



February 9th, 2022

JDE Project 1302

Rainsong Land Development Inc.
351 King Street, Suite 1300
Toronto ON, M6C 0L6

Attn: Trish Elliott, MCIP, RPP

**RE: Traffic Analysis and Functional Design Review
Rainsong Phase 2, City of Barrie**

This letter was prepared by **JD Northcote Engineering Inc.** [JD Engineering] for the account of **Rainsong Land Development Inc.** [Client].

1.0 BACKGROUND

Rainsong Phase 2 [Subject Site] is located within the Hewitt Secondary Plan Area [HSPA] on the north side of Lockhart Road, west of Yonge Street, in the City of Barrie [City]. This letter is intended as a traffic impact review and functional design review for the proposed development of the Subject Site.

The proposed development is anticipated to consist of 194 single-detached units, 118 semi-detached units and 155 townhouse units¹.

The proposed development will have internal connections to the adjacent Lockmaple and 620 Lockhart developments via the proposed internal road network. The proposed development will have access to a full-movement intersection on Yonge Street via the extension of Street B, through the Crown Development to the east. The proposed development will also have a direct full-movement intersection on Lockhart Road at Street R.

Figure 1 illustrates the location of the subject site and study area intersections, in relation to the surrounding area.

The Draft Plan of Subdivision by Jones Consulting Group Ltd. is included in the **Appendix**.

The proposed development is anticipated to be built-out by 2029 and fully occupied by 2031.

¹ The HSPA Master Transportation Study by LEA Consulting Ltd. (dated February 2019) [LEA TIS], assumed the proposed development would consist of a total of 381 residential units, which is 86 units less than the current proposed number of units.



Based on our correspondence with the City, the following intersections will be analysed as part of the Traffic Analysis and Functional Review:

- Yonge Street / Street B; and
- Lockhart Road / Street R.

Figure 1 – Site Location and Study Area



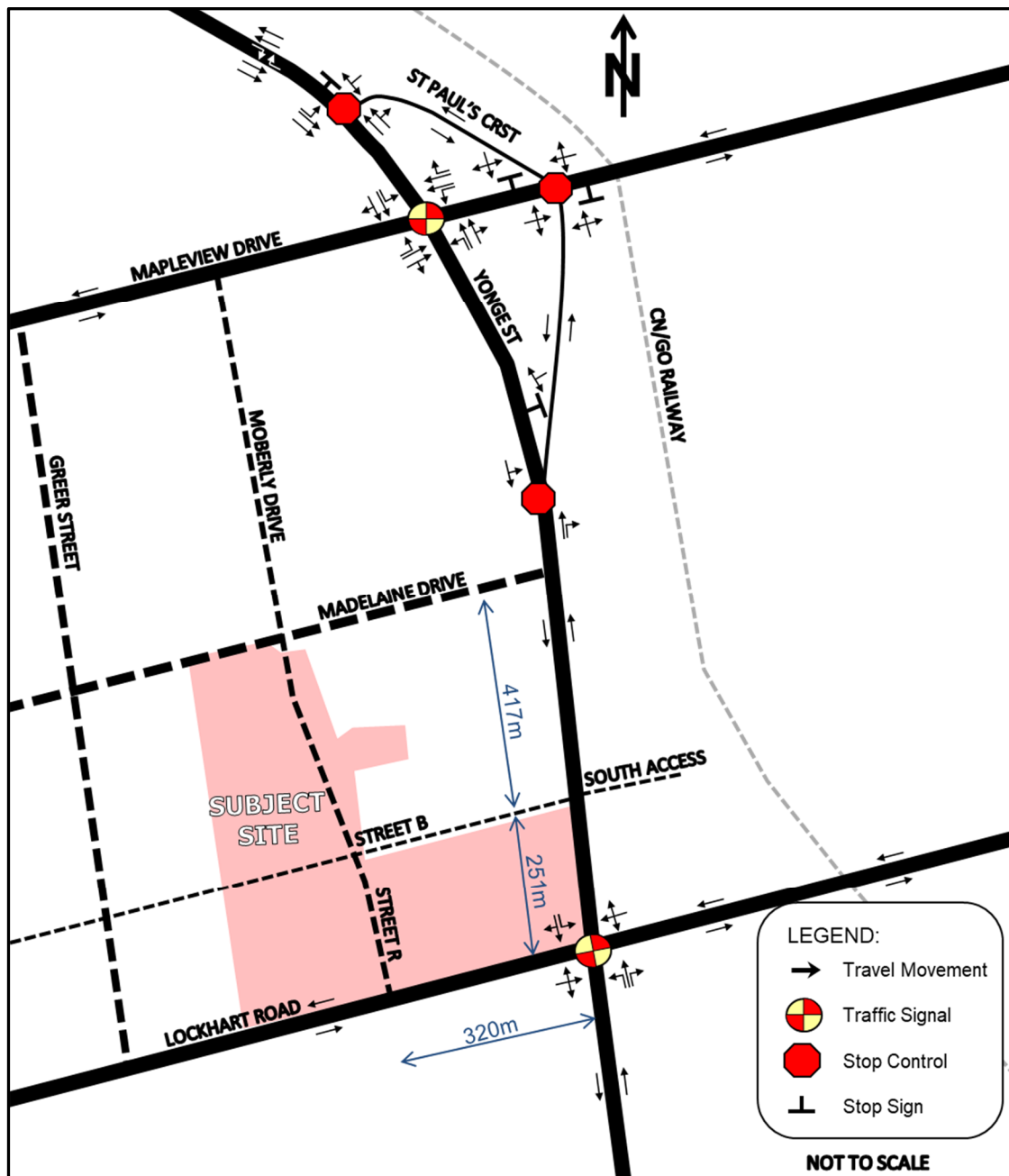
2.0 STREET AND INTERSECTION CHARACTERISTICS

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 (2022) Lane Configuration within Study Area



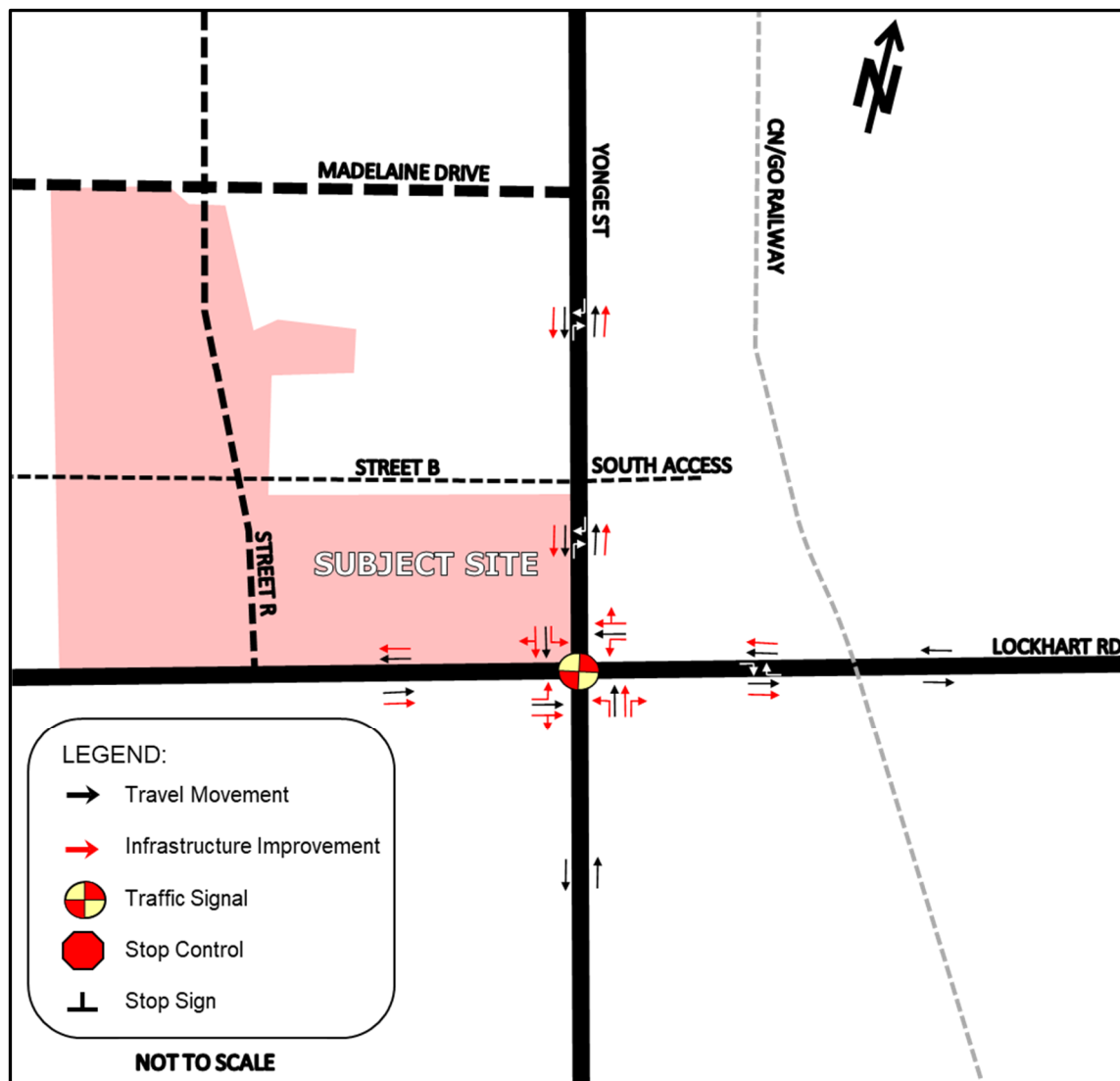
2.1 LOCAL TRANSPORTATION INFRASTRUCTURE IMPROVEMENTS

There are a number of future road improvements planned in the study area, which are anticipated to be complete by the 2031 horizon year. According to the City's 2022 Capital Budget, Lockhart Road is scheduled to be widened from the existing two-lane cross-section to a four-lane cross-section by 2031, between Huronia Road and Yonge Street. According to the City's 2022 Capital Budget, Yonge Street is scheduled to be widened from the existing two-lane cross-section to a five-lane cross-section by 2031, between Huronia Road and Yonge Street.

Figure 3 illustrates the ultimate (2031) lane configuration, within the study area.

The lane configuration at the Lockhart Road / Yonge Street intersection is conceptual only, based on our experience working in the area.

Figure 3 – Future Lane Configuration within Study Area (2031)



3.0 HORIZON YEAR AND ANALYSIS PERIODS

Traffic scenarios for the anticipated full-occupancy year (2031) was 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 letter.

The volume of traffic in the 2031 horizon year is highly dependent on the schedule for build-out of the units in the HSPA. As identified in the Yonge Street Corridor Brief, a total of 16,093 units and 25,141sq.m. of commercial space, has been assumed to be occupied by 2031, in the study area². Based on our discussions with the planner for the Hewitt's Creek Landowner Group (Ray Duhamel), the unit projections represent a conservative estimate of the number of occupied units for the noted year. Therefore, a more accurate metric to apply when considering the triggers for infrastructure improvements is the occupied unit projections, rather than associating infrastructure improvements to a specific horizon year. Regardless, for the purpose of this review, we have adopted the historically applied metric, which refers to the 2031 horizon year.

4.0 2031 TRAFFIC VOLUMES

The traffic projections for the 2031 horizon year are based on the traffic projections in the Yonge Street Corridor Brief.

The Yonge Street Corridor Brief provides an estimate the volume of traffic at the intersection of Yonge Street / Street B and Yonge Street / Lockhart Road for the 2031 horizon year. The traffic projections include the traffic generated by the HSPA (including the proposed development) and two future developments outside the HSPA, located north of Mapleview Drive East (700 Mapleview Development & 759 Yonge Development).

Since the completion of the Yonge Street Corridor Brief, the unit count for the proposed development has increased, marginally and the timing of the proposed development has been assumed to be fully built-out and occupied by 2031³.

Table 1 provides the traffic generation calculation for the proposed development.

Table 1 – Estimated Traffic Generation of Proposed Development

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Low-Density Residential	467 units*	68	166	234	200	122	322
Less: Transit Modal Split (95% personal vehicle, 5% non-auto)		-3	-8	-11	-10	-6	-16
TOTAL TRIP GENERATION		65	158	223	190	116	306

* The unit count used in the traffic generation calculation was based on a previous version of the site plan which had 488 residential units compared to 467 residential units currently proposed.

The following methodology was used to estimate the traffic at the study area intersections.

² This includes the units in the HSPA as well as the 700 Mapleview Development and the 759 Yonge Development)

³ The Yonge Street Corridor Study assumed 470 units for the proposed development based on the HSPA Unit Projections (dated July 2021) which is 3 units higher than the current proposed number of units.

4.1 YONGE STREET / STREET B

The traffic volumes at the intersection of Yonge Street / Street 'A'⁴ / South Access, as illustrated in Figure 11 from the Yonge Street Corridor Brief, were used to estimate the traffic at the noted intersection.

As noted in Section 4.0, the unit count for the proposed development has marginally increased, since the completion of the Yonge Street Corridor Brief. Consequently, the traffic projections have been modified to account for the latest unit count for the proposed development.

4.2 STREET R / LOCKHART ROAD

The traffic volume on Lockhart Road at Street R is based on the traffic volume at the west leg of the intersection of Yonge Street / Lockhart Road, as illustrated in Figure 11 in the Yonge Street Corridor Brief. The traffic volume has been adjusted to account for the increased unit count for the proposed development, as noted in Section 4.1.

The traffic on Street R was estimated based on the traffic methodology used to estimate the HSPA traffic in the Yonge Street Corridor Brief (methodology described in Section 1.4 in the Yonge Street Corridor Brief) and adjusted to account for the increased unit count. The traffic distribution at the Lockhart Road / Street R intersection is based on the Global Traffic Distribution used in the Yonge Street Corridor Brief and on the internal road network within the HSPA.

The resulting total (2031) horizon year traffic volumes, in the AM and PM peak hour are illustrated in **Figure 4**.

The traffic generation for the full-occupancy of the proposed development, in the in the AM and PM peak hour are illustrated in **Figure 5**. The traffic assigned internally into the HSPA was assumed to travel on Street R, Street B or Street O. For illustrative purposes in Figure 5, the traffic on Street B and Street O was combined.

⁴ Street 'A' in the Crown Development is the same road as Street B in the subject site.

Figure 4 – Total (2031) Traffic Volumes

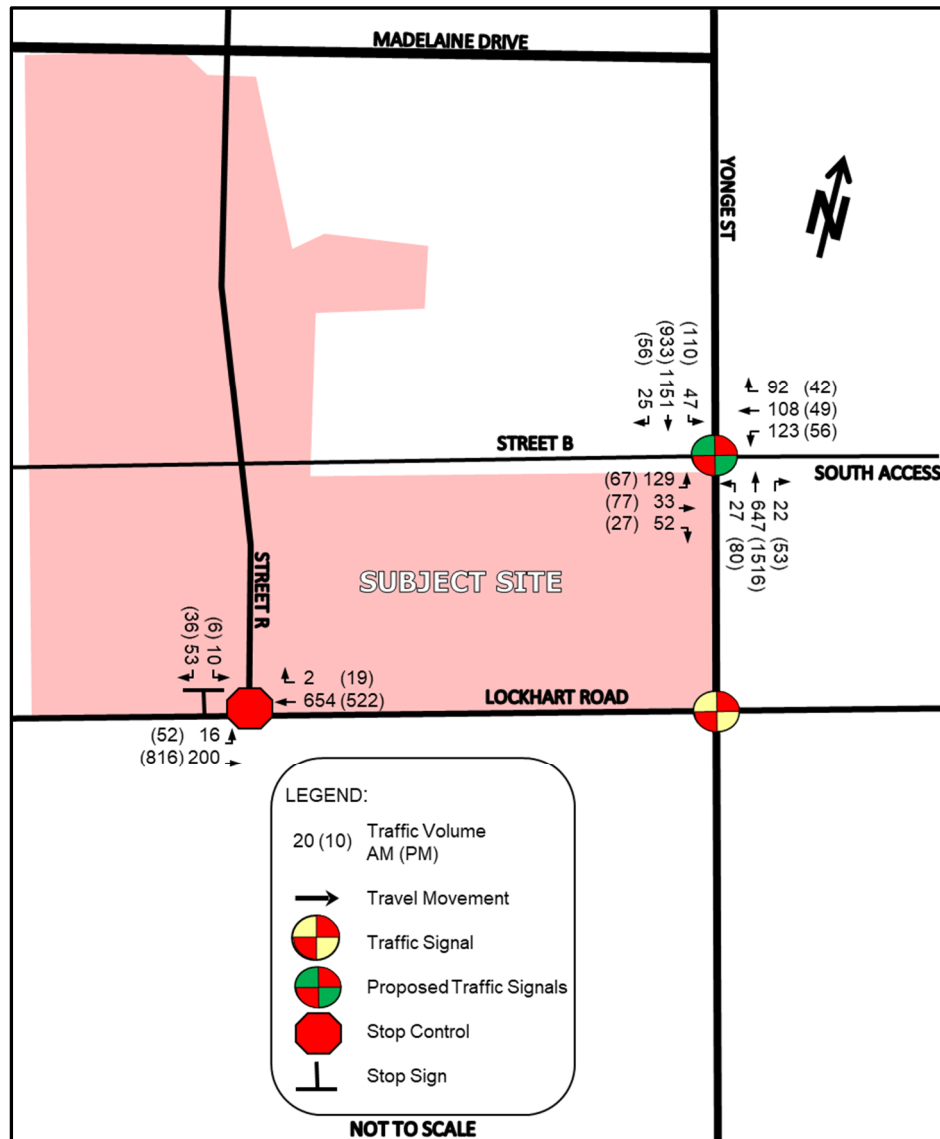
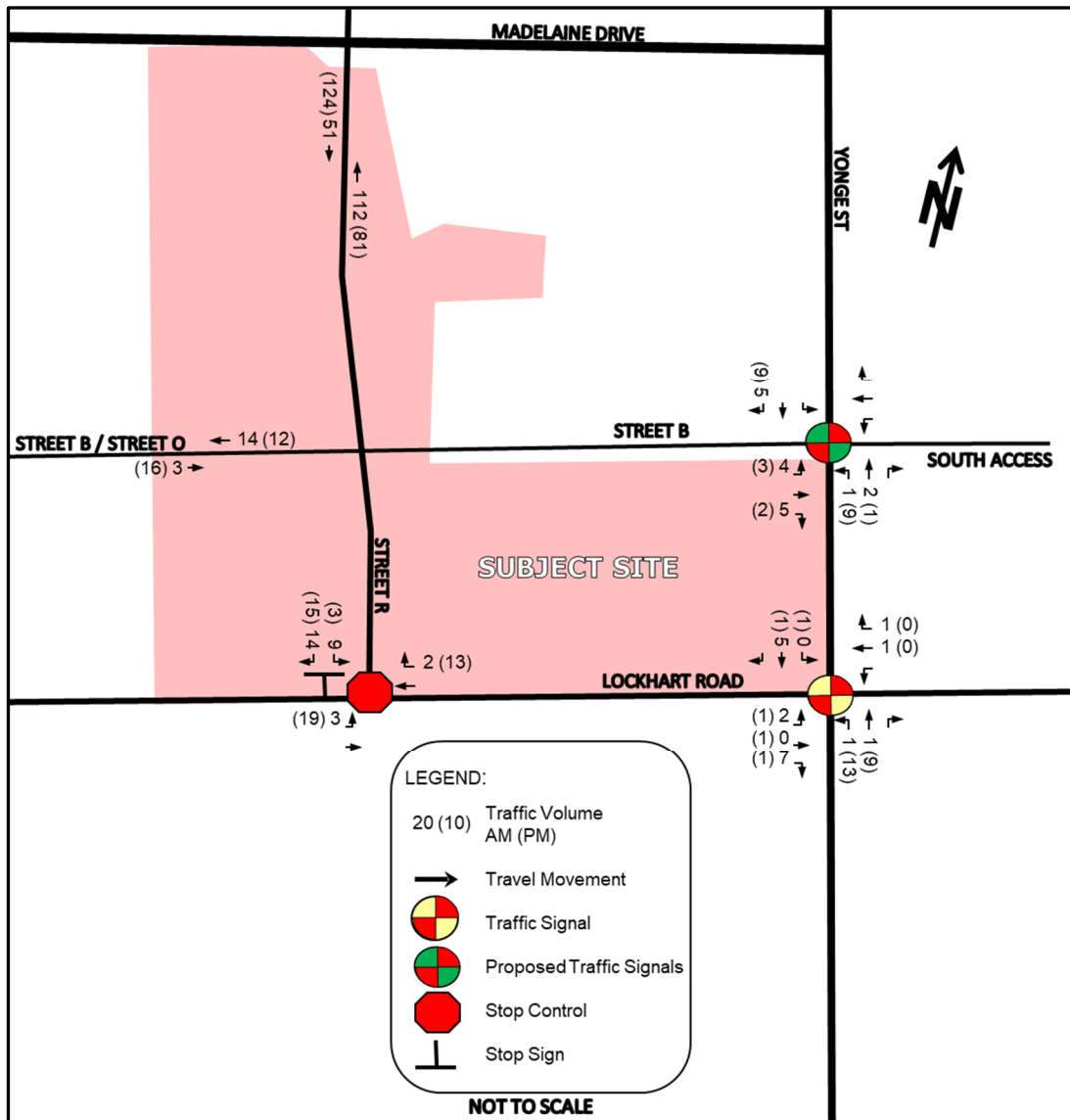


Figure 5 – Proposed Development Traffic Volumes (Full-Occupancy)



5.0 INTERSECTION OPERATION WITH PROPOSED DEVELOPMENT

5.1 INTERSECTION CAPACITY ANALYSIS CRITERIA

Intersection performance was measured using the traffic analysis software, Synchro 11, 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 11 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.

The intersection operations were 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 design limits outlined in the City's TIS Guidelines are highlighted in this report. At signalized intersections through movements and shared through/turning movements with a volume-to-capacity [V/C] ratio of 0.85 or greater and exclusive turning movements with a V/C ratio of 0.90 or greater are considered to be critical movements. At unsignalized intersections individual turning movements operating at LOS D or greater are considered to be critical movements. Values approaching these thresholds have been highlighted in the LOS tables.

The LOS criteria for signalized and stop sign controlled intersections are shown in **Table 1**. A description of traffic performance characteristics is included for each LOS.

Table 1 - 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 (Excellent)	less than 10.0	less than 10.0
B	Higher delay; more vehicles stop (Very Good)	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 (Good)	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 (Satisfactory)	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 acceptable 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 (Unacceptable)	greater than 80.0	greater than 50.0

5.2 TOTAL (2031) INTERSECTION OPERATION

The results of the LOS analysis under total (2031) traffic volumes during the AM and PM peak hour can be found below in **Table 2**.

It is anticipated that the Yonge Street / Street B intersection and connecting link to the Subject Site will be constructed by the 2031 horizon year. For the purposes of this letter, the Yonge Street / Street B intersection was analysed for the signalized and unsignalized condition.

Based on our review of the planned development in the study area and the proposed road network, the following configuration has been assumed for the Yonge Street / Street B / South Access intersection⁵:

- Eastbound: a through/right turn lane and an auxiliary left turn lane with a 75-metre storage and 55-metre taper length.
- Westbound: a through/right turn lane and an auxiliary left turn lane with a 30-metre storage and 55-metre taper length.

Based on our review of the planned development in the study area and the proposed road network, the following configuration is recommended for the southbound approach at the Street R / Lockhart Road intersection:

- Southbound: a right turn lane and an auxiliary left turn lane with a 30 metre storage length and 55 metre taper length.

⁵ This configuration is consistent with the recommendations provided in the traffic impact study completed for the ASA Development (Dated September 23, 2021, by JD Engineering), located on the northeast corner of the Yonge Street / Lockhart Road intersection.

Detailed output of the Synchro analysis can be found in the **Appendix**.

Table 2 – 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 / Street B / South Access (signalized)	0.54	19.7	B	-	-	0.56	10.4	B	-	-
EBL	0.70	58.5	E	48	75	0.39	44.8	D	28	75
EBTR	0.18	49.6	D	25	-	0.38	44.3	D	36	-
WBL	0.44	46.4	D	46	30	0.32	44.0	D	24	30
WBTR	0.74	64.7	E	73	-	0.26	43.2	D	27	-
NBL	0.11	7.7	A	7	TWLTL	0.21	5.0	A	11	TWLTL
NBTR	0.28	8.2	A	45	-	0.59	6.7	A	89	-
SBL	0.09	7.2	A	9	TWLTL	0.59	18.9	B	45	TWLTL
SBTR	0.49	10.3	B	93	-	0.37	4.8	A	44	-
Yonge Street / Street B / South Access (unsignalized)	-	13.2	C	-	-	-	14.4	C	-	-
EBL	0.92	117.7	F	51	75	0.49	54.7	F	19	75
EBTR	0.28	21.5	C	9	-	1.22	256.5	F	61	-
WBL	0.58	43.5	E	26	30	0.71	122.8	F	27	30
WBTR	0.73	46.4	E	42	-	0.55	50.7	F	23	-
Street R / Lockhart Road (unsignalized)	-	1.0	A	-	-	-	0.8	A	-	-
EBTR	0.02	1.9	A	1	-	0.06	1.9	A	2	-
SBL	0.04	17.7	C	1	30	0.04	24.4	C	1	30
SBR	0.09	11.1	B	3	-	0.05	10.1	B	2	-

Based on the Ontario Traffic Manual Book 12 Signal Justification, traffic signals are not technically warranted at the Yonge Street / Street B / South Access intersection for the 2031 horizon year (results are provided in **Appendix**); however, based on the results of the LOS analysis, it is anticipated that traffic signals will be required at the Yonge Street / Street B / South Access intersection due to the eastbound and westbound control delay.

The Lockhart Road / Street R intersection is projected to operate within the typical design limits as noted in Section 4.1.

The anticipated queue for the westbound left turning movements at the Yonge Street / Street B / South Access intersection extend marginally past the storage length; however, the excess queue can be accommodated by the taper length and will not result in any traffic safety or operational issues.

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

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 MTO DS. Based on the above noted criteria, a left turn lane is warranted in the eastbound direction of the Lockhart Road / Street R intersection in the PM peak hour (results are provided in **Appendix**); however, the eastbound left movements are only anticipated to block the eastbound through movements in the second lane for approximately 12.7% of the time during the critical PM peak hour. During this period, the second eastbound lane will act as a defacto left turn lane and eastbound through traffic will use the first eastbound lane (curb lane) to pass the vehicle queuing to make the left turn movement.

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 Street R / Lockhart Road intersection.

No additional traffic infrastructure improvements are recommended on Lockhart Road or Yonge Street for the total (2031) scenario, beyond the road widenings already planned by the City.

5.3 ROAD NETWORK SENSITIVITY ANALYSIS

The schedule for the proposed Street B extension from the subject site to Yonge Street is dependent on the timing of the development of the adjacent property (Crown Developments). In the event that this property does not develop prior to full-occupancy of the Subject Site, there would be a minor temporary redistribution of the traffic generated by the proposed development of the Subject Site, compared to the distribution assumed in Section 4.0. As illustrated in Figure 5, the volume of traffic assumed to travel via Street B is relatively low (15 AM peak hour trips and 23 PM peak hour trips). This traffic would be temporarily redistributed to the Street R / Lockhart Road intersection and to the Madelaine Drive / Yonge Street intersection. Based on the volume of traffic conveyed by these intersections, the additional temporary traffic would not have a notable impact on traffic operations or result in any capacity constraints. Furthermore, in the event that the Street B extension is not completed prior to full-occupancy of the proposed development of the Subject Site, there would also be an associated reduction in the traffic generated by the anticipated 1,110 units and commercial space within the Crown Development, which would provide additional traffic capacity in the adjacent intersections which would offset the temporary redistribution of traffic from the proposed development at the Subject Site.

5.4 INTERSECTION SPACING

As identified in Figure 2, the proposed spacing between Street R and the future Greer Street / Lockhart Road intersection and between Street R and the existing Yonge Street / Lockhart Road both exceed the minimum intersection spacing criteria for an arterial road as identified in the Transportation Association of Canada Design Guide for Canadian Roads (2017) [TAC Guidelines] (200 metres).

The proposed intersection spacing would allow for signal progression, in the event that traffic signals are required at the Street R / Lockhart Road intersection in the future (beyond 2031 horizon year reviewed in this report).

5.5 SIGHT DISTANCE

A review of the available sight distance for the proposed Street R / Lockhart Road intersection was completed as part of this analysis.

The sight distance to the east and west on Lockhart Road at the Street R (200+ metres in both directions) is greater than the minimum intersection sight distance as identified in the TAC Guidelines for a design speed of 80 km/h (170 metres for southbound left turn movement and 145 metres for southbound right turn movements).

There are no issues with the sight distance available for the proposed Street R / Lockhart Road intersection.

6.0 CONCLUSION

This chapter summarizes the conclusions and recommendations from the letter.

Traffic scenarios for the anticipated full-occupancy year (2031) was selected for analysis of traffic operations in the study area. The volume of traffic in the 2031 horizon year is highly dependent on the schedule for build-out of the units in the area (16,093 units and 25,141sq.m. of commercial space assumed in our analysis for 2031, which is expected to be a conservative estimate); it is noted, the actual timing for build-out of these units is a more accurate metric to apply when considering triggers for required infrastructure improvements for the development.

The following transportation infrastructure improvements have been applied in our analysis:

- 1) Infrastructure improvements anticipated to be completed by the City prior to 2031:
 - Widen Yonge Street to a 5-lane cross-section between Mapleview Drive East and Lockhart Road (Per City Capital Budget).
 - Widen Lockhart Road to a 4-lane cross-section between Huronia Road and Yonge Street (Per City Capital Budget).
- 2) Infrastructure configuration assumed for the Yonge Street / Street B / South Access intersection for the 2031 horizon year:
 - Eastbound: a through/right turn lane and an auxiliary left turn lane with a 75-metre storage and 55-metre taper length.
 - Westbound: a through/right turn lane and an auxiliary left turn lane with a 30-metre storage and 55-metre taper length.
- 3) Traffic signals are not technically warranted at the Yonge Street / Street B / South Access intersection for the 2031 horizon year (results are provided in Appendix); however, based on the results of the LOS analysis, it is anticipated that traffic signals will be required at the Yonge Street

- / Street B / South Access intersection before 2031, due to the eastbound and westbound control delay.
- 4) Infrastructure recommended for the southbound approach at the Street R / Lockhart Road intersection:
- Southbound: a right turn lane and an auxiliary left turn lane with a 30 metre storage length and 55 metre taper length.
- 5) The schedule for the proposed Street B extension from the subject site to Yonge Street is dependent on the timing of the development of the adjacent property (Crown Developments). In the event that this property does not develop prior to full-occupancy of the Subject Site, there would be a minor temporary redistribution of the traffic; however, this traffic redistribution would not have a notable impact on traffic operations or result in any capacity constraints at the adjacent intersections.
- 6) The proposed spacing between Street R and the future Greer Street / Lockhart Road intersection and between Street R and the existing Yonge Street / Lockhart Road both meets the minimum intersection spacing criteria for an arterial road as identified in the TAC Guidelines (200 metres)
- 7) The sight distance available east and west of Street R meets the minimum intersection sight distance requirements according to the TAC Guidelines.
- 8) In summary, the proposed development will not cause any operational or traffic safety issues within the study area.

We trust you will find this submission acceptable. Should you have any questions or concerns or require any additional information in this regard, please contact our office.

Yours truly,
JD Northcote Engineering Inc.

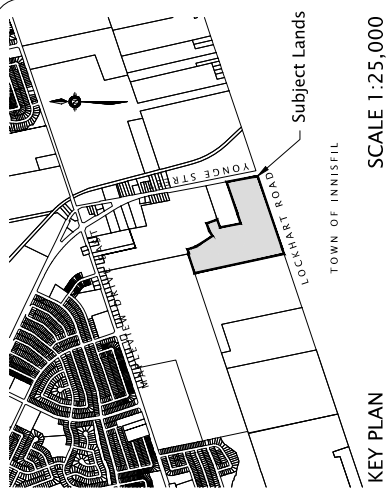
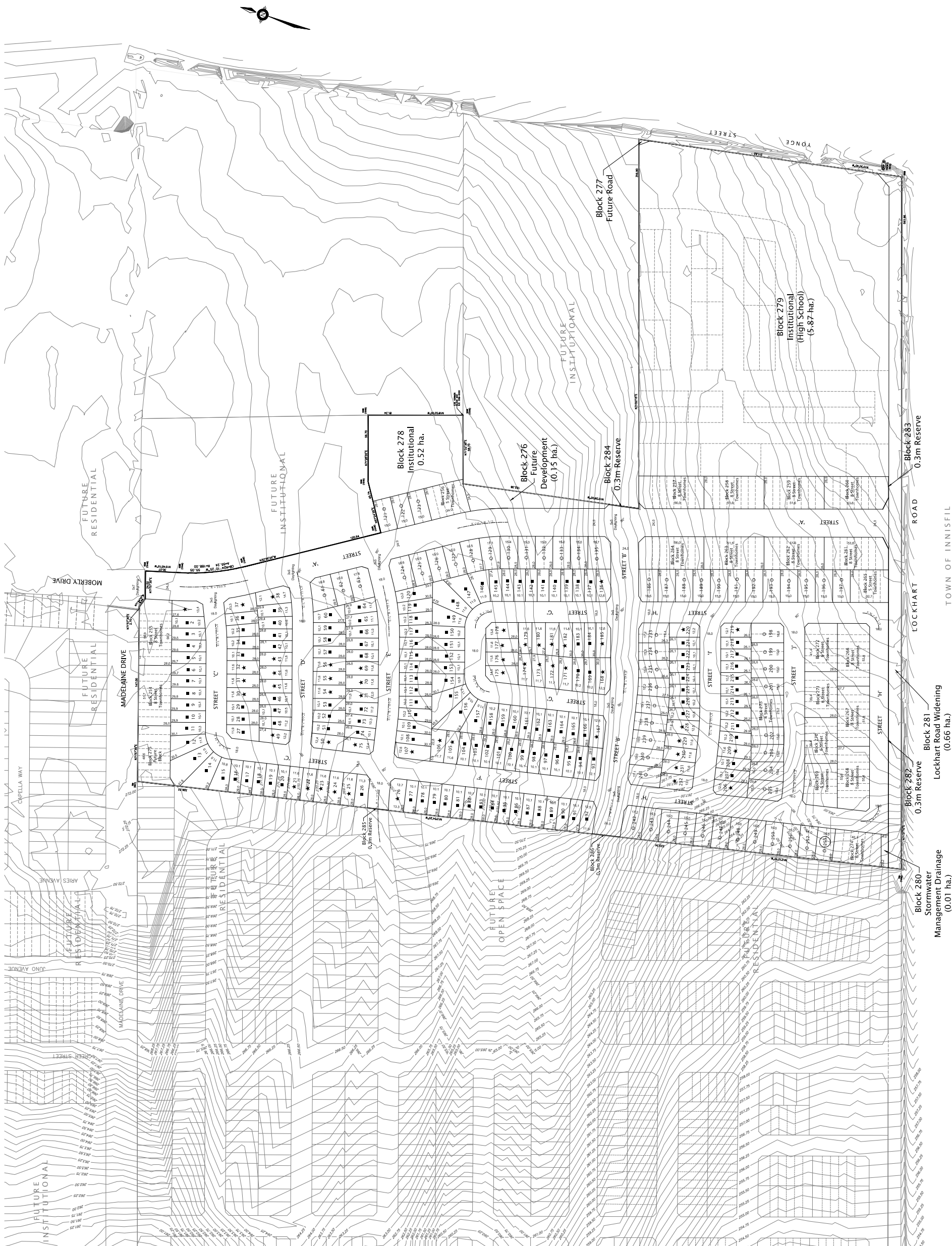


John Northcote, P.Eng.
President

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. JD Engineering accept no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this project.

Appendix

Draft Plan of Subdivision



Draft Plan of Subdivision

Part of Lot 15, Concession 11
Geographic Township of Innisfil,

County of Simcoe
2022

OWNER'S CERTIFICATE

I, THE UNDERSIGNED, BEING THE REGISTERED OWNER OF THE SUBJECT LANDS, HEREBY AUTHORIZE THE JONES CONSULTING GROUP LTD., TO PREPARE THIS DRAFT PLAN OF SUBDIVISION AND TO SUBMIT SAME TO THE CITY OF BARRIE FOR APPROVAL.

DATE _____ OWNER _____

SURVEYOR'S CERTIFICATE
I CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED
AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE ACCURATELY AND
CORRECTLY SHOWN.

DATE	
RUDY MAK, O.I.S	

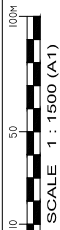
ADDITIONAL INFORMATION REQUIRED UNDER

g)	SHOWN ON DRAFT PLAN	h)	MUNICIPAL WATER
h)	SHOWN ON DRAFT PLAN	i)	TIOGA LOAMY SAND & BONDHEAD SANDY LOAM
i)	SHOWN ON KEY PLAN	j)	SHOWN ON DRAFT PLAN
j)	RESIDENTIAL, INSTITUTIONAL, & SWRI DRAINAGE	k)	ALL MUNICIPAL SERVICES TO BE PROVIDED
k)	SHOWN ON DRAFT PLAN	l)	THERE ARE NO RESTRICTIVE COVENANTS AFFECTING THE LAND TO BE SUBDIVIDED.
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STATISTICS	Area (ha.)	Units
11.6m Single	1.75 ha.	52
(Lom. 2: 21, 25, 30, 32, 37 and 38, 42, 46, 48 & 50, 54, 56, 69, 71, 75 & 76, 105, 106, 120, 126, 167 & 168, 171, 182, 186, 200, 205, 219, 220, 228 & 250)		
10.1m Corner Singles	4.32 ha.	142
(Lom. 2: 20, 25, 28, 33, 36, 39, 42, 46, 48, 51-53, 57-60, 64-68, 72-74, 77-104, 106, 120, 137, 160, 169 & 170, 182, 186, 200, 205, 219, 220, 228 & 250)		
15.0m Semi Detached	2.55 ha.	118
(7.5m Det. 43, 121, 135, 166, 206 & 203-250)		
Street Townhomes	2.75 ha.	147
(6.1m Unit) (Books 254-274)		
Future Block	0.14 ha.	8
(Block 275)		
Future Development/Road	0.15 ha.	
(Books 276 & 277)		
Institutional (School)	6.39 ha.	
(Books 278 & 279)		
Stormwater Management Drainage	0.01 ha.	
(Block 280)		
Road Widening / 0.3m Reserves	0.67 ha.	
(Books 281-286)		
Roads & Lanes	5.74 ha.	
(24.0m Minor Collector (Street A & B) (18.0m Local Streets (Streets C- T))		
TOTAL	24.47 ha.	467 units

RAINSONG

PHASE 2
DRAFT PLAN OF SUBDIVISION



Date Issued: JAN. 20, 2022

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Drawing Name:



Yonge Street Corridor Brief

Yonge Street Corridor

City of Barrie

Traffic Projection Brief

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Legal Notification

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1 Introduction

1.1 Background

This report summarizes the procedure used to estimate the future traffic volume on Yonge Street, between Maplevue Drive East and Lockhart Road [Yonge Street Corridor], which is located within the Hewitt Secondary Plan Area [HSPA], in the City of Barrie [City]. The HSPA 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).

JD Northcote Engineering Inc. [JD Engineering] prepared future traffic projection for the Yonge Street Corridor. Rainsong Land Development Inc. has retained **JD Northcote Engineering Inc.** [JD Engineering] to prepare this report to summarize their future traffic projections, in support of the Rainsong Phase 2 Development.

1.2 Study Area

Figure 1 illustrates the location of the Rainsong Phase 2 Development [Subject Site] and study area intersections in relation to the surrounding area.

Figure 1 – Study Area



1.3 Horizon Year and Analysis Periods

Traffic volume for the existing year (2021) and horizon year (2031) were calculated for the study area. The weekday morning [AM] and weekday afternoon [PM] peak hours have been selected as the analysis periods for this study.

1.4 Developments within the Study Area

The HSPA 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 HSPA 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 Master Transportation Study was completed by LEA Consulting Ltd. for the HSPA (dated February 2019) [Hewitt MTS]. The future traffic projections provided in the Hewitt MTS includes the traffic generated by all the planned development in the HSPA. The development plan for the HSPA can be found in the Hewitt MTS (excerpts provided in **Appendix A**). However, development statistics and timeline for development of the properties in the HSPA have been changed since the completion of the

Hewitt MTS. For the purposes of this report, we have updated the methodology to account for the updated statistics and timelines as it relates to the horizon years in this report.

Additionally, the City has identified the following two developments, located outside of the HSPA, which will have a notable impact on traffic in the study area:

- 700 Mapleview Development; and
- 759 Yonge Development.

Sections 1.4.1 to 1.4.6 outline the methodology used to generate and assign traffic in the study area. **Figure 2** illustrates the location of the critical planned developments in the study area.

Figure 2 – Development Locations



1.4.1 Traffic Generation for the Adjacent Developments

The traffic generation for the adjacent development have been based on the data provided in the Institute of Transportation Engineers [ITE] *Trip Generation Manual* (11th Edition) [ITE Trip Generation Manual] and based on previous work completed in the Hewitt MTS.

For the single-detached, townhouse and multi-residential (under four stories) units [Low-Density], the residential trip generation rate used in the Hewitt MTS was applied. **Table 1** illustrates the Low-Density residential unit rates. This rate provides the best representation of the traffic generation for Low-Density residential units in the study area.

Table 1 – Estimated Traffic Generation of Adjacent Low Density Development

Trip Rate (External Trips per Unit)	AM Peak Hour			PM Peak Hour		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Proxy Site Trip Rate	0.14	0.34	0.48	0.41	0.25	0.67

For multi-residential (over four stories) [Mid / High Density] and commercial land uses the following ITE land uses have been applied to estimate the traffic:

- ITE land use 221 (Multifamily Housing (Mid-Rise)) – General Urban /Suburban Setting
- ITE land use 822 (Strip Retail Plaza) – General Urban /Suburban Setting
- ITE land use 850 (Supermarket) – General Urban /Suburban Setting

The AM and PM peak traffic generation for the adjacent developments 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.

We have assumed a 95% and 5% modal split for vehicles and non-auto trips respectively, for the traffic generated for the adjacent developments¹.

1.4.2 Traffic Distribution for the Adjacent Developments

1.4.2.1 HSPA, 700 Mapleview Development & 759 Yonge Street Development

The traffic distribution for the HSPA, 700 Mapleview Development and 759 Yonge Street Development was estimated based on the Hewitt MTS. The Hewitt MTS determined the traffic distribution for the HSPA based on a dynamic traffic assignment, which accounts for any changes in the road network in the City that would impact the traffic assignment. The details of the methodology are outlined in Appendix C of the Hewitt MTS (excerpts provided in **Appendix A**).

The traffic distribution for the adjacent developments within the HSPA has been estimated based on HSPA traffic assignment for the 2031 horizon year, as illustrated in Appendix H of the Hewitt MTS (excerpts are provided in **Appendix A**). Reviewing the traffic model, a global traffic distribution for the adjacent developments was determined for the AM and PM peak hour, illustrated **Table 2**. The directions noted in the table represent the direction trips would travel relative to the HSPA lands based on our review of the traffic model.

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

Table 2 – Global Traffic Distribution

Scenario	Direction	Ingress / Egress Traffic Direction					
		North	Northwest	Northeast	Southwest	Southeast	South
AM	In	36%	47%	1%	11%	2%	3%
	Out	29%	42%	0%	18%	0%	11%
PM	In	27%	38%	0%	19%	0%	17%
	Out	32%	40%	1%	23%	1%	3%

The traffic has been assigned to each direction in the study area based on the location of the developments relative to the external road network and proposed road network in the HSPA.

1.4.2.2 ASA Development and Crown Development

Since the ASA Development and Crown Developments are located adjacent to and directly across the from the Rainsong Development on Yonge Street, the traffic generated by these developments would notably impact the study area intersections. Consequently, we have assumed the traffic distribution for the ASA Development and Crown Development independently from the Global Traffic Distribution noted previously.

The traffic distribution assumed for the ASA Development and Crown Development used 2016 Transportation Tomorrow Survey [TTS] data.

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 F**). 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 ASA Development and Crown Development during the AM and PM peak hour is expected to generally follow commuter travel patterns. The 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 roadway for the ASA Development has been based on the proposed parking layout, obtained from the traffic impact study for the ASA Development completed by JD Engineering [ASA Development TIS] (excerpts provided in **Appendix B**). It is noted that some traffic would access the ASA Development via Street 'A' and the internal connections in the HSPA to the west; however, in order to be conservative in our analysis, all traffic is assumed to access the ASA Development via Yonge Street at the access driveways.

Table 3 illustrates the traffic distribution for the ASA Development and Crown Development.

Table 3 – ASA Development and Crown Development Traffic Distribution

Travel Direction (to / from)	Percentage of Total Traffic Generation
North via Yonge Street	31%
West via Mapleview Drive East	35%
East via Mapleview Drive East	2%
West via Lockhart Road	11%
East via Lockhart Road	7%
South via Yonge Street	14%
TOTAL	100%

1.4.3 HSPA

1.4.3.1 Statistics and Timeline

The HSPA includes a number of development properties which all have different timelines. A schedule for the development properties in the HSPA was provided by Jones Consulting (dated July 2021), which also includes the unit breakdown and anticipated occupancies for each year between 2021 and 2031 (schedule is provided in **Appendix C**). **Table 4** summarizes the timeline for each development property in the HSPA from the schedule; the development properties have been identified with a letter which can be referenced on the HSPA Map in **Appendix C**.

Table 4 – HSPA Statistics and Timeline

Client (Development)	Parcel	Land-Use	Size	Build-Out Year	Horizon Year (% Occupied)			
					2021	2026	2027	2031
BEMP Holdings 2 Inc. & Honeyfield BEMP 2 Limited (BEMP II)	B	Residential	Low Density: 354 units Mid / High Density: 493 units	2029	12%	60%	79%	100%
		Commercial	2000 sq.m.	2028	0%	0%	0%	100%
GG (9 Mile) Limited (Lockmaple Development)	F	Residential	Low Density: 1114 units	2028	0%	88%	95%	100%
Rainsong Land Development Inc. Phase 1 (Rainsong Development Phase 1)	H (a)	Residential	Low Density: 442 units	2030	0%	0%	23%	100%
Centreville Barrie GP Inc. (Centreville Barrie Development)	BB	Residential	Mid / High Density: 204 units	2031	0%	0%	0%	100%
Sobeys (Sobeys Development)	R	Residential	Low Density: 72 units Mid / High Density: 792 units	Post-2031	0%	53%	53%	53%
		Supermarket	17,000 sq.m.	Post-2031	0%	7%	30%	55%
Pratt Hansen Group & Bradley Homes (Hewitt's Gate Subdivision)	I, J, K	Residential	Low Density: 904 Mid / High Density: 60	Post-2031	0%	61%	71%	83%
Pratt Hansen Group Inc. (Bistro 6 Development)	I	Residential	Mid / High Density: 788 units	2024	40%	100%	100%	100%
1091369 Ontario Inc. (Bulut Development)	M	Residential	Low Density: 658 units	2024	0%	100%	100%	100%
Sandy Creek Estates (Sandy Creek Estates)	N-1, N	Residential	Low Density: 330 units Mid / High Density: 37 units	2025	0%	100%	100%	100%
		Commercial	3,700 sq.m.	2023	0%	100%	100%	100%
1597229 Ontario Ltd. & Honeyfield Big Bay Point Inc. (Blue Sky Development)	P	Residential	Low Density: 893 units	2031	0%	45%	56%	100%
970 Mapleview Inc. (970 Mapleview Development)	Q	Residential	Low Density: 836 units Mid / High Density: 67 units	2026	3%	100%	100%	100%
		Commercial	2,000 sq.m.	2027	0%	0%	100%	100%

Client (Development)	Parcel	Land-Use	Size	Build-Out Year	Horizon Year (% Occupied)			
					2021	2026	2027	2031
Mapleview South (Innisfil) Ltd. (Mapleview South Development)	Y	Residential	Low Density: 466 units	2027	0%	79%	100%	100%
Mapleview Friday Corporation (Mapleview Friday Development)	X	Residential	Low Density: 16 units Mid / High Density: 75 units	2024	0%	100%	100%	100%
		Commercial	372 sq.m.	2023	0%	100%	100%	100%
Rainsong Land Development Inc. Phase 2 (Rainsong Development Phase 2)	H (b)	Residential	Low Density: 470 units	Post-2031	0%	0%	0%	55%
Mattamy (Lockhart) Limited (Mattamy Development)	G	Residential	Low Density: 630 units	2026	0%	100%	100%	100%
		Commercial	1,000 sq.m.	2025	0%	100%	100%	100%
Lockhart Innisfil Investments Limited I (Lockhart Development Phase 1)	D	Residential	Low Density: 198 units	2026	0%	100%	100%	100%
Lockhart Innisfil Investments Limited II (Lockhart Development Phase 2)	E	Residential	Low Density: 402 units	2028	0%	37%	75%	100%
Barrie Lockhart Road GP Inc. (400 Lockhart Development)	A	Residential	Low Density: 387 units Mid / High Density: 90 units	2026	0%	100%	100%	100%
Ballymore Building (Barrie) Corp. (Ballymore Development)	W	Residential	Low Density: 203 units Mid / High Density: 266 units	2028	0%	43%	57%	100%
2303757 Ontario Inc. (Campbell Development)	L	Residential	Low Density: 85 units	2025	0%	100%	100%	100%
ASA Development Inc. (ASA Development)	V	Residential	Low Density: 60 units Mid / High Density: 1158 units	Post-2031	0%	33%	52%	96%

1.4.3.2 Traffic Generation

The traffic generation methodology noted in Section 1.4.1 was applied to generate traffic for the HSPA. The traffic generation for the HSPA (without the Crown Development²) for the 2021 and 2031 horizon years have been illustrated in **Tables A and B** in **Appendix D**.

For the commercial land uses in each development property within the HSPA, we have assumed these lands would primarily service the local area in the HSPA. Consequently, we have assumed half of the commercial primary traffic would be captured in the internal road network of the HSPA and the other half assigned to the external road network. The commercial traffic generation illustrated in **Appendix D** represents the traffic generation prior to reduction.

1.4.3.3 Traffic Assignment

Using the traffic distributions pattern noted in Section 1.4.2, **Figures 2 and 3** illustrate the HSPA traffic assignment for the 2021 and 2031 horizon year, in the AM and PM peak hour.

The distribution of traffic in the study area for the HSPA is based on the proposed HSPA road layout illustrated in **Appendix C**.

² The Crown Development traffic assignment was determined separately in Section 1.4.6.

Figure 2 – HSPA (2021) Traffic Assignment

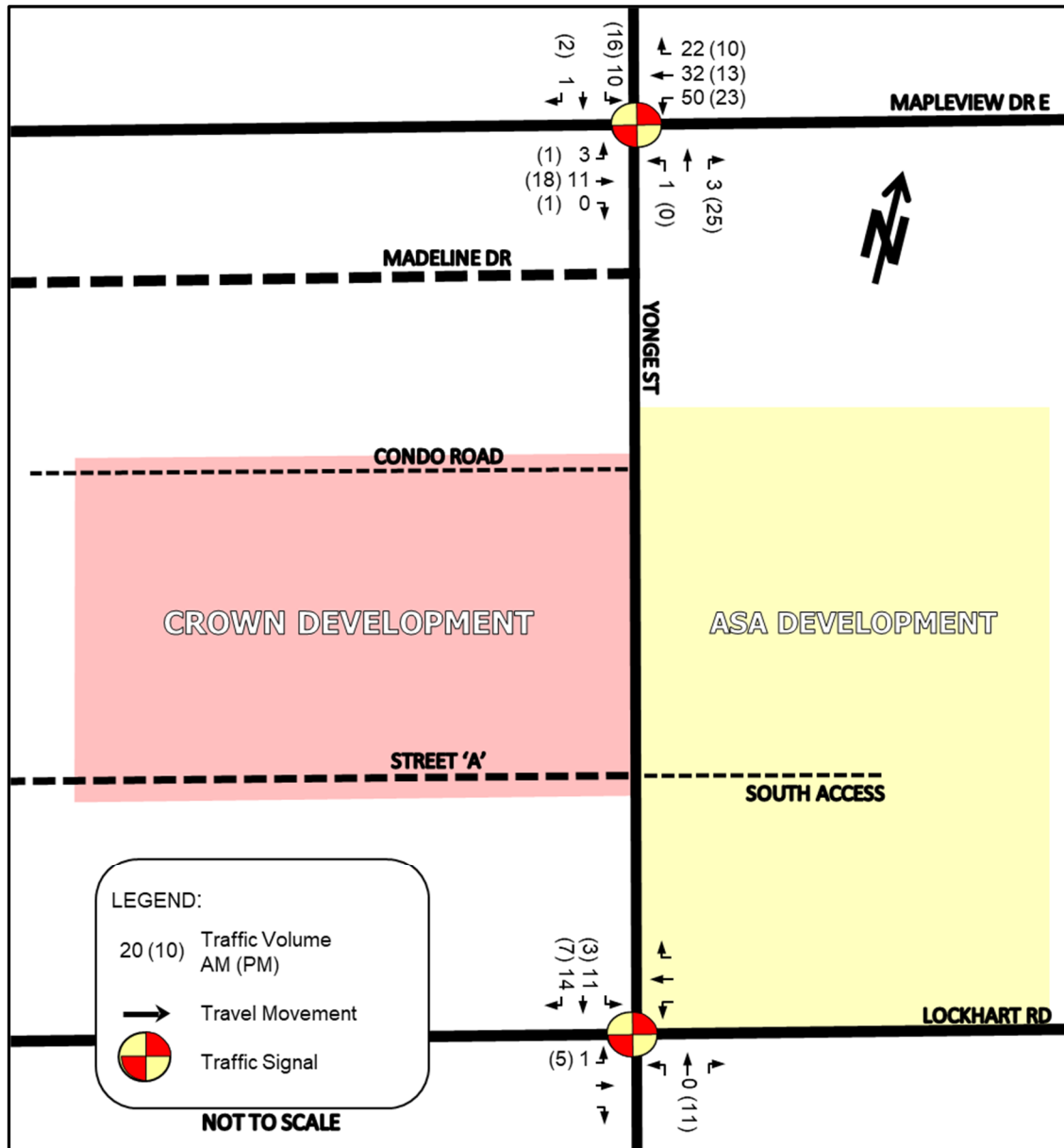
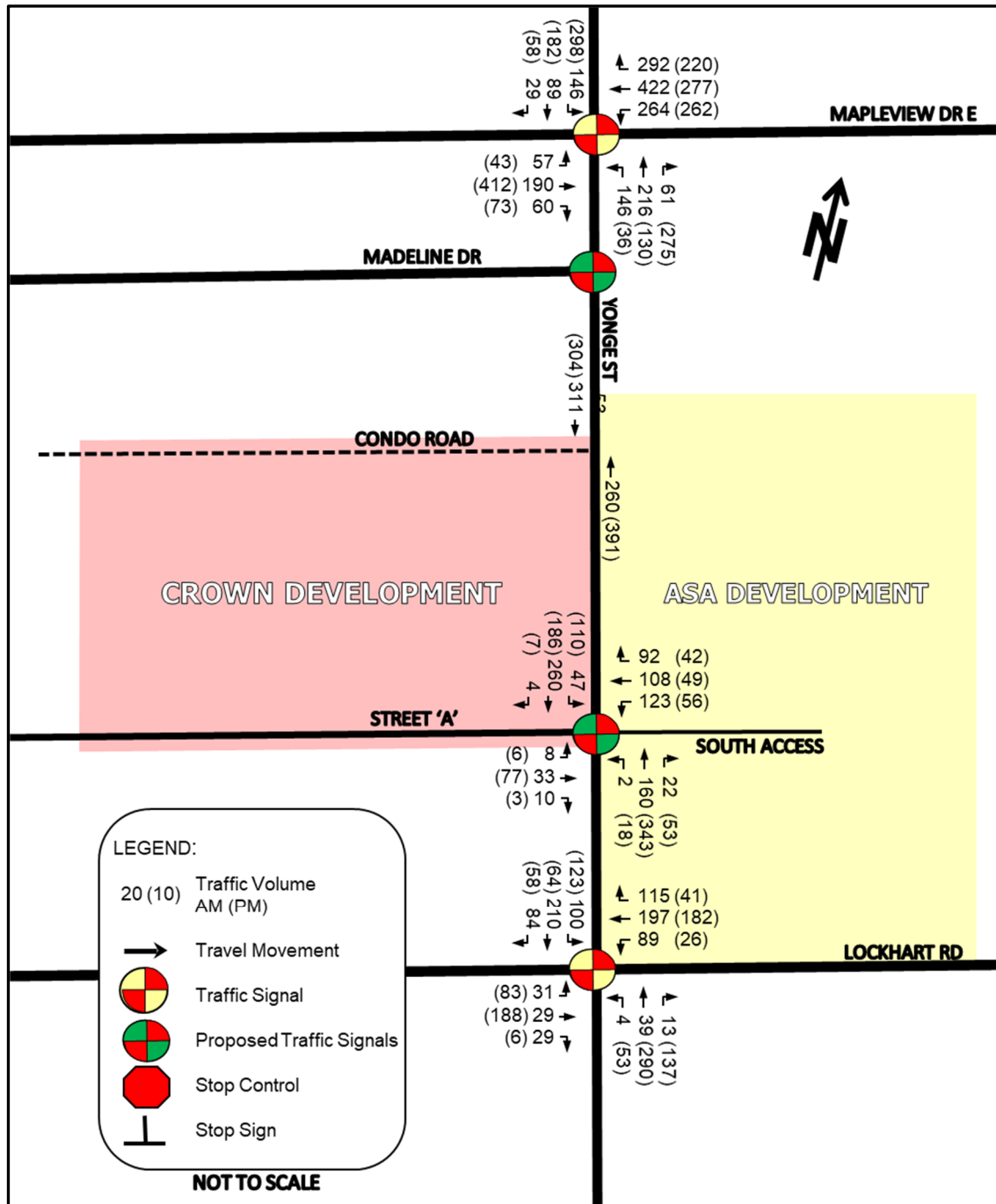


Figure 3 – HSPA (2031) Traffic Assignment



1.4.4 700 Mapleview Development

A mixed-use development is proposed on a site municipally known as 700 Mapleview Drive East located on the north side of Mapleview Drive East, midblock between the GO Train railway and Royal Jubilee Drive [700 Mapleview Development]. The Mapleview Development will consist of a total of 849 residential units, which will include 418 townhouse units, 427 walk-up apartment and an 8-unit residential apartment. The 700 Mapleview Development is pending site plan approval. For the purposes of this report, we have assumed the 700 Mapleview Development to be built-out by 2031.

The traffic generation for the 700 Mapleview Development is illustrated in **Table 5**.

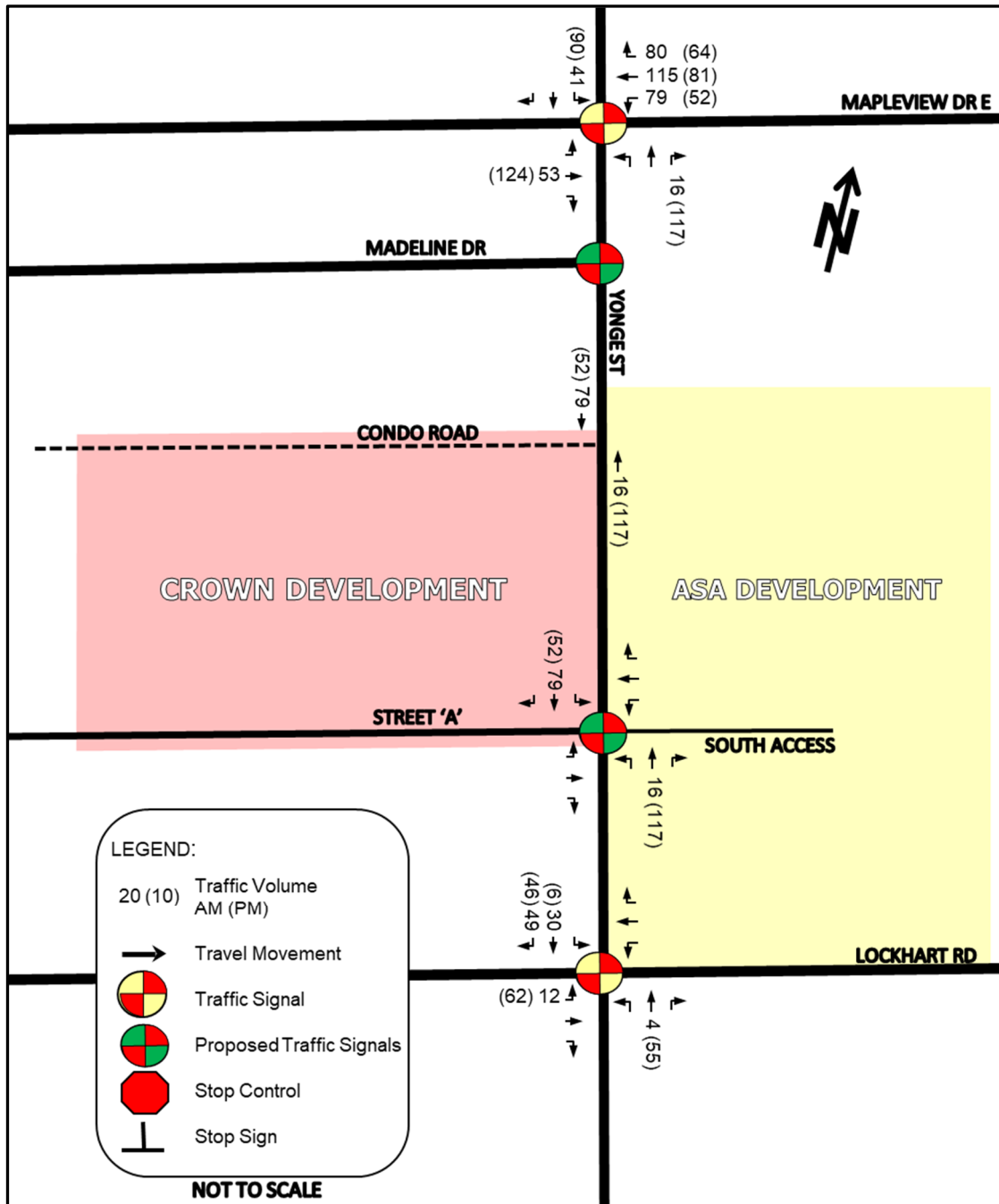
Table 5 – Estimated Traffic Generation for 700 Mapleview Development

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Low-Density Residential	849 units	119	289	408	348	212	560
Less: Transit Modal Split (95% personal vehicle, 5% non-auto)		-6	-14	-20	-17	-11	-28
TOTAL TRIP GENERATION		113	275	388	331	201	532

The traffic distribution for the 700 Mapleview Development will follow the traffic distribution noted in Section 1.4.2.

Figure 4 illustrates the traffic assignment for the 700 Mapleview Development, in the AM and PM peak hour.

Figure 4 – 700 Maplevue Development (2031) Traffic Assignment



1.4.5 759 Yonge Development

A mixed-use development is proposed on a site municipally known as 789 Yonge Street located north of the Yonge Street / County Lane intersection [759 Yonge Development]. The 759 Yonge Development will consist of a total of 1,326 residential units, which will include 427 townhouse units and 750 mid-rise residential units. The 759 Yonge Development will also include commercial retail (2,787 sq.m.) which will generate a negligible amount of traffic. The 759 Yonge Development is draft plan approved. For the purposes of this report, we have assumed the 759 Yonge Development to be built-out by 2031

The traffic generation for the 759 Yonge Development is illustrated in **Table 6**.

Table 6 – Estimated Traffic Generation for 759 Yonge Development

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Low-Density Residential	427 units	81	196	277	236	144	380
Multifamily Housing (Mid-Rise) ITE Land Use: 221	750 units	79	263	342	179	114	293
Strip Retail Plaza ITE Land Use: 822	2,787 sq.m. (29,999 sq.ft.)	36	24	60	85	85	170
Less: Transit Modal Split (95% personal vehicle, 5% non-auto)		-10	-24	-34	-25	-17	-42
TOTAL TRIP GENERATION		186	459	645	475	326	801
INTERNAL CAPTURE		-7	-7	-14	-29	-29	-58
PASS-BY TRIPS (ITE LAND USE 820)*		0	0	0	-23	-23	-46
NET TRIP GENERATION		179	452	631	423	274	697

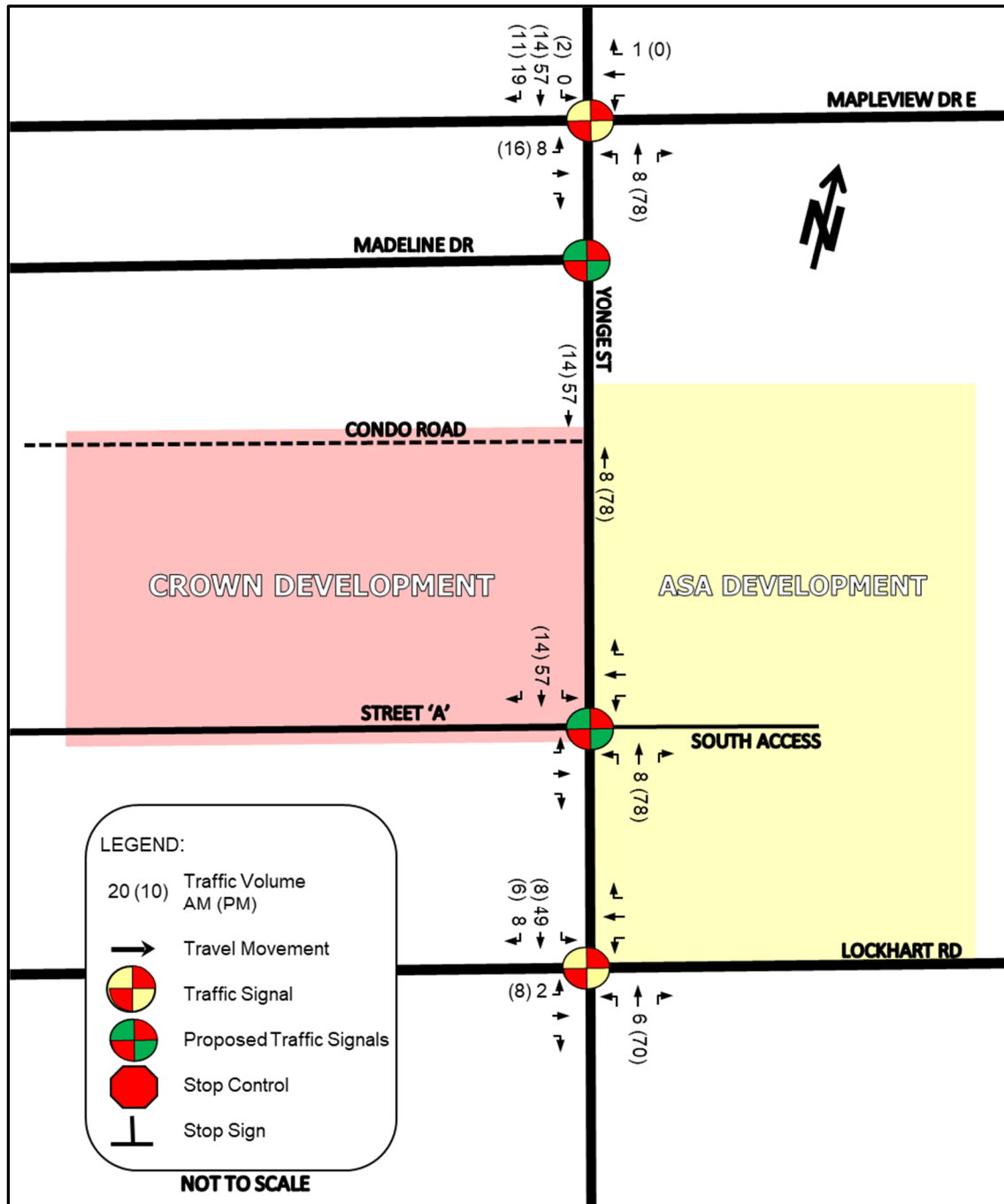
* The internal capture rates have been calculated using the ITE Trip Generation Handbook. Internal capture reports are provided in **Appendix G**.

** Commercial pass-by trips for the AM and PM peak hour are 0% and 34% respectively, according to the ITE data for ITE land use 820. A pass-by rate is not available for the ITE land use 822.

The traffic distribution for the 759 Yonge Development will follow the traffic distribution noted in Section 1.4.2.

Figure 5 illustrates the traffic assignment for the 759 Yonge Development, in the AM and PM peak hour.

Figure 5 – 759 Yonge Development (2031) Traffic Assignment



1.4.6 Crown Development

The **Crown (Barrie) Developments Inc.** property is municipally known as 1012 Yonge Street, located northwest of the Yonge Street / Lockhart Road intersection [Crown Development]. For the purpose of this report, the Crown Development has been assumed to include 1,110 condominium units (550 units in Phase 1 and 550 units in Phase 2), with ground floor commercial (1,282 sq.m. GFA)³.

It is anticipated that the Crown Development will be fully occupied by 2031.

The Crown Development includes a municipal minor collector road along the south boundary [Street 'A'] and a condominium road along the north boundary [Condo Road] of the site. Street 'A' will have full-movement access and the Condo Road will have right-in right-out [RIRO] access onto Yonge Street. Street 'A' and the Condo Road will connect with the future road network west of the Crown Development. Condo Road will be restricted to Crown Development traffic.

The traffic generation for the Crown Development is illustrated in **Table 7**.

Table 7 – Estimated Traffic Generation for Crown Development

Development Phasing	Land Use	Size	AM Peak Hour			PM Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL
Phase 1 (2026)	Multifamily Housing (Mid-Rise) ITE Land Use: 221	550 units	58	196	254	131	84	215
	Strip Retail Plaza ITE Land Use: 822	1,282 sq.m. (13,795 sq.ft.)	22	14	36	49	49	98
	Less: Transit Modal Split (95% personal vehicle, 5% non-auto)		-4	-11	-15	-9	-6	-15
	TOTAL TRIP GENERATION PHASE 1		76	199	275	171	127	298
	INTERNAL CAPTURE*		-3	-3	-6	-17	-17	-34
	PASS-BY TRIPS (ITE LAND USE 820)**		0	0	0	-14	-14	-28
	NET TRIP GENERATION PHASE 1		73	196	269	140	96	236
Phase 2 (2027)	Multifamily Housing (Mid-Rise) ITE Land Use: 221	550 units	56	186	242	131	84	215
	Less: Transit Modal Split (95% personal vehicle, 5% non-auto)		-3	-9	-12	-6	-4	-10
	TOTAL TRIP GENERATION PHASE 2		129	376	505	296	207	503
	INTERNAL CAPTURE*		-6	-6	-12	-17	-17	-34
	NET TRIP GENERATION PHASE 2		123	370	493	265	176	441

* The internal capture rates have been calculated using the ITE Trip Generation Handbook. Internal capture reports are provided in **Appendix G**.

** Commercial pass-by trips for the AM and PM peak hour are 0% and 34% respectively, according to the ITE data for ITE land use 820. A pass-by rate is not available for the ITE land use 822.

The traffic distribution for the Crown Development will follow the traffic distribution illustrated in Table 3 in Section 1.4.2.2, which used 2016 Transportation Tomorrow Survey Data [TTS] (excerpts provided in **Appendix F**).

Figure 6 to 9 illustrates the traffic assignment for the residential and commercial primary and pass-by trips, in the AM and PM peak hour.

³ The commercial component of the Crown Development has decreased in size from 1,282 sq.m. to 1,179.5 sq.m.; however, to be conservative, we have assumed the higher commercial size in the previous version of the site plan.

Figure 6 – Crown Development Phase 1 Traffic Assignment – Residential Trips

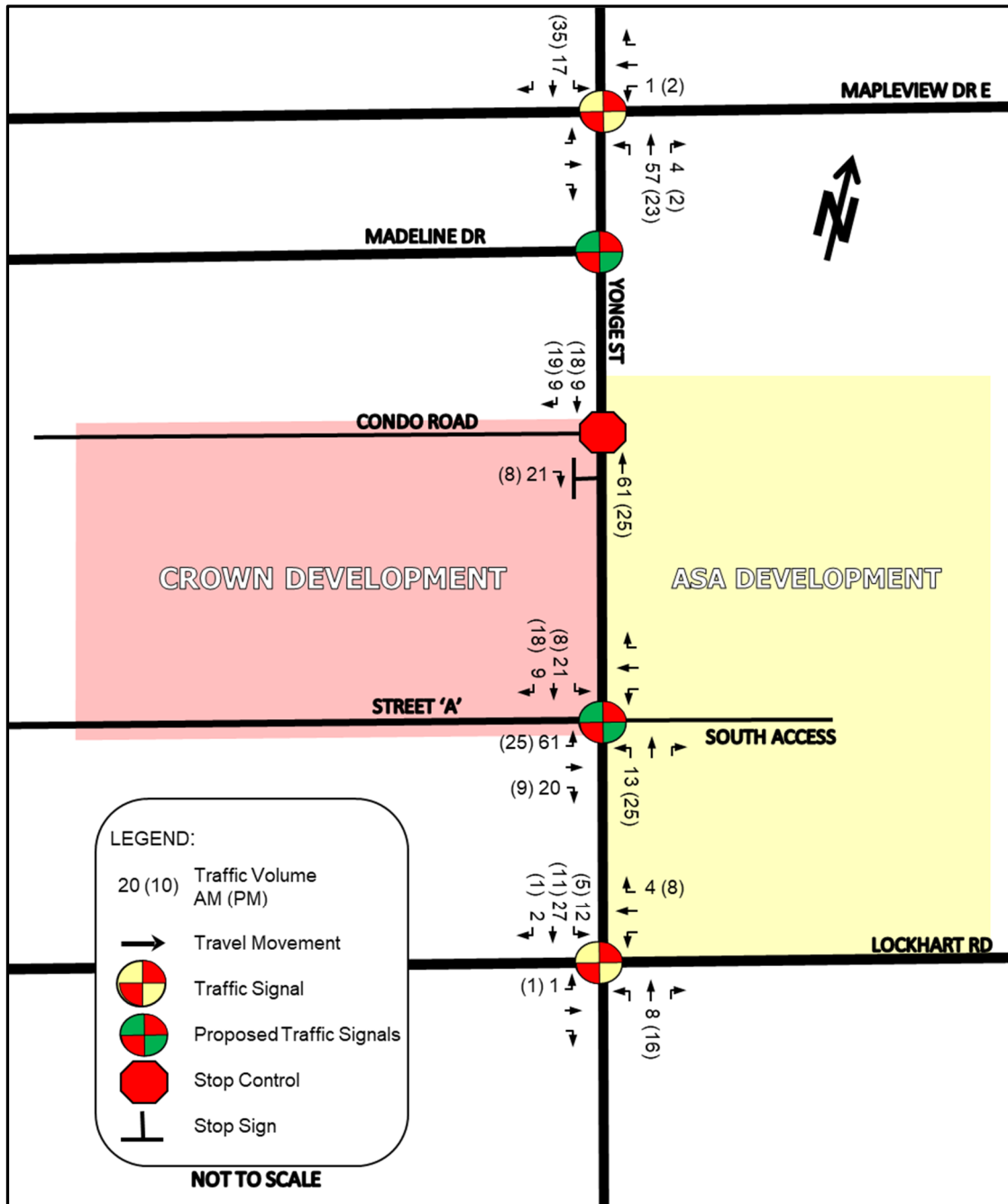


Figure 7 – Crown Development Traffic Assignment – Commercial Primary Trips

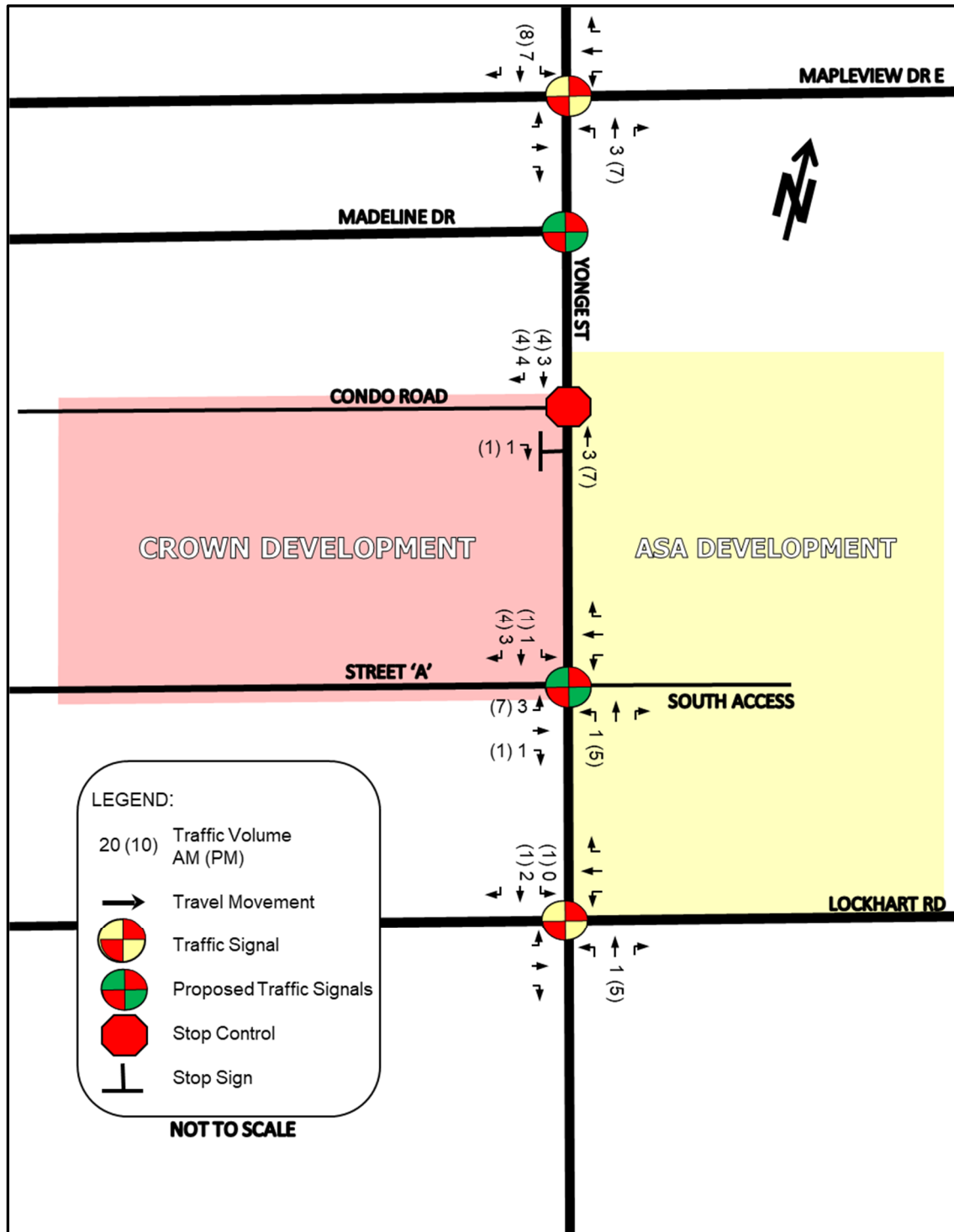


Figure 8 – Crown Development Traffic Assignment – Commercial Pass-by Trips

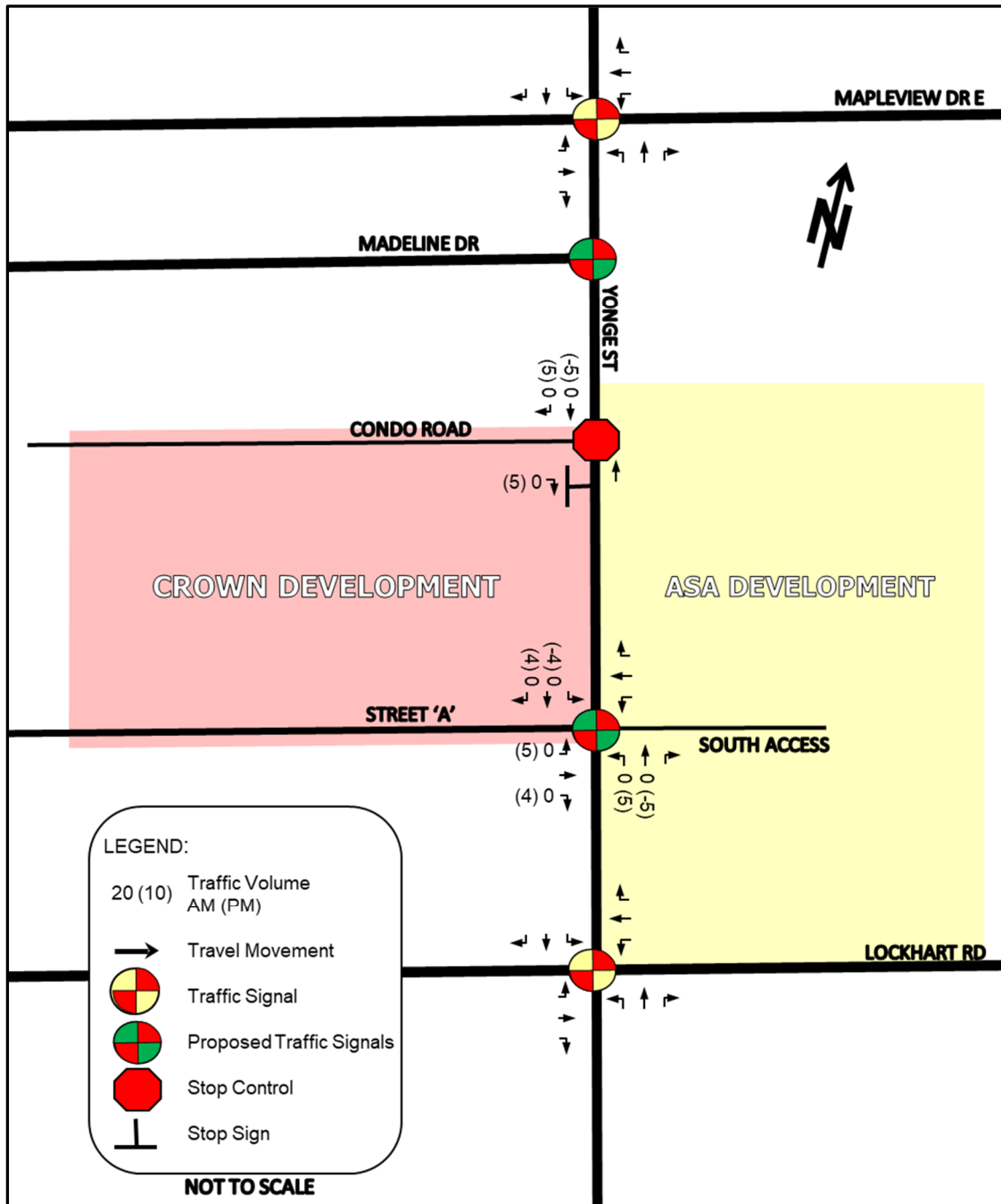
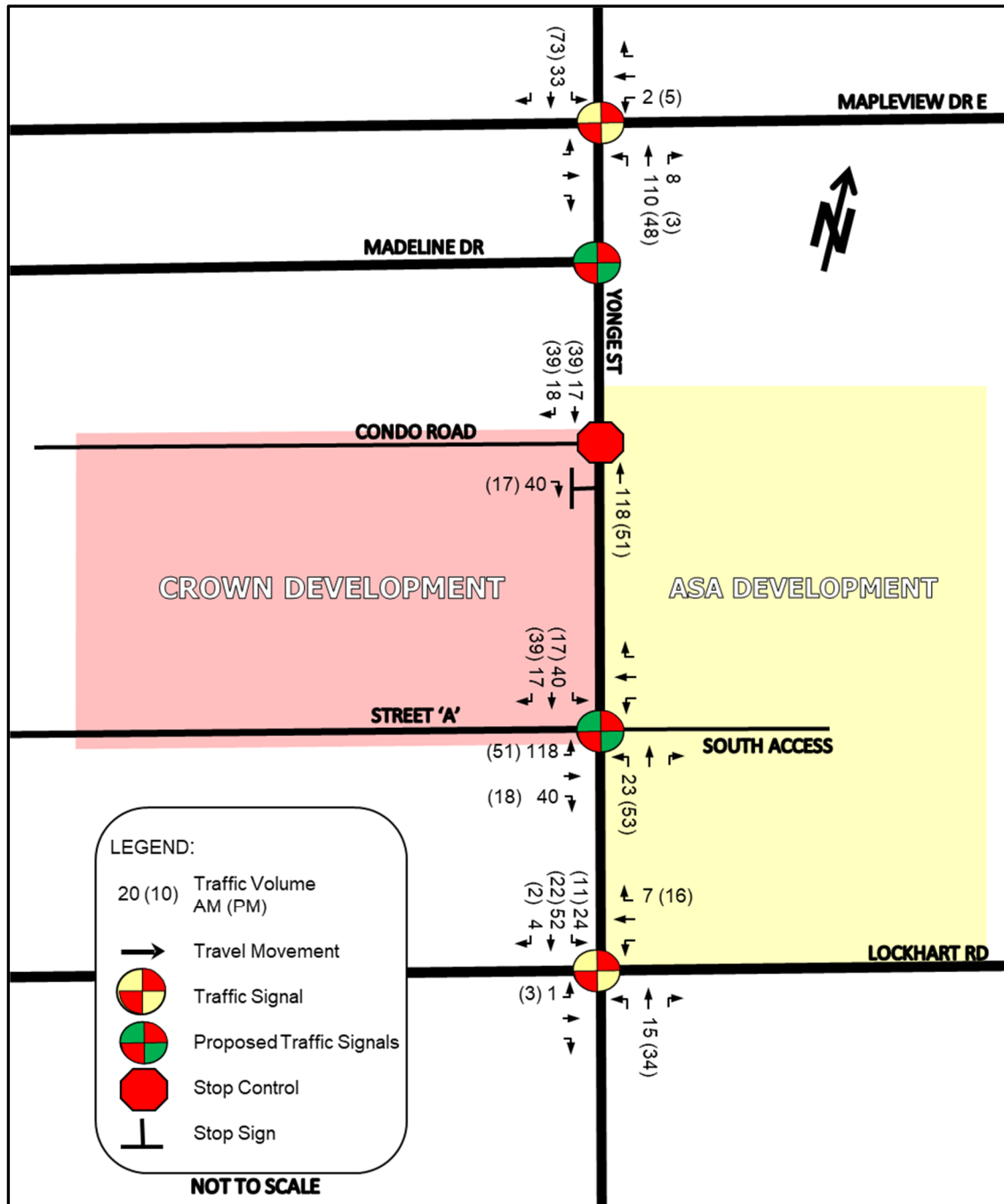


Figure 9 – Crown Development Phase 2 Traffic Assignment – Residential Trips



1.5 Background Traffic Growth

As noted in Section 1.4, there is a significant amount of anticipated development planned outside the study area, but still within the City. In order to account for the impact of this additional traffic, we have applied an additional background traffic growth rate to the existing traffic volume.

The background traffic growth rate for the study area was determined based on the methodology applied in the Hewitt MTS (excerpts provided in **Appendix A**). A background traffic growth rate of 1.57% and 1.62% was applied for the AM and PM peak hours respectively on all roads in the Hewitt MTS.

Historic annual average daily traffic data available from the City was also reviewed to confirm the above-noted background traffic growth assumption. Based on our review, the historic traffic growth in the study area is consistent with the traffic growth in the Hewitt MTS.

For the purpose of this analysis we have applied a background traffic growth rate of 1.57% and 1.62% for the AM and PM peak hours respectively to the existing traffic volume on Yonge Street. This will account for traffic growth outside the study area.

1.6 Traffic Counts

Detailed turning movements traffic and pedestrian counts were retrieved from the City for the intersections of Yonge Street / Mapleview Drive East and Yonge Street / Lockhart Road. Automatic traffic response [ATR] counts were also retrieved from the City.

Table 8 summarizes the traffic count data collection information.

Table 8 - Traffic Count Data

Intersection (N-S Street / E-W Street)	Count Date	AM Peak Hour	PM Peak Hour	Source
Yonge Street / Mapleview Drive East	Thursday, June 28 th 2018	07:45 – 08:45	17:00 – 18:00	City
Yonge Street / Lockhart Road	Thursday, September 28 th 2017	07:30 – 08:30	16:30 – 17:30	City

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

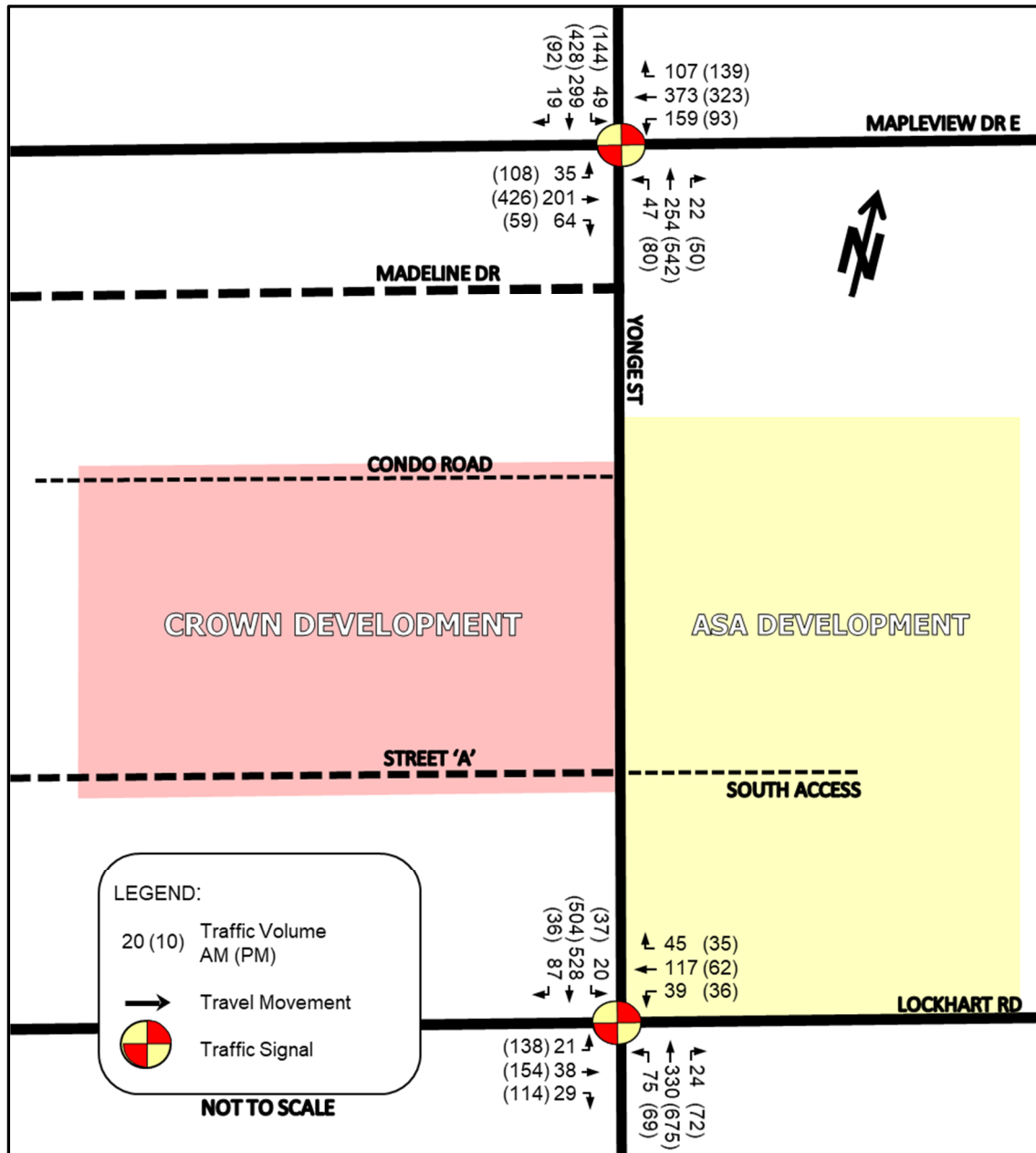
To determine the equivalent existing (2021) traffic volumes, the background traffic growth rates noted in Section 1.5 were applied.

As illustrated in Section 1.4, a portion of the HSPA has been built-out and occupied since the traffic counts were completed; the traffic generated by these developments have been included in the existing (2021) scenario.

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

Figure 10 illustrates the existing (2021) AM and PM peak hour traffic volumes in the study area.

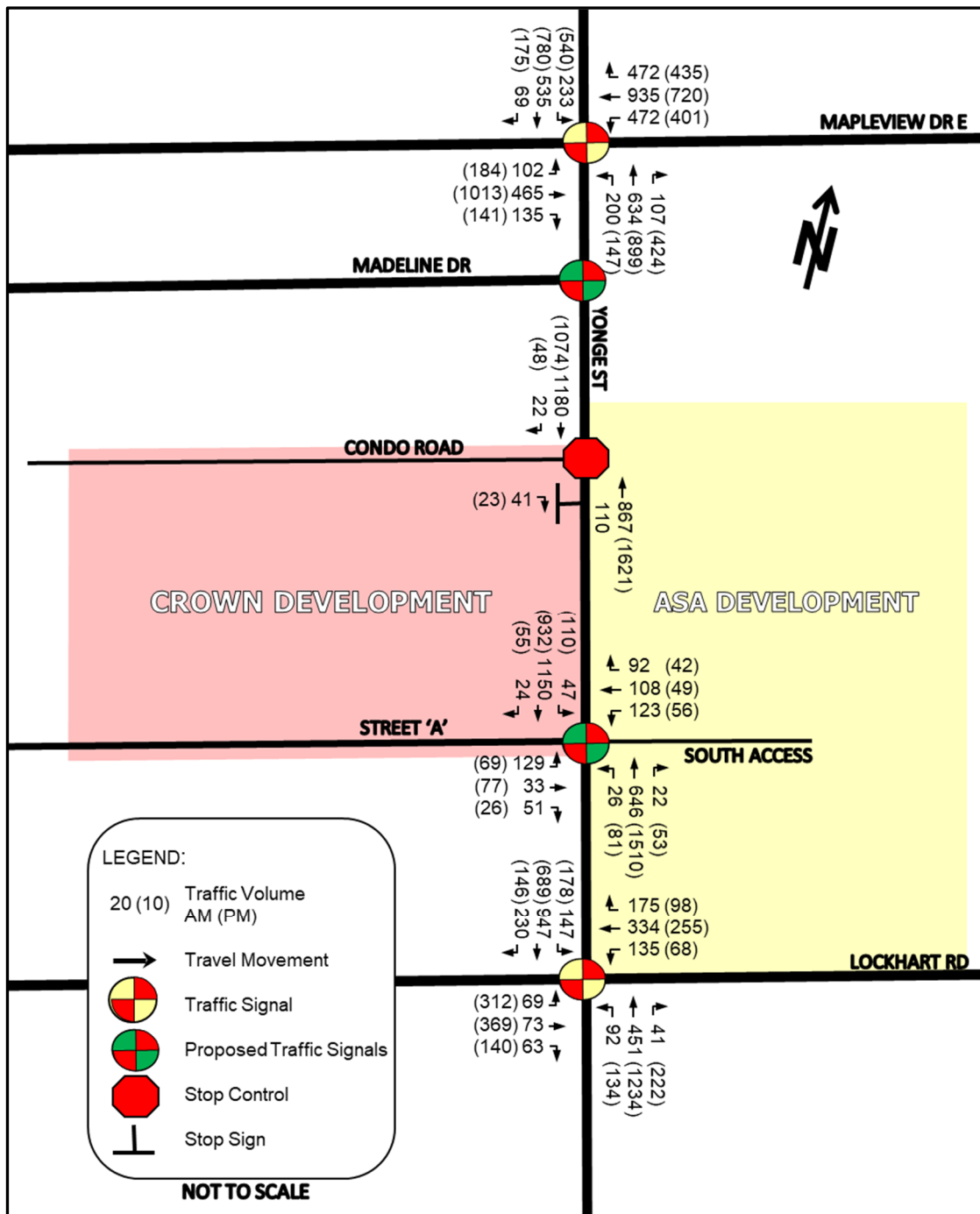
Figure 10 – Existing (2021) Traffic Volumes



1.7 Total Horizon Year Traffic Volumes

To determine the total (2031) traffic volumes, a background traffic growth rate noted in Section 1.5 and the traffic from the adjacent development from Section 1.4 were added. The resulting total (2031) horizon year traffic volumes for the AM and PM peak hour are illustrated in **Figure 11**.

Figure 11 – Total (2031) Traffic Volumes



Appendix A – 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.

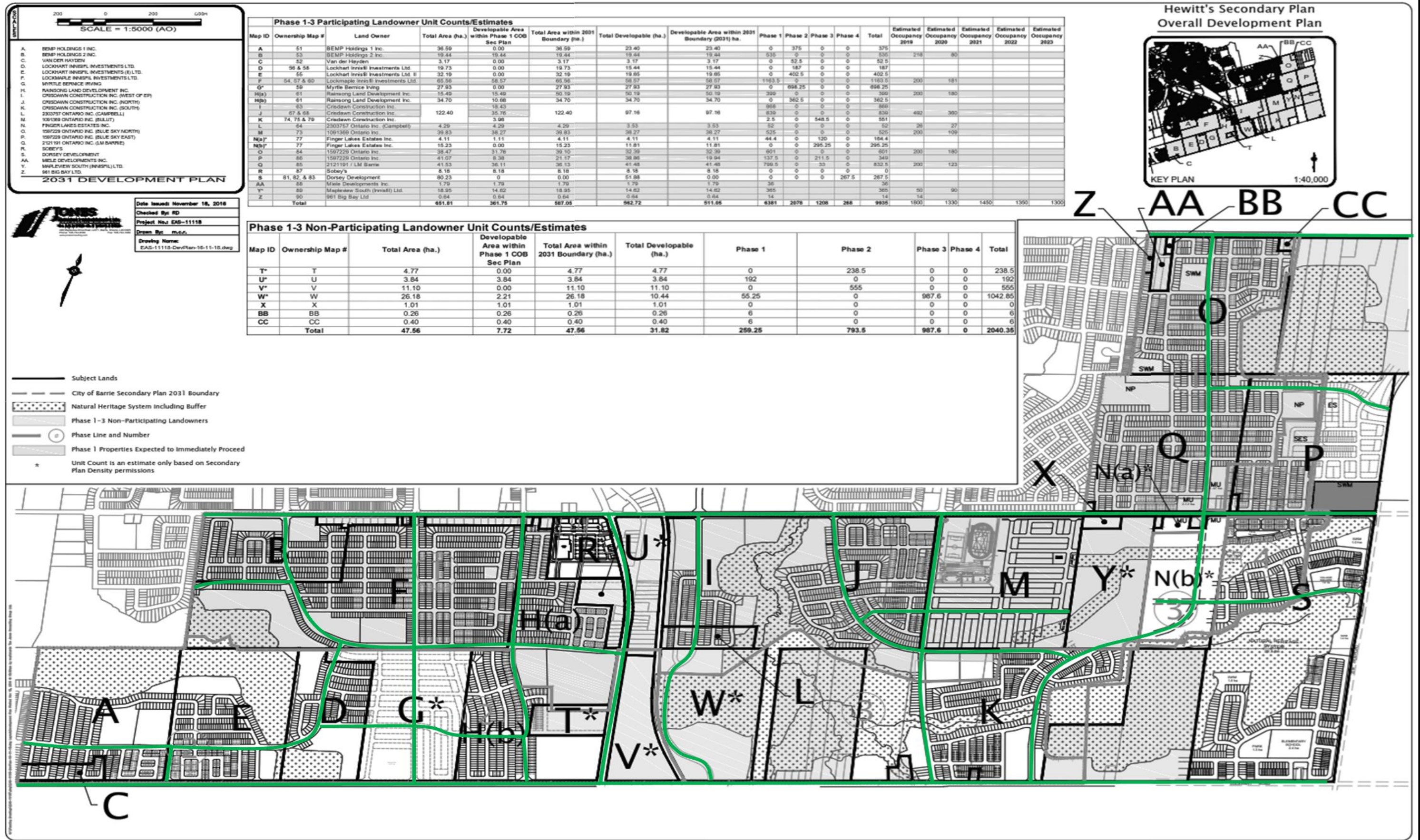


Figure ES-5
Proposed Future Sidewalk Network Plan
Hewitt Secondary Plan Area - Master Transportation Study

Legend

- Sidewalks on Both Sides



*Not to scale



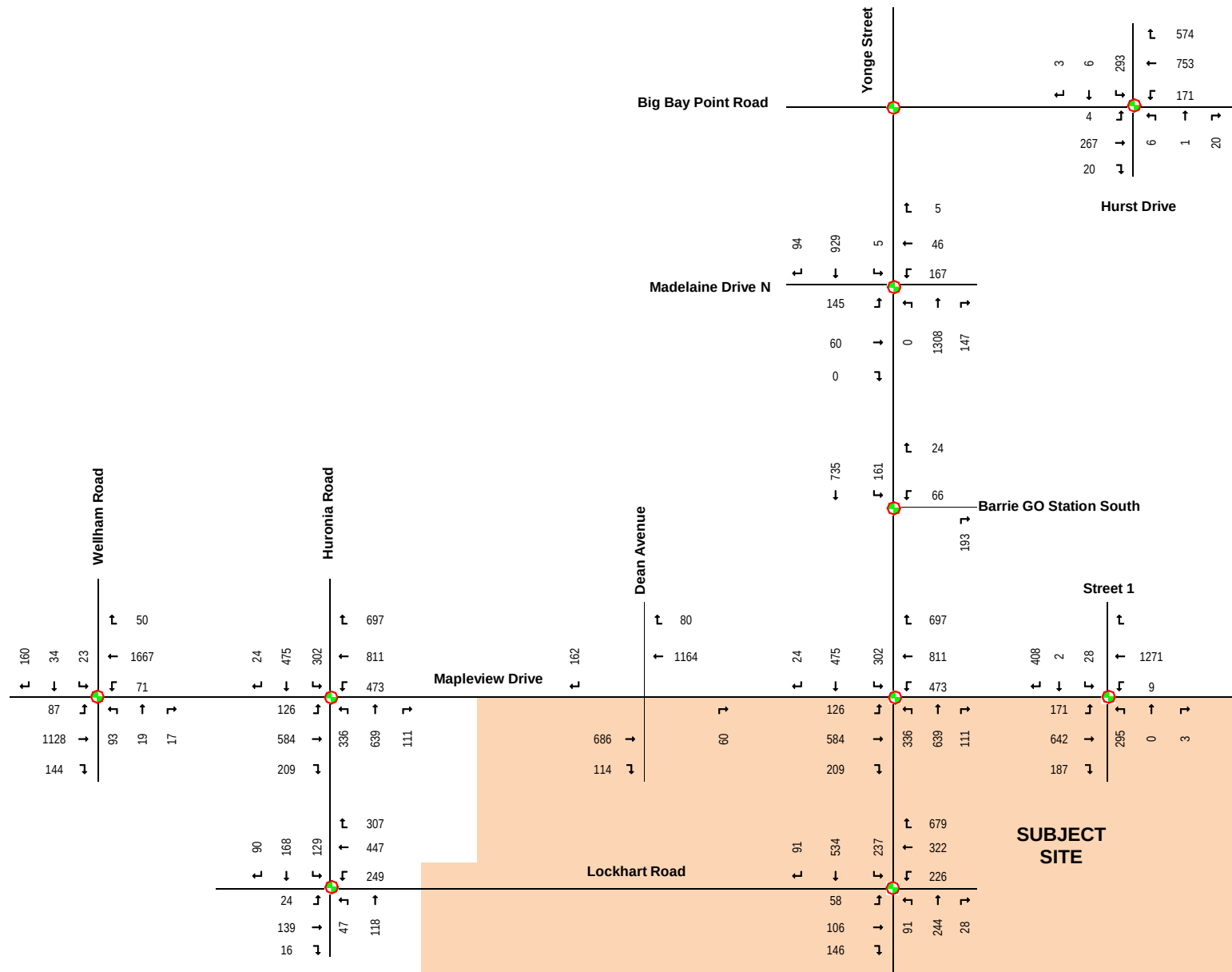


FIGURE 4-2

Future Total Traffic Volumes - Ultimate Horizon (2031)

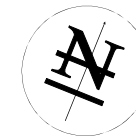
AM Peak Hour

Constraint Areas

LEGEND

XX Peak Hour Traffic Volumes

Signalized Intersection



NOT TO SCALE

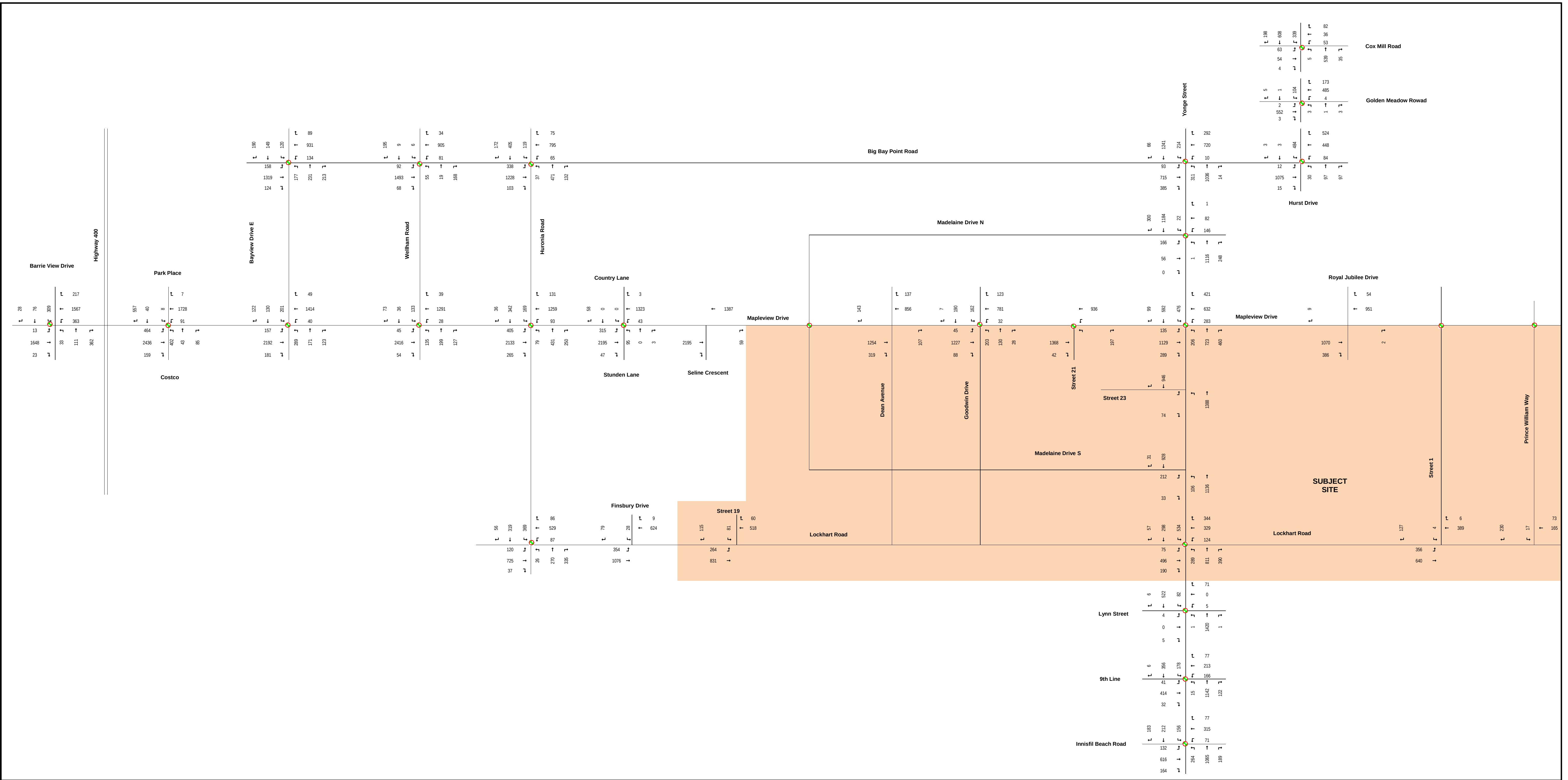


FIGURE 4-3
Future Total Traffic Volumes- Ultimate Horizon (2031)
PM Peak Hour
Constraint Areas

LEGEND
XX Peak Hour Traffic Volumes
 Signalized Intersection

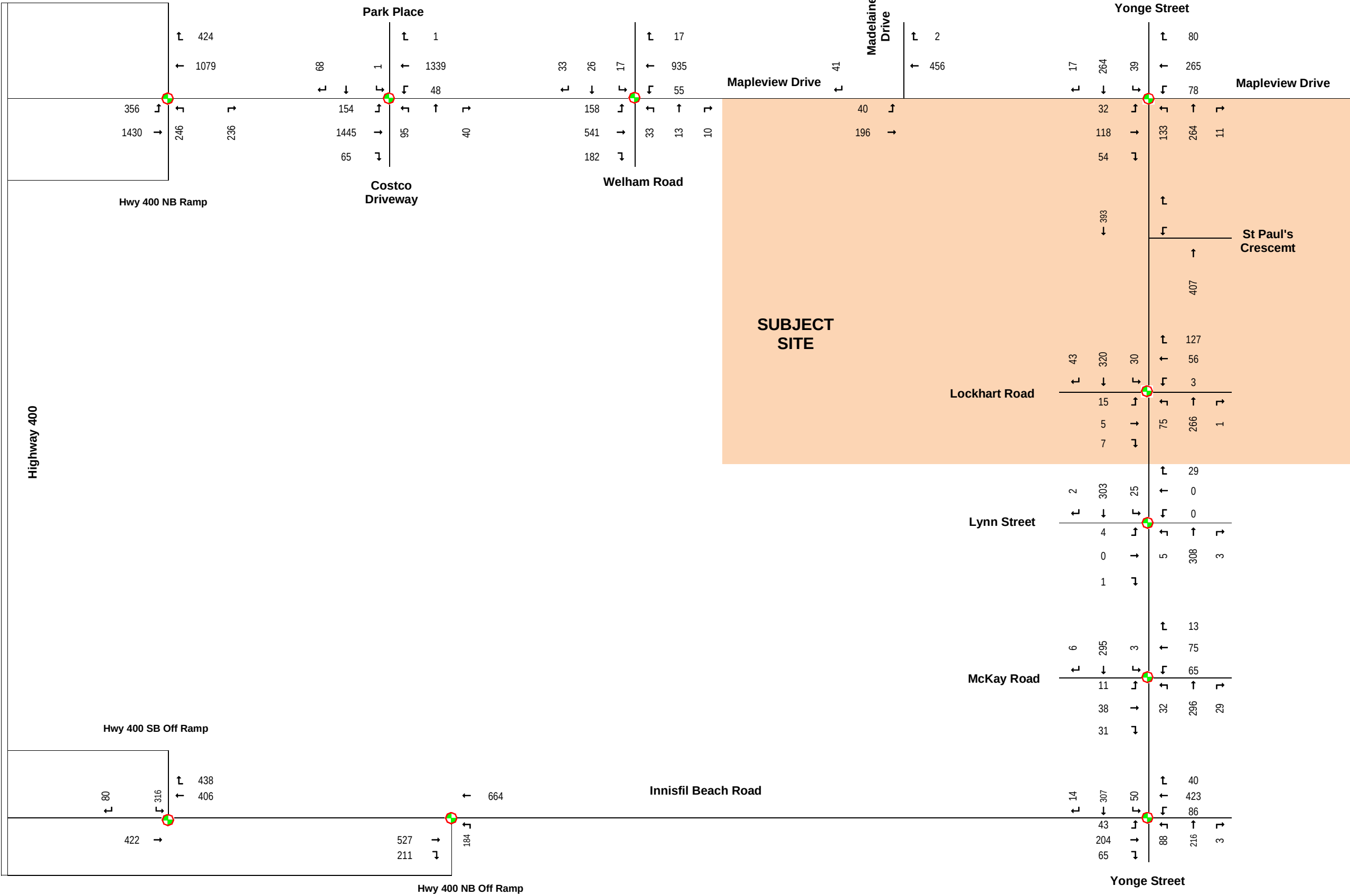


FIGURE 5-2
Future Background Traffic Volumes - Interim Horizon (2020)
AM Peak Hour
Constraint Ateas

LEGEND
XX Peak Hour Traffic Volumes
 Signalized Intersection



NOT TO SCALE



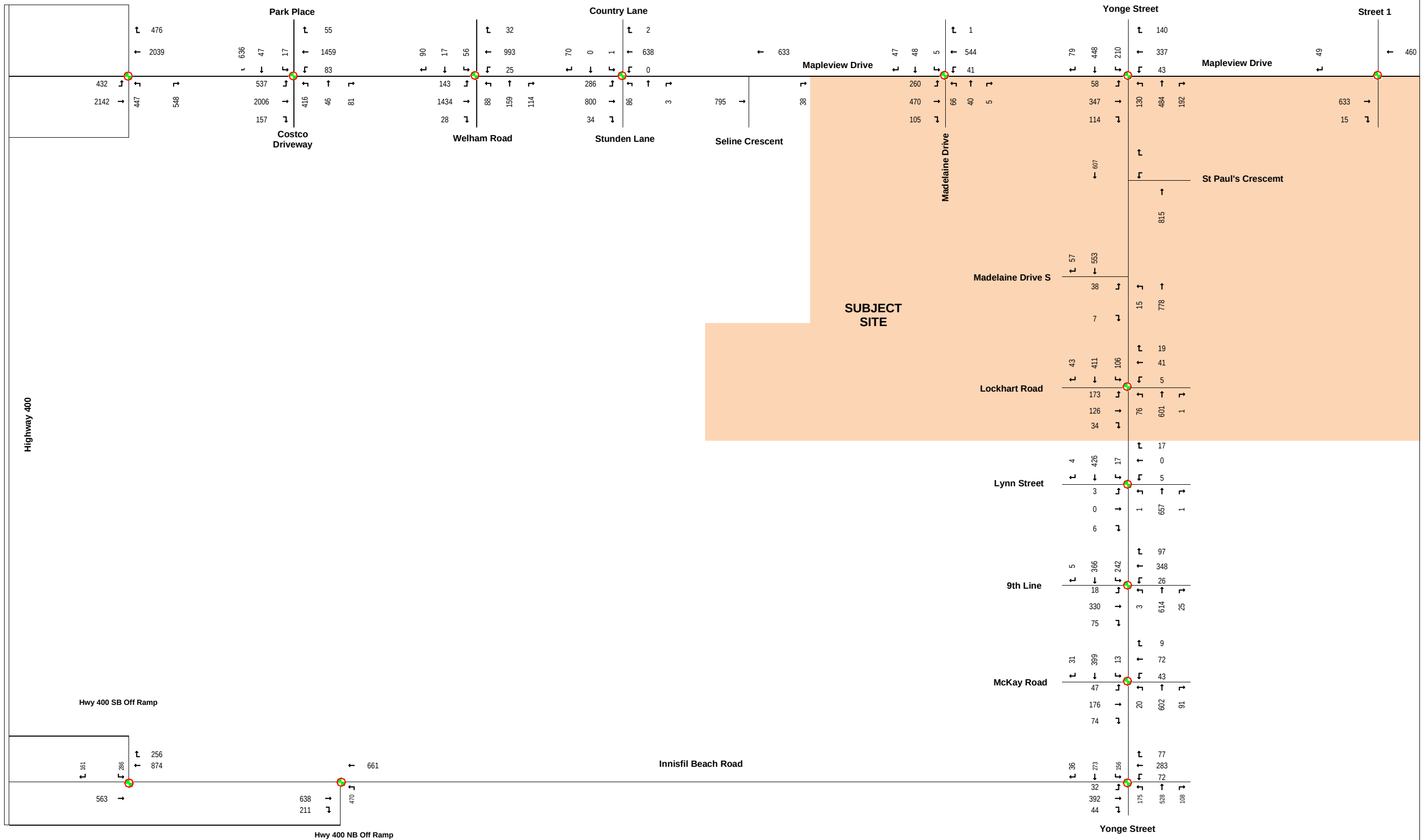


FIGURE 5-5
Future Total Traffic Volumes - Interim Horizon (2020)
PM Peak Hour
Constraint Ateas

LEGEND

XX Peak Hour Traffic Volumes

Signalized Intersection



NOT TO SCALE

APPENDIX E

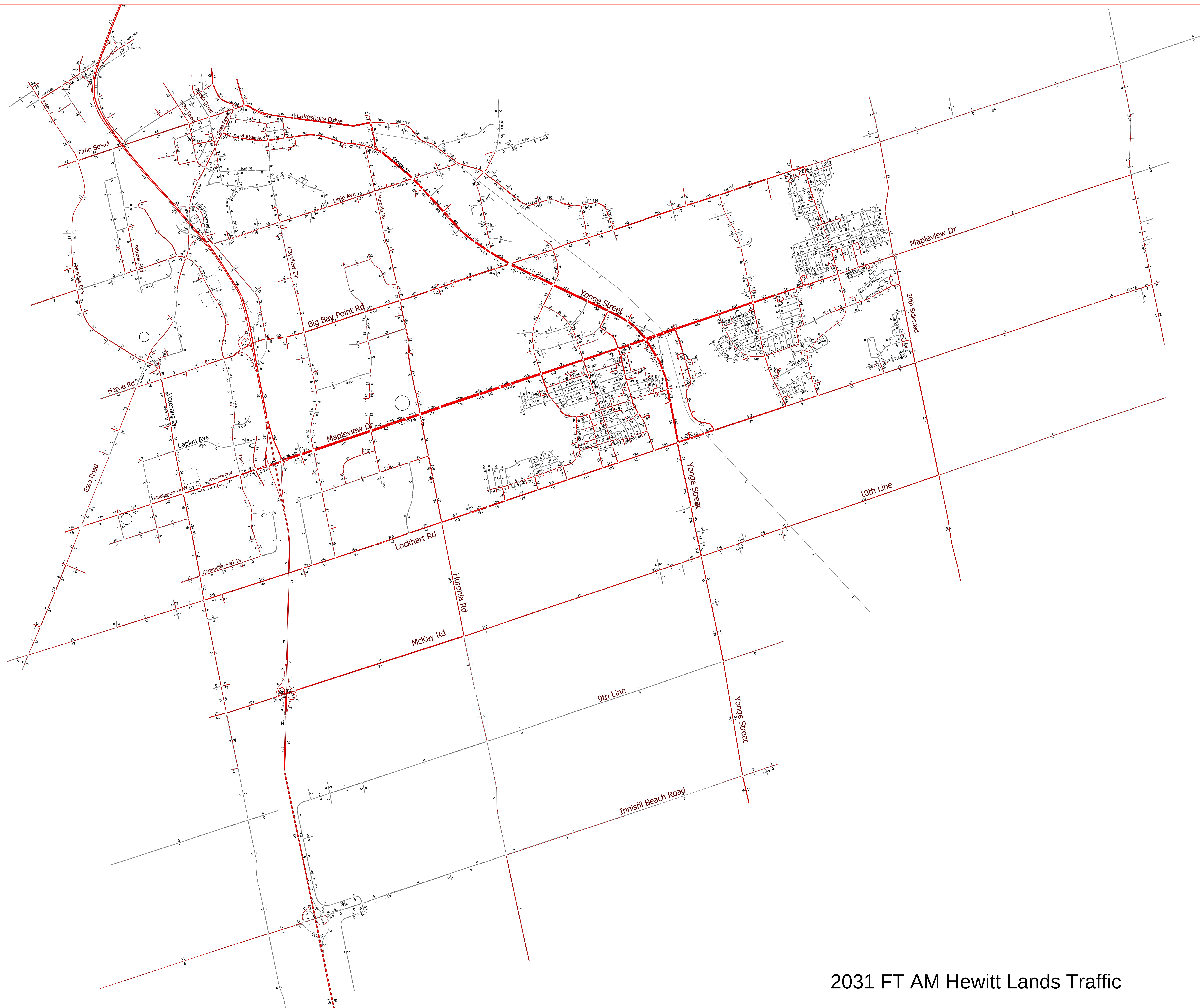
Traffic Volume Forecasts Extract from the Crisdawn Draft Plan Traffic Study

TABLE 1 TRIP GENERATION – 2021 SCENARIO

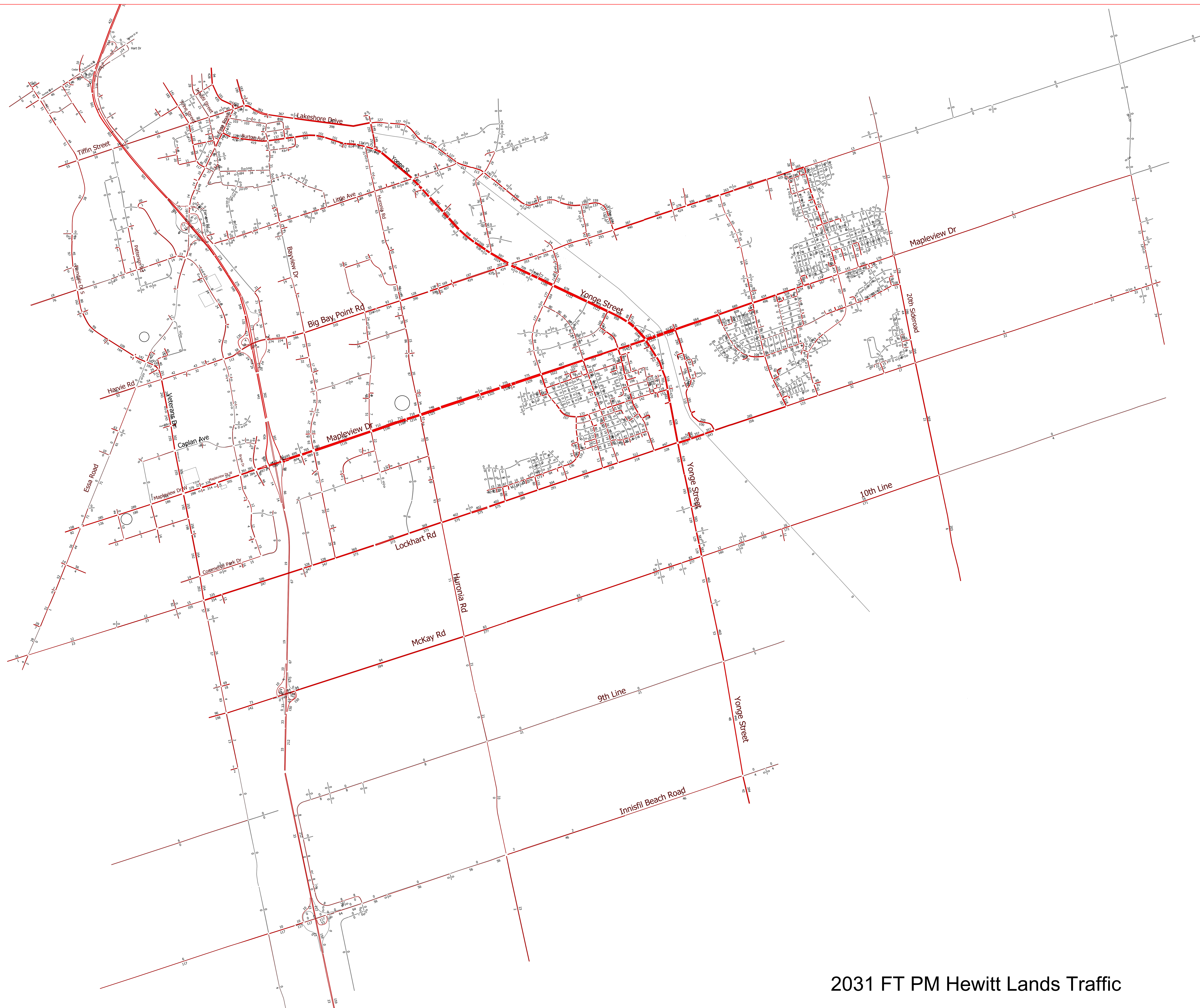
		AM Peak Hour			PM Peak Hour		
		In	Out	2-Way	In	Out	2-Way
ITE LUC 210	Units	0.2	0.57	0.77	0.65	0.37	1.02
ITE LUC 231	Units	0.1	0.44	0.54	0.35	0.29	0.64
ITE LUC 220	Units	0.16	0.39	0.55	0.41	0.26	0.67
Crisdawn							
Single Family / Semi Detached	250	49	139	187	158	90	248
Townhouse	132	13	58	71	46	38	84
Apartment	96	15	37	53	39	35	64
5% Transit Reduction		4	12	16	12	8	20
Crisdawn Total		73	222	296	231	145	377
Watersand							
Single Family / Semi Detached	580	116	331	447	377	215	592
Townhouse	220	22	97	119	77	64	141
5% Transit Reduction		7	21	28	23	14	37
Watersand Total		131	406	537	431	264	696
H&H Capital							
Single Family / Semi Detached	600	120	342	462	390	222	612
5% Transit Reduction		6	17	23	20	11	31
H&H Capital Total		114	325	439	371	211	581
DiPoce							
Single Family / Semi Detached	600	120	342	462	390	222	612
5% Transit Reduction		6	17	23	20	11	31
DiPoce Total		114	325	439	371	211	581
Sum Total							
Total Residential Trips	2352	432	1278	1711	1404	832	2235

APPENDIX H

Ultimate 2031 Future Total Site Traffic Assignment Volumes



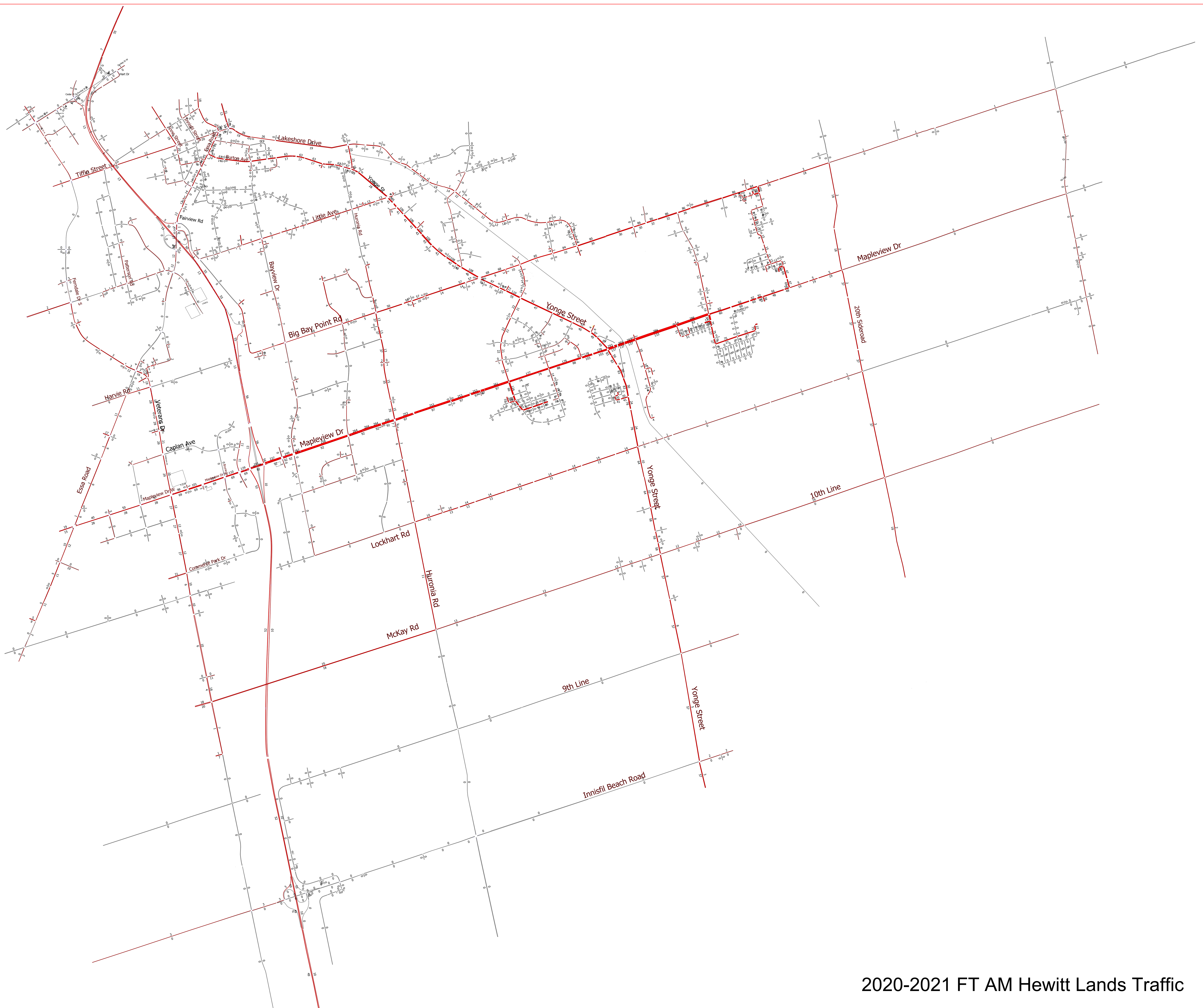
2031 FT AM Hewitt Lands Traffic

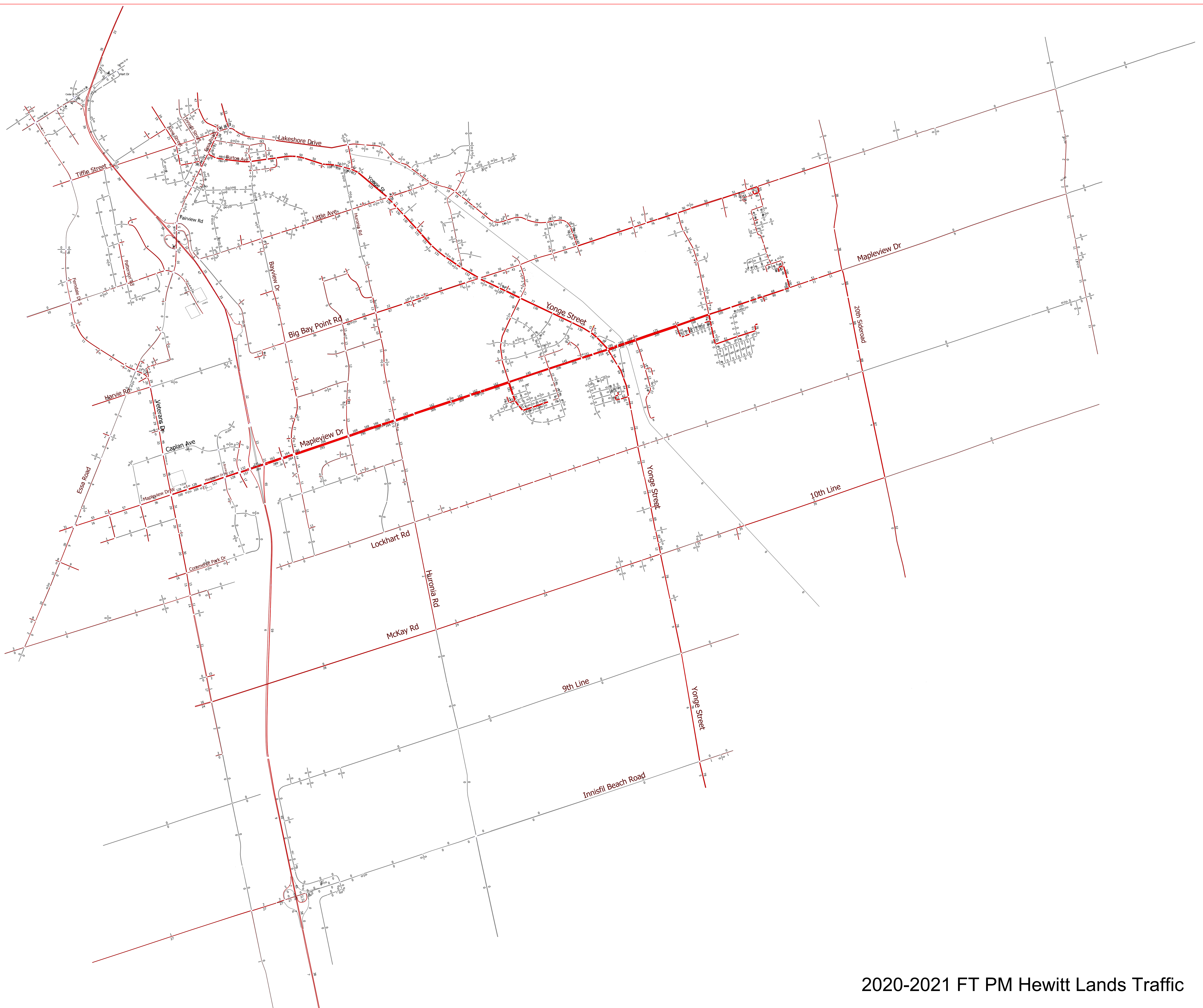


2031 FT PM Hewitt Lands Traffic

APPENDIX I

Interim 2020 Future Total Site Traffic Assignment Volumes





Appendix B – Adjacent Development Excerpts

ASA Development TIS

989 Yonge Street

City of Barrie

Traffic Impact Study for ASA Development Inc.

Type of Document:
Final Report

Project Number:
JDE – 18057

Date Submitted:
February 3rd, 2020
Revised: September 23rd, 2021



John Northcote, P.Eng.
Professional License #: 100124071



JD Northcote Engineering Inc.
86 Cumberland Street
Barrie, ON
705.725.4035
www.JDEngineering.ca

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. The 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 traffic between the North Access and South Access for the proposed development is based on our review of the location the first phase of the development, in conjunction with the internal and external road network. It is anticipated that all of the traffic generated by the proposed development in 2023 would use the North Access exclusively.

Tables 7 illustrates the residential traffic distribution for the proposed development.

Table 7 – Proposed Development Traffic Distribution

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

As noted in Section 2.4.1, the traffic generated by the proposed development in the Hewitt MTS traffic assignment was removed as it was assumed the access for the development was on Lockhart Road, illustrated in Figures 6 to 9. Consequently, the traffic assignment for the proposed development was added to the study area intersections.

Using the traffic distribution pattern noted above, **Figures 16** and **17** illustrates the traffic assignment for the proposed development in the build-out (2023) and horizon year (2031 / 2036) scenario, in the AM and PM peak hour.

Appendix C – HSPA Map and Phasing Breakdown

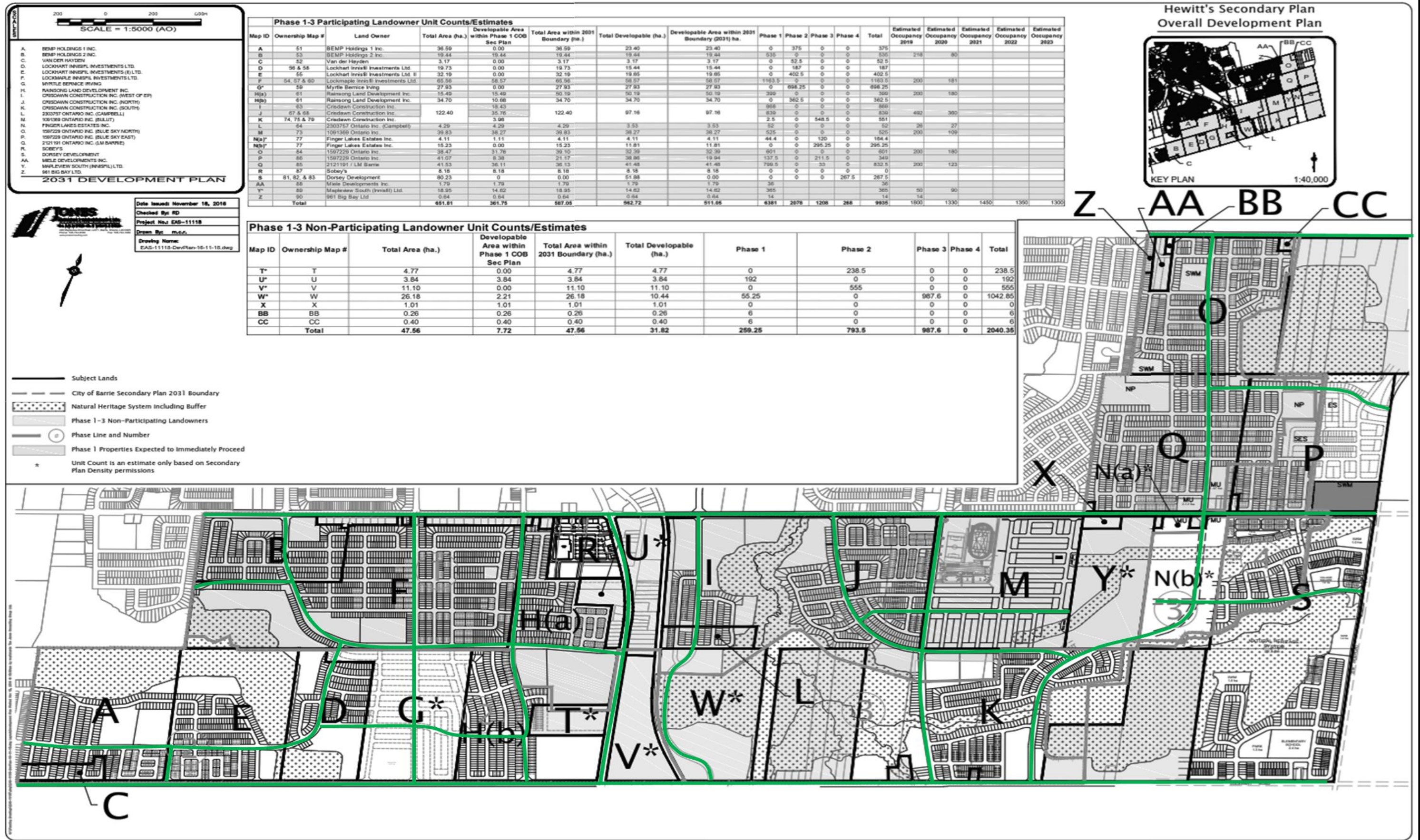


Figure ES-5
Proposed Future Sidewalk Network Plan
Hewitt Secondary Plan Area - Master Transportation Study

Legend

Sidewalks on Both Sides



*Not to scale



Health's Secondary Plan Area - Forecasted Unit Projections

Update Provided by:

Date:

001-07-13

A1. Participating Residential

Year	Map ID	Participating Landowner Name	Contract Number(s)	Notes	Start Date (Yr)	Total Units (2010)	Secondary Plan Phase				Unit Type		Market Value		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025		2026		2027		2028		2029		2030		2031		2032		2033		2034		2035		2036		2037		2038		2039		2040		2041		2042		2043		2044		2045		2046		2047		2048		2049		2050		2051		2052		2053		2054		2055		2056		2057		2058		2059		2060		2061		2062		2063		2064		2065		2066		2067		2068		2069		2070		2071		2072		2073		2074		2075		2076		2077		2078		2079		2080		2081		2082		2083		2084		2085		2086		2087		2088		2089		2090		2091		2092		2093		2094		2095		2096		2097		2098		2099		2100		2101		2102		2103		2104		2105		2106		2107		2108		2109		2110		2111		2112		2113		2114		2115		2116		2117		2118		2119		2120		2121		2122		2123		2124		2125		2126		2127		2128		2129		2130		2131		2132		2133		2134		2135		2136		2137		2138		2139		2140		2141		2142		2143		2144		2145		2146		2147		2148		2149		2150		2151		2152		2153		2154		2155		2156		2157		2158		2159		2160		2161		2162		2163		2164		2165		2166		2167		2168		2169		2170		2171		2172		2173		2174		2175		2176		2177		2178		2179		2180		2181		2182		2183		2184		2185		2186		2187		2188		2189		2190		2191		2192		2193		2194		2195		2196		2197		2198		2199		2200		2201		2202		2203		2204		2205		2206		2207		2208		2209		2210		2211		2212		2213		2214		2215		2216		2217		2218		2219		2220		2221		2222		2223		2224		2225		2226		2227		2228		2229		2230		2231		2232		2233		2234		2235		2236		2237		2238		2239		2240		2241		2242		2243		2244		2245		2246		2247		2248		2249		2250		2251		2252		2253		2254		2255		2256		2257		2258		2259		2260		2261		2262		2263		2264		2265		2266		2267		2268		2269		2270		2271		2272		2273		2274		2275		2276		2277		2278		2279		2280		2281		2282		2283		2284		2285		2286		2287		2288		2289		2290		2291		2292		2293		2294		2295		2296		2297		2298		2299		2300		2301		2302		2303		2304		2305		2306		2307		2308		2309		2310		2311		2312		2313		2314		2315		2316		2317		2318		2319		2320		2321		2322		2323		2324		2325		2326		2327		2328		2329		2330		2331		2332		2333		2334		2335		2336		2337		2338		2339		2340		2341		2342		2343		2344		2345		2346		2347		2348		2349		2350		2351		2352		2353		2354		2355		2356		2357		2358		2359		2360		2361		2362		2363		2364		2365		2366		2367		2368		2369		2370		2371		2372		2373		2374		2375		2376		2377		2378		2379		2380		2381		2382		2383		2384		2385		2386		2387		2388		2389		2390		2391		2392		2393		2394		2395		2396		2397		2398		2399		2400		2401		2402		2403		2404		2405		2406		2407		2408		2409		2410		2411		2412		2413		2414		2415		2416		2417		2418		2419		2420		2421		2422		2423		2424		2425		2426		2427		2428		2429		2430		2431		2432		2433		2434		2435		2436		2437		2438		2439		2440		2441		2442		2443		2444		2445		2446		2447		2448		2449		2450		2451		2452		2453		2454		2455		2456		2457		2458		2459		2460		2461		2462		2463		2464		2465		2466		2467		2468		2469		2470		2471		2472		2473		2474		2475		2476		2477		2478		2479		2480		2481		2482		2483		2484		2485		2486		2487		2488		2489		2490		2491		2492		2493		2494		2495		2496		2497		2498		2499		2500		2501		2502		2503		2504		2505		2506		2507		2508		2509		2510		2511		2512		2513		2514		2515		2516		2517		2518		2519		2520		2521		2522		2523		2524		2525		2526		2527		2528		2529		2530		2531		2532		2533		2534		2535		2536		2537		2538		2539		2540		2541		2542		2543		2544		2545		2546		2547		2548		2549		2550		2551		2552		2553		2554		2555		2556		2557		2558		2559		2560		2561		2562		2563		2564		2565		2566		2567		2568		2569		2570		2571		2572		2573		2574		2575		2576		2577		2578		2579		2580		2581		2582		2583		2584		2585		2586		2587		2588		2589		2590		2591		2592		2593		2594		2595		2596		2597		2598		2599		2600		2601		2602		2603		2604		2605		2606		2607		2608		2609		2610		2611		2612		2613		2614		2615		2616		2617		2618		2619		2620		2621		2622		2623		2624		2625		2626		2627		2628		2629		2630		2631		2632		2633		2634		2635		2636		2637		2638		2639		2640		2641		2642		2643		2644		2645		2646		2647		2648		2649		2650		2651		2652		2653		2654		2655		2656		2657		2658		2659		2660		2661		2662		2663		2664		2665		2666		2667		2668		2669		2670		2671		2672		2673		2674		2675		2676		2677		2678		2679		2680		2681		2682		2683		2684		2685		2686		2687		2688		2689		2690		2691		2692		2693		2694		2695		2696		2697		2698		2699		2700		2701		2702		2703		2704		2705		2706		2707		2708		2709		2710		2711		2712		2713		2714		2715		2716		2717		2718		2719		2720		2721		2722		2723		2724		2725		2726		2727		2728		2729		2730		2731		2732		2733		2734		2735		2736		2737		2738		2739		2740		2741		2742		2743		2744		2745		2746		2747		2748		2749		2750		2751		2752		2753		2754		2755		2756		2757		2758		2759		2760		2761		2762		2763		2764		2765		2766		2767		2768		2769		2770		2771		2772		2773		2774		2775		2776		2777		2778		2779		2780		2781		2782		2783		2784		2785		2786		2787		2788		2789		2790		2791		2792		2793		2794		2795		2796		2797		2798		2799		2800		2801		2802		2803		2804		2805		2806		2807		2808		2809		2810		2811		2812		2813		2814		2815		2816		2817		2818		2819		2820		2821		2822		2823		2824		2825		2826		2827		2828		2829		2830		2831		2832		2833		2834		2835		2836		2837		2838		2839		2840		2841		2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Appendix D – HSPA Traffic Generation Tables

Table A – Traffic Generation for the HSPA (2021)

Development	Land-Use	ITE Land Use	AM Peak Hour			PM Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL
BEMP II	Residential	Hewitt Rate & ITE 221	14	41	55	29	19	48
	Commercial	ITE 822*	0	0	0	0	0	0
Lockmaple Development	Residential	Hewitt Rate	0	0	0	0	0	0
Rainsong Development Phase 1	Residential	Hewitt Rate	0	0	0	0	0	0
Centreville Barrie Development	Residential	ITE 221	0	0	0	0	0	0
Sobeys Development	Residential	Hewitt Rate & ITE 221	0	0	0	0	0	0
	Supermarket	ITE 850**	0	0	0	0	0	0
Hewitt's Gate Subdivision	Residential	Hewitt Rate & ITE 221	0	0	0	0	0	0
Bistro 6 Development	Residential	ITE 221	32	109	141	71	46	117
Bulut Development	Residential	Hewitt Rate	0	0	0	0	0	0
Sandy Creek Estates	Residential	Hewitt Rate & ITE 221	0	0	0	0	0	0
	Commercial	ITE 822*	0	0	0	0	0	0
Blue Sky Development	Residential	Hewitt Rate	0	0	0	0	0	0
970 Mapleview Development	Residential	Hewitt Rate & ITE 221	6	17	23	9	7	16
	Commercial	ITE 822*	0	0	0	0	0	0
Mapleview South Development	Residential	Hewitt Rate	0	0	0	0	0	0
Mapleview Friday Development	Residential	Hewitt Rate & ITE 221	0	0	0	0	0	0
	Commercial	ITE 822*	0	0	0	0	0	0
Rainsong Development Phase 2	Residential	Hewitt Rate	0	0	0	0	0	0
Mattamy Development	Residential	Hewitt Rate	0	0	0	0	0	0
	Commercial	ITE 822*	0	0	0	0	0	0
Lockhart Development Phase 1	Residential	Hewitt Rate	0	0	0	0	0	0
Lockhart Development Phase 2	Residential	Hewitt Rate	0	0	0	0	0	0

Development	Land-Use	ITE Land Use	AM Peak Hour			PM Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL
400 Lockhart Development	Residential	Hewitt Rate & ITE 221	0	0	0	0	0	0
Ballymore Development	Residential	Hewitt Rate & ITE 221	0	0	0	0	0	0
Campbell Development	Residential	Hewitt Rate	0	0	0	0	0	0
ASA Development	Residential	Hewitt Rate & ITE 221	0	0	0	0	0	0

* Commercial pass-by trips for the AM and PM peak hour are 0% and 34% respectively, according to the ITE data for ITE land use 820. A pass-by rate is not available for the ITE land use 822.

** Commercial pass-by trips for the AM and PM peak hour are 0% and 36% respectively, according to the ITE data for ITE land use 850.

Table B – Traffic Generation for the HSPA (2031)

Development	Land-Use	ITE Land Use	AM Peak Hour			PM Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL
BEMP II	Residential	Hewitt Rate & ITE 221	98	281	379	250	156	406
	Commercial	ITE 822*	6	4	10	7	7	14
Lockmaple Development	Residential	Hewitt Rate	148	360	508	434	265	699
Rainsong Development Phase 1	Residential	Hewitt Rate	59	142	201	172	105	277
Centreville Barrie Development	Residential	ITE 221	22	75	97	47	29	76
Sobeys Development	Residential	Hewitt Rate & ITE 221	50	162	212	114	72	186
	Supermarket	ITE 850**	156	108	264	263	263	526
Hewitt's Gate Subdivision	Residential	Hewitt Rate & ITE 221	107	267	374	303	185	488
Bistro 6 Development	Residential	ITE 221	79	262	341	179	114	293
Bulut Development	Residential	Hewitt Rate	87	213	300	256	157	413
Sandy Creek Estates	Residential	Hewitt Rate & ITE 221	49	127	176	137	85	222
	Commercial	ITE 822*	41	28	69	65	65	130
Blue Sky Development	Residential	Hewitt Rate	119	289	408	348	212	560
970 Mapleview Development	Residential	Hewitt Rate & ITE 221	121	300	421	341	209	550
	Commercial	ITE 822*	28	18	46	42	42	84
Mapleview South Development	Residential	Hewitt Rate	62	150	212	181	111	292

Development	Land-Use	ITE Land Use	AM Peak Hour			PM Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL
Mapleview Friday Development	Residential	Hewitt Rate & ITE 221	11	38	49	24	15	39
	Commercial	ITE 822*	9	6	15	13	13	26
Rainsong Development Phase 2	Residential	Hewitt Rate	34	84	118	102	62	164
Mattamy Development	Residential	Hewitt Rate	84	203	287	245	150	395
	Commercial	ITE 822*	18	11	29	26	26	52
Lockhart Development Phase 1	Residential	Hewitt Rate	27	64	91	77	47	124
Lockhart Development Phase 2	Residential	Hewitt Rate	53	130	183	157	96	253
400 Lockhart Development	Residential	Hewitt Rate & ITE 221	63	163	226	172	105	277
Ballymore Development	Residential	Hewitt Rate & ITE 221	55	160	215	140	87	227
Campbell Development	Residential	Hewitt Rate	11	28	39	33	20	53
ASA Development	Residential	Hewitt Rate & ITE 221	117	386	503	275	175	450

* Commercial pass-by trips for the AM and PM peak hour are 0% and 34% respectively, according to the ITE data for ITE land use 820. A pass-by rate is not available for the ITE land use 822.

** Commercial pass-by trips for the AM and PM peak hour are 0% and 36% respectively, according to the ITE data for ITE land use 850.

Appendix E – Traffic Count Data

Trans-Plan Transportation Inc.

Site ID Code:
Intersection Location:
Municipality:
Count Date:
Weather and Temperature:
Surveyor:

Yonge Street & Maplevue Drive
Barrie, Ontario
Thursday June 28, 2018
Sunny, 20C
TP

AM	NORTH APPROACH										Total	EAST APPROACH										Total	SOUTH APPROACH										Total	WEST APPROACH										Total	Grand Total
	CAR			TRUCKS			CYCLISTS			Peds		CAR			TRUCKS			CYCLISTS			Peds		CAR			TRUCKS			CYCLISTS			Peds													
	L	T	R	L	T	R	L	T	R			L	T	R	L	T	R	L	T	R			L	T	R	L	T	R	L	T	R														
7:00	6	66	2	0	0	0	0	0	0	0	74	30	64	13	0	2	1	0	1	0	0	111	10	39	3	1	2	1	0	0	0	0	56	15	25	12	2	9	0	0	0	0	63	304	
7:15	5	65	10	1	2	2	0	0	0	0	85	24	56	15	1	5	0	0	0	0	0	101	5	44	3	0	1	1	0	0	0	0	54	8	27	18	0	7	0	0	0	0	60	300	
7:30	9	63	7	0	4	0	0	0	0	0	83	34	89	18	0	2	2	0	1	0	0	146	11	56	1	0	3	0	0	0	0	0	71	4	33	13	1	2	1	0	0	0	54	354	
7:45	8	65	1	1	2	1	0	0	0	0	78	32	91	14	0	3	1	0	0	0	0	141	9	53	4	1	4	0	0	0	0	0	71	6	31	14	0	7	0	0	0	0	58	348	
8:00	11	75	3	1	3	0	0	0	0	0	93	22	65	21	0	3	0	0	0	1	0	112	10	66	2	0	4	0	0	0	0	0	82	2	44	14	2	6	1	0	0	0	69	356	
8:15	5	67	3	1	7	0	0	0	0	0	83	26	76	27	0	3	2	0	0	0	0	134	6	48	4	3	3	1	0	0	0	0	65	10	42	15	2	2	1	0	0	0	72	354	
8:30	10	64	7	0	2	2	0	0	0	0	85	20	82	15	4	2	1	0	0	0	1	125	15	64	7	0	0	0	0	0	0	0	86	8	43	15	1	6	1	0	0	0	74	370	
8:45	7	65	3	1	2	2	0	0	0	1	81	15	79	12	1	2	2	0	0	0	0	111	11	56	3	1	3	0	0	0	0	0	74	6	37	11	1	3	1	0	0	0	59	325	
MD																																													
11:00	14	70	16	1	3	1	0	0	0	0	105	17	36	5	0	1	2	0	0	0	0	61	14	79	3	0	4	0	0	0	0	0	100	8	34	5	1	7	1	0	0	0	56	322	
11:15	15	54	16	2	0	4	0	0	0	0	91	10	38	13	1	3	0	0	0	0	0	65	14	68	1	1	5	1	0	0	0	0	90	18	49	16	2	4	0	0	0	0	89	335	
11:30	10	70	8	1	1	1	0	0	0	0	91	18	44	8	0	2	1	0	0	0	0	73	19	63	3	2	6	1	0	0	0	0	94	11	41	14	2	6	0	0	0	0	74	332	
11:45	12	71	12	0	1	1	0	0	0	0	97	6	47	15	0	3	2	0	0	0	0	73	17	62	4	0	3	0	0	0	0	0	86	10	34	12	0	1	0	0	0	0	57	313	
12:00	17	53	11	2	2	0	0	0	0	0	85	10	56	8	0	5	1	0	0	0	0	80	11	73	2	0	1	0	0	0	0	0	87	16	42	10	1	0	1	0	0	0	70	322	
12:15	11	81	10	1	2	1	0	0	0	0	106	18	59	19	0	2	0	0	0	0	0	98	14	69	7	2	3	1	0	0	0	0	96	11	36	8	2	0	0	0	0	0	57	357	
12:30	13	77	17	1	2	1	0	0	0	0	111	18	53	16	0	0	1	0	0	0	0	88	11	77	4	0	0	1	0	0	0	0	93	16	44	11	1	5	0	0	0	0	1	78	370
12:45	14	85	13	0	4	2	0	0	0	0	118	8	44	17	1	2	1	0	0	0	0	73	13	66	4	0	3	0	0	0	0	0	86	17	52	19	2	4	0	0	0	0	94	371	
13:00	19	76	12	1	1	0	0	0	0	0	109	9	51	20	0	4	1	0	0	0	0	85	13	76	5	0	3	0	0	0	0	0	97	7	39	15	1	8	0	0	0	0	70	361	
13:15	19	60	9	2	0	2	0	0	0	0	92	14	45	14	0	5	0	0	0	0	0	78	12	76	4	1	2	0	0	0	0	0	95	21	54	6	0	2	0	0	0	0	83	348	
13:30	9	83	9	0	0	0	0	0	1	0	102	11	61	16	1	5	1	0	0	0	0	95	13	67	2	0	1	0	0	0	0	0	83	20	63	17	1	3	0	0	0	0	104	384	
13:45	19	92	16	2	3	2	0	0	0	0	134	10	43	7	0	2	0	0	0	0	0	62	20	64	3	1	3	0	0	0	0	0	91	7	48	17	0	0	0	0	0	0	72	359	
PM																																													
15:00	11	100	10	1	1	2	0	0	0	0	125	10	70	17	0	5	1	0	0	0	0	103	22	88	3	1	4	0	0	0	0	0	118	8	51	16	1	4	0	0	0	0	80	426	
15:15	18	89	15	0	1	2	0	0	0	0	125	12	51	11	0	2	1	0	0	0	0	77	13	86	8	0	1	0	0	0	0	0	108	20	82	7	3	2	0	0	0	0	114	424	
15:30	9	94	4	3	1	0	0	0	0	0	111	10	56	12	0	3	1	0	0	0	0	82	20	101	2	0	1	1	0	0	0	0	125	19	70	14	1	0	1	0	0	0	0	105	423
15:45	21	88	6	0	4	3	0	0	0	0	122	20	49	17	1	7	0	0	0	0	0	94	19	104	9	1	4	0	0	0	0	0	137	12	72	6	0	1	2	0	0	0	0	93	446
16:00	24	101	8	1	1	1	0	0	0	0	136	15	37	15	1	2	2	0	0	0	0	72	36	121	2	3	2	0	0	0	0	0	164	17	66	12	1	2	0	0	0	0	0	98	470
16:15	12	82	12	0	1	1	0	0	0	0	108	17	58	16	0	3	0	0	0	0	0	94	17	92	5	3	1	0	0	0	0	0	118	16	83	9	1	0	0	0	0	0	0	109	429
16:30	14	97	9	1	3	0	0	0	0	0	124	17	70	10	2	1	2	0	0	0	0	102	16	82	10	0	2	0	0	0	0	0	110	17	98	10	0	4	0	0	0	0	0	129	465
16:45	19	81	5	1	1	2	0	0	0	0	109	11	75	25	1	2	0	0	0	0	0	114	16	127	10	1	2	0	0	0	0	0	156	24	84	20	2	3	0	0	0	0	1	134	513
17:00	22	104	11	1	3	0	0	0	0	0	141	15	47	40	0	1	1	0	0	0	0	104	22	160	6	0	0	0	0	0	0	0	188	35	105	17	0	0	0	0	0	0	0	157	590
17:15	43	98	36	0	1	1	0	0	0	0	179	17	64	33	0	0	0	0	0	0	0	114	14	112	7	2	2	0	0	0	0	0	137	21	93	14	1	0	1	0	0	0	0	130	560
17:30	21	90	16	0	1	0	0	0	1	0	129	17	64	18	2	2	1	0	0	0	0	104	28	130	8	0	1	0	0	0	0	0	167	28	88	10	0	0	1	0	0	0	0	127	527
17:45	34	110	21	1	1	1	0	0	0	0	168	14	58	30	2	1	0	0	0	0	0	105	10	111	3	0	1	0	0	0	0	0	125	16	100	12	1	3	0	0	0	0	0	132	530

North Total				7187							East Total				5645						
North Entering				3479			Cyclists	0	2	0	Truck	35	60	27	East Entering				3076		
North Receiving				3708				Cars	338	2536		481	East Receiving				2569				
North Peds				1					481	East Peds				1							
								←		↓		↘									
Mapleview Drive	0	33	454				↗					↖	537	28	1						
	0	101	1810				→					←	1878	85	2						
	0	12	409				↘					↙	527	18	0						
								←		↑		↗									
West Total				5662			481	2580	142					South Total				6874			
West Entering				2819			24	75	8					South Entering				3310			
West Receiving				2843			0	0	0					South Receiving				3564			
West Peds				2											South Peds				0		

Trans-Plan Transportation Inc.

Site ID Code:
Intersection Location:
Municipality:
Count Date:
Weather and Temperature:
Surveyor:

Yonge Street and Lockhart Road
Barrie, Ontario
Thursday September 28, 2017
Clear, 15C
TP

AM	NORTH APPROACH										Total	EAST APPROACH										Total	SOUTH APPROACH										Total	WEST APPROACH										Total	Grand Total
	CAR			TRUCKS			CYCLISTS			Peds		CAR			TRUCKS			CYCLISTS			Peds		CAR			TRUCKS			CYCLISTS			Peds													
	L	T	R	L	T	R	L	T	R			L	T	R	L	T	R	L	T	R			L	T	R	L	T	R	L	T	R														
7:00	2	109	6	0	2	0	0	0	0	0	119	12	20	8	0	1	0	0	0	0	0	41	14	33	8	1	1	0	0	1	0	0	58	2	3	9	1	0	1	0	0	0	16	234	
7:15	5	94	19	1	3	1	0	0	0	0	123	15	23	6	0	0	0	0	0	0	0	44	12	58	6	0	3	0	0	0	0	0	79	1	1	8	1	2	0	0	0	0	13	259	
7:30	3	138	16	0	4	3	0	0	0	0	164	10	36	8	1	0	2	0	0	0	0	57	17	80	5	1	1	1	0	0	0	0	105	3	6	5	1	1	0	0	0	0	16	342	
7:45	8	121	22	0	7	1	0	0	0	0	159	8	21	8	1	0	0	0	0	0	0	38	19	72	9	1	4	1	0	0	0	0	106	4	12	5	0	0	0	0	0	0	21	324	
8:00	4	111	17	0	2	1	0	0	0	0	135	6	31	12	0	0	0	0	0	0	0	49	17	69	2	0	2	0	0	0	0	0	90	4	7	10	1	1	0	0	0	0	23	297	
8:15	4	101	9	0	2	0	0	0	0	0	116	11	22	11	0	0	1	0	0	0	0	45	15	75	3	0	7	2	0	0	0	0	102	5	9	7	1	0	0	0	0	0	22	285	
8:30	4	117	10	0	2	3	0	0	0	0	136	9	22	10	0	0	0	0	0	0	0	41	19	84	2	1	3	0	0	0	0	0	109	10	8	13	0	1	1	0	0	0	33	319	
8:45	6	112	9	0	5	0	0	0	0	0	132	8	23	3	0	0	0	0	0	0	0	34	13	69	7	3	5	0	0	0	0	0	97	4	11	12	1	0	1	0	0	0	29	292	
MD																																													
11:00	6	77	3	0	3	0	0	0	0	0	89	6	10	8	1	0	4	0	0	0	0	29	8	74	5	0	5	0	0	0	0	0	92	3	14	8	0	1	1	0	0	0	0	27	237
11:15	4	82	5	0	2	0	0	0	0	0	93	7	11	11	0	1	0	0	0	0	0	30	9	75	9	1	8	0	0	0	0	0	102	6	18	16	0	0	1	1	0	0	0	42	267
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11:45	7	51	3	0	3	0	0	0	0	0	64	15	9	7	0	0	0	0	0	0	0	31	4	66	8	0	3	1	0	0	0	0	82	3	14	17	0	0	0	0	0	0	0	34	211
12:00	2	70	4	0	2	0	0	0	0	0	78	9	17	8	0	1	1	0	0	0	0	36	11	60	11	0	2	0	0	0	0	0	84	6	17	12	0	0	0	0	0	0	0	35	233
12:15	2	82	3	0	2	0	0	0	0	0	89	9	15	6	0	0	1	0	0	0	0	31	16	74	15	0	2	0	0	0	0	0	107	2	10	15	0	0	0	0	0	0	0	27	254
12:30	9	72	3	0	2	0	0	1	0	0	87	7	16	8	0	0	1	0	0	0	0	32	7	89	12	0	0	0	0	0	0	0	108	5	21	16	0	0	0	0	0	0	0	42	269
12:45	7	75	7	1	1	0	0	0	0	0	91	10	15	5	1	0	1	0	0	0	0	32	13	66	12	0	7	1	0	1	0	0	100	3	13	16	0	0	0	0	0	0	0	32	255
13:00	8	68	7	0	3	2	0	0	0	0	88	6	20	12	1	0	0	0	0	0	0	39	11	83	8	1	1	0	0	0	0	0	104	3	16	12	0	0	0	0	0	0	0	31	262
13:15	9	87	6	0	2	0	0	0	0	0	104	15	15	10	0	0	2	0	0	0	0	42	4	61	16	0	2	1	0	0	0	0	84	2	18	15	0	0	0	0	0	0	0	35	265
13:30	7	67	6	0	1	0	0	0	0	0	81	6	13	9	1	0	1	0	0	0	0	30	9	78	8	0	3	0	0	0	0	0	98	6	17	9	0	0	0	0	0	0	0	32	241
13:45	10	77	5	0	2	0	0	0	0	0	94	8	10	12	0	1	0	0	0	0	0	31	10	82	8	2	3	0	0	0	0	0	105	2	15	14	1	1	2	0	0	0	0	35	265
PM																																													
15:00	5	108	5	0	3	0	0	0	0	0	121	5	7	3	0	0	1	0	0	0	0	16	14	96	11	3	4	0	0	0	0	0	128	8	21	15	1	0	0	0	0	0	0	45	310
15:15	14	133	10	0	8	1	0	0	0	0	166	6	9	7	0	0	0	0	0	0	1	23	10	110	11	0	2	0	0	0	0	0	133	14	26	28	0	0	0	0	0	0	0	68	390
15:30	11	95	6	0	1	0	0	0	0	0	113	12	12	6	0	1	0	0	0	0	0	31	15	110	13	2	0	0	0	0	0	0	140	10	24	23	0	0	0	0	0	0	0	57	341
15:45	11	95	8	1	2	4	0	0	0	0	121	14	10	6	1	1	0	0	0	0	0	32	12	132	13	6	2	0	0	2	0	0	167	16	22	25	3	0	1	0	0	0	0	67	387
16:00	8	111	8	0	3	0	0	0	0	0	130	6	16	6	0	2	0	0	0	0	0	30	17	158	12	0	3	1	0	0	0	0	191	12	21	28	0	0	1	0	0	0	0	62	413
16:15	10	126	7	1	4	0	0	0	0	0	148	9	14	6	0	5	1	0	0	0	0	35	15	145	10	0	2	1	0	0	0	0	173	16	24	15	0	2	0	0	0	0	0	57	413
16:30	6	111	3	0	3	1	0	0	0	0	124	8	17	6	0	0	0	0	0	0	0	31	14	168	17	4	0	2	0	0	0	0	205	22	34	30	0	1	0	0	0	0	0	87	447
16:45	6	107	4	0	3	0	0	0	0	0	120	10	14	7	0	0	0	0	0	0	0	31	16	157	12	1	4	1	0	0	0	0	191	28	37	19	0	1	0	0	0	0	0	85	427
17:00	11	105	7	0	2	0	0	0	0	0	125	10	13	12	0	0	1	0	0	0	0	36	15	144	21	0	3	0	0	0	0	0	183	39	40	32	0	2	0	0	0	0	0	113	457
17:15	12	148	12	0	1	0	0	1	0	0	174	6	14	7	0	0	0	0	0	0	0	27	15	142	15	0	6	0	0	0	0	0	178	36	28	26	0	2	0	0	0	0	0	92	471
17:30	11	114	10	0	3	0	0	0	0	0	138	7	12	4	0	0	1	0	0	0	0	24	11	151	9	0	1	1	0	0	0	0	173	28	33	25	0	0	1	0	0	0	0	87	422
17:45	11	89	2	0	0	0	0	0	0	0	102	7	8	9	0	0	0	0	0	0	0	24	16	136	12	1	4	0	0	0	0	0	169	23	26	19	0	1	0	0	0	0	0	69	364



Turning Movement Count Diagram

Intersection: Yonge Street and Lockhart Road

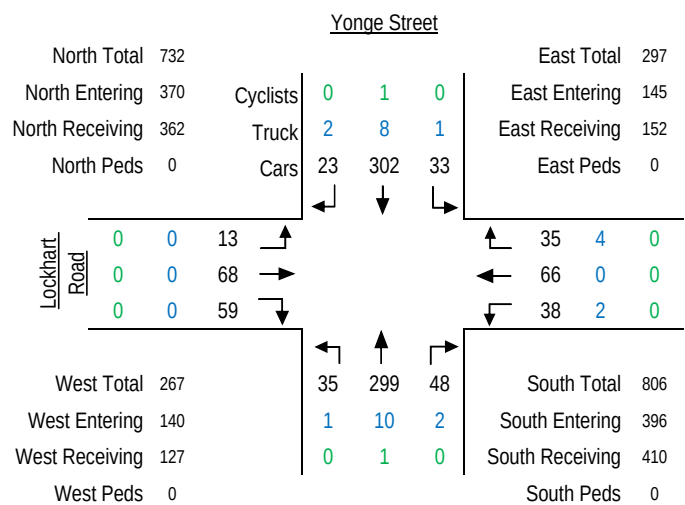
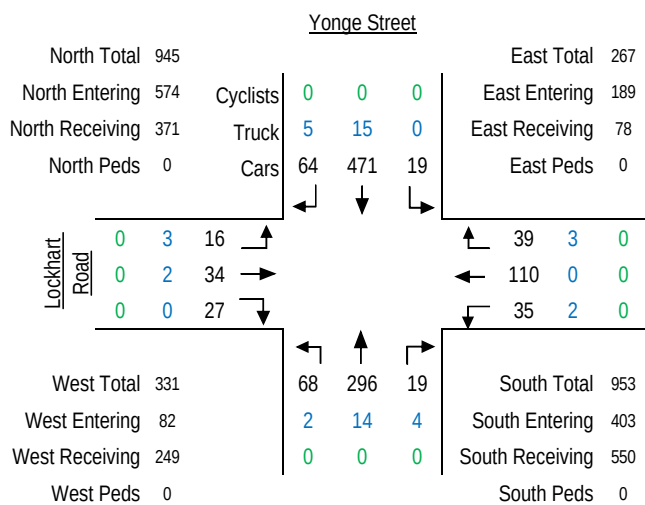
Municipality: Barrie, Ontario

Intersection ID:

Date: Thursday September 28, 2017

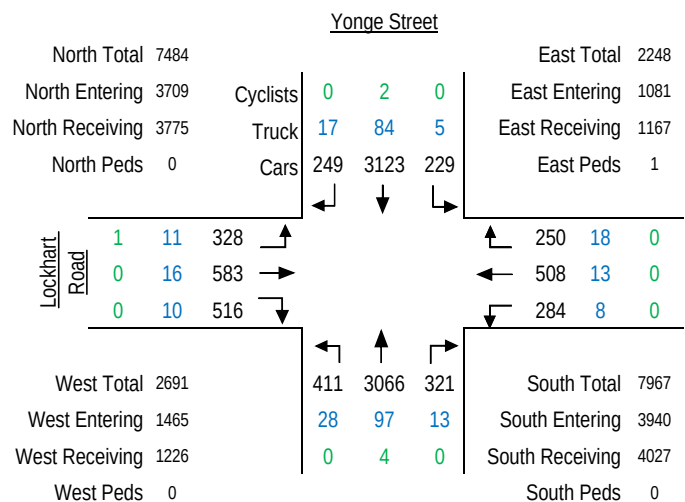
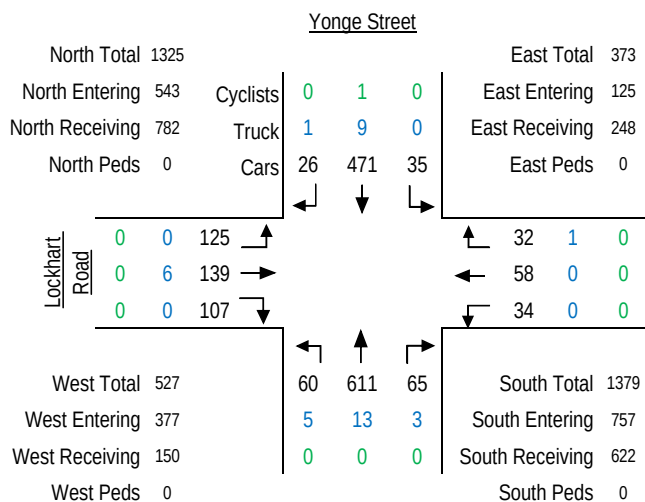
AM Peak Hour: 7:30 to 8:30

MD Peak Hour: 12:30 to 13:30



PM Peak Hour: 16:30 to 17:30

Total 8-Hour Count



Appendix F – Transportation Tomorrow Survey Excerpt

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

Appendix G – NCHRP Internal Capture Reports

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	Yonge Street Corridor Traffic Projection Brief	Organization:	JD Engineering		
Project Location:	Yonge Street Corridor	Performed By:	Allister Aresta		
Scenario Description:	Crown Development Internal Capture	Date:	February 9th 2022		
Analysis Year:	2031	Checked By:	John Northcote		
Analysis Period:	AM Street Peak Hour	Date:	February 9th 2022		

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				34	21	13
Restaurant				0		
Cinema/Entertainment				0		
Residential				471	108	363
Hotel				0		
All Other Land Uses ²				0		
				505	129	376

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office						
Retail	1.00	0%	0%	1.00	0%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.00	0%	0%	1.00	0%	0%
Hotel						
All Other Land Uses ²						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	2	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	4	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	505	129	376
Internal Capture Percentage	2%	5%	2%
External Vehicle-Trips ⁵	493	123	370
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	19%	15%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	1%
Hotel	N/A	N/A

¹ Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.
² Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³ Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i>).
⁴ Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.
⁵ Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.
⁶ Person-Trips
*Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Yonge Street Corridor Traffic Projection Brief
Analysis Period:	AM Street Peak Hour

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	21	21	1.00	13	13
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	108	108	1.00	363	363
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	4		2	0	2	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	7	4	73	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		7	0	0	0	0
Retail	0		0	0	2	0
Restaurant	0	2		0	5	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	4	0	0		0
Hotel	0	1	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	4	17	21	17	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	2	106	108	106	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	2	11	13	11	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	4	359	363	359	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

²Person-Trips

³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	Yonge Street Corridor Traffic Projection Brief	Organization:	JD Engineering		
Project Location:	Yonge Street Corridor	Performed By:	Allister Aresta		
Scenario Description:	Crown Development Internal Capture	Date:	February 9th 2022		
Analysis Year:	2031	Checked By:	John Northcote		
Analysis Period:	PM Street Peak Hour	Date:	February 9th 2022		

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				94	47	47
Restaurant				0		
Cinema/Entertainment				0		
Residential				409	249	160
Hotel				0		
All Other Land Uses ²				0		
				503	296	207

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office						
Retail	1.00	0%	0%	1.00	0%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.00	0%	0%	1.00	0%	0%
Hotel						
All Other Land Uses ²						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	12	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	5	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	503	296	207
Internal Capture Percentage	7%	6%	8%
External Vehicle-Trips ⁵	469	279	190
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	11%	26%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	5%	3%
Hotel	N/A	N/A

¹ Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.
² Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³ Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i>).
⁴ Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made
⁵ Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.
⁶ Person-Trips
[*] Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Yonge Street Corridor Traffic Projection Brief
Analysis Period:	PM Street Peak Hour

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	47	47	1.00	47	47
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	249	249	1.00	160	160
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	1		14	2	12	2
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	6	67	34	0		5
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		4	0	0	10	0
Retail	0		0	0	115	0
Restaurant	0	24		0	40	0
Cinema/Entertainment	0	2	0		10	0
Residential	0	5	0	0		0
Hotel	0	1	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	5	42	47	42	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	12	237	249	237	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	12	35	47	35	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	5	155	160	155	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

²Person-Trips

³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	Yonge Street Corridor Traffic Projection Brief	Organization:	JD Engineering		
Project Location:	Yonge Street Corridor	Performed By:	Allister Aresta		
Scenario Description:	759 Yonge Development Internal Capture	Date:	February 9th 2022		
Analysis Year:	2031	Checked By:	John Northcote		
Analysis Period:	AM Street Peak Hour	Date:	February 9th 2022		

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data <i>(For Information Only)</i>			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				57	34	23
Restaurant				0		
Cinema/Entertainment				0		
Residential				588	152	436
Hotel				0		
All Other Land Uses ²				0		
				645	186	459

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office						
Retail	1.00	0%	0%	1.00	0%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.00	0%	0%	1.00	0%	0%
Hotel						
All Other Land Uses ²						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	3	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	4	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	645	186	459
Internal Capture Percentage	2%	4%	2%
External Vehicle-Trips ⁵	631	179	452
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	12%	13%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	2%	1%
Hotel	N/A	N/A

¹ Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.
² Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³ Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i>).
⁴ Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.
⁵ Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.
⁶ Person-Trips
*Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Yonge Street Corridor Traffic Projection Brief
Analysis Period:	AM Street Peak Hour

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	34	34	1.00	23	23
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	152	152	1.00	436	436
Hotel	1.00	0	0	1.00	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	7		3	0	3	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	9	4	87	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		11	0	0	0	0
Retail	0		0	0	3	0
Restaurant	0	3		0	8	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	6	0	0		0
Hotel	0	1	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	4	30	34	30	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	3	149	152	149	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	3	20	23	20	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	4	432	436	432	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

²Person-Trips

³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool					
Project Name:	Yonge Street Corridor Traffic Projection Brief	Organization:	JD Engineering		
Project Location:	Yonge Street Corridor	Performed By:	Allister Aresta		
Scenario Description:	759 Yonge Development Internal Capture	Date:	February 9th 2022		
Analysis Year:	2031	Checked By:	John Northcote		
Analysis Period:	PM Street Peak Hour	Date:	February 9th 2022		

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data <i>(For Information Only)</i>			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail				162	81	81
Restaurant				0		
Cinema/Entertainment				0		
Residential				639	394	245
Hotel				0		
All Other Land Uses ²				0		
				801	475	326

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office						
Retail	1.00	0%	0%	1.00	0%	0%
Restaurant						
Cinema/Entertainment						
Residential	1.00	0%	0%	1.00	0%	0%
Hotel						
All Other Land Uses ²						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	21	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	8	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	801	475	326
Internal Capture Percentage	7%	6%	9%
External Vehicle-Trips ⁵	743	446	297
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	10%	26%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	5%	3%
Hotel	N/A	N/A

¹ Land Use Codes (LUCs) from <i>Trip Generation Manual</i> , published by the Institute of Transportation Engineers.
² Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.
³ Enter trips assuming no transit or non-motorized trips (as assumed in ITE <i>Trip Generation Manual</i>).
⁴ Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made
⁵ Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.
⁶ Person-Trips
[*] Indicates computation that has been rounded to the nearest whole number.
Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	Yonge Street Corridor Traffic Projection Brief
Analysis Period:	PM Street Peak Hour

Table 7-P: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.00	0	0	1.00	0	0
Retail	1.00	81	81	1.00	81	81
Restaurant	1.00	0	0	1.00	0	0
Cinema/Entertainment	1.00	0	0	1.00	0	0
Residential	1.00	394	394	1.00	245	245
Hotel	1.00	0	0	1.00	0	0

Table 8-P (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	2		23	3	21	4
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	10	103	51	0		7
Hotel	0	0	0	0	0	

Table 8-P (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		6	0	0	16	0
Retail	0		0	0	181	0
Restaurant	0	41		0	63	0
Cinema/Entertainment	0	3	0		16	0
Residential	0	8	0	0		0
Hotel	0	2	0	0	0	

Table 9-P (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	8	73	81	73	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	21	373	394	373	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Table 9-P (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	21	60	81	60	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	8	237	245	237	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

²Person-Trips

³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator

*Indicates computation that has been rounded to the nearest whole number.

Synchro Analysis Output

Total (2029) Traffic Volumes

Rainsong Phase 2
1: Yonge St & Street R/South Access

Queues
Total (2031) AM Peak Hour

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	129	33	123	108	27	647	47	1151
Future Volume (vph)	129	33	123	108	27	647	47	1151
Lane Group Flow (vph)	129	85	123	200	27	669	47	1176
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA
Protected Phases	7	4	3	8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	7	4	3	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	7.0	14.0	7.0	14.0	20.0	20.0	20.0	20.0
Minimum Split (s)	11.0	24.0	11.0	24.0	32.0	32.0	32.0	32.0
Total Split (s)	11.0	26.0	11.0	26.0	94.0	94.0	94.0	94.0
Total Split (%)	8.4%	19.8%	8.4%	19.8%	71.8%	71.8%	71.8%	71.8%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	1.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.0	6.0	4.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag	Lead	Lag	Lead	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes				
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio	0.67	0.31	0.41	0.76	0.11	0.28	0.09	0.49
Control Delay	59.6	25.9	45.4	65.0	8.7	8.4	7.9	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	59.6	25.9	45.4	65.0	8.7	8.4	7.9	10.6
Queue Length 50th (m)	28.5	8.1	27.0	44.8	2.3	33.6	3.9	72.1
Queue Length 95th (m)	#47.7	24.3	45.2	72.7	6.5	45.0	9.0	92.1
Internal Link Dist (m)		264.3		140.6		230.8		108.7
Turn Bay Length (m)	75.0		30.0		80.0		80.0	
Base Capacity (vph)	193	308	299	299	254	2351	495	2398
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.67	0.28	0.41	0.67	0.11	0.28	0.09	0.49

Intersection Summary

Cycle Length: 131

Actuated Cycle Length: 128.4

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: Yonge St & Street R/South Access

 Ø2	 Ø3	 Ø4
94 s	11 s	26 s
 Ø6	 Ø7	 Ø8
94 s	11 s	26 s

Rainsong Phase 2
1: Yonge St & Street R/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)	129	33	52	123	108	92	27	647	22	47	1151	25
Future Volume (vph)	129	33	52	123	108	92	27	647	22	47	1151	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.91		1.00	0.93		1.00	1.00		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1705		1805	1769		1770	3427		1805	3494	
Flt Permitted	0.34	1.00		0.70	1.00		0.20	1.00		0.38	1.00	
Satd. Flow (perm)	642	1705		1333	1769		371	3427		722	3494	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	129	33	52	123	108	92	27	647	22	47	1151	25
RTOR Reduction (vph)	0	44	0	0	24	0	0	2	0	0	1	0
Lane Group Flow (vph)	129	41	0	123	176	0	27	667	0	47	1175	0
Heavy Vehicles (%)	2%	0%	2%	0%	0%	0%	2%	5%	0%	0%	3%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	24.3	17.3		24.3	17.3		88.0	88.0		88.0	88.0	
Effective Green, g (s)	24.3	17.3		24.3	17.3		88.0	88.0		88.0	88.0	
Actuated g/C Ratio	0.19	0.13		0.19	0.13		0.69	0.69		0.69	0.69	
Clearance Time (s)	4.0	6.0		4.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	183	229		278	238		254	2350		495	2396	
v/s Ratio Prot	c0.04	0.02		0.02	c0.10			0.19			c0.34	
v/s Ratio Perm	0.10			0.06			0.07			0.07		
v/c Ratio	0.70	0.18		0.44	0.74		0.11	0.28		0.09	0.49	
Uniform Delay, d1	46.8	49.2		45.2	53.3		6.8	7.9		6.8	9.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.7	0.4		1.1	11.3		0.8	0.3		0.4	0.7	
Delay (s)	58.5	49.6		46.4	64.7		7.7	8.2		7.2	10.3	
Level of Service	E	D		D	E		A	A		A	B	
Approach Delay (s)		54.9			57.7			8.1			10.1	
Approach LOS		D			E			A			B	
Intersection Summary												
HCM 2000 Control Delay		19.7					HCM 2000 Level of Service		B			
HCM 2000 Volume to Capacity ratio		0.54										
Actuated Cycle Length (s)		128.3					Sum of lost time (s)		16.0			
Intersection Capacity Utilization		71.2%					ICU Level of Service		C			
Analysis Period (min)		15										
c Critical Lane Group												

Rainsong Phase 2
1: Yonge St & Street R/South Access

HCM Unsignalized 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 (veh/h)	129	33	52	123	108	92	27	647	22	47	1151	25
Future Volume (Veh/h)	129	33	52	123	108	92	27	647	22	47	1151	25
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour 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
Hourly flow rate (vph)	129	33	52	123	108	92	27	647	22	47	1151	25
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)							255					
pX, platoon unblocked	1.00	1.00		1.00	1.00	1.00				1.00		
vC, conflicting volume	1781	1980	588	1450	1982	334	1176			669		
vC1, stage 1 conf vol	1258	1258		712	712							
vC2, stage 2 conf vol	524	723		738	1270							
vCu, unblocked vol	1776	1976	588	1444	1978	324	1176			660		
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 %	8	83	89	42	41	86	95			95		
cM capacity (veh/h)	140	198	452	211	183	675	590			934		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3		
Volume Total	129	85	123	200	27	431	238	47	767	409		
Volume Left	129	0	123	0	27	0	0	47	0	0		
Volume Right	0	52	0	92	0	0	22	0	0	25		
cSH	140	302	211	275	590	1700	1700	934	1700	1700		
Volume to Capacity	0.92	0.28	0.58	0.73	0.05	0.25	0.14	0.05	0.45	0.24		
Queue Length 95th (m)	50.4	9.0	25.9	41.3	1.1	0.0	0.0	1.3	0.0	0.0		
Control Delay (s)	117.7	21.5	43.5	46.4	11.4	0.0	0.0	9.1	0.0	0.0		
Lane LOS	F	C	E	E	B			A				
Approach Delay (s)	79.5		45.3		0.4			0.3				
Approach LOS	F		E									
Intersection Summary												
Average Delay				13.2								
Intersection Capacity Utilization				67.5%	ICU Level of Service					C		
Analysis Period (min)				15								

Rainsong Phase 2
2: Lockhart Rd & Street B

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

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	16	200	654	2	10	53
Future Volume (Veh/h)	16	200	654	2	10	53
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	217	711	2	11	58
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)			326			
pX, platoon unblocked	1.00				1.00	1.00
vC, conflicting volume	713				854	356
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	702				844	344
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				96	91
cM capacity (veh/h)	887				295	649
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	89	145	474	239	11	58
Volume Left	17	0	0	0	11	0
Volume Right	0	0	0	2	0	58
cSH	887	1700	1700	1700	295	649
Volume to Capacity	0.02	0.09	0.28	0.14	0.04	0.09
Queue Length 95th (m)	0.5	0.0	0.0	0.0	0.9	2.3
Control Delay (s)	1.9	0.0	0.0	0.0	17.7	11.1
Lane LOS	A				C	B
Approach Delay (s)	0.7		0.0		12.1	
Approach LOS					B	
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			28.1%		ICU Level of Service	A
Analysis Period (min)			15			

Rainsong Phase 2
1: Yonge St & Street R/South Access

Queues
Total (2031) PM Peak Hour

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	67	77	56	49	80	1516	110	933
Future Volume (vph)	67	77	56	49	80	1516	110	933
Lane Group Flow (vph)	67	104	56	91	80	1569	110	989
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)	14.0	14.0	14.0	14.0	20.0	20.0	20.0	20.0
Minimum Split (s)	24.0	24.0	24.0	24.0	32.0	32.0	32.0	32.0
Total Split (s)	24.0	24.0	24.0	24.0	86.0	86.0	86.0	86.0
Total Split (%)	21.8%	21.8%	21.8%	21.8%	78.2%	78.2%	78.2%	78.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
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	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio	0.39	0.41	0.33	0.35	0.21	0.59	0.59	0.37
Control Delay	49.6	42.0	47.3	30.9	5.4	6.9	21.9	4.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
Total Delay	49.6	42.0	47.3	30.9	5.4	7.1	21.9	4.9
Queue Length 50th (m)	13.5	18.1	11.2	11.3	4.2	65.7	8.8	31.6
Queue Length 95th (m)	27.8	35.2	23.9	26.9	10.2	88.1	#44.9	43.2
Internal Link Dist (m)		264.3		140.6		230.8		104.0
Turn Bay Length (m)	75.0		30.0		80.0		80.0	
Base Capacity (vph)	214	312	216	320	386	2673	187	2665
Starvation Cap Reductn	0	0	0	0	0	397	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.33	0.26	0.28	0.21	0.69	0.59	0.37

Intersection Summary

Cycle Length: 110

Actuated Cycle Length: 109.1

Natural Cycle: 90

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: Yonge St & Street R/South Access



Rainsong Phase 2
1: Yonge St & Street R/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)	67	77	27	56	49	42	80	1516	53	110	933	56
Future Volume (vph)	67	77	27	56	49	42	80	1516	53	110	933	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt	1.00	0.96		1.00	0.93		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1817		1805	1768		1770	3524		1805	3509	
Flt Permitted	0.70	1.00		0.69	1.00		0.27	1.00		0.13	1.00	
Satd. Flow (perm)	1300	1817		1311	1768		509	3524		246	3509	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	67	77	27	56	49	42	80	1516	53	110	933	56
RTOR Reduction (vph)	0	12	0	0	30	0	0	2	0	0	3	0
Lane Group Flow (vph)	67	92	0	56	61	0	80	1567	0	110	986	0
Heavy Vehicles (%)	2%	0%	2%	0%	0%	0%	2%	2%	0%	0%	2%	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)	14.4	14.4		14.4	14.4		82.7	82.7		82.7	82.7	
Effective Green, g (s)	14.4	14.4		14.4	14.4		82.7	82.7		82.7	82.7	
Actuated g/C Ratio	0.13	0.13		0.13	0.13		0.76	0.76		0.76	0.76	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	171	239		173	233		385	2671		186	2659	
v/s Ratio Prot		0.05			0.03			0.44			0.28	
v/s Ratio Perm	c0.05			0.04			0.16			c0.45		
v/c Ratio	0.39	0.38		0.32	0.26		0.21	0.59		0.59	0.37	
Uniform Delay, d1	43.3	43.3		42.9	42.6		3.8	5.8		5.8	4.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	1.0		1.1	0.6		1.2	1.0		13.1	0.4	
Delay (s)	44.8	44.3		44.0	43.2		5.0	6.7		18.9	4.8	
Level of Service	D	D		D	D		A	A		B	A	
Approach Delay (s)		44.5			43.5			6.6			6.2	
Approach LOS		D			D			A			A	
Intersection Summary												
HCM 2000 Control Delay			10.4				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			109.1				Sum of lost time (s)			12.0		
Intersection Capacity Utilization			86.9%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Rainsong Phase 2
1: Yonge St & Street R/South Access

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

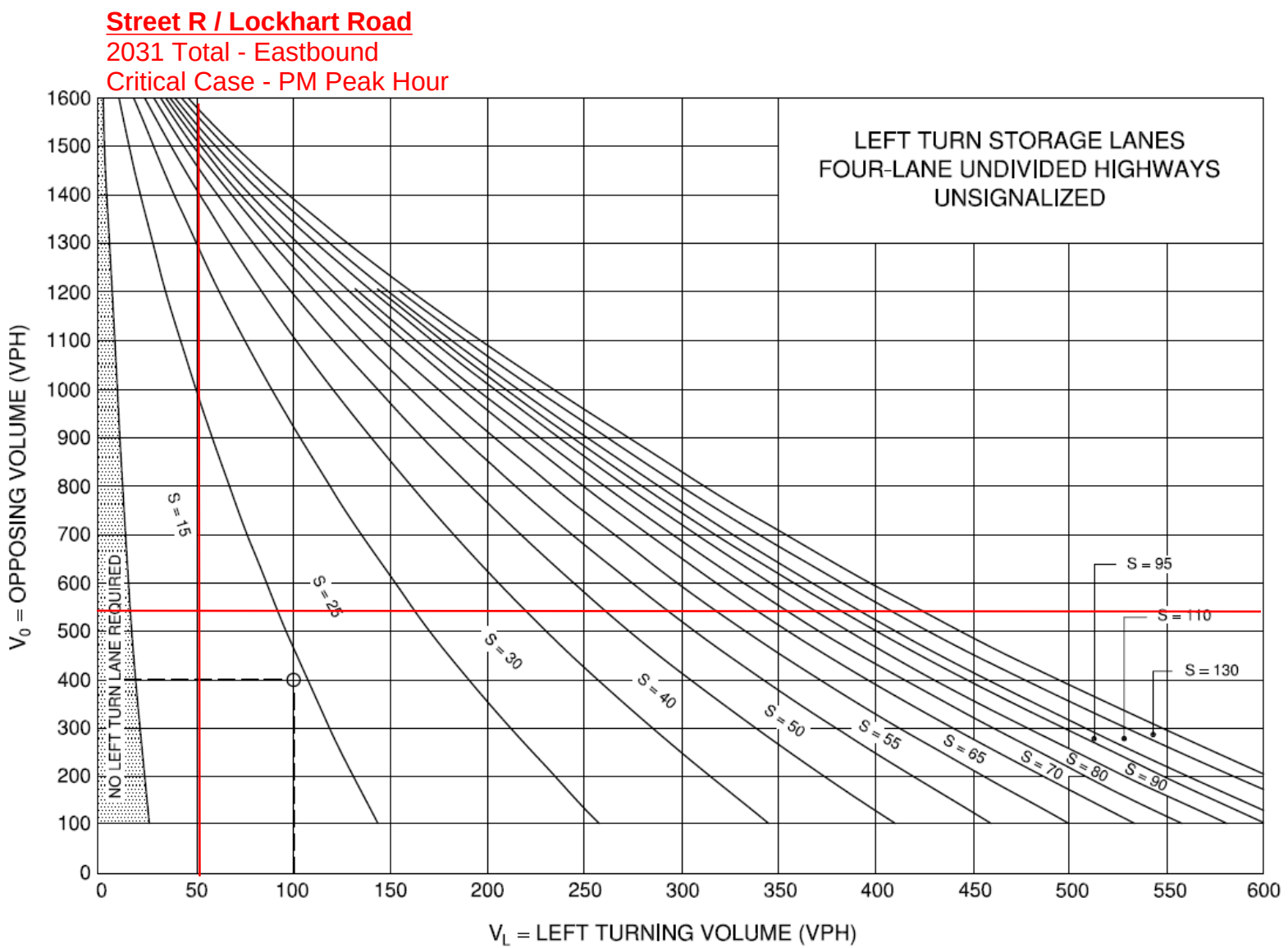
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	67	77	27	56	49	42	80	1516	53	110	933	56
Future Volume (Veh/h)	67	77	27	56	49	42	80	1516	53	110	933	56
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	67	77	27	56	49	42	80	1516	53	110	933	56
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)								255				
pX, platoon unblocked	0.64	0.64		0.64	0.64	0.64				0.64		
vC, conflicting volume	2166	2910	494	2454	2912	784	989			1569		
vC1, stage 1 conf vol	1181	1181		1702	1702							
vC2, stage 2 conf vol	984	1729		752	1209							
vCu, unblocked vol	1686	2858	494	2141	2861	0	989			747		
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 %	51	0	95	29	51	94	88			80		
cM capacity (veh/h)	136	66	521	79	100	693	695			553		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3		
Volume Total	67	104	56	91	80	1011	558	110	622	367		
Volume Left	67	0	56	0	80	0	0	110	0	0		
Volume Right	0	27	0	42	0	0	53	0	0	56		
cSH	136	85	79	165	695	1700	1700	553	1700	1700		
Volume to Capacity	0.49	1.22	0.71	0.55	0.12	0.59	0.33	0.20	0.37	0.22		
Queue Length 95th (m)	18.4	60.2	27.0	22.6	3.1	0.0	0.0	5.9	0.0	0.0		
Control Delay (s)	54.7	256.5	122.8	50.7	10.9	0.0	0.0	13.1	0.0	0.0		
Lane LOS	F	F	F	F	B			B				
Approach Delay (s)	177.4		78.2		0.5			1.3				
Approach LOS	F		F									
Intersection Summary												
Average Delay			14.4									
Intersection Capacity Utilization			70.1%		ICU Level of Service					C		
Analysis Period (min)			15									

Rainsong Phase 2
2: Lockhart Rd & Street B

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

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		 	 		 	 
Traffic Volume (veh/h)	52	816	522	19	6	36
Future Volume (Veh/h)	52	816	522	19	6	36
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	57	887	567	21	7	39
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (m)			331			
pX, platoon unblocked	0.98				0.98	0.98
vC, conflicting volume	588				1135	294
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	534				1093	234
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	94				96	95
cM capacity (veh/h)	1007				192	751
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	353	591	378	210	7	39
Volume Left	57	0	0	0	7	0
Volume Right	0	0	0	21	0	39
cSH	1007	1700	1700	1700	192	751
Volume to Capacity	0.06	0.35	0.22	0.12	0.04	0.05
Queue Length 95th (m)	1.4	0.0	0.0	0.0	0.9	1.3
Control Delay (s)	1.9	0.0	0.0	0.0	24.4	10.1
Lane LOS	A				C	B
Approach Delay (s)	0.7		0.0		12.2	
Approach LOS					B	
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			52.4%		ICU Level of Service	A
Analysis Period (min)			15			

MTO Left Turn Analysis

Exhibit 9A-30

OTM Signal Justification Sheets

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

Yonge Street / Street B

Justification	Description		Compliance			Signal Warrant	Underground Provisions Warrant
			Sectional		Entire %		
			Rest. Flow	Numerical			
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	900	1380	153%	84%	YES	YES
	B. Vehicle volume, along minor streets (average hour)	170	214	126%		NO	YES
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	900	1128	125%	52%	NO	YES
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	170	133	78%		NO	NO

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

Street R / Lockhart Road

Justification	Description		Compliance			Signal Warrant	Underground Provisions Warrant
			Sectional		Entire %		
			Rest. Flow	Numerical			
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	900	596	66%	7%	NO	NO
	B. Vehicle volume, along minor streets (average hour)	255	26	10%		NO	NO
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	900	565	63%	2%	NO	NO
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	170	4	2%		NO	NO