

**989 Yonge Street**  
City of Barrie

**Traffic Brief for  
ASA Development Inc.**

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## Executive Summary

This report summarizes the traffic impact study for the proposed development located on the site municipally known as 989 Yonge Street, located in the northeast corner of the Yonge Street / Lockhart Road intersection, in the City of Barrie [City]. The report assesses the impact of traffic related to the development on the adjacent roadway and provides recommendations to accommodate this traffic in a safe and efficient manner.

The proposed development will consist of 61 townhouse units, five residential condominiums (648 units) and four mixed-use buildings (510 units). The mixed-use buildings will provide ground floor commercial space in each building.

The proposed development will have two full-movement access driveways onto Yonge Street [North Access & South Access]. The South Access will be located directly across from the planned future minor collector road [Street 'A'].

The scope of this analysis includes a review of the following intersections:

- Yonge Street / Lockhart Road;
- Yonge Street / North Access; and
- Yonge Street / South Access & Street 'A'.

## Conclusions

1. The Phase 1 of the proposed development is expected to generate a total of 29 AM and 37 PM peak hour trips. The ultimate build-out of the proposed development is expected to generate 393 AM and 442 PM peak hour trips
2. Background traffic and pedestrian counts were obtained from the City at the Yonge Street / Lockhart intersection, completed on Thursday, September 28<sup>th</sup>, 2017.
3. An estimate of the amount of traffic that would be generated by the Subject Site was prepared and assigned to the study area streets and intersections.
4. An intersection operation analysis was completed under total (2021, 2026 & 2031) traffic volumes with the proposed development operational at the study area intersections. The following improvements are recommended:

### **Yonge Street / Lockhart Road**

Existing (2019) traffic volumes

- Reconstruct the asphalt at the northeast corner of the intersection (similar to the paved shoulder at the southwest corner of the intersection).

Total (2026) traffic volumes

- Replace southbound traffic signal heads in order to provide a protected southbound left turn phase.

Total (2031) traffic volumes

- Replace northbound and westbound traffic signal heads in order to provide a protected northbound and westbound left turn phase.

### **Yonge Street / Street 'A' / South Access**

Total (2026) traffic volumes

- Signalization of intersection.
  - Adjust pavement markings to accommodate a westbound left turn lane with a 15 metre storage and 15 metre taper length.
5. The proposed South Access will operate efficiently as a full-movement access. Prior to the reconstruction of Yonge Street, two-way stop control is recommended for the South Access / Street 'A' (eastbound and westbound) approach at Yonge Street, with a single ingress and egress lane for the South Access. Installation of traffic signals at the Yonge Street / Street 'A' / South Access intersection is recommended as part of the Yonge Street reconstruction works. For the signalized configuration, it is recommended that the South Access include a westbound through / right turn lane and an auxiliary left turn lane with a 15 metre storage length and a 15 metre taper length. It is recommended that the City monitor traffic volumes on Yonge Street to determine if temporary traffic signals are warranted ahead of the planned Yonge Street reconstruction.
  6. The proposed North Access will operate efficiently as a full-movement access, with one-way stop control for westbound movements. A single ingress and egress lane at the North Access driveway will provide the necessary capacity to service the proposed development.
  7. The sight distance available for the proposed North Access and South Access meets the minimum stopping sight distance and decision sight distance requirements.
  8. The proposed parking meets the required parking requirements for the City.
  9. In summary, the proposed development will not cause any operational issues and will not add significant delay or congestion to the local roadway network.

# Table of Contents

<b>1</b>	<b>Introduction.....</b>	<b>1</b>
1.1	Background .....	1
1.2	Study Area.....	1
1.3	Study Scope and Objectives.....	3
1.4	Horizon Year and Analysis Periods .....	3
<b>2</b>	<b>Information Gathering .....</b>	<b>3</b>
2.1	Street and Intersection Characteristics .....	3
2.2	Local Transportation Infrastructure Improvements .....	5
2.3	Transit Access .....	6
2.4	Other Developments within the Study Area .....	7
2.4.1	Distribution of Local Traffic in the Study Area .....	8
2.4.2	Yonge Street / Lockhart Road.....	9
2.4.3	Traffic Generation for the Adjacent Developments on Street 'A' .....	10
2.4.4	Street 'A' Background Traffic Volume .....	17
2.5	Background Traffic Growth .....	19
2.6	Traffic Counts .....	20
<b>3</b>	<b>Proposed Development Traffic Generation and Assignment .....</b>	<b>22</b>
3.1	Traffic Generation .....	22
3.2	Traffic Assignment.....	23
3.3	Total Horizon Year Traffic Volumes with the Proposed Development .....	27
3.3.1	Total 2021 Traffic Volumes .....	27
3.3.2	Total 2026 and 2031 Traffic Volumes .....	27
<b>4</b>	<b>Intersection Operation with Proposed Development .....</b>	<b>33</b>
4.1	Intersection Capacity Analysis Criteria .....	33
4.2	Existing (2019) Intersection Operation.....	34
4.3	Total (2021) Intersection Operation .....	34
4.4	Total (2026) Intersection Operation .....	36
4.5	Total (2031) Intersection Operation .....	37
4.6	Site Access .....	40
4.7	Sight Distance Review.....	40
4.8	Active Transportation Review .....	41
4.9	Parking Review.....	41
4.10	Construction Parking .....	42
<b>5</b>	<b>Summary .....</b>	<b>42</b>

## List of Tables

Table 1 – Estimated Traffic Generation of Crown Development.....	11
Table 2 – Estimated Traffic Generation of Rainsong and Irving Development.....	13
Table 3 – Estimated Traffic Generation from Rainsong Development School.....	15
Table 4 – Rainsong Development School Residential Capture Distribution.....	15
Table 5 – Rainsong Development School Trip Distribution.....	16
Table 6 - Traffic Count Data.....	20
Table 7 – Estimated Traffic Generation of Proposed Development.....	23
Table 8 – Proposed Development Traffic Distribution.....	23
Table 9 – Level of Service Criteria for Intersections.....	33
Table 10 – Existing (2019) LOS.....	34
Table 11 – Total (2021) LOS.....	35
Table 12 – Total (2026) LOS.....	36
Table 13 – Total (2026) LOS with Improvements.....	37
Table 14 – Total (2031) LOS.....	38
Table 15 – Total (2031) LOS with Improvements.....	39
Table 16 - Zoning By-law Parking Requirements.....	42

## List of Figures

Figure 1 – Proposed Site Location and Study Area.....	2
Figure 2 – Existing (2019) Lane Configuration within Study Area.....	4
Figure 3 - Future Lane Configuration within Study Area.....	6
Figure 4 – Adjacent Development Location.....	8
Figure 5 – Hewitt Secondary Plan Area (2021) Traffic Assignment.....	10
Figure 6 – Crown Development (2021) Traffic Assignment.....	12
Figure 7 – Rainsong & Irving Development (2026 & 2031) Traffic Assignment.....	14
Figure 8 – Rainsong Development School (2026) Traffic Assignment.....	17
Figure 9 – Total Adjacent (2021) Traffic Assignment.....	18
Figure 10 – Total Adjacent (2026 & 2031) Traffic Assignment.....	19
Figure 11 – Existing (2019) Traffic Volumes.....	21
Figure 12 – Proposed Development (2021) Traffic Assignment.....	25
Figure 13 – Proposed Development (2026 & 2031) Traffic Assignment.....	26
Figure 14 – Hewitt MTS Total (2026) Traffic Volumes (without Rainsong Development School).....	28
Figure 15 – Hewitt MTS Total (2031) Traffic Volumes (without Rainsong Development School).....	29
Figure 16 – Total (2021) Traffic Volumes.....	30
Figure 17 – Total (2026) Traffic Volumes.....	31
Figure 18 – Total (2031) Traffic Volumes.....	32

## List of Appendices

APPENDIX A – Site Plan
APPENDIX B – Hewitt MTS Excerpts
APPENDIX C – Crown Developments Conceptual Site Plan
APPENDIX D – Traffic Count Data
APPENDIX E – Synchro Analysis Output – Existing Traffic Volumes
APPENDIX F – Synchro Analysis Output – Total Traffic Volumes
APPENDIX G – OTM Signal Justification Sheets
APPENDIX H – Transportation Tomorrow Survey Excerpts

# 1 Introduction

## 1.1 Background

The **ASA Development Inc.** [Client] is proposing to develop a site municipally known as 989 Yonge Street, located in the northeast corner of the Yonge Street / Lockhart Road intersection, in the City of Barrie [City]. The proposed development will consist of 61 townhouse units, five residential condominiums (648 units) and four mixed-use buildings (510 units). The mixed-use buildings will provide ground floor commercial space in each building.

The proposed development will have two full-movement access driveways onto Yonge Street [North Access & South Access]. The South Access will be located directly across from the planned future minor collector road [Street 'A'].

The proposed development is located within the Hewitt Secondary Plan Area. The Hewitt Secondary Plan Area includes 2,290 hectares of annexed lands previously under the jurisdiction of the Town of Innisfil as per the Barrie-Innisfil Boundary Adjustment Act (dated 2009). Details regarding the Hewitt Secondary Plan Area are further discussed in Section 2.4.

The Client has retained **JD Northcote Engineering Inc.** [JD Engineering] to prepare this traffic impact study in support of the proposed development.

## 1.2 Study Area

**Figure 1** illustrates the location of the subject site and study area intersections in relation to the surrounding area. The Site Plan by SRM Architects Inc. is attached in **Appendix A**.

The subject site is bound by Yonge Street to the west, Lockhart Road to the south, GO Transit / CN railway track to the east side and existing residential developments to the north.

Based on our experience with similar studies, the following intersections will be analysed as part of the study:

- Yonge Street / Lockhart Road;
- Yonge Street / North Access; and
- Yonge Street / South Access & Street 'A'.

Figure 1 – Proposed Site Location and Study Area



### 1.3 Study Scope and Objectives

The purpose of this study is to identify the potential impacts to traffic flow at the site access and on the surrounding roadway network. The study analysis includes the following tasks:

- Determine existing traffic volumes and circulation patterns;
- Estimate future traffic volumes if the proposed development was not constructed, including the impact of additional proposed developments in the area;
- Complete level-of-service [LOS] analysis of horizon year (without the proposed development) traffic conditions and identify operational deficiencies;
- Estimate the amount of traffic that would be generated by the proposed development and assign to the roadway network;
- Complete LOS analysis of horizon year (with the proposed development) traffic conditions and identify additional operational deficiencies;
- Provide an assessment of the impact of the additional traffic on the local road network;
- Identify improvement options to address operational deficiencies;
- Calculate lane improvements for the site access driveway based on the Transportation Association of Canada [TAC] and Ontario Ministry of Transportation guidelines;
- Complete a review of traffic operations of the site access driveway;
- Review the proposed configuration of the site access driveways;
- Review the proposed parking supply; and
- Document findings and recommendations in a final report.

### 1.4 Horizon Year and Analysis Periods

Traffic operations for the existing (2019) and horizon years (2021, 2026 & 2031) were selected for analysis of traffic operations in the study area. The weekday morning [AM] and weekday afternoon [PM] peak hours have been selected as the analysis periods for this study.

## 2 Information Gathering

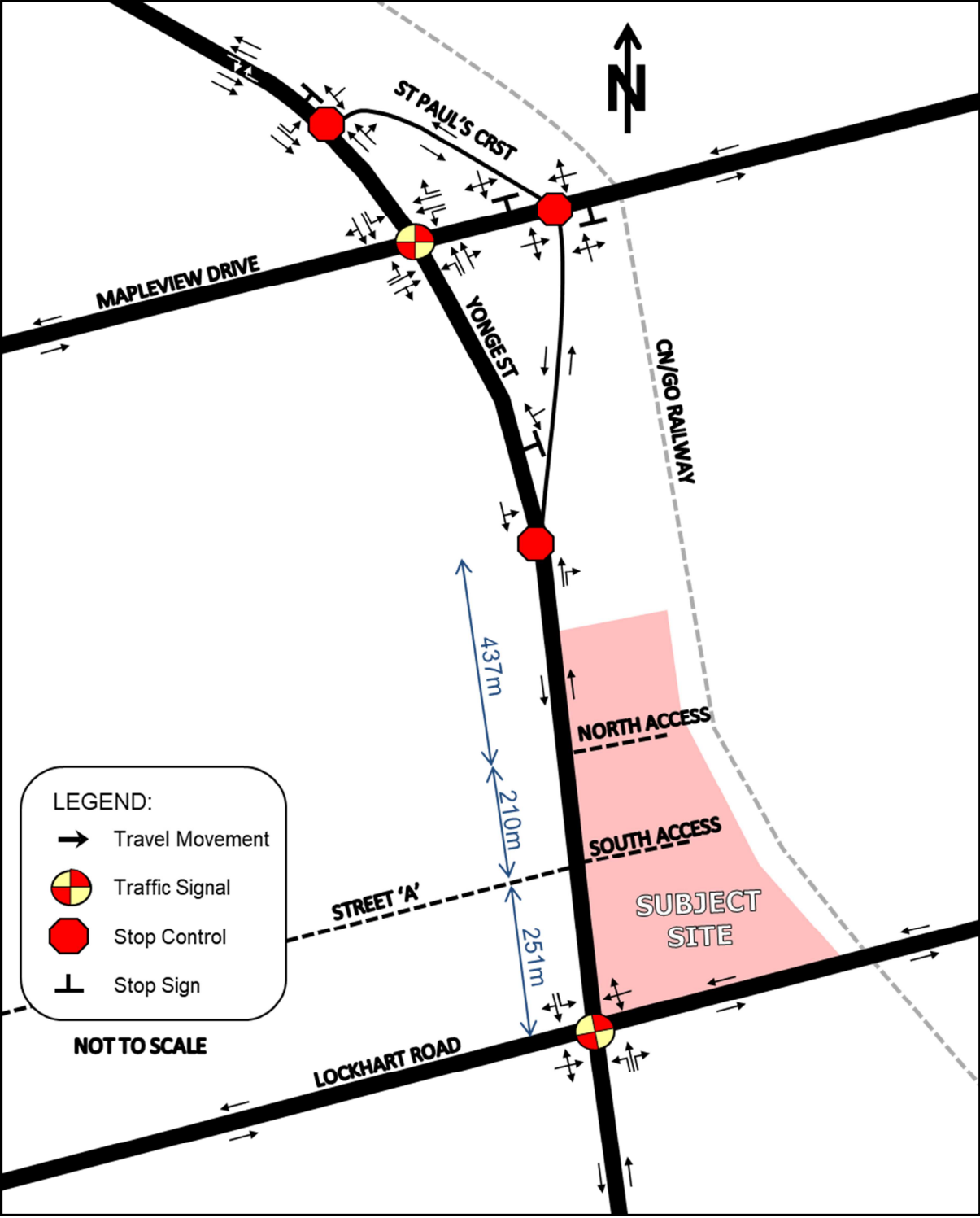
### 2.1 Street and Intersection Characteristics

**Yonge Street** is a two-lane road with a rural cross section, no sidewalk and gravel shoulders within the study area. Yonge Street is under the jurisdiction of the City north of Lockhart Road and under jurisdiction of the County of Simcoe south of Lockhart Road. Yonge Street is an arterial road in the City's jurisdiction and a Primary Arterial – Controlled Access road in the County of Simcoe's jurisdiction. Yonge Street has a posted speed limit of 60km/h within the study area.

**Lockhart Road** is a two-lane arterial road with a rural cross section, no sidewalk and gravel shoulders within the study area. Lockhart Road has a posted speed limit of 60km/h and is under the jurisdiction of the City, in the study area.

The existing intersection lane configuration within the study area is illustrated in **Figure 2**.

Figure 2 – Existing (2019) Lane Configuration within Study Area



## 2.2 Local Transportation Infrastructure Improvements

A review of the City's Transportation Master Plan [City TMP] (April 2019), the City's Capital Plan (2019) and the Town of Innisfil Transportation Master Plan [Innisfil TMP] (dated May 2018) was completed to assess future road improvements. A review of the Master Transportation Study completed by LEA Consulting Ltd. for the Hewitt Secondary Plan (dated February 2019) [Hewitt MTS] was also completed to identify the future road improvements in the study area. The following infrastructure improvements are planned in the study area:

The following improvement is anticipated to be completed by 2026:

- Yonge Street – Road Reconstruction (Mapleview to Lockhart Road)
  - Widen roadway to include an extra lane in both directions;
  - An addition of a two-way left turn lane [TWLTL];
  - Buffered bike lanes along both sides of the road; and
  - Urban cross-section with a sidewalk on both sides of the road.

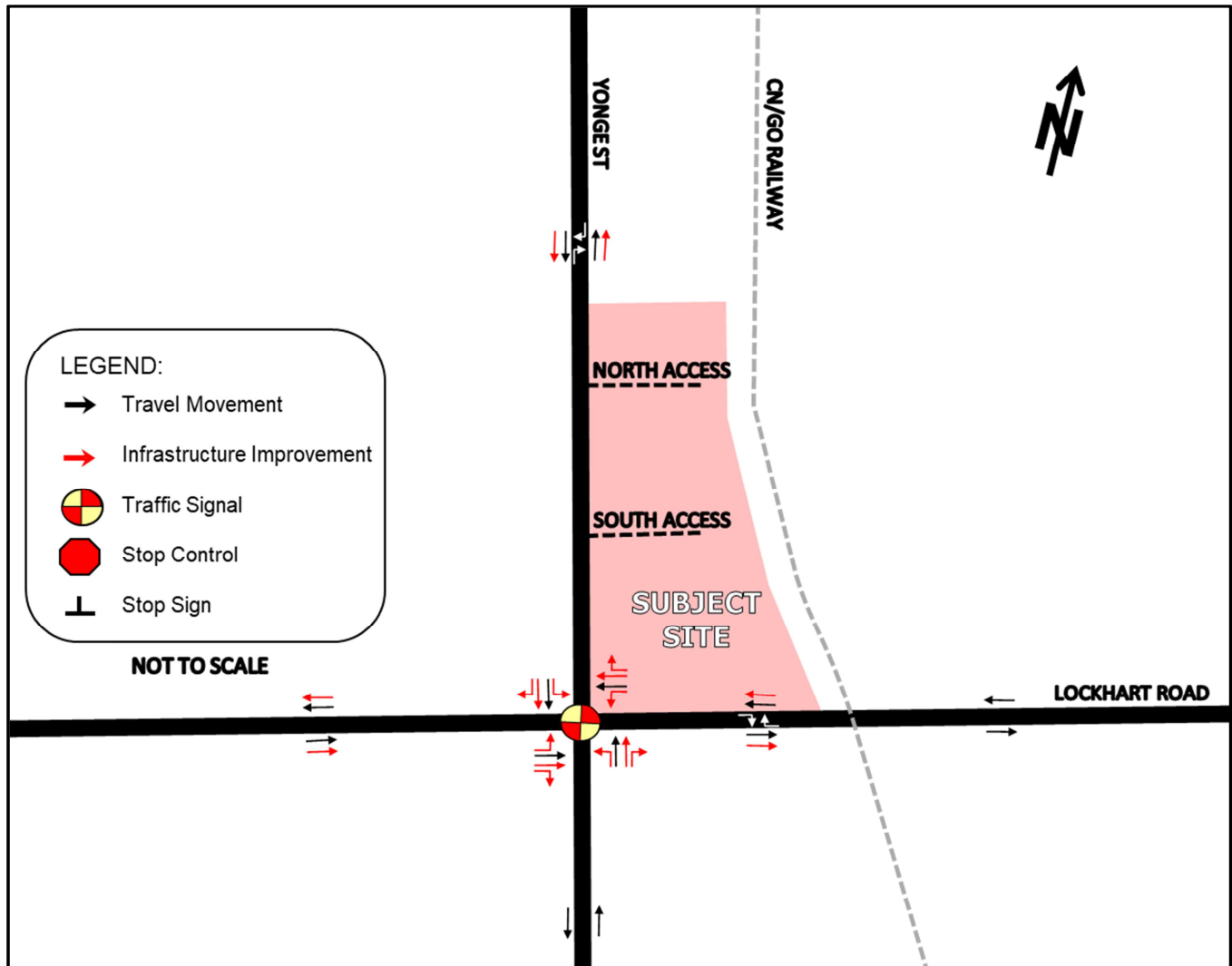
The following improvement is anticipated to be completed by 2031:

- Lockhart Road – Road Reconstruction
  - Widen roadway to include an extra lane in both directions;
  - An addition of a TWLTL (east of Yonge Street); and
  - Urban cross-section with a multi-use trail on the north side of the road and a paved shoulder on the south side of the road.

The ultimate (2031) lane configuration within the study area can be seen in **Figure 3**.

For the purposes of the analysis we have assumed that the reconstruction of Yonge Street will be complete for the 2026 horizon year. We have also assumed that the Yonge Street reconstruction will include a full reconstruction of the Lockhart Road / Yonge Street intersection.

Figure 3 - Future Lane Configuration within Study Area



### 2.3 Transit Access

Barrie transit currently has four bus routes nearby the study area. The No. 4A-4B (East Bayfield/South Go) bus route provides service from Barrie South GO Station to East Bayfield. The No. 8A (Southbound) and 8B (Northbound) bus route provides service on Mapleview Drive and Yonge Street nearby the study area. The No. 3A-3B (Bayview / Painswick) bus route provides service from the Downtown Terminal to Barrie South GO Station and travels along Maple View Drive. The GO transit bus route No. 68 (Barrie - Newmarket) also provides service on Yonge Street within the study area.

The No. 4A and 4B bus routes operate between 05:51 – 23:21 and 05:25 – 23:45 respectively on weekdays with service approximately every 30 minutes, from 07:42 – 23:21 and 07:34 – 23:45 respectively on Saturdays with service every 30 minutes and between 09:15 – 22:11 and 09:17 – 22:35 respectively on Sundays with service every hour. The closest bus stop is currently located at the Barrie South GO Station.

The No. 8A (Southbound) & 8B (Northbound) bus route runs between 4:53 – 02:50 and 5:20 – 1:24 respectively on weekdays with daytime service approximately every 30 minutes. On Saturdays, The No. 8A (Southbound) & 8B (Northbound) bus routes operate between 6:53- 02:50 and 06:50 – 01:24 respectively with daytime service every 30 minutes. On Sundays, the No. 8A (Southbound) & No. 8B (Northbound) bus routes operate between 08:53 – 21:50 and 09:20 – 22:47 respectively and provides service after every hour. The closest bus stop is currently located at the Barrie South GO Station.

The No. 3A & 3B bus route runs between 05:54 – 23:12 and 05:10 – 23:26 respectively on weekdays with daytime service every 30 minutes, between 06:29 – 23:12 and 07:15 – 23:26 respectively on Saturdays with daytime service every 30 minutes. On Sundays, the No. 3A & 3B bus routes operate between 08:29 – 21:12 and 08:45 – 21:26 respectively with service every hour. The closest bus stop for the No. 3B bus route is located in northeast corner of the Yonge Street / Mapleview Drive intersection.

The No. 68 & 68B (Southbound) GO Transit bus routes operate between 08:46 – 22:26 & 4:09 – 23:00 respectively on weekdays, between 06:40 – 22:26 & 07:40 – 23:20 respectively on Saturdays and Sundays. The No. 68 & 68B (Northbound) GO Transit bus runs between 06:10 – 23:59 & 07:40 – 00:53 respectively on weekdays, between 08:00 – 22:44 & 12:52 – 01:52 respectively on Saturdays and Sundays. The closest bus stop for the No. 68 & 68B (Southbound) GO Transit bus routes is located at the northwest and southeast corner of the Yonge Street / Mapleview Drive intersection.

The City is planning an adjustment and expansion of transit service in the study area, associated with the development of the Hewitt Secondary Plan Area. The future service (which is subject to change), will provide a core transit route (Route 101) along Yonge Street, with looping service via Street 'A' and a bus stop at the South Access and another near the north end of the subject site. The routes for the No. 3, No. 4 and No. 8 routes will be revised; however, enhanced transit service will be provided via proposed route No. 2, No. 3, No. 4 and No. 6, which will provide service on Mapleview Drive East and Yonge Street, north of the subject site.

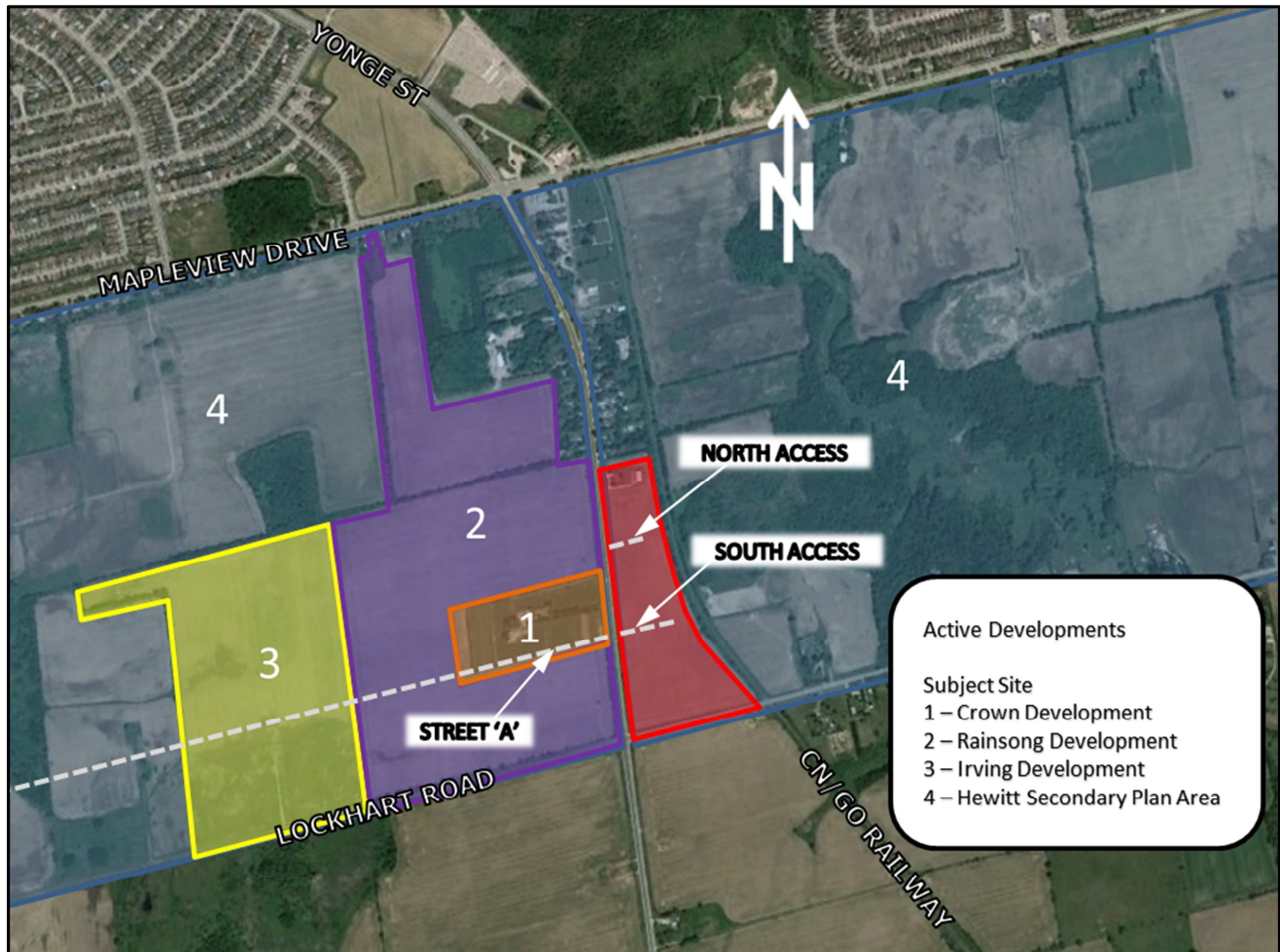
## 2.4 Other Developments within the Study Area

The Hewitt Secondary Plan Area will include approximately 2,290 hectares of annexed lands, previously under jurisdiction of the Town of Innisfil. There is a significant amount of anticipated development planned within Hewitt Secondary Plan Area with the development of major residential communities, with low, medium and high density residential, and neighbourhood commercial uses. The development will also include schools, parks, recreational centres, open spaces and environmentally protected areas.

The future traffic projections provided in the Hewitt MTS includes the traffic generated by all the planned development in the Hewitt Secondary Plan Area. The development plan for the Hewitt Secondary Plan Area can be found in the Hewitt MTS (excerpts provided in **Appendix B**).

The Hewitt MTS included detailed turning movement traffic projections at critical locations in the study area; however, the Hewitt MTS did not include detailed turning movement projections at all midblock intersections. Consequently, some site specific traffic generation and distribution estimates were completed as part of our analysis. Sections 2.4.1 to 2.4.5 outline the methodology used to refine the distribution of the future traffic in the study area. The development locations are illustrated in **Figure 4**.

Figure 4 – Adjacent Development Location



#### 2.4.1 Distribution of Local Traffic in the Study Area

Street 'A' is a proposed minor collector road, which is planned to be located directly across from the South Access. Street 'A' will provide a transportation link between Yonge Street and the future major collector road [Fenchurch Manor] in the Hewitt Secondary Plan Area. There are three notable developments in the Hewitt Secondary Plan Area that would impact traffic operations at the Yonge Street / Street 'A' & South Access intersection. Descriptions of the three developments are provided below.

Crown (Barrie) Developments Inc. is proposing a residential development located on the west side of Yonge Street, north of Lockhart Road, across from the South Access [Crown Development]. The Crown Development is anticipated to consist of 630 walk-up apartments units; four of the apartments are anticipated to have commercial suites. The latest Crown Development Site Plan includes a driveway / fire route access at the north limit of the property and a municipal road along the south limit of the property (Street 'A').

The Rainsong Land Developments Inc. property extends from the northwest corner of the Yonge Street / Lockhart Road intersection, around the Crown Development property, up to Mapleview Drive East [Rainsong Development]. The Rainsong Development is a proposed mixed-use development

which will include a variety of residential units, a school and a community centre. At the south end of the property, the Rainsong Development will include a direct municipal road access onto Lockhart Road, access to Yonge Street via Street 'A', and a second access to Yonge Street via a planned major collector road [Madelaine Drive], midblock between Mapleview Drive East and Lockhart Road. The proposed community centre is located between the Crown Development and Madelaine Drive. Details regarding the community centre and access to the community centre have not been finalized.

Myrtle Bernice Irving is proposing a mixed-use development within their site, located on the north side of Lockhart Road, just west of the Rainsong Development [Irving Development]. The Irving Development will include two full-movement municipal road connections onto Lockhart Road and a link to Yonge Street via Street 'A' and Madelaine Drive.

The exact schedule for build-out and occupancy of the above-noted developments has not been finalized. For the purposes of this report we have assumed the Crown Development will be fully built-out and occupied by the 2021 horizon year. We have also assumed the Rainsong Development and Irving Development to be fully built-out by the 2026 horizon year.

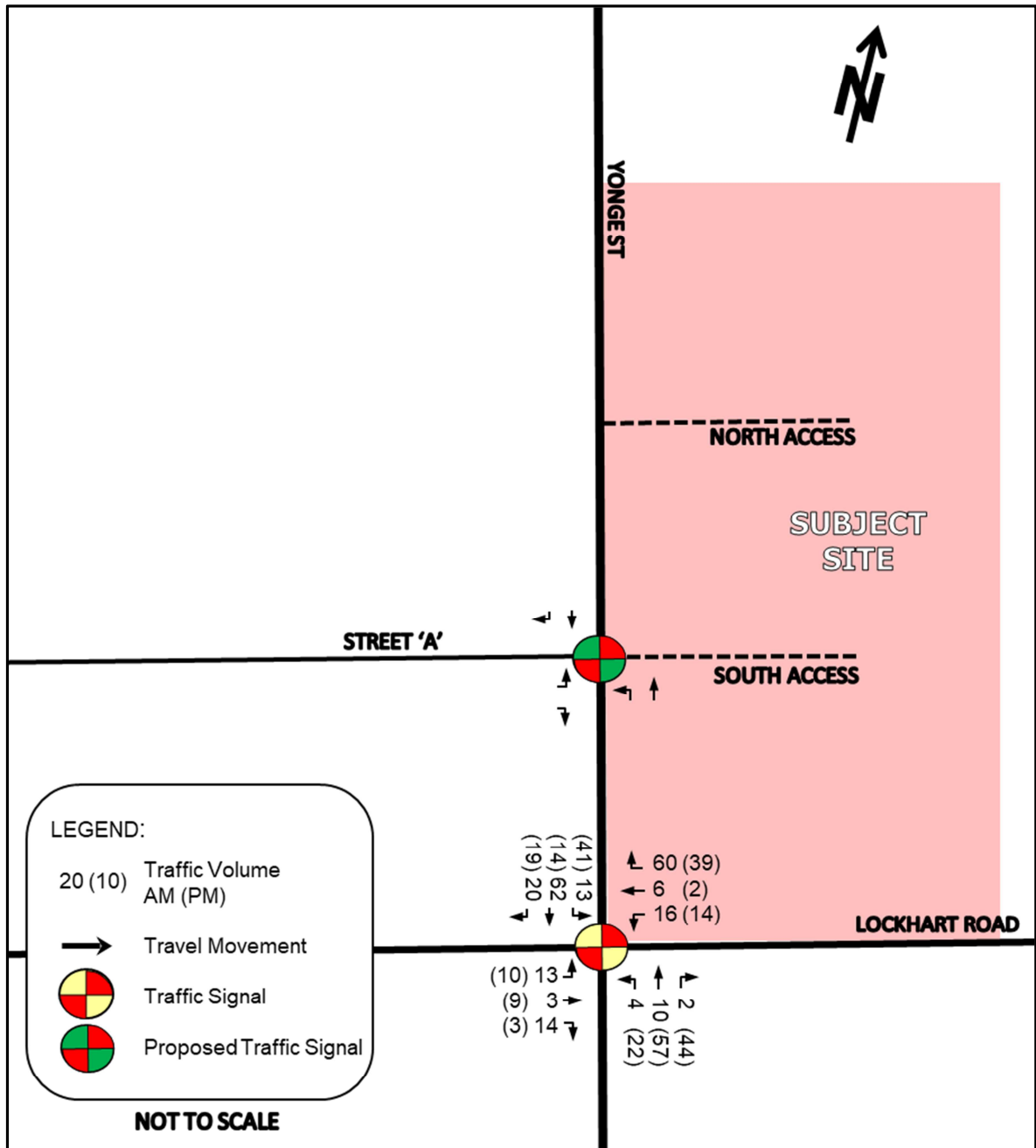
#### 2.4.2 Yonge Street / Lockhart Road

The Hewitt MTS included detailed turning movement traffic projections at the Yonge Street / Lockhart Road intersection and midblock traffic volumes for the 2020 and 2031 horizon years. In order to estimate the 2021 traffic generation from the Hewitt Secondary Plan Area, we have assumed a linear growth rate. The linear growth rate has been calculated using the midblock 2020 and 2031 traffic projections from the Hewitt MTS (excerpts provided in **Appendix B**).

**Figure 5** illustrates the traffic assignment for proposed development in the Hewitt Secondary Plan Area in the 2021 horizon year for the AM and PM peak hour. The traffic volumes in Figure 4 account for the traffic generated by the proposed development, Irving Development, Crown Development and the Rainsong Development.

Sections 2.4.3 to 2.4.5 summarize the methodology used to refine the traffic projections from the Hewitt MTS, in order to estimate the turning movements at North Access and South Access & Street 'A' intersections.

Figure 5 – Hewitt Secondary Plan Area (2021) Traffic Assignment



### 2.4.3 Traffic Generation for the Adjacent Developments on Street 'A'

The midblock traffic distribution estimates for the Crown Development, Rainsong Development and Irving Development have been estimated based on the data provided in the Institute of Transportation Engineers [ITE] Trip generation Manual (10th Edition) [ITE Trip Generation Manual]. The following ITE land use has been applied to estimate the traffic from the adjacent developments:

- ITE land use 210 (Single-Family Detached Housing) – General Urban / Suburban Setting

- ITE land use 220 (Multifamily Housing (Low-Rise)) – General Urban / Suburban Setting
- ITE land use 221 (Multifamily Housing (Mid-Rise)) – General Urban / Suburban Setting
- ITE land use 231 (Mid-Rise Residential with First Floor Commercial) - General Urban / Suburban Setting
- ITE land use 530 (High School) – General Urban / Suburban Setting

We have assumed a 95% and 5% modal split for vehicles and non-auto trips respectively, for the traffic generated for the adjacent developments<sup>1</sup>.

The AM and PM peak traffic generation for the adjacent development is not expected to exactly align with the AM and PM peak hour in the traffic counts; consequently, we have applied the peak hour of adjacent street traffic values provided in the ITE Trip Generation Manual.

#### 2.4.3.1 Crown Development

The estimated trip generation for the Crown Development is illustrated in **Table 1**.

**Table 1 – Estimated Traffic Generation of Crown Development**

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Multifamily Housing (Mid-Rise) ITE Land Use: 221	630 units	58	165	223	166	106	272
Mid-Rise Residential with 1 <sup>st</sup> -Floor Commercial ITE Land Use: 231	12 units	1	3	4	4	2	5
Less: Transit Modal Split (95% personal vehicle, 5% non-auto)		-3	-8	-11	-9	-5	-14
<b>TOTAL TRIP GENERATION</b>		<b>56</b>	<b>160</b>	<b>216</b>	<b>161</b>	<b>103</b>	<b>264</b>

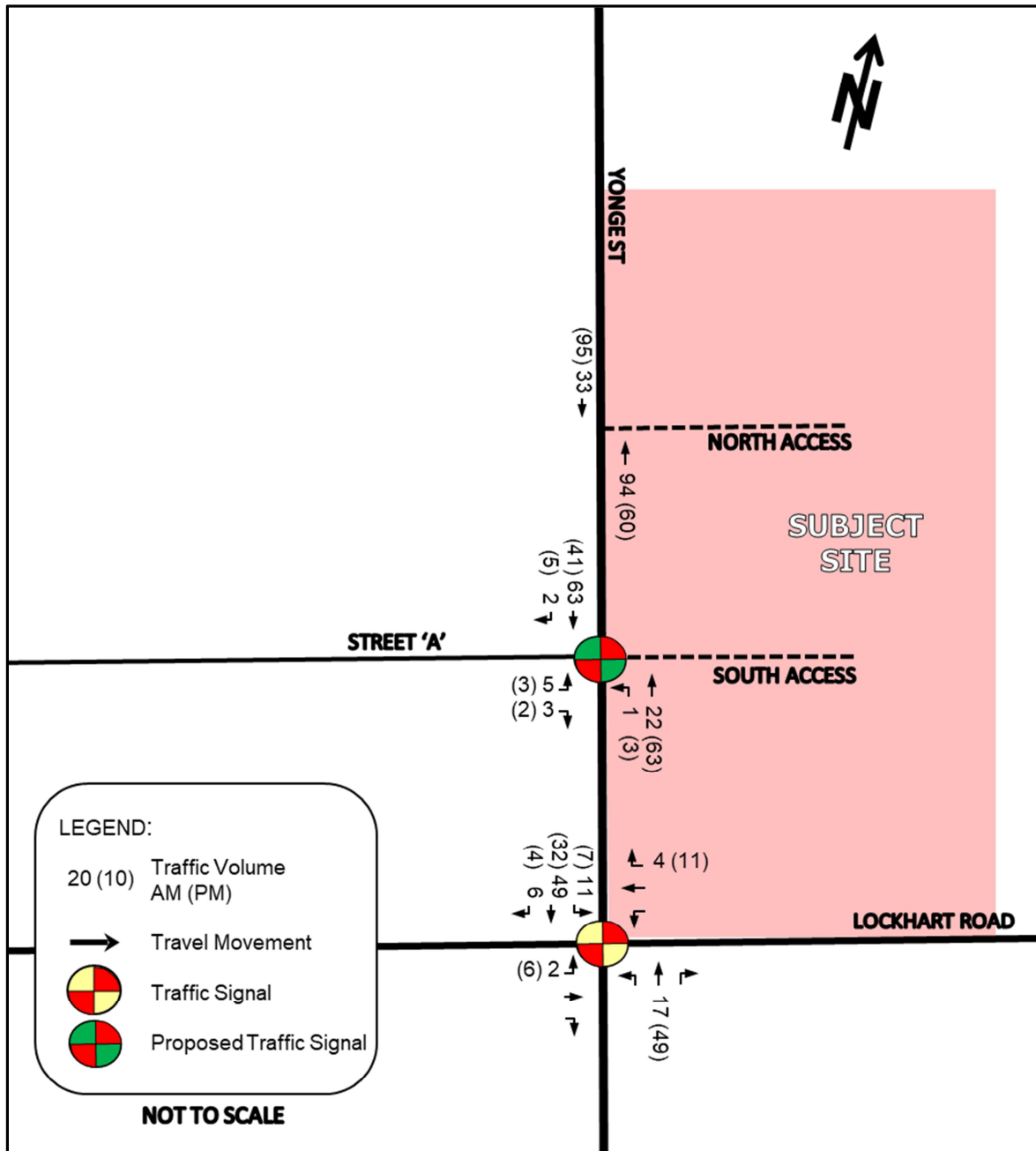
The traffic distribution of the Crown Development traffic in the study area has been based on the same traffic distribution as the proposed development noted in **Table 8** in Section 3.2.

The distribution of traffic to each access driveway for the Crown Development has been based on the proposed distribution of parking and the internal connections to the proposed surrounding development. The preliminary site plan for the Crown Development is provided in **Appendix C**.

**Figure 6** illustrates the traffic assignment for the Crown Development for the build-out (2021) year, in the AM and PM peak hour.

<sup>1</sup> The 5% non-auto split was based on the estimate used in the approved Hewlit MTS (excerpts provided in **Appendix B**).

Figure 6 – Crown Development (2021) Traffic Assignment



2.4.3.2 Rainsong Development and Irving Development

Based on a review of the Hewitt Secondary Plan we have estimated that approximately 225 single detached units and 130 townhouse units from the residential component of the Rainsong Development [Rainsong Development Residential] and 195 single detached units and 8 townhouse units from the Irving Development would use Street 'A' to access Yonge Street.

The estimated trip generation for the Rainsong Development Residential and the Irving Development for trips at Street 'A', is illustrated in **Table 2**.

**Table 2 – Estimated Traffic Generation of Rainsong and Irving Development**

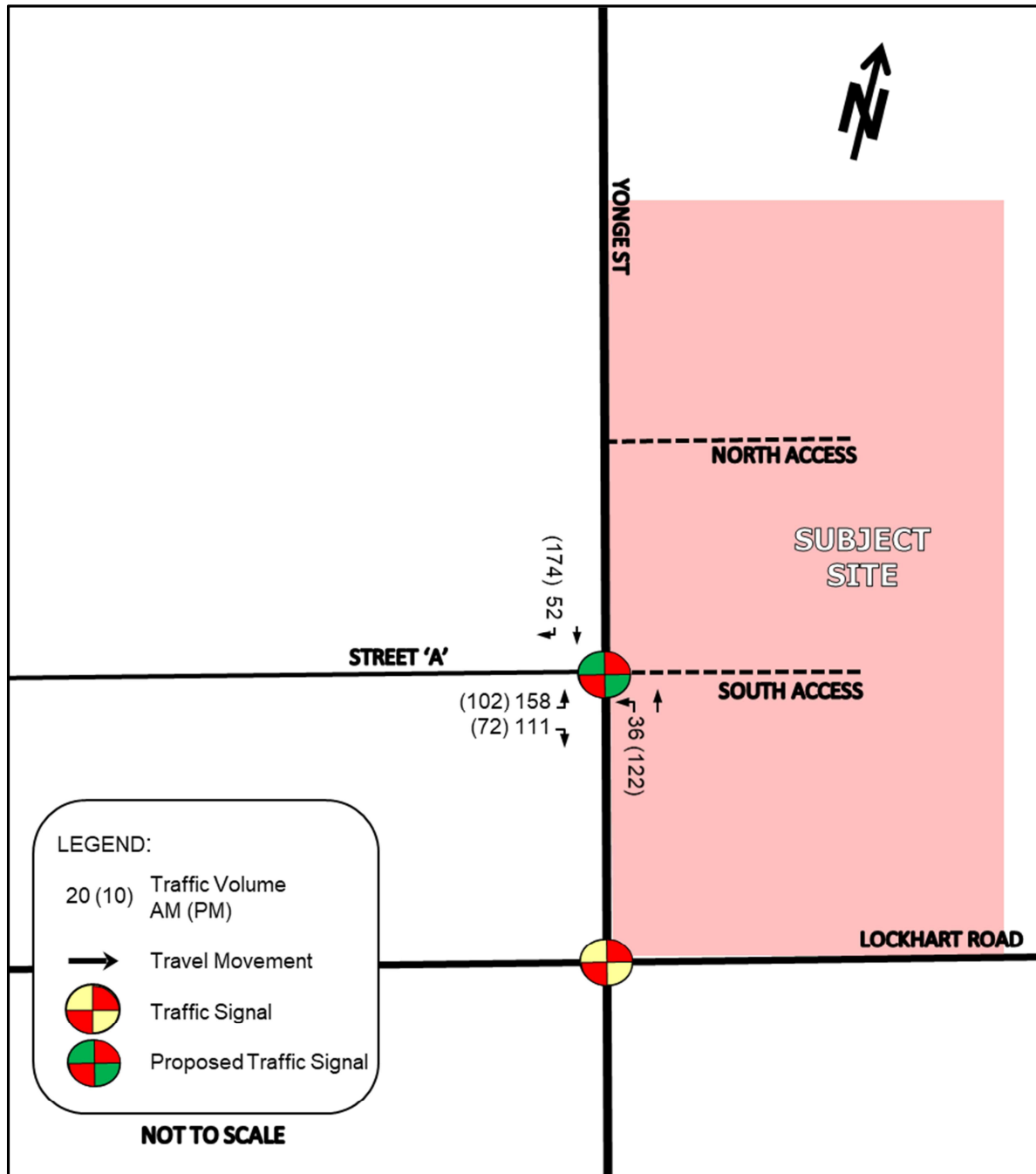
Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Single-Family Detached Housing ITE Land Use: 210	420 units	78	233	311	262	154	416
Multifamily Housing (Low-Rise) ITE Land Use: 220	138 units	15	50	65	50	29	79
Less: Transit Modal Split (95% personal vehicle, 5% non-auto)		-5	-14	-19	-16	-9	-25
<b>TOTAL TRIP GENERATION</b>		<b>88</b>	<b>269</b>	<b>357</b>	<b>296</b>	<b>174</b>	<b>470</b>

The traffic distribution of the Rainsong Development Residential and the Irving Development traffic in the study area has been based on the same traffic distribution as the proposed development noted in **Table 8** in Section 4.2.

The distribution of traffic to each access driveway for the Rainsong Development Residential and the Irving Development has been based on the proposed local road network, assuming drivers will select the route that takes the shortest amount of time.

**Figure 7** illustrates the traffic assignment for the Rainsong Development Residential and the Irving Development for the build-out (2026) year, in the AM and PM peak hour. No additional traffic is identified north or south of Street 'A' as the 2026 and 2031 Hewitt MTS traffic projections already include the traffic generated by the Rainsong Development.

Figure 7 – Rainsong & Irving Development (2026 & 2031) Traffic Assignment



### 2.4.3.3 Rainsong Development School

In the Hewitt MTS, the traffic generation estimates for the development in the Hewitt Secondary Area were based on proxy traffic counts, which were completed in a nearby area. The Hewitt MTS did not include a separate calculation for the traffic generated by the planned school blocks, as it was assumed the trip rate determined from the proxy site included trips generated by residential,

commercial and institutional (school) development. While this methodology was appropriate for the scope of the Hewitt MTS analysis, for the purpose of this report, the proposed school in the Rainsong Development will have a notable impact on the local traffic distribution. Consequently, the traffic generation for the school in the Rainsong Development has been calculated separately, in addition to the Hewitt Secondary Plan Area traffic generation estimates, as calculated in the Hewitt MTS.

Specific details regarding the development of the school block in the Rainsong Development [Rainsong Development School], are not currently available. For the purpose of this report we have conservatively assumed the Rainsong Development School will be a high school with a maximum capacity of 1,200 students.

The estimated trip generation for the Rainsong Development School is illustrated in **Table 3**.

**Table 3 – Estimated Traffic Generation from Rainsong Development School**

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
High School ITE Land Use: 530	1,200 students	418	206	624	81	87	168
Less: Transit Modal Split (95% personal vehicle, 5% non-auto)		-21	-10	-31	-4	-4	-8
<b>TOTAL TRIP GENERATION</b>		<b>397</b>	<b>196</b>	<b>593</b>	<b>77</b>	<b>83</b>	<b>160</b>

We have assumed that the distribution of traffic generated by the Rainsong Development School will be related to the location of existing and planned residential development in the surrounding area. The traffic distribution was estimated based on the probable route of travel between the residential areas and the school, assuming that people will select their route primarily based on travel time. We have assumed the Rainsong Development School will have access via Street 'A' and Lockhart Road. The catchment area for the Rainsong Development School has been estimated based on the proximity to other existing and proposed high schools in the area.

**Table 4** illustrates the estimated distribution of traffic generated by the Rainsong Development School

**Table 4 – Rainsong Development School Residential Capture Distribution**

Travel Direction (to/from)	Percentage of Total Residential Capture
Hewitt Secondary Plan Area (west)	31%
Hewitt Secondary Plan Area (east)	54%
Innisfil	15%
<b>TOTAL</b>	<b>100%</b>

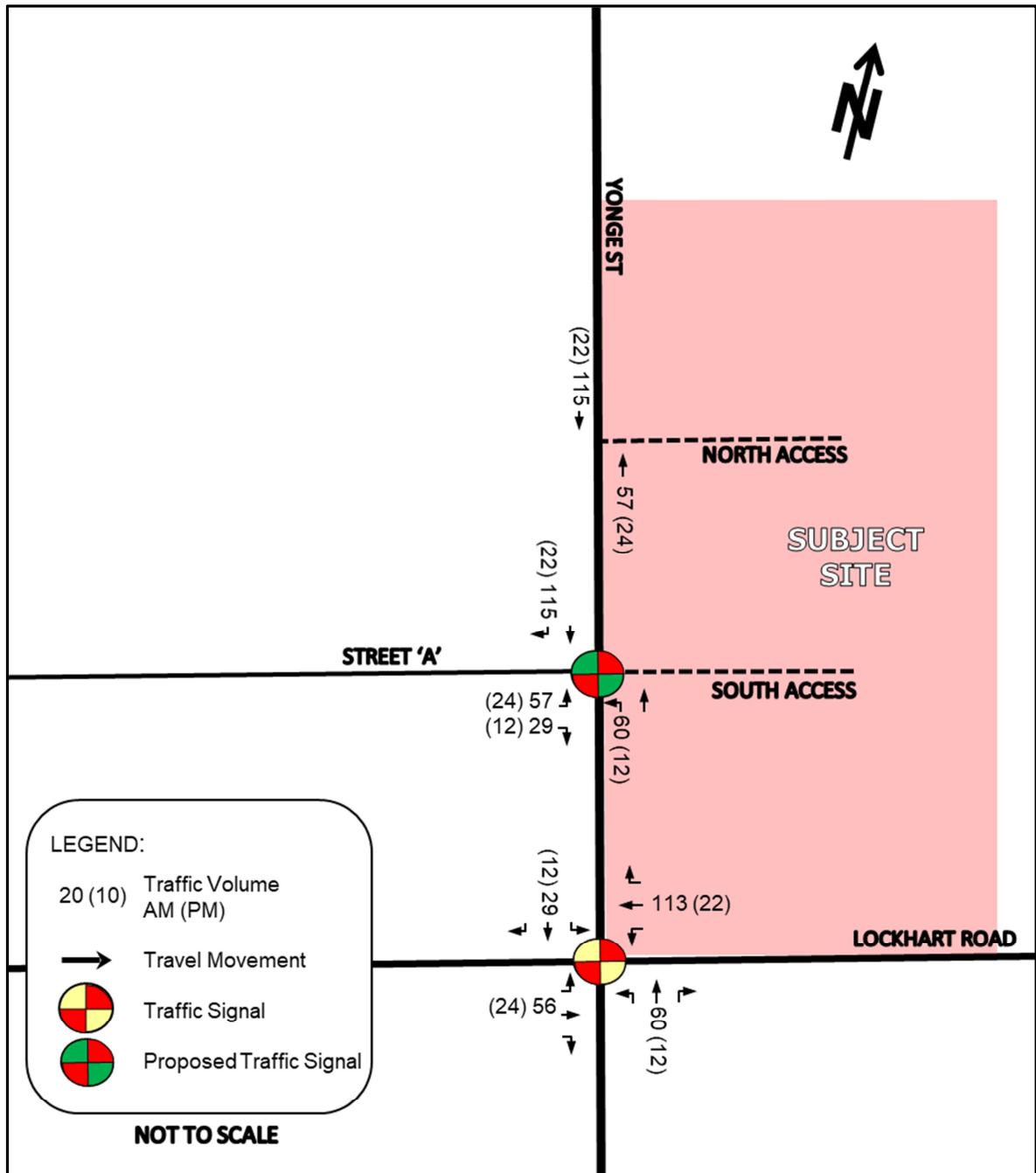
**Table 5** illustrates the estimated distribution of ingress and egress traffic for the Rainsong Development School

**Table 5 – Rainsong Development School Trip Distribution**

<b>Travel Direction (to/from)</b>	<b>Percentage of Total Traffic Capture</b>
<b>East</b> on Lockhart Road	29%
<b>South</b> on Yonge Street	15%
<b>North</b> on Yonge Street	29%
<b>West</b> internally within the Hewitt Secondary Plan Area (west)	28%
<b>TOTAL</b>	<b>100%</b>

**Figure 8** illustrates the traffic assignment for the Rainsong Development School for the build-out (2026) year, in the AM and PM peak hour.

Figure 8 – Rainsong Development School (2026) Traffic Assignment



2.4.4 Street 'A' Background Traffic Volume

Figure 9 and 10 illustrates the traffic assignment at the for all the above noted adjacent development in the 2021 and 2026 & 2031 horizon year at the access driveways.

Figure 9 – Total Adjacent (2021) Traffic Assignment

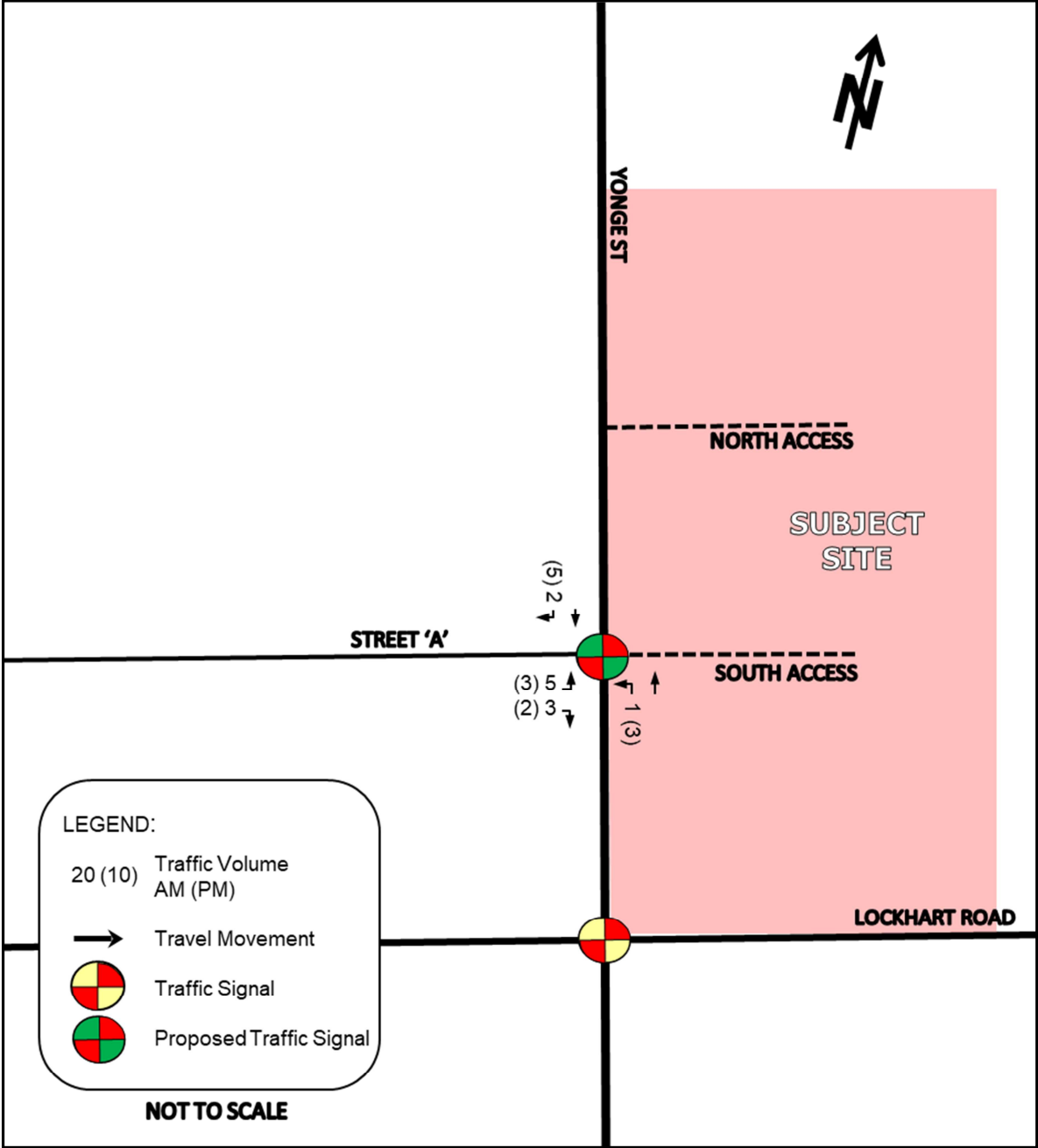
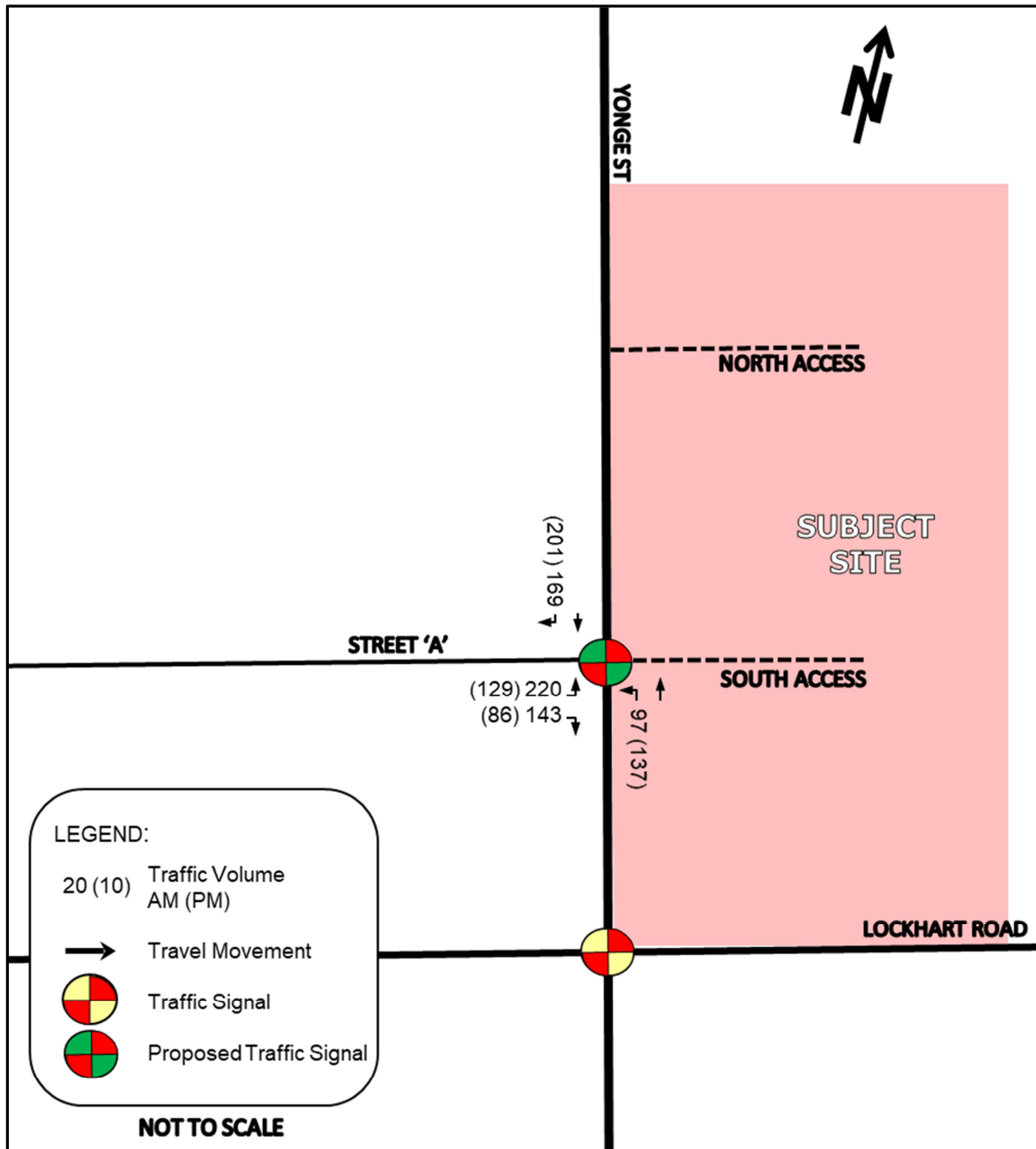


Figure 10 – Total Adjacent (2026 & 2031) Traffic Assignment



## 2.5 Background Traffic Growth

As noted in Section 2.4, there is a significant amount of anticipated development planned within the annexed lands at the south end of the City, as well as intensification developments along the City's major corridors.

The background traffic growth rate in the study area was determined based on the methodology applied in the Hewitt MTS (excerpts provided in **Appendix B**). A background traffic growth rate of

1.57% and 1.62% was applied for the AM and PM peak hours respectively for Yonge Street and Lockhart Road.

## 2.6 Traffic Counts

Detailed turning movements traffic and pedestrian counts were retrieved from the City for the intersection of Yonge Street / Lockhart Road.

**Table 6** summarizes the traffic count data collection information.

**Table 6 - Traffic Count Data**

Intersection (N-S Street / E-W Street)	Count Date	AM Peak Hour	PM Peak Hour	Source
Yonge Street / Lockhart Road	Thursday, September 28 <sup>th</sup> 2017	07:30 – 08:30	16:30 – 17:30	City

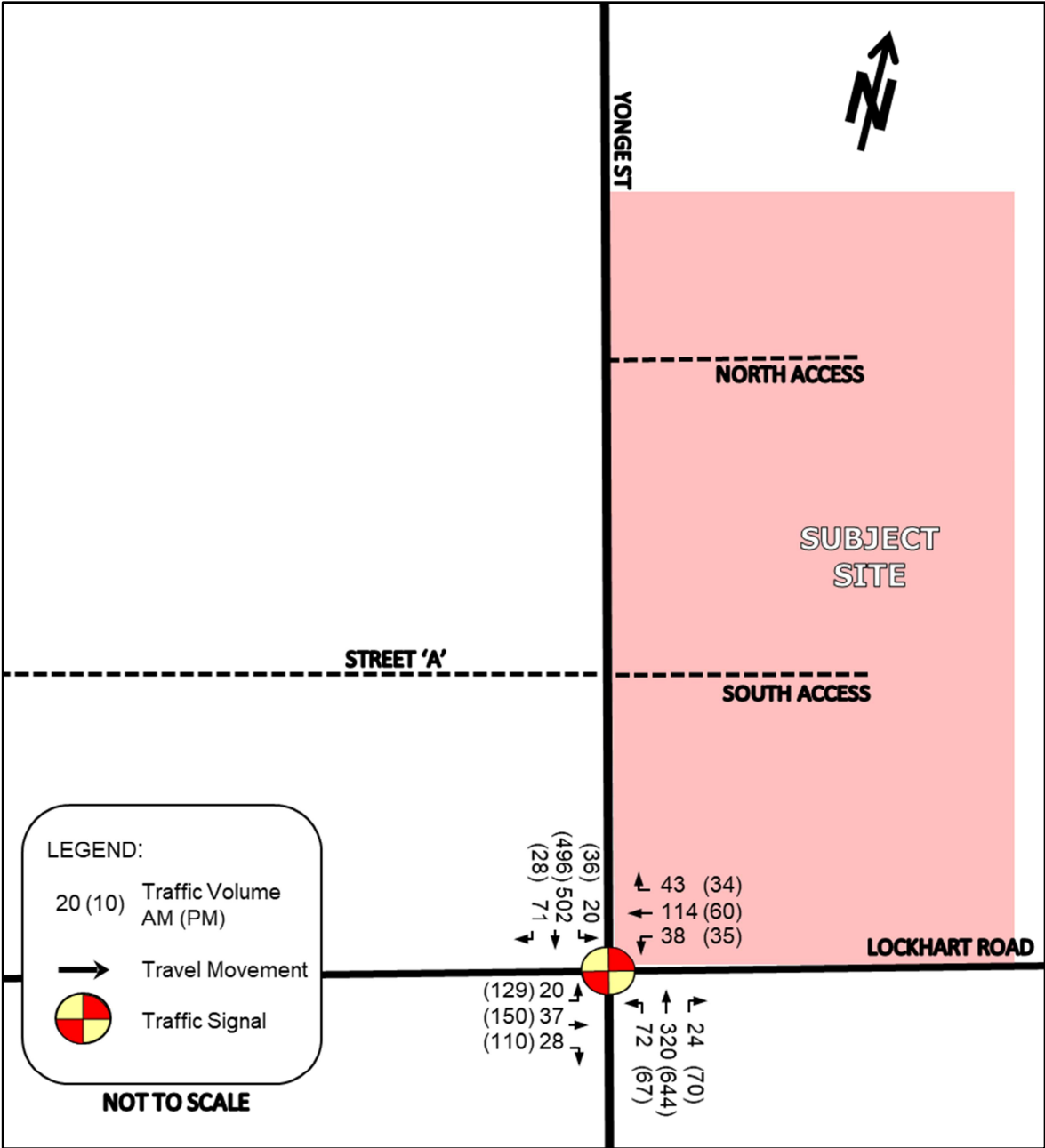
Detailed traffic count data can be found in **Appendix D**. The peak hours of traffic generation for the study area intersections generally aligned with the anticipated peak hour of traffic generation by the proposed development.

To determine the equivalent existing (2019) traffic volumes, the background traffic growth rate noted in Section 2.5 was applied.

Heavy vehicle percentages and pedestrian crossings from the traffic count data have also been included in the Synchro analysis.

**Figure 11** illustrates the existing (2019) AM and PM peak hour traffic volumes in the study area.

Figure 11 – Existing (2019) Traffic Volumes



## 3 Proposed Development Traffic Generation and Assignment

### 3.1 Traffic Generation

The traffic generation for the proposed development has been based on the Institute of Transportation Engineers [ITE] *Trip Generation Manual* (10<sup>th</sup> Edition) [ITE Trip Generation Manual]. The following ITE land uses have been applied to estimate the traffic from the proposed development:

- ITE land use 220 (Multifamily Housing (Low-Rise)) – General Urban / Suburban Setting
- ITE land use 221 (Multifamily Housing (Mid-Rise)) – General Urban /Suburban Setting
- ITE land use 222 (Multifamily Housing (High-Rise)) – General Urban /Suburban Setting
- ITE land use 231 (Mid-Rise Residential with First Floor Commercial) - General Urban / Suburban Setting
- ITE land use 232 (High-Rise Residential with First Floor Commercial) – Dense Multi-Use Urban<sup>2</sup>

We have assumed a 95% and 5% modal split for vehicles and non-auto trips respectively, for the traffic generated for the proposed development<sup>1</sup>.

The estimated trip generation of the proposed development is illustrated below in **Table 7**. The AM and PM peak traffic generation for the proposed development is not expected to exactly align with the AM and PM peak hour in the traffic counts; consequently, we have applied the peak hour of adjacent street traffic values provided in the ITE Trip Generation Manual.

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<sup>2</sup> Proposed development is not currently located in an area that would be defined as a dense multi-use urban setting; however, ITE Trip Generation data not available for a suburban setting. Based on our review of the planned development in the area, the ITE Trip Generation data for the dense multi-use urban is appropriate for the proposed development.

**Table 7 – Estimated Traffic Generation of Proposed Development**

Phasing	Land Use	Size	AM Peak Hour			PM Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL
Phase 1 (2021)	Multifamily Housing (Low-Rise) ITE Land Use: 220	61 units	7	23	30	25	14	39
	Less: Transit Modal Split (95% personal vehicle, 5% non-auto)		0	-1	-1	-1	-1	-2
<b>PHASE 1 TOTAL TRIP GENERATION</b>			<b>7</b>	<b>22</b>	<b>29</b>	<b>24</b>	<b>13</b>	<b>37</b>
Ultimate Build-out (2026)	Multifamily Housing (Mid-Rise) ITE Land Use: 221	495 units	47	132	179	133	85	218
	Multifamily Housing (High-Rise) ITE Land Use: 222	153 units	12	36	48	34	22	56
	Mid-Rise Residential with 1 <sup>st</sup> -Floor Commercial ITE Land Use: 231	290 units	24	63	87	74	32	105
	High-Rise Residential with 1 <sup>st</sup> - Floor Commercial ITE Land Use: 232	220 units	17*	52*	69	29*	18*	47
	Less: Transit Modal Split (95% personal vehicle, 5% non-auto)		-5	-15	-20	-15	-9	-24
<b>ULTIMATE BUILD-OUT TOTAL TRIP GENERATION</b>			<b>102</b>	<b>291</b>	<b>393</b>	<b>280</b>	<b>162</b>	<b>442</b>

\* The directional distribution was not available for ITE land use 232; consequently, we have assumed the same directional distribution for Multifamily Housing (High-Rise) – ITE Land Use: 222.

### 3.2 Traffic Assignment

For the purposes of this study, it has been assumed that all traffic generated by the proposed development will be new traffic and would not be in the study area if the development was not constructed.

The ITE data provides the anticipated percentage of new traffic entering and exiting during the peak hour. The distribution of traffic has been calculated based on the 2016 TTS data for traffic zone 8590, retrieved using the TTS IDRS (output attached as **Appendix H**). TTS data provides historical origin and destination work trip percentages for specific areas within the City and southern Ontario.

Traffic distribution for the trips generated by the proposed development during the AM and PM peak hour is expected to generally follow commuter travel patterns. Our analysis is based on egress traffic during the AM peak hour. Logically, the distribution of ingress traffic will follow the inverse of the exiting traffic distribution. For each of the individual areas identified in the TTS data, we have selected the probable route of travel, assuming that people will select their route primarily based on travel time.

The distribution of traffic to each access driveway for the proposed development has been based on the proposed parking layout.

The distribution of trips is illustrated in **Table 8** using the methodology outlined above.

**Table 8 – Proposed Development Traffic Distribution**

Travel Direction (to / from)	Percentage of Total Traffic Generation
<b>North</b> via Yonge Street	59%
<b>South</b> via Yonge Street	31%
<b>East</b> via Lockhart Road	7%
<b>West</b> via Lockhart Road	4%
<b>TOTAL</b>	<b>100%</b>

As noted in Section 2.4.1 we have not added the traffic generated by the proposed development at the Yonge Street / Lockhart Road intersection as it has already been included in the traffic assignment for the Hewitt Secondary Plan Area in the Hewitt MTS.

Using the traffic distributions pattern noted above, **Figure 12** and **13** illustrates the traffic assignment for the proposed development in the Phase 1 (2021) and Ultimate build-out (2026) respectively, in the AM and PM peak hour. Additional traffic from the proposed development is not identified at the Yonge Street / Lockhart Road intersection, as the Hewitt MTS already accounted for the traffic generated by the proposed development at this intersection.

Figure 12 – Proposed Development (2021) Traffic Assignment

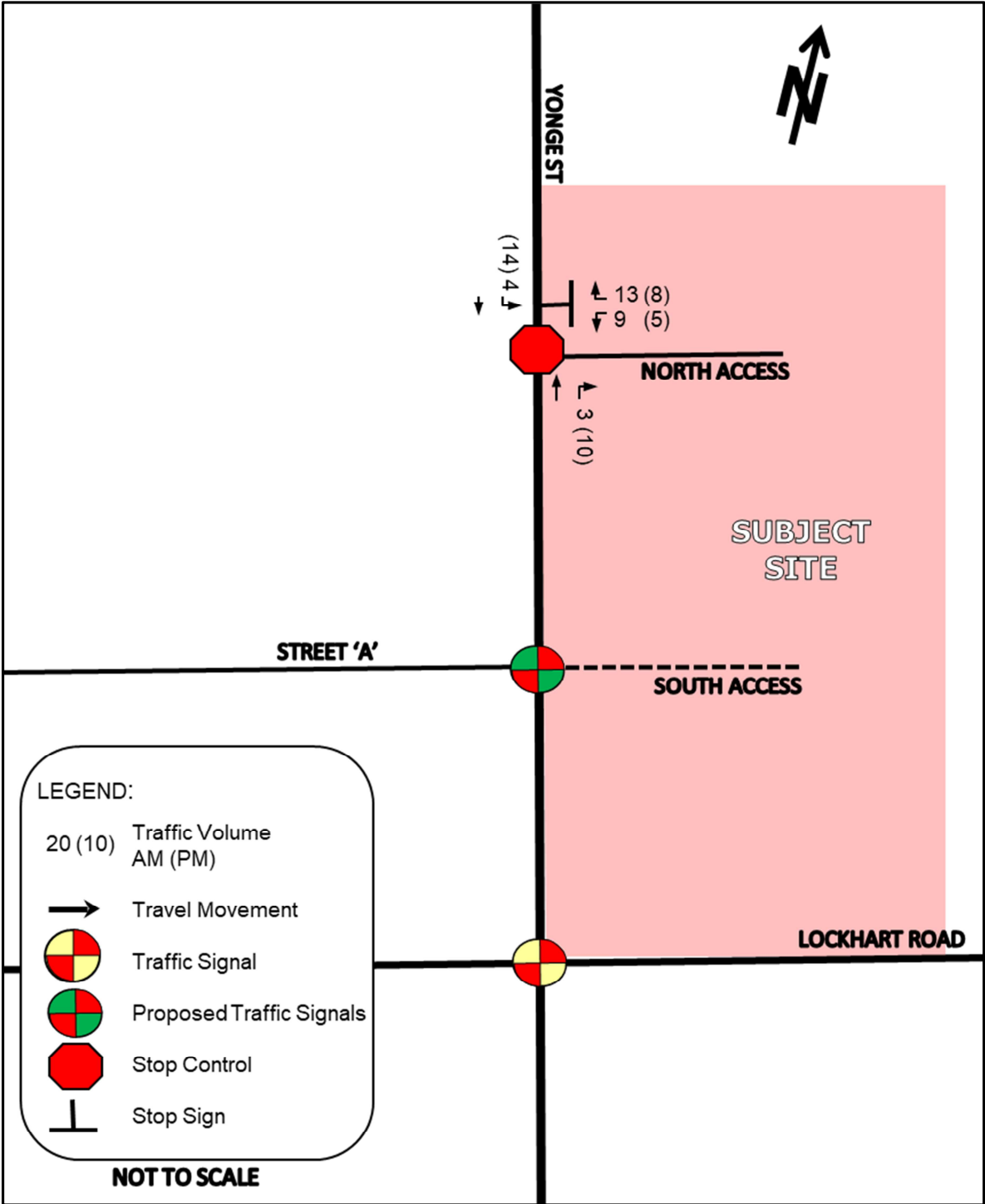
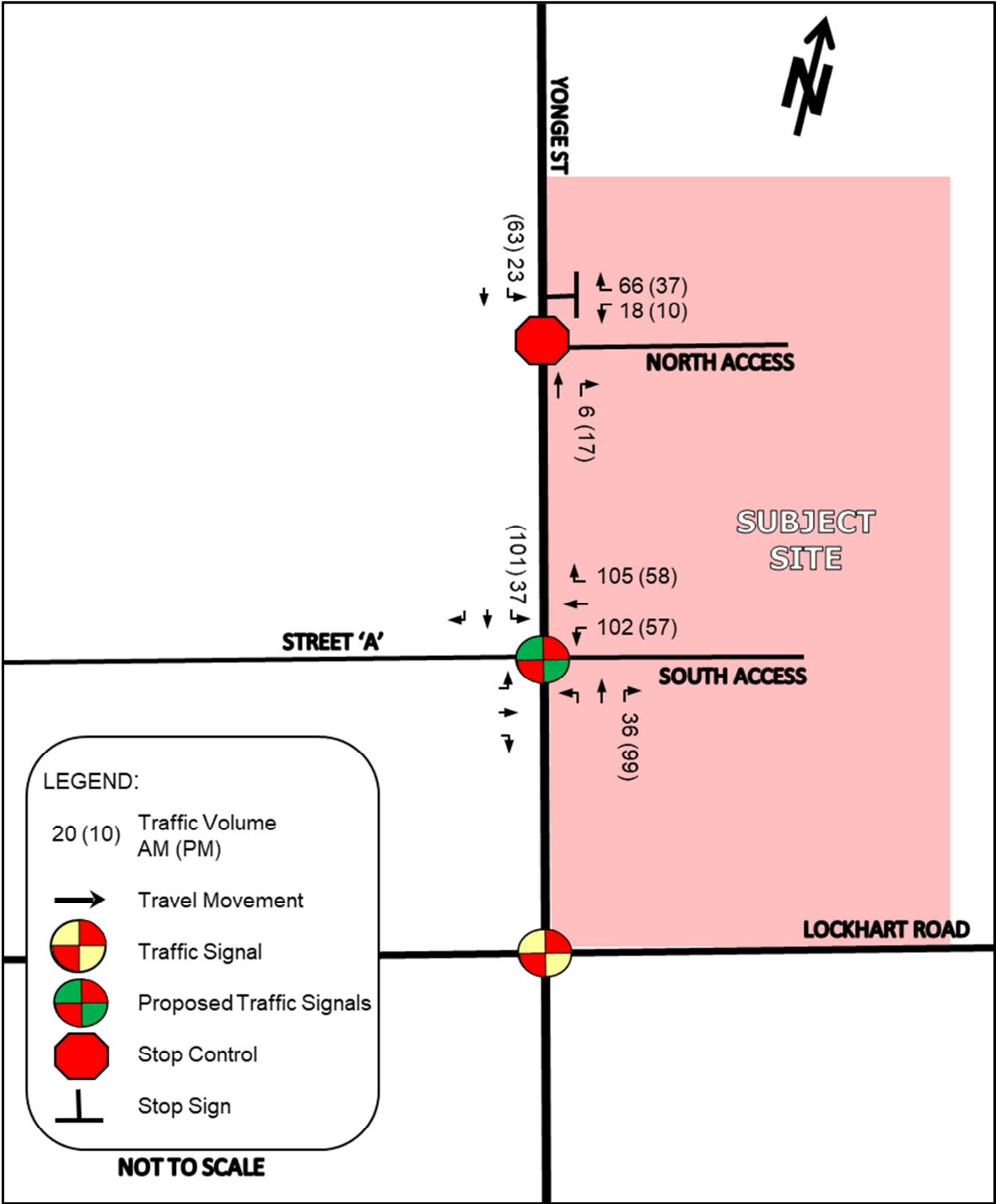


Figure 13 – Proposed Development (2026 & 2031) Traffic Assignment



### 3.3 Total Horizon Year Traffic Volumes with the Proposed Development

Two different methodologies have been applied in order to estimate the traffic volumes for the total (2021) and total (2026 & 2031) horizon years. The total 2021 traffic volumes are based on the 2019 traffic counts and the total 2026 and 2031 traffic volumes are based on the future traffic projections from the Hewitt MTS, which were based on Emme and Aimsun micro simulation model from the City TMP. The future traffic projections from the Hewitt MTS provide a better estimate of the long term traffic growth and distribution patterns in the study area, as they account for the impact of the planned infrastructure improvements and future development in and around the City.

#### 3.3.1 Total 2021 Traffic Volumes

The total (2021) AM and PM peak hour traffic volumes at the Yonge Street / Lockhart Road intersection were estimated by applying the background traffic growth rates (discussed in Section 2.5) to the existing (2019) traffic volumes, then adding the adjacent traffic volumes (Figure 4 and Figure 5) and the proposed development traffic (Figure 11). This methodology better represents the traffic volumes for the total (2021) analysis period, as the Hewitt Secondary Plan Area will be in the early stages of development and most of the planned infrastructure improvements in the City (which will impact local traffic distribution) will not be complete for this horizon year.

#### 3.3.2 Total 2026 and 2031 Traffic Volumes

The total (2026 & 2031) AM and PM peak hour traffic volumes at the Yonge Street / Lockhart Road intersection were estimated based on the traffic volume projections provided in the Hewitt MTS. The Hewitt MTS included detailed turning movement traffic projections at the Yonge Street / Lockhart Road intersection for the background (2020 – AM and PM peak hour), total (2020 – PM peak hour) and total (2031 – AM and PM peak hour) horizon years (excerpts provided in **Appendix B**). For the 2026 horizon year, we have assumed a linear traffic growth between the total (2020)<sup>3</sup> and total (2031) years.

The total (2026 & 2031 – AM and PM peak hour) traffic volumes at the Yonge Street / Lockhart Road intersection already include the traffic generated by the proposed development, as outlined in 2.4. The only traffic volume that has been added at the at the Yonge Street / Lockhart Road intersection for the total (2026 & 2031 – AM and PM peak hour) is the Rainsong Development School. The school traffic is theoretically already included in the Hewitt MTS traffic projections; however, based on the proximity to the proposed school, we have included the school traffic separately in our analysis, in order to be conservative.

**Figures 14** and **15** illustrate the Hewitt MTS total (2026 & 2031 – AM and PM peak hour) traffic volumes, which are based on the traffic projections provided in the Hewitt MTS.

**Figure 16** to **18** illustrates the resulting total (2021, 2026 & 2031) horizon year traffic volumes respectively, for the AM and PM peak hours.

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<sup>3</sup> The Hewitt MTS did not include detailed turning movement traffic volumes at the Yonge Street / Lockhart Road intersection for the total (2020) AM peak hour analysis period. The Hewitt MTS provided background (2020) AM peak hour traffic volumes at the Yonge Street / Lockhart Road intersection. Consequently, in order to determine the total (2020) AM peak hour traffic volumes at the Yonge Street / Lockhart Road intersection, we have estimated the Hewitt Secondary Plan Area 2020 AM peak hour period traffic volumes at this intersection (based on the data provide in the Hewitts MTS) and added it to the background (2020) AM peak hour traffic volumes.

Figure 14 – Hewitt MTS Total (2026) Traffic Volumes (without Rainsong Development School)

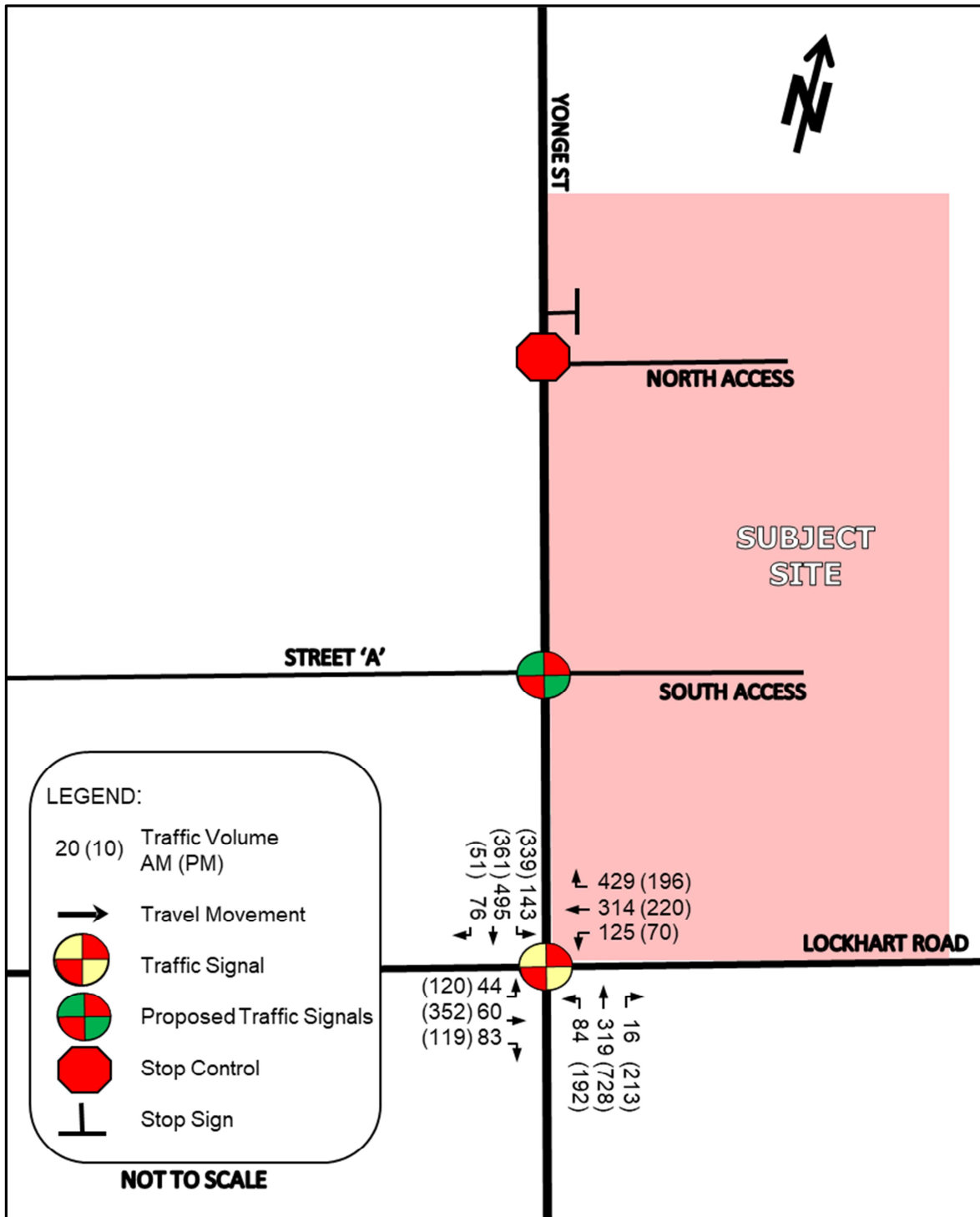


Figure 15 – Hewitt MTS Total (2031) Traffic Volumes (without Rainsong Development School)

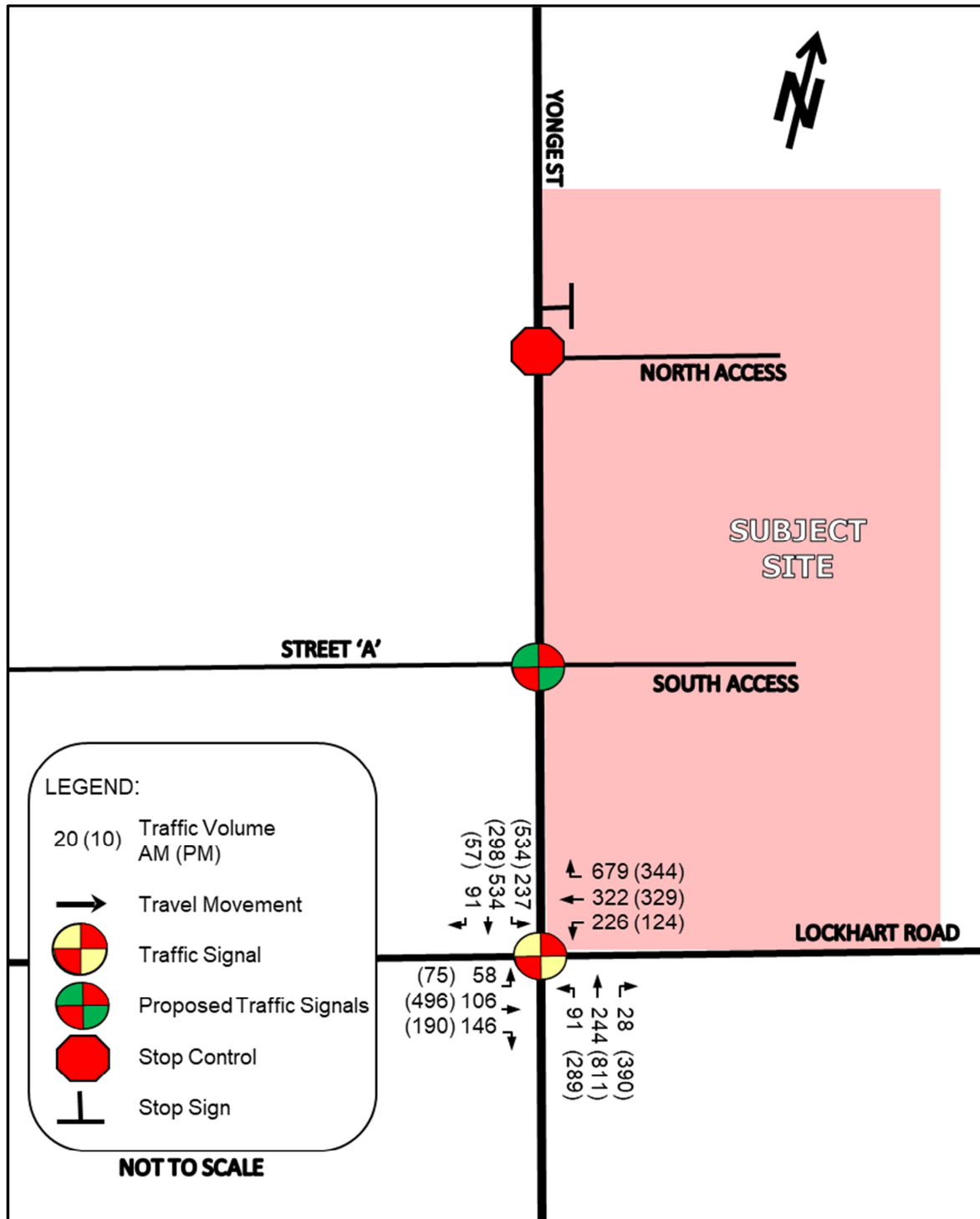


Figure 16 – Total (2021) Traffic Volumes

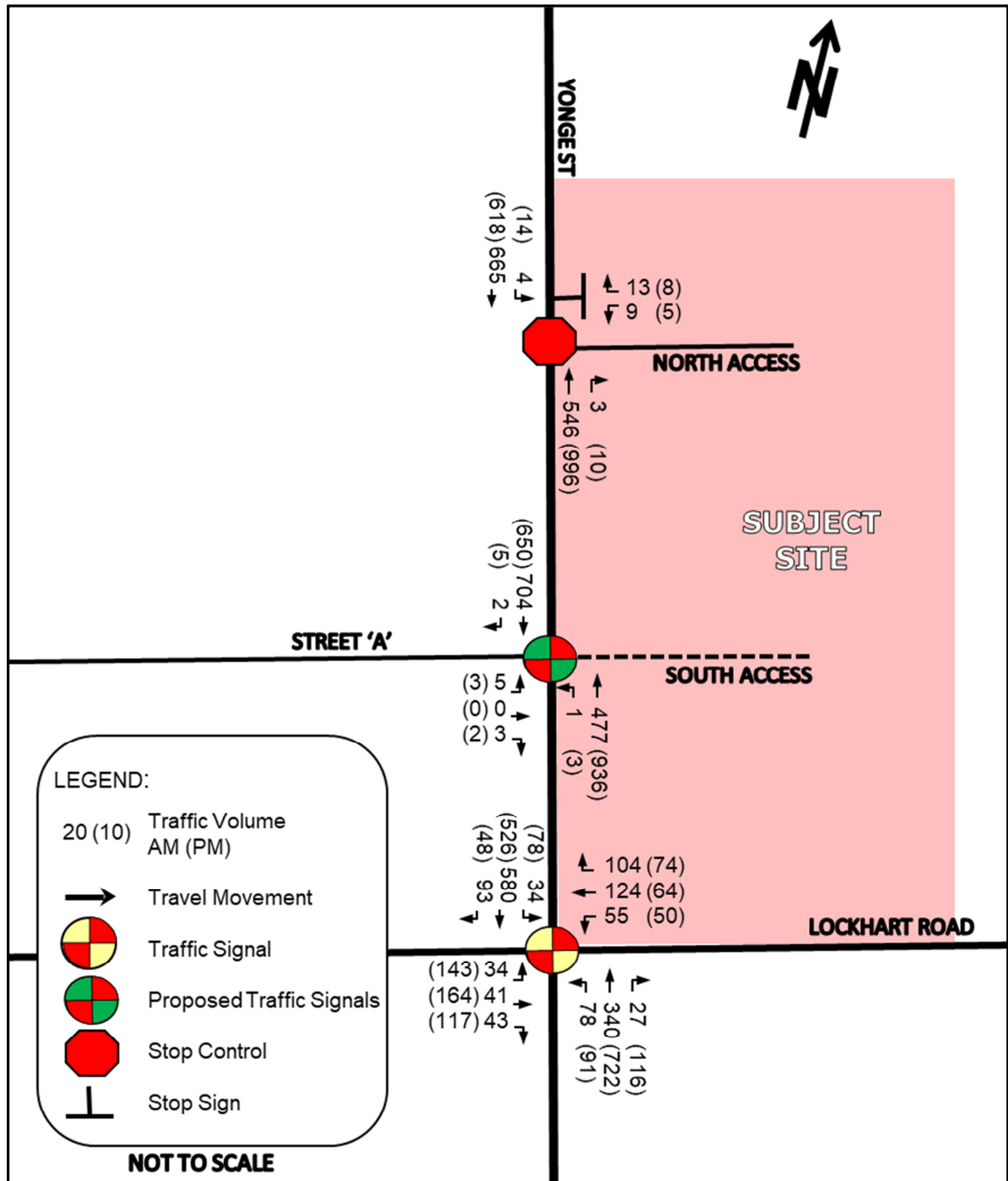


Figure 17 – Total (2026) Traffic Volumes

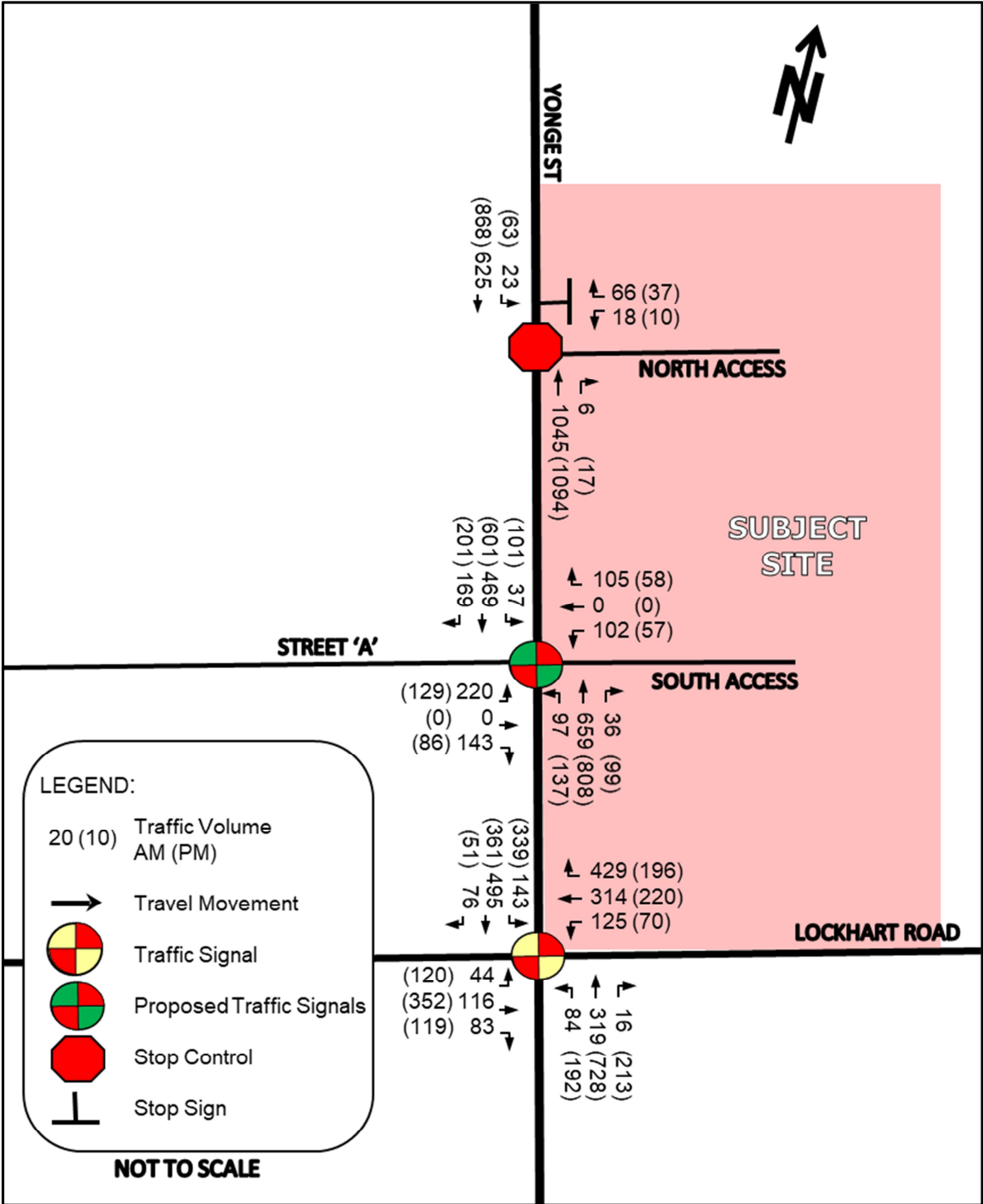
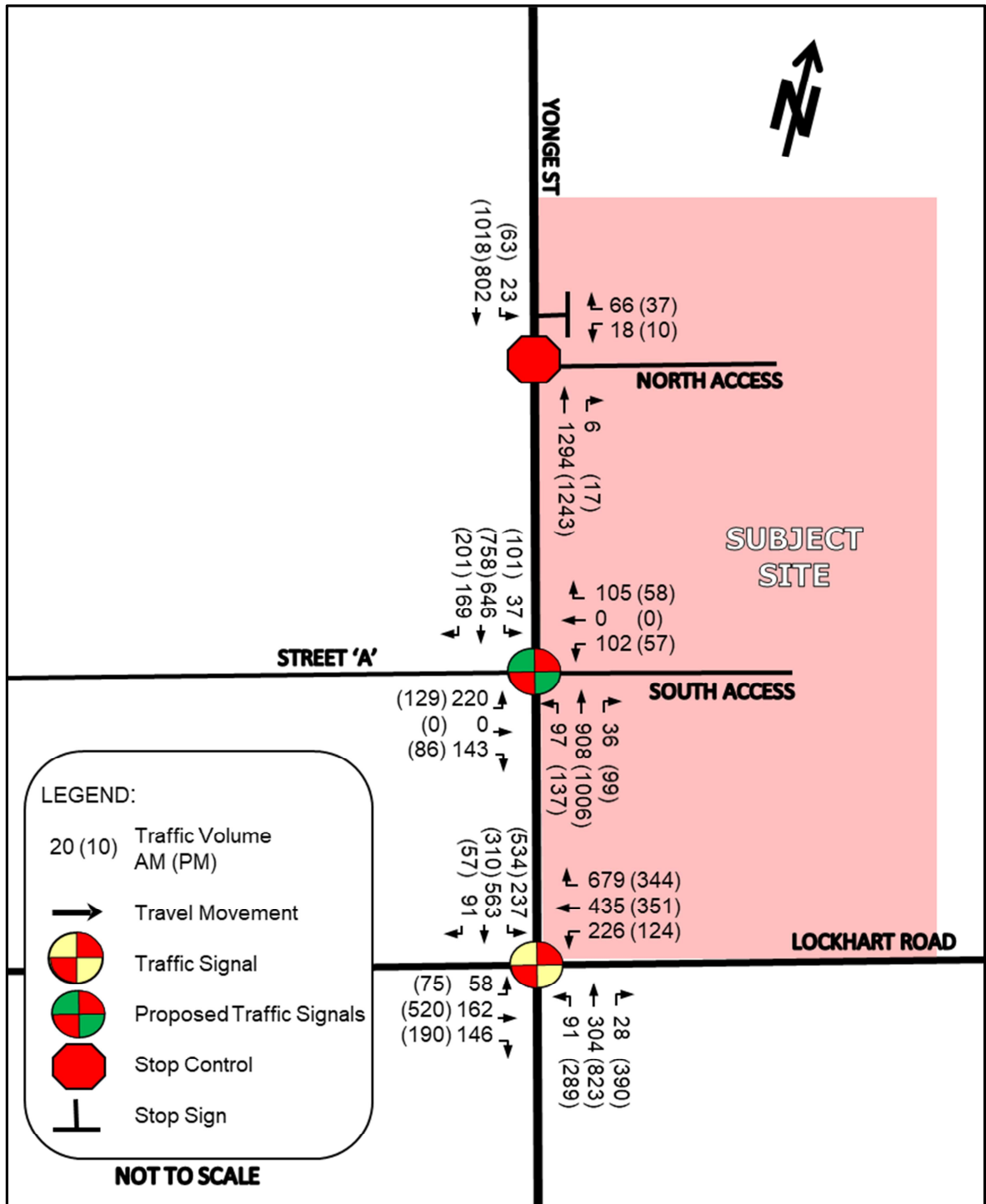


Figure 18 – Total (2031) Traffic Volumes



## 4 Intersection Operation with Proposed Development

### 4.1 Intersection Capacity Analysis Criteria

Intersection performance was measured using the traffic analysis software, Synchro 10, a deterministic model that employs Highway Capacity Manual and Intersection Capacity Utilization methodologies for analysing intersection operations. These procedures are accepted by provincial and municipal agencies throughout North America.

Synchro 10 enables the study area to be graphically defined in terms of streets and intersections, along with their geometric and traffic control characteristics. The user is able to evaluate both signalized and unsignalized intersections in relation to each other, thus not only providing level of service for the individual intersections, but also enabling an assessment of the impact the various intersections in a network have on each other in terms of spacing, traffic congestion, delay, and queuing.

Individual turning movements with a volume-to-capacity [V/C] ratio of 0.85 or greater are considered to be critical movements and have been highlighted in the LOS tables.

The intersection operations were also evaluated in terms of the LOS. LOS is a common measure of the quality of performance at an intersection and is defined in terms of vehicular delay. This delay includes deceleration delay, queue move-up time, stopped delay, and acceleration delay. LOS is expressed on a scale of A through F, where LOS A represents very little delay (i.e. less than 10 seconds per vehicle) and LOS F represents very high delay (i.e. greater than 50 seconds per vehicle for a stop sign controlled intersection and greater than 80 seconds per vehicle for a signalized intersection).

The LOS criteria for signalized and stop sign controlled intersections are shown in **Table 9**. A description of traffic performance characteristics is included for each LOS.

**Table 9 – Level of Service Criteria for Intersections**

LOS	LOS Description	Control Delay (seconds per vehicle)	
		Signalized Intersections	Stop Controlled Intersections
A	Very low delay; most vehicles do not stop ( <b>Excellent</b> )	less than 10.0	less than 10.0
B	Higher delay; more vehicles stop ( <b>Very Good</b> )	between 10.0 and 20.0	between 10.0 and 15.0
C	Higher level of congestion; number of vehicles stopping is significant, although many still pass through intersection without stopping ( <b>Good</b> )	between 20.0 and 35.0	between 15.0 and 25.0
D	Congestion becomes noticeable; vehicles must sometimes wait through more than one red light; many vehicles stop ( <b>Satisfactory</b> )	between 35.0 and 55.0	between 25.0 and 35.0
E	Vehicles must often wait through more than one red light; considered by many agencies to be the limit of <b>acceptable</b> delay	between 55.0 and 80.0	between 35.0 and 50.0
F	This level is considered to be unacceptable to most drivers; occurs when arrival flow rates exceed the capacity of the intersection ( <b>Unacceptable</b> )	greater than 80.0	greater than 50.0

## 4.2 Existing (2019) Intersection Operation

The results of the LOS analysis under existing (2019) traffic volumes during the AM and PM peak hours can be found below in **Table 10**. The existing infrastructure and traffic control have been utilized in this scenario. Detailed output of the Synchro analysis can be found in **Appendix E**.

**Table 10 – Existing (2019) LOS**

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Model	Storage				Model	Storage
Yonge Street / Lockhart Road (signalized)	0.60	12.5	B	-	-	0.83	21.5	C	-	-
EB	0.20	17.4	B	-	-	0.81	28.0	C	-	-
WB	0.51	19.6	B	-	-	0.24	14.7	B	-	-
NBL	0.23	8.7	A	13	39	0.27	12.9	B	15	39
NBT	0.36	8.7	A	-	-	0.84	24.6	C	135	-
NBR	0.02	6.3	A	1	27	0.05	9.4	A	7	27
SBL	0.04	6.4	A	5	66	0.23	13.4	B	10	66
SBTR	0.64	12.6	B	81	-	0.69	17.7	B	90	-

The results of the LOS analysis indicate that all intersections are operating within the typical design limits noted in Section 3.1.

The anticipated queue for the northbound through movement on Yonge Street at Lockhart Road will extend past the existing storage length for northbound right and left turn lanes. The anticipated queuing will not impact traffic operations at the adjacent intersection and there are no traffic safety issues related to the additional queuing at this location; consequently, interim road improvements are not recommended ahead of the planned Yonge Street road reconstruction in 2026.

The anticipated queue for all other movements in the study area can be accommodated within the existing auxiliary turn lanes.

A review of the need for additional auxiliary right turn lanes was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, interim right turn lane improvements are not recommended ahead of the planned Yonge Street and Lockhart Road reconstruction.

The existing asphalt at the northeast corner of the intersection of Yonge Street / Lockhart Road is damaged as a result of vehicles tracking over the shoulder when making a right turn movement. It is recommended that the City install a paved shoulder at this corner (similar to the paved shoulder at the southwest corner of the intersection).

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at any of the unsignalized intersections (results are provided in **Appendix G**).

No improvements are required for the total (2021) scenario.

## 4.3 Total (2021) Intersection Operation

The results of the LOS analysis under total (2021) traffic volumes during the AM and PM peak hours can be found below in **Table 11**. The existing infrastructure and traffic control have been utilized in

this scenario. We have applied signal timing improvements at the Yonge Street / Lockhart Road intersection for this scenario to optimize the use of the existing infrastructure. Detailed output of the Synchro analysis can be found in **Appendix F**.

**Table 11 – Total (2021) LOS**

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Model	Storage				Model	Storage
Yonge Street / Lockhart Road (signalized)	0.69	16.7	B	-	-	0.85	26.8	C	-	-
EB	0.31	23.4	C	-	-	0.85	37.9	D	-	-
WB	0.72	31.8	C	-	-	0.36	21.1	C	-	-
NBL	0.29	10.4	B	18	39	0.39	18.6	B	32	39
NBT	0.35	9.1	A	-	-	0.85	28.8	C	235	-
NBR	0.02	6.7	A	3	27	0.13	12.4	B	23	27
SBL	0.06	7.0	A	8	66	0.63	36.7	D	42	66
SBTR	0.69	14.6	B	128	-	0.68	20.9	C	156	-
Yonge Street / Street 'A' / South Access (unsignalized)	-	0.1	A	-	-	-	0.2	B	-	-
EB	0.04	22.1	C	-	-	0.07	60.4	F	-	-
Yonge Street / North Access (unsignalized)	-	0.4	A	-	-	-	0.5	B	-	-
WB	0.09	19.2	C	-	-	0.09	31.0	D	-	-

The results of the LOS analysis indicates that the Yonge Street / Lockhart Road intersection is operating at the typical design limits noted in Section 3.1 in the PM peak hour; however as the intersection is not exceeding the design limits and there are no issues with the anticipated queuing at this intersection, interim road improvements are not recommended ahead of the planned Yonge Street road reconstruction.

The results of the LOS analysis indicates that the Yonge Street / Street 'A' / South Access intersection is operating marginally outside the typical design limits noted in Section 3.1 in the PM peak hour; however, volumes on the side streets are very low, consequently no improvements are recommended. With the improvements along Yonge Street planned by the 2026 horizon year, it is recommended the City monitor the side street delay at this intersection prior to that time.

The anticipated queue for the northbound through movement on Yonge Street at Lockhart Road will extend past the existing storage length for northbound right and left turn lanes. The anticipated queuing will not impact traffic operations at the adjacent intersection and there are no traffic safety issues related to the additional queuing at this location; consequently, interim road improvements are not recommended ahead of the planned Yonge Street road reconstruction in 2026.

The anticipated queue for all other movements in the study area can be accommodated within the existing auxiliary turn lanes.

An analysis was completed for left turn movements at the unsignalized intersections in the study area, based on the criteria outlined in Appendix 9A of the Ontario Ministry of Transportation Design Supplement for TAC Geometric Design Guide for Canadian Roads (dated June 2017) [MTO DS]. Based on the above noted criteria a left-turn lane is not warranted at any of the unsignalized intersections in the study area.

A review of the need for additional auxiliary right turn lanes was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, additional auxiliary right turn lanes are not recommended ahead of the planned Yonge Street and Lockhart Road reconstruction.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at any of the unsignalized intersections (results are provided in **Appendix G**).

No improvements are required for the total (2021) scenario.

#### 4.4 Total (2026) Intersection Operation

The results of the LOS analysis under total (2026) traffic volumes during the AM and PM peak hours can be found below in **Table 12**. The planned infrastructure improvements noted in Section 2.2 have been utilized in this scenario. The recommended improvements identified in the Hewitt MTS for the Total (2031) scenario have been utilized at the Yonge Street / Lockhart Road intersection. The improvements include the following:

- Replace southbound traffic signal head to accommodate a southbound left protected phase; and
- Change the signal control type to coordination from semi-actuated coordinated

The proposed signal timing plan has been utilized in this scenario. Detailed output of the Synchro analysis can be found in **Appendix F**.

**Table 12 – Total (2026) LOS**

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Model	Storage				Model	Storage
Yonge Street / Lockhart Road (signalized)	0.31	23.6	C	-	-	0.66	23.4	C	-	-
EBL	0.32	39.4	D	19	62	0.64	47.3	D	43	62
EBT	0.21	37.5	D	-	-	0.62	42.0	D	-	-
EBR	0.06	36.5	D	11	61	0.08	36.5	D	15	61
WBL	0.62	45.6	D	44	62	0.53	43.4	D	28	62
WBT	0.54	40.6	D	-	-	0.37	38.7	D	-	-
WBR	0.29	38.5	D	27	65	0.14	37.0	D	19	65
NBL	0.18	11.8	B	23	56	0.42	19.5	B	65	56
NBT	0.17	11.1	B	-	-	0.44	17.9	B	-	-
NBR	0.01	9.9	A	0	56	0.15	14.8	B	19	56
SBL	0.21	5.6	A	20	62	0.63	10.1	B	47	62
SBT	0.21	5.9	A	33	-	0.16	5.7	A	25	-
SBR	0.05	5.2	A	6	56	0.03	5.1	A	5	56
Yonge Street / Street 'A' / South Access (unsignalized)	-	42.6	B	-	-	-	14.2	B	-	-
EB	1.34	208.4	F	-	-	1.03	114.9	F	-	-
WB	0.77	48.1	E	49	-	0.59	44.2	E	27	-
Yonge Street / North Access (unsignalized)	-	1.0	A	-	-	-	0.7	A	-	-
WB	0.24	17.0	C	-	-	0.13	16.0	C	-	-

The results of the LOS analysis indicates that the eastbound movement at the Yonge Street / Street 'A' / South Access intersection will operate outside the typical design limits noted in Section 3.1. Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at any of the unsignalized intersections (results are provided in **Appendix G**); however, installation of traffic signals is recommended at the Yonge Street / Street 'A' / South Access intersection to improve the side street delays.

As part of the intersection signalization works, it is recommended that the pavement markings be adjusted to accommodate a westbound left turn lane at the Yonge Street / Street 'A' / South Access intersection, with a 15 metre storage and 15 metre taper length.

The results of the LOS analysis with the above noted improvements can be found below in **Table 13**. Detailed output of the Synchro analysis can be found in **Appendix F**.

**Table 13 – Total (2026) LOS with Improvements**

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Model	Storage				Model	Storage
Yonge Street / Street 'A' / South Access (unsignalized)	0.64	16.0	B	-	-	0.64	15.0	B	-	-
EB	0.77	25.1	C	-	-	0.59	24.8	C	-	-
WBL	0.31	14.5	B	19	15	0.26	20.4	C	15	15
WBTR	0.16	13.4	B	14	-	0.04	19.0	B	6	-
NBL	0.38	15.8	B	26	TWLTL	0.39	7.9	A	17	TWLTL
NBTR	0.53	14.3	B	62	-	0.50	8.8	A	58	-
SBL	0.16	12.1	B	11	TWLTL	0.55	25.4	C	35	TWLTL
SBTR	0.48	13.7	B	-	-	0.67	18.5	A	-	-

The results of the LOS analysis indicate that all intersections are operating within the typical design limits noted in Section 3.1.

The anticipated queue for the northbound left movement at the Yonge Street / Lockhart Road intersection will extend past the proposed storage length; however, the additional queue can be accommodated by the proposed taper length.

The anticipated queue for the westbound left movements at the Yonge Street / Street 'A' / South Access marginally extends past the proposed storage length; however, the additional queue can be accommodated by the proposed taper length. Furthermore, the anticipated queue for westbound movements at the Yonge Street / Street 'A' / South Access intersection will not exceed past the proposed roundabout in the proposed development.

The anticipated queue for all other movements in the study area can be accommodated by the proposed network.

A review of the need for additional auxiliary right turn lanes was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, additional auxiliary right turn lanes are not recommended.

#### 4.5 Total (2031) Intersection Operation

The results of the LOS analysis under total (2031) traffic volumes during the AM and PM peak hours can be found below in **Table 14**. The planned infrastructure improvements noted in Section 2.2 and

the proposed improvements noted in Section 4.4 have been utilized in this scenario. Detailed output of the Synchro analysis can be found in **Appendix F**.

**Table 14 – Total (2031) LOS**

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Model	Storage				Model	Storage
Yonge Street / Lockhart Road (signalized)	0.51	25.3	C	-	-	0.98	43.6	D	-	-
EBL	0.32	31.6	C	21	62	0.36	33.7	C	28	62
EBT	0.18	29.6	C	-	-	0.64	37.0	D	-	-
EBR	0.10	28.9	C	15	61	0.13	30.9	C	17	61
WBL	0.74	44.1	D	71	62	0.93	92.6	F	62	62
WBT	0.47	32.5	C	-	-	0.42	33.6	C	-	-
WBR	0.59	35.5	D	59	65	0.24	32.0	C	23	65
NBL	0.28	21.4	C	32	56	1.01	92.1	F	124	56
NBT	0.22	19.0	B	-	-	0.84	42.8	D	118	-
NBR	0.02	17.2	B	0	56	0.77	45.6	D	117	56
SBL	0.37	10.4	B	42	62	0.96	56.7	E	188	62
SBT	0.28	10.6	B	48	-	0.15	8.5	A	24	-
SBR	0.06	9.0	A	8	56	0.04	7.8	A	6	56
Yonge Street / Street 'A' / South Access (signalized)	0.75	18.3	B	-	-	0.73	17.2	B	-	-
EB	0.78	25.5	C	-	-	0.59	24.8	C	-	-
WBL	0.30	14.3	B	19	15	0.26	20.4	C	15	15
WBTR	0.15	13.2	B	14	-	0.04	19.0	B	6	-
NBL	0.55	24.1	C	36	TWLTL	0.43	9.0	A	17	TWLTL
NBTR	0.73	18.1	B	105	-	0.61	10.0	B	77	-
SBL	0.28	16.5	B	14	TWLTL	0.68	36.7	D	40	TWLTL
SBTR	0.62	16.0	B	-	-	0.81	22.5	C	-	-
Yonge Street / North Access (unsignalized)	-	0.6	A	-	-	-	0.6	A	-	-
WB	0.18	13.5	B	-	-	0.12	14.5	B	-	-

The results of the LOS analysis indicates that the Yonge Street / Lockhart Road intersection is operating outside typical design limits noted in Section 3.1, during the PM peak hour. It is recommended northbound and westbound traffic signal heads be replaced to accommodate a northbound left turn and westbound left turn protected phase, to improve operations in the PM peak hour. The signal timing in the AM peak hour has been maintained as there are no operational issues.

The results of the LOS analysis with the above noted improvements can be found below in **Table 15**. Detailed output of the Synchro analysis can be found in **Appendix F**.

**Table 15 – Total (2031) LOS with Improvements**

Location (N-S Street / E-W Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95% Queue (m)		V/C	Delay (s)	LOS	95% Queue (m)	
				Model	Storage				Model	Storage
Yonge Street / Lockhart Road (signalized)	-	-	-	-	-	0.92	49.0	D	-	-
EBL	-	-	-	-	62	0.42	53.3	D	39	62
EBT	-	-	-	-	-	0.84	65.6	E	-	-
EBR	-	-	-	-	61	0.17	49.5	D	27	61
WBL	-	-	-	-	62	0.79	64.8	E	56	62
WBT	-	-	-	-	-	0.38	43.1	D	-	-
WBR	-	-	-	-	65	0.24	41.4	D	26	65
NBL	-	-	-	-	56	0.60	32.0	C	55	56
NBT	-	-	-	-	-	0.82	54.0	D	221	-
NBR	-	-	-	-	56	0.56	47.2	D	124	56
SBL	-	-	-	-	62	0.93	59.2	E	176	62
SBT	-	-	-	-	-	0.19	21.0	C	44	-
SBR	-	-	-	-	56	0.04	19.2	B	4	56

The results of the LOS analysis indicates that the southbound left turn movement at this intersection is operating outside the typical design limits noted in Section 3.1 in the PM peak hour; however, the all movements are within the theoretical operating capacity. As outlined in Section 2.4, the traffic projections used in our analysis includes additional traffic generated by the proposed school, over and above what is already accounted for in the local traffic projections, which is a conservative approach. Furthermore, as detailed below, there are no issues with the anticipated queuing at this intersection, consequently, no further improvements are recommended.

The anticipated queue for northbound right and northbound through movements at the Yonge Street / Lockhart Road intersection in the PM peak hour extend beyond the planned northbound right turn auxiliary lane storage length. The anticipated queuing will not extend into any adjacent driveways or intersections and will not result in any operational or traffic safety issues. Consequently, no additional improvements are required.

The anticipated queue for southbound left movements at the Yonge Street / Lockhart Road intersection in the PM peak hour extend beyond the planned storage length, however; the additional queuing will be contained within the planned TWLTL.

A review of the back-to-back queuing along Yonge Street was completed as part of our analysis. The critical case is the southbound left turn queue on Yonge Street at Lockhart Road and the northbound left turn queue on Yonge Street at Street 'A' & South Access. The total storage space available between the two intersections is 225 metres and the back-to-back queuing, in the PM peak hour, results in a total queuing length of 193 metres which leaves approximately 32 metres between the back-to-back queues. No traffic safety or operational issues are anticipated as a result of the queuing on Yonge Street.

The anticipated queue for the westbound left movements at the Yonge Street / Street 'A' / South Access marginally extends past the proposed storage length; however, the additional queue can be accommodated within the proposed taper length. Furthermore, the anticipated queue for westbound movements at the Yonge Street / Street 'A' / South Access intersection will not exceed past the proposed roundabout in the proposed development.

The anticipated queue for all other movements in the study area can be accommodated by the proposed network.

A review of the need for additional auxiliary right turn lanes was completed as part of our analysis. The results of the Synchro analysis indicate that there is excess capacity for all movements; consequently, additional auxiliary right turn lanes are not recommended.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the Yonge Street / North Access intersection (results are provided in **Appendix G**).

No additional improvements are required for the total (2031) scenario.

## 4.6 Site Access

The North Access will operate efficiently as a full-movement access, with one-way stop control for westbound movements. A single ingress and egress lane at the North Access driveway will provide the necessary capacity to service the proposed development.

The proposed spacing between the North Access and the future road allowance for Madelaine Drive (180 metres – measured edge to edge of roadway) is greater than the minimum suggested minimum corner clearance requirements for a public lane as identified in the Transportation Association of Canada *Design Guide for Canadian Roads* (2017) [TAC Guidelines] Figure 8.8.2 (Suggested Minimum Corner Clearances to Accesses or Public Lanes at Major Intersections) – 70 metres for signalized condition.

The proposed spacing between the South Access and North Access (200 metres – measured edge to edge of roadway) is significantly greater the minimum suggested minimum corner clearance requirements for a driveway as identified in the TAC Guidelines Figure 8.8.2 (Suggested Minimum Corner Clearances to Accesses or Public Lanes at Major Intersections) – 70 metres for signalized condition.

The South Access will operate efficiently as a full-movement access. It is recommended that the signalization of the Yonge Street / South Access & Street 'A' is included as part of the proposed Yonge Street reconstruction works. For the unsignalized configuration, a single ingress and egress lane at the South Access driveway will provide the necessary capacity to service the proposed development. Once the Yonge Street / South Access & Street 'A' intersection is reconstructed as a signalized intersection, it is recommended that the South Access include a westbound through / right turn lane and an auxiliary left turn lane with a 15 metre storage length and a 15 metre taper length.

The proposed spacing between the South Access and Lockhart Road (250 metres – measured centre of road to centre of road) less than the desired spacing between adjacent signalized intersections (400 metres) but it is greater than the minimum spacing (200 metres) as identified in TAC Guidelines Section 9.4.2.1). As identified in Section 4.5, there would be no operational issues as a result of queuing at the adjacent intersections.

Consequently, there are no issues with the location of the proposed North Access and South Access.

## 4.7 Sight Distance Review

A review of the available sight distance for the proposed Site Access was completed as part of this analysis.

The sight distance north and south of the South Access and North Access driveways are greater than the minimum stopping sight distance and decision sight distance requirements as identified in the

Transportation Association of Canada *Design Guide for Canadian Roads* (2017) [TAC Guidelines] for a design speed of 60km/h (85 metres & 95 metres respectively).

Consequently, there are no issues with the sight distance available for the proposed North Access and South Access driveways.

#### 4.8 Active Transportation Review

There is currently no dedicated cycling infrastructure or trail network adjacent to the proposed development. Cyclists from the subject site would be required to share the existing road network with all other users.

As noted in Section 2.2, dedicated bicycle infrastructure is planned along Yonge Street and Lockhart Road in the study area. The cycling network will connect to the existing and proposed major active transportation pathways on Yonge Street, Mapleview Drive East, Lockhart Road and future cycling network within the Hewitt Secondary Plan Area. As noted in Section 5.1 the proposed road network is approaching design capacity in 2031, based on the existing transportation modal split. It is recommended that the City continue to prioritize active transportation along these corridors, in order to provide the necessary transportation network capacity to accommodate the anticipated future transportation demands in the study area.

Also noted in Section 2.2, sidewalks are planned along Yonge Street and Lockhart Road in the study area. With these improvements the proposed development will connect into the sidewalk network on the adjacent streets and provide pedestrian access throughout the City.

The Town of Innisfil Transportation Master Plan (dated May 2018) [Innisfil TMP] has identified future improvements to add multi-use trails along Yonge Street, south of Lockhart Road. This would provide active transportation connections to the Town of Innisfil. The Innisfil TMP identifies this improvement in their long-term projects estimated by 2041

#### 4.9 Parking Review

The proposed parking supply for the subject site meets the minimum parking requirements specified in the City Zoning By-law Number 2009-141 [ZBL]. The proposed parking breakdown is provided in **Table 16**.

**Table 16 - Zoning By-law Parking Requirements**

Land Use	Uses	Zoning By-Law Section	Parking Standard	Size	Parking	
					Required	Provided
Residential	Residential units in a Mixed Use zone	5.4	1 space per dwelling unit	1,218 units	1,218 spaces	1,279 spaces
Commercial	Mixed-use commercial	14.4.1	1 parking space per 24 sq.m. of commercial GFA in mixed-use development	3,000 sq.m.	125 spaces	126 spaces
<b>TOTAL PARKING</b>					<b>1,343 spaces</b>	<b>1,390 spaces</b>
	Accessibility Parking	4.6.4	1 plus 3% of the total number of parking spaces provided in the parking area	-	42 spaces	42 spaces
Residential	Bicycle Parking	14.4.2	0.2 spaces / unit	1218 units	244 spaces	244 spaces
Commercial			7% of required vehicular spaces	3,000 sq.m.	9 space	15 spaces

#### 4.10 Construction Parking

Based on our correspondence with the design team for this project, the Client is committed to the following arrangement for construction parking:

The parking of construction vehicles and vehicles owned by staff and subcontractors employed by the will be formally directed (in writing where possible) to avoid parking on municipal streets surrounding the subject site and avoid parking within private parking lots surrounding the subject site, without consent from the owner of the parking lots.

## 5 Summary

**ASA Development Inc.** retained **JD Engineering** to prepare this traffic impact study in support of the proposed development a site municipally known as 989 Yonge Street located in the northeast corner of the Yonge Street / Lockhart Road intersection in the City of Barrie [City]. The proposed Site Plan is shown in **Appendix A**. This chapter summarizes the conclusions and recommendations from the study.

The proposed development will consist of 61 townhouse units, five residential condominiums (648 units) and four mixed-use buildings (510 units). The mixed-use buildings will have residential and commercial space in each building.

1. The Phase 1 of the proposed development is expected to generate a total of 29 AM and 37 PM peak hour trips. The ultimate build-out of the proposed development is expected to generate 393 AM and 442 PM peak hour trips
2. Background traffic and pedestrian counts were obtained from the City at the Yonge Street / Lockhart intersection, completed on Thursday, September 28<sup>th</sup>, 2017.
3. An estimate of the amount of traffic that would be generated by the Subject Site was prepared and assigned to the study area streets and intersections.

4. An intersection operation analysis was completed under total (2021, 2026 & 2031) traffic volumes with the proposed development operational at the study area intersections. The following improvements are recommended:

#### **Yonge Street / Lockhart Road**

Existing (2019) traffic volumes

- Reconstruct the asphalt at the northeast corner of the intersection (similar to the paved shoulder at the southwest corner of the intersection).

Total (2026) traffic volumes

- Replace southbound traffic signal heads in order to provide a protected southbound left turn phase.

Total (2031) traffic volumes

- Replace northbound and westbound traffic signal heads in order to provide a protected northbound and westbound left turn phase.

#### **Yonge Street / Street 'A' / South Access**

Total (2026) traffic volumes

- Signalization of intersection.
- Adjust pavement markings to accommodate a westbound left turn lane with a 15 metre storage and 15 metre taper length.

5. The proposed South Access will operate efficiently as a full-movement access. Prior to the reconstruction of Yonge Street, two-way stop control is recommended for the South Access / Street 'A' (eastbound and westbound) approach at Yonge Street, with a single ingress and egress lane for the South Access. Installation of traffic signals at the Yonge Street / Street 'A' / South Access intersection is recommended as part of the Yonge Street reconstruction works. For the signalized configuration, it is recommended that the South Access include a westbound through / right turn lane and an auxiliary left turn lane with a 15 metre storage length and a 15 metre taper length. It is recommended that the City monitor traffic volumes on Yonge Street to determine if temporary traffic signals are warranted ahead of the planned Yonge Street reconstruction.
6. The proposed North Access will operate efficiently as a full-movement access, with one-way stop control for westbound movements. A single ingress and egress lane at the North Access driveway will provide the necessary capacity to service the proposed development.
7. The sight distance available for the proposed North Access and South Access meets the minimum stopping sight distance and decision sight distance requirements.
8. The proposed parking meets the required parking requirements for the City.
9. In summary, the proposed development will not cause any operational issues and will not add significant delay or congestion to the local roadway network.

## Appendix A – Site Plan

SITE DATA		
989 Yonge Street, Innisfil, Ontario		
DATA	PERMITTED	PROPOSED
ZONING	R5 AND NMU	
LOT AREA (m²)	N/A	10.15 ha (site area) 0.43 ha (Lockhart road widening) 9.72 ha (developable area)

BUILDING DATA		
DATA	PERMITTED	PROPOSED
TOTAL DENSITY (# of units)	120 units/ha	BUILDING 1 = 220 (units) BUILDING 2 = 120 (units) BUILDING 3 = 85 (units) BUILDING 4 = 85 (units) BUILDING 5 = 115 (units) BUILDING 6 = 115 (units) BUILDING 7 = 150 (units) BUILDING 8 = 153 (units) BUILDING 9 = 115 (units) TOWNHOUSE = 60 (towns) TOTAL = 1218 (units) DENSITY = 120 units/ha
TOTAL RESIDENTIAL GFA (m²)	N/A	177,020 m²
TOTAL COMMERCIAL GFA (m²)	N/A	3,000 m²
BUILDING AREA (m²)	N/A	22,900 m² TOTAL PROJECT
GROSS FLOOR AREA (m²)	N/A	180,020 m² TOTAL PROJECT

LANDSCAPING DATA		
DATA	REQUIRED	PROVIDED
LANDSCAPE AREA (percentage)	25 %	61 %
LANDSCAPE AREA (m²)	25,350 m²	59,770 m²
includes pathways		

VEHICLE PARKING DATA		
DATA	REQUIRED	PROPOSED
APARTMENT RESIDENTIAL PARKING	1.0 / units	1204
TOWNHOUSE PARKING	1.0 / units	60
BARRIER FREE PARKING	3% (0.03 x 1398 = 42)	42
COMMERCIAL PARKING	1 / 24 m² (3,000/24 = 125)	126
MAXIMUM COMMERCIAL PARKING	1 / 18 m² (3,000/18 = 167)	
<b>TOTAL</b>		<b>1,390</b>

PARKING BREAKDOWN		
DATA	REQUIRED	PROPOSED
TOTAL SURFACE APARTMENT PARKING		37
TOTAL APARTMENT UNDERGROUND PARKING		1167
TOTAL SURFACE COMMERCIAL PARKING		104
TOTAL UNDERGROUND COMMERCIAL PARKING		22
TOTAL SURFACE PARKING TOWNHOUSES		60
<b>TOTAL PARKING</b>		<b>1,390</b>

BICYCLE PARKING		
DATA	REQUIRED	PROPOSED
RESIDENTIAL BICYCLE PARKING	0.2 / unit	244
COMMERCIAL BICYCLE PARKING	1/ each 7% of 167 stalls = 15	15

\* C = COMMERCIAL PARKING  
\*\* V = VISITOR PARKING

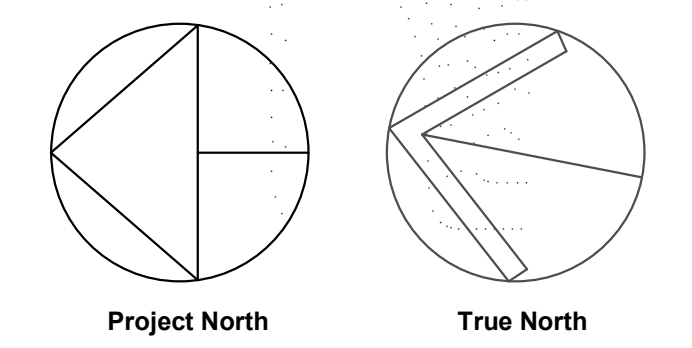
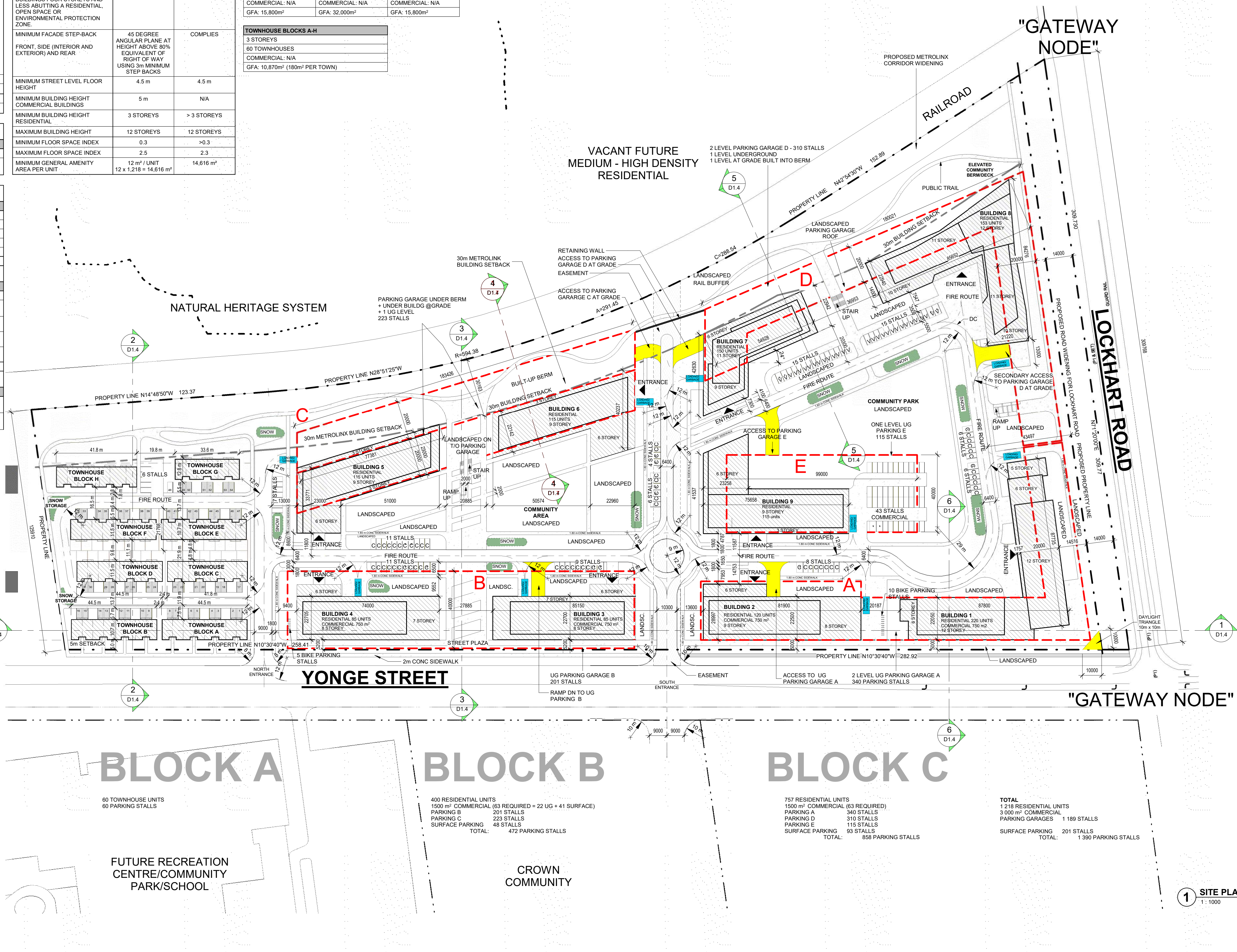
MIXED USE NMU - COMMERCIAL AND APARTMENTS	PERMITTED	PROPOSED
FRONT YARD (MIN) Lockhart Rd. used as frontage as part of zoning application.	0m	5 m
FRONT YARD (MIN)	Max. 50% of frontage within 5m	44%
SIDE OR REAR YARD SETBACK ABUTTING STREET (MIN)	1.5 m	1.5 m
SIDE OR REAR YARD (MIN)	5 m	5 m
NON-RESIDENTIAL BUILDINGS AND RESIDENTIAL BUILDINGS MORE THAN FOUR STOREYS ABUTTING A RESIDENTIAL OPEN SPACE OR ENVIRONMENTAL PROTECTION ZONE	5 m	33 m
MINIMUM SIDE OR REAR YARD SETBACK RESIDENTIAL BUILDINGS FOUR STOREYS AND LESS ABUTTING A RESIDENTIAL OPEN SPACE OR ENVIRONMENTAL PROTECTION ZONE	1.2 m	30 m
MINIMUM FACADE STEP-BACK	45 DEGREE ANGULAR PLANE AT HEIGHT ABOVE 80% EQUIVALENT OF RIGHT OF WAY USING 3m MINIMUM STEP BACKS	COMPLIES
FRONT, SIDE (INTERIOR AND EXTERIOR) AND REAR		
MINIMUM STREET LEVEL FLOOR HEIGHT	4.5 m	4.5 m
MINIMUM BUILDING HEIGHT COMMERCIAL BUILDINGS	5 m	N/A
MINIMUM BUILDING HEIGHT RESIDENTIAL	3 STOREYS	> 3 STOREYS
MAXIMUM BUILDING HEIGHT	12 STOREYS	12 STOREYS
MINIMUM FLOOR SPACE INDEX	0.3	>0.3
MAXIMUM FLOOR SPACE INDEX	2.5	2.3
MINIMUM GENERAL AMENITY AREA PER UNIT	12 m² / UNIT	14,616 m²

BUILDING 1	BUILDING 2	BUILDING 3
5+6+12 STOREYS	6+8+9 STOREYS	6+7+8 STOREYS
220 UNITS	120 UNITS	85 UNITS
COMMERCIAL: 750m²	COMMERCIAL: 750m²	COMMERCIAL: 750m²
GFA: 32,400m²	GFA: 17,000m²	GFA: 13,500m²

BUILDING 4	BUILDING 5	BUILDING 6
6+7+8 STOREYS	3+6+9 STOREYS	3+6+9 STOREYS
85 UNITS	115 UNITS	115 UNITS
COMMERCIAL: 750m²	COMMERCIAL: N/A	COMMERCIAL: N/A
GFA: 13,500m²	GFA: 14,350m²	GFA: 14,800m²

BUILDING 7	BUILDING 8	BUILDING 9
6+9+11 STOREYS	10+11+12 STOREYS	3+6+9 STOREYS
150 UNITS	153 UNITS	115 UNITS
COMMERCIAL: N/A	COMMERCIAL: N/A	COMMERCIAL: N/A
GFA: 15,800m²	GFA: 32,000m²	GFA: 15,800m²

TOWNHOUSE BLOCKS A-H
3 STOREYS
60 TOWNHOUSES
COMMERCIAL: N/A
GFA: 10,870m² (180m² PER TOWN)



- GENERAL NOTES**
- DO NOT SCALE DRAWINGS. WRITTEN DIMENSIONS SHALL HAVE PRECEDENCE OVER SCALED DIMENSIONS.
  - ALL WORK SHALL COMPLY WITH THE 2012 ONTARIO BUILDING CODE AND AMENDMENTS.
  - CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND SPECIFICATIONS AND REPORT ANY DISCREPANCIES TO THE ARCHITECT BEFORE PROCEEDING WITH THE WORK.
  - ALL CONTRACTORS AND SUB-CONTRACTORS SHALL HAVE A SET OF APPROVED CONSTRUCTION DOCUMENTS ON SITE AT ALL TIMES.
  - ALL DOCUMENTS REMAIN THE PROPERTY OF THE ARCHITECT. UNAUTHORIZED USE, MODIFICATION AND/OR REPRODUCTION OF THESE DOCUMENTS IS PROHIBITED WITHOUT WRITTEN PERMISSION. THE CONTRACT DOCUMENTS WERE PREPARED BY THE CONSULTANT FOR THE ACCOUNT OF THE OWNER.
  - THE MATERIAL CONTAINED HEREIN REFLECTS THE CONSULTANT'S BEST JUDGMENT IN LIGHT OF THE INFORMATION AVAILABLE TO HIM AT THE TIME OF PREPARATION. ANY USE WHICH A THIRD PARTY MAKES OF THE CONTRACT DOCUMENTS, OR ANY RELIANCE ON OR DECISIONS TO BE MADE BASED ON THEM ARE THE RESPONSIBILITY OF SUCH THIRD PARTIES.
  - THE CONSULTANT ACCEPTS NO RESPONSIBILITY FOR DAMAGES, IF ANY, SUFFERED BY ANY THIRD PARTY AS A RESULT OF DECISIONS MADE OR ACTIONS BASED ON THE CONTRACT DOCUMENTS.

No.	Date	Revision

Project No. 19006  
 Project Date 2019-06-14  
 Drawn by Author  
 Checked by MB  
 Plot Date / Time 2020-02-04 11:43:44 AM

**989 YONGE STREET, BARRIE**

**OVERALL SITE PLAN**

1 SITE PLAN  
1:1000

Drawing Scale As indicated  
 Status  
 PRELIMINARY  
 Drawing No. Revision No.  
**D1.1**

Do not scale drawings. Contractors must check and verify all dimensions and report any discrepancies to the Architect. Unapproved use, modification, or reproduction of these documents is prohibited without the written permission of the Architect. The Consultant is not responsible for any errors or omissions made or actions based on the Contract Documents. The material contained herein reflects the Consultant's best judgment in light of the information available to him at the time of preparation and is not intended to constitute a contract. The Consultant accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on the Contract Documents. C:\Users\cdicu\Documents\19006\_989 Yonge Street\_2019-02-19\_V7\_Full Project\_cdicu@srmarchitects.ca.rvt

## Appendix B – Hewitt MTS Excerpts



Draft Plan of Subdivisions, Hewitt Landowners  
Group (HLG)

# UPDATED MASTER TRANSPORTATION STUDY

February 2019  
17092

## 5 FUTURE TRAFFIC CONDITIONS – INTERIM BUILD-OUT (2020-2021)

This section discusses the analysis of the traffic conditions under the Interim Horizon traffic conditions, which corresponds to the build out of approximately 16 percent of the Hewitt development. This interim horizon corresponds to the year 2020-2021 for analysis of the traffic impacts prior to the implementation of the Harvie Road / Big Bay Point overpass at Highway 400; the overpass is expected to be in operation at the end of 2020. The Interim analysis will be broken down into two scenarios:

1. Future Background – prior to the addition of Hewitt site traffic; and
2. Future Total – after the addition of Hewitt site traffic.

### 5.1 ROAD NETWORK

The 2020-2021 roadway network reflects all of the implemented improvements for this horizon year listed in Table 1-2, which is located in Section 1.5 of this report. The intersection control types and lane configurations for all intersections under the 2020-2021 horizon year prior to the Hewitt development (background scenario) is illustrated in Figure 5-1. To be conservative the existing road network was used as a baseline, assuming no roadway improvements.

### 5.2 GROWTH

To account for background growth for the Interim Horizon, the existing traffic demand was factored up by an annual growth rate that was calculated from the City's EMME macro travel demand forecast model. The average annual growth rates were calculated to be 1.57 percent and 1.62 percent for the AM and PM peak hours, respectively.

In addition to the annual growth rate, the traffic associated with the development of the Salem Secondary Plan Area was added to the analysis. The traffic volumes associated with Salem were extracted from the transportation study prepared for the Crisdawn development by BA Group, of which an extract is provided in Appendix H. The traffic volumes forecasted by BA Group were added to the appropriate centroids in the Hewitt Aimsun model and distributed based on the City's 2031 EMME traversal demand matrices.

The growth methodology and distribution of Salem traffic is discussed in detail in the Modelling Report provided in Appendix C.

200 0 200 600m  
SCALE = 1:5000 (AO)

2031 DEVELOPMENT PLAN

A. BEMP HOLDINGS 1 INC.  
 B. BEMP HOLDINGS 2 INC.  
 C. VAN DER HAYDEN  
 D. LOCKHART INVESTMENTS LTD.  
 E. LOCKHART INVESTMENTS LTD.  
 F. LOCKHART INVESTMENTS LTD.  
 G. MYRTLE BERRICE IVING  
 H. RAINSONG LAND DEVELOPMENT INC.  
 I. CRISDAWN CONSTRUCTION INC. (WEST OF EPI)  
 J. CRISDAWN CONSTRUCTION INC. (NORTH)  
 K. CRISDAWN CONSTRUCTION INC. (SOUTH)  
 L. 230375 ONTARIO INC. (CARRELLI)  
 M. 1091389 ONTARIO INC. (SULLIV)  
 N. FINGER LAKES ESTATES INC.  
 O. 1597229 ONTARIO INC. (BLUE SKY NORTH)  
 P. 1597229 ONTARIO INC. (BLUE SKY EAST)  
 Q. 2121191 ONTARIO INC. (LM BARRIE)  
 R. SOBEY'S  
 S. DORSEY DEVELOPMENT  
 AA. MAPLEVIEW SOUTH (INVEST) LTD.  
 Y. MAPLEVIEW SOUTH (INVEST) LTD.  
 Z. 961 BIG BAY LTD.

Phase 1-3 Participating Landowner Unit Counts/Estimates																	
Map ID	Ownership Map #	Land Owner	Total Area (ha.)	Developable Area within Phase 1 COB Sec Plan	Total Area within 2031 Boundary (ha.)	Total Developable (ha.)	Developable Area within 2031 Boundary (2031) ha.	Phase 1	Phase 2	Phase 3	Phase 4	Total	Estimated Occupancy 2019	Estimated Occupancy 2020	Estimated Occupancy 2021	Estimated Occupancy 2022	Estimated Occupancy 2023
A	51	BEMP Holdings 1 Inc.	36.59	0.00	36.59	23.40	23.40	0	375	0	0	375					
B	53	BEMP Holdings 2 Inc.	19.44	19.44	19.44	19.44	19.44	0	0	0	0	0	218	90			
C	52	Van der Hayden	3.17	0.00	3.17	3.17	3.17	0	0	0	0	0					
D	56 & 58	Lockhart Investments Ltd.	19.73	0.00	19.73	15.44	15.44	0	187	0	0	187					
E	55	Lockhart Investments Ltd II	32.19	0.00	32.19	19.86	19.86	0	402.5	0	0	402.5					
F	54, 57 & 60	Lockhart Investments Ltd III	65.95	65.95	65.95	65.95	65.95	1163.5	0	0	0	1163.5	200	181			
G	59	Myrtle Berrice Ivring	27.93	0.00	27.93	27.93	27.93	0	698.25	0	0	698.25					
H(a)	61	Rainsong Land Development Inc.	15.49	15.49	15.49	15.49	15.49	0	0	0	0	0	200	180			
H(b)	61	Rainsong Land Development Inc.	34.70	10.68	34.70	34.70	34.70	0	362.5	0	0	362.5					
I	63	Crisdawn Construction Inc.	18.43	18.43	18.43	18.43	18.43	0	0	0	0	0	482	300			
J	67 & 68	Crisdawn Construction Inc.	122.40	35.76	122.40	97.16	97.16	0	0	0	0	0					
K	74, 75 & 79	Crisdawn Construction Inc.	3.98	3.98	3.98	3.98	3.98	2.5	0	0	0	2.5					
L	64	230375 Ontario Inc. (Campbell)	4.29	4.29	4.29	3.53	3.53	0	0	0	0	0	26	27			
M	73	1091389 Ontario Inc.	39.83	38.27	39.83	38.27	38.27	0	0	0	0	0	200	109			
N(a)*	77	Finger Lakes Estates Inc.	4.11	1.11	4.11	4.11	4.11	0	0	0	0	0					
N(b)*	77	Finger Lakes Estates Inc.	15.23	0.00	15.23	11.83	11.83	0	0	0	0	0					
O	84	1597229 Ontario Inc.	38.47	31.76	38.47	32.39	32.39	0	0	0	0	0	200	180			
P	86	1597229 Ontario Inc.	41.07	8.38	21.17	38.96	19.94	137.5	0	211.5	0	349					
Q	85	2121191 / LM Barrie	41.53	36.11	38.13	41.48	41.48	799.5	0	33	0	832.5	200	123			
R	87	Sobeys	8.18	8.18	8.18	8.18	8.18	0	0	0	0	0					
S	81, 82, & 83	Dorsey Development	80.23	0	0.00	51.88	0.00	0	0	0	0	267.5					
AA	88	Mapleview South (Invest) Ltd.	1.79	1.79	1.79	1.79	1.79	0	0	0	0	0					
Y*	89	Mapleview South (Invest) Ltd.	18.95	14.62	18.95	14.62	14.62	0	0	0	0	0	30	90			
Z	90	961 Big Bay Ltd.	0.64	0.64	0.64	0.64	0.64	0	0	0	0	0					
<b>Total</b>			<b>651.61</b>	<b>361.75</b>	<b>667.05</b>	<b>562.72</b>	<b>511.65</b>	<b>6361</b>	<b>2676</b>	<b>1208</b>	<b>268</b>	<b>9935</b>	<b>1900</b>	<b>1330</b>	<b>1480</b>	<b>1360</b>	<b>1300</b>

Phase 1-3 Non-Participating Landowner Unit Counts/Estimates															
Map ID	Ownership Map #	Total Area (ha.)	Developable Area within Phase 1 COB Sec Plan	Total Area within 2031 Boundary (ha.)	Total Developable (ha.)	Phase 1	Phase 2	Phase 3	Phase 4	Total	Estimated Occupancy 2019	Estimated Occupancy 2020	Estimated Occupancy 2021	Estimated Occupancy 2022	Estimated Occupancy 2023
T*	T	4.77	0.00	4.77	4.77	0	238.5	0	0	238.5					
U*	U	3.84	3.84	3.84	3.84	192	0	0	0	192					
V*	V	11.10	0.00	11.10	11.10	0	555	0	0	555					
W*	W	26.18	2.21	26.18	10.44	55.25	0	0	0	967.6					
X	X	1.01	1.01	1.01	1.01	0	0	0	0	0					
BB	BB	0.26	0.26	0.26	0.26	6	0	0	0	6					
CC	CC	0.40	0.40	0.40	0.40	6	0	0	0	6					
<b>Total</b>		<b>47.56</b>	<b>7.72</b>	<b>47.56</b>	<b>31.82</b>	<b>259.25</b>	<b>793.5</b>	<b>967.6</b>	<b>0</b>	<b>2040.35</b>					

Hewitt's Secondary Plan Overall Development Plan



Date Issued: November 16, 2016

Checked By: RD

Project No: EAS-11118

Drawn By: m.m.r.

Drawing Name: EAS-11118-DirPlan-16-11-15.dwg

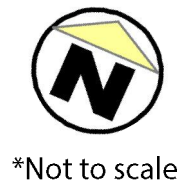
- Subject Lands
- City of Barrie Secondary Plan 2031 Boundary
- Natural Heritage System Including Buffer
- Phase 1-3 Non-Participating Landowners
- Phase Line and Number
- Phase 1 Properties Expected to Immediately Proceed
- \* Unit Count is an estimate only based on Secondary Plan Density permissions

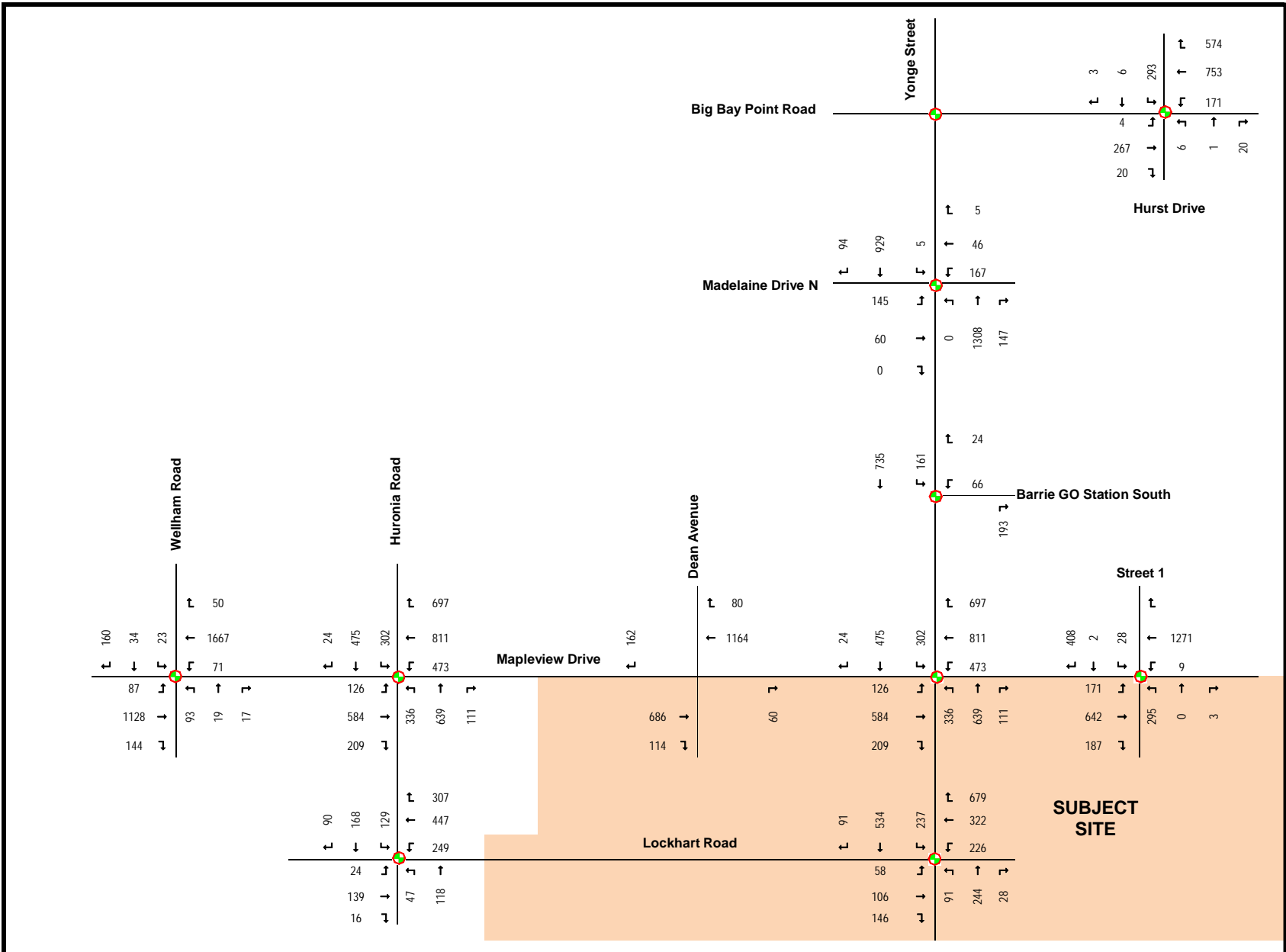


Figure ES-5  
Proposed Future Sidewalk Network Plan  
Hewitt Secondary Plan Area - Master Transportation Study

Legend

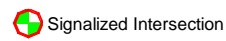
— Sidewalks on Both Sides



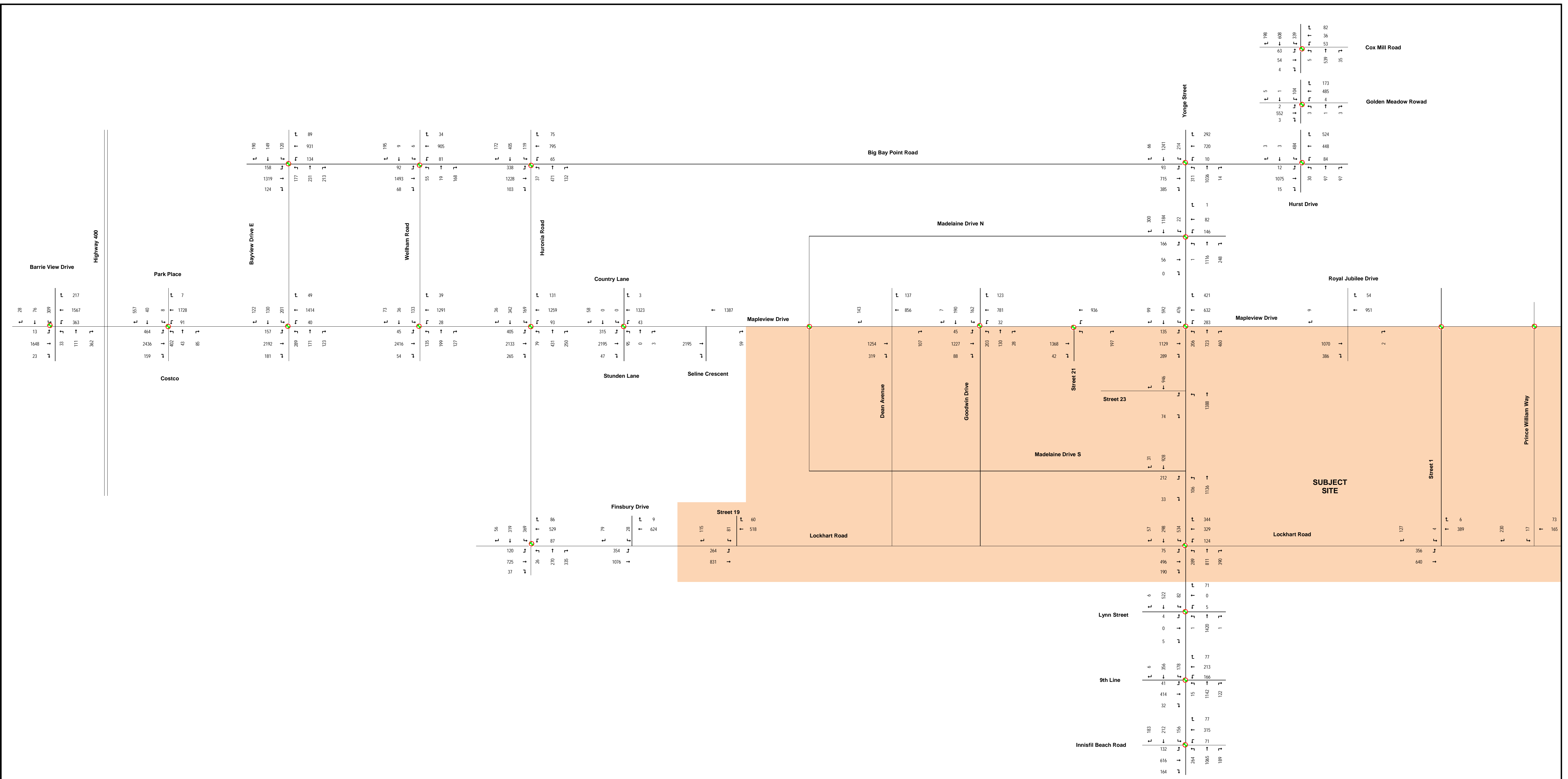


**FIGURE 4-2**  
**Future Total Traffic Volumes - Ultimate Horizon (2031)**  
**AM Peak Hour**  
**Constraint Areas**

**LEGEND**  
 XX Peak Hour Traffic Volumes

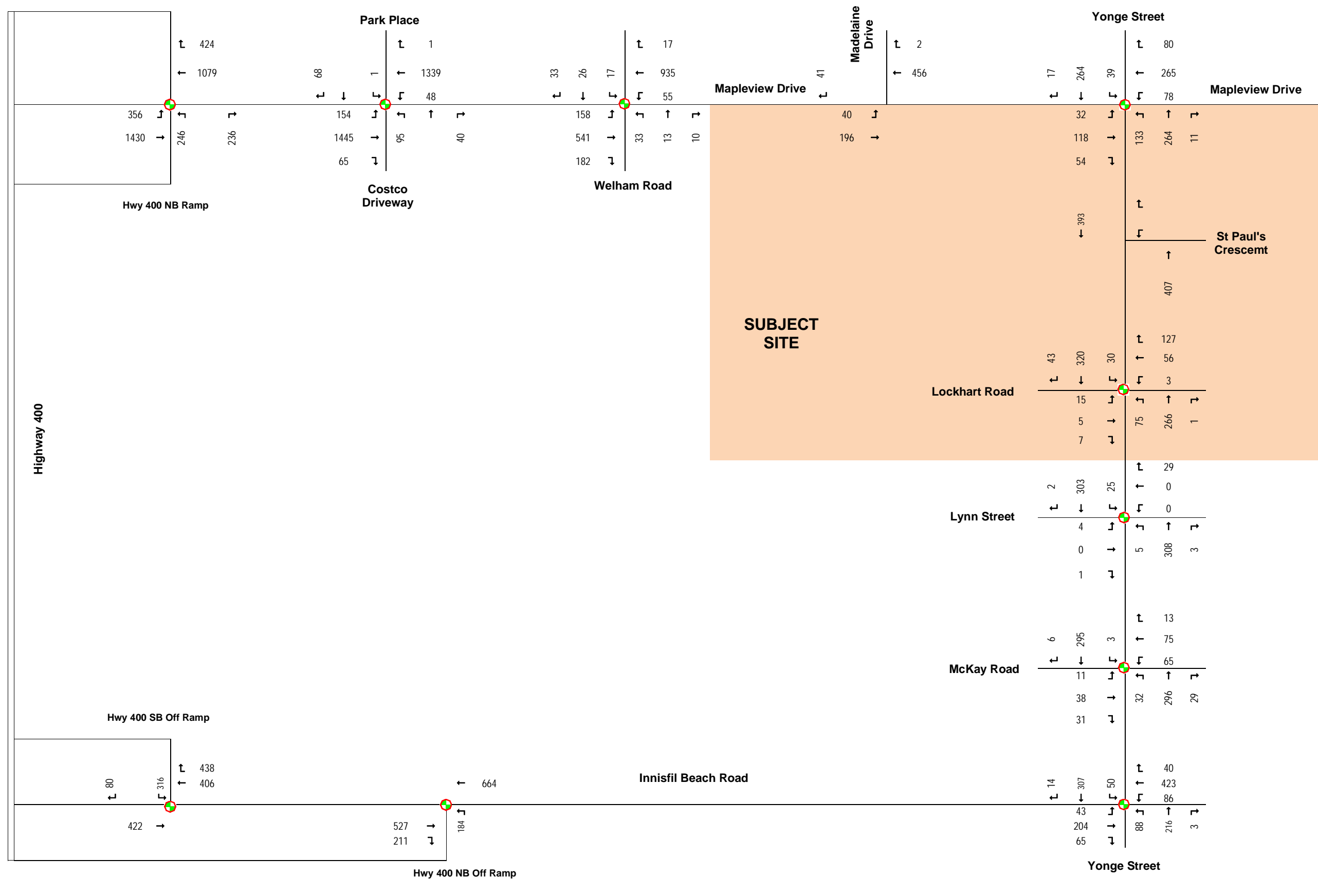


**NOT TO SCALE**



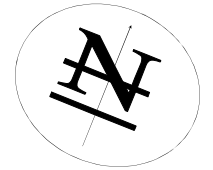
**FIGURE 4-3**  
 Future Total Traffic Volumes- Ultimate Horizon (2031)  
 PM Peak Hour  
 Constraint Areas

**LEGEND**  
 XX Peak Hour Traffic Volumes  
 Signalized Intersection

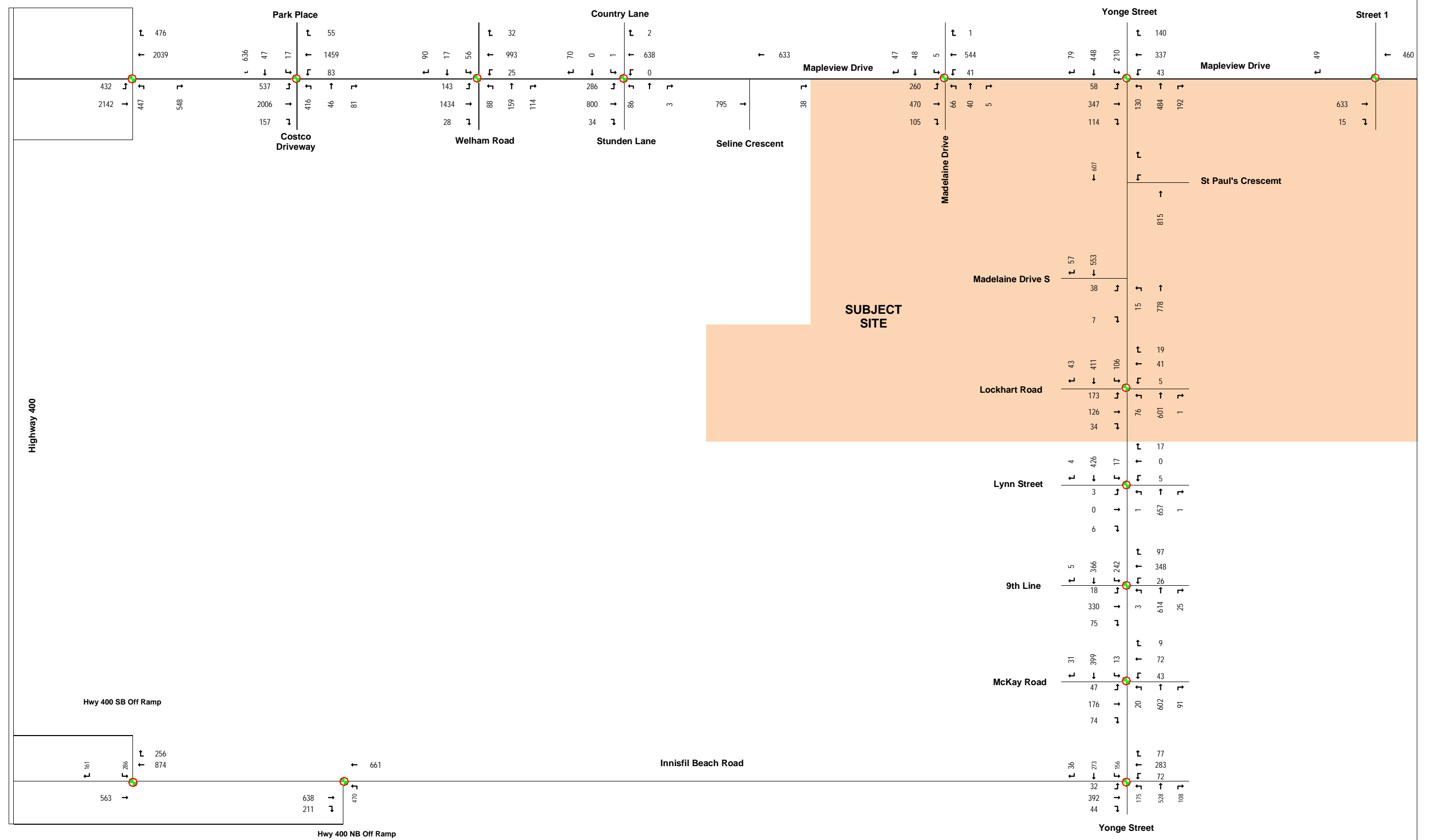


**FIGURE 5-2**  
**Future Background Traffic Volumes - Interim Horizon (2020)**  
**AM Peak Hour**  
**Constraint Areas**

**LEGEND**  
 XX Peak Hour Traffic Volumes  
 Signalized Intersection

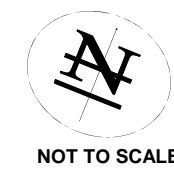


NOT TO SCALE



**FIGURE 5-5**  
**Future Total Traffic Volumes - Interim Horizon (2020)**  
**PM Peak Hour**  
**Constraint Areas**

**LEGEND**  
 XX Peak Hour Traffic Volumes  
 Signalized Intersection

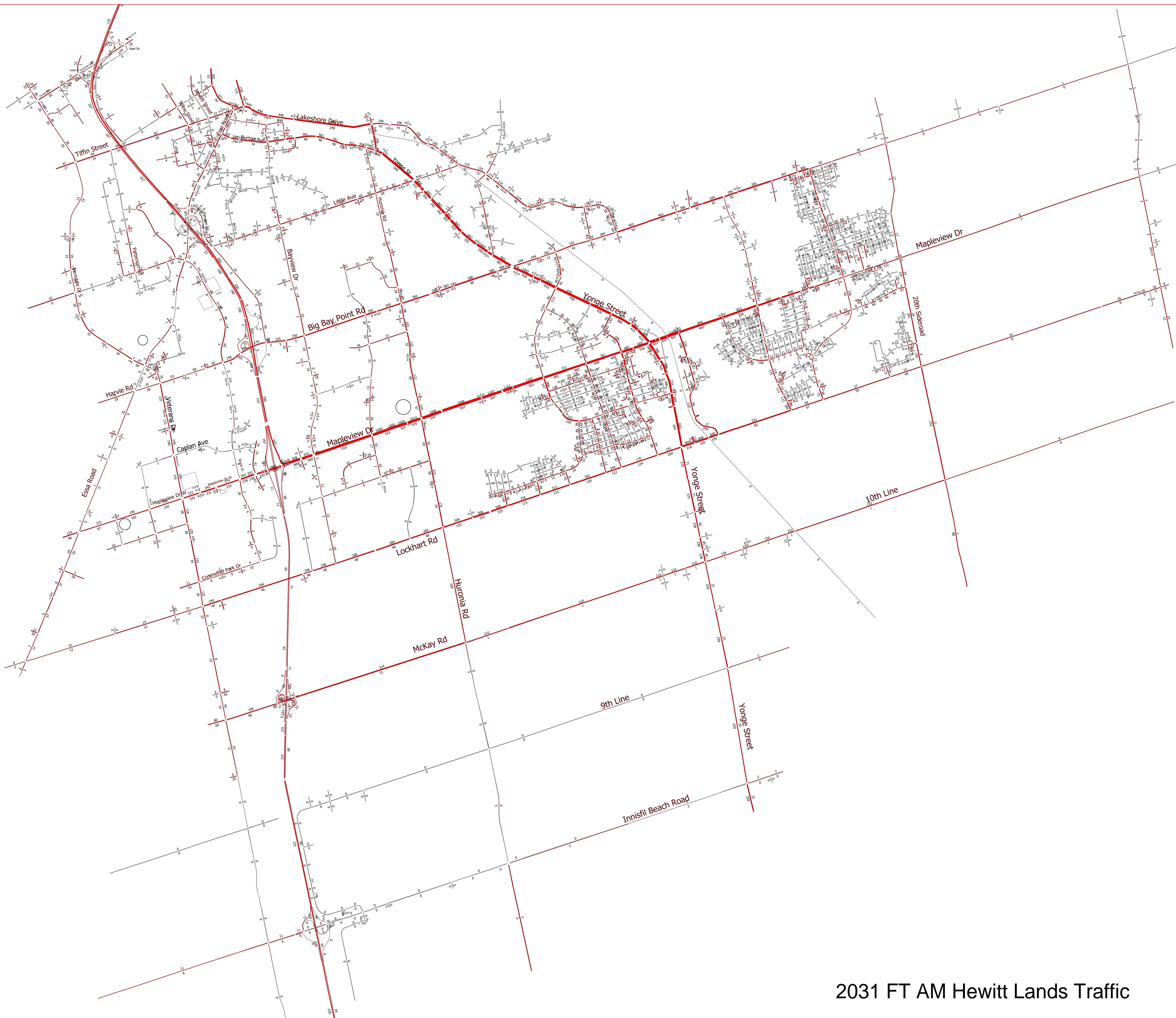


NOT TO SCALE

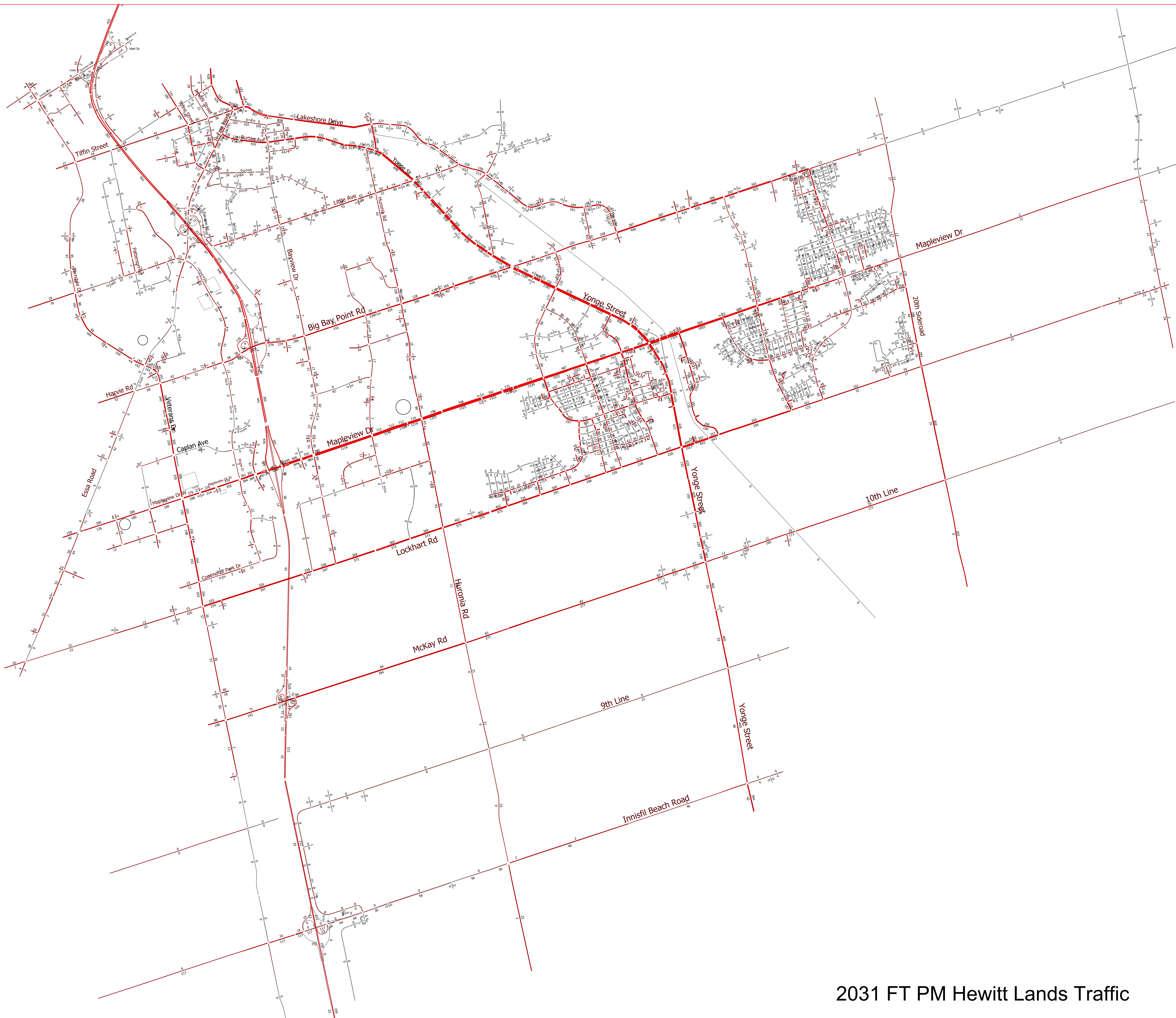
***APPENDIX H***

*Ultimate 2031 Future Total Site Traffic Assignment Volumes*





2031 FT AM Hewitt Lands Traffic



2031 FT PM Hewitt Lands Traffic

***APPENDIX I***

***Interim 2020 Future Total Site Traffic Assignment Volumes***





2020-2021 FT AM Hewitt Lands Traffic

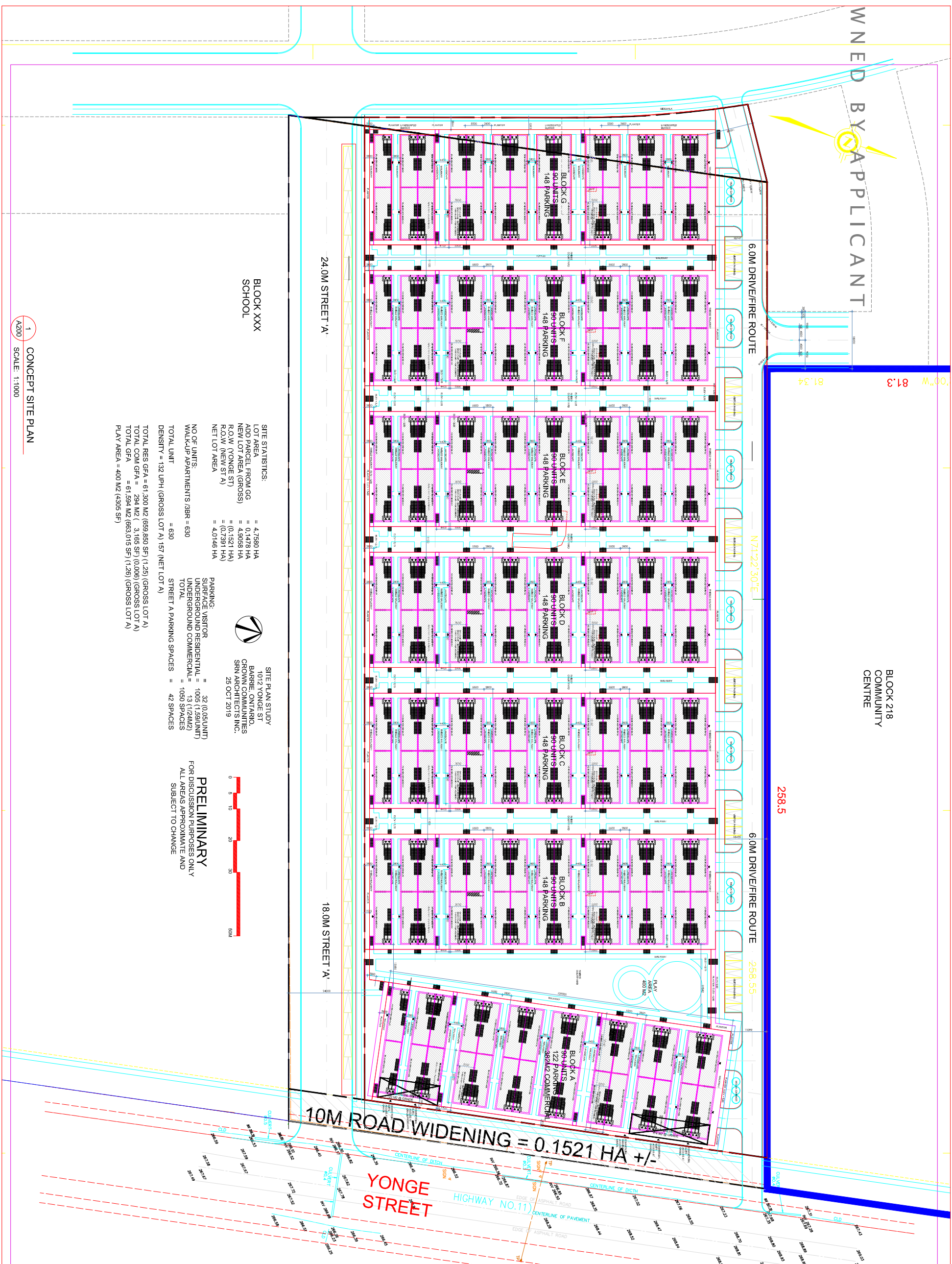


## Appendix C – Crown Developments Conceptual Site Plan

W N E D B Y A P P L I C A N T

BLOCK 218  
COMMUNITY  
CENTRE

**PRELIMINARY**  
NOT FOR CONSTRUCTION  
THE BUILDINGS ARE SPANNED AS PER AREA 13



BLOCK XXX  
SCHOOL

**SITE STATISTICS:**

LOT AREA	= 4,7580 HA
ADD PARCEL FROM GG	= 0,1478 HA
NEW LOT AREA (GROSS)	= 4,9058 HA
ROW (YONGE ST)	= (0,1521 HA)
ROW (NEW ST A)	= (0,7391 HA)
NET LOT AREA	= 4,0146 HA

**NO OF UNITS:**

WALK-UP APARTMENTS /BR	= 630
TOTAL UNIT	= 630
DENSITY = 132 UPH (GROSS LOT A) /57 (NET LOT A)	

**TOTAL RES GFA = 61 300 M2 (669 850 SF) (1,29) (GROSS LOT A)**

**TOTAL COM GFA = 294 M2 ( 3,185 SF) (0,006) (GROSS LOT A)**

**TOTAL GFA = 61,594 M2 (669,015 SF) (1,29) (GROSS LOT A)**

**PLAY AREA = 400 M2 (4305 SF)**

**SITE PLAN STUDY**  
1072 YONGE ST  
BARRE, ONTARIO  
CROWN COMMUNITIES  
SRM ARCHITECTS INC.  
25 OCT 2019



**PRELIMINARY**  
FOR DISCUSSION PURPOSES ONLY  
ALL AREAS APPROXIMATE AND  
SUBJECT TO CHANGE

1 CONCEPT SITE PLAN  
A200 SCALE: 1:1000

Proposed Residential Development  
YONGE STREET  
BARRE, ON

CONCEPT SITE PLAN  
MODULE V3  
24OCT19 1:500  
VS

S19013 A100

## Appendix D – Traffic Count Data





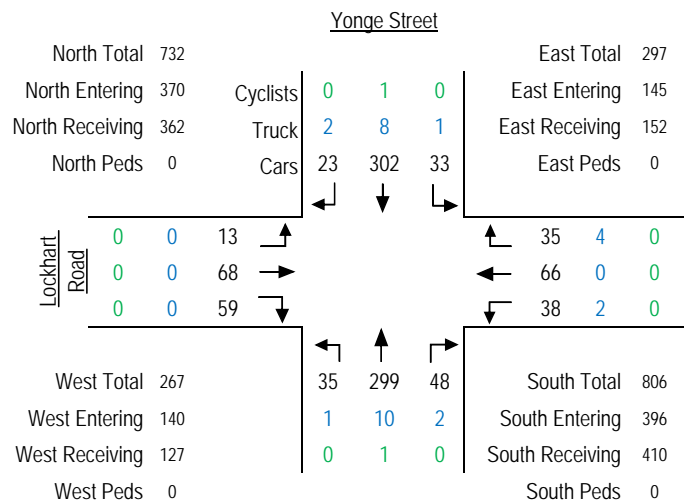
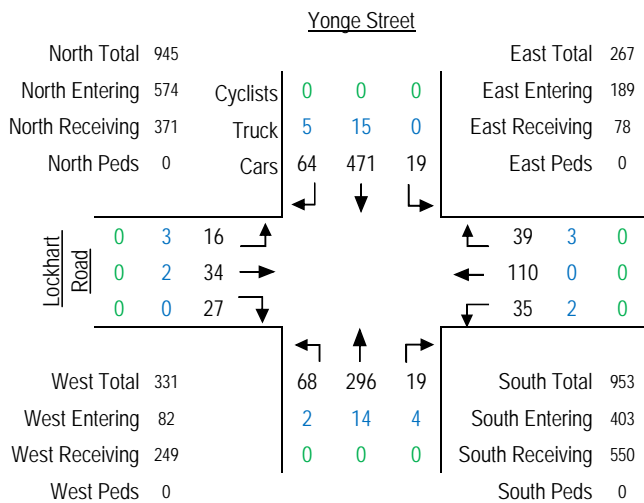
### Turning Movement Count Diagram

Intersection: Yonge Street and Lockhart Road  
 Municipality: Barrie, Ontario

Intersection ID:  
 Date: Thursday September 28, 2017

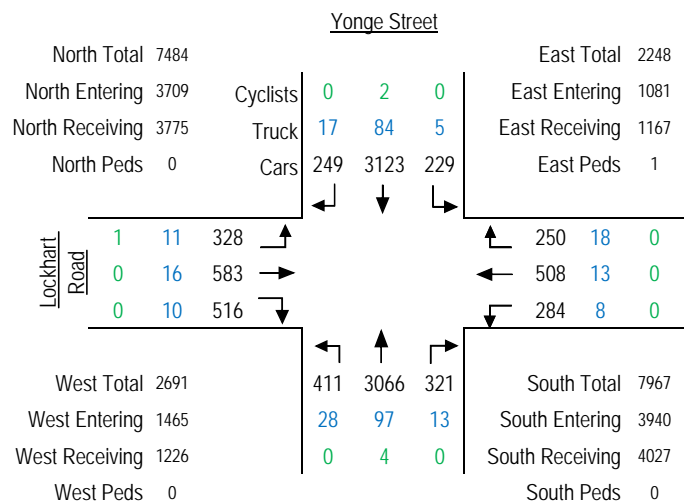
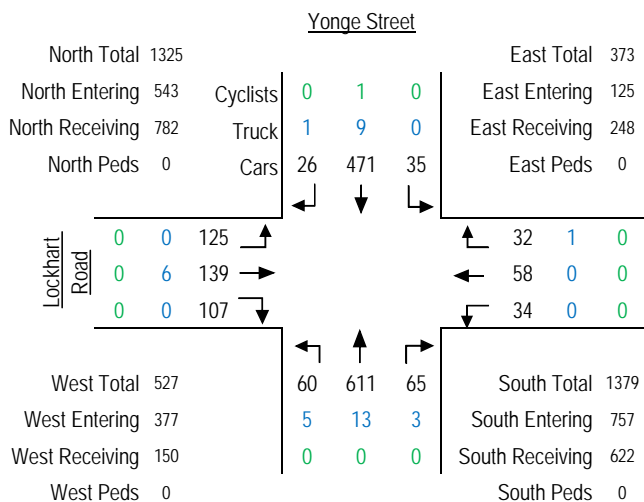
AM Peak Hour: 7:30 to 8:30

MD Peak Hour: 12:30 to 13:30



PM Peak Hour: 16:30 to 17:30

Total 8-Hour Count



## **Appendix E – Synchro Analysis Output – Existing Traffic Volumes**

989 Yonge St  
1: Lockhart Rd & Yonge St

Queues  
Existing (2019) AM Peak Hour



Lane Configurations	↕		↕		↗	↕	↗	↗	↘
Future Volume (vph)	20	37	38	114	72	320	24	20	502
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Permitted Phases	4		8		2		2		6
Switch Phase									
Minimum Split (s)	29.0	29.0	29.0	29.0	32.0	32.0	32.0	32.0	32.0
Total Split (%)	47.5%	47.5%	47.5%	47.5%	52.5%	52.5%	52.5%	52.5%	52.5%
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Total Lost Time (s)	7.0		7.0		7.0	7.0	7.0	7.0	7.0
Lead-Lag Optimize?									
v/c Ratio	0.25		0.54		0.23	0.36	0.03	0.04	0.64
Queue Delay	0.0		0.0		0.0	0.0	0.0	0.0	0.0
Queue Length 50th (m)	4.6		14.7		3.5	17.0	0.0	0.9	36.0
Internal Link Dist (m)	462.7		501.4		278.5		230.8		
Base Capacity (vph)	654		702		327	937	755	548	938
Spillback Cap Reductn	0		0		0	0	0	0	0
Reduced v/c Ratio	0.14		0.29		0.23	0.36	0.03	0.04	0.64

Cycle Length: 61

Natural Cycle: 65













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

Splits and Phases: 1: Lockhart Rd & Yonge St



989 Yonge St  
1: Lockhart Rd & Yonge St

HCM Signalized Intersection Capacity Analysis  
Existing (2019) AM Peak Hour

												
Lane Configurations	↕		↕		↗		↑		↖		↘	
Future Volume (vph)	20	37	28	38	114	43	72	320	24	20	502	71
Total Lost time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Frt	0.96		0.97		1.00		1.00		0.85		1.00	
Satd. Flow (prot)	1709		1807		1752		1810		1392		1805	
Satd. Flow (perm)	1539		1659		633		1810		1392		1799	
Adj. Flow (vph)	21	39	29	40	120	45	76	337	25	21	528	75
Lane Group Flow (vph)	0	66	0	0	185	0	76	337	13	21	596	0
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA	
Permitted Phases	4		8		2		2		6			
Effective Green, g (s)	11.7		11.7		27.8		27.8		27.8		27.8	
Clearance Time (s)	7.0		7.0		7.0		7.0		7.0		7.0	
Lane Grp Cap (vph)	336		362		328		940		723		550	
v/s Ratio Perm	0.04		c0.11		0.12		0.01		0.02			
Uniform Delay, d1	17.1		18.4		7.0		7.6		6.2		6.3	
Incremental Delay, d2	0.3		1.2		1.6		1.1		0.0		0.1	
Level of Service	B		B		A		A		A		B	
Approach LOS	B		B		A		A		A		B	
HCM 2000 Control Delay	12.5		HCM 2000 Level of Service		B							
Actuated Cycle Length (s)	53.5		Sum of lost time (s)		14.0							
Analysis Period (min)	15											

989 Yonge St  
1: Lockhart Rd & Yonge St

Queues  
Existing (2019) PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	129	150	35	60	67	644	70	36	496
Future Volume (vph)	129	150	35	60	67	644	70	36	496
Lane Group Flow (vph)	0	414	0	137	71	685	74	38	558
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		4		8		2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	2	2	2	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	25.0	25.0	25.0	25.0	25.0
Minimum Split (s)	29.0	29.0	29.0	29.0	32.0	32.0	32.0	32.0	32.0
Total Split (s)	29.0	29.0	29.0	29.0	32.0	32.0	32.0	32.0	32.0
Total Split (%)	47.5%	47.5%	47.5%	47.5%	52.5%	52.5%	52.5%	52.5%	52.5%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	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
Total Lost Time (s)		7.0		7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
v/c Ratio		0.82		0.28	0.27	0.84	0.10	0.23	0.69
Control Delay		31.3		12.6	15.4	28.3	4.0	16.3	19.6
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		31.3		12.6	15.4	28.3	4.0	16.3	19.6
Queue Length 50th (m)		37.6		8.2	5.1	68.6	0.2	2.7	49.9
Queue Length 95th (m)		#78.5		19.4	14.5	#135.0	6.6	9.6	#89.6
Internal Link Dist (m)		462.7		501.4		278.5			230.8
Turn Bay Length (m)					39.0		27.0	66.0	
Base Capacity (vph)		601		591	259	813	725	164	811
Starvation Cap Reductn		0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0	0
Reduced v/c Ratio		0.69		0.23	0.27	0.84	0.10	0.23	0.69

Intersection Summary

Cycle Length: 61

Actuated Cycle Length: 57.5

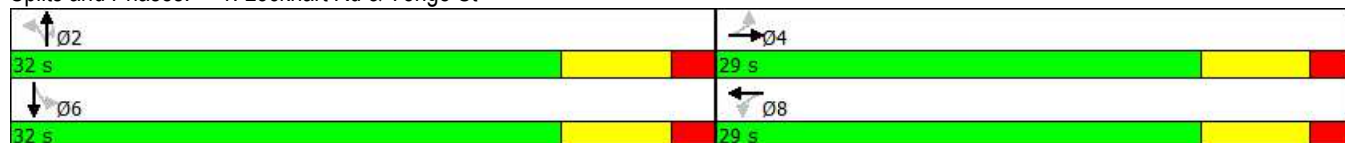
Natural Cycle: 65

Control Type: Semi Act-Uncoord

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





















Queue shown is maximum after two cycles.

Splits and Phases: 1: Lockhart Rd & Yonge St



989 Yonge St  
1: Lockhart Rd & Yonge St

HCM Signalized Intersection Capacity Analysis  
Existing (2019) PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	150	110	35	60	34	67	644	70	36	496	28
Future Volume (vph)	129	150	110	35	60	34	67	644	70	36	496	28
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	7.0	7.0	7.0	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Fr <sub>t</sub>		0.96			0.96		1.00	1.00	0.85	1.00	0.99	
Fl <sub>t</sub> Protected		0.98			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1772			1780		1770	1863	1568	1805	1850	
Fl <sub>t</sub> Permitted		0.84			0.82		0.32	1.00	1.00	0.20	1.00	
Satd. Flow (perm)		1507			1484		594	1863	1568	375	1850	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	137	160	117	37	64	36	71	685	74	38	528	30
RTOR Reduction (vph)	0	25	0	0	22	0	0	0	41	0	3	0
Lane Group Flow (vph)	0	389	0	0	115	0	71	685	33	38	555	0
Heavy Vehicles (%)	0%	3%	1%	0%	0%	6%	2%	2%	3%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		18.3			18.3		25.1	25.1	25.1	25.1	25.1	
Effective Green, g (s)		18.3			18.3		25.1	25.1	25.1	25.1	25.1	
Actuated g/C Ratio		0.32			0.32		0.44	0.44	0.44	0.44	0.44	
Clearance Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		480			473		259	814	685	163	808	
v/s Ratio Prot								c0.37			0.30	
v/s Ratio Perm		c0.26			0.08		0.12		0.02	0.10		
v/c Ratio		0.81			0.24		0.27	0.84	0.05	0.23	0.69	
Uniform Delay, d <sub>1</sub>		18.0			14.4		10.3	14.4	9.3	10.1	13.0	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d <sub>2</sub>		10.0			0.3		2.6	10.3	0.1	3.3	4.7	
Delay (s)		28.0			14.7		12.9	24.6	9.4	13.4	17.7	
Level of Service		C			B		B	C	A	B	B	
Approach Delay (s)		28.0			14.7			22.3			17.4	
Approach LOS		C			B			C			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			21.5				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			57.4				Sum of lost time (s)			14.0		
Intersection Capacity Utilization			95.8%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

## Appendix F – Synchro Analysis Output – Total Traffic Volumes

989 Yonge St  
1: Lockhart Rd & Yonge St

Queues  
Total (2021) AM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	34	41	55	124	78	340	27	34	580
Future Volume (vph)	34	41	55	124	78	340	27	34	580
Lane Group Flow (vph)	0	124	0	298	82	358	28	36	709
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		4		8		2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	2	2	2	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	25.0	25.0	25.0	25.0	25.0
Minimum Split (s)	29.0	29.0	29.0	29.0	32.0	32.0	32.0	32.0	32.0
Total Split (s)	62.0	62.0	62.0	62.0	48.0	48.0	48.0	48.0	48.0
Total Split (%)	56.4%	56.4%	56.4%	56.4%	43.6%	43.6%	43.6%	43.6%	43.6%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	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
Total Lost Time (s)		7.0		7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
v/c Ratio		0.37		0.74	0.29	0.35	0.03	0.06	0.69
Control Delay		19.4		33.5	12.9	10.3	2.4	8.7	16.3
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		19.4		33.5	12.9	10.3	2.4	8.7	16.3
Queue Length 50th (m)		10.2		34.1	5.4	24.4	0.0	2.0	63.2
Queue Length 95th (m)		23.8		59.7	17.4	50.4	2.8	7.2	127.9
Internal Link Dist (m)		462.7		501.4		278.5			230.8
Turn Bay Length (m)					39.0		27.0	66.0	
Base Capacity (vph)		1029		1251	286	1035	813	586	1030
Starvation Cap Reductn		0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0	0
Reduced v/c Ratio		0.12		0.24	0.29	0.35	0.03	0.06	0.69

Intersection Summary

Cycle Length: 110  
Actuated Cycle Length: 71.9  
Natural Cycle: 65  
Control Type: Semi Act-Uncoord




















Splits and Phases: 1: Lockhart Rd & Yonge St



989 Yonge St  
1: Lockhart Rd & Yonge St

HCM Signalized Intersection Capacity Analysis










Total (2021) AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	41	43	55	124	104	78	340	27	34	580	93
Future Volume (vph)	34	41	43	55	124	104	78	340	27	34	580	93
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	7.0	7.0	7.0	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Flt		0.95			0.95		1.00	1.00	0.85	1.00	0.98	
Flt Protected		0.99			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1694			1766		1752	1810	1392	1805	1794	
Flt Permitted		0.77			0.91		0.27	1.00	1.00	0.54	1.00	
Satd. Flow (perm)		1330			1618		500	1810	1392	1024	1794	
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)	36	43	45	58	131	109	82	358	28	36	611	98
RTOR Reduction (vph)	0	28	0	0	29	0	0	0	12	0	3	0
Lane Group Flow (vph)	0	96	0	0	269	0	82	358	16	36	706	0
Heavy Vehicles (%)	8%	5%	3%	3%	0%	2%	3%	5%	16%	0%	3%	8%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		16.7			16.7		41.2	41.2	41.2	41.2	41.2	
Effective Green, g (s)		16.7			16.7		41.2	41.2	41.2	41.2	41.2	
Actuated g/C Ratio		0.23			0.23		0.57	0.57	0.57	0.57	0.57	
Clearance Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		308			375		286	1037	797	586	1027	
v/s Ratio Prot								0.20			c0.39	
v/s Ratio Perm		0.07			c0.17		0.16		0.01	0.04		
v/c Ratio		0.31			0.72		0.29	0.35	0.02	0.06	0.69	
Uniform Delay, d1		22.8			25.4		7.8	8.2	6.6	6.8	10.8	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.6			6.4		2.5	0.9	0.0	0.2	3.7	
Delay (s)		23.4			31.8		10.4	9.1	6.7	7.0	14.6	
Level of Service		C			C		B	A	A	A	B	
Approach Delay (s)		23.4			31.8			9.2			14.2	
Approach LOS		C			C			A			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			16.7				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			71.9				Sum of lost time (s)			14.0		
Intersection Capacity Utilization			93.4%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

989 Yonge St  
2: Yonge St & Street 'A'

HCM Unsignalized Intersection Capacity Analysis










Total (2021) AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	3	1	477	704	2
Future Volume (Veh/h)	5	3	1	477	704	2
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)	5	3	1	518	765	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				255		
pX, platoon unblocked	0.93					
vC, conflicting volume	1286	766	767			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1269	766	767			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	99	100			
cM capacity (veh/h)	172	403	847			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	8	519	767			
Volume Left	5	1	0			
Volume Right	3	0	2			
cSH	219	847	1700			
Volume to Capacity	0.04	0.00	0.45			
Queue Length 95th (m)	0.9	0.0	0.0			
Control Delay (s)	22.1	0.0	0.0			
Lane LOS	C	A				
Approach Delay (s)	22.1	0.0	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			0.1			
Intersection Capacity Utilization		47.2%		ICU Level of Service		A
Analysis Period (min)			15			

989 Yonge St  
3: Yonge St & North Access

HCM Unsignalized Intersection Capacity Analysis

Total (2021) AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	9	13	546	3	4	665
Future Volume (Veh/h)	9	13	546	3	4	665
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)	10	14	593	3	4	723
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1326	594			596	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1326	594			596	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	97			100	
cM capacity (veh/h)	171	505			980	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	24	596	727			
Volume Left	10	0	4			
Volume Right	14	3	0			
cSH	278	1700	980			
Volume to Capacity	0.09	0.35	0.00			
Queue Length 95th (m)	2.2	0.0	0.1			
Control Delay (s)	19.2	0.0	0.1			
Lane LOS	C		A			
Approach Delay (s)	19.2	0.0	0.1			
Approach LOS	C					
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			48.2%	ICU Level of Service	A	
Analysis Period (min)			15			

989 Yonge St  
1: Lockhart Rd & Yonge St

Queues  
Total (2021) PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	143	164	50	64	91	722	116	78	526
Future Volume (vph)	143	164	50	64	91	722	116	78	526
Lane Group Flow (vph)	0	450	0	200	97	768	123	83	611
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		4		8		2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	2	2	2	6	6
Switch Phase									
Minimum Initial (s)	10.0	10.0	10.0	10.0	25.0	25.0	25.0	25.0	25.0
Minimum Split (s)	29.0	29.0	29.0	29.0	32.0	32.0	32.0	32.0	32.0
Total Split (s)	62.0	62.0	62.0	62.0	48.0	48.0	48.0	48.0	48.0
Total Split (%)	56.4%	56.4%	56.4%	56.4%	43.6%	43.6%	43.6%	43.6%	43.6%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	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
Total Lost Time (s)		7.0		7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
v/c Ratio		0.85		0.39	0.39	0.85	0.16	0.62	0.68
Control Delay		39.8		17.7	23.5	32.5	11.0	45.6	23.8
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		39.8		17.7	23.5	32.5	11.0	45.6	23.8
Queue Length 50th (m)		66.3		19.3	10.0	108.6	7.3	9.9	75.2
Queue Length 95th (m)		103.5		36.1	31.2	#234.1	22.1	#42.0	#154.2
Internal Link Dist (m)		462.7		501.4		278.5			230.8
Turn Bay Length (m)					39.0		27.0	66.0	
Base Capacity (vph)		966		913	246	904	782	133	897
Starvation Cap Reductn		0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0	0
Reduced v/c Ratio		0.47		0.22	0.39	0.85	0.16	0.62	0.68

Intersection Summary

Cycle Length: 110  
 Actuated Cycle Length: 85.3  
 Natural Cycle: 70  
 Control Type: Semi Act-Uncoord  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.





















Splits and Phases: 1: Lockhart Rd & Yonge St












989 Yonge St  
1: Lockhart Rd & Yonge St

HCM Signalized Intersection Capacity Analysis

Total (2021) PM Peak Hour










												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	164	117	50	64	74	91	722	116	78	526	48
Future Volume (vph)	143	164	117	50	64	74	91	722	116	78	526	48
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	7.0	7.0	7.0	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Fr <sub>t</sub>		0.96			0.95		1.00	1.00	0.85	1.00	0.99	
Fl <sub>t</sub> Protected		0.98			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1773			1734		1770	1863	1568	1805	1842	
Fl <sub>t</sub> Permitted		0.81			0.79		0.27	1.00	1.00	0.14	1.00	
Satd. Flow (perm)		1469			1379		506	1863	1568	273	1842	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	152	174	124	53	68	79	97	768	123	83	560	51
RTOR Reduction (vph)	0	16	0	0	28	0	0	0	21	0	3	0
Lane Group Flow (vph)	0	434	0	0	172	0	97	768	102	83	608	0
Heavy Vehicles (%)	0%	3%	1%	0%	0%	6%	2%	2%	3%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		29.7			29.7		41.4	41.4	41.4	41.4	41.4	
Effective Green, g (s)		29.7			29.7		41.4	41.4	41.4	41.4	41.4	
Actuated g/C Ratio		0.35			0.35		0.49	0.49	0.49	0.49	0.49	
Clearance Time (s)		7.0			7.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		512			481		246	906	762	132	896	
v/s Ratio Prot								c0.41			0.33	
v/s Ratio Perm		c0.30			0.12		0.19		0.07	0.30		
v/c Ratio		0.85			0.36		0.39	0.85	0.13	0.63	0.68	
Uniform Delay, d1		25.6			20.6		13.9	19.1	12.0	16.2	16.8	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		12.3			0.5		4.7	9.7	0.4	20.6	4.1	
Delay (s)		37.9			21.1		18.6	28.8	12.4	36.7	20.9	
Level of Service		D			C		B	C	B	D	C	
Approach Delay (s)		37.9			21.1			25.7			22.8	
Approach LOS		D			C			C			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			26.8				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			85.1				Sum of lost time (s)			14.0		
Intersection Capacity Utilization			110.9%				ICU Level of Service			H		
Analysis Period (min)			15									
c Critical Lane Group												

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	3	2	3	936	650	5
Future Volume (Veh/h)	3	2	3	936	650	5
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)	3	2	3	1017	707	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)	255					
pX, platoon unblocked	0.59					
vC, conflicting volume	1732	710	712			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1895	710	712			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	100	100			
cM capacity (veh/h)	45	434	888			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	5	1020	712			
Volume Left	3	3	0			
Volume Right	2	0	5			
cSH	70	888	1700			
Volume to Capacity	0.07	0.00	0.42			
Queue Length 95th (m)	1.8	0.1	0.0			
Control Delay (s)	60.4	0.1	0.0			
Lane LOS	F	A				
Approach Delay (s)	60.4	0.1	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			61.6%	ICU Level of Service	B	
Analysis Period (min)			15			

989 Yonge St  
3: Yonge St & North Access

HCM Unsignalized Intersection Capacity Analysis

Total (2021) PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	5	8	996	10	14	618
Future Volume (Veh/h)	5	8	996	10	14	618
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)	5	9	1083	11	15	672
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1790	1088			1094	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1790	1088			1094	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	97			98	
cM capacity (veh/h)	87	262			638	
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total	14	1094	687			
Volume Left	5	0	15			
Volume Right	9	11	0			
cSH	152	1700	638			
Volume to Capacity	0.09	0.64	0.02			
Queue Length 95th (m)	2.4	0.0	0.6			
Control Delay (s)	31.0	0.0	0.6			
Lane LOS	D		A			
Approach Delay (s)	31.0	0.0	0.6			
Approach LOS	D					
Intersection Summary						
Average Delay			0.5			
Intersection Capacity Utilization			63.0%	ICU Level of Service	B	
Analysis Period (min)			15			

989 Yonge St  
1: Lockhart Rd & Yonge St

Queues  
Total (2026) AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	116	83	125	314	429	84	319	16	143	495	76
Future Volume (vph)	44	116	83	125	314	429	84	319	16	143	495	76
Lane Group Flow (vph)	46	122	87	132	331	452	88	336	17	151	521	80
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	2	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	25.0	25.0	25.0	3.0	25.0	25.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0	29.0	32.0	32.0	32.0	8.0	32.0	32.0
Total Split (s)	37.0	37.0	37.0	37.0	37.0	37.0	38.0	38.0	38.0	30.0	68.0	68.0
Total Split (%)	35.2%	35.2%	35.2%	35.2%	35.2%	35.2%	36.2%	36.2%	36.2%	28.6%	64.8%	64.8%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None	None	None	None	None	C-Max	C-Max	C-Max	None	C-Max	C-Max
v/c Ratio	0.32	0.21	0.25	0.62	0.54	0.70	0.18	0.17	0.02	0.20	0.21	0.08
Control Delay	41.8	36.5	8.0	52.0	42.0	9.7	14.6	12.5	0.1	6.2	6.6	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.8	36.5	8.0	52.0	42.0	9.7	14.6	12.5	0.1	6.2	6.6	1.9
Queue Length 50th (m)	8.9	12.1	0.0	26.8	34.8	0.0	8.4	16.7	0.0	8.5	18.1	0.0
Queue Length 95th (m)	18.4	18.6	11.0	43.1	44.4	26.4	22.1	31.4	0.0	19.9	32.7	5.5
Internal Link Dist (m)		462.7			501.4			278.5			230.8	
Turn Bay Length (m)	62.0		61.0	62.0		65.0	56.0		56.0	62.0		56.0
Base Capacity (vph)	241	982	515	355	1031	775	480	1951	830	888	2438	1064
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.12	0.17	0.37	0.32	0.58	0.18	0.17	0.02	0.17	0.21	0.08

Intersection Summary





























Cycle Length: 105  
 Actuated Cycle Length: 105  
 Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green  
 Natural Cycle: 70  
 Control Type: Actuated-Coordinated

Splits and Phases: 1: Lockhart Rd & Yonge St






















989 Yonge St  
1: Lockhart Rd & Yonge St

HCM Signalized Intersection Capacity Analysis  
Total (2026) AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	44	116	83	125	314	429	84	319	16	143	495	76
Future Volume (vph)	44	116	83	125	314	429	84	319	16	143	495	76
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	7.0	7.0	7.0	7.0	7.0	5.0	7.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1671	3438	1568	1752	3610	1583	1752	3438	1392	1805	3505	1495
Flt Permitted	0.48	1.00	1.00	0.67	1.00	1.00	0.46	1.00	1.00	0.51	1.00	1.00
Satd. Flow (perm)	846	3438	1568	1245	3610	1583	847	3438	1392	963	3505	1495
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)	46	122	87	132	331	452	88	336	17	151	521	80
RTOR Reduction (vph)	0	0	72	0	0	375	0	0	7	0	0	24
Lane Group Flow (vph)	46	122	15	132	331	77	88	336	10	151	521	56
Heavy Vehicles (%)	8%	5%	3%	3%	0%	2%	3%	5%	16%	0%	3%	8%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	18.0	18.0	18.0	18.0	18.0	18.0	59.6	59.6	59.6	73.0	73.0	73.0
Effective Green, g (s)	18.0	18.0	18.0	18.0	18.0	18.0	59.6	59.6	59.6	73.0	73.0	73.0
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.17	0.17	0.57	0.57	0.57	0.70	0.70	0.70
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	5.0	7.0	7.0
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	3.0
Lane Grp Cap (vph)	145	589	268	213	618	271	480	1951	790	736	2436	1039
v/s Ratio Prot		0.04			0.09			0.10		0.02	c0.15	
v/s Ratio Perm	0.05		0.01	c0.11		0.05	0.10		0.01	0.13		0.04
v/c Ratio	0.32	0.21	0.06	0.62	0.54	0.29	0.18	0.17	0.01	0.21	0.21	0.05
Uniform Delay, d1	38.1	37.4	36.4	40.3	39.7	37.9	11.0	10.9	9.9	5.5	5.7	5.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.3	0.2	0.1	5.3	0.9	0.6	0.8	0.2	0.0	0.1	0.2	0.1
Delay (s)	39.4	37.5	36.5	45.6	40.6	38.5	11.8	11.1	9.9	5.6	5.9	5.2
Level of Service	D	D	D	D	D	D	B	B	A	A	A	A
Approach Delay (s)		37.5			40.3			11.2			5.8	
Approach LOS		D			D			B			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			23.6	HCM 2000 Level of Service				C				
HCM 2000 Volume to Capacity ratio			0.31									
Actuated Cycle Length (s)			105.0	Sum of lost time (s)				19.0				
Intersection Capacity Utilization			82.0%	ICU Level of Service				E				
Analysis Period (min)			15									
c Critical Lane Group												

989 Yonge St  
2: Yonge St & Street 'A'/South Access













HCM Unsignalized Intersection Capacity Analysis  
Total (2026) AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	220	0	143	102	0	105	97	659	36	37	469	169
Future Volume (Veh/h)	220	0	143	102	0	105	97	659	36	37	469	169
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	239	0	155	111	0	114	105	716	39	40	510	184
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1364	1647	347	1436	1720	378	694			755		
vC1, stage 1 conf vol	682	682		946	946							
vC2, stage 2 conf vol	682	965		490	774							
vCu, unblocked vol	1364	1647	347	1436	1720	378	694			755		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	76	42	100	82	88			95		
cM capacity (veh/h)	217	223	649	191	213	620	897			851		
Direction, Lane #												
	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3				
Volume Total	394	225	105	477	278	40	340	354				
Volume Left	239	111	105	0	0	40	0	0				
Volume Right	155	114	0	0	39	0	0	184				
cSH	294	294	897	1700	1700	851	1700	1700				
Volume to Capacity	1.34	0.77	0.12	0.28	0.16	0.05	0.20	0.21				
Queue Length 95th (m)	159.2	46.7	3.2	0.0	0.0	1.2	0.0	0.0				
Control Delay (s)	208.4	48.1	9.5	0.0	0.0	9.4	0.0	0.0				
Lane LOS	F	E	A			A						
Approach Delay (s)	208.4	48.1	1.2			0.5						
Approach LOS	F	E										
Intersection Summary												
Average Delay			42.6									
Intersection Capacity Utilization			61.3%		ICU Level of Service					B		
Analysis Period (min)			15									

989 Yonge St  
3: Yonge St & North Access

HCM Unsignalized Intersection Capacity Analysis

Total (2026) AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	18	66	1045	6	23	625
Future Volume (Veh/h)	18	66	1045	6	23	625
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)	20	72	1136	7	25	679
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL		TWLTL	
Median storage veh			2		2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1529	572			1143	
vC1, stage 1 conf vol	1140					
vC2, stage 2 conf vol	390					
vCu, unblocked vol	1529	572			1143	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	84			96	
cM capacity (veh/h)	250	464			607	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	92	757	386	25	340	340
Volume Left	20	0	0	25	0	0
Volume Right	72	0	7	0	0	0
cSH	391	1700	1700	607	1700	1700
Volume to Capacity	0.24	0.45	0.23	0.04	0.20	0.20
Queue Length 95th (m)	7.2	0.0	0.0	1.0	0.0	0.0
Control Delay (s)	17.0	0.0	0.0	11.2	0.0	0.0
Lane LOS	C			B		
Approach Delay (s)	17.0	0.0		0.4		
Approach LOS	C					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			40.8%		ICU Level of Service	A
Analysis Period (min)			15			

989 Yonge St  
1: Lockhart Rd & Yonge St

Queues  
Total (2026) PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	352	119	70	220	196	192	728	213	339	361	51
Future Volume (vph)	120	352	119	70	220	196	192	728	213	339	361	51
Lane Group Flow (vph)	128	374	127	74	234	209	204	774	227	361	384	54
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	2	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	25.0	25.0	25.0	4.0	25.0	25.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0	29.0	32.0	32.0	32.0	8.0	32.0	32.0
Total Split (s)	37.0	37.0	37.0	37.0	37.0	37.0	38.0	38.0	38.0	30.0	68.0	68.0
Total Split (%)	35.2%	35.2%	35.2%	35.2%	35.2%	35.2%	36.2%	36.2%	36.2%	28.6%	64.8%	64.8%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None	None	None	None	None	C-Min	C-Min	C-Min	None	C-Min	C-Min
v/c Ratio	0.64	0.61	0.33	0.53	0.37	0.48	0.42	0.44	0.26	0.62	0.16	0.05
Control Delay	54.1	43.9	8.4	52.0	38.9	8.5	24.3	20.5	4.5	10.8	6.4	2.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	54.1	43.9	8.4	52.0	38.9	8.5	24.3	20.5	4.5	10.8	6.4	2.2
Queue Length 50th (m)	26.3	40.2	0.0	14.9	24.0	0.0	25.9	52.3	1.0	22.1	12.5	0.0
Queue Length 95th (m)	42.3	50.1	14.5	27.7	32.2	18.1	64.4	96.1	18.3	46.7	24.1	4.7
Internal Link Dist (m)		462.7			501.4			278.5			230.8	
Turn Bay Length (m)	62.0		61.0	62.0		65.0	56.0		56.0	62.0		56.0
Base Capacity (vph)	328	1001	547	229	1031	584	484	1756	887	698	2452	1135
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.37	0.23	0.32	0.23	0.36	0.42	0.44	0.26	0.52	0.16	0.05

Intersection Summary





























Cycle Length: 105  
 Actuated Cycle Length: 105  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 75  
 Control Type: Actuated-Coordinated

Splits and Phases: 1: Lockhart Rd & Yonge St



989 Yonge St  
1: Lockhart Rd & Yonge St

HCM Signalized Intersection Capacity Analysis  
Total (2026) PM Peak Hour













												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	120	352	119	70	220	196	192	728	213	339	361	51
Future Volume (vph)	120	352	119	70	220	196	192	728	213	339	361	51
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	7.0	7.0	7.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	3505	1599	1805	3610	1524	1770	3539	1568	1805	3539	1615
Flt Permitted	0.61	1.00	1.00	0.42	1.00	1.00	0.52	1.00	1.00	0.28	1.00	1.00
Satd. Flow (perm)	1151	3505	1599	804	3610	1524	977	3539	1568	530	3539	1615
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	128	374	127	74	234	209	204	774	227	361	384	54
RTOR Reduction (vph)	0	0	105	0	0	173	0	0	109	0	0	17
Lane Group Flow (vph)	128	374	22	74	234	36	204	774	118	361	384	37
Heavy Vehicles (%)	0%	3%	1%	0%	0%	6%	2%	2%	3%	0%	2%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	18.2	18.2	18.2	18.2	18.2	18.2	52.1	52.1	52.1	72.8	72.8	72.8
Effective Green, g (s)	18.2	18.2	18.2	18.2	18.2	18.2	52.1	52.1	52.1	72.8	72.8	72.8
Actuated g/C Ratio	0.17	0.17	0.17	0.17	0.17	0.17	0.50	0.50	0.50	0.69	0.69	0.69
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	4.0	7.0	7.0
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	3.0
Lane Grp Cap (vph)	199	607	277	139	625	264	484	1756	778	570	2453	1119
v/s Ratio Prot		0.11			0.06			0.22		c0.10	0.11	
v/s Ratio Perm	c0.11		0.01	0.09		0.02	0.21		0.08	c0.34		0.02
v/c Ratio	0.64	0.62	0.08	0.53	0.37	0.14	0.42	0.44	0.15	0.63	0.16	0.03
Uniform Delay, d1	40.4	40.2	36.4	39.5	38.4	36.8	16.8	17.1	14.4	7.7	5.5	5.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.9	1.9	0.1	3.9	0.4	0.2	2.7	0.8	0.4	2.3	0.1	0.1
Delay (s)	47.3	42.0	36.5	43.4	38.7	37.0	19.5	17.9	14.8	10.1	5.7	5.1
Level of Service	D	D	D	D	D	D	B	B	B	B	A	A
Approach Delay (s)		42.0			38.7			17.6			7.6	
Approach LOS		D			D			B			A	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			23.4				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			105.0				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			83.1%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

989 Yonge St  
2: Yonge St & Street 'A'/South Access

HCM Unsignalized Intersection Capacity Analysis

Total (2026) PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	129	0	86	57	0	58	137	808	99	101	601	201
Future Volume (Veh/h)	129	0	86	57	0	58	137	808	99	101	601	201
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	140	0	93	62	0	63	149	878	108	110	653	218
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type												
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked	0.89	0.89		0.89	0.89	0.89				0.89		
vC, conflicting volume	1782	2266	436	1870	2321	493	871			986		
vC1, stage 1 conf vol	982	982		1230	1230							
vC2, stage 2 conf vol	800	1284		640	1091							
vCu, unblocked vol	1625	2171	436	1724	2233	169	871			726		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	13	100	84	49	100	92	81			86		
cM capacity (veh/h)	161	96	569	122	90	748	770			773		
Direction, Lane #												
Volume Total	233	125	149	585	401	110	435	436				
Volume Left	140	62	149	0	0	110	0	0				
Volume Right	93	63	0	0	108	0	0	218				
cSH	226	211	770	1700	1700	773	1700	1700				
Volume to Capacity	1.03	0.59	0.19	0.34	0.24	0.14	0.26	0.26				
Queue Length 95th (m)	78.6	26.7	5.7	0.0	0.0	4.0	0.0	0.0				
Control Delay (s)	114.9	44.2	10.8	0.0	0.0	10.4	0.0	0.0				
Lane LOS	F	E	B			B						
Approach Delay (s)	114.9	44.2	1.4			1.2						
Approach LOS	F	E										
Intersection Summary												
Average Delay			14.2									
Intersection Capacity Utilization			57.9%		ICU Level of Service					B		
Analysis Period (min)			15									

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	10	37	1045	17	63	868
Future Volume (Veh/h)	10	37	1045	17	63	868
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)	11	40	1136	18	68	943
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL		TWLTL	
Median storage veh			2		2	
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1752	577			1154	
vC1, stage 1 conf vol	1145					
vC2, stage 2 conf vol	608					
vCu, unblocked vol	1752	577			1154	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	91			89	
cM capacity (veh/h)	230	460			601	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	51	757	397	68	472	472
Volume Left	11	0	0	68	0	0
Volume Right	40	0	18	0	0	0
cSH	378	1700	1700	601	1700	1700
Volume to Capacity	0.13	0.45	0.23	0.11	0.28	0.28
Queue Length 95th (m)	3.7	0.0	0.0	3.0	0.0	0.0
Control Delay (s)	16.0	0.0	0.0	11.8	0.0	0.0
Lane LOS	C			B		
Approach Delay (s)	16.0	0.0		0.8		
Approach LOS	C					
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			46.3%		ICU Level of Service	A
Analysis Period (min)			15			

989 Yonge St  
2: Yonge St & Street 'A'/South Access

Queues  
Total (2026) AM Peak Hour w. Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	220	0	102	0	97	659	37	469
Future Volume (vph)	220	0	102	0	97	659	37	469
Lane Group Flow (vph)	0	394	111	114	105	755	40	694
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Total Split (s)	69.0	69.0	69.0	69.0	31.0	31.0	31.0	31.0
Total Split (%)	69.0%	69.0%	69.0%	69.0%	31.0%	31.0%	31.0%	31.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
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
Total Lost Time (s)		7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.79	0.31	0.20	0.38	0.53	0.16	0.49
Control Delay		26.8	15.7	9.2	19.8	15.9	15.8	14.4
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		26.8	15.7	9.2	19.8	15.9	15.8	14.4
Queue Length 50th (m)		32.6	8.8	5.2	7.8	31.4	2.7	26.2
Queue Length 95th (m)		61.7	18.9	13.8	25.4	61.6	10.9	52.9
Internal Link Dist (m)		264.3		140.6		230.8		178.3
Turn Bay Length (m)			15.0		60.0		60.0	
Base Capacity (vph)		1296	1030	1552	277	1415	249	1423
Starvation Cap Reductn		0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0
Reduced v/c Ratio		0.30	0.11	0.07	0.38	0.53	0.16	0.49

Intersection Summary

Cycle Length: 100  
Actuated Cycle Length: 58.7  
Natural Cycle: 50  
Control Type: Semi Act-Uncoord




















Splits and Phases: 2: Yonge St & Street 'A'/South Access



989 Yonge St  
2: Yonge St & Street 'A'/South Access

HCM Signalized Intersection Capacity Analysis

Total (2026) AM Peak Hour w. Improvements

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	0	143	102	0	105	97	659	36	37	469	169
Future Volume (vph)	220	0	143	102	0	105	97	659	36	37	469	169
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	7.0		7.0	7.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Flt		0.95		1.00	0.85		1.00	0.99		1.00	0.96	
Flt Protected		0.97		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1712		1770	1583		1770	3416		1770	3374	
Flt Permitted		0.75		0.56	1.00		0.36	1.00		0.32	1.00	
Satd. Flow (perm)		1321		1050	1583		671	3416		604	3374	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	239	0	155	111	0	114	105	716	39	40	510	184
RTOR Reduction (vph)	0	40	0	0	29	0	0	3	0	0	28	0
Lane Group Flow (vph)	0	354	0	111	85	0	105	752	0	40	666	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	5%	2%	2%	3%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		20.3		20.3	20.3		24.3	24.3		24.3	24.3	
Effective Green, g (s)		20.3		20.3	20.3		24.3	24.3		24.3	24.3	
Actuated g/C Ratio		0.35		0.35	0.35		0.41	0.41		0.41	0.41	
Clearance Time (s)		7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		457		363	548		278	1416		250	1399	
v/s Ratio Prot					0.05			c0.22			0.20	
v/s Ratio Perm		c0.27		0.11			0.16			0.07		
v/c Ratio		0.77		0.31	0.16		0.38	0.53		0.16	0.48	
Uniform Delay, d1		17.1		14.0	13.2		11.9	12.9		10.8	12.5	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		8.0		0.5	0.1		3.9	1.4		1.4	1.2	
Delay (s)		25.1		14.5	13.4		15.8	14.3		12.1	13.7	
Level of Service		C		B	B		B	B		B	B	
Approach Delay (s)		25.1			13.9			14.5			13.6	
Approach LOS		C			B			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			16.0			HCM 2000 Level of Service			B			
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			58.6			Sum of lost time (s)		14.0				
Intersection Capacity Utilization			68.8%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

989 Yonge St  
2: Yonge St & Street 'A'/South Access

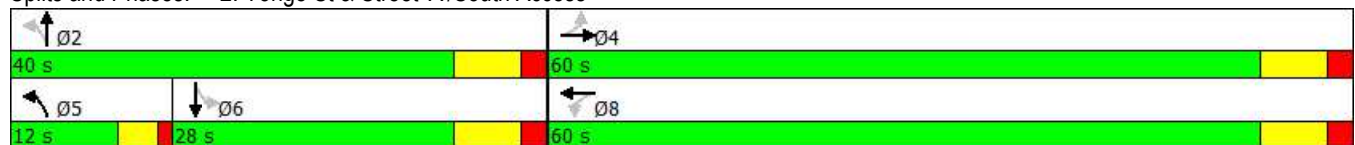
Queues  
Total (2026) PM Peak Hour w. Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	129	0	57	0	137	808	101	601
Future Volume (vph)	129	0	57	0	137	808	101	601
Lane Group Flow (vph)	0	233	62	63	149	986	110	871
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.0	25.0	25.0	25.0	12.0	25.0	25.0	25.0
Total Split (s)	60.0	60.0	60.0	60.0	12.0	40.0	28.0	28.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	12.0%	40.0%	28.0%	28.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	3.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0	7.0	7.0	4.0	7.0	7.0	7.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	Max
v/c Ratio		0.68	0.26	0.16	0.37	0.50	0.55	0.68
Control Delay		23.8	22.0	4.1	8.5	9.6	31.6	19.4
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		23.8	22.0	4.1	8.5	9.6	31.6	19.4
Queue Length 50th (m)		14.9	6.0	0.0	6.1	31.3	9.7	40.8
Queue Length 95th (m)		35.0	14.7	5.4	16.3	57.6	#34.5	70.3
Internal Link Dist (m)		264.3		140.6		230.8		178.3
Turn Bay Length (m)			15.0		60.0		60.0	
Base Capacity (vph)		1246	1091	1435	420	1960	199	1276
Starvation Cap Reductn		0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0
Reduced v/c Ratio		0.19	0.06	0.04	0.35	0.50	0.55	0.68

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 59.1  
 Natural Cycle: 65  
 Control Type: Semi Act-Uncoord  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.





















Splits and Phases: 2: Yonge St & Street 'A'/South Access



989 Yonge St  
2: Yonge St & Street 'A'/South Access

HCM Signalized Intersection Capacity Analysis

Total (2026) PM Peak Hour w. Improvements

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	0	86	57	0	58	137	808	99	101	601	201
Future Volume (vph)	129	0	86	57	0	58	137	808	99	101	601	201
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		4.0	7.0		7.0	7.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Fr <sub>t</sub>		0.95		1.00	0.85		1.00	0.98		1.00	0.96	
Fl <sub>t</sub> Protected		0.97		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1711		1770	1583		1770	3481		1770	3406	
Fl <sub>t</sub> Permitted		0.78		0.65	1.00		0.20	1.00		0.29	1.00	
Satd. Flow (perm)		1374		1211	1583		377	3481		541	3406	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	140	0	93	62	0	63	149	878	108	110	653	218
RTOR Reduction (vph)	0	70	0	0	50	0	0	6	0	0	26	0
Lane Group Flow (vph)	0	163	0	62	13	0	149	980	0	110	845	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		11.8		11.8	11.8		33.1	33.1		21.7	21.7	
Effective Green, g (s)		11.8		11.8	11.8		33.1	33.1		21.7	21.7	
Actuated g/C Ratio		0.20		0.20	0.20		0.56	0.56		0.37	0.37	
Clearance Time (s)		7.0		7.0	7.0		4.0	7.0		7.0	7.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		275		242	317		386	1956		199	1254	
v/s Ratio Prot					0.01		0.05	c0.28			c0.25	
v/s Ratio Perm		c0.12		0.05			0.17			0.20		
v/c Ratio		0.59		0.26	0.04		0.39	0.50		0.55	0.67	
Uniform Delay, d <sub>1</sub>		21.4		19.9	19.0		7.2	7.9		14.8	15.6	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d <sub>2</sub>		3.4		0.6	0.1		0.6	0.9		10.6	2.9	
Delay (s)		24.8		20.4	19.0		7.9	8.8		25.4	18.5	
Level of Service		C		C	B		A	A		C	B	
Approach Delay (s)		24.8			19.7			8.7			19.3	
Approach LOS		C			B			A			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			15.0				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			58.9				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			67.7%				ICU Level of Service			C		
Analysis Period (min)			15									

c Critical Lane Group

989 Yonge St  
1: Lockhart Rd & Yonge St

Queues  
Total (2031) AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	162	146	226	435	679	91	304	28	237	563	91
Future Volume (vph)	58	162	146	226	435	679	91	304	28	237	563	91
Lane Group Flow (vph)	61	171	154	238	458	715	96	320	29	249	593	96
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	2	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	25.0	25.0	25.0	3.0	25.0	25.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0	29.0	32.0	32.0	32.0	8.0	32.0	32.0
Total Split (s)	37.0	37.0	37.0	37.0	37.0	37.0	38.0	38.0	38.0	30.0	68.0	68.0
Total Split (%)	35.2%	35.2%	35.2%	35.2%	35.2%	35.2%	36.2%	36.2%	36.2%	28.6%	64.8%	64.8%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	5.0	7.0	7.0
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None	None	None	None	None	C-Min	C-Min	C-Min	None	C-Min	C-Min
v/c Ratio	0.32	0.18	0.29	0.75	0.47	0.80	0.28	0.22	0.04	0.36	0.28	0.10
Control Delay	33.1	28.5	5.6	48.9	32.9	12.3	26.2	21.4	0.1	11.8	11.6	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.1	28.5	5.6	48.9	32.9	12.3	26.2	21.4	0.1	11.8	11.6	2.8
Queue Length 50th (m)	10.3	14.6	0.0	46.0	42.6	13.2	13.3	22.5	0.0	22.8	31.3	0.0
Queue Length 95th (m)	20.9	21.6	14.1	70.1	53.6	58.2	31.7	38.8	0.0	41.1	47.6	7.5
Internal Link Dist (m)		462.7			501.4			278.5			230.8	
Turn Bay Length (m)	62.0		61.0	62.0		65.0	56.0		56.0	62.0		56.0
Base Capacity (vph)	215	1039	581	359	1091	921	341	1485	654	790	2152	954
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.16	0.27	0.66	0.42	0.78	0.28	0.22	0.04	0.32	0.28	0.10

Intersection Summary

Cycle Length: 105  
 Actuated Cycle Length: 105  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 70  
 Control Type: Actuated-Coordinated





























Splits and Phases: 1: Lockhart Rd & Yonge St



989 Yonge St  
1: Lockhart Rd & Yonge St
















HCM Signalized Intersection Capacity Analysis

Total (2031) AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	58	162	146	226	435	679	91	304	28	237	563	91
Future Volume (vph)	58	162	146	226	435	679	91	304	28	237	563	91
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	7.0	7.0	7.0	7.0	7.0	5.0	7.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1671	3438	1568	1752	3610	1583	1752	3438	1392	1805	3505	1495
Flt Permitted	0.40	1.00	1.00	0.64	1.00	1.00	0.43	1.00	1.00	0.50	1.00	1.00
Satd. Flow (perm)	711	3438	1568	1188	3610	1583	790	3438	1392	955	3505	1495
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)	61	171	154	238	458	715	96	320	29	249	593	96
RTOR Reduction (vph)	0	0	112	0	0	463	0	0	16	0	0	39
Lane Group Flow (vph)	61	171	42	238	458	252	96	320	13	249	593	57
Heavy Vehicles (%)	8%	5%	3%	3%	0%	2%	3%	5%	16%	0%	3%	8%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	28.3	28.3	28.3	28.3	28.3	28.3	45.3	45.3	45.3	62.7	62.7	62.7
Effective Green, g (s)	28.3	28.3	28.3	28.3	28.3	28.3	45.3	45.3	45.3	62.7	62.7	62.7
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.27	0.27	0.43	0.43	0.43	0.60	0.60	0.60
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	5.0	7.0	7.0
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	3.0
Lane Grp Cap (vph)	191	926	422	320	972	426	340	1483	600	670	2092	892
v/s Ratio Prot		0.05			0.13			0.09		c0.04	0.17	
v/s Ratio Perm	0.09		0.03	c0.20		0.16	0.12		0.01	c0.18		0.04
v/c Ratio	0.32	0.18	0.10	0.74	0.47	0.59	0.28	0.22	0.02	0.37	0.28	0.06
Uniform Delay, d1	30.7	29.5	28.8	35.0	32.1	33.3	19.3	18.7	17.1	10.0	10.3	8.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.1	0.1	9.0	0.4	2.2	2.1	0.3	0.1	0.3	0.3	0.1
Delay (s)	31.6	29.6	28.9	44.1	32.5	35.5	21.4	19.0	17.2	10.4	10.6	9.0
Level of Service	C	C	C	D	C	D	C	B	B	B	B	A
Approach Delay (s)		29.6			36.0			19.4			10.4	
Approach LOS		C			D			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			25.3									HCM 2000 Level of Service C
HCM 2000 Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			105.0								19.0	Sum of lost time (s)
Intersection Capacity Utilization			88.7%									ICU Level of Service E
Analysis Period (min)			15									
c Critical Lane Group												

989 Yonge St  
2: Yonge St & Street 'A'/South Access

Queues  
Total (2031) AM Peak Hour

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	220	0	102	0	97	908	37	646
Future Volume (vph)	220	0	102	0	97	908	37	646
Lane Group Flow (vph)	0	394	111	114	105	1026	40	886
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Total Split (s)	69.0	69.0	69.0	69.0	31.0	31.0	31.0	31.0
Total Split (%)	69.0%	69.0%	69.0%	69.0%	31.0%	31.0%	31.0%	31.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
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
Total Lost Time (s)		7.0	7.0	7.0	7.0	7.0	7.0	7.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.80	0.30	0.19	0.55	0.73	0.28	0.63
Control Delay		27.7	15.4	9.0	31.5	20.7	21.5	17.3
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		27.7	15.4	9.0	31.5	20.7	21.5	17.3
Queue Length 50th (m)		34.7	8.8	5.2	8.7	49.1	2.9	38.4
Queue Length 95th (m)		63.8	18.9	13.7	#35.8	#104.1	13.2	74.6
Internal Link Dist (m)		264.3		140.6		230.8		178.3
Turn Bay Length (m)			15.0		60.0		60.0	
Base Capacity (vph)		1289	1023	1545	191	1399	142	1408
Starvation Cap Reductn		0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0
Reduced v/c Ratio		0.31	0.11	0.07	0.55	0.73	0.28	0.63

Intersection Summary




















Cycle Length: 100  
 Actuated Cycle Length: 59.5  
 Natural Cycle: 55  
 Control Type: Semi Act-Uncoord  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: Yonge St & Street 'A'/South Access



989 Yonge St  
2: Yonge St & Street 'A'/South Access













HCM Signalized Intersection Capacity Analysis  
Total (2031) AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	220	0	143	102	0	105	97	908	36	37	646	169
Future Volume (vph)	220	0	143	102	0	105	97	908	36	37	646	169
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	7.0		7.0	7.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Fr <sub>t</sub>		0.95		1.00	0.85		1.00	0.99		1.00	0.97	
Fl <sub>t</sub> Protected		0.97		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1712		1770	1583		1770	3422		1770	3403	
Fl <sub>t</sub> Permitted		0.75		0.56	1.00		0.25	1.00		0.19	1.00	
Satd. Flow (perm)		1321		1048	1583		469	3422		349	3403	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	239	0	155	111	0	114	105	987	39	40	702	184
RTOR Reduction (vph)	0	28	0	0	28	0	0	2	0	0	18	0
Lane Group Flow (vph)	0	366	0	111	86	0	105	1024	0	40	868	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	5%	2%	2%	3%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		21.0		21.0	21.0		24.3	24.3		24.3	24.3	
Effective Green, g (s)		21.0		21.0	21.0		24.3	24.3		24.3	24.3	
Actuated g/C Ratio		0.35		0.35	0.35		0.41	0.41		0.41	0.41	
Clearance Time (s)		7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		467		371	560		192	1402		143	1394	
v/s Ratio Prot					0.05			c0.30				0.26
v/s Ratio Perm		c0.28		0.11			0.22			0.11		
v/c Ratio		0.78		0.30	0.15		0.55	0.73		0.28	0.62	
Uniform Delay, d <sub>1</sub>		17.1		13.8	13.1		13.3	14.7		11.7	13.9	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d <sub>2</sub>		8.3		0.5	0.1		10.7	3.4		4.8	2.1	
Delay (s)		25.5		14.3	13.2		24.1	18.1		16.5	16.0	
Level of Service		C		B	B		C	B		B	B	
Approach Delay (s)		25.5			13.7			18.7			16.0	
Approach LOS		C			B			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			18.3				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			59.3				Sum of lost time (s)			14.0		
Intersection Capacity Utilization			75.5%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

989 Yonge St  
3: Yonge St & North Access

HCM Unsignalized Intersection Capacity Analysis

Total (2031) AM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	18	66	1294	6	23	802
Future Volume (Veh/h)	18	66	1294	6	23	802
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)	20	72	1407	7	25	872
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL		TWLTL	
Median storage veh			2		2	
Upstream signal (m)			202			
pX, platoon unblocked	0.76	0.76			0.76	
vC, conflicting volume	1896	707			1414	
vC1, stage 1 conf vol	1410					
vC2, stage 2 conf vol	486					
vCu, unblocked vol	1545	0			909	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	91			96	
cM capacity (veh/h)	244	822			565	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	92	938	476	25	436	436
Volume Left	20	0	0	25	0	0
Volume Right	72	0	7	0	0	0
cSH	542	1700	1700	565	1700	1700
Volume to Capacity	0.17	0.55	0.28	0.04	0.26	0.26
Queue Length 95th (m)	4.9	0.0	0.0	1.1	0.0	0.0
Control Delay (s)	13.0	0.0	0.0	11.7	0.0	0.0
Lane LOS	B			B		
Approach Delay (s)	13.0	0.0		0.3		
Approach LOS	B					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			47.7%		ICU Level of Service	A
Analysis Period (min)			15			

989 Yonge St  
1: Lockhart Rd & Yonge St

Queues  
Total (2031) PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	520	190	124	351	344	289	823	390	534	310	57
Future Volume (vph)	75	520	190	124	351	344	289	823	390	534	310	57
Lane Group Flow (vph)	80	553	202	132	373	366	307	876	415	568	330	61
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	2	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	25.0	25.0	25.0	4.0	25.0	25.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0	29.0	32.0	32.0	32.0	8.0	32.0	32.0
Total Split (s)	37.0	37.0	37.0	37.0	37.0	37.0	38.0	38.0	38.0	30.0	68.0	68.0
Total Split (%)	35.2%	35.2%	35.2%	35.2%	35.2%	35.2%	36.2%	36.2%	36.2%	28.6%	64.8%	64.8%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None	None	None	None	None	C-Min	C-Min	C-Min	None	C-Min	C-Min
v/c Ratio	0.36	0.64	0.37	0.94	0.42	0.56	1.01	0.84	0.80	0.95	0.15	0.06
Control Delay	36.1	38.5	6.2	99.0	34.0	6.8	92.6	43.3	39.9	55.8	9.3	2.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.1	38.5	6.2	99.0	34.0	6.8	92.6	43.3	39.9	55.8	9.3	2.7
Queue Length 50th (m)	13.6	53.7	0.0	26.6	34.0	0.0	~67.0	92.6	66.8	~115.0	15.7	0.0
Queue Length 95th (m)	27.4	70.8	16.9	#61.4	47.1	22.1	#123.9	#118.0	#116.5	#187.3	23.1	5.4
Internal Link Dist (m)		462.7			501.4			278.5			230.8	
Turn Bay Length (m)	62.0		61.0	62.0		65.0	56.0		56.0	62.0		56.0
Base Capacity (vph)	257	1001	601	164	1031	696	304	1044	521	597	2195	1025
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.55	0.34	0.80	0.36	0.53	1.01	0.84	0.80	0.95	0.15	0.06

Intersection Summary





























Cycle Length: 105  
 Actuated Cycle Length: 105  
 Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 ~ Volume exceeds capacity, queue is theoretically infinite.  
 Queue shown is maximum after two cycles.  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: Lockhart Rd & Yonge St



989 Yonge St  
1: Lockhart Rd & Yonge St

HCM Signalized Intersection Capacity Analysis  
Total (2031) PM Peak Hour

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		 			 			 			 		
Traffic Volume (vph)	75	520	190	124	351	344	289	823	390	534	310	57	
Future Volume (vph)	75	520	190	124	351	344	289	823	390	534	310	57	
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	7.0	7.0	7.0	7.0	7.0	4.0	7.0	7.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1805	3505	1599	1805	3610	1524	1770	3539	1568	1805	3539	1615	
Flt Permitted	0.48	1.00	1.00	0.30	1.00	1.00	0.55	1.00	1.00	0.12	1.00	1.00	
Satd. Flow (perm)	903	3505	1599	576	3610	1524	1029	3539	1568	220	3539	1615	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Adj. Flow (vph)	80	553	202	132	373	366	307	876	415	568	330	61	
RTOR Reduction (vph)	0	0	152	0	0	276	0	0	58	0	0	23	
Lane Group Flow (vph)	80	553	50	132	373	90	307	876	357	568	330	38	
Heavy Vehicles (%)	0%	3%	1%	0%	0%	6%	2%	2%	3%	0%	2%	0%	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm	
Protected Phases		4			8			2		1	6		
Permitted Phases	4		4	8		8	2		2	6		6	
Actuated Green, G (s)	25.9	25.9	25.9	25.9	25.9	25.9	31.0	31.0	31.0	65.1	65.1	65.1	
Effective Green, g (s)	25.9	25.9	25.9	25.9	25.9	25.9	31.0	31.0	31.0	65.1	65.1	65.1	
Actuated g/C Ratio	0.25	0.25	0.25	0.25	0.25	0.25	0.30	0.30	0.30	0.62	0.62	0.62	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	4.0	7.0	7.0	
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	3.0	
Lane Grp Cap (vph)	222	864	394	142	890	375	303	1044	462	590	2194	1001	
v/s Ratio Prot		0.16			0.10			0.25		c0.28	0.09		
v/s Ratio Perm	0.09		0.03	c0.23		0.06	0.30		0.23	c0.32		0.02	
v/c Ratio	0.36	0.64	0.13	0.93	0.42	0.24	1.01	0.84	0.77	0.96	0.15	0.04	
Uniform Delay, d1	32.7	35.4	30.8	38.7	33.2	31.7	37.0	34.7	33.8	29.0	8.4	7.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	1.6	0.1	54.0	0.3	0.3	55.1	8.1	11.8	27.8	0.1	0.1	
Delay (s)	33.7	37.0	30.9	92.6	33.6	32.0	92.1	42.8	45.6	56.7	8.5	7.8	
Level of Service	C	D	C	F	C	C	F	D	D	E	A	A	
Approach Delay (s)		35.2			41.9			53.0			37.0		
Approach LOS		D			D			D			D		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			43.6									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.98										
Actuated Cycle Length (s)			105.0									Sum of lost time (s)	18.0
Intersection Capacity Utilization			95.9%									ICU Level of Service	F
Analysis Period (min)			15										
c Critical Lane Group													

989 Yonge St  
2: Yonge St & Street 'A'/South Access

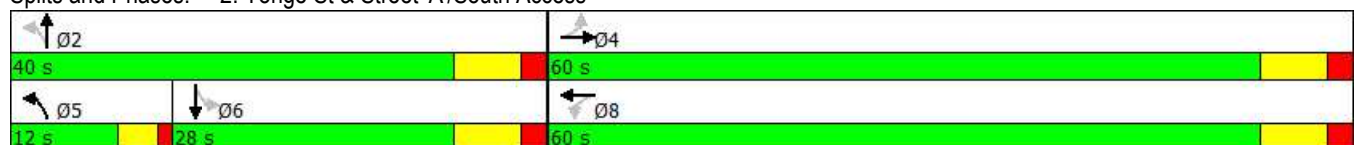
Queues  
Total (2031) PM Peak Hour

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	129	0	57	0	137	1006	101	758
Future Volume (vph)	129	0	57	0	137	1006	101	758
Lane Group Flow (vph)	0	233	62	63	149	1201	110	1042
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	Perm	NA
Protected Phases		4		8	5	2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	5	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	25.0	25.0	25.0	25.0	12.0	25.0	25.0	25.0
Total Split (s)	60.0	60.0	60.0	60.0	12.0	40.0	28.0	28.0
Total Split (%)	60.0%	60.0%	60.0%	60.0%	12.0%	40.0%	28.0%	28.0%
Yellow Time (s)	5.0	5.0	5.0	5.0	3.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.0	7.0	7.0	4.0	7.0	7.0	7.0
Lead/Lag					Lead		Lag	Lag
Lead-Lag Optimize?					Yes		Yes	Yes
Recall Mode	None	None	None	None	None	Max	Max	Max
v/c Ratio		0.68	0.26	0.16	0.41	0.61	0.69	0.82
Control Delay		23.8	22.0	4.1	9.3	11.0	45.9	24.7
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		23.8	22.0	4.1	9.3	11.0	45.9	24.7
Queue Length 50th (m)		14.9	6.0	0.0	6.1	41.8	10.3	53.4
Queue Length 95th (m)		35.0	14.7	5.4	16.3	76.6	#39.2	#103.8
Internal Link Dist (m)		264.3		140.6		230.8		178.3
Turn Bay Length (m)			15.0		60.0		60.0	
Base Capacity (vph)		1246	1091	1435	379	1965	160	1278
Starvation Cap Reductn		0	0	0	0	0	0	0
Spillback Cap Reductn		0	0	0	0	0	0	0
Storage Cap Reductn		0	0	0	0	0	0	0
Reduced v/c Ratio		0.19	0.06	0.04	0.39	0.61	0.69	0.82

Intersection Summary

Cycle Length: 100  
 Actuated Cycle Length: 59.1  
 Natural Cycle: 65  
 Control Type: Semi Act-Uncoord  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.





















Splits and Phases: 2: Yonge St & Street 'A'/South Access



989 Yonge St  
2: Yonge St & Street 'A'/South Access

HCM Signalized Intersection Capacity Analysis

Total (2031) PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	129	0	86	57	0	58	137	1006	99	101	758	201
Future Volume (vph)	129	0	86	57	0	58	137	1006	99	101	758	201
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		4.0	7.0		7.0	7.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Fr <sub>t</sub>		0.95		1.00	0.85		1.00	0.99		1.00	0.97	
Fl <sub>t</sub> Protected		0.97		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1711		1770	1583		1770	3491		1770	3428	
Fl <sub>t</sub> Permitted		0.78		0.65	1.00		0.16	1.00		0.23	1.00	
Satd. Flow (perm)		1374		1211	1583		290	3491		437	3428	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	140	0	93	62	0	63	149	1093	108	110	824	218
RTOR Reduction (vph)	0	70	0	0	50	0	0	5	0	0	19	0
Lane Group Flow (vph)	0	163	0	62	13	0	149	1196	0	110	1023	0
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2				6
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		11.8		11.8	11.8		33.1	33.1		21.7	21.7	
Effective Green, g (s)		11.8		11.8	11.8		33.1	33.1		21.7	21.7	
Actuated g/C Ratio		0.20		0.20	0.20		0.56	0.56		0.37	0.37	
Clearance Time (s)		7.0		7.0	7.0		4.0	7.0		7.0	7.0	
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		275		242	317		348	1961		161	1262	
v/s Ratio Prot					0.01		0.05	c0.34				c0.30
v/s Ratio Perm		c0.12		0.05			0.19			0.25		
v/c Ratio		0.59		0.26	0.04		0.43	0.61		0.68	0.81	
Uniform Delay, d <sub>1</sub>		21.4		19.9	19.0		8.2	8.6		15.7	16.7	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d <sub>2</sub>		3.4		0.6	0.1		0.8	1.4		21.0	5.7	
Delay (s)		24.8		20.4	19.0		9.0	10.0		36.7	22.5	
Level of Service		C		C	B		A	B		D	C	
Approach Delay (s)		24.8			19.7			9.9			23.8	
Approach LOS		C			B			A			C	

Intersection Summary













HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	58.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

989 Yonge St  
3: Yonge St & North Access

HCM Unsignalized Intersection Capacity Analysis

Total (2031) PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			 			 
Traffic Volume (veh/h)	10	37	1243	17	63	1018
Future Volume (Veh/h)	10	37	1243	17	63	1018
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)	11	40	1351	18	68	1107
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			TWLTL		TWLTL	
Median storage veh			2		2	
Upstream signal (m)			202			
pX, platoon unblocked	0.79	0.79			0.79	
vC, conflicting volume	2050	684			1369	
vC1, stage 1 conf vol	1360					
vC2, stage 2 conf vol	690					
vCu, unblocked vol	1792	57			927	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	95			88	
cM capacity (veh/h)	226	785			577	
Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	51	901	468	68	554	554
Volume Left	11	0	0	68	0	0
Volume Right	40	0	18	0	0	0
cSH	511	1700	1700	577	1700	1700
Volume to Capacity	0.10	0.53	0.28	0.12	0.33	0.33
Queue Length 95th (m)	2.6	0.0	0.0	3.2	0.0	0.0
Control Delay (s)	12.8	0.0	0.0	12.1	0.0	0.0
Lane LOS	B			B		
Approach Delay (s)	12.8	0.0		0.7		
Approach LOS	B					
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			51.7%		ICU Level of Service	A
Analysis Period (min)			15			

989 Yonge St  
1: Lockhart Rd & Yonge St

Queues  
Total (2031) AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	162	146	226	435	679	91	304	28	237	563	91
Future Volume (vph)	58	162	146	226	435	679	91	304	28	237	563	91
Lane Group Flow (vph)	61	171	154	238	458	715	96	320	29	249	593	96
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	8	8	8	2	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	25.0	25.0	25.0	4.0	25.0	25.0
Minimum Split (s)	29.0	29.0	29.0	29.0	29.0	29.0	32.0	32.0	32.0	8.0	32.0	32.0
Total Split (s)	37.0	37.0	37.0	37.0	37.0	37.0	38.0	38.0	38.0	30.0	68.0	68.0
Total Split (%)	35.2%	35.2%	35.2%	35.2%	35.2%	35.2%	36.2%	36.2%	36.2%	28.6%	64.8%	64.8%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag							Lag	Lag	Lag	Lead		
Lead-Lag Optimize?							Yes	Yes	Yes	Yes		
Recall Mode	None	None	None	None	None	None	C-Min	C-Min	C-Min	None	C-Min	C-Min
v/c Ratio	0.32	0.18	0.29	0.74	0.47	0.80	0.28	0.21	0.04	0.35	0.28	0.10
Control Delay	33.0	28.4	5.6	48.6	32.8	11.7	25.4	20.8	0.1	11.3	11.7	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	33.0	28.4	5.6	48.6	32.8	11.7	25.4	20.8	0.1	11.3	11.7	2.8
Queue Length 50th (m)	10.3	14.6	0.0	46.0	42.6	11.8	13.0	22.0	0.0	22.2	31.3	0.0
Queue Length 95th (m)	20.8	21.5	14.0	69.6	53.3	55.0	31.4	38.4	0.0	40.5	48.0	7.6
Internal Link Dist (m)		462.7			501.4			278.5			230.8	
Turn Bay Length (m)	62.0		61.0	62.0		65.0	56.0		56.0	62.0		56.0
Base Capacity (vph)	215	1042	582	360	1094	927	349	1520	661	816	2152	954
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.16	0.26	0.66	0.42	0.77	0.28	0.21	0.04	0.31	0.28	0.10

Intersection Summary





























Cycle Length: 105  
 Actuated Cycle Length: 105  
 Offset: 30 (29%), Referenced to phase 2:NBT and 6:SBTL, Start of Green  
 Natural Cycle: 70  
 Control Type: Actuated-Coordinated

Splits and Phases: 1: Lockhart Rd & Yonge St



989 Yonge St  
1: Lockhart Rd & Yonge St

HCM Signalized Intersection Capacity Analysis  
Total (2031) AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	58	162	146	226	435	679	91	304	28	237	563	91
Future Volume (vph)	58	162	146	226	435	679	91	304	28	237	563	91
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	7.0	7.0	7.0	7.0	7.0	4.0	7.0	7.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1671	3438	1568	1752	3610	1583	1752	3438	1392	1805	3505	1495
Flt Permitted	0.40	1.00	1.00	0.64	1.00	1.00	0.43	1.00	1.00	0.51	1.00	1.00
Satd. Flow (perm)	711	3438	1568	1188	3610	1583	790	3438	1392	976	3505	1495
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)	61	171	154	238	458	715	96	320	29	249	593	96
RTOR Reduction (vph)	0	0	112	0	0	469	0	0	16	0	0	39
Lane Group Flow (vph)	61	171	42	238	458	246	96	320	13	249	593	57
Heavy Vehicles (%)	8%	5%	3%	3%	0%	2%	3%	5%	16%	0%	3%	8%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA	Perm	pm+pt	NA	Perm
Protected Phases		4			8			2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Actuated Green, G (s)	28.3	28.3	28.3	28.3	28.3	28.3	46.5	46.5	46.5	62.7	62.7	62.7
Effective Green, g (s)	28.3	28.3	28.3	28.3	28.3	28.3	46.5	46.5	46.5	62.7	62.7	62.7
Actuated g/C Ratio	0.27	0.27	0.27	0.27	0.27	0.27	0.44	0.44	0.44	0.60	0.60	0.60
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	4.0	7.0	7.0
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	3.0
Lane Grp Cap (vph)	191	926	422	320	972	426	349	1522	616	679	2092	892
v/s Ratio Prot		0.05			0.13			0.09		c0.04	0.17	
v/s Ratio Perm	0.09		0.03	c0.20		0.16	0.12		0.01	c0.18		0.04
v/c Ratio	0.32	0.18	0.10	0.74	0.47	0.58	0.28	0.21	0.02	0.37	0.28	0.06
Uniform Delay, d1	30.7	29.5	28.8	35.0	32.1	33.2	18.6	18.0	16.4	10.0	10.3	8.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.1	0.1	9.0	0.4	1.9	1.9	0.3	0.1	0.3	0.3	0.1
Delay (s)	31.6	29.6	28.9	44.1	32.5	35.1	20.5	18.3	16.5	10.3	10.6	9.0
Level of Service	C	C	C	D	C	D	C	B	B	B	B	A
Approach Delay (s)		29.6			35.7			18.6			10.4	
Approach LOS		C			D			B			B	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			25.1				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.50									
Actuated Cycle Length (s)			105.0				Sum of lost time (s)		18.0			
Intersection Capacity Utilization			88.7%				ICU Level of Service		E			
Analysis Period (min)			15									
c Critical Lane Group												

989 Yonge St  
1: Lockhart Rd & Yonge St

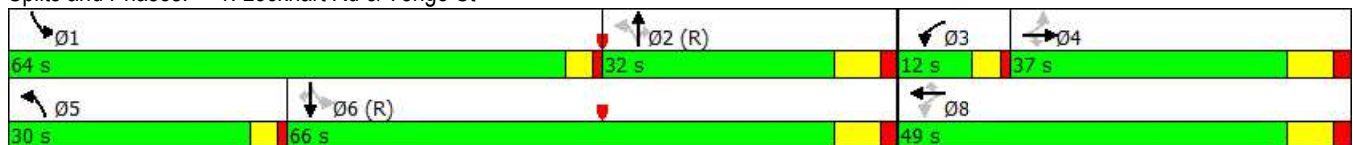
Queues  
Total (2031) PM Peak Hour w. Improvements

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	75	520	190	124	351	344	289	823	390	534	310	57
Future Volume (vph)	75	520	190	124	351	344	289	823	390	534	310	57
Lane Group Flow (vph)	80	553	202	132	373	366	307	876	415	568	330	61
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4		4	8		8	2		2	6		6
Detector Phase	4	4	4	3	8	8	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	4.0	10.0	10.0	4.0	25.0	25.0	4.0	25.0	25.0
Minimum Split (s)	29.0	29.0	29.0	8.0	29.0	29.0	8.0	32.0	32.0	8.0	32.0	32.0
Total Split (s)	37.0	37.0	37.0	12.0	49.0	49.0	30.0	32.0	32.0	64.0	66.0	66.0
Total Split (%)	25.5%	25.5%	25.5%	8.3%	33.8%	33.8%	20.7%	22.1%	22.1%	44.1%	45.5%	45.5%
Yellow Time (s)	5.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0	1.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.0	7.0	7.0	4.0	7.0	7.0	4.0	7.0	7.0	4.0	7.0	7.0
Lead/Lag	Lag	Lag	Lag	Lead			Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
v/c Ratio	0.42	0.84	0.45	0.76	0.38	0.54	0.58	0.82	0.67	0.92	0.19	0.07
Control Delay	58.4	68.4	11.5	67.0	43.8	6.8	21.4	54.9	28.3	57.1	22.2	1.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.4	68.4	11.5	67.0	43.8	6.8	21.4	54.9	28.3	57.1	22.2	1.8
Queue Length 50th (m)	21.3	84.6	3.7	30.1	47.8	0.0	37.8	131.1	54.0	142.9	29.3	0.0
Queue Length 95th (m)	38.8	105.8	26.2	#55.6	62.5	25.8	55.0	#220.3	#123.7	176.0	43.5	4.0
Internal Link Dist (m)		462.7			501.4			644.2			230.8	
Turn Bay Length (m)	62.0		61.0	62.0		65.0	56.0		56.0	62.0		56.0
Base Capacity (vph)	208	725	479	174	1045	701	649	1068	624	795	1738	839
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	3	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.76	0.42	0.76	0.36	0.52	0.47	0.82	0.67	0.72	0.19	0.07

Intersection Summary

Cycle Length: 145  
 Actuated Cycle Length: 145  
 Offset: 30 (21%), Referenced to phase 2:NBT and 6:SBTL, Start of Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.





























Splits and Phases: 1: Lockhart Rd & Yonge St



989 Yonge St  
1: Lockhart Rd & Yonge St

HCM Signalized Intersection Capacity Analysis

Total (2031) PM Peak Hour w. Improvements

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		 			 			 			 		
Traffic Volume (vph)	75	520	190	124	351	344	289	823	390	534	310	57	
Future Volume (vph)	75	520	190	124	351	344	289	823	390	534	310	57	
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	4.0	7.0	7.0	4.0	7.0	7.0	4.0	7.0	7.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1805	3505	1599	1805	3610	1524	1770	3539	1568	1805	3539	1615	
Flt Permitted	0.53	1.00	1.00	0.17	1.00	1.00	0.55	1.00	1.00	0.11	1.00	1.00	
Satd. Flow (perm)	1007	3505	1599	316	3610	1524	1029	3539	1568	206	3539	1615	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Adj. Flow (vph)	80	553	202	132	373	366	307	876	415	568	330	61	
RTOR Reduction (vph)	0	0	152	0	0	267	0	0	151	0	0	31	
Lane Group Flow (vph)	80	553	50	132	373	99	307	876	264	568	330	30	
Heavy Vehicles (%)	0%	3%	1%	0%	0%	6%	2%	2%	3%	0%	2%	0%	
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	Perm	
Protected Phases		4		3	8		5	2		1	6		
Permitted Phases	4		4	8		8	2		2	6		6	
Actuated Green, G (s)	27.4	27.4	27.4	39.4	39.4	39.4	60.2	43.8	43.8	91.6	71.2	71.2	
Effective Green, g (s)	27.4	27.4	27.4	39.4	39.4	39.4	60.2	43.8	43.8	91.6	71.2	71.2	
Actuated g/C Ratio	0.19	0.19	0.19	0.27	0.27	0.27	0.42	0.30	0.30	0.63	0.49	0.49	
Clearance Time (s)	7.0	7.0	7.0	4.0	7.0	7.0	4.0	7.0	7.0	4.0	7.0	7.0	
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	3.0	
Lane Grp Cap (vph)	190	662	302	168	980	414	511	1069	473	613	1737	793	
v/s Ratio Prot		0.16		c0.04	0.10		0.07	0.25		c0.28	0.09		
v/s Ratio Perm	0.08		0.03	c0.17		0.07	0.18		0.17	c0.31		0.02	
v/c Ratio	0.42	0.84	0.17	0.79	0.38	0.24	0.60	0.82	0.56	0.93	0.19	0.04	
Uniform Delay, d1	51.8	56.6	49.2	43.8	42.9	41.1	30.0	46.9	42.5	39.1	20.7	19.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.5	9.0	0.3	21.0	0.2	0.3	2.0	7.0	4.7	20.1	0.2	0.1	
Delay (s)	53.3	65.6	49.5	64.8	43.1	41.4	32.0	54.0	47.2	59.2	21.0	19.2	
Level of Service	D	E	D	E	D	D	C	D	D	E	C	B	
Approach Delay (s)		60.5			45.7			48.0			43.5		
Approach LOS		E			D			D			D		
<b>Intersection Summary</b>													
HCM 2000 Control Delay			49.0		HCM 2000 Level of Service						D		
HCM 2000 Volume to Capacity ratio			0.92										
Actuated Cycle Length (s)			145.0		Sum of lost time (s)						22.0		
Intersection Capacity Utilization			91.9%		ICU Level of Service						F		
Analysis Period (min)			15										
c Critical Lane Group													

## Appendix G – OTM Signal Justification Sheets

**Justification No. 7 - 2026 Total Traffic**

Yonge Street / South Access

Justification	Description	Compliance			Signal Warrant	Underground Provisions Warrant	
		Rest. Flow	Sectional				Entire %
			Numerical	%			
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	900	1080	120%	80%	NO	YES
	B. Vehicle volume, along minor streets (average hour)	170	225	132%		NO	YES
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	900	729	81%	50%	NO	NO
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	170	127	75%		NO	NO

**Justification No. 7 - 2031 Total Traffic (Critical Case)**

Yonge Street / North Access

Justification	Description	Compliance			Signal Warrant	Underground Provisions Warrant	
		Rest. Flow	Sectional				
			Numerical	%			
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	900	1149	128%	9%	NO	YES
	B. Vehicle volume, along minor streets (average hour)	255	33	13%		NO	NO
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	900	1111	123%	3%	NO	YES
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	170	7	4%		NO	NO

## Appendix H – Transportation Tomorrow Survey Excerpts

## TTS Cross Tabulation

### Cross Tabulation Query Form - Trip - 2016 v1.1

#### Filter Variables

2006 GTA zone of hous... x ▾ Start time of trip x ▾ (Optional) Table Attribute ▾

#### Group Attributes

Row Grouping Column Grouping Table Grouping

Grouping file: Choose File No file chosen

#### Filter Selection +

2006 GTA zone of household ▾ In ▾ 8590

And ▾

Start time of trip ▾ In ▾ 700-900

And ▾

Trip purpose of destination ▾ In ▾ W, R

Add Delete

#### Output

Comma-delimited table  Column format Expansion Factor On Click to Select Load Load

Execute Query Select All Save As

Sun Feb 02 2020 08:47:12 GMT-0500 (Eastern Standard Time) - Run Time: 2476ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of household - gta06\_hhld  
Column: Start time of trip - start\_time

Filters:

2006 GTA zone of household - gta06\_hhld In 8590  
and  
Start time of trip - start\_time In 700-900  
and  
Trip purpose of destination - purp\_dest In W, R

Trip 2016

ROW : gta06\_hhld

COLUMN : start\_time

gta06_hhld	start_time	total
8590	700	33
8590	730	53
8590	735	15
8590	745	40
8590	750	47
8590	800	92
8590	810	17
8590	830	25
8590	845	29
8590	900	33

Mon Nov 04 2019 10:49:22 GMT-0500 (Eastern Standard Time) - Run Time: 2375ms

Cross Tabulation Query Form - Trip - 2016 v1.1

Row: 2006 GTA zone of destination - gta06\_dest

Column: 2006 GTA zone of household - gta06\_hhld

Filters:

(2006 GTA zone of household - gta06\_hhld In 8590); and

(Start time of trip - start\_time In 700 - 900); and

Trip purpose of destination - purp\_dest In W

Trip 2016

ROW : gta06\_hhld

COLUMN : pd\_dest