

Transportation Impact Study

PROPOSED MIXED USE RESIDENTIAL DEVELOPMENT

Chateaux
CALEDON, ONTARIO

January 23, 2018
Project No: NT-17-216

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CONSULTING ENGINEERS

NextEng Consulting Group Inc.

January 24, 2018

Mr. John Spina

Chateaux of Caledon Corporation
55 Blue Willow Drive
Woodbridge, ON L4L 9E8

**Re: Transportation Impact Study
Chateaux Mixed Use Residential Development
Our Project No. NT-17-216**

Nextrans Consulting Engineers (A Division of NextEng Consulting Group Inc.) is pleased to present the enclosed Transportation Study for the above noted site in support of a proposed Zoning By-law Amendment and Site Plan Applications.

The subject site is currently vacant. Based on the preliminary site plan prepared by Architecture Unfolded, dated November 2017, the development proposal is to develop the existing subject lands into 85 apartment units and 899.88 m² of retail gross floor area (GFA) with surface and underground parking provided. Access to the site is envisioned via a full movement driveway onto Atchison Drive aligned with Boyces Creek Crescent.

The study concludes that the development proposal can adequately be accommodated by the existing transportation network with manageable traffic impact to the adjacent public roadways. We trust the enclosed sufficiently addresses your needs. Should you have any questions, please do not hesitate to contact the undersigned.

Yours truly,

Nextrans Consulting Engineers

A Division of NextEng Consulting Group Inc.

Prepared by:



Zara Georgis, EIT
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Reviewed by:



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Principal

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1.0 INTRODUCTION

Nextrans Consulting Engineers was retained by Chateaux of Caledon Corporation (the 'Client') to undertake a Traffic Impact Study for a Site Plan Application in support of a proposed 5-storey mixed-use residential and commercial development located on Atchison Drive, in the Town of Caledon. The location of the proposed development is illustrated in **Figure 1-1**.

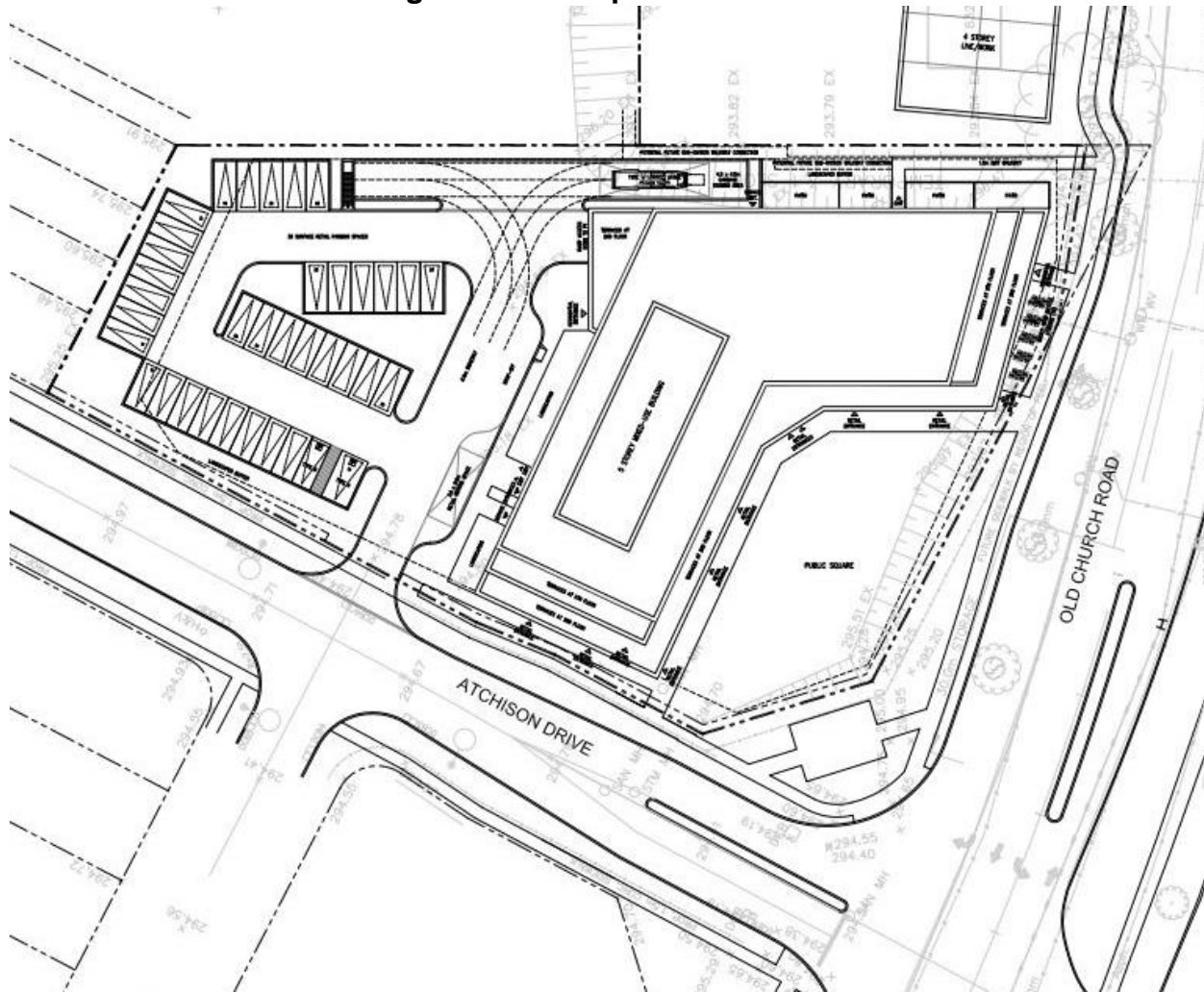
Figure 1-1 – Site Location



The subject site is currently vacant. Based on the preliminary site plan prepared by Architecture Unfolded, dated November 2017, the development proposal is to develop the existing subject lands into 85 apartment units and 899.88 m² of retail gross floor area (GFA) with surface and underground parking provided. Access to the site is envisioned via a full movement driveway onto Atchison Drive aligned with Boyces Creek Crescent. The preliminary site plan is provided in **Figure 1-2**; **Appendix A** also provides a larger scale version of the proposed site plan.

Given the residential based nature of the development proposal, the analysis will include the weekday morning and afternoon peak periods for assessment purposes.

Figure 1-2 – Proposed Site Plan



2.0 EXISTING TRAFFIC CONDITIONS

2.1. Existing Road Network

The existing subject lands are generally located north of Old Church Road and east of Atchison Drive, in the Town of Caledon. The road network is described as follows:

Old Church Road: is classified as a collector road under the jurisdiction of Peel Region. It has a four-lane cross section including exclusive eastbound left and westbound right turn lanes onto Atchison Drive. Sidewalks are provided on both sides of the roadway. Old Church Road maintains a posted speed limit of 50 km/h in the vicinity of the subject site.

Atchison Drive: is classified as a local road under the jurisdiction of Caledon. It has a two-lane cross section with sidewalks provided on both sides and maintains an unposted speed limit of 15 km/h. Atchison Drive has an exclusive left turn lane on approach to Old Church Road.

Old Church Road and Atchison Drive meet at a newly installed signalized intersection. The south leg to this intersection provides access to the Town of Caledon municipal offices.

2.2. Existing Active Transportation Network

Sidewalks

There are currently sidewalks available on both sides of Old Church Street and Atchison Drive.

Bicycle Lanes

There are no dedicated bicycle lanes within the vicinity of the subject site.

2.3. Active Transportation Mode and Assessment

Existing Conditions

The review of the current amenities in the vicinity of the proposed development indicates there are significant retail, food and service establishments in the vicinity of the proposed development, many of which can be easily reached by non-auto options. Amenities within a 1-km radius (approximately a 10-minute walk) include Caledon Public Library, Caledon Town Hall, Canada Post, CIBC, Subway, Pizza Express, Caledon Community Complex, etc.

2.4. Existing Traffic Volumes

Existing traffic volumes at the study area intersections were undertaken by Spectrum Traffic on behalf of NexTrans Consulting Engineers on Wednesday, November 15, 2017 during the morning (7:00 a.m. to 10:00 a.m.) and afternoon (4:00 p.m. to 7:00 p.m.) peak periods. Detailed existing traffic data are provided in **Appendix B**.

2.5. Existing Traffic Assessment

The existing peak hour traffic volumes are illustrated in **Figure 2-2**, and were analyzed using Synchro 9 software. The methodology of the software follows the procedures described and outlined in the Highway Capacity Manual, HCM 2000, published by the Transportation Research Board. The detailed results are provided in **Appendix C** and summarized in **Table 2.1**.

Figure 2-1 – Existing Traffic Volumes

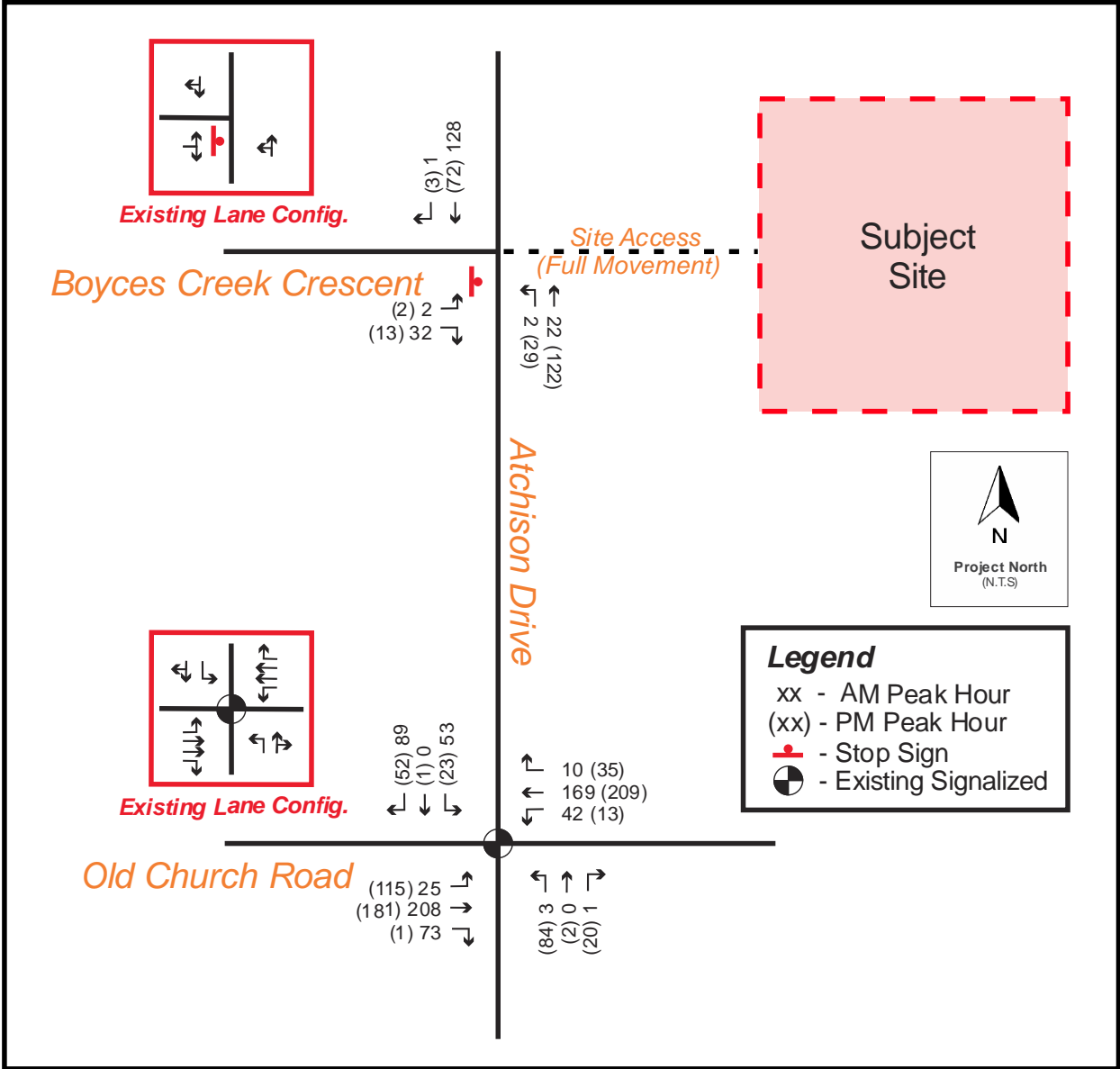


Table 2.1 – Level of Service – Existing Traffic Assessments

| Intersection | Movement | Weekday AM Peak Hour | | | Weekday PM Peak Hour | | |
|--|----------------|----------------------|-------------|----------------------------|----------------------|-------------|----------------------------|
| | | LOS (v/c) | Delay (s) | 95 th Queue (m) | LOS (v/c) | Delay (s) | 95 th Queue (m) |
| Town Hall Access / Atchison Drive & Old Church Road (Signalized) | OVERALL | B (0.18) | 15.8 | | B (0.35) | 14.8 | |
| | EBL | B (0.12) | 17.4 | 7.0 | B (0.29) | 15.4 | 22.0 |
| | EBT | B (0.40) | 18.5 | 16.2 | B (0.14) | 13.2 | 14.3 |
| | EBR | B (0.08) | 17.0 | 3.2 | B (0.00) | 12.3 | 0.0 |
| | WBL | B (0.39) | 19.3 | 8.5 | B (0.04) | 12.6 | 3.7 |
| | WBT | B (0.31) | 18.0 | 13.7 | B (0.17) | 13.4 | 15.9 |
| | WBR | B (0.02) | 16.8 | 0.0 | B (0.04) | 12.6 | 0.5 |
| | NBL | A (0.01) | 6.5 | 0.9 | B (0.42) | 19.0 | 13.8 |
| | NBTR | A (0.00) | 6.4 | 0.0 | B (0.03) | 14.2 | 1.7 |
| | SBL | A (0.09) | 7.0 | 7.8 | B (0.06) | 14.5 | 6.1 |
| SBTR | A (0.08) | 6.8 | 0.0 | B (0.05) | 14.4 | 0.0 | |
| Atchison Drive & Boyces Creek Crescent (Minor Street Stop Control) | EBLR | A (0.05) | 9.2 | 1.3 | A (0.03) | 9.3 | 0.8 |
| | NBTL | A (0.00) | 1.0 | 0.1 | A (0.02) | 1.6 | 0.6 |

Under existing conditions, the study intersections are currently operating at excellent levels of service during both peak periods with no critical movements. During existing traffic conditions, the Town Hall Access / Atchison Drive & Old Church Road intersection is operating at overall LOS 'B' or better during the peak hour periods.

3.0 FUTURE BACKGROUND CONDITIONS

A 5-year (2022) horizon period was selected and assumed in this analysis, which generally coincides with the full build out of the proposed development. For a conservative analysis, a standard 2.5% growth rate per annum is assumed for the north-south through traffic on Atchison Drive and for the east-west through traffic on Old Church Road.

The future (2022) 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**.

Figure 3-1 – Future (2022) Background Traffic Volumes

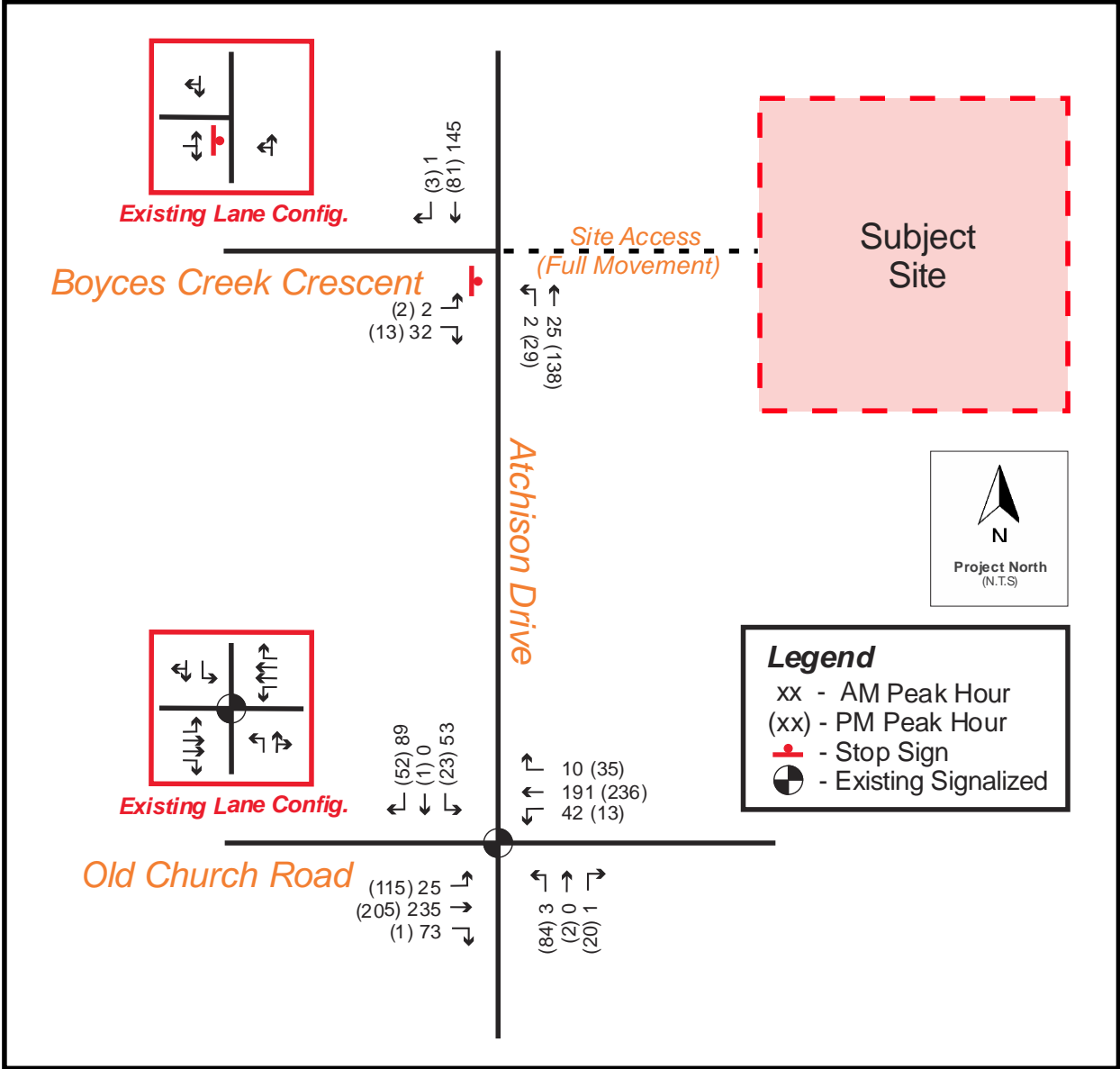


Table 3.1: Future (2022) Background Traffic Levels of Service

| Intersection | Movement | Weekday AM Peak Hour | | | Weekday PM Peak Hour | | |
|--|----------------|----------------------|-------------|----------------------------|----------------------|-------------|----------------------------|
| | | LOS (v/c) | Delay (s) | 95 th Queue (m) | LOS (v/c) | Delay (s) | 95 th Queue (m) |
| Town Hall Access / Atchison Drive & Old Church Road (Signalized) | OVERALL | B (0.19) | 16.0 | | B (0.35) | 14.9 | |
| | EBL | B (0.12) | 17.2 | 7.0 | B (0.29) | 15.6 | 22.1 |
| | EBT | B (0.44) | 18.6 | 18.1 | B (0.16) | 13.3 | 15.9 |
| | EBR | B (0.08) | 16.9 | 3.2 | B (0.00) | 12.3 | 0.0 |
| | WBL | B (0.40) | 19.2 | 8.5 | B (0.04) | 12.6 | 3.7 |
| | WBT | B (0.34) | 18.1 | 15.2 | B (0.20) | 13.6 | 17.7 |
| | WBR | B (0.02) | 16.6 | 0.0 | B (0.04) | 12.6 | 0.5 |
| | NBL | A (0.01) | 6.6 | 0.9 | B (0.42) | 19.0 | 13.8 |
| | NBTR | A (0.00) | 6.6 | 0.0 | B (0.03) | 14.2 | 1.7 |
| | SBL | A (0.09) | 7.1 | 7.9 | B (0.06) | 14.5 | 6.1 |
| SBTR | A (0.08) | 7.0 | 0.0 | B (0.05) | 14.4 | 0.0 | |
| Atchison Drive & Boyces Creek Crescent (Minor Street Stop Control) | EBLR | A (0.05) | 9.4 | 1.3 | A (0.03) | 9.4 | 0.8 |
| | NBTL | A (0.00) | 0.9 | 0.1 | A (0.02) | 1.5 | 0.6 |

As summarized in **Table 3.1**, it is shown that during future background traffic conditions the subject study area intersections continue to operate at excellent level of services with no changes to expected operations. During future background traffic conditions, the Town Hall Access / Atchison Drive & Old Church Road intersection is operating at overall LOS 'B' or better during the peak hour periods.

4.0 SITE TRAFFIC

The development proposal is to develop the existing subject lands into 85 condominium apartment units and 899.88 m² of retail GFA. Trip rates and site generated trips were derived from the information contained in the *Trip Generation Manual, 9th Edition* published by the Institute of Transportation Engineers (ITE) for "Apartment" (LUC 220) and "Shopping Center" (LUC 820). The trip generation summary is shown in **Table 4.1**.

Table 4.1 – Site Traffic Trip Generation (Based on ITE)

| ITE Land Use | Parameter | Morning Peak Hour | | | Afternoon Peak Hour | | |
|---|------------------|-------------------|-----------|-----------|---------------------|-----------|------------|
| | | In | Out | Total | In | Out | Total |
| Apartment (85 units) | New Trips | 9 | 36 | 45 | 42 | 22 | 64 |
| | Trip Rate | 0.11 | 0.42 | 0.53 | 0.49 | 0.26 | 0.75 |
| Shopping Center (899.88 m ²) | New Trips | 24 | 14 | 38 | 60 | 65 | 125 |
| | Trip Rate | 2.48 | 1.44 | 3.92 | 6.19 | 6.71 | 12.90 |
| Total | New Trips | 33 | 50 | 83 | 102 | 87 | 189 |

As shown in **Table 4.1**, and according to the ITE rates, the proposed development is anticipated to generate 83 two-way auto trips (33 inbound and 50 outbound) during the AM peak hours and 189 two-way auto trips (102 inbound and 87 outbound) during the PM peak hours.

However, the commercial trip generation rates prove to be extremely high and unreasonable for the proposed end users particularly during the PM Peak Hour. In this instance, it is more reasonable to undertake a first principles assessment based on the proposed parking supply. The development proposes 22 parking spaces for the retail use at the subject site. Assuming a 30-minute turnover for each space and a 50/50 in/out split, the proposed commercial use is anticipated to generate 88 two-way auto trips (44 inbound and 44 outbound) during the PM peak hour. The revised trip generation summary is shown in **Table 4.2**.

Table 4.2 – Site Traffic Trip Generation (Based on ITE & First Principles)

| ITE Land Use | Parameter | Morning Peak Hour | | | Afternoon Peak Hour | | |
|---|------------------|-------------------|-----------|-----------|---------------------|-----------|------------|
| | | In | Out | Total | In | Out | Total |
| Apartment (85 units) | New Trips | 9 | 36 | 45 | 42 | 22 | 64 |
| | Trip Rate | 0.11 | 0.42 | 0.53 | 0.49 | 0.26 | 0.75 |
| Shopping Center (899.88 m ²) | New Trips | 24 | 14 | 38 | 44 | 44 | 88 |
| | Trip Rate | 2.48 | 1.44 | 3.92 | 4.54 | 4.54 | 9.08 |
| Total | New Trips | 33 | 50 | 83 | 86 | 66 | 152 |

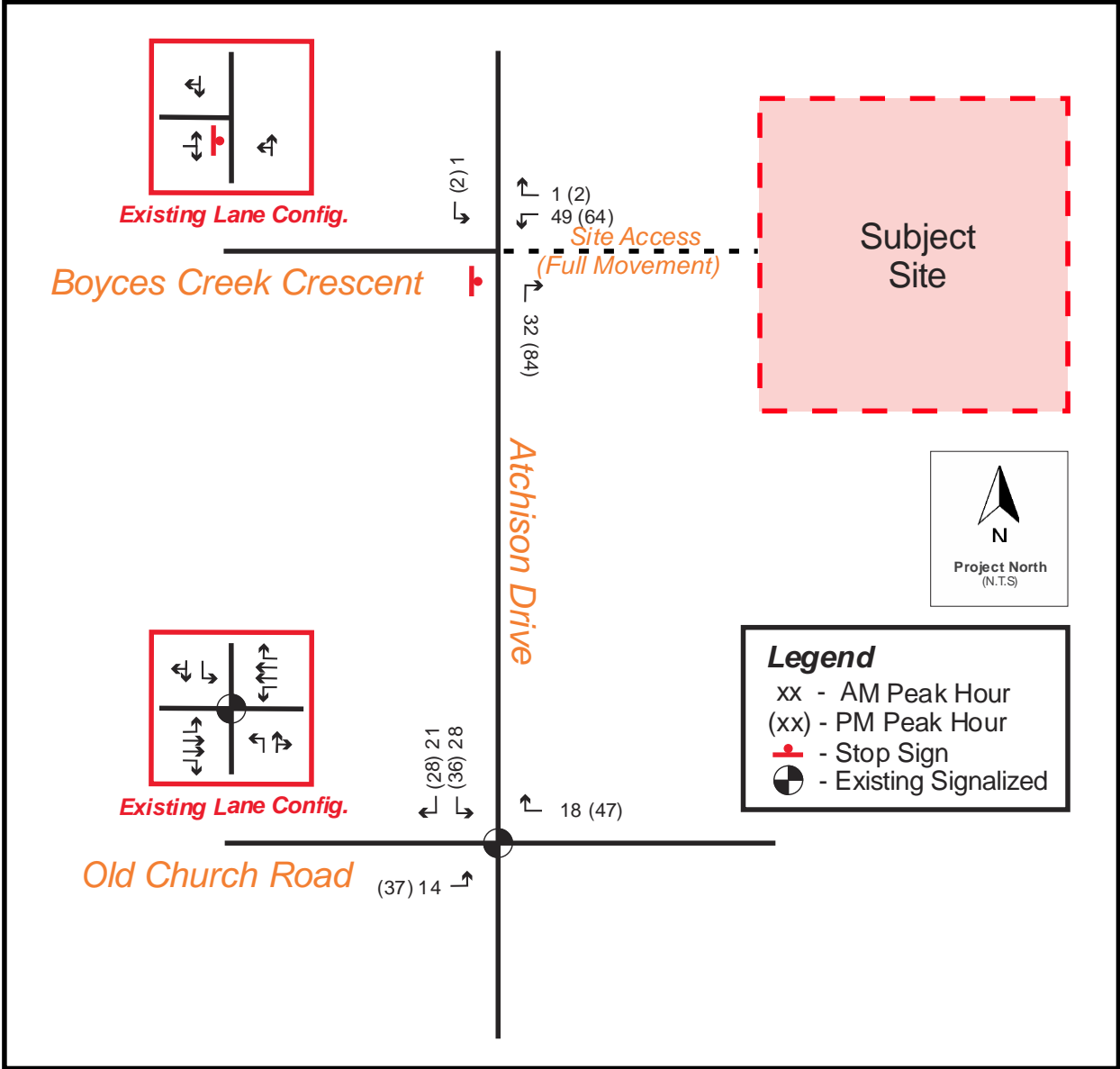
As shown in **Table 4.2**, according to ITE rates and first principles, the proposed development is anticipated to generate 83 two-way auto trips (33 inbound and 50 outbound) during the AM peak hours and 152 two-way auto trips (86 inbound and 66 outbound) during the PM peak hours.

The assumptions for the trip distribution rates are based on the information extracted from the 2011 Transportation Tomorrow Survey (TTS) and existing traffic patterns and routes that drivers would likely take to access the subject site and engineering judgement based on ease of site access. As a result, site trip distribution is summarized for the inbound and outbound site traffic movements during the morning and afternoon peak hours in **Table 4.2** with the trip assignment illustrated in **Figure 4-1**.

Table 4.3 – Site Traffic Trip Distribution

| Direction | Via | Inbound | Outbound |
|--------------|-----------------|-------------|-------------|
| North | Atchison Drive | 2% | 2% |
| East | Old Church Road | 55% | 55% |
| West | Old Church Road | 43% | 43% |
| Total | | 100% | 100% |

Figure 4-1 – Site Generated Traffic Assignments



5.0 FUTURE TOTAL TRAFFIC CONDITIONS

The forecasted 2022 future total traffic volumes (future background volumes plus site generated traffic volumes) are illustrated in **Figure 5-1**, and were analyzed using Synchro 9 software with stopped controlled at the proposed site access. The detailed calculations are provided in **Appendix E** and summarized in **Table 5.1**.

Figure 5-1 – Future (2022) Total Traffic Volumes

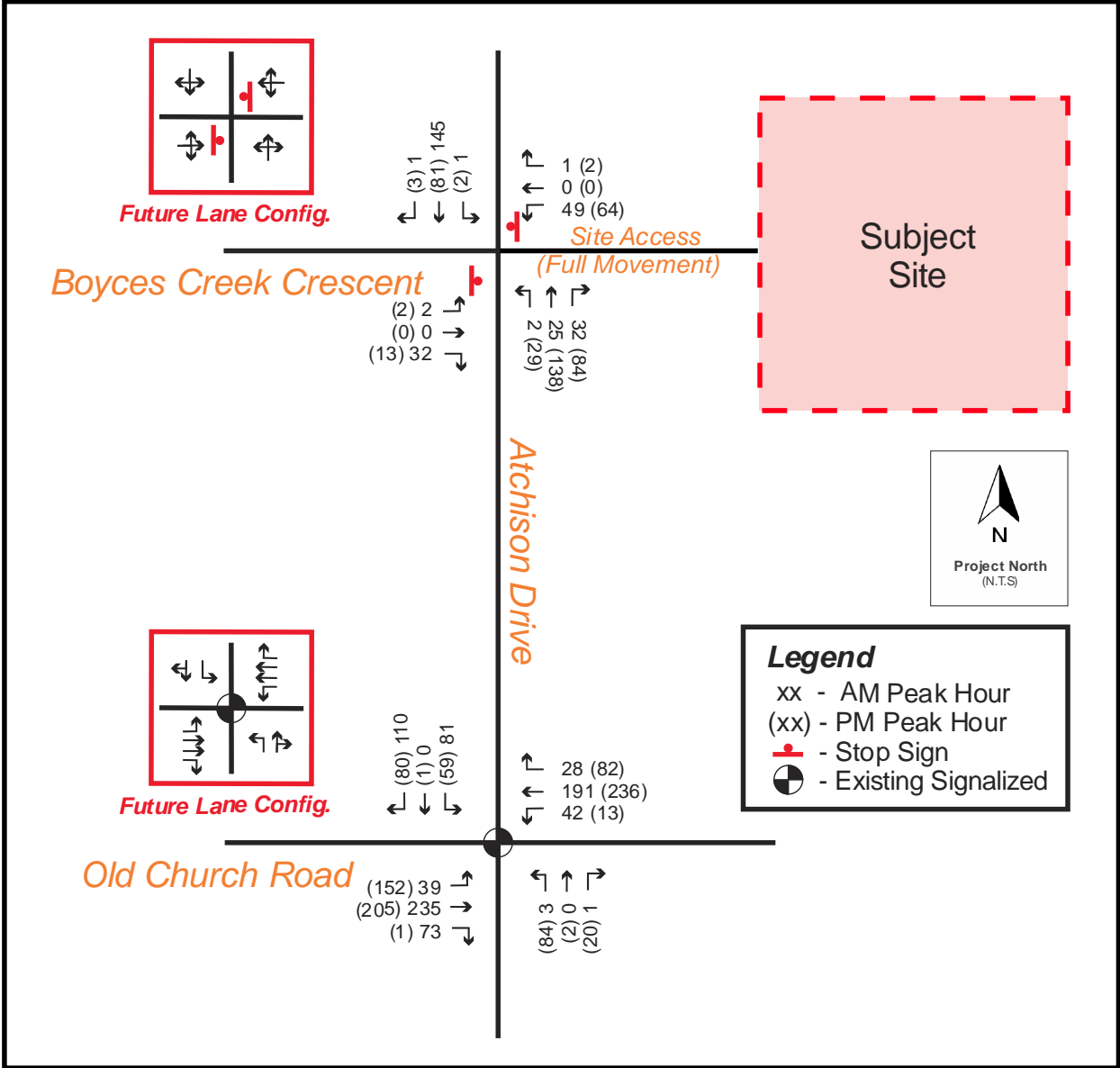


Table 5.1 – Level of Service – Future Total Traffic Assessments

| Intersection | Movement | Weekday AM Peak Hour | | | Weekday PM Peak Hour | | |
|--|----------------|----------------------|-------------|----------------------------|----------------------|-------------|----------------------------|
| | | LOS (v/c) | Delay (s) | 95 th Queue (m) | LOS (v/c) | Delay (s) | 95 th Queue (m) |
| Town Hall Access / Atchison Drive & Old Church Road (Signalized) | OVERALL | B (0.23) | 15.5 | | B (0.41) | 15.1 | |
| | EBL | B (0.19) | 17.5 | 9.8 | B (0.39) | 17.1 | 29.2 |
| | EBT | B (0.43) | 18.4 | 18.1 | B (0.16) | 13.3 | 15.9 |
| | EBR | B (0.08) | 16.8 | 3.1 | B (0.00) | 12.3 | 0.0 |
| | WBL | B (0.39) | 19.0 | 8.5 | B (0.04) | 12.6 | 3.7 |
| | WBT | B (0.33) | 17.9 | 15.2 | B (0.20) | 13.6 | 17.7 |
| | WBR | B (0.04) | 16.6 | 0.0 | B (0.09) | 13.0 | 0.9 |
| | NBL | A (0.01) | 6.8 | 0.9 | B (0.43) | 19.4 | 13.9 |
| | NBTR | A (0.00) | 6.7 | 0.0 | B (0.03) | 14.2 | 1.7 |
| | SBL | A (0.15) | 7.6 | 11.4 | B (0.17) | 15.6 | 12.2 |
| | SBTR | A (0.09) | 7.3 | 0.0 | B (0.07) | 14.6 | 0.0 |
| Atchison Drive & Boyces Creek Crescent (Minor Street Stop Control) | EBLTR | A (0.06) | 9.4 | 1.3 | A (0.03) | 9.6 | 0.8 |
| | WBLTR | B (0.08) | 11.0 | 2.1 | B (0.13) | 12.4 | 3.3 |
| | NBLTR | A (0.00) | 0.4 | 0.1 | A (0.02) | 1.1 | 0.6 |
| | SBLTR | A (0.00) | 0.0 | 0.0 | A (0.00) | 0.2 | 0.0 |

Under future total traffic conditions, the study intersection and proposed accesses are expected to continue operating with excellent level of service during both peak periods.

6.0 PARKING ASSESSMENT

Based on Town of Caledon Zoning By-law 2006-50 (Revised March 2016) Section 5 – Parking, Loading and Delivery, a minimum of 194 parking spaces will be required for the proposed development. The preliminary site plan provides for a total of 173 parking spaces, resulting in a technical parking deficiency of 21 parking spaces. The parking requirement for the proposed development is detailed in **Table 6.1**.

Table 6.1 – Vehicle Parking Requirements (Zoning By-law 2006-50)

| Use | Units / GFA | Rate | Parking Requirement | Parking Provided | Difference |
|--------------------|-----------------------|---|---------------------|------------------|------------|
| Apartment Building | 85 units | 1.5 spaces per dwelling unit | 128 | 137 | +9 |
| Apartment Visitor | 85 units | 0.25 spaces per unit for visitor | 21 | 36 | -30 |
| Retail Store | 899.88 m ² | 1 space per 20 m ² of net floor area | 45 | | |
| Total | | | 194 | 173 | -21 |

The Town of Caledon current By-law requires a parking standard rate of 1 space per 20 m² of net floor area for retail store. In our opinion, this would significantly oversupply the anticipated parking demand for the subject property as the retail use is generally an ancillary use based on the small floor area proposed that would generally support smaller retail end users. The retail requirement of 1 space per 20 m² is a balance between the more intense commercial uses (Restaurant – 1 space per 15 m²) and less impactful uses (Office – 1 space per 30 m²).

In order to identify a more reasonable parking standard to serve the site, Nextrans undertook a literature review of various in-house parking studies for similar developments across the Greater Toronto Area.

The data review included a review of the following mixed-use sites:

- 9500 & 9506 Markham Road, November 2017
- 60 South Town Centre Blvd & 50 Clegg Road, November 2017

Table 6.2 summarizes the proxy sites surveyed as part of the studies in the literature review. Proxy results are provided in **Appendix F**.

Table 6.2 – Proxy Sites

| Site | Land Use | Survey Date | Peak Parking Demand |
|---|---|---------------------------------------|---|
| 9500 & 9506 Markham Road | Residential: 434 Units Commercial: 1,338.42 m ² | November 18, 2017 & November 21, 2017 | Tenant: 0.88 spaces / unit Visitor: 0.12 spaces / unit Commercial: 2.53 spaces / 100 m ² |
| 60 South Town Centre Blvd & 50 Clegg Road | Residential: 532 Units Commercial: 890 m ² | November 22, 2017 & November 25, 2017 | Tenant: 0.93 spaces / unit Visitor: 0.10 spaces / unit Commercial: 2.13 spaces / 100 m ² |

Based on the proxy results, a parking rate of 2.5 spaces per 100 m² is appropriate for the proposed commercial component. On this basis, the proposed commercial development requires 22 spaces for the retail use. Based on above, we recommend that the 36 excess parking spaces be signed from 8:00 PM – 8:00 AM as visitor parking purposes and from 8:00 AM – 8:00 PM be signed as retail parking purposes. The parking requirement is detailed below in **Table 6.3**.

Table 6.3 – Vehicle Parking Requirements

| Use | Units / GFA | Rate | Parking Requirement | Parking Provided | Difference |
|---|-----------------------|-----------------------------------|---------------------|------------------|--|
| Apartment Building | 85 units | 1.5 spaces per dwelling unit | 128 | 137 | +9 |
| Apartment Visitor & Retail Store to be Shared | | | | | |
| Apartment Visitor | 85 units | 0.25 spaces per unit for visitor | 21 | 36 | Parking Provided minus the maximum of Apartment Visitor & Retail Store = +14 |
| Retail Store | 899.88 m ² | 2.5 spaces per 100 m ² | 22 | | |
| Total | | | 194 | 173 | +23 |

7.0 SITE PLAN REVIEW

It is recommended that the proposed site access design be consistent with the Town of Caledon's Site Plan Submission Guidelines.

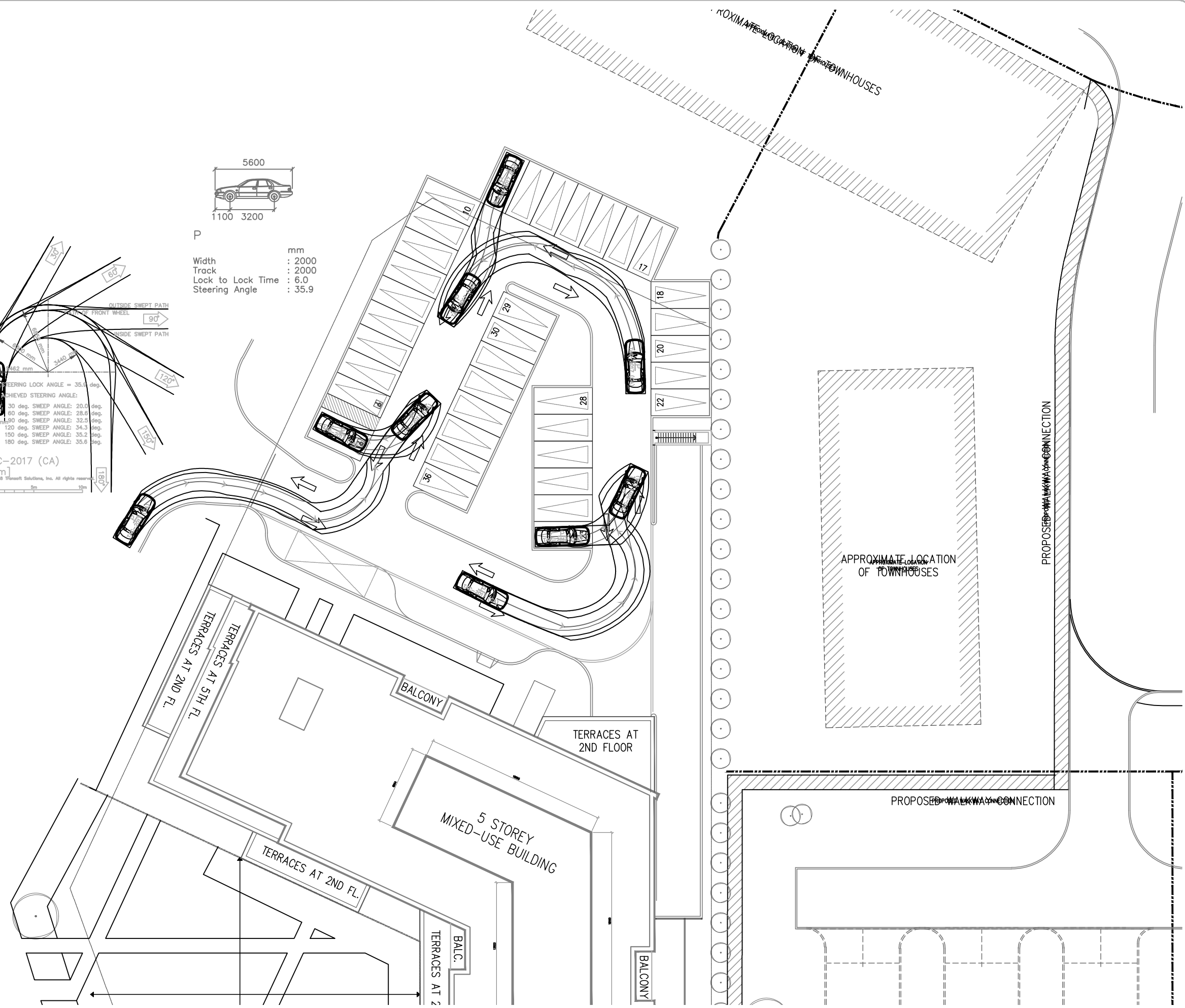
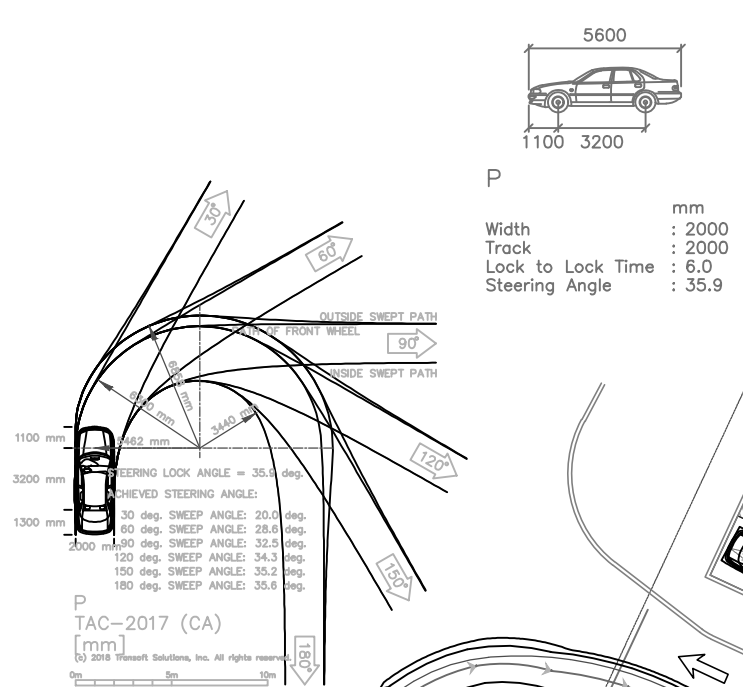
AutoTURN software was used (P TAC – 1999 & HSU TAC – 1999) to generate a vehicular turning template to confirm and demonstrate the accessibility of the proposed parking spaces. As illustrated in **Figure 7-1** and **Figure 7-2**, the AutoTURN analysis demonstrates that a 5.6 m long Passenger Car (P TAC – 1999) and an 11.5 m long Garbage Truck (HSU TAC – 1999) can effectively maneuver through the development area.

8.0 CONCLUSION

The findings and conclusions of our analysis are as follows:

- The development proposal is to develop the existing subject lands into 85 apartment units and 899.88 m² of retail gross floor area (GFA) with surface and underground parking provided.
- The proposed development is anticipated to generate 83 two-way auto trips (33 inbound and 50 outbound) during the AM peak hours and 152 two-way auto trips (86 inbound and 66 outbound) during the PM peak hours.
- The intersection capacity analysis results (based on the methodology and procedures outlined in the Highway Capacity Manual, HCM 2000, published by the Transportation Research Board) indicate that the study intersections and existing accesses are expected to operate with excellent levels of service.

- The preliminary site plan provides for a total of 194 parking spaces, resulting in a technical deficiency of 21 parking spaces. Based on the in-house parking data for mixed-use sites, a parking rate of 2.5 spaces per 100 m² is appropriate for the proposed commercial uses. On this basis, the proposed development requires 22 spaces for the retail use resulting in a surplus of 23 parking spaces with a shared parking provision in place. It is recommended that the 36 shared parking spaces be signed from 8:00 PM – 8:00 AM for visitor parking and from 8:00 AM – 8:00 PM be signed retail parking.
- The proposed site plan is accessible from a circulation perspective.
- No external road improvements are necessary to support the development application.



BENCHMARK

REVISIONS

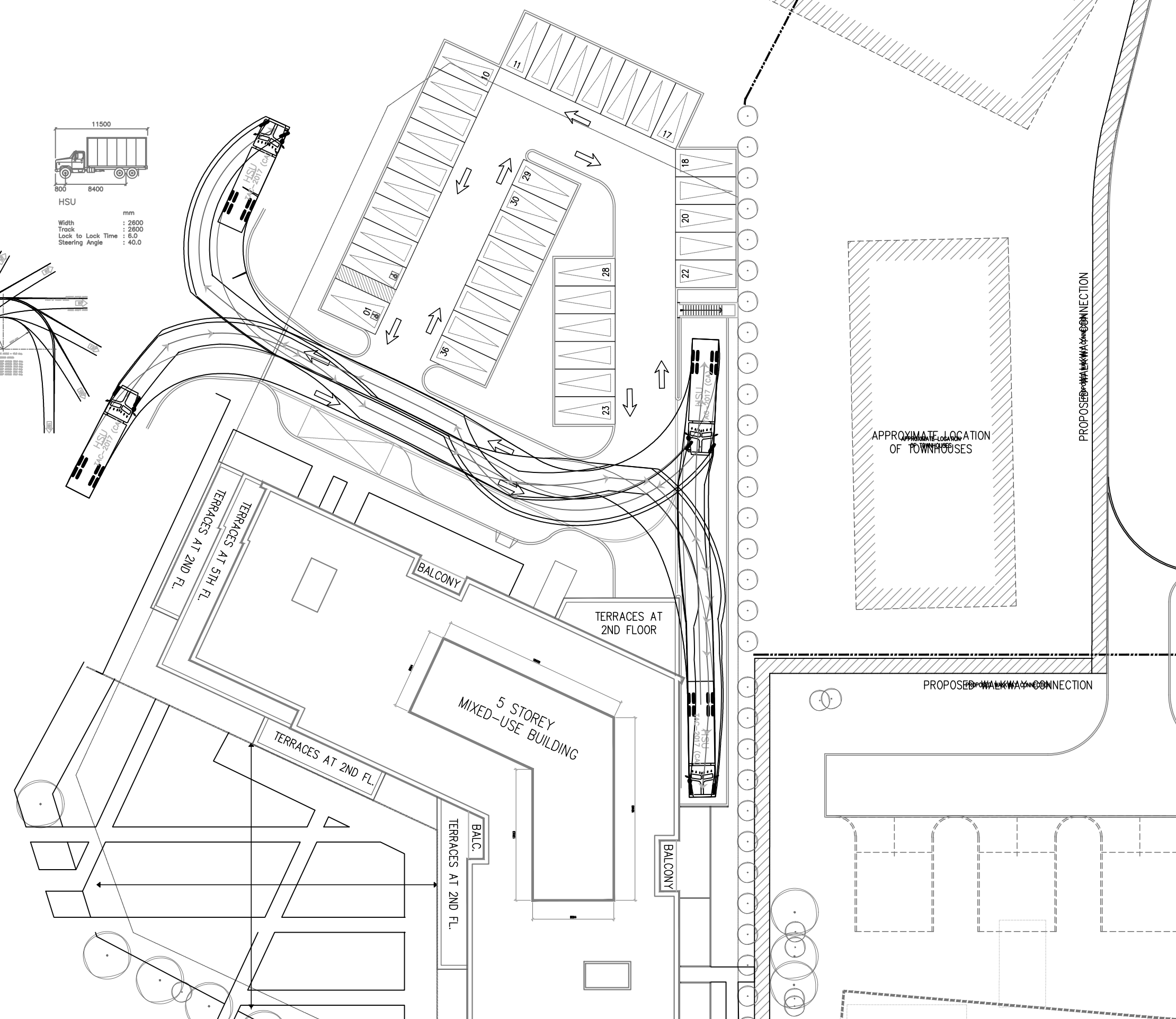
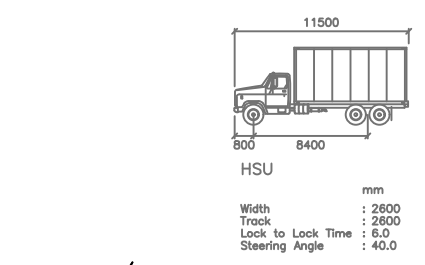
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PROJECT NAME:
PROPOSED MIXED USE DEVELOPMENT
Chateaux
(TOWN OF CALEDON)

DRAWING TITLE:
AutoTURN Analysis
(P TAC-1999)

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| DESIGN BY: A.S. | DATE: January 24, 2018 |
| CHECKED BY: R.P. | PROJECT NO.: |
| DRAWN BY: A.S. | NT-17-216 |
| SCALE: NTS | DRAWING NO.: |
| | Figure 7-2 |



BENCHMARK

REVISIONS

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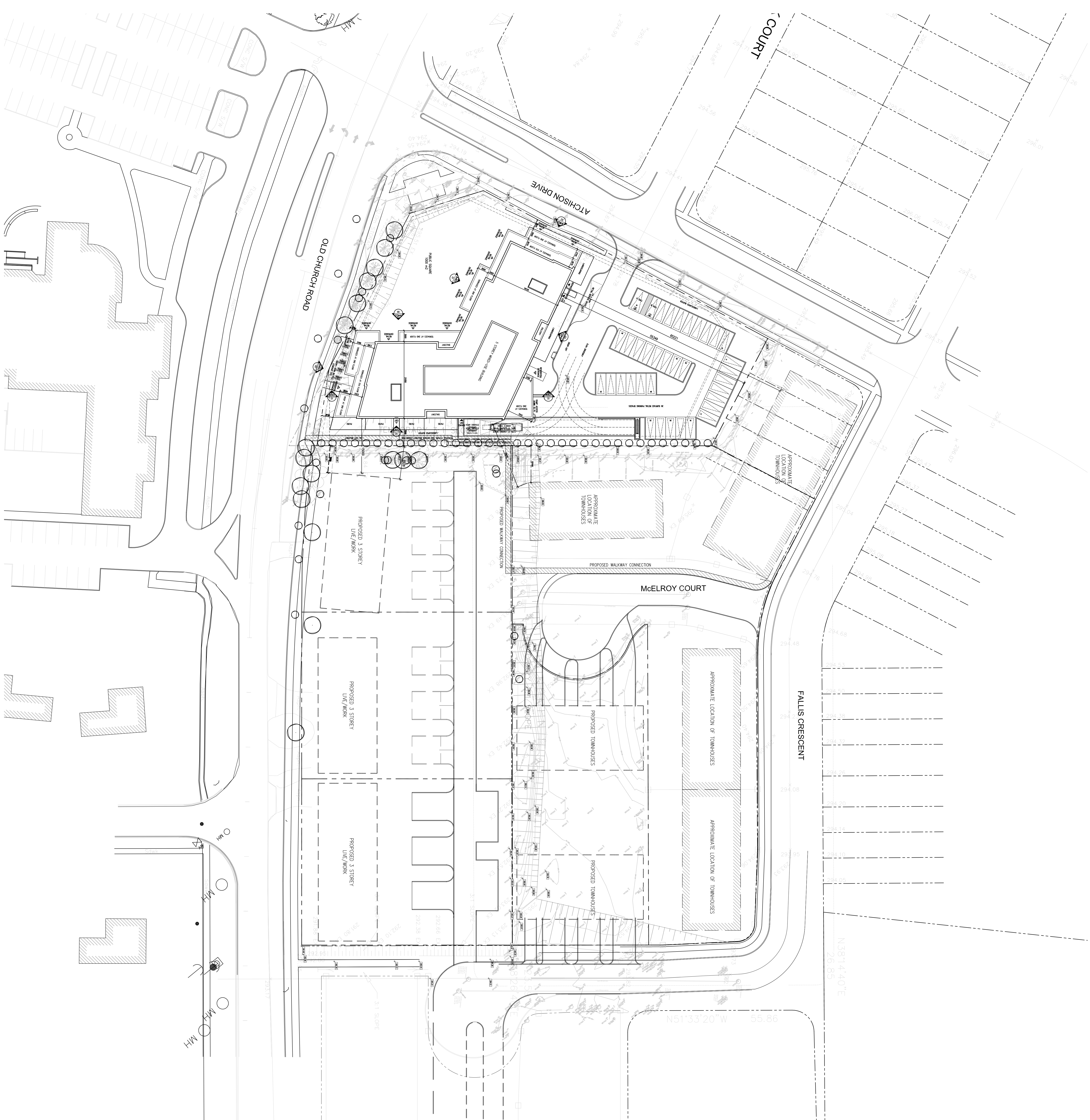
PROPOSED MIXED USE DEVELOPMENT
 Chateaux
 (TOWN OF CALEDON)

DRAWING TITLE:

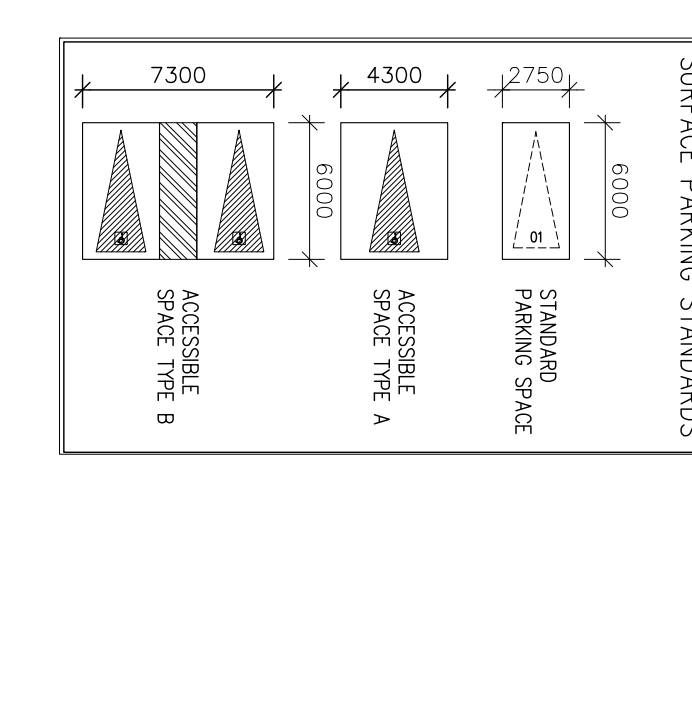
AutoTURN Analysis
 (HSU TAC-1999)

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| DESIGN BY: A.S. | DATE: January 24, 2018 |
| CHECKED BY: R.P. | PROJECT NO. |
| DRAWN BY: A.S. | NT-17-216 |
| SCALE: NTS | DRAWING NO. Figure 7-2 |

Appendix A - Proposed Site Plan



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STATISTICS

| | | |
|-----------------------------------|-------------------------|------------------------------------|
| L1 ZONING | CV-40 & CV-60 | November 11, 2017 |
| 2 UNIT AREA | 5,985.86 m ² | 64,481.20 m ² |
| 3 UNIT FLOOR AREA | 7,117.00 m ² | 76,606.60 m ² |
| 4 GROUND FLOOR AREA | 1,700.00 m ² | 18,300.00 m ² |
| PROPOSED BUILDING COVERAGE | 20% | 1,191.50 m ² (60% S.I.) |
| PROPOSED AREA PROPOSED | 600 | 1,191.50 m ² (60% S.I.) |

FLOOR AREA

| LEVEL | GROUND FLOOR AREA | NET AREA (M ²) | NET SCHEDULED AREA (M ²) |
|-------|-------------------------|----------------------------|--------------------------------------|
| PT | 3,018.24 m ² | 3,018.24 m ² | 3,018.24 m ² |
| 1ST | 8,981.01 m ² | 7,942.31 m ² | 7,942.31 m ² |
| 2ND | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 3RD | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 4TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 5TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 6TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 7TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 8TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 9TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 10TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 11TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 12TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 13TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 14TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 15TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 16TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 17TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 18TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 19TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 20TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 21TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 22TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 23TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 24TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 25TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 26TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 27TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 28TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 29TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 30TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 31TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 32TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 33TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 34TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 35TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 36TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 37TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 38TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 39TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 40TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 41TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 42TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 43TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 44TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 45TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 46TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 47TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 48TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 49TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |
| 50TH | 8,981.01 m ² | 8,981.01 m ² | 8,981.01 m ² |

13. HEIGHT

| | | | | | |
|----------|---------|---------|---------|--------|---------|
| REQUIRED | 15.75 m | 33.33 m | 40.00 m | 0.00 m | 31.00 m |
| PROPOSED | 0.00 m | 0.00 m | 0.00 m | 0.00 m | 0.00 m |

14. PARKING

| | | | | | |
|----------|-----|-----|-----|-----|-----|
| REQUIRED | 127 | 127 | 127 | 127 | 127 |
| PROPOSED | 0 | 0 | 0 | 0 | 0 |

15. LOADING SPACES

| | | | | | |
|----------|---|---|---|---|---|
| REQUIRED | 0 | 0 | 0 | 0 | 0 |
| PROPOSED | 0 | 0 | 0 | 0 | 0 |

ZONING RESOLUTION

| | | |
|------------------------------------|--------------------------------|--------------------------------|
| TOWN OF CALEDON BY-LAW | CV | PROPOSED |
| LOT AREA (minimum) | 5,400 m ² | 5,985.86 m ² |
| LOT FRONTAGE (minimum) | 3.00 m | 90.46 m |
| BUILDING AREA (maximum) | n/a | 7,840.26 m ² |
| BUILDING SETBACKS (minimum) | | |
| FRONT YARD | 7.50 m | S = 1.80 m |
| SIDE YARDS | 1.80 m | W = 2.57 m |
| REAR YARD | 3.90 m | E = 7.50 m |
| BUILDING HEIGHT (maximum) | 11.00 m | N = 54.61 m |
| RETAIL GFA (maximum) | 650 m ² | 899.88 m ² |
| PARKING SPACES | 1.75 spaces/unit = 148 | 1.35 spaces/unit = 115 |
| RESIDENTIAL | 0.25 spaces/unit = 21 | 0.20 spaces/unit = 17 |
| VISIONS | 1 space/29 m ² = 44 | 1 space/28 m ² = 36 |

1 Issued for client review
11.23.17

team
 architect: mick zwicker
 donnie dougwright

site plan & statistics

November 23, 2017
 1:400
 17-49
 bcd

DATE: November 23, 2017
 SCALE: 1:400
 PROJECT: 17-49
 DRAWN BY: bcd

DRWG NO: A101

Appendix B - Existing Traffic Data

REGIONAL MUNICIPALITY OF PEEL

Traffic Signal Timing Parameters

| | | | | | | | | | |
|-------------------------|--|------------------------|---------------------------|--------------------------------|--------------|----------------|--|-------------------|---------------|
| Database Date | | June 27, 2017 | | | | Prepared Date: | | November 27, 2017 | |
| Database Rev | | 2 | | | | Completed By: | | JA | |
| Timing Card / Field rev | | - | | | | Checked By: | | RS | |
| Location: | Old Church Road at Atchison Drive/Town Hall | | | | | | TIME PERIOD (sec.) (Green+Amber+All Red) | | |
| Phase # | Direction | Vehicle Minimum (sec.) | Pedestrian Minimum (sec.) | | Amber (sec.) | All Red (sec.) | MAX | | |
| | | | WALK | FDWALK | | | AM | FREE | PM |
| 1 | | | | | | | | | |
| 2 | Old Church Road - EB Green | 8.0 | 8.0 | 20.0 | 4.0 | 3.4 | 36.0 | 0.0 | 36.0 |
| 3 | | | | | | | | | |
| 4 | Town Hall Access - NB Green | 8.0 | 8.0 | 21.0 | 4.0 | 4.2 | 34.0 | 0.0 | 34.0 |
| 5 | | | | | | | | | |
| 6 | Old Church Road - WB Green | 8.0 | 8.0 | 20.0 | 4.0 | 3.4 | 36.0 | 0.0 | 36.0 |
| 7 | | | | | | | | | |
| 8 | Atchison Drive - SB Green | 8.0 | 8.0 | 21.0 | 4.0 | 4.2 | 34.0 | 0.0 | 34.0 |
| | | | | | | | | | |
| System Control | | Yes | | | | | | | |
| Local Control | | No | | | | | | | |
| Semi-Actuated Mode | | Yes | | | | | | | |
| | | | | TIME (M-F) | | PEAK | CYCLE LENGTH (sec.) | | OFFSET (sec.) |
| | | | | 06:30 - 09:00 | | AM | 70 | | 20 |
| | | | | 09:00 - 15:00 18:30 - 00:00 | | FREE | FREE | | 0 |
| | | | | 15:00 - 18:30 | | PM | 70 | | 20 |



Turning Movement Count (1 . BOYCES CREEK CRT (S) & ATCHISON DR)

| Start Time | N Approach ATCHISON DR | | | | | S Approach ATCHISON DR | | | | | W Approach BOYCES CREEK CRT (S) | | | | | Int. Total (15 min) | Int. Total (1 hr) |
|-------------|---------------------------|-------------|---------------|------------|----------------|---------------------------|-------------|---------------|------------|----------------|------------------------------------|-------------|---------------|------------|----------------|------------------------|----------------------|
| | Right N:W | Thru N:S | U-Turn N:N | Peds N: | Approach Total | Thru S:N | Left S:W | U-Turn S:S | Peds S: | Approach Total | Right W:S | Left W:N | U-Turn W:W | Peds W: | Approach Total | | |
| 07:00:00 | 0 | 31 | 0 | 0 | 31 | 2 | 1 | 0 | 0 | 3 | 7 | 0 | 0 | 0 | 7 | 41 | |
| 07:15:00 | 1 | 33 | 0 | 0 | 34 | 3 | 1 | 0 | 0 | 4 | 7 | 0 | 0 | 0 | 7 | 45 | |
| 07:30:00 | 0 | 30 | 0 | 0 | 30 | 7 | 0 | 0 | 0 | 7 | 5 | 0 | 0 | 0 | 5 | 42 | |
| 07:45:00 | 0 | 36 | 0 | 0 | 36 | 6 | 1 | 0 | 0 | 7 | 11 | 1 | 0 | 0 | 12 | 55 | 183 |
| 08:00:00 | 0 | 29 | 0 | 0 | 29 | 6 | 0 | 0 | 0 | 6 | 9 | 1 | 0 | 1 | 10 | 45 | 187 |
| 08:15:00 | 0 | 21 | 0 | 0 | 21 | 8 | 1 | 0 | 0 | 9 | 5 | 1 | 0 | 0 | 6 | 36 | 178 |
| 08:30:00 | 0 | 28 | 0 | 0 | 28 | 11 | 2 | 0 | 0 | 13 | 1 | 0 | 0 | 0 | 1 | 42 | 178 |
| 08:45:00 | 0 | 16 | 0 | 1 | 16 | 8 | 1 | 0 | 0 | 9 | 7 | 1 | 0 | 5 | 8 | 33 | 156 |
| 09:00:00 | 0 | 30 | 0 | 0 | 30 | 16 | 4 | 0 | 0 | 20 | 1 | 3 | 0 | 2 | 4 | 54 | 165 |
| 09:15:00 | 1 | 12 | 0 | 0 | 13 | 8 | 0 | 0 | 0 | 8 | 2 | 1 | 0 | 5 | 3 | 24 | 153 |
| 09:30:00 | 0 | 21 | 0 | 0 | 21 | 11 | 3 | 0 | 0 | 14 | 2 | 1 | 0 | 2 | 3 | 38 | 149 |
| 09:45:00 | 0 | 14 | 0 | 0 | 14 | 3 | 2 | 0 | 0 | 5 | 1 | 1 | 0 | 2 | 2 | 21 | 137 |
| ***BREAK*** | | | | | | | | | | | | | | | | | |
| 16:00:00 | 0 | 18 | 0 | 0 | 18 | 23 | 4 | 0 | 0 | 27 | 4 | 0 | 0 | 0 | 4 | 49 | |
| 16:15:00 | 1 | 20 | 0 | 0 | 21 | 33 | 12 | 1 | 0 | 46 | 0 | 1 | 0 | 0 | 1 | 68 | |
| 16:30:00 | 2 | 18 | 0 | 0 | 20 | 35 | 5 | 0 | 0 | 40 | 2 | 1 | 0 | 1 | 3 | 63 | |
| 16:45:00 | 1 | 9 | 0 | 0 | 10 | 29 | 8 | 0 | 0 | 37 | 4 | 1 | 0 | 0 | 5 | 52 | 232 |
| 17:00:00 | 1 | 21 | 0 | 0 | 22 | 31 | 2 | 0 | 0 | 33 | 1 | 0 | 0 | 1 | 1 | 56 | 239 |
| 17:15:00 | 0 | 21 | 0 | 0 | 21 | 32 | 4 | 0 | 0 | 36 | 3 | 0 | 0 | 0 | 3 | 60 | 231 |
| 17:30:00 | 0 | 17 | 0 | 0 | 17 | 36 | 9 | 0 | 0 | 45 | 3 | 0 | 0 | 0 | 3 | 65 | 233 |
| 17:45:00 | 1 | 14 | 0 | 0 | 15 | 30 | 9 | 0 | 0 | 39 | 5 | 0 | 0 | 0 | 5 | 59 | 240 |
| 18:00:00 | 2 | 20 | 0 | 0 | 22 | 24 | 7 | 0 | 0 | 31 | 2 | 2 | 0 | 0 | 4 | 57 | 241 |
| 18:15:00 | 0 | 26 | 0 | 0 | 26 | 22 | 7 | 0 | 0 | 29 | 3 | 0 | 0 | 0 | 3 | 58 | 239 |
| 18:30:00 | 0 | 17 | 0 | 0 | 17 | 19 | 4 | 0 | 0 | 23 | 7 | 0 | 0 | 0 | 7 | 47 | 221 |



| | | | | | | | | | | | | | | | | | |
|--------------------|------|-------|----|-------|-------|-------|-------|-------|------|------|-------|-------|----|----|-----|-------------|-----|
| 18:45:00 | 0 | 14 | 0 | 0 | 14 | 27 | 4 | 0 | 0 | 31 | 2 | 1 | 0 | 0 | 3 | 48 | 210 |
| Grand Total | 10 | 516 | 0 | 1 | 526 | 430 | 91 | 1 | 0 | 522 | 94 | 16 | 0 | 19 | 110 | 1158 | - |
| Approach% | 1.9% | 98.1% | 0% | - | - | 82.4% | 17.4% | 0.2% | - | - | 85.5% | 14.5% | 0% | - | - | - | - |
| Totals % | 0.9% | 44.6% | 0% | 45.4% | 37.1% | 7.9% | 0.1% | 45.1% | 8.1% | 1.4% | 0% | 9.5% | - | - | - | - | - |
| Heavy | 0 | 10 | 0 | - | 15 | 0 | 0 | - | 0 | 0 | 0 | - | - | - | - | - | - |
| Heavy % | 0% | 1.9% | 0% | - | 3.5% | 0% | 0% | - | 0% | 0% | 0% | - | - | - | - | - | - |
| Bicycles | 4 | 0 | 0 | - | 0 | 0 | 0 | - | 0 | 0 | 0 | - | - | - | - | - | - |
| Bicycle % | 40% | 0% | 0% | - | 0% | 0% | 0% | - | 0% | 0% | 0% | - | - | - | - | - | - |



Peak Hour: 07:15 AM - 08:15 AM Weather: Mostly Cloudy (1.6 °C)

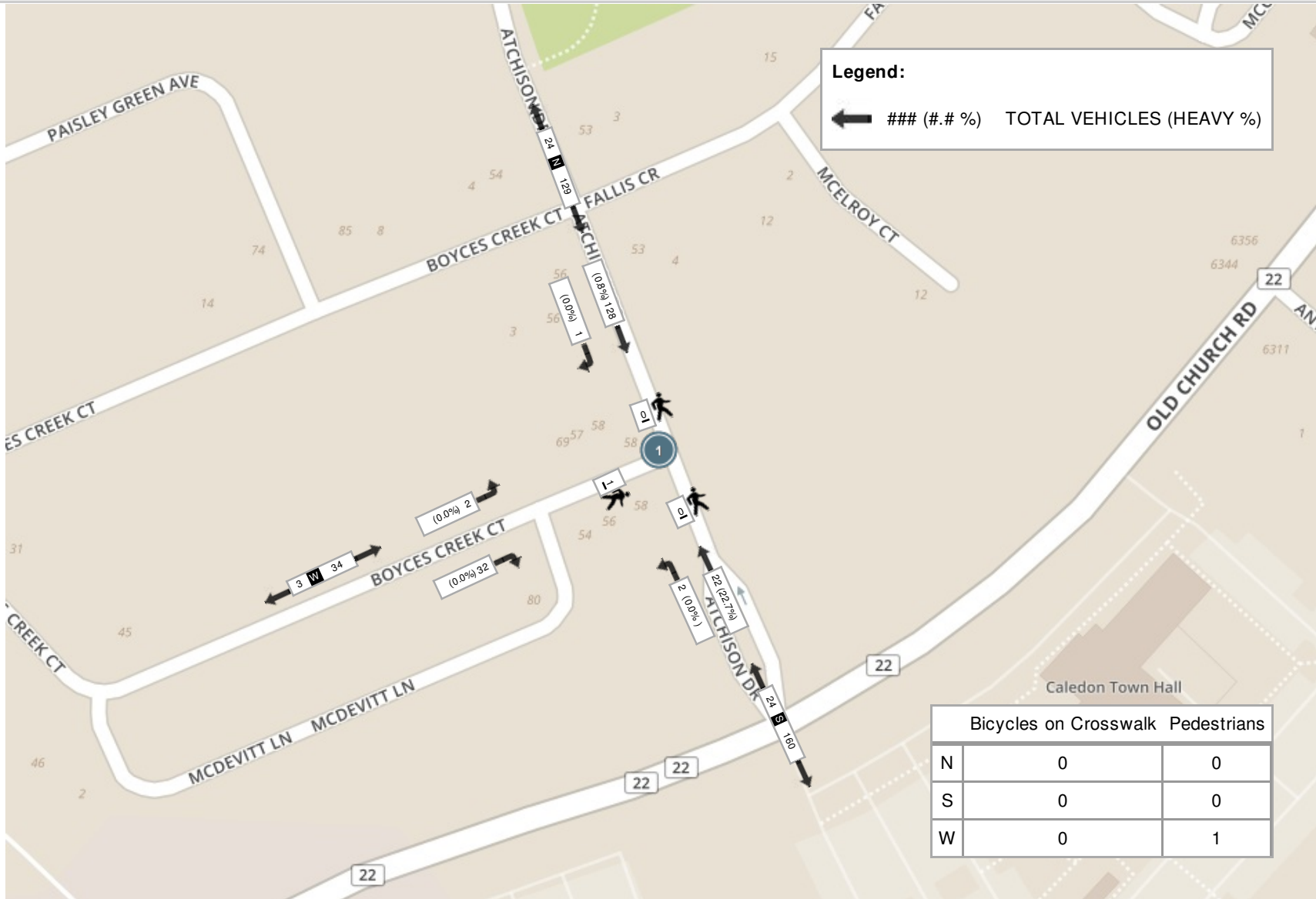
| Start Time | N Approach ATCHISON DR | | | | | S Approach ATCHISON DR | | | | | W Approach BOYCES CREEK CRT (S) | | | | | Int. Total (15 min) |
|-------------------------------|---------------------------|------------|----------|----------|----------------|---------------------------|----------|----------|----------|----------------|------------------------------------|----------|----------|----------|----------------|------------------------|
| | Right | Thru | U-Turn | Peds | Approach Total | Thru | Left | U-Turn | Peds | Approach Total | Right | Left | U-Turn | Peds | Approach Total | |
| 07:15:00 | 1 | 33 | 0 | 0 | 34 | 3 | 1 | 0 | 0 | 4 | 7 | 0 | 0 | 0 | 7 | 45 |
| 07:30:00 | 0 | 30 | 0 | 0 | 30 | 7 | 0 | 0 | 0 | 7 | 5 | 0 | 0 | 0 | 5 | 42 |
| 07:45:00 | 0 | 36 | 0 | 0 | 36 | 6 | 1 | 0 | 0 | 7 | 11 | 1 | 0 | 0 | 12 | 55 |
| 08:00:00 | 0 | 29 | 0 | 0 | 29 | 6 | 0 | 0 | 0 | 6 | 9 | 1 | 0 | 1 | 10 | 45 |
| Grand Total | 1 | 128 | 0 | 0 | 129 | 22 | 2 | 0 | 0 | 24 | 32 | 2 | 0 | 1 | 34 | 187 |
| Approach% | 0.8% | 99.2% | 0% | | - | 91.7% | 8.3% | 0% | | - | 94.1% | 5.9% | 0% | | - | - |
| Totals % | 0.5% | 68.4% | 0% | | 69% | 11.8% | 1.1% | 0% | | 12.8% | 17.1% | 1.1% | 0% | | 18.2% | - |
| PHF | 0.25 | 0.89 | 0 | | 0.9 | 0.79 | 0.5 | 0 | | 0.86 | 0.73 | 0.5 | 0 | | 0.71 | - |
| Heavy | 0 | 1 | 0 | | 1 | 5 | 0 | 0 | | 5 | 0 | 0 | 0 | | 0 | - |
| Heavy % | 0% | 0.8% | 0% | | 0.8% | 22.7% | 0% | 0% | | 20.8% | 0% | 0% | 0% | | 0% | - |
| Lights | 1 | 127 | 0 | | 128 | 17 | 2 | 0 | | 19 | 32 | 2 | 0 | | 34 | - |
| Lights % | 100% | 99.2% | 0% | | 99.2% | 77.3% | 100% | 0% | | 79.2% | 100% | 100% | 0% | | 100% | - |
| Single-Unit Trucks | 0 | 0 | 0 | | 0 | 1 | 0 | 0 | | 1 | 0 | 0 | 0 | | 0 | - |
| Single-Unit Trucks % | 0% | 0% | 0% | | 0% | 4.5% | 0% | 0% | | 4.2% | 0% | 0% | 0% | | 0% | - |
| Buses | 0 | 1 | 0 | | 1 | 4 | 0 | 0 | | 4 | 0 | 0 | 0 | | 0 | - |
| Buses % | 0% | 0.8% | 0% | | 0.8% | 18.2% | 0% | 0% | | 16.7% | 0% | 0% | 0% | | 0% | - |
| Pedestrians | - | - | - | 0 | - | - | - | 0 | | - | - | - | 1 | | - | - |
| Pedestrians% | - | - | - | 0% | - | - | - | 0% | | - | - | - | 100% | | - | - |
| Bicycles on Crosswalk | - | - | - | 0 | - | - | - | 0 | | - | - | - | 0 | | - | - |
| Bicycles on Crosswalk% | - | - | - | 0% | - | - | - | 0% | | - | - | - | 0% | | - | - |
| Bicycles on Road | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | - |
| Bicycles on Road% | - | - | - | 0% | - | - | - | 0% | | - | - | - | 0% | | - | - |



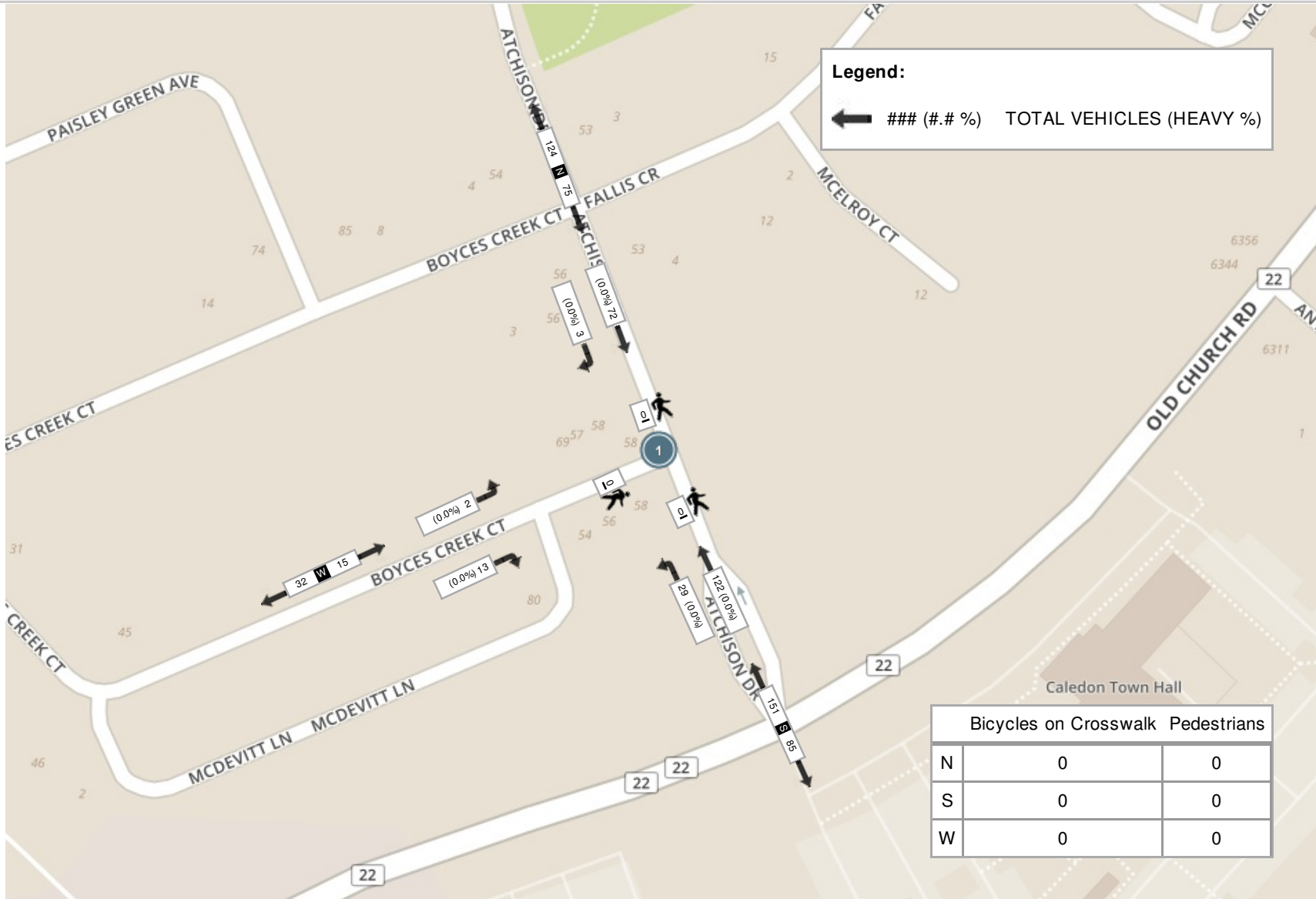
Peak Hour: 05:15 PM - 06:15 PM Weather: Rain (2.8 °C)

| Start Time | N Approach ATCHISON DR | | | | | S Approach ATCHISON DR | | | | | W Approach BOYCES CREEK CRT (S) | | | | | Int. Total (15 min) |
|-------------------------------|---------------------------|-----------|----------|----------|----------------|---------------------------|-----------|----------|----------|----------------|------------------------------------|----------|----------|----------|----------------|------------------------|
| | Right | Thru | U-Turn | Peds | Approach Total | Thru | Left | U-Turn | Peds | Approach Total | Right | Left | U-Turn | Peds | Approach Total | |
| 17:15:00 | 0 | 21 | 0 | 0 | 21 | 32 | 4 | 0 | 0 | 36 | 3 | 0 | 0 | 0 | 3 | 60 |
| 17:30:00 | 0 | 17 | 0 | 0 | 17 | 36 | 9 | 0 | 0 | 45 | 3 | 0 | 0 | 0 | 3 | 65 |
| 17:45:00 | 1 | 14 | 0 | 0 | 15 | 30 | 9 | 0 | 0 | 39 | 5 | 0 | 0 | 0 | 5 | 59 |
| 18:00:00 | 2 | 20 | 0 | 0 | 22 | 24 | 7 | 0 | 0 | 31 | 2 | 2 | 0 | 0 | 4 | 57 |
| Grand Total | 3 | 72 | 0 | 0 | 75 | 122 | 29 | 0 | 0 | 151 | 13 | 2 | 0 | 0 | 15 | 241 |
| Approach% | 4% | 96% | 0% | - | - | 80.8% | 19.2% | 0% | - | - | 86.7% | 13.3% | 0% | - | - | - |
| Totals % | 1.2% | 29.9% | 0% | 31.1% | 50.6% | 12% | 0% | 62.7% | 5.4% | 0.8% | 0% | 6.2% | - | - | - | - |
| PHF | 0.38 | 0.86 | 0 | 0.85 | 0.85 | 0.81 | 0 | 0.84 | 0.65 | 0.25 | 0 | 0.75 | - | - | - | - |
| Heavy | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - |
| Heavy % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | - |
| Lights | 3 | 72 | 0 | 75 | 122 | 29 | 0 | 151 | 13 | 2 | 0 | 15 | - | - | - | - |
| Lights % | 100% | 100% | 0% | 100% | 100% | 100% | 0% | 100% | 100% | 100% | 0% | 100% | - | - | - | - |
| Single-Unit Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - |
| Single-Unit Trucks % | 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 | - |
| Buses % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | - |
| Pedestrians | - | - | - | 0 | - | - | - | 0 | - | - | - | 0 | - | - | - | - |
| Pedestrians% | - | - | - | 0% | - | - | - | 0% | - | - | - | 0% | - | - | - | - |
| Bicycles on Crosswalk | - | - | - | 0 | - | - | - | 0 | - | - | - | 0 | - | - | - | - |
| Bicycles on Crosswalk% | - | - | - | 0% | - | - | - | 0% | - | - | - | 0% | - | - | - | - |
| Bicycles on Road | 2 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | - |
| Bicycles on Road% | - | - | - | 0% | - | - | - | 0% | - | - | - | 0% | - | - | - | - |

Peak Hour: 07:15 AM - 08:15 AM Weather: Mostly Cloudy (1.6 °C)



Peak Hour: 05:15 PM - 06:15 PM Weather: Rain (2.8 °C)





Turning Movement Count (2 . OLD CHURCH RD & ATCHISON DR)

| Start Time | N Approach ATCHISON DR | | | | | | E Approach OLD CHURCH RD | | | | | | S Approach ATCHISON DR | | | | | | W Approach OLD CHURCH RD | | | | | | Int. Total (15 min) | Int. Total (1 hr) |
|--------------------|---------------------------|-------------|-------------|---------------|------------|----------------|-----------------------------|-------------|-------------|---------------|------------|----------------|---------------------------|-------------|-------------|---------------|------------|----------------|-----------------------------|-------------|-------------|---------------|------------|----------------|------------------------|----------------------|
| | Right N:W | Thru N:S | Left N:E | U-Turn N:N | Peds N: | Approach Total | Right E:N | Thru E:W | Left E:S | U-Turn E:E | Peds E: | Approach Total | Right S:E | Thru S:N | Left S:W | U-Turn S:S | Peds S: | Approach Total | Right W:S | Thru W:E | Left W:N | U-Turn W:W | Peds W: | Approach Total | | |
| 07:00:00 | 21 | 1 | 15 | 0 | 0 | 37 | 2 | 15 | 0 | 0 | 0 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 27 | 1 | 0 | 0 | 28 | 82 | |
| 07:15:00 | 28 | 0 | 12 | 0 | 0 | 40 | 2 | 27 | 1 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 28 | 3 | 0 | 0 | 31 | 101 | |
| 07:30:00 | 21 | 0 | 13 | 0 | 0 | 34 | 1 | 32 | 5 | 0 | 0 | 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 50 | 5 | 0 | 1 | 55 | 127 | |
| 07:45:00 | 30 | 0 | 17 | 0 | 1 | 47 | 1 | 51 | 5 | 0 | 0 | 57 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 60 | 6 | 0 | 2 | 74 | 178 | 488 |
| 08:00:00 | 22 | 0 | 15 | 0 | 0 | 37 | 0 | 55 | 6 | 0 | 0 | 61 | 0 | 0 | 1 | 0 | 0 | 1 | 6 | 70 | 6 | 0 | 0 | 82 | 181 | 587 |
| 08:15:00 | 19 | 0 | 9 | 0 | 1 | 28 | 3 | 39 | 21 | 0 | 0 | 63 | 0 | 0 | 2 | 0 | 0 | 2 | 29 | 43 | 6 | 0 | 0 | 78 | 171 | 657 |
| 08:30:00 | 18 | 0 | 12 | 0 | 3 | 30 | 6 | 24 | 10 | 1 | 0 | 41 | 1 | 0 | 0 | 0 | 1 | 1 | 30 | 35 | 7 | 0 | 1 | 72 | 144 | 674 |
| 08:45:00 | 18 | 3 | 2 | 0 | 0 | 23 | 3 | 33 | 27 | 0 | 2 | 63 | 0 | 0 | 1 | 0 | 0 | 1 | 31 | 28 | 6 | 0 | 0 | 65 | 152 | 648 |
| 09:00:00 | 22 | 1 | 7 | 0 | 0 | 30 | 6 | 52 | 16 | 0 | 0 | 74 | 1 | 0 | 0 | 0 | 0 | 1 | 17 | 49 | 13 | 0 | 0 | 79 | 184 | 651 |
| 09:15:00 | 11 | 0 | 3 | 0 | 0 | 14 | 6 | 48 | 6 | 0 | 0 | 60 | 2 | 0 | 2 | 0 | 0 | 4 | 10 | 34 | 3 | 0 | 3 | 47 | 125 | 605 |
| 09:30:00 | 11 | 0 | 12 | 0 | 0 | 23 | 3 | 25 | 4 | 0 | 0 | 32 | 2 | 1 | 1 | 0 | 3 | 4 | 3 | 26 | 8 | 0 | 4 | 37 | 96 | 557 |
| 09:45:00 | 9 | 0 | 6 | 0 | 1 | 15 | 1 | 21 | 3 | 0 | 1 | 25 | 6 | 1 | 3 | 0 | 1 | 10 | 3 | 22 | 3 | 0 | 0 | 28 | 78 | 483 |
| ***BREAK*** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16:00:00 | 16 | 0 | 8 | 0 | 1 | 24 | 4 | 55 | 3 | 0 | 0 | 62 | 2 | 0 | 15 | 0 | 0 | 17 | 0 | 44 | 23 | 1 | 0 | 68 | 171 | |
| 16:15:00 | 14 | 1 | 6 | 0 | 0 | 21 | 16 | 51 | 5 | 0 | 0 | 72 | 3 | 1 | 2 | 0 | 1 | 6 | 1 | 49 | 29 | 0 | 1 | 79 | 178 | |
| 16:30:00 | 14 | 0 | 5 | 0 | 0 | 19 | 7 | 63 | 3 | 0 | 0 | 73 | 11 | 1 | 52 | 1 | 1 | 65 | 0 | 51 | 33 | 0 | 1 | 84 | 241 | |
| 16:45:00 | 8 | 0 | 4 | 0 | 0 | 12 | 8 | 40 | 2 | 0 | 0 | 50 | 4 | 0 | 15 | 0 | 0 | 19 | 0 | 37 | 30 | 0 | 0 | 67 | 148 | 738 |
| 17:00:00 | 14 | 1 | 7 | 0 | 1 | 22 | 7 | 47 | 4 | 0 | 0 | 58 | 4 | 0 | 12 | 0 | 0 | 16 | 0 | 32 | 26 | 0 | 0 | 58 | 154 | 721 |
| 17:15:00 | 22 | 0 | 2 | 0 | 2 | 24 | 10 | 45 | 3 | 0 | 0 | 58 | 1 | 0 | 5 | 0 | 0 | 6 | 3 | 30 | 25 | 0 | 0 | 58 | 146 | 689 |
| 17:30:00 | 12 | 2 | 6 | 0 | 0 | 20 | 6 | 46 | 5 | 0 | 0 | 57 | 0 | 0 | 4 | 0 | 0 | 4 | 2 | 38 | 39 | 0 | 0 | 79 | 160 | 608 |
| 17:45:00 | 16 | 0 | 3 | 0 | 0 | 19 | 10 | 45 | 3 | 0 | 0 | 58 | 1 | 0 | 5 | 0 | 0 | 6 | 5 | 38 | 29 | 0 | 0 | 72 | 155 | 615 |
| 18:00:00 | 13 | 0 | 9 | 0 | 1 | 22 | 13 | 31 | 3 | 0 | 0 | 47 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 34 | 18 | 0 | 0 | 54 | 123 | 584 |
| 18:15:00 | 20 | 3 | 5 | 0 | 1 | 28 | 7 | 32 | 4 | 0 | 0 | 43 | 3 | 0 | 0 | 0 | 0 | 3 | 1 | 27 | 22 | 0 | 0 | 50 | 124 | 562 |
| 18:30:00 | 22 | 1 | 2 | 0 | 1 | 25 | 7 | 32 | 5 | 0 | 0 | 44 | 10 | 0 | 1 | 0 | 0 | 11 | 3 | 38 | 15 | 0 | 0 | 56 | 136 | 538 |
| 18:45:00 | 9 | 0 | 6 | 0 | 1 | 15 | 7 | 31 | 5 | 0 | 0 | 43 | 3 | 1 | 0 | 0 | 0 | 4 | 0 | 28 | 24 | 0 | 0 | 52 | 114 | 497 |
| Grand Total | 410 | 13 | 186 | 0 | 14 | 609 | 136 | 940 | 149 | 1 | 3 | 1226 | 54 | 5 | 121 | 1 | 7 | 181 | 154 | 918 | 380 | 1 | 13 | 1453 | 3469 | - |
| Approach% | 67.3% | 2.1% | 30.5% | 0% | - | - | 11.1% | 76.7% | 12.2% | 0.1% | - | - | 29.8% | 2.8% | 66.9% | 0.6% | - | - | 10.6% | 63.2% | 26.2% | 0.1% | - | - | - | - |
| Totals % | 11.8% | 0.4% | 5.4% | 0% | - | 17.6% | 3.9% | 27.1% | 4.3% | 0% | - | 35.3% | 1.6% | 0.1% | 3.5% | 0% | - | - | 4.4% | 26.5% | 11% | 0% | - | - | 41.9% | - |
| Heavy | 6 | 0 | 3 | 0 | - | - | 6 | 52 | 1 | 0 | - | - | 1 | 0 | 1 | 0 | - | - | 1 | 47 | 10 | 0 | - | - | - | - |
| Heavy % | 1.5% | 0% | 1.6% | 0% | - | - | 4.4% | 5.5% | 0.7% | 0% | - | - | 1.9% | 0% | 0.8% | 0% | - | - | 0.6% | 5.1% | 2.6% | 0% | - | - | - | - |
| Bicycles | 0 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 0 | - | - | 0 | 0 | 0 | 0 | - | - | 0 | 1 | 0 | 0 | - | - | - | - |
| Bicycle % | 0% | 0% | 0% | 0% | - | - | 0% | 0% | 0% | 0% | - | - | 0% | 0% | 0% | 0% | - | - | 0% | 0.1% | 0% | 0% | - | - | - | - |



Turning Movement Count
Location Name: OLD CHURCH RD & ATCHISON DR
Date: Wed, Nov 15, 2017 Deployment Lead: Theo Daglis

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



Peak Hour: 07:45 AM - 08:45 AM Weather: Mostly Cloudy (1.6 °C)

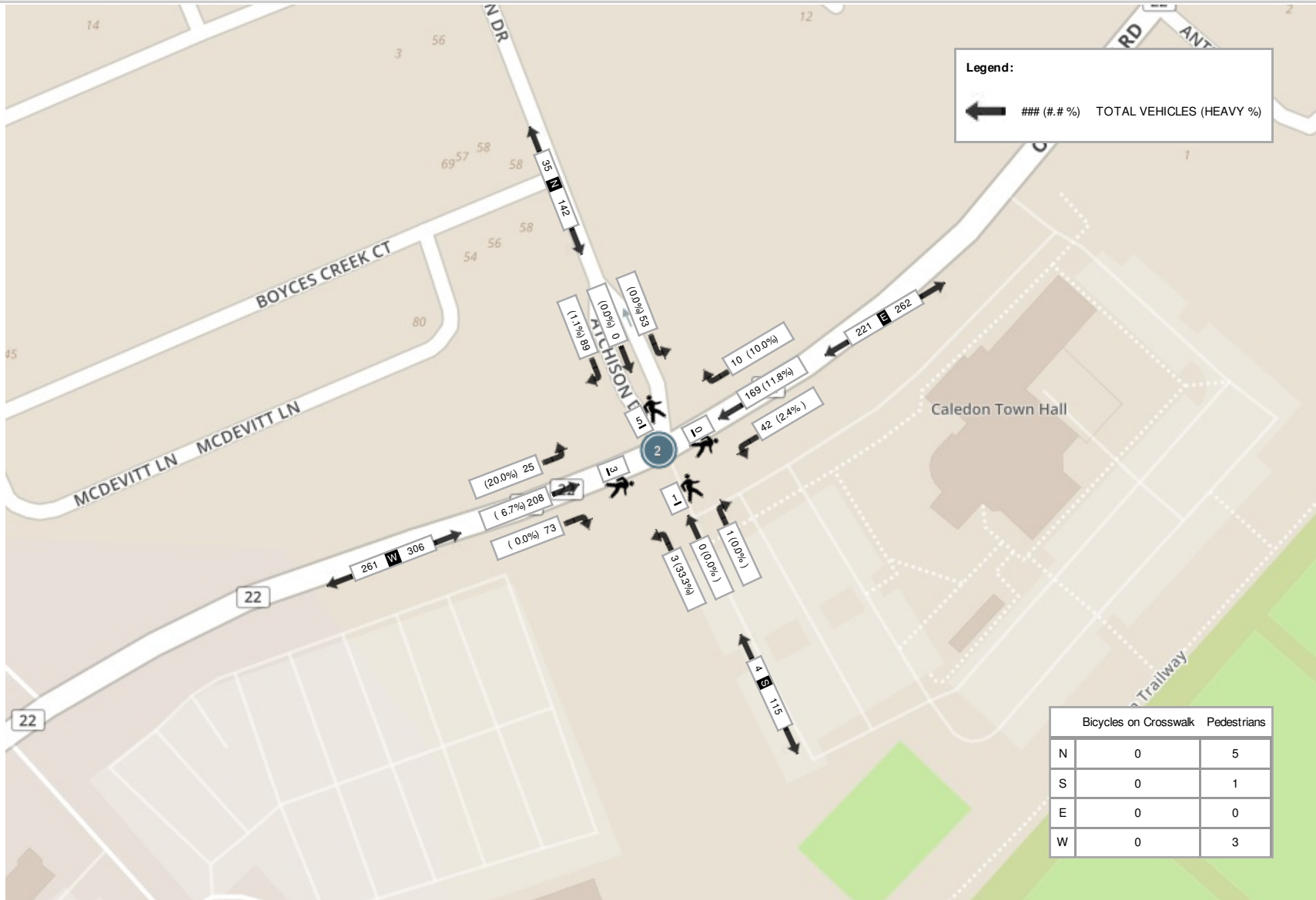
| Start Time | N Approach ATCHISON DR | | | | | | E Approach OLD CHURCH RD | | | | | | S Approach ATCHISON DR | | | | | | W Approach OLD CHURCH RD | | | | | | Int. Total (15 min) |
|-------------------------------|---------------------------|----------|-----------|----------|----------|----------------|-----------------------------|------------|-----------|----------|----------|----------------|---------------------------|----------|----------|----------|----------|----------------|-----------------------------|------------|-----------|----------|----------|----------------|------------------------|
| | Right | Thru | Left | U-Turn | Peds | Approach Total | Right | Thru | Left | U-Turn | Peds | Approach Total | Right | Thru | Left | U-Turn | Peds | Approach Total | Right | Thru | Left | U-Turn | Peds | Approach Total | |
| 07:45:00 | 30 | 0 | 17 | 0 | 1 | 47 | 1 | 51 | 5 | 0 | 0 | 57 | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 60 | 6 | 0 | 2 | 74 | 178 |
| 08:00:00 | 22 | 0 | 15 | 0 | 0 | 37 | 0 | 55 | 6 | 0 | 0 | 61 | 0 | 0 | 1 | 0 | 0 | 1 | 6 | 70 | 6 | 0 | 0 | 82 | 181 |
| 08:15:00 | 19 | 0 | 9 | 0 | 1 | 28 | 3 | 39 | 21 | 0 | 0 | 63 | 0 | 0 | 2 | 0 | 0 | 2 | 29 | 43 | 6 | 0 | 0 | 78 | 171 |
| 08:30:00 | 18 | 0 | 12 | 0 | 3 | 30 | 6 | 24 | 10 | 1 | 0 | 41 | 1 | 0 | 0 | 0 | 1 | 1 | 30 | 35 | 7 | 0 | 1 | 72 | 144 |
| Grand Total | 89 | 0 | 53 | 0 | 5 | 142 | 10 | 169 | 42 | 1 | 0 | 222 | 1 | 0 | 3 | 0 | 1 | 4 | 73 | 208 | 25 | 0 | 3 | 306 | 674 |
| Approach% | 62.7% | 0% | 37.3% | 0% | - | - | 4.5% | 76.1% | 18.9% | 0.5% | - | - | 25% | 0% | 75% | 0% | - | 23.9% | 68% | 8.2% | 0% | - | - | - | |
| Totals % | 13.2% | 0% | 7.9% | 0% | 21.1% | 1.5% | 25.1% | 6.2% | 0.1% | 32.9% | 0.1% | 0% | 0.4% | 0% | 0.6% | 10.8% | 30.9% | 3.7% | 0% | 45.4% | - | - | - | - | |
| PHF | 0.74 | 0 | 0.78 | 0 | 0.76 | 0.42 | 0.77 | 0.5 | 0.25 | 0.88 | 0.25 | 0 | 0.38 | 0 | 0.5 | 0.61 | 0.74 | 0.89 | 0 | 0.93 | - | - | - | - | |
| Heavy | 1 | 0 | 0 | 0 | 1 | 1 | 20 | 1 | 0 | 22 | 0 | 0 | 1 | 0 | 1 | 0 | 14 | 5 | 0 | 19 | - | - | - | - | |
| Heavy % | 1.1% | 0% | 0% | 0% | 0.7% | 10% | 11.8% | 2.4% | 0% | 9.9% | 0% | 0% | 33.3% | 0% | 25% | 0% | 6.7% | 20% | 0% | 6.2% | - | - | - | - | |
| Lights | 88 | 0 | 53 | 0 | 141 | 9 | 149 | 41 | 1 | 200 | 1 | 0 | 2 | 0 | 3 | 73 | 194 | 20 | 0 | 287 | - | - | - | - | |
| Lights % | 98.9% | 0% | 100% | 0% | 99.3% | 90% | 88.2% | 97.6% | 100% | 90.1% | 100% | 0% | 66.7% | 0% | 75% | 100% | 93.3% | 80% | 0% | 93.8% | - | - | - | - | |
| Single-Unit Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 6 | 3 | 0 | 9 | - | - | - | - | | |
| Single-Unit Trucks % | 0% | 0% | 0% | 0% | 0% | 0% | 1.8% | 0% | 0% | 1.4% | 0% | 0% | 0% | 0% | 0% | 2.9% | 12% | 0% | 2.9% | - | - | - | - | | |
| Buses | 1 | 0 | 0 | 0 | 1 | 1 | 17 | 1 | 0 | 19 | 0 | 0 | 1 | 0 | 1 | 7 | 2 | 0 | 9 | - | - | - | - | | |
| Buses % | 1.1% | 0% | 0% | 0% | 0.7% | 10% | 10.1% | 2.4% | 0% | 8.6% | 0% | 0% | 33.3% | 0% | 25% | 3.4% | 8% | 0% | 2.9% | - | - | - | - | | |
| Articulated Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | - | - | - | - | | |
| Articulated Trucks % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0.5% | 0% | 0% | 0.3% | - | - | - | - | | |
| Pedestrians | - | - | - | - | 5 | - | - | - | - | 0 | - | - | - | - | 1 | - | - | - | 3 | - | - | - | - | | |
| Pedestrians% | - | - | - | - | 55.6% | - | - | - | - | 0% | - | - | - | - | 11.1% | - | - | - | 33.3% | - | - | - | - | | |
| Bicycles on Crosswalk | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | 0 | - | - | - | - | | |
| Bicycles on Crosswalk% | - | - | - | - | 0% | - | - | - | - | 0% | - | - | - | - | 0% | - | - | - | 0% | - | - | - | - | | |
| Bicycles on Road | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Bicycles on Road% | - | - | - | - | 0% | - | - | - | - | 0% | - | - | - | - | 0% | - | - | - | 0% | - | - | - | - | | |



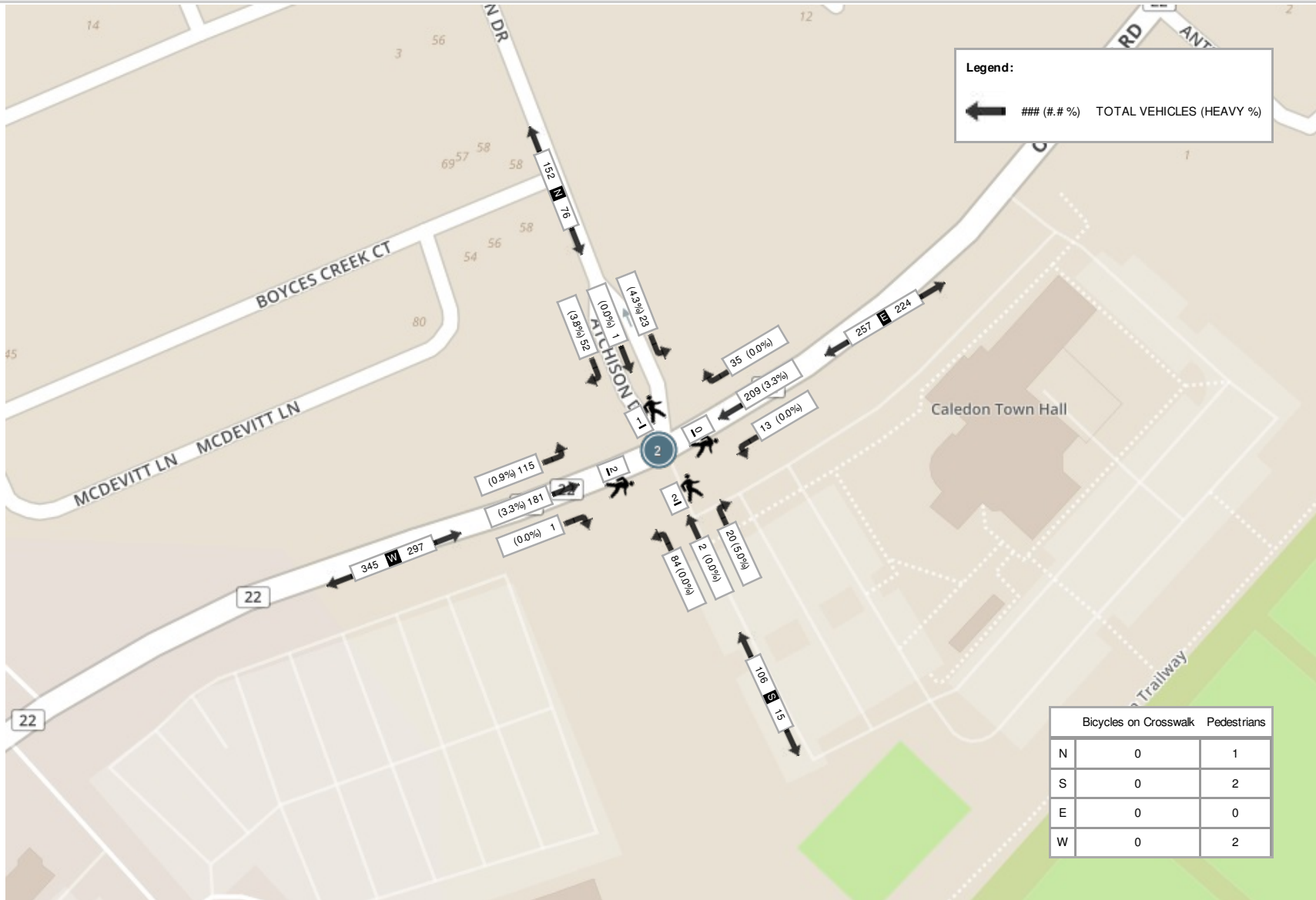
Peak Hour: 04:00 PM - 05:00 PM Weather: Rain (2.8 °C)

| Start Time | N Approach ATCHISON DR | | | | | | E Approach OLD CHURCH RD | | | | | | S Approach ATCHISON DR | | | | | | W Approach OLD CHURCH RD | | | | | | Int. Total (15 min) |
|-------------------------------|---------------------------|----------|-----------|----------|----------|----------------|-----------------------------|------------|-----------|----------|----------|----------------|---------------------------|----------|-----------|----------|----------|----------------|-----------------------------|------------|------------|----------|----------|----------------|------------------------|
| | Right | Thru | Left | U-Turn | Peds | Approach Total | Right | Thru | Left | U-Turn | Peds | Approach Total | Right | Thru | Left | U-Turn | Peds | Approach Total | Right | Thru | Left | U-Turn | Peds | Approach Total | |
| 16:00:00 | 16 | 0 | 8 | 0 | 1 | 24 | 4 | 55 | 3 | 0 | 0 | 62 | 2 | 0 | 15 | 0 | 0 | 17 | 0 | 44 | 23 | 1 | 0 | 68 | 171 |
| 16:15:00 | 14 | 1 | 6 | 0 | 0 | 21 | 16 | 51 | 5 | 0 | 0 | 72 | 3 | 1 | 2 | 0 | 1 | 6 | 1 | 49 | 29 | 0 | 1 | 79 | 178 |
| 16:30:00 | 14 | 0 | 5 | 0 | 0 | 19 | 7 | 63 | 3 | 0 | 0 | 73 | 11 | 1 | 52 | 1 | 1 | 65 | 0 | 51 | 33 | 0 | 1 | 84 | 241 |
| 16:45:00 | 8 | 0 | 4 | 0 | 0 | 12 | 8 | 40 | 2 | 0 | 0 | 50 | 4 | 0 | 15 | 0 | 0 | 19 | 0 | 37 | 30 | 0 | 0 | 67 | 148 |
| Grand Total | 52 | 1 | 23 | 0 | 1 | 76 | 35 | 209 | 13 | 0 | 0 | 257 | 20 | 2 | 84 | 1 | 2 | 107 | 1 | 181 | 115 | 1 | 2 | 298 | 738 |
| Approach% | 68.4% | 1.3% | 30.3% | 0% | - | - | 13.6% | 81.3% | 5.1% | 0% | - | - | 18.7% | 1.9% | 78.5% | 0.9% | - | 0.3% | 60.7% | 38.6% | 0.3% | - | - | - | - |
| Totals % | 7% | 0.1% | 3.1% | 0% | 10.3% | 4.7% | 28.3% | 1.8% | 0% | 34.8% | 2.7% | 0.3% | 11.4% | 0.1% | 14.5% | 0.1% | 24.5% | 15.6% | 0.1% | 40.4% | - | - | - | - | - |
| PHF | 0.81 | 0.25 | 0.72 | 0 | 0.79 | 0.55 | 0.83 | 0.65 | 0 | 0.88 | 0.45 | 0.5 | 0.4 | 0.25 | 0.41 | 0.25 | 0.89 | 0.87 | 0.25 | 0.89 | - | - | - | - | - |
| Heavy | 2 | 0 | 1 | 0 | 3 | 0 | 7 | 0 | 0 | 7 | 1 | 0 | 0 | 0 | 1 | 0 | 6 | 1 | 0 | 7 | - | - | - | - | - |
| Heavy % | 3.8% | 0% | 4.3% | 0% | 3.9% | 0% | 3.3% | 0% | 0% | 2.7% | 5% | 0% | 0% | 0% | 0.9% | 0% | 3.3% | 0.9% | 0% | 2.3% | - | - | - | - | - |
| Lights | 50 | 1 | 22 | 0 | 73 | 35 | 202 | 13 | 0 | 250 | 19 | 2 | 84 | 1 | 106 | 1 | 175 | 114 | 1 | 291 | - | - | - | - | - |
| Lights % | 96.2% | 100% | 95.7% | 0% | 96.1% | 100% | 96.7% | 100% | 0% | 97.3% | 95% | 100% | 100% | 100% | 99.1% | 100% | 96.7% | 99.1% | 100% | 97.7% | - | - | - | - | - |
| Single-Unit Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | - | - | - | - | - |
| Single-Unit Trucks % | 0% | 0% | 0% | 0% | 0% | 0% | 1% | 0% | 0% | 0.8% | 5% | 0% | 0% | 0% | 0.9% | 0% | 0.6% | 0% | 0% | 0.3% | - | - | - | - | - |
| Buses | 2 | 0 | 1 | 0 | 3 | 0 | 4 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 1 | 0 | 5 | - | - | - | - | - |
| Buses % | 3.8% | 0% | 4.3% | 0% | 3.9% | 0% | 1.9% | 0% | 0% | 1.6% | 0% | 0% | 0% | 0% | 0% | 0% | 2.2% | 0.9% | 0% | 1.7% | - | - | - | - | - |
| Articulated Trucks | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | - | - | - | - | - |
| Articulated Trucks % | 0% | 0% | 0% | 0% | 0% | 0% | 0.5% | 0% | 0% | 0.4% | 0% | 0% | 0% | 0% | 0% | 0% | 0.6% | 0% | 0% | 0.3% | - | - | - | - | - |
| Pedestrians | - | - | - | - | 1 | - | - | - | - | 0 | - | - | - | - | 2 | - | - | - | - | 2 | - | - | - | - | - |
| Pedestrians% | - | - | - | - | 20% | - | - | - | - | 0% | - | - | - | - | 40% | - | - | - | - | 40% | - | - | - | - | - |
| Bicycles on Crosswalk | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | 0 | - | - | - | - | - |
| Bicycles on Crosswalk% | - | - | - | - | 0% | - | - | - | - | 0% | - | - | - | - | 0% | - | - | - | - | 0% | - | - | - | - | - |
| Bicycles on Road | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | 0 | 0 | 0 | 0 | - | - | - | - | - |
| Bicycles on Road% | - | - | - | - | 0% | - | - | - | - | 0% | - | - | - | - | 0% | - | - | - | - | 0% | - | - | - | - | - |

Peak Hour: 07:45 AM - 08:45 AM Weather: Mostly Cloudy (1.6 °C)



Peak Hour: 04:00 PM - 05:00 PM Weather: Rain (2.8 °C)



Appendix C - Existing Traffic Level of Service Calculations

HCM Signalized Intersection Capacity Analysis

3: Town Hall Access/Atchison Drive & Old Church Road

11/30/2017



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | ↖ | ↗↗ | ↖ | ↖ | ↗↗ | ↖ | ↖ | ↗ | | ↖ | ↗ | |
| Traffic Volume (vph) | 25 | 208 | 73 | 42 | 169 | 10 | 3 | 0 | 1 | 53 | 0 | 89 |
| Future Volume (vph) | 25 | 208 | 73 | 42 | 169 | 10 | 3 | 0 | 1 | 53 | 0 | 89 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 8.2 | 8.2 | | 8.2 | 8.2 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.85 | | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1780 | 3579 | 1598 | 1788 | 3579 | 1558 | 1785 | 1633 | | 1825 | 1593 | |
| Flt Permitted | 0.61 | 1.00 | 1.00 | 0.58 | 1.00 | 1.00 | 0.68 | 1.00 | | 0.76 | 1.00 | |
| Satd. Flow (perm) | 1152 | 3579 | 1598 | 1090 | 3579 | 1558 | 1278 | 1633 | | 1451 | 1593 | |
| Peak-hour factor, PHF | 0.89 | 0.74 | 0.61 | 0.50 | 0.77 | 0.42 | 0.38 | 0.25 | 0.25 | 0.78 | 0.25 | 0.74 |
| Adj. Flow (vph) | 28 | 281 | 120 | 84 | 219 | 24 | 8 | 0 | 4 | 68 | 0 | 120 |
| RTOR Reduction (vph) | 0 | 0 | 97 | 0 | 0 | 19 | 0 | 2 | 0 | 0 | 60 | 0 |
| Lane Group Flow (vph) | 28 | 281 | 23 | 84 | 219 | 5 | 8 | 2 | 0 | 68 | 60 | 0 |
| Confl. Peds. (#/hr) | 5 | | 1 | 1 | | 5 | 3 | | | | | 3 |
| Heavy Vehicles (%) | 2% | 2% | 0% | 2% | 2% | 2% | 2% | 0% | 0% | 0% | 0% | 1% |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 10.1 | 10.1 | 10.1 | 10.1 | 10.1 | 10.1 | 25.9 | 25.9 | | 25.9 | 25.9 | |
| Effective Green, g (s) | 10.1 | 10.1 | 10.1 | 10.1 | 10.1 | 10.1 | 25.9 | 25.9 | | 25.9 | 25.9 | |
| Actuated g/C Ratio | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.50 | 0.50 | | 0.50 | 0.50 | |
| Clearance Time (s) | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 8.2 | 8.2 | | 8.2 | 8.2 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 225 | 700 | 312 | 213 | 700 | 304 | 641 | 819 | | 728 | 799 | |
| v/s Ratio Prot | | c0.08 | | | 0.06 | | | 0.00 | | | 0.04 | |
| v/s Ratio Perm | 0.02 | | 0.01 | 0.08 | | 0.00 | 0.01 | | | c0.05 | | |
| v/c Ratio | 0.12 | 0.40 | 0.08 | 0.39 | 0.31 | 0.02 | 0.01 | 0.00 | | 0.09 | 0.08 | |
| Uniform Delay, d1 | 17.1 | 18.1 | 16.9 | 18.1 | 17.8 | 16.7 | 6.4 | 6.4 | | 6.7 | 6.7 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.2 | 0.4 | 0.1 | 1.2 | 0.3 | 0.0 | 0.0 | 0.0 | | 0.3 | 0.2 | |
| Delay (s) | 17.4 | 18.5 | 17.0 | 19.3 | 18.0 | 16.8 | 6.5 | 6.4 | | 7.0 | 6.8 | |
| Level of Service | B | B | B | B | B | B | A | A | | A | A | |
| Approach Delay (s) | | 18.0 | | | 18.3 | | | 6.5 | | | 6.9 | |
| Approach LOS | | B | | | B | | | A | | | A | |

| Intersection Summary | | |
|-----------------------------------|-------|---------------------------|
| HCM 2000 Control Delay | 15.8 | HCM 2000 Level of Service |
| HCM 2000 Volume to Capacity ratio | 0.18 | B |
| Actuated Cycle Length (s) | 51.6 | Sum of lost time (s) |
| Intersection Capacity Utilization | 48.8% | 15.6 |
| Analysis Period (min) | 15 | ICU Level of Service |
| | | A |

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

6: Atchison Drive & Boyces Creek

11/30/2017



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------------|-------------|-------------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 2 | 32 | 2 | 22 | 128 | 1 |
| Future Volume (Veh/h) | 2 | 32 | 2 | 22 | 128 | 1 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.50 | 0.73 | 0.50 | 0.79 | 0.89 | 0.25 |
| Hourly flow rate (vph) | 4 | 44 | 4 | 28 | 144 | 4 |
| Pedestrians | 1 | | | | | |
| Lane Width (m) | 3.7 | | | | | |
| Walking Speed (m/s) | 1.1 | | | | | |
| Percent Blockage | 0 | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh | | | | | | |
| Upstream signal (m) | 80 | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 183 | 147 | 149 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 183 | 147 | 149 | | | |
| 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 | 100 | | | |
| cM capacity (veh/h) | 808 | 904 | 1443 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 48 | 32 | 148 | | | |
| Volume Left | 4 | 4 | 0 | | | |
| Volume Right | 44 | 0 | 4 | | | |
| cSH | 895 | 1443 | 1700 | | | |
| Volume to Capacity | 0.05 | 0.00 | 0.09 | | | |
| Queue Length 95th (m) | 1.3 | 0.1 | 0.0 | | | |
| Control Delay (s) | 9.2 | 1.0 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.2 | 1.0 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 2.1 | | | |
| Intersection Capacity Utilization | | | 17.0% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |

HCM Signalized Intersection Capacity Analysis

3: Town Hall Access/Atchison Drive & Old Church Road

11/30/2017



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|------|------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 115 | 181 | 1 | 13 | 209 | 35 | 84 | 2 | 20 | 23 | 1 | 52 |
| Future Volume (vph) | 115 | 181 | 1 | 13 | 209 | 35 | 84 | 2 | 20 | 23 | 1 | 52 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 8.2 | 8.2 | | 8.2 | 8.2 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.86 | | 1.00 | 0.86 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1805 | 3544 | 1594 | 1820 | 3544 | 1597 | 1821 | 1584 | | 1755 | 1569 | |
| Flt Permitted | 0.60 | 1.00 | 1.00 | 0.62 | 1.00 | 1.00 | 0.71 | 1.00 | | 0.73 | 1.00 | |
| Satd. Flow (perm) | 1131 | 3544 | 1594 | 1196 | 3544 | 1597 | 1366 | 1584 | | 1341 | 1569 | |
| Peak-hour factor, PHF | 0.87 | 0.89 | 0.25 | 0.65 | 0.83 | 0.55 | 0.40 | 0.50 | 0.45 | 0.72 | 0.25 | 0.81 |
| Adj. Flow (vph) | 132 | 203 | 4 | 20 | 252 | 64 | 210 | 4 | 44 | 32 | 4 | 64 |
| RTOR Reduction (vph) | 0 | 0 | 2 | 0 | 0 | 38 | 0 | 28 | 0 | 0 | 40 | 0 |
| Lane Group Flow (vph) | 132 | 203 | 2 | 20 | 252 | 26 | 210 | 20 | 0 | 32 | 28 | 0 |
| Confl. Peds. (#/hr) | 1 | | 2 | 2 | | 1 | 2 | | | | | 2 |
| Heavy Vehicles (%) | 1% | 3% | 0% | 0% | 3% | 0% | 0% | 0% | 5% | 4% | 0% | 4% |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 25.8 | 25.8 | | 25.8 | 25.8 | |
| Effective Green, g (s) | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 25.8 | 25.8 | | 25.8 | 25.8 | |
| Actuated g/C Ratio | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.37 | 0.37 | | 0.37 | 0.37 | |
| Clearance Time (s) | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 8.2 | 8.2 | | 8.2 | 8.2 | |
| Lane Grp Cap (vph) | 462 | 1447 | 651 | 488 | 1447 | 652 | 503 | 583 | | 494 | 578 | |
| v/s Ratio Prot | | 0.06 | | | 0.07 | | | 0.01 | | | 0.02 | |
| v/s Ratio Perm | c0.12 | | 0.00 | 0.02 | | 0.02 | c0.15 | | | 0.02 | | |
| v/c Ratio | 0.29 | 0.14 | 0.00 | 0.04 | 0.17 | 0.04 | 0.42 | 0.03 | | 0.06 | 0.05 | |
| Uniform Delay, d1 | 13.9 | 13.0 | 12.3 | 12.5 | 13.2 | 12.4 | 16.5 | 14.1 | | 14.3 | 14.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.6 | 0.2 | 0.0 | 0.2 | 0.3 | 0.1 | 2.5 | 0.1 | | 0.3 | 0.2 | |
| Delay (s) | 15.4 | 13.2 | 12.3 | 12.6 | 13.4 | 12.6 | 19.0 | 14.2 | | 14.5 | 14.4 | |
| Level of Service | B | B | B | B | B | B | B | B | | B | B | |
| Approach Delay (s) | | 14.0 | | | 13.2 | | | 18.1 | | | 14.4 | |
| Approach LOS | | B | | | B | | | B | | | B | |

| Intersection Summary | | | |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay | 14.8 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.35 | | |
| Actuated Cycle Length (s) | 70.0 | Sum of lost time (s) | 15.6 |
| Intersection Capacity Utilization | 55.8% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Unsignalized Intersection Capacity Analysis

6: Atchison Drive & Boyces Creek

11/30/2017



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------------|-------------|-------------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 2 | 13 | 29 | 122 | 72 | 3 |
| Future Volume (Veh/h) | 2 | 13 | 29 | 122 | 72 | 3 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.25 | 0.65 | 0.81 | 0.85 | 0.86 | 0.38 |
| Hourly flow rate (vph) | 8 | 20 | 36 | 144 | 84 | 8 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh | | | | | | |
| Upstream signal (m) | 80 | | | | | |
| pX, platoon unblocked | 0.97 | | | | | |
| vC, conflicting volume | 304 | 88 | 92 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 273 | 88 | 92 | | | |
| 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 | 98 | 98 | | | |
| cM capacity (veh/h) | 686 | 976 | 1515 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 28 | 180 | 92 | | | |
| Volume Left | 8 | 36 | 0 | | | |
| Volume Right | 20 | 0 | 8 | | | |
| cSH | 871 | 1515 | 1700 | | | |
| Volume to Capacity | 0.03 | 0.02 | 0.05 | | | |
| Queue Length 95th (m) | 0.8 | 0.6 | 0.0 | | | |
| Control Delay (s) | 9.3 | 1.6 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.3 | 1.6 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.9 | | | |
| Intersection Capacity Utilization | | | 24.7% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |

Appendix D – Future Background Level of Service Calculations

HCM Signalized Intersection Capacity Analysis

3: Town Hall Access/Atchison Drive & Old Church Road

12/8/2017



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | ↘ | ↗↗ | ↘ | ↘ | ↗↗ | ↘ | ↘ | ↗ | | ↘ | ↗ | |
| Traffic Volume (vph) | 25 | 235 | 73 | 42 | 191 | 10 | 3 | 0 | 1 | 53 | 0 | 89 |
| Future Volume (vph) | 25 | 235 | 73 | 42 | 191 | 10 | 3 | 0 | 1 | 53 | 0 | 89 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 8.2 | 8.2 | | 8.2 | 8.2 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frpb, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.85 | | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1780 | 3579 | 1598 | 1788 | 3579 | 1558 | 1785 | 1633 | | 1825 | 1593 | |
| Flt Permitted | 0.60 | 1.00 | 1.00 | 0.56 | 1.00 | 1.00 | 0.68 | 1.00 | | 0.76 | 1.00 | |
| Satd. Flow (perm) | 1120 | 3579 | 1598 | 1052 | 3579 | 1558 | 1278 | 1633 | | 1451 | 1593 | |
| Peak-hour factor, PHF | 0.89 | 0.74 | 0.61 | 0.50 | 0.77 | 0.42 | 0.38 | 0.25 | 0.25 | 0.78 | 0.25 | 0.74 |
| Adj. Flow (vph) | 28 | 318 | 120 | 84 | 248 | 24 | 8 | 0 | 4 | 68 | 0 | 120 |
| RTOR Reduction (vph) | 0 | 0 | 96 | 0 | 0 | 19 | 0 | 2 | 0 | 0 | 60 | 0 |
| Lane Group Flow (vph) | 28 | 318 | 24 | 84 | 248 | 5 | 8 | 2 | 0 | 68 | 60 | 0 |
| Confl. Peds. (#/hr) | 5 | | 1 | 1 | | 5 | 3 | | | | | 3 |
| Heavy Vehicles (%) | 2% | 2% | 0% | 2% | 2% | 2% | 2% | 0% | 0% | 0% | 0% | 1% |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 25.9 | 25.9 | | 25.9 | 25.9 | |
| Effective Green, g (s) | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 25.9 | 25.9 | | 25.9 | 25.9 | |
| Actuated g/C Ratio | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.50 | 0.50 | | 0.50 | 0.50 | |
| Clearance Time (s) | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 8.2 | 8.2 | | 8.2 | 8.2 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 226 | 722 | 322 | 212 | 722 | 314 | 636 | 813 | | 722 | 793 | |
| v/s Ratio Prot | | c0.09 | | | 0.07 | | | 0.00 | | | | 0.04 |
| v/s Ratio Perm | 0.02 | | 0.02 | 0.08 | | 0.00 | 0.01 | | | c0.05 | | |
| v/c Ratio | 0.12 | 0.44 | 0.08 | 0.40 | 0.34 | 0.02 | 0.01 | 0.00 | | 0.09 | 0.08 | |
| Uniform Delay, d1 | 17.0 | 18.2 | 16.8 | 18.0 | 17.8 | 16.6 | 6.6 | 6.6 | | 6.9 | 6.8 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.2 | 0.4 | 0.1 | 1.2 | 0.3 | 0.0 | 0.0 | 0.0 | | 0.3 | 0.2 | |
| Delay (s) | 17.2 | 18.6 | 16.9 | 19.2 | 18.1 | 16.6 | 6.6 | 6.6 | | 7.1 | 7.0 | |
| Level of Service | B | B | B | B | B | B | A | A | | A | A | |
| Approach Delay (s) | | 18.1 | | | 18.3 | | | 6.6 | | | 7.0 | |
| Approach LOS | | B | | | B | | | A | | | A | |

Intersection Summary

| | | | |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay | 16.0 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.19 | | |
| Actuated Cycle Length (s) | 52.0 | Sum of lost time (s) | 15.6 |
| Intersection Capacity Utilization | 48.8% | ICU Level of Service | A |
| Analysis Period (min) | 15 | | |

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

6: Atchison Drive & Boyces Creek

12/8/2017



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------------|-------------|-------------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 2 | 32 | 2 | 25 | 145 | 1 |
| Future Volume (Veh/h) | 2 | 32 | 2 | 25 | 145 | 1 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.50 | 0.73 | 0.50 | 0.79 | 0.89 | 0.25 |
| Hourly flow rate (vph) | 4 | 44 | 4 | 32 | 163 | 4 |
| Pedestrians | 1 | | | | | |
| Lane Width (m) | 3.7 | | | | | |
| Walking Speed (m/s) | 1.1 | | | | | |
| Percent Blockage | 0 | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage veh | | | | | | |
| Upstream signal (m) | 80 | | | | | |
| pX, platoon unblocked | | | | | | |
| vC, conflicting volume | 206 | 166 | 168 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 206 | 166 | 168 | | | |
| 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 | 95 | 100 | | | |
| cM capacity (veh/h) | 784 | 883 | 1421 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 48 | 36 | 167 | | | |
| Volume Left | 4 | 4 | 0 | | | |
| Volume Right | 44 | 0 | 4 | | | |
| cSH | 874 | 1421 | 1700 | | | |
| Volume to Capacity | 0.05 | 0.00 | 0.10 | | | |
| Queue Length 95th (m) | 1.3 | 0.1 | 0.0 | | | |
| Control Delay (s) | 9.4 | 0.9 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.4 | 0.9 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.9 | | | |
| Intersection Capacity Utilization | | | 17.9% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |

HCM Signalized Intersection Capacity Analysis

3: Town Hall Access/Atchison Drive & Old Church Road

12/8/2017



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|------|------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 115 | 205 | 1 | 13 | 236 | 35 | 84 | 2 | 20 | 23 | 1 | 52 |
| Future Volume (vph) | 115 | 205 | 1 | 13 | 236 | 35 | 84 | 2 | 20 | 23 | 1 | 52 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 8.2 | 8.2 | | 8.2 | 8.2 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.86 | | 1.00 | 0.86 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1805 | 3544 | 1594 | 1820 | 3544 | 1597 | 1821 | 1584 | | 1755 | 1569 | |
| Flt Permitted | 0.58 | 1.00 | 1.00 | 0.61 | 1.00 | 1.00 | 0.71 | 1.00 | | 0.73 | 1.00 | |
| Satd. Flow (perm) | 1097 | 3544 | 1594 | 1165 | 3544 | 1597 | 1366 | 1584 | | 1341 | 1569 | |
| Peak-hour factor, PHF | 0.87 | 0.89 | 0.25 | 0.65 | 0.83 | 0.55 | 0.40 | 0.50 | 0.45 | 0.72 | 0.25 | 0.81 |
| Adj. Flow (vph) | 132 | 230 | 4 | 20 | 284 | 64 | 210 | 4 | 44 | 32 | 4 | 64 |
| RTOR Reduction (vph) | 0 | 0 | 2 | 0 | 0 | 38 | 0 | 28 | 0 | 0 | 40 | 0 |
| Lane Group Flow (vph) | 132 | 230 | 2 | 20 | 284 | 26 | 210 | 20 | 0 | 32 | 28 | 0 |
| Confl. Peds. (#/hr) | 1 | | 2 | 2 | | 1 | 2 | | | | | 2 |
| Heavy Vehicles (%) | 1% | 3% | 0% | 0% | 3% | 0% | 0% | 0% | 5% | 4% | 0% | 4% |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 25.8 | 25.8 | | 25.8 | 25.8 | |
| Effective Green, g (s) | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 25.8 | 25.8 | | 25.8 | 25.8 | |
| Actuated g/C Ratio | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.37 | 0.37 | | 0.37 | 0.37 | |
| Clearance Time (s) | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 8.2 | 8.2 | | 8.2 | 8.2 | |
| Lane Grp Cap (vph) | 448 | 1447 | 651 | 475 | 1447 | 652 | 503 | 583 | | 494 | 578 | |
| v/s Ratio Prot | | 0.06 | | | 0.08 | | | 0.01 | | | 0.02 | |
| v/s Ratio Perm | c0.12 | | 0.00 | 0.02 | | 0.02 | c0.15 | | | 0.02 | | |
| v/c Ratio | 0.29 | 0.16 | 0.00 | 0.04 | 0.20 | 0.04 | 0.42 | 0.03 | | 0.06 | 0.05 | |
| Uniform Delay, d1 | 13.9 | 13.1 | 12.3 | 12.5 | 13.3 | 12.4 | 16.5 | 14.1 | | 14.3 | 14.2 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 1.7 | 0.2 | 0.0 | 0.2 | 0.3 | 0.1 | 2.5 | 0.1 | | 0.3 | 0.2 | |
| Delay (s) | 15.6 | 13.3 | 12.3 | 12.6 | 13.6 | 12.6 | 19.0 | 14.2 | | 14.5 | 14.4 | |
| Level of Service | B | B | B | B | B | B | B | B | | B | B | |
| Approach Delay (s) | | 14.1 | | | 13.4 | | | 18.1 | | | 14.4 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay | 14.9 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.35 | | |
| Actuated Cycle Length (s) | 70.0 | Sum of lost time (s) | 15.6 |
| Intersection Capacity Utilization | 55.8% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Unsignalized Intersection Capacity Analysis

6: Atchison Drive & Boyces Creek

12/8/2017



| Movement | EBL | EBR | NBL | NBT | SBT | SBR |
|-----------------------------------|-------------|-------------|-------------|----------------------|------|------|
| Lane Configurations | | | | | | |
| Traffic Volume (veh/h) | 2 | 13 | 29 | 138 | 81 | 3 |
| Future Volume (Veh/h) | 2 | 13 | 29 | 138 | 81 | 3 |
| Sign Control | Stop | | | Free | Free | |
| Grade | 0% | | | 0% | 0% | |
| Peak Hour Factor | 0.25 | 0.65 | 0.81 | 0.85 | 0.86 | 0.38 |
| Hourly flow rate (vph) | 8 | 20 | 36 | 162 | 94 | 8 |
| Pedestrians | | | | | | |
| Lane Width (m) | | | | | | |
| Walking Speed (m/s) | | | | | | |
| Percent Blockage | | | | | | |
| Right turn flare (veh) | | | | | | |
| Median type | | | | None | None | |
| Median storage (veh) | | | | | | |
| Upstream signal (m) | 80 | | | | | |
| pX, platoon unblocked | 0.97 | | | | | |
| vC, conflicting volume | 332 | 98 | 102 | | | |
| vC1, stage 1 conf vol | | | | | | |
| vC2, stage 2 conf vol | | | | | | |
| vCu, unblocked vol | 293 | 98 | 102 | | | |
| 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 | 98 | 98 | | | |
| cM capacity (veh/h) | 663 | 963 | 1503 | | | |
| Direction, Lane # | EB 1 | NB 1 | SB 1 | | | |
| Volume Total | 28 | 198 | 102 | | | |
| Volume Left | 8 | 36 | 0 | | | |
| Volume Right | 20 | 0 | 8 | | | |
| cSH | 853 | 1503 | 1700 | | | |
| Volume to Capacity | 0.03 | 0.02 | 0.06 | | | |
| Queue Length 95th (m) | 0.8 | 0.6 | 0.0 | | | |
| Control Delay (s) | 9.4 | 1.5 | 0.0 | | | |
| Lane LOS | A | A | | | | |
| Approach Delay (s) | 9.4 | 1.5 | 0.0 | | | |
| Approach LOS | A | | | | | |
| Intersection Summary | | | | | | |
| Average Delay | | | 1.7 | | | |
| Intersection Capacity Utilization | | | 25.5% | ICU Level of Service | A | |
| Analysis Period (min) | | | 15 | | | |

Appendix E – Future Total Level of Service Calculations

HCM Signalized Intersection Capacity Analysis

3: Town Hall Access/Atchison Drive & Old Church Road

12/8/2017



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|------|-------|------|------|------|------|------|------|------|-------|------|------|
| Lane Configurations | ↶ | ↷ | ↷ | ↶ | ↷ | ↷ | ↶ | ↷ | | ↶ | ↷ | |
| Traffic Volume (vph) | 39 | 235 | 73 | 42 | 191 | 28 | 3 | 0 | 1 | 81 | 0 | 110 |
| Future Volume (vph) | 39 | 235 | 73 | 42 | 191 | 28 | 3 | 0 | 1 | 81 | 0 | 110 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 8.2 | 8.2 | | 8.2 | 8.2 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.97 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 0.99 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.85 | | 1.00 | 0.85 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1780 | 3579 | 1598 | 1788 | 3579 | 1557 | 1785 | 1633 | | 1825 | 1593 | |
| Flt Permitted | 0.60 | 1.00 | 1.00 | 0.56 | 1.00 | 1.00 | 0.66 | 1.00 | | 0.76 | 1.00 | |
| Satd. Flow (perm) | 1120 | 3579 | 1598 | 1052 | 3579 | 1557 | 1245 | 1633 | | 1451 | 1593 | |
| Peak-hour factor, PHF | 0.89 | 0.74 | 0.61 | 0.50 | 0.77 | 0.42 | 0.38 | 0.25 | 0.25 | 0.78 | 0.25 | 0.74 |
| Adj. Flow (vph) | 44 | 318 | 120 | 84 | 248 | 67 | 8 | 0 | 4 | 104 | 0 | 149 |
| RTOR Reduction (vph) | 0 | 0 | 95 | 0 | 0 | 53 | 0 | 2 | 0 | 0 | 75 | 0 |
| Lane Group Flow (vph) | 44 | 318 | 25 | 84 | 248 | 14 | 8 | 2 | 0 | 104 | 74 | 0 |
| Confl. Peds. (#/hr) | 5 | | 1 | 1 | | 5 | 3 | | | | | 3 |
| Heavy Vehicles (%) | 2% | 2% | 0% | 2% | 2% | 2% | 2% | 0% | 0% | 0% | 0% | 1% |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | 6 |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 10.9 | 10.9 | 10.9 | 10.9 | 10.9 | 10.9 | 25.9 | 25.9 | | 25.9 | 25.9 | |
| Effective Green, g (s) | 10.9 | 10.9 | 10.9 | 10.9 | 10.9 | 10.9 | 25.9 | 25.9 | | 25.9 | 25.9 | |
| Actuated g/C Ratio | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.49 | 0.49 | | 0.49 | 0.49 | |
| Clearance Time (s) | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 8.2 | 8.2 | | 8.2 | 8.2 | |
| Vehicle Extension (s) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | | 3.0 | 3.0 | |
| Lane Grp Cap (vph) | 232 | 744 | 332 | 218 | 744 | 323 | 615 | 807 | | 717 | 787 | |
| v/s Ratio Prot | | c0.09 | | | 0.07 | | | 0.00 | | | | 0.05 |
| v/s Ratio Perm | 0.04 | | 0.02 | 0.08 | | 0.01 | 0.01 | | | c0.07 | | |
| v/c Ratio | 0.19 | 0.43 | 0.08 | 0.39 | 0.33 | 0.04 | 0.01 | 0.00 | | 0.15 | 0.09 | |
| Uniform Delay, d1 | 17.1 | 18.0 | 16.7 | 17.9 | 17.7 | 16.6 | 6.7 | 6.7 | | 7.2 | 7.0 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 0.4 | 0.4 | 0.1 | 1.1 | 0.3 | 0.1 | 0.0 | 0.0 | | 0.4 | 0.2 | |
| Delay (s) | 17.5 | 18.4 | 16.8 | 19.0 | 17.9 | 16.6 | 6.8 | 6.7 | | 7.6 | 7.3 | |
| Level of Service | B | B | B | B | B | B | A | A | | A | A | |
| Approach Delay (s) | | 17.9 | | | 17.9 | | | 6.8 | | | 7.4 | |
| Approach LOS | | B | | | B | | | A | | | A | |

| Intersection Summary | | |
|-----------------------------------|-------|---------------------------|
| HCM 2000 Control Delay | 15.5 | HCM 2000 Level of Service |
| HCM 2000 Volume to Capacity ratio | 0.23 | B |
| Actuated Cycle Length (s) | 52.4 | Sum of lost time (s) |
| Intersection Capacity Utilization | 48.8% | 15.6 |
| Analysis Period (min) | 15 | ICU Level of Service |
| | | A |

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

6: Atchison Drive & Boyces Creek/Site Access

12/8/2017



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------------|-------------|-------------|-------------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕ | | | ↕ | | | ↕ | | | ↕ | |
| Traffic Volume (veh/h) | 2 | 0 | 32 | 49 | 0 | 1 | 2 | 25 | 32 | 1 | 145 | 1 |
| Future Volume (Veh/h) | 2 | 0 | 32 | 49 | 0 | 1 | 2 | 25 | 32 | 1 | 145 | 1 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.50 | 0.92 | 0.73 | 0.92 | 0.92 | 0.92 | 0.50 | 0.79 | 0.92 | 0.92 | 0.89 | 0.25 |
| Hourly flow rate (vph) | 4 | 0 | 44 | 53 | 0 | 1 | 4 | 32 | 35 | 1 | 163 | 4 |
| Pedestrians | | 1 | | | | | | | | | | |
| Lane Width (m) | | 3.7 | | | | | | | | | | |
| Walking Speed (m/s) | | 1.1 | | | | | | | | | | |
| Percent Blockage | | 0 | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | 80 | | | | |
| pX, platoon unblocked | | | | | | | | | | | | |
| vC, conflicting volume | 226 | 243 | 166 | 268 | 228 | 50 | 168 | | | 67 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 226 | 243 | 166 | 268 | 228 | 50 | 168 | | | 67 | | |
| 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 | 95 | 92 | 100 | 100 | 100 | | | 100 | | |
| cM capacity (veh/h) | 729 | 656 | 883 | 648 | 669 | 1019 | 1421 | | | 1535 | | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 48 | 54 | 71 | 168 | | | | | | | | |
| Volume Left | 4 | 53 | 4 | 1 | | | | | | | | |
| Volume Right | 44 | 1 | 35 | 4 | | | | | | | | |
| cSH | 868 | 652 | 1421 | 1535 | | | | | | | | |
| Volume to Capacity | 0.06 | 0.08 | 0.00 | 0.00 | | | | | | | | |
| Queue Length 95th (m) | 1.3 | 2.1 | 0.1 | 0.0 | | | | | | | | |
| Control Delay (s) | 9.4 | 11.0 | 0.4 | 0.0 | | | | | | | | |
| Lane LOS | A | B | A | A | | | | | | | | |
| Approach Delay (s) | 9.4 | 11.0 | 0.4 | 0.0 | | | | | | | | |
| Approach LOS | A | B | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 3.2 | | | | | | | | | |
| Intersection Capacity Utilization | | | 24.4% | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

HCM Signalized Intersection Capacity Analysis

3: Town Hall Access/Atchison Drive & Old Church Road

12/13/2017



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|------------------------|-------|------|------|------|------|------|-------|------|------|------|------|------|
| Lane Configurations | | | | | | | | | | | | |
| Traffic Volume (vph) | 152 | 205 | 1 | 13 | 236 | 82 | 84 | 2 | 20 | 59 | 1 | 80 |
| Future Volume (vph) | 152 | 205 | 1 | 13 | 236 | 82 | 84 | 2 | 20 | 59 | 1 | 80 |
| Ideal Flow (vphpl) | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 | 1900 |
| Total Lost time (s) | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 8.2 | 8.2 | | 8.2 | 8.2 | |
| Lane Util. Factor | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frbp, ped/bikes | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | 0.98 | 1.00 | 1.00 | | 1.00 | 0.99 | |
| Flpb, ped/bikes | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Frt | 1.00 | 1.00 | 0.85 | 1.00 | 1.00 | 0.85 | 1.00 | 0.86 | | 1.00 | 0.86 | |
| Flt Protected | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | 1.00 | 0.95 | 1.00 | | 0.95 | 1.00 | |
| Satd. Flow (prot) | 1805 | 3544 | 1594 | 1820 | 3544 | 1597 | 1821 | 1584 | | 1755 | 1562 | |
| Flt Permitted | 0.58 | 1.00 | 1.00 | 0.61 | 1.00 | 1.00 | 0.69 | 1.00 | | 0.73 | 1.00 | |
| Satd. Flow (perm) | 1097 | 3544 | 1594 | 1165 | 3544 | 1597 | 1324 | 1584 | | 1341 | 1562 | |
| Peak-hour factor, PHF | 0.87 | 0.89 | 0.25 | 0.65 | 0.83 | 0.55 | 0.40 | 0.50 | 0.45 | 0.72 | 0.25 | 0.81 |
| Adj. Flow (vph) | 175 | 230 | 4 | 20 | 284 | 149 | 210 | 4 | 44 | 82 | 4 | 99 |
| RTOR Reduction (vph) | 0 | 0 | 2 | 0 | 0 | 88 | 0 | 28 | 0 | 0 | 63 | 0 |
| Lane Group Flow (vph) | 175 | 230 | 2 | 20 | 284 | 61 | 210 | 20 | 0 | 82 | 40 | 0 |
| Confl. Peds. (#/hr) | 1 | | 2 | 2 | | 1 | 2 | | | | | 2 |
| Heavy Vehicles (%) | 1% | 3% | 0% | 0% | 3% | 0% | 0% | 0% | 5% | 4% | 0% | 4% |
| Turn Type | Perm | NA | Perm | Perm | NA | Perm | Perm | NA | | Perm | NA | |
| Protected Phases | | 4 | | | 8 | | | 2 | | | 6 | |
| Permitted Phases | 4 | | 4 | 8 | | 8 | 2 | | | 6 | | |
| Actuated Green, G (s) | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 25.8 | 25.8 | | 25.8 | 25.8 | |
| Effective Green, g (s) | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 28.6 | 25.8 | 25.8 | | 25.8 | 25.8 | |
| Actuated g/C Ratio | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.37 | 0.37 | | 0.37 | 0.37 | |
| Clearance Time (s) | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 7.4 | 8.2 | 8.2 | | 8.2 | 8.2 | |
| Lane Grp Cap (vph) | 448 | 1447 | 651 | 475 | 1447 | 652 | 487 | 583 | | 494 | 575 | |
| v/s Ratio Prot | | 0.06 | | | 0.08 | | | 0.01 | | | 0.03 | |
| v/s Ratio Perm | c0.16 | | 0.00 | 0.02 | | 0.04 | c0.16 | | | 0.06 | | |
| v/c Ratio | 0.39 | 0.16 | 0.00 | 0.04 | 0.20 | 0.09 | 0.43 | 0.03 | | 0.17 | 0.07 | |
| Uniform Delay, d1 | 14.6 | 13.1 | 12.3 | 12.5 | 13.3 | 12.7 | 16.6 | 14.1 | | 14.9 | 14.3 | |
| Progression Factor | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | | 1.00 | 1.00 | |
| Incremental Delay, d2 | 2.6 | 0.2 | 0.0 | 0.2 | 0.3 | 0.3 | 2.8 | 0.1 | | 0.7 | 0.2 | |
| Delay (s) | 17.1 | 13.3 | 12.3 | 12.6 | 13.6 | 13.0 | 19.4 | 14.2 | | 15.6 | 14.6 | |
| Level of Service | B | B | B | B | B | B | B | B | | B | B | |
| Approach Delay (s) | | 14.9 | | | 13.4 | | | 18.4 | | | 15.0 | |
| Approach LOS | | B | | | B | | | B | | | B | |

Intersection Summary

| | | | |
|-----------------------------------|-------|---------------------------|------|
| HCM 2000 Control Delay | 15.1 | HCM 2000 Level of Service | B |
| HCM 2000 Volume to Capacity ratio | 0.41 | | |
| Actuated Cycle Length (s) | 70.0 | Sum of lost time (s) | 15.6 |
| Intersection Capacity Utilization | 57.6% | ICU Level of Service | B |
| Analysis Period (min) | 15 | | |
| c Critical Lane Group | | | |

HCM Unsignalized Intersection Capacity Analysis
 6: Atchison Drive & Boyces Creek/Site Access

12/13/2017



| Movement | EBL | EBT | EBR | WBL | WBT | WBR | NBL | NBT | NBR | SBL | SBT | SBR |
|-----------------------------------|-------------|-------------|-------------|-------------|----------------------|------|------|------|------|------|------|------|
| Lane Configurations | | ↕ | | | ↕ | | | ↕ | | | ↕ | |
| Traffic Volume (veh/h) | 2 | 0 | 13 | 64 | 0 | 1 | 29 | 138 | 84 | 2 | 81 | 3 |
| Future Volume (Veh/h) | 2 | 0 | 13 | 64 | 0 | 1 | 29 | 138 | 84 | 2 | 81 | 3 |
| Sign Control | | Stop | | | Stop | | | Free | | | Free | |
| Grade | | 0% | | | 0% | | | 0% | | | 0% | |
| Peak Hour Factor | 0.25 | 0.92 | 0.65 | 0.92 | 0.92 | 0.92 | 0.81 | 0.85 | 0.92 | 0.92 | 0.86 | 0.38 |
| Hourly flow rate (vph) | 8 | 0 | 20 | 70 | 0 | 1 | 36 | 162 | 91 | 2 | 94 | 8 |
| Pedestrians | | | | | | | | | | | | |
| Lane Width (m) | | | | | | | | | | | | |
| Walking Speed (m/s) | | | | | | | | | | | | |
| Percent Blockage | | | | | | | | | | | | |
| Right turn flare (veh) | | | | | | | | | | | | |
| Median type | | | | | | | | None | | | None | |
| Median storage veh | | | | | | | | | | | | |
| Upstream signal (m) | | | | | | | | 80 | | | | |
| pX, platoon unblocked | 0.96 | 0.96 | | 0.96 | 0.96 | 0.96 | | | | 0.96 | | |
| vC, conflicting volume | 382 | 427 | 98 | 402 | 386 | 208 | 102 | | | 253 | | |
| vC1, stage 1 conf vol | | | | | | | | | | | | |
| vC2, stage 2 conf vol | | | | | | | | | | | | |
| vCu, unblocked vol | 331 | 377 | 98 | 351 | 334 | 148 | 102 | | | 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 % | 99 | 100 | 98 | 87 | 100 | 100 | 98 | | | 100 | | |
| cM capacity (veh/h) | 586 | 516 | 963 | 554 | 546 | 859 | 1503 | | | 1317 | | |
| Direction, Lane # | EB 1 | WB 1 | NB 1 | SB 1 | | | | | | | | |
| Volume Total | 28 | 71 | 289 | 104 | | | | | | | | |
| Volume Left | 8 | 70 | 36 | 2 | | | | | | | | |
| Volume Right | 20 | 1 | 91 | 8 | | | | | | | | |
| cSH | 814 | 557 | 1503 | 1317 | | | | | | | | |
| Volume to Capacity | 0.03 | 0.13 | 0.02 | 0.00 | | | | | | | | |
| Queue Length 95th (m) | 0.8 | 3.3 | 0.6 | 0.0 | | | | | | | | |
| Control Delay (s) | 9.6 | 12.4 | 1.1 | 0.2 | | | | | | | | |
| Lane LOS | A | B | A | A | | | | | | | | |
| Approach Delay (s) | 9.6 | 12.4 | 1.1 | 0.2 | | | | | | | | |
| Approach LOS | A | B | | | | | | | | | | |
| Intersection Summary | | | | | | | | | | | | |
| Average Delay | | | 3.0 | | | | | | | | | |
| Intersection Capacity Utilization | | | 37.6% | | ICU Level of Service | | | | A | | | |
| Analysis Period (min) | | | 15 | | | | | | | | | |

Appendix F – Parking Data

Saturday, November 18, 2017

Parking Utilization Survey

Location: 9500 & 9506 Markham Road

Land Use: Residential (434 Units) & Commercial (1,338.42m2)

Time: 10am-2pm

| Time | Visitors | Commercial |
|---------------------|---------------------------|---------------------------|
| 10:00 AM | 43 | 24 |
| 10:30 AM | 44 | 22 |
| 11:00 AM | 44 | 28 |
| 11:30 AM | 43 | 29 |
| 12:00 PM | 45 | 32 |
| 12:30 PM | 47 | 34 |
| 1:00 PM | 46 | 33 |
| 1:30 PM | 48 | 32 |
| 2:00 PM | 50 | 31 |
| 2:30 PM | 47 | 30 |
| 3:00 PM | 45 | 26 |
| 3:30 PM | 44 | 20 |
| MAX | 50 | 34 |
| PARKING RATE | 0.12 spaces / unit | 0.76 spaces / 30m2 |

Tuesday, November 21, 2017

Parking Utilization Survey

Location: 9500 & 9506 Markham Road

Land Use: Residential (434 Units) & Commercial (1,338.42m2)

Time: 4pm-11pm & 12am-6am

| Time | Visitor | Commercial |
|---------------------|---------------------------|---------------------------|
| 4:00 PM | 39 | 17 |
| 4:30 PM | 38 | 15 |
| 5:00 PM | 39 | 18 |
| 5:30 PM | 39 | 17 |
| 6:00 PM | 35 | 20 |
| 6:30 PM | 37 | 21 |
| 7:00 PM | 33 | 16 |
| 7:30 PM | 34 | 12 |
| 8:00 PM | 33 | 12 |
| 8:30 PM | 30 | 13 |
| 9:00 PM | 31 | 11 |
| 9:30 PM | 29 | 10 |
| 10:00 PM | 25 | 6 |
| 10:30 PM | 26 | 4 |
| 11:00 PM | 26 | 4 |
| MAX | 39 | 21 |
| PARKING RATE | 0.09 spaces / unit | 0.47 spaces / 30m2 |

| Time | TENANT |
|---------------------|---------------------------|
| 12:00 AM | 360 |
| 12:30 AM | 360 |
| 1:00 AM | 367 |
| 1:30 AM | 365 |
| 2:00 AM | 376 |
| 2:30 AM | 382 |
| 3:00 AM | 384 |
| 3:30 AM | 381 |
| 4:00 AM | 381 |
| 4:30 AM | 378 |
| 5:00 AM | 369 |
| 5:30 AM | 366 |
| 6:00 AM | 363 |
| MAX | 384 |
| PARKING RATE | 0.88 spaces / unit |

| Use | MIN PARKING REQUIREMENT |
|------------|-------------------------|
| Tenant | 0.88 spaces / unit |
| Visitor | 0.12 spaces / unit |
| Commercial | 0.76 spaces / 30m2 |

Saturday, November 25, 2017

Parking Utilization Survey

Location: 60 South Town Centre Blvd & 50 Clegg Road

Land Use: Residential (532 Units) & Commercial (890m²)

Time: 10am-2pm

Surveyor: Annosan Srikantha

| Time | Visitors | Commercial |
|--------------|--------------------|--------------------------------|
| 10:00 AM | 42 | 12 |
| 10:30 AM | 43 | 14 |
| 11:00 AM | 44 | 12 |
| 11:30 AM | 41 | 13 |
| 12:00 PM | 43 | 14 |
| 12:30 PM | 49 | 19 |
| 1:00 PM | 52 | 15 |
| 1:30 PM | 51 | 16 |
| 2:00 PM | 49 | 17 |
| 2:30 PM | 50 | 14 |
| 3:00 PM | 46 | 10 |
| 3:30 PM | 45 | 12 |
| MAX | 52 | 19 |
| PARKING RATE | 0.10 spaces / unit | 0.64 spaces / 30m ² |

Wednesday, November 22, 2017

Parking Utilization Survey

Location: 60 South Town Centre Blvd & 50 Clegg Road

Land Use: Residential (532 Units) & Commercial (890m²)

Time: 4pm-11pm & 12am-6am

| Time | Visitor | Commercial |
|--------------|--------------------|--------------------------------|
| 4:00 PM | 26 | 9 |
| 4:30 PM | 22 | 12 |
| 5:00 PM | 24 | 10 |
| 5:30 PM | 26 | 10 |
| 6:00 PM | 28 | 8 |
| 6:30 PM | 32 | 11 |
| 7:00 PM | 34 | 11 |
| 7:30 PM | 39 | 12 |
| 8:00 PM | 35 | 11 |
| 8:30 PM | 31 | 8 |
| 9:00 PM | 18 | 7 |
| 9:30 PM | 22 | 7 |
| 10:00 PM | 21 | 5 |
| 10:30 PM | 22 | 5 |
| 11:00 PM | 23 | 3 |
| MAX | 39 | 12 |
| PARKING RATE | 0.07 spaces / unit | 0.40 spaces / 30m ² |

| Time | TENANT |
|--------------|--------------------|
| 12:00 AM | 472 |
| 12:30 AM | 480 |
| 1:00 AM | 486 |
| 1:30 AM | 490 |
| 2:00 AM | 492 |
| 2:30 AM | 493 |
| 3:00 AM | 496 |
| 3:30 AM | 495 |
| 4:00 AM | 495 |
| 4:30 AM | 493 |
| 5:00 AM | 492 |
| 5:30 AM | 490 |
| 6:00 AM | 486 |
| MAX | 496 |
| PARKING RATE | 0.93 spaces / unit |

| Use | MIN PARKING REQUIREMENT |
|------------|--------------------------------|
| Tenant | 0.93 spaces / unit |
| Visitor | 0.10 spaces / unit |
| Commercial | 0.64 spaces / 30m ² |