

APPENDIX D

Traffic Impact Study (Draft Report)



Proposed Aboiteau Campground Development Village de Cap-Pelé

Traffic Impact Study Draft Report

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Prepared for:
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December 14, 2016

Mr. Jean-Michel Allain, P.Eng.
J.R. Daigle Engineering
795 Main Street, Suite 200
Moncton, NB E4N 3B3

Dear Mr. Allain:

RE: Traffic Impact Study for a proposed campground development in Cap-Pelé

The GRIFFIN transportation group inc. is pleased to present the results of the enclosed traffic impact study carried out in support of the planning approval process for a proposed new campground development, expanding the current Aboiteau cottage rental business in Cap-Pelé, NB. The proposed campground access will connect to the existing Allée de la Plage which as access to the Route 133 corridor.

The results flowing from the study analyses have identified that the existing lane configuration of the Route 133 / Allée de la Plage intersection can adequately accommodate the additional traffic expected to be generated by the proposed campground. With the study recommendations in place, the campground traffic is forecast to have an acceptable level of impact on the main access and the Route 133 corridor.

It has been a pleasure working with the project team in completing this study. Feel free to contact the undersigned anytime to further discuss the details of this project.

Yours truly,

James J. Copeland, P.Eng.
Managing Principal
GRIFFIN transportation group inc.

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1. INTRODUCTION

1.1 Background

The GRIFFIN transportation group has been retained by *Camping Plage Aboiteau Beach Inc.* to carry out a traffic impact study (TIS) in support of the planning approval process associated with a proposed campground development on Allée de la Plage that connects to Route 133, west of Route 950, in the community of Cap-Pelé. The proposed location for the new campground development is an approximate 29-acre parcel of land (PID's #70314075 and 70245337), accommodating up to 256 campsites, that will be generally located north and west of the Route 133 / Allée de la Plage intersection. A key map showing the general location of the site is shown in *Figure 1*.

Allée de la Plage currently provides vehicle access to a cottage rental business. The business is comprised of 40 detached cottage units that are rented during the summer months. Based on information provided by the municipality, Allée de la Plage is considered to be a public road under their jurisdiction. Route 133 is under the jurisdiction of the New Brunswick Department of Transportation and Infrastructure (DTI).

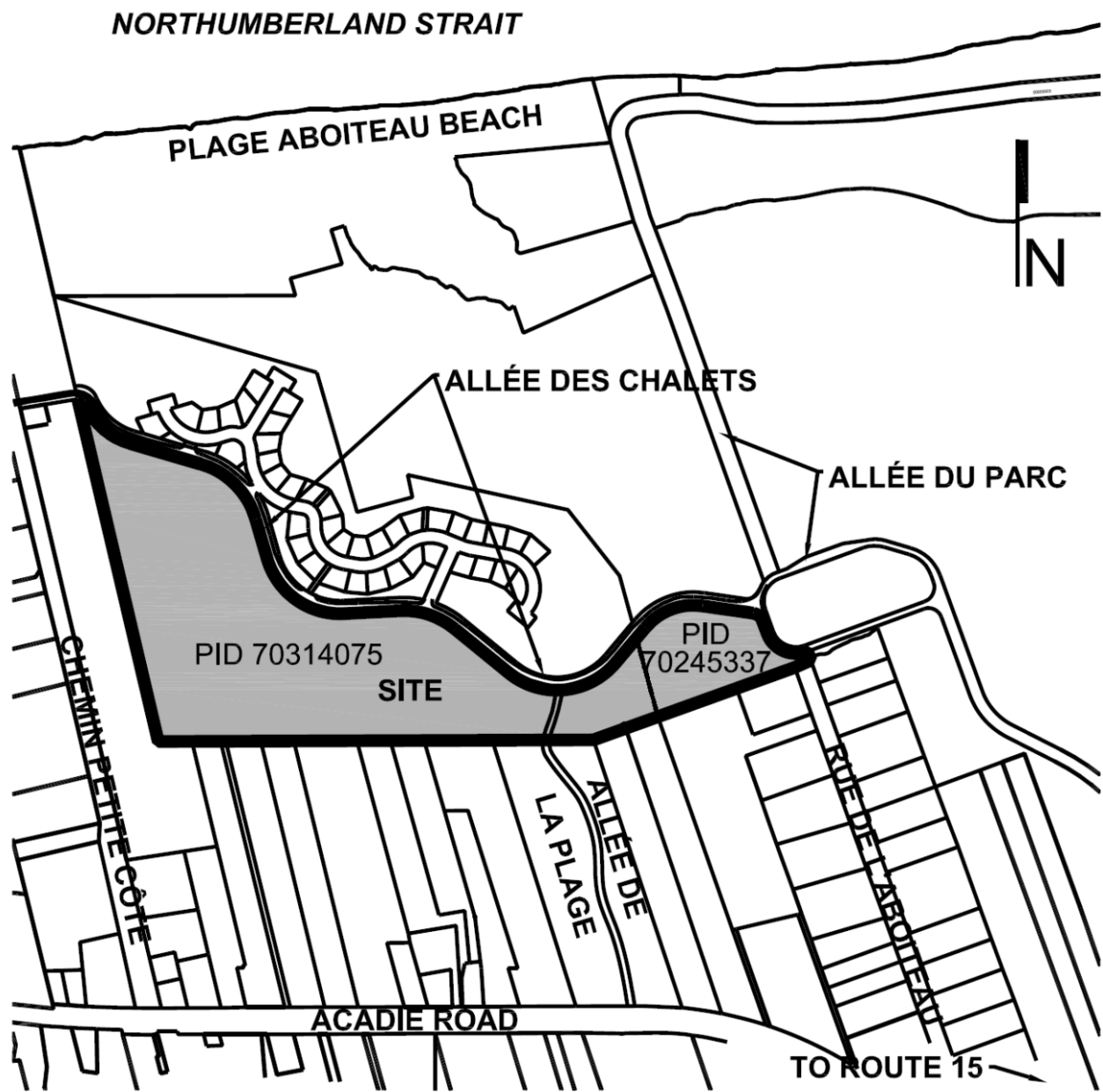
It is proposed that Allée de la Plage continue to serve the existing cottage rental business as well as the future traffic generated by the proposed campground. Vehicle access to/from the proposed campground will be via two connection points; the main east connection with Allée de la Plage and a secondary north access to Allée des Chalets.

1.2 Context

In order to satisfy the environmental assessment process, as well as the concerns of the approving agencies there was a need to understand the traffic impacts associated with the proposed campground. The approving agencies for this traffic impact study process include both the Village de Cap-Pelé and the New Brunswick Department of Transportation and Infrastructure (DTI). The general process and assumptions applied to this TIS follows industry-accepted practices as well as TIS guidelines established by the Institute of Transportation Engineers (ITE), the Nova Scotia Department of Transportation and Infrastructure Renewal, and the City of Moncton. The specific terms of reference for this impact study were developed based on the following:

- A Master Plan drawing prepared by *J.R. Daigle Engineering* dated November 2015.
- The City of Moncton's *Traffic Impact Study Guidelines (2012)*
- A site review carried out on December 10th, 2016.

The approach and technical findings of this traffic impact study are discussed in the following sections of this report.



Source: J.R. Daigle Engineering



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Key Map and Site Location

Figure 1

2. EXISTING CONDITIONS

This chapter describes the roadway network, traffic volumes, operational analysis results and other notable characteristics under the baseline conditions.

2.1 The Study Area Road Network

2.1.1 Overview

The proposed campground development is to be generally located in the northwest quadrant of the Route 133 / Allée de la Plage intersection, west of the Route 133 / Route 950 signalized intersection in Cap-Pelé. The main access to the site will be via Allée de la Plage which forms the north leg of an existing two-way stop-controlled t-intersection. A description of the study area roads is provided below.

2.1.2 Route 133

Route 133 is generally aligned in an east-west direction and in the vicinity of the proposed campground development it appears to function as a rural collector roadway. It has a rural open-ditch cross-section with a two-lane, two-way paved surface. The asphalt surface includes two 3.6m travel lanes and paved shoulders that vary in width between 2.5 and 3.2m. It should be noted there are no exclusive auxiliary turn lanes at the Allée de la Plage unsignalized t-intersection.

The regulatory posted speed limit along this section of Route 133 is 80 km/h. A vehicle operating speed survey was carried out for traffic traveling along Route 133 in the vicinity of Allée de la Plage. The speed observations were used to calculate an 85th percentile operating speed which was determined to be 88km/h. A 90 km/h operating speed was therefore used in the analysis steps of this study.

2.1.3 Allée de la Plage

Allée de la Plage is generally aligned in a north-south direction and appears to function as a rural local road with limited use from September to May. It is a public roadway under the jurisdiction of the municipality and serves a 40-unit cottage rental business – which are only occupied during the peak summer season.

Following Transportation Association of Canada (TAC) guidelines, this roadway is considered to be a low volume road and represents conditions where the vehicle demand is considerably below the actual capacity resulting in no operational issues. Given the low volume conditions it has a relatively narrow travel width (varies between 6.5 and 7m) with no shoulder and open ditches. The majority of inbound and outbound traffic using Allée de la Plage turns to / from the east along Route 133 due to the proximity of both the services offered in the community of Cap-Pelé and the access to Route 15 via the Route 950 interchange.

2.2 Traffic Data

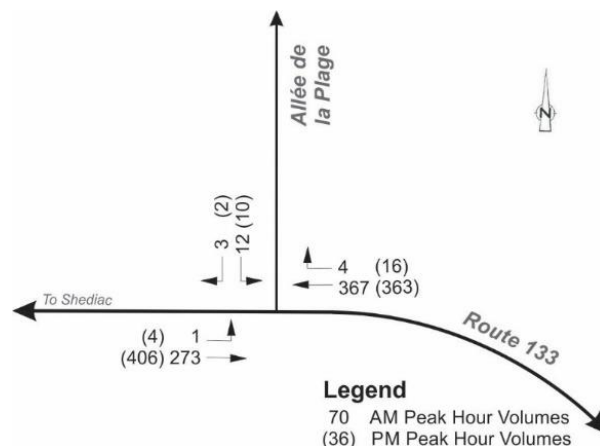
Following industry best practices, specific hours that experience the highest traffic volumes on the roadway are used for analysis in the traffic impact study process in order to identify the necessary capacity to accommodate peak vehicle demands. Ideally the peak hours for this analysis would occur during the peak travel times along Route 133 combined with the peak time for the proposed campground development. As such, it was determined that the combined peak would occur on a Friday morning and afternoon when the Route 133 corridor serves commuter, commercial retail and recreational traffic as well as campground patrons arriving for the weekend. For analysis purposes, the weekday AM and PM peak periods were selected for this study.

In order to facilitate an assessment of the existing and future traffic operations there was a need to develop a set of baseline traffic volumes. Discussions were held with representatives of Village de Cap-Pelé regarding historical traffic counts in the study area and it was determined that previous counts completed by DTI in 2010 at the Route 133/ Route 950 intersection were still relevant given the limited amount of population growth in the community. The GRIFFIN transportation group assessed the 2010 peak hour traffic counts and were adjusted for use in this study in the following ways:

- 2010 traffic counts recorded by NBDTI at the Route 133 / Route 950 intersection; plus
- A seasonal adjustment factor to reflect summer conditions (+31%); plus
- A yearly growth factor (1.25%/year) to account for recreational traffic growth between 2010 and 2016; plus
- An estimate of traffic generated by the existing Aboiteau rental cottages assuming all 40 units are fully occupied.

Therefore, the historical 2010 traffic volumes along Route 133 were seasonally adjusted to reflect summer conditions, increased to account for some increase in recreational traffic between 2010 and 2016. In addition, an estimate of traffic associated with the Aboiteau cottage rental business was also added to Allée de la Plage. A summary of the baseline Existing Summer 2016 peak hour traffic volumes applied to the study analyses are illustrated in *Figure 2*.

Figure 2: Summer 2016 Baseline Peak Hour Volumes



2.3 2016 Summer Conditions Operational Analysis

An intersection capacity analysis process was carried out using the estimated 2016 Summer traffic volumes as well as the existing lane configurations and traffic control at the key subject intersection. The analysis process used the industry accepted Trafficware’s *Synchro 8* software tool – founded in the methodologies contained in the Transportation Research Board’s (TRB) Highway Capacity Manual. The results of the existing summer conditions peak hour analysis are provided in *Table 1* below. Following TIS guidelines, the measures of effectiveness used to describe the operational performance included the average vehicle delay, volume-to-capacity ratio (v/c ratio) and 95th percentile queue length (metres) for all vehicle movements at each of the study area intersections.

Table 1: Existing Summer 2016 Operational Analysis Results

Route 133 / Allée de la Plage (unsignalized)						
	AM Peak Hour			PM Peak Hour		
	Move: LOS (Delay)	V/C	Queue ^A	Move: LOS (Delay)	V/C	Queue ^A
Summer 2016 ^B	EB Th-Lt: A (8.3s)	<0.01	0m	EB Th-Lt: A (8.3s)	0.01	0m
	WB Th-Rt: A (0.0s)	<0.01	0m	WB Th-Rt: A (0.0s)	<0.01	0m
	SB Lt-Rt: B (14.0s)	0.04	<10m	SB Lt-Rt: C (16.0s)	0.04	<10m

A – Queue represents the calculated vehicle queue length in metres occurring 95% of the time (95th percentile).

The capacity analysis results in *Table 1* indicate that all movements through the subject intersection operate with acceptable performance measures. The critical southbound shared left-right turn movement is stop-controlled and operates at v/c ratios of 0.04 and levels of service (LOS) C during the peak times of the day. The results suggest there is a considerable amount of residual capacity at this intersection under current summer peak hour conditions. Detailed summaries of the Existing 2016 operational analysis results are provided in *Appendix I*.

2.4 Driver Sight Distance

2.4.1 Overview

The driver sight distance review was carried out based on field information gathered by the GRIFFIN transportation group. It is understood that the NBDTI has contributed to the development of the Transportation Association of Canada’s (TAC) *Geometric Design Guide for Canadian Roads*¹ document and require these guidelines be applied to any roadway or intersection design process. Since Route 133 is under the jurisdiction of the NBDTI the TAC intersection design procedures were followed – and more specifically as they relate to sight distance requirements. The TAC guidelines use vehicle operating speed to determine the

¹ Geometric Design Guide for Canadian Roads. Transportation Association of Canada. 1999 Edition, Updated December 2011.

appropriate range of sight distance values. There are two different assessments that are required to be undertaken including:

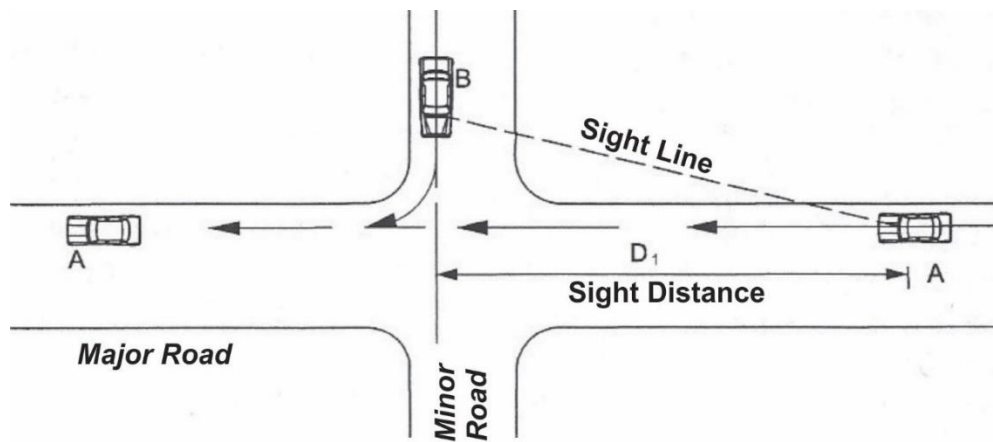
- *Approach Sight Distance* – This is applicable to driver’s traveling on the major road approaching the intersection and ensures there is sufficient distance for them to identify a hazard and bring their vehicle to a stop. The minimum criteria for approaching vehicles is referred to as *Stopping Sight Distance (SSD)*.
- *Departure Sight Distance* – This is applicable to driver’s waiting in a stopped position on the minor road and ensures there is sufficient distance for them to identify an oncoming vehicle on the major road and, as defined by TAC, not significantly affect an oncoming driver’s speed after they enter the major road traffic stream. This is also referred to as *Turning Sight Distance (TSD)*.

It is also important to understand the differences in terminology. This report has used the terminology as applied by the Transportation Association of Canada (TAC) that includes:

- *Sight Line* – This is the line of sight from the driver’s location to the oncoming vehicle (or object in the case of SSD) and is measured across intersection corners, through the inside of horizontal curves or over crest vertical curves.
- *Sight Distance* – Using the available sight line to identify an oncoming vehicle/hazard, sight distance is a vehicle’s travel path measured along the major roadway, from the point of recognizing a hazard up to the intersection.

An illustration of a sight line and a sight distance at an intersection is shown in *Figure 3*.

Figure 3: Transportation Association of Canada’s Definition of Driver Sight Line and Sight Distance



2.4.2 Approach Sight Distance

The approach sight distances to the Allée de la Plage intersection were measured from an eastbound and westbound driver’s viewpoint traveling along Route 133 to ensure that sufficient stopping sight distance (SSD) was available. Following TAC guidelines, a driver eye height of 1.05m was used for the vehicle on Route 133 approaching the intersection, and an object height of 0.38m was used for a hazard in the centre of the Route 133 / Allée de la Plage intersection.

A key factor in determining the required approach sight distance, or stopping sight distance (SSD), along Route 133 is to measure vehicle operating speeds on the main roadway. As discussed in *Section 2.1.2* the speed survey indicated that operating speeds were slightly less than 90 km/h and so the vehicle operating speed along Route 133 (in both directions) was assumed to be 90 km/h for analysis purposes. The results of the approach site distance review are summarized in *Table 2*.

Table 2: Approach Sight Distances Along Route 133 for a 90 km/h Operating Speed

	Eastbound Vehicles (towards Route 950)	Westbound Vehicles (towards Shediac)
TAC Minimum Stopping Sight Distance (SSD) ^A	170m	170m
Available Sight Distance	>200m	>180m
Does Available Meet Minimum Requirements?	Yes	Yes

A – Changes in elevation along Route 133 were assumed to be less than 1.5%, so no effect of grade included in analysis.

In summary, under current operating conditions the available approach sight distance, or SSD, along Route 133 to the Allée de la Plage intersection exceed minimum TAC guidelines for a 90 km/h operating speed.

2.4.3 Departure Sight Distance

The departure or turning sight distances from the proposed Allée de la Plage stop bar location were measured to ensure that sufficient distances are available so that departing vehicles do not significantly affect vehicle speeds on Route 133. Following TAC geometric design guidelines, a driver eye height of 1.05m was used for the driver eye height in a vehicle at the stop bar and an object height of 1.3m was used for an oncoming vehicle traveling on Route 133.

Similar to the earlier assessment in *Section 2.4.2*, a 90 km/h design speed was used. At this particular speed the TAC document defines a range of TSD values and the appropriate value within this range will depend on traffic conditions and local context. The likelihood of vehicle-to-vehicle conflicts and traffic volumes in general will dictate which value should be selected within the range. For example, TSD values at the higher end of the design domain are acceptable for intersections with relatively higher volumes, and TSD values at the lower end of the domain are more appropriate for lower volume intersections. A review of the local site context and traffic volumes at the Route 133 / Allée de la Plage intersection indicate this intersection currently experiences relatively low volumes for 9-10 months of the year and despite the increase in

volumes that are expected during the summer months (including the proposed seasonal campground) is still considered to be relatively low². Therefore, it appears acceptable to apply design values at the lower end of the design domain.

Following TAC's TSD review process contained in Section 2.3.3.3 of the *Geometric Design Guide for Canadian Roads* (including the December 2011 update), the designer is required to confirm the intersection TSD for the following conditions:

- *Condition #1*: Vehicles turning left onto the major roadway with traffic approaching from the left (TAC Figure 2.3.3.4a)
- *Condition #2*: Vehicles turning left onto the major roadway with traffic approaching from the right (TAC Figure 2.3.3.4b)
- *Condition #3*: Vehicles turning right onto the major roadway with traffic approaching from the left (TAC Figure 2.3.3.4b)

TAC has developed nomographs to assist designers in selecting appropriate TSD values and these were referenced in the *Geometric Design Guide for Canadian Roads* document (TAC Figures 2.3.3.4a and 2.3.3.4b). These nomographs are also provided in *Appendix III* for ease of reference. The required TSD for each of the three conditions presented above were reviewed for the Allée de la Plage intersection location and the findings are provided in the *Table 3*.

Table 3: Turning Sight Distances from Allée de la Plage for a 90 km/h Operating Speed

TAC TSD Turn Conditions	TAC Minimum TSD (90 km/h)	Available TSD ^A	TAC Minimum Requirement Met?
Condition #1	170m	>180m	Yes
Condition #2	190m	>200m	Yes
Condition #3	170m	>180m	Yes

A – sight distances confirmed in the field using 1.05m driver eye height and 1.3m object height.

In summary, the existing Allée de la Plage intersection location and configuration exceeds the TAC minimum intersection TSD requirements for the three critical turning conditions assuming a 90 km/h vehicle operating speed.

Figure 4: Driver Sight Lines along Route 133



Looking east along Route 133



Looking west along Route 133

² Chapter H, Low Volume Roads, Manual of Geometric Design Standards for Canadian Roads, pub. Transportation Association of Canada, 1986.

3. THE PROPOSED DEVELOPMENT

This chapter describes the existing site, proposed changes to the buildings/operations, and the development of the site generated traffic.

3.1 Proposed Campground Development

It is understood that *Camping Plage Aboiteau Beach Inc.* is the current property owner of PID's #70314075 and 70245337 (Lot 15-01) that has a combined area of about 29-acres. The subject lands are currently undeveloped and are bounded by Allée des Chalets to the north, Allée Petite Cote to the west, existing residential properties along Route 133 to the south and Allée de la Plage to the east.

The proposed campground layout is shown in the site plan drawing contained in *Figure 5*. There will be a variety of camp site offerings including standard sites, pull-through sites, and premium sites. There are plans for up to 256 camp sites and this formed the basis of the traffic analysis process. Should fewer sites be constructed then the operational conditions presented in this report would improve accordingly.

In addition to the proposed 256 camp sites, supporting amenities will also be constructed that could include an administrative building, recreational hall, a pool, games area (i.e. for volley ball, shuffle board, bouncing pillow, etc.), a picnic area with canopy, an outdoor play area and supporting comfort stations.

3.2 Site Trip Generation

The trip generation calculation process is carried out to identify the number of new vehicles that will be added to the study area roads and intersections as a direct result of a new development. Typically traffic engineers use vehicle generation rates that are published by the Institute of Transportation Engineers (ITE), if deemed appropriate and suitable. Since there is a related land use type contained in the ITE's *Trip Generation, 9th Edition* document – Campground/Recreational Vehicle Park (Code 416) – these published trip rates were applied to this analysis. The volume of site-generated trips has been calculated based on the number of camp sites contained within the development and it was assumed that all 256 sites are occupied - a worst case scenario.

A summary of the AM and PM peak hour site trip generation results associated with a new 29-acre, 256-site campground development is provided in *Table 4*. The total forecast site-generated trips for each peak hour are as follows:

- *AM Peak*: Forecast new trips comprised of 44 two-way trips, including 16 inbound and 28 outbound from the site.
- *PM Peak*: Forecast new trips comprised of 48 two-way trips, including 31 inbound and 17 outbound from the site.



Source: J.R. Daigle Engineering



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Proposed
Master Plan

Figure
5

Table 4: Peak Hour Site-Generated Trips (vph)

Peak	Land Use Type	Trip Rate ^A	Total Trips (In / Out)	Pass-by Trips (Rate)	New Trips (vph) ^B
AM Peak Hour	Campground/RV Park ITE Code 416	256 sites 0.17 /site	44 (36%/64%)	0 (0%)	44 (16 in, 28 out)
PM Peak Hour	Campground/RV Park ITE Code 416	256 sites 0.19 /site	48 (65%/35%)	0 (0%)	48 (31 in, 17 out)

A – trip rate calculated based on the ITE formula for LUC 416.

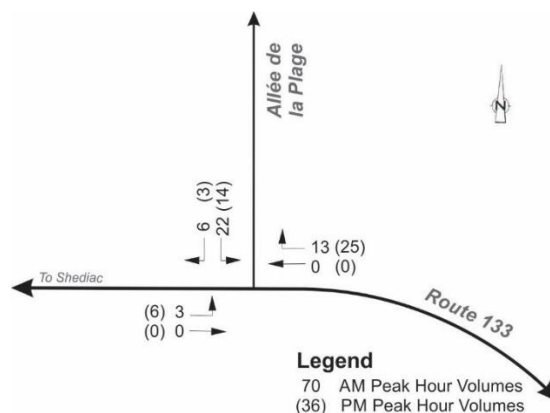
B – vehicles per hour

In order to remain conservative in the trip generation estimates, it was assumed there would be no reduction in the site-generated vehicle trips to account for the effect of pass-by trips and interaction with on-site services.

3.3 Distribution of Site-Generated Trips

Typically, the distribution of site-generated trips are based on the reason for the trip being made. In the case of the proposed campground it was assumed that the majority of trips would be comprised of either arriving/departing patrons moving to/from Highway 15 (via Route 950) and patrons using the commercial amenities in the urban area of Cap-Pelé. As such, it was assumed the majority of these two trip types would be moving to/from the east of Allée de la Plage, along Route 133.

Under these conditions it appeared reasonable to assume that 80% of site-generated trips would move to/from the east along Route 133 and the other 20% would move to/from the west. A summary of the site-generated trips assigned to the study area road network is illustrated in *Figure 6*.

Figure 6: Site-Generated Peak Hour Volumes


4. FUTURE TRAFFIC CONDITIONS

This chapter summarizes the assumptions used to develop future year traffic volumes for the total traffic scenario, the operational analysis results and associated impacts to the transportation infrastructure.

4.1 Overview

The future planning horizon chosen for a traffic impact study represents a milestone in the development process. It is assumed that the future planning horizon year used in the analysis for this type of development will occur 5 years beyond the full build-out/occupancy of the site. It is expected that the planning, design and construction of the proposed campground development will likely be complete by the end of 2017. Based on this information, the future horizon year selected for this study was 2022.

Following traffic impact study best practices, the analysis process carried out for the future planning horizon includes two sets of assessments. The first is referred to as the future background traffic scenario which excludes the proposed site-generated traffic. The second is referred to as the future total traffic scenario which includes the proposed site-generated traffic. It is through this process that the practitioner can identify the impacts explicitly associated with the new traffic added to the roadway network. The assembly of the future 2022 summer traffic conditions and the analysis process used to identify any future roadway infrastructure changes is discussed in the following Sections.

4.2 Developing the Future Summer 2022 Traffic Volumes

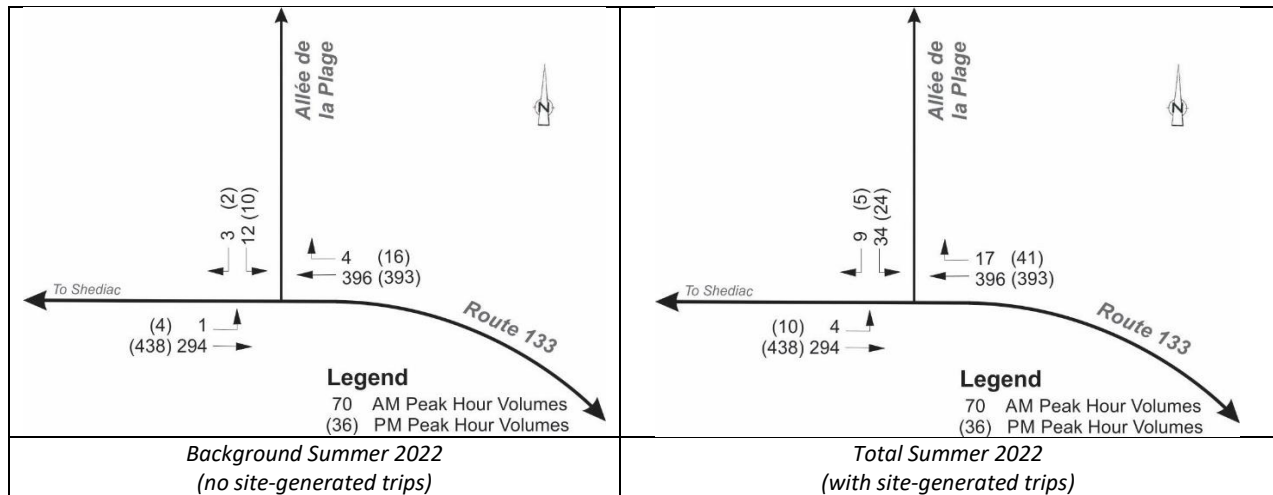
4.2.1 *Future Summer Background Traffic*

The future background traffic volumes are typically developed using a traffic growth factor to account for increases in population, employment and or recreational activities in the vicinity of the study area – assuming the proposed campground development has not been completed. In order to remain consistent with an earlier study carried out for the new traffic signals at the Route 133 / Route 950 intersection, a background traffic growth rate of 1.25%/year was also applied to this study. Therefore, the 2016 existing summer volumes shown in *Figure 2* were increased using this growth factor to yield 2022 summer background volumes. A summary of the future Background Summer 2022 peak hour traffic volumes used in the analysis are illustrated in *Figure 6*.

4.2.2 *Future Summer Total Traffic*

Under the future total summer traffic scenario, the proposed campground development is expected to be fully constructed and campsites occupied. The assembly of future Total Summer 2022 peak hour traffic volumes combined the site-generated traffic shown in *Figure 6* with the future background volumes shown in *Figure 7*.

Figure 7: Future Total Summer 2022 Peak Hour Volumes



4.3 Future Summer 2022 Operational Analysis Results

4.3.1 Route 133 Auxiliary Lane Warrant Analysis

Once the set of future Total Summer 2022 peak hour traffic volumes were established an initial analysis was carried out to determine if there was a need to provide exclusive right and left turning lanes at the Route 133 / Allée de la Plage intersection. The left turn lane warrant review was undertaken following Ministry of Transportation of Ontario (MTO) procedures. The right turn lane warrant review followed the Ohio Department of Transportation (ODOT) methodology. A summary of the auxiliary turn lane assessment results are provided in *Table 5*.

Table 5: Summary of Auxiliary Turn Lane Assessment at Allée de la Plage – 2022 Summer Conditions

Scenario	Turn Lane Location	Warrant?
Total Summer 2022 Peak Hour	Westbound Right Turn Lane	Warrant is met
	Eastbound Left Turn Lane	Warrant not met ^A

A – Left turning volume less than 2.5%

The results of the auxiliary turn lane assessment suggest that the warrant criteria for a westbound right turn lane under future Total Summer 2022 conditions was met. However, it is expected that the presence of the existing paved shoulder and a corner radius of at least 10 m would mitigate any operational concerns. The results of the eastbound left turn lane warrant indicate that such a lane is not required at the Allée de la Plage intersection. These findings are consistent with the intersection capacity results contained in *Table 7*, below. The warrant calculation results are provided in *Appendix II*.

4.3.2 Intersection Capacity Analysis

The next step in the future year analysis process was to carry out an intersection capacity evaluation under future Total Summer 2022 traffic conditions. Trafficware's *Synchro 8* software tool was applied following the Transportation Research Board's *Highway Capacity Manual* (HCM)

methodology for unsignalized intersections. The operational analysis results for the intersection movements for all three sets of traffic volumes are contained in *Table 6*.

Table 6: Future Total Summer 2022 Operational Analysis Results

Route 133 / Allée de la Plage (unsignalized)						
	AM Peak Hour			PM Peak Hour		
	Move ^C : LOS (Delay)	V/C	Queue ^A	Move ^C : LOS (Delay)	V/C	Queue ^A
Existing Summer 2016 ^B	EB Th-Lt: A (8.3s)	<0.01	0m	EB Th-Lt: A (8.3s)	0.01	0m
	WB Th-Rt: A (0.0s)	<0.01	0m	WB Th-Rt: A (0.0s)	<0.01	0m
	SB Lt-Rt: B (14.0s)	0.04	<10m	SB Lt-Rt: C (16.0s)	0.04	<10m
Background Summer 2022 ^B	EB Th-Lt: A (8.4s)	<0.01	0m	EB Th-Lt: A (8.4s)	0.01	0m
	WB Th-Rt: A (0.0s)	<0.01	0m	WB Th-Rt: A (0.0s)	<0.01	0m
	SB Lt-Rt: B (14.6s)	0.04	<10m	SB Lt-Rt: C (17.0s)	0.04	<10m
Total Summer 2022 ^B	EB Th-Lt: A (8.4s)	<0.01	0m	EB Th-Lt: A (8.5s)	0.01	0m
	WB Th-Rt: A (0.0s)	<0.01	0m	WB Th-Rt: A (0.0s)	<0.01	0m
	SB Lt-Rt: C (15.7s)	0.12	10m	SB Lt-Rt: C (18.5s)	0.11	10m

A – Queue represents the calculated vehicle queue length in metres occurring 95% of the time (95th percentile).

B – Existing lane configuration (i.e. no auxiliary turn lanes).

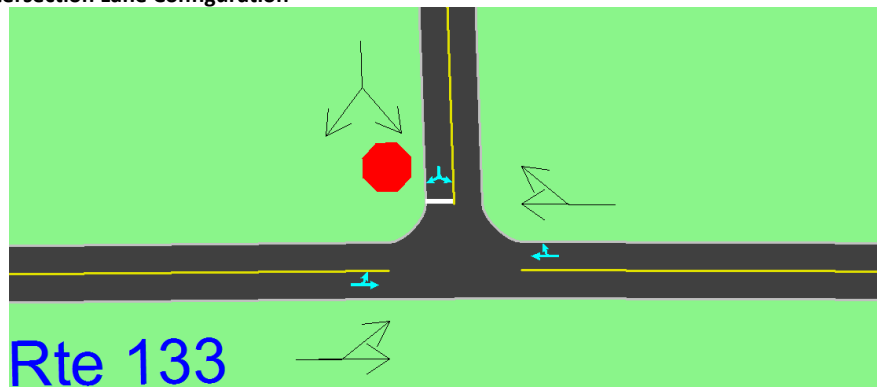
C – Th-Lt, Th-Rt and Lt-Rt indicate where two movements occur in the same lane.

A comparison of levels of service and v/c ratios between the Background 2022 and Total 2022 scenarios indicates that the additional site-generated trips associated with the proposed campground development will only slightly increase delay times and slightly reduce residual capacity at the intersection. Therefore, with the current lane configuration, the intersection is expected to have a substantial amount of residual capacity that can accommodate the new campground traffic as well as additional traffic growth beyond the future 2022 planning horizon.

4.4 Proposed Intersection Lane Configuration

A conceptual illustration of the proposed lane configuration at the Route 133 / Allée de la Plage intersection is provided in *Figure 8*. As presented earlier, auxiliary turn lanes for traffic entering or exiting the site are not required by the 2022 planning horizon.

Figure 8: Proposed Intersection Lane Configuration



5. CONCLUSIONS AND RECOMMENDATIONS

This chapter summarizes the salient findings of the analysis and identifies any necessary changes to the transportation infrastructure.

5.1 Conclusions

The following conclusions were gleaned from the traffic impact assessment of the proposed development:

- The existing Route 133 / Allée de la Plage intersection currently serves a seasonal cottage rental business and Allée de la Plage is considered to be a low volume recreational road within the Village de Cap-Pelé.
- The capacity analysis results under Summer 2016 and future Background Summer 2022 conditions at the Route 133 / Allée de la Plage intersection suggests that individual vehicle movements through the subject intersection will operate with acceptable performance measures in the absence of the proposed campground. The southbound shared left-right turn movement from Allée de la Plage will continue to operate with v/c ratios of 0.04 and LOS C or better. Therefore, this intersection will have a substantial amount of residual capacity to accommodate traffic growth well beyond the 2022 planning horizon.
- The proposed campground with up to 256 occupied camp sites is expected to generate new traffic in the Route 133 corridor that includes:
 - Weekday AM peak hour: 44 two-way trips, including 16 inbound and 28 outbound from the site.
 - Weekday PM peak hour: 48 two-way trips, including 31 inbound and 17 outbound from the site.
- The operational analysis of the subject intersection under future Total 2022 traffic conditions - including the site-generated traffic – is expected to operate at acceptable levels of service and v/c ratios with the existing lane configuration and stop control. No additional roadway infrastructure is required to increase capacity.

Overall, the traffic study analysis results suggest that the existing Route 133 / Allée de la Plage intersection has sufficient capacity to accommodate future 2022 traffic volumes and the additional traffic associated with the proposed campground development will have an acceptable level of impact on the Route 133 corridor.

5.2 Recommendations

The following recommendations are required to accommodate future traffic pattern changes associated with the proposed campground development:

- That the design team give consideration to the turning path requirements of the design vehicle – which could be in the form of a truck/RV trailer combination or a municipal vehicle such as a garbage truck or snow plow. Design modifications could include widening Allée de la Plage in the vicinity of the intersection with Route 133 to add shoulders and/or increase the corner radii to mitigate against turning trucks from encroaching into adjacent lanes. The travel lane width of Allée de la Plage should be of sufficient width to accommodate two passing truck/RV trailer combinations, typical minimum lane widths of 3.3m are desirable. Any infrastructure changes to the intersection should follow TAC geometric design guidelines.
- That driver sight lines and sight triangles across the northeast and northwest corners of the Route 133 / Allée de la Plage intersection be maintained such that municipal by-law requirements and TAC geometric design guidelines are met.
- That the design team review the curvilinear alignment of Allée de la Plage and ensure sufficient sight lines are provided for drivers. In particular, the small radius horizontal curve located near the north terminus limits a driver's sight line. An effort should be made to improve sight lines through the curve by either re-aligning Allée de la Plage or removing vegetation on the inside of the curve to provide a minimum stopping sight distance of 65m (50km/h operating speed). The need for curve warning, hidden intersection and advisory speed tabs should also be reviewed.
- That the north approach to the Route 133 / Allée de la Plage intersection have one inbound (northbound) lane, one outbound (southbound) lane to accommodate both right and left turning traffic, as shown in *Figure 7*.
- That all existing and proposed signage and pavement markings associated with the study area intersections – including intersection warning signs – be designed and installed in accordance with the most recent version of the *Manual of Uniform Traffic Control Devices of Canada* (MUTCDC).

APPENDIX I

Intersection operational analyses

Existing Conditions Results

Background 2022 Results

Total 2022 Results

APPENDIX II

Auxiliary Lane Warrant Results

APPENDIX III

Turning Sight Distance Nomographs