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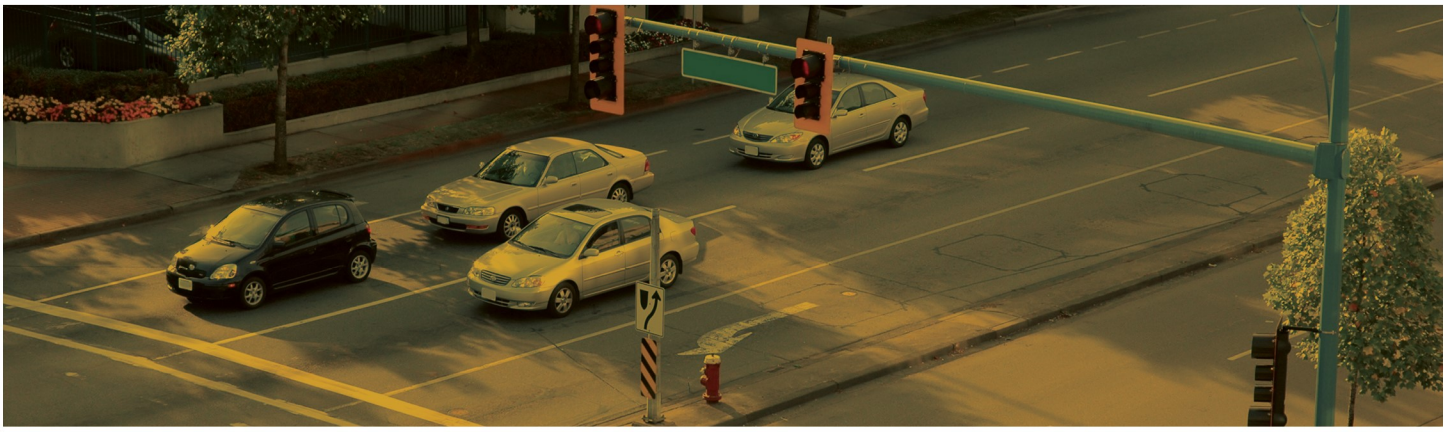

Childs Pit/Quarry Extension

TRAFFIC REVIEW

Fowler Construction Company Ltd.

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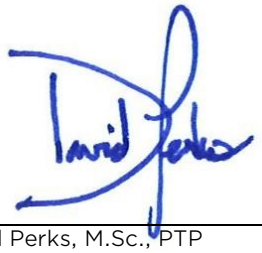	
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Issue	Date	Description
0	June 10, 2020	Draft report for client review
1	June 17, 2020	Final report

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1 Introduction

Tatham Engineering Limited was retained by Fowler Construction Company Ltd. to review the proposed Childs Pit/Quarry licensed boundary expansion and re-zoning plan from a transportation perspective, addressing the site access, site traffic volumes, and the potential impacts to the adjacent road network.

The subject site is located north of Muskoka Road 117 and west of Muskoka Road 46 (Bonnie Lake Road) on Concessions 9, 10, 11 and 12 in the Town of Bracebridge (as illustrated in Figure 1).

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 Muskoka Road 46, Muskoka Road 117 and the following intersections:

- Muskoka Road 46 with Muskoka Road 117; and
- Muskoka Road 46 with Childs Pit/Quarry access.

Photographs of the road system are provided in Figure 2.

2.1.1 Road Sections

Muskoka Road 46

As per the *Official Plan of the Muskoka District Area*[1], Muskoka Road 46 is a Class B District road under the jurisdiction of the District Municipality of Muskoka. The road is oriented north-south through the study area and has a 2-lane rural cross section (i.e. gravel ditches and open ditches), providing one lane of travel per direction. Muskoka Road 46 has a paved width of 7.4 metres in the vicinity of the access to Childs Pit/Quarry, with 1.0 to 1.5 metre gravel shoulders. The road has a posted speed limit of 60 km/h, and hence a design speed of 70 km/h (posted speed limit + 10 km/h for lower speed roads) has been assumed. As per the *Official Plan of the Muskoka District Area* a Class B road is intended to provide equally for the safe, efficient movement of traffic and the provision of access to abutting lands. This description is considered reflective of a major collector or minor arterial road. As such, a theoretical planning capacity of 700 vehicles per hour per lane (vphpl) has been assumed for Muskoka Road 46.

In the vicinity of the site access, the road maintains a relatively straight horizontal alignment with a varied vertical profile.

Muskoka Road 117

Muskoka Road 117 is a Class A District road under the jurisdiction of the District Municipality of Muskoka. The road is oriented east-west and has a 2-lane cross section, providing one lane of travel per direction. The road has a posted speed limit of 80 km/h, thus a design speed of 100 km/h has been assumed (posted speed limit + 20 km/h for higher speed roads). A Class A road

[1] *The Official Plan of the Muskoka District Area.* The District of Muskoka Planning & Economic Development Department. June 28, 2019 (office consolidated).

is a District road with a minimum speed limit of 80 km/h that is typically located within a rural area and is constructed to a standard that preserves the primary function of the efficient movement of traffic. Based on this description, the function of Muskoka Road 117 is consistent with that of a major arterial road. As such, a theoretical planning capacity of 900 to 1,100 vehicles per hour per lane (vphpl) would apply; 900 vphpl has been assumed to ensure a conservative approach.

The road is relatively flat with horizontal curves to the east and west of the Muskoka Road 46 intersection.

2.1.2 Key Intersections

The intersection of Muskoka Road 46 with Muskoka Road 117 is a 3-leg 'T' intersection with stop control on the minor approach (Muskoka Road 46). The east approach consists of a right turn taper and a through lane, whereas the west approach consists of a shared left/through lane. The north approach consists of a shared left/right turn lane.

The intersection of Muskoka Road 46 with the Childs Pit/Quarry Access is a 3-leg 'T' intersection with stop control on the minor approach (Childs Pit/Quarry access). The north approach consists of shared through/right lane, whereas the south approach consists of a shared left/through lane. The west approach consists of a shared left/right turn lane.

2.2 EXISTING TRAFFIC VOLUMES

To determine existing traffic volumes, traffic counts were conducted at the intersection of Muskoka Road 46 with Muskoka Road 117 on Tuesday July 30, 2019 from 7:00 to 10:00 and 16:00 to 19:00. The corresponding traffic count details are provided in Appendix A. Given the timing of the traffic counts, the observed volumes are considered reflective of typical summer conditions.

The 2019 peak hour volumes are illustrated in Figure 3.

2.3 EXISTING TRAFFIC OPERATIONS

2.3.1 Road Section Operations

As previously noted, the following lane capacities have been assumed for the adjacent road network:

- Muskoka Road 46 – 700 vphpl (major collector/minor arterial); and
- Muskoka Road 117 – 900 vphpl (major arterial).

Based on the peak summer volumes and the noted lane capacities, Muskoka Road 46 is operating at approximately 5% of capacity, whereas Muskoka Road 117 is operating at 21% of capacity. In considering these operating levels, there is significant reserve capacity along both roads to

accommodate increased volumes over a long period of time. Assuming a 2% annual increase in traffic volumes, the capacity of Muskoka Road 117 will not be reached for approximately 80 years (even with 5% annual growth assumed, there is more than 30 years of reserve capacity available).

2.3.2 Intersection Operations

The assessment of existing conditions provides the baseline from which the future traffic volumes and operations (both with and without the additional site trips) can be assessed. The capacity, and hence operations, of a road system is effectively dictated by its intersections. As such, the analysis focused on the operations of the noted key intersection of Muskoka Road 46 with Muskoka Road 117. The analysis is based on the 2019 traffic volumes, the existing configuration and intersection stop control and procedures outlined in the *2000 Highway Capacity Manual*[2] (using Synchro v.10 software). For unsignalized intersections, the review considers the average delay (measured in seconds), level of service (LOS) and volume to capacity (v/c) for the critical movements, namely the stop movements on the minor street. A summary of the analyses is provided in Table 1. Level of service A corresponds to the best operating condition with minimal delays whereas level of service F corresponds to poor operations resulting from high intersection delays. A v/c ratio of less than 1.0 indicates the intersection movement/approach is operating at less than capacity while v/c of 1.0 indicates capacity has been reached. Detailed operations worksheets for the existing traffic conditions are included in Appendix B.

Table 1: Intersection Operations – 2019 Conditions

INTERSECTION AND MOVEMENT		CONTROL	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Muskoka Road 46 & Muskoka Road 117	SB	stop	9	A	0.04	9	A	0.01

Based on the existing volumes and intersection configuration and control, the study area intersection provides an excellent level of service (LOS A) with minimal delays during both peak hours. As such, no intersection improvements are required to support the existing conditions.

2.4 LEFT TURN LANE WARRANT

Notwithstanding the otherwise excellent operating conditions anticipated at the intersection of Muskoka Road 46 with Muskoka Road 117, the need for an exclusive left turn lane on Muskoka Road 117 at Muskoka Road 46 has been investigated based on MTO turn lane warrants and considering the following:

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

- 100 km/h design speed (assumed to be speed limit + 20 km/h);
- left turning volumes at Muskoka Road 46; and
- approaching and opposing volumes on Muskoka Road 117.

Considering the above, a left turn lane is not warranted under existing conditions.

3 Childs Pit/Quarry Extension

3.1 SITE LOCATION

As illustrated in Figure 1, the proposed development site is located on Muskoka Road 46, north of Muskoka Road 117, in the Town of Bracebridge.

3.2 RE-ZONING PLAN

The re-zoning proposal calls for an expansion of the licensed boundary for the sand and gravel and quarry extraction operation. The current licensed boundary is 234 hectares. The re-zoning and Aggregate Resources Act (ARA) application proposes to increase the licensed boundary by 163.1 hectares, bringing the total area licensed for extraction to 397.1 hectares. A site plan is provided in Figure 4.

The existing site is licensed for unlimited extraction, although historically the extraction volumes have not exceeded 210,000 tonnes (in 2018, 205,000 tonnes were extracted). For the proposed extension, Fowler is applying for a maximum tonnage limit of 2,000,000 tonnes per year. As a result, this review considers the potential impacts associated with an increase in traffic levels assuming extraction of 2,000,000 tonnes per year compared to current production levels at the site. Although production levels are not expected to significantly increase in the near future, this assessment proactively assesses if any road improvements are required to accommodate this amount of traffic, which is already permitted to occur from the existing Childs Pit/Quarry.

3.3 SITE ACCESS

Access to the site is provided via Muskoka Road 46 which runs north-south along the eastern boundary of the property. The access point is located towards the southeast corner of the site. The access road has a recycled asphalt surface and an overall width of 7.5 metres. The entrance at Muskoka Road 46 has a measured width of 30 metres (widened as a result of the corner radii which facilitate turning trucks to/from the site). The apron is paved with an asphalt surface from the edge of pavement on Muskoka Road 46 to the end of radius on the subject property. Given the existing operations of the site and associated truck traffic and turning requirements, the current configuration is considered appropriate.

As per the *Noise Impact Assessment - Child's Pit and Quarry Extension*[3] report, it is recommended that the site access be shifted south as truck volumes increase (the proposed access location is illustrated in Figure 4). The relocation of the site access approximately 75 metres to the south of the existing access location will mitigate noise impacts to the existing

[3] *Noise Impact Assessment - Child's Pit and Quarry Extension.* HGC Engineering. June 2020.

residences on the east side of Muskoka Road 46. The truck volume thresholds at which relocation is required are identified in the noted noise impact assessment. The existing access will continue to operate until such time that the relocation is required. The new access will be constructed in anticipation of the critical volume threshold being reached, at which point the existing access will be closed and all site traffic routed to the new access. The new access will be constructed to satisfy District requirements. In this respect, it is anticipated that an entrance permit will be required from the District.

3.4 SITE TRAFFIC

3.4.1 Trip Generation – Existing Operations

The trips generated by the existing pit operations (assuming typical operations) have been summarized based on the following:

- 205,000 tonne annual extraction (2018);
- average truck capacity of 30 tonnes (average load in 2018 was 29 tonnes); and
- 250 operating days per year (reflective of year-round operations).

While the site may be operational year-round, the 2018 data indicates that the majority of extraction occurs during the months May to November (approximately 80% of annual tonnage). During the peak season, the quarry is assumed to operate 11 hours per day (7:00 to 18:00), whereas during the off peak period, reduced hours of operation are assumed (8 hours per day). A summary of the resulting truck volumes is provided in Table 2, including daily and hourly truck volumes. To further consider peak hour operations during a typical day, the average hourly volumes have been increased by a factor of 1.5 (i.e. site activity will not be uniform over the course of the day as some hours will be busier than others).

Table 2: Site Generated Traffic – 2018 Operations (loaded trucks)

PERIOD	TONNAGE	OPERATING DAYS	TONNES/ DAY	LOADS/ DAY	LOADS/HOUR	
					AVE	PEAK
Average (Jan – Dec)	205,000	250	820	27	2.5	4
Peak Season[1]	164,000	145	1131	38	3.5	5
Off-Peak Season[2]	41,000	105	310	13	1.6	2.4

[1] peak season = 11 hour operations from May to November (during which it is assumed 80% of the annual tonnage will be extracted)
[2] off-peak season = 8 hour operations from December to April (during which it is assumed that 20% of annual tonnage will be extracted)

In 2018, the site averaged 3 (rounded up from 2.5) loaded truck trips per hour, which translates to 3 trips to the site and 3 trips from the site. In considering peak hour operations, 4 truck trips to the site and 4 truck trips from the site are generated. As noted, these volumes represent average conditions and assume that pit extraction occurs uniformly over the course of the year.

The market for aggregates is typically greater during the spring and summer months than during the winter months. Therefore, it is important to consider peak operating conditions. Based on available information, the existing peak daily extraction (i.e. busiest day) of the site is approximately 3,000 tonnes, translating to 1.4% of the 205,000 annual tonnage. In considering the previous assumptions regarding truck capacity and operating hours, the resulting truck volumes are noted in Table 3.

On a peak day, the site is expected to process an average of 9 loads per hour, or 9 trips to the site and 9 trips from the site. During the peak hour of the peak day, the site is expected to process 14 loads, or 14 trips to the site (assuming peak hour is 1.5x the average hour) and 14 trips from the site.

The pit also generates automobile trips at the start and end of each day related to employee use. However, the volume of such is minor and thus the associated impacts are considered negligible.

Table 3: Site Generated Traffic – Peak Day Operations (existing)

PEAK DAY TONNAGE	LOADS/DAY	LOADS/HOUR	
		AVERAGE	PEAK
3,000	100	9	14

3.4.2 Trip Generation – Future Operations

Estimates of the number of trips to be generated by the site under future increased operations have been based on an annual extraction of 2,000,000 tonnes and the previously noted assumptions with respect to truck capacity and operating days/hours. In considering the annual operations, the following are noted:

- 66,667 total number of loads (2,000,000 tonnes ÷ 30 tonnes per load); and
- 133,334 truck trips (66,667 empty trucks arriving at the site and 66,667 loaded trucks departing from the site).

A summary of the truck trip estimates is provided in Table 4, including daily and hourly truck volumes. To further consider peak hour operations during the day, the average hourly volumes have been increased by a factor of 1.5, recognizing that site activity will not be uniform over the course of the day as some hours will be busier than others.

Table 4: Site Generated Traffic – Future Operations (loaded trucks)

PERIOD	TONNAGE	OPERATING DAYS	TONNES/ DAY	LOADS/ DAY	LOADS/HOUR	
					AVE	PEAK
Average (Jan – Dec)	2,000,000	250	8,000	267	24	36
Peak Season[1]	1,600,000	145	11,035	368	33	50
Off-Peak Season[2]	400,000	105	3810	127	16	24

[1] peak season = 11 hour operations from May to November (during which it is assumed 80% of the annual tonnage will be extracted)
[2] off-peak season = 8 hour operations from December to April (during which it is assumed that 20% of annual tonnage will be extracted)

Based on a projected annual extraction of 2,000,000 tonnes and considering typical conditions, the site could generate in the order of 127 to 368 loads per day which translates to 254 to 736 truck trips per day. Based on the noted operating hours per day, the average hourly volume of loaded trucks would be in the order of 16 to 33 per hour, with peak hour operations producing upwards of 50 loads per hour (assuming that the peak hour reflects the average hourly truck load volume increased by a factor of 1.5). This translates to 100 peak hour trips (i.e. 50 empty trips in and 50 loaded trips out) during the peak season.

In addition to typical operations, the ultimate peak daily operations have also been considered. A peak daily tonnage of 28,000 tonnes (i.e. the busiest day of the year) has been developed assuming that the future operations will act similar to existing conditions in that peak daily tonnage will account for approximately 1.4% of the annual tonnage (i.e. 2,000,000 tonnes x 1.4% = 28,000 tonnes). Such operations are not expected to be common place but have nonetheless been considered here to determine the potential number of trips generated by the site under these conditions. In considering the previous assumptions regarding truck size and operating hours, the resulting truck volumes associated with the peak operations are noted in Table 5.

Table 5: Site Generated Traffic – Peak Day Operations (future)

PEAK DAY TONNAGE	LOADS/DAY	LOADS/HOUR	
		AVERAGE	PEAK
28,000	933	85	127

On the projected ultimate peak day, the site is expected to generate an average of 85 loaded trips per hour, or 85 trips to the site and 85 trips from the site. During the peak hour of the peak day, the site is expected to generate 127 trips to the site (assuming the peak hour is 1.5x the average hour) and 127 trips from the site.

As previously noted, the trip generation assumes extraction of 2,000,000 tonnes per year (i.e. the proposed license limit); however, production levels are not expected to significantly increase in the near future. The purpose in assuming extraction levels equal to the proposed limit is to proactively assesses if any road improvements are required to accommodate this amount of traffic, which is already permitted to occur from the existing Childs Pit/Quarry based on the existing unlimited extraction license.

3.5 PEAK OPERATIONS – EXISTING VS FUTURE

A brief summary of the existing and future peak season operations and peak daily operations is provided in Table 6.

Table 6: Peak Daily Operations – Existing vs Future

SCENARIO	DAILY TONNAGE	LOADS/ DAY	LOADS/HOUR		PEAK HOUR TRIPS
			AVERAGE	PEAK	
Existing Peak Season Average Day	1,131	38	3.5	5	10
Existing Peak Season Peak Day	3,000	100	9	14	28
Future Peak Season Average Day	11,035	368	33	50	100
Future Peak Season Peak Day	28,000	933	85	127	254

Assuming a future annual extraction of 2,000,000 tonnes, the site is expected to generate 100 peak hour trips on an average day during the peak season, an increase of 90 peak hour trips when compared to existing conditions. In considering the peak day, the existing level of 28 trips increases to 254.

As previously noted, the purpose in assuming extraction levels equal to the proposed limit is to proactively assesses if any road improvements are required to accommodate this amount of traffic. It is noted that the site is currently licensed for unlimited extraction and could theoretically generate the noted peak hour volumes under the existing operations. However, production is market driven and the site has historically extracted far less tonnage than has been assumed in this review (205,000 tonnes extracted in 2018). Thus, the assessment is conservative in nature.

3.6 HAUL ROUTE

While typically dictated by market location, the predominant haul route for Childs Pit/Quarry is Muskoka Road 46 to Muskoka Road 117 to Highway 11. These roads are all upper tier roads and thus considered capable of accommodating the noted site traffic volumes.

4 Transportation Impacts

4.1 TOTAL TRAFFIC VOLUMES

The site traffic volumes have been combined with the existing 2019 volumes and are illustrated in the following:

- Figure 5: Total Traffic – Existing Peak Season Average Day;
- Figure 6: Total Traffic – Existing Peak Season Peak Day
- Figure 7: Total Traffic – Future Peak Season Average Day; and
- Figure 8: Total Traffic – Future Peak Season Peak Day.

The site traffic has been assigned to the haul route as previously noted (i.e. Muskoka Road 46 to Muskoka Road 117 to Highway 11).

4.2 TRAFFIC OPERATIONS

4.2.1 Road Section Operations

As previously noted, the study area road network is operating well below capacity, with Muskoka Road 46 at 5% of capacity and Muskoka Road 117 at 21% capacity.

In assuming an annual extraction of 2,000,000 tonnes, Childs Pit/Quarry (including the expansion area) is expected to generate 100 peak hour trips during an average day during the peak season. When considering the peak hour of the peak day, the site has the potential to generate 254 peak hour trips. With the addition of these generated trips to the road system, the individual road sections will continue to operate at 35% capacity or less during both peak hours. As such, the adjacent road network is expected to operate with considerable excess reserve capacity for the foreseeable future.

As previously noted, production levels are not expected to significantly increase in the near future. The purpose in assuming extraction levels equal to the proposed limit is to proactively assesses if any road improvements are required to accommodate this amount of traffic, which is already permitted to occur from the existing Childs Pit/Quarry based on the existing unlimited extraction license. Regardless, the road network will operate with excess reserve capacity.

4.2.2 Intersection Operations

The intersection of Muskoka Road 118 with Muskoka Road 26 was again analyzed to consider the projected total traffic volumes, specifically the Future Peak Season Peak Day volumes (Figure 8, considered the critical scenario as volumes will be greatest). The results are summarized in Table 7, detailed operation worksheets are included in Appendix B.

As indicated the intersection of Muskoka Road 46 with Muskoka Road 117 will continue to provide an excellent level of service (LOS B or greater) with minimal delays during both peak hours when considering the existing intersection configuration and Future Peak Season Peak Day volumes.

Based on the projected site volumes, no improvements are necessary at the study area intersection from an operational perspective.

Table 7: Intersection Operations – Future Peak Season Peak Day Conditions

INTERSECTION AND MOVEMENT		CONTROL	WEEKDAY AM PEAK HOUR			WEEKDAY PM PEAK HOUR		
			DELAY	LOS	V/C	DELAY	LOS	V/C
Muskoka Road 46 & Muskoka Road 117	SB	stop	10	B	0.20	10	A	0.16

4.3 LEFT TURN LANE REQUIREMENTS

4.3.1 Muskoka Road 46 & Muskoka Road 117

MTO warrants for a left turn lane at the intersection of Muskoka Road 46 and Muskoka Road 117 have been reviewed again to consider the potential increase in traffic generated by Childs Pit/Quarry Extension.

In considering the noted traffic volumes for the future peak season average day operations (Figure 7), an eastbound left turn lane on Muskoka Road 117 with 15 metres of storage is warranted to accommodate the additional site traffic associated with an annual extraction level of 2,000,000 tonnes. Similarly, when considering the traffic volumes associated with the future peak season peak day operations (Figure 8), a left turn lane with 15 metres of storage is also warranted. MTO design standards recommend that additional storage be added where the percentage of turning trucks is significant. At Muskoka Road 46, the volume of turning trucks is estimated to be upwards of 90% of the left turn volumes. Based on MTO design standards, an additional 15 metres of storage is required. Thus, an ultimate left turn storage lane of 30 metres is recommended.

The overall design of the left turn lane, based on MTO standards for a 100 km/h design speed, should include the following (which totals 260 metres to the west of Muskoka Road 46):

- 15 metre offset from the centre of the site access to the start of the left turn lane;
- 30 metre storage length;
- 70 metre parallel lane; and
- 160 metre taper length.

In addition, a run-out length of 190 metres would be required to the east of the intersection to return the intersection configuration to its existing 2-lane configuration.

In considering the time of need for the left turn lane, assuming the background volumes on Muskoka Roads 46 and 117 remain relatively unchanged, the left turn lane warrant will be surpassed with 25 additional left turning trucks during the peak hour (which would result from a 1,000,000 tonne annual extraction limit under peak season average day conditions).

4.3.2 Site Access

As noted, under future conditions with a 2,000,000 tonne extraction limit, the pit will generate 50 loads per hour under peak season average day conditions and 127 loads per hour under peak season peak day conditions. Although these generated trips are considered significant in that entering and exiting movements will occur every 30 to 60 seconds during the peak hour, when considering the low volumes on Muskoka Road 46 (in the order of 11 to 38 vehicles) an exclusive left turn lane on Muskoka Road 46 at the site access (existing location or proposed new location) is not considered necessary.

4.4 SIGHT LINES

The sight line assessment has considered both minimum stopping sight distance and intersection sight distance, as per guidelines provided in the TAC *Geometric Design Guide for Canadian Roads*[4]. The minimum stopping sight distance provides sufficient distance for an approaching motorist to observe a stationary hazard in the road and bring their vehicle to a complete stop prior to the hazard; whereas the intersection sight distance allows a vehicle to enter a main road from a side street or access and attain the appropriate operating speed without significantly impacting the operating speed of an approaching vehicle.

The available sight lines along Muskoka Road 46 at the existing and proposed site access locations are provided in Table 8. The available sight distances were established based on field measurements and TAC guidelines for determining intersection sight distances and minimum stopping sight distances.

Table 8: Sight Line Assessment

LOCATION	DESIGN SPEED	MINIMUM STOPPING SIGHT DISTANCE	INTERSECTION SIGHT DISTANCE		AVAILABLE SIGHTLINES	
			Left Turn from Stop	Right Turn from Stop	to/from South	to/from North
Existing Access	70 km/h	105 m	225 m	205 m	440 m	150 m
Proposed Access	70 km/h	105 m	225 m	205 m	360 m	210 m

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

As indicated, the available sight distances satisfy the minimum stopping and intersection sight distance requirements for the noted design speed - with the exception of the sight distance to/from the north along Muskoka Road 46 at the existing access, which satisfies the minimum stopping sight distance but not the intersection sight distance. While the intersection sight distance is not satisfied, such is not considered problematic given the very low volume of approaching traffic, that exiting truck traffic will be accelerating on a downgrade and further recognizing that the available sight lines at the existing access are a condition that has existed without issue or concern. It is further noted that the sight lines were assessed using a driver's eye height of 1.08 m - consistent with that of a passenger car. The sight lines for trucks exiting the site will be greater than noted given the increased driver's eye height (2.3 metres). Regardless, the sight distance does satisfy the minimum stopping sight distance, which is considered the critical condition (i.e. a motorist has sufficient room to bring their vehicle to a complete stop prior to the access should such a manoeuvre be required). As indicated in Table 8, the sight lines at the proposed access will satisfy TAC guidelines for all conditions.

It is recognized that the TAC minimum stopping sight distance is based on passenger cars and thus do not necessarily reflect the increased braking distance required for trucks. However, as truck drivers have a greater eye height (in the order of 2.3 metres), they have increased visibility and hence greater sight distances. As per TAC guidelines, this increased sight distance offsets the difference in vehicle performance relating to braking. Furthermore, as trucks will be slowing to complete their turns to/from the pit, they are not expected to be in a situation whereby they need to stop suddenly. This applies more so to approaching vehicles which are noted as having sufficient sight lines.

In consideration of the above, the available sight distances at the existing and proposed access locations are acceptable.

5 Summary

This review has addressed the transportation impacts associated with the proposed re-zoning and expansion of the licensed boundary of Childs Pit/Quarry. The re-zoning proposal calls for an expansion of the licensed boundary for the sand and gravel and quarry extraction operation. The current licensed boundary is 234 hectares. The re-zoning and Aggregate Resources Act (ARA) application proposes to increase the licensed boundary by 163.1 hectares, bringing the total area licensed for extraction to 397.1 hectares. The existing site is licensed for unlimited extraction, although historically the extraction volumes have not exceeded 210,000 tonnes (in 2018, 205,000 tonnes were extracted). For the proposed extension, Fowler is applying for a maximum tonnage limit of 2,000,000 tonnes per year. As a result, this review considers the potential impacts associated with an increase in traffic levels assuming extraction of 2,000,000 tonnes per year compared to current production levels at the site. Although production levels are not expected to significantly increase in the near future, this assessment proactively assesses if any road improvements are required to accommodate this amount of traffic, which is already permitted to occur from the existing Childs Pit/Quarry.

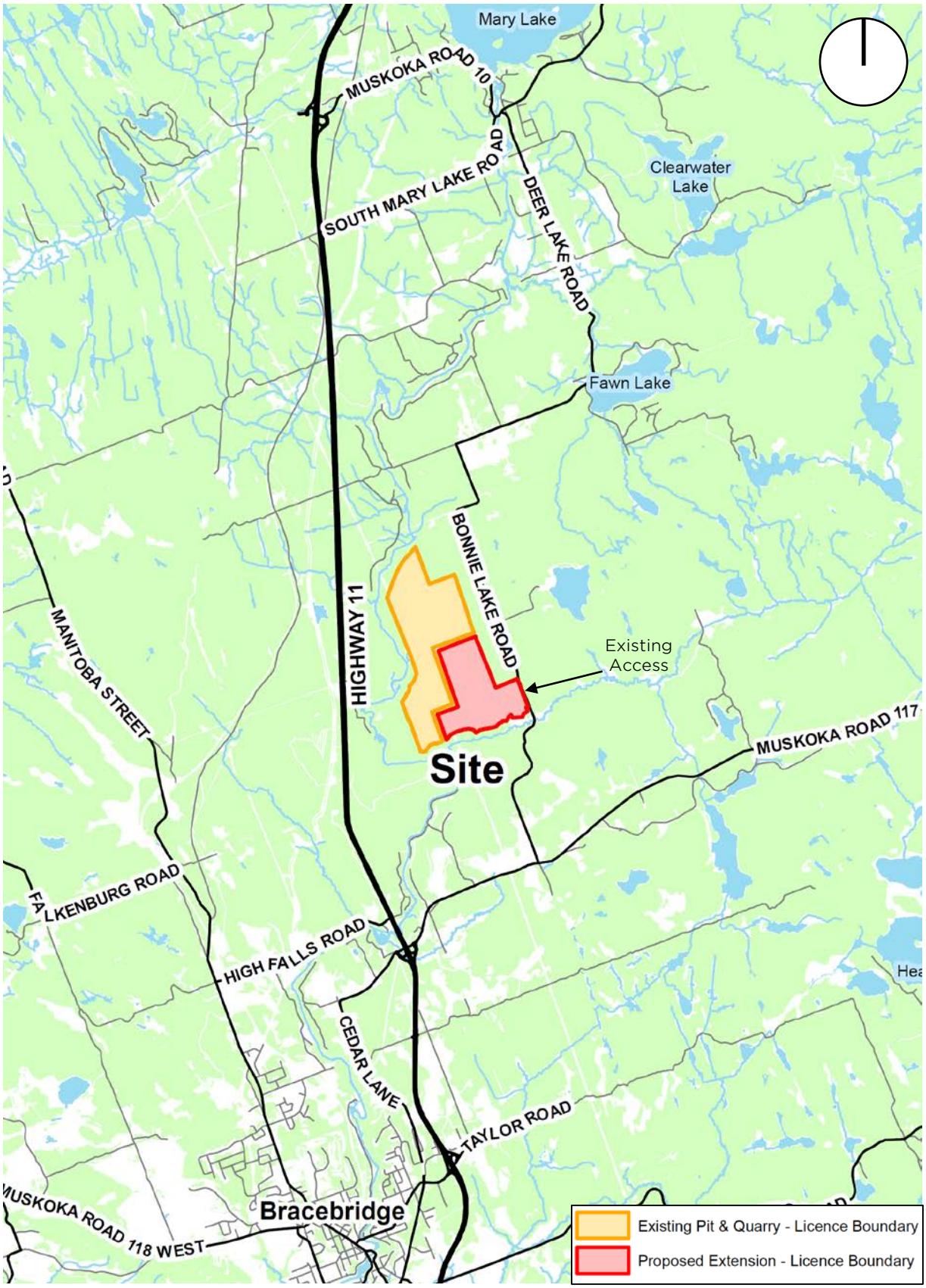
Under existing operations, the site is generating an average of 10 peak hour trips (5 in / 5 out) during an average day of the peak season; whereas during the peak day operations (i.e. busiest day of the peak season), the site generates 28 peak hour trips (14 in / 14 out). These volumes reflect an existing annual extraction of 205,000 tonnes. In considering an annual extraction increase to 2,000,000 tonnes, the site is expected to average 100 peak hour trips (50 in / 50 out) during the peak season and 254 peak hour trips (127 in / 127 out) during peak day operations.

Upon review of available traffic data, it was determined that the adjacent road network is operating with excess reserve capacity and can readily accommodate the additional traffic volumes associated with an increase in the operations at Childs Pit/Quarry. No improvements are required to address the available road capacity. With respect to intersection operations, the intersection of Muskoka Road 46 with Muskoka Road 117 will provide excellent operations. Likewise, the site access on Muskoka Road 46 will operate without issue given the low volumes on the road network and limited volumes generated by the site. No intersection/access improvements are considered necessary from an operations perspective. However, as per recommendations provided in the noise assessment report, the access location will be shifted to the south by approximately 75 metres to mitigate noise impacts to the existing residences on the east side of Muskoka Road 46. The existing access will continue to operate until such time that the relocation is required. The truck volume thresholds at which relocation is required are identified in the noted noise impact assessment. The new access will be constructed in anticipation of the critical volume threshold being reached, at which point the existing access

will be closed and all site traffic routed to the new access. The new access will be constructed to satisfy District requirements. In this respect, it is anticipated that an entrance permit will be required from the District.

The need for exclusive left turn lanes on Muskoka Road 46 (at the site access) and Muskoka Road 117 (at Muskoka Road 46) was reviewed based on MTO left turn lane warrants and the noted traffic volumes. Given the limited volumes to be generated by the site and the low volumes on Muskoka Road 46, an exclusive left turn lane on Muskoka Road 46 at the site access is not warranted. With respect to Muskoka Road 117, when considering the additional site traffic associated with an increase in the annual extraction to 2,000,000 tonnes, the volumes surpass the warrant threshold for provision of an eastbound left turn lane. The time of need for the left turn lane was further considered and resolved that operations of 1,000,000 tonnes per year would warrant the need (which relates to an additional 25 left turning trucks during the peak hour of the peak season average day). It is recommended that traffic volumes be monitored prior to implementing a left turn lane, thus providing an opportunity to observe actual pit operations moving forward and to confirm the need for and timing of implementation of such improvements.

Sight lines were reviewed along Muskoka Road 46 in both directions at the site access, to ensure vehicles accessing the site can do so in a safe and efficient manner. The available sight distances at both the existing and proposed site access locations are considered appropriate.



CHILDS PIT/QUARRY EXTENSION

Figure 1: Site Location

Looking west toward site access from Muskoka Road 46

Looking east towards Muskoka Road 46 from site access

Looking north along Muskoka Road 46 from site access

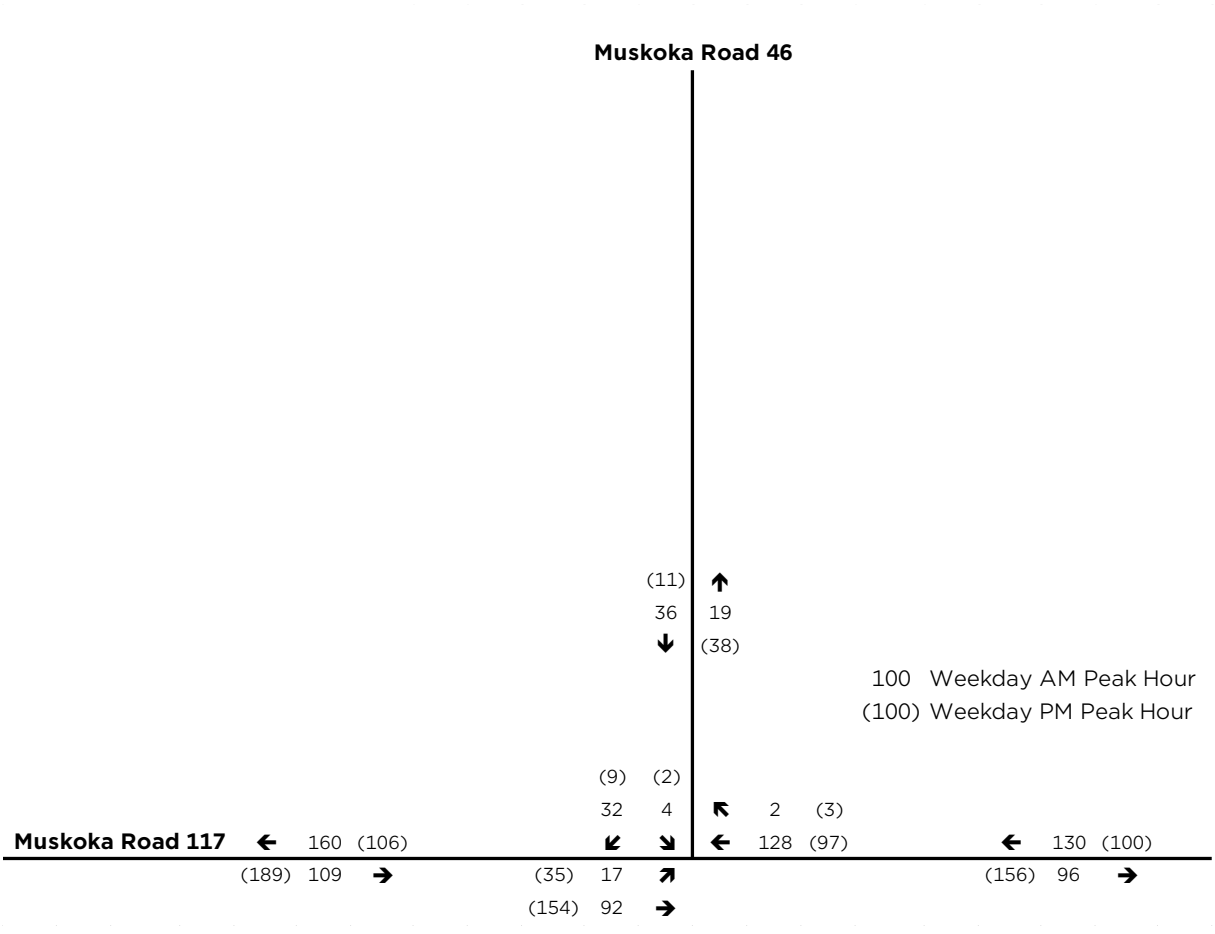
Looking south along Muskoka Road 46 from site access

Looking north along Muskoka Road 46 from Muskoka Road 117

Looking east along Muskoka Road 117 from Muskoka Road 46

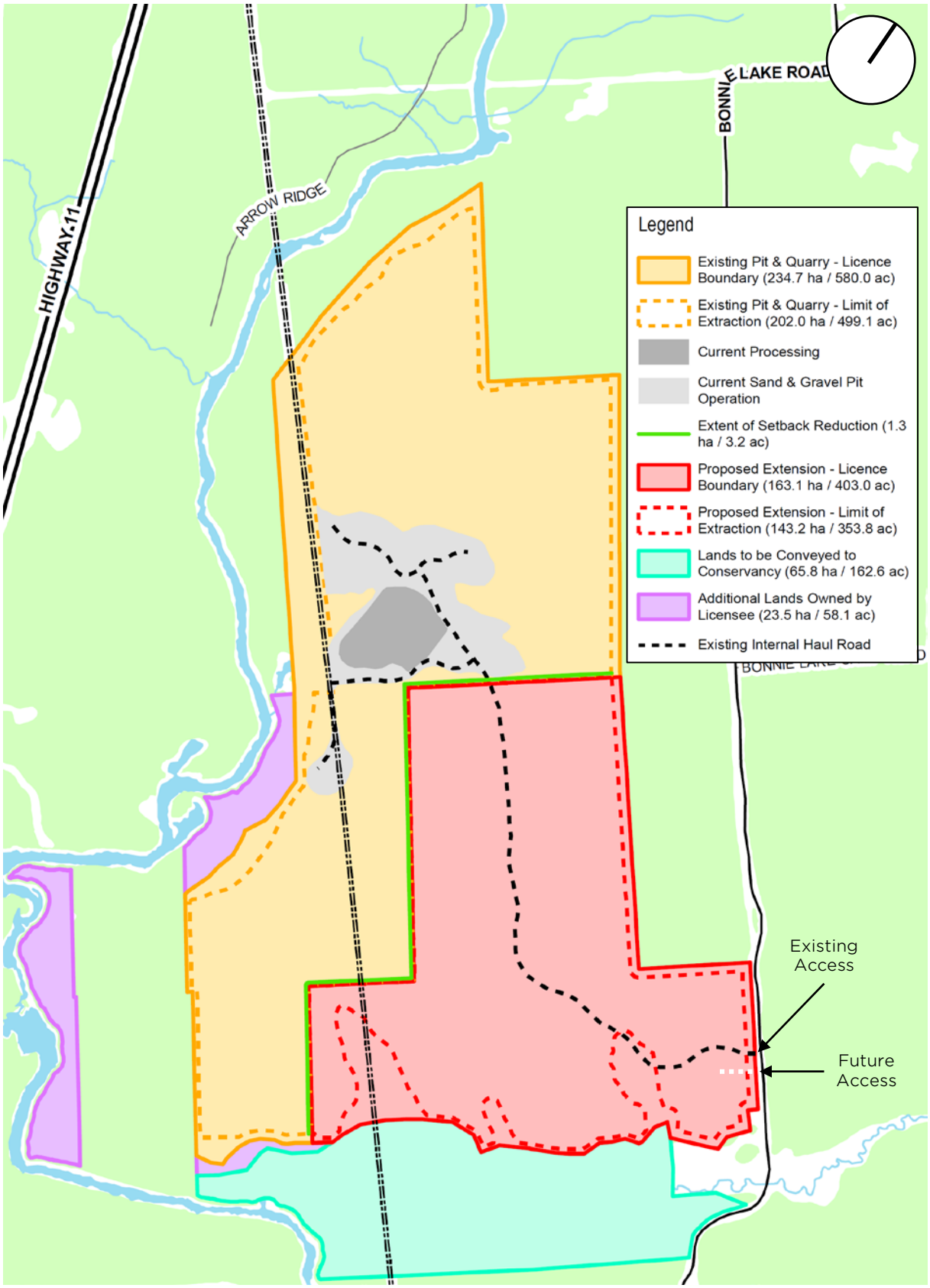
Looking west along Muskoka Road 117 from Muskoka Road 46

Looking west along Muskoka Road 117 towards Muskoka Road 46



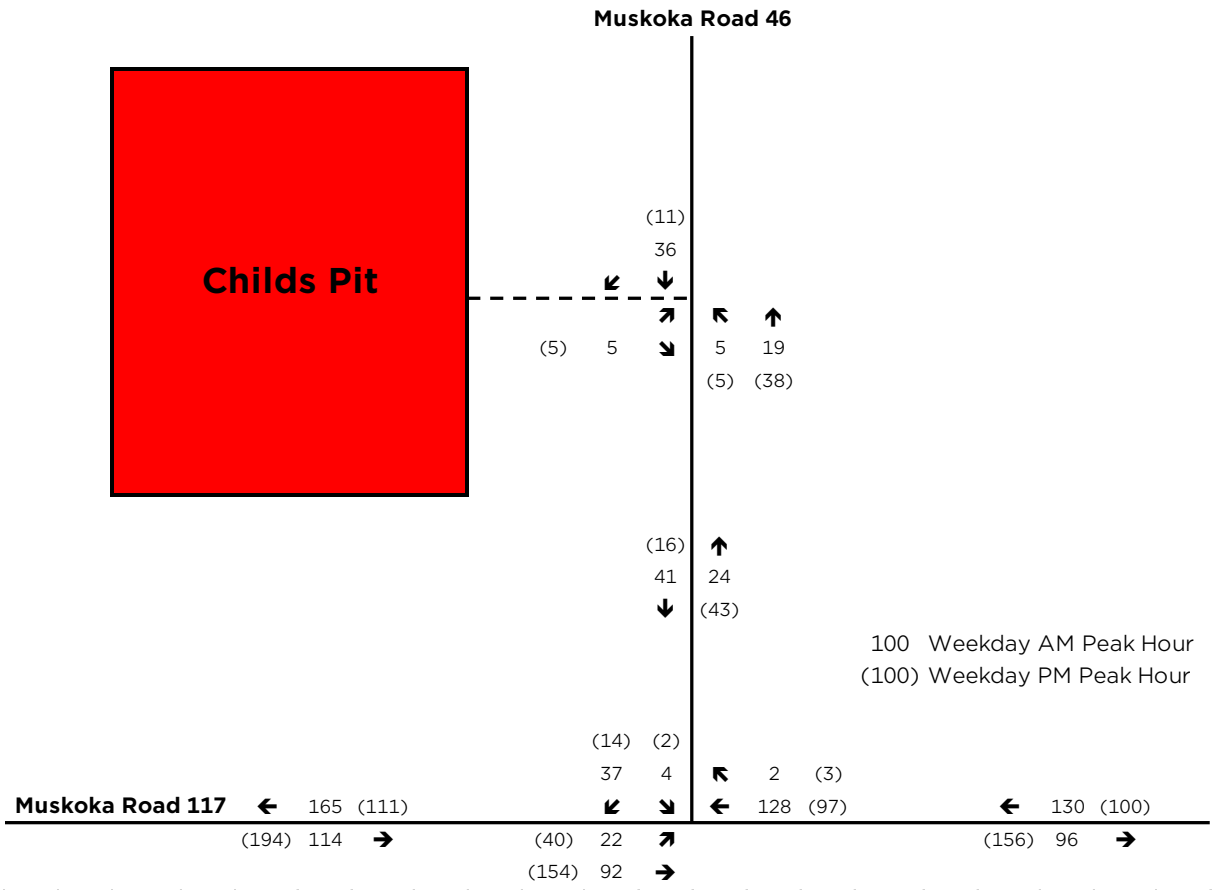
CHILDS PIT/QUARRY EXTENSION

Figure 3: 2019 Peak Traffic Volumes



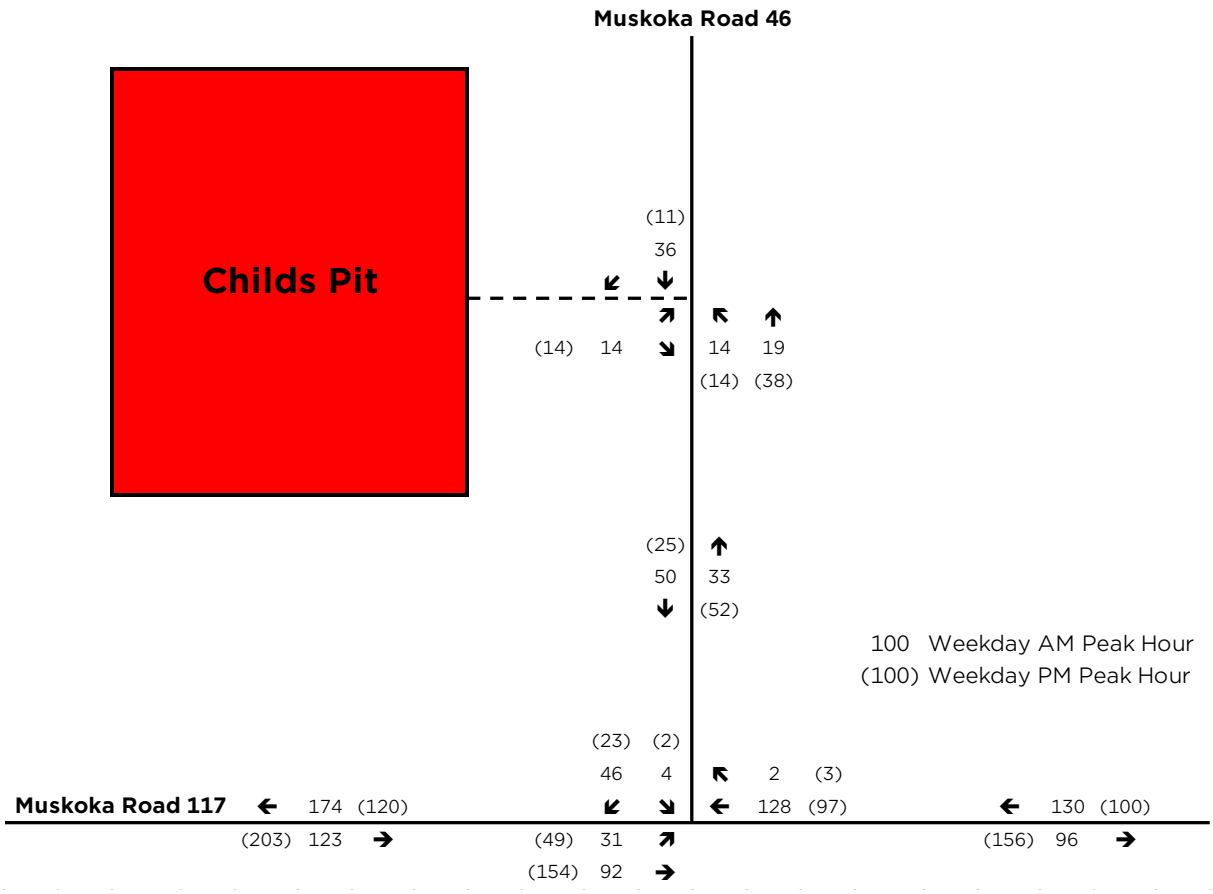
CHILDS PIT/QUARRY EXTENSION

Figure 4: Site Plan



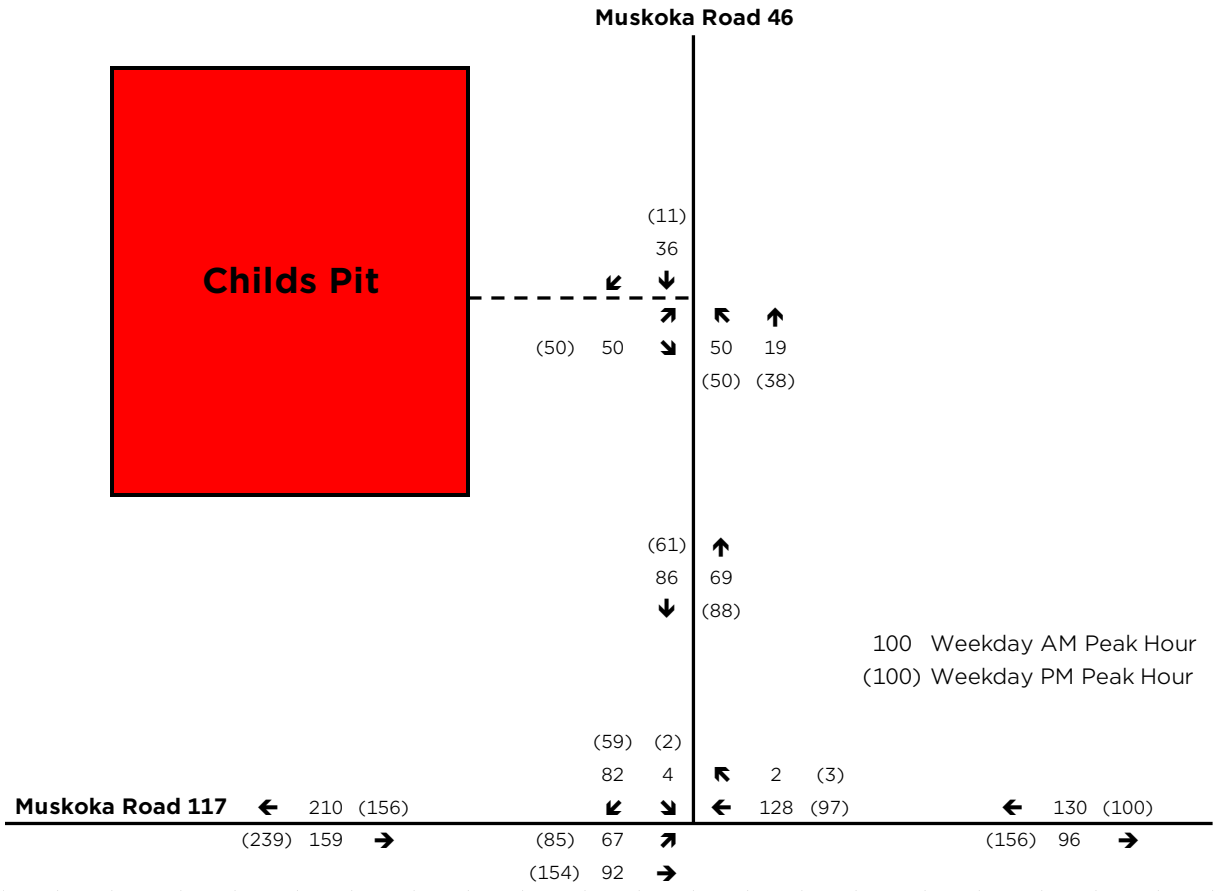
CHILDS PIT/QUARRY EXTENSION

Figure 5: Total Traffic – Existing Peak Season Average Day



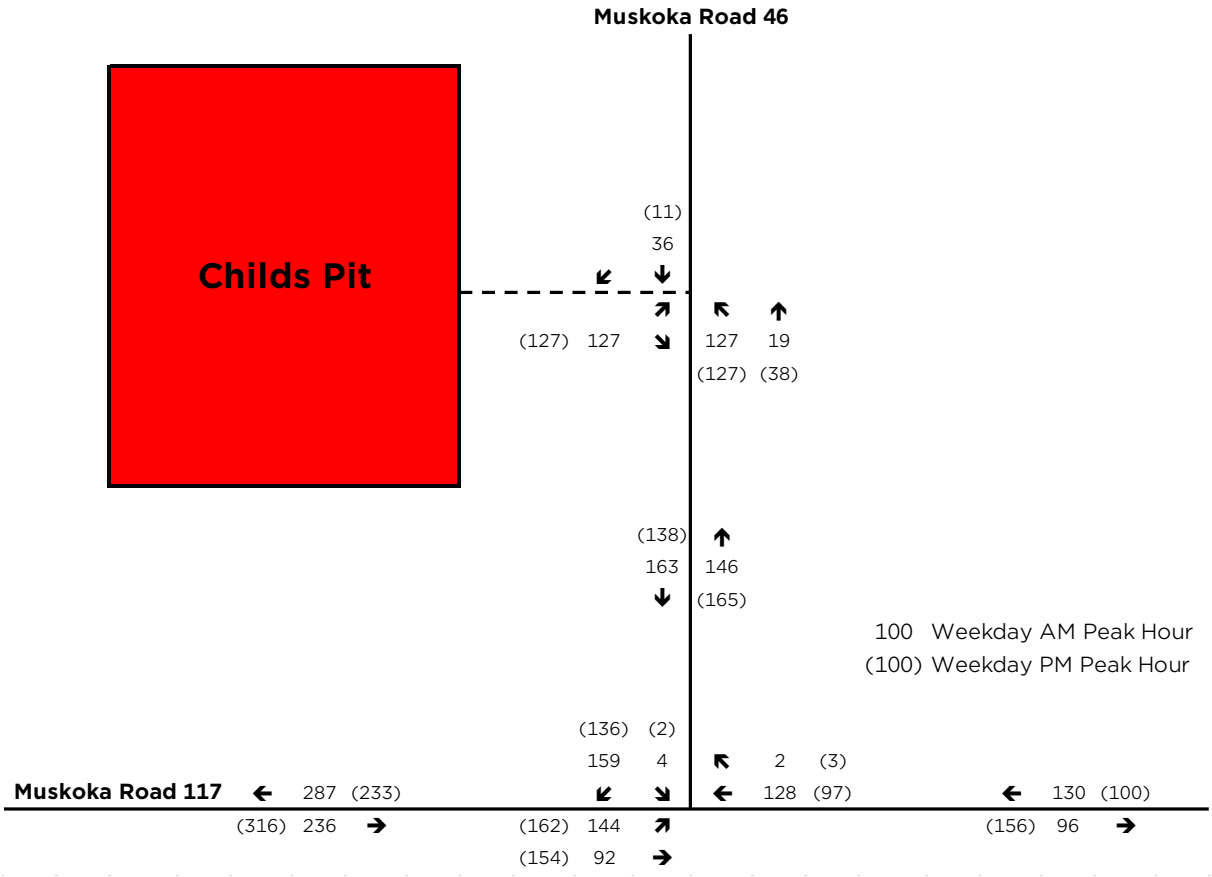
CHILDS PIT/QUARRY EXTENSION

Figure 6: Total Traffic – Existing Peak Season Peak Day



CHILDS PIT/QUARRY EXTENSION

Figure 7: Total Traffic – Future Peak Season Average Day



CHILDS PIT/QUARRY EXTENSION

Figure 8: Total Traffic – Future Peak Season Peak Day

Appendix A:
Traffic Counts

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Project #19259 - TATHAM Engineering Ltd

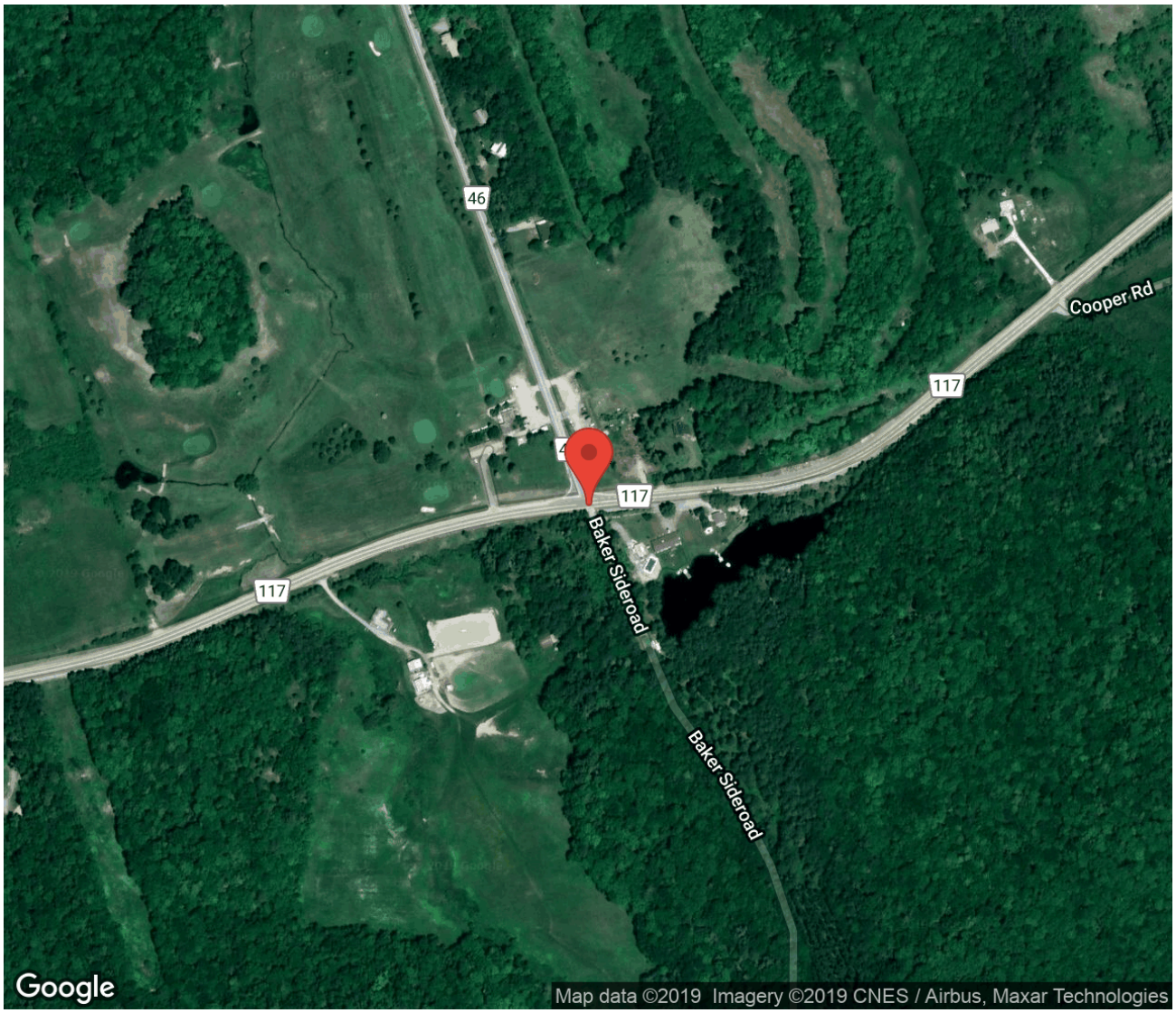
Intersection Count Report

Intersection:	Muskoka Rd 117 & Muskoka Rd 46
Municipality:	Bracebridge
Count Date:	Jul 30, 2019
Site Code:	1925900001
Count Categories:	Cars, Medium Trucks, Heavy Trucks, Bicycles, Pedestrians
Count Period:	07:00-10:00, 16:00-19:00
Weather:	Clear

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Map

Intersection:	Muskoka Rd 117 & Muskoka Rd 46
Municipality:	Bracebridge
Count Date:	Jul 30, 2019



Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Summary

Intersection: Muskoka Rd 117 & Muskoka Rd 46
Municipality: Bracebridge
Count Date: Jul 30, 2019

Muskoka Rd 46 - Traffic Summary

	North Approach Totals						South Approach Totals					
	Includes Cars, Medium Trucks, Heavy Trucks, Bicycles						Includes Cars, Medium Trucks, Heavy Trucks, Bicycles					
Hour	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds
07:00 - 08:00	2	0	28	0	0	1	0	0	0	0	0	0
08:00 - 09:00	4	0	34	0	0	0	0	0	0	0	0	0
09:00 - 10:00	4	0	24	0	0	0	0	0	0	0	0	1
BREAK												
16:00 - 17:00	0	0	6	0	0	0	0	0	0	0	0	0
17:00 - 18:00	2	0	12	0	0	0	0	0	0	0	0	0
18:00 - 19:00	0	0	15	0	0	0	0	0	0	0	0	0
GRAND TOTAL	**12**	**0**	**119**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**1**

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Summary

Intersection: Muskoka Rd 117 & Muskoka Rd 46
Municipality: Bracebridge
Count Date: Jul 30, 2019

Muskoka Rd 117 - Traffic Summary

	East Approach Totals						West Approach Totals					
	Includes Cars, Medium Trucks, Heavy Trucks, Bicycles						Includes Cars, Medium Trucks, Heavy Trucks, Bicycles					
Hour	Left	Thru	Right	U-Turn	Total	Peds	Left	Thru	Right	U-Turn	Total	Peds
07:00 - 08:00	0	113	1	0	0	0	9	60	0	0	0	1
08:00 - 09:00	0	127	2	0	0	0	15	86	0	0	0	0
09:00 - 10:00	0	137	0	0	0	0	16	84	0	0	0	0
BREAK												
16:00 - 17:00	0	69	3	0	0	0	32	127	0	0	0	0
17:00 - 18:00	0	94	5	0	0	0	40	146	0	0	0	0
18:00 - 19:00	0	83	5	0	0	0	24	148	0	0	0	0
GRAND TOTAL	**0**	**623**	**16**	**0**	**0**	**0**	**136**	**651**	**0**	**0**	**0**	**1**

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Data

Intersection: Muskoka Rd 117 & Muskoka Rd 46
Municipality: Bracebridge
Count Date: Jul 30, 2019

North Approach - Muskoka Rd 46

Start Time	Cars					Medium Trucks					Heavy Trucks					Bicycles					Total Peds
	↰	↑	↱	↻	Total	↰	↑	↱	↻	Total	↰	↑	↱	↻	Total	↰	↑	↱	↻	Total	
07:00	2	0	6	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	11	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
07:30	0	0	7	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	2	0	5	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	8	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	8	0	8	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
08:45	2	0	11	0	13	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
09:00	2	0	2	0	4	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
09:15	0	0	5	0	5	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
09:30	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	1	0	10	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	9	0	83	0	92	0	0	0	0	0	1	0	3	0	4	0	0	0	0	0	1

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Data

Intersection: Muskoka Rd 117 & Muskoka Rd 46
Municipality: Bracebridge
Count Date: Jul 30, 2019

North Approach - Muskoka Rd 46

Start Time	Cars					Medium Trucks					Heavy Trucks					Bicycles					Total Peds
	↰	↑	↱	↻	Total	↰	↑	↱	↻	Total	↰	↑	↱	↻	Total	↰	↑	↱	↻	Total	
16:00	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	2	0	2	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	1	0	3	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	1	0	5	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	2	0	2	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
18:15	0	0	4	0	4	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
18:30	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	2	0	29	0	31	0	0	2	0	2	0	0	2	0	2	0	0	0	0	0	0
GRAND TOTAL	11	0	112	0	123	0	0	2	0	2	1	0	5	0	6	0	0	0	0	0	1

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Data

Intersection: Muskoka Rd 117 & Muskoka Rd 46
Municipality: Bracebridge
Count Date: Jul 30, 2019

South Approach - Baker Sideroad

Start Time	Cars					Medium Trucks					Heavy Trucks					Bicycles					Total Peds
					Total					Total					Total					Total	
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Data

Intersection: Muskoka Rd 117 & Muskoka Rd 46
Municipality: Bracebridge
Count Date: Jul 30, 2019

South Approach - Baker Sideroad

Start Time	Cars					Medium Trucks					Heavy Trucks					Bicycles					Total Peds
					Total					Total					Total					Total	
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SUBTOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRAND TOTAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Data

Intersection: Muskoka Rd 117 & Muskoka Rd 46
Municipality: Bracebridge
Count Date: Jul 30, 2019

East Approach - Muskoka Rd 117

Start Time	Cars					Medium Trucks					Heavy Trucks					Bicycles					Total Peds
					Total					Total					Total					Total	
07:00	0	21	0	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	32	1	0	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	27	0	0	27	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
07:45	0	32	0	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	29	0	0	29	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0
08:15	0	31	1	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	40	1	0	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	24	0	0	24	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
09:00	0	30	0	0	30	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0
09:15	0	30	0	0	30	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0
09:30	0	31	0	0	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	40	0	0	40	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0
SUBTOTAL	0	367	3	0	370	0	2	0	0	2	0	8	0	0	8	0	0	0	0	0	0

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Data

Intersection: Muskoka Rd 117 & Muskoka Rd 46
Municipality: Bracebridge
Count Date: Jul 30, 2019

East Approach - Muskoka Rd 117

Start Time	Cars					Medium Trucks					Heavy Trucks					Bicycles					Total Peds
					Total					Total					Total					Total	
16:00	0	8	1	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	16	2	0	18	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
16:30	0	19	0	0	19	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
16:45	0	23	0	0	23	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
17:00	0	26	3	0	29	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
17:15	0	20	0	0	20	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
17:30	0	23	0	0	23	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0
17:45	0	21	2	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	21	3	0	24	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
18:15	0	20	0	0	20	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0
18:30	0	16	0	0	16	0	2	0	0	2	0	1	0	0	1	0	0	0	0	0	0
18:45	0	18	2	0	20	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0
SUBTOTAL	0	231	13	0	244	0	5	0	0	5	0	10	0	0	10	0	0	0	0	0	0
GRAND TOTAL	0	598	16	0	614	0	7	0	0	7	0	18	0	0	18	0	0	0	0	0	0

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Data

Intersection: Muskoka Rd 117 & Muskoka Rd 46
Municipality: Bracebridge
Count Date: Jul 30, 2019

West Approach - Muskoka Rd 117

Start Time	Cars					Medium Trucks					Heavy Trucks					Bicycles					Total Peds
	↰	↑	↱	↻	Total	↰	↑	↱	↻	Total	↰	↑	↱	↻	Total	↰	↑	↱	↻	Total	
07:00	1	7	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	3	17	0	0	20	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
07:30	1	14	0	0	15	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	0
07:45	2	19	0	0	21	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
08:00	1	22	0	0	23	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0
08:15	2	21	0	0	23	0	0	0	0	0	1	1	0	0	2	0	0	0	0	0	0
08:30	6	17	0	0	23	1	2	0	0	3	1	1	0	0	2	0	0	0	0	0	0
08:45	3	17	0	0	20	0	0	0	0	0	0	3	0	0	3	0	0	0	0	0	0
09:00	3	28	0	0	31	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0
09:15	6	17	0	0	23	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
09:30	1	11	0	0	12	0	4	0	0	4	2	4	0	0	6	0	0	0	0	0	0
09:45	3	15	0	0	18	0	1	0	0	1	1	1	0	0	2	0	0	0	0	0	0
SUBTOTAL	32	205	0	0	237	2	7	0	0	9	6	18	0	0	24	0	0	0	0	0	1

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Traffic Count Data

Intersection: Muskoka Rd 117 & Muskoka Rd 46
Municipality: Bracebridge
Count Date: Jul 30, 2019

West Approach - Muskoka Rd 117

Start Time	Cars					Medium Trucks					Heavy Trucks					Bicycles					Total Peds
					Total					Total					Total					Total	
16:00	5	26	0	0	31	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
16:15	8	32	0	0	40	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0
16:30	10	29	0	0	39	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
16:45	6	37	0	0	43	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0
17:00	6	35	0	0	41	0	1	0	0	1	0	1	0	0	1	0	0	0	0	0	0
17:15	11	37	0	0	48	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	0
17:30	9	40	0	0	49	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
17:45	12	29	0	0	41	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
18:00	4	37	0	0	41	0	1	0	0	1	1	2	0	0	3	0	0	0	0	0	0
18:15	7	35	0	0	42	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
18:30	4	36	0	0	40	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
18:45	7	33	0	0	40	0	0	0	0	0	1	2	0	0	3	0	0	0	0	0	0
SUBTOTAL	89	406	0	0	495	2	4	0	0	6	5	11	0	0	16	0	0	0	0	0	0
GRAND TOTAL	121	611	0	0	732	4	11	0	0	15	11	29	0	0	40	0	0	0	0	0	1

Peak Hour Diagram

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Specified Period		One Hour Peak	
From:	07:00:00	From:	08:15:00
To:	10:00:00	To:	09:15:00

Intersection: Muskoka Rd 117 & Muskoka Rd 46
Site ID: 1925900001
Count Date: Jul 30, 2019

Weather conditions:

**** Unsignalized Intersection ****

Major Road: Muskoka Rd 117 runs E/W

North Approach

	Out	In	Total
Cars	33	16	49
MT	0	1	1
HT	3	2	5
Bicycles	0	0	0
	36	**19**	**55**

Muskoka Rd 46

Bicycles	0	0	0	0
HT	3	0	0	0
MT	0	0	0	0
Cars	29	0	4	0
Totals	**32**	**0**	**4**	**0**

East Approach

	Out	In	Total
Cars	127	87	214
MT	1	2	3
HT	2	7	9
Bicycles	0	0	0
	130	**96**	**226**

Muskoka Rd 117

Bicycles	HT	MT	Cars	Totals
0	0	0	0	**0**
0	2	1	14	**17**
0	7	2	83	**92**
0	0	0	0	**0**

Peds: 0

Peds: 0

Peds: 0

Muskoka Rd 117

Totals	Cars	MT	HT	Bicycles
0	0	0	0	0
2	2	0	0	0
128	125	1	2	0
0	0	0	0	0

West Approach

	Out	In	Total
Cars	97	154	251
MT	3	1	4
HT	9	5	14
Bicycles	0	0	0
	109	**160**	**269**

Totals	**0**	**0**	**0**	**0**
Cars	0	0	0	0
MT	0	0	0	0
HT	0	0	0	0
Bicycles	0	0	0	0

Baker Sideroad

South Approach

	Out	In	Total
Cars	0	0	0
MT	0	0	0
HT	0	0	0
Bicycles	0	0	0
	0	**0**	**0**

Cars - Cars MT - Medium Trucks HT - Heavy Trucks Bicycles - Bicycles

Comments

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Peak Hour Summary

Intersection: Muskoka Rd 117 & Muskoka Rd 46
Count Date: Jul 30, 2019
Period: 07:00 - 10:00

Peak Hour Data (08:15 - 09:15)

Start Time	North Approach Muskoka Rd 46						South Approach Baker Sideroad						East Approach Muskoka Rd 117						West Approach Muskoka Rd 117						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
08:15	0	0	8	0	0	8	0	0	0	0	0	0	0	31	1	0	0	32	3	22	0	0	0	25	65
08:30	0	0	9	0	0	9	0	0	0	0	0	0	0	40	1	0	0	41	8	20	0	0	0	28	78
08:45	2	0	12	0	0	14	0	0	0	0	0	0	0	25	0	0	0	25	3	20	0	0	0	23	62
09:00	2	0	3	0	0	5	0	0	0	0	0	0	0	32	0	0	0	32	3	30	0	0	0	33	70
Grand Total	**4**	**0**	**32**	**0**	**0**	**36**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**128**	**2**	**0**	**0**	**130**	**17**	**92**	**0**	**0**	**0**	**109**	**275**
Approach %	11.1	0	88.9	0		-	0	0	0	0		-	0	98.5	1.5	0		-	15.6	84.4	0	0		-	
Totals %	1.5	0	11.6	0		13.1	0	0	0	0		0	0	46.5	0.7	0		47.3	6.2	33.5	0	0		39.6	
PHF	**0.5**	**0**	**0.67**	**0**		**0.64**	**0**	**0**	**0**	**0**		**0**	**0**	**0.8**	**0.5**	**0**		**0.79**	**0.53**	**0.77**	**0**	**0**		**0.83**	**0.88**
Cars	4	0	29	0		33	0	0	0	0		0	0	125	2	0		127	14	83	0	0		97	257
% Cars	100	0	90.6	0		91.7	0	0	0	0		0	0	97.7	100	0		97.7	82.4	90.2	0	0		89	93.5
Medium Trucks	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	1	2	0	0		3	4
% Medium Trucks	0	0	0	0		0	0	0	0	0		0	0	0.8	0	0		0.8	5.9	2.2	0	0		2.8	1.5
Heavy Trucks	0	0	3	0		3	0	0	0	0		0	0	2	0	0		2	2	7	0	0		9	14
% Heavy Trucks	0	0	9.4	0		8.3	0	0	0	0		0	0	1.6	0	0		1.5	11.8	7.6	0	0		8.3	5.1
Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
% Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
Peds					0	-					0	-					0	-					0	-	0
% Peds					0	-					0	-					0	-					0	-	

Peak Hour Diagram

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

Specified Period		One Hour Peak	
From:	16:00:00	From:	16:45:00
To:	19:00:00	To:	17:45:00

Intersection: Muskoka Rd 117 & Muskoka Rd 46
Site ID: 1925900001
Count Date: Jul 30, 2019

Weather conditions:

**** Unsignalized Intersection ****

Major Road: Muskoka Rd 117 runs E/W

North Approach

	Out	In	Total
Cars	11	35	46
MT	0	1	1
HT	0	2	2
Bicycles	0	0	0
	11	**38**	**49**

Muskoka Rd 46

Bicycles	0	0	0	0
HT	0	0	0	0
MT	0	0	0	0
Cars	9	0	2	0
Totals	**9**	**0**	**2**	**0**

East Approach

	Out	In	Total
Cars	95	151	246
MT	1	2	3
HT	4	3	7
Bicycles	0	0	0
	100	**156**	**256**

Muskoka Rd 117

Bicycles	HT	MT	Cars	Totals
0	0	0	0	**0**
0	2	1	32	**35**
0	3	2	149	**154**
0	0	0	0	**0**

Peds: 0

Peds: 0

Peds: 0

Muskoka Rd 117

Totals	Cars	MT	HT	Bicycles
0	0	0	0	0
3	3	0	0	0
97	92	1	4	0
0	0	0	0	0

West Approach

	Out	In	Total
Cars	181	101	282
MT	3	1	4
HT	5	4	9
Bicycles	0	0	0
	189	**106**	**295**

Totals	**0**	**0**	**0**	**0**
Cars	0	0	0	0
MT	0	0	0	0
HT	0	0	0	0
Bicycles	0	0	0	0

Baker Sideroad

South Approach

	Out	In	Total
Cars	0	0	0
MT	0	0	0
HT	0	0	0
Bicycles	0	0	0
	0	**0**	**0**

Cars - Cars MT - Medium Trucks HT - Heavy Trucks Bicycles - Bicycles

Comments

Ontario Traffic Inc.
TRAFFIC MONITORING SERVICES & PRODUCTS

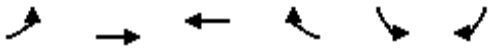
Peak Hour Summary

Intersection: Muskoka Rd 117 & Muskoka Rd 46
Count Date: Jul 30, 2019
Period: 16:00 - 19:00

Peak Hour Data (16:45 - 17:45)

Start Time	North Approach Muskoka Rd 46						South Approach Baker Sideroad						East Approach Muskoka Rd 117						West Approach Muskoka Rd 117						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	24	0	0	0	24	8	37	0	0	0	45	69
17:00	0	0	1	0	0	1	0	0	0	0	0	0	0	27	3	0	0	30	6	37	0	0	0	43	74
17:15	1	0	3	0	0	4	0	0	0	0	0	0	0	21	0	0	0	21	12	39	0	0	0	51	76
17:30	1	0	5	0	0	6	0	0	0	0	0	0	0	25	0	0	0	25	9	41	0	0	0	50	81
Grand Total	**2**	**0**	**9**	**0**	**0**	**11**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**97**	**3**	**0**	**0**	**100**	**35**	**154**	**0**	**0**	**0**	**189**	**300**
Approach %	18.2	0	81.8	0		-	0	0	0	0		-	0	97	3	0		-	18.5	81.5	0	0		-	
Totals %	0.7	0	3	0		3.7	0	0	0	0		0	0	32.3	1	0		33.3	11.7	51.3	0	0		63	
PHF	**0.5**	**0**	**0.45**	**0**		**0.46**	**0**	**0**	**0**	**0**		**0**	**0**	**0.9**	**0.25**	**0**		**0.83**	**0.73**	**0.94**	**0**	**0**		**0.93**	**0.93**
Cars	2	0	9	0		11	0	0	0	0		0	0	92	3	0		95	32	149	0	0		181	287
% Cars	100	0	100	0		100	0	0	0	0		0	0	94.8	100	0		95	91.4	96.8	0	0		95.8	95.7
Medium Trucks	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	1	2	0	0		3	4
% Medium Trucks	0	0	0	0		0	0	0	0	0		0	0	1	0	0		1	2.9	1.3	0	0		1.6	1.3
Heavy Trucks	0	0	0	0		0	0	0	0	0		0	0	4	0	0		4	2	3	0	0		5	9
% Heavy Trucks	0	0	0	0		0	0	0	0	0		0	0	4.1	0	0		4	5.7	1.9	0	0		2.6	3
Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
% Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0
Peds					0	-					0	-					0	-					0	-	0
% Peds					0	-					0	-					0	-					0	-	

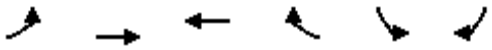
Appendix B:
Intersection Operations



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	17	92	128	2	4	32
Future Volume (Veh/h)	17	92	128	2	4	32
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)	18	100	139	2	4	35
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	141				275	139
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	141				275	139
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				99	96
cM capacity (veh/h)	1442				706	909

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	118	139	2	39
Volume Left	18	0	0	4
Volume Right	0	0	2	35
cSH	1442	1700	1700	883
Volume to Capacity	0.01	0.08	0.00	0.04
Queue Length 95th (m)	0.3	0.0	0.0	1.1
Control Delay (s)	1.2	0.0	0.0	9.3
Lane LOS	A			A
Approach Delay (s)	1.2	0.0		9.3
Approach LOS				A

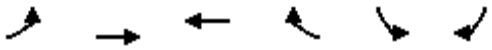
Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	25.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	35	154	97	3	2	9
Future Volume (Veh/h)	35	154	97	3	2	9
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)	38	167	105	3	2	10
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	108				348	105
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	108				348	105
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				100	99
cM capacity (veh/h)	1483				632	949

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	205	105	3	12
Volume Left	38	0	0	2
Volume Right	0	0	3	10
cSH	1483	1700	1700	876
Volume to Capacity	0.03	0.06	0.00	0.01
Queue Length 95th (m)	0.6	0.0	0.0	0.3
Control Delay (s)	1.6	0.0	0.0	9.2
Lane LOS	A			A
Approach Delay (s)	1.6	0.0		9.2
Approach LOS				A

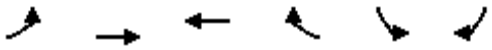
Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	26.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	144	92	128	2	4	159
Future Volume (Veh/h)	144	92	128	2	4	159
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)	157	100	139	2	4	173
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	141				553	139
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	141				553	139
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	89				99	81
cM capacity (veh/h)	1442				440	909

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	257	139	2	177
Volume Left	157	0	0	4
Volume Right	0	0	2	173
cSH	1442	1700	1700	888
Volume to Capacity	0.11	0.08	0.00	0.20
Queue Length 95th (m)	2.8	0.0	0.0	5.6
Control Delay (s)	5.1	0.0	0.0	10.1
Lane LOS	A			B
Approach Delay (s)	5.1	0.0		10.1
Approach LOS				B

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	39.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	162	154	97	3	2	136
Future Volume (Veh/h)	162	154	97	3	2	136
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)	176	167	105	3	2	148
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	108				624	105
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	108				624	105
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	88				99	84
cM capacity (veh/h)	1483				396	949

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	343	105	3	150
Volume Left	176	0	0	2
Volume Right	0	0	3	148
cSH	1483	1700	1700	932
Volume to Capacity	0.12	0.06	0.00	0.16
Queue Length 95th (m)	3.1	0.0	0.0	4.3
Control Delay (s)	4.5	0.0	0.0	9.6
Lane LOS	A			A
Approach Delay (s)	4.5	0.0		9.6
Approach LOS				A

Intersection Summary			
Average Delay	5.0		
Intersection Capacity Utilization	38.9%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix C:
Tatham CVs

TATHAM ENGINEERING

Michael Cullip, P.Eng.
Vice President Head Office Operations

Career Highlights

Michael is currently the Vice President of Head Office Operations for Tatham Engineering Limited. overseeing all head office operations, in addition to transportation and municipal engineering and development projects. Chairs the Tatham Quality Control Committee, responsible for the development and implementation of the corporate program.

Prior to Tatham, Michael was the Manager of Transportation Planning for Cansult Maunsell responsible for all such projects within the Gulf Region. He was also the General Manager of Cansult Tatham Transportation Consultants, a joint venture operation focussing on all aspects of transportation engineering and planning, during which time he was responsible for the development of a successful transportation department in a new market area.

In these roles, Michael has been responsible for managing teams of engineering professionals, consultation and negotiations with a wide range of stakeholder groups and delivery of programs and projects in the traffic and transport sector. He has regularly provided strategic and business advice to governments, transport infrastructure providers, operators and private developers. More specifically, this experience includes land use/transport studies, demand forecasting, route planning, public transport studies, parking studies, traffic impact assessments, access and circulation reviews and environmental assessments.

Detailed Experience

Municipal Engineering & Infrastructure Renewal

8th Street East Reconstruction, Owen Sound
Responsible for quality review and traffic engineering for reconstruction of 450m of 8th Street including replacement of sanitary sewers, storm sewers, combined sewers (west end) and watermain, and reconstruction of a two lane paved road platform with significant grade challenges. Various road cross sections have been explored in consideration of steep side slopes, property impacts and the desire to accommodate active transportation (sidewalks and bike lanes).

Engineering Services Support, Town of The Blue Mountains
On-going provision of consulting engineering services for the Town involving peer review of development applications, design services for municipal infrastructure projects and advice related to municipal design standards and the development review and approval process.

Hoover Lane/Teskey Drive & Arlberg Crescent Sanitary Servicing, Town of The Blue Mountains
Responsible for engineering services for the provision of wastewater servicing to the above noted residential roads and service areas, including service laterals. Work will include 3 low pressure forcemain systems and restoration of all area roads, totally approximately 1600m.

Sanitary Sewer Renewal Program Ph. 2, Collingwood
Project Director relating to the replacement and/or relining of approximately 3.3 km of existing sanitary sewer and associated water main throughout Collingwood. The project also includes local drainage improvements and storm sewer design to eliminate existing catch basins connected to the sanitary sewer.

Qualifications

1994	Bachelor Engineering & Management, McMaster University, Hamilton, ON
1996	Master of Engineering (Transportation) McMaster University Hamilton, ON

Professional Designations, Licences, Registrations

- Professional Engineers Ontario

Professional Affiliations

- Institute of Transportation Engineers
- Transportation Association of Canada

Professional Experience

2008 to Present	Tatham Engineering/C.C. Tatham & Associates Ltd. Collingwood, ON
2006 to 2007	Cansult Maunsell Limited Dubai, UAE Manager, Transportation Planning
2001 to 2005	Cansult Tatham Transportation Consultants, Collingwood, ON General Manager
1997 to 2001	Cansult Limited Markham, ON Transportation Planner
1996 to 1997	Centre for Research on Transportation & Society, Borlänge, Sweden Principal Researcher
1996	Waylaw Technical Services Paris, ON Survey Crew Chief
1994 to 1996	McMaster University Hamilton, ON Teaching Assistant

State of City Infrastructure, Owen Sound
Project Director for the detailed inventory assessment of the City's road, water and storm sewer networks. Established inventory and assessment protocol for curb, sidewalk and guiderail systems and oversaw development of the database containing 13,000 data entries for the 135 km road system, 75 km storm sewer system and 140 km watermain system. The database is the foundation for the City's Asset Management Plan and infrastructure renewal program.

Traffic Impact Studies/Assessments

Involved in over 100 traffic impact studies/assessments to address operations and traffic impacts associated with new development, including external and internal road circulation, parking assessment and site access review. Wide range of land uses have been addressed (residential, retail, office, landfills, quarries, vacation, institution, mixed-use) with peak hour trips ranging from 100 to 100,000.

Planning Studies & Reviews

Barrie Transit Strategic Operating Plan
Study addressed the existing and future operations of the Barrie Transit system. Study addressed route structures, fare policies, strategies for future development and interim recommendations. Conducted travel surveys and ridership counts to address current ridership levels.

Comprehensive Transportation Strategic Plan, Town of The Blue Mountains
In conjunction with AECOM, prepared a transportation strategic plan for the Town of The Blue Mountains, to review their existing transportation system and provide recommendations to meet future travel demands. The study also included a detailed review of traffic operations in several key areas, the development of an access management plan for Highway 26 with the Town and input to the Town's Development Charge study for applicable improvements.

Georgian College Access, Parking & Circulation Review, Barrie
This study addressed the transportation impacts associated with the proposed expansion of the Georgian College Barrie campus to accommodate up to 15,000 students. The existing parking system and opportunities to improve these facilities were addressed, as were associated parking rates and strategies to reduce overall demands. Vehicular access to the campus was reviewed and based on traffic operations, recommendations made for improvement, including consideration for additional access.

Speed Limit Review, Township of Oro-Medonte
Study established and documented guidelines and criteria to review road sections with the Township and determine the appropriateness of the existing speed limit, as well as the need for additional measures. Following a review of select road sections, on which speeding was considered prevalent, recommendations for improvements were provided. Consideration was given to road geometry and alignment, adjacent development, other road users and the need for increased enforcement.

Town of Collingwood Transportation Study
Study reviewed the Town's road system network and operations, and outlined existing, medium and long-term recommendations including improvements to the road network and identification of potential new arterial routes to ensure future travel demands can be adequately accommodated. While it is acknowledged that several modes of travel are available within the Town, the primary focus was on addressing vehicular travel by road and the infrastructure necessary to accommodate such.

Town of Midland Transportation Master Plan
To assist the Town with the future planning and development of their road system, this study reviewed the existing network and operations, and identified road system improvements necessary to accommodate future travel demands. Traffic projections, based on historic growth and considering new development, were prepared for a 20 year planning horizon.

York Region Transportation Master Plan
Assisted in the development of a Transportation Master Plan for York Region. Key areas of involvement include: development of background policy papers addressing travel demand management, air quality and goods movement; identification of key issues and strategic options for the transportation system.

Sandy Plains Road Traffic Calming, Seguin Township
The study reviewed and assessed a variety of traffic calming measures for Sandy Plains Road to address excessive speeds along this rural road, particularly in summer months when tourist traffic increases.

Simcoe Road 90 Transportation Needs Assessment
This study defined the long-term needs of County Road 90 from the City of Barrie to Angus (13 km). Responsible for traffic data collection, development of future traffic estimates, and identification of future road and intersection improvements and associated costs.

Parking Studies & Reviews

Completed numerous studies to address parking requirements of specific developments, which included a review of parking supply and requirements, operations, capacity, geometrics and circulation.

Completed studies addressing existing and future parking requirements with municipal downtown, waterfront and development areas. These included completion of occupancy and duration counts to establish existing parking patterns, estimation of future demands, assessment of parking supplies, recommendations for improvements, review of parking fees and review of municipal parking rates and by-laws.

The following studies have been completed:

- 200 Anglo Street Condominium, Bracebridge
- Barrie Waterfront Parking Study
- Collingwood Downtown Parking Study

- Collingwood Parking Rate Review
- Cranberry Marina Development, Collingwood
- Pine Street Campus, District of Muskoka
- Urban Commercial Core Parking Study, Alliston, Beeton & Tottenham

Road Needs Studies

Road needs studies have been prepared for various municipalities and agencies to provide an inventory and assessment of their existing road system, and provide recommendation with respect to future improvements, costs, and priorities. Studies have also included an assessment of bridges and culverts, sidewalks, municipal infrastructure and equipment, and housing, and valuation for PSAB 3150 purposes.

Studies have been completed for:

- Chippewas of Rama
- Municipality of Magnetawan
- Township of Georgian Bay
- Town of Innisfil
- Township of Muskoka Lakes
- Township of Ramara
- Township of Severn

Environmental Assessments

Responsible for Class Environmental Assessments (EAs) to identify and evaluate transportation system improvements. In accordance with MEA guidelines, improvement options were identified and evaluated in consideration of impacts to existing development, the natural environment, socio-economics, engineering feasibility, associated costs, and input received from the public, stakeholder groups, and government agencies.

Environmental Assessments have been completed for:

- 5 Points Intersection, Barrie
- Concessions B & C Truck Haul Route, Ramara
- District Road 25 Realignment, District of Muskoka
- District Road 50 Realignment, District of Muskoka
- Grey Road 19/21 Intersection, Grey County
- Hurst Drive Widening, Barrie
- Huronia Road Widening, Barrie
- Leslie Drive Extension, Innisfil
- Salmon Avenue Extension, Bracebridge
- Slabtown Community Access, Blue Mountains
- Simcoe Road 10 Improvements, Springwater Twp
- Simcoe Road 21 Widening, Innisfil
- Simcoe Road 27 & 90 Intersection, Essa Township
- Simcoe Road 43 & Wilson Drive Intersection, Springwater Township
- Simcoe Road 45 Improvements, Ramara Twp
- Simcoe Road 54 & 21 Intersection, Innisfil
- Sunnyside Drive/Harbourview Drive/Fuller Avenue Corridor Improvements, Midland

Road & Highway Design

Responsible for road design to address various road and intersection improvements. Where required, construction specifications and contract documents were prepared for tendering of the design works.

Design works have been completed for the following:

- 20th Sideroad Reconstruction, Innisfil
- 27/28 Sideroad Reconstruction, Clearview Twp
- Batteaux Creek Intersection, Clearview
- Blue Shores & Highway 26 Intersection, Collingwood
- Collingwood Regional Airport Pavement Resurfacing
- Cyprus Lake Road Upgrades, Tobermory
- District Road 169 Widening & Intersection Improvements, Muskoka
- Fuller Avenue Preliminary Design, Midland
- Grey Road 30 Resurfacing, Grey Highlands
- Grey Road 31 Improvements, Grey Highlands
- Highway 26 Resurfacing, Collingwood
- Highway 60 & Centre Street Intersection, Huntsville
- Mill Street Improvements, Blue Mountains
- Monarch Drive/Wal-Mart Access Signalization, Orillia
- Poplar Sideroad Reconstruction, Collingwood
- Simcoe Road 4 & 10th Line Signalization, Innisfil
- Simcoe Road 21 & 5 Sideroad Intersection, Innisfil
- Simcoe Road 22 & Fox Farm Road, Simcoe County
- Simcoe Road 27 & 21 Intersection,Simcoe County
- Simcoe Road 27 & 90 Intersection, Simcoe County
- Simcoe Road 29 & Conc 3 Intersection, Tiny Twp
- Western Commercial Node Road Improvements & Signalization, Collingwood

TATHAM ENGINEERING

David Perks, M.Sc., PTP.
Transportation Planner, Project Manager

Career Highlights

David is a member of the Transportation Engineering department at C.C. Tatham & Associates Ltd., where he leads to completion transportation studies, traffic impact studies, transportation reviews and environmental assessments for road improvements. David has obtained his certification as a Professional Transportation Planner and holds a Masters degree in Transportation Policy and Business Management.

Detailed Experience

Environmental Assessments

Big Bay Point Road & Bayview Avenue, Barrie
This large scale project involved undertaking Phases 3 & 4 of the Municipal Class EA process for the implementation of transportation improvements to Bayview Drive (from Big Bay Point Road to Little Avenue) and Big Bay Point Road (from Bayview Drive to Huronia Road), The study identified several alternative design options for implementation of the improvements, ultimately identifying a 3-lane cross-section for Bayview Drive and a 5-lane cross-section for Big Bay Point Road as the preferred solutions. The improvements also included the implementation of bicycle lanes along both corridors, keeping with the City's emphasis on active transportation. The recommended improvements were adopted by Council in 2016.

Duckworth Street Transportation Improvements, Barrie
A Schedule C Class EA was completed in support of transportation improvements along Duckworth Street from Bell Farm Road to St. Vincent Street. The recommended improvements included the implementation of bicycle lanes and sidewalks along the entire length of Duckworth Street, a road diet and the renewal of City infrastructure.

Simcoe Road 21 Widening, Innisfil

In support of the proposed widening of Simcoe Road 21, from Simcoe Road 27 to 20th Sideroad, a Schedule C Class EA was conducted in accordance with guidelines established by the Municipal Engineers Association. Several alternative solutions were developed and evaluated, and a preferred solution identified based on impacts to the natural, physical, social, economic and cultural environments and in consideration of input received from the public, government agencies and other stakeholders.

Simcoe County Maintenance Facility

A Class EA study was undertaken to address the establishment of a new road maintenance facility to service the northern area of Simcoe County. The study followed the planning and design process for a Schedule B undertaking. Potential sites for the new facility were identified and a preferred site selected based on an environmental impact evaluation and input provided by the public and various stakeholders. An Environmental Study Report documenting the study process was finalized in 2014, with construction of the facility completed in 2016.

Traffic Impact Studies

Leads numerous traffic impact studies to address operations and traffic impacts associated with new development, including external and internal road circulation, parking assessment and site access review with a wide range of land uses having been addressed.

Qualifications

2010	Master of Science in Transportation Policy Loughborough University Loughborough UK
2001	Aviation Management Georgian College Barrie, ON

Professional Experience

2011 to Present	Tatham Engineering Limited/ C.C. Tatham & Associates Ltd. Barrie, ON
2002 to 2009	M.S.C. Barrie, ON

The Residences at 5-Points, Barrie
The traffic study considered the impacts of the proposed 22-storey 203 unit condominium development with ground floor commercial to be located at the 5-Points intersection in the heart of Downtown Barrie. The study assessed several downtown intersections along with road network capacity and access operations.

Balfour Village, Greater Sudbury
The examination of potential traffic impacts pursuant to the development of a 400 unit retirement community with 4,200 m^2 of commercial space located in Greater Sudbury. The study reviewed intersection and road section operations and assessed exclusive turn lane warrants throughout the area. On-site circulation and parking provision was also reviewed to ensure that City standards and by-law requirements were satisfied.

Four Mile Lake Road Traffic Study, North Bay
The study examined the traffic impacts associated with the proposed 674 acre industrial park development in the City of North Bay and the required connection of Four Mile Lake Road with Marsh Drive to serve the development. In particular, the operations at the intersection of Marsh Drive with Highway 11 were analyzed and improvements recommended that would ensure the adequate operations of such given the projected increase in traffic through the area. The road network was also reviewed in terms of capacity and design to ensure its ability to accommodate the additional loading anticipated with the increase of industrial traffic.

7560 Woodbine Avenue, Markham
A traffic study addressing the impacts of a 20,000 m^2 office/commercial development in the City of Markham. The study included the operational analysis of several intersections and roads in the area, with specific consideration given to transit provision in the area, and transportation demand management opportunities.

Mapleview Drive East Residential, Barrie
The traffic impact study addressed the traffic implications related to a proposed 1,900 unit townhouse/apartment development in the City of Barrie. The study reviewed access, road section and intersection operations and recommended appropriate mitigating measures/ improvements as necessary.

544 River Road West, Wasaga Beach
The study reviewed the proposed development of a 10,992 m^2 commercial complex in the Town of Wasaga Beach and the traffic impacts of such on River Road West (a major travel route for the area) and the local road network. The analysis considered the findings of the River Road West Class Environmental Assessment and identified improvements within this context.

Transportation Studies

Tottenham Bypass & South Simcoe Transportation Study, New Tecumseth/South Simcoe
This study identified road improvement needs in the Town of New Tecumseth/South Simcoe area over the next 20 years. The study included an inventory and assessment of existing conditions on study area roads, an assessment of future operations based on traffic forecasts, identification of current and future road system needs, and development of alternative solutions to address these needs.

Transportation Study, Collingwood
The study reviewed the Town's existing transportation network and operations, and provided a road improvement needs framework aimed at ensuring that the Town's future travel demands are adequately met. Short, medium and long-term recommendations outlined in the study include intersection improvements and additional network capacity through road widening and the identification of potential new arterial routes.

Transportation Reviews/Peer Reviews

Completed numerous studies to address specific transportation aspects such as site access, on-site circulation, parking requirements, and existing road capacity. Transportation Reviews have been completed for the following:

- 7714 Yonge Street, Vaughan – Parking Study
- 4 Ley Boulevard, Keswick – Parking Study
- Beaver Street, Thornbury – Traffic Calming Review
- New Tecumseth – Accessible Pedestrian Signals Review

Conducted peer review of various traffic/transportation related studies for municipal clients, including the Town of Innisfil, Town of New Tecumseth, Town of Collingwood, Township of Ramara and the District Municipality of Muskoka.