



**BA Group**

# **NORVAL UNITED CHURCH PROPOSED RESIDENTIAL DEVELOPMENT**

Transportation Considerations Report  
Official Plan Amendment & Zoning By-law Amendment Application  
Town of Halton Hills

Prepared For: KPMB Architects

December 16, 2022



**MOVEMENT  
IN URBAN  
ENVIRONMENTS**  
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# TABLE OF CONTENTS

<b>1.0</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Background / Existing Site .....	1
1.2	Scope of Review.....	4
<b>2.0</b>	<b>PROPOSED DEVELOPMENT .....</b>	<b>5</b>
2.1	Overview .....	5
2.2	Site Access.....	5
2.3	Vehicular Parking .....	6
2.4	Bicycle Parking .....	6
2.5	Loading .....	6
2.6	Pick-up / Drop-off.....	6
<b>3.0</b>	<b>AREA TRANSPORTATION CONTEXT .....</b>	<b>8</b>
3.1	Area Road Context .....	8
3.2	Area Transit Context.....	13
3.3	Area Cycling Network .....	14
3.4	Area Pedestrian Context.....	17
3.5	Area Travel Behaviour – Mode Share.....	20
<b>4.0</b>	<b>TRANSPORTATION DEMAND MANAGEMENT .....</b>	<b>21</b>
4.1	TDM Plan Strategies and Initiatives .....	21
<b>5.0</b>	<b>VEHICULAR PARKING CONSIDERATIONS.....</b>	<b>23</b>
5.1	Standard Parking Requirements .....	23
5.2	Accessible Parking Requirements.....	25
5.3	Proposed Parking Supply and Strategy .....	26
5.4	Appropriateness of the Proposed Parking Supply.....	26
5.5	Parking Summary .....	36
<b>6.0</b>	<b>BICYCLE PARKING CONSIDERATIONS.....</b>	<b>37</b>
6.1	Minimum Bicycle Parking Requirements.....	37
6.2	Proposed Bicycle Parking Supply.....	37
<b>7.0</b>	<b>LOADING CONSIDERATIONS.....</b>	<b>38</b>
7.1	Minimum Loading Requirements .....	38
7.2	Proposed Loading Supply .....	38
<b>8.0</b>	<b>PICK-UP / DROP-OFF CONSIDERATIONS.....</b>	<b>39</b>
<b>9.0</b>	<b>TRAVEL DEMAND FORECAST.....</b>	<b>40</b>



9.1	Existing Traffic Volumes .....	40
9.2	Background Traffic Volumes .....	42
9.3	Site Traffic .....	44
9.4	Future Total Traffic Volumes .....	46
<b>10.0</b>	<b>TRAFFIC OPERATIONS ANALYSIS .....</b>	<b>49</b>
10.1	Analysis Methodology .....	49
10.2	Analysis Parameters .....	50
10.3	Signalized Intersections .....	51
10.4	Unsignalized Intersections .....	53
10.5	Sensitivity Analysis Without Signal.....	54
<b>11.0</b>	<b>SUMMARY AND CONCLUSIONS .....</b>	<b>55</b>

## TABLE OF APPENDICES

Appendix A:	Reduced Scale Architectural Plans
Appendix B:	Norval United Church Parking Demand Surveys
Appendix C:	Proxy Church Parking Demand Surveys
Appendix D:	Vehicle Manoeuvring Diagrams
Appendix E:	TTS Queries
Appendix F:	Traffic Data
Appendix G:	Vision Georgetown Extract
Appendix H:	Signal Timing Plans
Appendix I:	Synchro Analysis Worksheets



## LIST OF TABLES

Table 1	Existing Area Road Network.....	8
Table 2	Area Cycling Network.....	14
Table 3	Area Residential Mode Split (2016 TTS Zones – 4158, 4160 & 4161).....	20
Table 4	Recommended Site TDM Measures.....	22
Table 5	Zoning By-Law Vehicular Parking Requirements .....	23
Table 6	Proposed Minimum Vehicular Parking Requirements .....	24
Table 7	Residential Parking Rates within Halton Region .....	29
Table 8	Market vs. Rental Residential Parking Rates within Ontario .....	30
Table 9	Observed Peak Parking Demand Survey – Norval United Church .....	33
Table 10	Church Parking Demand Proxy Site – St. James United Church, Hamilton.....	34
Table 11	Place of Worship Parking Standards in Municipalities within Ontario .....	35
Table 12	Halton Hills Zoning By-Law 2010-0050 Loading Requirements .....	38
Table 13	Existing Traffic Count Summary .....	40
Table 14	Site Trip Distribution.....	44
Table 15	Vehicle Trip Generation .....	45
Table 16	Area Residential Mode Split.....	45
Table 17	Signalized Intersection Analysis Summary.....	51
Table 18	Unsignalized Intersection Analysis Summary.....	53
Table 19	Unsignalized Eighth Line / Danby Road Analysis Summary .....	54



## LIST OF FIGURES

Figure 1:	Site Location .....	2
Figure 2:	Site Context.....	3
Figure 3:	Proposed Site Plan .....	7
Figure 4:	Existing and Planned Area Road Network.....	10
Figure 5:	Existing Lane Configuration and Traffic Control .....	11
Figure 6:	Future Lane Configuration and Traffic Control .....	12
Figure 7:	Existing and Planned Area Cycling Network .....	16
Figure 8:	Existing and Planned Area Pedestrian Network .....	19
Figure 9:	Existing Traffic Volumes .....	41
Figure 10:	2031 Future Background Traffic Volumes .....	43
Figure 11:	New Site Traffic Volumes.....	47
Figure 12:	2031 Future Total Traffic Volumes.....	48



## 1.0 INTRODUCTION

BA Group has been retained by KPMB Architects to provide transportation consulting services in relation to the proposed residential development at the property municipally addressed as 14015 Danby Road (referred to herein as “the Site” or “proposed development”) in Georgetown, Town of Halton Hills. The Site is generally located at the northeast quadrant of the major intersection of Eighth Line and 10 Side Road in the community of Norval. Specifically, the Site is bounded by the Gellert Community Park to the north and east, Danby Road to the south, and Eighth Line to the west.

A concurrent Official Plan Amendment (OPA) and Zoning By-law Amendment application (ZBA) is being made to permit the proposed development of 157 residential units to the existing church use provided on-site today.

The following report provides a review of the transportation-related impacts of the proposed development, as well as detailed findings from BA Group’s review.

## 1.1 BACKGROUND / EXISTING SITE

The Site is currently occupied by the Norval United Church (NUC) development that was permitted through the minor variance process. By way of context, the existing church development was part of a multi-phase development proposal, which included an initial phase that was approved (2016) and fully constructed (2020), and a second phase (subsequent church expansion) that is no longer being pursued.

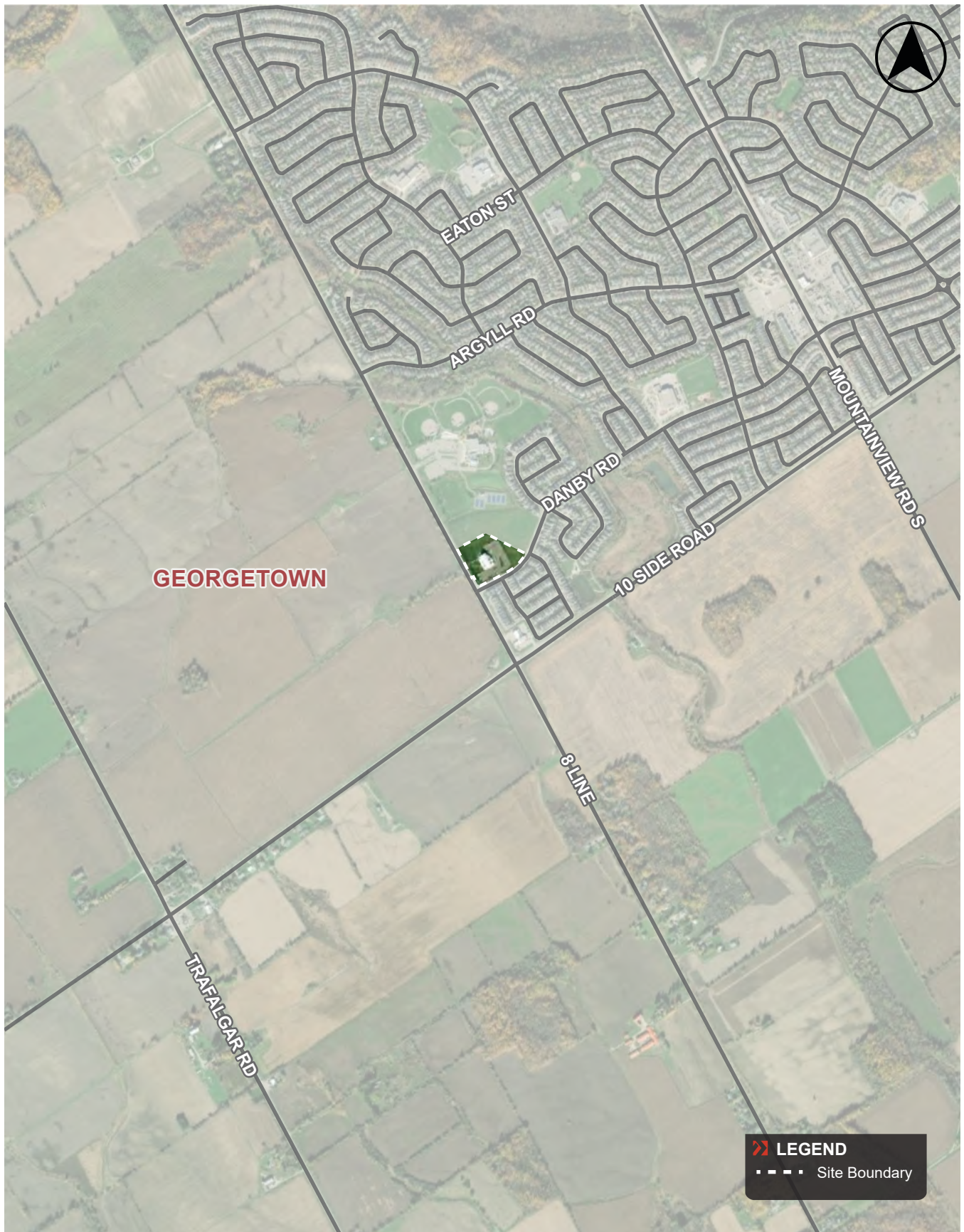
The existing church has a maximum capacity of 242 seats and is approximately 1,475 square metres in gross floor area (GFA). In addition, the church is surrounded by a surface parking lot comprising approximately 160 spaces. A total of five (5) bicycle spaces adjacent to the main entrance are also provided on-site today.

There is currently one (1) vehicular Site access from Danby Road, located approximately 90 metres east of the Eighth Line and Danby Road intersection (centreline-to-centreline). The existing loading arrangements for the church are being facilitated through a garbage enclosure at the northwest side of the property. Pedestrian pathways are provided along the perimeter of the building for convenient, on-foot access to other areas of the property.

The existing church building, loading enclosure, portion of the surface parking, and pedestrian pathways are planned to remain, following the redevelopment of the Site.

The Site location and context are illustrated in **Figure 1** and **Figure 2**.





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Aerial maps provided courtesy of Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, the GIS User Community and/or Google Earth/Maps.

**FIGURE 1 SITE LOCATION**





**FIGURE 2 SITE CONTEXT**

## 1.2 SCOPE OF REVIEW

BA Group has undertaken a review of the key transportation related aspects (i.e. traffic, parking, loading and bicycles) of the proposed OPA/ZBA application being submitted to the Town of Halton Hills to permit the proposed development. Key transportation related aspects reviewed include:

### Transportation Context

- A description of the existing transportation context of the Site considering the area road network, transit system and other non-automobile dependent travel options;
- A description of any future transportation related changes / improvements to the area context (i.e. transit improvements, other non-automobile dependent travel options, etc.);

### Development Plan

- An overview of the integrated on-site and area physical and operational transportation elements and strategies that enable the minimization of automobile-dependent travel for prospective residents, and visitors while meeting the practical and operational needs of mixed-use development;
- A review of the transportation elements of the proposed development plan including vehicular access and circulation, loading, and parking facilities;

### Site Planning

- A review of the adequacy of the vehicular parking supply provisions of the proposed development plans;
- A review of the loading space provisions for the proposed development plans;
- A review of the bicycle parking supply provisions for the proposed development plans;
- A review of the functionality and appropriateness of the proposed vehicular facilities incorporated into the Site plan including loading / garbage collection facility arrangements;

### Travel Demand Forecasting

- Assessment of the existing traffic activity patterns and volumes in the study area during the key weekday morning and afternoon peak periods;
- A comprehensive review of traffic changes that may occur in the area in the future with the development of a number of other area development projects;
- A review of the traffic and other trip generation characteristics of the proposed development; and

### Traffic Operations Review

- A review of traffic operations at intersections in the area under existing and future conditions including an assessment of the operational impacts of the proposed development.

## 2.0 PROPOSED DEVELOPMENT

### 2.1 OVERVIEW

A subsequent phase to the existing Norval United Church (NUC) development recognizes the opportunity to create a growing community hub at the Site to incorporate a mix of compatible uses in future years.

The proposed development includes 157 residential apartment units to be incorporated with the existing church on the Site. It is intended that the new residential uses be a mix of affordable and rental units. Changes to the existing surface parking lot and landscape area have been made to accommodate the transportation needs related to the revised development. These changes to the Site include the removal and re-construction of parking spaces, as well as the inclusion of a formal loading facility, pick-up / drop-off (PUDO) facility, and parking ramp, to accommodate all proposed uses.

The proposed Site Plan is illustrated in **Figure 3**. Reduced scale architectural plans are included for reference in **Appendix A**.

### 2.2 SITE ACCESS

#### 2.2.1 Vehicular Access

Vehicular access is currently provided via two (2) driveways. These include the existing access on Danby Road located directly across Sierra Crescent and the new right-in / right-out access on Eighth Line located to the north of the Site.

#### 2.2.2 Bicycle Access

Access to the existing bicycle parking area, which is proposed to be maintained, is provided via the Site driveways on Danby Road and Eighth Line, should visitors arrive to the Site with a bicycle.

#### 2.2.3 Pedestrian Access

External pedestrian access to the Site is provided through various sidewalk connections along Danby Road, Eighth Line, and the perimeter of the building. Internal pedestrian access to the existing church and new residential building will be provided via walkways and building entrances surrounding the existing church, as well as through a series of pedestrian crosswalks permeating the property.

#### 2.2.4 Loading Access

Loading access will be provided via a driveway on Danby Road to the formal facility located at-grade to the northeast of the Site. The existing garbage enclosure for the church will be relocated in proximity to the formal residential loading facility.

## 2.3 VEHICULAR PARKING

It is proposed to provide a total parking supply of 298 parking spaces, including 197 resident spaces, 40 residential visitor spaces, and 61 church spaces. Parking is provided in a single-level underground parking garage and in a surface parking lot. Of the total parking supply, 10 accessible spaces will be provided for all uses. Further details are provided in **Section 5.0**.

## 2.4 BICYCLE PARKING

Based upon the existing conditions, five (5) bicycle parking spaces are provided at the primary entrance of the church facing Danby Road, which is proposed to be maintained. Further details are provided in **Section 6.0**.

## 2.5 LOADING

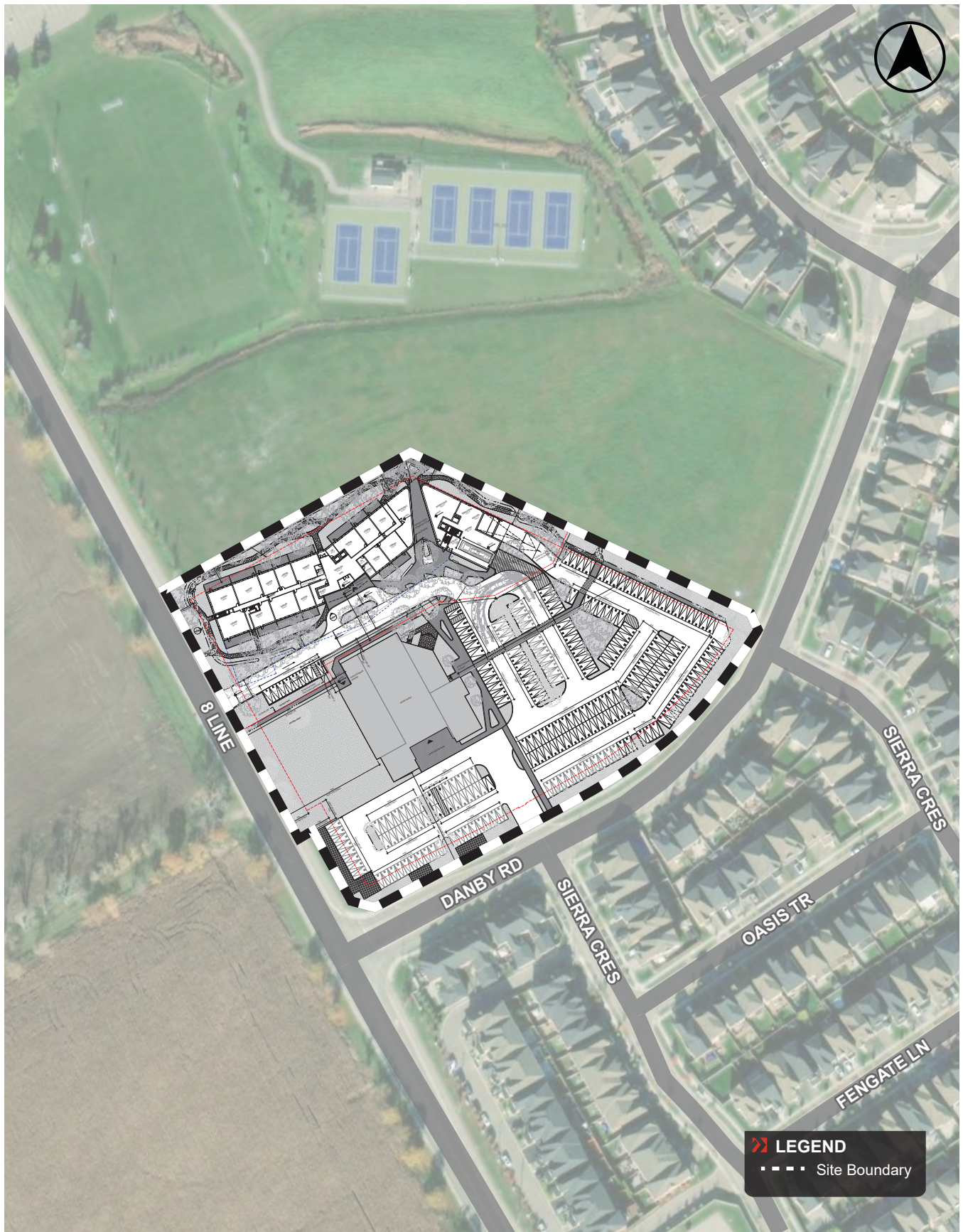
In addition to the garbage enclosure being maintained for the existing church, one (1) loading space is proposed at-grade in the northeast portion of the Site, adjacent to the proposed underground parking ramp. A garbage room is proposed to be located in front of the loading space, where access is provided to and from Danby Road. Further details are provided in **Section 7.0**.

## 2.6 PICK-UP / DROP-OFF

There is currently a drive aisle located adjacent to the existing primary entrance of the church PUDO purposes, which will be maintained in future conditions. The drive aisle holds a capacity of four (4) spaces. Access to the pick-up / drop-off area is provided to and from Danby Road.

In addition to the existing drive aisle, a new formal PUDO facility is being proposed, located between the church and the residential building. The facility will be a loop configuration with a right-in / right-out access on Eighth Line. This loop facility holds a capacity of two (2) spaces. Further details on the proposed facility are provided in **Section 8.0**.





**FIGURE 3 PROPOSED SITE PLAN**

## 3.0 AREA TRANSPORTATION CONTEXT

### 3.1 AREA ROAD CONTEXT

#### 3.1.1 Existing Area Road Network

The Site is primarily served by the existing road network. The property is accessible to a major arterial and minor arterial road, including 10 Side Road and Eighth Line, respectively. In addition, one local road adjacent to the Site includes Danby Road, which provides one of two accesses to the Site. Other nearby local roads, including Sierra Crescent and Northwest Court, are located to the south and east of the Site that provide access to the residential uses within the area.

Further details on the area road network is summarized in **Table 1**. The existing road network in the immediate Site vicinity is illustrated in **Figure 4**. In addition, the existing lane configuration and traffic control systems in place for the roads in the vicinity of the Site are illustrated in **Figure 5**.

**TABLE 1 EXISTING AREA ROAD NETWORK**

Road Type	Road Name	Orientation	Parking Regulations	Posted Speed Limit	Description of Existing Condition
Major Arterial	10 Side Road	North - South	No on-street parking permitted	80 km/h	10 Side Road is a north-south major arterial road. In the vicinity of the Site, it has a 2-lane cross section consisting of 1 northbound lane and 1 southbound lane. Auxiliary lanes are also provided for left and right turns at intersections.
Minor Arterial	Eighth Line	East - West	No on-street parking permitted	70 km/h	Eighth Line is an east-west minor arterial road. In the vicinity of the Site, it has a 2-lane cross section consisting of 1 eastbound lane and 1 westbound lane. Auxiliary lanes are also provided for left and right turns at intersections.
Collector	Danby Road	North - South	Parking permitted on northbound lane	40 km/h	Danby is a north-south proposed collector road. In the vicinity of the Site, it has a 2-lane cross section consisting of 1 northbound lane and 1 southbound lane. Auxiliary lanes are also provided for left and right turns at intersections. One diamond lane is present in each direction restricted to bicycles.
Local Road	Sierra Crescent	North - South and East - West	Parking permitted on both sides of the street	40 km/h	Sierra Crescent is a local road that generally runs in a north-south and east-west direction. In the vicinity of the Site, it has a 2-lane cross section with no line marking.
	Northwest Court	North - South and East - West	Parking permitted on both sides of the street	40 km/h	Northwest Court is a local road that generally runs in a north-south and east-west direction. In the vicinity of the Site, it has a 2-lane cross section with no line marking.

### 3.1.2 Planned Area Road Network

#### 3.1.2.1 Vision Georgetown Secondary Plan

In July 2018, Town of Halton Hills Official Plan Amendment (OPA) #32 was adopted to initiate a land use planning study for the Vision Georgetown Community. The Vision Georgetown community lands are bounded by Trafalgar Road to the west, Eighth Line to the east, 15 Side Road to the north, and 10 Side Road to the south. The study area is located immediately west of the Site.

As part of the Vision Georgetown Complete Transportation Network, as per Schedule H6-3, a new major collector north-south road (22.75-metre right-of-way), called Street 'A', is being planned in the centre of the study area, providing a connection between 15 Side Road and 10 Side Road. In addition, a minor collector east-west road (21-metre right-of-way), called Street 'D', is being planned as an extension from Danby Road in the east to Trafalgar Road in the west.

Since 2018, modifications to the Vision Georgetown Secondary Plan were made and the modified study was approved in September 2020. It is noted that the Vision Georgetown Secondary Plan is currently under appeal at the Local Planning Appeal Tribunal (LPAT).

The planned road network in the immediate Site vicinity is illustrated in **Figure 4**.

#### 3.1.2.2 Eighth Line Municipal Class Environmental Assessment Study

In June 2019, the Eighth Line Schedule C Municipal Class Environmental Assessment (EA) Study, from Steeles Avenue to Maple Avenue, is being undertaken by the Town to support increased population and greater demand on the Town's road network to the year 2031. The EA Study process is still underway, and as of June 2022, the EA Study is in the discretionary public contact point of Phase 3 (Alternative Design Concepts). Based upon the materials provided by Halton Hills, the preferred design solution to support the area growth consists of widening Eighth Line (e.g. from 2 lanes to 4 lanes) within the study area extents, improving the existing road infrastructure, and introducing active transportation facilities.

#### 3.1.2.3 On-site Road Improvements

As previously mentioned, it is proposed to provide an access on Eighth Line, in addition to the existing driveway access on Danby Road. This new access will have a right-in / right-out configuration and will add an enhanced level of circulation, primarily serving the new PUDO facility. Moreover, it is proposed to provide a traffic signal at the intersection of Eighth Line / Danby Road / Street 'D' as a result of the traffic operations analysis, as further discussed in **Section 10.0**. As such, **Figure 6** illustrates the future lane configuration and traffic control for the study area.





**FIGURE 4 EXISTING AND PLANNED AREA ROAD NETWORK**



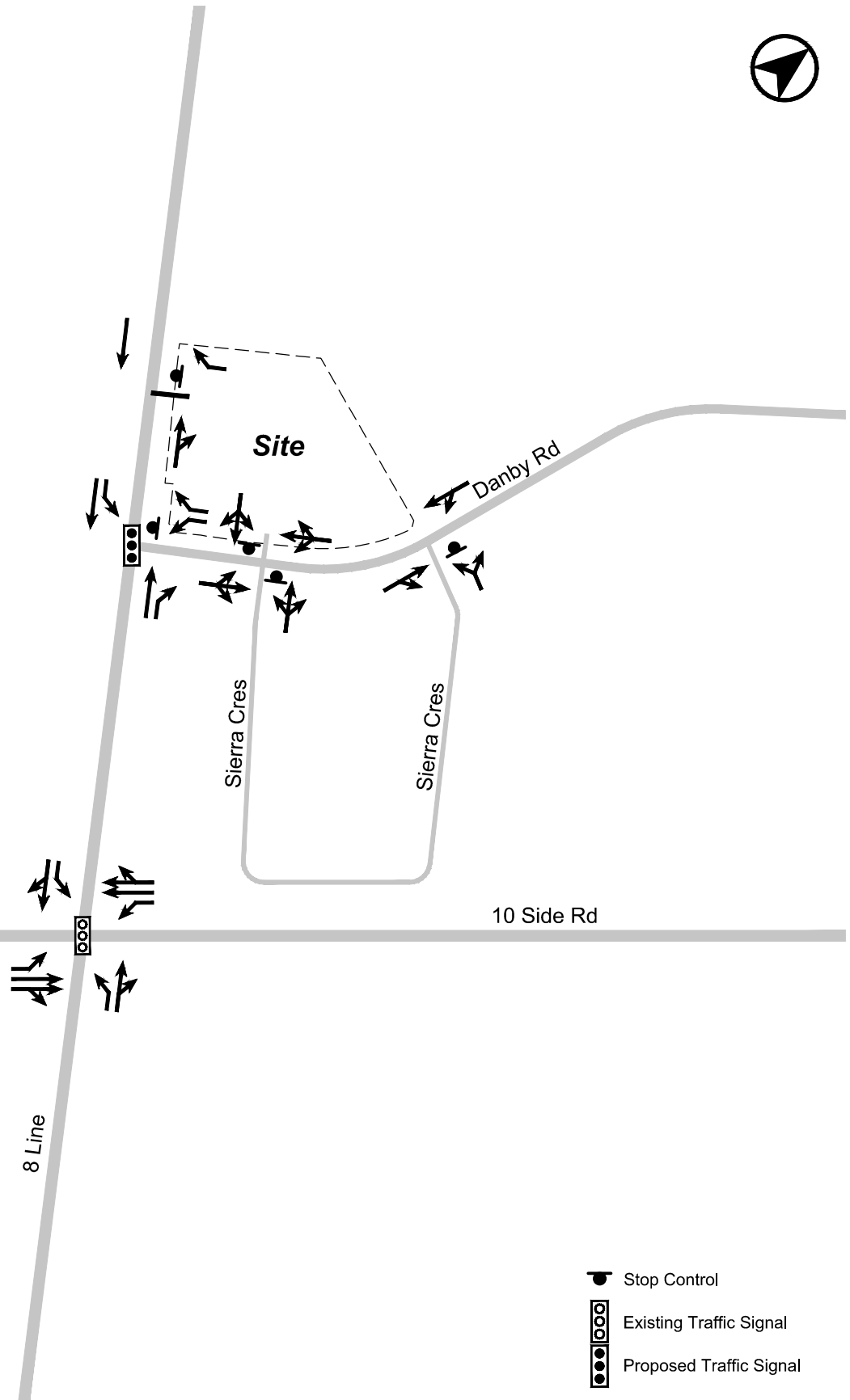
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**FIGURE 5 EXISTING LANE CONFIGURATION AND TRAFFIC CONTROL**





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**FIGURE 6 FUTURE LANE CONFIGURATION AND TRAFFIC CONTROL**

## **3.2 AREA TRANSIT CONTEXT**

### **3.2.1 Existing Transit Network**

The Site currently has limited access to local transit services within the immediate area. Despite this, the Georgetown GO Station is located approximately 6 kilometres north of the Site and can be reached within an approximate 8-minute drive.

As part of the Kitchener GO Line, the Georgetown GO Station provides an eastbound rapid transit connection to several other GO Stations such as Mount Pleasant Station, Brampton Station, and Bramalea Station. These stations provide access to east-west and north-south higher order transit services.




Additionally, the Town of Halton Hills provides transportation service, known as ActiVan, for seniors age 65 and older and residents with disabilities. This service is provided Monday to Friday between the hours of 7:30 a.m. and 6:00 p.m., and Saturday to Sunday between 8:00 a.m. and 4:00 p.m. Residents must book a trip ahead of time (e.g. 24 hours notice).

### 3.3 AREA CYCLING NETWORK

#### 3.3.1 Existing Cycling Infrastructure

The Site is currently accessible to cycling routes exist within a 500-metre radius. Key cycling facilities within the area include bike lanes and shared paths. **Table 2** lists the characteristics of cycling routes within the local area of the proposed development. The existing area cycling network is shown in **Figure 7**.

**TABLE 2 AREA CYCLING NETWORK**

Route	Cycling Infrastructure	Description	Image <sup>1</sup>
10 Side Road	Multi-use Trail (north side only)	10 Side Road provides cyclists a shared path with motorists on the road from 8 Line to Mountainview Road South.	 <p>10 Side Road at Eighth Line (facing west)</p>
Eighth Line	Multi-use Trail (east side only)	The Eighth Line bike path stretches from 10 Side Road to Main Street South. Pedestrians and cyclists share the path.	 <p>Eighth Line at 10 Side Road (facing north)</p>
Danby Road	Diamond Lane Present (each direction)	The Danby Road bike lanes stretch from 8 Line to Mountainview Road South. The bike lanes are indicated by pavement markings.	 <p>Danby Road at Eighth Line (facing east)</p>

Notes:

1. Images obtained from Google Maps Street View (2021).

### 3.3.2 Planned Cycling Infrastructure

A review of recent / ongoing transportation policies and plans indicate that the Site area will undergo substantial improvements to the cycling network, notably the area to the west. The planned area cycling network is shown in **Figure 7**.

#### 3.3.2.1 Cycling Master Plan

In 2012, the Town of Halton Hill has approved the updated Cycling Master Plan from 2010. This updated Master Plan provides a recommended bicycle route network of shared roadways (signed bicycle routes with pavement markings), conventional bicycle lanes, boulevard multi-use trails, and off-road trails. In addition, this updated plan recommends policies and programs that will support cycling by all types of cyclists.

Within a 500-metre radius, the existing cycling network is further connected through the proposed cycling infrastructure as recommended in the Town of Halton Hills Cycling Master Plan (2012). The existing bicycle infrastructure along the shared use path on Eighth Line is proposed to be revamped in the mid-term (10 year horizon) with the Town focusing on providing safer cycling infrastructure such as signed bicycles lanes along Eighth Line towards James Street. Furthermore, 10 Side Road is also included in the mid-term phase of the Cycling Master Plan with a northern extension of cycling lanes from Mountainview Road South to Winston Churchill Boulevard. Lastly, the already existing bike lanes on Danby road are expected in the mid-term, extending eastward to Tenth Line. The proposed cycling infrastructure mentioned above will improve connectivity for cyclists in the area.

#### 3.3.2.2 Vision Georgetown Secondary Plan

As per the Vision Georgetown Secondary Plan, a bicycle-friendly network is proposed immediately west of the Site, which includes a series of multi-use paths, trails, and bike lanes within the study area. Notably, a bike lane connection is proposed along Street 'D', which connects to the existing cycling infrastructure along Danby Road at the Site's location.

#### 3.3.2.3 Eighth Line EA Study

As mentioned in **Section 3.1.2.2**, the Eighth Line EA Study evaluates travel demand management, safety, and active transportation as key considerations for the transformation of Eighth Line. As such, it is planned to incorporate improvements along the Eighth Line corridor to enhance the level of safety and accessibility for cyclists.





**FIGURE 7 EXISTING AND PLANNED AREA CYCLING NETWORK**



## 3.4 AREA PEDESTRIAN CONTEXT

### 3.4.1 Existing Pedestrian Connections

Below discusses the key destinations and facilities that currently exist to support on-foot travel. The existing pedestrian context is illustrated in **Figure 8**.

#### 3.4.1.1 Key Destinations

The Site currently has access to a number of recreational facilities, stores, services, restaurants, or parks within a short to medium walking distance. The surrounding area has notable services, including a community centre located 400 metres north of the Site (approximate 4-minute walk) and a commercial plaza located 1.20 kilometres east (approximate 14-minute walk) of the Site. The following is a list of the pedestrian destinations located within 500 metres of the Site:

- Halton Hills Headquarters Fire Station – 400 metres (less than a 5-minute walk);
- Hidden Lake Park – 150 metres (approximate 1-minute walk);
- Gellert Boardwalk – 350 metres (approximate 4-minute walk) and,
- Gellert Community Park and Centre – 700 metres (approximate 9-minute walk).

#### 3.4.1.2 Pedestrian Facilities

Most roads within the Site vicinity have sidewalks along both sides of the road and are in suitable condition. Near the Site, the sidewalks along Danby Road have a landscape buffer between traffic and pedestrians for enhanced safety. Eighth Line provides a multi-use pathway on the north side, which can be shared between pedestrians and cyclists. In addition, Sierra Crescent and Northwest Court (to the south and northeast of the Site, respectively) have sidewalks on both sides of the road with landscape buffers.

### 3.4.2 Planned Pedestrian Connections

The evolving transportation policies and plans indicate that the Site area will undergo substantial improvements to the public realm. The planned pedestrian context is illustrated in **Figure 8**.

#### 3.4.2.1 Vision Georgetown Secondary Plan

As per the Vision Georgetown Secondary Plan, a pedestrian-friendly network is proposed immediately west of the Site, which includes a series of multi-use paths and trails within the study area. It was noted that the design of new collector road connections (e.g. Street 'A' and Street 'D') will provide pedestrian-supportive public realm that will promote a safe and walkable environment at the Site area.

#### 3.4.2.2 Eighth Line EA Study

As mentioned in **Section 3.1.2.2**, the Eighth Line EA Study evaluates travel demand management, safety, and active transportation as key considerations for the transformation of Eighth Line. As such, it is planned to incorporate improvements along the Eighth Line corridor to enhance the level of safety and accessibility for pedestrians.

### 3.4.2.3 On-site Pedestrian Improvements

A series of internal pedestrian pathways and crosswalks will be provided to increase the level of permeability for residents and visitors travelling on-foot to and from several areas, including the public sidewalk network, between buildings, and adjacent land uses (e.g. park to the east). This further provides convenient access and enhanced safety to and from the surface parking area and proposed pick-up / drop-off facility as they ingress or egress from the Site via automobile.

The existing and planned pathways internal to the Site is illustrated in **Figure 3**.



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Aerial maps provided courtesy of: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, the GIS User Community and/or Google Earth/Maps.

**FIGURE 8 EXISTING AND PLANNED AREA PEDESTRIAN NETWORK**

### 3.5 AREA TRAVEL BEHAVIOUR – MODE SHARE

To understand existing travel characteristics and patterns of the surrounding area, Transportation Tomorrow Survey data has been reviewed for the general site area. The Transportation Tomorrow Survey (TTS) is a comprehensive travel survey that is conducted in the Greater Toronto and Hamilton Area (GTHA) once every five years. The data set used for analysis is based upon information from the 2016 survey year.

A review of the travel characteristics of residential trips being made to / from the area during weekday peak periods is provided in the following sections. Travel behaviour characteristics for resident (home-based) travel during peak periods are summarized in **Table 3**.

**TABLE 3 AREA RESIDENTIAL MODE SPLIT (2016 TTS ZONES – 4158, 4160 & 4161)**

Mode	Morning Peak Period Outbound	Afternoon Peak Period Inbound
Auto Driver	69%	73%
Auto Passenger	23%	18%
Transit	3%	3%
Cycle	1%	2%
Walk	4%	5%
<b>Total</b>	<b>100%</b>	<b>100%</b>

Notes:

1. Based on 2016 TTS results for morning (6:00 - 8:59) and afternoon (15:00 - 17:59) peak traffic periods for TTS 2006 GTA Zones 4158, 4160 & 4161.
2. Auto passenger trips (includes auto passengers, school bus passengers and taxi passengers).

The 2016 TTS survey confirms a substantial proportion of travel is undertaken by using an automobile during the weekday morning and afternoon peak periods with approximately 69% and 73% residential trips being undertaken by an automobile, respectively.

The existing travel mode characteristics present an opportunity to shift travel patterns away from auto dependency towards active and sustainable modes of travel. This shift can be supported through a Travel Demand Strategy for the Site as discussed in **Section 4.0** as well as the continuing improvement of cycling and transit services and infrastructure in the area.

Detailed TTS queries for travel characteristics are attached in **Appendix E**.

## 4.0 TRANSPORTATION DEMAND MANAGEMENT

As part of the Town of Halton Hills Green Development Standards (GDS) Version 3, dated March 2021, a central element includes the adoption of a transportation demand management (TDM) plan for the project. The Plan will strive to influence the way people travel to and from the Site through a comprehensive suite of strategies.

These measures will include the application of various site design elements, alternative transportation offerings, property management, and operational policies, each of which have the goal of redistributing and reducing the travel demand of the project. Specifically, the primary goal is to reduce the overall reliance on single-occupant vehicles (SOV) while promoting the use of more active and sustainable modes of transportation, towards net-zero greenhouse gas emissions.

This TDM Plan has three primary objectives:

1. Reduce car dependence and the need for everyday SOV travel;
2. Improve pedestrian / cycling convenience to encourage non-automobile modes of transportation; and
3. Promote low-carbon modes of transportation, such as car-sharing and transit.

The Site has the potential to set a sustainable precedent of urban development in the Norval community. The TDM Plan aims to leverage the advantages imbedded within the design of the proposed development (i.e. it will be a compact, mixed-use development) to achieve its objectives.

### 4.1 TDM PLAN STRATEGIES AND INITIATIVES

The TDM Plan will serve as an initial guide for the design, development and implementation of the Site, as well as the ultimate operation of the facilities over time to maximize the travel demand sustainability of the project and allow the development to fully leverage its location relative to the growing range of recreation, retail, institutional, and residential uses in the vicinity of the Site. Strategies have been developed to support the use of non-auto modes of travel, and to encourage a change in travel behaviour that reduces automobile travel.

It is noteworthy that the recommended set of TDM strategies at this stage will be further refined throughout the planning approvals process. It is encouraged for the applicant to discuss the proposed content with Town staff upon initiating the development and Strategy.

The proposed TDM strategies are outlined in **Table 4**.



**TABLE 4 RECOMMENDED SITE TDM MEASURES**

<b>TDM Measure</b>	<b>Description</b>	<b>Intent</b>
<b>Pedestrian and Cycling Usage</b>		
Pedestrian Connections	Provide high-quality and safe pedestrian pathways within the Site boundary that directly connect to the greater public sidewalk network.	Improve pedestrian convenience to encourage non-automobile modes of transportation.
Bicycle Connections	Existing multi-use trails and bicycle-dedicated facilities (e.g. Eighth Line, Danby Road, and 10 Side Road) are provided within / easily accessible to the immediate road network of the Site area.	Improve cycling convenience to encourage non-automobile modes of transportation.
Bicycle Parking	Maintain existing bicycle parking supply on-site.	Encourage bicycle use as an alternative, sustainable mode of transportation.
<b>Transit Usage</b>		
Alternative Commute Services	The Site has access to the Town's ActiVan transportation service, specifically for seniors and residents with disabilities.	Promote car-sharing and transit.
<b>Automobile / Parking Usage</b>		
Reduced Parking Provisions	The Site is proposing a reduced parking supply to the in-force Zoning By-law requirement for the residential and church uses.	Reduce car usage and ownership.
Ride-Sharing Program	Explore opportunities to offer ride-sharing programs on-site for all residents. Online services are freely available and can be promoted on the Site to facilitate carpooling activity.	Reduce car dependence and the need for everyday travel. Promote car-sharing and transit.
Pick-up / Drop-off Facility	Provide a new, formal pick-up / drop-off facility at-grade for conventional transportation services (i.e. taxis, rideshare, ActiVan, etc.).	Reduced car usage, dependence, or ownership for everyday travel. Increase the potential for residents, employees and visitors to utilize high-occupancy vehicle options as necessary.
<b>Communication and Promotion</b>		
Travel Brochures and Resources	Provide a set of printed brochures that are readily available for residents, outlining the transportation services in the area (e.g. ActiVan, area cycling routes, walking distance to amenities, etc.).	Promote the range of available travel options as an alternative to the use of a car.

## 5.0 VEHICULAR PARKING CONSIDERATIONS

### 5.1 STANDARD PARKING REQUIREMENTS

#### 5.1.1 Halton Hills Zoning By-law 2010-0050 & Site-specific Zoning By-law

The Site is primarily subject to the Site-specific Zoning By-law pertaining to future residential apartment uses. In determining the minimum parking requirements for residential uses, the Site is subject to the Town of Halton Hills Zoning By-law 2010-0050. In addition, it is noted that a minor variance was obtained to reduce the amount of parking provided for the place of worship (NUC) use.

The minimum parking requirements per Zoning By-law 2010-0050, the Site-Specific Zoning By-law, and minor variance as applicable are summarized in **Table 5**.

**TABLE 5 ZONING BY-LAW VEHICULAR PARKING REQUIREMENTS**

Use	Units / GFA / Capacity <sup>[1]</sup>	Minimum Rate	Minimum Requirement <sup>[2]</sup>
<b>Residential</b>			
Apartment <sup>[3]</sup>	157 units	1.50 spaces per unit	236 spaces
<i>Subtotal Resident</i>			<i>236 spaces</i>
<b>Non-Residential</b>			
Residential Visitor (Apartment)	157 units	0.25 spaces per unit	40 spaces
Places of Worship (existing to remain)	242 seats or 1,475 m <sup>2</sup>	1.00 space per 9 m <sup>2</sup>	163 spaces <sup>[3,4]</sup>
<i>Subtotal Non-Resident</i>			<i>203 spaces</i>
<b>Total Requirement</b>			<b>439 spaces</b>

Notes:

1. Site statistics provided by KPMB Architects dated November 25, 2022.
2. As per Zoning By-law 2010-0050 Clause 5.2.2, all required parking space calculations must be rounded up to the nearest whole number.
3. A parking supply rate of 1 space per 9 m<sup>2</sup> was granted through a minor variance (D13VAR13.021H) to permit the Norval United Church development. Phase 1 of the development has been constructed and Phase 2 is no longer being pursued.
4. As part of Phase 1, an existing parking supply of 156 spaces is provided based on a survey undertaken by Speight, Van Nostrand and Gibson Limited, dated September 20, 2022.

Application of the Site-specific Zoning By-law standards result in a requirement of 439 vehicle parking spaces including 236 resident spaces, 40 residential visitor parking spaces, and 163 place of worship spaces. The overall resident parking ratio is approximately 1.50 spaces per unit.

### 5.1.2 Recommended Parking Standards

It is proposed to provide a modest reduction to minimum vehicular parking requirements to the in-force Zoning By-law 2010-0050 and most recent Site-specific approvals for each use. Below outlines the following parking standards being proposed for the Site:

- Resident: 1.25 spaces per unit (*reduced*);
- Residential Visitor: 0.25 spaces per unit; and
- Place of Worship: 1.00 space per 4 persons (*reduced*).

The recommended minimum parking requirements for the proposed development is summarized in **Table 6**.

**TABLE 6 PROPOSED MINIMUM VEHICULAR PARKING REQUIREMENTS**

Use	Units / GFA / Capacity <sup>[1]</sup>	Proposed Minimum Rate	Proposed Minimum Requirement <sup>[2]</sup>
<b>Residential</b>			
Apartment <sup>[3]</sup>	157 units	1.25 space per unit	197 spaces
<i>Subtotal Resident</i>			<i>197 spaces</i>
<b>Non-Residential</b>			
Resident Visitor	157 units	0.25 spaces per unit	40 spaces
Place of Worship (existing to remain)	242 seats or 1,475 m <sup>2</sup>	1.00 space per 4 persons	61 spaces
<i>Subtotal Non-Resident</i>			<i>101 spaces</i>
<b>Total Requirement</b>			<b>298 spaces</b>

Notes:

1. Site statistics provided by KPMB Architects dated November 25, 2022.
2. As per Zoning By-law 2010-0050 Clause 5.2.2, all required parking space calculations must be rounded up to the nearest whole number.
3. Tenure for apartment units to be operated as a rental building including 30% affordable units.

Application of the proposed parking rates result in a requirement of 298 vehicle parking spaces including 197 resident spaces, 40 residential visitor spaces, and 61 place of worship spaces. Therefore, the resident parking ratio represents a reduction of 0.25 spaces per unit to the current Site-specific Zoning By-law requirement. Please refer to **Section 5.3** for more information.



## 5.2 ACCESSIBLE PARKING REQUIREMENTS

### 5.2.1 Halton Hills Zoning By-law 2005-0117

The requirements for accessible parking for the total proposed development are outlined in the Town of Halton Hills Off-Street Parking Zoning By-law 2005-0117. The Zoning By-law 2005-0117 requires a minimum of *six (6) accessible spaces for the first 150 parking space plus one (1) additional accessible parking space for every 50 total space, or part thereof*. Furthermore, the Zoning By-law states that if the number of required accessible parking spaces results in a fraction, then the required number of spaces shall be rounded up to the nearest whole number. Application of these standards to the proposed parking supply would require a total of nine (9) accessible parking spaces.

Zoning By-law 2005-0117 also provides minimum dimensional parking space requirements for accessible parking spaces, including:

- Total width of 4.4 metres (including a 2.4-metre wide space plus a 2.0 metre access aisle); and
- Vertical height clearance of 2.75 metres.

### 5.2.2 Accessibility for Ontarians with Disabilities Act

The Accessibility for Ontarians with Disabilities Act (AODA) also includes accessible parking requirements for public spaces. These requirements are outlined in Ontario Regulation 413/12 Section 6 (80.36 (4)) and require that, when the parking supply is between 201 - 1,000 parking spaces, the minimum number of accessible parking spaces is in the order of *two (2) spaces plus 2 percent* of the parking supply. The AODA also states that, if the number of required accessible parking spaces results in a fraction, then the required number of spaces shall be rounded up to the nearest whole number. Application of these standards to the proposed parking supply would require a total of eight (8) accessible parking spaces.

In addition, of the total required accessible parking spaces, Section 6 (80.36 (2)ii) states that, four (4) must have Type A dimensions and 4 spaces must have Type B dimensions.

The AODA further provides minimum dimensional parking space requirements for the Type A and B accessible parking spaces, including:

- Type A: width of 3.4 metres with a 1.5 metre access aisle; and,
- Type B: width of 2.4 metres with a 1.5 metre access aisle.

### 5.2.3 Recommended Accessible Parking Standards

For the purposes of the proposed development, it is recommended to adopt the greater of the 2 requirement standards outlined above. This results in the adoption of minimum accessible parking requirements as per Zoning By-law 2005-0117 standards. In addition, it is recommended to apply the Type A and Type B dimensional requirements for accessible parking spaces as per AODA.

As such, application of Zoning By-law 2005-0117 to the proposed parking supply results in a minimum supply of 9 accessible parking spaces. Of the 9 minimum required accessible parking spaces, 4 spaces must be Type A and 5 must be Type B.

## 5.3 PROPOSED PARKING SUPPLY AND STRATEGY

A total supply of 298 parking spaces is proposed for the overall Site, including 197 resident spaces, 40 residential visitor spaces, and 61 place of worship spaces. The effective parking rates are as follows:

- Resident: 1.25 spaces per unit
- Resident visitor: 0.25 spaces per unit (shared with place of worship parking)
- Place of worship: 1 space per 4 persons (shared with resident visitor parking)

The parking facility will be provided at-grade and on the underground P1 level. Access to all parking will be provided via a driveways on Danby Road and Eighth Line. The majority of the parking supply will be located at-grade (surrounding the church building) to serve all place of worship, all residential visitor, and most resident uses. The remaining parking supply will be provided on the below grade P1 level for residents only.

In addition, an accessible parking supply of 10 spaces will be provided on the Site. This accessible parking supply adheres to the recommended accessible parking standards, based on the minimum supply requirements as per Town of Halton Hills Zoning By-law 2005-0117 and dimensional requirements as per AODA. The proposed accessible parking spaces are distributed proportionately across the Site and in proximity to the entrances of each of the buildings.

As such, the proposed parking supply is considered suitable for the nature and size of the development, based on a number of factors and considerations discussed below in **Section 5.4**.

## 5.4 APPROPRIATENESS OF THE PROPOSED PARKING SUPPLY

As previously noted, it is proposed to adopt reduced parking supply standards for the resident (1.25 spaces per unit) and place of worship (1 space per 4 persons) uses, to the latest Site-specific Zoning By-law approvals. A justification is provided in the following sections regarding the reduced parking supply.

### 5.4.1 Resident Parking

It is recognized that the resident parking standards currently in effect for the Site overstate the residential parking needs for the area. The contextual factors and considerations influencing parking demand in the Norval community and the appropriateness of the proposed parking supply at the Site include the following:

- Review of policy and planning directives in relation to parking;
- Review of existing transportation services and reachable destinations within the site area;
- Review of residential parking standards within other growing municipalities of Ontario;
- Rental / affordable nature of proposed development;
- Review of differing standards between market and affordable units within other municipalities in the Greater Toronto Area;
- Marketing strategy for proposed housing and demographics; and
- Proposed residential TDM strategies.

The following provides an overview of the contextual factors influencing parking demand at residential buildings in the Town of Halton Hills and the appropriateness of the proposed parking supply in this instance.

#### 5.4.1.1 Policy and Planning Directives

The Site is subject to a set of provincial and local policies and plans that form a development framework or guidance for future development for the Site. Below provides an outline of the various policies considered within a transportation context.

##### **Provincial Policies**

Adopted in May 2020, the *Provincial Policy Statement (PPS)* under Section 3 of the Planning Act sets provisions for transportation demand management (TDM) strategies to be implemented for new developments to increase the efficiency of existing and planned transportation infrastructure. The PPS also encourages density being added to lands that adopt a mix of land uses to encourage non-auto based travel modes and to limit the length and number of vehicular trips being generated. From a land use perspective, the PPS also recognizes the need to address the Province's ongoing challenge of housing affordability through the development of the *More Homes, More Choice Housing Supply Action Plan*. This Plan signalled a need to provide a greater mix of housing options for those with differing needs and levels of affordability. As such, it is important to consider the parking needs with respect to the diversity of housing types offered and targeted demographic at the proposed development to ensure that an appropriate amount (now and to the future) is provided. This suggests that a modest parking reduction is appropriate due to the varying needs and income of residents, plus the need to address other widespread planning issues, including air quality, congestion, and cost of living.

The *Places to Grow Plan* aims to foster economic growth, provide greater housing supply / options, increase employment, and build communities for a healthier and more affordable lifestyle within the Greater Golden Horseshoe. Specifically, the Plan is a long-term strategy that outlines the importance of reducing reliance on the automobile and promoting non-auto modes. In February 2022, the Transportation Plan for the Greater Golden Horseshoe was adopted to provide a 30-year vision for enhanced mobility across the Region. The plan includes a Vision for Mobility in 2051 for a transportation system that provides safe, efficient and convenient options and supports the wellbeing and economic prosperity of the Region into the future. Priorities under the Plan include fighting gridlock and improving road performance, getting people moving on a connected transit system, supporting a sustainable and resilient Region.

##### **Regional and Local Policies**

The *Halton Region Official Plan* includes various objectives that are supportive of reduced parking standards:

- Develop a balanced transportation system that reduces dependency on automobile use and promotes active transportation; and
- Improves transportation network efficiency through both travel demand management and transportation supply management strategies.

The *Halton Region Transportation Master Plan* (also known as The Road to Change) was adopted in 2011 (to the year 2031) and sets a policy framework to improve the quality of life for residents within the Region with an emphasis on providing a balanced and more sustainable approach to reduced automobile reliance / usage. Specific policies in the Master Plan speak to increasing the use of active transportation by providing a well-connected and safe network of sidewalks and multi-use paths, designated bicycle lanes, and off-road trails. This is also specified in the Region's *Active Transportation Master Plan*, initiated in 2015. Also, TDM initiatives are encouraged to reduced auto trips, travel off-peak hours, and reduce trip lengths by providing a mix of uses and providing adequate education and incentives to foster sustainable travel.

The *Halton Hills Official Plan* was consolidated in late 2020, and provides a set of policies for Town-wide development. In terms of transportation, major objectives include the following:

- Facilitate efficient and safe movement of people within the communities and between adjacent municipalities, particularly for walking and cycling routes;
- Promote public transit, walking, and cycling as affordable and accessible travel options; and
- Encourage and support appropriate (e.g. barrier-free design) pedestrian facilities.

An amendment to the Official Plan (OPA #32), known as the *Vision Georgetown Secondary Plan / Study*, developed various policies (guided by the *Town of Hills Transportation Master Plan* policies) related to the importance of implementing Transportation Demand Management (TDM) strategies in reducing single-occupant vehicle travel, building active transportation routes to facilitate sustainable travel behaviour, preserving future opportunities for efficient and effective transit along collector road corridors, and promote pedestrian safety through exploring the implementation of traffic calming measures to mitigate adverse effects of excessive automobile use. These policies are often supported and aligned with the reduction of parking, which is considered a key TDM measure and effective tool in this regard.

Lastly, the *Halton Hills Cycling Master Plan* indicated the need to encourage cycling use and build bicycle parking facilities for new developments, recognizing this and reduced parking as benefits of reduced automobile use. It was noted that vehicle parking is significant in cost, which can be replaced with more environmentally-friendly or economically feasible expansions such as bicycle infrastructure that can be integrated within the cycling network. Cycling generally forms a suitable alternative form of mobility and has become increasingly important for those who do not have access to a vehicle or live in communities with limited alternatives (e.g. transit), such as the Site. More importantly, improving active transportation methods can make growing communities safer and more liveable with reduced noise and pollution.

#### 5.4.1.2 Existing Transportation Services and Key Destinations

The location of the Site will provide existing and future site users with transportation options that will reduce the reliance on the automobile. The complete transportation context is provided in **Section 3.0**.

The Georgetown GO Station can be accessed within 21-minute bike ride and provides efficient transit service to other nearby stations and other areas within the Greater Toronto Area (GTA). Furthermore, Halton Hills provides the ActiVan service for seniors and residents with disabilities. This service is widely available throughout the week (e.g. visiting other communities or accessing the Georgetown GO Station).

Notably, the Site is well-connected from an active transportation perspective, given the infrastructure offered within a 500-metre distance. Cycling facilities within the local area include bike lanes and shared paths, which is further described in **Table 2** of **Section 3.3**. Furthermore, pedestrian paths are provided on-site and within the area that connect directly to key destinations within a walkable, 1-kilometre radius (e.g. community centre, retail / commercial plaza, schools, etc.).

As such, there are available non-auto options that can be used for daily trips. These sustainable forms of travel form an active and healthy lifestyle that is much more affordable. Should those need to use a vehicle and do not own a parking space, carpooling or pick-up / drop-off arrangements is a viable alternative with the new facility being proposed on-site.

### 5.4.1.3 Comparable Residential Parking Standards within Halton Region

There are varying zoning parking standards specified under a number of growing municipalities within Halton Region, all with a comparable context. In this case, the general site area has access to active transportation facilities with limited access to transit service and is generally split between residential uses and rural land. The Halton Hills Zoning By-law and proposed parking variance in comparison to other By-law standards within the Region are presented below in **Table 7**.

**TABLE 7 RESIDENTIAL PARKING RATES WITHIN HALTON REGION**

	Proposed Site	Halton Hills	Milton	Burlington	Oakville
Zoning By-law	-	2010-0050	016-2014	2020	2014-014
Designated Area		Georgetown Urban Area	HUSP Urban Area	General	General
Area Land Uses/Types	Dense residential subdivisions church, schools, parks, community centre, retail stores, other services and amenities, rural (currently undeveloped) areas.				
Apartment Rate <sup>[1]</sup>	1.25	1.50	1.50	1.25 <sup>[2]</sup>	1.00 < 75 m <sup>2</sup> 1.50 > 75 m <sup>2</sup>

Notes:

1. Parking rate as spaces per dwelling unit.
2. Parking rate inclusive of visitor parking.

Based on the above, the range of residential apartment standards observed is approximately 1.00 - 1.50 spaces per unit, partially depending on the unit size, where the Halton Hills Zoning By-law parking requirements fall within the high end of standards within the Region.

It is noted that the Norval community has demonstrated recent progress in urban development based on the newly available transportation facilities, land uses (e.g. NUC), and density within the Georgetown Urban Area that are comparable to the context of surrounding municipalities within Halton Region. The stage of development within a community should be relative to the shift in travel behaviour; more development, multi-modal transportation infrastructure, and accessible amenities should allow other non-auto modes, such as cycling, walking, rideshare, and transit, to be encouraged/supported. Similarly, historically dominant vehicle-based infrastructure can be reduced to address congestion, safety, and/or air quality issues through reduced parking provisions for new developments.

It is also important to use zoning as a tool and improved policies as a guide for future development that ultimately align with Town and Regional objectives. A reduced parking standard will set a new precedent within the area and allow other non-auto uses (e.g. cycling facilities) to be maximized given the growing infrastructure and urban development in the community area.

#### 5.4.1.4 Rental and Affordable Nature of Proposed Development

The residential component of the Site is to be constructed and operated as a rental building, with a portion as affordable units, which does not have comparable ownership restrictions as a condominium building, from a parking perspective. The rental nature of the building allows for parking to be provided as a pooled or non-exclusive supply under a common property management group, such that parking will be allocated based on the needs and demands of the tenants. This provides an opportunity to share parking between units and other uses (e.g. residential visitors and church), whereas for condominium building, a parking space is typically sold with a unit and does not allow for parking to be reallocated to another tenant, if required. As such, the overall development has the ability to reallocate parking should the demand between the uses change over time.

#### 5.4.1.5 Defining Residential Parking Standards for Market and Affordable Units within Ontario

It is recognized that the resident parking requirements for apartments, specifically in Halton Hills, currently do not differ based on location, unit size, or proximity to transit and active transportation. As previously mentioned, the Site seeks to support a wide range of residents through the provision of affordable and rental units, which typically generate a lower parking demand than other condo-based dwelling types and tenures. **Table 10** provides an outline of municipalities within Ontario (e.g. Greater Toronto Area of varying size) that specified different parking rates for condo, rental, or affordable housing.

**TABLE 8 MARKET VS. RENTAL RESIDENTIAL PARKING RATES WITHIN ONTARIO**

	Proposed Site	Halton Hills	Toronto		Mississauga	Brampton	Oshawa
Zoning By-law		2010-0050	569-2013	89-2022	0117-2022	270-2004	60-94
Designated Area	Site-specific	Georgetown Urban Area	All Other Areas		Precinct 4	General	General
Apartment (Market) Rate <sup>[1]</sup>	1.25 <sup>[2]</sup>	1.50	0.80 (studio) 0.90 (1-bed) 1.00 (2-bed) 1.20 (3-bed)	0.00	1.10	1.25 (studio, 1-bed) 1.40 (2-bed) 1.75 (3+ bed)	1.45
Rental Apartment Rate <sup>[1]</sup>	_[5]	_[5]	_[5]	_[5]	1.00	1.03 (studio) 1.21 (1-bed) 1.41 (2-bed) 1.53 (3-bed)	1.00 <sup>[4]</sup>
Affordable Housing Rate <sup>[1]</sup>	_[5]	_[5]	0.16 (studio) 0.30 (1-bed) 0.50 (2-bed) 0.90 (3-bed) <sup>[3]</sup>	0.00 <sup>[3]</sup>	_[5]	_[5]	_[5]
<i>Rental/Affordable to Market Rate Reduction</i>	-	-	-80% (studio) -67% (1-bed) -50% (2-bed) -25% (3-bed)	-	-9%	-18% (studio) -3% (1-bed) 0% (2-bed) -13% (3-bed)	-31%

Notes:

1. Parking rate as spaces per dwelling unit.
2. Proposed residential parking rate, inclusive of affordable and rental units.
3. As per Zoning By-law 569-2013, Section 200.5.10.1(9) under "Assisted Housing" – For the purposes of calculating parking space requirements, "assisted housing" means a dwelling unit operated by a non-profit organization or private sector organization in cooperation with the City of Toronto.
4. Parking rate for "Any building not specifically mentioned containing 3+ dwelling units" category as per Zoning By-law 60-94.
5. Rental/affordable parking rate not specified.



Based on the above, it is evident that various rental/affordable rates are reduced to the market (e.g. condo/apartment) rates, specifically within a range of 9% - 80% (depending on the unit size) for other municipalities throughout the Greater Toronto Area. This shows that many other municipalities have recognized the varying needs and income levels of residents within an area that has been apparent, depending on the housing type being offered. For example, providing all market condominium units typically indicates longer-term ownership and greater income (e.g. economic stability) in comparison to the provision of rental and affordable units, which typically indicates a shorter-term tenure and lower income levels. This notion can be reflected through the ownership and demand for parking, such that residents who live in a rental or affordable unit are more likely to prefer or use public transit as a primary transportation mode due to the financial commitment of owning a vehicle and/or parking space.

As such, the proposed resident rate of 1.25 for all units indicates a reduction of approximately 25% for all apartment units, which generally aligns with the rental reductions being observed for other municipalities of varying sizes and urban context in Ontario.

#### **5.4.1.6 Residential TDM Strategies**

As outlined in **Section 4.0**, a proposed transportation demand management (TDM) plan is proposed for the Site, both as a method to reduce vehicular traffic but also to reduce parking demand.

Highlights of the TDM Plan, in addition to the proposed residential parking supply reduction, are provided below:

- Unbundling of parking with each residential unit;
- Implementation of travel information brochures;
- Explore opportunities to offer educational programs (e.g. bicycle safety) on site;
- Providing pedestrian connections within the Site and along the public street network; and
- Providing a new formal pick-up / drop-off facility for all uses.

## 5.4.2 Non-resident Parking

Although the parking requirement for residential visitors is being maintained as per the Halton Hills Zoning By-law, it is proposed to reduce the parking requirement for the existing place of worship (church) use from the current standard, as granted as per minor variance. In addition, it is proposed to permit the sharing of parking between the residential visitor and church uses on a non-exclusive basis. The reduction of the church parking supply is appropriate at this location with consideration to the following factors and considerations:

- Review of existing Norval United Church (NUC) demand;
- Review parking utilization of proxy church data;
- Review of church parking standards within other municipalities in the Greater Toronto Area; and
- Proposed residential TDM strategies.

### 5.4.2.1 Existing Norval United Church Parking Demand

BA Group undertook parking surveys at the existing church on-site (14015 Danby Road, Halton Hills) to better understand the visitor demand of the existing to remain use.

The study examined the number of occupied parking spaces every 30 minutes from 8:00 a.m. to 3:00 p.m., on the following dates that peak accumulation was expected:

- Sunday February 27, 2022;
- Sunday, March 6, 2022; and
- Sunday, March 13, 2022.

The surveys were undertaken during times when visitor parking demand is considered greater and on a day of service at the church. At the time of the survey, the NUC informed BA Group that the building was almost at full capacity with respect to the COVID-19 capacity regulations.

Among the three (3) days surveyed, the peak (maximum) parking demand was observed on Sunday, March 13, 2022 at 11:00 a.m., with 44 spaces (34% occupied) at the NUC. The peak parking demand at the existing lot on this day is summarized below in **Table 9**. The detailed parking demand surveys are provided in **Appendix B**.

**TABLE 9 OBSERVED PEAK PARKING DEMAND SURVEY – NORVAL UNITED CHURCH**

Time	Demand (spaces)	Occupancy (%)	Available Parking Spaces
Total Parking Lot Supply: 130 spaces			
8:00	7	5%	123
8:30	7	5%	123
9:00	13	10%	117
9:30	23	18%	107
10:00	32	25%	98
10:30	43	33%	87
11:00	44	34%	86
11:30	30	23%	100
12:00	25	19%	105
12:30	12	9%	118
13:00	11	8%	119
13:30	17	13%	113
14:00	19	15%	111
14:30	20	15%	110
15:00	20	15%	110
<b>Peak Parking Demand</b>	<b>44 spaces</b>	<b>34%</b>	<b>86 spaces</b>

## Notes:

- Existing parking supply is 130 spaces, including 122 standard spaces and 8 accessible (handicapped) spaces.
- Parking demand survey dated Sunday, March 13, 2022.

Based on the above, the peak parking demand observed at the existing church equates to a parking rate of 1 space per 5.5 persons, which is considered a lower standard than the proposed rate of 1 space per 4 persons.

Thus, with the proposed parking supply of 61 spaces for the existing church, it is expected that the existing peak demand (on a busy Sunday) of 44 spaces can be appropriately accommodated. Therefore it is suitable to provide a parking rate of 1 space per 4 persons for the church use, which equates to an amount that can comfortably serve the existing church demand. Since there are no modifications expected for the church, it is assumed that the future demand will remain relatively stable, or potentially increase to a modest degree (e.g. assuming an additional 20-25% capacity) as a result of the post-pandemic condition.

### 5.4.2.2 Observed Parking Utilization at Proxy Church Site

By way of comparison, BA Group has undertaken a review of the peak (maximum) parking demand at another United Church site with a similar transportation context to determine whether the proposed parking rate for the existing NUC is appropriate.

The selected church is located at St. James United Church located at 306 Parkside Drive in Hamilton. The study examined the number of occupied parking spaces every 30 minutes from 8:00 a.m. to 3:00 p.m., on Sunday February 27, 2022. It is noted that, at the time of the survey, capacity regulations due the COVID-19 pandemic were restricted at the church, with attendance being around 20 - 25 people. The St. James United Church informed BA Group that an attendance of approximately 50 people (e.g. double the demand) is expected once all regulations are lifted pertaining to the COVID-19 pandemic.

Based upon the parking survey, the maximum parking demand is observed between the hours of 10:30 a.m. to 11:00 a.m., with 21 spaces (24% occupied) at St. James United Church. A summary of the peak demand results and parking demand rate is provided in **Table 10**. Further details are provided in **Appendix C**.

**TABLE 10 CHURCH PARKING DEMAND PROXY SITE – ST. JAMES UNITED CHURCH, HAMILTON**

Place of Worship	Year of Survey	GFA (m <sup>2</sup> )	Seating Capacity	Observed Peak Parking Demand	Observed Parking Demand Rate
St. James United Church (306 Parkside Drive, Hamilton)	February 2022	1,744	200	42 <sup>1</sup>	1 space per 4.76 persons

Notes:

1. As a conservative approach, the observed parking demand was adjusted to take into account the true demand during post-pandemic conditions. As such, the observed peak parking demand (e.g. originally 21 spaces) was doubled which equates to 42 spaces.
2. Parking demand survey dated Sunday, February 27, 2022.

Based on the table above, the observed maximum church parking demand is approximately 1 space per 4.76 persons, which is comparable to the parking rate proposed for the NUC (e.g. 1 space per 4 persons). Recognizing that the St. James United Church has a comparable level of transportation services in the area and that the NUC area is expected to undergo significant non-automobile improvements in the future, this accurately reflects a level of demand expected for the Site. Therefore, the church parking supply is considered appropriate for the development.

### 5.4.2.3 Comparable Church Parking Standards within Ontario

The place of worship parking standard subject to the property is considered to overstate the parking needs of the existing church. As such, comparable place of worship parking standards at other municipalities within the Greater Toronto Area / Ontario, of which have a similar transportation context as the Site, demonstrate reduced parking requirements for this use. A summary is provided in **Table 11**.

**TABLE 11 PLACE OF WORSHIP PARKING STANDARDS IN MUNICIPALITIES WITHIN ONTARIO**

	Proposed Site	Halton Hills	Toronto		Mississauga	Brampton	Kitchener	St. Catharines
Zoning By-law	Site-specific	2010-0050	569-2013	89-2022 (Under Appeal)	016-2014	270-2004	2019-051 (Under Appeal)	2013-283
Designated Area		Georgetown Urban Area	All Other Areas		General	General	All Other Zones	General
Place of Worship Rate <sup>(1)</sup>	1 space per 24 m <sup>2(2)</sup>	Greater of: 1 space per 9 m <sup>2</sup> <u>or</u> 1 space per 4 persons	1 space per 4.35 m <sup>2</sup>	No minimum	Greater of: 1 space per 10 m <sup>2</sup> <u>or</u> 1 space per 4.5 seats plus 27.1 spaces per square metres of non-fixed seating	1 space per 4 seats <u>or</u> 1 space per 5 m <sup>2</sup> net worship area	1 space per 23 m <sup>2</sup>	1 space per 20 m <sup>2</sup> gross leasable area

Notes:

1. Parking rates expressed as 1 space per [xx] square metres (unless otherwise specified) for comparison purposes.
2. Proposed parking rate of 1 space per 4 persons is equivalent to approximately 1 space per 24 square metres, based on the proposed supply of 61 spaces and church size of 1,475 square metres.

Based on the above, the comparable parking standards within other municipalities vary a fairly large range; nonetheless, there are other municipalities that are either very low (e.g. City of Toronto Zoning By-law 89-2022) or have comparable standards to the place of worship rate proposed for the Site (e.g. St. Catharines and Kitchener). As such, it is appropriate to provide a rate of 1 space per 24 square metres (or 1 space per 4 seats) and is generally falls within the range of standards observed on a regional level within municipalities of differing levels of growth or development (e.g. mix of rural, suburban, and urban environments).

### 5.4.2.4 Non-residential TDM Strategies

As outlined in **Section 4.0**, a proposed transportation demand management (TDM) plan is proposed for the Site, both as a method to reduce vehicular traffic but also to reduce parking demand. Highlights of the TDM Plan catered to visitors are provided below:

- Maintenance of bicycle parking at the church;
- Provision of nearby multi-use and dedicated cycling facilities within the immediate road network;
- Implementation of travel information brochures;
- Explore opportunities to offer educational programs (e.g. bicycle safety) on site; and
- Providing pedestrian connections within the Site and along the public street network.



## 5.5 PARKING SUMMARY

In summary, the proposed (reduced) resident parking rate of 1.25 spaces per unit is considered appropriate, considering the currently available and planned transportation infrastructure in proximity to the Site, policies in support of greater active transportation use or decreased automobile use, suite of proposed TDM measures, observed data for residential parking demand, and marketing strategy based on the proposed housing types at the Site.

In addition, it is proposed to provide shared non-resident parking for the residential visitor and church uses. The proposed (reduced) church parking rate of 1 space per 4 persons is appropriate with consideration to the observed existing peak parking demand for the Norval United Church, observed parking utilization levels at a comparable United Church site, comparison of other church standards in Ontario, and suite of proposed non-residential TDM measures. The proposed rate of 0.25 spaces per unit for apartment visitors is provided and consistent with the Town of Halton Hills Zoning By-law.

Lastly, it is proposed to incorporate 10 accessible parking spaces as part of the total supply, which meets the minimum requirements as per Zoning By-law 2005-0117 and the AODA.

Based upon this context, the overall proposed parking supply is appropriate and will adequately meet the requirements of existing and future users of the proposed development.

## **6.0 BICYCLE PARKING CONSIDERATIONS**

### **6.1 MINIMUM BICYCLE PARKING REQUIREMENTS**

The Town of Halton Hills Zoning By-law 2010-005 provides a set of minimum bicycle parking standards for non-residential uses only. However, the Zoning By-law does not indicate any requirements for new residential developments. Therefore, application of this Zoning By-law to the proposed development requires no minimum bicycle parking spaces.

### **6.2 PROPOSED BICYCLE PARKING SUPPLY**

There are currently five (5) bicycle spaces available at the entrance of the church building. As a result of the proposed development, the existing supply will be maintained in future conditions. As such, the minimum requirement for the proposed development as per Zoning By-law 2010-0050 has been met.

## 7.0 LOADING CONSIDERATIONS

### 7.1 MINIMUM LOADING REQUIREMENTS

Application of subject Halton Hills Zoning By-law 2010-0050 to the proposed residential portion of the development results in a requirement of 1 loading space with minimum dimensions of 3.5 metres by 12.0 metres. Based on the Region of Halton Solid Waste Guidelines, it is required to provide a minimum height clearance of 7.5 metres for residential loading spaces. The loading space requirements are summarized in **Table 12**.

**TABLE 12 HALTON HILLS ZONING BY-LAW 2010-0050 LOADING REQUIREMENTS**

Use	Units / GFA <sup>1</sup>	Minimum Rate	Minimum Requirement
Residential	157 units	- <sup>2</sup>	1 space
<b>Total Requirement</b>			<b>1 space</b>

Notes

1. Site statistics provided by KPMB Architects dated November 25, 2022.
2. No minimum rate specified under Zoning By-law 2010-0050; however it is assumed that one loading space will be required to accommodate for residential garbage.

### 7.2 PROPOSED LOADING SUPPLY

One (1) residential loading space is proposed at-grade with a dimension of 3.5 metres by 9.0 metres. The loading space is located adjacent to the proposed northeast driveway. A garbage loading room (staging area) is proposed to be located in front of the loading space.

As previously mentioned, an existing garbage enclosure currently exists on the Site to serve the church use. This loading area is existing to remain and be relocated as a result of the proposed development.

In addition, the site plan can appropriately accommodate the needs of the design vehicles. Vehicle Manoeuvring Diagrams (VMDs) illustrating the inbound and outbound manoeuvres of a Halton Region garbage collection vehicle and a Single Unit (SU) truck are attached in **Appendix D**.

Therefore, the proposed loading supply is expected to meet the needs of the development.

## 8.0 PICK-UP / DROP-OFF CONSIDERATIONS

The provision of a new pick-up and drop-off (PUDO) facility, in addition to the existing PUDO drive aisle at the church, will accommodate the uses offered as part of the overall development. It is noted that short-term PUDO needs have been designed and arranged in a suitable manner.

Under existing conditions, the Norval United Church facilitated short-term parking or PUDO activity along the drive aisle located adjacent to the main building entrance (facing Danby Road). It is assumed that the current supply will remain appropriate as no modifications to the church are being made. The existing PUDO area for the church currently has a capacity of four (4) vehicles.

As part of the proposed development, a new PUDO facility will be located via a driveway on Eighth Line with a right-in / right-out vehicle access. This facility will be located between the existing church and new residential building. In addition, the facility will provide short-term or PUDO activity with a capacity of two (2) vehicles.

It is noted that the design of the new PUDO facility will accommodate a range of vehicles to allow safe pick-up / drop-off activity. As such, VMDs have been produced to illustrate the movement of a representative Halton Hills accessible transit vehicle and TAC P vehicle ingressing and egressing the facility. All vehicle movements at the new PUDO facility are shown in **Appendix D**.

Overall, the proposed PUDO facilities will provide a total capacity of six (6) vehicles, which is expected to meet the needs of the proposed development.

## 9.0 TRAVEL DEMAND FORECAST

### 9.1 EXISTING TRAFFIC VOLUMES

To determine existing traffic conditions on the study area road network, traffic volumes were surveyed by Spectrum Traffic Inc. on Tuesday March 1, 2022.

**Table 13** summarizes the range of survey data used for this analysis. **Appendix F** contains the raw traffic survey data.

**TABLE 13 EXISTING TRAFFIC COUNT SUMMARY**

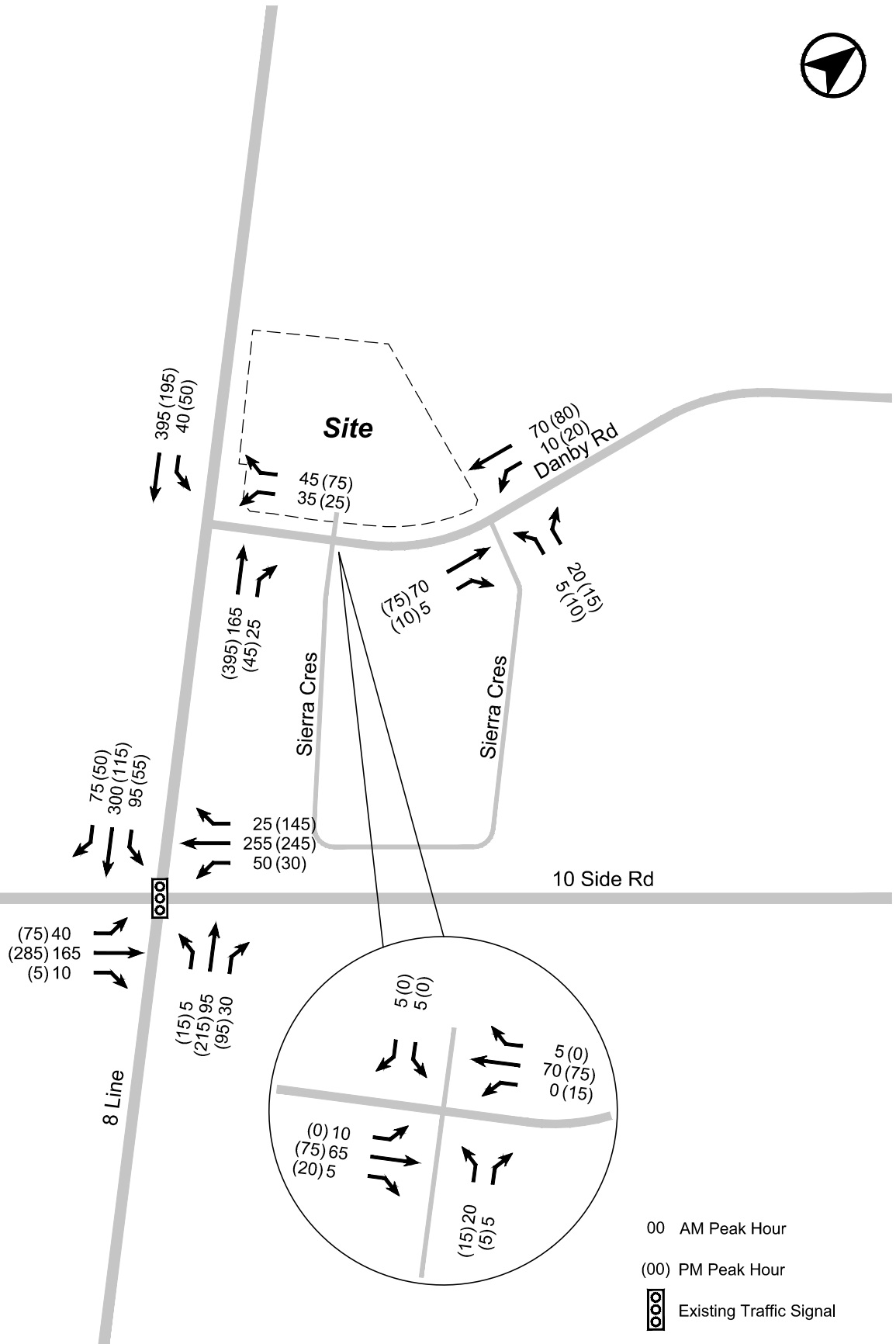
Intersection	Control Type	Date of Count
Eighth Line / 10 <sup>th</sup> Side Road	Signalized	Tuesday March 1, 2022
Eighth Line / Danby Road	STOP Control	
Danby Road / Sierra Crescent (East)	STOP Control	
Danby Road / Sierra Crescent (West) / Norval United Driveway	STOP Control	

Existing traffic volumes are summarized in **Figure 9**.





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**FIGURE 9 BASELINE EXISTING TRAFFIC VOLUMES**

## 9.2 BACKGROUND TRAFFIC VOLUMES

Given the Site is within close proximity of the Vision Georgetown lands and that there is an ongoing transportation study, future total volumes from the draft Vision Georgetown traffic analysis (AECOM, 2018) have been used to represent 2031 future background volumes for this study. The study includes the future area road network, which indicates a signalized intersection at Eighth Line / Danby Road.

The adopted volumes from the Vision Georgetown traffic analysis are attached as an extract in **Appendix G**.

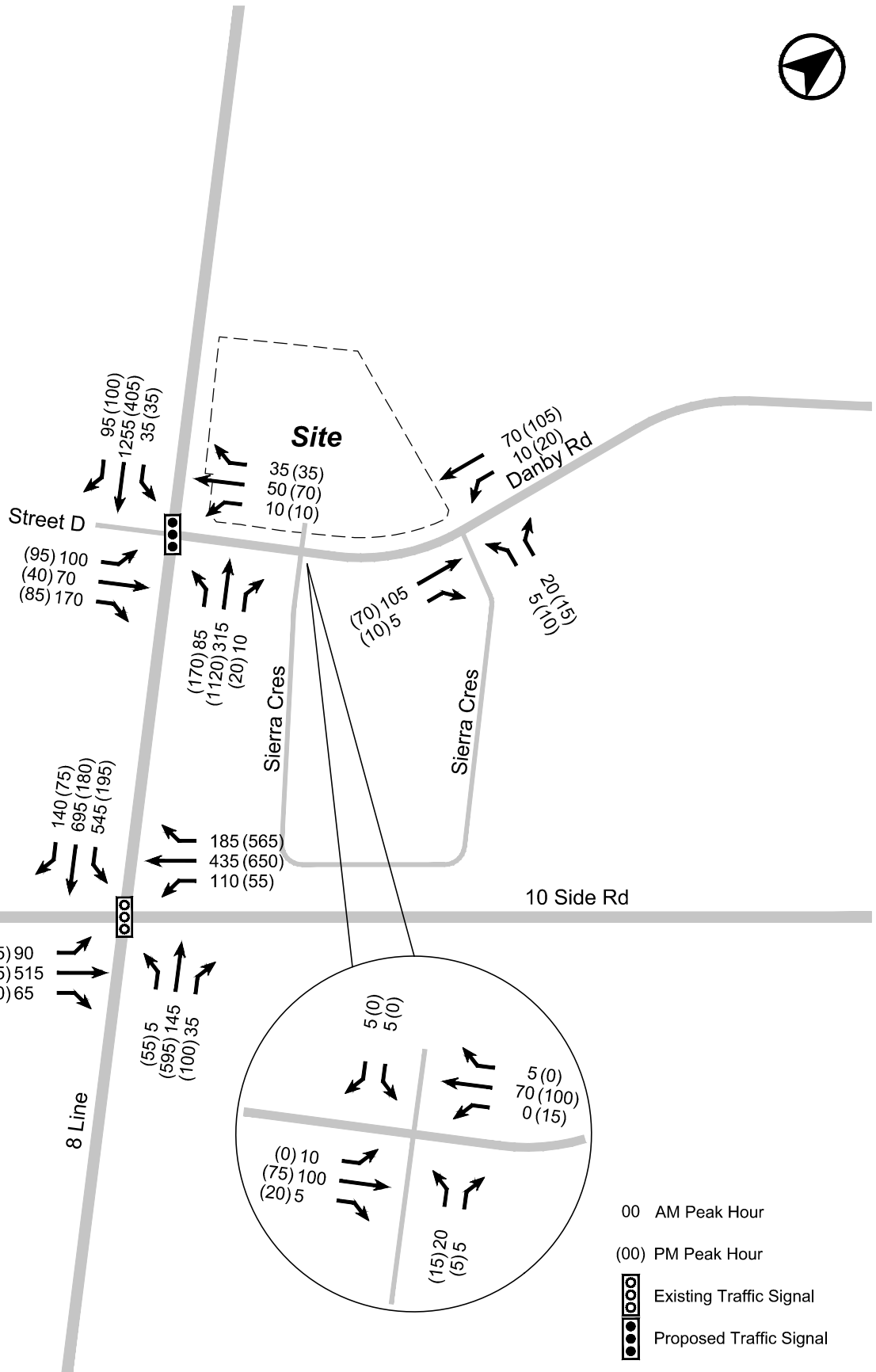
Future background traffic volumes reflect the full build-out of the Vision Georgetown lands to the west of Eighth Line, including its new internal street network and connection to Eighth Line at Danby road. It is expected that the Vision Georgetown project will include build-out of approximately 1,000 acres of land, providing housing for 19,000 new residents and a range of other mixed land uses to support a new community. Vision Georgetown is guided by the following vision statement:

*“The Vision Georgetown community is an inspiring new urban community; distinctive in the way it looks and functions, fostering healthy lifestyles, neighbourliness, economic prosperity, and local pride. It is a resilient, sustainable, complete, and compact community, with a thriving natural heritage system. It feels like a small Town and is physically connected to the broader community of Georgetown and the Town of Halton Hills. It honours the rich heritage of the Town, emphasizes people, and provides choices for day-to-day living. Overall, the Vision Georgetown community is an exceptional, forward thinking, and innovative model for new community development.”*

Future background traffic volumes on the area road network for the weekday morning and afternoon peak hours are summarized in **Figure 10**.



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**FIGURE 10 2031 FUTURE BACKGROUND TRAFFIC VOLUMES**

## 9.3 SITE TRAFFIC

### 9.3.1 Trip Distribution and Assignment

Trip distribution patterns and traffic route assignment for the residential component of the Site are derived from a 2016 Transportation Tomorrow Survey (TTS) residential travel query for 2006 GTA Zones 4160, 4158 and 4161.

**Table 14** presents adopted distribution of inbound and outbound vehicle traffic.

**TABLE 14 SITE TRIP DISTRIBUTION**

Direction (to or from)	Residential Traffic <sup>1</sup>	
	Outbound	Inbound
North via Eighth Line	47.5%	25%
South via Eighth Line	30%	35%
East via 10 Side Road	17.5%	37.5%
West via 10 Side Road	5%	2.5%
<b>Total</b>	<b>100%</b>	<b>100%</b>

Notes:

1. Values are rounded to the nearest 2.5%.

### 9.3.2 Existing Site Traffic

Traffic surveys for the Site's existing driveway demonstrated the generation of a small amount of weekday peak hour traffic. The existing site generated traffic is a result of the Church use located on the site today and will remain in future.

### 9.3.3 Site Vehicle Trip Forecast

Vehicle trip generation rates adopted for the purposes of this study are based on rates outlined within the *ITE Trip Generation Manual 11<sup>th</sup> Edition* for Land Use Code 221 (Mid-Rise Residential). **Table 15** is a summary of trip generation, including the rates utilized. No trips were removed for this analysis, given the existing church will remain on site in future.

**TABLE 15 VEHICLE TRIP GENERATION**

Land Use / Land Use Code	Weekday Morning Peak Hour			Weekday Afternoon Peak Hour		
	In	Out	2-Way	In	Out	2-Way
<i>Trip Generation Rates</i>						
<i>Land Use Code 221 (Mid-Rise), Not Close to Rail Transit – trips per unit</i>	0.09	0.28	0.37	0.24	0.15	0.39
<b>Trips Generated</b>						
Residential (157 units)	15	45	60	35	25	60
<b>New Site Traffic</b>	<b>15</b>	<b>45</b>	<b>60</b>	<b>35</b>	<b>25</b>	<b>60</b>

Notes:

1. Trips rounded to the nearest five (5).

Based on the trip generation methodology outlined above, the site is expected to generate in the order of **60** new two-way vehicle trips in the weekday morning and afternoon peak hours.

New site traffic volumes are illustrated on **Figure 11**.

### 9.3.4 Mode Split

Modal share characteristics for resident (home-based) travel during the morning and afternoon peak periods are summarized in **Table 16** and are based on a 2016 Transportation Tomorrow Survey (TTS) data query.

**TABLE 16 AREA RESIDENTIAL MODE SPLIT**

Mode	Morning Peak Period Outbound	Afternoon Peak Period Inbound
Auto Driver	69%	73%
Auto Passenger	23%	18%
Transit	3%	3%
Cycle	1%	2%
Walk	4%	5%

Notes:

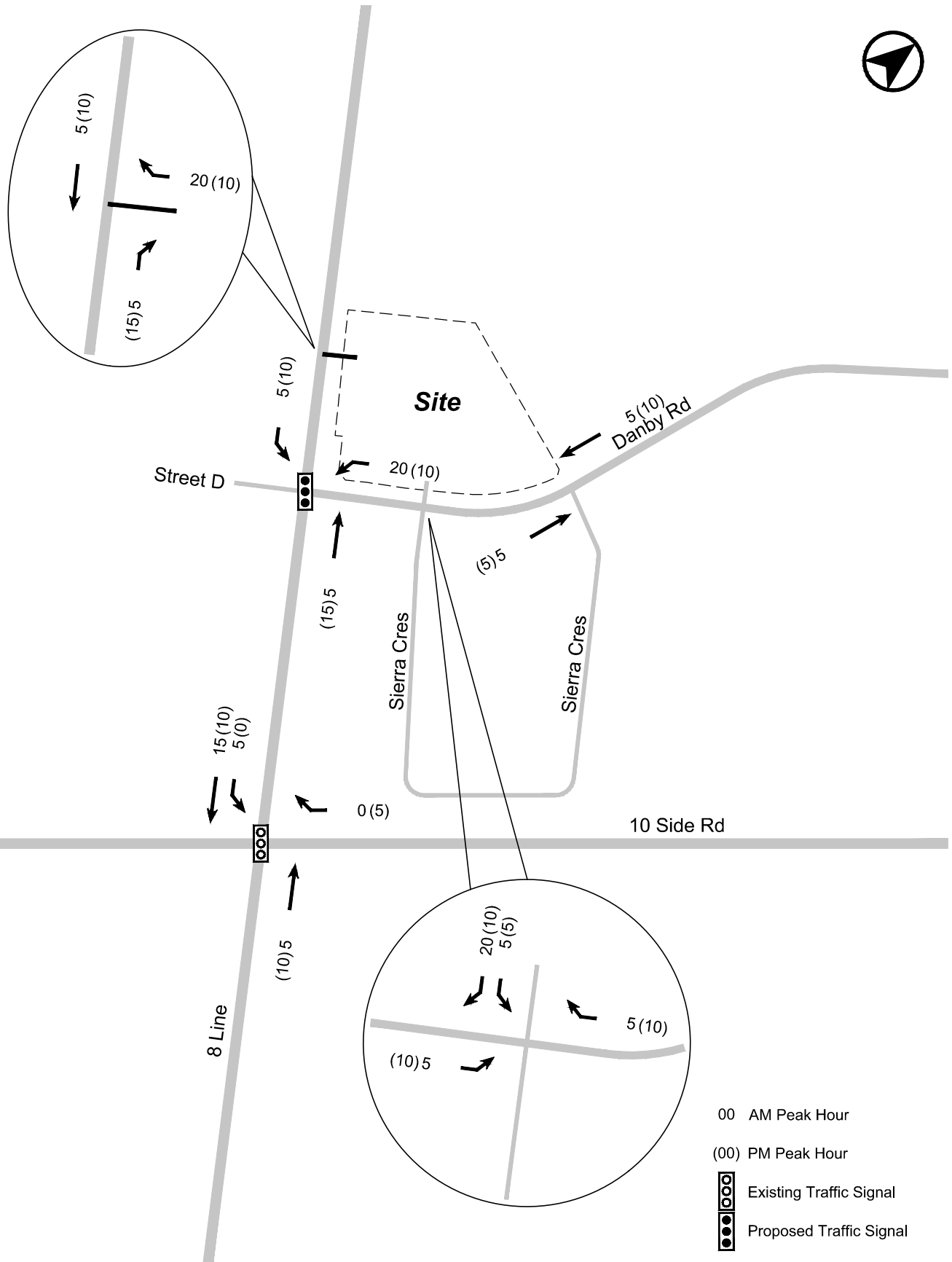
1. Based on 2016 TTS results for morning (6:00 - 8:59) and afternoon (15:00 - 17:59) peak traffic periods for TTS 2006 GTA Zones 4158, 4160 & 4161.
2. Auto passenger trips (includes auto passengers, school bus passengers and taxi passengers).

Overall, the area currently has an auto driver mode share in the order of 69% and 73% for morning outbound and afternoon inbound home-based trips during the peak travel periods, respectively.



## 9.4 FUTURE TOTAL TRAFFIC VOLUMES

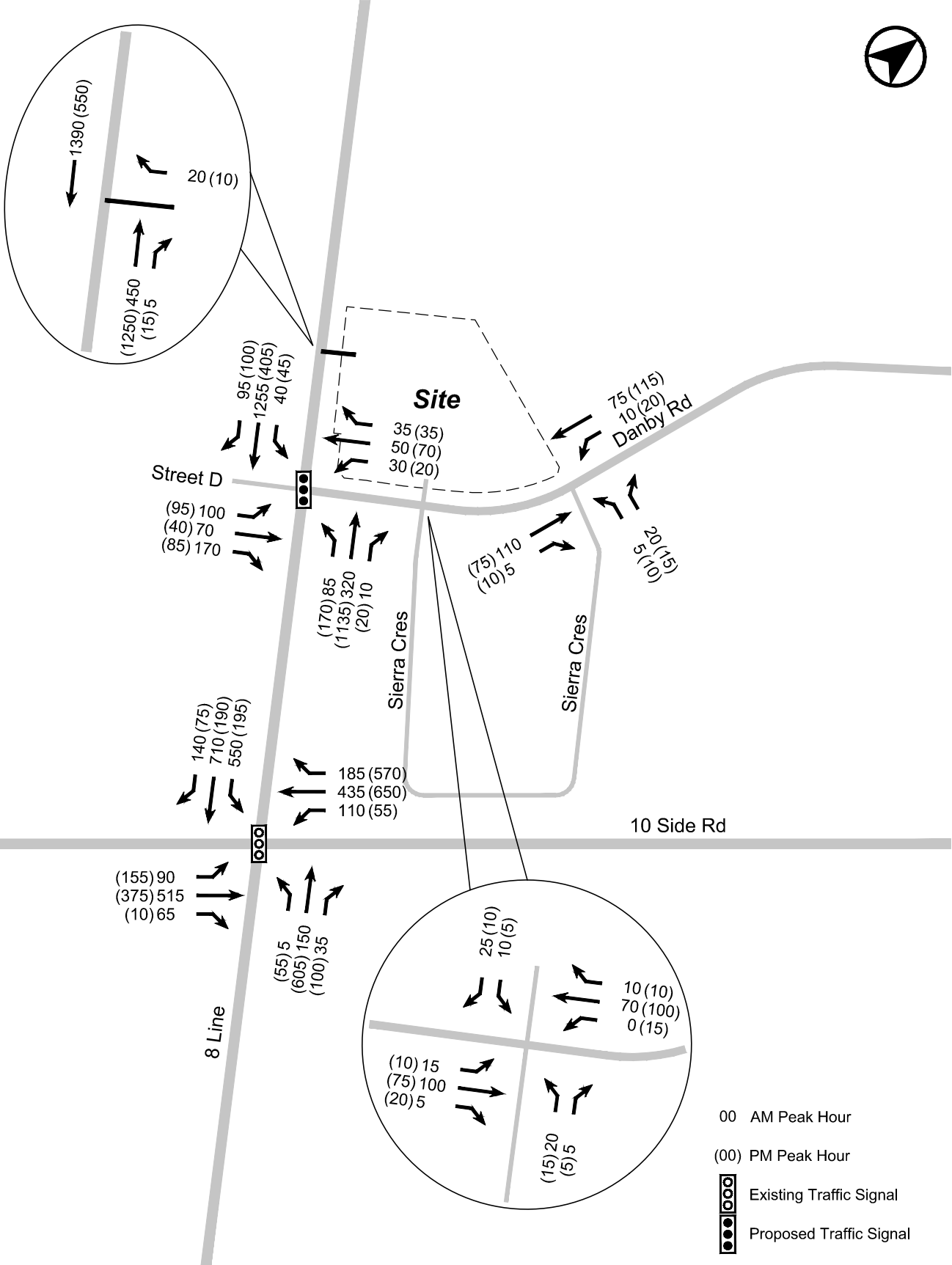
Future total traffic volumes during the weekday morning and afternoon peak hours reflect the sum of future background traffic volumes and new site traffic volumes. Future total traffic volumes for the 2031 study horizon are summarized in **Figure 12**.



**FIGURE 11 NEW SITE TRAFFIC VOLUMES**



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**FIGURE 12 2031 FUTURE TOTAL TRAFFIC VOLUMES**

## 10.0 TRAFFIC OPERATIONS ANALYSIS

### 10.1 ANALYSIS METHODOLOGY

#### 10.1.1 Analysis Scenarios

Traffic operations analyses have been undertaken during the weekday morning and afternoon street peak hours under the following traffic conditions:

- **Existing traffic conditions** that reflect activity levels and patterns on the area road network, based on the derived baseline existing traffic volumes;
- **Future background traffic conditions** based on the 2031 future total traffic volumes outlined in the Vision Georgetown traffic analysis (AECOM, 2018); and
- **Future total traffic conditions** with the development of the site as planned, including new traffic generated by the development proposal in addition to future background traffic volumes.

Traffic operations analyses were undertaken at the following locations in proximity of the proposed development site, including the intersections at:

- Eighth Line / 10 Side Road
- Eighth Line / Danby Road / Street “D”
- Eighth Line / Site Access (right-in, right-out only)
- Danby Road / Site Driveway / Sierra Crescent (west)
- Danby Road / Sierra Crescent (east)

The traffic analysis of this study is based on Highway Capacity Manual (HCM) 2000 methodology. A brief overview of the software, analysis parameters and assumptions are provided below.

#### 10.1.2 Analysis Software

The analysis has been completed using Synchro (version 11) capacity analysis software in accordance with the methodologies outlined in the Highway Capacity Manual (HCM 2000). The analysis is also in accordance with the Halton Hills Transportation Impact Study Guidelines (2015).

For signalized intersections, two indicators are used to reflect an intersection’s operation. The first is a volume to capacity (v/c) ratio which is an indicator of the capacity utilization at an intersection or on specific movements at an intersection. A v/c of 1.00 indicates that a movement, or intersection as a whole, is operating at or near theoretical capacity, based on HCM 2000 methodology.

The second indicator is a Level of Service (LOS) designation for an intersection as a whole or for individual movements. The LOS designation ranges from LOS A to LOS F, providing an understanding of the relative time a motorist may have to wait, on average, to travel through an intersection and complete any movement. A LOS A designation is reflective of a condition where motorists may experience little delay, while a LOS F designation is reflective of extended delays.

### **10.1.3 Traffic Signal Timings**

Analysis at signalized intersections was undertaken using the available signal timing parameters in an attempt to reflect how the signals were operating at the time of existing traffic data collection. Where signals have been optimized in future, existing signal cycle lengths and pedestrian minimum times were maintained.

Traffic signal timings adopted for this analysis were obtained for the area signalized intersections are provided in **Appendix H**.

Traffic signal timings were optimized for the Vision Georgetown analysis and selected left-turn movements were dedicated a protected phase.

## **10.2 ANALYSIS PARAMETERS**

### **10.2.1 Parameters and Assumptions**

#### **10.2.1.1 Peak Hour Factors**

Where available, Peak Hour Factors (PHF's) were adopted for signalized intersections within the study area in accordance with observed survey data. Where data was not available, PHFs consistent with adjacent intersections were adopted.

#### **10.2.1.2 Lost Time Adjustment**

A lost time adjustment of 0 seconds was adopted by default for all signalized intersection movements within the study area, consistent with the Halton Hills Synchro Guidelines.

## 10.3 SIGNALIZED INTERSECTIONS

This section contains an analysis of signalized intersections under existing, future background and future total traffic conditions for both the morning and afternoon peak hours. The results of the signalized intersection traffic operations analyses are summarized in **Table 17** and briefly in the following sections.

Detailed capacity analysis calculation worksheets for signalized intersections are attached in **Appendix I**.

Overall, signalized intersections in the study area operate well under future conditions. This is a result of the intersection split timings being optimized under future background conditions, to operate in the most efficient manner possible through the Vision Georgetown analysis recommendations.

**TABLE 17 SIGNALIZED INTERSECTION ANALYSIS SUMMARY**

	Existing		2031 Future Background		2031 Future Total	
	V/C	LOS	V/C	LOS	V/C	LOS
<b>Eighth Line / 10 Side Road</b>						
EBL	0.09 (0.14)	A (A)	0.57 (0.72)	C (C)	0.58 (0.72)	D (C)
EBTR	0.10 (0.15)	A (A)	0.53 (0.24)	C (B)	0.53 (0.24)	C (B)
WBL	0.09 (0.05)	A (A)	0.55 (0.17)	C (C)	0.55 (0.17)	C (C)
WBTR	0.16 (0.18)	A (A)	0.54 (0.92)	C (D)	0.54 (0.93)	C (D)
NBL	0.05 (0.05)	B (C)	0.07 (0.19)	C (C)	0.07 (0.20)	C (C)
NBTR	0.24 (0.65)	C (C)	0.25 (0.76)	C (C)	0.26 (0.77)	C (C)
SBL	0.28 (0.30)	C (C)	0.88 (0.82)	C (D)	0.89 (0.83)	C (D)
SBTR	0.75 (0.32)	C (C)	0.53 (0.17)	B (B)	0.54 (0.17)	B (B)
<b>Overall</b>	<b>0.37 (0.33)</b>	<b>B (B)</b>	<b>0.79 (0.89)</b>	<b>C (C)</b>	<b>0.79 (0.89)</b>	<b>C (C)</b>
<b>Eighth Line / Danby Road &amp; Street 'D'</b>						
EBTL	Signalized in future only.		0.72 (0.62)	D (D)	0.73 (0.63)	D (D)
EBR			0.44 (0.06)	C (C)	0.44 (0.06)	C (C)
WBTL			0.21 (0.29)	C (C)	0.35 (0.34)	C (C)
WBR			0.02 (0.02)	C (C)	0.02 (0.02)	C (C)
NBL			0.49 (0.30)	B (A)	0.49 (0.30)	B (A)
NBTR			0.14 (0.48)	A (A)	0.14 (0.48)	A (A)
SBL			0.06 (0.14)	A (A)	0.06 (0.19)	A (A)
SBTR			0.57 (0.21)	A (A)	0.57 (0.21)	A (A)
<b>Overall</b>				<b>0.60 (0.50)</b>	<b>B (A)</b>	<b>0.60 (0.51)</b>

Note:

1. xx (xx): Weekday morning peak hour (Weekday afternoon peak hour).

### 10.3.1 Eighth Line / 10 Side Road



Under existing conditions, the Eighth Line / 10 Side Road signalized intersection operates under acceptable conditions at all times. Overall volume to capacity (v/c) ratios are 0.37 and 0.33 for the weekday morning and afternoon peak hours, respectively.

With the addition of future background traffic, the intersection will reach theoretical capacity under its current configuration. Adjustments made to the intersection through the Vision Georgetown traffic analysis ensure that the intersection is able to operate within its capacity under future background conditions, with an overall v/c ratio 0.79 and 0.89 for the weekday morning and afternoon peak hours, respectively.

With the addition of site-related traffic, the intersection will remain within capacity, with overall v/c ratios of 0.79 and 0.89 in the weekday morning and afternoon peak hours, respectively.

### **10.3.2 Eighth Line / Danby Road**

Under existing conditions, the Eighth Line / Danby Road intersection operates under conventional STOP control. As a result of the lands to the west of Eighth Line being developed, a new connection will be made to Eighth Line from the west at Danby Road. This intersection is planned to be signalized in future to accommodate the approximate 19,000 new residents that are planned to live on the Vision Georgetown lands.

Under existing conditions, the intersection operates adequately, with a maximum level of service (LOS) of B for its westbound movements.

With the addition of future background traffic and changes as a result of the Vision Georgetown road improvements, the intersection will become signalized and remain within capacity, with overall v/c ratios of 0.60 and 0.50 in the weekday morning and weekday afternoon peak hours, respectively.

With the addition of site traffic, the intersection will remain within capacity, with overall v/c ratios of 0.60 and 0.51 in the weekday morning and afternoon peak hours, respectively.

With development of the site as planned, area signalized intersections can operate within capacity at all times.

## 10.4 UNSIGNALIZED INTERSECTIONS

Unsignalized intersection operations were analyzed under existing, future background and future total traffic conditions for both the morning and afternoon peak hours. **Table 18** summarizes results of the unsignalized intersection traffic operations analyses, including the Site driveways.

**TABLE 18 UNSIGNALIZED INTERSECTION ANALYSIS SUMMARY**

	Existing		2031 Future Background		2031 Future Total	
	LOS	Delay	LOS	Delay	LOS	Delay
<b>Eighth Line &amp; Site Driveway (RIRO)</b>						
WBR	Driveway is not existing.				A (B)	9.8 (10.9)
NBT					A (A)	0.0 (0.0)
NBTR					A (A)	0.0 (0.0)
SBT					A (A)	0.0 (0.0)
<b>Eighth Line &amp; Danby Road</b>						
WBLR	B (B)	12.1 (12.9)	Intersection is signalized in future with build-out of Vision Georgetown lands.			
NBT	A (A)	0.0 (0.0)				
NBR	A (A)	0.0 (0.0)				
SBL	A (A)	7.8 (8.5)				
SBT	A (A)	0.0 (0.0)				
<b>Sierra Crescent/Site Access &amp; Danby Road</b>						
EBTLR	A (A)	1.0 (0.0)	A (A)	0.7 (0.0)	A (A)	1.1 (0.8)
WBTLR	A (A)	0.0 (1.3)	A (A)	0.0 (1.1)	A (A)	0.0 (1.0)
NBTLR	B (A)	10.0 (9.9)	B (B)	10.4 (10.0)	B (B)	10.9 (10.4)
SBTLR	A (A)	9.6 (0.0)	A (A)	9.7 (0.0)	A (A)	9.7 (9.6)
<b>Sierra Crescent &amp; Danby Road</b>						
EBTR	A (A)	0.0 (0.0)	A (A)	0.0 (0.0)	A (A)	0.0 (0.0)
WBTL	A (A)	1.0 (1.6)	A (A)	1.1 (1.3)	A (A)	1.0 (1.2)
NBLR	A (A)	9.3 (9.3)	A (A)	9.6 (9.4)	A (A)	9.6 (9.4)

Note:

1. 00 (00): Weekday morning peak hour (Weekday afternoon peak hour).

All area unsignalized intersections, inclusive of the site driveways, operate adequately today and will continue to operate well under future conditions with background traffic growth and redevelopment of the Site.

## 10.5 SENSITIVITY ANALYSIS WITHOUT SIGNAL

An additional analysis scenario was considered to ensure that traffic operations would be adequate should the Vision Georgetown lands not be built out (or construction be delayed) and the intersection of Eighth Line / Danby Road remain under side street STOP Control.

Volumes for the sensitivity analysis scenario were derived from existing traffic counts, with the addition of a highly conservative 4% corridor growth, compounded annually for five years, northbound and southbound along Eighth Line.

Results for the unsignalized intersection of Eighth Line / Danby Road under the conditions stated above are summarized in **Table 19**.

**TABLE 19 UNSIGNALIZED EIGHTH LINE / DANBY ROAD ANALYSIS SUMMARY**

	Sensitivity Scenario	
	LOS	Delay (s)
WBLR	B (B)	13.6 (14.7)
NBTR	A (A)	0.0 (0.0)
NBTR	A (A)	0.0 (0.0)
SBL	A (A)	8.0 (8.9)
SBT	A (A)	0.0 (0.0)

Notes:

1. xx (xx) = weekday morning peak hour (weekday afternoon peak hour).

As displayed in the result summary above, the existing road network could adequately accommodate the proposed development in the event that the Vision Georgetown lands are not constructed and there is no new traffic signal installed at the intersection of Eighth Line / Danby Road.

## 11.0 SUMMARY AND CONCLUSIONS

Key findings of the transportation review are as follows:

### Introduction

1. BA Group has been retained by KPMB Architects to provide transportation consulting services in relation to the proposed residential development at the property municipally addressed as 14015 Danby Road (referred to herein as “the Site” or “proposed development”) in the Town of Halton Hills.

### Background (Existing Site)

2. The Site is currently occupied by the Norval United Church, which was constructed in 2020. The church holds a capacity of 242 seats and is approximately 1,475 square metres in gross floor area (GFA). The surface parking lot provides 156 parking spaces, including 150 standard spaces and six (6) accessible spaces.
3. There is currently one (1) vehicular access located on Danby Road, a surface parking lot with 156 parking spaces, and a garbage enclosure on the property. Pedestrian pathways are provided along the perimeter of the church building for convenient, on-foot access throughout the property.
4. The existing church building, portion of the surface parking supply, loading enclosure, and pedestrian pathways are planned to remain on-site in future conditions.

### Proposed Development

5. The proposed development includes a residential expansion to the Norval United Church property, providing 157 new apartment units. The apartment building is proposed to be rental in tenure with a portion as affordable units.
6. Infrastructural transportation changes to the Site include the removal and re-construction of parking spaces, provision of a parking ramp and underground parking level, re-location of garbage enclosure, provision of a formal loading facility, and provision of internal pedestrian connections.

### Transportation Context

7. The Site is currently served by the existing road network of major, minor, and local roads. As part of the Vision Georgetown Secondary Plan, an east-west (Street ‘D’) and north-south (Street ‘A’) collector road is being planned near the site. Various right-of-way improvements along Eighth Line are being considered and planned as per the Eighth Line Environmental Assessment Study.
8. There is currently limited transit services to and from the Site. ActiVan, a specialized or accessible transit service used by seniors or those with disabilities, is being offered at the site location.
9. Active transportation facilities are provided near the Site, including pedestrian pathways on-site, multi-use trails along Eighth Line and 10 Side Road, and cycling-dedicated facilities along Danby Road. In addition, the Site area is walkable to many key destinations, including the Gellert Community Centre, parks, a retail plaza, place of worship (on Site), and fire station.

## Transportation Demand Management

10. A Transportation Demand Management plan is pursued within the context of the proposed redevelopment as per the Green Development Standards (GDS) Version 3.
11. Numerous TDM strategies and measures are contemplated as part of the Plan. Their primary objectives are as follows:
  - Reduce car dependence and the need for everyday single occupancy vehicle travel;
  - Improve pedestrian / cycling convenience to encourage non-automobile travel modes; and
  - Promote low-carbon modes of transportation, such as car-sharing and transit.

## Vehicular Parking

12. The Site is subject to the Town of Halton Hills Zoning By-law 2010-0050, and the property obtained a Site-specific Zoning By-law and minor variance pertaining to the future residential apartment use and existing church supply, respectively. Application of the Zoning By-law 2010-0050 / Site-specific Zoning By-law / minor variance standards result in a minimum of 439 vehicle parking spaces, including 236 resident spaces, 40 residential visitor spaces, and 163 place of worship spaces. In addition, application of the Town of Halton Hills Zoning By-law 2005-0117 supply requirements and AODA dimensional requirements result in a minimum of 9 accessible parking spaces (4 Type A and 5 Type B).
13. It is proposed to reduce the minimum vehicular parking requirements to the in-force Zoning By-law 2010-0050 and Site-specific approvals. The proposed parking standards include the following: 1.25 spaces per unit for residents, 0.25 spaces per units for residential visitors, and 1 space per 4 persons for the place of worship use. Application of the proposed parking rates result in a requirement of 298 vehicle parking spaces including 197 resident spaces, 40 residential visitor spaces, and 61 place of worship spaces.
14. A total supply of 298 parking spaces is proposed for the Site, including 197 resident spaces, 40 residential visitor spaces, and 61 place of worship spaces. Of the total parking supply, 10 accessible spaces will be provided.
15. An overview of the appropriateness of the reduced parking supply, per use, is as follows:
  - The proposed overall resident parking rate of 1.25 spaces per unit is considered appropriate considering the currently available and planned transportation infrastructure in proximity to the Site, policies in support of greater active transportation use or decreased automobile use, suite of proposed TDM measures, data for residential parking demand and marketing strategy suitable based on the proposed housing types at the Site.
  - The proposed place of worship parking rate of 1 space per 4 persons is appropriate with consideration to the observed existing peak parking demand for the Norval United Church, observed parking utilization levels at a comparable United Church site (St. James), comparison of other church standards in Ontario, and suite of proposed non-residential TDM measures.
16. Based on the foregoing, the proposed vehicular parking supply is considered appropriate.



## **Bicycle Parking**

17. The Town of Halton Hills Zoning By-law 2010-0050 provides minimum standards for non-residential uses only and does not require bicycle parking for residential uses.
18. There are currently 5 bicycle spaces available at the main entrance of the church building, which will be maintained in future conditions.
19. Based on the foregoing, the proposed bicycle parking supply meets the subject Zoning By-law requirements for the Site.

## **Loading**

20. Application of the prevailing Zoning By-law 2010-0050 to the proposed development results in a requirement of 1 loading space with minimum dimensions of 3.5 metres by 12.0 metres. Based on the Region of Halton Solid Waste Guidelines, it is required to provide a minimum height clearance of 7.5 metres for residential loading spaces.
21. The loading supply for the residential building includes 1 loading space; in addition, the existing garbage enclosure will be relocated to the northwest of the Site to serve the existing church use.
22. Based on the foregoing, the proposed loading supply meets the requirements for the development.

## **Pick-up and Drop-off**

23. The Norval United Church currently facilitates short-term parking along the drive aisle across from the main building entrance (facing Danby Road). The existing PUDO area for the church has a capacity of 4 vehicles, which will be maintained in future conditions.
24. It is proposed to provide a new PUDO facility located via a driveway on Eighth Line with a right-in / right-out vehicle access. The new facility has a capacity of 2 vehicles.
25. The total capacity for PUDO activity on the Site is 6 vehicles, which is expected to meet the demand as part of the proposed development.
26. Based on the foregoing, the proposed PUDO space supply meets the requirements for the development.

## Travel Demand Forecast

27. To determine existing baseline traffic conditions on the study area road network, traffic volumes were surveyed by Spectrum Traffic Inc. on Tuesday March 1, 2022.
28. Given the site is within close proximity of the Vision Georgetown lands and that there is an ongoing transportation study, future total volumes from the draft Vision Georgetown traffic analysis (AECOM, 2018) have been used to represent 2031 future background volumes for this study. The study includes the future area road network, which indicates a signalized intersection at Eighth Line / Danby Road.
29. Future background traffic volumes reflect the full build-out of the Vision Georgetown lands to the west of Eighth Line, including its new internal street network and connection to Eighth Line at Danby road.
30. Trip distribution patterns and traffic route assignment for the residential component of the Site are derived from a 2016 Transportation Tomorrow Survey (TTS) residential travel query for 2006 GTA Zones 4160, 4158 and 4161.
31. Traffic surveys for the Site's existing driveway demonstrated the generation of a small amount of weekday peak hour traffic. The existing site generated traffic is a result of the Church use located on the Site today and will remain in future.
32. Vehicle trip generation rates adopted for the purposes of this study are based on rates outlined within the *ITE Trip Generation Manual 11<sup>th</sup> Edition* for Land Use Code 221 (Mid-Rise Residential). There are also 10 townhomes planned for the Site, therefore Land Use Code 215 (Single Family Attached Housing) was also adopted.
33. Based on the trip generation methodology outlined above, the Site is expected to generate in the order of 60 new two-way vehicle trips in the weekday morning and afternoon peak hours, respectively.
34. The area currently has an auto driver mode share in the order of 69% and 73% for morning outbound and afternoon inbound home-based trips during the peak travel periods, respectively.
35. Future total traffic volumes during the weekday morning and afternoon peak hours reflect the sum of future background traffic volumes and new Site traffic volumes.

## Traffic Operations Analysis

36. Traffic operations analyses have been undertaken for the study area road network during the weekday morning and afternoon street peak hours for existing, future background and future total conditions.
37. Analysis at signalized intersections was undertaken using the available signal timing parameters in an attempt to reflect how the signals were operating at the time of existing traffic data collection. Where signals have been optimized in future, existing signal cycle lengths and pedestrian minimum times were maintained.

38. Traffic signal timings were optimized and selected left-turn movements were dedicated a protected phase as a result of the “Vision Georgetown” analysis.
39. Overall, signalized intersections in the study area operate well under future conditions. This is a result of the intersection split timings being optimized under future background conditions, to operate in the most efficient manner possible through the Vision Georgetown analysis recommendations.
40. All area unsignalized intersections, inclusive of the site driveways, operate adequately today and will continue to operate well under future conditions with background traffic growth and redevelopment of the Site.

### **Overall**

41. Based upon our review of the development proposal, the development of new 157 residential units in addition to the existing Norval United Church can be reasonably accommodated on-site and within the surrounding area road network for all types of travel modes (i.e. transit, walking, cycling and vehicle).

## **Appendix A: Reduced Scale Architectural Plans**



# NORVAL UNITED CHURCH

DECEMBER 16 2022



Sheet No.	Drawing Name	Rev. No.	Issue Date
A0-00			
A0-00	COVER PAGE	E	12/16/22
A0-01	PROPOSAL	E	12/16/22
A0-02	PDS SURVEY	F	12/16/22
A1-00			
A1-00	PROPOSAL	E	12/16/22
A1-01	SITE PLAN	E	12/16/22
A2-00			
A2-00	FLOORPLAN - LEVEL P1	E	12/16/22
A2-01	FLOORPLAN - GROUND LEVEL	E	12/16/22
A2-02	FLOORPLAN - TYPICAL RESIDENTIAL FLOOR	E	12/16/22
A2-07	ROOF PLAN	F	12/16/22
A3-00			
A3-00	MAIN BUILDING - OVERALL ELEVATIONS	E	12/16/22

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## ZONING BY-LAW AMENDMENT

### PROJECT TEAM

- |  |  |  |  |  |   |
|--|--|--|--|--|---|
| <p><b>APPLICANT</b><br/>KINDRED WORKS<br/>8 King Street East<br/>Toronto, ON<br/>M5C 1B5<br/>T: 416-618-2097</p>                         | <p><b>ARCHITECT</b><br/>KPMB Architects Inc.<br/>351 King St E, Suite 1200<br/>Toronto, ON<br/>M5A 0L6<br/>T: 416-977-5104</p> | <p><b>STRUCTURAL ENGINEERS</b><br/>Aspect Structural Engineers<br/>53 Jarvis St, Suite 200<br/>Toronto, ON<br/>M5C 2H2<br/>T: 416-954-4004</p> | <p><b>MECHANICAL ENGINEERS</b><br/>Hammerschlag &amp; Joffe Inc<br/>43 Lesmill Rd<br/>North York, ON<br/>M3B 2T8<br/>T: 416-444-9263</p> | <p><b>ELECTRICAL ENGINEERS</b><br/>Mulvey &amp; Banani International Inc.<br/>90 Sheppard Ave E, Suite 500<br/>Toronto, ON<br/>M2N 3A1<br/>T: 416-751-2520</p> | <p><b>TRANSPORTATION, PARKING &amp; WASTE MANAGEMENT</b><br/>BA Consulting Group Ltd<br/>45 St Clair Ave W, Suite 300<br/>Toronto, ON<br/>M4V 1K9<br/>T: 416-961-7110</p> |
| <p><b>LANDSCAPE ARCHITECT</b><br/>Janet Rosenberg &amp; Studio14<br/>148 Kenwood Ave<br/>Toronto, ON<br/>M6C 2S3<br/>T: 416-656-6665</p> | <p><b>ENVIRONMENTAL</b><br/>Grounded Engineering<br/>1 Banigan Drive<br/>Toronto, ON<br/>M4H 1G3<br/>T: 647-264-7909</p>       | <p><b>PASSIVE HOUSE</b><br/>JM V Consulting<br/>XXXXXXXXX<br/>Toronto, ON<br/>XXX XXX<br/>T: 819-230-0369</p>                                  | <p><b>GEOTECH</b><br/>Grounded Engineering<br/>1 Banigan Drive<br/>Toronto, ON<br/>M4H 1G3<br/>T: 647-264-7909</p>                       | <p><b>CIVIL ENGINEERS</b><br/>WSP Global Inc.<br/>500 -119 Spadina Ave<br/>Toronto, ON<br/>M5V 2L1<br/>T: 416-260-1560</p>                                     |   |

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United Church Canada  
**UCC Norval United**

14215 Danby Rd, Georgetown, ON  
L7G 0L8

Project No. 2204  
Plot Date 12/16/22

**COVER PAGE**

**A0-00**





<b>14015 Danby Rd, Georgetown, ON L7G 0L8</b>	
1 Legal Address	Block 231, Plan 20m1156 Subject To An Easement For Entry As In H-1341065 Town Of Halton Hills
2 Municipal Address	14015 Danby Rd, Georgetown, ON L7G 0L8
3 Applicable Zoning By-Laws	Bylaw 2010-0050
4 Current Zoning Designation	Institutional Zone (I)
5 Total Lot Area (m <sup>2</sup> )	20,039m <sup>2</sup>
6 Retained Lot Area (m <sup>2</sup> )	13,180m <sup>2</sup>
7 Severed Lot Area (m <sup>2</sup> )	6,859m <sup>2</sup>
8 Total Residential Building GFA (m <sup>2</sup> )	11,609m <sup>2</sup>
9 Retained Lot Coverage (Area at Grade, m <sup>2</sup> )	1,510m <sup>2</sup>
10 Severed Lot Coverage (Area at Grade, m <sup>2</sup> )	1,941m <sup>2</sup>
11 Established Grade (m)	243.975m
12 Total Area of Renovated Space	0
13 Retained Lot Landscaped Area (m <sup>2</sup> and % of Retained Lot Area)	4655m <sup>2</sup> (35%)
14 Severed Lot Landscaped Area (m <sup>2</sup> and % of Severed Lot Area)	3626m <sup>2</sup> (51%)
<b>Proposed Building Height</b>	<b>22 m</b>
1 Building Height is measured from Established Grade as defined above	

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Project Area Breakdown (m <sup>2</sup> )					
Level	Gross Constructed Area (GCA)	Gross Floor Area (GFA)			
		Existing Place of Worship	New Community	Existing Residential	New Residential
LEVEL 1	1878 m <sup>2</sup>	1,490 m <sup>2</sup>	0.0 m <sup>2</sup>	0 m <sup>2</sup>	1,208 m <sup>2</sup>
LEVEL 2	1987 m <sup>2</sup>	0 m <sup>2</sup>	0.0 m <sup>2</sup>	0 m <sup>2</sup>	1,941 m <sup>2</sup>
LEVEL 3	2129 m <sup>2</sup>	0 m <sup>2</sup>	0.0 m <sup>2</sup>	0 m <sup>2</sup>	2,129 m <sup>2</sup>
LEVEL 4	2168 m <sup>2</sup>	0 m <sup>2</sup>	0.0 m <sup>2</sup>	0 m <sup>2</sup>	2,111 m <sup>2</sup>
LEVEL 5	2168 m <sup>2</sup>	0 m <sup>2</sup>	0.0 m <sup>2</sup>	0 m <sup>2</sup>	2,111 m <sup>2</sup>
LEVEL 6	2168 m <sup>2</sup>	0 m <sup>2</sup>	0.0 m <sup>2</sup>	0 m <sup>2</sup>	2,111 m <sup>2</sup>
<b>Total</b>	<b>13713 m<sup>2</sup></b>	<b>1,490 m<sup>2</sup></b>	<b>0.0 m<sup>2</sup></b>	<b>0 m<sup>2</sup></b>	<b>13,929 m<sup>2</sup></b>

Residential Suite Mix					
Level	1 Bed	2 Bed	2 Bed + D	3 Bed	Total Count
LEVEL 1	6	6	0	2	14
LEVEL 2	14	11	0	2	27
LEVEL 3	13	12	1	3	29
LEVEL 4	13	12	1	3	29
LEVEL 5	13	12	1	3	29
LEVEL 6	13	12	1	3	29
<b>Grand Total</b>	<b>72</b>	<b>69</b>	<b>4</b>	<b>16</b>	<b>157</b>

Barrier Free Units - Required (20% OBC 3.8.2.1.(6))					
	% of total units required	# of Units Required	% of total units provided	# of units provided	Comments
	20%	32	21.0%	33	

Residential Amenity Spaces						
	Req. Indoor Amenity	Req. Outdoor Amenity	Provided Indoor Amenity	Provided Outdoor Amenity	Overall Rate Required	Overall Rate Provided
Total Area	m <sup>2</sup>	m <sup>2</sup>	123m <sup>2</sup>	m <sup>2</sup>		
Area per Residential Suite	0	0	0.787	m <sup>2</sup>	m <sup>2</sup>	-

Residential Indoor Amenity Space Provided			Residential Outdoor Amenity Space Provided		
Level	Area	Description	Level	Area	Description
Ground Level	123m <sup>2</sup>		Ground Level	m <sup>2</sup>	
Level 3	m <sup>2</sup>		Level 3	m <sup>2</sup>	
<b>Total</b>	<b>123m<sup>2</sup></b>		<b>Total</b>	<b>m<sup>2</sup></b>	

Car Parking Provided			
	Spaces Provided	EVSE Parking Spaces Provided	Notes
Residential	237	59	EVSE spaces located on P1 level at a rate of 0.25. Exact location of spaces TBD.
<b>Total</b>	<b>237</b>	<b>59</b>	

Car Parking as per Parking Justification Report										
Land Use	Units	Parking Rate Required Per Zoning By-Law (per unit)	Parking Required	Parking Rate Provided	Parking Provided	Parking Provided on Retained Parcel	Parking Provided on Severed Parcel	Parking Provided Below Grade on Severed Parcel	Spaces Provided/Notes	
<b>Residential Parking</b>										
1 Bedroom	72	1.5	108	1.25	90	118	0	79	Required parking rates based on Zoning By-law 2010-0050. As per Zoning By-law 2010-0050 Clause S.2.2, all required parking space calculations must be rounded up to the nearest whole number. A parking supply of 229 spaces was granted through a minor variance (D13V4913.0214) to permit the Norval United Church development. As part of Phase 1, a parking supply of 165 spaces has been noted as per the 2016 site plan. Phase 2 is no longer being pursued.	
2 Bedroom	69	1.5	104	1.25	87					
3 Bedroom	16	1.5	24	1.25	20					
<b>Sub-Total</b>	<b>157</b>		<b>236</b>		<b>197</b>					
Effective Resident Ratio (Spaces per unit)			<b>1.50</b>		<b>1.25</b>					
<b>Visitor Parking</b>										
Resident Visitors	157	0.25	40	0.25	40	32	8	0		
<b>Sub-Total</b>	<b>157</b>		<b>40</b>		<b>40</b>					
Effective Visitor Ratio (Spaces per unit)			<b>0.25</b>		<b>0.25</b>					
<b>Place of Worship Parking</b>										
Place of Worship Area	1,475m <sup>2</sup>	1.00 parking space per 0.0m <sup>2</sup>	164	-	61	61	0	0		
Place of Worship Seating	244 sanctuary seats	-	-	1 parking space per 4 seats	0					
<b>Sub-Total</b>			<b>164</b>		<b>61</b>					
<b>Total</b>			<b>440</b>		<b>298</b>	<b>211</b>	<b>8</b>	<b>79</b>		

Bicycle Parking						
	Units/GFA	Rate (per unit)	Spaces Required	Rate Provided	Spaces Provided	Spaces Provided/Notes
Residential Long-term			-	-	-	
Residential Short-term	157	-	-	-	-	
<b>Total Long-term</b>			-	-	-	
<b>Total Short-term</b>			-	-	-	
<b>Total Bicycle Parking</b>			-	-	-	

Loading						
Use	Number of Units/Size	Rate1	Requirement			
			Type 'A'	Type 'B'	Type 'C'	Type 'G'
Residential	157	1 Type 'C' for 31 to 399 dwellings	-	-	-	1
<b>Total</b>			0	0	0	1

UNITED CHURCH CANADA  
UNITED CHURCH CANADA

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L7G 0L8

Project No. 2024  
Scale: 1:1  
Plot Date: 02/08/22

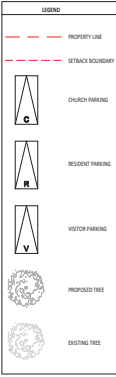
**STATISTICS**

**A1-00**



**NOTES:**

1. All dimensions are in meters unless otherwise specified.
2. All areas are to be finished to the level of the existing ground unless otherwise specified.
3. All areas are to be finished to the level of the existing ground unless otherwise specified.
4. All areas are to be finished to the level of the existing ground unless otherwise specified.
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10. All areas are to be finished to the level of the existing ground unless otherwise specified.



NO.	DATE	DESCRIPTION
1	12/15/2020	ISSUED FOR PERMIT

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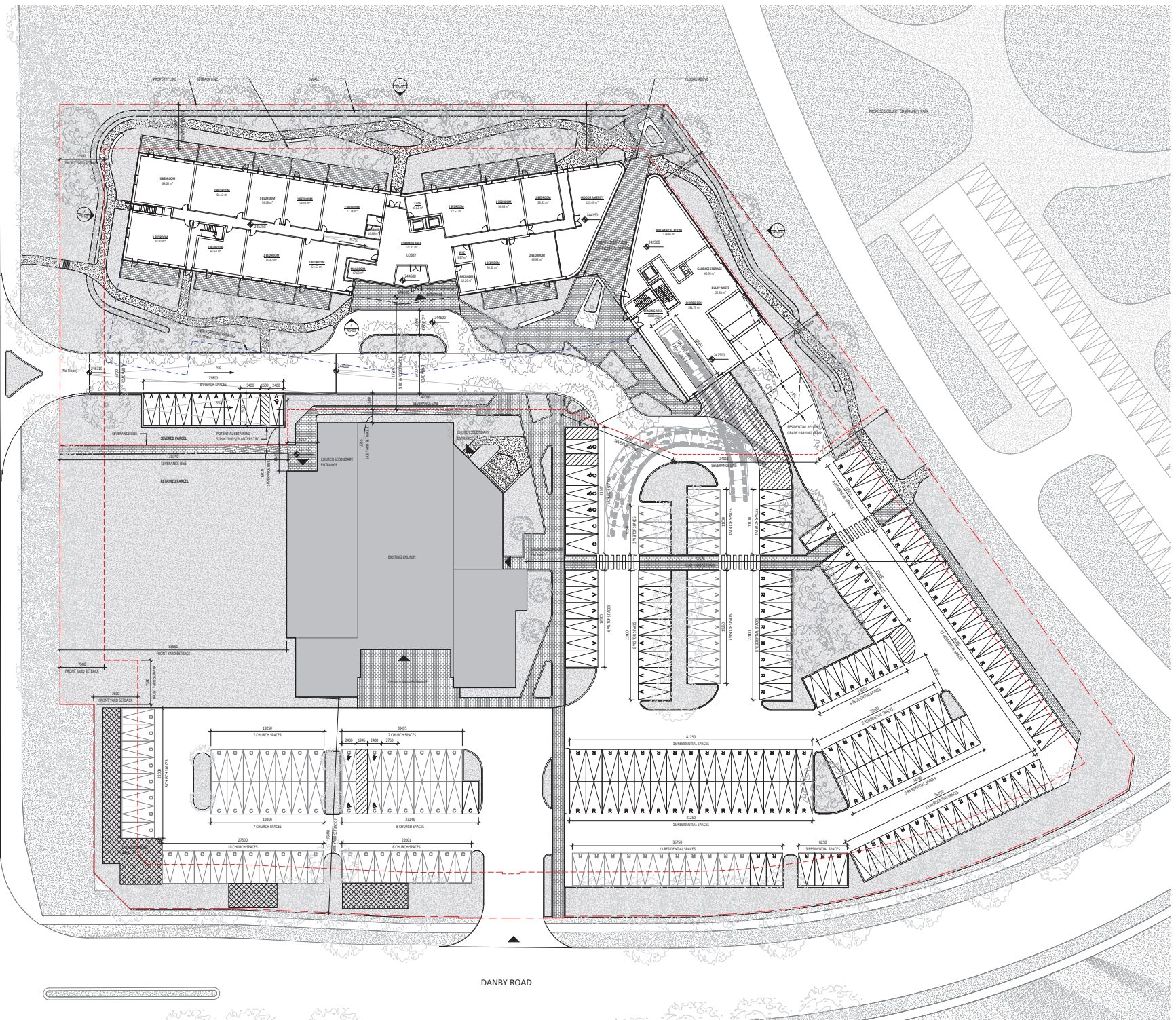


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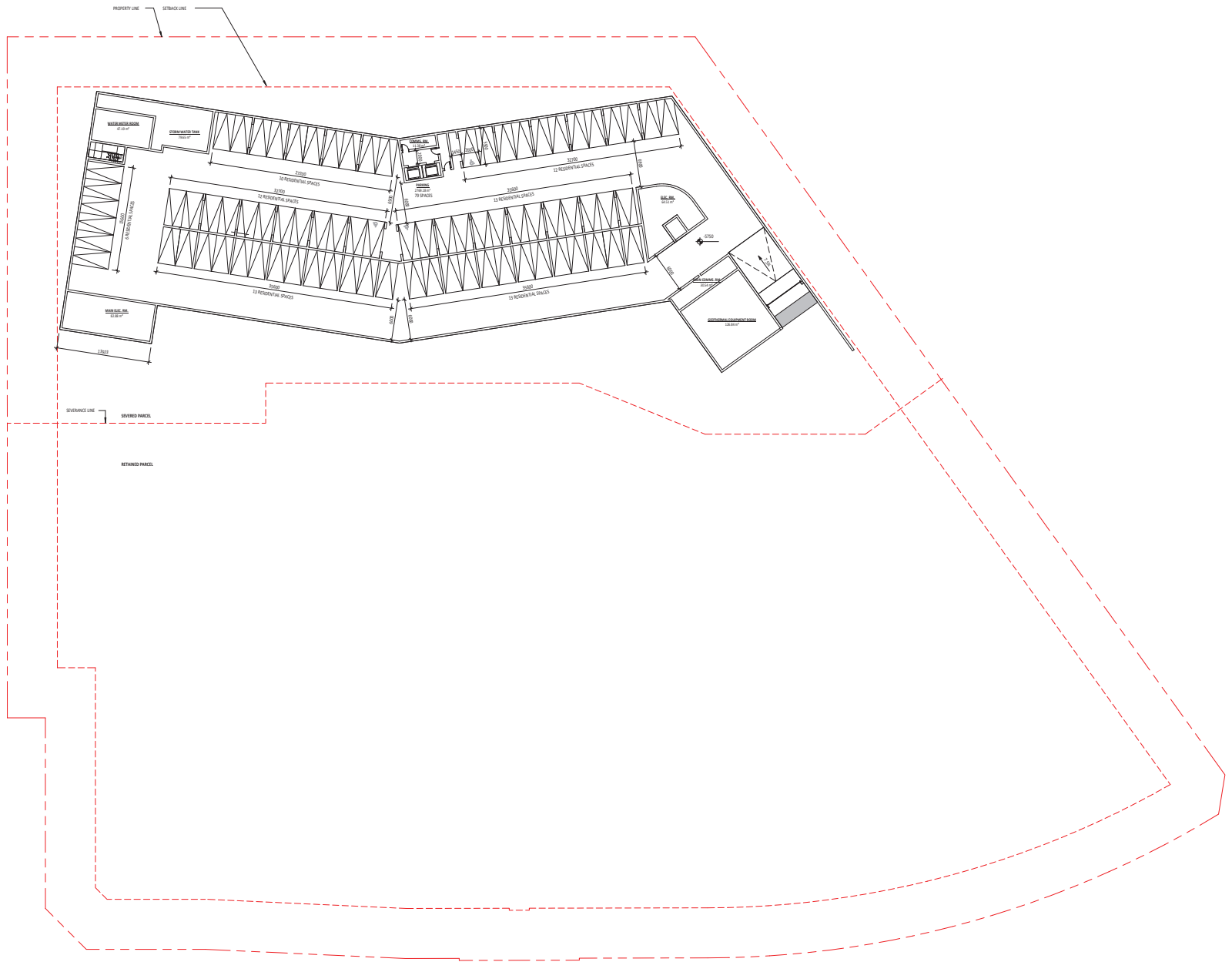
**SITE PLAN**

8 LINDER ROAD

DANBY ROAD







**Legend:**  
 - Green: Proposed  
 - Red: Existing  
 - Blue: Utility  
 - Yellow: Easement  
 - Grey: Other

NO.	DESCRIPTION	DATE
1	ISSUED FOR PERMIT	2024-08-15

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Project North: True North

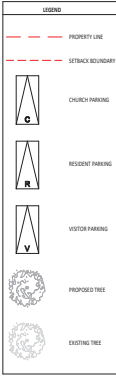
Project No: 2024  
 Scale: 1:400  
 Plot Date: 22/08/24

**FLOORPLAN - LEVEL P1**



**NOTES:**

1. All dimensions are in millimeters unless otherwise stated.
2. All areas are to be finished to the level indicated on the site plan.
3. All areas are to be finished to the level indicated on the site plan.
4. All areas are to be finished to the level indicated on the site plan.
5. All areas are to be finished to the level indicated on the site plan.
6. All areas are to be finished to the level indicated on the site plan.
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8. All areas are to be finished to the level indicated on the site plan.
9. All areas are to be finished to the level indicated on the site plan.
10. All areas are to be finished to the level indicated on the site plan.



NO.	DATE	DESCRIPTION
1	2024	ISSUED FOR PERMIT

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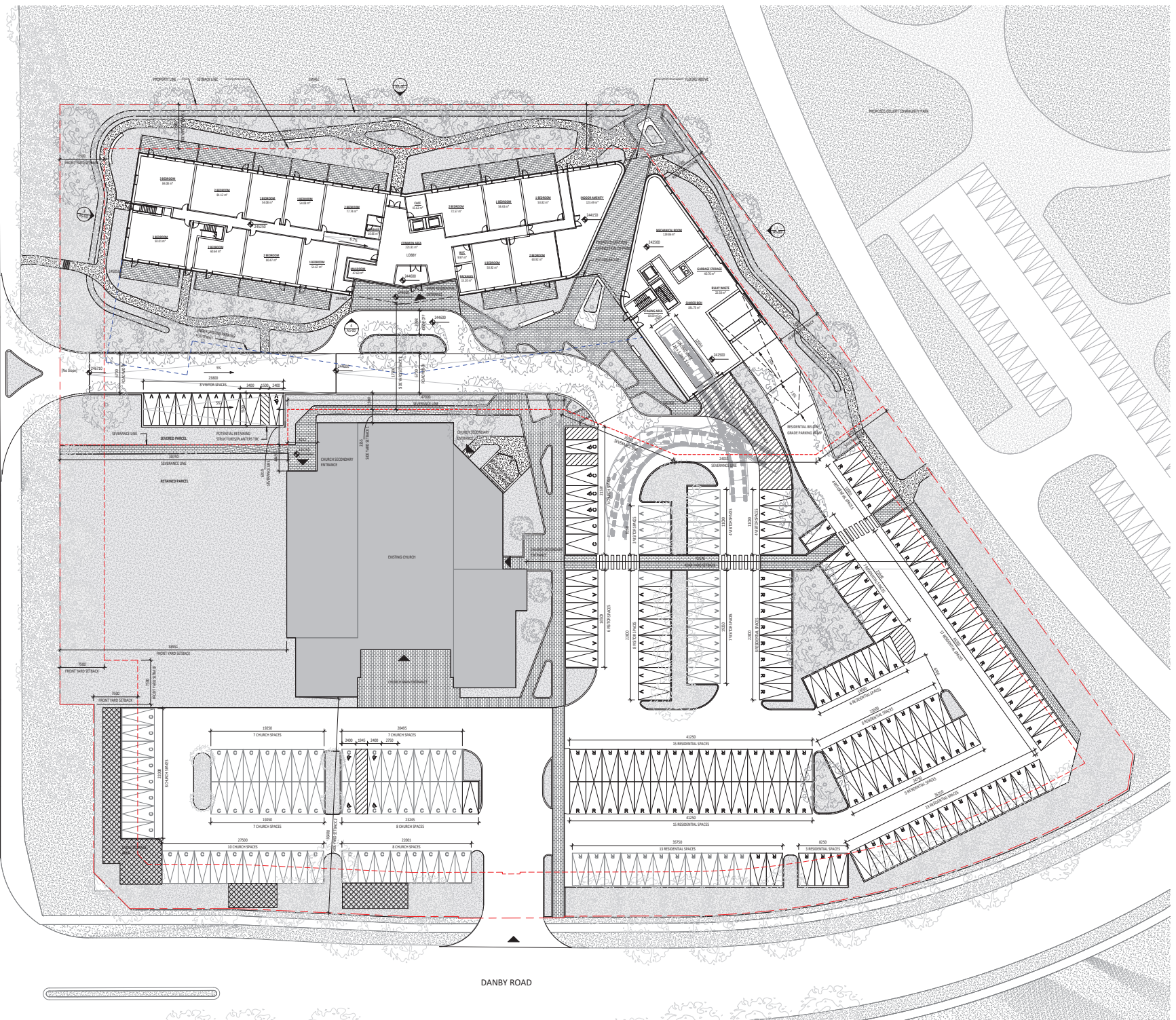


Project No. 2024  
 Scale: 1:200  
 Plot Date: 03/18/24

**FLOORPLAN - GROUND LEVEL**

8 LINER ROAD

DANBY ROAD





## **Appendix B: Norval United Church Parking Demand Surveys**



Project: Norval United Church  
 Project No: 6126-25  
 Location: 14015 Danby Rd

Date: Sunday February 27, 2022

Area	Lot	HC	Total
Supply	122	8	130
8:00	10	0	10
8:30	10	0	10
9:00	12	0	12
9:30	23	0	23
10:00	41	1	42
10:30	37	1	38
11:00	37	1	38
11:30	25	1	26
12:00	21	0	21
12:30	11	0	11
13:00	14	0	14
13:30	18	0	18
14:00	26	0	26
14:30	24	0	24
15:00	24	0	24

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14%  
20%  
18%  
18%

Date: Sunday March 6, 2022

Area	Lot	HC	On Street	Total
Supply	122	8	-	130
8:00	9	0	0	9
8:30	9	0	0	9
9:00	11	0	0	11
9:30	23	0	0	23
10:00	34	0	0	34
10:30	40	0	0	40
11:00	37	0	0	37
11:30	22	0	0	22
12:00	15	0	0	15
12:30	17	0	0	17
13:00	18	0	0	18
13:30	23	0	0	23
14:00	25	0	0	25
14:30	26	1	0	27
15:00	25	1	0	26

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28%  
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13%  
14%  
18%  
19%  
21%  
20%

\*PEAK DAY\*

Date: Sunday March 13, 2022

Area	Lot	HC	On Street	Total
Supply	122	8	-	130
8:00	7	0	0	7
8:30	7	0	0	7
9:00	13	0	0	13
9:30	23	0	0	23
10:00	32	0	0	32
10:30	42	1	0	43
11:00	43	1	0	44
11:30	29	1	0	30
12:00	24	1	0	25
12:30	12	0	0	12
13:00	11	0	0	11
13:30	17	0	0	17
14:00	19	0	0	19
14:30	20	0	0	20
15:00	20	0	0	20

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Available

-7  
-7  
-13  
-23  
-32  
-43  
-44  
-30  
-25  
-12  
-11  
-17  
-19  
-20  
-20



## **Appendix C: Proxy Church Parking Demand Surveys**



**Project:** UPRC St James Waterdown  
**Project No:** 6126-25  
**Location:** 306 Parkside Dr - Waterdown  
**Date:** Sunday February 27, 2022

**Parking Summary**

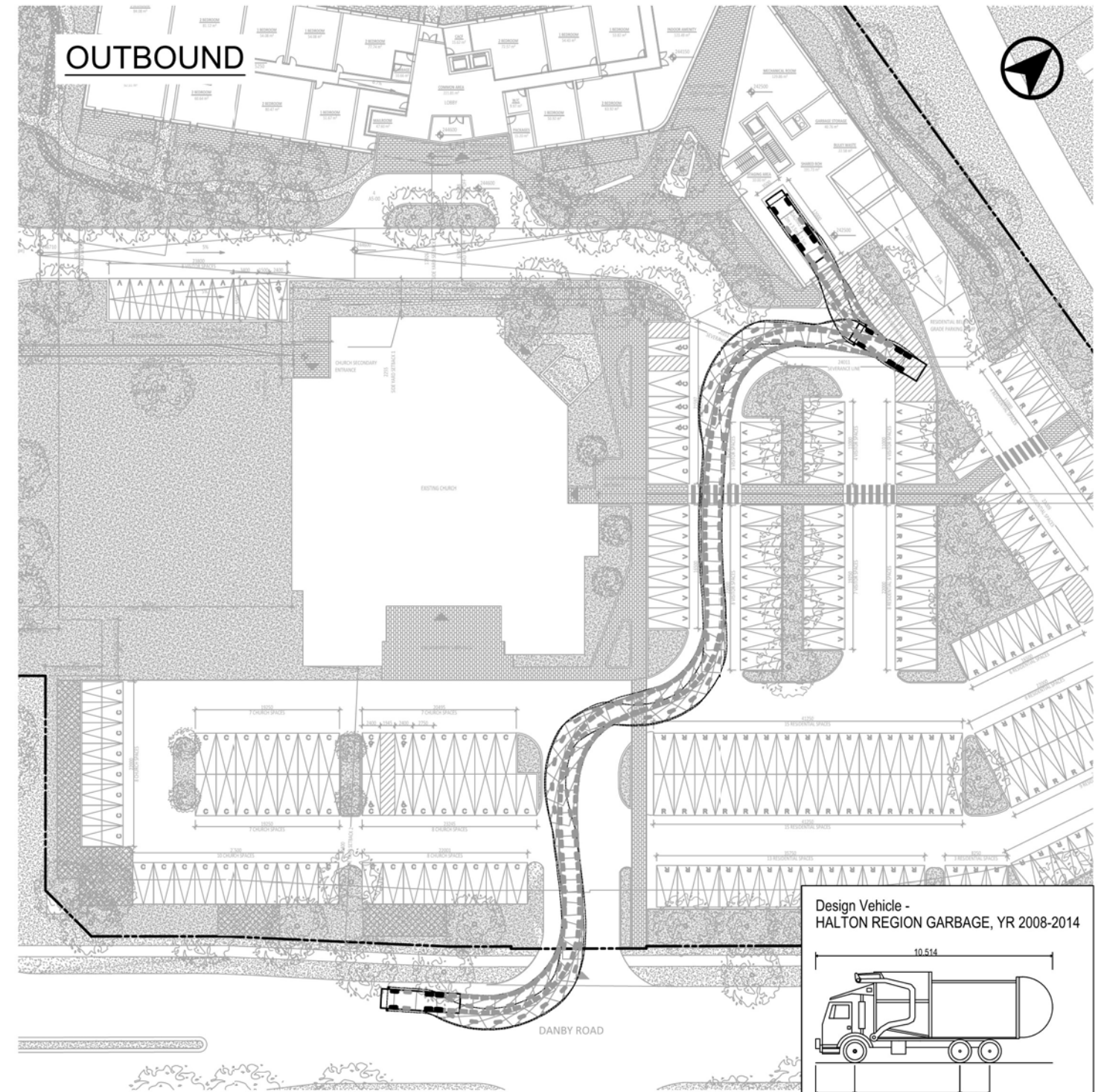
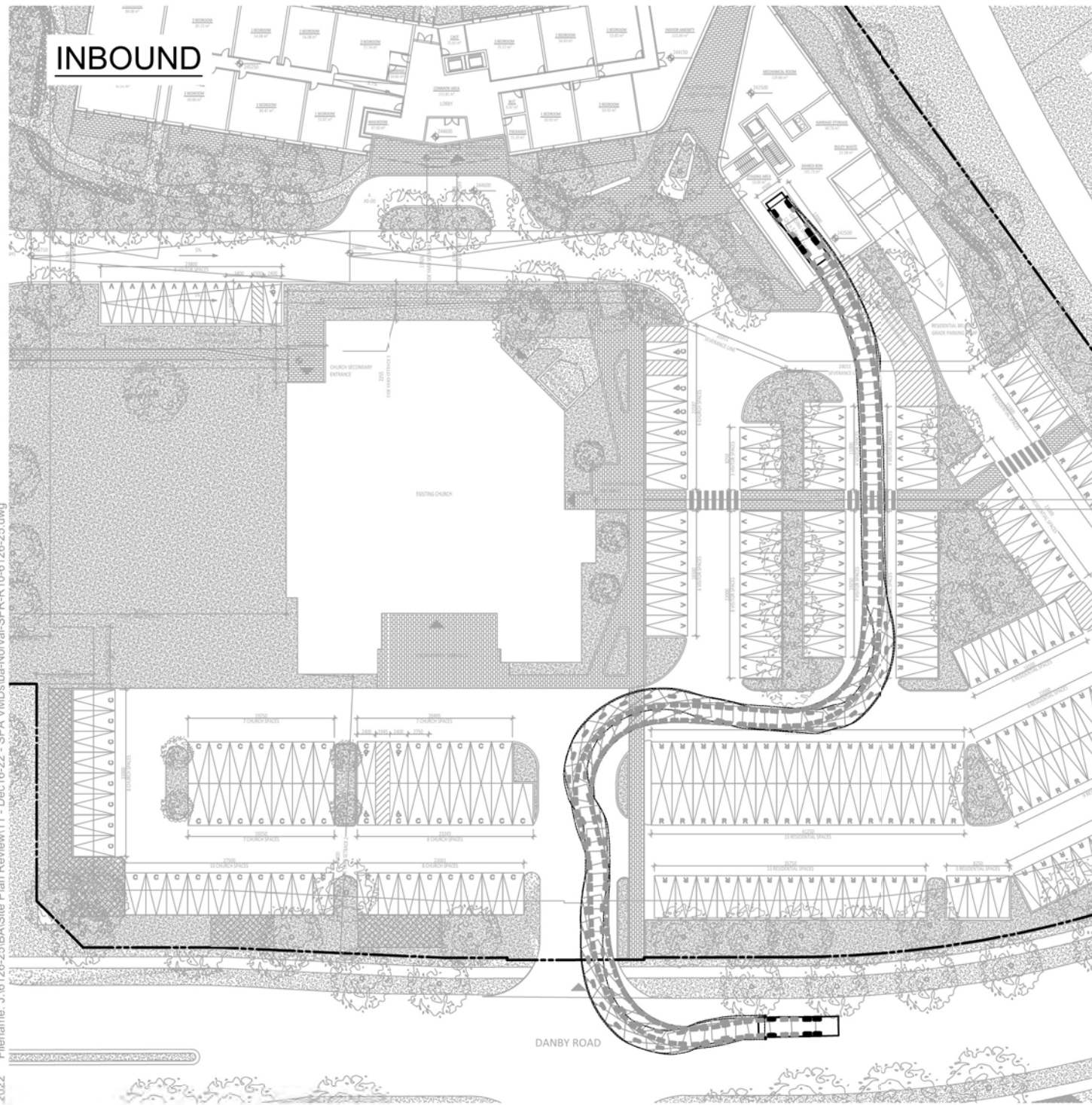
Area	Lot	HC	Total	
<b>Supply</b>	<b>80</b>	<b>7</b>	<b>87</b>	
8:00	0	0	0	0%
8:30	0	0	0	0%
9:00	4	0	4	5%
9:30	7	0	7	8%
10:00	20	0	20	23%
10:30	21	0	21	24%
11:00	21	0	21	24%
11:30	16	0	16	18%
12:00	15	0	15	17%
12:30	14	0	14	16%
13:00	4	0	4	5%
13:30	3	0	3	3%
14:00	0	0	0	0%
14:30	0	0	0	0%
15:00	0	0	0	0%

## **Appendix D: Vehicle Manoeuvring Diagrams**





File name: J:\6126-25\BA\Site Plan Review\11 - Dec 16-22 - SPA VMD\Site Plan Review\11 - Dec 16-22 - SPA VMD\Site Plan Review\11 - Dec 16-22 - SPA VMD\Site Plan Review\11 - Dec 16-22 - SPA VMD.dwg  
Date Plotted: December 16, 2022



**Design Vehicle -  
HALTON REGION GARBAGE, YR 2008-2014**

Overall Length	10.514m
Overall Width	2.570m
Overall Body Height	4.040m
Min Body Ground Clearance	0.391m
Track Width	2.570m
Lock-to-lock time	5.00s
Wall to Wall Turning Radius	13.715m



**Norval United Church**  
Vehicle Manoeuvring Diagram  
Loading - Halton Region Garbage Truck

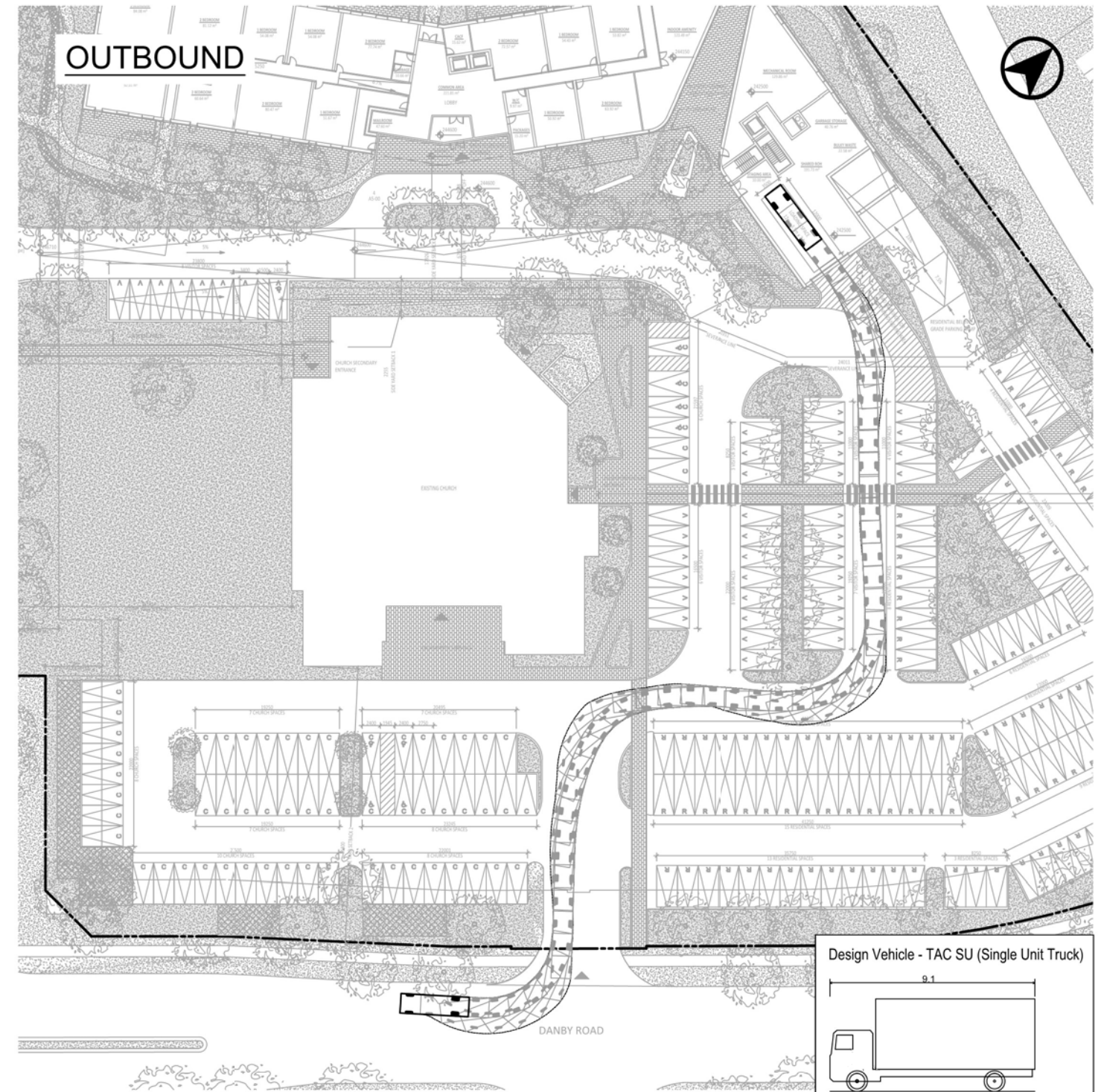
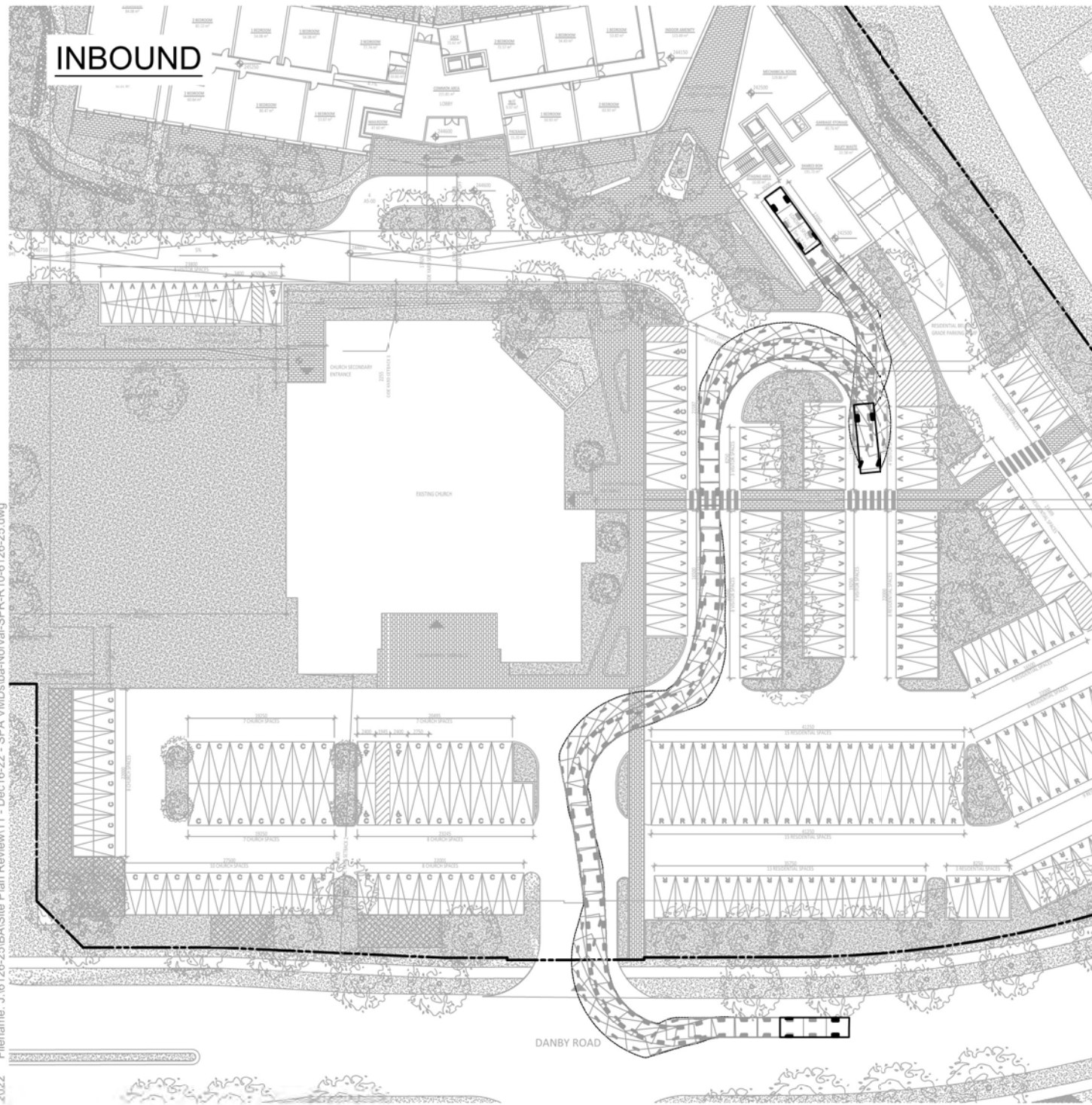
Project: Norval United Church  
Project No. 6126-25  
Date: March 11, 2022  
Revised: December 16, 2022

Scale: 1:750

Drawing No. **VMD-01**



File name: J:\6126-25\BA\Site Plan Review\11 - Dec16-22 - SPA VMD\ba-Norval-SPR-R10-6126-25.dwg  
Date Plotted: December 16, 2022



Design Vehicle - TAC SU (Single Unit Truck)

Overall Length	9.10m
Overall Width	2.60m
Overall Body Height	4.11m
Outside Turning Radius	13.40m
Inside Turning Radius	8.60m



Norval United Church  
Vehicle Manoeuvring Diagram  
Loading - TAC Single Unit (SU) Truck  
Reverse In / Forward Out

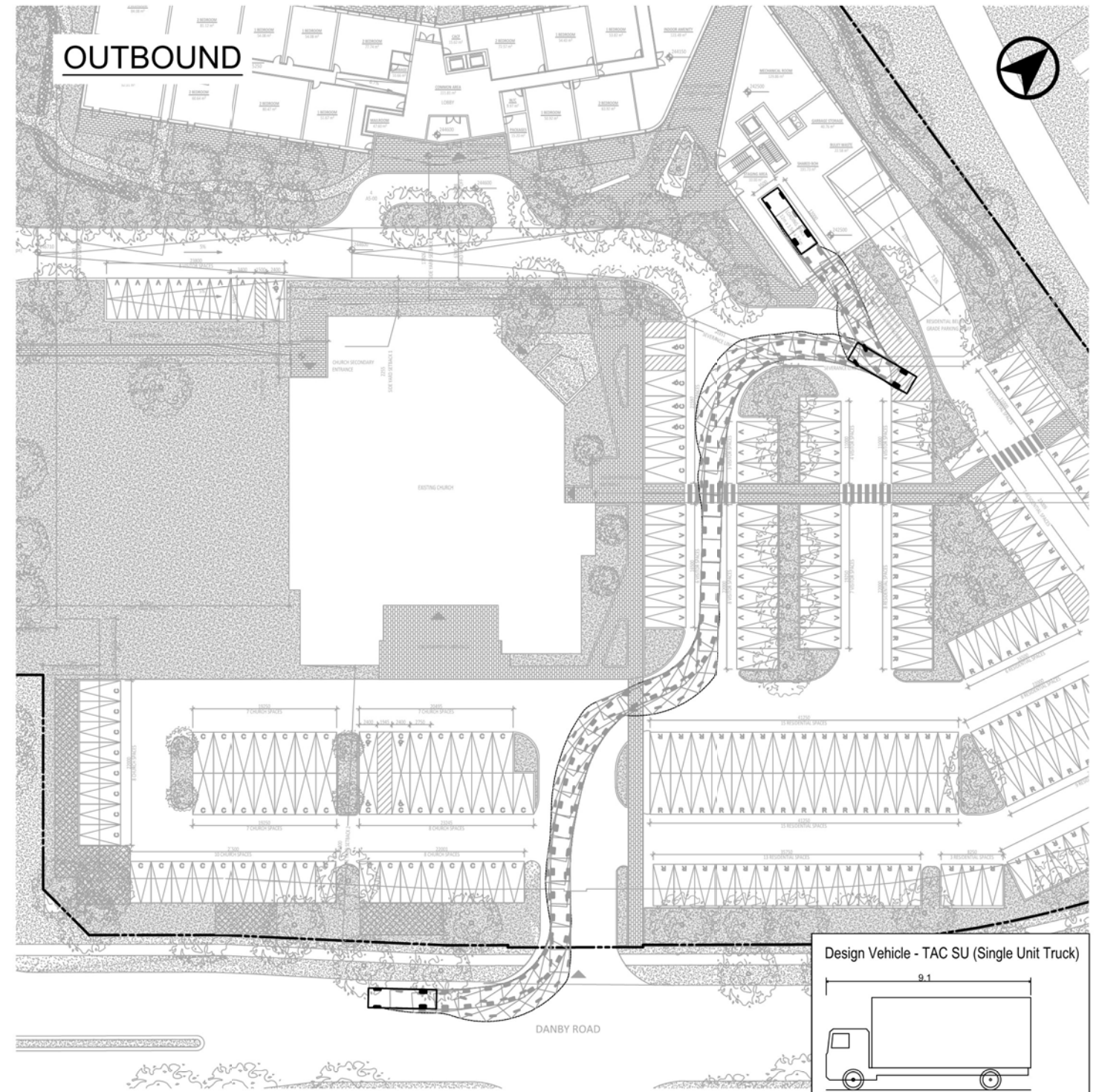
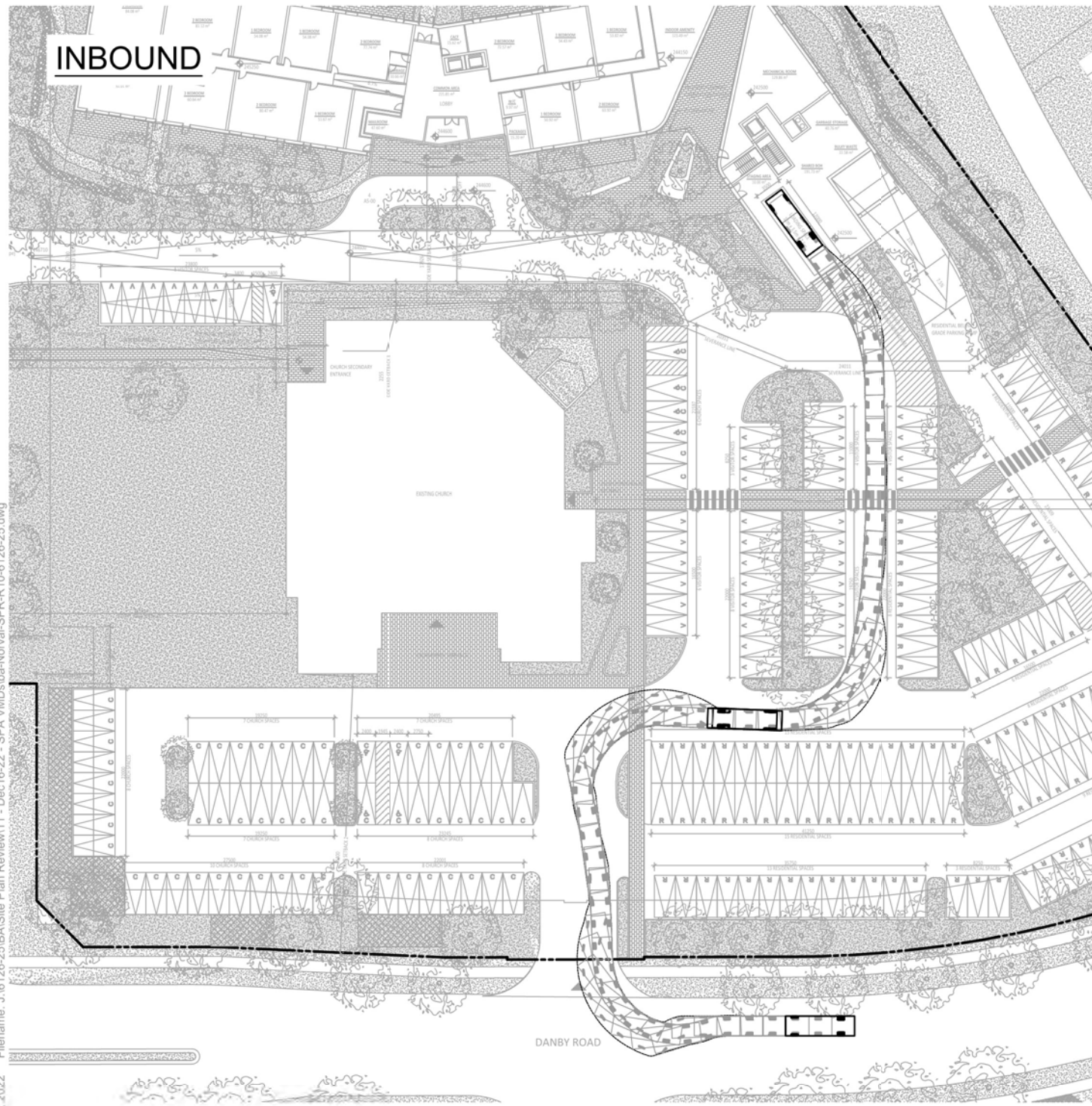
Project: Norval United Church  
Project No. 6126-25  
Date: March 11, 2022  
Revised: December 16, 2022

Scale 1:750

Drawing No. VMD-02



File name: J:\6126-25\BA\Site Plan Review\11 - Dec 16-22 - SPA VMD\Site Plan Review\11 - Dec 16-22 - SPA VMD\Site Plan Review\11 - Dec 16-22 - SPA VMD.dwg  
Date Plotted: December 16, 2022



Design Vehicle - TAC SU (Single Unit Truck)

Overall Length	9.10m
Overall Width	2.60m
Overall Body Height	4.11m
Outside Turning Radius	13.40m
Inside Turning Radius	8.60m



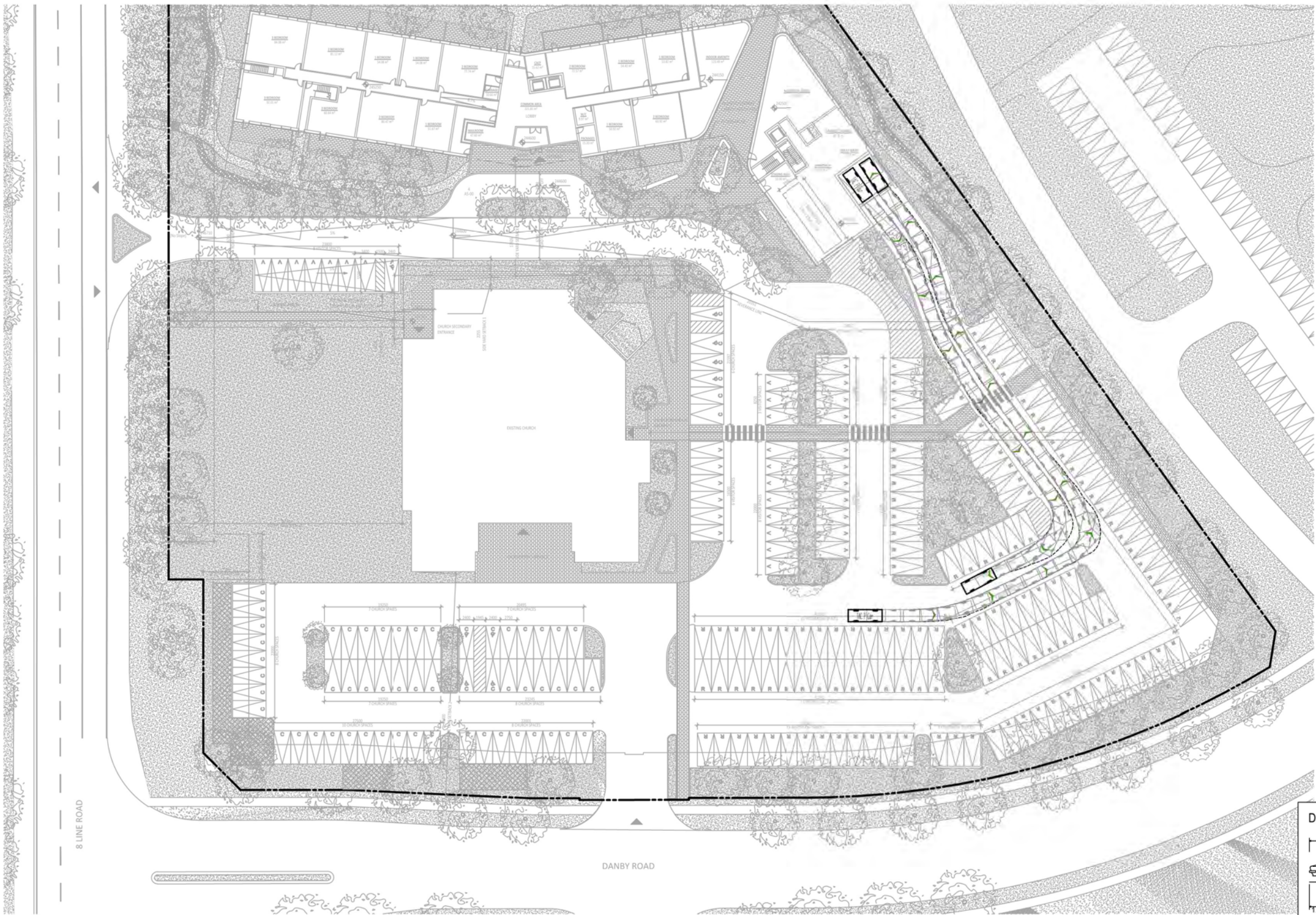
Norval United Church  
Vehicle Manoeuvring Diagram  
Loading - TAC Single Unit (SU) Truck  
Forward In / Reverse Out

Project: Norval United Church  
Project No. 6126-25  
Date: March 11, 2022  
Revised: December 16, 2022



Drawing No. VMD-03





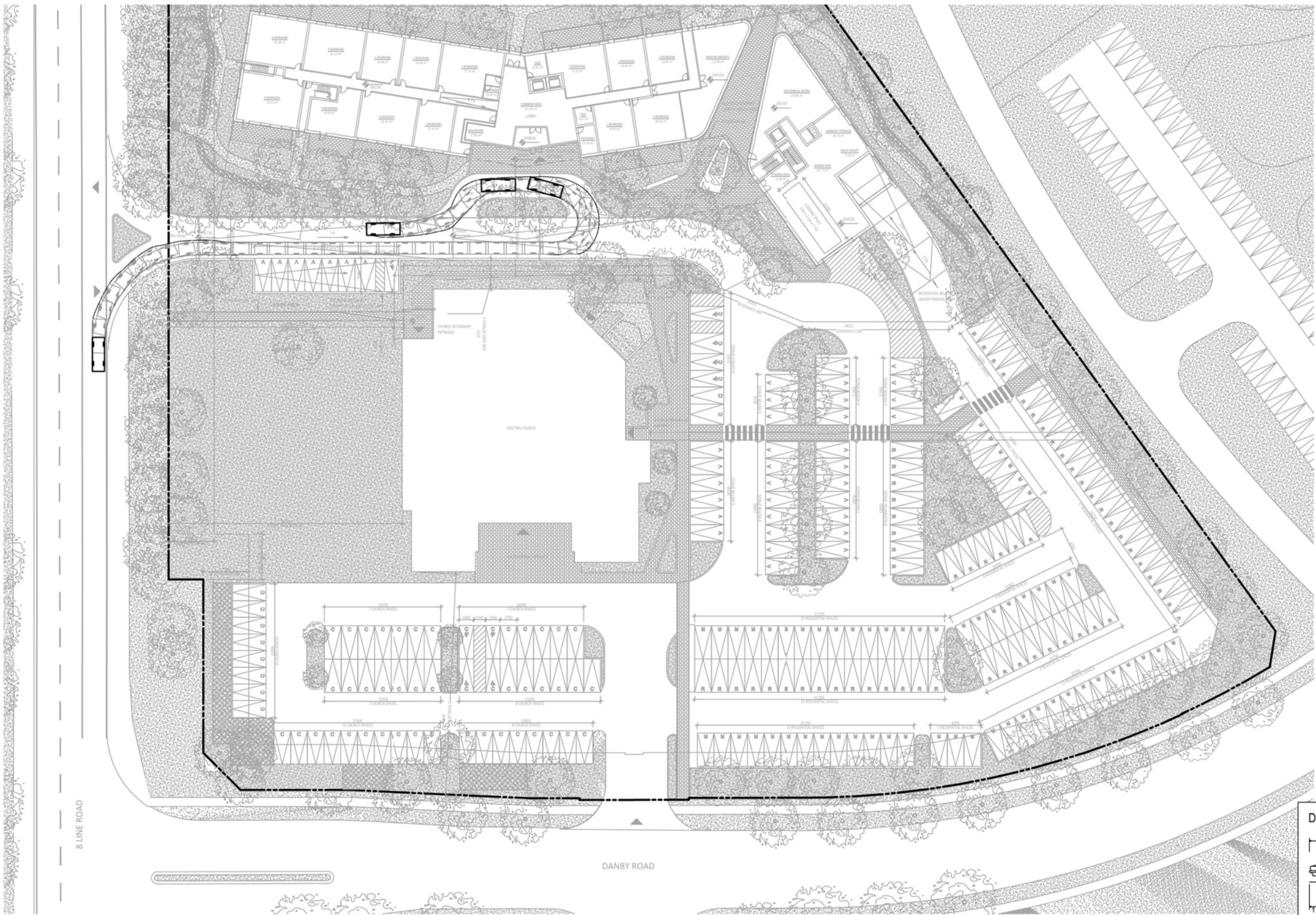
Norval United Church  
 Vehicle Manoeuvring Diagram  
 TAC P CAR  
 Ramp

Project: Norval United Church  
 Project No. 6126-25  
 Date: March 11, 2022  
 Revised: December 16, 2022



Drawing No. **VMD-04**





**LEGEND**

- PROPERTY LINE
- SETBACK BOUNDARY
- CHURCH PARKING
- RECENT PARKING
- VISITOR PARKING
- PROPOSED TREE
- EXISTING TREE

**Design Vehicle - TAC P CAR**

Overall Length	5.60m
Overall Width	2.00m
Overall Body Height	1.56m
Outside Turning Radius	6.90m
Inside Turning Radius	3.40m



**Norval United Church**  
**Vehicle Manoeuvring Diagram**  
 Tac P Car  
 PUJO Loop

Project: Norval United Church  
 Project No. 6126-25  
 Date: March 11, 2022  
 Revised: December 16, 2022

Scale 1:750

Drawing No. **VMD-05**

## **Appendix E: TTS Queries**



## TRAFFIC DISTRIBUTION - OUTBOUND

DESTINATION	ORIGIN	Total	Route Selection				Trip Distribution			
			N Eighth Line	S Eighth Line	E 10 Side Rd	W 10 Side Rd	N Eighth Line	S Eighth Line	E 10 Side Rd	W 10 Side Rd
Halton Hills	-	0					0.0%	0.0%	0.0%	0.0%
4158	0	0			100%		0.0%	0.0%	0.0%	0.0%
4160	18	18	25%	25%	25%	25%	1.5%	1.5%	1.5%	1.5%
4162	105	105	80%		20%		27.5%	0.0%	6.9%	0.0%
4163	62	62	100%				20.3%	0.0%	0.0%	0.0%
Aurora	13	13		100%			0.0%	4.2%	0.0%	0.0%
Brampton	20	20		20%	80%		0.0%	1.3%	5.2%	0.0%
Cambridge	21	21		50%		50%	0.0%	3.4%	0.0%	3.4%
Hamilton	16	16		100%			0.0%	5.2%	0.0%	0.0%
Markham	21	21		100%			0.0%	6.9%	0.0%	0.0%
Mississauga	21	21		50%	50%		0.0%	3.4%	3.4%	0.0%
Oakville	0	0		80%	20%		0.0%	0.0%	0.0%	0.0%
PD 8 of Toronto	9	9		100%			0.0%	2.9%	0.0%	0.0%
<b>Total</b>	<b>306</b>	<b>306</b>					49.2%	28.9%	17.0%	4.9%
							<b>50.0%</b>	<b>30.0%</b>	<b>17.5%</b>	<b>5.0%</b>
							47.5%	30.0%	17.5%	5.0%

Rounded  
Adopted

## TRAFFIC DISTRIBUTION - INBOUND

ORIGIN	ESITINATIO	Total	Route Selection				Trip Distribution			
			N Eighth Line	S Eighth Line	E 10 Side Rd	W 10 Side Rd	N Eighth Line	S Eighth Line	E 10 Side Rd	W 10 Side Rd
Halton Hills	-	0					0.0%	0.0%	0.0%	0.0%
4158	86	86			100%		0.0%	0.0%	27.8%	0.0%
4160	0	0	25%	25%	25%	25%	0.0%	0.0%	0.0%	0.0%
4162	43	43	80%		20%		11.1%	0.0%	2.8%	0.0%
4163	43	43	100%				13.9%	0.0%	0.0%	0.0%
Aurora	13	13		100%			0.0%	4.2%	0.0%	0.0%
Brampton	0	0		20%	80%		0.0%	0.0%	0.0%	0.0%
Cambridge	21	21		50%		50%	0.0%	3.4%	0.0%	3.4%
Hamilton	16	16		100%			0.0%	5.2%	0.0%	0.0%
Markham	21	21		100%			0.0%	6.8%	0.0%	0.0%
Mississauga	21	21		50%	50%		0.0%	3.4%	3.4%	0.0%
Oakville	36	36		80%	20%		0.0%	9.3%	2.3%	0.0%
PD 8 of Toronto	9	9		100%			0.0%	2.9%	0.0%	0.0%
<b>Total</b>	<b>309</b>	<b>309</b>					25.0%	35.2%	36.3%	3.4%
							<b>25.0%</b>	<b>35.0%</b>	<b>37.5%</b>	<b>2.5%</b>

Rounded  
Adopted



## TTS QUERIES - MODE SPLIT

### OUTBOUND MODE SPLIT

Wed May 04 2022 15:29:49 GMT+0200 (Central European Summer Time)

Frequency Distribution Query Form - Trip - 2016 v1.1

Field: Primary travel mode of trip - mode\_prime

Filters:

2006 GTA : 4158 4161

and

Trip purpose of origin - purp\_orig In H

and

Start time of trip - start\_time In 600-859

Table: Trip 2016

Row:	Count:	Expanded:	
Transit exc	3	52	1%
Cycle	5	87	1%
Auto drive	249	5261	69%
GO rail onl	12	109	1%
Joint GO r	5	62	1%
Auto passe	33	768	10%
School bus	51	959	13%
Taxi passe	1	23	0%
Walk	16	293	4%
Total:	375	7614	100%

### INBOUND MODE SPLIT

Wed May 04 2022 15:34:30 GMT+0200 (Central European Summer Time)

Frequency Distribution Query Form - Trip - 2016 v1.1

Field: Primary travel mode of trip - mode\_prime

Filters:

2006 GTA : 4158 4161

and

Trip purpose of destination - purp\_dest In H

and

Start time of trip - start\_time In 1500-1759

Table: Trip 2016

Row:	Count:	Expanded:	
Cycle	6	107	1%
Auto drive	254	5208	73%
GO rail onl	12	123	2%
Joint GO r	5	62	1%
Motorcycl	1	13	0%
Auto passe	31	631	9%
School bus	35	651	9%
Taxi passe	1	23	0%
Walk	20	357	5%
Total:	365	7175	100%

Mode	Morning Peak Period Outbound	Afternoon Peak Period Inbound
Auto Driver	69%	73%
Auto Passenger	23%	18%
Transit	3%	3%
Cycle	1%	2%
Walk	4%	5%
	100%	100%



## **Appendix F: Traffic Data**





Turning Movement Count (4 . 8TH LINE & 10TH SIDE RD)

Start Time	N Approach 8TH LINE						E Approach 10 SIDEROAD						S Approach 8TH LINE						W Approach 10 SIDEROAD						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
07:00:00	11	68	15	0	0	94	4	56	12	0	0	72	1	9	2	0	0	12	1	27	5	1	0	34	212	
07:15:00	20	83	25	0	0	128	4	53	15	0	0	72	9	12	1	0	0	22	2	41	3	0	0	46	268	
07:30:00	19	81	21	0	0	121	3	87	13	0	0	103	3	11	1	0	0	15	3	44	8	0	0	55	294	
07:45:00	22	87	22	0	0	131	12	68	13	0	0	93	8	35	1	0	0	44	5	39	7	0	0	51	319	1093
08:00:00	21	64	22	0	0	107	8	55	8	0	0	71	3	26	1	0	0	30	0	25	16	0	0	41	249	1130
08:15:00	14	66	30	0	0	110	3	47	14	0	0	64	18	22	2	0	0	42	3	55	10	0	0	68	284	1146
08:30:00	12	52	19	0	0	83	13	49	5	0	0	67	7	29	1	0	0	37	2	43	9	0	0	54	241	1093
08:45:00	12	51	20	0	0	83	26	45	10	0	0	81	15	21	2	0	0	38	2	37	3	0	0	42	244	1018
09:00:00	13	36	15	0	0	64	11	47	15	0	0	73	9	19	0	0	0	28	2	31	4	0	0	37	202	971
09:15:00	8	26	13	0	0	47	7	29	10	0	0	46	5	16	1	0	0	22	2	36	7	0	0	45	160	847
09:30:00	5	26	6	0	0	37	7	28	8	0	0	43	5	14	2	0	0	21	1	26	7	0	0	34	135	741
09:45:00	9	33	9	0	0	51	6	29	8	0	0	43	9	19	0	0	0	28	1	24	8	0	0	33	155	652
***BREAK***																										
16:00:00	8	25	7	0	0	40	37	73	16	0	0	126	21	51	2	0	0	74	2	62	12	0	0	76	316	
16:15:00	12	35	16	0	0	63	36	67	7	0	0	110	20	53	2	0	0	75	1	81	21	0	0	103	351	
16:30:00	12	28	12	0	0	52	33	63	8	0	0	104	28	50	4	0	0	82	2	64	16	0	0	82	320	
16:45:00	10	15	11	0	0	36	36	57	7	0	0	100	24	61	8	0	0	93	1	70	12	0	0	83	312	1299
17:00:00	15	37	16	0	0	68	41	57	9	0	0	107	23	53	2	0	0	78	2	72	26	0	0	100	353	1336
17:15:00	10	26	12	0	0	48	24	67	3	0	0	94	16	60	1	0	0	77	1	82	21	0	0	104	323	1308
17:30:00	10	19	11	0	0	40	14	55	7	0	0	76	21	64	0	0	0	85	1	76	9	0	0	86	287	1275
17:45:00	14	29	15	0	0	58	27	62	9	0	0	98	21	54	2	0	0	77	1	73	19	0	0	93	326	1289
<b>Grand Total</b>	<b>257</b>	<b>887</b>	<b>317</b>	<b>0</b>	<b>0</b>	<b>1461</b>	<b>352</b>	<b>1094</b>	<b>197</b>	<b>0</b>	<b>0</b>	<b>1643</b>	<b>266</b>	<b>679</b>	<b>35</b>	<b>0</b>	<b>0</b>	<b>980</b>	<b>35</b>	<b>1008</b>	<b>223</b>	<b>1</b>	<b>0</b>	<b>1267</b>	<b>5351</b>	<b>-</b>
<b>Approach%</b>	17.6%	60.7%	21.7%	0%	-	-	21.4%	66.6%	12%	0%	-	-	27.1%	69.3%	3.6%	0%	-	-	2.8%	79.6%	17.6%	0.1%	-	-	-	-
<b>Totals %</b>	4.8%	16.6%	5.9%	0%	-	27.3%	6.6%	20.4%	3.7%	0%	-	30.7%	5%	12.7%	0.7%	0%	-	18.3%	0.7%	18.8%	4.2%	0%	-	23.7%	-	-
<b>Heavy</b>	7	10	4	0	-	-	6	33	4	0	-	-	4	11	2	0	-	-	2	47	14	0	-	-	-	-
<b>Heavy %</b>	2.7%	1.1%	1.3%	0%	-	-	1.7%	3%	2%	0%	-	-	1.5%	1.6%	5.7%	0%	-	-	5.7%	4.7%	6.3%	0%	-	-	-	-
<b>Bicycles</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Bicycle %</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



**Peak Hour: 07:30 AM - 08:30 AM Weather: Broken Clouds (-4.7 °C)**

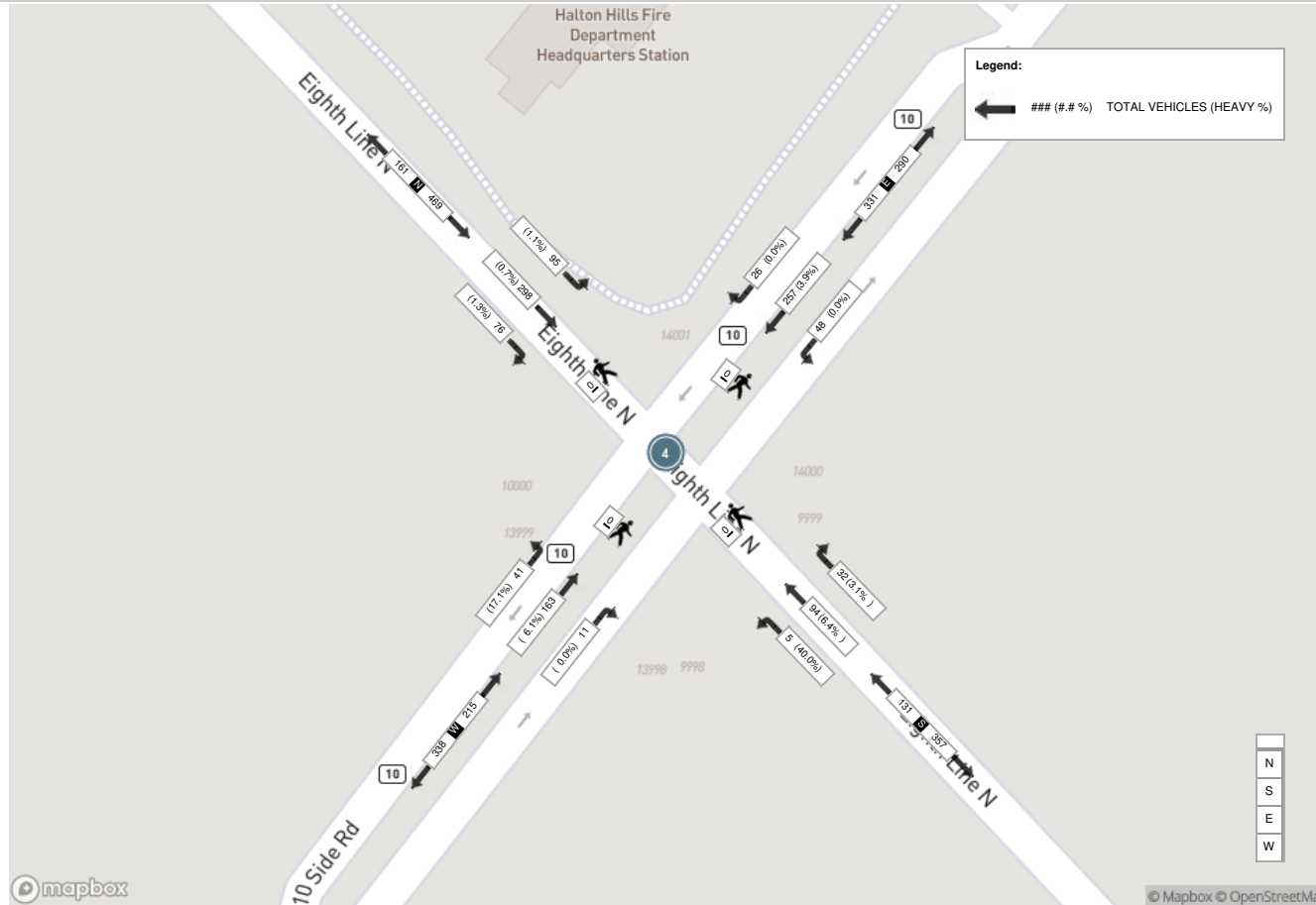
Start Time	N Approach 8TH LINE						E Approach 10 SIDEROAD						S Approach 8TH LINE						W Approach 10 SIDEROAD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
07:30:00	19	81	21	0	0	121	3	87	13	0	0	103	3	11	1	0	0	15	3	44	8	0	0	55	294
07:45:00	22	87	22	0	0	131	12	68	13	0	0	93	8	35	1	0	0	44	5	39	7	0	0	51	319
08:00:00	21	64	22	0	0	107	8	55	8	0	0	71	3	26	1	0	0	30	0	25	16	0	0	41	249
08:15:00	14	66	30	0	0	110	3	47	14	0	0	64	18	22	2	0	0	42	3	55	10	0	0	68	284
<b>Grand Total</b>	<b>76</b>	<b>298</b>	<b>95</b>	<b>0</b>	<b>0</b>	<b>469</b>	<b>26</b>	<b>257</b>	<b>48</b>	<b>0</b>	<b>0</b>	<b>331</b>	<b>32</b>	<b>94</b>	<b>5</b>	<b>0</b>	<b>0</b>	<b>131</b>	<b>11</b>	<b>163</b>	<b>41</b>	<b>0</b>	<b>0</b>	<b>215</b>	<b>1146</b>
<b>Approach%</b>	16.2%	63.5%	20.3%	0%		-	7.9%	77.6%	14.5%	0%		-	24.4%	71.8%	3.8%	0%		-	5.1%	75.8%	19.1%	0%		-	-
<b>Totals %</b>	6.6%	26%	8.3%	0%		40.9%	2.3%	22.4%	4.2%	0%		28.9%	2.8%	8.2%	0.4%	0%		11.4%	1%	14.2%	3.6%	0%		18.8%	-
<b>PHF</b>	0.86	0.86	0.79	0		0.9	0.54	0.74	0.86	0		0.8	0.44	0.67	0.63	0		0.74	0.55	0.74	0.64	0		0.79	-
<b>Heavy</b>	1	2	1	0		4	0	10	0	0		10	1	6	2	0		9	0	10	7	0		17	-
<b>Heavy %</b>	1.3%	0.7%	1.1%	0%		0.9%	0%	3.9%	0%	0%		3%	3.1%	6.4%	40%	0%		6.9%	0%	6.1%	17.1%	0%		7.9%	-
<b>Lights</b>	75	296	94	0		465	26	247	48	0		321	31	88	3	0		122	11	153	34	0		198	-
<b>Lights %</b>	98.7%	99.3%	98.9%	0%		99.1%	100%	96.1%	100%	0%		97%	96.9%	93.6%	60%	0%		93.1%	100%	93.9%	82.9%	0%		92.1%	-
<b>Single-Unit Trucks</b>	0	1	1	0		2	0	3	0	0		3	1	1	0	0		2	0	3	0	0		3	-
<b>Single-Unit Trucks %</b>	0%	0.3%	1.1%	0%		0.4%	0%	1.2%	0%	0%		0.9%	3.1%	1.1%	0%	0%		1.5%	0%	1.8%	0%	0%		1.4%	-
<b>Buses</b>	1	1	0	0		2	0	3	0	0		3	0	5	2	0		7	0	6	7	0		13	-
<b>Buses %</b>	1.3%	0.3%	0%	0%		0.4%	0%	1.2%	0%	0%		0.9%	0%	5.3%	40%	0%		5.3%	0%	3.7%	17.1%	0%		6%	-
<b>Articulated Trucks</b>	0	0	0	0		0	0	4	0	0		4	0	0	0	0		0	0	1	0	0		1	-
<b>Articulated Trucks %</b>	0%	0%	0%	0%		0%	0%	1.6%	0%	0%		1.2%	0%	0%	0%	0%		0%	0%	0.6%	0%	0%		0.5%	-



**Peak Hour: 04:15 PM - 05:15 PM Weather: Overcast Clouds (3.99 °C)**

Start Time	N Approach 8TH LINE						E Approach 10 SIDEROAD						S Approach 8TH LINE						W Approach 10 SIDEROAD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:15:00	12	35	16	0	0	63	36	67	7	0	0	110	20	53	2	0	0	75	1	81	21	0	0	103	351
16:30:00	12	28	12	0	0	52	33	63	8	0	0	104	28	50	4	0	0	82	2	64	16	0	0	82	320
16:45:00	10	15	11	0	0	36	36	57	7	0	0	100	24	61	8	0	0	93	1	70	12	0	0	83	312
17:00:00	15	37	16	0	0	68	41	57	9	0	0	107	23	53	2	0	0	78	2	72	26	0	0	100	353
<b>Grand Total</b>	<b>49</b>	<b>115</b>	<b>55</b>	<b>0</b>	<b>0</b>	<b>219</b>	<b>146</b>	<b>244</b>	<b>31</b>	<b>0</b>	<b>0</b>	<b>421</b>	<b>95</b>	<b>217</b>	<b>16</b>	<b>0</b>	<b>0</b>	<b>328</b>	<b>6</b>	<b>287</b>	<b>75</b>	<b>0</b>	<b>0</b>	<b>368</b>	<b>1336</b>
<b>Approach%</b>	22.4%	52.5%	25.1%	0%		-	34.7%	58%	7.4%	0%		-	29%	66.2%	4.9%	0%		-	1.6%	78%	20.4%	0%		-	-
<b>Totals %</b>	3.7%	8.6%	4.1%	0%		16.4%	10.9%	18.3%	2.3%	0%		31.5%	7.1%	16.2%	1.2%	0%		24.6%	0.4%	21.5%	5.6%	0%		27.5%	-
<b>PHF</b>	0.82	0.78	0.86	0		0.81	0.89	0.91	0.86	0		0.96	0.85	0.89	0.5	0		0.88	0.75	0.89	0.72	0		0.89	-
<b>Heavy</b>	1	1	0	0		2	0	5	0	0		5	0	1	0	0		1	1	7	0	0		8	-
<b>Heavy %</b>	2%	0.9%	0%	0%		0.9%	0%	2%	0%	0%		1.2%	0%	0.5%	0%	0%		0.3%	16.7%	2.4%	0%	0%		2.2%	-
<b>Lights</b>	48	114	55	0		217	146	239	31	0		416	95	216	16	0		327	5	280	75	0		360	-
<b>Lights %</b>	98%	99.1%	100%	0%		99.1%	100%	98%	100%	0%		98.8%	100%	99.5%	100%	0%		99.7%	83.3%	97.6%	100%	0%		97.8%	-
<b>Single-Unit Trucks</b>	0	0	0	0		0	0	3	0	0		3	0	0	0	0		0	1	4	0	0		5	-
<b>Single-Unit Trucks %</b>	0%	0%	0%	0%		0%	0%	1.2%	0%	0%		0.7%	0%	0%	0%	0%		0%	16.7%	1.4%	0%	0%		1.4%	-
<b>Buses</b>	1	1	0	0		2	0	2	0	0		2	0	1	0	0		1	0	2	0	0		2	-
<b>Buses %</b>	2%	0.9%	0%	0%		0.9%	0%	0.8%	0%	0%		0.5%	0%	0.5%	0%	0%		0.3%	0%	0.7%	0%	0%		0.5%	-
<b>Articulated Trucks</b>	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	-
<b>Articulated Trucks %</b>	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0%	0%	0%		0%	0%	0.3%	0%	0%		0.3%	-

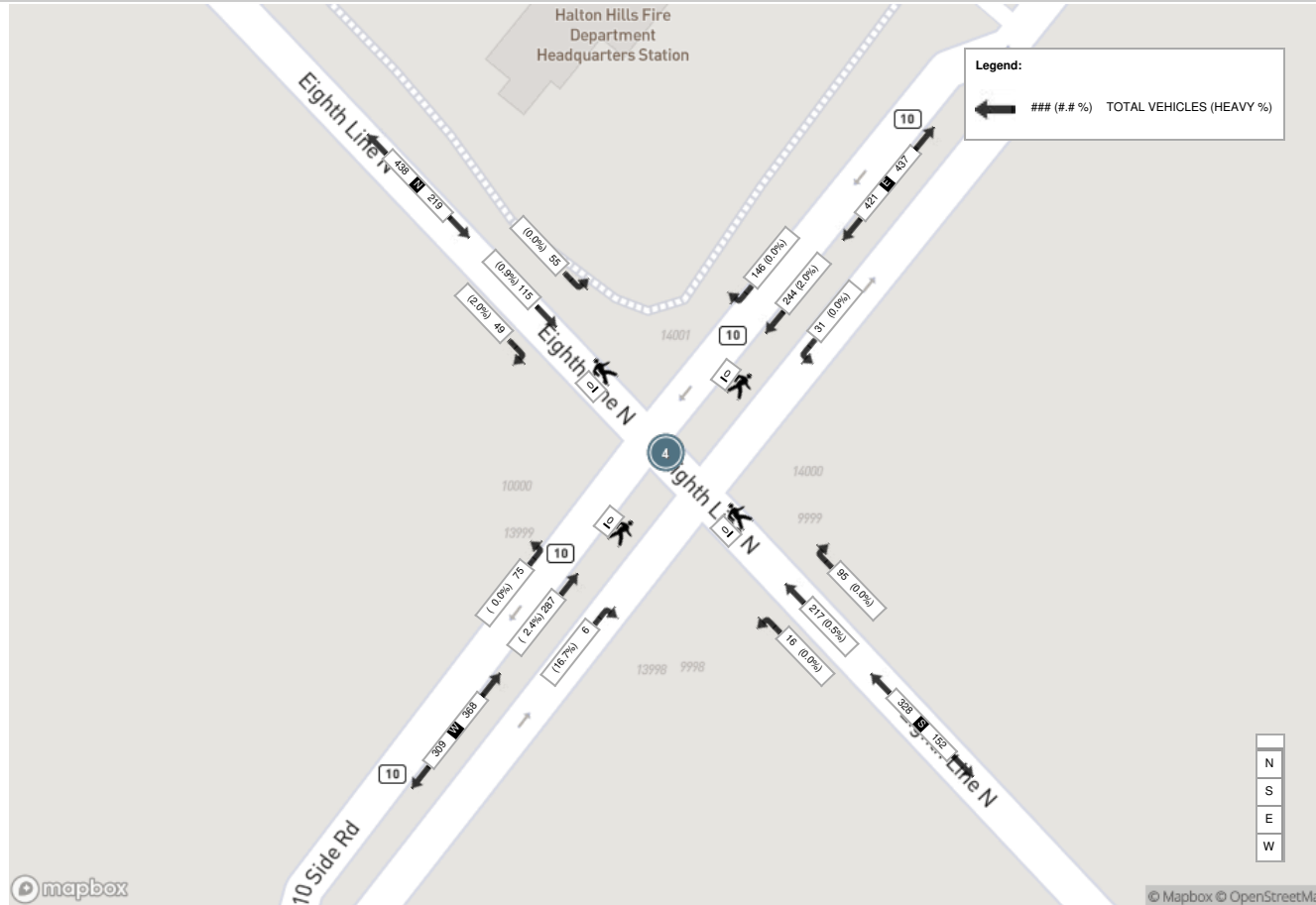
Peak Hour: 07:30 AM - 08:30 AM Weather: Broken Clouds (-4.7 °C)



mapbox

© Mapbox © OpenStreetMap

Peak Hour: 04:15 PM - 05:15 PM Weather: Overcast Clouds (3.99 °C)



mapbox

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**Turning Movement Count (1 . 8TH LINE & DANBY RD)**

Start Time	N Approach EIGHTH LINE					E Approach DANBY RD					S Approach EIGHTH LINE					Int. Total (15 min)	Int. Total (1 hr)
	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	UTurn S:S	Peds S:	Approach Total		
07:00:00	87	3	0	0	90	1	9	0	1	10	0	17	0	0	17	117	
07:15:00	113	6	0	0	119	3	12	0	1	15	0	20	0	0	20	154	
07:30:00	114	4	0	0	118	6	12	0	0	18	0	21	0	0	21	157	
07:45:00	117	3	0	0	120	9	10	0	3	19	5	50	0	0	55	194	622
08:00:00	97	13	0	0	110	5	14	0	2	19	8	40	0	0	48	177	682
08:15:00	102	12	0	0	114	14	6	0	2	20	2	33	0	0	35	169	697
08:30:00	80	14	0	0	94	18	5	0	2	23	8	44	0	0	52	169	709
08:45:00	73	18	0	0	91	25	11	0	3	36	1	51	0	0	52	179	694
09:00:00	52	8	0	0	60	8	10	0	0	18	4	28	0	0	32	110	627
09:15:00	43	3	0	0	46	6	2	0	1	8	5	24	0	0	29	83	541
09:30:00	32	2	0	0	34	5	6	0	0	11	5	24	0	0	29	74	446
09:45:00	47	6	0	0	53	4	4	0	2	8	2	32	0	0	34	95	362
***BREAK***																	
16:00:00	34	13	0	0	47	16	7	0	0	23	10	91	0	0	101	171	
16:15:00	54	17	0	0	71	20	9	0	1	29	7	102	0	0	109	209	
16:30:00	47	7	0	0	54	17	4	0	1	21	14	85	0	0	99	174	
16:45:00	36	13	0	0	49	25	3	0	3	28	11	95	0	0	106	183	737
17:00:00	58	11	0	0	69	12	7	0	4	19	13	112	0	0	125	213	779
17:15:00	42	12	0	0	54	12	6	0	5	18	11	91	0	0	102	174	744
17:30:00	35	16	0	0	51	16	6	0	1	22	7	82	0	0	89	162	732
17:45:00	51	15	0	0	66	25	9	0	3	34	13	88	0	0	101	201	750
<b>Grand Total</b>	1314	196	0	0	1510	247	152	0	35	399	126	1130	0	0	1256	<b>3165</b>	-
<b>Approach%</b>	87%	13%	0%	-	-	61.9%	38.1%	0%	-	-	10%	90%	0%	-	-	-	-
<b>Totals %</b>	41.5%	6.2%	0%	-	47.7%	7.8%	4.8%	0%	-	12.6%	4%	35.7%	0%	-	39.7%	-	-
<b>Heavy</b>	18	4	0	-	-	6	4	0	-	-	11	18	0	-	-	-	-
<b>Heavy %</b>	1.4%	2%	0%	-	-	2.4%	2.6%	0%	-	-	8.7%	1.6%	0%	-	-	-	-
<b>Bicycles</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Bicycle %</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



**Peak Hour: 07:45 AM - 08:45 AM Weather: Broken Clouds (-4.7 °C)**

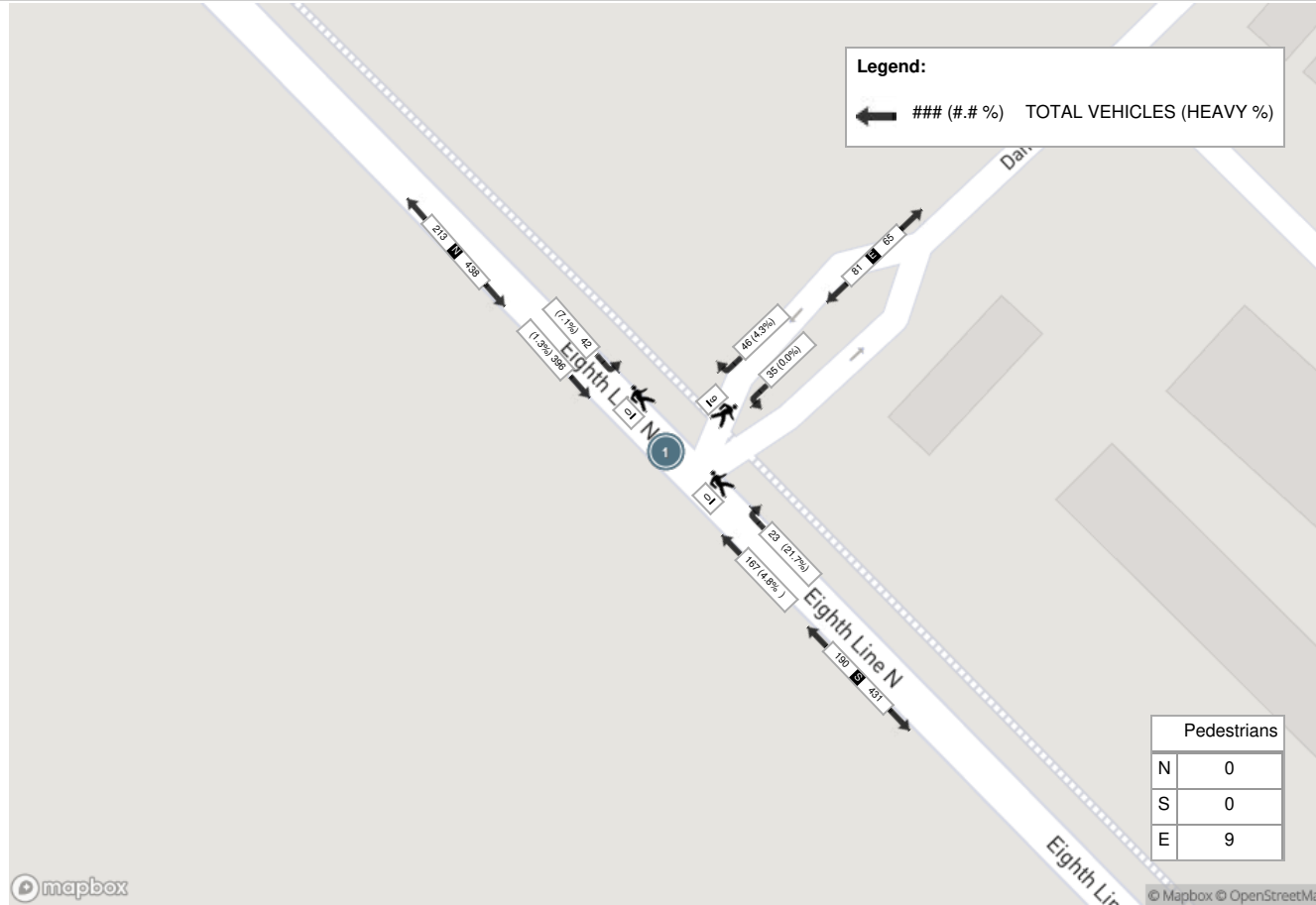
Start Time	N Approach EIGHTH LINE					E Approach DANBY RD					S Approach EIGHTH LINE					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
07:45:00	117	3	0	0	120	9	10	0	3	19	5	50	0	0	55	194
08:00:00	97	13	0	0	110	5	14	0	2	19	8	40	0	0	48	177
08:15:00	102	12	0	0	114	14	6	0	2	20	2	33	0	0	35	169
08:30:00	80	14	0	0	94	18	5	0	2	23	8	44	0	0	52	169
<b>Grand Total</b>	<b>396</b>	<b>42</b>	<b>0</b>	<b>0</b>	<b>438</b>	<b>46</b>	<b>35</b>	<b>0</b>	<b>9</b>	<b>81</b>	<b>23</b>	<b>167</b>	<b>0</b>	<b>0</b>	<b>190</b>	<b>709</b>
<b>Approach%</b>	90.4%	9.6%	0%		-	56.8%	43.2%	0%		-	12.1%	87.9%	0%		-	-
<b>Totals %</b>	55.9%	5.9%	0%		61.8%	6.5%	4.9%	0%		11.4%	3.2%	23.6%	0%		26.8%	-
<b>PHF</b>	0.85	0.75	0		0.91	0.64	0.63	0		0.88	0.72	0.84	0		0.86	-
<b>Heavy</b>	5	3	0		8	2	0	0		2	5	8	0		13	-
<b>Heavy %</b>	1.3%	7.1%	0%		1.8%	4.3%	0%	0%		2.5%	21.7%	4.8%	0%		6.8%	-
<b>Lights</b>	391	39	0		430	44	35	0		79	18	159	0		177	-
<b>Lights %</b>	98.7%	92.9%	0%		98.2%	95.7%	100%	0%		97.5%	78.3%	95.2%	0%		93.2%	-
<b>Single-Unit Trucks</b>	2	1	0		3	0	0	0		0	0	1	0		1	-
<b>Single-Unit Trucks %</b>	0.5%	2.4%	0%		0.7%	0%	0%	0%		0%	0%	0.6%	0%		0.5%	-
<b>Buses</b>	2	2	0		4	2	0	0		2	5	7	0		12	-
<b>Buses %</b>	0.5%	4.8%	0%		0.9%	4.3%	0%	0%		2.5%	21.7%	4.2%	0%		6.3%	-
<b>Articulated Trucks</b>	1	0	0		1	0	0	0		0	0	0	0		0	-
<b>Articulated Trucks %</b>	0.3%	0%	0%		0.2%	0%	0%	0%		0%	0%	0%	0%		0%	-
<b>Pedestrians</b>	-	-	-	0	-	-	-	-	9	-	-	-	-	0	-	-
<b>Pedestrians%</b>	-	-	-	0%	-	-	-	-	100%	-	-	-	-	0%	-	-



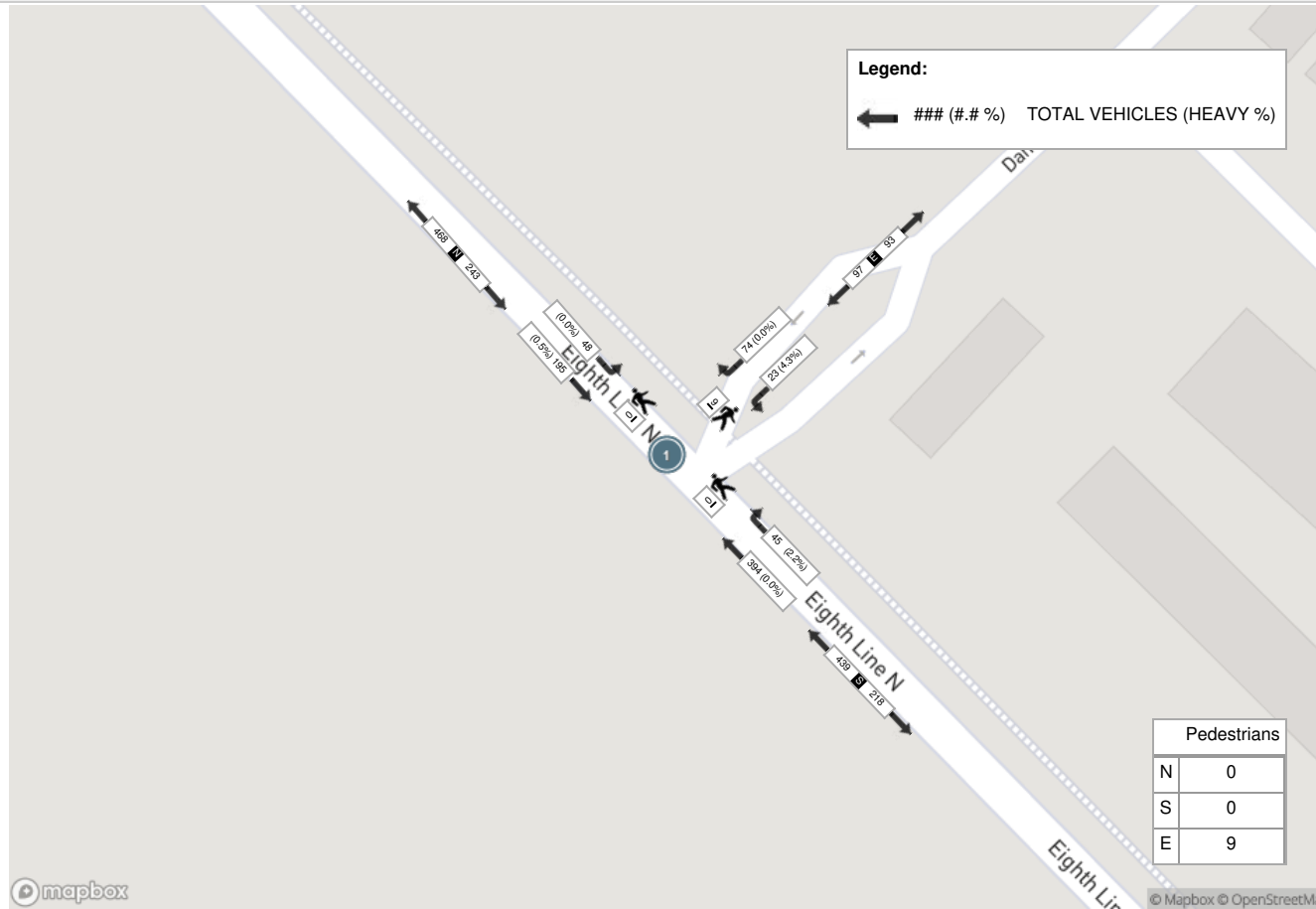
**Peak Hour: 04:15 PM - 05:15 PM Weather: Overcast Clouds (3.99 °C)**

Start Time	N Approach EIGHTH LINE					E Approach DANBY RD					S Approach EIGHTH LINE					Int. Total (15 min)
	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	
16:15:00	54	17	0	0	71	20	9	0	1	29	7	102	0	0	109	209
16:30:00	47	7	0	0	54	17	4	0	1	21	14	85	0	0	99	174
16:45:00	36	13	0	0	49	25	3	0	3	28	11	95	0	0	106	183
17:00:00	58	11	0	0	69	12	7	0	4	19	13	112	0	0	125	213
<b>Grand Total</b>	<b>195</b>	<b>48</b>	<b>0</b>	<b>0</b>	<b>243</b>	<b>74</b>	<b>23</b>	<b>0</b>	<b>9</b>	<b>97</b>	<b>45</b>	<b>394</b>	<b>0</b>	<b>0</b>	<b>439</b>	<b>779</b>
<b>Approach%</b>	80.2%	19.8%	0%		-	76.3%	23.7%	0%		-	10.3%	89.7%	0%		-	-
<b>Totals %</b>	25%	6.2%	0%		31.2%	9.5%	3%	0%		12.5%	5.8%	50.6%	0%		56.4%	-
<b>PHF</b>	0.84	0.71	0		0.86	0.74	0.64	0		0.84	0.8	0.88	0		0.88	-
<b>Heavy</b>	1	0	0		1	0	1	0		1	1	0	0		1	-
<b>Heavy %</b>	0.5%	0%	0%		0.4%	0%	4.3%	0%		1%	2.2%	0%	0%		0.2%	-
<b>Lights</b>	194	48	0		242	74	22	0		96	44	394	0		438	-
<b>Lights %</b>	99.5%	100%	0%		99.6%	100%	95.7%	0%		99%	97.8%	100%	0%		99.8%	-
<b>Single-Unit Trucks</b>	0	0	0		0	0	0	0		0	0	0	0		0	-
<b>Single-Unit Trucks %</b>	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	-
<b>Buses</b>	1	0	0		1	0	1	0		1	1	0	0		1	-
<b>Buses %</b>	0.5%	0%	0%		0.4%	0%	4.3%	0%		1%	2.2%	0%	0%		0.2%	-
<b>Articulated Trucks</b>	0	0	0		0	0	0	0		0	0	0	0		0	-
<b>Articulated Trucks %</b>	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	-
<b>Pedestrians</b>	-	-	-	0	-	-	-	-	9	-	-	-	-	0	-	-
<b>Pedestrians%</b>	-	-	-	0%	-	-	-	-	100%	-	-	-	-	0%	-	-

Peak Hour: 07:45 AM - 08:45 AM Weather: Broken Clouds (-4.7 °C)



Peak Hour: 04:15 PM - 05:15 PM Weather: Overcast Clouds (3.99 °C)





Turning Movement Count (5 . DANBY RD & NORTHWEST CT / HIDDEN LINK TRAIL)

Start Time	N Approach NORTHWEST CT						E Approach DANBY RD						S Approach HIDDEN LINK TRAIL						W Approach DANBY RD						Int. Total (15 min)	Int. Total (1 hr)	
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total			
07:00:00	0	0	1	0	0	1	0	4	0	0	0	4	1	0	1	0	2	2	0	3	0	0	1	3	10		
07:15:00	1	0	3	0	1	4	0	8	0	0	0	8	1	0	1	0	0	2	0	9	0	0	0	9	23		
07:30:00	3	0	2	0	1	5	3	9	0	0	0	12	3	0	1	0	2	4	1	7	1	0	1	9	30		
07:45:00	3	0	6	0	0	9	0	11	1	0	0	12	1	0	3	0	0	4	0	5	0	0	0	5	30	93	
08:00:00	1	0	7	0	0	8	1	15	0	0	0	16	4	0	1	0	0	5	0	23	2	0	0	25	54	137	
08:15:00	2	0	2	0	2	4	3	11	0	0	0	14	1	0	5	0	0	6	0	11	2	0	0	13	37	151	
08:30:00	4	0	3	0	5	7	0	16	1	0	1	17	3	1	0	0	5	4	0	17	3	1	11	21	49	170	
08:45:00	7	0	6	0	2	13	0	16	3	0	3	19	2	0	1	0	9	3	3	26	2	0	2	31	66	206	
09:00:00	0	0	5	0	1	5	7	15	1	0	1	23	2	0	0	0	1	2	0	7	3	0	0	10	40	192	
09:15:00	0	0	1	0	0	1	5	8	1	0	0	14	2	0	1	0	2	3	0	8	0	0	0	8	26	181	
09:30:00	2	0	0	0	0	2	0	9	0	0	2	9	1	0	1	0	1	2	0	9	0	0	0	9	22	154	
09:45:00	0	0	1	0	0	1	2	5	0	1	1	8	1	0	1	0	1	2	0	9	0	0	0	9	20	108	
***BREAK***																											
16:00:00	2	0	5	0	1	7	3	22	2	0	0	27	2	0	0	0	2	2	3	24	1	0	0	28	64		
16:15:00	1	1	2	0	2	4	4	28	1	0	0	33	2	1	1	0	0	4	1	19	1	1	0	22	63		
16:30:00	2	0	1	1	2	4	3	23	3	0	0	29	1	0	2	0	1	3	3	11	5	0	0	19	55		
16:45:00	3	1	1	0	2	5	7	17	1	0	0	25	2	0	1	0	2	3	3	17	4	0	2	24	57	239	
17:00:00	1	0	3	0	0	4	5	20	0	0	1	25	2	0	1	0	1	3	0	21	2	1	0	24	56	231	
17:15:00	2	0	4	0	1	6	7	12	5	0	0	24	0	1	3	0	0	4	2	16	4	0	0	22	56	224	
17:30:00	5	0	5	0	0	10	6	28	1	0	0	35	0	1	1	0	0	2	0	17	2	0	0	19	66	235	
17:45:00	3	0	4	0	1	7	6	21	1	0	0	28	0	0	0	0	1	0	3	18	2	0	0	23	58	236	
<b>Grand Total</b>	<b>42</b>	<b>2</b>	<b>62</b>	<b>1</b>	<b>21</b>	<b>107</b>	<b>62</b>	<b>298</b>	<b>21</b>	<b>1</b>	<b>9</b>	<b>382</b>	<b>31</b>	<b>4</b>	<b>25</b>	<b>0</b>	<b>30</b>	<b>60</b>	<b>19</b>	<b>277</b>	<b>34</b>	<b>3</b>	<b>17</b>	<b>333</b>	<b>882</b>	<b>-</b>	
<b>Approach%</b>	39.3%	1.9%	57.9%	0.9%	-	-	16.2%	78%	5.5%	0.3%	-	-	51.7%	6.7%	41.7%	0%	-	-	5.7%	83.2%	10.2%	0.9%	-	-	-	-	
<b>Totals %</b>	4.8%	0.2%	7%	0.1%	-	12.1%	7%	33.8%	2.4%	0.1%	-	43.3%	3.5%	0.5%	2.8%	0%	-	6.8%	2.2%	31.4%	3.9%	0.3%	-	37.8%	-	-	
<b>Heavy</b>	0	0	1	0	-	-	1	7	0	1	-	-	0	0	0	0	-	-	0	7	1	0	-	-	-	-	
<b>Heavy %</b>	0%	0%	1.6%	0%	-	-	1.6%	2.3%	0%	100%	-	-	0%	0%	0%	0%	-	-	0%	2.5%	2.9%	0%	-	-	-	-	
<b>Bicycles</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Bicycle %</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Peak Hour: 08:00 AM - 09:00 AM Weather: Broken Clouds (-4.7 °C)

Start Time	N Approach NORTHWEST CT						E Approach DANBY RD						S Approach HIDDEN LINK TRAIL						W Approach DANBY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
08:00:00	1	0	7	0	0	8	1	15	0	0	0	16	4	0	1	0	0	5	0	23	2	0	0	25	54
08:15:00	2	0	2	0	2	4	3	11	0	0	0	14	1	0	5	0	0	6	0	11	2	0	0	13	37
08:30:00	4	0	3	0	5	7	0	16	1	0	1	17	3	1	0	0	5	4	0	17	3	1	11	21	49
08:45:00	7	0	6	0	2	13	0	16	3	0	3	19	2	0	1	0	9	3	3	26	2	0	2	31	66
<b>Grand Total</b>	<b>14</b>	<b>0</b>	<b>18</b>	<b>0</b>	<b>9</b>	<b>32</b>	<b>4</b>	<b>58</b>	<b>4</b>	<b>0</b>	<b>4</b>	<b>66</b>	<b>10</b>	<b>1</b>	<b>7</b>	<b>0</b>	<b>14</b>	<b>18</b>	<b>3</b>	<b>77</b>	<b>9</b>	<b>1</b>	<b>13</b>	<b>90</b>	<b>206</b>
<b>Approach%</b>	43.8%	0%	56.3%	0%	-	-	6.1%	87.9%	6.1%	0%	-	-	55.6%	5.6%	38.9%	0%	-	-	3.3%	85.6%	10%	1.1%	-	-	-
<b>Totals %</b>	6.8%	0%	8.7%	0%	15.5%	15.5%	1.9%	28.2%	1.9%	0%	32%	32%	4.9%	0.5%	3.4%	0%	8.7%	8.7%	1.5%	37.4%	4.4%	0.5%	43.7%	-	-
<b>PHF</b>	0.5	0	0.64	0	0.62	0.62	0.33	0.91	0.33	0	0.87	0.87	0.63	0.25	0.35	0	0.75	0.75	0.25	0.74	0.75	0.25	0.73	-	-
<b>Heavy</b>	0	0	1	0	1	1	1	2	0	0	3	3	0	0	0	0	0	0	0	6	1	0	7	-	-
<b>Heavy %</b>	0%	0%	5.6%	0%	3.1%	3.1%	25%	3.4%	0%	0%	4.5%	4.5%	0%	0%	0%	0%	0%	0%	0%	7.8%	11.1%	0%	7.8%	-	-
<b>Lights</b>	14	0	17	0	31	31	3	56	4	0	63	63	10	1	7	0	18	18	3	71	8	1	83	-	-
<b>Lights %</b>	100%	0%	94.4%	0%	96.9%	96.9%	75%	96.6%	100%	0%	95.5%	95.5%	100%	100%	100%	0%	100%	100%	100%	92.2%	88.9%	100%	92.2%	-	-
<b>Single-Unit Trucks</b>	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	-	-
<b>Single-Unit Trucks %</b>	0%	0%	5.6%	0%	3.1%	3.1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	11.1%	0%	1.1%	-	-
<b>Buses</b>	0	0	0	0	0	0	1	2	0	0	3	3	0	0	0	0	0	0	0	6	0	0	6	-	-
<b>Buses %</b>	0%	0%	0%	0%	0%	0%	25%	3.4%	0%	0%	4.5%	4.5%	0%	0%	0%	0%	0%	0%	0%	7.8%	0%	0%	6.7%	-	-
<b>Pedestrians</b>	-	-	-	-	9	-	-	-	-	-	4	-	-	-	-	-	14	-	-	-	-	-	13	-	-
<b>Pedestrians%</b>	-	-	-	-	22.5%	-	-	-	-	-	10%	-	-	-	-	35%	-	-	-	-	-	-	32.5%	-	-

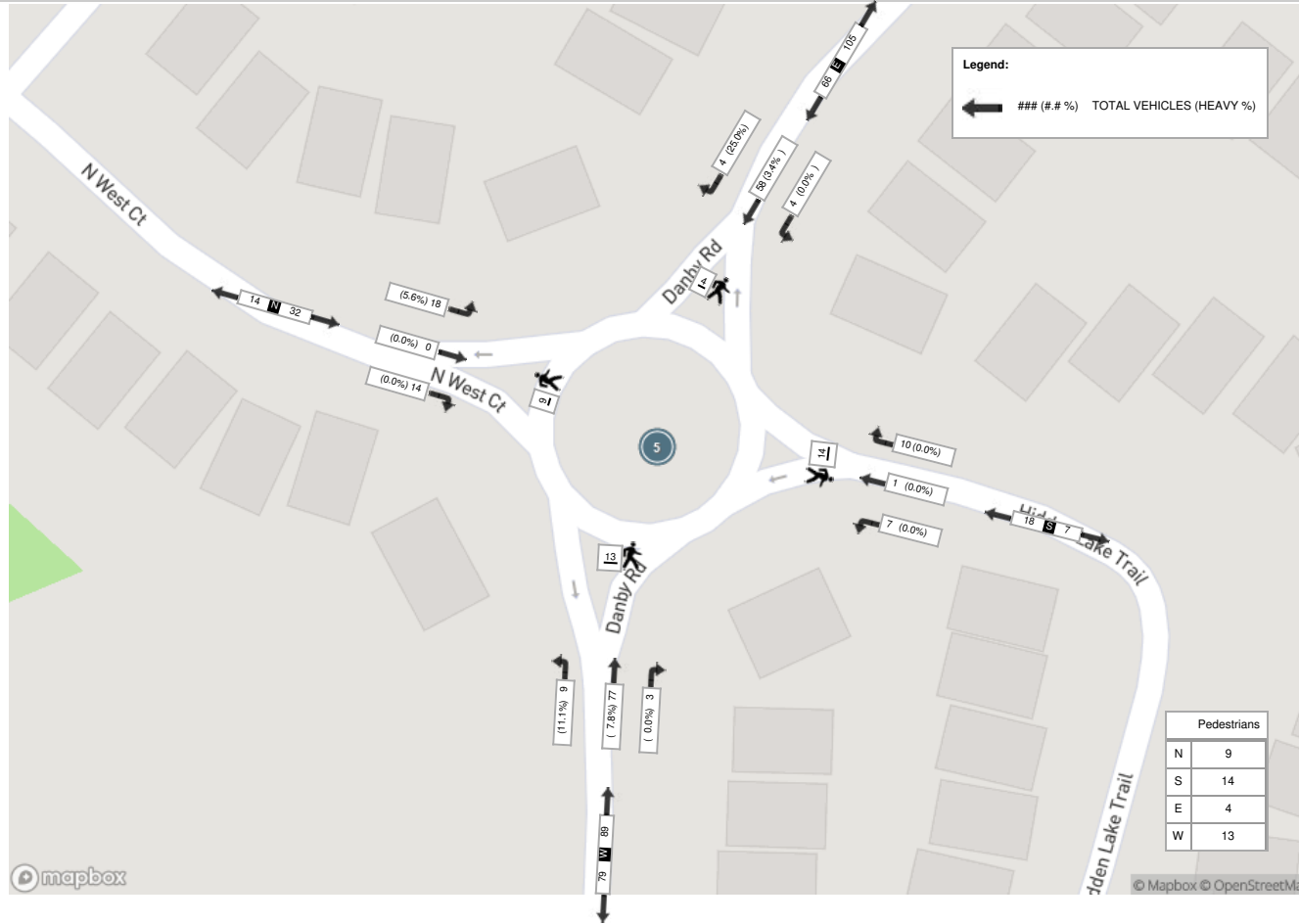




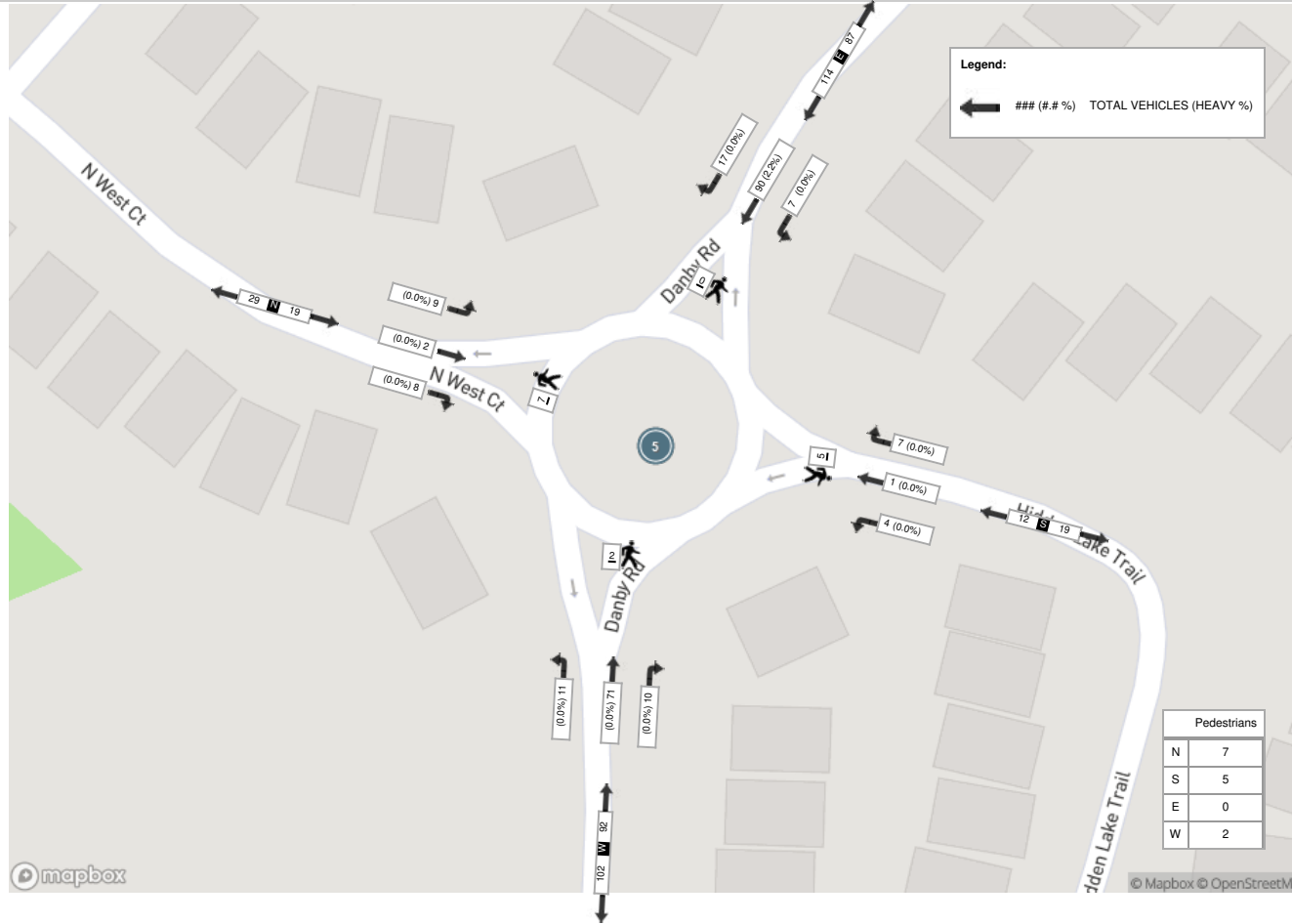
Peak Hour: 04:00 PM - 05:00 PM Weather: Overcast Clouds (3.99 °C)

Start Time	N Approach NORTHWEST CT						E Approach DANBY RD						S Approach HIDDEN LINK TRAIL						W Approach DANBY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
16:00:00	2	0	5	0	1	7	3	22	2	0	0	27	2	0	0	0	2	2	3	24	1	0	0	28	64
16:15:00	1	1	2	0	2	4	4	28	1	0	0	33	2	1	1	0	0	4	1	19	1	1	0	22	63
16:30:00	2	0	1	1	2	4	3	23	3	0	0	29	1	0	2	0	1	3	3	11	5	0	0	19	55
16:45:00	3	1	1	0	2	5	7	17	1	0	0	25	2	0	1	0	2	3	3	17	4	0	2	24	57
<b>Grand Total</b>	<b>8</b>	<b>2</b>	<b>9</b>	<b>1</b>	<b>7</b>	<b>20</b>	<b>17</b>	<b>90</b>	<b>7</b>	<b>0</b>	<b>0</b>	<b>114</b>	<b>7</b>	<b>1</b>	<b>4</b>	<b>0</b>	<b>5</b>	<b>12</b>	<b>10</b>	<b>71</b>	<b>11</b>	<b>1</b>	<b>2</b>	<b>93</b>	<b>239</b>
<b>Approach%</b>	40%	10%	45%	5%	-	-	14.9%	78.9%	6.1%	0%	-	-	58.3%	8.3%	33.3%	0%	-	-	10.8%	76.3%	11.8%	1.1%	-	-	-
<b>Totals %</b>	3.3%	0.8%	3.8%	0.4%	8.4%	7.1%	37.7%	2.9%	0%	47.7%	2.9%	0.4%	1.7%	0%	5%	4.2%	29.7%	4.6%	0.4%	38.9%	-	-	-	-	-
<b>PHF</b>	0.67	0.5	0.45	0.25	0.71	0.61	0.8	0.58	0	0.86	0.88	0.25	0.5	0	0.75	0.83	0.74	0.55	0.25	0.83	-	-	-	-	-
<b>Heavy</b>	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Heavy %</b>	0%	0%	0%	0%	0%	0%	0%	2.2%	0%	0%	1.8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
<b>Lights</b>	8	2	9	1	20	17	88	7	0	112	7	1	4	0	12	10	71	11	1	93	-	-	-	-	-
<b>Lights %</b>	100%	100%	100%	100%	100%	100%	100%	97.8%	100%	0%	98.2%	100%	100%	100%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
<b>Single-Unit Trucks</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Single-Unit Trucks %</b>	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
<b>Buses</b>	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Buses %</b>	0%	0%	0%	0%	0%	0%	0%	2.2%	0%	0%	1.8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
<b>Pedestrians</b>	-	-	-	-	7	-	-	-	-	0	-	-	-	-	5	-	-	-	-	-	2	-	-	-	-
<b>Pedestrians%</b>	-	-	-	-	50%	-	-	-	-	0%	-	-	-	-	35.7%	-	-	-	-	-	14.3%	-	-	-	-

Peak Hour: 08:00 AM - 09:00 AM Weather: Broken Clouds (-4.7 °C)



Peak Hour: 04:00 PM - 05:00 PM Weather: Overcast Clouds (3.99 °C)





**Turning Movement Count (3 . DANBY RD & SIERRA CRES (EAST))**

Start Time	N Approach NORTH SIDEWALK			E Approach DANBY RD					S Approach SIERRA CRES (EAST)					W Approach DANBY RD				Int. Total (15 min)	Int. Total (1 hr)	
	UTurn N:N	Peds N:	Approach Total	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	UTurn W:W	Peds W:			Approach Total
07:00:00	0	1	0	6	0	0	0	6	1	0	0	1	1	1	2	0	0	3	10	
07:15:00	0	0	0	9	0	0	0	9	5	0	0	0	5	0	6	0	0	6	20	
07:30:00	0	8	0	14	0	0	1	14	2	0	0	1	2	1	6	0	1	7	23	
07:45:00	0	0	0	16	1	0	0	17	3	0	0	1	3	1	1	0	0	2	22	75
08:00:00	0	0	0	15	2	0	0	17	3	1	0	0	4	1	20	0	0	21	42	107
08:15:00	0	2	0	15	4	0	0	19	2	1	0	2	3	1	11	0	0	12	34	121
08:30:00	0	0	0	16	2	0	0	18	5	3	0	15	8	0	16	0	0	16	42	140
08:45:00	0	1	0	25	3	0	0	28	8	0	1	1	9	2	22	0	0	24	61	179
09:00:00	0	0	0	12	2	0	0	14	2	2	0	2	4	2	7	0	0	9	27	164
09:15:00	0	0	0	6	4	0	0	10	1	0	0	2	1	0	7	0	0	7	18	148
09:30:00	0	0	0	11	1	0	0	12	1	0	0	0	1	0	9	0	0	9	22	128
09:45:00	0	0	0	4	2	0	0	6	0	1	0	0	1	0	8	0	0	8	15	82
***BREAK***																				
16:00:00	0	1	0	16	8	1	0	25	4	2	0	5	6	3	21	0	0	24	55	
16:15:00	0	3	0	26	5	0	0	31	8	3	0	2	11	1	13	0	0	14	56	
16:30:00	0	1	0	19	7	0	0	26	0	2	0	1	2	2	19	0	0	21	49	
16:45:00	0	1	0	19	2	0	0	21	3	3	0	2	6	2	21	0	0	23	50	210
17:00:00	0	0	0	17	3	0	0	20	2	2	0	1	4	0	21	0	0	21	45	200
17:15:00	0	0	0	16	2	0	0	18	4	3	0	0	7	2	16	0	0	18	43	187
17:30:00	0	0	0	27	6	0	0	33	1	2	0	0	3	4	16	0	0	20	56	194
17:45:00	0	1	0	23	1	0	0	24	5	2	0	1	7	1	20	0	0	21	52	196
<b>Grand Total</b>	0	19	0	312	55	1	1	368	60	27	1	37	88	24	262	0	1	286	742	-
<b>Approach%</b>	0%	-	-	84.8%	14.9%	0.3%	-	-	68.2%	30.7%	1.1%	-	-	8.4%	91.6%	0%	-	-	-	-
<b>Totals %</b>	0%	0%	0%	42%	7.4%	0.1%	49.6%	8.1%	3.6%	0.1%	11.9%	3.2%	35.3%	0%	38.5%	-	-	-	-	-
<b>Heavy</b>	0	-	-	7	1	0	-	-	0	0	0	-	-	0	8	0	-	-	-	-
<b>Heavy %</b>	0%	-	-	2.2%	1.8%	0%	-	-	0%	0%	0%	-	-	0%	3.1%	0%	-	-	-	-
<b>Bicycles</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Bicycle %</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



**Peak Hour: 08:00 AM - 09:00 AM Weather: Broken Clouds (-4.7 °C)**

Start Time	N Approach NORTH SIDEWALK			E Approach DANBY RD			S Approach SIERRA CRES (EAST)					W Approach DANBY RD			Int. Total (15 min)				
	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right		Thru	UTurn	Peds	Approach Total
08:00:00	0	0	0	15	2	0	0	17	3	1	0	0	4	1	20	0	0	21	42
08:15:00	0	2	0	15	4	0	0	19	2	1	0	2	3	1	11	0	0	12	34
08:30:00	0	0	0	16	2	0	0	18	5	3	0	15	8	0	16	0	0	16	42
08:45:00	0	1	0	25	3	0	0	28	8	0	1	1	9	2	22	0	0	24	61
<b>Grand Total</b>	0	3	0	71	11	0	0	82	18	5	1	18	24	4	69	0	0	73	<b>179</b>
<b>Approach%</b>	0%	-	-	86.6%	13.4%	0%	-	-	75%	20.8%	4.2%	-	-	5.5%	94.5%	0%	-	-	-
<b>Totals %</b>	0%	0%	0%	39.7%	6.1%	0%	0%	45.8%	10.1%	2.8%	0.6%	0%	13.4%	2.2%	38.5%	0%	0%	40.8%	-
<b>PHF</b>	0	0	0	0.71	0.69	0	0	0.73	0.56	0.42	0.25	0	0.67	0.5	0.78	0	0	0.76	-
<b>Heavy</b>	0	0	0	2	1	0	0	3	0	0	0	0	0	0	7	0	0	7	-
<b>Heavy %</b>	0%	0%	0%	2.8%	9.1%	0%	0%	3.7%	0%	0%	0%	0%	0%	0%	10.1%	0%	0%	9.6%	-
<b>Lights</b>	0	0	0	69	10	0	0	79	18	5	1	18	24	4	62	0	0	66	-
<b>Lights %</b>	0%	0%	0%	97.2%	90.9%	0%	0%	96.3%	100%	100%	100%	100%	100%	100%	89.9%	0%	0%	90.4%	-
<b>Single-Unit Trucks</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	-
<b>Single-Unit Trucks %</b>	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1.4%	0%	0%	1.4%	-
<b>Buses</b>	0	0	0	2	1	0	0	3	0	0	0	0	0	0	6	0	0	6	-
<b>Buses %</b>	0%	0%	0%	2.8%	9.1%	0%	0%	3.7%	0%	0%	0%	0%	0%	0%	8.7%	0%	0%	8.2%	-
<b>Pedestrians</b>	-	3	-	-	-	-	0	-	-	-	-	18	-	-	-	-	0	-	-
<b>Pedestrians%</b>	-	14.3%	-	-	-	-	0%	-	-	-	-	85.7%	-	-	-	-	0%	-	-

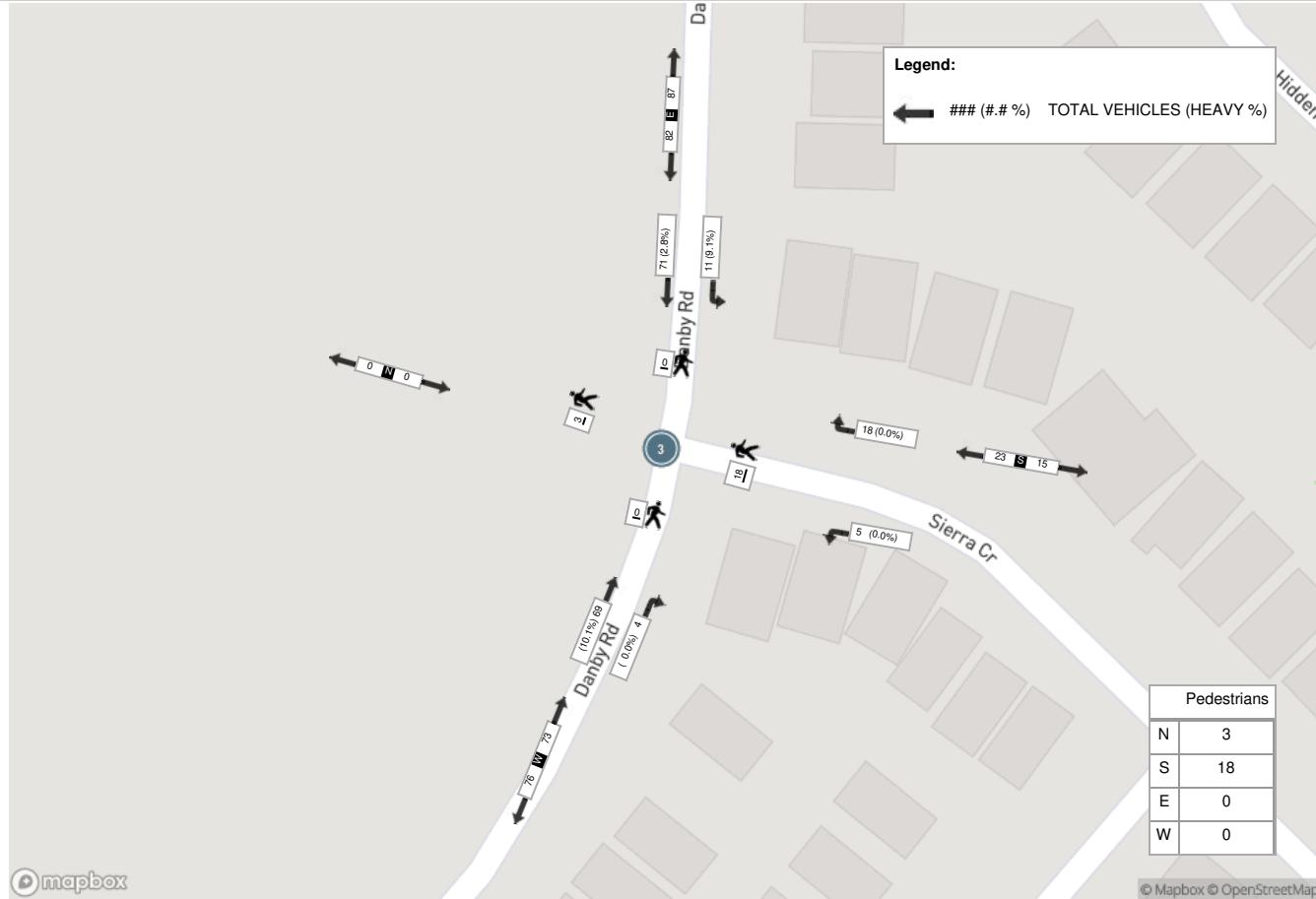




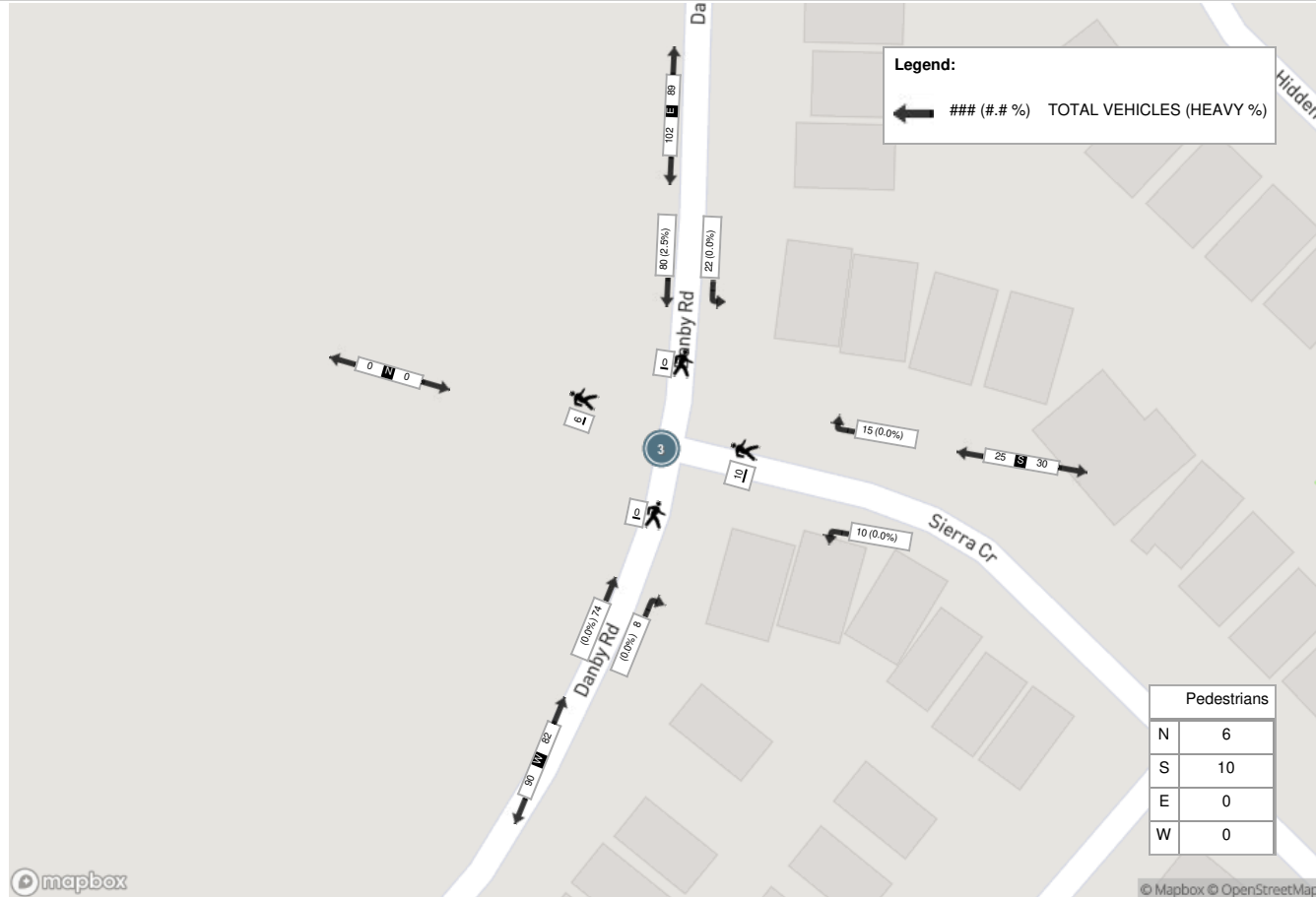
**Peak Hour: 04:00 PM - 05:00 PM Weather: Overcast Clouds (3.99 °C)**

Start Time	N Approach NORTH SIDEWALK			E Approach DANBY RD			S Approach SIERRA CRES (EAST)					W Approach DANBY RD			Int. Total (15 min)				
	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	Right	Left	UTurn	Peds	Approach Total	Right		Thru	UTurn	Peds	Approach Total
16:00:00	0	1	0	16	8	1	0	25	4	2	0	5	6	3	21	0	0	24	55
16:15:00	0	3	0	26	5	0	0	31	8	3	0	2	11	1	13	0	0	14	56
16:30:00	0	1	0	19	7	0	0	26	0	2	0	1	2	2	19	0	0	21	49
16:45:00	0	1	0	19	2	0	0	21	3	3	0	2	6	2	21	0	0	23	50
<b>Grand Total</b>	0	6	0	80	22	1	0	103	15	10	0	10	25	8	74	0	0	82	<b>210</b>
<b>Approach%</b>	0%	-	-	77.7%	21.4%	1%	-	-	60%	40%	0%	-	-	9.8%	90.2%	0%	-	-	-
<b>Totals %</b>	0%	0%	0%	38.1%	10.5%	0.5%	0%	49%	7.1%	4.8%	0%	0%	11.9%	3.8%	35.2%	0%	0%	39%	-
<b>PHF</b>	0	0	0	0.77	0.69	0.25	0	0.83	0.47	0.83	0	0	0.57	0.67	0.88	0	0	0.85	-
<b>Heavy</b>	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	-
<b>Heavy %</b>	0%	0%	0%	2.5%	0%	0%	0%	1.9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
<b>Lights</b>	0	0	0	78	22	1	0	101	15	10	0	0	25	8	74	0	0	82	-
<b>Lights %</b>	0%	0%	0%	97.5%	100%	100%	0%	98.1%	100%	100%	0%	0%	100%	100%	100%	0%	0%	100%	-
<b>Single-Unit Trucks</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
<b>Single-Unit Trucks %</b>	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
<b>Buses</b>	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	-
<b>Buses %</b>	0%	0%	0%	2.5%	0%	0%	0%	1.9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
<b>Pedestrians</b>	-	6	-	-	-	-	0	-	-	-	-	10	-	-	-	-	0	-	-
<b>Pedestrians%</b>	-	37.5%	-	-	-	-	0%	-	-	-	-	62.5%	-	-	-	-	0%	-	-

Peak Hour: 08:00 AM - 09:00 AM Weather: Broken Clouds (-4.7 °C)



Peak Hour: 04:00 PM - 05:00 PM Weather: Overcast Clouds (3.99 °C)





Turning Movement Count (2 . NORVAL UNITED CHURCH DRIVEWAY / SIERRA CRES (WEST) & DANBY RD)

Start Time	N Approach 14015 DANBY RD						E Approach DANBY RD						S Approach SIERRA CRES						W Approach DANBY RD						Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Thru N:S	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	Left E:S	UTurn E:E	Peds E:	Approach Total	Right S:E	Thru S:N	Left S:W	UTurn S:S	Peds S:	Approach Total	Right W:S	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
07:00:00	0	0	0	0	1	0	0	6	0	0	0	6	0	0	4	0	1	4	0	3	0	0	0	3	13	
07:15:00	0	0	0	0	1	0	1	9	0	0	0	10	1	0	7	0	0	8	0	6	0	0	0	6	24	
07:30:00	0	0	1	0	14	1	1	13	0	0	2	14	1	0	4	0	0	5	0	4	0	0	0	4	24	
07:45:00	0	0	0	0	1	0	0	16	0	0	1	16	0	0	3	0	2	3	3	2	3	0	0	8	27	88
08:00:00	0	0	1	0	0	1	1	16	0	0	0	17	2	0	4	0	0	6	2	18	1	0	0	21	45	120
08:15:00	3	0	1	0	2	4	1	14	1	0	0	16	1	0	2	0	3	3	0	10	4	0	2	14	37	133
08:30:00	3	0	1	0	0	4	0	16	0	0	0	16	1	0	4	0	1	5	0	19	3	0	0	22	47	156
08:45:00	1	0	0	0	1	1	1	25	1	0	0	27	2	0	12	0	0	14	1	17	1	0	0	19	61	190
09:00:00	1	0	0	0	0	1	0	11	2	0	0	13	2	0	4	0	0	6	6	6	0	0	0	12	32	177
09:15:00	1	0	1	0	0	2	0	5	1	0	0	6	0	0	2	0	1	2	0	6	2	0	0	8	18	158
09:30:00	2	0	2	0	1	4	2	9	0	0	2	11	3	0	1	0	0	4	1	4	2	0	0	7	26	137
09:45:00	1	0	1	0	0	2	0	2	3	0	0	5	0	0	4	0	0	4	1	7	0	0	0	8	19	95
***BREAK***																										
16:00:00	2	0	4	0	1	6	0	18	0	0	0	18	1	0	2	0	0	3	3	19	1	0	0	23	50	
16:15:00	1	0	0	0	4	1	0	28	1	0	1	29	0	0	1	0	1	1	6	16	2	0	0	24	55	
16:30:00	0	0	1	0	1	1	1	19	1	0	0	21	1	0	3	0	1	4	3	18	0	0	0	21	47	
16:45:00	0	0	0	0	1	0	0	21	0	0	0	21	3	0	5	0	2	8	4	19	0	0	0	23	52	204
17:00:00	1	0	0	0	2	1	1	15	3	0	2	19	1	0	3	0	0	4	4	20	0	0	0	24	48	202
17:15:00	0	0	1	0	0	1	0	17	2	0	1	19	2	0	1	0	1	3	8	15	0	0	0	23	46	193
17:30:00	0	0	0	0	0	0	0	20	6	0	0	26	0	0	3	0	0	3	2	22	0	0	0	24	53	199
17:45:00	1	0	0	0	1	1	0	25	2	0	0	27	1	0	6	0	2	7	6	20	1	0	0	27	62	209
<b>Grand Total</b>	<b>17</b>	<b>0</b>	<b>14</b>	<b>0</b>	<b>31</b>	<b>31</b>	<b>9</b>	<b>305</b>	<b>23</b>	<b>0</b>	<b>9</b>	<b>337</b>	<b>22</b>	<b>0</b>	<b>75</b>	<b>0</b>	<b>15</b>	<b>97</b>	<b>50</b>	<b>251</b>	<b>20</b>	<b>0</b>	<b>2</b>	<b>321</b>	<b>786</b>	<b>-</b>
<b>Approach%</b>	54.8%	0%	45.2%	0%	-	-	2.7%	90.5%	6.8%	0%	-	-	22.7%	0%	77.3%	0%	-	-	15.6%	78.2%	6.2%	0%	-	-	-	-
<b>Totals %</b>	2.2%	0%	1.8%	0%	3.9%	3.9%	1.1%	38.8%	2.9%	0%	42.9%	42.9%	2.8%	0%	9.5%	0%	12.3%	6.4%	31.9%	2.5%	0%	40.8%	-	-	-	-
<b>Heavy</b>	2	0	0	0	-	-	1	6	0	0	-	-	0	0	2	0	-	1	8	6	0	-	-	-	-	-
<b>Heavy %</b>	11.8%	0%	0%	0%	-	-	11.1%	2%	0%	0%	-	-	0%	0%	2.7%	0%	-	2%	3.2%	30%	0%	-	-	-	-	-
<b>Bicycles</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
<b>Bicycle %</b>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



**Peak Hour: 08:00 AM - 09:00 AM Weather: Broken Clouds (-4.7 °C)**

Start Time	N Approach 14015 DANBY RD						E Approach DANBY RD						S Approach SIERRA CRES						W Approach DANBY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
08:00:00	0	0	1	0	0	1	1	16	0	0	0	17	2	0	4	0	0	6	2	18	1	0	0	21	45
08:15:00	3	0	1	0	2	4	1	14	1	0	0	16	1	0	2	0	3	3	0	10	4	0	2	14	37
08:30:00	3	0	1	0	0	4	0	16	0	0	0	16	1	0	4	0	1	5	0	19	3	0	0	22	47
08:45:00	1	0	0	0	1	1	1	25	1	0	0	27	2	0	12	0	0	14	1	17	1	0	0	19	61
<b>Grand Total</b>	<b>7</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>3</b>	<b>10</b>	<b>3</b>	<b>71</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>76</b>	<b>6</b>	<b>0</b>	<b>22</b>	<b>0</b>	<b>4</b>	<b>28</b>	<b>3</b>	<b>64</b>	<b>9</b>	<b>0</b>	<b>2</b>	<b>76</b>	<b>190</b>
<b>Approach%</b>	70%	0%	30%	0%	-	-	3.9%	93.4%	2.6%	0%	-	-	21.4%	0%	78.6%	0%	-	-	3.9%	84.2%	11.8%	0%	-	-	-
<b>Totals %</b>	3.7%	0%	1.6%	0%	5.3%	5.3%	1.6%	37.4%	1.1%	0%	40%	40%	3.2%	0%	11.6%	0%	14.7%	14.7%	1.6%	33.7%	4.7%	0%	40%	40%	-
<b>PHF</b>	0.58	0	0.75	0	0.63	0.63	0.75	0.71	0.5	0	0.7	0.7	0.75	0	0.46	0	0.5	0.5	0.38	0.84	0.56	0	0.86	0.86	-
<b>Heavy</b>	2	0	0	0	2	2	1	1	0	0	2	2	0	0	1	0	1	1	0	7	2	0	9	9	-
<b>Heavy %</b>	28.6%	0%	0%	0%	20%	20%	33.3%	1.4%	0%	0%	2.6%	2.6%	0%	0%	4.5%	0%	3.6%	3.6%	0%	10.9%	22.2%	0%	11.8%	11.8%	-
<b>Lights</b>	5	0	3	0	8	8	2	70	2	0	74	74	6	0	21	0	27	27	3	57	7	0	67	67	-
<b>Lights %</b>	71.4%	0%	100%	0%	80%	80%	66.7%	98.6%	100%	0%	97.4%	97.4%	100%	0%	95.5%	0%	96.4%	96.4%	100%	89.1%	77.8%	0%	88.2%	88.2%	-
<b>Single-Unit Trucks</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	-
<b>Single-Unit Trucks %</b>	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1.6%	0%	0%	1.3%	1.3%	-
<b>Buses</b>	2	0	0	0	2	2	1	1	0	0	2	2	0	0	1	0	1	1	0	6	2	0	8	8	-
<b>Buses %</b>	28.6%	0%	0%	0%	20%	20%	33.3%	1.4%	0%	0%	2.6%	2.6%	0%	0%	4.5%	0%	3.6%	3.6%	0%	9.4%	22.2%	0%	10.5%	10.5%	-
<b>Pedestrians</b>	-	-	-	-	3	3	-	-	-	-	0	0	-	-	-	-	4	4	-	-	-	-	2	2	-
<b>Pedestrians%</b>	-	-	-	-	33.3%	33.3%	-	-	-	-	0%	0%	-	-	-	-	44.4%	44.4%	-	-	-	-	22.2%	22.2%	-

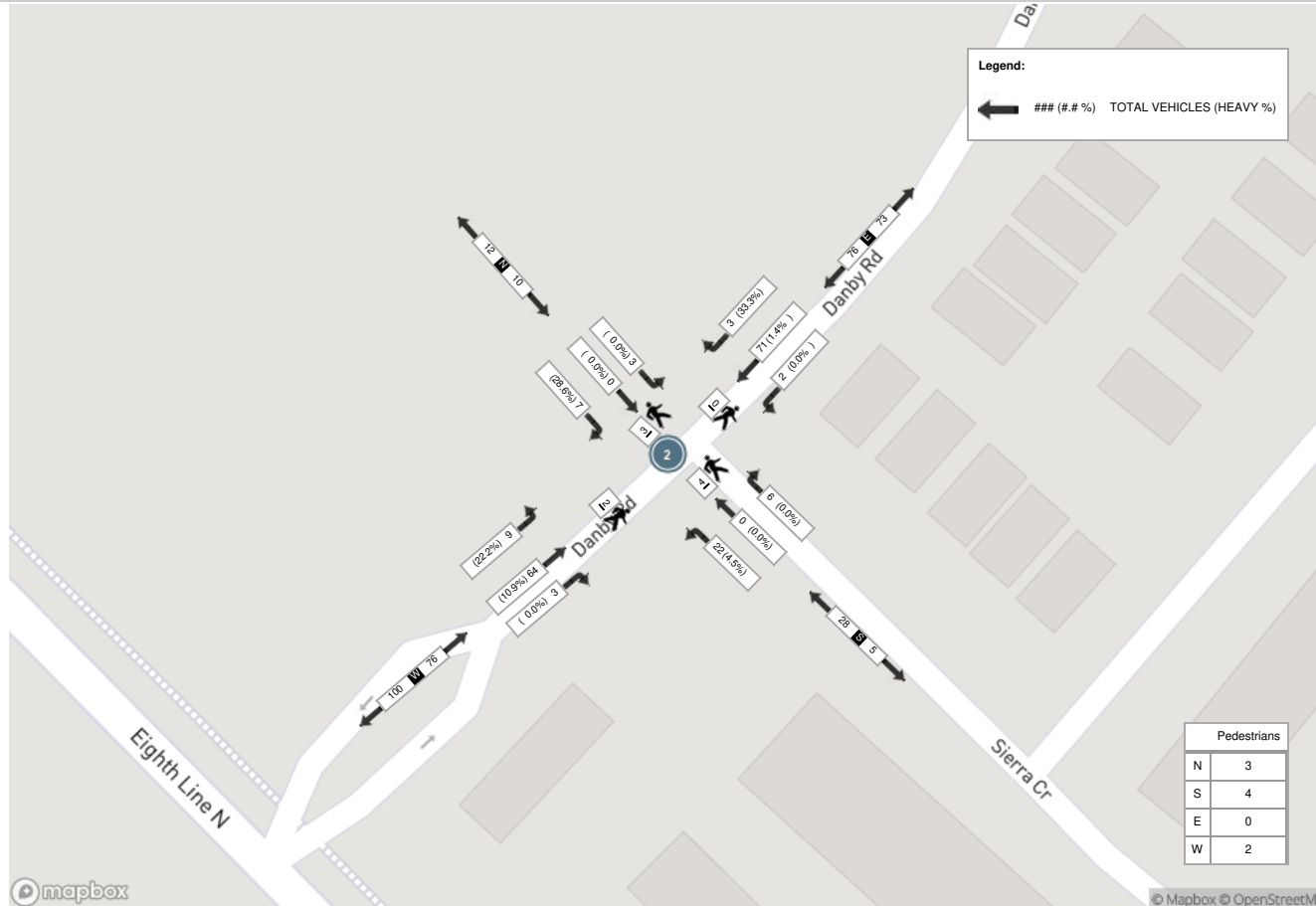




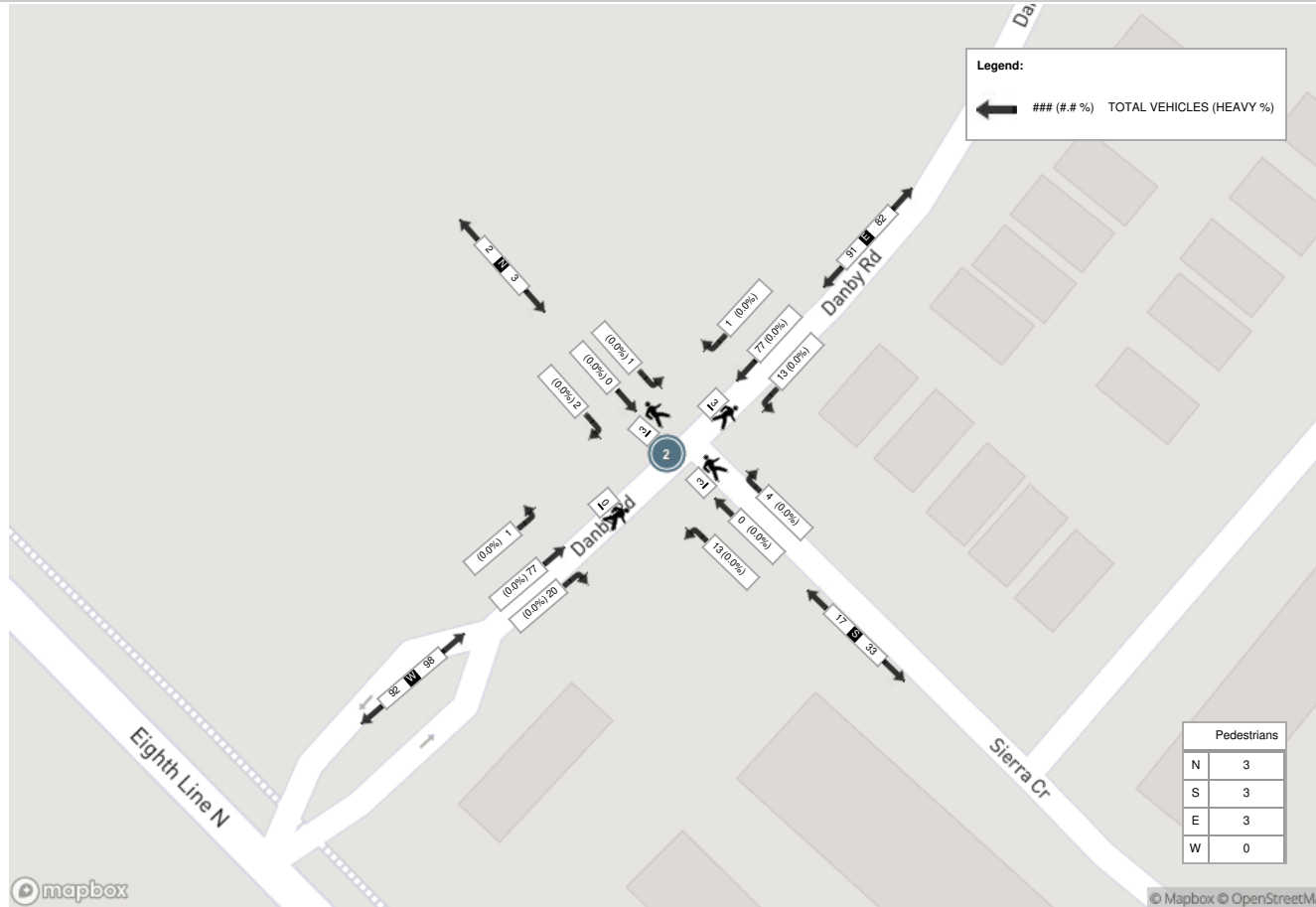
**Peak Hour: 05:00 PM - 06:00 PM Weather: Overcast Clouds (3.99 °C)**

Start Time	N Approach 14015 DANBY RD						E Approach DANBY RD						S Approach SIERRA CRES						W Approach DANBY RD						Int. Total (15 min)
	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	Right	Thru	Left	UTurn	Peds	Approach Total	
17:00:00	1	0	0	0	2	1	1	15	3	0	2	19	1	0	3	0	0	4	4	20	0	0	0	24	48
17:15:00	0	0	1	0	0	1	0	17	2	0	1	19	2	0	1	0	1	3	8	15	0	0	0	23	46
17:30:00	0	0	0	0	0	0	0	20	6	0	0	26	0	0	3	0	0	3	2	22	0	0	0	24	53
17:45:00	1	0	0	0	1	1	0	25	2	0	0	27	1	0	6	0	2	7	6	20	1	0	0	27	62
<b>Grand Total</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>77</b>	<b>13</b>	<b>0</b>	<b>3</b>	<b>91</b>	<b>4</b>	<b>0</b>	<b>13</b>	<b>0</b>	<b>3</b>	<b>17</b>	<b>20</b>	<b>77</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>98</b>	<b>209</b>
<b>Approach%</b>	66.7%	0%	33.3%	0%	-	-	1.1%	84.6%	14.3%	0%	-	-	23.5%	0%	76.5%	0%	-	-	20.4%	78.6%	1%	0%	-	-	-
<b>Totals %</b>	1%	0%	0.5%	0%	1.4%	1.4%	0.5%	36.8%	6.2%	0%	43.5%	43.5%	1.9%	0%	6.2%	0%	8.1%	8.1%	9.6%	36.8%	0.5%	0%	46.9%	46.9%	-
<b>PHF</b>	0.5	0	0.25	0	0.75	0.75	0.25	0.77	0.54	0	0.84	0.84	0.5	0	0.54	0	0.61	0.61	0.63	0.88	0.25	0	0.91	0.91	-
<b>Heavy</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
<b>Heavy %</b>	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
<b>Lights</b>	2	0	1	0	3	3	1	77	13	0	3	91	4	0	13	0	3	17	20	77	1	0	0	98	-
<b>Lights %</b>	100%	0%	100%	0%	100%	100%	100%	100%	100%	0%	100%	100%	100%	0%	100%	0%	100%	100%	100%	100%	100%	0%	0%	100%	-
<b>Single-Unit Trucks</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
<b>Single-Unit Trucks %</b>	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
<b>Buses</b>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
<b>Buses %</b>	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
<b>Pedestrians</b>	-	-	-	-	3	-	-	-	-	-	3	-	-	-	-	-	3	-	-	-	-	-	0	-	-
<b>Pedestrians%</b>	-	-	-	-	33.3%	-	-	-	-	-	33.3%	-	-	-	-	-	33.3%	-	-	-	-	-	0%	-	-

Peak Hour: 08:00 AM - 09:00 AM Weather: Broken Clouds (-4.7 °C)



Peak Hour: 05:00 PM - 06:00 PM Weather: Overcast Clouds (3.99 °C)



## **Appendix G: Vision Georgetown Extract**



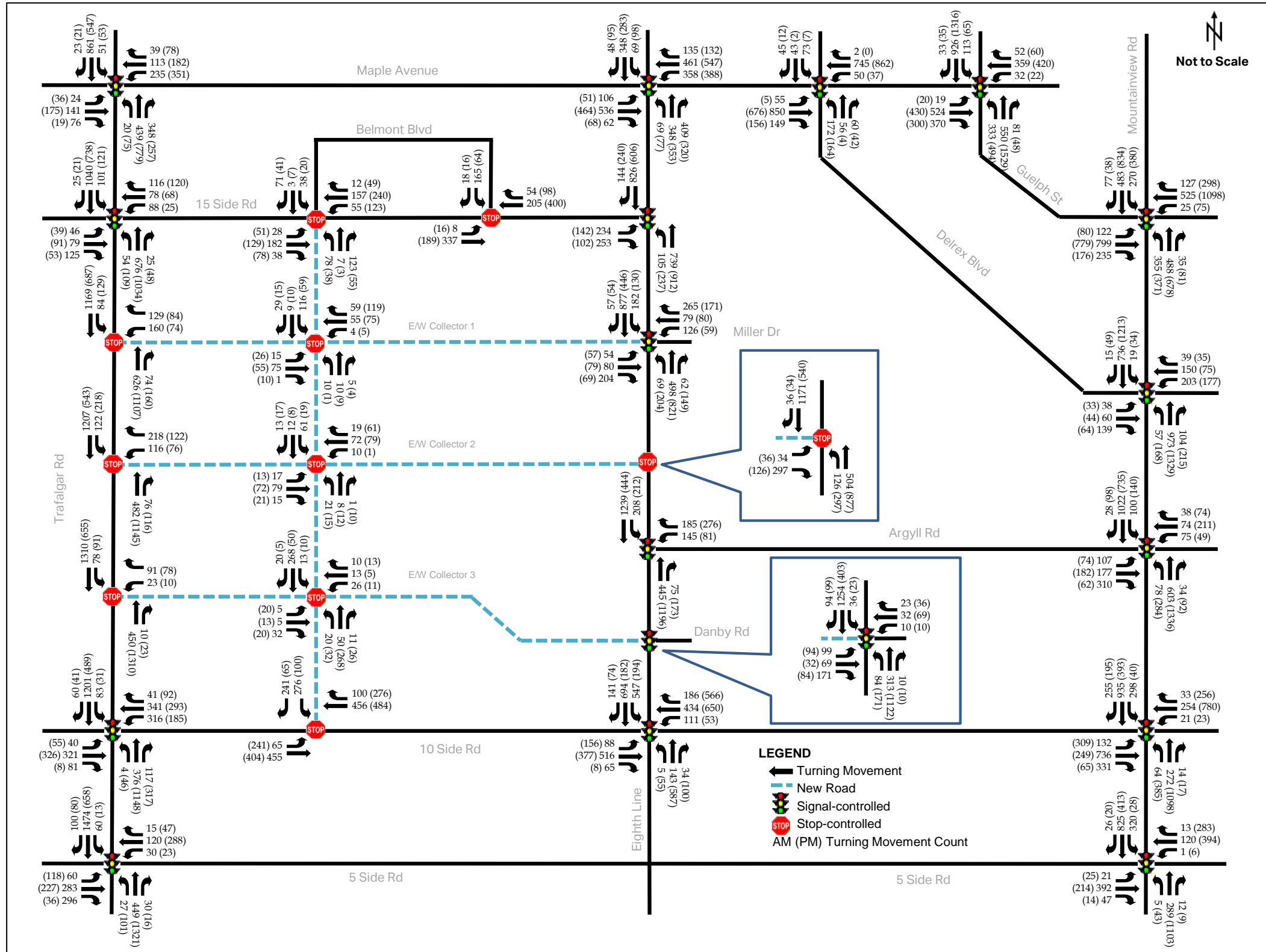


Figure 17: Future Total Traffic Volumes – Year 2031

## **Appendix H: Signal Timing Plans**







Date: 12-Feb-2021

Intersection: 10 Side Road @ Eighth Line

**8 Phase Basic Timing Sheet**

	1	2	3	4	5	6	7	8	2 Ped	4 Ped	6 Ped	8 Ped
Phases in use		X		X		X		X	X	x	x	x
Direction		EB		SB		WB		NB				
Min Green		25		15		25		15				
Veh Ext.		5.5		4.0		5.5		5.5				
Yellow		5		4.2		5		4.2				
Red		2		2		2		2				
Walk		10		10		10		10				
Don't Walk		15		15		15		15				
Max 1		47		31		47		31				
Max 2												
Max 3												
Veh Recall		X				X						
Ped Recall												
<b>Notes:</b>	Presently running uncoordinated Sync reference 3:15am											

# **Appendix I: Synchro Analysis Worksheets**



HCM Unsignalized Intersection Capacity Analysis

2: Eighth Line & Danby Road

12/15/2022

	←		↑		→	
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔	↔	↑	↔	↔	↑
Traffic Volume (veh/h)	35	45	165	25	40	395
Future Volume (Veh/h)	35	45	165	25	40	395
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	38	49	181	27	44	434
Pedestrians	9					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	1					
Right turn flare (veh)	5					
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	273					
pX, platoon unblocked						
vC, conflicting volume	712	190	217			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	712	190	217			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	90	94	97			
cM capacity (veh/h)	385	839	1312			
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	87	181	27	44	434	
Volume Left	38	0	0	44	0	
Volume Right	49	0	27	0	0	
cSH	882	1700	1700	1312	1700	
Volume to Capacity	0.10	0.11	0.02	0.03	0.26	
Queue Length 95th (m)	2.5	0.0	0.0	0.8	0.0	
Control Delay (s)	12.1	0.0	0.0	7.8	0.0	
Lane LOS	B			A		
Approach Delay (s)	12.1	0.0	0.7			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay	1.8					
Intersection Capacity Utilization	30.8%		ICU Level of Service A			
Analysis Period (min)	15					

Timings

3: Eighth Line & 10 Side Road

12/15/2022

	←		→		↑		↓	
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	40	165	50	255	5	95	95	300
Future Volume (vph)	40	165	50	255	5	95	95	300
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2		6		4		8	
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
<b>Switch Phase</b>								
Minimum Initial (s)	25.0	25.0	25.0	25.0	15.0	15.0	15.0	15.0
Minimum Split (s)	32.0	32.0	32.0	32.0	31.2	31.2	31.2	31.2
Total Split (s)	47.0	47.0	47.0	47.0	31.0	31.0	31.0	31.0
Total Split (%)	60.3%	60.3%	60.3%	60.3%	39.7%	39.7%	39.7%	39.7%
Yellow Time (s)	5.0	5.0	5.0	5.0	4.2	4.2	4.2	4.2
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	6.2	6.2	6.2	6.2
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	40.1	40.1	40.1	40.1	22.1	22.1	22.1	22.1
Actuated g/C Ratio	0.53	0.53	0.53	0.53	0.29	0.29	0.29	0.29
v/c Ratio	0.09	0.11	0.09	0.17	0.05	0.26	0.28	0.75
Control Delay	10.3	9.1	10.1	9.3	20.0	18.3	22.6	32.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.3	9.1	10.1	9.3	20.0	18.3	22.6	32.7
LOS	B	A	B	A	B	B	C	C
Approach Delay	9.3		9.4		18.4		30.6	
Approach LOS	A		A		B		C	
<b>Intersection Summary</b>								
Cycle Length: 78								
Actuated Cycle Length: 75.4								
Natural Cycle: 65								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.75								
Intersection Signal Delay: 19.1			Intersection LOS: B					
Intersection Capacity Utilization 90.6%			ICU Level of Service E					
Analysis Period (min) 15								
Splits and Phases: 3: Eighth Line & 10 Side Road								

Queues  
3: Eighth Line & 10 Side Road

12/15/2022

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	44	194	56	311	6	139	106	416
v/c Ratio	0.09	0.11	0.09	0.17	0.05	0.26	0.28	0.75
Control Delay	10.3	9.1	10.1	9.3	20.0	18.3	22.6	32.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.3	9.1	10.1	9.3	20.0	18.3	22.6	32.7
Queue Length 50th (m)	3.1	6.8	4.0	11.3	0.6	12.6	11.5	51.1
Queue Length 95th (m)	8.1	11.8	9.5	17.7	3.2	25.5	23.5	81.6
Internal Link Dist (m)		142.5		168.4		187.8		248.9
Turn Bay Length (m)	85.0		140.0		100.0		155.0	
Base Capacity (vph)	491	1825	643	1856	130	593	419	619
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.11	0.09	0.17	0.05	0.23	0.25	0.67
<b>Intersection Summary</b>								

HCM Signalized Intersection Capacity Analysis  
3: Eighth Line & 10 Side Road

12/15/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	165	10	50	255	25	5	95	30	95	300	75
Future Volume (vph)	40	165	10	50	255	25	5	95	30	95	300	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		6.2	6.2		6.2	6.2	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flt	1.00	0.99		1.00	0.99		1.00	0.96		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1560	3425		1825	3474		1304	1760		1807	1845	
Flt Permitted	0.56	1.00		0.63	1.00		0.29	1.00		0.67	1.00	
Satd. Flow (perm)	924	3425		1210	3474		396	1760		1271	1845	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	44	183	11	56	283	28	6	106	33	106	333	83
RTOR Reduction (vph)	0	5	0	0	9	0	0	15	0	0	12	0
Lane Group Flow (vph)	44	189	0	56	302	0	6	124	0	106	404	0
Heavy Vehicles (%)	17%	6%	0%	0%	4%	0%	40%	6%	3%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	40.1	40.1		40.1	40.1		22.1	22.1		22.1	22.1	
Effective Green, g (s)	40.1	40.1		40.1	40.1		22.1	22.1		22.1	22.1	
Actuated g/C Ratio	0.53	0.53		0.53	0.53		0.29	0.29		0.29	0.29	
Clearance Time (s)	7.0	7.0		7.0	7.0		6.2	6.2		6.2	6.2	
Vehicle Extension (s)	5.5	5.5		5.5	5.5		4.0	4.0		5.5	5.5	
Lane Grp Cap (vph)	491	1821		643	1847		116	515		372	540	
v/s Ratio Prot		0.06			c0.09			0.07			c0.22	
v/s Ratio Perm	0.05			0.05			0.02			0.08		
v/c Ratio	0.09	0.10		0.09	0.16		0.05	0.24		0.28	0.75	
Uniform Delay, d1	8.7	8.7		8.7	9.0		19.1	20.3		20.6	24.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.1		0.1	0.1		0.3	0.3		1.0	7.1	
Delay (s)	9.0	8.9		8.8	9.2		19.4	20.6		21.6	31.2	
Level of Service	A	A		A	A		B	C		C	C	
Approach Delay (s)		8.9			9.1			20.6			29.3	
Approach LOS		A			A			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		18.7			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.37										
Actuated Cycle Length (s)		75.4			Sum of lost time (s)			13.2				
Intersection Capacity Utilization		90.6%			ICU Level of Service			E				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis  
4: Sierra Crescent/Site Access & Danby Road

12/15/2022



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		+			+			+			+	
Traffic Volume (veh/h)	10	65	5	0	70	5	20	0	5	5	0	5
Future Volume (Veh/h)	10	65	5	0	70	5	20	0	5	5	0	5
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	13	83	6	0	90	6	26	0	6	6	0	6
Pedestrians	2			4			3			3		
Lane Width (m)	3.7			3.7			3.7			3.7		
Walking Speed (m/s)	1.1			1.1			1.1			1.1		
Percent Blockage	0			0			0			0		
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	99	93			217			215	90	214	215	98
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	99	93			217			215	90	214	215	98
tC, single (s)	4.3	4.1			7.1			6.5	6.2	7.1	6.5	6.5
tC, 2 stage (s)												
tF (s)	2.4	2.2			3.5			4.0	3.3	3.5	4.0	3.6
p0 queue free %	99	100			96			100	99	99	100	99
cM capacity (veh/h)	1373	1508			715			675	970	731	675	885
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	102	96	32	12								
Volume Left	13	0	26	6								
Volume Right	6	6	6	6								
cSH	1373	1508	752	801								
Volume to Capacity	0.01	0.00	0.04	0.01								
Queue Length 95th (m)	0.2	0.0	1.0	0.3								
Control Delay (s)	1.0	0.0	10.0	9.6								
Lane LOS	A		B	A								
Approach Delay (s)	1.0	0.0	10.0	9.6								
Approach LOS			B	A								
<b>Intersection Summary</b>												
Average Delay				2.2								
Intersection Capacity Utilization	21.9%			ICU Level of Service			A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis  
5: Sierra Crescent & Danby Road

12/15/2022



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	+			+	+	
Traffic Volume (veh/h)	70	5	10	70	5	20
Future Volume (Veh/h)	70	5	10	70	5	20
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73
Hourly flow rate (vph)	96	7	14	96	7	27
Pedestrians			18		18	
Lane Width (m)			3.7		3.7	
Walking Speed (m/s)			1.1		1.1	
Percent Blockage			2		2	
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			121		242 118	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			121		242 118	
tC, single (s)			4.2		6.4 6.2	
tC, 2 stage (s)						
tF (s)			2.3		3.5 3.3	
p0 queue free %			99		99 97	
cM capacity (veh/h)			1393		731 923	
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	103	110	34			
Volume Left	0	14	7			
Volume Right	7	0	27			
cSH	1700	1393	876			
Volume to Capacity	0.06	0.01	0.04			
Queue Length 95th (m)	0.0	0.2	0.9			
Control Delay (s)	0.0	1.0	9.3			
Lane LOS		A	A			
Approach Delay (s)	0.0	1.0	9.3			
Approach LOS			A			
<b>Intersection Summary</b>						
Average Delay			1.7			
Intersection Capacity Utilization	20.9%		ICU Level of Service		A	
Analysis Period (min)	15					

### HCM Unsignalized Intersection Capacity Analysis

#### 2: Eighth Line & Danby Road

12/15/2022

	←		↑		→	
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖	↗	↑	↘	↖	↗
Traffic Volume (veh/h)	25	75	395	45	50	195
Future Volume (Veh/h)	25	75	395	45	50	195
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	27	82	434	49	55	214
Pedestrians	9					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	1					
Right turn flare (veh)	5					
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	273					
pX, platoon unblocked						
vC, conflicting volume	767	443	492			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	767	443	492			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	87	95			
cM capacity (veh/h)	346	613	1072			
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	109	434	49	55	214	
Volume Left	27	0	0	55	0	
Volume Right	82	0	49	0	0	
cSH	815	1700	1700	1072	1700	
Volume to Capacity	0.13	0.26	0.03	0.05	0.13	
Queue Length 95th (m)	3.5	0.0	0.0	1.2	0.0	
Control Delay (s)	12.9	0.0	0.0	8.5	0.0	
Lane LOS	B			A		
Approach Delay (s)	12.9	0.0	1.7			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay	2.2					
Intersection Capacity Utilization	37.5%		ICU Level of Service		A	
Analysis Period (min)	15					

### Timings

#### 3: Eighth Line & 10 Side Road

12/15/2022

	←		→		↑		↓	
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	75	285	30	245	15	215	55	115
Future Volume (vph)	75	285	30	245	15	215	55	115
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	2		6		4		8	
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	8	8
<b>Switch Phase</b>								
Minimum Initial (s)	25.0	25.0	25.0	25.0	15.0	15.0	15.0	15.0
Minimum Split (s)	32.0	32.0	32.0	32.0	31.2	31.2	31.2	31.2
Total Split (s)	47.0	47.0	47.0	47.0	31.0	31.0	31.0	31.0
Total Split (%)	60.3%	60.3%	60.3%	60.3%	39.7%	39.7%	39.7%	39.7%
Yellow Time (s)	5.0	5.0	5.0	5.0	4.2	4.2	4.2	4.2
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	6.2	6.2	6.2	6.2
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	40.1	40.1	40.1	40.1	18.6	18.6	18.6	18.6
Actuated g/C Ratio	0.56	0.56	0.56	0.56	0.26	0.26	0.26	0.26
v/c Ratio	0.14	0.15	0.05	0.21	0.05	0.66	0.30	0.36
Control Delay	9.7	8.5	8.9	5.6	19.6	28.5	25.4	19.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.7	8.5	8.9	5.6	19.6	28.5	25.4	19.7
LOS	A	A	A	A	B	C	C	B
Approach Delay	8.7		5.9		28.0		21.1	
Approach LOS	A		A		C		C	
<b>Intersection Summary</b>								
Cycle Length: 78								
Actuated Cycle Length: 72								
Natural Cycle: 65								
Control Type: Semi Act-Uncoord								
Maximum v/c Ratio: 0.66								
Intersection Signal Delay: 14.6				Intersection LOS: B				
Intersection Capacity Utilization 93.3%				ICU Level of Service F				
Analysis Period (min) 15								

#### Splits and Phases: 3: Eighth Line & 10 Side Road





Queues  
3: Eighth Line & 10 Side Road

12/15/2022

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	79	305	32	411	16	326	58	174
v/c Ratio	0.14	0.15	0.05	0.21	0.05	0.66	0.30	0.36
Control Delay	9.7	8.5	8.9	5.6	19.6	28.5	25.4	19.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.7	8.5	8.9	5.6	19.6	28.5	25.4	19.7
Queue Length 50th (m)	4.5	9.1	1.7	7.6	1.6	35.5	6.3	15.6
Queue Length 95th (m)	12.9	18.2	6.3	17.1	5.7	59.6	15.5	30.3
Internal Link Dist (m)		142.5		168.4		187.8		248.9
Turn Bay Length (m)	85.0		140.0		100.0		155.0	
Base Capacity (vph)	547	1987	605	1964	429	648	261	644
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.15	0.05	0.21	0.04	0.50	0.22	0.27
<b>Intersection Summary</b>								

HCM Signalized Intersection Capacity Analysis  
3: Eighth Line & 10 Side Road

12/15/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	285	5	30	245	145	15	215	95	55	115	50
Future Volume (vph)	75	285	5	30	245	145	15	215	95	55	115	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		6.2	6.2		6.2	6.2	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Flt	1.00	1.00		1.00	0.94		1.00	0.95		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3561		1825	3404		1825	1820		1825	1810	
Flt Permitted	0.51	1.00		0.57	1.00		0.65	1.00		0.39	1.00	
Satd. Flow (perm)	982	3561		1087	3404		1244	1820		757	1810	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	79	300	5	32	258	153	16	226	100	58	121	53
RTOR Reduction (vph)	0	1	0	0	68	0	0	22	0	0	22	0
Lane Group Flow (vph)	79	304	0	32	343	0	16	304	0	58	152	0
Heavy Vehicles (%)	0%	2%	17%	0%	2%	0%	0%	1%	0%	0%	1%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			6			4			8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	40.1	40.1		40.1	40.1		18.6	18.6		18.6	18.6	
Effective Green, g (s)	40.1	40.1		40.1	40.1		18.6	18.6		18.6	18.6	
Actuated g/C Ratio	0.56	0.56		0.56	0.56		0.26	0.26		0.26	0.26	
Clearance Time (s)	7.0	7.0		7.0	7.0		6.2	6.2		6.2	6.2	
Vehicle Extension (s)	5.5	5.5		5.5	5.5		4.0	4.0		5.5	5.5	
Lane Grp Cap (vph)	547	1986		606	1898		321	470		195	468	
v/s Ratio Prot		0.09			c0.10			c0.17			0.08	
v/s Ratio Perm	0.08			0.03			0.01			0.08		
v/c Ratio	0.14	0.15		0.05	0.18		0.05	0.65		0.30	0.32	
Uniform Delay, d1	7.6	7.7		7.2	7.8		20.0	23.7		21.4	21.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.2		0.1	0.1		0.1	3.4		2.1	1.0	
Delay (s)	8.2	7.9		7.3	7.9		20.1	27.1		23.5	22.6	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		7.9			7.9			26.8			22.8	
Approach LOS		A			A			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay				15.0			HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio				0.33								
Actuated Cycle Length (s)				71.9			Sum of lost time (s)			13.2		
Intersection Capacity Utilization				93.3%			ICU Level of Service			F		
Analysis Period (min)				15								
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis  
4: Sierra Crescent/Site Access & Danby Road

12/15/2022



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	0	75	20	15	75	0	15	0	5	0	0	0
Future Volume (Veh/h)	0	75	20	15	75	0	15	0	5	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	0	89	24	18	89	0	18	0	6	0	0	0
Pedestrians					3			3			3	
Lane Width (m)					3.7			3.7			3.7	
Walking Speed (m/s)					1.1			1.1			1.1	
Percent Blockage					0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	92			116			229	232	107	238	244	92
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	92			116			229	232	107	238	244	92
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			97	100	99	100	100	100
cM capacity (veh/h)	1511			1481			718	660	947	702	650	968
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	113	107	24	0								
Volume Left	0	18	18	0								
Volume Right	24	0	6	0								
cSH	1511	1481	764	1700								
Volume to Capacity	0.00	0.01	0.03	0.00								
Queue Length 95th (m)	0.0	0.3	0.7	0.0								
Control Delay (s)	0.0	1.3	9.9	0.0								
Lane LOS		A	A	A								
Approach Delay (s)	0.0	1.3	9.9	0.0								
Approach LOS			A	A								
<b>Intersection Summary</b>												
Average Delay	1.6											
Intersection Capacity Utilization	22.6%		ICU Level of Service				A					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis  
5: Sierra Crescent & Danby Road










12/15/2022



Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	↕			↕	↕		
Traffic Volume (veh/h)	75	10	20	80	10	15	
Future Volume (Veh/h)	75	10	20	80	10	15	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	
Hourly flow rate (vph)	80	11	21	85	11	16	
Pedestrians				10			
Lane Width (m)				3.7			
Walking Speed (m/s)				1.1			
Percent Blockage				1			
Right turn flare (veh)							
Median type	None			None			
Median storage (veh)							
Upstream signal (m)							
pX, platoon unblocked							
vC, conflicting volume			101	222	96		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			101	222	96		
tC, single (s)			4.1	6.4	6.2		
tC, 2 stage (s)							
tF (s)			2.2	3.5	3.3		
p0 queue free %			99	99	98		
cM capacity (veh/h)			1489	752	957		
Direction, Lane #	EB 1	WB 1	NB 1				
Volume Total	91	106	27				
Volume Left	0	21	11				
Volume Right	11	0	16				
cSH	1700	1489	861				
Volume to Capacity	0.05	0.01	0.03				
Queue Length 95th (m)	0.0	0.3	0.7				
Control Delay (s)	0.0	1.6	9.3				
Lane LOS		A	A				
Approach Delay (s)	0.0	1.6	9.3				
Approach LOS			A				
<b>Intersection Summary</b>							
Average Delay	1.9						
Intersection Capacity Utilization	22.0%		ICU Level of Service				A
Analysis Period (min)	15						











HCM Unsignalized Intersection Capacity Analysis  
1: Eighth Line & Site Driveway (RIRO)

Sensitivity Analysis (No Signal)  
12/08/2022

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	20	260	5	0	540
Future Volume (Veh/h)	0	20	260	5	0	540
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	22	283	5	0	587
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)			388			
pX, platoon unblocked						
vC, conflicting volume	579	144			288	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	579	144			288	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			100	
cM capacity (veh/h)	446	877			1271	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	22	189	99	294	294	
Volume Left	0	0	0	0	0	
Volume Right	22	0	5	0	0	
cSH	877	1700	1700	1700	1700	
Volume to Capacity	0.03	0.11	0.06	0.17	0.17	
Queue Length 95th (m)	0.6	0.0	0.0	0.0	0.0	
Control Delay (s)	9.2	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	9.2	0.0		0.0		
Approach LOS	A					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			18.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
2: Eighth Line & Danby Road

Sensitivity Analysis (No Signal)  
12/08/2022

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	55	60	205	25	60	480
Future Volume (Veh/h)	55	60	205	25	60	480
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	60	66	225	27	66	527
Pedestrians	9					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	1					
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)			273			
pX, platoon unblocked						
vC, conflicting volume	643	135			261	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	643	135			261	
tC, single (s)	6.8	7.0			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.3	
p0 queue free %	84	92			95	
cM capacity (veh/h)	386	875			1254	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	126	150	102	66	264	264
Volume Left	60	0	0	66	0	0
Volume Right	66	0	27	0	0	0
cSH	545	1700	1700	1254	1700	1700
Volume to Capacity	0.23	0.09	0.06	0.05	0.15	0.15
Queue Length 95th (m)	6.7	0.0	0.0	1.3	0.0	0.0
Control Delay (s)	13.6	0.0	0.0	8.0	0.0	0.0
Lane LOS	B			A		
Approach Delay (s)	13.6	0.0		0.9		
Approach LOS	B					
Intersection Summary						
Average Delay			2.3			
Intersection Capacity Utilization			Err%	ICU Level of Service	H	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis  
1: Eighth Line & Site Driveway (RIRO)

Sensitivity Analysis (Without Signal)  
12/08/2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↕			↖
Traffic Volume (veh/h)	0	10	555	15	0	295
Future Volume (Veh/h)	0	10	555	15	0	295
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	11	603	16	0	321
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (m)	388					
pX, platoon unblocked						
vC, conflicting volume	772	310			619	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	772	310			619	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	336	686			957	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	11	402	217	160	160	
Volume Left	0	0	0	0	0	
Volume Right	11	0	16	0	0	
cSH	686	1700	1700	1700	1700	
Volume to Capacity	0.02	0.24	0.13	0.09	0.09	
Queue Length 95th (m)	0.4	0.0	0.0	0.0	0.0	
Control Delay (s)	10.3	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	10.3	0.0	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay	0.1					
Intersection Capacity Utilization	25.8%		ICU Level of Service		A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
2: Eighth Line & Danby Road

Sensitivity Analysis (Without Signal)  
12/08/2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations		↗	↕		↖	↖	↖
Traffic Volume (veh/h)	35	75	495	50	60	235	
Future Volume (Veh/h)	35	75	495	50	60	235	
Sign Control	Stop		Free		Free		
Grade	0%		0%		0%		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	
Hourly flow rate (vph)	38	82	544	55	66	258	
Pedestrians	9						
Lane Width (m)	3.7						
Walking Speed (m/s)	1.1						
Percent Blockage	1						
Right turn flare (veh)							
Median type			None		None		
Median storage (veh)							
Upstream signal (m)	273						
pX, platoon unblocked	0.98	0.98			0.98		
vC, conflicting volume	842	308			608		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	800	257			562		
tC, single (s)	6.9	6.9			4.1		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	87	89			93		
cM capacity (veh/h)	289	728			991		
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3	
Volume Total	120	363	236	66	129	129	
Volume Left	38	0	0	66	0	0	
Volume Right	82	0	55	0	0	0	
cSH	491	1700	1700	991	1700	1700	
Volume to Capacity	0.24	0.21	0.14	0.07	0.08	0.08	
Queue Length 95th (m)	7.2	0.0	0.0	1.6	0.0	0.0	
Control Delay (s)	14.7	0.0	0.0	8.9	0.0	0.0	
Lane LOS	B			A			
Approach Delay (s)	14.7	0.0	1.8				
Approach LOS	B						
Intersection Summary							
Average Delay	2.3						
Intersection Capacity Utilization	Err%		ICU Level of Service		H		
Analysis Period (min)	15						

HCM Unsignalized Intersection Capacity Analysis  
1: Eighth Line & Site Driveway (RIRO)

12/15/2022

	↙	↘	↑	↙	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↗			↖
Traffic Volume (veh/h)	0	0	450	0	0	1385
Future Volume (Veh/h)	0	0	450	0	0	1385
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	489	0	0	1505
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			115			
pX, platoon unblocked	0.99	0.99			0.99	
vC, conflicting volume	1242	244			489	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1232	229			475	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	168	769			1077	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	0	326	163	752	752	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.19	0.10	0.44	0.44	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0		0.0		
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			0.0			
Intersection Capacity Utilization			41.6%		ICU Level of Service	A
Analysis Period (min)			15			

Timings  
2: Eighth Line & Street 'D'/Danby Road

12/15/2022

	↙	→	↘	↙	←	↘	↙	↘	↑	↙	↓
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	
Lane Configurations		↖	↖		↖	↖	↖	↖	↖	↖	
Traffic Volume (vph)	100	70	170	10	50	35	85	315	35	1255	
Future Volume (vph)	100	70	170	10	50	35	85	315	35	1255	
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		
Detector Phase	4	4	4	8	8	8	2	2	6	6	
<b>Switch Phase</b>											
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	
Total Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	67.0	67.0	67.0	67.0	
Total Split (%)	25.6%	25.6%	25.6%	25.6%	25.6%	25.6%	74.4%	74.4%	74.4%	74.4%	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)		0.0	0.0		0.0	0.0		0.0	0.0	0.0	
Total Lost Time (s)		4.5	4.5		4.5	4.5		4.5	4.5	4.5	
Lead/Lag											
<b>Lead-Lag Optimize?</b>											
Recall Mode	None	None	None	None	None	None	Max	Max	Max	Max	
Act Effct Green (s)	15.1	15.1	15.1	15.1	15.1	63.4	63.4	63.4	63.4	63.4	
Actuated g/C Ratio	0.17	0.17		0.17	0.17	0.72	0.72	0.72	0.72	0.72	
v/c Ratio	0.72	0.54		0.21	0.13	0.48	0.14	0.06	0.57		
Control Delay	50.4	25.0		31.9	11.0	16.7	4.1	4.4	7.0		
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	50.4	25.0		31.9	11.0	16.7	4.1	4.4	7.0		
LOS	D	C		C	B	B	A	A	A		
Approach Delay		37.7			24.3			6.7		7.0	
Approach LOS		D			C			A		A	
<b>Intersection Summary</b>											
Cycle Length: 90											
Actuated Cycle Length: 87.5											
Natural Cycle: 70											
Control Type: Semi Act-Uncoord											
Maximum v/c Ratio: 0.72											
Intersection Signal Delay: 12.4											
Intersection LOS: B											
Intersection Capacity Utilization 69.6%											
ICU Level of Service C											
Analysis Period (min) 15											
<b>Splits and Phases: 2: Eighth Line &amp; Street 'D'/Danby Road</b>											

Queues

2: Eighth Line & Street 'D'/Danby Road

12/15/2022

	→	↘	←	↙	↑	↗	↓	
Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	187	187	66	38	93	357	38	1483
v/c Ratio	0.72	0.54	0.21	0.13	0.48	0.14	0.06	0.57
Control Delay	50.4	25.0	31.9	11.0	16.7	4.1	4.4	7.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	50.4	25.0	31.9	11.0	16.7	4.1	4.4	7.0
Queue Length 50th (m)	29.6	16.3	9.5	0.0	5.8	8.2	1.6	52.5
Queue Length 95th (m)	51.0	35.8	20.4	7.7	23.0	13.6	4.6	76.0
Internal Link Dist (m)	110.9		68.4		248.9			90.8
Turn Bay Length (m)		40.0		40.0	55.0		180.0	
Base Capacity (vph)	317	405	381	361	192	2493	690	2597
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.59	0.46	0.17	0.11	0.48	0.14	0.06	0.57
<b>Intersection Summary</b>								

HCM Signalized Intersection Capacity Analysis

2: Eighth Line & Street 'D'/Danby Road

12/15/2022

	↘	→	↙	←	↗	↑	↘	↓	↙	↘	↙	↘	
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↘	↙		↘	↙	↘	↙		↘	↙	↘	
Traffic Volume (vph)	100	70	170	10	50	35	85	315	10	35	1255	95	
Future Volume (vph)	100	70	170	10	50	35	85	315	10	35	1255	95	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	1.00	
Frnt	1.00	0.85	1.00	0.85	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	
Flt Protected	0.97	1.00	0.99	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1866	1633	1905	1570	1825	3439	1683	3578					
Flt Permitted	0.78	1.00	0.94	1.00	0.14	1.00	0.54	1.00					
Satd. Flow (perm)	1501	1633	1802	1570	264	3439	954	3578					
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	
Adj. Flow (vph)	110	77	187	11	55	38	93	346	11	38	1379	104	
RTOR Reduction (vph)	0	0	64	0	0	31	0	2	0	0	6	0	
Lane Group Flow (vph)	0	187	123	0	66	7	93	355	0	38	1477	0	
Confl. Peds. (#/hr)							9	9					
Heavy Vehicles (%)	0%	0%	0%	0%	0%	4%	0%	5%	22%	7%	1%	0%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA	Perm	NA	
Protected Phases		4			8			2			6		
Permitted Phases	4		4	8		8	2			6			
Actuated Green, G (s)	15.1	15.1		15.1	15.1	63.4	63.4	63.4	63.4	63.4	63.4	63.4	
Effective Green, g (s)	15.1	15.1		15.1	15.1	63.4	63.4	63.4	63.4	63.4	63.4	63.4	
Actuated g/C Ratio	0.17	0.17		0.17	0.17	0.72	0.72	0.72	0.72	0.72	0.72	0.72	
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	259	281		310	270	191	2491	691	2592				
v/s Ratio Prot							0.10				c0.41		
v/s Ratio Perm	c0.12	0.08		0.04	0.00	0.35		0.04					
v/c Ratio	0.72	0.44		0.21	0.02	0.49	0.14	0.05	0.57				
Uniform Delay, d1	34.2	32.4		31.1	30.1	5.1	3.7	3.5	5.7				
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00				
Incremental Delay, d2	9.5	1.1		0.3	0.0	8.6	0.1	0.2	0.9				
Delay (s)	43.7	33.5		31.4	30.1	13.7	3.8	3.6	6.6				
Level of Service	D	C		C	C	B	A	A	A				
Approach Delay (s)	38.6			31.0			5.9		6.5				
Approach LOS	D			C			A		A				
<b>Intersection Summary</b>													
HCM 2000 Control Delay	12.3		HCM 2000 Level of Service					B					
HCM 2000 Volume to Capacity ratio	0.60												
Actuated Cycle Length (s)	87.5			Sum of lost time (s)				9.0					
Intersection Capacity Utilization	69.6%		ICU Level of Service					C					
Analysis Period (min)	15												
c Critical Lane Group													



Timings

3: Eighth Line & 10 Side Road

12/15/2022

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↖	↗	↖	↗	↖	↗	↖	↗
Traffic Volume (vph)	90	515	110	435	5	145	545	695
Future Volume (vph)	90	515	110	435	5	145	545	695
Turn Type	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		2		6		4		3
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	3	8
Switch Phase								
Minimum Initial (s)	25.0	25.0	25.0	25.0	15.0	15.0	5.0	15.0
Minimum Split (s)	32.0	32.0	32.0	32.0	31.2	31.2	9.5	31.2
Total Split (s)	35.4	35.4	35.4	35.4	31.2	31.2	23.4	54.6
Total Split (%)	39.3%	39.3%	39.3%	39.3%	34.7%	34.7%	26.0%	60.7%
Yellow Time (s)	5.0	5.0	5.0	5.0	4.2	4.2	3.0	4.2
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	6.2	6.2	3.0	6.2
Lead/Lag					Lag	Lag	Lag	Lead
Lead-Lag Optimize?					Yes	Yes	Yes	
Recall Mode	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	28.5	28.5	28.5	28.5	16.8	16.8	42.8	39.6
Actuated g/C Ratio	0.35	0.35	0.35	0.35	0.21	0.21	0.53	0.49
v/c Ratio	0.57	0.53	0.55	0.56	0.07	0.28	0.84	0.53
Control Delay	39.2	23.2	34.0	21.4	27.6	23.4	26.0	14.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.2	23.2	34.0	21.4	27.6	23.4	26.0	14.9
LOS	D	C	C	C	C	C	C	B
Approach Delay		25.3		23.3		23.6		19.3
Approach LOS		C		C		C		B

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 81.3  
 Natural Cycle: 80  
 Control Type: Semi Act-Uncoord  
 Maximum v/c Ratio: 0.84  
 Intersection Signal Delay: 21.9      Intersection LOS: C  
 Intersection Capacity Utilization 104.5%      ICU Level of Service G  
 Analysis Period (min) 15

Splits and Phases: 3: Eighth Line & 10 Side Road



Queues

3: Eighth Line & 10 Side Road

12/15/2022

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	100	644	122	689	6	200	606	928
v/c Ratio	0.57	0.53	0.55	0.56	0.07	0.28	0.84	0.53
Control Delay	39.2	23.2	34.0	21.4	27.6	23.4	26.0	14.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.2	23.2	34.0	21.4	27.6	23.4	26.0	14.9
Queue Length 50th (m)	12.1	39.1	14.5	38.2	0.8	11.5	62.4	47.3
Queue Length 95th (m)	#38.2	64.6	#40.6	64.5	3.9	19.9	#97.7	62.2
Internal Link Dist (m)		142.5		168.4		187.8		248.9
Turn Bay Length (m)	85.0		140.0		100.0		155.0	
Base Capacity (vph)	174	1204	223	1238	130	1059	732	2121
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.57	0.53	0.55	0.56	0.05	0.19	0.83	0.44

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

3: Eighth Line & 10 Side Road

12/15/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	90	515	65	110	435	185	5	145	35	545	695	140
Future Volume (vph)	90	515	65	110	435	185	5	145	35	545	695	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		6.2	6.2		3.0	6.2	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.96		1.00	0.97		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1560	3407		1825	3391		1304	3361		1807	3523	
Flt Permitted	0.30	1.00		0.33	1.00		0.31	1.00		0.53	1.00	
Satd. Flow (perm)	498	3407		638	3391		422	3361		1011	3523	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	100	572	72	122	483	206	6	161	39	606	772	156
RTOR Reduction (vph)	0	10	0	0	50	0	0	26	0	0	21	0
Lane Group Flow (vph)	100	634	0	122	639	0	6	174	0	606	907	0
Heavy Vehicles (%)	17%	6%	0%	0%	4%	0%	40%	6%	3%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		2			6			4			3	8
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	28.5	28.5		28.5	28.5		16.9	16.9		39.6	39.6	
Effective Green, g (s)	28.5	28.5		28.5	28.5		16.9	16.9		39.6	39.6	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.21	0.21		0.49	0.49	
Clearance Time (s)	7.0	7.0		7.0	7.0		6.2	6.2		3.0	6.2	
Vehicle Extension (s)	5.5	5.5		5.5	5.5		4.0	4.0		3.0	5.5	
Lane Grp Cap (vph)	174	1194		223	1188		87	698		685	1716	
v/s Ratio Prot		0.19			0.19			0.05		c0.21	0.26	
v/s Ratio Perm	c0.20			0.19			0.01			c0.22		
v/c Ratio	0.57	0.53		0.55	0.54		0.07	0.25		0.88	0.53	
Uniform Delay, d1	21.5	21.1		21.2	21.1		25.9	26.9		16.4	14.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.1	1.7		5.4	1.0		0.5	0.3		13.0	0.7	
Delay (s)	34.6	22.8		26.6	22.1		26.3	27.2		29.4	15.1	
Level of Service	C	C		C	C		C	C		C	B	
Approach Delay (s)		24.3			22.8			27.1			20.7	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	81.3	Sum of lost time (s)	16.2
Intersection Capacity Utilization	104.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis

4: Sierra Crescent/Site Access & Danby Road

12/15/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	10	100	5	0	70	5	20	0	5	5	0	5
Future Volume (Veh/h)	10	100	5	0	70	5	20	0	5	5	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Hourly flow rate (vph)	13	128	6	0	90	6	26	0	6	6	0	6
Pedestrians		2			4			3			3	
Lane Width (m)		3.7			3.7			3.7			3.7	
Walking Speed (m/s)		1.1			1.1			1.1			1.1	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)		92										
pX, platoon unblocked												
vC, conflicting volume	99			138			262	260	135	259	260	98
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	99			138			262	260	135	259	260	98
tC, single (s)	4.3			4.1			7.1	6.5	6.2	7.1	6.5	6.5
tC, 2 stage (s)												
tF (s)	2.4			2.2			3.5	4.0	3.3	3.5	4.0	3.6
p0 queue free %	99			100			96	100	99	99	100	99
cM capacity (veh/h)	1373			1452			668	637	916	683	637	885
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	147	96	32	12								
Volume Left	13	0	26	6								
Volume Right	6	6	6	6								
cSH	1373	1452	703	771								
Volume to Capacity	0.01	0.00	0.05	0.02								
Queue Length 95th (m)	0.2	0.0	1.1	0.4								
Control Delay (s)	0.7	0.0	10.4	9.7								
Lane LOS	A		B	A								
Approach Delay (s)	0.7	0.0	10.4	9.7								
Approach LOS			B	A								

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis  
5: Sierra Crescent & Danby Road

12/15/2022

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔		↔	
Traffic Volume (veh/h)	105	5	10	70	5	20
Future Volume (Veh/h)	105	5	10	70	5	20
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73
Hourly flow rate (vph)	144	7	14	96	7	27
Pedestrians	18					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	2					
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)	219					
pX, platoon unblocked						
vC, conflicting volume			169	290	166	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			169	290	166	
tC, single (s)			4.2	6.4	6.2	
tC, 2 stage (s)						
tF (s)			2.3	3.5	3.3	
p0 queue free %			99	99	97	
cM capacity (veh/h)			1337	686	869	
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	151	110	34			
Volume Left	0	14	7			
Volume Right	7	0	27			
cSH	1700	1337	823			
Volume to Capacity	0.09	0.01	0.04			
Queue Length 95th (m)	0.0	0.2	1.0			
Control Delay (s)	0.0	1.1	9.6			
Lane LOS	A		A			
Approach Delay (s)	0.0	1.1	9.6			
Approach LOS	A		A			
<b>Intersection Summary</b>						
Average Delay	1.5					
Intersection Capacity Utilization	20.9%		ICU Level of Service		A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
1: Eighth Line & Site Driveway (RIRO)

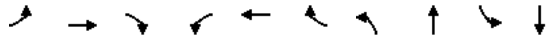
12/15/2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔		↔	
Traffic Volume (veh/h)	0	0	1250	0	0	540
Future Volume (Veh/h)	0	0	1250	0	0	540
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	1359	0	0	587
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	115					
pX, platoon unblocked	0.85	0.85			0.85	
vC, conflicting volume	1652	680			1359	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1409	260			1062	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	110	626			552	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	0	906	453	294	294	
Volume Left	0	0	0	0	0	
Volume Right	0	0	0	0	0	
cSH	1700	1700	1700	1700	1700	
Volume to Capacity	0.00	0.53	0.27	0.17	0.17	
Queue Length 95th (m)	0.0	0.0	0.0	0.0	0.0	
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.0	0.0	0.0			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	0.0					
Intersection Capacity Utilization	37.9%		ICU Level of Service		A	
Analysis Period (min)	15					

Timings

2: Eighth Line & Street 'D'/Danby Road

12/15/2022

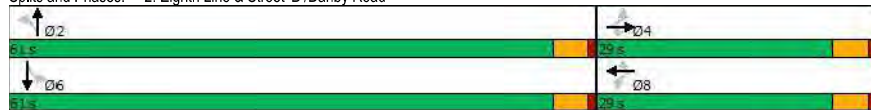


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations		↕	↗		↕	↗	↖	↖	↖	↖
Traffic Volume (vph)	95	40	85	10	70	35	170	1120	35	405
Future Volume (vph)	95	40	85	10	70	35	170	1120	35	405
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA
Protected Phases		4			8		2		6	
Permitted Phases	4		4	8		8	2		6	
Detector Phase	4	4	4	8	8	8	2	2	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	29.0	29.0	29.0	29.0	29.0	29.0	61.0	61.0	61.0	61.0
Total Split (%)	32.2%	32.2%	32.2%	32.2%	32.2%	32.2%	67.8%	67.8%	67.8%	67.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	None	None	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	13.7	13.7	13.7	13.7	13.7	13.7	59.4	59.4	59.4	59.4
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.17	0.17	0.72	0.72	0.72	0.72
v/c Ratio	0.63	0.27	0.29	0.13	0.30	0.48	0.14	0.22	0.22	0.22
Control Delay	43.1	8.4	30.8	10.3	6.4	6.0	6.2	3.9	6.2	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.1	8.4	30.8	10.3	6.4	6.0	6.2	3.9	6.2	3.9
LOS	D	A	C	B	A	A	A	A	A	A
Approach Delay	29.7			24.6			6.1		4.0	
Approach LOS	C			C			A		A	

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 82.1  
 Natural Cycle: 55  
 Control Type: Semi Act-Uncooord  
 Maximum v/c Ratio: 0.63  
 Intersection Signal Delay: 8.9  
 Intersection Capacity Utilization 61.1%  
 Analysis Period (min) 15

Splits and Phases: 2: Eighth Line & Street 'D'/Danby Road



Queues

2: Eighth Line & Street 'D'/Danby Road

12/15/2022



Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	148	93	88	38	187	1253	38	555
v/c Ratio	0.63	0.27	0.29	0.13	0.30	0.48	0.14	0.22
Control Delay	43.1	8.4	30.8	10.3	6.4	6.0	6.2	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.1	8.4	30.8	10.3	6.4	6.0	6.2	3.9
Queue Length 50th (m)	20.8	0.0	11.6	0.0	8.2	34.5	1.5	10.3
Queue Length 95th (m)	38.1	11.0	23.4	7.3	22.2	62.1	6.1	20.6
Internal Link Dist (m)	110.9		68.4		248.9			90.8
Turn Bay Length (m)		40.0		40.0	55.0		180.0	
Base Capacity (vph)	422	553	546	514	617	2631	263	2559
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.17	0.16	0.07	0.30	0.48	0.14	0.22

Intersection Summary

HCM Signalized Intersection Capacity Analysis

2: Eighth Line & Street 'D'/Danby Road

12/15/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕	↗	↗	↕		↗	↕	
Traffic Volume (vph)	95	40	85	10	70	35	170	1120	20	35	405	100
Future Volume (vph)	95	40	85	10	70	35	170	1120	20	35	405	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5		
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95		
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00		
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00		
Frnt	1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.97		
Flt Protected	0.97	1.00		0.99	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1856	1633		1900	1633	1825	3637		1820	3513		
Flt Permitted	0.74	1.00		0.96	1.00	0.44	1.00		0.19	1.00		
Satd. Flow (perm)	1414	1633		1826	1633	853	3637		364	3513		
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	104	44	93	11	77	38	187	1231	22	38	445	110
RTOR Reduction (vph)	0	0	77	0	0	32	0	1	0	0	18	0
Lane Group Flow (vph)	0	148	16	0	88	6	187	1252	0	38	537	0
Confl. Peds. (#/hr)									9	9		
Heavy Vehicles (%)	0%	0%	0%	4%	0%	0%	0%	0%	2%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA	NA	NA
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		13.7	13.7		13.7	13.7	59.4	59.4		59.4	59.4	
Effective Green, g (s)		13.7	13.7		13.7	13.7	59.4	59.4		59.4	59.4	
Actuated g/C Ratio		0.17	0.17		0.17	0.17	0.72	0.72		0.72	0.72	
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		235	272		304	272	617	2631		263	2541	
v/s Ratio Prot							c0.34				0.15	
v/s Ratio Perm		c0.10	0.01		0.05	0.00	0.22			0.10		
v/c Ratio		0.63	0.06		0.29	0.02	0.30	0.48		0.14	0.21	
Uniform Delay, d1		31.8	28.8		29.9	28.6	4.0	4.8		3.5	3.7	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		5.2	0.1		0.5	0.0	1.3	0.6		1.2	0.2	
Delay (s)		37.0	28.9		30.5	28.6	5.3	5.4		4.7	3.9	
Level of Service		D	C		C	C	A	A		A	A	
Approach Delay (s)		33.9			29.9			5.4			3.9	
Approach LOS		C			C			A			A	

Intersection Summary

HCM 2000 Control Delay	9.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	82.1	Sum of lost time (s)	9.0
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Timings

3: Eighth Line & 10 Side Road

12/15/2022

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↗	↕	↗	↕	↗	↕	↗	↕
Traffic Volume (vph)	155	375	55	650	55	595	195	180
Future Volume (vph)	155	375	55	650	55	595	195	180
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	5	2		6		4	3	8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	6	6	4	4	3	8
Switch Phase								
Minimum Initial (s)	5.0	25.0	25.0	25.0	15.0	15.0	5.0	15.0
Minimum Split (s)	9.5	32.0	32.0	32.0	31.2	31.2	9.5	31.2
Total Split (s)	9.8	48.3	38.5	38.5	31.2	31.2	10.5	41.7
Total Split (%)	10.9%	53.7%	42.8%	42.8%	34.7%	34.7%	11.7%	46.3%
Yellow Time (s)	3.0	5.0	5.0	5.0	4.2	4.2	3.0	4.2
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	7.0	6.2	6.2	3.0	6.2
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	None	None	None	None	None
Act Effct Green (s)	45.4	41.4	31.5	31.5	23.4	23.4	37.1	33.9
Actuated g/C Ratio	0.51	0.47	0.36	0.36	0.26	0.26	0.42	0.38
v/c Ratio	0.69	0.24	0.17	0.93	0.19	0.77	0.78	0.20
Control Delay	29.5	14.8	21.8	35.7	26.9	35.2	39.6	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.5	14.8	21.8	35.7	26.9	35.2	39.6	12.9
LOS	C	B	C	D	C	D	D	B
Approach Delay		19.0		35.1		34.6		24.5
Approach LOS		B		D		C		C

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 88.5	
Natural Cycle: 85	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 30.5	Intersection LOS: C
Intersection Capacity Utilization 92.8%	ICU Level of Service F
Analysis Period (min) 15	

Splits and Phases: 3: Eighth Line & 10 Side Road



Queues  
3: Eighth Line & 10 Side Road

12/15/2022

	↖	→	↙	←	↘	↑	↗	↓
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	163	406	58	1279	58	731	205	268
v/c Ratio	0.69	0.24	0.17	0.93	0.19	0.77	0.78	0.20
Control Delay	29.5	14.8	21.8	35.7	26.9	35.2	39.6	12.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.5	14.8	21.8	35.7	26.9	35.2	39.6	12.9
Queue Length 50th (m)	14.6	21.5	6.8	92.4	7.6	58.5	22.1	10.7
Queue Length 95th (m)	#36.4	30.8	15.6	#138.1	17.2	78.5	#46.2	18.7
Internal Link Dist (m)		142.5		168.4		187.8		248.9
Turn Bay Length (m)	85.0		140.0		100.0		155.0	
Base Capacity (vph)	237	1661	351	1370	319	1016	263	1430
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.24	0.17	0.93	0.18	0.72	0.78	0.19

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis  
3: Eighth Line & 10 Side Road

12/15/2022

	↖	→	↙	←	↘	↑	↗	↓	↖	↗	↘	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↖↗		↖	↖↗	
Traffic Volume (vph)	155	375	10	55	650	565	55	595	100	195	180	75
Future Volume (vph)	155	375	10	55	650	565	55	595	100	195	180	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0		7.0	7.0		6.2	6.2		3.0	6.2	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Flt	1.00	1.00		1.00	0.93		1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3550		1825	3359		1825	3541		1825	3444	
Flt Permitted	0.12	1.00		0.51	1.00		0.59	1.00		0.17	1.00	
Satd. Flow (perm)	223	3550		986	3359		1127	3541		325	3444	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	163	395	11	58	684	595	58	626	105	205	189	79
RTOR Reduction (vph)	0	2	0	0	173	0	0	15	0	0	49	0
Lane Group Flow (vph)	163	404	0	58	1106	0	58	716	0	205	219	0
Heavy Vehicles (%)	0%	2%	17%	0%	2%	0%	0%	1%	0%	0%	1%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	41.3	41.3		31.5	31.5		23.4	23.4		33.9	33.9	
Effective Green, g (s)	41.3	41.3		31.5	31.5		23.4	23.4		33.9	33.9	
Actuated g/C Ratio	0.47	0.47		0.36	0.36		0.26	0.26		0.38	0.38	
Clearance Time (s)	3.0	7.0		7.0	7.0		6.2	6.2		3.0	6.2	
Vehicle Extension (s)	3.0	5.5		5.5	5.5		4.0	4.0		3.0	5.5	
Lane Grp Cap (vph)	227	1658		351	1196		298	937		251	1320	
v/s Ratio Prot	c0.06	0.11			c0.33			0.20		c0.07	0.06	
v/s Ratio Perm	0.28			0.06			0.05			c0.24		
v/c Ratio	0.72	0.24		0.17	0.92		0.19	0.76		0.82	0.17	
Uniform Delay, d1	19.4	14.2		19.5	27.3		25.2	30.0		20.6	17.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.3	0.3		0.5	12.6		0.4	4.0		18.2	0.1	
Delay (s)	29.7	14.5		20.0	39.9		25.6	33.9		38.8	18.1	
Level of Service	C	B		C	D		C	C		D	B	
Approach Delay (s)		18.9			39.0			33.3			27.1	
Approach LOS		B			D			C			C	

Intersection Summary

HCM 2000 Control Delay	32.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	88.4	Sum of lost time (s)	19.2
Intersection Capacity Utilization	92.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



HCM Unsignalized Intersection Capacity Analysis  
4: Sierra Crescent/Site Access & Danby Road

12/15/2022



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Volume (veh/h)	0	75	20	15	100	0	15	0	5	0	0	0
Future Volume (Veh/h)	0	75	20	15	100	0	15	0	5	0	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	0	89	24	18	119	0	18	0	6	0	0	0
Pedestrians					3			3			3	
Lane Width (m)					3.7			3.7			3.7	
Walking Speed (m/s)					1.1			1.1			1.1	
Percent Blockage					0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)		92										
pX, platoon unblocked												
vC, conflicting volume	122			116			259	262	107	268	274	122
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	122			116			259	262	107	268	274	122
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			97	100	99	100	100	100
cM capacity (veh/h)	1473			1481			687	635	947	671	625	932
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	113	137	24	0								
Volume Left	0	18	18	0								
Volume Right	24	0	6	0								
cSH	1473	1481	737	1700								
Volume to Capacity	0.00	0.01	0.03	0.00								
Queue Length 95th (m)	0.0	0.3	0.8	0.0								
Control Delay (s)	0.0	1.1	10.0	0.0								
Lane LOS		A	B	A								
Approach Delay (s)	0.0	1.1	10.0	0.0								
Approach LOS			B	A								
<b>Intersection Summary</b>												
Average Delay				1.4								
Intersection Capacity Utilization				23.8%			ICU Level of Service		A			
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis  
5: Sierra Crescent & Danby Road

12/15/2022



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↕			↕	↕	
Traffic Volume (veh/h)	70	10	20	105	10	15
Future Volume (Veh/h)	70	10	20	105	10	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	74	11	21	112	11	16
Pedestrians				10		
Lane Width (m)				3.7		
Walking Speed (m/s)				1.1		
Percent Blockage				1		
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	219					
pX, platoon unblocked						
vC, conflicting volume			95	244	90	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			95	244	90	
tC, single (s)			4.1	6.4	6.2	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			99	98	98	
cM capacity (veh/h)			1497	732	964	
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	85	133	27			
Volume Left	0	21	11			
Volume Right	11	0	16			
cSH	1700	1497	854			
Volume to Capacity	0.05	0.01	0.03			
Queue Length 95th (m)	0.0	0.3	0.7			
Control Delay (s)	0.0	1.3	9.4			
Lane LOS		A	A			
Approach Delay (s)	0.0	1.3	9.4			
Approach LOS			A			
<b>Intersection Summary</b>						
Average Delay				1.7		
Intersection Capacity Utilization				23.3%		ICU Level of Service
Analysis Period (min)				15		

HCM Unsignalized Intersection Capacity Analysis  
1: Eighth Line & Site Driveway (RIRO)

12/08/2022

	↖	↗	↑	↘	↙	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations		↗	↗↘			↗↘
Traffic Volume (veh/h)	0	20	450	5	0	1390
Future Volume (Veh/h)	0	20	450	5	0	1390
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	22	489	5	0	1511
<b>Pedestrians</b>						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage (veh)						
Upstream signal (m)			115			
pX, platoon unblocked	0.99	0.99			0.99	
vC, conflicting volume	1247	247			494	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1236	229			478	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	97			100	
cM capacity (veh/h)	167	768			1074	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>NB 1</b>	<b>NB 2</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	22	326	168	756	756	
Volume Left	0	0	0	0	0	
Volume Right	22	0	5	0	0	
cSH	768	1700	1700	1700	1700	
Volume to Capacity	0.03	0.19	0.10	0.44	0.44	
Queue Length 95th (m)	0.7	0.0	0.0	0.0	0.0	
Control Delay (s)	9.8	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	9.8	0.0		0.0		
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay			0.1			
Intersection Capacity Utilization			41.8%		ICU Level of Service	A
Analysis Period (min)			15			

Timings  
2: Eighth Line & Street 'D'/Danby Road

12/08/2022

	↖	→	↘	↙	←	↗	↘	↑	↙	↓
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Configurations		↗	↗		↗	↗	↗	↗↘	↗	↗↘
Traffic Volume (vph)	100	70	170	30	50	35	85	320	40	1255
Future Volume (vph)	100	70	170	30	50	35	85	320	40	1255
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	
Detector Phase	4	4	4	8	8	8	2	2	6	6
<b>Switch Phase</b>										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	23.0	23.0	23.0	23.0	23.0	23.0	67.0	67.0	67.0	67.0
Total Split (%)	25.6%	25.6%	25.6%	25.6%	25.6%	25.6%	74.4%	74.4%	74.4%	74.4%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag										
<b>Lead-Lag Optimize?</b>										
Recall Mode	None	None	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	15.1	15.1	15.1	15.1	15.1	15.1	63.2	63.2	63.2	63.2
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.17	0.17	0.72	0.72	0.72	0.72
v/c Ratio	0.73	0.54	0.35	0.13	0.49	0.15	0.06	0.57		
Control Delay	51.1	24.9	35.1	11.0	17.1	4.2	4.5	7.1		
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Total Delay	51.1	24.9	35.1	11.0	17.1	4.2	4.5	7.1		
LOS	D	C		D	B	B	A	A	A	A
Approach Delay		38.0			27.8			6.8		7.0
Approach LOS		D			C			A		A
<b>Intersection Summary</b>										
Cycle Length: 90										
Actuated Cycle Length: 87.3										
Natural Cycle: 70										
Control Type: Semi Act-Uncoord										
Maximum v/c Ratio: 0.73										
Intersection Signal Delay: 12.7										
Intersection Capacity Utilization 69.6%										
Analysis Period (min) 15										
<b>Splits and Phases: 2: Eighth Line &amp; Street 'D'/Danby Road</b>										

Queues

2: Eighth Line & Street 'D'/Danby Road

12/08/2022

	→	↘	←	↙	↗	↑	↘	↓
Lane Group	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	187	187	88	38	93	363	44	1483
v/c Ratio	0.73	0.54	0.35	0.13	0.49	0.15	0.06	0.57
Control Delay	51.1	24.9	35.1	11.0	17.1	4.2	4.5	7.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.1	24.9	35.1	11.0	17.1	4.2	4.5	7.1
Queue Length 50th (m)	29.6	16.3	13.0	0.0	5.8	8.4	1.9	53.2
Queue Length 95th (m)	51.2	35.8	26.0	7.7	23.4	13.8	5.2	76.0
Internal Link Dist (m)	110.9		68.4			248.9		90.8
Turn Bay Length (m)		40.0		40.0	55.0		180.0	
Base Capacity (vph)	313	406	313	362	190	2489	685	2593
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.46	0.28	0.10	0.49	0.15	0.06	0.57
<b>Intersection Summary</b>								

HCM Signalized Intersection Capacity Analysis

2: Eighth Line & Street 'D'/Danby Road

12/08/2022

	↗	→	↘	↙	←	↖	↑	↘	↓	↙		
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↗	↘		↗	↘	↗	↘		↗	↘	
Traffic Volume (vph)	100	70	170	30	50	35	85	320	10	40	1255	95
Future Volume (vph)	100	70	170	30	50	35	85	320	10	40	1255	95
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	0.95	1.00		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		0.99	1.00	
Frt	1.00	0.85		1.00	0.85	1.00	1.00	1.00		1.00	0.99	
Flt Protected	0.97	1.00		0.98	1.00	0.95	1.00	0.95		0.95	1.00	
Satd. Flow (prot)	1866	1633		1886	1570	1825	3439	1683		1683	3578	
Flt Permitted	0.77	1.00		0.77	1.00	0.14	1.00			0.54	1.00	
Satd. Flow (perm)	1477	1633		1477	1570	264	3439			948	3578	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	110	77	187	33	55	38	93	352	11	44	1379	104
RTOR Reduction (vph)	0	0	64	0	0	31	0	2	0	0	6	0
Lane Group Flow (vph)	0	187	123	0	88	7	93	361	0	44	1477	0
Confl. Peds. (#/hr)								9		9		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	4%	0%	5%	22%	7%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	NA
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2				6	
Actuated Green, G (s)		15.1	15.1		15.1	15.1	63.2	63.2		63.2	63.2	
Effective Green, g (s)		15.1	15.1		15.1	15.1	63.2	63.2		63.2	63.2	
Actuated g/C Ratio		0.17	0.17		0.17	0.17	0.72	0.72		0.72	0.72	
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		255	282		255	271	191	2489		686	2590	
v/s Ratio Prot								0.10			c0.41	
v/s Ratio Perm		c0.13	0.08		0.06	0.00	0.35			0.05		
v/c Ratio		0.73	0.44		0.35	0.02	0.49	0.14		0.06	0.57	
Uniform Delay, d1		34.2	32.3		31.8	30.0	5.1	3.7		3.5	5.7	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		10.4	1.1		0.8	0.0	8.6	0.1		0.2	0.9	
Delay (s)		44.6	33.4		32.6	30.0	13.8	3.8		3.7	6.6	
Level of Service		D	C		C	C	B	A		A	A	
Approach Delay (s)		39.0			31.8			5.9			6.5	
Approach LOS		D			C			A			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay		12.6								B		
HCM 2000 Volume to Capacity ratio		0.60										
Actuated Cycle Length (s)		87.3					Sum of lost time (s)	9.0				
Intersection Capacity Utilization		69.6%					ICU Level of Service	C				
Analysis Period (min)		15										
c Critical Lane Group												

Timings  
3: Eighth Line & 10 Side Road

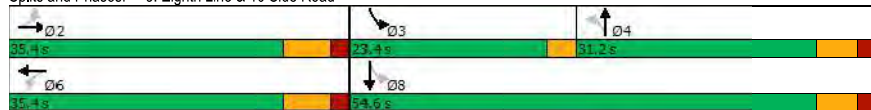
12/08/2022

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↔	↕	↔	↕	↔	↕	↔	↕
Traffic Volume (vph)	90	515	110	435	5	150	550	710
Future Volume (vph)	90	515	110	435	5	150	550	710
Turn Type	Perm	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases		2		6		4		3
Permitted Phases	2		6		4		8	
Detector Phase	2	2	6	6	4	4	3	8
Switch Phase								
Minimum Initial (s)	25.0	25.0	25.0	25.0	15.0	15.0	5.0	15.0
Minimum Split (s)	32.0	32.0	32.0	32.0	31.2	31.2	9.5	31.2
Total Split (s)	35.4	35.4	35.4	35.4	31.2	31.2	23.4	54.6
Total Split (%)	39.3%	39.3%	39.3%	39.3%	34.7%	34.7%	26.0%	60.7%
Yellow Time (s)	5.0	5.0	5.0	5.0	4.2	4.2	3.0	4.2
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	6.2	6.2	3.0	6.2
Lead/Lag					Lag	Lag	Lead	
Lead-Lag Optimize?					Yes	Yes	Yes	
Recall Mode	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	28.5	28.5	28.5	28.5	17.2	17.2	43.2	40.0
Actuated g/C Ratio	0.35	0.35	0.35	0.35	0.21	0.21	0.53	0.49
v/c Ratio	0.58	0.54	0.55	0.56	0.07	0.28	0.84	0.54
Control Delay	39.8	23.4	34.6	21.7	27.4	23.8	26.3	15.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.8	23.4	34.6	21.7	27.4	23.8	26.3	15.0
LOS	D	C	C	C	C	C	C	B
Approach Delay		25.6		23.6		23.9		19.5
Approach LOS		C		C		C		B

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 81.7  
 Natural Cycle: 80  
 Control Type: Semi Act-Uncoord  
 Maximum v/c Ratio: 0.84  
 Intersection Signal Delay: 22.1                      Intersection LOS: C  
 Intersection Capacity Utilization 104.8%              ICU Level of Service G  
 Analysis Period (min) 15

Splits and Phases: 3: Eighth Line & 10 Side Road



Queues  
3: Eighth Line & 10 Side Road

12/08/2022

	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	100	644	122	689	6	206	611	945
v/c Ratio	0.58	0.54	0.55	0.56	0.07	0.28	0.84	0.54
Control Delay	39.8	23.4	34.6	21.7	27.4	23.8	26.3	15.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.8	23.4	34.6	21.7	27.4	23.8	26.3	15.0
Queue Length 50th (m)	12.1	39.1	14.6	38.2	0.8	12.1	63.3	48.5
Queue Length 95th (m)	#38.4	64.9	#40.9	64.8	3.8	20.7	#100.4	63.8
Internal Link Dist (m)		142.5		168.4		187.8		248.9
Turn Bay Length (m)	85.0		140.0		100.0		155.0	
Base Capacity (vph)	173	1198	221	1232	127	1054	732	2110
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.54	0.55	0.56	0.05	0.20	0.83	0.45

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

3: Eighth Line & 10 Side Road

12/08/2022



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Traffic Volume (vph)	90	515	65	110	435	185	5	150	35	550	710	140
Future Volume (vph)	90	515	65	110	435	185	5	150	35	550	710	140
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0		7.0	7.0		6.2	6.2		3.0	6.2	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frt	1.00	0.98		1.00	0.96		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1560	3407		1825	3391		1304	3364		1807	3524	
Flt Permitted	0.30	1.00		0.33	1.00		0.30	1.00		0.53	1.00	
Satd. Flow (perm)	496	3407		636	3391		415	3364		1008	3524	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	100	572	72	122	483	206	6	167	39	611	789	156
RTOR Reduction (vph)	0	10	0	0	50	0	0	24	0	0	20	0
Lane Group Flow (vph)	100	634	0	122	639	0	6	182	0	611	925	0
Heavy Vehicles (%)	17%	6%	0%	0%	4%	0%	40%	6%	3%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases		2			6			4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	28.5	28.5		28.5	28.5		17.2	17.2		40.0	40.0	
Effective Green, g (s)	28.5	28.5		28.5	28.5		17.2	17.2		40.0	40.0	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.21	0.21		0.49	0.49	
Clearance Time (s)	7.0	7.0		7.0	7.0		6.2	6.2		3.0	6.2	
Vehicle Extension (s)	5.5	5.5		5.5	5.5		4.0	4.0		3.0	5.5	
Lane Grp Cap (vph)	173	1188		221	1182		87	708		687	1725	
v/s Ratio Prot		0.19			0.19			0.05		c0.22	0.26	
v/s Ratio Perm	c0.20			0.19			0.01			c0.22		
v/c Ratio	0.58	0.53		0.55	0.54		0.07	0.26		0.89	0.54	
Uniform Delay, d1	21.7	21.3		21.5	21.3		25.8	26.9		16.4	14.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.3	1.7		5.7	1.0		0.5	0.3		13.4	0.7	
Delay (s)	35.0	23.0		27.1	22.4		26.3	27.2		29.9	15.1	
Level of Service	D	C		C	C		C	C		C	B	
Approach Delay (s)		24.6			23.1			27.2			20.9	
Approach LOS		C			C			C			C	

Intersection Summary

HCM 2000 Control Delay	22.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	81.7	Sum of lost time (s)	16.2
Intersection Capacity Utilization	104.8%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis

4: Sierra Crescent/Site Access & Danby Road

12/08/2022



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR		
Lane Configurations		↕			↕			↕			↕			
Traffic Volume (veh/h)	15	100	5	0	70	10	20	0	5	10	0	25		
Future Volume (Veh/h)	15	100	5	0	70	10	20	0	5	10	0	25		
Sign Control	Free			Free			Stop			Stop				
Grade	0%			0%			0%			0%				
Peak Hour Factor	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78		
Hourly flow rate (vph)	19	128	6	0	90	13	26	0	6	13	0	32		
Pedestrians	2			4			3			3				
Lane Width (m)	3.7			3.7			3.7			3.7				
Walking Speed (m/s)	1.1			1.1			1.1			1.1				
Percent Blockage	0			0			0			0				
Right turn flare (veh)														
Median type	None			None										
Median storage (veh)														
Upstream signal (m)	92													
pX, platoon unblocked														
vC, conflicting volume	106				138				304	279	135	274	276	102
vC1, stage 1 conf vol														
vC2, stage 2 conf vol														
vCu, unblocked vol	106				138				304	279	135	274	276	102
tC, single (s)	4.3				4.1				7.1	6.5	6.2	7.1	6.5	6.5
tC, 2 stage (s)														
tF (s)	2.4				2.2				3.5	4.0	3.3	3.5	4.0	3.6
p0 queue free %	99				100				96	100	99	98	100	96
cM capacity (veh/h)	1365				1452				606	619	916	665	622	881
Direction, Lane #	EB 1	WB 1	NB 1	SB 1										
Volume Total	153	103	32	45										
Volume Left	19	0	26	13										
Volume Right	6	13	6	32										
cSH	1365	1452	647	805										
Volume to Capacity	0.01	0.00	0.05	0.06										
Queue Length 95th (m)	0.3	0.0	1.2	1.3										
Control Delay (s)	1.1	0.0	10.9	9.7										
Lane LOS	A		B	A										
Approach Delay (s)	1.1	0.0	10.9	9.7										
Approach LOS			B	A										

Intersection Summary

Average Delay	2.8
Intersection Capacity Utilization	23.8%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis  
5: Sierra Crescent & Danby Road

12/08/2022

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	110	5	10	75	5	20
Future Volume (Veh/h)	110	5	10	75	5	20
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73
Hourly flow rate (vph)	151	7	14	103	7	27
Pedestrians	18					
Lane Width (m)	3.7					
Walking Speed (m/s)	1.1					
Percent Blockage	2					
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)	219					
pX, platoon unblocked						
vC, conflicting volume			176	304	172	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			176	304	172	
tC, single (s)			4.2	6.4	6.2	
tC, 2 stage (s)						
tF (s)			2.3	3.5	3.3	
p0 queue free %			99	99	97	
cM capacity (veh/h)			1329	673	861	
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	158	117	34			
Volume Left	0	14	7			
Volume Right	7	0	27			
cSH	1700	1329	814			
Volume to Capacity	0.09	0.01	0.04			
Queue Length 95th (m)	0.0	0.2	1.0			
Control Delay (s)	0.0	1.0	9.6			
Lane LOS	A		A			
Approach Delay (s)	0.0	1.0	9.6			
Approach LOS	A					
<b>Intersection Summary</b>						
Average Delay	1.4					
Intersection Capacity Utilization	21.2%		ICU Level of Service		A	
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
1: Eighth Line & Site Driveway (RIRO)

12/08/2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	10	1250	15	0	550
Future Volume (Veh/h)	0	10	1250	15	0	550
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	11	1359	16	0	598
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)	115					
pX, platoon unblocked	0.84	0.84			0.84	
vC, conflicting volume	1666	688			1375	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1418	257			1072	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	98			100	
cM capacity (veh/h)	108	626			544	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	11	906	469	299	299	
Volume Left	0	0	0	0	0	
Volume Right	11	0	16	0	0	
cSH	626	1700	1700	1700	1700	
Volume to Capacity	0.02	0.53	0.28	0.18	0.18	
Queue Length 95th (m)	0.4	0.0	0.0	0.0	0.0	
Control Delay (s)	10.9	0.0	0.0	0.0	0.0	
Lane LOS	B					
Approach Delay (s)	10.9	0.0	0.0			
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay	0.1					
Intersection Capacity Utilization	45.0%		ICU Level of Service		A	
Analysis Period (min)	15					



Timings

2: Eighth Line & Street 'D'/Danby Road

12/08/2022

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group										
Lane Configurations		↕	↕		↕	↕	↕	↕↔	↕	↕↔
Traffic Volume (vph)	95	40	85	20	70	35	170	1135	45	405
Future Volume (vph)	95	40	85	20	70	35	170	1135	45	405
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	
Detector Phase	4	4	4	8	8	8	2	2	6	6
Switch Phase										
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5
Total Split (s)	29.0	29.0	29.0	29.0	29.0	29.0	61.0	61.0	61.0	61.0
Total Split (%)	32.2%	32.2%	32.2%	32.2%	32.2%	32.2%	67.8%	67.8%	67.8%	67.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag										
Lead-Lag Optimize?										
Recall Mode	None	None	None	None	None	None	Max	Max	Max	Max
Act Effct Green (s)	13.8	13.8	13.8	13.8	13.8	13.8	59.4	59.4	59.4	59.4
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.17	0.17	0.72	0.72	0.72	0.72
v/c Ratio	0.63	0.27	0.34	0.12	0.30	0.48	0.19	0.48	0.19	0.22
Control Delay	43.3	8.4	32.0	10.3	6.4	6.1	6.9	6.9	3.9	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.3	8.4	32.0	10.3	6.4	6.1	6.9	6.9	3.9	3.9
LOS	D	A	C	B	A	A	A	A	A	A
Approach Delay	29.8			25.9			6.1		4.2	
Approach LOS	C			C			A		A	

Intersection Summary

Cycle Length: 90  
 Actuated Cycle Length: 82.2  
 Natural Cycle: 55  
 Control Type: Semi Act-Uncoord  
 Maximum v/c Ratio: 0.63  
 Intersection Signal Delay: 9.1  
 Intersection Capacity Utilization 61.5%  
 Analysis Period (min) 15

Splits and Phases: 2: Eighth Line & Street 'D'/Danby Road



Queues

2: Eighth Line & Street 'D'/Danby Road

12/08/2022

	EBT	EBR	WBT	WBR	NBL	NBT	SBL	SBT
Lane Group								
Lane Group Flow (vph)	148	93	99	38	187	1269	49	555
v/c Ratio	0.63	0.27	0.34	0.12	0.30	0.48	0.19	0.22
Control Delay	43.3	8.4	32.0	10.3	6.4	6.1	6.9	3.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	43.3	8.4	32.0	10.3	6.4	6.1	6.9	3.9
Queue Length 50th (m)	20.8	0.0	13.2	0.0	8.3	35.3	2.0	10.4
Queue Length 95th (m)	38.2	11.0	26.0	7.3	22.3	63.4	7.9	20.6
Internal Link Dist (m)	110.9		68.4		248.9		90.8	
Turn Bay Length (m)		40.0		40.0	55.0		180.0	
Base Capacity (vph)	418	553	517	514	616	2629	258	2556
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.17	0.19	0.07	0.30	0.48	0.19	0.22
Intersection Summary								

HCM Signalized Intersection Capacity Analysis

2: Eighth Line & Street 'D'/Danby Road

12/08/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔	↔	↔		↔	↔	
Traffic Volume (vph)	95	40	85	20	70	35	170	1135	20	45	405	100
Future Volume (vph)	95	40	85	20	70	35	170	1135	20	45	405	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5		
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95		
Frbp, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00		
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00		
Frt	1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.97		
Flt Protected	0.97	1.00		0.99	1.00	0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1856	1633		1883	1633	1825	3637		1820	3513		
Flt Permitted	0.73	1.00		0.91	1.00	0.44	1.00		0.19	1.00		
Satd. Flow (perm)	1401	1633		1733	1633	853	3637		356	3513		
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	104	44	93	22	77	38	187	1247	22	49	445	110
RTOR Reduction (vph)	0	0	77	0	0	32	0	1	0	0	18	0
Lane Group Flow (vph)	0	148	16	0	99	6	187	1268	0	49	537	0
Confl. Peds. (#/hr)								9		9		
Heavy Vehicles (%)	0%	0%	0%	4%	0%	0%	0%	0%	2%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	NA	NA	NA
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		
Actuated Green, G (s)		13.8	13.8		13.8	13.8	59.4	59.4		59.4	59.4	
Effective Green, g (s)		13.8	13.8		13.8	13.8	59.4	59.4		59.4	59.4	
Actuated g/C Ratio		0.17	0.17		0.17	0.17	0.72	0.72		0.72	0.72	
Clearance Time (s)		4.5	4.5		4.5	4.5	4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		235	274		290	274	616	2628		257	2538	
v/s Ratio Prot							c0.35				0.15	
v/s Ratio Perm		c0.11	0.01		0.06	0.00	0.22			0.14		
v/c Ratio		0.63	0.06		0.34	0.02	0.30	0.48		0.19	0.21	
Uniform Delay, d1		31.8	28.7		30.2	28.6	4.1	4.9		3.7	3.7	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		5.2	0.1		0.7	0.0	1.3	0.6		1.6	0.2	
Delay (s)		37.0	28.8		30.9	28.6	5.3	5.5		5.3	3.9	
Level of Service		D	C		C	C	A	A		A	A	
Approach Delay (s)		33.9			30.3			5.5			4.0	
Approach LOS		C			C			A			A	

Intersection Summary

HCM 2000 Control Delay	9.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	82.2	Sum of lost time (s)	9.0
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Timings

3: Eighth Line & 10 Side Road

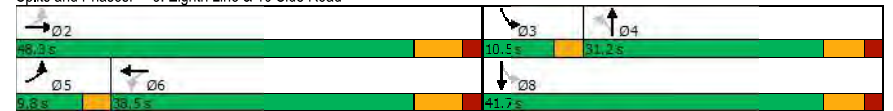
12/08/2022

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	375	55	650	55	605	195	190
Future Volume (vph)	155	375	55	650	55	605	195	190
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	pm+pt	NA
Protected Phases	5	2		6		4	3	8
Permitted Phases	2		6		4		8	
Detector Phase	5	2	6	6	4	4	3	8
Switch Phase								
Minimum Initial (s)	5.0	25.0	25.0	25.0	15.0	15.0	5.0	15.0
Minimum Split (s)	9.5	32.0	32.0	32.0	31.2	31.2	9.5	31.2
Total Split (s)	9.8	48.3	38.5	38.5	31.2	31.2	10.5	41.7
Total Split (%)	10.9%	53.7%	42.8%	42.8%	34.7%	34.7%	11.7%	46.3%
Yellow Time (s)	3.0	5.0	5.0	5.0	4.2	4.2	3.0	4.2
All-Red Time (s)	0.0	2.0	2.0	2.0	2.0	2.0	0.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	7.0	7.0	7.0	6.2	6.2	3.0	6.2
Lead/Lag	Lead		Lag	Lag	Lag	Lag	Lead	Lead
Lead-Lag Optimize?	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Max	None	None	None	None	None	None
Act Effct Green (s)	45.4	41.4	31.5	31.5	23.5	23.5	37.2	34.0
Actuated g/C Ratio	0.51	0.47	0.36	0.36	0.27	0.27	0.42	0.38
v/c Ratio	0.69	0.24	0.17	0.94	0.20	0.78	0.79	0.20
Control Delay	29.6	14.9	21.9	36.3	27.0	35.6	41.1	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.6	14.9	21.9	36.3	27.0	35.6	41.1	13.3
LOS	C	B	C	D	C	D	D	B
Approach Delay		19.1		35.6		35.0		25.0
Approach LOS		B		D		D		C

Intersection Summary

Cycle Length: 90	
Actuated Cycle Length: 88.6	
Natural Cycle: 85	
Control Type: Semi Act-Uncoord	
Maximum v/c Ratio: 0.94	
Intersection Signal Delay: 30.9	Intersection LOS: C
Intersection Capacity Utilization 93.2%	ICU Level of Service F
Analysis Period (min) 15	

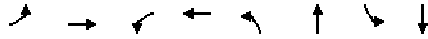
Splits and Phases: 3: Eighth Line & 10 Side Road



Queues

3: Eighth Line & 10 Side Road

12/08/2022



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	163	406	58	1284	58	742	205	279
v/c Ratio	0.69	0.24	0.17	0.94	0.20	0.78	0.79	0.20
Control Delay	29.6	14.9	21.9	36.3	27.0	35.6	41.1	13.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.6	14.9	21.9	36.3	27.0	35.6	41.1	13.3
Queue Length 50th (m)	14.6	21.5	6.8	92.7	7.6	59.6	22.1	11.5
Queue Length 95th (m)	#36.4	30.8	15.6	#138.8	17.2	79.9	#48.4	19.7
Internal Link Dist (m)		142.5		168.4		187.8		248.9
Turn Bay Length (m)	85.0		140.0		100.0		155.0	
Base Capacity (vph)	237	1659	351	1370	314	1015	259	1431
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.69	0.24	0.17	0.94	0.18	0.73	0.79	0.19

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

3: Eighth Line & 10 Side Road

12/08/2022



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	155	375	10	55	650	570	55	605	100	195	190	75
Future Volume (vph)	155	375	10	55	650	570	55	605	100	195	190	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	7.0		7.0	7.0		6.2	6.2		3.0	6.2	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Flt	1.00	1.00		1.00	0.93		1.00	0.98		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1825	3550		1825	3358		1825	3542		1825	3451	
Flt Permitted	0.12	1.00		0.51	1.00		0.58	1.00		0.16	1.00	
Satd. Flow (perm)	223	3550		986	3358		1115	3542		313	3451	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	163	395	11	58	684	600	58	637	105	205	200	79
RTOR Reduction (vph)	0	2	0	0	175	0	0	15	0	0	47	0
Lane Group Flow (vph)	163	404	0	58	1109	0	58	727	0	205	232	0
Heavy Vehicles (%)	0%	2%	17%	0%	2%	0%	0%	1%	0%	0%	1%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		pm+pt	NA	
Protected Phases	5	2			6			4		3	8	
Permitted Phases	2			6			4			8		
Actuated Green, G (s)	41.3	41.3		31.5	31.5		23.5	23.5		34.0	34.0	
Effective Green, g (s)	41.3	41.3		31.5	31.5		23.5	23.5		34.0	34.0	
Actuated g/C Ratio	0.47	0.47		0.36	0.36		0.27	0.27		0.38	0.38	
Clearance Time (s)	3.0	7.0		7.0	7.0		6.2	6.2		3.0	6.2	
Vehicle Extension (s)	3.0	5.5		5.5	5.5		4.0	4.0		3.0	5.5	
Lane Grp Cap (vph)	227	1656		350	1195		296	940		248	1325	
v/s Ratio Prot	c0.06	0.11			c0.33			0.21		c0.07	0.07	
v/s Ratio Perm	0.28			0.06			0.05			c0.25		
v/c Ratio	0.72	0.24		0.17	0.93		0.20	0.77		0.83	0.17	
Uniform Delay, d1	19.5	14.2		19.5	27.4		25.2	30.0		20.6	18.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.3	0.4		0.6	13.0		0.4	4.3		19.7	0.2	
Delay (s)	29.9	14.6		20.1	40.4		25.6	34.3		40.3	18.1	
Level of Service	C	B		C	D		C	C		D	B	
Approach Delay (s)		18.9			39.6			33.7			27.5	
Approach LOS		B			D			C			C	

Intersection Summary

HCM 2000 Control Delay	32.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	88.5	Sum of lost time (s)	19.2
Intersection Capacity Utilization	93.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis  
4: Sierra Crescent/Site Access & Danby Road

12/08/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (veh/h)	10	75	20	15	100	10	15	0	5	5	0	10
Future Volume (Veh/h)	10	75	20	15	100	10	15	0	5	5	0	10
Sign Control	Free			Free			Stop			Stop		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	12	89	24	18	119	12	18	0	6	6	0	12
Pedestrians				3			3			3		
Lane Width (m)				3.7			3.7			3.7		
Walking Speed (m/s)				1.1			1.1			1.1		
Percent Blockage				0			0			0		
Right turn flare (veh)												
Median type	None			None								
Median storage (veh)												
Upstream signal (m)	92											
pX, platoon unblocked												
vC, conflicting volume	134			116			301	298	107	298	304	128
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	134			116			301	298	107	298	304	128
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			97	100	99	99	100	99
cM capacity (veh/h)	1459			1481			632	601	947	637	597	925
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	125	149	24	18								
Volume Left	12	18	18	6								
Volume Right	24	12	6	12								
cSH	1459	1481	689	804								
Volume to Capacity	0.01	0.01	0.03	0.02								
Queue Length 95th (m)	0.2	0.3	0.8	0.5								
Control Delay (s)	0.8	1.0	10.4	9.6								
Lane LOS	A	A	B	A								
Approach Delay (s)	0.8	1.0	10.4	9.6								
Approach LOS				B								
<b>Intersection Summary</b>												
Average Delay				2.1								
Intersection Capacity Utilization				20.8%	ICU Level of Service	A						
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis  
5: Sierra Crescent & Danby Road

12/08/2022

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	
Traffic Volume (veh/h)	75	10	20	115	10	15
Future Volume (Veh/h)	75	10	20	115	10	15
Sign Control	Free		Free		Stop	Stop
Grade	0%		0%		0%	0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	80	11	21	122	11	16
Pedestrians			10		10	
Lane Width (m)			3.7		3.7	
Walking Speed (m/s)			1.1		1.1	
Percent Blockage			1		1	
Right turn flare (veh)						
Median type	None		None			
Median storage (veh)						
Upstream signal (m)	219					
pX, platoon unblocked						
vC, conflicting volume			101	260	96	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			101	260	96	
tC, single (s)			4.1	6.4	6.2	
tC, 2 stage (s)						
tF (s)			2.2	3.5	3.3	
p0 queue free %			99	98	98	
cM capacity (veh/h)			1489	716	957	
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	91	143	27			
Volume Left	0	21	11			
Volume Right	11	0	16			
cSH	1700	1489	842			
Volume to Capacity	0.05	0.01	0.03			
Queue Length 95th (m)	0.0	0.3	0.8			
Control Delay (s)	0.0	1.2	9.4			
Lane LOS	A		A			
Approach Delay (s)	0.0	1.2	9.4			
Approach LOS			A			
<b>Intersection Summary</b>						
Average Delay			1.6			
Intersection Capacity Utilization			23.8%	ICU Level of Service	A	
Analysis Period (min)			15			