



Transportation Planning
Traffic Impact Assessment
Parking Assessment
Site Access Design & Review
Site Servicing and Grading
Stormwater Management
Municipal Road Design

Transportation Study

PROPOSED RESIDENTIAL DEVELOPMENT

Villalago Residence Inc.
TOWN OF CALEDON

May 2016
Project No:NT-16-031

May 21, 2016

Villalago Residences Inc.
c/o Treasure Hill Homes
1681 Langstaff Road, Unit 1
Vaughan, ON | L4K 5T3

Attention: Mr. Jason Bottoni, MCIP, RPP

Re: **Transportation Impact Study**
Proposed Residential Site Plan / Plan of Condominium
Landsbridge Street, Town of Caledon (Bolton)
Our Project No. NT-16-031

NexTrans Engineering (A Division of NextEng Consulting Group Inc.) is pleased to present the enclosed Transportation Impact Study in support of a Rezoning/Site Plan and Draft Plan of Condominium application for the above noted property.

The subject property is located at the southeast corner of Highway 50 (Queen Street) and Side Road 5 in the Town of Caledon (Bolton) ON. The development plan is to provide 118 townhouse units (i.e. 104 condominium units and 14 freehold townhouse units) and one (1) single detached dwelling unit. An overall quantum parking supply of 348 parking spaces are provided for the proposed development.

The study concludes that the proposed development can adequately accommodate the existing transportation network with minimal traffic impact to the adjacent public roadways according to analysis provided. The proposed site access will operate at good levels of services.

We trust the enclosed sufficiently addresses your needs. Should you have any questions, please do not hesitate to contact the undersigned.

Yours truly,

NEXTRANS ENGINEERING



Prepared by:
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Principal

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1.0 INTRODUCTION

NexTrans Engineering (A Division of NextEng Consulting Group Inc.) is pleased to present the enclosed Transportation Impact Study in support of a Rezoning/Site Plan and Draft Plan of Condominium application for the above noted property. The subject property is located at the southeast corner of Highway 50 (Queen Street) and Side Road 5 in the Town of Caledon (Bolton) ON, herein referred to as the "subject site". **Figure 1-1** illustrates the subject site location.

Figure 1-1: Site Location

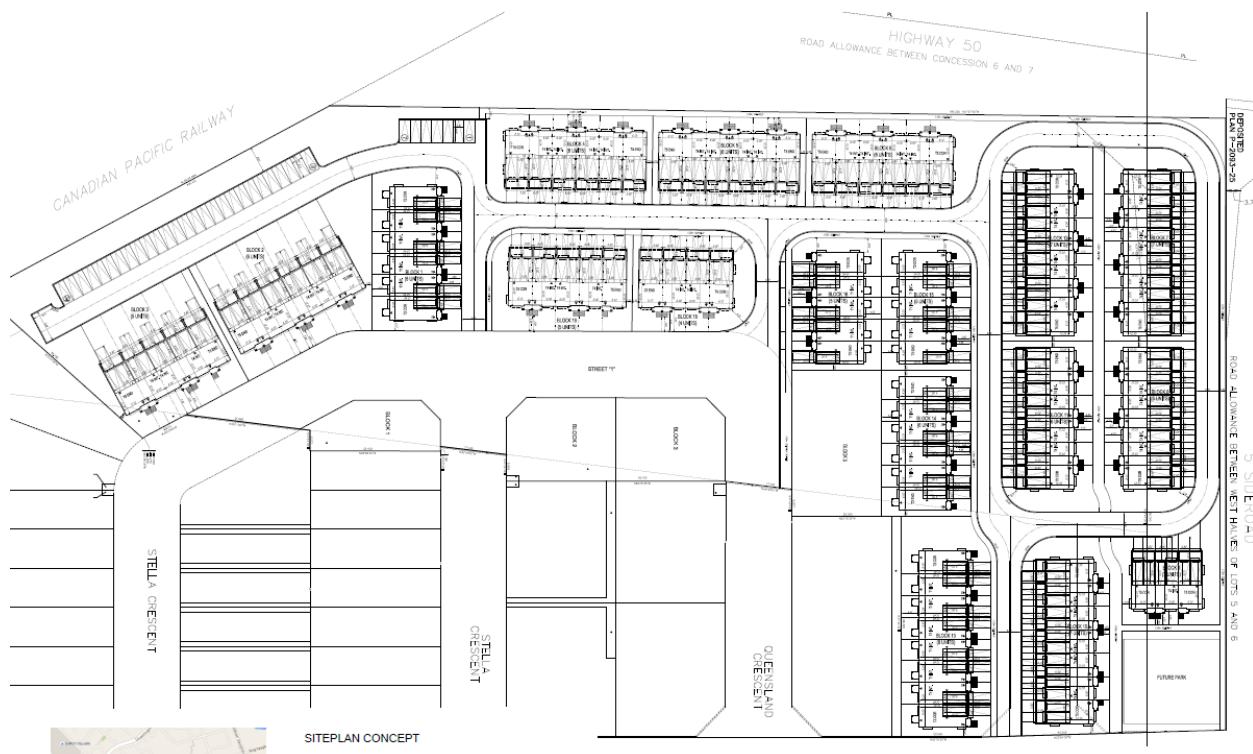


The subject lands are 2.69 hectares (6.66 acres) in size and generally bounded by commercial development to the north, residential subdivision to the east and Highway 50 (Queen Street) to the west. The development plan is to provide 118 townhouse units (i.e. 104 condominium units and 14 freehold townhouse units) and one (1) single detached dwelling unit. At a minimum, two (2) car parking spaces will be provided for each condominium and townhouse unit in a garage and lead in driveway portion for 44 units while 74 units will provide three (3) car parking spaces per unit within the garage and lead in driveway portion. The single detached dwelling unit provides four (4)

car parking spaces within the garage and lead in driveway portion. Furthermore, 34 visitor parking stalls will be provided on-site located in the southwest corner of the development totaling overall quantum parking supply of 348 parking spaces. A private condominium road with multiple connections to the external public municipal road network will service the condominium blocks. Side Road 5 is an existing Municipal Road that provides access to a single family residence. The intention is to close and stop-up of Side Road 5 and merge the road allowance into the development plan.

Figure 1-2 illustrates the proposed draft plan; **Appendix A** also provides a larger scale version of the proposed draft plan.

Figure 1-2: Draft Plan



Weekday morning and afternoon peak period traffic volume counts was undertaken by Spectrum Traffic Data Inc. at the following study area intersection for traffic assessment purposes:

- Queensgate Blvd / Landsbridge Street, existing signalized
- Landsbridge Street / Hanton Crescent, existing unsignalized
- Landsbridge Street / Stella Crescent, existing unsignalized

Weekday peak period Turning Movement Counts were undertaken at the aforementioned study area intersection on Wednesday, March 9, 2016. This data will represent existing baseline traffic conditions for proposed development.

For assessment purposes, a 5-year planning horizon was selected, representing a horizon year of 2021. Future background traffic volumes for the 2021 horizon year consists of two (2) components; background traffic growth

applied to through traffic movements within the study area intersections as well as traffic generated by background developments in the vicinity of the subject site.

Future Total Traffic conditions will be determined by the summation of the estimated traffic volumes generated by the site traffic volumes and the background traffic volumes. The study area intersections will be analyzed using SYNCHRO v8.0 software, which utilizes the U.S. Transportation Research Board Highway Capacity Manual 2000 methodology.

2.0 EXISTING TRAFFIC CONDITIONS

2.1. Existing Road Network

The subject property is located in the southeast corner of Highway 50 (Queen Street) and Side Road 5 intersection in the Town of Caledon (Bolton) ON. The road network description is as follows:

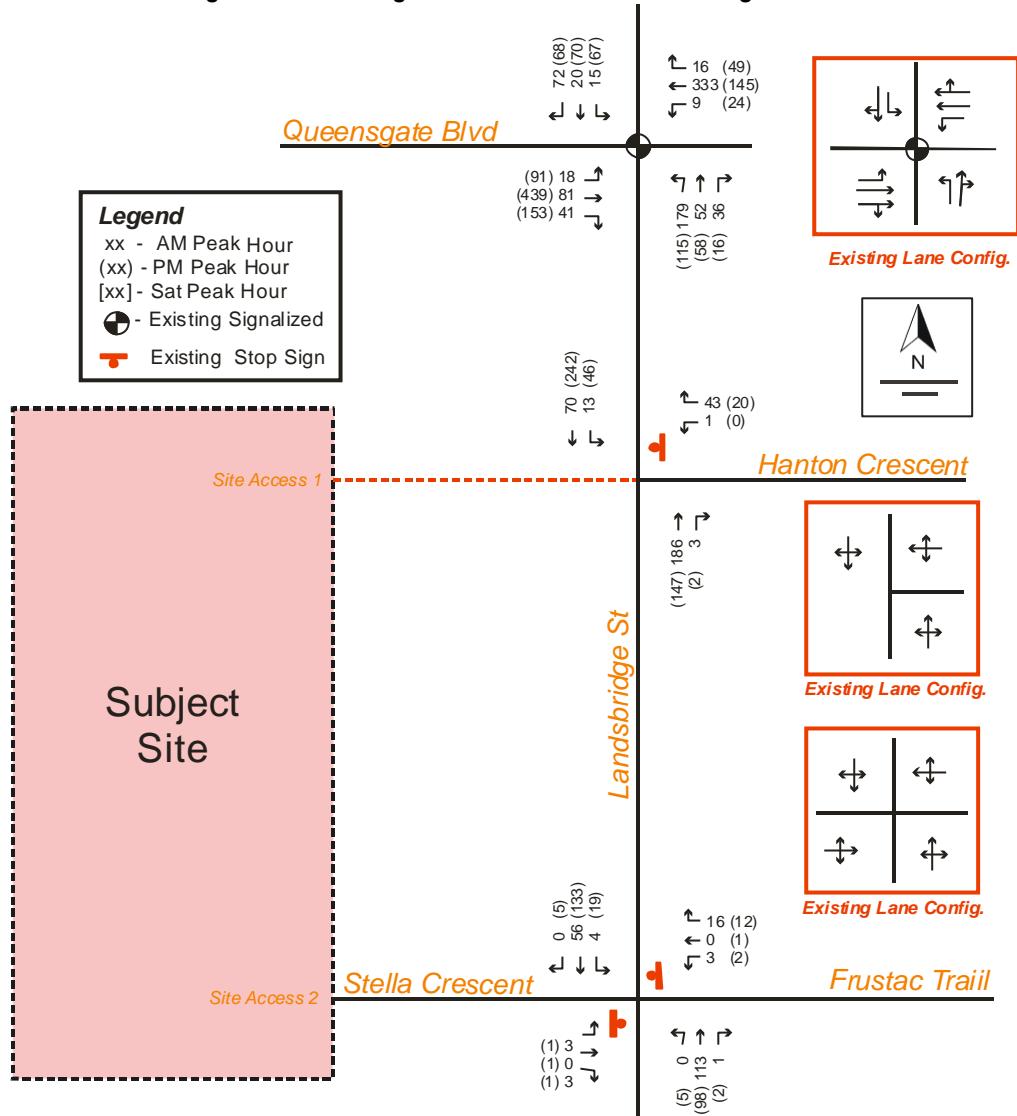
Queensgate Boulevard is an east-west local roadway under the jurisdiction of the Town of Caledon. Queensgate Boulevard in the vicinity of the subject site has a four (4) lane cross section and maintains a posted speed limit of 60 km/h. Turning lanes are provided on approach to Queensgate Boulevard / Landsbridge Street.

Landsbridge Street is a north-south local road under the jurisdiction of the Town of Caledon. Landsbridge in the vicinity of the subject site has a two (2)-lane cross section and maintains a posted speed limit of 40 km/h. Turning lanes are provided on approach to Queensgate Boulevard. Landsbridge Street meets Queensgate Boulevard as a signalized intersection.

Hanton Crescent is an east-west local road under the jurisdiction of the Town of Caledon. Hanton Crescent has a two (2)-lane cross section and maintains a posted speed limit of 40 km/h. Hanton Crescent meets Landsbridge Street as an unsignalized intersection.

Stella Crescent is an east-west local road under the jurisdiction of the Town of Caledon. Stella Crescent has a two (2)-lane cross section and maintains a posted speed limit of 40 km/h. Stella Crescent meets Landsbridge Street as an unsignalized intersection.

The existing road network and existing traffic volumes during the weekday AM and PM peak hours are illustrated in Figure 2-1:

Figure 2-1: Existing Traffic Volumes / Lane Configurations

2.2. Data Collection

The Study Area includes the intersections of Queensgate Blvd / Landsbridge Street, Landsbridge Street / Hanton Crescent and Landsbridge Street / Stella Crescent. Spectrum Traffic Data Inc. during weekday AM (7:00-9:00) and PM (4:00-6:00) peak hours conducted turning movement counts on Wednesday, March 9, 2016. The detailed traffic data is provided in **Appendix B**.

2.3. Existing Capacity Analysis

Capacity analysis at the studied area intersections was carried out using Synchro version 8. **Table 2.1** shows the existing levels of service for the given intersection. A detailed capacity analysis is provided in **Appendix C**.

Table 2.1: Existing Traffic Levels of Service

| Intersection | Movement | Weekday AM Peak Hour | | Weekday PM Peak Hour | |
|---|----------|----------------------|-----------|----------------------|-----------|
| | | v/c ratio | Delay (s) | v/c ratio | Delay (s) |
| Queensgate Blvd / Landsbridge Street (Signalized) | OVERALL | B (0.37) | 16.9 | B (0.37) | 19.1 |
| | EBL | C (0.20) | 22.9 | C (0.40) | 23.3 |
| | EBTR | C (0.19) | 22.4 | C (0.68) | 26.6 |
| | WBL | C (0.09) | 21.9 | C (0.32) | 23.4 |
| | WBTR | C (0.63) | 26.2 | C (0.23) | 21.5 |
| | NBL | A (0.28) | 7.5 | A (0.23) | 8.5 |
| | NBTR | A (0.14) | 6.2 | A (0.09) | 7.3 |
| | SBL | A (0.04) | 5.6 | A (0.10) | 7.4 |
| | SBTR | A (0.09) | 5.9 | A (0.17) | 7.8 |
| | WBLR | B (0.08) | 10.2 | A (0.05) | 9.6 |
| Landsbridge Street / Hanton Crescent (Unsignalized) | SBLT | A (0.02) | 1.5 | A (0.05) | 1.9 |
| | EBLTR | A (0.01) | 9.7 | B (0.02) | 10.8 |
| | WBLTR | A (0.03) | 9.6 | A (0.03) | 9.9 |
| Landsbridge Street / Stella Crescent (Unsignalized) | SBLTR | A (0.01) | 0.8 | A (0.01) | 0.5 |
| | | | | A (0.02) | 1.4 |
| | | | | | |

Table 2.1 indicates that all study area intersections are currently operating at excellent levels of service and are operating at overall LOS 'B' or better during peak hour time periods. Furthermore, all individual turning movements are operating below capacity with acceptable LOS with no critical movements identified.

3.0 FUTURE BACKGROUND CONDITIONS

A five (5)-year (2021) horizon period was selected for analysis, which generally coincides with the full build out of the proposed development. As mentioned earlier, a 2% growth rate per annum for the north-south and east-west through movement traffic volumes at the study area intersections was applied.

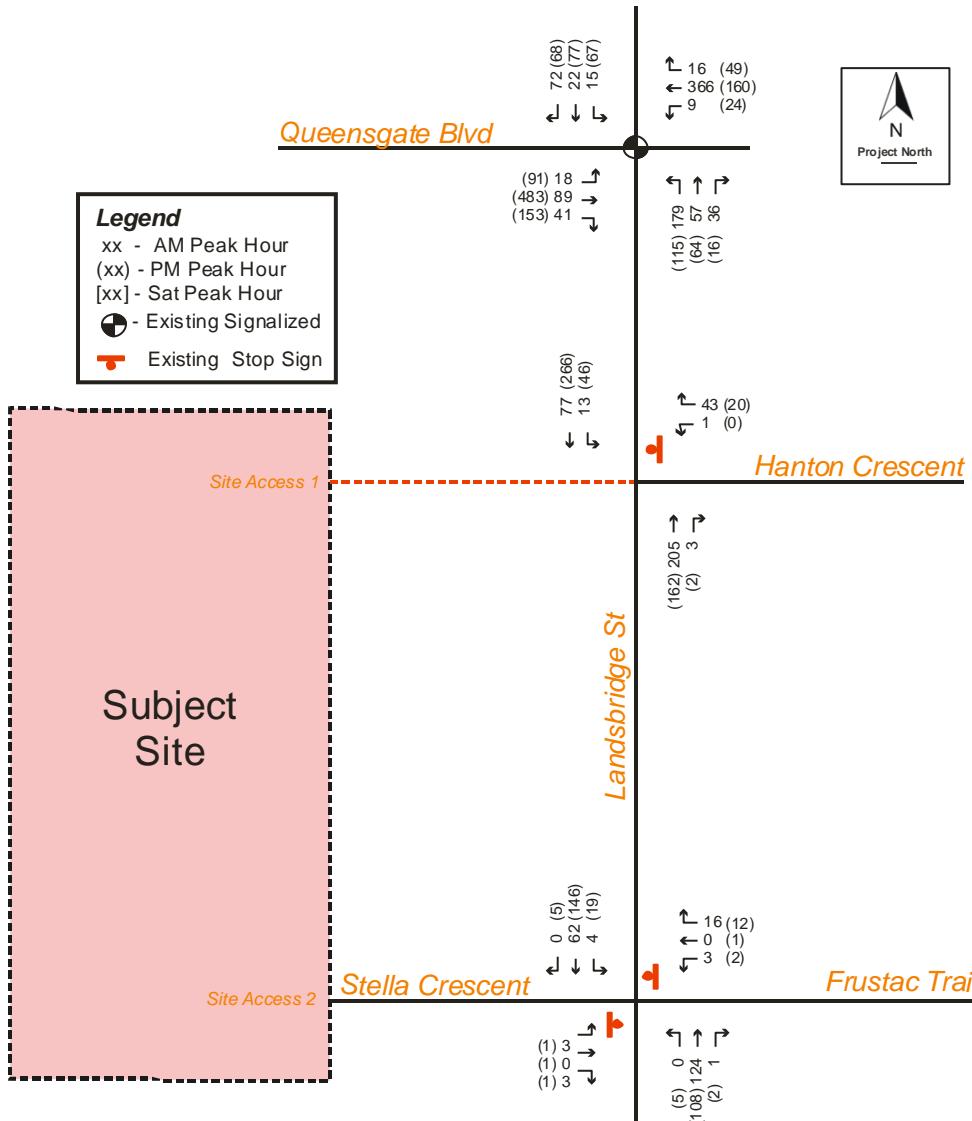
The future (2021) background traffic volumes are provided in **Figure 3-1**. **Table 3.1** summarizes the level of service at the given intersections under future background traffic conditions. Detailed output analysis can be found in **Appendix D**.

Table 3.1: Future (2021) Background Traffic Levels of Service

| Intersection | Movement | Weekday AM Peak Hour | | Weekday PM Peak Hour | |
|--|----------|----------------------|-----------|----------------------|-----------|
| | | v/c ratio | Delay (s) | v/c ratio | Delay (s) |
| Queensgate Blvd / Landsbridge Street (Signalized) | OVERALL | B (0.38) | 17.3 | B (0.39) | 19.4 |
| | EBL | C (0.20) | 22.7 | C (0.39) | 22.9 |
| | EBTR | C (0.20) | 22.1 | C (0.71) | 26.9 |
| | WBL | C (0.09) | 21.6 | C (0.34) | 23.4 |
| | WBTR | C (0.64) | 26.3 | C (0.25) | 21.3 |
| | NBL | A (0.29) | 7.9 | A (0.24) | 9.0 |
| | NBTR | A (0.15) | 6.7 | A (0.10) | 7.8 |
| | SBL | A (0.04) | 6.0 | A (0.11) | 7.9 |
| | SBTR | A (0.09) | 6.3 | A (0.18) | 8.3 |
| | | | | | |
| Landsbridge Street / Hanton Crescent (Unsignalized) | WBLR | B (0.08) | 10.4 | A (0.05) | 9.7 |
| | SBLT | A (0.02) | 1.4 | A (0.05) | 1.8 |
| Landsbridge Street / Stella Crescent (Unsignalized) | EBLTR | A (0.01) | 9.8 | B (0.02) | 11.0 |
| | WBLTR | A (0.03) | 9.7 | B (0.03) | 10.1 |
| | SBLTR | A (0.01) | 0.8 | A (0.01) | 0.5 |
| | | | | A (0.02) | 1.4 |

As summarized in Table 3.1 it is shown that during future background traffic conditions, the subject study area intersections continue to operate at overall excellent level of services with no changes to expected operations. During future background traffic conditions, the intersections are operating at overall LOS 'B' or better during the peak hour periods.

Figure 3-1: Future (2021) Background Traffic Volumes



4.0 SITE TRAFFIC TRIP GENERATION, TRIP DISTRIBUTION / ASSIGNMENT

According to the site plan, the proposed development comprises of 118 CTownhouse units and one (1) single detached dwelling unit. A private condominium road with multiple connections to the external public municipal road network will service the condominium block. Trip generation for the residential units were determined using equations contained in the *Trip Generation Manual, 9th Edition*, published by the ITE for the *Low-Rise Residential Condominium/Townhouse (Land Use Code 231)*. The expected trip generation calculation is provided in **Table 4.1**.

Table 4.1: Site Traffic Trip Generation

| Land Use (Size) | Parameter | Weekday AM Peak Hour | | | Weekday PM Peak Hour | | |
|--|-----------|----------------------|-----------|-----------|----------------------|-----------|-----------|
| | | In | Out | Total | In | Out | Total |
| Low-Rise Residential Condominium/Townhouse (118 Units) | Trip Rate | 0.17 | 0.50 | 0.67 | 0.45 | 0.33 | 0.78 |
| | New Trips | 20 | 58 | 78 | 53 | 38 | 91 |
| Single Family Detached Housing (1 Units) | Trip Rate | 0.00 | 1.00 | 1.00 | 1.00 | 1.00 | 2.00 |
| | New Trips | 0 | 1 | 1 | 1 | 1 | 2 |
| Total Trips | | 20 | 59 | 79 | 54 | 39 | 93 |

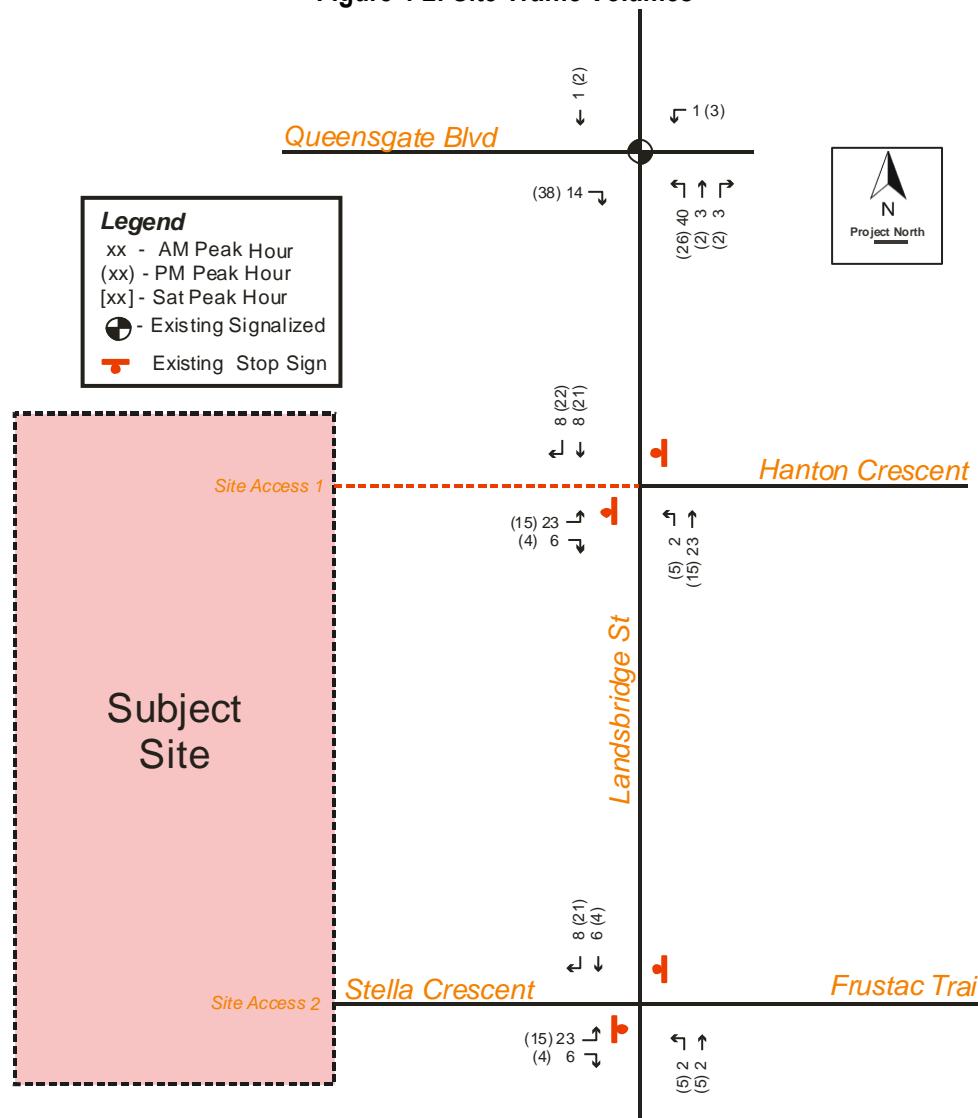
Based on the trip generation calculations, the proposed and future background residential development is expected to generate 79 two-way trips (20 inbound and 59 outbound) during the weekday morning peak hour and 93 two-way trips (54 inbound and 39 outbound) during the afternoon peak hour.

To remain conservative, no trip reductions were applied to account for transit or other modes of transport. In addition, site traffic was assigned to two (2) of the multiple road networks (ie. Hanton Crescent / Landsbridge Street and Stella Crescent / Landsbridge Street) to assess worst case scenario.

Provided in **Table 4.2** are the assumptions for the trip distribution rates. It is based on the information extracted from the 2011 Transportation Tomorrow Survey (TTS) and the existing road pattern. The site traffic volumes are illustrated in **Figure 4-1**.

Table 4.2: Site Traffic Trip Distribution

| Direction | Via | Trips In | Trips Out |
|--------------|-----------------|-------------|-------------|
| North | Landsbridge St | 5% | 5% |
| South | Landsbridge St | 20% | 20% |
| East | Queensgate Blvd | 5% | 5% |
| West | Queensgate Blvd | 70% | 70% |
| Total | | 100% | 100% |

Figure 4-2: Site Traffic Volumes

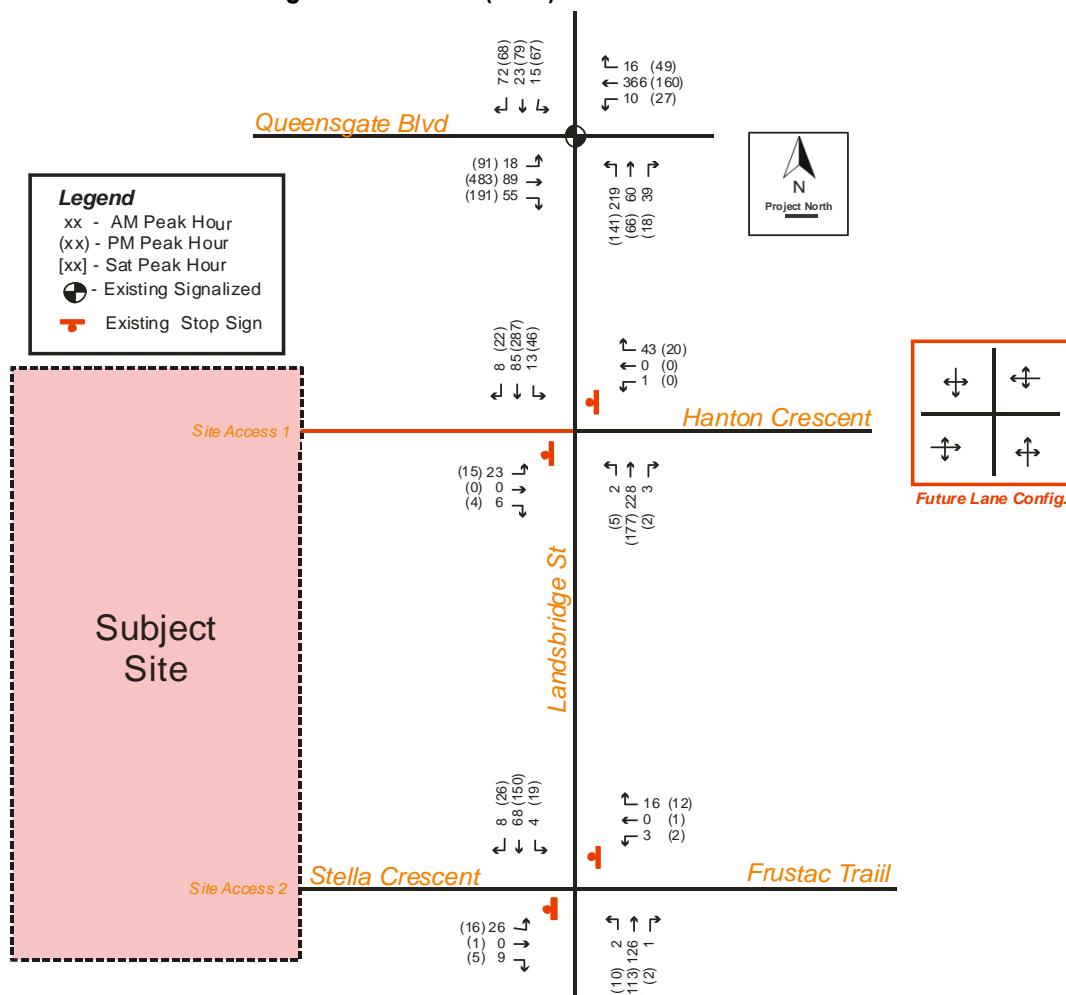
5.0 FUTURE TOTAL TRAFFIC CONDITIONS

Future total traffic was determined by adding site generated traffic to future background traffic volumes during the weekday AM and PM peak hours, and is illustrated in **Figure 5-1**. **Table 5.1** summarizes the level of services at the intersections under future background traffic conditions. Detailed analysis outputs are provided in **Appendix E**.

Table 5.1: Future (2021) Total Traffic Levels of Service

| Intersection | Movement | Weekday AM Peak Hour | | Weekday PM Peak Hour | |
|--|----------|----------------------|-----------|----------------------|-----------|
| | | v/c ratio | Delay (s) | v/c ratio | Delay (s) |
| Queensgate Blvd / Landsbridge Street (Signalized) | OVERALL | B (0.43) | 17.1 | C (0.50) | 22.6 |
| | EBL | C (0.20) | 22.7 | C (0.44) | 21.8 |
| | EBTR | C (0.21) | 22.1 | C (0.82) | 29.4 |
| | WBL | C (0.10) | 21.6 | D (0.71) | 46.7 |
| | WBTR | C (0.64) | 26.3 | B (0.21) | 19.3 |
| | NBL | A (0.35) | 8.6 | B (0.29) | 12.9 |
| | NBTR | A (0.17) | 6.7 | B (0.17) | 11.3 |
| | SBL | A (0.04) | 6.0 | B (0.19) | 11.8 |
| | SBTR | A (0.09) | 6.3 | B (0.21) | 11.7 |
| Landsbridge Street / Hanton Crescent (Unsignalized) | EBLTR | B (0.06) | 11.8 | B (0.05) | 14.4 |
| | WBLTR | A (0.06) | 9.9 | A (0.03) | 9.4 |
| | NBLTR | A (<0.01) | 0.1 | A (<0.01) | 0.3 |
| | SBLTR | A (0.01) | 1.0 | A (0.04) | 1.3 |
| Landsbridge Street / Stella Crescent (Unsignalized) | EBLTR | B (0.07) | 11.1 | B (0.07) | 14.0 |
| | WBLTR | A (0.03) | 9.8 | B (0.04) | 11.1 |
| | NBLTR | A (0.01) | 0.3 | A (0.03) | 1.6 |
| | SBLTR | A (0.01) | 0.5 | A (0.03) | 1.1 |

As summarized in Table 5.1, it is shown that during future total traffic conditions, the subject study area intersections continue to operate at excellent levels of services with only minor changes. Under Future Total Traffic conditions, the study area intersections are operating at overall LOS 'C' or better during the peak hour periods. Based on above, it is our opinion that the site entrances as they operate today and in the future have negligible impact to the future operations of Landsbridge Street and may remain in their current state.

Figure 5-1: Future (2021) Total Traffic Volumes

6.0 PARKING

The proposed development is subject to the Town of Caledon Zoning By-law. **Table 6.1** summarizes the parking requirements based on the By-law. As mentioned earlier, at a minimum, two (2) car parking spaces will be provided for each unit in a garage and lead in driveway portion for 44 units while 74 units will provide three (3) car parking spaces per unit within the garage and lead in driveway portion. The single detached dwelling unit provides four (4) car parking spaces within the garage and lead in driveway portion. Furthermore, 34 visitor parking stalls will be provided on-site located in the southwest corner of the development totaling overall quantum parking supply of 348 parking spaces.

Table 6.1: Vehicular Parking Requirement Zoning By-law

| Use | Units | Parking Strategy | |
|--|-------|------------------------|-------------------------|
| | | Minimum Parking Rate | Parking Spaces Required |
| Townhouses (104 condominium and 14 freehold) & Single Detached | 119 | 2.0 spaces per unit | 238 |
| Townhouses (104 condominium and 14 freehold) | 118 | 0.25 spaces per unit * | 30 |
| Total Required | | | 268 |
| Total Provided | | | 348 |
| Difference | | | +80 |

visitor parking rate

The proposed development is required to provide 268 parking spaces and the site plan depicts 348 spaces, which results in parking surplus of 80 spaces. The parking supply is sufficient as it meets the requirements of the By-Law.

7.0 SITE ACCESS & ON-SITE CIRCULATION

As mentioned earlier, there are four (4) connections to the external public municipal road network as site traffic was assigned to two (2) networks (ie. Hanton Crescent / Landsbridge Street and Stella Crescent / Landsbridge Street) to assess worst case scenario. The proposed development will however provide a full movement access from Landsbridge Street via Hanton Crescent, Queensland Crescent and Stella Crescent. Based on the results of the future total Synchro outputs, there will not be any inbound or outbound queuing issues. Furthermore, the site access will operate at excellent levels of services and will not require auxiliary lanes due to the low site related traffic volumes.

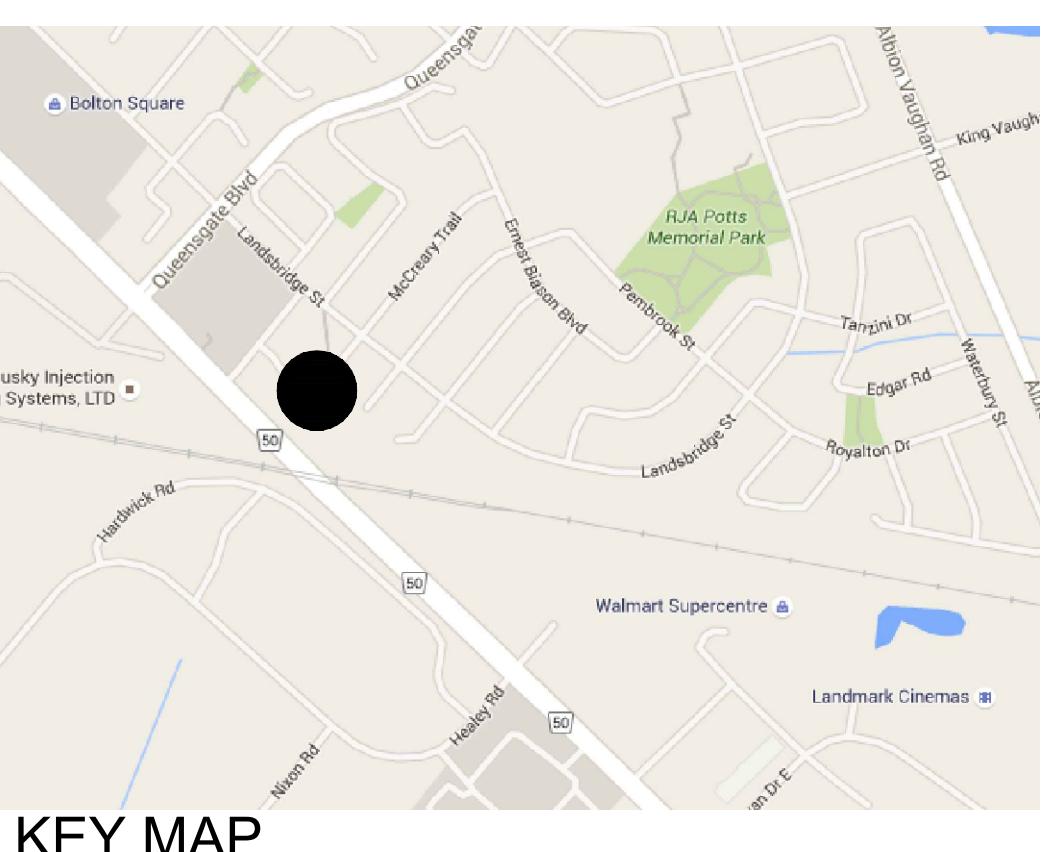
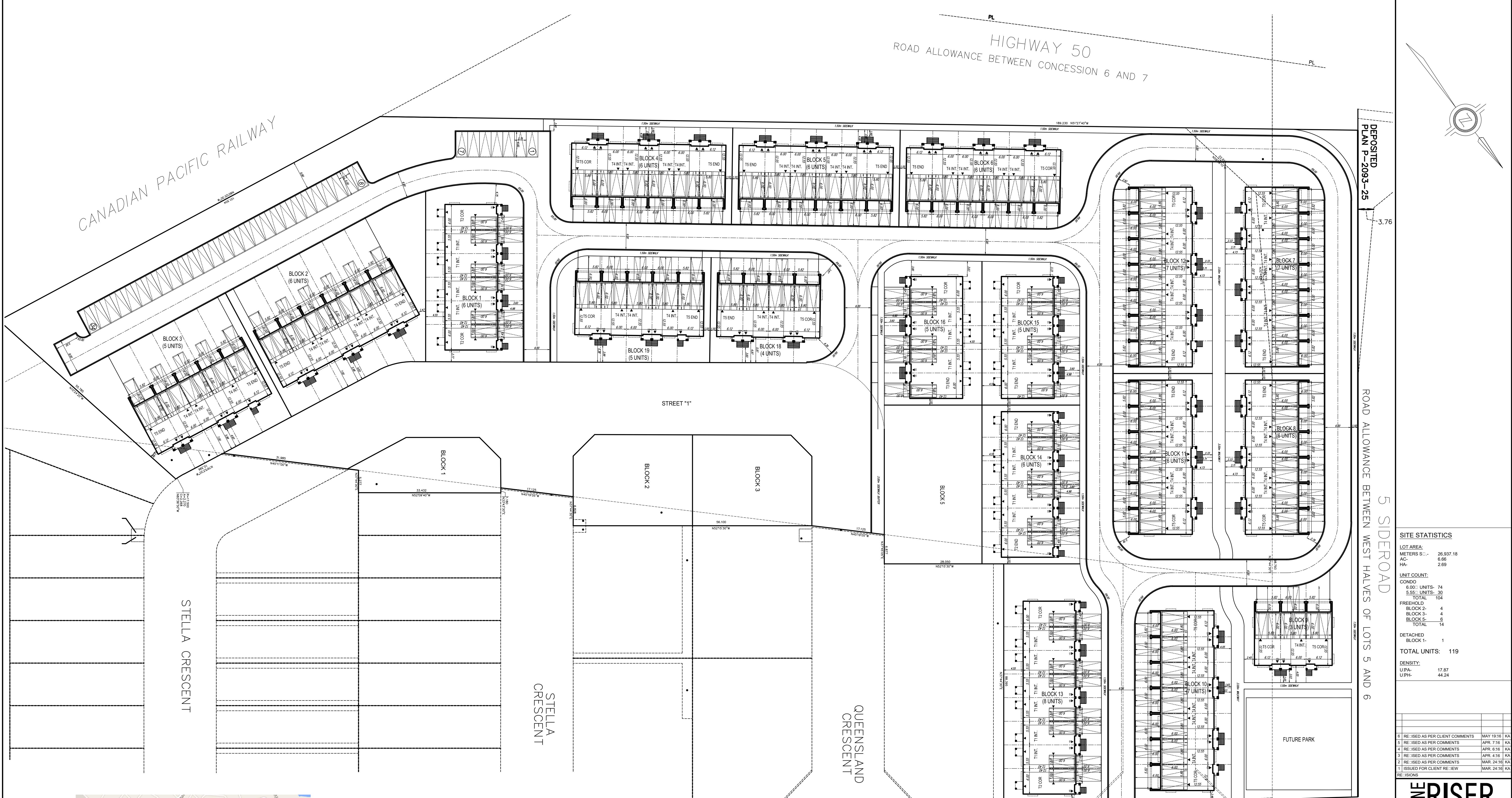
A truck turning path assessment was conducted to evaluate the expected movements of garbage truck to and from the proposed development site. An AutoTURN analysis was undertaken using a typical 12.0 meter City Garbage Truck (HSUTAC) as illustrated in **Appendix F**. The analysis demonstrates that a typical garbage truck can maneuver within the designated route with no conflict. As a result, moving trucks under 12.0 meters can sufficiently access the subject site.

CONCLUSIONS / FINDINGS

The findings and conclusions of our analysis are as follows:

- The subject development application proposes to provide approximately 118 townhouse units (i.e. 104 condominium units and 14 freehold townhouse units) and one (1) single detached dwelling unit.
- The proposed and future background residential development is expected to generate 79 two-way trips (20 inbound and 59 outbound) during the weekday morning peak hour and 93 two-way trips (54 inbound and 39 outbound) during the afternoon peak hour.
- The proposed site will have a minor impact on the study area intersections operations during Weekday AM and PM peak hours.
- A private condominium road with multiple connections to the external public municipal road network will service the condominium blocks.
- Due to the low traffic activity at site entrances, the closure of Side Road 5 will have no consequent to the remaining site entrances operations. As a result, site traffic accessing multiple roadways (ie. Hanton Crescent, Queensland Crescent and Stella Crescent) will not be detrimental to Landsbridge Street considering traffic and site operations are minimal for vehicle transportation purposes.
- Garbage and emergency vehicles will be able to circulate within the proposed site and exit the site in a cab forward manner.
- The overall quantum of parking supply as proposed is acceptable and will not negatively affect the overall peak period visitor parking demands, as visitor over flow (if required) can be provided within individual units.

Appendix A - Proposed Site Plan



SITEPLAN CONCEPT

RISER
ONE DESIGNS

20 PIERMONT ROAD UNIT 101
CONCORD, ONTARIO, L4K 5N3
PHONE: (905) 669-2111
FAX: 1 (905) 669-1163
www.oneriser.com

TREASURE HILL

ILLALGO RESIDENCES INC.

SITEPLAN

CP-1

1:400

Appendix B - Existing Traffic Data



Turning Movement Count (2 . LANDSBRIDGE STREET & FRUSTAC TRAIL) MioID: 297214

| Start Time | N Approach LANDSBRIDGE STREET | | | | | E Approach FRUSTAC TRAIL | | | | | S Approach LANDSBRIDGE STREET | | | | | W Approach FRUSTAC TRAIL | | | | | Int. Total (15 min) | Int. Total (1 hr) |
|--------------------|----------------------------------|-------------|-------------|------------|----------------|-----------------------------|-------------|-------------|------------|----------------|----------------------------------|-------------|-------------|------------|----------------|-----------------------------|-------------|-------------|------------|----------------|------------------------|----------------------|
| | Right N:W | Thru N:S | Left N:E | Peds N: | Approach Total | Right E:N | Thru E:W | Left E:S | Peds E: | Approach Total | Right S:E | Thru S:N | Left S:W | Peds S: | Approach Total | Right W:S | Thru W:E | Left W:N | Peds W: | Approach Total | | |
| 07:00:00 | 0 | 6 | 0 | 0 | 6 | 3 | 0 | 0 | 0 | 3 | 0 | 16 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 25 | |
| 07:15:00 | 0 | 4 | 0 | 0 | 4 | 5 | 0 | 0 | 0 | 5 | 0 | 15 | 0 | 0 | 15 | 0 | 0 | 2 | 0 | 2 | 26 | |
| 07:30:00 | 0 | 16 | 0 | 0 | 16 | 5 | 0 | 0 | 1 | 5 | 0 | 25 | 0 | 2 | 25 | 0 | 0 | 1 | 0 | 1 | 47 | |
| 07:45:00 | 0 | 7 | 1 | 0 | 8 | 3 | 0 | 0 | 3 | 3 | 1 | 23 | 0 | 2 | 24 | 0 | 0 | 2 | 0 | 2 | 37 | 135 |
| 08:00:00 | 0 | 7 | 1 | 0 | 8 | 4 | 0 | 1 | 1 | 5 | 1 | 20 | 0 | 0 | 21 | 1 | 0 | 1 | 0 | 2 | 36 | 146 |
| 08:15:00 | 0 | 15 | 0 | 4 | 15 | 4 | 0 | 0 | 0 | 4 | 0 | 17 | 0 | 0 | 17 | 1 | 0 | 1 | 0 | 2 | 38 | 158 |
| 08:30:00 | 0 | 17 | 2 | 0 | 19 | 5 | 0 | 1 | 1 | 6 | 0 | 46 | 0 | 0 | 46 | 1 | 0 | 0 | 0 | 1 | 72 | 183 |
| 08:45:00 | 0 | 17 | 1 | 0 | 18 | 3 | 0 | 1 | 2 | 4 | 0 | 30 | 0 | 0 | 30 | 0 | 0 | 1 | 0 | 1 | 53 | 199 |
| ***BREAK*** | | | | | | | | | | | | | | | | | | | | | | |
| 16:00:00 | 0 | 46 | 2 | 0 | 48 | 0 | 0 | 0 | 1 | 0 | 1 | 22 | 0 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 71 | |
| 16:15:00 | 0 | 32 | 3 | 0 | 35 | 1 | 0 | 0 | 5 | 1 | 0 | 22 | 1 | 0 | 23 | 0 | 0 | 0 | 0 | 0 | 59 | |
| 16:30:00 | 0 | 39 | 5 | 0 | 44 | 3 | 0 | 1 | 1 | 4 | 0 | 23 | 0 | 0 | 23 | 1 | 0 | 0 | 0 | 1 | 72 | |
| 16:45:00 | 1 | 34 | 3 | 0 | 38 | 4 | 0 | 1 | 4 | 5 | 0 | 28 | 0 | 0 | 28 | 0 | 0 | 0 | 0 | 0 | 71 | 273 |
| 17:00:00 | 0 | 32 | 8 | 0 | 40 | 2 | 0 | 0 | 4 | 2 | 0 | 23 | 1 | 2 | 24 | 0 | 0 | 0 | 4 | 0 | 66 | 268 |
| 17:15:00 | 0 | 32 | 3 | 0 | 36 | 3 | 0 | 1 | 3 | 4 | 1 | 23 | 2 | 2 | 26 | 0 | 0 | 1 | 0 | 1 | 67 | 276 |
| 17:30:00 | 4 | 35 | 5 | 0 | 44 | 3 | 1 | 0 | 2 | 4 | 1 | 24 | 2 | 0 | 27 | 1 | 1 | 0 | 0 | 2 | 77 | 281 |
| 17:45:00 | 3 | 33 | 7 | 0 | 43 | 1 | 0 | 1 | 2 | 2 | 0 | 24 | 0 | 1 | 24 | 0 | 0 | 1 | 0 | 1 | 70 | 280 |
| Grand Total | 8 | 372 | 41 | 4 | 422 | 49 | 1 | 7 | 30 | 57 | 5 | 381 | 6 | 9 | 392 | 5 | 1 | 10 | 4 | 16 | 887 | - |
| Approach% | 1.9% | 88.2% | 9.7% | | - | 86% | 1.8% | 12.3% | | - | 1.3% | 97.2% | 1.5% | | - | 31.3% | 6.3% | 62.5% | | - | - | - |
| Totals % | 0.9% | 41.9% | 4.6% | | 47.6% | 5.5% | 0.1% | 0.8% | | 6.4% | 0.6% | 43% | 0.7% | | 44.2% | 0.6% | 0.1% | 1.1% | | 1.8% | - | - |
| Heavy | 0 | 13 | 0 | | - | 0 | 0 | 0 | | - | 0 | 11 | 0 | | - | 0 | 0 | 0 | | - | - | - |
| Heavy % | 0% | 3.5% | 0% | | - | 0% | 0% | 0% | | - | 0% | 2.9% | 0% | | - | 0% | 0% | 0% | | - | - | - |



Peak Hour: 08:00 AM - 09:00 AM

| Start Time | N Approach LANDSBRIDGE STREET | | | | | E Approach FRUSTAC TRAIL | | | | | S Approach LANDSBRIDGE STREET | | | | | W Approach FRUSTAC TRAIL | | | | | Int. Total (15 min) |
|-------------------------------|----------------------------------|-------|------|-------|----------------|-----------------------------|-------|------|------|----------------|----------------------------------|-------|------|------|----------------|-----------------------------|------|------|------|----------------|------------------------|
| | Right | Thru | Left | Peds | Approach Total | Right | Thru | Left | Peds | Approach Total | Right | Thru | Left | Peds | Approach Total | Right | Thru | Left | Peds | Approach Total | |
| 08:00:00 | 0 | 7 | 1 | 0 | 8 | 4 | 0 | 1 | 1 | 5 | 1 | 20 | 0 | 0 | 21 | 1 | 0 | 1 | 0 | 2 | 36 |
| 08:15:00 | 0 | 15 | 0 | 4 | 15 | 4 | 0 | 0 | 0 | 4 | 0 | 17 | 0 | 0 | 17 | 1 | 0 | 1 | 0 | 2 | 38 |
| 08:30:00 | 0 | 17 | 2 | 0 | 19 | 5 | 0 | 1 | 1 | 6 | 0 | 46 | 0 | 0 | 46 | 1 | 0 | 0 | 0 | 1 | 72 |
| 08:45:00 | 0 | 17 | 1 | 0 | 18 | 3 | 0 | 1 | 2 | 4 | 0 | 30 | 0 | 0 | 30 | 0 | 0 | 1 | 0 | 1 | 53 |
| Grand Total | 0 | 56 | 4 | 4 | 60 | 16 | 0 | 3 | 4 | 19 | 1 | 113 | 0 | 0 | 114 | 3 | 0 | 3 | 0 | 6 | 199 |
| Approach% | 0% | 93.3% | 6.7% | - | 84.2% | 0% | 15.8% | - | 0.9% | 99.1% | 0% | - | 50% | 0% | 50% | - | - | - | - | - | - |
| Totals % | 0% | 28.1% | 2% | 30.2% | 8% | 0% | 1.5% | 9.5% | 0.5% | 56.8% | 0% | 57.3% | 1.5% | 0% | 1.5% | 3% | - | - | - | - | - |
| PHF | 0 | 0.82 | 0.5 | 0.79 | 0.8 | 0 | 0.75 | 0.79 | 0.25 | 0.61 | 0 | 0.62 | 0.75 | 0 | 0.75 | 0.75 | - | - | - | - | - |
| Heavy | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - |
| Heavy % | 0% | 5.4% | 0% | 5% | 0% | 0% | 0% | 0% | 0% | 3.5% | 0% | 3.5% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | - |
| Lights | 0 | 53 | 4 | 57 | 16 | 0 | 3 | 19 | 1 | 109 | 0 | 110 | 3 | 0 | 3 | 6 | - | - | - | - | - |
| Lights % | 0% | 94.6% | 100% | 95% | 100% | 0% | 100% | 100% | 100% | 96.5% | 0% | 96.5% | 100% | 0% | 100% | 100% | - | - | - | - | - |
| Single-Unit Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - |
| Single-Unit Trucks % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0.9% | 0% | 0.9% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | - |
| Buses | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - |
| Buses % | 0% | 5.4% | 0% | 5% | 0% | 0% | 0% | 0% | 0% | 2.7% | 0% | 2.6% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | - |
| Pedestrians | - | - | - | 4 | - | - | - | 4 | - | - | 0 | - | - | - | 0 | - | - | - | 0 | - | - |
| Pedestrians% | - | - | - | 50% | - | - | - | 50% | - | - | 0% | - | - | - | 0% | - | - | - | 0% | - | - |
| Bicycles on Crosswalk | - | - | - | 0 | - | - | - | 0 | - | - | 0 | - | - | - | 0 | - | - | - | 0 | - | - |
| Bicycles on Crosswalk% | - | - | - | 0% | - | - | - | 0% | - | - | 0% | - | - | - | 0% | - | - | - | 0% | - | - |
| Bicycles on Road | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | - | - |
| Bicycles on Road% | - | - | - | 0% | - | - | - | 0% | - | - | 0% | - | - | - | 0% | - | - | - | 0% | - | - |



Peak Hour: 04:45 PM - 05:45 PM

| Start Time | N Approach LANDSBRIDGE STREET | | | | | E Approach FRUSTAC TRAIL | | | | | S Approach LANDSBRIDGE STREET | | | | | W Approach FRUSTAC TRAIL | | | | | Int. Total (15 min) |
|-------------------------------|----------------------------------|-------|------|------|----------------|-----------------------------|------|-------|------|----------------|----------------------------------|-------|------|------|----------------|-----------------------------|-------|-------|------|----------------|------------------------|
| | Right | Thru | Left | Peds | Approach Total | Right | Thru | Left | Peds | Approach Total | Right | Thru | Left | Peds | Approach Total | Right | Thru | Left | Peds | Approach Total | |
| 16:45:00 | 1 | 34 | 3 | 0 | 38 | 4 | 0 | 1 | 4 | 5 | 0 | 28 | 0 | 0 | 28 | 0 | 0 | 0 | 0 | 0 | 71 |
| 17:00:00 | 0 | 32 | 8 | 0 | 40 | 2 | 0 | 0 | 4 | 2 | 0 | 23 | 1 | 2 | 24 | 0 | 0 | 0 | 4 | 0 | 66 |
| 17:15:00 | 0 | 32 | 3 | 0 | 36 | 3 | 0 | 1 | 3 | 4 | 1 | 23 | 2 | 2 | 26 | 0 | 0 | 1 | 0 | 1 | 67 |
| 17:30:00 | 4 | 35 | 5 | 0 | 44 | 3 | 1 | 0 | 2 | 4 | 1 | 24 | 2 | 0 | 27 | 1 | 1 | 0 | 0 | 2 | 77 |
| Grand Total | 5 | 133 | 19 | 0 | 158 | 12 | 1 | 2 | 13 | 15 | 2 | 98 | 5 | 4 | 105 | 1 | 1 | 1 | 4 | 3 | 281 |
| Approach% | 3.2% | 84.2% | 12% | | - | 80% | 6.7% | 13.3% | | - | 1.9% | 93.3% | 4.8% | | - | 33.3% | 33.3% | 33.3% | | - | - |
| Totals % | 1.8% | 47.3% | 6.8% | | 56.2% | 4.3% | 0.4% | 0.7% | | 5.3% | 0.7% | 34.9% | 1.8% | | 37.4% | 0.4% | 0.4% | 0.4% | | 1.1% | - |
| PHF | 0.31 | 0.95 | 0.59 | | 0.9 | 0.75 | 0.25 | 0.5 | | 0.75 | 0.5 | 0.88 | 0.63 | | 0.94 | 0.25 | 0.25 | 0.25 | | 0.38 | - |
| Heavy | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 2 | 0 | | 2 | 0 | 0 | 0 | | 0 | - |
| Heavy % | 0% | 0% | 0% | | 0% | 0% | 0% | 0% | | 0% | 0% | 2% | 0% | | 1.9% | 0% | 0% | 0% | | 0% | - |
| Lights | 5 | 133 | 19 | | 158 | 12 | 1 | 2 | | 15 | 2 | 96 | 5 | | 103 | 1 | 1 | 1 | | 3 | - |
| Lights % | 100% | 100% | 100% | | 100% | 100% | 100% | 100% | | 100% | 100% | 98% | 100% | | 98.1% | 100% | 100% | 100% | | 100% | - |
| Single-Unit Trucks | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 2 | 0 | | 2 | 0 | 0 | 0 | | 0 | - |
| Single-Unit Trucks % | 0% | 0% | 0% | | 0% | 0% | 0% | 0% | | 0% | 0% | 2% | 0% | | 1.9% | 0% | 0% | 0% | | 0% | - |
| Buses | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | - |
| Buses % | 0% | 0% | 0% | | 0% | 0% | 0% | 0% | | 0% | 0% | 0% | 0% | | 0% | 0% | 0% | 0% | | 0% | - |
| Pedestrians | - | - | - | 0 | - | - | - | 10 | - | - | - | - | 4 | - | - | - | - | 4 | - | - | |
| Pedestrians% | - | - | - | 0% | - | - | - | 47.6% | - | - | - | - | 19% | - | - | - | - | 19% | - | - | |
| Bicycles on Crosswalk | - | - | - | 0 | - | - | - | 3 | - | - | - | - | 0 | - | - | - | - | 0 | - | - | |
| Bicycles on Crosswalk% | - | - | - | 0% | - | - | - | 14.3% | - | - | - | - | 0% | - | - | - | - | 0% | - | - | |
| Bicycles on Road | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | - | |
| Bicycles on Road% | - | - | - | 0% | - | - | - | 0% | - | - | - | - | 0% | - | - | - | - | 0% | - | - | |

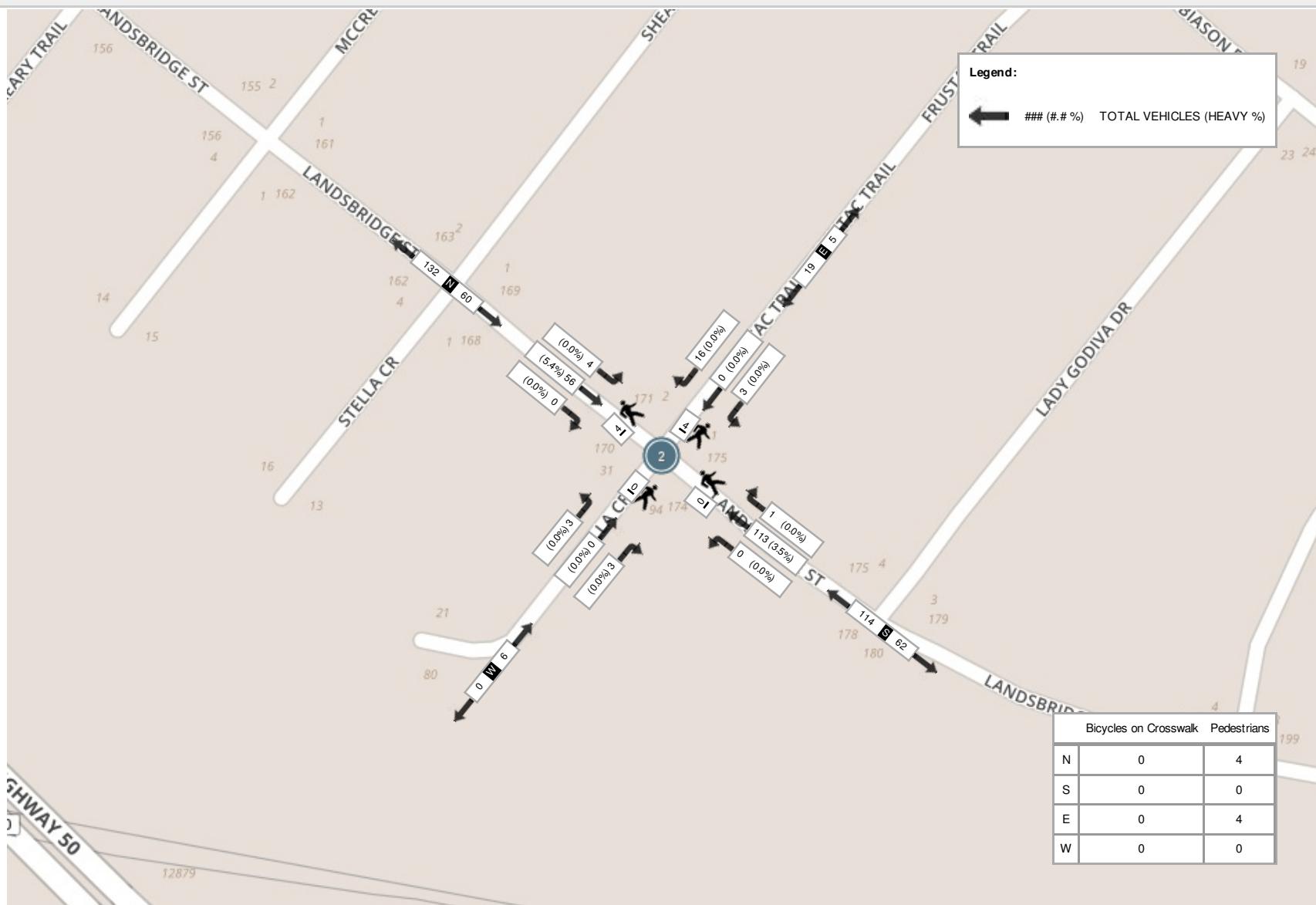


Spectrum

Turning Movement Count
Location Name: LANDSBRIDGE STREET & FRUSTAC TRAIL
Date: Wed, Mar 09, 2016

NexTrans
4261-A14 Highway 7 East
Suite 489
Markham ON, CANADA, L3R 9W6

Peak Hour: 08:00 AM - 09:00 AM



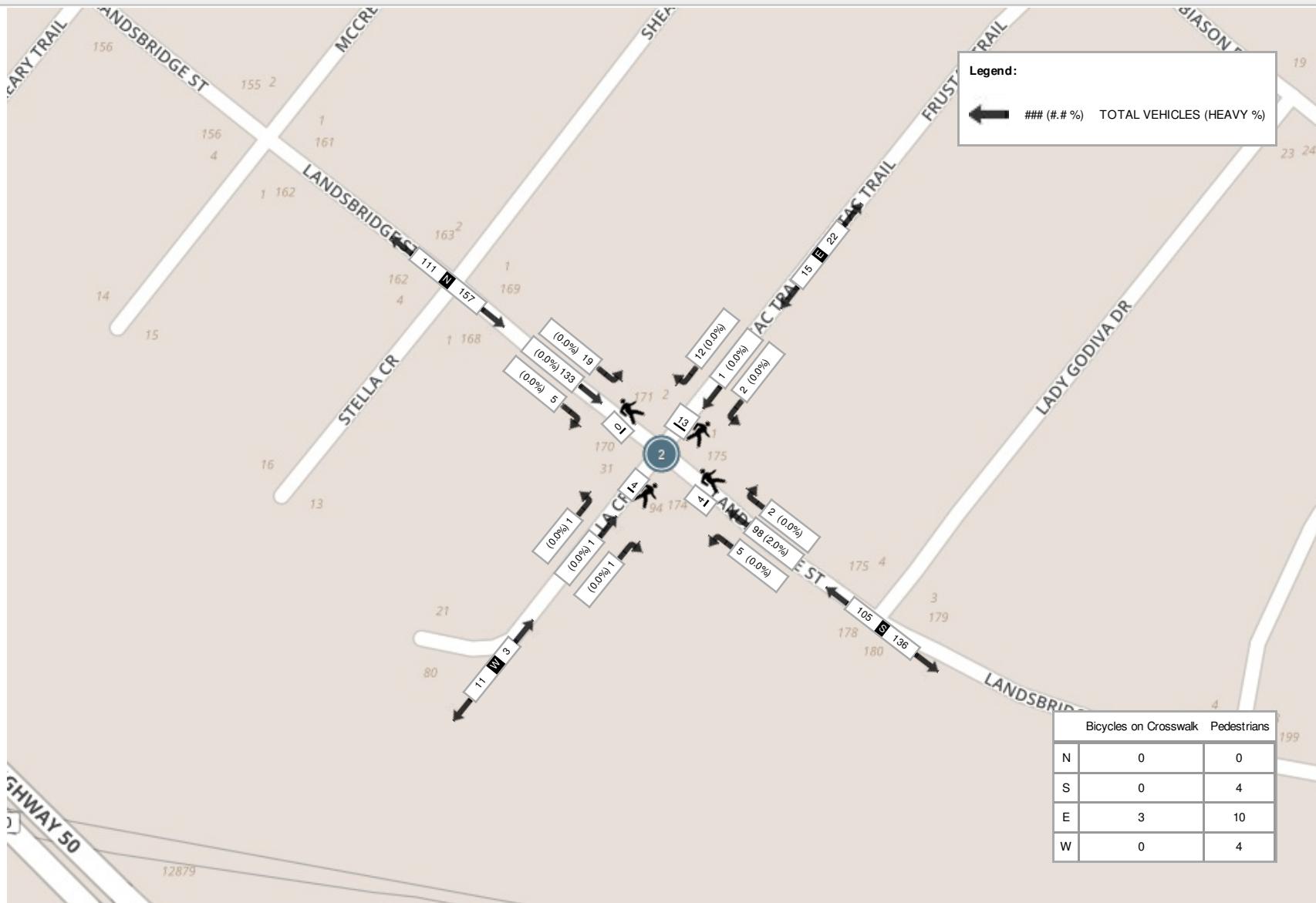


Spectrum

Turning Movement Count
Location Name: LANDSBRIDGE STREET & FRUSTAC TRAIL
Date: Wed, Mar 09, 2016

NexTrans
4261-A14 Highway 7 East
Suite 489
Markham ON, CANADA, L3R 9W6

Peak Hour: 04:45 PM - 05:45 PM



Turning Movement Count (1 . LANDSBIDGE STREET & HANTON CRESCENT) MiID: 297212

| Start Time | N Approach LANDSBIDGE STREET | | | | E Approach HANTON CRESCENT | | | | S Approach LANDSBIDGE STREET | | | | Int. Total (15 min) | Int. Total (1 hr) |
|------------|---------------------------------|-------------|------------|----------------|-------------------------------|-------------|------------|----------------|---------------------------------|-------------|------------|----------------|------------------------|----------------------|
| | Thru N:S | Left N:E | Peds N: | Approach Total | Right E:N | Left E:S | Peds E: | Approach Total | Right S:E | Thru S:N | Peds S: | Approach Total | | |
| 07:00:00 | 9 | 1 | 0 | 10 | 9 | 0 | 1 | 9 | 0 | 32 | 0 | 32 | 51 | |
| 07:15:00 | 6 | 2 | 0 | 8 | 10 | 0 | 3 | 10 | 0 | 37 | 3 | 37 | 55 | |
| 07:30:00 | 16 | 3 | 0 | 19 | 9 | 0 | 5 | 9 | 0 | 51 | 0 | 52 | 80 | |
| 07:45:00 | 11 | 0 | 1 | 11 | 6 | 0 | 10 | 6 | 0 | 47 | 0 | 47 | 64 | 250 |
| 08:00:00 | 14 | 2 | 1 | 16 | 14 | 1 | 3 | 15 | 2 | 40 | 0 | 42 | 73 | 272 |
| 08:15:00 | 17 | 2 | 2 | 19 | 7 | 0 | 7 | 7 | 0 | 50 | 9 | 50 | 76 | 293 |
| 08:30:00 | 15 | 4 | 0 | 19 | 11 | 0 | 0 | 11 | 0 | 61 | 0 | 61 | 91 | 304 |
| 08:45:00 | 24 | 5 | 0 | 29 | 11 | 0 | 0 | 11 | 1 | 35 | 0 | 36 | 76 | 316 |

*****BREAK*****

| | | | | | | | | | | | | | | |
|--------------------|-----|-----|----|-----|-----|---|----|-----|----|-----|----|-----|------|-----|
| 16:00:00 | 60 | 9 | 0 | 69 | 1 | 0 | 6 | 1 | 1 | 29 | 0 | 30 | 100 | |
| 16:15:00 | 47 | 12 | 0 | 59 | 8 | 1 | 5 | 9 | 0 | 32 | 0 | 32 | 100 | |
| 16:30:00 | 63 | 10 | 0 | 73 | 3 | 0 | 1 | 3 | 3 | 28 | 0 | 31 | 107 | |
| 16:45:00 | 50 | 14 | 0 | 64 | 10 | 2 | 16 | 12 | 1 | 40 | 0 | 41 | 117 | 424 |
| 17:00:00 | 60 | 13 | 0 | 73 | 1 | 0 | 3 | 1 | 0 | 35 | 0 | 35 | 109 | 433 |
| 17:15:00 | 58 | 16 | 4 | 74 | 5 | 0 | 7 | 5 | 1 | 37 | 0 | 38 | 117 | 450 |
| 17:30:00 | 60 | 8 | 1 | 68 | 4 | 0 | 7 | 4 | 1 | 31 | 0 | 32 | 104 | 447 |
| 17:45:00 | 64 | 9 | 2 | 73 | 10 | 0 | 4 | 10 | 0 | 44 | 0 | 44 | 127 | 457 |
| Grand Total | 574 | 110 | 11 | 684 | 119 | 4 | 78 | 123 | 10 | 630 | 12 | 640 | 1447 | - |

| | | | | | | | | | | | | | |
|------------------|-------|-------|-------|-------|------|------|------|-------|-------|---|---|---|---|
| Approach% | 83.9% | 16.1% | - | 96.7% | 3.3% | - | 1.6% | 98.4% | - | - | - | - | - |
| Totals % | 39.7% | 7.6% | 47.3% | 8.2% | 0.3% | 8.5% | 0.7% | 43.5% | 44.2% | - | - | - | - |
| Heavy | 15 | 0 | - | 0 | 0 | - | 0 | 14 | - | - | - | - | - |
| Heavy % | 2.6% | 0% | - | 0% | 0% | - | 0% | 2.2% | - | - | - | - | - |

Peak Hour: 08:00 AM - 09:00 AM

| Start Time | N Approach LANDSBIDGE STREET | | | | E Approach HANTON CRESCENT | | | | S Approach LANDSBIDGE STREET | | | | Int. Total (15 min) |
|-------------------------------|---------------------------------|-------|-------|----------------|-------------------------------|------|-------|----------------|---------------------------------|-------|-------|----------------|------------------------|
| | Thru | Left | Peds | Approach Total | Right | Left | Peds | Approach Total | Right | Thru | Peds | Approach Total | |
| 08:00:00 | 14 | 2 | 1 | 16 | 14 | 1 | 3 | 15 | 2 | 40 | 0 | 42 | 73 |
| 08:15:00 | 17 | 2 | 2 | 19 | 7 | 0 | 7 | 7 | 0 | 50 | 9 | 50 | 76 |
| 08:30:00 | 15 | 4 | 0 | 19 | 11 | 0 | 0 | 11 | 0 | 61 | 0 | 61 | 91 |
| 08:45:00 | 24 | 5 | 0 | 29 | 11 | 0 | 0 | 11 | 1 | 35 | 0 | 36 | 76 |
| Grand Total | 70 | 13 | 3 | 83 | 43 | 1 | 10 | 44 | 3 | 186 | 9 | 189 | 316 |
| Approach% | 84.3% | 15.7% | | - | 97.7% | 2.3% | | - | 1.6% | 98.4% | | - | - |
| Totals % | 22.2% | 4.1% | | 26.3% | 13.6% | 0.3% | | 13.9% | 0.9% | 58.9% | | 59.8% | - |
| PHF | 0.73 | 0.65 | | 0.72 | 0.77 | 0.25 | | 0.73 | 0.38 | 0.76 | | 0.77 | - |
| Heavy | 3 | 0 | | 3 | 0 | 0 | | 0 | 0 | 4 | | 4 | - |
| Heavy % | 4.3% | 0% | | 3.6% | 0% | 0% | | 0% | 0% | 2.2% | | 2.1% | - |
| Lights | 67 | 13 | | 80 | 43 | 1 | | 44 | 3 | 182 | | 185 | - |
| Lights % | 95.7% | 100% | | 96.4% | 100% | 100% | | 100% | 100% | 97.8% | | 97.9% | - |
| Single-Unit Trucks | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 1 | | 1 | - |
| Single-Unit Trucks % | 0% | 0% | | 0% | 0% | 0% | | 0% | 0% | 0.5% | | 0.5% | - |
| Buses | 3 | 0 | | 3 | 0 | 0 | | 0 | 0 | 3 | | 3 | - |
| Buses % | 4.3% | 0% | | 3.6% | 0% | 0% | | 0% | 0% | 1.6% | | 1.6% | - |
| Pedestrians | - | - | 3 | - | - | - | 10 | - | - | - | 9 | - | - |
| Pedestrians% | - | - | 13.6% | - | - | - | 45.5% | - | - | - | 40.9% | - | - |
| Bicycles on Crosswalk | - | - | 0 | - | - | - | 0 | - | - | - | 0 | - | - |
| Bicycles on Crosswalk% | - | - | 0% | - | - | - | 0% | - | - | - | 0% | - | - |
| Bicycles on Road | 0 | 0 | 0 | - | 0 | 0 | 0 | - | 0 | 0 | 0 | - | - |
| Bicycles on Road% | - | - | 0% | - | - | - | 0% | - | - | - | 0% | - | - |

Peak Hour: 05:00 PM - 06:00 PM

| Start Time | N Approach LANDSBIDGE STREET | | | | | E Approach HANTON CRESCENT | | | | | S Approach LANDSBIDGE STREET | | | | | Int. Total (15 min) |
|-------------------------------|---------------------------------|-------|------|----------------|-------|-------------------------------|-------|----------------|-------|-------|---------------------------------|----------------|---|--|---|------------------------|
| | Thru | Left | Peds | Approach Total | Right | Left | Peds | Approach Total | Right | Thru | Peds | Approach Total | | | | |
| 17:00:00 | 60 | 13 | 0 | 73 | 1 | 0 | 3 | 1 | 0 | 35 | 0 | 35 | | | | 109 |
| 17:15:00 | 58 | 16 | 4 | 74 | 5 | 0 | 7 | 5 | 1 | 37 | 0 | 38 | | | | 117 |
| 17:30:00 | 60 | 8 | 1 | 68 | 4 | 0 | 7 | 4 | 1 | 31 | 0 | 32 | | | | 104 |
| 17:45:00 | 64 | 9 | 2 | 73 | 10 | 0 | 4 | 10 | 0 | 44 | 0 | 44 | | | | 127 |
| Grand Total | 242 | 46 | 7 | 288 | 20 | 0 | 21 | 20 | 2 | 147 | 0 | 149 | | | | 457 |
| Approach% | 84% | 16% | | - | 100% | 0% | | - | 1.3% | 98.7% | | | - | | | - |
| Totals % | 53% | 10.1% | | 63% | 4.4% | 0% | | 4.4% | 0.4% | 32.2% | | 32.6% | | | | - |
| PHF | 0.95 | 0.72 | | 0.97 | 0.5 | 0 | | 0.5 | 0.5 | 0.84 | | 0.85 | | | | - |
| Heavy | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 1 | | 1 | | | | - |
| Heavy % | 0% | 0% | | 0% | 0% | 0% | | 0% | 0% | 0.7% | | 0.7% | | | | - |
| Lights | 242 | 46 | | 288 | 20 | 0 | | 20 | 2 | 146 | | 148 | | | | - |
| Lights % | 100% | 100% | | 100% | 100% | 0% | | 100% | 100% | 99.3% | | 99.3% | | | | - |
| Single-Unit Trucks | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 1 | | 1 | | | | - |
| Single-Unit Trucks % | 0% | 0% | | 0% | 0% | 0% | | 0% | 0% | 0.7% | | 0.7% | | | | - |
| Buses | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | | | | - |
| Buses % | 0% | 0% | | 0% | 0% | 0% | | 0% | 0% | 0% | | 0% | | | | - |
| Pedestrians | - | - | 7 | - | - | - | 20 | - | - | - | 0 | - | | | - | - |
| Pedestrians% | - | - | 25% | - | - | - | 71.4% | - | - | - | 0% | - | | | - | - |
| Bicycles on Crosswalk | - | - | 0 | - | - | - | 1 | - | - | - | 0 | - | | | - | - |
| Bicycles on Crosswalk% | - | - | 0% | - | - | - | 3.6% | - | - | - | 0% | - | | | - | - |
| Bicycles on Road | 1 | 0 | 0 | - | 0 | 0 | 0 | - | 0 | 0 | 0 | - | | | - | - |
| Bicycles on Road% | - | - | 0% | - | - | - | 0% | - | - | - | 0% | - | | | - | - |

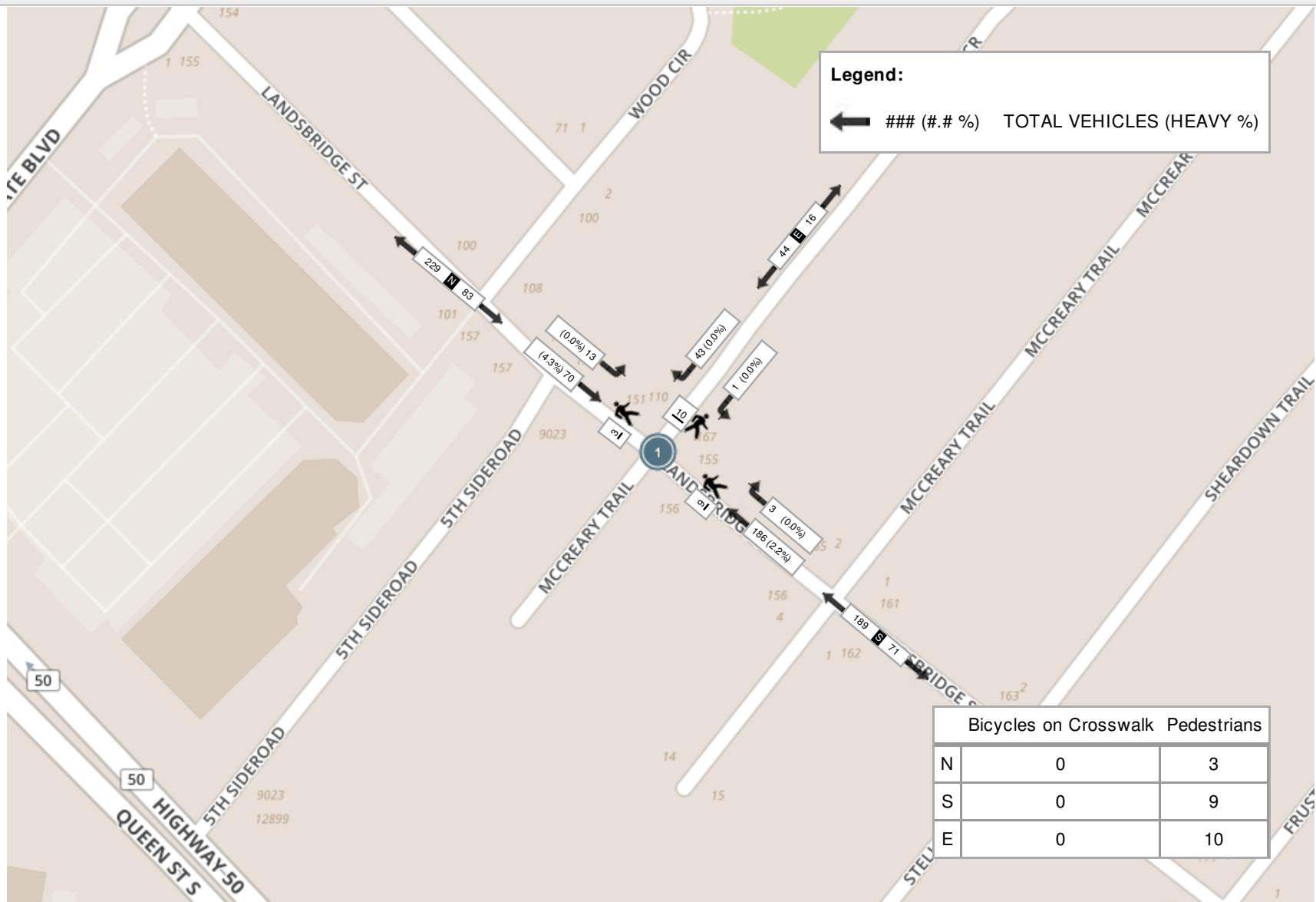


Spectrum

Turning Movement Count
Location Name: LANDSBRIDGE STREET & HANTON CRESCENT
Date: Wed, Mar 09, 2016

NexTrans
4261-A14 Highway 7 East
Suite 489
Markham ON, CANADA, L3R 9W6

Peak Hour: 08:00 AM - 09:00 AM



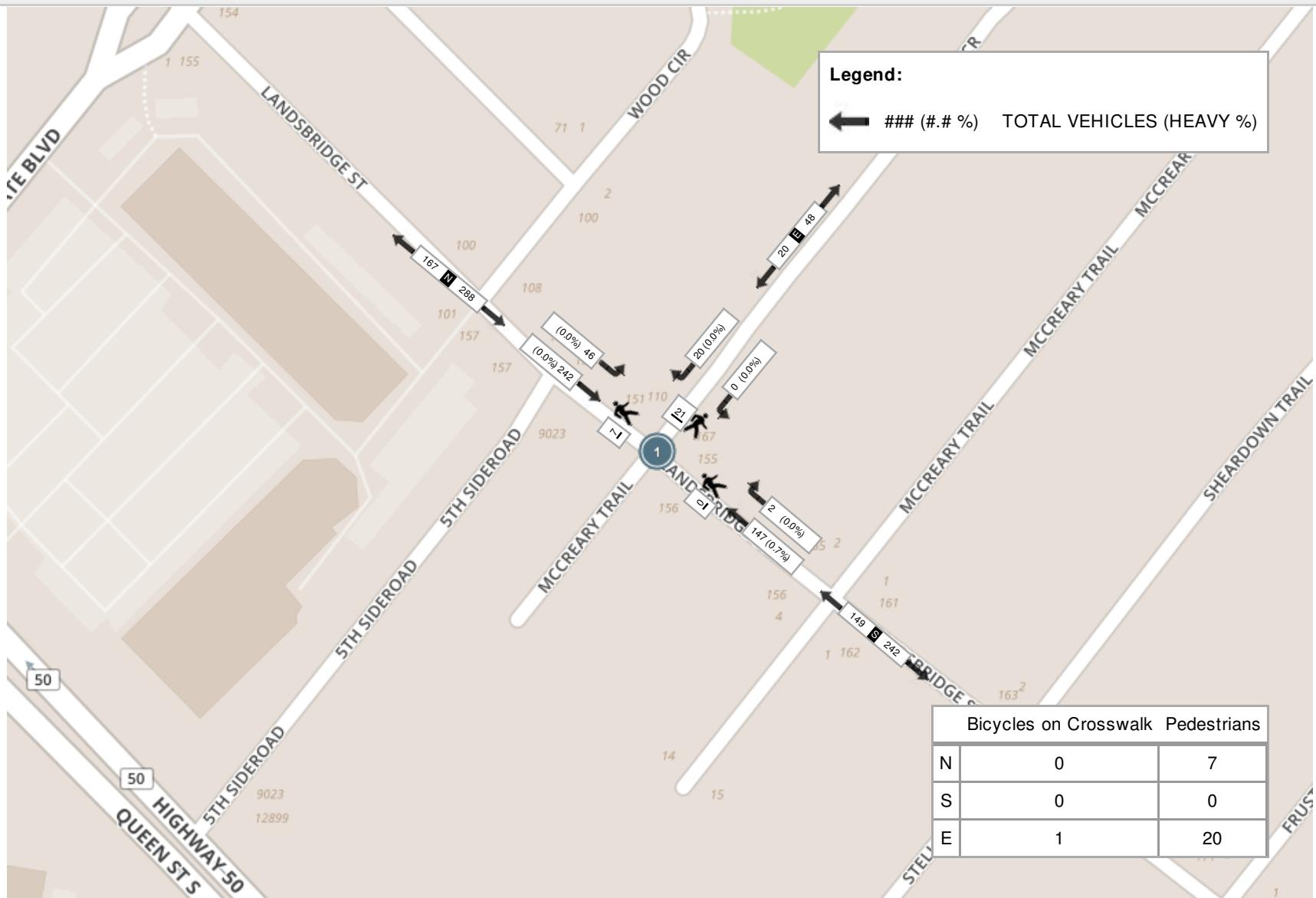


Spectrum

Turning Movement Count
Location Name: LANDSBIDGE STREET & HANTON CRESCENT
Date: Wed, Mar 09, 2016

NexTrans
4261-A14 Highway 7 East
Suite 489
Markham ON, CANADA, L3R 9W6

Peak Hour: 05:00 PM - 06:00 PM





Turning Movement Count (3 . LANDSBRIDGE STREET & QUEENSGATE BOULEVARD (SIGNALIZED)) MiOID: 297215

| Start Time | N Approach LANDSBRIDGE STREET | | | | | E Approach QUEENSGATE BOULEVARD | | | | | S Approach LANDSBRIDGE STREET | | | | | W Approach QUEENSGATE BOULEVARD | | | | | Int. Total (15 min) | Int. Total (1 hr) |
|--------------------|----------------------------------|-------------|-------------|------------|----------------|------------------------------------|-------------|-------------|------------|----------------|----------------------------------|-------------|-------------|------------|----------------|------------------------------------|-------------|-------------|------------|----------------|------------------------|----------------------|
| | Right N:W | Thru N:S | Left N:E | Peds N: | Approach Total | Right E:N | Thru E:W | Left E:S | Peds E: | Approach Total | Right S:E | Thru S:N | Left S:W | Peds S: | Approach Total | Right W:S | Thru W:E | Left W:N | Peds W: | Approach Total | | |
| 07:00:00 | 25 | 1 | 3 | 1 | 29 | 3 | 83 | 0 | 1 | 86 | 0 | 1 | 44 | 0 | 45 | 8 | 5 | 2 | 0 | 15 | 175 | |
| 07:15:00 | 22 | 2 | 2 | 1 | 26 | 5 | 63 | 1 | 1 | 69 | 2 | 6 | 39 | 1 | 47 | 2 | 8 | 3 | 0 | 13 | 155 | |
| 07:30:00 | 17 | 5 | 4 | 1 | 26 | 5 | 90 | 1 | 2 | 96 | 4 | 4 | 55 | 0 | 63 | 15 | 14 | 6 | 1 | 35 | 220 | |
| 07:45:00 | 17 | 3 | 1 | 0 | 21 | 4 | 105 | 0 | 1 | 109 | 7 | 8 | 45 | 1 | 60 | 9 | 19 | 2 | 0 | 30 | 220 | 770 |
| 08:00:00 | 19 | 7 | 3 | 0 | 29 | 1 | 60 | 3 | 4 | 64 | 6 | 7 | 53 | 0 | 66 | 8 | 16 | 7 | 0 | 31 | 190 | 785 |
| 08:15:00 | 23 | 5 | 6 | 0 | 34 | 4 | 86 | 1 | 0 | 91 | 7 | 11 | 39 | 0 | 57 | 13 | 16 | 4 | 0 | 33 | 215 | 845 |
| 08:30:00 | 13 | 5 | 5 | 0 | 23 | 7 | 82 | 5 | 2 | 94 | 16 | 26 | 42 | 0 | 84 | 11 | 30 | 5 | 0 | 46 | 247 | 872 |
| 08:45:00 | 14 | 16 | 2 | 0 | 32 | 3 | 68 | 5 | 3 | 76 | 4 | 11 | 35 | 0 | 50 | 16 | 30 | 6 | 4 | 52 | 210 | 862 |
| ***BREAK*** | | | | | | | | | | | | | | | | | | | | | | |
| 16:00:00 | 16 | 20 | 12 | 1 | 48 | 13 | 38 | 3 | 0 | 54 | 5 | 5 | 20 | 0 | 30 | 26 | 82 | 22 | 5 | 130 | 262 | |
| 16:15:00 | 21 | 19 | 14 | 3 | 54 | 6 | 49 | 4 | 5 | 59 | 7 | 10 | 23 | 6 | 40 | 32 | 78 | 16 | 1 | 126 | 279 | |
| 16:30:00 | 16 | 14 | 18 | 0 | 48 | 11 | 33 | 4 | 4 | 48 | 2 | 18 | 22 | 3 | 42 | 40 | 106 | 19 | 0 | 165 | 303 | |
| 16:45:00 | 20 | 16 | 19 | 3 | 55 | 13 | 45 | 10 | 10 | 68 | 3 | 13 | 39 | 3 | 55 | 36 | 102 | 24 | 10 | 162 | 340 | 1184 |
| 17:00:00 | 15 | 12 | 13 | 3 | 40 | 14 | 30 | 5 | 4 | 49 | 2 | 16 | 24 | 1 | 42 | 42 | 115 | 28 | 2 | 185 | 316 | 1238 |
| 17:15:00 | 17 | 28 | 17 | 4 | 62 | 11 | 37 | 5 | 4 | 53 | 9 | 11 | 30 | 8 | 50 | 35 | 116 | 20 | 3 | 171 | 336 | 1295 |
| 17:30:00 | 10 | 14 | 10 | 2 | 34 | 13 | 34 | 1 | 1 | 48 | 3 | 6 | 31 | 2 | 40 | 40 | 78 | 24 | 6 | 142 | 264 | 1256 |
| 17:45:00 | 16 | 9 | 18 | 1 | 43 | 10 | 36 | 5 | 2 | 51 | 5 | 15 | 33 | 0 | 53 | 40 | 60 | 20 | 2 | 120 | 267 | 1183 |
| Grand Total | 281 | 176 | 147 | 20 | 604 | 123 | 939 | 53 | 44 | 1115 | 82 | 168 | 574 | 25 | 824 | 373 | 875 | 208 | 34 | 1456 | 3999 | - |
| Approach% | 46.5% | 29.1% | 24.3% | - | 11% | 84.2% | 4.8% | - | 10% | 20.4% | 69.7% | - | 25.6% | 60.1% | 14.3% | - | - | - | - | - | - | |
| Totals % | 7% | 4.4% | 3.7% | 15.1% | 3.1% | 23.5% | 1.3% | 27.9% | 2.1% | 4.2% | 14.4% | 20.6% | 9.3% | 21.9% | 5.2% | 36.4% | - | - | - | - | - | |
| Heavy | 4 | 5 | 2 | - | 2 | 11 | 1 | - | 3 | 2 | 8 | - | 8 | 9 | 3 | - | - | - | - | - | | |
| Heavy % | 1.4% | 2.8% | 1.4% | - | 1.6% | 1.2% | 1.9% | - | 3.7% | 1.2% | 1.4% | - | 2.1% | 1% | 1.4% | - | - | - | - | - | | |



Spectrum

Turning Movement Count
Location Name: LANDSBRIDGE STREET & QUEENSGATE BOULEVARD
(SIGNALIZED)
Date: Wed, Mar 09, 2016

NexTrans
4261-A14 Highway 7 East
Suite 489
Markham ON, CANADA, L3R 9W6

Peak Hour: 07:45 AM - 08:45 AM

| Start Time | N Approach LANDSBRIDGE STREET | | | | | E Approach QUEENSGATE BOULEVARD | | | | | S Approach LANDSBRIDGE STREET | | | | | W Approach QUEENSGATE BOULEVARD | | | | | Int. Total (15 min) |
|-------------------------------|----------------------------------|-------|-------|------|----------------|------------------------------------|-------|-------|-------|----------------|----------------------------------|-------|-------|-------|----------------|------------------------------------|-------|-------|------|----------------|------------------------|
| | Right | Thru | Left | Peds | Approach Total | Right | Thru | Left | Peds | Approach Total | Right | Thru | Left | Peds | Approach Total | Right | Thru | Left | Peds | Approach Total | |
| | | | | | | | | | | | | | | | | | | | | | |
| 07:45:00 | 17 | 3 | 1 | 0 | 21 | 4 | 105 | 0 | 1 | 109 | 7 | 8 | 45 | 1 | 60 | 9 | 19 | 2 | 0 | 30 | 220 |
| 08:00:00 | 19 | 7 | 3 | 0 | 29 | 1 | 60 | 3 | 4 | 64 | 6 | 7 | 53 | 0 | 66 | 8 | 16 | 7 | 0 | 31 | 190 |
| 08:15:00 | 23 | 5 | 6 | 0 | 34 | 4 | 86 | 1 | 0 | 91 | 7 | 11 | 39 | 0 | 57 | 13 | 16 | 4 | 0 | 33 | 215 |
| 08:30:00 | 13 | 5 | 5 | 0 | 23 | 7 | 82 | 5 | 2 | 94 | 16 | 26 | 42 | 0 | 84 | 11 | 30 | 5 | 0 | 46 | 247 |
| Grand Total | 72 | 20 | 15 | 0 | 107 | 16 | 333 | 9 | 7 | 358 | 36 | 52 | 179 | 1 | 267 | 41 | 81 | 18 | 0 | 140 | 872 |
| Approach% | 67.3% | 18.7% | 14% | | - | 4.5% | 93% | 2.5% | | - | 13.5% | 19.5% | 67% | | - | 29.3% | 57.9% | 12.9% | | - | - |
| Totals % | 8.3% | 2.3% | 1.7% | | 12.3% | 1.8% | 38.2% | 1% | | 41.1% | 4.1% | 6% | 20.5% | | 30.6% | 4.7% | 9.3% | 2.1% | | 16.1% | - |
| PHF | 0.78 | 0.71 | 0.63 | | 0.79 | 0.57 | 0.79 | 0.45 | | 0.82 | 0.56 | 0.5 | 0.84 | | 0.79 | 0.79 | 0.68 | 0.64 | | 0.76 | - |
| Heavy | 4 | 3 | 2 | | 9 | 0 | 5 | 1 | | 6 | 1 | 1 | 5 | | 7 | 3 | 2 | 2 | | 7 | - |
| Heavy % | 5.6% | 15% | 13.3% | | 8.4% | 0% | 1.5% | 11.1% | | 1.7% | 2.8% | 1.9% | 2.8% | | 2.6% | 7.3% | 2.5% | 11.1% | | 5% | - |
| Lights | 68 | 17 | 13 | | 98 | 16 | 328 | 8 | | 352 | 35 | 51 | 174 | | 260 | 38 | 79 | 16 | | 133 | - |
| Lights % | 94.4% | 85% | 86.7% | | 91.6% | 100% | 98.5% | 88.9% | | 98.3% | 97.2% | 98.1% | 97.2% | | 97.4% | 92.7% | 97.5% | 88.9% | | 95% | - |
| Single-Unit Trucks | 1 | 0 | 0 | | 1 | 0 | 0 | 1 | | 1 | 0 | 0 | 1 | | 1 | 0 | 0 | 0 | | 0 | - |
| Single-Unit Trucks % | 1.4% | 0% | 0% | | 0.9% | 0% | 0% | 11.1% | | 0.3% | 0% | 0% | 0.6% | | 0.4% | 0% | 0% | 0% | | 0% | - |
| Buses | 3 | 3 | 2 | | 8 | 0 | 5 | 0 | | 5 | 1 | 1 | 4 | | 6 | 3 | 2 | 2 | | 7 | - |
| Buses % | 4.2% | 15% | 13.3% | | 7.5% | 0% | 1.5% | 0% | | 1.4% | 2.8% | 1.9% | 2.2% | | 2.2% | 7.3% | 2.5% | 11.1% | | 5% | - |
| Pedestrians | - | - | - | 0 | - | - | - | - | 7 | - | - | - | - | 0 | - | - | - | - | 0 | - | |
| Pedestrians% | - | - | - | 0% | - | - | - | - | 87.5% | - | - | - | - | 0% | - | - | - | - | 0% | - | |
| Bicycles on Crosswalk | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 1 | - | - | - | - | 0 | - | |
| Bicycles on Crosswalk% | - | - | - | 0% | - | - | - | - | 0% | - | - | - | - | 12.5% | - | - | - | - | 0% | - | |
| Bicycles on Road | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | |
| Bicycles on Road% | - | - | - | 0% | - | - | - | - | 0% | - | - | - | - | 0% | - | - | - | - | 0% | - | |



Spectrum

Turning Movement Count
Location Name: LANDSBRIDGE STREET & QUEENSGATE BOULEVARD
(SIGNALIZED)
Date: Wed, Mar 09, 2016

NexTrans
4261-A14 Highway 7 East
Suite 489
Markham ON, CANADA, L3R 9W6

Peak Hour: 04:30 PM - 05:30 PM

| Start Time | N Approach LANDSBRIDGE STREET | | | | | E Approach QUEENSGATE BOULEVARD | | | | | S Approach LANDSBRIDGE STREET | | | | | W Approach QUEENSGATE BOULEVARD | | | | | Int. Total (15 min) |
|-------------------------------|----------------------------------|-------|-------|-------|----------------|------------------------------------|-------|------|-------|----------------|----------------------------------|-------|-------|------|----------------|------------------------------------|-------|-------|------|----------------|------------------------|
| | Right | Thru | Left | Peds | Approach Total | Right | Thru | Left | Peds | Approach Total | Right | Thru | Left | Peds | Approach Total | Right | Thru | Left | Peds | Approach Total | |
| | | | | | | | | | | | | | | | | | | | | | |
| 16:30:00 | 16 | 14 | 18 | 0 | 48 | 11 | 33 | 4 | 4 | 48 | 2 | 18 | 22 | 3 | 42 | 40 | 106 | 19 | 0 | 165 | 303 |
| 16:45:00 | 20 | 16 | 19 | 3 | 55 | 13 | 45 | 10 | 10 | 68 | 3 | 13 | 39 | 3 | 55 | 36 | 102 | 24 | 10 | 162 | 340 |
| 17:00:00 | 15 | 12 | 13 | 3 | 40 | 14 | 30 | 5 | 4 | 49 | 2 | 16 | 24 | 1 | 42 | 42 | 115 | 28 | 2 | 185 | 316 |
| 17:15:00 | 17 | 28 | 17 | 4 | 62 | 11 | 37 | 5 | 4 | 53 | 9 | 11 | 30 | 8 | 50 | 35 | 116 | 20 | 3 | 171 | 336 |
| Grand Total | 68 | 70 | 67 | 10 | 205 | 49 | 145 | 24 | 22 | 218 | 16 | 58 | 115 | 15 | 189 | 153 | 439 | 91 | 15 | 683 | 1295 |
| Approach% | 33.2% | 34.1% | 32.7% | | - | 22.5% | 66.5% | 11% | | - | 8.5% | 30.7% | 60.8% | | - | 22.4% | 64.3% | 13.3% | | - | - |
| Totals % | 5.3% | 5.4% | 5.2% | | 15.8% | 3.8% | 11.2% | 1.9% | | 16.8% | 1.2% | 4.5% | 8.9% | | 14.6% | 11.8% | 33.9% | 7% | | 52.7% | - |
| PHF | 0.85 | 0.63 | 0.88 | | 0.83 | 0.88 | 0.81 | 0.6 | | 0.8 | 0.44 | 0.81 | 0.74 | | 0.86 | 0.91 | 0.95 | 0.81 | | 0.92 | - |
| Heavy | 0 | 0 | 0 | | 0 | 0 | 1 | 0 | | 1 | 0 | 0 | 0 | | 0 | 0 | 1 | 0 | | 1 | - |
| Heavy % | 0% | 0% | 0% | | 0% | 0% | 0.7% | 0% | | 0.5% | 0% | 0% | 0% | | 0% | 0% | 0.2% | 0% | | 0.1% | - |
| Lights | 68 | 70 | 67 | | 205 | 49 | 144 | 24 | | 217 | 16 | 58 | 115 | | 189 | 153 | 438 | 91 | | 682 | - |
| Lights % | 100% | 100% | 100% | | 100% | 100% | 99.3% | 100% | | 99.5% | 100% | 100% | 100% | | 100% | 100% | 99.8% | 100% | | 99.9% | - |
| Single-Unit Trucks | 0 | 0 | 0 | | 0 | 0 | 1 | 0 | | 1 | 0 | 0 | 0 | | 0 | 0 | 1 | 0 | | 1 | - |
| Single-Unit Trucks % | 0% | 0% | 0% | | 0% | 0% | 0.7% | 0% | | 0.5% | 0% | 0% | 0% | | 0% | 0% | 0.2% | 0% | | 0.1% | - |
| Buses | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | | 0 | - |
| Buses % | 0% | 0% | 0% | | 0% | 0% | 0% | 0% | | 0% | 0% | 0% | 0% | | 0% | 0% | 0% | 0% | | 0% | - |
| Pedestrians | - | - | - | 10 | - | - | - | - | 20 | - | - | - | - | 13 | - | - | - | - | 13 | - | |
| Pedestrians% | - | - | - | 16.1% | - | - | - | - | 32.3% | - | - | - | - | 21% | - | - | - | - | 21% | - | |
| Bicycles on Crosswalk | - | - | - | 0 | - | - | - | - | 2 | - | - | - | - | 2 | - | - | - | - | 2 | - | |
| Bicycles on Crosswalk% | - | - | - | 0% | - | - | - | - | 3.2% | - | - | - | - | 3.2% | - | - | - | - | 3.2% | - | |
| Bicycles on Road | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | - | |
| Bicycles on Road% | - | - | - | 0% | - | - | - | - | 0% | - | - | - | - | 0% | - | - | - | - | 0% | - | |

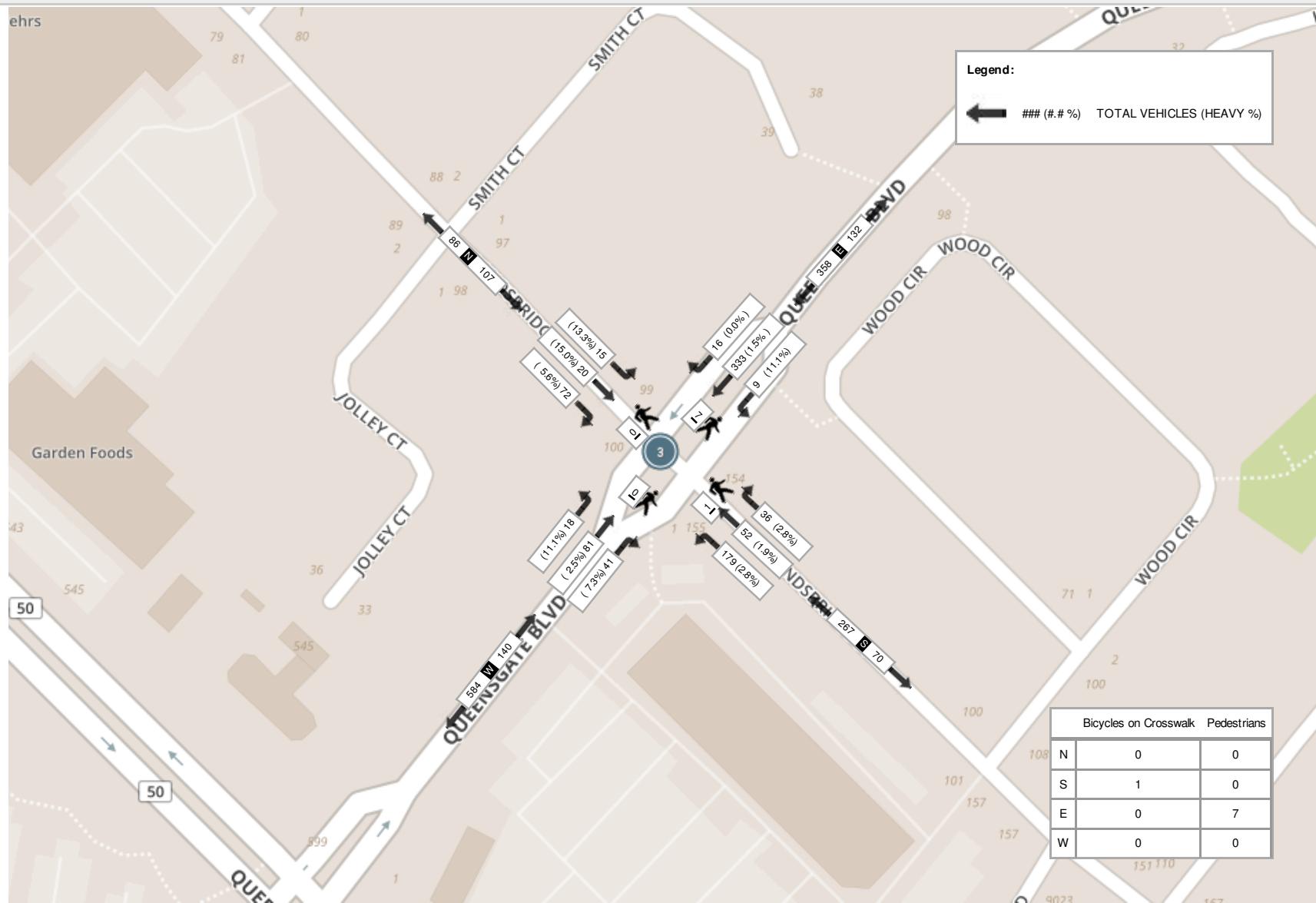


Spectrum

Turning Movement Count
Location Name: LANDSBRIDGE STREET & QUEENSGATE BOULEVARD
(SIGNALIZED)
Date: Wed, Mar 09, 2016

NexTrans
4261-A14 Highway 7 East
Suite 489
Markham ON, CANADA, L3R 9W6

Peak Hour: 07:45 AM - 08:45 AM



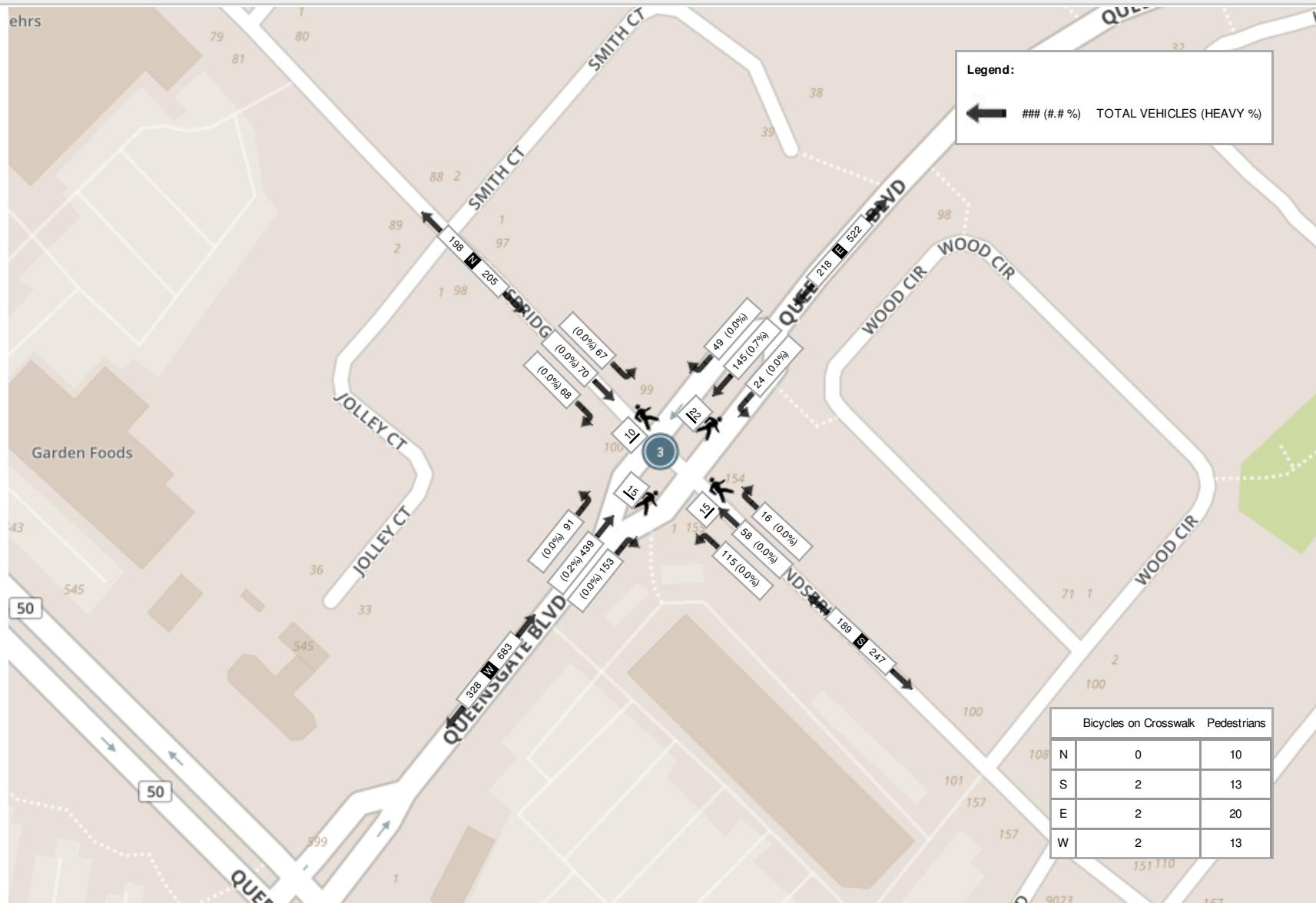


Spectrum

Turning Movement Count
Location Name: LANDSBRIDGE STREET & QUEENSGATE BOULEVARD
(SIGNALIZED)
Date: Wed, Mar 09, 2016

NexTrans
4261-A14 Highway 7 East
Suite 489
Markham ON, CANADA, L3R 9W6

Peak Hour: 04:30 PM - 05:30 PM



Appendix C - Existing Traffic Level of Service Calculations

HCM Signalized Intersection Capacity Analysis

3: Landsbridge St & Queensgate Blvd

19/04/2016

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|---------------------------|------|-------|------|------|------|------|------|
| Lane Configurations | ↑ | ↑↑ | | ↑ | ↑↑ | | ↑ | ↑ | | ↑ | ↑ | |
| Volume (vph) | 18 | 81 | 41 | 9 | 333 | 16 | 179 | 52 | 36 | 15 | 20 | 72 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 7.4 | 7.4 | | 7.4 | 7.4 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 0.99 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.95 | | 1.00 | 0.99 | | 1.00 | 0.94 | | 1.00 | 0.89 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1626 | 3307 | | 1624 | 3510 | | 1752 | 1738 | | 1591 | 1556 | |
| Flt Permitted | 0.42 | 1.00 | | 0.64 | 1.00 | | 0.68 | 1.00 | | 0.65 | 1.00 | |
| Satd. Flow (perm) | 711 | 3307 | | 1101 | 3510 | | 1254 | 1738 | | 1090 | 1556 | |
| Peak-hour factor, PHF | 0.64 | 0.68 | 0.79 | 0.45 | 0.79 | 0.57 | 0.84 | 0.50 | 0.56 | 0.63 | 0.71 | 0.78 |
| Adj. Flow (vph) | 28 | 119 | 52 | 20 | 422 | 28 | 213 | 104 | 64 | 24 | 28 | 92 |
| RTOR Reduction (vph) | 0 | 42 | 0 | 0 | 7 | 0 | 0 | 20 | 0 | 0 | 37 | 0 |
| Lane Group Flow (vph) | 28 | 129 | 0 | 20 | 443 | 0 | 213 | 148 | 0 | 24 | 83 | 0 |
| Confl. Peds. (#/hr) | | | 1 | 1 | | | | | 7 | 7 | | |
| Heavy Vehicles (%) | 11% | 2% | 7% | 11% | 2% | 0% | 3% | 2% | 3% | 13% | 15% | 6% |
| Turn Type | Perm | NA | | Perm | NA | | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 13.5 | 13.5 | | 13.5 | 13.5 | | 40.1 | 40.1 | | 40.1 | 40.1 | |
| Effective Green, g (s) | 13.5 | 13.5 | | 13.5 | 13.5 | | 40.1 | 40.1 | | 40.1 | 40.1 | |
| Actuated g/C Ratio | 0.20 | 0.20 | | 0.20 | 0.20 | | 0.60 | 0.60 | | 0.60 | 0.60 | |
| Clearance Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 7.4 | 7.4 | | 7.4 | 7.4 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 143 | 666 | | 221 | 707 | | 750 | 1040 | | 652 | 931 | |
| v/s Ratio Prot | | 0.04 | | | c0.13 | | | 0.09 | | | 0.05 | |
| v/s Ratio Perm | 0.04 | | | 0.02 | | | c0.17 | | | 0.02 | | |
| v/c Ratio | 0.20 | 0.19 | | 0.09 | 0.63 | | 0.28 | 0.14 | | 0.04 | 0.09 | |
| Uniform Delay, d1 | 22.2 | 22.2 | | 21.8 | 24.4 | | 6.5 | 5.9 | | 5.5 | 5.7 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.7 | 0.1 | | 0.2 | 1.7 | | 0.9 | 0.3 | | 0.1 | 0.2 | |
| Delay (s) | 22.9 | 22.4 | | 21.9 | 26.2 | | 7.5 | 6.2 | | 5.6 | 5.9 | |
| Level of Service | C | C | | C | C | | A | A | | A | A | |
| Approach Delay (s) | | 22.4 | | | 26.0 | | | 6.9 | | | 5.8 | |
| Approach LOS | | C | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | 16.9 | | | HCM 2000 Level of Service | | | B | | | | |
| HCM 2000 Volume to Capacity ratio | | 0.37 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 67.0 | | | Sum of lost time (s) | | | 13.4 | | | | |
| Intersection Capacity Utilization | | 49.6% | | | ICU Level of Service | | | A | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

1: Landsbridge St & Hanton Crescent

19/04/2016



| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 1 | 43 | 186 | 3 | 13 | 70 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.25 | 0.77 | 0.76 | 0.38 | 0.65 | 0.73 |
| Hourly flow rate (vph) | 4 | 56 | 245 | 8 | 20 | 96 |
| Pedestrians | 10 | | 9 | | | 3 |
| Lane Width (m) | 3.6 | | 3.6 | | | 3.6 |
| Walking Speed (m/s) | 1.2 | | 1.2 | | | 1.2 |
| Percent Blockage | 1 | | 1 | | | 0 |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | | | | 217 |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 404 | 262 | | 263 | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 404 | 262 | | 263 | | |
| 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 | 93 | | 98 | | |
| cM capacity (veh/h) | 588 | 773 | | 1302 | | |
| Direction, Lane # | WB 1 | NB 1 | SB 1 | | | |
| Volume Total | 60 | 253 | 116 | | | |
| Volume Left | 4 | 0 | 20 | | | |
| Volume Right | 56 | 8 | 0 | | | |
| cSH | 757 | 1700 | 1302 | | | |
| Volume to Capacity | 0.08 | 0.15 | 0.02 | | | |
| Queue Length 95th (m) | 2.1 | 0.0 | 0.4 | | | |
| Control Delay (s) | 10.2 | 0.0 | 1.5 | | | |
| Lane LOS | B | | A | | | |
| Approach Delay (s) | 10.2 | 0.0 | 1.5 | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.8 | | | |
| Intersection Capacity Utilization | | 25.7% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Unsignalized Intersection Capacity Analysis

2: Landsbridge St & Stella Crescent/Frustac Trail

19/04/2016



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 3 | 0 | 3 | 3 | 0 | 16 | 0 | 113 | 1 | 4 | 56 | 0 |
| Sign Control | | Stop | | | | Stop | | | Free | | | Free |
| Grade | | 0% | | | | 0% | | | 0% | | | 0% |
| Peak Hour Factor | 0.75 | 0.25 | 0.75 | 0.75 | 0.25 | 0.80 | 0.25 | 0.61 | 0.25 | 0.50 | 0.82 | 0.25 |
| Hourly flow rate (vph) | 4 | 0 | 4 | 4 | 0 | 20 | 0 | 185 | 4 | 8 | 68 | 0 |
| Pedestrians | | | | | | 4 | | | | | | 4 |
| Lane Width (m) | | | | | | 3.6 | | | | | | 3.6 |
| Walking Speed (m/s) | | | | | | 1.2 | | | | | | 1.2 |
| Percent Blockage | | | | | | 0 | | | | | | 0 |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 296 | 278 | 68 | 280 | 276 | 195 | 68 | | | | 193 | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 296 | 278 | 68 | 280 | 276 | 195 | 68 | | | | 193 | |
| 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 | 99 | 100 | 98 | 100 | | | | 99 | |
| cM capacity (veh/h) | 638 | 628 | 1001 | 667 | 630 | 846 | 1546 | | | | 1388 | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 8 | 24 | 189 | 76 | | | | | | | | |
| Volume Left | 4 | 4 | 0 | 8 | | | | | | | | |
| Volume Right | 4 | 20 | 4 | 0 | | | | | | | | |
| cSH | 780 | 809 | 1546 | 1388 | | | | | | | | |
| Volume to Capacity | 0.01 | 0.03 | 0.00 | 0.01 | | | | | | | | |
| Queue Length 95th (m) | 0.2 | 0.7 | 0.0 | 0.1 | | | | | | | | |
| Control Delay (s) | 9.7 | 9.6 | 0.0 | 0.8 | | | | | | | | |
| Lane LOS | A | A | | A | | | | | | | | |
| Approach Delay (s) | 9.7 | 9.6 | 0.0 | 0.8 | | | | | | | | |
| Approach LOS | A | A | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 1.2 | | | | | | | | | |
| Intersection Capacity Utilization | | 18.2% | | ICU Level of Service | | | | A | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

3: Landsbridge St & Queensgate Blvd

19/04/2016

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|------|------|---------------------------|------|------|------|------|------|
| Lane Configurations | ↑ | ↑↑ | | ↑ | ↑↑ | | ↑ | ↑ | | ↑ | ↑ | |
| Volume (vph) | 91 | 439 | 153 | 24 | 145 | 49 | 115 | 58 | 16 | 67 | 70 | 68 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 7.4 | 7.4 | | 7.4 | 7.4 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | 1.00 | 0.99 | | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 0.96 | | 1.00 | 0.96 | | 1.00 | 0.95 | | 1.00 | 0.94 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1786 | 3427 | | 1790 | 3426 | | 1789 | 1788 | | 1779 | 1763 | |
| Flt Permitted | 0.61 | 1.00 | | 0.27 | 1.00 | | 0.64 | 1.00 | | 0.69 | 1.00 | |
| Satd. Flow (perm) | 1138 | 3427 | | 508 | 3426 | | 1200 | 1788 | | 1287 | 1763 | |
| Peak-hour factor, PHF | 0.81 | 0.95 | 0.91 | 0.60 | 0.81 | 0.88 | 0.74 | 0.81 | 0.44 | 0.88 | 0.63 | 0.85 |
| Adj. Flow (vph) | 112 | 462 | 168 | 40 | 179 | 56 | 155 | 72 | 36 | 76 | 111 | 80 |
| RTOR Reduction (vph) | 0 | 52 | 0 | 0 | 42 | 0 | 0 | 16 | 0 | 0 | 25 | 0 |
| Lane Group Flow (vph) | 112 | 578 | 0 | 40 | 193 | 0 | 155 | 92 | 0 | 76 | 166 | 0 |
| Confl. Peds. (#/hr) | 10 | | 15 | 15 | | 10 | 15 | | 22 | 22 | | 15 |
| Heavy Vehicles (%) | 0% | 0% | 0% | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Turn Type | Perm | NA | | Perm | NA | | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 17.5 | 17.5 | | 17.5 | 17.5 | | 40.1 | 40.1 | | 40.1 | 40.1 | |
| Effective Green, g (s) | 17.5 | 17.5 | | 17.5 | 17.5 | | 40.1 | 40.1 | | 40.1 | 40.1 | |
| Actuated g/C Ratio | 0.25 | 0.25 | | 0.25 | 0.25 | | 0.56 | 0.56 | | 0.56 | 0.56 | |
| Clearance Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 7.4 | 7.4 | | 7.4 | 7.4 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 280 | 844 | | 125 | 844 | | 677 | 1009 | | 726 | 995 | |
| v/s Ratio Prot | | c0.17 | | | 0.06 | | | 0.05 | | | 0.09 | |
| v/s Ratio Perm | 0.10 | | | 0.08 | | | c0.13 | | | 0.06 | | |
| v/c Ratio | 0.40 | 0.68 | | 0.32 | 0.23 | | 0.23 | 0.09 | | 0.10 | 0.17 | |
| Uniform Delay, d1 | 22.4 | 24.3 | | 21.9 | 21.4 | | 7.7 | 7.1 | | 7.1 | 7.4 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.9 | 2.3 | | 1.5 | 0.1 | | 0.8 | 0.2 | | 0.3 | 0.4 | |
| Delay (s) | 23.3 | 26.6 | | 23.4 | 21.5 | | 8.5 | 7.3 | | 7.4 | 7.8 | |
| Level of Service | C | C | | C | C | | A | A | | A | A | |
| Approach Delay (s) | | 26.1 | | | 21.8 | | | 8.0 | | | 7.7 | |
| Approach LOS | | C | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | 19.1 | | | | | HCM 2000 Level of Service | | | B | | |
| HCM 2000 Volume to Capacity ratio | | 0.37 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 71.0 | | | | | Sum of lost time (s) | | | 13.4 | | |
| Intersection Capacity Utilization | | 77.4% | | | | | ICU Level of Service | | | D | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

1: Landsbridge St & Hanton Crescent

19/04/2016



| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 0 | 20 | 147 | 2 | 46 | 242 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.25 | 0.50 | 0.84 | 0.50 | 0.72 | 0.95 |
| Hourly flow rate (vph) | 0 | 40 | 175 | 4 | 64 | 255 |
| Pedestrians | 21 | | | | | 7 |
| Lane Width (m) | 3.6 | | | | | 3.6 |
| Walking Speed (m/s) | 1.2 | | | | | 1.2 |
| Percent Blockage | 2 | | | | | 1 |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | | | | 217 |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 581 | 205 | | 200 | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 581 | 205 | | 200 | | |
| tC, single (s) | 6.4 | 6.2 | | 4.1 | | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | 2.2 | | |
| p0 queue free % | 100 | 95 | | 95 | | |
| cM capacity (veh/h) | 449 | 821 | | 1360 | | |
| Direction, Lane # | WB 1 | NB 1 | SB 1 | | | |
| Volume Total | 40 | 179 | 319 | | | |
| Volume Left | 0 | 0 | 64 | | | |
| Volume Right | 40 | 4 | 0 | | | |
| cSH | 821 | 1700 | 1360 | | | |
| Volume to Capacity | 0.05 | 0.11 | 0.05 | | | |
| Queue Length 95th (m) | 1.2 | 0.0 | 1.2 | | | |
| Control Delay (s) | 9.6 | 0.0 | 1.9 | | | |
| Lane LOS | A | | A | | | |
| Approach Delay (s) | 9.6 | 0.0 | 1.9 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.8 | | | |
| Intersection Capacity Utilization | | 41.3% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Unsignalized Intersection Capacity Analysis

2: Landsbridge St & Stella Crescent/Frustac Trail

19/04/2016



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 1 | 1 | 1 | 2 | 1 | 12 | 5 | 98 | 2 | 19 | 133 | 5 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.25 | 0.25 | 0.25 | 0.50 | 0.25 | 0.75 | 0.63 | 0.88 | 0.50 | 0.59 | 0.95 | 0.31 |
| Hourly flow rate (vph) | 4 | 4 | 4 | 4 | 4 | 16 | 8 | 111 | 4 | 32 | 140 | 16 |
| Pedestrians | | | | | 13 | | | 4 | | | | |
| Lane Width (m) | | 3.6 | | | 3.6 | | | 3.6 | | | | |
| Walking Speed (m/s) | | 1.2 | | | 1.2 | | | 1.2 | | | | |
| 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 | 364 | 361 | 156 | 365 | 367 | 126 | 160 | | | 128 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 364 | 361 | 156 | 365 | 367 | 126 | 160 | | | 128 | | |
| 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 | 99 | 99 | 98 | 99 | | | 98 | | |
| cM capacity (veh/h) | 562 | 546 | 889 | 562 | 542 | 919 | 1427 | | | 1454 | | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 12 | 24 | 123 | 188 | | | | | | | | |
| Volume Left | 4 | 4 | 8 | 32 | | | | | | | | |
| Volume Right | 4 | 16 | 4 | 16 | | | | | | | | |
| cSH | 633 | 752 | 1427 | 1454 | | | | | | | | |
| Volume to Capacity | 0.02 | 0.03 | 0.01 | 0.02 | | | | | | | | |
| Queue Length 95th (m) | 0.5 | 0.8 | 0.1 | 0.5 | | | | | | | | |
| Control Delay (s) | 10.8 | 9.9 | 0.5 | 1.4 | | | | | | | | |
| Lane LOS | B | A | A | A | | | | | | | | |
| Approach Delay (s) | 10.8 | 9.9 | 0.5 | 1.4 | | | | | | | | |
| Approach LOS | B | A | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 2.0 | | | | | | | | | |
| Intersection Capacity Utilization | | 25.7% | | ICU Level of Service | | | | A | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

Appendix D - Future (2021) Background Traffic Level of Service Calculations

HCM Signalized Intersection Capacity Analysis

3: Landsbridge St & Queensgate Blvd

19/04/2016

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|-------|------|-------|------|----------------------|------|------|------|
| Lane Configurations | ↑ | ↑↑ | | ↑ | ↑↑ | | ↑ | ↑ | | ↑ | ↑ | |
| Volume (vph) | 18 | 89 | 41 | 9 | 366 | 16 | 179 | 57 | 36 | 15 | 22 | 72 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 7.4 | 7.4 | | 7.4 | 7.4 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 0.99 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.96 | | 1.00 | 0.99 | | 1.00 | 0.95 | | 1.00 | 0.89 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1626 | 3322 | | 1624 | 3513 | | 1752 | 1745 | | 1591 | 1558 | |
| Flt Permitted | 0.38 | 1.00 | | 0.64 | 1.00 | | 0.68 | 1.00 | | 0.64 | 1.00 | |
| Satd. Flow (perm) | 645 | 3322 | | 1088 | 3513 | | 1251 | 1745 | | 1080 | 1558 | |
| Peak-hour factor, PHF | 0.64 | 0.68 | 0.79 | 0.45 | 0.79 | 0.57 | 0.84 | 0.50 | 0.56 | 0.63 | 0.71 | 0.78 |
| Adj. Flow (vph) | 28 | 131 | 52 | 20 | 463 | 28 | 213 | 114 | 64 | 24 | 31 | 92 |
| RTOR Reduction (vph) | 0 | 41 | 0 | 0 | 6 | 0 | 0 | 19 | 0 | 0 | 38 | 0 |
| Lane Group Flow (vph) | 28 | 142 | 0 | 20 | 485 | 0 | 213 | 159 | 0 | 24 | 85 | 0 |
| Confl. Peds. (#/hr) | | | 1 | 1 | | | | | 7 | 7 | | |
| Heavy Vehicles (%) | 11% | 2% | 7% | 11% | 2% | 0% | 3% | 2% | 3% | 13% | 15% | 6% |
| Turn Type | Perm | NA | | Perm | NA | | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 14.6 | 14.6 | | 14.6 | 14.6 | | 40.1 | 40.1 | | 40.1 | 40.1 | |
| Effective Green, g (s) | 14.6 | 14.6 | | 14.6 | 14.6 | | 40.1 | 40.1 | | 40.1 | 40.1 | |
| Actuated g/C Ratio | 0.21 | 0.21 | | 0.21 | 0.21 | | 0.59 | 0.59 | | 0.59 | 0.59 | |
| Clearance Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 7.4 | 7.4 | | 7.4 | 7.4 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 138 | 712 | | 233 | 753 | | 736 | 1027 | | 635 | 917 | |
| v/s Ratio Prot | | 0.04 | | | c0.14 | | | 0.09 | | | 0.05 | |
| v/s Ratio Perm | 0.04 | | | 0.02 | | | c0.17 | | | 0.02 | | |
| v/c Ratio | 0.20 | 0.20 | | 0.09 | 0.64 | | 0.29 | 0.15 | | 0.04 | 0.09 | |
| Uniform Delay, d1 | 22.0 | 22.0 | | 21.4 | 24.4 | | 6.9 | 6.3 | | 5.9 | 6.1 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.7 | 0.1 | | 0.2 | 1.9 | | 1.0 | 0.3 | | 0.1 | 0.2 | |
| Delay (s) | 22.7 | 22.1 | | 21.6 | 26.3 | | 7.9 | 6.7 | | 6.0 | 6.3 | |
| Level of Service | C | C | | C | C | | A | A | | A | A | |
| Approach Delay (s) | | 22.2 | | | 26.1 | | | 7.4 | | | 6.2 | |
| Approach LOS | | C | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | 17.3 | | | | | | | | B | | |
| HCM 2000 Volume to Capacity ratio | | 0.38 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 68.1 | | | | | | | Sum of lost time (s) | | | |
| Intersection Capacity Utilization | | 49.6% | | | | | | | 13.4 | | | |
| Analysis Period (min) | | 15 | | | | | | | | A | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis

1: Landsbridge St & Hanton Crescent

19/04/2016



| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 1 | 43 | 205 | 3 | 13 | 77 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.25 | 0.77 | 0.76 | 0.38 | 0.65 | 0.73 |
| Hourly flow rate (vph) | 4 | 56 | 270 | 8 | 20 | 105 |
| Pedestrians | 10 | | 9 | | 3 | |
| Lane Width (m) | 3.6 | | 3.6 | | 3.6 | |
| Walking Speed (m/s) | 1.2 | | 1.2 | | 1.2 | |
| Percent Blockage | 1 | | 1 | | 0 | |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage veh) | | | | | | |
| Upstream signal (m) | | | | | | 217 |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 438 | 287 | | 288 | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 438 | 287 | | 288 | | |
| 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 | 93 | | 98 | | |
| cM capacity (veh/h) | 562 | 749 | | 1275 | | |
| Direction, Lane # | WB 1 | NB 1 | SB 1 | | | |
| Volume Total | 60 | 278 | 125 | | | |
| Volume Left | 4 | 0 | 20 | | | |
| Volume Right | 56 | 8 | 0 | | | |
| cSH | 733 | 1700 | 1275 | | | |
| Volume to Capacity | 0.08 | 0.16 | 0.02 | | | |
| Queue Length 95th (m) | 2.1 | 0.0 | 0.4 | | | |
| Control Delay (s) | 10.4 | 0.0 | 1.4 | | | |
| Lane LOS | B | | A | | | |
| Approach Delay (s) | 10.4 | 0.0 | 1.4 | | | |
| Approach LOS | B | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.7 | | | |
| Intersection Capacity Utilization | | 26.0% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Unsignalized Intersection Capacity Analysis

2: Landsbridge St & Stella Crescent/Frustac Trail

19/04/2016



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 3 | 0 | 3 | 3 | 0 | 16 | 0 | 124 | 1 | 4 | 62 | 0 |
| Sign Control | | Stop | | | | Stop | | | Free | | | Free |
| Grade | | 0% | | | | 0% | | | 0% | | | 0% |
| Peak Hour Factor | 0.75 | 0.25 | 0.75 | 0.75 | 0.25 | 0.80 | 0.25 | 0.61 | 0.25 | 0.50 | 0.82 | 0.25 |
| Hourly flow rate (vph) | 4 | 0 | 4 | 4 | 0 | 20 | 0 | 203 | 4 | 8 | 76 | 0 |
| Pedestrians | | | | | | 4 | | | | | | 4 |
| Lane Width (m) | | | | | | 3.6 | | | | | | 3.6 |
| Walking Speed (m/s) | | | | | | 1.2 | | | | | | 1.2 |
| Percent Blockage | | | | | | 0 | | | | | | 0 |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 321 | 303 | 76 | 305 | 301 | 213 | 76 | | | | 211 | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 321 | 303 | 76 | 305 | 301 | 213 | 76 | | | | 211 | |
| 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 | 99 | 100 | 98 | 100 | | | | 99 | |
| cM capacity (veh/h) | 614 | 608 | 991 | 642 | 609 | 826 | 1536 | | | | 1367 | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 8 | 24 | 207 | 84 | | | | | | | | |
| Volume Left | 4 | 4 | 0 | 8 | | | | | | | | |
| Volume Right | 4 | 20 | 4 | 0 | | | | | | | | |
| cSH | 758 | 789 | 1536 | 1367 | | | | | | | | |
| Volume to Capacity | 0.01 | 0.03 | 0.00 | 0.01 | | | | | | | | |
| Queue Length 95th (m) | 0.3 | 0.8 | 0.0 | 0.1 | | | | | | | | |
| Control Delay (s) | 9.8 | 9.7 | 0.0 | 0.8 | | | | | | | | |
| Lane LOS | A | A | | A | | | | | | | | |
| Approach Delay (s) | 9.8 | 9.7 | 0.0 | 0.8 | | | | | | | | |
| Approach LOS | A | A | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 1.2 | | | | | | | | | |
| Intersection Capacity Utilization | | 18.7% | | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

3: Landsbridge St & Queensgate Blvd

19/04/2016



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|-------|------|------|------|------|------|
| Lane Configurations | ↑ ↗ | ↑ ↘ | | ↑ ↗ | ↑ ↘ | | ↑ ↗ | ↑ ↘ | | ↑ ↗ | ↑ ↘ | |
| Volume (vph) | 91 | 483 | 153 | 24 | 160 | 49 | 115 | 64 | 16 | 67 | 77 | 68 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 7.4 | 7.4 | | 7.4 | 7.4 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | 1.00 | 0.99 | | 1.00 | 0.99 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | | 0.99 | 1.00 | |
| Frt | 1.00 | 0.96 | | 1.00 | 0.97 | | 1.00 | 0.95 | | 1.00 | 0.94 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1786 | 3439 | | 1791 | 3437 | | 1789 | 1795 | | 1779 | 1771 | |
| Flt Permitted | 0.59 | 1.00 | | 0.24 | 1.00 | | 0.63 | 1.00 | | 0.68 | 1.00 | |
| Satd. Flow (perm) | 1118 | 3439 | | 458 | 3437 | | 1188 | 1795 | | 1279 | 1771 | |
| Peak-hour factor, PHF | 0.81 | 0.95 | 0.91 | 0.60 | 0.81 | 0.88 | 0.74 | 0.81 | 0.44 | 0.88 | 0.63 | 0.85 |
| Adj. Flow (vph) | 112 | 508 | 168 | 40 | 198 | 56 | 155 | 79 | 36 | 76 | 122 | 80 |
| RTOR Reduction (vph) | 0 | 44 | 0 | 0 | 36 | 0 | 0 | 16 | 0 | 0 | 24 | 0 |
| Lane Group Flow (vph) | 112 | 632 | 0 | 40 | 218 | 0 | 155 | 99 | 0 | 76 | 178 | 0 |
| Confl. Peds. (#/hr) | 10 | | 15 | 15 | | 10 | 15 | | 22 | 22 | | 15 |
| Heavy Vehicles (%) | 0% | 0% | 0% | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Turn Type | Perm | NA | | Perm | NA | | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 18.7 | 18.7 | | 18.7 | 18.7 | | 40.1 | 40.1 | | 40.1 | 40.1 | |
| Effective Green, g (s) | 18.7 | 18.7 | | 18.7 | 18.7 | | 40.1 | 40.1 | | 40.1 | 40.1 | |
| Actuated g/C Ratio | 0.26 | 0.26 | | 0.26 | 0.26 | | 0.56 | 0.56 | | 0.56 | 0.56 | |
| Clearance Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 7.4 | 7.4 | | 7.4 | 7.4 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 289 | 890 | | 118 | 890 | | 659 | 996 | | 710 | 983 | |
| v/s Ratio Prot | | c0.18 | | | 0.06 | | | 0.06 | | | 0.10 | |
| v/s Ratio Perm | 0.10 | | | 0.09 | | | c0.13 | | | 0.06 | | |
| v/c Ratio | 0.39 | 0.71 | | 0.34 | 0.25 | | 0.24 | 0.10 | | 0.11 | 0.18 | |
| Uniform Delay, d1 | 22.0 | 24.3 | | 21.7 | 21.2 | | 8.2 | 7.6 | | 7.6 | 7.9 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.9 | 2.6 | | 1.7 | 0.1 | | 0.8 | 0.2 | | 0.3 | 0.4 | |
| Delay (s) | 22.9 | 26.9 | | 23.4 | 21.3 | | 9.0 | 7.8 | | 7.9 | 8.3 | |
| Level of Service | C | C | | C | C | | A | A | | A | A | |
| Approach Delay (s) | | 26.3 | | | 21.6 | | | 8.5 | | | 8.2 | |
| Approach LOS | | C | | | C | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay | 19.4 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.39 | | |
| Actuated Cycle Length (s) | 72.2 | Sum of lost time (s) | 13.4 |
| Intersection Capacity Utilization | 78.2% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Unsignalized Intersection Capacity Analysis

1: Landsbridge St & Hanton Crescent

19/04/2016



| Movement | WBL | WBR | NBT | NBR | SBL | SBT |
|-----------------------------------|------|-------|------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Volume (veh/h) | 0 | 20 | 162 | 2 | 46 | 266 |
| Sign Control | Stop | | Free | | | Free |
| Grade | 0% | | 0% | | | 0% |
| Peak Hour Factor | 0.25 | 0.50 | 0.84 | 0.50 | 0.72 | 0.95 |
| Hourly flow rate (vph) | 0 | 40 | 193 | 4 | 64 | 280 |
| Pedestrians | 21 | | | | | 7 |
| Lane Width (m) | 3.6 | | | | | 3.6 |
| Walking Speed (m/s) | 1.2 | | | | | 1.2 |
| Percent Blockage | 2 | | | | | 1 |
| Right turn flare (veh) | | | | | | |
| Median type | | | None | | | None |
| Median storage veh | | | | | | |
| Upstream signal (m) | | | | | | 217 |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 624 | 223 | | | 218 | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 624 | 223 | | | 218 | |
| tC, single (s) | 6.4 | 6.2 | | | 4.1 | |
| tC, 2 stage (s) | | | | | | |
| tF (s) | 3.5 | 3.3 | | | 2.2 | |
| p0 queue free % | 100 | 95 | | | 95 | |
| cM capacity (veh/h) | 424 | 803 | | | 1340 | |
| Direction, Lane # | WB 1 | NB 1 | SB 1 | | | |
| Volume Total | 40 | 197 | 344 | | | |
| Volume Left | 0 | 0 | 64 | | | |
| Volume Right | 40 | 4 | 0 | | | |
| cSH | 803 | 1700 | 1340 | | | |
| Volume to Capacity | 0.05 | 0.12 | 0.05 | | | |
| Queue Length 95th (m) | 1.3 | 0.0 | 1.2 | | | |
| Control Delay (s) | 9.7 | 0.0 | 1.8 | | | |
| Lane LOS | A | | A | | | |
| Approach Delay (s) | 9.7 | 0.0 | 1.8 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.7 | | | |
| Intersection Capacity Utilization | | 43.0% | | ICU Level of Service | | A |
| Analysis Period (min) | | 15 | | | | |

HCM Unsignalized Intersection Capacity Analysis

2: Landsbridge St & Stella Crescent/Frustac Trail

19/04/2016



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 1 | 1 | 1 | 2 | 1 | 12 | 5 | 108 | 2 | 19 | 146 | 5 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.25 | 0.25 | 0.25 | 0.50 | 0.25 | 0.75 | 0.63 | 0.88 | 0.50 | 0.59 | 0.95 | 0.31 |
| Hourly flow rate (vph) | 4 | 4 | 4 | 4 | 4 | 16 | 8 | 123 | 4 | 32 | 154 | 16 |
| Pedestrians | | | | | 13 | | | | 4 | | | |
| Lane Width (m) | | 3.6 | | | 3.6 | | | 3.6 | | | | |
| Walking Speed (m/s) | | 1.2 | | | 1.2 | | | 1.2 | | | | |
| 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 | 389 | 386 | 170 | 390 | 392 | 138 | 174 | | | 140 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 389 | 386 | 170 | 390 | 392 | 138 | 174 | | | 140 | | |
| 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 | 99 | 99 | 98 | 99 | | | 98 | | |
| cM capacity (veh/h) | 541 | 529 | 874 | 541 | 524 | 906 | 1410 | | | 1440 | | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 12 | 24 | 135 | 202 | | | | | | | | |
| Volume Left | 4 | 4 | 8 | 32 | | | | | | | | |
| Volume Right | 4 | 16 | 4 | 16 | | | | | | | | |
| cSH | 614 | 734 | 1410 | 1440 | | | | | | | | |
| Volume to Capacity | 0.02 | 0.03 | 0.01 | 0.02 | | | | | | | | |
| Queue Length 95th (m) | 0.5 | 0.8 | 0.1 | 0.5 | | | | | | | | |
| Control Delay (s) | 11.0 | 10.1 | 0.5 | 1.4 | | | | | | | | |
| Lane LOS | B | B | A | A | | | | | | | | |
| Approach Delay (s) | 11.0 | 10.1 | 0.5 | 1.4 | | | | | | | | |
| Approach LOS | B | B | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 1.9 | | | | | | | | | |
| Intersection Capacity Utilization | | 26.6% | | ICU Level of Service | | | | A | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

Appendix E - Future (2021) Total Traffic Level of Service Calculations

HCM Signalized Intersection Capacity Analysis

3: Landsbridge St & Queensgate Blvd

19/04/2016

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|-------|------|-------|------|----------------------|------|------|------|
| Lane Configurations | ↑ | ↑↑ | | ↑ | ↑↑ | | ↑ | ↑ | | ↑ | ↑ | |
| Volume (vph) | 18 | 89 | 55 | 10 | 366 | 16 | 219 | 60 | 39 | 15 | 23 | 72 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 7.4 | 7.4 | | 7.4 | 7.4 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 0.99 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.95 | | 1.00 | 0.99 | | 1.00 | 0.94 | | 1.00 | 0.89 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1626 | 3273 | | 1624 | 3513 | | 1752 | 1742 | | 1591 | 1559 | |
| Flt Permitted | 0.38 | 1.00 | | 0.63 | 1.00 | | 0.68 | 1.00 | | 0.64 | 1.00 | |
| Satd. Flow (perm) | 645 | 3273 | | 1070 | 3513 | | 1250 | 1742 | | 1068 | 1559 | |
| Peak-hour factor, PHF | 0.64 | 0.68 | 0.79 | 0.45 | 0.79 | 0.57 | 0.84 | 0.50 | 0.56 | 0.63 | 0.71 | 0.78 |
| Adj. Flow (vph) | 28 | 131 | 70 | 22 | 463 | 28 | 261 | 120 | 70 | 24 | 32 | 92 |
| RTOR Reduction (vph) | 0 | 55 | 0 | 0 | 6 | 0 | 0 | 19 | 0 | 0 | 38 | 0 |
| Lane Group Flow (vph) | 28 | 146 | 0 | 22 | 485 | 0 | 261 | 171 | 0 | 24 | 86 | 0 |
| Confl. Peds. (#/hr) | | | 1 | 1 | | | | | 7 | 7 | | |
| Heavy Vehicles (%) | 11% | 2% | 7% | 11% | 2% | 0% | 3% | 2% | 3% | 13% | 15% | 6% |
| Turn Type | Perm | NA | | Perm | NA | | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | | 8 | | | 2 | | | 6 | | |
| Actuated Green, G (s) | 14.6 | 14.6 | | 14.6 | 14.6 | | 40.1 | 40.1 | | 40.1 | 40.1 | |
| Effective Green, g (s) | 14.6 | 14.6 | | 14.6 | 14.6 | | 40.1 | 40.1 | | 40.1 | 40.1 | |
| Actuated g/C Ratio | 0.21 | 0.21 | | 0.21 | 0.21 | | 0.59 | 0.59 | | 0.59 | 0.59 | |
| Clearance Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 7.4 | 7.4 | | 7.4 | 7.4 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 138 | 701 | | 229 | 753 | | 736 | 1025 | | 628 | 918 | |
| v/s Ratio Prot | | 0.04 | | | c0.14 | | | 0.10 | | | 0.06 | |
| v/s Ratio Perm | 0.04 | | | 0.02 | | | c0.21 | | | 0.02 | | |
| v/c Ratio | 0.20 | 0.21 | | 0.10 | 0.64 | | 0.35 | 0.17 | | 0.04 | 0.09 | |
| Uniform Delay, d1 | 22.0 | 22.0 | | 21.5 | 24.4 | | 7.3 | 6.4 | | 5.9 | 6.1 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.7 | 0.1 | | 0.2 | 1.9 | | 1.3 | 0.4 | | 0.1 | 0.2 | |
| Delay (s) | 22.7 | 22.1 | | 21.6 | 26.3 | | 8.6 | 6.7 | | 6.0 | 6.3 | |
| Level of Service | C | C | | C | C | | A | A | | A | A | |
| Approach Delay (s) | | 22.2 | | | 26.1 | | | 7.8 | | | 6.2 | |
| Approach LOS | | C | | | C | | | A | | | A | |
| Intersection Summary | | | | | | | | | | | | |
| HCM 2000 Control Delay | | 17.1 | | | | | | | | B | | |
| HCM 2000 Volume to Capacity ratio | | 0.43 | | | | | | | | | | |
| Actuated Cycle Length (s) | | 68.1 | | | | | | | Sum of lost time (s) | 13.4 | | |
| Intersection Capacity Utilization | | 49.6% | | | | | | | ICU Level of Service | A | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |
| c Critical Lane Group | | | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis
1: Landsbridge St & Site Access 1/Hanton Crescent

19/04/2016



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 23 | 0 | 6 | 1 | 0 | 43 | 2 | 228 | 3 | 13 | 85 | 8 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 25 | 0 | 7 | 1 | 0 | 47 | 2 | 248 | 3 | 14 | 92 | 9 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | 214 | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 426 | 380 | 97 | 385 | 383 | 249 | 101 | | | 251 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 426 | 380 | 97 | 385 | 383 | 249 | 101 | | | 251 | | |
| 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 % | 95 | 100 | 99 | 100 | 100 | 94 | 100 | | | 99 | | |
| cM capacity (veh/h) | 502 | 545 | 960 | 564 | 543 | 789 | 1491 | | | 1314 | | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 32 | 48 | 253 | 115 | | | | | | | | |
| Volume Left | 25 | 1 | 2 | 14 | | | | | | | | |
| Volume Right | 7 | 47 | 3 | 9 | | | | | | | | |
| cSH | 557 | 782 | 1491 | 1314 | | | | | | | | |
| Volume to Capacity | 0.06 | 0.06 | 0.00 | 0.01 | | | | | | | | |
| Queue Length 95th (m) | 1.4 | 1.6 | 0.0 | 0.3 | | | | | | | | |
| Control Delay (s) | 11.8 | 9.9 | 0.1 | 1.0 | | | | | | | | |
| Lane LOS | B | A | A | A | | | | | | | | |
| Approach Delay (s) | 11.8 | 9.9 | 0.1 | 1.0 | | | | | | | | |
| Approach LOS | B | A | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 2.2 | | | | | | | | | |
| Intersection Capacity Utilization | | 28.9% | | ICU Level of Service | | | | A | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis
 2: Landsbridge St & Stella Crescent(Site Access 2)/Frustac Trail

19/04/2016

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 26 | 0 | 9 | 3 | 0 | 16 | 2 | 126 | 1 | 4 | 68 | 8 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.75 | 0.25 | 0.75 | 0.75 | 0.25 | 0.80 | 0.25 | 0.61 | 0.25 | 0.50 | 0.82 | 0.25 |
| Hourly flow rate (vph) | 35 | 0 | 12 | 4 | 0 | 20 | 8 | 207 | 4 | 8 | 83 | 32 |
| Pedestrians | | | | | 4 | | | | | | 4 | |
| Lane Width (m) | | | | | 3.6 | | | | | | 3.6 | |
| Walking Speed (m/s) | | | | | 1.2 | | | | | | 1.2 | |
| Percent Blockage | | | | | 0 | | | | | | 0 | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 363 | 345 | 99 | 355 | 359 | 217 | 115 | | | 215 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 363 | 345 | 99 | 355 | 359 | 217 | 115 | | | 215 | | |
| 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 % | 94 | 100 | 99 | 99 | 100 | 98 | 99 | | | 99 | | |
| cM capacity (veh/h) | 573 | 572 | 962 | 587 | 562 | 823 | 1487 | | | 1363 | | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 47 | 24 | 219 | 123 | | | | | | | | |
| Volume Left | 35 | 4 | 8 | 8 | | | | | | | | |
| Volume Right | 12 | 20 | 4 | 32 | | | | | | | | |
| cSH | 640 | 771 | 1487 | 1363 | | | | | | | | |
| Volume to Capacity | 0.07 | 0.03 | 0.01 | 0.01 | | | | | | | | |
| Queue Length 95th (m) | 1.9 | 0.8 | 0.1 | 0.1 | | | | | | | | |
| Control Delay (s) | 11.1 | 9.8 | 0.3 | 0.5 | | | | | | | | |
| Lane LOS | B | A | A | A | | | | | | | | |
| Approach Delay (s) | 11.1 | 9.8 | 0.3 | 0.5 | | | | | | | | |
| Approach LOS | B | A | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 2.2 | | | | | | | | | |
| Intersection Capacity Utilization | | 21.6% | | ICU Level of Service | | | | A | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

3: Landsbridge St & Queensgate Blvd

19/04/2016



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|-------|------|------|------|------|------|------|
| Lane Configurations | ↑ | ↑↑ | | ↑ | ↑↑ | | ↑ | ↑ | | ↑ | ↑ | |
| Volume (vph) | 91 | 483 | 191 | 27 | 160 | 49 | 141 | 66 | 18 | 67 | 79 | 68 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 7.4 | 7.4 | | 7.4 | 7.4 | |
| Lane Util. Factor | 1.00 | 0.95 | | 1.00 | 0.95 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 0.99 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Flpb, ped/bikes | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 0.96 | | 1.00 | 0.96 | | 1.00 | 0.97 | | 1.00 | 0.93 | |
| Flt Protected | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1626 | 3344 | | 1626 | 3401 | | 1752 | 1798 | | 1590 | 1598 | |
| Flt Permitted | 0.57 | 1.00 | | 0.15 | 1.00 | | 0.63 | 1.00 | | 0.65 | 1.00 | |
| Satd. Flow (perm) | 984 | 3344 | | 257 | 3401 | | 1168 | 1798 | | 1093 | 1598 | |
| Peak-hour factor, PHF | 0.64 | 0.68 | 0.79 | 0.45 | 0.79 | 0.57 | 0.84 | 0.50 | 0.56 | 0.63 | 0.71 | 0.78 |
| Adj. Flow (vph) | 142 | 710 | 242 | 60 | 203 | 86 | 168 | 132 | 32 | 106 | 111 | 87 |
| RTOR Reduction (vph) | 0 | 42 | 0 | 0 | 57 | 0 | 0 | 10 | 0 | 0 | 32 | 0 |
| Lane Group Flow (vph) | 142 | 910 | 0 | 60 | 232 | 0 | 168 | 154 | 0 | 106 | 166 | 0 |
| Confl. Peds. (#/hr) | | | 1 | 1 | | | | | 7 | 7 | | |
| Heavy Vehicles (%) | 11% | 2% | 7% | 11% | 2% | 0% | 3% | 2% | 3% | 13% | 15% | 6% |
| Turn Type | Perm | NA | | Perm | NA | | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 8 | | | 2 | | | 6 | | | |
| Actuated Green, G (s) | 26.6 | 26.6 | | 26.6 | 26.6 | | 40.1 | 40.1 | | 40.1 | 40.1 | |
| Effective Green, g (s) | 26.6 | 26.6 | | 26.6 | 26.6 | | 40.1 | 40.1 | | 40.1 | 40.1 | |
| Actuated g/C Ratio | 0.33 | 0.33 | | 0.33 | 0.33 | | 0.50 | 0.50 | | 0.50 | 0.50 | |
| Clearance Time (s) | 6.0 | 6.0 | | 6.0 | 6.0 | | 7.4 | 7.4 | | 7.4 | 7.4 | |
| Vehicle Extension (s) | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 326 | 1110 | | 85 | 1129 | | 584 | 900 | | 547 | 799 | |
| v/s Ratio Prot | | c0.27 | | | 0.07 | | | 0.09 | | | 0.10 | |
| v/s Ratio Perm | 0.14 | | 0.23 | | | c0.14 | | | 0.10 | | | |
| v/c Ratio | 0.44 | 0.82 | | 0.71 | 0.21 | | 0.29 | 0.17 | | 0.19 | 0.21 | |
| Uniform Delay, d1 | 20.9 | 24.5 | | 23.3 | 19.2 | | 11.7 | 10.9 | | 11.1 | 11.1 | |
| Progression Factor | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.9 | 4.8 | | 23.3 | 0.1 | | 1.2 | 0.4 | | 0.8 | 0.6 | |
| Delay (s) | 21.8 | 29.4 | | 46.7 | 19.3 | | 12.9 | 11.3 | | 11.8 | 11.7 | |
| Level of Service | C | C | | D | B | | B | B | | B | B | |
| Approach Delay (s) | | 28.4 | | | 24.0 | | | 12.1 | | | 11.8 | |
| Approach LOS | | C | | | C | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay | 22.6 | HCM 2000 Level of Service | C |
| HCM 2000 Volume to Capacity ratio | 0.50 | | |
| Actuated Cycle Length (s) | 80.1 | Sum of lost time (s) | 13.4 |
| Intersection Capacity Utilization | 78.5% | ICU Level of Service | D |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Unsignalized Intersection Capacity Analysis
1: Landsbridge St & Site Access 1/Hanton Crescent

19/04/2016



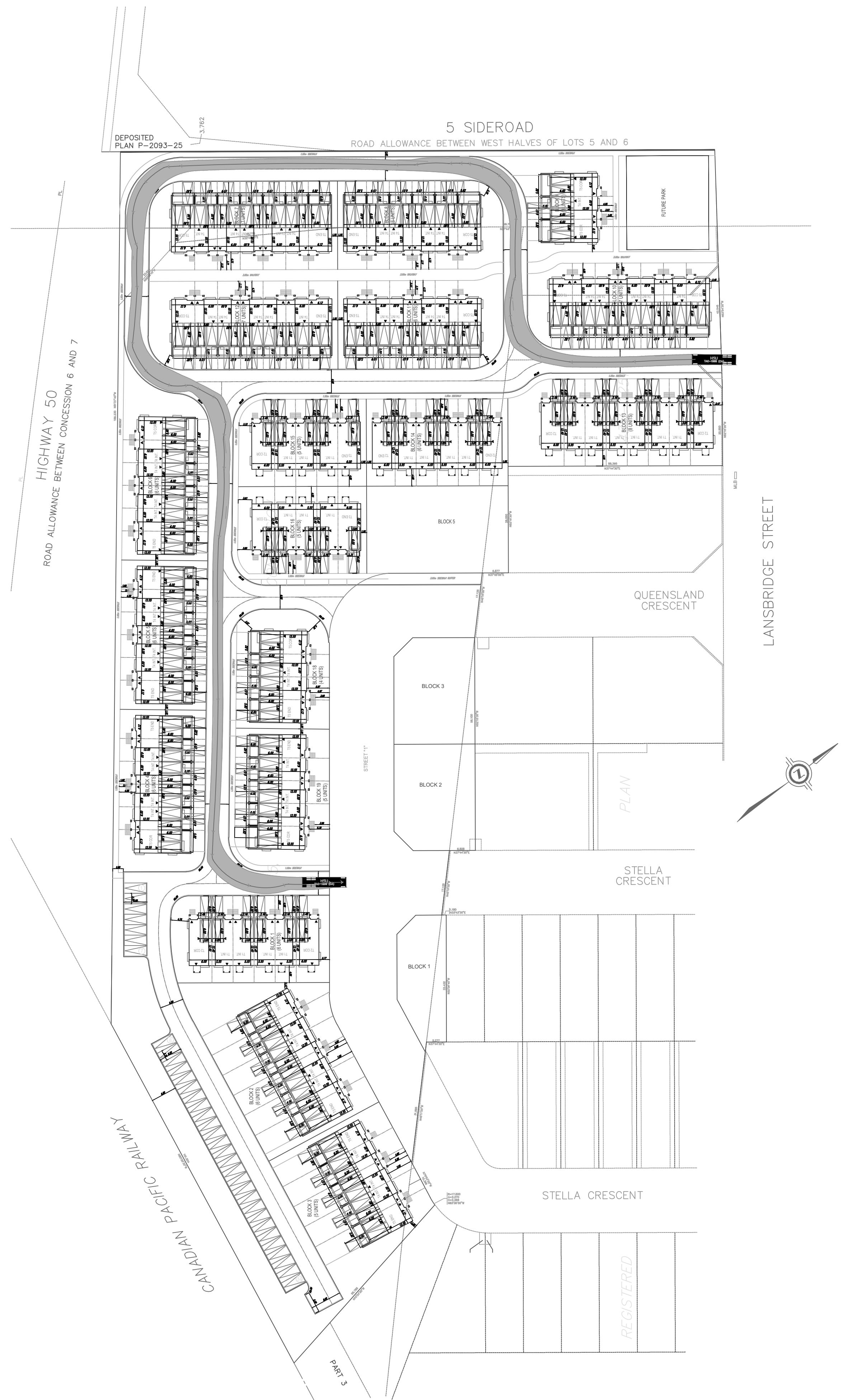
| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 15 | 0 | 4 | 0 | 0 | 20 | 5 | 177 | 2 | 46 | 287 | 22 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 | 0.92 |
| Hourly flow rate (vph) | 16 | 0 | 4 | 0 | 0 | 22 | 5 | 192 | 2 | 50 | 312 | 24 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | 214 | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 650 | 629 | 324 | 633 | 640 | 193 | 336 | | | 195 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 650 | 629 | 324 | 633 | 640 | 193 | 336 | | | 195 | | |
| 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 % | 95 | 100 | 99 | 100 | 100 | 97 | 100 | | | 96 | | |
| cM capacity (veh/h) | 361 | 383 | 717 | 378 | 377 | 848 | 1223 | | | 1379 | | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 21 | 22 | 200 | 386 | | | | | | | | |
| Volume Left | 16 | 0 | 5 | 50 | | | | | | | | |
| Volume Right | 4 | 22 | 2 | 24 | | | | | | | | |
| cSH | 403 | 848 | 1223 | 1379 | | | | | | | | |
| Volume to Capacity | 0.05 | 0.03 | 0.00 | 0.04 | | | | | | | | |
| Queue Length 95th (m) | 1.3 | 0.6 | 0.1 | 0.9 | | | | | | | | |
| Control Delay (s) | 14.4 | 9.4 | 0.3 | 1.3 | | | | | | | | |
| Lane LOS | B | A | A | A | | | | | | | | |
| Approach Delay (s) | 14.4 | 9.4 | 0.3 | 1.3 | | | | | | | | |
| Approach LOS | B | A | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 1.7 | | | | | | | | | |
| Intersection Capacity Utilization | | 46.4% | | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

HCM Unsignalized Intersection Capacity Analysis
 2: Landsbridge St & Stella Crescent (Site Access 2)/Frustac Trail

19/04/2016

| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|------|-------|------|----------------------|------|------|------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Volume (veh/h) | 16 | 1 | 5 | 2 | 1 | 12 | 10 | 113 | 2 | 19 | 150 | 26 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.75 | 0.25 | 0.75 | 0.75 | 0.25 | 0.80 | 0.25 | 0.61 | 0.25 | 0.50 | 0.82 | 0.25 |
| Hourly flow rate (vph) | 21 | 4 | 7 | 3 | 4 | 15 | 40 | 185 | 8 | 38 | 183 | 104 |
| Pedestrians | | | | | 4 | | | | | | 4 | |
| Lane Width (m) | | | | | 3.6 | | | | | | 3.6 | |
| Walking Speed (m/s) | | | | | 1.2 | | | | | | 1.2 | |
| Percent Blockage | | | | | 0 | | | | | | 0 | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh) | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 601 | 588 | 235 | 593 | 636 | 197 | 287 | | | 197 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 601 | 588 | 235 | 593 | 636 | 197 | 287 | | | 197 | | |
| 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 % | 94 | 99 | 99 | 99 | 99 | 98 | 97 | | | 97 | | |
| cM capacity (veh/h) | 384 | 398 | 809 | 393 | 374 | 843 | 1287 | | | 1383 | | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 32 | 22 | 233 | 325 | | | | | | | | |
| Volume Left | 21 | 3 | 40 | 38 | | | | | | | | |
| Volume Right | 7 | 15 | 8 | 104 | | | | | | | | |
| cSH | 434 | 614 | 1287 | 1383 | | | | | | | | |
| Volume to Capacity | 0.07 | 0.04 | 0.03 | 0.03 | | | | | | | | |
| Queue Length 95th (m) | 1.9 | 0.9 | 0.8 | 0.7 | | | | | | | | |
| Control Delay (s) | 14.0 | 11.1 | 1.6 | 1.1 | | | | | | | | |
| Lane LOS | B | B | A | A | | | | | | | | |
| Approach Delay (s) | 14.0 | 11.1 | 1.6 | 1.1 | | | | | | | | |
| Approach LOS | B | B | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 2.3 | | | | | | | | | |
| Intersection Capacity Utilization | | 25.9% | | ICU Level of Service | | | | A | | | | |
| Analysis Period (min) | | 15 | | | | | | | | | | |

Appendix F - Typical Garbage Truck AutoTURN Analysis



BENCHMARK

REVISIONS

STAMP

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PROJECT NAME:

TOWNHOUSE DEVELOPMENT
Villalago Residence
TOWN OF CALEDON

DRAWING TITLE:

Typical Garbage Truck
AutoTURN Analysis

| | |
|------------------|---------------------------|
| DESIGN BY: A.S. | DATE: May 21, 2016 |
| CHECKED BY: R.P. | PROJECT NO. |
| DRAWN BY: A.S. | NT-16-031 |
| SCALE: | DRAWING NO. Appendix F |