



Ministry of  
Transportation  
and Infrastructure

# Highway 99 Capacity and Safety Review, Whistler (Alpha Lake Road / Cheakamus Lake Road to Lorimer Road)

## Final Report



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## **Preface: Highway 99 in Context**

July 31, 2020

The BC Ministry of Transportation and Infrastructure (MoTI) has undertaken a study in cooperation with the Resort Municipality of Whistler (RMOW) to review traffic congestion and safety issues on Highway 99 within Whistler. The study area was defined as Alpha Lake Road/Cheakamus Lake Road at Function Junction at the south end of Whistler to Lorimer Road in Whistler Village. The detailed findings of the study are presented in the **Highway 99 Capacity and Safety Review, Whistler (Alpha Lake Road / Cheakamus Lake Road to Lorimer Road) Final Report** and are discussed below, in the context of other objectives and plans for the highway, the municipal transportation network and future developments in Whistler. The intent of this preface, prepared by the RMOW, is to help bring forward some of the local operational concerns discussed in Section 6 of this report. The RMOW and MoTI staff will work closely to determine which issues require further studies to confirm these concerns and develop possible mitigation strategies.

Traffic congestion is a recurring issue on Highway 99 during peak times, particularly in the section between Whistler Creekside (Lake Placid Road) and Function Junction (Alpha Lake Road/Cheakamus Lake Road). In general, there are potentially four ways in which traffic congestion, safety and operational issues on Highway 99 can be addressed:

### **1. Improve Safety and Operations.**

There are a number of small scale, localized projects identified in the report that would improve safety and operations at intersections along Highway 99, which can be undertaken in the short-term regardless of any long-term larger-scale capacity improvements. Analysis of these proposed improvements was not within the scope of the study, and therefore the next step should be to investigate each improvement to determine the benefits it offers and its associated costs. This investigation should also include locations north of the Village (which were not within the scope of the study), where safety and operations concerns have increased as traffic from north of Whistler has increased.

Priority locations for localized improvements on Highway 99 include (from south to north):

- Alpha Lake Road – adjust intersection geometry and optimize signal timing and phasing, particularly for left turns, to reduce delays for vehicles turning to and from the highway and reduce traffic queues on Alpha Lake Road.
- Spring Creek Drive and Whistler Road – construct protected left turn intersections to improve safety and reduce delays for transit buses and other vehicles turning left (southbound) onto the highway.
- Lorimer Road – extend the southbound left turn lane, implement new bus stops, and add dual left turn lanes for the westbound-to-southbound left turn (when considering this last improvement, it will be important to assess the potential for increased congestion at the Village Gate Boulevard intersection as a result).
- Nesters Road/Spruce Grove Way – reconfigure the southbound-to-westbound channelized right turn lane as a separated “off-ramp” to improve safety and operations of the Nesters Road intersection immediately west of the Highway 99 intersection.



- Meadow Lane, Autumn Drive and Emerald Drive – implement northbound left turn lanes on Highway 99 to improve safety and minimize the potential for rear-end collisions.

## **2. Increase traffic capacity.**

The key finding of the study is that the most effective way to reduce southbound traffic congestion on the highway is to increase traffic capacity by constructing an additional traffic lane from Whistler Creekside to Function Junction (the two southbound lanes could eventually be extended north to Whistler Village, but the analysis indicates that the major benefit would be south of Creekside). The estimated cost for the additional southbound lane is \$30 million.

It is important to note that the scope of the study was limited to the “worst case” traffic congestion which occurs southbound on Sunday afternoons in the winter. Prior to any major widening an analysis should be undertaken of northbound traffic congestion in winter and summer to determine what widening or other improvements would be needed to increase northbound traffic capacity, and these should be included in any widening project.

A risk in widening the highway to increase traffic capacity is that it can be expected to generate more peak period traffic due to latent demand (people who currently wait in the Village for a couple of hours before driving home) and induced demand (people who currently travel by bus or other modes and would choose to drive instead, or who don’t drive to Whistler on peak days and would now choose to do so). As a result, congestion would likely not be alleviated to the extent anticipated in the study analysis.

## **3. Increase people capacity.**

Given the cost of increasing traffic capacity on the highway (northbound as well as southbound) and the likelihood that congestion would not be alleviated to the extent anticipated, it may be more cost-effective to invest in improving the *people* capacity of the highway rather than the *vehicle* capacity. This means carrying more people on transit on Highway 99, and shifting some automobile trips to transit. Options to make transit a more attractive travel option include the following infrastructure projects on the highway and parallel to the highway:

- Queue jumpers that allow buses to bypass traffic queued at an intersection, reducing delays to buses at traffic signals. Potential locations for queue jumpers include northbound and southbound at Blueberry Drive, and southbound at Lake Placid Road.
- Protected left turn intersections that improve safety and reduce delays for buses turning left onto the highway at unsignalized intersections, including at Whistler Road, Spring Creek Drive and the Meadow Park Sports Centre.
- Bus-on-shoulder (BOS) operation that allows buses to use the shoulder on the highway during times when there is significant traffic congestion, to bypass vehicles moving slowly in traffic lanes and minimize delays to buses. BOS is a cost-effective means of providing priority for buses as it generally does not require dedicated infrastructure or additional right-of-way, is low-cost and can be implemented relatively easily. BOS could be implemented northbound and southbound between Function Junction (Alpha Lake Road/ Cheakamus



Lake Road) and Whistler Creekside (Lake Placid Road), beginning with a peak summer-only demonstration project from Bayshore Drive to Lake Placid Road.

- New bus stops on Highway 99 at Lorimer Road northbound and southbound and at Nesters Road/Spruce Grove Way southbound, and improvements to existing bus stops to increase passenger comfort and security.
- A transit-only exit from southbound Highway 99 to Lynham Road in Function Junction.
- The planned Bayshores–Spring Creek Road connection that would enable buses to travel between these two neighbourhoods without using Highway 99, increasing route options and reducing bus travel times.

Other options to increase transit trips include increased frequencies, extended hours of service and expanded express services on Highway 99, particularly south of the Village, as well as reduced or integrated transit fares (such as a community transit pass for residents).

#### 4. **Divert traffic.**

Long term options to address traffic congestion on Highway 99 through Whistler include diverting regional traffic off the highway by redirecting it to a new gondola in Whistler South near Cheakamus Lake Road, and diverting local trips off the highway to new parallel routes on the municipal road network. Although development of a new ski base at Whistler South is likely decades away, it is useful to consider the effects of this proposal on traffic patterns when evaluating the potential benefits and costs of widening the highway.

In the short-term, the MoTI and RMOW should pursue the safety and operations improvements identified in item 1 above, and the transit improvements to increase people capacity identified in item 3 above. An analysis of potential benefits and costs would provide a basis for prioritizing improvements, developing a schedule for implementation, and allocating funds to complete these projects.

Submitted by:

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# 1. Introduction

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At the request of the Resort Municipality of Whistler (RMOW), the BC Ministry of Transportation and Infrastructure (MoTI) is undertaking a study to review traffic congestion and safety issues on the Highway 99 corridor within Whistler. The intent of this assignment is to identify problem areas (either operationally or safety) and potential causes by conducting a traffic and safety analyses for the corridor, and to develop short-, medium-, and long-term options that will provide the best value.

This existing condition work presented herein will serve as a starting point to document the issues in the area and help MoTI understand the current traffic conditions of Highway 99 within the Whistler corridor. The next step, which is detailed in [Section 4](#), is to develop and analyze short-term improvements (within the next five years) and medium improvements (five to ten years). Long-term options are provided for discussion purposes and may be required depending on growth along the corridor over the next 25 years. Local operational issues and high-level improvement opportunities are discussed and summarized in Section 6.0.

## 1.1. Highway Characteristics

Highway 99, also known as the Sea to Sky Highway north of Vancouver, is the major North-South highway running through the Greater Vancouver area of British Columbia from the U.S. border, up Howe Sound past the municipalities of Squamish, Whistler, and Pemberton to Lillooet; eventually connecting with Highway 97 just north of Cache Creek.

Highway 99 serves multiple road users including commuter traffic, local residents, and commercial vehicles. Most significantly, Highway 99 serves the high volume of tourist traffic traveling between Vancouver and Whistler during the summer and winter seasons.

Through the study area, Highway 99 is mostly a two-lane undivided roadway with a posted speed of 60 km/h - 80 km/h.

## 1.2. Highway Access

Access to/from the highway within the study area consists of a mix of signalized and unsignalized (side-street stop-controlled - SSSC and right-in right-out – RIRO) intersections. The signalized intersections typically serve major commercial areas while the unsignalized intersections mostly serve local residential developments. There is also a pedestrian signal, with SSSC, at Alta Lake Road.

At the major signalized intersections there are typically separate left- and right-turn lanes for the highway, as well as for the side-street. All of the unsignalized intersections are T-intersections with the majority of them having left- and right-turn lanes for the highway as well as for the minor roadway.

## 1.3. Land Use

Land use along Highway 99 ranges from industrial, commercial, and residential. There is a small industrial area (RMOW Treatment Plant) south of Highway 99 just south of the Highway 99 / Alpha Lake Road / Cheakamus Road intersection. There are large commercial developments west of Highway 99 at Alpha Lake Road (Function Junction Light Industrial) and east at Lake Placid Road. Whistler Creekside also provides a secondary connection to the Whistler Ski Area. Ski patrons can stay in Whistler Creekside and use the Creekside Gondola to access the Whistler and Blackcomb ski areas. Development at Alta Lake Road, Bayshore Drive, and Blueberry Drive is predominantly residential. The area east of Highway 99 between Village Gate Boulevard and Lorimer Road is Whistler Village with a large mix of both residential, commercial, and recreational land uses.

## 1.4. Topography

The general grade of the highway through the study corridor is mainly flat with a minor grade (approximately 4%) between Alpha Lake Road / Cheakamus Lake Road to half-way between Spring Creek Drive and Alta Lake Road. However, the highway grade does constantly change throughout the corridor to match the topography of the area, so is steeper in some locations.

The topography east of the highway is typically level with or higher than the highway through much of the corridor, while to the west it slopes down from the highway, sometimes quite significantly.



## 2. Study Area

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The study area extends along Highway 99 from Alpha Lake Road / Cheakamus Lake Road in the south to Lorimer Road in the north. The study area is shown on *Figure 1*.

The following seven intersections will be analyzed as part of the operations analysis for the Highway 99 Corridor Study.

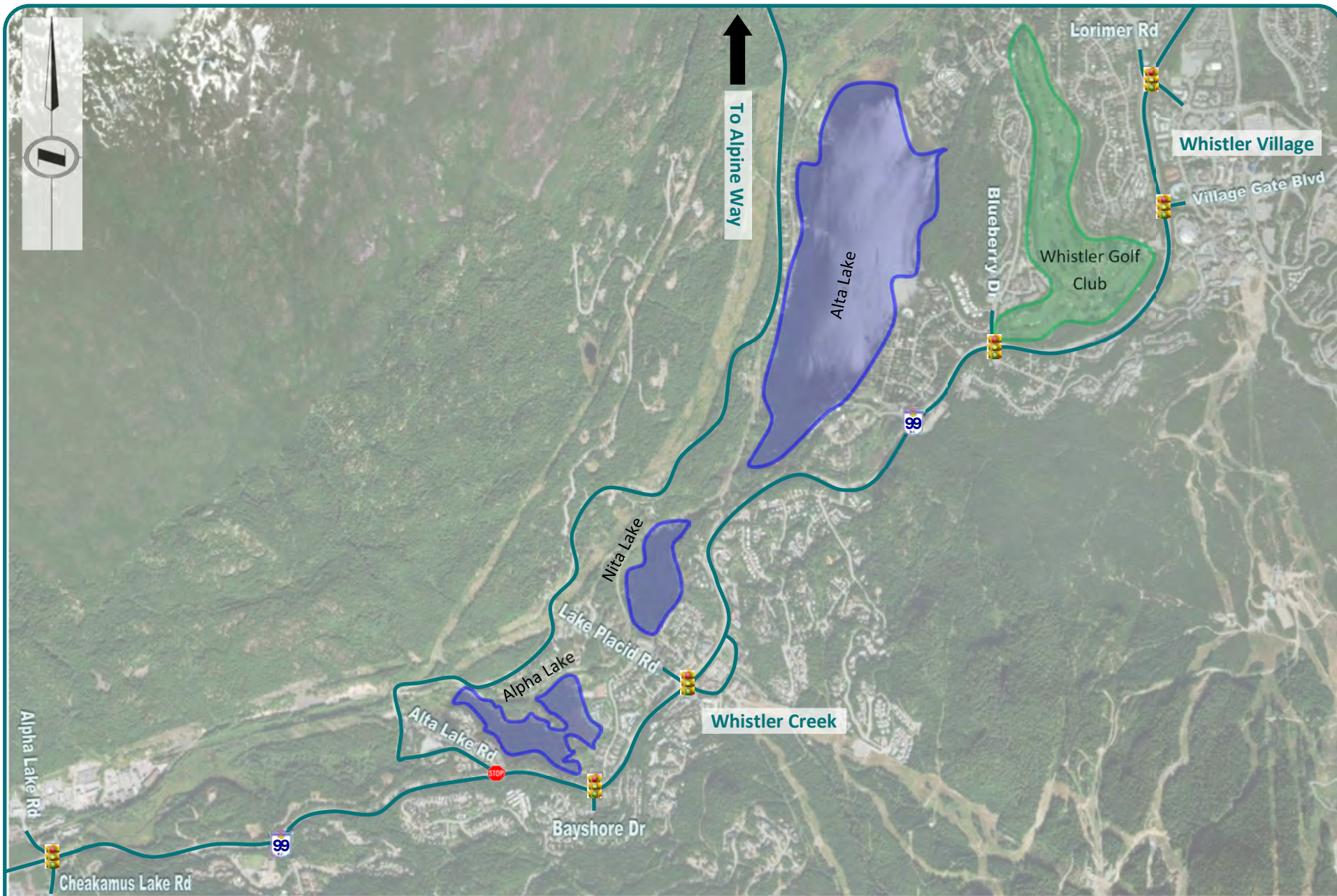
- Highway 99 / Alpha Lake Road / Cheakamus Lake Road (signalized)
- Highway 99 / Alta Lake Road (pedestrian signal, side-street stop-controlled – SSSC)
- Highway 99 / Bayshore Drive (signalized)
- Highway 99 / Lake Placid Road (signalized)
- Highway 99 / Blueberry Drive (signalized)
- Highway 99 / Village Gate Boulevard (signalized)
- Highway 99 / Lorimer Road (signalized)

It is noted that the unsignalized intersections were not analyzed as part of the study.

### 2.1. Road Network

Within the study area, there are four types of road classification:

- **Highway:** Traffic movement is the primary consideration. Limited access generally used to connect major population centers.
- **Major:** Traffic movement is the primary consideration while land access is a secondary function. Provide connectivity to higher order roads (i.e. highways).
- **Minor:** Traffic movement and land access are of equal consideration. Provide connectivity between local roads and arterials.
- **Local:** Land access is the primary consideration. Provide direct access to adjacent land and generally do not carry through traffic.



## HIGHWAY 99 CAPACITY AND SAFETY REVIEW (WHISTLER)

FIGURE 1: STUDY AREA

### 2.1.1. Highway 99

Highway 99 through the study area is typically a two-lane regional highway with a posted speed of 60 km/h, except from Alpha Lake Road to Alta Lake Road (80 km/h). The designation of Highway 99 is a northbound-southbound highway that runs from the U.S. border up Howe Sound, eventually connecting with Highway 97 just north of Cache Creek. Most of the intersecting roadways with the highway have a posted speed of 50 km/h within the study area, except for Alpha Lake Road (40 km/h) and Lake Placid Road (30 km/h).

Shoulders are paved and vary from 1.5 m to 2.0 m with 0.5 m to 1.0 m additional gravel shoulder. Additionally, a significant portion of the highway has concrete roadside barrier, primarily on the west side of the highway, but also on the east.

There are marked bike lanes northbound and southbound for the length of the study corridor. For pedestrians, there are no sidewalks along Highway 99. However, portions of the Valley Trail network run parallel to the highway and provide separated facilities for pedestrian and cyclists away from the highway. There is an overhead pedestrian bridge just north of Nordic Drive.

Roadside lighting is generally only provided at side-street intersections, with some additional lighting provided upstream and downstream of signalized intersections. There are overhead advance warning flashers to warn motorists of traffic signals ahead northbound and southbound at Cheakamus Lake Road / Alpha Lake Road, southbound at Bayshore Drive, northbound at Blueberry Drive, and southbound at Lorimer Road. Additionally, there are northbound/southbound overhead emergency vehicle access flashers at Spring Creek Drive and an overhead electronic changeable message sign southbound on Highway 99 approximately 300 m south of Alta Lake Road.

### 2.1.2. Alpha Lake Road / Cheakamus Lake Road

Alpha Lake Road / Cheakamus Lake Road is a two-lane roadway that provides access to a large commercial/light industrial area west of Highway 99 along Alpha Lake Road (Function Junction) and Cheakamus Crossing to the east along Cheakamus Lake Road. The Highway 99 / Alpha Lake Road / Cheakamus Lake Road intersection is signalized with turning bays for all movements, and it should be noted as one of the busiest intersection in the study area.

### 2.1.3. Alta Lake Road

Alta Lake Road is a two-lane roadway that forms the west leg of a T-intersection with Highway 99. It provides access to the residential area (Tamarisk) west of Highway 99 adjacent to Alpha Lake. Alta Lake Road continues along the north side of Alpha Lake, Nita Lake, and Alta Lake eventually connecting to the Alpine Meadows neighbourhood adjacent to Green Lake north of Whistler Village. Alta Lake Road is used by many local drivers to avoid the congestion southbound during peak times. If coming from the Village, drivers would head north to Alpine Way, then turn onto Rainbow Drive, which becomes Alta Lake Road after leaving the Alpine Meadows Neighbourhood. The Highway 99 / Alta Lake Road intersection is a pedestrian-controlled signal with side-street stop-controlled and left- and right-turn bays for the northbound left and southbound right.



## 2.1.4. Bayshore Drive

Bayshore Drive is a two-lane roadway that forms the east leg of a T-intersection with Highway 99 and provides access to the large residential area just south of Creekside. The Highway 99 / Bayshore Drive intersection is signalized with turning bays for all movements.

## 2.1.5. Lake Placid Road

Lake Placid Road is a two-lane roadway with a posted speed of 30 km/h west of the highway. It provides access to the large residential areas on both the east and west sides of Highway 99 within Whistler Creekside. Additionally, east of the highway is the large Creekside commercial development, with shopping, restaurants, and lodging. Moreover, the Creekside Gondola, which is one of the major access points for Whistler Mountain, is located within Creekside. As such, Lake Placid Road experiences high traffic volumes during the winter season. The Highway 99 / Lake Placid Road intersection is signalized with turning bays for most movements (except the EBL and SBR), including dual westbound lefts (left and a shared thru-left).

## 2.1.6. Blueberry Drive

Blueberry Drive is a two-lane roadway that forms the west leg of a T-intersection with Highway 99. It provides access to the large residential areas surrounding the Whistler Golf Club, as well as, both Blueberry Beach Park North and South which are adjacent to the east shore of Alta Lake. Blueberry Drive transitions to Beaver Lane near the north end of the Whistler Golf Club. The Highway 99 / Blueberry Drive intersection is signalized with turning bays for all movements.

## 2.1.7. Village Gate Boulevard

Village Gate Boulevard is a four-lane roadway that forms the east leg of a T-intersection with Highway 99. It is the main access roadway to Whistler Village and services a large number of commercial, residential, and recreational areas within the municipality. Within the Whistler Village are major lifts to both Whistler Mountain and Blackcomb Mountain. As such, Village Gate Boulevard experiences extremely high traffic volumes during both the summer and winter seasons. The Highway 99 / Village Gate Boulevard intersection is signalized with turning bays for all movements, including dual westbound lefts.

## 2.1.8. Lorimer Road

Lorimer Road is a four-lane roadway to the east of Highway 99 and a two-lane roadway to the west of Highway 99 located at the northern end of Whistler Village. Similar to Village Gate Boulevard, Lorimer Road provides access to a large number of commercial, residential, and recreational areas within the Village. Lorimer Road also experiences extremely high traffic volumes during both the summer and winter seasons due to the local mountain resort. Unlike Village Gate Boulevard, Lorimer Road also provides access to the residential areas west of Highway 99 adjacent to the Whistler Golf Club. The Highway 99 / Lorimer Road intersection is signalized with turning bays for all movements.

## 3. Existing Conditions

### 3.1. Traffic Operations

#### 3.1.1. Field Observations

##### Field Visit

A site visit was conducted on January 14, 2018 to observe conditions within the study area. The key observations are as follows:

- ~3:00 pm – Free flow traffic southbound through the corridor
- ~3:15 pm – Start of southbound queuing at Lake Placid Road. This generally clears up just south of the lane drop to Taylor Way.
- ~4:00 pm – southbound queuing at Lake Placid Road back to Whistler Road (~600 m). Westbound queuing into Creekside along Lake Placid Road to Rob Boyd Way (~300 m). The southbound queue extends beyond the Lake Placid Road intersection, resulting in gridlock even though additional southbound green time is provided.
- ~4:00 pm – Southbound queuing from Blueberry Drive to Lorimer Road (~ 2 km). Large westbound queues at Village Gate Boulevard and Lorimer Road.
- ~4:30 pm – significant queue for the eastbound right movement from Alta Lake Road to Highway 99

Travel times were recorded at approximately 3:00 pm and 5:00 pm and are summarized in [Table 1](#). As shown, travel times prior to 4:00 pm were generally one-third or less the travel time at 5:00 pm. Additionally, travel time along Alta Lake Road (alternate route) was also approximately one-third.

Table 1: Observed Travel Times

From	To	Travel Time min:sec			
		SB @ 3 PM	SB @ 5 PM	NB @ 3 PM	Alta Lake Rd SB @ 4 PM
Lorimer Rd	Village Gate Blvd	NA <sup>(1)</sup>	10:00	NA <sup>(1)</sup>	NA <sup>(1)</sup>
Village Gate Blvd	Blueberry Dr	NA <sup>(1)</sup>	9:50	NA <sup>(1)</sup>	NA <sup>(1)</sup>
Blueberry Dr	Lake Placid Rd	NA <sup>(1)</sup>	16:30	NA <sup>(1)</sup>	NA <sup>(1)</sup>
Lake Placid Rd	Alta Lake Road	NA <sup>(1)</sup>	4:50	NA <sup>(1)</sup>	NA <sup>(1)</sup>
Alta Lake Rd	Alpha Lake Rd	NA <sup>(1)</sup>	2:55	NA <sup>(1)</sup>	NA <sup>(1)</sup>
Total:		~14:00	44:05	~9:00	~16:00

##### Notes:

1. No queuing observed at these locations or time periods. Only total travel time recorded.



## Density Map

A traffic density map was obtained from Google during the time of the observed travel times. These densities are summarized on [Figure 2](#). As shown, northbound is mostly free-flow, while southbound the highest densities occur around Lake Placid Road and Village Gate Boulevard, which are in part due to the lane drops downstream of each intersection. The high density around Lake Placid Road begins around the lane drop and runs north along Highway 99 to approximately Nordic Drive, and then again starting at Blueberry Drive and extending to Lorimer Road. These densities are consistent with the observations made during the site visit.

### 3.1.2. Traffic Volumes

Based on initial review, the winter Sunday PM peak hour typically experiences long delays and queues (extending through most of the corridor). Although northbound traffic does queue up in the summer, it is less intense than the southbound queuing in the winter. Therefore, this study chose to examine the worst case issues, which is the winter southbound conditions. Existing traffic volumes were provided by the MoTI in January of 2018 at the six signalized study intersections. Turning movement volumes were provided in 15-minute intervals. Counts from Sunday January 14, 2018 were used for this study and are representative of the desired study scenario. Since queues develop around 4:00 pm, the peak period was assumed to be from 3:00 pm to 6:00 pm. [Section 6](#) of this report provides a discussion of summer and internal traffic volumes.

It should be noted, that the volume data from MoTI is from loop detectors at each of the signalized intersections, and while is a good indication of the total demand during non-peak times, only represents the demand served during the peaks, where queues develop on the highway (sometimes extending from Alta Lake Road to north of Lorimer Road) as well as the side-streets.

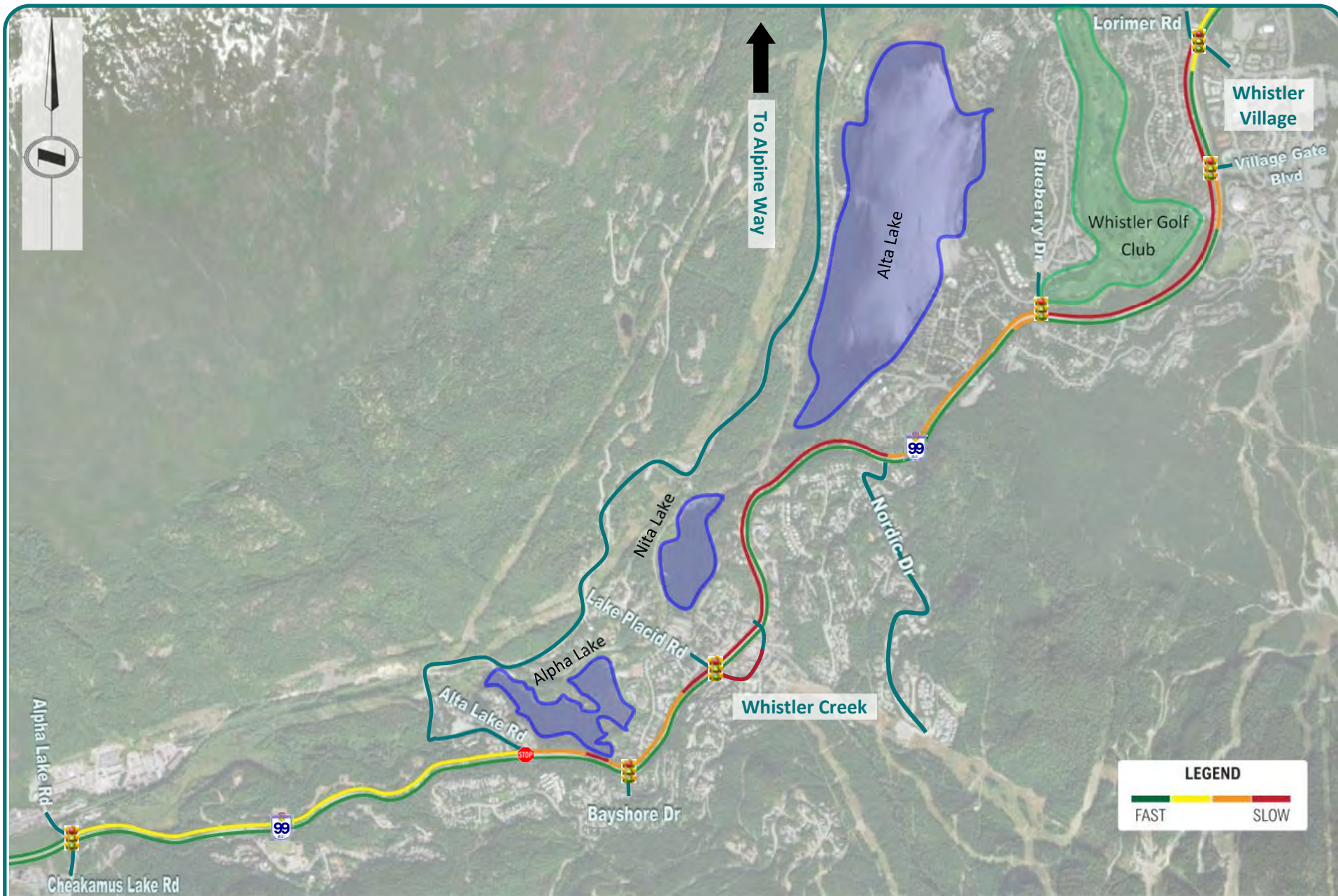
Since traffic volumes were not available at any of the unsignalized intersections, and volumes at these intersections are likely minor during the peak periods, they were only used to balanced between the signalized intersections.

Pedestrian volumes were modelled only at Alta Lake Road (pedestrian signal) and Lake Placid Road, as the other locations had minimal pedestrian volumes, which would not impact vehicle operation. The existing 2018 Sunday PM Peak Hour volumes are presented on [Figure 3](#), while the intersection count data can be found in [Appendix A](#).

### 3.1.3. Traffic Volume Balancing

VISSIM requires volumes between all intersections to be balanced, as the software does not generate or lose vehicles similar to how SimTraffic accounts for volume imbalance. Additionally, as stated above, the counts reflect only the demand served during periods of congestion and does not reflect the true latent demand and the lengthy queuing that occurs throughout the corridor over the course of several hours. This results in significant volume imbalances between signalized intersections. The balancing of volumes was done in a multi-step process:

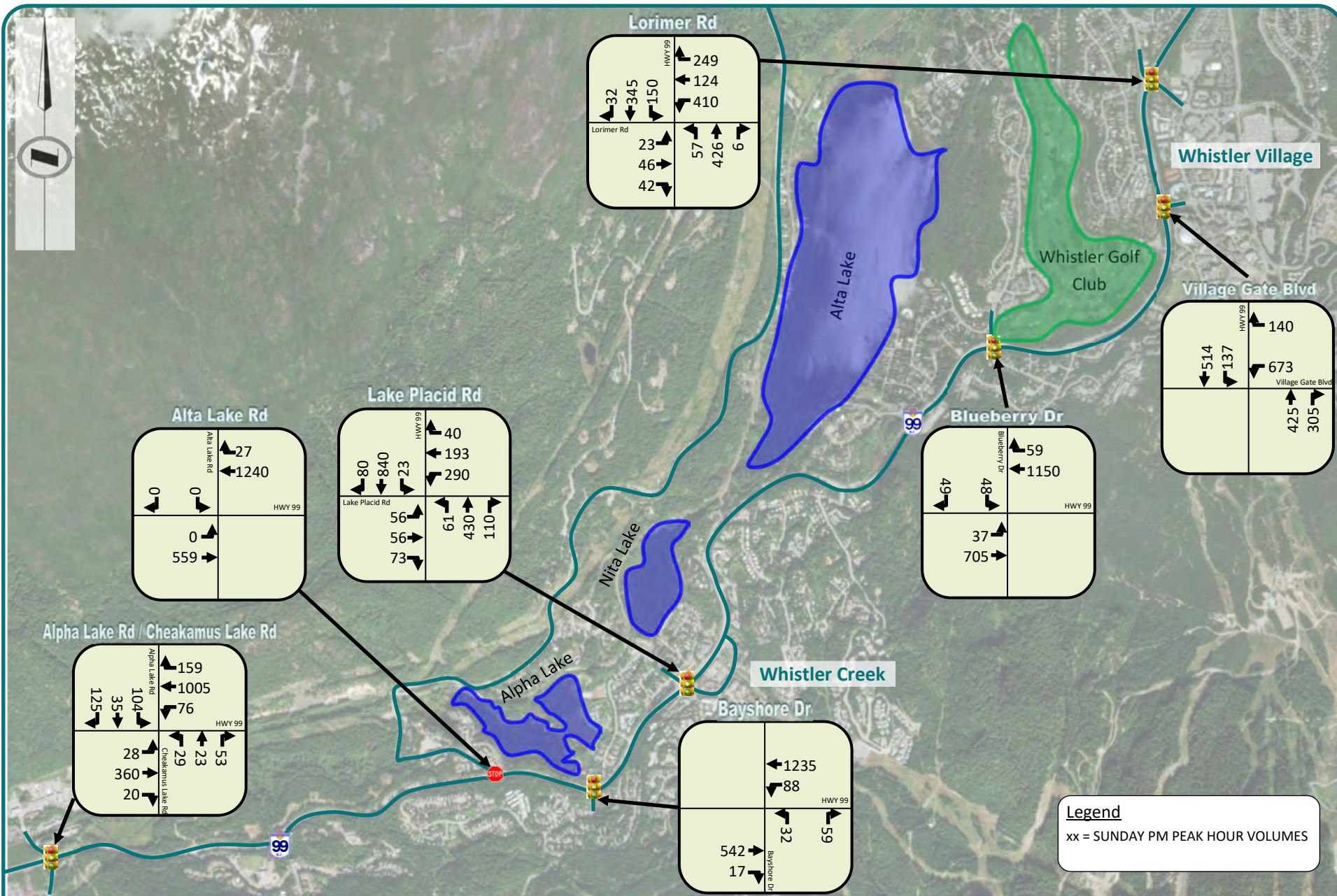
- 1) Through observations made during the site visit, the Highway 99 / Cheakamus Lake Road / Alpha Lake Road and Highway 99 / Lorimer Road intersections generally service 100% of the demand throughout the study period. Therefore, these two intersections were used as controls to balance volumes between intersections.



## HIGHWAY 99 CAPACITY AND SAFETY REVIEW (WHISTLER)

FIGURE 2: SUNDAY PM HIGHWAY DENSITY MAP





## HIGHWAY 99 CAPACITY AND SAFETY REVIEW (WHISTLER)

FIGURE 3: EXISTING 2018 SUNDAY PM PEAK HOUR VOLUMES

- 2) Southbound through volume at each subsequent intersection was balanced up, as any imbalance between intersections would likely be because of the lengthy queues
- 3) Where balancing up resulted in more vehicles at Alpha Lake Road / Cheakamus Lake Road than the count, volume was distributed to minor intersections (Alta Lake Road and London Lane)
- 4) Where volume was still lost at Alpha Lake Road / Cheakamus Lake Road, the volumes at the intersection was increased for all southbound movements
- 5) Northbound volume gains/losses were distributed to minor streets (Spring Creek Drive, London Lane, Whistler Road, Nordic Drive, Hill crest Drive, Whistler Way, and Whistler Cay Drive)
- 6) Where volume was still lost at Lorimer Road, the volumes at the intersection was increased for all northbound movements

This process was done for each hour (2:15 pm – 3:15 pm, etc.) of the study period between 2:15 pm – 6:15 pm.

As stated above, the minor side-streets were observed to have a negligible effect on the overall operation of the corridor and given that traffic volumes were not obtained at these locations, they were assumed not to have any volume, except where volume balancing was necessary. The pedestrian-controlled intersection at Alta Lake Road was also included in the volume balancing due to the eastbound right-turn to southbound Highway 99 influencing the operation of the study corridor.

### 3.1.4. Historical Traffic Growth

There are two BC MoTI permanent count stations within the vicinity of the study area. Station P-15-11NS is approximately 9 km north of the Hwy 99 / Lorimer Road intersection along Highway 99 near the north end of Green Lake. Station P-15-3NS is approximately 40 km south of the Highway 99 / Alpha Lake Road / Cheakamus Lake Road intersection along Highway 99 near Squamish. Data collected from the permanent count station 48 km south of Whistler was used to determine an annual growth rate. Count station P-15-11NS north of Whistler does not capture the high volume of seasonal traffic that travels between Vancouver and Whistler during the winter months and therefore is not a good representation of the traffic behaviour within the study corridor.

The average annual daily traffic (AADT) growth at the permanent count station from 2011 to 2016 is approximately 3% per year. To be consistent during winter weekend months, the monthly average weekend traffic (MAWET) for December, January, February was also calculated from 2011 to 2016. The growth in MAWET from 2011 to 2016 for the three winter months was also approximately 3%, consistent with the average AADT growth rate for the same period. Therefore, the 3% growth rate will be used to project existing traffic volumes for future analysis scenarios. It is noted that the internal traffic volume and growth within Whistler is discussed in [Section 6](#).

It is worth noting that no data before 2011 is being used due to the 2010 Winter Olympics which were held in Vancouver and Whistler. This event resulted in significant traffic variation that is not consistent with typical traffic operation of the highway.

### 3.1.5. Level of Service Analysis

#### Calibration

An existing Highway 99 VISSIM model (traffic microsimulation model) was provided by the MoTI which modelled the highway from Horseshoe Bay to Pemberton. The original model was calibrated based on calibration criteria from the *Traffic Analysis Toolbox Volume III: Guidelines for Applying Traffic Microsimulation Modelling Software*, published by the U.S. Federal Highways Administration. These calibration criteria were based on the calibration criteria originally created by the Wisconsin Department of Transportation. The model was calibrated on traffic volumes, travel times, and a visual audit of vehicle behaviour.

For the scope of this study, the model was reduced to only include the study intersections Cheakamus Lake Road / Alpha Lake Road to Lorimer Road, and a modeled time of 2:15 pm to 6:15 pm (four-hour model). However, after several model runs, it was apparent that the model was not replicating the merge areas (south of Lake Placid Road and south of Village Gate Boulevard) appropriately. To replicate the merge behaviour, McElhanney modified the last 50 m of the merge to a different driver behaviour to better replicate merging under congested conditions. This included:

- Not allowing vehicles to change lanes over the last 25 m of the merge at the lane drop at Taylor Way south of Lake Placid Road and changing the driver behaviour for 25 m upstream of the lane drop
  - Average standstill distance = 5.5 m (from 2 m)
  - Additive part of safety distance = 3 (from 2)
  - Multiplicative part of safety distance = 6 (from 3)
- Not allowing vehicles to change lanes to the right over the last 25 m of the merge south of Village Gate Boulevard and changing the driver behaviour (the above-mentioned changes) over the last 50 m of the merge

Additionally, there was significant queuing WB at Village Gate Boulevard that would not be captured by the counts, as the controller data is only able to record demand that passes over the detector. Therefore, an additional 200 vehicles were added to the WBL for the last two hours of the model to keep it consistent with the previous two hours.

#### Validation of Traffic Model

Given the larger Highway 99 model was already calibrated, only validation of the reduced model within the study corridor was performed. Travel times were obtained using Google's travel time application program interface (API) and compared to the field observations from January 14, 2018. However, the results from Google API was significantly shorter southbound than what was observed from the field visit (even the high travel time). Therefore, the Google travel time information was not solely used to validate the VISSIM model. Instead, the model was validated using a combination of the travel times obtained during the site visit and Google API. The travel time results are summarized in [Table 2](#).



Table 2: Travel Time Results

Direction	Time Period	Travel Time (m:s)				VISSIM (m:s)
		Average	Low	High	Observed	
Northbound	3:15 – 4:15	9:08	8:03	9:56	NA <sup>(1)</sup>	9:31
	4:15 – 5:15	11:01	9:42	12:00	NA <sup>(1)</sup>	9:31
	5:15 – 6:15	9:26	8:23	10:15	NA <sup>(1)</sup>	9:08
Southbound	3:15 – 4:15	9:11	7:52	10:39	~14:00	26:01
	4:15 – 5:15	11:00	9:22	12:44	N/A	43:22
	5:15 – 6:15	9:22	8:08	10:23	~44:00	46:32

**Notes:**

1. No queuing observed at these time periods. Only total travel time recorded.

While the travel time results do not fall within the API data southbound, northbound generally falls within the travel time range. For southbound, the VISSIM results are much closer to the observed travel time. It should be noted that the purpose of the project will be to compare with and without improvements. Therefore, since the model is replicating observed conditions, it will be a good indication of the benefits of the improvements.

Additionally, the traffic volumes obtained from MoTI were validated based on the served (i.e. count), and not demand, as this would result in areas with significantly underserved volumes. [Table 3](#) summarizes the intersection volumes.

The model was also visually inspected at various time intervals to ensure that the behaviour replicated observations in the field.

Table 3: Intersection Volume Results

Intersection	Total Volume			VISSIM Volume		
	3:15-4:15	4:15-5:15	5:15-6:15	3:15-4:15	4:15-5:15	5:15-6:15
1. Hwy 99 / Alpha Lake Rd / Cheakamus Lake Rd	2,020	1,921	1,705	1,890	1,871	1,638
2. Hwy 99 / Alta Lake Rd	NA <sup>(1)</sup>			NA <sup>(1)</sup>		
3. Hwy 99 / Bayshore Dr	1,940	1,719	1,635	1,747	1,784	1,662
4. Hwy 99 / Lake Placid Rd	1,940	1,768	1,692	1,998	2,010	1,938
5. Hwy 99 / Blueberry Dr	1,789	1,462	1,540	1,907	1,691	1,606
6. Hwy 99 / Village Gate Blvd	1,781	1,383	1,360	2,033	1,564	1,546
7. Hwy 99 / Lorimer Rd	2,030	1,808	1,401	2,164	1,810	1,371

**Notes:**

1. Count is not available at this intersection

## Level of Service Definition

Operations of roadway facilities are described in terms of Level of Service (LOS). LOS is a qualitative description of traffic flow based on factors such as speed, travel time, delay, and freedom to manoeuvre. Six service levels are defined ranging from LOS A, the best operating conditions, to LOS F, the worst operating conditions. LOS E corresponds to “at or near capacity” operations. When volumes exceed capacity, stop-and-go conditions result, and operations are designated LOS F. The delay thresholds and corresponding LOS are presented in *Table 4*. The MoTI criterion for acceptable operation is LOS D. Therefore, any movement or intersection operating at LOS E or worse is considered failing.

Table 4: Intersection Level of Service Definitions

Level of Service	Signalized Intersections <sup>(1)</sup>	Unsignalized Intersections <sup>(2)</sup>	Description
<b>A</b>	≤ 10	≤ 10	Represents free flow. Individual users are virtually unaffected by others in the traffic stream. Usually no conflicting traffic
<b>B</b>	> 10 to 20	> 10 to 15	Stable flow, but the presence of other users in the traffic stream begins to be noticeable. Occasionally some delay due to conflicting traffic
<b>C</b>	> 20 to 35	> 15 to 25	Stable flow, but the operation of individual users becomes significantly affected by interactions with others in the traffic stream. Delay is noticeable, but not inconveniencing.
<b>D</b>	> 35 to 55	> 25 to 35	Represents high-density, but stable flow. Delay is noticeable and irritating; increased likelihood of risk taking.
<b>E</b>	<b>&gt; 55 to 80</b>	<b>&gt; 35 to 50</b>	<b>Represents operating conditions at or near the capacity level. Delay approaching tolerance levels; risk taking behaviour is likely.</b>
<b>F</b>	<b>&gt; 80</b>	<b>&gt; 50</b>	<b>Represents forced or breakdown flow. Delay exceeds tolerance level; high likelihood of risk taking.</b>

**Notes:**

Values shown are in seconds/vehicle. **BOLD** indicates unacceptable LOS.

1. HCM 2010, Chapter 18, Signalized Intersections

2. HCM 2010, Chapter 19 (Two-Way) and 20 (All-Way), Unsignalized Intersections

Signalized operations were analyzed using the methodology contained in Chapter 18 of the Highway Capacity Manual (HCM), Transportation Research Board, 2010. This methodology determines the level of service by comparing the average control delay for all vehicles approaching the intersection to the delay thresholds shown in *Table 4*.

For unsignalized (side-street stop-controlled) intersections, the level of service calculations were conducted using the methodology in Chapter 19-20 of the HCM. The LOS rating is based on the average control delay expressed in seconds per vehicle. For controlled approaches composed of a single lane, the control delay is computed as the average of all movements in that lane. *Table 4* also presents the thresholds for unsignalized intersections.

For the purpose of this analysis, based on the previous calibrated model, a vehicle is considered in queue if its speed drops below 5 km/h and has not yet exceeded 10 km/h (after dropping below 5 km/h). Also, a maximum headway of 20 m was assumed (the distance between two vehicles so that the queue is not disrupted) for a vehicle to still be considered in a queue.

## Existing Conditions

A summary of intersection LOS results (worst movement LOS and maximum queue length) for the Sunday PM Peak Hour can be found in *Table 5*

It should be noted that results are for the last hour (5:15 pm - 6:15 pm) of the model, and not presented for each modeled hour. As shown, poor intersection operation starts at the Lake Placid Road intersection and extends to Lorimer Road. A visual inspection of the corridor shows the bottleneck occurring at the merge just south of Lake Placid Road, consistent with field observations.

Table 5: Existing Sunday Intersection LOS

Location	Control <sup>(1)</sup>	Intersection <sup>(2)</sup>	Worst Movement		
			Movement <sup>(3)</sup>	Delay <sup>(2)</sup> (LOS)	Max. Queue (m)
1. Hwy 99 / Alpha Lake Rd / Cheakamus Lake Rd	Signal	15 (B)	EBL	33 ©	55
2. Hwy 99 / Alta Lake Rd	Ped Signal SSSC	7 (A)	EBR	12 (B)	25
3. Hwy 99 / Bayshore Dr	Signal	5 (A)	WBL	<b>113 (F)</b>	30
4. Hwy 99 / Lake Placid Rd	Signal	<b>203 (F)</b>	WBL	<b>470 (F)</b>	Note 5
5. Hwy 99 / Blueberry Dr	Signal	49 (D)	EBR	<b>180 (F)</b>	90
6. Hwy 99 / Village Gate Blvd	Signal	<b>203 (F)</b>	SBT	<b>383 (F)</b>	330
7. Hwy 99 / Lorimer Rd	Signal	<b>138 (F)</b>	SBT	<b>290 (F)</b>	465

### Notes:

1. SSSC = side-street stop-controlled
2. 25 (C) = Average delay per vehicle in seconds (LOS). **Bold** indicates unacceptable operation.
3. Highway 99 is designated north-south (even though there are locations where it runs east-west)
4. Delay in seconds per vehicle
5. Exceeds modeled link, queue likely longer

It is worth noting that the intersection LOS is only reported for the main signalized intersections within the study area that have count data. The minor intersections within the study corridor were primarily used for balancing the volumes between study intersections, and thus are not included in the reported LOS.

## 3.2. Safety

### 3.2.1. Collision History

Collision data for Highway 99 was obtained from MoTI for a ten-year period (2007-2017) and is provided in *Appendix B*. It should be noted that the collision analysis is typically completed for the previous five years. However, to determine any trends along the corridor, the last ten years were analyzed for severity, occurrence, type, contributing factors, and conditions (road/weather/lighting).

#### Collision Severity

*Figure 4* presents the collision severity, while *Figure 5* shows the spatial distribution of the collisions, including the severity, along the corridor. There were 149 property damage, 98 injuries, and four fatalities within the study corridor, for a total of 251 incidents over the past ten years.

As shown on *Figure 5*, the majority of collisions occur at the signalized intersections due to increase in number of conflict points, with 20 or more each at Alpha Lake Road / Cheakamus Lake Road, Lake Placid Road, Blueberry Drive, Village Gate Boulevard, and Lorimer Road, and with the most of those being property damage only. However, at Alpha Lake Road / Cheakamus Lake Road, injuries were higher, which is indicative that speeds are higher at this location (generally, the higher the speeds, the higher the chance of injury). It should be noted that the speed changes from 60 km/h to 80 km/h just south of Alpha Lake Road, approximately 2 km north of this intersection.

There were four fatalities within the study corridor:

- South end of the study area south of Alpha Lake Road / Cheakamus Lake Road (head-on involving a pickup truck and a commercially licenced limousine)
- At Nordic Drive (off-road left involving a motorcycle and logging truck and pole trailer)
- At Blueberry Drive (Van with trailer and pedestrian)
- North of Lorimer Road near the north end of the project (Van and pedestrian)

Three of the four fatalities occurred in locations where it was dark/had no illumination (nearly 40% of all collisions occurred outside of the daylight hours – see discussion below), and two were pedestrian-related. There does not appear to be any specific location pattern to the fatalities within the corridor as they are all spaced out throughout the study area.

Figure 4: Collision Severity

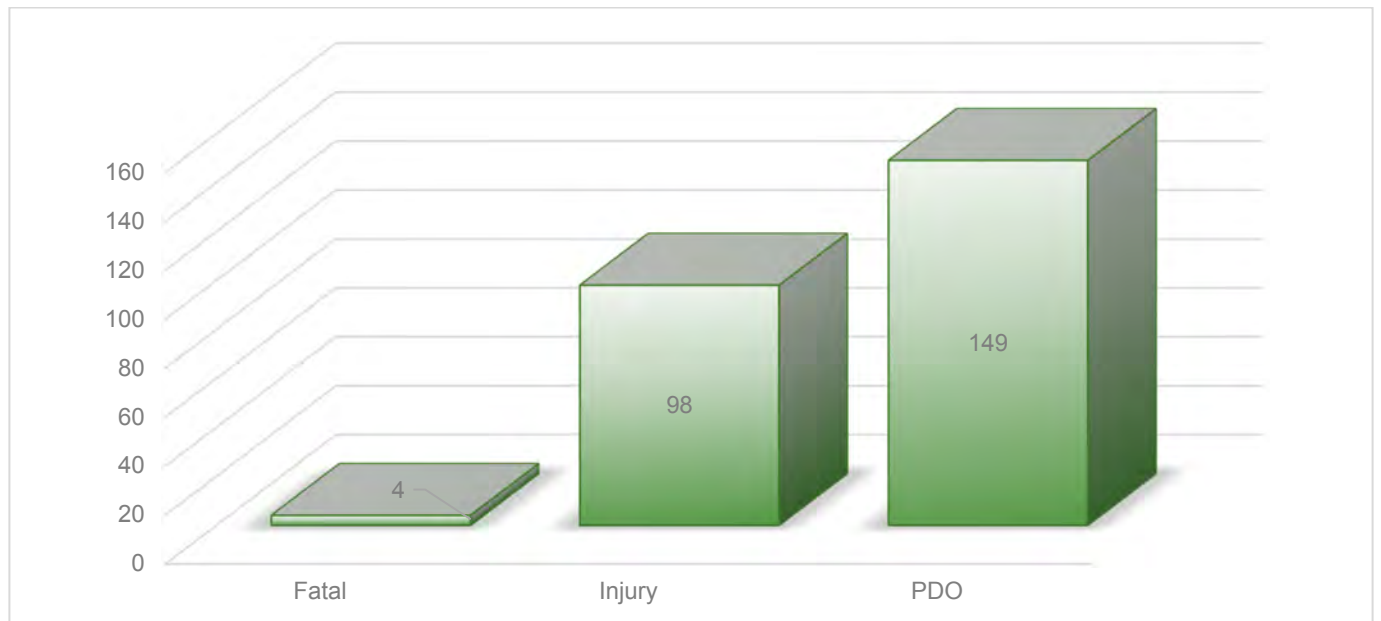
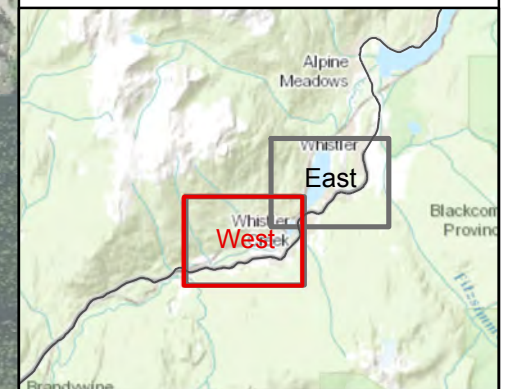




Figure 5 - Spatial Distribution of Collision Severity (West)



2121-00288-02

1:11,000

0 0.1 0.2 0.3 0.4 0.5 km







Figure 5 - Spatial Distribution of Collision Severity (East)



1:11,000



A horizontal scale bar with a black background and white markings. The bar is divided into five equal segments, each labeled with a number: 0, 0.1, 0.2, 0.3, 0.4, and 0.5. The unit 'km' is written at the right end of the bar.



**McElhanney**

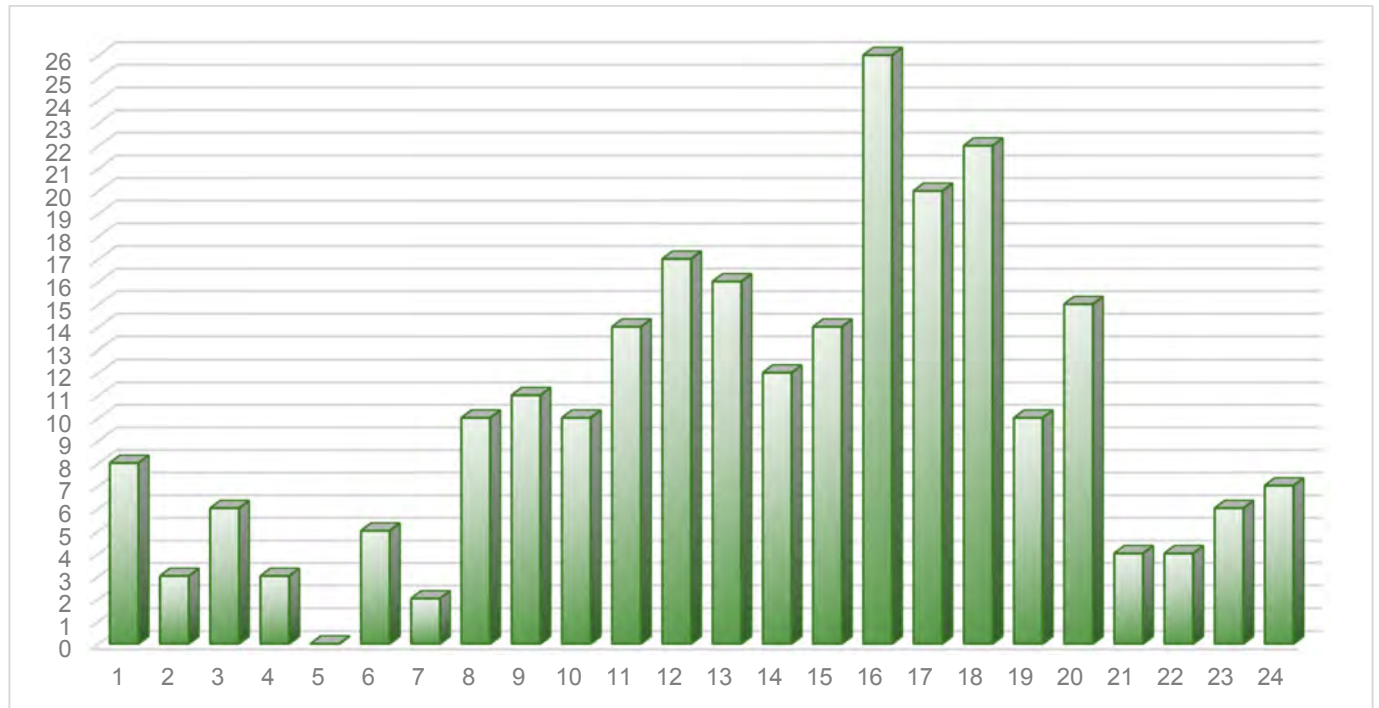


## Collision Occurrence

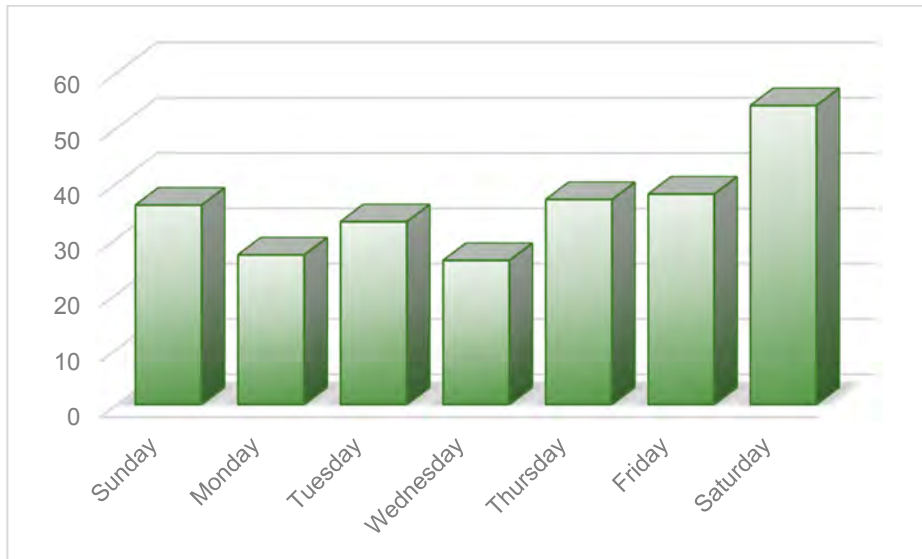
Figure 6 presents the hour ending, day of week, month, and year of collision occurrence. The trends that can be seen from the figures are:

- The highest rate of collisions occurs between the hours of 3:00 pm and 6:00 pm, with the lowest occurring early in the morning around 5:00 am
- Collisions throughout the week are relatively constant with a spike in collisions on Saturdays. This is likely due to the increased recreational traffic experienced by the corridor on weekends.
- Increase in collisions over the winter months (December, January, February) and the end of summer (August). This could be due to the change in weather during the winter (i.e. ice, rain, snow, etc.), the higher traffic volumes during the tourist seasons, and vehicles without dedicated snow tires.
- A general trend of decreasing yearly collisions, with a significant drop from 2016 to 2017. It should be noted that 2017 seems to be an anomaly, as the yearly collisions are consistent between 2007-2016. It's also of note that there did not seem to be a significant increase in collisions in 2010, the year Vancouver held the Winter Olympics.

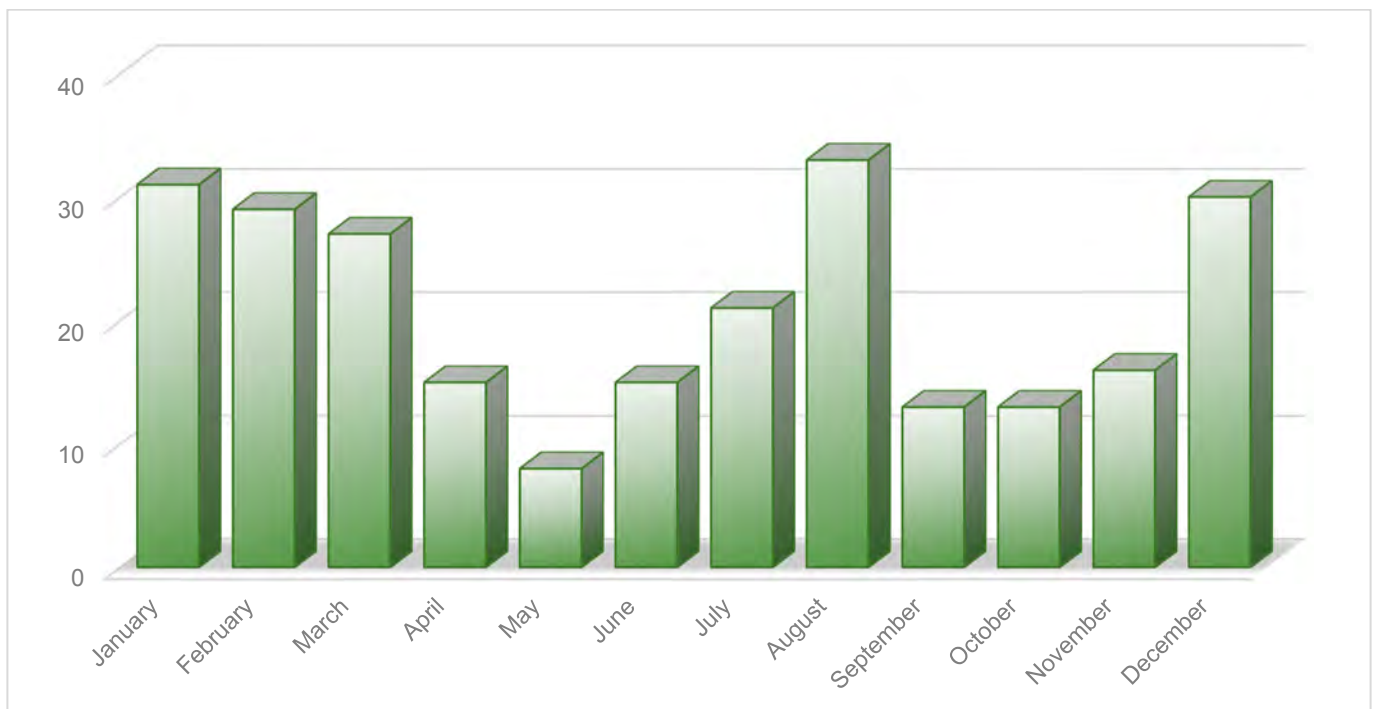
Figure 6: Collision Occurrence



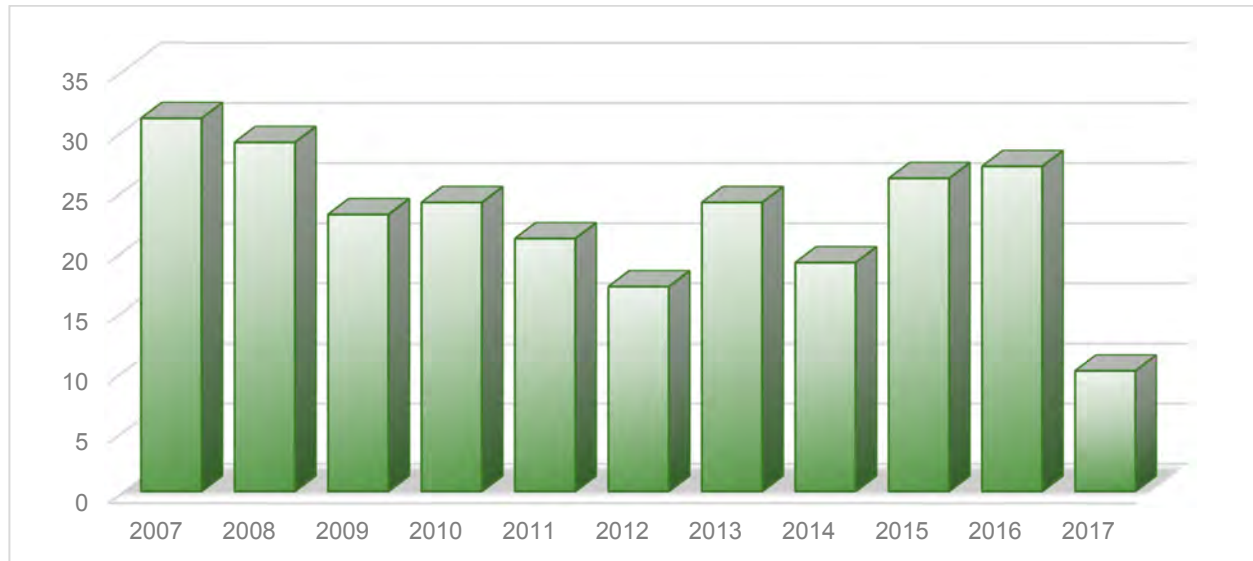
### Hour Ending



*Day of Week*



*Month*

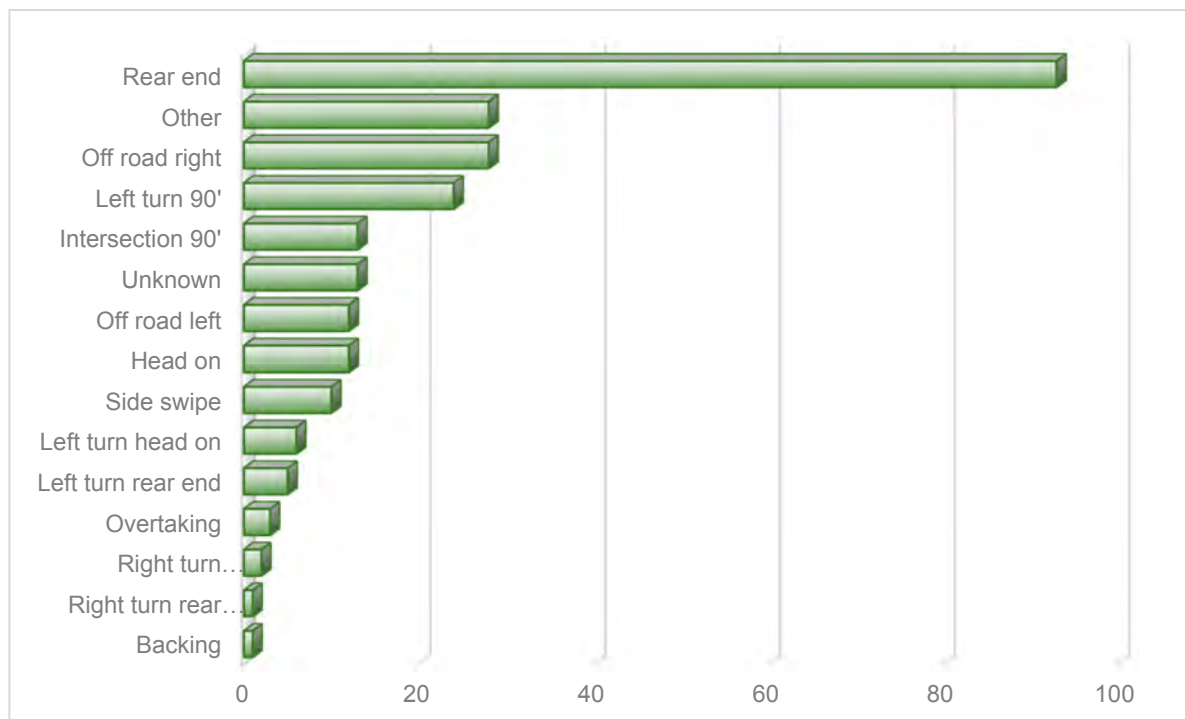


Year

### Collision Type

The types of collisions throughout the study corridor are presented on *Figure 7*, while the location of each of these collisions is presented on *Figure 8*. As shown, rear end occurs over three times as often as the next closest collision type (other) and accounts for approximately 37% of collisions within the study corridor. This is indicative that there is significant queuing in the corridor, as drivers are either too close within the queue or are not expecting a queue.

Figure 7: Collision Type





# Highway 99 Safety Review

Figure 8 - Spatial Distribution  
of Collision Type  
( West )



UTM NAD 83 Zone 10  
Date Modified: Mar 7, 2018  
Map Author: J. Leimanis  
2121-00288-02

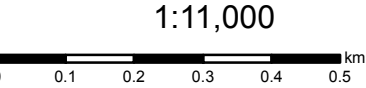





Figure 8 - Spatial Distribution of Collision Type ( East)



2121-00288-02

1:11,000

0 0.1 0.2 0.3 0.4 0.5 km

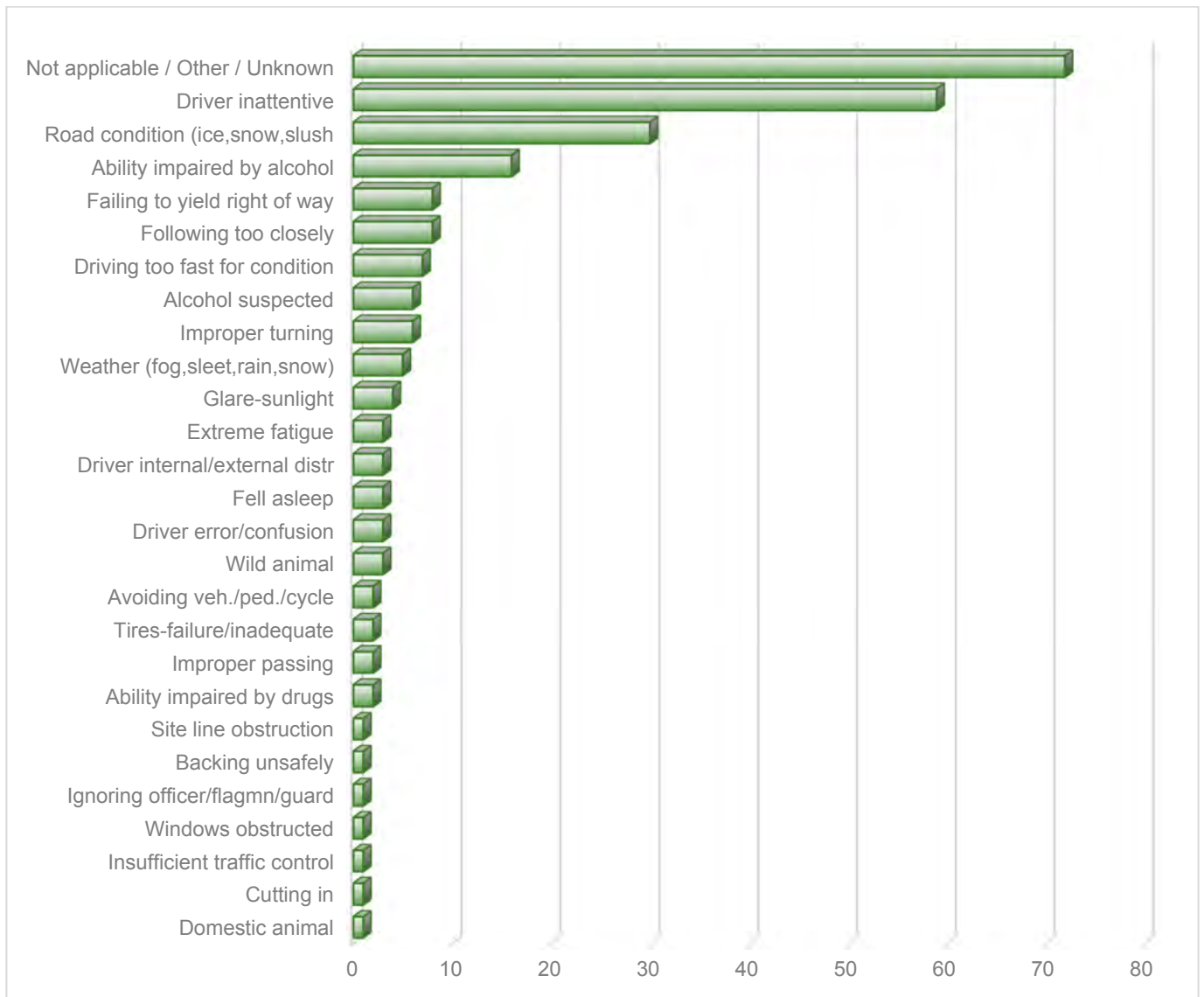




## Contributing Factor

Figure 9 shows the total collisions along the study corridor based on the main contributing factors. Other than not applicable/other/unknown, as shown, driver inattentiveness is the highest contributing factor to collisions along the corridor, accounting for approximately 24% of collisions. Road condition (ice, snow, slush) is the second highest contributing factor accounting for 12% of collisions.

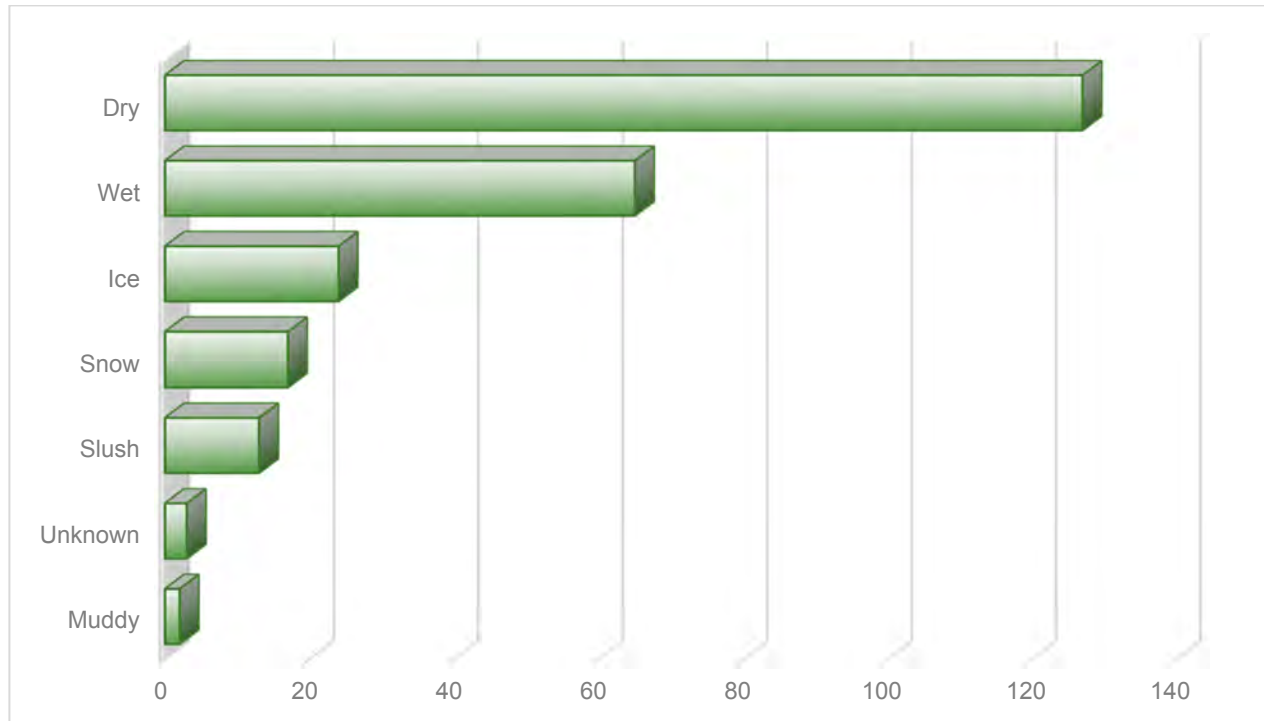
Figure 9: Contributing Factor



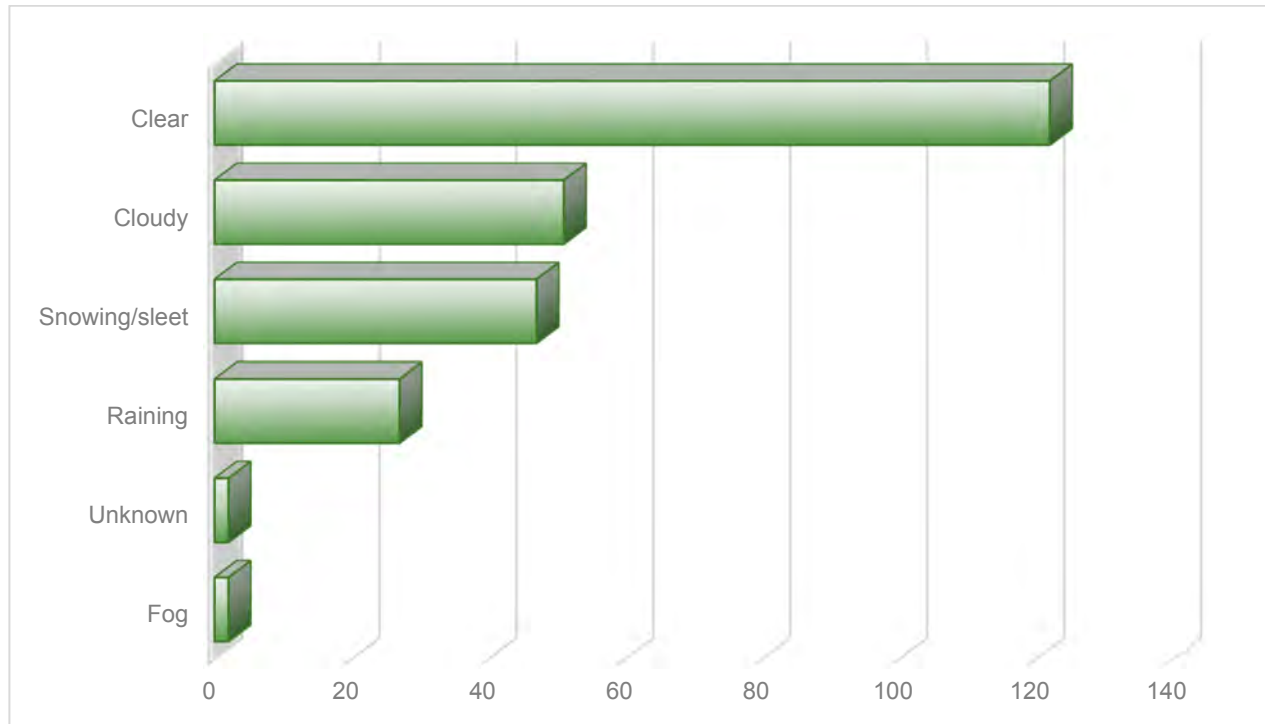
## Conditions

*Figure 10* shows the roadway, weather, and lighting conditions for collisions along the study corridor. As shown, most collisions occurred during daylight, with clear skies, and a dry road. Therefore, collisions along the corridor are generally not a result of the prevailing adverse conditions.

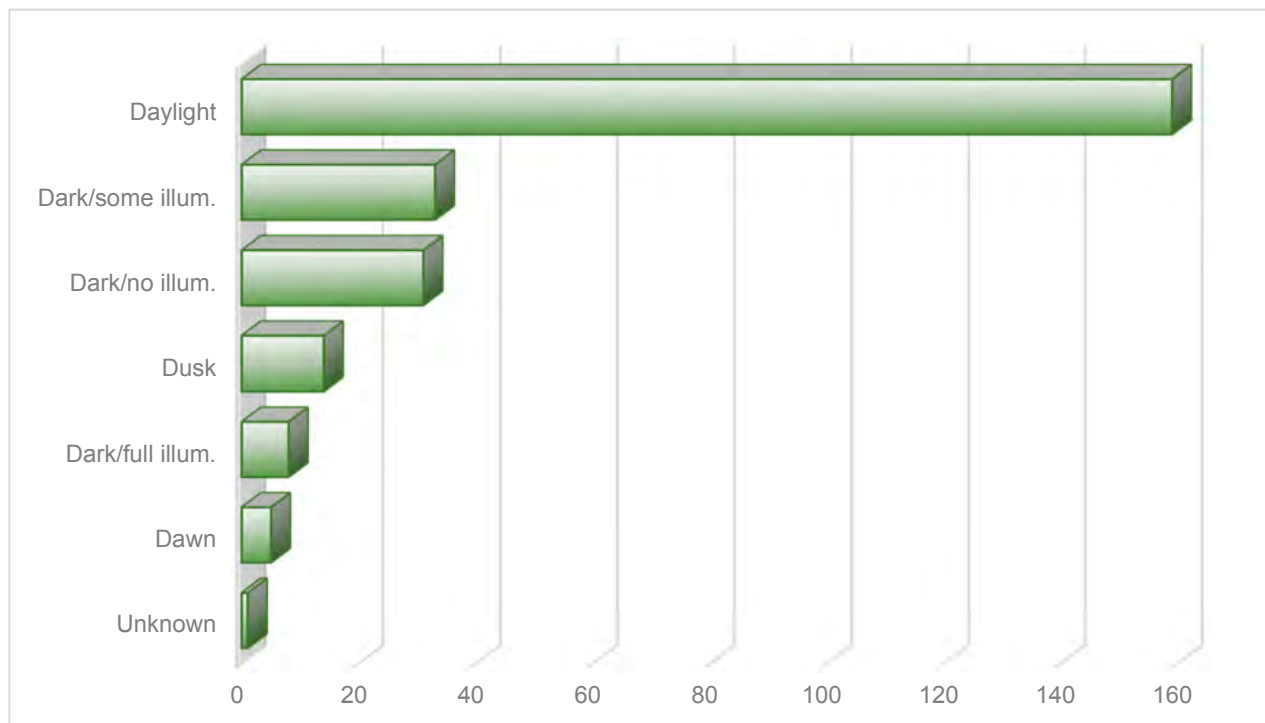
*Figure 10: Road Conditions*



### Roadway Condition



*Weather Conditions*



*Lighting Conditions*



### 3.2.2. Intersection & Provincial Collision Rate and Severity Index Comparison

The safety performance measures for the study intersections were compared to British Columbia Provincial benchmarks to determine if the study intersections are within the Provincial average of similar intersections. The latest five-year traffic volume range (January 1, 2009, to December 31, 2013) and average Provincial collision rates by highway service class ([Appendix C](#)) were used to compare the observed rates at the study intersections. It should be noted that while the collision history above is from the last ten years, the intersection and severity index are only from the last full five years (2013-2017). This results in a decrease in collisions from 251 for the ten-year period to 106 for the last five years (a reduction of approximately 58%). The following safety performance benchmarks, based on Provincial rates, are the most commonly used to determine the performance of a highway and have been used as part of this study. The highway classification used for Highway 99 is urban undivided, two-lane arterial with at-grade intersections (UAU2).

- *Provincial Average Collision Rate:* An average collision rate is simply an average of the calculated collision rates for a large group of similar locations that can be used as the basis for comparison. The average collision rates are often generated by road classification and traffic volume levels.
- *Critical Collision Rate:* The critical collision rate, which is based on statistical quality control procedures, has been the most widely used statistical technique among highway agencies to identify collision prone locations. The technique defines a location as collision prone if the observed collision rate exceeds a critical collision rate, which is based on the average collision rate. The critical collision rate is calculated as follows:

$$CR = CRave + k \sqrt{\frac{CRave}{m}} + \frac{1}{2m}$$

where,

*CRave* = Average Provincial collision rate

*k* is a constant (1.64 for 95% confidence)

*m* = Million Vehicle Kilometres (MVK)

- *Provincial Average Collision Severity Index (CSI):* An average collision severity index is simply an average of the calculated collision severity indices for a large group of similar locations that can be used as the basis for comparison. Similar to average collision rates, the average CSI are often generated by road classification.

[Table 6](#) presents a comparison of observed safety performance measures at the seven study intersections as compared to Provincial benchmarks for similar intersections.

Table 6: Comparison of Provincial Averages & Intersection Collision Rates

Location	Provincial Average Collision Rate <sup>(1)</sup>	Provincial Critical Collision Rate <sup>(2)</sup>	Intersection Average Collision Rate	Collision Prone (Yes/No)
Hwy 99 / Alpha Lake Rd / Cheakamus Lake Rd	0.25	0.40	0.41	Yes
Hwy 99 / Alta Lake Rd	0.09	0.19	0.23	Yes
Hwy 99 / Bayshore Dr	0.25	0.41	0.06	No
Hwy 99 / Lake Placid Rd	0.34	0.51	0.16	No
Hwy 99 / Blueberry Dr	0.25	0.40	0.29	No
Hwy 99 / Village Gate Blvd	0.34	0.51	0.32	No
Hwy 99 / Lorimer Rd	0.25	0.41	0.37	No

**Notes:**

1. Based on Road Classification (UAU2); Provincial Average Collision Rate = number of collisions/million entering vehicles
2. See notes above for calculation of Provincial Critical Collision Rate

As can be seen, the Alpha Lake Rd / Cheakamus Lake Road intersection and Alta Lake Road intersection are considered collision prone when compared to the Provincial Critical Collision Rate. Over the last five years there have been 14 and seven collisions at the two intersections, respectively.

Table 7 presents a comparison of observed intersection collision severity to the Provincial severity index for the UAU2 roadway classification. The severity index is calculated as:

Severity Index = (100\*fatal collisions + 10\*injury collisions + property damage collisions) / total number of collisions during 5-year period

Table 7: Comparison of Provincial Averages & Intersection Severity Indices

Location	Provincial Severity Index	Intersection Severity Index	Higher than Average Severity
Hwy 99 / Alpha Lake Rd / Cheakamus Lake Rd	7.82	6.79	No
Hwy 99 / Alta Lake Rd	7.73	4.86	No
Hwy 99 / Bayshore Dr	7.82	1.00	No
Hwy 99 / Lake Placid Rd	5.40	4.00	No
Hwy 99 / Blueberry Dr	7.82	4.60	No
Hwy 99 / Village Gate Blvd	5.40	3.25	No
Hwy 99 / Lorimer Rd	7.82	6.25	No

As shown, the severity index for the study intersections does not exceed the Provincial average. The results indicate that while the collisions occurring at the Alpha Lake Road / Cheakamus Lake Road and Alta Lake Road intersections are greater than the Provincial Critical Collision Rate, they are not as severe as collisions

occurring at similar intersections. There have been no fatalities at either of these intersections within the past five years.

### 3.2.3. Provincial Collision Prone Locations and Segments

Collision Prone Locations (CPLs) refer to intersections and Collision Prone Sections (CPSs) are highway segments at least a kilometre in length (excluding intersections), which have been identified as locations for safety improvements based on an analysis of collision data. Based on the Ministry's Collision Information System (CIS), CPLs and CPSs are identified using a preliminary safety performance analysis. The sites are then ranked to provide a priority for more detailed analysis. These are just the first steps in the Roadway Safety Management Process. Subsequent steps at the project level include problem confirmation (a more detailed review of collision data, traffic volumes, site conditions, etc.), problem definition (defining the issue; whether it's reduced site lines, unsafe vehicle speeds, lack of capacity, etc.), option development (how to address the issue), and option evaluation (benefits, costs, and other impacts). The *Corridor Management Plan and Project Level In-Service Road Safety Review Guidelines*, MoTI, rev. November 2010, provides further guidance on safety problem identification, problem definition, option development, and option evaluation (<http://www.th.gov.bc.ca/publications/planning/index.htm>).

Within the scope of this project, a review of the CIS data to determine if any locations within the study area are collision prone is sufficient.

The CPL and CPS locations are analyzed based on the composite index of the site. Each site is tested against two criteria and if both components of either criteria are satisfied the site is added to the collision prone list.

- Criteria 1: Collision Rate > Critical Collision Rate AND Number of Collisions > 15; or
- Criteria 2: Collision Severity Ratio > 6.0 AND Number of Collisions > 15

The composite index is calculated as follows:

- Composite Index = ADT x Severity-Weighted Accident Rate (SWAR) / Critical Severity-Weighted Accident Rate (CRSWAR).

The latest data available for the study area is from January 1, 2009, to December 31, 2013 (five years). The data shows none of the roadway segments (CPS) in the study area having a composite index that is ranked as collision prone for level one or two criteria. Additionally, none of the intersections are on the composite index rank for collision prone locations (CPL) for level one or two criteria.

### 3.2.4. Collision History Summary

The majority of collisions within the study corridor occur between 3:00 pm and 6:00 pm, and on Saturdays (not necessarily during the same time). The winter months of January, February, and December have the highest rate of collisions, as well as, the end of summer in August. Rear end is the most common type of collision (37%) with driver inattentiveness being the leading cause (24%). Most collisions occurred during daylight, with clear skies, and a dry road. Therefore, collisions along the corridor are generally not a result of the prevailing adverse driving conditions. Overall there has been a general decreasing trend in collisions over the past ten years with a significant drop in collisions from 2016 to 2017. It should be noted that 2017 seems to be an anomaly, however, as the yearly collisions are consistent between 2007-2016. It's also of note that there did not seem to be a significant increase in collisions in 2010, the year Vancouver held the Winter Olympics.

The Highway 99 / Alpha Lake Road / Cheakamus Lake Road and Highway 99 / Alta Lake Road intersections are considered collision prone when compared to the Provincial Critical Collision Rate. However, the severity index for these two intersections does not exceed the Provincial average. This indicates that while the number of collisions occurring at the two study intersections are greater than the Provincial Critical Collision Rate, they are not as severe as collisions occurring at similar intersections. There have not been any fatalities at any of the seven study intersections over the past five years.

The latest CPS and CPL data for the study area from January 1, 2009 to December 31, 2013 shows that none of the roadway segments or study intersections are collision prone for level one or two criteria.

### 3.3. Reliability

MoTI maintains a record on road closure events such as road closures related construction, incidents, and special events. MoTI provided closure events that were recorded along Highway 99 between January 2006 and December 2017. During this period there were 222 closures recorded within the Whistler area. There were ten closures for collisions, 201 for construction, five for special events, and six closures for miscellaneous events such as downed hydro lines and winter highway maintenance. All construction closures occurred before 2010, indicating that the majority, if not all, were related to the Sea-to-Sky upgrades for the 2010 Olympics in Vancouver. There have only been nine road closures since 2010, with five of those being planned closures for special events. The remaining four consist of a collision in 2013 that closed the highway in both directions for under 17 hours, a collision in 2017 that closed the highway in both directions for over an hour, and two police incidents in 2011.

Since Highway 99 is the primary route through the study corridor, any road closure, either partial (i.e. one-way) or full, would result in significant delay to users of the highway. The only viable detour route would be Alta Lake Road west of the Highway 99 corridor, between the Highway 99/Alta Lake Road and Highway 99/Alpine Way intersections. However, Alta Lake Road is a two-lane facility with limited shoulders and does not appear to be capable of accommodating a high number of vehicles (especially heavy vehicles).

### 3.4. Multi-Modal Considerations

#### 3.4.1. Pedestrians

Pedestrian facilities are limited within the corridor, with no sidewalks adjacent to the highway for the length of the corridor. There are separated MUP segments on the east side of Highway 99 between Bayshore Drive and Lake Placid Road, London Lane and Whistler Road, as well as, Village Gate Boulevard and Lorimer Road. There is also a multi-use bridge crossing above the highway at Nordic Drive. All the separated facilities adjacent to the highway are part of the Valley Trail network that runs throughout the Whistler area.

#### 3.4.2. Cyclists

Many of the facilities mentioned above are also available for cyclist use. The valley trail network is a multi-use trail primarily for pedestrians. It provides separated facilities away from the highway traffic for its users. There



are marked bike lanes both northbound and southbound directions for the length of the study corridor. The cyclist lane pavement markings are wearing out and difficult to identify at certain points along the highway.

### 3.4.3. Transit

The study corridor is well serviced by public transit, with multiple bus routes running throughout the area. The bus numbers and a short description of their service routes are shown below.

- **20** – Runs between Cheakamus Crossing and Function Junction following Highway 99 northbound to Whistler Village. Makes a detour off the highway to stop in Whistler Creek and to service the large residential area north of Whistler Creek.
- **21** – Runs between Spring Creek following Highway 99 northbound to Whistler Village. Makes a detour off the highway to stop in Whistler Creek and to service the large residential area north of Whistler Creek.
- **25** – Runs between Whistler Creek following Highway 99 northbound to Whistler Village. Makes a detour off the highway to service the large residential area north of Whistler Creek.
- **6** – Originates and terminates at Whistler Village. Services the large residential area of Whistler Cay Heights around the Whistler Golf Club and adjacent to the east shore of Alta Lake.
- **30, 31** – Runs from Whistler Village following the highway northbound past Lorimer Rd.
- **10** – Runs between Emerald Estates and Alpha Lake Road/Cheakamus Lake Road.

A complete transit map of the Whistler area can be found in [Appendix D](#).

### 3.5. Existing Conditions Summary

An initial review of the existing summer and winter conditions within the study corridor show that there is significant southbound queuing throughout the study corridor during the Sunday PM Peak in winter, with travel times in upwards of three to four times those of a typical trip. The primary issues appear to be due to reduced capacity at the lane drop south of Lake Placid Road and Village Gate Boulevard. Another reason is the sharp spike in traffic exiting the ski area which cannot be accommodated by the corridor with primarily one southbound lane. MoTI has implemented a max. green extension for southbound to try to resolve queuing in the corridor. However, as the issues seem to be related to the lane drops, rather than the available green time, the additional green time tends to be wasted as vehicles are unable to proceed through the intersection.

Over the past ten years there have been 251 incidents within the study area. The majority occur at/near signalized intersections, with rear-end being the most common type of incident. This is indicative that queues are developing along the corridor (either at the signalized intersections or lane drops), which is a result of more demand than there is capacity. Additionally, queuing seems to be mostly limited to southbound, especially during the winter months on a Sunday afternoon when most people are leaving Whistler to return south (either Squamish or Vancouver).

The highest rate of collisions occurs between the hours of 3:00 pm and 6:00 pm, which is during the weekday PM peak or a Sunday leaving Whistler.

While the queuing seems to be higher on Sundays in the winter, over the year, more incidents actually occur on Saturdays. There is also a noticeable increase in incidents over the winter months (December, January, February). However, there has been a general decreasing trend in incidents within the corridor over the past ten years, with a significant drop from 2016 to 2017. It should be noted that 2017 seems to be an anomaly, however, as the yearly collisions are consistent between 2007-2016. It's also of note that there did not seem to be a significant increase in collisions in 2010, the year Vancouver held the Winter Olympics.

Most collisions occur during daylight, with clear skies, and a dry road. This indicates that collisions along the corridor are generally not a result of the prevailing adverse conditions (i.e. when conditions are bad, people are generally more cautious). However, there were four fatalities within the study corridor; three of the four occurred in locations where it was dark/had no illumination, and two were pedestrian-related. There does not appear to be any specific location pattern to the fatalities within the corridor as they are all spaced out throughout the study area.

The Highway 99 / Alpha Lake Road / Cheakamus Lake Road intersection and the Highway 99 / Alta Lake Road intersection are considered collision prone when compared to the Provincial Critical Collision Rate. Over the past five years there have been 14 and seven collisions at the two intersections, respectively. However, the severity index for these two intersections does not exceed the Provincial Average. This indicates that while the collisions occurring at these intersections are greater than the average, they are not as severe as collisions occurring at similar intersections.

The latest CPS and CPL data for the study area shows that none of the roadway segments or study intersections are collision prone for level one or two criteria.

## 4. Conceptual Design Analysis

### 4.1. Option Development

The goal of the overall project is to develop short- and medium-term options to address operational deficiencies in the study area. Accordingly, the options have been separated into short- (within the next five years) and medium-term (within five to ten years) options. A long-term option is also provided for discussion purposes. It should be noted that all short and medium-term options were analyzed with existing volumes for purposes of this discussion.

#### 4.1.1. Short-Term Options

Deficiencies at the Highway 99 / Lorimer Road intersection are related to the queues from the southbound lane merges (south of Village Gate Boulevard and south of Lake Placid Road) as well as the high demand (410 vph) for the WB left exiting the village. Currently, the second southbound lane is developed from the eastbound right turn lane, which has a much lower volume of 42 vph. This imbalance of lane allocation creates turbulence and reduction in capacity. Since addressing the operations of the lane merges is related to medium and longer term options (more costly options require more time to design and construct), the short-term recommendation is to provide an immediate additional westbound left-turn lane capacity at the Highway 99 / Lorimer Road intersection. This can be accomplished one of two ways (conceptual design sketches are attached in [Appendix E](#)):

- Re-stripe the through lane for shared through-left movements; split phase east-west operation (due to the shared lane, it is necessary to split-phase to ensure safe operation EB and WB); or
- Add a second lane in the median (minimum 75 m); protected only phasing for the WB left

With either option, the EB right-turn will need to become yield control (from free) as the WB left-turn will need to utilize both southbound lanes. This short-term improvement will increase capacity and intersection performance all year-round. The evaluations results are documented in [Section 5.3](#).

#### 4.1.2. Medium-Term Options

All medium-term options would include the WB left improvement at Highway 99 / Lorimer Road.

##### Option 1 – Counterflow

This option would include a counterflow lane between Lake Placid Road to just north of Alpha Lake Road / Cheakamus Lake Road. Long-term, the counterflow lane could be extended to north of Lorimer Road, but since the main operational deficiency in the corridor is the southbound lane drop south of Lake Placid Road, it is not required in the medium term.

There are two options for a counterflow lane: a single lane separating northbound and southbound direction (similar to W. Georgia Street in downtown Vancouver, BC) that can be operated either direction depending on the need, including a three-lane cross section through intersections (i.e. no separate left-turn lanes); or a single lane separating northbound and southbound direction that can be operated either direction depending on the need, with widening to a five-lane cross section through intersections (i.e. with left-turn lanes).

The first option requires less widening of the roadway. However, with this operation, left-turns must be prohibited from the highway to prevent head-on collisions in the counterflow lane (drivers becoming confused where they should turn left) or rear-end collisions as a vehicle stops in the through lane to find gaps in the opposing direction. While this may be desirable in downtown Vancouver, most (if not all) of these intersections are the only option for access into the neighbourhood. Therefore, this is not likely an option, as it prohibits access for local residents and businesses.

The second option would require widening at any intersection that has a left-turn to accommodate left-turns from the highway during counterflow operation (schematic drawings are attached in [Appendix F](#)). For the medium-term option, this would require widening at three intersections (Bayshore Drive, Alta Lake Road, and Spring Creek Drive). However, long-term, this would include more than ten locations. While it would be feasible to widen at only the three intersections in the short-term, long-term, this would likely be cost prohibitive, potentially require closing some access points, and/or developing a parallel road system. Additionally, the operational deficiencies are mostly southbound (the northbound does not have the same pulse of traffic as the southbound during the Sunday PM, as vehicles arrive throughout the weekend rather than leave all around the same time), and therefore developing a counterflow lane does not seem to be a beneficial as it would likely be in southbound operation most of the time anyway. Therefore, a counterflow lane would not be recommended to address the corridors operational deficiencies.

### Option 2 – Two Southbound Lanes from Taylor Way to Bayshore Drive

This option would continue the two southbound lanes from the current terminus point south of Lake Placid Road (lane drop to Taylor Way) to approximately 125 m south of Bayshore Drive (schematic drawings are attached in [Appendix G](#)).

As shown in [Table 8](#) with Option 1, the travel time northbound remains relatively unchanged when compared to Existing. However, southbound travel times are reduced by approximately 25%. The LOS also improves or remains consistent at all intersections, with the exception of the Highway 99 / Bayshore Drive intersection (shown in [Table 9](#)). The main reason for the degradation is that the two-lane section ends downstream of the intersection, causing queues to spillback through the intersection. In Existing conditions, since the bottleneck is upstream of the intersection, the intersection operates well.

### Option 3 – Two Southbound Lanes from Taylor Way to Alpha Lake Road

This option would continue the two southbound lanes from the current terminus point south of Lake Placid Road (lane drop to Taylor Way) to just north of Alpha Lake Road / Cheakamus Lake Road, where the highway widens to two lanes southbound (and continues for approximately 2.5 km to the south). This can be accomplished one of two ways (schematic drawings are attached in [Appendix H](#)):

- a. Option 3A – Drive on Shoulder: Widen the shoulder (approximately 1.5 m to 2.5 m depending on existing shoulder width) to accommodate vehicle travel on the shoulder during times of congestion (e.g. during winter weekend PM peak periods). This would require additional infrastructure (Intelligent Transportation Systems – ITS) to monitor and warn drivers that they are allowed (or not) to drive on the shoulder. Additionally, bus bays (additional 3.0 m) would need to be accommodated, likely behind the shoulder, as well as emergency pullouts (additional 2.5 m) at about every 500 m to provide areas for vehicles to pull over (in an emergency) so they are not blocking the shoulder during drive-on-shoulder operation. Additional width will also be required for areas requiring concrete roadside barriers.
- b. Option 3B – Two full southbound lanes: Widen southbound by an entire lane (3.6 m) plus standard shoulder. Additional width will be required for bus bays and areas requiring concrete roadside barriers.



The conceptual drawings also identified potential impacts to properties and areas requiring rock cuts or retaining walls due to the road widening.

As shown in [Table 8](#) with all three options, the northbound travel time remains relatively unchanged when compared to Existing. However, with Option 3A or 3B, southbound travel times are reduced by approximately 50% to 75% over the three-hour period in the Sunday afternoon.

With Option 3, the Level of Service (LOS) also improves or remains consistent at all intersections, with the exception of the Highway 99 / Alpha Lake Road / Cheakamus Lake Road intersection as shown in [Table 9](#). The main reason for the degradation is that more vehicles are able to get through the corridor, and hence incur a little more delay at the intersection. However, it should be noted that the intersection still operates well.

[Table 8: Travel Time Comparison](#)

Direction	Time Period	Travel Time (m:s) <sup>(1)</sup>		
		Existing	Option 2	Option 3 <sup>(2)</sup>
Northbound	3:15 – 4:15	9:31	9:27 (0:04)	9:30 (0:01)
	4:15 – 5:15	9:31	9:26 (0:05)	9:29 (0:02)
	5:15 – 6:15	9:08	9:07 (0:01)	9:01 (0:07)
Southbound	3:15 – 4:15	26:01	20:56 (5:05)	13:17 (12:44)
	4:15 – 5:15	43:22	31:40 (11:42)	14:59 (28:23)
	5:15 – 6:15	46:32	36:30 (10:02)	12:50 (33:42)

**Notes:**

Travel times are based on existing winter volumes.

- xx (yy) = Option travel time (difference from Existing). **Purple** denotes travel time savings.
- Option 3 performance is same for Options 3A and 3B.

[Table 9: Intersection LOS Comparison](#)

Location	Existing	Option 2	Option 3
1. Hwy 99 / Alpha Lake Rd / Cheakamus Lake Rd	15 (B)	15 (B)	20 (C)
2. Hwy 99 / Alta Lake Rd	7 (A)	8 (A)	5 (A)
3. Hwy 99 / Bayshore Dr	5 (A)	143 (F)	4 (A)
4. Hwy 99 / Lake Placid Rd	203 (F)	173 (F)	21 (C)
5. Hwy 99 / Blueberry Dr	49 (D)	41 (D)	8 (A)
6. Hwy 99 / Village Gate Blvd	203 (F)	146 (F)	20 (C)
7. Hwy 99 / Lorimer Rd	138 (F)	21 (C)	21 (C)

**Notes:**

Intersection LOS based on existing winter volumes.

Delay is presented in seconds/vehicle

xx (yy) = Delay (LOS)

### 4.1.3. Long-Term Option

While not part of the current task, McElhanney has developed a long-term option that provides two lanes southbound from Lorimer Road to Alpha Lake Road (schematic drawings are attached in [Appendix I](#)). This is provided for discussion purposes as it is likely, in the long-term, two southbound lanes will be required to accommodate the heavy southbound volume between Lorimer Road and Alpha Lake Road.

## 5. Option Evaluation

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### 5.1. Methodology

The methodology for option evaluation was aimed at achieving as many of the project objectives as possible. The evaluation considered several key project objectives including cost, safety, traffic operations, drivers experience, compatibility with long-term options, constructability, and environmental impacts. A multiple account evaluation (MAE) framework was established with evaluation criteria used to qualitatively score each design option. Based on this option evaluation process, recommendations are presented for consideration.

### 5.2. Evaluation Criteria

#### Cost

To better compare conceptual design options, detailed construction cost estimates were prepared for each option using the Elemental Parametric estimation method (known as “Wolski method”). The key elements include items such as grade construction, drainage, structural construction, paving construction, signing and pavement markings/operational construction, electrical, landscaping, and utility construction. A 30% construction contingency was included in all construction cost estimates, as well as, 8% for First Nations Accommodations and 12% for MoTI Regional Cost Recoveries & Project Management. The total project cost does not include land acquisition costs. A breakdown of the detail Wolski cost estimates can be found in *Appendix J*.

#### Safety

The Ministry’s ShortBEN tool was used to calculate the collision savings, which compares collision rates and severities of the Base and Proposed Cases. Specific collision severity (fatal, injury, PDO) is provided within the ShortBEN tool and is adjusted to reflect the specific improvements for each option.

The collision rate and severity distribution for the base case was assumed to be similar to the provincial average for a rural arterial undivided two-lane highway (RAU2). Provincial average data for rural arterial undivided three-lane highways is unavailable. Therefore, the collision rate and severity distribution for the proposed case was assumed to be the average of a rural arterial undivided four-lane highway (RAU4) and an RAU2.

The collision impacts, and the potential savings realized through proposed upgrades, were assessed over a 25-year benefit period. The net present value of the total benefit was obtained using a 6% discount rate, per the Ministry’s Guideline.

To calculate the total cost for all collisions, the number of collisions saved was multiplied by the latest collision costs from the Ministry’s default values for each collision type:

- Fatal: \$8,087,204/incident
- Injury: \$302,636/incident
- PDO: \$13,518/incident

## Traffic Operations

Travel time costs for the Highway 99 improvements were calculated using ShortBEN and are a function of:

- Number of vehicle trips
- Distance travelled
- Travel speed
- Value of time

The travel time costs for each trip origin and destination are calculated as:

$$\text{Travel Time Cost} = (\text{Distance} / \text{Speed}) \times \text{Trips} \times \text{Value of Time}$$

Travel speeds for the Base and Proposed Cases were estimated using field observations. For the base case it was assumed that the speed varied throughout the day based on congestion. During peak congestion periods it was assumed that traffic travelled at average speeds of 11 km/h. Vehicles speeds during shoulder and off-peak periods were assumed to be 23 km/h and 35 km/h, respectively.

It was also assumed that congestion only occurs on Saturdays and Sundays during the ski season (November to April) and on long weekends during the rest of the year (May to October). In total it is assumed that congestion occurs for 58 days throughout the year.

For the proposed cases it was assumed that congestion would be reduced. Therefore, it was assumed that travel speeds will be consistent throughout the day and are similar to speeds observed during the off-peak time (35 km/h).

## Vehicle Operating Cost Savings

Vehicle operating costs were calculated using the ShortBEN tool and are a function of:

- Number of vehicle trips
- Distance travelled
- Travel speeds
- Unit costs (e.g. fuel, depreciation, licensing, etc.)

Positive vehicle operating cost savings indicate less fuel consumption for an improvement option.

## Financial Performance

The financial performance of the improvement options has been measured in terms of the benefit/cost ratio (B/C) and the net present value (NPV). A B/C ration greater than 1.0 is typically an indication that a proposed project presents a clear benefit, while a positive NPV indicates that the benefits associated with an improvement are greater than the costs. The B/C ratio and NPV for each option were determined assuming a discount rate of 6% and a benefit period of 25 years.

## Greenhouse Gas Reduction

Reducing congestion may also lead to a reduction in greenhouse gas (GHG) emissions. Changes in the GHG emissions were estimated using the ShortBEN tool.

## Environmental Impact

The design options to minimize impacts to adjacent parks and lakes by reducing the footprint of the highway upgrades as much as possible.

## Driver Experience

Drivers typically expect to travel at the posted speed of the highway facility. When congestion occurs, travel speeds decrease, and drivers can become frustrated. Counterflow lanes may not be intuitive to drivers and may cause confusion, particularly for out of town drivers. Driving on highway shoulders is not a standard practice and may also cause confusion to some drivers.

## Compatibility with Long-Term Option

The more a short-term option aligns with a long-term solution, the less chance there will be significant throwaway cost.

## Constructability

The construction of the improvement options should focus on minimizing disruption to the existing capacity of the highway and not impacting current accesses.



















## 5.3. Evaluation Results






### Short-Term Options

The short-term options 1 and 2 are related to the westbound left-turn capacity improvements at the Highway 99 / Lorimer Road intersection. Evaluation results for the short-term options are summarized in [Table 10](#).

Table 10: Short-Term Options

Criteria	Short-Term Option 1 Hwy 99 / Lorimer Rd Intersection (Left/Shared Left-Through)	Short-Term Option 2 Hwy 99 / Lorimer Rd Intersection (Dual Left)
Cost	\$0.2 M 	\$0.4 M 
Safety	Creates diverging conflict point from left-through lane. Creates conflict between EBR and WBL. 	Allows two designated left only lanes. Creates conflict between EBR and WBL. 
Traffic Operations	Increases WBL capacity from Lorimer Road to Hwy 99. Changes EBR from a free movement to a yield movement. Requires split phasing. 	Increases WBL capacity from Lorimer Road to Hwy 99. Changes EBR from a free movement to a yield movement. Requires protected only left phasing. 
Greenhouse Gas Reduction	GHG will be reduced from the existing condition. 	GHG will be reduced from the existing condition. 
Environmental Impact	Minor environmental impact 	Slightly more environmental impact. 
Driver Experience	Less common signal timing and traffic pattern through intersection 	Common signal timing and traffic pattern through intersection. 
Compatibility with Long-Term Option	Improves performance at the Hwy 99 / Lorimer Road intersection. Ties left-turn lanes into two lanes SB on Hwy 99. 	Improves performance at the Hwy 99 / Lorimer Road intersection. Ties left-turn lanes into two lanes SB on Hwy 99. 
Constructability	Minimal traffic disruption during pavement marking changes and island reconstruction 	Traffic disruption during island removal and turning lane construction. 
<b>Total Score</b>	<b>21</b>	<b>22</b>

#### Legend

 Poor (0 points)	 Below Average (1 points)	 Average (2 points)	 Above Average (3 points)	 Excellent (4 point)
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### Medium- & Long-Term Options

The medium- and long-term improvements focused on creating additional capacity on Highway 99 southbound to reduce travel time and improve safety. The evaluation results for these options are summarized in [Table 11](#).

Table 11: Medium- and Long-Term Options

Criteria	Medium-Term Option 1 (Counterflow – between Lake Placid Rd to just north of Alpha Lake Rd / Cheakamus Lake Rd. 3.5 km)		Medium-Term Option 2 (2 SB Lanes from Taylor Way to Bayshore Dr. 0.5 km)		Medium-Term Option 3A (Shoulder Widening – Taylor Way to Alpha Lake Rd. 3.2 km)		Medium-Term Option 3B (2 SB Lanes from Taylor Way to Alpha Lake Rd. 3.2 km)		Long-Term Option (2 SB Lanes from Lorimer Rd. to Alpha Lake Rd. 5.6 km)	
Cost	\$31.8 M	1	\$5.3 M	●	\$24.3 M	①	\$29.6 M	①	\$60.2 M	○
Safety (Collision Savings)	\$5.6 M	①	\$0.7 M	1	\$5.0 M	①	\$5.0 M	●	\$8.8 M	●
Traffic Operations (Travel Time Savings)	\$9.0 M	●	\$1.2 M	1	\$8.2 M	●	\$8.2 M	●	\$14.4 M	●
Vehicle operating Savings	\$1.0 M	●	\$0.1 M	①	\$0.9 M	●	\$0.9 M	●	\$1.6 M	●
Financial Performance	B/C Ratio 0.63 NPV <b>-\$9.0 M</b>	①	B/C Ratio 0.51 NPV <b>-\$2.0 M</b>	①	B/C Ratio 0.79 NPV <b>-\$3.8 M</b>	●	B/C Ratio 0.65 NPV <b>-\$7.8 M</b>	①	B/C Ratio 0.56 NPV <b>-\$19.6 M</b>	①
Greenhouse Gas Reduction (tonnes/year)	119	①	15	1	109	①	109	①	191	●
Environmental Impact	Close proximity to Alpha Lake requiring retaining walls to contain earthworks from additional lane construction	①	No significant environmental impacts	●	Close proximity to Alpha Lake requiring retaining walls to contain earthworks from shoulder widening	①	Close proximity to Alpha Lake requiring retaining walls to contain earthworks from additional lane construction	①	Close proximity to Alpha Lake requiring retaining walls to contain earthworks from shoulder widening	1
Driver Experience	High likelihood of driver unfamiliarity with counterflow signing and operation, particularly for tourist traffic using the Highway.	①	Driver experience is improved by eliminating points of decision through lane drops or merge	●	High likelihood of driver unfamiliarity with shoulder lane signing and operation, particularly for tourist traffic using the Highway	●	Driver experience is improved by eliminating points of decision through lane drops or merges. Standard two SB lanes.	●	Driver experience is improved by eliminating points of decision through lane drops or merges	●
Compatibility with Long-Term Option	Requires widening at intersections for left-turns off the highway. Becomes operationally and economically unfeasible when extended from Lorimer Road to Alpha Lake Road.	○	Highly compatible with the long-term option of two full lanes southbound from Lorimer Rd to Alpha Lake Rd	●	Low compatibility with long-term option of two full lanes southbound from Lorimer Rd to Alpha Lake Rd	①	Highly compatible with the long-term option of two full lanes Southbound from Lorimer Rd to Alpha Lake Rd	●	Construction of additional northbound lane will not impact the southbound lanes.	●
Constructability	Counterflow lane and intersection widening will occur between the northbound and southbound lanes causing significant disruption to traffic along the Highway during construction.	①	Construction of additional southbound lane can be added to the west side of the Highway with minimal disruption to traffic along the Highway	●	Construction of shoulder widening can be added to the west side of the Highway with minimal disruption to traffic along the Highway	●	Construction of additional southbound lane can be added to the west side of the Highway with minimal disruption to traffic along the Highway	●	Construction of additional southbound lane can be added to the west side of the Highway with minimal disruption to traffic along the Highway	●
Total Score	19		25		26		28		29	

Legend

○ Poor (0 points)	① Below Average (1 points)	● Average (2 points)	● Above Average (3 points)	● Excellent (4 point)
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Based on the results of the MAE, both short term options are fairly equal, however Option 2 (Dual Left) scores slightly better than Option 1. Option 2 also performs slightly better than Option 1 in terms of LOS.

For the medium-term options:

- The counterflow option is not recommended (refer to [Section 4.1.2](#)) but is shown in [Table 11](#) for comparison. This option resulted in the lowest score (19 points) and has the lowest NPV at **-\$9.0M**.
- Option 2 is the lowest cost option but has the lowest B/C ratio (0.51). It also has the lowest travel time savings and safety benefits; therefore, it does not solve the congestion problem and simply shifts the queue further south.
- Option 3A and 3B are both viable options. Option 3A is a cheaper option with the highest B/C ratio (0.79) and only requires shoulder widening. Option 3B is more expensive than 3A with a slightly lower B/C ratio (0.65). However, Option 3B creates less confusion to drivers as it is two lanes full time operation; whereas, Option 3A (drive on shoulder) is only needed during peak time operation which relies on overhead lane use signals for guidance. Overtime, motorists are expected to be accustomed to Option 3A.

In the long-term, two southbound lanes from Lorimer Road to Alpha Lake Road can be considered, subject to further investigation and analysis. This is the most expensive option at \$60M with a low B/C 0.56 and an NPV of **-\$19.6M**.

## 6. Local Operational Issues

During the Highway 99 Capacity and Safety Review Draft Report meeting with the RMOW and MoTI, the team identified local operational problems/issues and potential improvements that could alleviate these issues.

These local issues are discussed in the following sections.

### 6.1. Understanding Internal Traffic Volumes

The RMOW provided traffic data from the permanent count station on Hwy 99 located near Brio (Hwy 99/Blueberry Dr intersection)<sup>1</sup>, which was compared to MoTI's permanent count station P-15-3NS located approximately 50 km south of the Highway 99 / Alpha Lake Road / Cheakamus Lake Road intersection, north of Squamish.

The Brio Entrance count station data can provide some insight to the number of internal trips within Whistler. Winter peak hour volumes for both count stations are shown in [Table 12](#), [Table 13](#), and [Table 14](#) for northbound, southbound, and both directions, respectively. Similarly, summer peak hour volumes for both count stations are shown in [Table 15](#), [Table 16](#), and [Table 17](#) for northbound, southbound, and both directions, respectively.

*Table 12: Comparison of Winter Peak Hour Volumes - Northbound*

	Winter – Northbound			
	P-15-3NS (Hwy 99, 10 km North of Squamish)		Hwy 99, North of Brio Entrance	
Peak Hour Period	AM	PM	AM	PM
Time	7:00 AM	4:00 PM	10:00 AM	6:00 PM
Average (veh/h)	745	369	948	889
Weekday (veh/h)	598	305	944	889
Friday (veh/h)	747	668	989	1,030
Weekend (veh/h)	1,063	358	936	869
Difference between Brio Entrance and P-15-3NS (Peak Hour Averages)			+ 203 (27%)	+ 520 (141%)

<sup>1</sup> This count station has been operated by the RMOW since MoTI upgraded this section of highway and decommissioned count station P-15-4 (200m north of Lake Placid Road) as part of the Whistler Creekside Development in the early 2000's.

Table 13: Comparison of Winter Peak Hour Volumes - Southbound

	Winter – Southbound			
	P-15-3NS (Hwy 99, 10 km North of Squamish)		Hwy 99, North of Brio Entrance	
Peak Hour Period	AM	PM	AM	PM
Time	11:00 AM	4:00 PM	11:00 AM	5:00 PM
Average (veh/h)	372	731	608	1,053
Weekday (veh/h)	330	611	642	1,048
Friday (veh/h)	332	684	629	1,090
Weekend (veh/h)	484	1,016	614	1,138
Difference between Brio Entrance and P-15-3NS (Peak Hour Averages)			+ 236 (63%)	+ 322 (44%)

Table 14: Comparison of Winter Peak Hour Volumes - Both Directions

	Winter – Both Directions			
	P-15-3NS (Hwy 99, 10 km North of Squamish)		Hwy 99, North of Brio Entrance	
Peak Hour Period	AM	PM	AM	PM
Time	7:00 AM	4:00 PM	10:00 AM	6:00 PM
Average (veh/h)	865	1,100	1,556	1,942
Weekday (veh/h)	736	916	1,586	1,937
Friday (veh/h)	852	1,352	1,618	2,120
Weekend (veh/h)	1,150	1,373	1,458	2,007
Difference between Brio Entrance and P-15-3NS (Peak Hour Averages)			+ 691 (80%)	+ 842 (77%)

For the northbound volumes, the internal count station near Brio recorded approximately 200 more vehicles in the AM peak hour, and 520 more vehicles in the PM peak hour, compared to the count station north of Squamish. For southbound there were about 230 more vehicles in the AM peak hour and 320 more vehicles in the PM peak hour at the Brio count station than the external MoTI count station. All peak hours stayed relatively consistent except for the AM peak hour period at the count station north of Squamish; the P-15-3NS count station data had AM peak hours of either 7:00 AM or 11:00 AM, depending on direction of travel. Overall, the AM peak hour for both count stations was generally 10:00 AM / 11:00 AM and the PM peak hour was between 4:00 PM – 6:00 PM.



Table 15: Comparison of Summer Peak Hour Volumes - Northbound

	Summer – Northbound			
	P-15-3NS (Hwy 99, 10 km North of Squamish)		Hwy 99, North of Brio Entrance	
Peak Hour Period	AM	PM	AM	PM
Time	11:00 AM	4:00 PM	10:00 AM	6:00 PM
Average (veh/h)	660	539	840	1,035
Weekday (veh/h)	592	484	928	1,069
Friday (veh/h)	644	802	894	1,116
Weekend (veh/h)	810	518	807	930
Difference between Brio Entrance and P-15-3NS (Peak Hour Averages)			+ 180 (27%)	+ 496 (92%)

Table 16: Comparison of Summer Peak Hour Volumes - Southbound

	Summer – Southbound			
	P-15-3NS (Hwy 99, 10 km North of Squamish)		Hwy 99, North of Brio Entrance	
Peak Hour Period	AM	PM	AM	PM
Time	11:00 AM	5:00 PM	11:00 AM	6:00 PM
Average (veh/h)	546	775	740	1,166
Weekday (veh/h)	511	752	791	1,211
Friday (veh/h)	550	695	800	1,141
Weekend (veh/h)	620	864	604	1,089
Difference between Brio Entrance and P-15-3NS (Peak Hour Averages)			+ 194 (36%)	+ 391 (50%)

Table 17: Comparison of Summer Peak Hour Volumes - Both Directions

	Summer – Both Directions			
	P-15-3NS (Hwy 99, 10 km North of Squamish)		Hwy 99, North of Brio Entrance	
Peak Hour Period	AM	PM	AM	PM
Time	11:00 AM	4:00 PM	11:00 AM	6:00 PM
Average (veh/h)	1,205	1,254	1,578	2,201
Weekday (veh/h)	1,103	1,156	1,653	2,280
Friday (veh/h)	1,194	1,485	1,658	2,258
Weekend (veh/h)	1,429	1,348	1,410	2,010
Difference between Brio Entrance and P-15-3NS Peak Hour Averages (% Change)			+ 373 (31%)	+ 947 (76%)

For the northbound volumes, the internal count station near Brio recorded 180 more vehicles in the AM peak hour, and about 500 more vehicles in the PM peak hour, compared to the count station north of Squamish. Likewise, for the southbound there were approximately 200 more vehicles in the AM peak hour and about 400 more vehicles in the PM peak hour at the Brio count station than the external MoTI count station.

All peak hours stayed relatively consistent; the AM peak hour for both count stations was generally 10:00 AM / 11:00 AM and the PM peak hour was between 4:00 PM – 6:00 PM. Compared to the winter volumes, the summer AM peak hour was consistently in the late morning for both count stations, whereas the winter AM peak hour near Squamish was 7:00 AM to reflect the northbound traffic heading to the ski resort.

As shown in Tables 12 to 17, there is significant internal trips generated and circulating within Whistler. Winter and summer (AM and PM peak hours) volume graphs are in [Appendix K](#).

## 6.2. Lack of Parallel Connectivity

The existing parallel connectivity in the area are at Alta Lake Road to Alpine Way on the west side of the highway. On the east side of the highway the parallel road connections are limited (Mons Road to Spruce Grove Way to Fitzsimmons Road back onto Blackcomb Way, as well as Whistler Road to Eva Lake Road to Garibaldi Way to Nordic Drive). This creates a heavy reliance on Highway 99 for local internal trips, as evident in the internal traffic volumes summarized in Section 6.1. Further internal parallel connectivity needs to be reviewed.

## 6.3. Opportunities for Intersection Improvements

During the review meeting, several intersection improvements were discussed that could help ease the congestion. Possible individual intersection improvements are summarized in sections below. It is noted that further internal parallel connectivity along with localized intersection improvements need to be analyzed and studied to confirm the issues and determine the most feasible solutions.

### 6.3.1. Function Junction Roundabout Feasibility

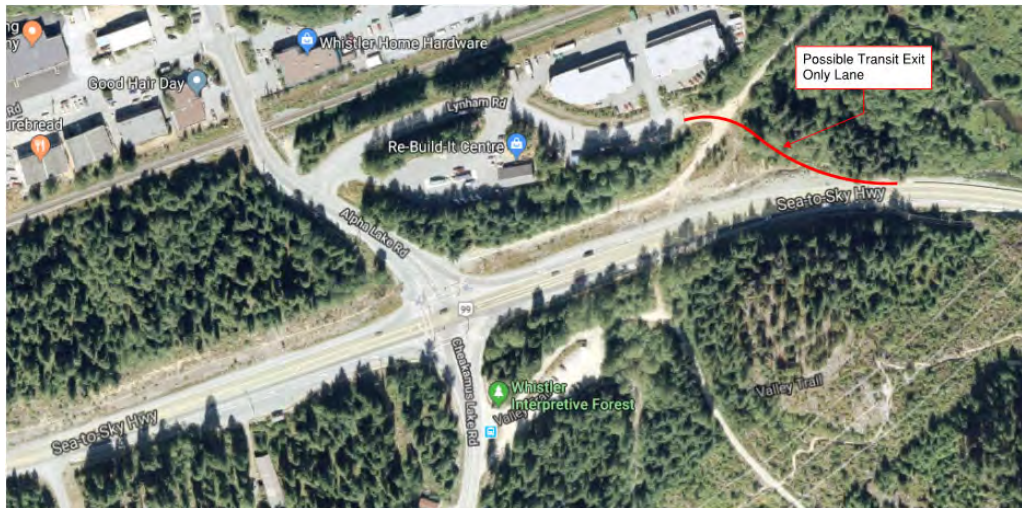
MoTI has addressed the suitability of installing a roundabout at the Highway 99 / Alpha Lake Road / Cheakamus Lake Road (Function Junction) intersection in their 2013 technical memo, *Re: Suitability of Roundabout on Highway 99 within Resort Municipality of Whistler*. In summary, a roundabout would be unfeasible at Highway 99 / Function Junction since traffic is unbalanced across the approaches; there are heavy north-south volumes along Highway 99 which can result in delays to Whistler traffic. Additionally, a roundabout would not be able to accommodate varying traffic flows, whereas a signal could be programed with “time of day” timing plans.

### 6.3.2. Alpha Lake Road / Cheakamus Lake Road (Function Junction)

This intersection is currently a signalized, four-legged intersection at the southern end of the Highway 99 study area. The addition of an eastbound to southbound acceleration lane could benefit the operations of this intersection; this may be more evident with the proposed gas station built in Function Junction (2020).

To improve transit connectivity and reduced transit delays, a transit exit only from the highway to Function Junction along Lynham Road may be considered as shown in *Figure 11* below.

*Figure 11: Transit Exit Ramp from Highway*



With the current signal timing plan, the southbound left-turn signal is delayed. Further investigation is required to determine if the northbound left-turn and southbound left-turn movements can go simultaneously. A truck template should also be run to determine if both northbound and southbound left-turn can occur concurrently. Moreover, an eastbound to northbound advanced left-turn phase could be considered if additional developments and increased in trips are expected at Function Junction.

### 6.3.3. Spring Creek Drive

Currently, buses are having difficulties making left-turns out of Spring Creek Drive as the posted speed on this section is 80 km/h. Reducing the posted speed from 80 km/h to 60 km/h or a possible protected left turn should be further investigated. However, motorists may not obey the lower speed limit in the section of roadway during off peak periods as the ambient condition does not match the feel of a lower speed facility.



Furthermore, the RMOW stated that there is a future plan to connect Cheakamus Way to Cheakamus Place for better transit connectivity (*Figure 12*).

*Figure 12: Cheakamus Place to Cheakamus Way Connection*



It is also recommended that traffic operations and safety at this intersection be reviewed and monitored for the possibility of a westbound to southbound protected left-turn, as well as a northbound acceleration lane.

#### 6.3.4. Alta Lake Road

The T-intersection of Highway 99 with Alta Lake Road currently operates with a pedestrian-activated signal. Based on the site visit conducted on January 14, 2018, a significant queue for the eastbound right movement from Alta Lake Road to the highway was observed. The addition of a southbound acceleration lane could potentially alleviate the right-turning queues and should be further investigated. Consequently, the southbound bus stop south of the intersection would be relocated to the north of the intersection near the barrier flare.

In the long term, consider upgrading this intersection to be the main access to Bayshores / Millars Pond Neighbourhood and remove the existing Bayshore signalized intersection.



### 6.3.5. Bayshore Drive

This intersection is currently a signalized T-intersection with turning bays for all movements. It is recommended that traffic operations and safety at this intersection be reviewed and monitored for the possibility of a northbound acceleration lane.

Moreover, a bus queue jumper lane for the northbound direction to the Lake Placid Road intersection may be considered to accommodate transit vehicles serving Whistler Creekside.

In the long term, consider removing the signalized intersection in conjunction with a major upgrade to the Alta Lake Road intersection becoming the main access to Bayshores / Millars Pond Neighbourhood.

### 6.3.6. Taylor Way

The intersection of Highway 99 and Taylor Way currently operates as an unsignalized, RIRO intersection. Southbound queueing in the PM period was observed adjacent this intersection during the site visit in January 2018. The addition of a southbound acceleration lane as well as a southbound bus queue jumper lane will help ease the congestion.

Improvement on signage and paint lines for the southbound lane drop approaching this intersection should be reviewed to determine if further improvements are required. As one of the two southbound lanes on Highway 99 becomes a right-turn exit lane only, additional sign(s), such as the image to the right, notifying motorists of the lane drop would be beneficial.

Another option to consider is closing the SB right turn lane and creating a longer merge lane. Southbound right turn traffic would use the Lake Placid intersection.

### 6.3.7. Lake Placid Road

This signalized, four-legged intersection provides access to Whistler Creekside's residential and commercial areas on both sides of the highway. It is noted that the Creekside Gondola is located in Whistler Creekside and is a major access point for Whistler Mountain. Many skiers park here to access the mountain instead of going to Whistler Village. The Highway 99 / Lake Placid Road intersection experiences high traffic volumes during the winter season and is a key contributing factor in the traffic operation issues and long traffic queues affecting Whistler Creekside and nearby roadways, as observed during the site visit.

To optimize signal timing at this intersection, consider removing the south crosswalk so that additional green time can be provided to the WB left movement without conflicting with pedestrians. The existing southbound bus stop would then have to be relocated north of the intersection. To improve transit operations, consider installing a northbound bus queue jumper lane starting approximately between Bayshore Drive and Taylor Way, as well as a southbound bus queue jumper lane starting near London Lane.

### 6.3.8. London Lane & Whistler Road

Both London Lane and Whistler Road intersect Highway 99 and are unsignalized T-intersections. Transit operators have reported that they are having a difficult time making left-turns from Whistler Road. To improve safety, one option discussed during the meeting was to add a protected westbound to southbound left-turn lane

and tie it to the existing southbound left-turn lane to London Lane. This would eliminate buses having to merge into Highway 99 southbound traffic before entering the left turn lane at London Lane intersection, as illustrated in *Figure 13* below.

Additionally, it is recommended that traffic operations and safety at this intersection is reviewed and monitored for the possibility of a northbound acceleration lane at the Highway 99 / London Lane intersection.

*Figure 13: Whistler Road to London Lane Protected Left-Turn Lane*



### 6.3.9. Nordic Drive

The intersection of Highway 99 and Nordic Drive currently operates as an unsignalized T-intersection just south of an overhead pedestrian bridge that serves the Valley Trail network. Addition of a protected westbound to southbound left-turn lane at this intersection could help motorists enter the highway and reduce delay.

### 6.3.10. Hillcrest Drive

This intersection is currently operating as an unsignalized T-intersection. Approximately 150m north of the intersection, the southbound shoulder begins to widen to develop the bus pullout. It has been reported that motorists (knowingly or mistakenly) making the southbound lane as a deceleration lane by utilizing this pullout. It is recommended that the bus pull out be better delineated with improved signing and pavement marking. If warranted, an addition of an eastbound to southbound acceleration lane could help traffic operation.

### 6.3.11. Blueberry Drive

The Highway 99 / Blueberry Drive intersection is currently a signalized T-intersection with turning bays for all movements. Southbound queueing was observed during the site visit at this intersection. To improve transit operation, northbound and southbound bus queue jumper lanes could be considered.

### 6.3.12. Brio Entrance

The Highway 99 / Brio Entrance is currently operating as an unsignalized T-intersection. While there is a sign for no southbound left-turns from the highway, it is difficult to enforce. To eliminate the southbound left-in movement, a raised delta island will need to be installed to form a proper RIRO intersection.

There is currently a northbound bus pull out immediately north of the intersection. Pavement marking could be improved to prevent westbound to northbound motorists from using this pullout as an acceleration lane.

### 6.3.13. Panorama Ridge

There is currently a tapered northbound right turn lane. It is recommended that traffic operations and safety at this intersection be reviewed and monitored for the possibility of increasing the northbound deceleration lane length and adding a northbound acceleration lane. It is noted that there is currently a northbound bus pull out just north of the intersection which will need to be considered if an acceleration lane is added.

### 6.3.14. Village Gate Boulevard

The Highway 99 / Village Gate Boulevard intersection is currently signalized with turning bays for all movements, including dual westbound lefts. Village Gate Boulevard is the main access roadway to Whistler Village and services many commercial, residential, and recreational areas within the municipality, therefore experiences high traffic volumes. Based on the site, significant westbound queues were observed at this intersection as well as at the Highway 99 / Lorimer Road intersection, as skiers were leaving the Village. As discussed in previous sections of the study, the two WB to SB left turn traffic must merge into one lane further downstream; therefore, creates traffic backup, especially during the peak periods. The longer-term solution is to extend the two southbound lanes as discussed.

There is currently a NB bus pull out south of the overpass and then a right turn lane is developed north of the overpass. Some drivers may mistake the pullout as the right turn lane. The pavement marking and signing plan for the northbound bus stop should be reviewed and determine if improvements are needed to help reduce driver confusion.

### 6.3.15. Whistler Cay Drive

The Whistler Cay Drive intersection with Highway 99 is currently an unsignalized T-intersection. Pedestrians have been reported to be jaywalking across the highway to access the Valley Trail on the east side of the highway. To decrease jaywalking and improve safety, the possible addition of the Valley Trail west of Highway 99 to the Village Gate Boulevard intersection should be considered.

### 6.3.16. Lorimer Road

This signalized, four-legged intersection provides access to several commercial, residential, and recreational areas within the Village. Similar to the Village Gate Boulevard intersection, the Highway 99 / Lorimer Road intersection serves high traffic volumes during the winter season due to the local mountain resort. Westbound queues have been observed at this intersection during the site visit.

The southbound left-turn lane storage length should be reviewed as there has been a significant increase in traffic volume from the north in the past three years.

With regards to transit, a bus stop could be added approximately 50 m south of Lorimer Road intersection on the west side of highway for southbound transit vehicles. Additionally, there is an opportunity for a possible northbound bus stop location, south of Lorimer Road intersection. The design of these bus stops will have to be integrated safely with the existing acceleration or deceleration lanes.

## 7. Conclusion & Recommendations

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The following is a summary of the findings from the initial review of the existing conditions within the study corridor:

- There is significant queuing during the Sunday PM Peak, with travel times in upwards of three to four times those of a typical trip.
- The primary issues appear to be due to reduced capacity at the lane drop south of Lake Placid Road and Village Gate Boulevard.
- Another factor for the poor operation is the sharp spike in traffic exiting the ski area which cannot be accommodated by the corridor with primarily one southbound lane.
- MoTI has implemented a max. green extension for southbound traffic to try to resolve queuing in the corridor. However, as the issues seem to be related to the lane drops and lack of roadway capacity, rather than the available green time, the additional green time tends to be wasted as vehicles are unable to proceed through the intersection with the traffic spillback.

Short-term, medium-term, and long-term concept options were developed to improve traffic operations throughout the project corridor, focusing primarily on the southbound poor performance during the Sunday Peak period. Two short-term and four medium-term concepts were evaluated using a MAE framework in order to determine which options achieved the most project objectives. Criteria that were used to evaluate the different design options were cost, safety, traffic operations, driver experience, compatibility with long-term option, constructability, and environmental impact.

Based on the results of the analysis and MAE, the following recommendations have been made:

- Short-term Option 2 (Lorimer Road intersection improvements) has the highest score and should be considered for implementation.
- In the medium-term (subject to funding), both Options 3A and 3B are viable and achieve the most project objectives. Moving forward, it is recommended that MoTI conduct additional analysis and design to determine the most appropriate medium-term option. MoTI should review the policy of “driving on shoulder” supported by overhead signals during peak periods as a potential option.
- MoTI should further review the constructability and feasibility of the long-term option.

Based on the meetings with the RMOW and MoTI, the internal traffic circulation was reviewed, and the local traffic and transit operational issues and opportunities were discussed and summarized in this report. By comparing count stations at Brio and with one near Squamish, it was found that both the northbound and southbound traffic volumes were higher at Brio. This confirms that there are many internal trips within Whistler. With a limited parallel road system, there is a heavy reliance on Highway 99 for local internal trips. Mixing internal trips, tourism traffic, recreational trips and regional trips create traffic congestion on this extremely constrained corridor, especially during the summer and winter seasons.

Further internal parallel connectivity along with localized intersection improvements need to be studied to determine the most feasible solutions. An improved bus network including bus queue jumpers would help improve transit travel time and promote transit ridership; thus, removing more vehicles from the highway. It is recommended that MoTI to work with RMOW and further review the local operational issues identified in



*Section 6* and determine which issues require further studies to confirm these concerns and develop possible mitigation strategies.

It is also recommended that all the corridor pavement markings should be completed in early spring (before June 1 if possible) to improve visibility and safety.

## Appendix A – Existing Intersection Counts

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## Hwy 99 / Alpha Lake Rd / Cheakamus Lake Rd

	Detector Loop #	Det2 L13	Det21 L21/L22	Det9 L15	Det6 L6	Det14 L5	Det13 L8	Det22 L17/L18	Det24 L19/L20	Det8 L9	Det11 L12	Det4 L1	Det15 L4	Det23 L16	
	Movement A1	A1 RT	A1 RT	AX	A2	A2	AY	A2 RT	B2 RT	B2	B2	B1	B1	B1 RT	
	Direction	NBT	NBR	NBL	SBT1	SBT2	SBL	SBR	SBR	WBT	WBL	EBT	EBL	EBR	
Date	Time														
1/14/2018	12:00:00 AM		10	2	0	7	5	3	2	3	1	0	0	3	0
1/14/2018	12:15:00 AM		12	0	0	9	2	8	3	2	1	3	0	3	0
1/14/2018	12:30:00 AM		7	0	0	6	2	3	0	2	0	1	0	2	1
1/14/2018	12:45:00 AM		3	0	1	6	1	3	1	1	1	0	0	3	1
1/14/2018	1:00:00 AM		3	0	0	2	2	9	0	5	0	4	0	0	0
1/14/2018	1:15:00 AM		6	0	0	5	3	2	1	0	0	1	0	2	0
1/14/2018	1:30:00 AM		3	0	0	1	1	2	1	0	1	0	0	2	0
1/14/2018	1:45:00 AM		4	1	0	5	0	8	0	4	0	1	0	1	0
1/14/2018	2:00:00 AM		4	0	0	4	0	4	0	2	1	1	0	1	0
1/14/2018	2:15:00 AM		3	0	0	2	0	5	4	2	1	0	0	2	2
1/14/2018	2:30:00 AM		1	0	0	5	1	5	2	3	0	3	0	3	0
1/14/2018	2:45:00 AM		2	0	0	0	1	3	0	0	0	1	0	0	0
1/14/2018	3:00:00 AM		0	0	0	5	3	1	2	2	0	0	0	1	0
1/14/2018	3:15:00 AM		3	1	1	3	1	4	3	1	1	0	1	1	0
1/14/2018	3:30:00 AM		2	0	0	1	4	0	0	1	1	1	0	0	1
1/14/2018	3:45:00 AM		1	0	0	2	0	4	1	1	0	2	0	1	0
1/14/2018	4:00:00 AM		1	0	0	4	2	2	2	1	0	2	1	2	0
1/14/2018	4:15:00 AM		3	0	0	4	2	2	0	1	0	0	0	0	0
1/14/2018	4:30:00 AM		6	0	0	12	0	0	0	1	0	0	0	0	0
1/14/2018	4:45:00 AM		1	1	0	8	4	1	2	1	0	2	0	1	0
1/14/2018	5:00:00 AM		6	0	0	11	5	0	1	2	0	0	0	2	0
1/14/2018	5:15:00 AM		5	0	0	12	4	1	2	3	0	1	0	0	0
1/14/2018	5:30:00 AM		8	0	0	9	2	0	0	3	0	0	0	3	0
1/14/2018	5:45:00 AM		8	1	0	7	0	0	3	2	1	1	1	0	0
1/14/2018	6:00:00 AM		11	1	1	14	5	2	3	4	0	0	0	2	1
1/14/2018	6:15:00 AM		14	0	0	10	7	1	2	6	0	0	1	2	0
1/14/2018	6:30:00 AM		32	0	4	16	6	3	3	8	0	1	1	5	3
1/14/2018	6:45:00 AM		30	0	0	17	9	3	3	7	0	1	1	3	2
1/14/2018	7:00:00 AM		49	0	0	27	8	3	12	10	2	3	1	4	0
1/14/2018	7:15:00 AM		110	1	2	28	22	4	11	22	1	1	1	5	3
1/14/2018	7:30:00 AM		200	2	2	32	21	5	4	28	0	4	2	9	3
1/14/2018	7:45:00 AM		280	0	3	25	15	5	10	26	2	3	1	5	2
1/14/2018	8:00:00 AM		265	0	2	22	29	5	8	18	1	3	1	4	4
1/14/2018	8:15:00 AM		245	0	2	38	34	1	19	11	1	4	1	1	6
1/14/2018	8:30:00 AM		220	1	5	36	28	4	16	19	4	2	4	6	9
1/14/2018	8:45:00 AM		240	5	7	40	28	9	41	14	4	6	3	14	16
1/14/2018	9:00:00 AM		235	1	7	37	39	4	18	13	0	4	2	10	5
1/14/2018	9:15:00 AM		130	2	5	53	36	9	18	17	3	1	2	16	13
1/14/2018	9:30:00 AM		100	1	4	60	30	13	27	16	1	5	3	11	8
1/14/2018	9:45:00 AM		120	3	5	80	33	5	33	12	7	2	5	18	6
1/14/2018	10:00:00 AM		115	2	2	80	27	8	36	13	2	7	2	28	12
1/14/2018	10:15:00 AM		115	1	3	70	38	11	52	21	7	5	5	21	22
1/14/2018	10:30:00 AM		90	2	4	70	34	8	42	18	3	2	4	28	18
1/14/2018	10:45:00 AM		90	3	4	95	42	12	42	11	3	4	3	20	11
1/14/2018	11:00:00 AM		80	3	6	58	45	13	39	8	2	4	7	30	16
1/14/2018	11:15:00 AM		105	2	5	75	39	13	52	14	2	6	4	19	9
1/14/2018	11:30:00 AM		80	1	5	63	42	18	37	14	8	6	10	38	10
1/14/2018	11:45:00 AM		65	0	4	60	33	19	46	14	6	3	7	40	21
1/14/2018	12:00:00 PM		85	6	6	65	32	17	50	16	5	12	4	29	16
1/14/2018	12:15:00 PM		70	5	3	65	41	17	39	10	8	5	7	30	31
1/14/2018	12:30:00 PM		85	3	8	70	33	20	37	20	6	2	6	30	14
1/14/2018	12:45:00 PM		80	4	8	65	43	17	47	14	8	3	5	38	18
1/14/2018	1:00:00 PM		70	6	9	65	43	21	42	14	5	5	11	34	23
1/14/2018	1:15:00 PM		80	4	8	95	33	18	57	17	1	6	6	27	22
1/14/2018	1:30:00 PM		85	5	6	80	42	18	47	9	6	4	1	25	24
1/14/2018	1:45:00 PM		70	0	6	115	46	18	49	14	6	8	5	28	21
1/14/2018	2:00:00 PM		80	1	8	120	57	18	41	13	3	6	4	31	24
1/14/2018	2:15:00 PM		80	1	4	115	48	15	41	13	7	5	3	33	16
1/14/2018	2:30:00 PM		95	3	5	105	43	26	52	14	7	4	6	47	16
1/14/2018	2:45:00 PM		95	4	6	170	70	20	38	11	5	6	5	35	21
1/14/2018	3:00:00 PM		85	9	9	160	75	22	38	17	5	8	9	32	23
1/14/2018	3:15:00 PM		80	3	7	195	90	14	37	6	4	8	11	22	28
1/14/2018	3:30:00 PM		100	4	6	165	80	20	46	19	9	7	10	36	32
1/14/2018	3:45:00 PM		70	7	11	185	80	19	37	17	6	6	4	20	22
1/14/2018	4:00:00 PM		90	3	5	185	85	18	37	10	5	6	9	30	14
1/14/2018	4:15:00 PM		90	3	6	180	95	25	29	13	4	8	2	23	19
1/14/2018	4:30:00 PM		80	3	9	190	95	12	29	20	2	5	3	20	20
1/14/2018	4:45:00 PM		75	7	7	190	75	20	25	11	3	10	5	20	15
1/14/2018	5:00:00 PM		80	3	8	185	80	17	26	14	10	4	6	20	20
1/14/2018	5:15:00 PM		85	3	2	185	80	17	12	8	2	6	2	22	13

1/14/2018	5:30:00 PM	65	3	9	190	80	19	21	8	3	4	6	21	7
1/14/2018	5:45:00 PM	53	3	4	200	65	19	15	9	1	7	5	16	8
1/14/2018	6:00:00 PM	54	2	4	190	65	29	23	12	8	6	3	18	13
1/14/2018	6:15:00 PM	47	3	1	145	46	24	15	12	1	6	3	16	9
1/14/2018	6:30:00 PM	42	1	3	115	46	15	20	16	1	4	2	12	11
1/14/2018	6:45:00 PM	42	1	0	80	40	7	13	14	2	5	2	11	7
1/14/2018	7:00:00 PM	46	3	1	90	29	9	12	5	1	1	3	3	6
1/14/2018	7:15:00 PM	25	5	0	85	23	8	10	13	1	7	0	10	2
1/14/2018	7:30:00 PM	34	2	1	65	20	16	11	5	0	2	2	6	7
1/14/2018	7:45:00 PM	43	1	1	70	16	12	6	5	2	5	2	7	4
1/14/2018	8:00:00 PM	32	2	1	42	18	13	4	6	2	6	3	8	1
1/14/2018	8:15:00 PM	24	1	0	45	16	10	4	3	1	1	2	9	0
1/14/2018	8:30:00 PM	29	1	0	35	13	12	1	5	0	4	1	5	2
1/14/2018	8:45:00 PM	35	1	0	29	15	12	6	5	1	4	3	5	0
1/14/2018	9:00:00 PM	38	1	0	16	11	3	4	3	0	1	1	4	1
1/14/2018	9:15:00 PM	32	2	0	17	5	7	4	4	0	3	0	6	0
1/14/2018	9:30:00 PM	31	1	0	21	6	8	4	4	2	3	0	3	2
1/14/2018	9:45:00 PM	25	1	0	10	5	8	6	2	0	1	1	7	0
1/14/2018	10:00:00 PM	19	1	0	11	5	6	7	5	1	2	0	6	1
1/14/2018	10:15:00 PM	22	2	1	11	5	8	2	0	0	0	0	3	0
1/14/2018	10:30:00 PM	23	1	0	7	3	7	3	5	0	0	1	5	0
1/14/2018	10:45:00 PM	18	0	0	10	4	6	1	1	1	1	0	2	0
1/14/2018	11:00:00 PM	12	1	1	7	5	9	1	3	0	3	1	4	0
1/14/2018	11:15:00 PM	9	0	0	8	9	8	4	6	1	2	0	5	0
1/14/2018	11:30:00 PM	7	1	2	5	4	9	8	0	1	1	0	8	0
1/14/2018	11:45:00 PM	4	2	2	1	3	8	2	2	0	1	0	9	1

Hwy 99 / Bayshore Dr

		Detector	Det2	Det21	Det6	Det9	Det12	Det23		
		Loop #	L1	L9/L10	L2	L4	L6	L11/L12		
		Movement	A1	A1 >	A2	A2 <	B	B >		
		Direction	EBT	EBR	WBT	WBL	NBT	NBR		
Date	Time									
1/14/2018	12:00:00 AM		26	1	20	9	2	4		
1/14/2018	12:15:00 AM		15	0	18	6	0	3		
1/14/2018	12:30:00 AM		15	3	15	5	1	8		
1/14/2018	12:45:00 AM		12	1	16	2	0	0	182	
1/14/2018	1:00:00 AM		10	1	17	8	2	6	164	
1/14/2018	1:15:00 AM		11	0	14	6	0	5	158	
1/14/2018	1:30:00 AM		9	0	9	8	2	4	143	
1/14/2018	1:45:00 AM		10	0	14	3	1	2	142	
1/14/2018	2:00:00 AM		8	1	10	2	0	1	120	
1/14/2018	2:15:00 AM		6	1	13	5	0	4	113	
1/14/2018	2:30:00 AM		10	0	10	4	2	0	107	
1/14/2018	2:45:00 AM		4	0	7	5	1	3	97	
1/14/2018	3:00:00 AM		5	0	9	1	0	2	92	
1/14/2018	3:15:00 AM		5	0	11	6	1	3	89	
1/14/2018	3:30:00 AM		4	0	5	2	1	1	76	
1/14/2018	3:45:00 AM		2	1	4	1	1	0	65	
1/14/2018	4:00:00 AM		2	0	9	4	1	2	66	
1/14/2018	4:15:00 AM		4	0	8	1	0	4	57	
1/14/2018	4:30:00 AM		7	0	12	1	0	0	64	
1/14/2018	4:45:00 AM		3	0	13	1	1	2	75	
1/14/2018	5:00:00 AM		11	0	19	1	0	0	88	
1/14/2018	5:15:00 AM		8	1	18	2	1	2	103	
1/14/2018	5:30:00 AM		16	0	11	2	1	4	117	
1/14/2018	5:45:00 AM		11	0	9	2	0	3	122	
1/14/2018	6:00:00 AM		15	1	25	2	1	4	139	
1/14/2018	6:15:00 AM		20	0	18	3	1	7	156	
1/14/2018	6:30:00 AM		51	0	26	0	1	7	207	
1/14/2018	6:45:00 AM		43	3	32	0	1	6	267	
1/14/2018	7:00:00 AM		59	1	52	4	3	8	346	
1/14/2018	7:15:00 AM		125	2	53	5	4	12	498	
1/14/2018	7:30:00 AM		225	3	55	2	8	26	732	
1/14/2018	7:45:00 AM		280	0	49	9	1	30	1016	
1/14/2018	8:00:00 AM		275	0	61	9	3	22	1259	
1/14/2018	8:15:00 AM		265	2	90	5	5	32	1457	
1/14/2018	8:30:00 AM		275	0	80	5	1	28	1527	
1/14/2018	8:45:00 AM		290	3	105	12	6	24	1598	
1/14/2018	9:00:00 AM		295	1	95	16	3	22	1660	
1/14/2018	9:15:00 AM		260	5	105	10	6	26	1673	
1/14/2018	9:30:00 AM		145	2	115	17	3	15	1581	
1/14/2018	9:45:00 AM		135	2	145	8	7	24	1462	
1/14/2018	10:00:00 AM		170	5	155	12	11	31	1414	
1/14/2018	10:15:00 AM		165	3	165	9	7	34	1385	



1/14/2018	10:30:00 AM	160	7	155	9	8	21	1448
1/14/2018	10:45:00 AM	155	3	165	15	7	33	1505
1/14/2018	11:00:00 AM	140	3	150	16	8	18	1456
1/14/2018	11:15:00 AM	105	5	165	12	9	12	1381
1/14/2018	11:30:00 AM	155	2	160	13	8	26	1385
1/14/2018	11:45:00 AM	130	8	140	10	7	19	1321
1/14/2018	12:00:00 PM	140	5	160	12	4	23	1330
1/14/2018	12:15:00 PM	115	3	160	13	7	16	1336
1/14/2018	12:30:00 PM	125	1	145	17	3	24	1287
1/14/2018	12:45:00 PM	135	5	150	13	10	10	1296
1/14/2018	1:00:00 PM	125	12	150	16	5	9	1269
1/14/2018	1:15:00 PM	120	5	200	17	5	20	1322
1/14/2018	1:30:00 PM	120	4	190	24	7	20	1372
1/14/2018	1:45:00 PM	125	3	220	12	8	10	1427
1/14/2018	2:00:00 PM	120	5	220	26	6	14	1501
1/14/2018	2:15:00 PM	120	5	210	16	8	12	1505
1/14/2018	2:30:00 PM	150	5	215	18	7	28	1563
1/14/2018	2:45:00 PM	155	3	290	20	8	17	1678
1/14/2018	3:00:00 PM	140	4	315	25	4	16	1791
1/14/2018	3:15:00 PM	105	6	315	25	8	13	1892
1/14/2018	3:30:00 PM	140	4	315	16	12	13	1969
1/14/2018	3:45:00 PM	140	7	295	32	11	21	1982
1/14/2018	4:00:00 PM	115	13	295	17	8	14	1940
1/14/2018	4:15:00 PM	140	14	270	18	11	12	1933
1/14/2018	4:30:00 PM	150	12	250	10	9	16	1880
1/14/2018	4:45:00 PM	115	8	230	12	5	13	1757
1/14/2018	5:00:00 PM	125	9	255	14	7	14	1719
1/14/2018	5:15:00 PM	130	5	205	24	7	6	1631
1/14/2018	5:30:00 PM	115	12	245	27	7	14	1604
1/14/2018	5:45:00 PM	85	8	270	34	6	16	1640
1/14/2018	6:00:00 PM	95	13	270	17	6	18	1635
1/14/2018	6:15:00 PM	85	4	215	29	4	16	1611
1/14/2018	6:30:00 PM	75	2	190	15	6	8	1487
1/14/2018	6:45:00 PM	65	4	135	8	8	22	1310
1/14/2018	7:00:00 PM	65	0	125	20	3	9	1113
1/14/2018	7:15:00 PM	61	2	135	19	8	10	995
1/14/2018	7:30:00 PM	54	5	105	11	8	10	892
1/14/2018	7:45:00 PM	47	3	105	21	6	9	841
1/14/2018	8:00:00 PM	40	2	75	12	3	10	761
1/14/2018	8:15:00 PM	41	3	80	6	7	3	666
1/14/2018	8:30:00 PM	41	2	58	14	5	8	601
1/14/2018	8:45:00 PM	44	1	65	10	3	11	544
1/14/2018	9:00:00 PM	35	4	44	9	0	8	502
1/14/2018	9:15:00 PM	54	2	40	4	1	8	471
1/14/2018	9:30:00 PM	42	2	43	14	3	5	452
1/14/2018	9:45:00 PM	20	1	35	14	3	6	397
1/14/2018	10:00:00 PM	33	3	29	11	4	5	382
1/14/2018	10:15:00 PM	30	1	36	8	1	9	358
1/14/2018	10:30:00 PM	33	3	19	19	4	8	335

1/14/2018 10:45:00 PM	24	0	18	10	0	3	311
1/14/2018 11:00:00 PM	15	1	29	7	2	3	283
1/14/2018 11:15:00 PM	19	5	32	6	3	3	266
1/14/2018 11:30:00 PM	15	0	22	11	4	4	236
1/14/2018 11:45:00 PM	15	3	13	6	1	5	224

## Hwy 99 / Lake Placid Rd

Det12	Det17	Det8	Det11	Det24	Det2	Det13	Det21	Det6	Det14	Det9
L10	L8	L1	L4	L15/L16	L5	L7	L17/L18	L12	L11	L14
C	C>	B	B<	B>	A1	A1<	A1>	A2	A2	A2<
EBT/L	EBR	WBT	WBL	WBR	NBT	NBL	NBR	SBT1	SBT2/R	SBL

Date	Time											
1/14/2018	12:00:00 AM	7	1	2	2	1	27	1	2	13	16	2
1/14/2018	12:15:00 AM	9	1	3	0	1	16	2	3	16	7	2
1/14/2018	12:30:00 AM	10	0	1	5	2	14	2	4	11	11	3
1/14/2018	12:45:00 AM	6	2	2	2	1	9	4	0	14	7	2
1/14/2018	1:00:00 AM	9	2	2	1	0	11	2	2	16	9	3
1/14/2018	1:15:00 AM	6	2	1	1	1	13	2	3	10	9	4
1/14/2018	1:30:00 AM	6	2	0	1	0	12	2	1	10	4	3
1/14/2018	1:45:00 AM	5	1	1	0	0	8	1	1	11	11	3
1/14/2018	2:00:00 AM	6	1	1	1	3	8	1	0	6	8	3
1/14/2018	2:15:00 AM	6	1	2	1	1	8	1	1	9	10	2
1/14/2018	2:30:00 AM	6	3	1	0	1	7	3	1	5	12	2
1/14/2018	2:45:00 AM	6	0	2	0	1	4	1	2	8	3	5
1/14/2018	3:00:00 AM	5	3	1	1	1	3	2	2	3	2	1
1/14/2018	3:15:00 AM	3	0	2	2	1	8	1	0	12	2	2
1/14/2018	3:30:00 AM	4	0	1	0	0	4	0	0	5	5	4
1/14/2018	3:45:00 AM	3	0	0	0	1	2	0	0	4	5	2
1/14/2018	4:00:00 AM	2	0	1	3	0	3	1	0	7	3	1
1/14/2018	4:15:00 AM	1	1	0	0	0	7	0	1	6	2	1
1/14/2018	4:30:00 AM	3	2	2	1	1	7	0	1	3	9	2
1/14/2018	4:45:00 AM	3	2	0	0	0	4	0	0	8	10	1
1/14/2018	5:00:00 AM	4	2	0	2	0	8	2	1	8	9	1
1/14/2018	5:15:00 AM	1	1	0	0	0	9	0	1	10	8	1
1/14/2018	5:30:00 AM	3	0	2	0	0	19	2	1	8	3	1
1/14/2018	5:45:00 AM	4	0	0	3	3	13	1	1	7	10	0
1/14/2018	6:00:00 AM	8	0	4	0	0	13	2	4	13	12	1
1/14/2018	6:15:00 AM	6	1	3	5	0	23	4	0	8	7	4
1/14/2018	6:30:00 AM	9	1	3	3	0	51	3	6	11	10	3
1/14/2018	6:45:00 AM	11	1	3	4	3	46	4	3	14	16	0
1/14/2018	7:00:00 AM	8	0	4	1	1	48	3	13	31	23	2
1/14/2018	7:15:00 AM	13	2	6	8	4	100	11	28	25	24	3
1/14/2018	7:30:00 AM	20	2	5	6	5	160	16	75	23	22	6
1/14/2018	7:45:00 AM	19	8	4	10	7	165	14	130	28	19	4
1/14/2018	8:00:00 AM	23	1	12	11	8	145	9	145	40	26	15
1/14/2018	8:15:00 AM	35	2	8	8	17	160	7	135	54	32	8
1/14/2018	8:30:00 AM	22	3	20	24	12	150	9	155	41	30	6
1/14/2018	8:45:00 AM	30	5	15	29	8	155	7	135	51	33	9
1/14/2018	9:00:00 AM	21	8	10	18	10	185	15	120	57	44	9
1/14/2018	9:15:00 AM	20	3	8	20	14	185	14	85	65	32	6
1/14/2018	9:30:00 AM	18	5	8	19	8	110	9	50	65	39	6
1/14/2018	9:45:00 AM	24	13	13	25	8	105	12	48	65	58	5
1/14/2018	10:00:00 AM	29	7	11	28	13	130	12	57	80	56	10
1/14/2018	10:15:00 AM	33	8	14	20	17	115	20	60	80	63	5
1/14/2018	10:30:00 AM	22	5	16	31	18	115	11	57	85	56	6
1/14/2018	10:45:00 AM	23	10	11	23	28	125	11	46	90	61	11
1/14/2018	11:00:00 AM	35	16	15	20	12	120	14	35	75	65	14
1/14/2018	11:15:00 AM	31	12	16	31	11	85	8	21	75	58	8
1/14/2018	11:30:00 AM	26	10	19	24	13	125	12	44	80	53	7
1/14/2018	11:45:00 AM	34	8	22	23	13	95	19	33	75	54	10
1/14/2018	12:00:00 PM	25	13	15	26	9	115	14	32	80	59	11
1/14/2018	12:15:00 PM	28	11	6	26	8	90	11	28	80	55	14
1/14/2018	12:30:00 PM	24	3	16	30	9	110	24	25	70	54	10
1/14/2018	12:45:00 PM	29	10	8	28	5	100	9	29	65	55	7
1/14/2018	1:00:00 PM	12	10	17	33	7	90	11	30	80	65	5
1/14/2018	1:15:00 PM	29	11	15	34	10	105	11	25	95	65	9
1/14/2018	1:30:00 PM	24	11	15	34	5	105	14	19	105	57	5
1/14/2018	1:45:00 PM	29	8	25	34	8	105	12	21	115	80	12
1/14/2018	2:00:00 PM	30	18	27	43	3	100	9	28	100	80	10
1/14/2018	2:15:00 PM	30	14	23	44	10	100	10	24	95	70	13
1/14/2018	2:30:00 PM	36	14	30	52	11	115	17	46	105	75	11
1/14/2018	2:45:00 PM	39	18	44	65	13	115	19	35	115	105	10

1/14/2018	3:00:00 PM	27	23	62	70	12	110	18	27	120	115	4
1/14/2018	3:15:00 PM	22	21	65	56	7	85	11	25	95	85	7
1/14/2018	3:30:00 PM	24	11	65	56	8	120	13	23	85	80	2
1/14/2018	3:45:00 PM	23	14	65	51	10	110	20	30	85	85	4
1/14/2018	4:00:00 PM	23	16	65	61	9	90	11	22	90	85	5
1/14/2018	4:15:00 PM	17	15	43	57	5	120	23	18	80	80	6
1/14/2018	4:30:00 PM	24	17	59	46	6	110	27	25	70	70	4
1/14/2018	4:45:00 PM	26	7	51	45	6	90	15	22	70	70	4
1/14/2018	5:00:00 PM	25	15	56	50	4	110	10	21	75	70	4
1/14/2018	5:15:00 PM	24	25	35	39	14	90	19	27	62	56	2
1/14/2018	5:30:00 PM	18	19	16	23	17	85	15	27	100	95	3
1/14/2018	5:45:00 PM	27	26	26	28	12	65	18	19	120	120	6
1/14/2018	6:00:00 PM	26	27	17	28	14	75	15	26	95	80	11
1/14/2018	6:15:00 PM	28	24	13	26	11	70	16	22	80	90	7
1/14/2018	6:30:00 PM	24	27	15	25	8	55	7	14	70	60	10
1/14/2018	6:45:00 PM	27	14	9	15	9	61	14	15	65	53	13
1/14/2018	7:00:00 PM	26	6	6	22	5	57	10	8	65	65	8
1/14/2018	7:15:00 PM	19	11	14	16	7	54	6	9	65	58	11
1/14/2018	7:30:00 PM	25	9	7	16	7	46	10	9	49	51	5
1/14/2018	7:45:00 PM	25	15	7	16	6	36	9	12	53	44	7
1/14/2018	8:00:00 PM	17	6	6	12	6	36	6	6	43	47	7
1/14/2018	8:15:00 PM	27	9	8	15	4	37	2	8	29	34	12
1/14/2018	8:30:00 PM	21	4	4	8	4	37	7	8	35	34	8
1/14/2018	8:45:00 PM	20	10	6	8	9	48	9	5	28	36	11
1/14/2018	9:00:00 PM	18	10	5	3	4	27	7	7	17	25	8
1/14/2018	9:15:00 PM	23	2	5	1	4	47	7	8	20	25	8
1/14/2018	9:30:00 PM	16	5	4	4	6	30	8	10	26	26	3
1/14/2018	9:45:00 PM	12	0	3	4	3	24	3	3	25	26	5
1/14/2018	10:00:00 PM	13	4	4	3	2	33	5	4	19	22	5
1/14/2018	10:15:00 PM	12	3	3	2	2	30	6	2	21	18	10
1/14/2018	10:30:00 PM	18	7	4	2	1	26	10	6	20	20	8
1/14/2018	10:45:00 PM	14	3	4	2	0	23	1	3	12	18	6
1/14/2018	11:00:00 PM	11	2	4	4	2	14	3	2	20	11	3
1/14/2018	11:15:00 PM	6	4	5	1	0	14	5	3	25	16	3
1/14/2018	11:30:00 PM	3	1	2	3	0	17	0	3	22	9	1
1/14/2018	11:45:00 PM	7	1	3	1	1	16	2	1	12	12	3

Hwy 99 / Blueberry Dr

		Det13	Det2	Det6	Det14	Det15	Det4	
		L9	L7	L6	L5	L4	L1	
		A1<	A1	A2	A2>	B<	B	
		EBL	EBT	WBT	WBR	SBL	SBT	
Date	Time							
1/14/2018	12:00:00 AM	0	2	37	47	6	4	0
1/14/2018	12:15:00 AM	0	1	29	33	3	4	0
1/14/2018	12:30:00 AM	0	3	39	41	1	3	0
1/14/2018	12:45:00 AM	0	1	21	30	6	5	0
1/14/2018	1:00:00 AM	0	1	28	37	8	6	0
1/14/2018	1:15:00 AM	0	1	20	27	6	7	2
1/14/2018	1:30:00 AM	0	1	30	36	6	6	1
1/14/2018	1:45:00 AM	0	0	23	35	5	6	1
1/14/2018	2:00:00 AM	0	1	25	25	3	3	0
1/14/2018	2:15:00 AM	0	0	16	23	6	2	2
1/14/2018	2:30:00 AM	0	1	19	29	6	4	1
1/14/2018	2:45:00 AM	0	1	14	16	5	4	2
1/14/2018	3:00:00 AM	0	0	8	19	0	1	0
1/14/2018	3:15:00 AM	0	1	16	18	3	1	1
1/14/2018	3:30:00 AM	0	0	10	18	1	0	0
1/14/2018	3:45:00 AM	0	0	11	14	0	0	0
1/14/2018	4:00:00 AM	0	1	3	13	3	1	0
1/14/2018	4:15:00 AM	0	0	12	15	0	1	1
1/14/2018	4:30:00 AM	0	0	13	15	0	0	1
1/14/2018	4:45:00 AM	0	0	10	17	0	0	0
1/14/2018	5:00:00 AM	0	0	11	20	2	1	2
1/14/2018	5:15:00 AM	0	1	13	15	0	3	0
1/14/2018	5:30:00 AM	0	0	26	15	1	1	1
1/14/2018	5:45:00 AM	0	0	26	21	0	0	0
1/14/2018	6:00:00 AM	0	0	26	30	1	0	1
1/14/2018	6:15:00 AM	0	2	36	19	1	6	0
1/14/2018	6:30:00 AM	0	0	70	27	0	2	0
1/14/2018	6:45:00 AM	0	0	65	39	0	1	1
1/14/2018	7:00:00 AM	0	1	65	70	0	5	5
1/14/2018	7:15:00 AM	0	0	125	65	2	9	4
1/14/2018	7:30:00 AM	0	3	185	85	2	6	5
1/14/2018	7:45:00 AM	0	1	220	80	2	15	4
1/14/2018	8:00:00 AM	0	1	210	90	4	17	9
1/14/2018	8:15:00 AM	0	4	215	125	4	16	15
1/14/2018	8:30:00 AM	0	6	210	105	7	22	7
1/14/2018	8:45:00 AM	0	9	210	90	12	21	6
1/14/2018	9:00:00 AM	0	7	215	115	4	15	21
1/14/2018	9:15:00 AM	0	7	245	115	7	17	14
1/14/2018	9:30:00 AM	0	0	155	125	6	18	5
1/14/2018	9:45:00 AM	0	4	155	140	11	21	14



1/14/2018	10:00:00 AM	0	8	200	155	5	21	17
1/14/2018	10:15:00 AM	0	11	180	170	10	15	14
1/14/2018	10:30:00 AM	0	4	185	150	12	14	24
1/14/2018	10:45:00 AM	0	7	210	170	4	20	8
1/14/2018	11:00:00 AM	0	1	195	175	13	20	12
1/14/2018	11:15:00 AM	0	6	160	170	11	7	9
1/14/2018	11:30:00 AM	0	5	180	145	9	12	14
1/14/2018	11:45:00 AM	0	9	160	170	6	8	11
1/14/2018	12:00:00 PM	0	2	170	155	11	12	10
1/14/2018	12:15:00 PM	0	4	145	165	10	8	12
1/14/2018	12:30:00 PM	0	5	140	135	10	12	14
1/14/2018	12:45:00 PM	0	7	150	160	14	10	14
1/14/2018	1:00:00 PM	0	5	125	160	15	11	15
1/14/2018	1:15:00 PM	0	8	145	185	7	14	9
1/14/2018	1:30:00 PM	0	10	145	205	9	9	9
1/14/2018	1:45:00 PM	0	3	165	215	9	14	10
1/14/2018	2:00:00 PM	0	6	130	195	11	11	9
1/14/2018	2:15:00 PM	0	8	135	225	12	8	8
1/14/2018	2:30:00 PM	0	3	160	240	10	12	11
1/14/2018	2:45:00 PM	0	10	190	285	18	15	17
1/14/2018	3:00:00 PM	0	9	185	320	12	10	6
1/14/2018	3:15:00 PM	0	6	145	315	17	11	12
1/14/2018	3:30:00 PM	0	12	185	230	12	12	14
1/14/2018	3:45:00 PM	0	7	180	130	3	14	15
1/14/2018	4:00:00 PM	0	11	175	225	11	19	28
1/14/2018	4:15:00 PM	0	12	165	180	9	15	25
1/14/2018	4:30:00 PM	0	6	150	135	9	19	26
1/14/2018	4:45:00 PM	0	10	145	130	10	16	30
1/14/2018	5:00:00 PM	0	5	140	175	8	13	29
1/14/2018	5:15:00 PM	0	12	150	185	10	22	23
1/14/2018	5:30:00 PM	0	6	145	160	13	9	11
1/14/2018	5:45:00 PM	0	11	110	280	17	15	21
1/14/2018	6:00:00 PM	0	5	115	195	6	9	10
1/14/2018	6:15:00 PM	0	7	120	210	11	18	2
1/14/2018	6:30:00 PM	0	1	125	185	9	11	9
1/14/2018	6:45:00 PM	0	3	85	145	6	8	5
1/14/2018	7:00:00 PM	0	6	95	145	18	13	8
1/14/2018	7:15:00 PM	0	2	85	135	7	10	8
1/14/2018	7:30:00 PM	0	1	80	135	13	5	3
1/14/2018	7:45:00 PM	0	7	80	130	3	11	7
1/14/2018	8:00:00 PM	0	4	55	125	14	10	6
1/14/2018	8:15:00 PM	0	4	70	110	8	4	3
1/14/2018	8:30:00 PM	0	5	65	95	4	5	4
1/14/2018	8:45:00 PM	0	4	80	90	6	5	2
1/14/2018	9:00:00 PM	0	2	61	65	5	5	3
1/14/2018	9:15:00 PM	0	5	70	75	9	8	2
1/14/2018	9:30:00 PM	0	1	55	61	9	3	2

1/14/2018	9:45:00 PM	0	3	54	80	6	5	2
1/14/2018	10:00:00 PM	0	4	52	63	10	5	4
1/14/2018	10:15:00 PM	0	4	54	62	2	8	2
1/14/2018	10:30:00 PM	0	2	50	41	3	3	1
1/14/2018	10:45:00 PM	0	3	37	50	1	6	2
1/14/2018	11:00:00 PM	0	1	32	52	5	1	0
1/14/2018	11:15:00 PM	0	0	29	61	8	4	1
1/14/2018	11:30:00 PM	0	0	27	44	4	2	1
1/14/2018	11:45:00 PM	0	0	31	40	1	1	0

## Hwy 99 / Village Gate Blvd

		Detector Loop #	Det11 L5	Det12 L3	Det8 L1	Det2 L6	Det21 L11	Det6 L8	Det14 L7	Det9 L10
		Movement	B<	B<	B>	A1	A1>	A2	A2	A2<
		Direction	WBL1	WBL2	WBR	NBT	NBR	SBT1	SBT2	SBL
Date	Time									
1/14/2018	12:00:00 AM		27	6	20	19	17	18	0	4
1/14/2018	12:15:00 AM		22	5	15	12	19	7	0	1
1/14/2018	12:30:00 AM		34	5	20	14	21	9	0	1
1/14/2018	12:45:00 AM		36	6	16	10	12	3	0	0
1/14/2018	1:00:00 AM		28	7	23	7	21	4	0	1
1/14/2018	1:15:00 AM		21	5	10	10	9	4	0	2
1/14/2018	1:30:00 AM		36	8	8	6	28	7	0	1
1/14/2018	1:45:00 AM		19	3	25	3	22	10	0	0
1/14/2018	2:00:00 AM		23	5	9	6	22	7	0	0
1/14/2018	2:15:00 AM		19	5	19	4	13	5	0	2
1/14/2018	2:30:00 AM		24	4	13	4	16	5	0	0
1/14/2018	2:45:00 AM		14	3	16	3	11	5	0	0
1/14/2018	3:00:00 AM		12	2	7	6	5	5	0	4
1/14/2018	3:15:00 AM		16	1	7	4	8	6	0	1
1/14/2018	3:30:00 AM		14	2	7	8	4	5	0	3
1/14/2018	3:45:00 AM		10	2	3	5	4	3	0	0
1/14/2018	4:00:00 AM		15	1	4	2	3	2	0	1
1/14/2018	4:15:00 AM		12	2	3	5	4	4	0	0
1/14/2018	4:30:00 AM		5	0	0	8	7	8	0	1
1/14/2018	4:45:00 AM		9	1	2	2	2	9	0	0
1/14/2018	5:00:00 AM		7	0	3	5	4	8	0	0
1/14/2018	5:15:00 AM		8	0	1	6	4	6	0	2
1/14/2018	5:30:00 AM		5	4	1	8	8	6	0	2
1/14/2018	5:45:00 AM		6	4	1	11	15	11	0	1
1/14/2018	6:00:00 AM		11	2	2	14	11	8	0	2
1/14/2018	6:15:00 AM		9	1	1	14	16	7	0	2
1/14/2018	6:30:00 AM		8	5	4	19	37	13	0	2
1/14/2018	6:45:00 AM		14	3	5	23	32	17	0	4
1/14/2018	7:00:00 AM		23	7	5	21	37	23	0	8
1/14/2018	7:15:00 AM		19	6	4	27	65	26	0	6
1/14/2018	7:30:00 AM		23	6	8	37	125	33	0	9
1/14/2018	7:45:00 AM		35	9	7	54	130	21	0	9
1/14/2018	8:00:00 AM		41	9	5	53	145	19	0	15
1/14/2018	8:15:00 AM		42	10	14	48	150	39	0	19
1/14/2018	8:30:00 AM		38	14	19	61	135	25	0	13
1/14/2018	8:45:00 AM		35	11	24	90	145	43	0	13
1/14/2018	9:00:00 AM		40	16	16	75	145	37	0	14
1/14/2018	9:15:00 AM		33	12	20	80	155	39	0	14
1/14/2018	9:30:00 AM		33	10	13	80	95	41	0	22
1/14/2018	9:45:00 AM		43	10	12	65	95	50	0	28
1/14/2018	10:00:00 AM		48	16	13	85	115	41	0	24
1/14/2018	10:15:00 AM		2	75	7	80	105	38	0	25
1/14/2018	10:30:00 AM		46	25	27	85	105	38	0	22
1/14/2018	10:45:00 AM		54	19	16	75	125	60	0	15
1/14/2018	11:00:00 AM		61	20	17	75	130	56	0	37
1/14/2018	11:15:00 AM		56	17	18	65	100	48	0	30
1/14/2018	11:30:00 AM		46	19	19	65	100	38	0	28
1/14/2018	11:45:00 AM		57	13	21	70	85	26	0	23
1/14/2018	12:00:00 PM		53	14	17	70	95	51	0	15
1/14/2018	12:15:00 PM		62	20	18	65	85	43	0	23
1/14/2018	12:30:00 PM		55	15	21	53	90	33	0	16
1/14/2018	12:45:00 PM		58	20	26	70	75	29	0	22

1/14/2018	1:00:00 PM	65	26	19	63	49	33	0	24	25
1/14/2018	1:15:00 PM	75	25	21	90	70	38	0	16	26
1/14/2018	1:30:00 PM	70	27	25	70	65	37	0	34	28
1/14/2018	1:45:00 PM	75	36	19	70	90	35	0	42	38
1/14/2018	2:00:00 PM	75	15	13	65	65	33	0	34	24
1/14/2018	2:15:00 PM	75	0	27	75	56	1	0	31	36
1/14/2018	2:30:00 PM	75	18	25	85	75	0	0	41	43
1/14/2018	2:45:00 PM	90	53	28	105	90	0	0	43	33
1/14/2018	3:00:00 PM	120	75	30	100	75	31	0	43	26
1/14/2018	3:15:00 PM	105	90	45	105	75	6	0	62	19
1/14/2018	3:30:00 PM	70	70	37	115	65	0	0	75	28
1/14/2018	3:45:00 PM	40	52	31	95	95	7	0	41	22
1/14/2018	4:00:00 PM	49	49	19	95	75	10	0	53	9
1/14/2018	4:15:00 PM	54	59	15	100	70	6	0	50	9
1/14/2018	4:30:00 PM	46	46	18	110	65	8	0	46	12
1/14/2018	4:45:00 PM	27	31	14	95	80	10	0	33	11
1/14/2018	5:00:00 PM	39	37	28	75	70	11	0	47	16
1/14/2018	5:15:00 PM	44	57	36	90	65	6	0	59	28
1/14/2018	5:30:00 PM	36	28	31	90	75	2	0	45	32
1/14/2018	5:45:00 PM	70	46	33	70	50	41	0	32	27
1/14/2018	6:00:00 PM	70	29	27	65	46	38	0	21	26
1/14/2018	6:15:00 PM	90	34	35	70	63	41	0	26	20
1/14/2018	6:30:00 PM	75	21	13	55	65	36	0	22	21
1/14/2018	6:45:00 PM	56	21	22	35	46	44	0	15	17
1/14/2018	7:00:00 PM	65	29	19	47	46	42	0	23	21
1/14/2018	7:15:00 PM	42	16	19	40	46	52	0	15	13
1/14/2018	7:30:00 PM	62	21	20	37	33	32	0	18	25
1/14/2018	7:45:00 PM	60	15	21	39	47	25	0	11	13
1/14/2018	8:00:00 PM	63	20	14	29	29	39	0	11	18
1/14/2018	8:15:00 PM	49	13	25	41	30	30	0	12	19
1/14/2018	8:30:00 PM	38	13	13	28	32	36	0	8	19
1/14/2018	8:45:00 PM	33	10	14	31	42	23	0	4	12
1/14/2018	9:00:00 PM	40	8	15	36	22	15	0	4	14
1/14/2018	9:15:00 PM	40	11	14	39	35	25	0	5	7
1/14/2018	9:30:00 PM	38	7	17	33	20	20	0	5	17
1/14/2018	9:45:00 PM	37	8	12	21	33	23	0	9	8
1/14/2018	10:00:00 PM	37	15	14	18	26	19	0	3	7
1/14/2018	10:15:00 PM	27	7	11	24	33	16	0	5	4
1/14/2018	10:30:00 PM	22	9	13	19	26	13	0	4	17
1/14/2018	10:45:00 PM	20	4	17	21	11	17	0	2	12
1/14/2018	11:00:00 PM	36	9	11	20	15	15	0	3	12
1/14/2018	11:15:00 PM	39	12	14	11	16	8	0	5	8
1/14/2018	11:30:00 PM	26	8	16	13	15	5	0	0	6
1/14/2018	11:45:00 PM	27	4	15	12	18	9	0	1	6

## Hwy 99 / Lorimer Rd

Det15	Det4	Det23	Det11	Det8	Det24	Det13	Det2	Det21	Det9	Det6	Det22
L4	L1	L15/L16	L11	L8	L19/L20	L14	L12	L21/L22	L7	L5	L17/L18
B1<	B1	B1>	B2<	B2	B2 >	A1<	A1	A1>	A2<	A2	A2>
EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR

Date	Time												
1/14/2018	12:00:00 AM	1	3	6	14	2	11	5	24	0	4	12	1
1/14/2018	12:15:00 AM	1	1	4	5	2	5	2	20	0	4	8	2
1/14/2018	12:30:00 AM	0	1	8	5	4	9	7	22	0	6	12	0
1/14/2018	12:45:00 AM	1	0	5	1	4	7	2	20	0	3	13	0
1/14/2018	1:00:00 AM	0	1	5	5	2	9	5	22	0	4	11	1
1/14/2018	1:15:00 AM	2	2	2	2	1	7	3	13	0	7	12	1
1/14/2018	1:30:00 AM	0	0	2	5	3	4	0	10	0	6	11	0
1/14/2018	1:45:00 AM	1	1	4	6	3	3	8	20	0	3	12	0
1/14/2018	2:00:00 AM	2	1	6	2	4	4	3	12	0	5	13	1
1/14/2018	2:15:00 AM	1	1	5	3	5	1	6	12	0	1	9	0
1/14/2018	2:30:00 AM	1	1	4	5	1	1	4	11	0	1	12	0
1/14/2018	2:45:00 AM	0	0	9	2	1	6	7	10	0	6	7	0
1/14/2018	3:00:00 AM	0	3	3	3	4	3	4	7	0	4	7	0
1/14/2018	3:15:00 AM	0	0	1	1	2	2	0	8	0	1	6	1
1/14/2018	3:30:00 AM	2	1	0	3	0	3	2	12	0	2	4	0
1/14/2018	3:45:00 AM	1	0	0	0	1	3	1	4	0	4	4	0
1/14/2018	4:00:00 AM	0	0	2	0	0	2	2	3	0	0	3	0
1/14/2018	4:15:00 AM	1	1	2	3	0	0	1	6	0	4	1	0
1/14/2018	4:30:00 AM	0	1	4	4	0	1	0	4	0	2	4	1
1/14/2018	4:45:00 AM	0	0	1	4	1	1	0	4	0	0	7	0
1/14/2018	5:00:00 AM	0	0	0	6	0	0	0	7	0	4	9	0
1/14/2018	5:15:00 AM	1	2	2	6	1	1	1	5	0	5	2	0
1/14/2018	5:30:00 AM	1	1	2	4	0	1	0	7	0	10	7	0
1/14/2018	5:45:00 AM	0	3	2	4	1	3	0	8	0	8	16	0
1/14/2018	6:00:00 AM	0	2	2	6	0	2	2	10	0	6	9	0
1/14/2018	6:15:00 AM	1	1	2	3	3	1	0	10	0	11	7	0
1/14/2018	6:30:00 AM	2	6	3	9	2	5	0	14	1	18	22	0
1/14/2018	6:45:00 AM	2	10	2	10	3	4	1	20	0	11	31	2
1/14/2018	7:00:00 AM	3	3	2	19	3	1	1	20	1	17	36	0
1/14/2018	7:15:00 AM	3	7	9	14	5	4	2	15	1	19	46	0
1/14/2018	7:30:00 AM	1	10	3	12	4	5	5	22	0	34	57	0
1/14/2018	7:45:00 AM	2	14	8	10	8	6	3	26	0	42	53	2
1/14/2018	8:00:00 AM	5	18	10	25	3	16	7	28	0	52	57	3
1/14/2018	8:15:00 AM	1	33	16	23	4	11	5	22	0	80	75	3
1/14/2018	8:30:00 AM	5	25	10	16	9	21	5	46	1	55	75	5
1/14/2018	8:45:00 AM	5	17	5	18	9	11	14	55	0	62	75	7
1/14/2018	9:00:00 AM	1	21	11	29	7	19	9	43	0	41	62	6
1/14/2018	9:15:00 AM	7	14	8	35	10	15	4	45	1	46	52	7
1/14/2018	9:30:00 AM	8	10	10	38	10	15	10	44	0	54	61	7
1/14/2018	9:45:00 AM	6	18	15	41	11	21	5	52	0	65	70	4
1/14/2018	10:00:00 AM	16	18	18	46	8	19	8	45	3	46	70	11
1/14/2018	10:15:00 AM	10	16	9	42	10	24	5	54	0	37	61	9
1/14/2018	10:30:00 AM	5	15	6	25	10	26	6	63	1	48	90	2
1/14/2018	10:45:00 AM	5	15	6	41	6	21	5	62	0	46	80	4
1/14/2018	11:00:00 AM	5	16	13	51	8	14	6	59	1	42	85	10
1/14/2018	11:15:00 AM	11	14	9	24	20	22	5	44	0	42	85	8
1/14/2018	11:30:00 AM	9	17	17	36	6	21	10	51	0	37	85	6
1/14/2018	11:45:00 AM	11	19	16	41	10	30	11	50	1	47	90	8
1/14/2018	12:00:00 PM	14	28	7	40	11	27	8	56	3	40	75	6
1/14/2018	12:15:00 PM	9	12	13	30	7	29	5	57	0	35	90	6
1/14/2018	12:30:00 PM	5	7	16	22	13	33	6	50	0	39	52	5
1/14/2018	12:45:00 PM	11	20	6	30	13	34	10	59	1	55	65	5
1/14/2018	1:00:00 PM	7	9	6	38	18	18	9	50	0	43	75	7
1/14/2018	1:15:00 PM	8	11	13	44	9	32	6	65	2	35	62	1
1/14/2018	1:30:00 PM	5	9	8	60	20	22	5	65	3	44	80	7
1/14/2018	1:45:00 PM	5	11	10	48	10	34	7	52	1	52	85	5
1/14/2018	2:00:00 PM	8	11	14	60	21	31	4	49	0	33	75	5
1/14/2018	2:15:00 PM	7	13	10	61	16	40	14	70	0	52	85	10
1/14/2018	2:30:00 PM	6	15	16	70	15	41	9	63	0	42	90	2
1/14/2018	2:45:00 PM	3	11	19	70	21	29	10	75	3	38	110	8
1/14/2018	3:00:00 PM	4	8	9	95	32	65	13	85	1	35	70	4
1/14/2018	3:15:00 PM	9	8	2	110	31	70	12	95	0	42	85	7
1/14/2018	3:30:00 PM	7	19	12	135	40	85	13	105	1	35	80	13
1/14/2018	3:45:00 PM	13	16	5	115	44	85	23	80	1	43	65	9
1/14/2018	4:00:00 PM	11	16	11	90	59	110	19	85	2	38	56	18



1/14/2018	4:15:00 PM	13	10	4	100	51	75	19	105	0	25	44	12
1/14/2018	4:30:00 PM	12	16	5	95	39	85	18	105	1	39	65	9
1/14/2018	4:45:00 PM	10	18	3	70	38	70	23	100	2	46	65	11
1/14/2018	5:00:00 PM	5	27	8	58	33	63	10	90	0	42	63	6
1/14/2018	5:15:00 PM	11	10	15	58	39	75	20	80	0	22	61	5
1/14/2018	5:30:00 PM	8	10	11	35	29	75	15	105	0	26	47	3
1/14/2018	5:45:00 PM	8	11	7	56	24	65	11	70	0	22	61	5
1/14/2018	6:00:00 PM	5	6	11	49	20	39	6	65	0	32	65	3
1/14/2018	6:15:00 PM	8	9	6	43	10	37	10	70	1	34	70	4
1/14/2018	6:30:00 PM	4	4	5	35	18	37	5	56	0	27	70	6
1/14/2018	6:45:00 PM	2	10	4	33	12	25	6	36	0	28	50	8
1/14/2018	7:00:00 PM	3	5	10	31	10	19	3	44	0	13	62	5
1/14/2018	7:15:00 PM	2	5	9	30	12	19	9	39	0	21	56	7
1/14/2018	7:30:00 PM	3	4	4	33	9	25	7	36	0	12	55	2
1/14/2018	7:45:00 PM	4	3	5	26	9	23	7	44	0	14	29	3
1/14/2018	8:00:00 PM	4	9	6	18	10	20	4	31	0	18	54	3
1/14/2018	8:15:00 PM	3	0	6	28	7	24	8	39	0	15	32	2
1/14/2018	8:30:00 PM	1	5	4	15	13	8	5	20	0	14	50	4
1/14/2018	8:45:00 PM	3	5	3	15	3	25	4	29	0	10	33	5
1/14/2018	9:00:00 PM	1	1	7	16	6	13	6	28	0	7	16	2
1/14/2018	9:15:00 PM	1	5	0	16	12	16	6	34	0	11	28	5
1/14/2018	9:30:00 PM	3	4	7	13	5	8	7	34	0	10	31	2
1/14/2018	9:45:00 PM	0	6	4	20	7	17	0	24	0	6	19	1
1/14/2018	10:00:00 PM	0	1	2	6	5	13	5	23	0	11	18	2
1/14/2018	10:15:00 PM	1	3	4	11	9	7	2	23	0	7	13	2
1/14/2018	10:30:00 PM	0	2	4	7	5	11	6	20	0	7	19	2
1/14/2018	10:45:00 PM	1	5	4	20	7	5	5	29	0	5	24	5
1/14/2018	11:00:00 PM	2	2	6	11	6	16	4	20	0	9	11	1
1/14/2018	11:15:00 PM	2	1	3	7	4	9	5	15	0	5	15	1
1/14/2018	11:30:00 PM	0	1	4	5	2	9	6	17	0	7	4	1
1/14/2018	11:45:00 PM	0	0	3	6	1	10	4	18	0	1	12	0

## Appendix B – Collision History

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Highway Number	Segment Number	Km Mark	Collision Date	Collision Time	Weekday Description	Road surface condition code Description	Weather conditions code Description	Lighting conditions code Description	Primary Occurrence Description	Vehicle 1 - 1st contributing factor Description	Severity Type Description
99	2944	50.3	1/28/2012	23:05	Saturday	Slush	Snowing/sleet	Dark/no illum.	Head on	Ability impaired by drugs	Fatal
99	2944	50.3	10/12/2015	17:49	Monday	Wet	Cloudy	Dusk	Rear end	Driver inattentive	Personal injury
99	2944	50.4	4/11/2007	11:00	Wednesday	Dry	Clear	Daylight	Rear end	Not applicable	Personal injury
99	2944	50.4	12/17/2007	2:30	Monday	Slush	Snowing/sleet	Dark/no illum.	Off road right	Road condition (ice,snow,slush)	Personal injury
99	2944	50.4	2/1/2008	18:12	Friday	Snow	Snowing/sleet	Dark/no illum.	Unknown	Improper turning	Personal injury
99	2944	50.4	11/10/2008	12:15	Monday	Dry	Cloudy	Daylight	Head on	Driver inattentive	Personal injury
99	2944	50.4	11/19/2008	23:31	Wednesday	Dry	Clear	Dark/some illum.	Rear end	Ability impaired by alcohol	Personal injury
99	2944	50.4	12/25/2008	8:37	Thursday	Ice	Clear	Daylight	Off road right	Road condition (ice,snow,slush)	Property damage only
99	2944	50.4	6/20/2009	6:57	Saturday	Wet	Raining	Daylight	Unknown	Driving too fast for condition	Personal injury
99	2944	50.4	4/15/2010	16:20	Thursday	Dry	Clear	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	50.4	7/5/2010	15:00	Monday	Dry	Cloudy	Daylight	Rear end	Not applicable	Property damage only
99	2944	50.4	8/13/2010	19:00	Friday	Dry	Clear	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	50.4	10/23/2010	19:25	Saturday	Wet	Raining	Dark/no illum.	Other	Weather (fog,sleet,rain,snow)	Property damage only
99	2944	50.4	2/28/2011	10:10	Monday	Wet	Snowing/sleet	Daylight	Intersection 90'	Driver inattentive	Personal injury
99	2944	50.4	3/22/2011	9:10	Tuesday	Dry	Clear	Daylight	Intersection 90'	Driver inattentive	Personal injury
99	2944	50.4	2/13/2012	15:41	Monday	Dry	Clear	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	50.4	7/24/2012	23:18	Tuesday	Dry	Clear	Dark/no illum.	Off road left	Other	Property damage only
99	2944	50.4	10/2/2012	17:50	Tuesday	Dry	Clear	Daylight	Rear end	Not applicable	Personal injury
99	2944	50.4	12/28/2013	17:30	Saturday	Wet	Cloudy	Dusk	Left turn head on	Not applicable	Personal injury
99	2944	50.4	11/28/2014	15:50	Friday	Wet	Raining	Daylight	Off road left	Driver inattentive	Personal injury
99	2944	50.4	8/1/2015	17:24	Saturday	Dry	Clear	Daylight	Rear end	Not applicable	Property damage only
99	2944	50.4	10/30/2015	5:58	Friday	Wet	Raining	Dawn	Off road left	Road condition (ice,snow,slush)	Personal injury
99	2944	50.4	12/3/2015	8:16	Thursday	Wet	Raining	Daylight	Rear end	Ability impaired by alcohol	Personal injury
99	2944	50.4	12/12/2015	15:50	Saturday	Snow	Snowing/sleet	Dusk	Rear end	Road condition (ice,snow,slush)	Personal injury
99	2944	50.4	5/20/2016	17:56	Friday	Dry	Cloudy	Daylight	Rear end	Following too closely	Property damage only
99	2944	50.4	7/8/2016	17:43	Friday	Dry	Cloudy	Daylight	Rear end	Driver inattentive	Personal injury
99	2944	50.4	7/14/2016	16:30	Thursday	Wet	Raining	Daylight	Rear end	Not applicable	Property damage only
99	2944	50.4	8/12/2016	17:01	Friday	Dry	Clear	Dusk	Rear end	Not applicable	Property damage only
99	2944	50.4	8/17/2016	15:22	Wednesday	Dry	Clear	Daylight	Other	Wild animal	Property damage only
99	2944	50.4	9/4/2016	11:55	Sunday	Dry	Clear	Daylight	Rear end	Driver inattentive	Personal injury
99	2944	50.4	2/7/2017	17:45	Tuesday	Ice	Clear	Dusk	Intersection 90'	Not applicable	Personal injury
99	2944	50.4	7/5/2017	17:29	Wednesday	Dry	Clear	Daylight	Unknown	Driver inattentive	Personal injury
99	2944	50.6	1/21/2011	6:44	Friday	Snow	Snowing/sleet	Dark/no illum.	Off road left	Weather (fog,sleet,rain,snow)	Property damage only
99	2944	50.9	12/21/2014	20:34	Sunday	Wet	Raining	Dark/some illum.	Off road left	Road condition (ice,snow,slush)	Property damage only
99	2944	51.1	1/18/2012	18:53	Wednesday	Ice	Snowing/sleet	Dark/no illum.	Off road right	Driving too fast for condition	Property damage only
99	2944	51.2	12/24/2007	0:20	Monday	Snow	Snowing/sleet	Dark/no illum.	Rear end	Not applicable	Property damage only
99	2944	51.2	7/9/2015	11:20	Thursday	Dry	Clear	Daylight	Off road left	Unknown	Personal injury
99	2944	51.2	11/20/2016	17:34	Sunday	Wet	Raining	Dark/some illum.	Left turn rear end	Not applicable	Personal injury
99	2944	51.2	1/5/2017	10:13	Thursday	Ice	Clear	Daylight	Off road right	Driving too fast for condition	Personal injury
99	2944	51.5	11/17/2013	7:09	Sunday	Slush	Snowing/sleet	Dark/no illum.	Unknown	Road condition (ice,snow,slush)	Property damage only
99	2944	51.6	2/24/2011	13:16	Thursday	Dry	Clear	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	52	2/24/2007	19:43	Saturday	Ice	Snowing/sleet	Dark/some illum.	Rear end	Weather (fog,sleet,rain,snow)	Property damage only
99	2944	52.1	2/24/2007	19:00	Saturday	Snow	Snowing/sleet	Dark/no illum.	Off road left	Driver inattentive	Property damage only
99	2944	52.1	12/17/2008	9:15	Wednesday	Snow	Snowing/sleet	Daylight	Head on	Not applicable	Personal injury
99	2944	52.1	5/26/2009	8:22	Tuesday	Wet	Raining	Daylight	Off road right	Alcohol suspected	Property damage only
99	2944	52.1	12/9/2013	10:40	Monday	Ice	Cloudy	Daylight	Off road left	Road condition (ice,snow,slush)	Personal injury
99	2944	52.5	7/3/2007	20:45	Tuesday	Wet	Cloudy	Dusk	Off road right	Ability impaired by alcohol	Property damage only
99	2944	52.5	6/25/2008	10:10	Wednesday	Dry	Clear	Daylight	Rear end	Wild animal	Personal injury
99	2944	52.5	10/23/2008	10:57	Thursday	Wet	Clear	Daylight	Rear end	Domestic animal	Property damage only

99	2944	52.5	9/7/2013	10:20 Saturday	Dry	Clear	Daylight	Rear end	Driver inattentive	Personal injury
99	2944	52.5	8/15/2016	23:49 Monday	Dry	Clear	Dark/no illum.	Rear end	Not applicable	Property damage only
99	2944	52.8	4/21/2007	1:20 Saturday	Dry	Clear	Dark/no illum.	Other	Alcohol suspected	Personal injury
99	2944	52.8	7/31/2007	17:19 Tuesday	Dry	Clear	Daylight	Rear end	Following too closely	Property damage only
99	2944	52.8	5/27/2008	0:20 Tuesday	Wet	Raining	Dark/some illum.	Off road left	Weather (fog,sleet,rain,snow)	Personal injury
99	2944	52.8	7/28/2009	9:58 Tuesday	Dry	Clear	Daylight	Rear end	Driver inattentive	Personal injury
99	2944	52.8	2/24/2012	12:22 Friday	Snow	Snowing/sleet	Daylight	Off road right	Driving too fast for condition	Property damage only
99	2944	52.8	12/1/2013	15:31 Sunday	Wet	Raining	Daylight	Right turn overtaking	Driver inattentive	Property damage only
99	2944	52.8	12/18/2013	16:50 Wednesday	Wet	Cloudy	Dusk	Left turn 90'	Improper turning	Property damage only
99	2944	52.8	12/15/2014	10:15 Monday	Dry	Clear	Daylight	Intersection 90'	Glare-sunlight	Property damage only
99	2944	52.8	4/12/2015	15:31 Sunday	Dry	Clear	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	52.8	10/25/2015	9:05 Sunday	Wet	Cloudy	Dark/no illum.	Other	Ability impaired by alcohol	Personal injury
99	2944	52.8	3/23/2016	13:37 Wednesday	Wet	Cloudy	Daylight	Rear end	Driver inattentive	Personal injury
99	2944	52.8	8/26/2016	15:50 Friday	Dry	Clear	Daylight	Rear end	Not applicable	Personal injury
99	2944	52.9	2/13/2016	15:56 Saturday	Wet	Snowing/sleet	Daylight	Other	Driver inattentive	Property damage only
99	2944	53.2	3/27/2011	14:43 Sunday	Wet	Raining	Daylight	Head on	Other	Personal injury
99	2944	53.3	7/23/2008	16:52 Wednesday	Dry	Clear	Daylight	Unknown	Glare-sunlight	Property damage only
99	2944	53.3	7/23/2008	16:52 Wednesday	Dry	Clear	Daylight	Rear end	Not applicable	Property damage only
99	2944	53.3	10/4/2009	15:39 Sunday	Dry	Clear	Daylight	Left turn 90'	Driver inattentive	Personal injury
99	2944	53.3	6/22/2010	2:41 Tuesday	Dry	Clear	Dark/some illum.	Off road right	Alcohol suspected	Property damage only
99	2944	53.3	12/14/2010	19:34 Tuesday	Slush	Snowing/sleet	Dark/some illum.	Off road right	Road condition (ice,snow,slush)	Property damage only
99	2944	53.3	1/29/2011	7:19 Saturday	Snow	Snowing/sleet	Dawn	Unknown	Road condition (ice,snow,slush)	Property damage only
99	2944	53.3	8/16/2011	18:15 Tuesday	Dry	Clear	Daylight	Left turn 90'	Glare-sunlight	Personal injury
99	2944	53.3	9/2/2011	11:50 Friday	Dry	Clear	Daylight	Rear end	Not applicable	Property damage only
99	2944	53.3	9/8/2012	12:30 Saturday	Dry	Clear	Daylight	Other	Driver error/confusion	Property damage only
99	2944	53.3	8/7/2014	18:00 Thursday	Dry	Clear	Daylight	Rear end	Not applicable	Property damage only
99	2944	53.3	8/18/2016	13:16 Thursday	Dry	Clear	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	53.4	8/3/2013	15:39 Saturday	Dry	Clear	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	53.7	8/4/2009	5:13 Tuesday	Dry	Clear	Dark/some illum.	Off road right	Alcohol suspected	Property damage only
99	2944	53.7	6/6/2015	2:48 Saturday	Dry	Clear	Dark/some illum.	Off road left	Fell asleep	Personal injury
99	2944	53.7	8/3/2016	16:25 Wednesday	Dry	Clear	Daylight	Rear end	Not applicable	Property damage only
99	2944	53.8	8/5/2011	15:40 Friday	Dry	Clear	Daylight	Rear end	Other	Personal injury
99	2944	53.9	1/26/2008	12:05 Saturday	Wet	Cloudy	Daylight	Rear end	Not applicable	Personal injury
99	2944	54	1/22/2007	7:35 Monday	Snow	Snowing/sleet	Dawn	Left turn head on	Road condition (ice,snow,slush)	Property damage only
99	2944	54	2/15/2007	Thursday	Ice	Snowing/sleet	Dawn	Side swipe	Weather (fog,sleet,rain,snow)	Property damage only
99	2944	54	2/20/2007	15:24 Tuesday	Wet	Cloudy	Daylight	Other	Improper turning	Property damage only
99	2944	54	8/20/2007	12:42 Monday	Dry	Clear	Daylight	Left turn 90'	Driver inattentive	Property damage only
99	2944	54	1/27/2008	8:30 Sunday	Snow	Snowing/sleet	Dark/some illum.	Backing	Not applicable	Property damage only
99	2944	54	4/19/2008	15:50 Saturday	Dry	Clear	Daylight	Left turn 90'	Not applicable	Property damage only
99	2944	54	8/7/2008	16:30 Thursday	Dry	Clear	Daylight	Left turn 90'	Not applicable	Personal injury
99	2944	54	3/15/2009	16:21 Sunday	Wet	Cloudy	Daylight	Other	Cutting in	Property damage only
99	2944	54	4/6/2009	17:05 Monday	Dry	Clear	Daylight	Intersection 90'	Failing to yield right of way	Personal injury
99	2944	54	6/25/2009	14:20 Thursday	Dry	Cloudy	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	54	9/15/2009	11:22 Tuesday	Dry	Clear	Daylight	Other	Driver internal/external distr	Personal injury
99	2944	54	2/16/2010	9:26 Tuesday	Wet	Raining	Daylight	Unknown	Driver internal/external distr	Personal injury
99	2944	54	2/17/2010	12:06 Wednesday	Dry	Clear	Daylight	Rear end	Not applicable	Personal injury
99	2944	54	6/13/2011	Monday	Dry	Cloudy	Daylight	Side swipe	Driver inattentive	Property damage only
99	2944	54	1/2/2012	16:32 Monday	Wet	Raining	Dark/full illum.	Intersection 90'	Failing to yield right of way	Personal injury
99	2944	54	10/9/2012	9:17 Tuesday	Dry	Clear	Daylight	Left turn rear end	Not applicable	Property damage only
99	2944	54	11/9/2012	7:12 Friday	Dry	Clear	Daylight	Left turn 90'	Driver inattentive	Personal injury
99	2944	54	7/27/2013	12:00 Saturday	Dry	Clear	Daylight	Unknown	Driver inattentive	Property damage only
99	2944	54	8/22/2013	17:31 Thursday	Dry	Clear	Daylight	Left turn 90'	Driver inattentive	Personal injury
99	2944	54	1/24/2014	15:46 Friday	Dry	Clear	Daylight	Rear end	Not applicable	Property damage only
99	2944	54	1/11/2015	11:00 Sunday	Dry	Clear	Daylight	Rear end	Not applicable	Property damage only
99	2944	54	1/15/2015	12:56 Thursday	Wet	Raining	Daylight	Rear end	Driver inattentive	Personal injury
99	2944	54.1	7/18/2016	10:58 Monday	Dry	Clear	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	54.3	12/30/2007	7:30 Sunday	Wet	Clear	Dark/full illum.	Other	Driver inattentive	Property damage only

99	2944	54.3	12/5/2009	7:40 Saturday	Dry	Clear	Daylight	Rear end	Unknown	Property damage only
99	2944	54.3	12/11/2010	19:50 Saturday	Ice	Snowing/sleet	Dark/some illum.	Head on	Road condition (ice,snow,slush	Property damage only
99	2944	54.3	6/20/2014	19:42 Friday	Dry	Cloudy	Daylight	Left turn 90'	Driver inattentive	Property damage only
99	2944	54.3	8/1/2015	18:28 Saturday	Dry	Clear	Daylight	Left turn 90'	Failing to yield right of way	Property damage only
99	2944	54.4	6/28/2016	12:46 Tuesday	Dry	Clear	Daylight	Rear end	Driver internal/external distr	Property damage only
99	2944	54.6	1/28/2012	10:36 Saturday	Snow	Snowing/sleet	Daylight	Off road right	Improper passing	Property damage only
99	2944	54.6	9/12/2015	10:55 Saturday	Dry	Clear	Daylight	Rear end	Driver inattentive	Personal injury
99	2944	54.6	3/3/2017	14:50 Friday	Slush	Snowing/sleet	Daylight	Intersection 90'	Failing to yield right of way	Personal injury
99	2944	54.7	1/23/2009	0:27 Friday	Wet	Clear	Dark/some illum.	Head on	Ability impaired by alcohol	Personal injury
99	2944	54.8	12/25/2008	12:26 Thursday	Ice	Clear	Daylight	Head on	Road condition (ice,snow,slush	Personal injury
99	2944	54.8	3/30/2013	20:12 Saturday	Dry	Cloudy	Dusk	Right turn overtaking	Ability impaired by alcohol	Property damage only
99	2944	54.8	3/22/2014	8:57 Saturday	Snow	Snowing/sleet	Daylight	Other	Road condition (ice,snow,slush	Property damage only
99	2944	54.8	3/17/2016	9:53 Thursday	Dry	Clear	Daylight	Other	Driver inattentive	Property damage only
99	2944	55.1	3/8/2011	13:53 Tuesday	Wet	Cloudy	Daylight	Rear end	Other	Personal injury
99	2944	55.1	1/31/2015	17:14 Saturday	Dry	Clear	Dusk	Side swipe	Tires-failure/inadequate	Property damage only
99	2944	55.2	2/22/2008	8:05 Friday	Dry	Clear	Daylight	Left turn head on	Not applicable	Property damage only
99	2944	55.2	2/18/2009	13:47 Wednesday	Wet	Clear	Daylight	Left turn rear end	Driver inattentive	Property damage only
99	2944	55.2	4/3/2009	5:18 Friday	Slush	Snowing/sleet	Dark/some illum.	Off road right	Road condition (ice,snow,slush	Property damage only
99	2944	55.2	6/27/2013	13:24 Thursday	Dry	Cloudy	Daylight	Rear end	Following too closely	Personal injury
99	2944	55.3	1/28/2008	11:30 Monday	Ice	Clear	Daylight	Off road right	Road condition (ice,snow,slush	Property damage only
99	2944	55.4	10/4/2010	14:12 Monday	Wet	Cloudy	Daylight	Rear end	Driver inattentive	Personal injury
99	2944	55.4	4/29/2014	3:40 Tuesday	Dry	Clear	Dark/no illum.	Side swipe	Unknown	Personal injury
99	2944	55.4	8/1/2015	16:26 Saturday	Dry	Clear	Daylight	Other	Driver inattentive	Personal injury
99	2944	55.5	12/14/2007	14:30 Friday	Ice	Snowing/sleet	Dusk	Head on	Road condition (ice,snow,slush	Property damage only
99	2944	55.5	6/3/2008	20:38 Tuesday	Wet	Cloudy	Daylight	Off road right	Alcohol suspected	Property damage only
99	2944	55.5	3/16/2014	Sunday	Wet	Snowing/sleet	Dark/no illum.	Off road right	Ability impaired by alcohol	Personal injury
99	2944	55.6	11/14/2007	19:56 Wednesday	Muddy	Snowing/sleet	Dark/no illum.	Off road left	Road condition (ice,snow,slush	Property damage only
99	2944	55.6	11/5/2011	22:38 Saturday	Dry	Clear	Dark/no illum.	Off road right	Ability impaired by alcohol	Property damage only
99	2944	55.6	11/11/2012	15:49 Sunday	Ice	Snowing/sleet	Dark/some illum.	Head on	Road condition (ice,snow,slush	Property damage only
99	2944	55.6	2/22/2014	8:50 Saturday	Slush	Snowing/sleet	Daylight	Off road right	Not applicable	Personal injury
99	2944	55.6	8/22/2014	22:00 Friday	Dry	Clear	Dark/some illum.	Rear end	Insufficient traffic control	Property damage only
99	2944	55.7	10/19/2013	14:31 Saturday	Dry	Clear	Daylight	Off road left	Other	Fatal
99	2944	55.9	1/10/2017	11:40 Tuesday	Ice	Clear	Daylight	Off road right	Road condition (ice,snow,slush	Personal injury
99	2944	56	12/22/2014	19:12 Monday	Wet	Clear	Dark/some illum.	Unknown	Tires-failure/inadequate	Personal injury
99	2944	56.1	2/1/2015	7:26 Sunday	Slush	Snowing/sleet	Daylight	Unknown	Road condition (ice,snow,slush	Personal injury
99	2944	56.2	1/1/2011	16:16 Saturday	Dry	Clear	Daylight	Side swipe	Other	Property damage only
99	2944	56.4	1/2/2009	0:30 Friday	Unknown	Cloudy	Dark/some illum.	Off road right	Ability impaired by alcohol	Personal injury
99	2944	56.5	3/16/2007	22:53 Friday	Wet	Raining	Dark/no illum.	Other	Ability impaired by alcohol	Personal injury
99	2944	56.5	10/11/2007	2:47 Thursday	Wet	Raining	Dark/no illum.	Off road right	Not applicable	Property damage only
99	2944	56.5	10/26/2007	22:19 Friday	Dry	Clear	Dark/no illum.	Rear end	Driver inattentive	Property damage only
99	2944	56.5	8/23/2008	1:30 Saturday	Dry	Clear	Dark/some illum.	Off road right	Ability impaired by drugs	Personal injury
99	2944	56.5	11/12/2010	11:09 Friday	Dry	Cloudy	Daylight	Other	Driver inattentive	Property damage only
99	2944	56.6	5/27/2008	18:25 Tuesday	Dry	Cloudy	Daylight	Other	Driver inattentive	Personal injury
99	2944	56.7	11/10/2007	11:15 Saturday	Dry	Cloudy	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	56.7	3/12/2010	13:32 Friday	Ice	Snowing/sleet	Daylight	Rear end	Road condition (ice,snow,slush	Personal injury
99	2944	56.7	8/1/2010	23:30 Sunday	Dry	Cloudy	Dark/no illum.	Other	Failing to yield right of way	Property damage only
99	2944	56.7	4/24/2011	16:35 Sunday	Dry	Cloudy	Daylight	Overtaking	Driver inattentive	Property damage only
99	2944	56.8	7/29/2007	2:26 Sunday	Dry	Cloudy	Dark/no illum.	Other	Other	Fatal
99	2944	56.8	8/14/2007	15:15 Tuesday	Dry	Clear	Daylight	Rear end	Following too closely	Property damage only
99	2944	56.8	3/5/2009	0:12 Thursday	Wet	Snowing/sleet	Dark/some illum.	Off road right	Ability impaired by alcohol	Property damage only
99	2944	56.8	4/17/2009	11:02 Friday	Wet	Raining	Daylight	Rear end	Other	Personal injury
99	2944	56.8	8/20/2009	11:02 Thursday	Dry	Clear	Daylight	Rear end	Following too closely	Property damage only
99	2944	56.8	3/12/2010	13:27 Friday	Ice	Snowing/sleet	Daylight	Rear end	Road condition (ice,snow,slush	Property damage only
99	2944	56.8	10/10/2010	13:20 Sunday	Wet	Clear	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	56.8	12/29/2010	10:27 Wednesday	Wet	Cloudy	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	56.8	4/15/2011	17:56 Friday	Dry	Clear	Daylight	Unknown	Windows obstructed	Property damage only
99	2944	56.8	8/10/2012	12:52 Friday	Dry	Clear	Daylight	Left turn 90'	Road condition (ice,snow,slush	Personal injury



99	2944	56.8	9/21/2012	16:47 Friday	Dry	Clear	Daylight	Rear end	Following too closely	Personal injury
99	2944	56.8	8/31/2013	Saturday	Dry	Clear	Daylight	Rear end	Other	Personal injury
99	2944	56.8	12/21/2013	11:03 Saturday	Wet	Cloudy	Daylight	Rear end	Extreme fatigue	Property damage only
99	2944	56.8	3/8/2014	18:34 Saturday	Slush	Snowing/sleet	Dark/no illum.	Side swipe	Driving too fast for condition	Property damage only
99	2944	56.8	9/2/2014	12:23 Tuesday	Dry	Cloudy	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	56.8	9/7/2014	12:31 Sunday	Dry	Clear	Daylight	Rear end	Not applicable	Property damage only
99	2944	56.8	1/1/2016	14:09 Friday	Slush	Clear	Daylight	Rear end	Not applicable	Property damage only
99	2944	56.8	6/21/2016	17:16 Tuesday	Dry	Clear	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	56.8	5/25/2017	16:45 Thursday	Dry	Clear	Daylight	Rear end	Not applicable	Personal injury
99	2944	56.8	7/2/2017	15:14 Sunday	Dry	Clear	Daylight	Off road right	Extreme fatigue	Personal injury
99	2944	56.8	7/13/2017	14:10 Thursday	Dry	Clear	Daylight	Rear end	Not applicable	Personal injury
99	2944	56.9	12/14/2007	14:13 Friday	Snow	Snowing/sleet	Dusk	Rear end	Following too closely	Property damage only
99	2944	56.9	12/20/2007	18:05 Thursday	Wet	Cloudy	Dark/some illum.	Rear end	Improper passing	Property damage only
99	2944	56.9	12/24/2008	8:42 Wednesday	Ice	Snowing/sleet	Daylight	Side swipe	Driving too fast for condition	Property damage only
99	2944	56.9	12/15/2009	19:36 Tuesday	Ice	Snowing/sleet	Dark/some illum.	Head on	Unknown	Property damage only
99	2944	56.9	3/12/2010	19:30 Friday	Wet	Cloudy	Dusk	Other	Ignoring officer/flagmn/guard	Personal injury
99	2944	56.9	4/30/2010	16:24 Friday	Dry	Cloudy	Daylight	Off road right	Ability impaired by alcohol	Personal injury
99	2944	56.9	1/27/2011	2:37 Thursday	Ice	Fog	Dark/some illum.	Off road right	Ability impaired by alcohol	Property damage only
99	2944	56.9	2/28/2013	9:15 Thursday	Wet	Cloudy	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	56.9	8/9/2014	5:05 Saturday	Dry	Clear	Dawn	Off road right	Extreme fatigue	Property damage only
99	2944	57.1	1/24/2016	14:00 Sunday	Slush	Clear	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	57.2	7/9/2015	15:08 Thursday	Dry	Clear	Daylight	Overtaking	Not applicable	Property damage only
99	2944	57.2	9/26/2015	18:15 Saturday	Dry	Clear	Dusk	Side swipe	Unknown	Property damage only
99	2944	57.3	8/30/2015	11:48 Sunday	Wet	Raining	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	57.5	2/18/2007	9:05 Sunday	Wet	Snowing/sleet	Daylight	Rear end	Driver inattentive	Personal injury
99	2944	57.5	2/18/2007	0:49 Sunday	Wet	Raining	Dark/some illum.	Rear end	Driver error/confusion	Property damage only
99	2944	57.5	6/28/2007	15:25 Thursday	Dry	Cloudy	Daylight	Other	Fell asleep	Property damage only
99	2944	57.5	12/1/2007	11:19 Saturday	Wet	Cloudy	Daylight	Rear end	Following too closely	Property damage only
99	2944	57.5	6/10/2011	3:36 Friday	Dry	Clear	Dark/no illum.	Off road right	Alcohol suspected	Property damage only
99	2944	57.6	1/15/2012	1:58 Sunday	Wet	Cloudy	Dark/no illum.	Other	Road condition (ice,snow,slush	Personal injury
99	2944	57.6	7/5/2014	7:47 Saturday	Dry	Cloudy	Dark/no illum.	Head on	Not applicable	Personal injury
99	2944	57.6	2/18/2015	15:23 Wednesday	Dry	Cloudy	Daylight	Rear end	Avoiding veh./ped./cycle	Property damage only
99	2944	57.6	4/30/2016	17:23 Saturday	Dry	Clear	Daylight	Rear end	Not applicable	Property damage only
99	2944	57.6	5/2/2016	15:35 Monday	Dry	Clear	Daylight	Rear end	Not applicable	Personal injury
99	2944	58.1	3/18/2007	15:00 Sunday	Dry	Unknown	Unknown	Unknown	Not applicable	Property damage only
99	2944	58.1	4/18/2007	8:45 Wednesday	Unknown	Unknown	Daylight	Other	Not applicable	Property damage only
99	2944	58.1	11/14/2007	19:22 Wednesday	Snow	Snowing/sleet	Dark/no illum.	Off road right	Road condition (ice,snow,slush	Property damage only
99	2944	58.1	1/6/2008	0:05 Sunday	Ice	Snowing/sleet	Dark/full illum.	Rear end	Backing unsafely	Personal injury
99	2944	58.1	9/25/2008	15:38 Thursday	Wet	Snowing/sleet	Daylight	Other	Road condition (ice,snow,slush	Property damage only
99	2944	58.1	12/29/2008	Monday	Snow	Clear	Dark/some illum.	Left turn 90'	Improper turning	Personal injury
99	2944	58.1	3/15/2009	8:29 Sunday	Ice	Cloudy	Daylight	Side swipe	Road condition (ice,snow,slush	Property damage only
99	2944	58.1	7/4/2009	19:10 Saturday	Dry	Clear	Daylight	Left turn head on	Not applicable	Property damage only
99	2944	58.1	1/16/2010	10:56 Saturday	Wet	Clear	Daylight	Left turn 90'	Glare-sunlight	Personal injury
99	2944	58.1	3/12/2010	12:48 Friday	Slush	Snowing/sleet	Daylight	Side swipe	Road condition (ice,snow,slush	Property damage only
99	2944	58.1	7/8/2010	14:00 Thursday	Dry	Clear	Daylight	Left turn 90'	Other	Property damage only
99	2944	58.1	8/21/2010	23:19 Saturday	Muddy	Raining	Dark/some illum.	Overtaking	Driver inattentive	Property damage only
99	2944	58.1	9/28/2012	11:14 Friday	Dry	Clear	Daylight	Left turn rear end	Other	Property damage only
99	2944	58.1	11/11/2012	16:13 Sunday	Ice	Snowing/sleet	Dark/some illum.	Left turn rear end	Road condition (ice,snow,slush	Property damage only
99	2944	58.1	1/6/2013	10:25 Sunday	Wet	Snowing/sleet	Daylight	Rear end	Driver inattentive	Property damage only
99	2944	58.1	1/23/2013	7:55 Wednesday	Snow	Snowing/sleet	Daylight	Other	Not applicable	Property damage only
99	2944	58.1	3/10/2013	5:52 Sunday	Dry	Cloudy	Daylight	Rear end	Avoiding veh./ped./cycle	Property damage only
99	2944	58.1	5/3/2014	9:25 Saturday	Wet	Raining	Dusk	Rear end	Not applicable	Property damage only
99	2944	58.1	2/5/2015	19:05 Thursday	Wet	Raining	Dark/no illum.	Left turn 90'	Other	Property damage only
99	2944	58.1	8/16/2015	12:27 Sunday	Dry	Cloudy	Daylight	Left turn 90'	Failing to yield right of way	Personal injury
99	2944	58.1	11/25/2015	14:59 Wednesday	Ice	Clear	Daylight	Rear end	Road condition (ice,snow,slush	Property damage only
99	2944	58.1	2/8/2016	23:24 Monday	Wet	Fog	Dark/full illum.	Intersection 90'	Not applicable	Property damage only
99	2944	58.1	7/18/2016	17:20 Monday	Dry	Cloudy	Daylight	Rear end	Not applicable	Property damage only

99	2944	58.1	2/9/2017	18:36 Thursday	Snow	Snowing/sleet	Dark/full illum.	Left turn 90'	Failing to yield right of way	Personal injury
99	2946	0	3/8/2016	21:22 Tuesday	Dry	Clear	Dark/full illum.	Rear end	Ability impaired by alcohol	Property damage only
99	2946	0	6/24/2017	15:33 Saturday	Dry	Clear	Daylight	Left turn 90'	Not applicable	Personal injury
99	2946	0.3	2/21/2008	21:20 Thursday	Dry	Clear	Dark/some illum.	Left turn 90'	Driver inattentive	Personal injury
99	2946	0.3	1/31/2009	0:21 Saturday	Ice	Cloudy	Dark/some illum.	Other	Ability impaired by alcohol	Property damage only
99	2946	0.3	1/29/2015	22:14 Thursday	Dry	Clear	Dark/no illum.	Unknown	Other	Personal injury
99	2946	0.4	2/13/2010	16:45 Saturday	Wet	Raining	Daylight	Rear end	Driver inattentive	Personal injury
99	2946	0.6	2/22/2007	19:00 Thursday	Dry	Clear	Dark/full illum.	Intersection 90'	Not applicable	Personal injury
99	2946	0.6	3/3/2008	16:22 Monday	Wet	Clear	Daylight	Other	Driver inattentive	Property damage only
99	2946	0.6	4/23/2008	13:00 Wednesday	Dry	Clear	Daylight	Intersection 90'	Not applicable	Property damage only
99	2946	0.6	12/6/2008	17:50 Saturday	Wet	Raining	Dark/some illum.	Left turn 90'	Driver inattentive	Property damage only
99	2946	0.6	12/30/2008	17:03 Tuesday	Wet	Clear	Dark/some illum.	Left turn 90'	Improper turning	Personal injury
99	2946	0.6	3/30/2009	8:48 Monday	Dry	Cloudy	Daylight	Other	Not applicable	Property damage only
99	2946	0.6	8/4/2009	16:25 Tuesday	Dry	Clear	Daylight	Rear end	Wild animal	Property damage only
99	2946	0.6	8/8/2010	16:30 Sunday	Dry	Clear	Daylight	Rear end	Other	Property damage only
99	2946	0.6	2/26/2011	12:20 Saturday	Dry	Cloudy	Daylight	Intersection 90'	Other	Property damage only
99	2946	0.6	8/13/2011	21:40 Saturday	Dry	Clear	Dark/no illum.	Left turn 90'	Driver inattentive	Personal injury
99	2946	0.6	12/22/2011	17:31 Thursday	Unknown	Clear	Dark/some illum.	Left turn head on	Failing to yield right of way	Property damage only
99	2946	0.6	1/1/2013	17:05 Tuesday	Wet	Clear	Dark/full illum.	Left turn 90'	Not applicable	Property damage only
99	2946	0.6	3/6/2013	Wednesday	Dry	Clear	Daylight	Rear end	Not applicable	Property damage only
99	2946	0.6	3/11/2013	13:40 Monday	Dry	Clear	Daylight	Intersection 90'	Improper turning	Personal injury
99	2946	0.6	3/12/2013	22:44 Tuesday	Wet	Raining	Dark/some illum.	Left turn head on	Ability impaired by alcohol	Property damage only
99	2946	0.6	5/22/2013	7:54 Wednesday	Dry	Clear	Daylight	Head on	Fell asleep	Personal injury
99	2946	0.6	11/30/2013	13:23 Saturday	Wet	Cloudy	Daylight	Intersection 90'	Site line obstruction	Personal injury
99	2946	0.6	8/25/2014	14:00 Monday	Dry	Cloudy	Daylight	Rear end	Not applicable	Personal injury
99	2946	0.6	9/12/2015	15:20 Saturday	Dry	Clear	Daylight	Right turn rear end	Driver inattentive	Personal injury
99	2946	0.6	11/25/2015	10:14 Wednesday	Ice	Clear	Daylight	Rear end	Not applicable	Property damage only
99	2946	0.6	2/6/2016	11:19 Saturday	Wet	Cloudy	Daylight	Rear end	Driver inattentive	Personal injury
99	2946	0.6	3/13/2016	21:24 Sunday	Wet	Raining	Dark/some illum.	Rear end	Driver error/confusion	Personal injury
99	2946	0.6	6/28/2016	14:55 Tuesday	Dry	Clear	Daylight	Left turn 90'	Not applicable	Property damage only
99	2946	0.8	1/6/2011	3:09 Thursday	Slush	Snowing/sleet	Dark/no illum.	Other	Driving too fast for condition	Fatal

## **Appendix C – Average Provincial Collision Rates, BC MoTI (2009-2013)**

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**British Columbia Ministry of Transportation and Infrastructure**  
**AVERAGE PROVINCIAL COLLISION RATES BY HIGHWAY SERVICE CLASS AND TRAFFIC VOLUME RANGE**  
 January 1, 2009 to December 31, 2013 Data (5 years)

**All Collisions (intersection and non-intersection)**

Average Daily Traffic Volume (vpd)	Highway Class																													
	UAU2			UAU4			UAD4			UED4 **			UFD4 **			RAU2		RAU4			RAD4**		RED4**			RFD4 **				
	(C/MVK)	(km)	(# coll)	(C/MVK)	(km)	(# coll)	(C/MVK)	(km)	(# coll)	(C/MVK)	(km)	(# coll)	(C/MVK)	(km)	(# coll)	(C/MVK)	(km)	(# coll)	(C/MVK)	(km)	(# coll)	(C/MVK)	(km)	(# coll)	(C/MVK)	(km)	(# coll)	(C/MVK)	(km)	(# coll)
1 - 5,000	0.78	239	920	1.37	7	43	0.66	2	7	1.92	4	54	0.00	0	0	0.41	8400	10713	0.40	150	337	0.33	49	104	0.73	2	8	0.26	526	934
5,001 - 10,000	0.55	79	521	0.94	33	469	0.83	8	98	1.08	4	54	0.00	0	0	0.36	974	4293	0.19	46	102	0.52	31	177	0.41	52	289	0.40	333	1491
10,001 - 15,000	0.63	53	723	0.88	16	333	0.00	0	0	0.41	2	18	2.63	0.1	7	0.29	139	936	0.22	40	212	0.21	47	226	0.37	121	995	0.26	28	136
15,001 - 20,000	0.32	19	194	0.79	20	505	1.37	2	99	0.56	20	333	0.20	24	170	0.17	17	94	0.32	18	187	0.30	22	220	0.28	15	136	0.23	11	76
over 20,000	0.42	4	62	0.67	37	1382	0.76	48	1842	0.30	16	377	0.30	130	3399	0.40	19	314	0.32	43	619	0.45	55	1205	0.31	49	723	0.23	263	3337
All Volumes	0.60	394	2420	0.76	113	2732	0.78	60	2046	0.42	46	836	0.29	153	3576	0.39	9548	16350	0.30	297	1457	0.38	204	1932	0.35	239	2151	0.26	1161	5974

**Collisions Occurring At All Intersections (MV6020 Accident Location Code 01, LKI Landmarks A1, A2, A3 & A5). Zero radius from intersection point.**

Average Daily Traffic Volume (vpd)	Highway Class																													
	UAU2			UAU4			UAD4			UED4 **			UFD4 **			RAU2			RAU4			RAD4**			RED4**			RFD4 **		
	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)
1 - 5,000	0.38	298	597	0.34	21	42	0.27	4	6	0.52	4	16	0.00	0	0	0.44	1912	3746	0.40	45	99	0.59	14	54	0.00	0	0	0.52	30	103
5,001 - 10,000	0.22	229	638	0.24	107	372	0.26	23	90	0.20	6	18	0.00	0	0	0.21	725	1911	0.21	20	50	0.24	17	45	0.25	54	221	0.26	54	154
10,001 - 15,000	0.16	123	438	0.24	85	473	0.19	5	23	0.14	5	16	0.00	0	0	0.16	168	620	0.20	20	97	0.29	20	128	0.22	85	417	0.16	16	55
15,001 - 20,000	0.12	50	183	0.19	56	354	0.25	12	101	0.40	16	195	0.28	4	38	0.17	76	408	0.19	27	164	0.22	36	268	0.32	28	279	0.18	10	57
over 20,000	0.12	13	70	0.20	122	1247	0.21	152	1639	0.20	23	354	0.10	126	1044	0.16	32	223	0.19	66	565	0.20	92	952	0.22	49	529	0.11	98	694
All Volumes	0.21	713	1926	0.21	391	2488	0.21	196	1859	0.24	54	599	0.10	130	1082	0.27	2913	6908	0.20	178	975	0.21	179	1447	0.24	216	1446	0.14	208	1063

**Collisions Occurring At Non-Signalized Intersections (LKI Landmarks A1 & A2). Zero radius from intersection point.**

Average Daily Traffic Volume (vpd)	Highway Class																													
	UAU2			UAU4			UAD4			UED4 **		UFD4 **		RAU2		RAU4		RAD4**		RED4**		RFD4 **								
	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)			
1 - 5,000	0.38	260	510	0.29	14	22	0.18	2	2	0.58	1	4	0.00	0	0	0.45	1678	3380	0.40	39	84	0.21	1	1	0.00	0	0	1.10	6	33
5,001 - 10,000	0.19	193	453	0.20	63	186	0.23	9	31	0.37	2	11	0.00	0	0	0.21	594	1558	0.16	15	29	0.25	9	25	0.21	23	77	0.25	6	18
10,001 - 15,000	0.14	98	315	0.17	43	170	0.08	2	4	0.06	3	4	0.00	0	0	0.16	125	457	0.15	14	51	0.19	2	8	0.14	34	106	0.11	2	4
15,001 - 20,000	0.09	33	95	0.13	32	135	0.18	3	18	0.27	1	9	0.00	0	0	0.15	33	153	0.25	16	132	0.15	9	47	0.12	3	11	0.00	0	0
over 20,000	0.06	7	20	0.20	52	503	0.10	71	376	0.12	9	84	0.24	1	11	0.14	24	146	0.13	25	149	0.11	28	154	0.11	13	74	0.25	2	21
All Volumes	0.19	591	1393	0.18	204	1016	0.11	87	431	0.13	16	112	0.24	1	11	0.29	2454	5694	0.19	109	445	0.12	49	235	0.14	73	268	0.34	16	76

**Collisions Occurring At Signalized Intersections (LKI Landmarks A3 & A5). Zero radius from intersection point.**

Average Daily Traffic Volume (vpd)	Highway Class																													
	UAU2			UAU4			UAD4			UED4 **			UFD4 **			RAU2		RAU4			RAD4**			RED4**			RFD4 **			
	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)	(C/MV)	(# int)	(# coll)
1 - 5,000	0.71	16	71	0.52	5	17	0.36	2	4	0.00	0	0	0.00	0	0	0.88	7	35	1.54	1	10	0.61	13	53	0.00	0	0	0.31	4	8
5,001 - 10,000	0.50	22	157	0.48	22	155	0.38	8	46	0.07	1	1	0.00	0	0	0.65	14	122	0.50	3	19	0.00	0	0	0.72	7	81	0.00	0	0
10,001 - 15,000	0.30	21	138	0.42	29	281	0.26	3	19	0.26	2	12	0.00	0	0	0.56	10	136	0.32	5	41	0.35	13	105	0.47	25	260	0.00	0	0
15,001 - 20,000	0.25	9	66	0.36	19	226	0.38	5	65	0.76	4	98	0.00	0	0	0.36	14	153	0.60	1	21	0.38	15	194	0.40	16	198	0.00	0	0
over 20,000	0.34	3	43	0.32	43	738	0.42	60	1318	0.26	15	309	0.00	0	0	0.40	3	55	0.41	17	329	0.37	37	722	0.36	21	374	0.12	1	9
All Volumes	0.38	71	475	0.36	118	1417	0.42	78	1452	0.30	22	420	0.00	0	0	0.49	48	501	0.42	27	420	0.37	78	1074	0.42	69	913	0.17	5	17

**Non-Intersection Collisions (collisions not occurring at intersections above)**

Average Daily Traffic Volume (vpd)	Highway Class																													
	UAU2			UAU4			UAD4			UED4 **		UFD4 **		RAU2		RAU4			RAD4**		RED4**			RFD4 **						
	(C/MVK)	(km)	(# coll)	(C/MVK)	(km)	(# coll)	(C/MVK)	(km)	(# coll)	(C/MVK)	(km)	(# coll)	(C/MVK)	(km)	(# coll)	(C/MVK)	(km)	(# coll)	(C/MVK)	(km)	(# coll)	(C/MVK)	(km)	(# coll)	(C/MVK)	(km)	(# coll)			
1 - 5,000	0.18	239	214	0.03	7	1	0.09	2	1	1.78	4	50	0.00	0	0	0.26	8400	6757	0.29	150	241	0.16	49	50	0.73	2	8	0.24	526	834
5,001 - 10,000	0.12	79	111	0.16	33	80	0.07	8	8	0.48	4	24	0.00	0	0	0.20	974	2399	0.13	46	67	0.39	31	132	0.22	52	152	0.36	333	1351
10,001 - 15,000	0.12	53	135	0.06	16	24	0.00	0	0	0.05	2	2	2.63	0.1	7	0.10	139	303	0.04	40	43	0.06	47	60	0.12	121	322	0.22	28	115
15,001 - 20,000	0.05	19	31	0.08	20	50	0.26	2	19	0.23	20	138	0.15	24	124	0.09	17	48	0.12	18	72	0.10	22	73	0.07	15	32	0.14	11	47
over 20,000	0.04	4	6	0.08	37	159	0.07	48	175	0.02	16	23	0.21	130	2363	0.10	19	78	0.06	43	122	0.06	55	173	0.08	49	191	0.17	263	2564
All Volumes	0.12	394	497	0.09	113	314	0.08	60	203	0.12	46	237	0.20	153	2494	0.23	9548	9585	0.11	297	545	0.09	204	488	0.11	239	705	0.21	1161	4911

NOTES:

1. \*\* All RFD4 & UFD4 and most UED4, RED4, & RAD4 roadways have a separate LKI segment for each direction of travel (see the "opposing LKI segments" tab for details). Therefore, the length in the tables above, which represents LKI segment length, will differ from roadway length for these 5 service classes. As well, for these 5 classes the rate is based on the collisions and volumes for each 1-directional LKI segment. Therefore to find an average rate by volume range for any of these 5 classes use the volume range that best represents the 1-way AADT at your site.
2. Provincial average intersection collision rates are artificially high due to the lack of cross-street volume data in the CIS and the fact that the CIS analysis does not include intersections where there are zero collisions when calculating provincial average rates.
3. As a general rule a sample of at least 25 collisions is necessary to have confidence in the calculated collision rate. Where the collision sample size is less than 25 collisions the rate has been blacked out. However, these rates can still be seen and may be used at the discretion of the analyst.
4. Analysis dates: 10th to 12th February 2015. CIS version 2.0.1 CIS collision data last updated 1 February 2015. Traffic volume updated to the end of 2013. Effective LKI: July 2014. Subsequent updates to the data may affect the results in this table.
5. Total annual collision counts (F/I/PDO) for 2009-13 are only 78% of what they were in 2006-10. Consequently Provincial average collision rates for 2009-13 in the tables above are also generally lower than they were in 2006-10. Many factors could be contributing to this reduction. Two significant known factors include a change to police reporting practices in 2008 and the Immediate Roadside Prohibition (IRP) introduced in 2012.

LEGEND:

U = Urban	vpd =Vehicles per Day	A1 = Intersection with stop sign or flashing red lights, no turning slots
R = Rural	C/MVK = Collisions per Million Vehicle Kilometres	A2 = Intersection with stop sign or flashing red lights, and turning slots
A = Arterial	C/MV = Collisions per Million Entering Vehicles	A3 = Intersection with traffic control lights, no turning slots
E = Expressway, multi-lanes with at grade intersections	# coll = Number of Collisions	A5 = Intersection with traffic control lights, and turning slots
F = Freeway, multi-lane with grade separations	# int = Number of Intersections	MV6020 Form, Accident Location Code 01 = at intersection
U2 = Undivided Up to 3 Lanes		
U4 = Undivided 4 or More Lanes		
D4 = Divided 4 or More Lanes		
		<div></div> Less than 25 collisions for this volume range and service class
		<div></div> Zero collisions or no inventory for this volume range and service class

British Columbia Ministry of Transportation and Infrastructure  
**NUMBER OF COLLISIONS BY SERVICE CLASS, TRAFFIC VOLUME RANGE, AND SEVERITY**  
 January 1, 2009 to December 31, 2013 Data (5 years)

**All Collisions (intersection and non-intersection)**

Average Daily Traffic Volume (vpd)	Highway Class																																			
	UAU2						UAU4						UAD4						UED4						UFD4						RAU2					
	FAT	%	INJ	PDO	%	FAT	%	INJ	PDO	%	FAT	%	INJ	PDO	%	FAT	%	INJ	PDO	%	FAT	%	INJ	PDO	%	FAT	%	INJ	PDO	%	FAT	%	INJ	PDO	%	
1 - 5,000	12	1.30	388	42.20	520	56.50	0	0.00	11	25.60	32	74.40	0	0.00	4	57.10	3	42.90	0	0.00	20	37.00	34	63.00	0		0		0		326	3.00	4705	43.90	5682	53.00
5,001 - 10,000	5	1.00	212	40.70	304	58.30	6	1.30	206	43.90	257	54.80	1	1.00	45	45.90	52	53.10	1	1.90	16	29.60	37	68.50	0		0		0		115	2.70	1733	40.40	2445	57.00
10,001 - 15,000	5	0.70	329	45.50	389	53.80	1	0.30	135	40.50	197	59.20	0		0		0		0	0.00	8	44.40	10	55.60	0	0.00	2	28.60	5	71.40	20	2.10	461	49.30	455	48.60
15,001 - 20,000	5	2.60	103	53.10	86	44.30	6	1.20	197	39.00	302	59.80	1	1.00	36	36.40	62	62.60	2	0.60	132	39.60	199	59.80	2	1.20	58	34.10	110	64.70	6	6.40	43	45.70	45	47.90
over 20,000	0	0.00	33	53.20	29	46.80	18	1.30	704	50.90	660	47.80	10	0.50	819	44.50	1013	55.00	1	0.30	179	47.50	197	52.30	10	0.30	1377	40.50	2012	59.20	5	1.60	157	50.00	152	48.40
All Volumes	27	1.10	1065	44.00	1328	54.90	31	1.10	1253	45.90	1448	53.00	12	0.60	904	44.20	1130	55.20	4	0.50	355	42.50	477	57.10	12	0.30	1437	40.20	2127	59.50	472	2.90	7099	43.40	8779	53.70

**Collisions Occurring At All Intersections (MV6020 Accident Location Code 01, LKI Landmarks A1, A2, A3 & A5). Zero radius from intersection point.**

Average Daily Traffic Volume (vpd)	Highway Class																																			
	UAU2						UAU4						UAD4						UED4						UFD4						RAU2					
	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%
1 - 5,000	8	1.30	252	42.20	337	56.40	0	0.00	10	23.80	32	76.20	0	0.00	4	66.70	2	33.30	0	0.00	8	50.00	8	50.00	0		0		0		68	1.80	1655	44.20	2023	54.00
5,001 - 10,000	4	0.60	252	39.50	382	59.90	5	1.30	170	45.70	197	53.00	0	0.00	42	46.70	48	53.30	0	0.00	4	22.20	14	77.80	0		0		0		38	2.00	833	43.60	1040	54.40
10,001 - 15,000	2	0.50	203	46.30	233	53.20	1	0.20	198	41.90	274	57.90	0	0.00	10	43.50	13	56.50	0	0.00	8	50.00	8	50.00	0		0		0		12	1.90	296	47.70	312	50.30
15,001 - 20,000	3	1.60	101	55.20	79	43.20	4	1.10	136	38.40	214	60.50	1	1.00	35	34.70	65	64.40	1	0.50	85	43.60	109	55.90	0	0.00	11	28.90	27	71.10	6	1.50	187	45.80	215	52.70
over 20,000	0	0.00	38	54.30	32	45.70	10	0.80	638	51.20	599	48.00	7	0.40	748	45.60	884	53.90	1	0.30	171	48.30	182	51.40	2	0.20	426	40.80	616	59.00	3	1.30	125	56.10	95	42.60
All Volumes	17	0.90	846	43.90	1063	55.20	20	0.80	1152	46.30	1316	52.90	8	0.40	839	45.10	1012	54.40	2	0.30	276	46.10	321	53.60	2	0.20	437	40.40	643	59.40	127	1.80	3096	44.80	3685	53.30

**Collisions Occurring At Non-Signalized Intersections (LKI Landmarks A1 & A2). Zero radius from intersection point.**

Average Daily Traffic Volume (vpd)	Highway Class																																			
	UAU2						UAU4						UAD4						UED4						UFD4						RAU2					
	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%
1 - 5,000	8	1.60	211	41.40	291	57.10	0	0.00	7	31.80	15	68.20	0	0.00	1	50.00	1	50.00	0	0.00	3	75.00	1	25.00	0		0		0		58	1.70	1501	44.40	1821	53.90
5,001 - 10,000	3	0.70	179	39.50	271	59.80	3	1.60	91	48.90	92	49.50	0	0.00	17	54.80	14	45.20	0	0.00	2	18.20	9	81.80	0		0		0		26	1.70	692	44.40	840	53.90
10,001 - 15,000	1	0.30	147	46.70	167	53.00	1	0.60	80	47.10	89	52.40	0	0.00	2	50.00	2	50.00	0	0.00	3	75.00	1	25.00	0		0		0		8	1.80	230	50.30	219	47.90
15,001 - 20,000	2	2.10	49	51.60	44	46.30	1	0.70	46	34.10	88	65.20	0	0.00	3	16.70	15	83.30	0	0.00	5	55.60	4	44.40	0		0		0		5	3.30	72	47.10	76	49.70
over 20,000	0	0.00	12	60.00	8	40.00	4	0.80	259	51.50	240	47.70	3	0.80	188	50.00	185	49.20	1	1.20	39	46.40	44	52.40	0	0.00	5	45.50	6	54.50	3	2.10	81	55.50	62	42.50
All Volumes	14	1.00	598	42.90	781	56.10	9	0.90	483	47.50	524	51.60	3	0.70	211	49.00	217	50.30	1	0.90	52	46.40	59	52.70	0	0.00	5	45.50	6	54.50	100	1.80	2576	45.20	3018	53.00

**Collisions Occurring At Signalized Intersections (LKI Landmarks A3 & A5). Zero radius from intersection point.**

Average Daily Traffic Volume  (vpd)	Highway Class																																			
	UAU2						UAU4						UAD4						UED4						UFD4						RAU2					
	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%
1 - 5,000	0	0.00	35	49.30	36	50.70	0	0.00	3	17.60	14	82.40	0	0.00	3	75.00	1	25.00	0		0		0		0		0		0		1	2.90	18	51.40	16	45.70
5,001 - 10,000	1	0.60	63	40.10	93	59.20	2	1.30	65	41.90	88	56.80	0	0.00	22	47.80	24	52.20	0	0.00	1	100.00	0	0.00	0		0		0		1	0.80	50	41.00	71	58.20
10,001 - 15,000	1	0.70	56	40.60	81	58.70	0	0.00	108	38.40	173	61.60	0	0.00	8	42.10	11	57.90	0	0.00	5	41.70	7	58.30	0		0		0		1	0.70	54	39.70	81	59.60
15,001 - 20,000	1	1.50	39	59.10	26	39.40	3	1.30	90	39.80	133	58.80	1	1.50	27	41.50	37	56.90	0	0.00	47	48.00	51	52.00	0		0		0		0	0.00	74	48.40	79	51.60
over 20,000	0	0.00	21	48.80	22	51.20	7	0.90	373	50.50	358	48.50	5	0.40	598	45.40	715	54.20	1	0.30	148	47.90	160	51.80	0		0		0		0	0.00	31	56.40	24	43.60
All Volumes	3	0.60	214	45.10	258	54.30	12	0.80	639	45.10	766	54.10	6	0.40	658	45.30	788	54.30	1	0.20	201	47.90	218	51.90	0		0		0		3	0.60	227	45.30	271	54.10

**Non-Intersection Collisions (collisions not occurring at intersections above)**

Average Daily Traffic Volume (vpd)	Highway Class																																			
	UAU2						UAU4						UAD4						UED4						UFD4						RAU2					
	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%
1 - 5,000	4	1.90	93	43.50	117	54.70	0	0.00	1	100.00	0	0.00	0	0.00	0	0.00	1	100.00	0	0.00	17	34.00	33	66.00	0		0		0		257	3.80	2954	43.70	3546	52.50
5,001 - 10,000	1	0.90	42	37.80	68	61.30	1	1.30	30	37.50	49	61.30	1	12.50	3	37.50	4	50.00	1	4.20	7	29.20	16	66.70	0		0		0		75	3.10	929	38.70	1395	58.10
10,001 - 15,000	4	3.00	69	51.10	62	45.90	1	4.20	6	25.00	17	70.80	0		0		0		0	0.00	0	0.00	2	100.00	0	0.00	2	28.60	5	71.40	10	3.30	144	47.50	149	49.20
15,001 - 20,000	1	3.20	12	38.70	18	58.10	1	2.00	22	44.00	27	54.00	0	0.00	5	26.30	14	73.70	1	0.70	47	34.10	90	65.20	2	1.60	44	35.50	78	62.90	3	6.30	22	45.80	23	47.90
over 20,000	0	0.00	4	66.70	2	33.30	8	5.00	79	49.70	72	45.30	3	1.70	64	36.60	108	61.70	0	0.00	8	34.80	15	65.20	8	0.30	954	40.40	1401	59.30	3	3.80	34	43.60	41	52.60
All Volumes	10	2.00	220	44.30	267	53.70	11	3.50	138	43.90	165	52.50	4	2.00	72	35.50	127	62.60	2	0.80	79	33.30	156	65.80	10	0.40	1000	40.10	1484	59.50	348	3.60	4083	42.60	5154	53.80



Highway Class																														
RAU4						RAD4						RED4						RFD4						All 10 Highway Classes						
FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	All
9	2.70	144	42.70	184	54.60	1	1.00	40	38.50	63	60.60	0	0.00	5	62.50	3	37.50	18	1.90	457	48.90	459	49.10	366	2.79	5774	44.07	8980	53.20	13120
2	2.00	47	46.10	53	52.00	3	1.70	70	39.50	104	58.80	5	1.70	115	39.80	169	58.50	18	1.20	647	43.40	826	55.40	156	2.08	3091	41.25	4247	56.67	7494
4	1.90	110	51.90	98	46.20	7	3.10	87	38.50	132	58.40	11	1.10	407	40.90	577	58.00	2	1.50	61	44.90	73	53.70	50	1.39	1600	44.62	1936	53.99	3586
4	2.10	85	45.50	98	52.40	3	1.40	86	39.10	131	59.50	1	0.70	52	38.20	83	61.00	0	0.00	35	46.10	41	53.90	30	1.49	827	41.06	1157	57.45	2014
11	1.80	292	47.20	316	51.10	13	1.10	533	44.20	659	54.70	8	1.10	331	45.80	384	53.10	27	0.80	1282	38.40	2028	60.80	103	0.78	5707	43.04	7450	56.18	13260
30	2.10	678	46.50	749	51.40	27	1.40	816	42.20	1089	56.40	25	1.20	910	42.30	1216	56.50	65	1.10	2482	41.50	3427	57.40	705	1.79	16999	43.06	21770	55.15	39474

Highway Class																														
RAU4						RAD4						RED4						RFD4						All 10 Highway Classes						
FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	All
1	1.00	44	44.40	54	54.50	0	0.00	20	37.00	34	63.00	0		0		0		0	0.00	45	43.70	58	56.30	77	1.65	2038	43.71	2548	54.64	4663
0	0.00	32	64.00	18	36.00	0	0.00	19	42.20	26	57.80	4	1.80	86	38.90	131	59.30	1	0.60	67	43.50	86	55.80	52	1.49	1505	43.03	1942	55.50	3499
1	1.00	54	55.70	42	43.30	2	1.60	53	41.40	73	57.00	5	1.20	177	42.40	235	56.40	1	1.80	18	32.70	36	65.50	24	1.06	1017	44.86	1226	54.08	2267
3	1.80	68	41.50	93	56.70	4	1.50	112	41.80	152	56.70	1	0.40	126	45.20	152	54.50	0	0.00	29	50.90	28	49.10	23	1.12	890	43.48	1134	55.40	2047
5	0.90	272	48.10	288	51.00	7	0.70	422	44.30	523	54.90	6	1.10	237	44.80	286	54.10	1	0.10	273	39.30	420	60.50	42	0.57	3350	45.78	3925	53.64	7317
10	1.00	470	48.20	495	50.80	13	0.90	626	43.30	808	55.80	16	1.10	626	43.30	804	55.60	3	0.30	432	40.60	628	59.10	218	1.10	8800	44.46	10775	54.44	19793

Highway Class																														
RAU4						RAD4						RED4						RFD4						All 10 Highway Classes						
FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	All
1	1.20	40	47.60	43	51.20	0	0.00	1	100.00	0	0.00	0		0		0		0	0.00	15	45.50	18	54.50	67	1.66	1779	44.08	2190	54.26	4036
0	0.00	22	75.90	7	24.10	0	0.00	10	40.00	15	60.00	2	2.60	21	27.30	54	70.10	0	0.00	8	44.40	10	55.60	34	1.42	1042	43.63	1310	54.94	2388
1	2.00	30	58.80	20	39.20	0	0.00	4	50.00	4	50.00	5	4.70	42	39.60	59	55.70	1	25.00	2	50.00	1	25.00	17	1.52	540	48.26	562	50.22	1119
3	2.30	54	40.90	75	56.80	1	2.10	21	44.70	25	53.20	0	0.00	8	72.70	3	27.30	0		0		0		12	2.00	258	43.00	330	55.00	600
4	2.70	68	45.60	77	51.70	2	1.30	67	43.50	85	55.20	2	2.70	26	35.10	46	62.20	0	0.00	9	42.90	12	57.10	19	1.24	754	49.02	765	49.74	1538
9	2.00	214	48.10	222	49.90	3	1.30	103	43.80	129	54.90	9	3.40	97	36.20	162	60.40	1	1.30	34	44.70	41	53.90	149	1.54	4373	45.17	5159	53.29	9681

Highway Class																														
RAU4						RAD4						RED4						RFD4						All 10 Highway Classes						
FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	All
0	0.00	2	20.00	8	80.00	0	0.00	19	35.80	34	64.20	0		0		0		0	0.00	2	25.00	6	75.00	1	0.51	82	41.41	115	58.08	198
0	0.00	9	47.40	10	52.60	0		0		0		1	1.20	41	50.60	39	48.10	0		0		0		0	0.86	251	43.20	325	55.94	581
0	0.00	23	56.10	18	43.90	2	1.90	43	41.00	60	57.10	0	0.00	114	43.80	146	56.20	0		0		0		4	0.40	411	41.43	577	58.17	992
0	0.00	9	42.90	12	57.10	3	1.50	84	43.30	107	55.20	0	0.00	91	46.00	107	54.00	0		0		0		8	0.78	461	45.15	552	54.06	1021
0	0.00	165	50.20	164	49.80	5	0.70	310	42.90	407	56.40	4	1.10	181	48.40	189	50.50	0	0.00	0	0.00	9	100.00	22	0.56	1827	46.88	2048	52.55	3897
0	0.00	208	49.50	212	50.50	10	0.90	456	42.50	608	56.60	5	0.50	427	46.80	481	52.70	0	0.00	2	11.80	15	88.20	40	0.60	3032	45.33	3617	54.07	6689

Highway Class																														
RAU4					RAD4					RED4					RFD4					All 10 Highway Classes										
FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	FAT	%	INJ	%	PDO	%	All
8	3.30	101	41.90	132	54.80	1	2.00	20	40.00	29	58.00	0	0.00	5	62.50	3	37.50	18	2.20	410	49.20	406	48.70	288	3.53	3601	44.15	4267	52.32	8156
2	3.00	28	41.80	37	55.20	3	2.30	51	38.60	78	59.10	2	1.30	58	38.20	92	60.50	17	1.30	587	43.40	747	55.30	103	2.38	1735	40.12	2486	57.49	4324
3	7.00	16	37.20	24	55.80	4	6.70	18	30.00	38	63.30	5	1.60	120	37.30	197	61.20	1	0.90	51	44.30	63	54.80	28	2.77	426	42.14	557	55.09	1011
4	5.60	32	44.40	36	50.00	0	0.00	25	34.20	48	65.80	0	0.00	10	31.30	22	68.80	0	0.00	18	38.30	29	61.70	12	1.89	237	37.38	385	60.73	634
6	4.90	54	44.30	62	50.80	6	3.50	77	44.50	90	52.00	2	1.00	91	47.60	98	51.30	26	1.00	984	38.40	1554	60.60	62	1.06	2349	40.13	3443	58.81	5854
23	4.20	231	42.40	291	53.40	14	2.90	191	39.10	283	58.00	9	1.30	284	40.30	412	58.40	62	1.30	2050	41.70	2799	57.00	493	2.47	8348	41.78	11148	55.75	19979

# Notes:

1. Analysis dates: 10th to 12th February 2015. CIS version 2.0.1 CIS collision data last updated 1 February 2015. Effective LKI: July 2014. Subsequent updates to the data may affect the results in this table.

2. Statistically, severity proportions in these tables can be used with confidence if the collision sample size (#fat + #inj + #PDO) is at least:  
- 1500 collisions, for fatal proportion  
- 50 collisions, for injury and PDO proportions

# Legend:

U = Urban

R = Rural

A = Arterial

E = Expressway, multi-lanes with at grade intersections

F = Freeway, multi-lane with grade separations

U2 = Undivided Up to 3 Lanes

U4 = Undivided 4 or More Lanes

D4 = Divided 4 or More Lanes

vpd = Vehicles per Day

FAT = Number of fatal collisions

INJ = Number of injury collisions

PDO = Number of Property Damage Only collisions

A1 = Intersection with stop sign or flashing red lights, no turning slots

A2 = Intersection with stop sign or flashing red lights, and turning slots

A3 = Intersection with traffic control lights, no turning slots

A5 = Intersection with traffic control lights, and turning slots

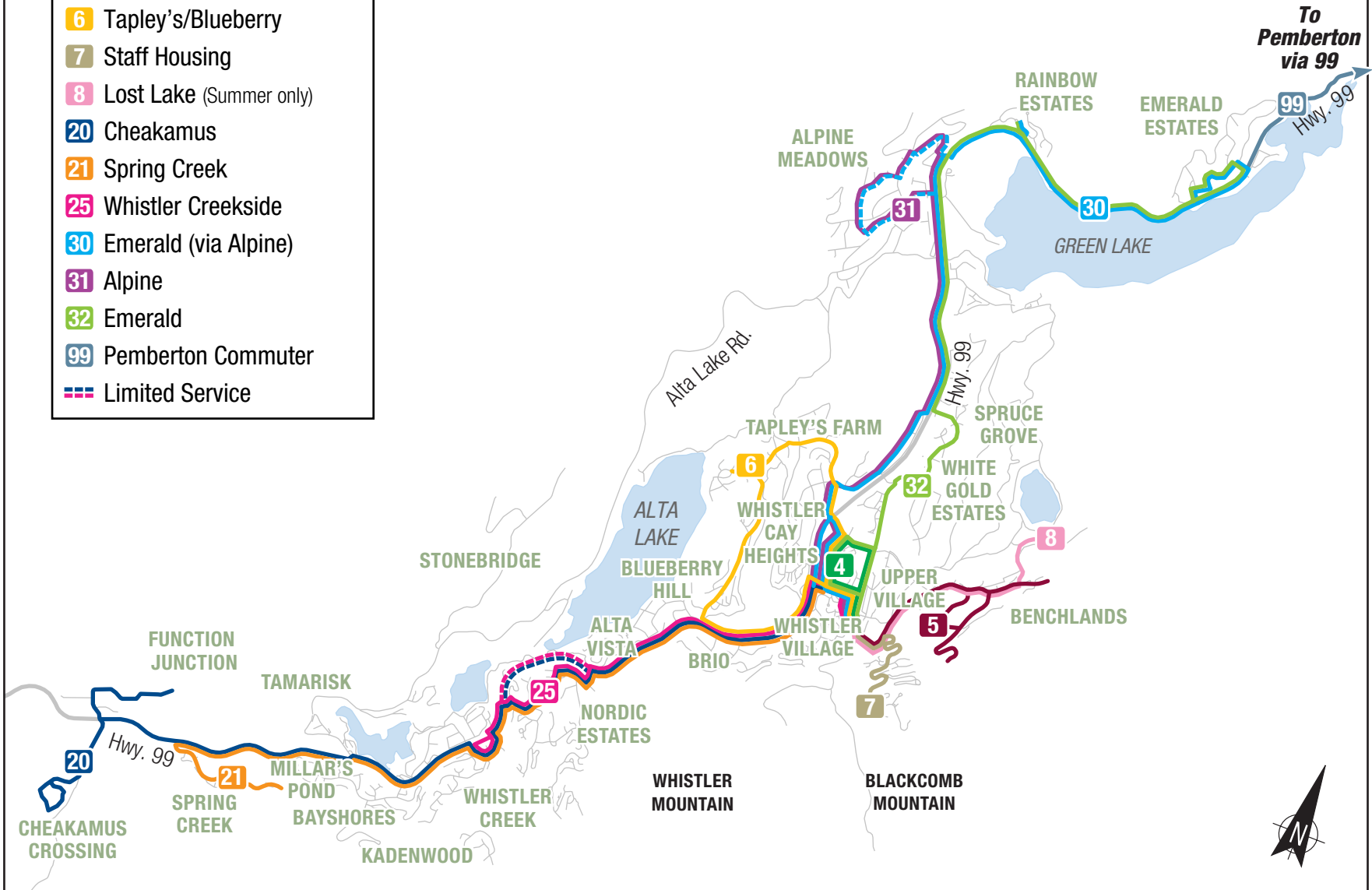
MV6020 Form, Accident Location Code 01 = at intersection

Zero collisions or no inventory for this volume range and service class

## Appendix D – Whistler Transit Map

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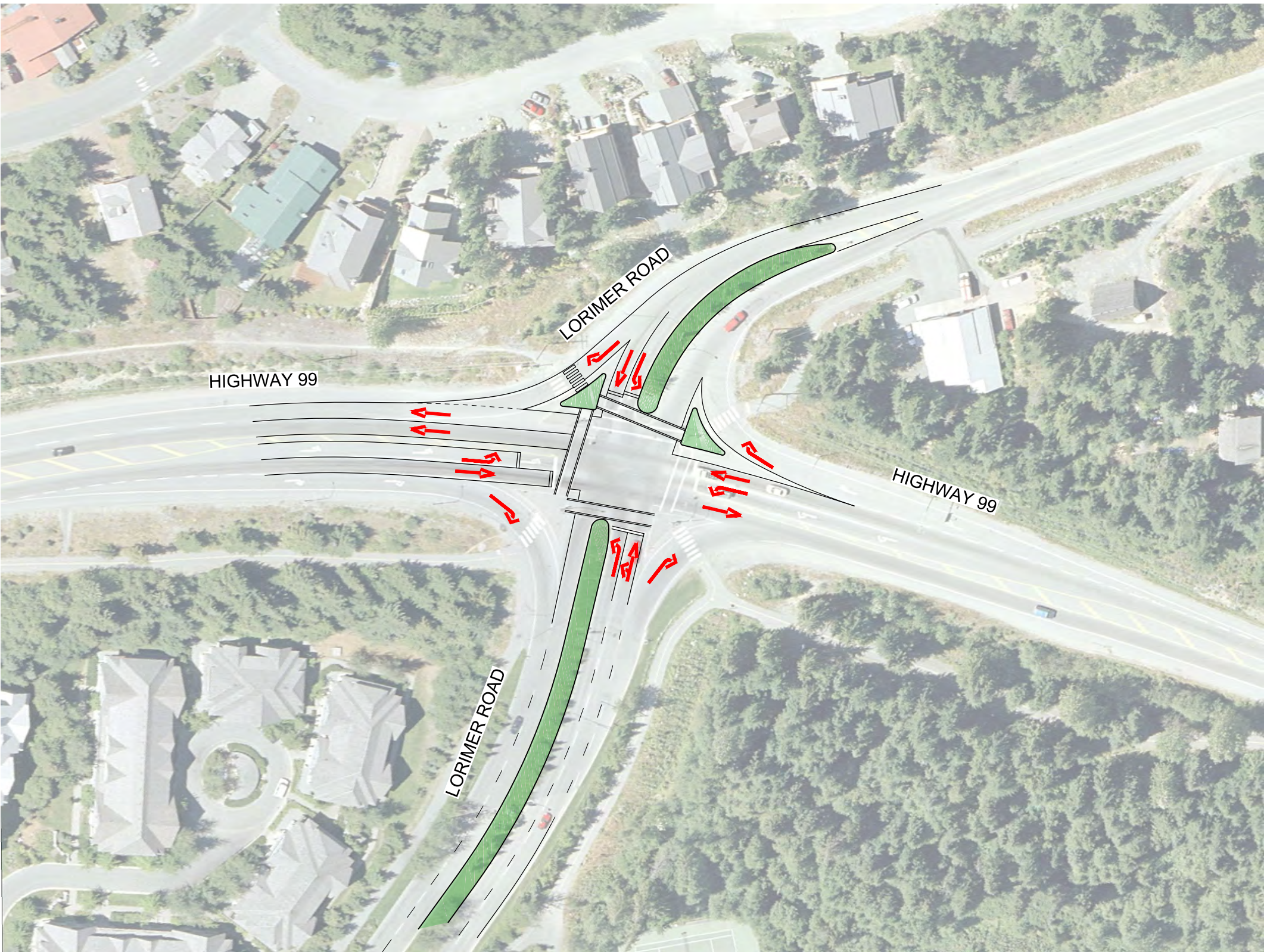
- 4 Marketplace (Winter only)
- 5 Upper Village/Benchlands
- 6 Tapley's/Blueberry
- 7 Staff Housing
- 8 Lost Lake (Summer only)
- 20 Cheakamus
- 21 Spring Creek
- 25 Whistler Creekside
- 30 Emerald (via Alpine)
- 31 Alpine
- 32 Emerald
- 99 Pemberton Commuter
- Limited Service



## **Appendix E – Short-Term Option (Dual WB Left at Lorimer Road)**

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DESIGN VEHICLE (Lorimer Road WB to SB)	
LEFT	HSU
SHARED LEFT THROUGH	WB20

HALFSIZE


FOR DISCUSSION ONLY

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BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE  
SOUTH COAST REGION  
HIGHWAY ENGINEERING

SCALE  
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CAD FILENAME  
DATE

REV	DATE	REVISIONS	SIGNATURE
A	2018-05-30	ISSUED FOR REVIEW	

PLAN  
MoTI WHISTLER HIGHWAY 99 CAPACITY & SAFETY REVIEW  
LORIMER ROAD INTERSECTION  
SHORT-TERM OPTION A - LEFT / SHARED LEFT-THROUGH

DESIGNED  
QUALITY CONTROL  
QUALITY ASSURANCE  
DRAWN

DATE  
DATE  
DATE  
DATE

SENIOR DESIGNER  
DATE

FILE NUMBER  
2121-00288-02

PROJECT NUMBER

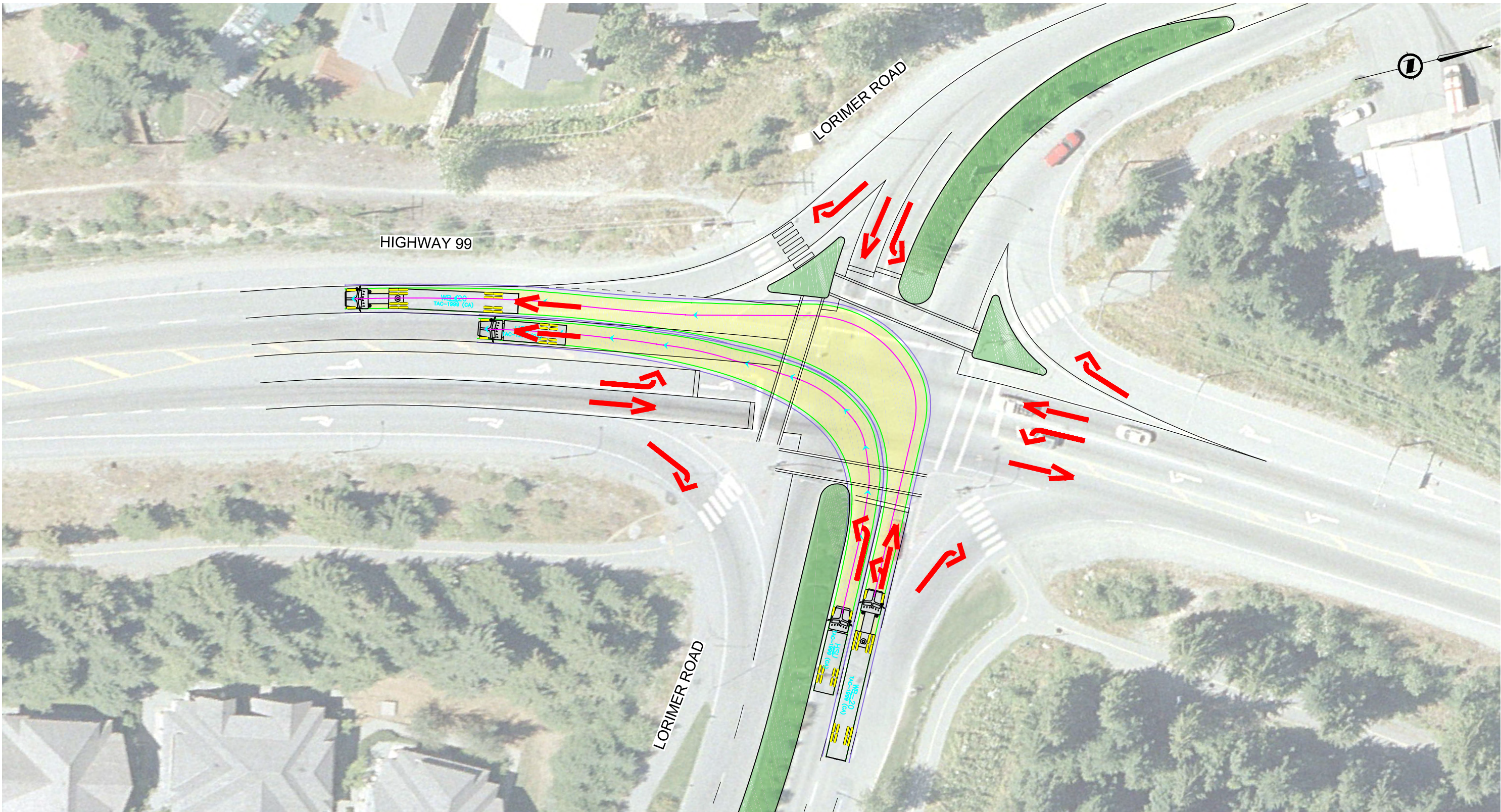
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DRAWING NUMBER  
R1-288-A-101

REV  
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TRUCK TURNING MOVEMENTS

DESIGN VEHICLE (Lorimer Road WB to SB)

LEFT	HSU
SHARED LEFT THROUGH	WB20

HALFSIZE

FOR DISCUSSION ONLY

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SOUTH COAST REGION  
HIGHWAY ENGINEERING

SCALE021:25012m

CAD FILENAME  
DATE

REV	DATE	REVISIONS	SIGNATURE
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PLAN

MOTI WHISTLER HIGHWAY 99 CAPACITY & SAFETY REVIEW  
LORIMER ROAD INTERSECTION  
SHORT-TERM OPTION A - LEFT / SHARED LEFT-THROUGH

DESIGNED  
QUALITY CONTROL  
QUALITY ASSURANCE  
DRAWN

DATE  
DATE  
DATE  
DATE

SENIOR DESIGNER  
DATE

FILE NUMBER  
2121-00288-02

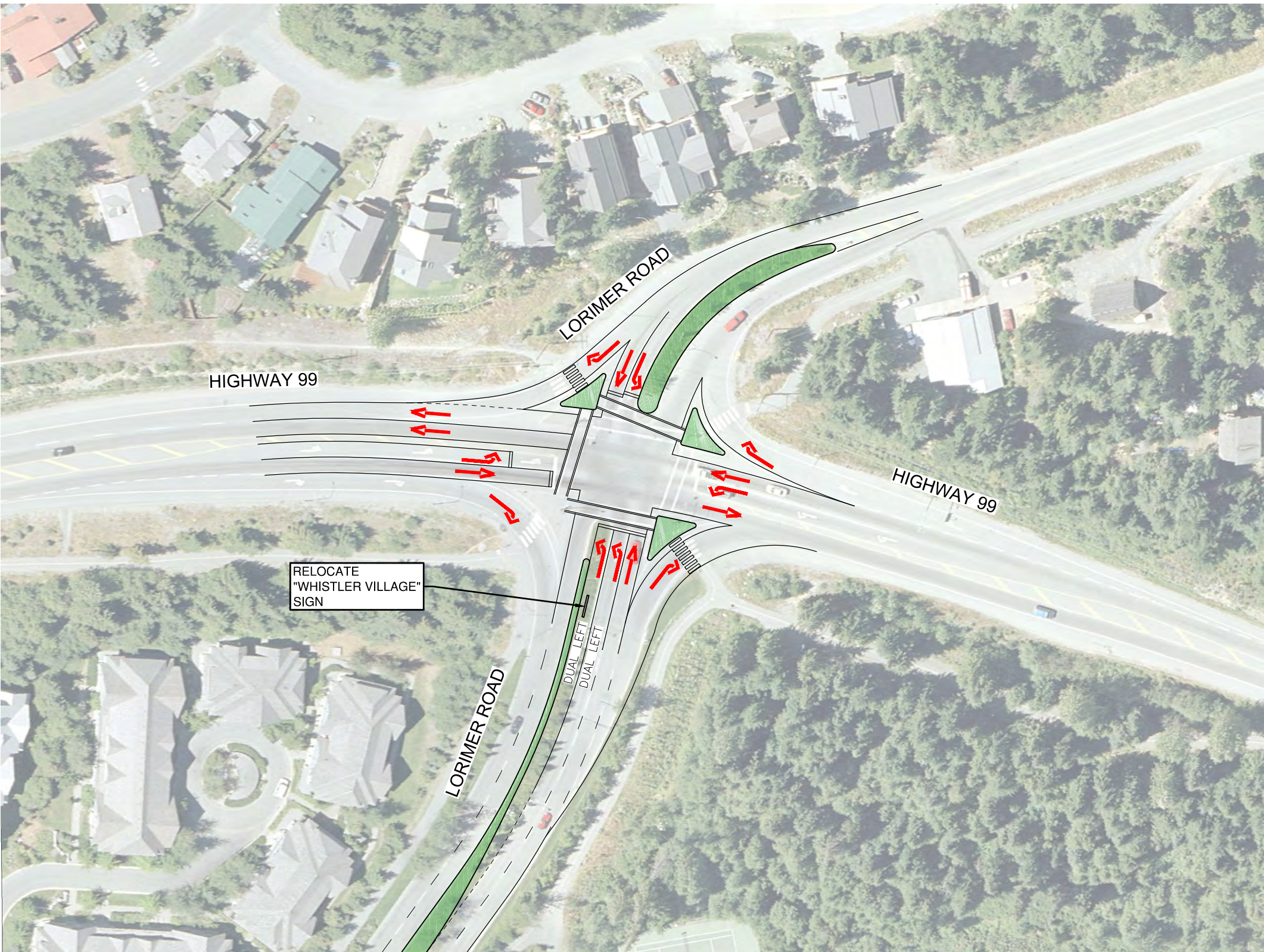
PROJECT NUMBER

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DRAWING NUMBER  
R1-288-A-102

REV  
A






DESIGN VEHICLE (Lorimer Road WB to SB)	
DUAL LEFT INSIDE	HSU
DUAL LEFT OUTSIDE	WB20

HALFSIZE

FOR DISCUSSION ONLY


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SOUTH COAST REGION  
HIGHWAY ENGINEERING

SCALE051:50025m

CAD FILENAME  
DATE

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A	2018-05-30	ISSUED FOR REVIEW	

PLAN

MoTI WHISTLER HIGHWAY 99 CAPACITY & SAFETY REVIEW

LORIMER ROAD INTERSECTION

SHORT-TERM OPTION B - DUAL LEFT

DESIGNED  
QUALITY CONTROL  
QUALITY ASSURANCE  
DRAWN

DATE  
DATE  
DATE  
DATE

SENIOR DESIGNER

DATE

FILE NUMBER

2121-00288-02

PROJECT NUMBER

REV

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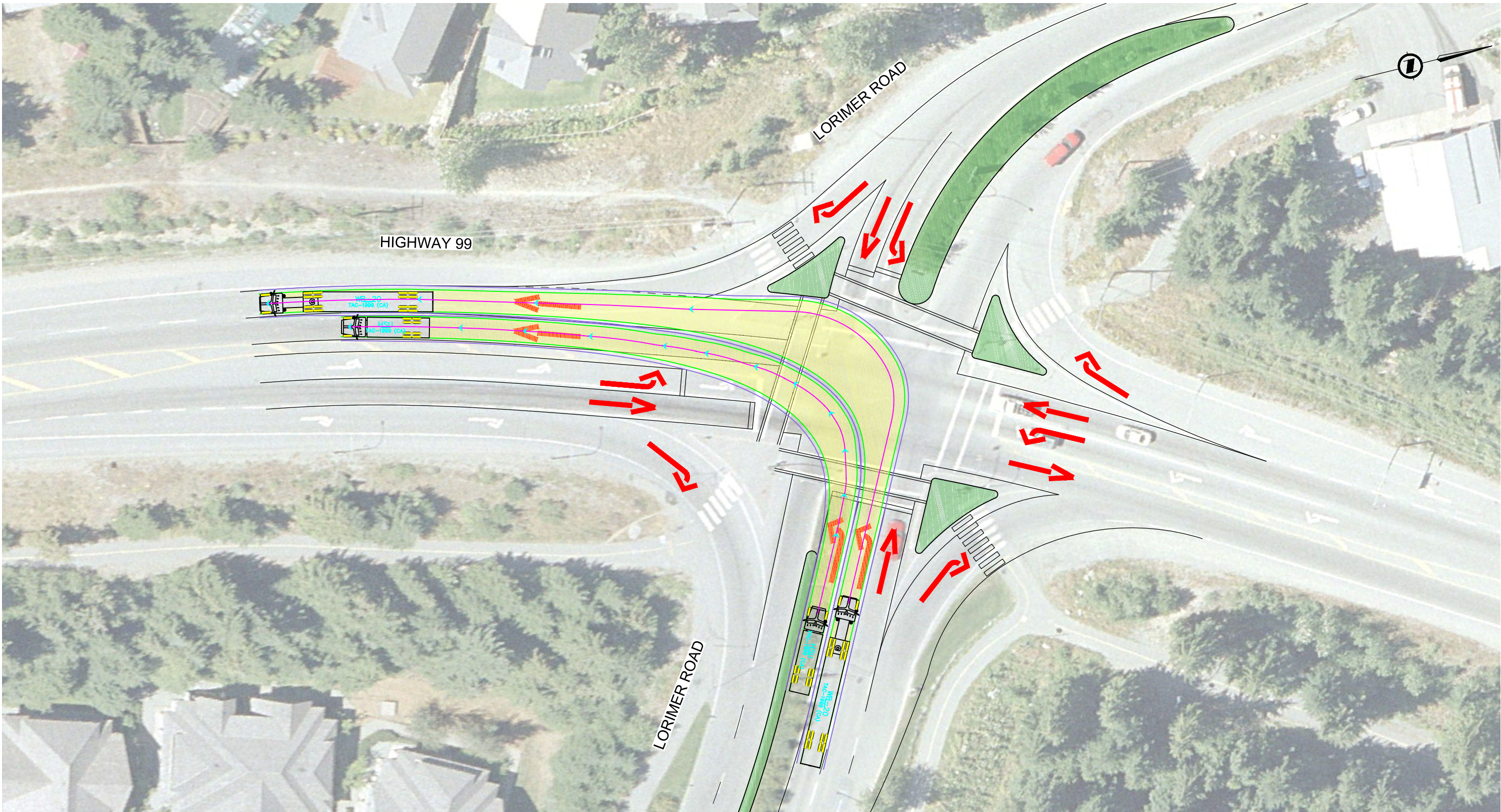
DRAWING NUMBER

R1-288-B-101

REV

A





TRUCK TURNING MOVEMENTS

DESIGN VEHICLE (Lorimer Road WB to SB)

DUAL LEFT INSIDE	HSU
DUAL LEFT OUTSIDE	WB20

HALFSIZE

FOR DISCUSSION ONLY

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MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE  
SOUTH COAST REGION  
HIGHWAY ENGINEERING

SCALE 

CAD FILENAME \_\_\_\_\_  
DATE \_\_\_\_\_

REV	DATE	REVISIONS	SIGNATURE
A	2018-05-30	ISSUED FOR REVIEW	

PLAN  
MoTI WHISTLER HIGHWAY 99 CAPACITY & SAFETY REVIEW  
LORIMER ROAD INTERSECTION  
SHORT-TERM OPTION B - LEFT / DUAL LEFT

DESIGNED \_\_\_\_\_ DATE \_\_\_\_\_  
QUALITY CONTROL \_\_\_\_\_ DATE \_\_\_\_\_  
QUALITY ASSURANCE \_\_\_\_\_ DATE \_\_\_\_\_  
DRAWN \_\_\_\_\_ DATE \_\_\_\_\_

SENIOR DESIGNER \_\_\_\_\_  
DATE \_\_\_\_\_

FILE NUMBER  
2121-00288-02

PROJECT NUMBER

REG  
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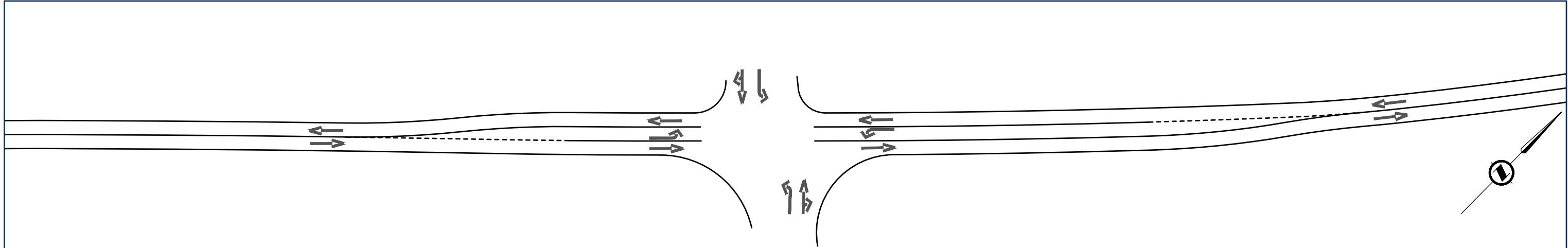
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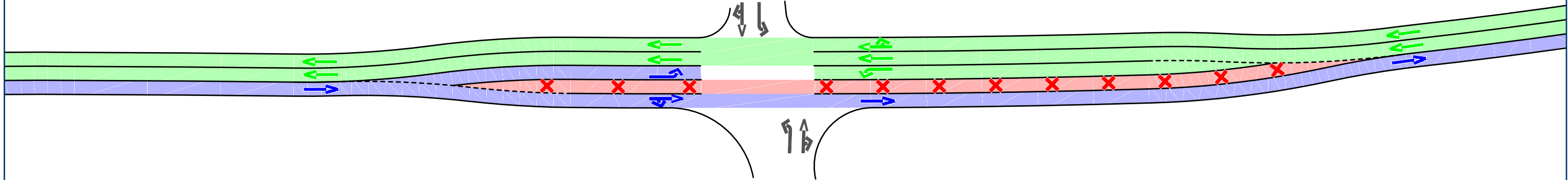


## **Appendix F – Medium-Term Option 1 (Counterflow)**

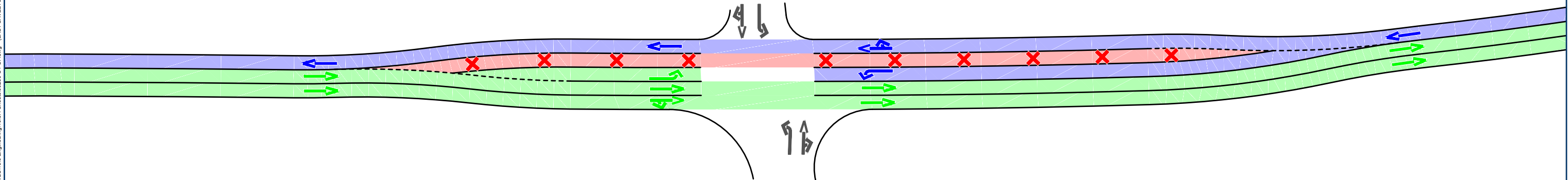
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EXISTING ROAD CONFIGURATION



COUNTERFLOW 2 LANES SOUTHBOUND



COUNTERFLOW 2 LANES NORTHBOUND

HALFSIZE

FOR DISCUSSION ONLY


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SOUTH COAST REGION  
HIGHWAY ENGINEERING

SCALE  
0 5 1:500 25m  
CAD FILENAME  
DATE

REV	DATE	REVISIONS	SIGNATURE

PLAN  
MOTI WHISTLER HIGHWAY 99 CAPACITY & SAFETY REVIEW  
EXAMPLE ROAD INTERSECTION  
COUNTERFLOW OPTION

DESIGNED  
QUALITY CONTROL  
QUALITY ASSURANCE  
DRAWN

DATE  
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DATE  
DATE

SENIOR DESIGNER  
DATE

FILE NUMBER  
2121-00288-02

PROJECT NUMBER

REG  
1

DRAWING NUMBER  
R1-288-112

REV  
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PRINTED: June 6, 2018 - 3:35 PM  
CAD FILE: C:\Users\j11\OneDrive\Moti Whistler Hwy 99 Capacity & Safety Review\10.3 Drawings\10.3 Engineering\10.31 Sheets\00288-02-CF.dwg (LAST SAVED: #reusel)

McElhanney ANSI D (34 x 22 inches)



## **Appendix G – Medium-Term Option 2 (Two SB Lanes from Taylor Way to Bayshore Drive)**

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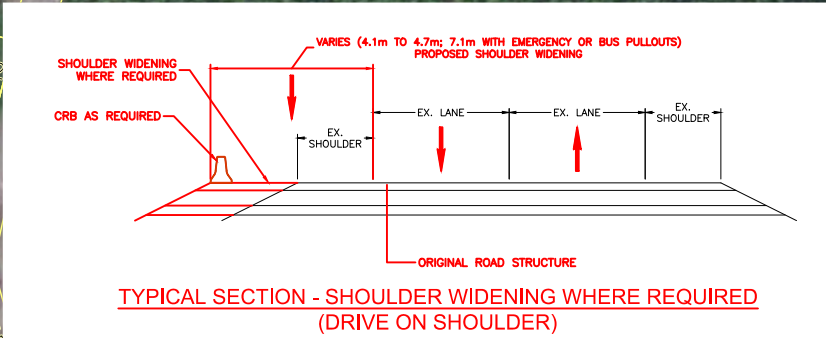
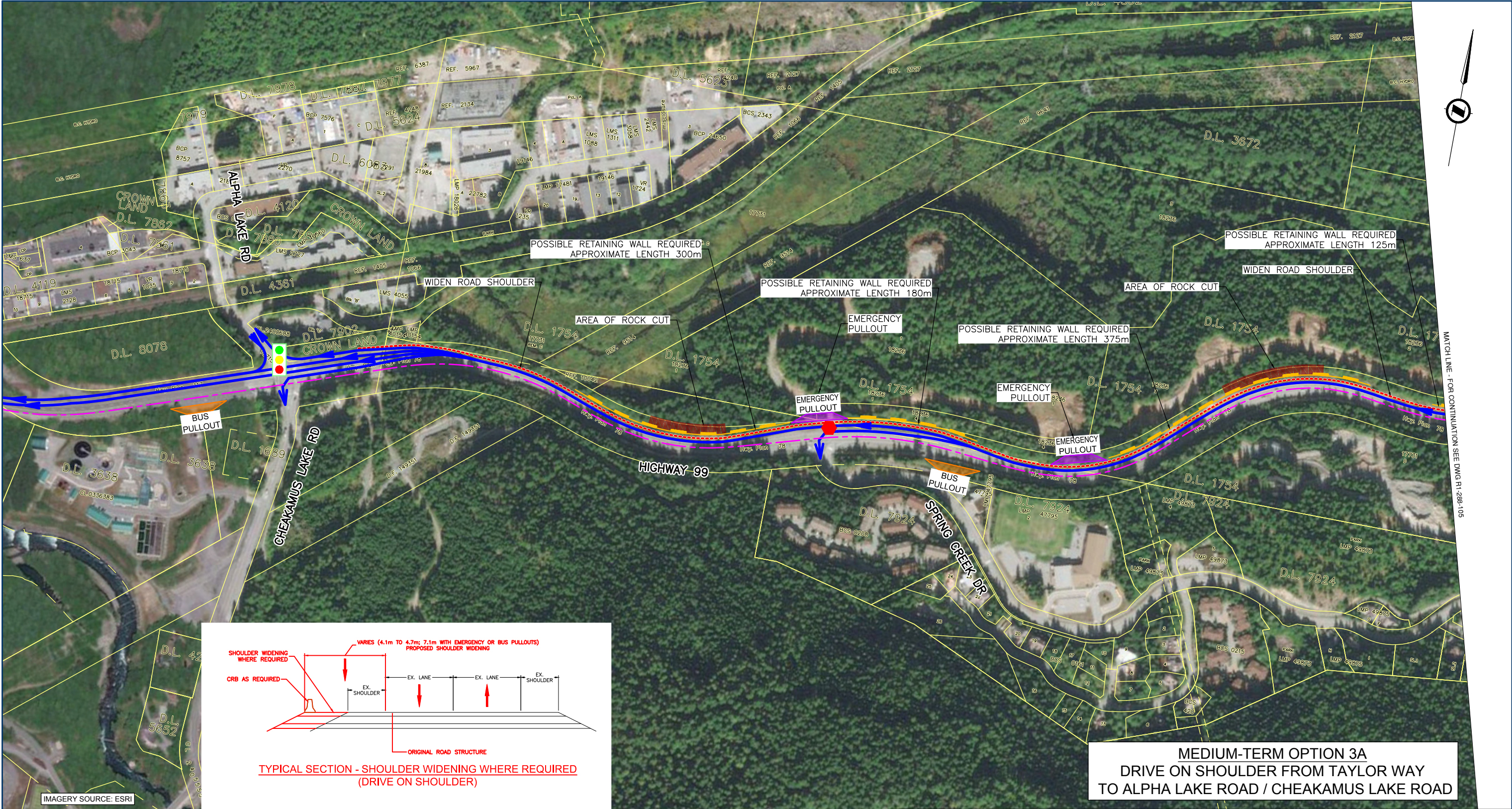




## **Appendix H – Medium-Term Option 3 (Two SB Lanes from Taylor Way to Alpha Lake Road)**

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MEDIUM-TERM OPTION 3A  
DRIVE ON SHOULDER FROM TAYLOR WAY  
TO ALPHA LAKE ROAD / CHEAKAMUS LAKE ROAD

IMAGERY SOURCE: ESRI

PRINTED: June 6, 2018 12:08 PM  
CAD FILE: D:\Projects\18-00288-02\18-00288-02.dwg (LAST SAVED: 18-Jun-18)

LEGEND

HIGHWAY 99 CENTRELINE

EXISTING SOUTHBOUND LANE

PROPOSED LANE

PROPOSED RETAINING WALL

AREA OF ROCK CUT

PROPOSED SHOULDER WIDENING

TRAFFIC CONTROL

TRAFFIC SIGNAL

PEDESTRIAN SIGNAL

UNSIGNALIZED

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SOUTH COAST REGION  
HIGHWAY ENGINEERING

SCALE: 0 25 1:2500 125m

CAD FILENAME: \_\_\_\_\_  
DATE: \_\_\_\_\_

REV DATE REVISIONS SIGNATURE

Professional Seal

PLAN

MOTI WHISTLER HIGHWAY 99 CAPACITY & SAFETY REVIEW  
SEA TO SKY HIGHWAY No. 99 - MEDIUM-TERM OPTION 3A  
ALPHA LAKE RD/CHEAKAMUS LAKE RD TO 800m EAST OF SPRING CREEK DR

DESIGNED: \_\_\_\_\_ DATE: \_\_\_\_\_  
QUALITY CONTROL: \_\_\_\_\_ DATE: \_\_\_\_\_  
SENIOR DESIGNER: \_\_\_\_\_  
DATE: \_\_\_\_\_  
FILE NUMBER: 2121-00288-02  
PROJECT NUMBER: \_\_\_\_\_  
REG: 1  
DRAWING NUMBER: R1-288-104  
REV: A

HALFSIZE

FOR DISCUSSION ONLY

McElhanney ANSI D (34 x 22 inches)















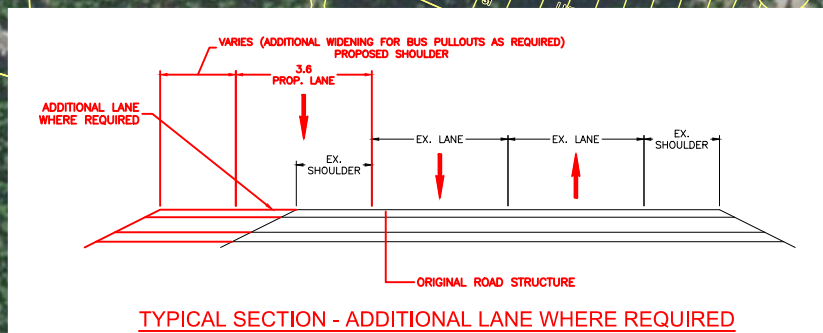
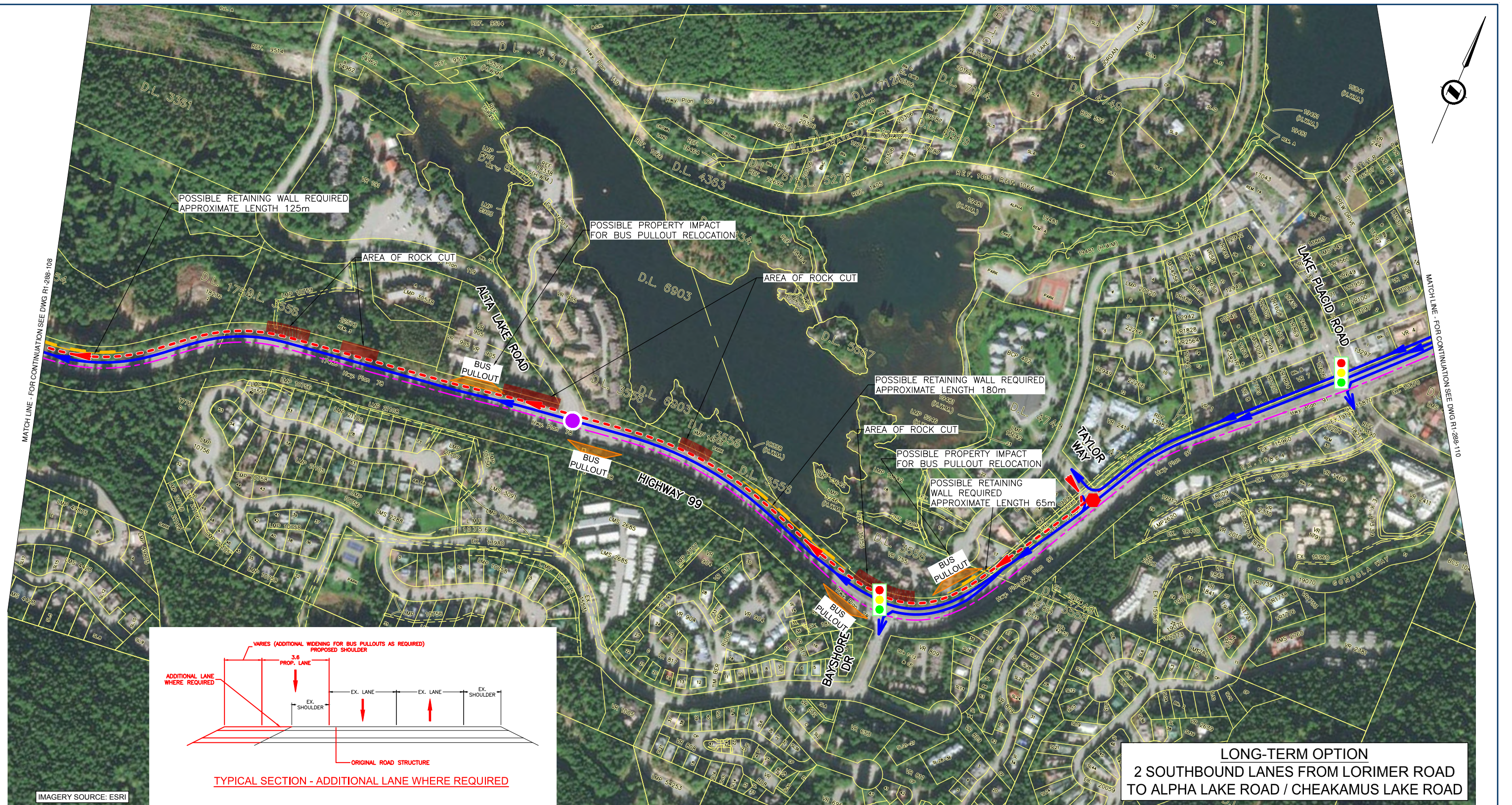
## **Appendix I – Long-Term Option (Two SB Lanes from Lorimer Road to Alpha Lake Road)**

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LONG-TERM OPTION  
2 SOUTHBOUND LANES FROM LORIMER ROAD  
TO ALPHA LAKE ROAD / CHEAKAMUS LAKE ROAD

HIGHWAY 99 CENTRELINE  
EXISTING SOUTHBOUND LANE  
PROPOSED LANE  
PROPOSED RETAINING WALL  
AREA OF ROCK CUT

TRAFFIC CONTROL

TRAFFIC SIGNAL

PEDESTRIAN SIGNAL

UNSIGNALIZED



●



HALFSIZE

FOR DISCUSSION ONLY

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BRITISH COLUMBIA

MINISTRY OF TRANSPORTATION  
AND INFRASTRUCTURE

SOUTH COAST REGION  
HIGHWAY ENGINEERING

## PLAN

MoTI WHISTLER HIGHWAY 99 CAPACITY & SAFETY REVIEW  
SEA TO SKY HIGHWAY No. 99 - LONG-TERM OPTION  
300m EAST OF SPRING CREEK DR TO 150m WEST OF LONDON LN

SENIOR DESIGNER _____	DESIGNED _____	DATE _____
	QUALITY CONTROL _____	DATE _____
	QUALITY ASSURANCE _____	DATE _____
	DRAWN _____	DATE _____

DATE				
FILE NUMBER	PROJECT NUMBER	REG	DRAWING NUMBER	REV
2121-00288-02		1	R1-288-109	A

PRINTED: June 6, 2018 - 2:55 PM  
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McElhanney ANSI D (34 x 22 inches)











## Appendix J – Cost Estimates

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# Whistler Highway 99 Capacity and Safety Review

Conceptual Design Project Cost Estimate

MCSL Proj #: 2121-00288-02

EST.DATE August, 2018

Description	Hwy 99 / Lorimer Rd ST-1 Short Term Option - 1 Left / Shared Left- Through	Hwy 99 / Lorimer Rd ST-2 Short Term Option - 2 Dual Left	Lake Placid Rd to Alpha MT-1 Medium Term Option - 1 Counterflow	Lake Placid Rd to MT-2 Medium Term Option - 2 2 SB lanes from Taylor Way to Baysshore Dr	Taylor Way to Alpha MT-3A Medium Term Option - 3A Shoulder Widening	Taylor Way to Alpha MT-3B Medium Term Option - 3B 2 Full Lanes SB	Lorimer Rd to Alpha LT-1 Long Term Option - 1 2 Full Lanes SB
Road Length	100	75	3500	450	3150	3150	5600
Grade Construction	\$25,601	\$68,982	\$4,358,866	\$666,196	\$3,130,333	\$3,859,634	\$8,086,178
Other Construction (Environmental Mitigation & Archaeological)	\$5,150	\$5,150	\$46,350	\$18,540	\$69,525	\$9,270	\$92,700
Drainage	\$278	\$9,200	\$161,421	\$20,754	\$110,557	\$145,279	\$572,136
Structural Construction (Including Retaining Walls)			\$9,967,825	\$1,782,003	\$7,974,260	\$9,967,825	\$20,294,090
Paving Construction	\$9,409	\$21,529	\$806,315	\$103,669	\$349,550	\$725,683	\$1,290,104
Signing & Pavement Markings / Operational Construction (Signing, Pavement Marking and Guard Rail ie. Barriers)	\$9,006	\$9,866	\$676,118	\$22,225	\$490,056	\$297,034	\$447,885
Electrical (Lighting and Signal)	\$56,650	\$91,670	\$529,935	\$176,645	\$459,895	\$459,895	\$529,935
Landscaping	\$508	\$691	\$62,028	\$6,625	\$55,046	\$55,825	\$81,101
Utility Construction (hydro, telephone, pipelines etc.)			\$336,000		\$302,400	\$302,400	\$537,600
<b>Subtotal Construction</b>	<b>\$106,603</b>	<b>\$207,088</b>	<b>\$16,944,858</b>	<b>\$2,796,657</b>	<b>\$12,941,622</b>	<b>\$15,822,846</b>	<b>\$31,931,729</b>
Construction Contingency 30%	\$31,981	\$62,126	\$5,083,457	\$838,997	\$3,882,487	\$4,746,854	\$9,579,519
<b>Total Construction (Primary) Cost</b>	<b>\$138,583</b>	<b>\$269,214</b>	<b>\$22,028,315</b>	<b>\$3,635,654</b>	<b>\$16,824,109</b>	<b>\$20,569,699</b>	<b>\$41,511,248</b>
Land acquisition							
Planning	\$2,662	\$5,190	\$111,794	\$26,351	\$83,845	\$83,845	\$268,304
Preliminary Design	\$5,148	\$10,296	\$210,210	\$50,193	\$162,162	\$135,135	\$528,528
Engineering	\$11,530	\$22,399	\$1,796,414	\$302,486	\$1,367,058	\$1,678,691	\$3,395,589
Project Management	\$9,153	\$17,775	\$1,388,706	\$231,040	\$1,059,818	\$1,291,893	\$2,626,279
Resident Engineering/Construction Supervision	\$13,800	\$26,396	\$1,907,795	\$320,023	\$1,446,845	\$1,770,765	\$3,569,867
First Nations Accommodations (8%)	\$11,087	\$21,537	\$1,762,265	\$290,852	\$1,345,929	\$1,645,576	\$3,320,900
MoTI Regional Cost Recoveries & Project Management (12%)	\$16,630	\$32,306	\$2,643,398	\$436,278	\$2,018,893	\$2,468,364	\$4,981,350
<b>Total External Costs</b>	<b>\$70,010</b>	<b>\$135,900</b>	<b>\$9,820,582</b>	<b>\$1,657,225</b>	<b>\$7,484,551</b>	<b>\$9,074,269</b>	<b>\$18,690,817</b>
<b>Total Costs</b>	<b>\$208,593</b>	<b>\$405,114</b>	<b>\$31,848,897</b>	<b>\$5,292,879</b>	<b>\$24,308,660</b>	<b>\$29,643,968</b>	<b>\$60,202,065</b>
<b>COST / KM (With Structures)</b>	<b>\$2,085,931</b>	<b>\$5,401,514</b>	<b>\$9,099,685</b>	<b>\$11,761,953</b>	<b>\$7,717,035</b>	<b>\$9,410,784</b>	<b>\$10,750,369</b>
<b>COST / KM (Without Structures)</b>	<b>\$2,085,931</b>	<b>\$5,401,514</b>	<b>\$5,397,350</b>	<b>\$6,613,944</b>	<b>\$4,426,070</b>	<b>\$5,297,078</b>	<b>\$6,039,241</b>
<b>Cost Range</b>							
Lower (-35%)	\$135,585	\$263,324	\$20,701,783	\$3,440,371	\$15,800,629	\$19,268,579	\$39,131,342
Estimated	\$208,593	\$405,114	\$31,848,897	\$5,292,879	\$24,308,660	\$29,643,968	\$60,202,065
Upper (+35%)	\$281,601	\$546,903	\$42,996,011	\$7,145,386	\$32,816,691	\$40,019,357	\$81,272,788

# Whistler Highway 99 Capacity and Safety Review

Conceptual Design Project Cost Estimate

MCSL Proj #: 2121-00288-02

EST.DATE August, 2018

Description	Hwy 99 / Lorimer Rd ST-1  Short Term Option - 1 Left / Shared Left-Through	Hwy 99 / Lorimer Rd ST-2  Short Term Option - 2 Dual Left	Lake Road Rd to Alpha Lake Road / Cheakamus Lake Rd MT-1  Medium Term Option - 1 Counterflow	Lake Road Rd to South of Bayshore Dr MT-2  Medium Term Option - 2 2 SB lanes from Taylor Way to Bayshore Dr	Taylor Way to Alpha Lake Rd MT-3A  Medium Term Option - 3A Shoulder Widening	Taylor Way to Alpha Lake Rd MT-3B  Medium Term Option - 3B 2 Full Lanes SB	Lorimer Rd to Alpha Lake Rd LT-1  Long Term Option - 1 2 Full Lanes SB
Road Length	100	75	3500	450	3150	3150	5600
Grade Construction	\$25,601	\$68,982	\$4,358,866	\$666,196	\$3,130,333	\$3,859,634	\$8,086,178
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Project Management	\$9,153	\$17,775	\$1,388,706	\$231,040	\$1,059,818	\$1,291,893	\$2,626,279
Resident Engineering/Construction Supervision	\$13,800	\$26,396	\$1,907,795	\$320,023	\$1,446,845	\$1,770,765	\$3,569,867
First Nations Accommodations (8%)	\$11,087	\$21,537	\$1,762,265	\$290,852	\$1,345,929	\$1,645,576	\$3,320,900
MoTI Regional Cost Recoveries & Project Management (12%)	\$16,630	\$32,306	\$2,643,398	\$436,278	\$2,018,893	\$2,468,364	\$4,981,350
<b>Total External Costs</b>	<b>\$70,010</b>	<b>\$135,900</b>	<b>\$9,820,582</b>	<b>\$1,657,225</b>	<b>\$7,484,551</b>	<b>\$9,074,269</b>	<b>\$18,690,817</b>
<b>Total Costs</b>	<b>\$208,593</b>	<b>\$405,114</b>	<b>\$31,848,897</b>	<b>\$5,292,879</b>	<b>\$24,308,660</b>	<b>\$29,643,968</b>	<b>\$60,202,065</b>
<b>COST / KM (With Structures)</b>	<b>\$2,085,931</b>	<b>\$5,401,514</b>	<b>\$9,099,685</b>	<b>\$11,761,953</b>	<b>\$7,717,035</b>	<b>\$9,410,784</b>	<b>\$10,750,369</b>
<b>COST / KM (Without Structures)</b>	<b>\$2,085,931</b>	<b>\$5,401,514</b>	<b>\$5,397,350</b>	<b>\$6,613,944</b>	<b>\$4,426,070</b>	<b>\$5,297,078</b>	<b>\$6,039,241</b>
<b>Cost Range</b>							
Lower (-35%)	\$135,585	\$263,324	\$20,701,783	\$3,440,371	\$15,800,629	\$19,268,579	\$39,131,342
Estimated	\$208,593	\$405,114	\$31,848,897	\$5,292,879	\$24,308,660	\$29,643,968	\$60,202,065
Upper (+35%)	\$281,601	\$546,903	\$42,996,011	\$7,145,386	\$32,816,691	\$40,019,357	\$81,272,788



Whistler Highway 99 Capacity and Safety Review

Printing Date: 8/24/2018 Time: 2:37 PM

Estimated by: P. Nahal

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Company MCSL

(2018 Dollars) Whistler Highway 99 Capacity and Safety Review  
ACTIVITY Capacity and Safety Review  
CODE EST.DATE August, 2018  
Conceptual Est.

Blk Est. # 6.14A  
Version Sept. 1, 2002

	Hwy 99 / Lorimer Rd	Hwy 99 / Lorimer Rd	Alpha Lake Road / Chcid Rd to South of Baylor Way to Alpha Lake	for Way to Alpha Lake	for Way to Alpha Lake	for Way to Alpha Lake	for Way to Alpha Lake	
	ST-1	ST-2	MT-1	MT-2	MT-3A	MT-3B	LT-1	
	Short Term Option - 1	Short Term Option - 2	Medium Term Option - 1	Medium Term Option - 2	Medium Term Option - 3A	Medium Term Option - 3B	Long Term Option - 1	
	Left / Shared Left-Through	Dual Left	Counterflow	2 SB lanes from Taylor Way to	Shoulder Widening	2 Full Lanes SB	2 Full Lanes SB	
	0	0	0	0	0	0	0	MR
	100	75	3500	450	3150	3150	5600	OR
DESCRIPTION \Length	MR	MR	MR	MR	MR	MR	MR	TR
Engineering	28,493	55,660	3,507,124	610,071	2,672,884	3,189,564	6,818,701	
Land	0	0	0	0	0	0	0	
Construction	152,384	295,610	23,936,110	3,955,677	18,270,954	22,340,464	45,081,114	
Management Reserve	0	0	0	0	0	0	0	
Escalation	0	0	0	0	0	0	0	
Total	180,876	351,271	27,443,234	4,565,748	20,943,838	25,530,028	51,899,815	
<b>BASIC QUANTITY SUMMARY</b>								
Construct.Cost ONLY Per L.M.	1,524	3,941	6,839	8,790	5,800	7,092	8,050	\$/LM
Land Area	0.0	0.1	3.9	0.5	2.5	3.5	5.6	ha
Mobilization	3,105	6,032	483,753	81,456	368,133	452,052	914,392	
Land Cont.	0	0	0	0	0	0	0	
Construction Cont.	31,981	62,126	5,083,457	838,997	3,882,487	4,746,854	9,579,519	
Engineering Cont.	6,575	12,845	809,336	140,786	616,819	736,053	1,573,546	
Supervision Cont.	3,185	6,091	440,260	73,852	333,887	408,638	823,815	
Total Cont.	41,741	81,062	6,333,054	1,053,634	4,833,193	5,891,545	11,976,880	
S.G.S.B.	55	146	6,791	873	3,002	6,112	10,866	m3
C.B.C.	55	146	6,174	794	2,729	5,557	9,878	m3
Asphalt	43	116	4,498	578	1,786	4,048	7,197	t
Concrete Barrier	0	0	2,450	135	2,205	2,205	3,360	lm
Noise Attenuation Wall	0	0	0	0	0	0	0	m2
No. of Light Poles	0	0	0	0	0	0	0	ea
Sidewalk	0	0	0	0	0	0	0	lm
Curb and Gutter	25	120	0	0	0	0	0	lm
Signals	0	0	2	1	2	2	2	ea
Bridge total area	0	0	0	0	0	0	180	m2
Total Rock	0	0	13,230	2,041	7,442	11,907	38,102	m3
Total OM	37	97	11,907	1,531	6,698	10,716	19,051	m3
Total Stripping	0	0	6,174	794	4,217	5,557	9,878	m3
Total Borrow	18	49	17,861	1,956	10,047	16,074	11,642	m3
Total Cut/Excavation	55	146	49,172	6,322	28,403	44,254	78,674	m3
Total Fill	37	97	37,044	4,763	20,837	33,340	59,270	m3
Surplus or Deficit	18	49	12,128	1,559	7,566	10,915	19,404	m3
ENG & PM	0.028	0.056	3.507	0.610	2.673	3.190	6.819	
LAND	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
CONST.	0.152	0.296	9.883	1.443	7.028	8.287	16.470	
BRIDGES-R/W	0.000	0.000	14.053	2.513	11.243	14.053	28.611	
MANAGEMENT RESERVE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
ESCALATION	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
TOTAL (Millions) (2018 Dollars)	0.180	0.352	27.443	4.566	20.944	25.530	51.900	
TOTAL Cost per meter \$	1,809	4,684	7,841	10,146	6,649	8,105	9,268	
Construction cost per meter \$	1,520	3,947	6,839	8,791	5,800	7,092	8,050	

Whistler Highway 99 Capacity and Safety Review

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Estimated by: P. Nahal

File: O:\Proj\2121-00288-02 MoTI Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3 Estimates\20180824  
Company MCSL

File:	Hwy 99 / Lorimer Rd	Hwy 99 / Lorimer Rd	Alpha Lake Road / Chcid Rd to South of Baylor Way to Alpha Lake	for Way to Alpha Lake	imer Rd to Alpha Lake	Rd	
	ST-1	ST-2	MT-1	MT-2	MT-3A	MT-3B	LT-1
	Short Term Option - 1	Short Term Option - 2	Medium Term Option - 1	Medium Term Option - 2	Medium Term Option - 3A	Medium Term Option - 3B	Long Term Option - 1
	Left / Shared Left-Through	Dual Left	Counterflow	2 SB lanes from Taylor Way to	Shoulder Widening	2 Full Lanes SB	2 Full Lanes SB
(2018 Dollars)	0	0	0	0	0	0	0
ACTIVITY CODE	EST.DATE August, 2018						
Conceptual Est.	Divison/site / Shared Left-Through	Dual Left	Counterflow	from Taylor Way to B	Shoulder Widening	2 Full Lanes SB	2 Full Lanes SB
Blk Est. # 6.14A	Road Type						
Version Sept. 1, 2002	DESCRIPTION \Length	100 MR	75 MR	3500 MR	450 MR	3150 MR	3150 MR
							5600 MR
SUMMARY BY ACTIVITY LEVEL							
2000	PROJECT MANAGEMENT	7,041	13,673	1,068,236	177,723	815,245	993,764
2500	PLANNING	2,048	3,993	85,995	20,270	64,496	64,496
3000	PRELIMINARY DESIGN	3,960	7,920	161,700	38,610	124,740	103,950
3500	DETAILED DESIGN	8,869	17,230	1,381,857	232,682	1,051,583	1,291,301
	Total Engineering	14,877	29,142	1,629,552	291,562	1,240,820	1,459,747
							3,224,940
4000	LAND ACQUISITION	0	0	0	0	0	0
5000	GRADE CONSTRUCTION	26,388	78,873	4,582,315	693,575	3,295,936	4,060,738
5200	ROAD SIDE CONSTRUCTION	0	0	0	0	0	0
5300	OTHER CONSTRUCTION	5,150	5,150	46,350	18,540	69,525	9,270
5500	STRUCTURAL CONSTRUCTION	0	0	9,967,825	1,782,003	7,974,260	9,967,825
6000	PAVING CONSTRUCTION	9,409	21,529	806,315	103,669	349,550	725,683
6500	OPERATIONAL CONSTRUCTION	65,656	101,536	1,206,053	198,870	949,951	756,929
6700	UTILITY CONSTRUCTION	0	0	336,000	0	302,400	302,400
6800	RESIDENT ENGINEERING	10,616	20,305	1,467,535	246,172	1,112,958	1,362,127
		0	0	0	0	0	0
	Total Construction	117,218	227,393	18,412,392	3,042,829	14,054,580	17,184,972
							34,677,780
9700	CONTINGENCY	41,741	81,062	6,333,054	1,053,634	4,833,193	5,891,545
							11,976,880
9800	SUB-TOTAL MANAGEMENT RESERVE	180,876	351,271	27,443,234	4,565,748	20,943,838	25,530,028
		0	0	0	0	0	0
	TOTAL	180,876	351,271	27,443,234	4,565,748	20,943,838	25,530,028
							51,899,815
9900	ESCALATION	0	0	0	0	0	0
	TOTAL COST	180,876	351,271	27,443,234	4,565,748	20,943,838	25,530,028
							51,899,815
=====	Const. Less Resident Eng.	106,603	207,088	16,944,858	2,796,657	12,941,622	15,822,846
							31,931,729



Whistler Highway 99 Capacity and Safety Review

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Company **MCSL**

File: O:\Proj\2121-00288-02 MoTi Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3 Estimates\20180824	Hwy 99 / Lorimer Rd	Hwy 99 / Lorimer Rd	Alpha Lake Road / Chcid Rd to South of Baylor Way to Alpha Lakefor Way to Alpha Lakeimer Rd to Alpha Lake Rd				
	Company MCSL						
	ST-1	ST-2	MT-1	MT-2	MT-3A	MT-3B	LT-1
	Short Term Option - 1	Short Term Option - 2	Medium Term Option - 1	Medium Term Option - 2	Medium Term Option - 3A	Medium Term Option - 3B	Long Term Option - 1
	Left / Shared Left-Through	Dual Left	Counterflow	2 SB lanes from Taylor Way to	Shoulder Widening	2 Full Lanes SB	2 Full Lanes SB
(2018 Dollars)	Whistler Highway 99 Capacity and Safety Re						

(2018 Dollars) **Whistler Highway 99 Capacity and Safety Review**

ACTIVITY **Capacity and Safety Review**

CODE EST. DATE August, 2018

Conceptual Est.

Blk Est. # 6.14A	Division/site / Shared Left-Through	0	0	0	0	0	0	0	MR
Version Sept. 1, 2002	Road Type	100	75	3500	450	3150	3150	5600	OR
	DESCRIPTION \Length	MR	MR	MR	MR	MR	MR	MR	TR

2500	PLANNING								
2521	Consultant - transport. planning study	250	488	10,500	2,475	7,875	7,875	25,200	
2531	Consultant - corridor study	250	488	10,500	2,475	7,875	7,875	25,200	
2541	Consultant - functional plan. study	250	488	10,500	2,475	7,875	7,875	25,200	
2502	Consultant - functional plan. study	38	73	1,575	371	1,181	1,181	3,780	
	Consultant sub-total	788	1,536	33,075	7,796	24,806	24,806	79,380	

2510	Client - project ident.	250	488	10,500	2,475	7,875	7,875	25,200	
2520	Client - transport. planning study	250	488	10,500	2,475	7,875	7,875	25,200	
2530	Client - corridor study	350	683	14,700	3,465	11,025	11,025	35,280	
2540	Client - functional plan. study	350	683	14,700	3,465	11,025	11,025	35,280	
2501	Client - general	60	117	2,520	594	1,890	1,890	6,048	
	Client Sub-total	1,260	2,457	52,920	12,474	39,690	39,690	127,008	

2599	Planning Contingency	614	1,198	25,799	6,081	19,349	19,349	61,916	
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	<b>TOTAL PLANNING</b>	2,662	5,190	111,794	26,351	83,845	83,845	268,304	
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3000	PRELIMINARY DESIGN								
3013	Consultant - aerial base plan	300	600	12,250	2,925	9,450	7,875	30,800	
3014	Consultant - prel. design	360	720	14,700	3,510	11,340	9,450	36,960	
3015	Consultant - control survey	300	600	12,250	2,925	9,450	7,875	30,800	
3021	Consultant - environmental impact	600	1,200	24,500	5,850	18,900	15,750	61,600	
3031	Consultant - funct.-road field survey	300	600	12,250	2,925	9,450	7,875	30,800	
3041	Consultant - functional design	240	480	9,800	2,340	7,560	6,300	24,640	
3051	Consultant - funct. structural des.	180	360	7,350	1,755	5,670	4,725	18,480	
3061	Consultant - geotechnical design	1,500	3,000	61,250	14,625	47,250	39,375	154,000	
3071	Consultant - right-of-way research	180	360	7,350	1,755	5,670	4,725	18,480	
3002	Consultant - general	0	0	0	0	0	0	0	
	Consultant sub-total	3,960	7,920	161,700	38,610	124,740	103,950	406,560	

3010	Client - aerial base plan	0	0	0	0	0	0	0	
3011	Client - prel. design	0	0	0	0	0	0	0	
3012	Client - control survey	0	0	0	0	0	0	0	
3020	Client - environmental impact	0	0	0	0	0	0	0	
3030	Client - funct.-road field survey	0	0	0	0	0	0	0	
3040	Client - functional design	0	0	0	0	0	0	0	
3050	Client - funct. structural des.	0	0	0	0	0	0	0	
3060	Client - geotechnical design	0	0	0	0	0	0	0	
3070	Client - right-of-way research	0	0	0	0	0	0	0	
3001	Client - general	0	0	0	0	0	0	0	
	Client Sub-total	0	0	0	0	0	0	0	

3099	Preliminary design Contingency	1,188	2,376	48,510	11,583	37,422	31,185	121,968	
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	<b>TOTAL PRELIMINARY DESIGN</b>	5,148	10,296	210,210	50,193	162,162	135,135	528,528	
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Whistler Highway 99 Capacity and Safety Review

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Company MCSL

		Hwy 99 / Lorimer Rd	Hwy 99 / Lorimer Rd	Alpha Lake Road / Chcid Rd to South of Baylor Way to Alpha Lake	for Way to Alpha Lake	for Way to Alpha Lake	for Way to Alpha Lake	for Way to Alpha Lake	for Way to Alpha Lake
		ST-1	ST-2	MT-1	MT-2	MT-3A	MT-3B	LT-1	
		Short Term Option - 1	Short Term Option - 2	Medium Term Option - 1	Medium Term Option - 2	Medium Term Option - 3A	Medium Term Option - 3B	Long Term Option - 1	
		Left / Shared Left-Through	Dual Left	Counterflow	2 SB lanes from Taylor Way to	Shoulder Widening	2 Full Lanes SB	2 Full Lanes SB	
(2018 Dollars) Whistler Highway 99 Capacity and Safety Review		Through							
ACTIVITY	Capacity and Safety Review								
CODE	EST.DATE	August, 2018							
Conceptual Est.									
Blk Est. # 6.14A									
Version Sept. 1, 2002									
		Division/site	ft / Shared Left-Through	Dual Left	Counterflow	from Taylor Way to B	Shoulder Widening	2 Full Lanes SB	2 Full Lanes SB
		Road Type							
		DESCRIPTION \Length	100 MR	75 MR	3500 MR	450 MR	3150 MR	3150 MR	5600 MR
6700	UTILITIES								
6710	Util. Prov. - Hydro		0	0	224,000	0	201,600	201,600	358,400
6711	Util. Prov. - Telephone		0	0	112,000	0	100,800	100,800	179,200
	Util. Prov. sub-total		0	0	336,000	0	302,400	302,400	537,600
6712	Util. Others - pipelines		0	0	0	0	0	0	0
6713	Util. Others - telecommunication		0	0	0	0	0	0	0
6714	Util. Others - storm & sewer inspect.		0	0	0	0	0	0	0
6715	Util. Others - waterworks inspect.		0	0	0	0	0	0	0
6716	Util. Others - engineering services		0	0	0	0	0	0	0
6717	Util. Others - parks/recreation-prel.		0	0	0	0	0	0	0
6718	Util. Others - transit		0	0	0	0	0	0	0
6719	Util. Others - tr-ops/signs & detours		0	0	0	0	0	0	0
6701	Util. Others - general		0	0	0	0	0	0	0
	Util. Others sub-total		0	0	0	0	0	0	0
6799	Util. Others Contingency		0	0	100,800	0	90,720	90,720	161,280
<b>TOTAL UTILITIES</b>			0	0	436,800	0	393,120	393,120	698,880
=====									
5000	GRADE CONSTRUCTION								
5032	Grade Const- water		0	0	0	0	0	0	0
5033	Grade Const- sanitary		0	0	0	0	0	0	0
5034	Grade Const- storm		0	0	0	0	0	0	0
5031	Grade Const- mobilization		0	0	0	0	0	0	0
5039	Grade Const- utility contingency		0	0	0	0	0	0	0
	Grade Const. Utilities Sub-total		0	0	0	0	0	0	0
5010	Grade Const- site prep./clear grubbing		34	2,155	100,168	11,709	66,134	90,151	144,544
5020	Grade Const- road grade/exc.placing.fill		5,941	29,376	3,179,474	427,760	2,556,393	2,865,527	6,315,874
5030	Grade Const- drainage/pipe.cul.		278	9,200	161,421	20,754	110,557	145,279	572,136
5040	Grade Const- multiplate		0	0	0	0	0	0	0
5050	Grade Const-SGSB/produce.place.comp		3,069	8,185	380,318	48,898	168,087	342,287	608,509
5051	Grade Const-CBC/produce.place.comp		3,289	8,770	370,440	47,628	163,721	333,396	592,704
5060	Grade Const- grade finishing landscaping		506	627	41,352	4,417	36,697	37,217	54,067
5061	Grade Const- grade finishing hydro seed.		3	64	20,676	2,208	18,349	18,608	27,034
5062	Grade Const- grade finishing fencing		0	0	0	0	0	0	0
5063	Grade Const- noise barriers		0	0	0	0	0	0	0
5064	Grade Const- passing lanes		0	0	0	0	0	0	0
5090	Grade Const- sidewalks, curb & gutter		1,500	7,200	0	0	0	0	0
5005	Grade Const-detours c/w ex.bf.paving		11,000	11,000	195,000	110,000	80,000	110,000	170,000
5001	Grade Const- mobilization		769	2,297	133,465	20,201	95,998	118,274	254,546
5099	Grade Const- Contingency		7,916	23,662	1,374,694	208,072	988,781	1,218,222	2,621,824
	Grade Construction Sub-total		34,304	102,535	5,957,009	901,647	4,284,717	5,278,960	11,361,239
<b>GRADE CONSTRUCTION COSTS</b>			34,304	102,535	5,957,009	901,647	4,284,717	5,278,960	11,361,239
3510	Grade Eng. - detailed design		1,887	5,639	327,636	49,591	235,659	290,343	624,868
3519	Grade Eng. - detailed design/Contingency		566	1,692	98,291	14,877	70,698	87,103	187,460
6810	Grade Eng. - general const. supervision		1,029	3,076	178,710	27,049	128,542	158,369	340,837
6811	Grade Eng. - quality assurance		686	2,051	119,140	18,033	85,694	105,579	227,225
6812	Grade Eng. - surveying		686	2,051	119,140	18,033	85,694	105,579	227,225
6819	Grade Eng. - Residency Contingency		720	2,153	125,097	18,935	89,979	110,858	238,586
	Grade Engineering Sub-total		5,574	16,662	968,014	146,518	696,267	857,831	1,846,201
<b>Total Grade Const. &amp; Eng. Costs</b>			39,878	119,197	6,925,023	1,048,165	4,980,983	6,136,791	13,207,440
=====									



Whistler Highway 99 Capacity and Safety Review

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Company **MCSL**

ACTIVITY	CODE	EST.DATE	August, 2018	0	0	0	0	0	0	0	0	MR
Conceptual Est.				Divison/site / Shared Left-Through	Dual Left	Counterflow	from Taylor Way to B	Shoulder Widening	2 Full Lanes SB	2 Full Lanes SB	MR	OR
Blk Est. # 6.14A				Road Type								TR
Version Sept. 1, 2002				DESCRIPTION \Length	100	75	3500	450	3150	3150	5600	TR
					MR	MR	MR	MR	MR	MR	MR	

5500	STRUCTURAL CONSTRUCTION											
5522	Struct.Const - water	0	0	0	0	0	0	0	0	0	0	
5523	Struct.Const - sanitary	0	0	0	0	0	0	0	0	0	0	
5524	Struct.Const - storm	0	0	0	0	0	0	0	0	0	0	
5521	Struct.Const - mobilization	0	0	0	0	0	0	0	0	0	0	
5599	Struct.Const - utility contingency	0	0	0	0	0	0	0	0	0	0	
	Structural Const. Utilities Sub-total	0	0	0	0	0	0	0	0	0	0	
5510	Struct.Const - tunnel site preparation	0	0	0	0	0	0	0	0	0	0	
5511	Struct.Const - tunnel construction	0	0	0	0	0	0	0	0	0	0	
5512	Struct.Const - snow shed site prep.	0	0	0	0	0	0	0	0	0	0	
5513	Struct.Const - snow shed site const.	0	0	0	0	0	0	0	0	0	0	
5514	Struct.Const - bridge site preparation	0	0	0	0	0	0	0	0	0	117,773	
5515	Struct.Const - bridge piers	0	0	0	0	0	0	0	0	0	29,774	
5516	Struct.Const - bridge abutments	0	0	0	0	0	0	0	0	0	63,000	
5517	Struct.Const - bridge superstructure	0	0	0	0	0	0	0	0	0	334,954	
5518	Struct.Const - retain. wall site prep.	0	0	0	0	0	0	0	0	0	0	
5519	Struct.Const - retaining wall const.	0	0	9,677,500	1,730,100	7,742,000	9,677,500	19,157,500				
5501	Struct.Const - mobilization	0	0	290,325	51,903	232,260	290,325	591,090				
5529	Struct.Const - Contingency	0	0	2,990,348	534,601	2,392,278	2,990,348	6,088,227				
	Structural Construction Sub-total	0	0	12,958,173	2,316,604	10,366,538	12,958,173	26,382,318				
	STRUCTURAL CONSTRUCTION COSTS	0	0	12,958,173	2,316,604	10,366,538	12,958,173	26,382,318				
3520	Struct. Eng. - detailed design	0	0	712,699	127,413	570,160	712,699	1,451,027				
3529	Struct. Eng. - detailed design/Contingency	0	0	213,810	38,224	171,048	213,810	435,308				
6820	Struct. Eng. - general const. supervision	0	0	518,327	92,664	414,662	518,327	1,055,293				
6821	Struct. Eng. - quality assurance	0	0	259,163	46,332	207,331	259,163	527,646				
6822	Struct. Eng. - surveying	0	0	64,791	11,583	51,833	64,791	131,912				
6829	Struct. Eng. - Residency Contingency	0	0	252,684	45,174	202,147	252,684	514,455				
	Structural Engineering Sub-total	0	0	2,021,475	361,390	1,617,180	2,021,475	4,115,642				
	<b>Total Structural &amp; Eng. Costs</b>	0	0	14,979,647	2,677,994	11,983,718	14,979,647	30,497,959				

# Whistler Highway 99 Capacity and Safety Review

Printing Date: 8/24/2018 Time: 2:37 PM

Estimated by: P. Nahal

File: O:\Proj\2121-00288-02 MoTI Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3 Estimates\20180824 Company MCSL

		Hwy 99 / Lorimer Rd	Hwy 99 / Lorimer Rd	Alpha Lake Road / Chcid Rd to South of Baylor Way to Alpha Lake	for Way to Alpha Lake	for Way to Alpha Lake	for Way to Alpha Lake	for Way to Alpha Lake	for Way to Alpha Lake
		ST-1	ST-2	MT-1	MT-2	MT-3A	MT-3B	LT-1	
		Short Term Option - 1	Short Term Option - 2	Medium Term Option - 1	Medium Term Option - 2	Medium Term Option - 3A	Medium Term Option - 3B	Long Term Option - 1	
		Left / Shared Left-Through	Dual Left	Counterflow	2 SB lanes from Taylor Way to	Shoulder Widening	2 Full Lanes SB	2 Full Lanes SB	
(2018 Dollars) Whistler Highway 99 Capacity and Safety Review		0	0	0	0	0	0	0	
ACTIVITY CODE		EST. DATE August, 2018							
Conceptual Est.		Divison/site / Shared Left-Through	Dual Left	Counterflow	from Taylor Way to B	Shoulder Widening	2 Full Lanes SB	2 Full Lanes SB	MR
Blk Est. # 6.14A		Road Type							OR
Version Sept. 1, 2002		DESCRIPTION \Length	100 MR	75 MR	3500 MR	450 MR	3150 MR	3150 MR	5600 MR
									TR
6000 PAVING CONSTRUCTION									
6020	Paving Cons - machine paving asphalt	9,135	20,901	782,830	100,650	339,369	704,547	1,252,528	
6030	Paving Cons - machine paving concrete	0	0	0	0	0	0	0	
6040	Paving Cons - hot reprofiling	0	0	0	0	0	0	0	
6050	Paving Cons - shoulder paving	0	0	0	0	0	0	0	
6060	Paving Cons - pavement finishing	0	0	0	0	0	0	0	
6070	Paving Cons - seal coating	0	0	0	0	0	0	0	
6001	Paving Cons - mobilization	274	627	23,485	3,019	10,181	21,136	37,576	
6010	Paving Cons - pavement design	0	0	0	0	0	0	0	
6099	Paving Cons - Contingency	2,823	6,459	241,894	31,101	104,865	217,705	387,031	
PAVING CONSTRUCTION COSTS		12,232	27,987	1,048,209	134,770	454,415	943,388	1,677,135	
3560	Paving Eng. - detailed design	673	1,539	57,652	7,412	24,993	51,886	92,242	
3569	Paving Eng. - detailed design/Contingency	202	462	17,295	2,224	7,498	15,566	27,673	
6860	Paving Eng. - general const. supervision	245	560	20,964	2,695	9,088	18,868	33,543	
6861	Paving Eng. - quality assurance	612	1,399	52,410	6,738	22,721	47,169	83,857	
6862	Paving Eng. - surveying	61	140	5,241	674	2,272	4,717	8,386	
6869	Paving Eng. - Residency Contingency	275	630	23,585	3,032	10,224	21,226	37,736	
	Paving Engineering Sub-total	2,067	4,730	177,147	22,776	76,796	159,433	283,436	
Total Paving Const. & Eng. Costs		14,300	32,717	1,225,357	157,546	531,212	1,102,821	1,960,571	
=====									
6500	OPERATIONAL CONSTRUCTION								
6510	Operat.Cons - lighting	0	34,000	102,000	34,000	34,000	34,000	102,000	
6520	Operat.Cons - signals	55,000	55,000	412,500	137,500	412,500	412,500	412,500	
6530	Operat.Cons - signing	3,500	4,500	371,000	4,500	218,900	31,500	39,200	
6540	Operat.Cons - guard rail	0	0	267,050	14,715	240,345	240,345	366,240	
6550	Operat.Cons - pavement markings	5,243	5,079	18,375	2,363	16,538	16,538	29,400	
6501	Operat.Cons - mobilization	1,912	2,957	35,128	5,792	27,668	22,046	28,480	
6599	Operat.Cons - contingency	19,697	30,461	361,816	59,661	284,985	227,079	293,346	
OPERATIONAL CONSTRUCTION COSTS		85,352	131,997	1,567,869	258,531	1,234,936	984,008	1,271,166	
3540	Operat. Eng. - detailed design	4,694	7,260	86,233	14,219	67,921	54,120	69,914	
3549	Operat. Eng. - detailed design/Contingency	1,408	2,178	25,870	4,266	20,376	16,236	20,974	
6840	Operat. Eng. - general const. supervision	4,694	7,260	86,233	14,219	67,921	54,120	69,914	
6841	Operat. Eng. - quality assurance	1,707	2,640	31,357	5,171	24,699	19,680	25,423	
6842	Operat. Eng. - surveying	427	660	7,839	1,293	6,175	4,920	6,356	
6849	Operat. Eng. - Residency Contingency	2,048	3,168	37,629	6,205	29,638	23,616	30,508	
	Operational Engineering Sub-total	14,979	23,165	275,161	45,372	216,731	172,693	223,090	
Total Operational Const.& Eng.Costs		100,331	155,162	1,843,029	303,903	1,451,668	1,156,701	1,494,256	
=====									



Whistler Highway 99 Capacity and Safety Review

Printing Date: 8/24/2018 Time: 2:37 PM

Estimated by: P. Nahal

File: O:\Proj\2121-00288-02 MoTI Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3 Estimates\20180824  
Company **MCSL**

(2018 Dollars) **Whistler Highway 99 Capacity and Safety Review**

ACTIVITY **Capacity and Safety Review**

CODE EST. DATE August, 2018

Conceptual Est.

Blk Est. # 6.14A

Version Sept. 1, 2002

	Hwy 99 / Lorimer Rd	Hwy 99 / Lorimer Rd	Alpha Lake Road / Chcid Rd to South of Baylor Way to Alpha Lake	for Way to Alpha Lake	imer Rd to Alpha Lake	Rd to Alpha Lake	
	ST-1	ST-2	MT-1	MT-2	MT-3A	MT-3B	LT-1
	Short Term Option - 1	Short Term Option - 2	Medium Term Option - 1	Medium Term Option - 2	Medium Term Option - 3A	Medium Term Option - 3B	Long Term Option - 1
	Left / Shared Left-Through	Dual Left	Counterflow	2 SB lanes from Taylor Way to	Shoulder Widening	2 Full Lanes SB	2 Full Lanes SB
Divison/site / Shared Left-Through	0	0	0	0	0	0	0
Road Type	100	75	3500	450	3150	3150	5600
DESCRIPTION \Length	MR	MR	MR	MR	MR	MR	MR
5200 ROAD SIDE CONSTRUCTION							
5203 RoadSide C/- water	0	0	0	0	0	0	0
5204 RoadSide C/- sanitary	0	0	0	0	0	0	0
5205 RoadSide C/- storm	0	0	0	0	0	0	0
5202 RoadSide C/- mobilization	0	0	0	0	0	0	0
5209 RoadSide C/- Utility Contingency	0	0	0	0	0	0	0
Road Side Const. Utilities Sub-total	0	0	0	0	0	0	0
5210 RoadSide C/- weigh scales	0	0	0	0	0	0	0
5220 RoadSide C/- safety rest areas	0	0	0	0	0	0	0
5230 RoadSide C/- tourist rest & view areas	0	0	0	0	0	0	0
5201 RoadSide C/- mobilization	0	0	0	0	0	0	0
5299 RoadSide C/- Contingency	0	0	0	0	0	0	0
Road Side Construction Sub-total	0	0	0	0	0	0	0
ROAD SIDE CONSTRUCTION COSTS	0	0	0	0	0	0	0
3550 RoadSide Er- detailed design	0	0	0	0	0	0	0
3559 RoadSide Er- detailed design/Contingency	0	0	0	0	0	0	0
6850 RoadSide Er- general const. supervision	0	0	0	0	0	0	0
6851 RoadSide Er- quality assurance	0	0	0	0	0	0	0
6852 RoadSide Er- surveying	0	0	0	0	0	0	0
6859 RoadSide Er- Residency Contingency	0	0	0	0	0	0	0
Road Side Engineering Sub-total	0	0	0	0	0	0	0
Total Road Side Const. & Eng. Costs	0	0	0	0	0	0	0
5300 OTHER CONSTRUCTION							
5303 Other Const. - water	0	0	0	0	0	0	0
5304 Other Const. - sanitary	0	0	0	0	0	0	0
5305 Other Const. - storm	0	0	0	0	0	0	0
5302 Other Const. - mobilization	0	0	0	0	0	0	0
5309 Other Const. - utility contingency	0	0	0	0	0	0	0
Other Const. Utilities Sub-total	0	0	0	0	0	0	0
5310 Other Const. - railroads main & spur lines	0	0	0	0	0	0	0
5320 Other Const. - railroad crossings	0	0	0	0	0	0	0
5330 Other Const. - marine work	0	0	0	0	0	0	0
5340 Other Const. - environmental mitigations	5,000	5,000	45,000	18,000	67,500	9,000	90,000
5301 Other Const. - mobilization	150	150	1,350	540	2,025	270	2,700
5399 Other Const. - Contingency	1,545	1,545	13,905	5,562	20,857	2,781	27,810
Other Construction Sub-total	6,695	6,695	60,255	24,102	90,382	12,051	120,510
OTHER CONSTRUCTION COSTS	6,695	6,695	60,255	24,102	90,382	12,051	120,510
3570 Other Eng. - detailed design	368	368	3,314	1,326	4,971	663	6,628
3579 Other Eng. - detailed design/Contingency	110	110	994	398	1,491	199	1,988
6870 Other Eng. - general const. supervision	268	268	2,410	964	3,615	482	4,820
6871 Other Eng. - quality assurance	134	134	1,205	482	1,808	241	2,410
6872 Other Eng. - surveying	67	67	603	241	904	121	1,205
6879 Other Eng. - Residency Contingency	141	141	1,265	506	1,898	253	2,531
Other Engineering Sub-total	1,088	1,088	9,791	3,917	14,687	1,958	19,583
Total Other Const. & Eng. Costs	7,783	7,783	70,046	28,019	105,070	14,009	140,093

# Whistler Highway 99 Capacity and Safety Review

Estimated by: P. Nahal

Printing Date: 8/24/2018 Time: 2:37 PM

File: O:\Proj\2121-00288-02 MoTI Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3 Estimates\20180824  
Company **MCSL**

(2018 Dollars) **Whistler Highway 99 Capacity and Safety Review**  
ACTIVITY **Capacity and Safety Review**  
CODE EST. DATE August, 2018  
Conceptual Est.

DESCRIPTION \Length	Hwy 99 / Lorimer Rd ST-1 Short Term Option - 1 Left / Shared Left-Through	Hwy 99 / Lorimer Rd ST-2 Short Term Option - 2 Dual Left	Alpha Lake Road / Chcid Rd to South of Baylor Way to Alpha Lake MT-1 Medium Term Option - 1 Counterflow	Chcid Rd to South of Baylor Way to Alpha Lake MT-2 Medium Term Option - 2 2 SB lanes from Taylor Way to	Chcid Rd to South of Baylor Way to Alpha Lake MT-3A Medium Term Option - 3A Shoulder Widening	Chcid Rd to South of Baylor Way to Alpha Lake MT-3B Medium Term Option - 3B 2 Full Lanes SB	Chcid Rd to South of Baylor Way to Alpha Lake LT-1 Long Term Option - 1 2 Full Lanes SB	MR OR TR
	0	0	0	0	0	0	0	
	100	75	3500	450	3150	3150	5600	
	MR	MR	MR	MR	MR	MR	MR	
3500 DETAILED DESIGN								
from 3510,3520,3540,3550,3570	9,909	19,249	1,543,793	259,949	1,174,816	1,442,625	2,918,084	
3530 Geotech. En - detailed design	1,247	2,423	194,324	32,721	147,879	181,589	367,311	
3539 Geotech. En - Contingency	374	727	58,297	9,816	44,364	54,477	110,193	
<b>TOTAL DETAILED DESIGN COSTS</b>	<b>11,530</b>	<b>22,399</b>	<b>1,796,414</b>	<b>302,486</b>	<b>1,367,058</b>	<b>1,678,691</b>	<b>3,395,589</b>	
6800 RESIDENT ENGINEERING	0	0	0	0	0	0	0	
from 6810,6820,6840,6850,6860,6870	13,800	26,396	1,907,795	320,023	1,446,845	1,770,765	3,569,867	
<b>TOTAL RESIDENT ENG. COSTS</b>	<b>13,800</b>	<b>26,396</b>	<b>1,907,795</b>	<b>320,023</b>	<b>1,446,845</b>	<b>1,770,765</b>	<b>3,569,867</b>	
	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	
	0	0	0	0	0	0	0	
<b>PART 1 SUMMARY</b>								
CONSTRUCTION	106,603	207,088	16,944,858	2,796,657	12,941,622	15,822,846	31,931,729	
ENGINEERING & SUPERVISION	25,492	49,447	3,097,087	537,734	2,353,778	2,821,874	5,970,991	
CONTRACTUAL CONTINGENCY	39,629	76,960	6,012,583	1,000,317	4,588,620	5,593,416	11,370,816	
	0	0	0	0	0	0	0	
<b>CONSTRUCTION COST TOTAL</b>	<b>171,724</b>	<b>333,495</b>	<b>26,054,528</b>	<b>4,334,708</b>	<b>19,884,020</b>	<b>24,238,136</b>	<b>49,273,536</b>	





Blk Est. # 6.14A  
Version Sept.1, 2002

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 Company **MCSL**  
 (2018 Dollars) Whistler Highway 99 Capacity and Safety Review  
 ACTIVITY CODE EST.DATE August, 2018

Conceptual Est. R1 DATE: **Blk Est. # 6.14A**  
 Version Sept. 1, 2002 R2 DATE: **EST.DATE August, 2018**

ACTIVITY CODE	DESCRIPTION	Unit Price	Unit	Cost-Quant. PerSection	Lump Sum Values
<b>SUMMARY BY ACTIVITY LEVEL</b>					
2000	PROJECT MANAGEMENT			Diff. -7041	0
2500	PLANNING			-2048	0
3000	PRELIMINARY DESIGN			-3960	0
3500	DETAILED DESIGN			-8869	0
	Total Engineering			-14877	0
4000	LAND ACQUISITION			0	0
5000	GRADE CONSTRUCTION			-26388	0
5200	ROAD SIDE CONSTRUCTION			0	0
5300	OTHER CONSTRUCTION			-5150	0
5500	STRUCTURAL CONSTRUCTION			0	0
6000	PAVING CONSTRUCTION			-9409	0
6500	OPERATIONAL CONSTRUCTION			-65656	0
6700	UTILITY CONSTRUCTION			0	0
6800	RESIDENT ENGINEERING			-10616	0
	Total Construction			-117218	0
9700	CONTINGENCY			-41741	0
9800	SUB-TOTAL MANAGEMENT RESERVE			-180876	0
	TOTAL			-180876	0
9900	ESCALATION			0	0
	<b>TOTAL COST</b>			-180876	0
	Constr. Less Resident Eng.			-106603	0
	ENG. & PM				28,493
	LAND				0
	CONST.				152,384
	MAN. RES.				0
	ESC.				0
	<b>TOTAL</b>				180,876

Hwy 99 / Lorimer Rd ST-1	Short Term Option - 1	Left / Shared Left-Through	MR
Hwy 99 / Road Types ST-1	1	100	1
1. 2In Frontage	1	100	1
2. 2In Acc Rds	1	100	1
3. 4In Acc Rds	1	100	1
4.R4L-4L EXP R/B	1	100	1
5.R2/3L-4L EXP R/B	1	100	1
6.Refr.4L-4LEX R/B	1	100	1
7.R4L-4LEX R/B E/S	1	100	1
8. New 4L EXP R/B	1	100	1
9. R-E4L-4L D/M	1	100	1
10.N 4L EXP D/M	1	100	1
11.N 4L EXP D/E/M	1	100	1
12.N2L/F4LEX D/M	1	100	1
13.INST.R/B-EX.RD	1	100	1
14.AS IS	1	100	1
15. Misc.	1	100	1
20.I/C Str.&Ramps	1	100	1
21. Bridges	1	100	1
22. Grade Sep.	1	100	1
Cost/LM	% of T	% of TC	
70	3.9%	3.9%	
20	1.1%	1.1%	
40	2.2%	2.2%	
89	4.9%	4.9%	
149	8.2%	8.2%	
0	0.0%	0.0%	
264	14.6%	14.6%	
0	0.0%	0.0%	
51	2.8%	2.8%	
0	0.0%	0.0%	
94	5.2%	5.2%	
657	36.3%	36.3%	
0	0.0%	0.0%	
106	5.9%	5.9%	
1172	64.8%	64.8%	
417	23.1%	23.1%	
1809	100.0%	100.0%	
0	0.0%	0.0%	
1809	100.0%	100.0%	
0			
1066			
285	15.8%		
0	0.0%		
1524	84.2%		
0	0.0%		
0	0.0%		
1809	100.0%		

Est \$	180,876
\$	1,809
\$	1,524

21918

Short Term Option - 1				Assumptions									
1	Existing Right-Of -Way	m		Existing Rd	Shoulder	Lane	Lane	Median	Lane	Lane	Shoulder		
				Pvmt Width	0.0								
2	New Addition Right-Of -Way	partial taking NO m		New Rd.	Shoulder	Lane	Lane	Median	Lane	Lane	Shoulder	Ditch W.	
	ROW	13 m		Pvmt Width	10.2	1.50	3.60		3.60		1.50	0.5	
	Bridges	Width(m)	Length(m)	SCOPE	Road L.	Bridge L.	Seg. L.	Asphalt depth mm	100	Tonage t	43	Unit Price	\$ 151.00
3.1		0	12.2	0.0	CBS	slope	D= meter	Volume	Unit		Rock	-	\$ 107.66
3.2		0	12.2	0.0		4.0	2.523	55	\$ 60.00		OM	37	\$ 29.11
3.3		0	12.2	0.0	SGSB	slope	D= meter	Volume	Unit		Stripping	-	\$ 49.54
3.4		0	12.2	0.0		4.0	1.417	55	\$ 56.00		Borrow	18	\$ 42.95
3.5		0	12.2	0.0									
4	Tunnels	Length(m)	Width(m)	Height(m)									
4.1	2InSt.w-x	0	12.0	8.27									
4.2	x-Pass.TI	0	3.0	3.16									
4.3	shaft	0	2.0	Diameter									
4.4	snowshedlength (lm)	0											
	Bridges	Net \$/M2	Gross\$/m2										
3.1		0	#DIV/0!	#DIV/0!									
3.2		0	#DIV/0!	#DIV/0!									
3.3		0	#DIV/0!	#DIV/0!									
3.4		0	#DIV/0!	#DIV/0!									
3.5		0	#DIV/0!	#DIV/0!									

File:	O:\Proj\2121-00288-02 MoTi Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3 Company MCSL	Man. Reserve	0.0%	Land		Hwy 99 / Lorimer Rd	Hwy 99 / Road Types	9. R-E4L-4L D/M		
	(2018 Dollars) Whistler Highway 99 Capacity and Safety Review	Contingency	30.0%	30.0%		ST-1	ST-1	10. N 4L EXP D/M		
ACTIVITY	EST.DATE August, 2018	Division/Site	Short Term Option - 1			Short Term Option - 1	Short Ter	11. N 4L EXP D/E/M		
CODE		Road Type	1			1	3. 4In Acc Rds	12. N2L;F4LEXP D/M		
		Length	100	L.M.		Left / Shared Left-Through	4.R4L-4L EXP R/B	13. INST.R/B-EX.RD		
	Conceptual Est. R1 DATE:		=====				5. R2/3L-4L EXP R/B	14. AS IS	15. Misc.	
	Blk Est. # 6.14A R2 DATE:						6. Retr.4L-4LEX R/B	20. I/C Str.&Ramps		
	Version Sept.1, 2002						7. R4L-4LEX R/B E/S	21. Bridges		
							8. New 4L EXP R/B	22. Grade Sep.		
		Unit Price	Unit	Cost-Quant. PerSection	Lump Sum Values					Est \$
										180,876
										\$ 1,809
										\$ 1,524
2500	PLANNING					MR				
2521	Consultant - transport. planning study	2.50	LM	250		250	3	Description	No.	Units
2531	Consultant - corridor study	2.50	LM	250		250	3	Quantity	Rate	Total
2541	Consultant - functional plan. study	2.50	LM	250		250	3			-
2502	Consultant - general	5.0%		38		38	0			-
	Consultant sub-total					788	8			-
2510	Client - project ident.	2.50	LM	250		250	3			-
2520	Client - transport. planning study	2.50	LM	250		250	3			-
2530	Client - corridor study	3.50	LM	350		350	4			-
2540	Client - functional study	3.50	LM	350	0	350	4			-
2501	Client - general	5.0%		60		60	1			-
	Client Sub-total			1260		1,260	13			-
2599	Planning Contingency	30.0%		614		614	6			-
	TOTAL PLANNING					2,662	27			-
3000	PRELIMINARY DESIGN									-
3013	Consultant - aerial base plan	3.00	LM	300		300	3			-
3014	Consultant - prel. design	3.60	LM	360		360	4			-
3015	Consultant - control survey	3.00	LM	300		300	3			-
3021	Consultant - environmental impact	6.00	LM	600		600	6			-
3031	Consultant - funct.-road field survey	3.00	LM	300		300	3			-
3041	Consultant - functional design	2.40	LM	240	0	240	2			-
3051	Consultant - funct. des. structural	1.80	LM	180	0	180	2	Structural	0.50%	-
3061	Consultant - geotechnical design	15.00	LM	1500		1,500	15			-
3071	Consultant - right-of-way research	1.80	LM	180	0	180	2	\$/Prop.	\$ 150	-
3002	Consultant - general	0.0%		0		0	0	Description	No.	Units
	Consultant sub-total					3,960	40	Quantity	Rate	Total
3010	Client - aerial base plan	0.00	LM	0		0	0	Cantilever Fil	1	ea
3011	Client - prel. design	0.00	LM	0		0	0			0
3012	Client - control survey	0.00	LM	0		0	0	Median Islan	1	m2
3020	Client - environmental impact	0.00	LM	0		0	0			40
3030	Client - funct.-road field survey	0.00	LM	0		0	0			100.00
3040	Client - functional design	0.00	LM	0		0	0			4,000
3050	Client - funct. des. structural	0.00	LM	0		0	0			-
3060	Client - geotechnical design	0.00	LM	0		0	0			-
3070	Client - right-of-way research	0.00	LM	0		0	0			-
3001	Client - general	0.0%		0		0	0			-
	Client Sub-total					0	0			-
3099	Preliminary design Contingency	30.0%		1188		1,188	12			-
	TOTAL PRELIMINARY DESIGN					5,148	51			-



[illegible]

ESTIMATED BY : P. Nahal

ESTIMATED BY : P. Nahal



File:	O:\Proj\2121-00288-02 MoTI Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3 Company MCSL (2018 Dollars) Whistler Highway 99 Capacity and Safety Review EST.DATE August, 2018	Man. Reserve Contingency	0.0% 30.0%	Land 30.0%	Hwy 99 / Lorimer Rd ST-1	Hwy 99 / Road Types ST-1	9. R-E4L-4L D/M 10. N 4L EXP D/M 11. N 4L EXP D/E/M 12. N2L;F4LEXP D/M 13. INST.R/B-EX.RD	
ACTIVITY CODE		Division/Site Road Type Length	Short Term Option - 1 1 100	L.M.	Short Term Option - 1	Short Ter 1. 2In Frontage 2. 2In Acc Rds 3. 4In Acc Rds 4.R4L-4L EXP R/B	14. AS IS 15. Misc. 20. I/C Str.&Ramps 21. Bridges 22. Grade Sep.	Est \$
Conceptual Est. R1 DATE: Blk Est. # 6.14A Version Sept.1, 2002	R2 DATE: DESCRIPTION	Unit Price	Unit	Cost-Quant. PerSection	Lump Sum Values	5.R2/3L-4L EXP R/B 6.Retr.4L-4LEX R/B 7.R4L-4LEX R/B E/S 8. New 4L EXP R/B		180,876 1,809 1,524
3500 DETAILED DESIGN	from 3510,3520,3540,3550,3570					0 1 1		
3530 Geotech. E - detailed design		0.90%		1247	0	99 Bridge Tunnel Special		
3539 Geotech. Er - Contingency		30.0%		374		4 Description No. Units Quantity Rate Total		
<b>TOTAL DETAILED DESIGN COSTS</b>					11,530	115		
6800 RESIDENT ENGINEERING	from 6810,6820,6840,6850,6860,6870				13,800			
<b>TOTAL RESIDENT ENG. COSTS</b>					13,800	138		
PART 1 SUMMARY								
CONSTRUCTION ENGINEERING & SUPERVISION CONTRACTUAL CONTINGENCY					106,603	1066		
<b>CONSTRUCTION COST TOTAL</b>	DIVISION/SITE Short Term Option - 1				171,724	1717		
2000 PROJECT MANAGEMENT	Land							
2060 Project Man - office costs wages	2.00%	3434	0	3,434	34			
2062 Project Man - office costs - expenses	0.50%	859	0	859	9			
2063 Project Man - printing costs	0.00%	0	0	0	0			
2061 Project Man - general (MoTI Regional Cost F Project Manager Sub-total	0.00%	0	0	0	0			
2010 Client - office costs wages	1.00%	1717	0	1,717	17			
2012 Client - office costs - expenses	0.50%	859	0	859	9			
2030 Client - printing costs	0.00%	0	0	0	0			
2011 Client - general Client Sub-total	0.00%	0	0	0	0			
2070 Public Rel. - wages & expenses	0.00%	0	0	0	0			
2072 Public Rel. - adv., media, displays	0.00%	0	0	0	0			
2073 Public Rel. - opening ceremonies	0.00%	0	0	0	0			
2071 Public Rel. - general (FN Accom.) Public Relations Sub-total	0.00%	0	0	0	0			
2040 Legal Costs - lawyers fees	0.10%	172	0	172	2			
2041 Legal Costs - general Legal Costs Sub-total	0.00%	0	0	0	0			
2080 Insurance - const./ liability, E&O	0.00%	0	0	0	0			
2081 Insurance - general Legal Costs Sub-total	0.00%	0	0	0	0			
2099 Project Management Contingency	30.0%	2112		2,112	21			
<b>TOTAL PROJECT MANAGEMENT COSTS</b>					9,153	92		
4000 LAND	\$/Building # buildings LS				0			
4010 Land(Code -Mrkt,ROW,Serv,Imp,V,Ease.C Acquisition Sub-total	250,000 Res. 2,000,000 Corr	0 0	0 0	0 0	0 0			
4020 Land(Code -Bus.,5%,Mrg.P,Rel\$,P/Tax,Etc	10.00%	0	0	0	0			
4030 Land(Code -Owners(LS,ApprsI,Rprt,Lgl,In	7.00%	0	0	0	0			
4040 Land(Code -Demolition	0.00%	0	0	0	0			
4050 Land(Code -Pro.Man,P.Tax,Util,Security	1.00%	0	0	0	0			
4060 Land(Code -Not Used								
4070 Land(Code -Not Used								
4080 Land(Code -Acq.F,M/Sal,TrvIV,Cntr.S,Appr	7.00%	0	0	0	0			
4090 Land(Code -Surveys	0.00%	0	0	0	0			
Associated costs-sub-total		0		0	0			
4099 Land Contingency Sub-total	30.0%	0	0	0	0			
<b>TOTAL LAND COSTS</b>					0	0		

File:	O:\Proj\2121-00288-02 MoTI Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3 Company MCSL	Man. Reserve	0.0%	Land		Hwy 99 / Lorimer Rd	Hwy 99 / Road Types	9. R-E4L-4L D/M	
	(2018 Dollars) Whistler Highway 99 Capacity and Safety Review	Contingency	30.0%	30.0%		ST-1	ST-1	10. N 4L EXP D/M	
ACTIVITY	EST.DATE August, 2018	Division/Site	Short Term Option - 1			Short Term Option - 1	Short Ter	11. N 4L EXP D/E/M	
CODE		Road Type	1			1		12. N2L/F4LEXP D/M	
		Length	100	L.M.		Left / Shared Left-Through		13. INST.R/B-EX.RD	
						MR			
Conceptual Est. R1 DATE:		Unit	Cost-Quant.	Lump Sum					
Blk Est. # 6.14A	R2 DATE:	Price	PerSection	Values					
Version Sept. 1, 2002									
	DESCRIPTION								
9800	MANAGEMENT RESERVE								
	MAN. RES. - planning	0.0%	2662			0	0		
	MAN. RES. - preliminary design	0.0%	5148			0	0		
	MAN. RES. - utility construction	0.0%	0			0	0		
	MAN. RES. - grade construction	0.0%	34304			0	0		
	MAN. RES. - structural construction	0.0%	0			0	0		
	MAN. RES. - paving construction	0.0%	12232			0	0		
	MAN. RES. - operation construction	0.0%	85352			0	0		
	MAN. RES. - roadside construction	0.0%	0			0	0		
	MAN. RES. - other construction	0.0%	6695			0	0		
	MAN. RES. - project management	0.0%	9153			0	0		
	MAN. RES. - land	0.0%	0			0	0		
	MAN. RES. - detailed eng.	0.0%	11530			0	0		
	MAN. RES. - residency eng.	0.0%	13800			0	0		
	MAN. RES. - Contingency	0.0%	0			0	0		
	TOTAL MANAGEMENT RESERVE		180876			0	0		
	TOTAL LESS ESCALATION		0	180876					
9900	ESCALATION								
	YEAR PROJECTED ESCALATION COMPLETE \$ DONE								
	2016-2017 0.5750% 5.00%		0			0	0		
	2017-2018 0.6250% 10.00%		0			0	0		
	2018-2019 1.0000% 35.00%		0			0	0		
	2019-2020 1.0000% 45.00%		0			0	0		
	2020-2021 1.0000% 5.00%		0			0	0		
	2021-2022 1.0000% 0.00%		0			0	0		
	2022-2023 1.0000% 0.00%		0			0	0		
	2023-2024 1.0000% 0.00%		0			0	0		
	2024-2025 1.0000% 0.00%		0			0	0		
	TOTAL ESCALATION	100.00%	0			0	0		
	PART 2 SUMMARY NON-CONSTRUCTION COSTS								
	Non-Construction					7,041	70		
	Non-Const. Contingency					2,112	21		
	TOTAL NON-CONSTRUCTION COSTS					9,153	92		
	Short Term TOTAL FOR ROAD TYPE	1				180,876	1809		

File: O:\Proj\2121-00288-02 MoTI Whistler Hwy 99 Capacity  
& Safety Review\4.0 ENGINEERING DESIGN\4.3  
Company **MCSL**  
(2018 Dollars) Whistler Highway 99 Capacity and Safety Review  
ACTIVITY Capacity and Safety Review  
CODE EST. DATE August, 2018  
Conceptual Est. R1 DATE:  
Blk Est. # 6.14A R2 DATE:  
Version Sept. 1, 2002

Man. Reserve 0.0% Land  
Contingency 30.0% 30.0%  
Short Term Option - 2  
Division/Site  
Road Type 1  
Length 75 L.M.  
=====

Hwy 99 / Lorimer Rd  
ST-2  
Short Term Option -  
2  
Dual Left  
MR

Hwy 99 / Road Types  
ST-2 1. 2In Frontage  
Short Ter 2. 2In Acc Rds  
3. 4In Acc Rds  
4. R4L-4L EXP R/B  
5. R2/3L-4L EXP R/B  
6. Retr. 4L-4LEX R/B  
7. R4L-4LEX R/B E/S  
8. New 4L EXP R/B  
Cost/LM % of T % of TC

9. R-E4L-4L D/M  
10. N 4L EXP D/M  
11. N 4L EXP D/E/M  
12. N2L; F4LEX D/M  
13. INST. R/B-EX. RD  
14. AS IS 15. Misc.  
20. I/C Str. & Ramps  
21. Bridges  
22. Grade Sep.

Est \$	351,271
\$	4,684
\$	3,941

SUMMARY BY ACTIVITY LEVEL		Diff.	Previous Estimate				
2000	PROJECT MANAGEMENT	-13673	0	13,673	182	3.9%	3.9%
2500	PLANNING	-3993	0	3,993	53	1.1%	1.1%
3000	PRELIMINARY DESIGN	-7920	0	7,920	106	2.3%	2.3%
3500	DETAILED DESIGN	-17230	0	17,230	230	4.9%	4.9%
	Total Engineering	-29142	0	29,142	389	8.3%	8.3%
4000	LAND ACQUISITION	0	0	0	0	0.0%	0.0%
5000	GRADE CONSTRUCTION	-78873	0	78,873	1052	22.5%	22.5%
5200	ROAD SIDE CONSTRUCTION	0	0	0	0	0.0%	0.0%
5300	OTHER CONSTRUCTION	-5150	0	5,150	69	1.5%	1.5%
5500	STRUCTURAL CONSTRUCTION	0	0	0	0	0.0%	0.0%
6000	PAVING CONSTRUCTION	-21529	0	21,529	287	6.1%	6.1%
6500	OPERATIONAL CONSTRUCTION	-101536	0	101,536	1354	28.9%	28.9%
6700	UTILITY CONSTRUCTION	0	0	0	0	0.0%	0.0%
6800	RESIDENT ENGINEERING	-20305	0	20,305	271	5.8%	5.8%
	Total Construction	-227393	0	227,393	3032	64.7%	64.7%
9700	CONTINGENCY	-81062	0	81,062	1081	23.1%	23.1%
9800	SUB-TOTAL	-351271	0	351,271	4684	100.0%	100.0%
	MANAGEMENT RESERVE	0	0	0	0	0.0%	0.0%
	TOTAL	-351271	0	351,271	4684	100.0%	100.0%
9900	ESCALATION	0	0	0	0		0.0%
	TOTAL COST	-351271	0	351,271	4684		100.0%
	Constr. Less Resident Eng.	-207088	0	207,088	2761		
	ENG. & PM			55,660	742	15.8%	
	LAND			0	0	0.0%	
	CONST.			295,610	3941	84.2%	
	MAN. RES.			0	0	0.0%	
	ESC.			0	0	0.0%	
	TOTAL			351,271	4684	100.0%	

42816

## Short Term Option - 2

## Assumptions

1	Existing Right-Of-Way	m	Existing Rd	Shoulder	Lane	Lane	Median	Lane	Lane	Shoulder	
			Pvmt Width	0.0							
2	New Addition Right-Of-Way	partial taking NO m	New Rd.	Shoulder	Lane	Lane	Median	Lane	Lane	Shoulder	Ditch W.
	ROW	11 m	Pvmt Width	1.50		3.60		3.60		1.50	0.5
				10.2	Asphalt depth mm	100	Tonage t	116	Unit Price		\$ 151.00
	Bridges	Width(m)	Length(m)	SCOPE	Road L.	Bridge L.	Seg. L.		X-sect./lm	Tot. Vol.	
3.1	0	12.2	0.0		75	-	75		1.95	146	
3.2	0	12.2	0.0	CBS	slope	D= meter	Volume	Unit	Rock	-	\$ 107.66
3.3	0	12.2	0.0		4.0	0.165	146	\$ 60.00	OM	97	\$ 29.11
3.4	0	12.2	0.0	SGSB	slope	D= meter	Volume	Unit	Stripping	-	\$ 49.54
3.5	0	12.2	0.0		4.0	0.144	146	\$ 56.00	Borrow	49	\$ 42.95
4	Tunnels	Length(m)	Width(m)	Height(m)							
4.1	2InSt.w-x	0	12.0	8.27							
4.2	x-Pass.TI	0	3.0	3.16							
4.3	shaft	0	2.0	Diameter							
4.4	snowshedlength (lm)	0									
	Bridges	Net \$/M2	Gross\$/m2								
3.1	0	#DIV/0!	#DIV/0!								
3.2	0	#DIV/0!	#DIV/0!								
3.3	0	#DIV/0!	#DIV/0!								
3.4	0	#DIV/0!	#DIV/0!								
3.5	0	#DIV/0!	#DIV/0!								



O:\Proj\2121-00288-02 MoTi Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3		Man. Reserve Contingency	0.0%	Land	30.0%	Hwy 99 / Lorimer Rd	Hwy 99 / Road Types	9. R-E4L-4L D/M		
File:	Company MCSL	Division/Site	Short Term Option - 2			ST-2	ST-2	10.N 4L EXP D/M		
(2018 Dollars)	Whistler Highway 99 Capacity and Safety Review	Road Type	1			Short Term Option - 2	Short Term	11.N 4L EXP D/E/M		
ACTIVITY CODE	EST.DATE August, 2018	Length	75	L.M.		Dual Left	1	12.N2L;F4LEXP D/M		
Conceptual Est.	R1 DATE:	Unit Price	Unit	Cost-Quant.	Lump Sum Values		75	13.INST.R/B-EX.RD		
Blk Est. # 6.14A	R2 DATE:							14.AS IS 15. Misc.		
Version Sept. 1, 2002								20.I/C Str.&Ramps		
								21. Bridges		
								22. Grade Sep.		
									Est \$	
									351,271	
									\$ 4,684	
									\$ 3,941	
2500	PLANNING									
2521	Consultant - transport. planning study	6.50	LM	488			488	7	Description	No. Units Quantity Rate Total
2531	Consultant - corridor study	6.50	LM	488			488	7		-
2541	Consultant - functional plan. study	6.50	LM	488			488	7		-
2502	Consultant - general	5.0%		73			73	1		-
	Consultant sub-total						1,536	20		-
2510	Client - project ident.	6.50	LM	488			488	7		-
2520	Client - transport. planning study	6.50	LM	488			488	7		-
2530	Client - corridor study	9.10	LM	683			683	9		-
2540	Client - functional study	9.10	LM	683			683	9		-
2501	Client - general	5.0%		117			117	2		-
	Client Sub-total			2457			2,457	33		-
2599	Planning Contingency	30.0%		1198			1,198	16		-
	TOTAL PLANNING						5,190	69		-
3000	PRELIMINARY DESIGN									-
3013	Consultant - aerial base plan	8.00	LM	600			600	8		-
3014	Consultant - prel. design	9.60	LM	720			720	10		-
3015	Consultant - control survey	8.00	LM	600			600	8		-
3021	Consultant - environmental impact	16.00	LM	1200			1,200	16		-
3031	Consultant - funct.-road field survey	8.00	LM	600			600	8		-
3041	Consultant - functional design	6.40	LM	480			480	6		-
3051	Consultant - funct. des. structural	4.80	LM	360			360	5	Structural	0.50%
3061	Consultant - geotechnical design	40.00	LM	3000			3,000	40		-
3071	Consultant - right-of-way research	4.80	LM	360			360	5	\$/Prop.	\$ 150
3002	Consultant - general	0.0%		0			0	0	Description	No. Units Quantity Rate Total
	Consultant sub-total						7,920	106		-
3010	Client - aerial base plan	0.00	LM	0			0	0	Cantilever Fil	1 ea 0 3,500.00
3011	Client - prel. design	0.00	LM	0			0	0		-
3012	Client - control survey	0.00	LM	0			0	0	Median Islan	1 m2 40 100.00 4,000
3020	Client - environmental impact	0.00	LM	0			0	0	Island Remov	1 m2 350 30.00 10,500
3030	Client - funct.-road field survey	0.00	LM	0			0	0	Whistler Sigr	1 ea 1 5,000.00 5,000
3040	Client - functional design	0.00	LM	0			0	0	Tree Remov	1 ea 16 200.00 3,200
3050	Client - funct. des. structural	0.00	LM	0			0	0	Light pole rer	1 ea 2 500.00 1,000
3060	Client - geotechnical design	0.00	LM	0			0	0	Overhead sig	1 ea 1 500.00 500
3070	Client - right-of-way research	0.00	LM	0			0	0		-
3001	Client - general	0.0%		0			0	0		-
	Client Sub-total						0	0		-
3099	Preliminary design Contingency	30.0%		2376			2,376	32		-
	TOTAL PRELIMINARY DESIGN						10,296	137		-

ESTIMATED BY : P. Nahal

ESTIMATED BY : P. Nahal



ESTIMATED BY : P. Nahal

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O:\Proj\2121-00288-02 MoTi Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3 Company MCSL (2018 Dollars) Whistler Highway 99 Capacity and Safety Review				Man. Reserve Contingency	0.0% 30.0%	Land 30.0%	Hwy 99 / Lorimer Rd ST-2	Hwy 99 / Road Types	9. R-E4L-4L D/M	
ACTIVITY CODE	Division/Site	Short Term Option - 2	1	Division/Site	Short Term Option - 2	1	Short Term Option - 2	ST-2	1. 2In Frontage	10.N 4L EXP D/M
Conceptual Est	R1 DATE:	=====	=====	Road Type	75 L.M.	=====	Dual Left	Short Ter	2. 2In Acc Rds	11.N 4L EXP D/E/M
Bik Est. # 6.14A	R2 DATE:	Unit Price	Cost-Quant.	Lump Sum	=====	=====	MR	1	3. 4In Acc Rds	12.N2L;F4LEXP D/M
Version Sept.1, 2002	DESCRIPTION	Unit	PerSection	Values	=====	=====	75	75	4.R4L-4L EXP R/B	13.INST.R/B-EX.RD
								1	5.R2/3L-4L EXP R/B	14.AS IS 15. Misc.
								75	6.Refr.4L-4LEX R/B	20.I/C Str.&Ramps
									7.R4L-4LEX R/B E/S	21. Bridges
									8. New 4L EXP R/B	22. Grade Sep.



File: O:\Proj\2121-00288-02 MoTI Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3 Company MCSL (2018 Dollars) Whistler Highway 99 Capacity and Safety Review	Man. Reserve 0.0%	Land 30.0%	Alpha Lake Road / Ch	Lake PlarRoad Types	9. R-E4L-4L D/M
ACTIVITY CODE	Contingency 30.0%	Division/Site 30.0%	MT-1	MT-1	10.N 4L EXP D/M
EST.DATE August, 2018	Road Type 1	Medium Term Option - 1	Medium Term Option - 1	Medium	11.N 4L EXP D/E/M
Conceptual Est. R1 DATE:	Length 3500	L.M.	Counterflow	1	12.N2L/F4LEXP D/M
Blk Est. # 6.14A R2 DATE:	Unit Price	Unit	MR	3500	13.INST.R/B-EX.RD
Version Sept.1, 2003	DESCRIPTION	Cost-Quant. PerSection		1	14.AS IS 15. Misc.
		Lump Sum Values		3500	20.I/C Str.&Ramps
				Cost/LM	21. Bridges
				% of T	22. Grade Sep.
				% of TC	
<b>SUMMARY BY ACTIVITY LEVEL</b>					
2000	PROJECT MANAGEMENT	Diff. -1068236	Previous Estimate 0	1,068,236	305 3.9% 3.9%
2500	PLANNING	-85995	0	85,995	25 0.3% 0.3%
3000	PRELIMINARY DESIGN	-161700	0	161,700	46 0.6% 0.6%
3500	DETAILED DESIGN	-1381857	0	1,381,857	395 5.0% 5.0%
	Total Engineering	-1629552	0	1,629,552	466 5.9% 5.9%
4000	LAND ACQUISITION	0	0	0	0 0.0% 0.0%
5000	GRADE CONSTRUCTION	-4582315	0	4,582,315	1309 16.7% 16.7%
5200	ROAD SIDE CONSTRUCTION	0	0	0	0 0.0% 0.0%
5300	OTHER CONSTRUCTION	-46350	0	46,350	13 0.2% 0.2%
5500	STRUCTURAL CONSTRUCTION	-9967825	0	9,967,825	2848 36.3% 36.3%
6000	PAVING CONSTRUCTION	-806315	0	806,315	230 2.9% 2.9%
6500	OPERATIONAL CONSTRUCTION	-1206053	0	1,206,053	345 4.4% 4.4%
6700	UTILITY CONSTRUCTION	-336000	0	336,000	96 1.2% 1.2%
6800	RESIDENT ENGINEERING	-1467535	0	1,467,535	419 5.3% 5.3%
	Total Construction	-18412392	0	18,412,392	5261 67.1% 67.1%
9700	CONTINGENCY	-6333054	0	6,333,054	1809 23.1% 23.1%
9800	SUB-TOTAL MANAGEMENT RESERVE	-27443234	0	27,443,234	7841 100.0% 100.0%
	TOTAL	-27443234	0	27,443,234	7841 100.0% 100.0%
9900	ESCALATION	0	0	0	0 0.0%
	<b>TOTAL COST</b>	-27443234	0	27,443,234	7841 100.0%
	Constr. Less Resident Eng.	-16944858	0	16,944,858	4841
	ENG. & PM			3,507,124	1002 12.8%
	LAND			0	0 0.0%
	CONST.			23,936,110	6839 87.2%
	MAN. RES.			0	0 0.0%
	ESC.			0	0 0.0%
	TOTAL			27,443,234	7841 100.0%

2697788

Medium Term Option - 1				Assumptions									
1	Existing Right-Of -Way	m		Existing Rd	Shoulder	Lane	Lane	Median	Lane	Lane	Shoulder		
				Pvmt Width	0.0								
2	New Addition Right-Of -Way	partial taking		New Rd.	Shoulder	Lane	Lane	Median	Lane	Lane	Shoulder	Ditch W.	
	ROW	11 m		Pvmt Width	5.1	1.50	3.60					0.5	
	Bridges	Width(m)	Length(m)	SCOPE	Road L.	Bridge L.	Seg. L.					Unit Price	\$ 151.00
3.1	0	12.2	0.0		3,500	-	3,500					4498	
3.2	0	12.2	0.0	CBS	slope	D= meter	Volume	Unit				14.05	49,172
3.3	0	12.2	0.0		4.0	0.257	6174	\$ 60.00					
3.4	0	12.2	0.0	SGSB	slope	D= meter	Volume	Unit					
3.5	0	12.2	0.0		4.0	0.210	6791	\$ 56.00					
4	Tunnels	Length(m)	Width(m)	Height(m)									
4.1	2InSt.w-x	0	12.0	8.27									
4.2	x-Pass.TI	0	3.0	3.16									
4.3	shaft	0	2.0	Diameter									
4.4	snowshedlength (lm)	0											
	Bridges	Net \$/M2	Gross\$/m2										
3.1	0	#DIV/0!	#DIV/0!										
3.2	0	#DIV/0!	#DIV/0!										
3.3	0	#DIV/0!	#DIV/0!										
3.4	0	#DIV/0!	#DIV/0!										
3.5	0	#DIV/0!	#DIV/0!										

File: O:\Proj\2121-00288-02 MoTi Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3 Company MCSL		Man. Reserve	0.0%	Land		Alpha Lake Road / Ch	Lake Plar	Road Types	9. R-E4L-4L D/M	
(2018 Dollars) Whistler Highway 99 Capacity and Safety Review		Contingency	30.0%	30.0%		MT-1	MT-1	1. 2In Frontage	10.N 4L EXP D/M	
ACTIVITY CODE		Division/Site	Medium Term Option - 1			Medium Term Option - 1	Medium	2. 2In Acc Rds	11.N 4L EXP D/E/M	
Conceptual Est. R1 DATE:		Road Type	1			Counterflow		3. 4In Acc Rds	12.N2L;F4LEXP D/M	
Blk Est. # 6.14A R2 DATE:		Length	3500	L.M.				4.R4L-4L EXP R/B	13.INST.R/B-EX.RD	
Version Sept.1, 2002		Unit Price	Unit	Cost-Quant.	Lump Sum Values			5.R2/3L-4L EXP R/B	14.AS IS 15. Misc.	Est \$
DESCRIPTION								6.Retr.4L-4LEX R/B	20.I/C Str.&Ramps	\$ 7,841
								7.R4L-4LEX R/B E/S	21. Bridges	\$ 6,839
								8. New 4L EXP R/B	22. Grade Sep.	
2500 PLANNING										
2521 Consultant - transport. planning study		3.00	LM	10500						
2531 Consultant - corridor study		3.00	LM	10500						
2541 Consultant - functional plan. study		3.00	LM	10500						
2502 Consultant - general		5.0%		1575						
Consultant sub-total										
2510 Client - project ident.		3.00	LM	10500						
2520 Client - transport. planning study		3.00	LM	10500						
2530 Client - corridor study		4.20	LM	14700						
2540 Client - functional study		4.20	LM	14700	0					
2501 Client - general		5.0%		2520						
Client Sub-total				52920						
2599 Planning Contingency		30.0%		25799						
TOTAL PLANNING										
3000 PRELIMINARY DESIGN										
3013 Consultant - aerial base plan		3.50	LM	12250						
3014 Consultant - prel. design		4.20	LM	14700						
3015 Consultant - control survey		3.50	LM	12250						
3021 Consultant - environmental impact		7.00	LM	24500						
3031 Consultant - funct.-road field survey		3.50	LM	12250						
3041 Consultant - functional design		2.80	LM	9800	0					
3051 Consultant - funct. des. structural		2.10	LM	7350	0					
3061 Consultant - geotechnical design		17.50	LM	61250						
3071 Consultant - right-of-way research		2.10	LM	7350	0					
3002 Consultant - general		0.0%		0						
Consultant sub-total										
3010 Client - aerial base plan		0.00	LM	0						
3011 Client - prel. design		0.00	LM	0						
3012 Client - control survey		0.00	LM	0						
3020 Client - environmental impact		0.00	LM	0						
3030 Client - funct.-road field survey		0.00	LM	0						
3040 Client - functional design		0.00	LM	0						
3050 Client - funct. des. structural		0.00	LM	0						
3060 Client - geotechnical design		0.00	LM	0						
3070 Client - right-of-way research		0.00	LM	0						
3001 Client - general		0.0%		0						
Client Sub-total										
3099 Preliminary design Contingency		30.0%		48510						
TOTAL PRELIMINARY DESIGN										

ESTIMATED BY : P. Nahal



ESTIMATED BY : P. Nahal

[illegible]

ESTIMATED BY : P. Nahal



File: O:\Proj\2121-00288-02 MoTi Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3 Company MCSI (2018 Dollars) Whistler Highway 99 Capacity and Safety Review		Man. Reserve	0.0%	Land	Alpha Lake Road / Ch	Lake Plar	Road Types	9. R-E4L-4L D/M		
ACTIVITY CODE		Contingency	30.0%	30.0%	MT-1	MT-1	1. 2In Frontage	10.N 4L EXP D/M		
EST.DATE August, 2018		Division/Site	Medium Term Option - 1		Medium Term Option - 1	Medium	2. 2In Acc Rds	11.N 4L EXP D/E/M		
R1 DATE:		Road Type	1		Counterflow		3. 4In Acc Rds	12.N2L;F4LEXP D/M		
R2 DATE:		Length	3500	L.M.			4.R4L-4L EXP R/B	13.INST.R/B-EX.RD		
Blk Est. # 6.14A		Unit	=====	Cost-Quant.	1	1	5.R2/3L-4L EXP R/B	14.AS IS 15. Misc.		
Version Sept.1, 2003		Price	Unit	Lump Sum	3500	3500	6.Retr.4L-4LEX R/B	20.I/C Str.&Ramps		
DESCRIPTION		Unit	PerSection	Values			7.R4L-4LEX R/B E/S	21. Bridges		
					MR		8. New 4L EXP R/B	22. Grade Sep.		
9800 MANAGEMENT RESERVE										
MAN. RES. - planning		0.0%	111794			0				
MAN. RES. - preliminary design		0.0%	210210			0				
MAN. RES. - utility construction		0.0%	436800			0				
MAN. RES. - grade construction		0.0%	5957009			0				
MAN. RES. - structural construction		0.0%	12958173			0				
MAN. RES. - paving construction		0.0%	1048209			0				
MAN. RES. - operation construction		0.0%	1567869			0				
MAN. RES. - roadside construction		0.0%	0			0				
MAN. RES. - other construction		0.0%	60255			0				
MAN. RES. - project management		0.0%	1388706			0				
MAN. RES. - land		0.0%	0			0				
MAN. RES. - detailed eng.		0.0%	1796414			0				
MAN. RES. - residency eng.		0.0%	1907795			0				
MAN. RES. - Contingency		0.0%	0			0				
TOTAL MANAGEMENT RESERVE			27443234			0				
TOTAL LESS ESCALATION			0	27443234						
FISCAL										
9900 ESCALATION										
YEAR PROJECTED ESCALATION COMPLETE \$ DONE										
2016-2017 0.5750% 5.00%			0			0	0			
2017-2018 0.6250% 10.00%			0			0	0			
2018-2019 1.0000% 35.00%			0			0	0			
2019-2020 1.0000% 45.00%			0			0	0			
2020-2021 1.0000% 5.00%			0			0	0			
2021-2022 1.0000% 0.00%			0			0	0			
2022-2023 1.0000% 0.00%			0			0	0			
2023-2024 1.0000% 0.00%			0			0	0			
2024-2025 1.0000% 0.00%			0			0	0			
TOTAL ESCALATION		100.00%	0			0	0			
PART 2 SUMMARY NON-CONSTRUCTION COSTS										
Non-Construction						1,068,236	305			
Non-Const. Contingency						320,471	92			
TOTAL NON-CONSTRUCTION COSTS						1,388,706	397			
Medium Te TOTAL FOR ROAD TYPE		1				27,443,234	7841			

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& Safety Review\4.0 ENGINEERING DESIGN\4.3

Company MCSL

(2018 Dollars) Whistler Highway 99 Capacity and Safety Review

ACTIVITY CODE EST.DATE August, 2018

Man. Reserve  
Contingency  
Division/Site  
Road Type  
Length0.0% Land  
30.0% 30.0%  
Medium Term Option - 2  
1  
450 L.M.cid Rd to South of Bay  
MT-2  
Medium Term Option  
- 2  
2 SB lanes from  
Taylor Way to  
Bayshore DrLake Plar Road Types  
MT-2 1. 2In Frontage  
Medium 2. 2In Acc Rds  
3. 4In Acc Rds  
4.R4L-4L EXP R/B9. R-E4L-4L D/M  
10.N 4L EXP D/M  
11.N 4L EXP D/E/M  
12.N2L;F4LEXP D/M  
13.INST.R/B-EX.RD

Est \$

4,565,748

\$ 10,146  
\$ 8,790

Conceptual Est. R1 DATE:

Blk Est. # 6.14A

R2 DATE:

Version Sept. 1, 2002

DESCRIPTION	Unit Price	Unit	Cost-Quant. PerSection	Lump Sum Values	MR	Cost/LM	% of T	% of TC
<b>SUMMARY BY ACTIVITY LEVEL</b>								
2000 PROJECT MANAGEMENT			Diff. -177723	0	177,723	395	3.9%	3.9%
2500 PLANNING			-20270	0	20,270	45	0.4%	0.4%
3000 PRELIMINARY DESIGN			-38610	0	38,610	86	0.8%	0.8%
3500 DETAILED DESIGN			-232682	0	232,682	517	5.1%	5.1%
Total Engineering			-291562	0	291,562	648	6.4%	6.4%
4000 LAND ACQUISITION			0	0	0	0	0.0%	0.0%
5000 GRADE CONSTRUCTION			-693575	0	693,575	1541	15.2%	15.2%
5200 ROAD SIDE CONSTRUCTION			0	0	0	0	0.0%	0.0%
5300 OTHER CONSTRUCTION			-18540	0	18,540	41	0.4%	0.4%
5500 STRUCTURAL CONSTRUCTION			-1782003	0	1,782,003	3960	39.0%	39.0%
6000 PAVING CONSTRUCTION			-103669	0	103,669	230	2.3%	2.3%
6500 OPERATIONAL CONSTRUCTION			-198870	0	198,870	442	4.4%	4.4%
6700 UTILITY CONSTRUCTION			0	0	0	0	0.0%	0.0%
6800 RESIDENT ENGINEERING			-246172	0	246,172	547	5.4%	5.4%
Total Construction			-3042829	0	3,042,829	6762	66.6%	66.6%
9700 CONTINGENCY			-1053634	0	1,053,634	2341	23.1%	23.1%
9800 SUB-TOTAL MANAGEMENT RESERVE			-4565748	0	4,565,748	10146	100.0%	100.0%
			0	0	0	0	0.0%	0.0%
TOTAL			-4565748	0	4,565,748	10146	100.0%	100.0%
9900 ESCALATION			0	0	0	0		0.0%
<b>TOTAL COST</b>			-4565748	0	4,565,748	10146		100.0%
=====								
Constr. Less Resident Eng.			-2796657	0	2,796,657	6215		
=====								
ENG. & PM					610,071	1356	13.4%	
LAND					0	0	0.0%	
CONST.					3,955,677	8790	86.6%	
MAN. RES.					0	0	0.0%	
ESC.					0	0	0.0%	
TOTAL					4,565,748	10146	100.0%	

469285

## Medium Term Option - 2 Assumptions

Existing Rd	Shoulder	Lane	Lane	Median	Lane	Lane	Shoulder	Ditch W.
Pvmt Width	0.0	-	-	-	-	-	-	0.5
New Rd.	Shoulder	Lane	Lane	Median	Lane	Lane	Shoulder	Ditch W.
Pvmt Width	5.1	1.50	3.60	-	-	-	-	0.5
SCOPE	Asphalt depth mm	100	Tonage t	578	Unit Price	\$	151.00	
Road L.	Bridge L.	Seg. L.	X-sect./lm	Tot. Vol.				
450	-	450	14.05	6,322				
CBS	slope	D= meter	Volume	Unit	Rock	2,041	\$	107.66
4.0	0.257	794	\$ 60.00	OM	1,531	\$	29.11	
SGSB	slope	D= meter	Volume	Unit	Stripping	794	\$	49.54
4.0	0.210	873	\$ 56.00	Borrow	1,956	\$	42.95	
4 Tunnels	Length(m)	Width(m)	Height(m)					
4.1 2InSt.w-x	0	12.0	8.27					
4.2 x-Pass.TI	0	3.0	3.16					
4.3 shaft	0	2.0	Diameter					
4.4 snowshedlength (lm)	0							
Bridges	Net \$/M2	Gross\$/m2						
3.1	0	#DIV/0!	#DIV/0!					
3.2	0	#DIV/0!	#DIV/0!					
3.3	0	#DIV/0!	#DIV/0!					
3.4	0	#DIV/0!	#DIV/0!					
3.5	0	#DIV/0!	#DIV/0!					

File:	O:\Proj\2121-00288-02 MoTI Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3 Company MCSL	Man. Reserve Contingency	0.0%	Land	30.0%	cid Rd to South of Bay	Lake Plar	Road Types	9. R-E4L-4L D/M	
(2018 Dollars)	Whistler Highway 99 Capacity and Safety Review	Division/Site	Medium Term Option - 2			MT-2	MT-2	1. 2In Frontage	10. N 4L EXP D/M	
ACTIVITY	EST.DATE August, 2018	Road Type	1			Medium Term Option - 2	Medium	2. 2In Acc Rds	11. N 4L EXP D/E/M	
CODE		Length	450	L.M.				3. 4In Acc Rds	12. N2L;F4LEXP D/M	
								4.R4L-4L EXP R/B	13. INST.R/B-EX.RD	Est \$
										4,565,748
										\$ 10,146
										\$ 8,790
Conceptual Est. R1 DATE:								5.R2/3L-4L EXP R/B	14. AS IS	15. Misc.
Blk Est. # 6.14A	R2 DATE:							6. Retr.4L-4LEX R/B	20. I/C Str.&Ramps	
Version Sept. 1, 2002								7.R4L-4LEX R/B E/S	21. Bridges	
								8. New 4L EXP R/B	22. Grade Sep.	
2500 PLANNING										
2521 Consultant - transport. planning study	5.50	LM	2475							
2531 Consultant - corridor study	5.50	LM	2475							
2541 Consultant - functional plan. study	5.50	LM	2475							
2502 Consultant - general	5.0%		371							
Consultant sub-total										
2510 Client - project ident.	5.50	LM	2475							
2520 Client - transport. planning study	5.50	LM	2475							
2530 Client - corridor study	7.70	LM	3465							
2540 Client - functional study	7.70	LM	3465	0						
2501 Client - general	5.0%		594							
Client Sub-total			12474							
2599 Planning Contingency	30.0%		6081							
TOTAL PLANNING										
3000 PRELIMINARY DESIGN										
3013 Consultant - aerial base plan	6.50	LM	2925							
3014 Consultant - prel. design	7.80	LM	3510							
3015 Consultant - control survey	6.50	LM	2925							
3021 Consultant - environmental impact	13.00	LM	5850							
3031 Consultant - funct.-road field survey	6.50	LM	2925							
3041 Consultant - functional design	5.20	LM	2340	0						
3051 Consultant - funct. des. structural	3.90	LM	1755	0						
3061 Consultant - geotechnical design	32.50	LM	14625							
3071 Consultant - right-of-way research	3.90	LM	1755	0						
3002 Consultant - general	0.0%		0							
Consultant sub-total										
3010 Client - aerial base plan	0.00	LM	0							
3011 Client - prel. design	0.00	LM	0							
3012 Client - control survey	0.00	LM	0							
3020 Client - environmental impact	0.00	LM	0							
3030 Client - funct.-road field survey	0.00	LM	0							
3040 Client - functional design	0.00	LM	0							
3050 Client - funct. des. structural	0.00	LM	0							
3060 Client - geotechnical design	0.00	LM	0							
3070 Client - right-of-way research	0.00	LM	0							
3001 Client - general	0.0%		0							
Client Sub-total										
3099 Preliminary design Contingency	30.0%		11583							
TOTAL PRELIMINARY DESIGN										



Est \$	
	4,565,741
\$	10,146,000
\$	8,790,259

1	6.Retr.4L-4LEX R/B	20.I/C Str.&Ramps	\$	10,146
450	7.R4L-4LEX R/B E/S	21. Bridges	\$	8,790
-----	8. New 4L EXP R/B	22. Grade Sep		

[illegible]

0	blow	1950	42.93	3402.1		
0	Misc./LS		29.11	0	Surplus Mtl	Neat vol.cu
=====	Total	6322	61.32	387658		6,322
		Spec	Spec	PI/PL	PI/PL	
0	Medium Term Option - 2			21.8	26.9	
0	Road			Ditch Width	Ditch Width	Resurface
0	pl to pl	10.01	11.80	1.0	0.0	Road ONLY
0	*no./lane	1	2	Col L Vol.	Col. M Vol.	1
0	*lane wid	3.6	3.6	6.638	-	3.6
0	*med	0.0	0.0	Pmt W=	16.9	0.0
0	*shldrs tot	1.5	4.6	CBC. slope	CBC. slope	1.5
26	c.b.c.(w)	6.5	11.8	4.0	0.0	A.C. (mm)
951	sgsb (w)	8.8	11.8	Pmt W=	22.0	50
46	sgsb slope :1	4.0	0.0			A.B.C. (mm)
0	*depth(d)	1.321	0.000	5%		0
109	*road (l)	450	0			0
106	*no.cul./kil	3.0	5.0	\$ 2,530		Appl. rate
10	cul.(l)	9.64	11.80	\$ 1,070		1.50
5	*sgsb (d)	0.21	0.30	5%		
0	*cbc (d)	0.26	0.30	5%		
0	*Add.ROW	-20.92	0.00			
0	X-m3/lm	14.75	0.00			
0	C&G \$/LM	\$60.00		Exp-100kmp	Exp- 80kmp	Coli-80kmp
244	Decel.(T-lm)		520	440	260	
45	Accel.(T-lm)		950	630	80	
462	Left T.(T-lm)		716	596	456	
2004	TOTAL		2186	1666	796	

2004	Gravel 2.00mm/m3	No.	Units	Quantity	Rate	Total
	Box Cul.	0	lm	45	8250	-
110	Head Walls	0	ea.	3	16500	-
33	Catch Basin	0	ea.	14	3,250	-
60	CB Leads	0	m	108	220	-
40	MH	0	ea.	3	4,500	-
40	900mm CSP	0	lm	80	1,070	-
42						-
326	Structure Dre	0	lm	100	150.00	-
2329						-

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& Safety Review\4.0 ENGINEERING DESIGN\4.3

Company **MCSL**

(2018 Dollars) Whistler Highway 99 Capacity and Safety Review

ACTIVITY CODE EST. DATE August, 2018

Man. Reserve  
Contingency  
Division/Site  
Road Type  
Length

0.0%  
30.0%  
Medium Term Option - 2  
1  
450 L.M.

cid Rd to South of Bay  
MT-2  
Medium Term Option  
- 2  
2 SB lanes from  
Taylor Way to  
Bayshore Dr  
MR

Lake Plar Road Types  
MT-2 1. 2In Frontage  
Medium 12. 2In Acc Rds  
3. 4In Acc Rds  
4. R4L-4L EXP R/B

9. R-E4L-4L D/M  
10. N 4L EXP D/M  
11. N 4L EXP D/E/M  
12. N2L/F4LEXP D/M  
13. INST. R/B-EX. RD

Est \$  
4,565,748  
\$ 10,146  
\$ 8,790

Conceptual Est. R1 DATE:

Bik Est. # 6.14A

Version Sept. 1, 2002

R2 DATE:

DESCRIPTION

Unit Price Unit Cost-Quant. Lump Sum  
PerSection Values

5500	STRUCTURAL CONSTRUCTION	Unit Price	Unit	Quantity	Lump Sum
5522	Struct.Cons - water	758.00	Im	0	
5523	Struct.Cons - sanitary	489.00	Im	0	
5524	Struct.Cons - storm	500.00	Im	0	
5521	Struct.Cons - mobilization	3.0%		0	
5599	Struct.Cons - utility contingency	30.0%		0	
	Structural Const. Utilities Sub-total				
5510	Struct.Cons - tunnel site preparation	0.00	Im	0	0
5511	Struct.Cons - tunnel construction	-	Im	0	0
5512	Struct.Cons - snow shed site prep.	0.00	Im	0	0
5513	Struct.Cons - snow shed site const.	-	Im	0	0
5514	Struct.Cons - bridge site preparation	1	LS	0	
5515	Struct.Cons - bridge piers	1	LS	0	
5516	Struct.Cons - bridge abutments	1	LS	0	
5517	Struct.Cons - bridge superstructure	1	LS	0	0
5518	Struct.Cons - retain. wall site prep.	1	LS	0	
5519	Struct.Cons - retaining wall const.	1580	m2	1095	
5501	Struct.Cons - mobilization	3.0%		51903	
5529	Struct.Cons - Contingency	30.0%		534601	
	Structural Construction Sub-total				2,316,604

#### STRUCTURAL CONSTRUCTION COSTS

3520	Struct. Eng. - detailed design	5.50%		127413	
3529	Struct. Eng. - detailed design/Contingency	30.0%		38224	
6820	Struct. Eng. - general const. supervision	4.00%		92664	
6821	Struct. Eng. - quality assurance	2.00%		46332	
6822	Struct. Eng. - surveying	0.50%		11583	
6829	Struct. Eng. - Residency Contingency	30.0%		45174	
	Structural Engineering Sub-total				361,390

#### Total Structural & Eng. Costs

6000	PAVING CONSTRUCTION				SM./OIL
6020	Paving Con - machine paving asphalt	151.00	t	578	4016
6030	Paving Con - machine paving concrete	0.00	m2		
6040	Paving Con - hot repaving	0.00	m2	2295	
6050	Paving Con - shoulder paving	0.00	t	194	
6060	Paving Con - pavement finishing	100.00	m2	0	
6070	Paving Con - seal coating	0.00			
6001	Paving Con - mobilization	3.0%		3019	
6010	Paving Con - pavement design	0.0%		0	
6099	Paving Con - Contingency	30.0%		31101	

#### PAVING CONSTRUCTION COSTS

3560	Paving Eng - detailed design	5.50%		7412	
3569	Paving Eng - detailed design/Contingency	30.0%		2224	
6860	Paving Eng - general const. supervision	2.00%		2695	
6861	Paving Eng - quality assurance	5.00%		6738	
6862	Paving Eng - surveying	0.50%		674	
6869	Paving Eng - Residency Contingency	30.0%		3032	
	Paving Engineering Sub-total				22,776

#### Total Paving Const. & Eng. Costs

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5. R2/3L-4L EXP R/B	14. AS IS	15. Misc.	
6. Retr. 4L-4LEX R/B	20. I/C Str. & Ramps		
7. R4L-4LEX R/B E/S	21. Bridges		
8. New 4L EXP R/B	22. Grade Sep.		
Bridge	Site \$	Piers \$	Abut. \$
1	-	160,504	145,800
2	-	177,516	109,800
3	-	177,516	109,800
4	-	177,516	109,800
5	-	177,516	109,800
Pier/Ht	Pier No.	P/\$/VLM	Abut\$/HLM
1	8	1	20063
2	8	1	22190
3	8	1	22190
4	8	1	22190
5	8	1	22190
(W)	(L)	(\$/m2)	Net Cost
DECK #1	12.2	0	1791
DECK #2	12.2	0	1981
DECK #3	12.2	0	1981
DECK #4	12.2	0	1981
DECK #5	12.2	0	1981
			295936
			295936
			295936

3845	Bridge #1	Gross/m2	Net/m2
115	Bridge #2	#DIV/0!	#DIV/0!
1188	Bridge #3	#DIV/0!	#DIV/0!
5148	Bridge #4	#DIV/0!	#DIV/0!
	Bridge #5	#DIV/0!	#DIV/0!
		Tnnl \$/Im - Net	
		Tnnl \$/Im - Gross	

2InSt.w-x	x-Pass.TI	shaft	
1-D-Shape	2-D-Shape	1-Circle	Radius-1-D
0	-	0	7.267
5.100	2.550	Radius	Per.S&Rf
1.00	1.00	m2/rkac	24.32
12.00	3.00	Tnnl height	6.25
0.250	0.250	Radius-2-D	8.27
0.250	0.250	Per.S&Rf	2.157
0.500	0.200	m2/rkac	8.42
0.100	0.100	Tnnl height	6.25
0.100	0.100	Exc.-m3	3.16
0.100	0.100	Obk-m3	-
0.100	0.100	Liner-m3	-

Items	Quantity	rate	Total \$	Avg.\$/ tot-Im	1-Circle
Exc.-m3	0	125	0	#DIV/0!	0
Obk-m3	0	2625	0	#DIV/0!	0
Rk anch-Ea	0	1125	0	#DIV/0!	0
Misc.-Im	0	2500	0	#DIV/0!	0
Liner-m3	0	1050	0	#DIV/0!	10.00
Drainage-Im	0	550	0	#DIV/0!	
Lighting-m	0	900	0	#DIV/0!	5%
Mech-m	0	2100	0	#DIV/0!	15%
Misc.-Im	0	1000	0	#DIV/0!	3%
1Tonne=16.67m2/25mm			0	#DIV/0!	snowshed
60kg=1m2/25mm					length (Im)
asphalt (T)=mm					1.0
A.C.	100	100	230	29.00	0.50
A.B.C.	0	0	1.00	\$ 1,500.00	-
\$Oil/Litre	1.50	5%	3.00	\$ 1,580.00	11.20
Appl. rate	1.75	1.75	3.00	\$ 1,580.00	-
Pavement Removal					26.00
m2	\$/m2	Total	1.00	\$ 1,000.00	-
90	\$8.84	796	5.00	\$ 60.00	37.00
Milling					-
m2	\$/m2	Total	5.00	\$ 500.00	-
675	\$9.63	6500	Electrical	\$ 4,500.00	-
			Mech.	\$ 5,000.00	-
			Misc.	\$ 300.00	-
				#DIV/0!	-

File: O:\Proj\2121-00288-02 MoTi Whistler Hwy 99 Capacity  
& Safety Review\4.0 ENGINEERING DESIGN\4.3

Company MCSL

(2018 Dollars) Whistler Highway 99 Capacity and Safety Review

ACTIVITY CODE EST. DATE August, 2018

Man. Reserve 0.0% Land 30.0%  
Contingency 30.0%  
Division/Site Medium Term Option - 2  
Road Type 1  
Length 450 L.M.

cid Rd to South of Bay  
MT-2  
Medium Term Option  
- 2  
2 SB lanes from  
Taylor Way to  
Bayshore Dr  
MR

Lake Plar Road Types 9. R-E4L-4L D/M  
MT-2 1. 2In Frontage 10. N 4L EXP D/M  
Medium 12. 2In Acc Rds 11. N 4L EXP D/E/M  
3. 4In Acc Rds 12. N2L/F4LEXP D/M  
4. R4L-4L EXP R/B 13. INST. R/B-EX. RD

Est \$	4,565,748
\$	10,146
\$	8,790

Conceptual Est. R1 DATE:

Bik Est. # 6.14A

Version Sept. 1, 2002

R2 DATE:

DESCRIPTION

Unit Price Unit Cost-Quant. Lump Sum Values

6500	OPERATIONAL CONSTRUCTION				
6510	Operat.Con- lighting	8500.00	Ea	0	34000
6520	Operat.Con- signals	275,000	Ea	0.50	0
6530	Operat.Con- signing	10.00	LM	4500	4,500
6540	Operat.Con- guard rail	109.00	Im	135	0
6550	Operat.Con- pavement markings	1.75	Im	1350	2,363
6501	Operat.Con- mobilization	3.0%		5792	5,792
6599	Operat.Con- contingency	30.0%		59661	59,661

OPERATIONAL CONSTRUCTION COSTS 258,531

3540	Operat. Eng- detailed design	5.50%		14219	14,219
3549	Operat. Eng- detailed design/Contingency	30.0%		4266	4,266
6840	Operat. Eng- general const. supervision	5.50%		14219	14,219
6841	Operat. Eng- quality assurance	2.00%		5171	5,171
6842	Operat. Eng- surveying	0.50%		1293	1,293
6849	Operat. Eng- Residency Contingency	30.0%		6205	6,205
	Operational Engineering Sub-total				45,372

Total Operational Const. & Eng. Costs 303,903

5200	ROAD SIDE CONSTRUCTION				
5203	RoadSide C- water	758.00	Im	0	0
5204	RoadSide C- sanitary	489.00	Im	0	0
5205	RoadSide C- storm	500.00	Im	0	0
5202	RoadSide C- mobilization	3.0%		0	0
5209	RoadSide C- Utility Contingency	30.0%		0	0
	Road Side Const. Utilities Sub-total				0
5210	RoadSide C- weigh scales	-	ea	0	0
5220	RoadSide C- safety rest areas	-	ea	0	0
5230	RoadSide C- tourist rest & view areas	40000	ea	0	0
5201	RoadSide C- mobilization	3.0%		0	0
5299	RoadSide C- Contingency	30.0%		0	0
	Road Side Construction Sub-total				0

ROAD SIDE CONSTRUCTION COSTS 0

3550	RoadSide E- detailed design	10.00%		0	0
3559	RoadSide E- detailed design/Contingency	30.0%		0	0
6850	RoadSide E- general const. supervision	6.00%		0	0
6851	RoadSide E- quality assurance	2.00%		0	0
6852	RoadSide E- surveying	1.00%		0	0
6859	RoadSide E- Residency Contingency	30.0%		0	0
	Road Side Engineering Sub-total				0

Total Road Side Const. & Eng. Costs 0

5300	OTHER CONSTRUCTION				
5303	Other Const- water	758.00	Im	0	0
5304	Other Const- sanitary	489.00	Im	0	0
5305	Other Const- storm	500.00	Im	0	0
5302	Other Const- mobilization	3.0%		0	0
5309	Other Const- utility contingency	30.0%		0	0
	Other Const. Utilities Sub-total				0

5310	Other Const- railroads main & spur lines	-	Im	0	0
5320	Other Const- railroad crossings	-	ea	0	0
5330	Other Const- marine work	-	ea	0	0
5340	Other Const- environmental mitigations	90,000	ea	0.20	18,000
5301	Other Const- mobilization	3.0%		540	540
5399	Other Const- Contingency	30.0%		5562	5,562
	Other Construction Sub-total				24,102

OTHER CONSTRUCTION COSTS 24,102

3570	Other Eng. - detailed design	5.50%		1326	1,326
3579	Other Eng. - detailed design/Contingency	30.0%		398	398
6870	Other Eng. - general const. supervision	4.00%		964	964
6871	Other Eng. - quality assurance	2.00%		482	482
6872	Other Eng. - surveying	1.00%		241	241
6879	Other Eng. - Residency Contingency	30.0%		506	506
	Other Engineering Sub-total				3,917

Total Other Const. & Eng. Costs 28,019

1	5. R2/3L-4L EXP R/B	14. AS IS	15. Misc.	
1	6. Retr. 4L-4LEX R/B	20. I/C Str. & Ramps		
450	7. R4L-4LEX R/B E/S	21. Bridges		
	8. New 4L EXP R/B	22. Grade Sep.		
		Length		
	Pole Sp. (lm)	No. of Sides		
	76	50	0	450
	306	Signals	No.	Units
	10	Controller	1	ea
	3	Sig. pot. base	1	ea
	5	Wiring U/G	1	ls
	13			
	133			

Signals 137,500

LP \$/lm \$ 1.00 Refl. Sp. 20.00 Refl. \$/ea \$ 15.00

32	Ext. Lines	2.0	1.0	1.0	
9	Weighscale	No.	Units	Quantity	Rate
					Total
32	Buildings	0	m2	60	2,800.00
11	Pit & Apron	0	m2	120	400.00
3	S&I W/S	0	ea	1	80,000.00
14	Parking Lot	0	m2	9000	40.00
101	Road Const.	0	lm	1,500	400.00
	light/signs	0	ls	1	50,000.00

Weighscale -

	Safety Rest Area	No.	Units	Quantity	Rate	Total
0	Class A&B					
0	Buildings	0	m2	100	3,000.00	-
0	Class C					
0	Site/toilets	0	ea	2	12,500.00	-
0	Parking Lot	0	m2	2500	40.00	-
0	Road Const.	0	lm	800	350.00	-
0	Furnishings	0	ls	-	10,000.00	-
0	Landscaping	0	ls	1	5,000.00	-
0	light/signs	0	ls	-	50,000.00	-

SAFETY REST AREAS -

	Description	No.	Units	Quantity	Rate	Total
0		0		0	-	-
0		0		0	-	-
0		0		0	-	-
0		0		0	-	-

Description -

	Railway	No.	Units	Quantity	Rate	Total
0	Removal	0	tklm	200.00	50.00	-
0	Track Const.	0	tklm	200.00	700.00	-
0	Ballast	0	m3	500.00	60.00	-
0	Sub-ballast	0	m3	500.00	56.00	-
0	Resurfacing	0	tklm	1.00	30.00	-
0	Tie-ins	0	ea	1.00	5000.00	-
0	Turnout # 9	0	ea	1.00	125000.00	-
0	Others	0	ls	1.00	1500.00	-
0		0			2000.00	-
0	Earthworks (see grading)	0	lm	1	400.00	-

Railway -

	R/rd X-ing	No.	Units	Quantity	Rate	Total
0	Planks	0	tklm	45	2500.00	-
0	Sig./gates	0	each	1	250000.00	-
0					-	-
0					-	-

R/rd X-ing -

	Description	No.	Units	Quantity	Rate	Total
0					-	-
0					-	-
0					-	-
0					-	-
40					-	-
1					-	-
12					-	-
54					-	-

Description -

	Environment	No.	Units	Quantity	Rate	Total
3	Mitigation	0.20	ls	1	50,000	10,000
2	Ponds	0.20	ea	1	40,000	8,000
1					-	-
2					-	-
1					-	-
1					-	-
9					-	-

Environmental 18,000





File:	O:\Proj\2121-00288-02 MoTI Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3 Company MCSL	Man. Reserve	0.0%	Land	0.0%	cid Rd to South of Bay	Lake Plar	Road Types	9. R-E4L-4L D/M
ACTIVITY	(2018 Dollars) Whistler Highway 99 Capacity and Safety Review	Contingency	30.0%	Medium Term Option - 2	30.0%	MT-2	MT-2	1. 2In Frontage	10. N 4L EXP D/M
CODE	EST.DATE August, 2018	Division/Site				Medium Term Option - 2	Medium	2. 2In Acc Rds	11. N 4L EXP D/E/M
		Road Type	1					3. 4In Acc Rds	12. N2L; F4LEXP D/M
		Length	450	L.M.				4. R4L-4L EXP R/B	13. INST. R/B-EX. RD
						2 SB lanes from Taylor Way to Bayshore Dr		5. R2/3L-4L EXP R/B	14. AS IS
								6. Retr. 4L-4LEX R/B	15. Misc.
								7. R4L-4LEX R/B E/S	20. I/C Str. & Ramps
								8. New 4L EXP R/B	21. Bridges
									22. Grade Sep.
Conceptual Est. R1 DATE:		Unit Price	Unit	Cost-Quant.	Lump Sum Values				
Blk Est. # 6.14A	R2 DATE:								
Version Sept. 1, 2002									
9800	MANAGEMENT RESERVE								
	MAN. RES. - planning	0.0%		26351					
	MAN. RES. - preliminary design	0.0%		50193					
	MAN. RES. - utility construction	0.0%		0					
	MAN. RES. - grade construction	0.0%		901647					
	MAN. RES. - structural construction	0.0%		2316604					
	MAN. RES. - paving construction	0.0%		134770					
	MAN. RES. - operation construction	0.0%		258531					
	MAN. RES. - roadside construction	0.0%		0					
	MAN. RES. - other construction	0.0%		24102					
	MAN. RES. - project management	0.0%		231040					
	MAN. RES. - land	0.0%		0					
	MAN. RES. - detailed eng.	0.0%		302486					
	MAN. RES. - residency eng.	0.0%		320023					
	MAN. RES. - Contingency	0.0%		0					
	TOTAL MANAGEMENT RESERVE			4565748					
	TOTAL LESS ESCALATION			0	4565748				
9900	ESCALATION								
	YEAR PROJECTED ESCALATION COMPLETE \$ DONE								
	2016-2017 0.5750% 5.00%			0					
	2017-2018 0.6250% 10.00%			0					
	2018-2019 1.0000% 35.00%			0					
	2019-2020 1.0000% 45.00%			0					
	2020-2021 1.0000% 5.00%			0					
	2021-2022 1.0000% 0.00%			0					
	2022-2023 1.0000% 0.00%			0					
	2023-2024 1.0000% 0.00%			0					
	2024-2025 1.0000% 0.00%			0					
	TOTAL ESCALATION		100.00%	0					
	PART 2 SUMMARY NON-CONSTRUCTION COSTS								
	Non-Construction					177,723	395		
	Non-Const. Contingency					53,317	118		
	TOTAL NON-CONSTRUCTION COSTS					231,040	513		
	Medium Te TOTAL FOR ROAD TYPE		1			4,565,748	10146		

File: O:\Proj\2121-00288-02 MoTI Whistler Hwy 99 Capacity  
& Safety Review\4.0 ENGINEERING DESIGN\4.3

Company **MCSL**  
(2018 Dollars) Whistler Highway 99 Capacity and Safety Review  
ACTIVITY Capacity and Safety Review  
CODE EST.DATE August, 2018

Man. Reserve 0.0% Land  
Contingency 30.0%  
Division/Site Medium Term Option - 3A  
Road Type 1  
Length 3150 L.M.

for Way to Alpha Lake  
MT-3A  
Medium Term Option  
- 3A

Taylor W Road Types  
MT-3A 1. 2In Frontage  
Medium 2. 2In Acc Rds  
3. 4In Acc Rds  
4.R4L-4L EXP R/B

9. R-E4L-4L D/M  
10.N 4L EXP D/M  
11.N 4L EXP D/E/M  
12.N2L;F4LEX D/M  
13.INST.R/B-EX.RD

Est \$
20,943,838
\$ 6,649
\$ 5,800

Conceptual Est. R1 DATE:  
Blk Est. # 6.14A R2 DATE:  
Version Sept. 1, 2002

DESCRIPTION	Unit Price	Unit	Cost-Quant. PerSection	Lump Sum Values	1	3150	3150	Cost/LM	% of T	% of TC
<b>SUMMARY BY ACTIVITY LEVEL</b>										
2000 PROJECT MANAGEMENT			Diff. -815245	0	815,245	259	3.9%	3.9%		
2500 PLANNING			-64496	0	64,496	20	0.3%	0.3%		
3000 PRELIMINARY DESIGN			-124740	0	124,740	40	0.6%	0.6%		
3500 DETAILED DESIGN			-1051583	0	1,051,583	334	5.0%	5.0%		
Total Engineering			-1240820	0	1,240,820	394	5.9%	5.9%		
4000 LAND ACQUISITION			0	0	0	0	0.0%	0.0%		
5000 GRADE CONSTRUCTION			-3295936	0	3,295,936	1046	15.7%	15.7%		
5200 ROAD SIDE CONSTRUCTION			0	0	0	0	0.0%	0.0%		
5300 OTHER CONSTRUCTION			-69525	0	69,525	22	0.3%	0.3%		
5500 STRUCTURAL CONSTRUCTION			-7974260	0	7,974,260	2532	38.1%	38.1%		
6000 PAVING CONSTRUCTION			-349550	0	349,550	111	1.7%	1.7%		
6500 OPERATIONAL CONSTRUCTION			-949951	0	949,951	302	4.5%	4.5%		
6700 UTILITY CONSTRUCTION			-302400	0	302,400	96	1.4%	1.4%		
6800 RESIDENT ENGINEERING			-1112958	0	1,112,958	353	5.3%	5.3%		
Total Construction			-14054580	0	14,054,580	4462	67.1%	67.1%		
9700 CONTINGENCY			-4833193	0	4,833,193	1534	23.1%	23.1%		
9800 SUB-TOTAL MANAGEMENT RESERVE			-20943838	0	20,943,838	6649	100.0%	100.0%		
			0	0	0	0	0.0%	0.0%		
TOTAL			-20943838	0	20,943,838	6649	100.0%	100.0%		
9900 ESCALATION			0	0	0	0		0.0%		
TOTAL COST			-20943838	0	20,943,838	6649		100.0%		
Constr. Less Resident Eng.			-12941622	0	12,941,622	4108				
ENG. & PM					2,672,884	849	12.8%			
LAND					0	0	0.0%			
CONST.					18,270,954	5800	87.2%			
MAN. RES.					0	0	0.0%			
ESC.					0	0	0.0%			
TOTAL					20,943,838	6649	100.0%			

2056064

## Medium Term Option - 3A Assumptions

1	Existing Right-Of -Way	m	Shoulder	-	Lane	-	Lane	-	Median	-	Lane	-	Lane	-	Shoulder	-
			Existing Rd													
			Pvmt Width	0.0												
2	New Addition Right-Of -Way	partial taking	Shoulder	-	Lane	-	Lane	2.25	Median	-	Lane	-	Lane	-	Shoulder	-
	ROW	8 m	New Rd.													
			Pvmt Width	2.3	Asphalt depth mm	100	Tonage t	1786	Unit Price	\$ 151.00						
Bridges			SCOPE	Road L.	Bridge L.	Seg. L.		X-sect./lm	Tot. Vol.							
3.1	0	12.2	0.0	3,150	-	3,150		9.02	28,403							
3.2	0	12.2	0.0	CBS	slope	D= meter	Volume	Unit	Rock	7,442	\$	107.66				
3.3	0	12.2	0.0		4.0	0.231	2729	\$ 60.00	OM	6,698	\$	29.11				
3.4	0	12.2	0.0	SGSB	slope	D= meter	Volume	Unit	Stripping	4,217	\$	49.54				
3.5	0	12.2	0.0		4.0	0.163	3002	\$ 56.00	Borrow	10,047	\$	42.95				
Tunnels																
4.1	2InSt.w-x	0	12.0	8.27												
4.2	x-Pass.TI	0	3.0	3.16												
4.3	shaft	0	2.0	Diameter												
4.4	snowshedlength (lm)	0														
Bridges																
	Net \$/M2	Gross\$/m2														
3.1	0	#DIV/0!	#DIV/0!													
3.2	0	#DIV/0!	#DIV/0!													
3.3	0	#DIV/0!	#DIV/0!													
3.4	0	#DIV/0!	#DIV/0!													
3.5	0	#DIV/0!	#DIV/0!													



O:\Proj\2121-00288-02 MoTi Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3 Company MCSL (2018 Dollars) Whistler Highway 99 Capacity and Safety Review		Man. Reserve Contingency	0.0% 30.0%	Land 30.0%	for Way to Alpha Lake MT-3A Medium Term Option - 3A Shoulder Widening	Taylor W Road Types MT-3A 1. 2In Frontage Medium 12. 2In Acc Rds 3. 4In Acc Rds 4.R4L-4L EXP R/B 5.R2/3L-4L EXP R/B 6.Refr.4L-4LEX R/B 7.R4L-4LEX R/B E/S 8. New 4L EXP R/B	9. R-E4L-4L D/M 10.N 4L EXP D/M 11.N 4L EXP D/E/M 12.N2L;F4LEXP D/M 13.INST.R/B-EX.RD 14.AS IS 15. Misc. 20.I/C Str.&Ramps 21. Bridges 22. Grade Sep.	Est \$ 20,943,838 \$ 6,649 \$ 5,800
ACTIVITY CODE	R1 DATE: R2 DATE: EST.DATE August, 2018	Division/Site Road Type Length	Medium Term Option - 3A 1 3150	L.M.				
Conceptual Est. R1 DATE: Blk Est. # 6.14A Version Sept. 1, 2002			=====					
DESCRIPTION		Unit Price	Unit	Cost-Quant. PerSection	Lump Sum Values			
2500 PLANNING								
2521 Consultant - transport. planning study		2.50	LM	7875		7,875	3	
2531 Consultant - corridor study		2.50	LM	7875		7,875	3	
2541 Consultant - functional plan. study		2.50	LM	7875		7,875	3	
2502 Consultant - general		5.0%		1181		1,181	0	
Consultant sub-total						24,806	8	
2510 Client - project ident.		2.50	LM	7875		7,875	3	
2520 Client - transport. planning study		2.50	LM	7875		7,875	3	
2530 Client - corridor study		3.50	LM	11025		11,025	4	
2540 Client - functional study		3.50	LM	11025	0	11,025	4	
2501 Client - general		5.0%		1890		1,890	1	
Client Sub-total				39690		39,690	13	
2599 Planning Contingency		30.0%		19349		19,349	6	
TOTAL PLANNING						83,845	27	
=====								
3000 PRELIMINARY DESIGN								
3013 Consultant - aerial base plan		3.00	LM	9450		9,450	3	
3014 Consultant - prel. design		3.60	LM	11340		11,340	4	
3015 Consultant - control survey		3.00	LM	9450		9,450	3	
3021 Consultant - environmental impact		6.00	LM	18900		18,900	6	
3031 Consultant - funct.-road field survey		3.00	LM	9450		9,450	3	
3041 Consultant - functional design		2.40	LM	7560	0	7,560	2	
3051 Consultant - funct. des. structural		1.80	LM	5670	0	5,670	2	
3061 Consultant - geotechnical design		15.00	LM	47250		47,250	15	
3071 Consultant - right-of-way research		1.80	LM	5670	0	5,670	2	
3002 Consultant - general		0.0%		0		0	0	
Consultant sub-total						124,740	40	
3010 Client - aerial base plan		0.00	LM	0		0	0	
3011 Client - prel. design		0.00	LM	0		0	0	
3012 Client - control survey		0.00	LM	0		0	0	
3020 Client - environmental impact		0.00	LM	0		0	0	
3030 Client - funct.-road field survey		0.00	LM	0		0	0	
3040 Client - functional design		0.00	LM	0		0	0	
3050 Client - funct. des. structural		0.00	LM	0		0	0	
3060 Client - geotechnical design		0.00	LM	0		0	0	
3070 Client - right-of-way research		0.00	LM	0		0	0	
3001 Client - general		0.0%		0		0	0	
Client Sub-total						0	0	
3099 Preliminary design Contingency		30.0%		37422		37,422	12	
TOTAL PRELIMINARY DESIGN						162,162	51	
=====								
Description		No.	Units	Quantity	Rate	Total		
Cantilever Fli		1	ea	0	3,500			
Barrier remo		1	lm	2205	50	110,250		
Electric sign		1	ea	1	20,000	20,000		
Bus Pullout F		1	ea	2	10,000	20,000		
ITS System			ea		200,000			
Emergency F		1	ea	4	166,667	666,667		
Description		No.	Units	Quantity	Rate	Total		
Description		No.	Units	Quantity	Rate	Total		

ESTIMATED BY : P. Nahal

File: O:\Proj\2121-00288-02 MoTi Whistler Hwy 99 Capacity  
& Safety Review\4.0 ENGINEERING DESIGN\4.3

Company **MCSL**  
(2018 Dollars) Whistler Highway 99 Capacity and Safety Review  
ACTIVITY Capacity and Safety Review  
CODE EST.DATE August, 2018

Man. Reserve 0.0% Land  
Contingency 30.0% 30.0%  
Division/Site Medium Term Option - 3A  
Road Type 1  
Length 3150 L.M.

Conceptual Est. R1 DATE:

Bik Est. # 6.14A

Version Sept. 1, 2002

R2 DATE:

DESCRIPTION

Unit Price Unit Cost-Quant. Lump Sum  
PerSection Values

5500	STRUCTURAL CONSTRUCTION	Unit Price	Unit	Quantity	Lump Sum
5522	Struct.Cons - water	758.00	lm	0	
5523	Struct.Cons - sanitary	489.00	lm	0	
5524	Struct.Cons - storm	500.00	lm	0	
5521	Struct.Cons - mobilization	3.0%		0	
5599	Struct.Cons - utility contingency	30.0%		0	
	Structural Const. Utilities Sub-total				

5510	Struct.Cons - tunnel site preparation	0.00	lm	0	0
5511	Struct.Cons - tunnel construction	-	lm	0	
5512	Struct.Cons - snow shed site prep.	0.00	lm	0	
5513	Struct.Cons - snow shed site const.	-	lm	0	

5514	Struct.Cons - bridge site preparation	1	LS	0	
5515	Struct.Cons - bridge piers	1	LS	0	
5516	Struct.Cons - bridge abutments	1	LS	0	
5517	Struct.Cons - bridge superstructure	1	LS	0	0
5518	Struct.Cons - retain. wall site prep.	1	LS	0	
5519	Struct.Cons - retaining wall const.	1580	m2	4900	
5501	Struct.Cons - mobilization	3.0%		232260	
5529	Struct.Cons - Contingency	30.0%		2392278	
	Structural Construction Sub-total				10,366,538

STRUCTURAL CONSTRUCTION COSTS 10,366,538

3520	Struct. Eng. - detailed design	5.50%		570160	
3529	Struct. Eng. - detailed design/Contingency	30.0%		171048	
6820	Struct. Eng. - general const. supervision	4.00%		414662	
6821	Struct. Eng. - quality assurance	2.00%		207331	
6822	Struct. Eng. - surveying	0.50%		51833	
6829	Struct. Eng. - Residency Contingency	30.0%		202147	
	Structural Engineering Sub-total				1,617,180

Total Structural & Eng. Costs 11,983,718

6000	PAVING CONSTRUCTION				SM./OIL
6020	Paving Con - machine paving asphalt	151.00	t	1786	12403
6030	Paving Con - machine paving concrete	0.00	m2		
6040	Paving Con - hot reprofiling	0.00	m2	7088	
6050	Paving Con - shoulder paving	0.00	t	0	
6060	Paving Con - pavement finishing	100.00	m2	0	
6070	Paving Con - seal coating	0.00			
6001	Paving Con - mobilization	3.0%		10181	
6010	Paving Con - pavement design	0.0%		0	
6099	Paving Con - Contingency	30.0%		104865	

PAVING CONSTRUCTION COSTS 454,415

3560	Paving Eng - detailed design	5.50%		24993	
3569	Paving Eng - detailed design/Contingency	30.0%		7498	
6860	Paving Eng - general const. supervision	2.00%		9088	
6861	Paving Eng - quality assurance	5.00%		22721	
6862	Paving Eng - surveying	0.50%		2272	
6869	Paving Eng - Residency Contingency	30.0%		10224	
	Paving Engineering Sub-total				76,796

Total Paving Const. & Eng. Costs 531,212

for Way to Alpha Lake

MT-3A

Medium Term Option - 3A

Shoulder Widening

MR

1

3150

3150

1

1

1

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Taylor W Road Types

MT-3A 1. 2In Frontage

Medium 2. 2In Acc Rds

3. 4In Acc Rds

4.R4L-4L EXP R/B

5.R2/3L-4L EXP R/B

6.Refr.4L-4LEX R/B

7.R4L-4LEX R/B E/S

8. New 4L EXP R/B

14.AS IS

15. Misc.

20.I/C Str.&Ramps

21. Bridges

22. Grade Sep.

9. R-E4L-4L D/M

10.N 4L EXP D/M

11.N 4L EXP D/E/M

12.N2L/F4LEX D/M

13.INST.R/B-EX.R/D



File: O:\Proj\2121-00288-02 Mt1 Whistler Hwy 99 Capacity  
& Safety Review\4.0 ENGINEERING DESIGN\4.3

Company **MCSL**

(2018 Dollars) Whistler Highway 99 Capacity and Safety Review

ACTIVITY CODE  
EST.DATE August, 2018

Man. Reserve

Contingency

Division/Site

Road Type

Length

0.0%

30.0%

Medium Term Option - 3A

1

3150 L.M.

for Way to Alpha Lake

MT-3A

Medium Term Option - 3A

Shoulder Widening

MR

Taylor W Road Types

MT-3A

Medium

1

3150

9. R-E4L-4L D/M

10.N 4L EXP D/M

11.N 4L EXP D/E/M

12.N2L;F4LEXP D/M

13.INST.R/B-EX.R/D

Est \$
20,943,838
\$ 6,649
\$ 5,800

Conceptual Est. R1 DATE:

Blk Est. # 6.14A R2 DATE:

Version Sept. 1, 2002

DESCRIPTION

Unit Price

Unit

Cost-Quant.

PerSection

Lump Sum

Values

6500 OPERATIONAL CONSTRUCTION

6510 Operat.Con- lighting

6520 Operat.Con- signals

6530 Operat.Con- signing

6540 Operat.Con- guard rail

6550 Operat.Con- pavement markings

6501 Operat.Con- mobilization

6599 Operat.Con- contingency

8500.00

275,000

6.00

109.00

1.75

3.0%

30.0%

Ea

1.50

LM

Im

Im

LM

LM

0

1.50

18900

2205

9450

27668

284985

34000

0

200000

0

0

0

0

OPERATIONAL CONSTRUCTION COSTS

1,234,936

3540 Operat. Eng- detailed design

3549 Operat. Eng- detailed design/Contingency

6840 Operat. Eng- general const. supervision

6841 Operat. Eng- quality assurance

6842 Operat. Eng- surveying

6849 Operat. Eng- Residency Contingency

Operational Engineering Sub-total

5.50%

30.0%

5.50%

2.00%

0.50%

30.0%

67921

20376

67921

24699

6175

29638

216,731

67,921

20,376

67,921

24,699

6,175

29,638

216,731

Total Operational Const. & Eng. Costs

1,451,668

5200 ROAD SIDE CONSTRUCTION

5203 RoadSide C- water

5204 RoadSide C- sanitary

5205 RoadSide C- storm

5202 RoadSide C- mobilization

5209 RoadSide C- Utility Contingency

Road Side Const. Utilities Sub-total

Unit Price

Unit

Quantity

Lump Sum

758.00

489.00

500.00

3.0%

30.0%

Im

Im

Im

0

0

0

0

0

0

0

0

0

5210 RoadSide C- weigh scales

5220 RoadSide C- safety rest areas

5230 RoadSide C- tourist rest & view areas

5201 RoadSide C- mobilization

5299 RoadSide C- Contingency

Road Side Construction Sub-total

-

-

40000

3.0%

30.0%

ea

ea

ea

0

0

0

0

0

0

0

0

0

ROAD SIDE CONSTRUCTION COSTS

0

3550 RoadSide E- detailed design

3559 RoadSide E- detailed design/Contingency

6850 RoadSide E- general const. supervision

6851 RoadSide E- quality assurance

6852 RoadSide E- surveying

6859 RoadSide E- Residency Contingency

Road Side Engineering Sub-total

10.00%

30.0%

6.00%

2.00%

1.00%

30.0%

0

0

0

0

0

0

0

0

0

0

0

0

Total Road Side Const. & Eng. Costs

0

5300 OTHER CONSTRUCTION

5303 Other Const- water

5304 Other Const- sanitary

5305 Other Const- storm

5302 Other Const- mobilization

5309 Other Const- utility contingency

Other Const. Utilities Sub-total

Unit Price

Unit

Quantity

Lump Sum

758.00

489.00

500.00

3.0%

30.0%

Im

Im

Im

0

0

0

0

0

0

0

0

0

5310 Other Const- railroads main & spur lines

5320 Other Const- railroad crossings

5330 Other Const- marine work

5340 Other Const- environmental mitigations

5301 Other Const- mobilization

5399 Other Const- Contingency

Other Construction Sub-total

-

-

-

90,000

3.0%

30.0%

Im

ea

ea

ea

0.75

2025

20857

0

0

0

67,500

2,025

20,857

90,382

OTHER CONSTRUCTION COSTS

90,382

3570 Other Eng. - detailed design

3579 Other Eng. - detailed design/Contingency

6870 Other Eng. - general const. supervision

6871 Other Eng. - quality assurance

6872 Other Eng. - surveying

6879 Other Eng. - Residency Contingency

Other Engineering Sub-total

5.50%

30.0%

4.00%

2.00%

1.00%

30.0%

4971

1491

3615

1808

904

1898

14,687

4,971

1,491

3,615

1,808

904

1,898

14,687

Total Other Const. & Eng. Costs

105,070

=====

=====

1

3150

3150

1

11

131

69

76

5

9

90

392

22

6

22

8

2

9

69

461

ESTIMATED BY : P. Nahal

File: O:\Proj\2121-00288-02 MoTI Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3		Man. Reserve	0.0%	Land	0.0%	for Way to Alpha Lake	Taylor W Road Types	9. R-E4L-4L D/M		
Company MCSL		Contingency	30.0%		30.0%	MT-3A	MT-3A 1. 2In Frontage	10.N 4L EXP D/M		
(2018 Dollars) Whistler Highway 99 Capacity and Safety Review		Division/Site	Medium Term Option - 3A			Medium Term Option - 3A	Medium 2. 2In Acc Rds	11.N 4L EXP D/E/M		
ACTIVITY CODE		Road Type	1				3. 4In Acc Rds	12.N2L;F4LEXP D/M		
EST.DATE August, 2018		Length	3150	L.M.			4.R4L-4L EXP R/B	13.INST.R/B-EX.RD		
Conceptual Est. R1 DATE:			=====			Shoulder Widening	5.R2/3L-4L EXP R/B	14.AS IS	15. Misc.	Est \$
Bik Est. # 6.14A R2 DATE:		Unit	Cost-Quant.	Lump Sum		1	6.Refr.4L-4LEX R/B	20.I/C Str.&Ramps		20,943,838
Version Sept.1, 2002		Price	PerSection	Values		3150	7.R4L-4LEX R/B E/S	21. Bridges		\$ 6,649
							8. New 4L EXP R/B	22. Grade Sep.		\$ 5,800
9800	MANAGEMENT RESERVE									
	MAN. RES. - planning	0.0%	83845							
	MAN. RES. - preliminary design	0.0%	162162							
	MAN. RES. - utility construction	0.0%	393120							
	MAN. RES. - grade construction	0.0%	4284717							
	MAN. RES. - structural construction	0.0%	10366538							
	MAN. RES. - paving construction	0.0%	454415							
	MAN. RES. - operation construction	0.0%	1234936							
	MAN. RES. - roadside construction	0.0%	0							
	MAN. RES. - other construction	0.0%	90382							
	MAN. RES. - project management	0.0%	1059818							
	MAN. RES. - land	0.0%	0							
	MAN. RES. - detailed eng.	0.0%	1367058							
	MAN. RES. - residency eng.	0.0%	1446845							
	MAN. RES. - Contingency	0.0%	0							
TOTAL MANAGEMENT RESERVE			20943838			0	0			
TOTAL LESS ESCALATION			0	20943838						
FISCAL										
9900	ESCALATION									
	YEAR PROJECTED ESCALATION COMPLETE \$ DONE									
	2016-2017 0.5750% 5.00%		0			0	0			
	2017-2018 0.6250% 10.00%		0			0	0			
	2018-2019 1.0000% 35.00%		0			0	0			
	2019-2020 1.0000% 45.00%		0			0	0			
	2020-2021 1.0000% 5.00%		0			0	0			
	2021-2022 1.0000% 0.00%		0			0	0			
	2022-2023 1.0000% 0.00%		0			0	0			
	2023-2024 1.0000% 0.00%		0			0	0			
	2024-2025 1.0000% 0.00%		0			0	0			
TOTAL ESCALATION		100.00%	0			0	0			
PART 2 SUMMARY NON-CONSTRUCTION COSTS										
	Non-Construction					815,245	259			
	Non-Const. Contingency					244,573	78			
TOTAL NON-CONSTRUCTION COSTS						1,059,818	336			
Medium Te TOTAL FOR ROAD TYPE		1				20,943,838	6649			



File: O:\Proj\2121-00288-02 MoTI Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3  
 Company **MCSL**  
 (2018 Dollars) Whistler Highway 99 Capacity and Safety Review  
 ACTIVITY Capacity and Safety Review  
 CODE EST. DATE August, 2018  
 Conceptual Est. R1 DATE:  
 Blk Est. # 6.14A R2 DATE:  
 Version Sept. 1, 2002

Man. Reserve 0.0% Land  
 Contingency 30.0%  
 Division/Site Medium Term Option - 3B  
 Road Type 1  
 Length 3150 L.M.  
 Cost-Quant. =====  
 Lump Sum

for Way to Alpha Lake  
 MT-3B  
 Medium Term Option  
 - 3B  
 2 Full Lanes SB  
 MR

Taylor W Road Types  
 MT-3B 1. 2In Frontage  
 Medium 2. 2In Acc Rds  
 3. 4In Acc Rds  
 4. R4L-4L EXP R/B  
 5. R2/3L-4L EXP R/B  
 6. Retr. 4L-4LEX R/B  
 7. R4L-4LEX R/B E/S  
 8. New 4L EXP R/B  
 Cost/LM 1  
 3150 3150  
 % of T % of TC

9. R-E4L-4L D/M  
 10. N 4L EXP D/M  
 11. N 4L EXP D/E/M  
 12. N2L; F4LEX D/M  
 13. INST. R/B-EX. RD  
 14. AS IS 15. Misc.  
 20. I/C Str. & Ramps  
 21. Bridges  
 22. Grade Sep.

Est \$	25,530,028
\$	8,105
\$	7,092

SUMMARY BY ACTIVITY LEVEL				Previous Estimate				
2000	PROJECT MANAGEMENT	Diff.						
		-993764		0	993,764	315	3.9%	3.9%
2500	PLANNING	-64496		0	64,496	20	0.3%	0.3%
3000	PRELIMINARY DESIGN	-103950		0	103,950	33	0.4%	0.4%
3500	DETAILED DESIGN	-1291301		0	1,291,301	410	5.1%	5.1%
	Total Engineering	-1459747		0	1,459,747	463	5.7%	5.7%
4000	LAND ACQUISITION	0		0	0	0	0.0%	0.0%
5000	GRADE CONSTRUCTION	-4060738		0	4,060,738	1289	15.9%	15.9%
5200	ROAD SIDE CONSTRUCTION	0		0	0	0	0.0%	0.0%
5300	OTHER CONSTRUCTION	-9270		0	9,270	3	0.0%	0.0%
5500	STRUCTURAL CONSTRUCTION	-9967825		0	9,967,825	3164	39.0%	39.0%
6000	PAVING CONSTRUCTION	-725683		0	725,683	230	2.8%	2.8%
6500	OPERATIONAL CONSTRUCTION	-756929		0	756,929	240	3.0%	3.0%
6700	UTILITY CONSTRUCTION	-302400		0	302,400	96	1.2%	1.2%
6800	RESIDENT ENGINEERING	-1362127		0	1,362,127	432	5.3%	5.3%
	Total Construction	-17184972		0	17,184,972	5456	67.3%	67.3%
9700	CONTINGENCY	-5891545		0	5,891,545	1870	23.1%	23.1%
9800	SUB-TOTAL MANAGEMENT RESERVE	-25530028		0	25,530,028	8105	100.0%	100.0%
		0		0	0	0	0.0%	0.0%
	TOTAL	-25530028		0	25,530,028	8105	100.0%	100.0%
9900	ESCALATION	0		0	0	0		0.0%
	TOTAL COST	-25530028		0	25,530,028	8105		100.0%
	Constr. Less Resident Eng.	-15822846		0	15,822,846	5023		
	ENG. & PM				3,189,564	1013	12.5%	
	LAND				0	0	0.0%	
	CONST.				22,340,464	7092	87.5%	
	MAN. RES.				0	0	0.0%	
	ESC.				0	0	0.0%	
	TOTAL				25,530,028	8105	100.0%	

2453511

Medium Term Option - 3B				Assumptions									
1	Existing Right-Of-Way	m		Existing Rd	Shoulder	Lane	Lane	Median	Lane	Lane	Shoulder		
				Pvmt Width	0.0								
2	New Addition Right-Of-Way	partial taking NO m		New Rd.	Shoulder	Lane	Lane	Median	Lane	Lane	Shoulder	Ditch W.	
	ROW	11 m		Pvmt Width	5.1	Asphalt	depth mm	100	Tonage t	4048	Unit Price	\$	151.00
	Bridges		Width(m) Length(m)	SCOPE	Road L.	Bridge L.	Seg. L.			X-sect./lm	Tot. Vol.		
3.1	0	12.2	0.0	CBS	3,150	-	3,150			14.05	44,254		
3.2	0	12.2	0.0		slope	D= meter	Volume	Unit		Rock	11,907	\$	107.66
3.3	0	12.2	0.0		4.0	0.257	5557	\$ 60.00		OM	10,716	\$	29.11
3.4	0	12.2	0.0	SGSB	slope	D= meter	Volume	Unit		Stripping	5,557	\$	49.54
3.5	0	12.2	0.0		4.0	0.210	6112	\$ 56.00		Borrow	16,074	\$	42.95
4	Tunnels		Length(m) Width(m) Height(m)										
4.1	2InSt.w-x	0	12.0	8.27									
4.2	x-Pass.TI	0	3.0	3.16									
4.3	shaft	0	2.0	Diameter									
4.4	snowshedlength (lm)	0											
	Bridges		Net \$/M2	Gross\$/m2									
3.1	0	#DIV/0!	#DIV/0!										
3.2	0	#DIV/0!	#DIV/0!										
3.3	0	#DIV/0!	#DIV/0!										
3.4	0	#DIV/0!	#DIV/0!										
3.5	0	#DIV/0!	#DIV/0!										

O:\Proj\2121-00288-02 MoTi Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3		Man. Reserve	0.0%	Land	for Way to Alpha Lake	Taylor W Road Types	9. R-E4L-4L D/M		
File:	Company MCSL	Contingency	30.0%	30.0%	MT-3B	MT-3B 1. 2In Frontage	10.N 4L EXP D/M		
(2018 Dollars)	Whistler Highway 99 Capacity and Safety Review	Division/Site	Medium Term Option - 3B	Medium Term Option - 3B	Medium Term Option - 3B	2. 2In Acc Rds	11.N 4L EXP D/E/M		
ACTIVITY CODE	EST.DATE August, 2018	Road Type	1	L.M.	2 Full Lanes SB	3. 4In Acc Rds	12.N2L;F4LEXP D/M		
Conceptual Est. R1 DATE:	R2 DATE:	Length	3150	=====	MR	4.R4L-4L EXP R/B	13.INST.R/B-EX.RD		
Blk Est. # 6.14A	Version Sept. 1, 2002	Unit Price	Unit	Cost-Quant.	Lump Sum Values	5.R2/3L-4L EXP R/B	14.AS IS 15. Misc.		
						6.Retr.4L-4LEX R/B	20.I/C Str.&Ramps		
						7.R4L-4LEX R/B E/S	21. Bridges		
						8. New 4L EXP R/B	22. Grade Sep.		
								Est \$	25,530,028
								\$	8,105
								\$	7,092
2500	PLANNING								
2521	Consultant - transport. planning study	2.50	LM	7875	7,875	3	Description	No.	Units
2531	Consultant - corridor study	2.50	LM	7875	7,875	3		Quantity	Rate
2541	Consultant - functional plan. study	2.50	LM	7875	7,875	3			Total
2502	Consultant - general	5.0%		1181	1,181	0			-
	Consultant sub-total				24,806	8			-
2510	Client - project ident.	2.50	LM	7875	7,875	3			-
2520	Client - transport. planning study	2.50	LM	7875	7,875	3			-
2530	Client - corridor study	3.50	LM	11025	11,025	4			-
2540	Client - functional study	3.50	LM	11025	11,025	4			-
2501	Client - general	5.0%		1890	1,890	1			-
	Client Sub-total			39690	39,690	13			-
2599	Planning Contingency	30.0%		19349	19,349	6			-
TOTAL PLANNING					83,845	27			-
3000	PRELIMINARY DESIGN								-
3013	Consultant - aerial base plan	2.50	LM	7875	7,875	3			-
3014	Consultant - prel. design	3.00	LM	9450	9,450	3			-
3015	Consultant - control survey	2.50	LM	7875	7,875	3			-
3021	Consultant - environmental impact	5.00	LM	15750	15,750	5			-
3031	Consultant - funct.-road field survey	2.50	LM	7875	7,875	3			-
3041	Consultant - functional design	2.00	LM	6300	6,300	2			-
3051	Consultant - funct. des. structural	1.50	LM	4725	4,725	2	Structural	0.50%	-
3061	Consultant - geotechnical design	12.50	LM	39375	39,375	13			-
3071	Consultant - right-of-way research	1.50	LM	4725	4,725	2	\$/Prop.	\$ 150	-
3002	Consultant - general	0.0%		0	0	0	Description	No.	Units
	Consultant sub-total				103,950	33		Quantity	Rate
3010	Client - aerial base plan	0.00	LM	0	0	0			Total
3011	Client - prel. design	0.00	LM	0	0	0			-
3012	Client - control survey	0.00	LM	0	0	0	Cantilever Fil	1	ea
3020	Client - environmental impact	0.00	LM	0	0	0		0	3,500.00
3030	Client - funct.-road field survey	0.00	LM	0	0	0	Barrier remo	1	lm
3040	Client - functional design	0.00	LM	0	0	0	Electric sign	1	ea
3050	Client - funct. des. structural	0.00	LM	0	0	0		2205	50.00
3060	Client - geotechnical design	0.00	LM	0	0	0	Bus Pullout F	1	ea
3070	Client - right-of-way research	0.00	LM	0	0	0		2	10,000.00
3001	Client - general	0.0%		0	0	0			20,000
	Client Sub-total				0	0			-
3099	Preliminary design Contingency	30.0%		31185	31,185	10			-
TOTAL PRELIMINARY DESIGN					135,135	43			-
							Description		150,250

ESTIMATED BY : P. Nahal



File: O:\Proj\2121-00288-02 MoTi Whistler Hwy 99 Capacity  
& Safety Review\4.0 ENGINEERING DESIGN\4.3

Company **MCSL**

(2018 Dollars) Whistler Highway 99 Capacity and Safety Review

ACTIVITY Capacity and Safety Review

CODE EST.DATE August, 2018

Conceptual Est. R1 DATE:

Blk Est. # 6.14A R2 DATE:

Version Sept.1, 2002

Man. Reserve 0.0% Land  
Contingency 30.0%  
Division/Site Medium Term Option - 3B  
Road Type 1  
Length 3150 L.M.

Unit Price Unit PerSection Lump Sum Values

5500	STRUCTURAL CONSTRUCTION	Unit Price	Unit	Quantity	Lump Sum
5522	Struct.Cons - water	758.00	Im	0	
5523	Struct.Cons - sanitary	489.00	Im	0	
5524	Struct.Cons - storm	500.00	Im	0	
5521	Struct.Cons - mobilization	3.0%		0	
5599	Struct.Cons - utility contingency	30.0%		0	
	Structural Const. Utilities Sub-total				
5510	Struct.Cons - tunnel site preparation	0.00	Im	0	0
5511	Struct.Cons - tunnel construction	-	Im	0	
5512	Struct.Cons - snow shed site prep.	0.00	Im	0	
5513	Struct.Cons - snow shed site const.	-	Im	0	
5514	Struct.Cons - bridge site preparation	1	LS	0	
5515	Struct.Cons - bridge piers	1	LS	0	
5516	Struct.Cons - bridge abutments	1	LS	0	
5517	Struct.Cons - bridge superstructure	1	LS	0	0
5518	Struct.Cons - retain. wall site prep.	1	LS	0	
5519	Struct.Cons - retaining wall const.	1580	m2	6125	
5501	Struct.Cons - mobilization	3.0%		290325	
5529	Struct.Cons - Contingency	30.0%		2990348	
	Structural Construction Sub-total				

STRUCTURAL CONSTRUCTION COSTS					12,958,173
3520	Struct. Eng. - detailed design	5.50%		712699	712,699
3529	Struct. Eng. - detailed design/Contingency	30.0%		213810	213,810
6820	Struct. Eng. - general const. supervision	4.00%		518327	518,327
6821	Struct. Eng. - quality assurance	2.00%		259163	259,163
6822	Struct. Eng. - surveying	0.50%		64791	64,791
6829	Struct. Eng. - Residency Contingency	30.0%		252684	252,684
	Structural Engineering Sub-total				2,021,475
<b>Total Structural &amp; Eng. Costs</b>					<b>14,979,647</b>

PAVING CONSTRUCTION					SM./OIL
6000	PAVING CONSTRUCTION				
6020	Paving Con - machine paving asphalt	151.00	t	4048	28114
6030	Paving Con - machine paving concrete	0.00	m2		
6040	Paving Con - hot reprofiling	0.00	m2	16065	
6050	Paving Con - shoulder paving	0.00	t	1361	
6060	Paving Con - pavement finishing	100.00	m2	0	
6070	Paving Con - seal coating	0.00			
6001	Paving Con - mobilization	3.0%		21136	21,136
6010	Paving Con - pavement design	0.0%		0	
6099	Paving Con - Contingency	30.0%		217705	217,705

PAVING CONSTRUCTION COSTS					943,388
3560	Paving Eng - detailed design	5.50%		51886	51,886
3569	Paving Eng - detailed design/Contingency	30.0%		15566	15,566
6860	Paving Eng - general const. supervision	2.00%		18868	18,868
6861	Paving Eng - quality assurance	5.00%		47169	47,169
6862	Paving Eng - surveying	0.50%		4717	4,717
6869	Paving Eng - Residency Contingency	30.0%		21226	21,226
	Paving Engineering Sub-total				159,433
<b>Total Paving Const. &amp; Eng. Costs</b>					<b>1,102,821</b>

for Way to Alpha Lake  
MT-3B  
Medium Term Option  
- 3B  
2 Full Lanes SB  
MR

Taylor W Road Types		9. R-E4L-4L D/M	
MT-3B	1. 2In Frontage		10.N 4L EXP D/M
Medium	2. 2In Acc Rds		11.N 4L EXP D/E/M
	3. 4In Acc Rds		12.N2L/F4LEXP D/M
	4.R4L-4L EXP R/B		13.INST.R/B-EX.RD
	5.R2/3L-4L EXP R/B		14.AS IS 15. Misc.
	6.Retr.4L-4LEX R/B		20.I/C Str.&Ramps
	7.R4L-4LEX R/B E/S		21. Bridges
	8. New 4L EXP R/B		22. Grade Sep.

Bridge	Site \$	Piers \$	Abut. \$	abut. extra length (Im)	
1	-	160,504	145,800	4	0%
2	-	177,516	109,800		0%
3	-	177,516	109,800		0%
4	-	177,516	109,800		0%
5	-	177,516	109,800		0%

Pier/Ht	Pier No.	P/\$/VLM	Abut\$/HLM	
8	1	20063	4500	
8	1	22190	4500	
8	1	22190	4500	
8	1	22190	4500	

DECK #1	(W)	(L)	(\$/m2)	Net Cost	No. of Bridge
12.2	0		1791	315493	0
12.2	0		1981	295936	0
12.2	0		1981	295936	0
12.2	0		1981	295936	0
12.2	0		1981	295936	0

Gross/m2	Net/m2	
#DIV/0!	#DIV/0!	
#DIV/0!	#DIV/0!	
#DIV/0!	#DIV/0!	
#DIV/0!	#DIV/0!	
#DIV/0!	#DIV/0!	

Items	Quantity	rate	Total \$	Avg.\$/ tot-Im	1-Circle
Exc.-m3	0	125	0	#DIV/0!	0
Obk-m3	0	2625	0	#DIV/0!	0
Rk anch-Ea	0	1125	0	#DIV/0!	0
Misc.-Im	0	2500	0	#DIV/0!	0
Liner-m3	0	1050	0	#DIV/0!	10.00
Drainage-Im	0	550	0	#DIV/0!	%
Lighting-Im	0	900	0	#DIV/0!	5%
Mech-m	0	2100	0	#DIV/0!	15%
Misc.-Im	0	1000	0	#DIV/0!	3%

69	1Tonne=16.67m2/25mm		0	#DIV/0!	snowshed
60kg=1m2/25mm					length (Im) 0.0
299	asphalt (T)=mm	1.5L =1M2 (P)			Roof 1.0
	A.C.	100	100	1607	29.00 0.50
16	A.B.C.	0	0	1,500.00	-
5	\$Oil/Litre	\$1.50	5%	Walls	1.0 11.20
6	Appl. rate	1.75	1.75	3.00	\$ 1,580.00 -
15	Pavement Removal	(See I155)		Base	1.0 26.00
1	m2	\$/m2	Total	1.00	\$ 1,000.00 -
7	630	\$8.84	5569	Exc.-m3	1.0 37.00
51	Milling			5.00	\$ 60.00 -
m2	\$/m2	Total		Drainage	\$ 500.00 -
350	4,725	\$9.63	45502	Electrical	\$ 4,500.00 -
				Mech.	\$ 5,000.00 -
				Misc.	\$ 300.00 -
				#DIV/0!	-

ESTIMATED BY : P. Nahal

ESTIMATED BY : P. Nahal



File: O:\Proj\2121-00288-02 MoTi Whistler Hwy 99 Capacity & Safety Review\4.0 ENGINEERING DESIGN\4.3		Man. Reserve	0.0%	Land	0.0%	for Way to Alpha Lake	Taylor W Road Types	9. R-E4L-4L D/M					
Company MCSL		Contingency	30.0%	30.0%		MT-3B	MT-3B 1. 2In Frontage	10.N 4L EXP D/M					
(2018 Dollars) Whistler Highway 99 Capacity and Safety Review		Division/Site		Medium Term Option - 3B		Medium	12. 2In Acc Rds	11.N 4L EXP D/E/M					
ACTIVITY CODE	Capacity and Safety Review	Road Type	1			Medium Term Option - 3B	3. 4In Acc Rds	12.N2L;F4LEXP D/M					
EST.DATE August, 2018		Length	3150	L.M.			4.R4L-4L EXP R/B	13.INST.R/B-EX.RD					
Conceptual Est. R1 DATE:			=====			2 Full Lanes SB	5.R2/3L-4L EXP R/B	14.AS IS 15. Misc.					
Blk Est. # 6.14A R2 DATE:		Unit		Cost-Quant.	Lump Sum	1	6.Retr.4L-4LEX R/B	20.I/C Str.&Ramps					
Version Sept.1, 2002		Price	Unit	PerSection	Values	3150	7.R4L-4LEX R/B E/S	21. Bridges					
	DESCRIPTION						8. New 4L EXP R/B	22. Grade Sep.					
						MR	Description No.	Units	Quantity	Rate	Total		
9800	MANAGEMENT RESERVE												
	MAN. RES. - planning	0.0%		83845		0	0			-	-		
	MAN. RES. - preliminary design	0.0%		135135		0	0			-	-		
	MAN. RES. - utility construction	0.0%		393120		0	0			-	-		
	MAN. RES. - grade construction	0.0%		5278960		0	0			-	-		
	MAN. RES. - structural construction	0.0%		12958173		0	0			-	-		
	MAN. RES. - paving construction	0.0%		943388		0	0			-	-		
	MAN. RES. - operation construction	0.0%		984008		0	0			-	-		
	MAN. RES. - roadside construction	0.0%		0		0	0			-	-		
	MAN. RES. - other construction	0.0%		12051		0	0			-	-		
	MAN. RES. - project management	0.0%		1291893		0	0			-	-		
	MAN. RES. - land	0.0%		0		0	0			-	-		
	MAN. RES. - detailed eng.	0.0%		1678691		0	0			-	-		
	MAN. RES. - residency eng.	0.0%		1770765		0	0			-	-		
	MAN. RES. - Contingency	0.0%		0		0	0			-	-		
	TOTAL MANAGEMENT RESERVE			25530028		0	0			-	-		
=====								Description			-		
	TOTAL LESS ESCALATION			0	25530028			Description	No.	Units	Quantity	Rate	Total
	FISCAL												
9900	ESCALATION												
	YEAR PROJECTED ESCALATION COMPLETE \$ DONE												
	2016-2017 0.5750% 5.00%			0		0	0						
	2017-2018 0.6250% 10.00%			0		0	0						
	2018-2019 1.0000% 35.00%			0		0	0						
	2019-2020 1.0000% 45.00%			0		0	0						
	2020-2021 1.0000% 5.00%			0		0	0						
	2021-2022 1.0000% 0.00%			0		0	0						
	2022-2023 1.0000% 0.00%			0		0	0						
	2023-2024 1.0000% 0.00%			0		0	0						
	2024-2025 1.0000% 0.00%			0		0	0						
	TOTAL ESCALATION		100.00%	0		0	0						
=====													
	PART 2 SUMMARY NON-CONSTRUCTION COSTS												
	Non-Construction					993,764	315						
	Non-Const. Contingency					298,129	95						
	TOTAL NON-CONSTRUCTION COSTS					1,291,893	410						
=====													
	Medium Term TOTAL FOR ROAD TYPE		1			25,530,028	8105			Description			

\$	8,050
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2:37 PM ESTIMATED BY : P. Nahal

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ESTIMATED BY :P. Nahal

			Project Location: South Coast - Lower Mainland					
Description	U of M	Avg. Unit Cost Used for Cost Est.	Highway No. 7 Four Laning - Silverdale Avenue to	Lougheed Highway No. 7 Corridor Improve	Highway 1 at Mountain Highway Interchange	Evergreen Line Rapid Transit Project - Coquitlam	Nordel Way - Truck Parking Area, Highway	Average of Averages
			43160	43221	42795	42491	42552	
			12452MJ0001	12452-0003	12573MJ2016	03901MJ0002	12641MJ0001	
Site Prep & Grading								
Clearing & Grubbing	ha	\$26,000	\$45,109	\$41,759	\$28,630	\$0	\$14,592	\$26,018
Stripping	m <sup>3</sup>	\$50	\$86	\$46	\$37		\$29	\$50
Rock Excavation - Type A	m <sup>3</sup>	\$108	\$108					\$108
Excavation (O.M. - Type D)	m <sup>3</sup>	\$29	\$32	\$46	\$29	\$22	\$17	\$29
Import Fill	m <sup>3</sup>	\$43			\$31	\$55		\$43
SGSB	m <sup>3</sup>	\$56		\$64	\$53	\$56	\$50	\$56
CBC	m <sup>3</sup>	\$60	\$56	\$70	\$56	\$58	\$60	\$60
Rock Sacaling	m <sup>2</sup>	\$95		\$100		\$90		\$95
Rock Bolting	m	\$451		\$570		\$332		\$451
Shotcrete	m <sup>3</sup>	\$1,705		\$1,485		\$1,925		\$1,705
Grade finishing landscaping	m <sup>2</sup>	\$2	\$2					\$2
Grade finishing hydro seed	m <sup>2</sup>	\$1	\$1	\$1	\$1	7.9167*0	\$1	\$1
Drainage								
Culverts (900mm Dia)	m	\$1,070	\$1,061	\$1,081				\$1,071
Culvert Headwall	ea	\$10,120	\$10,119					\$10,119
3000 x 1800 Concrete Box Culvert	m	\$8,250	\$8,250					\$8,250
2400 x 1500 Concrete Box Culvert	m	\$5,260	\$5,260					\$5,260
Concrete Headwall - Box Culvert	ea	\$16,500	\$16,500					\$16,500
CB Leads(200mm Ø)	m	\$220	\$206			\$300	\$164	\$223
Catch Basin	ea	\$3,250	\$2,212		\$5,627		\$1,907	\$3,249
Double Catch Basin	ea	\$4,410	\$3,168		\$5,642			\$4,405
Oil Grate Separator	ea	\$30,000	\$30,000					30000
Asphalt Spilways	ea	\$1,179			\$1,179			\$1,179
Class 10 kg Riprap	m <sup>3</sup>	\$173	\$146	\$224	\$150			\$173
Non-Woven Geotextile (Supply and Install)	m <sup>2</sup>	\$7	\$7					\$7
Paving								
Asphalt	tonne	\$151	\$172	\$119	\$220	\$100	\$142	\$151
Pavement Removal	m <sup>2</sup>	\$9	\$7	\$12	\$6	\$13	\$7	\$9
Pavement Milling	m <sup>2</sup>	\$10	\$18	\$6	\$7		\$8	\$10
CRB	m	\$109	\$122	\$111	\$93			\$109
Sidewalks / C&G (1.8 m wide)	m	\$161		\$145	\$176			\$161
Rumble Strips	km	\$1,515	\$1,515					\$1,515
Utilities								
Water	m	\$758			\$758			\$758
Sanitary	m	\$489		\$243	\$779	\$445		\$489
Storm	m	\$500	\$500					\$500
MH (1050mm Ø)	ea	\$4,500		\$4,900	\$4,100			\$4,500
Structures								
Bridge	m <sup>2</sup> of deck							
Retaining Wall	m <sup>2</sup>	\$1,580	\$1,440		\$1,727			\$1,583
Lock Block Wall	m <sup>2</sup>	\$840	\$768	\$921				\$844
Sound Wall	m <sup>2</sup>	\$440			\$443			\$443
Bridge End Fill	m <sup>3</sup>	\$50			\$55			\$55
Steel Fences								
Pedestrain Sidewalk Fence	m	\$190			\$193			\$193
Chainlink Fence	m	\$90	\$93					\$93
Splash Pads for Conceret Lock Block Ret. Wall	ea	\$450	\$450					\$450
Electrical (Operational Construction)								
Lighting	each	\$8,500	\$8,500					\$8,500
Signs	ea	\$475		\$425		\$700		\$533
Guide Signs	ea	\$5,500	\$5,500					\$5,500
Project Sign	ea	\$2,500	\$2,500					\$2,500
New traffic Signal	ea	\$275,000						
Ped Activated Signal	ea	\$190,000						
Hydro (lm)	m	\$160	\$160					\$160
Tel (lm)	m	\$80	\$80					\$80
Detour	LS	\$100,000	\$100,000					\$100,000



Whistler Highway 99 Capacity and Safety Review

Conceptual Design Notes

MCSL Proj #: 2121-00288-02

EST.DATE August, 2018

No.	Location	Issue ID	OPTION	Start Station	End Station	Total Dist.	Segment	Comments
1	Hwy 99 / Lorimer Rd	ST-1	Short Term Option - 1	1+000	1+100	.1 km	Left / Shared Left-Through	
2	Hwy 99 / Lorimer Rd	ST-2	Short Term Option - 2	1+000	1+075	.1 km	Dual Left	- assuming 75m turning bay
3	Lake Placid Rd to Alpha Lake Road / Cheakamus Lake Rd	MT-1	Medium Term Option - 1	1+000	4+500	3.5 km	Counterflow	
4	Lake Placid Rd to South of Bayshore Dr	MT-2	Medium Term Option - 2	1+000	1+450	.5 km	2 SB lanes from Taylor Way to Bayshore Dr	
5	Taylor Way to Alpha Lake Rd	MT-3A	Medium Term Option - 3A	1+000	4+150	3.2 km	Shoulder Widening	-used an average shoulder widening of 2.25m
6	Taylor Way to Alpha Lake Rd	MT-3B	Medium Term Option - 3B	1+000	4+150	3.2 km	2 Full Lanes SB	
7	Lorimer Rd to Alpha Lake Rd	LT-1	Long Term Option - 1	1+000	6+600	5.6 km	2 Full Lanes SB	

Option Description
Re-stripe the through lane for shared through-left movements; split phase east-west operation (due to the shared lane, it is necessary to split-phase in order to ensure safe operation EB and WB)
Add a second lane in the median (minimum 75m); protected only phasing for the WB left
This option would include a counterflow lane between Lake Placid Road to just north of Alpha Lake Road / Cheakamus Lake Road. Long-term, the counterflow lane could be extended to north of Lorimer Road, but since the main operational deficiency in the corridor is the SB lane drop south of Lake Placid Road, it is not required in the medium term.
This option would continue the two SB lanes from the current terminus point south of Lake Placid Road (lane drop to Taylor Way) to approximately 125m south of Bayshore Drive
Option 3A – Drive on Shoulder: Widen the shoulder (approximately 1.5 to 2.5 m depending on existing shoulder width) to accommodate vehicle travel on the shoulder during times of congestion (e.g. during winter weekend PM peak periods). This would require additional infrastructure (Intelligent Transportation Systems – ITS) to monitor and warn drivers that they are allowed (or not) to drive on the shoulder. Additionally, bus bays (additional 3.0m) would need to be accommodated, likely behind the shoulder, as well as emergency pullouts (additional 2.5m) at about every 500m to provide areas for vehicles to pull over (in an emergency) so they are not blocking the shoulder during drive-on-shoulder operation. Additional width will also be required for areas requiring concrete roadside barriers.
Option 3B – 2 Full SB lanes: Widen SB by an entire lane (3.6m) plus standard shoulder. Additional width will be required for bus bays and areas requiring concrete roadside barriers.
While not part of the current task, McElhanney has developed a long-term option that provides two lanes SB from Lorimer Road to Alpha Lake Road (Attachment E). This is provided for discussion purposes as it is likely, in the long term, two SB lanes will be required to accommodate the heavy SB volume between Lorimer Road and Alpha Lake Road.

# Whistler Highway 99 Capacity and Safety Review

MCSL Proj #: 2121-00288-02

## Conceptual Design Volumes

EST.DATE August, 2018

No.		1	2	3	4	5	6	7
Option ID		ST-1	ST-2	MT-1	MT-2	MT-3A	MT-3B	LT-1
Option	U of M	Short Term Option - 1 Left / Shared Left-Through	Short Term Option - 2 Dual Left	Medium Term Option - 1 Counterflow	Medium Term Option - 2 2 SB lanes from Taylor Way to Bayshore Dr	Medium Term Option - 3A Shoulder Widening	Medium Term Option - 3B 2 Full Lanes SB	Long Term Option - 1 2 Full Lanes SB
Start Sta.	m	1+000	1+000	1+000	1+000	1+000	1+000	1+000
End Sta.	m	1+100	1+075	4+500	1+450	4+150	4+150	6+600
Dist	km	0.10	0.08	3.50	0.45	3.15	3.15	5.60
Type A Excavation	m <sup>3</sup>	0	0	12,600	1,944	7,088	11,340	36,288
Type D Excavation	m <sup>3</sup>	35	93	11,340	1,458	6,379	10,206	18,144
Stripping	m <sup>3</sup>	0	0	5,880	756	4,016	5,292	9,408
Cl. & Gr. (3m off toe)	ha	0.0	0.0	3.0	0.4	2.3	2.7	4.8
Embankment (Fill)	m <sup>3</sup>	35	93	35,280	4,536	19,845	31,752	56,448
AP	ton	42	112	4,320	555	1,715	3,888	6,912
CBC	m <sup>3</sup>	52	139	5,880	756	2,599	5,292	9,408
SGSB	m <sup>3</sup>	52	139	6,468	832	2,859	5,821	10,349
Culverts	each	0	0	0	0	0	0	0
Pavement Removal	m <sup>2</sup>	174	174	700	90	630	630	1,120
Milling	m <sup>2</sup>	30	132	5,250	675	4,725	4,725	8,400
Signals	each	0	0	1.5	0.5	1.5	1.5	1.5
Lights	each	0	4	12	4	4	4	12
Guard Rail	m	0	0	2,450	135	2,205	2,205	3,360
Hydro	m	0	0	1,400	0	1,260	1,260	2,240
Telephone	m	0	0	1,400	0	1,260	1,260	2,240
Water	m	0	0	0	0	0	0	0
Sanitary	m	0	0	0	0	0	0	0
Storm	m	0	0	0	0	0	0	0
Ped Overpass	m <sup>2</sup>	0	0					180
Bridge 2	m <sup>2</sup>	0	0					
Bridge 3	m <sup>2</sup>	0	0					
Bridge 4	m <sup>2</sup>							
Bridge 5	m <sup>2</sup>							
Total Bridge Area	m <sup>2</sup>	0	0	0	0	0	0	180
Wall 1	m <sup>2</sup>	0	0	6,125	1,095	4,900	6,125	12,125
Wall 2	m <sup>2</sup>	0	0					
Wall 3	m <sup>2</sup>	0	0					
Wall 4	m <sup>2</sup>	0	0					
Wall 5	m <sup>2</sup>							
Total Wall Area	m <sup>2</sup>	0	0	6,125	1,095	4,900	6,125	12,125

Whistler Highway 99 Capacity and Safety Review  
Conceptual Design Volumes

MCSL Proj #: 2121-00288-02  
EST.DATE August, 2018

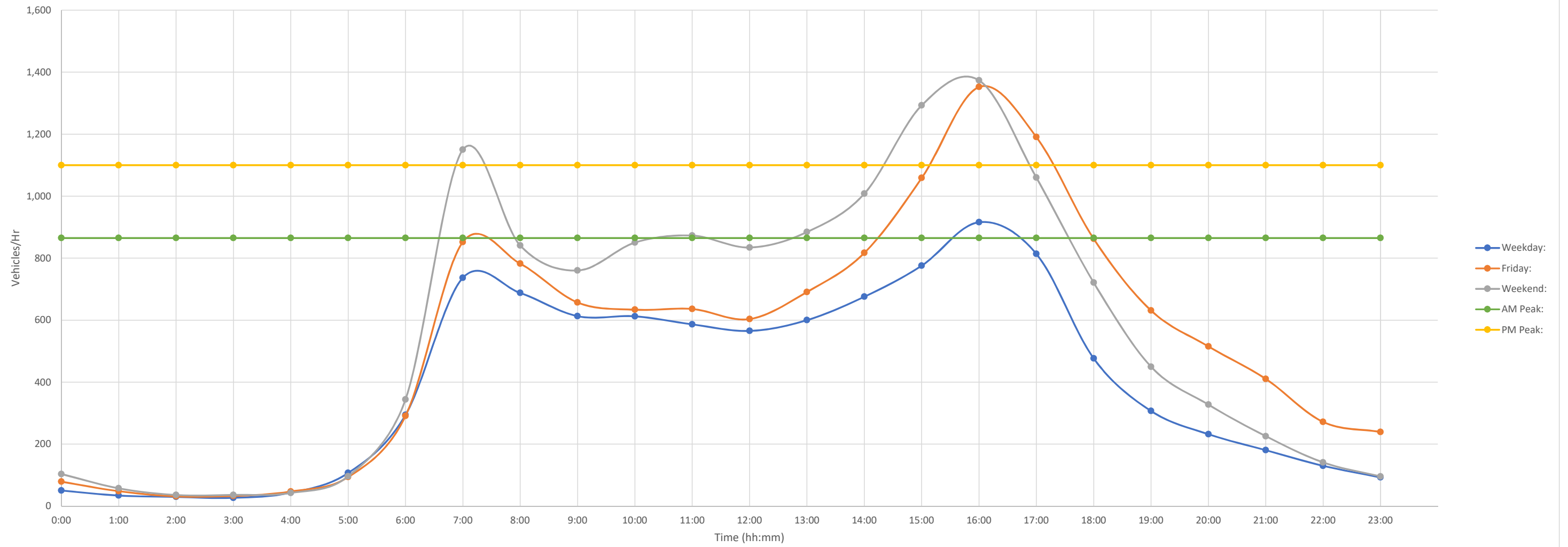
No.	Issue ID	Name	Start Station	End Station	Total Dist. (m)	Cut (Rock + OM)	Rock Cut	OM	Usable OM	Usable Fill	Stripping (All waste)	Fill	OM Borrow / Surplus	OM Waste	Total Vol. Req.	AP (ton)	CBC	SBSB
1	ST-1	Short Term Option - 1 Left / Shared Left-Through	1+000	1+100	0	35	0	35	17	17	0	35	(17)	17	52	42	52	52
2	ST-2	Short Term Option - 2 Dual Left	1+000	1+075	0	93	0	93	46	46	0	93	(46)	46	139	112	139	139
3	MT-1	Medium Term Option - 1 Counterflow	1+000	4+500	4	23,940	12,600	11,340	5,670	18,270	5,880	35,280	(17,010)	5,670	46,830	4,320	5,880	6,468
4	MT-2	Medium Term Option - 2 2 SB lanes from Taylor Way to Bayshore Dr	1+000	1+450	0	3,402	1,944	1,458	729	2,673	756	4,536	(1,863)	729	6,021	555	756	832
5	MT-3A	Medium Term Option - 3A Shoulder Widening	1+000	4+150	3	13,466	7,088	6,379	3,189	10,277	4,016	19,845	(9,568)	3,189	27,051	1,715	2,599	2,859
6	MT-3B	Medium Term Option - 3B 2 Full Lanes SB	1+000	4+150	3	21,546	11,340	10,206	5,103	16,443	5,292	31,752	(15,309)	5,103	42,147	3,888	5,292	5,821
7	LT-1	Long Term Option - 1 2 Full Lanes SB	1+000	6+600	6	54,432	36,288	18,144	9,072	45,360	9,408	56,448	(11,088)	9,072	74,928	6,912	9,408	10,349



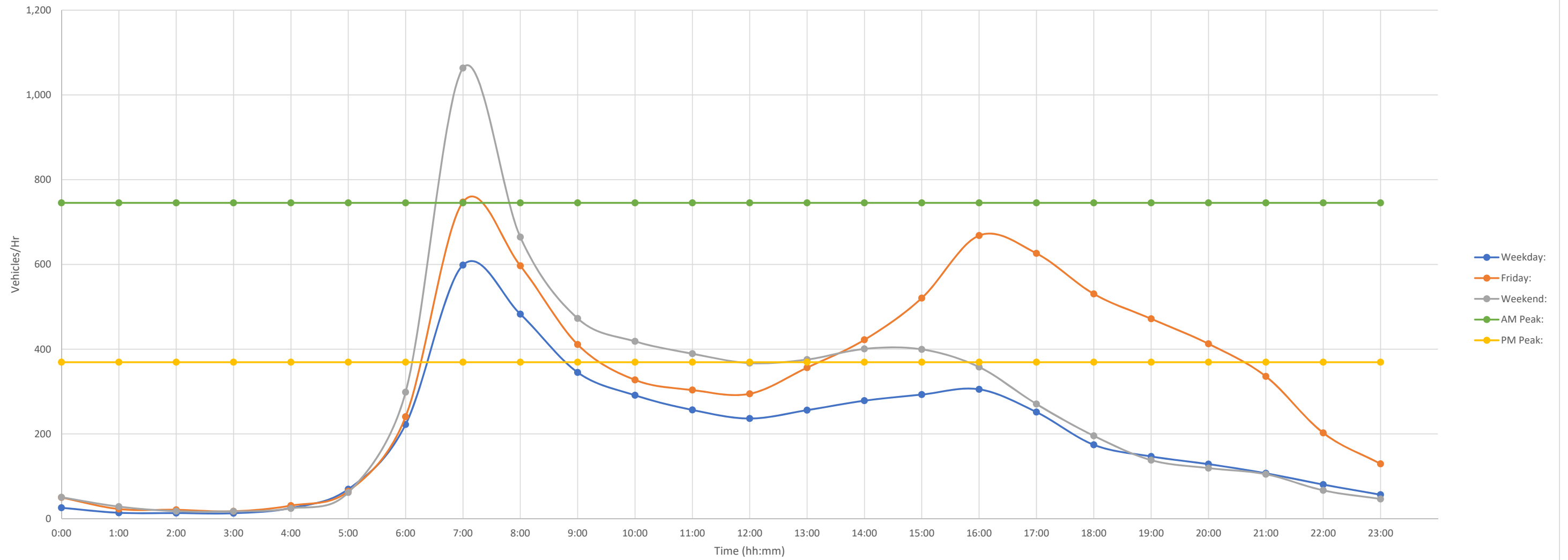
## Appendix K – Count Station Volume Graphs

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2018 Winter 24-Hr Volume Profiles - Both Directions  
Station P-15-3NS

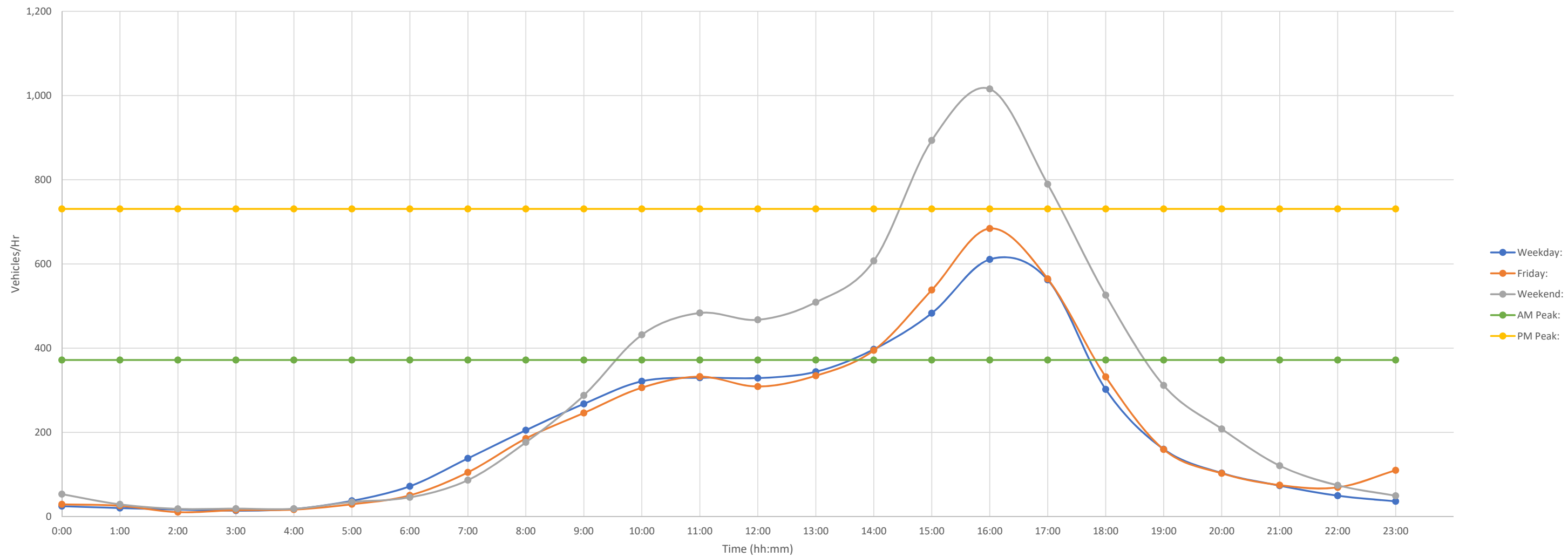


2018 Winter 24-Hr Volume Profiles - Northbound  
Station P-15-3NS

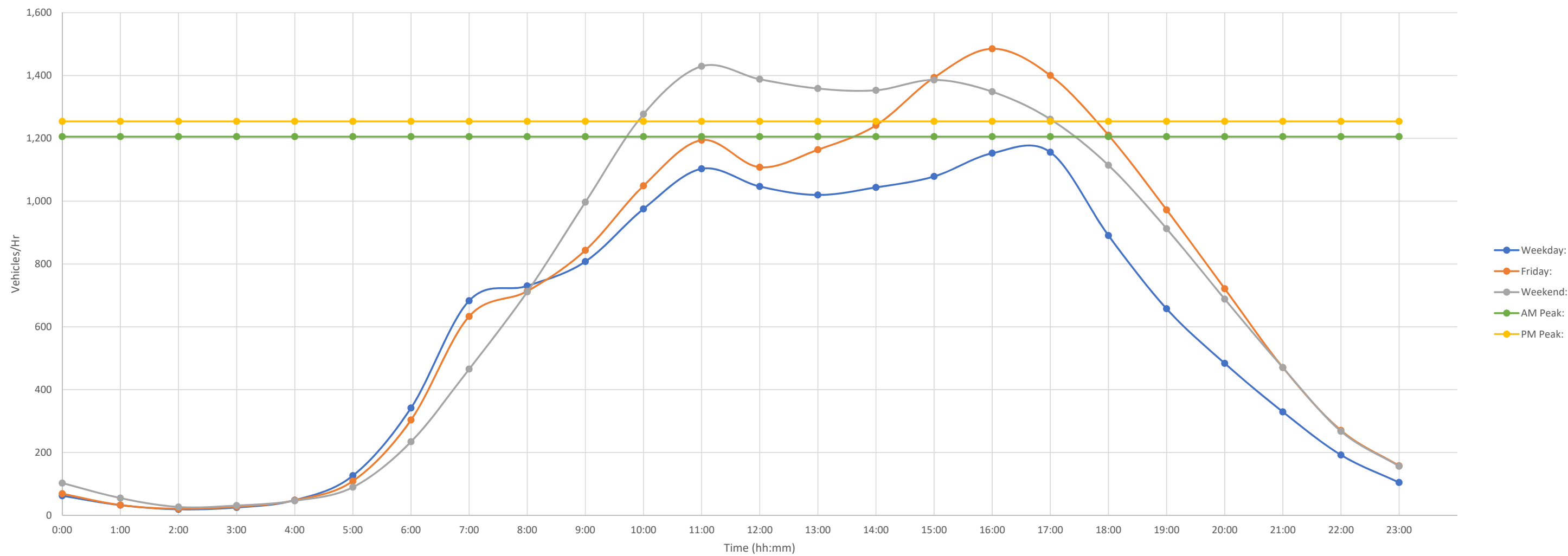




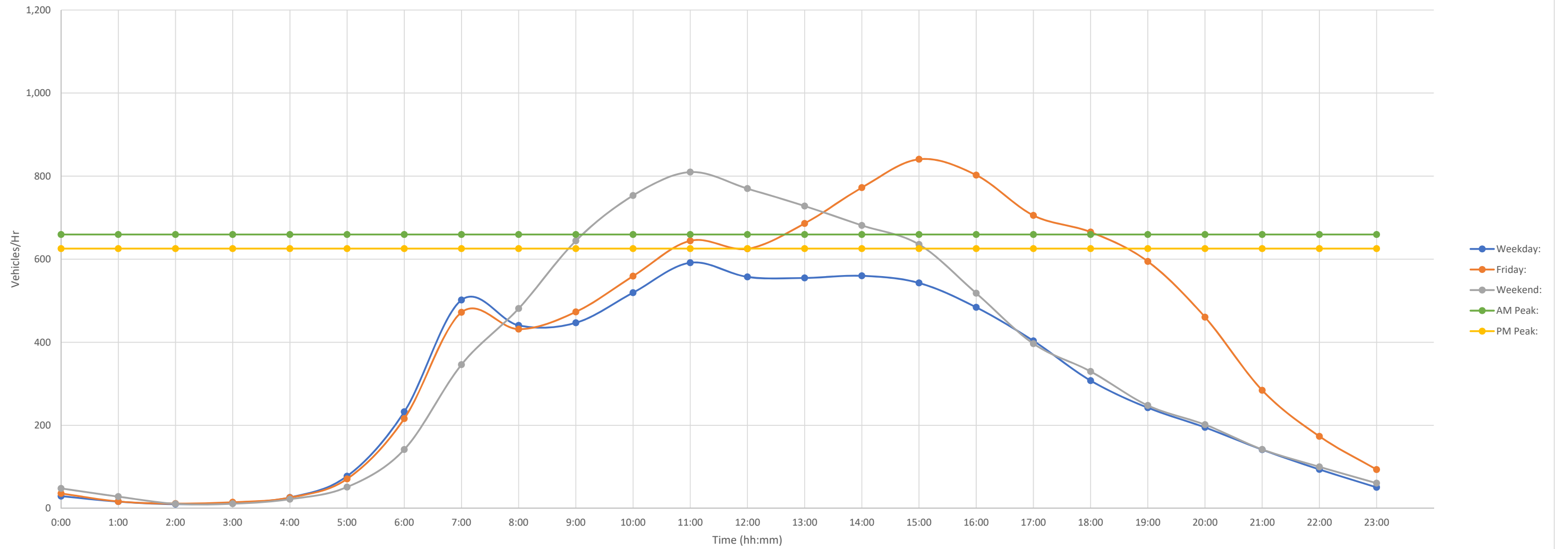
2018 Winter 24-Hr Volume Profiles - Southbound  
Station P-15-3NS



2018 Summer 24-Hr Volume Profiles - Both Directions  
Station P-15-3NS

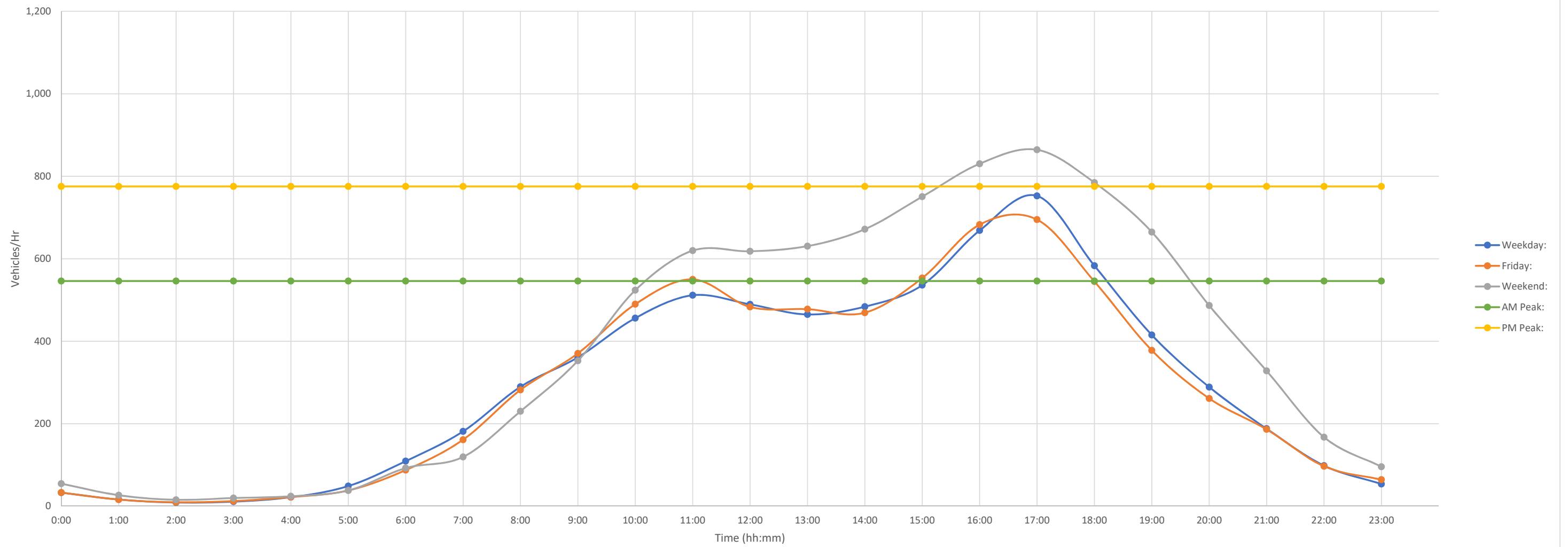


2018 Summer 24-Hr Volume Profiles - Northbound  
Station P-15-3NS

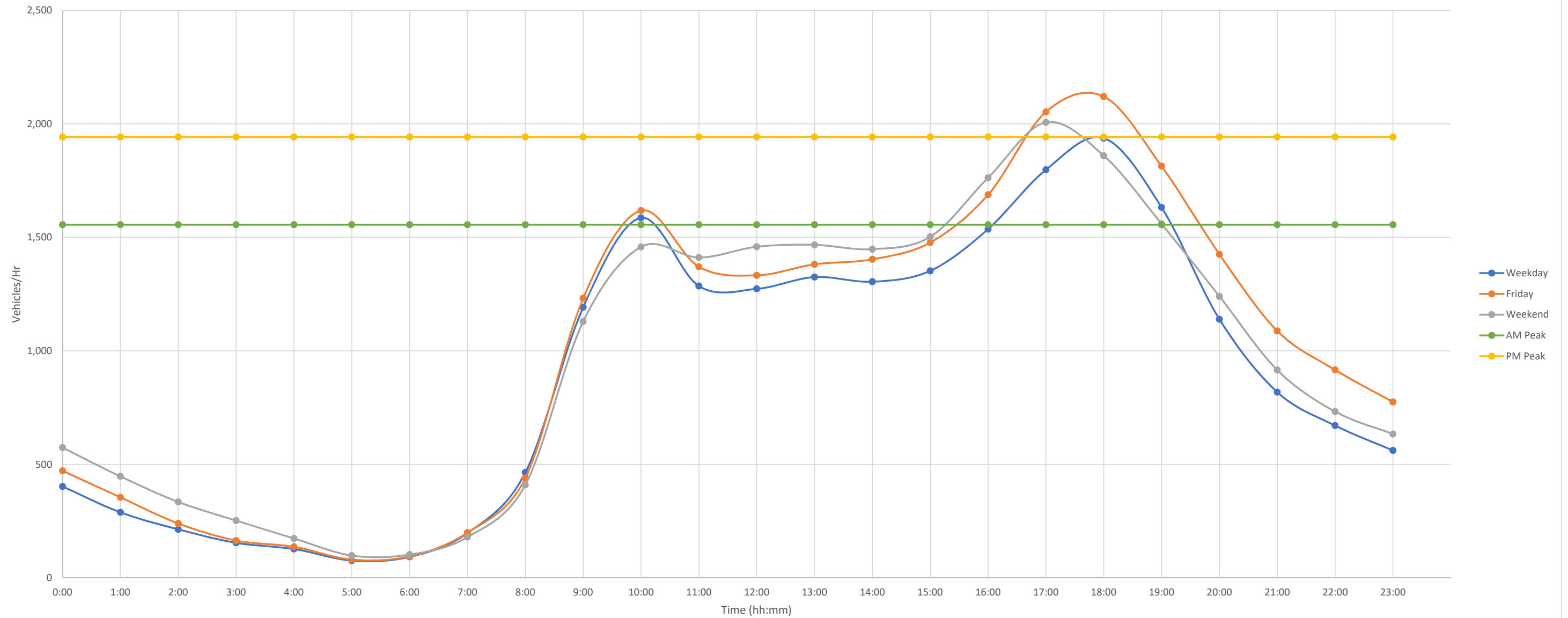




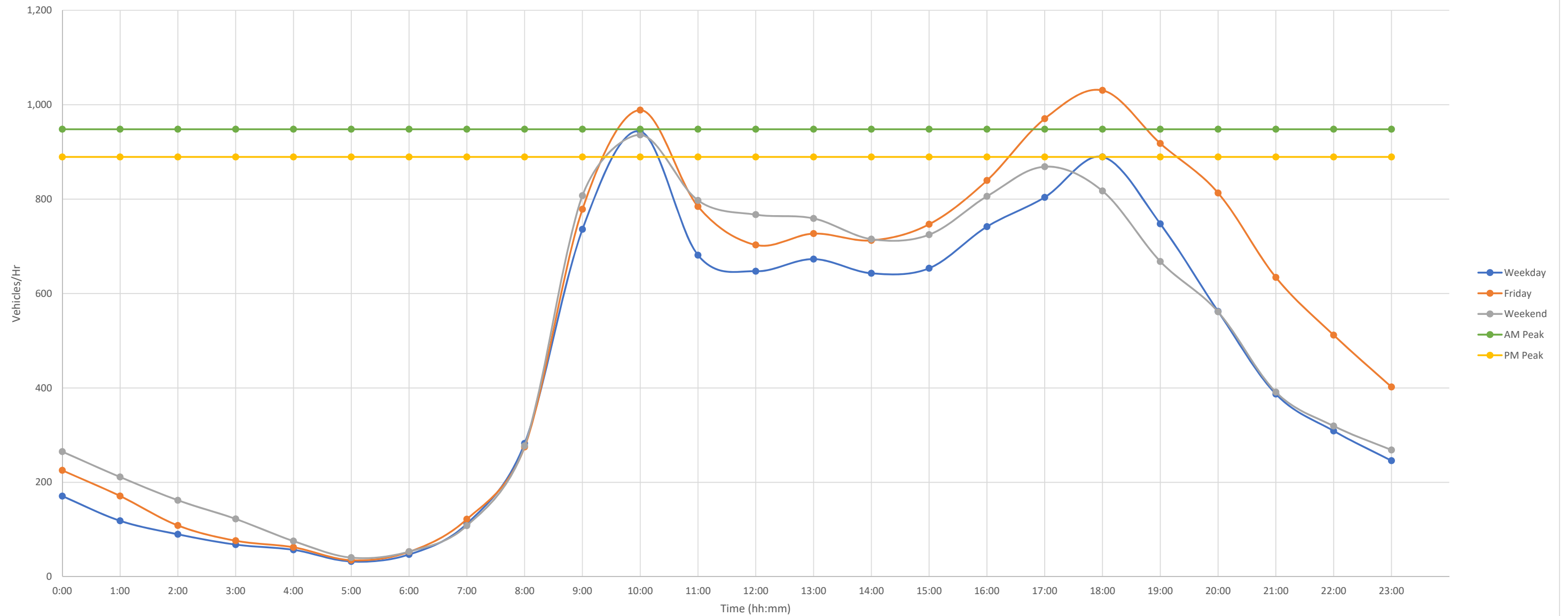
2018 Summer 24-Hr Volume Profiles - Southbound  
Station P-15-3NS



2018 Winter 24-Hr Volume Profiles - Both Directions  
North of Brio Entrance

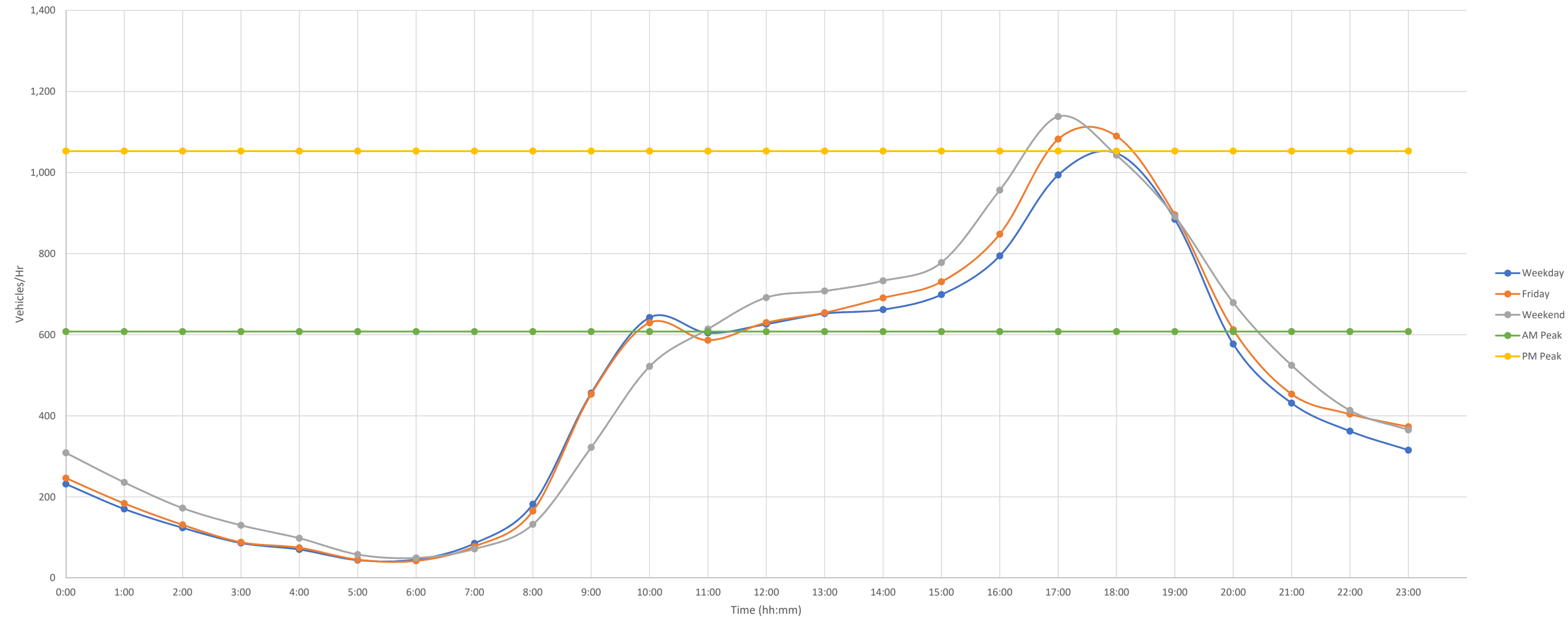


2018 Winter 24-Hr Volume Profiles - Northbound  
North of Brio Entrance

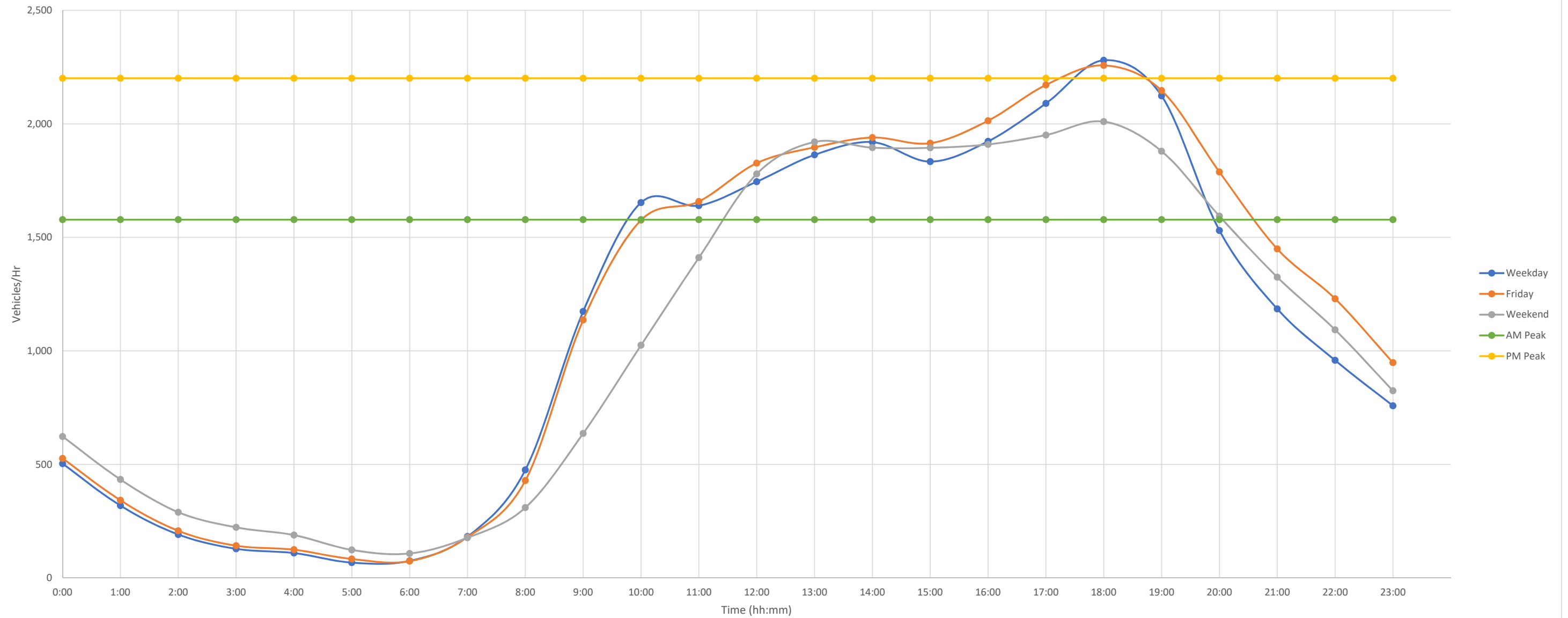




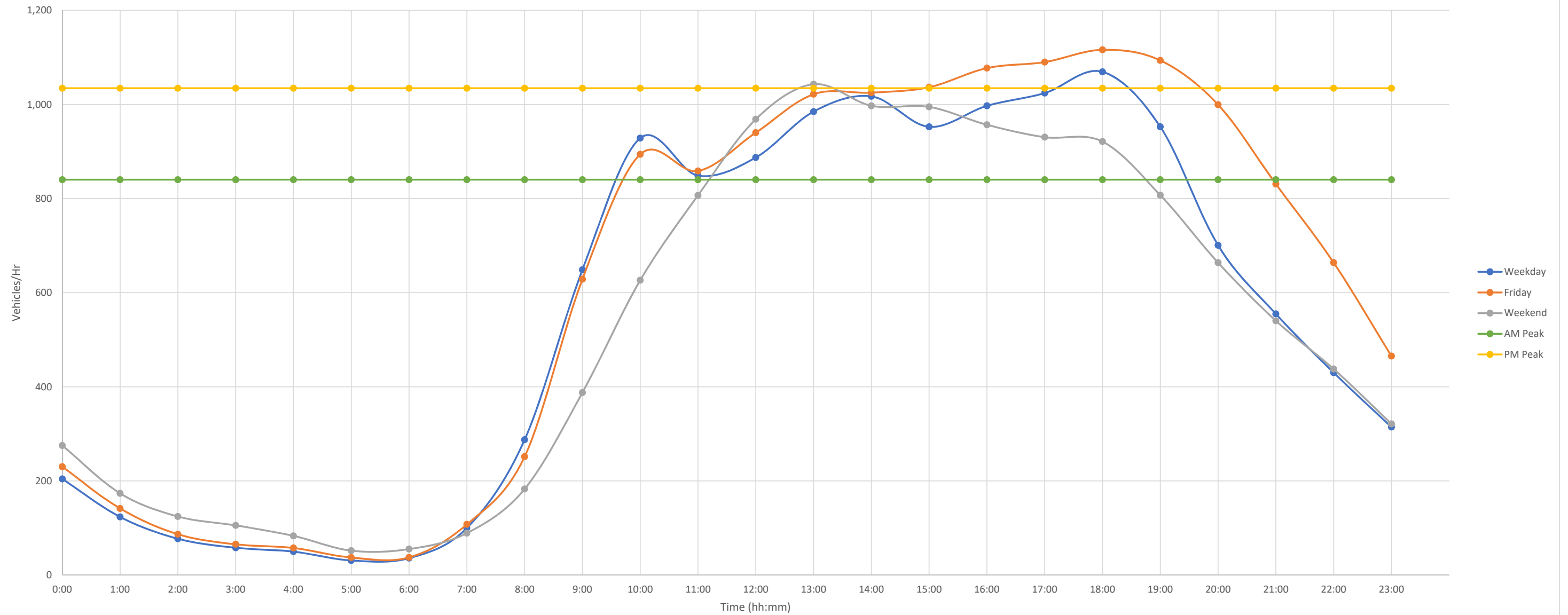
2018 Winter 24-Hr Volume Profiles - Southbound  
North of Brio Entrance



2018 Summer 24-Hr Volume Profiles - Both Directions  
North of Brio Entrance



2018 Summer 24-Hr Volume Profiles - Northbound  
North of Brio Entrance





2018 Summer 24-Hr Volume Profiles - Southbound  
North of Brio Entrance

