

Furry Creek Transportation Impact Assessment

Draft V1

Prepared for
Creus Engineering Ltd.

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Dear Kevin:

**Re: Furry Creek
Transportation Impact Assessment**

As requested, Bunt & Associates (Bunt) has prepared a detailed Transportation Impact Assessment for the proposed development at Furry Creek. The following report provides a high level overview of existing transportation conditions on the study network and the anticipated transportation impacts of the proposed development.

We trust that the information provided in the attached report will be of assistance to you and your team for the development application. Please contact us, should you have any questions.

Yours truly,
Bunt & Associates



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EXECUTIVE SUMMARY

The “Oceanside Community of Furry Creek” proposes several clusters of development distributed on the east and west sides of Highway 99. Bunt & Associates was engaged to provide an updated traffic study that identifies the anticipated pre and post development levels of service at all receiving streets, intersections, and highway connections to support the rezoning submission.

A Preliminary Layout Approval (PLA) was obtained for the Furry Creek lands in 1991 which indicated 920 Residential Units, a golf course, a Resort/Hotel, and a 145 boat marina. Since then, the golf course has been built along with a total of 90 single family lots, 56 townhomes, and 4 duplexes. The highway interchange has also been constructed to accommodate the future traffic anticipated from the full build-out of the development.

Bunt conducted traffic counts in December 2018 during the Friday (3:00 PM – 6:00 PM) and Sunday (3:00 PM – 6:00 PM) peak periods on the area street system. These times were selected to coincide with the high weekend demand on the Sea-to-Sky Highway. Counts were collected at the Highway 99 on and off ramps and at the key intersections within the local road network. An analysis of existing traffic operations found all movements at all intersections operating Level of Service (LOS) B or better.

Count data from the BC MoTI Eagle Ridge permanent count station (located just north of horseshoe Bay) was analyzed to establish background traffic volumes for the future traffic scenarios. The traffic count data indicated that peak hour traffic volumes during the summer were typically around 30% higher than those in December. Accordingly, the traffic volumes analyzed were adjusted to reflect the peak summer period. A 3.0% peak hour traffic growth rate was observed between 2011 and 2017, although based on the maximum observed traffic volumes it is unlikely that this rate could be sustained without major corridor upgrades to Highway 99.

The proposed development is anticipated to generate a total of 815 new trips in the Friday PM peak hour and 711 trips during the Sunday peak hour. Traffic from the nearby proposed Britannia developments was also considered in this analysis. Based on previous reports, these developments were assumed to generate 800 trips during the Friday peak hour and 600 trips during the Sunday peak hour. The Furry Creek and Britannia trips were subtracted from the background traffic growth to avoid double counting. The peak traffic periods for the existing community and for the highway were found to occur at different times, although as a conservative assumption for the analysis these peaks were assumed to coincide.

With the anticipated future total traffic volumes, all movements at all intersections within the study area are anticipated to operate at LOS B or better, and the Highway 99 on and off ramps operate at LOS C or better. Accordingly, our analysis indicated no need for laning or traffic control modifications to the exiting intersections and ramps.

The 2015 BC Transit Sea-to-Sky Transit Future Plan recommends considering providing local transit service from Squamish to locations further south, and Furry Creek is the furthest south of the areas mentioned. Interregional transit service connecting the communities along the Sea-to-Sky corridor is also recommended. To better accommodate alternate modes of transportation, Bunt recommends planning for bus pullouts along Highway 99 and within the local road network. Additional pedestrian facilities are also recommended along Furry Creek Drive and connecting to the proposed new neighborhoods.

1. INTRODUCTION

1.1 Study Purpose & Objectives

The proposed development is located at Furry Creek along Highway 99 between Vancouver and Squamish, as illustrated in **Exhibit 1.1**. The “Oceanside Community of Furry Creek” plans several clusters of development distributed on the east and west sides of Highway 99, and has been developed in stages since its creation in 1991. A Preliminary Layout Approval (PLA) was obtained for the lands in 1991 which indicated 920 Residential Units, a golf course, a Resort/Hotel, and a 145 boat marina and chandlery.

A traffic report for the development was prepared originally, and updated in 1995, although this is no longer considered of use due to the time elapsed and changes that have taken place along the Sea-to-Sky Corridor since it was prepared. The purpose of this study is to identify the pre and post development levels of service at all receiving streets, intersections, and highway connections to support the rezoning submission, as required by the Squamish-Lillooet Regional District (SLRD).

1.2 Study Scope & Area

The study area includes the following intersections:

- Highway 99 at Northbound On/off Ramps
- Northbound On/off Ramps & Furry Creek Drive
- Furry Creek Drive & Country Club Road
- Howe Sound Drive & Sea View Drive
- Highway 99 at Southbound On/off Ramps
- Sea View Drive & Furry Creek Drive

Traffic counts were collected at the existing intersections in this study area during the Friday and Sunday peak traffic periods on the area road system. These days were selected to coincide with the high weekend demand on the Sea-to-Sky Highway (Highway 99) corridor. Traffic capacity analysis was carried out at the study area intersections for existing traffic conditions, at full build-out of the development (assumed to be 2028) and full build-out + 10 years (2038).

1.3 Organization of Report

The report is organized as follows:

- Section 2 reviews the existing transportation conditions;
- Section 3 assesses the future traffic conditions;
- Section 4 provides high level design recommendations for the site plan; and,
- Section 5 provides the study’s conclusions and recommendations.

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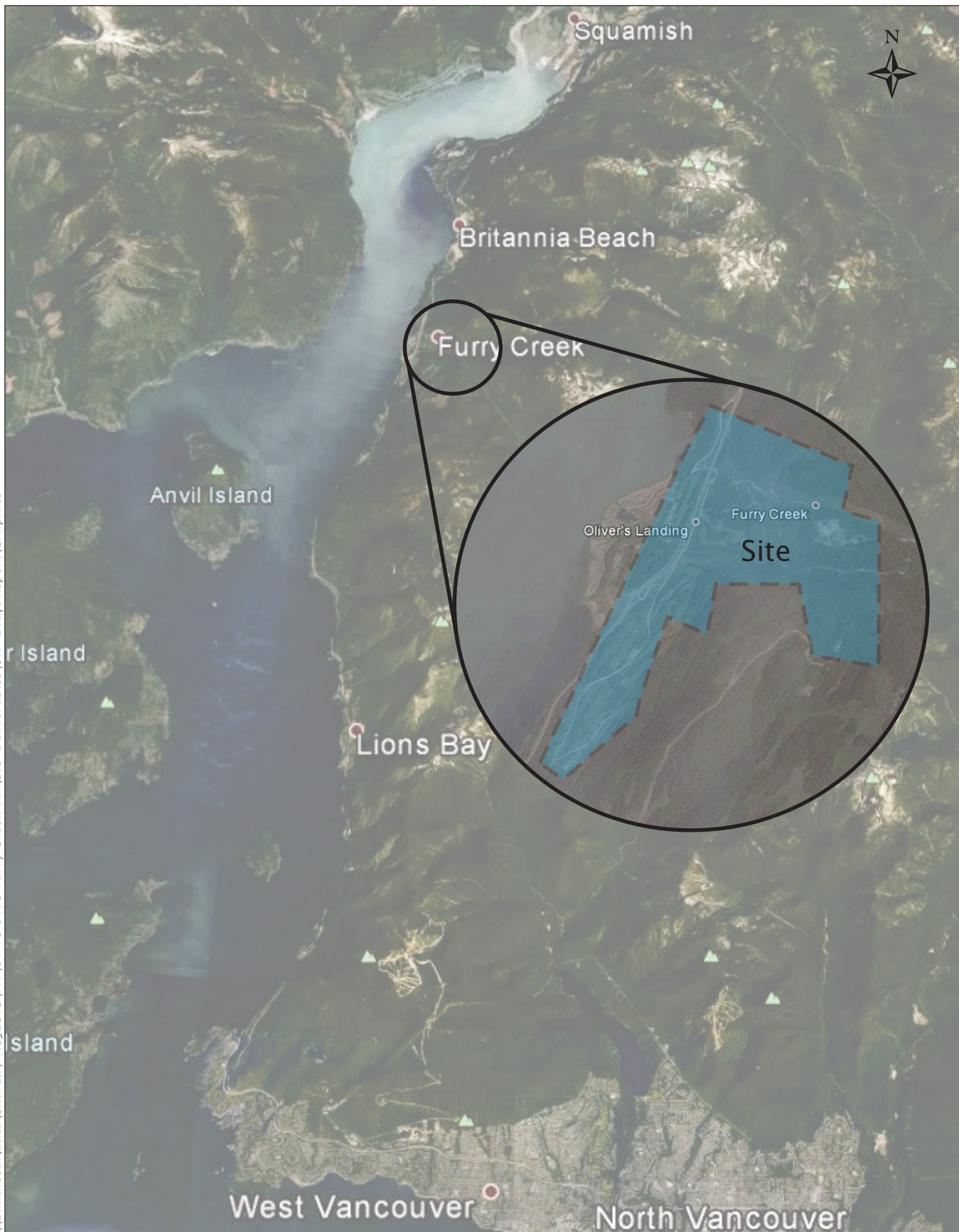


Exhibit 1.1 Site Location & Study Area

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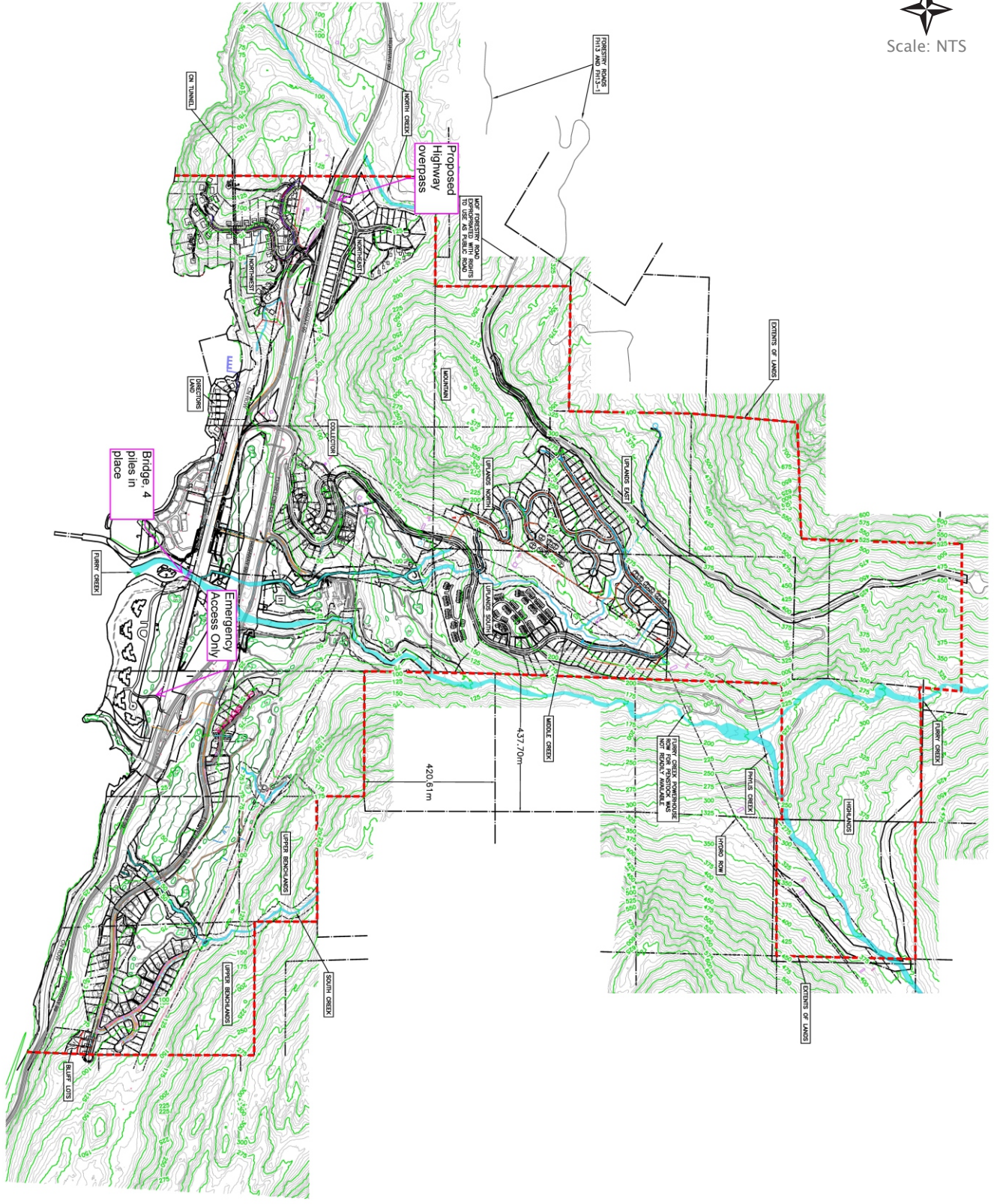
1.4 Proposed Development

The “Oceanside Community of Furry Creek” has been developed in stages since its creation in 1991. Fine Peace have purchased the remaining undeveloped lands. This includes the golf course, the next phase of Oliver Landing Townhouse development on the north side of Furry creek as well as 6.29 ha portion south of Furry Creek. These were purchased from Burrard Group. The Uplands are owned by Tanac which is controlled by Park Lane/Wesgroup. The lands are currently under contract by Fine Peace. The lands compromise approximately 263 ha (~650 ac) split into 15 legal entities. District Lots 4149, 4145, 4144, 4007, 3727, 2922 and 2924 are undivided district lots east of the highway that have no access to civil services or constructed roads.

The lands are Part of what is known as the Oceanside Community of Furry Creek. The lands are within the Squamish Lillooet Regional District (SLRD). The lands are less than 50 km north of Vancouver and 70 km south of Whistler.

A Preliminary Layout Approval (PLA) was obtained for the lands on April 30, 1991 which indicated 920 Residential Units, a golf course, Resort/Hotel, 145 boat marina and chandlery. The PLA was updated April 30, 1993 and has been further updated since though it has been difficult to get copies of any of the PLAs issued since. A copy of the PLA is contained in Appendix 8. To date there has been 5 phases of Single Family and one phase of townhouse development as well as subdivision of the golf course, clubhouse and service lots. This has created 56 townhouse units and community centre on the waterfront side of the highway. There is the Clubhouse, Service lots, 90 single family and 4 duplex lots that have been created to date on the east side of the highway.

The current “Oceanside Community of Furry Creek” proposal includes 920 residential units, the golf course, 120 room resort, 15,000 ft² of village commercial, up to 45 berth locals marina as well as up to 120 below market housing units. The mix of single family and multi family is moving towards more multi family. The uses are spread out through several clusters of development distributed on the east and west sides of Highway 99. **Exhibit 1.2** illustrates the proposed site plan.



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Exhibit 1.2 Site Plan

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Table 1.1 shows the land use statistics that were used in this traffic analysis. Several areas of the development had flexibility in the number of units that could be provided, so the maximum number of units assumed for each cluster was scaled down by a overall factor to meet 920 unit maximum. The development clusters are broken down by the locations where they connect to the study area road network, which was required for traffic forecasting purposes. These categories are:

- **Accessed from Furry Creek Drive (South):** Includes the portions of the development located east of Highway 99 and south of the northbound on/off-ramp.
- **Accessed from Country Club Road:** Includes the portions of the development located along the road to the Furry Creek Golf Course Clubhouse. The golf course was closed when the traffic counts took place, so the additional trip generation from the existing golf course were also forecast from here.
- **Accessed from Sea View Drive:** Includes the portions of the development located east of Furry Creek Drive along Sea View Drive. There are units proposed between holes of the golf course and also east of the Golf Course along the mountainside.
- **Accessed from Waterfront Drive:** Includes the waterfront portions of the development located west of the CN Rail Line on the west side of Highway 99. This includes an expansion of the existing Oliver's landing neighborhood, as well as additional development areas to the South of Furry Creek, which will be access by a new bridge, and to the along an extension of Beach Drive.
- **Accessed from Howe Sound Drive:** Includes areas at the north end of the site adjacent to the highway 99 southbound on/off ramp. There are proposed units on the west side of Highway 99, as well as the eastside which will be accessed from a new overpass crossing the Highway.

Table 1.1: Proposed Land Uses

LOCATION	LAND USE	DENSITY
Accessed from Furry Creek Drive (South)	Single family homes	39 units
Accessed from Country Club Road	Resort hotel	100 rooms
Accessed from Sea View Drive	Single family homes	232 units
Accessed from Waterfront Drive	Single family homes	31 units
	Low rise multi-family homes	19 units
	Mid-rise multi-family homes	255 units
	Commercial uses	19,000 ft ²
	Marina	80 berths
Accessed from Howe Sound Drive	Single family homes	194 units

2. EXISTING CONDITIONS

2.1 Land Use

Furry Creek has been developed in stages since the original plan was created in 1991. Phase 1 of the development was built in 1993 and included the Golf Course and 24 residential lots. Since then, a total of 90 single family lots and 4 duplexes have been constructed on the east side of Highway 99, and 56 townhomes have been constructed on the west side adjacent to the ocean. **Exhibit 2.1** illustrates the existing land uses.

2.2 Existing Transportation Network

2.2.1 Road Network

Furry Creek is served by a network of local roads accessed from on and off ramps along Highway 99. The northbound on and off ramps are located at the south end of the site, and the southbound on and off ramps are located at the north end of the site. An underpass connects the portions of the site on the east and west sides of Highway 99, and connects the northbound and southbound ramps to allow for grade separated full movements access to and from the highway. This grade separated interchange was completed in 1997 to accommodate the full build-out traffic generated by the site. An at-grade crossing of the CN Rail Line is located along Waterfront Drive which connects to the Oliver's Landing Neighborhood. **Exhibit 2.2** illustrates the existing road network and **Exhibit 2.3** illustrates the existing laning and traffic control.

On the east side of the site, Furry Creek Drive provides north-south connectivity between a series of minor access roads. Sea View Drive connects the east and west sides of the site across the Highway 99 underpass, and also extends far into the mountains of the east side of the site as a gravel road. On the west side of the site, Waterfront Drive connects to the existing Oliver's Landing neighborhood to the south of the overpass, and Howe Sound Drive extends to the Highway 99 southbound on-off ramps to the north of the overpass. **Table 2.1** summarizes the existing street characteristics.

Table 2.1: Existing Street Characteristics

STREET	CLASSIFICATION	NUMBER OF TRAVEL LANES	POSTED SPEED	PARKING FACILITIES
Highway 99 (Sea-to-Sky Highway)	Rural Arterial Divided	4	90 km/h	None
Furry Creek Drive	Local	2	50 km/h	None
Country Club Road	Local	2	50 km/h	None
Sea View Drive	Local	2	50 km/h	None
Waterfront Drive	Local	2	50 km/h	None
Howe Sound Drive	Local	2	50 km/h	None

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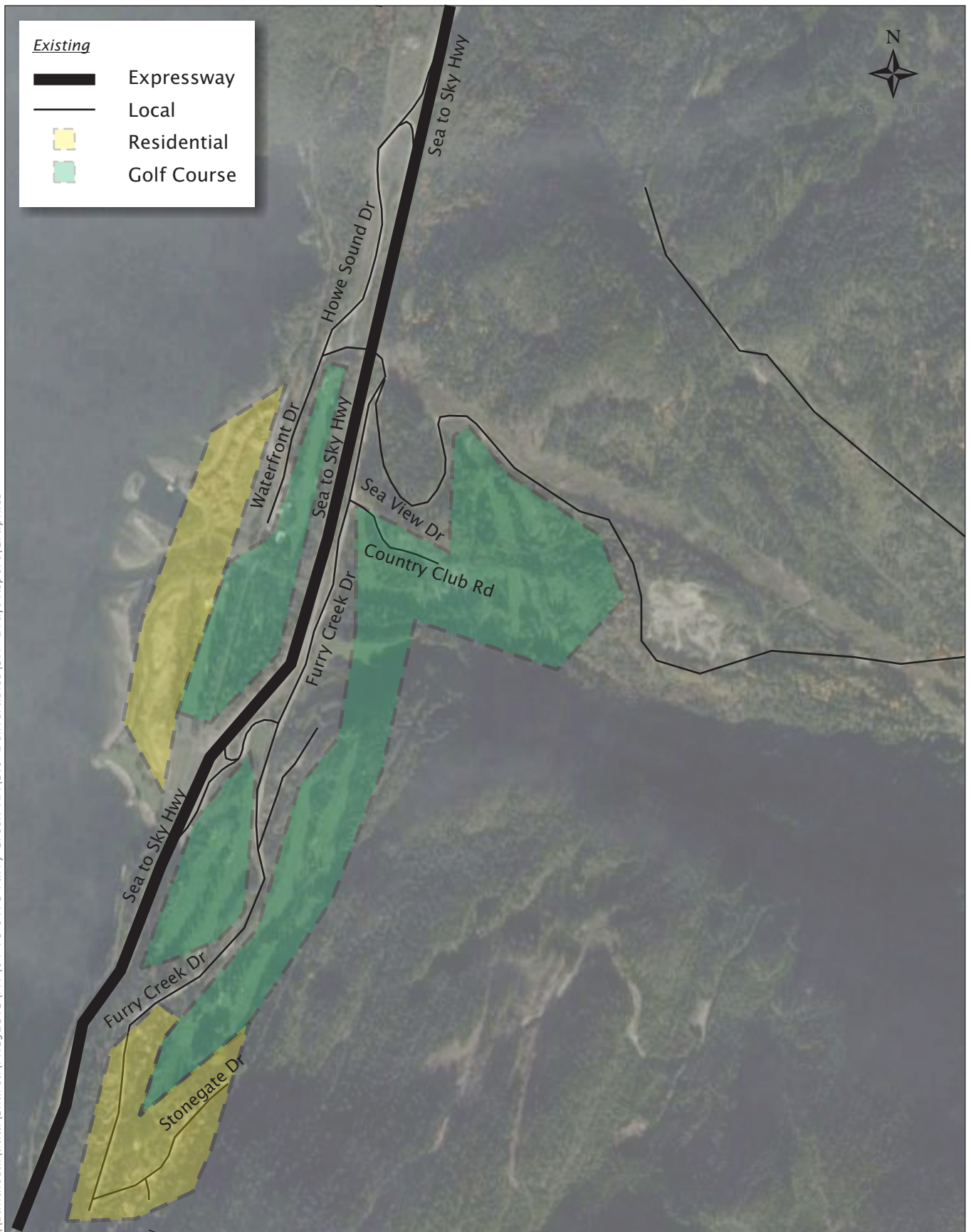


Exhibit 2.1 Existing Land Use

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Exhibit 2.2 Existing Road Network

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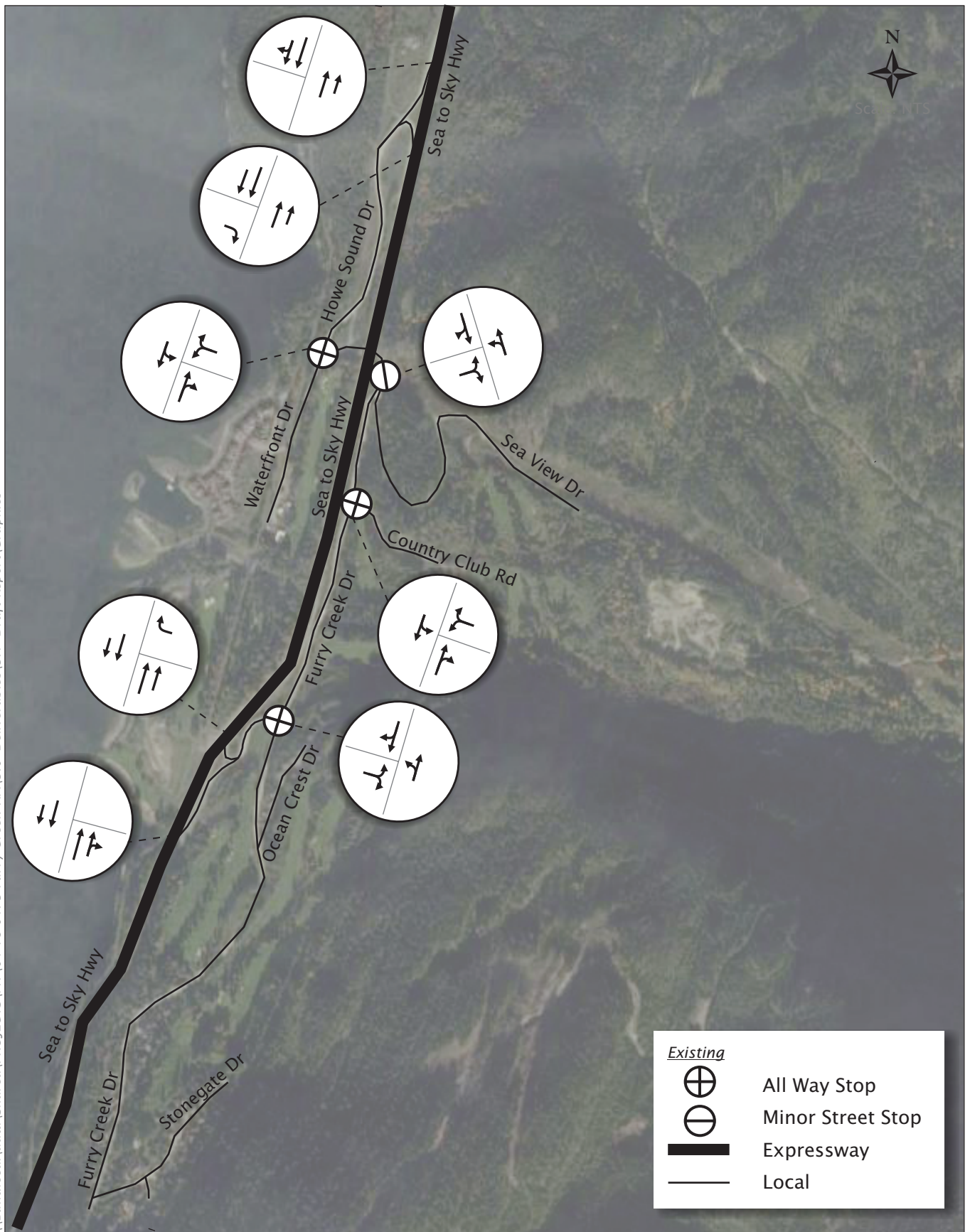


Exhibit 2.3 Existing Laning & Traffic Control

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2.2.2 Transit Network

Currently, there is no existing transit service within the study area. A bus pull out exists at the south end of the study area, adjacent to the northbound off-ramp. There is no pullout for buses travelling in the southbound direction.

2.2.3 Cycling & Pedestrian Networks

Limited pedestrian facilities are provided through the site with sidewalks along one side of the road provided along portions of Furry Creek Drive, Sea View Drive, and Waterfront Drive. Additional connectivity is provided by the network of paths that connect the different areas of the Golf Course. There are also paved road shoulders that can be used by pedestrians. There are no cyclist facilities through the study area, although the Highway 99 road shoulders are regularly used by cyclists. **Exhibit 2.4** illustrates the existing pedestrian facilities within the study area.

2.3 Current Relevant Policies & Plans

As Furry Creek is its own isolated community, there are limited plans and policies impacting the study area aside from the development plan for Furry Creek itself. Other notable plans are:

2.3.1 BC Transit Sea-to-Sky transit Future Plan (2015)

This document includes future plans for local transit service, regional transit service connecting the communities within the Sea-to-Sky area, and interregional transit network that connects the Sea-to-Sky region and Metro Vancouver. The plans long term strategies include introducing new local transit service to select areas such as the North Squamish Parks District, Furry Creek, and Britannia Beach.

2.3.2 South Britannia Beach Master Plan (2014)

This document plans for a new neighborhood south of the existing Britannia Beach community, which was planned to provide between 850 and 1,000 residential units with a mix of single family and multi-family homes. The planned community is planned to be developed in phases over a 15 – 20 year period.

2.3.3 Britannia Oceanfront Development (2017)

According to this document, the proposed mixed use development, located at the entry to Britannia Beach North at Copper Drive, includes 82 residential units, 436 m² (4,690 sq.ft) of new commercial space, 2605 m² (28,035 sq.ft.) of existing commercial space, a total of 278 parking spaces, a bus lay-by, and the preservation of 12 existing “heritage” buildings.

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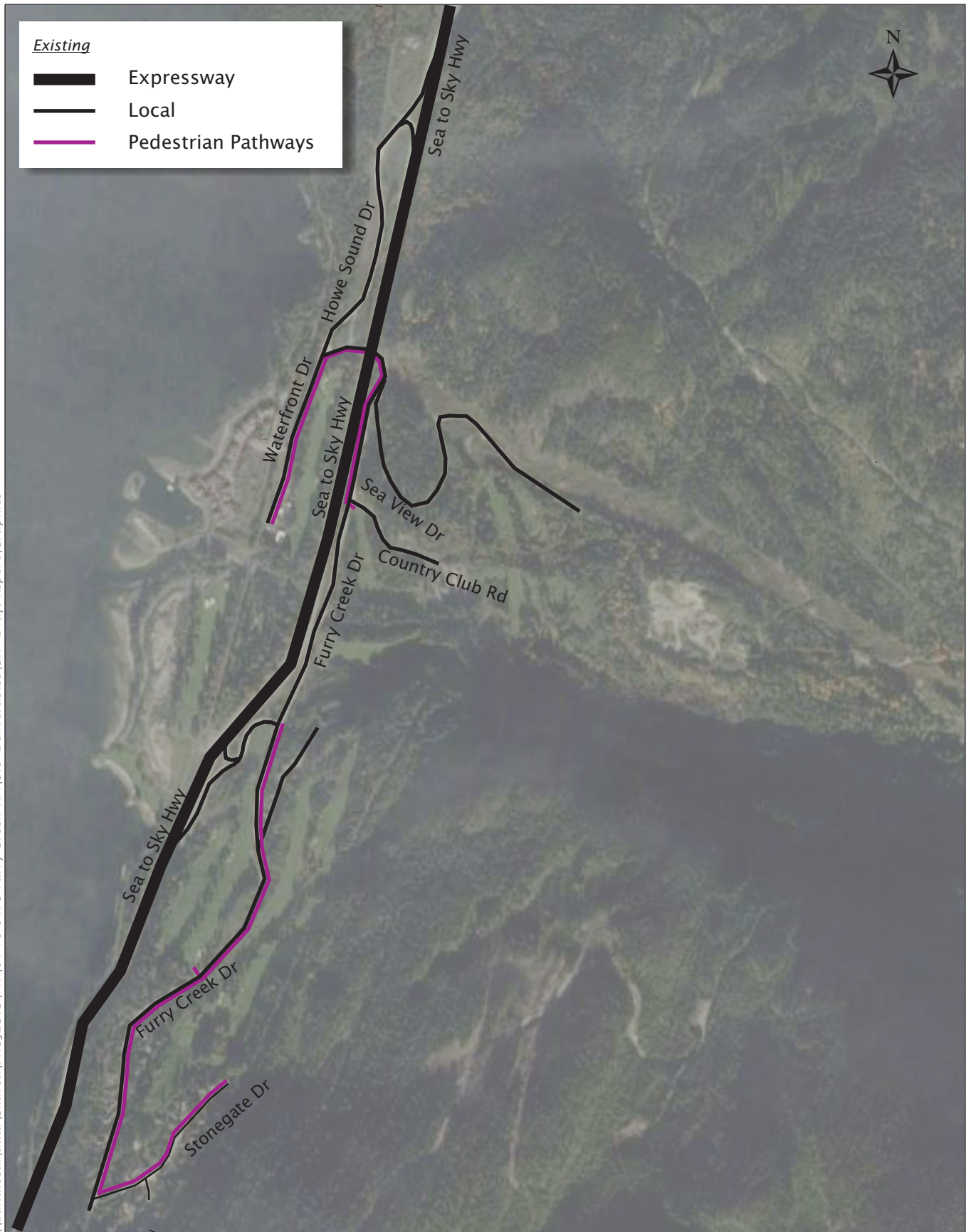


Exhibit 2.4 Existing Pedestrian Facilities

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2.4 Data Collection

2.4.1 Traffic Data Collection Program

Bunt conducted traffic counts in December 2018 during the Friday (3:00 PM – 6:00 PM) and Sunday (3:00 PM – 6:00 PM) peak periods on the area street system. These days were selected to coincide with the high weekend demand on the Sea-to-Sky Highway. As traffic volumes are typically higher on this segment of Highway 99 during the summer, seasonal adjustments are applied to the base traffic volume in the future conditions analysis scenarios (background and total). These adjustments are detailed in **Section 3.1.1**. **Table 2.2** summarizes the data collection program as well as the peak hours for the intersections and overall study area. Raw traffic count data for each intersection is provided in **Appendix B**.

Table 2.2: Summary of Available and Counted Traffic Data

INTERSECTION	SOURCE	DATE OF COUNT	PEAK HOURS	
			FRIDAY	SUNDAY
HWY 99 NB-SB	BUNT	Dec 14 & 16, 2018	16:15 – 17:15	15:30 – 16:30
Furry Creek NB on/off ramp	BUNT	Dec 14 & 16, 2018	17:00 – 18:00	15:15 – 16:15
Furry Creek Dr and Country Club Dr	BUNT	Dec 14 & 16, 2018	16:15 – 17:15	16:00 – 17:00
Howe Sound Dr and Sea View Dr	BUNT	Dec 14 & 16, 2018	16:15 – 17:15	16:00 – 17:00
OVERALL STUDY AREA PEAK HOUR			16:15 – 17:15	15:30 – 16:30

An analysis of the 2017 count data from the BC MoTI Eagle Ridge permanent count station (just north of Horseshoe Bay) confirms that on average Fridays and Sundays experience the highest hourly traffic volumes. Throughout the week, the average two way traffic volumes exceeded 1,900 vehicles per hour on Fridays from 4:00 PM to 5:00 pm, and on Sundays from 12:00 PM to 5:00 PM. The average traffic volumes in the peak direction exceeded 1,200 vehicles (northbound) on Fridays from 4:00 PM to 5:00 PM, and on Sundays (southbound) from 3:00 PM to 5:00 PM. Although this site is located much further south than Furry Creek, it is assumed that the relative traffic patterns would be similar.

2.4.2 Peak Hour Traffic Volumes

Peak hour traffic volumes were extracted from the traffic counts by selecting the peak hour for the overall study area. Minor volume balancing was carried out to account for discrepancies between counts. The through traffic volume along the Highway 99 were counted at the northbound on/off ramp and then calculated at the remaining intersections through volume balancing. The existing peak hour traffic volumes are illustrated in **Exhibit 2.5**. **Table 2.3** presents a summary of the two-way peak-hour vehicle movements for the streets in the study area.

Table 2.3: Existing Peak Hour Roadway Link Volumes

ROAD LINK	PEAK LINK VOLUMES (VEH/HR)	
	FRIDAY	SUNDAY
Highway 99 (sea-to-Sky Highway)	2,040	2,080
Furry Creek Drive	20	12
Sea View Drive	20	12
Howe Sound Drive	20	13

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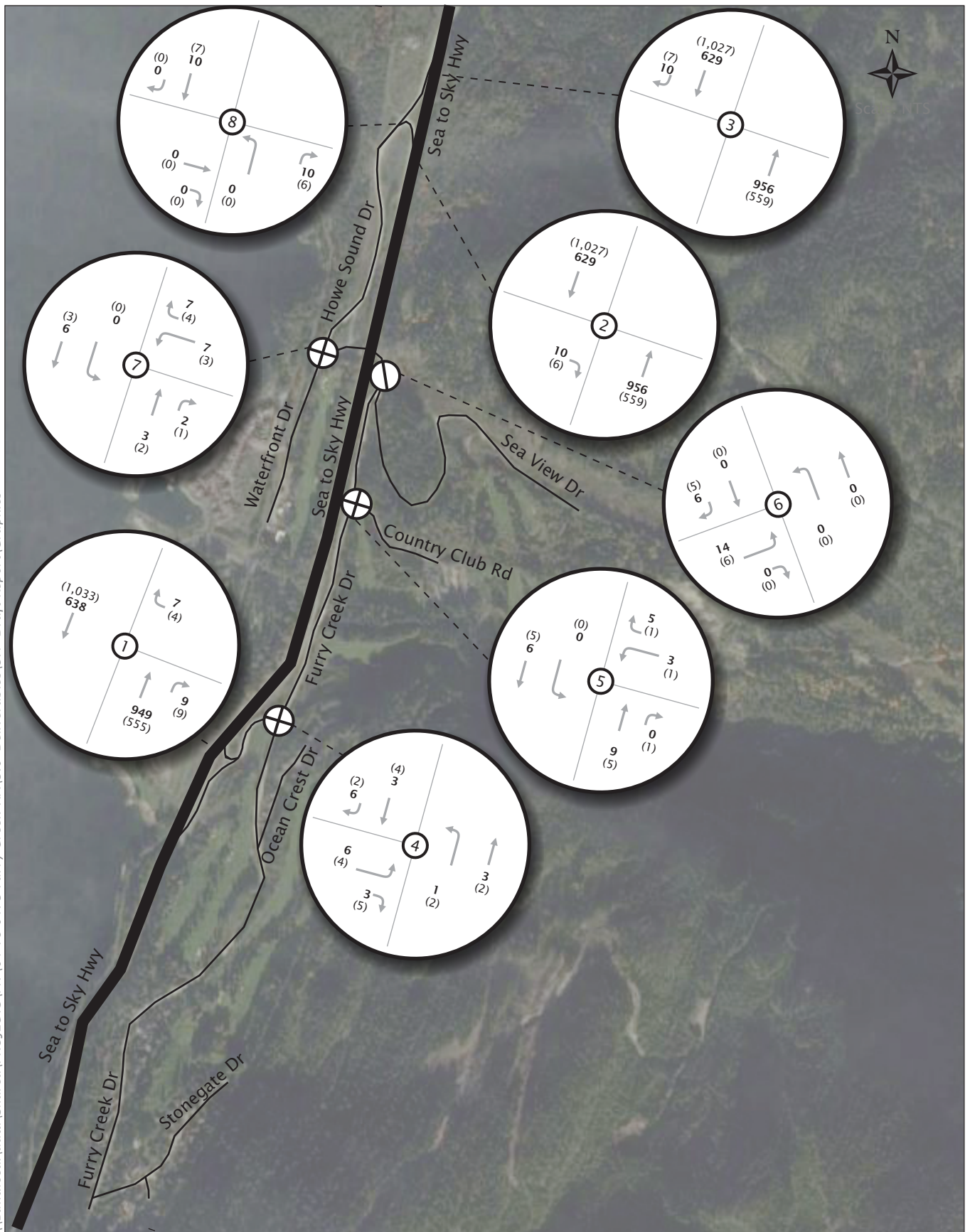


Exhibit 2.5 Existing (2018) Peak Hour Traffic volumes

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2.4.3 Existing Site Vehicle Trip Generation

The traffic counts were collected in the winter, and the existing Golf Course was closed. It was found to generate very few trips during the peak periods with a total of 8 trips during the Friday peak hour and 2 trips during the Sunday peak hour. The future conditions analysis scenarios account for this by forecasting traffic generated by the Golf Course using ITE Trip Generation Rates (See **Section 3.1.1**).

There are two existing residential areas, which are located east of Highway 99 along Furry Creek Drive south of the northbound on/off ramp and west of Highway 99 along Waterfront Drive south of the intersection with Sea View Drive. These were also found to generate a low number of vehicle trips as shown in **Table 2.4**.

Table 2.4: Existing Residential Trip Generation

LOCATION	LAND USE	FRIDAY PEAK HOUR			SUNDAY PEAK HOUR		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Accessed from Furry Creek Drive (South)	90 Single Family Homes	6	4	10	9	4	13
Accessed from Waterfront Drive	56 Low-rise multi-family homes	13	5	18	6	3	9
TOTAL		19	9	28	15	7	22

Table 2.5 calculates the trip generation rates for the existing residential uses on the site. It should be noted that the trip rates for the residential uses accessed from Waterfront Drive may be inaccurate as non-residents may also be visiting the area for recreation uses, as there are publically accessible walking paths and a beach.

Table 2.5: Existing Residential Trip Generation Rates

LOCATION	UNITS	FRIDAY PEAK HOUR			SUNDAY PEAK HOUR		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Accessed from Furry Creek Drive (South)	Per dwelling unit	0.07	0.04	0.11	0.10	0.04	0.14
Accessed from Waterfront Drive	Per dwelling unit	0.23	0.09	0.32	0.11	0.05	0.16

The observed trip generation rates are much lower than the average rates for similar uses found in the ITE trip generation manual. The lower trip generation rate may be attributable to several factors:

- A high proportion the homes may be vacation homes, which would less used during the winter months when the count data was collected;
- A high proportion of the homes may be occupied by retired or semi-retired households who tend to make fewer vehicle trips; and,
- The peak hour for the individual homes occur at a different time than the peak hour for the highway, which is the time period that these rates are based on (for instance, there were 19 vehicle trips to and

from the south end of Furry Creek Drive on Friday at 5:00 PM, while only 10 vehicle trips at 4:15 PM which was the peak hour for the overall study area).

As the trip generation rates for these units during the peak summer period is unknown, the site generated trips are estimated using ITE Trip Generation Rates, although this is likely a conservative assumption.

2.5 Existing Operations

2.5.1 Performance Thresholds

The existing operations of study area intersections and access points were assessed using the methods outlined in the 2000 Highway Capacity Manual (HCM), using the Synchro 9 analysis software (Build 914). The traffic operations were assessed using the performance measures of Level of Service (LOS) and volume-to-capacity (V/C) ratio. Traffic operations at the Highway 99 on and off ramps were assessed with the HCM procedures using HCS 7 software.

The LOS rating is based on average vehicle delay and ranges from “A” to “F” based on the quality of operation at the intersection. LOS “A” represents optimal, minimal delay conditions while a LOS “F” represents an over-capacity condition with considerable congestion and/or delay. Delay is calculated in seconds and is based on the average intersection delay per vehicle.

Table 2.6 below summarizes the LOS thresholds for the six Levels of Service, for both signalized and unsignalized intersections.

Table 2.6: Intersection Level of Service Thresholds

LEVEL OF SERVICE	AVERAGE CONTROL DELAY PER VEHICLE (SECONDS)	
	SIGNALIZED	UNSIGNALIZED
A	≤10	≤10
B	>10 and ≤20	>10 and ≤15
C	>20 and ≤35	>15 and ≤25
D	>35 and ≤55	>25 and ≤35
E	>55 and ≤80	>35 and ≤50
F	>80	>50

Source: Highway Capacity Manual

The volume to capacity (V/C) ratio of an intersection represents ratio between the demand volume and the available capacity. A V/C ratio less than 0.85 indicates that there is sufficient capacity to accommodate demands and generally represents reasonable traffic conditions in suburban settings. A V/C value between 0.85 and 0.95 indicates an intersection is approaching practical capacity; a V/C ratio over 0.95 indicates that traffic demands are close to exceeding the available capacity, resulting in saturated conditions. A V/C ratio over 1.0 indicates a very congested intersection where drivers may have to wait through several signal cycles. In downtown and Town Centre contexts, during peak demand periods, V/C ratios over 0.90 and even 1.0 are common.

The performance thresholds that were used to trigger consideration of roadway or traffic control improvements to support roadway or traffic control improvements employed in this study are listed below:

Unsignalized Intersections:

- Individual movement Level of Service = LOS E or better, unless the volume is very low in which case LOS F is acceptable.

In interpreting of the analysis results, note that the HCM methodology reports performance differently for various types of intersection traffic control. In this report, the performance reporting convention is as follows:

- For unsignalized two-way stop controlled intersections: HCM 2000 LOS and V/C output is reported just for individual lanes as the HCM methodology does not report overall performance.
- For unsignalized All-way Stop controlled intersections: HCM 2000 unsignalized LOS is reported for the overall intersection as well as by intersection approach LOS. The HCM 2000 methodology does not report an overall V/C ratio for All Way Stop controlled intersections. Degree of Utilization calculated with the HCM 2000 methodology is reported for individual movements in place of V/C, which is not part of the HCM 2000 report;
- For interchange on/off ramps: HCM 6th Edition V/C ratios are reported for the highway and ramp lanes. A LOS is reported for each combined facility.

The performance reporting conventions noted above have been consistently applied throughout this document and the detailed outputs are provided in **Appendix B**.

2.5.2 Existing Conditions Analysis Assumptions

Synchro Parameters

The following adjustments were made to Synchro parameters for this analysis:

- Link speeds updated to reflect posted speed limits;
- Road grades estimated for each approach;
- Heavy vehicle percentages for individual movements based on traffic count data;
- Peak hour factors based on calculated overall intersection factors from traffic count data;

Synchro defaults were used for the parameters aside from these.

2.5.3 Existing Operational Analysis Results

The traffic operational analysis results for the existing conditions are summarized in **Table 2.7**.

Table 2.7: Existing Traffic Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	FRI			SUN		
		LOS	v/c	95th Q (m)	LOS	v/c	95th Q (m)
Highway 99 NB off-ramp	Through	A	0.26	-	A	0.15	-
	Ramp		0.00	-		0.00	-
Highway 99 NB on-ramp	Through	B	0.26	-	A	0.15	-
	Ramp		0.01	-		0.00	-
Highway 99 SB off-ramp	Through	A	0.17	-	B	0.25	-
	Ramp		0.01	-		0.01	-
Highway 99 SB on-ramp	Through	A	0.18	-	A	0.17	-
	Ramp		0.02	-		0.01	-
Furry Creek Dr & NB on/off Ramp	OVERALL	A	-	-	A	-	-
	EBL/R	A	0.02	-	A	0.02	-
	NBT/R	A	0.01	-	A	0.01	-
	SBT	A	0.01	-	A	0.01	-
Furry Creek Dr & Country Club Rd	OVERALL	A	-	-	A	-	-
	WBL/R	A	0.01	-	A	0.00	-
	NBT/R	A	0.01	-	A	0.01	-
	SBL/T	A	0.01	-	A	0.01	-
Sea View Dr & Furry Creek Dr	OVERALL	-	-	-	-	-	-
	EBL/R	A	0.02	0	A	0.01	0
	NBL/T	A	0.00	0	A	0.00	0
	SBT/R	A	0.00	0	A	0.00	0
Waterfront Dr/Howe Sound Dr & Sea View Dr	OVERALL	A	-	-	A	-	-
	WBT	A	0.01	-	A	0.00	-
	WBR	A	0.01	-	A	0.01	-
	NBT	A	0.00	-	A	0.00	-
	NBR	A	0.00	-	A	0.00	-
	SBL/T	A	0.02	-	A	0.01	-

All movements at all intersections within the study area are anticipated to operate at LOS A, and the Highway 99 on and off ramps operate at LOS B or better.

3. FUTURE TRAFFIC CONDITIONS

3.1 Traffic Forecasts

3.1.1 Background Traffic Forecasts

Background traffic is traffic that would be present on the road network if the site did not redevelop. The analysis of background traffic volumes is based on the anticipated future volumes expected to occur during the peak period for Highway 99, which occurs in August. Several factors were accounted in developing the background traffic volume forecasts. The steps followed were:

1. Adjust the winter traffic volumes to peak summer conditions;
2. Apply the background growth rate to the future horizon years;
3. Add the expected traffic volumes from the existing Furry Creek Golf Course; and,
4. Add the approximate traffic volumes anticipated from the proposed Britannia developments.

Seasonal Adjustments

An analysis of count data from the BC MoTI Eagle Ridge permanent count station (just north of Horseshoe Bay) was carried out. Although this site is located much further south than Furry Creek, it is assumed that the relative traffic patterns would be similar. This count data was used to develop seasonal adjustment factors for this segment of Highway 99, which were required to account the fact that the highway traffic volumes adjacent to the site are typically much higher in the summer, which also corresponds to the peak traffic generation period for the site.

The seasonal adjustment facts were calculated for each month of the year based on available traffic count data. The factors are calculated as follows:

$$f_{AUG} = \frac{AADT}{ADT_{AUG}}$$

where,

AADT = Average annual daily traffic

ADT = Average daily traffic over a specific time period

These factors allow for the ADT during a particular month to be converted to the AADT by multiplying by the factor, and for the AADT to be converted to the ADT during a particular month by dividing by the factor. High factors indicate lower than average traffic volumes and low values indicate higher than average traffic volumes. **Table 3.1** shows the monthly adjustment factors based on the past 5 years of available traffic data (2013-2017) at the Eagle Ridge count station.

Table 3.1: Seasonal Adjustment Factors based on AADT

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1.18	1.11	1.08	1.05	0.98	0.91	0.81	0.77	0.92	1.10	1.21	1.14

One concern with using these AADT factors is that the difference in daily traffic volumes may be greater than the difference in peak hour traffic volumes. This could occur if high daily traffic volumes were attributable to sustained long periods of high traffic volumes, rather than sharper peaks. To account for this, adjustment factors were developed using hourly rather than daily traffic volumes.

The factors were estimated by averaging the 4:00 PM – 5:00 PM traffic volumes for each Friday and Sunday of each month, and comparing these to the average 4:00 PM – 5:00 PM traffic volumes for the entire year. This is analogous the calculation of the factors using daily traffic volumes. The 4:00 PM – 5:00 PM period was selected as it was generally found to be the busiest hour of the day. These factors were calculated using the past 12 months of hourly data available at the Eagle Ridge count station, from October 2017 through September 2018.

Table 3.2 calculates these peak hour adjustment factors for the Friday and Sunday Peak periods. As expected, these adjustment factors show less sharp increases in traffic volumes in the summer months than the daily traffic factors.

Table 3.2: Seasonal Adjustment Factors based on Peak Hour Traffic

DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Friday	0.99	1.07	0.98	1.01	0.95	1.00	0.89	0.89	1.01	1.04	1.09	1.14
Sunday	1.08	1.00	0.95	0.97	0.87	0.95	0.90	0.89	1.07	0.99	1.31	1.16

To adjust the base traffic volumes which were collected in December to the peak summer period in August, the following was applied:

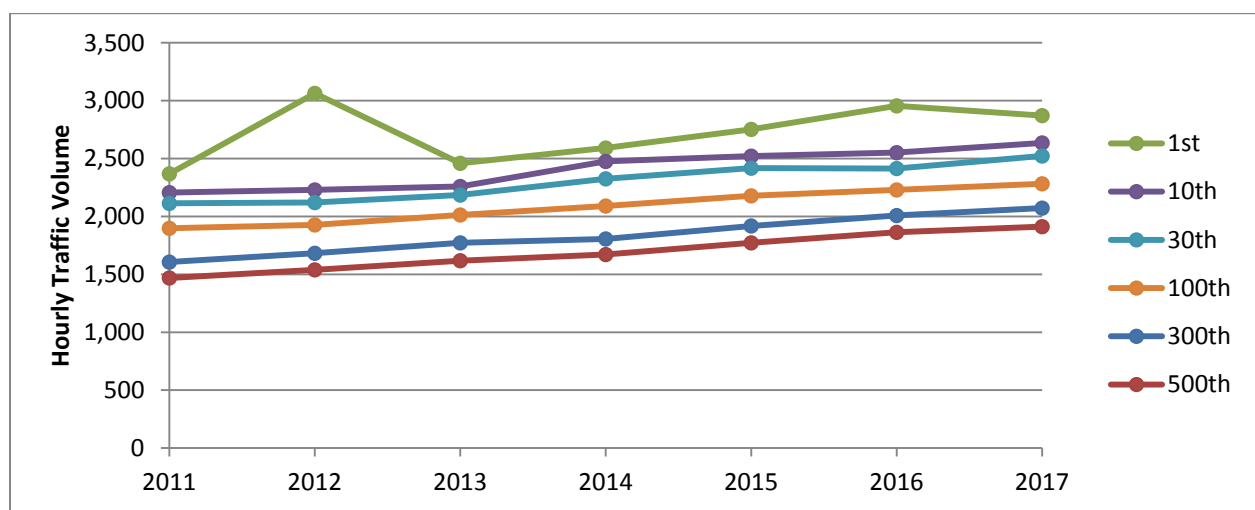
$$Vol_{AUG} = Vol_{DEC} * \frac{f_{DEC}}{f_{AUG}} = Vol_{DEC}$$

This results in an overall factor of 1.28 for the Friday peak period and 1.30 for the Sunday peak period. The base December traffic volumes were then multiplied by these factors to adjust then to August traffic.

Background Traffic Growth

Traffic growth rates along Highway 99 were analyzed using count data analysis of count data from the BC MoTI Eagle Ridge permanent count station (just north of Horseshoe Bay). It is assumed that the relative traffic patterns at this location would be similar to the Highway 99 volumes adjacent to the site. Data on the busiest hours of the year (the 1st, 10th, 30th, 100th, 300th, and 500th) from 2011 – 2017 were compared, which are illustrated in **Figure 3.1**.

Figure 3.1: Combined Hourly Traffic Volumes during the Busiest Hours of the Year



A similar trend in peak traffic volumes is observed for each busiest hour analyzed. Traffic volumes during the 30th busiest hour of the year are generally considered for design purposes. The compound annually traffic growth rate for the 30th busiest hour over this period (2011 – 2017) was calculated to be 3.0%, as indicated in **Table 3.3**.

Table 3.3: Compound annual Growth Rates from 2011 – 2017

DESIGN HOUR	1 ST	10 TH	30 TH	100 TH	300 TH	500 TH
Compound Annual Growth Rate	3.3%	3.0%	3.0%	3.1%	4.3%	4.5%

Development along Highway 99 accounts for a portion of the traffic growth experienced throughout this corridor, and the Furry Creek and adjacent Britannia developments are a continuation of this development related traffic growth. Therefore, the additional traffic generated by these sites would be a component of the background traffic growth rate expected. The forecasted site traffic volumes were subtracted from the forecasted background traffic growth (using a 3.0% compound annual growth rate), and the resulting non-site traffic growth rates were re-calculated, which were found to be 1.6% for Friday and 1.9% for Sunday. These growth rates were used to calculate background traffic volumes at the future horizon years.

It should be noted that there are constraints of the capacity of the Highway 99 corridor that will prevent these growth rates from being sustained for much longer. For instance, a 3.0% compound growth rate

over 20 years results in an 81% increase in traffic volumes. Applying this growth rate to the 30th busiest hour in 2017 results in a combined hourly traffic volume of 4,600 vehicles. This is substantially higher than any observed traffic volumes on this segment of the corridor, which have only slightly exceeded 3,000 vehicles within an hour. Without major corridor upgrades to increase the overall capacity of the highway, it is unlikely that a 3.0% growth rate could be achieved over the time horizons considered in this analysis. The use of this growth rate in this analysis is therefore highly conservative.

Existing Golf Course Traffic

The traffic counts took place during December when the existing Furry Creek Golf Course was closed. The analysis of future traffic volumes in this study are based on the peak summer period, so the expected traffic volumes from the Furry Creek Golf course were added to the background traffic forecasts. These volumes were forecast using average trip generation data from the ITE Trip Generation Database (10th Edition) and are shown in **Table 3.4**.

Table 3.4: Existing Golf Course Trip Generation

LAND USE	ITE LAND USE CODE	FRIDAY PEAK HOUR			SUNDAY PEAK HOUR		
		IN	OUT	TOTAL	IN	OUT	TOTAL
18 Hole Golf Course	430	28	25	52	23	44	66

Adjacent Development Traffic

The anticipated traffic generated by the proposed developments at Britannia (Tiger Bay/South Britannia and Britannia Oceanfront) were taken into account in this analysis. High level trip generation estimates for these site were assumed for these developments based on previous reports.

Table 3.5: Approximate Trip Generation for Britannia Developments

LAND USE	FRIDAY PEAK HOUR			SUNDAY PEAK HOUR		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Proposed Tiger Bay and Britannia Oceanfront Developments	480	320	800	360	240	600

The traffic generated by these proposed developments was included in the background traffic forecasts.. The resulting background traffic forecasts are shown in **Exhibit 3.1** and **3.2** for the 2028 and 2038 horizon years.

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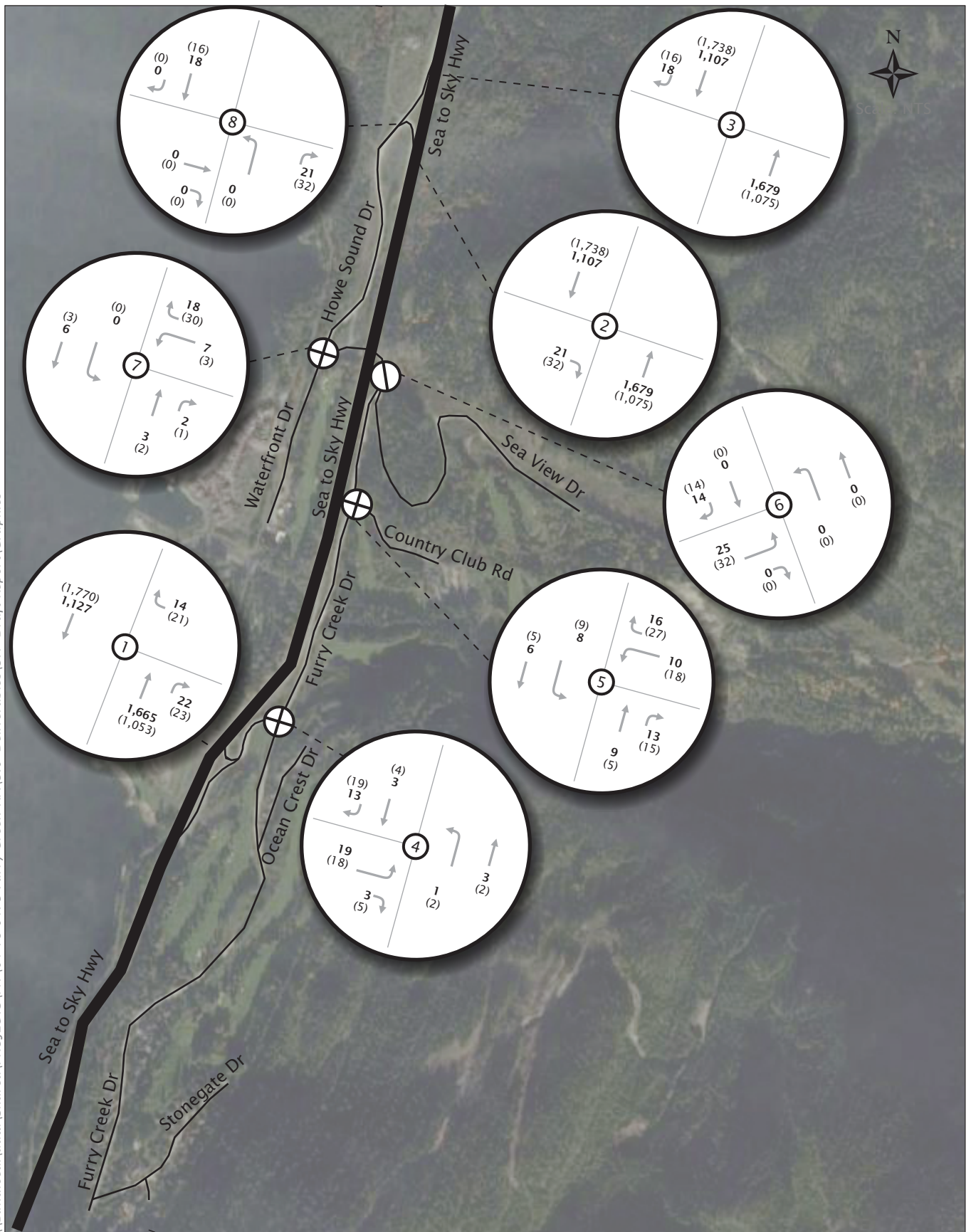


Exhibit 3.1 Opening Day (2028) Background Traffic Forecasts

Furry Creek Traffic Impact Analysis
04-18-0473
June 2019

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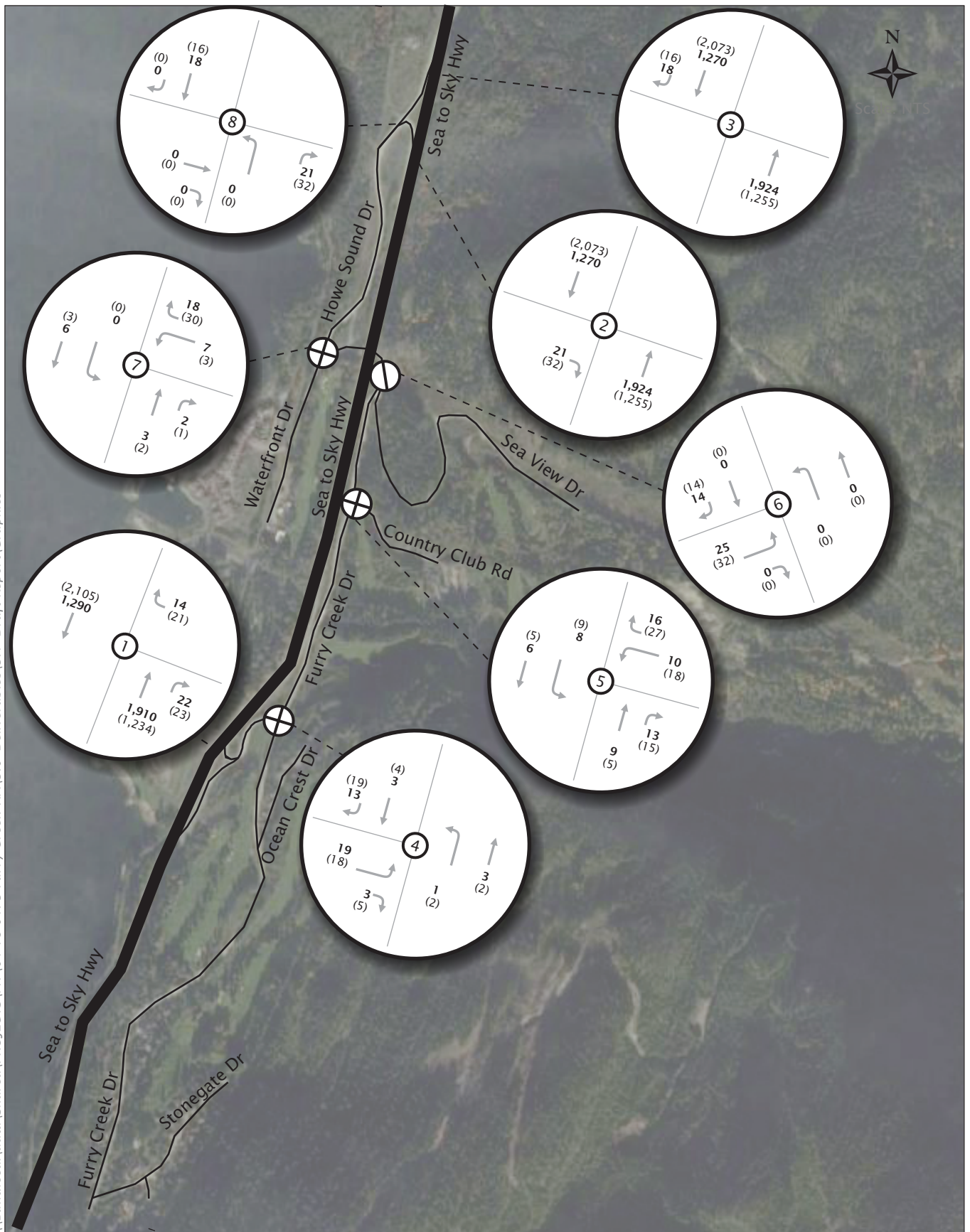


Exhibit 3.2 Opening Day + 10 (2038) Background Traffic Forecasts

Furry Creek Traffic Impact Analysis
04-18-0473
June 2019

3.1.2 Site Traffic

Trip Generation

The number of vehicle trips generated by the proposed development was estimated by using the Institute of Transportation Engineers (ITE) Trip Generation Manual 10th Edition. The land uses selected were based on the description of the proposed development provided, and the trip rates used are shown in **Table 3.6**. The Friday PM peak period forecasts use the “Weekday, Peak Hour of Adjacent Street Traffic between 4 and 6 PM” rates, while the Sunday PM peak period forecasts use the “Sunday, Peak Hour of Generator” rates. The use of these rates appears to be conservative based on trip generation of the existing site.

Table 3.6: Peak Hour Vehicle Trip Rates

LAND USE	UNITS	FRIDAY PM PEAK HOUR			SUNDAY PM PEAK HOUR		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Single Family Homes (ITE 210)	Dwelling Units	0.62	0.37	0.99	0.45	0.40	0.85
Low Rise Multi-Family (ITE 220)	Dwelling Units	0.35	0.21	0.56	0.42	0.25	0.67
Mid Rise Multi-Family (ITE 221)	Dwelling Units	0.27	0.17	0.44	0.24	0.15	0.39
Resort (ITE 330)	Rooms	0.23	0.09	0.32	0.18	0.23	0.41
Commercial (ITE 820)	1000 ft2	1.83	1.98	3.81	1.37	1.42	2.79
Marina (ITE 4210)	Berths	0.13	0.08	0.21	0.13	0.08	0.21

Table 3.7 summarizes the anticipated future site generated vehicle trips for the proposed development based on the above rates. A total of 815 new trips are anticipated to be generated by the site in the Friday PM peak hour and 711 trips during the Sunday peak hour.

Table 3.7: Estimated Peak Hour Site Vehicle Trips

LOCATION	LAND USE	FRIDAY PM PEAK HOUR			SUNDAY PM PEAK HOUR		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Accessed from Furry Creek Drive (south)	Single Family Homes	26	15	41	19	16	35
Accessed from Sea View Dr	Single Family Homes	154	90	244	111	98	209
Accessed from Country Club Road	Resort Hotel	23	9	32	18	23	41
Accessed from Howe Sound Drive	Single Family Homes	128	75	203	92	82	174
Accessed from Waterfront Dr	Single Family Homes	21	12	33	15	13	28
	Low Rise Multi Family	7	4	11	8	5	13
	Mid Rise Multi Family	73	47	120	66	40	106
	Commercial	35	38	73	26	27	53
	Marina	10	7	17	10	7	17
Accessed from Benchlands	Single Family Homes	26	15	41	19	16	35
TOTAL		503	312	815	384	327	711

Trip Distribution & Assignment

The vehicle trips were distributed and assigned to the road network based on existing turning movements and travel patterns observed within the study area. The assumed trip distribution is shown in **Table 3.8**.

Table 3.8: Estimated Trip Distribution

ORIGIN/DESTINATION	FRIDAY PEAK HOUR		FRIDAY PEAK HOUR	
	IN (%)	OUT (%)	IN (%)	OUT (%)
Highway 99 - North	40%	40%	40%	40%
Highway 99 - South	60%	60%	60%	60%
TOTAL	100%	100%	100%	100%

Traffic assignment was based on logical routings from site access points to the outer extents of the traffic study area. The resulting site traffic forecast is shown in **Exhibit 3.3**.

3.1.3 Total Traffic

Total traffic was estimated by summing the background and site traffic forecasts. The resulting total traffic forecasts are shown in **Exhibits 3.4** and **3.5**. The net changes in intersection traffic volumes are presented **Tables 3.9**, which is calculated based on the 2028 horizon year.

Table 3.9: Net Change in Future Intersection Vehicle Volumes with New Site Trips

INTERSECTION	FRIDAY PEAK HOUR			PM PEAK HOUR VOLUMES		
	BACK-GROUND	SITE	TOTAL	BACK-GROUND	SITE	TOTAL
Highway 99 NB on/off ramps	2829	564	3393	2867	511	3378
Highway 99 SB on/off ramps	2826	499	3325	2861	493	3354
Furry Creek Drive & Highway 99 NB on/off ramps	42	409	451	50	348	398
Furry Creek Drive & Country Club Road	62	410	472	79	352	431
Furry Creek Drive & Sea View Drive	39	495	534	47	430	477
Howe Sound Dr / Waterfront Dr & Sea View Drive	48	492	540	52	435	487
Howe Sound Drive & Highway 99 SB on/off ramps	39	497	536	48	453	501

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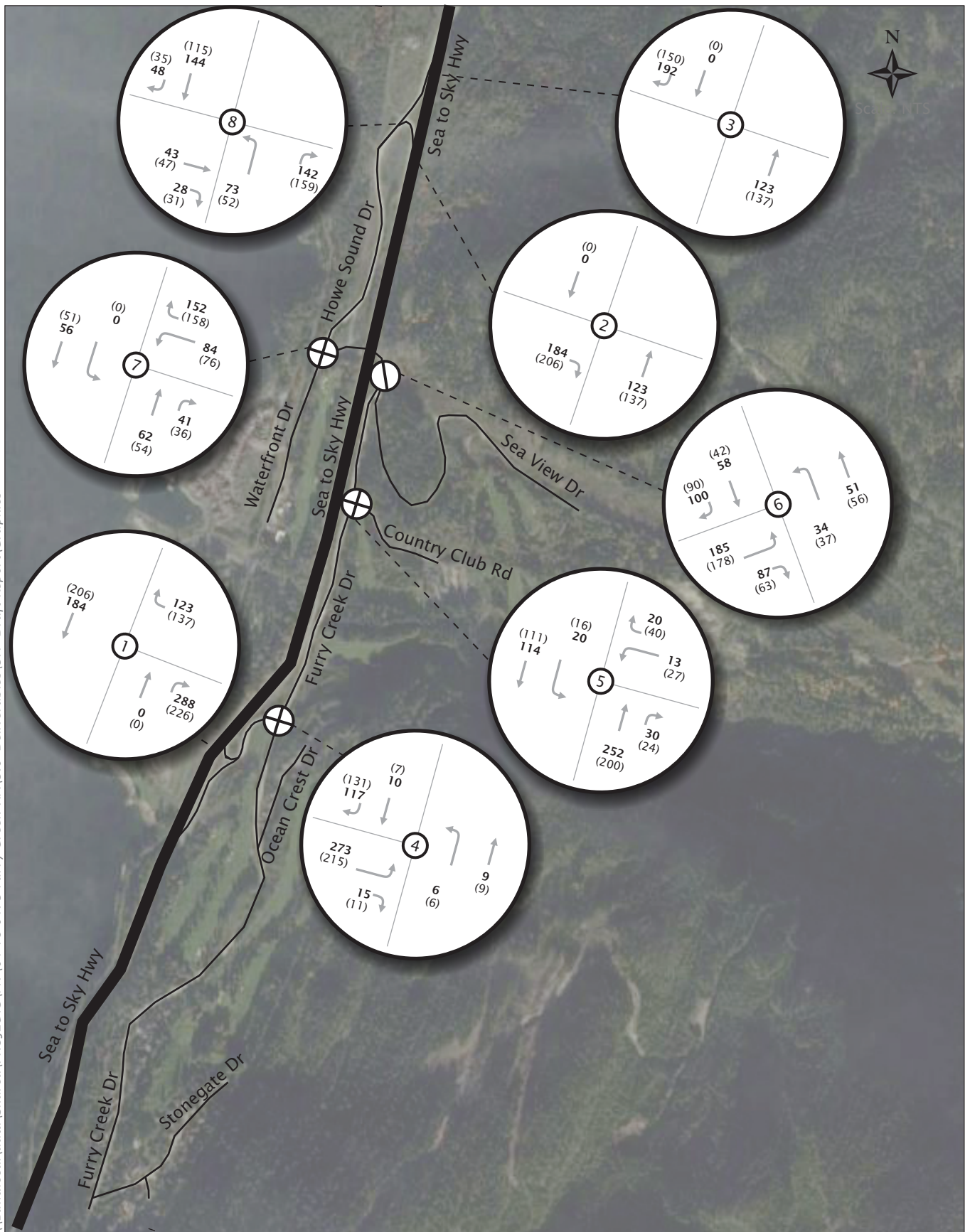


Exhibit 3.3 Site Traffic Forecasts

Furry Creek Traffic Impact Analysis
04-18-0473
June 2019

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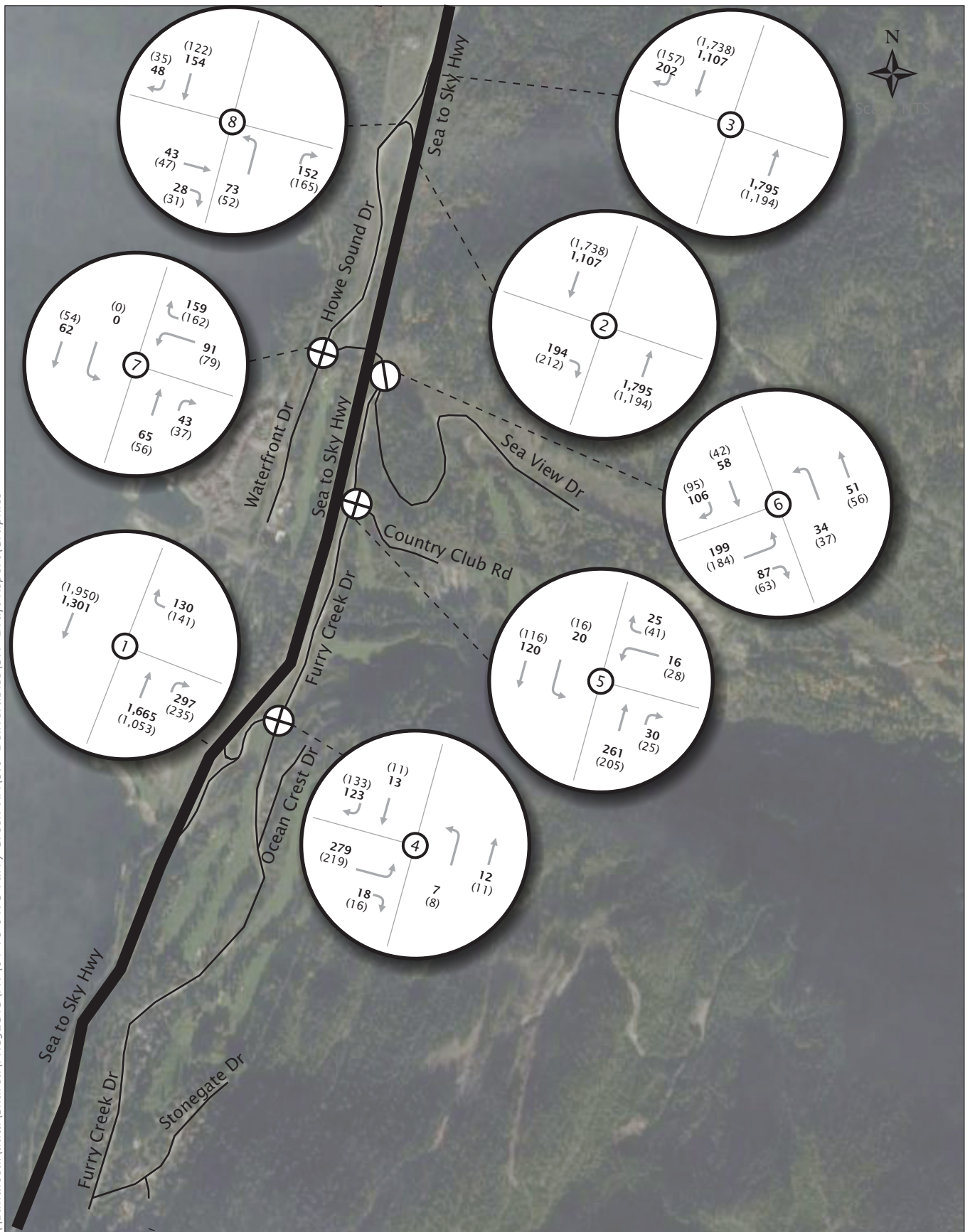


Exhibit 3.4 Opening Day (2028) Total Traffic Forecasts

Furry Creek Traffic Impact Analysis
04-18-0473
June 2019

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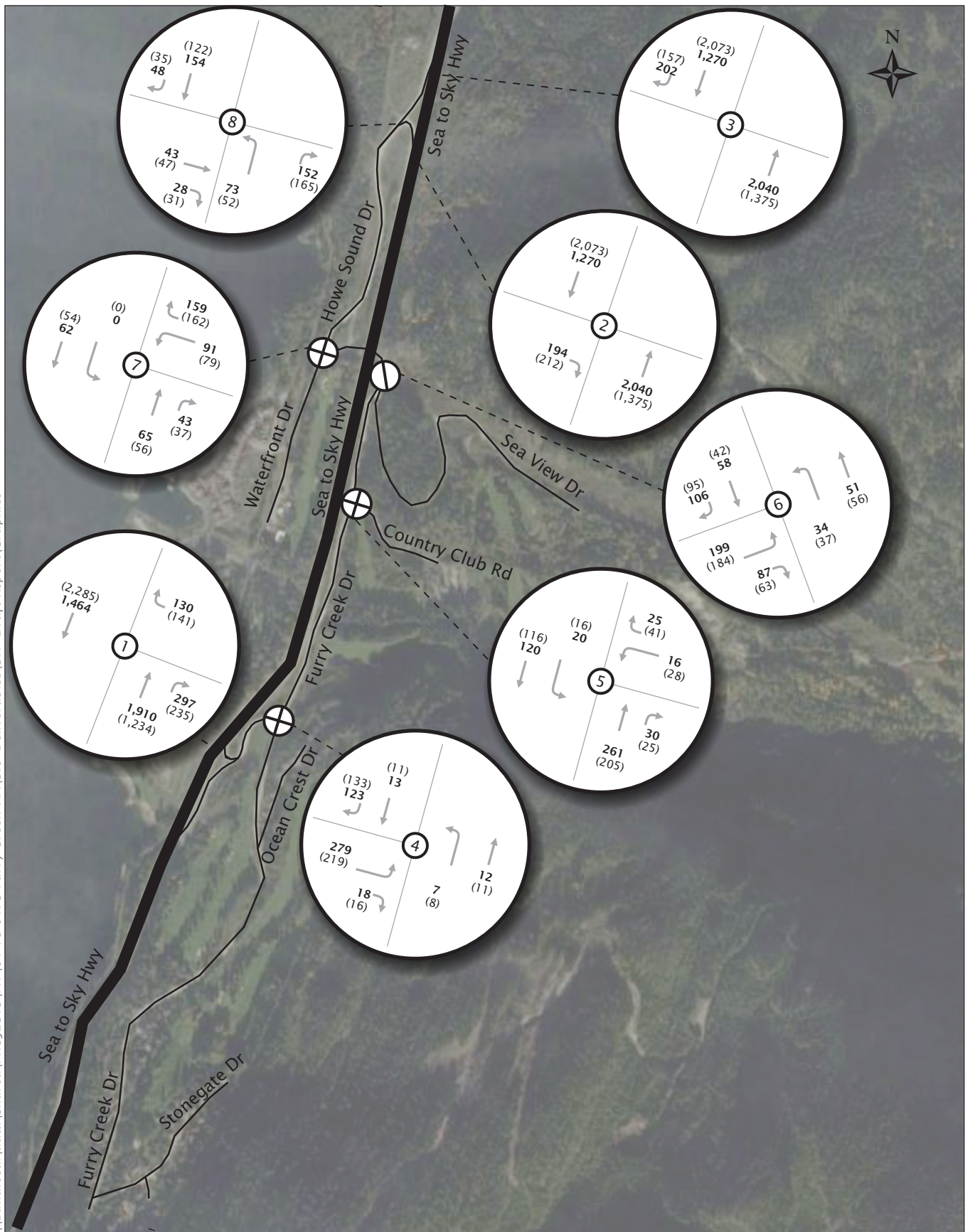


Exhibit 3.5 Opening Day + 10 (2038) Total Traffic Volumes Forecasts

Furry Creek Traffic Impact Analysis
04-18-0473
June 2019

3.2 Future Traffic Operations

3.2.1 Future Conditions Analysis Assumptions

The peak hour factors at the local intersections within the study area were found to be low under existing conditions, which is attributable to the very minor traffic volumes experienced at these locations. As traffic increases, peak hour factors also typically increase. A peak hour factor of 0.92 was assumed for these intersections. All remaining Synchro parameters were unchanged from the existing conditions analysis.

3.2.2 Future Background Traffic Operations

The results from the background traffic operations assessment are summarized in **Tables 3.10** and **3.11**. The study area intersections are anticipated to operate with no capacity, delay, or queueing concerns.

Table 3.10: Opening Day Background Vehicle Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	FRI			SUN		
		LOS	v/c	95th Q (m)	LOS	v/c	95th Q (m)
Highway 99 NB off-ramp	Through	B	0.41	-	A	0.26	-
	Ramp		0.01	-		0.01	-
Highway 99 NB on-ramp	Through	B	0.42	-	A	0.15	-
	Ramp		0.02	-		0.00	-
Highway 99 SB off-ramp	Through	B	0.46	-	B	0.42	-
	Ramp		0.02	-		0.02	-
Highway 99 SB on-ramp	Through	B	0.31	-	B	0.47	-
	Ramp		0.03	-		0.03	-
Furry Creek Dr & NB on/off Ramp	OVERALL	A	-	-	A	-	-
	EBL/R	A	0.03	-	A	0.03	-
	NBT/R	A	0.00	-	A	0.00	-
	SBT	A	0.02	-	A	0.02	-
Furry Creek Dr & Country Club Rd	OVERALL	A	-	-	A	-	-
	WBL/R	A	0.03	-	A	0.05	-
	NBT/R	A	0.02	-	A	0.02	-
	SBL/T	A	0.02	-	A	0.02	-
Sea View Dr & Furry Creek Dr	OVERALL	-	-	-	-	-	-
	EBL/R	A	0.03	1	A	0.03	1
	NBL/T	A	0.00	0	A	0.00	0
	SBT/R	A	0.01	0	A	0.01	0
Waterfront Dr/Howe Sound Dr & Sea View Dr	OVERALL	A	-	-	A	-	-
	WBT	A	0.01	-	A	0.00	-
	WBR	A	0.02	-	A	0.03	-
	NBT	A	0.00	-	A	0.00	-
	NBR	A	0.00	-	A	0.00	-
	SBL/T	A	0.02	-	A	0.02	-

All movements at all intersections within the study area are anticipated to operate at LOS A, and the Highway 99 on and off ramps operate at level of service B or better.

Table 3.11: Opening Day + 10 Background Vehicle Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	FRI			SUN		
		LOS	v/c	95th Q (m)	LOS	v/c	95th Q (m)
Highway 99 NB off-ramp	Through	B	0.48	-	B	0.31	-
	Ramp		0.01	-		0.01	-
Highway 99 NB on-ramp	Through	B	0.48	-	B	0.31	-
	Ramp		0.02	-		0.01	-
Highway 99 SB off-ramp	Through	B	0.33	-	C	0.50	-
	Ramp		0.02	-		0.02	-
Highway 99 SB on-ramp	Through	B	0.35	-	C	0.57	-
	Ramp		0.03	-		0.05	-
Furry Creek Dr & NB on/off Ramp	OVERALL	A	-	-	A	-	-
	EBL/R	A	0.03	-	A	0.03	-
	NBT/R	A	0.00	-	A	0.00	-
	SBT	A	0.02	-	A	0.02	-
Furry Creek Dr & Country Club Rd	OVERALL	A	-	-	A	-	-
	WBL/R	A	0.03	-	A	0.05	-
	NBT/R	A	0.02	-	A	0.02	-
	SBL/T	A	0.02	-	A	0.02	-
Sea View Dr & Furry Creek Dr	OVERALL	-	-	-	-	-	-
	EBL/R	A	0.03	1	A	0.03	1
	NBL/T	A	0.00	0	A	0.00	0
	SBT/R	A	0.01	0	A	0.01	0
Waterfront Dr/Howe Sound Dr & Sea View Dr	OVERALL	A	-	-	A	-	-
	WBT	A	0.01	-	A	0.00	-
	WBR	A	0.02	-	A	0.03	-
	NBT	A	0.00	-	A	0.00	-
	NBR	A	0.00	-	A	0.00	-
	SBL/T	A	0.02	-	A	0.02	-

All movements at all intersections within the study area are anticipated to operate at LOS A, and the Highway 99 on and off ramps operate at LOS C or better.

3.2.3 Future Total Traffic Operations

The total traffic operations results are summarized in **Tables 3.12** and **3.13**. In the total traffic scenarios, a new four way intersection is created at Howe Sound Drive where the Highway 99 southbound on and off ramps currently intersect. For this intersection, stop control has been assumed for the eastbound approach from the new residential areas, and free movements have been assumed from the northbound and southbound approaches. This is recommended to ensure that no queueing occurs on the Highway 99 southbound off-ramp. All remaining laning and traffic control within the study has been unchanged.

The study area intersections are anticipated to operate with no capacity, delay, or queueing concerns.

Table 3.12: Opening Day Total Vehicle Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	FRI			SUN		
		LOS	v/c	95th Q (m)	LOS	v/c	95th Q (m)
Highway 99 NB off-ramp	Through	B	0.41		A	0.26	
	Ramp		0.16			0.13	
Highway 99 NB on-ramp	Through	B	0.44		B	0.29	
	Ramp		0.08			0.08	
Highway 99 SB off-ramp	Through	B	0.29		B	0.42	
	Ramp		0.12			0.09	
Highway 99 SB on-ramp	Through	B	0.34		B	0.34	
	Ramp		0.11			0.11	
Furry Creek Dr & NB on/off Ramp	OVERALL	A	-	-	A	-	-
	EBL/R	B	0.40	-	A	0.31	-
	NBT/R	A	0.03	-	A	0.03	-
	SBT	A	0.17	-	A	0.17	-
Furry Creek Dr & Country Club Rd	OVERALL	A	-	-	A	-	-
	WBL/R	A	0.06	-	A	0.09	-
	NBT/R	A	0.36	-	A	0.29	-
	SBL/T	A	0.18	-	A	0.17	-
Sea View Dr & Furry Creek Dr	OVERALL	-	-	-	-	-	-
	EBL/R	B	0.40	15	B	0.34	12
	NBL/T	A	0.03	1	A	0.03	1
	SBT/R	A	0.10	0	A	0.09	0
Waterfront Dr/Howe Sound Dr & Sea View Dr	OVERALL	A	-	-	A	-	-
	WBT	A	0.13	-	A	0.11	-
	WBR	A	0.15	-	A	0.16	-
	NBT	A	0.09	-	A	0.07	-
	NBR	A	0.04	-	A	0.04	-
	SBL/T	A	0.24	-	A	0.20	-
Howe Sound Dr/SB Off-Ramp & SB On-Ramp	OVERALL	-	-	-	-	-	-
	EBT/R	B	0.14	4	B	0.14	4
	NBL/R	A	0.06	1	A	0.04	1
	SBT/R	A	0.13	0	A	0.10	0

All movements at all intersections within the study area are anticipated to operate at LOS B or better, and the Highway 99 on and off ramps operate at LOS B or better.

Table 3.13: Opening Day + 10 Total Vehicle Operations

INTERSECTION/ TRAFFIC CONTROL	MOVEMENT	FRI			SUN		
		LOS	v/c	95th Q (m)	LOS	v/c	95th Q (m)
Highway 99 NB off-ramp	Through	B	0.48	-	B	0.31	-
	Ramp		0.16	-		0.13	-
Highway 99 NB on-ramp	Through	B	0.54	-	B	0.36	-
	Ramp		0.17	-		0.14	-
Highway 99 SB off-ramp	Through	B	0.33	-	C	0.50	-
	Ramp		0.12	-		0.09	-
Highway 99 SB on-ramp	Through	B	0.38	-	C	0.56	-
	Ramp		0.11	-		0.12	-
Furry Creek Dr & NB on/off Ramp	OVERALL	A	-	-	A	-	-
	EBL/R	B	0.40	-	A	0.31	-
	NBT/R	A	0.03	-	A	0.03	-
	SBT	A	0.17	-	A	0.17	-
Furry Creek Dr & Country Club Rd	OVERALL	A	-	-	A	-	-
	WBL/R	A	0.06	-	A	0.09	-
	NBT/R	A	0.36	-	A	0.29	-
	SBL/T	A	0.18	-	A	0.17	-
Sea View Dr & Furry Creek Dr	OVERALL	-	-	-	-	-	-
	EBL/R	B	0.40	15	B	0.34	12
	NBL/T	A	0.03	1	A	0.03	1
	SBT/R	A	0.10	0	A	0.09	0
Waterfront Dr/Howe Sound Dr & Sea View Dr	OVERALL	A	-	-	A	-	-
	WBT	A	0.13	-	A	0.11	-
	WBR	A	0.15	-	A	0.16	-
	NBT	A	0.09	-	A	0.07	-
	NBR	A	0.04	-	A	0.04	-
	SBL/T	A	0.24	-	A	0.20	-
Howe Sound Dr/SB Off-Ramp & SB On-Ramp	OVERALL	-	-	-	-	-	-
	EBT/R	B	0.14	4	B	0.14	4
	NBL/R	A	0.06	1	A	0.04	1
	SBT/R	A	0.13	0	A	0.10	0

All movements at all intersections within the study area are anticipated to operate at LOS B or better, and the Highway 99 on and off ramps operate at LOS C or better.

3.2.4 Summary of Traffic Impacts & Recommended Mitigations

When the new intersection is constructed at Howe Sound Drive were the Highway 99 southbound on and off ramps currently intersect. Stop control is recommended for the eastbound approach from the new residential areas, and free movements are recommended from the northbound and southbound approaches. No other laning or traffic control modifications are required.

4. SITE DESIGN RECOMMENDATIONS

4.1 Site Access Design

Based on the result of the traffic operations analysis, the site access design can accommodate the anticipated future traffic volumes. A design review of the on-and off ramps should be carried out to confirm they are acceptable from a geometric design perspective.

4.2 Transit Accessibility

Although there is currently no transit service provided to Furry Creek, BC Transit has plans for future local and interregional transit service that would connect this area. Improvements can be made to better accommodate future transit service to the area.

Due to the configuration of the highway 99 on and off ramps, for interregional transit service to connect through the site, a transit vehicle would need to loop inside the site to continue in the same direction. This is because the northbound on and off ramps are at the south end of the site and the southbound on and off ramps are at the north end of the site. To accommodate interregional service, bus stops can be provided along the highway off-ramps with bus only through roads connecting through to the highway on-ramps. This improves safety by removing the pedestrian and bus interactions from the highway traffic stream. This treatment currently exists along the northbound on/off ramps.

Furthermore, for a local transit service connecting to Squamish, Furry Creek may be a logical point for the transit service to end and reverse direction. The interchange configuration is well suited for this type of service because a southbound bus could enter at the north end of the site, continue through to the south end of the site and exit leaving northbound.

To accommodate potential future transit service, the following measures are recommended:

- Maintain / improve the existing northbound bus pullout on Highway 99 for future interregional transit service. Provide improved pedestrian facilities connecting to this location;
- Plan for a southbound bus pullout along the southbound Highway 99 on/off-ramps for future interregional transit service. This could be placed within the existing island along a bus only through road. Provide pedestrian facilities connecting to this location; and,
- Plan for bus pullouts within Furry Creek's road network for future local transit service. Locations to consider are along Howe Sound drive near Sea View Drive on the west side of the site, and along Furry Creek Drive near the northbound on/off ramps on the east side of the site.

Exhibit 4.1 illustrates the recommended bus stop locations and routing.

In addition to the above considerations, a conceptual location for the northbound bus stop lane, which allows for un-conflicted pedestrian connectivity from a potential park and ride has been contemplated and

shown as **Exhibit 4.2** below. The concept northbound bus stop allows for a bus to pull off the highway to allow boarding and alighting movements for passengers. When a bus leaves, said bus could utilize the existing bus stop area between the entrance and exit ramps and thereafter, use the exit ramp to the highway.

Aside from the northbound bus stop, a potential southbound stop location is contemplated and noted in **Exhibit 4.3** below.

It is important to note that as the Highway speeds are high, adequate sight distance is required to ensure that following vehicles are able to react to buses exiting and entering the Highway traffic streams. Aside from requiring adequate deceleration and acceleration laning, stopping sight distances of approximately 200-400m is required from the Transportation Association of Canada Geometric Design Guidelines (Section 9). Based on this requirement, **Exhibit 4.3** also notes the approximate available stopping sight distances for both the highway northbound and southbound direction.

Finally of note, the conceptual locations and the concepts themselves are provided for discussion purposes only. These concepts require further review to ensure they could be adequately designed to appropriate design standards.

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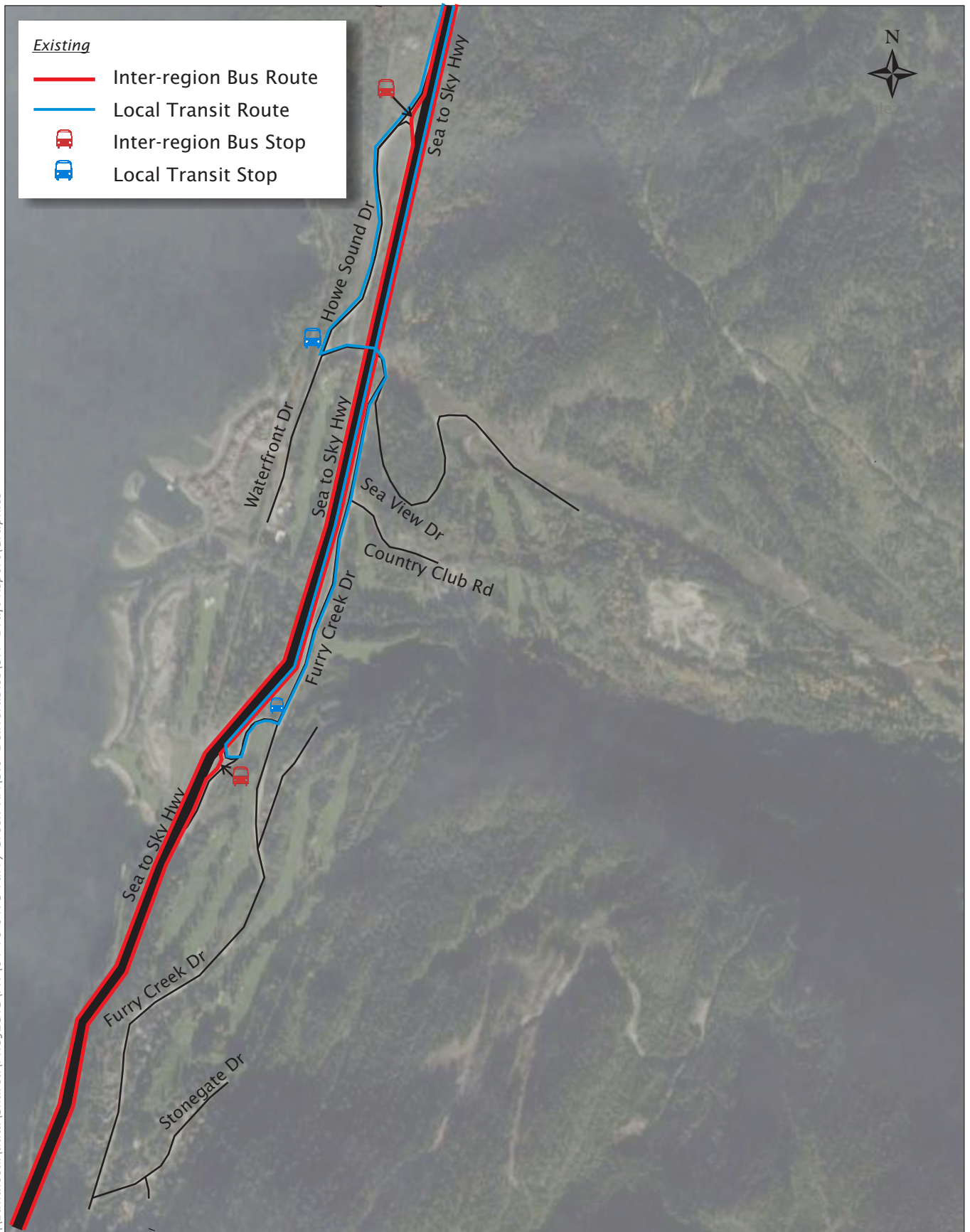
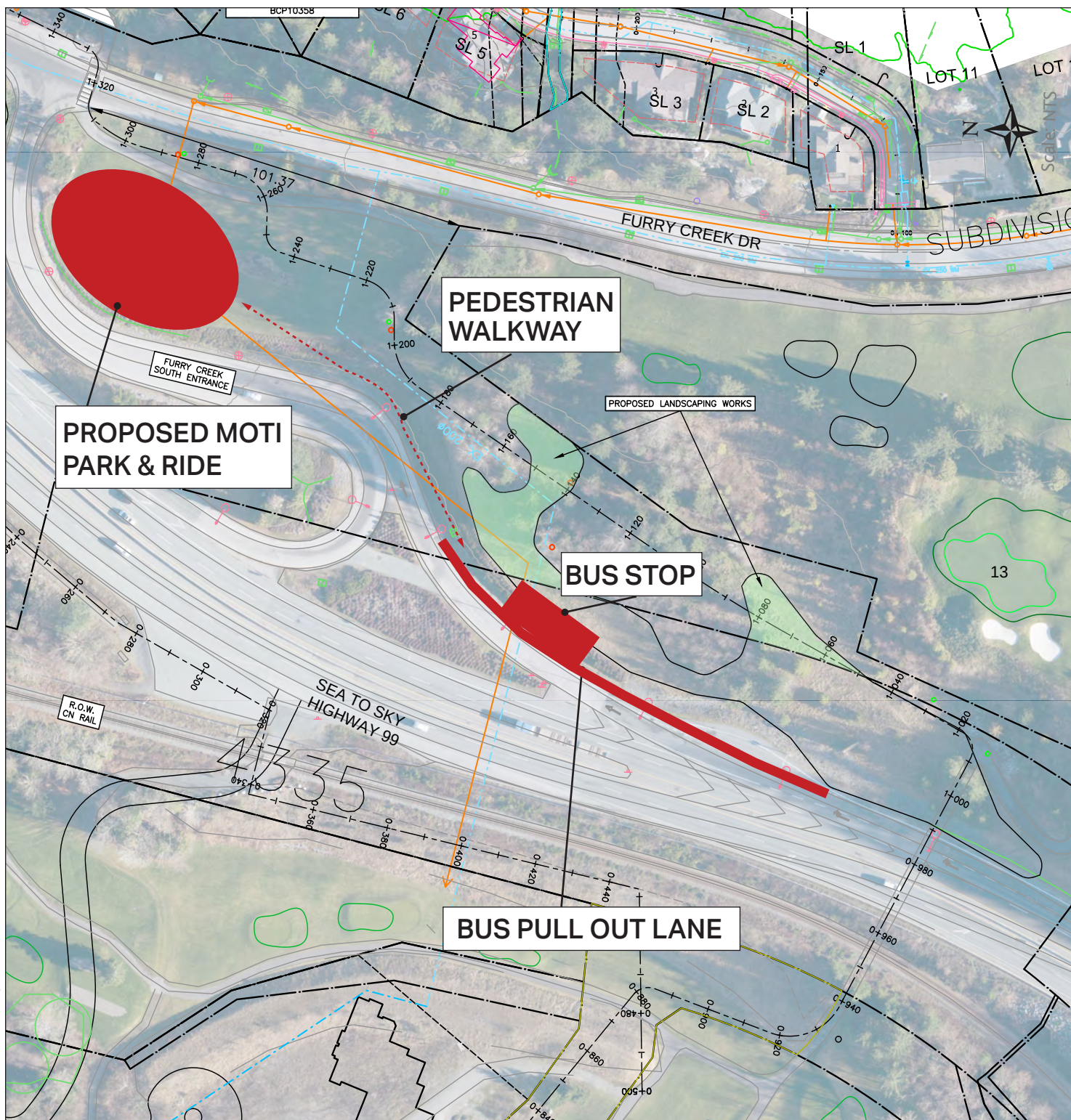


Exhibit 4.1 Proposed Future Transit Network

Furry Creek Traffic Impact Analysis
04-18-0473
June 2019

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4.3 Pedestrian Connectivity

Although pedestrian facilities are provided through some areas of the site, there is a notable missing link between Furry Creek Drive between the Northbound on/off ramp and Country Club Road. A sidewalk or multi-use path is recommended here to complete the connectivity. Pedestrian facilities should also be planned to connect new neighborhoods to the existing pedestrians network when they are built.

5. CONCLUSIONS & RECOMMENDATIONS

5.1 Conclusions

- A Preliminary Layout Approval (PLA) was obtained for the “Oceanside Community of Furry Creek” which proposes several clusters of development distributed on the east and west sides of Highway 99, which includes 920 Residential Units, a golf course, a Resort/Hotel, and a 145 boat marina;
- The observed trip generation from the existing 146 residential units in this area is much lower than ITE rates. This may be due to these being vacation homes, an older population who make fewer vehicle trips, and a peak period for the residential uses different than that of the highway;
- Existing traffic operations within the study were found to be very efficient within the study area with all movements at all intersections operating Level of Service (LOS) B or better;
- Peak hour traffic volumes on Highway 99 in the peak summer season are expected to be approximately 30% higher than those in December when the traffic counts were collected. Accordingly, the collected data was adjusted to reflect the peak season in future conditions analyses;
- A 3.0% traffic growth rate was observed at the Eagle Ridge Count Station (just north of Horseshoe bay) from 2011 through 2017 (based on the 30th highest hourly volume of each year). It is unlikely that this growth rate can be sustained based on the maximum observed traffic volumes at this location;
- The proposed development is anticipated to generate a total of 815 new trips in the Friday PM peak hour and 711 trips during the Sunday peak hour; and,
- With the anticipated future total traffic volumes, all movements at all intersections within the study area are anticipated to operate at LOS B or better, and the Highway 99 on and off ramps operate at LOS C or better.

5.2 Recommendations

- No laning or traffic control modifications are required at the existing intersections and ramps within the study area.
- For the new intersection proposed where Howe Sound Drive and the Highway 99 southbound on and off ramps currently intersect. Stop control is recommended for the eastbound approach, and free movements are recommended from the northbound and southbound approaches.
- To accommodate future transit service, bus pullouts should be planned along Highway 99 and within the local road network. Recommended locations are along the northbound and southbound off-ramps, along Furry Creek Drive near Country Club Road, and along Howe Sound Drive near Sea View Drive.

- Additional pedestrian facilities should be provided along Furry Creek Drive between the northbound on-ramp and Country Club Road, and connecting to the proposed future neighborhoods.

APPENDIX A

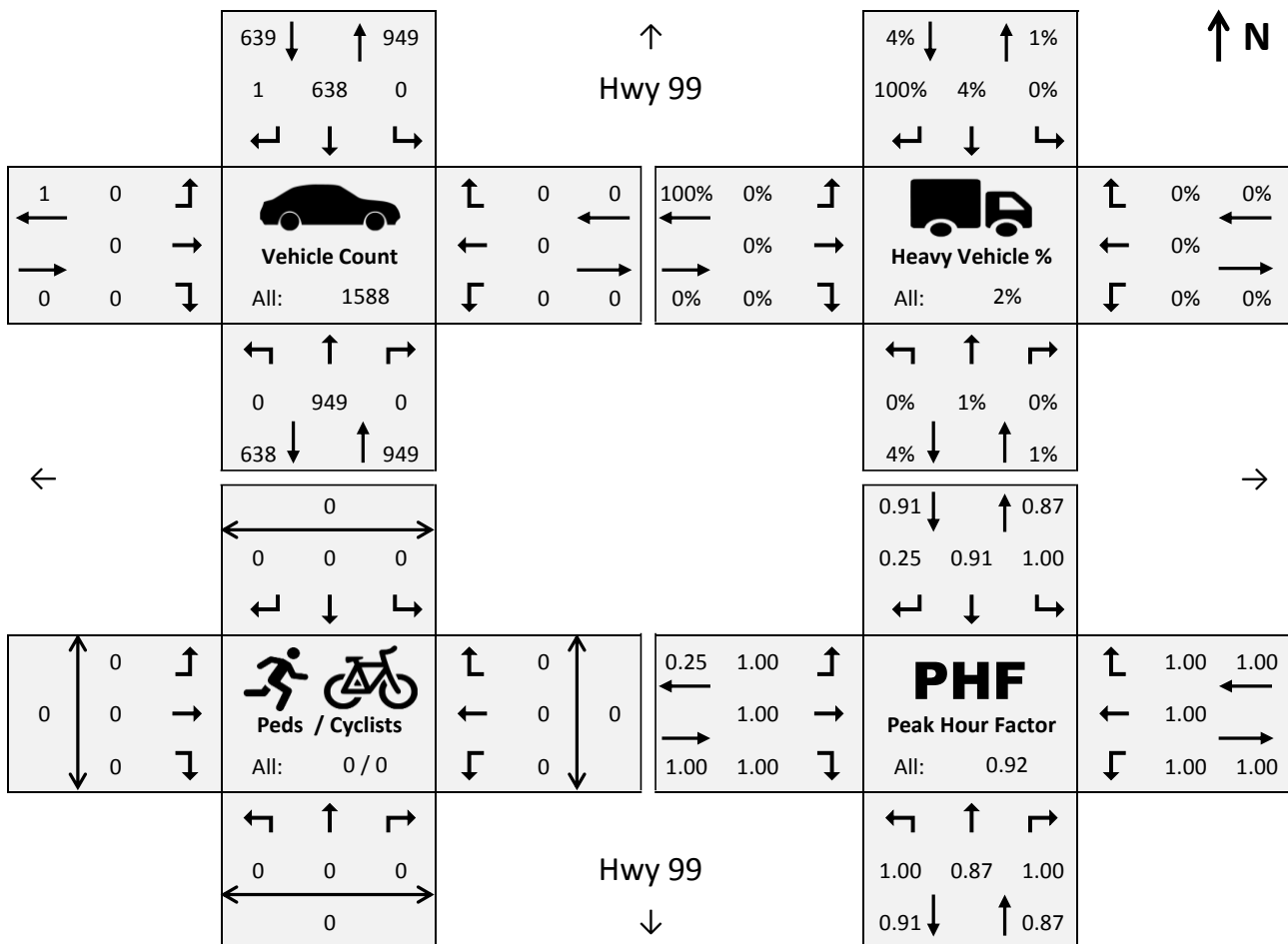
Traffic Data

Hwy 99 @ – Furry Creek, BC

Project#: 04-18-0473 **Weather:** Rainy **Analysis Period:** 16:15 - 17:15
Date: Dec 14, 2018 (Fri) **Road Cond:** Wet **Intersection Peak:** 16:15 - 17:15
Notes: Furry Creek Golf & Country Club is closed, Hwy 99 NB-SB thru



TIME INTERVAL	AUTOMOBILE COUNT												PEDESTRIANS			
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	N	S	E	W
15:00 - 15:15	0	176	0	0	145	0	0	0	0	0	0	0	0	0	0	0
15:15 - 15:30	0	172	0	0	141	0	0	0	0	0	0	0	0	0	0	0
15:30 - 15:45	0	175	0	0	180	0	0	0	0	0	0	0	0	0	0	0
15:45 - 16:00	0	257	0	0	144	0	0	0	0	0	0	0	0	0	0	0
16:00 - 16:15	0	214	0	0	129	0	0	0	0	0	0	0	0	0	0	0
16:15 - 16:30	0	259	0	0	150	1	0	0	0	0	0	0	0	0	0	0
16:30 - 16:45	0	273	0	0	157	0	0	0	0	0	0	0	0	0	0	0
16:45 - 17:00	0	248	0	0	156	0	0	0	0	0	0	0	0	0	0	0
17:00 - 17:15	0	169	0	0	175	0	0	0	0	0	0	0	0	0	0	0
17:15 - 17:30	0	156	0	0	154	0	0	0	0	0	0	0	0	0	0	0
17:30 - 17:45	0	191	0	0	150	0	0	0	0	0	0	0	0	0	0	0
17:45 - 18:00	0	183	0	0	110	0	0	0	0	0	0	0	0	0	0	0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

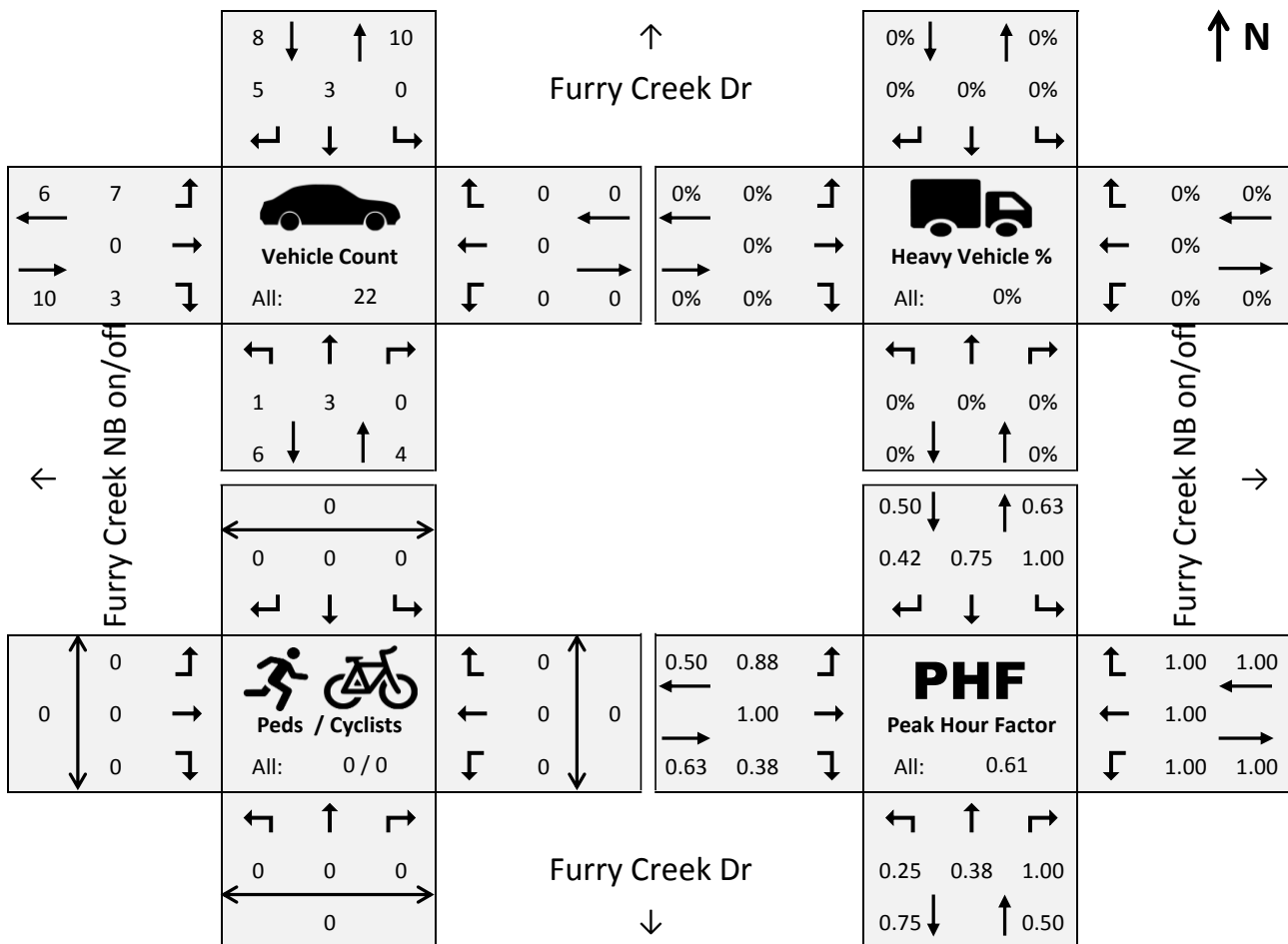


Furry Creek Dr @ Furry Creek NB on/off ramp – Furry Creek, BC

Project#: 04-18-0473 **Weather:** Rainy **Analysis Period:** 16:15 - 17:15
Date: Dec 14, 2018 (Fri) **Road Cond:** Wet **Intersection Peak:** 17:00 - 18:00
Notes: Furry Creek Golf & Country Club is closed



TIME INTERVAL	AUTOMOBILE COUNT												PEDESTRIANS			
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	N	S	E	W
15:00 - 15:15	0	0	0	0	3	1	2	0	0	0	0	0	0	0	0	0
15:15 - 15:30	1	2	0	0	2	0	1	0	2	0	0	0	0	0	0	0
15:30 - 15:45	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0
15:45 - 16:00	0	2	0	0	1	0	1	0	0	0	0	0	0	0	0	0
16:00 - 16:15	1	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0
16:15 - 16:30	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
16:30 - 16:45	0	2	0	0	1	3	2	0	1	0	0	0	0	0	0	0
16:45 - 17:00	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0
17:00 - 17:15	0	1	0	0	0	1	2	0	2	0	0	0	0	0	0	0
17:15 - 17:30	1	1	0	0	1	1	1	0	4	0	0	0	0	0	0	0
17:30 - 17:45	0	2	0	0	1	1	2	0	2	0	0	0	0	0	0	0
17:45 - 18:00	1	1	0	0	1	1	2	0	1	0	0	0	0	0	0	0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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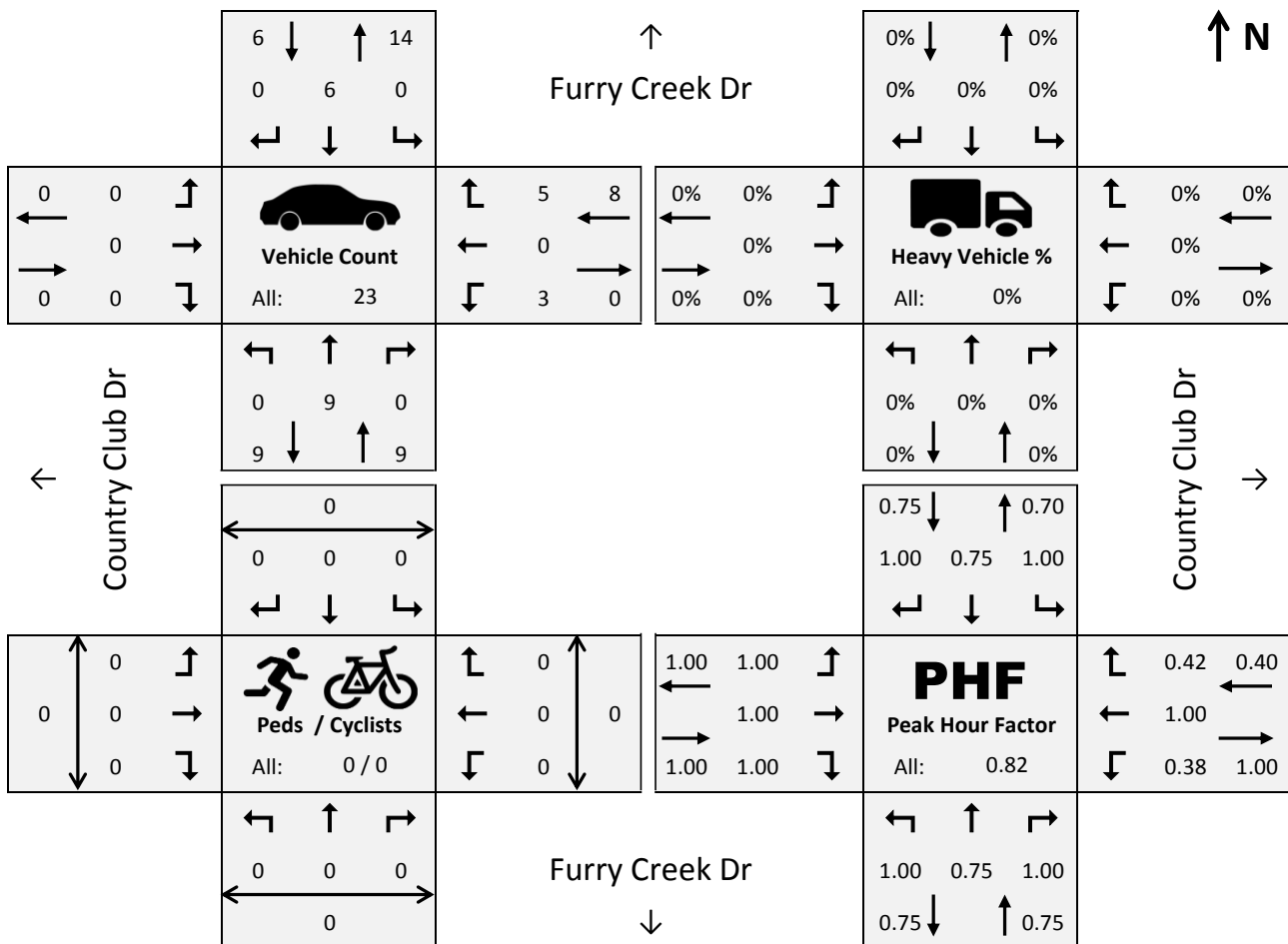


Furry Creek Dr @ Country Club Dr – Furry Creek, BC

Project#: 04-18-0473 **Weather:** Rainy **Analysis Period:** 16:15 - 17:15
Date: Dec 14, 2018 (Fri) **Road Cond:** Wet **Intersection Peak:** 16:15 - 17:15
Notes: Furry Creek Golf & Country Club is closed



TIME INTERVAL	AUTOMOBILE COUNT												PEDESTRIANS			
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	N	S	E	W
15:00 - 15:15	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
15:15 - 15:30	0	3	0	0	2	0	0	0	0	0	0	1	0	0	0	0
15:30 - 15:45	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45 - 16:00	0	3	0	0	2	0	0	0	0	0	0	1	0	0	0	0
16:00 - 16:15	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
16:15 - 16:30	0	2	0	0	2	0	0	0	0	1	0	0	0	0	0	0
16:30 - 16:45	0	2	0	0	0	0	0	0	0	2	0	3	0	0	0	0
16:45 - 17:00	0	2	0	0	2	0	0	0	0	0	0	2	0	0	0	0
17:00 - 17:15	0	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0
17:15 - 17:30	0	3	0	1	1	0	0	0	0	0	0	0	0	0	0	0
17:30 - 17:45	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0
17:45 - 18:00	0	3	0	0	1	0	0	0	0	1	0	0	0	0	0	0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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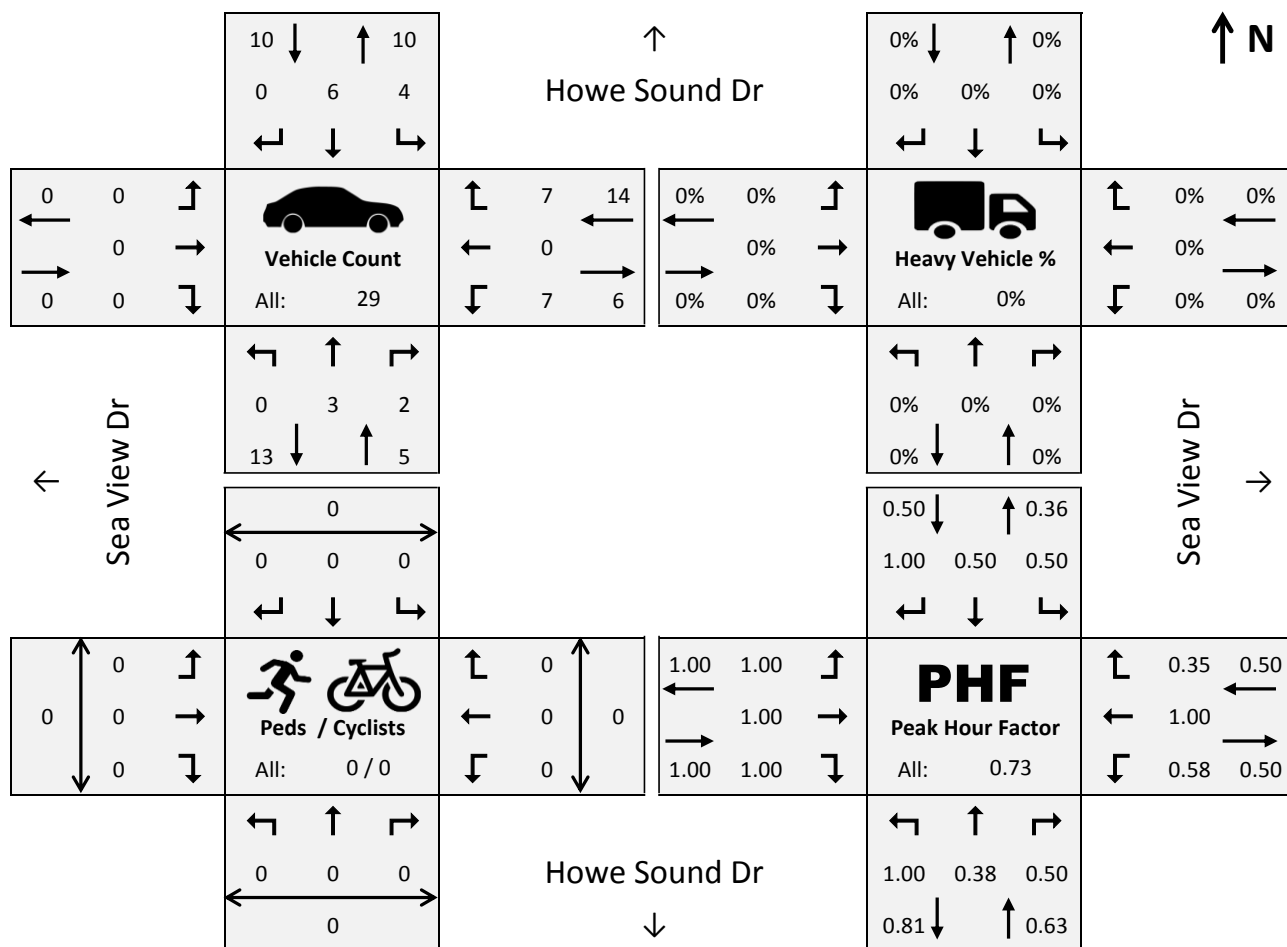


Howe Sound Dr @ Sea View Dr – Furry Creek, BC

Project#: 04-18-0473 **Weather:** Rainy **Analysis Period:** 16:15 - 17:15
Date: Dec 14, 2018 (Fri) **Road Cond:** Wet **Intersection Peak:** 16:15 - 17:15
Notes: Furry Creek Golf & Country Club is closed



TIME INTERVAL	AUTOMOBILE COUNT												PEDESTRIANS			
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	N	S	E	W
15:00 - 15:15	0	1	0	2	2	0	0	0	0	0	0	0	0	0	0	0
15:15 - 15:30	0	0	1	1	2	0	0	0	0	1	0	3	0	0	0	0
15:30 - 15:45	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0
15:45 - 16:00	0	0	0	1	0	0	0	0	0	1	0	2	0	0	0	0
16:00 - 16:15	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0
16:15 - 16:30	0	0	0	2	3	0	0	0	0	1	0	0	0	0	0	0
16:30 - 16:45	0	2	0	0	1	0	0	0	0	2	0	5	0	0	0	0
16:45 - 17:00	0	0	1	1	2	0	0	0	0	1	0	1	0	0	0	0
17:00 - 17:15	0	1	1	1	0	0	0	0	0	3	0	1	0	0	0	0
17:15 - 17:30	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0
17:30 - 17:45	0	1	0	1	0	0	0	0	0	2	0	2	0	0	0	0
17:45 - 18:00	0	0	0	1	0	0	0	0	0	3	0	1	0	0	0	0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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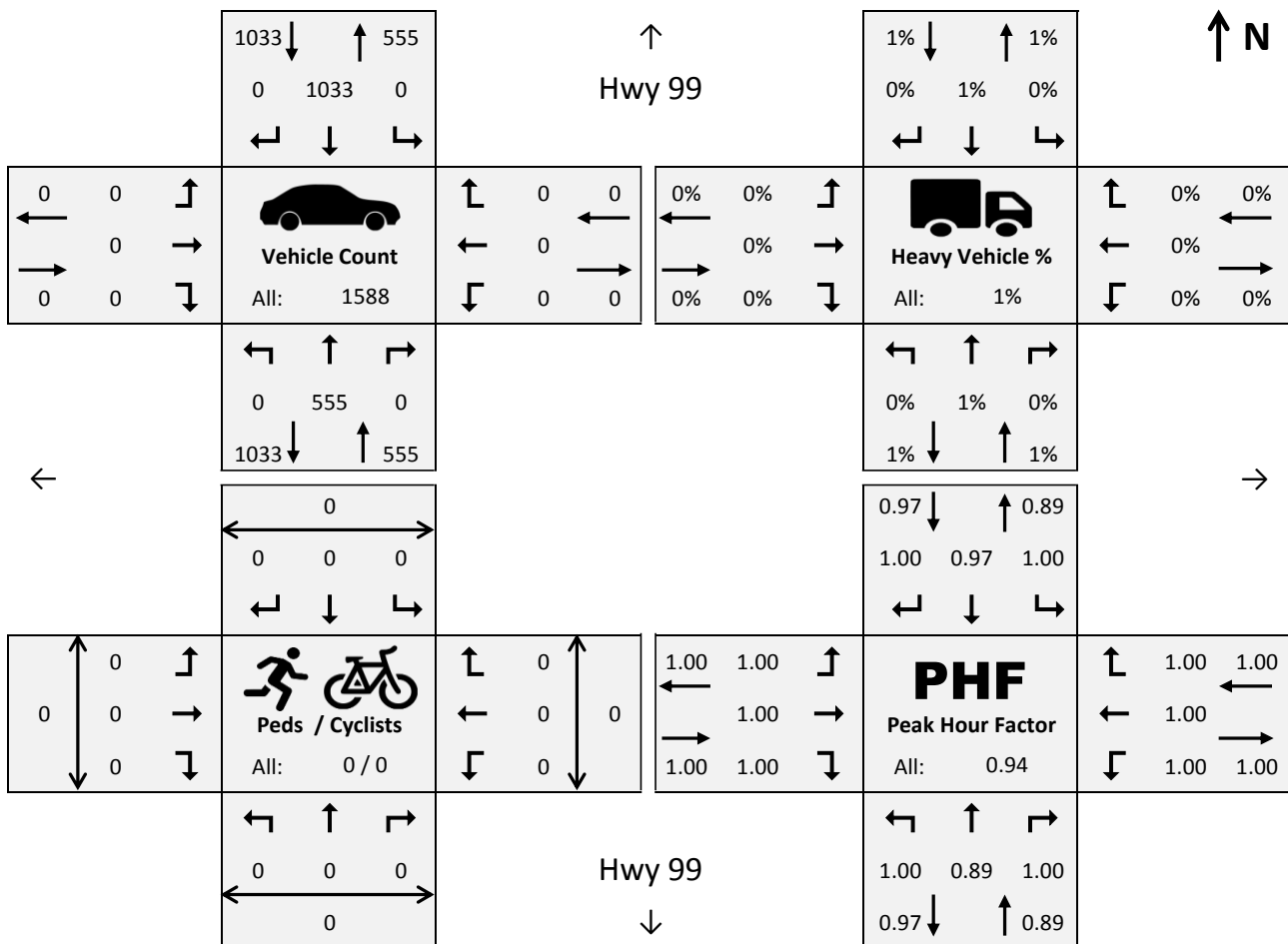


Hwy 99 @ – Furry Creek, BC

Project#: 04-18-0473 **Weather:** Rainy **Analysis Period:** 15:30 - 16:30
Date: Dec 16, 2018 (Sun) **Road Cond:** Wet **Intersection Peak:** 15:30 - 16:30
Notes: Furry Creek Golf & Country Club is closed, Hwy 99 NB-SB thru



TIME INTERVAL	AUTOMOBILE COUNT												PEDESTRIANS			
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	N	S	E	W
15:00 - 15:15	0	135	0	0	221	0	0	0	0	0	0	0	0	0	0	0
15:15 - 15:30	0	172	0	0	218	0	0	0	0	0	0	0	0	0	0	0
15:30 - 15:45	0	148	0	0	267	0	0	0	0	0	0	0	0	0	0	0
15:45 - 16:00	0	132	0	0	232	0	0	0	0	0	0	0	0	0	0	0
16:00 - 16:15	0	119	0	0	267	0	0	0	0	0	0	0	0	0	0	0
16:15 - 16:30	0	156	0	0	267	0	0	0	0	0	0	0	0	0	0	0
16:30 - 16:45	0	113	0	0	259	0	0	0	0	0	0	0	0	0	0	0
16:45 - 17:00	0	131	0	0	264	0	0	0	0	0	0	0	0	0	0	0
17:00 - 17:15	0	101	0	0	230	0	0	0	0	0	0	0	0	0	0	0
17:15 - 17:30	0	106	0	0	205	0	0	0	0	0	0	0	0	0	0	0
17:30 - 17:45	0	116	0	0	188	0	0	0	0	0	0	0	0	0	0	0
17:45 - 18:00	0	79	0	0	200	0	0	0	0	0	0	0	0	0	0	0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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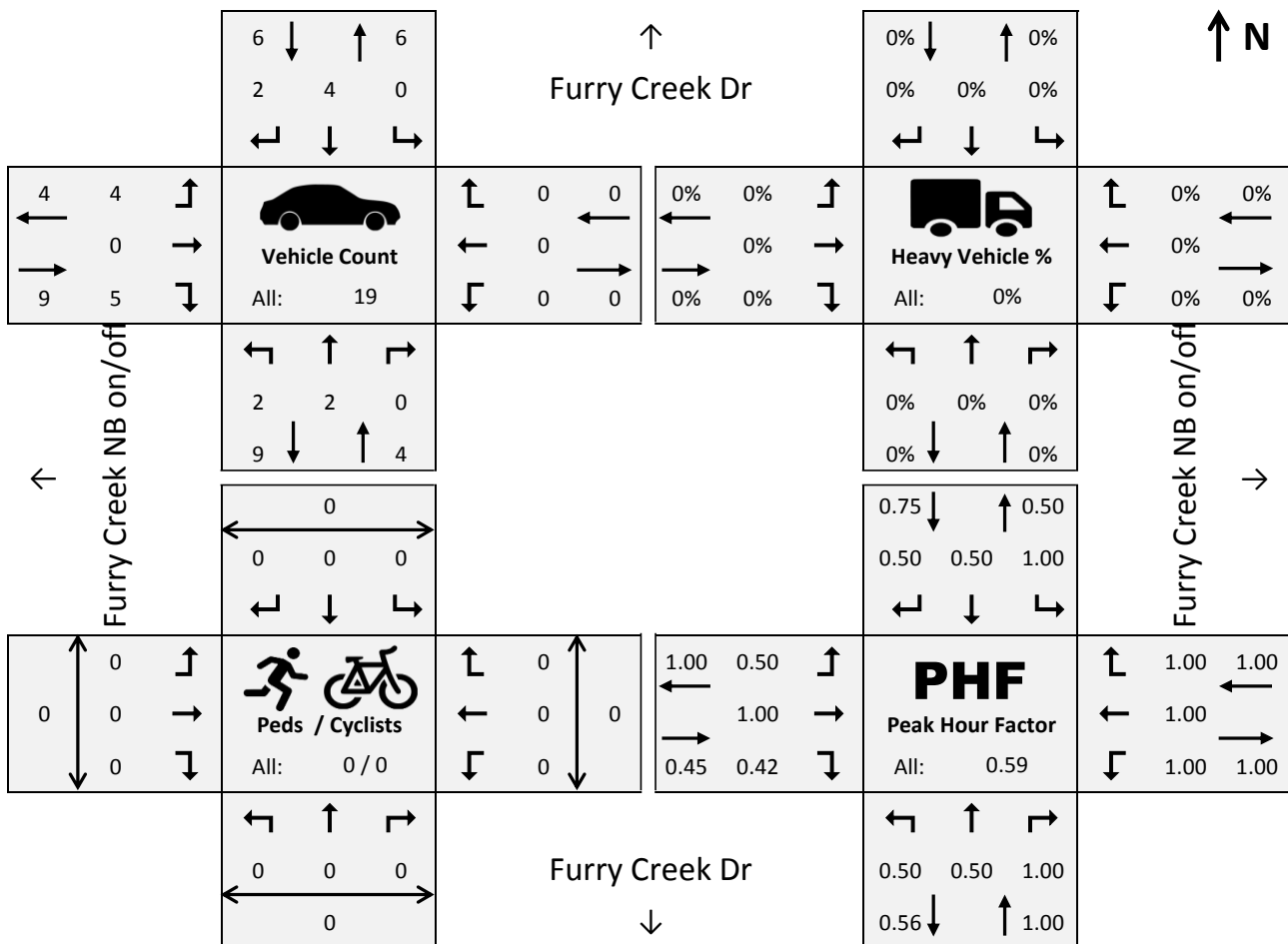


Furry Creek Dr @ Furry Creek NB on/off ramp – Furry Creek, BC

Project#: 04-18-0473 **Weather:** Rainy **Analysis Period:** 15:30 - 16:30
Date: Dec 16, 2018 (Sun) **Road Cond:** Wet **Intersection Peak:** 15:15 - 16:15
Notes: Furry Creek Golf & Country Club is closed



TIME INTERVAL	AUTOMOBILE COUNT												PEDESTRIANS			
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	N	S	E	W
15:00 - 15:15	0	0	0	0	2	2	1	0	0	0	0	0	0	0	0	0
15:15 - 15:30	1	3	0	0	0	0	0	0	3	0	0	0	0	0	0	0
15:30 - 15:45	1	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0
15:45 - 16:00	1	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0
16:00 - 16:15	0	1	0	0	1	1	2	0	3	0	0	0	0	0	0	0
16:15 - 16:30	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0
16:30 - 16:45	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
16:45 - 17:00	1	0	0	0	1	1	1	0	2	0	0	0	0	0	0	0
17:00 - 17:15	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
17:15 - 17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30 - 17:45	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
17:45 - 18:00	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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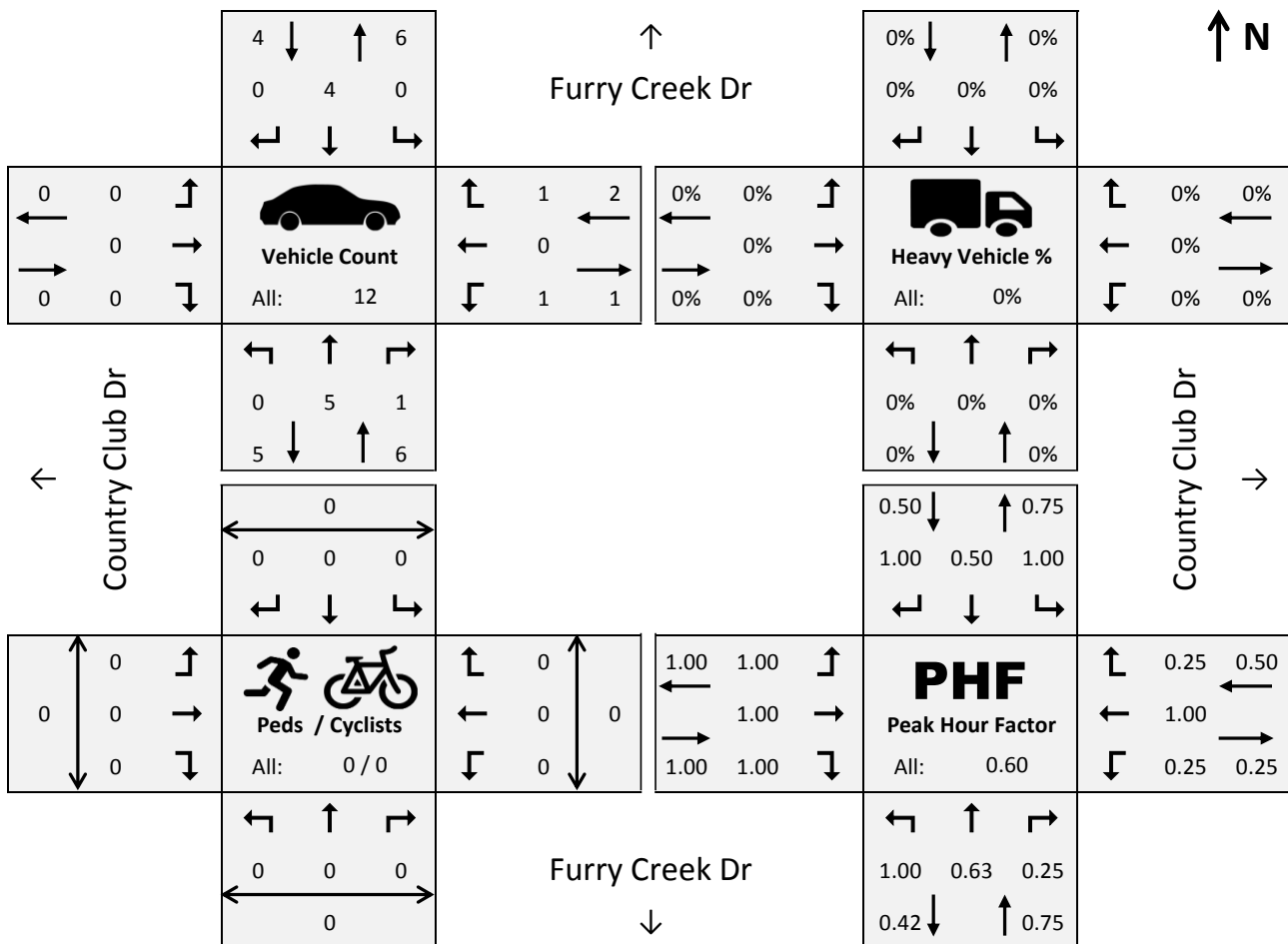


Furry Creek Dr @ Country Club Dr – Furry Creek, BC

Project#: 04-18-0473 **Weather:** Rainy **Analysis Period:** 15:30 - 16:30
Date: Dec 16, 2018 (Sun) **Road Cond:** Wet **Intersection Peak:** 16:00 - 17:00
Notes: Furry Creek Golf & Country Club is closed



TIME INTERVAL	AUTOMOBILE COUNT												PEDESTRIANS			
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	N	S	E	W
15:00 - 15:15	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0
15:15 - 15:30	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30 - 15:45	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0
15:45 - 16:00	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
16:00 - 16:15	0	2	0	0	2	0	0	0	0	1	0	0	0	0	0	0
16:15 - 16:30	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30 - 16:45	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45 - 17:00	0	1	0	1	3	0	0	0	0	0	0	0	0	0	0	0
17:00 - 17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15 - 17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30 - 17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45 - 18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

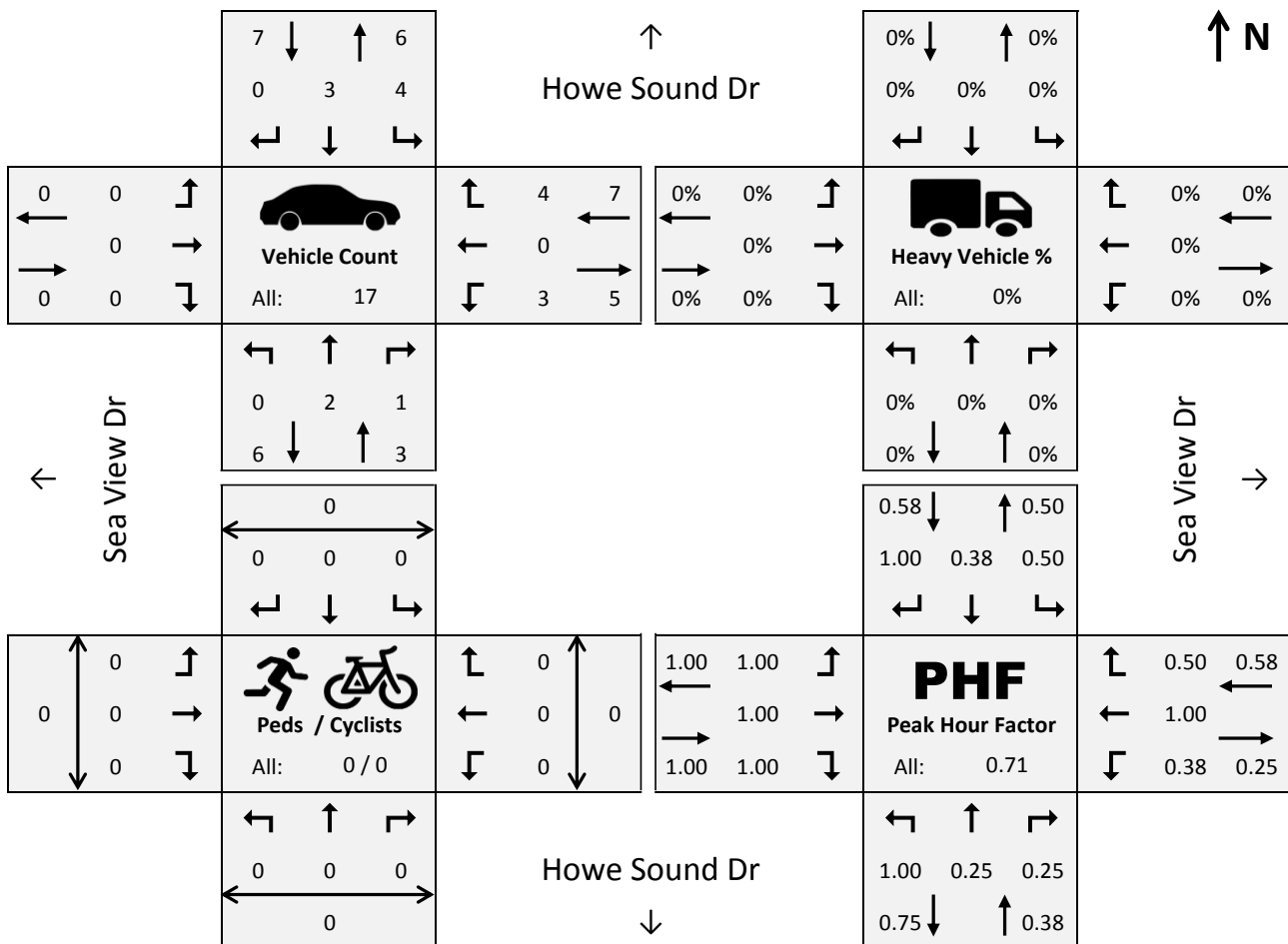


Howe Sound Dr @ Sea View Dr – Furry Creek, BC

Project#: 04-18-0473 **Weather:** Rainy **Analysis Period:** 15:30 - 16:30
Date: Dec 16, 2018 (Sun) **Road Cond:** Wet **Intersection Peak:** 16:00 - 17:00
Notes: Furry Creek Golf & Country Club is closed



TIME INTERVAL	AUTOMOBILE COUNT												PEDESTRIANS			
	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	N	S	E	W
15:00 - 15:15	0	3	1	2	0	0	0	0	0	1	0	0	0	0	0	0
15:15 - 15:30	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
15:30 - 15:45	0	0	0	2	0	0	0	0	0	2	0	1	0	0	0	0
15:45 - 16:00	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
16:00 - 16:15	0	0	1	1	2	0	0	0	0	0	0	2	0	0	0	0
16:15 - 16:30	0	2	0	0	0	0	0	0	0	1	0	1	0	0	0	0
16:30 - 16:45	0	1	0	0	0	0	0	0	0	1	0	2	0	0	0	0
16:45 - 17:00	0	1	0	2	0	0	0	0	0	1	0	0	0	0	0	0
17:00 - 17:15	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0
17:15 - 17:30	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
17:30 - 17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45 - 18:00	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



APPENDIX B

Traffic Reports

HCM Unsignalized Intersection Capacity Analysis

4: Furry Creek Dr & NB on/off Ramp

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	6	3	1	3	3	6
Future Volume (vph)	6	3	1	3	3	6
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61
Hourly flow rate (vph)	10	5	2	5	5	10
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	15	7	15			
Volume Left (vph)	10	2	0			
Volume Right (vph)	5	0	10			
Hadj (s)	-0.07	0.06	-0.40			
Departure Headway (s)	3.9	4.0	3.5			
Degree Utilization, x	0.02	0.01	0.01			
Capacity (veh/h)	917	892	1007			
Control Delay (s)	6.9	7.0	6.6			
Approach Delay (s)	6.9	7.0	6.6			
Approach LOS	A	A	A			
Intersection Summary						
Delay			6.8			
Level of Service			A			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Furry Creek Dr & Country Club Rd

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	3	5	9	0	0	6
Future Volume (vph)	3	5	9	0	0	6
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	4	6	11	0	0	7
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	10	11	7			
Volume Left (vph)	4	0	0			
Volume Right (vph)	6	0	0			
Hadj (s)	-0.28	0.00	0.00			
Departure Headway (s)	3.7	3.9	3.9			
Degree Utilization, x	0.01	0.01	0.01			
Capacity (veh/h)	972	911	908			
Control Delay (s)	6.7	7.0	7.0			
Approach Delay (s)	6.7	7.0	7.0			
Approach LOS	A	A	A			
Intersection Summary						
Delay			6.9			
Level of Service			A			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Sea View Dr & Furry Creek Dr

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			T	T	L
Traffic Volume (veh/h)	14	0	0	0	0	6
Future Volume (Veh/h)	14	0	0	0	0	6
Sign Control	Stop			Free	Free	
Grade	3%			-6%	3%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	17	0	0	0	0	7
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	4	4	7			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	4	4	7			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	98	100	100			
cM capacity (veh/h)	1019	1080	1614			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	17	0	7			
Volume Left	17	0	0			
Volume Right	0	0	7			
cSH	1019	1700	1700			
Volume to Capacity	0.02	0.00	0.00			
Queue Length 95th (m)	0.4	0.0	0.0			
Control Delay (s)	8.6	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	8.6	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			6.1			
Intersection Capacity Utilization			13.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: Waterfront Dr/Howe Sound Dr & Sea View Dr

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	7	7	3	2	4	6
Future Volume (vph)	7	7	3	2	4	6
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72
Hourly flow rate (vph)	10	10	4	3	6	8
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	
Volume Total (vph)	10	10	4	3	14	
Volume Left (vph)	10	0	0	0	6	
Volume Right (vph)	0	10	0	3	0	
Hadj (s)	0.20	-0.60	0.00	-0.60	0.09	
Departure Headway (s)	4.1	3.2	3.9	3.2	4.0	
Degree Utilization, x	0.01	0.01	0.00	0.00	0.02	
Capacity (veh/h)	860	1121	908	1121	892	
Control Delay (s)	7.2	6.2	7.0	6.2	7.1	
Approach Delay (s)	6.7		6.6		7.1	
Approach LOS	A		A		A	
Intersection Summary						
Delay			6.8			
Level of Service			A			
Intersection Capacity Utilization			13.9%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

4: Furry Creek Dr & NB on/off Ramp

01/30/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	4	5	2	2	4	2
Future Volume (vph)	4	5	2	2	4	2
Peak Hour Factor	0.59	0.59	0.59	0.59	0.59	0.59
Hourly flow rate (vph)	7	8	3	3	7	3
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	15	6	10			
Volume Left (vph)	7	3	0			
Volume Right (vph)	8	0	3			
Hadj (s)	-0.23	0.10	-0.18			
Departure Headway (s)	3.7	4.0	3.8			
Degree Utilization, x	0.02	0.01	0.01			
Capacity (veh/h)	960	874	949			
Control Delay (s)	6.8	7.1	6.8			
Approach Delay (s)	6.8	7.1	6.8			
Approach LOS	A	A	A			
Intersection Summary						
Delay			6.8			
Level of Service			A			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Furry Creek Dr & Country Club Rd

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	1	1	5	1	0	5
Future Volume (vph)	1	1	5	1	0	5
Peak Hour Factor	0.60	0.60	0.60	0.60	0.60	0.60
Hourly flow rate (vph)	2	2	8	2	0	8
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	4	10	8			
Volume Left (vph)	2	0	0			
Volume Right (vph)	2	2	0			
Hadj (s)	-0.20	-0.12	0.00			
Departure Headway (s)	3.7	3.8	3.9			
Degree Utilization, x	0.00	0.01	0.01			
Capacity (veh/h)	951	944	912			
Control Delay (s)	6.8	6.8	7.0			
Approach Delay (s)	6.8	6.8	7.0			
Approach LOS	A	A	A			
Intersection Summary						
Delay			6.9			
Level of Service			A			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Sea View Dr & Furry Creek Dr

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	0	0	0	0	5
Future Volume (Veh/h)	6	0	0	0	0	5
Sign Control	Stop			Free	Free	
Grade	3%			-6%	3%	
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82
Hourly flow rate (vph)	7	0	0	0	0	6
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	3	3	6			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3	3	6			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	100	100			
cM capacity (veh/h)	1019	1081	1615			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	7	0	6			
Volume Left	7	0	0			
Volume Right	0	0	6			
cSH	1019	1700	1700			
Volume to Capacity	0.01	0.00	0.00			
Queue Length 95th (m)	0.2	0.0	0.0			
Control Delay (s)	8.6	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	8.6	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			4.6			
Intersection Capacity Utilization			13.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: Waterfront Dr/Howe Sound Dr & Sea View Dr

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	3	4	2	1	4	3
Future Volume (vph)	3	4	2	1	4	3
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71
Hourly flow rate (vph)	4	6	3	1	6	4
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	
Volume Total (vph)	4	6	3	1	10	
Volume Left (vph)	4	0	0	0	6	
Volume Right (vph)	0	6	0	1	0	
Hadj (s)	0.20	-0.60	0.00	-0.60	0.12	
Departure Headway (s)	4.1	3.2	3.9	3.2	4.0	
Degree Utilization, x	0.00	0.01	0.00	0.00	0.01	
Capacity (veh/h)	863	1121	914	1121	888	
Control Delay (s)	7.1	6.2	6.9	6.2	7.1	
Approach Delay (s)	6.6		6.7		7.1	
Approach LOS	A		A		A	
Intersection Summary						
Delay			6.8			
Level of Service			A			
Intersection Capacity Utilization			13.7%		ICU Level of Service	A
Analysis Period (min)			15			

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

4: Furry Creek Dr & NB on/off Ramp

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	19	3	1	3	3	13
Future Volume (vph)	19	3	1	3	3	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	3	1	3	3	14
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	24	4	17			
Volume Left (vph)	21	1	0			
Volume Right (vph)	3	0	14			
Hadj (s)	0.10	0.05	-0.49			
Departure Headway (s)	4.0	4.0	3.5			
Degree Utilization, x	0.03	0.00	0.02			
Capacity (veh/h)	880	877	1026			
Control Delay (s)	7.2	7.0	6.5			
Approach Delay (s)	7.2	7.0	6.5			
Approach LOS	A	A	A			
Intersection Summary						
Delay			6.9			
Level of Service			A			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Furry Creek Dr & Country Club Rd

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	10	16	9	13	8	6
Future Volume (vph)	10	16	9	13	8	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	17	10	14	9	7
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	28	24	16			
Volume Left (vph)	11	0	9			
Volume Right (vph)	17	14	0			
Hadj (s)	-0.29	-0.35	0.11			
Departure Headway (s)	3.7	3.6	4.1			
Degree Utilization, x	0.03	0.02	0.02			
Capacity (veh/h)	957	982	869			
Control Delay (s)	6.8	6.7	7.2			
Approach Delay (s)	6.8	6.7	7.2			
Approach LOS	A	A	A			
Intersection Summary						
Delay			6.9			
Level of Service			A			
Intersection Capacity Utilization			17.4%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Sea View Dr & Furry Creek Dr

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	0	0	0	0	14
Future Volume (Veh/h)	25	0	0	0	0	14
Sign Control	Stop			Free	Free	
Grade	3%			-6%	3%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	0	0	0	0	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	8	8	15			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	8	8	15			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	100	100			
cM capacity (veh/h)	1013	1075	1603			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	27	0	15			
Volume Left	27	0	0			
Volume Right	0	0	15			
cSH	1013	1700	1700			
Volume to Capacity	0.03	0.00	0.01			
Queue Length 95th (m)	0.6	0.0	0.0			
Control Delay (s)	8.6	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	8.6	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			5.6			
Intersection Capacity Utilization			13.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: Waterfront Dr/Howe Sound Dr & Sea View Dr

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	7	18	3	2	12	6
Future Volume (vph)	7	18	3	2	12	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	20	3	2	13	7
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	
Volume Total (vph)	8	20	3	2	20	
Volume Left (vph)	8	0	0	0	13	
Volume Right (vph)	0	20	0	2	0	
Hadj (s)	0.20	-0.60	0.00	-0.60	0.13	
Departure Headway (s)	4.1	3.2	3.9	3.2	4.1	
Degree Utilization, x	0.01	0.02	0.00	0.00	0.02	
Capacity (veh/h)	857	1121	908	1121	874	
Control Delay (s)	7.2	6.3	6.9	6.2	7.1	
Approach Delay (s)	6.5		6.7		7.1	
Approach LOS	A		A		A	
Intersection Summary						
Delay			6.8			
Level of Service			A			
Intersection Capacity Utilization			17.6%		ICU Level of Service	A
Analysis Period (min)			15			

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

4: Furry Creek Dr & NB on/off Ramp

01/30/2019

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	18	5	2	2	4	19
Future Volume (vph)	18	5	2	2	4	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	5	2	2	4	21
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	25	4	25			
Volume Left (vph)	20	2	0			
Volume Right (vph)	5	0	21			
Hadj (s)	0.04	0.10	-0.50			
Departure Headway (s)	4.0	4.1	3.5			
Degree Utilization, x	0.03	0.00	0.02			
Capacity (veh/h)	888	864	1029			
Control Delay (s)	7.1	7.1	6.5			
Approach Delay (s)	7.1	7.1	6.5			
Approach LOS	A	A	A			
Intersection Summary						
Delay			6.8			
Level of Service			A			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Furry Creek Dr & Country Club Rd

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	18	27	5	15	9	5
Future Volume (vph)	18	27	5	15	9	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	29	5	16	10	5
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	49	21	15			
Volume Left (vph)	20	0	10			
Volume Right (vph)	29	16	0			
Hadj (s)	-0.27	-0.46	0.13			
Departure Headway (s)	3.7	3.6	4.1			
Degree Utilization, x	0.05	0.02	0.02			
Capacity (veh/h)	957	995	852			
Control Delay (s)	6.9	6.6	7.2			
Approach Delay (s)	6.9	6.6	7.2			
Approach LOS	A	A	A			
Intersection Summary						
Delay			6.9			
Level of Service			A			
Intersection Capacity Utilization			17.4%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Sea View Dr & Furry Creek Dr

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	32	0	0	0	0	14
Future Volume (Veh/h)	32	0	0	0	0	14
Sign Control	Stop			Free	Free	
Grade	3%			-6%	3%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	0	0	0	0	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	8	8	15			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	8	8	15			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	100	100			
cM capacity (veh/h)	1013	1075	1603			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	35	0	15			
Volume Left	35	0	0			
Volume Right	0	0	15			
cSH	1013	1700	1700			
Volume to Capacity	0.03	0.00	0.01			
Queue Length 95th (m)	0.8	0.0	0.0			
Control Delay (s)	8.7	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	8.7	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			6.1			
Intersection Capacity Utilization			13.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: Waterfront Dr/Howe Sound Dr & Sea View Dr

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	3	30	2	1	13	3
Future Volume (vph)	3	30	2	1	13	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	33	2	1	14	3
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	
Volume Total (vph)	3	33	2	1	17	
Volume Left (vph)	3	0	0	0	14	
Volume Right (vph)	0	33	0	1	0	
Hadj (s)	0.20	-0.60	0.00	-0.60	0.16	
Departure Headway (s)	4.1	3.2	3.9	3.2	4.1	
Degree Utilization, x	0.00	0.03	0.00	0.00	0.02	
Capacity (veh/h)	859	1121	913	1121	880	
Control Delay (s)	7.2	6.3	6.9	6.2	7.2	
Approach Delay (s)	6.4		6.7		7.2	
Approach LOS	A		A		A	
Intersection Summary						
Delay			6.6			
Level of Service			A			
Intersection Capacity Utilization			17.5%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

4: Furry Creek Dr & NB on/off Ramp

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	19	3	1	3	3	13
Future Volume (vph)	19	3	1	3	3	13
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	3	1	3	3	14
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	24	4	17			
Volume Left (vph)	21	1	0			
Volume Right (vph)	3	0	14			
Hadj (s)	0.10	0.05	-0.49			
Departure Headway (s)	4.0	4.0	3.5			
Degree Utilization, x	0.03	0.00	0.02			
Capacity (veh/h)	880	877	1026			
Control Delay (s)	7.2	7.0	6.5			
Approach Delay (s)	7.2	7.0	6.5			
Approach LOS	A	A	A			
Intersection Summary						
Delay			6.9			
Level of Service			A			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Furry Creek Dr & Country Club Rd

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	10	16	9	13	8	6
Future Volume (vph)	10	16	9	13	8	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	17	10	14	9	7
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	28	24	16			
Volume Left (vph)	11	0	9			
Volume Right (vph)	17	14	0			
Hadj (s)	-0.29	-0.35	0.11			
Departure Headway (s)	3.7	3.6	4.1			
Degree Utilization, x	0.03	0.02	0.02			
Capacity (veh/h)	957	982	869			
Control Delay (s)	6.8	6.7	7.2			
Approach Delay (s)	6.8	6.7	7.2			
Approach LOS	A	A	A			
Intersection Summary						
Delay			6.9			
Level of Service			A			
Intersection Capacity Utilization			17.4%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Sea View Dr & Furry Creek Dr

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	25	0	0	0	0	14
Future Volume (Veh/h)	25	0	0	0	0	14
Sign Control	Stop			Free	Free	
Grade	3%			-6%	3%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	0	0	0	0	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	8	8	15			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	8	8	15			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	100	100			
cM capacity (veh/h)	1013	1075	1603			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	27	0	15			
Volume Left	27	0	0			
Volume Right	0	0	15			
cSH	1013	1700	1700			
Volume to Capacity	0.03	0.00	0.01			
Queue Length 95th (m)	0.6	0.0	0.0			
Control Delay (s)	8.6	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	8.6	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			5.6			
Intersection Capacity Utilization			13.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: Waterfront Dr/Howe Sound Dr & Sea View Dr

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	7	18	3	2	12	6
Future Volume (vph)	7	18	3	2	12	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	20	3	2	13	7
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	
Volume Total (vph)	8	20	3	2	20	
Volume Left (vph)	8	0	0	0	13	
Volume Right (vph)	0	20	0	2	0	
Hadj (s)	0.20	-0.60	0.00	-0.60	0.13	
Departure Headway (s)	4.1	3.2	3.9	3.2	4.1	
Degree Utilization, x	0.01	0.02	0.00	0.00	0.02	
Capacity (veh/h)	857	1121	908	1121	874	
Control Delay (s)	7.2	6.3	6.9	6.2	7.1	
Approach Delay (s)	6.5		6.7		7.1	
Approach LOS	A		A		A	
Intersection Summary						
Delay			6.8			
Level of Service			A			
Intersection Capacity Utilization			17.6%		ICU Level of Service	A
Analysis Period (min)			15			

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

4: Furry Creek Dr & NB on/off Ramp

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	18	5	2	2	4	19
Future Volume (vph)	18	5	2	2	4	19
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	5	2	2	4	21
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	25	4	25			
Volume Left (vph)	20	2	0			
Volume Right (vph)	5	0	21			
Hadj (s)	0.04	0.10	-0.50			
Departure Headway (s)	4.0	4.1	3.5			
Degree Utilization, x	0.03	0.00	0.02			
Capacity (veh/h)	888	864	1029			
Control Delay (s)	7.1	7.1	6.5			
Approach Delay (s)	7.1	7.1	6.5			
Approach LOS	A	A	A			
Intersection Summary						
Delay			6.8			
Level of Service			A			
Intersection Capacity Utilization			13.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Furry Creek Dr & Country Club Rd

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	18	27	5	15	9	5
Future Volume (vph)	18	27	5	15	9	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	20	29	5	16	10	5
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	49	21	15			
Volume Left (vph)	20	0	10			
Volume Right (vph)	29	16	0			
Hadj (s)	-0.27	-0.46	0.13			
Departure Headway (s)	3.7	3.6	4.1			
Degree Utilization, x	0.05	0.02	0.02			
Capacity (veh/h)	957	995	852			
Control Delay (s)	6.9	6.6	7.2			
Approach Delay (s)	6.9	6.6	7.2			
Approach LOS	A	A	A			
Intersection Summary						
Delay			6.9			
Level of Service			A			
Intersection Capacity Utilization			17.4%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Sea View Dr & Furry Creek Dr

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	32	0	0	0	0	14
Future Volume (Veh/h)	32	0	0	0	0	14
Sign Control	Stop			Free	Free	
Grade	3%			-6%	3%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	0	0	0	0	15
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	8	8	15			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	8	8	15			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	100	100			
cM capacity (veh/h)	1013	1075	1603			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	35	0	15			
Volume Left	35	0	0			
Volume Right	0	0	15			
cSH	1013	1700	1700			
Volume to Capacity	0.03	0.00	0.01			
Queue Length 95th (m)	0.8	0.0	0.0			
Control Delay (s)	8.7	0.0	0.0			
Lane LOS	A					
Approach Delay (s)	8.7	0.0	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			6.1			
Intersection Capacity Utilization			13.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: Waterfront Dr/Howe Sound Dr & Sea View Dr

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	3	30	2	1	13	3
Future Volume (vph)	3	30	2	1	13	3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	3	33	2	1	14	3
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	
Volume Total (vph)	3	33	2	1	17	
Volume Left (vph)	3	0	0	0	14	
Volume Right (vph)	0	33	0	1	0	
Hadj (s)	0.20	-0.60	0.00	-0.60	0.16	
Departure Headway (s)	4.1	3.2	3.9	3.2	4.1	
Degree Utilization, x	0.00	0.03	0.00	0.00	0.02	
Capacity (veh/h)	859	1121	913	1121	880	
Control Delay (s)	7.2	6.3	6.9	6.2	7.2	
Approach Delay (s)	6.4		6.7		7.2	
Approach LOS	A		A		A	
Intersection Summary						
Delay			6.6			
Level of Service			A			
Intersection Capacity Utilization			17.5%	ICU Level of Service		A
Analysis Period (min)			15			

Intersection Sign configuration not allowed in HCM analysis.

HCM Unsignalized Intersection Capacity Analysis

4: Furry Creek Dr & NB on/off Ramp

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	279	18	7	12	13	123
Future Volume (vph)	279	18	7	12	13	123
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	303	20	8	13	14	134
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	323	21	148			
Volume Left (vph)	303	8	0			
Volume Right (vph)	20	0	134			
Hadj (s)	0.15	0.08	-0.54			
Departure Headway (s)	4.4	4.9	4.2			
Degree Utilization, x	0.40	0.03	0.17			
Capacity (veh/h)	792	674	801			
Control Delay (s)	10.3	8.1	8.0			
Approach Delay (s)	10.3	8.1	8.0			
Approach LOS	B	A	A			
Intersection Summary						
Delay			9.5			
Level of Service			A			
Intersection Capacity Utilization			31.5%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Furry Creek Dr & Country Club Rd

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	16	25	261	30	20	120
Future Volume (vph)	16	25	261	30	20	120
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	27	284	33	22	130
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	44	317	152			
Volume Left (vph)	17	0	22			
Volume Right (vph)	27	33	0			
Hadj (s)	-0.29	-0.06	0.03			
Departure Headway (s)	4.6	4.1	4.3			
Degree Utilization, x	0.06	0.36	0.18			
Capacity (veh/h)	703	860	800			
Control Delay (s)	7.9	9.4	8.3			
Approach Delay (s)	7.9	9.4	8.3			
Approach LOS	A	A	A			
Intersection Summary						
Delay			9.0			
Level of Service			A			
Intersection Capacity Utilization			33.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Sea View Dr & Furry Creek Dr

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	199	87	34	51	58	106
Future Volume (Veh/h)	199	87	34	51	58	106
Sign Control	Stop			Free	Free	
Grade	3%			-6%	3%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	216	95	37	55	63	115
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	250	120	178			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	250	120	178			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	70	90	97			
cM capacity (veh/h)	724	936	1410			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	311	92	178			
Volume Left	216	37	0			
Volume Right	95	0	115			
cSH	778	1410	1700			
Volume to Capacity	0.40	0.03	0.10			
Queue Length 95th (m)	14.7	0.6	0.0			
Control Delay (s)	12.7	3.2	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.7	3.2	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		7.3				
Intersection Capacity Utilization		40.5%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

7: Waterfront Dr/Howe Sound Dr & Sea View Dr

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	91	159	65	43	120	62
Future Volume (vph)	91	159	65	43	120	62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	99	173	71	47	130	67
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	
Volume Total (vph)	99	173	71	47	197	
Volume Left (vph)	99	0	0	0	130	
Volume Right (vph)	0	173	0	47	0	
Hadj (s)	0.20	-0.60	0.00	-0.60	0.13	
Departure Headway (s)	4.7	3.2	4.4	3.2	4.4	
Degree Utilization, x	0.13	0.15	0.09	0.04	0.24	
Capacity (veh/h)	716	1121	791	1121	802	
Control Delay (s)	8.4	6.8	7.8	6.3	8.7	
Approach Delay (s)	7.4		7.2		8.7	
Approach LOS	A		A		A	
Intersection Summary						
Delay			7.8			
Level of Service			A			
Intersection Capacity Utilization			28.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

8: Howe Sound Dr/SB Off-Ramp & SB On-Ramp

01/30/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	43	28	0	0	0	73	0	152	0	154	48
Future Volume (Veh/h)	0	43	28	0	0	0	73	0	152	0	154	48
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			-3%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	47	30	0	0	0	79	0	165	0	167	52
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	434	516	193	487	460	82	219			165		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	434	516	193	487	460	82	219			165		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	89	96	100	100	100	94			100		
cM capacity (veh/h)	512	439	854	419	472	983	1362			1426		
Direction, Lane #	EB 1	NB 1	SB 1									
Volume Total	77	244	219									
Volume Left	0	79	0									
Volume Right	30	165	52									
cSH	541	1362	1700									
Volume to Capacity	0.14	0.06	0.13									
Queue Length 95th (m)	3.7	1.4	0.0									
Control Delay (s)	12.8	2.9	0.0									
Lane LOS	B	A										
Approach Delay (s)	12.8	2.9	0.0									
Approach LOS	B											
Intersection Summary												
Average Delay			3.1									
Intersection Capacity Utilization			38.4%			ICU Level of Service				A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

4: Furry Creek Dr & NB on/off Ramp

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	219	16	8	11	11	133
Future Volume (vph)	219	16	8	11	11	133
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	238	17	9	12	12	145
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	255	21	157			
Volume Left (vph)	238	9	0			
Volume Right (vph)	17	0	145			
Hadj (s)	0.15	0.09	-0.55			
Departure Headway (s)	4.4	4.8	4.0			
Degree Utilization, x	0.31	0.03	0.17			
Capacity (veh/h)	788	703	844			
Control Delay (s)	9.4	7.9	7.8			
Approach Delay (s)	9.4	7.9	7.8			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.8			
Level of Service			A			
Intersection Capacity Utilization			28.6%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Furry Creek Dr & Country Club Rd

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	28	41	205	25	16	116
Future Volume (vph)	28	41	205	25	16	116
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	45	223	27	17	126
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	75	250	143			
Volume Left (vph)	30	0	17			
Volume Right (vph)	45	27	0			
Hadj (s)	-0.28	-0.06	0.02			
Departure Headway (s)	4.5	4.2	4.4			
Degree Utilization, x	0.09	0.29	0.17			
Capacity (veh/h)	734	841	795			
Control Delay (s)	7.9	8.9	8.3			
Approach Delay (s)	7.9	8.9	8.3			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.5			
Level of Service			A			
Intersection Capacity Utilization			30.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Sea View Dr & Furry Creek Dr

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	184	63	37	56	42	95
Future Volume (Veh/h)	184	63	37	56	42	95
Sign Control	Stop			Free	Free	
Grade	3%			-6%	3%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	200	68	40	61	46	103
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	238	98	149			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	238	98	149			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	73	93	97			
cM capacity (veh/h)	733	964	1445			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	268	101	149			
Volume Left	200	40	0			
Volume Right	68	0	103			
cSH	780	1445	1700			
Volume to Capacity	0.34	0.03	0.09			
Queue Length 95th (m)	11.6	0.6	0.0			
Control Delay (s)	12.0	3.1	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.0	3.1	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			6.8			
Intersection Capacity Utilization			37.1%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

7: Waterfront Dr/Howe Sound Dr & Sea View Dr

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	79	162	56	37	100	54
Future Volume (vph)	79	162	56	37	100	54
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	86	176	61	40	109	59
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	
Volume Total (vph)	86	176	61	40	168	
Volume Left (vph)	86	0	0	0	109	
Volume Right (vph)	0	176	0	40	0	
Hadj (s)	0.20	-0.60	0.00	-0.60	0.13	
Departure Headway (s)	4.6	3.2	4.3	3.2	4.3	
Degree Utilization, x	0.11	0.16	0.07	0.04	0.20	
Capacity (veh/h)	733	1121	808	1121	812	
Control Delay (s)	8.2	6.8	7.6	6.3	8.4	
Approach Delay (s)	7.3		7.1		8.4	
Approach LOS	A		A		A	
Intersection Summary						
Delay			7.6			
Level of Service			A			
Intersection Capacity Utilization			26.1%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

8: Howe Sound Dr/SB Off-Ramp & SB On-Ramp

01/30/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	47	31	0	0	0	52	0	165	0	122	35
Future Volume (Veh/h)	0	47	31	0	0	0	52	0	165	0	122	35
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			-3%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	51	34	0	0	0	57	0	179	0	133	38
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	356	445	152	415	374	90	171			179		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	356	445	152	415	374	90	171			179		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	90	96	100	100	100	96			100		
cM capacity (veh/h)	585	490	900	474	537	974	1418			1409		
Direction, Lane #	EB 1	NB 1	SB 1									
Volume Total	85	236	171									
Volume Left	0	57	0									
Volume Right	34	179	38									
cSH	599	1418	1700									
Volume to Capacity	0.14	0.04	0.10									
Queue Length 95th (m)	3.7	1.0	0.0									
Control Delay (s)	12.0	2.1	0.0									
Lane LOS	B	A										
Approach Delay (s)	12.0	2.1	0.0									
Approach LOS	B											
Intersection Summary												
Average Delay			3.1									
Intersection Capacity Utilization			36.0%			ICU Level of Service				A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

4: Furry Creek Dr & NB on/off Ramp

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	279	18	7	12	13	123
Future Volume (vph)	279	18	7	12	13	123
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	303	20	8	13	14	134
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	323	21	148			
Volume Left (vph)	303	8	0			
Volume Right (vph)	20	0	134			
Hadj (s)	0.15	0.08	-0.54			
Departure Headway (s)	4.4	4.9	4.2			
Degree Utilization, x	0.40	0.03	0.17			
Capacity (veh/h)	792	674	801			
Control Delay (s)	10.3	8.1	8.0			
Approach Delay (s)	10.3	8.1	8.0			
Approach LOS	B	A	A			
Intersection Summary						
Delay			9.5			
Level of Service			A			
Intersection Capacity Utilization			31.5%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Furry Creek Dr & Country Club Rd

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	16	25	261	30	20	120
Future Volume (vph)	16	25	261	30	20	120
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	27	284	33	22	130
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	44	317	152			
Volume Left (vph)	17	0	22			
Volume Right (vph)	27	33	0			
Hadj (s)	-0.29	-0.06	0.03			
Departure Headway (s)	4.6	4.1	4.3			
Degree Utilization, x	0.06	0.36	0.18			
Capacity (veh/h)	703	860	800			
Control Delay (s)	7.9	9.4	8.3			
Approach Delay (s)	7.9	9.4	8.3			
Approach LOS	A	A	A			
Intersection Summary						
Delay			9.0			
Level of Service			A			
Intersection Capacity Utilization			33.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Sea View Dr & Furry Creek Dr

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	199	87	34	51	58	106
Future Volume (Veh/h)	199	87	34	51	58	106
Sign Control	Stop			Free	Free	
Grade	3%			-6%	3%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	216	95	37	55	63	115
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	250	120	178			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	250	120	178			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	70	90	97			
cM capacity (veh/h)	724	936	1410			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	311	92	178			
Volume Left	216	37	0			
Volume Right	95	0	115			
cSH	778	1410	1700			
Volume to Capacity	0.40	0.03	0.10			
Queue Length 95th (m)	14.7	0.6	0.0			
Control Delay (s)	12.7	3.2	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.7	3.2	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		7.3				
Intersection Capacity Utilization		40.5%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

7: Waterfront Dr/Howe Sound Dr & Sea View Dr

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	91	159	65	43	120	62
Future Volume (vph)	91	159	65	43	120	62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	99	173	71	47	130	67
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	
Volume Total (vph)	99	173	71	47	197	
Volume Left (vph)	99	0	0	0	130	
Volume Right (vph)	0	173	0	47	0	
Hadj (s)	0.20	-0.60	0.00	-0.60	0.13	
Departure Headway (s)	4.7	3.2	4.4	3.2	4.4	
Degree Utilization, x	0.13	0.15	0.09	0.04	0.24	
Capacity (veh/h)	716	1121	791	1121	802	
Control Delay (s)	8.4	6.8	7.8	6.3	8.7	
Approach Delay (s)	7.4		7.2		8.7	
Approach LOS	A		A		A	
Intersection Summary						
Delay			7.8			
Level of Service			A			
Intersection Capacity Utilization			28.3%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis8: Howe Sound Dr/SB Off-Ramp & SB On-Ramp

01/30/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	43	28	0	0	0	73	0	152	0	154	48
Future Volume (Veh/h)	0	43	28	0	0	0	73	0	152	0	154	48
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			-3%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	47	30	0	0	0	79	0	165	0	167	52
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	434	516	193	487	460	82	219			165		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	434	516	193	487	460	82	219			165		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	89	96	100	100	100	94			100		
cM capacity (veh/h)	512	439	854	419	472	983	1362			1426		
Direction, Lane #	EB 1	NB 1	SB 1									
Volume Total	77	244	219									
Volume Left	0	79	0									
Volume Right	30	165	52									
cSH	541	1362	1700									
Volume to Capacity	0.14	0.06	0.13									
Queue Length 95th (m)	3.7	1.4	0.0									
Control Delay (s)	12.8	2.9	0.0									
Lane LOS	B	A										
Approach Delay (s)	12.8	2.9	0.0									
Approach LOS	B											
Intersection Summary												
Average Delay			3.1									
Intersection Capacity Utilization			38.4%			ICU Level of Service				A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

4: Furry Creek Dr & NB on/off Ramp

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Traffic Volume (vph)	219	16	8	11	11	133
Future Volume (vph)	219	16	8	11	11	133
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	238	17	9	12	12	145
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total (vph)	255	21	157			
Volume Left (vph)	238	9	0			
Volume Right (vph)	17	0	145			
Hadj (s)	0.15	0.09	-0.55			
Departure Headway (s)	4.4	4.8	4.0			
Degree Utilization, x	0.31	0.03	0.17			
Capacity (veh/h)	788	703	844			
Control Delay (s)	9.4	7.9	7.8			
Approach Delay (s)	9.4	7.9	7.8			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.8			
Level of Service			A			
Intersection Capacity Utilization			28.6%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

5: Furry Creek Dr & Country Club Rd

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	28	41	205	25	16	116
Future Volume (vph)	28	41	205	25	16	116
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	45	223	27	17	126
Direction, Lane #	WB 1	NB 1	SB 1			
Volume Total (vph)	75	250	143			
Volume Left (vph)	30	0	17			
Volume Right (vph)	45	27	0			
Hadj (s)	-0.28	-0.06	0.02			
Departure Headway (s)	4.5	4.2	4.4			
Degree Utilization, x	0.09	0.29	0.17			
Capacity (veh/h)	734	841	795			
Control Delay (s)	7.9	8.9	8.3			
Approach Delay (s)	7.9	8.9	8.3			
Approach LOS	A	A	A			
Intersection Summary						
Delay			8.5			
Level of Service			A			
Intersection Capacity Utilization			30.3%	ICU Level of Service	A	
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

6: Sea View Dr & Furry Creek Dr

01/30/2019



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	184	63	37	56	42	95
Future Volume (Veh/h)	184	63	37	56	42	95
Sign Control	Stop			Free	Free	
Grade	3%			-6%	3%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	200	68	40	61	46	103
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	238	98	149			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	238	98	149			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	73	93	97			
cM capacity (veh/h)	733	964	1445			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	268	101	149			
Volume Left	200	40	0			
Volume Right	68	0	103			
cSH	780	1445	1700			
Volume to Capacity	0.34	0.03	0.09			
Queue Length 95th (m)	11.6	0.6	0.0			
Control Delay (s)	12.0	3.1	0.0			
Lane LOS	B	A				
Approach Delay (s)	12.0	3.1	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		6.8				
Intersection Capacity Utilization		37.1%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis

7: Waterfront Dr/Howe Sound Dr & Sea View Dr

01/30/2019

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	79	162	56	37	100	54
Future Volume (vph)	79	162	56	37	100	54
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	86	176	61	40	109	59
Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	
Volume Total (vph)	86	176	61	40	168	
Volume Left (vph)	86	0	0	0	109	
Volume Right (vph)	0	176	0	40	0	
Hadj (s)	0.20	-0.60	0.00	-0.60	0.13	
Departure Headway (s)	4.6	3.2	4.3	3.2	4.3	
Degree Utilization, x	0.11	0.16	0.07	0.04	0.20	
Capacity (veh/h)	733	1121	808	1121	812	
Control Delay (s)	8.2	6.8	7.6	6.3	8.4	
Approach Delay (s)	7.3		7.1		8.4	
Approach LOS	A		A		A	
Intersection Summary						
Delay			7.6			
Level of Service			A			
Intersection Capacity Utilization			26.1%	ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

8: Howe Sound Dr/SB Off-Ramp & SB On-Ramp

01/30/2019

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	47	31	0	0	0	52	0	165	0	122	35
Future Volume (Veh/h)	0	47	31	0	0	0	52	0	165	0	122	35
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			-3%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	51	34	0	0	0	57	0	179	0	133	38
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	356	445	152	415	374	90	171			179		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	356	445	152	415	374	90	171			179		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	90	96	100	100	100	96			100		
cM capacity (veh/h)	585	490	900	474	537	974	1418			1409		
Direction, Lane #	EB 1	NB 1	SB 1									
Volume Total	85	236	171									
Volume Left	0	57	0									
Volume Right	34	179	38									
cSH	599	1418	1700									
Volume to Capacity	0.14	0.04	0.10									
Queue Length 95th (m)	3.7	1.0	0.0									
Control Delay (s)	12.0	2.1	0.0									
Lane LOS	B	A										
Approach Delay (s)	12.0	2.1	0.0									
Approach LOS	B											
Intersection Summary												
Average Delay			3.1									
Intersection Capacity Utilization			36.0%			ICU Level of Service				A		
Analysis Period (min)			15									