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151 Peel Street

TRANSPORTATION IMPACT STUDY

Mamta Homes

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	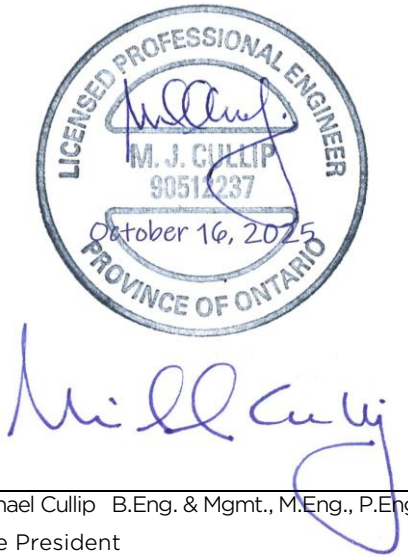
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Issue	Date	Description
1	October 16, 2025	Final report

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1 Introduction

Tatham Engineering Limited was retained by Mamta Homes to prepare a Transportation Impact Study in support of the proposed residential development to be located at 151 Peel Street in the Town of Collingwood. The location of the development 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 to address the requirements of the Town of Collingwood with respect to the potential transportation impacts of the development on the area road network. 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.

This study has been completed in context of the Terms of Reference as approved by the Town and 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);
- 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);
- Chapter 6: summary of the report and key findings.

2 Existing Conditions

This chapter will describe the road network, traffic volumes and operations for the existing conditions.

2.1 ROAD NETWORK

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

Roads

- Cameron Street
- Collins Street
- Hume Street
- Hurontario Street
- McKean Crescent
- Peel Street

Intersections

- Peel Street & Collins Street
- Peel Street & Hume Street
- Hurontario Street & Cameron Street/Collins Street
- Peel Street & McKean Crescent (south)

Aerial mapping and photographs of the road network are provided in Figure 2 with additional details provided below.

2.1.1 Roads

Key details of the study area roads are summarized in Table 1. The functional classifications are based on that presented in the *Town of Collingwood Official Plan*[1].

Table 1: Study Area Roads

ROAD	CLASS	OWNER	LANES	SPEED LIMIT	DIRECTION
Hume Street	Arterial	Town	3	50 km/h	E-W
Hurontario Street	Arterial	Town	2/3[1]	50	N-S
Cameron Street	Collector	Town	2	50	E-W
Collins Street	Collector	Town	2	50	E-W
Peel Street	Collector	Town	2	50	N-S
McKean Crescent	Local	Town	2	50	E-W

[1] Hurontario Street has a 2-lane cross-section north of Cameron Street and 3-lane cross-section south

[1] *Town of Collingwood Official Plan*. Town of Collingwood, December 2023.

2.1.2 Intersections

Peel Street & Collins Street

The intersection of Peel Street with Collins Street is a 4-leg intersection operating under all-way stop control. While Collins Street terminates at Peel Street, the access to the Riverside Apartment development forms the east leg. All approaches are single lane approaches (i.e. no exclusive turn lanes are provided).

Peel Street & Hume Street

The intersection of Peel Street with Hume Street is a 4-leg signalized intersection. All approaches consist of an exclusive left turn lane and a shared through-right lane. The existing signal timing accommodates advance movements for the eastbound and westbound left turns as dictated by demands.

Hurontario Street & Collins Street/ Cameron Street

The intersection of Hurontario Street with Collins Street is a 4-leg signalized intersection. All approaches consist of an exclusive left turn lane and a shared through-right lane. There are provisions for advance movements for all of the left turn lanes, as required.

Peel Street & McKean Crescent (South)

The intersection of Peel Street with McKean Crescent is a 3-leg intersection operating under stop control on the minor approach (McKean Crescent). All approaches are single lane approaches (i.e. no exclusive turn lanes are provided).

2.2 ACTIVE TRANSPORTATION NETWORK

The active transportation network in the immediate area of the site is illustrated in Figure 3. As indicated, the area is well served by existing sidewalks and trail connections. Beyond the immediate area, there are bicycle lanes on Hume Street.

2.3 TRANSIT

Colltrans, the Town of Collingwoods transit service, operates several routes within the Town. The Collingwood East Route provides service to the study area, with the nearest stop located on Peel Street immediately north of Collins Street (approximately 200 metres north of the site). The Collingwood East Route is operated on a 1 hour headway, Monday to Sunday from 6:30AM to 11:00PM.

2.4 TRAFFIC VOLUMES

To determine existing traffic volumes on the study area road network, traffic counts were conducted on Tuesday, May 27 2025, from 07:00 to 10:00 and 15:00 to 18:00, at the intersections of Peel Street with Collins Street and Hume Street, and at Hurontario Street with Collins Street/Cameron Street. A supplementary count was conducted by Tatham staff on Wednesday, June 4, 2025, at the intersection of Peel Street and McKean Crescent (the count times were limited to the AM and PM peak hours experienced at the adjacent intersection of Peel Street with Collins Street). The observed peak hour traffic volumes are illustrated in Figure 4, with detailed count data provided in Appendix B.

2.5 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 analysis focused on the operations of the study area intersections considering the following:

- the 2025 peak hour traffic volumes;
- the existing intersection configurations and control; and
- procedures outlined in the *2000 Highway Capacity Manual*[2] (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 and left turn movements):

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

For level of service, LOS A corresponds to the best operating condition with minimal delays whereas LOS F corresponds to poor operations resulting from high intersection delays. Level of Service (LOS) definitions are provided in Appendix C.

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

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

and input into the traffic model. Where the observed heavy vehicle percentage was less than the Synchro default value (2%), the default was applied.

A summary of the analysis is provided in Table 2, whereas detailed worksheets are included in Appendix D. As indicated, the signalized intersections are providing good overall operations (LOS C or better) with average delays and reserve capacity, whereas the stop-controlled intersections are providing excellent operations with minor delays (LOS B or better).

2.6 NEED FOR IMPROVEMENTS

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

Table 2: Intersection Operations – 2025

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Peel Street & Collins Street/ Private Access	EB LTR	stop	8	A	0.16	8	A	0.10
	WB LTR	stop	7	A	0.02	7	A	0.02
	NB LTR	stop	8	A	0.08	8	A	0.05
	SB LTR	stop	7	A	0.13	7	A	0.10
Hurontario Street & Cameron Street/ Collins Street	EB L	signal	28	C	0.23	32	C	0.10
	EB TR	signal	36	D	0.48	36	D	0.25
	WB L	signal	27	C	0.32	27	C	0.25
	WB TR	signal	35	D	0.48	32	C	0.18
	NB L	signal	10	B	0.07	9	A	0.07
	NB TR	signal	17	B	0.48	16	B	0.52
	SB L	signal	11	B	0.11	9	A	0.11
	SB TR	signal	14	B	0.27	14	B	0.41
	overall	signal	22	C	0.44	18	B	0.44
Peel Street & Hume Steet	EB L	signal	6	A	0.09	12	B	0.19
	EB TR	signal	10	A	0.43	22	C	0.78
	WB L	signal	5	A	0.13	11	B	0.25
	WB TR	signal	9	A	0.45	20	C	0.76
	NB L	signal	22	C	0.21	12	B	0.07
	NB TR	signal	22	C	0.29	12	B	0.09
	SB L	signal	21	C	0.12	12	B	0.08
	SB TR	signal	21	C	0.09	12	B	0.09
	overall	signal	12	B	0.40	19	B	0.43
Peel Street & McKean Crescent	EB LR	stop	9	A	0.00	9	A	0.01
	NB LT	free	1	A	0.00	1	A	0.00

L left lane T through lane R right lane LT left-through TR through-right LTR left-through-right

3 Future Background Conditions

This chapter will describe the road network and background traffic volumes expected for the years 2030, 2035 and 2040. The 2030 horizon year has been adopted to reflect full build-out of the proposed development, whereas the 2035 and 2040 horizons will address the longer-term impacts (5 and 10 years beyond build-out).

3.1 ROAD NETWORK

There are no road system improvements or modifications that have been identified that would impact traffic volumes or operations within the study area. Therefore, the existing road network as described in 2.1 has been maintained under future horizons.

3.1.1 Background Growth

In considering historical and projected population levels for the Town of Collingwood, the following are noted:

- based on the Census data for the years 2006 and 2021, the population of the Town increased from 17,290 to 24,811 persons, which translates to an annual growth of 2.4%;
- as per the *2021 Community Profile*[3], the Town's 2030 population is estimated at 29,866, which translates to 2.1% annual growth over the 9-year period 2021 to 2030;
- as per the County of Simcoe's *Growth Forecast and Land Needs Assessment*[4]*,* the Town has been allocated a population of 42,690 by 2051 which yields an annual growth of 1.8% when considering a 2021 population of 24,811.

The corresponding population figures are provided in Table 3.

Table 3: Town of Collingwood Population

	2001	2006	2011	2016	2021	2030	2051
Population	16,039	17,290	19,241	21,793	24,811	29,866	42,690
Annual Growth		2006 to 2021 – 2.4%			2021 to 2051 – 1.8%		

[3] *2021 Community Profile.* Town of Collingwood, May 2021.
[4] *Growth Forecast and Land Needs Assessment.* March 31, 2022, Hemson for the County of Simcoe.

Based on the above, an annual growth rate of 2% has been assumed. It is to be noted, that the 2% growth rate was not applied to the south and east legs of the intersection of Peel Street and Collins Street due to the fact that south and east legs serve fully build-out residential areas (dead end and development site access) and are not expected to have any increase in volumes.

Having said that, it is noted that the existing Riverside Apartments development (served by the east leg of the Peel Street & Collins Street intersection) is not full built-out, with a fourth apartment building yet to be completed. To account for the future completion of the fourth building, the observed volumes turning to/from the east leg were increased by 25% for the 2030 horizon.

3.1.2 Development Growth

Other planned developments within the immediate study area were identified through a review of the Town's development application map and as per direction provided by the Town's peer reviewer. The following developments have been identified for consideration in the establishment of future background volumes:

- 452 Raglan Street;
- 225 Collins Street; and
- The Gateway Centre.

The locations of the above noted background developments are illustrated in Figure 5, with additional details provided below. For the purpose of this study, the background developments are assumed to be fully built-out by the 2030 horizon.

452 Raglan Street (Indigo 2)

As per the *Indigo 2 Traffic Impact Study*[5], the proposed residential development to be located at 452 Raglan Street is to consist of 21 single detached units and 107 townhouse units. Upon full build-out, the development is expected to generate 67 new trips during the weekday AM peak hour and 81 new trips during the weekday PM peak hour. The traffic volumes associated with the Indigo 2 development are illustrated in Figure 6 and have been assigned to the study area road network as per the assumptions provided in the respective traffic study (excerpts of which are provided in Appendix E) and/or consistent with the methodology presented in Section 4.6.2 as applied to the subject development.

[5] *Indigo 2 Traffic Impact Study*. C.F. Crozier & Associates Inc., December 2021.

225 Collins Street

As per the *225 Collins Street Traffic Impact Brief*[6], the proposed development will consist of a 3-storey mixed-use building with 10 apartment units and 326 m^2 of ground floor commercial space. The development is expected to generate 70 new trips during the weekday AM peak hour and 61 new trips during the weekday PM peak hour. The traffic volumes associated with the Collins Street development are illustrated in Figure 7, based on the respective traffic study (excerpts of which are provided in Appendix E) and extended through the study area as appropriate.

Gateway Centre

The Gateway Centre is to be located at the northeast corner of the Poplar Sideroad/County Road 32 and Hurontario Street/County Road 124. As noted in *The Gateway Centre Traffic Impact Study*[7], the development is to consist of 165 residential units and a variety of commercial/retail uses. The development is expected to generate 261 new trips during the weekday AM peak hour and 414 new trips during the weekday PM peak hour. The assignment of the associated traffic volumes through the study area road system, as illustrated in Figure 8, was based on the noted study (excerpts provided in Appendix E)and extended through the network as required.

3.1.3 Background Traffic Volumes

The future background traffic volumes for the 2030, 2035 and 2040 horizon years are illustrated in Figure 9 through Figure 11. These volumes reflect the 2025 traffic volumes as shown in Figure 4, the assumed annual background growth rate and the additional traffic volumes associated with the identified background developments.

3.2 TRAFFIC OPERATIONS

The study area intersections were again analyzed for each horizon year, the results of which are summarized in Table 4 through Table 6, with detailed worksheets provided in Appendix F.

As indicated, the signalized intersections will continue to provide good overall operations (LOS C or better) with reserve capacity (ie. v/c < 1.0) and the stop-controlled intersections will continue to provide excellent operations through the 2040 horizon under background conditions.

3.3 NEED FOR IMPROVEMENTS

Based on the results of the operational analysis under background conditions, no intersection improvements are required to support the future background traffic volumes.

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[6] *225 Collins Street Traffic Impact Brief.* Tatham Engineering Limited. April 17, 2024.
[7] *The Gateway Centre Traffic Impact Study.* Tatham Engineering Limited. June 30,2025

Table 4: Intersection Operations – 2030 Background

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Peel Street & Collins Street/ Private Access	EB LTR	stop	9	A	0.22	8	A	0.14
	WB LTR	stop	8	A	0.03	7	A	0.03
	NB LTR	stop	8	A	0.13	8	A	0.08
	SB LTR	stop	8	A	0.20	8	A	0.15
Hurontario Street & Cameron Street/ Collins Street	EB L	signal	28	C	0.27	33	C	0.11
	EB TR	signal	37	D	0.54	37	D	0.32
	WB L	signal	28	C	0.40	28	C	0.32
	WB TR	signal	37	D	0.56	33	C	0.21
	NB L	signal	11	B	0.11	10	B	0.12
	NB TR	signal	23	C	0.66	22	C	0.74
	SB L	signal	13	B	0.19	11	B	0.23
	SB TR	signal	18	B	0.43	17	B	0.59
	overall	signal	25	C	0.58	22	C	0.61
Peel Street & Hume Steet	EB L	signal	7	A	0.11	12	B	0.22
	EB TR	signal	13	B	0.53	28	C	0.86
	WB L	signal	6	A	0.19	13	B	0.35
	WB TR	signal	13	B	0.54	28	C	0.86
	NB L	signal	22	C	0.22	12	B	0.10
	NB TR	signal	22	C	0.32	13	B	0.12
	SB L	signal	21	C	0.13	12	B	0.10
	SB TR	signal	21	C	0.10	13	B	0.11
	overall	signal	14	B	0.46	24	B	0.48
Peel Street & McKean Crescent	EB LR	stop	9	A	0.00	9	A	0.01
	NB LT	free	1	A	0.00	1	A	0.00

L left lane T through lane R right lane LT left-through TR through-right LTR left-through-right

Table 5: Intersection Operations – 2035 Background

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Peel Street & Collins Street/ Private Access	EB LTR	stop	9	A	0.24	8	A	0.15
	WB LTR	stop	8	A	0.03	7	A	0.03
	NB LTR	stop	9	A	0.14	8	A	0.08
	SB LTR	stop	8	A	0.21	8	A	0.15
Hurontario Street & Cameron Street/ Collins Street	EB L	signal	28	C	0.27	33	C	0.12
	EB TR	signal	37	D	0.54	37	D	0.38
	WB L	signal	26	C	0.38	28	C	0.34
	WB TR	signal	35	D	0.53	33	C	0.24
	NB L	signal	13	B	0.14	11	B	0.15
	NB TR	signal	30	C	0.76	26	C	0.81
	SB L	signal	16	B	0.26	13	B	0.29
	SB TR	signal	21	C	0.49	19	B	0.64
	overall	signal	28	C	0.64	24	C	0.67
Peel Street & Hume Steet	EB L	signal	7	A	0.10	12	B	0.25
	EB TR	signal	15	B	0.59	32	C	0.90
	WB L	signal	6	A	0.23	12	B	0.35
	WB TR	signal	14	B	0.61	27	C	0.86
	NB L	signal	21	C	0.23	14	B	0.11
	NB TR	signal	22	C	0.35	14	B	0.13
	SB L	signal	23	C	0.15	14	B	0.12
	SB TR	signal	20	C	0.11	14	B	0.13
	overall	signal	15	B	0.52	25	C	0.53
Peel Street & McKean Crescent	EB LR	stop	9	A	0.01	9	A	0.01
	NB LT	free	1	A	0.00	1	A	0.00

L left lane T through lane R right lane LT left-through TR through-right LTR left-through-right

Table 6: Intersection Operations – 2040 Background

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Peel Street & Collins Street/ Private Access	EB LTR	stop	10	A	0.27	8	A	0.16
	WB LTR	stop	8	A	0.04	7	A	0.03
	NB LTR	stop	9	A	0.14	8	A	0.08
	SB LTR	stop	8	A	0.23	8	A	0.16
Hurontario Street & Cameron Street/ Collins Street	EB L	signal	28	C	0.30	35	D	0.12
	EB TR	signal	38	D	0.58	41	D	0.40
	WB L	signal	26	C	0.43	30	C	0.36
	WB TR	signal	36	D	0.58	36	D	0.29
	NB L	signal	14	B	0.16	13	B	0.18
	NB TR	signal	36	D	0.84	30	C	0.85
	SB L	signal	18	B	0.33	17	B	0.36
	SB TR	signal	23	C	0.54	22	C	0.69
	overall	signal	31	C	0.70	28	C	0.70
Peel Street & Hume Steet	EB L	signal	8	A	0.17	13	B	0.29
	EB TR	signal	17	B	0.66	30	C	0.89
	WB L	signal	7	A	0.29	13	B	0.41
	WB TR	signal	16	B	0.68	26	C	0.87
	NB L	signal	21	C	0.24	16	B	0.13
	NB TR	signal	22	C	0.41	16	B	0.14
	SB L	signal	20	C	0.16	17	B	0.14
	SB TR	signal	20	B	0.11	16	B	0.15
	overall	signal	17	B	0.58	25	C	0.57
Peel Street & McKean Crescent	EB LR	stop	9	A	0.01	9	A	0.01
	NB LT	free	1	A	0.00	1	A	0.00

L left lane T through lane R right lane LT left-through TR through-right LTR left-through-right

4 Proposed Development

This chapter will provide additional details with respect to the proposed development, including its location, parking provision, the projected site generated traffic volumes and the assignment of such to the adjacent road network.

4.1 SITE LOCATION

The subject site is located at 151 Peel Street in the Town of Collingwood (as per Figure 1).

4.2 LAND USE & PHASING

The proposed development will consist of 240 residential units distributed across four 4-storey apartment buildings, with the following breakdown:

- Building A – 65 units;
- Building B – 65 units;
- Building C – 65 units; and
- Building D – 45 units.

The development will be constructed in two phases:

- Phase 1 will include Buildings A and Bl and
- Phase 2 will include Buildings C and D.

For the purposes of this assessment, it is assumed that both phases will be fully built out by the 2030 horizon.

A corresponding site plan is provided in Figure 12.

4.3 PARKING

4.3.1 Standard Parking

The parking requirements for the development have been determined based on the proposed use and the parking rates outlined in the Town's *Zoning By-law*[8] for apartment dwellings. The by-law requires a minimum of 0.5 parking spaces per unit for residents, plus an additional 0.25 spaces per unit for visitor parking, resulting in a total requirement of 0.75 parking spaces per unit.

[8] *Town of Collingwood Zoning By-law 2010-040*. Town of Collingwood, Consolidated March 26, 2025.

Based on above, the development requires 120 resident spaces and 60 visitor spaces for a total parking supply of 180 spaces.

As per the site plan, 229 parking spaces are proposed (0.95 spaces per unit), inclusive of visitor parking. As such, the proposed parking supply satisfies the Town's requirements. Visitor parking should be appropriately designated.

4.3.2 Accessible Parking

The Town's *Zoning By-law* requires that a minimum of 2% of total parking spaces be designated as accessible parking when the overall parking requirement exceeds 100 spaces. With a requirement of 180 parking spaces for the proposed development, 4 accessible parking spaces are required.

As shown on the site plan, 7 accessible parking spaces are proposed, thereby exceeding the Town's requirement.

4.3.3 Bicycle Parking

As per the Town's *Zoning By-law*, an apartment use is required to provide bicycle parking at a rate of 0.5 spaces per unit, up to a maximum of 20 spaces; though this maximum may be exceeded. Based on this requirement, the development must provide a minimum of 20 bicycle parking spaces.

The proposed development will provide 64 bicycle parking spaces.

4.4 ACCESS

4.4.1 Location & Configuration

The site will be served by 2 access points to Peel Street. Each access will support two-way operations, provide single lane approaches and operate under stop control. The access points are proposed to be 8.4 metres and 8.6 metres wide at the property line, which meets the Town of Collingwood's minimum requirement of 7.5 metres.

The north access is located approximately 75 metres north of the northern intersection of Peel Street and McKean Crescent, and 115 metres south of the intersection of Peel Street and Collins Street (measured centre to centre). The south access will form a four-leg intersection with the southern intersection of Peel Street and McKean Crescent.

According to the Transportation Association of Canada's *Geometric Design Guide for Canadian Roads*, a minimum clearance (from the edge of the access to the edge of the roadway) of 25 metres is recommended along collector roads and 15 metres along local roads. In this regard,

the proposed locations of both access points are considered appropriate (Peel Street is a collector road).

4.4.2 Sight Lines

The sight lines along Peel Street at the site access points have been reviewed in context of the minimum stopping sight distance and intersection sight distance requirements as per the Transportation Association of Canada (TAC) *Geometric Design Guide for Canadian Roads*[9], which are further explained below.

- Minimum stopping sight distance provides sufficient distance for an approaching motorist to observe a hazard in the road and bring their vehicle to a complete stop prior to the hazard.
- Intersection sight distance allows a vehicle to enter a main road from a side street (or site access) and attain the appropriate operating speed without significantly impacting the operating speed of an approaching vehicle.

Table 7 summarizes the sight distance requirements for a design speed of 60 km/h, reflective of the 50 km/h posted speed limit on Peel Street, as well as the available sight lines at the site access points (refer also to Figure 13). As shown, the minimum stopping and intersection sight distance requirements for a 60 km/h design speed are met in all cases.

Table 7: Sight Line Assessment

LOCATION	DESIGN SPEED	STOPPING SIGHT DISTANCE	INTERSECTION SIGHT DISTANCE		AVAILABLE SIGHT DISTANCES TO/FROM	
			Left Turn	Right Turn	North	South
North Access	60 km/h	85 m	130 m	110 m	>150m	>150m
South Access	60 km/h	85 m	130 m	110 m	>150m	>150m

4.5 CIRCULATION

4.5.1 Vehicles

The internal drive aisles will provide two-way operations and maintain a minimum clear width of 6.0 metres with a centre turn radius of 12.0 metres. Overall, the parking and aisle layout as proposed are considered sufficient with respect to the circulation of site generated traffic and

[9] *Geometric Design Guide for Canadian Roads, Chapter 9.* Transportation Association of Canada, June 2017.

the manoeuvring requirements of typical design vehicles (moving vans, trucks, fire truck, etc.). The fire route is identified on the site plan.

4.5.2 Pedestrians & Cyclists

As evident on the site plan, pedestrian walkways will be provided throughout the site, with connections provided to the existing sidewalks on Peel Street, which in turn provide access to the wider active transportation network.

Cyclists can utilize the internal drive aisles or the sidewalks, as dictated by their abilities and comfort levels.

4.6 TRAFFIC

4.6.1 Trip Generation

The number of trips generated by the proposed development has been determined based on the type of use, development size and trip generation rates published in the *ITE Trip Generation* Based on the proposed development, trip rates for the *multifamily housing – mid-rise* (ITE code 221) have been employed.

The associated trip rates and resulting trip estimates are provided in Table 8. As indicated, the proposed development is expected to generate 92 trips during the weekday AM peak hour and 92 trips during the weekday PM peak hour (total of inbound and outbound trips).

Table 8: Trip Rates – 151 Peel Street

LAND USE	VARIABLE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
		In	Out	Total	In	Out	Total
multifamily housing mid-rise (ITE 221)	trips/unit	0.09	0.29	0.38	0.24	0.14	0.38
Building A	65 units	6	19	25	16	9	25
Building B	65	6	19	25	16	9	25
Building C	65	6	19	25	16	9	25
Building D	45	4	13	17	11	6	17
Total	**240**	**22**	**70**	**92**	**59**	**33**	**92**

4.6.2 Trip Distribution

The distribution of the site generated trips has been developed based on the results of the *Transportation Tomorrow Survey* (TTS) conducted in 2022. The TTS is a comprehensive travel survey conducted in the Greater Golden Horseshoe area once every five years. As per the *TTS 2022 Data Guide,* the development site resides in Traffic Boundary Zone 17199. Trip data was filtered to consider trips to, from and internal to the respective traffic zone (the summary of the TTS data is provided in Appendix F). The following distribution was established:

- to/from north 15%;
- to/from south 20%;
- to/from east 40%; and
- to/from west 25%.

Based on the above, with consideration given to anticipated travel routes, the following distribution/assignment has been assumed:

- to/from the north via Peel Street 7.5%;
- to/from the north via Collins Street to Hurontario Street 7.5%;
- to/from the south via Collins Street to Hurontario Street 10%;
- to/from the south via Peel Street to Hume Street to Highway 26 10%;
- to/from the east via Peel Street to Hume Street 40%;
- to/from the west via Peel Street to Hume Street 12.5%; and
- to/from the west via Collins Street to Hurontario Street 12.5%.

With respect to trip assignment to the site access points, an equal distribution between the 2 access points has been assumed.

The resulting site traffic distribution across the road network is illustrated in Figure 14.

While it is acknowledged that the completion of the 452 Raglan Street (Indigo 2) development will include a connection between Peel Street and Kirby Avenue, the new route will not provide a convenient or direct connection for motorists destined to/from Poplar Sideroad or Hurontario Street. The proposed road network serving the 452 Raglan Street development includes several street elbows and not considered a likely to induce cut through traffic. Development traffic using this route will be minimal.

5 Future Total Conditions

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

- operations at the key intersection and site access points; and
- potential improvements to the study area road network, if necessary.

5.1 TRAFFIC VOLUMES

To assess the impacts of the increased traffic volumes resulting from the proposed development, the site generated traffic was combined with the 2030, 2035 and 2040 background traffic volumes. The resulting total traffic volumes are presented in Figure 15 to Figure 17.

5.2 TRAFFIC OPERATIONS

The study area intersections were re-analyzed to account for future total traffic volumes. Additionally, the operations of both site access points onto Peel Street were reviewed. The site access configuration includes a single shared left-right outbound lane under stop control and a single inbound lane at the north access, while the south access is configured with a single left-through-right outbound lane and a single inbound lane, forming a 4-leg intersection with McKean Crescent at full buildout.

The results of the operational analysis are summarized in

Table 9 through Table 11, with detailed worksheets provided in Appendix H.

5.3 NEED FOR IMPROVEMENTS

5.3.1 Traffic Operations

Based on the total traffic volumes, all individual movements at the study area intersections operate at acceptable levels of service (LOS D or better). As such, no intersection improvements are required to accommodate total traffic conditions. Given that the intersection operations under total conditions are comparable to those under existing and background conditions, the proposed development is not expected to have any material impact on the surrounding road network.

5.3.2 Turn Lane Requirements

Exclusive turn lanes on Peel Street at the site access points are not considered necessary given the limited volume of traffic to be generated by the site and the low volumes on Peel Street.

Table 9: Intersection Operations – 2030 Total

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Peel Street & Collins Street/ Private Access	EB LTR	stop	10	A	0.25	8	A	0.17
	WB LTR	stop	8	A	0.04	8	A	0.03
	NB LTR	stop	10	A	0.27	8	A	0.12
	SB LTR	stop	9	A	0.23	8	A	0.20
Hurontario Street & Cameron Street/ Collins Street	EB L	signal	28	C	0.24	33	C	0.11
	EB TR	signal	37	D	0.51	36	D	0.32
	WB L	signal	25	C	0.37	27	C	0.33
	WB TR	signal	35	C	0.50	32	C	0.22
	NB L	signal	13	B	0.12	10	B	0.12
	NB TR	signal	26	C	0.70	17	C	0.75
	SB L	signal	14	B	0.22	11	B	0.27
	SB TR	signal	20	C	0.45	14	B	0.59
	overall	signal	26	C	0.59	22	C	0.62
Peel Street & Hume Steet	EB L	signal	7	A	0.11	12	B	0.21
	EB TR	signal	14	B	0.55	26	C	0.85
	WB L	signal	6	A	0.23	13	B	0.45
	WB TR	signal	13	B	0.56	22	C	0.80
	NB L	signal	21	C	0.26	14	B	0.12
	NB TR	signal	21	C	0.35	14	B	0.13
	SB L	signal	20	C	0.14	14	B	0.10
	SB TR	signal	20	B	0.10	14	B	0.12
	overall	signal	15	B	0.48	21	B	0.50
Peel Street & McKean Crescent/ Site Access (S)	EB LTR	stop	10	A	0.01	10	A	0.02
	WB LTR	stop	9	A	0.04	9	A	0.02
	NB LTR	free	1	A	0.00	1	A	0.00
	SB LTR	free	3	A	0.01	2	A	0.02
Peel St & Site Access (N)	WB LR	stop	9	A	0.04	9	A	0.02
	SB LT	free	2	A	0.01	2	A	0.02

L left lane T through lane R right lane LT left-through TR through-right LTR left-through-right

Table 10: Intersection Operations – 2035 Total

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Peel Street & Collins Street/ Private Access	EB LTR	stop	10	A	0.27	8	A	0.18
	WB LTR	stop	8	A	0.04	8	A	0.03
	NB LTR	stop	10	A	0.27	8	A	0.13
	SB LTR	stop	9	A	0.25	8	A	0.21
Hurontario Street & Cameron Street/ Collins Street	EB L	signal	28	C	0.28	31	C	0.10
	EB TR	signal	37	D	0.53	35	D	0.32
	WB L	signal	26	C	0.41	26	C	0.31
	WB TR	signal	36	D	0.56	31	C	0.22
	NB L	signal	13	B	0.14	12	B	0.16
	NB TR	signal	30	C	0.77	32	C	0.86
	SB L	signal	16	B	0.28	16	B	0.38
	SB TR	signal	22	C	0.49	21	C	0.67
	overall	signal	28	C	0.65	27	C	0.68
Peel Street & Hume Steet	EB L	signal	7	A	0.14	12	B	0.25
	EB TR	signal	15	B	0.61	33	C	0.91
	WB L	signal	7	A	0.27	13	B	0.48
	WB TR	signal	15	B	0.63	26	C	0.86
	NB L	signal	21	C	0.27	15	B	0.13
	NB TR	signal	21	C	0.39	15	B	0.14
	SB L	signal	20	C	0.17	15	B	0.12
	SB TR	signal	20	B	0.10	15	B	0.13
	overall	signal	16	B	0.54	25	B	0.55
Peel Street & McKean Crescent/ Site Access (S)	EB LTR	stop	10	A	0.01	10	B	0.02
	WB LTR	stop	9	A	0.04	9	A	0.02
	NB LTR	free	1	A	0.00	1	A	0.00
	SB LTR	free	3	A	0.01	2	A	0.02
Peel St & Site Access (N)	WB LR	stop	9	A	0.04	9	A	0.02
	SB LT	free	2	A	0.01	2	A	0.02

L left lane T through lane R right lane LT left-through TR through-right LTR left-through-right

Table 11: Intersection Operations – 2040 Total

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Peel Street & Collins Street/ Private Access	EB LTR	stop	10	A	0.29	9	A	0.19
	WB LTR	stop	8	A	0.04	8	A	0.03
	NB LTR	stop	10	A	0.28	8	A	0.13
	SB LTR	stop	9	A	0.27	8	A	0.22
Hurontario Street & Cameron Street/ Collins Street	EB L	signal	28	C	0.31	35	D	0.11
	EB TR	signal	38	D	0.57	41	D	0.38
	WB L	signal	26	C	0.44	29	C	0.33
	WB TR	signal	37	D	0.60	35	C	0.27
	NB L	signal	14	B	0.16	14	B	0.19
	NB TR	signal	37	D	0.85	37	D	0.90
	SB L	signal	18	B	0.36	20	C	0.48
	SB TR	signal	23	C	0.54	25	C	0.72
	overall	signal	31	C	0.72	31	C	0.71
Peel Street & Hume Steet	EB L	signal	8	A	0.18	13	B	0.29
	EB TR	signal	18	B	0.69	31	C	0.91
	WB L	signal	8	A	0.33	15	B	0.56
	WB TR	signal	17	B	0.70	26	C	0.86
	NB L	signal	20	C	0.28	17	B	0.15
	NB TR	signal	21	C	0.44	17	B	0.16
	SB L	signal	20	C	0.19	17	B	0.14
	SB TR	signal	19	B	0.11	17	B	0.15
	overall	signal	17	B	0.61	25	C	0.59
Peel Street & McKean Crescent/ Site Access (S)	EB LTR	stop	10	A	0.01	10	A	0.02
	WB LTR	stop	9	A	0.04	9	A	0.02
	NB LTR	free	1	A	0.00	1	A	0.00
	SB LTR	free	3	A	0.01	2	A	0.02
Peel St & Site Access (N)	WB LR	stop	9	A	0.04	9	A	0.02
	SB LT	free	2	A	0.01	2	A	0.02

L left lane T through lane R right lane LT left-through TR through-right LTR left-through-right

6 Summary

Proposed Development

The study has addressed the transportation impacts associated with the proposed residential development located at 151 Peel Street in the Town of Collingwood. Upon completion, the development is expected to generate 92 new trips during the AM peak and 92 new trips during the PM peak hours.

Transportation Impacts

In assessing the impact of the proposed development on the study area road system, the key intersections were analyzed under existing (2025) and future (2030, 2035 and 2040) horizon periods. The results of the operational analyses indicate that the study area intersections and the new site access intersections with Peel Street will provide acceptable operations through 2040. Thus, no improvements are required to accommodate the subject development.

Overall, the subject site is not expected to have any material impact on the operations of the adjacent road network.

Sight Line Assessment

The available sight lines along Peel Street at both access points were reviewed in context of TAC design guidelines for minimum stopping sight and intersection sight distances. Based on the results of the review, the sight lines were found to be appropriate.

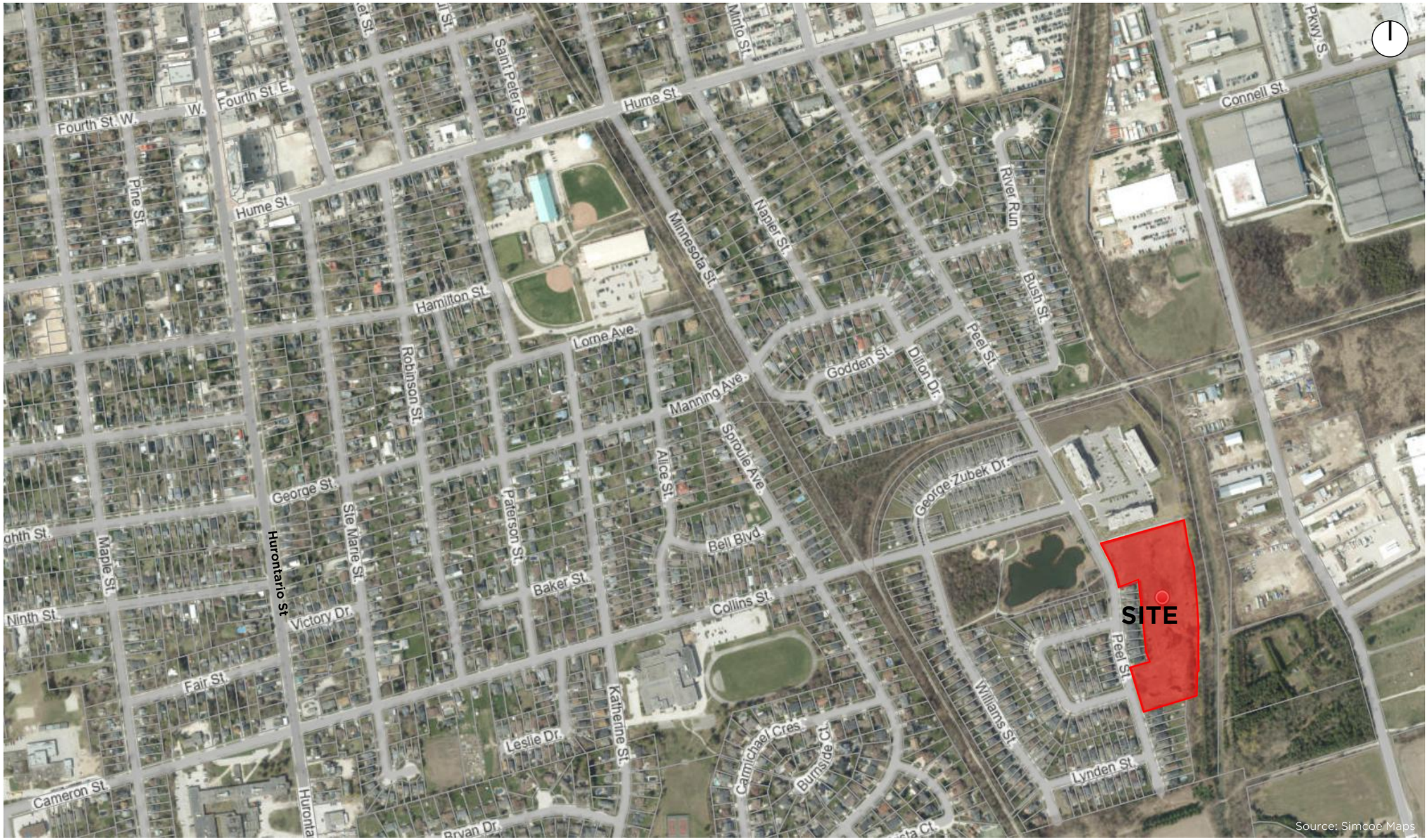
Turn Lane Requirements

Given the limited volumes accessing the site and the relatively low volumes on Peel Street, exclusive turn lanes are not warranted to support the proposed development.

Source: Simcoe Maps

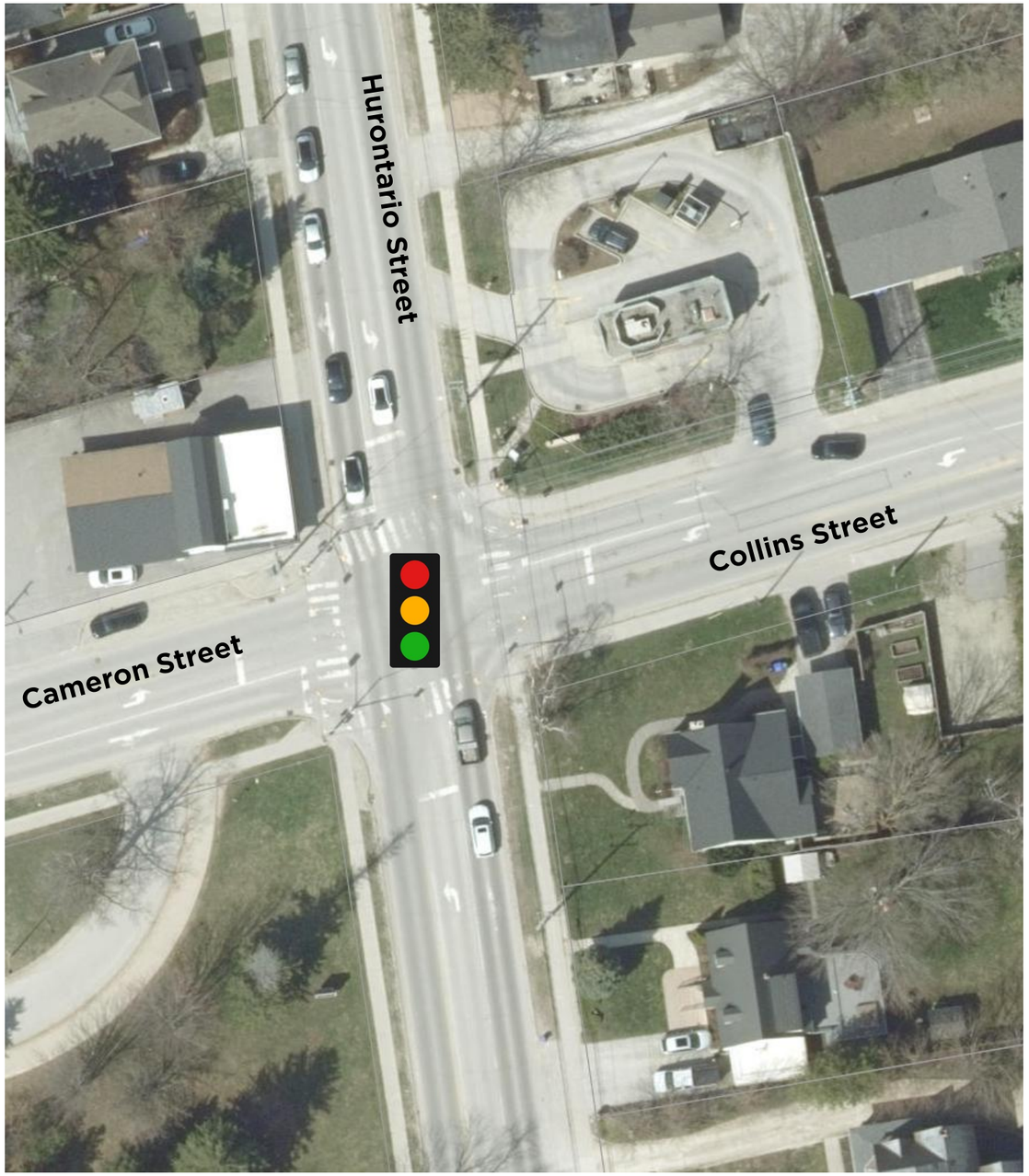
151 PEEL STREET – TRANSPORTATION IMPACT STUDY

Figure 1: Site Location

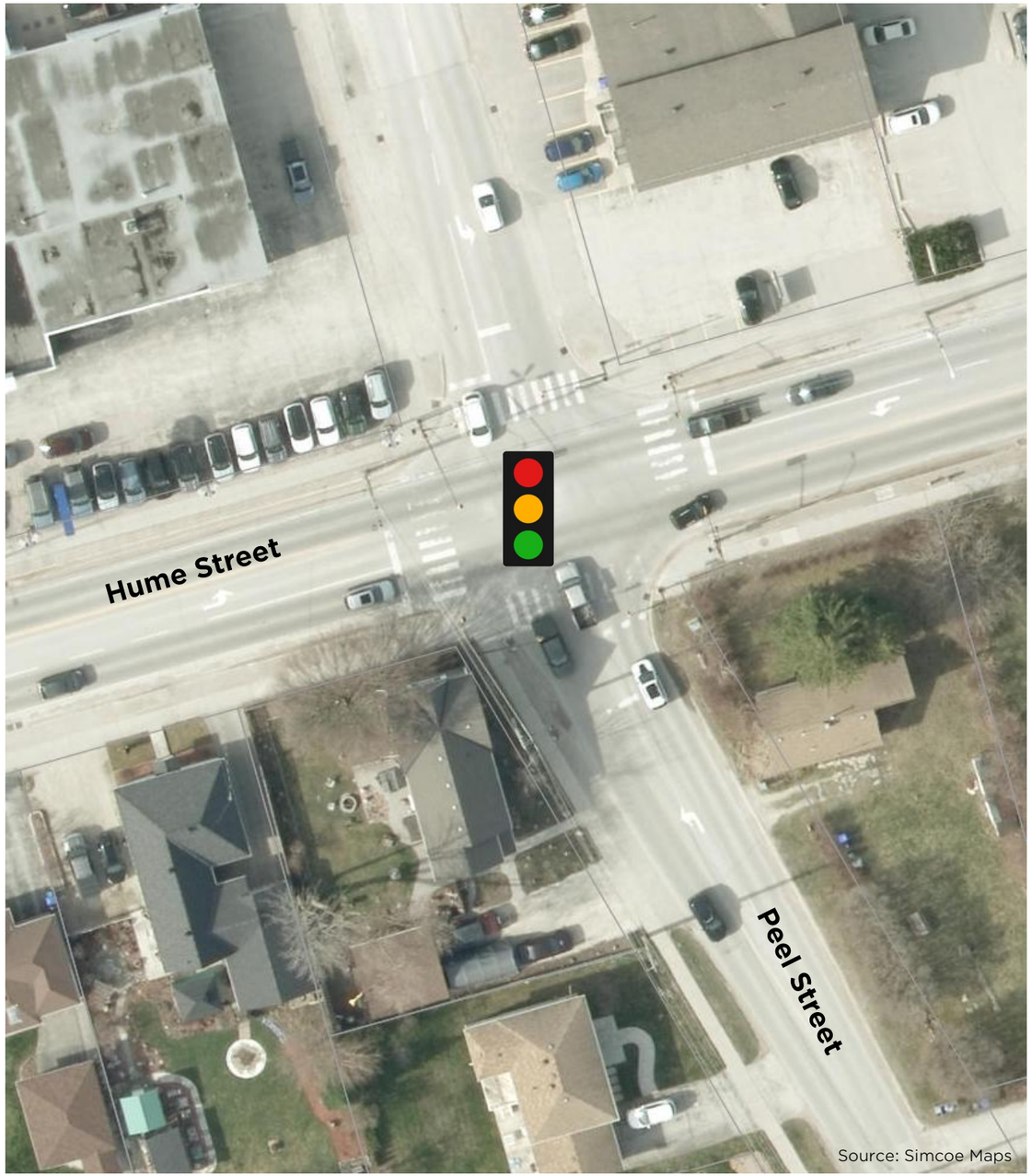


151 PEEL STREET – TRANSPORTATION IMPACT STUDY

Figure 2A: Area Road Network



Intersection of Hurontario Street with Collins Street/ Cameron Street

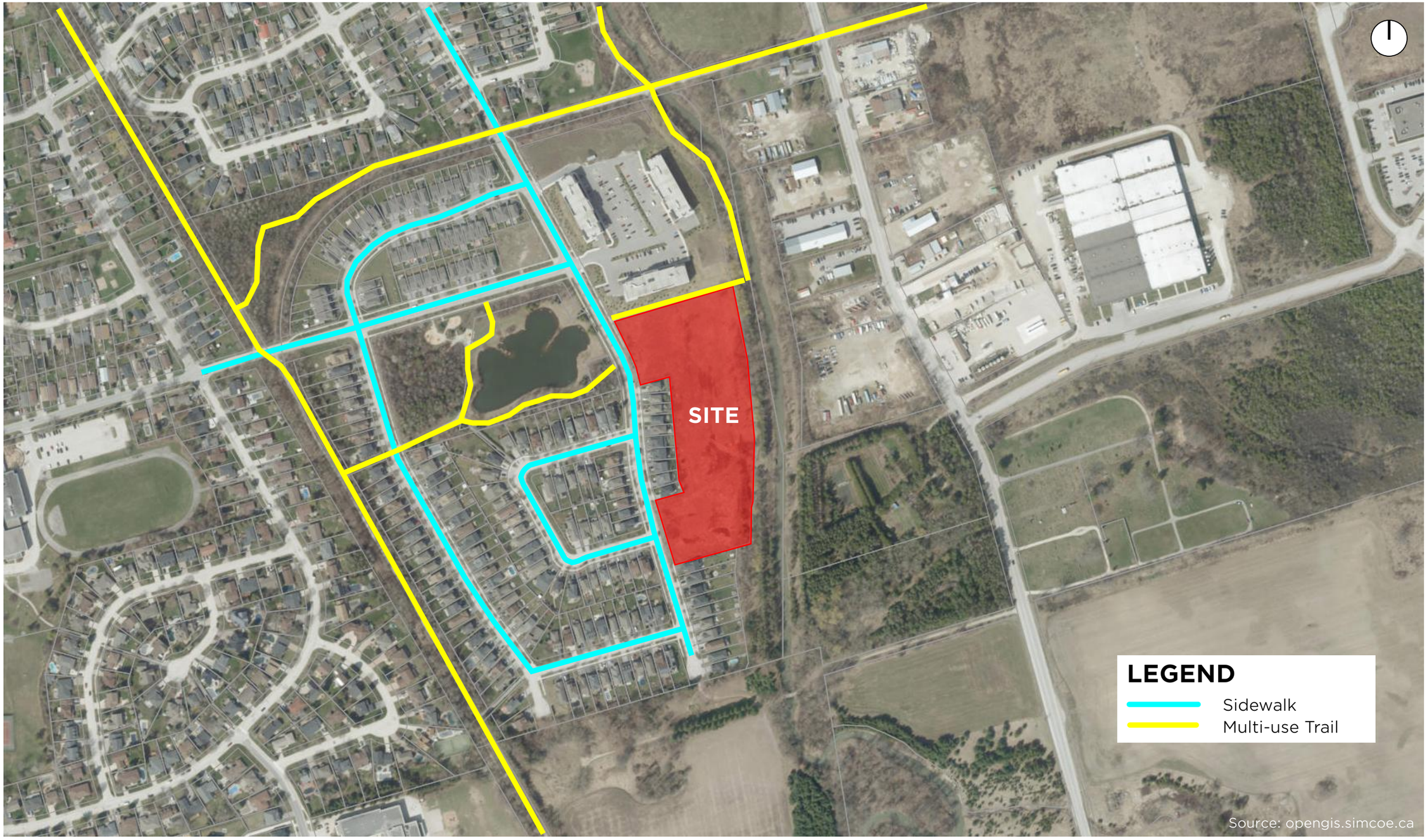


Intersection of Peel Street with Hume Street

Intersection of Peel Street with Collins Street

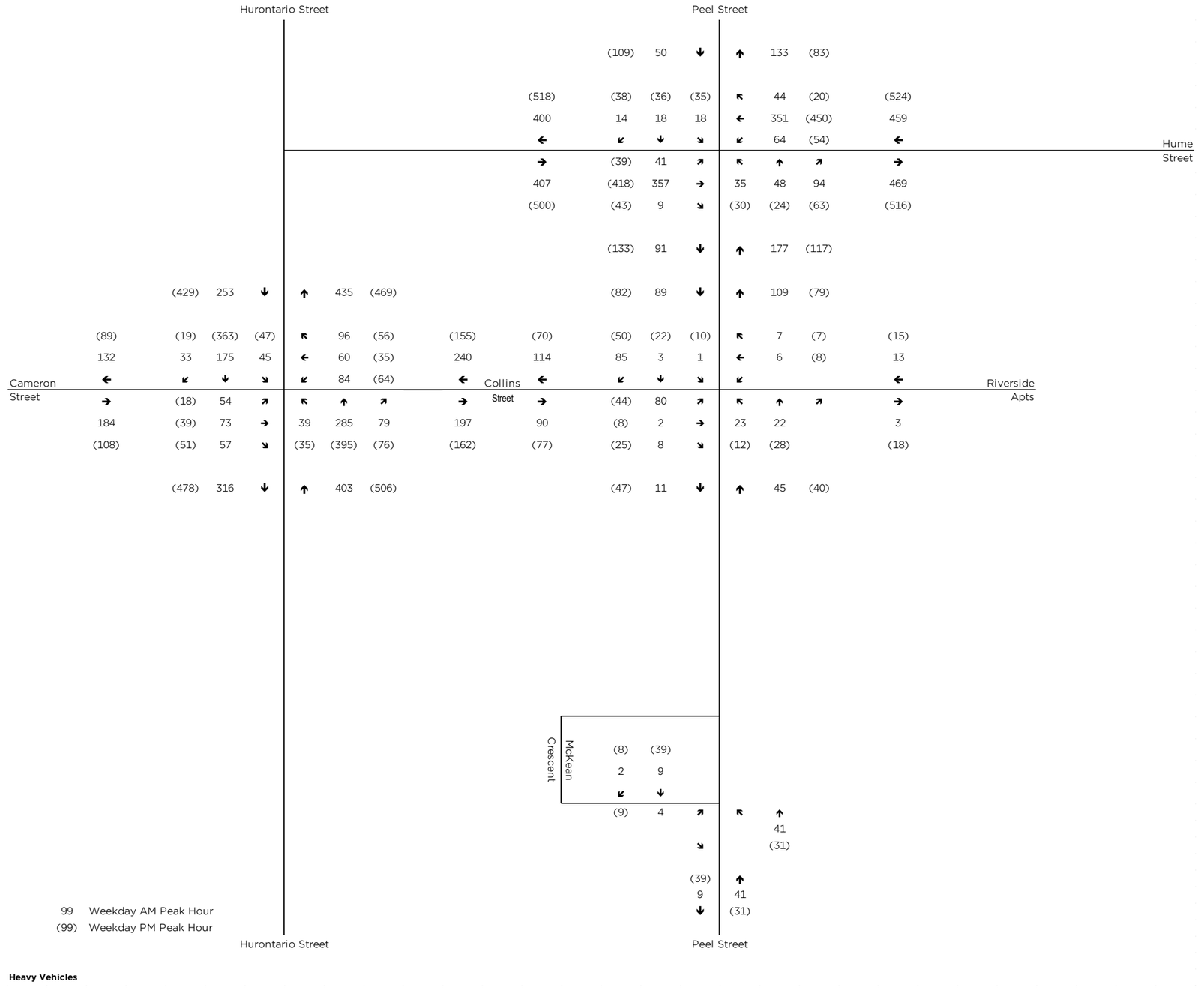
Intersection of Peel Street with McKean Crescent (South)

Figure 2C: Area Road Network



151 PEEL STREET – TRANSPORTATION IMPACT STUDY

Figure 3: Active Transportation

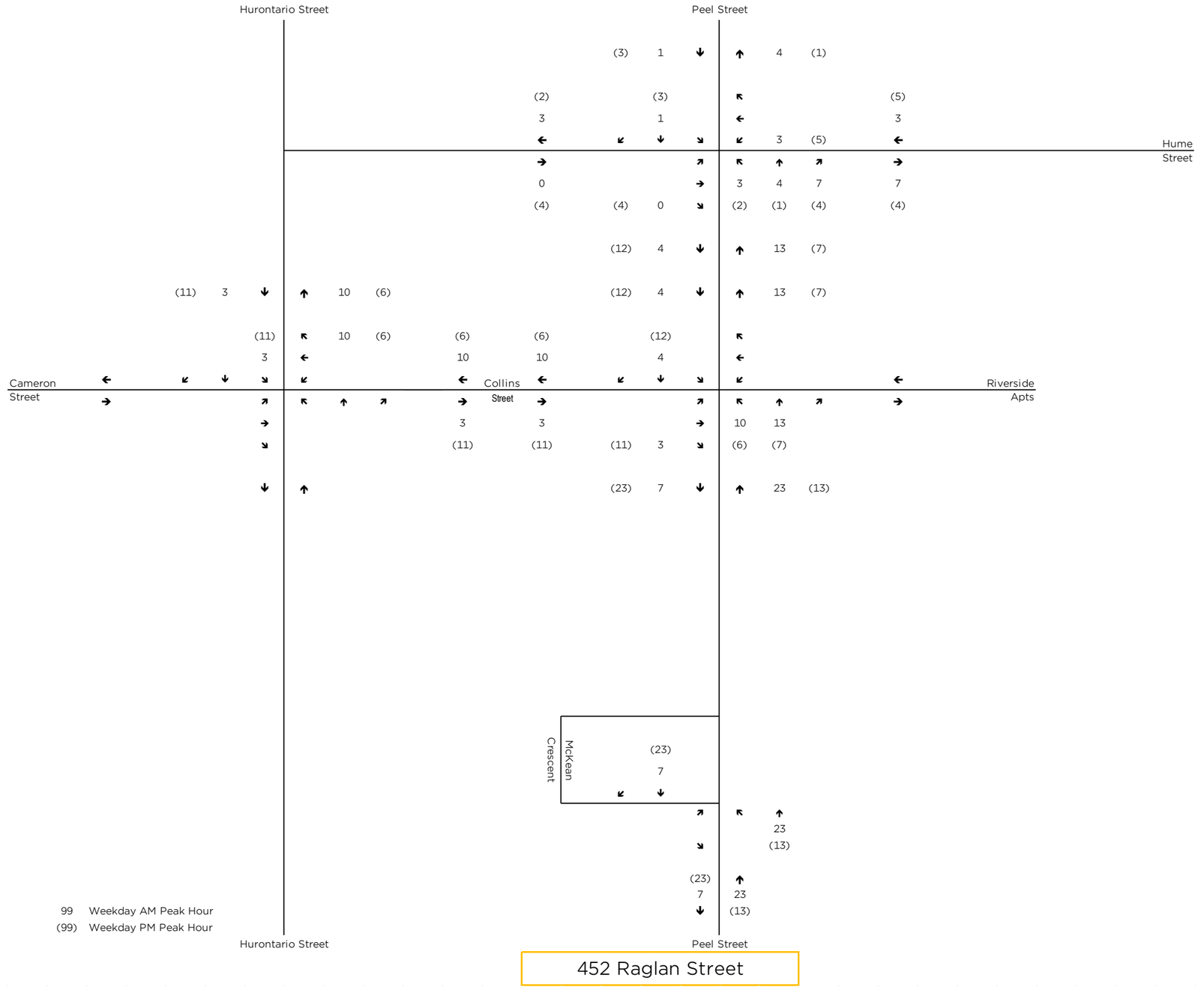


151 PEEL STREET – TRANSPORTATION IMPACT STUDY

Figure 4: Traffic Volumes - 2025

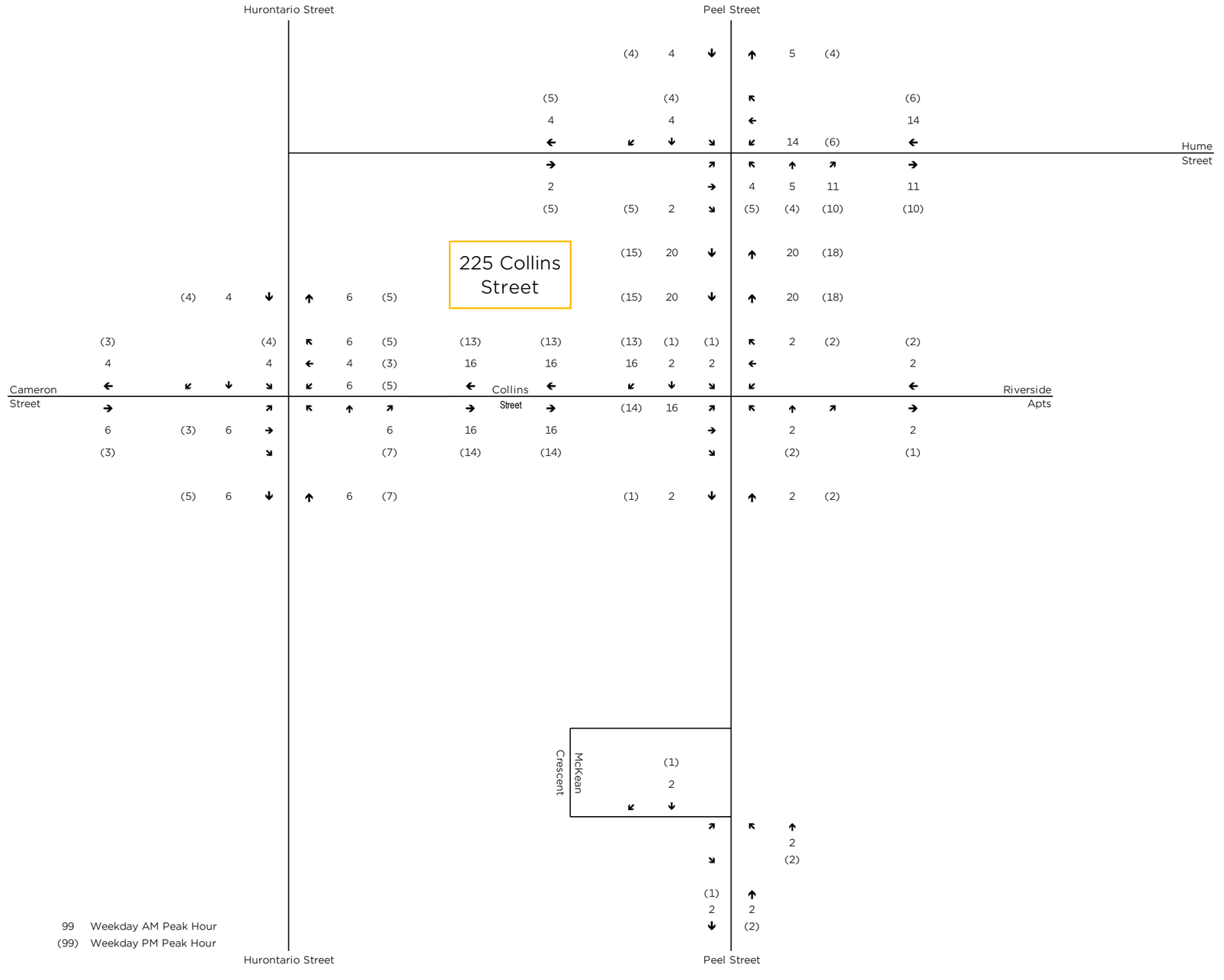
Source: Simcoe Maps

Figure 5: Background Development Locations



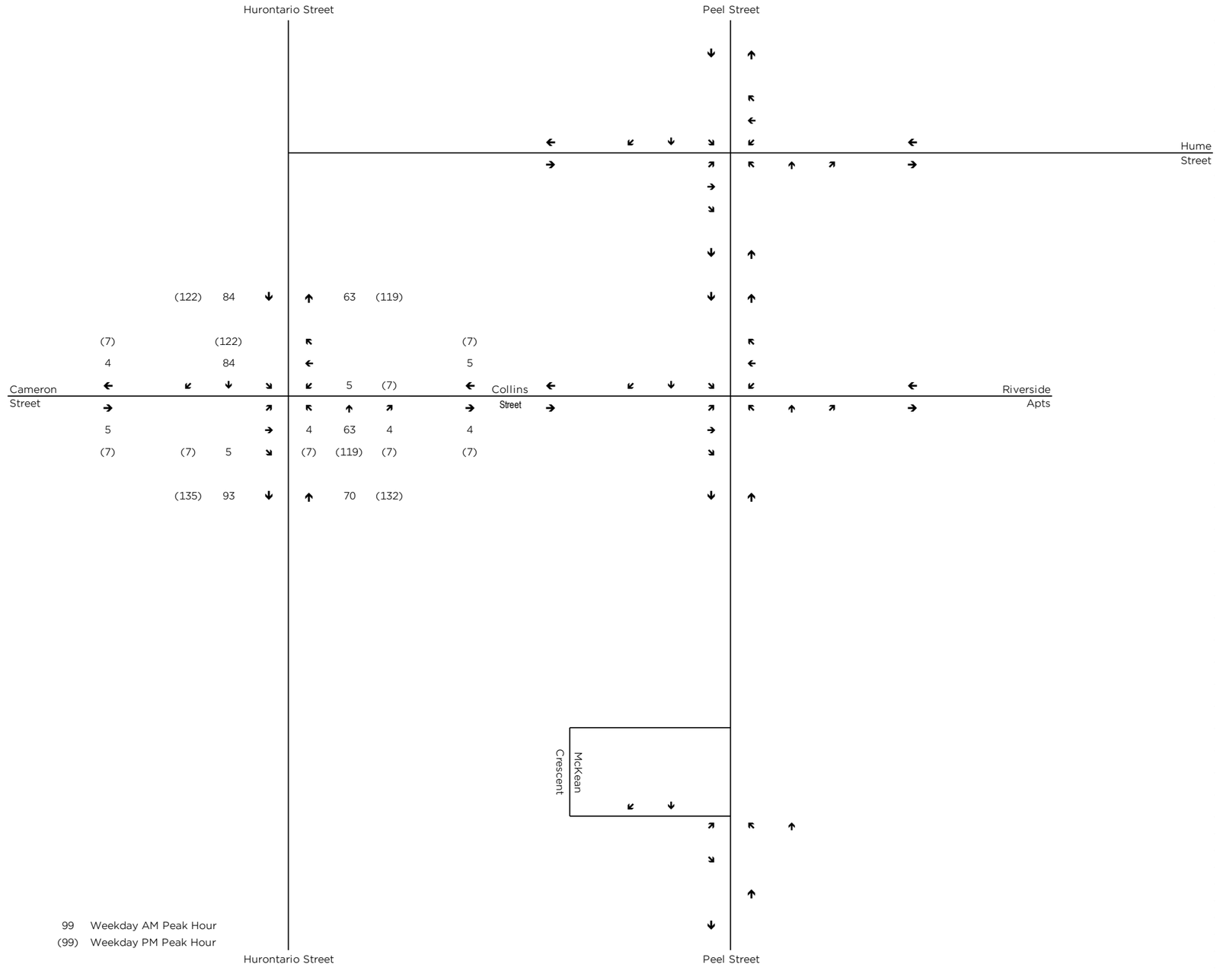
151 PEEL STREET – TRANSPORTATION IMPACT STUDY

Figure 6: Traffic Volumes – 452 Raglan Street



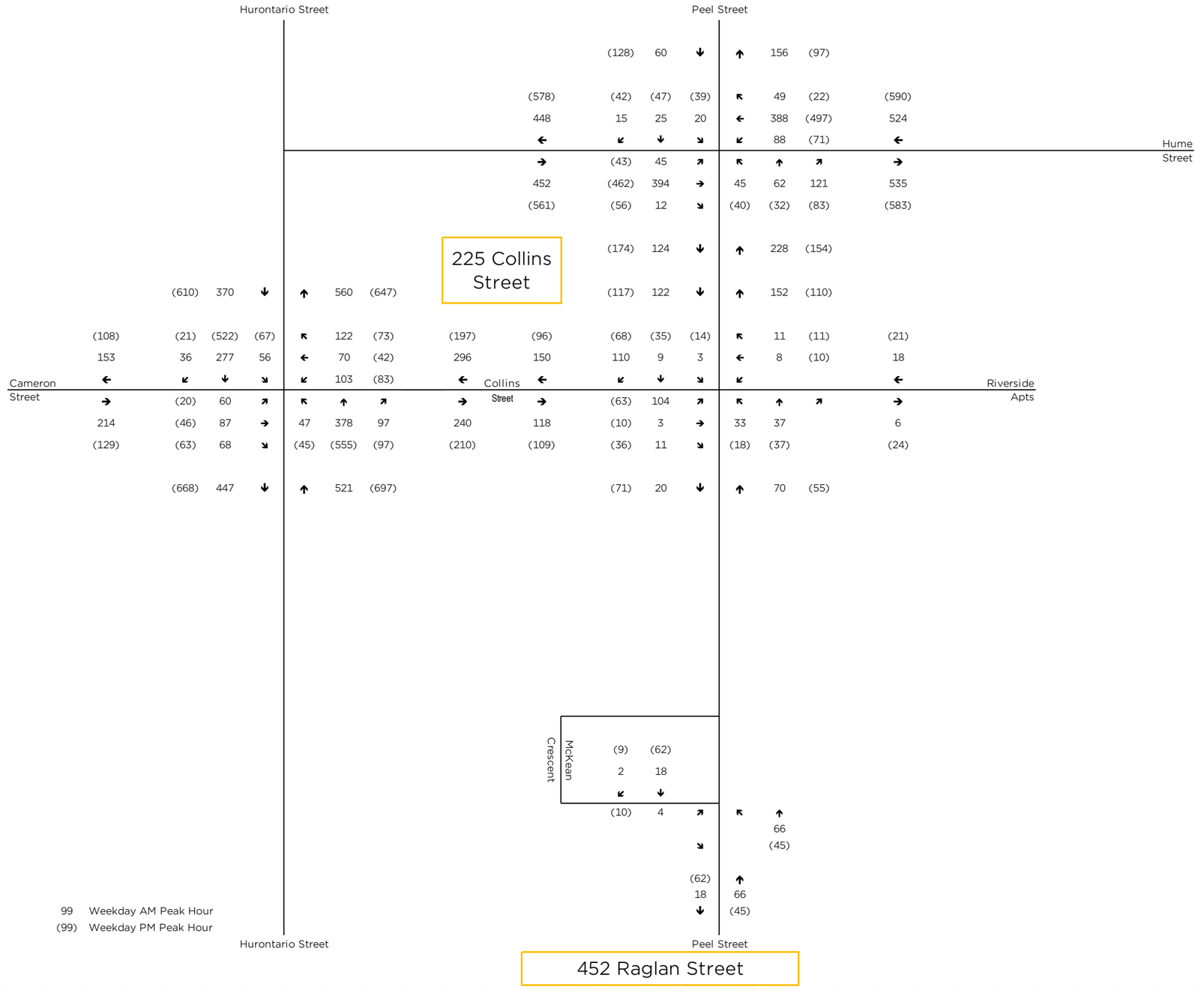
151 PEEL STREET – TRANSPORTATION IMPACT STUDY

Figure 7: Traffic Volumes – 225 Collins Street



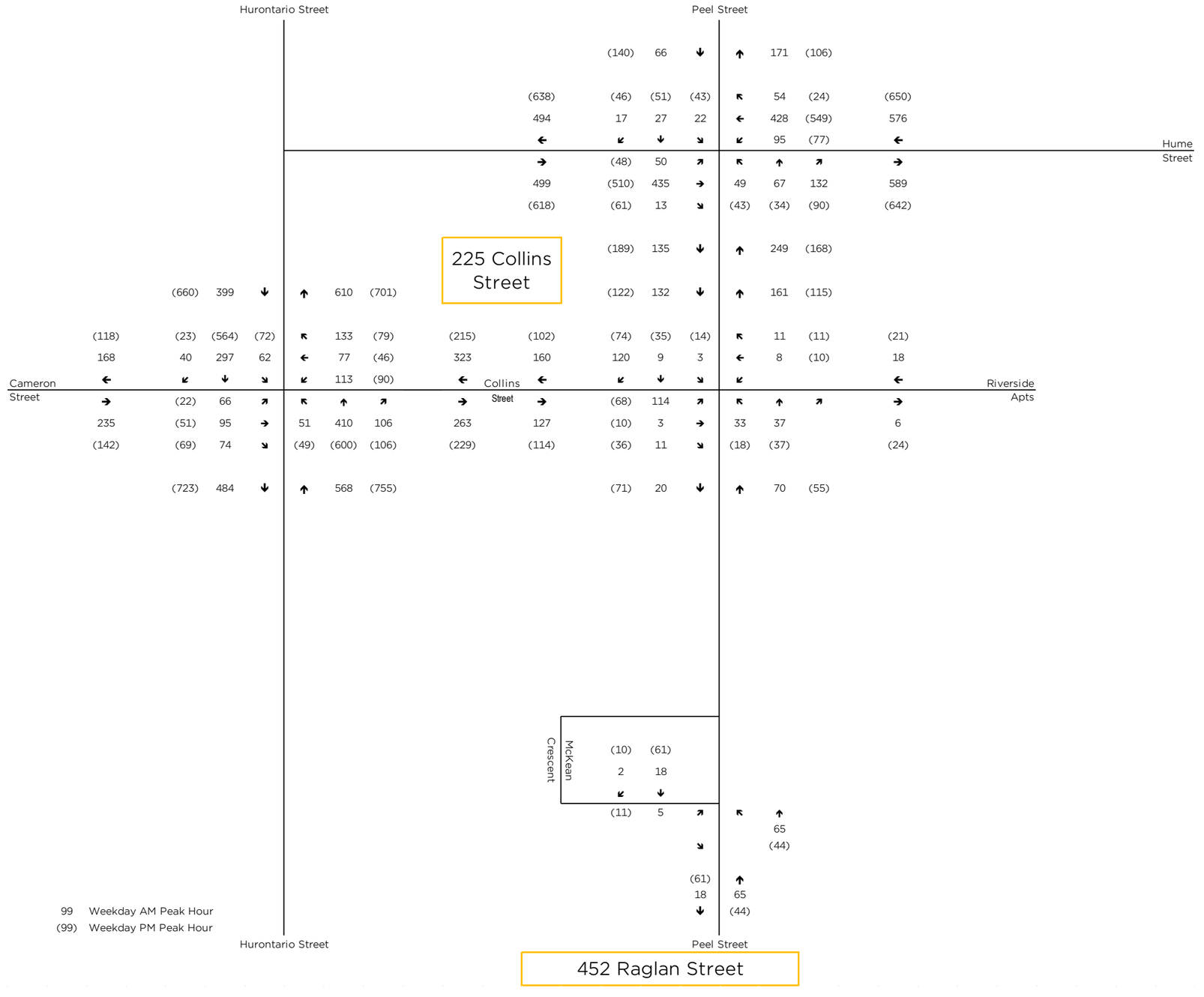
151 PEEL STREET – TRANSPORTATION IMPACT STUDY

Figure 8: Traffic Volumes – The Gateway Centre



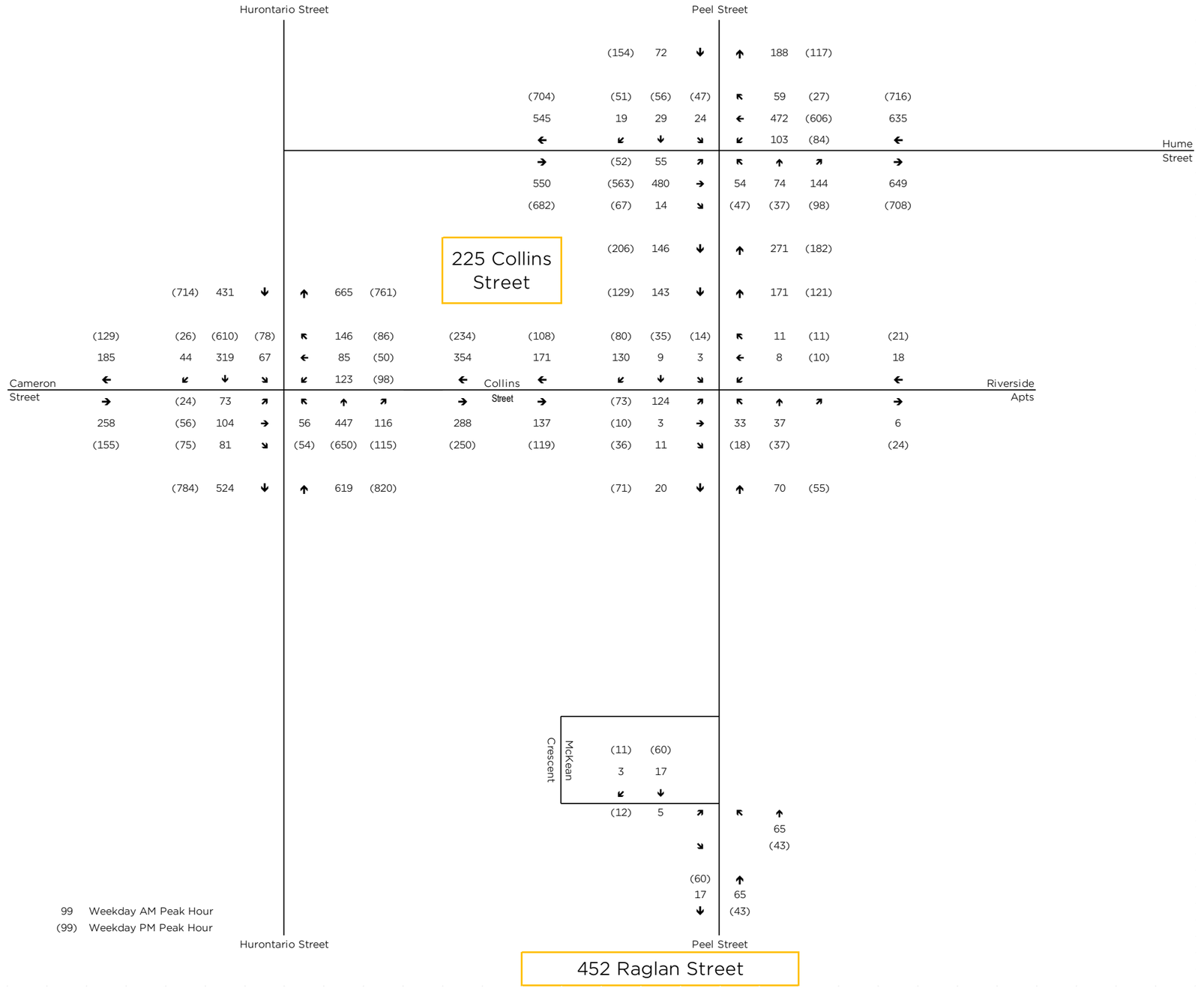
151 PEEL STREET – TRANSPORTATION IMPACT STUDY

Figure 9: Traffic Volumes – 2030 Background



151 PEEL STREET – TRANSPORTATION IMPACT STUDY

Figure 10: Traffic Volumes – 2035 Background



151 PEEL STREET – TRANSPORTATION IMPACT STUDY

Figure 11: Traffic Volumes – 2040 Background

	PHASE-1	PHASE-2
UNIT	130 BUILDING-A: 65 UNITS BUILDING-B: 65 UNITS	110 BUILDING-C: 65 UNITS BUILDING-D: 45 UNITS
PARKING	124	105 (INCLUDING 25 UNDERGROUND PARKING IN BUILDING-D)
LANDSCAPE	40.12%	40.12%
Main Streets A : 7.20m Other Streets : 6.00m		

LEGEND :

	STREET TREE		CONCRETE SIDEWALK
	ORNAMENTAL TREE		PAINTED LINES
	SHRUBS BED		PROPERTY LINE
	BENCH		SOD
	BIKE RACK		ACCESSIBLE PARKING SPACE
S.S.	SNOW STORAGE	S.B.S.	CURB CUT/ DEPRESSED SIDE WALK
			SNOW BIO SWALE

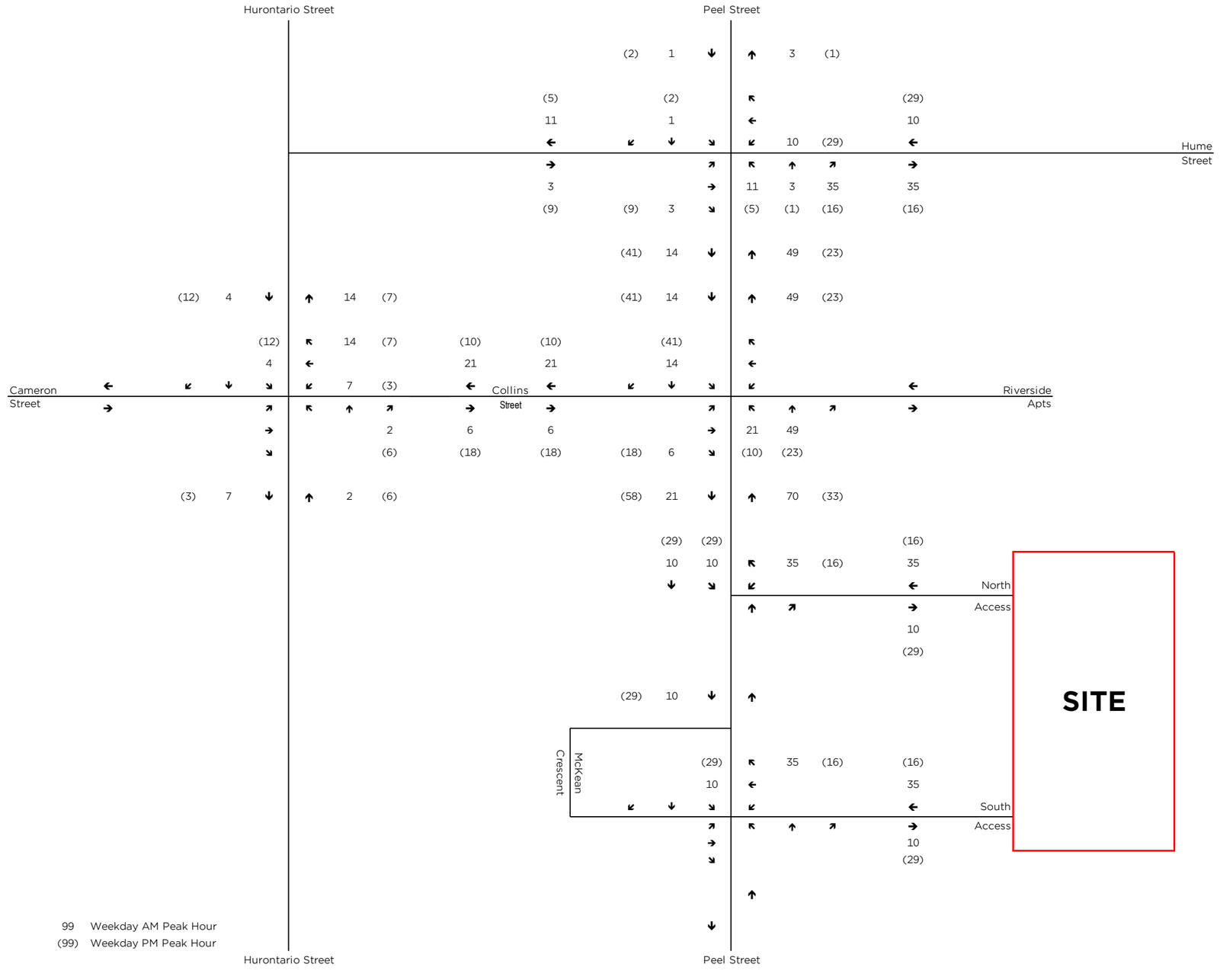
Figure 12: Site Plan

Looking north along Peel Street from proposed North Access

Looking north along Peel Street from proposed South Access

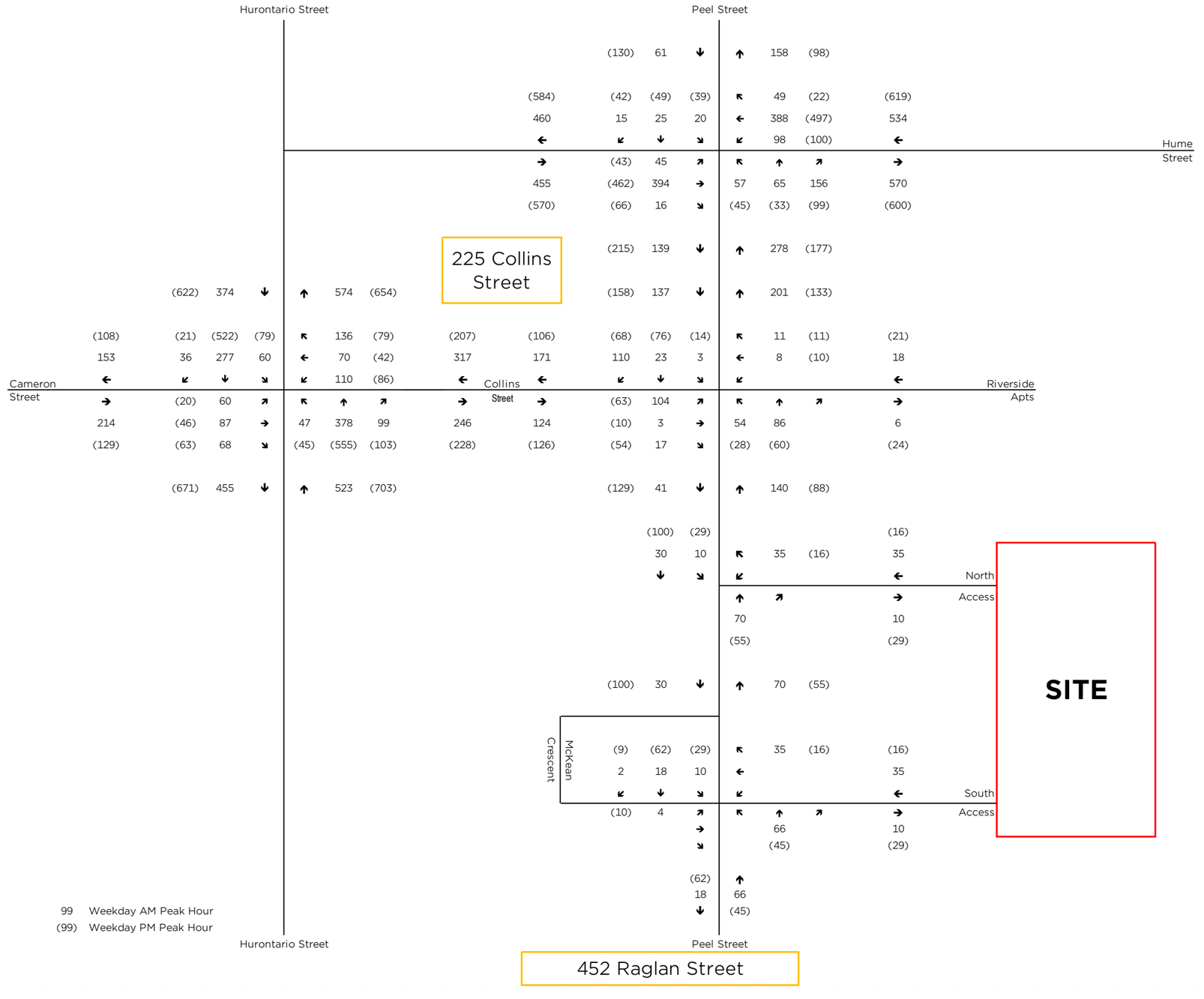
Looking south along Peel Street from proposed North Access

Looking south along Peel Street from proposed South Access



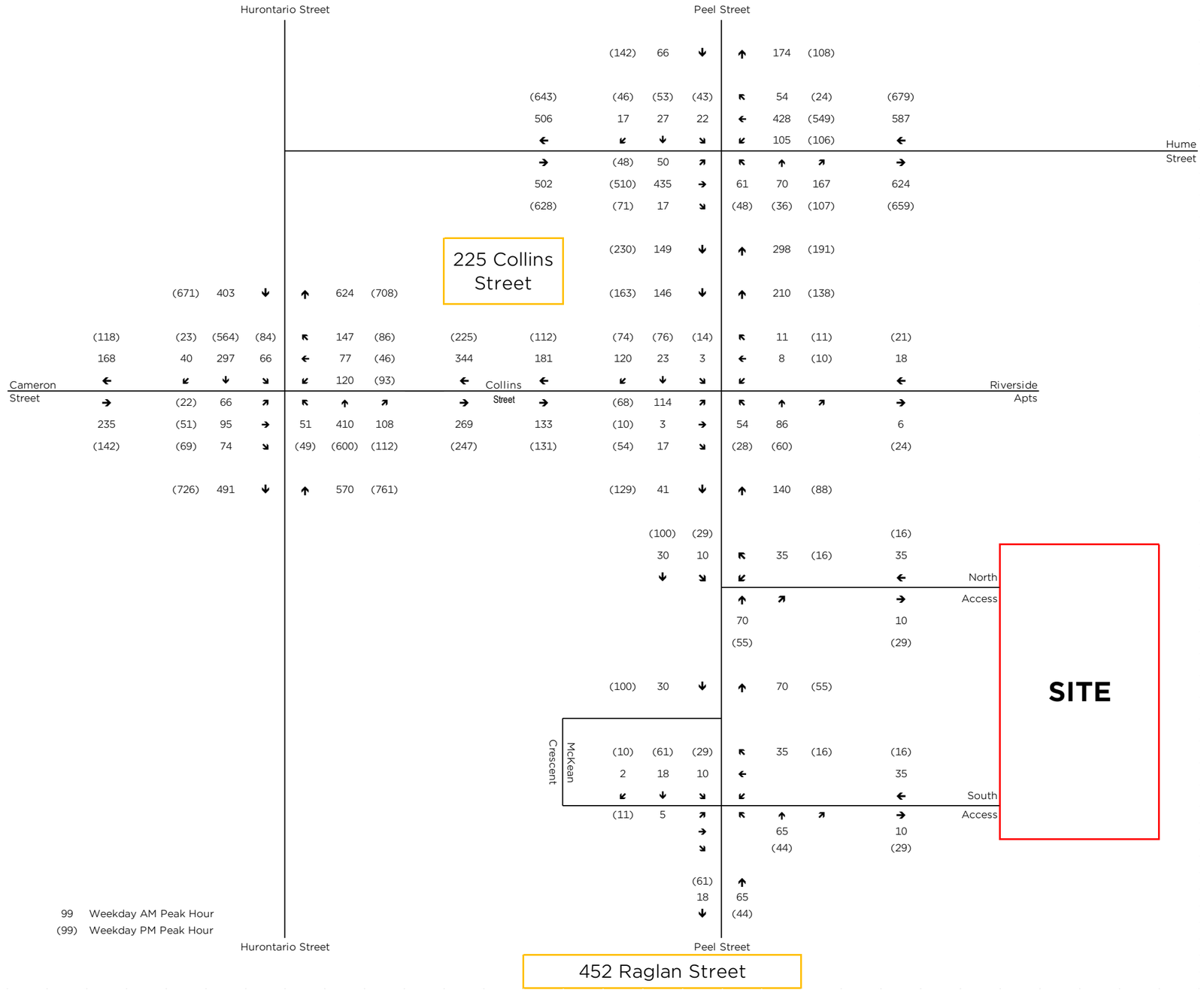
151 PEEL STREET – TRANSPORTATION IMPACT STUDY

Figure 14: Traffic Volumes - Site



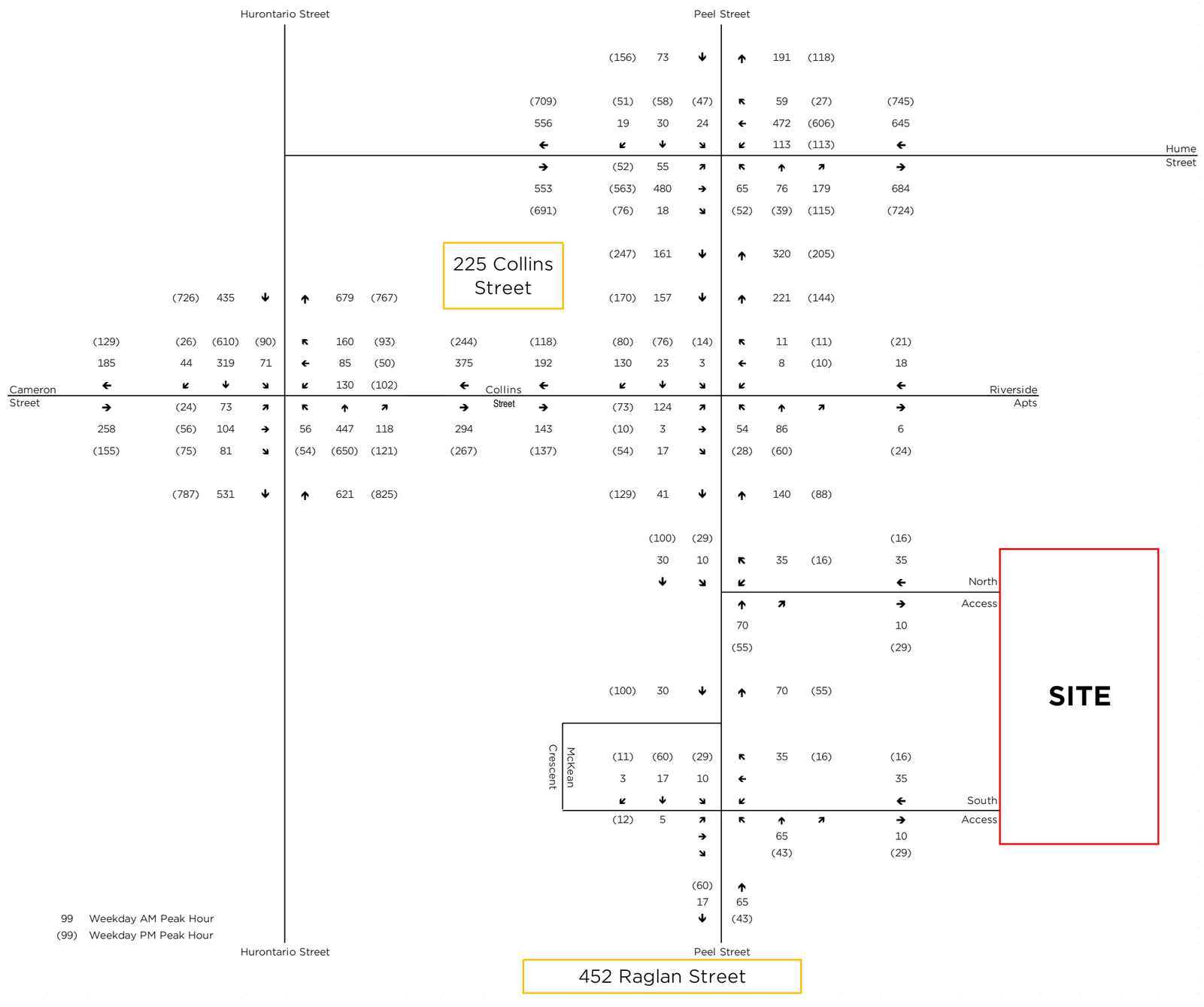
151 PEEL STREET – TRANSPORTATION IMPACT STUDY

Figure 15: Traffic Volumes – 2030 Total



151 PEEL STREET – TRANSPORTATION IMPACT STUDY

Figure 16: Traffic Volumes – 2035 Total



151 PEEL STREET – TRANSPORTATION IMPACT STUDY

Figure 17: Traffic Volumes – 2040 Total

Appendix A:
Terms of Reference

Karolina Kukielka

From: shelley planwells.com <shelley@planwells.com>
Sent: Tuesday, May 20, 2025 8:26 PM
To: Karolina Kukielka
Cc: Harjinder Kang; Raj Patel; David Perks
Subject: FW: Terms of Reference - 151 Peel St, Collingwood

Hello Karolina
Please find below comments on your terms of reference for the Harmony Living Traffic Impact Report. If we have issues please just give me a call so we can talk.
Sincerely
Shelley

From: Beckett Frisch <bfrisch@collingwood.ca>
Sent: May 20, 2025 4:37 PM
To: shelley planwells.com <shelley@planwells.com>
Subject: FW: Terms of Reference - 151 Peel St, Collingwood

Good afternoon Shelley,

Please see the below comments in red from the Town's peer reviewer. Should your client have any questions, please don't hesitate to reach out.

Here's hoping for warmer weather!

Best,
Beckett

Beckett Frisch (he/him)
Community Planner
705-445-1030 Ext. 3288
www.collingwood.ca

From: Karolina Kukielka <kkukielka@tathameng.com>
Sent: April 17, 2025 1:24 PM
To: Beckett Frisch <bfrisch@collingwood.ca>
Cc: David Perks <dperks@tathameng.com>
Subject: Terms of Reference - 151 Peel St, Collingwood

Good afternoon,

Tatham Engineering Limited has been retained to prepare a Traffic Impact Study (TIS) in support of a proposed residential development located at 151 Peel Street in the Town of Collingwood. The development will consist of 240 residential units contained in four 4-storey apartment buildings.

The proposed work program is outlined below:

1. The study area will include Peel Street, Collins Street, and their intersections. Intersections to be considered included Peel St/Collins St, North Access/Peel St, South Access/McKean Crescent/Peel St., Peel St/Hume St and Collins St/Hurontario St.
2. Existing volumes will be established using new traffic counts (if data from the last two years is not available).
3. The assessment will consider weekday AM and PM peak hour conditions.
4. Using historical data and projected growth in the area, future background traffic volumes will be identified. Background traffic growth forecasts are to include general traffic growth plus traffic growth from background developments. The consultant should confirm growth rates with the Town's ongoing Master Mobility and Transportation Plan (exp). The analysis will include the future development of 452 Raglan St (and the resulting connection of Kirby Street with Peel Street) and the commercial parcel on the northwest corner of the Peel Street and Collins Street intersection (as per the Town's comments). In addition to the background developments identified above please include the following additional background development (obtain TIS for background developments from the Town):

    - The Gateway Centre

      Projections will be developed for:

    - 2030: Year of full build-out
    - 2035: 5-year planning horizon beyond full build-out
    - 2040: 10-year planning horizon beyond full build-out

5. Trip generation will be based on the ITE Trip Generation Manual, 11th Edition, for land uses consistent with the proposed development. Trips will be assigned to the road network based on:

    - Existing traffic patterns
    - Available distribution data
    - Anticipated travel routes

6. The operational analysis of the study area intersection and site access points will be conducted using Synchro traffic analysis software. The road network will be assessed under existing conditions, future background conditions (i.e. without the subject development) and future

total conditions (i.e. with the subject development). Operational analysis to include signal warrants (where required), capacity, LOS, queuing and turn lane requirements based on MTO criteria. Also Quantify the number of vehicles anticipated to infiltrate through the subdivision to the south (Eden Oak, 452 Raglan).

7. Review the on-site circulation and access location and design. Provide AutoTURN analysis for on-site circulation for cars, waste vehicles and fire trucks.
8. Following the traffic analysis, any road improvements or mitigation measures required to support the existing, background or total conditions will be identified, along with the appropriate timing for implementation. . Traffic analysis to also be completed with improvements/mitigation measures implemented.
9. An evaluation of available sight lines at the proposed site access points will be provided in accordance with TAC guidelines and other relevant industry standards.
10. All findings and recommendations will be documented in a Transportation Impact Study for submission to the Town for review and approval.
11. Provide analysis and recommendations surrounding active transportation linkages both within and external to the development, including traffic calming, crosswalks etc.
12. Provide comment on existing and future transit connections to serve this development.
13. Confirm that proposed parking will meet the Town's By-law requirements. If parking is deficient then a terms of reference for a parking justification study will be required for approval. Opportunities for Transportation Demand Management (TDM) should be identified.

Please let me know if the above Terms of Reference is acceptable and do not hesitate to contact me if you have any comments/questions.

TATHAM ENGINEERING

Karolina Kukielka C.E.T., EIT, rcsi
Engineering Intern

kkukielka@tathameng.com **T** 705-733-9037 x2238
645 Veterans Drive, Unit D, Barrie, Ontario L4N 9H8

tathameng.com

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Appendix B:
Traffic Counts

Peel Street & Collins Street

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

Municipality: Collingwood
Site #: 0000003601
Intersection: Peel Street & Collins Street
TFR File #: 1
Count date: 27-May-2025

Weather conditions:
Clear

Person(s) who counted:

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

Major Road: Peel Street runs N/S

North Leg Total: 198
North Entering: 89
North Peds: 6
Peds Cross: ⋈

Heavys	1	0	0	1
Trucks	0	0	0	0
Cars	84	3	1	88
Totals	85	3	1	

Heavys	1
Trucks	0
Cars	108
Totals	109

East Leg Total: 16
East Entering: 13
East Peds: 3
Peds Cross: ⧖

Peel Street

Heavys	Trucks	Cars	Totals
1	0	113	114

Cars	Trucks	Heavys	Totals
7	0	0	7
6	0	0	6
0	0	0	0
13	0	0	

Collins Street

N
W E
S

Heavys	Trucks	Cars	Totals
1	0	79	80
0	0	2	2
0	0	8	8
1	0	89	

Driveway

Cars	Trucks	Heavys	Totals
3	0	0	3

Peel Street

Peds Cross: ⧖
West Peds: 4
West Entering: 90
West Leg Total: 204

Cars	11
Trucks	0
Heavys	0
Totals	11

Cars	23	22	0	45
Trucks	0	0	0	0
Heavys	0	0	0	0
Totals	23	22	0	

Peds Cross: ⋈
South Peds: 4
South Entering: 45
South Leg Total: 56

Comments

Peel Street & Collins Street

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

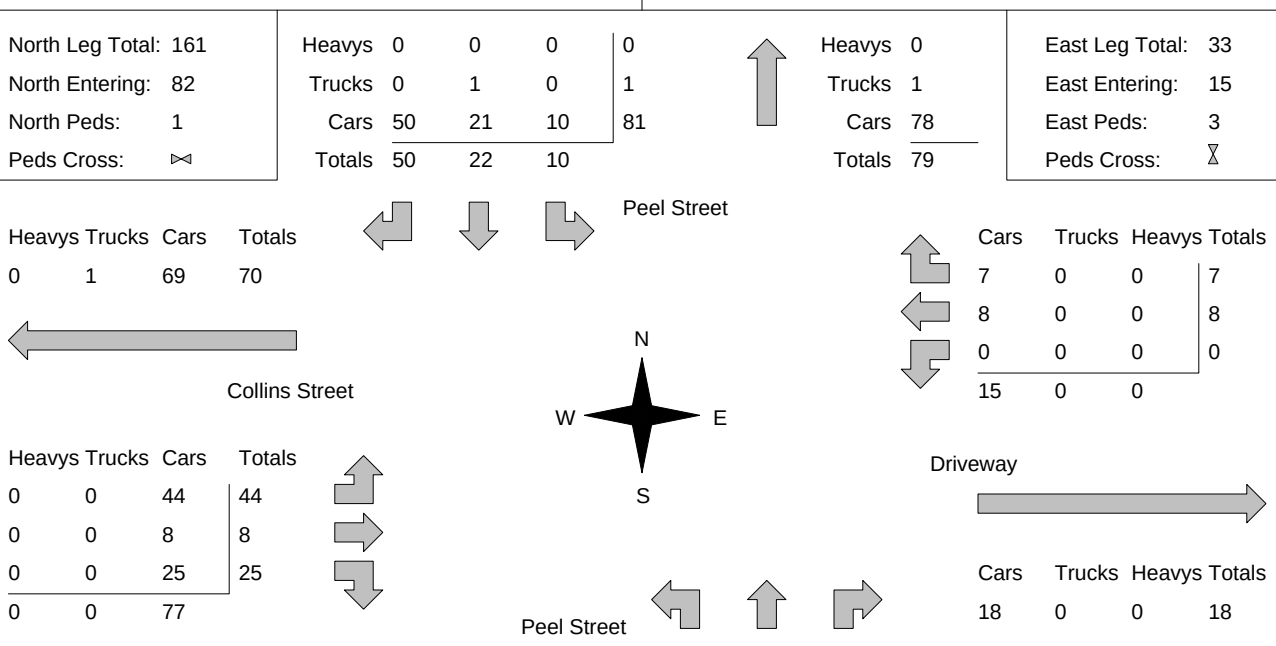
Municipality: Collingwood
Site #: 0000003601
Intersection: Peel Street & Collins Street
TFR File #: 1
Count date: 27-May-2025

Weather conditions:
Clear

Person(s) who counted:

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

Major Road: Peel Street runs N/S



Comments

Peel Street & Collins Street

Total Count Diagram

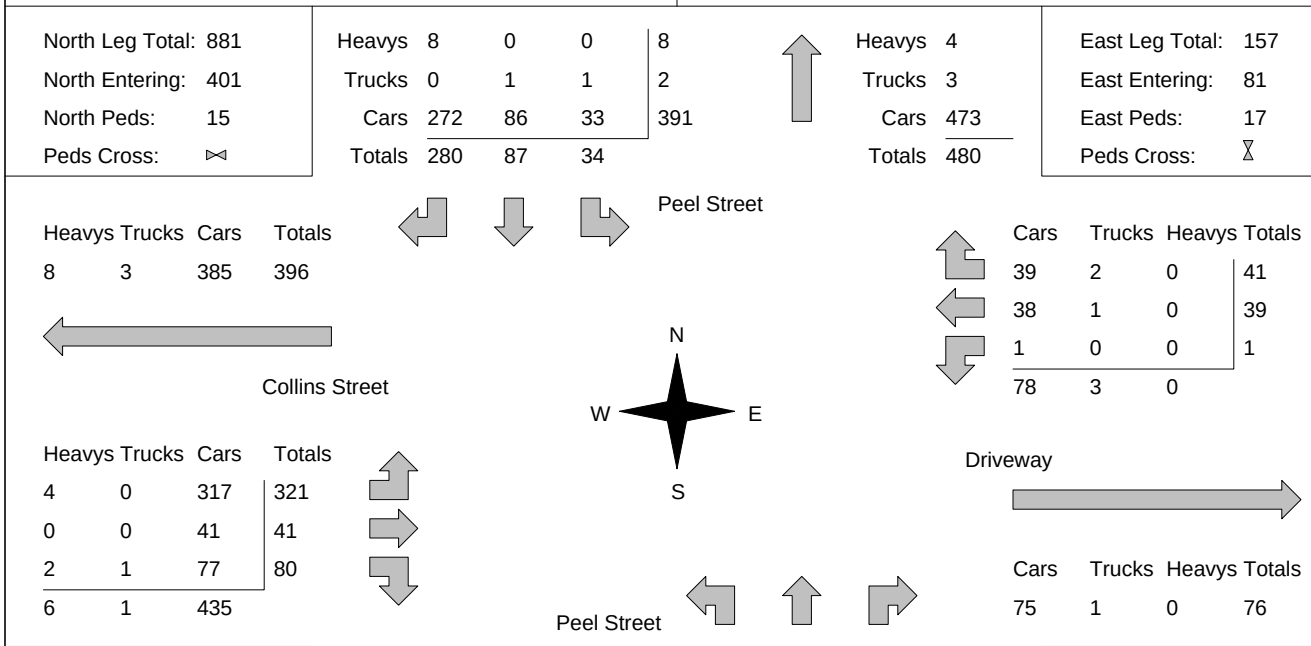
Municipality: Collingwood
Site #: 0000003601
Intersection: Peel Street & Collins Street
TFR File #: 1
Count date: 27-May-2025

Weather conditions:
Clear

Person(s) who counted:

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

Major Road: Peel Street runs N/S



Comments

Peel Street & Collins Street
Traffic Count Summary

Intersection: Peel Street & Collins Street | **Count Date:** 27-May-2025 | **Municipality:** Collingwood

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	1	6	64	71	1	102
9:00:00	5	7	53	65	5	114
10:00:00	7	7	29	43	0	61
15:00:00	0	0	0	0	0	0
16:00:00	4	20	50	74	1	103
17:00:00	7	17	44	68	2	102
18:00:00	10	30	40	80	6	115
Totals:	34	87	280	401	15	597

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	15	16	0	31	6
9:00:00	21	27	1	49	2
10:00:00	6	12	0	18	5
15:00:00	0	0	0	0	0
16:00:00	13	16	0	29	5
17:00:00	14	20	0	34	7
18:00:00	8	27	0	35	9
Totals:	77	118	1	196	34

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	0	6	8	14	7	73
9:00:00	1	3	6	10	2	83
10:00:00	0	10	8	18	0	93
15:00:00	0	0	0	0	0	0
16:00:00	0	4	5	9	0	99
17:00:00	0	8	9	17	4	95
18:00:00	0	8	5	13	4	80
Totals:	1	39	41	81	17	523

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	55	1	3	59	3
9:00:00	64	2	7	73	4
10:00:00	58	9	8	75	4
15:00:00	0	0	0	0	0
16:00:00	55	10	25	90	10
17:00:00	48	6	24	78	5
18:00:00	41	13	13	67	4
Totals:	321	41	80	442	30

Calculated Values for Traffic Crossing Major Street

Hours Ending:	7:00	8:00	9:00	10:00	15:00	16:00	17:00	18:00
Crossing Values:	0	68	75	73	0	71	65	69

Peel Street & Hume Street

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 7:45:00
To: 8:45:00

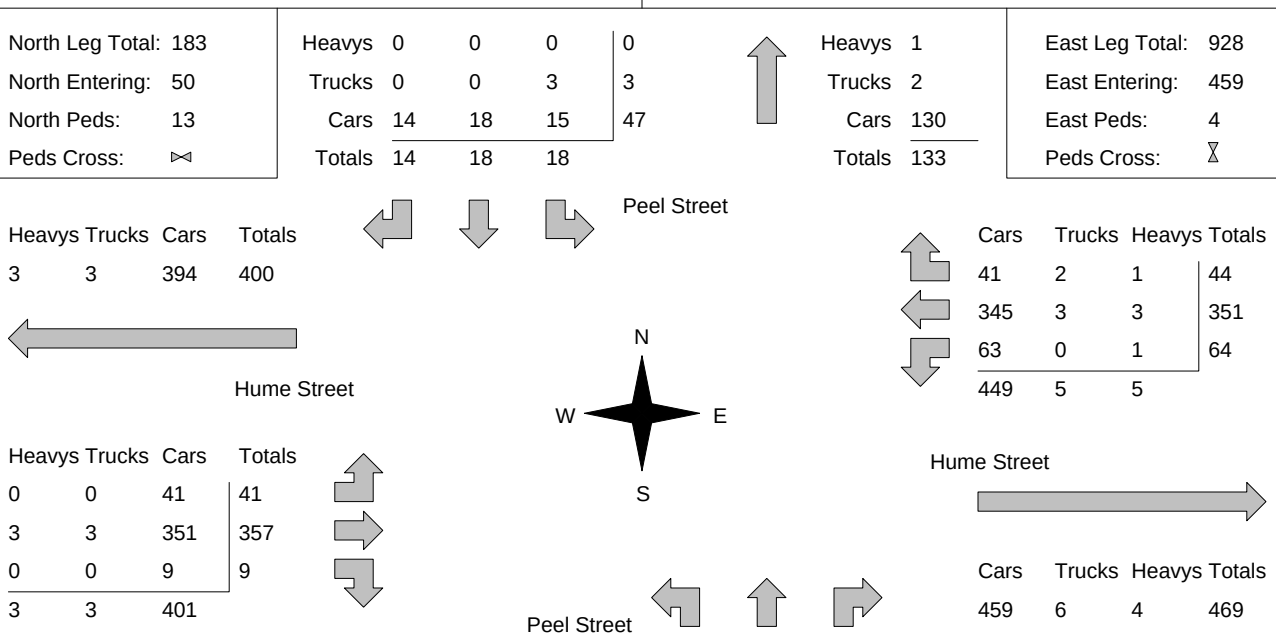
Municipality: Collingwood
Site #: 0000003602
Intersection: Hume Street & Peel Street
TFR File #: 1
Count date: 27-May-2025

Weather conditions:
Clear

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hume Street runs W/E



Comments

Peel Street & Hume Street

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 16:15:00
To: 17:15:00

Municipality: Collingwood
Site #: 0000003602
Intersection: Hume Street & Peel Street
TFR File #: 1
Count date: 27-May-2025

Weather conditions:
Clear

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hume Street runs W/E

North Leg Total: 192
North Entering: 109
North Peds: 7
Peds Cross: ⋈

Heavys	0	0	0	0
Trucks	0	1	0	1
Cars	38	35	35	108
Totals	38	36	35	

Heavys	1
Trucks	1
Cars	81
Totals	83

East Leg Total: 1040
East Entering: 524
East Peds: 2
Peds Cross: ⧖

Peel Street

Heavys	Trucks	Cars	Totals
2	2	514	518

Cars	Trucks	Heavys	Totals
18	1	1	20
446	2	2	450
53	1	0	54
517	4	3	

Hume Street

N
W E
S

Heavys	Trucks	Cars	Totals
0	0	39	39
5	4	409	418
0	0	43	43
5	4	491	

Hume Street

Cars	Trucks	Heavys	Totals
506	5	5	516

Peel Street

Peds Cross: ⧖
West Peds: 5
West Entering: 500
West Leg Total: 1018

Cars	131
Trucks	2
Heavys	0
Totals	133

Cars	30	24	62	116
Trucks	0	0	1	1
Heavys	0	0	0	0
Totals	30	24	63	

Peds Cross: ⋈
South Peds: 4
South Entering: 117
South Leg Total: 250

Comments

Peel Street & Hume Street

Total Count Diagram

Municipality: Collingwood
Site #: 0000003602
Intersection: Hume Street & Peel Street
TFR File #: 1
Count date: 27-May-2025

Weather conditions:
Clear

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hume Street runs W/E

North Leg Total:	1038			
North Entering:	484			
North Peds:	75			
Peds Cross:	⋈			

Heavys	0	1	5	6
Trucks	0	1	5	6
Cars	164	146	162	472
Totals	164	148	172	

Heavys	10			
Trucks	5			
Cars	539			
Totals	554			

East Leg Total:	5294			
East Entering:	2666			
East Peds:	15			
Peds Cross:	⧖			

Peel Street

Heavys	Trucks	Cars	Totals
13	25	2517	2555

Cars	Trucks	Heavys	Totals
149	4	8	161
2182	23	13	2218
278	4	5	287
2609	31	26	

Hume Street

N
W E
S

Heavys	Trucks	Cars	Totals
0	0	203	203
30	25	2001	2056
0	0	142	142
30	25	2346	

Hume Street

Cars	Trucks	Heavys	Totals
2556	34	38	2628

Peel Street

Peds Cross:	⧖			
West Peds:	50			
West Entering:	2401			
West Leg Total:	4956			

Cars	566			
Trucks	5			
Heavys	6			
Totals	577			

Cars	171	187	393	751
Trucks	2	1	4	7
Heavys	0	2	3	5
Totals	173	190	400	

Peds Cross:	⋈			
South Peds:	28			
South Entering:	763			
South Leg Total:	1340			

Comments

Peel Street & Hume Street
Traffic Count Summary

Intersection: Hume Street & Peel Street | **Count Date:** 27-May-2025 | **Municipality:** Collingwood

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	15	8	8	31	4	163
9:00:00	26	20	21	67	20	225
10:00:00	18	17	22	57	5	183
15:00:00	0	0	0	0	0	0
16:00:00	35	33	33	101	30	220
17:00:00	48	30	39	117	8	226
18:00:00	30	40	41	111	8	230
Totals:	172	148	164	484	75	1247

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	19	35	78	132	2
9:00:00	43	40	75	158	9
10:00:00	26	29	71	126	2
15:00:00	0	0	0	0	0
16:00:00	24	33	62	119	3
17:00:00	27	21	61	109	6
18:00:00	34	32	53	119	6
Totals:	173	190	400	763	28

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	53	233	15	301	2	613
9:00:00	52	363	58	473	5	834
10:00:00	35	380	27	442	2	789
15:00:00	0	0	0	0	0	0
16:00:00	54	418	29	501	4	967
17:00:00	42	446	20	508	2	996
18:00:00	51	378	12	441	0	868
Totals:	287	2218	161	2666	15	5067

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	36	271	5	312	5
9:00:00	34	315	12	361	17
10:00:00	30	304	13	347	6
15:00:00	0	0	0	0	0
16:00:00	36	398	32	466	14
17:00:00	38	413	37	488	5
18:00:00	29	355	43	427	3
Totals:	203	2056	142	2401	50

Calculated Values for Traffic Crossing Major Street

Hours Ending:	7:00	8:00	9:00	10:00	15:00	16:00	17:00	18:00
Crossing Values:	0	76	131	81	0	110	112	107

Collins Street & Hurontario Street

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 7:45:00
To: 8:45:00

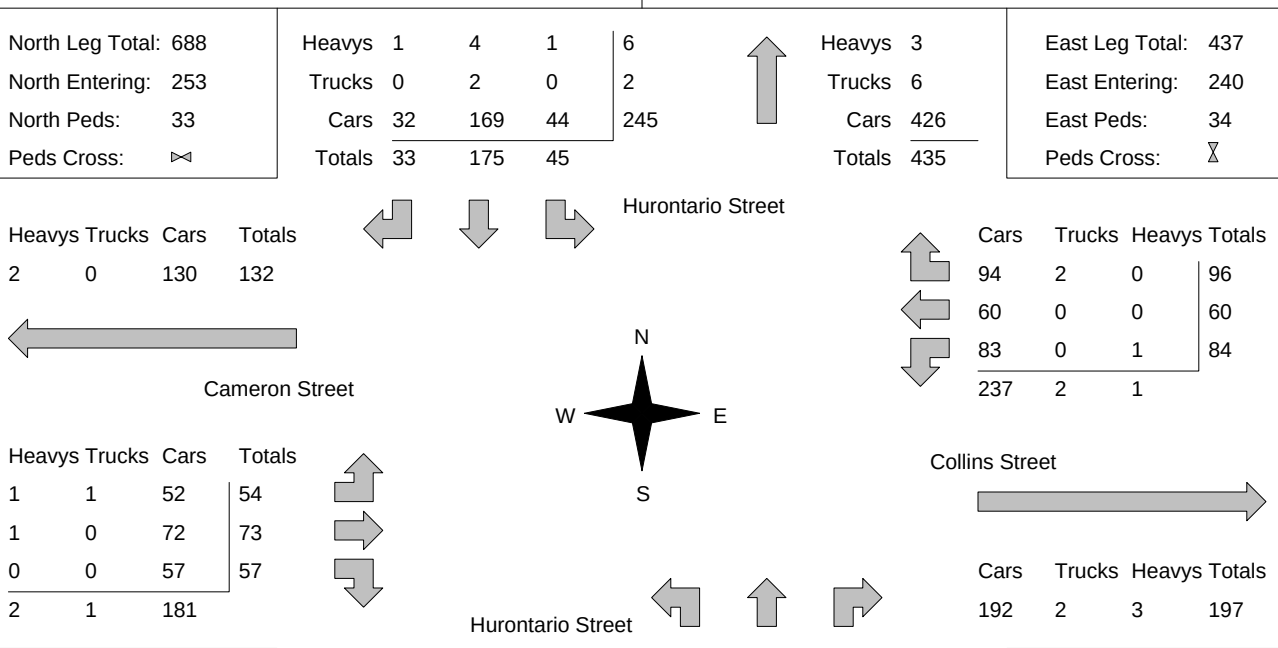
Municipality: Collingwood
Site #: 0000003603
Intersection: Hurontario Street & Collins Street
TFR File #: 1
Count date: 27-May-2025

Weather conditions:
Clear

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hurontario Street runs N/S



Comments

Collins Street & Hurontario Street

Afternoon Peak Diagram

Specified Period
From: 15:00:00
To: 18:00:00

One Hour Peak
From: 15:30:00
To: 16:30:00

Municipality: Collingwood
Site #: 0000003603
Intersection: Hurontario Street & Collins Street
TFR File #: 1
Count date: 27-May-2025

Weather conditions:
Clear

Person(s) who counted:

**** Signalized Intersection ****

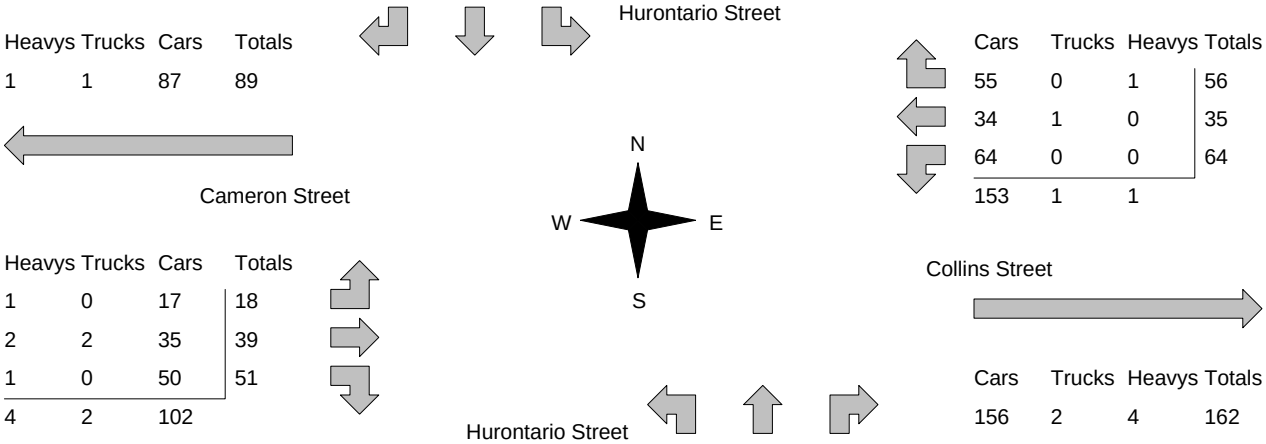
Major Road: Hurontario Street runs N/S

North Leg Total: 898
North Entering: 429
North Peds: 12
Peds Cross: ⋈

Heavys	0	5	0	5
Trucks	0	5	0	5
Cars	19	353	47	419
Totals	19	363	47	

Heavys	5
Trucks	0
Cars	464
Totals	469

East Leg Total: 317
East Entering: 155
East Peds: 8
Peds Cross: ⧖



Peds Cross: ⧖
West Peds: 20
West Entering: 108
West Leg Total: 197

Cars	467			
Trucks	5			
Heavys	6			
Totals	478			

Cars	34	392	74	500
Trucks	0	0	0	0
Heavys	1	3	2	6
Totals	35	395	76	

Peds Cross: ⋈
South Peds: 16
South Entering: 506
South Leg Total: 984

Comments

Collins Street & Hurontario Street

Total Count Diagram

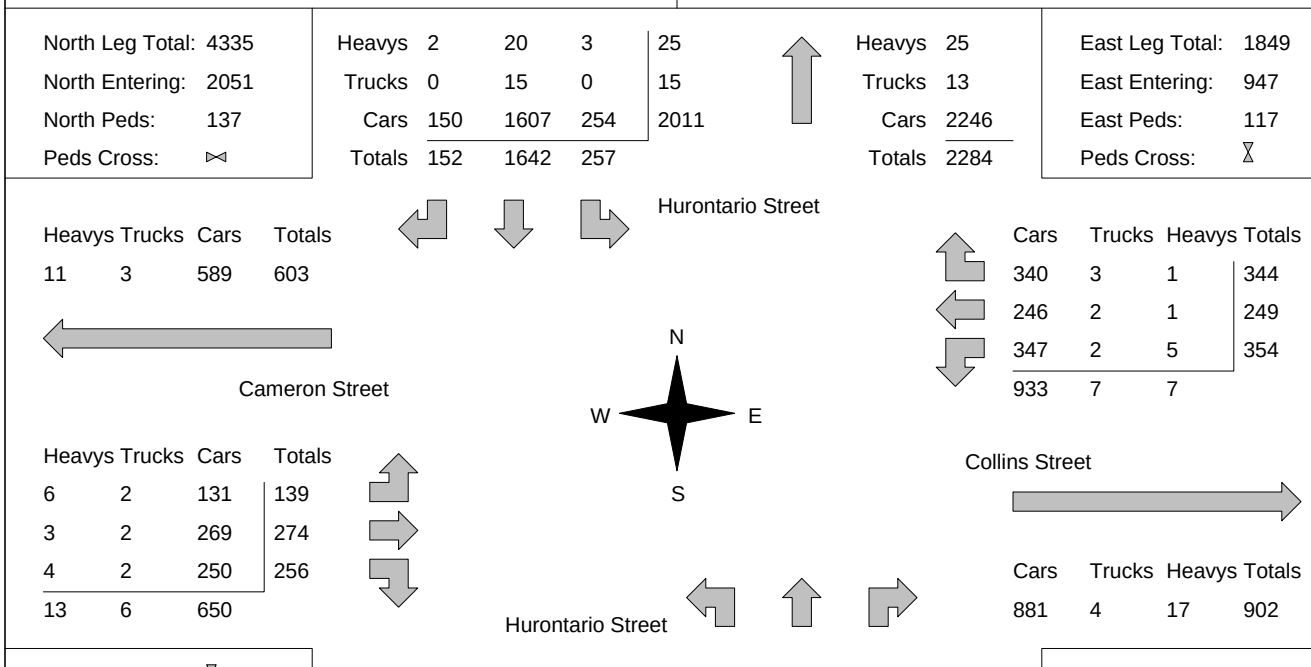
Municipality: Collingwood
Site #: 0000003603
Intersection: Hurontario Street & Collins Street
TFR File #: 1
Count date: 27-May-2025

Weather conditions:
Clear

Person(s) who counted:

**** Signalized Intersection ****

Major Road: Hurontario Street runs N/S



Comments

Collins Street & Hurontario Street
Traffic Count Summary

Intersection: Hurontario Street & Collins Street | **Count Date:** 27-May-2025 | **Municipality:** Collingwood

North Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	North/South Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	32	135	31	198	21	457
9:00:00	46	171	26	243	29	687
10:00:00	35	210	18	263	31	655
15:00:00	0	0	0	0	0	0
16:00:00	40	338	31	409	27	850
17:00:00	46	387	25	458	20	908
18:00:00	58	401	21	480	9	868
Totals:	257	1642	152	2051	137	4425

South Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	41	157	61	259	39
9:00:00	42	326	76	444	22
10:00:00	24	320	48	392	50
15:00:00	0	0	0	0	0
16:00:00	38	348	55	441	11
17:00:00	26	354	70	450	10
18:00:00	31	296	61	388	11
Totals:	202	1801	371	2374	143

East Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds	East/West Total Approaches
7:00:00	0	0	0	0	0	0
8:00:00	63	53	60	176	29	306
9:00:00	74	54	89	217	13	366
10:00:00	55	30	68	153	49	256
15:00:00	0	0	0	0	0	0
16:00:00	57	37	44	138	10	248
17:00:00	55	39	48	142	7	244
18:00:00	50	36	35	121	9	196
Totals:	354	249	344	947	117	1616

West Approach Totals

Hour Ending	Includes Cars, Trucks, & Heavys: Left	Thru	Right	Grand Total	Total Peds
7:00:00	0	0	0	0	0
8:00:00	34	55	41	130	35
9:00:00	34	65	50	149	15
10:00:00	26	43	34	103	27
15:00:00	0	0	0	0	0
16:00:00	27	36	47	110	29
17:00:00	12	43	47	102	18
18:00:00	6	32	37	75	7
Totals:	139	274	256	669	131

Calculated Values for Traffic Crossing Major Street

Hours Ending:	7:00	8:00	9:00	10:00	15:00	16:00	17:00	18:00
Crossing Values:	0	212	224	205	0	159	140	112

INTERSECTION COUNT
AM PEAK HOUR

GENERAL INFORMATION				
Surveyor Name	Delaney Martin	Jurisdiction/Date	Town of Collingwood	June 4 2025
Weather Conditions	Clear	Major Street	Peel Street	N-S
Project Name	151 Peel Street	Minor Street	McKean Crescent	E-W
Project Number	425052	Intersection Control	stop control on minor street	

Additional Comments

Total Vehicles	6
% Trucks Entering	0.0%
Vehicles Entering	2
Pedestrians	0
Ped Crossing	↔
NORTH LEG	

Peel Street

TOTAL	2	0
Heavy Trucks	0	0
Light Trucks	0	0
Autos	2	0

4	TOTAL
0	Heavy Trucks
0	Light Trucks
4	Autos

Total	Heavy Trucks	Light Trucks	Autos
2	0	0	2

NORTH

McKean Crescent

4	0	0	4
0	0	0	0
TOTAL	Heavy Trucks	Light Trucks	Autos

Autos	0
Light Trucks	0
Heavy Trucks	0
TOTAL	0

0	0	Autos
0	0	Light Trucks
0	0	Heavy Trucks
0	0	TOTAL

Peel Street

WEST LEG	
Ped Crossing	↕
Pedestrians	0
Vehicles Entering	4
% Trucks Entering	0.0%
Total Vehicles	6

SOUTH LEG	
Ped Crossing	↔
Pedestrians	0
Vehicles Entering	0
% Trucks Entering	-
Total Vehicles	0

7:30 to **8:30**

INTERSECTION COUNT
PM PEAK HOUR

GENERAL INFORMATION

Surveyor Name	Delaney Martin	Jurisdiction/Date	Town of Collingwood	June 4 2025
Weather Conditions	Clear	Major Street	Peel Street	N-S
Project Name	151 Peel Street	Minor Street	McKean Crescent	E-W
Project Number	425052	Intersection Control	stop control on minor street	

Additional Comments

Total Vehicles	17
% Trucks Entering	0.0%
Vehicles Entering	8
Pedestrians	0
Ped Crossing	↔

NORTH LEG

Peel Street

TOTAL	8	0
Heavy Trucks	0	0
Light Trucks	0	0
Autos	8	0

9	TOTAL
0	Heavy Trucks
0	Light Trucks
9	Autos

Total	Heavy Trucks	Light Trucks	Autos
8	0	0	8

NORTH

McKean Crescent

9	0	0	9
0	0	0	0
TOTAL	Heavy Trucks	Light Trucks	Autos

Autos	0
Light Trucks	0
Heavy Trucks	0
TOTAL	0

0	0	Autos
0	0	Light Trucks
0	0	Heavy Trucks
0	0	TOTAL

Peel Street

WEST LEG	
Ped Crossing	↕
Pedestrians	0
Vehicles Entering	9
% Trucks Entering	0.0%
Total Vehicles	17

SOUTH LEG	
Ped Crossing	↔
Pedestrians	0
Vehicles Entering	0
% Trucks Entering	-
Total Vehicles	0

16:15 to **17:15**

Appendix C:
LOS 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

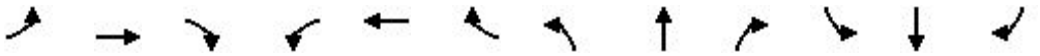
Level of Service (LOS) for signalized intersections is defined in terms of delay, which is made up of a number of factors that relate to control, geometrics, traffic and incidents. Only the portion of total delay attributed to the control facility is quantified. This control delay includes initial deceleration,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

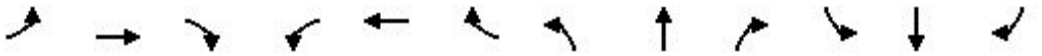
Appendix D:
Traffic Operations – Existing



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	80	2	8	0	6	7	23	22	0	1	3	85
Future Volume (vph)	80	2	8	0	6	7	23	22	0	1	3	85
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	116	3	12	0	9	10	33	32	0	1	4	123

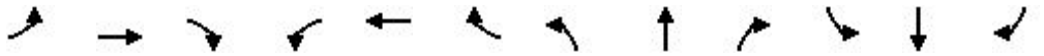
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	131	19	65	128
Volume Left (vph)	116	0	33	1
Volume Right (vph)	12	10	0	123
Hadj (s)	0.16	-0.28	0.14	-0.54
Departure Headway (s)	4.5	4.2	4.5	3.8
Degree Utilization, x	0.16	0.02	0.08	0.13
Capacity (veh/h)	769	802	760	911
Control Delay (s)	8.4	7.3	7.9	7.4
Approach Delay (s)	8.4	7.3	7.9	7.4
Approach LOS	A	A	A	A

Intersection Summary				
Delay	7.8			
Level of Service	A			
Intersection Capacity Utilization	27.5%	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)	54	73	57	84	60	96	39	285	79	45	175	33
Future Volume (vph)	54	73	57	84	60	96	39	285	79	45	175	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.91		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1760		1789	1710		1772	1822		1789	1836	
Flt Permitted	0.56	1.00		0.59	1.00		0.60	1.00		0.42	1.00	
Satd. Flow (perm)	1055	1760		1118	1710		1113	1822		782	1836	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	63	85	66	98	70	112	45	331	92	52	203	38
RTOR Reduction (vph)	0	30	0	0	60	0	0	8	0	0	5	0
Lane Group Flow (vph)	63	121	0	98	122	0	45	415	0	52	236	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	3%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	18.4	12.2		19.6	12.8		44.3	40.5		44.5	40.6	
Effective Green, g (s)	18.4	12.2		19.6	12.8		44.3	40.5		44.5	40.6	
Actuated g/C Ratio	0.22	0.14		0.23	0.15		0.52	0.47		0.52	0.48	
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	1.0		3.0	1.0	
Lane Grp Cap (vph)	280	251		310	256		606	864		453	872	
v/s Ratio Prot	0.02	0.07		c0.03	c0.07		0.00	c0.23		c0.01	0.13	
v/s Ratio Perm	0.03			0.05			0.04			0.05		
v/c Ratio	0.23	0.48		0.32	0.48		0.07	0.48		0.11	0.27	
Uniform Delay, d1	27.3	33.7		26.8	33.2		10.2	15.3		10.5	13.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	2.0		0.6	1.9		0.1	1.9		0.1	0.8	
Delay (s)	27.7	35.7		27.4	35.1		10.2	17.2		10.6	14.2	
Level of Service	C	D		C	D		B	B		B	B	
Approach Delay (s)		33.3			32.4			16.5			13.6	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	85.4	Sum of lost time (s)	22.0
Intersection Capacity Utilization	56.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



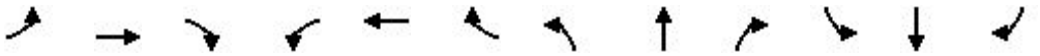
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	41	357	9	64	351	44	35	48	94	18	18	14
Future Volume (vph)	41	357	9	64	351	44	35	48	94	18	18	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		5.4	5.4		5.4	5.4	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.98		1.00	0.90		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1877		1789	1852		1789	1697		1783	1761	
Flt Permitted	0.47	1.00		0.45	1.00		0.73	1.00		0.65	1.00	
Satd. Flow (perm)	881	1877		844	1852		1381	1697		1225	1761	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	48	415	10	74	408	51	41	56	109	21	21	16
RTOR Reduction (vph)	0	1	0	0	5	0	0	93	0	0	14	0
Lane Group Flow (vph)	48	424	0	74	454	0	41	72	0	21	23	0
Confl. Peds. (#/hr)										3		
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	32.0	29.4		34.6	30.7		8.1	8.1		8.1	8.1	
Effective Green, g (s)	32.0	29.4		34.6	30.7		8.1	8.1		8.1	8.1	
Actuated g/C Ratio	0.57	0.52		0.61	0.54		0.14	0.14		0.14	0.14	
Clearance Time (s)	4.0	5.7		4.0	5.7		5.4	5.4		5.4	5.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	540	976		582	1006		197	243		175	252	
v/s Ratio Prot	0.00	0.23		c0.01	c0.25			c0.04			0.01	
v/s Ratio Perm	0.05			0.07			0.03			0.02		
v/c Ratio	0.09	0.43		0.13	0.45		0.21	0.29		0.12	0.09	
Uniform Delay, d1	5.5	8.4		4.6	7.8		21.4	21.6		21.1	21.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	1.4		0.1	1.5		0.5	0.7		0.3	0.2	
Delay (s)	5.6	9.8		4.7	9.3		21.9	22.3		21.4	21.2	
Level of Service	A	A		A	A		C	C		C	C	
Approach Delay (s)		9.4			8.6			22.2			21.3	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	56.5	Sum of lost time (s)	15.1
Intersection Capacity Utilization	54.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	0	0	41	9	2
Future Volume (Veh/h)	4	0	0	41	9	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	0	0	45	10	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	56	11	12			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	56	11	12			
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)	952	1070	1607			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	4	45	12
Volume Left	4	0	0
Volume Right	0	0	2
cSH	952	1607	1700
Volume to Capacity	0.00	0.00	0.01
Queue Length 95th (m)	0.1	0.0	0.0
Control Delay (s)	8.8	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.8	0.0	0.0
Approach LOS	A		

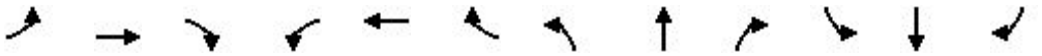
Intersection Summary			
Average Delay	0.6		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	44	8	25	0	8	7	12	28	0	10	22	50
Future Volume (vph)	44	8	25	0	8	7	12	28	0	10	22	50
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	49	9	28	0	9	8	13	31	0	11	24	56

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	86	17	44	91
Volume Left (vph)	49	0	13	11
Volume Right (vph)	28	8	0	56
Hadj (s)	-0.05	-0.22	0.09	-0.31
Departure Headway (s)	4.2	4.0	4.3	3.9
Degree Utilization, x	0.10	0.02	0.05	0.10
Capacity (veh/h)	837	851	804	904
Control Delay (s)	7.6	7.1	7.5	7.3
Approach Delay (s)	7.6	7.1	7.5	7.3
Approach LOS	A	A	A	A

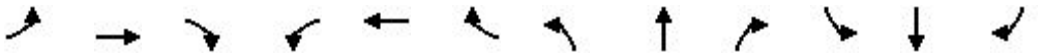
Intersection Summary				
Delay	7.4			
Level of Service	A			
Intersection Capacity Utilization	22.9%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	18	39	51	64	35	56	35	395	76	47	363	19
Future Volume (vph)	18	39	51	64	35	56	35	395	76	47	363	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.91		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1723		1789	1710		1789	1838		1789	1869	
Flt Permitted	0.69	1.00		0.49	1.00		0.46	1.00		0.37	1.00	
Satd. Flow (perm)	1309	1723		927	1710		863	1838		704	1869	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	19	41	54	67	37	59	37	416	80	49	382	20
RTOR Reduction (vph)	0	48	0	0	50	0	0	5	0	0	1	0
Lane Group Flow (vph)	19	47	0	67	46	0	37	491	0	49	401	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	11.7	9.2		19.3	13.0		47.5	43.9		47.9	44.1	
Effective Green, g (s)	11.7	9.2		19.3	13.0		47.5	43.9		47.9	44.1	
Actuated g/C Ratio	0.14	0.11		0.23	0.15		0.56	0.52		0.56	0.52	
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	1.0		3.0	1.0	
Lane Grp Cap (vph)	193	186		273	260		520	947		444	967	
v/s Ratio Prot	0.00	0.03		c0.02	0.03		0.00	c0.27		c0.00	0.21	
v/s Ratio Perm	0.01			c0.04			0.04			0.06		
v/c Ratio	0.10	0.25		0.25	0.18		0.07	0.52		0.11	0.41	
Uniform Delay, d1	32.0	34.8		26.6	31.4		8.7	13.7		9.0	12.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	1.0		0.5	0.4		0.1	2.0		0.1	1.3	
Delay (s)	32.3	35.8		27.0	31.9		8.8	15.7		9.1	13.9	
Level of Service	C	D		C	C		A	B		A	B	
Approach Delay (s)		35.2			29.9			15.2			13.4	
Approach LOS		D			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	85.2	Sum of lost time (s)	22.0
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)	39	418	43	54	450	20	30	24	63	35	36	38
Future Volume (vph)	39	418	43	54	450	20	30	24	63	35	36	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.89		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1857		1789	1872		1789	1680		1789	1739	
Flt Permitted	0.25	1.00		0.22	1.00		0.70	1.00		0.69	1.00	
Satd. Flow (perm)	477	1857		421	1872		1325	1680		1308	1739	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	43	464	48	60	500	22	33	27	70	39	40	42
RTOR Reduction (vph)	0	7	0	0	3	0	0	45	0	0	27	0
Lane Group Flow (vph)	43	505	0	60	519	0	33	52	0	39	55	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	21.0	19.2		22.8	20.1		19.6	19.6		19.6	19.6	
Effective Green, g (s)	21.0	19.2		22.8	20.1		19.6	19.6		19.6	19.6	
Actuated g/C Ratio	0.38	0.35		0.41	0.37		0.36	0.36		0.36	0.36	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	225	648		241	684		472	598		466	619	
v/s Ratio Prot	0.01	0.27		c0.01	c0.28			0.03			c0.03	
v/s Ratio Perm	0.07			0.09			0.02			0.03		
v/c Ratio	0.19	0.78		0.25	0.76		0.07	0.09		0.08	0.09	
Uniform Delay, d1	11.5	16.0		10.9	15.3		11.7	11.8		11.7	11.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	6.1		0.5	4.9		0.3	0.3		0.4	0.3	
Delay (s)	11.9	22.1		11.4	20.2		12.0	12.0		12.1	12.0	
Level of Service	B	C		B	C		B	B		B	B	
Approach Delay (s)		21.3			19.3			12.0			12.1	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	55.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	48.9%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	9	0	0	31	39	8
Future Volume (Veh/h)	9	0	0	31	39	8
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	0	0	34	42	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	80	46	51			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	80	46	51			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	922	1023	1555			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	10	34	51
Volume Left	10	0	0
Volume Right	0	0	9
cSH	922	1555	1700
Volume to Capacity	0.01	0.00	0.03
Queue Length 95th (m)	0.2	0.0	0.0
Control Delay (s)	8.9	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.9	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix E:
Background Developments

TRAFFIC IMPACT STUDY

INDIGO2
EDEN OAK (RAGLAN) INC.
TOWN OF COLLINGWOOD

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
1 FIRST STREET
COLLINGWOOD, ONTARIO
L9Y 4R3

DECEMBER 2021

CFCA FILE NO. 2142-6059

CROZIER
CONSULTING ENGINEERS

Identification	Date	Description of Work
Rev. 0	December 2021	First Submission to the Town and the County

1 EXECUTIVE SUMMARY

C.F. Crozier & Associates Inc. (Crozier) was retained by Eden Oak (Raglan) Inc. (the Client) to prepare a Traffic Impact Study (TIS) in support of the Zoning By-law Amendment and Draft Plan of Subdivision for a residential development, IndigO2, located at 452 Raglan Street (the Site) in the Town of Collingwood (the Town).

The Draft Plan proposes 21 single detached units and 107 townhouse units. The site includes four roadways to serve the site which will connect to the existing boundary road network through Kirby Avenue, Peel Street and Williams Street.

The analysis contained within this report was completed based on a previous version of the Draft Plan which proposed 21 single detached units and 98 townhouse units. The trip generation described herein is understated by 5 and 7 two-way trips in the a.m. and p.m. peak hours, respectively. As such, the findings and conclusions contained within this report remain valid when considering the final Draft Plan dated November 16, 2021.

It is anticipated that the proposed development will be completed by 2024. Accordingly, the horizon years of 2024 and 2029 have been analyzed, representing the build out year and 5 years beyond full build out.

To be consistent with the Town's 2019 Transportation Study Update, a growth rate of 0.5 percent was used on all roadways to establish the base future background traffic volumes. Background developments, in close proximity to the site, were also included in the analysis.

The detailed analysis contained within this report has resulted in the following key findings:

- Under existing conditions, the study intersections are operating at a Level of Service (LOS) "C" or better, with excess capacity for growth. This analysis took into consideration the completion of the left-turn lane on Poplar Sideroad at Portland Street and the realignment of Tracey Lane/Findlay Drive at Hurontario Street.

- Under 2029 future background conditions, the intersections of Tracey Lane/Findlay Drive and Hurontario Street, Poplar Sideroad and Portland Street, and Collins Street and Peel Street are expected to operate at a LOS "C" or better; LOS of "E" or better; and LOS of "A", respectively.

- The proposed development is expected to generate 67 and 81 trips in the weekday a.m. and p.m. peak hours, respectively. As noted, this trip generation was based on a previous version of the site plan and is understated by 5 and 7 two-way trips in the a.m. and p.m. peak hours, respectively. As such, the findings and conclusions contained within this report remain valid when considering the final Draft Plan prepared by MHBC Consulting, dated November 16, 2021.

- The proposed development will result in additional traffic volumes to local roads north and west of the site. The addition of traffic volumes on Collins Street is forecasted to be 17vehicles or less. The addition of traffic volumes on Peel Street is forecasted to be 19 vehicles or less. The intersections of Collins Street and Hurontario Street, as well as Peel Street and Hume Street are signalized and can support additional traffic volumes.

- Under the 2029 future total traffic volume conditions, the study intersections do not warrant signalization. The analysis followed the procedures specified in Chapter 4 of the "Ontario

Traffic Manual – Book 12", March 2012 for Justifications 1 (Minimum Vehicle Volume), 2 (Delay to Cross Traffic) and 3 (Volume/Delay Combination). The future total peak hour volumes were assigned to the 8-hours based on the percentage of the peak hour traffic volumes established from the existing 8-hour traffic data.

- Under 2029 future total conditions, the intersections of Tracey Lane/Findlay Drive and Hurontario Street, Poplar Sideroad and Portland Street, and Collins Street and Peel Street are expected to operate at a LOS "C; LOS of "E" or better; and LOS of "A", respectively.
    - The addition of the site generated traffic at the intersections of Poplar Sideroad and Portland Street is expected to result in a maximum increase in the control delay of 6.6 s and a maximum increase in volume-to-capacity ratio of 0.08, associated with the southbound approach, when compared to the future background traffic operations.
- Sidewalks will be provided throughout the site, tying into the existing infrastructure on Williams Street, Peel Street and Kirby Avenue, and provide connectivity to the Rail Trail. Internal intersection traffic control and crosswalks will be reviewed through detailed design.

It is concluded that the traffic generated by the proposed development can be accommodated by the boundary road network.

The analysis described herein was prepared using a previous version of the Draft Plan. The findings and conclusions contained within this report remain valid when considering the final Draft Plan, as prepared by MHBC Planning dated November 16, 2021. Any minor changes to the Plan will not materially impact the conclusions of this report.

The proposed Zoning By-law Amendment and Draft Plan of Subdivision Applications can be supported from a traffic operations perspective.

Table 7: 2029 Future Background Level of Service

Intersection	Control	Peak Hour	Level of Service[1]	Control Delay	Maximum v/c ratio[2]
Tracey Lane/Findlay Drive and Hurontario Street	Stop (Two-way)	A.M.	B	14.9 s (EB)	0.16 (WB)
		P.M.	C	16.6 s (EB)	0.17 (EB & WB)
Poplar Sideroad and Portland Street	Stop (T)	A.M.	C	21.6 s	0.46 (SB)
		P.M.	E	35.8 s	0.57 (SB)
Collins Street and Peel Street	Stop (Four-way)	A.M.	A	7.5 s	0.09 (EB)
		P.M.	A	8.0 s	0.16 (SB)

Note[1]: The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor road approach.

Note[2]: The maximum v/c ratio for two-way stop-controlled intersections represents the maximum v/c for the minor road approach movements at the intersection.

The intersection of Tracey Lane/Findlay Drive and Hurontario Street is expected to operate with a LOS "C" or better under 2029 future background traffic volume conditions. The maximum control delay of 16.6 s and maximum volume-to-capacity ratio of 0.17 (EB) indicates that the intersection has reserve capacity for increases in traffic volumes.

The intersection of Poplar Sideroad and Portland Street is expected to operate with a LOS "E" or better under 2029 future background traffic volume conditions. The maximum control delay of 35.8 s and maximum volume-to-capacity ratio of 0.57 (SB) indicates that the intersection is expected to operate acceptably with reserve capacity for increases in traffic volumes.

The intersection of Collins Street and Peel Street is expected to operate with a LOS "A" or better under 2029 future background traffic volume conditions. The maximum control delay of 8.0 s (EB) and maximum volume-to-capacity ratio of 0.16 (SB) indicates that the intersection is expected to operate well with reserve capacity for increases in traffic volumes.

5 SITE GENERATED TRAFFIC

5.1 Trip Generation

The proposed site will result in additional vehicles on the boundary road network that previously did not exist.

As noted previously, the following trip generation calculations were based on a previous version of the Draft Plan, which proposed 98 townhouse units. The final Draft Plan contains 107 townhouse units. This results in a forecasted trip generation that is understated by 5 and 7 two-way trips in the a.m. and p.m. peak hours, respectively. As such, the findings and conclusions contained within this report remain valid when considering the final Draft Plan prepared by MHBC Consulting, dated November 16, 2021.

The trip generation of the residential development was forecasted using the fitted curve equations provided in the ITE Trip Generation Manual, 10th Edition under the Land Use Category 220 "Multifamily Housing (Low-Rise)" and 210 "Single-Family Detached Housing". Relevant excerpts have been included as **Appendix J**. The forecasted trips are summarized in **Table 8**.

Table 8: ITE Trip Generation

Land Use	Peak Hour	Number of Trips		
		Inbound	Outbound	Total
LUC: 210 Single-Family Detached Housing (21 Units)	Weekday A.M.	5	15	20
	Weekday P.M.	14	9	23
LUC 220: Multifamily Housing (Low-Rise) (98 Units)	Weekday A.M.	11	36	47
	Weekday P.M.	37	21	58
TOTAL	**Weekday A.M.**	**16**	**51**	**67**
	Weekday P.M.	**51**	**30**	**81**

5.2 Trip Distribution and Assignment

The Jones Consulting Group Ltd. completed a Traffic Impact Study (August 2004) for the lands formerly known as the Hughes Development, which encompassed the Riverside developments and the now built Lockhart Meadows residential development. The trips generated by the proposed development were distributed to the boundary road network based on the trip distribution described in the Hughes Development TIS. This trip distribution was found to be consistent with the distribution utilized in the original Eden Oak TIS, and thus was used for this analysis.

- 30% via Hurontario Street northbound to/from the downtown core
  - 10% at Tracey Lane
  - 20% at Collin Street
- 24% via Hume Street westbound to/from the downtown core
- 26% via Poplar Sideroad eastbound to/from Wasaga Beach
- 20% via Poplar Sideroad westbound to/from the Town of the Blue Mountains and Nottawa

It is acknowledged that the site has two connections to Collins Street through Williams Street and Peel Street. For the purpose of this assessment, the accesses were consolidated to review the impacts of the site generated traffic at the intersection of Peel Street and Collins Street. As described in **Section 6.3**, the intersection of Peel Street and Collins Street is anticipated to operate with a LOS "A" under 2029 future total traffic volume conditions. Accordingly, the redistribution of the inbound and outbound trips between the two access points is expected to have a minimal impact on the operations of the boundary road network.

The trips generated by the proposed development were assigned to the boundary road network per the distributions illustrated in **Figure 17**. The corresponding trip assignment is illustrated in **Figure 18**.

- Under 2029 future total conditions, the intersections of Tracey Lane/Finlay Drive and Hurontario Street, Poplar Sideroad and Portland Street, and Collins Street and Peel Street are expected to operate at a LOS "C"; LOS of "E" or better; and LOS of "A", respectively.
    - The addition of the site generated traffic at the intersections of Poplar Sideroad and Portland Street is expected to result in a maximum increase in the control delay of 6.6 s and a maximum increase in volume-to-capacity ratio of 0.08, associated with the southbound approach, when compared to the future background traffic operations.
- Sidewalks will be provided throughout the site, tying into the existing infrastructure on Williams Street, Peel Street and Kirby Avenue, and provide connectivity to the Rail Trail. Internal intersection traffic control and crosswalks will be reviewed through detailed design.

It is concluded that the traffic generated by the proposed development can be accommodated by the boundary road network.

The analysis described herein was prepared using a previous version of the Draft Plan. The findings and conclusions contained within this report remain valid when considering the final Draft Plan, as prepared by MHBC Planning dated November 16, 2021. Any minor changes to the Plan will not materially impact the conclusions of this report.

The proposed Zoning By-law Amendment and Draft Plan of Subdivision Applications can be supported from a traffic operations perspective.

C.F. CROZIER & ASSOCIATES INC.

LICENSED PROFESSIONAL ENGINEER
M. N. FERGUSON
1000505162
PROVINCE OF ONTARIO

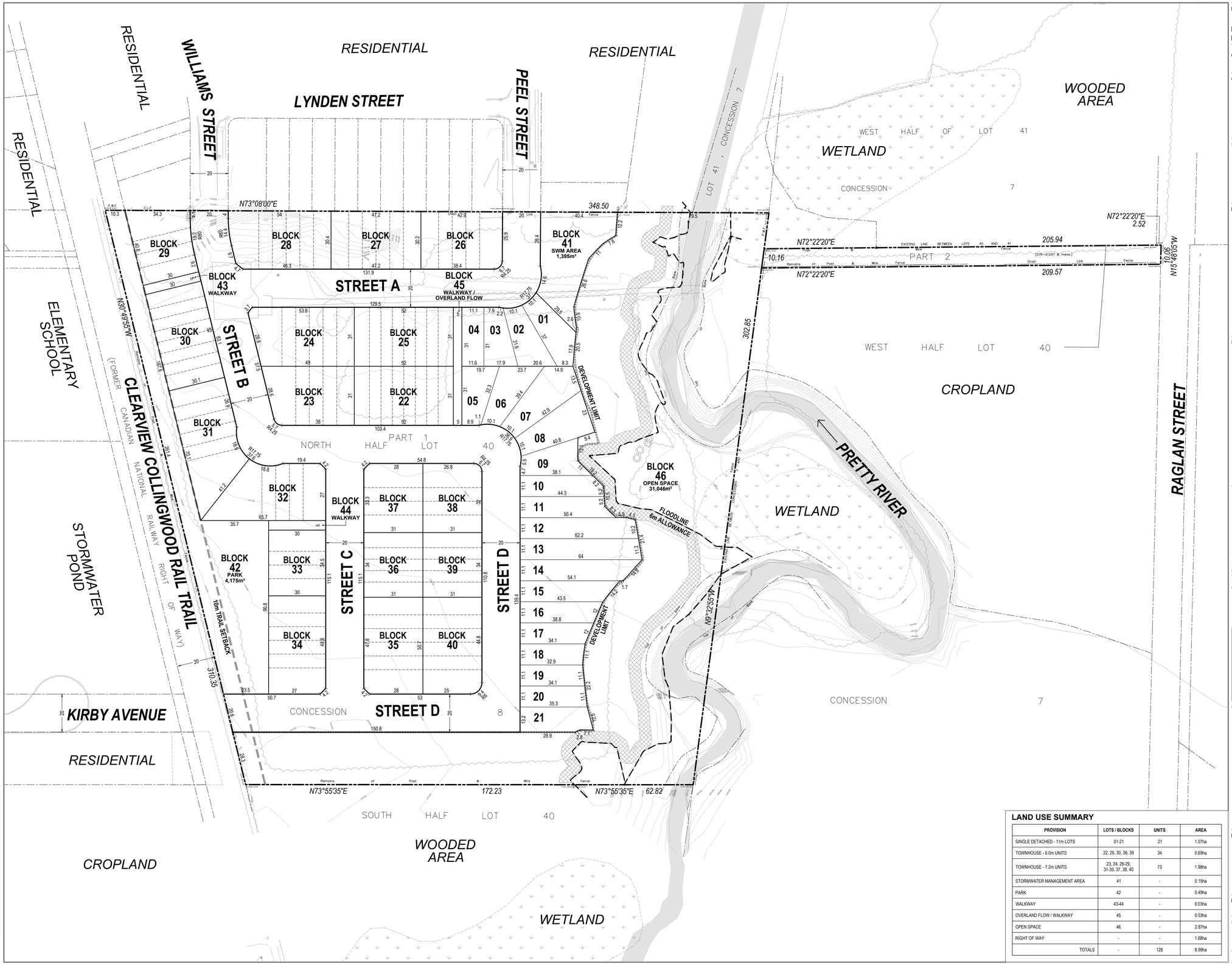
Madeleine Ferguson, P.Eng.
Manager of Transportation

C.F. CROZIER & ASSOCIATES INC.

Emma Howlett, EIT
Engineering Intern, Transportation

MF/eh

J:\200\218 - Eden Oak\5833-452 Raglan St\Reports\Traffic\5833_TIS (December 2021).docx



LEGAL DESCRIPTION

PART OF LOT 40,
IN CONCESSION SEVEN AND EIGHT
TOWNSHIP OF NOTTAWASAGA
COUNTY OF SIMCOE

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.

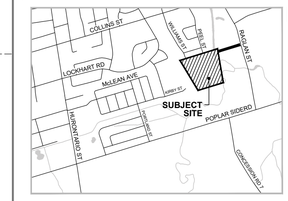
DATE: _____ _____
XXXXXXXXXXXXX - PRESIDENT
XXXXXXXXXXXXXX

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED ON THIS PLAN AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

DATE: _____ _____
XXXXXXXXXXXXX - O.L.S.
XXXXXXXXXXXXXX

KEY PLAN



Subject Site

NORTH

SCALE
0 0.25 0.5 0.75 1km

LEGEND

- PROJECT BOUNDARY LINE
- RIGHT OF WAY LINE
- BLOCK LINE
- LOT LINE
- UNIT LINE
- LOT FRONTAGE
- PARCEL FABRIC

REVISION No.	DATE	ISSUED / REVISION	BY

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT R.S.O. 1990 C.P.13 AS AMENDED

A. AS SHOWN	**E.** AS SHOWN	**J.** AS SHOWN
B. AS SHOWN	**F.** AS SHOWN	**K.** FULL MUNICIPAL SERVICES
C. AS SHOWN	**G.** AS SHOWN	**L.** AS SHOWN
D. 21 SINGLE DETACHED & 107 TOWNHOUSE UNITS	**H.** MUNICIPAL WATER SUPPLY	
	I. SOIL?	

PLANNING
URBAN DESIGN
& LANDSCAPE
ARCHITECTURE
MHBC PLANNING
113 COLLIER STREET
BARRIE, ON, L4M 1H2
P: 705 728 0045 F: 705 728 2010
WWW.MHBCPLAN.COM

LAND USE SUMMARY

PROVISION	LOTS / BLOCKS	UNITS	AREA
SINGLE DETACHED - 11m LOTS	01-21	21	1.07ha
TOWNHOUSE - 6.0m UNITS	22, 25, 30, 36, 39	34	0.69ha
TOWNHOUSE - 7.2m UNITS	23, 24, 26-29, 31-35, 37, 38, 40	73	1.98ha
STORMWATER MANAGEMENT AREA	41	-	0.15ha
PARK	42	-	0.49ha
WALKWAY	43-44	-	0.03ha
OVERLAND FLOW / WALKWAY	45	-	0.03ha
OPEN SPACE	46	-	2.87ha
RIGHT OF WAY	-	-	1.68ha
TOTALS	-	128	8.99ha

STAMP

DATE	OCT. 8, 2021
FILE No.	Y537R
SCALE	1:900 (ARCH D)
DRAWN BY	M.M.
CHECKED BY	K.C.
OTHER	

PROJECT

452 RAGLAN STREET
EDEN OAK INC.
1443 HURONTARIO STREET
MISSISSAUGA, ONTARIO
L5G 3H5

NORTH

FILE NAME
DRAFT PLAN OF SUBDIVISION

DWG No.
1 of 1

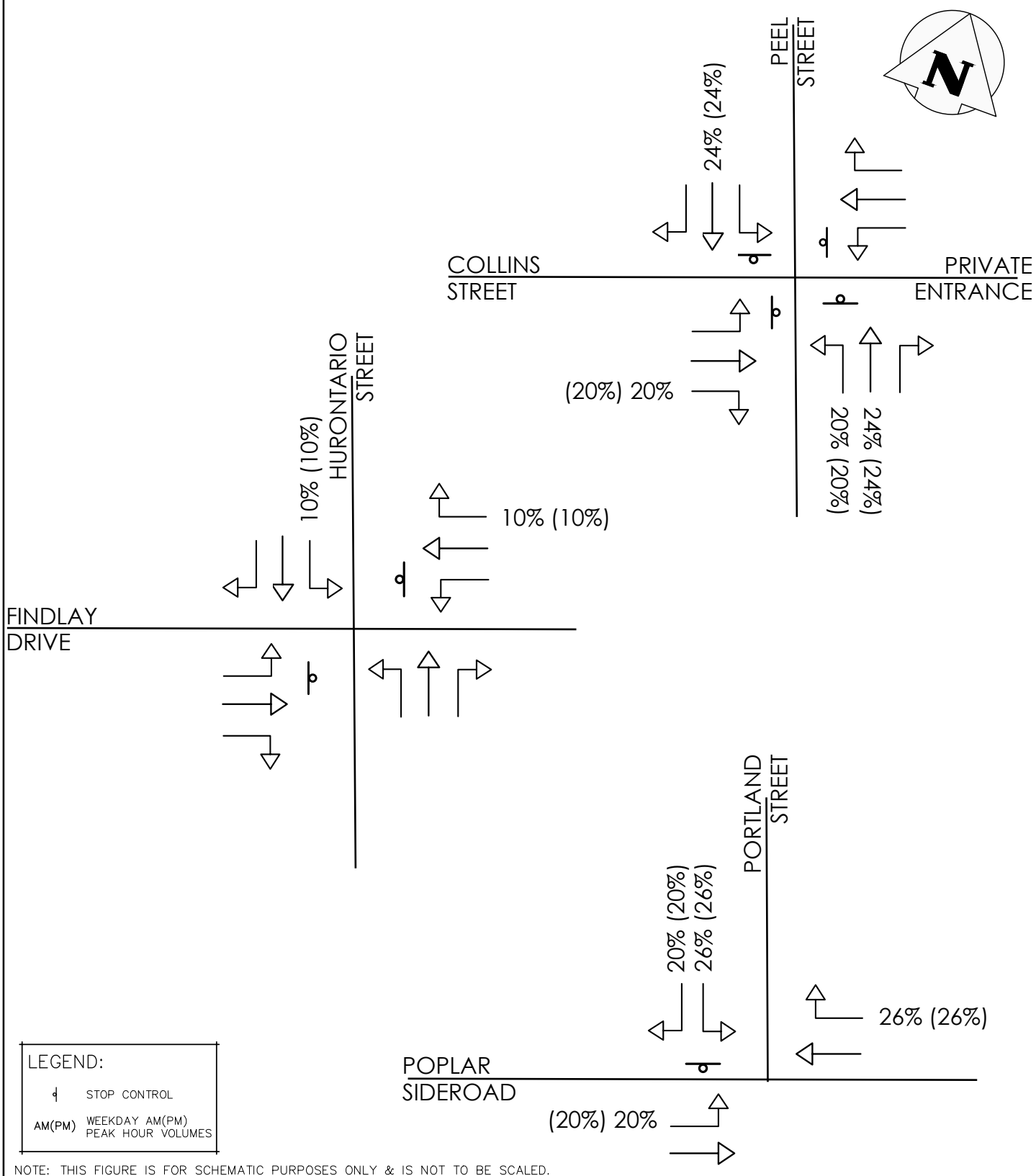
SCALE BAR

0 4 8 12 16 20 30 40 60 80m

MEASUREMENTS SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

N:\Collingwood\Eden Oak - 452 Raglan St, Collingwood - Y537R\Drawings\Draft Plan\CAD\Y537R - Draft Plan - 2021-10-08.dwg

FIG. 1



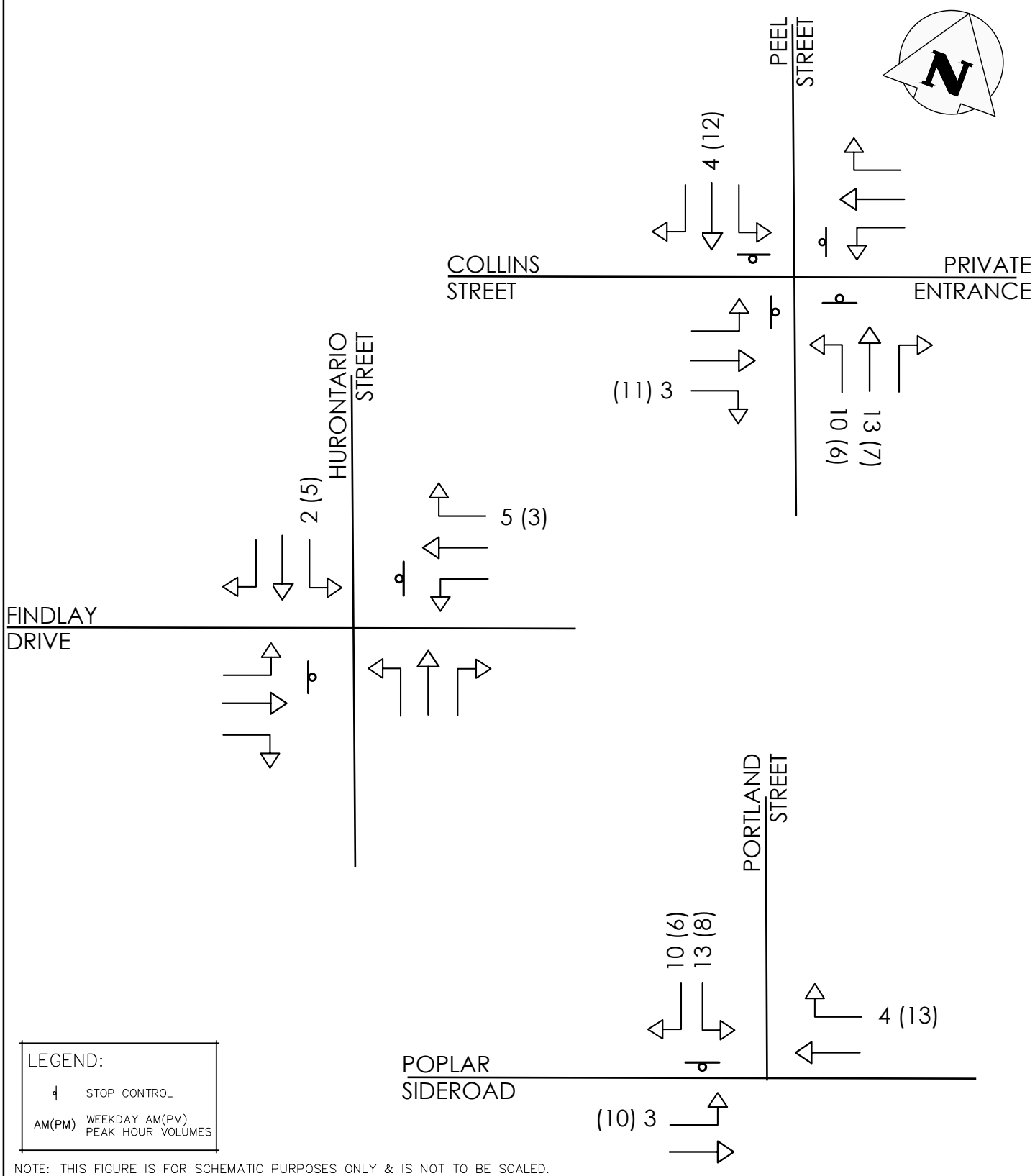
NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

IndigO2
Town of Collingwood, Simcoe County

Site Trip Distribution

CROZIER CONSULTING ENGINEERS
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn	Design	Project No.	
E.H.	E.H.	0200-5833	
Date	Check	Scale	Dwg.
2021/09/30	M.F.	N.T.S	FIG. 17



NOTE: THIS FIGURE IS FOR SCHEMATIC PURPOSES ONLY & IS NOT TO BE SCALED.

IndigO2
Town of Collingwood, Simcoe County

Site Trip Assignment

CROZIER CONSULTING ENGINEERS
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn	Design	Project No.	
E.H.	E.H.	0200-5833	
Date	Check	Scale	Dwg.
2021/09/30	M.F.	N.T.S	FIG. 18

TATHAM ENGINEERING

Enhancing our communities

225 Collins Street

TRAFFIC IMPACT BRIEF

Osmi Homes Inc.

File 123226 | April 17, 2024

Document Control

File:

123226

Date:

April 17, 2024

Prepared by:

Tatham Engineering Limited
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tathameng.com

Prepared for:

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Toronto, Ontario M1B 3C6

Authored by:	Reviewed by:
Karolina Kukielka C.E.T., rcsi Transportation Technologist	Michael Cullip B.Eng. & Mgmt., M.Eng., P.Eng. Vice President

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Issue	Date	Description
1	April 17, 2024	Final Report

3.5.2 Pedestrians & Cyclists

As evident on the site plan, pedestrian walkways will be provided around the perimeter of the building, with connections provided to the existing sidewalks on Peel Street and Collins Street, which in turn provide access to the broader Collingwood sidewalk and trial network.

3.6 SITE TRAFFIC

3.6.1 Trip Generation

Total Trips

The number of trips generated by the proposed development has been determined based on the type of use, development size and trip generation rates published in the *ITE Trip Generation Manual, 11th Edition*[6]. Based on the proposed development, trip rates for the following uses have been employed:

- *multifamily housing – low rise* (ITE code 220);
- *convenience store* (ITE code 851);
- *pharmacy/drug store* (ITE code 880); and
- *hair salon* (ITE code 918).

The associated trip rates are provided in Table 4 whereas the gross trip estimates are provided in Table 5. As indicated, the proposed development is expected to generate 114 trips during the AM peak hour and 99 trips during the PM peak hour (total of inbound and outbound trips).

Table 4: Trip Rates – 225 Collins Street

LAND USE	VARIABLE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
		In	Out	Total	In	Out	Total
multifamily housing (ITE 220)	units	0.10	0.30	0.40	0.32	0.19	0.51
convenience store (ITE 851)	1000 ft² GFA	31.27	31.27	62.52	25.05	24.06	49.11
pharmacy/drug store (ITE 880)	1000 ft² GFA	1.91	1.03	2.94	4.17	4.34	8.51
hair salon (ITE 918)	1000 ft² GFA	0.61	0.61	1.22	0.25	1.20	1.45

[6] *ITE Trip Generation Manual, 11th Edition.* Institute of Transportation Engineers, September 2021.

Table 5: Trip Generation – 225 Collins Street (Total Trips)

LAND USE	VARIABLE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
		In	Out	Total	In	Out	Total
apartments	10 units	1	3	4	3	2	5
convenience store	1657 ft^2	52	52	104	42	40	82
pharmacy	1315 ft^2	3	1	4	5	6	11
hair salon	537 ft^2	1	1	2	0	1	1
Total Trips		**57**	**57**	**114**	**50**	**49**	**99**

Trip Adjustments

With commercially oriented development, not all trips generated will be new trips. Rather, a portion of the trips generated are expected to be already on the adjacent road network for other purposes but will visit the site as they are driving past (eg. on the way to work, on the way home, etc.). These are referred to as pass-by trips. In terms of the study area road network, pass-by trips will occur as existing traffic travelling along Collins Street and/or Peel Street access the site prior to continuing along their normal route.

As per the *ITE Trip Generation Handbook, 3rd Edition,* the following uses are expected to generate significant pass-by traffic:

- convenience store 51%; and
- pharmacy/drug store 53%.

In addition, given the range of uses within the site, some degree of shared/internal trips is expected. A shared/internal trip occurs when there is interaction between the uses on a single site (eg. residents of the apartments may also visit the convenience store). For shared/internal trips, it is common practice to apply a reduction to the trip estimates in order to avoid double counting. However, given the limited number of residential oriented trips, such has not been considered.

New Trips

The adjusted trip estimates are summarized in Table 6, assuming 40% pass-by trips for the convenience store and 40% pass-by for the pharmacy related trips. A reduced pass-by rate has been assumed as compared to industry standards (ie. 40% vs 51% and 53%) in consideration of

the traffic volumes on Collins Street and Peel Street that are expected to pass the site (and hence would generate the pass-by trips). As noted, the net number of new trips to be generated is 70 during the AM peak hour and 61 during the PM peak hour.

Table 6: Trip Generation – 225 Collins Street (New Trips)

LAND USE	VARIABLE	PASS-BY	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			In	Out	Total	In	Out	Total
apartments	10 units	-	1	3	4	3	2	5
convenience store	1657 ft²	40%	31	31	62	25	23	48
pharmacy	1315 ft²	40%	2	0	2	3	4	7
hair salon	537 ft²	-	1	1	2	0	1	1
Total Trips			**35**	**35**	**70**	**31**	**30**	**61**

3.6.2 Trip Distribution & Assignment

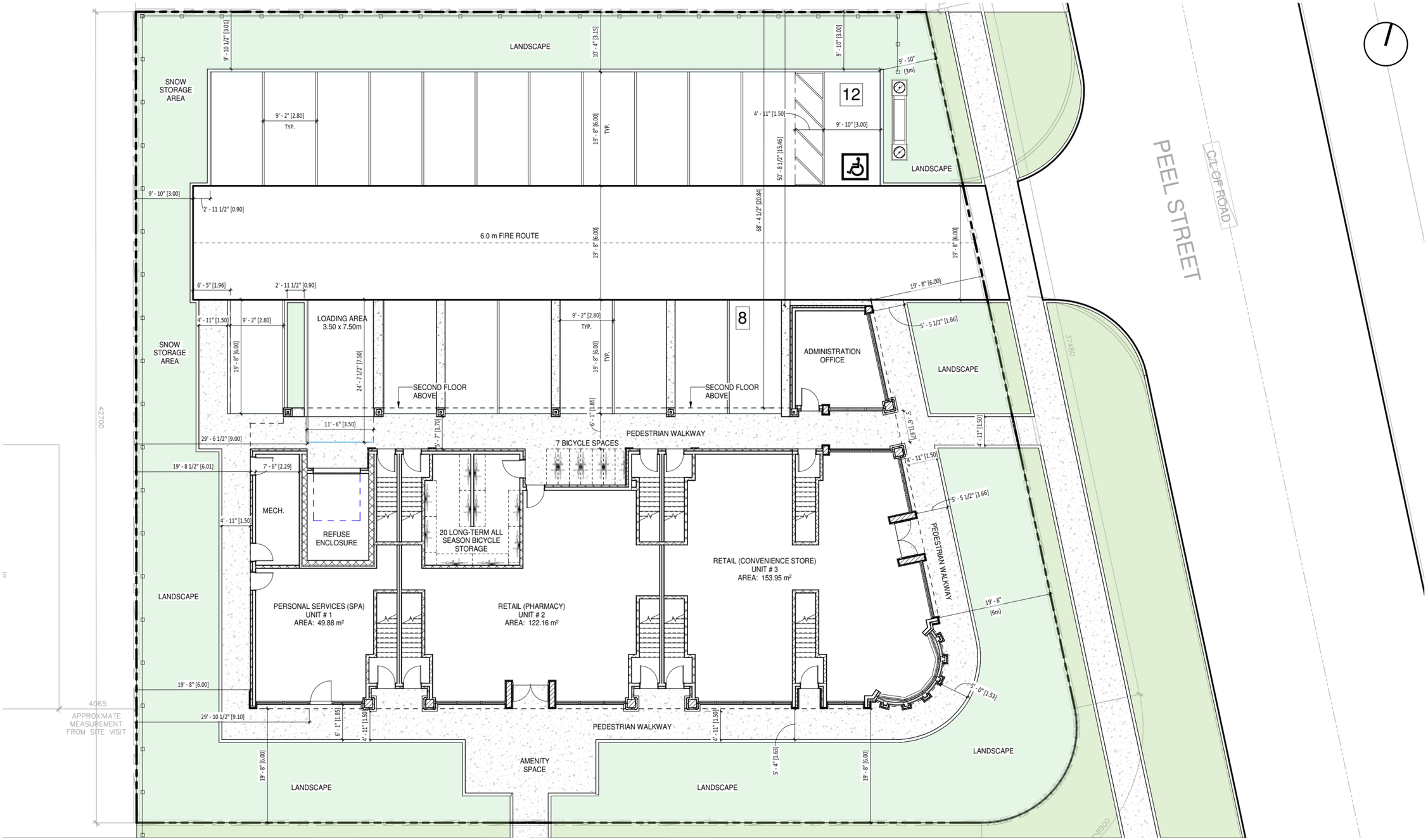
The distribution of the site generated trips has been developed based on the travel patterns reflected in the traffic count and recognizing that the commercial units will serve a local, neighbourhood function. For the new trips, the following distribution has been assumed:

- to/from the north via Peel Street 45%;
- to/from the south via Peel Street 5%;
- to/from the west via Collins Street 45%; and
- to/from the east via the Riverside Apartments 5%.

For the pass-by trips, they have been allocated proportional to the directional volumes across the front of the site.

The resulting assignment of site traffic to the road network is illustrated in:

- Figure 7 for the new trips (these trips that will be new to the road system);
- Figure 8 for the pass-by trips (these trips are already on the road system); and
- Figure 9 for the combined new + pass-by trips.



225 COLLINS STREET, TRAFFIC IMPACT BRIEF

Figure 6: Site Plan

99 AM Peak Hour

(99) PM Peak Hour

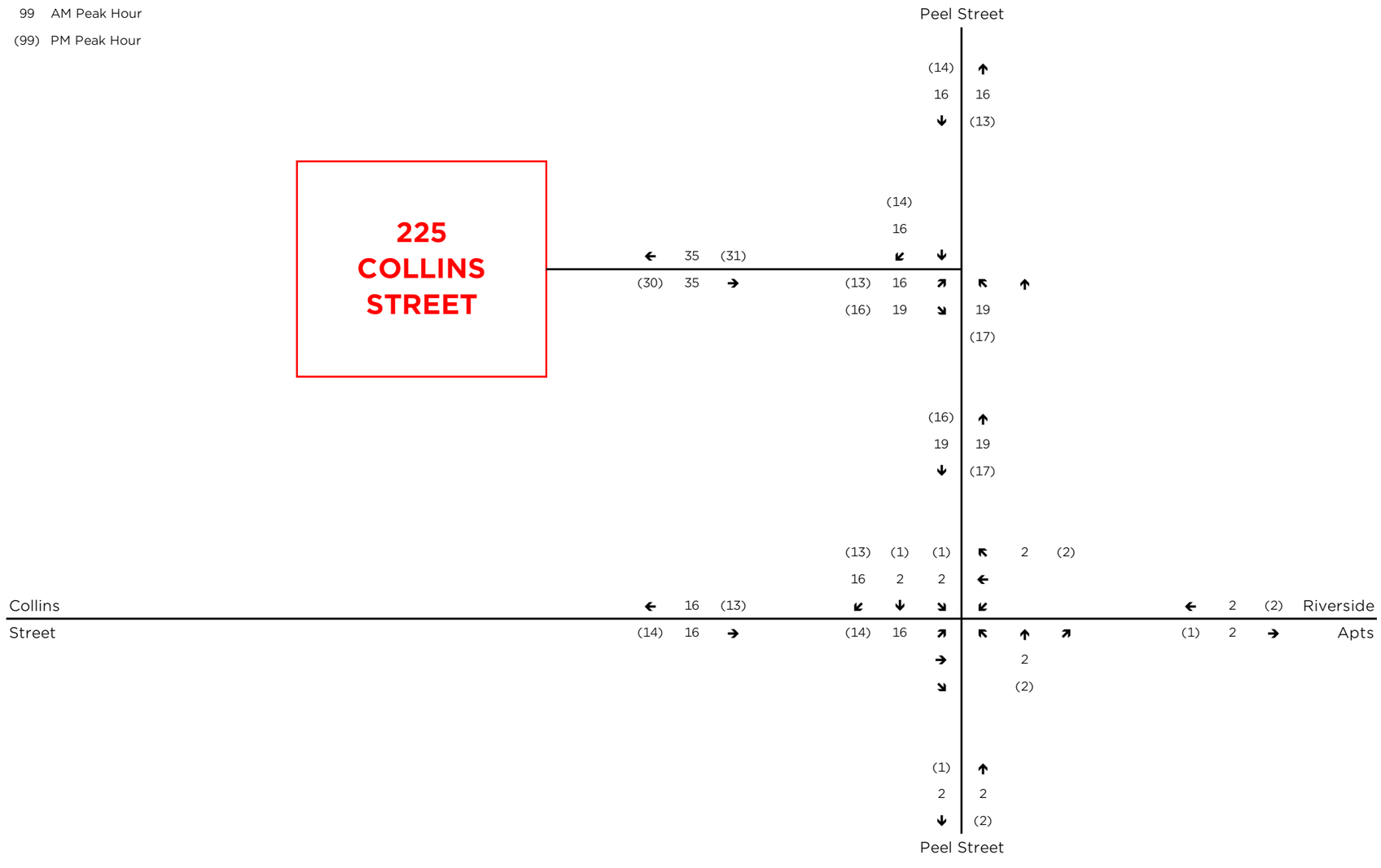


Figure 7: Traffic Volumes - 225 Collins Street (New Trips)

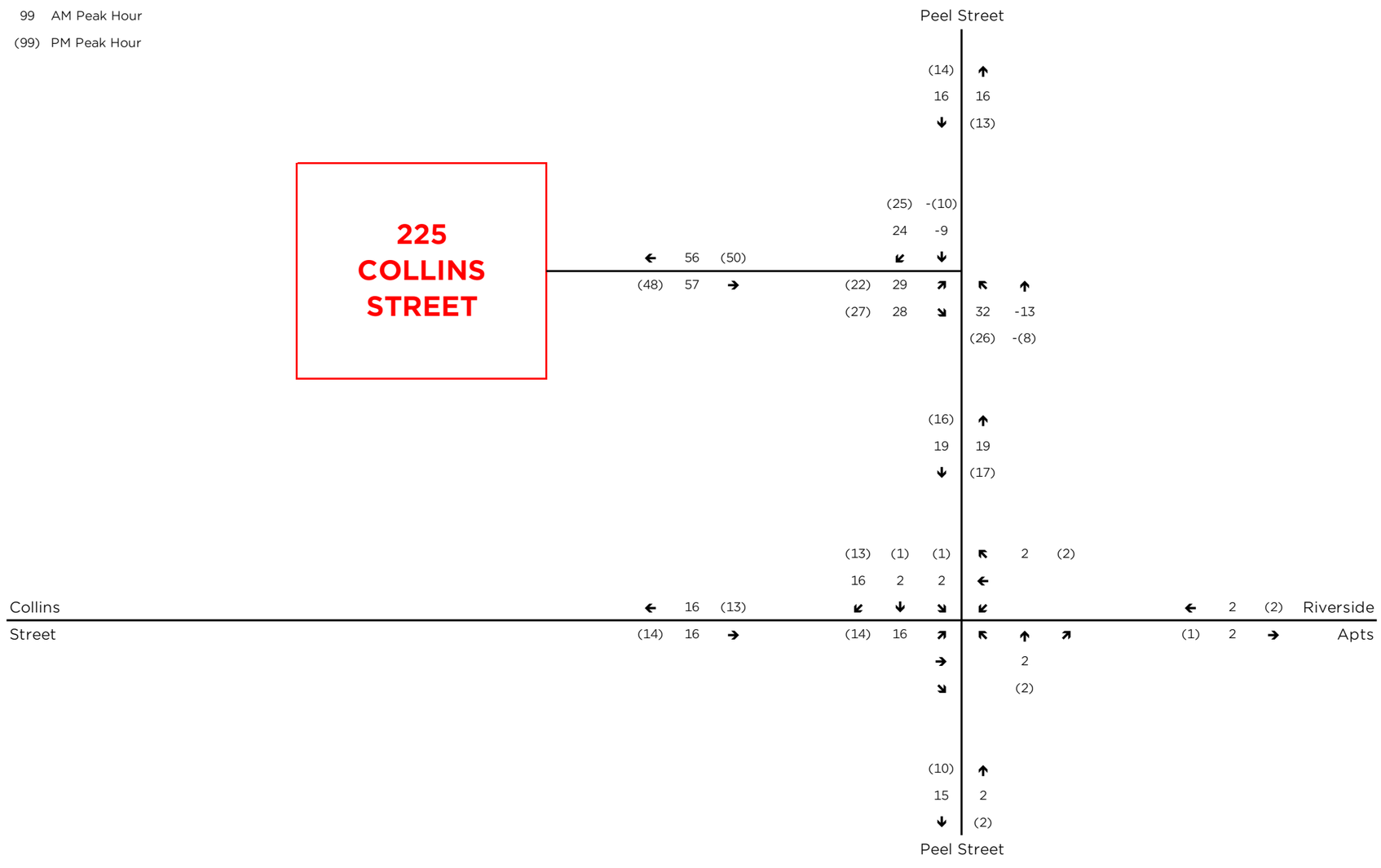
99 AM Peak Hour

(99) PM Peak Hour

Figure 8: Traffic Volumes - 225 Collins Street (Pass-By Trips)

99 AM Peak Hour

(99) PM Peak Hour



225 COLLINS STREET, TRAFFIC IMPACT BRIEF

Figure 9: Traffic Volumes - 225 Collins Street (Total Trips)

TATHAM ENGINEERING

Enhancing our communities

The Gateway Centre

TRAFFIC IMPACT STUDY

Charis Developments

File 120119 | May 14, 2025

Document Control

File:

120199

Date:

May
14, 2025

Prepared by:

Tatham Engineering Limited
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Collingwood, Ontario L9Y 5A6

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tathameng.com

Prepared for:

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Authored by:	Reviewed by:
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Matthew Buttrum B.Eng., EIT Engineering Intern	Michael Cullip B.Eng. & Mgmt., M.Eng. P.Eng. Vice President

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Issue	Date	Description
1	April 1, 2022	Final Report
2	September 17, 2024	Revised Site Plan
3	May 14, 2025	Revised Site Plan

Document Contents

4 Proposed Development

This chapter will provide additional details with respect to the proposed development, including its location, the projected site generated traffic volumes and the assignment of such to the adjacent road network.

4.1 LOCATION

As illustrated in Figure 1, the proposed development is to be located at the northeast corner of the Poplar Sideroad/County Road 32 and Hurontario Street/County Road 124 intersection in the Town of Collingwood.

4.2 LAND-USE & PHASING

Details with respect to the proposed land uses, sizes and phases (3 phases are proposed) are provided in Table 14. The corresponding site plan is illustrated in Figure 11.

Table 14: Development Land Use & Size Details

BUILDING & LAND USE		PHASE	SIZE		UNITS
1	Starbucks + drive-thru	1	157 m^2	1,690 ft^2	GFA
2	Dollarama	1	836 m^2	9,000 ft^2	GFA
3	commercial/retail	3	589 m^2	6,341 ft^2	GFA
	residential	3	165		units
4	commercial/retail	3	540 m^2	5,811 ft^2	GFA
	office	3	1,080 m^2	11,621 ft^2	GFA
5	grocery store	2	2,016 m^2	21,699 ft^2	GFA
6	Pet Valu	2	245 m^2	2,635 ft^2	GFA
	commercial/retail	2	1,426 m^2	15,301 ft^2	GFA
7	McDonalds + drive-thru	1	287 m^2	3,089 ft^2	GFA
8	commercial/retail	1	762 m^2	8,203 ft^2	GFA
	restaurant	1	344 m^2	3,703 ft^2	GFA

As defined by the Town's *Zoning By-law*[16], the gross floor area (GFA) of non-residential uses excludes "any space used for storage, mechanical rooms, common halls, stairwells, private kitchens, washrooms and garages" from the gross area of the building. As such, the GFA identified for each building is reflective of the following reductions:

- for general commercial uses – GFA is 10% less than gross area; and
- for restaurant uses – GFA is 30% less than gross area.

These generalized reductions have been employed as detailed floor plans for each use are not yet final. These reductions are, however, based on the experience of the developer of this site and are considered conservative; for other developments in the area, commercial GFA reductions in excess of 20% and restaurant GFA reductions in excess of 30% have been realized and approved by the Town.

With respect to completion and build-out, it is assumed that Phase 1 and 2 construction (i.e. all but Buildings 3 and 4) will begin promptly, with the entire site fully built out by 2030.

4.3 ACCESS

4.3.1 Configuration & Location

As per the site plan and further illustrated in Figure 12, the development will be served by 2 access points as referenced below (all of which are to be constructed as part of Phase 1):

- Access 1: full moves access approximately 190 metres north of Poplar Sideroad/County Road 32 (measured centre to centre) with a width of 9.0 metres; and
- Access 2: full moves access approximately 150 metres east of Hurontario Street/County Road 124 and 120 metres west of Hughes Street (measured centre to centre) with a width of 9.0 metres.

4.3.2 TAC Guidelines

The Transportation Association of Canada (TAC) has established guidelines with respect to access spacing/corner clearances in relation to signalized intersections recognizing the implications that each can have on the other (e.g. queued vehicles at the signalized intersection can block the access thus interfering with inbound and outbound movements). For operating speeds of 50 km/h, the TAC guidelines recommend a minimum spacing (i.e. corner clearance) of 70 metres, measured from the edge of the access to the edge of the road.

[16] *Town of Collingwood Zoning By-law 2010-040*. Town of Collingwood, consolidated March 2025.

- 1 loading space for a development of 2,501 to 7,000 m^2 gross floor area;
- 2 loading spaces for a development of 7,001 to 10,000 m^2 gross floor area; and
- 1 additional loading space for every additional 2,500 m^2 gross floor area.

Considering the needs of each building separately, all buildings excluding Buildings 1 and 7 require 1 delivery space, as each has a GFA between 460 m^2 and 2,500 m^2.

As per the Site Plan, one delivery space will be provided at each building with exception of Buildings 2 and 5. Buildings 2 and 5 will be provided with one and two loading spaces, respectively. Building 6 will be provided with one loading space in addition to its delivery space. Considering the proposed supply of delivery and loading spaces, the Town requirements are surpassed.

4.10 DRIVE-THRUS

For restaurant uses, the *Collingwood Zoning By-Law* requires 10 queueing spaces within a drive-thru. Measured from the pick-up window, the drive-thru at the Starbucks will provide space for 12 queued vehicles, whereas that at the McDonalds will accommodate 14 vehicles. A further 2 queueing spaces are provided in each drive-thru beyond the pick-up window.

4.11 SITE TRAFFIC

4.11.1 Trip Generation

Gross Trips

The number of vehicle trips to be generated by the proposed development for the weekday AM, weekday PM, and Saturday peak hours has been determined based on type of use, development size and trip generation rates as per the *ITE Trip Generation Manual, 11th Edition* noted in Table 17. Trip rates specific to McDonalds and Starbucks were also identified from other development specific traffic studies and are included in Table 17 for comparative purposes. The McDonalds rates are based on surveys of such restaurants with drive-thrus in the City of Ottawa[17] whereas the Starbucks rates are based on 4 separate surveys of a site in New Jersey[18].

[17] *886 March Road McDonalds Transportation Study*. HDR Corporation, March 2013.
[18] Traffic Impact Study Proposed Starbucks Drive-Thru Only Facility. Stonefield Engineering & Design, LLC, February 24, 2021.

Table 17: Trip Rates

LAND-USE & ITE CODE		VARIABLE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
			In	Out	Total	In	Out	Total	In	Out	Total
multifamily housing (high-rise)	222	dwelling units	0.09	0.18	0.27	0.18	0.14	0.32	0.21	0.15	0.36
small office building	712	1,000 ft² GFA	1.59	0.33	1.92	0.78	1.67	2.45	-	-	-
variety store (dollar store)	814	1,000 ft² GLA	1.67	1.37	3.04	3.42	3.28	6.70	4.10	3.94	8.04
shopping plaza, w/o supermarket	821	1,000 ft² GLA	0.58	0.36	0.94	1.83	1.98	3.81	3.23	2.99	6.22
supermarket	850	1,000 ft² GLA	1.69	1.17	2.86	4.48	4.48	8.95	5.05	5.05	10.10
pet supply superstore	866	1,000 ft² GLA	-	-	-	1.78	1.78	3.55	3.46	3.60	7.06
high-turnover restaurant	932	1,000 ft² GFA	5.26	4.31	9.57	5.52	3.53	9.05	5.71	5.48	11.19
fast food + drive-thru	934	1,000 ft² GFA	22.75	21.86	44.61	17.18	15.85	33.03	28.18	27.07	55.25
coffee/donut shop + drive-thru	937	1,000 ft² GFA	43.80	42.08	85.88	19.50	19.50	38.99	43.96	43.96	87.91
McDonalds	-	1000 ft² GFA	12.12	11.18	23.30	10.02	8.88	18.90	30.17	27.84	58.01
Starbucks	-	drive-thru	93	93	186	46	46	92	-	-	-

The resulting trip estimates are provided in Table 18, considering the following:

- the reduced gross floor area for each building/use noted in Table 14. These values essentially exclude non-trip-generating areas of a building (storage areas, mechanical rooms, common hallways, etc.), thus are considered appropriate for use in estimating trips for each building.
- any commercial uses with a specific tenant identified on the site plan (i.e. Dollarama, Pet Valu, grocery store) have used rates representative of that use;
- the *shopping plaza without supermarket* trip rates have been applied to the general commercial/retail uses (i.e. without a specific tenant identified) and while the rates are based on gross leasable area (GLA), it is assumed to equal the gross floor area (GFA) in that no “internal corridors” as would occur in a shopping mall are expected. Furthermore, while

ITE rates are available for a *shopping plaza with supermarket*, consideration of the supermarket as a separate independent building and use results in higher, thus more conservative, trip estimates;

- the fast food + drive-thru trip rates have been applied to the McDonalds as opposed to the specific "McDonalds" rates as the former were significantly higher than the latter (thus ensuring a conservative approach);
- the application of coffee/donut shop + drive-thru trip rates yields near identical trip estimates to the "Starbucks" rates (the ITE rates have been employed as they reflect industry standards).

Table 18: Trip Estimates – Gross Trips

BUILDING & LAND USE		SIZE		WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
				In	Out	Total	In	Out	Total	In	Out	Total
1	Starbucks + D/T	1.7	1000 ft²	74	71	145	33	33	66	74	74	149
2	Dollarama	9.0	1000 ft²	15	12	27	31	30	60	37	35	72
3	commercial/ retail	6.3	1000 ft²	7	4	11	16	17	33	21	19	39
	residential	165	units	15	29	45	30	23	53	34	26	59
4	commercial/ retail	5.8	1000 ft²	6	4	10	15	15	30	19	17	36
	office	11.6	1000 ft²	16	3	19	9	17	25	-	-	-
5	grocery store	21.7	1000 ft²	37	25	62	97	97	194	110	110	219
6	Pet Valu	2.6	1000 ft²	-	-	-	5	5	9	9	9	19
	commercial/ retail	15.3	1000 ft²	16	10	26	39	40	79	49	46	95
7	McDonalds + D/T	3.1	1000 ft²	70	68	138	53	49	102	87	84	171
8	commercial/ retail	8.2	1000 ft²	9	5	14	21	22	43	27	24	51
	restaurant	3.7	1000 ft²	19	16	35	20	13	34	21	20	41
Total Gross Trips				**285**	**249**	**533**	**368**	**360**	**728**	**487**	**465**	**952**

Trip Adjustments

With commercially-oriented development, not all trips generated will be new trips. Rather, a portion of the trips generated are expected to be already on the adjacent road network for other purposes but will visit the site as they are driving past (e.g. on the way to work, on the way home, etc.). These are referred to as pass-by trips. In terms of the study area road network, pass-by trips will occur as existing traffic travelling along Poplar Sideroad/County Road 32 and/or Hurontario Street/County Road 124 access the site prior to continuing along their normal route.

As per the *ITE Trip Generation Handbook, 3rd Edition,* the following uses are expected to generate significant pass-by traffic:

- variety store 0% AM (not typically open) and 34% PM;
- supermarket 0% AM (not typically open) and 51% PM;
- fast food with drive-thru 49% AM and 50% PM;
- shopping plaza 0% AM (not typically open) and 34% PM; and

In addition, given the range of uses within the site, some degree of shared/internal trips is expected. A shared/internal trip occurs when there is interaction between the uses on a single site (e.g. patrons of the restaurants may also visit the retail shops, residents of the site may work in one of the offices). For shared/internal trips, it is common practice to apply a reduction to the trip estimates in order to avoid double counting. To account for this, ITE recommends using the methodologies outlined in the National Cooperative Highway Research Program's *Report 684*[19], which considers factors such as the trips to be generated by each use in a mixed-use development (residential, retail, office, etc.) and their proximity to each other. A worksheet is provided which will calculate the estimated internal trip capture for a given site. The completed worksheet is provided in Appendix I. As indicated, for the proposed development, an internal trip capture of 10% and 33% is estimated for the weekday AM and weekday PM peak periods, respectively. The internal capture data for a Saturday peak is not provided, thus an internal capture proportion is not calculated for this period.

The assumed pass-by and internal/shared trips are summarized in Table 19. A conservative 10% reduction for internal trips was applied to all uses – in line with the estimated AM peak capture and much lower than the estimated PM peak capture. For pass-by trips, a 30% reduction was applied to most commercial uses, whereas 50% was applied to the restaurant uses.

[19] *Report 684 – Enhancing Internal Trip Capture Estimation for Mixed-Use Developments*. Transportation Research Bureau, Washington D.C., 2011.

Table 19: Trip Estimates – Pass-By & Internal/Shared Trips

BUILDING & LAND USE		TRIPS		WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
				In	Out	Total	In	Out	Total	In	Out	Total
1	Starbucks + D/T	50%	pass-by	37	37	74	17	17	34	37	37	74
2	Dollarama	30%	pass-by	5	5	9	9	9	18	11	11	22
3	commercial/ retail	30%	pass-by	2	2	4	5	5	10	6	6	12
	residential		n/a	-	-	-	-	-	-	-	-	-
4	commercial/ retail	30%	pass-by	2	2	4	4	4	8	6	6	12
	office		n/a	-	-	-	-	-	-	-	-	-
5	grocery store	30%	pass-by	11	11	22	29	29	58	33	33	66
6	Pet Valu	30%	pass-by	-	-	-	1	1	2	3	3	6
	commercial/ retail	30%	pass-by	5	5	10	12	12	24	15	15	30
7	McDonalds + D/T	50%	pass-by	35	35	70	27	27	54	44	44	88
8	commercial/ retail	30%	pass-by	3	3	6	6	6	12	8	8	16
	restaurant	50%	pass-by	10	10	20	10	10	20	11	11	22
Total Pass-by				**109**	**109**	**218**	**121**	**121**	**242**	**173**	**173**	**346**
All uses		10%	internal/ shared	28	25	53	37	36	73	49	46	95
Total Internal/Shared				**28**	**25**	**53**	**37**	**36**	**73**	**49**	**46**	**95**

The resulting new trips to be generated by the development (i.e. gross trips minus pass-by and internal/shared trips) are summarized in Table 20. These represent the new trips to the road system that are expected.

Table 20: Trip Estimates – New Trips

BUILDING & LAND USE		TRIPS		WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR			SATURDAY PEAK HOUR		
				In	Out	Total	In	Out	Total	In	Out	Total
1	Starbucks + D/T	40%	new trips	30	27	57	13	13	26	30	30	59
2	Dollarama	60%	new trips	9	7	16	18	17	36	22	21	43
3	commercial/ retail	60%	new trips	4	2	6	10	10	20	12	11	23
	residential	90%	new trips	14	26	40	27	21	48	30	23	53
4	commercial/ retail	60%	new trips	4	2	5	9	9	19	11	10	21
	office	90%	new trips	14	3	17	8	15	23	-	-	-
5	grocery store	60%	new trips	22	12	34	58	58	117	66	66	131
6	Pet Valu	60%	new trips	-	-	-	3	3	6	5	6	11
	commercial/ retail	60%	new trips	10	4	14	23	25	47	30	26	56
7	McDonalds + D/T	40%	new trips	28	26	54	21	18	38	35	32	66
8	commercial/ retail	60%	new trips	5	2	7	13	13	26	16	14	30
	restaurant	40%	new trips	8	5	12	8	2	10	8	8	16
Total New Trips				**147**	**115**	**261**	**210**	**204**	**414**	**266**	**246**	**510**

4.11.2 Trip Distribution

New Trips

The distribution of the new trips generated by the site has been established based on the existing travel patterns observed at the study area intersection and consideration for development within the immediate areas (recognizing that a significant amount of site patrons are likely to come from the residential developments in the immediate area). While there may be subtle differences in the AM and PM peak hours, a common distribution has been assumed for both.

The overall distribution of traffic was applied as follows:

- to/from the north via Hurontario Street 40%;
- to/from the south via County Road 124 10%;

- to/from the west via Poplar Sideroad 25%; and
- to/from the east via Poplar Sideroad 25%.

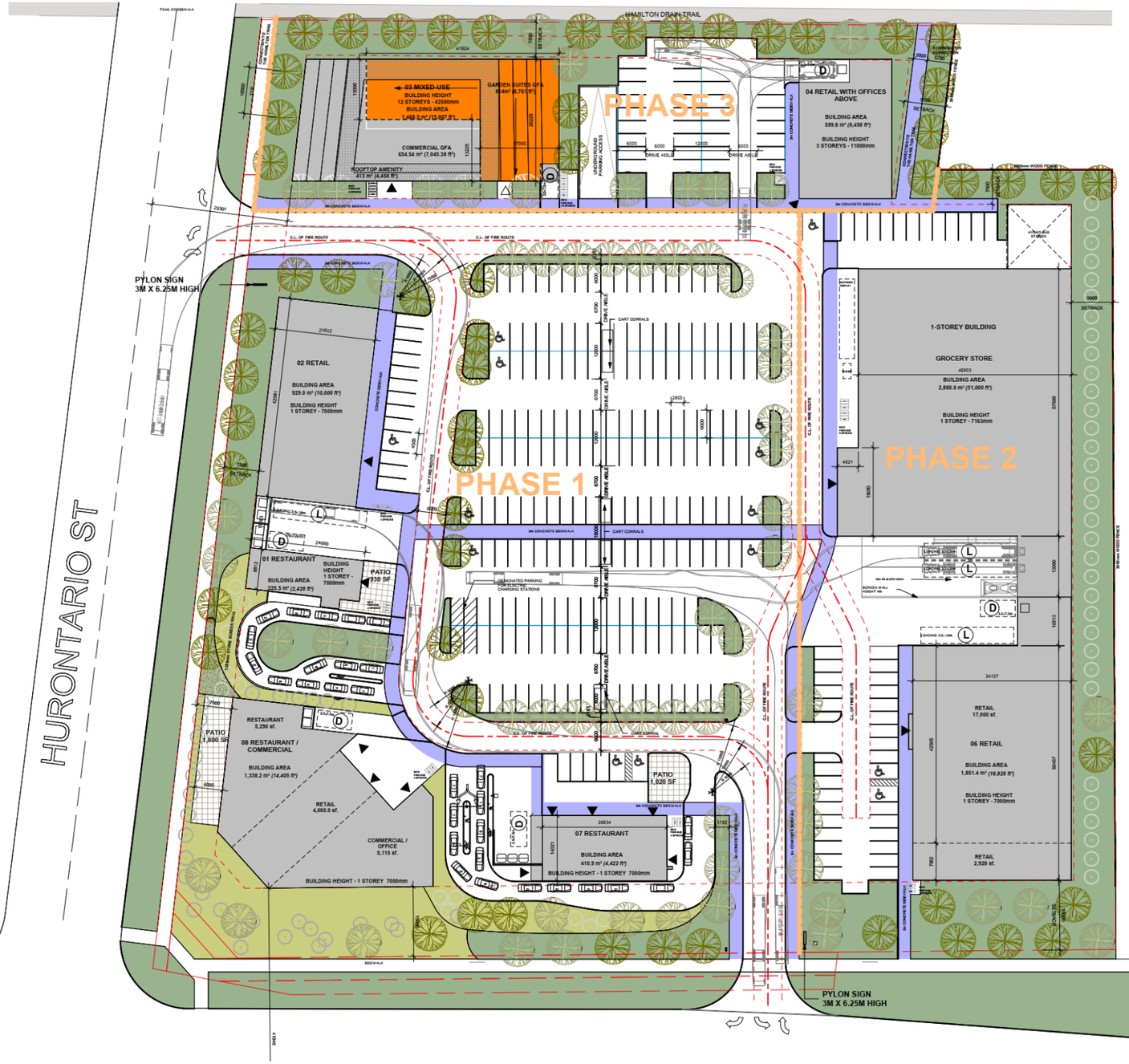
Pass-By Trips

As previously noted, pass-by trips are those trips already on the road system that are expected to stop at the site as they travel past. As such, the distribution of the pass-by trips was based on the directional volumes on Poplar Sideroad/County Road 32 and Hurontario Street/County Road 124 as observed at their respective intersection. The greatest approach volumes past the site will contribute the greatest number of pass-by trips. While the northbound to westbound and eastbound to southbound movements will not travel past the site per se, such have been considered as a source of pass-by traffic given their proximity to the site and ease of access (i.e. people will deviate from their initial path to accommodate a visit to the site).

4.11.3 Trip Assignment

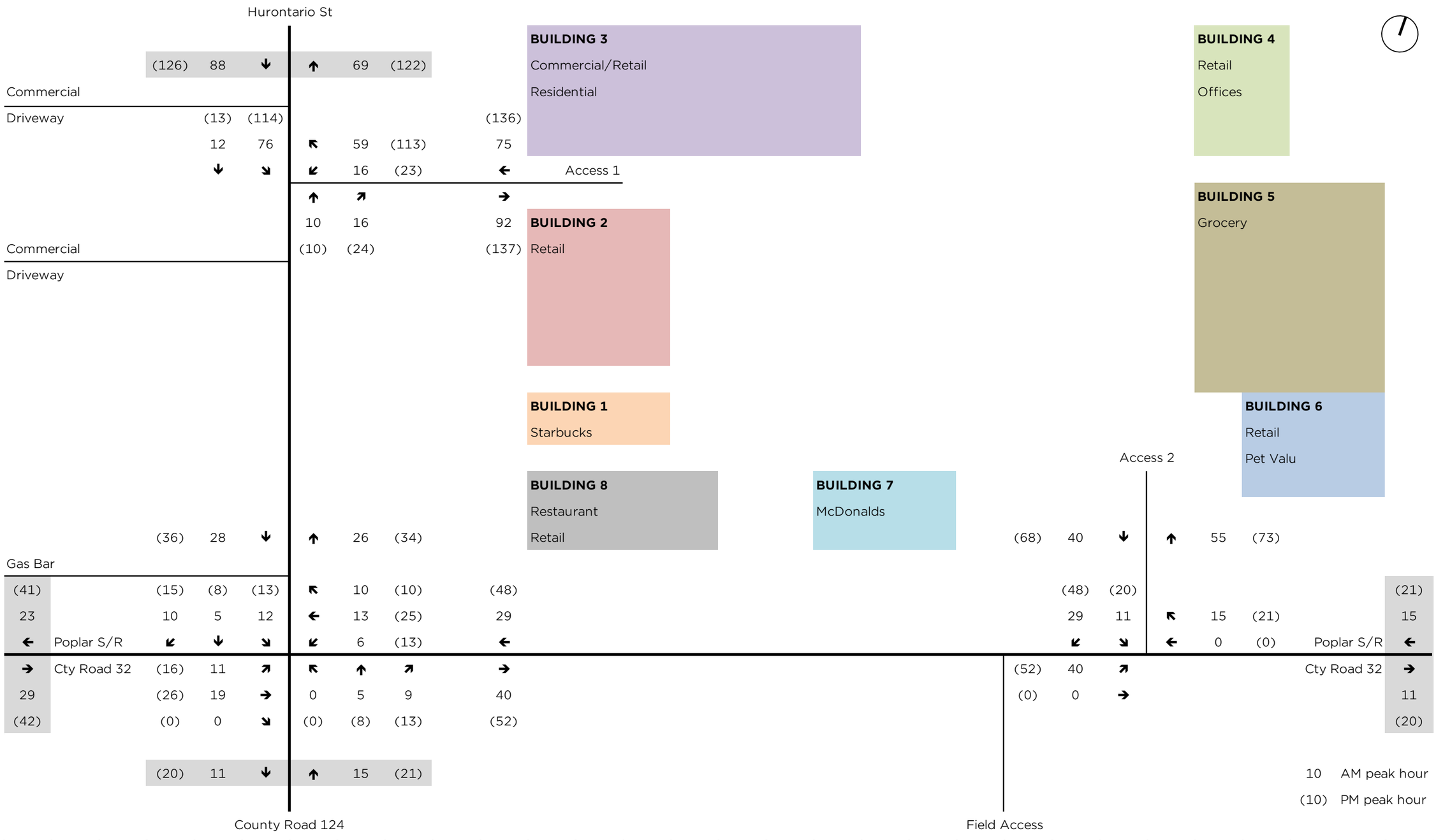
The assignment of the trips generated by the development to the area road network and site access points is based on the trip distribution noted above with consideration given to the expected travel routes. In terms of access assignment, site trips have been assigned to the 2 access points based on the site layout and the location of each access in relation to the proposed building that is generating the trips.

The resulting site generated traffic volumes are illustrated in Figure 14, Figure 15 and Figure 16 for the new trips, pass-by trips and total trips. Additional details specific to the new trips and pass-by trips generated by each specific building and land use are provided in Appendix J.



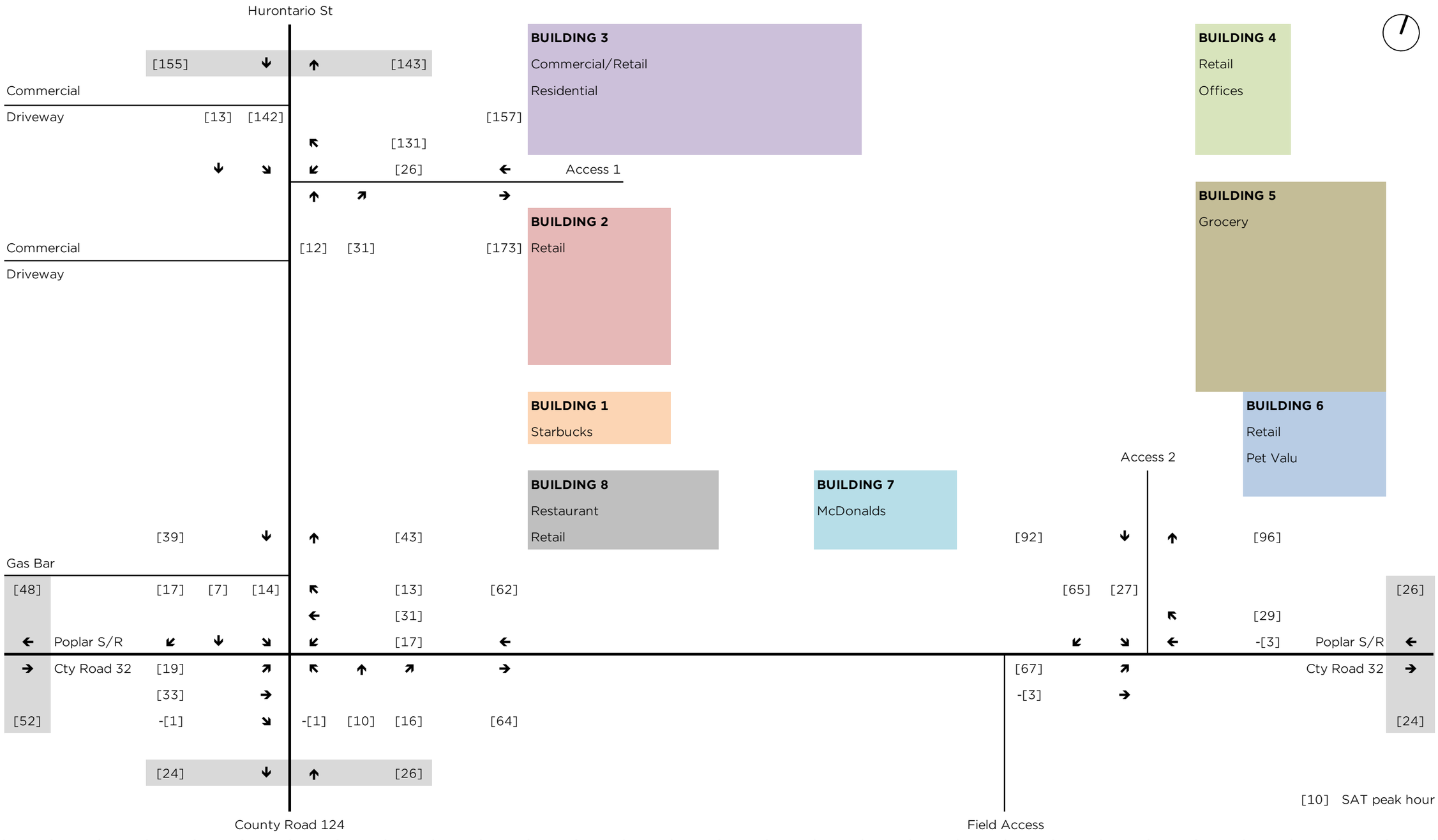
THE GATEWAY CENTRE – TRANSPORTATION IMPACT STUDY

Figure 11: Site Plan



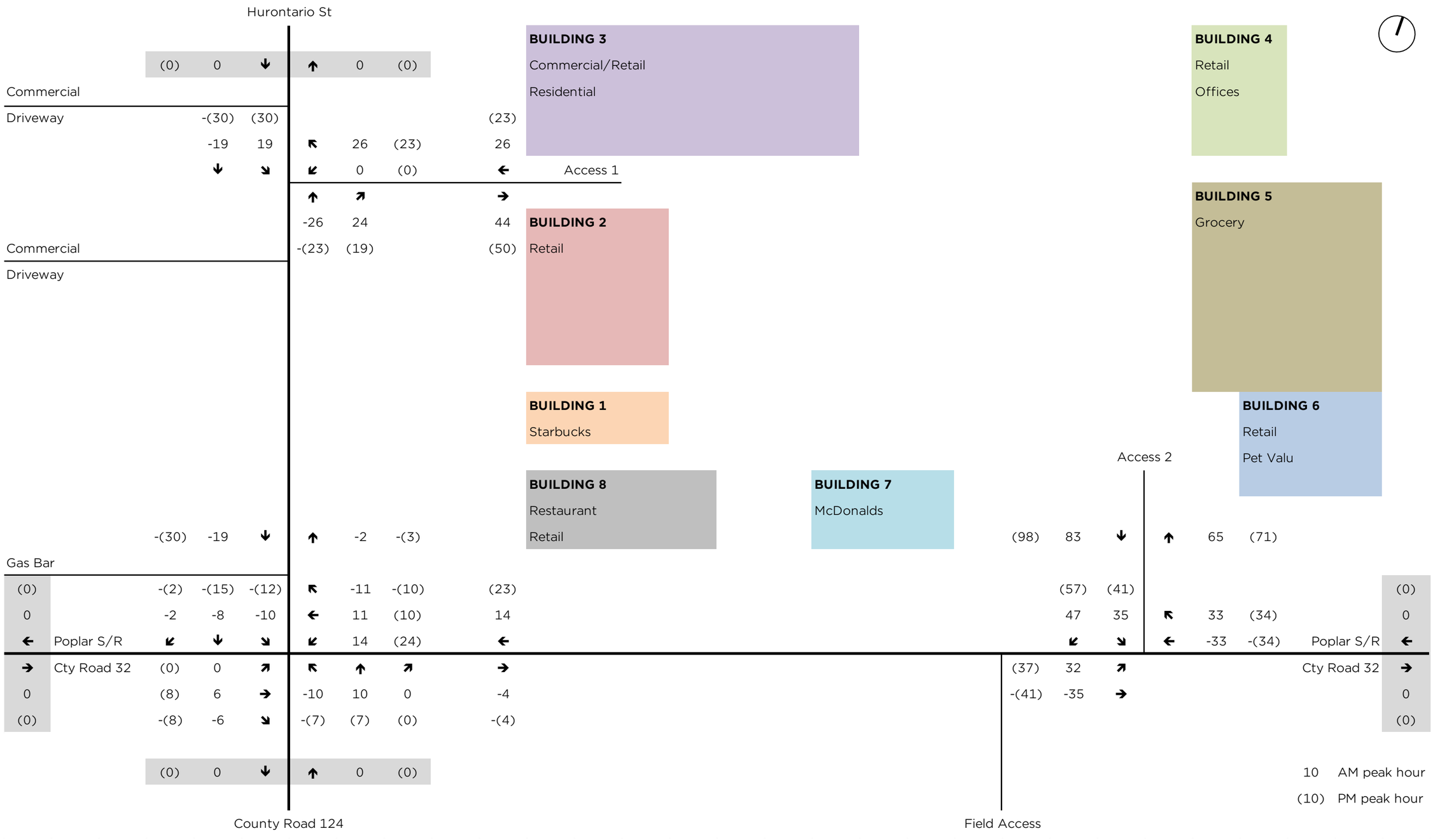
THE GATEWAY CENTRE – TRANSPORTATION IMPACT STUDY

Figure 14A: Site Traffic – New Weekday Trips



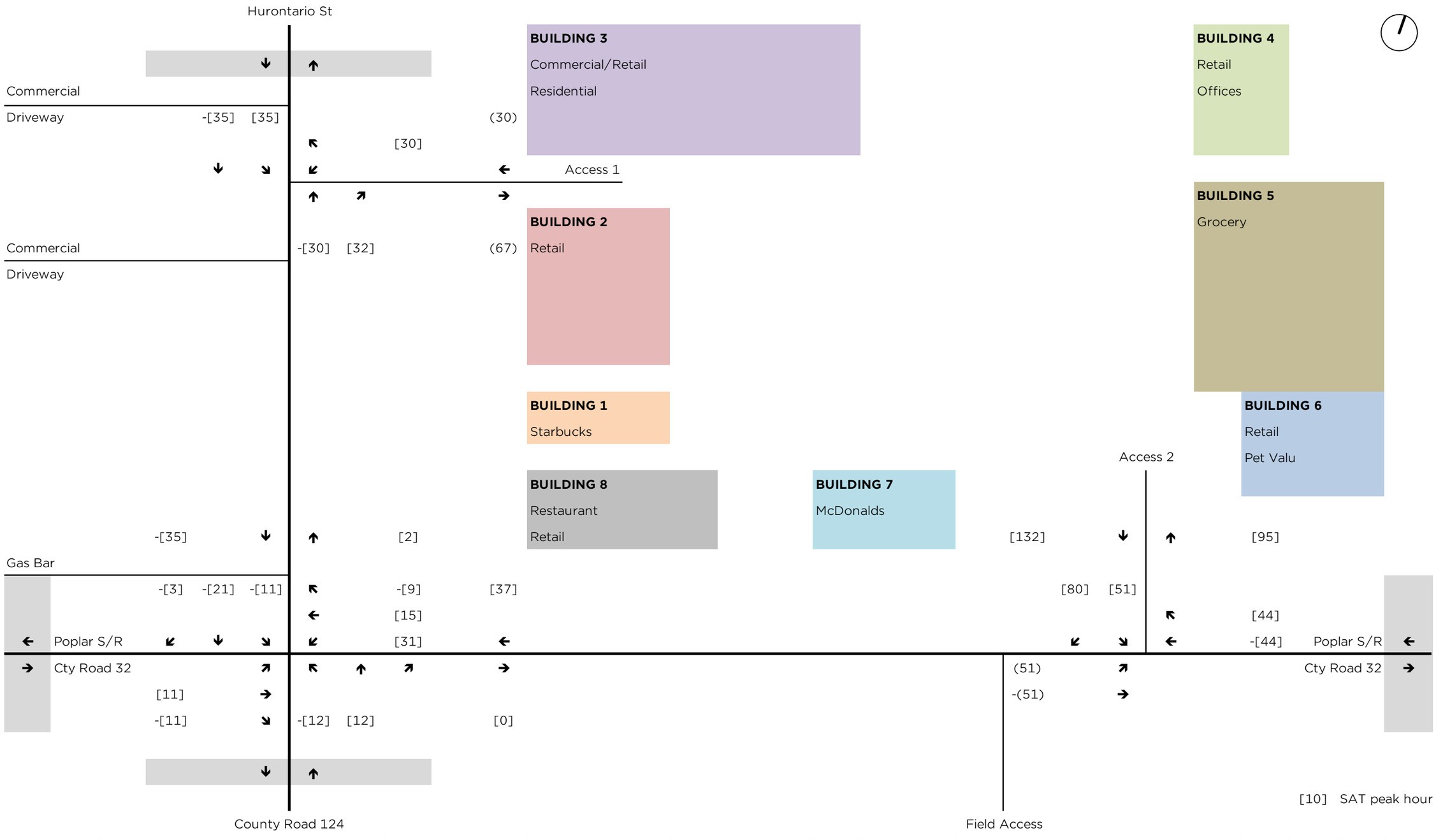
THE GATEWAY CENTRE – TRANSPORTATION IMPACT STUDY

Figure 14B: Site Traffic – New Saturday Trips



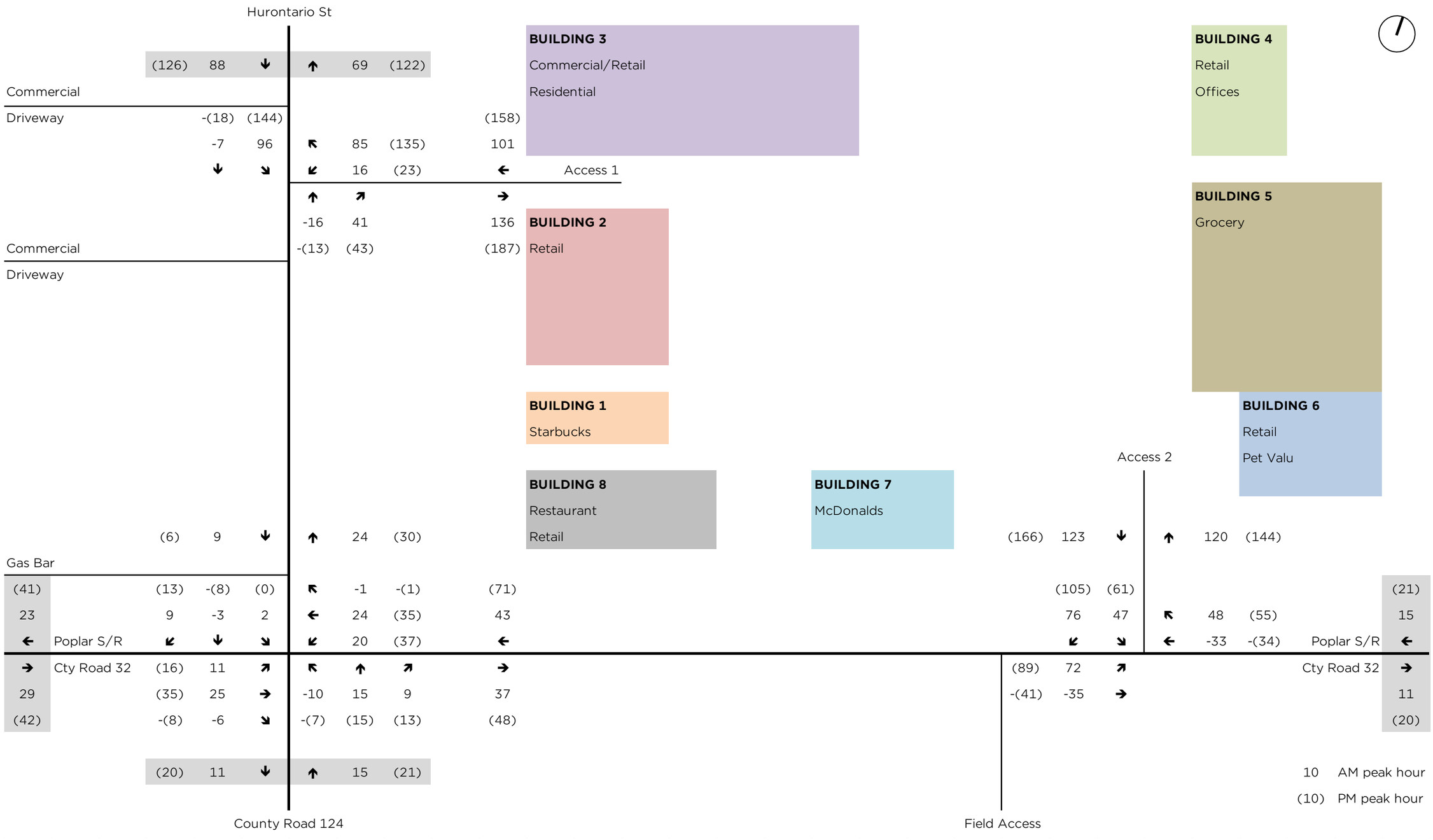
THE GATEWAY CENTRE – TRANSPORTATION IMPACT STUDY

Figure 15A: Site Traffic – Weekday Pass-By Trips



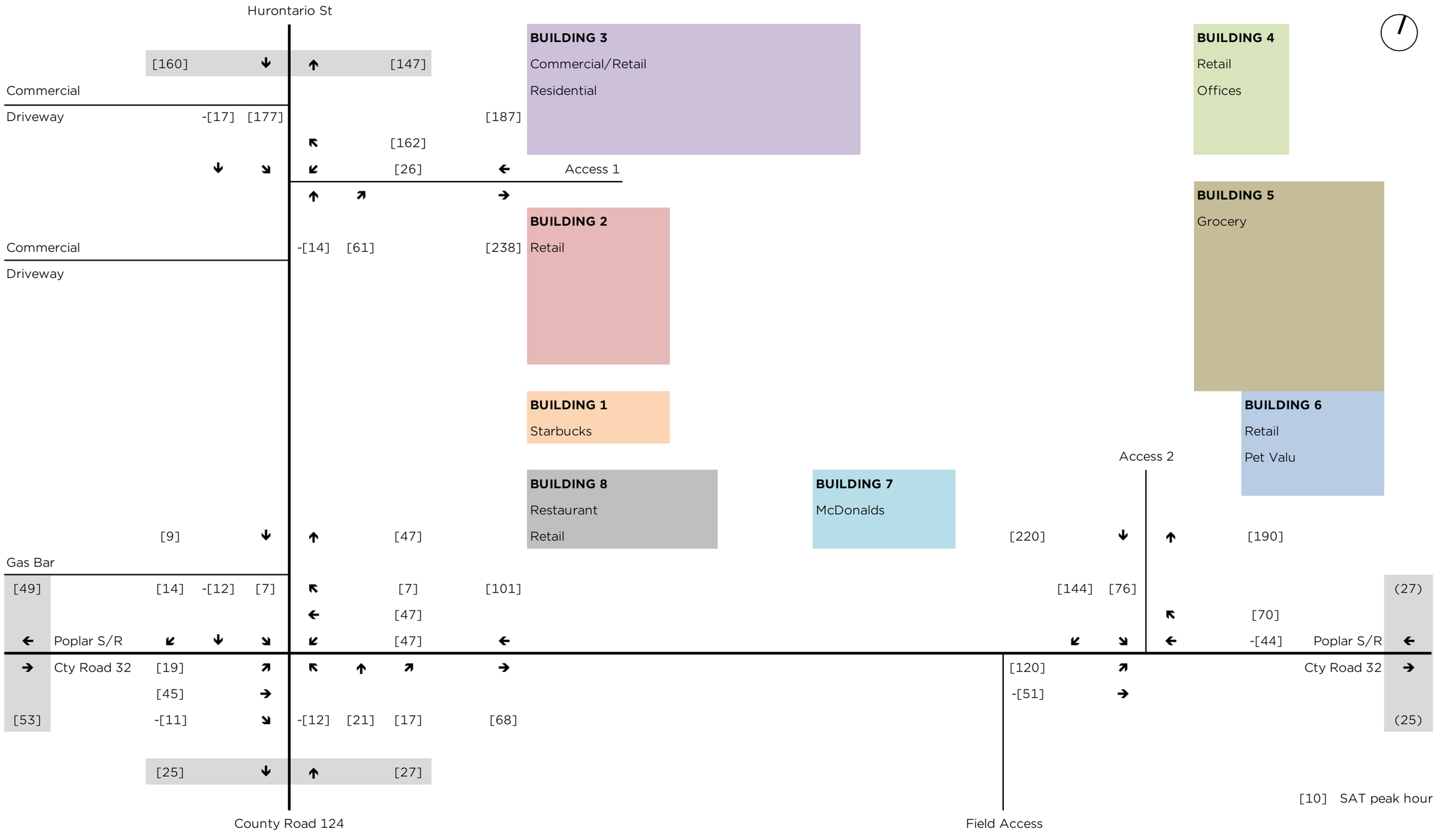
THE GATEWAY CENTRE – TRANSPORTATION IMPACT STUDY

Figure 15B: Site Traffic – Saturday Pass-By Trips



THE GATEWAY CENTRE – TRANSPORTATION IMPACT STUDY

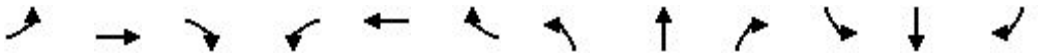
Figure 16A: Site Traffic – Total Weekday Trips



THE GATEWAY CENTRE – TRANSPORTATION IMPACT STUDY

Figure 16B: Site Traffic – Total Saturday Trips

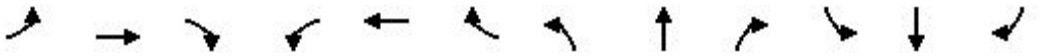
Appendix F:
Traffic Operations – Background



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	104	3	11	0	8	11	33	37	0	3	9	110
Future Volume (vph)	104	3	11	0	8	11	33	37	0	3	9	110
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	151	4	16	0	12	16	48	54	0	4	13	159

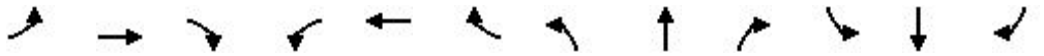
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	171	28	102	176
Volume Left (vph)	151	0	48	4
Volume Right (vph)	16	16	0	159
Hadj (s)	0.15	-0.31	0.13	-0.50
Departure Headway (s)	4.7	4.4	4.7	4.0
Degree Utilization, x	0.22	0.03	0.13	0.20
Capacity (veh/h)	718	743	723	844
Control Delay (s)	9.1	7.6	8.4	8.0
Approach Delay (s)	9.1	7.6	8.4	8.0
Approach LOS	A	A	A	A

Intersection Summary				
Delay	8.4			
Level of Service	A			
Intersection Capacity Utilization	30.4%	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)	60	87	68	103	70	122	47	378	97	56	277	36
Future Volume (vph)	60	87	68	103	70	122	47	378	97	56	277	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.90		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1759		1789	1704		1772	1826		1789	1849	
Flt Permitted	0.46	1.00		0.51	1.00		0.46	1.00		0.28	1.00	
Satd. Flow (perm)	859	1759		957	1704		862	1826		527	1849	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	70	101	79	120	81	142	55	440	113	65	322	42
RTOR Reduction (vph)	0	29	0	0	65	0	0	8	0	0	4	0
Lane Group Flow (vph)	70	151	0	120	158	0	55	545	0	65	360	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	3%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	20.4	14.1		22.0	14.9		45.8	40.5		46.2	40.7	
Effective Green, g (s)	20.4	14.1		22.0	14.9		45.8	40.5		46.2	40.7	
Actuated g/C Ratio	0.23	0.16		0.25	0.17		0.51	0.45		0.52	0.46	
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	1.0		3.0	1.0	
Lane Grp Cap (vph)	262	278		302	284		496	829		350	843	
v/s Ratio Prot	0.02	0.09		c0.03	c0.09		0.01	c0.30		c0.01	0.19	
v/s Ratio Perm	0.04			0.07			0.05			0.08		
v/c Ratio	0.27	0.54		0.40	0.56		0.11	0.66		0.19	0.43	
Uniform Delay, d1	27.7	34.6		27.2	34.1		11.1	19.0		12.3	16.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	2.7		0.9	2.9		0.1	4.1		0.3	1.6	
Delay (s)	28.2	37.3		28.1	37.0		11.2	23.0		12.5	18.0	
Level of Service	C	D		C	D		B	C		B	B	
Approach Delay (s)		34.7			33.9			22.0			17.1	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	25.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	89.2	Sum of lost time (s)	22.0
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



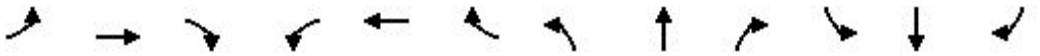
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	394	12	88	388	49	45	62	121	20	25	15
Future Volume (vph)	45	394	12	88	388	49	45	62	121	20	25	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		5.4	5.4		5.4	5.4	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.98		1.00	0.90		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1875		1789	1852		1789	1696		1783	1779	
Flt Permitted	0.40	1.00		0.38	1.00		0.73	1.00		0.55	1.00	
Satd. Flow (perm)	755	1875		713	1852		1369	1696		1036	1779	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	52	458	14	102	451	57	52	72	141	23	29	17
RTOR Reduction (vph)	0	2	0	0	5	0	0	116	0	0	14	0
Lane Group Flow (vph)	52	470	0	102	503	0	52	97	0	23	32	0
Confl. Peds. (#/hr)										3		
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	32.8	28.6		35.8	30.1		10.6	10.6		10.6	10.6	
Effective Green, g (s)	32.8	28.6		35.8	30.1		10.6	10.6		10.6	10.6	
Actuated g/C Ratio	0.55	0.48		0.60	0.50		0.18	0.18		0.18	0.18	
Clearance Time (s)	4.0	5.7		4.0	5.7		5.4	5.4		5.4	5.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	485	893		527	929		241	299		183	314	
v/s Ratio Prot	0.01	0.25		c0.02	c0.27			c0.06			0.02	
v/s Ratio Perm	0.05			0.10			0.04			0.02		
v/c Ratio	0.11	0.53		0.19	0.54		0.22	0.32		0.13	0.10	
Uniform Delay, d1	6.5	11.0		5.6	10.2		21.1	21.6		20.8	20.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	2.2		0.2	2.3		0.5	0.6		0.3	0.1	
Delay (s)	6.6	13.2		5.8	12.5		21.6	22.2		21.1	20.9	
Level of Service	A	B		A	B		C	C		C	C	
Approach Delay (s)		12.5			11.4			22.1			20.9	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	14.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	15.1
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	4	0	0	66	18	2
Future Volume (Veh/h)	4	0	0	66	18	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	0	0	72	20	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	93	21	22			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	93	21	22			
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)	907	1056	1593			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	4	72	22
Volume Left	4	0	0
Volume Right	0	0	2
cSH	907	1593	1700
Volume to Capacity	0.00	0.00	0.01
Queue Length 95th (m)	0.1	0.0	0.0
Control Delay (s)	9.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.0	0.0	0.0
Approach LOS	A		

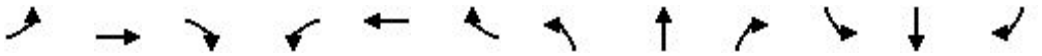
Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	13.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	63	10	36	0	10	11	18	37	0	14	35	68
Future Volume (vph)	63	10	36	0	10	11	18	37	0	14	35	68
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	70	11	40	0	11	12	20	41	0	16	39	76

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	121	23	61	131
Volume Left (vph)	70	0	20	16
Volume Right (vph)	40	12	0	76
Hadj (s)	-0.05	-0.28	0.10	-0.29
Departure Headway (s)	4.3	4.2	4.5	4.0
Degree Utilization, x	0.14	0.03	0.08	0.15
Capacity (veh/h)	801	804	769	865
Control Delay (s)	8.0	7.3	7.8	7.7
Approach Delay (s)	8.0	7.3	7.8	7.7
Approach LOS	A	A	A	A

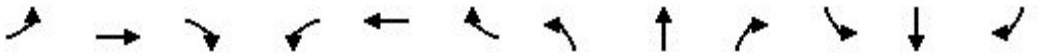
Intersection Summary				
Delay	7.8			
Level of Service	A			
Intersection Capacity Utilization	26.8%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	46	63	83	42	73	45	555	97	67	522	21
Future Volume (vph)	20	46	63	83	42	73	45	555	97	67	522	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.90		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1720		1789	1704		1789	1841		1789	1873	
Flt Permitted	0.68	1.00		0.48	1.00		0.33	1.00		0.21	1.00	
Satd. Flow (perm)	1279	1720		903	1704		616	1841		387	1873	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	21	48	66	87	44	77	47	584	102	71	549	22
RTOR Reduction (vph)	0	54	0	0	65	0	0	5	0	0	1	0
Lane Group Flow (vph)	21	60	0	87	56	0	47	681	0	71	570	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	11.9	9.4		19.9	13.4		47.3	43.5		50.3	45.0	
Effective Green, g (s)	11.9	9.4		19.9	13.4		47.3	43.5		50.3	45.0	
Actuated g/C Ratio	0.14	0.11		0.23	0.15		0.55	0.50		0.58	0.52	
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	1.0		3.0	1.0	
Lane Grp Cap (vph)	190	186		273	263		387	923		310	972	
v/s Ratio Prot	0.00	0.03		c0.02	0.03		0.01	c0.37		c0.01	0.30	
v/s Ratio Perm	0.01			c0.05			0.06			0.12		
v/c Ratio	0.11	0.32		0.32	0.21		0.12	0.74		0.23	0.59	
Uniform Delay, d1	32.6	35.7		27.1	32.0		10.1	17.1		11.1	14.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	1.4		0.7	0.6		0.1	5.3		0.4	2.6	
Delay (s)	32.9	37.1		27.8	32.6		10.2	22.3		11.4	17.0	
Level of Service	C	D		C	C		B	C		B	B	
Approach Delay (s)		36.4			30.6			21.6			16.4	
Approach LOS		D			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	86.7	Sum of lost time (s)	22.0
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
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)	43	462	56	71	497	22	40	32	83	39	47	42
Future Volume (vph)	43	462	56	71	497	22	40	32	83	39	47	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.89		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1853		1789	1872		1789	1680		1789	1749	
Flt Permitted	0.20	1.00		0.20	1.00		0.69	1.00		0.67	1.00	
Satd. Flow (perm)	384	1853		384	1872		1305	1680		1271	1749	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	48	513	62	79	552	24	44	36	92	43	52	47
RTOR Reduction (vph)	0	8	0	0	3	0	0	60	0	0	30	0
Lane Group Flow (vph)	48	567	0	79	573	0	44	68	0	43	69	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	22.3	19.6		22.3	19.6		19.4	19.4		19.4	19.4	
Effective Green, g (s)	22.3	19.6		22.3	19.6		19.4	19.4		19.4	19.4	
Actuated g/C Ratio	0.40	0.36		0.40	0.36		0.35	0.35		0.35	0.35	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	223	657		223	664		458	590		446	614	
v/s Ratio Prot	0.01	0.31		c0.02	c0.31			c0.04			0.04	
v/s Ratio Perm	0.08			0.13			0.03			0.03		
v/c Ratio	0.22	0.86		0.35	0.86		0.10	0.12		0.10	0.11	
Uniform Delay, d1	11.5	16.6		11.7	16.6		12.0	12.1		12.0	12.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	11.3		1.0	11.3		0.4	0.4		0.4	0.4	
Delay (s)	12.0	27.9		12.7	27.8		12.4	12.5		12.4	12.5	
Level of Service	B	C		B	C		B	B		B	B	
Approach Delay (s)		26.7			26.0			12.5			12.4	
Approach LOS		C			C			B			B	

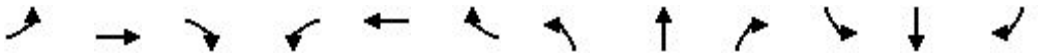
Intersection Summary			
HCM 2000 Control Delay	23.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	55.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	10	0	0	45	62	9
Future Volume (Veh/h)	10	0	0	45	62	9
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	0	0	49	67	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	121	72	77			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	121	72	77			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	874	990	1522			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	11	49	77
Volume Left	11	0	0
Volume Right	0	0	10
cSH	874	1522	1700
Volume to Capacity	0.01	0.00	0.05
Queue Length 95th (m)	0.3	0.0	0.0
Control Delay (s)	9.2	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.2	0.0	0.0
Approach LOS	A		

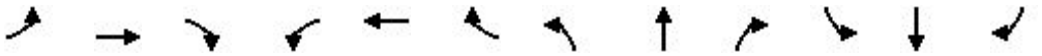
Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	13.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	114	3	11	0	8	11	33	37	0	3	9	120
Future Volume (vph)	114	3	11	0	8	11	33	37	0	3	9	120
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	165	4	16	0	12	16	48	54	0	4	13	174

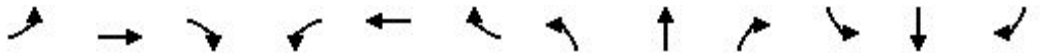
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	185	28	102	191
Volume Left (vph)	165	0	48	4
Volume Right (vph)	16	16	0	174
Hadj (s)	0.16	-0.31	0.13	-0.51
Departure Headway (s)	4.8	4.5	4.8	4.0
Degree Utilization, x	0.24	0.03	0.14	0.21
Capacity (veh/h)	711	730	712	835
Control Delay (s)	9.3	7.7	8.5	8.2
Approach Delay (s)	9.3	7.7	8.5	8.2
Approach LOS	A	A	A	A

Intersection Summary				
Delay	8.6			
Level of Service	A			
Intersection Capacity Utilization	35.6%	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)	66	95	74	113	77	133	51	410	106	62	297	40
Future Volume (vph)	66	95	74	113	77	133	51	410	106	62	297	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.91		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1759		1789	1705		1772	1826		1789	1847	
Flt Permitted	0.49	1.00		0.44	1.00		0.42	1.00		0.21	1.00	
Satd. Flow (perm)	922	1759		826	1705		777	1826		391	1847	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	77	110	86	131	90	155	59	477	123	72	345	47
RTOR Reduction (vph)	0	29	0	0	61	0	0	8	0	0	4	0
Lane Group Flow (vph)	77	167	0	131	184	0	59	592	0	72	388	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	3%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	23.1	16.5		28.1	19.0		45.3	39.7		45.9	40.0	
Effective Green, g (s)	23.1	16.5		28.1	19.0		45.3	39.7		45.9	40.0	
Actuated g/C Ratio	0.25	0.18		0.30	0.20		0.49	0.43		0.49	0.43	
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	1.0		3.0	1.0	
Lane Grp Cap (vph)	289	311		343	347		437	777		281	792	
v/s Ratio Prot	0.02	0.10		c0.04	c0.11		0.01	c0.32		c0.02	0.21	
v/s Ratio Perm	0.05			0.08			0.06			0.11		
v/c Ratio	0.27	0.54		0.38	0.53		0.14	0.76		0.26	0.49	
Uniform Delay, d1	27.6	34.9		24.7	33.1		13.1	22.7		15.1	19.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	2.3		0.7	1.9		0.1	7.0		0.5	2.2	
Delay (s)	28.1	37.2		25.5	35.0		13.3	29.7		15.6	21.4	
Level of Service	C	D		C	D		B	C		B	C	
Approach Delay (s)		34.6			31.7			28.2			20.5	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	93.2	Sum of lost time (s)	22.0
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



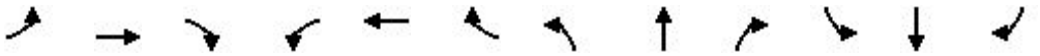
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	50	435	13	95	428	54	49	67	132	22	27	17
Future Volume (vph)	50	435	13	95	428	54	49	67	132	22	27	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		5.4	5.4		5.4	5.4	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.98		1.00	0.90		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1875		1789	1852		1789	1696		1783	1773	
Flt Permitted	0.35	1.00		0.33	1.00		0.72	1.00		0.52	1.00	
Satd. Flow (perm)	653	1875		627	1852		1363	1696		968	1773	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	58	506	15	110	498	63	57	78	153	26	31	20
RTOR Reduction (vph)	0	2	0	0	6	0	0	122	0	0	16	0
Lane Group Flow (vph)	58	519	0	110	555	0	57	109	0	26	35	0
Confl. Peds. (#/hr)										3		
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	32.2	28.0		35.0	29.4		11.0	11.0		11.0	11.0	
Effective Green, g (s)	32.2	28.0		35.0	29.4		11.0	11.0		11.0	11.0	
Actuated g/C Ratio	0.54	0.47		0.59	0.49		0.18	0.18		0.18	0.18	
Clearance Time (s)	4.0	5.7		4.0	5.7		5.4	5.4		5.4	5.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	432	879		476	912		251	312		178	326	
v/s Ratio Prot	0.01	0.28		c0.02	c0.30			c0.06			0.02	
v/s Ratio Perm	0.06			0.11			0.04			0.03		
v/c Ratio	0.13	0.59		0.23	0.61		0.23	0.35		0.15	0.11	
Uniform Delay, d1	6.9	11.6		6.2	11.0		20.7	21.2		20.4	20.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	2.9		0.2	3.0		0.5	0.7		0.4	0.1	
Delay (s)	7.1	14.6		6.4	14.0		21.2	21.9		20.8	20.4	
Level of Service	A	B		A	B		C	C		C	C	
Approach Delay (s)		13.8			12.8			21.8			20.5	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	59.7	Sum of lost time (s)	15.1
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	0	0	65	18	2
Future Volume (Veh/h)	5	0	0	65	18	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	0	0	71	20	2
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	92	21	22			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	92	21	22			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	908	1056	1593			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	5	71	22
Volume Left	5	0	0
Volume Right	0	0	2
cSH	908	1593	1700
Volume to Capacity	0.01	0.00	0.01
Queue Length 95th (m)	0.1	0.0	0.0
Control Delay (s)	9.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.0	0.0	0.0
Approach LOS	A		

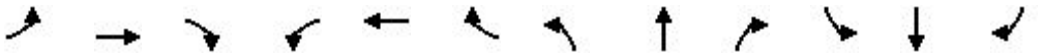
Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	13.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	68	10	36	0	10	11	18	37	0	14	35	74
Future Volume (vph)	68	10	36	0	10	11	18	37	0	14	35	74
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	76	11	40	0	11	12	20	41	0	16	39	82

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	127	23	61	137
Volume Left (vph)	76	0	20	16
Volume Right (vph)	40	12	0	82
Hadj (s)	-0.04	-0.28	0.10	-0.30
Departure Headway (s)	4.3	4.2	4.5	4.0
Degree Utilization, x	0.15	0.03	0.08	0.15
Capacity (veh/h)	796	798	764	863
Control Delay (s)	8.1	7.3	7.9	7.7
Approach Delay (s)	8.1	7.3	7.9	7.7
Approach LOS	A	A	A	A

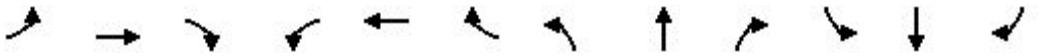
Intersection Summary				
Delay	7.9			
Level of Service	A			
Intersection Capacity Utilization	27.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	51	69	90	46	79	49	600	106	72	564	23
Future Volume (vph)	22	51	69	90	46	79	49	600	106	72	564	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.90		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1721		1789	1704		1789	1841		1789	1872	
Flt Permitted	0.67	1.00		0.48	1.00		0.29	1.00		0.16	1.00	
Satd. Flow (perm)	1268	1721		897	1704		538	1841		293	1872	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	23	54	73	95	48	83	52	632	112	76	594	24
RTOR Reduction (vph)	0	53	0	0	65	0	0	5	0	0	1	0
Lane Group Flow (vph)	23	74	0	95	66	0	52	739	0	76	617	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.3	9.8		20.5	13.9		46.8	43.0		50.0	44.6	
Effective Green, g (s)	12.3	9.8		20.5	13.9		46.8	43.0		50.0	44.6	
Actuated g/C Ratio	0.14	0.11		0.24	0.16		0.54	0.50		0.58	0.51	
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	1.0		3.0	1.0	
Lane Grp Cap (vph)	194	194		279	272		344	912		261	961	
v/s Ratio Prot	0.00	0.04		c0.03	0.04		0.01	c0.40		c0.02	0.33	
v/s Ratio Perm	0.01			c0.05			0.07			0.15		
v/c Ratio	0.12	0.38		0.34	0.24		0.15	0.81		0.29	0.64	
Uniform Delay, d1	32.4	35.7		26.8	31.9		10.8	18.5		12.7	15.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	1.7		0.7	0.6		0.2	7.7		0.6	3.3	
Delay (s)	32.7	37.4		27.6	32.5		11.0	26.2		13.3	18.6	
Level of Service	C	D		C	C		B	C		B	B	
Approach Delay (s)		36.7			30.4			25.2			18.0	
Approach LOS		D			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	24.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	86.8	Sum of lost time (s)	22.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



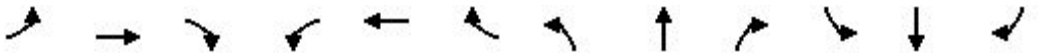
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	510	61	77	549	24	43	34	90	43	51	46
Future Volume (vph)	48	510	61	77	549	24	43	34	90	43	51	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.89		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1853		1789	1869		1789	1679		1789	1750	
Flt Permitted	0.18	1.00		0.17	1.00		0.69	1.00		0.67	1.00	
Satd. Flow (perm)	341	1853		326	1869		1295	1679		1260	1750	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	53	567	68	86	610	27	48	38	100	48	57	51
RTOR Reduction (vph)	0	7	0	0	2	0	0	67	0	0	34	0
Lane Group Flow (vph)	53	628	0	86	635	0	48	71	0	48	74	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	5%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	25.0	22.1		27.0	23.1		19.2	19.2		19.2	19.2	
Effective Green, g (s)	25.0	22.1		27.0	23.1		19.2	19.2		19.2	19.2	
Actuated g/C Ratio	0.43	0.38		0.46	0.39		0.33	0.33		0.33	0.33	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	216	697		247	735		423	549		412	572	
v/s Ratio Prot	0.01	0.34		c0.02	c0.34			c0.04			0.04	
v/s Ratio Perm	0.09			0.14			0.04			0.04		
v/c Ratio	0.25	0.90		0.35	0.86		0.11	0.13		0.12	0.13	
Uniform Delay, d1	11.7	17.3		11.5	16.4		13.8	13.9		13.8	13.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	14.7		0.9	10.3		0.5	0.5		0.6	0.5	
Delay (s)	12.3	32.0		12.3	26.6		14.3	14.4		14.4	14.3	
Level of Service	B	C		B	C		B	B		B	B	
Approach Delay (s)		30.5			24.9			14.4			14.4	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	25.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	58.7	Sum of lost time (s)	13.5
Intersection Capacity Utilization	61.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	0	0	44	61	10
Future Volume (Veh/h)	11	0	0	44	61	10
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)	12	0	0	48	66	11
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	120	72	77			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	120	72	77			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	876	991	1522			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	12	48	77
Volume Left	12	0	0
Volume Right	0	0	11
cSH	876	1522	1700
Volume to Capacity	0.01	0.00	0.05
Queue Length 95th (m)	0.3	0.0	0.0
Control Delay (s)	9.2	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.2	0.0	0.0
Approach LOS	A		

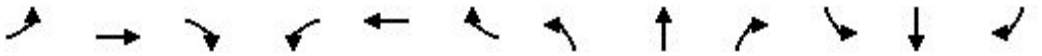
Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	13.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	124	3	11	0	8	11	33	37	0	3	9	130
Future Volume (vph)	124	3	11	0	8	11	33	37	0	3	9	130
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	180	4	16	0	12	16	48	54	0	4	13	188

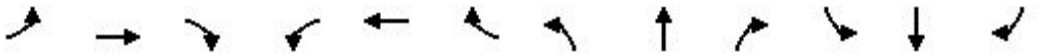
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	200	28	102	205
Volume Left (vph)	180	0	48	4
Volume Right (vph)	16	16	0	188
Hadj (s)	0.17	-0.31	0.13	-0.51
Departure Headway (s)	4.8	4.5	4.8	4.1
Degree Utilization, x	0.27	0.04	0.14	0.23
Capacity (veh/h)	705	716	701	826
Control Delay (s)	9.5	7.7	8.6	8.3
Approach Delay (s)	9.5	7.7	8.6	8.3
Approach LOS	A	A	A	A

Intersection Summary				
Delay	8.8			
Level of Service	A			
Intersection Capacity Utilization	36.8%	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)	73	104	81	123	85	146	56	447	116	67	319	44
Future Volume (vph)	73	104	81	123	85	146	56	447	116	67	319	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.91		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1760		1789	1705		1772	1825		1789	1847	
Flt Permitted	0.44	1.00		0.41	1.00		0.38	1.00		0.15	1.00	
Satd. Flow (perm)	822	1760		764	1705		710	1825		281	1847	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	85	121	94	143	99	170	65	520	135	78	371	51
RTOR Reduction (vph)	0	29	0	0	60	0	0	8	0	0	4	0
Lane Group Flow (vph)	85	186	0	143	209	0	65	647	0	78	418	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	3%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	24.2	17.4		29.2	19.9		45.5	39.7		46.1	40.0	
Effective Green, g (s)	24.2	17.4		29.2	19.9		45.5	39.7		46.1	40.0	
Actuated g/C Ratio	0.26	0.18		0.31	0.21		0.48	0.42		0.49	0.42	
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	1.0		3.0	1.0	
Lane Grp Cap (vph)	280	324		336	359		407	766		234	781	
v/s Ratio Prot	0.02	0.11		c0.04	c0.12		0.01	c0.35		c0.02	0.23	
v/s Ratio Perm	0.06			0.09			0.07			0.14		
v/c Ratio	0.30	0.58		0.43	0.58		0.16	0.84		0.33	0.54	
Uniform Delay, d1	27.6	35.2		24.8	33.6		13.8	24.6		16.8	20.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	3.0		0.9	2.8		0.2	11.0		0.8	2.6	
Delay (s)	28.2	38.1		25.7	36.4		14.0	35.7		17.7	22.9	
Level of Service	C	D		C	D		B	D		B	C	
Approach Delay (s)		35.3			32.7			33.7			22.1	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	30.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	94.5	Sum of lost time (s)	22.0
Intersection Capacity Utilization	70.7%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



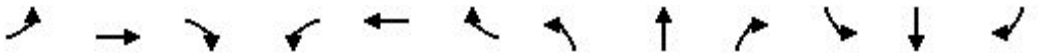
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	480	14	103	472	59	54	74	144	24	29	19
Future Volume (vph)	55	480	14	103	472	59	54	74	144	24	29	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		5.4	5.4		5.4	5.4	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.98		1.00	0.90		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1876		1789	1852		1789	1697		1783	1772	
Flt Permitted	0.29	1.00		0.28	1.00		0.72	1.00		0.47	1.00	
Satd. Flow (perm)	545	1876		529	1852		1357	1697		892	1772	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	64	558	16	120	549	69	63	86	167	28	34	22
RTOR Reduction (vph)	0	2	0	0	6	0	0	120	0	0	18	0
Lane Group Flow (vph)	64	572	0	120	612	0	63	133	0	28	38	0
Confl. Peds. (#/hr)										3		
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	31.4	27.3		34.2	28.7		11.5	11.5		11.5	11.5	
Effective Green, g (s)	31.4	27.3		34.2	28.7		11.5	11.5		11.5	11.5	
Actuated g/C Ratio	0.53	0.46		0.58	0.48		0.19	0.19		0.19	0.19	
Clearance Time (s)	4.0	5.7		4.0	5.7		5.4	5.4		5.4	5.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	373	862		421	894		262	328		172	343	
v/s Ratio Prot	0.01	0.31		c0.03	c0.33			c0.08			0.02	
v/s Ratio Perm	0.08			0.14			0.05			0.03		
v/c Ratio	0.17	0.66		0.29	0.68		0.24	0.41		0.16	0.11	
Uniform Delay, d1	7.6	12.5		6.9	11.9		20.3	21.0		19.9	19.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	4.0		0.4	4.2		0.5	0.8		0.4	0.1	
Delay (s)	7.8	16.5		7.2	16.1		20.7	21.8		20.4	19.9	
Level of Service	A	B		A	B		C	C		C	B	
Approach Delay (s)		15.6			14.7			21.6			20.1	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	59.4	Sum of lost time (s)	15.1
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	0	0	65	17	3
Future Volume (Veh/h)	5	0	0	65	17	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	0	0	71	18	3
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	90	20	21			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	90	20	21			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	910	1058	1595			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	5	71	21
Volume Left	5	0	0
Volume Right	0	0	3
cSH	910	1595	1700
Volume to Capacity	0.01	0.00	0.01
Queue Length 95th (m)	0.1	0.0	0.0
Control Delay (s)	9.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.0	0.0	0.0
Approach LOS	A		

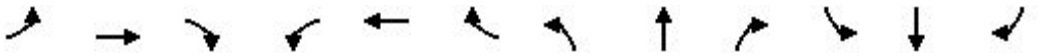
Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	13.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	73	10	36	0	10	11	18	37	0	14	35	80
Future Volume (vph)	73	10	36	0	10	11	18	37	0	14	35	80
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	81	11	40	0	11	12	20	41	0	16	39	89

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	132	23	61	144
Volume Left (vph)	81	0	20	16
Volume Right (vph)	40	12	0	89
Hadj (s)	-0.03	-0.28	0.10	-0.31
Departure Headway (s)	4.3	4.2	4.5	4.0
Degree Utilization, x	0.16	0.03	0.08	0.16
Capacity (veh/h)	791	793	760	862
Control Delay (s)	8.2	7.3	7.9	7.8
Approach Delay (s)	8.2	7.3	7.9	7.8
Approach LOS	A	A	A	A

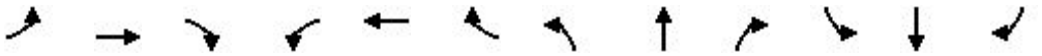
Intersection Summary				
Delay	7.9			
Level of Service	A			
Intersection Capacity Utilization	28.1%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	56	75	98	50	86	54	650	115	78	610	26
Future Volume (vph)	24	56	75	98	50	86	54	650	115	78	610	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.91		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1722		1789	1705		1789	1841		1789	1872	
Flt Permitted	0.67	1.00		0.46	1.00		0.23	1.00		0.12	1.00	
Satd. Flow (perm)	1253	1722		862	1705		440	1841		233	1872	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	25	59	79	103	53	91	57	684	121	82	642	27
RTOR Reduction (vph)	0	46	0	0	56	0	0	5	0	0	1	0
Lane Group Flow (vph)	25	92	0	103	88	0	57	800	0	82	668	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	15.9	13.2		24.9	17.7		55.7	50.4		56.7	50.9	
Effective Green, g (s)	15.9	13.2		24.9	17.7		55.7	50.4		56.7	50.9	
Actuated g/C Ratio	0.16	0.13		0.25	0.18		0.56	0.51		0.58	0.52	
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	1.0		3.0	1.0	
Lane Grp Cap (vph)	216	230		285	306		321	941		225	966	
v/s Ratio Prot	0.00	0.05		c0.03	0.05		0.01	c0.43		c0.02	0.36	
v/s Ratio Perm	0.02			c0.06			0.09			0.19		
v/c Ratio	0.12	0.40		0.36	0.29		0.18	0.85		0.36	0.69	
Uniform Delay, d1	35.2	39.1		29.4	35.0		12.2	20.8		15.8	17.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	1.6		0.8	0.7		0.3	9.5		1.0	4.1	
Delay (s)	35.4	40.6		30.2	35.7		12.5	30.4		16.8	22.0	
Level of Service	D	D		C	D		B	C		B	C	
Approach Delay (s)		39.8			33.4			29.2			21.4	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	98.6	Sum of lost time (s)	22.0
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
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)	52	563	67	84	606	27	47	37	98	47	56	51
Future Volume (vph)	52	563	67	84	606	27	47	37	98	47	56	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.89		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1854		1789	1869		1789	1678		1789	1748	
Flt Permitted	0.15	1.00		0.15	1.00		0.68	1.00		0.66	1.00	
Satd. Flow (perm)	286	1854		277	1869		1282	1678		1246	1748	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	58	626	74	93	673	30	52	41	109	52	62	57
RTOR Reduction (vph)	0	6	0	0	2	0	0	76	0	0	40	0
Lane Group Flow (vph)	58	694	0	93	701	0	52	74	0	52	79	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	5%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	29.2	26.3		31.0	27.2		19.3	19.3		19.3	19.3	
Effective Green, g (s)	29.2	26.3		31.0	27.2		19.3	19.3		19.3	19.3	
Actuated g/C Ratio	0.46	0.42		0.49	0.43		0.31	0.31		0.31	0.31	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	202	775		227	808		393	514		382	536	
v/s Ratio Prot	0.01	0.37		c0.02	c0.37			0.04			c0.05	
v/s Ratio Perm	0.12			0.18			0.04			0.04		
v/c Ratio	0.29	0.89		0.41	0.87		0.13	0.14		0.14	0.15	
Uniform Delay, d1	11.9	17.0		11.9	16.2		15.8	15.8		15.8	15.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	12.8		1.2	9.7		0.7	0.6		0.7	0.6	
Delay (s)	12.7	29.8		13.1	25.9		16.4	16.4		16.5	16.4	
Level of Service	B	C		B	C		B	B		B	B	
Approach Delay (s)		28.5			24.4			16.4			16.4	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	24.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	62.9	Sum of lost time (s)	13.5
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	0	0	43	60	11
Future Volume (Veh/h)	12	0	0	43	60	11
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)	13	0	0	47	65	12
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	118	71	77			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	118	71	77			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	878	991	1522			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	13	47	77
Volume Left	13	0	0
Volume Right	0	0	12
cSH	878	1522	1700
Volume to Capacity	0.01	0.00	0.05
Queue Length 95th (m)	0.3	0.0	0.0
Control Delay (s)	9.2	0.0	0.0
Lane LOS	A		
Approach Delay (s)	9.2	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	13.8%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix G: TTS Data

TTS Data Summary

TTS 2022 Search Parameters

Cross Tabulation Query Form - Trip - 2022

Row: 2022 TTS zone of destination - tts22_dest

Column: Planning district of origin - pd_orig

Table: Start time of trip - start_time

RowG:(17199)

ColG:

TblG:(700-1000, 1500-1800)

Filters:

(2022 TTS zone of destination - tts22_dest In 17199)

*Note: Search criteria reflective of inbound travel during AM/PM peak periods.

Origin/Destination parameters reversed for outbound travel

Data Outputs

Planning District	Inbound Trips	Outbound Trips	Total Trips	Local Travel Direction
Barrie	61	16	77	east
Blue Mountains	526	611	1,137	west
Clearview	246	86	332	south
Collingwood	1,552	1,293	2,845	internal
Grey Highlands	127	127	254	west
Guelph	8	-	8	south
Markham	12	-	12	south
Meaford	-	33	33	west
Midland	43	-	43	north
Oro-Medonte	-	37	37	east
Owen Sound	-	8	8	west
PD 13 of Toronto	31	-	31	south
Tiny	362	362	724	north
Wasaga Beach	226	333	559	east
Whitchurch-Stouffville	111	-	111	east
Total	**3,305**	**2,906**	**6,211**	

Travel Summary

Local Direction of Travel

Excludes external and undefined locations

Trip Type	North	South	East	West	Internal	Total
Inbound	405	297	398	653	1,552	3,305
Outbound	362	86	386	779	1,293	2,906
Total	**767**	**383**	**784**	**1,432**	**2,845**	**6,211**
	12%	**6%**	**13%**	**23%**	**46%**	**100%**

Travel Proportions

Proportion	North	South	East	West	Internal	Total
Calculated	12%	9%	12%	20%	47%	100%

Redistribution of Internal/Local Trips

Trips identified as internal to Collingwood are redistributed based on location of the subject site

	North	South	East	West	Internal	Total
Internal Redistribution	5%	30%	65%	0%	-	100%

Revised Local Direction of Travel

Considers redistributed internal/local trips

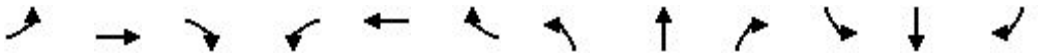
Trip Type	North	South	East	West	Internal	Total
Inbound	483	763	1,407	653	-	3,305
Outbound	427	474	1,226	779	-	2,906
Total	**909**	**1,237**	**2,633**	**1,432**	**-**	**6,211**

Revised Travel Proportions

Reflective of revised trip distribution established above, these values are considered for new site traffic

Proportion	North	South	East	West	Internal	Total
Calculated	15%	20%	42%	23%	-	100%
Rounded	15%	20%	40%	25%	-	100%

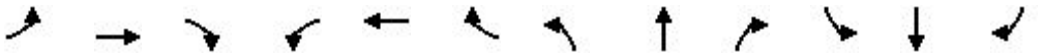
Appendix H:
Traffic Operations – Total



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	104	3	17	0	8	11	54	86	0	3	23	110
Future Volume (vph)	104	3	17	0	8	11	54	86	0	3	23	110
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	151	4	25	0	12	16	78	125	0	4	33	159

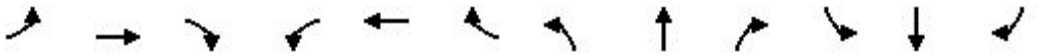
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	180	28	203	196
Volume Left (vph)	151	0	78	4
Volume Right (vph)	25	16	0	159
Hadj (s)	0.12	-0.31	0.11	-0.45
Departure Headway (s)	5.0	4.8	4.8	4.2
Degree Utilization, x	0.25	0.04	0.27	0.23
Capacity (veh/h)	671	668	717	795
Control Delay (s)	9.6	8.0	9.5	8.5
Approach Delay (s)	9.6	8.0	9.5	8.5
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.2			
Level of Service	A			
Intersection Capacity Utilization	39.3%	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)	60	87	68	110	70	136	47	378	99	60	277	36
Future Volume (vph)	60	87	68	110	70	136	47	378	99	60	277	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.90		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1759		1789	1697		1772	1825		1789	1849	
Flt Permitted	0.51	1.00		0.46	1.00		0.45	1.00		0.25	1.00	
Satd. Flow (perm)	957	1759		867	1697		838	1825		479	1849	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	70	101	79	128	81	158	55	440	115	70	322	42
RTOR Reduction (vph)	0	29	0	0	70	0	0	8	0	0	4	0
Lane Group Flow (vph)	70	151	0	128	169	0	55	547	0	70	360	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	3%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	22.0	15.6		27.4	18.3		45.2	39.7		45.8	40.0	
Effective Green, g (s)	22.0	15.6		27.4	18.3		45.2	39.7		45.8	40.0	
Actuated g/C Ratio	0.24	0.17		0.30	0.20		0.49	0.43		0.50	0.43	
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	1.0		3.0	1.0	
Lane Grp Cap (vph)	286	297		348	336		466	785		320	802	
v/s Ratio Prot	0.02	0.09		c0.04	c0.10		0.01	c0.30		c0.01	0.19	
v/s Ratio Perm	0.04			0.07			0.05			0.09		
v/c Ratio	0.24	0.51		0.37	0.50		0.12	0.70		0.22	0.45	
Uniform Delay, d1	27.9	34.8		24.7	32.9		12.6	21.4		14.0	18.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	1.9		0.7	1.6		0.1	5.1		0.3	1.8	
Delay (s)	28.3	36.7		25.4	34.5		12.8	26.4		14.3	20.2	
Level of Service	C	D		C	C		B	C		B	C	
Approach Delay (s)		34.3			31.3			25.2			19.2	
Approach LOS		C			C			C			B	

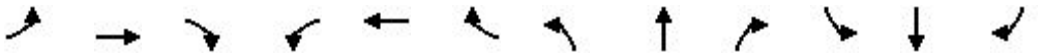
Intersection Summary			
HCM 2000 Control Delay	26.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	92.2	Sum of lost time (s)	22.0
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	394	16	98	388	49	57	65	156	20	25	15
Future Volume (vph)	45	394	16	98	388	49	57	65	156	20	25	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		5.4	5.4		5.4	5.4	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.89		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1872		1789	1852		1789	1684		1784	1779	
Flt Permitted	0.39	1.00		0.37	1.00		0.73	1.00		0.46	1.00	
Satd. Flow (perm)	739	1872		693	1852		1369	1684		867	1779	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	52	458	19	114	451	57	66	76	181	23	29	17
RTOR Reduction (vph)	0	2	0	0	6	0	0	147	0	0	14	0
Lane Group Flow (vph)	52	475	0	114	502	0	66	110	0	23	32	0
Confl. Peds. (#/hr)										3		
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	31.3	27.2		34.1	28.6		11.1	11.1		11.1	11.1	
Effective Green, g (s)	31.3	27.2		34.1	28.6		11.1	11.1		11.1	11.1	
Actuated g/C Ratio	0.53	0.46		0.58	0.49		0.19	0.19		0.19	0.19	
Clearance Time (s)	4.0	5.7		4.0	5.7		5.4	5.4		5.4	5.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	465	864		503	899		257	317		163	335	
v/s Ratio Prot	0.01	0.25		c0.02	c0.27			c0.07			0.02	
v/s Ratio Perm	0.05			0.11			0.05			0.03		
v/c Ratio	0.11	0.55		0.23	0.56		0.26	0.35		0.14	0.10	
Uniform Delay, d1	6.9	11.4		6.1	10.7		20.4	20.8		19.9	19.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	2.5		0.2	2.5		0.5	0.7		0.4	0.1	
Delay (s)	7.0	13.9		6.3	13.2		20.9	21.4		20.3	19.9	
Level of Service	A	B		A	B		C	C		C	B	
Approach Delay (s)		13.3			11.9			21.3			20.0	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	58.9	Sum of lost time (s)	15.1
Intersection Capacity Utilization	58.4%	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 (veh/h)	4	0	0	0	0	35	0	66	0	10	18	2
Future Volume (Veh/h)	4	0	0	0	0	35	0	66	0	10	18	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	0	0	0	0	38	0	72	0	11	20	2
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	153	115	21	115	116	72	22			72		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	153	115	21	115	116	72	22			72		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	100	100	96	100			99		
cM capacity (veh/h)	779	770	1056	857	769	990	1593			1528		

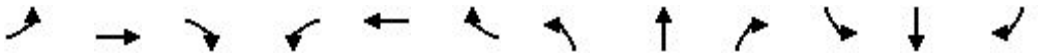
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	4	38	72	33
Volume Left	4	0	0	11
Volume Right	0	38	0	2
cSH	779	990	1593	1528
Volume to Capacity	0.01	0.04	0.00	0.01
Queue Length 95th (m)	0.1	0.9	0.0	0.2
Control Delay (s)	9.6	8.8	0.0	2.5
Lane LOS	A	A		A
Approach Delay (s)	9.6	8.8	0.0	2.5
Approach LOS	A	A		

Intersection Summary				
Average Delay	3.1			
Intersection Capacity Utilization	18.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	35	70	0	10	30
Future Volume (Veh/h)	0	35	70	0	10	30
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	38	76	0	11	33
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	131	76			76	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	131	76			76	
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	96			99	
cM capacity (veh/h)	857	985			1523	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	38	76	44
Volume Left	0	0	11
Volume Right	38	0	0
cSH	985	1700	1523
Volume to Capacity	0.04	0.04	0.01
Queue Length 95th (m)	0.9	0.0	0.2
Control Delay (s)	8.8	0.0	1.9
Lane LOS	A		A
Approach Delay (s)	8.8	0.0	1.9
Approach LOS	A		

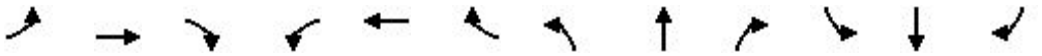
Intersection Summary			
Average Delay		2.6	
Intersection Capacity Utilization		18.8%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	63	10	54	0	10	11	28	60	0	14	76	68
Future Volume (vph)	63	10	54	0	10	11	28	60	0	14	76	68
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	70	11	60	0	11	12	31	67	0	16	84	76

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	141	23	98	176
Volume Left (vph)	70	0	31	16
Volume Right (vph)	60	12	0	76
Hadj (s)	-0.12	-0.28	0.10	-0.21
Departure Headway (s)	4.4	4.4	4.6	4.2
Degree Utilization, x	0.17	0.03	0.12	0.20
Capacity (veh/h)	760	748	749	815
Control Delay (s)	8.3	7.5	8.2	8.3
Approach Delay (s)	8.3	7.5	8.2	8.3
Approach LOS	A	A	A	A

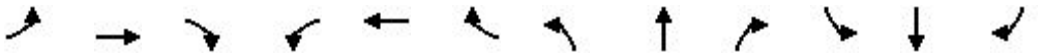
Intersection Summary				
Delay	8.2			
Level of Service	A			
Intersection Capacity Utilization	32.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	46	63	86	42	79	45	555	103	79	522	21
Future Volume (vph)	20	46	63	86	42	79	45	555	103	79	522	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.90		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1720		1789	1699		1789	1839		1789	1873	
Flt Permitted	0.68	1.00		0.47	1.00		0.33	1.00		0.20	1.00	
Satd. Flow (perm)	1272	1720		894	1699		620	1839		370	1873	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	21	48	66	91	44	83	47	584	108	83	549	22
RTOR Reduction (vph)	0	54	0	0	70	0	0	5	0	0	1	0
Lane Group Flow (vph)	21	60	0	91	57	0	47	687	0	83	570	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	11.8	9.3		20.0	13.4		46.7	43.0		50.3	44.8	
Effective Green, g (s)	11.8	9.3		20.0	13.4		46.7	43.0		50.3	44.8	
Actuated g/C Ratio	0.14	0.11		0.23	0.16		0.54	0.50		0.58	0.52	
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	1.0		3.0	1.0	
Lane Grp Cap (vph)	188	185		275	263		385	915		305	971	
v/s Ratio Prot	0.00	0.03		c0.03	0.03		0.01	c0.37		c0.02	0.30	
v/s Ratio Perm	0.01			c0.05			0.06			0.14		
v/c Ratio	0.11	0.32		0.33	0.22		0.12	0.75		0.27	0.59	
Uniform Delay, d1	32.6	35.6		27.0	31.9		10.2	17.4		11.3	14.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	1.4		0.7	0.6		0.1	5.6		0.5	2.6	
Delay (s)	32.9	37.0		27.7	32.5		10.3	23.0		11.8	17.0	
Level of Service	C	D		C	C		B	C		B	B	
Approach Delay (s)		36.4			30.5			22.2			16.3	
Approach LOS		D			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	86.4	Sum of lost time (s)	22.0
Intersection Capacity Utilization	69.4%	ICU Level of Service	C
Analysis Period (min)	15		

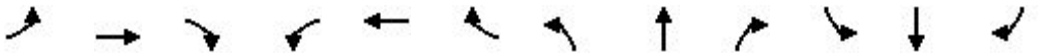
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	43	462	66	100	497	22	45	33	99	39	49	42
Future Volume (vph)	43	462	66	100	497	22	45	33	99	39	49	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.89		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1848		1789	1872		1789	1672		1789	1752	
Flt Permitted	0.21	1.00		0.18	1.00		0.69	1.00		0.66	1.00	
Satd. Flow (perm)	394	1848		338	1872		1303	1672		1250	1752	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	48	513	73	111	552	24	50	37	110	43	54	47
RTOR Reduction (vph)	0	9	0	0	2	0	0	73	0	0	31	0
Lane Group Flow (vph)	48	577	0	111	574	0	50	74	0	43	70	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	24.3	21.4		26.1	22.3		19.3	19.3		19.3	19.3	
Effective Green, g (s)	24.3	21.4		26.1	22.3		19.3	19.3		19.3	19.3	
Actuated g/C Ratio	0.42	0.37		0.45	0.38		0.33	0.33		0.33	0.33	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	234	681		247	719		433	556		415	582	
v/s Ratio Prot	0.01	c0.31		c0.03	0.31			c0.04			0.04	
v/s Ratio Perm	0.08			0.17			0.04			0.03		
v/c Ratio	0.21	0.85		0.45	0.80		0.12	0.13		0.10	0.12	
Uniform Delay, d1	11.2	16.8		11.3	15.8		13.4	13.5		13.4	13.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	9.6		1.3	6.2		0.5	0.5		0.5	0.4	
Delay (s)	11.7	26.4		12.6	22.0		14.0	14.0		13.9	13.9	
Level of Service	B	C		B	C		B	B		B	B	
Approach Delay (s)		25.3			20.5			14.0			13.9	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	21.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	58.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	60.9%	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 (veh/h)	10	0	0	0	0	16	0	45	0	29	62	9
Future Volume (Veh/h)	10	0	0	0	0	16	0	45	0	29	62	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	0	0	0	0	17	0	49	0	32	67	10
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	202	185	72	185	190	49	77			49		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	202	185	72	185	190	49	77			49		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	100	100	100	98	100			98		
cM capacity (veh/h)	732	695	990	764	690	1020	1522			1558		

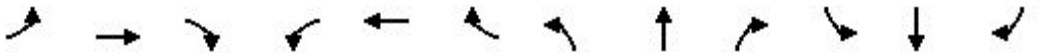
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	11	17	49	109
Volume Left	11	0	0	32
Volume Right	0	17	0	10
cSH	732	1020	1522	1558
Volume to Capacity	0.02	0.02	0.00	0.02
Queue Length 95th (m)	0.3	0.4	0.0	0.5
Control Delay (s)	10.0	8.6	0.0	2.3
Lane LOS	A	A		A
Approach Delay (s)	10.0	8.6	0.0	2.3
Approach LOS	A	A		

Intersection Summary				
Average Delay	2.7			
Intersection Capacity Utilization	26.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	16	55	0	29	100
Future Volume (Veh/h)	0	16	55	0	29	100
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	17	60	0	32	109
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	233	60			60	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	233	60			60	
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	98			98	
cM capacity (veh/h)	740	1005			1544	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	17	60	141
Volume Left	0	0	32
Volume Right	17	0	0
cSH	1005	1700	1544
Volume to Capacity	0.02	0.04	0.02
Queue Length 95th (m)	0.4	0.0	0.5
Control Delay (s)	8.6	0.0	1.8
Lane LOS	A		A
Approach Delay (s)	8.6	0.0	1.8
Approach LOS	A		

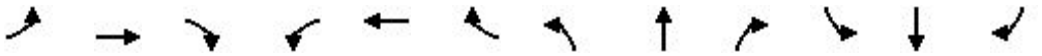
Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	114	3	17	0	8	11	54	86	0	3	23	120
Future Volume (vph)	114	3	17	0	8	11	54	86	0	3	23	120
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	165	4	25	0	12	16	78	125	0	4	33	174

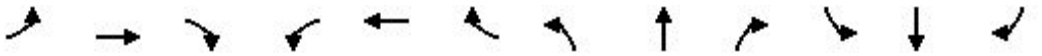
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	194	28	203	211
Volume Left (vph)	165	0	78	4
Volume Right (vph)	25	16	0	174
Hadj (s)	0.13	-0.31	0.11	-0.46
Departure Headway (s)	5.0	4.9	4.8	4.3
Degree Utilization, x	0.27	0.04	0.27	0.25
Capacity (veh/h)	665	655	706	787
Control Delay (s)	9.9	8.0	9.6	8.7
Approach Delay (s)	9.9	8.0	9.6	8.7
Approach LOS	A	A	A	A

Intersection Summary				
Delay	9.3			
Level of Service	A			
Intersection Capacity Utilization	40.5%	ICU Level of Service	A	
Analysis Period (min)	15			



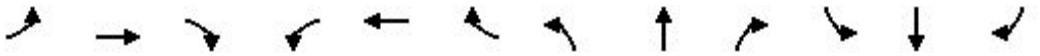
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	66	95	74	120	77	147	51	410	108	66	297	40
Future Volume (vph)	66	95	74	120	77	147	51	410	108	66	297	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.90		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1759		1789	1698		1772	1824		1789	1847	
Flt Permitted	0.45	1.00		0.44	1.00		0.42	1.00		0.20	1.00	
Satd. Flow (perm)	856	1759		824	1698		778	1824		380	1847	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	77	110	86	140	90	171	59	477	126	77	345	47
RTOR Reduction (vph)	0	29	0	0	67	0	0	8	0	0	4	0
Lane Group Flow (vph)	77	167	0	140	194	0	59	595	0	77	388	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	3%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	23.3	16.7		28.5	19.3		45.3	39.7		46.1	40.1	
Effective Green, g (s)	23.3	16.7		28.5	19.3		45.3	39.7		46.1	40.1	
Actuated g/C Ratio	0.25	0.18		0.30	0.21		0.48	0.42		0.49	0.43	
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	1.0		3.0	1.0	
Lane Grp Cap (vph)	278	313		345	350		436	773		277	791	
v/s Ratio Prot	0.02	0.10		c0.04	c0.11		0.01	c0.33		c0.02	0.21	
v/s Ratio Perm	0.05			0.08			0.06			0.12		
v/c Ratio	0.28	0.53		0.41	0.56		0.14	0.77		0.28	0.49	
Uniform Delay, d1	27.7	34.9		24.8	33.3		13.3	23.0		15.3	19.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	2.2		0.8	2.3		0.1	7.3		0.5	2.2	
Delay (s)	28.2	37.2		25.6	35.6		13.4	30.3		15.9	21.5	
Level of Service	C	D		C	D		B	C		B	C	
Approach Delay (s)		34.6			32.1			28.8			20.6	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	28.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	93.6	Sum of lost time (s)	22.0
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
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)	50	435	17	105	428	54	61	70	167	22	27	17
Future Volume (vph)	50	435	17	105	428	54	61	70	167	22	27	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		5.4	5.4		5.4	5.4	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.89		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1873		1789	1852		1789	1684		1784	1773	
Flt Permitted	0.34	1.00		0.32	1.00		0.72	1.00		0.43	1.00	
Satd. Flow (perm)	640	1873		604	1852		1363	1684		806	1773	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	58	506	20	122	498	63	71	81	194	26	31	20
RTOR Reduction (vph)	0	2	0	0	6	0	0	147	0	0	16	0
Lane Group Flow (vph)	58	524	0	122	555	0	71	128	0	26	35	0
Confl. Peds. (#/hr)										3		
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	30.7	26.7		33.5	28.1		11.4	11.4		11.4	11.4	
Effective Green, g (s)	30.7	26.7		33.5	28.1		11.4	11.4		11.4	11.4	
Actuated g/C Ratio	0.52	0.46		0.57	0.48		0.19	0.19		0.19	0.19	
Clearance Time (s)	4.0	5.7		4.0	5.7		5.4	5.4		5.4	5.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	413	853		454	888		265	327		156	344	
v/s Ratio Prot	0.01	0.28		c0.02	c0.30			c0.08			0.02	
v/s Ratio Perm	0.06			0.13			0.05			0.03		
v/c Ratio	0.14	0.61		0.27	0.63		0.27	0.39		0.17	0.10	
Uniform Delay, d1	7.3	12.1		6.5	11.3		20.1	20.6		19.6	19.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	3.3		0.3	3.3		0.5	0.8		0.5	0.1	
Delay (s)	7.4	15.4		6.9	14.7		20.6	21.3		20.2	19.5	
Level of Service	A	B		A	B		C	C		C	B	
Approach Delay (s)		14.6			13.3			21.2			19.7	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	58.6	Sum of lost time (s)	15.1
Intersection Capacity Utilization	62.5%	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 (veh/h)	5	0	0	0	0	35	0	65	0	10	18	2
Future Volume (Veh/h)	5	0	0	0	0	35	0	65	0	10	18	2
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	0	0	0	0	38	0	71	0	11	20	2
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	152	114	21	114	115	71	22			71		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	152	114	21	114	115	71	22			71		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	100	100	96	100			99		
cM capacity (veh/h)	780	771	1056	858	770	991	1593			1529		

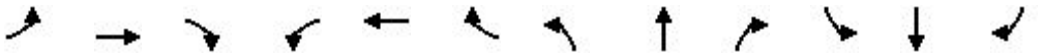
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	5	38	71	33
Volume Left	5	0	0	11
Volume Right	0	38	0	2
cSH	780	991	1593	1529
Volume to Capacity	0.01	0.04	0.00	0.01
Queue Length 95th (m)	0.1	0.9	0.0	0.2
Control Delay (s)	9.6	8.8	0.0	2.5
Lane LOS	A	A		A
Approach Delay (s)	9.6	8.8	0.0	2.5
Approach LOS	A	A		

Intersection Summary				
Average Delay	3.2			
Intersection Capacity Utilization	19.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	35	70	0	10	30
Future Volume (Veh/h)	0	35	70	0	10	30
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	38	76	0	11	33
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	131	76			76	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	131	76			76	
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	96			99	
cM capacity (veh/h)	857	985			1523	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	38	76	44
Volume Left	0	0	11
Volume Right	38	0	0
cSH	985	1700	1523
Volume to Capacity	0.04	0.04	0.01
Queue Length 95th (m)	0.9	0.0	0.2
Control Delay (s)	8.8	0.0	1.9
Lane LOS	A		A
Approach Delay (s)	8.8	0.0	1.9
Approach LOS	A		

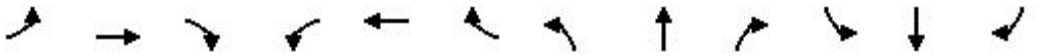
Intersection Summary			
Average Delay		2.6	
Intersection Capacity Utilization		18.8%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	68	10	54	0	10	11	28	60	0	14	76	74
Future Volume (vph)	68	10	54	0	10	11	28	60	0	14	76	74
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	76	11	60	0	11	12	31	67	0	16	84	82

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	147	23	98	182
Volume Left (vph)	76	0	31	16
Volume Right (vph)	60	12	0	82
Hadj (s)	-0.11	-0.28	0.10	-0.22
Departure Headway (s)	4.5	4.4	4.6	4.2
Degree Utilization, x	0.18	0.03	0.13	0.21
Capacity (veh/h)	755	743	744	814
Control Delay (s)	8.4	7.6	8.3	8.3
Approach Delay (s)	8.4	7.6	8.3	8.3
Approach LOS	A	A	A	A

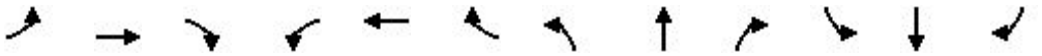
Intersection Summary				
Delay	8.3			
Level of Service	A			
Intersection Capacity Utilization	32.5%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	22	51	69	93	46	86	49	600	112	84	564	23
Future Volume (vph)	22	51	69	93	46	86	49	600	112	84	564	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.90		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1721		1789	1698		1789	1839		1789	1872	
Flt Permitted	0.67	1.00		0.50	1.00		0.27	1.00		0.12	1.00	
Satd. Flow (perm)	1259	1721		937	1698		505	1839		230	1872	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	23	54	73	98	48	91	52	632	118	88	594	24
RTOR Reduction (vph)	0	52	0	0	68	0	0	5	0	0	1	0
Lane Group Flow (vph)	23	75	0	98	71	0	52	745	0	88	617	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	14.6	12.0		23.2	16.3		45.1	41.2		48.9	43.1	
Effective Green, g (s)	14.6	12.0		23.2	16.3		45.1	41.2		48.9	43.1	
Actuated g/C Ratio	0.17	0.14		0.26	0.19		0.51	0.47		0.56	0.49	
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	1.0		3.0	1.0	
Lane Grp Cap (vph)	224	234		314	314		316	861		230	917	
v/s Ratio Prot	0.00	0.04		c0.02	0.04		0.01	c0.40		c0.03	0.33	
v/s Ratio Perm	0.01			c0.06			0.08			0.19		
v/c Ratio	0.10	0.32		0.31	0.22		0.16	0.86		0.38	0.67	
Uniform Delay, d1	31.0	34.3		25.3	30.4		12.2	20.9		14.6	17.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	1.1		0.6	0.5		0.2	11.3		1.1	3.9	
Delay (s)	31.2	35.4		25.9	30.9		12.4	32.2		15.7	21.0	
Level of Service	C	D		C	C		B	C		B	C	
Approach Delay (s)		34.7			28.8			30.9			20.3	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	87.9	Sum of lost time (s)	22.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		

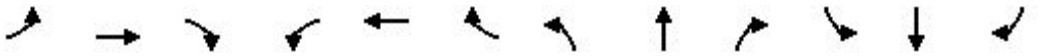
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	510	71	106	549	24	48	36	107	43	53	46
Future Volume (vph)	48	510	71	106	549	24	48	36	107	43	53	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.89		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1849		1789	1871		1789	1672		1789	1752	
Flt Permitted	0.18	1.00		0.17	1.00		0.69	1.00		0.66	1.00	
Satd. Flow (perm)	338	1849		323	1871		1292	1672		1236	1752	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	53	567	79	118	610	27	53	40	119	48	59	51
RTOR Reduction (vph)	0	8	0	0	2	0	0	80	0	0	34	0
Lane Group Flow (vph)	53	638	0	118	635	0	53	79	0	48	76	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	25.2	22.3		27.2	23.3		19.1	19.1		19.1	19.1	
Effective Green, g (s)	25.2	22.3		27.2	23.3		19.1	19.1		19.1	19.1	
Actuated g/C Ratio	0.43	0.38		0.46	0.40		0.32	0.32		0.32	0.32	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	216	701		246	741		419	543		401	569	
v/s Ratio Prot	0.01	c0.35		c0.03	0.34			c0.05			0.04	
v/s Ratio Perm	0.09			0.19			0.04			0.04		
v/c Ratio	0.25	0.91		0.48	0.86		0.13	0.14		0.12	0.13	
Uniform Delay, d1	11.6	17.3		11.8	16.2		14.0	14.1		13.9	14.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	15.9		1.5	9.6		0.6	0.6		0.6	0.5	
Delay (s)	12.2	33.2		13.3	25.8		14.6	14.6		14.6	14.5	
Level of Service	B	C		B	C		B	B		B	B	
Approach Delay (s)		31.7			23.8			14.6			14.5	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	58.8	Sum of lost time (s)	13.5
Intersection Capacity Utilization	64.7%	ICU Level of Service	C
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 (veh/h)	11	0	0	0	0	16	0	44	0	29	61	10
Future Volume (Veh/h)	11	0	0	0	0	16	0	44	0	29	61	10
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	0	0	0	0	17	0	48	0	32	66	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	200	184	72	184	189	48	77			48		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	200	184	72	184	189	48	77			48		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	100	100	100	98	100			98		
cM capacity (veh/h)	734	696	991	765	691	1021	1522			1559		

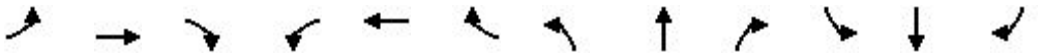
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	12	17	48	109
Volume Left	12	0	0	32
Volume Right	0	17	0	11
cSH	734	1021	1522	1559
Volume to Capacity	0.02	0.02	0.00	0.02
Queue Length 95th (m)	0.4	0.4	0.0	0.5
Control Delay (s)	10.0	8.6	0.0	2.3
Lane LOS	A	A		A
Approach Delay (s)	10.0	8.6	0.0	2.3
Approach LOS	A	A		

Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	26.0%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	16	55	0	29	100
Future Volume (Veh/h)	0	16	55	0	29	100
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	17	60	0	32	109
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	233	60			60	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	233	60			60	
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	98			98	
cM capacity (veh/h)	740	1005			1544	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	17	60	141
Volume Left	0	0	32
Volume Right	17	0	0
cSH	1005	1700	1544
Volume to Capacity	0.02	0.04	0.02
Queue Length 95th (m)	0.4	0.0	0.5
Control Delay (s)	8.6	0.0	1.8
Lane LOS	A		A
Approach Delay (s)	8.6	0.0	1.8
Approach LOS	A		

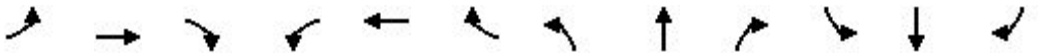
Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	124	3	17	0	8	11	54	86	0	3	23	130
Future Volume (vph)	124	3	17	0	8	11	54	86	0	3	23	130
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Hourly flow rate (vph)	180	4	25	0	12	16	78	125	0	4	33	188

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	209	28	203	225
Volume Left (vph)	180	0	78	4
Volume Right (vph)	25	16	0	188
Hadj (s)	0.13	-0.31	0.11	-0.46
Departure Headway (s)	5.1	4.9	4.9	4.3
Degree Utilization, x	0.29	0.04	0.28	0.27
Capacity (veh/h)	659	643	695	779
Control Delay (s)	10.2	8.1	9.8	8.9
Approach Delay (s)	10.2	8.1	9.8	8.9
Approach LOS	B	A	A	A

Intersection Summary				
Delay	9.5			
Level of Service	A			
Intersection Capacity Utilization	41.6%	ICU Level of Service	A	
Analysis Period (min)	15			

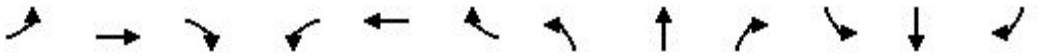


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	73	104	81	130	85	160	56	447	118	71	319	44
Future Volume (vph)	73	104	81	130	85	160	56	447	118	71	319	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.90		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1760		1789	1699		1772	1825		1789	1847	
Flt Permitted	0.40	1.00		0.41	1.00		0.38	1.00		0.14	1.00	
Satd. Flow (perm)	762	1760		765	1699		710	1825		271	1847	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	85	121	94	151	99	186	65	520	137	83	371	51
RTOR Reduction (vph)	0	28	0	0	66	0	0	8	0	0	4	0
Lane Group Flow (vph)	85	187	0	151	219	0	65	649	0	83	418	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	3%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	24.5	17.7		29.7	20.3		45.5	39.7		46.3	40.1	
Effective Green, g (s)	24.5	17.7		29.7	20.3		45.5	39.7		46.3	40.1	
Actuated g/C Ratio	0.26	0.19		0.31	0.21		0.48	0.42		0.49	0.42	
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	1.0		3.0	1.0	
Lane Grp Cap (vph)	270	327		340	363		404	762		231	779	
v/s Ratio Prot	0.02	0.11		c0.04	c0.13		0.01	c0.36		c0.02	0.23	
v/s Ratio Perm	0.06			0.09			0.07			0.15		
v/c Ratio	0.31	0.57		0.44	0.60		0.16	0.85		0.36	0.54	
Uniform Delay, d1	27.6	35.2		24.8	33.7		14.0	25.0		17.1	20.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	2.9		0.9	3.3		0.2	11.5		1.0	2.6	
Delay (s)	28.3	38.1		25.7	37.0		14.2	36.5		18.1	23.1	
Level of Service	C	D		C	D		B	D		B	C	
Approach Delay (s)		35.3			33.1			34.5			22.3	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	31.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	95.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
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)	55	480	18	113	472	59	65	76	179	24	30	19
Future Volume (vph)	55	480	18	113	472	59	65	76	179	24	30	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.7		4.0	5.7		5.4	5.4		5.4	5.4	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	0.89		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1873		1789	1852		1789	1685		1784	1774	
Flt Permitted	0.28	1.00		0.27	1.00		0.72	1.00		0.39	1.00	
Satd. Flow (perm)	530	1873		505	1852		1356	1685		739	1774	
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	64	558	21	131	549	69	76	88	208	28	35	22
RTOR Reduction (vph)	0	2	0	0	6	0	0	144	0	0	18	0
Lane Group Flow (vph)	64	577	0	131	612	0	76	152	0	28	39	0
Confl. Peds. (#/hr)										3		
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	30.3	26.3		33.1	27.7		11.9	11.9		11.9	11.9	
Effective Green, g (s)	30.3	26.3		33.1	27.7		11.9	11.9		11.9	11.9	
Actuated g/C Ratio	0.52	0.45		0.56	0.47		0.20	0.20		0.20	0.20	
Clearance Time (s)	4.0	5.7		4.0	5.7		5.4	5.4		5.4	5.4	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	359	839		402	873		274	341		149	359	
v/s Ratio Prot	0.01	0.31		c0.03	c0.33			c0.09			0.02	
v/s Ratio Perm	0.08			0.15			0.06			0.04		
v/c Ratio	0.18	0.69		0.33	0.70		0.28	0.44		0.19	0.11	
Uniform Delay, d1	7.9	12.9		7.3	12.2		19.8	20.5		19.4	19.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	4.6		0.5	4.7		0.6	0.9		0.6	0.1	
Delay (s)	8.1	17.5		7.7	16.9		20.3	21.4		20.0	19.2	
Level of Service	A	B		A	B		C	C		C	B	
Approach Delay (s)		16.6			15.3			21.2			19.5	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	58.7	Sum of lost time (s)	15.1
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
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 (veh/h)	5	0	0	0	0	35	0	65	0	10	17	3
Future Volume (Veh/h)	5	0	0	0	0	35	0	65	0	10	17	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	0	0	0	0	38	0	71	0	11	18	3
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	150	112	20	112	114	71	21			71		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	150	112	20	112	114	71	21			71		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	99	100	100	100	100	96	100			99		
cM capacity (veh/h)	781	772	1058	860	771	991	1595			1529		

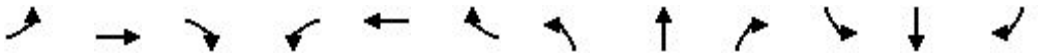
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	5	38	71	32
Volume Left	5	0	0	11
Volume Right	0	38	0	3
cSH	781	991	1595	1529
Volume to Capacity	0.01	0.04	0.00	0.01
Queue Length 95th (m)	0.1	0.9	0.0	0.2
Control Delay (s)	9.6	8.8	0.0	2.6
Lane LOS	A	A		A
Approach Delay (s)	9.6	8.8	0.0	2.6
Approach LOS	A	A		

Intersection Summary				
Average Delay	3.2			
Intersection Capacity Utilization	19.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	35	70	0	10	30
Future Volume (Veh/h)	0	35	70	0	10	30
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	38	76	0	11	33
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	131	76			76	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	131	76			76	
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	96			99	
cM capacity (veh/h)	857	985			1523	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	38	76	44
Volume Left	0	0	11
Volume Right	38	0	0
cSH	985	1700	1523
Volume to Capacity	0.04	0.04	0.01
Queue Length 95th (m)	0.9	0.0	0.2
Control Delay (s)	8.8	0.0	1.9
Lane LOS	A		A
Approach Delay (s)	8.8	0.0	1.9
Approach LOS	A		

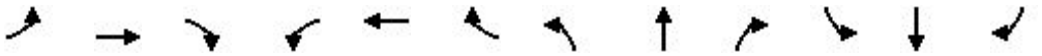
Intersection Summary			
Average Delay		2.6	
Intersection Capacity Utilization		18.8%	ICU Level of Service A
Analysis Period (min)		15	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	73	10	54	0	10	11	28	60	0	14	76	80
Future Volume (vph)	73	10	54	0	10	11	28	60	0	14	76	80
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	81	11	60	0	11	12	31	67	0	16	84	89

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	152	23	98	189
Volume Left (vph)	81	0	31	16
Volume Right (vph)	60	12	0	89
Hadj (s)	-0.10	-0.28	0.10	-0.23
Departure Headway (s)	4.5	4.5	4.6	4.2
Degree Utilization, x	0.19	0.03	0.13	0.22
Capacity (veh/h)	750	737	739	813
Control Delay (s)	8.5	7.6	8.3	8.4
Approach Delay (s)	8.5	7.6	8.3	8.4
Approach LOS	A	A	A	A

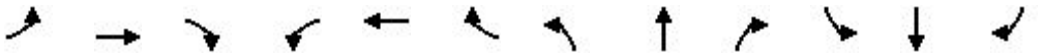
Intersection Summary				
Delay	8.4			
Level of Service	A			
Intersection Capacity Utilization	33.0%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	24	56	75	102	50	93	54	650	121	90	610	26
Future Volume (vph)	24	56	75	102	50	93	54	650	121	90	610	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.90		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1722		1789	1700		1789	1839		1789	1872	
Flt Permitted	0.66	1.00		0.46	1.00		0.22	1.00		0.09	1.00	
Satd. Flow (perm)	1245	1722		859	1700		410	1839		177	1872	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	25	59	79	107	53	98	57	684	127	95	642	27
RTOR Reduction (vph)	0	45	0	0	58	0	0	5	0	0	1	0
Lane Group Flow (vph)	25	93	0	107	93	0	57	806	0	95	668	0
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	17.3	14.5		28.5	20.7		55.0	49.6		56.6	50.4	
Effective Green, g (s)	17.3	14.5		28.5	20.7		55.0	49.6		56.6	50.4	
Actuated g/C Ratio	0.17	0.14		0.28	0.20		0.54	0.49		0.56	0.50	
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	6.0		5.0	6.0	
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	1.0		3.0	1.0	
Lane Grp Cap (vph)	227	246		324	347		296	900		197	931	
v/s Ratio Prot	0.00	0.05		c0.03	0.05		0.01	c0.44		c0.03	0.36	
v/s Ratio Perm	0.02			c0.06			0.09			0.24		
v/c Ratio	0.11	0.38		0.33	0.27		0.19	0.90		0.48	0.72	
Uniform Delay, d1	35.3	39.3		28.0	33.9		13.8	23.5		18.4	19.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	1.3		0.6	0.6		0.3	13.3		1.9	4.7	
Delay (s)	35.5	40.6		28.6	34.5		14.1	36.8		20.2	24.6	
Level of Service	D	D		C	C		B	D		C	C	
Approach Delay (s)		39.8			32.1			35.3			24.1	
Approach LOS		D			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	31.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	101.3	Sum of lost time (s)	22.0
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		

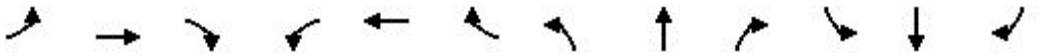
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	563	76	113	606	27	52	39	115	47	58	51
Future Volume (vph)	52	563	76	113	606	27	52	39	115	47	58	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.89		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1789	1850		1789	1871		1789	1672		1789	1750	
Flt Permitted	0.15	1.00		0.15	1.00		0.68	1.00		0.65	1.00	
Satd. Flow (perm)	284	1850		275	1871		1279	1672		1216	1750	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	58	626	84	126	673	30	58	43	128	52	64	57
RTOR Reduction (vph)	0	8	0	0	2	0	0	89	0	0	40	0
Lane Group Flow (vph)	58	702	0	126	701	0	58	82	0	52	81	0
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	29.4	26.5		31.2	27.4		19.3	19.3		19.3	19.3	
Effective Green, g (s)	29.4	26.5		31.2	27.4		19.3	19.3		19.3	19.3	
Actuated g/C Ratio	0.47	0.42		0.49	0.43		0.31	0.31		0.31	0.31	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	201	776		227	812		391	511		371	535	
v/s Ratio Prot	0.01	c0.38		c0.03	0.37			c0.05			0.05	
v/s Ratio Perm	0.12			0.24			0.05			0.04		
v/c Ratio	0.29	0.91		0.56	0.86		0.15	0.16		0.14	0.15	
Uniform Delay, d1	11.9	17.1		12.4	16.2		15.9	16.0		15.9	15.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.8	14.0		2.9	9.4		0.8	0.7		0.8	0.6	
Delay (s)	12.7	31.1		15.3	25.6		16.7	16.7		16.7	16.5	
Level of Service	B	C		B	C		B	B		B	B	
Approach Delay (s)		29.7			24.0			16.7			16.6	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	24.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	63.1	Sum of lost time (s)	13.5
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
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 (veh/h)	12	0	0	0	0	16	0	43	0	29	60	11
Future Volume (Veh/h)	12	0	0	0	0	16	0	43	0	29	60	11
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	0	0	0	0	17	0	47	0	32	65	12
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	199	182	71	182	188	47	77			47		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	199	182	71	182	188	47	77			47		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	100	100	100	98	100			98		
cM capacity (veh/h)	735	697	991	767	692	1022	1522			1560		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	13	17	47	109
Volume Left	13	0	0	32
Volume Right	0	17	0	12
cSH	735	1022	1522	1560
Volume to Capacity	0.02	0.02	0.00	0.02
Queue Length 95th (m)	0.4	0.4	0.0	0.5
Control Delay (s)	10.0	8.6	0.0	2.3
Lane LOS	A	A		A
Approach Delay (s)	10.0	8.6	0.0	2.3
Approach LOS	A	A		

Intersection Summary				
Average Delay	2.8			
Intersection Capacity Utilization	26.1%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	16	55	0	29	100
Future Volume (Veh/h)	0	16	55	0	29	100
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	17	60	0	32	109
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	233	60			60	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	233	60			60	
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	98			98	
cM capacity (veh/h)	740	1005			1544	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	17	60	141
Volume Left	0	0	32
Volume Right	17	0	0
cSH	1005	1700	1544
Volume to Capacity	0.02	0.04	0.02
Queue Length 95th (m)	0.4	0.0	0.5
Control Delay (s)	8.6	0.0	1.8
Lane LOS	A		A
Approach Delay (s)	8.6	0.0	1.8
Approach LOS	A		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		