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939 Highway 60

TRANSPORTATION IMPACT STUDY

Sandford Investments Corp.

File 424440 | December 12, 2024

Document Control

File:

424440

Date:

December 12, 2024

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1	December 12, 2024	Final Report

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1 Introduction

Tatham Engineering Limited was retained by Sanford Investments Corp. to conduct a transportation impact study in support of the proposed development to be located at 939 Highway 60 in the Town of Huntsville, District of Muskoka. The location of the development site is illustrated in Figure 1.

1.1 REPORT OBJECTIVE

The objective of this report is to present the findings of the transportation impact study and address the requirements of the Town, the District, and the Ministry of Transportation of Ontario (MTO) with respect to the potential transportation impacts of the development on the area road network (recognizing that each has jurisdiction over roads in the corresponding study area). In particular, the following will be discussed:

- the operations of the road system through the study area prior to the proposed development;
- the growth in the traffic volumes not otherwise attributed to the development (i.e. from overall growth in the area and/or other developments);
- the number of new trips the proposed development is likely to generate;
- the operations of the study area road system upon completion of the development; and
- the resulting impacts and need for mitigating measures (if required) to ensure acceptable overall road operations.

A Terms of Reference encompassing the above scope was submitted to MTO for review prior to commencement of this study. The submitted Terms of Reference is provided in Appendix A.

1.2 REPORT STRUCTURE

The report is structured as follows:

- Chapter 1: introduction and study purpose;
- Chapter 2: existing conditions, detailing the road system and corresponding traffic operations;
- Chapter 3: future conditions, prior to the completion of the proposed development (referred to as future background conditions), the expected growth in traffic levels and the resulting operating conditions;

- Chapter 4: proposed development and associated details including land use, access, and traffic volumes;
- Chapter 5: future conditions, with completion of the proposed development (referred to as future total conditions); and
- Chapter 6: summary of the report and key findings.

2 Existing Conditions

This chapter will detail the current road network, traffic volumes, and traffic operations under existing conditions.

2.1 ROAD NETWORK

The road network to be addressed by this study consists of the following roads and intersections:

Roads

- Highway 60
- Canal Road (Muskoka Road 23)
- Grandview Drive

Intersections

- Highway 60 & Grandview Drive
- Highway 60 & Canal Road (Muskoka Road 23)

Aerial mapping and imagery of the road system is provided in Figure 2 and Figure 3.

2.1.1 Roads

Brief descriptions of the study area roads are provided below. The functional classifications are based on those presented in *Schedule B2* of Huntsville's *Official Plan*[1], *Schedule F* of Muskoka's *Official Plan*[2], and MTO's *Highway Corridor Management Manual*[3].

Highway 60

Highway 60 is an east-west Class 2B Arterial under the jurisdiction of MTO, having a 4-lane (2 lanes of travel per direction) rural cross-section (3 metre paved shoulders and open ditches). The road has a posted speed limit of 80 km/h throughout the study area.

Canal Road (Muskoka Road 23)

Canal Road (Muskoka Road 23) is a north-south Class B District Road under the jurisdiction of the District. The road has a 2-lane (1 lane of travel per direction) rural cross-section (2.0 metre paved shoulders and open ditches) with a posted speed limit of 60 km/h within the study area.

Grandview Drive

Grandview Drive is a north-south local road under the jurisdiction of the Town of Huntsville. The road has a 2-lane rural cross-section with narrow grass shoulders and a speed limit of 30 km/h.

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[1] *Town of Huntsville Official Plan*. Town of Huntsville, March 2019.
[2] *Muskoka Official Plan*. District Municipality of Muskoka, as consolidated March 2023.
[3] *Highway Corridor Management Manual*. MTO Corridor Management Office, April 2022.

2.1.2 Intersections

The configuration of each study area intersection is detailed below and illustrated in Figure 3.

Highway 60 & Grandview Drive

The intersection of Highway 60 with Grandview Drive is a 4-leg, signalized intersection. The east and west approaches (Highway 60) each consist of a left turn lane, two through lanes and a right turn taper. The north and south approaches (Grandview Drive) each consist of a left turn lane and a shared through-right turn lane.

Highway 60 & Canal Road

The intersection of Highway 60 with Canal Road is a 3-leg, signalized intersection. The east leg (Highway 60) consists of a left turn lane and two through lanes, whereas the west leg (Highway 60) consists of two through lanes and a channelized right turn lane. The south approach (Canal Road) consists of a single shared left-right turn lane.

2.2 TRANSIT NETWORK

The study area is not currently served by any local or regional public transit services. However, within the wider area, local and regional transit services are provided by the following agencies:

- Huntsville Transit – a local transit service offered within the urban area of Huntsville; and
- Corridor 11 Bus – a regional transit service offered by the District of Muskoka in partnership with Hammond Transportation.

Huntsville Transit

Huntsville Transit operates one route traversing through the town every two hours in each direction. This service connects to the Corridor 11 Bus. The nearest stop to the subject site is on Fairview Drive at the Laketree Residences, approximately 2.5 km west of the subject site.

Corridor 11 Bus

The Corridor 11 Bus operates primarily along the Highway 11 corridor between Huntsville and Orillia, connecting various communities throughout Muskoka and providing connections to other local and regional transit services in Huntsville, Bracebridge, and Orillia. A total of 3 northbound and 3 southbound trips are provided each operating day. The nearest stop to the subject site is located at the Huntsville Hospital, approximately 4 km west of the subject site.

Operational details for each route are summarized in Table 1 with the routing near the subject site illustrated in Figure 4.

Table 1: Transit Service Summary

AGENCY	SCHEDULE	OPERATING HOURS	HEADWAY
Huntsville Transit	Monday-Friday	8:00 AM to 6:00 PM	2 hours
	Saturday	10:00 AM to 6:00 PM	2 hours
	Sunday/Holiday	no service	no service
Corridor 11 Bus	Monday-Friday	6:00 AM to 7:00 PM	varied, 3-5 hours
	Saturday	no service	no service
	Sunday/Holiday	no service	no service

2.3 TRAFFIC VOLUMES

2.3.1 Traffic Counts

To determine existing traffic volumes, turning movement counts were conducted at each of the study area intersections on Wednesday, October 9, 2024, from 7:00 to 9:00, 11:00 to 14:00, and 16:00 to 19:00. The observed peak hour periods and associated peak hour volumes entering each intersection are summarized in Table 2, with individual movement volumes for each peak hour provided in Figure 5 and further count details provided in Appendix B. In all cases, the PM peak hour volumes were greater than, or comparable to, the AM and Mid-Day peak hour volumes thus confirming the PM peak hour as the critical period.

Table 2: 2024 Traffic Counts

INTERSECTION	PEAK HOURS & PEAK HOUR VOLUMES		
	Weekday AM	Weekday Mid-Day	Weekday PM
Highway 60 & Grandview Drive	8:00 – 9:00 915 vehicles	12:00 – 13:00 1,010 vehicles	16:30 – 17:30 **1,143 vehicles**
Highway 60 & Canal Road	8:00 – 9:00 889	12:00 – 13:00 969	16:30 – 17:30 **1,096**

2.3.2 Adjustments

Seasonal Adjustment

Traffic volumes in the Huntsville area are typically highest during the summer months (i.e. July and August) due to increased recreational/leisure travel. As the traffic counts were completed

in early October (considered reflective of average volumes), the need to apply a seasonal adjustment was reviewed. MTO publishes the following data for all provincial highways[4]:

- Annual Average Daily Traffic (AADT) – average 24-hour, two-way traffic volumes over an entire year (January 1 to December 31);
- Summer Average Daily Traffic (SADT) – average 24-hour, two-way traffic volumes over the period from July 1 to August 31, including weekends; and
- Summer Weekday Average Daily Traffic (SWADT) – average 24-hour, two-way traffic volumes over the period from July 1 to August 31, excluding weekends.

The historical AADT, SADT and SWADT volumes on Highway 60 between Muskoka Road 23 and Muskoka Road 3 (within which the study area is located) were reviewed for the period 2015 to 2021 (the most recent data available) to establish any seasonal variations that may exist. The corresponding volumes and their respective ratios are summarized in Table 3. Summer weekend Average Daily Traffic was calculated based on the available SADT and SWADT data.

Table 3: Highway 60 Average Daily Traffic Volumes

YEAR	AVERAGE DAILY TRAFFIC (ADT) VOLUMES				SADT / AADT
	Annual (AADT)	Summer (SADT)	Summer Weekday	Summer Weekend[1]	
2015	7,650	10,000	10,200	9,500	1.31
2016	7,550	9,850	10,000	9,500	1.30
2017	7,450	10,400	10,300	10,650	1.40
2018	7,400	10,400	10,300	10,650	1.41
2019	8,500	11,900	11,800	12,150	1.40
2020	n/a	n/a	n/a	n/a	-
2021	7,400	10,200	10,100	10,450	1.38
Average					**1.37**

[1] Summer ADT x 7 = Summer Weekday ADT x 5 + Summer Weekend ADT x 2

As indicated, the SADT volumes on Highway 60 are typically 30% to 40% higher than the AADT volumes. While this reflects daily volumes and thus does not necessarily translate to peak hour

[4] *Provincial Highways Traffic Volumes 1988-2021*. Ministry of Transportation of Ontario.

volumes (in that during the summer periods, the peak hours are typically spread over a greater period), all of the peak hour volumes as determined from the 2024 traffic counts have been increased by 40% to reflect peak summer conditions.

Saturday Peak Volumes

Saturday turning movement counts were not completed at the study area intersections and thus volumes have been projected based on the noted traffic counts.

With respect to summer weekday versus summer weekend volumes, a review of historical MTO traffic volumes on Highway 60 (see Table 3) indicates that the weekend volumes are approximately 3.5% greater than the weekday volumes. While this may not necessarily translate to the peak hour volumes, such has otherwise been assumed. To maintain a conservative approach, the greatest peak hour volumes from the AM, Mid-Day and PM peak hours have been employed, increased 3.5% to reflect the Saturday peak hour volumes.

2.3.3 2024 Traffic Volumes

The resulting 2024 traffic volumes are illustrated in Figure 6.

2.4 TRAFFIC OPERATIONS

The assessment of existing conditions provides the baseline from which the future traffic operations (both without and with the subject development) can be assessed. As the capacity, and hence operations, of a road system is effectively dictated by its intersections, the traffic assessment has focused on the operations of the study area intersections based on the following:

- the 2024 traffic volumes;
- the existing intersection configurations and controls; and
- procedures outlined in the *2000 Highway Capacity Manual*[5] (using Synchro v.11 software).

The analysis considers the following metrics for each lane group at signalized intersections and for the critical movements at unsignalized intersections (namely the stop-controlled movements):

- average delay (measured in seconds);
- level of service (LOS); and
- volume to capacity (v/c) ratio.

[5] *2000 Highway Capacity Manual*. Transportation Research Board. Washington DC, 2000.

Level of Service definitions are provided in Appendix C; level of service 'A' corresponds to the best operating condition with minimal delays whereas level of service 'F' corresponds to poor operations resulting from high intersection delays. A v/c ratio of less than 1.0 indicates the intersection movement/approach is operating at less than capacity while v/c of 1.0 indicates capacity has been reached.

To more accurately model existing traffic conditions, the overall intersection peak hour factor and heavy vehicle percentages for each movement were calculated based on the traffic counts and input into the traffic model. Where the observed heavy vehicle percentage was less than the Synchro default value (2%), the default was applied.

Results of the operational assessment are summarized in Table 4 with detailed operations worksheets provided in Appendix D. Any movements operating at level of service 'F' and/or with a volume to capacity ratio of 1.0 or greater have been bolded in the summary table.

Table 4: Intersection Operations – 2024

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
			Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c
Highway 60 & Grandview Drive	EB L	signal	28	C	0.21	28	C	0.19	29	C	0.31
	EB T	signal	7	A	0.39	6	A	0.36	7	A	0.39
	EB R	signal	5	A	0.02	5	A	0.03	6	A	0.03
	WB L	signal	28	C	0.17	31	C	0.38	30	C	0.36
	WB T	signal	6	A	0.30	6	A	0.39	7	A	0.41
	WB R	signal	5	A	0.00	5	A	0.00	5	A	0.00
	NB L	signal	25	C	0.32	30	C	0.43	24	C	0.30
	NB TR	signal	23	C	0.01	24	C	0.01	22	C	0.02
	SB L	signal	23	C	0.02	25	C	0.10	22	C	0.03
	SB TR	signal	23	C	0.02	24	C	0.01	22	C	0.03
	overall	signal	8	A	0.38	7	A	0.39	8	A	0.40
Highway 60 & Canal Road	EB T	signal	12	B	0.43	11	B	0.37	12	B	0.44
	EB R	signal	9	A	0.12	9	A	0.15	9	A	0.16
	WB L	signal	7	A	0.06	6	A	0.05	7	A	0.06
	WB T	signal	7	A	0.21	7	A	0.33	8	A	0.33
	NB LR	signal	19	B	0.56	18	B	0.51	19	B	0.54
	overall	signal	11	B	0.48	9	A	0.44	11	B	0.50

As indicated, the study intersections currently provide excellent operations overall (LOS B or better). Each individual movement provides good operations (LOS C or better) with low to average delays (5 to 31 seconds) and reserve capacity remaining ($v/c \leq 0.56$).

2.5 ROAD NETWORK IMPROVEMENTS

Based on the results of the operational analysis under existing conditions, no improvements are required to accommodate the existing traffic volumes.

3 Future Background Conditions

This chapter will describe the road network and background traffic volumes expected for the years 2029, 2034 and 2039. The 2029 horizon has been adopted to reflect full build-out of the subject development, whereas the 2034 and 2039 horizons will address longer-term impacts of the development (5 and 10 years beyond build-out).

3.1 ROAD NETWORK

Highway 60

In March 2013, MTO published a *Transportation Environmental Study Report* (TESR) on proposed improvements along the Highway 60 corridor between Highway 11 and Highway 35 (a summary of which is provided in Appendix E). While the TESR ultimately recommends numerous improvements along the corridor, no improvements were identified within the study area. As such, the configuration of Highway 60 as described under existing conditions has been maintained under future conditions unless operations dictate the need for improvements.

Other Roads

No improvements were identified on the remaining roads within the study area. As such, the configuration of each as detailed under existing conditions has been maintained under future conditions unless operations dictate the need for improvements.

3.2 TRANSIT NETWORK

The Town's *2018 Transit Needs Assessment and Ridership Growth Plan*[6] provided a framework for the expansion of Huntsville Transit services through to 2023. A summary of the recommended improvements is as follows:

- split the existing single route into 2 different routes to improve service coverage (see Figure 7), with one route serving the Hidden Valley and Deerhurst Resort areas (i.e. passing through the subject study area);
- extend weekday/Saturday service hours and add Sunday service;
- provide transit on-demand ("dial-a-ride") services to communities near Huntsville; and
- improve service headways during peak periods.

[6] *2018 Town of Huntsville Transit Needs Assessment and Ridership Growth Plan*. Transit Consulting Network, November 5, 2018.

As of October 2024, most of these improvements have not been realized; only small increases in coverage area for the existing transit route have been implemented.

3.3 TRAFFIC VOLUMES

Background traffic volumes expected for the 2029, 2034, and 2039 horizon years have been determined based on the existing traffic volumes, historical and projected growth, and consideration for other development-specific traffic volumes.

3.3.1 Background Growth

Historical Growth – Population

To establish recent growth trends in the area, census data for the Town and District from the years 2011, 2016 and 2021 was reviewed, as summarized in Table 5. As indicated, the Town and District have experienced growth in the order of 1.1% and 1.4% per annum, respectively, between 2011 and 2021.

Table 5: Historical Population Growth

AREA	POPULATION			ANNUAL GROWTH RATE		
	2011	2016	2021	2011-16	2016-21	2011-21
Huntsville	19,056	19,816	21,147	0.79%	1.31%	1.05%
Muskoka	58,017	60,614	66,674	0.88%	1.92%	1.40%

Historical Growth – Traffic Volumes

As per the most recent traffic data published by MTO (as summarized in Table 3), the average annual daily traffic (AADT) volumes on Highway 60 have experienced approximately 1% per annum decrease between 2015 and 2018 and no change between 2018 and 2021. Overall, from 2015 to 2021, the volumes have decreased slightly.

With respect to the summer average daily traffic (SADT) volumes, such have experienced nominal growth in the order of 0.3% per annum over the same period (2015 to 2021).

Projected Growth – Population

The District Municipality of Muskoka 2019 Growth Strategy – Forecast & Growth Allocation Report[7] forecasts that over the period 2016 to 2046, the permanent population of the Town will increase from 19,800 to 26,200 (1.0% per annum), whereas the seasonal population (i.e. cottagers) is forecast to increase from 7,100 to 10,200 (1.2% per annum). In this respect, the overall population (i.e. year-round + seasonal) is projected to increase from 26,900 in 2016 to 36,400 by 2046, translating to growth of 1.1% per annum. For the District overall, permanent and seasonal population growth is expected to be in the order of 0.7% and 0.5% per annum, respectively, over the same period.

Background Growth Rates

In consideration of the historical and project population growth within the Town and District, and historical traffic volumes on Highway 60, the following background growth rates have been considered on the study area road network:

- Highway 60 – 2% per annum (greater than the noted growth rates to ensure a conservative assessment);
- Canal Road – 2% per annum (greater than the noted growth rates to ensure a conservative assessment); and
- Grandview Drive – no annual growth (local road serving limited development with no connections to the wider road network).

3.3.2 Background Developments

Upon review of available development information, three other developments were identified near the study area:

- Deerhurst Highlands, consisting of 128 single detached residential units;
- Deerhurst Modern, a 454-room resort residential development at Deerhurst Resort; and
- Treetops Condominiums, consisting of 120 condominium townhouse residential units.

The location of each development in relation to the subject site is illustrated in Figure 8. Excerpts from relevant traffic studies completed in support of these developments (where available) are provided in Appendix E, for reference.

[7] *The District Municipality of Muskoka 2019 Growth Strategy - Forecast & Growth Allocation Report.* Hemson Consulting Ltd., February 8, 2019.

Deerhurst Modern

Construction has not yet commenced at the Deerhurst Modern development as of October 2024. Given the larger size of this development, trips to be generated by this development have been considered independently from the background growth applied to each road. As per the *Deerhurst Modern Traffic Impact Study*[8], the site is expected to generate 144 trips during the weekday AM peak hour and 188 trips during the weekday PM peak hour; trip estimates were established using the *Resort Hotel* trip rates as per the ITE *Trip Generation Manual, 10th Edition*[9]. It is noted that the ITE dataset does not contain trip rates for the Saturday peak period. As such, the weekday PM peak trip estimates have been employed during the Saturday peak period, as these reflect the highest (i.e. most conservative) available trip estimates.

The resulting development traffic to be added to the study area road network is illustrated in Figure 9. It is assumed that this development will be fully built-out by the 2029 horizon.

Other Developments

Both the Deerhurst Highlands and Treetops Condominiums developments are partially built-out as of October 2024, with approximately 70 units remaining in Deerhurst Highlands and 100 units remaining in Treetops Condominiums. Given the location of each development in relation to the subject site, and limited trip generation of the remaining unbuilt units, it is assumed that the remaining development traffic which will pass through the study area has been captured in the background growth rates applied to the road network (recall historical and projected growth rates are in the order of 1% per annum or less, whereas a growth rate of 2% per annum has been applied to the District and MTO roads).

3.3.3 Background Traffic Volumes

The resulting 2029, 2034 and 2039 background traffic volumes are illustrated in Figure 10 through Figure 12, and are based on the existing 2024 traffic volumes, the noted background growth rates and the trips associated with the Deerhurst Modern development.

3.4 TRAFFIC OPERATIONS

The operations of the study area intersections were reviewed again for the future horizons considering the background traffic volumes. Results of the operational analyses are summarized in Table 6 though Table 8 with detailed operations worksheets provided in Appendix F.

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[8] *Deerhurst Modern Traffic Impact Study*. WMI & Associates Limited, May 2024.
[9] *Trip Generation Manual, 10th Edition*. Institute of Transportation Engineers, September 2017.

As indicated, the study area intersections are expected to continue to provide excellent overall operations (LOS B or better) through the 2039 horizon. Each individual movement is expected to provide good operations (LOS C or better) with low to average delays (5 to 34 seconds) and will operate with reserve capacity remaining (v/c ≤ 0.67). One exception is noted – the westbound left turn lane at the intersection of Highway 60 with Grandview Drive is expected to operate at LOS D during the weekday PM peak hour, with up to 37 seconds of delay (which remains acceptable notwithstanding).

Table 6: Intersection Operations – 2029 Background

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
			Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c
Highway 60 & Grandview Drive	EB L	signal	29	C	0.22	29	C	0.20	31	C	0.34
	EB T	signal	7	A	0.47	7	A	0.45	7	A	0.46
	EB R	signal	5	A	0.02	5	A	0.03	5	A	0.03
	WB L	signal	29	C	0.18	34	C	0.42	32	C	0.40
	WB T	signal	7	A	0.34	7	A	0.48	7	A	0.49
	WB R	signal	5	A	0.00	5	A	0.00	5	A	0.00
	NB L	signal	25	C	0.32	25	C	0.19	24	C	0.30
	NB TR	signal	23	C	0.00	24	C	0.01	23	C	0.02
	SB L	signal	23	C	0.02	24	C	0.04	23	C	0.03
	SB TR	signal	23	C	0.02	24	C	0.01	23	C	0.03
	overall	signal	8	A	0.44	8	A	0.45	8	A	0.46
Highway 60 & Canal Road	EB T	signal	14	B	0.50	14	B	0.45	15	B	0.54
	EB R	signal	12	B	0.17	13	B	0.22	13	B	0.23
	WB L	signal	8	A	0.11	8	A	0.10	9	A	0.12
	WB T	signal	8	A	0.24	9	A	0.38	9	A	0.38
	NB LR	signal	21	C	0.65	21	C	0.67	22	C	0.69
	overall	signal	13	B	0.56	13	B	0.56	14	B	0.61

Compared to existing conditions, delays on each movement throughout the network have increased slightly (up to 6 seconds) with nominal increases in utilized capacity (up to 23% higher usage).

Table 7: Intersection Operations – 2034 Background

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
			Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c
Highway 60 & Grandview Drive	EB L	signal	30	C	0.24	31	C	0.22	32	C	0.35
	EB T	signal	7	A	0.51	7	A	0.49	7	A	0.50
	EB R	signal	5	A	0.02	5	A	0.03	5	A	0.03
	WB L	signal	30	C	0.20	36	D	0.45	33	C	0.41
	WB T	signal	7	A	0.37	7	A	0.52	8	A	0.53
	WB R	signal	5	A	0.00	5	A	0.00	5	A	0.00
	NB L	signal	25	C	0.33	25	C	0.19	25	C	0.31
	NB TR	signal	23	C	0.01	24	C	0.01	23	C	0.02
	SB L	signal	23	C	0.02	24	C	0.04	23	C	0.03
	SB TR	signal	23	C	0.02	24	C	0.01	23	C	0.03
	overall	signal	8	A	0.48	8	A	0.49	8	A	0.50
Highway 60 & Canal Road	EB T	signal	15	B	0.56	15	B	0.51	16	B	0.60
	EB R	signal	13	B	0.19	13	B	0.23	14	B	0.25
	WB L	signal	8	A	0.13	9	A	0.12	9	A	0.15
	WB T	signal	9	A	0.27	9	A	0.42	9	A	0.43
	NB LR	signal	22	C	0.68	22	C	0.69	22	C	0.71
	overall	signal	14	B	0.61	14	B	0.61	15	B	0.66

Table 8: Intersection Operations – 2039 Background

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
			Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c
Highway 60 & Grandview Drive	EB L	signal	31	C	0.25	31	C	0.23	33	C	0.36
	EB T	signal	9	A	0.58	7	A	0.53	9	A	0.58
	EB R	signal	6	A	0.02	5	A	0.03	6	A	0.03
	WB L	signal	31	C	0.20	37	D	0.47	34	C	0.42
	WB T	signal	8	A	0.43	8	A	0.57	9	A	0.61
	WB R	signal	6	A	0.00	5	A	0.00	6	A	0.00
	NB L	signal	24	C	0.28	25	C	0.20	23	C	0.26
	NB TR	signal	22	C	0.01	24	C	0.01	22	C	0.01
	SB L	signal	22	C	0.02	25	C	0.04	22	C	0.03
	SB TR	signal	22	C	0.01	24	C	0.01	22	C	0.02
	overall	signal	9	A	0.53	8	A	0.53	9	A	0.55
Highway 60 & Canal Road	EB T	signal	16	B	0.63	16	B	0.57	18	B	0.67
	EB R	signal	13	B	0.20	14	B	0.25	15	B	0.27
	WB L	signal	9	A	0.16	9	A	0.15	10	B	0.18
	WB T	signal	9	A	0.30	11	B	0.48	11	B	0.48
	NB LR	signal	23	C	0.70	22	C	0.71	23	C	0.73
	overall	signal	15	B	0.66	15	B	0.65	16	B	0.71

3.5 ROAD NETWORK IMPROVEMENTS

Based on the results of the operational analyses under future background conditions, no improvements are required to accommodate the anticipated future background traffic through the 2039 horizon.

4 Proposed Development

This chapter will provide additional details with respect to the proposed development, including its location, land-use, site access, anticipated trip generation and assignment of said trips to the adjacent road network.

4.1 LOCATION

The subject site is located at 939 Highway 60, in the Town of Huntsville, District of Muskoka, as illustrated in Figure 1. The site is generally bounded by Highway 60 to the north, existing development to the south and east, and Grandview Drive to the west.

4.2 LAND USE

4.2.1 Previous Land-Use

The subject site is the location of The Inn Course, a 9-hole golf course previously operated by the Grandview Golf Club. The golf course is no longer in use.

4.2.2 Proposed Land-Use

The proposed development includes the construction of up to 120 townhouse units and 2,000 m^2 (21,528 ft^2) of commercial space. A concept plan is provided in Figure 13.

4.3 PHASING

The development is assumed to be fully built out by 2029.

4.4 SITE ACCESS

4.4.1 Access Design

Access to the proposed development will be provided by multiple private access points to Grandview Drive. Each access will be designed according to the relevant municipal standards for a commercial or multi-unit residential access, allowing for safe and efficient operations and access by anticipated design vehicles.

4.4.2 Access Separation

Access separation is the minimum suggested distance between an intersection and an adjacent driveway along a road. The distance is typically measured from the near curb of a street intersection to the near edge of an access or driveway throat and consists of 3 measurements: the intersection corner curb radius; a tangent section; and the curb radius of the driveway. As

per MTO's *Highway Corridor Management Manual*, the tangent section along Grandview Drive must be a minimum of 45 metres, with 85 metres or greater preferred. Based on the current concept plan, the closest access to Highway 60 provides a tangent length in the order of 70 metres, thus satisfying the minimum required separation.

4.5 CIRCULATION

Circulation within the site will be provided via a new, central private road (cul-de-sac) connecting to Grandview Drive along with several other private roads (some of which will also provide direct access to Grandview Drive). The road network will be constructed to the appropriate municipal standards for private roads.

4.6 PARKING

As per the Town's *Community Planning Permit By-law*[10], a townhouse dwelling is required to supply 2 parking spaces per unit, of which one space may be located in a garage.

With respect to the commercial development space, parking must be provided at a rate of 1 parking space per 25 m^2 GFA. Based on the proposed 2,000 m^2 of commercial area, a total of 80 parking spaces are required for the commercial use.

4.7 SITE TRAFFIC

4.7.1 Trip Generation

Gross Trips

The number of vehicle trips to be generated by the proposed development for the weekday AM, weekday PM peak and Saturday peak hours has been determined based on type of use, development size and trip generation rates per the *ITE Trip Generation Manual, 11th Edition*[11]. Based on the proposed development, trip rates for the following land-uses have been applied:

- *single family attached* (ITE land-use code 215); and
- *strip retail plaza* (ITE land-use code 822).

Trip rates for the noted land uses are summarized in Table 9, with corresponding trip estimates provided in Table 10. As indicated, the proposed development is anticipated to generate 108 trips during the weekday AM peak hour and 210 trips during the weekday PM and Saturday peak hours.

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[10] *Community Planning Permit By-law 2022-97*. Town of Huntsville, SGL Planning & Design Inc, and Dillon Consulting, as consolidated May 22, 2024.
[11] *Trip Generation Manual, 11th Edition*. Institute of Transportation Engineers, September 2021.

Table 9: Trip Rates – 939 Highway 60

LAND USE	VARIABLE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
		In	Out	Total	In	Out	Total	In	Out	Total
single family attached (ITE 215)	per unit	0.15	0.33	0.48	0.32	0.25	0.57	0.27	0.30	0.57
strip retail plaza (ITE 822)	per 1,000 ft^2 GFA	1.42	0.94	2.36	3.30	3.30	6.59	3.35	3.22	6.57

Table 10: Trip Estimates (Gross) – 939 Highway 60

LAND USE	VARIABLE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
		In	Out	Total	In	Out	Total	In	Out	Total
townhouses	120 units	18	40	58	39	29	68	33	36	69
commercial space	21,528 ft^2	30	20	50	71	71	142	72	69	141
Total Gross Trips		**48**	**60**	**108**	**110**	**100**	**210**	**105**	**105**	**210**

Trip Adjustments

Not all of the trips noted above are expected to be new trips on the road network. A portion of these trips are expected to consist of internal and/or pass-by trips, defined as follows:

- An internal trip occurs when there is an interaction between the uses on a single site; such as someone living in one of the residential units patronizing one of the shops in the on-site commercial space. For such trips, it is common practice to apply a reduction to the gross trip estimates to avoid double-counting.
- A pass-by trip occurs when a motorist passing the site on an adjacent road interrupts their travel to stop at the site before resuming their intended trip. In this case, motorists passing the site on Highway 60 may interrupt their travel to stop at one of the shops within the development before continuing to their intended destination.

To account for internal trips, a 10% reduction has been applied to the gross trip estimates during each peak period.

To account for pass-by trips, pass-by trip data provided in the ITE *Trip Generation Handbook*[12] for the *shopping centre* land-use has been applied as follows (as there is no such data for the *retail plaza* land use, the shopping centre data has been employed as representative):

- PM peak hour – 34%; and
- Saturday peak hour – 26%.

It is noted that pass-by rates for the weekday AM peak hour have not been established for the *shopping centre* land use in that such are not typically open during the AM peak hour and thus do not generate pass-by activity.

A summary of the trip estimates by type and corresponding net new trips on the adjacent road network is provided in Table 11. In employing the *strip retail plaza*, it is assumed that the commercial component will generate traffic during the AM peak hour and thus will also generate pass-by trips during this same period. In absences of ITE data, a pass-by rate of 10% has been assumed.

Table 11: Trip Estimates (Net) – 939 Highway 60

LAND USE	VARIABLE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
		In	Out	Total	In	Out	Total	In	Out	Total
Total Gross Trips		**48**	**60**	**108**	**110**	**100**	**210**	**105**	**105**	**210**
Internal Trips	10%	5	6	11	11	10	21	10	11	21
Pass-by Trips	10%/34%/26% AM/PM/SAT	2	2	4	24	24	48	18	18	36
Total Net Trips		**41**	**52**	**93**	**75**	**66**	**141**	**77**	**76**	**153**

As indicated, the proposed development is expected to generate 93 new trips during the weekday AM peak hour, 141 new trips during the weekday PM peak hour, and 153 new trips during the Saturday mid-day peak hour.

It is further noted that, as detailed in Section 4.2.1, the proposed development will be located on the site of a former 9-hole golf course. Based on ITE trip data for a golf course use, this use is expected to have generated in the order of 15 to 25 peak hour trips when in operation. While these trips could be subtracted from the trip estimates noted above, the golf course was not in

[12] *Trip Generation Handbook, 3rd Edition*. Institute of Transportation Engineers, September 2017.

operation at the time the 2024 traffic counts were completed. Therefore, negating these trips would result removal of trips which are already absent from the road network. Therefore, no adjustments were made to remove trips associated with the golf course from the network.

4.7.2 Trip Distribution

New Trips

The distribution of new trips generated by the site has been developed based on the location of the site in relation to existing built-up areas (Huntsville, Dwight, etc.), location of other major trip attractors/generators (such as Algonquin Provincial Park), and existing traffic patterns observed within the study area. The following distribution has been assumed:

- 0% to/from the north via Grandview Drive;
- 10% to/from the south via Canal Road;
- 20% to/from the east via Highway 60; and
- 70% to/from the west via Highway 60.

Pass-by Trips

As previously defined, pass-by trips are those trips that are already on the road network and expected to stop at the subject site as they travel past. The distribution of these pass-by trips is therefore proportional to the directional volumes passing by the site during peak periods. The greatest approach volume past the site will generate the greatest number of pass-by trips. Pass-by trips were distributed to/from Highway 60, as this represents the primary travel corridor adjacent to the subject site. The following distribution was realized:

Weekday PM Peak

- 48% eastbound
- 52% westbound

Saturday Mid-Day Peak

- 49% eastbound
- 51% westbound

Access Assignment

As noted previously, access to the site is expected to be provided from multiple connections to Grandview Drive. For the purposes of this study, all site traffic has been assigned though a single conceptual access point on Grandview Drive. This ensures a conservative assessment of access operations; if more than one access is ultimately provided on Grandview Drive, site traffic will be distributed across each one, resulting in better access operations than demonstrated in this study.

4.7.3 Trip Assignment

The assignment of site traffic to the adjacent road network is illustrated as follows:

- Figure 14 – new site traffic;
- Figure 15 – pass-by site traffic; and
- Figure 16 – total site traffic.

5 Future Total Conditions

This chapter will address the resulting impacts of the proposed development on the adjacent road system. The following areas will be addressed:

- operations of the key intersections; and
- potential improvements to the study area road network, if necessary.

5.1 TRAFFIC VOLUMES

To assess the impacts of the proposed development, the site-generated traffic volumes were added to the background traffic volumes for each horizon year. The resulting future total traffic volumes are illustrated in Figure 17 through Figure 19.

5.2 TRAFFIC OPERATIONS

A final operational analysis of the study area intersections was conducted for the future horizons to determine the impact of the proposed development. Operations of the future site access were also reviewed, assuming a single lane approach on Grandview Drive operating under stop control. Results of the operational analyses are summarized in Table 12 through Table 14, with detailed operations worksheets provided in Appendix G.

As indicated, each intersection is expected to continue to provide excellent overall operations (LOS B or better) through the 2039 horizon. Each individual movement is expected to provide acceptable operations (LOS D or better) with low to average delays (5 to 39 seconds) and will operate with reserve capacity remaining ($v/c \leq 0.74$). One exception is noted; the westbound left turn lane at the intersection of Highway 60 with Grandview Drive is expected to operate at LOS E during the weekday AM peak hour, with up to 70 seconds of delay by the 2039 horizon. It is noted that this is due to the fully protected operation of the westbound left signal coupled with the low number of vehicles expected to turn during the AM peak hour – if a single vehicle arrives just after the start of a new cycle, it will have to wait nearly a full cycle to receive a green turn signal. As noted under PM peak conditions, increased traffic volumes on the movement actually result in lower overall delays per vehicle, as some vehicles arrive closer to when the turn signal changes to green. As such, this movement is not considered problematic.

The site access is expected to provide excellent operations (LOS A) with low delays (<10 seconds) and significant reserve capacity remaining ($v/c \leq 0.10$) through the 2039 horizon. Given that a single access point is demonstrated to provide acceptable operations through the 2039 horizon, no operational concerns are anticipated should multiple access points to the proposed development ultimately be provided along Grandview Drive

Table 12: Intersection Operations – 2029 Total

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
			Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c
Highway 60 & Grandview Drive	EB L	signal	29	C	0.22	32	C	0.21	34	C	0.35
	EB T	signal	9	A	0.54	11	B	0.55	11	B	0.54
	EB R	signal	8	A	0.04	9	A	0.10	9	A	0.09
	WB L	signal	45	D	0.56	29	C	0.45	29	C	0.42
	WB T	signal	9	A	0.40	9	A	0.53	9	A	0.52
	WB R	signal	7	A	0.00	7	A	0.00	7	A	0.00
	NB L	signal	22	C	0.38	24	C	0.41	24	C	0.48
	NB TR	signal	19	B	0.02	21	C	0.03	21	C	0.03
	SB L	signal	19	B	0.01	21	C	0.03	21	C	0.02
	SB TR	signal	19	B	0.01	21	C	0.01	21	C	0.02
	overall	signal	11	B	0.51	12	B	0.53	12	B	0.54
Highway 60 & Canal Road	EB T	signal	14	B	0.51	14	B	0.47	15	B	0.55
	EB R	signal	12	B	0.18	13	B	0.22	13	B	0.24
	WB L	signal	8	A	0.11	8	A	0.11	9	A	0.13
	WB T	signal	8	A	0.24	9	A	0.39	9	A	0.40
	NB LR	signal	21	C	0.65	22	C	0.67	22	C	0.70
	overall	signal	14	B	0.57	13	B	0.57	14	B	0.63
Grandview Drive & Site Access	WB LR	stop	9	A	0.06	9	A	0.09	9	A	0.10

Table 13: Intersection Operations – 2034 Total

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
			Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c
Highway 60 & Grandview Drive	EB L	signal	31	C	0.25	33	C	0.22	36	D	0.36
	EB T	signal	11	B	0.58	12	B	0.59	12	B	0.58
	EB R	signal	7	A	0.04	9	A	0.10	9	A	0.09
	WB L	signal	64	E	0.63	30	C	0.47	30	C	0.43
	WB T	signal	9	A	0.43	9	A	0.57	9	A	0.57
	WB R	signal	7	A	0.00	7	A	0.00	7	A	0.00
	NB L	signal	22	C	0.39	24	C	0.42	25	C	0.48
	NB TR	signal	19	B	0.02	22	C	0.03	22	C	0.03
	SB L	signal	19	B	0.01	22	C	0.03	22	C	0.02
	SB TR	signal	19	B	0.01	22	C	0.01	22	C	0.02
	overall	signal	11	B	0.54	12	B	0.57	12	B	0.57
Highway 60 & Canal Road	EB T	signal	15	B	0.57	15	B	0.53	17	B	0.62
	EB R	signal	13	B	0.19	13	B	0.24	14	B	0.26
	WB L	signal	9	A	0.14	9	A	0.12	9	A	0.15
	WB T	signal	9	A	0.27	9	A	0.44	11	B	0.44
	NB LR	signal	22	C	0.68	22	C	0.69	23	C	0.71
	overall	signal	14	B	0.61	14	B	0.62	15	B	0.67
Grandview Drive & Site Access	WB LR	stop	9	A	0.06	9	A	0.09	9	A	0.10

Table 14: Intersection Operations – 2039 Total

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
			Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c
Highway 60 & Grandview Drive	EB L	signal	32	C	0.26	34	C	0.23	39	D	0.41
	EB T	signal	11	B	0.62	12	B	0.62	12	B	0.62
	EB R	signal	7	A	0.04	8	A	0.10	9	A	0.09
	WB L	signal	70	E	0.66	31	C	0.48	31	C	0.44
	WB T	signal	9	A	0.46	10	A	0.61	10	A	0.60
	WB R	signal	7	A	0.00	7	A	0.00	7	A	0.00
	NB L	signal	23	C	0.39	25	C	0.43	26	C	0.49
	NB TR	signal	21	C	0.02	22	C	0.03	22	C	0.03
	SB L	signal	21	C	0.01	23	C	0.03	22	C	0.02
	SB TR	signal	21	C	0.01	22	C	0.01	22	C	0.02
	overall	signal	12	B	0.57	12	B	0.60	13	B	0.60
Highway 60 & Canal Road	EB T	signal	17	B	0.64	17	B	0.59	18	B	0.67
	EB R	signal	13	B	0.21	14	B	0.26	15	B	0.28
	WB L	signal	9	A	0.16	9	A	0.15	11	B	0.19
	WB T	signal	9	A	0.30	11	B	0.49	11	B	0.49
	NB LR	signal	23	C	0.71	22	C	0.71	24	C	0.74
	overall	signal	15	B	0.67	15	B	0.67	16	B	0.72
Grandview Drive & Site Access	WB LR	stop	9	A	0.06	9	A	0.09	9	A	0.10

Compared to the background conditions, delays on each movement throughout the network have increased nominally (up to 6 seconds) with moderate increases in utilized capacity (up to 23% higher usage). One exception is noted, with the westbound left movement at Highway 60 and Grandview Drive seeing increases of up to 46% in utilized capacity. This is attributable to the increase in left turning traffic resulting from the proposed development; it is not considered

problematic, however, as the movement still operates with significant reserve capacity remaining.

5.3 ROAD NETWORK IMPROVEMENTS

5.3.1 Intersection Operations

Based on the results of the operational analysis under total conditions, no road network improvements are required to accommodate the proposed development.

5.3.2 Turn Lane Requirements

Given the low volume of traffic projected on Grandview Drive, dedicated left and right turn lanes are not necessary to serve the proposed development.

Given the acceptable operations demonstrated along Highway 60, no modifications to the existing turn lanes are considered necessary to accommodate the proposed development.

6 Summary

This study has addressed the transportation impacts associate with the proposed mixed-use development to be located at 939 Highway 60 in the Town of Huntsville.

Proposed Development

The proposed development will consist of up to 120 townhouse residential units and 2,000 m^2 of commercial space. Upon completion, the development is expected to generate 93 new trips during the weekday AM peak hour, 141 new trips during the weekday PM peak hour and 153 new trips during the Saturday peak hour.

Transportation Impacts

In assessing the impact of the proposed development on the study area road system, the key intersections were reviewed under existing (2024) and future (2029, 2034 and 2039) horizon periods.

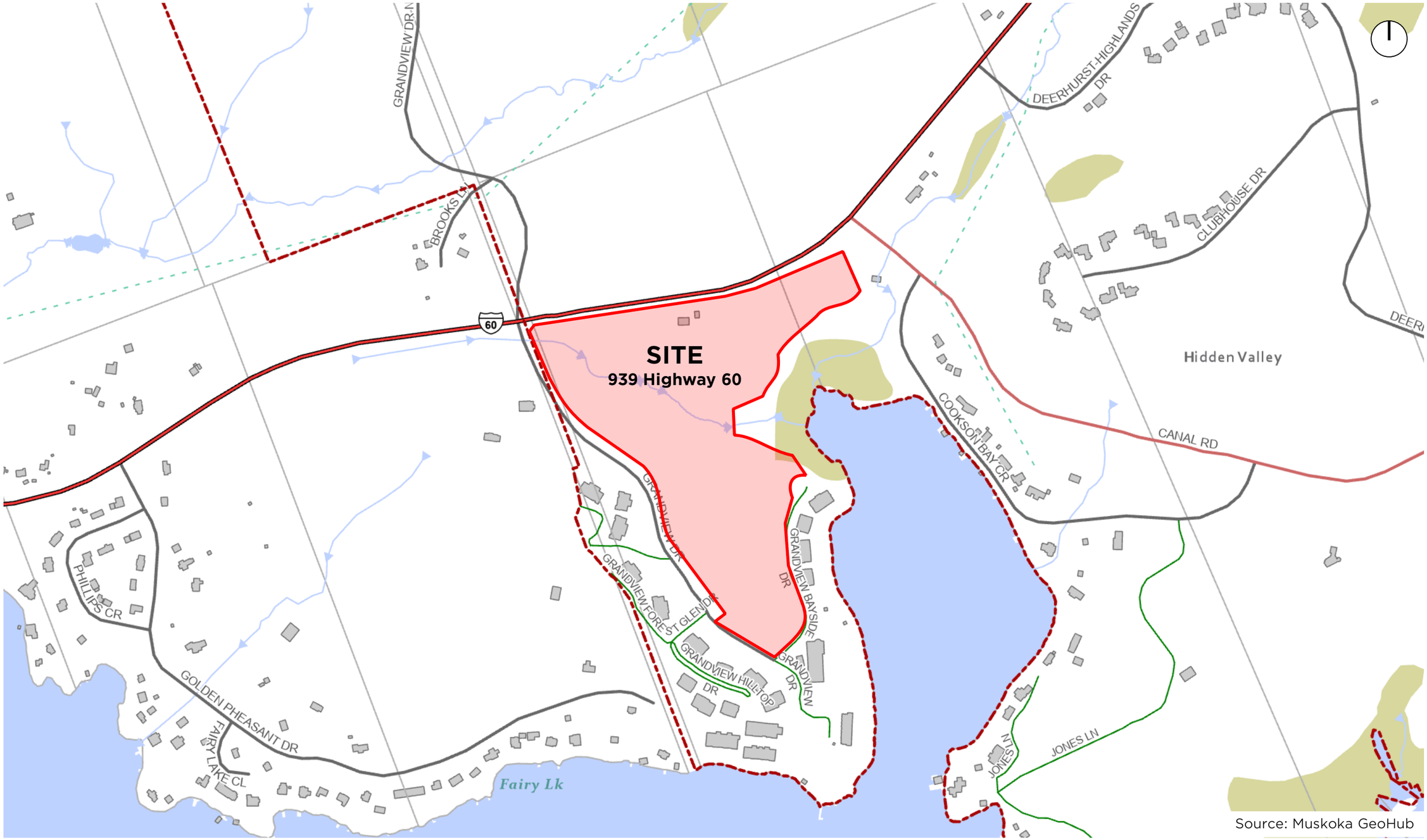
Results of the operational analyses at each study intersection indicate that the intersections currently provide excellent overall operations (LOS B or better) under existing conditions and are expected to continue to provide excellent overall operations (LOS B or better) through the 2039 horizon under both background and total conditions. Individual movements at each intersection currently provide good operations (LOS C or better) with low to average delays and reserve capacity remaining. These movements are expected to provide acceptable operations (LOS E or better) with low to moderate delays and reserve capacity remaining through the 2039 horizon under both background and total conditions.

All site traffic was assumed to travel through a single site access point on Grandview Drive. This conceptual access point was found to provide excellent operations (LOS A) with low delays and significant reserve capacity remaining through the 2039 horizon.

Overall, the proposed development was not found to have a significant impact on the operations of the study area road network.

Turn Lane Requirements

No turn lanes are required on Grandview Drive to serve the proposed development. No modifications to the existing turn lanes at the study intersections along Highway 60 are required to accommodate the proposed development.



Source: Muskoka GeoHub

Figure 1: Site Location

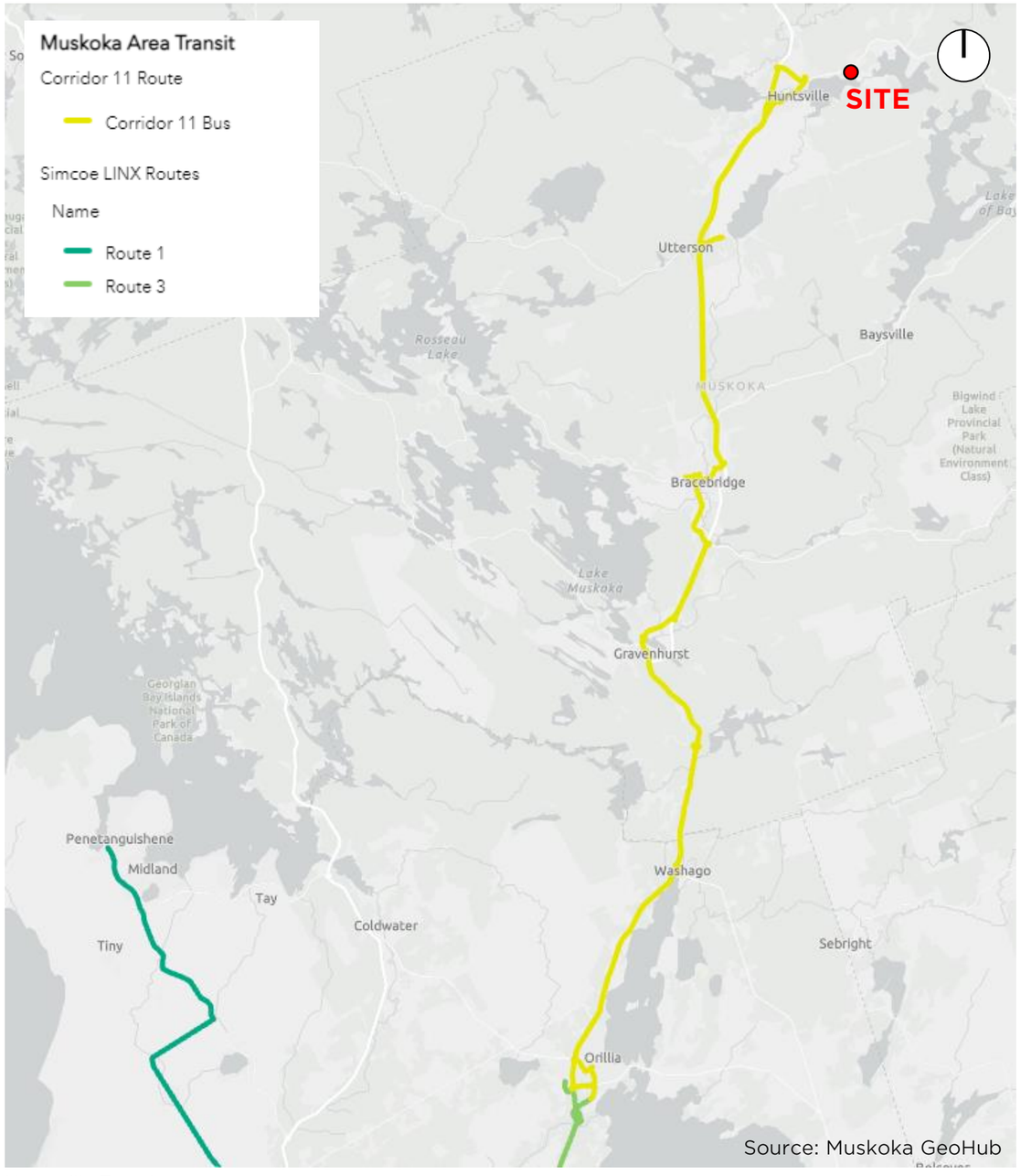
939 HIGHWAY 60 – TRANSPORTATION IMPACT STUDY

Figure 2: Study Area Road Network

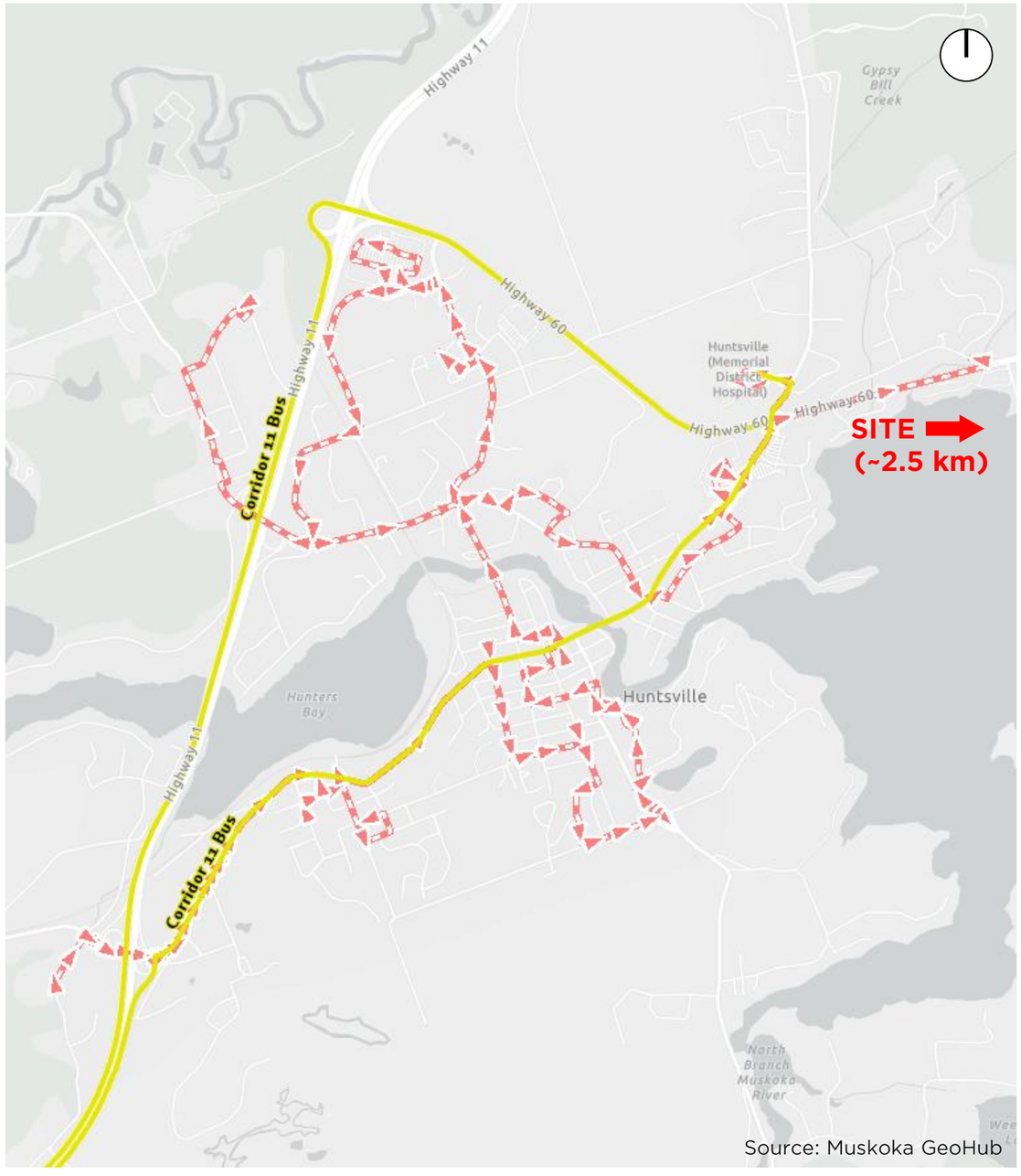
Intersection of Highway 60 with Grandview Drive

Intersection of Highway 60 with Canal Road

Figure 3: Study Area Intersections



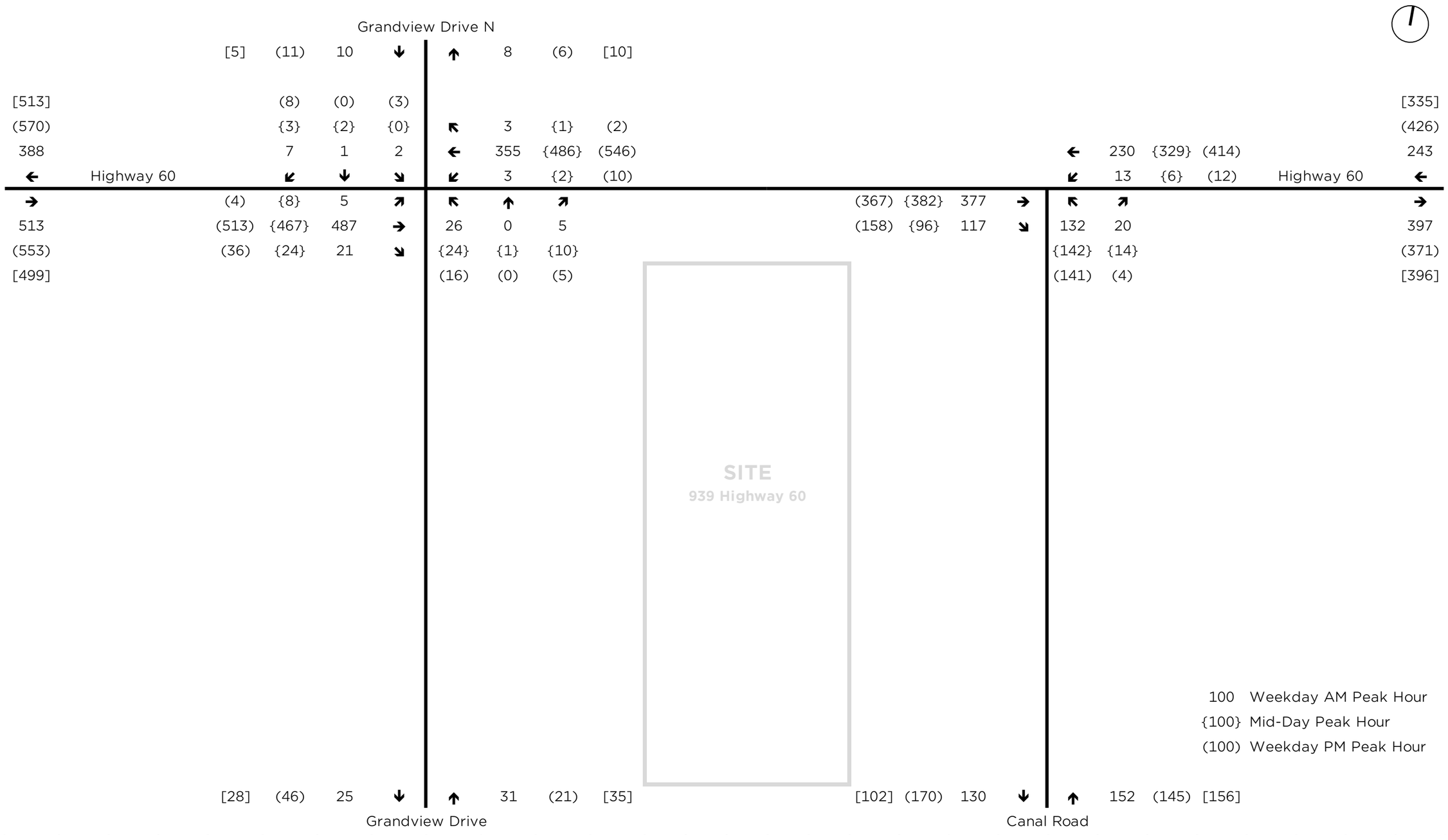
Huntsville Transit



Corridor 11

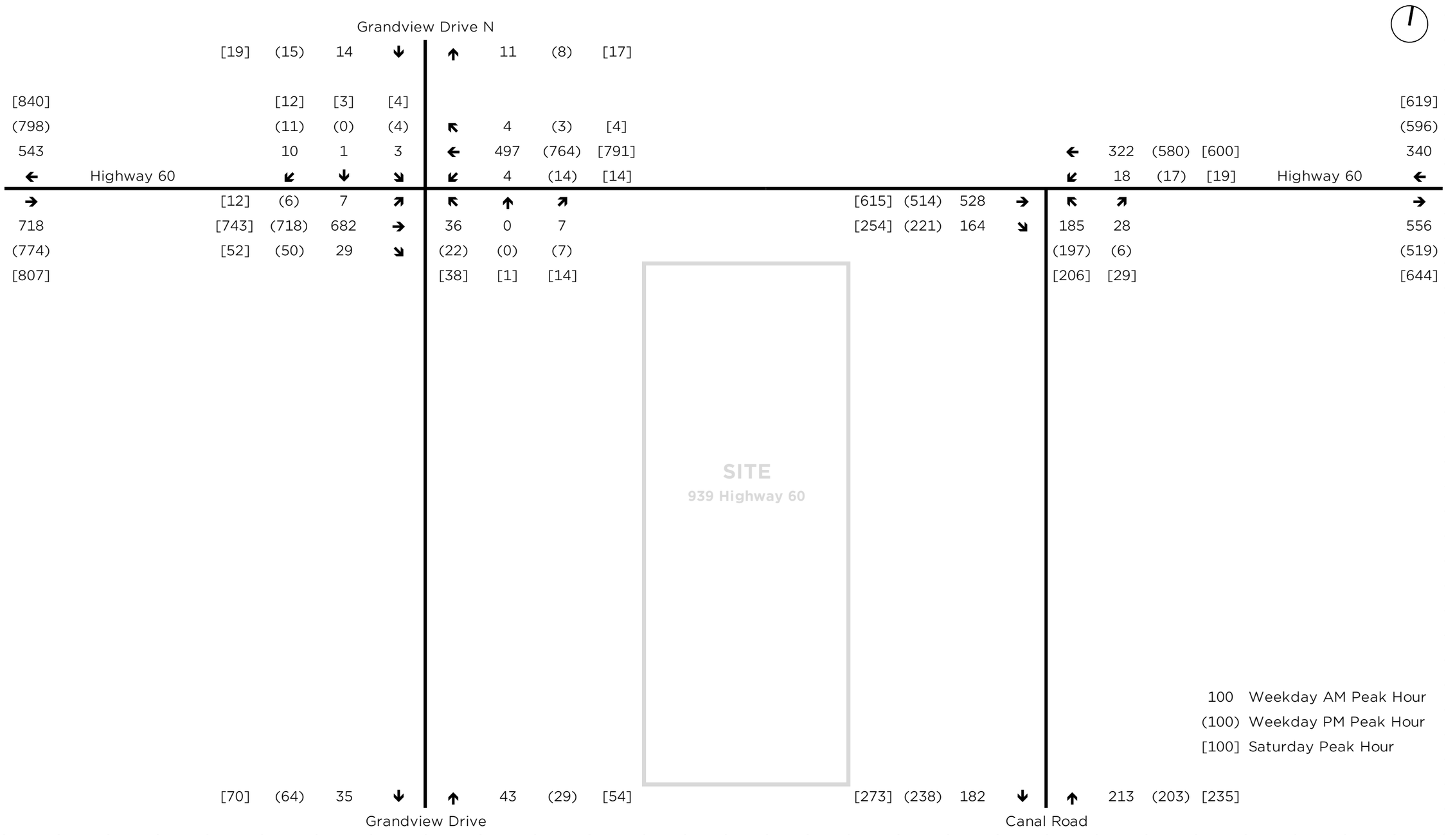
939 HIGHWAY 60 – TRANSPORTATION IMPACT STUDY

Figure 4: Transit Networks – Existing



939 HIGHWAY 60 – TRANSPORTATION IMPACT STUDY

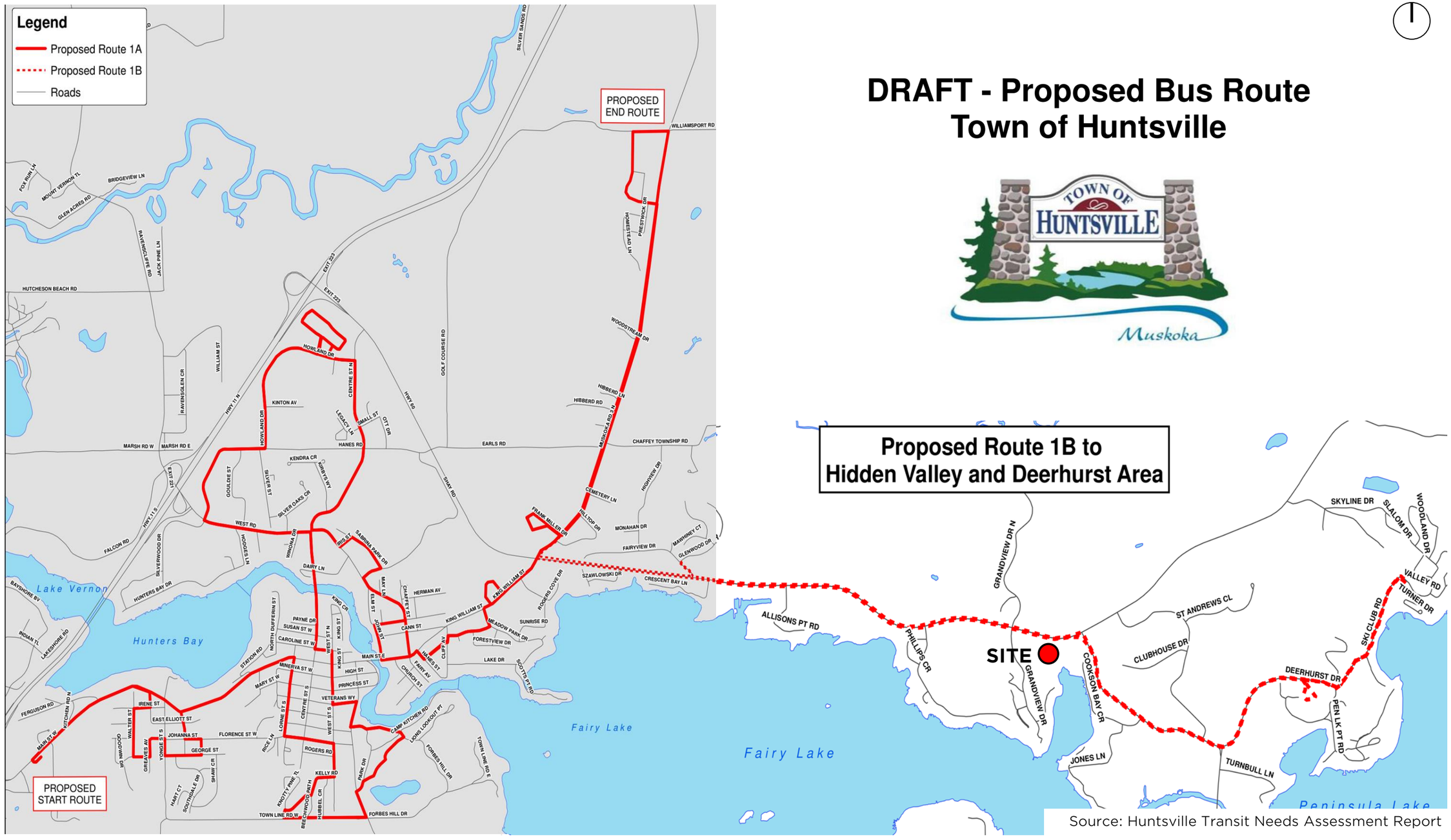
Figure 5: Traffic Counts – 2024



939 HIGHWAY 60 – TRANSPORTATION IMPACT STUDY

Figure 6: Traffic Volumes – 2024

DRAFT - Proposed Bus Route
Town of Huntsville



Source: Huntsville Transit Needs Assessment Report

939 HIGHWAY 60 – TRANSPORTATION IMPACT STUDY

Figure 7: Transit Network – Huntsville Transit Conceptual Routes

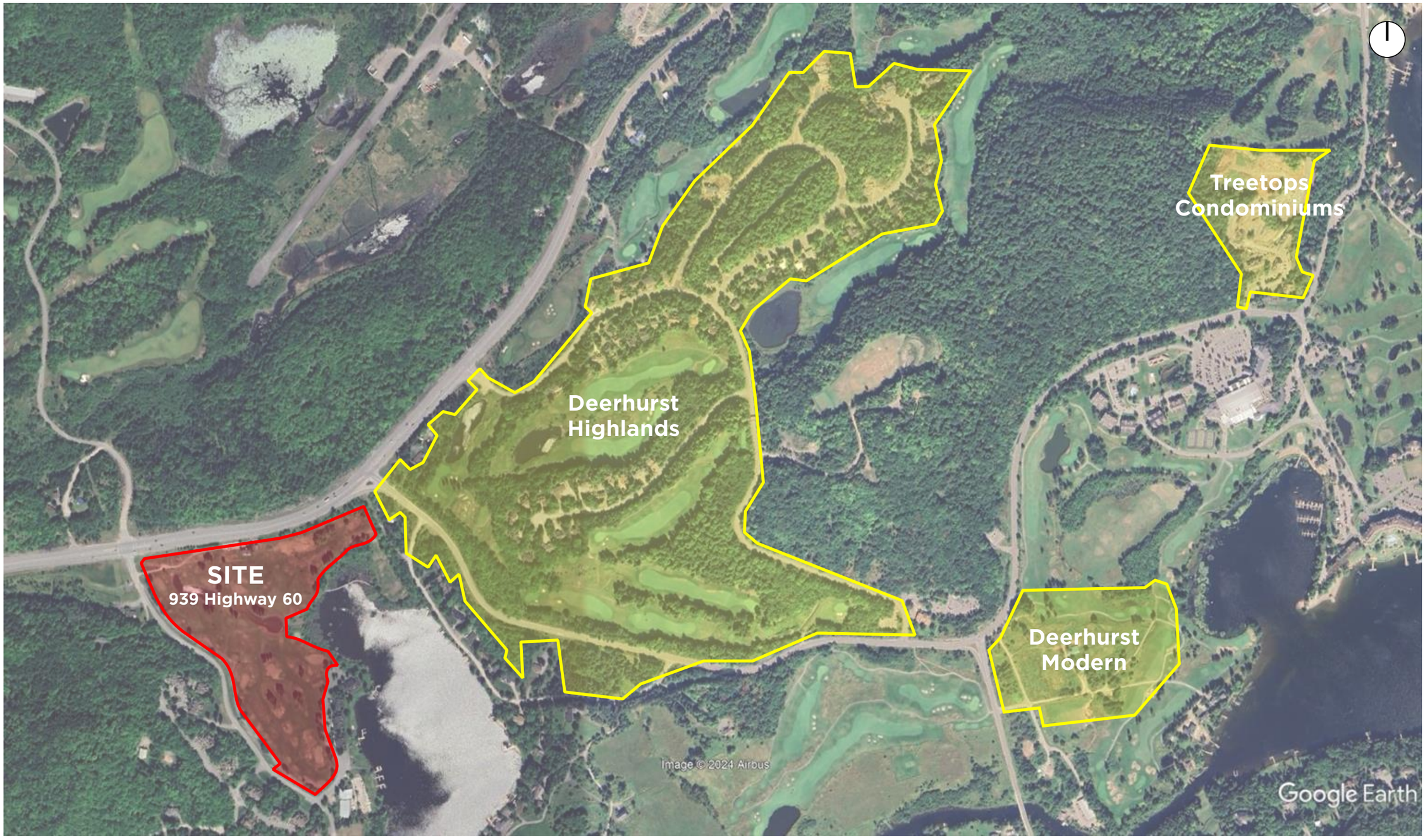
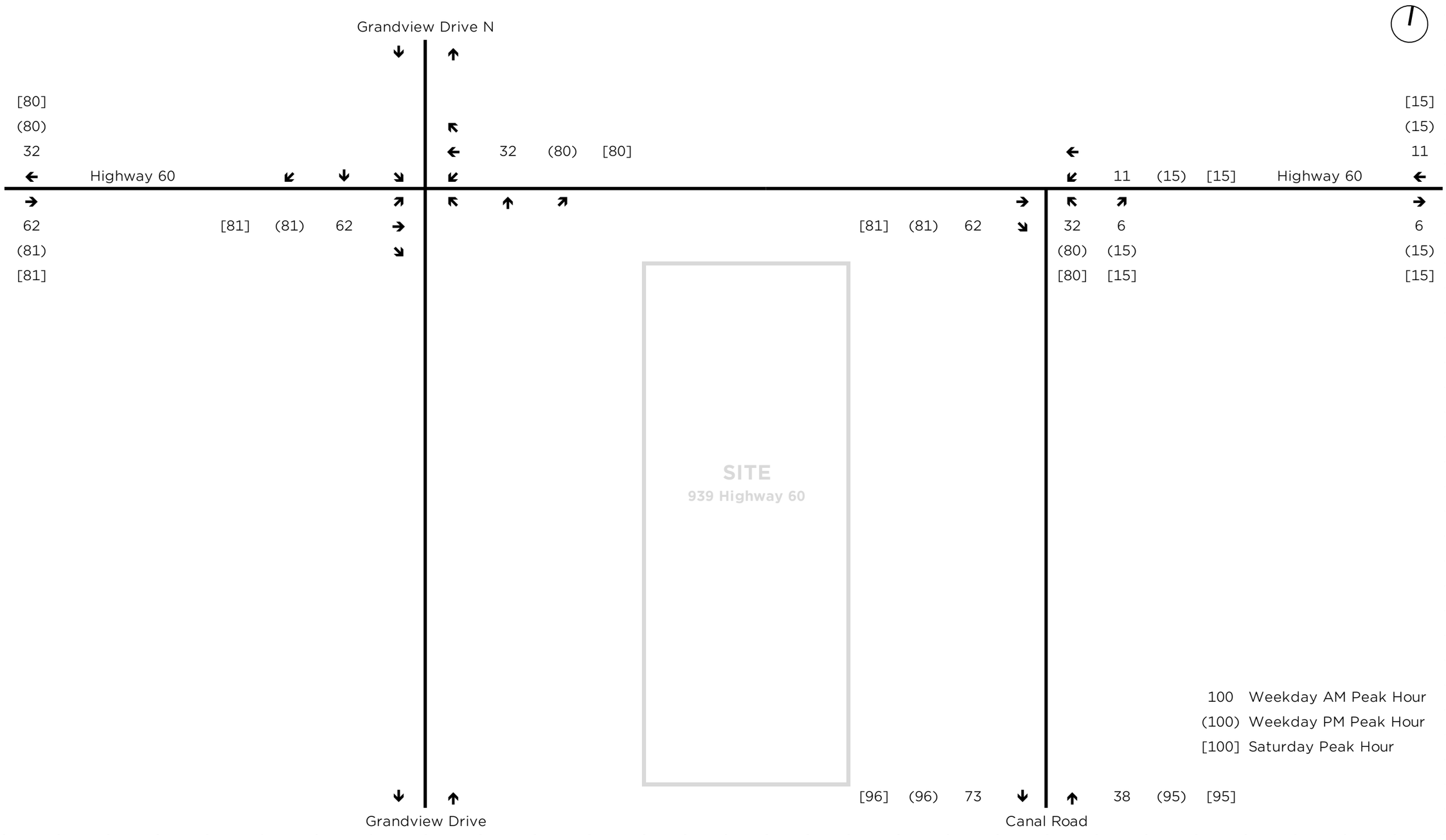
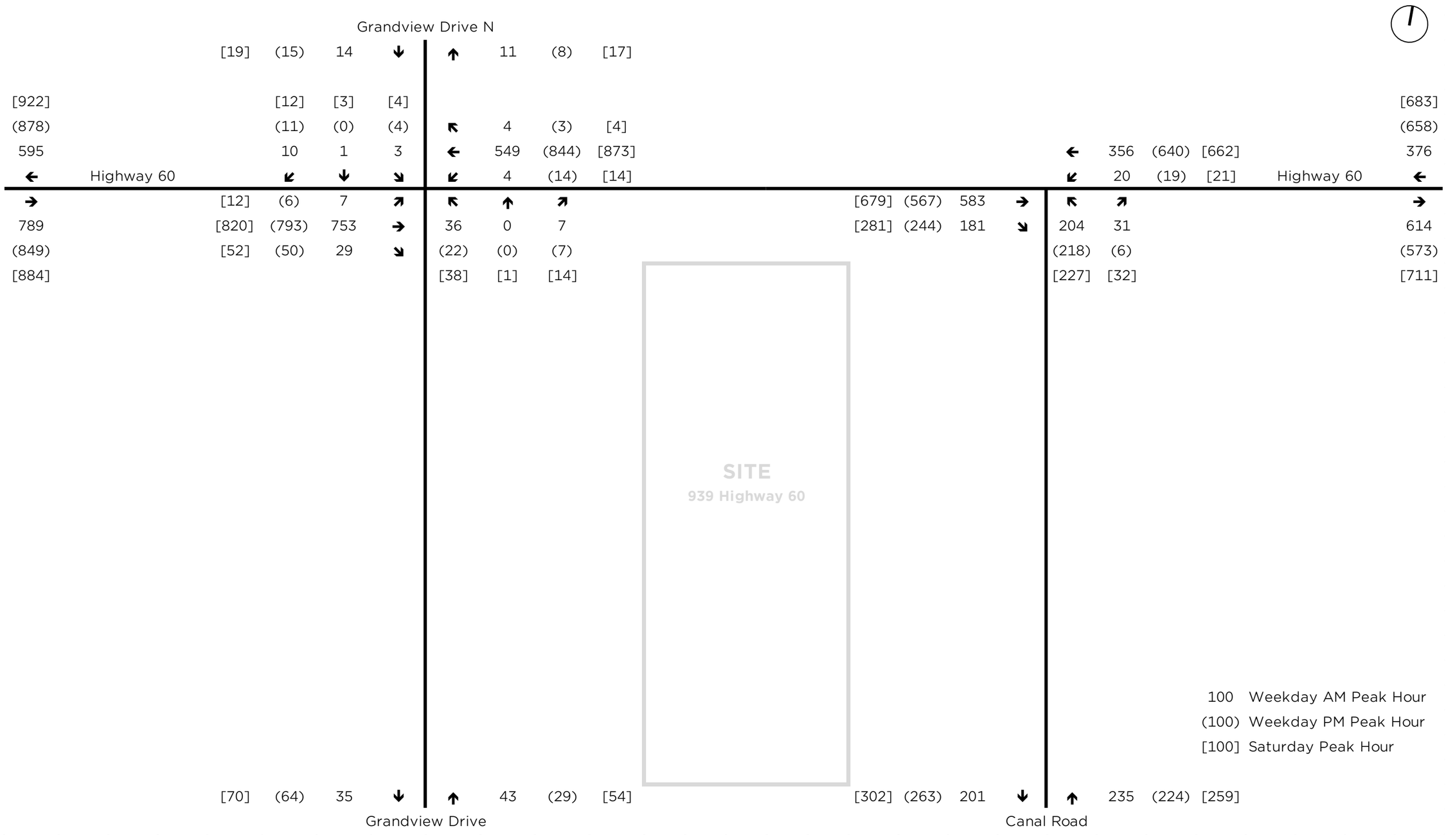


Figure 8: Background Developments



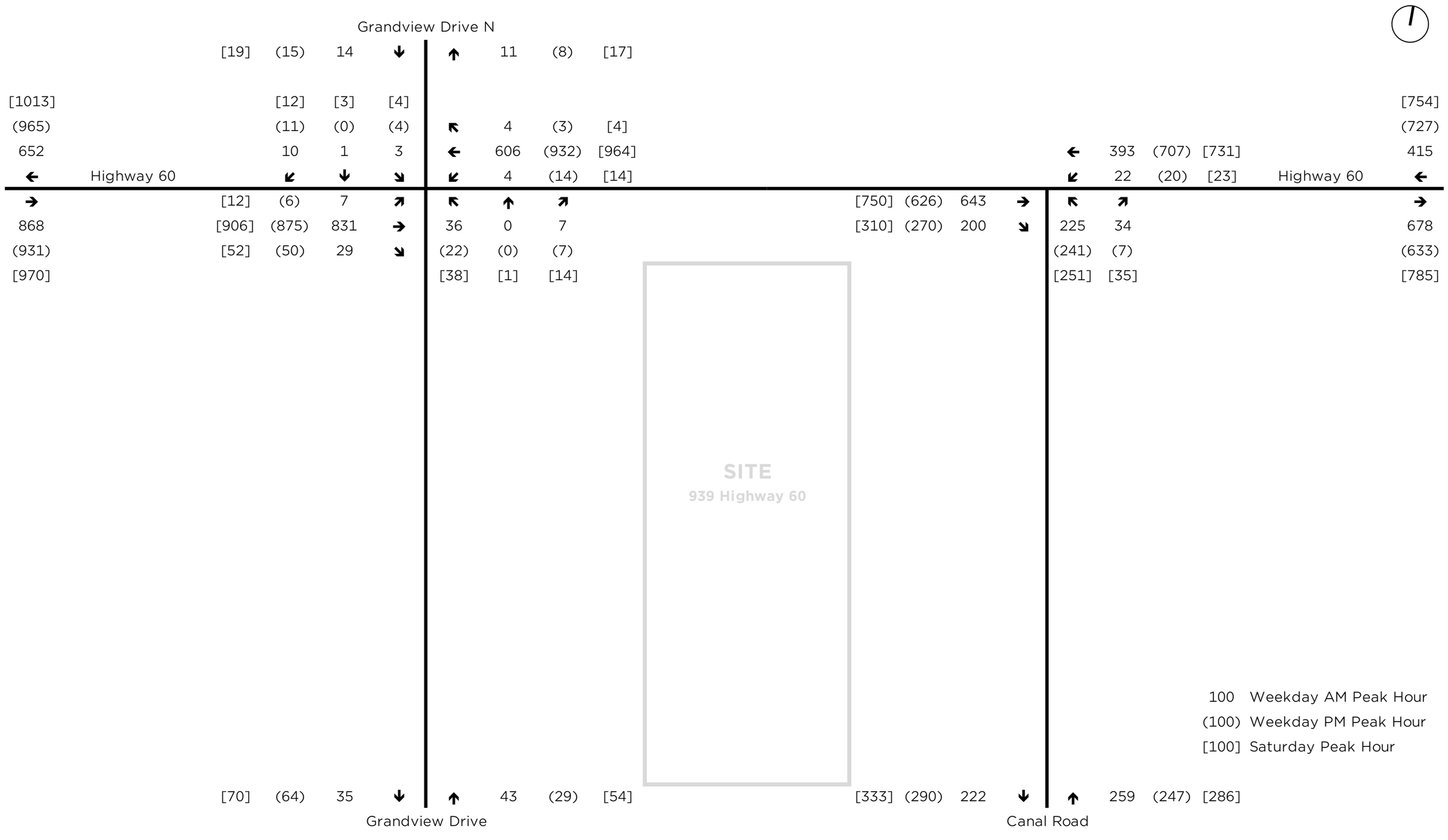
939 HIGHWAY 60 – TRANSPORTATION IMPACT STUDY

Figure 9: Background Development Traffic – Deerhurst Modern



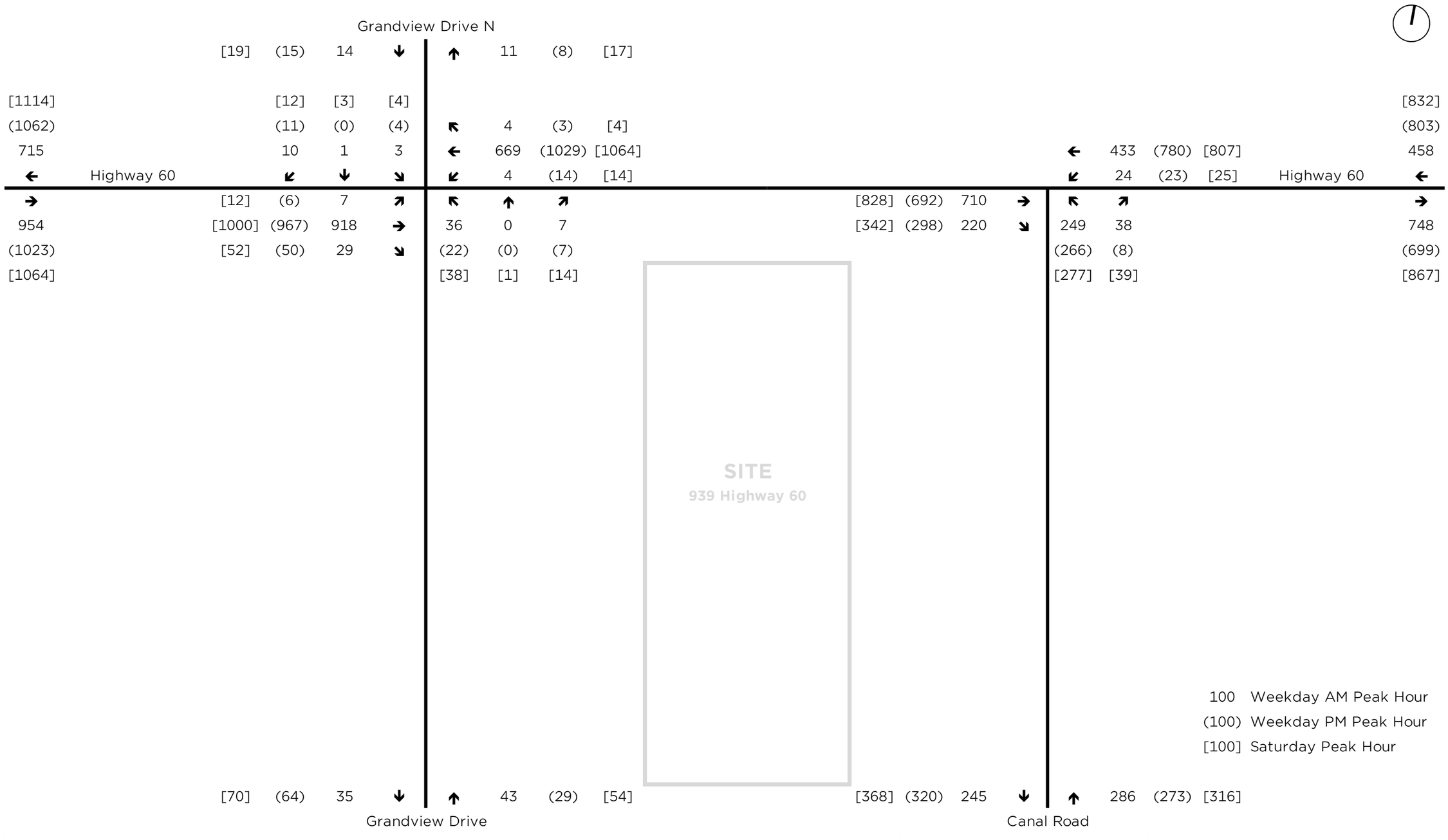
939 HIGHWAY 60 – TRANSPORTATION IMPACT STUDY

Figure 10: Traffic Volumes – 2029 Background



939 HIGHWAY 60 – TRANSPORTATION IMPACT STUDY

Figure 11: Traffic Volumes – 2034 Background



939 HIGHWAY 60 – TRANSPORTATION IMPACT STUDY

Figure 12: Traffic Volumes – 2039 Background

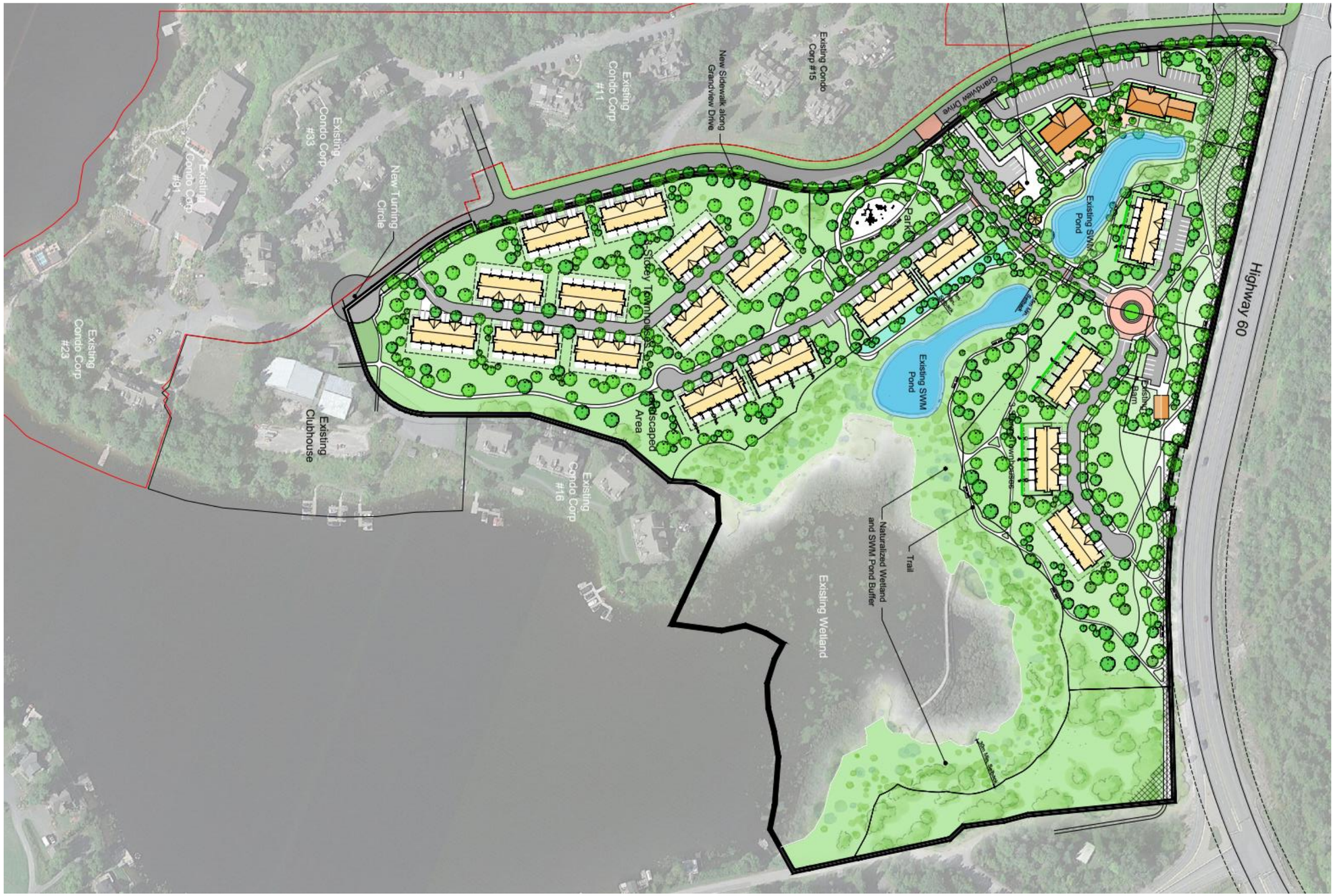


Figure 13: Concept Plan

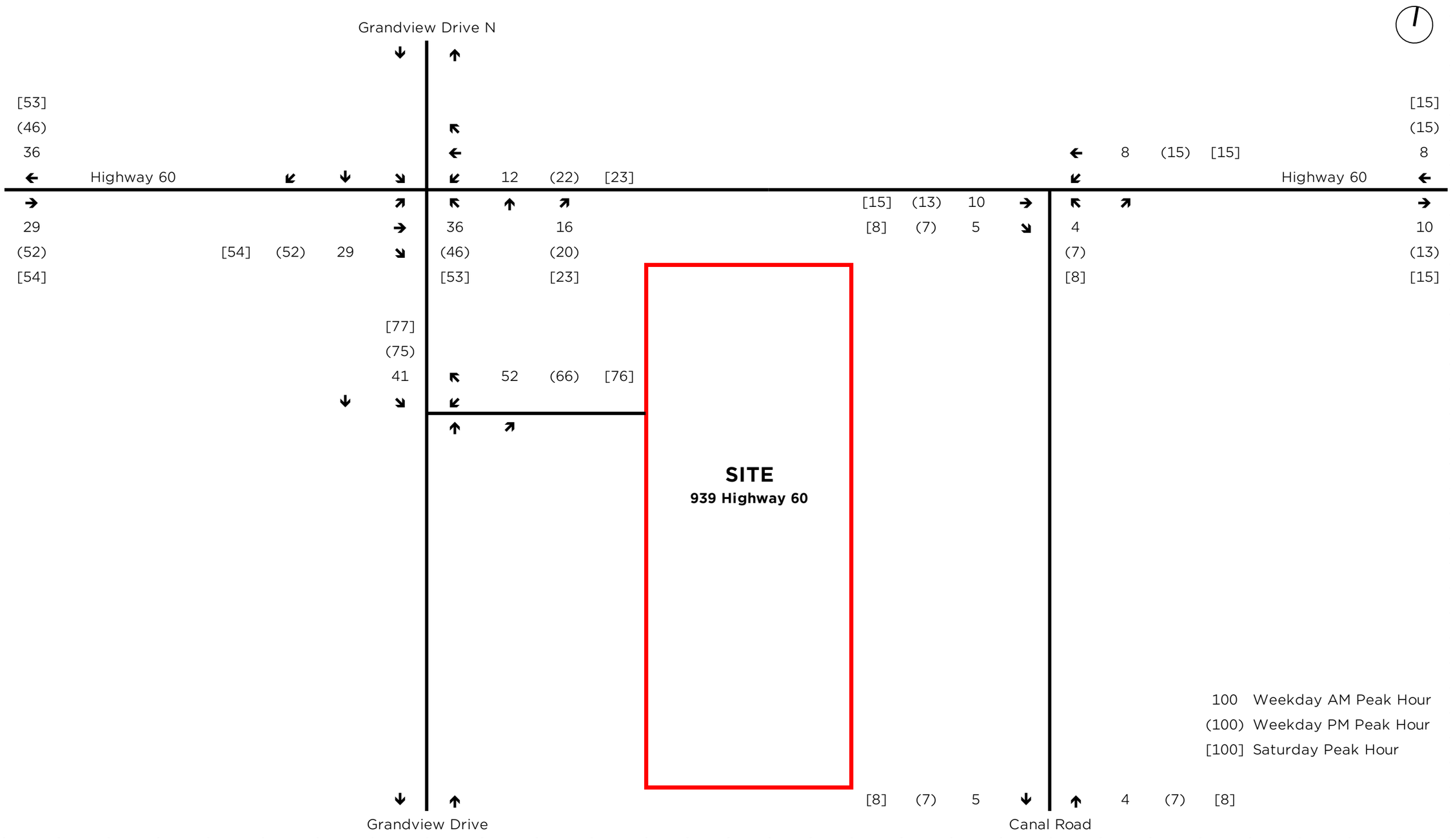


Figure 14: Site Traffic – New Trips

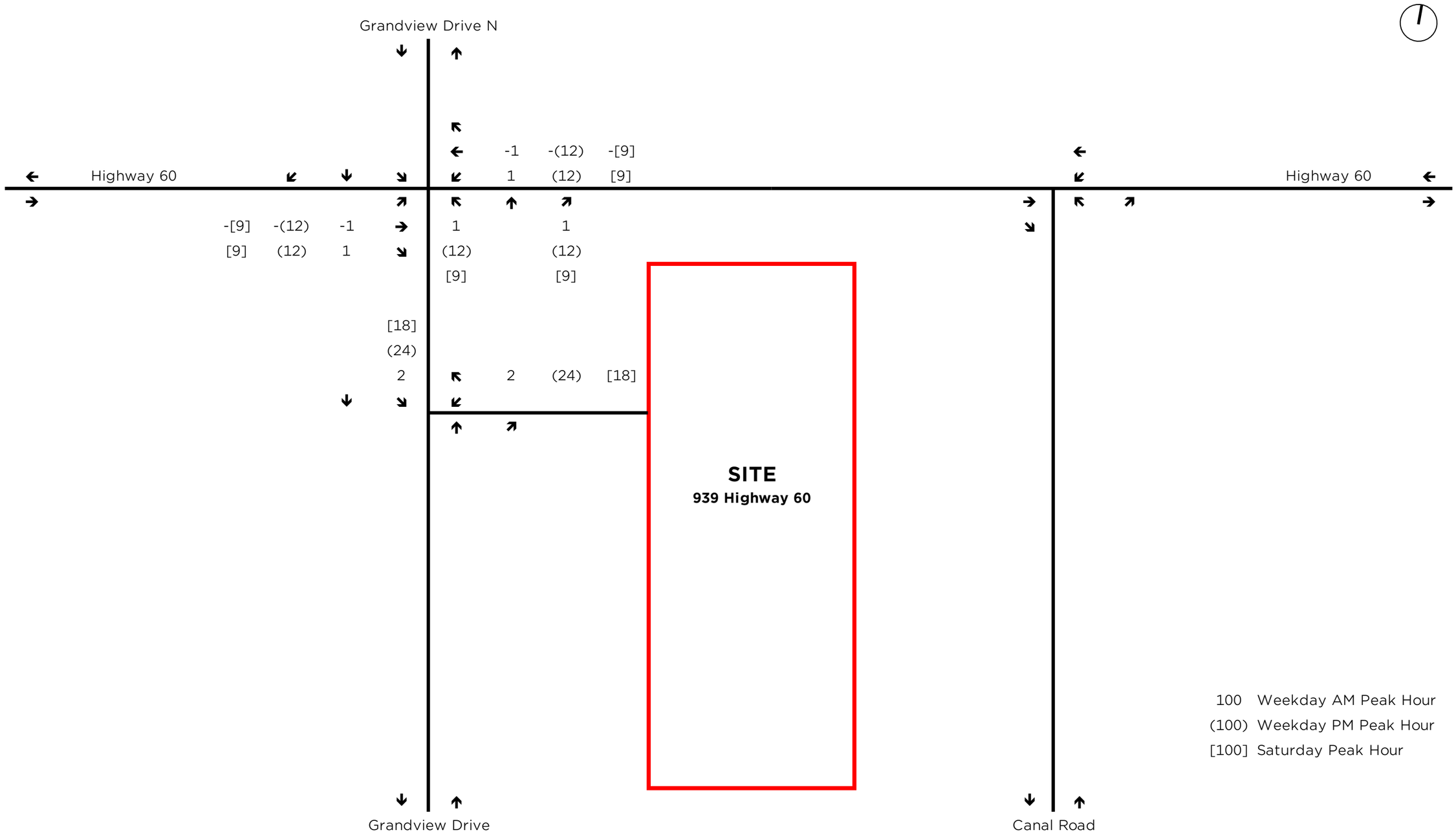
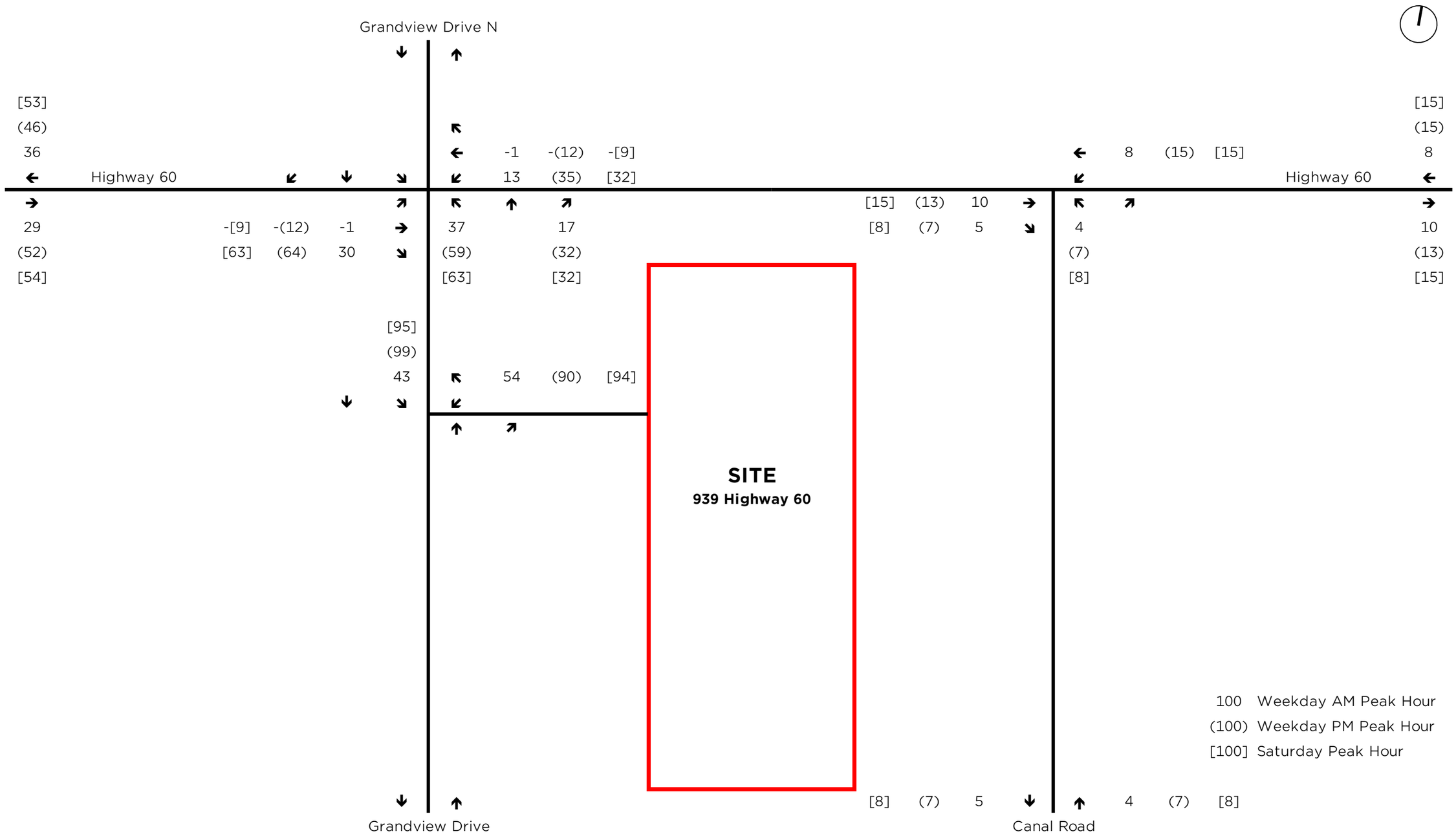
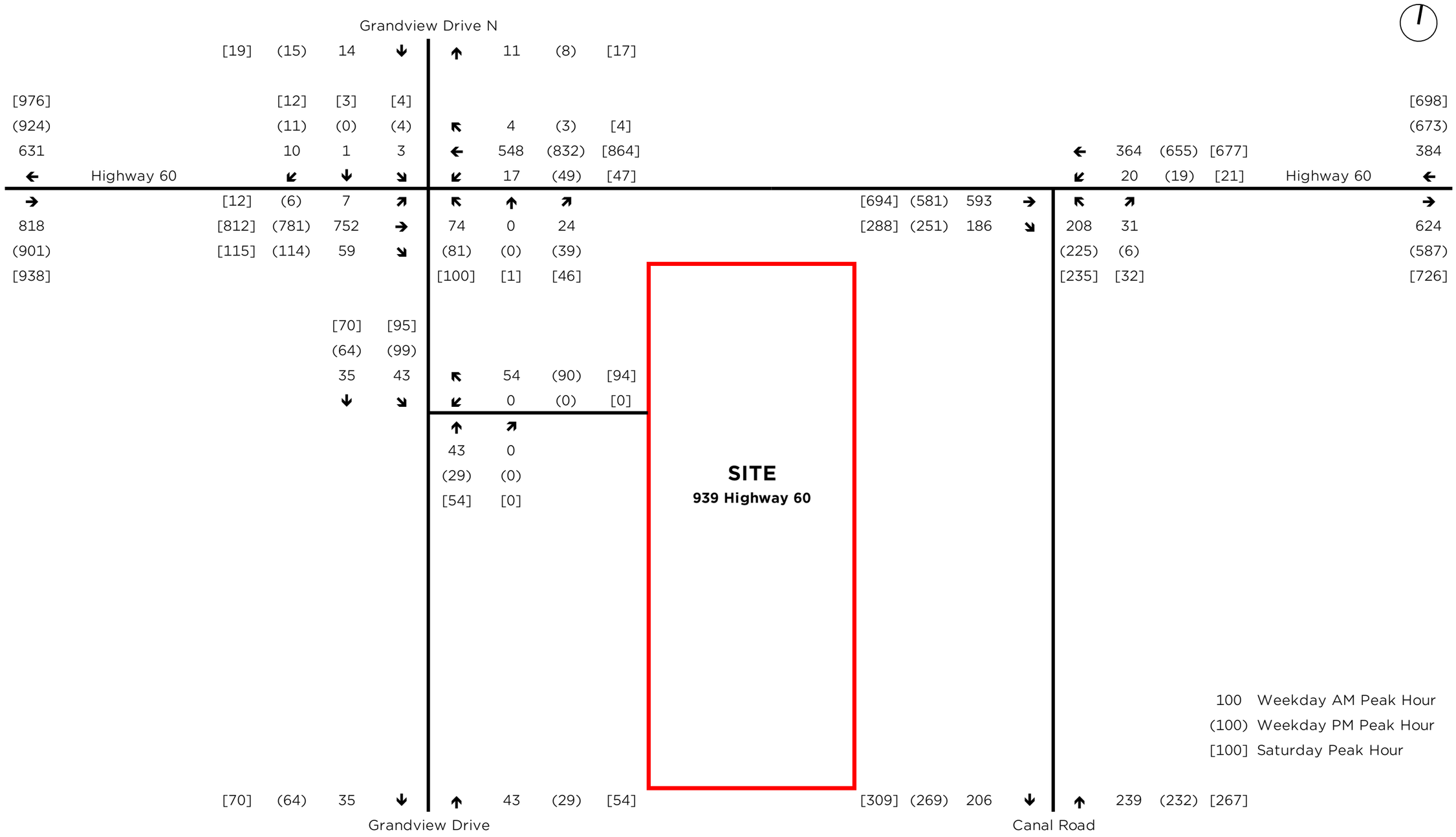


Figure 15: Site Traffic – Pass-by Trips



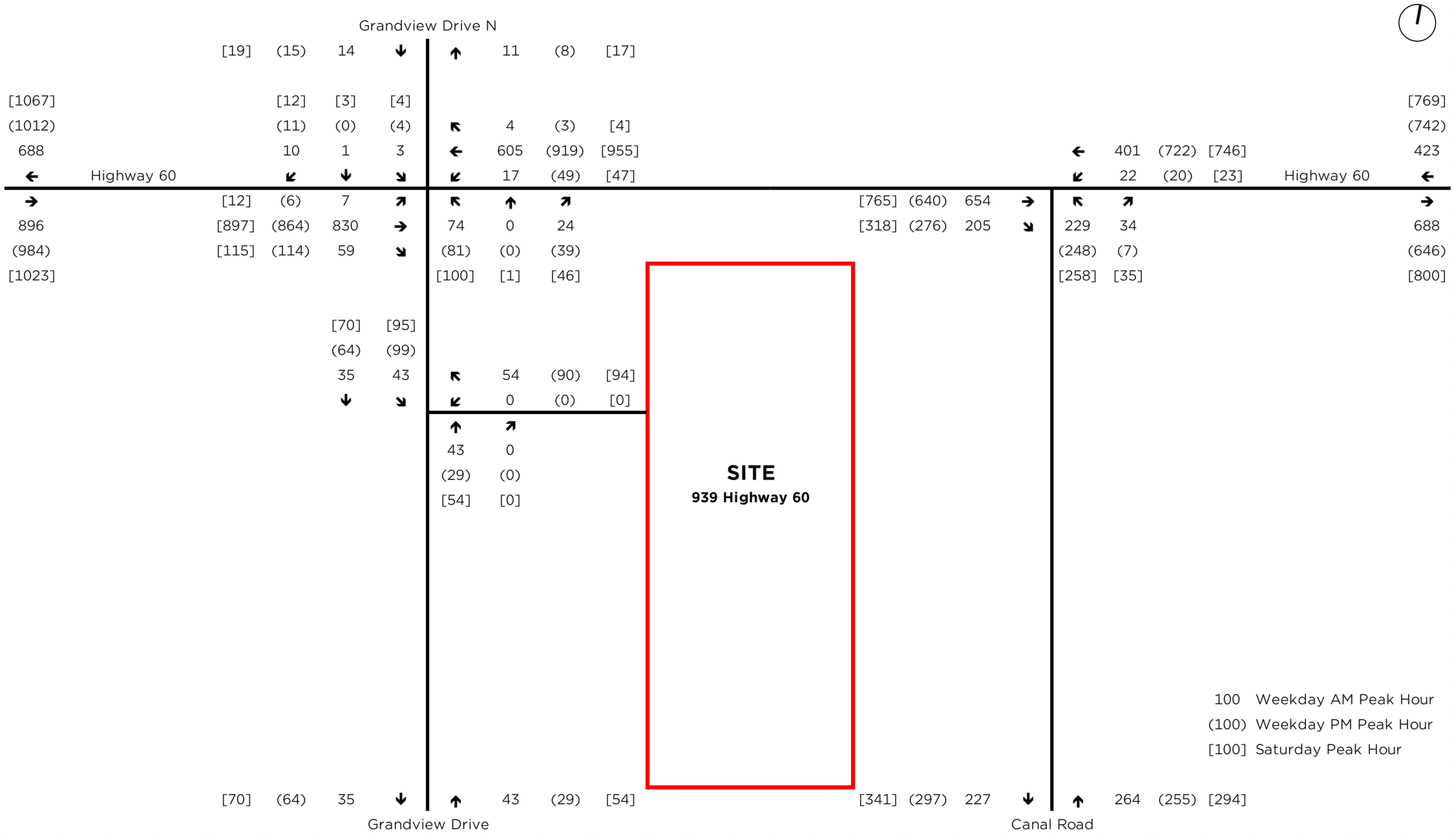
939 HIGHWAY 60 – TRANSPORTATION IMPACT STUDY

Figure 16: Site Traffic – Total Trips



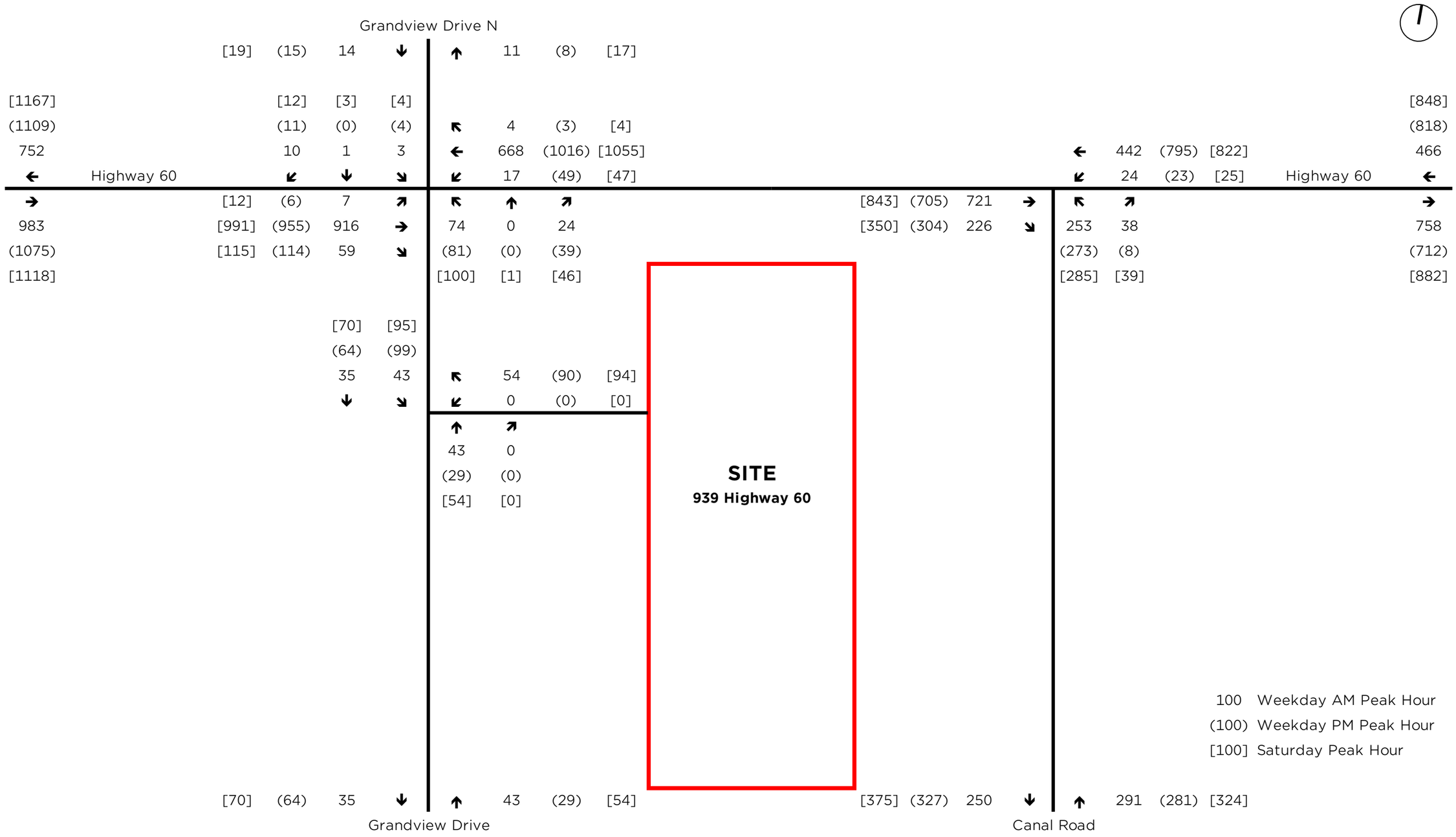
939 HIGHWAY 60 – TRANSPORTATION IMPACT STUDY

Figure 17: Traffic Volumes – 2029 Total



939 HIGHWAY 60 – TRANSPORTATION IMPACT STUDY

Figure 18: Traffic Volumes – 2034 Total



939 HIGHWAY 60 – TRANSPORTATION IMPACT STUDY

Figure 19: Traffic Volumes – 2039 Total

Appendix A:
Study Terms of Reference

From:	Geauvreau, Jamie (MTO)
To:	Matthew Buttrum
Subject:	RE: Traffic Study Terms of Reference - 939 Highway 60
Sent:	9/4/2024 2:03:44 PM

Apologies Matthew, nothing yet. I will follow up again.

Jamie Geauvreau
A/Corridor Management Planner | Corridor Management/Operations Division
North Region – Area East
Ministry of Transportation | Ontario Public Service
705-492-6410 | jamie.geauvreau2@ontario.ca

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From: Matthew Buttrum <mbuttrum@tathameng.com>
Sent: Wednesday, September 4, 2024 2:02 PM
To: Geauvreau, Jamie (MTO) <Jamie.Geauvreau2@ontario.ca>
Subject: RE: Traffic Study Terms of Reference - 939 Highway 60

Hi Jamie,

Any news yet regarding this Terms of Reference?

Thank you,

Matthew Buttrum EIT
Engineering Intern

mbuttrum@tathameng.com **T** 705-733-9037 x2222
645 Veterans Drive, Unit D, Barrie, Ontario L4N 9H8

From: Geauvreau, Jamie (MTO) <Jamie.Geauvreau2@ontario.ca>
Sent: Tuesday, August 13, 2024 10:07 AM
To: Matthew Buttrum <mbuttrum@tathameng.com>
Subject: RE: Traffic Study Terms of Reference - 939 Highway 60

Hi Matthew,

I have not yet received a response from the Traffic folk on the terms of reference. I have followed up with them again.

Regards,
Jamie

Jamie Geauvreau
A/Corridor Management Planner | Corridor Management/Operations Division
North Region – Area East
Ministry of Transportation | Ontario Public Service
705-492-6410 | jamie.geauvreau2@ontario.ca

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From: Matthew Buttrum <mbuttrum@tathameng.com>
Sent: Tuesday, August 6, 2024 1:43 PM
To: Geauvreau, Jamie (MTO) <Jamie.Geauvreau2@ontario.ca>
Cc: David Perks <dperks@tathameng.com>
Subject: RE: Traffic Study Terms of Reference - 939 Highway 60

Hi Jamie,

Hope you had a nice long weekend. Just checking in regarding the status of the Terms of Reference for this project.

Thanks,

Matthew Buttrum EIT
Engineering Intern

mbuttrum@tathameng.com **T** 705-733-9037 x2222
645 Veterans Drive, Unit D, Barrie, Ontario L4N 9H8

From: Geauvreau, Jamie (MTO) <Jamie.Geauvreau2@ontario.ca>
Sent: Wednesday, July 10, 2024 11:45 AM
To: Matthew Buttrum <mbuttrum@tathameng.com>
Cc: David Perks <dperks@tathameng.com>
Subject: RE: Traffic Study Terms of Reference - 939 Highway 60

Hi Matthew,

We had received the information provided, and I have forwarded to the Traffic Section for review.

Regards,
Jamie

Jamie Geauvreau
A/Corridor Management Planner | Corridor Management/Operations Division
North Region – Area East
Ministry of Transportation | Ontario Public Service
705-492-6410 | jamie.geauvreau2@ontario.ca

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From: Zarkovich, Aide (MTO) <Aide.Zarkovich@ontario.ca>
Sent: Wednesday, July 10, 2024 11:40 AM
To: Matthew Buttrum <mbuttrum@tathameng.com>; Geauvreau, Jamie (MTO) <Jamie.Geauvreau2@ontario.ca>
Cc: David Perks <dperks@tathameng.com>
Subject: Re: Traffic Study Terms of Reference - 939 Highway 60

Good morning Matthew,

Thank you for checking in I forwarded your TOR to @Geauvreau, Jamie (MTO) he is the current Corridor Planner :)

Have a good rest of your day !

Aide Zarkovich
Indigenous Liaison Specialist | North Operations
Ministry of Transportation | Ontario Public Service
705-783-3672 | aide.zarkovich@ontario.ca

Taking pride in strengthening Ontario, its places and its people

From: Matthew Buttrum <mbuttrum@tathameng.com>
Sent: Wednesday, July 10, 2024 11:29:32 AM
To: Zarkovich, Aide (MTO) <Aide.Zarkovich@ontario.ca>
Cc: David Perks <dperks@tathameng.com>
Subject: RE: Traffic Study Terms of Reference - 939 Highway 60

Hi Aide,

Just following up to confirm that MTO has received the terms of reference outlined below.

Thank you,

Matthew Buttrum EIT
Engineering Intern

mbuttrum@tathameng.com **T** 705-733-9037 x2222
645 Veterans Drive, Unit D, Barrie, Ontario L4N 9H8
*We have moved! We look forward to welcoming you at our new Barrie location

tathameng.com

From: Matthew Buttrum
Sent: Tuesday, July 2, 2024 2:47 PM
To: aide.zarkovich@ontario.ca
Cc: David Perks <dperks@tathameng.com>
Subject: Traffic Study Terms of Reference - 939 Highway 60

Hello Aide,

We (Tatham Engineering Limited) have been retained to prepare a transportation impact study in support of a proposed mixed-use development to be located at 939 Highway 60 in the Town of Huntsville. We have prepared the following terms of reference for MTO review and acceptance prior to commencement of the study. If you are not the correct person to send this to, please forward it along to the correct recipient.

Development Details
As per the most recent concept plan and through communications with the client, the development will consist of:

- 120 townhouse units; and
- approx. 2,000 m^2 of commercial/retail space

Preliminary trip estimates (as per ITE trip rates representative of each land use, see attached figure) indicated the development is expected to generate in the order of:

- Weekday AM peak – 110 trips;
- Weekday PM peak – 210 trips; and
- Saturday mid-day peak – 210 trips

These estimates are reflective of the gross trip estimates of the site. Consideration will be made in the study for internal trip capture and pass-by trips, which will reduce the number of new trips on the road network. Assignment of the gross trips to the adjacent road network are illustrated in the attached figure, based on the proposed development type and in consideration of its proximity to existing built-up areas.

Terms of Reference
We propose the following scope for the transportation impact study:

1. Study area to consist of the two existing intersections of Highway 60 with Grandview Drive and with Canal Road (Muskoka Road 23), plus the site access to Grandview Drive.
2. New 8-hr traffic counts will be completed at the study area intersections, unless recent data is available from MTO.
3. Study horizons will review existing (2024) and future (year of build-out plus 5 and 10-year horizons beyond build-out) conditions on the study area road network.
4. Future traffic volumes will consider historical and projected growth within the area, including consideration for any nearby developments (to be determined through consultation with Town planning staff).
5. Operations of the study area intersections will be reviewed at each horizon (considering both background and total conditions), including commentary on any necessary improvements/mitigating measures.
6. Location and design of the site access points will be reviewed in context of MTO access guidelines and/or local municipal standards.
7. Study will also review concerns specific to the Town of Huntsville, such as parking requirements, circulation, etc.

Please review the above and provide me with any comments or questions. I look forward to hearing back from you.

Regards,

Matthew Buttrum EIT
Engineering Intern

mbuttrum@tathameng.com **T** 705-733-9037 x2222
645 Veterans Drive, Unit D, Barrie, Ontario L4N 9H8
*We have moved! We look forward to welcoming you at our new Barrie location

tathameng.com

Appendix B: Traffic Data

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Project #24-435 - Tatham Engineering Ltd

Intersection Count Report

Intersection:	Hwy 60 & Grandview Dr
Municipality:	Huntsville
Count Date:	Wednesday, Oct 09, 2024
Site Code:	2443500001
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-09:00, 11:00-14:00, 16:00-19:00
Weather:	Clear
Comments:	

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Traffic Count Map

Intersection:	Hwy 60 & Grandview Dr
Site Code:	2443500001
Municipality:	Huntsville
Count Date:	Oct 09, 2024

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Summary

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Municipality: Huntsville
Count Date: Oct 09, 2024

Grandview Dr - Traffic Summary

	North Approach Totals						South Approach Totals						
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
Hour	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	Total
07:00 - 08:00	0	0	2	0	2	0	9	0	2	0	11	1	13
08:00 - 09:00	2	1	7	0	10	0	26	0	5	0	31	0	41
BREAK													
11:00 - 12:00	1	0	12	0	13	0	22	0	4	0	26	0	39
12:00 - 13:00	0	2	3	0	5	0	24	1	10	0	35	0	40
13:00 - 14:00	0	1	17	0	18	0	17	0	6	0	23	0	41
BREAK													
16:00 - 17:00	5	1	6	0	12	0	12	0	6	0	18	0	30
17:00 - 18:00	3	0	11	0	14	0	16	0	5	0	21	0	35
18:00 - 19:00	0	1	11	0	12	0	17	0	0	0	17	0	29
GRAND TOTAL	**11**	**6**	**69**	**0**	**86**	**0**	**143**	**1**	**38**	**0**	**182**	**1**	**268**

Ontario Traffic Inc.
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Traffic Count Summary

Intersection:	Hwy 60 & Grandview Dr
Site Code:	2443500001
Municipality:	Huntsville
Count Date:	Oct 09, 2024

Hwy 60 - Traffic Summary

	East Approach Totals						West Approach Totals						
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
Hour	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	Total
07:00 - 08:00	1	278	2	0	281	0	5	336	5	0	346	0	627
08:00 - 09:00	3	355	3	0	361	0	5	487	21	0	513	0	874
BREAK													
11:00 - 12:00	2	427	5	0	434	0	14	401	22	0	437	0	871
12:00 - 13:00	2	468	1	0	471	0	8	467	24	0	499	2	970
13:00 - 14:00	7	450	3	0	460	3	3	443	24	0	470	0	930
BREAK													
16:00 - 17:00	5	549	1	0	555	0	3	501	24	0	528	0	1083
17:00 - 18:00	9	486	2	0	497	0	4	453	43	0	500	0	997
18:00 - 19:00	1	309	0	0	310	14	1	299	12	0	312	0	622
GRAND TOTAL	**30**	**3322**	**17**	**0**	**3369**	**17**	**43**	**3387**	**175**	**0**	**3605**	**2**	**6974**

Ontario Traffic Inc.
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Traffic Count Data

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Municipality: Huntsville
Count Date: Oct 09, 2024

North Approach - Grandview Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
					Total					Total					Total	
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0
08:45	2	1	3	0	6	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	2	1	9	0	12	0	0	0	0	0	0	0	0	0	0	0

Ontario Traffic Inc.
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Traffic Count Data

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Municipality: Huntsville
Count Date: Oct 09, 2024

North Approach - Grandview Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
					Total					Total					Total	
11:00	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0
11:15	1	0	4	0	5	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	2	0	2	0	0	1	0	1	0	0	0	0	0	0
11:45	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0
12:00	0	1	2	0	3	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
13:00	0	1	6	0	7	0	0	0	0	0	0	0	0	0	0	0
13:15	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	1	3	31	0	35	0	0	1	0	1	0	0	0	0	0	0

Ontario Traffic Inc.
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Traffic Count Data

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Municipality: Huntsville
Count Date: Oct 09, 2024

North Approach - Grandview Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
16:00	3	0	1	0	4	0	0	0	0	0	1	0	0	0	1	0
16:15	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0
16:45	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0
17:00	1	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	2	0	2	1	0	0	0	1	0	0	0	0	0	0
17:30	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0
17:45	1	0	4	0	5	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	4	0	4	0	0	1	0	1	0	0	0	0	0	0
18:15	0	0	3	0	3	0	0	0	0	0	0	1	0	0	1	0
18:30	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
18:45	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	6	1	27	0	34	1	0	1	0	2	1	1	0	0	2	0
GRAND TOTAL	9	5	67	0	81	1	0	2	0	3	1	1	0	0	2	0

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Traffic Count Data

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Municipality: Huntsville
Count Date: Oct 09, 2024

South Approach - Grandview Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
					Total					Total					Total	
07:00	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
07:15	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1
07:30	4	0	1	0	5	0	0	0	0	0	0	0	0	0	0	0
07:45	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
08:00	6	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
08:15	5	0	1	0	6	1	0	0	0	1	0	0	0	0	0	0
08:30	6	0	2	0	8	0	0	0	0	0	0	0	0	0	0	0
08:45	8	0	2	0	10	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	34	0	7	0	41	1	0	0	0	1	0	0	0	0	0	1

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Traffic Count Data

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Municipality: Huntsville
Count Date: Oct 09, 2024

South Approach - Grandview Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
					Total					Total					Total	
11:00	10	0	1	0	11	0	0	0	0	0	0	0	0	0	0	0
11:15	2	0	0	0	2	0	0	1	0	1	0	0	0	0	0	0
11:30	6	0	1	0	7	0	0	0	0	0	0	0	0	0	0	0
11:45	4	0	1	0	5	0	0	0	0	0	0	0	0	0	0	0
12:00	4	0	2	0	6	0	0	0	0	0	0	0	0	0	0	0
12:15	10	0	2	0	12	0	0	0	0	0	0	0	0	0	0	0
12:30	4	0	5	0	9	0	0	0	0	0	0	0	0	0	0	0
12:45	6	1	1	0	8	0	0	0	0	0	0	0	0	0	0	0
13:00	1	0	3	0	4	0	0	0	0	0	0	0	0	0	0	0
13:15	3	0	2	0	5	0	0	0	0	0	0	0	0	0	0	0
13:30	6	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0
13:45	7	0	1	0	8	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	63	1	19	0	83	0	0	1	0	1	0	0	0	0	0	0

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Traffic Count Data

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Municipality: Huntsville
Count Date: Oct 09, 2024

South Approach - Grandview Dr

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
16:00	2	0	1	0	3	0	0	1	0	1	0	0	0	0	0	0
16:15	5	0	3	0	8	0	0	0	0	0	0	0	0	0	0	0
16:30	4	0	1	0	5	0	0	0	0	0	0	0	0	0	0	0
16:45	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
17:00	3	0	2	0	5	0	0	0	0	0	0	0	0	0	0	0
17:15	8	0	2	0	10	0	0	0	0	0	0	0	0	0	0	0
17:30	3	0	1	0	4	0	0	0	0	0	0	0	0	0	0	0
17:45	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
18:00	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
18:15	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0
18:30	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0
18:45	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	45	0	10	0	55	0	0	1	0	1	0	0	0	0	0	0
GRAND TOTAL	142	1	36	0	179	1	0	2	0	3	0	0	0	0	0	1

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Traffic Count Data

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Municipality: Huntsville
Count Date: Oct 09, 2024

East Approach - Hwy 60

Start Time	Cars					Trucks					Bicycles					Total Peds
					Total					Total					Total	
07:00	0	45	0	0	45	0	1	0	0	1	0	0	0	0	0	0
07:15	0	60	0	0	60	0	5	0	0	5	0	0	0	0	0	0
07:30	0	75	1	0	76	0	3	0	0	3	0	0	0	0	0	0
07:45	1	84	1	0	86	0	5	0	0	5	0	0	0	0	0	0
08:00	0	71	1	0	72	1	10	0	0	11	0	0	0	0	0	0
08:15	1	77	1	0	79	0	6	0	0	6	0	0	0	0	0	0
08:30	0	85	1	0	86	0	7	0	0	7	0	0	0	0	0	0
08:45	1	93	0	0	94	0	6	0	0	6	0	0	0	0	0	0
SUBTOTAL	3	590	5	0	598	1	43	0	0	44	0	0	0	0	0	0

Ontario Traffic Inc.
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Traffic Count Data

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Municipality: Huntsville
Count Date: Oct 09, 2024

East Approach - Hwy 60

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	
11:00	0	94	2	0	96	0	5	1	0	6	0	0	0	0	0	0
11:15	0	92	0	0	92	0	6	0	0	6	0	0	0	0	0	0
11:30	1	105	2	0	108	0	6	0	0	6	0	0	0	0	0	0
11:45	1	113	0	0	114	0	6	0	0	6	0	0	0	0	0	0
12:00	0	104	0	0	104	0	4	0	0	4	0	0	0	0	0	0
12:15	0	123	0	0	123	0	7	0	0	7	0	0	0	0	0	0
12:30	0	106	0	0	106	0	9	0	0	9	0	0	0	0	0	0
12:45	2	104	1	0	107	0	11	0	0	11	0	0	0	0	0	0
13:00	0	109	0	0	109	0	8	0	0	8	0	0	0	0	0	3
13:15	1	115	1	0	117	0	9	0	0	9	0	0	0	0	0	0
13:30	1	102	1	0	104	0	9	0	0	9	0	0	0	0	0	0
13:45	5	91	1	0	97	0	7	0	0	7	0	0	0	0	0	0
SUBTOTAL	11	1258	8	0	1277	0	87	1	0	88	0	0	0	0	0	3

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Municipality: Huntsville
Count Date: Oct 09, 2024

East Approach - Hwy 60

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	
16:00	1	129	0	0	130	0	7	0	0	7	0	0	0	0	0	0
16:15	1	146	0	0	147	0	4	0	0	4	0	0	0	0	0	0
16:30	1	127	1	0	129	0	10	0	0	10	0	0	0	0	0	0
16:45	2	124	0	0	126	0	2	0	0	2	0	0	0	0	0	0
17:00	3	141	0	0	144	0	3	0	0	3	0	1	0	0	1	0
17:15	4	135	1	0	140	0	3	0	0	3	0	0	0	0	0	0
17:30	0	106	0	0	106	0	4	0	0	4	0	0	0	0	0	0
17:45	2	90	1	0	93	0	3	0	0	3	0	0	0	0	0	0
18:00	1	82	0	0	83	0	4	0	0	4	0	1	0	0	1	11
18:15	0	67	0	0	67	0	2	0	0	2	0	0	0	0	0	3
18:30	0	78	0	0	78	0	4	0	0	4	0	0	0	0	0	0
18:45	0	68	0	0	68	0	3	0	0	3	0	0	0	0	0	0
SUBTOTAL	15	1293	3	0	1311	0	49	0	0	49	0	2	0	0	2	14
GRAND TOTAL	29	3141	16	0	3186	1	179	1	0	181	0	2	0	0	2	17

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Municipality: Huntsville
Count Date: Oct 09, 2024

West Approach - Hwy 60

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
07:00	2	57	0	0	59	0	6	0	0	6	0	0	0	0	0	0
07:15	2	76	2	0	80	0	8	0	0	8	0	0	0	0	0	0
07:30	1	75	0	0	76	0	5	0	0	5	0	0	0	0	0	0
07:45	0	93	3	0	96	0	16	0	0	16	0	0	0	0	0	0
08:00	1	103	6	0	110	0	4	0	0	4	0	0	0	0	0	0
08:15	1	115	3	0	119	0	5	0	0	5	0	0	0	0	0	0
08:30	1	119	4	0	124	0	6	0	0	6	0	0	0	0	0	0
08:45	2	127	7	0	136	0	8	1	0	9	0	0	0	0	0	0
SUBTOTAL	10	765	25	0	800	0	58	1	0	59	0	0	0	0	0	0

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Municipality: Huntsville
Count Date: Oct 09, 2024

West Approach - Hwy 60

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
11:00	8	71	3	0	82	0	6	0	0	6	0	0	0	0	0	0
11:15	4	93	5	0	102	0	6	0	0	6	0	0	0	0	0	0
11:30	0	114	8	0	122	0	8	0	0	8	0	0	0	0	0	0
11:45	2	96	6	0	104	0	7	0	0	7	0	0	0	0	0	0
12:00	3	124	6	0	133	0	5	0	0	5	0	0	0	0	0	0
12:15	2	107	4	0	113	0	5	0	0	5	0	0	0	0	0	0
12:30	3	98	11	0	112	0	5	0	0	5	0	0	0	0	0	2
12:45	0	115	3	0	118	0	8	0	0	8	0	0	0	0	0	0
13:00	1	103	8	0	112	0	8	0	0	8	0	0	0	0	0	0
13:15	0	90	3	0	93	0	7	0	0	7	0	0	0	0	0	0
13:30	2	117	6	0	125	0	4	0	0	4	0	0	0	0	0	0
13:45	0	110	7	0	117	0	4	0	0	4	0	0	0	0	0	0
SUBTOTAL	25	1238	70	0	1333	0	73	0	0	73	0	0	0	0	0	2

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Municipality: Huntsville
Count Date: Oct 09, 2024

West Approach - Hwy 60

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
16:00	1	118	8	0	127	0	2	1	0	3	0	0	0	0	0	0
16:15	0	115	7	0	122	0	4	0	0	4	0	0	0	0	0	0
16:30	2	138	1	0	141	0	0	0	0	0	0	0	0	0	0	0
16:45	0	121	7	0	128	0	3	0	0	3	0	0	0	0	0	0
17:00	0	108	18	0	126	1	2	0	0	3	0	0	0	0	0	0
17:15	1	139	10	0	150	0	2	0	0	2	0	0	0	0	0	0
17:30	1	111	10	0	122	0	8	0	0	8	0	0	0	0	0	0
17:45	1	80	5	0	86	0	3	0	0	3	0	0	0	0	0	0
18:00	0	80	2	0	82	0	3	0	0	3	0	1	0	0	1	0
18:15	1	75	4	0	80	0	1	0	0	1	0	0	0	0	0	0
18:30	0	71	3	0	74	0	4	0	0	4	0	0	0	0	0	0
18:45	0	61	3	0	64	0	3	0	0	3	0	0	0	0	0	0
SUBTOTAL	7	1217	78	0	1302	1	35	1	0	37	0	1	0	0	1	0
GRAND TOTAL	42	3220	173	0	3435	1	166	2	0	169	0	1	0	0	1	2

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Diagram

Specified Period		One Hour Peak	
From:	07:00:00	From:	08:00:00
To:	09:00:00	To:	09:00:00

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Count Date: Oct 09, 2024

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Hwy 60 runs E/W

North Approach

	Out	In	Total
Cars	10	8	18
Trucks	0	0	0
Bicycles	0	0	0
	10	**8**	**18**

Grandview Dr

Bicycles	0	0	0	0
Trucks	0	0	0	0
Cars	7	1	2	0
Totals	**7**	**1**	**2**	**0**

Peds: 0

East Approach

	Out	In	Total
Cars	331	471	802
Trucks	30	23	53
Bicycles	0	0	0
	361	**494**	**855**

Hwy 60

Bicycles	Trucks	Cars	Totals	
0	0	0	**0**	
0	0	5	**5**	
0	23	464	**487**	
0	1	20	**21**	

Peds: 0

Peds: 0

Hwy 60

	Totals	Cars	Trucks	Bicycles
	0	0	0	0
	3	3	0	0
	355	326	29	0
	3	2	1	0

Peds: 0

West Approach

	Out	In	Total
Cars	489	358	847
Trucks	24	30	54
Bicycles	0	0	0
	513	**388**	**901**

Totals	**26**	**0**	**5**	**0**
Cars	25	0	5	0
Trucks	1	0	0	0
Bicycles	0	0	0	0

Grandview Dr

South Approach

	Out	In	Total
Cars	30	23	53
Trucks	1	2	3
Bicycles	0	0	0
	31	**25**	**56**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Count Date: Oct 09, 2024
Period: 07:00 - 09:00

Peak Hour Data (08:00 - 09:00)

Start Time	North Approach Grandview Dr						South Approach Grandview Dr						East Approach Hwy 60						West Approach Hwy 60						Total Vehicles
	↰	↑	↱	↩	Peds	Total	↰	↑	↱	↩	Peds	Total	↰	↑	↱	↩	Peds	Total	↰	↑	↱	↩	Peds	Total	
08:00	0	0	0	0	0	0	6	0	0	0	0	6	1	81	1	0	0	83	1	107	6	0	0	114	203
08:15	0	0	1	0	0	1	6	0	1	0	0	7	1	83	1	0	0	85	1	120	3	0	0	124	217
08:30	0	0	3	0	0	3	6	0	2	0	0	8	0	92	1	0	0	93	1	125	4	0	0	130	234
08:45	2	1	3	0	0	6	8	0	2	0	0	10	1	99	0	0	0	100	2	135	8	0	0	145	261
Grand Total	**2**	**1**	**7**	**0**	**0**	**10**	**26**	**0**	**5**	**0**	**0**	**31**	**3**	**355**	**3**	**0**	**0**	**361**	**5**	**487**	**21**	**0**	**0**	**513**	**915**
Approach %	20	10	70	0		-	83.9	0	16.1	0		-	0.8	98.3	0.8	0		-	1	94.9	4.1	0		-	
Totals %	0.2	0.1	0.8	0		1.1	2.8	0	0.5	0		3.4	0.3	38.8	0.3	0		39.5	0.5	53.2	2.3	0		56.1	
PHF	**0.25**	**0.25**	**0.58**	**0**		**0.42**	**0.81**	**0**	**0.63**	**0**		**0.78**	**0.75**	**0.9**	**0.75**	**0**		**0.9**	**0.63**	**0.9**	**0.66**	**0**		**0.88**	**0.88**
Cars	2	1	7	0		10	25	0	5	0		30	2	326	3	0		331	5	464	20	0		489	860
% Cars	100	100	100	0		100	96.2	0	100	0		96.8	66.7	91.8	100	0		91.7	100	95.3	95.2	0		95.3	94
Trucks	0	0	0	0		0	1	0	0	0		1	1	29	0	0		30	0	23	1	0		24	55
% Trucks	0	0	0	0		0	3.8	0	0	0		3.2	33.3	8.2	0	0		8.3	0	4.7	4.8	0		4.7	6
Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
% Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
Peds					0	-					0	-					0	-					0	-	0
% Peds					0	-					0	-					0	-					0	-	

Peak Hour Diagram

Specified Period
From: 11:00:00
To: 14:00:00

One Hour Peak
From: 12:00:00
To: 13:00:00

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Count Date: Oct 09, 2024

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Hwy 60 runs E/W

North Approach

	Out	In	Total
Cars	5	10	15
Trucks	0	0	0
Bicycles	0	0	0
	5	**10**	**15**

Grandview Dr

Bicycles	0	0	0	0
Trucks	0	0	0	0
Cars	3	2	0	0
Totals	**3**	**2**	**0**	**0**

Peds: 0

East Approach

	Out	In	Total
Cars	440	454	894
Trucks	31	23	54
Bicycles	0	0	0
	471	**477**	**948**

Hwy 60

Bicycles	Trucks	Cars	Totals	
0	0	0	**0**	
0	0	8	**8**	
0	23	444	**467**	
0	0	24	**24**	

Peds: 2

N
W E
S

Peds: 0

Hwy 60

	Totals	Cars	Trucks	Bicycles
	0	0	0	0
	1	1	0	0
	468	437	31	0
	2	2	0	0

Peds: 0

West Approach

	Out	In	Total
Cars	476	464	940
Trucks	23	31	54
Bicycles	0	0	0
	499	**495**	**994**

Grandview Dr

Totals	**24**	**1**	**10**	**0**
Cars	24	1	10	0
Trucks	0	0	0	0
Bicycles	0	0	0	0

South Approach

	Out	In	Total
Cars	35	28	63
Trucks	0	0	0
Bicycles	0	0	0
	35	**28**	**63**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Count Date: Oct 09, 2024
Period: 11:00 - 14:00

Peak Hour Data (12:00 - 13:00)

Start Time	North Approach Grandview Dr						South Approach Grandview Dr						East Approach Hwy 60						West Approach Hwy 60						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
12:00	0	1	2	0	0	3	4	0	2	0	0	6	0	108	0	0	0	108	3	129	6	0	0	138	255
12:15	0	0	0	0	0	0	10	0	2	0	0	12	0	130	0	0	0	130	2	112	4	0	0	118	260
12:30	0	1	0	0	0	1	4	0	5	0	0	9	0	115	0	0	0	115	3	103	11	0	2	117	242
12:45	0	0	1	0	0	1	6	1	1	0	0	8	2	115	1	0	0	118	0	123	3	0	0	126	253
Grand Total	**0**	**2**	**3**	**0**	**0**	**5**	**24**	**1**	**10**	**0**	**0**	**35**	**2**	**468**	**1**	**0**	**0**	**471**	**8**	**467**	**24**	**0**	**2**	**499**	**1010**
Approach %	0	40	60	0		-	68.6	2.9	28.6	0		-	0.4	99.4	0.2	0		-	1.6	93.6	4.8	0		-	
Totals %	0	0.2	0.3	0		0.5	2.4	0.1	1	0		3.5	0.2	46.3	0.1	0		46.6	0.8	46.2	2.4	0		49.4	
PHF	**0**	**0.5**	**0.38**	**0**		**0.42**	**0.6**	**0.25**	**0.5**	**0**		**0.73**	**0.25**	**0.9**	**0.25**	**0**		**0.91**	**0.67**	**0.91**	**0.55**	**0**		**0.9**	**0.97**
Cars	0	2	3	0		5	24	1	10	0		35	2	437	1	0		440	8	444	24	0		476	956
% Cars	0	100	100	0		100	100	100	100	0		100	100	93.4	100	0		93.4	100	95.1	100	0		95.4	94.7
Trucks	0	0	0	0		0	0	0	0	0		0	0	31	0	0		31	0	23	0	0		23	54
% Trucks	0	0	0	0		0	0	0	0	0		0	0	6.6	0	0		6.6	0	4.9	0	0		4.6	5.3
Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
% Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
Peds					0	-					0	-					0	-					2	-	2
% Peds					0	-					0	-					0	-					100	-	

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Diagram

Specified Period		One Hour Peak	
From:	16:00:00	From:	16:30:00
To:	19:00:00	To:	17:30:00

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Count Date: Oct 09, 2024

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Hwy 60 runs E/W

North Approach

	Out	In	Total
Cars	10	5	15
Trucks	1	1	2
Bicycles	0	0	0
	11	**6**	**17**

Grandview Dr

Bicycles	0	0	0	0
Trucks	0	0	1	0
Cars	8	0	2	0
Totals	**8**	**0**	**3**	**0**

East Approach

	Out	In	Total
Cars	539	513	1052
Trucks	18	8	26
Bicycles	1	0	1
	558	**521**	**1079**

Hwy 60

Bicycles	Trucks	Cars	Totals	
0	0	0	**0**	
0	1	3	**4**	
0	7	506	**513**	
0	0	36	**36**	

Peds: 0

Peds: 0

Peds: 0

Hwy 60

Totals	Cars	Trucks	Bicycles
0	0	0	0
2	2	0	0
546	527	18	1
10	10	0	0

West Approach

	Out	In	Total
Cars	545	551	1096
Trucks	8	18	26
Bicycles	0	1	1
	553	**570**	**1123**

Totals	**16**	**0**	**5**	**0**
Cars	16	0	5	0
Trucks	0	0	0	0
Bicycles	0	0	0	0

Grandview Dr

South Approach

	Out	In	Total
Cars	21	46	67
Trucks	0	0	0
Bicycles	0	0	0
	21	**46**	**67**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection: Hwy 60 & Grandview Dr
Site Code: 2443500001
Count Date: Oct 09, 2024
Period: 16:00 - 19:00

Peak Hour Data (16:30 - 17:30)

Start Time	North Approach Grandview Dr						South Approach Grandview Dr						East Approach Hwy 60						West Approach Hwy 60						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
16:30	0	0	2	0	0	2	4	0	1	0	0	5	1	137	1	0	0	139	2	138	1	0	0	141	287
16:45	1	0	2	0	0	3	1	0	0	0	0	1	2	126	0	0	0	128	0	124	7	0	0	131	263
17:00	1	0	2	0	0	3	3	0	2	0	0	5	3	145	0	0	0	148	1	110	18	0	0	129	285
17:15	1	0	2	0	0	3	8	0	2	0	0	10	4	138	1	0	0	143	1	141	10	0	0	152	308
Grand Total	**3**	**0**	**8**	**0**	**0**	**11**	**16**	**0**	**5**	**0**	**0**	**21**	**10**	**546**	**2**	**0**	**0**	**558**	**4**	**513**	**36**	**0**	**0**	**553**	**1143**
Approach %	27.3	0	72.7	0		-	76.2	0	23.8	0		-	1.8	97.8	0.4	0		-	0.7	92.8	6.5	0		-	
Totals %	0.3	0	0.7	0		1	1.4	0	0.4	0		1.8	0.9	47.8	0.2	0		48.8	0.3	44.9	3.1	0		48.4	
PHF	**0.75**	**0**	**1**	**0**		**0.92**	**0.5**	**0**	**0.63**	**0**		**0.53**	**0.63**	**0.94**	**0.5**	**0**		**0.94**	**0.5**	**0.91**	**0.5**	**0**		**0.91**	**0.93**
Cars	2	0	8	0		10	16	0	5	0		21	10	527	2	0		539	3	506	36	0		545	1115
% Cars	66.7	0	100	0		90.9	100	0	100	0		100	100	96.5	100	0		96.6	75	98.6	100	0		98.6	97.6
Trucks	1	0	0	0		1	0	0	0	0		0	0	18	0	0		18	1	7	0	0		8	27
% Trucks	33.3	0	0	0		9.1	0	0	0	0		0	0	3.3	0	0		3.2	25	1.4	0	0		1.4	2.4
Bicycles	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	0	0	0	0		0	1
% Bicycles	0	0	0	0		0	0	0	0	0		0	0	0.2	0	0		0.2	0	0	0	0		0	0.1
Peds					0	-					0	-					0	-					0	-	0
% Peds					0	-					0	-					0	-					0	-	

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Project #24-435 - Tatham Engineering Ltd

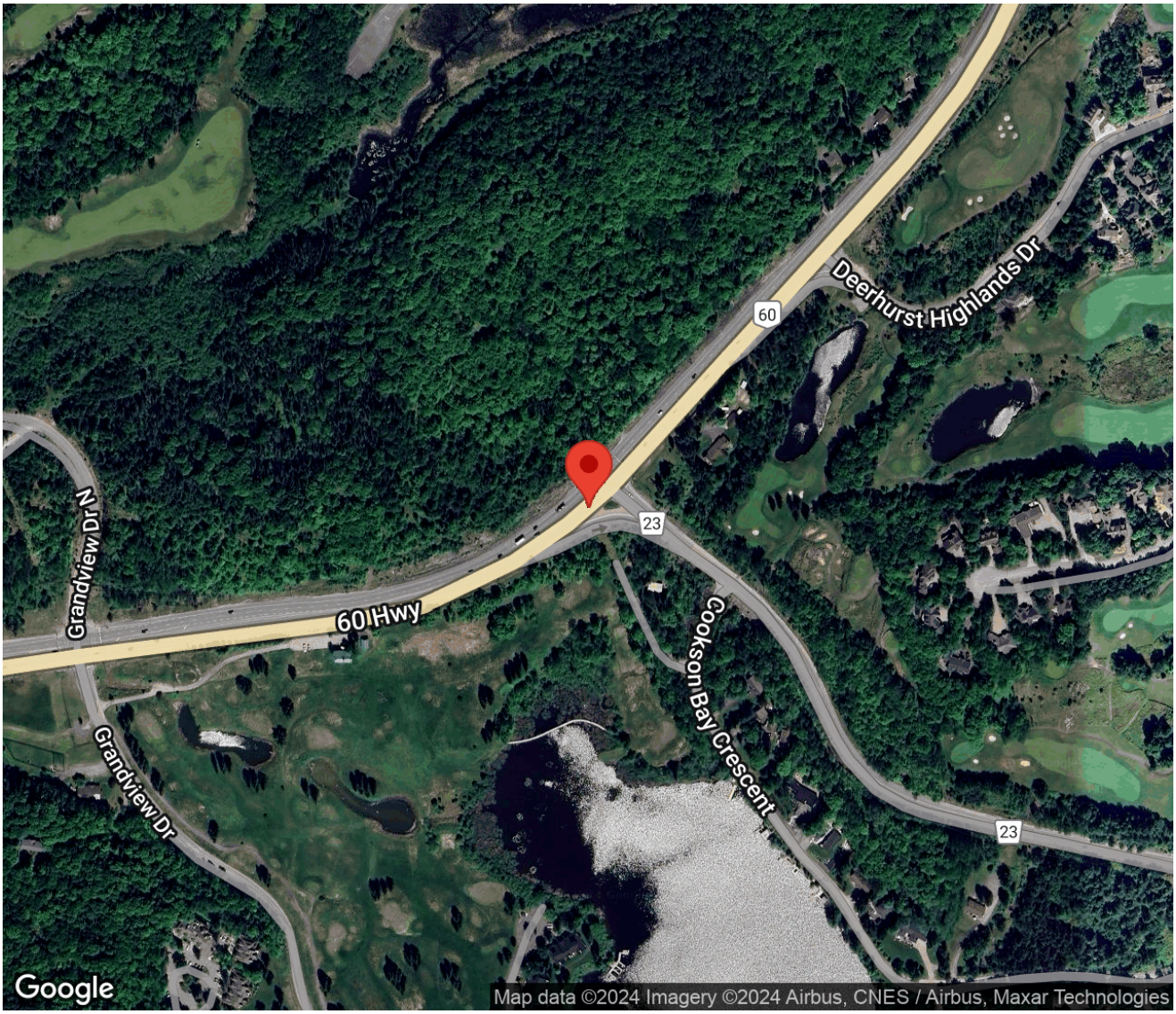
Intersection Count Report

Intersection:	Hwy 60 & Muskoka Rd 23
Municipality:	Huntsville
Count Date:	Wednesday, Oct 09, 2024
Site Code:	2443500002
Count Categories:	Cars, Trucks, Bicycles, Pedestrians
Count Period:	07:00-09:00, 11:00-14:00, 16:00-19:00
Weather:	Clear
Comments:	

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Map

Intersection:	Hwy 60 & Muskoka Rd 23
Site Code:	2443500002
Municipality:	Huntsville
Count Date:	Oct 09, 2024



Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Summary

Intersection: Hwy 60 & Muskoka Rd 23
Site Code: 2443500002
Municipality: Huntsville
Count Date: Oct 09, 2024

Muskoka Rd 23 - Traffic Summary

	North Approach Totals						South Approach Totals						
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
Hour	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	Total
07:00 - 08:00	0	0	0	0	0	0	78	0	8	0	86	0	86
08:00 - 09:00	0	0	0	0	0	0	132	0	20	0	152	0	152
BREAK													
11:00 - 12:00	0	0	0	0	0	0	121	0	11	0	132	0	132
12:00 - 13:00	0	0	0	0	0	0	142	0	14	0	156	0	156
13:00 - 14:00	0	0	0	0	0	0	107	0	21	0	128	0	128
BREAK													
16:00 - 17:00	0	0	0	0	0	0	102	0	7	0	109	0	109
17:00 - 18:00	0	0	0	0	0	0	130	0	9	0	139	0	139
18:00 - 19:00	0	1	0	0	1	1	91	0	10	0	101	1	102
GRAND TOTAL	**0**	**1**	**0**	**0**	**1**	**1**	**903**	**0**	**100**	**0**	**1003**	**1**	**1004**

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Summary

Intersection: Hwy 60 & Muskoka Rd 23
Site Code: 2443500002
Municipality: Huntsville
Count Date: Oct 09, 2024

Hwy 60 - Traffic Summary

	East Approach Totals						West Approach Totals						
	Includes Cars, Trucks, Bicycles						Includes Cars, Trucks, Bicycles						
Hour	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds	Total
07:00 - 08:00	3	203	0	0	206	0	0	254	83	0	337	0	543
08:00 - 09:00	13	230	0	0	243	0	0	377	117	0	494	1	737
BREAK													
11:00 - 12:00	10	313	0	0	323	0	0	316	90	0	406	0	729
12:00 - 13:00	6	329	0	0	335	0	0	382	96	0	478	0	813
13:00 - 14:00	8	354	0	0	362	0	0	320	128	0	448	0	810
BREAK													
16:00 - 17:00	17	457	0	0	474	1	0	364	148	0	512	0	986
17:00 - 18:00	21	363	0	0	384	0	0	329	133	0	462	0	846
18:00 - 19:00	22	217	0	0	239	0	0	207	92	0	299	0	538
GRAND TOTAL	**100**	**2466**	**0**	**0**	**2566**	**1**	**0**	**2549**	**887**	**0**	**3436**	**1**	**6002**

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Hwy 60 & Muskoka Rd 23
Site Code: 2443500002
Municipality: Huntsville
Count Date: Oct 09, 2024

South Approach - Muskoka Rd 23

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
07:00	18	0	4	0	22	0	0	0	0	0	0	0	0	0	0	0
07:15	16	0	3	0	19	0	0	0	0	0	0	0	0	0	0	0
07:30	24	0	1	0	25	1	0	0	0	1	0	0	0	0	0	0
07:45	19	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0
08:00	21	0	0	0	21	3	0	1	0	4	0	0	0	0	0	0
08:15	28	0	1	0	29	2	0	0	0	2	0	0	0	0	0	0
08:30	38	0	8	0	46	1	0	1	0	2	0	0	0	0	0	0
08:45	38	0	7	0	45	1	0	2	0	3	0	0	0	0	0	0
SUBTOTAL	202	0	24	0	226	8	0	4	0	12	0	0	0	0	0	0

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Hwy 60 & Muskoka Rd 23
Site Code: 2443500002
Municipality: Huntsville
Count Date: Oct 09, 2024

South Approach - Muskoka Rd 23

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
11:00	29	0	3	0	32	0	0	0	0	0	0	0	0	0	0	0
11:15	21	0	1	0	22	2	0	0	0	2	0	0	0	0	0	0
11:30	39	0	5	0	44	1	0	0	0	1	0	0	0	0	0	0
11:45	28	0	2	0	30	1	0	0	0	1	0	0	0	0	0	0
12:00	29	0	5	0	34	1	0	0	0	1	0	0	0	0	0	0
12:15	38	0	1	0	39	2	0	0	0	2	0	0	0	0	0	0
12:30	35	0	5	0	40	3	0	0	0	3	0	0	0	0	0	0
12:45	34	0	3	0	37	0	0	0	0	0	0	0	0	0	0	0
13:00	23	0	3	0	26	2	0	0	0	2	0	0	0	0	0	0
13:15	32	0	2	0	34	3	0	0	0	3	0	0	0	0	0	0
13:30	19	0	6	0	25	5	0	1	0	6	0	0	0	0	0	0
13:45	19	0	7	0	26	4	0	2	0	6	0	0	0	0	0	0
SUBTOTAL	346	0	43	0	389	24	0	3	0	27	0	0	0	0	0	0

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Hwy 60 & Muskoka Rd 23
Site Code: 2443500002
Municipality: Huntsville
Count Date: Oct 09, 2024

South Approach - Muskoka Rd 23

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	↰	↑	↱	↷	Total	
16:00	26	0	2	0	28	1	0	0	0	1	0	0	0	0	0	0
16:15	16	0	3	0	19	0	0	0	0	0	0	0	0	0	0	0
16:30	26	0	1	0	27	0	0	0	0	0	0	0	0	0	0	0
16:45	32	0	1	0	33	1	0	0	0	1	0	0	0	0	0	0
17:00	44	0	0	0	44	1	0	0	0	1	0	0	0	0	0	0
17:15	37	0	2	0	39	0	0	0	0	0	0	0	0	0	0	0
17:30	25	0	5	0	30	0	0	0	0	0	0	0	0	0	0	0
17:45	23	0	2	0	25	0	0	0	0	0	0	0	0	0	0	0
18:00	22	0	2	0	24	1	0	0	0	1	0	0	0	0	0	0
18:15	22	0	2	0	24	1	0	0	0	1	0	0	0	0	0	0
18:30	23	0	2	0	25	1	0	0	0	1	0	0	0	0	0	1
18:45	19	0	3	0	22	1	0	1	0	2	1	0	0	0	1	0
SUBTOTAL	315	0	25	0	340	7	0	1	0	8	1	0	0	0	1	1
GRAND TOTAL	863	0	92	0	955	39	0	8	0	47	1	0	0	0	1	1

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Hwy 60 & Muskoka Rd 23
Site Code: 2443500002
Municipality: Huntsville
Count Date: Oct 09, 2024

East Approach - Hwy 60

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↻	Total	↰	↑	↱	↻	Total	↰	↑	↱	↻	Total	
07:00	0	28	0	0	28	0	2	0	0	2	0	0	0	0	0	0
07:15	0	44	0	0	44	0	4	0	0	4	0	0	0	0	0	0
07:30	0	53	0	0	53	0	2	0	0	2	0	0	0	0	0	0
07:45	3	65	0	0	68	0	5	0	0	5	0	0	0	0	0	0
08:00	0	53	0	0	53	0	8	0	0	8	0	0	0	0	0	0
08:15	4	51	0	0	55	0	6	0	0	6	0	0	0	0	0	0
08:30	3	47	0	0	50	0	5	0	0	5	0	0	0	0	0	0
08:45	5	56	0	0	61	1	4	0	0	5	0	0	0	0	0	0
SUBTOTAL	15	397	0	0	412	1	36	0	0	37	0	0	0	0	0	0

Ontario Traffic Inc.
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Traffic Count Data

Intersection: Hwy 60 & Muskoka Rd 23
Site Code: 2443500002
Municipality: Huntsville
Count Date: Oct 09, 2024

East Approach - Hwy 60

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
11:00	5	67	0	0	72	0	6	0	0	6	0	0	0	0	0	0
11:15	1	71	0	0	72	0	4	0	0	4	0	0	0	0	0	0
11:30	3	70	0	0	73	1	5	0	0	6	0	0	0	0	0	0
11:45	0	84	0	0	84	0	6	0	0	6	0	0	0	0	0	0
12:00	3	75	0	0	78	0	4	0	0	4	0	0	0	0	0	0
12:15	1	85	0	0	86	0	3	0	0	3	0	0	0	0	0	0
12:30	0	70	0	0	70	0	6	0	0	6	0	0	0	0	0	0
12:45	2	74	0	0	76	0	12	0	0	12	0	0	0	0	0	0
13:00	2	86	0	0	88	0	5	0	0	5	0	0	0	0	0	0
13:15	0	87	0	0	87	0	6	0	0	6	0	0	0	0	0	0
13:30	2	85	0	0	87	0	4	0	0	4	0	0	0	0	0	0
13:45	4	77	0	0	81	0	3	0	0	3	0	1	0	0	1	0
SUBTOTAL	23	931	0	0	954	1	64	0	0	65	0	1	0	0	1	0

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Hwy 60 & Muskoka Rd 23
Site Code: 2443500002
Municipality: Huntsville
Count Date: Oct 09, 2024

East Approach - Hwy 60

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
16:00	4	105	0	0	109	0	6	0	0	6	0	0	0	0	0	1
16:15	7	133	0	0	140	0	4	0	0	4	0	0	0	0	0	0
16:30	1	102	0	0	103	0	10	0	0	10	0	0	0	0	0	0
16:45	5	95	0	0	100	0	2	0	0	2	0	0	0	0	0	0
17:00	4	98	0	0	102	0	1	0	0	1	0	0	0	0	0	0
17:15	2	103	0	0	105	0	3	0	0	3	0	0	0	0	0	0
17:30	8	79	0	0	87	0	4	0	0	4	0	0	0	0	0	0
17:45	7	71	0	0	78	0	4	0	0	4	0	0	0	0	0	0
18:00	2	61	0	0	63	0	3	0	0	3	0	0	0	0	0	0
18:15	3	45	0	0	48	0	1	0	0	1	0	0	0	0	0	0
18:30	13	54	0	0	67	0	2	0	0	2	0	0	0	0	0	0
18:45	4	49	0	0	53	0	2	0	0	2	0	0	0	0	0	0
SUBTOTAL	60	995	0	0	1055	0	42	0	0	42	0	0	0	0	0	1
GRAND TOTAL	98	2323	0	0	2421	2	142	0	0	144	0	1	0	0	1	1

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Hwy 60 & Muskoka Rd 23
Site Code: 2443500002
Municipality: Huntsville
Count Date: Oct 09, 2024

West Approach - Hwy 60

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
07:00	0	44	14	0	58	0	6	0	0	6	0	0	0	0	0	0
07:15	0	56	20	0	76	0	4	4	0	8	0	0	0	0	0	0
07:30	0	57	19	0	76	0	4	1	0	5	0	0	0	0	0	0
07:45	0	72	21	0	93	0	11	4	0	15	0	0	0	0	0	0
08:00	0	85	19	0	104	0	3	2	0	5	0	0	0	0	0	1
08:15	0	95	20	0	115	0	4	1	0	5	0	0	0	0	0	0
08:30	0	88	34	0	122	0	6	0	0	6	0	0	0	0	0	0
08:45	0	90	39	0	129	0	6	2	0	8	0	0	0	0	0	0
SUBTOTAL	0	587	186	0	773	0	44	14	0	58	0	0	0	0	0	1

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Hwy 60 & Muskoka Rd 23
Site Code: 2443500002
Municipality: Huntsville
Count Date: Oct 09, 2024

West Approach - Hwy 60

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
11:00	0	54	18	0	72	0	4	2	0	6	0	0	0	0	0	0
11:15	0	78	17	0	95	0	5	2	0	7	0	0	0	0	0	0
11:30	0	85	31	0	116	0	6	0	0	6	0	0	0	0	0	0
11:45	0	76	19	0	95	0	8	1	0	9	0	0	0	0	0	0
12:00	0	107	18	0	125	0	4	1	0	5	0	0	0	0	0	0
12:15	0	82	29	0	111	0	3	2	0	5	0	0	0	0	0	0
12:30	0	81	22	0	103	0	3	2	0	5	0	0	0	0	0	0
12:45	0	95	22	0	117	0	7	0	0	7	0	0	0	0	0	0
13:00	0	81	25	0	106	0	8	1	0	9	0	0	0	0	0	0
13:15	0	66	26	0	92	0	5	2	0	7	0	0	0	0	0	0
13:30	0	80	36	0	116	0	2	2	0	4	0	0	0	0	0	0
13:45	0	74	36	0	110	0	4	0	0	4	0	0	0	0	0	0
SUBTOTAL	0	959	299	0	1258	0	59	15	0	74	0	0	0	0	0	0

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Traffic Count Data

Intersection: Hwy 60 & Muskoka Rd 23
Site Code: 2443500002
Municipality: Huntsville
Count Date: Oct 09, 2024

West Approach - Hwy 60

Start Time	Cars					Trucks					Bicycles					Total Peds
	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	↰	↑	↱	↶	Total	
16:00	0	77	44	0	121	0	3	0	0	3	0	0	0	0	0	0
16:15	0	87	30	0	117	0	3	0	0	3	0	0	0	0	0	0
16:30	0	103	38	0	141	0	1	0	0	1	0	0	0	0	0	0
16:45	0	88	35	0	123	0	2	1	0	3	0	0	0	0	0	0
17:00	0	79	31	0	110	0	1	0	0	1	0	0	0	0	0	0
17:15	0	90	52	0	142	0	3	1	0	4	0	0	0	0	0	0
17:30	0	82	28	0	110	0	8	0	0	8	0	0	0	0	0	0
17:45	0	63	20	0	83	0	3	0	0	3	0	0	1	0	1	0
18:00	0	55	25	0	80	0	2	1	0	3	0	0	0	0	0	0
18:15	0	53	23	0	76	0	1	0	0	1	0	0	0	0	0	0
18:30	0	51	20	0	71	0	2	2	0	4	0	0	0	0	0	0
18:45	0	41	20	0	61	0	2	1	0	3	0	0	0	0	0	0
SUBTOTAL	0	869	366	0	1235	0	31	6	0	37	0	0	1	0	1	0
GRAND TOTAL	0	2415	851	0	3266	0	134	35	0	169	0	0	1	0	1	1

Peak Hour Diagram

Specified Period		One Hour Peak	
From:	07:00:00	From:	08:00:00
To:	09:00:00	To:	09:00:00

Intersection: Hwy 60 & Muskoka Rd 23
Site Code: 2443500002
Count Date: Oct 09, 2024

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Hwy 60 runs E/W

East Approach

	Out	In	Total
Cars	219	374	593
Trucks	24	23	47
Bicycles	0	0	0
	243	**397**	**640**

Peds: 0

Hwy 60

			Totals
0	0	0	**0**
0	19	358	**377**
0	5	112	**117**

Peds: 1

Peds: 0

Hwy 60

	Totals			
	0	0	0	0
	230	207	23	0
	13	12	1	0

Peds: 0

West Approach

	Out	In	Total
Cars	470	332	802
Trucks	24	30	54
Bicycles	0	0	0
	494	**362**	**856**

Totals	132	20	0
Cars	125	16	0
Trucks	7	4	0
Bicycles	0	0	0

Muskoka Rd 23

South Approach

	Out	In	Total
Cars	141	124	265
Trucks	11	6	17
Bicycles	0	0	0
	152	**130**	**282**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection: Hwy 60 & Muskoka Rd 23
Site Code: 2443500002
Count Date: Oct 09, 2024
Period: 07:00 - 09:00

Peak Hour Data (08:00 - 09:00)

Start Time	North Approach						South Approach Muskoka Rd 23						East Approach Hwy 60						West Approach Hwy 60						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
08:00					0		24		1	0	0	25	0	61		0	0	61		88	21	0	1	109	195
08:15					0		30		1	0	0	31	4	57		0	0	61		99	21	0	0	120	212
08:30					0		39		9	0	0	48	3	52		0	0	55		94	34	0	0	128	231
08:45					0		39		9	0	0	48	6	60		0	0	66		96	41	0	0	137	251
Grand Total					**0**	**0**	**132**		**20**	**0**	**0**	**152**	**13**	**230**		**0**	**0**	**243**		**377**	**117**	**0**	**1**	**494**	**889**
Approach %						-	86.8		13.2	0		-	5.3	94.7		0		-		76.3	23.7	0		-	
Totals %						0	14.8		2.2	0		17.1	1.5	25.9		0		27.3		42.4	13.2	0		55.6	
PHF						**0**	**0.85**		**0.56**	**0**		**0.79**	**0.54**	**0.94**		**0**		**0.92**		**0.95**	**0.71**	**0**		**0.9**	**0.89**
Cars						0	125		16	0		141	12	207		0		219		358	112	0		470	830
% Cars						0	94.7		80	0		92.8	92.3	90		0		90.1		95	95.7	0		95.1	93.4
Trucks						0	7		4	0		11	1	23		0		24		19	5	0		24	59
% Trucks						0	5.3		20	0		7.2	7.7	10		0		9.9		5	4.3	0		4.9	6.6
Bicycles						0	0		0	0		0	0	0		0		0		0	0	0		0	0
% Bicycles						0	0		0	0		0	0	0		0		0		0	0	0		0	0
Peds					0	-					0	-					0	-					1	-	1
% Peds					0	-					0	-					0	-					100	-	

Peak Hour Diagram

Specified Period
From: 11:00:00
To: 14:00:00

One Hour Peak
From: 12:00:00
To: 13:00:00

Intersection: Hwy 60 & Muskoka Rd 23
Site Code: 2443500002
Count Date: Oct 09, 2024

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Hwy 60 runs E/W

East Approach

	Out	In	Total
Cars	310	379	689
Trucks	25	17	42
Bicycles	0	0	0
	335	**396**	**731**

Peds: 0

Hwy 60

			Totals
0	0	0	**0**
0	17	365	**382**
0	5	91	**96**

Peds: 0

N / W / E / S

Peds: 0

Hwy 60

Totals			
0	0	0	0
329	304	25	0
6	6	0	0

West Approach

	Out	In	Total
Cars	456	440	896
Trucks	22	31	53
Bicycles	0	0	0
	478	**471**	**949**

Peds: 0

Totals	142	14	0
Cars	136	14	0
Trucks	6	0	0
Bicycles	0	0	0

Muskoka Rd 23

South Approach

	Out	In	Total
Cars	150	97	247
Trucks	6	5	11
Bicycles	0	0	0
	156	**102**	**258**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection: Hwy 60 & Muskoka Rd 23
Site Code: 2443500002
Count Date: Oct 09, 2024
Period: 11:00 - 14:00

Peak Hour Data (12:00 - 13:00)

Start Time	North Approach						South Approach Muskoka Rd 23						East Approach Hwy 60						West Approach Hwy 60						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
12:00					0		30		5	0	0	35	3	79		0	0	82		111	19	0	0	130	247
12:15					0		40		1	0	0	41	1	88		0	0	89		85	31	0	0	116	246
12:30					0		38		5	0	0	43	0	76		0	0	76		84	24	0	0	108	227
12:45					0		34		3	0	0	37	2	86		0	0	88		102	22	0	0	124	249
Grand Total					**0**	**0**	**142**		**14**	**0**	**0**	**156**	**6**	**329**		**0**	**0**	**335**		**382**	**96**	**0**	**0**	**478**	**969**
Approach %						-	91		9	0		-	1.8	98.2		0		-		79.9	20.1	0		-	
Totals %						0	14.7		1.4	0		16.1	0.6	34		0		34.6		39.4	9.9	0		49.3	
PHF						**0**	**0.89**		**0.7**	**0**		**0.91**	**0.5**	**0.93**		**0**		**0.94**		**0.86**	**0.77**	**0**		**0.92**	**0.97**
Cars						0	136		14	0		150	6	304		0		310		365	91	0		456	916
% Cars						0	95.8		100	0		96.2	100	92.4		0		92.5		95.5	94.8	0		95.4	94.5
Trucks						0	6		0	0		6	0	25		0		25		17	5	0		22	53
% Trucks						0	4.2		0	0		3.8	0	7.6		0		7.5		4.5	5.2	0		4.6	5.5
Bicycles						0	0		0	0		0	0	0		0		0		0	0	0		0	0
% Bicycles						0	0		0	0		0	0	0		0		0		0	0	0		0	0
Peds					0	-					0	-					0	-					0	-	0
% Peds					0	-					0	-					0	-					0	-	

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Diagram

Specified Period		One Hour Peak	
From:	16:00:00	From:	16:30:00
To:	19:00:00	To:	17:30:00

Intersection: Hwy 60 & Muskoka Rd 23
Site Code: 2443500002
Count Date: Oct 09, 2024

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Hwy 60 runs E/W

East Approach

	Out	In	Total
Cars	410	364	774
Trucks	16	7	23
Bicycles	0	0	0
	426	**371**	**797**

Peds: 0

Hwy 60

			Totals
0	0	0	**0**
0	7	360	**367**
0	2	156	**158**

Peds: 0

Peds: 0

Hwy 60

	Totals			
	0	0	0	0
	414	398	16	0
	12	12	0	0

Peds: 0

West Approach

	Out	In	Total
Cars	516	537	1053
Trucks	9	18	27
Bicycles	0	0	0
	525	**555**	**1080**

Muskoka Rd 23

Totals	141	4	0
Cars	139	4	0
Trucks	2	0	0
Bicycles	0	0	0

South Approach

	Out	In	Total
Cars	143	168	311
Trucks	2	2	4
Bicycles	0	0	0
	145	**170**	**315**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection: Hwy 60 & Muskoka Rd 23
Site Code: 2443500002
Count Date: Oct 09, 2024
Period: 16:00 - 19:00

Peak Hour Data (16:30 - 17:30)

Start Time	North Approach						South Approach Muskoka Rd 23						East Approach Hwy 60						West Approach Hwy 60						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
16:30					0		26		1	0	0	27	1	112		0	0	113		104	38	0	0	142	282
16:45					0		33		1	0	0	34	5	97		0	0	102		90	36	0	0	126	262
17:00					0		45		0	0	0	45	4	99		0	0	103		80	31	0	0	111	259
17:15					0		37		2	0	0	39	2	106		0	0	108		93	53	0	0	146	293
Grand Total					**0**	**0**	**141**		**4**	**0**	**0**	**145**	**12**	**414**		**0**	**0**	**426**		**367**	**158**	**0**	**0**	**525**	**1096**
Approach %						-	97.2		2.8	0		-	2.8	97.2		0		-		69.9	30.1	0		-	
Totals %						0	12.9		0.4	0		13.2	1.1	37.8		0		38.9		33.5	14.4	0		47.9	
PHF						**0**	**0.78**		**0.5**	**0**		**0.81**	**0.6**	**0.92**		**0**		**0.94**		**0.88**	**0.75**	**0**		**0.9**	**0.94**
Cars						0	139		4	0		143	12	398		0		410		360	156	0		516	1069
% Cars						0	98.6		100	0		98.6	100	96.1		0		96.2		98.1	98.7	0		98.3	97.5
Trucks						0	2		0	0		2	0	16		0		16		7	2	0		9	27
% Trucks						0	1.4		0	0		1.4	0	3.9		0		3.8		1.9	1.3	0		1.7	2.5
Bicycles						0	0		0	0		0	0	0		0		0		0	0	0		0	0
% Bicycles						0	0		0	0		0	0	0		0		0		0	0	0		0	0
Peds					0	-					0	-					0	-					0	-	0
% Peds					0	-					0	-					0	-					0	-	

Appendix C:
Level of Service Definitions

TATHAM ENGINEERING

Level of Service – Unsignalized Intersections

Level of Service (LOS) for unsignalized intersections is defined in terms of control delay for each critical lane. Control delay includes initial deceleration, queue move-up time, stopped delay and final acceleration delay, and is a function of the service rate or capacity of the approach and degree of saturation.

The following table describes in detail the characteristics of each level of service, with A being the best and F being the worst.

LOS	EXPECTED DELAY TO STREET TRAFFIC	DELAY (sec/veh)
A	Little or no delays	$0 < d \leq 10$
B	Short traffic delays	$10 < d \leq 15$
C	Average traffic delays	$15 < d \leq 25$
D	Long traffic delays	$25 < d \leq 35$
E	Very long traffic delays	$35 < d \leq 50$
F	Extreme delays with queuing which may cause congestion affecting other traffic movements in the intersection	$50 < d$

source: 2010 Highway Capacity Manual

TATHAM ENGINEERING

Level of Service – Signalized Intersections

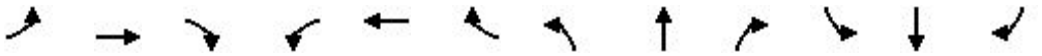
Level of Service (LOS) for signalized intersections is defined in terms of delay, which is made up of a number of factors that relate to control, geometrics, traffic and incidents. Only the portion of total delay attributed to the control facility is quantified. This control delay includes initial deceleration, queue move-up time, stopped delay and final acceleration delay.

The following table describes in detail the characteristics of each level of service, with A being the best and F being the worst.

LOS	EXPECTED DELAY TO STREET TRAFFIC	DELAY (sec/veh)
A	This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all at this LOS. Short cycle lengths may also contribute to low delay.	$0 < d \leq 10$
B	This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop at this level than at LOS A, causing longer average delays.	$10 < d \leq 20$
C	These higher delays may result from fair progression, longer cycle length, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant, though many still pass through the intersection without stopping.	$20 < d \leq 35$
D	At this level, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, or high volume to capacity ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures become noticeable.	$35 < d \leq 55$
E	This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.	$55 < d \leq 80$
F	At this level, oversaturation occurs when arrival flow rates exceed the design capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors to such high delay levels. LOS F is considered to be unacceptable to most drivers.	$80 < d$

source: 2010 Highway Capacity Manual

Appendix D:
Existing Operations

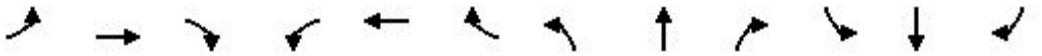


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	682	29	4	497	4	36	0	7	3	1	10
Future Volume (vph)	7	682	29	4	497	4	36	0	7	3	1	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3476	1555	1372	3380	1601	1755	1601		1789	1624	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00		1.00	1.00	
Satd. Flow (perm)	1789	3476	1555	1372	3380	1601	1847	1601		1883	1624	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	8	775	33	5	565	5	41	0	8	3	1	11
RTOR Reduction (vph)	0	0	14	0	0	2	0	7	0	0	10	0
Lane Group Flow (vph)	8	775	19	5	565	3	41	1	0	3	2	0
Heavy Vehicles (%)	2%	5%	5%	33%	8%	2%	4%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.1	29.2	29.2	1.1	29.2	29.2	3.6	3.6		3.6	3.6	
Effective Green, g (s)	1.1	29.2	29.2	1.1	29.2	29.2	3.6	3.6		3.6	3.6	
Actuated g/C Ratio	0.02	0.57	0.57	0.02	0.57	0.57	0.07	0.07		0.07	0.07	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	38	1967	879	29	1912	905	128	111		131	113	
v/s Ratio Prot	c0.00	c0.22		0.00	0.17			0.00			0.00	
v/s Ratio Perm			0.01			0.00	c0.02			0.00		
v/c Ratio	0.21	0.39	0.02	0.17	0.30	0.00	0.32	0.01		0.02	0.02	
Uniform Delay, d1	24.8	6.3	4.9	24.8	5.8	4.9	22.8	22.3		22.4	22.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.8	0.1	0.0	2.8	0.1	0.0	1.5	0.0		0.1	0.1	
Delay (s)	27.6	6.4	4.9	27.6	5.9	4.9	24.3	22.4		22.4	22.4	
Level of Service	C	A	A	C	A	A	C	C		C	C	
Approach Delay (s)		6.5			6.1			24.0			22.4	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	51.6	Sum of lost time (s)	17.7
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	528	164	18	322	185	28
Future Volume (vph)	528	164	18	322	185	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3476	1570	1690	3318	1691	
Flt Permitted	1.00	1.00	0.34	1.00	0.96	
Satd. Flow (perm)	3476	1570	606	3318	1691	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	593	184	20	362	208	31
RTOR Reduction (vph)	0	110	0	0	7	0
Lane Group Flow (vph)	593	74	20	362	232	0
Heavy Vehicles (%)	5%	4%	8%	10%	5%	20%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	20.5	20.5	26.6	26.6	12.6	
Effective Green, g (s)	20.5	20.5	26.6	26.6	12.6	
Actuated g/C Ratio	0.40	0.40	0.52	0.52	0.25	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1394	629	338	1727	416	
v/s Ratio Prot	c0.17		0.00	c0.11	c0.14	
v/s Ratio Perm		0.05	0.03			
v/c Ratio	0.43	0.12	0.06	0.21	0.56	
Uniform Delay, d1	11.0	9.6	6.2	6.6	16.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.1	0.1	0.1	1.6	
Delay (s)	11.3	9.7	6.3	6.7	18.4	
Level of Service	B	A	A	A	B	
Approach Delay (s)	10.9			6.6	18.4	
Approach LOS	B			A	B	

Intersection Summary			
HCM 2000 Control Delay	11.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	51.1	Sum of lost time (s)	16.9
Intersection Capacity Utilization	38.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

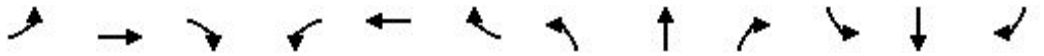


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	718	50	14	764	3	22	0	7	4	0	11
Future Volume (vph)	6	718	50	14	764	3	22	0	7	4	0	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1460	3579	1601	1789	3544	1601	1789	1601		1372	1601	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00		1.00	1.00	
Satd. Flow (perm)	1460	3579	1601	1789	3544	1601	1883	1601		1444	1601	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	6	772	54	15	822	3	24	0	8	4	0	12
RTOR Reduction (vph)	0	0	22	0	0	1	0	8	0	0	12	0
Lane Group Flow (vph)	6	772	32	15	822	2	24	0	0	4	0	0
Heavy Vehicles (%)	25%	2%	2%	2%	3%	2%	2%	2%	2%	33%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.1	30.1	30.1	1.1	30.1	30.1	1.5	1.5		1.5	1.5	
Effective Green, g (s)	1.1	30.1	30.1	1.1	30.1	30.1	1.5	1.5		1.5	1.5	
Actuated g/C Ratio	0.02	0.60	0.60	0.02	0.60	0.60	0.03	0.03		0.03	0.03	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	31	2137	956	39	2116	956	56	47		42	47	
v/s Ratio Prot	0.00	0.22		c0.01	c0.23			0.00			0.00	
v/s Ratio Perm			0.02			0.00	c0.01			0.00		
v/c Ratio	0.19	0.36	0.03	0.38	0.39	0.00	0.43	0.01		0.10	0.01	
Uniform Delay, d1	24.2	5.2	4.2	24.3	5.3	4.1	24.0	23.7		23.8	23.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.0	0.1	0.0	6.2	0.1	0.0	5.2	0.0		1.0	0.1	
Delay (s)	27.3	5.3	4.2	30.5	5.4	4.1	29.2	23.8		24.8	23.8	
Level of Service	C	A	A	C	A	A	C	C		C	C	
Approach Delay (s)		5.4			5.9			27.9			24.0	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	6.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	50.4	Sum of lost time (s)	17.7
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	514	221	17	580	197	6
Future Volume (vph)	514	221	17	580	197	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	
Flt Protected	1.00	1.00	0.95	1.00	0.95	
Satd. Flow (prot)	3579	1601	1755	3579	1789	
Flt Permitted	1.00	1.00	0.36	1.00	0.95	
Satd. Flow (perm)	3579	1601	665	3579	1789	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	547	235	18	617	210	6
RTOR Reduction (vph)	0	139	0	0	2	0
Lane Group Flow (vph)	547	96	18	617	214	0
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	20.6	20.6	26.7	26.7	11.9	
Effective Green, g (s)	20.6	20.6	26.7	26.7	11.9	
Actuated g/C Ratio	0.41	0.41	0.53	0.53	0.24	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1459	653	375	1892	421	
v/s Ratio Prot	c0.15		0.00	c0.17	c0.12	
v/s Ratio Perm		0.06	0.02			
v/c Ratio	0.37	0.15	0.05	0.33	0.51	
Uniform Delay, d1	10.4	9.4	5.9	6.8	16.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.1	0.1	0.1	1.0	
Delay (s)	10.6	9.5	6.0	6.9	17.7	
Level of Service	B	A	A	A	B	
Approach Delay (s)	10.3			6.9	17.7	
Approach LOS	B			A	B	

Intersection Summary			
HCM 2000 Control Delay	9.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	50.5	Sum of lost time (s)	16.9
Intersection Capacity Utilization	37.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	743	52	14	791	4	38	1	14	4	3	12
Future Volume (vph)	12	743	52	14	791	4	38	1	14	4	3	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	1620		1789	1657	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00		1.00	1.00	
Satd. Flow (perm)	1789	3579	1601	1789	3579	1601	1883	1620		1883	1657	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	12	766	54	14	815	4	39	1	14	4	3	12
RTOR Reduction (vph)	0	0	24	0	0	2	0	13	0	0	11	0
Lane Group Flow (vph)	12	766	30	14	815	2	39	2	0	4	4	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.1	27.9	27.9	1.1	27.9	27.9	3.5	3.5		3.5	3.5	
Effective Green, g (s)	1.1	27.9	27.9	1.1	27.9	27.9	3.5	3.5		3.5	3.5	
Actuated g/C Ratio	0.02	0.56	0.56	0.02	0.56	0.56	0.07	0.07		0.07	0.07	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	39	1989	889	39	1989	889	131	112		131	115	
v/s Ratio Prot	0.01	0.21		c0.01	c0.23			0.00			0.00	
v/s Ratio Perm			0.02			0.00	c0.02			0.00		
v/c Ratio	0.31	0.39	0.03	0.36	0.41	0.00	0.30	0.02		0.03	0.03	
Uniform Delay, d1	24.2	6.3	5.0	24.2	6.4	5.0	22.2	21.7		21.8	21.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.4	0.1	0.0	5.6	0.1	0.0	1.3	0.1		0.1	0.1	
Delay (s)	28.6	6.4	5.1	29.8	6.6	5.0	23.5	21.8		21.9	21.9	
Level of Service	C	A	A	C	A	A	C	C		C	C	
Approach Delay (s)		6.7			6.9			23.0			21.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	50.2	Sum of lost time (s)	17.7
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	615	254	19	600	206	29
Future Volume (vph)	615	254	19	600	206	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3579	1601	1789	3579	1774	
Flt Permitted	1.00	1.00	0.32	1.00	0.96	
Satd. Flow (perm)	3579	1601	600	3579	1774	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	634	262	20	619	212	30
RTOR Reduction (vph)	0	157	0	0	6	0
Lane Group Flow (vph)	634	105	20	619	236	0
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	20.4	20.4	26.5	26.5	12.4	
Effective Green, g (s)	20.4	20.4	26.5	26.5	12.4	
Actuated g/C Ratio	0.40	0.40	0.52	0.52	0.24	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1437	642	338	1866	433	
v/s Ratio Prot	c0.18		0.00	c0.17	c0.13	
v/s Ratio Perm		0.07	0.03			
v/c Ratio	0.44	0.16	0.06	0.33	0.54	
Uniform Delay, d1	11.1	9.7	6.2	7.0	16.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.1	0.1	0.1	1.4	
Delay (s)	11.3	9.9	6.3	7.1	18.1	
Level of Service	B	A	A	A	B	
Approach Delay (s)	10.9			7.1	18.1	
Approach LOS	B			A	B	

Intersection Summary			
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	50.8	Sum of lost time (s)	16.9
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Appendix E:
Study Excerpts

THE DISTRICT MUNICIPALITY OF MUSKOKA

ENGINEERING AND PUBLIC WORKS DEPARTMENT
70 PINE STREET, BRACEBRIDGE, ONTARIO P1L 1N3
Telephone (705) 645-6764 OR 1-800-281-3483
Fax (705) 645-7599 E-mail publicworks@muskoka.on.ca
www.muskoka.on.ca

TO: Chair and Members
Engineering and Public Works Committee

FROM: A.J. White, P.Eng.
Commissioner of Engineering and Public Works

DATE: April 10, 2013

SUBJECT: Transportation Environmental Study Report For
Highway 60 Improvements Between Highway 11 and Highway 35
Ministry Of Transportation Of Ontario Project GWP-5006-05-00

REPORT NO: PW-5-2013-13

RECOMMENDATION

None – For information only.

ORIGIN

Representatives of the Ministry of Transportation of Ontario (MTO) and its consultants made presentations to the Engineering and Public Works Committee on May 10, 2010 and July 20, 2011 regarding the subject improvements to Highway 60.

ANALYSIS

In March, 2013, the MTO published a Transportation Environmental Study Report (TESR) on proposed improvements to two sections of Highway 60 between Highway 11 in the Town of Huntsville and Highway 35 in the Township of Lake of Bays. The Executive Summary and Exhibits 7-2a to 7-2d from the TESR, which describe and illustrate the preferred plans, are attached as Appendix "A". The complete TESR may be viewed at www.highway60.ca. The direct link to the complete TESR is:
http://www.highway60.ca/highway60/pdf/Highway%2060%20Improvements%20Transportation%20Environmental%20Study%20Report%20-%20Complete%20Report.pdf

Respectfully submitted,

A.J. White, P.Eng.
Commissioner of Engineering
and Public Works

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EXECUTIVE SUMMARY

The study limits of the proposed improvements to Highway 60 are located in the Town of Huntsville and the Township of Lake of Bays, within the District Municipality of Muskoka, in the following two sections:

- Section 1: Highway 60 / Highway 11 interchange to Muskoka Road 3 (including the interchange).
- Section 2: Muskoka Road 23 to Highway 35.

This project is classified as a Group 'B' project as defined in the *Class Environmental Assessment (Class EA) for Provincial Transportation Facilities* (2000).

Highway 60 is a key transportation corridor that provides access to many tourist and recreational uses/activities in the Muskoka area, including the Algonquin Provincial Park, where it is designated the "Frank McDougall Parkway". Highway 60 also serves as a major artery from the study area to Highway 11. As such, Highway 60 is important for the economic development of the regions that it serves.

Sections 1 and 2 within the study limits were broken down further into four sections, based on their different characteristics. The four sections are as follows:

- Section 1A: Highway 60 / Highway 11 Interchange
- Section 1B: Highway 11 to Muskoka Road 3
- Section 2A: Muskoka Road 23 to Muskoka Road 8
- Section 2B: Muskoka Road 8 to Highway 35

The section between Muskoka Road 3 and Muskoka Road 23 was not considered in this Class EA, as there are no deficiencies associated with the existing four-lane undivided section.

To proactively plan for future infrastructure needs for Highway 60, this study examined operational and capacity needs to the Year 2031 and considered options to accommodate future transportation needs in the Highway 60 corridor. Future improvement alternatives for Highway 60 were determined by reviewing existing and projected future traffic volumes (transportation demand is expected to grow approximately 1.5 % annually in the future), projected population growth, and opportunities to upgrade horizontal and vertical curves for safety reasons.

Preferred Plan

This study included extensive consultation with the public, interest groups and all interested government agencies. This study concluded that the most appropriate way to improve traffic operations and accommodate future traffic along Highway 60 within the project limits is to proceed with the plans described in **Exhibit E-1**.

Exhibit E-1: Summary of Preferred Plan

SECTION	PREFERRED	RATIONALE
Section 1A: Highway 60 / Highway 11 Interchange	Alternative 1A-1 - Do Nothing; Maintain Existing Trumpet "B" Configuration	• The existing configuration is capable of accommodating future projected traffic demand.
Section 1B: Highway 11 to Muskoka Road 3	Alternative 1B-2 – Widen Highway 60 to 4 Lanes (undivided)	• Providing two westbound lanes west of King William Street to Highway 11 is required to address truck-climbing requirements. • This section experiences the highest traffic volumes and traffic growth is anticipated to continue in the future. • Alternative 1B-2 provides ultimate capacity for projected traffic demand and traffic operations and the fewest impacts to the natural and socio-economic environment.
Section 2A: Muskoka Road 23 to Muskoka Road 8	Alternative 2A-4 – Widen Highway 60 to 4 Lanes (Undivided) with Minimal Horizontal and Vertical Alignment Changes	• Mainline traffic analysis reveals that the widening of Highway 60 to four lanes easterly from Deerhurst Highlands Road to Limberlost Road is required to address existing traffic operations. • With widening of Highway 60 to four lanes easterly to Limberlost Road, a separate eastbound left-turn lane is warranted at Limberlost Road. • This alternative accommodates existing and future transportation demand and resolves traffic capacity. • Operational problems are resolved with minimal property and environmental impacts.
Section 2B: Muskoka Road 8 to Highway 35	<u>Preferred Interim Alternative</u> Alternative 2B-1 – Do Nothing; Maintain Existing Highway Configuration <u>Preferred Ultimate Alternative</u> Alternative 2B-4 – Widen Highway 60 to 4 Lanes (Undivided) with Minimal Horizontal and Vertical Alignment Changes	<u>Preferred Interim Alternative</u> • Mainline traffic analysis reveals that Section 2B will continue to operate satisfactorily until 2025 with no widening. • The "Do Nothing" alternative is not anticipated to address future transportation/traffic requirements beyond 2025. <u>Preferred Ultimate Alternative</u> • Mainline traffic analysis reveals that improvements to future traffic operations beyond 2025 can only be achieved by widening to four lanes. • Separate eastbound left-turn lanes are warranted at Millar Hill Road and

Exhibit E-1: Summary of Preferred Plan

SECTION	PREFERRED	RATIONALE
		Echo Road and separate westbound left turn lanes are warranted at South Portage Road, Dwight Bay Road North and Highway 35 with ultimate widening. • Alternative 2B-4 accommodates future transportation demand and resolves traffic capacity, geometric and operational problems.
Highway 60 – Dwight Options	<u>Preferred Interim Alternative</u> Dwight Option #2 – Provide Centre Left Turning Lane through Dwight <u>Preferred Ultimate Alternative</u> Dwight Option #3 – Widen Highway 60 to 4 Lanes (Undivided)	<u>Preferred Interim Alternative</u> • This alternative only partially addresses future transportation/traffic requirements and geometric problems. • The introduction of a centre left turning lane through Dwight in the interim is expected to enhance safety for vehicles turning from both directions to the local businesses and residents. • The posted speed will remain 60 km/h through Dwight. <u>Preferred Ultimate Alternative</u> Mainline traffic analysis reveals that improvements to future traffic operations beyond 2025 in Section 2B can only be achieved by widening to four lanes.

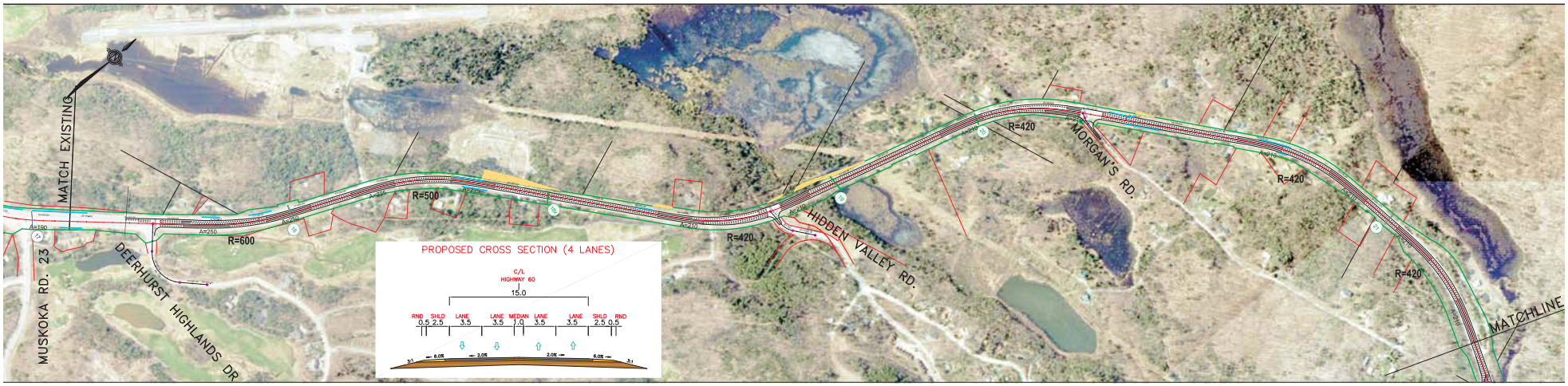
Section 7 of the Transportation Environmental Study Report (TESR) describes the technically preferred plan for the proposed improvements to Highway 60 listed above.

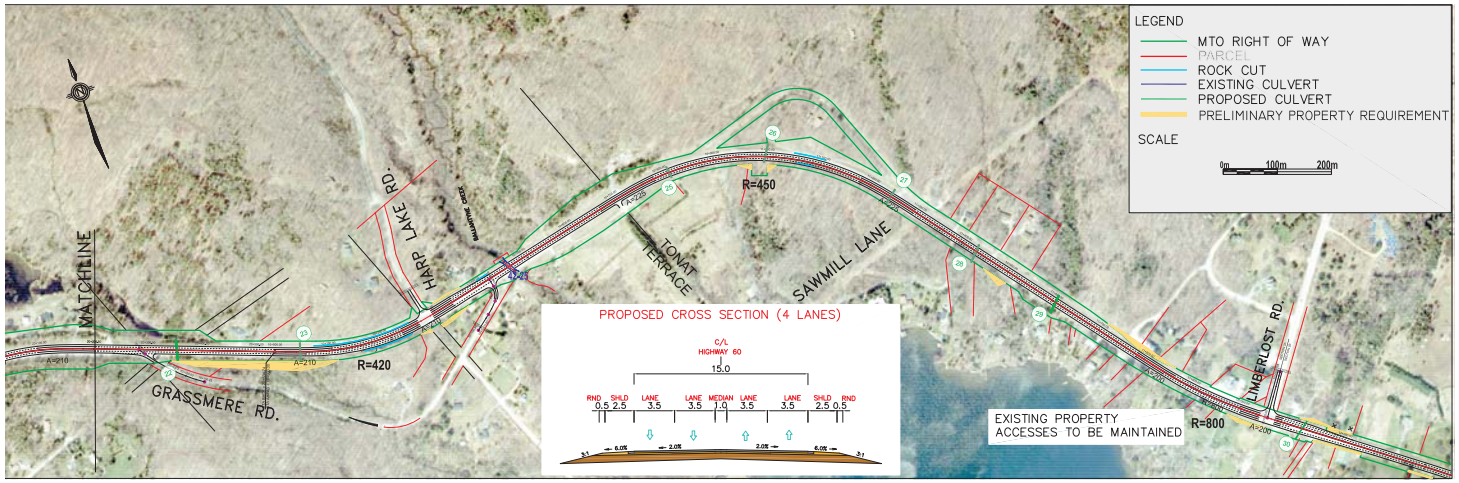
Section 8 of the TESR outlines the potential environmental effects associated with the selected design, proposed mitigation measures and commitments to future work. Identified Concerns, Proposed Mitigation and Future Commitments are summarized in **Exhibit 8-1**.

SECTIONS 1A and 1B: PREFERRED PLAN

Ontario	G.W.P. 5006-05-00 Highway 60 Improvements Preliminary Design Study and Class EA	**SECTIONS 1A and 1B: PREFERRED PLAN** **Highway 11 to Muskoka Road 3**	**EXHIBIT** **7-2a**

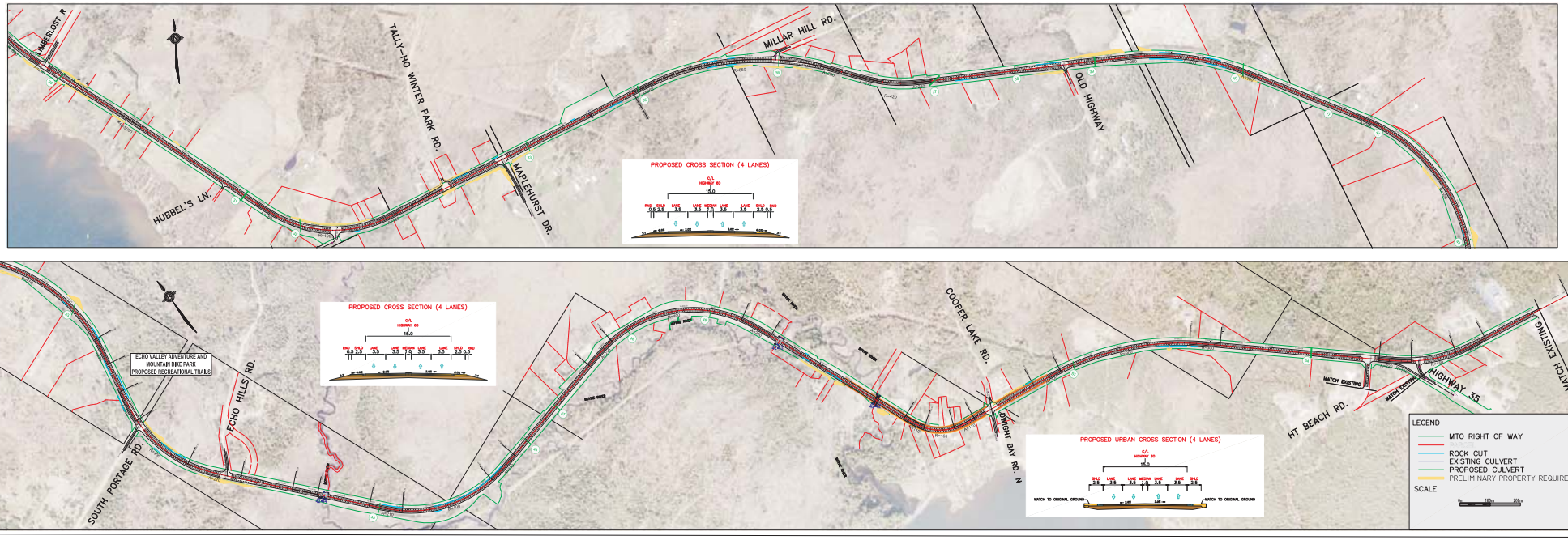
SECTION 2A PREFERRED PLAN



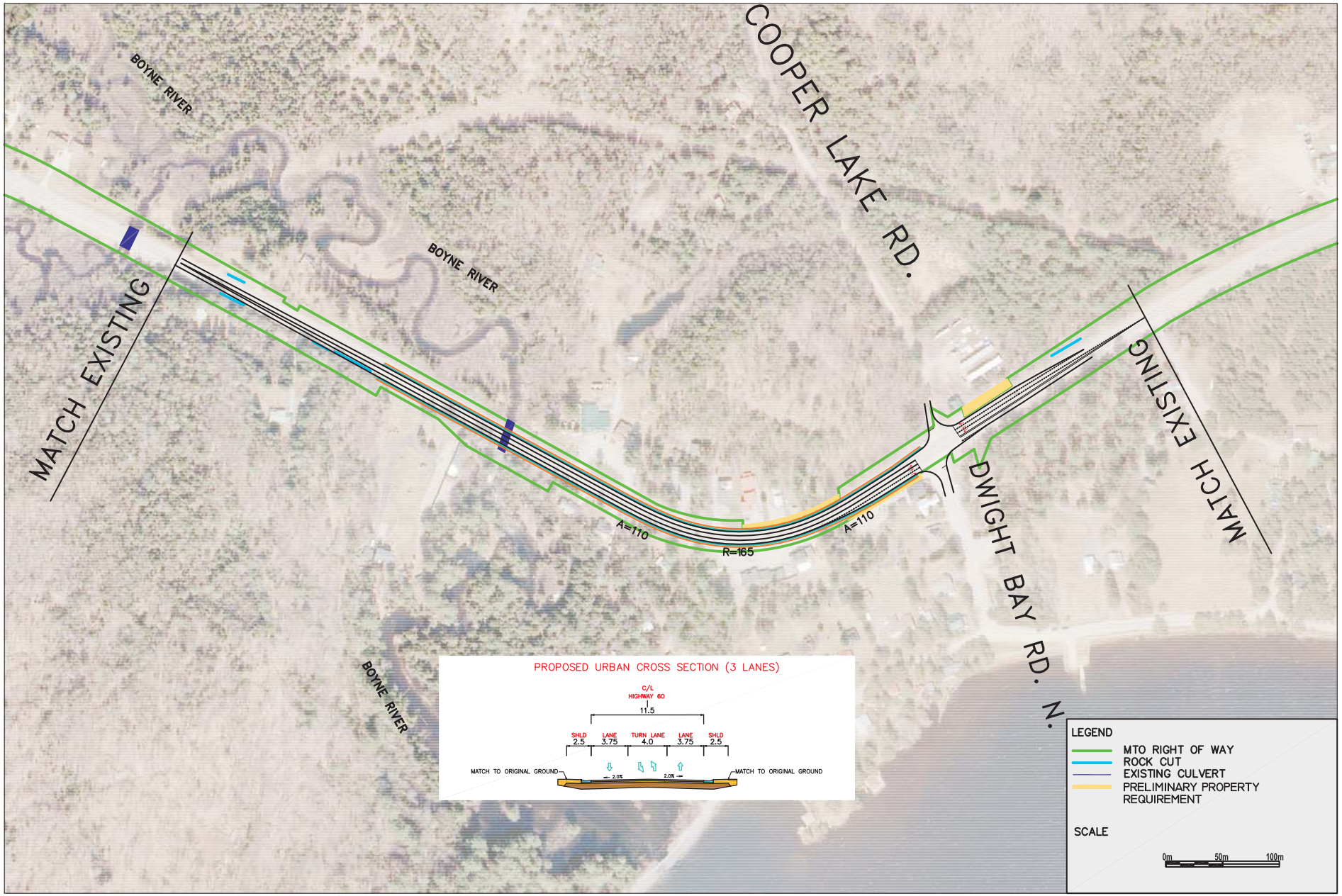


Ontario	G.W.P. 5006-05-00 Highway 60 Improvements Preliminary Design Study and Class EA	**SECTION 2A PREFERRED PLAN** **Muskoka Road 23 to Muskoka Road 8**	**EXHIBIT** **7-2b**

SECTION 2B: PREFERRED PLAN (ULTIMATE)



Ontario	G.W.P. 5006-05-00 Highway 60 Improvements Preliminary Design Study and Class EA	**SECTION 2B: PREFERRED PLAN (ULTIMATE)** **Muskoka Road 8 to Highway 35**	**EXHIBIT** **7-2c**



Ontario	G.W.P. 5006-05-00 Highway 60 Improvements Preliminary Design Study and Class EA	**SECTION 2B: PREFERRED PLAN (INTERIM)** **Provide Centre Turning Lane through Dwight** **(Widen Highway 60 to 3 Lanes)**	**EXHIBIT** **7-2d**

Traffic Impact Study

Deerhurst Modern

Town of Huntsville
District Municipality of Muskoka

WMI 11-154B

September 2022
Revised May 2024

Prepared by

WMI & Associates Limited
119 Collier Street, Barrie Ontario L4M 1H5

intersections. From this information, Background Traffic sketches for the year 2027, 2032, and 2037 (Figures 3A, 3B, and 3C, respectively) have been prepared and are contained in **Appendix A** for reference.

3.2 Trip Generation

Trip generation rates were estimated for the subject Deerhurst Modern development using data from the Institute of Transportation Engineers' (ITE) Trip Generation Manual, 10th Edition. The datasets for Resort Hotel units (land use code 330) were utilized to determine a viable trip generation rate for the proposed resort residential units, since it is expected that the traffic patterns associated with the proposed units will resemble that of a resort hotel. The data for the 'Weekday Peak hour of Adjacent Street Traffic, One Hour Between 7am and 9am' time period, and the 'Weekday Peak hour of Adjacent Street Traffic, One Hour Between 4pm and 6pm' time period were utilized since these data sets typically best represent the peak travel periods in resort-residential settings.

Using the fitted curve equation from the 'Weekday Peak hour of Adjacent Street Traffic, one hundred and forty four (144) and one hundred and eighty one (181) total vehicular trips (entering and exiting) are expected to be generated by this development, under the One Hour Between 7am and 9am' and 'One Hour Between 4pm and 6pm timeframes, respectively.

Refer to the trip generation calculations contained in **Appendix B** for reference.

3.3 Other Development Traffic

From information provided by the District of Muskoka, it is understood that an additional 90 resort condominium units are proposed for construction within the Treetops development that is located to the east of the subject site on Deerhurst Drive. An additional 56 recreational detached homes are also proposed within the Golf Cottages site, located on St. Andrews Circle.

Based on publicly available data obtained from the developer's website, it is understood that the Treetops Development units are residential condominium suites that are intended as secondary recreational properties. As such it is estimated that the Recreational Homes (land use code 260) data set would be most appropriate to determine a trip generation rate. The Recreational homes dataset is also determined to be appropriate to estimate trips from the Golf Cottages development.

Trip generation calculations for other development traffic are contained in **Appendix B** for reference

3.4 Trip Distribution

From an analysis of the existing and proposed road network, typical travel routes, and likely destinations, trip distribution patterns have been estimated to determine the total development traffic impact within the study area and at each critical intersection. Tables 1 and 2 below describe the trip distribution estimates at each subject intersection under the existing and proposed traffic scenarios, respectively:

Table 1: Existing Traffic Distribution Estimates

Scenario/ Intersection location:	Distribution Split:	Notes:
Deerhurst Highlands & Canal Road (EX. Residential only)	100% east	Of the estimated trips from the existing residences on Deerhurst Highlands Drive and connected local roads, 25% are to/from Deerhurst Highlands Drive & Canal Road Intersection. The remaining 75% is to/from Deerhurst Highlands Drive & Highway 60 intersection (not the subject of this report). Of the 25% to/from this intersection, 100% is assumed to/from the east to existing resorts amenities and south to Canal Road.
Deerhurst Highlands & Canal Road (EX. Golf Course Only)	50% east, 50% west	50% of trips are west to Highway 60 (major route to nearby urban centres), 50% east to/from existing nearby resort accommodations (i.e. Deerhurst Pavilion, Hidden Valley).

Table 2: Proposed Traffic Distribution Estimates (Subject Site)

Scenario/ Intersection location:	Distribution Split:	Notes:
Turnbull Lane site access & Canal Road (Subject Development)	95% north; 5% south	95% north to Highway 60 as this is the main thoroughfare and shortest / quickest route to the local urban centers and the major north-south provincial highway (Highway 11). Canal Road south leads to other resorts and rural-residential properties to the south and east of Hidden Valley.
Deerhurst Drive site access & Deerhurst Drive (Subject Development)	N/A	Zero trips have been assigned as this access is intended to be utilized infrequently for deliveries by large trucks at off-peak hours.
Canal Road & Deerhurst Drive (Subject Development)	95% west; 5% east	95% to major urban centers via Highway 60 as per the rationale above. 5% assigned to/ from the west to account for traffic draw to/from other area resorts: Hidden Valley, Deerhurst Pavilion, Deerhurst Lakeside Lodge, as well as local residents.

Canal Road & Deerhurst Highlands Drive + Deerhurst Drive (PR. Golf Cottages Phase 4+5)	100% east	Of the estimated trips from the new residences on St. Andrews Circle, 25% are to/from Deerhurst Highland Drive & Canal Road Intersection. The remaining 75% are to/from Deerhurst Highlands Drive & Highway 60 intersection (not the subject of this report). Of the 25% to/from Deerhurst Highland Drive & Canal Road, 100% is assumed to/from the east to existing resorts amenities and south to Canal Road.
Canal Road & Deerhurst Drive (PR. Treetops Development)	90% west; 10% south	90% majority to major urban centers via Highway 60 as per the rationale above. The minority assigned to/ from Canal Road south.
Highway 60 & Canal Road (all development)	85% west; 15% east	85% assigned to the west approach of Highway 60 as this is the shortest / quickest route to urban centers (Greater Toronto Area, various northern Ontario municipalities, Town of Huntsville). 15% of development traffic assigned to/ from Canal Road south, which leads to other resorts, rural-residential properties to the south and east of Hidden Valley, and some reginal draw would be expected from eastern urban Centres (i.e. Ottawa Valley, Renfrew, Arnprior). The majority draw to/from the west is substantiated by the traffic counts- which sees the vast majority of traffic to/ from the west.

From the trip generation calculations and estimates of trip distribution, Development Traffic Distribution figures have been prepared. Figure 4A illustrates the Deerhurst Modern (subject site) development traffic distribution, Figure 4B illustrates the proposed traffic distribution from Golf Cottages Phase 4+5, and Figure 4C illustrates the proposed traffic distribution from Tree tops at Hidden Valley. Figures 4A, 4B, and 4C are contained in **Appendix A** for reference.

3.5 Background + Overall Development Traffic

The combination of background and anticipated development traffic (both from the subject development and other developments) for both the AM and PM Peak periods under the full build-out year (2027), the 5-year horizon (2032) and the 10-year horizon (2037) scenarios are illustrated on Figures 5A, 5B, and 5C respectively, and are contained in **Appendix A** for reference.

4.0 Warrant Analyses

Warrant analyses have been completed for traffic signals and all-way stop controls at the Canal Road and Deerhurst Drive Intersections, using the Background + Development Traffic 2027, 2032, and 2037 scenarios as illustrated on Figures 5A, 5B & 5C, respectively. A warrant analysis for auxiliary lanes has also been conducted for all new intersections.

assessments, and via the geometric design of the site plan and entrance driveways which is intended to accommodate large vehicles and buses.

10.0 Recommendations

From the preceding analysis it is determined that the Deerhurst Modern development will not result in major / adverse impacts to existing transportation systems within the study area. The predominant concern is the pre-existing sight distance deficiency experienced at the Canal Road and Deerhurst Drive intersection, and which may be exacerbated by the increased traffic resulting from the Deerhurst Modern development. It is recommended to convert this intersection to an all-way stop configuration, to circumvent the sight-distance concern by slowing/ stopping traffic from all approaches and to thereby allow for safer left and right turning movements onto Canal Road and Deerhurst Drive from the southern Canal Road approach. The transition to an all-way stop configuration will require advanced warning signage at all approaches, and it is recommended that rumble strips also be employed for westbound traffic on Deerhurst Drive (in accordance with Ontario Traffic Manual Requirements) as a further warning to drivers of the upcoming all-way stop condition at the intersection.

Due to the anticipated increased delays and queues anticipated in the future condition(s) to westbound left turning traffic at the Highway 60 & Canal Road intersection, it is recommended that signal timing be re-assessed & possibly optimized following the full-build out of the subject development, and in the future 5 and 10 year horizons.

It is further recommended that wayfinding signage be implemented in advance of the site's location so that guests know to make a right turn at the Canal Road & Deerhurst Drive intersection which them leads to the appropriate site entrance at Turnbull Lane.

11.0 Conclusion

This Traffic Impact Study for the Deerhurst Modern development (formerly referred to as Village Centre) demonstrates that the development can be accommodated within the local community without adverse impacts on existing transportation systems. Specifically:

- An estimated 144 and 181 peak hourly trips during the AM and PM peak hour periods, respectively, is expected to be generated due to the proposed development.

- The warrants analyses at the Canal Road & Deerhurst Drive Intersection reveals that traffic signals are not warranted, however an all-way stop is warranted.

- Traffic operations at nearby / critical intersections will continue to function adequately with the provision of all way stop control at Canal Road & Deerhurst Drive, and minor signal timing improvements under the development + background traffic scenario to the year 2037. A detailed traffic signal assessment and possible timing re-configuration should be assessed in the future following a review of actual circumstances after the full-build out of the subject development.

- The proposed site entrances will be configured to avoid sight-distance issues and to ensure adequate vehicular circulation both into and out of the subject site.

- The concept site plan design adequately accommodates parking and the circulation of EMS vehicles and large trucks.

- Sight distance is currently deficient at the Canal Road & Deerhurst Drive intersection. Implementing the all-way stop at the Canal Road & Deerhurst Drive Intersection will improve the existing safety issue.

- Active transportation is predominantly accounted for through the connection of walking and cycling trails through the existing Deerhurst Resort lands.

Should you have any questions or require additional information, please contact the undersigned.

Yours truly,

WMI & Associates Limited

Jonathan Reimer, P. Eng.

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APPENDIX A

FIGURES

GENERAL SITE NOTES:

1. TO BE READ IN CONJUNCTION WITH DRAWINGS PREPARED BY SITE SERVICING ENGINEER AND LANDSCAPE ARCHITECT. REFER TO SITE SERVICES/GRADING DRAWINGS FOR GRADING INFORMATION AND DRAINAGE.

2. FIRE ROUTES SHALL BE DESIGNED IN ACCORDANCE WITH APPLICABLE RADIUS OF 12m, INTERIOR RADIUS OF 9m AND OUTSIDE TURNING RADIUS OF 15m.

3. FIRE ROUTES SHALL BE DESIGNED TO SUPPORT EXPECTED LOADS IMPOSED BY FIREFIGHTING EQUIPMENT AND MEET THE REQUIREMENTS OF THE CANADIAN HIGHWAY BRIDGE CODE, AND SHALL BE SURFACES IN ORDER TO BE ACCESSIBLE UNDER ALL CLIMACTIC CONDITIONS.

4. SITE BOUNDARY AND EASEMENTS REFERENCED FROM KRCMAR DATED 11/15/2020. REFER TO SURVEY BY KRCMAR DATED 11/15/2020 FOR EASEMENTS; WETLAND AND ENVIRONMENTAL SETBACK REFERENCED FROM SURVEY AND REPORT BY KRCMAR DATED 11/15/2020. AREAS AND DIMENSIONS ARE APPROXIMATE AND SUBJECT TO CONFIRMATION BY UP-TO-DATE SURVEY.

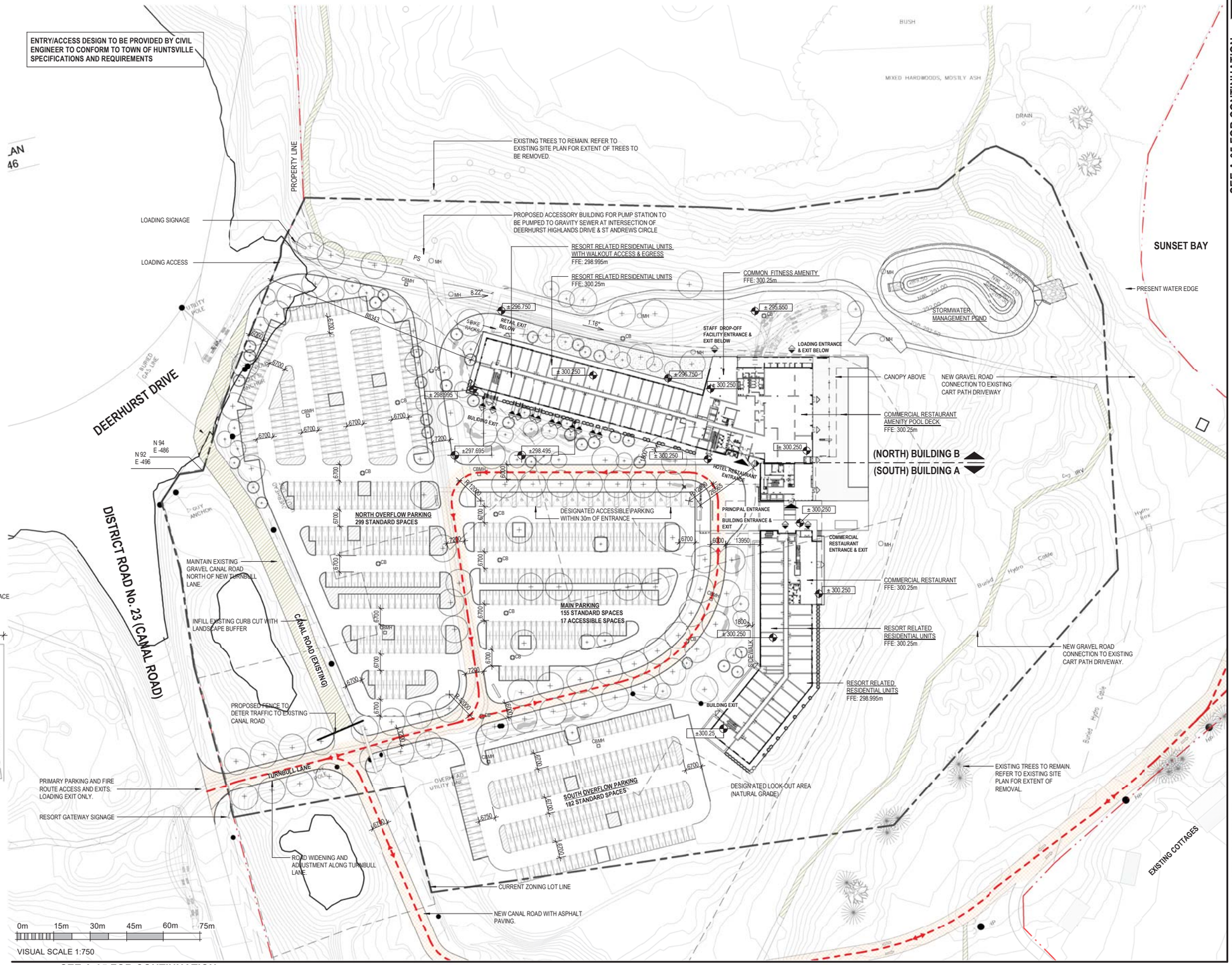
LEGEND:

- PRINCIPAL BUILDING ENTRANCE
- BUILDING ENTRANCE
- BUILDING EGRESS
- TRAFFIC DIRECTION
- +0.00 PROPOSED ELEVATION
- 6M FIRE ROUTE (CROSS HATCHED)
- FIRE HYDRANT
- LIGHT POST
- CBMH CATCH BASIN MAN-HOLE COVER
- MH MAN-HOLE COVER
- CB CATCH BASIN
- TRENCH DRAIN MAN-HOLE COVER
- PS PUMP STATION
- FIRE ACCESS ROUTE
- PROPERTY LINE
- RESORT DEVELOPMENT BOUNDARY
- X-XX RESIDENTIAL UNIT NO.
- EXISTING ROAD PAVING CONDITION TO REMAIN

STANDARD PARKING SPACE 6x2.6m (2.60 m, 6.00 m)

ACCESSIBLE PARKING SPACE 4.5x6m WITH 1.5m TRANSFER AISLE (4.50 m + 1.50 m, 6.00 m)

LOADING SPACE 4mx15m (4.00 m, 15.00 m)



SEE A-05 FOR CONTINUATION

1 **SITE PLAN - DEERHURST MODERN**
1 : 750

CONTRACTOR SHALL CHECK ALL DIMENSIONS ON THE WORK AND REPORT ANY DISCREPANCY TO THE CONSULTANT BEFORE PROCEEDING. THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION UNTIL AUTHORIZED IN WRITING BY CONSULTANT.

KEY PLAN

REVISION		
NO.	DATE	DESCRIPTION
1	20220909	ISSUED FOR OPA/ZBA
2	20240501	ISSUED FOR OPA/ZBA

B+H Architects
320 Bay Street, Suite 200
Toronto, ON, Canada M5H 4A6
T/416.596.2299 F/416.586.0599

SEAL :

LANDSCAPE ARCHITECT:
B+H Architects
320 Bay St. #200
Toronto | Ontario | M5H 4A6
T/ 416 596 2299

PLANNING CONSULTANT:
MHBC
113 Collier Street
Barrie | Ontario | L4M 1H2
T/ 705 728 0045 F/ 705 728 2010

SITE SERVICES/ CIVIL ENGINEER/ TRAFFIC :
WMI & Associates Ltd Engineering
119 Collier St
Barrie | Ontario | L4M 1H5
T/ 705 797 2027

ENVIRONMENTAL ENGINEER:
Birks Natural Heritage Consultants Inc.
23 Herrell Avenue, Barrie L4N 6T5
T/ 705 790 1285

GEOTECHNICAL CONSULTANT:
Soil Engineers Ltd.
90 West Bellver Creek Road, Suite #100
Richmond Hill | Ontario | L4B 1E7
T/ 416 754 8515

OWNER :
freed
552 WELLINGTON STREET WEST, TORONTO, ON M5V 2V5

PROJECT :
DEERHURST MODERN

PROPOSED RESORT RESIDENTIAL DEVELOPMENT

SHEET CONTENTS :
SITE PLAN - DEERHURST MODERN

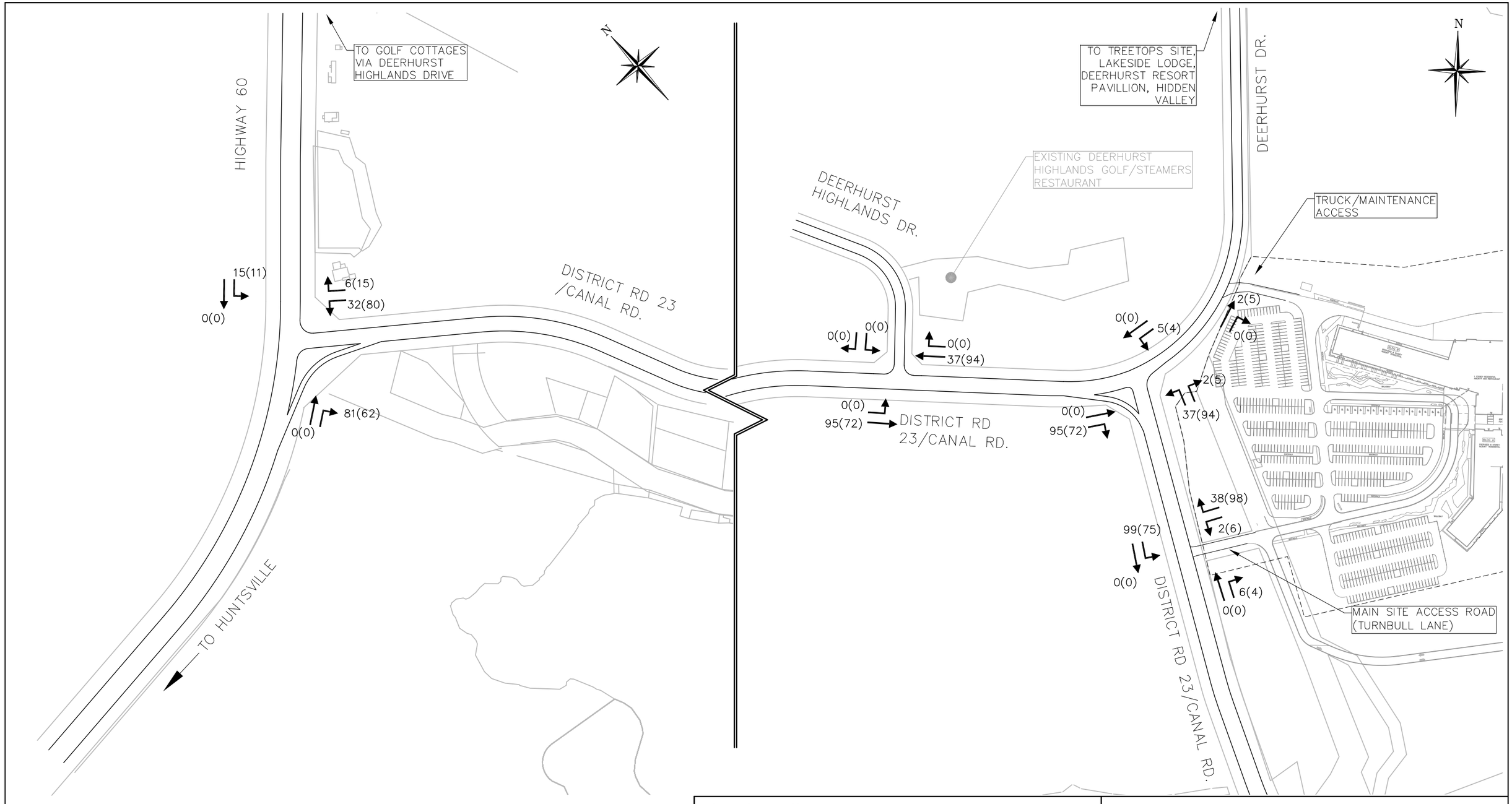
PROJECT NUMBER :
2111098

DRAWING SCALE :
As indicated

DRAWN BY :	CHECKED BY :	DATE:
Author	Checker	02/18/22

SHEET NO : A-03 REV : 2

ZONING BY-LAW AMENDMENT



LEGEND:
000 AM PEAK HOUR
(000) PM PEAK HOUR

Drawing Title

DEERHURST MODERN (SUBJECT SITE)
DEVELOPMENT TRAFFIC DISTRIBUTION

Project Title

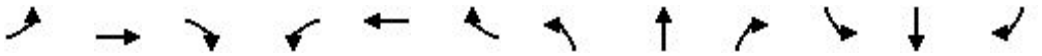
DEERHURST MODERN
TRAFFIC IMPACT STUDY

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
705-797-2027
www.wmiengineering.ca

Drawn By	Checked By	Figure No.
AB	JR	FIG 4A
Scale	Project No.	
N.T.S.	11-154B	

\\wminas\Public\Data\Projects\2011\11-154\CAD\WMI\Village_Centre\TIS\Issue_No2\240418_TIS(11-154B).dwg, FIG4A, 1:1

Appendix F:
Future Background Operations

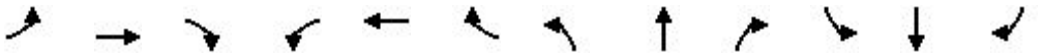


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	815	29	4	581	4	36	0	7	3	1	10
Future Volume (vph)	7	815	29	4	581	4	36	0	7	3	1	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3476	1555	1372	3380	1601	1755	1601		1789	1624	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00		1.00	1.00	
Satd. Flow (perm)	1789	3476	1555	1372	3380	1601	1847	1601		1883	1624	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	8	926	33	5	660	5	41	0	8	3	1	11
RTOR Reduction (vph)	0	0	14	0	0	2	0	7	0	0	10	0
Lane Group Flow (vph)	8	926	19	5	660	3	41	1	0	3	2	0
Heavy Vehicles (%)	2%	5%	5%	33%	8%	2%	4%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.1	29.9	29.9	1.1	29.9	29.9	3.6	3.6		3.6	3.6	
Effective Green, g (s)	1.1	29.9	29.9	1.1	29.9	29.9	3.6	3.6		3.6	3.6	
Actuated g/C Ratio	0.02	0.57	0.57	0.02	0.57	0.57	0.07	0.07		0.07	0.07	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	37	1987	888	28	1932	915	127	110		129	111	
v/s Ratio Prot	c0.00	c0.27		0.00	0.20			0.00			0.00	
v/s Ratio Perm			0.01			0.00	c0.02			0.00		
v/c Ratio	0.22	0.47	0.02	0.18	0.34	0.00	0.32	0.01		0.02	0.02	
Uniform Delay, d1	25.2	6.5	4.9	25.2	6.0	4.8	23.2	22.7		22.7	22.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	0.2	0.0	3.0	0.1	0.0	1.5	0.0		0.1	0.1	
Delay (s)	28.1	6.7	4.9	28.2	6.1	4.8	24.7	22.7		22.8	22.8	
Level of Service	C	A	A	C	A	A	C	C		C	C	
Approach Delay (s)		6.8			6.2			24.3			22.8	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	52.3	Sum of lost time (s)	17.7
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	583	243	31	356	236	37
Future Volume (vph)	583	243	31	356	236	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3476	1570	1690	3318	1689	
Flt Permitted	1.00	1.00	0.29	1.00	0.96	
Satd. Flow (perm)	3476	1570	523	3318	1689	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	655	273	35	400	265	42
RTOR Reduction (vph)	0	171	0	0	7	0
Lane Group Flow (vph)	655	102	35	400	300	0
Heavy Vehicles (%)	5%	4%	8%	10%	5%	20%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	20.6	20.6	27.9	27.9	15.1	
Effective Green, g (s)	20.6	20.6	27.9	27.9	15.1	
Actuated g/C Ratio	0.38	0.38	0.51	0.51	0.28	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1304	589	314	1686	464	
v/s Ratio Prot	c0.19		0.00	c0.12	c0.18	
v/s Ratio Perm		0.07	0.05			
v/c Ratio	0.50	0.17	0.11	0.24	0.65	
Uniform Delay, d1	13.2	11.5	7.2	7.5	17.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.1	0.2	0.1	3.1	
Delay (s)	13.5	11.6	7.4	7.6	20.7	
Level of Service	B	B	A	A	C	
Approach Delay (s)	12.9			7.6	20.7	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	13.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	54.9	Sum of lost time (s)	16.9
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

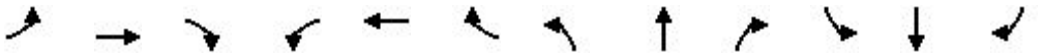


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	874	50	14	924	3	22	0	7	4	0	11
Future Volume (vph)	6	874	50	14	924	3	22	0	7	4	0	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1460	3579	1601	1789	3544	1601	1789	1601		1372	1601	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00		1.00	1.00	
Satd. Flow (perm)	1460	3579	1601	1789	3544	1601	1883	1601		1444	1601	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	6	940	54	15	994	3	24	0	8	4	0	12
RTOR Reduction (vph)	0	0	23	0	0	1	0	7	0	0	11	0
Lane Group Flow (vph)	6	940	31	15	994	2	24	1	0	4	1	0
Heavy Vehicles (%)	25%	2%	2%	2%	3%	2%	2%	2%	2%	33%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.1	30.9	30.9	1.1	30.9	30.9	3.6	3.6		3.6	3.6	
Effective Green, g (s)	1.1	30.9	30.9	1.1	30.9	30.9	3.6	3.6		3.6	3.6	
Actuated g/C Ratio	0.02	0.58	0.58	0.02	0.58	0.58	0.07	0.07		0.07	0.07	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	30	2074	928	36	2054	928	127	108		97	108	
v/s Ratio Prot	0.00	0.26		c0.01	c0.28			0.00			0.00	
v/s Ratio Perm			0.02			0.00	c0.01			0.00		
v/c Ratio	0.20	0.45	0.03	0.42	0.48	0.00	0.19	0.01		0.04	0.01	
Uniform Delay, d1	25.7	6.4	4.8	25.8	6.5	4.7	23.5	23.2		23.2	23.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.3	0.2	0.0	7.6	0.2	0.0	0.7	0.0		0.2	0.0	
Delay (s)	28.9	6.5	4.8	33.4	6.7	4.7	24.2	23.2		23.4	23.2	
Level of Service	C	A	A	C	A	A	C	C		C	C	
Approach Delay (s)		6.6			7.1			23.9			23.3	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	53.3	Sum of lost time (s)	17.7
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	567	325	34	640	298	21
Future Volume (vph)	567	325	34	640	298	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3579	1601	1755	3579	1784	
Flt Permitted	1.00	1.00	0.32	1.00	0.96	
Satd. Flow (perm)	3579	1601	592	3579	1784	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	603	346	36	681	317	22
RTOR Reduction (vph)	0	217	0	0	3	0
Lane Group Flow (vph)	603	129	36	681	336	0
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	20.6	20.6	27.9	27.9	15.6	
Effective Green, g (s)	20.6	20.6	27.9	27.9	15.6	
Actuated g/C Ratio	0.37	0.37	0.50	0.50	0.28	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1330	595	346	1802	502	
v/s Ratio Prot	c0.17		0.00	c0.19	c0.19	
v/s Ratio Perm		0.08	0.05			
v/c Ratio	0.45	0.22	0.10	0.38	0.67	
Uniform Delay, d1	13.1	11.9	7.3	8.4	17.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.2	0.1	0.1	3.4	
Delay (s)	13.4	12.1	7.5	8.6	21.0	
Level of Service	B	B	A	A	C	
Approach Delay (s)	12.9			8.5	21.0	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	12.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	55.4	Sum of lost time (s)	16.9
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	901	52	14	953	4	38	1	14	4	3	12
Future Volume (vph)	12	901	52	14	953	4	38	1	14	4	3	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	1620		1789	1657	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00		1.00	1.00	
Satd. Flow (perm)	1789	3579	1601	1789	3579	1601	1883	1620		1883	1657	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	12	929	54	14	982	4	39	1	14	4	3	12
RTOR Reduction (vph)	0	0	24	0	0	2	0	13	0	0	11	0
Lane Group Flow (vph)	12	929	30	14	982	2	39	2	0	4	4	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.0	28.8	28.8	1.0	28.8	28.8	3.5	3.5		3.5	3.5	
Effective Green, g (s)	1.0	28.8	28.8	1.0	28.8	28.8	3.5	3.5		3.5	3.5	
Actuated g/C Ratio	0.02	0.56	0.56	0.02	0.56	0.56	0.07	0.07		0.07	0.07	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	35	2021	904	35	2021	904	129	111		129	113	
v/s Ratio Prot	0.01	0.26		c0.01	c0.27			0.00			0.00	
v/s Ratio Perm			0.02			0.00	c0.02			0.00		
v/c Ratio	0.34	0.46	0.03	0.40	0.49	0.00	0.30	0.02		0.03	0.03	
Uniform Delay, d1	24.7	6.5	4.9	24.7	6.7	4.8	22.6	22.1		22.2	22.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.8	0.2	0.0	7.3	0.2	0.0	1.3	0.1		0.1	0.1	
Delay (s)	30.5	6.7	4.9	32.0	6.8	4.8	23.9	22.2		22.3	22.3	
Level of Service	C	A	A	C	A	A	C	C		C	C	
Approach Delay (s)		6.9			7.2			23.4			22.3	
Approach LOS		A			A			C			C	

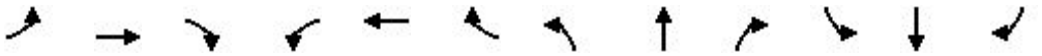
Intersection Summary			
HCM 2000 Control Delay	7.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	51.0	Sum of lost time (s)	17.7
Intersection Capacity Utilization	45.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	679	362	36	662	307	47
Future Volume (vph)	679	362	36	662	307	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3579	1601	1789	3579	1773	
Flt Permitted	1.00	1.00	0.26	1.00	0.96	
Satd. Flow (perm)	3579	1601	498	3579	1773	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	700	373	37	682	316	48
RTOR Reduction (vph)	0	237	0	0	6	0
Lane Group Flow (vph)	700	136	37	682	358	0
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	20.7	20.7	28.1	28.1	16.7	
Effective Green, g (s)	20.7	20.7	28.1	28.1	16.7	
Actuated g/C Ratio	0.37	0.37	0.50	0.50	0.29	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1306	584	301	1773	522	
v/s Ratio Prot	c0.20		0.01	c0.19	c0.20	
v/s Ratio Perm		0.09	0.06			
v/c Ratio	0.54	0.23	0.12	0.38	0.69	
Uniform Delay, d1	14.2	12.5	8.0	8.9	17.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.2	0.2	0.1	3.7	
Delay (s)	14.6	12.7	8.2	9.1	21.4	
Level of Service	B	B	A	A	C	
Approach Delay (s)	14.0			9.0	21.4	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	56.7	Sum of lost time (s)	16.9
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

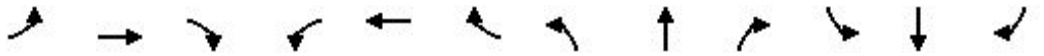


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	893	29	4	638	4	36	0	7	3	1	10
Future Volume (vph)	7	893	29	4	638	4	36	0	7	3	1	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3476	1555	1372	3380	1601	1755	1601		1789	1624	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00		1.00	1.00	
Satd. Flow (perm)	1789	3476	1555	1372	3380	1601	1847	1601		1883	1624	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	8	1015	33	5	725	5	41	0	8	3	1	11
RTOR Reduction (vph)	0	0	14	0	0	2	0	7	0	0	10	0
Lane Group Flow (vph)	8	1015	19	5	725	3	41	1	0	3	2	0
Heavy Vehicles (%)	2%	5%	5%	33%	8%	2%	4%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.0	30.5	30.5	1.0	30.5	30.5	3.6	3.6		3.6	3.6	
Effective Green, g (s)	1.0	30.5	30.5	1.0	30.5	30.5	3.6	3.6		3.6	3.6	
Actuated g/C Ratio	0.02	0.58	0.58	0.02	0.58	0.58	0.07	0.07		0.07	0.07	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	33	2007	898	25	1952	924	125	109		128	110	
v/s Ratio Prot	c0.00	c0.29		0.00	0.21			0.00			0.00	
v/s Ratio Perm			0.01			0.00	c0.02			0.00		
v/c Ratio	0.24	0.51	0.02	0.20	0.37	0.00	0.33	0.01		0.02	0.02	
Uniform Delay, d1	25.5	6.7	4.8	25.5	6.0	4.7	23.4	22.9		23.0	22.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.8	0.2	0.0	3.9	0.1	0.0	1.5	0.0		0.1	0.1	
Delay (s)	29.3	6.9	4.8	29.4	6.1	4.7	25.0	22.9		23.0	23.0	
Level of Service	C	A	A	C	A	A	C	C		C	C	
Approach Delay (s)		7.0			6.3			24.7			23.0	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	52.8	Sum of lost time (s)	17.7
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	643	262	33	393	257	40
Future Volume (vph)	643	262	33	393	257	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3476	1570	1690	3318	1689	
Flt Permitted	1.00	1.00	0.26	1.00	0.96	
Satd. Flow (perm)	3476	1570	458	3318	1689	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	722	294	37	442	289	45
RTOR Reduction (vph)	0	184	0	0	6	0
Lane Group Flow (vph)	722	110	37	442	328	0
Heavy Vehicles (%)	5%	4%	8%	10%	5%	20%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	21.0	21.0	28.3	28.3	16.1	
Effective Green, g (s)	21.0	21.0	28.3	28.3	16.1	
Actuated g/C Ratio	0.37	0.37	0.50	0.50	0.29	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1296	585	280	1667	483	
v/s Ratio Prot	c0.21		0.01	c0.13	c0.19	
v/s Ratio Perm		0.07	0.06			
v/c Ratio	0.56	0.19	0.13	0.27	0.68	
Uniform Delay, d1	14.0	11.9	7.8	8.0	17.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	0.2	0.2	0.1	3.8	
Delay (s)	14.5	12.1	8.0	8.1	21.6	
Level of Service	B	B	A	A	C	
Approach Delay (s)	13.8			8.1	21.6	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	13.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	56.3	Sum of lost time (s)	16.9
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

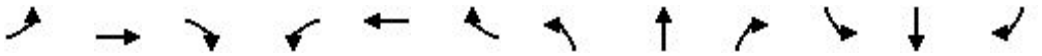


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	956	50	14	1012	3	22	0	7	4	0	11
Future Volume (vph)	6	956	50	14	1012	3	22	0	7	4	0	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1460	3579	1601	1789	3544	1601	1789	1601		1372	1601	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00		1.00	1.00	
Satd. Flow (perm)	1460	3579	1601	1789	3544	1601	1883	1601		1444	1601	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	6	1028	54	15	1088	3	24	0	8	4	0	12
RTOR Reduction (vph)	0	0	22	0	0	1	0	7	0	0	11	0
Lane Group Flow (vph)	6	1028	32	15	1088	2	24	1	0	4	1	0
Heavy Vehicles (%)	25%	2%	2%	2%	3%	2%	2%	2%	2%	33%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.0	31.5	31.5	1.0	31.5	31.5	3.6	3.6		3.6	3.6	
Effective Green, g (s)	1.0	31.5	31.5	1.0	31.5	31.5	3.6	3.6		3.6	3.6	
Actuated g/C Ratio	0.02	0.59	0.59	0.02	0.59	0.59	0.07	0.07		0.07	0.07	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	27	2095	937	33	2075	937	126	107		96	107	
v/s Ratio Prot	0.00	0.29		c0.01	c0.31			0.00			0.00	
v/s Ratio Perm			0.02			0.00	c0.01			0.00		
v/c Ratio	0.22	0.49	0.03	0.45	0.52	0.00	0.19	0.01		0.04	0.01	
Uniform Delay, d1	26.0	6.5	4.7	26.1	6.7	4.6	23.7	23.4		23.5	23.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.1	0.2	0.0	9.6	0.2	0.0	0.7	0.0		0.2	0.0	
Delay (s)	30.2	6.7	4.7	35.8	6.9	4.6	24.5	23.4		23.7	23.5	
Level of Service	C	A	A	D	A	A	C	C		C	C	
Approach Delay (s)		6.7			7.3			24.2			23.5	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	53.8	Sum of lost time (s)	17.7
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	626	351	35	707	321	22
Future Volume (vph)	626	351	35	707	321	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3579	1601	1755	3579	1784	
Flt Permitted	1.00	1.00	0.28	1.00	0.96	
Satd. Flow (perm)	3579	1601	520	3579	1784	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	666	373	37	752	341	23
RTOR Reduction (vph)	0	237	0	0	3	0
Lane Group Flow (vph)	666	136	37	752	361	0
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	20.6	20.6	28.0	28.0	16.7	
Effective Green, g (s)	20.6	20.6	28.0	28.0	16.7	
Actuated g/C Ratio	0.36	0.36	0.49	0.49	0.30	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1302	582	309	1770	526	
v/s Ratio Prot	c0.19		0.01	c0.21	c0.20	
v/s Ratio Perm		0.08	0.05			
v/c Ratio	0.51	0.23	0.12	0.42	0.69	
Uniform Delay, d1	14.1	12.5	7.9	9.1	17.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.2	0.2	0.2	3.7	
Delay (s)	14.4	12.7	8.1	9.3	21.3	
Level of Service	B	B	A	A	C	
Approach Delay (s)	13.8			9.3	21.3	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	56.6	Sum of lost time (s)	16.9
Intersection Capacity Utilization	56.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	987	52	14	1044	4	38	1	14	4	3	12
Future Volume (vph)	12	987	52	14	1044	4	38	1	14	4	3	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	1620		1789	1657	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00		1.00	1.00	
Satd. Flow (perm)	1789	3579	1601	1789	3579	1601	1883	1620		1883	1657	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	12	1018	54	14	1076	4	39	1	14	4	3	12
RTOR Reduction (vph)	0	0	23	0	0	2	0	13	0	0	11	0
Lane Group Flow (vph)	12	1018	31	14	1076	2	39	2	0	4	4	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.0	29.3	29.3	1.0	29.3	29.3	3.5	3.5		3.5	3.5	
Effective Green, g (s)	1.0	29.3	29.3	1.0	29.3	29.3	3.5	3.5		3.5	3.5	
Actuated g/C Ratio	0.02	0.57	0.57	0.02	0.57	0.57	0.07	0.07		0.07	0.07	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	34	2036	910	34	2036	910	127	110		127	112	
v/s Ratio Prot	0.01	0.28		c0.01	c0.30			0.00			0.00	
v/s Ratio Perm			0.02			0.00	c0.02			0.00		
v/c Ratio	0.35	0.50	0.03	0.41	0.53	0.00	0.31	0.02		0.03	0.03	
Uniform Delay, d1	24.9	6.7	4.9	25.0	6.8	4.8	22.8	22.4		22.4	22.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.2	0.2	0.0	7.9	0.2	0.0	1.4	0.1		0.1	0.1	
Delay (s)	31.2	6.9	4.9	32.9	7.1	4.8	24.2	22.5		22.5	22.5	
Level of Service	C	A	A	C	A	A	C	C		C	C	
Approach Delay (s)		7.1			7.4			23.7			22.5	
Approach LOS		A			A			C			C	

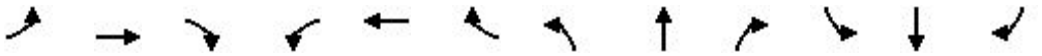
Intersection Summary			
HCM 2000 Control Delay	7.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	51.5	Sum of lost time (s)	17.7
Intersection Capacity Utilization	48.2%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	750	391	38	731	331	50
Future Volume (vph)	750	391	38	731	331	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3579	1601	1789	3579	1773	
Flt Permitted	1.00	1.00	0.23	1.00	0.96	
Satd. Flow (perm)	3579	1601	424	3579	1773	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	773	403	39	754	341	52
RTOR Reduction (vph)	0	258	0	0	6	0
Lane Group Flow (vph)	773	145	39	754	387	0
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	21.0	21.0	28.4	28.4	18.0	
Effective Green, g (s)	21.0	21.0	28.4	28.4	18.0	
Actuated g/C Ratio	0.36	0.36	0.49	0.49	0.31	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1289	576	262	1743	547	
v/s Ratio Prot	c0.22		0.01	c0.21	c0.22	
v/s Ratio Perm		0.09	0.07			
v/c Ratio	0.60	0.25	0.15	0.43	0.71	
Uniform Delay, d1	15.2	13.1	8.7	9.7	17.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.8	0.2	0.3	0.2	4.2	
Delay (s)	16.0	13.4	9.0	9.9	22.0	
Level of Service	B	B	A	A	C	
Approach Delay (s)	15.1			9.8	22.0	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	58.3	Sum of lost time (s)	16.9
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

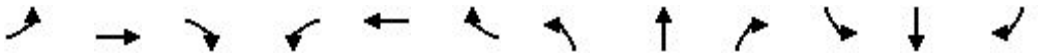


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	980	29	4	701	4	36	0	7	3	1	10
Future Volume (vph)	7	980	29	4	701	4	36	0	7	3	1	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3476	1555	1372	3380	1601	1755	1601		1789	1624	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.75	1.00		0.75	1.00	
Satd. Flow (perm)	1789	3476	1555	1372	3380	1601	1385	1601		1417	1624	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	8	1114	33	5	797	5	41	0	8	3	1	11
RTOR Reduction (vph)	0	0	15	0	0	2	0	7	0	0	10	0
Lane Group Flow (vph)	8	1114	18	5	797	3	41	1	0	3	2	0
Heavy Vehicles (%)	2%	5%	5%	33%	8%	2%	4%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.0	30.1	30.1	1.0	30.1	30.1	5.7	5.7		5.7	5.7	
Effective Green, g (s)	1.0	30.1	30.1	1.0	30.1	30.1	5.7	5.7		5.7	5.7	
Actuated g/C Ratio	0.02	0.55	0.55	0.02	0.55	0.55	0.10	0.10		0.10	0.10	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	32	1919	858	25	1866	884	144	167		148	169	
v/s Ratio Prot	c0.00	c0.32		0.00	0.24			0.00			0.00	
v/s Ratio Perm			0.01			0.00	c0.03			0.00		
v/c Ratio	0.25	0.58	0.02	0.20	0.43	0.00	0.28	0.01		0.02	0.01	
Uniform Delay, d1	26.4	8.0	5.5	26.4	7.1	5.5	22.5	21.9		21.9	21.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.1	0.5	0.0	3.9	0.2	0.0	1.1	0.0		0.1	0.0	
Delay (s)	30.5	8.5	5.5	30.3	7.3	5.5	23.6	21.9		21.9	21.9	
Level of Service	C	A	A	C	A	A	C	C		C	C	
Approach Delay (s)		8.6			7.4			23.3			21.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	8.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	54.5	Sum of lost time (s)	17.7
Intersection Capacity Utilization	46.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	710	282	35	433	281	44
Future Volume (vph)	710	282	35	433	281	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3476	1570	1690	3318	1690	
Flt Permitted	1.00	1.00	0.22	1.00	0.96	
Satd. Flow (perm)	3476	1570	387	3318	1690	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	798	317	39	487	316	49
RTOR Reduction (vph)	0	201	0	0	6	0
Lane Group Flow (vph)	798	116	39	487	359	0
Heavy Vehicles (%)	5%	4%	8%	10%	5%	20%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	21.3	21.3	28.6	28.6	17.5	
Effective Green, g (s)	21.3	21.3	28.6	28.6	17.5	
Actuated g/C Ratio	0.37	0.37	0.49	0.49	0.30	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1276	576	242	1636	509	
v/s Ratio Prot	c0.23		0.01	c0.15	c0.21	
v/s Ratio Perm		0.07	0.07			
v/c Ratio	0.63	0.20	0.16	0.30	0.70	
Uniform Delay, d1	15.1	12.5	8.5	8.7	18.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	0.2	0.3	0.1	4.4	
Delay (s)	16.0	12.7	8.9	8.8	22.4	
Level of Service	B	B	A	A	C	
Approach Delay (s)	15.1			8.8	22.4	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	58.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

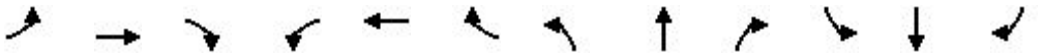


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	1048	50	14	1109	3	22	0	7	4	0	11
Future Volume (vph)	6	1048	50	14	1109	3	22	0	7	4	0	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1460	3579	1601	1789	3544	1601	1789	1601		1372	1601	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00		1.00	1.00	
Satd. Flow (perm)	1460	3579	1601	1789	3544	1601	1883	1601		1444	1601	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	6	1127	54	15	1192	3	24	0	8	4	0	12
RTOR Reduction (vph)	0	0	22	0	0	1	0	7	0	0	11	0
Lane Group Flow (vph)	6	1127	32	15	1192	2	24	1	0	4	1	0
Heavy Vehicles (%)	25%	2%	2%	2%	3%	2%	2%	2%	2%	33%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.0	32.4	32.4	1.0	32.4	32.4	3.6	3.6		3.6	3.6	
Effective Green, g (s)	1.0	32.4	32.4	1.0	32.4	32.4	3.6	3.6		3.6	3.6	
Actuated g/C Ratio	0.02	0.59	0.59	0.02	0.59	0.59	0.07	0.07		0.07	0.07	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	26	2119	948	32	2099	948	123	105		95	105	
v/s Ratio Prot	0.00	0.31		c0.01	c0.34			0.00			0.00	
v/s Ratio Perm			0.02			0.00	c0.01			0.00		
v/c Ratio	0.23	0.53	0.03	0.47	0.57	0.00	0.20	0.01		0.04	0.01	
Uniform Delay, d1	26.5	6.6	4.6	26.6	6.8	4.6	24.2	23.9		23.9	23.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.5	0.3	0.0	10.5	0.4	0.0	0.8	0.0		0.2	0.0	
Delay (s)	31.0	6.9	4.7	37.0	7.2	4.6	25.0	23.9		24.1	23.9	
Level of Service	C	A	A	D	A	A	C	C		C	C	
Approach Delay (s)		6.9			7.6			24.7			24.0	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	54.7	Sum of lost time (s)	17.7
Intersection Capacity Utilization	49.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	692	379	38	780	346	23
Future Volume (vph)	692	379	38	780	346	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3579	1601	1755	3579	1784	
Flt Permitted	1.00	1.00	0.24	1.00	0.96	
Satd. Flow (perm)	3579	1601	447	3579	1784	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	736	403	40	830	368	24
RTOR Reduction (vph)	0	259	0	0	3	0
Lane Group Flow (vph)	736	144	40	830	389	0
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	20.8	20.8	28.2	28.2	18.0	
Effective Green, g (s)	20.8	20.8	28.2	28.2	18.0	
Actuated g/C Ratio	0.36	0.36	0.49	0.49	0.31	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1281	573	270	1737	552	
v/s Ratio Prot	c0.21		0.01	c0.23	c0.22	
v/s Ratio Perm		0.09	0.07			
v/c Ratio	0.57	0.25	0.15	0.48	0.71	
Uniform Delay, d1	15.1	13.2	8.6	10.0	17.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.2	0.3	0.2	4.1	
Delay (s)	15.7	13.4	8.9	10.2	21.8	
Level of Service	B	B	A	B	C	
Approach Delay (s)	14.9			10.2	21.8	
Approach LOS	B			B	C	

Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	58.1	Sum of lost time (s)	16.9
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	12	1081	52	14	1144	4	38	1	14	4	3	12
Future Volume (vph)	12	1081	52	14	1144	4	38	1	14	4	3	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	1620		1789	1657	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.75	1.00		0.75	1.00	
Satd. Flow (perm)	1789	3579	1601	1789	3579	1601	1408	1620		1408	1657	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	12	1114	54	14	1179	4	39	1	14	4	3	12
RTOR Reduction (vph)	0	0	25	0	0	2	0	12	0	0	11	0
Lane Group Flow (vph)	12	1114	29	14	1179	2	39	3	0	4	4	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.0	28.9	28.9	1.0	28.9	28.9	5.8	5.8		5.8	5.8	
Effective Green, g (s)	1.0	28.9	28.9	1.0	28.9	28.9	5.8	5.8		5.8	5.8	
Actuated g/C Ratio	0.02	0.54	0.54	0.02	0.54	0.54	0.11	0.11		0.11	0.11	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	33	1936	866	33	1936	866	152	175		152	179	
v/s Ratio Prot	0.01	0.31		c0.01	c0.33			0.00			0.00	
v/s Ratio Perm			0.02			0.00	c0.03			0.00		
v/c Ratio	0.36	0.58	0.03	0.42	0.61	0.00	0.26	0.01		0.03	0.02	
Uniform Delay, d1	25.9	8.2	5.7	25.9	8.4	5.6	21.8	21.2		21.3	21.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.7	0.4	0.0	8.6	0.5	0.0	0.9	0.0		0.1	0.1	
Delay (s)	32.6	8.6	5.7	34.5	8.9	5.6	22.7	21.3		21.3	21.3	
Level of Service	C	A	A	C	A	A	C	C		C	C	
Approach Delay (s)		8.7			9.2			22.3			21.3	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	9.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	53.4	Sum of lost time (s)	17.7
Intersection Capacity Utilization	51.0%	ICU Level of Service	A
Analysis Period (min)	15		

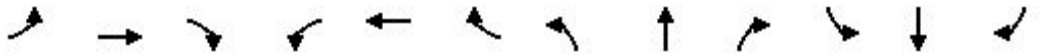
c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	828	423	40	807	357	54
Future Volume (vph)	828	423	40	807	357	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3579	1601	1789	3579	1773	
Flt Permitted	1.00	1.00	0.19	1.00	0.96	
Satd. Flow (perm)	3579	1601	350	3579	1773	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	854	436	41	832	368	56
RTOR Reduction (vph)	0	280	0	0	6	0
Lane Group Flow (vph)	854	156	41	832	418	0
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	21.8	21.8	29.2	29.2	19.7	
Effective Green, g (s)	21.8	21.8	29.2	29.2	19.7	
Actuated g/C Ratio	0.36	0.36	0.48	0.48	0.32	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1283	574	224	1718	574	
v/s Ratio Prot	c0.24		0.01	c0.23	c0.24	
v/s Ratio Perm		0.10	0.08			
v/c Ratio	0.67	0.27	0.18	0.48	0.73	
Uniform Delay, d1	16.4	13.9	9.6	10.7	18.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.3	0.3	0.4	0.2	4.6	
Delay (s)	17.7	14.1	10.0	10.9	22.8	
Level of Service	B	B	B	B	C	
Approach Delay (s)	16.5			10.9	22.8	
Approach LOS	B			B	C	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	60.8	Sum of lost time (s)	16.9
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Appendix G:
Future Total Operations



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	814	59	17	580	4	74	0	24	3	1	10
Future Volume (vph)	7	814	59	17	580	4	74	0	24	3	1	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3476	1555	1659	3380	1601	1755	1601		1789	1624	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.75	1.00		0.74	1.00	
Satd. Flow (perm)	1789	3476	1555	1659	3380	1601	1385	1601		1393	1624	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	8	925	67	19	659	5	84	0	27	3	1	11
RTOR Reduction (vph)	0	0	34	0	0	3	0	23	0	0	9	0
Lane Group Flow (vph)	8	925	33	19	659	2	84	4	0	3	3	0
Heavy Vehicles (%)	2%	5%	5%	10%	8%	2%	4%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.1	26.2	26.2	1.1	26.2	26.2	8.5	8.5		8.5	8.5	
Effective Green, g (s)	1.1	26.2	26.2	1.1	26.2	26.2	8.5	8.5		8.5	8.5	
Actuated g/C Ratio	0.02	0.49	0.49	0.02	0.49	0.49	0.16	0.16		0.16	0.16	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	36	1702	761	34	1655	784	220	254		221	258	
v/s Ratio Prot	0.00	c0.27		c0.01	0.19			0.00			0.00	
v/s Ratio Perm			0.02			0.00	c0.06			0.00		
v/c Ratio	0.22	0.54	0.04	0.56	0.40	0.00	0.38	0.02		0.01	0.01	
Uniform Delay, d1	25.8	9.5	7.1	26.0	8.7	7.0	20.1	19.0		19.0	19.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.1	0.4	0.0	18.4	0.2	0.0	1.1	0.0		0.0	0.0	
Delay (s)	28.9	9.8	7.1	44.4	8.8	7.0	21.3	19.0		19.0	19.0	
Level of Service	C	A	A	D	A	A	C	B		B	B	
Approach Delay (s)		9.8			9.8			20.7			19.0	
Approach LOS		A			A			C			B	

Intersection Summary			
HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	53.5	Sum of lost time (s)	17.7
Intersection Capacity Utilization	45.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	593	248	31	364	240	37
Future Volume (vph)	593	248	31	364	240	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3476	1570	1690	3318	1689	
Flt Permitted	1.00	1.00	0.29	1.00	0.96	
Satd. Flow (perm)	3476	1570	511	3318	1689	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	666	279	35	409	270	42
RTOR Reduction (vph)	0	175	0	0	7	0
Lane Group Flow (vph)	666	104	35	409	305	0
Heavy Vehicles (%)	5%	4%	8%	10%	5%	20%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	20.6	20.6	27.9	27.9	15.3	
Effective Green, g (s)	20.6	20.6	27.9	27.9	15.3	
Actuated g/C Ratio	0.37	0.37	0.51	0.51	0.28	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1299	586	307	1680	468	
v/s Ratio Prot	c0.19		0.00	c0.12	c0.18	
v/s Ratio Perm		0.07	0.05			
v/c Ratio	0.51	0.18	0.11	0.24	0.65	
Uniform Delay, d1	13.4	11.6	7.3	7.7	17.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.1	0.2	0.1	3.3	
Delay (s)	13.7	11.7	7.5	7.7	20.8	
Level of Service	B	B	A	A	C	
Approach Delay (s)	13.1			7.7	20.8	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	13.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	55.1	Sum of lost time (s)	16.9
Intersection Capacity Utilization	51.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	54	43	0	43	35
Future Volume (Veh/h)	0	54	43	0	43	35
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	59	47	0	47	38
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						243
pX, platoon unblocked						
vC, conflicting volume	179	47			47	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	179	47			47	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			97	
cM capacity (veh/h)	786	1022			1560	

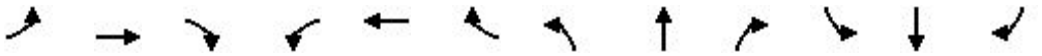
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	59	47	85
Volume Left	0	0	47
Volume Right	59	0	0
cSH	1022	1700	1560
Volume to Capacity	0.06	0.03	0.03
Queue Length 95th (m)	1.4	0.0	0.7
Control Delay (s)	8.7	0.0	4.2
Lane LOS	A		A
Approach Delay (s)	8.7	0.0	4.2
Approach LOS	A		

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	20.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	43	0	0	35
Future Volume (Veh/h)	0	0	43	0	0	35
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	47	0	0	38
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						396
pX, platoon unblocked						
vC, conflicting volume	85	47			47	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	85	47			47	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	916	1022			1560	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	47	38
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1560
Volume to Capacity	0.00	0.03	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	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 (vph)	6	862	114	49	912	3	81	0	39	4	0	11
Future Volume (vph)	6	862	114	49	912	3	81	0	39	4	0	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1460	3579	1601	1789	3544	1601	1789	1601		1372	1601	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.75	1.00		0.73	1.00	
Satd. Flow (perm)	1460	3579	1601	1789	3544	1601	1412	1601		1054	1601	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	6	927	123	53	981	3	87	0	42	4	0	12
RTOR Reduction (vph)	0	0	49	0	0	1	0	36	0	0	10	0
Lane Group Flow (vph)	6	927	74	53	981	2	87	6	0	4	2	0
Heavy Vehicles (%)	25%	2%	2%	2%	3%	2%	2%	2%	2%	33%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.1	27.1	27.1	3.8	29.8	29.8	8.5	8.5		8.5	8.5	
Effective Green, g (s)	1.1	27.1	27.1	3.8	29.8	29.8	8.5	8.5		8.5	8.5	
Actuated g/C Ratio	0.02	0.47	0.47	0.07	0.52	0.52	0.15	0.15		0.15	0.15	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	28	1698	759	119	1849	835	210	238		156	238	
v/s Ratio Prot	0.00	0.26		c0.03	c0.28			0.00			0.00	
v/s Ratio Perm			0.05			0.00	c0.06			0.00		
v/c Ratio	0.21	0.55	0.10	0.45	0.53	0.00	0.41	0.03		0.03	0.01	
Uniform Delay, d1	27.6	10.6	8.3	25.6	9.0	6.5	22.0	20.8		20.8	20.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.8	0.4	0.1	2.6	0.3	0.0	1.3	0.0		0.1	0.0	
Delay (s)	31.4	11.0	8.3	28.3	9.3	6.5	23.4	20.8		20.8	20.7	
Level of Service	C	B	A	C	A	A	C	C		C	C	
Approach Delay (s)		10.8			10.3			22.5			20.7	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	11.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	57.1	Sum of lost time (s)	17.7
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

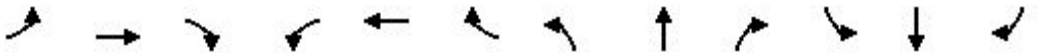
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	581	332	34	655	305	21
Future Volume (vph)	581	332	34	655	305	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3579	1601	1755	3579	1784	
Flt Permitted	1.00	1.00	0.31	1.00	0.96	
Satd. Flow (perm)	3579	1601	574	3579	1784	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	618	353	36	697	324	22
RTOR Reduction (vph)	0	222	0	0	3	0
Lane Group Flow (vph)	618	131	36	697	343	0
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	20.6	20.6	27.9	27.9	15.9	
Effective Green, g (s)	20.6	20.6	27.9	27.9	15.9	
Actuated g/C Ratio	0.37	0.37	0.50	0.50	0.29	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1323	592	336	1792	509	
v/s Ratio Prot	c0.17		0.00	c0.19	c0.19	
v/s Ratio Perm		0.08	0.05			
v/c Ratio	0.47	0.22	0.11	0.39	0.67	
Uniform Delay, d1	13.4	12.0	7.5	8.6	17.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	0.2	0.1	0.1	3.5	
Delay (s)	13.6	12.2	7.6	8.8	21.1	
Level of Service	B	B	A	A	C	
Approach Delay (s)	13.1			8.7	21.1	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	12.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	55.7	Sum of lost time (s)	16.9
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	90	29	0	99	64
Future Volume (Veh/h)	0	90	29	0	99	64
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	98	32	0	108	70
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						243
pX, platoon unblocked						
vC, conflicting volume	318	32			32	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	318	32			32	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	91			93	
cM capacity (veh/h)	629	1042			1580	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	98	32	178
Volume Left	0	0	108
Volume Right	98	0	0
cSH	1042	1700	1580
Volume to Capacity	0.09	0.02	0.07
Queue Length 95th (m)	2.4	0.0	1.7
Control Delay (s)	8.8	0.0	4.7
Lane LOS	A		A
Approach Delay (s)	8.8	0.0	4.7
Approach LOS	A		

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	27.8%	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 (vph)	12	893	115	47	944	4	100	1	46	4	3	12
Future Volume (vph)	12	893	115	47	944	4	100	1	46	4	3	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	1607		1789	1657	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.75	1.00		0.73	1.00	
Satd. Flow (perm)	1789	3579	1601	1789	3579	1601	1408	1607		1367	1657	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	12	921	119	48	973	4	103	1	47	4	3	12
RTOR Reduction (vph)	0	0	49	0	0	2	0	40	0	0	10	0
Lane Group Flow (vph)	12	921	70	48	973	2	103	8	0	4	5	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.1	27.3	27.3	3.7	29.9	29.9	8.8	8.8		8.8	8.8	
Effective Green, g (s)	1.1	27.3	27.3	3.7	29.9	29.9	8.8	8.8		8.8	8.8	
Actuated g/C Ratio	0.02	0.47	0.47	0.06	0.52	0.52	0.15	0.15		0.15	0.15	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	34	1699	760	115	1861	832	215	245		209	253	
v/s Ratio Prot	0.01	0.26		c0.03	c0.27			0.01			0.00	
v/s Ratio Perm			0.04			0.00	c0.07			0.00		
v/c Ratio	0.35	0.54	0.09	0.42	0.52	0.00	0.48	0.03		0.02	0.02	
Uniform Delay, d1	27.8	10.7	8.3	25.9	9.1	6.6	22.3	20.7		20.7	20.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.2	0.4	0.1	2.4	0.3	0.0	1.7	0.1		0.0	0.0	
Delay (s)	34.1	11.0	8.3	28.3	9.4	6.6	23.9	20.8		20.7	20.7	
Level of Service	C	B	A	C	A	A	C	C		C	C	
Approach Delay (s)		11.0			10.2			22.9			20.7	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	57.5	Sum of lost time (s)	17.7
Intersection Capacity Utilization	58.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	694	369	36	677	315	47
Future Volume (vph)	694	369	36	677	315	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3579	1601	1789	3579	1773	
Flt Permitted	1.00	1.00	0.26	1.00	0.96	
Satd. Flow (perm)	3579	1601	483	3579	1773	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	715	380	37	698	325	48
RTOR Reduction (vph)	0	242	0	0	6	0
Lane Group Flow (vph)	715	138	37	698	367	0
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	20.8	20.8	28.2	28.2	17.0	
Effective Green, g (s)	20.8	20.8	28.2	28.2	17.0	
Actuated g/C Ratio	0.36	0.36	0.49	0.49	0.30	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1303	583	293	1767	527	
v/s Ratio Prot	c0.20		0.01	c0.20	c0.21	
v/s Ratio Perm		0.09	0.06			
v/c Ratio	0.55	0.24	0.13	0.40	0.70	
Uniform Delay, d1	14.4	12.6	8.1	9.1	17.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	0.2	0.2	0.1	4.0	
Delay (s)	14.9	12.8	8.3	9.2	21.8	
Level of Service	B	B	A	A	C	
Approach Delay (s)	14.2			9.2	21.8	
Approach LOS	B			A	C	

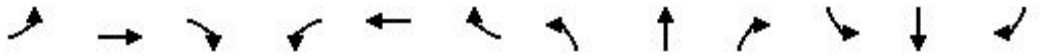
Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	57.1	Sum of lost time (s)	16.9
Intersection Capacity Utilization	59.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	94	54	0	95	70
Future Volume (Veh/h)	0	94	54	0	95	70
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	102	59	0	103	76
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						243
pX, platoon unblocked						
vC, conflicting volume	341	59			59	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	341	59			59	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	90			93	
cM capacity (veh/h)	611	1007			1545	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	102	59	179
Volume Left	0	0	103
Volume Right	102	0	0
cSH	1007	1700	1545
Volume to Capacity	0.10	0.03	0.07
Queue Length 95th (m)	2.6	0.0	1.6
Control Delay (s)	9.0	0.0	4.5
Lane LOS	A		A
Approach Delay (s)	9.0	0.0	4.5
Approach LOS	A		

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	28.1%	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 (vph)	7	892	59	17	637	4	74	0	24	3	1	10
Future Volume (vph)	7	892	59	17	637	4	74	0	24	3	1	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3476	1555	1659	3380	1601	1755	1601		1789	1624	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.75	1.00		0.74	1.00	
Satd. Flow (perm)	1789	3476	1555	1659	3380	1601	1385	1601		1393	1624	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	8	1014	67	19	724	5	84	0	27	3	1	11
RTOR Reduction (vph)	0	0	33	0	0	2	0	23	0	0	9	0
Lane Group Flow (vph)	8	1014	34	19	724	3	84	4	0	3	3	0
Heavy Vehicles (%)	2%	5%	5%	10%	8%	2%	4%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.0	27.6	27.6	1.0	27.6	27.6	8.6	8.6		8.6	8.6	
Effective Green, g (s)	1.0	27.6	27.6	1.0	27.6	27.6	8.6	8.6		8.6	8.6	
Actuated g/C Ratio	0.02	0.50	0.50	0.02	0.50	0.50	0.16	0.16		0.16	0.16	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	32	1747	781	30	1699	804	216	250		218	254	
v/s Ratio Prot	0.00	c0.29		c0.01	0.21			0.00			0.00	
v/s Ratio Perm			0.02			0.00	c0.06			0.00		
v/c Ratio	0.25	0.58	0.04	0.63	0.43	0.00	0.39	0.02		0.01	0.01	
Uniform Delay, d1	26.6	9.6	6.9	26.8	8.6	6.8	20.8	19.6		19.6	19.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.1	0.5	0.0	36.3	0.2	0.0	1.2	0.0		0.0	0.0	
Delay (s)	30.7	10.1	7.0	63.1	8.8	6.8	22.0	19.6		19.6	19.6	
Level of Service	C	B	A	E	A	A	C	B		B	B	
Approach Delay (s)		10.0			10.2			21.4			19.6	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	54.9	Sum of lost time (s)	17.7
Intersection Capacity Utilization	46.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	654	267	33	401	261	40
Future Volume (vph)	654	267	33	401	261	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3476	1570	1690	3318	1690	
Flt Permitted	1.00	1.00	0.25	1.00	0.96	
Satd. Flow (perm)	3476	1570	446	3318	1690	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	735	300	37	451	293	45
RTOR Reduction (vph)	0	188	0	0	6	0
Lane Group Flow (vph)	735	112	37	451	332	0
Heavy Vehicles (%)	5%	4%	8%	10%	5%	20%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	21.1	21.1	28.4	28.4	16.3	
Effective Green, g (s)	21.1	21.1	28.4	28.4	16.3	
Actuated g/C Ratio	0.37	0.37	0.50	0.50	0.29	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1295	585	274	1664	486	
v/s Ratio Prot	c0.21		0.01	c0.14	c0.20	
v/s Ratio Perm		0.07	0.06			
v/c Ratio	0.57	0.19	0.14	0.27	0.68	
Uniform Delay, d1	14.1	12.0	7.9	8.1	17.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.2	0.2	0.1	3.9	
Delay (s)	14.7	12.1	8.1	8.2	21.8	
Level of Service	B	B	A	A	C	
Approach Delay (s)	14.0			8.2	21.8	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	13.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	56.6	Sum of lost time (s)	16.9
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	54	43	0	43	35
Future Volume (Veh/h)	0	54	43	0	43	35
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	59	47	0	47	38
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						243
pX, platoon unblocked						
vC, conflicting volume	179	47			47	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	179	47			47	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			97	
cM capacity (veh/h)	786	1022			1560	

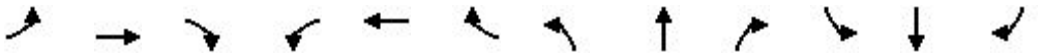
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	59	47	85
Volume Left	0	0	47
Volume Right	59	0	0
cSH	1022	1700	1560
Volume to Capacity	0.06	0.03	0.03
Queue Length 95th (m)	1.4	0.0	0.7
Control Delay (s)	8.7	0.0	4.2
Lane LOS	A		A
Approach Delay (s)	8.7	0.0	4.2
Approach LOS	A		

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	20.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	0	43	0	0	35
Future Volume (Veh/h)	0	0	43	0	0	35
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	47	0	0	38
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						396
pX, platoon unblocked						
vC, conflicting volume	85	47			47	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	85	47			47	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	916	1022			1560	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	0	47	38
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1700	1560
Volume to Capacity	0.00	0.03	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	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 (vph)	6	945	114	49	999	3	81	0	39	4	0	11
Future Volume (vph)	6	945	114	49	999	3	81	0	39	4	0	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1460	3579	1601	1789	3544	1601	1789	1601		1372	1601	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.75	1.00		0.73	1.00	
Satd. Flow (perm)	1460	3579	1601	1789	3544	1601	1412	1601		1054	1601	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	6	1016	123	53	1074	3	87	0	42	4	0	12
RTOR Reduction (vph)	0	0	48	0	0	1	0	36	0	0	10	0
Lane Group Flow (vph)	6	1016	75	53	1074	2	87	6	0	4	2	0
Heavy Vehicles (%)	25%	2%	2%	2%	3%	2%	2%	2%	2%	33%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.1	28.2	28.2	3.7	30.8	30.8	8.6	8.6		8.6	8.6	
Effective Green, g (s)	1.1	28.2	28.2	3.7	30.8	30.8	8.6	8.6		8.6	8.6	
Actuated g/C Ratio	0.02	0.48	0.48	0.06	0.53	0.53	0.15	0.15		0.15	0.15	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	27	1734	775	113	1875	847	208	236		155	236	
v/s Ratio Prot	0.00	0.28		c0.03	c0.30			0.00			0.00	
v/s Ratio Perm			0.05			0.00	c0.06			0.00		
v/c Ratio	0.22	0.59	0.10	0.47	0.57	0.00	0.42	0.03		0.03	0.01	
Uniform Delay, d1	28.1	10.8	8.1	26.3	9.3	6.5	22.5	21.2		21.2	21.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.1	0.5	0.1	3.1	0.4	0.0	1.4	0.0		0.1	0.0	
Delay (s)	32.3	11.3	8.2	29.4	9.7	6.5	23.9	21.3		21.3	21.2	
Level of Service	C	B	A	C	A	A	C	C		C	C	
Approach Delay (s)		11.1			10.6			23.0			21.2	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	58.2	Sum of lost time (s)	17.7
Intersection Capacity Utilization	59.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

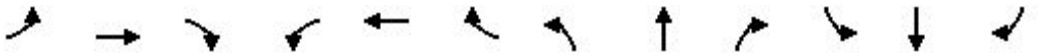
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	640	357	35	722	328	22
Future Volume (vph)	640	357	35	722	328	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3579	1601	1755	3579	1784	
Flt Permitted	1.00	1.00	0.27	1.00	0.96	
Satd. Flow (perm)	3579	1601	504	3579	1784	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	681	380	37	768	349	23
RTOR Reduction (vph)	0	242	0	0	3	0
Lane Group Flow (vph)	681	138	37	768	369	0
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	20.6	20.6	28.0	28.0	17.0	
Effective Green, g (s)	20.6	20.6	28.0	28.0	17.0	
Actuated g/C Ratio	0.36	0.36	0.49	0.49	0.30	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1295	579	300	1761	533	
v/s Ratio Prot	c0.19		0.01	c0.21	c0.21	
v/s Ratio Perm		0.09	0.06			
v/c Ratio	0.53	0.24	0.12	0.44	0.69	
Uniform Delay, d1	14.3	12.7	8.1	9.3	17.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.2	0.2	0.2	3.9	
Delay (s)	14.7	12.9	8.2	9.5	21.5	
Level of Service	B	B	A	A	C	
Approach Delay (s)	14.0			9.5	21.5	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	56.9	Sum of lost time (s)	16.9
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	90	29	0	99	64
Future Volume (Veh/h)	0	90	29	0	99	64
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	98	32	0	108	70
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						243
pX, platoon unblocked						
vC, conflicting volume	318	32			32	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	318	32			32	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	91			93	
cM capacity (veh/h)	629	1042			1580	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	98	32	178
Volume Left	0	0	108
Volume Right	98	0	0
cSH	1042	1700	1580
Volume to Capacity	0.09	0.02	0.07
Queue Length 95th (m)	2.4	0.0	1.7
Control Delay (s)	8.8	0.0	4.7
Lane LOS	A		A
Approach Delay (s)	8.8	0.0	4.7
Approach LOS	A		

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	27.8%	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 (vph)	12	978	115	47	1035	4	100	1	46	4	3	12
Future Volume (vph)	12	978	115	47	1035	4	100	1	46	4	3	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	1607		1789	1657	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.75	1.00		0.73	1.00	
Satd. Flow (perm)	1789	3579	1601	1789	3579	1601	1408	1607		1367	1657	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	12	1008	119	48	1067	4	103	1	47	4	3	12
RTOR Reduction (vph)	0	0	48	0	0	2	0	40	0	0	10	0
Lane Group Flow (vph)	12	1008	71	48	1067	2	103	8	0	4	5	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.1	28.3	28.3	3.7	30.9	30.9	8.9	8.9		8.9	8.9	
Effective Green, g (s)	1.1	28.3	28.3	3.7	30.9	30.9	8.9	8.9		8.9	8.9	
Actuated g/C Ratio	0.02	0.48	0.48	0.06	0.53	0.53	0.15	0.15		0.15	0.15	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	33	1728	773	112	1887	844	213	244		207	251	
v/s Ratio Prot	0.01	0.28		c0.03	c0.30			0.01			0.00	
v/s Ratio Perm			0.04			0.00	c0.07			0.00		
v/c Ratio	0.36	0.58	0.09	0.43	0.57	0.00	0.48	0.03		0.02	0.02	
Uniform Delay, d1	28.4	10.9	8.2	26.4	9.3	6.6	22.7	21.2		21.1	21.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.7	0.5	0.1	2.6	0.4	0.0	1.7	0.1		0.0	0.0	
Delay (s)	35.1	11.4	8.2	29.1	9.7	6.6	24.5	21.2		21.2	21.2	
Level of Service	D	B	A	C	A	A	C	C		C	C	
Approach Delay (s)		11.3			10.5			23.4			21.2	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	58.6	Sum of lost time (s)	17.7
Intersection Capacity Utilization	61.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	765	399	38	746	338	50
Future Volume (vph)	765	399	38	746	338	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3579	1601	1789	3579	1773	
Flt Permitted	1.00	1.00	0.22	1.00	0.96	
Satd. Flow (perm)	3579	1601	407	3579	1773	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	789	411	39	769	348	52
RTOR Reduction (vph)	0	264	0	0	6	0
Lane Group Flow (vph)	789	147	39	769	394	0
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	21.0	21.0	28.4	28.4	18.3	
Effective Green, g (s)	21.0	21.0	28.4	28.4	18.3	
Actuated g/C Ratio	0.36	0.36	0.48	0.48	0.31	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1282	573	253	1734	553	
v/s Ratio Prot	c0.22		0.01	c0.21	c0.22	
v/s Ratio Perm		0.09	0.07			
v/c Ratio	0.62	0.26	0.15	0.44	0.71	
Uniform Delay, d1	15.5	13.3	8.9	9.9	17.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	0.2	0.3	0.2	4.3	
Delay (s)	16.4	13.5	9.2	10.1	22.1	
Level of Service	B	B	A	B	C	
Approach Delay (s)	15.4			10.0	22.1	
Approach LOS	B			B	C	

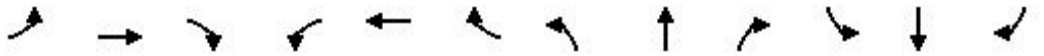
Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	58.6	Sum of lost time (s)	16.9
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	94	54	0	95	70
Future Volume (Veh/h)	0	94	54	0	95	70
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	102	59	0	103	76
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						243
pX, platoon unblocked						
vC, conflicting volume	341	59			59	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	341	59			59	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	90			93	
cM capacity (veh/h)	611	1007			1545	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	102	59	179
Volume Left	0	0	103
Volume Right	102	0	0
cSH	1007	1700	1545
Volume to Capacity	0.10	0.03	0.07
Queue Length 95th (m)	2.6	0.0	1.6
Control Delay (s)	9.0	0.0	4.5
Lane LOS	A		A
Approach Delay (s)	9.0	0.0	4.5
Approach LOS	A		

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	28.1%	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 (vph)	7	978	59	17	700	4	74	0	24	3	1	10
Future Volume (vph)	7	978	59	17	700	4	74	0	24	3	1	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3476	1555	1659	3380	1601	1755	1601		1789	1624	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.75	1.00		0.74	1.00	
Satd. Flow (perm)	1789	3476	1555	1659	3380	1601	1385	1601		1393	1624	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	8	1111	67	19	795	5	84	0	27	3	1	11
RTOR Reduction (vph)	0	0	33	0	0	2	0	23	0	0	9	0
Lane Group Flow (vph)	8	1111	34	19	795	3	84	4	0	3	3	0
Heavy Vehicles (%)	2%	5%	5%	10%	8%	2%	4%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.0	28.8	28.8	1.0	28.8	28.8	8.7	8.7		8.7	8.7	
Effective Green, g (s)	1.0	28.8	28.8	1.0	28.8	28.8	8.7	8.7		8.7	8.7	
Actuated g/C Ratio	0.02	0.51	0.51	0.02	0.51	0.51	0.15	0.15		0.15	0.15	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	31	1781	796	29	1732	820	214	247		215	251	
v/s Ratio Prot	0.00	c0.32		c0.01	0.24			0.00			0.00	
v/s Ratio Perm			0.02			0.00	c0.06			0.00		
v/c Ratio	0.26	0.62	0.04	0.66	0.46	0.00	0.39	0.02		0.01	0.01	
Uniform Delay, d1	27.2	9.8	6.8	27.4	8.7	6.7	21.4	20.1		20.1	20.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.4	0.7	0.0	42.6	0.2	0.0	1.2	0.0		0.0	0.0	
Delay (s)	31.6	10.5	6.9	70.0	8.9	6.7	22.6	20.2		20.1	20.1	
Level of Service	C	B	A	E	A	A	C	C		C	C	
Approach Delay (s)		10.4			10.3			22.0			20.1	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	11.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	56.2	Sum of lost time (s)	17.7
Intersection Capacity Utilization	48.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

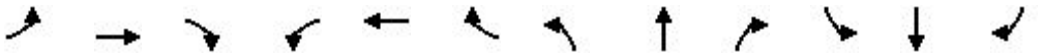
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	721	288	35	442	285	44
Future Volume (vph)	721	288	35	442	285	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3476	1570	1690	3318	1690	
Flt Permitted	1.00	1.00	0.21	1.00	0.96	
Satd. Flow (perm)	3476	1570	376	3318	1690	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	810	324	39	497	320	49
RTOR Reduction (vph)	0	205	0	0	6	0
Lane Group Flow (vph)	810	119	39	497	363	0
Heavy Vehicles (%)	5%	4%	8%	10%	5%	20%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	21.4	21.4	28.8	28.8	17.7	
Effective Green, g (s)	21.4	21.4	28.8	28.8	17.7	
Actuated g/C Ratio	0.37	0.37	0.49	0.49	0.30	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1273	575	239	1636	512	
v/s Ratio Prot	c0.23		0.01	c0.15	c0.21	
v/s Ratio Perm		0.08	0.07			
v/c Ratio	0.64	0.21	0.16	0.30	0.71	
Uniform Delay, d1	15.3	12.7	8.6	8.8	18.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.1	0.2	0.3	0.1	4.5	
Delay (s)	16.3	12.9	9.0	8.9	22.5	
Level of Service	B	B	A	A	C	
Approach Delay (s)	15.3			8.9	22.5	
Approach LOS	B			A	C	

Intersection Summary			
HCM 2000 Control Delay	15.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	58.4	Sum of lost time (s)	16.9
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	54	43	0	43	35
Future Volume (Veh/h)	0	54	43	0	43	35
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	59	47	0	47	38
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						243
pX, platoon unblocked						
vC, conflicting volume	179	47			47	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	179	47			47	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	94			97	
cM capacity (veh/h)	786	1022			1560	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	59	47	85
Volume Left	0	0	47
Volume Right	59	0	0
cSH	1022	1700	1560
Volume to Capacity	0.06	0.03	0.03
Queue Length 95th (m)	1.4	0.0	0.7
Control Delay (s)	8.7	0.0	4.2
Lane LOS	A		A
Approach Delay (s)	8.7	0.0	4.2
Approach LOS	A		

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	20.9%	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 (vph)	6	1036	114	49	1096	3	81	0	39	4	0	11
Future Volume (vph)	6	1036	114	49	1096	3	81	0	39	4	0	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1460	3579	1601	1789	3544	1601	1789	1601		1372	1601	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.75	1.00		0.73	1.00	
Satd. Flow (perm)	1460	3579	1601	1789	3544	1601	1412	1601		1054	1601	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	6	1114	123	53	1178	3	87	0	42	4	0	12
RTOR Reduction (vph)	0	0	47	0	0	1	0	36	0	0	10	0
Lane Group Flow (vph)	6	1114	76	53	1178	2	87	6	0	4	2	0
Heavy Vehicles (%)	25%	2%	2%	2%	3%	2%	2%	2%	2%	33%	2%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.1	29.8	29.8	3.7	32.4	32.4	8.6	8.6		8.6	8.6	
Effective Green, g (s)	1.1	29.8	29.8	3.7	32.4	32.4	8.6	8.6		8.6	8.6	
Actuated g/C Ratio	0.02	0.50	0.50	0.06	0.54	0.54	0.14	0.14		0.14	0.14	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	26	1783	797	110	1920	867	203	230		151	230	
v/s Ratio Prot	0.00	0.31		c0.03	c0.33			0.00			0.00	
v/s Ratio Perm			0.05			0.00	c0.06			0.00		
v/c Ratio	0.23	0.62	0.10	0.48	0.61	0.00	0.43	0.03		0.03	0.01	
Uniform Delay, d1	28.9	10.9	7.9	27.1	9.4	6.3	23.4	22.0		22.0	21.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.5	0.7	0.1	3.3	0.6	0.0	1.5	0.0		0.1	0.0	
Delay (s)	33.4	11.6	8.0	30.4	10.0	6.3	24.8	22.0		22.1	22.0	
Level of Service	C	B	A	C	A	A	C	C		C	C	
Approach Delay (s)		11.4			10.9			23.9			22.0	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	59.8	Sum of lost time (s)	17.7
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

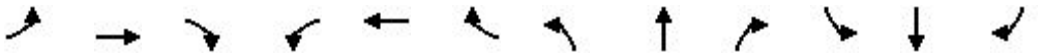
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	705	385	38	795	353	23
Future Volume (vph)	705	385	38	795	353	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3579	1601	1755	3579	1784	
Flt Permitted	1.00	1.00	0.23	1.00	0.96	
Satd. Flow (perm)	3579	1601	431	3579	1784	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	750	410	40	846	376	24
RTOR Reduction (vph)	0	264	0	0	3	0
Lane Group Flow (vph)	750	146	40	846	397	0
Heavy Vehicles (%)	2%	2%	4%	2%	2%	2%
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	20.8	20.8	28.2	28.2	18.4	
Effective Green, g (s)	20.8	20.8	28.2	28.2	18.4	
Actuated g/C Ratio	0.36	0.36	0.48	0.48	0.31	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1272	569	262	1725	561	
v/s Ratio Prot	c0.21		0.01	c0.24	c0.22	
v/s Ratio Perm		0.09	0.07			
v/c Ratio	0.59	0.26	0.15	0.49	0.71	
Uniform Delay, d1	15.4	13.4	8.8	10.3	17.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	0.2	0.3	0.2	4.1	
Delay (s)	16.1	13.6	9.1	10.5	21.8	
Level of Service	B	B	A	B	C	
Approach Delay (s)	15.2			10.4	21.8	
Approach LOS	B			B	C	

Intersection Summary			
HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	58.5	Sum of lost time (s)	16.9
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	90	29	0	99	64
Future Volume (Veh/h)	0	90	29	0	99	64
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	98	32	0	108	70
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						243
pX, platoon unblocked						
vC, conflicting volume	318	32			32	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	318	32			32	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	91			93	
cM capacity (veh/h)	629	1042			1580	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	98	32	178
Volume Left	0	0	108
Volume Right	98	0	0
cSH	1042	1700	1580
Volume to Capacity	0.09	0.02	0.07
Queue Length 95th (m)	2.4	0.0	1.7
Control Delay (s)	8.8	0.0	4.7
Lane LOS	A		A
Approach Delay (s)	8.8	0.0	4.7
Approach LOS	A		

Intersection Summary			
Average Delay	5.5		
Intersection Capacity Utilization	27.8%	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 (vph)	12	1072	115	47	1135	4	100	1	46	4	3	12
Future Volume (vph)	12	1072	115	47	1135	4	100	1	46	4	3	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.85		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	3579	1601	1789	3579	1601	1789	1607		1789	1657	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.75	1.00		0.73	1.00	
Satd. Flow (perm)	1789	3579	1601	1789	3579	1601	1408	1607		1367	1657	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	12	1105	119	48	1170	4	103	1	47	4	3	12
RTOR Reduction (vph)	0	0	47	0	0	2	0	40	0	0	10	0
Lane Group Flow (vph)	12	1105	72	48	1170	2	103	8	0	4	5	0
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.0	29.9	29.9	3.7	32.6	32.6	9.0	9.0		9.0	9.0	
Effective Green, g (s)	1.0	29.9	29.9	3.7	32.6	32.6	9.0	9.0		9.0	9.0	
Actuated g/C Ratio	0.02	0.50	0.50	0.06	0.54	0.54	0.15	0.15		0.15	0.15	
Clearance Time (s)	5.0	6.4	6.4	5.0	6.4	6.4	6.3	6.3		6.3	6.3	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	29	1774	793	109	1934	865	210	239		204	247	
v/s Ratio Prot	0.01	0.31		c0.03	c0.33			0.00			0.00	
v/s Ratio Perm			0.05			0.00	c0.07			0.00		
v/c Ratio	0.41	0.62	0.09	0.44	0.60	0.00	0.49	0.03		0.02	0.02	
Uniform Delay, d1	29.4	11.1	8.0	27.3	9.5	6.4	23.5	21.9		21.9	21.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.3	0.7	0.0	2.8	0.5	0.0	1.8	0.1		0.0	0.0	
Delay (s)	38.7	11.8	8.1	30.1	10.0	6.4	25.3	22.0		21.9	21.9	
Level of Service	D	B	A	C	A	A	C	C		C	C	
Approach Delay (s)		11.7			10.8			24.3			21.9	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	12.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	60.3	Sum of lost time (s)	17.7
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	843	431	40	822	365	54
Future Volume (vph)	843	431	40	822	365	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.2	6.2	5.0	6.2	5.7	
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3579	1601	1789	3579	1773	
Flt Permitted	1.00	1.00	0.18	1.00	0.96	
Satd. Flow (perm)	3579	1601	340	3579	1773	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	869	444	41	847	376	56
RTOR Reduction (vph)	0	284	0	0	6	0
Lane Group Flow (vph)	869	160	41	847	426	0
Turn Type	NA	Perm	pm+pt	NA	Prot	
Protected Phases	2		1	6	8	
Permitted Phases		2	6			
Actuated Green, G (s)	22.0	22.0	29.4	29.4	19.7	
Effective Green, g (s)	22.0	22.0	29.4	29.4	19.7	
Actuated g/C Ratio	0.36	0.36	0.48	0.48	0.32	
Clearance Time (s)	6.2	6.2	5.0	6.2	5.7	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	1290	577	220	1724	572	
v/s Ratio Prot	c0.24		0.01	c0.24	c0.24	
v/s Ratio Perm		0.10	0.08			
v/c Ratio	0.67	0.28	0.19	0.49	0.74	
Uniform Delay, d1	16.5	13.9	9.7	10.7	18.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.4	0.3	0.4	0.2	5.2	
Delay (s)	17.9	14.1	10.1	10.9	23.6	
Level of Service	B	B	B	B	C	
Approach Delay (s)	16.6			10.9	23.6	
Approach LOS	B			B	C	

Intersection Summary			
HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	61.0	Sum of lost time (s)	16.9
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	94	54	0	95	70
Future Volume (Veh/h)	0	94	54	0	95	70
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	102	59	0	103	76
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						243
pX, platoon unblocked						
vC, conflicting volume	341	59			59	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	341	59			59	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	90			93	
cM capacity (veh/h)	611	1007			1545	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	102	59	179
Volume Left	0	0	103
Volume Right	102	0	0
cSH	1007	1700	1545
Volume to Capacity	0.10	0.03	0.07
Queue Length 95th (m)	2.6	0.0	1.6
Control Delay (s)	9.0	0.0	4.5
Lane LOS	A		A
Approach Delay (s)	9.0	0.0	4.5
Approach LOS	A		

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	28.1%	ICU Level of Service	A
Analysis Period (min)	15		