618      |            |  |
| Volume Left         2         0         61           Volume Right         34         4         0           cSH         1065         1700         1618           Volume to Capacity         0.03         0.00         0.04           Queue Length 95th (m)         0.8         0.0         0.9           Control Delay (s)         8.5         0.0         7.3           Lane LOS         A         A           Approach Delay (s)         8.5         0.0         7.3           Approach LOS         A         A           Average Delay         7.4           Intersection Capacity Utilization         19.7%         ICU Level of Service   | Direction, Lane #      | WB 1  | NB 1 | SB 1  |      |           |            |  |
| Volume Right         34         4         0           cSH         1065         1700         1618           Volume to Capacity         0.03         0.00         0.04           Queue Length 95th (m)         0.8         0.0         0.9           Control Delay (s)         8.5         0.0         7.3           Lane LOS         A         A           Approach Delay (s)         8.5         0.0         7.3           Intersection Summary         7.4           Intersection Capacity Utilization         19.7%         ICU Level of Service  | Volume Total           | 36    | 4    | 61    |      |           |            |  |
| cSH       1065       1700       1618         Volume to Capacity       0.03       0.00       0.04         Queue Length 95th (m)       0.8       0.0       0.9         Control Delay (s)       8.5       0.0       7.3         Lane LOS       A       A         Approach Delay (s)       8.5       0.0       7.3         Intersection Summary       7.4         Intersection Capacity Utilization       19.7%       ICU Level of Service  | Volume Left            | 2     | 0    | 61    |      |           |            |  |
| Volume to Capacity0.030.000.04Queue Length 95th (m)0.80.00.9Control Delay (s)8.50.07.3Lane LOSAAApproach Delay (s)8.50.07.3Approach LOSA7.3Intersection SummaryAverage Delay7.4Intersection Capacity Utilization19.7%ICU Level of Service   | Volume Right           | 34    | 4    | 0     |      |           |            |  |
| Queue Length 95th (m)       0.8       0.0       0.9         Control Delay (s)       8.5       0.0       7.3         Lane LOS       A       A         Approach Delay (s)       8.5       0.0       7.3         Approach LOS       A       A         Intersection Summary       7.4         Intersection Capacity Utilization       19.7%       ICU Level of Service  | cSH                    | 1065  | 1700 | 1618  |      |           |            |  |
| Queue Length 95th (m)       0.8       0.0       0.9         Control Delay (s)       8.5       0.0       7.3         Lane LOS       A       A         Approach Delay (s)       8.5       0.0       7.3         Approach LOS       A       A         Intersection Summary       7.4         Intersection Capacity Utilization       19.7%       ICU Level of Service  | Volume to Capacity     | 0.03  | 0.00 | 0.04  |      |           |            |  |
| Control Delay (s)       8.5       0.0       7.3         Lane LOS       A       A         Approach Delay (s)       8.5       0.0       7.3         Approach LOS       A       Intersection Summary         Average Delay       7.4         Intersection Capacity Utilization       19.7%       ICU Level of Service  |                        | 0.8   | 0.0  | 0.9   |      |           |            |  |
| Lane LOS     A     A       Approach Delay (s)     8.5     0.0     7.3       Approach LOS     A     A       Intersection Summary     A       Average Delay     7.4       Intersection Capacity Utilization     19.7%     ICU Level of Service  | • • • •                | 8.5   | 0.0  | 7.3   |      |           |            |  |
| Approach Delay (s)       8.5       0.0       7.3         Approach LOS       A       Intersection Summary         Average Delay       7.4         Intersection Capacity Utilization       19.7%       ICU Level of Service   | • • • /                | А     |      | А     |      |           |            |  |
| Approach LOS A<br>Intersection Summary<br>Average Delay 7.4<br>Intersection Capacity Utilization 19.7% ICU Level of Service   |                        |       | 0.0  |       |      |           |            |  |
| Average Delay     7.4       Intersection Capacity Utilization     19.7%     ICU Level of Service  | Approach LOS           |       |      |       |      |           |            |  |
| Intersection Capacity Utilization 19.7% ICU Level of Service  | Intersection Summary   |       |      |       |      |           |            |  |
|   | Average Delay          |       |      | 7.4   |      |           |            |  |
|   |                        | ation |      | 19.7% | IC   | U Level o | of Service |  |
|   | Analysis Period (min)  |       |      | 15    |      |           |            |  |

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|------------------------------|-------------|------|-------|--------|------------|------------|
| Movement                     | EBL         | EBR  | NBL   | NBT    | SBT        | SBR        |
| Lane Configurations          | Y           |      |       | र्भ    | 4          |            |
| Traffic Volume (veh/h)       | 2           | 0    | 0     | 2      | 3          | 3          |
| Future Volume (Veh/h)        | 2           | 0    | 0     | 2      | 3          | 3          |
| Sign Control                 | Stop        |      |       | Free   | Free       |            |
| Grade                        | 0%          |      |       | 0%     | 0%         |            |
| Peak Hour Factor             | 0.90        | 0.90 | 0.90  | 0.90   | 0.90       | 0.90       |
| Hourly flow rate (vph)       | 2           | 0    | 0     | 2      | 3          | 3          |
| Pedestrians                  |             |      |       |        |            |            |
| Lane Width (m)               |             |      |       |        |            |            |
| Walking Speed (m/s)          |             |      |       |        |            |            |
| Percent Blockage             |             |      |       |        |            |            |
| Right turn flare (veh)       |             |      |       |        |            |            |
| Median type                  |             |      |       | None   | None       |            |
| Median storage veh)          |             |      |       | 110110 | 1.0110     |            |
| Upstream signal (m)          |             |      |       |        |            |            |
| pX, platoon unblocked        |             |      |       |        |            |            |
| vC, conflicting volume       | 6           | 4    | 6     |        |            |            |
| vC1, stage 1 conf vol        | v           |      | Ŭ     |        |            |            |
| vC2, stage 2 conf vol        |             |      |       |        |            |            |
| vCu, unblocked vol           | 6           | 4    | 6     |        |            |            |
| tC, single (s)               | 6.4         | 6.2  | 4.1   |        |            |            |
| tC, 2 stage (s)              | <b>v</b> .न | 5.2  | 7.1   |        |            |            |
| tF (s)                       | 3.5         | 3.3  | 2.2   |        |            |            |
| p0 queue free %              | 100         | 100  | 100   |        |            |            |
| cM capacity (veh/h)          | 1015        | 1079 | 1615  |        |            |            |
|                              |             |      |       |        |            |            |
| Direction, Lane #            | EB 1        | NB 1 | SB 1  |        |            |            |
| Volume Total                 | 2           | 2    | 6     |        |            |            |
| Volume Left                  | 2           | 0    | 0     |        |            |            |
| Volume Right                 | 0           | 0    | 3     |        |            |            |
| cSH                          | 1015        | 1615 | 1700  |        |            |            |
| Volume to Capacity           | 0.00        | 0.00 | 0.00  |        |            |            |
| Queue Length 95th (m)        | 0.0         | 0.0  | 0.0   |        |            |            |
| Control Delay (s)            | 8.6         | 0.0  | 0.0   |        |            |            |
| Lane LOS                     | А           |      |       |        |            |            |
| Approach Delay (s)           | 8.6         | 0.0  | 0.0   |        |            |            |
| Approach LOS                 | А           |      |       |        |            |            |
| Intersection Summary         |             |      |       |        |            |            |
| Average Delay                |             |      | 1.7   |        |            |            |
| Intersection Capacity Utiliz | zation      |      | 13.3% | IC     | CU Level o | of Service |
| Analysis Period (min)        |             |      | 15    |        |            |            |
|                              |             |      | 10    |        |            |            |

### HCM Unsignalized Intersection Capacity Analysis 1: Hilltop & Swan

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|-------------------------------|-------|------|-------|------|-----------|------------|------|------|------|------|------|------|
| Movement                      | EBL   | EBT  | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |       | 4    |       |      | 4         |            | ሻ    | î.   |      | ٦    | T+   |      |
| Traffic Volume (veh/h)        | 4     | 0    | 0     | 38   | 0         | 274        | 0    | 337  | 11   | 91   | 176  | 0    |
| Future Volume (Veh/h)         | 4     | 0    | 0     | 38   | 0         | 274        | 0    | 337  | 11   | 91   | 176  | 0    |
| Sign Control                  |       | Stop |       |      | Stop      |            |      | Free |      |      | Free |      |
| Grade                         |       | 0%   |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 4     | 0    | 0     | 42   | 0         | 304        | 0    | 374  | 12   | 101  | 196  | 0    |
| Pedestrians                   |       |      |       |      | 1         |            |      | 3    |      |      |      |      |
| Lane Width (m)                |       |      |       |      | 3.5       |            |      | 3.5  |      |      |      |      |
| Walking Speed (m/s)           |       |      |       |      | 1.1       |            |      | 1.1  |      |      |      |      |
| Percent Blockage              |       |      |       |      | 0         |            |      | 0    |      |      |      |      |
| Right turn flare (veh)        |       |      |       |      |           |            |      |      |      |      |      |      |
| Median type                   |       |      |       |      |           |            |      | None |      |      | None |      |
| Median storage veh)           |       |      |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)           |       |      |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked         |       |      |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume        | 1076  | 785  | 199   | 782  | 779       | 381        | 196  |      |      | 387  |      |      |
| vC1, stage 1 conf vol         | 1010  | 100  | 100   | 102  |           | 001        | 100  |      |      | 001  |      |      |
| vC2, stage 2 conf vol         |       |      |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol            | 1076  | 785  | 199   | 782  | 779       | 381        | 196  |      |      | 387  |      |      |
| tC, single (s)                | 7.1   | 6.5  | 6.2   | 7.1  | 6.5       | 6.2        | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)               | 7.1   | 0.0  | 0.2   | 7.1  | 0.0       | 0.2        |      |      |      |      |      |      |
| tF (s)                        | 3.5   | 4.0  | 3.3   | 3.5  | 4.0       | 3.3        | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %               | 96    | 100  | 100   | 86   | 100       | 54         | 100  |      |      | 91   |      |      |
| cM capacity (veh/h)           | 101   | 299  | 845   | 292  | 301       | 668        | 1389 |      |      | 1181 |      |      |
|                               |       |      |       |      |           |            | 1003 |      |      | 1101 |      |      |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  | NB 2 | SB 1      | SB 2       |      |      |      |      |      |      |
| Volume Total                  | 4     | 346  | 0     | 386  | 101       | 196        |      |      |      |      |      |      |
| Volume Left                   | 4     | 42   | 0     | 0    | 101       | 0          |      |      |      |      |      |      |
| Volume Right                  | 0     | 304  | 0     | 12   | 0         | 0          |      |      |      |      |      |      |
| cSH                           | 101   | 578  | 1700  | 1700 | 1181      | 1700       |      |      |      |      |      |      |
| Volume to Capacity            | 0.04  | 0.60 | 0.00  | 0.23 | 0.09      | 0.12       |      |      |      |      |      |      |
| Queue Length 95th (m)         | 0.9   | 30.0 | 0.0   | 0.0  | 2.1       | 0.0        |      |      |      |      |      |      |
| Control Delay (s)             | 42.1  | 20.1 | 0.0   | 0.0  | 8.3       | 0.0        |      |      |      |      |      |      |
| Lane LOS                      | E     | С    |       |      | А         |            |      |      |      |      |      |      |
| Approach Delay (s)            | 42.1  | 20.1 | 0.0   |      | 2.8       |            |      |      |      |      |      |      |
| Approach LOS                  | Е     | С    |       |      |           |            |      |      |      |      |      |      |
| Intersection Summary          |       |      |       |      |           |            |      |      |      |      |      |      |
| Average Delay                 |       |      | 7.7   |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | ation |      | 60.9% | IC   | U Level o | of Service |      |      | В    |      |      |      |
| Analysis Period (min)         |       |      | 15    |      |           |            |      |      |      |      |      |      |

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|-------------------------------|-------|------|-------|-------|-----------|------------|------|------|------|------|------|------|
| Movement                      | EBL   | EBT  | EBR   | WBL   | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |       | \$   |       |       | \$        |            |      | \$   |      |      | \$   |      |
| Sign Control                  |       | Stop |       |       | Stop      |            |      | Stop |      |      | Stop |      |
| Traffic Volume (vph)          | 3     | 26   | 75    | 19    | 41        | 0          | 220  | 14   | 51   | 0    | 3    | 13   |
| Future Volume (vph)           | 3     | 26   | 75    | 19    | 41        | 0          | 220  | 14   | 51   | 0    | 3    | 13   |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90  | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 3     | 29   | 83    | 21    | 46        | 0          | 244  | 16   | 57   | 0    | 3    | 14   |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  | SB 1  |           |            |      |      |      |      |      |      |
| Volume Total (vph)            | 115   | 67   | 317   | 17    |           |            |      |      |      |      |      |      |
| Volume Left (vph)             | 3     | 21   | 244   | 0     |           |            |      |      |      |      |      |      |
| Volume Right (vph)            | 83    | 0    | 57    | 14    |           |            |      |      |      |      |      |      |
| Hadj (s)                      | -0.31 | 0.06 | 0.08  | -0.49 |           |            |      |      |      |      |      |      |
| Departure Headway (s)         | 4.5   | 4.9  | 4.4   | 4.2   |           |            |      |      |      |      |      |      |
| Degree Utilization, x         | 0.14  | 0.09 | 0.39  | 0.02  |           |            |      |      |      |      |      |      |
| Capacity (veh/h)              | 741   | 677  | 785   | 789   |           |            |      |      |      |      |      |      |
| Control Delay (s)             | 8.2   | 8.4  | 10.3  | 7.3   |           |            |      |      |      |      |      |      |
| Approach Delay (s)            | 8.2   | 8.4  | 10.3  | 7.3   |           |            |      |      |      |      |      |      |
| Approach LOS                  | А     | А    | В     | А     |           |            |      |      |      |      |      |      |
| Intersection Summary          |       |      |       |       |           |            |      |      |      |      |      |      |
| Delay                         |       |      | 9.5   |       |           |            |      |      |      |      |      |      |
| Level of Service              |       |      | А     |       |           |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | ition |      | 39.2% | IC    | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |       |      | 15    |       |           |            |      |      |      |      |      |      |

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|--------------------------------|------|----------|-------|------|-----------|------------|------|-------|------|------|-------|------|
| Movement                       | EBL  | EBT      | EBR   | WBL  | WBT       | WBR        | NBL  | NBT   | NBR  | SBL  | SBT   | SBR  |
| Lane Configurations            |      | \$       |       |      | \$        |            |      | \$    |      |      | \$    |      |
| Sign Control                   |      | Yield    |       |      | Yield     |            |      | Yield |      |      | Yield |      |
| Traffic Volume (vph)           | 0    | 0        | 0     | 0    | 0         | 11         | 0    | 0     | 0    | 4    | 0     | 0    |
| Future Volume (vph)            | 0    | 0        | 0     | 0    | 0         | 11         | 0    | 0     | 0    | 4    | 0     | 0    |
| Peak Hour Factor               | 0.90 | 0.90     | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90  | 0.90 | 0.90 | 0.90  | 0.90 |
| Hourly flow rate (vph)         | 0    | 0        | 0     | 0    | 0         | 12         | 0    | 0     | 0    | 4    | 0     | 0    |
| Direction, Lane #              | EB 1 | WB 1     | NB 1  | SB 1 |           |            |      |       |      |      |       |      |
| Volume Total (vph)             | 0    | 12       | 0     | 4    |           |            |      |       |      |      |       |      |
| Volume Left (vph)              | 0    | 0        | 0     | 4    |           |            |      |       |      |      |       |      |
| Volume Right (vph)             | 0    | 12       | 0     | 0    |           |            |      |       |      |      |       |      |
| Hadj (s)                       | 0.00 | -0.57    | 0.00  | 0.23 |           |            |      |       |      |      |       |      |
| Departure Headway (s)          | 3.9  | 3.3      | 3.9   | 4.2  |           |            |      |       |      |      |       |      |
| Degree Utilization, x          | 0.00 | 0.01     | 0.00  | 0.00 |           |            |      |       |      |      |       |      |
| Capacity (veh/h)               | 913  | 1069     | 910   | 859  |           |            |      |       |      |      |       |      |
| Control Delay (s)              | 6.9  | 6.4      | 6.9   | 7.2  |           |            |      |       |      |      |       |      |
| Approach Delay (s)             | 0.0  | 6.4      | 0.0   | 7.2  |           |            |      |       |      |      |       |      |
| Approach LOS                   | Α    | Α        | A     | A    |           |            |      |       |      |      |       |      |
| Intersection Summary           |      |          |       |      |           |            |      |       |      |      |       |      |
| Delay                          |      |          | 6.6   |      |           |            |      |       |      |      |       |      |
| Level of Service               |      |          | А     |      |           |            |      |       |      |      |       |      |
| Intersection Capacity Utilizat | ion  |          | 13.3% | IC   | U Level o | of Service |      |       | А    |      |       |      |
| Analysis Period (min)          |      |          | 15    |      |           |            |      |       |      |      |       |      |

# HCM Unsignalized Intersection Capacity Analysis 21: Stanley & Northumberland

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|--------------------------------|------|------|-------|-------|-----------|------------|------|------|------|------|------|------|
| Movement                       | EBL  | EBT  | EBR   | WBL   | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations            |      | \$   |       |       | é.        | 1          |      | \$   |      |      | \$   |      |
| Sign Control                   |      | Stop |       |       | Stop      |            |      | Stop |      |      | Stop |      |
| Traffic Volume (vph)           | 70   | 25   | 0     | 2     | 17        | 790        | 2    | 2    | 2    | 297  | 9    | 21   |
| Future Volume (vph)            | 70   | 25   | 0     | 2     | 17        | 790        | 2    | 2    | 2    | 297  | 9    | 21   |
| Peak Hour Factor               | 0.90 | 0.90 | 0.90  | 0.90  | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)         | 78   | 28   | 0     | 2     | 19        | 878        | 2    | 2    | 2    | 330  | 10   | 23   |
| Direction, Lane #              | EB 1 | WB 1 | WB 2  | NB 1  | SB 1      |            |      |      |      |      |      |      |
| Volume Total (vph)             | 106  | 21   | 878   | 6     | 363       |            |      |      |      |      |      |      |
| Volume Left (vph)              | 78   | 2    | 0     | 2     | 330       |            |      |      |      |      |      |      |
| Volume Right (vph)             | 0    | 0    | 878   | 2     | 23        |            |      |      |      |      |      |      |
| Hadj (s)                       | 0.19 | 0.02 | -0.58 | -0.13 | 0.14      |            |      |      |      |      |      |      |
| Departure Headway (s)          | 5.0  | 4.9  | 3.2   | 4.5   | 4.4       |            |      |      |      |      |      |      |
| Degree Utilization, x          | 0.15 | 0.03 | 0.78  | 0.01  | 0.44      |            |      |      |      |      |      |      |
| Capacity (veh/h)               | 669  | 665  | 1121  | 753   | 796       |            |      |      |      |      |      |      |
| Control Delay (s)              | 8.8  | 8.1  | 16.5  | 7.5   | 10.8      |            |      |      |      |      |      |      |
| Approach Delay (s)             | 8.8  | 16.3 |       | 7.5   | 10.8      |            |      |      |      |      |      |      |
| Approach LOS                   | А    | С    |       | Α     | В         |            |      |      |      |      |      |      |
| Intersection Summary           |      |      |       |       |           |            |      |      |      |      |      |      |
| Delay                          |      |      | 14.2  |       |           |            |      |      |      |      |      |      |
| Level of Service               |      |      | В     |       |           |            |      |      |      |      |      |      |
| Intersection Capacity Utilizat | ion  |      | 75.6% | IC    | U Level o | of Service |      |      | D    |      |      |      |
| Analysis Period (min)          |      |      | 15    |       |           |            |      |      |      |      |      |      |

|                               | -     | 7    | 4     | -    | 1         | 1         |
|-------------------------------|-------|------|-------|------|-----------|-----------|
| Movement                      | EBT   | EBR  | WBL   | WBT  | NBL       | NBR       |
| Lane Configurations           | 1     |      | ٦     | 1    | Y         |           |
| Traffic Volume (veh/h)        | 109   | 31   | 43    | 53   | 62        | 175       |
| Future Volume (Veh/h)         | 109   | 31   | 43    | 53   | 62        | 175       |
| Sign Control                  | Free  |      |       | Free | Stop      |           |
| Grade                         | 0%    |      |       | 0%   | 0%        |           |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90 | 0.90      | 0.90      |
| Hourly flow rate (vph)        | 121   | 34   | 48    | 59   | 69        | 194       |
| Pedestrians                   |       |      |       |      | 2         |           |
| Lane Width (m)                |       |      |       |      | 3.5       |           |
| Walking Speed (m/s)           |       |      |       |      | 1.1       |           |
| Percent Blockage              |       |      |       |      | 0         |           |
| Right turn flare (veh)        |       |      |       |      |           |           |
| Median type                   | None  |      |       | None |           |           |
| Median storage veh)           |       |      |       | -    |           |           |
| Upstream signal (m)           |       |      |       |      |           |           |
| pX, platoon unblocked         |       |      |       |      |           |           |
| vC, conflicting volume        |       |      | 157   |      | 295       | 140       |
| vC1, stage 1 conf vol         |       |      |       |      |           |           |
| vC2, stage 2 conf vol         |       |      |       |      |           |           |
| vCu, unblocked vol            |       |      | 157   |      | 295       | 140       |
| tC, single (s)                |       |      | 4.1   |      | 6.4       | 6.2       |
| tC, 2 stage (s)               |       |      |       |      |           |           |
| tF (s)                        |       |      | 2.2   |      | 3.5       | 3.3       |
| p0 queue free %               |       |      | 97    |      | 90        | 79        |
| cM capacity (veh/h)           |       |      | 1408  |      | 675       | 909       |
| Direction, Lane #             | EB 1  | WB 1 | WB 2  | NB 1 |           |           |
| Volume Total                  | 155   | 48   | 59    | 263  |           |           |
| Volume Left                   | 0     | 48   | 0     | 69   |           |           |
| Volume Right                  | 34    | 0    | 0     | 194  |           |           |
| cSH                           | 1700  | 1408 | 1700  | 833  |           |           |
| Volume to Capacity            | 0.09  | 0.03 | 0.03  | 0.32 |           |           |
| Queue Length 95th (m)         | 0.0   | 0.8  | 0.0   | 10.3 |           |           |
| Control Delay (s)             | 0.0   | 7.6  | 0.0   | 11.3 |           |           |
| Lane LOS                      |       | А    |       | В    |           |           |
| Approach Delay (s)            | 0.0   | 3.4  |       | 11.3 |           |           |
| Approach LOS                  |       |      |       | В    |           |           |
| Intersection Summary          |       |      |       |      |           |           |
| Average Delay                 |       |      | 6.4   |      |           |           |
| Intersection Capacity Utiliza | ation |      | 36.7% | IC   | U Level c | f Service |
| Analysis Period (min)         |       |      | 15    |      |           |           |
| <b>j</b> = = = = = ()         |       |      |       |      |           |           |

|                               | -    | 7    | 4     | +    | 1          | 1         |
|-------------------------------|------|------|-------|------|------------|-----------|
| Movement                      | EBT  | EBR  | WBL   | WBT  | NBL        | NBR       |
| Lane Configurations           | ţ,   |      |       | र्स  | Y          |           |
| Traffic Volume (veh/h)        | 48   | 275  | 25    | 53   | 747        | 21        |
| Future Volume (Veh/h)         | 48   | 275  | 25    | 53   | 747        | 21        |
| Sign Control                  | Free |      |       | Free | Stop       |           |
| Grade                         | 0%   |      |       | 0%   | 0%         |           |
| Peak Hour Factor              | 0.90 | 0.90 | 0.90  | 0.90 | 0.90       | 0.90      |
| Hourly flow rate (vph)        | 53   | 306  | 28    | 59   | 830        | 23        |
| Pedestrians                   | 1    |      |       |      | 1          |           |
| Lane Width (m)                | 3.5  |      |       |      | 3.5        |           |
| Walking Speed (m/s)           | 1.1  |      |       |      | 1.1        |           |
| Percent Blockage              | 0    |      |       |      | 0          |           |
| Right turn flare (veh)        |      |      |       |      |            |           |
| Median type                   | None |      |       | None |            |           |
| Median storage veh)           |      |      |       |      |            |           |
| Upstream signal (m)           |      |      |       |      |            |           |
| pX, platoon unblocked         |      |      |       |      |            |           |
| vC, conflicting volume        |      |      | 360   |      | 323        | 207       |
| vC1, stage 1 conf vol         |      |      |       |      |            |           |
| vC2, stage 2 conf vol         |      |      |       |      |            |           |
| vCu, unblocked vol            |      |      | 360   |      | 323        | 207       |
| tC, single (s)                |      |      | 4.1   |      | 6.4        | 6.3       |
| tC, 2 stage (s)               |      |      |       |      |            |           |
| tF (s)                        |      |      | 2.2   |      | 3.5        | 3.4       |
| p0 queue free %               |      |      | 98    |      | 0          | 97        |
| cM capacity (veh/h)           |      |      | 1209  |      | 656        | 823       |
| Direction, Lane #             | EB 1 | WB 1 | NB 1  |      |            |           |
| Volume Total                  | 359  | 87   | 853   |      |            |           |
| Volume Left                   | 0    | 28   | 830   |      |            |           |
| Volume Right                  | 306  | 0    | 23    |      |            |           |
| cSH                           | 1700 | 1209 | 660   |      |            |           |
| Volume to Capacity            | 0.21 | 0.02 | 1.29  |      |            |           |
| Queue Length 95th (m)         | 0.0  | 0.5  | 255.8 |      |            |           |
| Control Delay (s)             | 0.0  | 2.7  | 163.1 |      |            |           |
| Lane LOS                      | 0.0  | A    | F     |      |            |           |
| Approach Delay (s)            | 0.0  | 2.7  | 163.1 |      |            |           |
| Approach LOS                  | 0.0  | 2.1  | F     |      |            |           |
| ••                            |      |      |       |      |            |           |
| Intersection Summary          |      |      |       |      |            |           |
| Average Delay                 |      |      | 107.3 |      |            |           |
| Intersection Capacity Utiliza | tion |      | 81.2% | IC   | CU Level c | f Service |
| Analysis Period (min)         |      |      | 15    |      |            |           |

|                                 | ٠    | -            | -     | *    | 1          | 1          |  |
|---------------------------------|------|--------------|-------|------|------------|------------|--|
| Movement                        | EBL  | EBT          | WBT   | WBR  | SBL        | SBR        |  |
| Lane Configurations             |      | <del>د</del> | ¢Î,   |      | Y          |            |  |
| Traffic Volume (veh/h)          | 26   | 0            | 0     | 208  | 66         | 9          |  |
| Future Volume (Veh/h)           | 26   | 0            | 0     | 208  | 66         | 9          |  |
| Sign Control                    |      | Free         | Free  |      | Stop       |            |  |
| Grade                           |      | 0%           | 0%    |      | 0%         |            |  |
| Peak Hour Factor                | 0.90 | 0.90         | 0.90  | 0.90 | 0.90       | 0.90       |  |
| Hourly flow rate (vph)          | 29   | 0            | 0     | 231  | 73         | 10         |  |
| Pedestrians                     |      |              |       |      |            |            |  |
| Lane Width (m)                  |      |              |       |      |            |            |  |
| Walking Speed (m/s)             |      |              |       |      |            |            |  |
| Percent Blockage                |      |              |       |      |            |            |  |
| Right turn flare (veh)          |      |              |       |      |            |            |  |
| Median type                     |      | None         | None  |      |            |            |  |
| Median storage veh)             |      |              |       |      |            |            |  |
| Upstream signal (m)             |      |              |       |      |            |            |  |
| pX, platoon unblocked           |      |              |       |      |            |            |  |
| vC, conflicting volume          | 231  |              |       |      | 174        | 116        |  |
| vC1, stage 1 conf vol           |      |              |       |      |            |            |  |
| vC2, stage 2 conf vol           |      |              |       |      |            |            |  |
| vCu, unblocked vol              | 231  |              |       |      | 174        | 116        |  |
| tC, single (s)                  | 4.1  |              |       |      | 6.4        | 6.2        |  |
| tC, 2 stage (s)                 |      |              |       |      | ••••       | •          |  |
| tF (s)                          | 2.2  |              |       |      | 3.5        | 3.3        |  |
| p0 queue free %                 | 98   |              |       |      | 91         | 99         |  |
| cM capacity (veh/h)             | 1337 |              |       |      | 799        | 937        |  |
|                                 |      |              |       |      |            |            |  |
| Direction, Lane #               | EB 1 | WB 1         | SB 1  |      |            |            |  |
| Volume Total                    | 29   | 231          | 83    |      |            |            |  |
| Volume Left                     | 29   | 0            | 73    |      |            |            |  |
| Volume Right                    | 0    | 231          | 10    |      |            |            |  |
| cSH                             | 1337 | 1700         | 813   |      |            |            |  |
| Volume to Capacity              | 0.02 | 0.14         | 0.10  |      |            |            |  |
| Queue Length 95th (m)           | 0.5  | 0.0          | 2.6   |      |            |            |  |
| Control Delay (s)               | 7.8  | 0.0          | 9.9   |      |            |            |  |
| Lane LOS                        | А    |              | А     |      |            |            |  |
| Approach Delay (s)              | 7.8  | 0.0          | 9.9   |      |            |            |  |
| Approach LOS                    |      |              | А     |      |            |            |  |
| Intersection Summary            |      |              |       |      |            |            |  |
| Average Delay                   |      |              | 3.1   |      |            |            |  |
| Intersection Capacity Utilizati | on   |              | 32.7% | IC   | CU Level o | of Service |  |
| Analysis Period (min)           |      |              | 15    |      |            |            |  |

|                                       | ۶     | +    | Ŧ     | ×    | 4         | 4          |
|---------------------------------------|-------|------|-------|------|-----------|------------|
| Movement                              | EBL   | EBT  | WBT   | WBR  | SBL       | SBR        |
| Lane Configurations                   |       | र्स  | ħ     |      | ¥         |            |
| Traffic Volume (veh/h)                | 0     | 37   | 115   | 0    | 0         | 0          |
| Future Volume (Veh/h)                 | 0     | 37   | 115   | 0    | 0         | 0          |
| Sign Control                          |       | Free | Free  |      | Stop      |            |
| Grade                                 |       | 0%   | 0%    |      | 0%        |            |
| Peak Hour Factor                      | 0.90  | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       |
| Hourly flow rate (vph)                | 0     | 41   | 128   | 0    | 0         | 0          |
| Pedestrians                           |       |      |       |      |           |            |
| Lane Width (m)                        |       |      |       |      |           |            |
| Walking Speed (m/s)                   |       |      |       |      |           |            |
| Percent Blockage                      |       |      |       |      |           |            |
| Right turn flare (veh)                |       |      |       |      |           |            |
| Median type                           |       | None | None  |      |           |            |
| Median storage veh)                   |       |      |       |      |           |            |
| Upstream signal (m)                   |       |      |       |      |           |            |
| pX, platoon unblocked                 |       |      |       |      |           |            |
| vC, conflicting volume                | 128   |      |       |      | 169       | 128        |
| vC1, stage 1 conf vol                 |       |      |       |      |           |            |
| vC2, stage 2 conf vol                 |       |      |       |      |           |            |
| vCu, unblocked vol                    | 128   |      |       |      | 169       | 128        |
| tC, single (s)                        | 4.1   |      |       |      | 6.4       | 6.2        |
| tC, 2 stage (s)                       |       |      |       |      |           |            |
| tF (s)                                | 2.2   |      |       |      | 3.5       | 3.3        |
| p0 queue free %                       | 100   |      |       |      | 100       | 100        |
| cM capacity (veh/h)                   | 1458  |      |       |      | 821       | 922        |
| Direction, Lane #                     | EB 1  | WB 1 | SB 1  |      |           |            |
| Volume Total                          | 41    | 128  | 0     |      |           |            |
| Volume Left                           | 0     | 0    | 0     |      |           |            |
| Volume Right                          | 0     | 0    | 0     |      |           |            |
| cSH                                   | 1458  | 1700 | 1700  |      |           |            |
| Volume to Capacity                    | 0.00  | 0.08 | 0.00  |      |           |            |
| Queue Length 95th (m)                 | 0.0   | 0.0  | 0.0   |      |           |            |
| Control Delay (s)                     | 0.0   | 0.0  | 0.0   |      |           |            |
| Lane LOS                              |       |      | А     |      |           |            |
| Approach Delay (s)                    | 0.0   | 0.0  | 0.0   |      |           |            |
| Approach LOS                          |       |      | А     |      |           |            |
| Intersection Summary                  |       |      |       |      |           |            |
| Average Delay                         |       |      | 0.0   |      |           |            |
| Intersection Capacity Utilization     | ation |      | 10.3% | IC   | U Level o | of Service |
| Analysis Period (min)                 |       |      | 15    |      |           |            |
| · · · · · · · · · · · · · · · · · · · |       |      |       |      |           |            |

|                                | -    | 7    | 1         | -    | 1         | 1          |  |
|--------------------------------|------|------|-----------|------|-----------|------------|--|
| Movement                       | EBT  | EBR  | WBL       | WBT  | NBL       | NBR        |  |
| Lane Configurations            | 4    |      |           | र्भ  | ¥         |            |  |
| Traffic Volume (veh/h)         | 37   | 30   | 0         | 115  | 94        | 0          |  |
| Future Volume (Veh/h)          | 37   | 30   | 0         | 115  | 94        | 0          |  |
| Sign Control                   | Free |      |           | Free | Stop      |            |  |
| Grade                          | 0%   |      |           | 0%   | 0%        |            |  |
| Peak Hour Factor               | 0.90 | 0.90 | 0.90      | 0.90 | 0.90      | 0.90       |  |
| Hourly flow rate (vph)         | 41   | 33   | 0         | 128  | 104       | 0          |  |
| Pedestrians                    |      |      |           |      |           |            |  |
| Lane Width (m)                 |      |      |           |      |           |            |  |
| Walking Speed (m/s)            |      |      |           |      |           |            |  |
| Percent Blockage               |      |      |           |      |           |            |  |
| Right turn flare (veh)         |      |      |           |      |           |            |  |
| Median type                    | None |      |           | None |           |            |  |
| Median storage veh)            |      |      |           |      |           |            |  |
| Upstream signal (m)            |      |      |           |      |           |            |  |
| pX, platoon unblocked          |      |      |           |      |           |            |  |
| vC, conflicting volume         |      |      | 74        |      | 186       | 58         |  |
| vC1, stage 1 conf vol          |      |      |           |      |           |            |  |
| vC2, stage 2 conf vol          |      |      |           |      |           |            |  |
| vCu, unblocked vol             |      |      | 74        |      | 186       | 58         |  |
| 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       |      | 87        | 100        |  |
| cM capacity (veh/h)            |      |      | 1526      |      | 804       | 1009       |  |
| Direction, Lane #              | EB 1 | WB 1 | NB 1      |      |           |            |  |
| Volume Total                   | 74   | 128  | 104       |      |           |            |  |
| Volume Left                    | 0    | 0    | 104       |      |           |            |  |
| Volume Right                   | 33   | 0    | 0         |      |           |            |  |
| cSH                            | 1700 | 1526 | 804       |      |           |            |  |
| Volume to Capacity             | 0.04 | 0.00 | 0.13      |      |           |            |  |
| Queue Length 95th (m)          | 0.04 | 0.00 | 3.4       |      |           |            |  |
| Control Delay (s)              | 0.0  | 0.0  | 10.1      |      |           |            |  |
|                                | 0.0  | 0.0  | -         |      |           |            |  |
| Lane LOS<br>Approach Delay (s) | 0.0  | 0.0  | В<br>10.1 |      |           |            |  |
| Approach LOS                   | 0.0  | 0.0  | B         |      |           |            |  |
|                                |      |      | D         |      |           |            |  |
| Intersection Summary           |      |      |           |      |           |            |  |
| Average Delay                  |      |      | 3.4       |      |           |            |  |
| Intersection Capacity Utiliza  | tion |      | 19.2%     | IC   | U Level c | of Service |  |
| Analysis Period (min)          |      |      | 15        |      |           |            |  |

### HCM Unsignalized Intersection Capacity Analysis 47: Leslie Davis & Street A

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|---------------------------------|------|----------|-------|-------|-----------|------------|------|-------|------|------|-------|------|
| Movement                        | EBL  | EBT      | EBR   | WBL   | WBT       | WBR        | NBL  | NBT   | NBR  | SBL  | SBT   | SBR  |
| Lane Configurations             |      | \$       |       |       | \$        |            |      | \$    |      |      | \$    |      |
| Sign Control                    |      | Yield    |       |       | Yield     |            |      | Yield |      |      | Yield |      |
| Traffic Volume (vph)            | 10   | 0        | 0     | 0     | 0         | 5          | 0    | 80    | 0    | 2    | 26    | 3    |
| Future Volume (vph)             | 10   | 0        | 0     | 0     | 0         | 5          | 0    | 80    | 0    | 2    | 26    | 3    |
| Peak Hour Factor                | 0.90 | 0.90     | 0.90  | 0.90  | 0.90      | 0.90       | 0.90 | 0.90  | 0.90 | 0.90 | 0.90  | 0.90 |
| Hourly flow rate (vph)          | 11   | 0        | 0     | 0     | 0         | 6          | 0    | 89    | 0    | 2    | 29    | 3    |
| Direction, Lane #               | EB 1 | WB 1     | NB 1  | SB 1  |           |            |      |       |      |      |       |      |
| Volume Total (vph)              | 11   | 6        | 89    | 34    |           |            |      |       |      |      |       |      |
| Volume Left (vph)               | 11   | 0        | 0     | 2     |           |            |      |       |      |      |       |      |
| Volume Right (vph)              | 0    | 6        | 0     | 3     |           |            |      |       |      |      |       |      |
| Hadj (s)                        | 0.23 | -0.57    | 0.03  | -0.01 |           |            |      |       |      |      |       |      |
| Departure Headway (s)           | 4.4  | 3.6      | 4.0   | 4.0   |           |            |      |       |      |      |       |      |
| Degree Utilization, x           | 0.01 | 0.01     | 0.10  | 0.04  |           |            |      |       |      |      |       |      |
| Capacity (veh/h)                | 791  | 960      | 883   | 885   |           |            |      |       |      |      |       |      |
| Control Delay (s)               | 7.5  | 6.6      | 7.4   | 7.2   |           |            |      |       |      |      |       |      |
| Approach Delay (s)              | 7.5  | 6.6      | 7.4   | 7.2   |           |            |      |       |      |      |       |      |
| Approach LOS                    | А    | А        | А     | А     |           |            |      |       |      |      |       |      |
| Intersection Summary            |      |          |       |       |           |            |      |       |      |      |       |      |
| Delay                           |      |          | 7.3   |       |           |            |      |       |      |      |       |      |
| Level of Service                |      |          | А     |       |           |            |      |       |      |      |       |      |
| Intersection Capacity Utilizati | on   |          | 19.2% | IC    | U Level o | of Service |      |       | А    |      |       |      |
| Analysis Period (min)           |      |          | 15    |       |           |            |      |       |      |      |       |      |

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|-------------------------------|-------|----------|-------|------|-----------|------------|
| Movement                      | EBL   | EBT      | WBT   | WBR  | SBL       | SBR        |
| Lane Configurations           |       | र्स      | ţ,    |      | ¥         |            |
| Traffic Volume (veh/h)        | 2     | 6        | 16    | 0    | 0         | 4          |
| Future Volume (Veh/h)         | 2     | 6        | 16    | 0    | 0         | 4          |
| Sign Control                  |       | Free     | Free  |      | Stop      |            |
| Grade                         |       | 0%       | 0%    |      | 0%        |            |
| Peak Hour Factor              | 0.90  | 0.90     | 0.90  | 0.90 | 0.90      | 0.90       |
| Hourly flow rate (vph)        | 2     | 7        | 18    | 0    | 0         | 4          |
| Pedestrians                   |       |          |       |      |           |            |
| Lane Width (m)                |       |          |       |      |           |            |
| Walking Speed (m/s)           |       |          |       |      |           |            |
| Percent Blockage              |       |          |       |      |           |            |
| Right turn flare (veh)        |       |          |       |      |           |            |
| Median type                   |       | None     | None  |      |           |            |
| Median storage veh)           |       | NONC     | NOTIC |      |           |            |
| Upstream signal (m)           |       |          |       |      |           |            |
| pX, platoon unblocked         |       |          |       |      |           |            |
| vC, conflicting volume        | 18    |          |       |      | 29        | 18         |
| vC1, stage 1 conf vol         | 10    |          |       |      | 25        | 10         |
| vC2, stage 2 conf vol         |       |          |       |      |           |            |
| vCu, unblocked vol            | 18    |          |       |      | 29        | 18         |
| tC, single (s)                | 4.1   |          |       |      | 6.4       | 6.2        |
| tC, 2 stage (s)               | 7.1   |          |       |      | U.7       | 0.2        |
| tF (s)                        | 2.2   |          |       |      | 3.5       | 3.3        |
| p0 queue free %               | 100   |          |       |      | 100       | 100        |
| cM capacity (veh/h)           | 1599  |          |       |      | 984       | 1061       |
|                               |       |          |       |      | 504       | 1001       |
| Direction, Lane #             | EB 1  | WB 1     | SB 1  |      |           |            |
| Volume Total                  | 9     | 18       | 4     |      |           |            |
| Volume Left                   | 2     | 0        | 0     |      |           |            |
| Volume Right                  | 0     | 0        | 4     |      |           |            |
| cSH                           | 1599  | 1700     | 1061  |      |           |            |
| Volume to Capacity            | 0.00  | 0.01     | 0.00  |      |           |            |
| Queue Length 95th (m)         | 0.0   | 0.0      | 0.1   |      |           |            |
| Control Delay (s)             | 1.6   | 0.0      | 8.4   |      |           |            |
| Lane LOS                      | А     |          | А     |      |           |            |
| Approach Delay (s)            | 1.6   | 0.0      | 8.4   |      |           |            |
| Approach LOS                  |       |          | А     |      |           |            |
| Intersection Summary          |       |          |       |      |           |            |
| Average Delay                 |       |          | 1.6   |      |           |            |
| Intersection Capacity Utiliza | ation |          | 13.3% | IC   | U Level o | of Service |
| Analysis Period (min)         |       |          | 15    |      |           |            |
|                               |       |          |       |      |           |            |

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|------------------------------|-------|--------|--------|------|-------------|------------|
| Movement                     | EBL   | EBT    | WBT    | WBR  | SBL         | SBR        |
| Lane Configurations          |       | ÷.     | ţ,     |      | ¥           |            |
| Traffic Volume (veh/h)       | 6     | 0      | 0      | 0    | 0           | 16         |
| Future Volume (Veh/h)        | 6     | 0      | 0      | 0    | 0           | 16         |
| Sign Control                 |       | Free   | Free   |      | Stop        |            |
| Grade                        |       | 0%     | 0%     |      | 0%          |            |
| Peak Hour Factor             | 0.90  | 0.90   | 0.90   | 0.90 | 0.90        | 0.90       |
| Hourly flow rate (vph)       | 7     | 0      | 0      | 0    | 0           | 18         |
| Pedestrians                  |       |        |        |      |             |            |
| Lane Width (m)               |       |        |        |      |             |            |
| Walking Speed (m/s)          |       |        |        |      |             |            |
| Percent Blockage             |       |        |        |      |             |            |
| Right turn flare (veh)       |       |        |        |      |             |            |
| Median type                  |       | None   | None   |      |             |            |
| Median storage veh)          |       | 110110 | 110110 |      |             |            |
| Upstream signal (m)          |       |        |        |      |             |            |
| pX, platoon unblocked        |       |        |        |      |             |            |
| vC, conflicting volume       | 0     |        |        |      | 14          | 0          |
| vC1, stage 1 conf vol        | 0     |        |        |      | T           | v          |
| vC2, stage 2 conf vol        |       |        |        |      |             |            |
| vCu, unblocked vol           | 0     |        |        |      | 14          | 0          |
| tC, single (s)               | 4.1   |        |        |      | 6.4         | 6.2        |
| tC, 2 stage (s)              | 7.1   |        |        |      | <b>V</b> .न | 0.2        |
| tF (s)                       | 2.2   |        |        |      | 3.5         | 3.3        |
| p0 queue free %              | 100   |        |        |      | 100         | 98         |
| cM capacity (veh/h)          | 1623  |        |        |      | 1001        | 1085       |
|                              |       |        |        |      | 1001        | 1000       |
| Direction, Lane #            | EB 1  | WB 1   | SB 1   |      |             |            |
| Volume Total                 | 7     | 0      | 18     |      |             |            |
| Volume Left                  | 7     | 0      | 0      |      |             |            |
| Volume Right                 | 0     | 0      | 18     |      |             |            |
| cSH                          | 1623  | 1700   | 1085   |      |             |            |
| Volume to Capacity           | 0.00  | 0.00   | 0.02   |      |             |            |
| Queue Length 95th (m)        | 0.1   | 0.0    | 0.4    |      |             |            |
| Control Delay (s)            | 7.2   | 0.0    | 8.4    |      |             |            |
| Lane LOS                     | А     |        | А      |      |             |            |
| Approach Delay (s)           | 7.2   | 0.0    | 8.4    |      |             |            |
| Approach LOS                 |       |        | А      |      |             |            |
| Intersection Summary         |       |        |        |      |             |            |
| Average Delay                |       |        | 8.1    |      |             |            |
| Intersection Capacity Utiliz | ation |        | 13.3%  | IC   | U Level o   | of Service |
| Analysis Period (min)        |       |        | 15     |      |             |            |
|                              |       |        |        |      |             |            |

# HCM Unsignalized Intersection Capacity Analysis 51: Swan & Brant-Waterloo

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|-------------------------------|------|------|-------|------|-----------|------------|------|------|------|------|------|------|
| Movement                      | EBL  | EBT  | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |      | 4    |       |      | 4         |            |      | 4    |      |      | 4    |      |
| Traffic Volume (veh/h)        | 3    | 0    | 5     | 20   | 5         | 7          | 3    | 120  | 10   | 7    | 94   | 4    |
| Future Volume (Veh/h)         | 3    | 0    | 5     | 20   | 5         | 7          | 3    | 120  | 10   | 7    | 94   | 4    |
| Sign Control                  |      | Stop |       |      | Stop      |            |      | Free |      |      | Free |      |
| Grade                         |      | 0%   |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor              | 0.90 | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 3    | 0    | 6     | 22   | 6         | 8          | 3    | 133  | 11   | 8    | 104  | 4    |
| Pedestrians                   |      |      |       |      |           |            |      |      |      |      |      |      |
| Lane Width (m)                |      |      |       |      |           |            |      |      |      |      |      |      |
| Walking Speed (m/s)           |      |      |       |      |           |            |      |      |      |      |      |      |
| Percent Blockage              |      |      |       |      |           |            |      |      |      |      |      |      |
| Right turn flare (veh)        |      |      |       |      |           |            |      |      |      |      |      |      |
| Median type                   |      |      |       |      |           |            |      | None |      |      | None |      |
| Median storage veh)           |      |      |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)           |      |      |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked         |      |      |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume        | 278  | 272  | 106   | 272  | 268       | 138        | 108  |      |      | 144  |      |      |
| vC1, stage 1 conf vol         |      |      |       |      |           |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol         |      |      |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol            | 278  | 272  | 106   | 272  | 268       | 138        | 108  |      |      | 144  |      |      |
| tC, single (s)                | 7.1  | 6.5  | 6.2   | 7.1  | 6.5       | 6.2        | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)               |      |      |       |      |           |            |      |      |      |      |      |      |
| tF (s)                        | 3.5  | 4.0  | 3.3   | 3.5  | 4.0       | 3.3        | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %               | 100  | 100  | 99    | 97   | 99        | 99         | 100  |      |      | 99   |      |      |
| cM capacity (veh/h)           | 664  | 633  | 954   | 676  | 636       | 915        | 1495 |      |      | 1451 |      |      |
| Direction, Lane #             | EB 1 | WB 1 | NB 1  | SB 1 |           | 010        | 1100 |      |      |      |      |      |
|                               |      |      |       |      |           |            |      |      |      |      |      |      |
| Volume Total                  | 9    | 36   | 147   | 116  |           |            |      |      |      |      |      | _    |
| Volume Left                   | 3    | 22   | 3     | 8    |           |            |      |      |      |      |      |      |
| Volume Right                  | 6    | 8    | 11    | 4    |           |            |      |      |      |      |      |      |
| cSH                           | 833  | 710  | 1495  | 1451 |           |            |      |      |      |      |      |      |
| Volume to Capacity            | 0.01 | 0.05 | 0.00  | 0.01 |           |            |      |      |      |      |      |      |
| Queue Length 95th (m)         | 0.2  | 1.2  | 0.0   | 0.1  |           |            |      |      |      |      |      |      |
| Control Delay (s)             | 9.4  | 10.3 | 0.2   | 0.6  |           |            |      |      |      |      |      |      |
| Lane LOS                      | А    | В    | A     | A    |           |            |      |      |      |      |      |      |
| Approach Delay (s)            | 9.4  | 10.3 | 0.2   | 0.6  |           |            |      |      |      |      |      |      |
| Approach LOS                  | А    | В    |       |      |           |            |      |      |      |      |      |      |
| Intersection Summary          |      |      |       |      |           |            |      |      |      |      |      |      |
| Average Delay                 |      |      | 1.8   |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | tion |      | 21.0% | IC   | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |      |      | 15    |      |           |            |      |      |      |      |      |      |

|                              | 4     | *    | t     | 1    | 4    | ţ          |   |
|------------------------------|-------|------|-------|------|------|------------|---|
| Movement                     | WBL   | WBR  | NBT   | NBR  | SBL  | SBT        |   |
| Lane Configurations          | ¥     |      | ¢Î,   |      |      | र्स        |   |
| Traffic Volume (veh/h)       | 10    | 175  | 0     | 3    | 52   | 0          |   |
| Future Volume (Veh/h)        | 10    | 175  | 0     | 3    | 52   | 0          |   |
| Sign Control                 | Stop  |      | Free  |      |      | Free       |   |
| Grade                        | 0%    |      | 0%    |      |      | 0%         |   |
| Peak Hour Factor             | 0.90  | 0.90 | 0.90  | 0.90 | 0.90 | 0.90       |   |
| Hourly flow rate (vph)       | 11    | 194  | 0     | 3    | 58   | 0          |   |
| Pedestrians                  |       |      | ·     | Ū    |      | •          |   |
| Lane Width (m)               |       |      |       |      |      |            |   |
| Walking Speed (m/s)          |       |      |       |      |      |            |   |
| Percent Blockage             |       |      |       |      |      |            |   |
| Right turn flare (veh)       |       |      |       |      |      |            |   |
| Median type                  |       |      | None  |      |      | None       |   |
| Median storage veh)          |       |      | NULLE |      |      | None       |   |
| Upstream signal (m)          |       |      |       |      |      |            |   |
| pX, platoon unblocked        |       |      |       |      |      |            |   |
| vC, conflicting volume       | 118   | 2    |       |      | 3    |            |   |
| vC1, stage 1 conf vol        | 110   | Z    |       |      | 3    |            |   |
| vC1, stage 1 conf vol        |       |      |       |      |      |            |   |
|                              | 118   | n    |       |      | 2    |            |   |
| vCu, unblocked vol           |       | 2    |       |      | 3    |            |   |
| tC, single (s)               | 6.4   | 6.2  |       |      | 4.1  |            |   |
| tC, 2 stage (s)              | 0.5   | 0.0  |       |      | 0.0  |            |   |
| tF (s)                       | 3.5   | 3.3  |       |      | 2.2  |            |   |
| p0 queue free %              | 99    | 82   |       |      | 96   |            |   |
| cM capacity (veh/h)          | 847   | 1083 |       |      | 1619 |            |   |
| Direction, Lane #            | WB 1  | NB 1 | SB 1  |      |      |            |   |
| Volume Total                 | 205   | 3    | 58    |      |      |            |   |
| Volume Left                  | 11    | 0    | 58    |      |      |            |   |
| Volume Right                 | 194   | 3    | 0     |      |      |            |   |
| cSH                          | 1067  | 1700 | 1619  |      |      |            |   |
| Volume to Capacity           | 0.19  | 0.00 | 0.04  |      |      |            |   |
| Queue Length 95th (m)        | 5.4   | 0.0  | 0.8   |      |      |            |   |
| Control Delay (s)            | 9.2   | 0.0  | 7.3   |      |      |            |   |
| Lane LOS                     | А     |      | А     |      |      |            |   |
| Approach Delay (s)           | 9.2   | 0.0  | 7.3   |      |      |            |   |
| Approach LOS                 | А     |      |       |      |      |            |   |
| Intersection Summary         |       |      |       |      |      |            |   |
| Average Delay                |       |      | 8.7   |      |      |            |   |
| Intersection Capacity Utiliz | ation |      | 28.5% |      |      | of Service | 2 |
|                              | allon |      |       | iC   |      |            | , |
| Analysis Period (min)        |       |      | 15    |      |      |            |   |

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|------------------------------|-------|------|-------|------|------------|------------|
| Movement                     | EBL   | EBR  | NBL   | NBT  | SBT        | SBR        |
| Lane Configurations          | Y     |      |       | र्स  | 4î         |            |
| Traffic Volume (veh/h)       | 8     | 0    | 0     | 7    | 3          | 2          |
| Future Volume (Veh/h)        | 8     | 0    | 0     | 7    | 3          | 2          |
| Sign Control                 | Stop  |      |       | Free | Free       |            |
| Grade                        | 0%    |      |       | 0%   | 0%         |            |
| Peak Hour Factor             | 0.90  | 0.90 | 0.90  | 0.90 | 0.90       | 0.90       |
| Hourly flow rate (vph)       | 9     | 0    | 0     | 8    | 3          | 2          |
| Pedestrians                  |       |      |       |      |            |            |
| Lane Width (m)               |       |      |       |      |            |            |
| Walking Speed (m/s)          |       |      |       |      |            |            |
| Percent Blockage             |       |      |       |      |            |            |
| Right turn flare (veh)       |       |      |       |      |            |            |
| Median type                  |       |      |       | None | None       |            |
| Median storage veh)          |       |      |       |      |            |            |
| Upstream signal (m)          |       |      |       |      |            |            |
| pX, platoon unblocked        |       |      |       |      |            |            |
| vC, conflicting volume       | 12    | 4    | 5     |      |            |            |
| vC1, stage 1 conf vol        | 12    | 1    | Ŭ     |      |            |            |
| vC2, stage 2 conf vol        |       |      |       |      |            |            |
| vCu, unblocked vol           | 12    | 4    | 5     |      |            |            |
| tC, single (s)               | 6.4   | 6.2  | 4.1   |      |            |            |
| tC, 2 stage (s)              | 0.1   | 0.2  |       |      |            |            |
| tF (s)                       | 3.5   | 3.3  | 2.2   |      |            |            |
| p0 queue free %              | 99    | 100  | 100   |      |            |            |
| cM capacity (veh/h)          | 1008  | 1080 | 1616  |      |            |            |
|                              |       |      |       |      |            |            |
| Direction, Lane #            | EB 1  | NB 1 | SB 1  |      |            |            |
| Volume Total                 | 9     | 8    | 5     |      |            |            |
| Volume Left                  | 9     | 0    | 0     |      |            |            |
| Volume Right                 | 0     | 0    | 2     |      |            |            |
| cSH                          | 1008  | 1616 | 1700  |      |            |            |
| Volume to Capacity           | 0.01  | 0.00 | 0.00  |      |            |            |
| Queue Length 95th (m)        | 0.2   | 0.0  | 0.0   |      |            |            |
| Control Delay (s)            | 8.6   | 0.0  | 0.0   |      |            |            |
| Lane LOS                     | А     |      |       |      |            |            |
| Approach Delay (s)           | 8.6   | 0.0  | 0.0   |      |            |            |
| Approach LOS                 | А     |      |       |      |            |            |
| Intersection Summary         |       |      |       |      |            |            |
| Average Delay                |       |      | 3.5   |      |            |            |
| Intersection Capacity Utiliz | ation |      | 13.3% | IC   | CU Level o | of Service |
| Analysis Period (min)        |       |      | 15    |      |            |            |
|                              |       |      | 10    |      |            |            |

### HCM Unsignalized Intersection Capacity Analysis 1: Hilltop & Swan

| Movement         EBL         EBR         WBL         WBT         WBR         NBL         NBT         NBR         SBL         SBT         SBR           Lane Configurations         -   |                        | ٠     | +    | 1     | 4    | ł         | *          | •    | Ť    | 1    | 1    | ţ    | ~    |
|--|------------------------|-------|------|-------|------|-----------|------------|------|------|------|------|------|------|
| Traffic Volume (veh/h)         2         0         0         28         0         172         0         238         38         309         418         7           Future Volume (Veh/h)         2         0         0         28         0         172         0         238         38         309         418         7           Future Volume (Veh/h)         2         0         0         28         0         172         0         238         38         309         418         7           Sign Control         Stop         Stop         Free         Free         Free         Free         Free         Free         Free         Free         Pageshians         0   | Movement               | EBL   | EBT  | EBR   | WBL  | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Future Volume (Veh/h)         2         0         0         28         0         172         0         238         38         309         418         7           Sign Control         Stop         Stop         Free         Fre  | Lane Configurations    |       | 4    |       |      | 4         |            | ٦    | 1+   |      | ٦    | T+   |      |
| Sign Control       Stop       Free       Free       Free         Grade       0%       0%       0%       0.90   | Traffic Volume (veh/h) | 2     |      | 0     | 28   | 0         | 172        | 0    | 238  | 38   | 309  | 418  | 7    |
| Grade         0%         0%         0%         0%         0%           Peak Hour Factor         0.90 <td< td=""><td>Future Volume (Veh/h)</td><td>2</td><td>0</td><td>0</td><td>28</td><td>0</td><td>172</td><td>0</td><td>238</td><td>38</td><td>309</td><td>418</td><td>7</td></td<>  | Future Volume (Veh/h)  | 2     | 0    | 0     | 28   | 0         | 172        | 0    | 238  | 38   | 309  | 418  | 7    |
| Peak Hour Factor       0.90       0.9  | Sign Control           |       | Stop |       |      | Stop      |            |      | Free |      |      | Free |      |
| Hourly flow rate (vph)       2       0       0       31       0       191       0       264       42       343       464       8         Pedestrians       1       3       3       3       3       3       3       4       34         Lane Width (m)       3.4       3.4       3.4       3.4       3.4       34       Walking Speed (m/s)       1       1.1       1.1       1<   | Grade                  |       | 0%   |       |      | 0%        |            |      | 0%   |      |      | 0%   |      |
| Pedestrians       1       3         Lane Width (m)       3.4       3.4         Lane Width (m)       3.4       3.4         Walking Speed (m/s)       1.1       1.1         Percent Blockage       0       0         Right turn flare (veh)       0       0         Median type       None       None         VC, conflicting volume       1609       1461       471       1439       1444       286       472       307         vC1, stage 1 conf vol       vC2, stage  | Peak Hour Factor       | 0.90  | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Lane Width (m) 3.4 3.4<br>Walking Speed (m/s) 1.1 1.1<br>Percent Blockage 0 0 0<br>Right turn flare (veh)<br>Median storage veh)<br>Upstream signal (m)<br>pX, platoon unblocked<br>vC, conflicting volume 1609 1461 471 1439 1444 286 472 307<br>vC2, stage 2 conf vol<br>vC2, stage 2 conf vol<br>vO100 75 100 73<br>L000 73 | Hourly flow rate (vph) | 2     | 0    | 0     | 31   | 0         | 191        | 0    | 264  | 42   | 343  | 464  | 8    |
| Walking Speed (m/s)       1.1       1.1       1.1         Percent Blockage       0       0         Right turn flare (veh)       None       None         Median storage veh)       Upstream signal (m)       None       None         yZ, platoon unblocked       vC, conflicting volume       1609       1461       471       1439       1444       286       472       307         vC1, stage 1 conf vol       vC2, stage 2 conf vol       vC2, stage 3       3.7       7         VC2, stage (s)       7.1       6.5       6.2       7.1       6.5       6.2       4.1       4.1         U2, ublocked vol       1609       1461       471       1439       1444       286       472       307         U2, ublocked vol       1609       1461       471       1439       1444       286       472       307         U2, ublocked vol       1609       1461       471       1439       1444       286       472       307         U2, ublocked vol       1609       1461       471       1439       1444       286       472       307         U2, ublocked vol       1609   | Pedestrians            |       |      |       |      | 1         |            |      | 3    |      |      |      |      |
| Percent Blockage         0         0           Right turn flare (veh)         None         None           Median storage veh)         Volumet and the storage veh         None         None           Upstream signal (m)         pX, platoon unblocked         Volumet and the storage veh         None         None           Vc, conflicting volume         1609         1461         471         1439         1444         286         472         307           Vc1, stage 1 conf vol         Vc2, stage 2 conf vol         Vc2, stage 3         307         Ct2, stage (s)         T         6.5         6.2         4.1 <td>Lane Width (m)</td> <td></td> <td></td> <td></td> <td></td> <td>3.4</td> <td></td> <td></td> <td>3.4</td> <td></td> <td></td> <td></td> <td></td>   | Lane Width (m)         |       |      |       |      | 3.4       |            |      | 3.4  |      |      |      |      |
| Right turn flare (veh)       None       None         Median storage veh)       Upstream signal (m)       None       None         pX, platoon unblocked       vC, conflicting volume       1609       1461       471       1439       1444       286       472       307         vC1, stage 1 conf vol       vC2, stage 2 conf vol       vC1       471       1439       1444       286       472       307         vC2, stage 2 conf vol       vC4       vC7, onflicting volume       1609       1461       471       1439       1444       286       472       307         vC2, stage 1 conf vol       vC2, stage 2 conf vol       vC4       v1       4.1       4.1       4.1       4.1       4.1       4.1       4.1       4.1       4.2       4.0       3.3       2.2       2.2       2.2       p0 queue free %       96       100       100       65       100       75       100       73       cM apacity (veh/h)       50       95       585       88       97       752       1100       1264       1264       1264       1264       1264       1264       1264       1264       1264       1264       1264       1264       1264       1264       1264       1264       14   | Walking Speed (m/s)    |       |      |       |      | 1.1       |            |      | 1.1  |      |      |      |      |
| Median type         None         None           Median storage veh)         Upstream signal (m)         PX         PAtomublecked         VC, conflicting volume         1609         1461         471         1439         1444         286         472         307           VC2, stage 1 conf vol         VC2, stage 2 co  | Percent Blockage       |       |      |       |      | 0         |            |      | 0    |      |      |      |      |
| Median storage veh)       Upstream signal (m)         pX, platoon unblocked       vC, conflicting volume       1609       1461       471       1439       1444       286       472       307         vC1, stage 1 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol       vC2, unblocked vol       1609       1461       471       1439       1444       286       472       307         vC2, stage 2 conf vol       vC2, unblocked vol       1609       1461       471       1439       1444       286       472       307         vC2, stage 2 conf vol       vC2, unblocked vol       1609       1461       471       1439       1444       286       472       307         vC2, stage 2 conf vol       vC2, unblocked vol       1609       1461       471       1439       1444       286       472       307         vC2, stage 2 conf vol       vC1, unblocked vol       1609       1461       471       1439       1444       286       472       307         vC, stage 2 conf vol       vC1, unblocked vol       1609       1461       871       1439       1444       286       472       307         tF (s)       3.5       4.0       3.3       3.5       4.0       3.3   | Right turn flare (veh) |       |      |       |      |           |            |      |      |      |      |      |      |
| Upstream signal (m)<br>pX, platoon unblocked<br>vC, conflicting volume 1609 1461 471 1439 1444 286 472 307<br>vC2, stage 2 conf vol<br>vC2, stage 2 conf vol<br>vC2, stage 2 conf vol<br>vC2, stage 2 conf vol<br>vC2, stage 3 conf vol<br>vC2, stage 3 conf vol<br>vC2, stage 4 conf vol<br>vC2, stage 4 conf vol<br>vC2, stage 5 conf vol<br>vC2, stage 5 conf vol<br>VC2, stage 6 conf vol<br>F (s) 3.5 4.0 3.3 3.5 4.0 3.3 2.2 2.2<br>pd queu free % 96 100 100 65 100 75 100 73<br>cM capacity (veh/h) 50 95 595 88 97 752 1100 1264<br>Direction, Lane # EB 1 WB 1 NB 1 NB 2 SB 1 SB 2<br>Volume Total 2 222 0 306 343 472<br>Volume Right 0 191 0 42 0 8<br>cSH 50 366 1700 1700 1264 1700<br>Volume C Capacity 0.04 0.61 0.00 0.1 8 0.27 0.28<br>Queue Length 95th (m) 0.9 29.0 0.0 0.0 8.4 0.0<br>Control Delay (s) 79.7 28.8 0.0 3.7<br>Approach Delay (s) 79.7 28.8 0.0 3.7<br>Approach LOS F D A<br>Approach LOS F D.<br>Intersection Summary<br>Net State 50 362 ICU Level of Service B   | Median type            |       |      |       |      |           |            |      | None |      |      | None |      |
| pX, platoon unblocked<br>vC, conflicting volume 1609 1461 471 1439 1444 286 472 307<br>vC1, stage 1 conf vol<br>vC2, stage 2 conf vol<br>vC2, stage 2 conf vol<br>vC2, stage 2 conf vol<br>vC1, unblocked vol 1609 1461 471 1439 1444 286 472 307<br>tC, single (s) 7.1 6.5 6.2 7.1 6.5 6.2 4.1 4.1<br>tC, 2 stage (s)<br>tF (s) 3.5 4.0 3.3 3.5 4.0 3.3 2.2 2.2<br>pl queue free % 96 100 100 65 100 75 100 73<br>cM capacity (veh/h) 50 95 595 88 97 752 1100 1264<br>Direction, Lane # EB 1 WB 1 NB 1 NB 2 SB 1 SB 2<br>Volume Total 2 222 0 306 343 472<br>Volume Right 0 191 0 42 0 8<br>cSH 50 366 1700 1700 1264 1700<br>Volume to Capacity 0.04 0.61 0.00 0.18 0.27 0.28<br>Queue Length 95th (m) 0.9 29.0 0.0 0.0 8.4 0.0<br>Control Delay (s) 79.7 28.8 0.0 0.0 8.9 0.0<br>Lane LOS F D A<br>Approach Delay (s) 79.7 28.8 0.0 3.7<br>Approach Delay (s) 79.7 28.7<br>Average   | Median storage veh)    |       |      |       |      |           |            |      |      |      |      |      |      |
| pX, platoon unblocked<br>vC, conflicting volume 1609 1461 471 1439 1444 286 472 307<br>vC1, stage 1 conf vol<br>vC2, stage 2 conf vol<br>vC2, stage 2 conf vol<br>vC2, stage 2 conf vol<br>vC1, unblocked vol 1609 1461 471 1439 1444 286 472 307<br>tC, single (s) 7.1 6.5 6.2 7.1 6.5 6.2 4.1 4.1<br>tC, 2 stage (s)<br>tF (s) 3.5 4.0 3.3 3.5 4.0 3.3 2.2 2.2<br>pl queue free % 96 100 100 65 100 75 100 73<br>cM capacity (veh/h) 50 95 595 88 97 752 1100 1264<br>Direction, Lane # EB 1 WB 1 NB 1 NB 2 SB 1 SB 2<br>Volume Total 2 222 0 306 343 472<br>Volume Right 0 191 0 42 0 8<br>cSH 50 366 1700 1700 1264 1700<br>Volume to Capacity 0.04 0.61 0.00 0.18 0.27 0.28<br>Queue Length 95th (m) 0.9 29.0 0.0 0.0 8.4 0.0<br>Control Delay (s) 79.7 28.8 0.0 0.0 8.9 0.0<br>Lane LOS F D A<br>Approach Delay (s) 79.7 28.8 0.0 3.7<br>Approach Delay (s) 79.7 28.7<br>Average   | <b>,</b>               |       |      |       |      |           |            |      |      |      |      |      |      |
| vC, conflicting volume       1609       1461       471       1439       1444       286       472       307         vC1, stage 1 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol       vC2, stage 2 conf vol       307       0         vC1, unblocked vol       1609       1461       471       1439       1444       286       472       307         tC, stage 2 conf vol       vC1, unblocked vol       1609       1461       471       1439       1444       286       472       307         tC, stage (s)       T.1       6.5       6.2       7.1       6.5       6.2       4.1       4.1         tC, 2 stage (s)       T       T       6.5       100       75       100       73       73         pd queue free %       96       100       100       65       100       75       100       73       73         cd capacity (veh/h)       50       95       595       88       97       752       1100       1264         Direction, Lane #       EB1       WB1       NB 2       SB1       SB 2       SB       SB 2         Volume Total       2       222       0       306       343       472       08 <td></td>  |                        |       |      |       |      |           |            |      |      |      |      |      |      |
| vC1, stage 1 conf vol       vC2, stage 2 conf vol         vC1, unblocked vol       1609       1461       471       1439       1444       286       472       307         tC, single (s)       7.1       6.5       6.2       7.1       6.5       6.2       4.1       4.1         tC, 2 stage (s)  |                        | 1609  | 1461 | 471   | 1439 | 1444      | 286        | 472  |      |      | 307  |      |      |
| vC2, stage 2 conf vol         vCu, unblocked vol       1609       1461       471       1439       1444       286       472       307         tC, single (s)       7.1       6.5       6.2       7.1       6.5       6.2       4.1       4.1         tC, single (s)       7.1       6.5       6.2       4.1       4.1       4.1         tC, stage (s)       75       100       73       73       6.5       6.2       4.1       4.1         tC, stage (s)       75       100       73       73       73       73       73       73         p0 queue free %       96       100       100       65       100       75       100       73         cM capacity (veh/h)       50       95       595       88       97       752       1100       1264         Direction, Lane #       EB 1       WB 1       NB 2       SB 1       SB 2       Volume total       2       222       0       306       343       472       Volume total       2       31       0       0       343       0       Volume total       2       31       0       0       343       0       0       0       0       6   |                        |       |      |       |      |           |            |      |      |      |      |      |      |
| vCu, unblocked vol       1609       1461       471       1439       1444       286       472       307         tC, single (s)       7.1       6.5       6.2       7.1       6.5       6.2       4.1       4.1         tC, 2 stage (s)  |                        |       |      |       |      |           |            |      |      |      |      |      |      |
| tC, 2 stage (s)         tF (s)       3.5       4.0       3.3       3.5       4.0       3.3       2.2       2.2         p0 queue free %       96       100       100       65       100       75       100       73         cM capacity (veh/h)       50       95       595       88       97       752       1100       1264         Direction, Lane #       EB 1       WB 1       NB 1       NB 2       SB 1       SB 2         Volume Total       2       222       0       306       343       472         Volume Left       2       31       0       0       343       0         Volume Right       0       191       0       42       0       8         cSH       50       366       1700       1700       1264       1700         Volume to Capacity       0.04       0.61       0.00       0.18       0.27       0.28         Queue Length 95th (m)       0.9       29.0       0.0       8.9       0.0       1264         Lane LOS       F       D       A       Approach LOS       F       D       A         Approach LOS       F       D       A </td <td></td> <td>1609</td> <td>1461</td> <td>471</td> <td>1439</td> <td>1444</td> <td>286</td> <td>472</td> <td></td> <td></td> <td>307</td> <td></td> <td></td>   |                        | 1609  | 1461 | 471   | 1439 | 1444      | 286        | 472  |      |      | 307  |      |      |
| tC, 2 stage (s)         tF (s)       3.5       4.0       3.3       3.5       4.0       3.3       2.2       2.2         p0 queue free %       96       100       100       65       100       75       100       73         cM capacity (veh/h)       50       95       595       88       97       752       1100       1264         Direction, Lane #       EB 1       WB 1       NB 1       NB 2       SB 1       SB 2         Volume Total       2       222       0       306       343       472         Volume Left       2       31       0       0       343       0         Volume Right       0       191       0       42       0       8         cSH       50       366       1700       1700       1264       1700         Volume to Capacity       0.04       0.61       0.00       0.18       0.27       0.28         Queue Length 95th (m)       0.9       29.0       0.0       0.0       8.9       0.0         Lane LOS       F       D       A       Approach LOS       F       D       A         Approach LOS       F       D       ICU   |                        | 7.1   | 6.5  | 6.2   | 7.1  | 6.5       | 6.2        | 4.1  |      |      | 4.1  |      |      |
| tF (s)       3.5       4.0       3.3       3.5       4.0       3.3       2.2       2.2         p0 queue free %       96       100       100       65       100       75       100       73         cM capacity (veh/h)       50       95       595       88       97       752       1100       1264         Direction, Lane #       EB 1       WB 1       NB 1       NB 2       SB 1       SB 2         Volume Total       2       222       0       306       343       472         Volume Left       2       31       0       0       343       0         Volume Right       0       191       0       42       0       8         cSH       50       366       1700       1264       1700         Volume to Capacity       0.04       0.61       0.00       0.18       0.27       0.28         Queue Length 95th (m)       0.9       29.0       0.0       0.0       8.9       0.0         Lane LOS       F       D       A       Approach LOS       F       D       A         Approach LOS       F       D       A       Aporage Delay       7.1       ICU Level  |                        |       |      |       |      |           |            |      |      |      |      |      |      |
| p0 queue free %       96       100       100       65       100       75       100       73         cM capacity (veh/h)       50       95       595       88       97       752       1100       1264         Direction, Lane #       EB 1       WB 1       NB 1       NB 2       SB 1       SB 2         Volume Total       2       222       0       306       343       472         Volume Left       2       31       0       0       343       0         Volume Right       0       191       0       42       0       8         CSH       50       366       1700       1700       1264       1700         Volume to Capacity       0.04       0.61       0.00       0.18       0.27       0.28         Queue Length 95th (m)       0.9       29.0       0.0       0.89       0.0       0.0         Control Delay (s)       79.7       28.8       0.0       0.89       0.0       0.0         Lane LOS       F       D       A       Approach LOS       F       D       A         Intersection Summary  |                        | 3.5   | 4.0  | 3.3   | 3.5  | 4.0       | 3.3        | 2.2  |      |      | 2.2  |      |      |
| CM capacity (veh/h)         50         95         595         88         97         752         1100         1264           Direction, Lane #         EB 1         WB 1         NB 1         NB 2         SB 1         SB 2           Volume Total         2         222         0         306         343         472           Volume Left         2         31         0         0         343         0           Volume Right         0         191         0         42         0         8           CSH         50         366         1700         1264         1700           Volume to Capacity         0.04         0.61         0.00         0.18         0.27         0.28           Queue Length 95th (m)         0.9         29.0         0.0         0.0         8.4         0.0           Control Delay (s)         79.7         28.8         0.0         0.3.7         Approach Delay (s)         79.7         28.8         0.0         3.7           Approach LOS         F         D         A         Approach LOS         F         D           Intersection Capacity Utilization         63.2%         ICU Level of Service         B  |                        | 96    | 100  | 100   | 65   | 100       | 75         | 100  |      |      | 73   |      |      |
| Volume Total         2         222         0         306         343         472           Volume Left         2         31         0         0         343         0           Volume Right         0         191         0         42         0         8           cSH         50         366         1700         1264         1700           Volume to Capacity         0.04         0.61         0.00         0.18         0.27         0.28           Queue Length 95th (m)         0.9         29.0         0.0         0.84         0.0           Control Delay (s)         79.7         28.8         0.0         0.0         8.9         0.0           Lane LOS         F         D         A         A         Approach Delay (s)         79.7         28.8         0.0         3.7           Approach LOS         F         D         A         A         Approach LOS         F         D           Intersection Summary         7.1         Intersection Capacity Utilization         63.2%         ICU Level of Service         B   | • •                    |       |      |       |      |           |            |      |      |      |      |      |      |
| Volume Left         2         31         0         0         343         0           Volume Right         0         191         0         42         0         8           cSH         50         366         1700         1264         1700           Volume to Capacity         0.04         0.61         0.00         0.18         0.27         0.28           Queue Length 95th (m)         0.9         29.0         0.0         0.0         8.4         0.0           Control Delay (s)         79.7         28.8         0.0         0.0         8.9         0.0           Lane LOS         F         D         A         Approach Delay (s)         79.7         28.8         0.0         3.7           Approach LOS         F         D         A         Approach LOS         F         D           Intersection Summary         7.1         Average Delay         7.1         ICU Level of Service         B   | Direction, Lane #      | EB 1  | WB 1 | NB 1  | NB 2 | SB 1      | SB 2       |      |      |      |      |      |      |
| Volume Right         0         191         0         42         0         8           cSH         50         366         1700         1264         1700           Volume to Capacity         0.04         0.61         0.00         0.18         0.27         0.28           Queue Length 95th (m)         0.9         29.0         0.0         0.0         8.4         0.0           Control Delay (s)         79.7         28.8         0.0         0.0         8.9         0.0           Lane LOS         F         D         A           Approach Delay (s)         79.7         28.8         0.0         3.7           Approach LOS         F         D         A           Average Delay         F         D         A           Intersection Summary         7.1         1CU Level of Service         B   | Volume Total           | 2     | 222  | 0     | 306  | 343       | 472        |      |      |      |      |      |      |
| Volume Right         0         191         0         42         0         8           cSH         50         366         1700         1264         1700           Volume to Capacity         0.04         0.61         0.00         0.18         0.27         0.28           Queue Length 95th (m)         0.9         29.0         0.0         0.0         8.4         0.0           Control Delay (s)         79.7         28.8         0.0         0.0         8.9         0.0           Lane LOS         F         D         A           Approach Delay (s)         79.7         28.8         0.0         3.7           Approach LOS         F         D         A           Average Delay         F         D         A           Intersection Summary         7.1         1CU Level of Service         B   | Volume Left            | 2     | 31   | 0     | 0    | 343       | 0          |      |      |      |      |      |      |
| cSH       50       366       1700       1700       1264       1700         Volume to Capacity       0.04       0.61       0.00       0.18       0.27       0.28         Queue Length 95th (m)       0.9       29.0       0.0       0.0       8.4       0.0         Control Delay (s)       79.7       28.8       0.0       0.0       8.9       0.0         Lane LOS       F       D       A         Approach Delay (s)       79.7       28.8       0.0       3.7         Approach LOS       F       D       A         Average Delay       F       D       A         Intersection Summary       7.1       1CU Level of Service       B  | Volume Right           | 0     |      | 0     | 42   | 0         |            |      |      |      |      |      |      |
| Volume to Capacity         0.04         0.61         0.00         0.18         0.27         0.28           Queue Length 95th (m)         0.9         29.0         0.0         0.0         8.4         0.0           Control Delay (s)         79.7         28.8         0.0         0.0         8.9         0.0           Lane LOS         F         D         A         A         Approach Delay (s)         79.7         28.8         0.0         3.7           Approach LOS         F         D         A         A         A         Approach LOS         F         D         A         Approach LOS         F         D         A         A         A         Approach LOS         F         D         A <td></td> <td>50</td> <td>366</td> <td>1700</td> <td>1700</td> <td>1264</td> <td>1700</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>   |                        | 50    | 366  | 1700  | 1700 | 1264      | 1700       |      |      |      |      |      |      |
| Queue Length 95th (m)         0.9         29.0         0.0         0.0         8.4         0.0           Control Delay (s)         79.7         28.8         0.0         0.0         8.9         0.0           Lane LOS         F         D         A           Approach Delay (s)         79.7         28.8         0.0         3.7           Approach LOS         F         D         A           Average Delay         F         D         A           Intersection Summary         7.1         ICU Level of Service         B  |                        | 0.04  | 0.61 | 0.00  | 0.18 | 0.27      | 0.28       |      |      |      |      |      |      |
| Control Delay (s)         79.7         28.8         0.0         0.0         8.9         0.0           Lane LOS         F         D         A   |                        |       |      | 0.0   | 0.0  | 8.4       | 0.0        |      |      |      |      |      |      |
| Lane LOS     F     D     A       Approach Delay (s)     79.7     28.8     0.0     3.7       Approach LOS     F     D       Intersection Summary     7.1       Average Delay     7.1       Intersection Capacity Utilization     63.2%  | •                      |       |      |       |      |           |            |      |      |      |      |      |      |
| Approach Delay (s)       79.7       28.8       0.0       3.7         Approach LOS       F       D       D         Intersection Summary         Average Delay       7.1         Intersection Capacity Utilization       63.2%       ICU Level of Service       B  | ,,,                    |       |      |       |      | А         |            |      |      |      |      |      |      |
| Approach LOS     F     D       Intersection Summary     7.1       Average Delay     7.1       Intersection Capacity Utilization     63.2%       ICU Level of Service     B   |                        | 79.7  |      | 0.0   |      |           |            |      |      |      |      |      |      |
| Average Delay     7.1       Intersection Capacity Utilization     63.2%       ICU Level of Service     B   |                        |       |      |       |      |           |            |      |      |      |      |      |      |
| Average Delay     7.1       Intersection Capacity Utilization     63.2%       ICU Level of Service     B   | Intersection Summary   |       |      |       |      |           |            |      |      |      |      |      |      |
| Intersection Capacity Utilization 63.2% ICU Level of Service B   |                        |       |      | 7.1   |      |           |            |      |      |      |      |      |      |
|  |                        | ition |      | 63.2% | IC   | U Level o | of Service |      |      | В    |      |      |      |
|  | Analysis Period (min)  |       |      | 15    |      |           |            |      |      |      |      |      |      |

## HCM Unsignalized Intersection Capacity Analysis 5: Howard Marshall & Hilltop

| 04/05/2018 |  |
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|-------------------------------|-------|------|-------|-------|-----------|------------|------|------|------|------|------|------|
| Movement                      | EBL   | EBT  | EBR   | WBL   | WBT       | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations           |       | \$   |       |       | \$        |            |      | \$   |      |      | \$   |      |
| Sign Control                  |       | Stop |       |       | Stop      |            |      | Stop |      |      | Stop |      |
| Traffic Volume (vph)          | 5     | 49   | 245   | 68    | 36        | 0          | 150  | 8    | 27   | 0    | 2    | 4    |
| Future Volume (vph)           | 5     | 49   | 245   | 68    | 36        | 0          | 150  | 8    | 27   | 0    | 2    | 4    |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90  | 0.90      | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)        | 6     | 54   | 272   | 76    | 40        | 0          | 167  | 9    | 30   | 0    | 2    | 4    |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  | SB 1  |           |            |      |      |      |      |      |      |
| Volume Total (vph)            | 332   | 116  | 206   | 6     |           |            |      |      |      |      |      |      |
| Volume Left (vph)             | 6     | 76   | 167   | 0     |           |            |      |      |      |      |      |      |
| Volume Right (vph)            | 272   | 0    | 30    | 4     |           |            |      |      |      |      |      |      |
| Hadj (s)                      | -0.49 | 0.13 | 0.07  | -0.40 |           |            |      |      |      |      |      |      |
| Departure Headway (s)         | 4.1   | 5.0  | 5.0   | 4.8   |           |            |      |      |      |      |      |      |
| Degree Utilization, x         | 0.38  | 0.16 | 0.29  | 0.01  |           |            |      |      |      |      |      |      |
| Capacity (veh/h)              | 837   | 680  | 675   | 653   |           |            |      |      |      |      |      |      |
| Control Delay (s)             | 9.6   | 8.9  | 10.0  | 7.8   |           |            |      |      |      |      |      |      |
| Approach Delay (s)            | 9.6   | 8.9  | 10.0  | 7.8   |           |            |      |      |      |      |      |      |
| Approach LOS                  | А     | А    | Α     | А     |           |            |      |      |      |      |      |      |
| Intersection Summary          |       |      |       |       |           |            |      |      |      |      |      |      |
| Delay                         |       |      | 9.6   |       |           |            |      |      |      |      |      |      |
| Level of Service              |       |      | А     |       |           |            |      |      |      |      |      |      |
| Intersection Capacity Utiliza | ation |      | 50.7% | IC    | U Level o | of Service |      |      | А    |      |      |      |
| Analysis Period (min)         |       |      | 15    |       |           |            |      |      |      |      |      |      |

|                                | ٠    | +     | 1     | 4    | +         | •          | 1    | Ť     | 1    | *    | ţ     | ~    |
|--------------------------------|------|-------|-------|------|-----------|------------|------|-------|------|------|-------|------|
| Movement                       | EBL  | EBT   | EBR   | WBL  | WBT       | WBR        | NBL  | NBT   | NBR  | SBL  | SBT   | SBR  |
| Lane Configurations            |      | \$    |       |      | \$        |            |      | \$    |      |      | \$    |      |
| Sign Control                   |      | Yield |       |      | Yield     |            |      | Yield |      |      | Yield |      |
| Traffic Volume (vph)           | 0    | 0     | 0     | 0    | 0         | 7          | 0    | 0     | 0    | 12   | 0     | 0    |
| Future Volume (vph)            | 0    | 0     | 0     | 0    | 0         | 7          | 0    | 0     | 0    | 12   | 0     | 0    |
| Peak Hour Factor               | 0.90 | 0.90  | 0.90  | 0.90 | 0.90      | 0.90       | 0.90 | 0.90  | 0.90 | 0.90 | 0.90  | 0.90 |
| Hourly flow rate (vph)         | 0    | 0     | 0     | 0    | 0         | 8          | 0    | 0     | 0    | 13   | 0     | 0    |
| Direction, Lane #              | EB 1 | WB 1  | NB 1  | SB 1 |           |            |      |       |      |      |       |      |
| Volume Total (vph)             | 0    | 8     | 0     | 13   |           |            |      |       |      |      |       |      |
| Volume Left (vph)              | 0    | 0     | 0     | 13   |           |            |      |       |      |      |       |      |
| Volume Right (vph)             | 0    | 8     | 0     | 0    |           |            |      |       |      |      |       |      |
| Hadj (s)                       | 0.00 | -0.57 | 0.00  | 0.23 |           |            |      |       |      |      |       |      |
| Departure Headway (s)          | 3.9  | 3.4   | 3.9   | 4.1  |           |            |      |       |      |      |       |      |
| Degree Utilization, x          | 0.00 | 0.01  | 0.00  | 0.01 |           |            |      |       |      |      |       |      |
| Capacity (veh/h)               | 900  | 1060  | 911   | 861  |           |            |      |       |      |      |       |      |
| Control Delay (s)              | 6.9  | 6.4   | 6.9   | 7.2  |           |            |      |       |      |      |       |      |
| Approach Delay (s)             | 0.0  | 6.4   | 0.0   | 7.2  |           |            |      |       |      |      |       |      |
| Approach LOS                   | A    | A     | A     | A    |           |            |      |       |      |      |       |      |
| Intersection Summary           |      |       |       |      |           |            |      |       |      |      |       |      |
| Delay                          |      |       | 6.9   |      |           |            |      |       |      |      |       |      |
| Level of Service               |      |       | А     |      |           |            |      |       |      |      |       |      |
| Intersection Capacity Utilizat | tion |       | 13.3% | IC   | U Level o | of Service |      |       | А    |      |       |      |
| Analysis Period (min)          |      |       | 15    |      |           |            |      |       |      |      |       |      |

# HCM Unsignalized Intersection Capacity Analysis 21: Stanley & Northumberland

|                                | ٠    | +    | *     | 1     | Ļ          | •          | 1    | Ť    | 1    | 1    | ţ    | ~    |
|--------------------------------|------|------|-------|-------|------------|------------|------|------|------|------|------|------|
| Movement                       | EBL  | EBT  | EBR   | WBL   | WBT        | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations            |      | \$   |       |       | ŧ          | 1          |      | \$   |      |      | \$   |      |
| Sign Control                   |      | Stop |       |       | Stop       |            |      | Stop |      |      | Stop |      |
| Traffic Volume (vph)           | 76   | 43   | 3     | 2     | 44         | 472        | 2    | 16   | 5    | 855  | 11   | 95   |
| Future Volume (vph)            | 76   | 43   | 3     | 2     | 44         | 472        | 2    | 16   | 5    | 855  | 11   | 95   |
| Peak Hour Factor               | 0.90 | 0.90 | 0.90  | 0.90  | 0.90       | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)         | 84   | 48   | 3     | 2     | 49         | 524        | 2    | 18   | 6    | 950  | 12   | 106  |
| Direction, Lane #              | EB 1 | WB 1 | WB 2  | NB 1  | SB 1       |            |      |      |      |      |      |      |
| Volume Total (vph)             | 135  | 51   | 524   | 26    | 1068       |            |      |      |      |      |      |      |
| Volume Left (vph)              | 84   | 2    | 0     | 2     | 950        |            |      |      |      |      |      |      |
| Volume Right (vph)             | 3    | 0    | 524   | 6     | 106        |            |      |      |      |      |      |      |
| Hadj (s)                       | 0.11 | 0.01 | -0.60 | -0.12 | 0.12       |            |      |      |      |      |      |      |
| Departure Headway (s)          | 6.0  | 6.1  | 3.2   | 5.3   | 4.6        |            |      |      |      |      |      |      |
| Degree Utilization, x          | 0.23 | 0.09 | 0.47  | 0.04  | 1.38       |            |      |      |      |      |      |      |
| Capacity (veh/h)               | 586  | 571  | 1116  | 652   | 765        |            |      |      |      |      |      |      |
| Control Delay (s)              | 10.8 | 9.7  | 9.0   | 8.5   | 193.8      |            |      |      |      |      |      |      |
| Approach Delay (s)             | 10.8 | 9.0  |       | 8.5   | 193.8      |            |      |      |      |      |      |      |
| Approach LOS                   | В    | А    |       | А     | F          |            |      |      |      |      |      |      |
| Intersection Summary           |      |      |       |       |            |            |      |      |      |      |      |      |
| Delay                          |      |      | 118.5 |       |            |            |      |      |      |      |      |      |
| Level of Service               |      |      | F     |       |            |            |      |      |      |      |      |      |
| Intersection Capacity Utilizat | ion  |      | 94.0% | IC    | CU Level o | of Service |      |      | F    |      |      |      |
| Analysis Period (min)          |      |      | 15    |       |            |            |      |      |      |      |      |      |

|                               | -     | 7    | 1     | -    | 1         | 1         |
|-------------------------------|-------|------|-------|------|-----------|-----------|
| Movement                      | EBT   | EBR  | WBL   | WBT  | NBL       | NBR       |
| Lane Configurations           | +     |      | ٦     | 1    | ¥         |           |
| Traffic Volume (veh/h)        | 42    | 73   | 163   | 90   | 48        | 64        |
| Future Volume (Veh/h)         | 42    | 73   | 163   | 90   | 48        | 64        |
| Sign Control                  | Free  |      |       | Free | Stop      |           |
| Grade                         | 0%    |      |       | 0%   | 0%        |           |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90 | 0.90      | 0.90      |
| Hourly flow rate (vph)        | 47    | 81   | 181   | 100  | 53        | 71        |
| Pedestrians                   |       | • •  |       |      | 2         |           |
| Lane Width (m)                |       |      |       |      | 3.4       |           |
| Walking Speed (m/s)           |       |      |       |      | 1.1       |           |
| Percent Blockage              |       |      |       |      | 0         |           |
| Right turn flare (veh)        |       |      |       |      | v         |           |
| Median type                   | None  |      |       | None |           |           |
| Median storage veh)           | Nono  |      |       | None |           |           |
| Upstream signal (m)           |       |      |       |      |           |           |
| pX, platoon unblocked         |       |      |       |      |           |           |
| vC, conflicting volume        |       |      | 130   |      | 552       | 90        |
| vC1, stage 1 conf vol         |       |      | 100   |      | 552       | 50        |
| vC2, stage 2 conf vol         |       |      |       |      |           |           |
| vCu, unblocked vol            |       |      | 130   |      | 552       | 90        |
| tC, single (s)                |       |      | 4.1   |      | 6.4       | 6.2       |
| tC, 2 stage (s)               |       |      | 7.1   |      | 0.4       | 0.2       |
| tF (s)                        |       |      | 2.2   |      | 3.5       | 3.3       |
| p0 queue free %               |       |      | 88    |      | 88        | 93        |
| cM capacity (veh/h)           |       |      | 1465  |      | 436       | 972       |
|                               |       |      |       |      | 400       | 512       |
| Direction, Lane #             | EB 1  | WB 1 | WB 2  | NB 1 |           |           |
| Volume Total                  | 128   | 181  | 100   | 124  |           |           |
| Volume Left                   | 0     | 181  | 0     | 53   |           |           |
| Volume Right                  | 81    | 0    | 0     | 71   |           |           |
| cSH                           | 1700  | 1465 | 1700  | 637  |           |           |
| Volume to Capacity            | 0.08  | 0.12 | 0.06  | 0.19 |           |           |
| Queue Length 95th (m)         | 0.0   | 3.2  | 0.0   | 5.4  |           |           |
| Control Delay (s)             | 0.0   | 7.8  | 0.0   | 12.0 |           |           |
| Lane LOS                      |       | А    |       | В    |           |           |
| Approach Delay (s)            | 0.0   | 5.0  |       | 12.0 |           |           |
| Approach LOS                  |       |      |       | В    |           |           |
| Intersection Summary          |       |      |       |      |           |           |
| Average Delay                 |       |      | 5.4   |      |           |           |
| Intersection Capacity Utiliza | ation |      | 30.1% | IC   | U Level c | f Service |
| Analysis Period (min)         | -     |      | 15    |      |           |           |
|                               |       |      | 10    |      |           |           |

|                               | -    | 7    | *     | +            | 1         | 1         |  |
|-------------------------------|------|------|-------|--------------|-----------|-----------|--|
| Movement                      | EBT  | EBR  | WBL   | WBT          | NBL       | NBR       |  |
| Lane Configurations           | ţ,   |      |       | <del>د</del> | Y         |           |  |
| Traffic Volume (veh/h)        | 61   | 845  | 28    | 61           | 459       | 15        |  |
| Future Volume (Veh/h)         | 61   | 845  | 28    | 61           | 459       | 15        |  |
| Sign Control                  | Free |      |       | Free         | Stop      |           |  |
| Grade                         | 0%   |      |       | 0%           | 0%        |           |  |
| Peak Hour Factor              | 0.90 | 0.90 | 0.90  | 0.90         | 0.90      | 0.90      |  |
| Hourly flow rate (vph)        | 68   | 939  | 31    | 68           | 510       | 17        |  |
| Pedestrians                   | 1    |      |       |              | 1         |           |  |
| Lane Width (m)                | 3.4  |      |       |              | 3.4       |           |  |
| Walking Speed (m/s)           | 1.1  |      |       |              | 1.1       |           |  |
| Percent Blockage              | 0    |      |       |              | 0         |           |  |
| Right turn flare (veh)        |      |      |       |              |           |           |  |
| Median type                   | None |      |       | None         |           |           |  |
| Median storage veh)           |      |      |       |              |           |           |  |
| Upstream signal (m)           |      |      |       |              |           |           |  |
| pX, platoon unblocked         |      |      |       |              |           |           |  |
| vC, conflicting volume        |      |      | 1008  |              | 670       | 538       |  |
| vC1, stage 1 conf vol         |      |      |       |              |           |           |  |
| vC2, stage 2 conf vol         |      |      |       |              |           |           |  |
| vCu, unblocked vol            |      |      | 1008  |              | 670       | 538       |  |
| tC, single (s)                |      |      | 4.1   |              | 6.4       | 6.2       |  |
| tC, 2 stage (s)               |      |      |       |              |           |           |  |
| tF (s)                        |      |      | 2.2   |              | 3.5       | 3.3       |  |
| p0 queue free %               |      |      | 96    |              | 0         | 97        |  |
| cM capacity (veh/h)           |      |      | 695   |              | 404       | 546       |  |
| Direction, Lane #             | EB 1 | WB 1 | NB 1  |              |           |           |  |
| Volume Total                  | 1007 | 99   | 527   |              |           |           |  |
| Volume Left                   | 0    | 31   | 510   |              |           |           |  |
| Volume Right                  | 939  | 0    | 17    |              |           |           |  |
| cSH                           | 1700 | 695  | 408   |              |           |           |  |
| Volume to Capacity            | 0.59 | 0.04 | 1.29  |              |           |           |  |
| Queue Length 95th (m)         | 0.0  | 1.1  | 177.5 |              |           |           |  |
| Control Delay (s)             | 0.0  | 3.6  | 176.8 |              |           |           |  |
| Lane LOS                      |      | A    | F     |              |           |           |  |
| Approach Delay (s)            | 0.0  | 3.6  | 176.8 |              |           |           |  |
| Approach LOS                  | 0.0  | 5.0  | F     |              |           |           |  |
| Intersection Summary          |      |      |       |              |           |           |  |
| Average Delay                 |      |      | 57.3  |              |           |           |  |
| Intersection Capacity Utiliza | tion |      | 99.0% | IC           | U Level o | f Service |  |
| Analysis Period (min)         |      |      | 15    | 10           |           |           |  |
|                               |      |      | 15    |              |           |           |  |

|                               | ٨     | -      | +      | •    | 1         | ~          |
|-------------------------------|-------|--------|--------|------|-----------|------------|
| Movement                      | EBL   | EBT    | WBT    | WBR  | SBL       | SBR        |
| Lane Configurations           |       | é.     | ţ,     |      | Y         |            |
| Traffic Volume (veh/h)        | 16    | 0      | 0      | 128  | 223       | 27         |
| Future Volume (Veh/h)         | 16    | 0      | 0      | 128  | 223       | 27         |
| Sign Control                  |       | Free   | Free   |      | Stop      |            |
| Grade                         |       | 0%     | 0%     |      | 0%        |            |
| Peak Hour Factor              | 0.90  | 0.90   | 0.90   | 0.90 | 0.90      | 0.90       |
| Hourly flow rate (vph)        | 18    | 0      | 0      | 142  | 248       | 30         |
| Pedestrians                   |       |        |        |      |           |            |
| Lane Width (m)                |       |        |        |      |           |            |
| Walking Speed (m/s)           |       |        |        |      |           |            |
| Percent Blockage              |       |        |        |      |           |            |
| Right turn flare (veh)        |       |        |        |      |           |            |
| Median type                   |       | None   | None   |      |           |            |
| Median storage veh)           |       | 110110 | 110110 |      |           |            |
| Upstream signal (m)           |       |        |        |      |           |            |
| pX, platoon unblocked         |       |        |        |      |           |            |
| vC, conflicting volume        | 142   |        |        |      | 107       | 71         |
| vC1, stage 1 conf vol         | 172   |        |        |      | 107       | 11         |
| vC2, stage 2 conf vol         |       |        |        |      |           |            |
| vCu, unblocked vol            | 142   |        |        |      | 107       | 71         |
| tC, single (s)                | 4.1   |        |        |      | 6.4       | 6.2        |
| tC, 2 stage (s)               | 4.1   |        |        |      | 0.4       | 0.2        |
| tF (s)                        | 2.2   |        |        |      | 3.5       | 3.3        |
| p0 queue free %               | 99    |        |        |      | 72        | 97         |
| cM capacity (veh/h)           | 1441  |        |        |      | 879       | 97<br>991  |
| ,                             |       |        |        |      | 019       | 331        |
| Direction, Lane #             | EB 1  | WB 1   | SB 1   |      |           |            |
| Volume Total                  | 18    | 142    | 278    |      |           |            |
| Volume Left                   | 18    | 0      | 248    |      |           |            |
| Volume Right                  | 0     | 142    | 30     |      |           |            |
| cSH                           | 1441  | 1700   | 890    |      |           |            |
| Volume to Capacity            | 0.01  | 0.08   | 0.31   |      |           |            |
| Queue Length 95th (m)         | 0.3   | 0.0    | 10.2   |      |           |            |
| Control Delay (s)             | 7.5   | 0.0    | 10.9   |      |           |            |
| Lane LOS                      | А     |        | В      |      |           |            |
| Approach Delay (s)            | 7.5   | 0.0    | 10.9   |      |           |            |
| Approach LOS                  |       |        | В      |      |           |            |
| Intersection Summary          |       |        |        |      |           |            |
| Average Delay                 |       |        | 7.2    |      |           |            |
| Intersection Capacity Utiliza | ation |        | 37.0%  | IC   | U Level o | of Service |
| Analysis Period (min)         |       |        | 15     |      | 5 201010  |            |
|                               |       |        | 10     |      |           |            |

|                               | ٨     | <b>→</b> | Ļ      | ×    | 4         | 4          |
|-------------------------------|-------|----------|--------|------|-----------|------------|
| Movement                      | EBL   | EBT      | WBT    | WBR  | SBL       | SBR        |
| Lane Configurations           |       | é.       | ţ,     |      | Y         |            |
| Traffic Volume (veh/h)        | 0     | 123      | 71     | 0    | 0         | 0          |
| Future Volume (Veh/h)         | 0     | 123      | 71     | 0    | 0         | 0          |
| Sign Control                  |       | Free     | Free   |      | Stop      |            |
| Grade                         |       | 0%       | 0%     |      | 0%        |            |
| Peak Hour Factor              | 0.90  | 0.90     | 0.90   | 0.90 | 0.90      | 0.90       |
| Hourly flow rate (vph)        | 0     | 137      | 79     | 0    | 0         | 0          |
| Pedestrians                   |       |          |        |      |           |            |
| Lane Width (m)                |       |          |        |      |           |            |
| Walking Speed (m/s)           |       |          |        |      |           |            |
| Percent Blockage              |       |          |        |      |           |            |
| Right turn flare (veh)        |       |          |        |      |           |            |
| Median type                   |       | None     | None   |      |           |            |
| Median storage veh)           |       | 1.0110   | 110110 |      |           |            |
| Upstream signal (m)           |       |          |        |      |           |            |
| pX, platoon unblocked         |       |          |        |      |           |            |
| vC, conflicting volume        | 79    |          |        |      | 216       | 79         |
| vC1, stage 1 conf vol         | 10    |          |        |      | 210       | 15         |
| vC2, stage 2 conf vol         |       |          |        |      |           |            |
| vCu, unblocked vol            | 79    |          |        |      | 216       | 79         |
| tC, single (s)                | 4.1   |          |        |      | 6.4       | 6.2        |
| tC, 2 stage (s)               | т. 1  |          |        |      | т.т       | 0.2        |
| tF (s)                        | 2.2   |          |        |      | 3.5       | 3.3        |
| p0 queue free %               | 100   |          |        |      | 100       | 100        |
| cM capacity (veh/h)           | 1519  |          |        |      | 772       | 981        |
| ,                             |       |          |        |      | 112       | 301        |
| Direction, Lane #             | EB 1  | WB 1     | SB 1   |      |           |            |
| Volume Total                  | 137   | 79       | 0      |      |           |            |
| Volume Left                   | 0     | 0        | 0      |      |           |            |
| Volume Right                  | 0     | 0        | 0      |      |           |            |
| cSH                           | 1519  | 1700     | 1700   |      |           |            |
| Volume to Capacity            | 0.00  | 0.05     | 0.00   |      |           |            |
| Queue Length 95th (m)         | 0.0   | 0.0      | 0.0    |      |           |            |
| Control Delay (s)             | 0.0   | 0.0      | 0.0    |      |           |            |
| Lane LOS                      |       |          | А      |      |           |            |
| Approach Delay (s)            | 0.0   | 0.0      | 0.0    |      |           |            |
| Approach LOS                  |       |          | А      |      |           |            |
| Intersection Summary          |       |          |        |      |           |            |
| Average Delay                 |       |          | 0.0    |      |           |            |
| Intersection Capacity Utiliza | ation |          | 10.8%  | IC   | U Level o | of Service |
| Analysis Period (min)         |       |          | 15     | .0   |           |            |
|                               |       |          | 10     |      |           |            |

|                               | -     | 7    | 4     | -    | 1         | 1          |  |
|-------------------------------|-------|------|-------|------|-----------|------------|--|
| Movement                      | EBT   | EBR  | WBL   | WBT  | NBL       | NBR        |  |
| Lane Configurations           | ŧ,    |      |       | र्भ  | ¥         |            |  |
| Traffic Volume (veh/h)        | 123   | 101  | 0     | 71   | 58        | 0          |  |
| Future Volume (Veh/h)         | 123   | 101  | 0     | 71   | 58        | 0          |  |
| Sign Control                  | Free  |      |       | Free | Stop      |            |  |
| Grade                         | 0%    |      |       | 0%   | 0%        |            |  |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       |  |
| Hourly flow rate (vph)        | 137   | 112  | 0     | 79   | 64        | 0          |  |
| Pedestrians                   |       |      |       |      |           |            |  |
| Lane Width (m)                |       |      |       |      |           |            |  |
| Walking Speed (m/s)           |       |      |       |      |           |            |  |
| Percent Blockage              |       |      |       |      |           |            |  |
| Right turn flare (veh)        |       |      |       |      |           |            |  |
| Median type                   | None  |      |       | None |           |            |  |
| Median storage veh)           |       |      |       |      |           |            |  |
| Upstream signal (m)           |       |      |       |      |           |            |  |
| pX, platoon unblocked         |       |      |       |      |           |            |  |
| vC, conflicting volume        |       |      | 249   |      | 272       | 193        |  |
| vC1, stage 1 conf vol         |       |      |       |      |           |            |  |
| vC2, stage 2 conf vol         |       |      |       |      |           |            |  |
| vCu, unblocked vol            |       |      | 249   |      | 272       | 193        |  |
| 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   |      | 91        | 100        |  |
| cM capacity (veh/h)           |       |      | 1317  |      | 717       | 849        |  |
| Direction, Lane #             | EB 1  | WB 1 | NB 1  |      |           |            |  |
| Volume Total                  | 249   | 79   | 64    |      |           |            |  |
| Volume Left                   | 0     | 0    | 64    |      |           |            |  |
| Volume Right                  | 112   | 0    | 0     |      |           |            |  |
| cSH                           | 1700  | 1317 | 717   |      |           |            |  |
| Volume to Capacity            | 0.15  | 0.00 | 0.09  |      |           |            |  |
| Queue Length 95th (m)         | 0.0   | 0.0  | 2.2   |      |           |            |  |
| Control Delay (s)             | 0.0   | 0.0  | 10.5  |      |           |            |  |
| Lane LOS                      |       |      | В     |      |           |            |  |
| Approach Delay (s)            | 0.0   | 0.0  | 10.5  |      |           |            |  |
| Approach LOS                  |       |      | В     |      |           |            |  |
| Intersection Summary          |       |      |       |      |           |            |  |
| Average Delay                 |       |      | 1.7   |      |           |            |  |
| Intersection Capacity Utiliza | ation |      | 24.7% | IC   | U Level c | of Service |  |
| Analysis Period (min)         |       |      | 15    |      |           |            |  |
|                               |       |      |       |      |           |            |  |

### HCM Unsignalized Intersection Capacity Analysis 47: Leslie Davis & Street A

| 04/05/2018 | 5 |
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|---------------------------------|------|-------|-------|-------|-----------|------------|------|-------|------|------|-------|------|
| Movement                        | EBL  | EBT   | EBR   | WBL   | WBT       | WBR        | NBL  | NBT   | NBR  | SBL  | SBT   | SBR  |
| Lane Configurations             |      | 4     |       |       | \$        |            |      | \$    |      |      | 4     |      |
| Sign Control                    |      | Yield |       |       | Yield     |            |      | Yield |      |      | Yield |      |
| Traffic Volume (vph)            | 6    | 0     | 0     | 0     | 0         | 3          | 0    | 50    | 0    | 6    | 86    | 11   |
| Future Volume (vph)             | 6    | 0     | 0     | 0     | 0         | 3          | 0    | 50    | 0    | 6    | 86    | 11   |
| Peak Hour Factor                | 0.90 | 0.90  | 0.90  | 0.90  | 0.90      | 0.90       | 0.90 | 0.90  | 0.90 | 0.90 | 0.90  | 0.90 |
| Hourly flow rate (vph)          | 7    | 0     | 0     | 0     | 0         | 3          | 0    | 56    | 0    | 7    | 96    | 12   |
| Direction, Lane #               | EB 1 | WB 1  | NB 1  | SB 1  |           |            |      |       |      |      |       |      |
| Volume Total (vph)              | 7    | 3     | 56    | 115   |           |            |      |       |      |      |       |      |
| Volume Left (vph)               | 7    | 0     | 0     | 7     |           |            |      |       |      |      |       |      |
| Volume Right (vph)              | 0    | 3     | 0     | 12    |           |            |      |       |      |      |       |      |
| Hadj (s)                        | 0.23 | -0.57 | 0.03  | -0.02 |           |            |      |       |      |      |       |      |
| Departure Headway (s)           | 4.5  | 3.7   | 4.1   | 4.0   |           |            |      |       |      |      |       |      |
| Degree Utilization, x           | 0.01 | 0.00  | 0.06  | 0.13  |           |            |      |       |      |      |       |      |
| Capacity (veh/h)                | 766  | 924   | 868   | 901   |           |            |      |       |      |      |       |      |
| Control Delay (s)               | 7.5  | 6.7   | 7.3   | 7.5   |           |            |      |       |      |      |       |      |
| Approach Delay (s)              | 7.5  | 6.7   | 7.3   | 7.5   |           |            |      |       |      |      |       |      |
| Approach LOS                    | А    | А     | Α     | А     |           |            |      |       |      |      |       |      |
| Intersection Summary            |      |       |       |       |           |            |      |       |      |      |       |      |
| Delay                           |      |       | 7.5   |       |           |            |      |       |      |      |       |      |
| Level of Service                |      |       | А     |       |           |            |      |       |      |      |       |      |
| Intersection Capacity Utilizati | on   |       | 25.3% | IC    | U Level o | of Service |      |       | А    |      |       |      |
| Analysis Period (min)           |      |       | 15    |       |           |            |      |       |      |      |       |      |

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|-------------------------------|-------|-------|--------|------|---------|------------|
| Movement                      | EBL   | EBT   | WBT    | WBR  | SBL     | SBR        |
| Lane Configurations           |       | é.    | ţ,     |      | Y       |            |
| Traffic Volume (veh/h)        | 5     | 17    | 10     | 0    | 0       | 3          |
| Future Volume (Veh/h)         | 5     | 17    | 10     | 0    | 0       | 3          |
| Sign Control                  |       | Free  | Free   |      | Stop    |            |
| Grade                         |       | 0%    | 0%     |      | 0%      |            |
| Peak Hour Factor              | 0.90  | 0.90  | 0.90   | 0.90 | 0.90    | 0.90       |
| Hourly flow rate (vph)        | 6     | 19    | 11     | 0    | 0       | 3          |
| Pedestrians                   |       |       |        |      |         |            |
| Lane Width (m)                |       |       |        |      |         |            |
| Walking Speed (m/s)           |       |       |        |      |         |            |
| Percent Blockage              |       |       |        |      |         |            |
| Right turn flare (veh)        |       |       |        |      |         |            |
| Median type                   |       | None  | None   |      |         |            |
| Median storage veh)           |       | 10110 | 10110  |      |         |            |
| Upstream signal (m)           |       |       |        |      |         |            |
| pX, platoon unblocked         |       |       |        |      |         |            |
| vC, conflicting volume        | 11    |       |        |      | 42      | 11         |
| vC1, stage 1 conf vol         |       |       |        |      | 74      |            |
| vC2, stage 2 conf vol         |       |       |        |      |         |            |
| vCu, unblocked vol            | 11    |       |        |      | 42      | 11         |
| tC, single (s)                | 4.1   |       |        |      | 6.4     | 6.2        |
| tC, 2 stage (s)               | 4.1   |       |        |      | 0.4     | 0.2        |
| tF (s)                        | 2.2   |       |        |      | 3.5     | 3.3        |
| p0 queue free %               | 100   |       |        |      | 100     | 100        |
|                               | 1608  |       |        |      | 965     | 1070       |
| cM capacity (veh/h)           |       |       |        |      | 905     | 1070       |
| Direction, Lane #             | EB 1  | WB 1  | SB 1   |      |         |            |
| Volume Total                  | 25    | 11    | 3      |      |         |            |
| Volume Left                   | 6     | 0     | 0      |      |         |            |
| Volume Right                  | 0     | 0     | 3      |      |         |            |
| cSH                           | 1608  | 1700  | 1070   |      |         |            |
| Volume to Capacity            | 0.00  | 0.01  | 0.00   |      |         |            |
| Queue Length 95th (m)         | 0.1   | 0.0   | 0.1    |      |         |            |
| Control Delay (s)             | 1.8   | 0.0   | 8.4    |      |         |            |
| Lane LOS                      | А     |       | А      |      |         |            |
| Approach Delay (s)            | 1.8   | 0.0   | 8.4    |      |         |            |
| Approach LOS                  |       |       | А      |      |         |            |
| Intersection Summary          |       |       |        |      |         |            |
| Average Delay                 |       |       | 1.8    |      |         |            |
| Intersection Capacity Utiliza | ation |       | 16.0%  | IC   | ULevelo | of Service |
| Analysis Period (min)         |       |       | 10.070 | 10   |         |            |
|                               |       |       | 13     |      |         |            |

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|-----------------------------------|-------|----------|--------|------|-----------|------------|
| Movement                          | EBL   | EBT      | WBT    | WBR  | SBL       | SBR        |
| Lane Configurations               |       | र्स      | ţ,     |      | Y         |            |
| Traffic Volume (veh/h)            | 17    | 0        | 0      | 0    | 0         | 10         |
| Future Volume (Veh/h)             | 17    | 0        | 0      | 0    | 0         | 10         |
| Sign Control                      |       | Free     | Free   |      | Stop      |            |
| Grade                             |       | 0%       | 0%     |      | 0%        |            |
| Peak Hour Factor                  | 0.90  | 0.90     | 0.90   | 0.90 | 0.90      | 0.90       |
| Hourly flow rate (vph)            | 19    | 0        | 0      | 0    | 0         | 11         |
| Pedestrians                       |       | -        | -      | -    | -         |            |
| Lane Width (m)                    |       |          |        |      |           |            |
| Walking Speed (m/s)               |       |          |        |      |           |            |
| Percent Blockage                  |       |          |        |      |           |            |
| Right turn flare (veh)            |       |          |        |      |           |            |
| Median type                       |       | None     | None   |      |           |            |
| Median storage veh)               |       | 110110   | 110110 |      |           |            |
| Upstream signal (m)               |       |          |        |      |           |            |
| pX, platoon unblocked             |       |          |        |      |           |            |
| vC, conflicting volume            | 0     |          |        |      | 38        | 0          |
| vC1, stage 1 conf vol             | v     |          |        |      | 00        | Ŭ          |
| vC2, stage 2 conf vol             |       |          |        |      |           |            |
| vCu, unblocked vol                | 0     |          |        |      | 38        | 0          |
| tC, single (s)                    | 4.1   |          |        |      | 6.4       | 6.2        |
| tC, 2 stage (s)                   | 7.1   |          |        |      | 0.4       | 0.2        |
| tF (s)                            | 2.2   |          |        |      | 3.5       | 3.3        |
| p0 queue free %                   | 99    |          |        |      | 100       | 99         |
| cM capacity (veh/h)               | 1623  |          |        |      | 963       | 1085       |
|                                   |       |          |        |      | 505       | 1000       |
| Direction, Lane #                 | EB 1  | WB 1     | SB 1   |      |           |            |
| Volume Total                      | 19    | 0        | 11     |      |           |            |
| Volume Left                       | 19    | 0        | 0      |      |           |            |
| Volume Right                      | 0     | 0        | 11     |      |           |            |
| cSH                               | 1623  | 1700     | 1085   |      |           |            |
| Volume to Capacity                | 0.01  | 0.00     | 0.01   |      |           |            |
| Queue Length 95th (m)             | 0.3   | 0.0      | 0.2    |      |           |            |
| Control Delay (s)                 | 7.2   | 0.0      | 8.4    |      |           |            |
| Lane LOS                          | А     |          | А      |      |           |            |
| Approach Delay (s)                | 7.2   | 0.0      | 8.4    |      |           |            |
| Approach LOS                      |       |          | А      |      |           |            |
| Intersection Summary              |       |          |        |      |           |            |
| Average Delay                     |       |          | 7.7    |      |           |            |
| Intersection Capacity Utilization | ation |          | 13.3%  | IC   | U Level o | of Service |
| Analysis Period (min)             |       |          | 15     |      |           |            |
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# HCM Unsignalized Intersection Capacity Analysis 51: Swan & Brant-Waterloo

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|--------------------------------|------|------|-------|------|---------|------------|------|------|------|------|------|------|
| Movement                       | EBL  | EBT  | EBR   | WBL  | WBT     | WBR        | NBL  | NBT  | NBR  | SBL  | SBT  | SBR  |
| Lane Configurations            |      | 4    |       |      | 4       |            |      | 4    |      |      | 4    |      |
| Traffic Volume (veh/h)         | 8    | 3    | 4     | 12   | 3       | 5          | 4    | 152  | 24   | 5    | 208  | 5    |
| Future Volume (Veh/h)          | 8    | 3    | 4     | 12   | 3       | 5          | 4    | 152  | 24   | 5    | 208  | 5    |
| Sign Control                   |      | Stop |       |      | Stop    |            |      | Free |      |      | Free |      |
| Grade                          |      | 0%   |       |      | 0%      |            |      | 0%   |      |      | 0%   |      |
| Peak Hour Factor               | 0.90 | 0.90 | 0.90  | 0.90 | 0.90    | 0.90       | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 | 0.90 |
| Hourly flow rate (vph)         | 9    | 3    | 4     | 13   | 3       | 6          | 4    | 169  | 27   | 6    | 231  | 6    |
| Pedestrians                    |      |      |       |      |         |            |      |      |      |      |      |      |
| Lane Width (m)                 |      |      |       |      |         |            |      |      |      |      |      |      |
| Walking Speed (m/s)            |      |      |       |      |         |            |      |      |      |      |      |      |
| Percent Blockage               |      |      |       |      |         |            |      |      |      |      |      |      |
| Right turn flare (veh)         |      |      |       |      |         |            |      |      |      |      |      |      |
| Median type                    |      |      |       |      |         |            |      | None |      |      | None |      |
| Median storage veh)            |      |      |       |      |         |            |      |      |      |      |      |      |
| Upstream signal (m)            |      |      |       |      |         |            |      |      |      |      |      |      |
| pX, platoon unblocked          |      |      |       |      |         |            |      |      |      |      |      |      |
| vC, conflicting volume         | 444  | 450  | 234   | 442  | 440     | 182        | 237  |      |      | 196  |      |      |
| vC1, stage 1 conf vol          |      |      |       |      |         |            |      |      |      |      |      |      |
| vC2, stage 2 conf vol          |      |      |       |      |         |            |      |      |      |      |      |      |
| vCu, unblocked vol             | 444  | 450  | 234   | 442  | 440     | 182        | 237  |      |      | 196  |      |      |
| tC, single (s)                 | 7.1  | 6.5  | 6.2   | 7.1  | 6.5     | 6.2        | 4.1  |      |      | 4.1  |      |      |
| tC, 2 stage (s)                |      |      |       |      |         |            |      |      |      |      |      |      |
| tF (s)                         | 3.5  | 4.0  | 3.3   | 3.5  | 4.0     | 3.3        | 2.2  |      |      | 2.2  |      |      |
| p0 queue free %                | 98   | 99   | 100   | 98   | 99      | 99         | 100  |      |      | 100  |      |      |
| cM capacity (veh/h)            | 519  | 504  | 810   | 521  | 511     | 865        | 1342 |      |      | 1389 |      |      |
| Direction, Lane #              | EB 1 | WB 1 | NB 1  | SB 1 |         |            |      |      |      |      |      |      |
| Volume Total                   | 16   | 22   | 200   | 243  |         |            |      |      |      |      |      |      |
| Volume Left                    | 9    | 13   | 4     | 6    |         |            |      |      |      |      |      |      |
| Volume Right                   | 4    | 6    | 27    | 6    |         |            |      |      |      |      |      |      |
| cSH                            | 566  | 583  | 1342  | 1389 |         |            |      |      |      |      |      |      |
| Volume to Capacity             | 0.03 | 0.04 | 0.00  | 0.00 |         |            |      |      |      |      |      |      |
| Queue Length 95th (m)          | 0.7  | 0.9  | 0.1   | 0.1  |         |            |      |      |      |      |      |      |
| Control Delay (s)              | 11.5 | 11.4 | 0.2   | 0.2  |         |            |      |      |      |      |      |      |
| Lane LOS                       | B    | В    | A     | A    |         |            |      |      |      |      |      |      |
| Approach Delay (s)             | 11.5 | 11.4 | 0.2   | 0.2  |         |            |      |      |      |      |      |      |
| Approach LOS                   | B    | В    | 0.2   | 0.2  |         |            |      |      |      |      |      |      |
| Intersection Summary           |      |      |       |      |         |            |      |      |      |      |      |      |
| Average Delay                  |      |      | 1.1   |      |         |            |      |      |      |      |      |      |
| Intersection Capacity Utilizat | ion  |      | 26.8% | IC   | Ulevelo | of Service |      |      | А    |      |      |      |
| Analysis Period (min)          |      |      | 15    |      |         |            |      |      | /\   |      |      |      |
|                                |      |      | 10    |      |         |            |      |      |      |      |      |      |

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|------------------------------|-------|------|-------|------|-----------|------------|--|
| Movement                     | WBL   | WBR  | NBT   | NBR  | SBL       | SBT        |  |
| Lane Configurations          | Y     |      | 4Î    |      |           | ર્સ        |  |
| Traffic Volume (veh/h)       | 6     | 103  | 0     | 11   | 182       | 0          |  |
| Future Volume (Veh/h)        | 6     | 103  | 0     | 11   | 182       | 0          |  |
| Sign Control                 | Stop  |      | Free  |      |           | Free       |  |
| Grade                        | 0%    |      | 0%    |      |           | 0%         |  |
| Peak Hour Factor             | 0.90  | 0.90 | 0.90  | 0.90 | 0.90      | 0.90       |  |
| Hourly flow rate (vph)       | 7     | 114  | 0     | 12   | 202       | 0          |  |
| Pedestrians                  |       |      |       |      |           |            |  |
| Lane Width (m)               |       |      |       |      |           |            |  |
| Walking Speed (m/s)          |       |      |       |      |           |            |  |
| Percent Blockage             |       |      |       |      |           |            |  |
| Right turn flare (veh)       |       |      |       |      |           |            |  |
| Median type                  |       |      | None  |      |           | None       |  |
| Median storage veh)          |       |      |       |      |           |            |  |
| Upstream signal (m)          |       |      |       |      |           |            |  |
| pX, platoon unblocked        |       |      |       |      |           |            |  |
| vC, conflicting volume       | 410   | 6    |       |      | 12        |            |  |
| vC1, stage 1 conf vol        | •     | Ū    |       |      |           |            |  |
| vC2, stage 2 conf vol        |       |      |       |      |           |            |  |
| vCu, unblocked vol           | 410   | 6    |       |      | 12        |            |  |
| tC, single (s)               | 6.4   | 6.2  |       |      | 4.1       |            |  |
| tC, 2 stage (s)              | 0.1   | 0.2  |       |      |           |            |  |
| tF (s)                       | 3.5   | 3.3  |       |      | 2.2       |            |  |
| p0 queue free %              | 99    | 89   |       |      | 87        |            |  |
| cM capacity (veh/h)          | 523   | 1077 |       |      | 1607      |            |  |
| ,                            |       |      |       |      | 1001      |            |  |
| Direction, Lane #            | WB 1  | NB 1 | SB 1  |      |           |            |  |
| Volume Total                 | 121   | 12   | 202   |      |           |            |  |
| Volume Left                  | 7     | 0    | 202   |      |           |            |  |
| Volume Right                 | 114   | 12   | 0     |      |           |            |  |
| cSH                          | 1015  | 1700 | 1607  |      |           |            |  |
| Volume to Capacity           | 0.12  | 0.01 | 0.13  |      |           |            |  |
| Queue Length 95th (m)        | 3.1   | 0.0  | 3.3   |      |           |            |  |
| Control Delay (s)            | 9.0   | 0.0  | 7.6   |      |           |            |  |
| Lane LOS                     | А     |      | A     |      |           |            |  |
| Approach Delay (s)           | 9.0   | 0.0  | 7.6   |      |           |            |  |
| Approach LOS                 | А     |      |       |      |           |            |  |
| Intersection Summary         |       |      |       |      |           |            |  |
| Average Delay                |       |      | 7.8   |      |           |            |  |
| Intersection Capacity Utiliz | ation |      | 30.6% | IC   | U Level o | of Service |  |
| Analysis Period (min)        |       |      | 15    |      |           |            |  |
|                              |       |      | 10    |      |           |            |  |

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|-------------------------------|-------|------|-------|--------|------------|------------|
| Movement                      | EBL   | EBR  | NBL   | NBT    | SBT        | SBR        |
| Lane Configurations           | Y     |      |       | र्भ    | 4          |            |
| Traffic Volume (veh/h)        | 5     | 0    | 0     | 5      | 8          | 7          |
| Future Volume (Veh/h)         | 5     | 0    | 0     | 5      | 8          | 7          |
| Sign Control                  | Stop  |      |       | Free   | Free       |            |
| Grade                         | 0%    |      |       | 0%     | 0%         |            |
| Peak Hour Factor              | 0.90  | 0.90 | 0.90  | 0.90   | 0.90       | 0.90       |
| Hourly flow rate (vph)        | 6     | 0    | 0     | 6      | 9          | 8          |
| Pedestrians                   |       |      |       |        |            |            |
| Lane Width (m)                |       |      |       |        |            |            |
| Walking Speed (m/s)           |       |      |       |        |            |            |
| Percent Blockage              |       |      |       |        |            |            |
| Right turn flare (veh)        |       |      |       |        |            |            |
| Median type                   |       |      |       | None   | None       |            |
| Median storage veh)           |       |      |       | 110110 | 1.0110     |            |
| Upstream signal (m)           |       |      |       |        |            |            |
| pX, platoon unblocked         |       |      |       |        |            |            |
| vC, conflicting volume        | 19    | 13   | 17    |        |            |            |
| vC1, stage 1 conf vol         | 10    | 10   | 17    |        |            |            |
| vC2, stage 2 conf vol         |       |      |       |        |            |            |
| vCu, unblocked vol            | 19    | 13   | 17    |        |            |            |
| tC, single (s)                | 6.4   | 6.2  | 4.1   |        |            |            |
| tC, 2 stage (s)               | 0.4   | 0.2  | 7.1   |        |            |            |
| tF (s)                        | 3.5   | 3.3  | 2.2   |        |            |            |
| p0 queue free %               | 99    | 100  | 100   |        |            |            |
| cM capacity (veh/h)           | 998   | 1067 | 1600  |        |            |            |
|                               |       |      |       |        |            |            |
| Direction, Lane #             | EB 1  | NB 1 | SB 1  |        |            |            |
| Volume Total                  | 6     | 6    | 17    |        |            |            |
| Volume Left                   | 6     | 0    | 0     |        |            |            |
| Volume Right                  | 0     | 0    | 8     |        |            |            |
| cSH                           | 998   | 1600 | 1700  |        |            |            |
| Volume to Capacity            | 0.01  | 0.00 | 0.01  |        |            |            |
| Queue Length 95th (m)         | 0.1   | 0.0  | 0.0   |        |            |            |
| Control Delay (s)             | 8.6   | 0.0  | 0.0   |        |            |            |
| Lane LOS                      | А     |      |       |        |            |            |
| Approach Delay (s)            | 8.6   | 0.0  | 0.0   |        |            |            |
| Approach LOS                  | А     |      |       |        |            |            |
| Intersection Summary          |       |      |       |        |            |            |
| Average Delay                 |       |      | 1.8   |        |            |            |
| Intersection Capacity Utiliza | ation |      | 13.3% | IC     | CU Level o | of Service |
| Analysis Period (min)         |       |      | 15    |        |            |            |
|                               |       |      | 10    |        |            |            |