

TRAFFIC IMPACT STUDY

**EDEN OAK – BLUE TRAILS
RESIDENTIAL DEVELOPMENT**

**EDEN OAK (TRAILSHEAD) INC.
TOWN OF THE BLUE MOUNTAINS**

PREPARED BY:

**C.F. CROZIER & ASSOCIATES INC.
110 PINE STREET
COLLINGWOOD, ONTARIO
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JULY 2012

CFCA FILE NO. 218-2659

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1.0 Executive Summary

CF Crozier & Associates Inc. was retained by Eden Oak (Trailshead) Inc. to complete a Traffic Impact Study for a proposed residential development at Highway 26 and Old Lakeshore Road in the village of Craighleith in the Town of The Blue Mountains. The study is to support an Official Plan Amendment, a Zoning By-Law Amendment and a Draft Plan of Subdivision Application on the lands.

Analysis contained herein is based on a development proposed to consist of 217 residential units of varying form. Minor changes to the unit count will not materially affect the conclusions and recommendations of the study.

The key recommendation of the study is that a westbound left-turn lane with 30 metres of storage is required at the intersection of Highway 26 and Old Lakeshore Road/Fraser Crescent, and that this westbound left-turn lane is required after the 55th unit is occupied.

The study has been completed in accordance with the procedures set out in the MTO "General Guidelines for the Preparation of Traffic Impact Studies" December 2009 guide, with the associated analysis and findings outlined herein. The scope of study has been confirmed with staff from MTO.

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2.0 Introduction

CF Crozier & Associates Inc. (Crozier) was retained by Eden Oak (Trailhead) Inc. to complete a Traffic Impact Study for the proposed Eden Oak – Blue Trails residential development. This study is to support an Official Plan Amendment, a Zoning By-law Amendment and a Draft Plan Application on the lands. The purpose of the study was to assess the impacts of the proposed development on the boundary road system and in particular, to determine the number of developable units before triggering the requirement for a westbound left-turn lane on Highway 26.

The study analyses the operations of the Highway 26 and Old Lakeshore Road intersection under several time horizons. The future traffic operations with and without the addition of the site generated vehicular trips are also analyzed.

The study has been completed in accordance with the procedures set out in the MTO “General Guidelines for the Preparation of Traffic Impact Studies” December 2009 guide, with the associated analysis and findings outlined herein. The scope of work for the study has been set in consultation with staff from MTO.

2.1 Project History

The subject lands were formerly Draft Approved in 2006 by the previous site owners for a 71 lot golf course community known as the Trailhead Golf & Residence Club. Subsequent to this approval, Eden Oak (Trailhead) Inc. purchased the subject lands and modified the development concept plan to reflect a 77 unit estate residential subdivision. This plan was Draft Approved in 2007.

Agreements with MTO specified that 40 units could be constructed before triggering the requirement of a westbound left-turn lane on Highway 26 at Old Lakeshore Road. The recent changes to the unit count and type necessitate a Traffic Impact Study to support the applications, and to determine the new unit count that would trigger external roadway improvements.

3.0 Existing Conditions

3.1 Study Area

The study area comprises the intersection of Highway 26 and Old Lakeshore Road/Fraser Crescent. These roadways and the intersection are described in Section 3.4.

Low density residential areas exist to the north of the property along Highway 26, and south of the property atop the Nipissing Ridge. Undeveloped areas exist to the east and west. Along Old Lakeshore Road, a mix of residential and vacant lands abut the roadway.

3.2 Boundary Road Network

Highway 26 is a two lane rural east-west highway under the jurisdiction of MTO. The posted speed transitions from 80 km/h to 60 km/h approximately 300 metres east of Old Lakeshore Road. The roadway consists of two 3.6 metre paved travel lanes with 3.0 metre granular shoulders.

Old Lakeshore Road is a two lane east-west rural local roadway under the jurisdiction of the Town of The Blue Mountains. The posted speed limit is 50 km/h. The roadway consists of two 3.0 metre paved travel lanes with 0.5 metre granular shoulders.

Fraser Crescent is a two-lane local rural roadway under the jurisdiction of the Town of The Blue Mountains. The speed limit is not posted and is therefore 50 km/h per municipal regulation. The roadway consists of a 50 metre unpaved platform with no shoulders.

The four-legged intersection of Highway 26 and Old Lakeshore Road/Fraser Crescent is unsignalized. The east and west approaches (Highway 26) have no restriction to free-flow and consist of a shared left-turn/through/right-turn lane. The north approach (Fraser Crescent) and south approach (Old Lakeshore Road) are stop-controlled and consist of a shared left-turn/through/right-turn lane.

3.3 Development Proposal

The proposed development is to consist of mixed residential unit types. 128 clustered or attached townhomes are proposed, along with 62 semi-detached units. Additionally, five attached units are proposed away from the main site on the north side of Lakeshore. These units will serve as model homes for sales purposes.

The tenure of the internal roadway system is to be publically owned and contained within a 20 metre road allowance. Private condominium elements will exist within the site to serve the clustered townhomes.

Access to the public roadway will be through a single access to Old Lakeshore Road, approximately 85 metres south of the Highway 26 and Old Lakeshore Road/Fraser Crescent intersection. An allowance for a public road connection to undeveloped lands to the east has been made to accommodate future development to the east.

Refer to Figure 2 for the draft plan prepared by D.C. Slade & Associates, June, 2012.

3.4 Traffic Data

Turning movement counts at the intersection of Highway 26 and Old Lakeshore Road/Fraser Crescent were undertaken by C. F. Crozier & Associates staff from 7:00 to 9:00 a.m. and from 4:00 to 6:00 p.m. on June 22, 2012.

The a.m. peak hour was found to be from 8:00 to 9:00 a.m., and the p.m. peak hour was found to be from 4:15 to 5:15 p.m. The traffic count data is summarized in Appendix B.

Figure 3 illustrates the 2012 existing traffic volumes.

3.5 Intersection Operations

The operations of intersection were analyzed on the basis of the traffic volumes illustrated in Figure 3. The assessment of unsignalized intersections is based on the method outlined in the "Highway Capacity Manual, 2000" and was modeled using Synchro 8 software. The definitions for unsignalized intersections are included in Appendix A and detailed capacity analyses are included in Appendix C.

Table 1 outlines the 2012 traffic levels of service.

Table 1
2012 Existing Traffic Levels of Service

Intersection	Peak Hour	Level of Service	Control Delay	95 th ile Queue Length	Volume-to-Capacity
Highway 26 and Old Lakeshore Road / Fraser Crescent	Weekday A.M.	A	11.3 s	1 veh.	0.01
	Weekday P.M.	B	10.9 s	1 veh.	0.01

Note: The Level of Service of a stop-controlled intersection is based on the delay associated with the critical minor public road movement (i.e. Old Lakeshore Road).

As indicated in Table 1, the intersection of Highway 26 and Old Lakeshore Road/Fraser Crescent operates at a Level of Service "A" in the weekday a.m. peak hour and a Level of Service "B" in the weekday p.m. peak hour. Both metrics refer to the south approach (Old Lakeshore Road), which experiences greater traffic volumes than the north approach. Volume-to-capacity ratios will be negligible with 95th percentile queue lengths of one vehicle. These metrics are indicative of an intersection that is operating with no capacity or congestion concerns.

4.0 Future Background Conditions

4.1 Horizon Years

At the time of writing of the report, decisions regarding phasing of the development had not been made. A full build-out horizon year of 2020 was assumed, which equates to an average of 30 units per year over seven years. This market absorption rate was considered reasonable for the Georgian Triangle Area. Accordingly, the year 2020 was selected as the first horizon year, with further horizon years of five and ten years (2025 and 2030) as per MTO guidelines.

4.2 Highway 26 Corridor Growth Rate

Traffic growth rates for Highway 26 were provided by MTO. A corridor growth rate of 1.25 was specified. This growth rate was applied to Highway 26 traffic volumes, as well as traffic volumes on Old Lakeshore Road and Fraser Crescent.

4.3 Other Local Area Developments

One other local area development that will directly influence future background traffic volumes is currently in the planning phase. The Craigeith Village mixed use development is proceeding through draft plan approval after receiving an Official Plan and Zoning By-Law Amendment. The development is located approximately one kilometre east of the subject property on the north side of Highway 26 between Blue Mountain Drive and Long Point Road. Traffic volumes available from the "Traffic Impact Study Update, Silver Creek at Craigeith", Crozier, May 2009 report were included in the calculation of future background traffic volumes. Excerpts of this report have been included in Appendix B.

Figures 4, 5 and 6 illustrate the future background traffic volumes for the 2020, 2025 and 2030 horizon years, respectively, and reflect the Highway 26 corridor growth and the development specific growth from the Craigleith Village mixed use development.

4.4 Intersection Operations

The operations of the critical intersections were analyzed on the basis of the traffic volumes illustrated in Figures 4, 5 and 6. Table 3 outlines the 2020, 2025 and 2030 future background traffic levels of service. Detailed capacity analyses are included in Appendix C.

Table 3
Future Background Traffic Levels of Service

Intersection	Horizon Year	Peak Hour	Level of Service	Control Delay	95%ile Queue Length	Volume-to-Capacity
Highway 26 and Old Lakeshore Road / Fraser Crescent	2020	A.M.	B	12.2 s	1 veh.	0.02
		P.M.	B	12.2 s	1 veh.	0.02
	2025	A.M.	B	12.5 s	1 veh.	0.02
		P.M.	B	12.5 s	1 veh.	0.02
	2030	A.M.	B	12.8 s	1 veh.	0.02
		P.M.	B	12.8 s	1 veh.	0.02

Note: The level of service of a stop-controlled intersection is based on the delay associated with the critical minor road movement.

As indicated in Table 3 the intersection of Highway 26 and Old Lakeshore Road/Fraser Crescent will experience minor increases in delays to a maximum of two seconds by the 2030 p.m. peak hour. This is a result of the low volume of vehicles entering Highway 26 from Old Lakeshore Road.

5.0 Site Generated Traffic

The proposed development will result in additional vehicles on the boundary road network, as well as additional turning movements at the boundary road intersections.

5.1 Trip Generation

The ITE Trip Generation Manual, 8th Edition was used to model the various residential unit types proposed for the subject lands. No category exists for semi-detached units; therefore the rates corresponding to townhouses were substituted as the most similar.

The five model home townhouses that are proposed on the north side of Old Lakeshore Road have been tabulated separately from the main site units.

Eight future units known as the Chaisson lands are not a part of the subject development proposal, but will access the boundary road system through the development access to Old Lakeshore Road. These units have been accounted for and are included in the site trip generation as single-family detached units.

The specific categories used are specified in Table 4, along with the corresponding trips.

Table 4
Site Generated Residential Trips

Use	Units	Roadway Peak Hour	Number of Trips		
			Inbound	Outbound	Total
Single Family Lots Category 210 (Chaisson Lands)	8	Weekday A.M.	2	4	6
		Weekday P.M.	5	3	8
Semis/ Townhouses Category 230	212	Weekday A.M.	16	77	93
		Weekday P.M.	74	36	110
Model Home Townhouses Category 230	5	Weekday A.M.	0	2	2
		Weekday P.M.	2	1	3
Total Residential Trips	225	Weekday A.M.	18	83	101
		Weekday P.M.	81	40	121

5.2 Trip Distribution and Assignment

The trips generated by the development were distributed to the boundary roadways based on the location of retail, commercial and recreational destinations. With the Town of Collingwood located to the east of the subject lands, 60 percent of trips were assumed to arrive from/depart to the east along Highway 26. 20 percent of the trips were assumed to arrive from/depart to the west along Old Lakeshore Road for the recreational and leisure destinations associated with the Niagara Escarpment, primarily the Village at Blue. The remaining 20 percent of trips were assumed to arrive from/depart to Thornbury and areas west along Highway 26. Figure 7 illustrates the trip distribution.

The trips generated by the proposed development were assigned to the boundary road network as per the distribution illustrated in Figure 7. The trip assignment is illustrated in Figures 8.

6.0 Total Future Conditions

6.1 Basis of Assessment

The traffic impacts arising from the proposed development were assessed on the basis of the site generated traffic illustrated in Figure 8 being superimposed on the future background traffic volumes in Figures 4, 5 and 6. The resulting total traffic volumes for the weekday a.m. and p.m. peak hours are illustrated in Figures 9, 10 and 11 for the 2020, 2025 and 2030 horizon years, respectively.

6.2 Auxiliary Lane Analysis

A left-turn lane warrant was undertaken for the intersection of Highway 26 and the site entrance using the Ontario Ministry of Transportation (MTO) Geometric Design Standards for Ontario Highways (GDSOH). During the critical 2030 total traffic p.m. peak hour, 51 vehicles out of an advancing volume (V_a) of 624 vehicles will make a westbound left-turn, equating to 8.2 percent. Accordingly, the 10 percent warrant chart with a design speed of 90 km/h was used. With an opposing volume of 601 vehicles, a left turn lane with 30 metres of storage is warranted in the p.m. peak hour under the 2030 total traffic condition per Figure EA-22 of the GDSOH. The left-turn lane warrant has been included in Appendix D.

Table E9-1 of the GDSOH prescribes a left-turn lane parallel and taper requirement of 60 metres and 145 metres, respectively for an 90 km/h design speed and a grade of less than 2 percent. Refer to Figure 12 for a preliminary design of the left-turn lane.

6.3 Auxiliary Lane Trigger

Analysis was undertaken to determine the number of units that could be occupied before triggering the requirement of a westbound left-turn lane on Highway 26 at Old Lakeshore Road. The trigger was selected to be the number of westbound left-turns that would cause the percentage of left-turns to be 2.5 percent of the total westbound traffic volumes. 2.5 percent represents the midpoint between no left-turns and the minimum 5 percent left-turn warrant chart. The 2020 p.m. peak hour was selected for analysis.

It was calculated that 14 additional left-turns would cause the left-turn percentage to exceed the 2.5 percent threshold. This volume of left-turns is equivalent to 55 occupied units in the development. Calculation sheets are provided in Appendix D.

6.4 Intersection Operations

The intersection levels of service were analyzed on the basis of the total traffic volumes illustrated in Figures 9, 10 and 11, and a westbound left-turn lane at the Highway 26 and Old Lakeshore Road/Fraser Crescent intersection. Table 5 outlines the year 2020, 2025 and 2030 total traffic levels of service, respectively. Detailed capacity analyses are included in Appendix C.

Table 5
Total Traffic Levels of Service

Intersection	Horizon Year	Peak Hour	Level of Service	Control Delay	95%ile Queue Length	Volume-to-Capacity
Highway 26 and Old Lakeshore Road / Fraser Crescent	2020	A.M.	C	15.4 s	1 veh.	0.19
		P.M.	C	16.9 s	1 veh.	0.12
	2025	A.M.	C	16.1 s	1 veh.	0.20
		P.M.	C	17.7 s	1 veh.	0.13
	2030	A.M.	C	16.9 s	1 veh.	0.21
		P.M.	C	18.7 s	1 veh.	0.14

Note: The level of service of a stop-controlled intersection is based on the delay associated with the critical minor road movement.

The intersection of Highway 26 and Old Lakeshore Road/Fraser Crescent will experience greater delay in all horizon years than under future background traffic volumes. During the a.m. peak hour, the increase will be four seconds or less with a maximum volume-to-capacity ratio of 0.21. During the p.m. peak hour, the increase in delay will be six seconds or less with a maximum volume-to-capacity ratio of 0.14.

These traffic operations metrics are indicative of a well-functioning intersection with no capacity or congestion concerns. The addition of site generated traffic through this intersection does not appreciably increase the very low levels of traffic on the Old Lakeshore Road approach. The volume-to-capacity ratios are low, and signify considerable excess capacity to serve any increase in demand.

7.0 Conclusions and Recommendations

Intersection analyses of existing traffic volumes indicate that the intersections of Highway 26 and Old Lakeshore Road/Fraser Crescent operates at a LOS "A" and "B" in the weekday a.m. and p.m. peak hours, respectively.

Intersection analyses of the 2020, 2025 and 2030 future background traffic volumes indicate that the intersection of Highway 26 and Old Lakeshore Road/Fraser Crescent is expected to operate at a LOS "B" during all peak hours through all horizon years.

The proposed development is expected to add 101 and 121 residential trips to the boundary road system in the a.m. and p.m. peak hours, respectively. These volumes include trips attributable to the Chaisson development, which will access Old Lakeshore Road through the site entrance.

A left-turn lane analysis was undertaken for the intersection of Highway 26 and Old Lakeshore Road/Fraser Crescent. It was concluded that a westbound left turn lane is warranted and that it be implemented consisting of 30 metres of storage length, 60 metres of parallel lane length, and 145 metres of taper length.

Analysis to determine the number of units that could be occupied before the westbound left-turn lane would be warranted was undertaken. It was concluded that 55 units could be occupied before triggering the requirement for the westbound left-turn lane at Highway 26 and Old Lakeshore Road/Fraser Crescent.

Intersection analysis of the 2020, 2025 and 2030 total background traffic volumes indicate that the intersections of Highway 26 with Old Lakeshore Road/Fraser Crescent will experience increased delay of six seconds or less and culminate in a LOS "C" during all peak hours through all horizon years.

The analysis undertaken within was prepared using the most recent draft plan. Any minor changes to the plan will not materially affect the conclusions and recommendations contained within this report.

It is concluded that the traffic affects associated with the proposed development can be mitigated through the implementation of a westbound left-turn lane at the site entrance, and that this auxiliary lane is required after the occupancy of the 55th unit.

Prepared by,

C.F. CROZIER & ASSOCIATES INC.



Alexander J. W. Fleming, MBA, P.Eng., PTOE

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APPENDIX A

Level of Service Definitions

Level of Service Definitions

Two-Way Stop Controlled Intersections

Level of Service	Control Delay per Vehicle (seconds)	Interpretation
A	≤ 10	EXCELLENT. Large and frequent gaps in traffic on the main roadway. Queuing on the minor street is rare.
B	> 10 and ≤ 15	VERY GOOD. Many gaps exist in traffic on the main roadway. Queuing on the minor street is minimal.
C	> 15 and ≤ 25	GOOD. Fewer gaps exist in traffic on the main roadway. Delay on minor approach becomes more noticeable.
D	> 25 and ≤ 35	FAIR. Infrequent and shorter gaps in traffic on the main roadway. Queue lengths develop on the minor street.
E	> 35 and ≤ 50	POOR. Very infrequent gaps in traffic on the main roadway. Queue lengths become noticeable.
F	> 50	UNSATISFACTORY. Very few gaps in traffic on the main roadway. Excessive delay with significant queue lengths on the minor street.

Adapted from Highway Capacity Manual 2000, Transportation Research Board

APPENDIX B

Turning Movement Counts

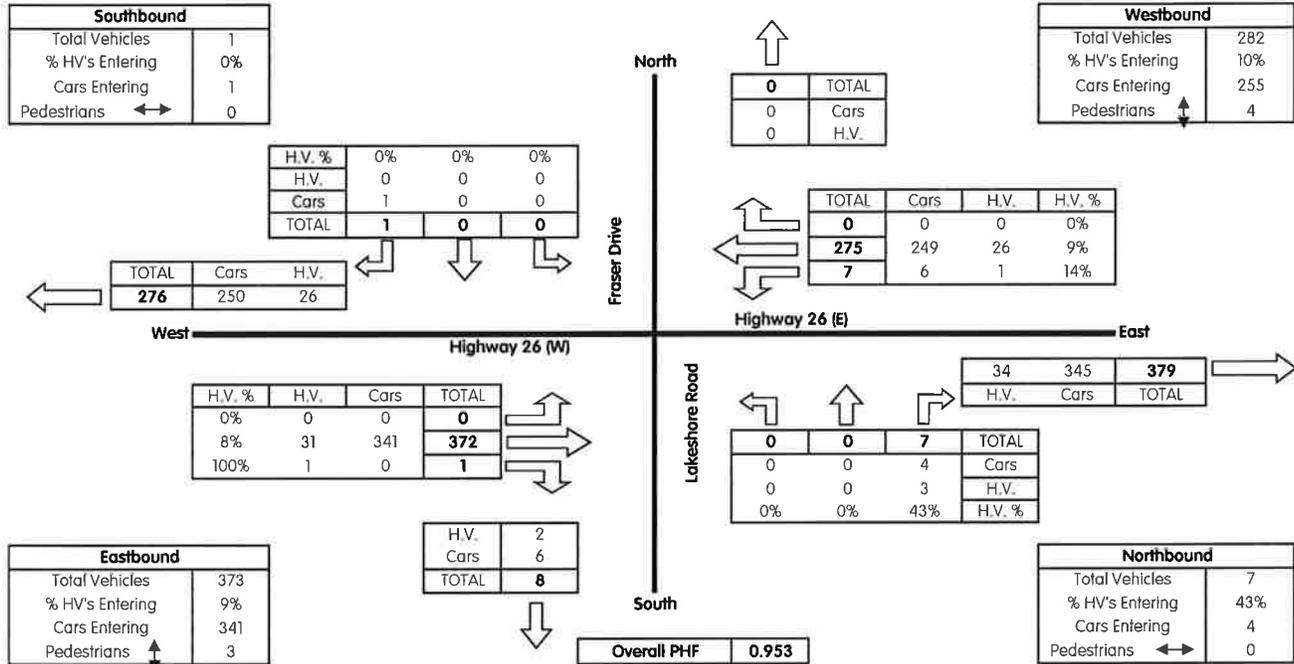


INTERSECTION TRAFFIC COUNT
Highway 26 and Lakeshore Road

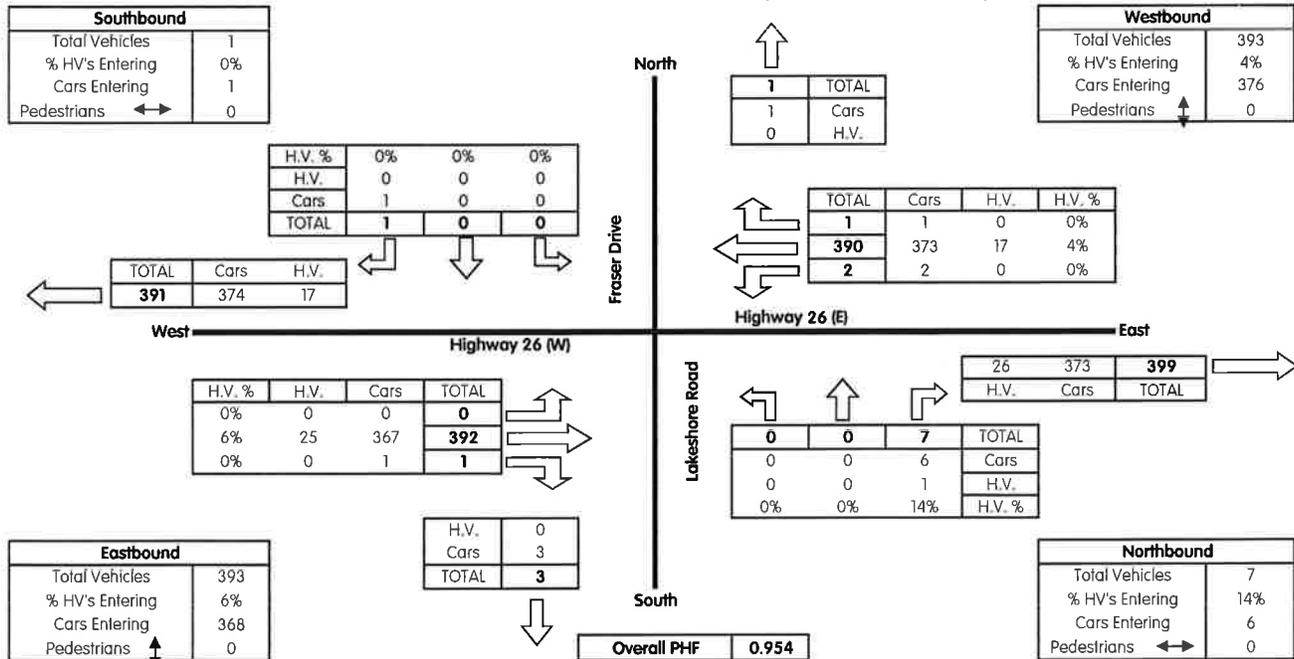
Traffic Counter Name: JB & EJ
Weather Conditions: Sunny & Dry
Project:
Municipality: Town of The Blue Mountains

North Leg (Southbound): Fraser Drive
South Leg (Northbound): Lakeshore Road
East Leg (Westbound): Highway 26 (E)
West Leg (Eastbound): Highway 26 (W)

WEEKDAY A.M. PEAK HOUR SUMMARY (8:00 AM - 9:00 AM)



WEEKDAY P.M. PEAK HOUR SUMMARY (4:15 PM - 5:15 PM)





INTERSECTION TRAFFIC COUNT

Highway 26 and Lakeshore Road

Traffic Counter Name: JB & EJ
Weather Conditions: Sunny & Dry
Project:
Municipality: Town of The Blue Mountains

North Leg (Southbound): Fraser Drive
South Leg (Northbound): Lakeshore Road
East Leg (Westbound): Highway 26 (E)
West Leg (Eastbound): Highway 26 (W)

WEEKDAY A.M. TOTAL COUNT AT 15 MIN. INTERVALS

A.M. Peak Hour 8:00 - 9:00	Eastbound Highway 26 (W)			Westbound Highway 26 (E)			Northbound Lakeshore Road			Southbound Fraser Drive			TOTAL	HOUR TOTAL
	L	T	R	L	T	R	L	T	R	L	T	R		
7:00 - 7:15	0	49	0	0	61	0	0	0	0	0	0	0	110	
7:15 - 7:30	1	70	0	1	44	0	0	0	0	0	0	0	116	
7:30 - 7:45	0	82	0	0	48	0	0	0	1	0	0	0	131	
7:45 - 8:00	0	90	1	6	61	0	0	0	0	0	0	0	158	515
8:00 - 8:15	0	82	0	1	68	0	0	0	0	0	0	0	151	556
8:15 - 8:30	0	94	1	0	76	0	0	0	3	0	0	0	174	614
8:30 - 8:45	0	101	0	3	61	0	0	0	2	0	0	1	168	651
8:45 - 9:00	0	95	0	3	70	0	0	0	2	0	0	0	170	663
9:00 - 9:15													0	512
9:15 - 9:30													0	338
9:30 - 9:45													0	170
9:45 - 10:00													0	0
10:00 - 10:15														
10:15 - 10:30														
10:30 - 10:45														
10:45 - 11:00														

Peak Hour HV's		31	1	1	26	0			3				62	
Ped Crossings		3			4				0			0	7	

A.M. Peak Hour	0	372	1	7	275	0	0	0	7	0	0	1	663	
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HV%		8%	100%	14%	9%				43%			0%	9%	
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Overall PHF	0.953
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INTERSECTION TRAFFIC COUNT

Highway 26 and Lakeshore Road

Traffic Counter Name: JB & EJ
Weather Conditions: Sunny & Dry
Project:
Municipality: Town of The Blue Mountains

North Leg (Southbound): Fraser Drive
South Leg (Northbound): Lakeshore Road
East Leg (Westbound): Highway 26 (E)
West Leg (Eastbound): Highway 26 (W)

WEEKDAY P.M. TOTAL COUNT AT 15 MIN. INTERVALS

P.M. Peak Hour 16:15 - 17:15	Eastbound Highway 26 (W)			Westbound Highway 26 (E)			Northbound Lakeshore Road			Southbound Fraser Drive			TOTAL	HOUR TOTAL
	L	T	R	L	T	R	L	T	R	L	T	R		
16:00 - 16:15		93		1	80								174	
16:15 - 16:30		105			100	1				1		1	208	
16:30 - 16:45		106			81					1			188	
16:45 - 17:00		87		1	108					1			197	767
17:00 - 17:15		94	1	1	101					4			201	794
17:15 - 17:30		74	1	3	112					1			191	777
17:30 - 17:45		92			83	2	1			1			179	768
17:45 - 18:00		82		1	96		1			1		1	182	753
18:00 - 18:15		62		1	70					1			134	686
18:15 - 18:30		58			66	1				2	1		128	623
18:30 - 18:45		74			63					1			138	582
18:45 - 19:00		37		1	55					1			94	494
19:00 - 19:15														
19:15 - 19:30														
19:30 - 19:45														
19:45 - 20:00														

Peak Hour HV's	0	25	0	0	17	0	0	0	1	0	0	0	43	
Ped Crossings		0			0			0			0		0	

P.M. Peak Hour	0	392	1	2	390	1	0	0	7	0	0	1	794	
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HV%		6%	0%	0%	4%	0%			14%			0%	5%	
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Overall PHF	0.954
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Alex Fleming

From: De Leon Morillo, Carmen (MTO) [Carmen.DeLeonMorillo@ontario.ca]
Sent: Monday, June 18, 2012 3:06 PM
To: afleming@cfcrozier.ca
Cc: Smyth, Ian (MTO)
Subject: FW: Traffic Data Request for Noise Impact Assessment
Attachments: 26129 spring hwy 26 2.1 km w of osler bluff rd.pdf; Spring 2010 Hwy 26 Sta 129 2.1 km w of Osler Bluff Rd.pdf; Summer 2010 Hwy 26 Sta 129 2.1 km w of Osler Bluff Rd.pdf

Hi Alex,

Please find below/attached the requested data.

2008 %Trucks: 5.9
%Growth: 1.25

If you need additional information, please let me know.

Sincerely,

Carmen De León

MTO West Region
659 Exeter Road
London, ON N6E 1L3
Phone: 519-873-4355

From: Smyth, Ian (MTO)
Sent: June 13, 2012 4:15 PM
To: Fellows, Kari (MTO)
Cc: Plut, Kevin (MTO)
Subject: FW: Traffic Data Request for Noise Impact Assessment

Kari,

I would appreciate it if someone would provide me with the information the information requested below.

Ian Smyth
Corridor Management Planner

From: Alex Fleming [<mailto:afleming@cfcrozier.ca>]
Sent: June 13, 2012 2:44 PM
To: Smyth, Ian (MTO)
Subject: Traffic Data Request for Noise Impact Assessment

Hello Ian,

As we were speaking of earlier today, I'd like to request traffic data for the Noise Impact Assessment that's needed for the Eden Oak development at Highway 26 and Lakeshore Road in Craighleith, Town of The Blue Mountains. Specifically, we are interested in:

1. Hourly counts at a location near Highway 26/Lakeshore. This is needed to determine the split between daytime and night time traffic volumes.
2. Latest Year SADT. I have 2008 data from the traffic volumes publication.
3. Truck percentages.
4. SADT growth rate, or I can calculate from the last several years.

Thanks very much,

Alex



ALEXANDER FLEMING, MBA, P.ENG., PTOE

PROJECT MANAGER

The Harbour Edge Building

40 Huron Street, Suite 301

Collingwood, ON L9Y 4R3

tel 705 446 3510 | fax 705 446 3520

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APPENDIX C

Detailed Capacity Analyses

HCM Unsignalized Intersection Capacity Analysis
 3: Lakeshore Road/Fraser Crescent & Highway 26

2012 AM Existing Volumes
 7/10/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	372	1	7	275	0	0	0	7	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	392	1	7	289	0	0	0	7	0	0	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	289			393			697	696	392	704	697	289
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	289			393			697	696	392	704	697	289
tC, single (s)	4.1			4.2			7.1	6.5	6.6	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.7	3.5	4.0	3.3
p0 queue free %	100			99			100	100	99	100	100	100
cM capacity (veh/h)	1284			1104			356	365	576	348	365	754
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	393	297	7	1								
Volume Left	0	7	0	0								
Volume Right	1	0	7	1								
cSH	1284	1104	576	754								
Volume to Capacity	0.00	0.01	0.01	0.00								
Queue Length 95th (m)	0.0	0.2	0.3	0.0								
Control Delay (s)	0.0	0.3	11.3	9.8								
Lane LOS		A	B	A								
Approach Delay (s)	0.0	0.3	11.3	9.8								
Approach LOS			B	A								
Intersection Summary												
Average Delay			0.2									
Intersection Capacity Utilization			30.1%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Lakeshore Road/Fraser Crescent & Highway 26

2012 PM Existing Volumes
 7/10/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	0	392	1	2	373	1	0	0	7	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	413	1	2	393	1	0	0	7	0	0	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	394			414			812	811	413	818	811	393
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	394			414			812	811	413	818	811	393
tC, single (s)	4.1			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	100			100			100	100	99	100	100	100
cM capacity (veh/h)	1176			1156			299	315	614	293	315	660
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	414	396	7	1								
Volume Left	0	2	0	0								
Volume Right	1	1	7	1								
cSH	1176	1156	614	660								
Volume to Capacity	0.00	0.00	0.01	0.00								
Queue Length 95th (m)	0.0	0.0	0.3	0.0								
Control Delay (s)	0.0	0.1	10.9	10.5								
Lane LOS		A	B	B								
Approach Delay (s)	0.0	0.1	10.9	10.5								
Approach LOS			B	B								
Intersection Summary												
Average Delay			0.1									
Intersection Capacity Utilization			31.3%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Lakeshore Road/Fraser Crescent & Highway 26

2020 AM Future Background Volumes
 7/10/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	459	1	8	341	0	0	0	8	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	483	1	8	359	0	0	0	8	0	0	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	359			484			861	859	484	868	860	359
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	359			484			861	859	484	868	860	359
tC, single (s)	4.1			4.2			7.1	6.5	6.6	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.7	3.5	4.0	3.3
p0 queue free %	100			99			100	100	98	100	100	100
cM capacity (veh/h)	1211			1019			276	294	508	269	293	690
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	484	367	8	1								
Volume Left	0	8	0	0								
Volume Right	1	0	8	1								
cSH	1211	1019	508	690								
Volume to Capacity	0.00	0.01	0.02	0.00								
Queue Length 95th (m)	0.0	0.2	0.4	0.0								
Control Delay (s)	0.0	0.3	12.2	10.2								
Lane LOS		A	B	B								
Approach Delay (s)	0.0	0.3	12.2	10.2								
Approach LOS			B	B								
Intersection Summary												
Average Delay			0.3									
Intersection Capacity Utilization			34.4%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Lakeshore Road/Fraser Crescent & Highway 26

2020 PM Future Background Volumes

7/10/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕		2	↕			↕			↕	
Volume (veh/h)	0	526	1	2	515	1	0	0	8	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	554	1	2	542	1	0	0	8	0	0	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	543			555			1102	1102	554	1109	1102	543
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	543			555			1102	1102	554	1109	1102	543
tC, single (s)	4.1			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	100			100			100	100	98	100	100	100
cM capacity (veh/h)	1036			1026			190	213	509	185	213	544
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	555	545	8	1								
Volume Left	0	2	0	0								
Volume Right	1	1	8	1								
cSH	1036	1026	509	544								
Volume to Capacity	0.00	0.00	0.02	0.00								
Queue Length 95th (m)	0.0	0.0	0.4	0.0								
Control Delay (s)	0.0	0.1	12.2	11.6								
Lane LOS		A	B	B								
Approach Delay (s)	0.0	0.1	12.2	11.6								
Approach LOS			B	B								
Intersection Summary												
Average Delay			0.1									
Intersection Capacity Utilization			38.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Lakeshore Road/Fraser Crescent & Highway 26

2025 AM Future Background Volumes
 7/10/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	485	1	9	360	0	0	0	9	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	511	1	9	379	0	0	0	9	0	0	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	379			512			910	909	511	918	909	379
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	379			512			910	909	511	918	909	379
tC, single (s)	4.1			4.2			7.1	6.5	6.6	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.7	3.5	4.0	3.3
p0 queue free %	100			99			100	100	98	100	100	100
cM capacity (veh/h)	1191			995			255	274	489	247	274	672
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	512	388	9	1								
Volume Left	0	9	0	0								
Volume Right	1	0	9	1								
cSH	1191	995	489	672								
Volume to Capacity	0.00	0.01	0.02	0.00								
Queue Length 95th (m)	0.0	0.2	0.4	0.0								
Control Delay (s)	0.0	0.3	12.5	10.4								
Lane LOS		A	B	B								
Approach Delay (s)	0.0	0.3	12.5	10.4								
Approach LOS			B	B								
Intersection Summary												
Average Delay			0.3									
Intersection Capacity Utilization			36.2%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Lakeshore Road/Fraser Crescent & Highway 26

2025 PM Future Background Volumes
 7/10/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	0	554	1	2	543	1	0	0	9	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	583	1	2	572	1	0	0	9	0	0	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	573			584			1161	1161	584	1169	1161	572
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	573			584			1161	1161	584	1169	1161	572
tC, single (s)	4.1			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	100			100			100	100	98	100	100	100
cM capacity (veh/h)	1010			1000			173	197	490	168	197	523
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	584	575	9	1								
Volume Left	0	2	0	0								
Volume Right	1	1	9	1								
cSH	1010	1000	490	523								
Volume to Capacity	0.00	0.00	0.02	0.00								
Queue Length 95th (m)	0.0	0.0	0.4	0.0								
Control Delay (s)	0.0	0.1	12.5	11.9								
Lane LOS		A	B	B								
Approach Delay (s)	0.0	0.1	12.5	11.9								
Approach LOS			B	B								
Intersection Summary												
Average Delay			0.1									
Intersection Capacity Utilization			40.2%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Lakeshore Road/Fraser Crescent & Highway 26

2030 AM Future Background Volumes
 7/10/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	513	1	10	381	0	0	0	10	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	540	1	11	401	0	0	0	11	0	0	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	401			541			964	963	541	973	963	401
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	401			541			964	963	541	973	963	401
tC, single (s)	4.1			4.2			7.1	6.5	6.6	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.7	3.5	4.0	3.3
p0 queue free %	100			99			100	100	98	100	100	100
cM capacity (veh/h)	1169			970			235	255	470	226	255	653
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	541	412	11	1								
Volume Left	0	11	0	0								
Volume Right	1	0	11	1								
cSH	1169	970	470	653								
Volume to Capacity	0.00	0.01	0.02	0.00								
Queue Length 95th (m)	0.0	0.3	0.5	0.0								
Control Delay (s)	0.0	0.3	12.8	10.5								
Lane LOS		A	B	B								
Approach Delay (s)	0.0	0.3	12.8	10.5								
Approach LOS			B	B								
Intersection Summary												
Average Delay			0.3									
Intersection Capacity Utilization			38.1%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Lakeshore Road/Fraser Crescent & Highway 26

2030 PM Future Background Volumes
 7/10/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	584	1	2	572	1	0	0	10	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	615	1	2	602	1	0	0	11	0	0	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	603			616			1223	1223	615	1233	1223	603
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	603			616			1223	1223	615	1233	1223	603
tC, single (s)	4.1			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	100			100			100	100	98	100	100	100
cM capacity (veh/h)	984			974			157	181	470	152	181	503
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	616	605	11	1								
Volume Left	0	2	0	0								
Volume Right	1	1	11	1								
cSH	984	974	470	503								
Volume to Capacity	0.00	0.00	0.02	0.00								
Queue Length 95th (m)	0.0	0.0	0.5	0.0								
Control Delay (s)	0.0	0.1	12.8	12.2								
Lane LOS		A	B	B								
Approach Delay (s)	0.0	0.1	12.8	12.2								
Approach LOS			B	B								
Intersection Summary												
Average Delay			0.1									
Intersection Capacity Utilization			41.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Lakeshore Road/Fraser Crescent & Highway 26

2020 AM Total Volumes
 7/10/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	459	5	18	341	0	16	0	59	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	483	5	19	359	0	17	0	62	0	0	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	359			488			884	883	486	945	885	359
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	359			488			884	883	486	945	885	359
tC, single (s)	4.1			4.2			7.1	6.5	6.6	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.7	3.5	4.0	3.3
p0 queue free %	100			98			94	100	88	100	100	100
cM capacity (veh/h)	1211			1015			264	282	507	211	281	690
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	488	19	359	79	1							
Volume Left	0	19	0	17	0							
Volume Right	5	0	0	62	1							
cSH	1211	1015	1700	424	690							
Volume to Capacity	0.00	0.02	0.21	0.19	0.00							
Queue Length 95th (m)	0.0	0.4	0.0	5.1	0.0							
Control Delay (s)	0.0	8.6	0.0	15.4	10.2							
Lane LOS		A		C	B							
Approach Delay (s)	0.0	0.4		15.4	10.2							
Approach LOS				C	B							
Intersection Summary												
Average Delay			1.5									
Intersection Capacity Utilization			42.3%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Lakeshore Road/Fraser Crescent & Highway 26

2020 PM Total Volumes
 7/10/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	526	17	51	515	1	8	0	32	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	554	18	54	542	1	8	0	34	0	0	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	543			572			1213	1213	563	1246	1222	543
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	543			572			1213	1213	563	1246	1222	543
tC, single (s)	4.1			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	100			95			95	100	93	100	100	100
cM capacity (veh/h)	1036			1011			153	174	504	136	172	544
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	572	54	543	42	1							
Volume Left	0	54	0	8	0							
Volume Right	18	0	1	34	1							
cSH	1036	1011	1700	346	544							
Volume to Capacity	0.00	0.05	0.32	0.12	0.00							
Queue Length 95th (m)	0.0	1.3	0.0	3.1	0.0							
Control Delay (s)	0.0	8.8	0.0	16.9	11.6							
Lane LOS		A		C	B							
Approach Delay (s)	0.0	0.8		16.9	11.6							
Approach LOS				C	B							
Intersection Summary												
Average Delay			1.0									
Intersection Capacity Utilization			58.1%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Lakeshore Road/Fraser Crescent & Highway 26

2025 AM Total Volumes
 7/10/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	485	5	19	360	0	16	0	60	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	511	5	20	379	0	17	0	63	0	0	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	379			516			933	932	513	995	935	379
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	379			516			933	932	513	995	935	379
tC, single (s)	4.1			4.2			7.1	6.5	6.6	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.7	3.5	4.0	3.3
p0 queue free %	100			98			93	100	87	100	100	100
cM capacity (veh/h)	1191			991			244	263	488	193	262	672
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	516	20	379	80	1							
Volume Left	0	20	0	17	0							
Volume Right	5	0	0	63	1							
cSH	1191	991	1700	403	672							
Volume to Capacity	0.00	0.02	0.22	0.20	0.00							
Queue Length 95th (m)	0.0	0.5	0.0	5.5	0.0							
Control Delay (s)	0.0	8.7	0.0	16.1	10.4							
Lane LOS		A		C	B							
Approach Delay (s)	0.0	0.4		16.1	10.4							
Approach LOS				C	B							
Intersection Summary												
Average Delay				1.5								
Intersection Capacity Utilization			43.7%		ICU Level of Service				A			
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis
 3: Lakeshore Road/Fraser Crescent & Highway 26

2025 PM Total Volumes
 7/10/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	554	17	51	543	1	8	0	33	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	583	18	54	572	1	8	0	35	0	0	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	573			601			1272	1272	592	1306	1281	572
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	573			601			1272	1272	592	1306	1281	572
tC, single (s)	4.1			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	100			95			94	100	93	100	100	100
cM capacity (veh/h)	1010			986			139	160	484	123	158	523
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	601	54	573	43	1							
Volume Left	0	54	0	8	0							
Volume Right	18	0	1	35	1							
cSH	1010	986	1700	327	523							
Volume to Capacity	0.00	0.05	0.34	0.13	0.00							
Queue Length 95th (m)	0.0	1.3	0.0	3.4	0.0							
Control Delay (s)	0.0	8.9	0.0	17.7	11.9							
Lane LOS		A		C	B							
Approach Delay (s)	0.0	0.8		17.7	11.9							
Approach LOS				C	B							
Intersection Summary												
Average Delay			1.0									
Intersection Capacity Utilization			58.2%		ICU Level of Service				B			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
 3: Lakeshore Road/Fraser Crescent & Highway 26

2030 AM Total Volumes
 7/10/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	513	5	20	381	0	16	0	61	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	540	5	21	401	0	17	0	64	0	0	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	401			545			987	986	543	1050	988	401
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	401			545			987	986	543	1050	988	401
tC, single (s)	4.1			4.2			7.1	6.5	6.6	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.7	3.5	4.0	3.3
p0 queue free %	100			98			92	100	86	100	100	100
cM capacity (veh/h)	1169			966			224	244	469	176	243	653
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	545	21	401	81	1							
Volume Left	0	21	0	17	0							
Volume Right	5	0	0	64	1							
cSH	1169	966	1700	382	653							
Volume to Capacity	0.00	0.02	0.24	0.21	0.00							
Queue Length 95th (m)	0.0	0.5	0.0	6.0	0.0							
Control Delay (s)	0.0	8.8	0.0	16.9	10.5							
Lane LOS		A		C	B							
Approach Delay (s)	0.0	0.4		16.9	10.5							
Approach LOS				C	B							
Intersection Summary												
Average Delay			1.5									
Intersection Capacity Utilization		45.3%		ICU Level of Service		A						
Analysis Period (min)		15										

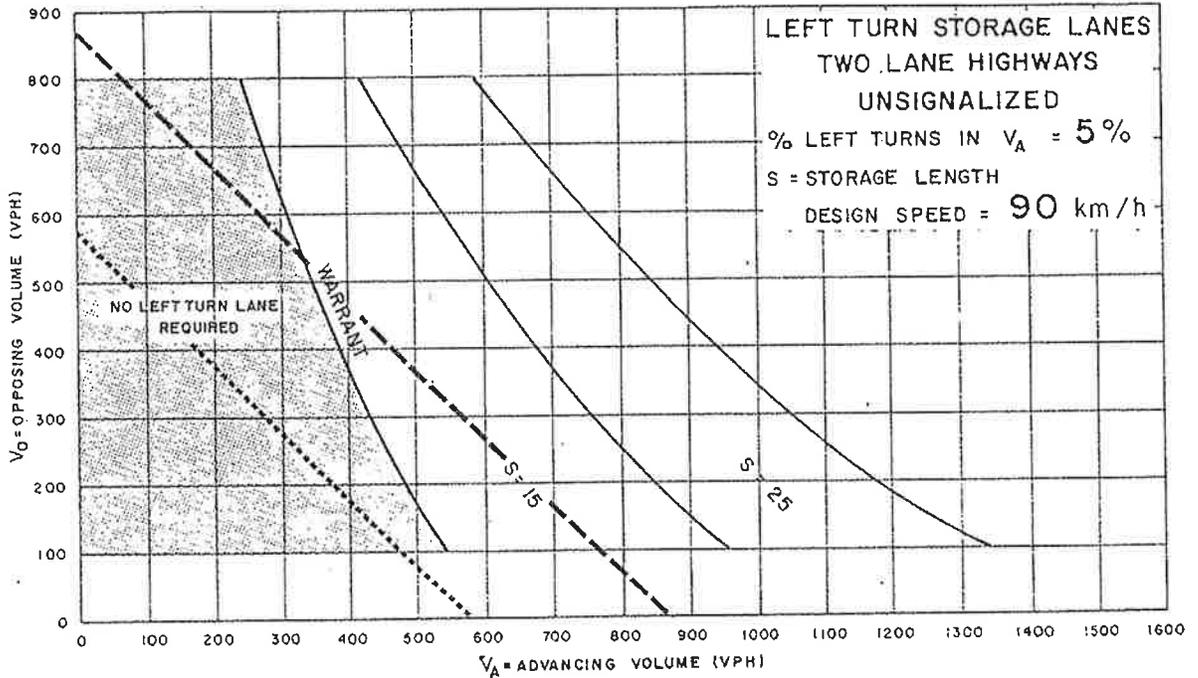
HCM Unsignalized Intersection Capacity Analysis
 3: Lakeshore Road/Fraser Crescent & Highway 26

2030 PM Total Volumes
 7/10/2012

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	584	17	51	572	1	8	0	34	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	615	18	54	602	1	8	0	36	0	0	1
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	603			633			1334	1334	624	1369	1343	603
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	603			633			1334	1334	624	1369	1343	603
tC, single (s)	4.1			4.1			7.1	6.5	6.3	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.4	3.5	4.0	3.3
p0 queue free %	100			94			93	100	92	100	100	100
cM capacity (veh/h)	984			960			126	147	465	110	145	503
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1							
Volume Total	633	54	603	44	1							
Volume Left	0	54	0	8	0							
Volume Right	18	0	1	36	1							
cSH	984	960	1700	308	503							
Volume to Capacity	0.00	0.06	0.35	0.14	0.00							
Queue Length 95th (m)	0.0	1.3	0.0	3.8	0.0							
Control Delay (s)	0.0	9.0	0.0	18.7	12.2							
Lane LOS		A		C	B							
Approach Delay (s)	0.0	0.7		18.7	12.2							
Approach LOS				C	B							
Intersection Summary												
Average Delay			1.0									
Intersection Capacity Utilization			58.3%		ICU Level of Service					B		
Analysis Period (min)			15									

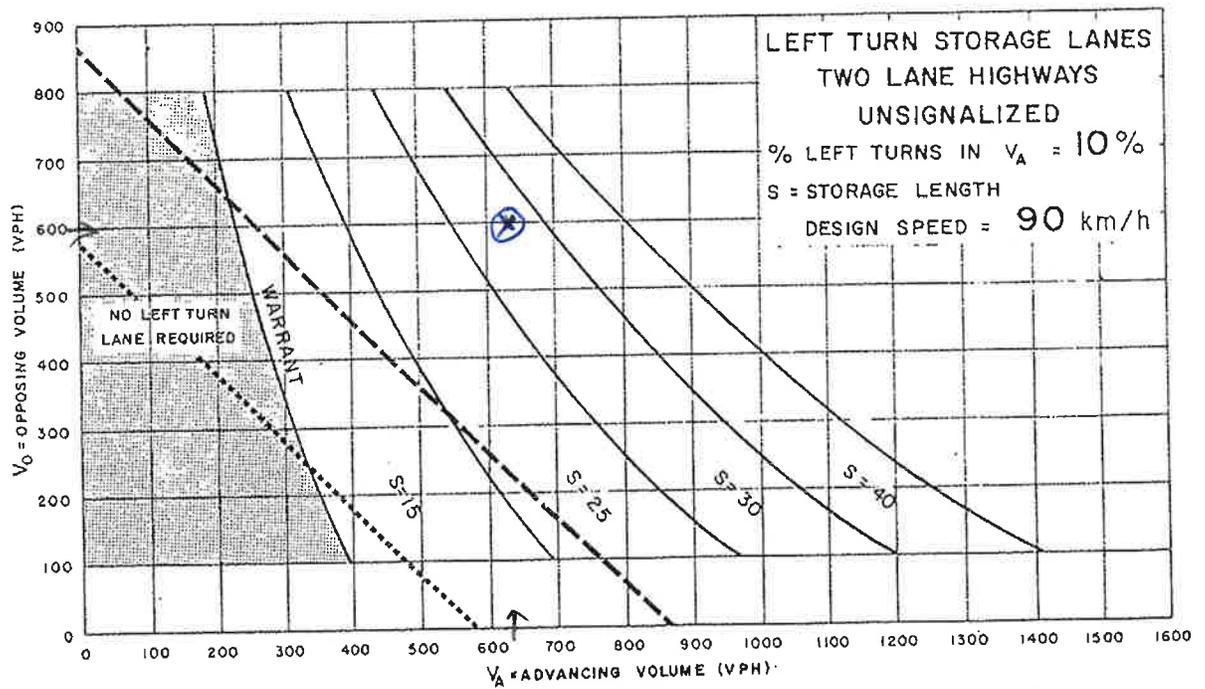
APPENDIX D

Left-turn Lane Analysis



--- TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

..... TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS



2030 p.m. peak hour $V_A = 624$ vch., $V_0 = 601$ vch.

Figure EA-18



Date: July 4 2012 Project No: 218-2659 Prepared By: A. Fleming Reviewed By: _____

Project: Eden Oak Craigleith TW

Subject: May 26 WB LTZ trigger.

May 2020 p.m. peak hour volumes.

$$WB RT = 1 \text{ veh.}$$

$$WB TH = 515 \text{ veh.}$$

$$WB LT = x \text{ veh.}$$

$$x \div (x + 515 + 1) = 0.025$$

$$x = 0.025x + 12.9$$

$$x = 13.2 \Rightarrow 14^{\text{th}} \text{ veh will trigger.}$$

$$14 \text{ veh} - 2 \text{ existing veh.} = 12 \text{ site vehicles.}$$

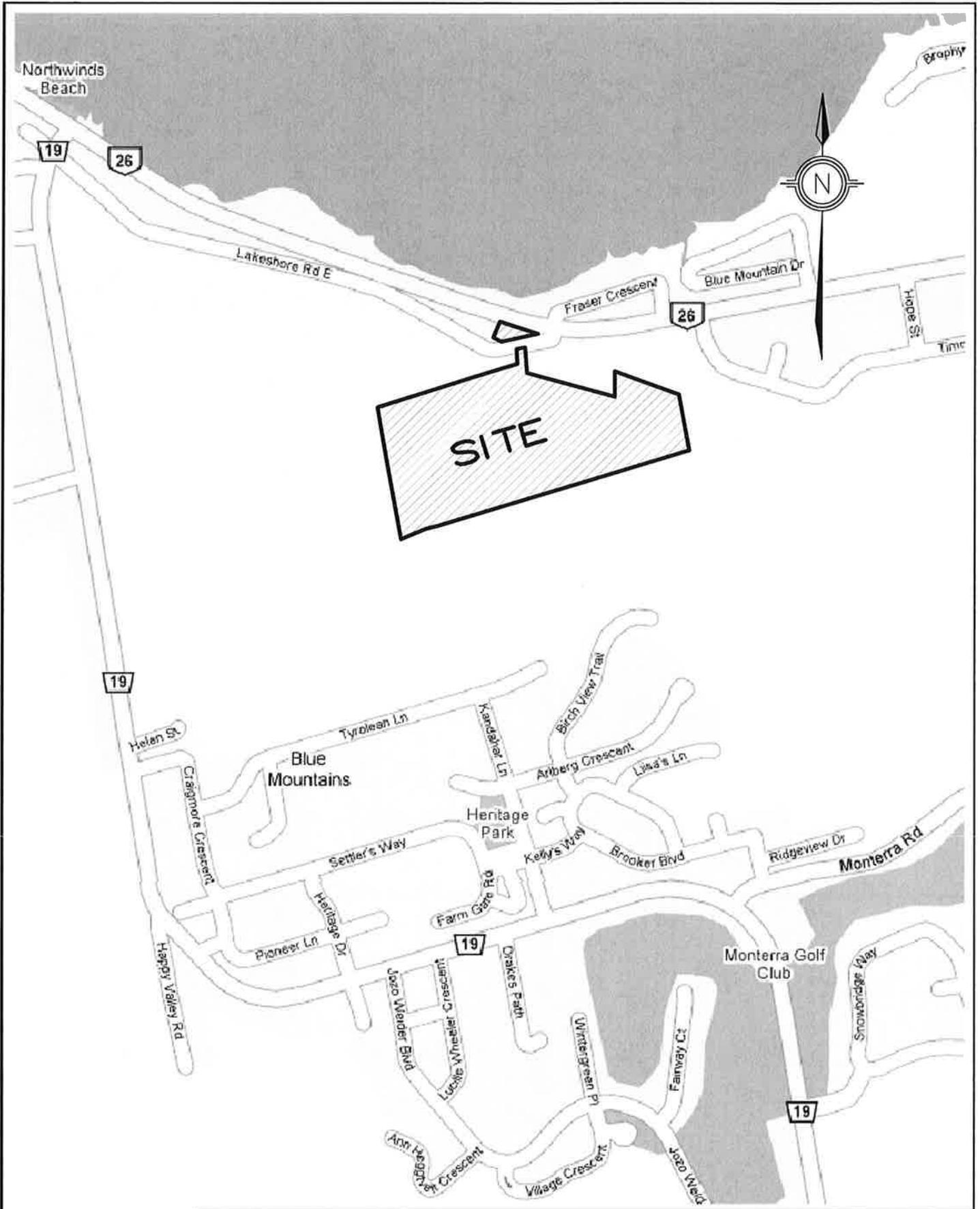
$$12 \text{ site vehicles} \div 49 \text{ WB LT site vehicles (total)} = 0.245$$

$$225 \text{ units} \times 24.5\% = \underline{55 \text{ units}}$$

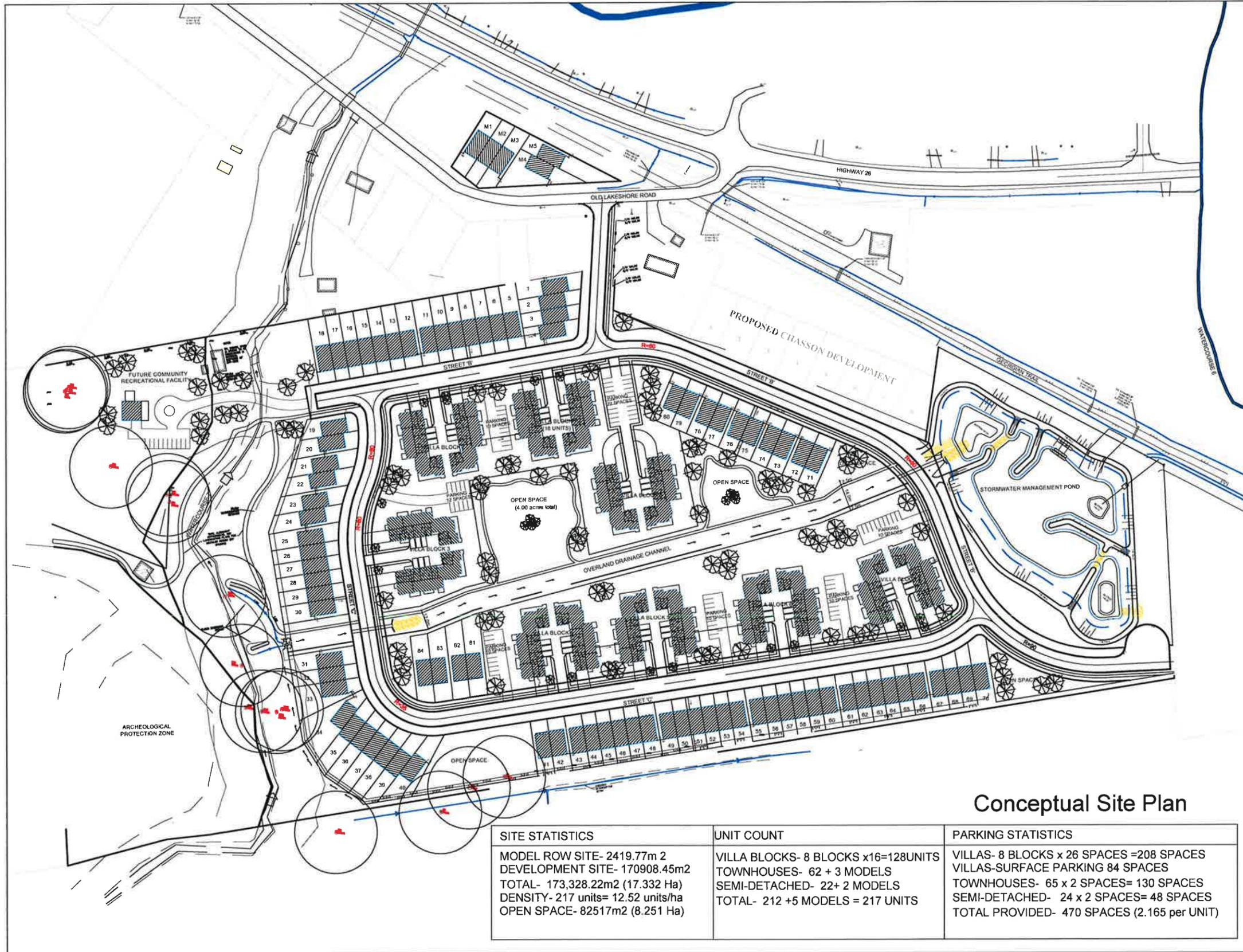
55 units can be occupied before triggering
WB left-turn lane at Hwy 26 / Lakeshore Rd.

FIGURES

- Figure 1:** Site Location Plan
- Figure 2:** Concept Plan
- Figure 3:** 2012 Existing Traffic Volumes
- Figure 4:** 2020 Future Background Traffic Volumes
- Figure 5:** 2025 Future Background Traffic Volumes
- Figure 6:** 2030 Future Background Traffic Volumes
- Figure 7:** Residential Trip Distribution
- Figure 8:** Residential Trip Assignment
- Figure 9:** 2020 Total Future Traffic Volumes
- Figure 10:** 2025 Total Future Traffic Volumes
- Figure 11:** 2030 Total Future Traffic Volumes
- Figure 12:** Preliminary Design – Left-turn Lane



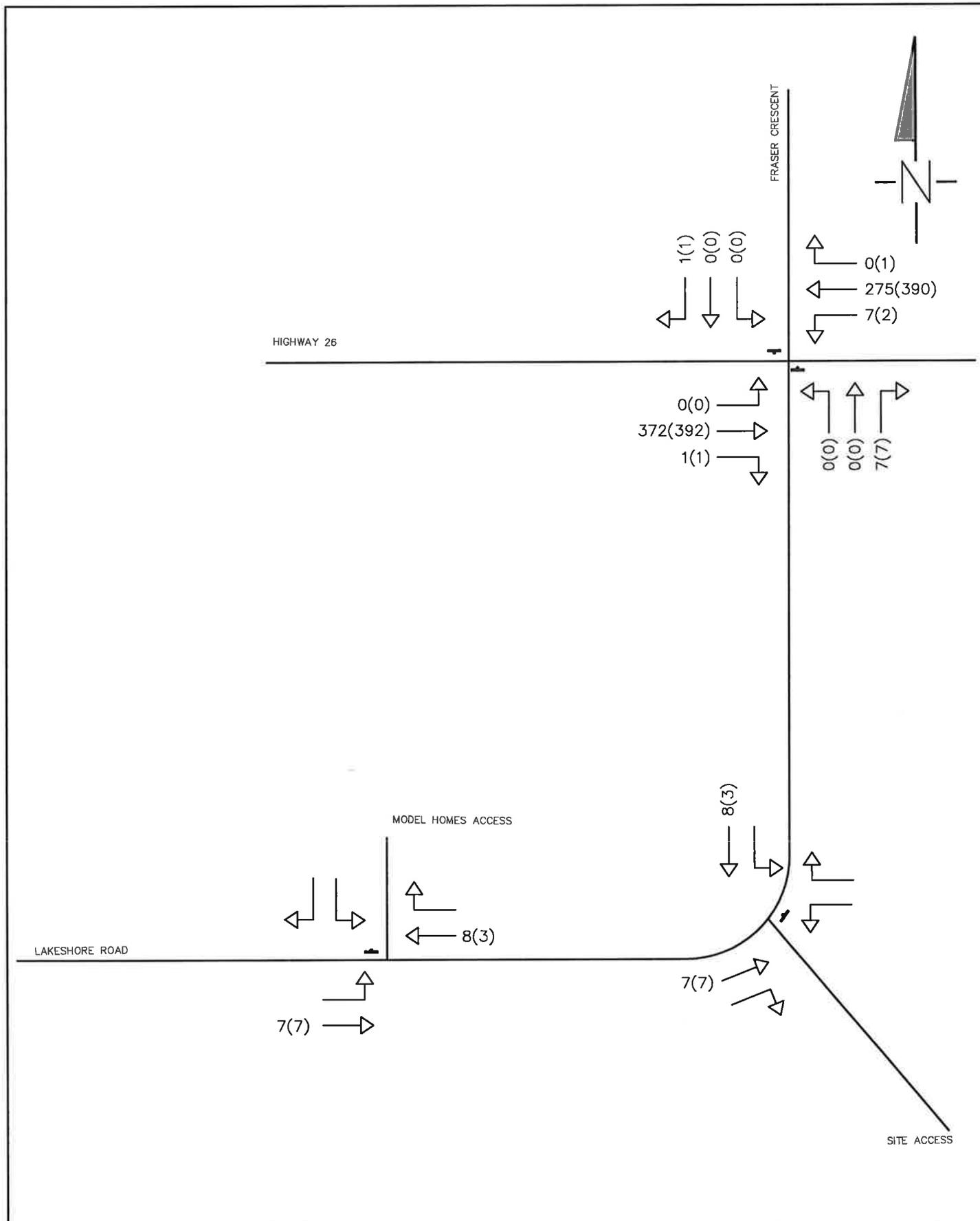
Project		EDEN OAK TOWN OF THE BLUE MOUNTAINS		
Drawing		SITE LOCATION PLAN		
			CROZIER & ASSOCIATES Consulting Engineers	<small>THE HARBOUREdge BUILDING 40 HURON STREET, SUITE 301 COLLINGWOOD, ON L3Y 4R3</small>
		Drawn By J.R.S.	Check By N.M.	Project No. 218-2659
		Scale N.T.S.	Date 01/28/2008	Drawing No. FIG.1
				<small>705-446-3510 T 705-446-3020 F WWW.CROZIER.CA INFO@CROZIER.CA</small>



Conceptual Site Plan

SITE STATISTICS	UNIT COUNT	PARKING STATISTICS
MODEL ROW SITE- 2419.77m ²	VILLA BLOCKS- 8 BLOCKS x16=128UNITS	VILLAS- 8 BLOCKS x 26 SPACES =208 SPACES
DEVELOPMENT SITE- 170908.45m ²	TOWNHOUSES- 62 + 3 MODELS	VILLAS-SURFACE PARKING 84 SPACES
TOTAL- 173,328.22m ² (17.332 Ha)	SEMI-DETACHED- 22+ 2 MODELS	TOWNHOUSES- 65 x 2 SPACES= 130 SPACES
DENSITY- 217 units= 12.52 units/ha	TOTAL- 212 +5 MODELS = 217 UNITS	SEMI-DETACHED- 24 x 2 SPACES= 48 SPACES
OPEN SPACE- 82517m ² (8.251 Ha)		TOTAL PROVIDED- 470 SPACES (2.165 per UNIT)

FIGURE 2



Legend:
 † STOP CONTROL
 XX(YY) A.M. (P.M.) PEAK HOUR TRAFFIC VOLUMES

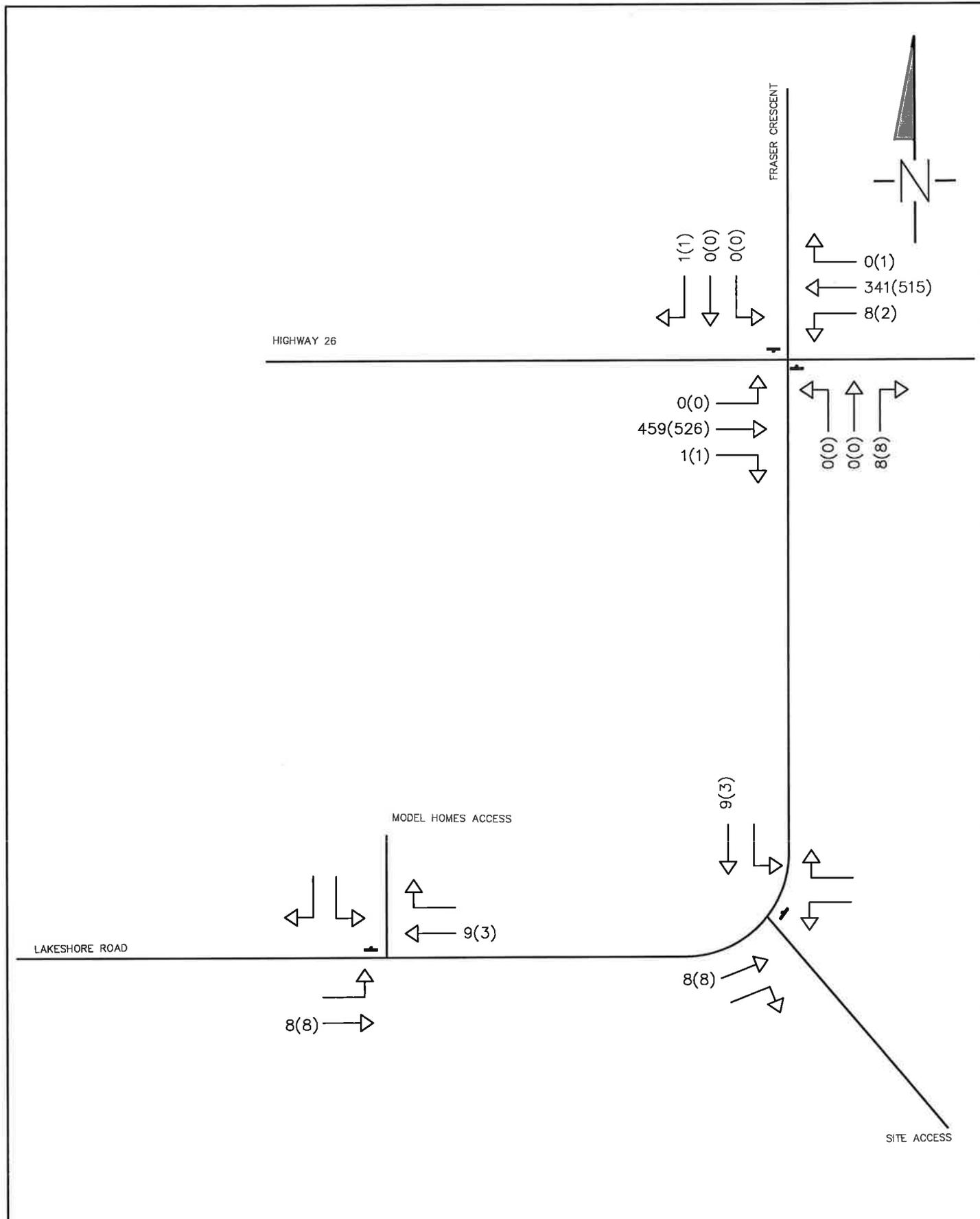
Project: EDEN OAK CRAIGHLEITH

Drawing: EXISTING TRAFFIC VOLUMES (2012)

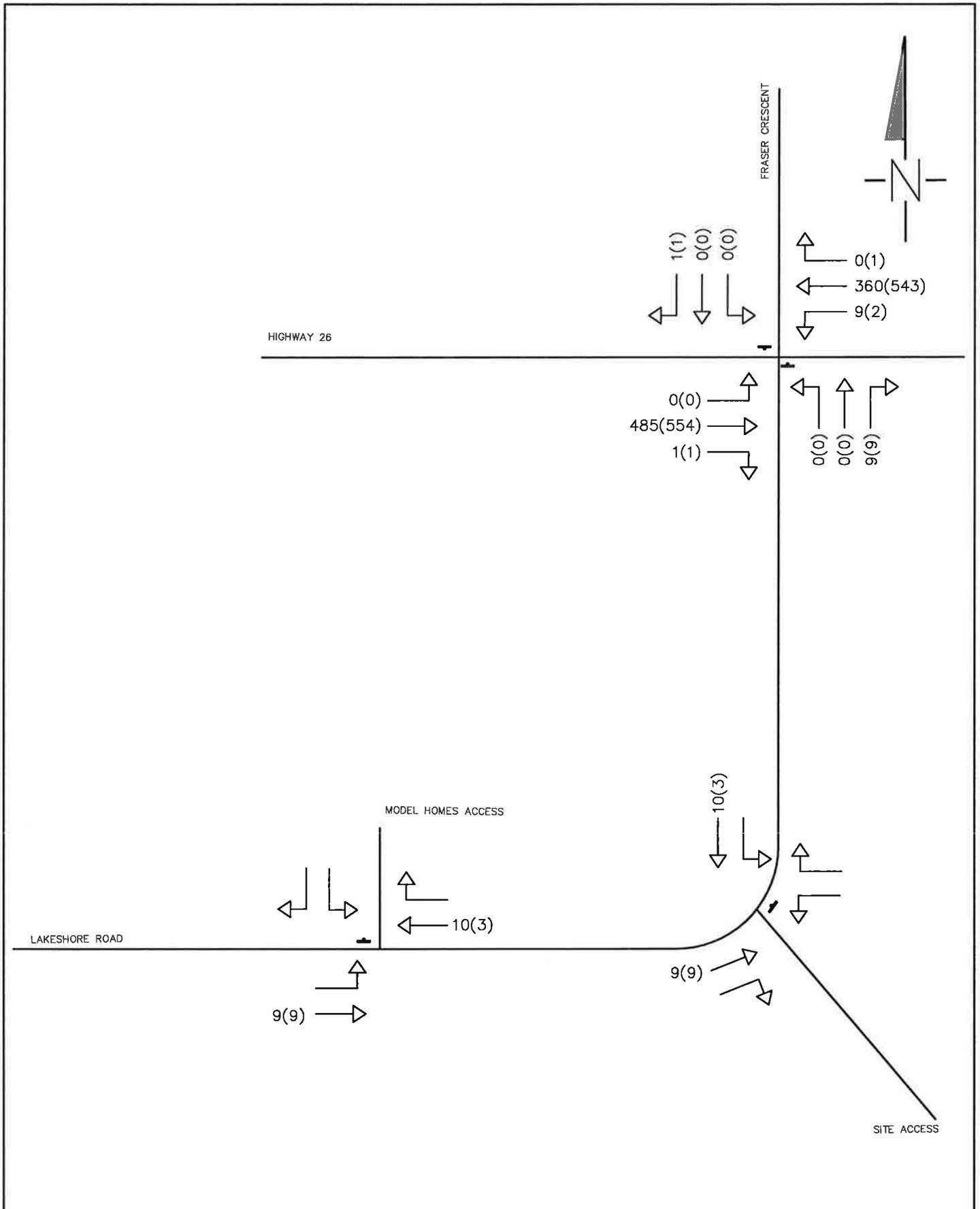
CROZIER & ASSOCIATES
 Consulting Engineers

Drawn By: E.J. **Design By:** C.C.C./D.D.D. **Project:** 218-2659

Scale: N.T.S. **Date:** 06/25/2012 **Check By:** E.E.E./F.F.F. **Drawing:** FIGURE 3



Legend STOP CONTROL XX(YY) A.M. (P.M.) PEAK HOUR TRAFFIC VOLUMES	Project EDEN OAK CRAIGHLEITH	CROZIER & ASSOCIATES Consulting Engineers <small>THE HARBOUREDGE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L9Y 4R3 705 446-3510 T 705 446-3520 F WWW.CROZIER.CA INFO@CROZIER.CA</small>
	Drawing FUTURE BACKGROUND TRAFFIC VOLUMES (2020)	



Legend

STOP CONTROL

XX(YY) A.M. (P.M.) PEAK HOUR TRAFFIC VOLUMES

Project

**EDEN OAK
CRAIGHLEITH**

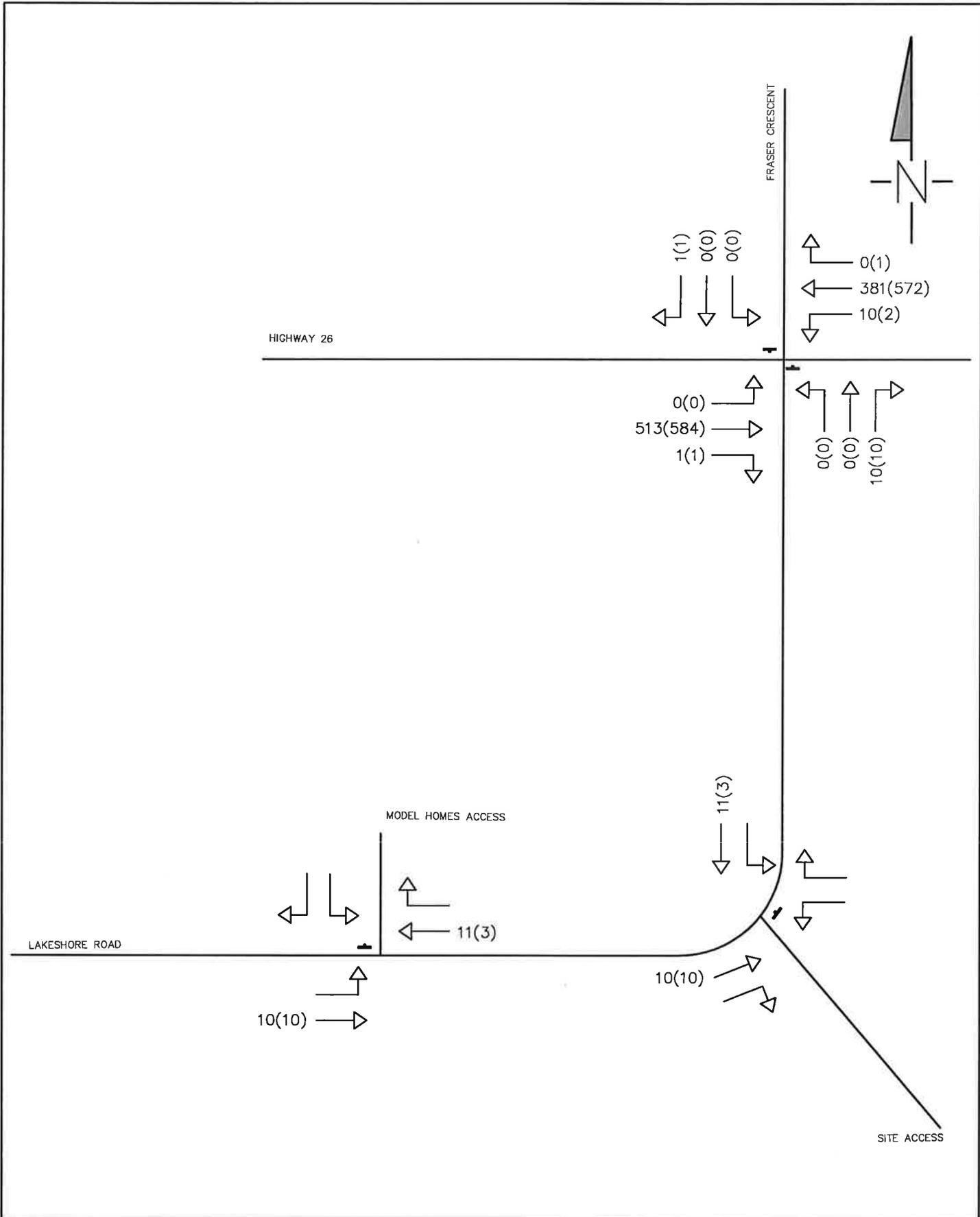
Drawing

**FUTURE BACKGROUND
TRAFFIC VOLUMES (2025)**

CROZIER & ASSOCIATES
Consulting Engineers

THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
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Drawn By:	E.J.	Design By:	C.C.C./D.D.D.	Project:	218-2659
Scale:	N.T.S.	Date:	06/25/2012	Check By:	E.E.E./F.F.F.
					FIGURE 5



Legend:
 ▬ STOP CONTROL
 XX(YY) A.M. (P.M.) PEAK HOUR TRAFFIC VOLUMES

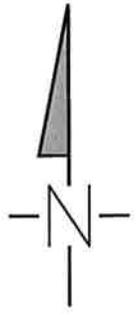
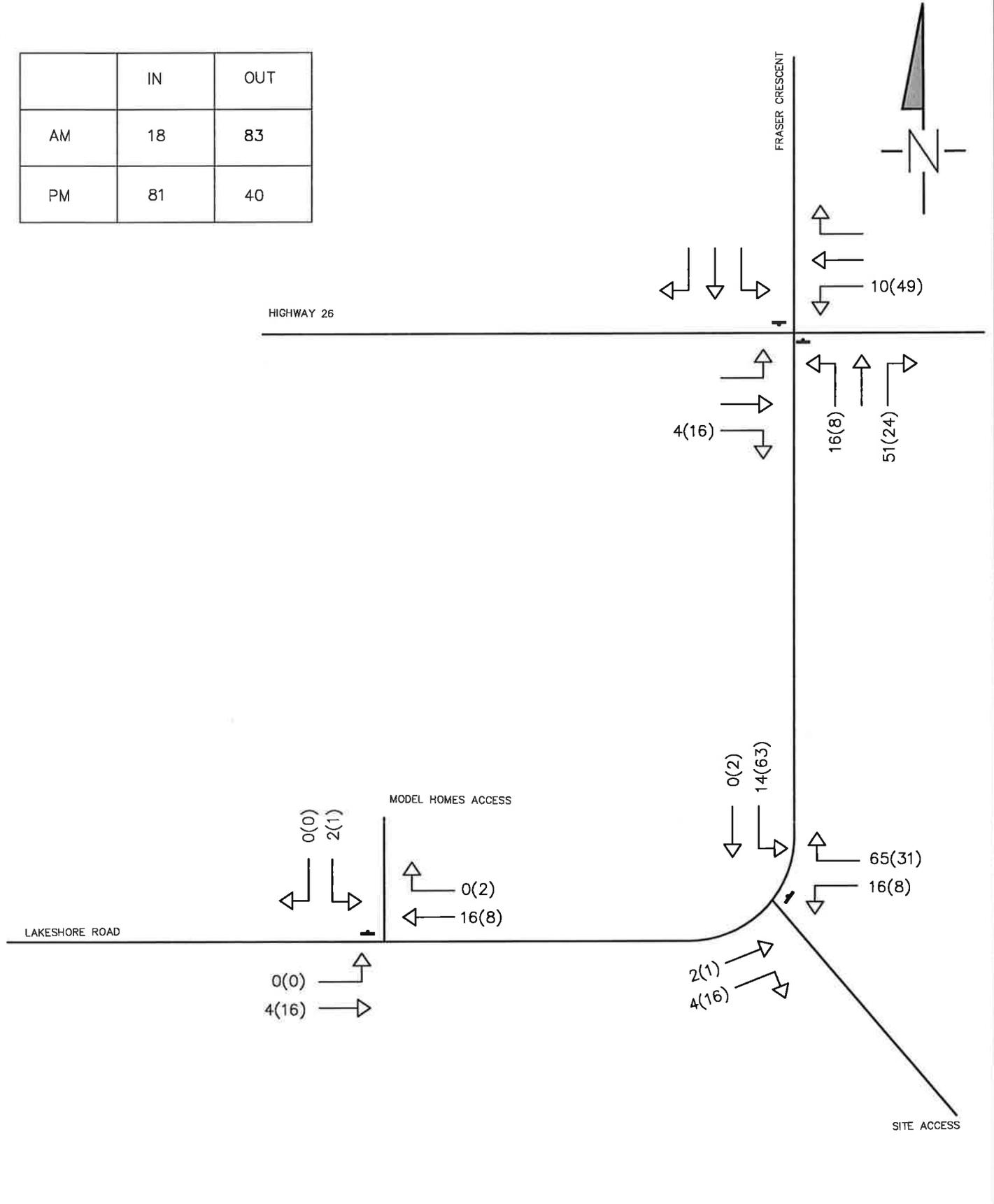
Project: EDEN OAK CRAIGHLEITH
 Drawing: FUTURE BACKGROUND TRAFFIC VOLUMES (2030)

CROZIER & ASSOCIATES
 Consulting Engineers

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

Drawn By: E.J. Design By: C.C.C./D.D.D. Project: 218-2659
 Scale: N.T.S. Date: 06/25/2012 Check By: E.E.E./F.F.F. Drawing: FIGURE 6

	IN	OUT
AM	18	83
PM	81	40



Legend
 ▬ STOP CONTROL
 XX(YY) A.M. (P.M.) PEAK HOUR TRAFFIC VOLUMES

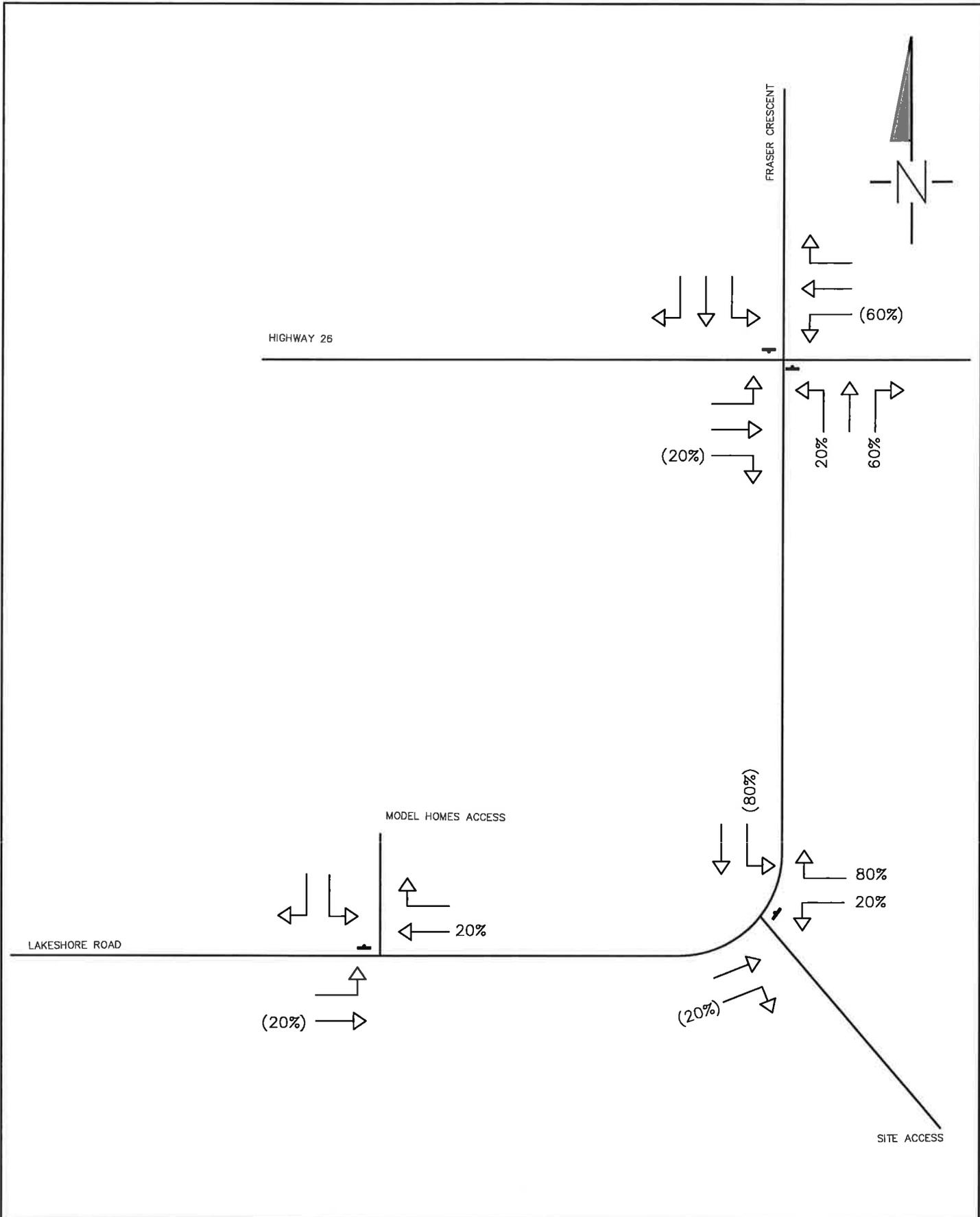
Project
EDEN OAK CRAIGHLEITH

Drawing
TRIP ASSIGNMENT

CROZIER & ASSOCIATES
 Consulting Engineers

THE HARBOUREDGE BUILDING,
 40 HURON STREET, SUITE 301,
 COLLINGWOOD, ON L9Y 4R3
 705.446.3510 T
 705.446.3520 F
 WWW.CROZIER-CA.COM
 INFO@CROZIER-CA.COM

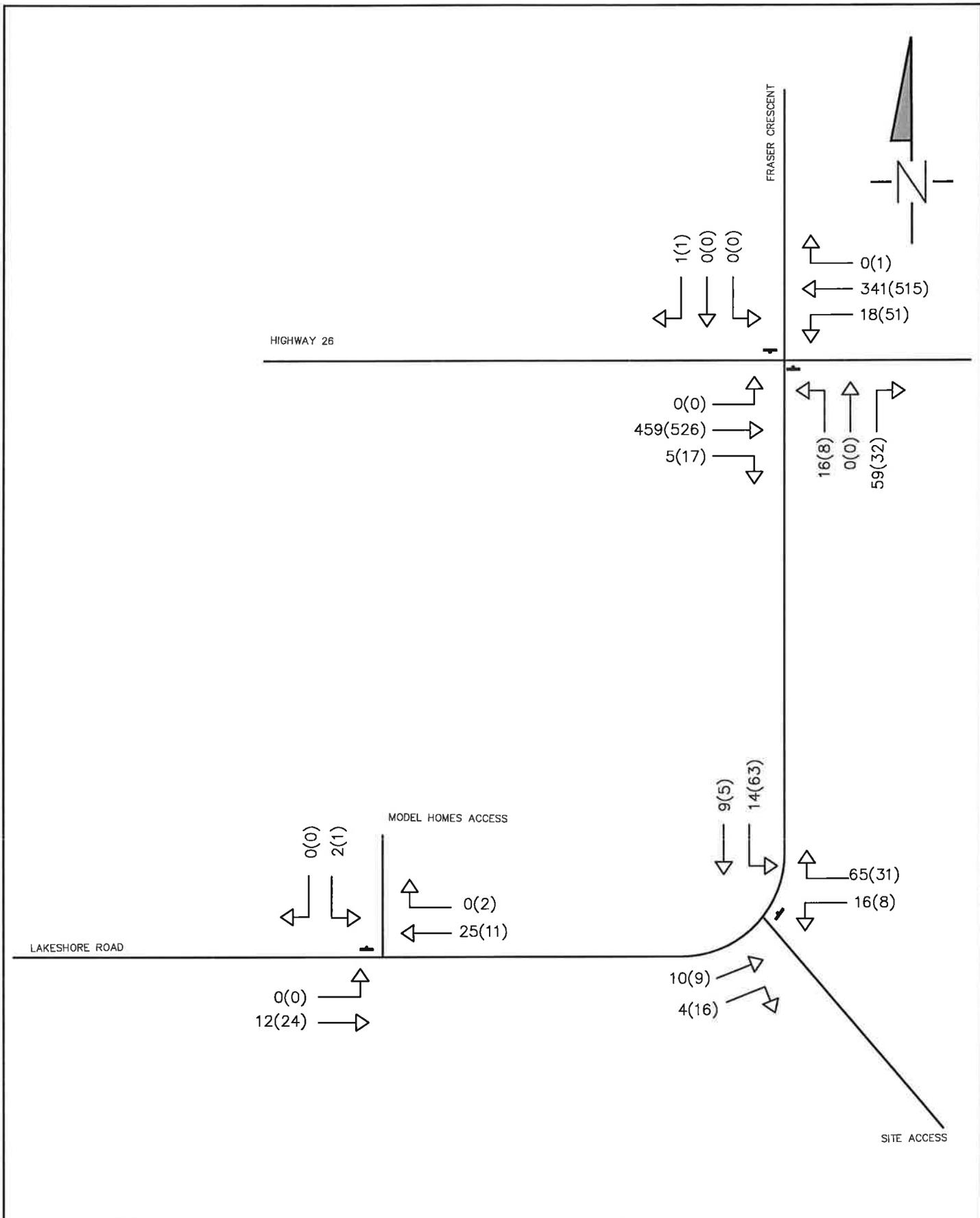
Drawn By	E.J.	Design By	C.C.C./D.D.D.	Project	218-2659
Scale	N.T.S.	Date	06/25/2012	Check By	E.E.E./F.F.F.
					FIGURE 7



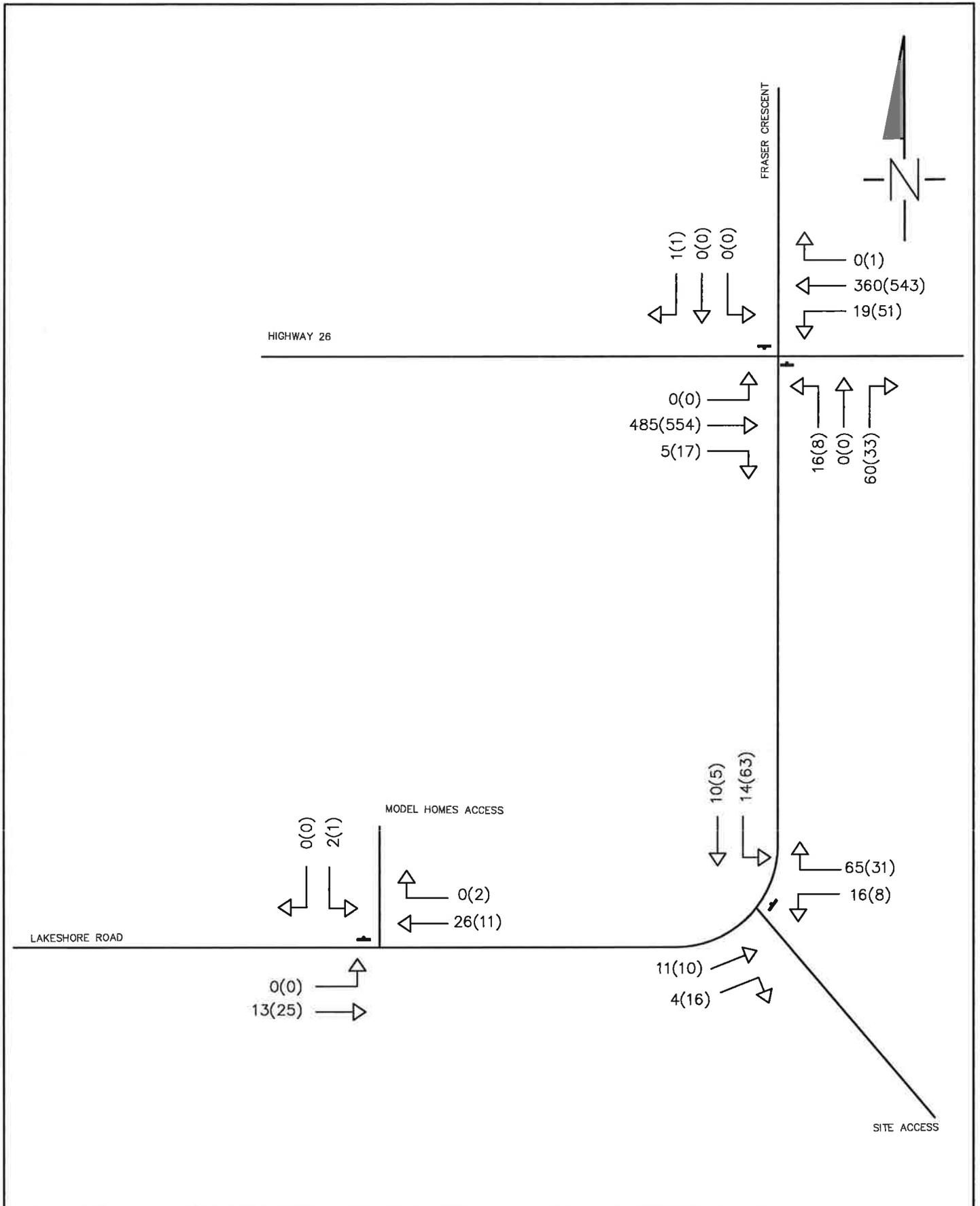
Legend	Project
<p>STOP CONTROL</p> <p>XX(YY) OUTBOUND (INBOUND) TRIP DISTRIBUTION</p>	<p>EDEN OAK CRAIGHLEITH</p>
	Drawing
	TRIP DISTRIBUTION

<p>EDEN OAK CRAIGHLEITH</p>	
<p>TRIP DISTRIBUTION</p>	

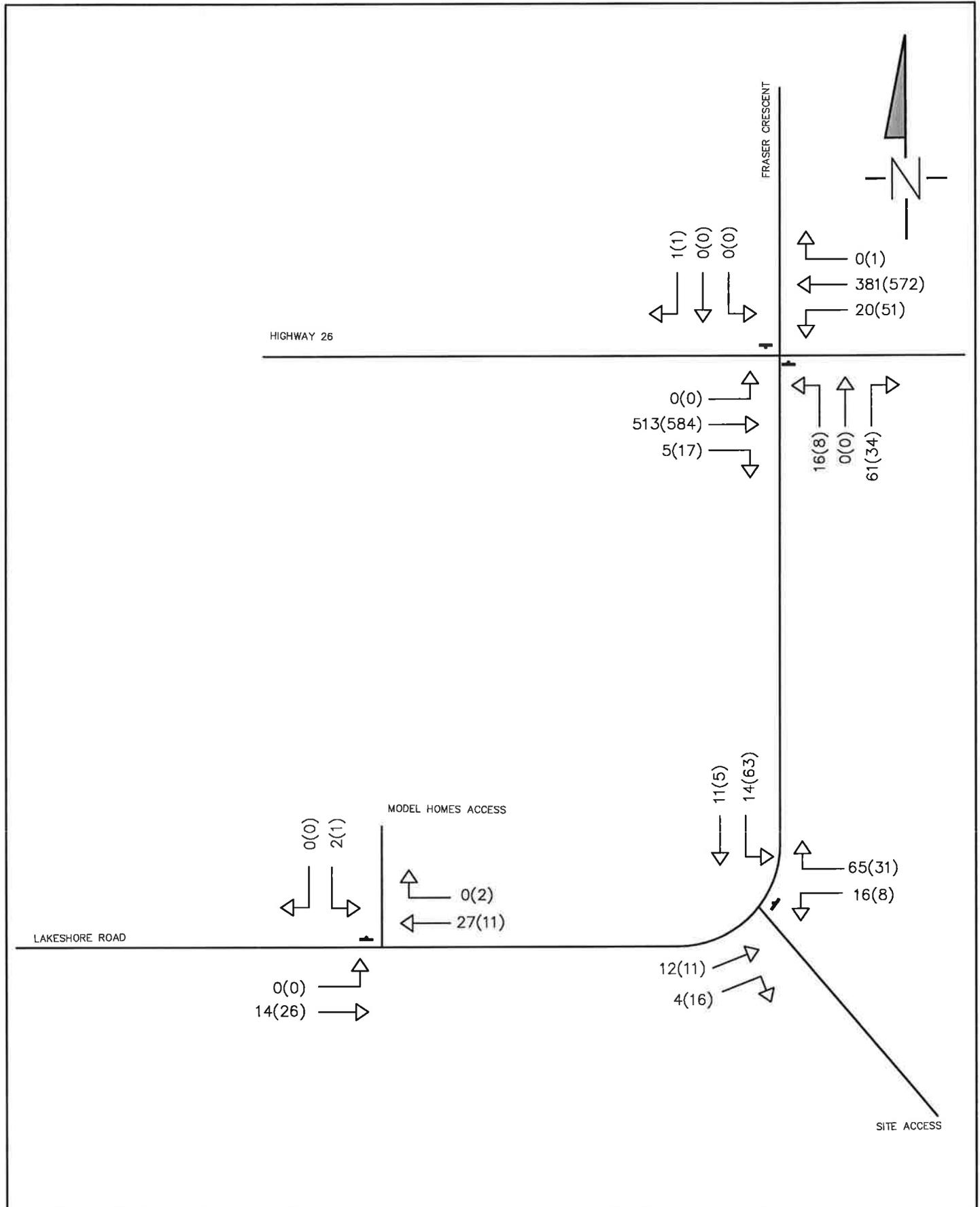
 <p>CROZIER & ASSOCIATES Consulting Engineers</p>		<p>THE HARBOUREDGE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L9Y 4R3 705 446-3510 T 705 446-3520 F WWW.CROZIER.CA INFO@CROZIER.CA</p>				
Drawn By	E.J.	Design By	C.C.C./D.D.D.	Project	218-2659	
Scale	N.T.S.	Date	06/25/2012	Check By	E.E.E./F.F.F.	
					Drawn	FIGURE 8



Legend STOP CONTROL XX(YY) A.M. (P.M.) PEAK HOUR TRAFFIC VOLUMES	Project EDEN OAK CRAIGHLAITH	CROZIER & ASSOCIATES Consulting Engineers <small>THE HARBOUREDGE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L5Y 4R3 705 446-3510 T 705 446-3520 F WWW.CROZIER-CA.COM INFO@CROZIER-CA.COM</small>
	Drawing TOTAL TRAFFIC VOLUMES (2020)	
		Drawn By E.J. Design By C.C.C./D.D.D. Project 218-2659
		Figure FIGURE 9



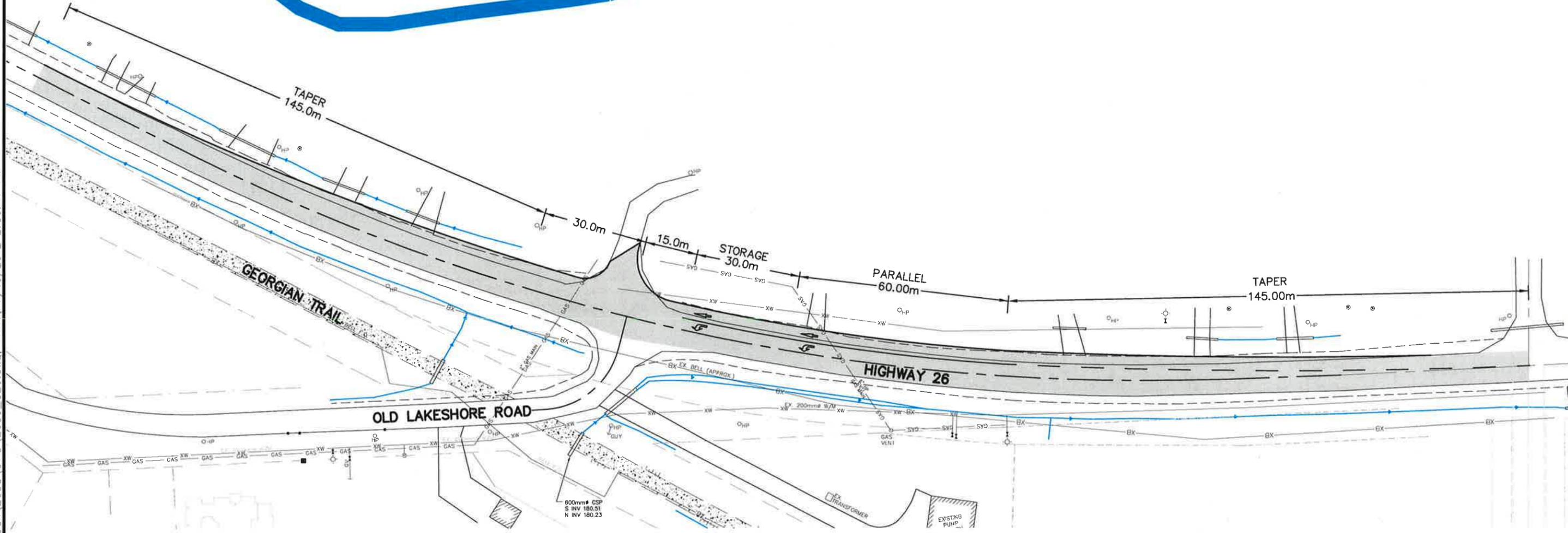
Legend STOP CONTROL XX(YY) A.M. (P.M.) PEAK HOUR TRAFFIC VOLUMES	Project EDEN OAK CRAIGHLAITH	 CROZIER & ASSOCIATES Consulting Engineers <small>THE HARBOUREDGE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L3Y 4R3 705 446-9510 T 705 446-3520 F www.crozier.ca info@crozier.ca</small>	Drawn By E.J.	Design By C.C.C./D.D.D.	Project 218-2659
	Drawing TOTAL TRAFFIC VOLUMES (2025)		Title N.T.S.	Date 06/25/2012	Check By E.E.E./F.F.F.



Legend STOP CONTROL XX(YY) A.M. (P.M.) PEAK HOUR TRAFFIC VOLUMES	Project EDEN OAK CRAIGHLEITH	CROZIER & ASSOCIATES Consulting Engineers <small>THE HARBOUR EDGE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L9Y 4R3 705 446-3510 T 705 446-3520 F WWW.CROZIER.CA INFO@CROZIER.CA</small>
	Drawing TOTAL TRAFFIC VOLUMES (2030)	



GEORGIAN BAY



J:\200\218 - Eden Oak\2659\CAD\2659_320.dwg, 11x17, 7/10/2012 2:30:47 PM

Project		EDEN OAK CRAIGHLEITH		 CROZIER & ASSOCIATES Consulting Engineers <small>THE HARBOUREDE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L3Y 4R3 705 446-3510 T 705 446-3520 F www.crozier.ca info@crozier.ca</small>		
Drawing		PRELIMINARY DESIGN - LEFT TURN LANE				
Drawn By	J.K.	Design By	G.C.C./D.D.D.	Project	218-2659	
Scale	1:1000	Date	07/10/2012	Check By	E.E.E./F.F.F.	
					Drawing	FIG. 12