1303 Belle Aire Beach Road

Town of Innisfil

Traffic Impact Study for

1602850 Ontario Ltd.

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Executive Summary

This report summarizes the traffic impact study prepared for the residential subdivision on a site municipally known as 1303 Belle Aire Beach Road located south of Belle Aire Beach Road west of the GO Transit railway corridor in the community of Lefroy, Town of Innisfil [Town], County of Simcoe [County]. The report assesses the impact of traffic related to the development on the adjacent roadway and provides recommendations to accommodate this traffic in a safe and efficient manner.

It is anticipated that the proposed development will be completely built-out and occupied by 2020.

The proposed development includes 16 single-detached units and 135 townhouse units and will have a single full-movement access [Site Access] onto Belle Aire Beach Road. The proposed development will also include road connections along the southwest edge of the subject site, to the existing LSAMI development.

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

- Belle Aire Beach Road & 5th Line / 20th Sideroad; and
- Site Access / Belle Aire Beach Road.

Conclusions

1. The proposed development is expected to generate a total of 80 AM and 95 PM peak hour trips.
2. Detailed turning movement counts were completed for the Belle Aire Beach Road & 5th Line / 20th Sideroad intersection on Wednesday, November 8, 2017.
3. An intersection operation analysis was completed at the study area intersections, using the existing (2017) and background (2025 and 2030) traffic volumes, with the adjacent development traffic and without the proposed development traffic. This enabled a review of existing and future traffic deficiencies that would be present without the influence of the proposed development. The following transportation infrastructure improvements are recommended within the study area:

   Background (2025)

   Belle Aire Beach Road & 5th Line / 20th Sideroad

   - Signalization of intersection
4. An estimate of the amount of traffic that would be generated by the Subject Site was prepared and assigned to the study area streets and intersections.
5. An intersection operation analysis was completed under total (2025 and 2030) traffic volumes with the proposed development operational at the study area intersections. No geometric lane improvements or traffic signal improvements are recommended within the study area.
6. It is recommended that the posted 50km/h speed limit zone is extended west from the current location to the 20th Sideroad.
7. The proposed Site Access driveway will operate efficiently with one-way stop control for northbound traffic. A single lane for ingress and egress movements will provide the necessary capacity to convey the traffic volume generated by the proposed development.
8. With the above-noted change to the posted speed limit on Belle Aire Beach Road, the sight distance east and west of the Site Access driveway meets the minimum stopping sight distance requirements.

9. In summary, the proposed development will not cause any operational issues and will not add significant delay or congestion to the local roadway network.

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1 Introduction

1.1 Background

1602850 Ontario Ltd. [The Developer] is proposing to develop a residential subdivision on a site municipally known as 1303 Belle Aire Beach Road, located south of Belle Aire Beach Road west of the GO Transit railway corridor in the community of Lefroy, Town of Innisfil [Town], County of Simcoe [County]. The proposed residential development includes 16 single-detached units and 135 townhouse units.

It is anticipated that the proposed development will be completely built-out and occupied by 2020.

The proposed development will have a single full-movement access [Site Access] onto Belle Aire Beach Road. The proposed development will also include internal road connections along the southwest edge of the subject site, to the existing and future Lefroy Settlement Area Management Inc. [LSAMI] properties located west of the proposed development.

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

1.2 Study Area

Figure 1 shows the location of the subject site and study area intersections in relation to the surrounding area. The Site Plan by Innovative Planning Solutions is provided in **Appendix A**.

The subject site is bound by existing residential lands to the south and west, Belle Aire Beach Road to the north and a GO Transit railway corridor to the east.

Through consultation with the Town, the following intersections are included in the traffic impact study:

- Belle Aire Beach Road & 5th Line / 20th Sideroad; and
- Site Access / Belle Aire Beach Road.

Figure 1 – Proposed Site Location and Study Area

1.3 Study Scope and Objectives

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

- Consult with the Town to address any traffic-related issues or concerns they have with the proposed development;
- Determine existing traffic volumes and circulation patterns;
- Estimate future traffic volumes if the proposed development was not constructed, including the impact of additional proposed developments in the area;
- Complete level-of-service [LOS] analysis of horizon year (without the proposed development) traffic conditions and identify operational deficiencies;
- Estimate the amount of traffic that would be generated by the proposed development and assign to the roadway network;
- Complete LOS analysis of horizon year (with the proposed development) traffic conditions and identify additional operational deficiencies;
- Identify improvement options to address operational deficiencies;
- Review the available sight distance at the proposed site access driveway onto Belle Aire Beach Road; and
- Document findings and recommendations in a final report.

1.4 Horizon Year and Analysis Periods

Traffic scenarios for the existing year (2017), 5-year post-buildout (2025) horizon year and 10-year post-buildout (2030) horizon year were selected for analysis of traffic operations in the study area. The weekday morning [AM] and weekday afternoon [PM] peak hours have been selected as the analysis periods for this study.

2 Information Gathering

2.1 Street and Intersection Characteristics

20th Sideroad is a two-lane arterial road with a rural cross-section with no sidewalks within the study area. The posted speed limit on 20th Sideroad transitions from an 80km/h zone to a 60km/h zone (north to south). The posted speed limit on 20th Sideroad is 80km/h through the intersection of Belle Aire Beach Road in the southbound direction and 60km/h through the intersection of Belle Aire Beach Road in the northbound direction. 20th Sideroad has 20th Sideroad is under the jurisdiction of the Town within the study area.

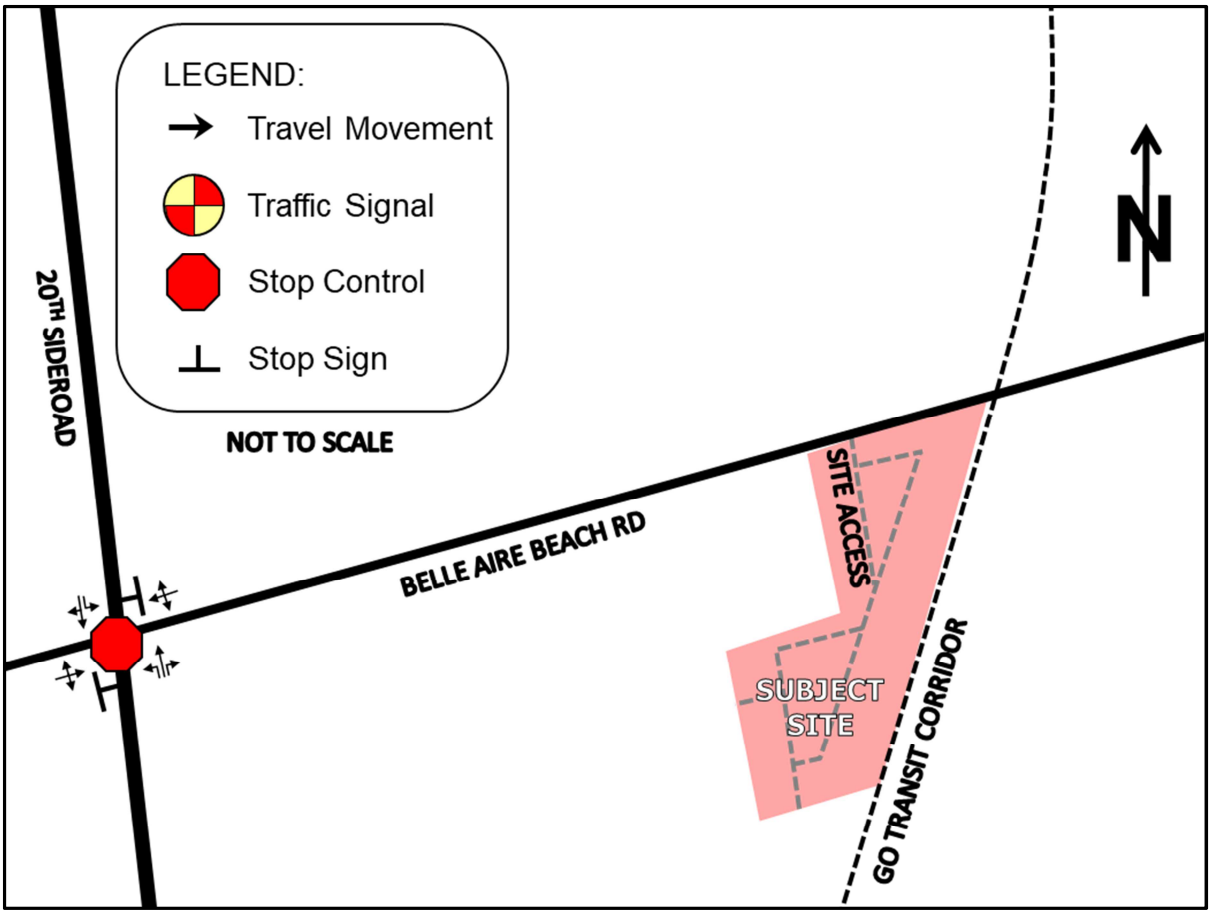
There is an existing multi-use trail on the east side of 20th Sideroad from roughly midblock between Belle Aire Beach Road and Killarney Beach Road to approximately 100 metres south of Belle Aire Beach Road.

20th Sideroad has paved one metre shoulders through the intersection of Belle Aire Beach Road, adjacent to the existing auxiliary turn lanes.

Belle Aire Beach Road (5th Line) is a two-lane major collector road east of 20th Sideroad and a two-lane local road west of 20th Sideroad. Belle Aire Beach Road has posted speed limit of 80km/h and a rural cross-section with no sidewalks within the study area. Belle Aire Beach Road is under the jurisdiction of the Town, within the study area.

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

Figure 2 – Existing (2017) Intersection Spacing and Lane Configuration with in Study Area



2.2 Local Transportation Infrastructure Improvements

Based on the Town's Transportation Master Plan (August 2013) [Town TMP], the following road improvements are anticipated to be completed prior to 2023:

- 20th Sideroad (within study area);
  - Construction of paved shoulders;

Based on the Town TMP, the following road improvements are anticipated to be completed prior to 2031:

- Belle Aire Beach Road (east of 20th Sideroad within study area);
  - Urbanization of roadway;
- 20th Sideroad / Belle Aire Beach Road intersection
  - Signalization of Intersection;

2.3 Transit Access

There is no municipal transit service currently available within the study area. It is noted that the Town TMP identifies a potential GO Station location on Belle Aire Beach Drive, east of 20th Sideroad; however, this potential location was identified in 2005 and since that time, the Ontario Growth Plan

amendment for the Simcoe area in 2012 necessitates a review of the station location as per the Town TMP.

2.4 Other Developments within the Study Area

The Town has identified a number of other developments in the area that will impact the traffic generation rates. A majority of these developments are located within the Lefroy Settlement Area (most notably the development of the LSAMI properties), Alcona South Existing Settlement Area [Alcona Existing] and the Alcona South Expansion Area [Alcona Expansion]. The traffic generation from the following areas and developments has been included within the background traffic volume for this study:

- LSAMI;
- Alcona Existing;
- Alcona Expansion; and
- 1357 Belle Aire Beach Road.

Figure 3 shows the location of the above noted adjacent areas and developments in relation to the subject site.

There is some uncertainty with respect to the build-out timelines and phasing for the above-noted areas and developments. For the purpose of our analysis, it is assumed that 80% and 100% of the traffic generated from the above-noted areas and developments will be completed prior to the 2025 and 2030 horizon years respectively.

Figure 3 – Adjacent Developments within Study Area

2.4.1 Traffic Generation for Adjacent Developments

Traffic impact studies are not available for some of the above-noted local developments. Consequently, the traffic generation for these proposed developments have been calculated based on the data provided in the Institute of Transportation Engineers [ITE] *Trip Generation Manual* (10th Edition) [ITE Trip Generation Manual]. The following ITE land uses have been applied to estimate the traffic from the adjacent developments:

- ITE land use 210 (Single-Family Detached Housing) – General Urban / Suburban Setting
- ITE land use 220 (Multifamily Housing (Low-Rise)) – General Urban / Suburban Setting

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

2.4.2 Traffic Assignment for Adjacent Developments

The ITE data provides the anticipated percentage of new traffic entering and exiting during the peak hour.

The distribution of traffic for LSAMI and 1357 Belle Aire Beach Road has been calculated based on the 2011 Transportation Tomorrow Survey [TTS] data for traffic zone 8594 retrieved using the TTS Internet Data Retrieval System [IDRS] (output attached as **Appendix H**). The distribution of traffic for the Alcona Existing and the Alcona Expansion has been calculated based on the TTS data for traffic zones 8559 and 8595 retrieved using the TTS Internet Data Retrieval System [IDRS] (output attached as **Appendix H**). TTS data provides historical origin and destination trip percentages for specific areas within the Town and the Greater Toronto and Hamilton Area [GTHA].

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

Using the methodology outlined above, the distribution of trips for P2, P3 and P4 from the LSAMI Parcels, the Alcona Existing, the Alcona Expansion and 1357 Belle Aire Beach Road have been calculated based on the location of the development. The main access to each development is listed below:

- LSAMI Parcel P2 – via the 20th Sideroad;
- LSAMI Parcel P3 – via Killarney Beach Road;
- LSAMI Parcel P4 – via 20th Sideroad and Killarney Beach Road; and
- 1357 Belle Aire Beach Road – via Belle Aire Beach Road.

Generally speaking, access to future development within Alcona Existing and Alcona Expansion would be via 20th Sideroad, north of the subject site. The distribution of trips for the adjacent developments is illustrated in **Table 1**.

Table 1 – Adjacent Development Traffic Distribution within Study Area

Travel Direction (to / from)	Percentage of Total Traffic Generation				
	LSAMI Parcel P2	LSAMI Parcel P3	LSAMI Parcel P4	1357 Belle Aire Beach Road	Alcona Existing and Alcona Expansion
North via 20th Sideroad	37%	19%	28%	25%	17%
South via 20th Sideroad	-	-	-	16%	-
East via Belle Aire Beach Road	-	-	-	58%	-
West via Belle Aire Beach Road	10%	-	-	1%	2%
Outside Study Area	53%	81%	72%	-	-
TOTAL	**100%**	**100%**	**100%**	**100%**	**100%**

2.4.3 LSAMI

The LSAMI development area consists of four land Parcels; P1, P2, P3 and P4. An excerpt from the Lefroy Development Guidelines in **Appendix B** illustrates the location of these four land parcels within the LSAMI development area.

A summary of the statistics and current status of the four land parcels is illustrated below in **Table 2.**

Table 2 – LSAMI Summary

Parcel	Size	Access	Status
P1	Phase 1 – 195 units Phase 2 – 100 units Phase 3 – 99 units Phase 4 – 150 units Phase 5 – 101 units	via Lormel Gate Avenue	Phase 1 – occupied Phase 2 – occupied Phase 3 – built but not occupied Phase 4 – not built Phase 5 – not built
P2	125 single detached units	via Lormel Gate Avenue (south)	not built
P3	125 single detached units 80 apartment units	via Killarney Beach Road	not built
P4	300 single detached units 100 townhouse units	via 20th Sideroad and Killarney Beach Road	not built

2.4.3.1 **Parcel P1**

The Parcel P1 Development is located at the southeast corner of the Belle Aire Beach Road & 5th Line / 20th Sideroad intersection. Phase 1 and Phase 2 of P1 are occupied, Phase 3 is built but not yet occupied and Phase 4 and Phase 5 are yet to be built. It is anticipated that P1 will be fully occupied by 2019.

Traffic generated by the Phases 3, 4 and 5 of P1 have been estimated based on the Lormel Homes Ltd. LSAMI Parcel 1 – Phase 4/5 by The Municipal Infrastructure Group Ltd. (May 2017) [P1 TIS] (excerpts provided in **Appendix B**). **Figure A** in **Appendix C** illustrates the traffic within the study area, as generated by Phase 3, 4 and 5 of Parcel P1 development. It is noted that the P1 TIS only includes Phases 4 and 5; however, an adjustment to the traffic generation has been made to account for the units in Phase 3.

2.4.3.2 **Parcel P2**

The Parcel P2 Development is located at the northeast corner of the Killarney Beach Road / 20th Sideroad intersection.

The estimated trip generation of the Parcel P2 Development is illustrated below in **Table 3**.

Table 3 – Estimated Traffic Generation – Parcel P2 Development

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Single-Family Detached Housing ITE Land Use:210	125 units	24	70	94	79	47	126

Using the traffic distribution pattern noted in Section 2.4.2, the Parcel P2 Development traffic assignment was calculated for the AM and PM peak hour and is illustrated in **Figure B** in **Appendix C**.

2.4.3.3 **Parcel P3**

The Parcel P3 Development is located at the southeast corner of the Killarney Beach Road / 20th Sideroad intersection.

The estimated trip generation of the Parcel P3 Development is illustrated below in **Table 4**.

Table 4 – Estimated Traffic Generation – Parcel P3 Development

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Single-Family Detached Housing ITE Land Use:210	120 units	23	67	90	76	45	121
Multifamily Housing (Low-Rise) ITE Land Use: 220	80 units	9	30	39	30	18	48
TOTAL TRIP GENERATION		**32**	**97**	**129**	**106**	**63**	**169**

Using the traffic distribution pattern noted in Section 2.4.2, the Parcel P3 Development traffic assignment was calculated for the AM and PM peak hour and is illustrated in **Figure C** in **Appendix C**.

2.4.3.4 **Parcel P4**

The Parcel P4 Development is located at the southwest corner of the Killarney Beach Road / Pine Avenue intersection.

The estimated trip generation of the Parcel P4 Development is illustrated below in **Table 5**.

Table 5 – Estimated Traffic Generation – Parcel P4 Development

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Single-Family Detached Housing ITE Land Use:210	300 units	55	163	218	184	108	292
Multifamily Housing (Low-Rise) ITE Land Use: 220	100 units	11	37	48	37	22	59
TOTAL TRIP GENERATION		**66**	**200**	**266**	**221**	**130**	**351**

Using the traffic distribution pattern noted in Section 2.4.2, the Parcel P4 Development traffic assignment was calculated for the AM and PM peak hour and is illustrated in **Figure D** in **Appendix C**.

2.4.4 Alcona Existing and Alcona Expansion

There is a significant number of developments that are anticipated in the Alcona Existing and the Alcona Expansion. Rather than calculating the traffic generation for each development, we have used the Alcona Existing and the Alcona Expansion population projections for 2031 in the Town TMP and determined the anticipated traffic generated as a result of this increase in population.

Through correspondence with the Town, there are currently 4,250 existing residential units south of Innisfil Beach Road (excerpt provided in **Appendix B**) resulting in a population of the 11,263[1] residents. The 2031 population projections per the Town TMP identify 16,925 residents south of Innisfil Beach Road (Alcona South Existing Settlement and Alcona South Expansion Area) resulting in an increase of 2,137 residential units within the Alcona Existing and the Alcona Expansion by 2031.

The estimated trip generation of this increase in residential units is illustrated below in **Table 6** with the assumption that 60% of the units will be single detached units and 40% will be residential townhouses.

Table 6 – Estimated Traffic Generation – Parcel P4 Development

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Single-Family Detached Housing ITE Land Use:210	1282 units	229	686	915	741	435	1176
Multifamily Housing (Low-Rise) ITE Land Use: 220	855 units	84	282	366	251	148	399
TOTAL TRIP GENERATION		**313**	**968**	**1281**	**992**	**583**	**1575**

Using the traffic distribution pattern noted in Section 2.4.2, the Alcona Existing and the Alcona Expansion additional traffic assignment was calculated for the AM and PM peak hour and is illustrated in **Figure E** in **Appendix C**.

2.4.5 1357 Belle Aire Beach Road Residential Development

The 1357 Belle Aire Beach Road residential development is a proposed residential development located south of Belle Aire Beach Road, west of the subject site consisting of 79 townhouse units.

The estimated trip generation of the 1357 Belle Aire Beach Road residential development is illustrated below in **Table 7**.

Table 7 – Estimated Traffic Generation – 1357 Belle Aire Beach Road

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Multifamily Housing (Low-Rise) ITE Land Use:220	79 units	9	29	38	30	18	48

[1] It has been assumed that there are 2.65 residents per unit as per the Town TMP.

Using the traffic distribution pattern noted in Section 2.4.2, the 1357 Belle Aire Beach Road traffic assignment was calculated for the AM and PM peak hour and is illustrated in **Figure F** in **Appendix C**.

2.5 Traffic Counts

Detailed turning movement traffic and pedestrian counts were commissioned by JD Engineering for the Belle Aire Beach Road & 5th Line / 20th Sideroad intersection.

Table 8 summarizes the traffic count data collection information.

Table 8 – Traffic Count Data

Intersection (E-W Street / N-S Street)	Count Date	AM Peak Hour	PM Peak Hour	Source
Belle Aire Beach Road & 5th Line / 20th Sideroad	Wednesday, November 8, 2017	07:00 – 08:00	16:30 – 17:30	JD Eng.*

*Traffic counts were completed by Ontario Traffic Inc. on behalf of JD Engineering.

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

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

Figure G in **Appendix C** illustrates the existing (2017) AM and PM peak hour traffic volumes within the study area.

2.6 Horizon Year Traffic Volumes

Figures H and **I** in **Appendix C** illustrate the background traffic volumes without the proposed development traffic volumes for horizon years 2025 and 2030.

As noted in Section 2.4, it is assumed that 80% and 100% of the traffic generated from the adjacent development traffic will be completed prior to the 2025 and 2030 horizon years respectively. Through discussions with the Town, no additional background growth rate, above and beyond the adjacent developments, was applied to the study area intersections.

3 Intersection Operation without Proposed Development

3.1 Introduction

Existing year operational conditions were established to determine how the street network within the study area is currently functioning without the proposed development. This provides a base case scenario to compare with future development scenarios. Traffic operations within the study area were evaluated using the 2017 traffic volumes with the existing road configuration and traffic control. The intersection performance was measured using the traffic analysis software, Synchro 10, a deterministic model that employs Highway Capacity Manual and Intersection Capacity Utilization

methodologies for analyzing intersection operations. These procedures are accepted by provincial and municipal agencies throughout North America.

Synchro 9 enables the study area to be graphically defined in terms of streets and intersections, along with their geometric and traffic control characteristics. The user is able to evaluate both signalized and unsignalized intersections in relation to each other, thus not only providing level of service for the individual intersections, but also enabling an assessment of the impact the various intersections in a network have on each other in terms of spacing, traffic congestion, delay, and queuing.

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

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

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

Table 9 – Level of Service Criteria for Intersections

LOS	LOS Description	Control Delay (seconds per vehicle)	
		Signalized Intersections	Stop Controlled Intersections
A	Very low delay; most vehicles do not stop (**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

3.2 Existing (2017) Intersection Operation

The results of the LOS analysis under existing (2017) traffic volumes during the AM and PM peak hour can be found below in **Table 10**. Existing intersection geometry and traffic control have been utilized for this scenario. Detailed output of the Synchro analysis can be found in **Appendix E**.

Table 10 – Existing (2017) LOS

Location (E-W Street / N-S Street)	Weekday AM Peak Hour			Weekday PM Peak Hour		
	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
Belle Aire Beach Road & 5th Line / 20th Sideroad (unsignalized)	-	2.8	A	-	2.9	A
EB	0.05	12.8	B	0.27	21.5	C
WB	0.16	12.5	B	0.11	16.0	C

The results of the LOS analysis indicate that the Belle Aire Beach Road & 5th Line / 20th Sideroad intersection is operating within the typical design limits noted in Section 3.1.

The existing storage length for all auxiliary turn lanes can accommodate the anticipated 95th percentile queue length for the associated turning movement.

The criterion outlined in Section E.7 of the Ontario Ministry of Transportation Geometric Design Standards for Ontario Highways [MTO GDSOH] (60vph minimum right turn volume warrant) has been used to assess whether an auxiliary right turn lane is required at the Belle Aire Beach Road & 5th Line / 20th Sideroad intersection. Our analysis indicates that no additional right turn lane is warranted.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the Belle Aire Beach Road & 5th Line / 20th Sideroad intersection (results are provided in **Appendix F**).

No infrastructure improvements are recommended within the study area to accommodate the existing traffic volume.

3.3 Background (2025) Intersection Operation

The results of the LOS analysis under background (2025) traffic volumes during the AM and PM peak hour can be found below in **Table 11**. Existing intersection geometry and traffic control have been utilized for this scenario. Detailed output of the Synchro analysis can be found in **Appendix G**.

Table 11 – Background (2025) LOS

Location (E-W Street / N-S Street)	Weekday AM Peak Hour			Weekday PM Peak Hour		
	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
Belle Aire Beach Road & 5th Line / 20th Sideroad (unsignalized)	**-**	**4.3**	**A**	**-**	**16.5**	**B**
EB	0.16	22.3	C	1.06	167.3	F
WB	0.43	23.7	C	0.42	48.4	E

The results of the LOS analysis indicate that the Belle Aire Beach Road & 5th Line / 20th Sideroad intersection is operating outside the typical design limits noted in Section 3.1 during the PM peak hour. Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the Belle Aire Beach Road & 5th Line / 20th Sideroad intersection (results are provided in **Appendix F**); however, due to the anticipated control delay at this intersection, it is recommended that the Town plan to install traffic signals at this intersection prior to 2025.

The results of the Synchro analysis with the above-noted improvement can be found below in **Table 12**. Detailed output of the Synchro analysis can be found in **Appendix G**.

Table 12 – Background (2025) LOS with Improvements

Location (E-W Street / N-S Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95th % Queue (m)		V/C	Delay (s)	LOS	95th % Queue (m)	
				Model	Actual				Model	Actual
Belle Aire Beach Road & 5th Line / 20th Sideroad (signalized)	0.45	11.7	B	-	-	0.55	12.7	B	-	-
EB	0.09	20.6	C	-	-	0.31	22.1	C	-	-
WB	0.27	21.9	C	-	-	0.11	20.6	C	-	-
NBL	0.05	6.6	A	4.5	110.0	0.06	6.7	A	5.2	110.0
NBT	0.27	8.0	A	-	-	0.65	12.9	B	-	-
NBR	0.00	6.2	A	0.0	110.0	0.02	6.3	A	2.3	110.0
SBL	0.03	6.4	A	3.8	40.0	0.16	8.1	A	9.7	40.0
SBTR	0.53	10.7	B	-	-	0.49	10.3	B	-	-

The results of the LOS analysis indicate that the Belle Aire Beach Road & 5th Line / 20th Sideroad intersection is operating within the typical design limits noted in Section 3.1.

The existing storage length for all auxiliary turn lanes can accommodate the anticipated 95th percentile queue length for the associated turning movement.

No additional infrastructure improvements are recommended within the study area for this analysis scenario.

3.4 Background (2030) Intersection Operation

The results of the LOS analysis under background (2030) traffic volumes during the AM and PM peak hour can be found below in **Table 13**. The recommended intersection geometry and traffic control identified in Section 3.3 has been utilized for this scenario. Detailed output of the Synchro analysis can be found in **Appendix G**.

Table 13 – Background (2030) LOS

Location (E-W Street / N-S Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95th % Queue (m)		V/C	Delay (s)	LOS	95th % Queue (m)	
				Model	Actual				Model	Actual
Belle Aire Beach Road & 5th Line / 20th Sideroad (signalized)	0.50	12.3	B	-	-	0.60	13.8	B	-	-
EB	0.10	20.3	C	-	-	0.34	22.0	C	-	-
WB	0.30	21.7	C	-	-	0.11	20.4	C	-	-
NBL	0.06	6.8	A	4.9	110.0	0.07	6.9	A	5.4	110.0
NBT	0.32	8.5	A	-	-	0.71	14.5	B	-	-
NBR	0.00	6.3	A	0.0	110.0	0.02	6.4	A	2.7	110.0
SBL	0.04	6.6	A	4.3	40.0	0.23	9.4	A	11.9	40.0
SBTR	0.58	11.7	B	-	-	0.56	11.3	B	-	-

The results of the LOS analysis indicate that the Belle Aire Beach Road & 5th Line / 20th Sideroad intersection is operating within the typical design limits noted in Section 3.1.

The existing storage length for all auxiliary turn lanes can accommodate the anticipated 95th percentile queue length for the associated turning movement.

No additional infrastructure improvements are recommended within the study area for this analysis scenario.

4 Proposed Development Traffic Generation and Assignment

4.1 Traffic Generation

The traffic generation for the subject site has been based on the ITE Trip Generation Manual. The following ITE land use has been applied to estimate the traffic from the proposed development:

- ITE land use 210 (Single-Family Detached Housing) – General Urban / Suburban Setting
- ITE land use 220 (Multifamily Housing (Low-Rise)) – General Urban / Suburban Setting

The estimated trip generation of the proposed development is illustrated below in **Table 14**. The AM and PM peak traffic generation for the proposed development does not 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.

Table 14 – Estimated Traffic Generation of Proposed Development

Land Use	Size	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Single-Family Detached Housing ITE Land Use:210	16 units	4	13	17	11	7	18
Multifamily Housing (Low-Rise) ITE Land Use:220	135 units	14	49	63	49	28	77
TOTAL TRIP GENERATION		**18**	**62**	**80**	**60**	**35**	**95**

No transportation modal split has been applied to the above-noted traffic generation calculation.

4.2 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 distribution of traffic for the proposed development is assumed to follow the trip distribution calculated for 1357 Belle Aire Beach Road, as illustrated in Table 1 in Section 2.4.2.

It is anticipated that some ingress and egress traffic south on 20th Sideroad would travel via the LSAMI development to access the subject site; however, for the purposes of analysis we have conservatively assumed that all traffic generated by the subject site would pass though the Belle Aire Beach Road & 5th Line / 20th Sideroad intersection.

Using the traffic distribution pattern noted in Section 2.4.2, the proposed development traffic assignment was calculated for the AM and PM peak hour and is illustrated in **Figure J** in **Appendix C**.

4.3 Total Horizon Year Traffic Volumes with the Proposed Development

For the total (2025 and 2030) horizon year traffic volumes, the proposed development traffic was added to the background (2025 and 2030) traffic volumes. The resulting total (2025 and 2030) horizon year traffic volume for the AM and PM peak hour are illustrated in **Figure K** and **L** in **Appendix C**.

5 Intersection Operation with Proposed Development

5.1 Total (2025) Intersection Operation

The results of the LOS analysis under total (2025) traffic volumes during the AM and PM peak hour can be found below in **Table 15**. The recommended intersection geometry and traffic control identified in Section 3.3 has been utilized for this scenario. Detailed output of the Synchro analysis can be found in **Appendix I**.

Table 15 – Total (2025) LOS

Location (E-W Street / N-S Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95th % Queue (m)		V/C	Delay (s)	LOS	95th % Queue (m)	
				Model	Actual				Model	Actual
Belle Aire Beach Road & 5th Line / 20th Sideroad (signalized)	0.50	14.6	B	-	-	0.57	13.3	B	-	-
EB	0.09	17.8	B	-	-	0.39	21.8	C	-	-
WB	0.36	19.8	B	-	-	0.18	20.3	C	-	-
NBL	0.06	9.0	A	4.5	110.0	0.06	6.8	A	5.2	110.0
NBT	0.31	10.9	B	-	-	0.66	13.4	B	-	-
NBR	0.01	8.4	A	0.1	110.0	0.03	6.5	A	4.2	110.0
SBL	0.04	8.7	A	4.4	40.0	0.21	8.9	A	11.6	40.0
SBTR	0.59	14.7	B	-	-	0.50	10.6	B	-	-
Site Access / Belle Aire Beach Road (unsignalized)	-	3.1	A	-	-	-	1.6	A	-	-
NB	0.08	9.5	A	-	-	0.05	9.6	A	-	-

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

The criterion outlined in Section E.7 of the MTO GDSOH (60vph minimum right turn volume warrant) has been used to assess whether an auxiliary right turn lane is required at the Belle Aire Beach Road / Site Access intersection. Our analysis indicates that no additional right turn lane is warranted.

An analysis was completed for left turn movements at the Belle Aire Beach Road / Site Access intersection, based on the criteria outlined in Section E.9.1 of the MTO GDSOH. Based on the low volume of left turn movements, no additional left turn lane is warranted.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the Belle Aire Beach Road & 5th Line / Site Access intersection (results are provided in **Appendix F**).

The existing storage length for all auxiliary turn lanes can accommodate the anticipated 95th percentile queue length for the associated turning movement.

No additional infrastructure improvements are recommended within the study area for this analysis scenario.

5.2 Total (2030) Intersection Operation

The results of the LOS analysis under total (2030) traffic volumes during the AM and PM peak hour can be found below in **Table 16**. The recommended intersection geometry and traffic control identified in Section 3.3 has been utilized for this scenario. Detailed output of the Synchro analysis can be found in **Appendix I**.

Table 16 – Total (2030) LOS

Location (E-W Street / N-S Street)	Weekday AM Peak Hour					Weekday PM Peak Hour				
	V/C	Delay (s)	LOS	95th % Queue (m)		V/C	Delay (s)	LOS	95th % Queue (m)	
				Model	Actual				Model	Actual
Belle Aire Beach Road & 5th Line / 20th Sideroad (signalized)	0.54	15.3	B	-	-	0.62	18.0	B	-	-
EB	0.10	17.7	B	-	-	0.34	19.6	B	-	-
WB	0.38	19.9	B	-	-	0.15	18.2	B	-	-
NBL	0.07	9.3	A	4.8	110.0	0.08	9.4	A	5.5	110.0
NBT	0.36	11.5	B	-	-	0.78	20.6	C	-	-
NBR	0.01	8.5	A	0.2	110.0	0.03	8.6	A	4.5	110.0
SBL	0.05	8.9	A	4.8	40.0	0.38	16.7	B	16.2	40.0
SBTR	0.64	16.0	B	-	-	0.62	15.3	B	-	-
Site Access / Belle Aire Beach Road (unsignalized)	-	3.1	A	-	-	-	1.6	A	-	-
NB	0.08	9.5	A	-	-	0.05	9.5	A	-	-

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

The criterion outlined in Section E.7 of the MTO GDSOH (60vph minimum right turn volume warrant) has been used to assess whether an auxiliary right turn lane is required at the Belle Aire Beach Road / Site Access intersection. Our analysis indicates that no additional right turn lane is warranted.

An analysis was completed for left turn movements at the Belle Aire Beach Road / Site Access intersection, based on the criteria outlined in Section E.9.1 of the MTO GDSOH. Based on the low volume of left turn movements, no additional left turn lane is warranted.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the Belle Aire Beach Road & 5th Line / Site Access intersection (results are provided in **Appendix F**).

The existing storage length for all auxiliary turn lanes can accommodate the anticipated 95th percentile queue length for the associated turning movement.

No additional infrastructure improvements are recommended within the study area for this analysis scenario.

5.3 Site Access

The Site Access will operate efficiently as a full-movement access with one-way stop control for the northbound movements at Belle Aire Beach Road. No lane improvements are recommended on Belle Aire Beach Road at the Site Access. A single northbound and southbound lane at the Site Access driveway will provide the necessary capacity to service the proposed development.

5.4 Sight Distance Review

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

There is currently a change in the posted speed limit (from 80km/h to 50km/h) on Belle Aire Beach Road, approximately 265 metres east of the Site Access. As part of the redevelopment of the area east of the 20th Sideroad, it is recommended that the posted 50km/h speed limit zone is extended west from the current location to the 20th Sideroad. With this change in the posted speed limit, the available sight distance east and west at the Site Access would meet the minimum stopping sight distance requirements as identified in the Transportation Association of Canada *Design Guide for Canadian Roads* (2017) [TAC Guidelines] for a design speed of 70km/h (105 meters).

6 Summary

1602850 Ontario Ltd. retained **JD Engineering** to prepare this traffic impact study in support of the proposed 1303 Belle Aire Beach Road residential development in the Town of Innisfil, County of Simcoe. The proposed Site Plan is shown in **Appendix A**. This chapter summarizes the conclusions and recommendations from the study.

The proposed residential development includes 16 single-detached units and 135 townhouse units.

1. The proposed development is expected to generate a total of 80 AM and 95 PM peak hour trips.
2. Detailed turning movement counts were completed for the Belle Aire Beach Road & 5th Line / 20th Sideroad intersection on Wednesday, November 8, 2017.
3. An intersection operation analysis was completed at the study area intersections, using the existing (2017) and background (2025 and 2030) traffic volumes, with the adjacent development traffic and without the proposed development traffic. This enabled a review of existing and future traffic deficiencies that would be present without the influence of the proposed development. The following transportation infrastructure improvements are recommended within the study area:

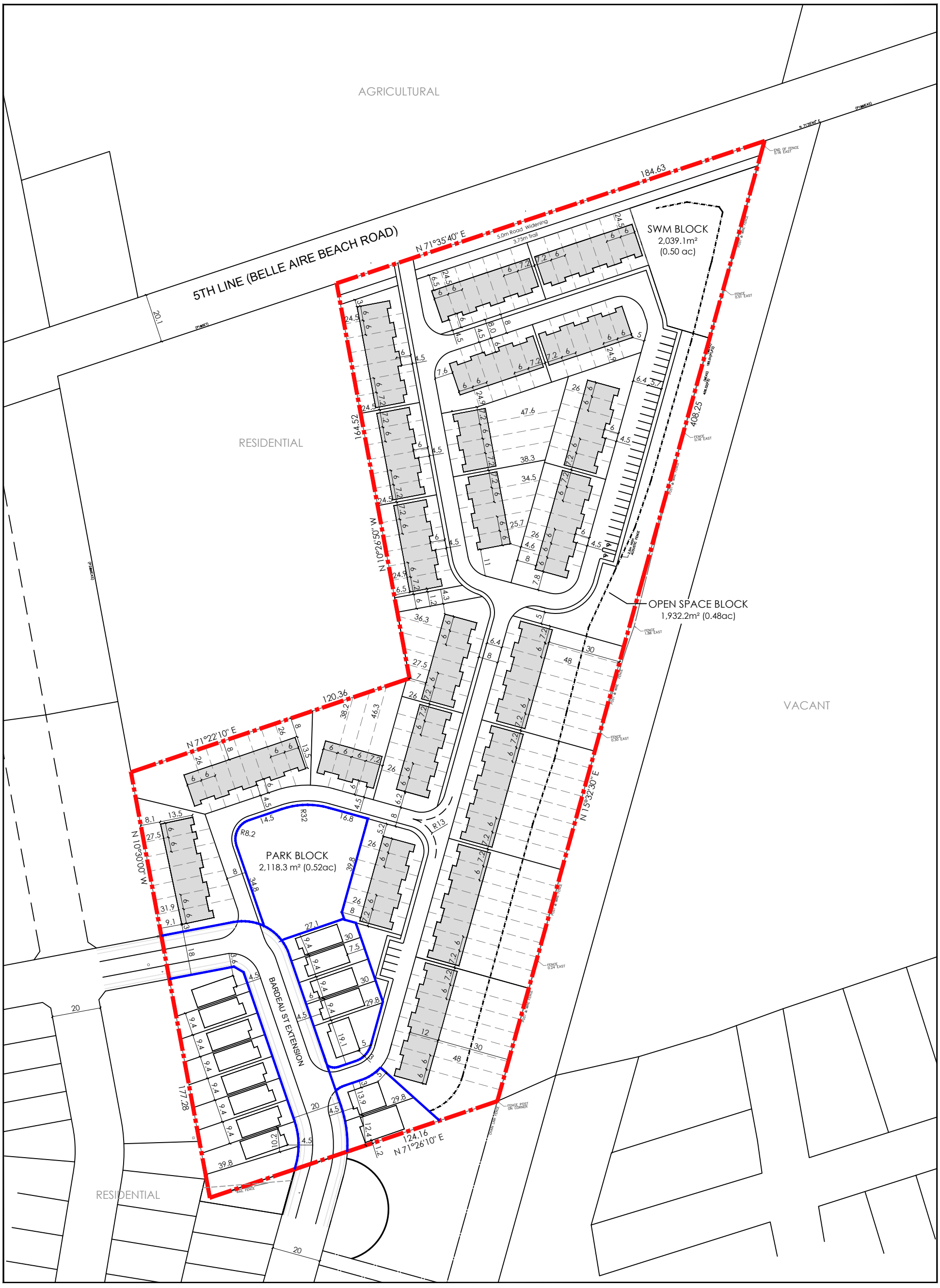
   Background (2025)

   Belle Aire Beach Road & 5th Line / 20th Sideroad

   - Signalization of intersection
4. An estimate of the amount of traffic that would be generated by the Subject Site was prepared and assigned to the study area streets and intersections.
5. An intersection operation analysis was completed under total (2025 and 2030) traffic volumes with the proposed development operational at the study area intersections. No geometric lane improvements or traffic signal improvements are recommended within the study area.

6. It is recommended that the posted 50km/h speed limit zone is extended west from the current location to the 20th Sideroad.
7. The proposed Site Access driveway will operate efficiently with one-way stop control for northbound traffic. A single lane for ingress and egress movements will provide the necessary capacity to convey the traffic volume generated by the proposed development.
8. With the above-noted change to the posted speed limit on Belle Aire Beach Road, the sight distance east and west of the Site Access driveway meets the minimum stopping sight distance requirements.
9. In summary, the proposed development will not cause any operational issues and will not add significant delay or congestion to the local roadway network.

Appendix A – Site Plan



CONCEPTUAL SITE PLAN 'K'
151 Units

1303 BELLE AIRE BEACH RD,
TOWN OF INNISFIL

LEGEND

- Subject Lands
- 6.0m Townhouse (135 Units)
- 9.0m Single Detached (15+1 Lots)
- Block Boundaries
- 2.5m High Acoustic Fence

Source: Topographic Plan prepared by JD Barnes Ltd, dated Jan. 19, 2016.
Note: This drawing is for discussion purposes only.
The information shown is approximate and subject to change.

0 25 50 75m

N

Date:	September 25, 2018	Scale:	1 : 1,500
File:	15-584	Drawn By:	AM

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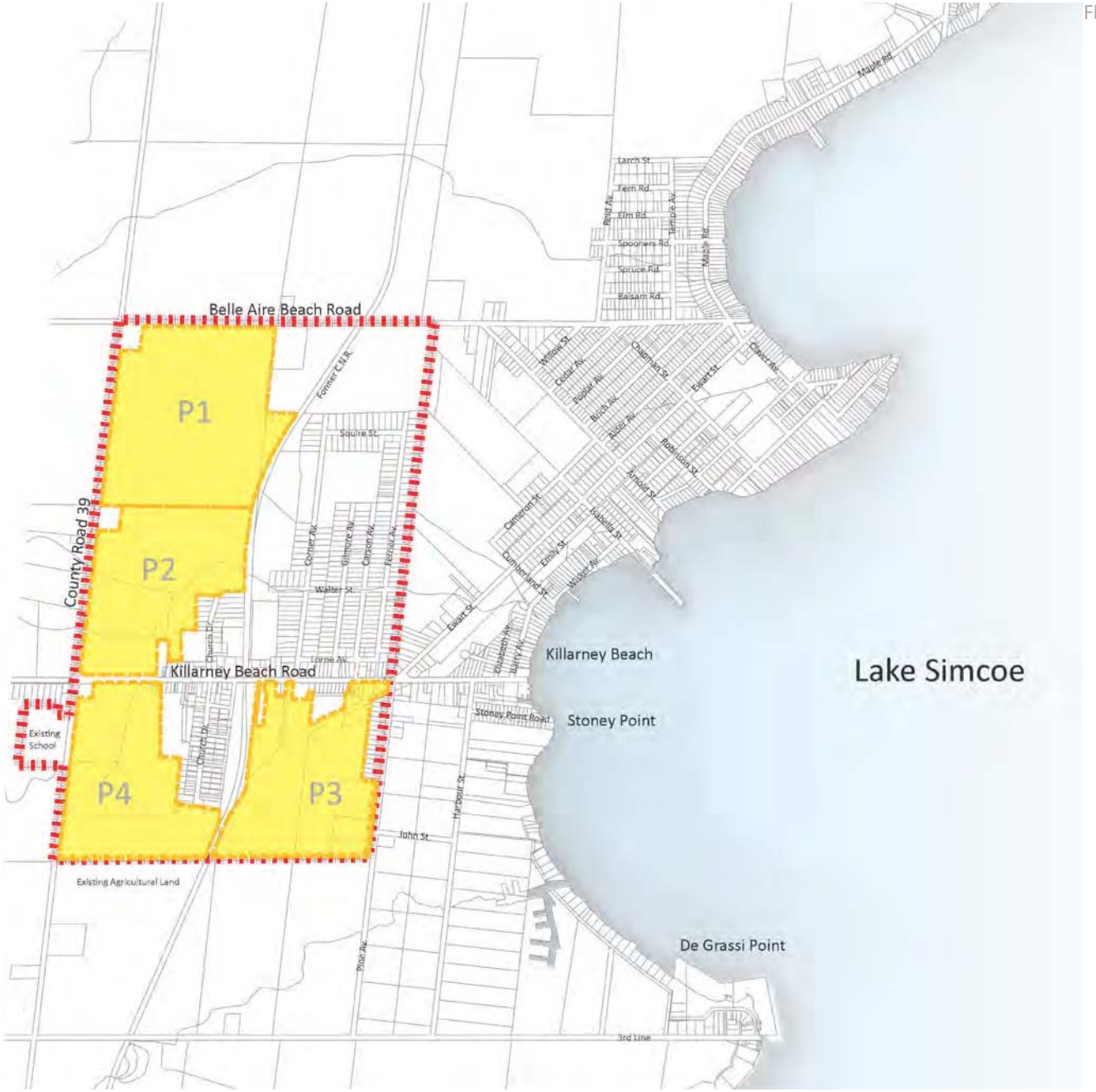
Appendix B –
Adjacent Development excerpt

FIG 1.0: CONTEXT PLAN

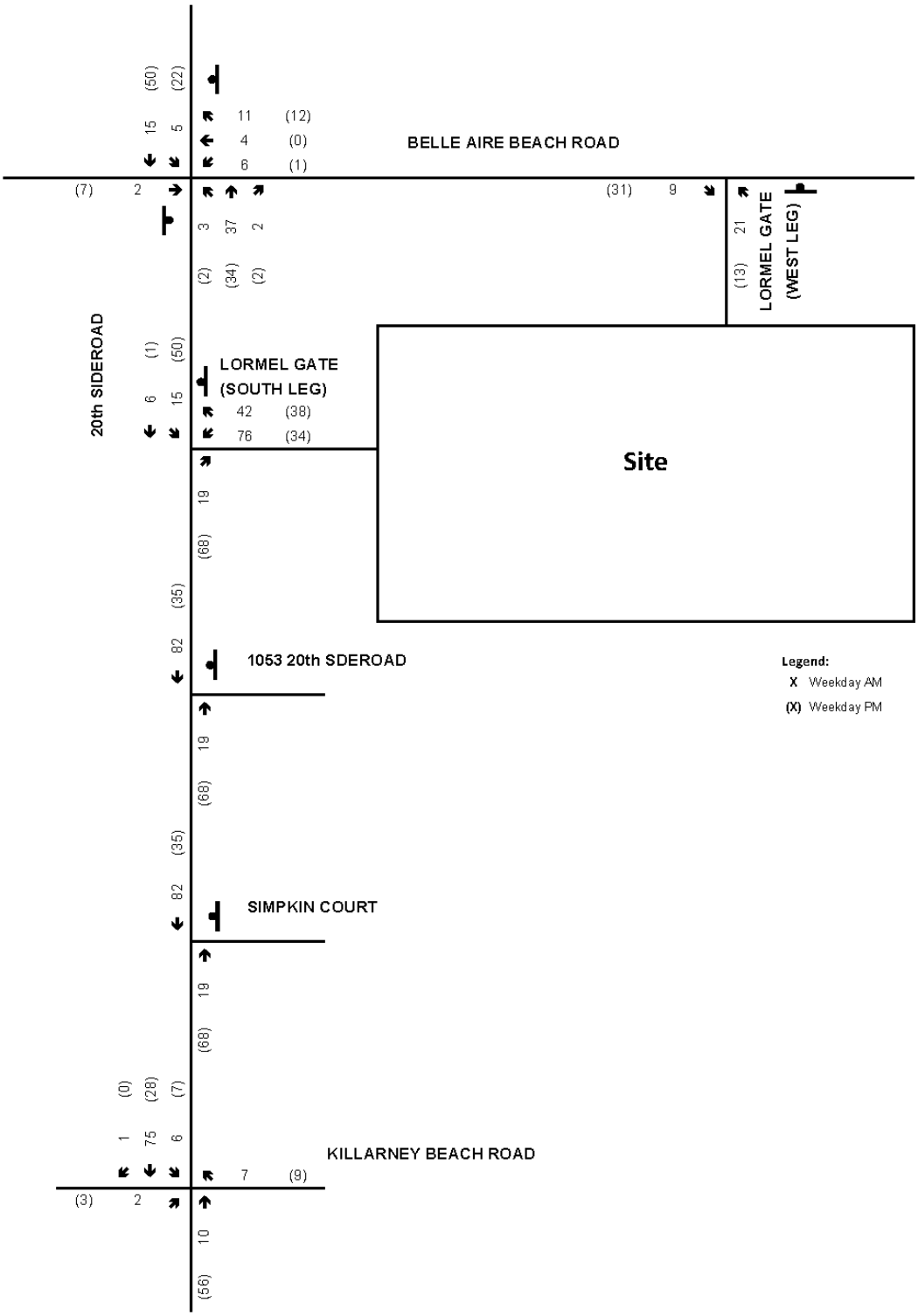


LEGEND

Lefroy Urban Settlement Area boundary

Plan of Sub-division Applications

Figure 2-12 Subject Site Traffic Volumes



Appendix C –
Traffic Volume Figures

FIGURE INDEX:

FIGURE	A	LSAMI Parcel P1 Peak Hour Traffic Volumes within Study Area
FIGURE	B	LSAMI Parcel P2 Peak Hour Traffic Volumes within Study Area
FIGURE	C	LSAMI Parcel P3 Peak Hour Traffic Volumes within Study Area
FIGURE	D	LSAMI Parcel P4 Peak Hour Traffic Volumes within Study Area
FIGURE	E	Alcona Existing and Alcona Expansion Additional Peak Hour Traffic Volumes within Study Area
FIGURE	F	1357 Belle Aire Beach Road Peak Hour Traffic Volumes within Study Area
FIGURE	G	Existing (2017) Peak Hour Traffic Volumes
FIGURE	H	Background (2025) Peak Hour Traffic Volumes
FIGURE	I	Background (2030) Peak Hour Traffic Volumes
FIGURE	J	Site Traffic Assignment
FIGURE	K	Total (2025) Peak Hour Traffic Volumes
FIGURE	L	Total (2030) Peak Hour Traffic Volumes

Figure A - LSAMI Parcel P1 Peak Hour Traffic Volumes within Study Area

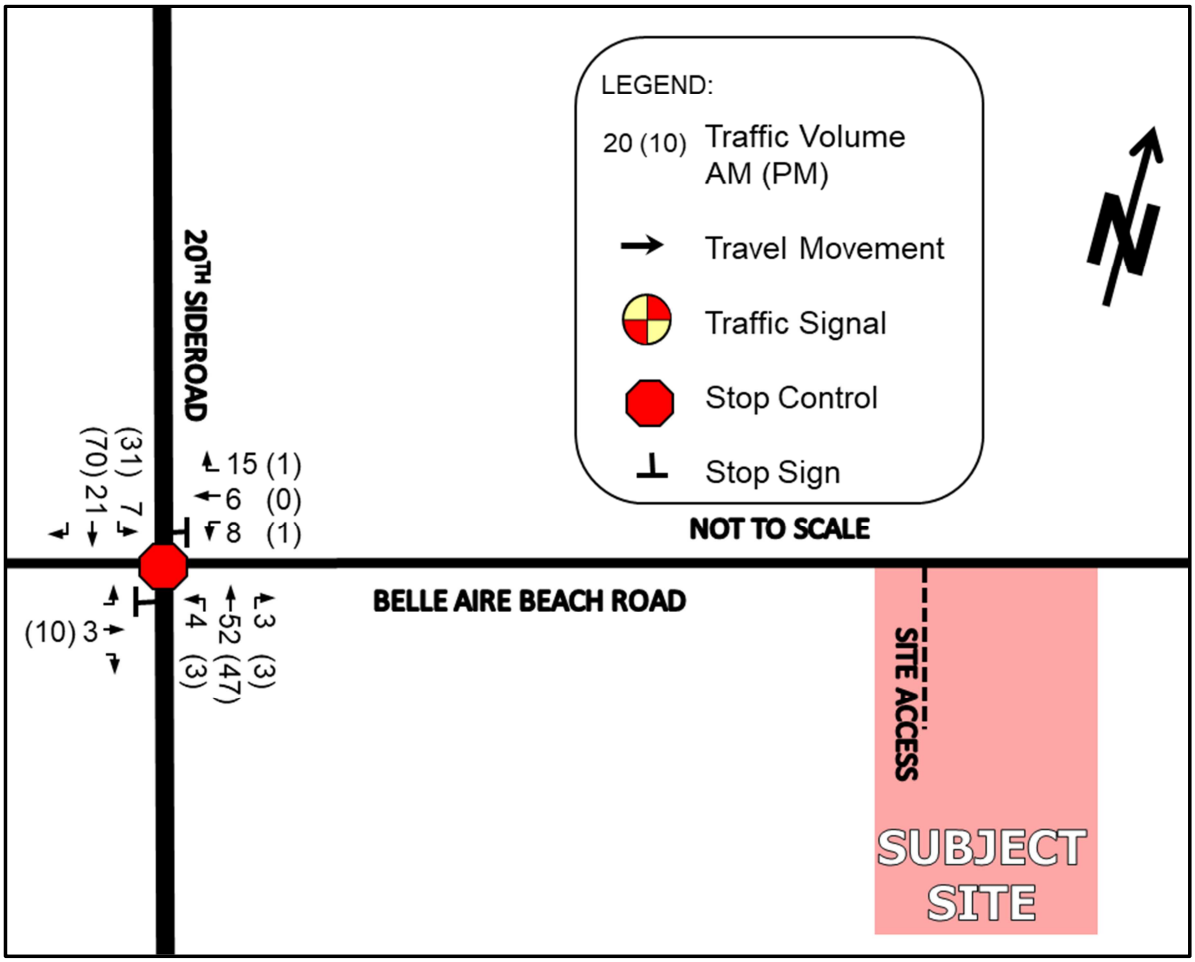


Figure B – LSAMI Parcel P2 Peak Hour Traffic Volumes within Study Area

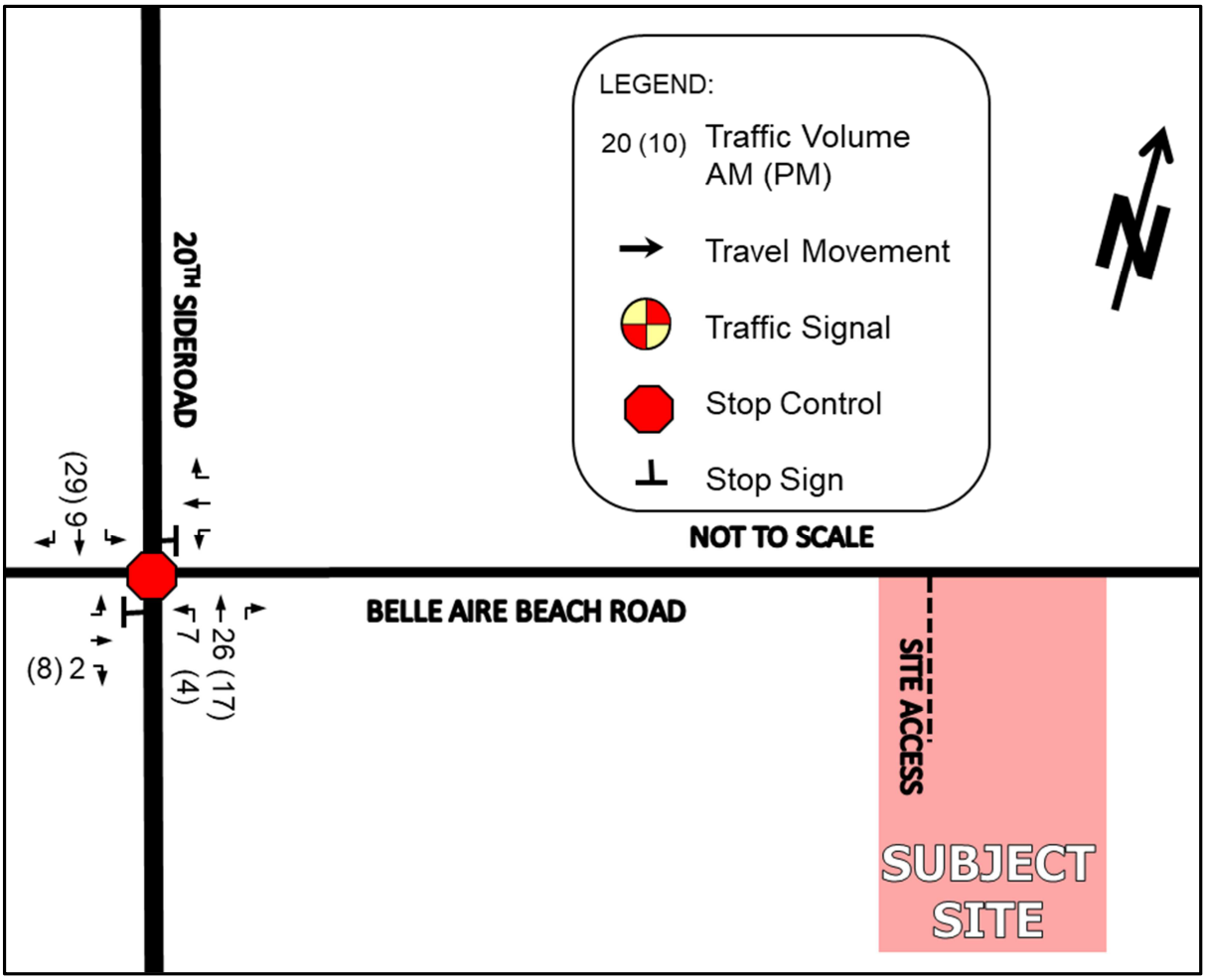


Figure C – LSAMI Parcel P3 Peak Hour Traffic Volumes within Study Area

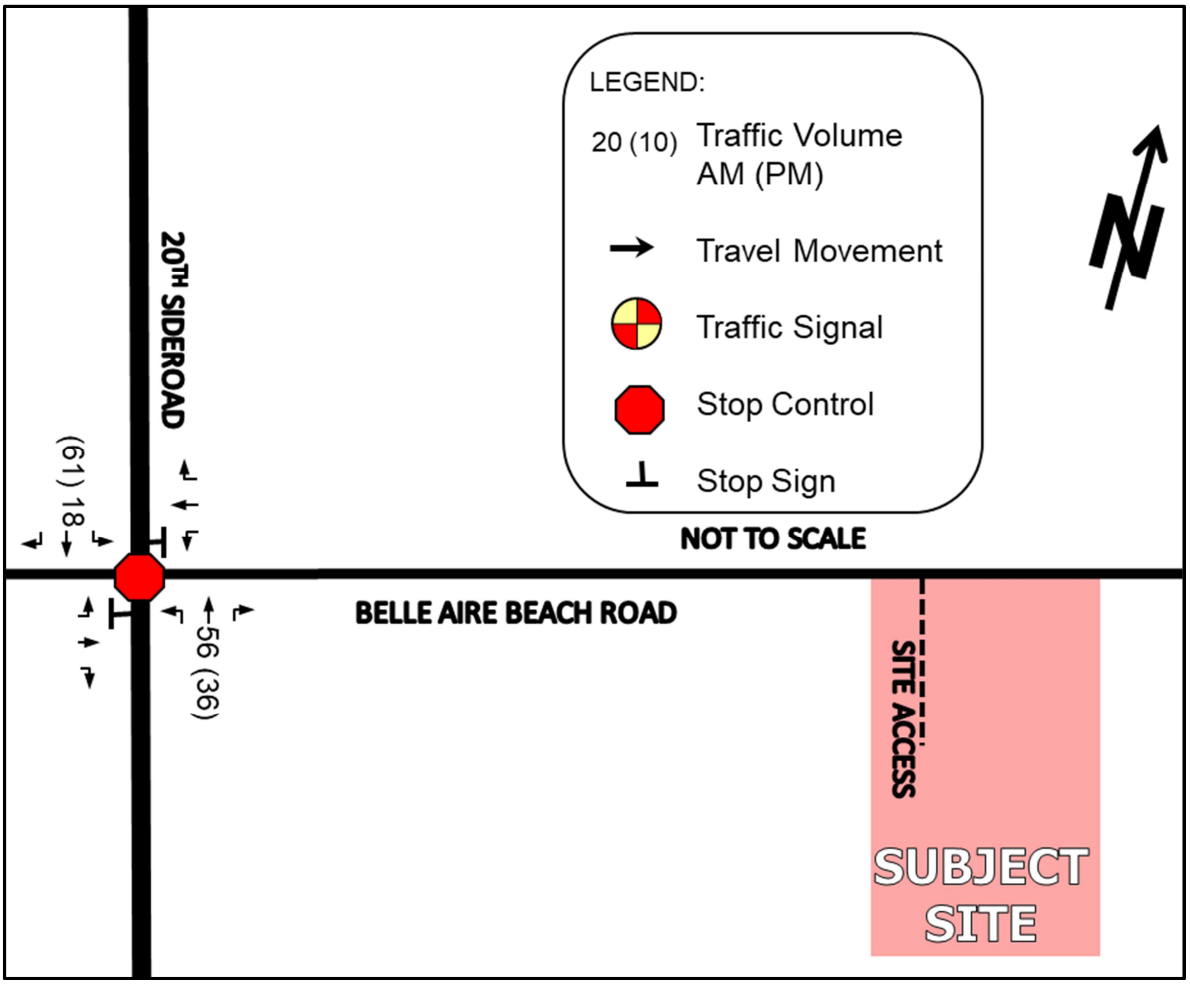


Figure D – LSAMI Parcel P4 Peak Hour Traffic Volumes within Study Area

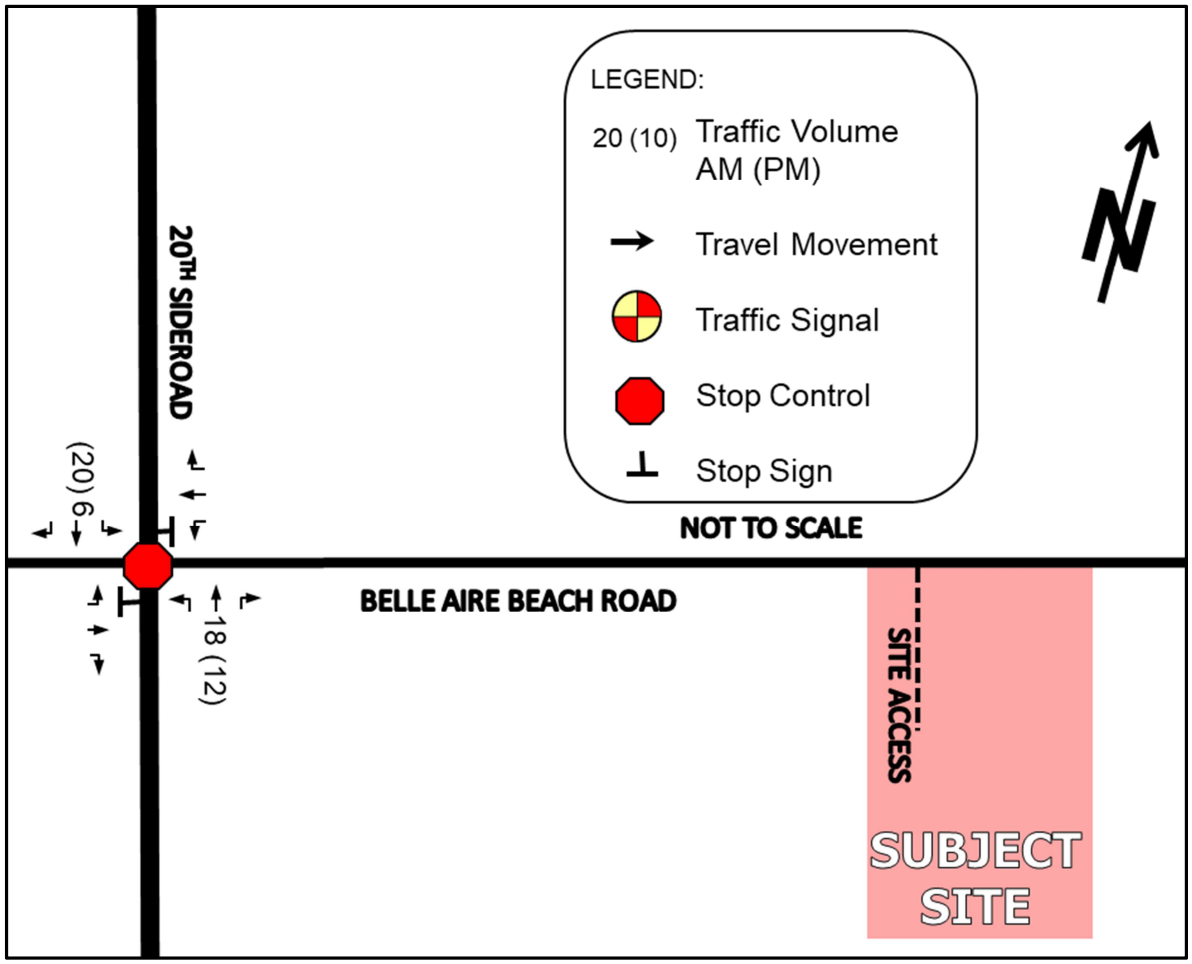


Figure E – Alcona Existing and Alcona Expansion Additional Peak Hour Traffic Volumes within Study Area

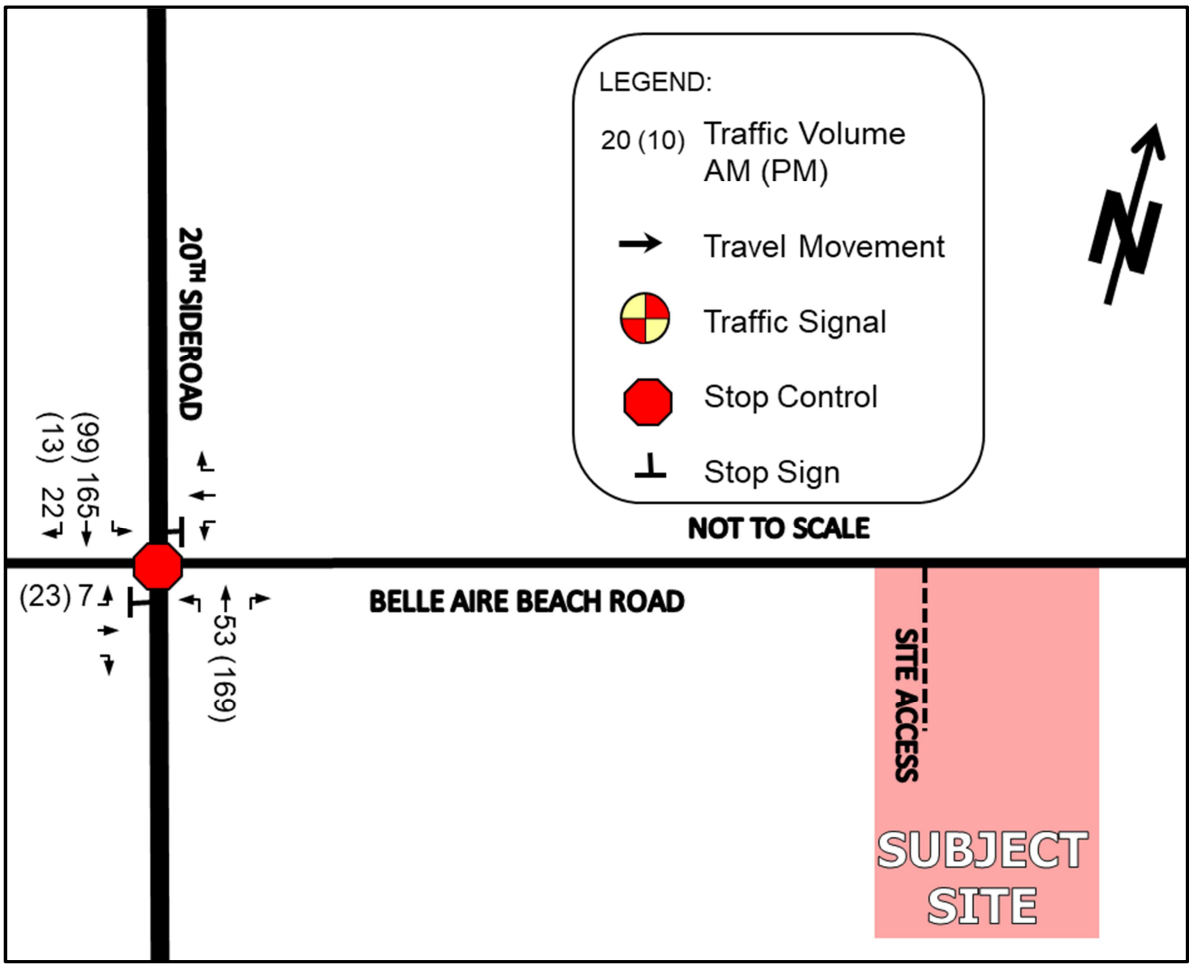


Figure F – 1357 Belle Aire Beach Road Peak Hour Traffic Volumes within Study Area

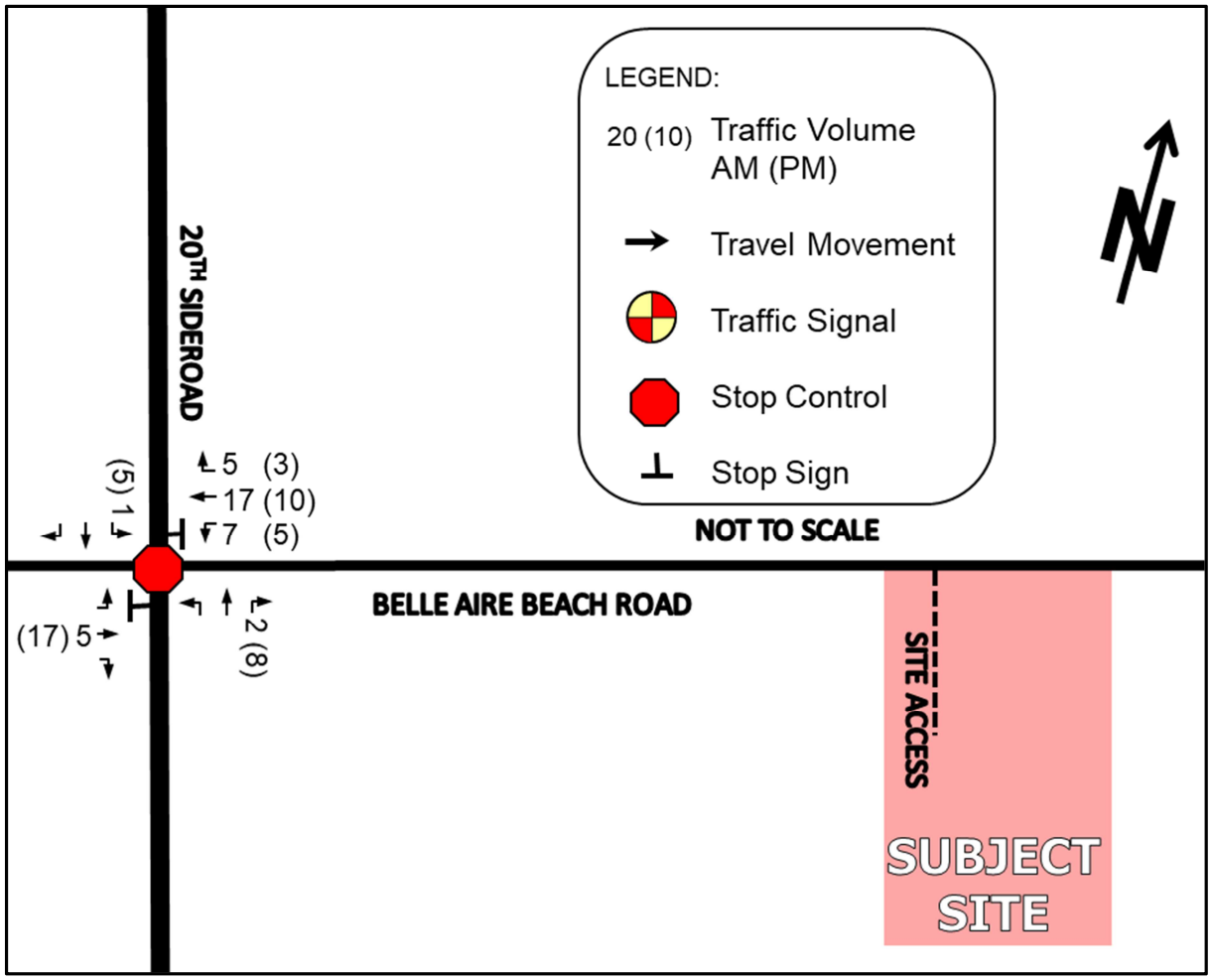


Figure G – Existing (2017) Peak Hour Traffic Volumes

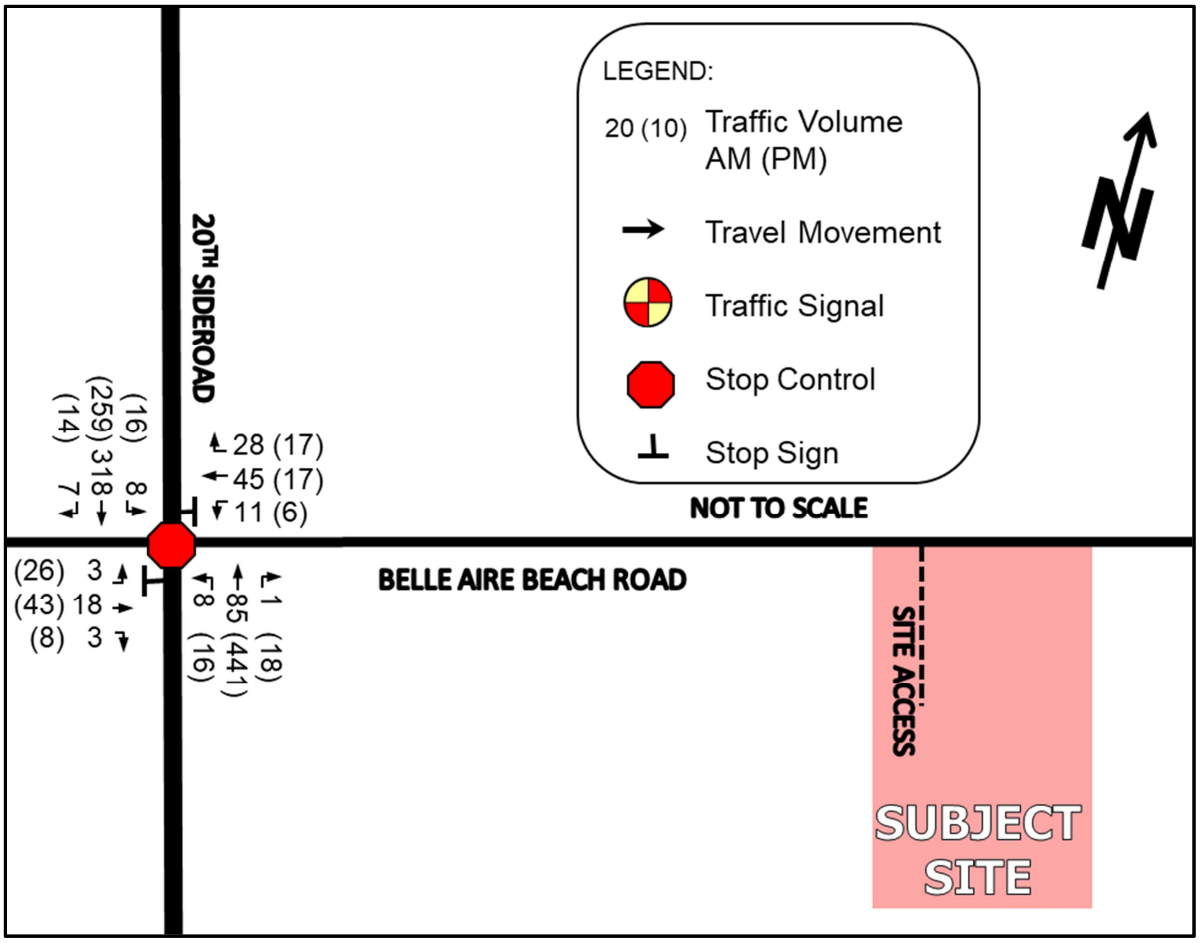


Figure H – Background (2025) Peak Hour Traffic Volumes

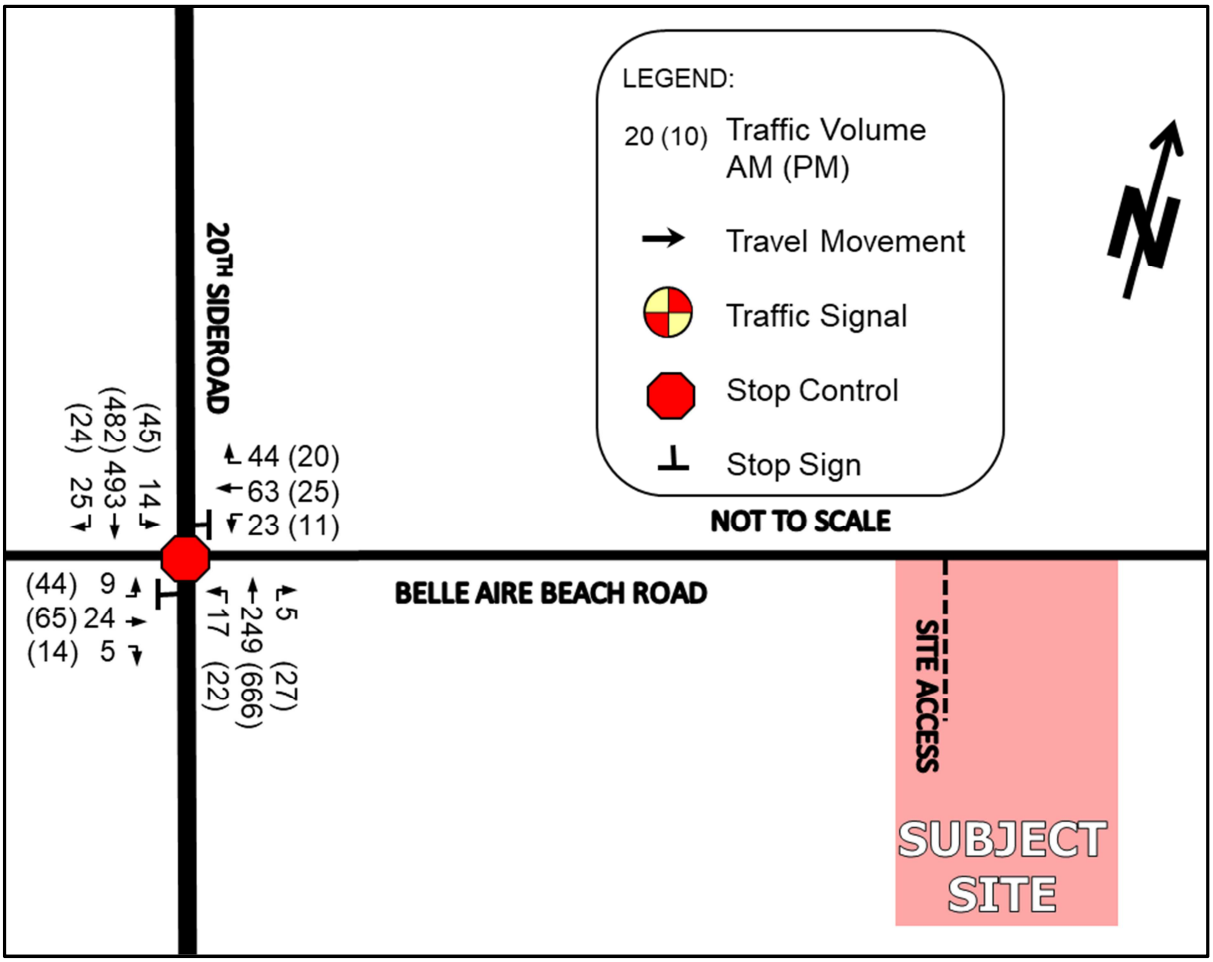


Figure I – Background (2030) Peak Hour Traffic Volumes

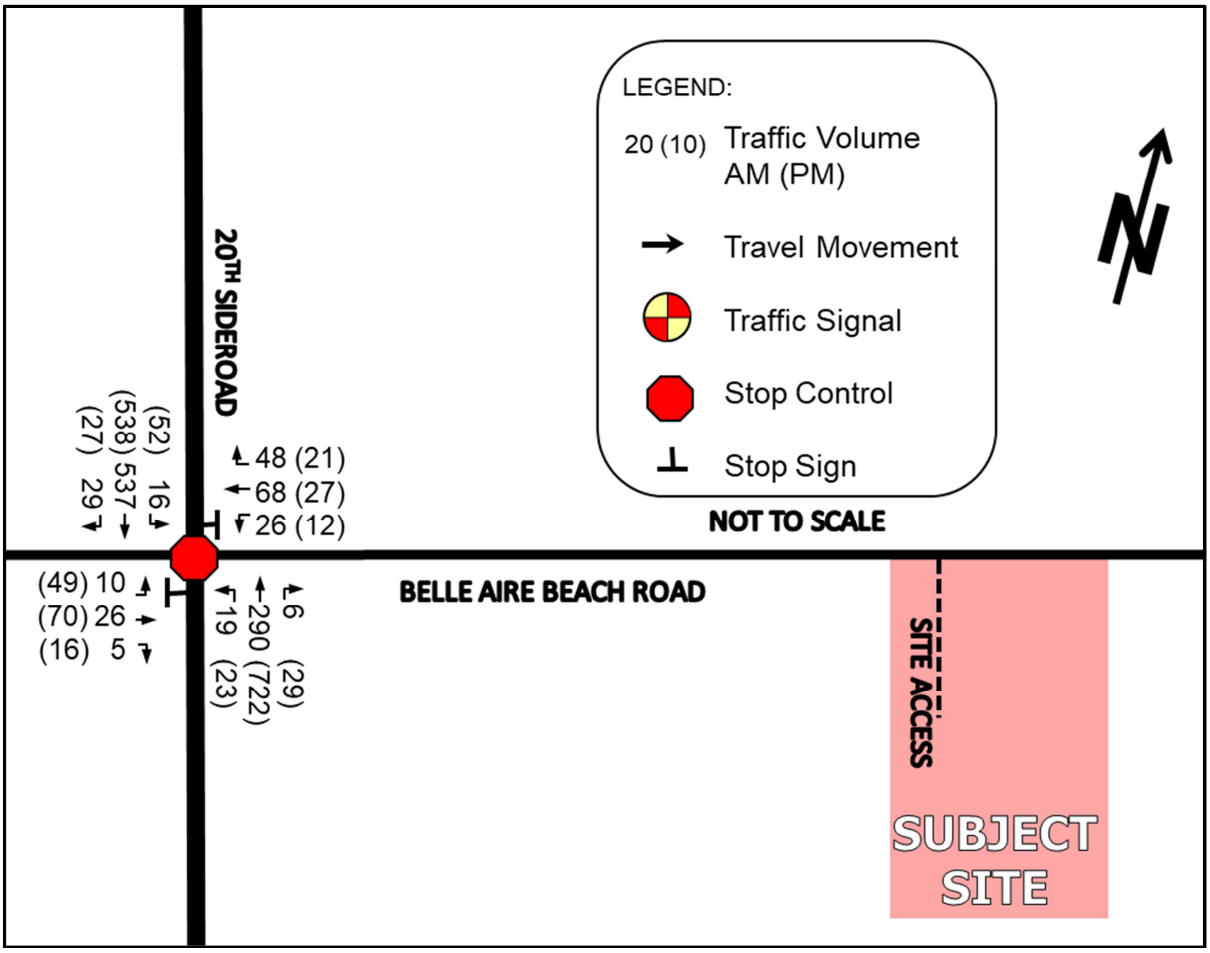


Figure J – Site Traffic Assignment

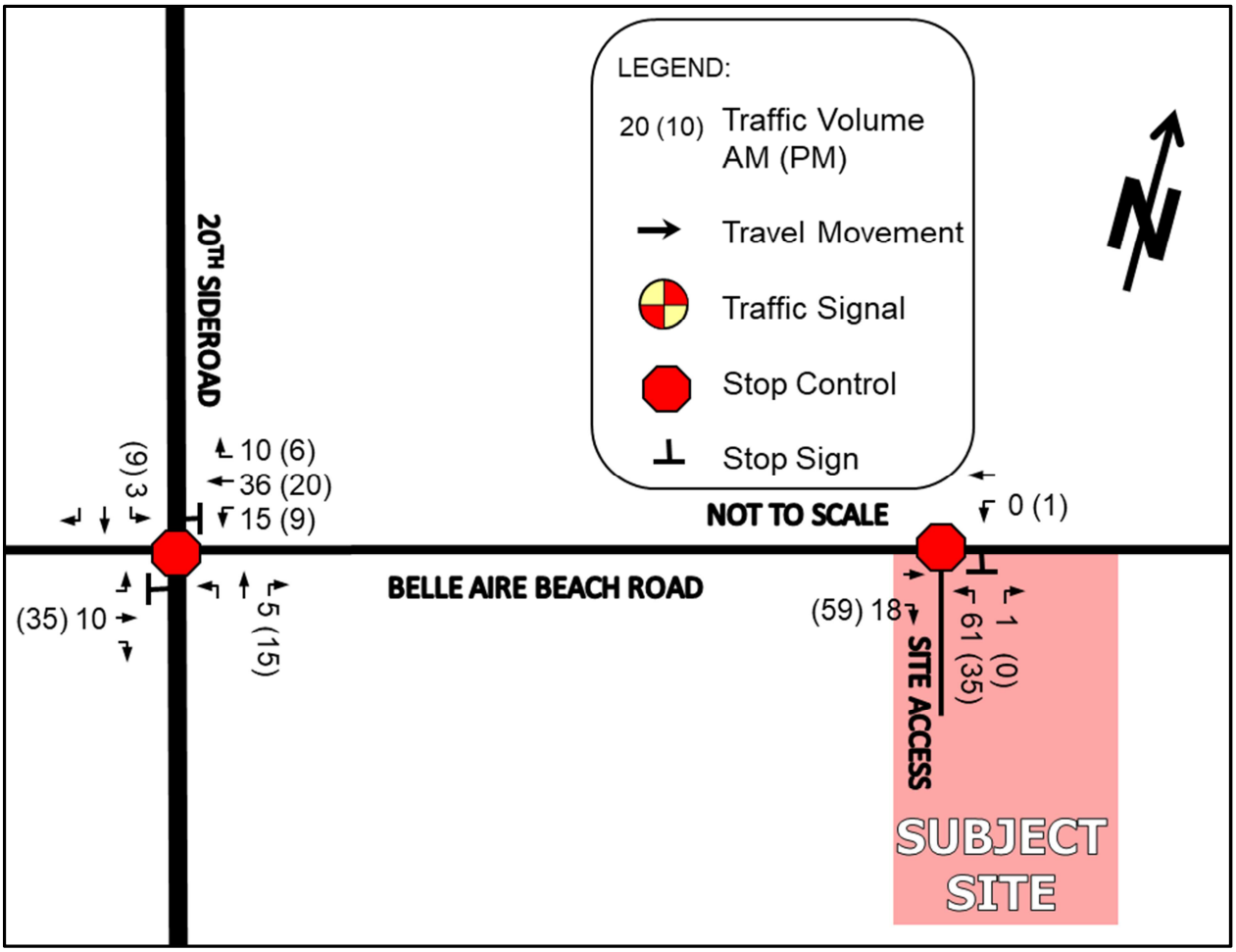


Figure K – Total (2025) Peak Hour Traffic Volumes

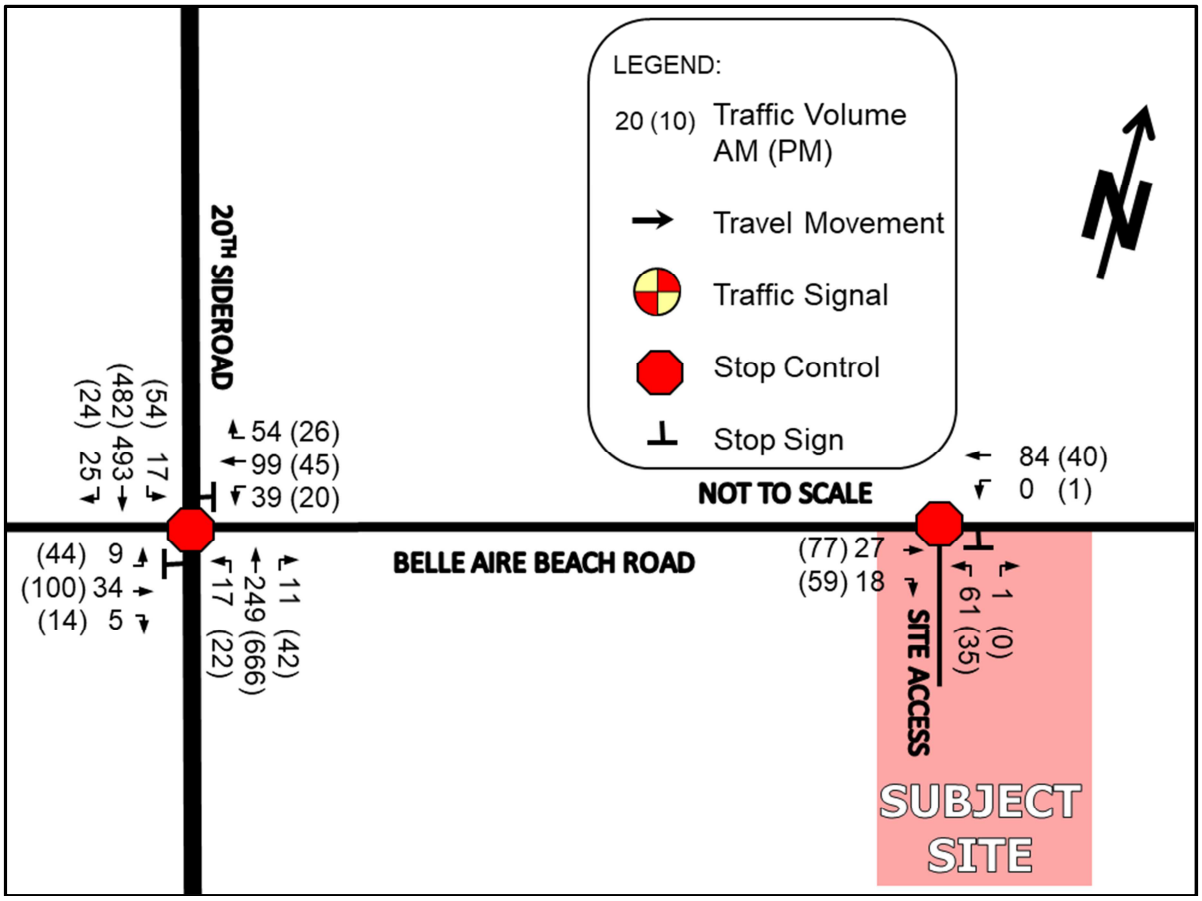
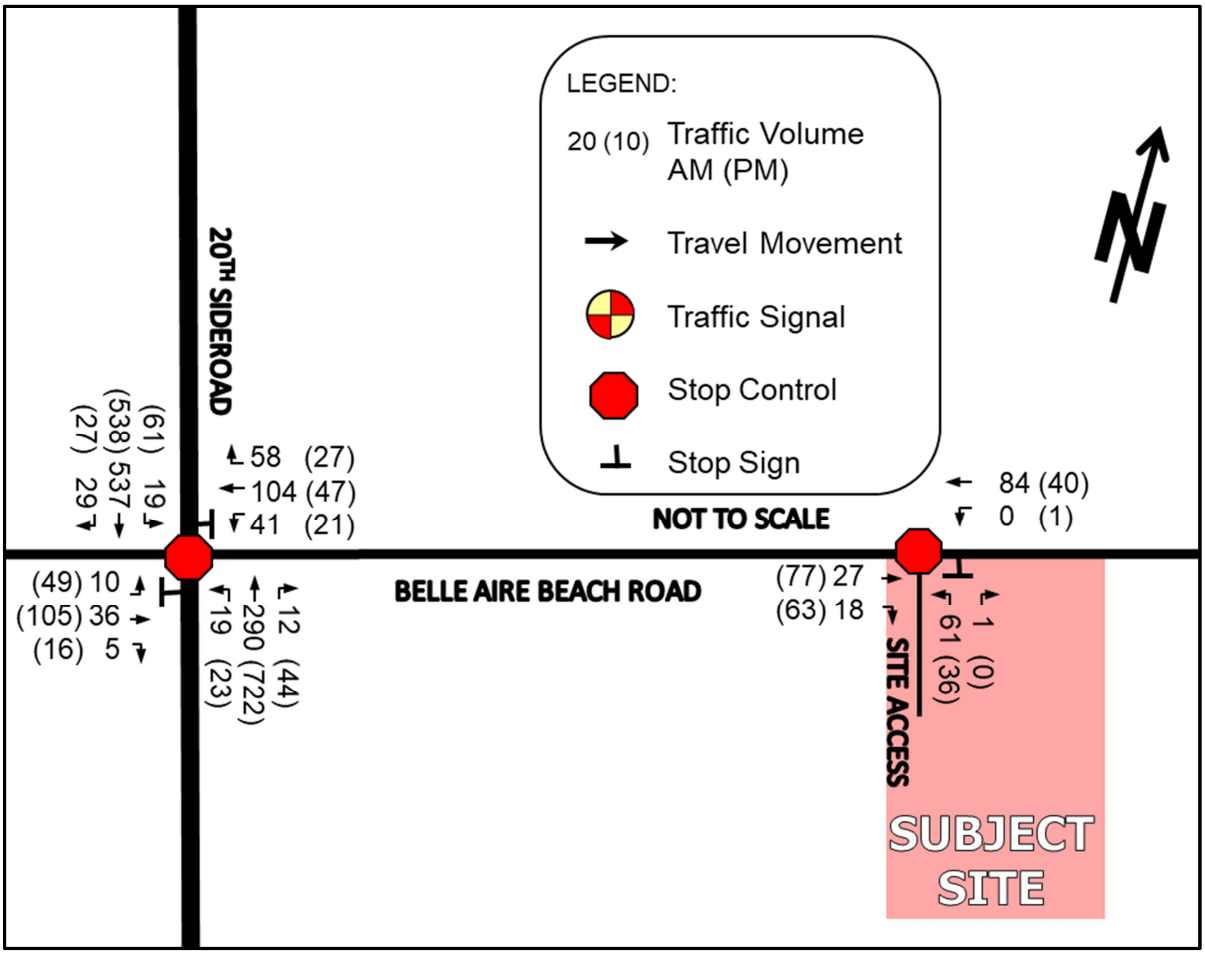


Figure L - Total (2030) Peak Hour Traffic Volumes



Appendix D –
Traffic Count Data

Ontario Traffic Inc.

Morning Peak Diagram

Specified Period
From: 6:00:00
To: 8:00:00

One Hour Peak
From: 7:00:00
To: 8:00:00

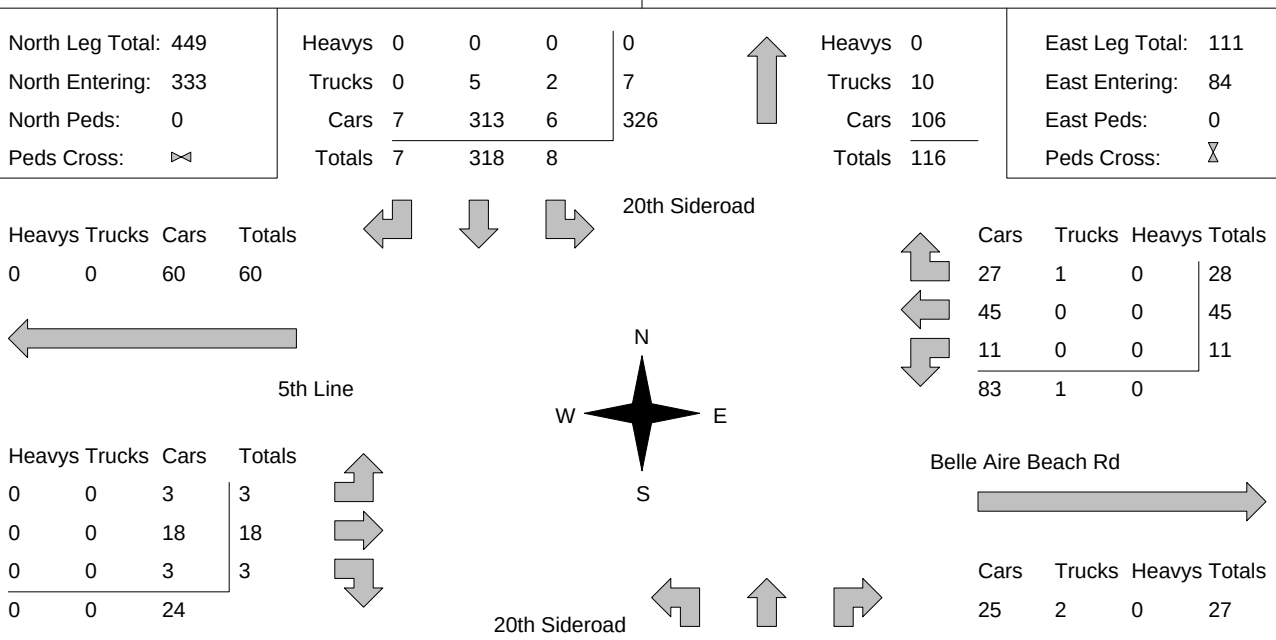
Municipality: Innisfil
Site #: 1732900001
Intersection: 20th Sideroad & Belle Aire Beach F
TFR File #: 3
Count date: 8-Nov-17

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: 20th Sideroad runs N/S



Comments

Ontario Traffic Inc.

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

One Hour Peak
From: 16:30:00
To: 17:30:00

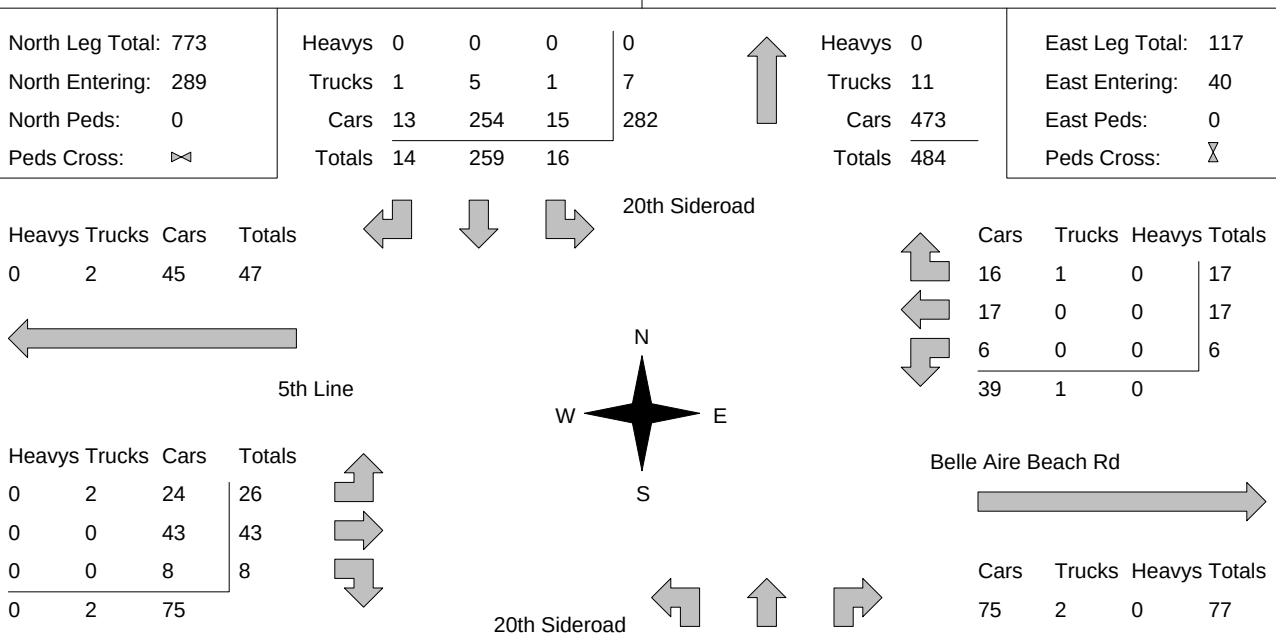
Municipality: Innisfil
Site #: 1732900001
Intersection: 20th Sideroad & Belle Aire Beach F
TFR File #: 3
Count date: 8-Nov-17

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: 20th Sideroad runs N/S



Comments

Ontario Traffic Inc.

Total Count Diagram

Municipality: Innisfil
Site #: 1732900001
Intersection: 20th Sideroad & Belle Aire Beach F
TFR File #: 3
Count date: 8-Nov-17

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: 20th Sideroad runs N/S

North Leg Total: 2895
North Entering: 1383
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0	0
Trucks	1	16	4	21
Cars	49	1271	42	1362
Totals	50	1287	46	

Heavys	0
Trucks	37
Cars	1475
Totals	1512

East Leg Total: 460
East Entering: 247
East Peds: 0
Peds Cross: ⧖

20th Sideroad

Heavys	Trucks	Cars	Totals
0	6	212	218

Cars	Trucks	Heavys	Totals
79	3	0	82
121	2	0	123
42	0	0	42
242	5	0	

5th Line

N
W E
S

Heavys	Trucks	Cars	Totals
0	5	83	88
0	4	112	116
0	1	32	33
0	10	227	

Belle Aire Beach Rd

Cars	Trucks	Heavys	Totals
203	10	0	213

20th Sideroad

Peds Cross: ⧖
West Peds: 0
West Entering: 237
West Leg Total: 455

Cars	1345
Trucks	17
Heavys	0
Totals	1362

Cars	42	1313	49	1404
Trucks	3	29	2	34
Heavys	0	0	0	0
Totals	45	1342	51	

Peds Cross: ⋈
South Peds: 0
South Entering: 1438
South Leg Total: 2800

Comments

Ontario Traffic Inc.
Traffic Count Summary

Intersection: 20th Sideroad & Belle Aire Beach | **Count Date:** 8-Nov-17 | **Municipality:** Innisfil

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	2	308	13	323	0	380
8:00:00	8	318	7	333	0	427
16:00:00	0	1	0	1	0	1
17:00:00	12	246	15	273	0	761
18:00:00	18	232	12	262	0	703
19:00:00	6	182	3	191	0	547
Totals:	46	1287	50	1383	0	2819

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	6	49	2	57	0
8:00:00	8	85	1	94	0
16:00:00	0	0	0	0	0
17:00:00	10	460	18	488	0
18:00:00	12	410	19	441	0
19:00:00	9	336	11	356	0
Totals:	45	1340	51	1436	0

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
6:00:00	0	0	0	0	0	0
7:00:00	16	37	15	68	0	80
8:00:00	11	45	28	84	0	108
16:00:00	0	0	0	0	0	0
17:00:00	8	11	16	35	0	112
18:00:00	5	18	14	37	0	114
19:00:00	2	12	9	23	0	70
Totals:	42	123	82	247	0	484

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys Left	Thru	Right	Grand Total	Total Peds
6:00:00	0	0	0	0	0
7:00:00	3	4	5	12	0
8:00:00	3	18	3	24	0
16:00:00	0	0	0	0	0
17:00:00	22	41	14	77	0
18:00:00	34	37	6	77	0
19:00:00	26	16	5	47	0
Totals:	88	116	33	237	0

Calculated Values for Traffic Crossing Major Street

Hours Ending:	0:00	6:00	7:00	8:00	16:00	17:00	18:00	19:00
Crossing Values:	0	0	56	59	0	71	76	44

Ontario Traffic Inc.

Count Date: 8-Nov-17 Site #: 1732900001

Interval Time	Passenger Cars - North Approach						Trucks - North Approach						Heavys - North Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		North Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
6:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00	1	1	84	84	4	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0
6:30:00	1	0	159	75	6	2	1	0	1	1	0	0	0	0	0	0	0	0	0	0
6:45:00	1	0	230	71	10	4	1	0	1	0	0	0	0	0	0	0	0	0	0	0
7:00:00	1	0	307	77	13	3	1	0	1	0	0	0	0	0	0	0	0	0	0	0
7:15:00	2	1	394	87	14	1	1	0	2	1	0	0	0	0	0	0	0	0	0	0
7:30:00	4	2	462	68	15	1	3	2	3	1	0	0	0	0	0	0	0	0	0	0
7:45:00	5	1	539	77	17	2	3	0	4	1	0	0	0	0	0	0	0	0	0	0
8:00:00	7	2	620	81	20	3	3	0	6	2	0	0	0	0	0	0	0	0	0	0
8:01:02	7	0	621	1	20	0	3	0	6	0	0	0	0	0	0	0	0	0	0	0
16:00:00	7	0	621	0	20	0	3	0	6	0	0	0	0	0	0	0	0	0	0	0
16:15:00	11	4	683	62	26	6	3	0	7	1	0	0	0	0	0	0	0	0	0	0
16:30:00	12	1	732	49	28	2	3	0	8	1	0	0	0	0	0	0	0	0	0	0
16:45:00	14	2	796	64	31	3	3	0	10	2	0	0	0	0	0	0	0	0	0	0
17:00:00	19	5	862	66	34	3	3	0	11	1	1	1	0	0	0	0	0	0	0	0
17:15:00	22	3	918	56	36	2	3	0	12	1	1	0	0	0	0	0	0	0	0	0
17:30:00	27	5	986	68	41	5	4	1	13	1	1	0	0	0	0	0	0	0	0	0
17:45:00	31	4	1039	53	44	3	4	0	13	0	1	0	0	0	0	0	0	0	0	0
18:00:00	36	5	1091	52	46	2	4	0	14	1	1	0	0	0	0	0	0	0	0	0
18:15:00	37	1	1141	50	47	1	4	0	14	0	1	0	0	0	0	0	0	0	0	0
18:30:00	38	1	1188	47	48	1	4	0	15	1	1	0	0	0	0	0	0	0	0	0
18:45:00	40	2	1235	47	49	1	4	0	16	1	1	0	0	0	0	0	0	0	0	0
19:00:00	42	2	1271	36	49	0	4	0	16	0	1	0	0	0	0	0	0	0	0	0
19:01:32	42	0	1271	0	49	0	4	0	16	0	1	0	0	0	0	0	0	0	0	0

Ontario Traffic Inc.

Count Date: 8-Nov-17 Site #: 1732900001

Interval Time	Passenger Cars - East Approach						Trucks - East Approach						Heavys - East Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		East Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
6:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00	5	5	9	9	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30:00	7	2	16	7	8	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45:00	11	4	23	7	12	4	0	0	1	1	0	0	0	0	0	0	0	0	0	0
7:00:00	16	5	35	12	15	3	0	0	2	1	0	0	0	0	0	0	0	0	0	0
7:15:00	17	1	44	9	24	9	0	0	2	0	1	1	0	0	0	0	0	0	0	0
7:30:00	21	4	55	11	28	4	0	0	2	0	1	0	0	0	0	0	0	0	0	0
7:45:00	24	3	66	11	36	8	0	0	2	0	1	0	0	0	0	0	0	0	0	0
8:00:00	27	3	80	14	42	6	0	0	2	0	1	0	0	0	0	0	0	0	0	0
8:01:02	27	0	80	0	42	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0
16:00:00	27	0	80	0	42	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0
16:15:00	32	5	83	3	45	3	0	0	2	0	1	0	0	0	0	0	0	0	0	0
16:30:00	33	1	85	2	48	3	0	0	2	0	2	1	0	0	0	0	0	0	0	0
16:45:00	34	1	88	3	51	3	0	0	2	0	3	1	0	0	0	0	0	0	0	0
17:00:00	35	1	91	3	56	5	0	0	2	0	3	0	0	0	0	0	0	0	0	0
17:15:00	37	2	97	6	60	4	0	0	2	0	3	0	0	0	0	0	0	0	0	0
17:30:00	39	2	102	5	64	4	0	0	2	0	3	0	0	0	0	0	0	0	0	0
17:45:00	39	0	106	4	66	2	0	0	2	0	3	0	0	0	0	0	0	0	0	0
18:00:00	40	1	109	3	70	4	0	0	2	0	3	0	0	0	0	0	0	0	0	0
18:15:00	41	1	112	3	72	2	0	0	2	0	3	0	0	0	0	0	0	0	0	0
18:30:00	41	0	113	1	76	4	0	0	2	0	3	0	0	0	0	0	0	0	0	0
18:45:00	42	1	118	5	78	2	0	0	2	0	3	0	0	0	0	0	0	0	0	0
19:00:00	42	0	121	3	79	1	0	0	2	0	3	0	0	0	0	0	0	0	0	0
19:01:32	42	0	121	0	79	0	0	0	2	0	3	0	0	0	0	0	0	0	0	0

Ontario Traffic Inc.

Count Date: 8-Nov-17 Site #: 1732900001

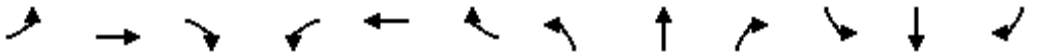
Interval Time	Passenger Cars - South Approach						Trucks - South Approach						Heavys - South Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		South Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
6:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00	3	3	4	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30:00	3	0	13	9	2	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0
6:45:00	3	0	28	15	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
7:00:00	6	3	47	19	2	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0
7:15:00	8	2	66	19	2	0	0	0	4	2	0	0	0	0	0	0	0	0	0	0
7:30:00	8	0	82	16	2	0	0	0	5	1	0	0	0	0	0	0	0	0	0	0
7:45:00	12	4	102	20	2	0	0	0	6	1	0	0	0	0	0	0	0	0	0	0
8:00:00	14	2	123	21	3	1	0	0	11	5	0	0	0	0	0	0	0	0	0	0
8:01:02	14	0	123	0	3	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0
16:00:00	14	0	123	0	3	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0
16:15:00	16	2	239	116	9	6	1	1	13	2	0	0	0	0	0	0	0	0	0	0
16:30:00	16	0	359	120	12	3	1	0	13	0	0	0	0	0	0	0	0	0	0	0
16:45:00	18	2	470	111	17	5	1	0	15	2	1	1	0	0	0	0	0	0	0	0
17:00:00	23	5	578	108	20	3	1	0	16	1	1	0	0	0	0	0	0	0	0	0
17:15:00	25	2	682	104	23	3	2	1	18	2	1	0	0	0	0	0	0	0	0	0
17:30:00	31	6	792	110	29	6	2	0	21	3	1	0	0	0	0	0	0	0	0	0
17:45:00	32	1	889	97	33	4	2	0	21	0	1	0	0	0	0	0	0	0	0	0
18:00:00	34	2	981	92	38	5	2	0	23	2	2	1	0	0	0	0	0	0	0	0
18:15:00	35	1	1068	87	41	3	2	0	25	2	2	0	0	0	0	0	0	0	0	0
18:30:00	36	1	1154	86	44	3	2	0	26	1	2	0	0	0	0	0	0	0	0	0
18:45:00	41	5	1236	82	45	1	3	1	27	1	2	0	0	0	0	0	0	0	0	0
19:00:00	42	1	1311	75	49	4	3	0	29	2	2	0	0	0	0	0	0	0	0	0
19:01:32	42	0	1313	2	49	0	3	0	29	0	2	0	0	0	0	0	0	0	0	0

Ontario Traffic Inc.

Count Date: 8-Nov-17 Site #: 1732900001

Interval Time	Passenger Cars - West Approach						Trucks - West Approach						Heavys - West Approach						Pedestrians	
	Left		Thru		Right		Left		Thru		Right		Left		Thru		Right		West Cross	
	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr	Cum	Incr
6:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:15:00	2	2	1	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30:00	3	1	2	1	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45:00	3	0	3	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00:00	3	0	4	1	4	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0
7:15:00	3	0	7	3	4	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7:30:00	4	1	13	6	5	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
7:45:00	4	0	18	5	6	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
8:00:00	6	2	22	4	7	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
8:01:02	6	0	22	0	7	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
16:00:00	6	0	22	0	7	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
16:15:00	12	6	26	4	11	4	0	0	0	0	1	0	0	0	0	0	0	0	0	0
16:30:00	17	5	40	14	16	5	0	0	1	1	1	0	0	0	0	0	0	0	0	0
16:45:00	24	7	50	10	18	2	0	0	1	0	1	0	0	0	0	0	0	0	0	0
17:00:00	28	4	62	12	21	3	0	0	1	0	1	0	0	0	0	0	0	0	0	0
17:15:00	34	6	75	13	23	2	1	1	1	0	1	0	0	0	0	0	0	0	0	0
17:30:00	41	7	83	8	24	1	2	1	1	0	1	0	0	0	0	0	0	0	0	0
17:45:00	53	12	91	8	25	1	3	1	2	1	1	0	0	0	0	0	0	0	0	0
18:00:00	59	6	98	7	27	2	3	0	2	0	1	0	0	0	0	0	0	0	0	0
18:15:00	66	7	104	6	29	2	4	1	2	0	1	0	0	0	0	0	0	0	0	0
18:30:00	73	7	107	3	30	1	4	0	3	1	1	0	0	0	0	0	0	0	0	0
18:45:00	77	4	110	3	32	2	5	1	3	0	1	0	0	0	0	0	0	0	0	0
19:00:00	83	6	112	2	32	0	5	0	4	1	1	0	0	0	0	0	0	0	0	0
19:01:32	83	0	112	0	32	0	5	0	4	0	1	0	0	0	0	0	0	0	0	0

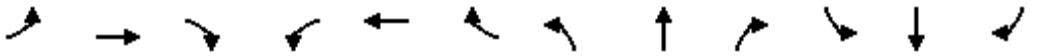
Appendix E –
Synchro Analysis Output –
Existing Traffic Volumes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	3	18	3	11	45	28	8	85	1	8	318	7
Future Volume (Veh/h)	3	18	3	11	45	28	8	85	1	8	318	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	3	20	3	12	49	31	9	93	1	9	349	8
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	538	483	353	491	486	93	357			94		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	538	483	353	491	486	93	357			94		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.3		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.4		
p0 queue free %	99	96	100	97	90	97	99			99		
cM capacity (veh/h)	404	479	695	468	478	959	1213			1368		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	26	92	9	93	1	9	357
Volume Left	3	12	9	0	0	9	0
Volume Right	3	31	0	0	1	0	8
cSH	486	573	1213	1700	1700	1368	1700
Volume to Capacity	0.05	0.16	0.01	0.05	0.00	0.01	0.21
Queue Length 95th (m)	1.4	4.5	0.2	0.0	0.0	0.2	0.0
Control Delay (s)	12.8	12.5	8.0	0.0	0.0	7.6	0.0
Lane LOS	B	B	A			A	
Approach Delay (s)	12.8	12.5	0.7			0.2	
Approach LOS	B	B					

Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	30.2%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	43	8	6	17	17	16	441	18	16	259	14
Future Volume (Veh/h)	26	43	8	6	17	17	16	441	18	16	259	14
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	27	45	8	6	18	18	17	464	19	17	273	15
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	840	832	280	836	820	464	288			483		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	840	832	280	836	820	464	288			483		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.3	4.2			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.4	2.3			2.3		
p0 queue free %	89	85	99	98	94	97	99			98		
cM capacity (veh/h)	252	298	763	247	303	590	1251			1059		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	80	42	17	464	19	17	288
Volume Left	27	6	17	0	0	17	0
Volume Right	8	18	0	0	19	0	15
cSH	298	368	1251	1700	1700	1059	1700
Volume to Capacity	0.27	0.11	0.01	0.27	0.01	0.02	0.17
Queue Length 95th (m)	8.5	3.1	0.3	0.0	0.0	0.4	0.0
Control Delay (s)	21.5	16.0	7.9	0.0	0.0	8.5	0.0
Lane LOS	C	C	A			A	
Approach Delay (s)	21.5	16.0	0.3			0.5	
Approach LOS	C	C					

Intersection Summary				
Average Delay	2.9			
Intersection Capacity Utilization	38.0%	ICU Level of Service		A
Analysis Period (min)	15			

Appendix F –
OTM Signal Justification Sheets

Justification No. 7 - 2030 Total Traffic (Critical Case)

20th Sideroad / Belle Aire Beach Road

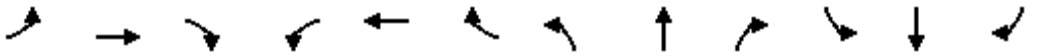
Justification	Description		Compliance			Signal Warrant	Underground Provisions Warrant
			Sectional		Entire %		
		Free Flow	Numerical	%			
1. Minimum Vehicluar Volume	A. Vehicle volume, all aproaches (average hour)	480	710	148%	90%	YES	YES
	B. Vehicle volume, along minor streets (average hour)	120	130	108%		NO	YES
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	480	552	115%	96%	NO	YES
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	68	136%		YES	YES

Justification No. 7 - 2030 Total Traffic (Critical Case)

Site Access / Belle Aire Beach Road

Justification	Description		Compliance			Signal Warrant	Underground Provisions Warrant
			Sectional		Entire %		
		Free Flow	Numerical	%			
1. Minimum Vehicluar Volume	A. Vehicle volume, all aproaches (average hour)	480	101	21%	9%	NO	NO
	B. Vehicle volume, along minor streets (average hour)	180	24	13%		NO	NO
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	480	57	12%	8%	NO	NO
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	24	48%		NO	NO

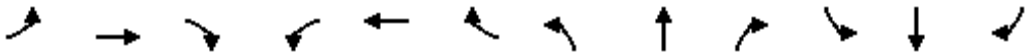
Appendix G –
Synchro Analysis Output –
Background Traffic Volumes



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	9	24	5	23	63	44	17	249	5	14	493	25
Future Volume (Veh/h)	9	24	5	23	63	44	17	249	5	14	493	25
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	10	26	5	25	69	48	19	274	5	15	542	27
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	980	902	556	902	911	274	569			279		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	980	902	556	902	911	274	569			279		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.3		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.4		
p0 queue free %	94	90	99	89	74	94	98			99		
cM capacity (veh/h)	169	271	535	234	268	760	1013			1162		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	41	142	19	274	5	15	569
Volume Left	10	25	19	0	0	15	0
Volume Right	5	48	0	0	5	0	27
cSH	249	332	1013	1700	1700	1162	1700
Volume to Capacity	0.16	0.43	0.02	0.16	0.00	0.01	0.33
Queue Length 95th (m)	4.6	16.5	0.5	0.0	0.0	0.3	0.0
Control Delay (s)	22.3	23.7	8.6	0.0	0.0	8.1	0.0
Lane LOS	C	C	A			A	
Approach Delay (s)	22.3	23.7	0.5			0.2	
Approach LOS	C	C					

Intersection Summary				
Average Delay	4.3			
Intersection Capacity Utilization	43.1%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	65	14	11	25	20	22	666	27	45	482	24
Future Volume (Veh/h)	44	65	14	11	25	20	22	666	27	45	482	24
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	46	68	15	12	26	21	23	701	28	47	507	25
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1394	1388	520	1397	1373	701	532			729		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1394	1388	520	1397	1373	701	532			729		
tC, single (s)	7.2	6.5	6.2	7.1	6.5	6.3	4.2			4.2		
tC, 2 stage (s)												
tF (s)	3.6	4.0	3.3	3.5	4.0	3.4	2.3			2.3		
p0 queue free %	48	49	97	82	81	95	98			95		
cM capacity (veh/h)	88	133	560	66	136	432	1016			857		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	129	59	23	701	28	47	532
Volume Left	46	12	23	0	0	47	0
Volume Right	15	21	0	0	28	0	25
cSH	122	140	1016	1700	1700	857	1700
Volume to Capacity	1.06	0.42	0.02	0.41	0.02	0.05	0.31
Queue Length 95th (m)	59.4	14.8	0.6	0.0	0.0	1.4	0.0
Control Delay (s)	167.3	48.4	8.6	0.0	0.0	9.4	0.0
Lane LOS	F	E	A			A	
Approach Delay (s)	167.3	48.4	0.3			0.8	
Approach LOS	F	E					

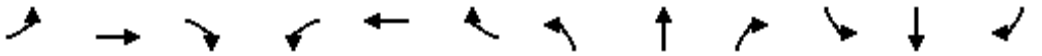
Intersection Summary				
Average Delay	16.5			
Intersection Capacity Utilization	55.8%	ICU Level of Service	B	
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	9	24	23	63	17	249	5	14	493
Future Volume (vph)	9	24	23	63	17	249	5	14	493
Lane Group Flow (vph)	0	41	0	142	19	274	5	15	569
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		4		8		2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	2	2	2	6	6
Switch Phase									
Minimum Initial (s)	23.0	23.0	23.0	23.0	19.0	19.0	19.0	19.0	19.0
Minimum Split (s)	29.0	29.0	29.0	29.0	25.0	25.0	25.0	25.0	25.0
Total Split (s)	29.0	29.0	29.0	29.0	41.0	41.0	41.0	41.0	41.0
Total Split (%)	41.4%	41.4%	41.4%	41.4%	58.6%	58.6%	58.6%	58.6%	58.6%
Yellow Time (s)	4.0	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	2.0
Lost Time Adjust (s)		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
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
v/c Ratio		0.07		0.24	0.04	0.26	0.00	0.03	0.50
Control Delay		15.6		14.6	9.5	10.4	0.0	9.2	13.1
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		15.6		14.6	9.5	10.4	0.0	9.2	13.1
Queue Length 50th (m)		3.5		10.5	1.3	21.0	0.0	1.0	52.4
Queue Length 95th (m)		9.7		22.6	4.5	36.1	0.0	3.8	83.3
Internal Link Dist (m)		311.9		827.8		443.9			552.9
Turn Bay Length (m)					110.0		110.0	40.0	
Base Capacity (vph)		581		591	429	1053	1012	553	1141
Starvation Cap Reductn		0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0	0
Reduced v/c Ratio		0.07		0.24	0.04	0.26	0.00	0.03	0.50

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 69.6
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 1: 20th Sideroad & 5th Line



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	24	5	23	63	44	17	249	5	14	493	25
Future Volume (vph)	9	24	5	23	63	44	17	249	5	14	493	25
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	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.98			0.95		1.00	1.00	0.85	1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1846			1773		1805	1712	1615	1444	1851	
Flt Permitted		0.92			0.95		0.37	1.00	1.00	0.59	1.00	
Satd. Flow (perm)		1724			1691		697	1712	1615	898	1851	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	10	26	5	25	69	48	19	274	5	15	542	27
RTOR Reduction (vph)	0	4	0	0	29	0	0	0	2	0	2	0
Lane Group Flow (vph)	0	37	0	0	113	0	19	274	3	15	567	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	4%	0%	11%	0%	25%	2%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		17.6			17.6		41.4	41.4	41.4	41.4	41.4	
Effective Green, g (s)		17.6			17.6		41.4	41.4	41.4	41.4	41.4	
Actuated g/C Ratio		0.25			0.25		0.58	0.58	0.58	0.58	0.58	
Clearance Time (s)		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	
Lane Grp Cap (vph)		427			419		406	998	941	523	1079	
v/s Ratio Prot								0.16			c0.31	
v/s Ratio Perm		0.02			c0.07		0.03		0.00	0.02		
v/c Ratio		0.09			0.27		0.05	0.27	0.00	0.03	0.53	
Uniform Delay, d1		20.5			21.5		6.3	7.3	6.2	6.3	8.9	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.1			0.3		0.2	0.7	0.0	0.1	1.8	
Delay (s)		20.6			21.9		6.6	8.0	6.2	6.4	10.7	
Level of Service		C			C		A	A	A	A	B	
Approach Delay (s)		20.6			21.9			7.9			10.6	
Approach LOS		C			C			A			B	

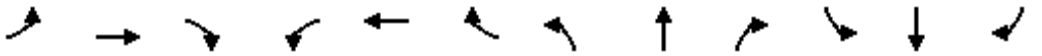
Intersection Summary			
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	71.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	44	65	11	25	22	666	27	45	482
Future Volume (vph)	44	65	11	25	22	666	27	45	482
Lane Group Flow (vph)	0	129	0	59	23	701	28	47	532
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		4		8		2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	2	2	2	6	6
Switch Phase									
Minimum Initial (s)	23.0	23.0	23.0	23.0	19.0	19.0	19.0	19.0	19.0
Minimum Split (s)	29.0	29.0	29.0	29.0	25.0	25.0	25.0	25.0	25.0
Total Split (s)	29.0	29.0	29.0	29.0	41.0	41.0	41.0	41.0	41.0
Total Split (%)	41.4%	41.4%	41.4%	41.4%	58.6%	58.6%	58.6%	58.6%	58.6%
Yellow Time (s)	4.0	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	2.0
Lost Time Adjust (s)		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
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
v/c Ratio		0.24		0.10	0.05	0.61	0.03	0.16	0.47
Control Delay		18.0		12.7	9.5	15.6	1.8	11.4	12.6
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		18.0		12.7	9.5	15.6	1.8	11.4	12.6
Queue Length 50th (m)		12.2		3.7	1.5	72.5	0.0	3.4	47.7
Queue Length 95th (m)		24.2		11.2	5.2	115.2	2.3	9.7	76.3
Internal Link Dist (m)		311.9		827.8		443.9			552.9
Turn Bay Length (m)					110.0		110.0	40.0	
Base Capacity (vph)		538		567	434	1145	955	301	1136
Starvation Cap Reductn		0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0	0
Reduced v/c Ratio		0.24		0.10	0.05	0.61	0.03	0.16	0.47

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 69.5
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 1: 20th Sideroad & 5th Line



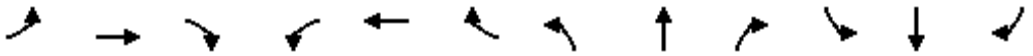
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	65	14	11	25	20	22	666	27	45	482	24
Future Volume (vph)	44	65	14	11	25	20	22	666	27	45	482	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0	6.0	6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.98			0.95		1.00	1.00	0.85	1.00	0.99	
Flt Protected		0.98			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1786			1753		1703	1863	1524	1703	1845	
Flt Permitted		0.87			0.93		0.39	1.00	1.00	0.27	1.00	
Satd. Flow (perm)		1587			1653		705	1863	1524	491	1845	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	46	68	15	12	26	21	23	701	28	47	507	25
RTOR Reduction (vph)	0	8	0	0	16	0	0	0	12	0	2	0
Lane Group Flow (vph)	0	121	0	0	43	0	23	701	16	47	530	0
Heavy Vehicles (%)	8%	0%	0%	0%	0%	6%	6%	2%	6%	6%	2%	7%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		17.6			17.6		41.2	41.2	41.2	41.2	41.2	
Effective Green, g (s)		17.6			17.6		41.2	41.2	41.2	41.2	41.2	
Actuated g/C Ratio		0.25			0.25		0.58	0.58	0.58	0.58	0.58	
Clearance Time (s)		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	
Lane Grp Cap (vph)		394			410		410	1084	886	285	1073	
v/s Ratio Prot								c0.38			0.29	
v/s Ratio Perm		c0.08			0.03		0.03		0.01	0.10		
v/c Ratio		0.31			0.11		0.06	0.65	0.02	0.16	0.49	
Uniform Delay, d1		21.6			20.5		6.4	9.9	6.3	6.8	8.7	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.4			0.1		0.3	3.0	0.0	1.2	1.6	
Delay (s)		22.1			20.6		6.7	12.9	6.3	8.1	10.3	
Level of Service		C			C		A	B	A	A	B	
Approach Delay (s)		22.1			20.6			12.5			10.1	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	70.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	10	26	26	68	19	290	6	16	537
Future Volume (vph)	10	26	26	68	19	290	6	16	537
Lane Group Flow (vph)	0	45	0	157	21	319	7	18	622
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		4		8		2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	2	2	2	6	6
Switch Phase									
Minimum Initial (s)	23.0	23.0	23.0	23.0	19.0	19.0	19.0	19.0	19.0
Minimum Split (s)	29.0	29.0	29.0	29.0	25.0	25.0	25.0	25.0	25.0
Total Split (s)	29.0	29.0	29.0	29.0	41.0	41.0	41.0	41.0	41.0
Total Split (%)	41.4%	41.4%	41.4%	41.4%	58.6%	58.6%	58.6%	58.6%	58.6%
Yellow Time (s)	4.0	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	2.0
Lost Time Adjust (s)		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
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
v/c Ratio		0.08		0.26	0.06	0.31	0.01	0.03	0.55
Control Delay		15.7		14.9	9.7	10.9	0.0	9.3	14.1
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		15.7		14.9	9.7	10.9	0.0	9.3	14.1
Queue Length 50th (m)		3.8		11.8	1.4	25.3	0.0	1.2	59.7
Queue Length 95th (m)		10.4		25.1	4.9	42.7	0.0	4.3	95.0
Internal Link Dist (m)		311.9		827.8		443.9			552.9
Turn Bay Length (m)					110.0		110.0	40.0	
Base Capacity (vph)		583		593	379	1045	1004	521	1132
Starvation Cap Reductn		0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0	0
Reduced v/c Ratio		0.08		0.26	0.06	0.31	0.01	0.03	0.55

Intersection Summary
Cycle Length: 70
Actuated Cycle Length: 68.9
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 1: 20th Sideroad & 5th Line



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	26	5	26	68	48	19	290	6	16	537	29
Future Volume (vph)	10	26	5	26	68	48	19	290	6	16	537	29
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	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.98			0.95		1.00	1.00	0.85	1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1849			1773		1805	1712	1615	1444	1850	
Flt Permitted		0.92			0.94		0.33	1.00	1.00	0.56	1.00	
Satd. Flow (perm)		1718			1682		622	1712	1615	854	1850	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	11	29	5	29	75	53	21	319	7	18	590	32
RTOR Reduction (vph)	0	4	0	0	29	0	0	0	3	0	3	0
Lane Group Flow (vph)	0	41	0	0	128	0	21	319	4	18	619	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	4%	0%	11%	0%	25%	2%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		17.6			17.6		40.6	40.6	40.6	40.6	40.6	
Effective Green, g (s)		17.6			17.6		40.6	40.6	40.6	40.6	40.6	
Actuated g/C Ratio		0.25			0.25		0.58	0.58	0.58	0.58	0.58	
Clearance Time (s)		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	
Lane Grp Cap (vph)		430			421		359	990	934	493	1069	
v/s Ratio Prot								0.19			c0.33	
v/s Ratio Perm		0.02			c0.08		0.03		0.00	0.02		
v/c Ratio		0.10			0.30		0.06	0.32	0.00	0.04	0.58	
Uniform Delay, d1		20.2			21.3		6.5	7.7	6.3	6.4	9.4	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.1			0.4		0.3	0.9	0.0	0.1	2.3	
Delay (s)		20.3			21.7		6.8	8.5	6.3	6.5	11.7	
Level of Service		C			C		A	A	A	A	B	
Approach Delay (s)		20.3			21.7			8.4			11.5	
Approach LOS		C			C			A			B	

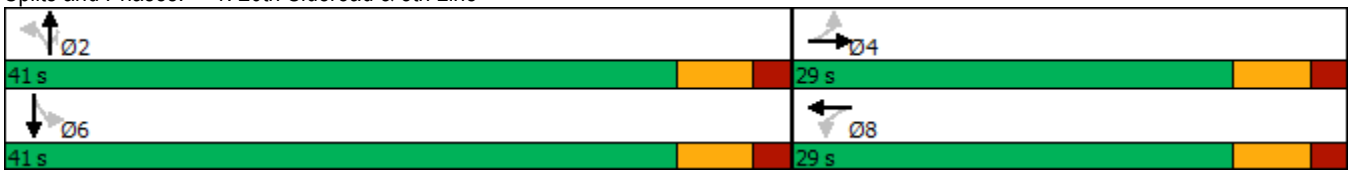
Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	70.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

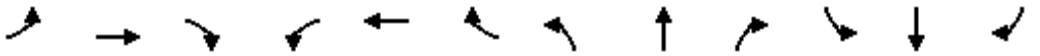
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	49	70	12	27	23	722	29	52	538
Future Volume (vph)	49	70	12	27	23	722	29	52	538
Lane Group Flow (vph)	0	143	0	63	24	760	31	55	594
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		4		8		2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	2	2	2	6	6
Switch Phase									
Minimum Initial (s)	23.0	23.0	23.0	23.0	19.0	19.0	19.0	19.0	19.0
Minimum Split (s)	29.0	29.0	29.0	29.0	25.0	25.0	25.0	25.0	25.0
Total Split (s)	29.0	29.0	29.0	29.0	41.0	41.0	41.0	41.0	41.0
Total Split (%)	41.4%	41.4%	41.4%	41.4%	58.6%	58.6%	58.6%	58.6%	58.6%
Yellow Time (s)	4.0	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	2.0
Lost Time Adjust (s)		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
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
v/c Ratio		0.27		0.11	0.06	0.67	0.03	0.22	0.53
Control Delay		18.2		12.7	9.8	17.6	2.1	13.1	13.7
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		18.2		12.7	9.8	17.6	2.1	13.1	13.7
Queue Length 50th (m)		13.4		3.9	1.6	82.9	0.0	4.1	55.9
Queue Length 95th (m)		26.6		11.7	5.4	#150.1	2.7	11.9	89.2
Internal Link Dist (m)		311.9		827.8		443.9			552.9
Turn Bay Length (m)					110.0		110.0	40.0	
Base Capacity (vph)		537		572	379	1137	948	254	1128
Starvation Cap Reductn		0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0	0
Reduced v/c Ratio		0.27		0.11	0.06	0.67	0.03	0.22	0.53

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 68.8
Natural Cycle: 60
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: 20th Sideroad & 5th Line





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	70	16	12	27	21	23	722	29	52	538	27
Future Volume (vph)	49	70	16	12	27	21	23	722	29	52	538	27
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	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.98			0.95		1.00	1.00	0.85	1.00	0.99	
Flt Protected		0.98			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1784			1755		1703	1863	1524	1703	1845	
Flt Permitted		0.87			0.93		0.35	1.00	1.00	0.23	1.00	
Satd. Flow (perm)		1572			1647		622	1863	1524	415	1845	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	52	74	17	13	28	22	24	760	31	55	566	28
RTOR Reduction (vph)	0	7	0	0	16	0	0	0	13	0	2	0
Lane Group Flow (vph)	0	136	0	0	47	0	24	760	18	55	592	0
Heavy Vehicles (%)	8%	0%	0%	0%	0%	6%	6%	2%	6%	6%	2%	7%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		17.6			17.6		40.5	40.5	40.5	40.5	40.5	
Effective Green, g (s)		17.6			17.6		40.5	40.5	40.5	40.5	40.5	
Actuated g/C Ratio		0.25			0.25		0.58	0.58	0.58	0.58	0.58	
Clearance Time (s)		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	
Lane Grp Cap (vph)		394			413		359	1076	880	239	1065	
v/s Ratio Prot								c0.41			0.32	
v/s Ratio Perm		c0.09			0.03		0.04		0.01	0.13		
v/c Ratio		0.34			0.11		0.07	0.71	0.02	0.23	0.56	
Uniform Delay, d1		21.5			20.2		6.5	10.6	6.3	7.2	9.2	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.5			0.1		0.4	3.9	0.0	2.2	2.1	
Delay (s)		22.0			20.4		6.9	14.5	6.4	9.4	11.3	
Level of Service		C			C		A	B	A	A	B	
Approach Delay (s)		22.0			20.4			13.9			11.1	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	70.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Appendix H –
Transportation Tomorrow Survey – Excerpt

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TTS Cross Tabulation

Cross Tabulation Query Form - Trip - 2011

Filter Variables

Planning district of desti... × | 2006 GTA zone of hous... × | (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	8594
And			
☑	Start time of trip	In	700-900
And			
☑	Trip purpose of destination	In	W,

Add | Delete

Output

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

Add Delete

Output

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

Execute Query | Select All | Save As

```
Mon Oct 30 2017 10:13:43 GMT-0400 (Eastern Daylight Time) - Run Time: 3225ms

Cross Tabulation Query Form - Trip - 2011

Row: Planning district of destination - pd_dest
Column: 2006 GTA zone of household - gta06_hhld


Filters:
(2006 GTA zone of household - gta06_hhld In 8594
and
Start time of trip - start_time In 700-900
and
Trip purpose of destination - purp_dest In W, )

Trip 2011
Table:

,8594
PD 1 of Toronto,26
PD 11 of Toronto,54
East Gwillimbury,17
Newmarket,71
Aurora,17
Barrie,97
Innisfil,88
Bradford-West Gwillimbury,28
Essa,17
Oro-Medonte,26
Orillia,17
```

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TTS Cross Tabulation

Cross Tabulation Query Form - Trip - 2011

Filter Variables

2006 GTA zone of desti... | 2006 GTA zone of hous... | (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	8594
	And		
☑	Start time of trip	In	700-900
	And		
☑	Trip purpose of destination	In	W,

Add | Delete

Output

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

Output

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

Execute Query | Select All | Save As

```
Mon Oct 30 2017 10:25:25 GMT-0400 (Eastern Daylight Time) - Run Time: 3325ms

Cross Tabulation Query Form - Trip - 2011

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 8594
and
Start time of trip - start_time in 700-900
and
Trip purpose of destination - purp_dest In W, )

Trip 2011
Table:

,8594
23,26
443,28
463,26
2557,17
2606,28
2613,17
2615,26
2780,17
8503,26
8509,26
8521,45
8559,17
8560,54
8582,26
8591,17
8622,17
8630,28
8684,17
```

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TTS Cross Tabulation

Cross Tabulation Query Form - Trip - 2011

Filter Variables

Planning district of desti... × | 2006 GTA zone of hous... × | (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	8595,8559
	And		
☑	Start time of trip	In	700-900
	And		
☑	Trip purpose of destination	In	W,

Add Delete

Output

Output

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

Execute Query | Select All | Save As

```
Wed Nov 22 2017 23:15:30 GMT-0500 (Eastern Standard Time) - Run Time: 2797ms

Cross Tabulation Query Form - Trip - 2011

Row: Planning district of destination - pd_dest
Column: 2006 GTA zone of household - gta06_hhld


Filters:
(2006 GTA zone of household - gta06_hhld In 8595,8559
and
Start time of trip - start_time In 700-900
and
Trip purpose of destination - purp_dest In W, )

Trip 2011
Table:

,8559,8595
PD 7 of Toronto,17,0
PD 9 of Toronto,17,52
PD 12 of Tororto,0,17
East Gwillimbury,52,45
Newmarket,174,54
Aurora,0,28
Whitchurch-Stouffville,17,0
Markham,28,56
King,17,26
Vaughan,88,69
Caledon,0,43
Mississauga,26,43
Erin,26,0
Barrie,331,424
Innisfil,298,273
Bradford-West Gwillimbury,45,0
New Tecumseth,34,0
Essa,26,26
Penetanguishere,0,26
Orillia,28,0
```

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TTS Cross Tabulation

Cross Tabulation Query Form - Trip - 2011

Filter Variables

2006 GTA zone of desti... | 2006 GTA zone of hous... | (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	8595,8559
	And		
☑	Start time of trip	In	700-900
	And		
☑	Trip purpose of destination	In	W,
	And		
☑	Planning district of destination	In	82,

Add | Delete

Add Delete

Output

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

Execute Query | Select All | Save As

```
Wed Nov 22 2017 23:26:28 GMT-0500 (Eastern Standard Time) - Run Time: 2589ms

Cross Tabulation Query Form - Trip - 2011

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 8595,8559
and
Start time of trip - start_time In 700-900
and
Trip purpose of destination - purp_dest In W,
and
Planning district of destination - pd_dest In 82, )

Trip 2011
Table:

,8559,8595
8559,17,140
8560,148,0
8586,45,0
8590,26,0
8594,0,26
8595,0,62
8621,17,0
8624,0,28
8627,17,0
8628,0,17
8629,28,0
```

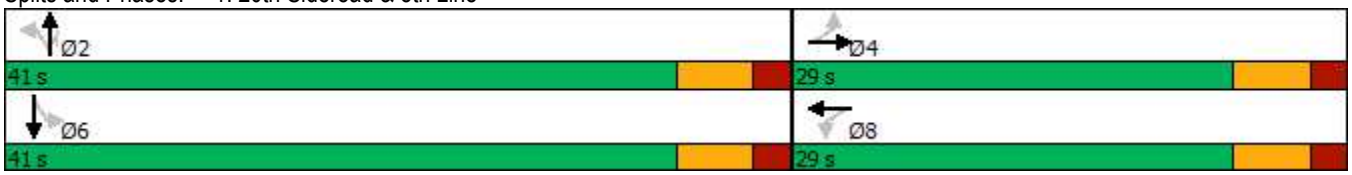
Appendix I –
Synchro Analysis Output –
Total Traffic Volumes

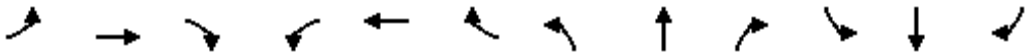
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	9	34	38	99	17	249	11	17	493
Future Volume (vph)	9	34	38	99	17	249	11	17	493
Lane Group Flow (vph)	0	52	0	210	19	274	12	19	569
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		4		8		2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	2	2	2	6	6
Switch Phase									
Minimum Initial (s)	23.0	23.0	23.0	23.0	19.0	19.0	19.0	19.0	19.0
Minimum Split (s)	29.0	29.0	29.0	29.0	25.0	25.0	25.0	25.0	25.0
Total Split (s)	29.0	29.0	29.0	29.0	41.0	41.0	41.0	41.0	41.0
Total Split (%)	41.4%	41.4%	41.4%	41.4%	58.6%	58.6%	58.6%	58.6%	58.6%
Yellow Time (s)	4.0	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	2.0
Lost Time Adjust (s)		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
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
v/c Ratio		0.09		0.38	0.06	0.31	0.01	0.04	0.59
Control Delay		15.7		18.2	9.7	11.4	0.0	9.4	15.4
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		15.7		18.2	9.7	11.4	0.0	9.4	15.4
Queue Length 50th (m)		4.4		18.4	1.3	21.0	0.0	1.3	52.4
Queue Length 95th (m)		11.5		35.3	4.5	36.1	0.1	4.4	83.3
Internal Link Dist (m)		311.9		827.8		443.9			552.9
Turn Bay Length (m)					110.0		110.0	40.0	
Base Capacity (vph)		556		551	326	892	863	464	966
Starvation Cap Reductn		0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0	0
Reduced v/c Ratio		0.09		0.38	0.06	0.31	0.01	0.04	0.59

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 73.5
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 1: 20th Sideroad & 5th Line





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	34	5	38	99	54	17	249	11	17	493	25
Future Volume (vph)	9	34	5	38	99	54	17	249	11	17	493	25
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	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.99			0.96		1.00	1.00	0.85	1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1857			1790		1805	1712	1615	1444	1851	
Flt Permitted		0.94			0.93		0.33	1.00	1.00	0.59	1.00	
Satd. Flow (perm)		1755			1687		627	1712	1615	891	1851	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	10	37	5	42	109	59	19	274	12	19	542	27
RTOR Reduction (vph)	0	3	0	0	21	0	0	0	6	0	2	0
Lane Group Flow (vph)	0	49	0	0	189	0	19	274	6	19	567	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	4%	0%	11%	0%	25%	2%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		23.1			23.1		38.3	38.3	38.3	38.3	38.3	
Effective Green, g (s)		23.1			23.1		38.3	38.3	38.3	38.3	38.3	
Actuated g/C Ratio		0.31			0.31		0.52	0.52	0.52	0.52	0.52	
Clearance Time (s)		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	
Lane Grp Cap (vph)		552			530		327	893	842	464	965	
v/s Ratio Prot								0.16			c0.31	
v/s Ratio Perm		0.03			c0.11		0.03		0.00	0.02		
v/c Ratio		0.09			0.36		0.06	0.31	0.01	0.04	0.59	
Uniform Delay, d1		17.7			19.4		8.7	10.0	8.4	8.6	12.1	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.1			0.4		0.3	0.9	0.0	0.2	2.6	
Delay (s)		17.8			19.8		9.0	10.9	8.4	8.7	14.7	
Level of Service		B			B		A	B	A	A	B	
Approach Delay (s)		17.8			19.8			10.7			14.5	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	73.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	27	18	0	84	61	1
Future Volume (Veh/h)	27	18	0	84	61	1
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)	29	20	0	91	66	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			49		130	39
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			49		130	39
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		92	100
cM capacity (veh/h)			1558		864	1033

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	49	91	67
Volume Left	0	0	66
Volume Right	20	0	1
cSH	1700	1558	866
Volume to Capacity	0.03	0.00	0.08
Queue Length 95th (m)	0.0	0.0	2.0
Control Delay (s)	0.0	0.0	9.5
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.5
Approach LOS			A

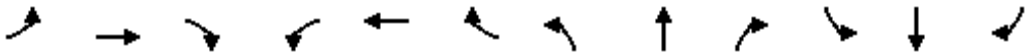
Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	14.5%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	44	100	20	45	22	666	42	54	482
Future Volume (vph)	44	100	20	45	22	666	42	54	482
Lane Group Flow (vph)	0	166	0	95	23	701	44	57	532
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		4		8		2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	2	2	2	6	6
Switch Phase									
Minimum Initial (s)	23.0	23.0	23.0	23.0	19.0	19.0	19.0	19.0	19.0
Minimum Split (s)	29.0	29.0	29.0	29.0	25.0	25.0	25.0	25.0	25.0
Total Split (s)	29.0	29.0	29.0	29.0	41.0	41.0	41.0	41.0	41.0
Total Split (%)	41.4%	41.4%	41.4%	41.4%	58.6%	58.6%	58.6%	58.6%	58.6%
Yellow Time (s)	4.0	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	2.0
Lost Time Adjust (s)		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
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
v/c Ratio		0.29		0.16	0.05	0.62	0.05	0.20	0.48
Control Delay		18.5		13.8	9.6	16.0	3.1	12.4	12.9
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		18.5		13.8	9.6	16.0	3.1	12.4	12.9
Queue Length 50th (m)		15.9		6.5	1.5	72.5	0.0	4.2	47.7
Queue Length 95th (m)		30.6		16.4	5.2	115.2	4.2	11.6	76.3
Internal Link Dist (m)		311.9		827.8		443.9			552.9
Turn Bay Length (m)					110.0		110.0	40.0	
Base Capacity (vph)		564		578	422	1124	938	290	1115
Starvation Cap Reductn		0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0	0
Reduced v/c Ratio		0.29		0.16	0.05	0.62	0.05	0.20	0.48

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 67.7
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 1: 20th Sideroad & 5th Line



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	44	100	14	20	45	26	22	666	42	54	482	24
Future Volume (vph)	44	100	14	20	45	26	22	666	42	54	482	24
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	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.99			0.96		1.00	1.00	0.85	1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1811			1777		1703	1863	1524	1703	1845	
Flt Permitted		0.89			0.91		0.39	1.00	1.00	0.27	1.00	
Satd. Flow (perm)		1630			1635		699	1863	1524	481	1845	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	46	105	15	21	47	27	23	701	44	57	507	25
RTOR Reduction (vph)	0	6	0	0	20	0	0	0	19	0	2	0
Lane Group Flow (vph)	0	160	0	0	75	0	23	701	25	57	530	0
Heavy Vehicles (%)	8%	0%	0%	0%	0%	6%	6%	2%	6%	6%	2%	7%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		17.6			17.6		39.4	39.4	39.4	39.4	39.4	
Effective Green, g (s)		17.6			17.6		39.4	39.4	39.4	39.4	39.4	
Actuated g/C Ratio		0.26			0.26		0.57	0.57	0.57	0.57	0.57	
Clearance Time (s)		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	
Lane Grp Cap (vph)		415			417		399	1063	870	274	1053	
v/s Ratio Prot								c0.38			0.29	
v/s Ratio Perm		c0.10			0.05		0.03		0.02	0.12		
v/c Ratio		0.39			0.18		0.06	0.66	0.03	0.21	0.50	
Uniform Delay, d1		21.2			20.1		6.6	10.2	6.5	7.2	8.9	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.6			0.2		0.3	3.2	0.1	1.7	1.7	
Delay (s)		21.8			20.3		6.8	13.4	6.5	8.9	10.6	
Level of Service		C			C		A	B	A	A	B	
Approach Delay (s)		21.8			20.3			12.8			10.5	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	69.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	77	63	1	40	36	0
Future Volume (Veh/h)	77	63	1	40	36	0
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)	84	68	1	43	39	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			152		163	118
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			152		163	118
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		95	100
cM capacity (veh/h)			1429		827	934

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	152	44	39
Volume Left	0	1	39
Volume Right	68	0	0
cSH	1700	1429	827
Volume to Capacity	0.09	0.00	0.05
Queue Length 95th (m)	0.0	0.0	1.2
Control Delay (s)	0.0	0.2	9.6
Lane LOS		A	A
Approach Delay (s)	0.0	0.2	9.6
Approach LOS			A

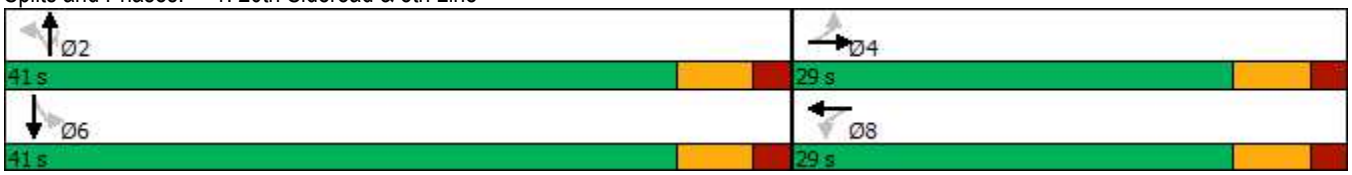
Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	17.9%	ICU Level of Service	A
Analysis Period (min)	15		

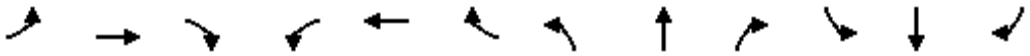
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	10	36	41	104	19	290	12	19	537
Future Volume (vph)	10	36	41	104	19	290	12	19	537
Lane Group Flow (vph)	0	56	0	223	21	319	13	21	622
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		4		8		2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	2	2	2	6	6
Switch Phase									
Minimum Initial (s)	23.0	23.0	23.0	23.0	19.0	19.0	19.0	19.0	19.0
Minimum Split (s)	29.0	29.0	29.0	29.0	25.0	25.0	25.0	25.0	25.0
Total Split (s)	29.0	29.0	29.0	29.0	41.0	41.0	41.0	41.0	41.0
Total Split (%)	41.4%	41.4%	41.4%	41.4%	58.6%	58.6%	58.6%	58.6%	58.6%
Yellow Time (s)	4.0	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	2.0
Lost Time Adjust (s)		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
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
v/c Ratio		0.10		0.40	0.07	0.36	0.02	0.05	0.65
Control Delay		15.9		18.6	10.1	12.0	0.0	9.5	16.7
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		15.9		18.6	10.1	12.0	0.0	9.5	16.7
Queue Length 50th (m)		4.8		19.7	1.4	25.3	0.0	1.4	59.7
Queue Length 95th (m)		12.3		37.5	5.0	42.7	0.2	4.8	95.0
Internal Link Dist (m)		311.9		827.8		443.9			552.9
Turn Bay Length (m)					110.0		110.0	40.0	
Base Capacity (vph)		555		552	283	889	861	429	963
Starvation Cap Reductn		0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0	0
Reduced v/c Ratio		0.10		0.40	0.07	0.36	0.02	0.05	0.65

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 73.2
Natural Cycle: 60
Control Type: Semi Act-Uncoord

Splits and Phases: 1: 20th Sideroad & 5th Line





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	36	5	41	104	58	19	290	12	19	537	29
Future Volume (vph)	10	36	5	41	104	58	19	290	12	19	537	29
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	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.99			0.96		1.00	1.00	0.85	1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1859			1788		1805	1712	1615	1444	1850	
Flt Permitted		0.93			0.93		0.29	1.00	1.00	0.54	1.00	
Satd. Flow (perm)		1748			1680		546	1712	1615	827	1850	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	11	40	5	45	114	64	21	319	13	21	590	32
RTOR Reduction (vph)	0	3	0	0	21	0	0	0	6	0	3	0
Lane Group Flow (vph)	0	53	0	0	202	0	21	319	7	21	619	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	4%	0%	11%	0%	25%	2%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		23.1			23.1		38.0	38.0	38.0	38.0	38.0	
Effective Green, g (s)		23.1			23.1		38.0	38.0	38.0	38.0	38.0	
Actuated g/C Ratio		0.32			0.32		0.52	0.52	0.52	0.52	0.52	
Clearance Time (s)		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	
Lane Grp Cap (vph)		552			530		283	889	839	429	961	
v/s Ratio Prot								0.19			c0.33	
v/s Ratio Perm		0.03			c0.12		0.04		0.00	0.03		
v/c Ratio		0.10			0.38		0.07	0.36	0.01	0.05	0.64	
Uniform Delay, d1		17.6			19.4		8.8	10.4	8.5	8.6	12.7	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.1			0.5		0.5	1.1	0.0	0.2	3.3	
Delay (s)		17.7			19.9		9.3	11.5	8.5	8.9	16.0	
Level of Service		B			B		A	B	A	A	B	
Approach Delay (s)		17.7			19.9			11.2			15.8	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	15.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	73.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	27	18	0	84	61	1
Future Volume (Veh/h)	27	18	0	84	61	1
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)	29	20	0	91	66	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			49		130	39
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			49		130	39
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		92	100
cM capacity (veh/h)			1571		869	1038

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	49	91	67
Volume Left	0	0	66
Volume Right	20	0	1
cSH	1700	1571	871
Volume to Capacity	0.03	0.00	0.08
Queue Length 95th (m)	0.0	0.0	2.0
Control Delay (s)	0.0	0.0	9.5
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.5
Approach LOS			A

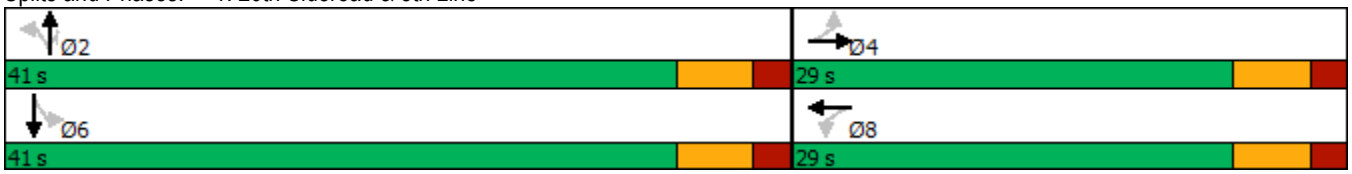
Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	14.5%	ICU Level of Service	A
Analysis Period (min)	15		

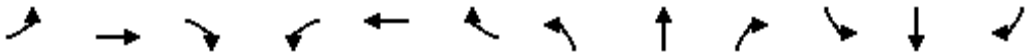
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	49	105	21	47	23	722	44	61	538
Future Volume (vph)	49	105	21	47	23	722	44	61	538
Lane Group Flow (vph)	0	180	0	99	24	760	46	64	594
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	Perm	NA
Protected Phases		4		8		2			6
Permitted Phases	4		8		2		2	6	
Detector Phase	4	4	8	8	2	2	2	6	6
Switch Phase									
Minimum Initial (s)	23.0	23.0	23.0	23.0	19.0	19.0	19.0	19.0	19.0
Minimum Split (s)	29.0	29.0	29.0	29.0	25.0	25.0	25.0	25.0	25.0
Total Split (s)	29.0	29.0	29.0	29.0	41.0	41.0	41.0	41.0	41.0
Total Split (%)	41.4%	41.4%	41.4%	41.4%	58.6%	58.6%	58.6%	58.6%	58.6%
Yellow Time (s)	4.0	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	2.0
Lost Time Adjust (s)		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
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode	None	None	None	None	Max	Max	Max	Max	Max
v/c Ratio		0.35		0.18	0.08	0.79	0.06	0.38	0.62
Control Delay		19.8		13.5	10.2	22.2	3.3	19.1	16.0
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		19.8		13.5	10.2	22.2	3.3	19.1	16.0
Queue Length 50th (m)		17.5		6.8	1.6	82.9	0.0	5.1	55.9
Queue Length 95th (m)		33.1		16.8	5.5	#150.1	4.5	16.2	89.2
Internal Link Dist (m)		311.9		827.8		443.9			552.9
Turn Bay Length (m)					110.0		110.0	40.0	
Base Capacity (vph)		519		538	289	968	814	170	961
Starvation Cap Reductn		0		0	0	0	0	0	0
Spillback Cap Reductn		0		0	0	0	0	0	0
Storage Cap Reductn		0		0	0	0	0	0	0
Reduced v/c Ratio		0.35		0.18	0.08	0.79	0.06	0.38	0.62

Intersection Summary

Cycle Length: 70
Actuated Cycle Length: 73.3
Natural Cycle: 60
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: 20th Sideroad & 5th Line





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	105	16	21	47	27	23	722	44	61	538	27
Future Volume (vph)	49	105	16	21	47	27	23	722	44	61	538	27
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	
Lane Util. Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.99			0.96		1.00	1.00	0.85	1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1807			1777		1703	1863	1524	1703	1845	
Flt Permitted		0.89			0.91		0.31	1.00	1.00	0.18	1.00	
Satd. Flow (perm)		1627			1644		555	1863	1524	327	1845	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	52	111	17	22	49	28	24	760	46	64	566	28
RTOR Reduction (vph)	0	5	0	0	19	0	0	0	22	0	2	0
Lane Group Flow (vph)	0	175	0	0	80	0	24	760	24	64	592	0
Heavy Vehicles (%)	8%	0%	0%	0%	0%	6%	6%	2%	6%	6%	2%	7%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2		2	6		
Actuated Green, G (s)		23.1			23.1		38.1	38.1	38.1	38.1	38.1	
Effective Green, g (s)		23.1			23.1		38.1	38.1	38.1	38.1	38.1	
Actuated g/C Ratio		0.32			0.32		0.52	0.52	0.52	0.52	0.52	
Clearance Time (s)		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	
Lane Grp Cap (vph)		513			518		288	969	793	170	960	
v/s Ratio Prot								c0.41			0.32	
v/s Ratio Perm		c0.11			0.05		0.04		0.02	0.20		
v/c Ratio		0.34			0.15		0.08	0.78	0.03	0.38	0.62	
Uniform Delay, d1		19.2			18.0		8.8	14.2	8.5	10.5	12.4	
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.4			0.1		0.6	6.3	0.1	6.3	3.0	
Delay (s)		19.6			18.2		9.4	20.6	8.6	16.7	15.3	
Level of Service		B			B		A	C	A	B	B	
Approach Delay (s)		19.6			18.2			19.6			15.5	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	73.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	77	59	1	40	35	0
Future Volume (Veh/h)	77	59	1	40	35	0
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)	84	64	1	43	38	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			148		161	116
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			148		161	116
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		95	100
cM capacity (veh/h)			1446		834	942

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	148	44	38
Volume Left	0	1	38
Volume Right	64	0	0
cSH	1700	1446	834
Volume to Capacity	0.09	0.00	0.05
Queue Length 95th (m)	0.0	0.0	1.1
Control Delay (s)	0.0	0.2	9.5
Lane LOS		A	A
Approach Delay (s)	0.0	0.2	9.5
Approach LOS			A

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	17.7%	ICU Level of Service	A
Analysis Period (min)	15		