

Seabeck Holly Road NW Culvert

Traffic Study



Traffic Division
Kitsap County Public Works

614 Division Street, MS-26
Port Orchard, WA 98366-5678
www.kitsapgov.com

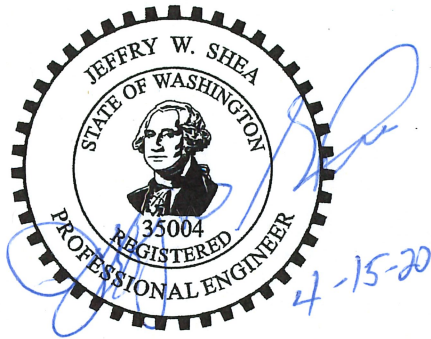


Published April 2020

(This page intentionally left blank)

CERTIFICATION

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.



Prepared by Christine DeGeus, Traffic Operations Supervisor

Reviewed and approved by Jeff Shea, P.E., Traffic Engineer

Under 23 U.S. Code § 409, safety data, reports, surveys, schedules, lists compiled or collected for the purpose of identifying, evaluating, or planning the safety enhancement of potential crash sites, hazardous roadway conditions, or railway-highway crossings are not subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location mentioned or addressed in such reports, surveys, schedules, lists, or data.

(This page intentionally left blank)

Table of Contents

EXECUTIVE SUMMARY.....	1
1 INTRODUCTION.....	2
2 PROJECT DESCRIPTION.....	2
2.1 APPLICABLE STADARDS	3
3 STUDY AREA.....	3
3.1 LAND USE	3
3.2 BICYCLE/PEDESTRIAN/TRANSIT	4
3.3 PROPOSED PROJECTS.....	4
4 ROADWAY CHARACTERISTICS	4
4.1 ROADWAY DESCRIPTIONS.....	4
4.2 SPEED LIMITS	6
4.3 PAVEMENT STRUCTURAL CONDITION.....	6
5 TRAFFIC COUNT DATA	6
5.1 VEHICLE CLASSIFICATION	7
5.2 EQUIVALENT SINGLE AXLE LOADS	7
5.3 DESIGN VEHICLE	7
6 TRAFFIC SAFETY.....	8
7 ROADWAY LEVEL OF SERVICE	8
8 ROAD CLOSURE	9
8.1 DETOUR ROUTE	9
8.2 FIRE RESPONSE.....	10
9 DESIGN ELEMENTS.....	11
9.1 DESIGN CLEAR ZONE	11
9.2 EXISTING GUARDRAIL	11
10 CONCLUSION AND RECOMMENDATIONS.....	12
11 REFERENCES.....	13
 APPENDIX A. SPEED LIMIT RESOLUTION	 A
APPENDIX B. 2018 PMS DECISION TREE FLOWCHART	A
APPENDIX C. VEHICLE COUNT DATA.....	B
APPENDIX D. FHWA VEHICLE CLASSIFICATION SYSTEM	C
APPENDIX E. ESAL WORKSHEETS.....	D
APPENDIX F. TRAFFIC CONTROL PLANS.....	E

List of Figures

Figure 1 – Vicinity Map	2
Figure 2 – Zoning Map.....	3
Figure 3 – Regional Non-Motorized Route Map	4
Figure 4– Photograph of Existing Roadway Conditions	5
Figure 5 – Detour Signage Location Map	9
Figure 6 – Fire Station Location Map.....	10

List of Tables

Table 1 – Design Recommendations.....	1
Table 2 – Applicable Design Standards.....	3
Table 3– Pavement Structural Condition Thresholds	6
Table 4 – Existing and Future ADT Volumes.....	6
Table 5 – Total ESALs for 20-Year Design Life.....	7
Table 6 – Roadway LOS Thresholds.....	8
Table 7 – Fire Response Times.....	11
Table 8 – Rural Design Recommendations	12

List of Abbreviations

AASHTO	American Association of State Highway Transportation Officials
CMF	Crash Modification Factor
FHWA	Federal Highway Administration
HSM	Highway Safety Manual
LOS	Level of Service
MUTCD	Manual on Uniform Traffic Control Devices
NCHRP	National Cooperative Highway Research Program
WSDOT	Washington State Department of Transportation

(This page intentionally left blank)

Executive Summary

Purpose and Need

Kitsap County is participating with the Hood Canal Salmon Enhancement Group to correct fish barrier (Culvert ID 18943). The Hood Canal Salmon Enhancement Group is one of 12 Regional Fisheries Enhancement Groups created by the Washington State Legislature to assist the State in salmon recovery efforts. Due to the undersized culvert where Seabeck Creek crosses Seabeck Holly Road NW, fish cannot progress upstream to their critical spawning and rearing habitats. By replacing the culvert with a bridge, the project will improve fish passage and allow flood waters to pass unobstructed.

Project Summary

The Kitsap County Six-Year Transportation Improvement Plan 2020-2025 includes Seabeck Holly Road Culvert Project #9. The project is described as a participation with Hood Canal Salmon Enhancement Group to correct fish barrier (Culvert ID #18943). The project will replace a 72-inch culvert with a 60-foot bridge. The project is sponsored by the Hood Canal Salmon Enhancement Group and funded by a Fish Barrier Removal Board grant for \$2,066,874 with an addition \$175,000 local funds from Kitsap County. The project is expected to go to construction in June 2020.

Recommendations

The recommendations for the design are summarized in Table 1.

Table 1 – Design Recommendations

Design Item	Recommendation
Federal functional class	<ul style="list-style-type: none">Major collector
20-year design volume	<ul style="list-style-type: none">3,651 ADT
Design vehicle	<ul style="list-style-type: none">SU-40
Design speed	<ul style="list-style-type: none">45 mph
Lane width	<ul style="list-style-type: none">12 feet
Shoulder width	<ul style="list-style-type: none">8 feet paved
Lighting	<ul style="list-style-type: none">None
Clear zone	<ul style="list-style-type: none">16 to 18 feet

1 Introduction

Kitsap County is participating with the Hood Canal Salmon Enhancement Group to correct fish barrier (Culvert ID 18943). The Hood Canal Salmon Enhancement Group is one of 12 Regional Fisheries Enhancement Groups created by the Washington State Legislature to assist the State in salmon recovery efforts. Due to the undersized culvert where Seabeck Creek crosses Seabeck Holly Road NW, fish cannot progress upstream to their critical spawning and rearing habitats. By replacing the culvert with a bridge, the project will improve fish passage and allow flood waters to pass unobstructed.

2 Project Description

The Kitsap County Six-Year Transportation Improvement Plan 2020-2025 includes Seabeck Holly Road Culvert Project #9. The project is described as a participation with Hood Canal Salmon Enhancement Group to correct fish barrier (Culvert ID #18943). The project will replace a 72-inch culvert with a 60-foot bridge. The project is sponsored by the Hood Canal Salmon Enhancement Group and funded by a Fish Barrier Removal Board grant for \$2,066,874 with an addition \$175,000 local funds from Kitsap County. The project is expected to go to construction in June 2020. Figure 1 is a vicinity map.

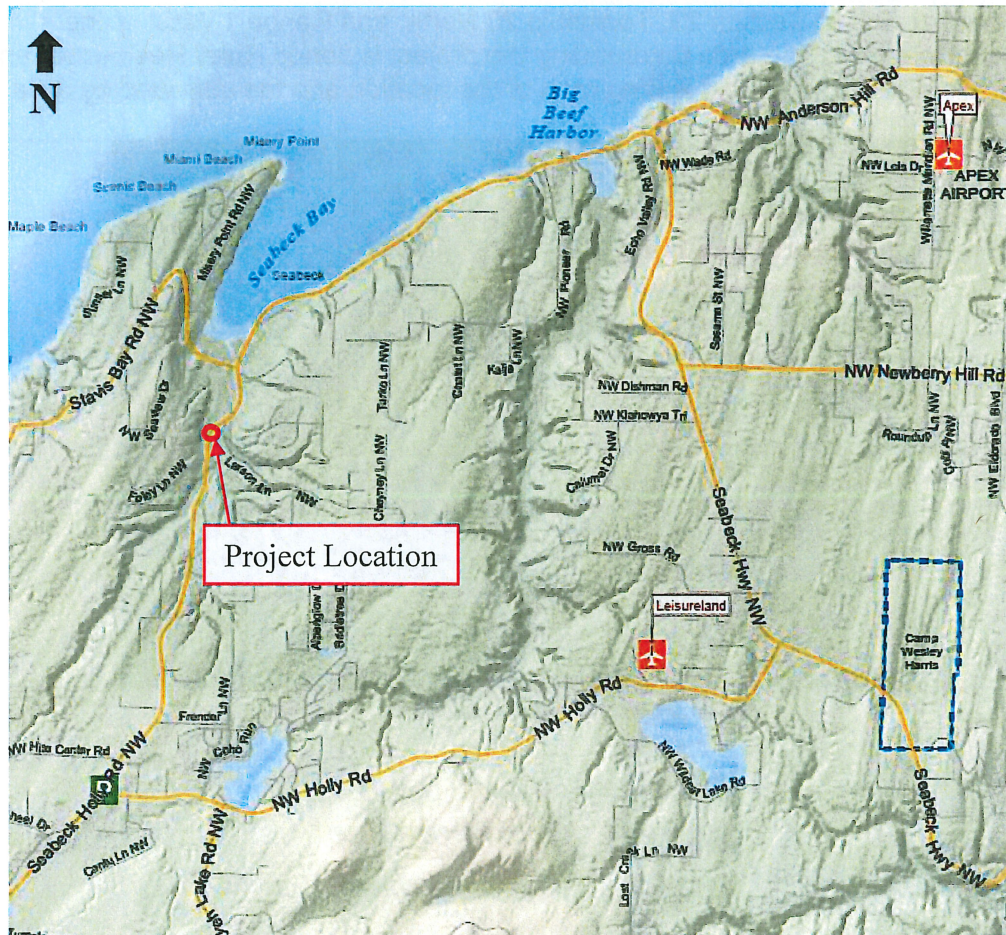


Figure 1 – Vicinity Map

2.1 Applicable Standards

Funding sources for this project are a Fish Barrier Removal Grant Program grant and Kitsap County local funds. The governing geometric design guidelines for this project will be the WSDOT *Local Agency Guidelines (LAG) Manual*. The applicable design guidelines are summarized in Table 2.

Table 2 – Applicable Design Standards

Roadway Element	Standard	Reference
Functional Classification	Major collector	FHWA
Design Vehicle	SU-40	Kitsap County Road Standards
Travel Lane Width	12 feet	LAG
Shoulder Width	8 feet paved	LAG/Kitsap County Road Standards
Clear Zone	16 - 18 feet	<i>Roadside Design Guide</i> , AASHTO
Ditch Slope	4:1	LAG/Kitsap County Road Standards

3 Study Area

3.1 Land Use

The project area is in Section 29, Township 25 North, and Range 1 West of the Willamette Meridian. The area surrounding the project is zoned Rural Residential and Rural Protected. Figure 2 is a zoning map of the location and the surrounding area.

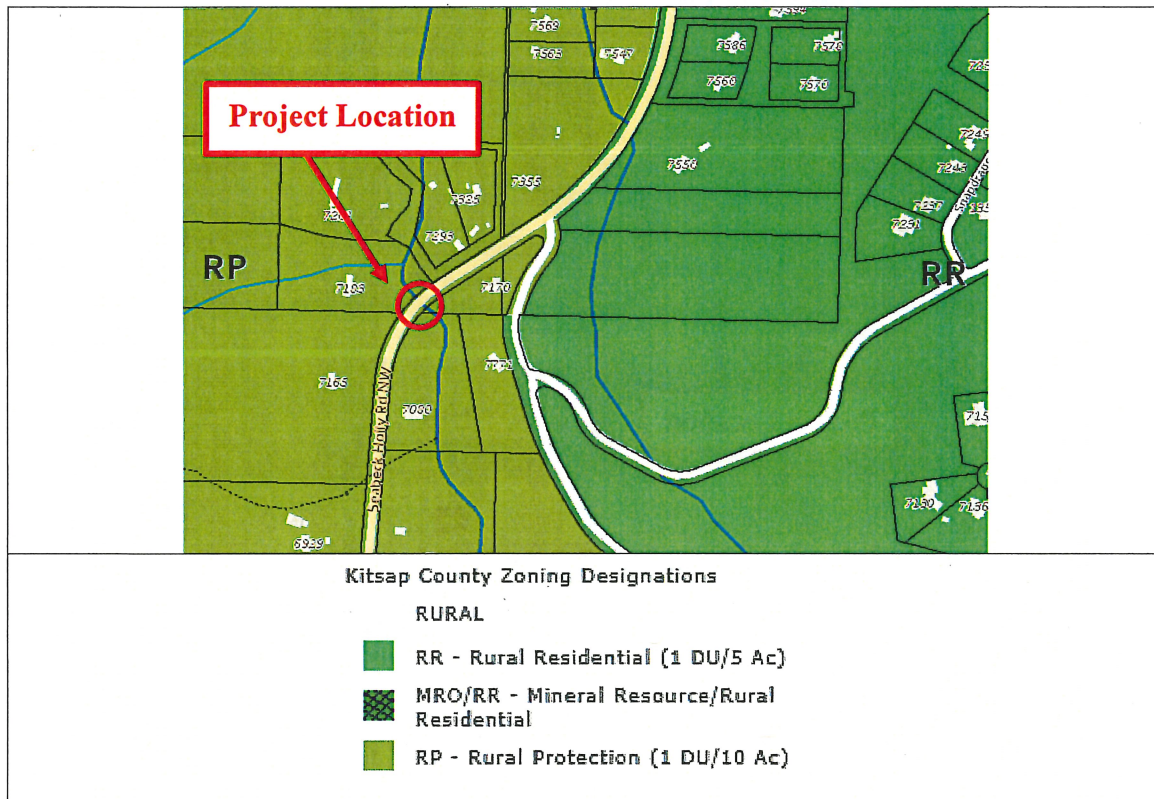


Figure 2 – Zoning Map

3.2 Bicycle/Pedestrian/Transit

The Kitsap County Non-Motorized Facilities Plan identifies opportunities for bikers, walkers, and all persons with "connections within communities" and "connections between communities". The Plan goals are:

- Recognize mobility needs of everyone
- Identify differences between rural and urban areas
- Make connections within communities, i.e. schools, parks, and services
- Make connections between communities within Kitsap County
- Promote recreational uses

The Kitsap County Non-Motorized Facility Plan identifies Seabeck Holly Road NW as non-motorized route. A map of the routes, extracted from the plan, is shown as Figure 3.

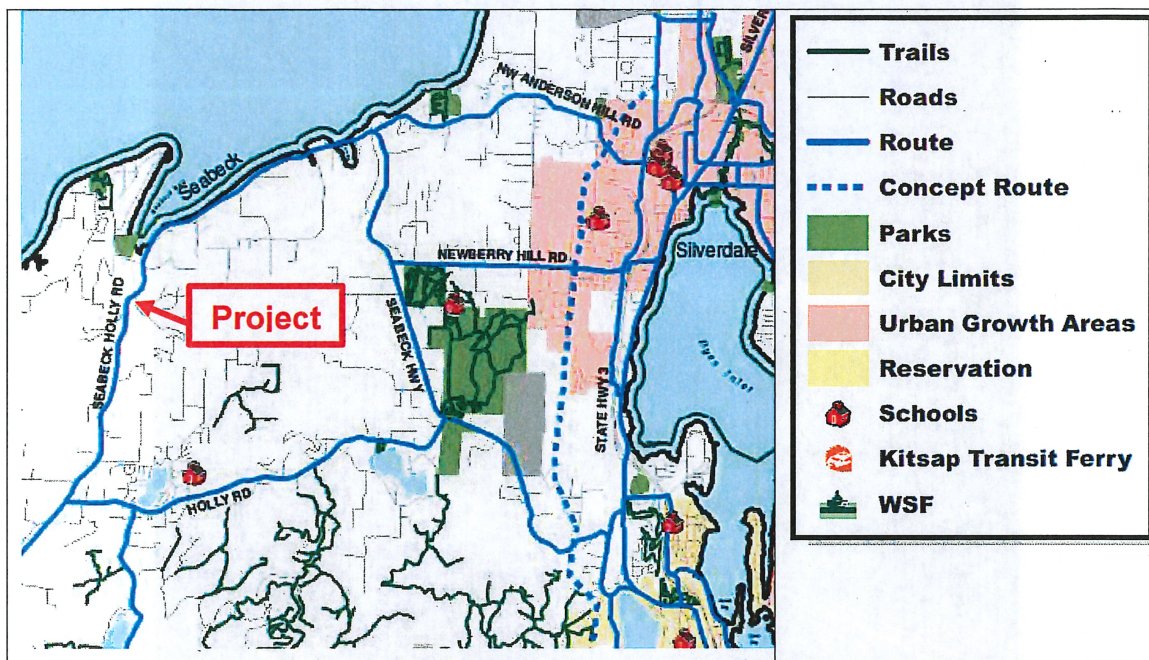


Figure 3 – Regional Non-Motorized Route Map

Kitsap Transit's routed buses do not serve the study area. No studies were conducted to count average daily pedestrian volumes.

3.3 Proposed Projects

There are no construction projects identified in the 2020-2025 TIP with potential impacts to the study location.

4 Roadway Characteristics

4.1 Roadway Descriptions

Seabeck Holly Road NW (Road Log ID 11300) is a rural major collector that generally runs in a north-south direction in the central area of Kitsap County. Seabeck Holly Road

NW begins at the intersection of Seabeck Highway NW and Miami Beach Road NW and terminates in the unincorporated community of Holly.

In the vicinity of the Seabeck Creek crossing, Seabeck Holly Road NW consists of two 11-foot travel lanes with a 6-foot gravel shoulder on the west side and 3-foot gravel shoulder on the east side. The travel lanes are delineated with white edge stripes and double yellow no-pass centerline. The roadway within the project limits is generally flat with a horizontal curve to the south. Guardrail is installed on the west side of the roadway in the vicinity of the stream crossing. Figure 4 shows the existing road conditions within the project limits.



Figure 4 – Photograph of Existing Roadway Conditions

4.2 Speed Limit

The posted speed limit within the project limits is 45 mph. The speed limit Resolution 360-1976 is included in this report as Appendix A.

4.3 Pavement Structural Conditions

Kitsap County evaluates road surface conditions using a Pavement Surface Condition (PSC) rating system. The PSC is a single index value used to quantify all forms and severity levels of pavement distress including; alligator (fatigue) cracking, longitudinal cracking, transverse cracking and patching for flexible pavements. The PSC has an upper limit of 100 (no distress) and a lower limit of zero (extensive distress). Kitsap County uses the PSC guidelines as shown in Table 3 along with a Pavement Management System (PMS) Decision Tree Flowchart (see Appendix B) to determine what sort of maintenance or rehabilitation a road requires.

Table 3 – Pavement Structural Condition Thresholds

PSC (weighted average score)	Condition
0 to 20	Failed
21 to 48	Poor
49 to 66	Fair
67 to 88	Good
89 to 100	Excellent

Mobility records show that Seabeck Holly Road NW the vicinity of the Seabeck Creek crossing (milepost 0.490) was paved with 2-inch ACP in 1973 and received a 1-inch ACP overlay in 1994. A pavement inspection performed in 2018 indicated that Seabeck Holly Road NW received a PSC rating of 88 for the section of roadway between milepost 0.400 to 0.500. According to the PMS Decision Tree Flowchart, a rating of 88 would indicate the pavement is in good condition and requires no action.

5 Traffic Count Data

Daily traffic count data were determined by road tube counts. A road tube count was performed on Seabeck Holly Road NW south of Foley Lane NW on April 15, 2019. Copies of the Daily Vehicle Volume, Daily Vehicle Classification, and Daily Speed data are found in Appendix C of this report.

Table 4 shows current and future average daily traffic (ADT) volumes for the roadway. The future ADT volumes were calculated using a typical 20-year project life and a 2% annual growth rate.

Table 4 – Existing and Future ADT Volumes

Travel Direction	Count Year 2019	Design Year 2040
Northbound	1,120	1,697
Southbound	1,289	1,954
Total	2,409	3,651

5.1 Vehicle Classification

Vehicles are categorized by the Federal Highway Administration into thirteen classes based on wheelbase, axle arrangement, and number of trailers. The 13-class vehicle classification system is shown in this report as Appendix D.

On Seabeck Holly Road NW, a total of 326 (13.5%) of the daily vehicles counted were buses and trucks (Classes 4 to 13). The count was taken on April 15, 2019. The majority of the buses and trucks counted were two-axle single unit trucks (Class 5) with a total of 309 vehicles (94.8%), followed by three-axle single unit trucks (Class 6) with a total of 9 vehicles (2.8%), and buses (Class 4) with a total of 5 vehicles (1.5%). The largest vehicle recorded was a six-axle double unit truck (Class 10) with a total of 1 vehicle (0.3%).

5.2 Equivalent Single Axle Loads

Based on the vehicle classification counts, the equivalent single axle loads (ESALs) on the pavement were calculated for Seabeck Holly Road NW. ESALs are the summation of equivalent 18,000-lb single axle loads used to combine the mixed traffic to the design traffic for the design period. Total ESALs represent the total load a pavement layer will experience over the design life. The American Association of State Highway and Transportation Officials (AASHTO) defines design period, design life, and performance period as being the same term. The design period is the time from original construction to a terminal condition for a pavement structure. AASHTO defines an analysis period as the time for which an economic analysis is to be constructed. Further, the analysis period can include provisions for periodic surface renewal or rehabilitation strategies which will extend the overall service life of a pavement structure before complete reconstruction is required. For this project, calculations assumed a design life of 20 years. Table 5 shows the results of the ESAL calculations for Seabeck Holly Road NW. Additionally, the calculations are detailed in Appendix E of this report.

Table 5 – Total ESALs for 20-Year Pavement Design Life

Road Name	Direction	Total ESALS
Seabeck Holly Road NW	NB	790,730
	SB	563,344

5.3 Design Vehicle

AASHTO's *A Policy on Geometric Design of Highways and Streets* defines standard characteristics of 19 design vehicles within the general vehicle classes. From the AASHTO list, the following vehicles have been selected as the minimum design vehicle for each functional classification of Kitsap County roadways:

Principal Arterial WB-40 (Intermediate Semi-trailer)
 Minor Arterial WB-40 (Intermediate Semi-trailer)
 Collector SU-40 (Single Unit Truck)
 Local Access SU-30 (Single Unit Truck)

The design of a roadway should consider the dimensions and operating characteristics of the vehicles traveling on the roadway. Kitsap County Road Standards indicate that the road's geometry must accommodate the physical dimensions and turning radius for the largest design vehicle likely to use the road with considerable frequency. In the case of

Seabeck Holly Road NW, it's federal functional classification (major collector) along with the traffic count data dictates the SU-40 as the minimum design vehicle.

6 Traffic Safety

The current 2014-2018 Traffic Safety Segment List ranks a section of the Seabeck Holly Road NW from 100 feet southwest of Larson Lane NW to 401 feet north of Foley Lane NW as Segment #36 out of 54.

All reported motor vehicle collisions that occurred within 250 feet of the Seabeck Holly Road NW at Seabeck Creek from January 1, 2015 through January 1, 2020 were analyzed. Collision data was retrieved using Mobility, a database utility maintained by Washington State County Road Administration Board. The collisions were analyzed for their type, frequency. A total of 3 collisions occurred within the project limits over the 5-year period. Of the 3 collisions:

- 0 was fatal collisions
- 1 was an injury collision
- 2 were property damage only (PDO) collisions

All three collisions involved the vehicles departing the roadway; two were fixed object and one was overturned. Cited contributing circumstance included:

- 1 speeding
- 1 inattention
- 1 under influence of alcohol

Based on the crash frequency and collision patterns within the project limits, no specific mitigation is recommended at this time.

7 Roadway Level of Service

Kitsap County uses a volume to capacity (V/C) ratio standard to determine roadway level of service (LOS). In Kitsap County, an acceptable roadway LOS for rural areas is LOS C or better, and for urban areas is D or better. For the purposes of defining LOS standards, urban areas are those geographic areas located within the boundaries of an Urban Growth Area (UGA). This project is in a rural area. Table 6 shows the roadway LOS thresholds and corresponding V/C ratio ranges.

Table 6 – Roadway LOS Thresholds

LOS	V/C Ratio Range
A	0.59 and below
B	0.60 – 0.69
C	0.70 – 0.79
D	0.80 – 0.89
E	0.90 – 0.99
F	1.00 and above

Based on current traffic volume and the roadway planning level of capacity, Seabeck Holly Road NW is currently operating at LOS A within the project limits. The Kitsap County Roadway Capacity Worksheet lists an hourly capacity of 1,450 vehicles for Seabeck Holly Road NW within the project limits. The most recent PM peak hour

Fire response times from CKFR Station 56 to the project area were calculated for a northern route as well as a southern route. The response times are summarized in Table 7.

Table 7 – Fire Response Times

Station	Address	Road Name	Speed (mph)	Distance (mi)	Time (min)
56	6470 Seabeck Hwy	Seabeck Hwy	50	2.515	3.018
		Seabeck Hwy	35	2.890	4.954
		Seabeck Hwy	25	0.350	0.840
		Seabeck Hwy	35	0.330	0.566
		Seabeck Holly Rd	35	0.080	0.137
		Seabeck Holly Rd	45	0.410	0.547
		Northern Route Total		6.575	10.062
56	6470 Seabeck Hwy	Seabeck Hwy	50	0.925	1.110
		Holly Rd	40	2.331	3.497
		Holly Rd	25	0.340	0.816
		Holly Rd	45	0.730	0.973
		Holly Rd	35	1.620	2.777
		Seabeck Holly Rd	45	0.924	1.232
		Seabeck Holly Rd	35	0.180	0.309
		Seabeck Holly Rd	45	1.530	2.040
		Southern Route Total		8.580	12.754
		Difference		2.005	2.692

Response from CKFR Station 56 to the project site is approximately 2.005 miles or 2.692 minutes longer via the southern route versus the northern route.

9 Design Elements

9.1 Clear Zone

The clear zone is the unobstructed, traversable area provided beyond the edge of the through traveled way for the recovery of errant vehicles. The clear zone includes shoulders, bike lanes, and auxiliary lanes, except those auxiliary lanes that function like through lanes. The Kitsap County Road Standards lists a design clear zone of 16 to 18 when the design speed is 45 to 50 mph, the side slope is 6H:1V or flatter, and the design ADT is between 1,500 to 6,000 vehicles.

9.2 Existing Guardrail

Type 31 guardrail is present on the west side of Seabeck Holly Road NW within the project limits. The guardrail was installed to shield motorists from a fill slope or drainage channel located within the 16 to 18-foot minimum clear zone.

Under the new bridge design, guardrail shall be considered to shield fill slope, drainage channels or bridge railings located within the minimum clear zone.

10 Conclusion and Recommendations

Based on projected traffic volumes, Seabeck Holly Road NW will continue to operate at acceptable LOS as a 2-lane roadway under 2040 projected traffic volumes.

Guardrail currently exists on the west side of Seabeck Holly Road within the project limits. Any fixed objects, critical slopes or bridge railings located inside the 16 to 18-foot clear zone under the bridge design shall be protected by barrier.

Road closure and traffic control shall be coordinated with the local fire department and school district.

The recommendations for the design options are summarized in Tables 8.

Table 8 – Rural Design Recommendations

Design Item	Recommendation
Federal functional class	<ul style="list-style-type: none">Major collector
20-year design volume	<ul style="list-style-type: none">3,651 ADT
Design vehicle	<ul style="list-style-type: none">SU-40
Design speed	<ul style="list-style-type: none">45 mph
Lane width	<ul style="list-style-type: none">12 feet
Shoulder width	<ul style="list-style-type: none">8 feet paved
Lighting	<ul style="list-style-type: none">None
Clear zone	<ul style="list-style-type: none">16 to 18 feet

11 References

1. *Design Manual*. Washington State Department of Transportation, December 2019.
2. "FHWA Vehicle Classification." Federal Highway Administration, November 2014 (accessed June 13, 2016).
http://www.fhwa.dot.gov/policyinformation/tmguidetmg_2013/vehicle-types.cfm.
3. *Highway Capacity Manual*. Transportation Research Board of the National Academies, 6th Edition.
4. *Kitsap County Non-Motorized Facility Plan*. Kitsap County Public Works, Port Orchard, Washington, April 2015.
5. *Kitsap County Road Standards*. Kitsap County Public Works, 2020 edition.
<http://www.kitsapgov.com/pw/pdf/Final%20Road%20Standards.pdf>
6. *Manual on Uniform Traffic Control Devices*. Federal Highway Administration, 2009 edition.
7. *A Policy on Geometric Design of Highways and Streets*. American Association of State Highway Transportation Officials, 2018.
8. Revised Code of Washington 46.61.205. Olympia, Washington, 1990.
9. *Roadside Design Guide*. American Association of State Highway Transportation Officials, 2011.
10. *Recommended Practice for Design and Maintenance of Roadway and Parking Facility Lighting*, ANSI/IES RP-8-18.
11. *Roundabouts: An Informational Guide*, 2nd Edition, TRB, NCHRP Report 672.

Appendix A. Speed Limit Resolution

RESOLUTION 360-1976


WHEREAS, an investigation of Kitsap County Road conditions has been conducted by the Traffic Engineering section of the County Road Department with regard to establishing reasonable and safe maximum vehicular speed limits thereon, and

WHEREAS the conclusion of said investigation determined, and so recommended, that the attached listing of speeds and roads, comprising ten sheets, be accepted and so fixed the same as if described at length in this resolution, therefore

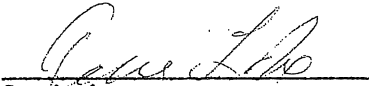
BE IT HEREBY RESOLVED that the speed limits on the respective roads, as listed, be established as designated, effective the date of this resolution (superseding any previous limits on roads in conflict herewith) and that the County Engineer cause same to be posted.

PASSED this 30th day of August, 1976.

BOARD OF COUNTY COMMISSIONERS
KITSAP COUNTY, WASHINGTON

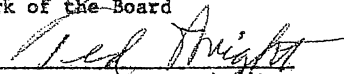

Chairman


Commissioner


Commissioner

ATTEST:

TED WRIGHT
County Auditor and Ex-Officio
Clerk of the Board

BY: 
Auditor

RESOLUTION: 360-71

SPEED LIMITS - CENTRAL AREA
PAGE NINE

35 MILES PER HOUR

Illahee-Brownsville Road (Trenton Avenue to Roosevelt Street)
Illahee-Brownsville Road (N. E. Berg Street to California Street)
Illahee-Brownsville Road (Utah Street to SR #303)
John Carlson Road (SR #303 to Clover Blossom Lane)
Jupiter Trail
"K" Street
West Kitsap Lake Road
Kitsap Way (Lakeview Drive to Bremerton City Limits)
Kittyhawk Drive
Madison Road
McWilliams Road (SR #303 to East Boulevard)
Miami Beach Road (Seabeck Highway North End to Misery Point Rd.)
Misery Point Road
Myhre Road (Clear Creek Road to Kitsap Way)
National Avenue (Burwell Street to K Street)
North Lake Way
Old Frontier Road
Old Military Road
Olympic View Road
Olympic View Loop Road
One Mile Road (Hintzville Road to Peter Hagen Road)
Panther Lake Road
Paulson Road
Perry Avenue
Pine Road (Riddell Road to McWilliams Road)
Provost Road (Newberry Hill Road to K Anderson Road)
Riddell Road (Perry Avenue to Tracyton Beach Road)
Rocky Point Road (Brygman Street to Bremerton City Limits)
Seabeck Highway (N. Lake Way to 1 1/2 miles north of N. Lake Way)
Seabeck Highway (Manley Road to 1/4 mile East of Seabeck Store)
Seabeck Highway (Wade Road to Manley Road)
Seabeck Highway (Miami Beach Road to 1/4 mile west of Seabeck Store)
Scenic Beach Road
Schold Road
Stampede Boulevard
Stavis Bay Road (Scenic Beach Road to Stavis Creek)
Sylvan Way (Pine Road to Dead End)
N. Tiger Road
Tiger to Mission Road
Tracyton Boulevard (Bucklin Hill Road to Nora Street)
Trenton Avenue (Bonair Place to SR #306)
Walker Road (Old Military Road North to Central Valley Road)
Werner Road
Willamette Meridian Road

40 MILES PER HOUR

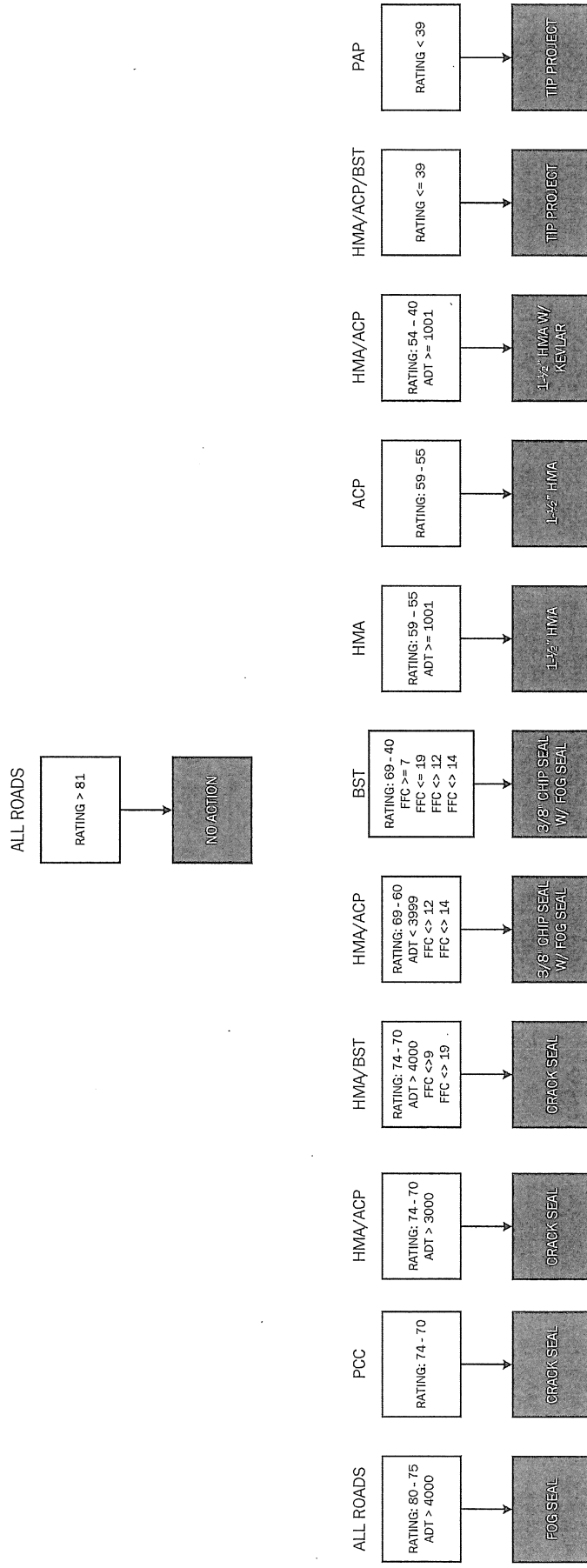
Clear Creek Road (Myhre Road to Kitsap Way)
Holly Road (Seabeck Highway to Wildcat Lake Road)
Kitsap Way (Lakeview Drive to Byron Street)
Kitsap Way (Myhre Road to SR #3)
Mountain View Road (Clear Creek Road to SR #3)
Newberry Hill Road (Kitsap Way to SR #3)
Tahuyeh Lake Road

45 MILES PER HOUR

Belfair Valley Road (Division Street to Mason County)
Bucklin Hill Road (Shore Drive to SR #303)
Nels Nelson Road (Bucklin Hill Road to South)
Provost Road (Newberry Hill Road to Eldorado Boulevard)
Seabeck-Holly Road (Holly Road to Miami Beach Road)

Appendix B. 2018 PMS Decision Tree Flow Chart

2018 PMS DECISION TREE FLOWCHART



- LEGEND:
- ACP – Asphalt Concrete Pavement
 - BST – Bituminous Surface Treatment
 - HMA – Hot Mix Asphalt
 - PAP – Pervious Asphalt Pavement
 - PCC – Portland Cement Concrete
 - PMS – Pavement Management System
 - TIP – Transportation Improvement Program

Appendix C. Vehicle Count Data

Daily Vehicle Volume Report

Study Date: Monday, 04/15/2019 / Tuesday, 04/16/2019

Unit ID: 1

Location: Seabeck Holly Rd. S. of Foley Rd. 163.7

	Northbound Volume	Southbound Volume	Total Volume
11:00 - 11:59	57	74	131
12:00 - 12:59	77	91	168
13:00 - 13:59	72	93	165
14:00 - 14:59	74	100	174
15:00 - 15:59	82	169	251
16:00 - 16:59	76	170	246
17:00 - 17:59	78	148	226
18:00 - 18:59	23	91	114
19:00 - 19:59	29	74	103
20:00 - 20:59	24	47	71
21:00 - 21:59	10	30	40
22:00 - 22:59	9	7	16
23:00 - 23:59	3	14	17
00:00 - 00:59	3	4	7
01:00 - 01:59	1	3	4
02:00 - 02:59	1	2	3
03:00 - 03:59	0	0	0
04:00 - 04:59	12	3	15
05:00 - 05:59	65	4	69
06:00 - 06:59	94	13	107
07:00 - 07:59	80	29	109
08:00 - 08:59	94	38	132
09:00 - 09:59	83	42	125
10:00 - 10:59	73	43	116
Totals	1120	1289	2409
AM Peak Time	06:29 - 07:28	11:00 - 11:59	07:53 - 08:52
AM Peak Volume	110	74	138
PM Peak Time	15:07 - 16:06	15:31 - 16:30	14:59 - 15:58
PM Peak Volume	86	178	259

Daily Northbound Classes Report

Study Date: Monday, 04/15/2019 / Tuesday, 04/16/2019

Unit ID: 1

Location: Seabeck Holly Rd. S. of Foley Rd. 163.7

	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	Total
11:00 - 11:59	0	40	7	0	10	0	0	0	0	0	0	0	0	57
12:00 - 12:59	1	57	4	0	15	0	0	0	0	0	0	0	0	77
13:00 - 13:59	3	49	9	0	11	0	0	0	0	0	0	0	0	72
14:00 - 14:59	2	56	9	0	7	0	0	0	0	0	0	0	0	74
15:00 - 15:59	0	52	15	0	15	0	0	0	0	0	0	0	0	82
16:00 - 16:59	0	42	14	1	17	2	0	0	0	0	0	0	0	76
17:00 - 17:59	0	51	13	0	14	0	0	0	0	0	0	0	0	78
18:00 - 18:59	1	18	2	0	2	0	0	0	0	0	0	0	0	23
19:00 - 19:59	0	22	2	0	5	0	0	0	0	0	0	0	0	29
20:00 - 20:59	0	18	3	0	3	0	0	0	0	0	0	0	0	24
21:00 - 21:59	0	5	5	0	0	0	0	0	0	0	0	0	0	10
22:00 - 22:59	0	6	2	0	1	0	0	0	0	0	0	0	0	9
23:00 - 23:59	0	3	0	0	0	0	0	0	0	0	0	0	0	3
00:00 - 00:59	0	3	0	0	0	0	0	0	0	0	0	0	0	3
01:00 - 01:59	0	0	0	0	1	0	0	0	0	0	0	0	0	1
02:00 - 02:59	0	1	0	0	0	0	0	0	0	0	0	0	0	1
03:00 - 03:59	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 - 04:59	0	9	2	0	1	0	0	0	0	0	0	0	0	12
05:00 - 05:59	1	43	7	0	14	0	0	0	0	0	0	0	0	65
06:00 - 06:59	1	58	18	0	17	0	0	0	0	0	0	0	0	94
07:00 - 07:59	0	56	11	2	11	0	0	0	0	0	0	0	0	80
08:00 - 08:59	0	58	16	0	16	3	0	1	0	0	0	0	0	94
09:00 - 09:59	1	56	15	0	10	0	0	1	0	0	0	0	0	83
10:00 - 10:59	1	50	12	0	10	0	0	0	0	0	0	0	0	73
Totals	11	753	166	3	180	5	0	2	0	0	0	0	0	1120
Percent of Total	1.0	67.2	14.8	0.3	16.1	0.4	0.0	0.2	0.0	0.0	0.0	0.0	0.0	100
Percent of AM	0.7	66.4	15.6	0.4	16.0	0.5	0.0	0.4	0.0	0.0	0.0	0.0	0.0	100
Percent of PM	1.3	68.0	14.0	0.2	16.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100

Truck Summary:

Total Trucks: 190

% Trucks: 17.0

AM % Trucks: 17.2

PM % Trucks: 16.7

Classification Scheme: FHWA (ID: 1)

#1 Motorcycles - 2 Axles
#2 Passenger Cars - 2 Axles
#3 Pickup Trucks, Vans - 2 Axles
#4 Buses
#5 Single Unit - 2 Axles, 6 Tires

#6 Single Unit Truck - 3 Axles
#7 Single Unit - 4 Axles
#8 Single Unit - 4 Axles or Less
#9 Double Unit - 5 Axles
#10 Double Unit - 6 Axles or More

#11 Multi-Unit - 5 Axles or Less
#12 Multi-Unit - 6 Axles
#13 Multi-Unit - 7 Axles or More

Daily Southbound Classes Report

Study Date: Monday, 04/15/2019 / Tuesday, 04/16/2019

Unit ID: 1

Location: Seabeck Holly Rd. S. of Foley Rd. 163.7

	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	Total
11:00 - 11:59	0	49	18	0	7	0	0	0	0	0	0	0	0	74
12:00 - 12:59	0	62	19	0	10	0	0	0	0	0	0	0	0	91
13:00 - 13:59	0	76	11	0	6	0	0	0	0	0	0	0	0	93
14:00 - 14:59	0	73	14	1	12	0	0	0	0	0	0	0	0	100
15:00 - 15:59	0	125	25	1	18	0	0	0	0	0	0	0	0	169
16:00 - 16:59	0	120	28	0	22	0	0	0	0	0	0	0	0	170
17:00 - 17:59	0	112	25	0	11	0	0	0	0	0	0	0	0	148
18:00 - 18:59	0	73	15	0	3	0	0	0	0	0	0	0	0	91
19:00 - 19:59	0	51	13	0	10	0	0	0	0	0	0	0	0	74
20:00 - 20:59	0	43	2	0	2	0	0	0	0	0	0	0	0	47
21:00 - 21:59	0	24	2	0	4	0	0	0	0	0	0	0	0	30
22:00 - 22:59	0	6	0	0	1	0	0	0	0	0	0	0	0	7
23:00 - 23:59	0	10	4	0	0	0	0	0	0	0	0	0	0	14
00:00 - 00:59	0	3	1	0	0	0	0	0	0	0	0	0	0	4
01:00 - 01:59	0	3	0	0	0	0	0	0	0	0	0	0	0	3
02:00 - 02:59	0	2	0	0	0	0	0	0	0	0	0	0	0	2
03:00 - 03:59	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 - 04:59	0	1	0	0	0	2	0	0	0	0	0	0	0	3
05:00 - 05:59	0	3	0	0	1	0	0	0	0	0	0	0	0	4
06:00 - 06:59	0	7	2	0	3	1	0	0	0	0	0	0	0	13
07:00 - 07:59	0	19	7	0	3	0	0	0	0	0	0	0	0	29
08:00 - 08:59	0	29	4	0	5	0	0	0	0	0	0	0	0	38
09:00 - 09:59	0	19	14	0	8	1	0	0	0	0	0	0	0	42
10:00 - 10:59	0	31	8	0	3	0	0	0	0	1	0	0	0	43
Totals	0	941	212	2	129	4	0	0	0	1	0	0	0	1289
Percent of Total	0.0	73.0	16.4	0.2	10.0	0.3	0.0	0.0	0.0	0.1	0.0	0.0	0.0	100
Percent of AM	0.0	65.1	21.2	0.0	11.8	1.6	0.0	0.0	0.0	0.4	0.0	0.0	0.0	100
Percent of PM	0.0	75.0	15.3	0.2	9.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100

Truck Summary:

Total Trucks: 136

% Trucks: 10.6

AM % Trucks: 13.7

PM % Trucks: 9.8

Classification Scheme: FHWA (ID: 1)

#1 Motorcycles - 2 Axles
#2 Passenger Cars - 2 Axles
#3 Pickup Trucks, Vans - 2 Axles
#4 Buses
#5 Single Unit - 2 Axles, 6 Tires

#6 Single Unit Truck - 3 Axles
#7 Single Unit - 4 Axles
#8 Single Unit - 4 Axles or Less
#9 Double Unit - 5 Axles
#10 Double Unit - 6 Axles or More

#11 Multi-Unit - 5 Axles or Less
#12 Multi-Unit - 6 Axles
#13 Multi-Unit - 7 Axles or More

Daily Total Classes Report

Study Date: Monday, 04/15/2019 / Tuesday, 04/16/2019

Unit ID: 1

Location: Seabeck Holly Rd. S. of Foley Rd. 163.7

	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	Total
11:00 - 11:59	0	89	25	0	17	0	0	0	0	0	0	0	0	131
12:00 - 12:59	1	119	23	0	25	0	0	0	0	0	0	0	0	168
13:00 - 13:59	3	125	20	0	17	0	0	0	0	0	0	0	0	165
14:00 - 14:59	2	129	23	1	19	0	0	0	0	0	0	0	0	174
15:00 - 15:59	0	177	40	1	33	0	0	0	0	0	0	0	0	251
16:00 - 16:59	0	162	42	1	39	2	0	0	0	0	0	0	0	246
17:00 - 17:59	0	163	38	0	25	0	0	0	0	0	0	0	0	226
18:00 - 18:59	1	91	17	0	5	0	0	0	0	0	0	0	0	114
19:00 - 19:59	0	73	15	0	15	0	0	0	0	0	0	0	0	103
20:00 - 20:59	0	61	5	0	5	0	0	0	0	0	0	0	0	71
21:00 - 21:59	0	29	7	0	4	0	0	0	0	0	0	0	0	40
22:00 - 22:59	0	12	2	0	2	0	0	0	0	0	0	0	0	16
23:00 - 23:59	0	13	4	0	0	0	0	0	0	0	0	0	0	17
00:00 - 00:59	0	6	1	0	0	0	0	0	0	0	0	0	0	7
01:00 - 01:59	0	3	0	0	1	0	0	0	0	0	0	0	0	4
02:00 - 02:59	0	3	0	0	0	0	0	0	0	0	0	0	0	3
03:00 - 03:59	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 - 04:59	0	10	2	0	1	2	0	0	0	0	0	0	0	15
05:00 - 05:59	1	46	7	0	15	0	0	0	0	0	0	0	0	69
06:00 - 06:59	1	65	20	0	20	1	0	0	0	0	0	0	0	107
07:00 - 07:59	0	75	18	2	14	0	0	0	0	0	0	0	0	109
08:00 - 08:59	0	87	20	0	21	3	0	1	0	0	0	0	0	132
09:00 - 09:59	1	75	29	0	18	1	0	1	0	0	0	0	0	125
10:00 - 10:59	1	81	20	0	13	0	0	0	0	1	0	0	0	116
Totals	11	1694	378	5	309	9	0	2	0	1	0	0	0	2409
Percent of Total	0.5	70.3	15.7	0.2	12.8	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0	100
Percent of AM	0.5	66.0	17.4	0.2	14.7	0.9	0.0	0.2	0.0	0.1	0.0	0.0	0.0	100
Percent of PM	0.4	72.5	14.8	0.2	11.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100

Truck Summary:

Total Trucks: 326

% Trucks: 13.5

AM % Trucks: 16.1

PM % Trucks: 12.2

Classification Scheme: FHWA (ID: 1)

#1 Motorcycles - 2 Axles
#2 Passenger Cars - 2 Axles
#3 Pickup Trucks, Vans - 2 Axles
#4 Buses
#5 Single Unit - 2 Axles, 6 Tires

#6 Single Unit Truck - 3 Axles
#7 Single Unit - 4 Axles
#8 Single Unit - 4 Axles or Less
#9 Double Unit - 5 Axles
#10 Double Unit - 6 Axles or More

#11 Multi-Unit - 5 Axles or Less
#12 Multi-Unit - 6 Axles
#13 Multi-Unit - 7 Axles or More

Daily Northbound Speeds (MPH)

Study Date: Monday, 04/15/2019 / Tuesday, 04/16/2019

Unit ID: 1

Location: Seabeck Holly Rd. S. of Foley Rd. 163.7

Posted Speed: 45

	5-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-99	Total
11:00 - 11:59	0	0	1	1	0	5	13	23	12	2	0	0	0	0	0	57
12:00 - 12:59	0	0	0	0	0	0	14	37	20	6	0	0	0	0	0	77
13:00 - 13:59	0	0	0	0	2	2	13	31	20	3	1	0	0	0	0	72
14:00 - 14:59	0	0	0	0	0	1	12	31	21	7	2	0	0	0	0	74
15:00 - 15:59	0	0	0	0	1	5	16	35	22	2	1	0	0	0	0	82
16:00 - 16:59	0	0	2	2	2	2	18	30	16	2	2	0	0	0	0	76
17:00 - 17:59	0	0	0	0	2	3	12	34	17	8	1	1	0	0	0	78
18:00 - 18:59	0	0	0	0	0	1	4	11	6	1	0	0	0	0	0	23
19:00 - 19:59	0	0	0	0	0	1	7	10	5	3	2	0	0	1	0	29
20:00 - 20:59	0	0	0	0	0	0	8	3	5	7	0	1	0	0	0	24
21:00 - 21:59	0	0	0	0	0	0	2	3	2	2	1	0	0	0	0	10
22:00 - 22:59	0	0	0	0	0	0	2	2	2	1	1	1	0	0	0	9
23:00 - 23:59	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	3
00:00 - 00:59	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	3
01:00 - 01:59	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
02:00 - 02:59	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
03:00 - 03:59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 - 04:59	0	0	0	0	0	0	0	2	5	4	0	0	1	0	0	12
05:00 - 05:59	0	0	0	0	0	0	6	13	33	8	4	0	1	0	0	65
06:00 - 06:59	0	0	0	0	1	5	13	43	25	6	0	1	0	0	0	94
07:00 - 07:59	0	0	0	0	2	3	13	29	24	7	1	0	1	0	0	80
08:00 - 08:59	0	0	0	0	1	7	20	41	19	2	2	1	1	0	0	94
09:00 - 09:59	0	0	0	0	0	1	14	33	23	10	2	0	0	0	0	83
10:00 - 10:59	0	0	0	0	1	5	16	36	11	4	0	0	0	0	0	73
Totals	0	0	3	3	12	41	205	449	290	86	20	5	4	2	0	1120
Percent of Total	0.0	0.0	0.3	0.3	1.1	3.7	18.3	40.1	25.9	7.7	1.8	0.4	0.4	0.2	0.0	100
Percent of AM	0.0	0.0	0.2	0.2	0.9	4.6	17.1	39.3	27.2	7.8	1.6	0.4	0.7	0.2	0.0	100
Percent of PM	0.0	0.0	0.4	0.4	1.3	2.7	19.6	40.9	24.6	7.5	2.0	0.5	0.0	0.2	0.0	100

Standard Deviation: 6.2 MPH

Ten Mile Pace: 45 to 54 MPH

85th Percentile: 54.1 MPH

Mean Speed: 48.5 MPH

Percent in Ten Mile Pace: 66.0%

Median Speed: 48.3 MPH

15th Percentile: 42.6 MPH

Modal Speed: 47.5 MPH

90th Percentile: 55.3 MPH

95th Percentile: 58.5 MPH

Daily Southbound Speeds (MPH)

Study Date: Monday, 04/15/2019 / Tuesday, 04/16/2019

Unit ID: 1

Location: Seabeck Holly Rd. S. of Foley Rd. 163.7

Posted Speed: 45

	5-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-99	Total
11:00 - 11:59	0	0	0	0	0	3	15	30	22	4	0	0	0	0	0	74
12:00 - 12:59	0	1	0	0	1	4	17	49	18	1	0	0	0	0	0	91
13:00 - 13:59	0	0	0	0	0	2	17	52	18	4	0	0	0	0	0	93
14:00 - 14:59	0	0	1	4	6	2	21	53	13	0	0	0	0	0	0	100
15:00 - 15:59	0	0	0	0	3	6	32	87	33	7	1	0	0	0	0	169
16:00 - 16:59	0	0	1	1	5	5	32	86	34	5	1	0	0	0	0	170
17:00 - 17:59	0	0	0	0	1	3	23	75	42	4	0	0	0	0	0	148
18:00 - 18:59	0	0	0	0	1	5	19	44	17	5	0	0	0	0	0	91
19:00 - 19:59	0	0	0	0	0	2	15	35	18	4	0	0	0	0	0	74
20:00 - 20:59	0	0	0	0	0	2	18	18	8	1	0	0	0	0	0	47
21:00 - 21:59	0	0	0	0	0	2	8	13	4	2	1	0	0	0	0	30
22:00 - 22:59	0	0	0	0	0	1	0	3	1	2	0	0	0	0	0	7
23:00 - 23:59	0	0	0	0	0	0	1	6	5	2	0	0	0	0	0	14
00:00 - 00:59	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	4
01:00 - 01:59	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	3
02:00 - 02:59	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	2
03:00 - 03:59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 - 04:59	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	3
05:00 - 05:59	0	0	0	0	0	1	2	0	1	0	0	0	0	0	0	4
06:00 - 06:59	0	0	0	0	0	5	2	3	3	0	0	0	0	0	0	13
07:00 - 07:59	0	0	0	0	1	3	7	13	5	0	0	0	0	0	0	29
08:00 - 08:59	0	0	0	1	0	2	13	14	7	0	1	0	0	0	0	38
09:00 - 09:59	0	0	0	0	1	1	9	19	10	1	1	0	0	0	0	42
10:00 - 10:59	0	0	0	0	0	2	15	23	2	1	0	0	0	0	0	43
Totals	0	1	2	6	20	53	270	626	262	44	5	0	0	0	0	1289
Percent of Total	0.0	0.1	0.2	0.5	1.6	4.1	20.9	48.6	20.3	3.4	0.4	0.0	0.0	0.0	0.0	100
Percent of AM	0.0	0.0	0.0	0.4	1.2	7.5	26.3	41.2	20.0	2.7	0.8	0.0	0.0	0.0	0.0	100
Percent of PM	0.0	0.1	0.2	0.5	1.6	3.3	19.6	50.4	20.4	3.6	0.3	0.0	0.0	0.0	0.0	100

Standard Deviation:	5.3 MPH	Ten Mile Pace:	40 to 49 MPH	85th Percentile:	52.2 MPH
Mean Speed:	47.1 MPH	Percent in Ten Mile Pace:	69.5%	15th Percentile:	42.1 MPH
Median Speed:	47.3 MPH			90th Percentile:	53.5 MPH
Modal Speed:	47.5 MPH			95th Percentile:	54.7 MPH

Daily Total Speeds (MPH)

Study Date: Monday, 04/15/2019 / Tuesday, 04/16/2019

Unit ID: 1

Location: Seabeck Holly Rd. S. of Foley Rd. 163.7

Posted Speed: 45

	5-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-99	Total
11:00 - 11:59	0	0	1	1	0	8	28	53	34	6	0	0	0	0	0	131
12:00 - 12:59	0	1	0	0	1	4	31	86	38	7	0	0	0	0	0	168
13:00 - 13:59	0	0	0	0	2	4	30	83	38	7	1	0	0	0	0	165
14:00 - 14:59	0	0	1	4	6	3	33	84	34	7	2	0	0	0	0	174
15:00 - 15:59	0	0	0	0	4	11	48	122	55	9	2	0	0	0	0	251
16:00 - 16:59	0	0	3	3	7	7	50	116	50	7	3	0	0	0	0	246
17:00 - 17:59	0	0	0	0	3	6	35	109	59	12	1	1	0	0	0	226
18:00 - 18:59	0	0	0	0	1	6	23	55	23	6	0	0	0	0	0	114
19:00 - 19:59	0	0	0	0	0	3	22	45	23	7	2	0	0	1	0	103
20:00 - 20:59	0	0	0	0	0	2	26	21	13	8	0	1	0	0	0	71
21:00 - 21:59	0	0	0	0	0	2	10	16	6	4	2	0	0	0	0	40
22:00 - 22:59	0	0	0	0	0	1	2	5	3	3	1	1	0	0	0	16
23:00 - 23:59	0	0	0	0	0	0	2	7	6	2	0	0	0	0	0	17
00:00 - 00:59	0	0	0	0	1	0	1	2	0	2	0	0	0	1	0	7
01:00 - 01:59	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	4
02:00 - 02:59	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	3
03:00 - 03:59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 - 04:59	0	0	0	0	0	2	0	2	6	4	0	0	1	0	0	15
05:00 - 05:59	0	0	0	0	0	1	8	13	34	8	4	0	1	0	0	69
06:00 - 06:59	0	0	0	0	1	10	15	46	28	6	0	1	0	0	0	107
07:00 - 07:59	0	0	0	0	3	6	20	42	29	7	1	0	1	0	0	109
08:00 - 08:59	0	0	0	1	1	9	33	55	26	2	3	1	1	0	0	132
09:00 - 09:59	0	0	0	0	1	2	23	52	33	11	3	0	0	0	0	125
10:00 - 10:59	0	0	0	0	1	7	31	59	13	5	0	0	0	0	0	116
Totals	0	1	5	9	32	94	475	1075	552	130	25	5	4	2	0	2409
Percent of Total	0.0	0.0	0.2	0.4	1.3	3.9	19.7	44.6	22.9	5.4	1.0	0.2	0.2	0.1	0.0	100
Percent of AM	0.0	0.0	0.1	0.2	1.0	5.5	19.9	39.9	24.9	6.2	1.3	0.2	0.5	0.1	0.0	100
Percent of PM	0.0	0.1	0.3	0.4	1.5	3.1	19.6	47.1	21.9	5.0	0.9	0.2	0.0	0.1	0.0	100

Standard Deviation: 5.8 MPH

Ten Mile Pace: 45 to 54 MPH

85th Percentile: 53.2 MPH

Mean Speed: 47.7 MPH

Percent in Ten Mile Pace: 67.5%

15th Percentile: 42.3 MPH

Median Speed: 47.7 MPH



































90th Percentile: 54.3 MPH

Modal Speed: 47.5 MPH

95th Percentile: 56.7 MPH

Appendix D. FHWA Vehicle Classification System

Appendix D – FHWA Vehicle Classification System

Class 1 Motorcycles		Class 7 Four or more axle, single unit	
Class 2 Passenger cars		Class 8 Four or less axle, single trailer	
			
			
			
Class 3 Four tire, single unit		Class 9 5-Axle tractor semitrailer	
			
			
Class 4 Buses		Class 10 Six or more axle, single trailer	
		Class 11 Five or less axle, multi trailer	
			
Class 5 Two axle, six tire, single unit		Class 12 Six axle, multi-trailer	
		Class 13 Seven or more axle, multi-trailer	
			
Class 6 Three axle, single unit			
			
			

Appendix E. ESAL Calculation Sheets

ESAL CALCULATION

Date: 4/3/2020
 Location: Seabeck Holly Road
 Lane Direction: NB
 Count Year 2019
 Project Year 2020
 Design Life (years) 20
 Traffic Growth Rate (%) 2%
 ESAL Growth Rate (%) 1.6%

Vehicle Categories	AADT	AADT	LEF	ESALS		
	2019	2040		2019	2020	2040
Single Unit	188	257	0.40	27448	28305	126954
Double Unit	2	3	1.00	730	753	1351
Trains	0	0	1.75	0	0	0
Total Load				28178	29058	128304

Total Design ESALs **790,730**

WSDOT Category	FHWA Class	LEF*
Passenger Cars & Trucks	1, 2, 3	**
Single Unit (SU)	4, 5, 6, 7	0.40
Double Unit (DU)	8, 9, 10	1.00
Trains	11, 12, 13	1.75

* WSDOT assumed ESALS per truck

** Passenger car and truck loads are considered insignificant due to the associated low LEF (0.0007).

ESAL = Equivalent Single Axle Load (18,000 lb/axle)

Project Year = First year the roadway experiences a load

Design Year = project year + design life (years)

Default Design Life is 20 years

Default traffic growth rate is 2%

Default ESAL growth rate is 1.6 %

AADT = Annual average daily traffic

LEF= Load equivalency factor

ESAL CALCULATION

Date: 4/3/2020
 Location: Seabeck Holly Road
 Lane Direction: SB
 Count Year: 2019
 Project Year: 2020
 Design Life (years): 20
 Traffic Growth Rate (%): 2%
 ESAL Growth Rate (%): 1.6%

Vehicle Categories	AADT	AADT	LEF	ESALS		
	2019	2040		2019	2020	2040
Single Unit	135	185	0.40	19710	20326	91164
Double Unit	1	1	1.00	365	376	675
Trains	0	0	1.75	0	0	0
Total Load				20075	20702	91839

Total Design ESALs **563,344**

WSDOT Category	FHWA Class	LEF*
Passenger Cars & Trucks	1, 2, 3	**
Single Unit (SU)	4, 5, 6, 7	0.40
Double Unit (DU)	8, 9, 10	1.00
Trains	11, 12, 13	1.75

* WSDOT assumed ESALS per truck

** Passenger car and truck loads are considered insignificant due to the associated low LEF (0.0007).

ESAL = Equivalent Single Axle Load (18,000 lb/axle)

Project Year = First year the roadway experiences a load

Design Year = project year + design life (years)

Default Design Life is 20 years

Default traffic growth rate is 2%

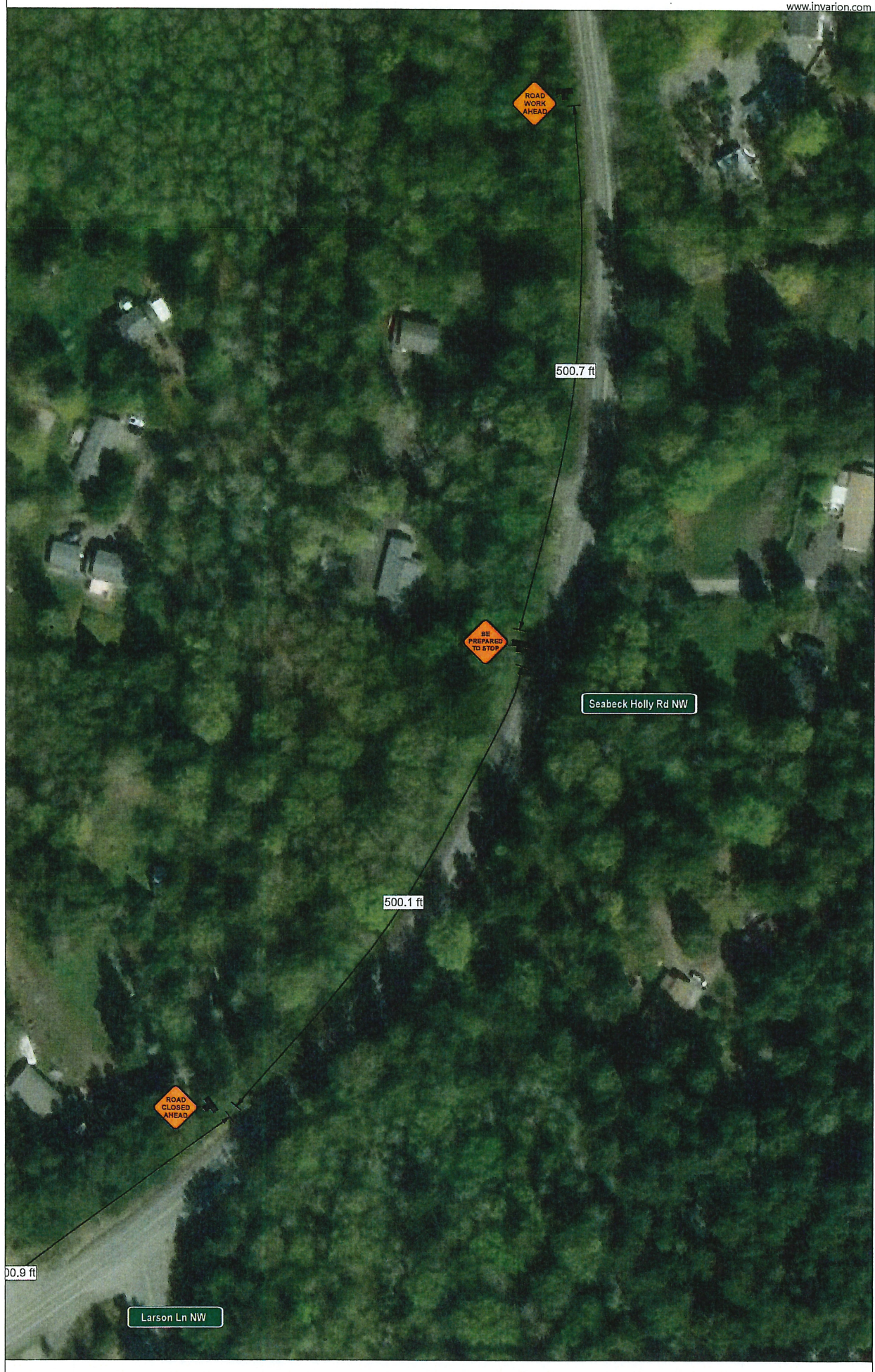
Default ESAL growth rate is 1.6 %

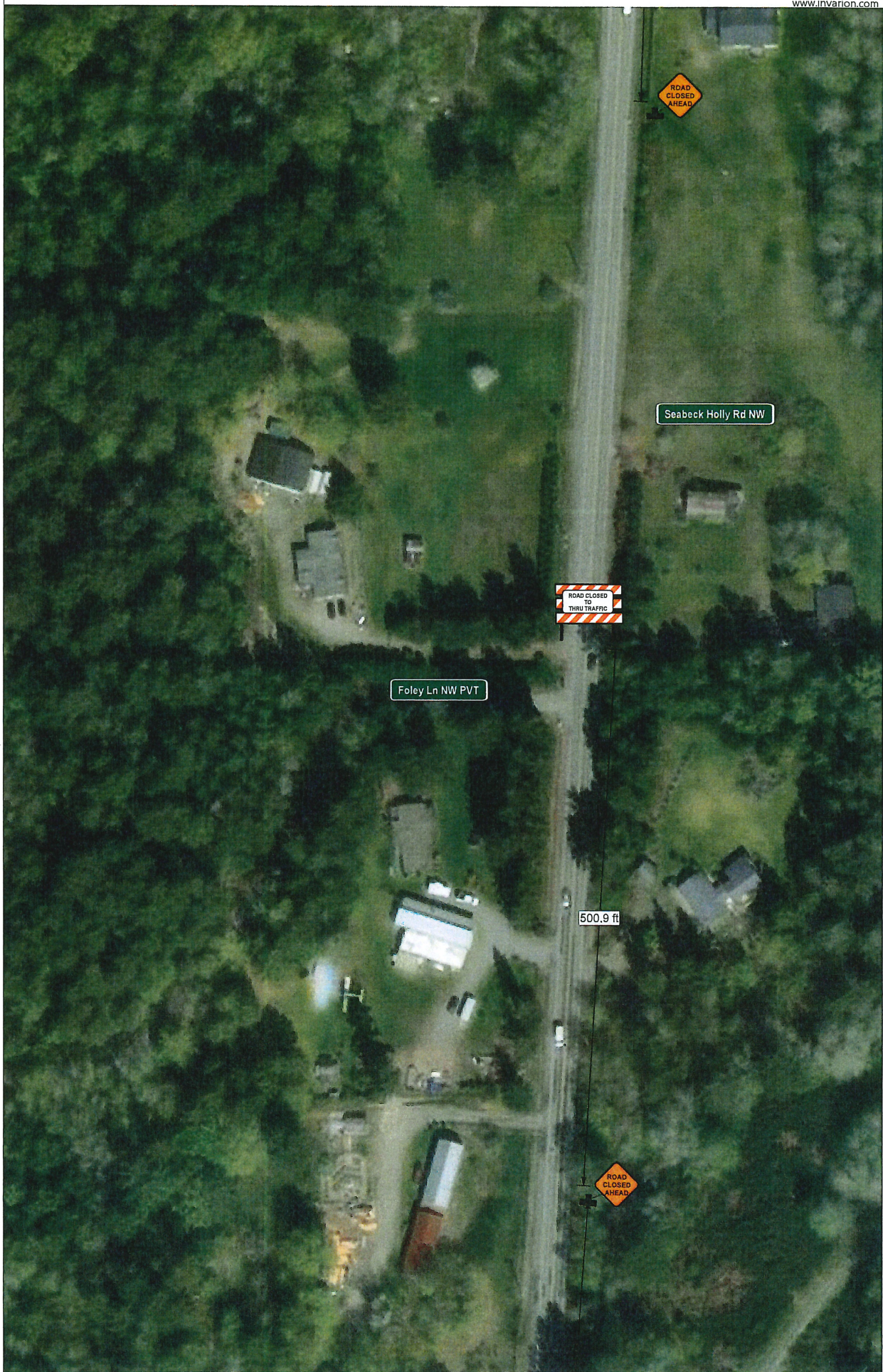
AADT = Annual average daily traffic

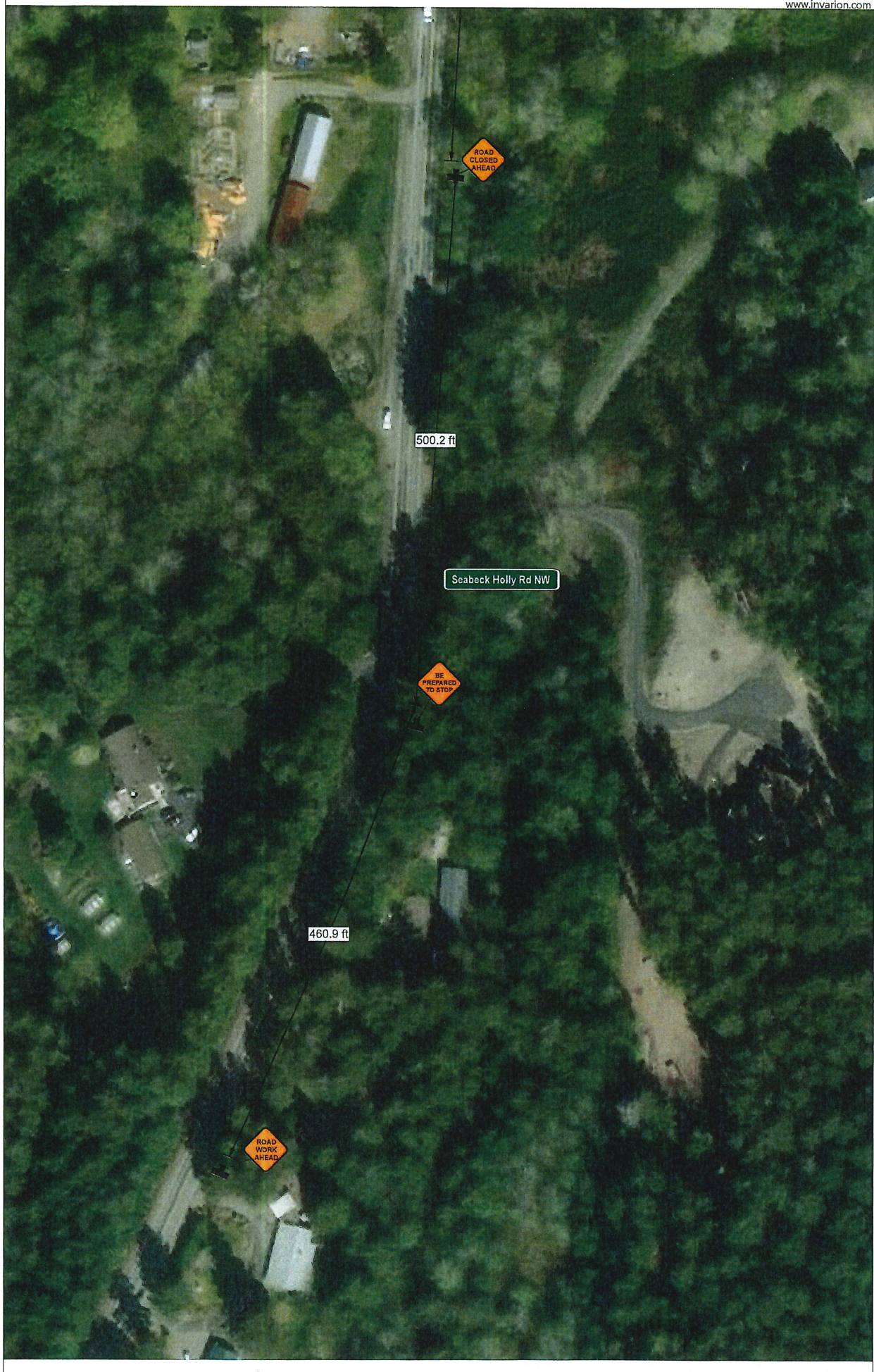
LEF= Load equivalency factor

Appendix F. Traffic Control Plans

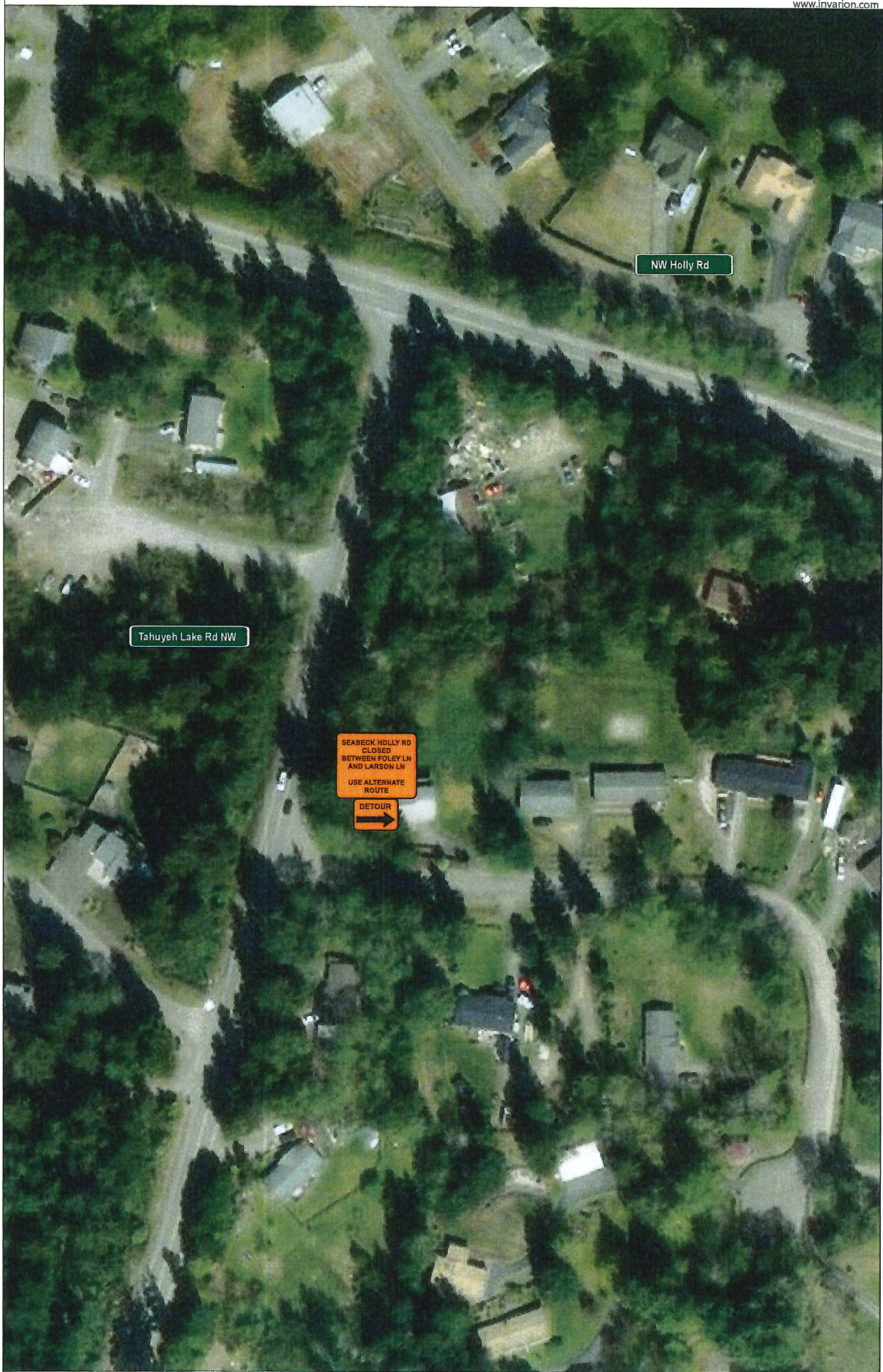














SEABECK HOLLY RD
CLOSED
BETWEEN HOLLY LN
AND LARSON LN
USE ALTERNATE
ROUTE

Seabeck Hwy NW

DETOUR

Seabeck Hwy NW

NW Holly Rd

SEABECK HOLLY RD
CLOSED
BETWEEN HOLLY LN
AND LARSON LN
USE ALTERNATE
ROUTE
DETOUR





NW Anderson Hill Rd

Seabeck Hwy NW

SEABECK HOLLOW RD
CLOSED DEAD END
BETWEEN LAKESIDE LN
AND LAKESIDE LN
USE ALTERNATE
ROUTE
OUTSIDE

