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372 Grey Road 21

TRAFFIC IMPACT BRIEF

Rhemm Properties Ltd.

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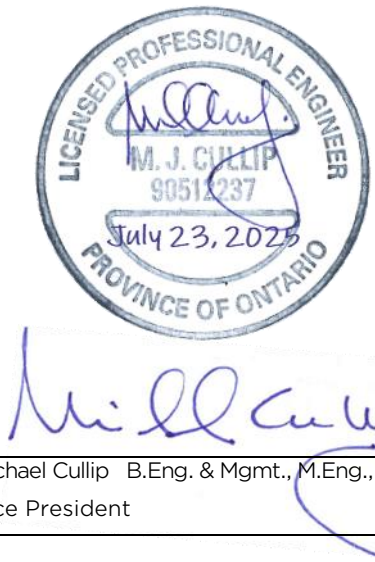
Prepared by:

Tatham Engineering Limited
115 Sandford Fleming Drive, Suite 200
Collingwood, Ontario L9Y 5A6

T 705-444-2565
tathameng.com

Prepared for:

Rhemm Properties Ltd.
119 Fieldcrest Court
Clarksburg, Ontario N0H 1J0

Authored by:	Reviewed by:
	
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	January 17, 2024	Final Report
2	July 26, 2024	Revised Site Plan
3	April 11, 2025	Revised Site Plan
4	July 23, 2025	Revised Site Plan

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1 Introduction

Tatham Engineering Limited has been retained by Rhemm Properties Ltd. to prepare a traffic impact brief to support a Draft Plan of Subdivision Application for a residential development at 372 Grey Road 21 in the Town of The Blue Mountains. The location of the development site is illustrated in Figure 1.

The purpose of this study is to review the proposed development from a transportation perspective, addressing site traffic volumes, on-site circulation, parking requirements and potential impacts to the adjacent road system. Recognizing that the trip generation associated with the proposed development will not be significant, the scope of the study has been limited to a traffic impact brief with a focus on the following:

- existing conditions, including a description of the study area road network, traffic volumes, operations and planned/proposed improvements;
- details of the proposed development and anticipated trip generation;
- on-site circulation and parking provision; and
- potential transportation impacts associated with the proposed development.

An initial traffic impact brief was issued on January 17, 2024 which addressed a previous development proposal consisting of 39 detached residential units and 28 semi-detached units. The development plan has subsequently been revised on several occasions, warranting updates to the brief.

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 Highway 26, Lakeshore Road East and their respective intersection. Mapping and photographs of the road network are provided in Figure 2 with further details provided below.

Highway 26

Key elements and characteristics of Highway 26 are as follows:

- under the jurisdiction of MTO and designated a Class 2B Arterial as per the MTO's *Highway Access Management Guideline*;
- oriented east-west through the study area;
- 1 travel lane per direction with a paved road surface, paved shoulders and a rural cross-section;
- posted speed limit of 70 km/h through the study area;
- wide curve (radius of approximately 600 metres) and flat alignment within the immediate study area; and
- assumed planning capacity of 900 vehicles per hour per lane (vphpl) reflective of its arterial road designation.

Lakeshore Road East

Lakeshore Road East has the following characteristics:

- under the jurisdiction of the Town of The Blue Mountains and designated a local road under the Town's *Official Plan*;
- generally oriented parallel to Highway 26 (i.e. east-west), reorients to a north-south alignment where it intersects with Highway 26;
- 1 travel lane per direction with a rural cross-section and a paved road surface;
- posted speed limit of 50 km/h; and
- assumed planning capacity of 400 vphpl reflective of its local road status.

Highway 26 & Lakeshore Road East/Fraser Crescent

The intersection of Highway 26 with Lakeshore Road East/Fraser Crescent is a 4-leg, unsignalized intersection, with stop control on Lakeshore Road East and Fraser Crescent (the south and north legs). As evident in Figure 2, the north, west and south approaches each consist of a single shared left-through-right lane. A westbound left turn lane was recently constructed on the east approach, consisting of a 30 metre storage lane, a 55 metre parallel lane and a 135 metre taper (as determined from field measures). Otherwise, the east approach has a shared through-right lane.

2.2 TRANSIT NETWORK

Blue Mountain Transit operates between the Blue Mountain Resort and Craigleith areas and the Town of Collingwood, including connections to the remaining transit routes within Collingwood and immediate areas (including Wasaga Beach) via the Collingwood Main Terminal. Through the study area, Blue Mountain Transit operates along Highway 26, Lakeshore Road East and Timmons Street, as illustrated in Figure 3. It is noted that service is provided in a loop within the Blue Mountain Resort and Craigleith area, operating in a clockwise fashion (and thus only eastbound service is provided in the area of the subject site). The closest bus stop is provided on Timmons Street, approximately 250 metres from the subject site (albeit such may not be directly accessible); another stop is provided on Lakeshore Road East, approximately 1,400 metres from the site (refer to Figure 3).

2.3 TRAFFIC VOLUMES

Given the scope of study, new traffic counts were not undertaken as part of this study. Rather, traffic volumes along Highway 26 through the study area were obtained from the *Aquavil Traffic Impact Study*[1], based on traffic counts completed on Friday, July 5, 2019. As noted in the referenced study, these counts are considered representative of peak summer conditions and thus reflect a conservative approach given the increase in recreational and tourist traffic experienced in the area in the summer months.

Turning movements at the intersection of Highway 26 and Lakeshore Road East/Fraser Crescent were obtained from the *Eden Oak – Blue Trails Traffic Impact Study*[2], based on counts completed on Tuesday, June 12, 2012. While it is acknowledged that this traffic count is over 10 years old, the turning movements are not expected to have changed significantly since 2012 recognizing that both Lakeshore Road East and Fraser Crescent are local residential roads, with limited reach

[1] *Aquavil Traffic Impact Study*. Crozier Consulting Engineers, September 2019.
[2] *Eden Oak – Blue Trails Residential Development Traffic Impact Study*. Crozier Consulting Engineers. July 2012.

and development, and hence low observed traffic volumes. Furthermore, as these roads are not through roads and are residential in nature, no significant seasonal variation is anticipated.

The corresponding traffic volumes as per the noted traffic counts are illustrated in Figure 4 for the weekday AM and PM peak hours, with corresponding count data provided in Appendix A. As noted, volumes to/from Lakeshore Road East and Fraser Crescent are relatively minor (less than 10 vehicles per hour per direction) and thus, should there be any increases beyond the 2012 count data, such would also be minimal.

Traffic volumes for the 2025 horizon (representative of existing conditions) have been determined assuming a growth of 1.5% (see Section 4.2.1) per annum along Highway 26. As noted above, Lakeshore Road and Fraser Crescent are not expected to see significant yearly growth, thus no growth has been applied to the volumes on either road. The resulting 2025 traffic volumes are illustrated in Figure 5.

2.4 TRAFFIC OPERATIONS

The assessment of existing conditions provides the baseline from which the future traffic volumes and operations can be assessed. Operations at the study area intersection and along the highway approaches have been considered as detailed in the following sections (as intersections are typically the bottleneck of the road system, their operations are more critical).

2.4.1 Intersection Operations

The intersection analyses were completed to investigate the operations of the Highway 26 intersection with Lakeshore Road East/Fraser Crescent based on:

- the 2025 traffic volumes (employing a minimum of 5 vehicles per turning movement);
- the existing intersection configurations and controls; and
- procedures outlined in the *2000 Highway Capacity Manual*[3] (using Synchro v.11 software).

For unsignalized intersections, the review considers the following metrics for the critical, stop controlled movements/approaches:

- average delay (measured in seconds);
- level of service (LOS) - level of service 'A' corresponds to the best operating condition with minimal delays whereas level of service 'F' corresponds to poor operations resulting from high intersection delays (level of service definitions are provided in Appendix B); and

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

- volume to capacity (v/c) ratios – a v/c ratio of less than 1.00 indicates the intersection movement/approach is operating at less than capacity while v/c of 1.00 indicates capacity has been reached.

A summary of the 2025 intersection analyses is provided in Table 1; corresponding detailed operational worksheets are included in Appendix C. Based on the existing volumes, intersection configurations and controls, the study area intersection provides acceptable levels of service (LOS D or better) during both peak hours. As such, no intersection improvements are required to support the existing conditions.

Table 1: Intersection Operations – 2025

INTERSECTION, MOVEMENT & CONTROL			WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			Delay	LOS	V/C	Delay	LOS	V/C
Highway 26 & Lakeshore Rd E/ Fraser Crescent	NB LTR	stop	18	C	0.04	25	C	0.07
	SB LTR	stop	19	C	0.04	28	D	0.06

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

2.4.2 Road Operations

Further to the intersection operations, consideration has also been given to the operations of Highway 26 considering the following:

- the peak hour peak directional traffic volumes;
- an assumed lane capacity of 900 vehicles per hour per lane (vphpl); and
- the provision of one through lane per direction.

The resulting road operations are summarized in Table 2. As noted, Highway 26 is currently operating at 75% or less of its assumed planning capacity and thus there is reserve capacity to accommodate additional growth.

Table 2: Road Operations – 2025

ROAD SECTION & DIRECTIONAL CAPACITY		PEAK TRAFFIC VOLUMES		PEAK V/C RATIOS	
		EB	WB	EB	WB
Highway 26 East of Lakeshore Road E	900 vph	659	675	0.73	0.75
Highway 26 West of Lakeshore Road E	900 vph	657	675	0.73	0.75

3 Proposed Development

This section 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.

3.1 LOCATION & LAND-USE

The subject site is located at 372 Grey Road 21 in the Town of The Blue Mountains (Craigleith area) as per Figure 1. The property is bound by the Georgian Trail to the north and east, the Trailshead residential development to the northwest, and vacant land to the south and southwest.

The proposed development will consist of 47 single detached units and 6 semi-detached units as detailed in the Concept Plan provided in Figure 6. In addition, the detached units on Lots 31 through 53 (23 in total) are proposed to be configured to allow for an accessory dwelling unit (i.e. basement apartment), which could result in an additional 23 potential dwelling units within the development. It is noted that the development of the accessory units is subject to the individual owners and thus may not be realized. For the purpose of this study, it is assumed that all 23 accessory units will be developed, which results in the most conservative estimate of the impact of the proposed development (53 detached units + 23 accessory units).

Full build-out is assumed by 2030 recognizing that it will be contingent on the completion of the Trailshead development (or a portion thereof).

3.2 SITE ACCESS

Access to the existing road network (i.e. Lakeshore Road East and Highway 26) will be provided by means of a connection near the northwest corner of the subject site to a future municipal road to be constructed as part of the Trailshead residential development, as illustrated Figure 7 and further detailed in Section 4.2.2.

3.3 SITE CIRCULATION

The site will be served by a network of new municipal roads with widths of 8.5 metres and minimum 12.0 metre centreline turn radii. This will readily accommodate the manoeuvring requirements of typical design vehicles, including passenger vehicles, waste collection trucks and emergency response vehicles (e.g. fire trucks). A temporary hammerhead turnaround is provided at the south limit of the site to facilitate turnaround of large vehicles (to be in place until the road is extended further south to service future development).

3.4 SITE PARKING

As per the Town of The Blue Mountains Zoning By-law 2018-65, a single detached or semi-detached residential development must provide 2 parking spaces per unit, whereas an accessory dwelling unit must provide 1 space per unit.

Each residential unit will be provided with a minimum of 2 parking spaces between the driveway and garage, thus satisfying the Town's requirement. For those units with provisions for accessory dwelling units, an additional parking space will be provided (minimum of 3 in total for the associated residential unit).

3.5 SITE TRAFFIC

3.5.1 Trip Generation

The number of vehicle trips to be generated by the proposed development for the weekday AM and PM 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*. Based on the proposed development, trip rates for the following ITE land use category have been employed:

- *single family detached* – ITE land-use code 210; and
- *single family attached* – ITE land-use code 215.

ITE trip rates are provided in Table 3 with the associated trip estimates provided in Table 4. As indicated, the proposed development is expected to generate 48 trips during the AM peak hour and 62 trips during the PM peak hour, assuming all of the potential accessory dwelling units are realized.

Table 3: Trip Rates – 372 Grey Road 21

LAND USE	VARIABLE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
		In	Out	Total	In	Out	Total
single family detached (LUC 210)	trips per unit	0.18	0.52	0.70	0.59	0.35	0.94
single family attached (LUC 215)	trips per unit	0.15	0.33	0.48	0.32	0.25	0.57

Table 4: Trip Estimates – 372 Grey Road 21

LAND USE	SIZE	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
		In	Out	Total	In	Out	Total
single and semi-detached units (LUC 210)	53 units	10	27	37	31	18	49
accessory units (LUC 215)	23 units	3	8	11	7	6	13
Total	**76 units**	**13**	**35**	**48**	**38**	**24**	**62**

3.5.2 Trip Distribution & Assignment

The distribution of the site traffic volumes reflects the proximity of the development site to the Town of The Blue Mountains to the west and the Town of Collingwood to the east and considers the assumptions of the *Aquavil Traffic Impact Study*. For purposes of this assessment, the following distribution has been assumed:

- 45% to/from the west via Highway 26; and
- 55% to/from the east via Highway 26.

The resulting site generated traffic assigned to the road network is illustrated in Figure 8, assuming that all traffic will be oriented to/from Highway 12 via its intersection with Lakeshore Road East.

4 Future 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 study area road system and site access; and
- potential improvements to the study area road network, if necessary.

For the purpose of this study, 2030 and 2035 horizons have been considered to assess the impact of the development on the road network – 2030 represents the assumed full build-out of the site (contingent on the completion of the Trailshead development), whereas 2035 reflects a further 5-year horizon.

4.1 ROAD NETWORK

A Municipal Class Environmental Assessment (Class EA) was initiated in 2015 by the Town of The Blue Mountains, the County of Grey and the MTO to investigate improvements to the Highway 26 corridor and surrounding road networks between Grey Road 19 and Grey Road 21. As per information presented at the 2018 Public Information Centre, the following road system improvements have been identified within the study area:

- realignment of the intersection of Lakeshore Road East with Highway 26 to a new alignment further west of the existing intersection;
- addition of a dedicated westbound left turn lane on Highway 26 at the new intersection; and
- closure of the west connection of Fraser Crescent to Highway 26 (located opposite Lakeshore Road East).

It is acknowledged that the improvements identified in the Class EA have yet to be implemented (albeit a westbound left turn lane has been constructed on Highway 26 at the existing Lakeshore Road East intersection) and as such, the existing road system remains in its current configuration for future horizons.

4.2 TRAFFIC VOLUMES

4.2.1 Background Growth

Background growth along the Highway 26 corridor was obtained from the *Aquavil Traffic Impact Study*, which identified the growth as approximately 1.5% per annum. This growth rate was applied to the though volumes on Highway 26 through the 2035 horizon. No growth has been applied to Lakeshore Road.

4.2.2 Background Developments

In addition to the noted background growth, several other developments were identified within the study area which will contribute additional traffic volumes to the study area network. Details of each are summarized below, with the location of each development and distribution of trips through the study area network illustrated in Appendix D. All noted developments are assumed to be fully built-out by the 2030 horizon.

Trailshead

The Trailshead development is a residential development consisting of a total of 225 single detached and townhouse units, located immediately west of the subject site and through which the subject site will have access to Lakeshore Road. Trip generation and distribution was obtained from the *Eden Oak – Blue Trails Residential Development Traffic Impact Study*. Fully built out, the site is expected to generate a total of 101 trips during the weekday AM peak hour and 121 trips during the weekday PM peak hour.

Aquavil

The Aquavil development is a large, mixed-use development located north of Highway 26, centred around Brophy's Lane (approximately 1 km northeast of the subject site). Per the *Aquavil Traffic Impact Study*, the development proposed contains a total of approximately 480 residential units (a mix of apartments, detached, semi-detached/townhouses, and senior's residences) and 9,100 m^2 of commercial/retail space, to be constructed in two phases. Trip generation and distribution was obtained from the *Aquavil Traffic Impact Study*. Fully built out, the site is expected to generate 259 trips during the weekday AM peak hour and 589 trips during the weekday PM peak hour.

Parkbridge Craigleith

The Parkbridge Craigleith development is a residential development located along Lakeshore Road, approximately 1 km west of the subject site and adjacent to the *Blue Trails* development. The Parkbridge development consists of a total of 211 single detached and townhouse units. Trip generation and distribution was obtained from the appendices of the *Aquavil Traffic Impact Study*. Fully built out, the site is expected to generate 133 trips during the weekday AM peak hour and 175 trips during the weekday PM peak hour.

209806 Highway 26

209806 Highway 26 is a small residential development located on Highway 26 (opposite Blue Mountain Drive) consisting of 17 townhouse units on the site of a former motel. Trip generation

and distribution was obtained from the *209806 Highway 26 Traffic Impact Brief*[4]. Fully built out, the site is expected to generate 8 trips during the weekday AM peak hour and 10 trips during the weekday PM peak hour.

4.2.3 Traffic Volumes

Future traffic volumes for the 2030 and 2035 horizon years, as illustrated in Figure 9 and Figure 10, have been determined from the following:

- the 2025 volumes;
- the noted background growth rate; and
- additional volumes contributed by the noted background developments.

It is noted that the effective growth rate on Highway 26 (considering both the 1.5% base growth and additional volumes added by background developments) is in the order of 2.4% to 3.4% per annum.

4.3 TRAFFIC OPERATIONS

4.3.1 Intersection Operations

The intersection of Highway 26 with Lakeshore Road East/Fraser Crescent was reassessed under future conditions considering the following:

- the existing intersection location (i.e. no relocation of Lakeshore Road East) with Fraser Crescent on the north leg;
- the 2030 and 2035 traffic volumes (assuming minimum turning volumes of 5 vehicles per hour for all movements to/from Lakeshore Road East and Fraser Crescent).

Results of the operational analyses are summarized in Table 5, with detailed worksheets provided in Appendix E.

[4] *209806 Highway 26 Traffic Impact Brief*. Tatham Engineering Ltd. July 4, 2022.

Table 5: Intersection Operations – 2030 & 2035

INTERSECTION, MOVEMENT & CONTROL				WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
				Delay	LOS	V/C	Delay	LOS	V/C
2030	Highway 26 & Lakeshore Rd E/ Fraser Crescent	NB LTR	stop	36	E	0.51	**113**	**F**	0.74
		SB LTR	stop	34	D	0.07	**89**	**F**	0.19
2035	Highway 26 & Lakeshore Rd E/ Fraser Crescent	NB LTR	stop	44	E	0.58	**163**	**F**	0.88
		SB LTR	stop	39	E	0.08	**114**	**F**	0.23

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

As indicated, the intersection of Highway 26 with Lakeshore Road East/Fraser Crescent provides acceptable operations (LOS E or better) through the 2035 horizon under weekday AM peak conditions. Under weekday PM peak conditions, the intersection performs poorly (LOS F) by the 2030 horizon with high delays (89 seconds or greater) on the northbound and southbound movements. Under 2035 conditions, these delays increase further to 114 seconds or greater. This poor performance is also observed at the intersections assessed in the Aquavil and the 209806 Highway 26 traffic studies and is attributed to the increased through volumes on Highway 26, particularly during the summer months. These increased volumes result in smaller and less frequent gaps in the through traffic stream to facilitate safe turning manoeuvres from the intersecting side streets.

The high delays on Lakeshore Road are caused by the left-turning volumes, despite accounting for only 30% of the volume on that approach. It is expected that left-turning motorists experiencing excessive delays may divert westward on Lakeshore Road East to Grey Road 19, where they can complete a left turn at the signalized intersection of Grey Road 19 and Highway 26. Additionally, while the Lakeshore Road East approach has been assessed as a single shared left-through-right turn lane, sufficient space is likely available at Highway 26 (due to the large corner radius) to allow right-turning vehicles to bypass a queuing left-turning or through-moving vehicle. This would reduce delays and improve overall operations of that approach further.

The delays on Fraser Crescent are caused by the same reason noted above (left-turning volume), but are not of concern, recognizing that the assessed volumes (5 vehicles per turning movement) are minimal. Additionally, should the road works noted in Section 4.1 be completed by either future horizon, the north approach would be removed entirely. This would have the

simultaneous effect of somewhat reduced delays on the south approach due to the removal of movement conflicts with the north approach.

4.3.2 Road Operations

The operations of Highway 26 across the study intersection were again assessed considering the 2030 and 2035 traffic volumes, a summary of which is provided in Table 6. As noted, during the 2030 horizon, Highway 26 will operate at or above its planning capacity (v/c ratios of 0.99 to 1.05). By 2035 the highway will operate entirely above its planning capacity (v/c ratios of 1.05 to 1.11). This is a reflection of the assumed continued growth in the highway volumes and the additional traffic to be generated by the background developments, and thus not precipitated by the subject site. A previously noted, the intersections will serve as the bottlenecks of the transportation system and provided they can operate acceptably, so too will the highway itself.

Table 6: Road Operations – 2030 & 2035

ROAD SECTION & DIRECTIONAL CAPACITY			PEAK TRAFFIC VOLUMES		PEAK V/C RATIOS	
			EB	WB	EB	WB
2030	Hwy 26 East of Lakeshore Road E	900 vph	911	945	**1.01**	**1.05**
	Hwy 26 West of Lakeshore Road E	900 vph	901	894	**1.00**	**0.99**
2035	Hwy 26 East of Lakeshore Road E	900 vph	965	1,001	**1.07**	**1.11**
	Hwy 26 West of Lakeshore Road E	900 vph	955	949	**1.06**	**1.06**

4.4 TURN LANE REQUIREMENTS

The need for exclusive turn lanes on Highway 26 to service the site have been considered (i.e. turn lanes on the highway at Lakeshore Road East).

4.4.1 Right Turn Lane

Right turn lanes are generally warranted where right turn volumes exceed 60 vehicles per hour and/or impede through traffic. In considering this threshold and the projected right turn volumes, an eastbound right turn lane on Highway 26 at Lakeshore Road East is not required.

4.4.2 Left Turn Lane

As per the *Eden Oaks – Blue Trails Residential Development Traffic Impact Study*, a westbound left turn lane with 30 metres of storage, a 60 metre parallel lane and a 145 metre taper was identified as required to accommodate the Trailshead development under the 2030 horizon. A

previously noted, this turn lane has been constructed to consist of 30 metres of storage, a 55 metre parallel lane and a 135 metre taper (as evident in Figure 2, the length of the turn lane is restricted slightly by the proximity of Fraser Crescent to the east, in that the turn lane is not desired to extend through the Fraser Crescent intersection). Given the additional developments proposed within the area, including the subject site, and the increased traffic volumes on Highway 26 associated with the 2035 horizon considered for this study, the warrant analysis for the left turn lane was revisited.

Based on the requirements for 5% (AM peak) and 10% (PM peak) left turns in the advancing volumes at a design speed of 90 km/h (reflective of the 70 km/h posted speed limit), a westbound left turn with a storage length of 50 metres is warranted; corresponding MTO nomographs are provided in Appendix F. Notwithstanding these findings, it is not considered practical to extend the turn lane any further as such would result in the turn lane extending past the east intersection of Fraser Crescent. The existing turn lane is expected to serve the anticipated turning traffic appropriately without need for further modifications.

5 Summary

Proposed Development

This report has addressed the traffic impacts of the proposed residential development to be located at 372 Grey Road 21, which will consist of 47 single detached units, 6 semi-detached units and up to 23 accessory units, totalling a potential of 76 residential units. Fully built out, the development is expected to generate 48 trips during the weekday AM peak hour and 62 trips during the weekday PM peak hour (assuming all of the accessory dwelling units are realized).

Transportation Impacts

To assess the impact of the proposed development, the operations of the key intersection of Highway 26 with Lakeshore Road East/Fraser Crescent were assessed under existing (2025) and future (2030 and 2035) conditions. Based on the operational analyses, the noted intersection provides good operations (LOS D or better) under existing conditions, and will provide acceptable (LOS E or better) to poor operations (LOS F) under both the 2030 and 2035 horizons. The latter operating levels are due largely to the significant increase in through volumes along Highway 26 by the 2035 horizon resulting from background growth and new developments in the area. The poor intersection operations are not expected to be problematic, recognizing that drivers have alternative options available to avoid delays at the intersection (i.e. motorists, particularly those destined to/from the west, can access Highway 26 via its signalized intersection with Grey Road 19, which is accessible via Lakeshore Road East).

The available through capacity on Highway 26 was also assessed at each horizon. Under existing conditions, Highway 26 operates at or below 72% capacity. By 2035 the road is projected to operate at 105% capacity or greater. While this is not desirable, the intersection operations indicate that Highway 26 will continue to provide acceptable operations through the 2035 horizon, thus no action is required.

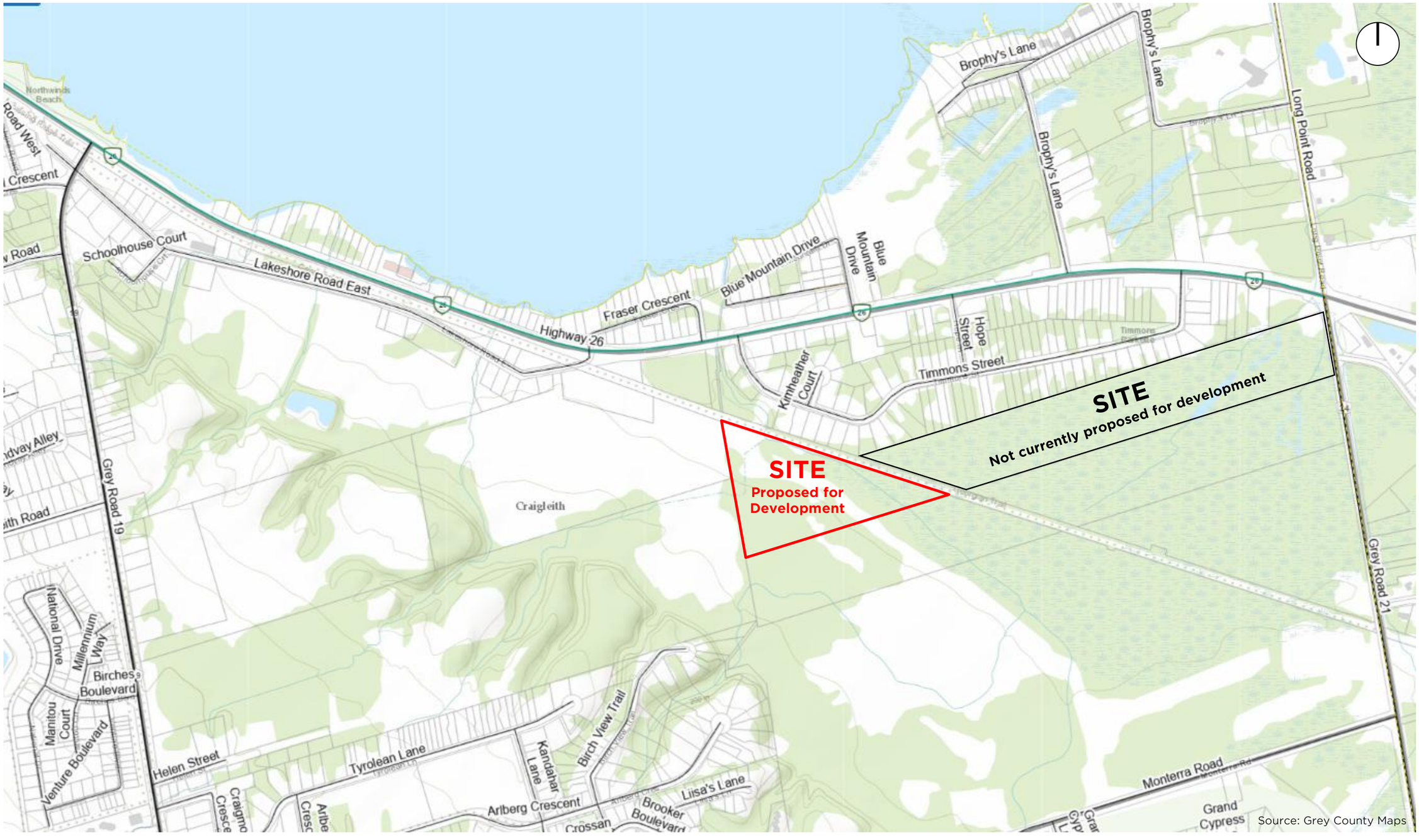
Overall, the development is not expected to have a significant impact on the area road network.

Turn Lane Requirements

A westbound left turn lane on Highway 26 at Lakeshore Road with 30 metres of storage was previously identified as necessary to serve the Trailshead development adjacent to the subject site and has been constructed. Upon review of the relevant MTO warrants with consideration for continued development and growth in the area, an increase in the storage length to 50 metres is warranted by the 2035 horizon. However, the ability to extend the turn lane is constrained given

the proximity of the east Fraser Crescent intersection. In this regard, the existing turn lane is considered appropriate.

With respect to the need for an eastbound right turn lane on Highway 26 at Lakeshore Road, such is not required given the reduced volume of right turns from the highway.



372 GREY ROAD 21 – TRAFFIC IMPACT BRIEF

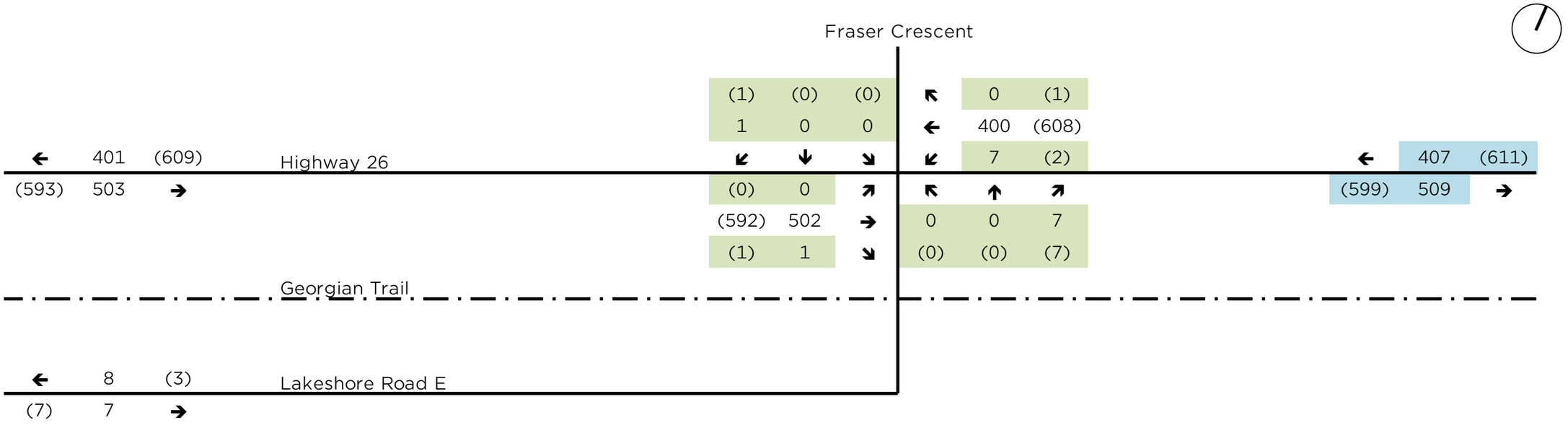
Figure 1: Site Location

372 GREY ROAD 21 – TRAFFIC IMPACT BRIEF

Figure 2A: Area Road Network

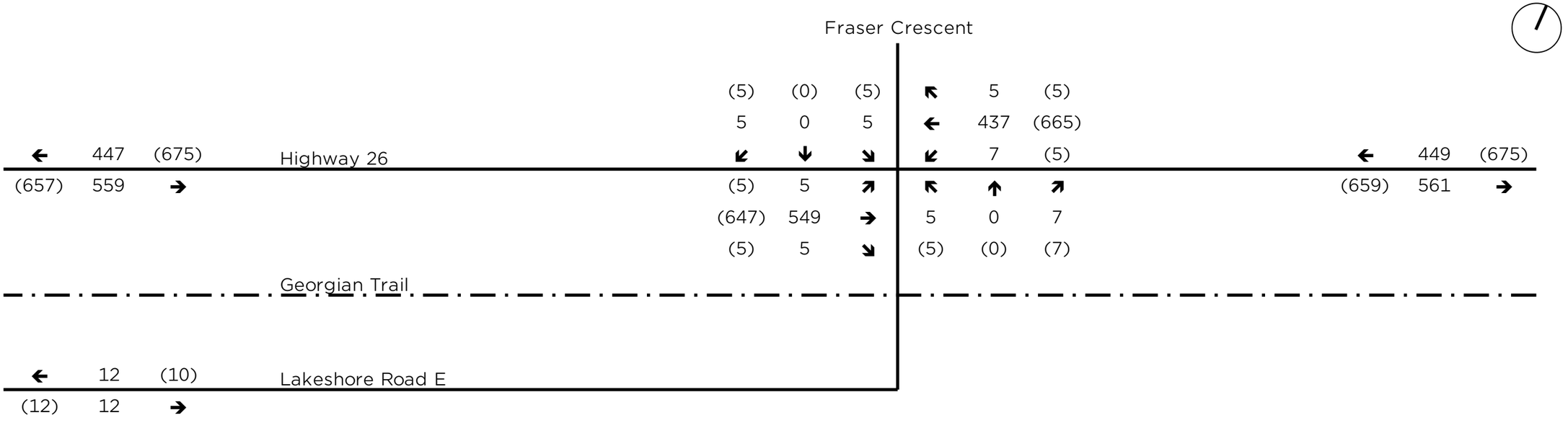
Figure 2B: Area Road Network - Westbound Left Turn Lane at Lakeshore Road East

Figure 3: Area Transit Network



10	AM Peak Hour	10	July 2019 traffic counts
(10)	PM Peak Hour	10	June 2012 traffic counts

Figure 4: Traffic Volumes – 2012 & 2019 Counts



10 AM Peak Hour
(10) PM Peak Hour

5 minimum volume for turns to/from Lakeshore Road E & Fraser Crescent

Figure 5: Traffic Volumes – 2025

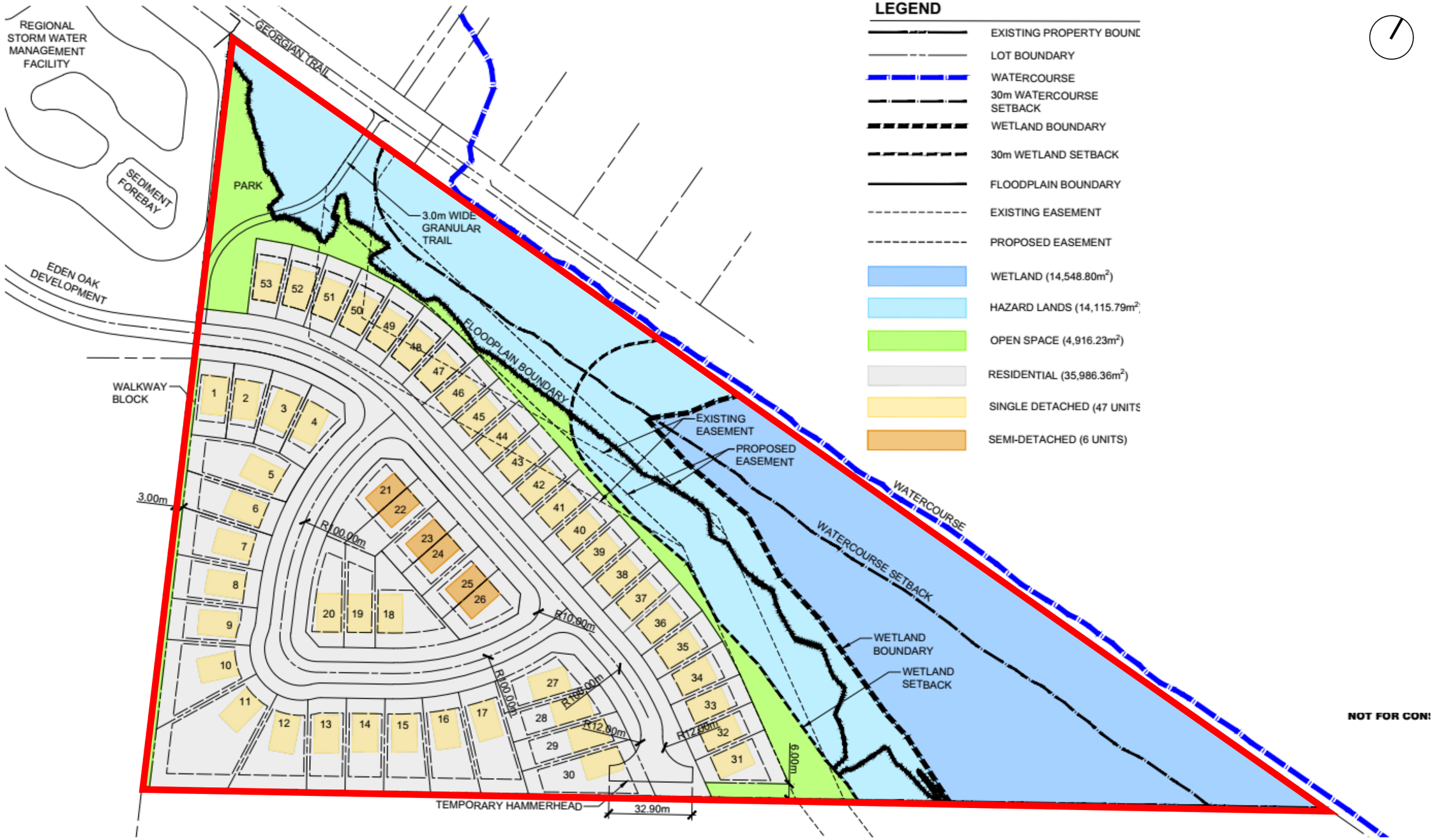


Figure 6: Concept Plan

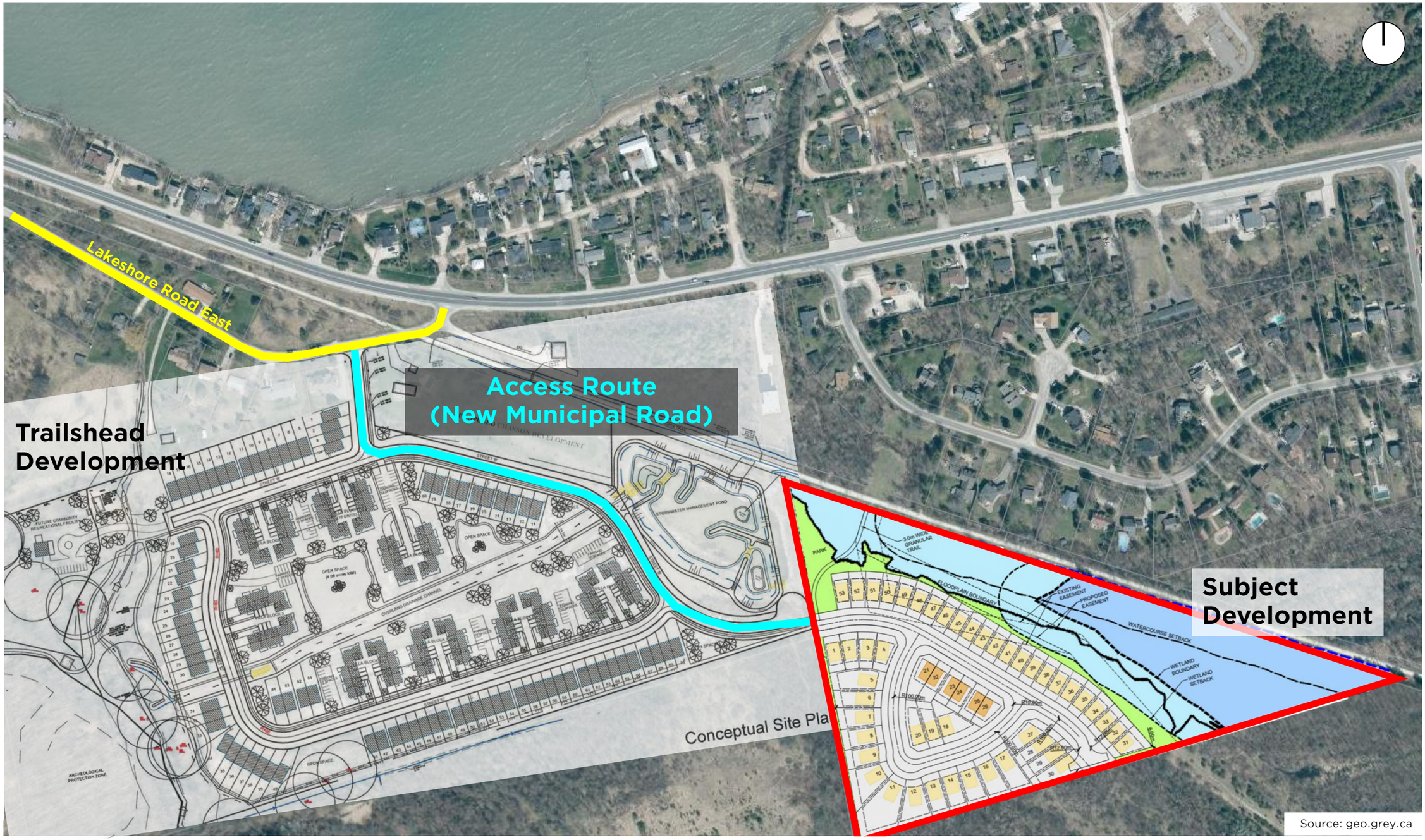
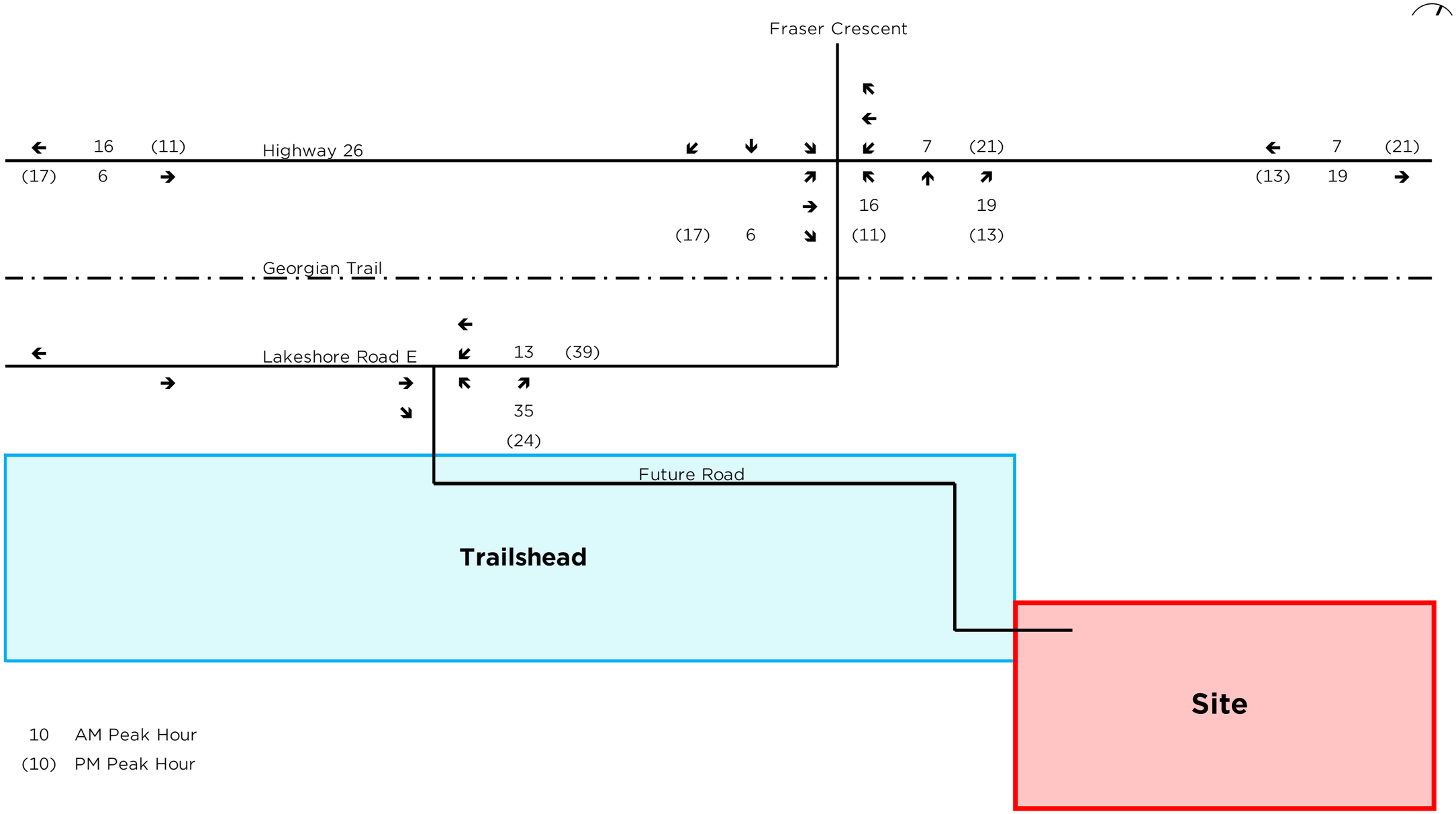


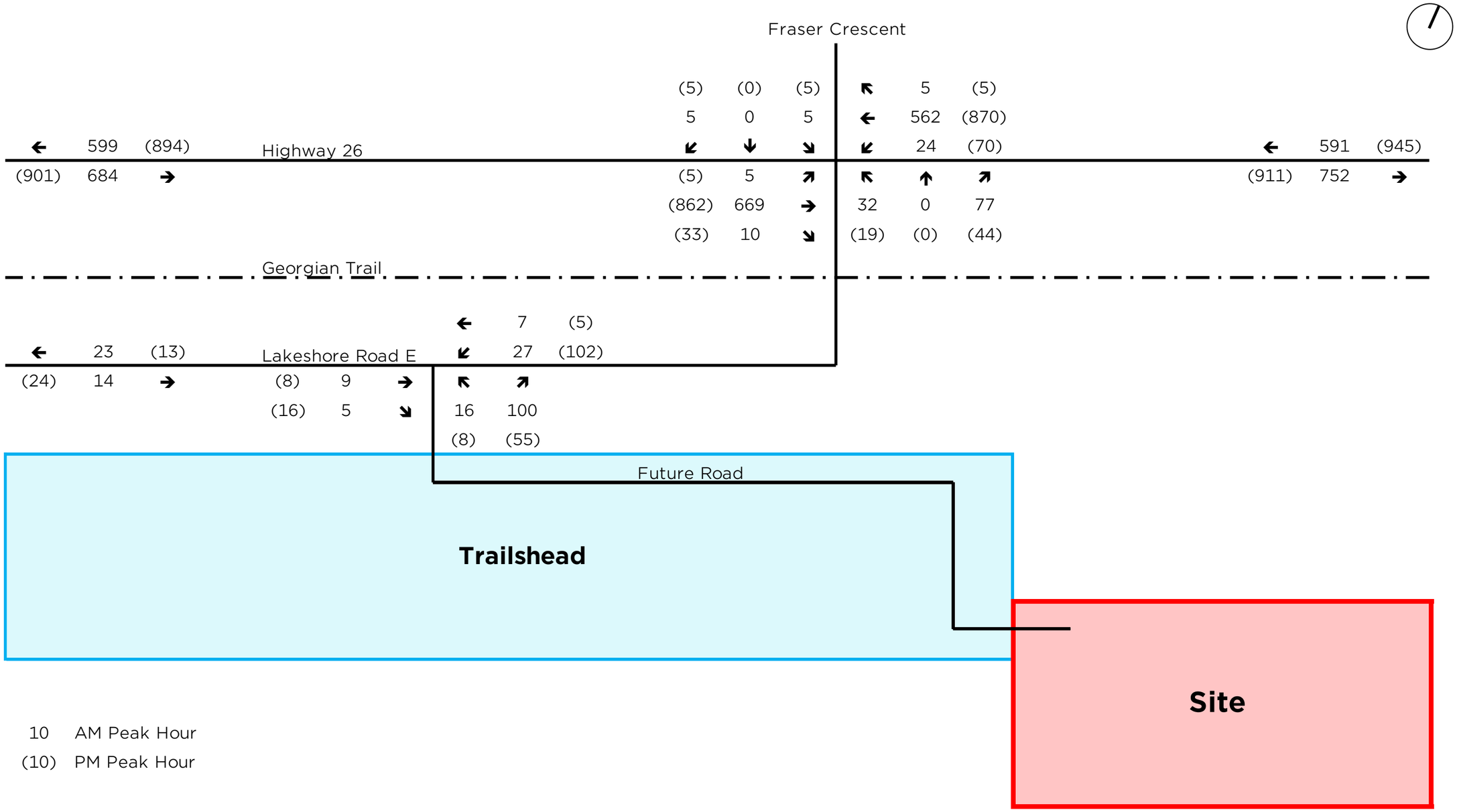
Figure 7: Future Road Network



10 AM Peak Hour

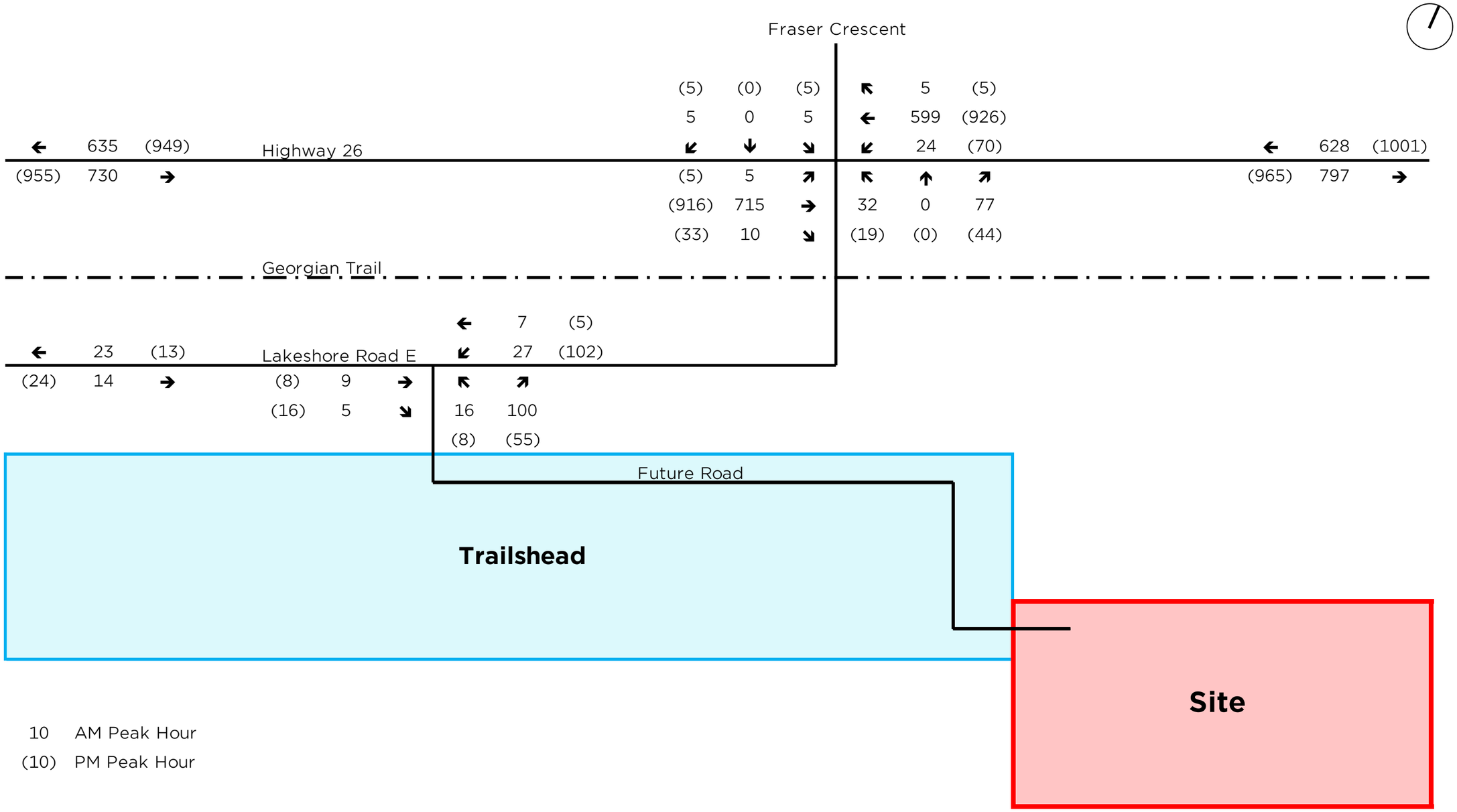
(10) PM Peak Hour

Figure 8: Traffic Volumes – 372 Grey Road 21



10 AM Peak Hour

(10) PM Peak Hour



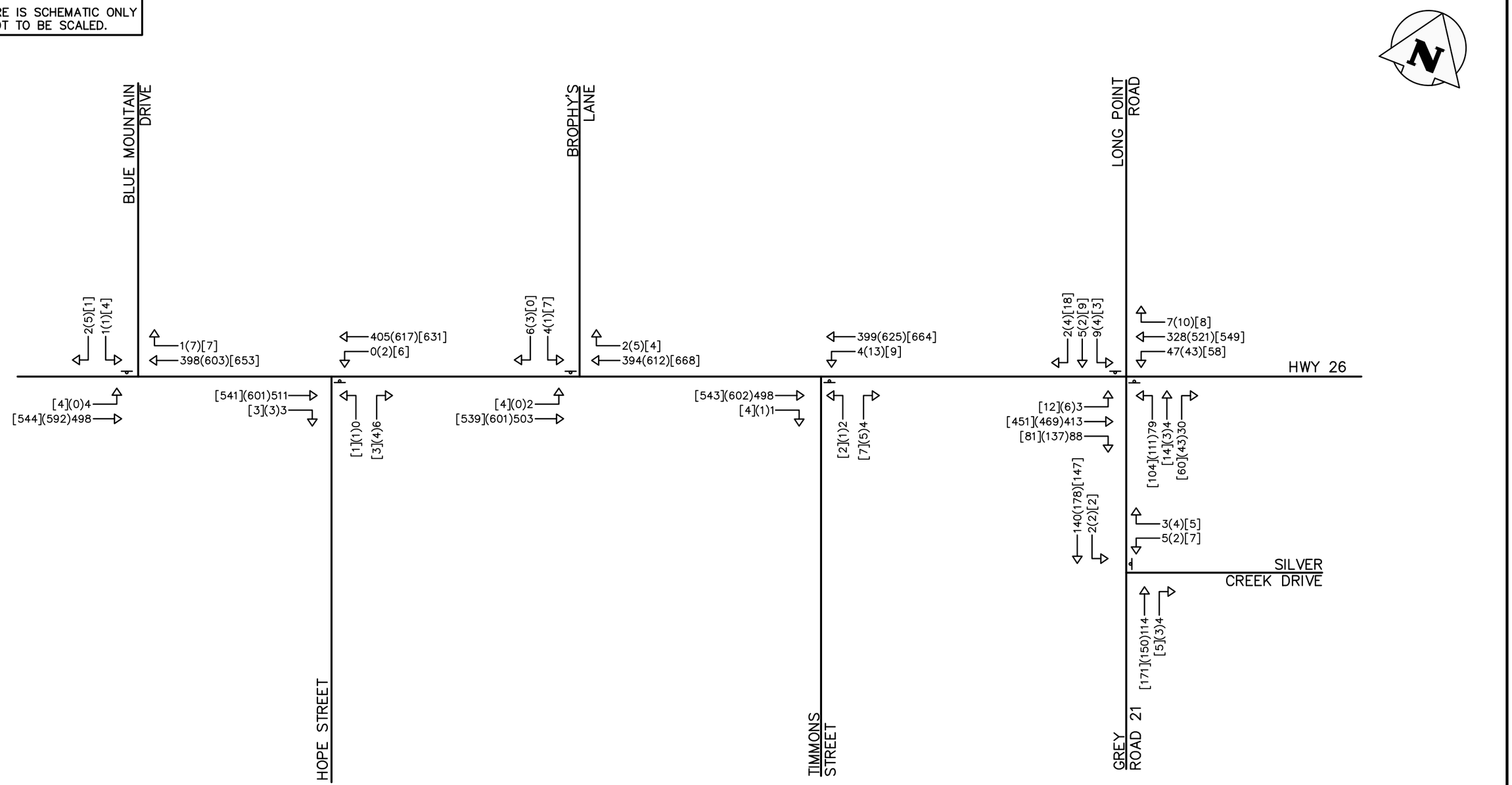
10 AM Peak Hour

(10) PM Peak Hour

Figure 10: Traffic Volumes – 2035

Appendix A:
Traffic Counts

NOTE:
THIS FIGURE IS SCHEMATIC ONLY AND IS NOT TO BE SCALED.



LEGEND:

⊕	SIGNAL CONTROL
⊣	STOP CONTROL
AM(PM)[SAT]	WEEKDAY AM(WEEKDAY PM)[SATURDAY]

AQUAVIL
TOWN OF THE BLUE MOUNTAINS

2019 EXISTING TRAFFIC VOLUMES

CROZIER & ASSOCIATES Consulting Engineers
2800 High Point Drive
Suite 100
Milton, ON L9T 6P4
905 875-0026 T
905 875-4915 F
www.cfcrozier.ca

Drawn	Design	Project No.	
M.J.	M.F.		876-4866
Check	Check	Scale	Dwg.
M.F.	M.F.	N.T.S	FIG. 4

Turning Movement Count (1 . HWY 26 & BLUE MOUNTAIN DR)

Start Time	N Approach					E Approach					W Approach					Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	UTurn E:E	Peds E:	Approach Total	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
06:00:00	0	0	0	0	0	0	20	0	0	20	19	0	0	0	19	39	
06:15:00	0	0	0	0	0	0	27	0	0	27	42	0	0	0	42	69	
06:30:00	0	0	0	0	0	0	55	0	0	55	40	0	0	0	40	95	
06:45:00	0	0	0	0	0	0	58	0	0	58	74	0	0	0	74	132	335
07:00:00	0	1	0	0	1	1	72	0	0	73	64	1	0	0	65	139	435
07:15:00	0	1	0	0	1	0	72	0	0	72	64	0	0	0	64	137	503
07:30:00	0	0	0	0	0	0	105	0	0	105	93	0	0	0	93	198	606
07:45:00	0	0	0	0	0	0	76	0	0	76	82	0	0	0	82	158	632
08:00:00	1	1	0	0	2	0	95	0	0	95	96	0	0	0	96	193	686
08:15:00	0	1	0	0	1	1	118	0	0	119	94	0	0	0	94	214	763
08:30:00	0	1	0	0	1	0	104	0	0	104	111	0	0	0	111	216	781
08:45:00	0	1	0	0	1	1	100	0	0	101	123	0	0	0	123	225	848
09:00:00	1	1	0	0	2	0	106	0	0	106	102	0	0	0	102	210	865
09:15:00	0	0	0	0	0	0	104	0	0	104	116	0	0	0	116	220	871
09:30:00	0	0	0	0	0	0	100	0	0	100	140	0	0	0	140	240	895
09:45:00	1	0	0	0	1	1	88	0	0	89	140	4	0	0	144	234	904
BREAK																	
15:00:00	0	0	0	0	0	2	148	1	0	151	134	0	0	0	134	285	
15:15:00	1	3	0	0	4	0	133	0	0	133	147	2	0	0	149	286	
15:30:00	0	1	0	0	1	0	154	0	0	154	138	0	0	0	138	293	
15:45:00	1	0	0	0	1	1	146	0	0	147	153	0	0	0	153	301	1165
16:00:00	0	1	0	0	1	3	145	0	0	148	131	0	0	0	131	280	1160
16:15:00	2	0	0	0	2	2	162	0	0	164	162	0	0	0	162	328	1202
16:30:00	2	0	0	0	2	1	150	0	0	151	146	0	0	0	146	299	1208

16:45:00	1	2	0	0	3	0	140	0	0	140	142	1	0	0	143	286	1193
17:00:00	0	0	0	0	0	1	133	0	0	134	134	0	0	0	134	268	1181
17:15:00	0	0	0	0	0	5	155	0	0	160	153	2	0	0	155	315	1168
17:30:00	3	3	0	0	6	1	151	0	0	152	132	1	0	0	133	291	1160
17:45:00	0	1	0	0	1	1	153	0	0	154	107	1	0	0	108	263	1137
18:00:00	0	4	0	0	4	4	132	0	0	136	114	0	0	0	114	254	1123
18:15:00	0	1	0	0	1	1	114	0	0	115	105	1	0	0	106	222	1030
18:30:00	0	2	0	0	2	2	117	0	0	119	74	0	0	0	74	195	934
18:45:00	0	2	0	0	2	1	103	0	0	104	96	1	0	0	97	203	874
Grand Total	13	27	0	0	40	29	3536	1	0	3566	3468	14	0	0	3482	**7088**	-
Approach%	32.5%	67.5%	0%		-	0.8%	99.2%	0%		-	99.6%	0.4%	0%		-	**-**	-
Totals %	0.2%	0.4%	0%		0.6%	0.4%	49.9%	0%		50.3%	48.9%	0.2%	0%		49.1%	**-**	-
Heavy	1	0	0		-	1	113	0		-	117	0	0		-	**-**	-
Heavy %	7.7%	0%	0%		-	3.4%	3.2%	0%		-	3.4%	0%	0%		-	**-**	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-

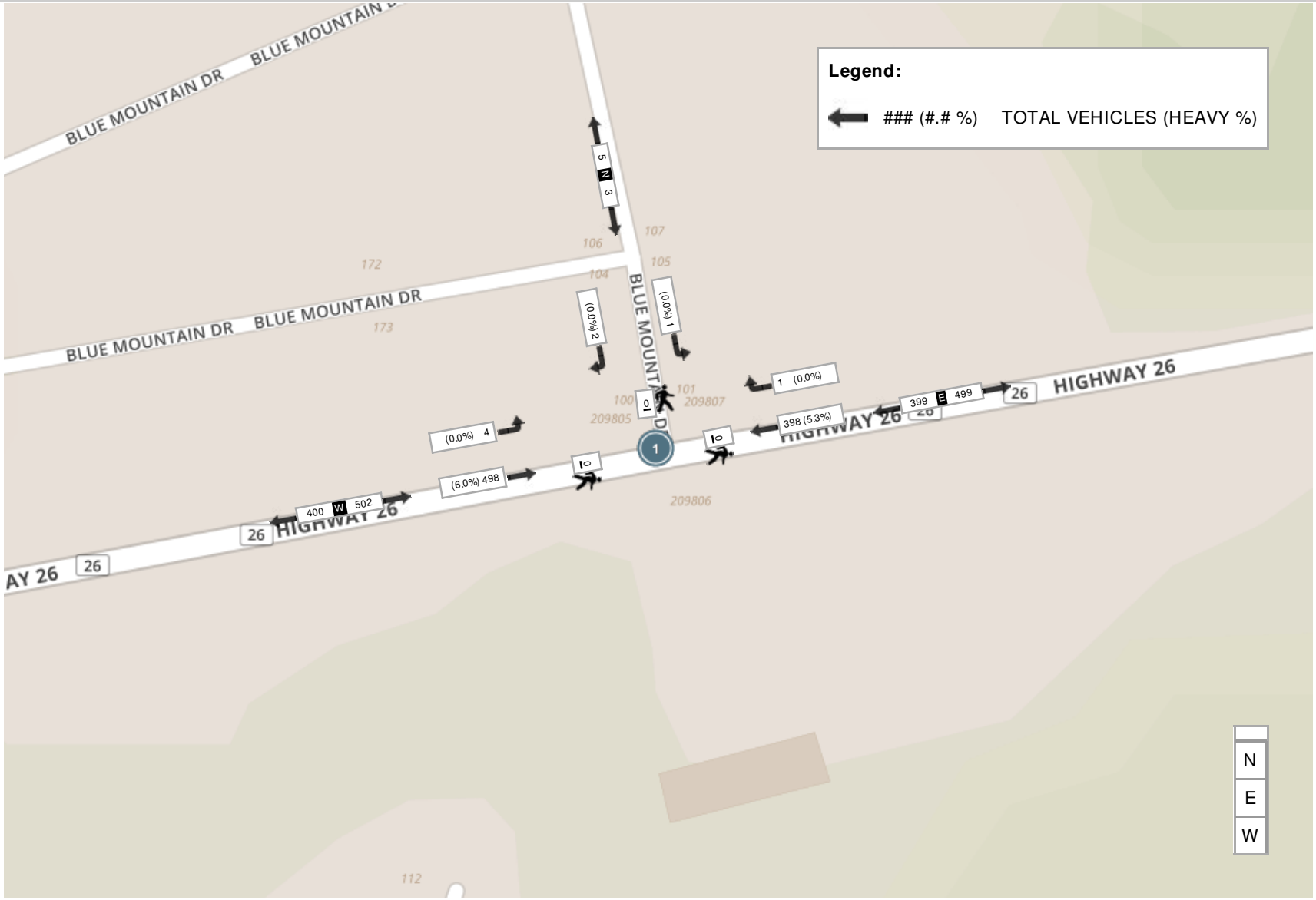
Peak Hour: 09:00 AM - 10:00 AM Weather: Clear Sky (19.93 °C)

Start Time	N Approach					E Approach					W Approach					Int. Total (15 min)
	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	
09:00:00	1	1	0	0	2	0	106	0	0	106	102	0	0	0	102	210
09:15:00	0	0	0	0	0	0	104	0	0	104	116	0	0	0	116	220
09:30:00	0	0	0	0	0	0	100	0	0	100	140	0	0	0	140	240
09:45:00	1	0	0	0	1	1	88	0	0	89	140	4	0	0	144	234
Grand Total	2	1	0	0	3	1	398	0	0	399	498	4	0	0	502	**904**
Approach%	66.7%	33.3%	0%		-	0.3%	99.7%	0%		-	99.2%	0.8%	0%		-	-
Totals %	0.2%	0.1%	0%		0.3%	0.1%	44%	0%		44.1%	55.1%	0.4%	0%		55.5%	-
PHF	0.5	0.25	0		0.38	0.25	0.94	0		0.94	0.89	0.25	0		0.87	-
Heavy	0	0	0		0	0	21	0		21	30	0	0		30	-
Heavy %	0%	0%	0%		0%	0%	5.3%	0%		5.3%	6%	0%	0%		6%	-
Lights	2	1	0		3	1	376	0		377	468	4	0		472	-
Lights %	100%	100%	0%		100%	100%	94.5%	0%		94.5%	94%	100%	0%		94%	-
Single-Unit Trucks	0	0	0		0	0	15	0		15	22	0	0		22	-
Single-Unit Trucks %	0%	0%	0%		0%	0%	3.8%	0%		3.8%	4.4%	0%	0%		4.4%	-
Buses	0	0	0		0	0	0	0		0	0	0	0		0	-
Buses %	0%	0%	0%		0%	0%	0%	0%		0%	0%	0%	0%		0%	-
Articulated Trucks	0	0	0		0	0	6	0		6	8	0	0		8	-
Articulated Trucks %	0%	0%	0%		0%	0%	1.5%	0%		1.5%	1.6%	0%	0%		1.6%	-
Bicycles on Road	0	0	0		0	0	1	0		1	0	0	0		0	-
Bicycles on Road %	0%	0%	0%		0%	0%	0.3%	0%		0.3%	0%	0%	0%		0%	-

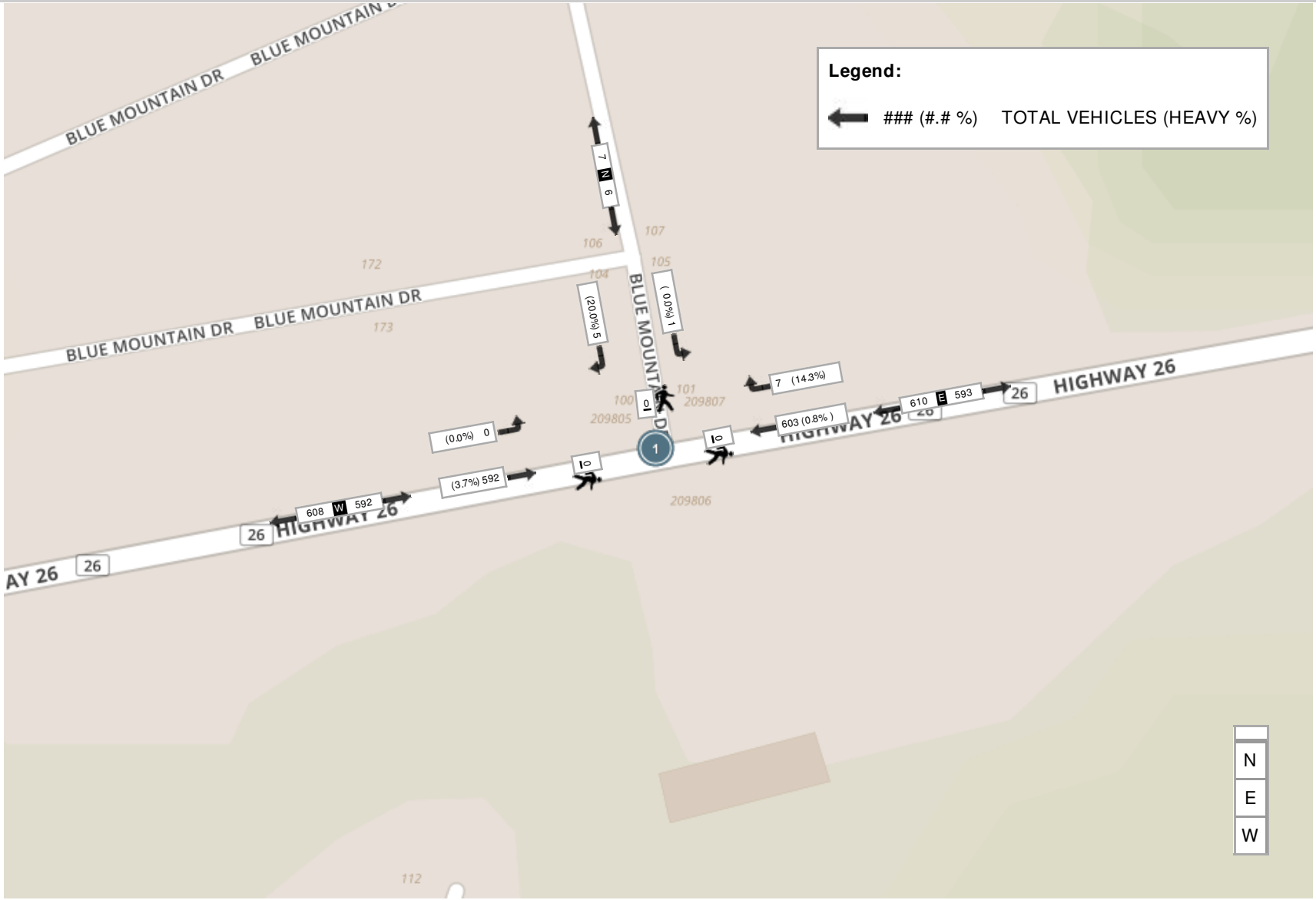
Peak Hour: 03:45 PM - 04:45 PM Weather: Few Clouds (29.54 °C)

Start Time	N Approach					E Approach					W Approach					Int. Total (15 min)
	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	
15:45:00	1	0	0	0	1	1	146	0	0	147	153	0	0	0	153	301
16:00:00	0	1	0	0	1	3	145	0	0	148	131	0	0	0	131	280
16:15:00	2	0	0	0	2	2	162	0	0	164	162	0	0	0	162	328
16:30:00	2	0	0	0	2	1	150	0	0	151	146	0	0	0	146	299
Grand Total	5	1	0	0	6	7	603	0	0	610	592	0	0	0	592	**1208**
Approach%	83.3%	16.7%	0%		-	1.1%	98.9%	0%		-	100%	0%	0%		-	-
Totals %	0.4%	0.1%	0%		0.5%	0.6%	49.9%	0%		50.5%	49%	0%	0%		49%	-
PHF	0.63	0.25	0		0.75	0.58	0.93	0		0.93	0.91	0	0		0.91	-
Heavy	1	0	0		1	1	5	0		6	22	0	0		22	-
Heavy %	20%	0%	0%		16.7%	14.3%	0.8%	0%		1%	3.7%	0%	0%		3.7%	-
Lights	4	1	0		5	5	596	0		601	569	0	0		569	-
Lights %	80%	100%	0%		83.3%	71.4%	98.8%	0%		98.5%	96.1%	0%	0%		96.1%	-
Single-Unit Trucks	1	0	0		1	1	3	0		4	19	0	0		19	-
Single-Unit Trucks %	20%	0%	0%		16.7%	14.3%	0.5%	0%		0.7%	3.2%	0%	0%		3.2%	-
Buses	0	0	0		0	0	1	0		1	0	0	0		0	-
Buses %	0%	0%	0%		0%	0%	0.2%	0%		0.2%	0%	0%	0%		0%	-
Articulated Trucks	0	0	0		0	0	1	0		1	3	0	0		3	-
Articulated Trucks %	0%	0%	0%		0%	0%	0.2%	0%		0.2%	0.5%	0%	0%		0.5%	-
Bicycles on Road	0	0	0		0	1	2	0		3	1	0	0		1	-
Bicycles on Road %	0%	0%	0%		0%	14.3%	0.3%	0%		0.5%	0.2%	0%	0%		0.2%	-

Peak Hour: 09:00 AM - 10:00 AM Weather: Clear Sky (19.93 °C)



Peak Hour: 03:45 PM - 04:45 PM Weather: Few Clouds (29.54 °C)



Turning Movement Count (1 . HWY 26 & BLUE MOUNTAIN DR)

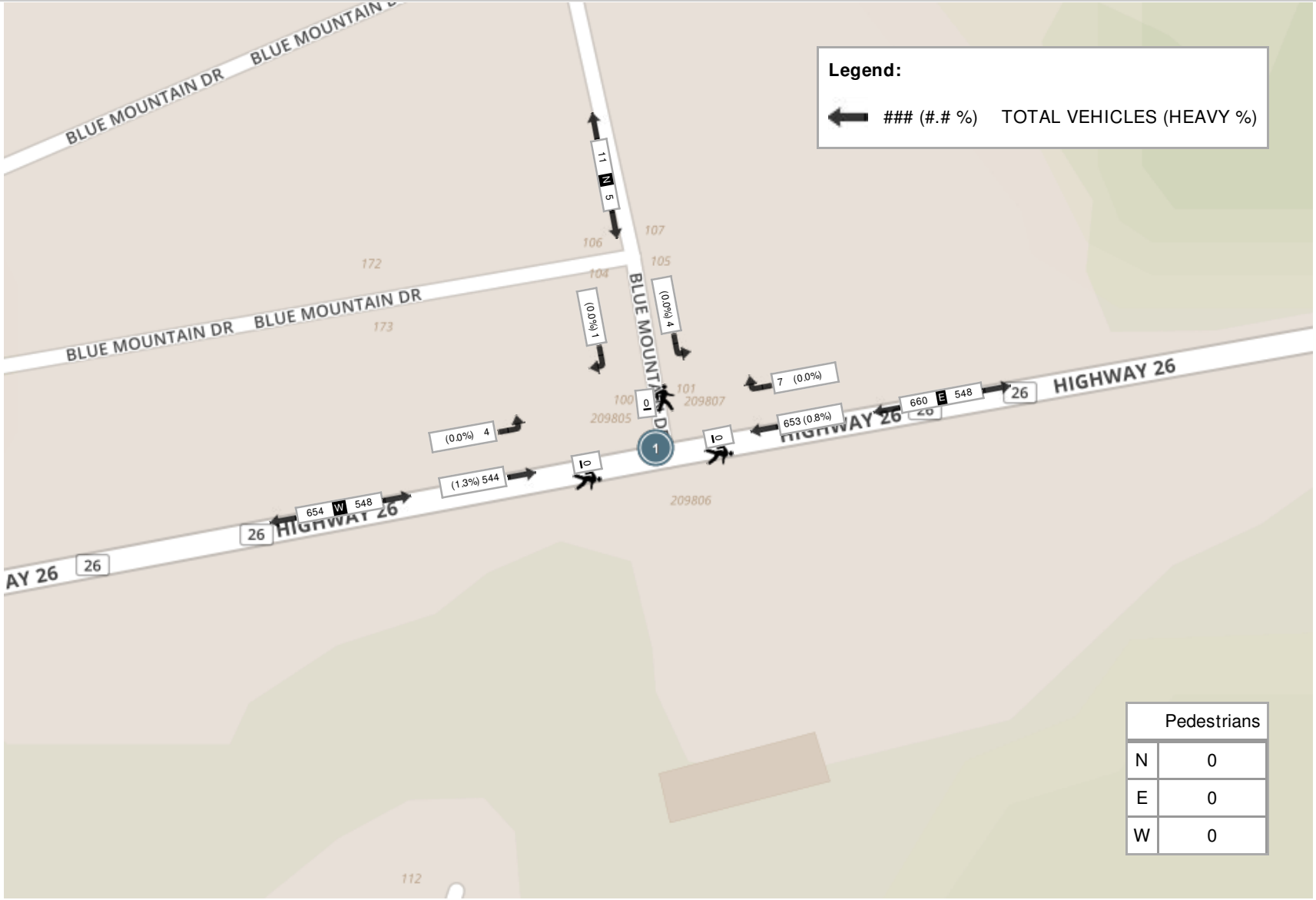
Start Time	N Approach					E Approach					W Approach					Int. Total (15 min)	Int. Total (1 hr)
	Right N:W	Left N:E	UTurn N:N	Peds N:	Approach Total	Right E:N	Thru E:W	UTurn E:E	Peds E:	Approach Total	Thru W:E	Left W:N	UTurn W:W	Peds W:	Approach Total		
10:00:00	0	1	0	0	1	0	113	0	0	113	120	0	0	0	120	234	
10:15:00	1	0	0	0	1	0	127	0	0	127	123	0	0	0	123	251	
10:30:00	0	1	0	0	1	0	104	0	0	104	138	0	0	0	138	243	
10:45:00	1	0	0	0	1	0	110	0	0	110	117	1	0	0	118	229	957
11:00:00	2	1	0	0	3	0	115	0	0	115	144	0	0	0	144	262	985
11:15:00	1	0	0	0	1	2	140	0	0	142	132	0	0	0	132	275	1009
11:30:00	0	1	0	0	1	1	111	0	0	112	123	0	0	1	123	236	1002
11:45:00	0	0	0	0	0	2	143	0	0	145	141	0	0	0	141	286	1059
12:00:00	1	1	0	0	2	2	135	0	0	137	136	1	0	0	137	276	1073
12:15:00	0	1	0	0	1	0	165	0	0	165	147	1	0	0	148	314	1112
12:30:00	1	1	0	0	2	3	151	0	0	154	117	0	0	0	117	273	1149
12:45:00	0	1	0	0	1	1	155	0	0	156	159	1	0	0	160	317	1180
13:00:00	0	1	0	0	1	0	141	0	0	141	119	0	0	0	119	261	1165
13:15:00	0	1	0	0	1	3	183	0	0	186	136	0	0	0	136	323	1174
13:30:00	1	1	0	0	2	3	174	0	0	177	130	3	0	0	133	312	1213
13:45:00	0	3	0	0	3	3	154	0	0	157	112	0	0	0	112	272	1168
14:00:00	1	2	0	0	3	3	162	0	0	165	92	0	0	0	92	260	1167
14:15:00	1	1	0	0	2	1	141	0	0	142	120	1	0	0	121	265	1109
14:30:00	2	0	0	0	2	2	143	0	0	145	129	1	0	0	130	277	1074
14:45:00	0	3	0	0	3	1	146	0	0	147	106	0	0	0	106	256	1058
15:00:00	0	0	0	0	0	0	123	0	0	123	128	0	0	0	128	251	1049
15:15:00	0	1	0	0	1	1	125	0	0	126	117	1	0	0	118	245	1029
15:30:00	1	0	0	0	1	2	145	0	0	147	100	1	0	1	101	249	1001
15:45:00	1	0	0	0	1	2	142	0	0	144	123	8	0	0	131	276	1021

16:00:00	0	0	0	0	0	0	128	0	0	128	115	1	0	0	116	244	1014
16:15:00	0	3	0	0	3	3	126	0	0	129	129	0	0	0	129	261	1030
16:30:00	0	1	0	0	1	0	103	0	0	103	112	0	0	0	112	216	997
16:45:00	2	2	0	2	4	1	122	0	0	123	114	0	0	2	114	241	962
17:00:00	0	1	0	0	1	1	113	0	0	114	90	1	0	0	91	206	924
17:15:00	0	0	0	0	0	0	96	0	0	96	103	0	0	0	103	199	862
17:30:00	0	1	0	1	1	1	86	0	0	87	126	0	0	1	126	214	860
17:45:00	0	3	0	0	3	0	97	0	0	97	93	2	0	0	95	195	814
Grand Total	16	32	0	3	48	43	4219	0	0	4257	3891	23	0	5	3914	**8219**	-
Approach%	33.3%	66.7%	0%		-	1%	99.1%	0%		-	99.4%	0.6%	0%		-	**-**	-
Totals %	0.2%	0.4%	0%		0.6%	0.5%	51.3%	0%		51.8%	47.3%	0.3%	0%		47.6%	**-**	-
Heavy	0	0	0		-	0	32	0		-	36	0	0		-	**-**	-
Heavy %	0%	0%	0%		-	0%	0.8%	0%		-	0.9%	0%	0%		-	**-**	-
Bicycles	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-
Bicycle %	-	-	-		-	-	-	-		-	-	-	-		-	**-**	-

Peak Hour: 12:45 PM - 01:45 PM Weather: Mist (22.43 °C)

Start Time	N Approach					E Approach					W Approach					Int. Total (15 min)
	Right	Left	UTurn	Peds	Approach Total	Right	Thru	UTurn	Peds	Approach Total	Thru	Left	UTurn	Peds	Approach Total	
12:45:00	0	1	0	0	1	1	155	0	0	156	159	1	0	0	160	317
13:00:00	0	1	0	0	1	0	141	0	0	141	119	0	0	0	119	261
13:15:00	0	1	0	0	1	3	183	0	0	186	136	0	0	0	136	323
13:30:00	1	1	0	0	2	3	174	0	0	177	130	3	0	0	133	312
Grand Total	1	4	0	0	5	7	653	0	0	660	544	4	0	0	548	**1213**
Approach%	20%	80%	0%		-	1.1%	98.9%	0%		-	99.3%	0.7%	0%		-	**-**
Totals %	0.1%	0.3%	0%		0.4%	0.6%	53.8%	0%		54.4%	44.8%	0.3%	0%		45.2%	**-**
PHF	0.25	1	0		0.63	0.58	0.89	0		0.89	0.86	0.33	0		0.86	**-**
Heavy	0	0	0		0	0	5	0		5	7	0	0		7	**-**
Heavy %	0%	0%	0%		0%	0%	0.8%	0%		0.8%	1.3%	0%	0%		1.3%	**-**
Lights	1	4	0		5	7	640	0		647	537	1	0		538	**-**
Lights %	100%	100%	0%		100%	100%	98%	0%		98%	98.7%	25%	0%		98.2%	**-**
Single-Unit Trucks	0	0	0		0	0	3	0		3	6	0	0		6	**-**
Single-Unit Trucks %	0%	0%	0%		0%	0%	0.5%	0%		0.5%	1.1%	0%	0%		1.1%	**-**
Buses	0	0	0		0	0	1	0		1	0	0	0		0	**-**
Buses %	0%	0%	0%		0%	0%	0.2%	0%		0.2%	0%	0%	0%		0%	**-**
Articulated Trucks	0	0	0		0	0	1	0		1	1	0	0		1	**-**
Articulated Trucks %	0%	0%	0%		0%	0%	0.2%	0%		0.2%	0.2%	0%	0%		0.2%	**-**
Bicycles on Road	0	0	0		0	0	8	0		8	0	3	0		3	**-**
Bicycles on Road %	0%	0%	0%		0%	0%	1.2%	0%		1.2%	0%	75%	0%		0.5%	**-**
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	**-**
Pedestrians%	-	-	-	0%		-	-	-	0%		-	-	-	0%		**-**

Peak Hour: 12:45 PM - 01:45 PM Weather: Mist (22.43 °C)



	Pedestrians
N	0
E	0
W	0

CROZIER & ASSOCIATES
Consulting Engineers

Project No.: 218-2659
Project Name: Traffic Count
Date: 20-Jun-12

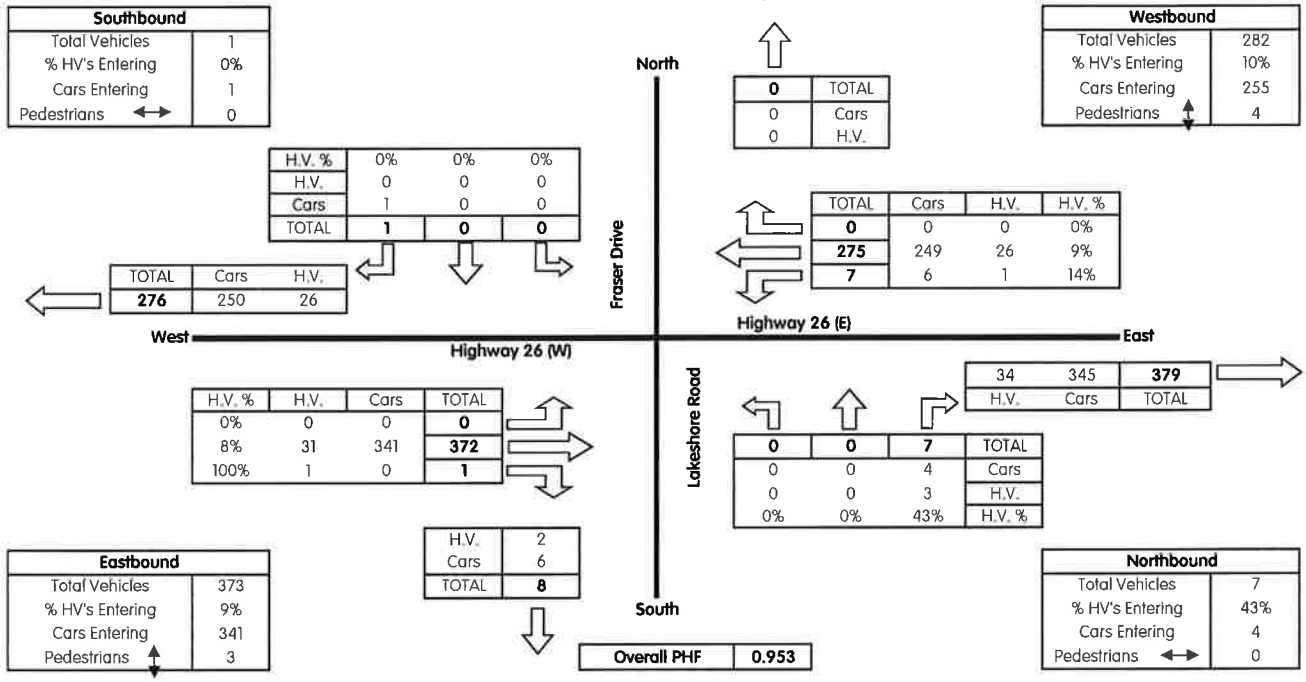
INTERSECTION TRAFFIC COUNT

Highway 26 and Lakeshore Road

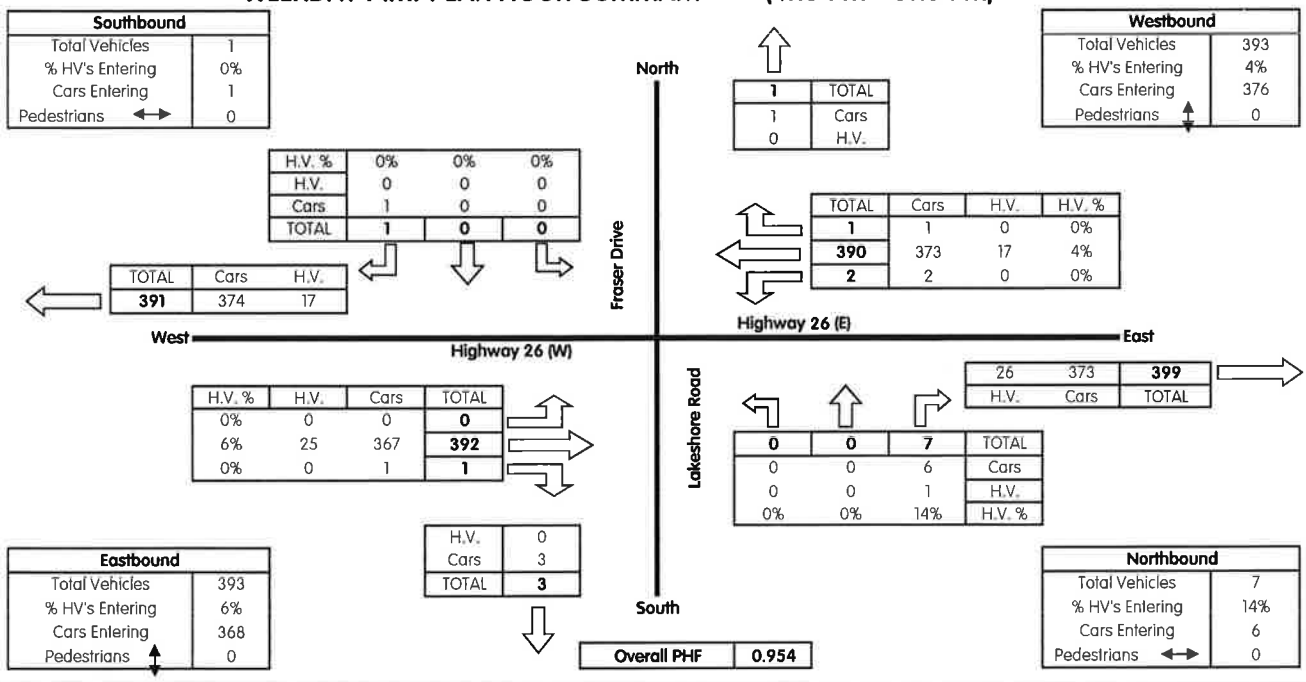
Traffic Counter Name: JB & EJ
Weather Conditions: Sunny & Dry
Project:
Municipality: Town of The Blue Mountains

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)



CROZIER & ASSOCIATES
Consulting Engineers

Project No.: 218-2659
Project Name: Traffic Count
Date: 20-Jun-12

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	
HV%		8%	100%	14%	9%				43%			0%	9%	

Overall PHF	0.953

CROZIER & ASSOCIATES
Consulting Engineers

Project No.: 218-2659
Project Name: Traffic Count
Date: 20-Jun-12

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	
HV%		6%	0%	0%	4%	0%			14%			0%	5%	

Overall PHF	0.954

Appendix B:
Level of Service Definitions

TATHAM ENGINEERING

Level of Service – Unsignalized Intersections

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

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

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

source: 2010 Highway Capacity Manual

TATHAM ENGINEERING

Level of Service – Signalized Intersections

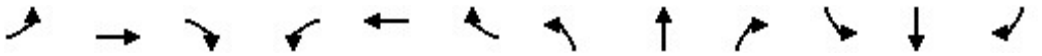
Level of Service (LOS) for signalized intersections is defined in terms of delay, which is made up of a number of factors that relate to control, geometrics, traffic and incidents. Only the portion of total delay attributed to the control facility is quantified. This control delay includes initial deceleration,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

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

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

source: 2010 Highway Capacity Manual

Appendix C:
Intersection Operations – Existing



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	549	5	7	437	5	5	0	7	5	0	5
Future Volume (Veh/h)	5	549	5	7	437	5	5	0	7	5	0	5
Sign Control		Free			Free			Stop			Stop	
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	597	5	8	475	5	5	0	8	5	0	5
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	480			602			1106	1106	600	1111	1106	478
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	480			602			1106	1106	600	1111	1106	478
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			97	100	98	97	100	99
cM capacity (veh/h)	1082			975			185	208	501	182	208	588

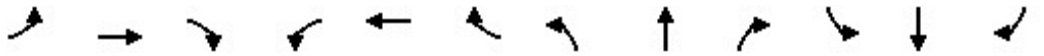
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	607	8	480	13	10
Volume Left	5	8	0	5	5
Volume Right	5	0	5	8	5
cSH	1082	975	1700	302	277
Volume to Capacity	0.00	0.01	0.28	0.04	0.04
Queue Length 95th (m)	0.1	0.2	0.0	1.0	0.8
Control Delay (s)	0.1	8.7	0.0	17.5	18.5
Lane LOS	A	A		C	C
Approach Delay (s)	0.1	0.1		17.5	18.5
Approach LOS				C	C

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	43.2%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	0	0	0
Future Volume (Veh/h)	0	0	0	0	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	0	0	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			0		0	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		0	0
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1623		1023	1085

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

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	0.0%	ICU Level of Service	A
Analysis Period (min)	15		

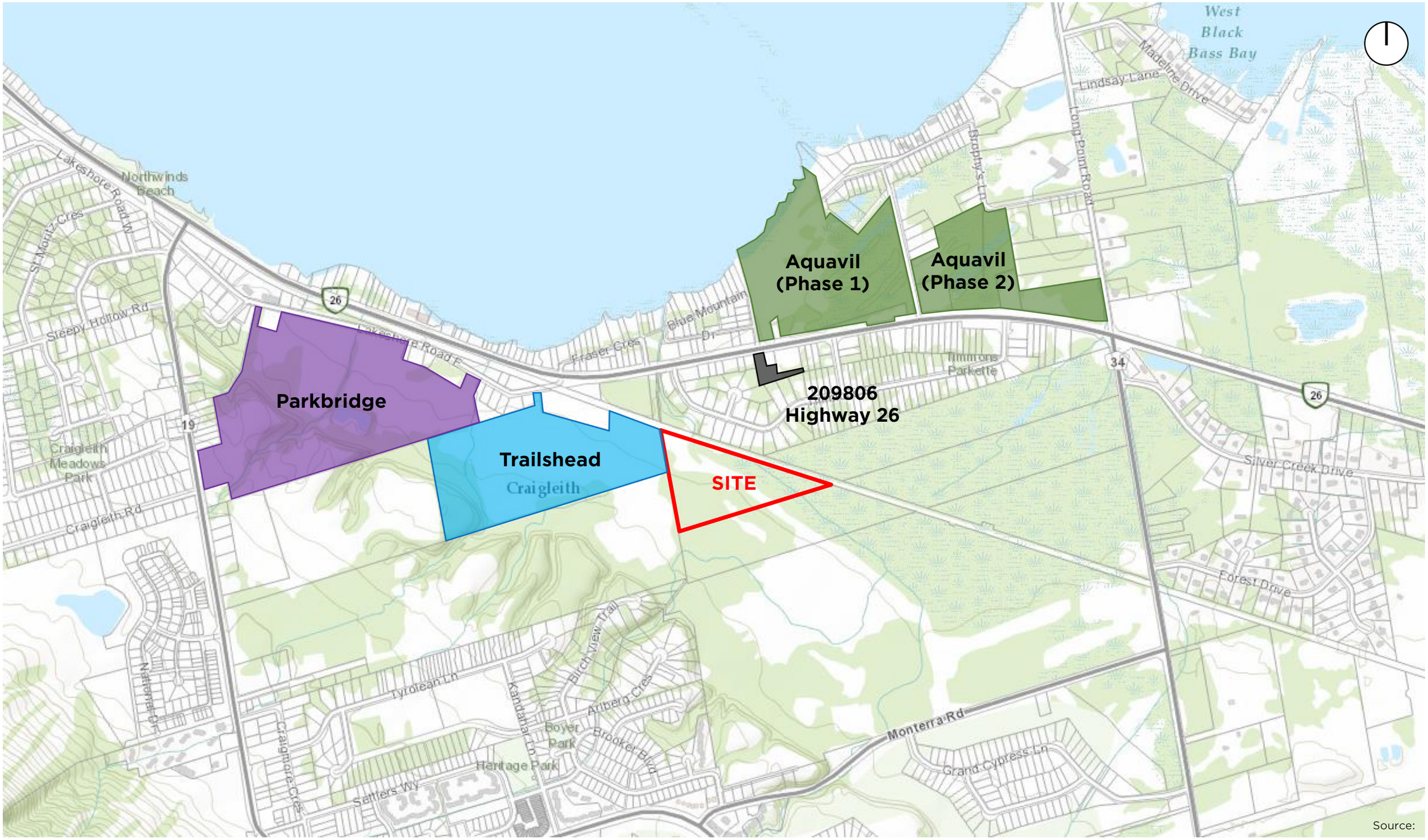


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	647	5	5	665	5	5	0	7	5	0	5
Future Volume (Veh/h)	5	647	5	5	665	5	5	0	7	5	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	703	5	5	723	5	5	0	8	5	0	5
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	728			708			1454	1454	706	1459	1454	726
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	728			708			1454	1454	706	1459	1454	726
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			95	100	98	95	100	99
cM capacity (veh/h)	876			891			106	129	436	104	129	425

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	713	5	728	13	10
Volume Left	5	5	0	5	5
Volume Right	5	0	5	8	5
cSH	876	891	1700	198	168
Volume to Capacity	0.01	0.01	0.43	0.07	0.06
Queue Length 95th (m)	0.1	0.1	0.0	1.6	1.4
Control Delay (s)	0.2	9.1	0.0	24.4	27.8
Lane LOS	A	A		C	D
Approach Delay (s)	0.2	0.1		24.4	27.8
Approach LOS				C	D

Intersection Summary				
Average Delay	0.5			
Intersection Capacity Utilization	48.3%	ICU Level of Service		A
Analysis Period (min)	15			

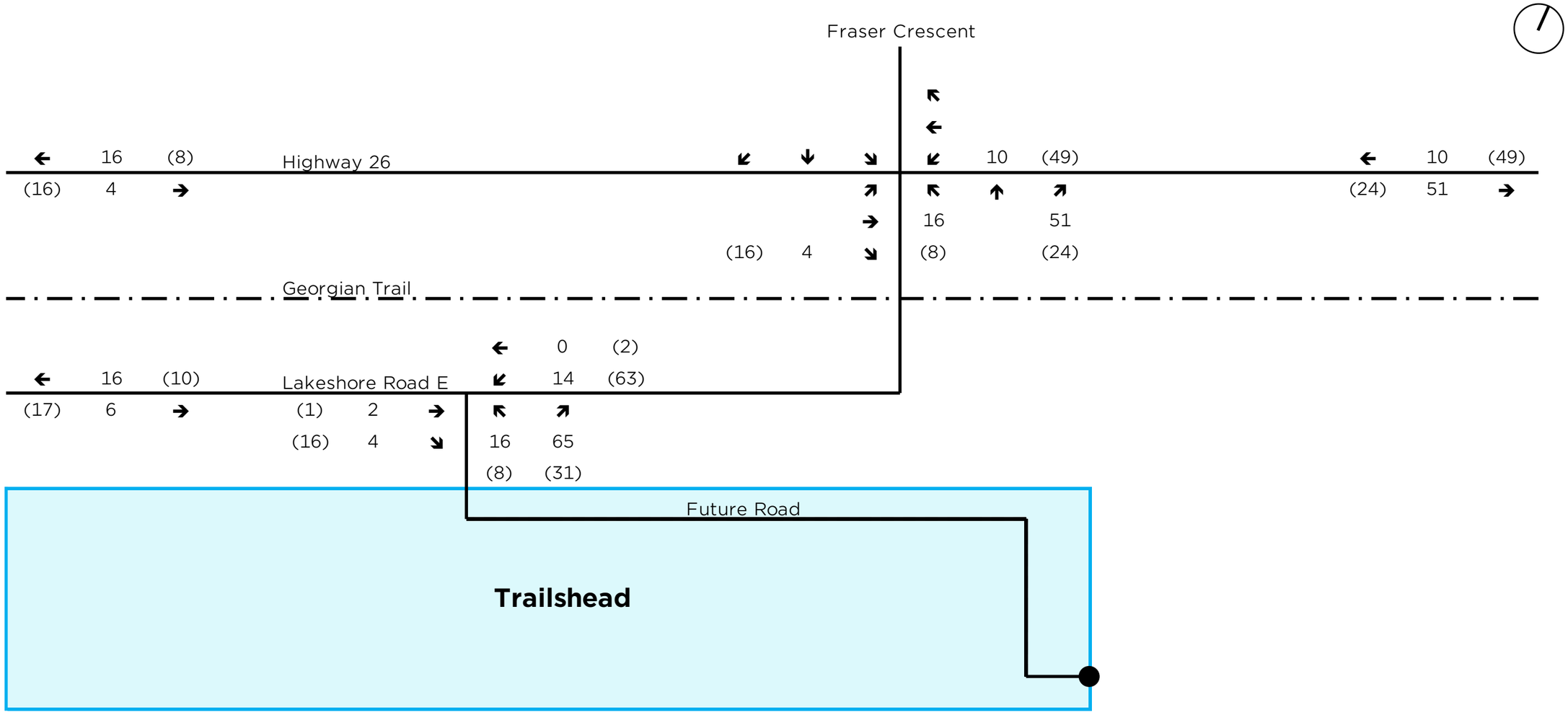
Appendix D:
Background Developments



Source:

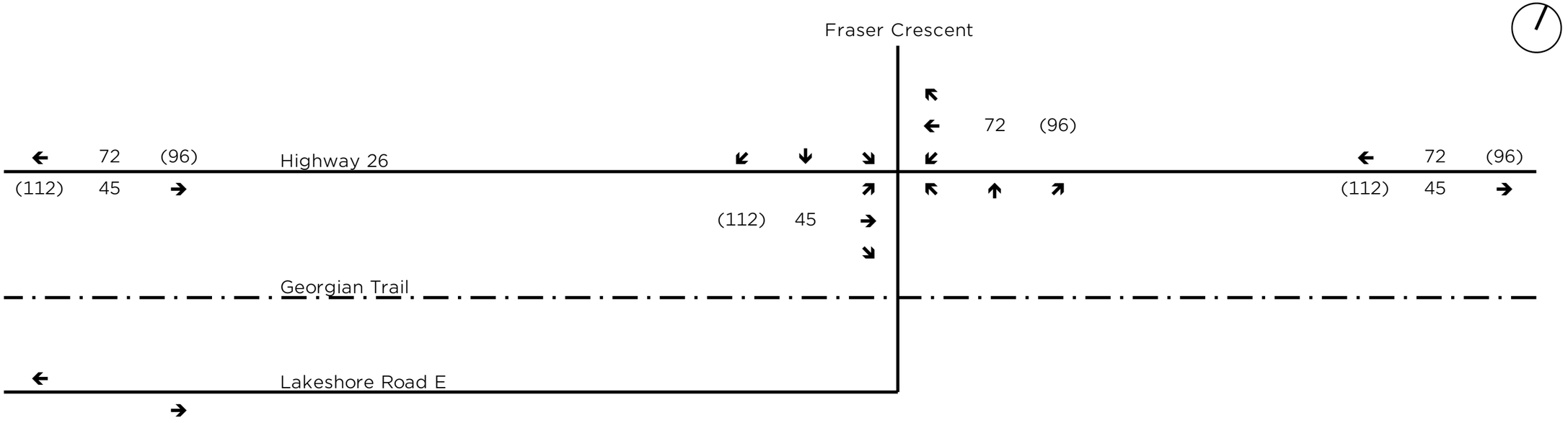
372 GREY ROAD 21 – APPENDIX D

Figure D1: Background Development Locations

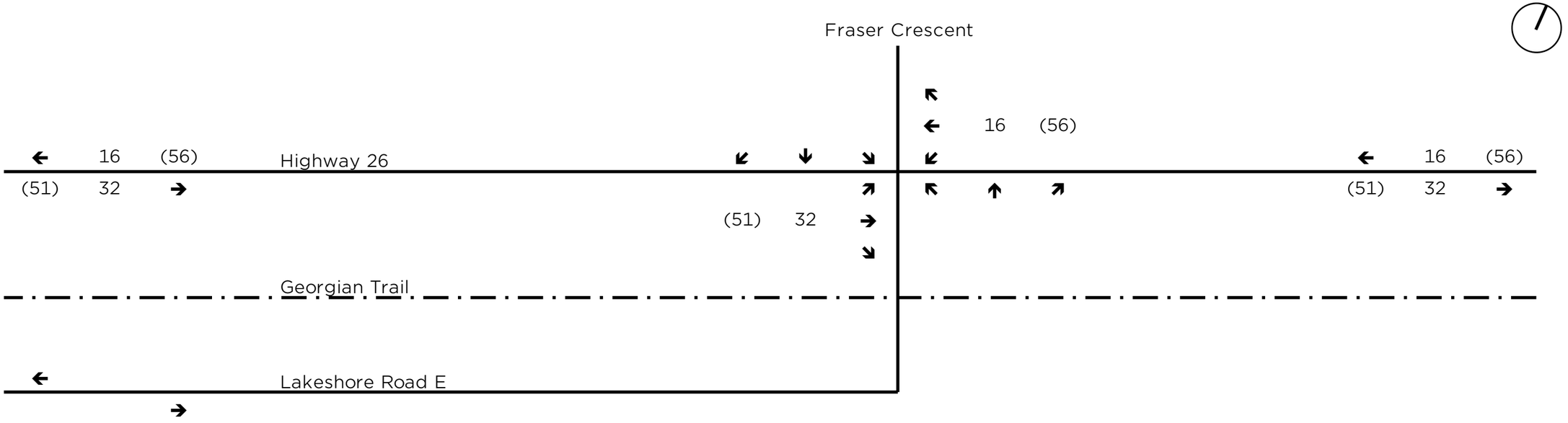


10 AM Peak Hour

(10) PM Peak Hour

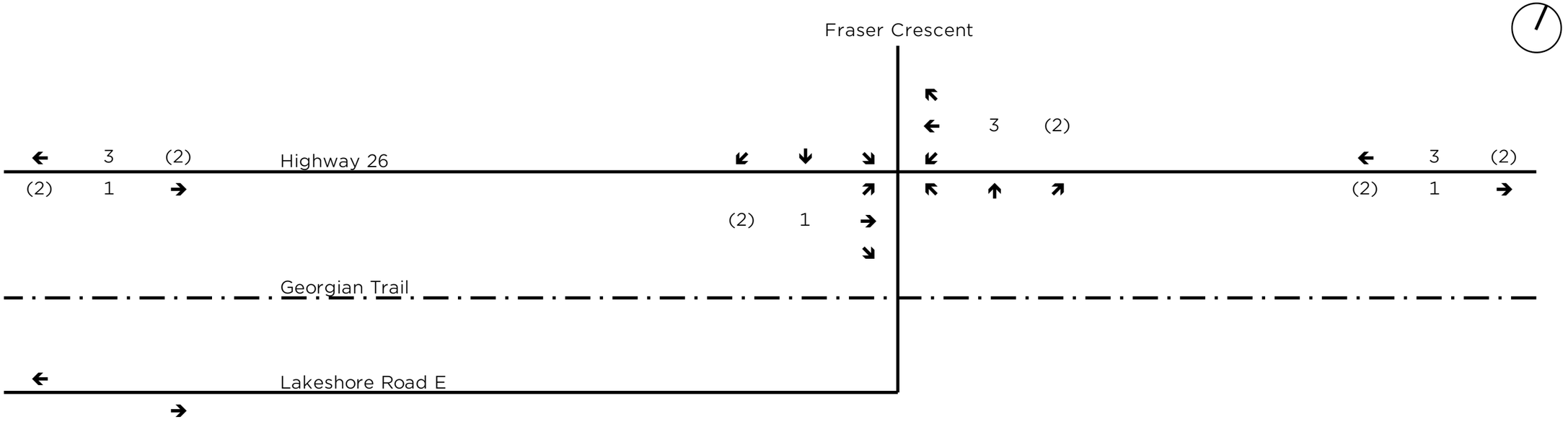


10 AM Peak Hour
(10) PM Peak Hour



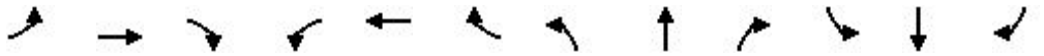
10 AM Peak Hour
(10) PM Peak Hour

Figure D4: Parkbridge Craigleith



10 AM Peak Hour
(10) PM Peak Hour

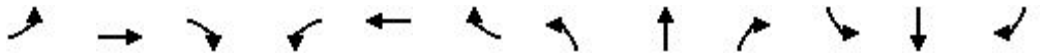
Appendix E:
Intersection Operations – Future



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	669	9	24	562	5	32	0	77	5	0	5
Future Volume (Veh/h)	5	669	9	24	562	5	32	0	77	5	0	5
Sign Control		Free			Free			Stop			Stop	
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	727	10	26	611	5	35	0	84	5	0	5
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	616			737			1410	1410	732	1492	1412	614
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	616			737			1410	1410	732	1492	1412	614
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			69	100	80	94	100	99
cM capacity (veh/h)	964			869			112	134	421	79	133	492

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	742	26	616	119	10
Volume Left	5	26	0	35	5
Volume Right	10	0	5	84	5
cSH	964	869	1700	232	137
Volume to Capacity	0.01	0.03	0.36	0.51	0.07
Queue Length 95th (m)	0.1	0.7	0.0	20.2	1.8
Control Delay (s)	0.1	9.3	0.0	35.8	33.4
Lane LOS	A	A		E	D
Approach Delay (s)	0.1	0.4		35.8	33.4
Approach LOS				E	D

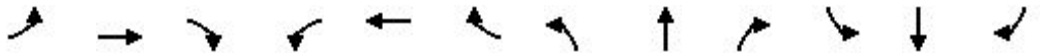
Intersection Summary				
Average Delay	3.3			
Intersection Capacity Utilization	53.5%	ICU Level of Service		A
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	862	33	70	870	5	19	0	44	5	0	5
Future Volume (Veh/h)	5	862	33	70	870	5	19	0	44	5	0	5
Sign Control		Free			Free			Stop			Stop	
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	937	36	76	946	5	21	0	48	5	0	5
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	951			973			2068	2068	955	2114	2084	948
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	951			973			2068	2068	955	2114	2084	948
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			89			41	100	85	83	100	98
cM capacity (veh/h)	722			709			36	48	313	29	47	316

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	978	76	951	69	10
Volume Left	5	76	0	21	5
Volume Right	36	0	5	48	5
cSH	722	709	1700	93	53
Volume to Capacity	0.01	0.11	0.56	0.74	0.19
Queue Length 95th (m)	0.2	2.7	0.0	28.8	4.8
Control Delay (s)	0.2	10.7	0.0	112.3	89.0
Lane LOS	A	B		F	F
Approach Delay (s)	0.2	0.8		112.3	89.0
Approach LOS				F	F

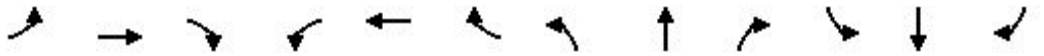
Intersection Summary				
Average Delay	4.6			
Intersection Capacity Utilization	64.5%	ICU Level of Service		C
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	715	9	24	599	5	32	0	77	5	0	5
Future Volume (Veh/h)	5	715	9	24	599	5	32	0	77	5	0	5
Sign Control		Free			Free			Stop			Stop	
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	777	10	26	651	5	35	0	84	5	0	5
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	656			787			1500	1500	782	1582	1502	654
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	656			787			1500	1500	782	1582	1502	654
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			64	100	79	93	100	99
cM capacity (veh/h)	931			832			97	118	394	67	117	467

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	792	26	656	119	10
Volume Left	5	26	0	35	5
Volume Right	10	0	5	84	5
cSH	931	832	1700	207	118
Volume to Capacity	0.01	0.03	0.39	0.58	0.08
Queue Length 95th (m)	0.1	0.7	0.0	24.0	2.1
Control Delay (s)	0.1	9.5	0.0	43.7	38.4
Lane LOS	A	A		E	E
Approach Delay (s)	0.1	0.4		43.7	38.4
Approach LOS				E	E

Intersection Summary				
Average Delay	3.7			
Intersection Capacity Utilization	55.9%	ICU Level of Service		B
Analysis Period (min)	15			

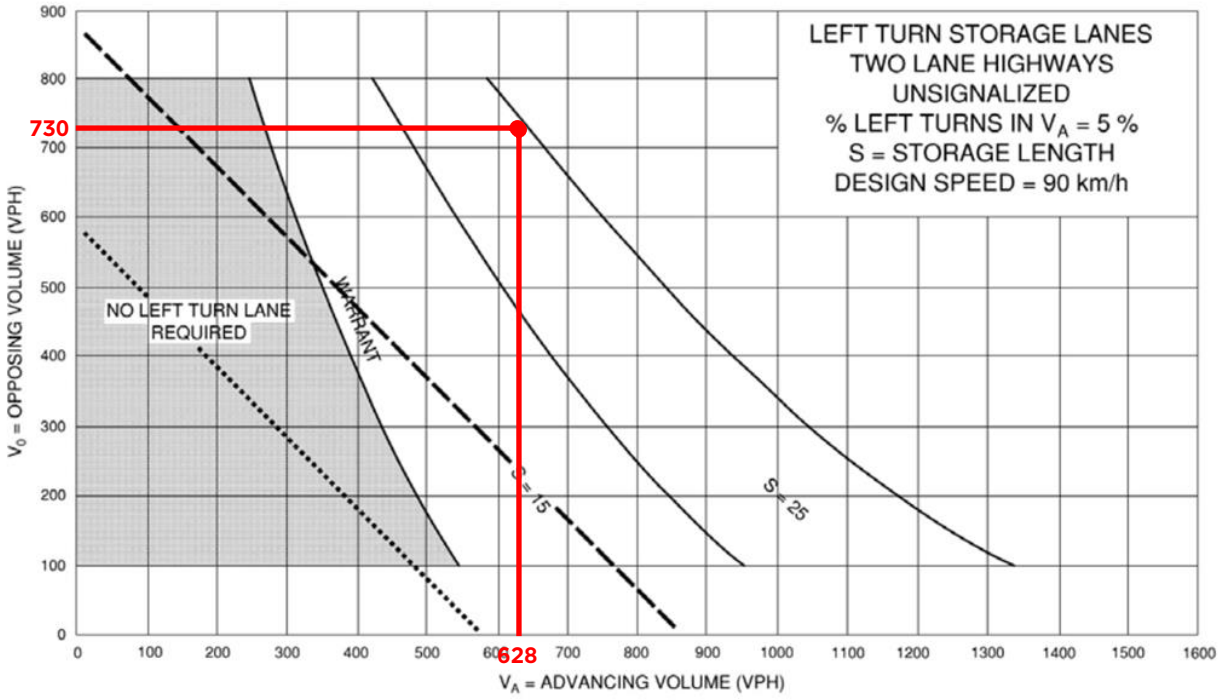


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	5	916	33	70	926	5	19	0	44	5	0	5
Future Volume (Veh/h)	5	916	33	70	926	5	19	0	44	5	0	5
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	996	36	76	1007	5	21	0	48	5	0	5
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	1012			1032			2188	2188	1014	2234	2204	1010
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1012			1032			2188	2188	1014	2234	2204	1010
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			89			28	100	83	78	100	98
cM capacity (veh/h)	685			673			29	40	290	23	39	291

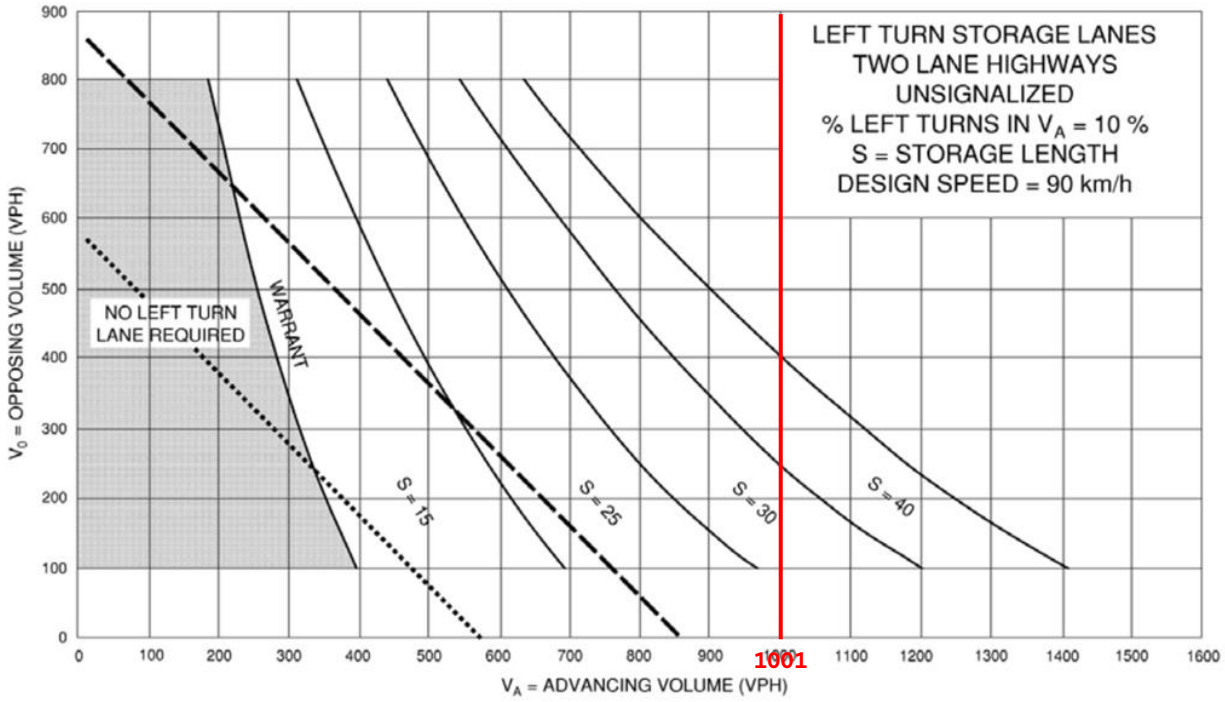
Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	1037	76	1012	69	10
Volume Left	5	76	0	21	5
Volume Right	36	0	5	48	5
cSH	685	673	1700	78	43
Volume to Capacity	0.01	0.11	0.60	0.88	0.23
Queue Length 95th (m)	0.2	2.9	0.0	34.6	5.9
Control Delay (s)	0.2	11.0	0.0	162.9	113.5
Lane LOS	A	B		F	F
Approach Delay (s)	0.2	0.8		162.9	113.5
Approach LOS				F	F

Intersection Summary				
Average Delay	6.1			
Intersection Capacity Utilization	65.0%	ICU Level of Service		C
Analysis Period (min)	15			

Appendix F:
MTO Left Turn Warrants



2035 Total Traffic – Weekday AM Peak Hour



2035 Total Traffic – Weekday PM Peak Hour

Figure F1: Left Turn Warrants