Juneau Access Improvements Project
Draft Supplemental Environmental Impact Statement

2014 Update to Appendix D
Technical Alignment Report

Prepared for:

Alaska Department of Transportation
& Public Facilities
6860 Glacier Highway
Juneau, Alaska 99801-7999

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Acronyms and Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ACF	Alaska Class Ferry
ADT	average daily traffic
AMHS	Alaska Marine Highway System
ATB	Asphalt Treated Base
CIP	Capital Improvement Plan
DOT&PF	Alaska Department of Transportation and Public Facilities
EATB	Emulsified Asphalt Treated Base
EIS	Environmental Impact Statement
FEIS	Final Environmental Impact Statement
JAI	Juneau Access Improvements
MP	Milepost
NEPA	National Environmental Policy Act
NHS	National Highway System
SEIS	Supplemental Environmental Impact Statement

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1. Introduction

In September 2004, the Juneau Access Improvement (JAI) Project-Technical Alignment Report was prepared and included as Appendix D of the JAI Supplemental Draft Environmental Impact Statement (EIS) in January 2005. During development of the JAI 2006 Final EIS, the Alaska Department of Transportation and Public Facilities (DOT&PF) responded to comments on the Supplemental Draft EIS and incorporated new data and new analysis into the project. Changes were made to Alternative 2B, and Alternatives 2, 2A, and 2C were dropped from the range of reasonable alternatives. These revisions required the preparation of an Addendum to Appendix D – Alignment Technical Report, which was included in Appendix W of the 2006 Final EIS.

The 2006 Addendum to Appendix D described changes to the design criteria, updated the alignment discussion where changes occurred, provided updated bridge summaries, provided updated plan and profile sheets where changes occurred, updated ferry terminal layouts and cost estimates, updated the Engineer's Estimate, and provided an errata sheet for the original technical report.

As part of the JAI Project 2014 Draft Supplemental Environmental Impact Statement (SEIS), additional changes and updates to design criteria, plans, and costs have been prepared and are presented in this *2014 Update to Appendix D – Technical Alignment Report*. This Update incorporates and replaces the 2006 Addendum to Appendix D. The information reported in the 2004 Technical Alignment Report Appendix D remains valid unless replaced with new information presented in this Update.

Due to the extent of changes to the Alternative 2B and 3 alignments, new plan and profile sheets are provided, as are new ferry terminal layouts and highway and ferry terminal cost estimates.

1.1 Project Description

As required by the National Environmental Policy Act (NEPA), this technical report considers the following reasonable alternatives.

1.1.1 Alternative 1 – No Action

The No Action Alternative (Alternative 1) includes a continuation of mainline ferry service in Lynn Canal and incorporates two Day Boat Alaska Class Ferries (ACFs). The Alaska Marine Highway System (AMHS) would continue to be the National Highway System (NHS) route from Juneau to Haines and Skagway, and no new roads or ferry terminals would be built. In addition to the Day Boat ACFs, programmed improvements include improved vehicle and passenger staging areas at the Auke Bay and Haines ferry terminals to optimize traffic flow on and off the Day Boat ACFs as well as expansion of the Haines Ferry Terminal to include a new double bow berth to accommodate the Day Boat ACFs. This alternative is based on the most likely AMHS operations in the absence of any capital improvements specific to the JAI Project.

Mainline service would include two round trips per week in the summer and one per week in the winter with Auke Bay-Haines-Skagway-Haines-Auke Bay routing. During the summer, one Day Boat ACF would make one round trip between Auke Bay and Haines six days per week, and one would make two round trips per day between Haines and Skagway six days per week. The Day

Boat ACFs would not sail on the seventh day because the mainliner is on a similar schedule. In the winter, ferry service in Lynn Canal would be provided primarily by the Day Boat ACFs three times per week. The *M/V Malaspina* would no longer operate as a summer day boat in Lynn Canal.

1.1.2 Alternative 1B – Enhanced Service with Existing AMHS Assets

Alternative 1B includes all of the components of Alternative 1, No Action, but focuses on enhancing service using existing AMHS assets without major initial capital expenditures. Similar to Alternative 1, Alternative 1B includes a continuation of mainline ferry service in Lynn Canal; the AMHS would continue to be the NHS route from Juneau to Haines and Skagway; no new roads or ferry terminals would be built; and in addition to the Day Boat ACFs, programmed improvements include improved vehicle and passenger staging areas at the Auke Bay and Haines ferry terminals to optimize traffic flow on and off the Day Boat ACFs as well as expansion of the Haines Ferry Terminal to include a new double bow berth to accommodate the Day Boat ACFs. Service to other communities would remain the same as with the No Action Alternative. Alternative 1B keeps the *M/V Malaspina* in service after the second Day Boat ACF is brought online to provide additional capacity in Lynn Canal. Enhanced services included as part of Alternative 1B are a 20 percent reduction in fares for trips in Lynn Canal and extended hours of operations for the reservation call center.

Mainline service would include two round trips per week in the summer and one per week in the winter with Auke Bay-Haines-Skagway-Haines-Auke Bay routing. During the summer, the *M/V Malaspina* would make one round trip per day seven days per week on a Skagway-Auke Bay-Skagway route, while one Day Boat ACF would make one round trip between Auke Bay and Haines six days per week, and one would make two round trips per day between Haines and Skagway six days per week. The Day Boat ACFs would not sail on the seventh day because the mainliner would be on a similar schedule. In the winter, ferry service in Lynn Canal would be provided primarily by the Day Boat ACFs three times per week.

1.1.3 Alternative 2B – East Lynn Canal Highway to Katzehin, Shuttles to Haines and Skagway

Alternative 2B would construct the East Lynn Canal Highway (50.8 miles, including 47.9 miles of new highway and upgrade to 2.9 miles of the existing Glacier Highway) from Echo Cove around Berners Bay to a new ferry terminal 2 miles north of the Katzehin River. Ferry service would connect Katzehin to Haines and Skagway. In addition, this alternative includes modifications to the Skagway Ferry Terminal to include a new end berth and construction of a new conventional monohull ferry to operate between Haines and Skagway. Mainline ferry service would end at Auke Bay. This alternative assumes the following improvements will have been made independent of the JAI Project before Alternative 2B would come on-line: two Day Boat ACFs, improved vehicle and passenger staging areas at the Haines Ferry Terminal to optimize traffic flow on and off the Day Boat ACFs, and expansion of the Haines Ferry Terminal to include two new double bow berths.

During the summer months, one Day Boat ACF would make eight round trips per day between Haines and Katzehin, a second Day Boat ACF would make six round trips per day between Skagway and Katzehin, and the Haines-Skagway shuttle ferry would make two trips per day.

During the winter, one Day Boat ACF would make six round trips per day between Haines and Katzehin, and a second Day Boat ACF would make four round trips per day between Skagway and Katzehin. The Haines-Skagway shuttle would not operate; travelers going between Haines and Skagway would travel to Katzehin and transfer ferries.

1.1.4 Alternative 3 – West Lynn Canal Highway

Alternative 3 would upgrade/extend the Glacier Highway (5.2 miles, including 2.3 miles of new highway and upgrade to 2.9 miles of the existing Glacier Highway) from Echo Cove to Sawmill Cove in Berners Bay. New ferry terminals would be constructed at Sawmill Cove in Berners Bay and at William Henry Bay on the west shore of Lynn Canal, and the Skagway Ferry Terminal would be modified to include a new end berth. A new 38.9-mile highway would be constructed from the William Henry Bay Ferry Terminal to Haines with a bridge across the Chilkat River/Inlet connecting into Mud Bay Road. A new conventional monohull ferry would be constructed and would operate between Haines and Skagway. Mainline ferry service would end at Auke Bay. This alternative assumes the following improvements will have been made independent of the JAI Project before Alternative 3 would come on-line: two Day Boat ACFs, improved vehicle and passenger staging areas at the Haines Ferry Terminal to optimize traffic flow on and off the Day Boat ACFs, and expansion of the Haines Ferry Terminal to include two new double bow berths.

During the summer, two Day Boat ACFs would make six round-trips per day between Sawmill Cove and William Henry Bay (total of 12 trips each direction), and the Haines-Skagway shuttle ferry would make six round-trips per day. During the winter, one Day Boat ACF would make four round-trips per day between Sawmill Cove and William Henry Bay, and the Haines-Skagway shuttle ferry would make four round-trips per day.

1.1.5 Alternatives 4A through 4D – Marine Alternatives

All four marine alternatives would include continued mainline ferry service in Lynn Canal with a minimum of two trips per week in the summer and one per week in the winter with Auke Bay-Haines-Skagway-Haines-Auke Bay routing. Each marine alternative includes a new conventional monohull shuttle that would make two round trips per day between Haines and Skagway six days a week in the summer and a minimum of three round trips per week between Haines and Skagway in the winter. The AMHS would continue to be the NHS route from Juneau to Haines and Skagway. These alternatives assume the following improvements will have been made independent of the JAI Project before the alternative comes on-line: improved vehicle and passenger staging areas at the Auke Bay and Haines ferry terminals to optimize traffic flow on and off the Day Boat ACFs, and expansion of the Haines Ferry Terminal to include new double bow berths.

1.1.5.1 Alternative 4A – Fast Vehicle Ferry Service from Auke Bay

Alternative 4A would construct two new fast vehicle ferries (FVFs). No new roads would be built for this alternative, and the Auke Bay Ferry Terminal would be expanded to include a new double stern berth. A new conventional monohull ferry would be constructed and would operate between Haines and Skagway. The *M/V Malaspina* would no longer operate as a summer day boat in Lynn Canal, and the Day Boat ACFs would no longer operate in Lynn Canal. The FVFs would make two round trips between Auke Bay and Haines and two round trips between Auke

Bay and Skagway per day in the summer. During the winter, one FVF would make one round trip between Auke Bay and Haines and one round trip between Auke Bay and Skagway each day.

1.1.5.2 Alternative 4B – Fast Vehicle Ferry Service from Berners Bay

Similar to Alternative 4A, Alternative 4B would construct two new FVFs. This alternative would upgrade/extend Glacier Highway (5.2 miles, including 2.3 miles of new highway and 2.9 miles of the existing Glacier Highway) from Echo Cove to Sawmill Cove in Berners Bay, where a new ferry terminal would be constructed. The Auke Bay Ferry Terminal would be expanded to include a new double stern berth. A new conventional monohull ferry would be constructed and would operate between Haines and Skagway. The *M/V Malaspina* would no longer operate as a summer day boat in Lynn Canal, and the Day Boat ACFs would no longer operate in Lynn Canal. In the summer, the FVFs would make two round trips between Sawmill Cove and Haines and two round trips between Sawmill Cove and Skagway per day. During the winter, one FVF would make one round trip between Auke Bay and Haines and one round trip between Auke Bay and Skagway each day.

1.1.5.3 Alternative 4C – Conventional Monohull Service from Auke Bay

Alternative 4C would use Day Boat ACFs to provide additional ferry service in Lynn Canal. No new roads would be built for this alternative. The Auke Bay Ferry Terminal would be expanded to include a new double stern berth, and the Skagway Ferry Terminal would be expanded to include a new bow berth. A new conventional monohull ferry would be constructed and would operate between Haines and Skagway. In the summer, one Day Boat ACF would make one round trip per day between Auke Bay and Haines, and one Day Boat ACF would make one round trip per day between Auke Bay and Skagway. During the winter, one Day Boat ACF would alternate between a round trip to Haines one day and a round trip to Skagway the next day.

1.1.5.4 Alternative 4D – Conventional Monohull Service from Berners Bay

Alternative 4D would use Day Boat ACFs to provide additional ferry service in Lynn Canal. This alternative would upgrade/extend Glacier Highway (5.2 miles, including 2.3 miles of new highway and 2.9 miles of the existing Glacier Highway) from Echo Cove to Sawmill Cove in Berners Bay, where a new ferry terminal would be constructed. The Auke Bay Ferry Terminal would be expanded to include a new double stern berth, and the Skagway Ferry Terminal would be expanded to include a new bow berth. This alternative includes construction of a new conventional monohull ferry that would operate between Haines and Skagway. In the summer, the Day Boat ACFs would make two trips per day between Sawmill Cove and Haines and two trips per day between Sawmill Cove and Skagway. During the winter, a Day Boat ACF would operate from Auke Bay, alternating between a round trip to Haines one day and to Skagway the next day.

2. Design Standards

2.1 Highway Design Criteria

The highway has been designed following the American Association of State Highway and Transportation Officials' (AASHTO's) "A Policy on Geometric Design of Highways and Streets." Over the years AASHTO has updated its design guidance, with the latest update occurring in 2011. Based on this latest update, the following revision is made to Roadway Design Criteria: The minimum Allowable Radius of a Horizontal Curve has been reduced from 510 feet to 485 feet using a design speed of 40 mph.

2.2 Design Exceptions

The following design exception will be required (see Table 2-1); supporting reasons are quoted from AASHTO:

Table 2-1: Alaska State National Highway System Standard

Criteria Description	AASHTO Standard	Juneau Access Improvements Project
Width of shoulder	6 ft.	4 ft.

The reasons for the exception have remained the same, with slight changes in wording:

Reason: The State of Alaska has adopted the AASHTO Standard as its standard.

Shoulder Widths: AASHTO Standards indicate that a 4-foot-wide usable shoulder should be considered for rural arterials with average daily traffic (ADT) less than 400 that have travel lanes 11 feet wide and Design Speeds from 40 to 55 mph. For ADTs between 400 and 1,500 a 6-foot-wide usable shoulder should be considered.

AASHTO states: "As a minimum, 0.6 m [2 ft] of the shoulder width should be paved to provide for pavement support, wide vehicles, and collision avoidance."

AASHTO also states: "Where bicycles are to be accommodated on the shoulder, a minimum paved width of 1.2 m [4 ft] should be used."

The DOT&PF has elected to use the 4-foot paved usable shoulder width to minimize construction impacts while still providing for bicyclists and pedestrians.

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3. Recommended Design

3.1 Typical Sections

The highway typical section has been revised to replace the 4-inch-thick layer of Emulsified Asphalt Treated Base (EATB) with 2 inches Asphalt Treated Base (ATB) and 4 inches Aggregate Base Course, Grading D-1. The combined ATB and Base Course will provide a more durable structural section. The ATB and Base Course have been included in the Engineer's Estimates for all alternatives and are shown on the typical sections.

Select material below the base and pavement section has increased from 12 inches to 24 inches where the road is constructed on frost susceptible soils. Providing a non-frost susceptible material below the road base is critical in preserving the integrity of the road structure and will minimize long term maintenance efforts.

The ditch width has increased from 8 feet to 10 feet. The wider ditch width will better accommodate subsurface drainage from the 24-inch select material to the ditch and provide more capacity for drainage and snow storage.

The attached Figures 3-1 through 3-6 reflect this change and provide information on various typical sections.

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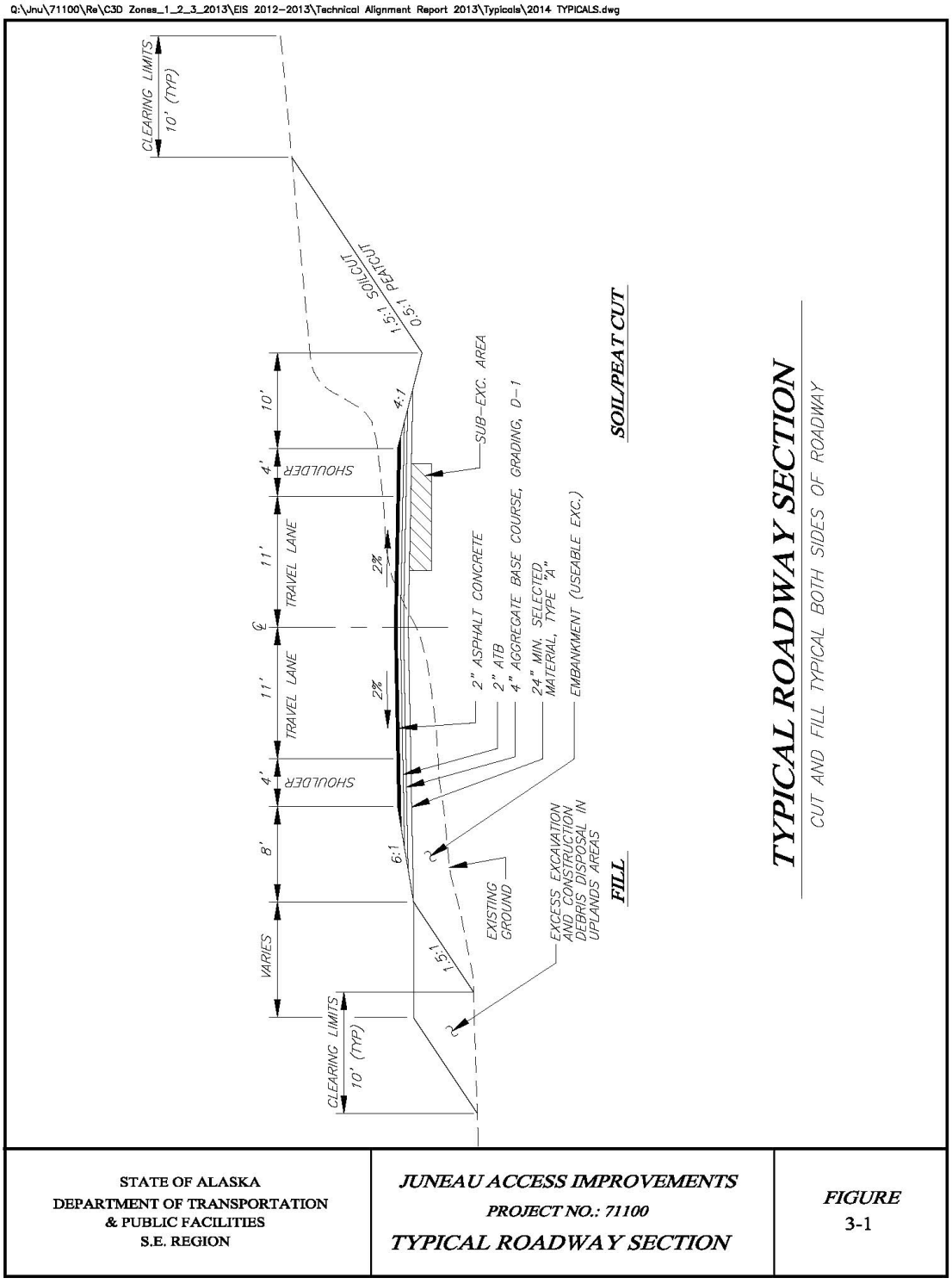

Figure 3-1: Typical Roadway Section

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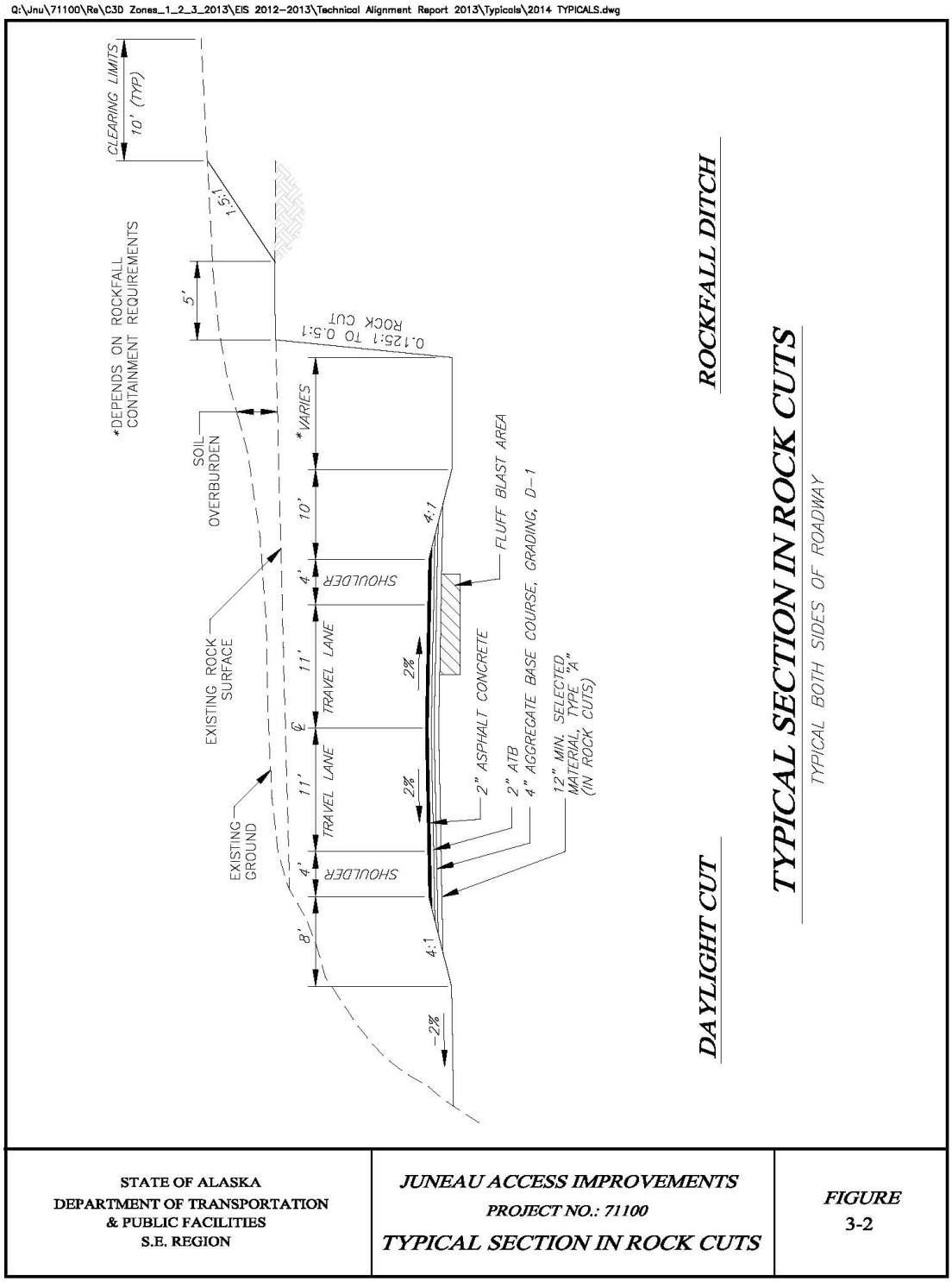

Figure 3-2: Typical Section in Rock Cuts

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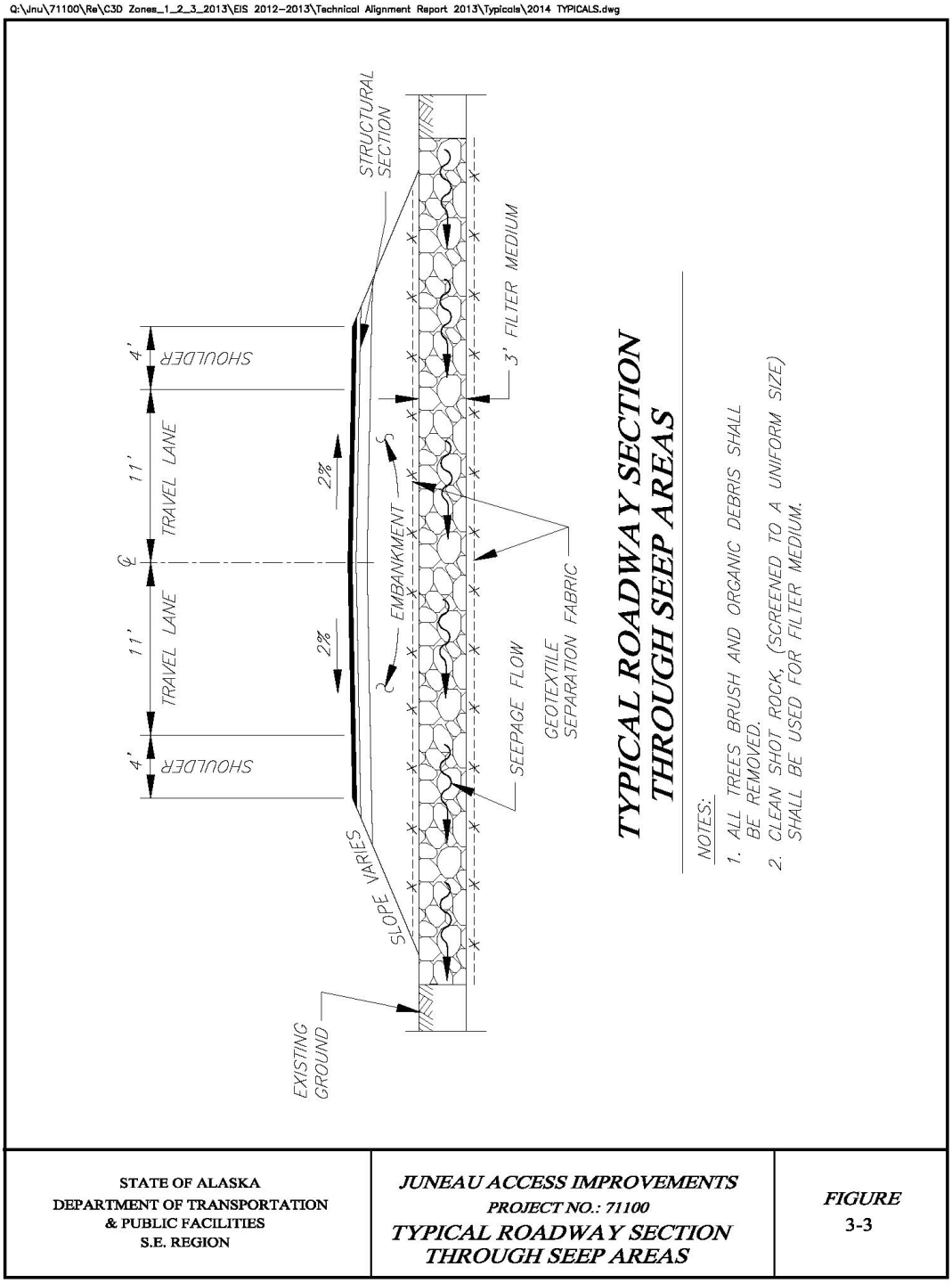

Figure 3-3: Typical Roadway Section through Seep Areas

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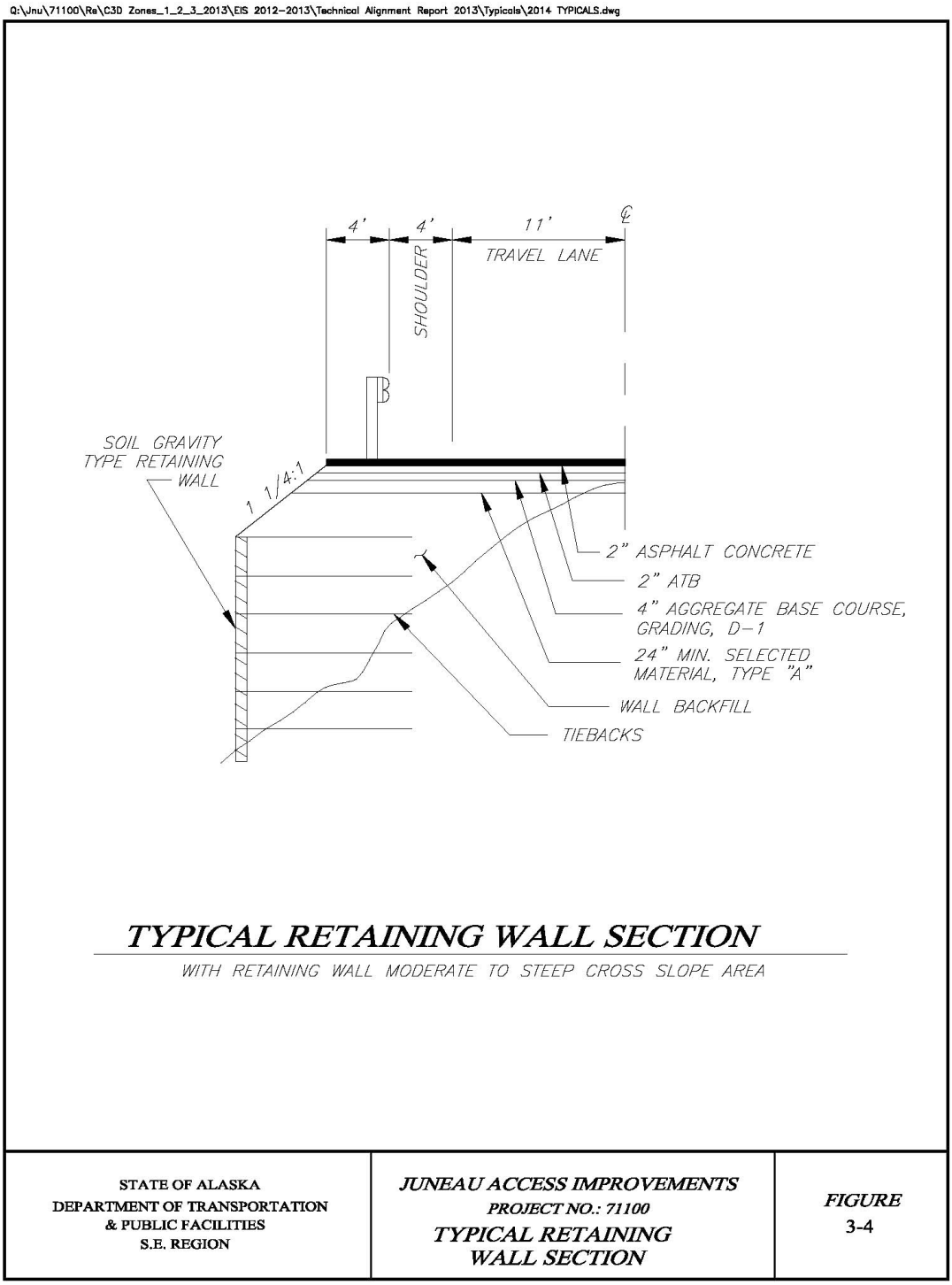

Figure 3-4: Typical Retaining Wall Section (Moderate to Steep)

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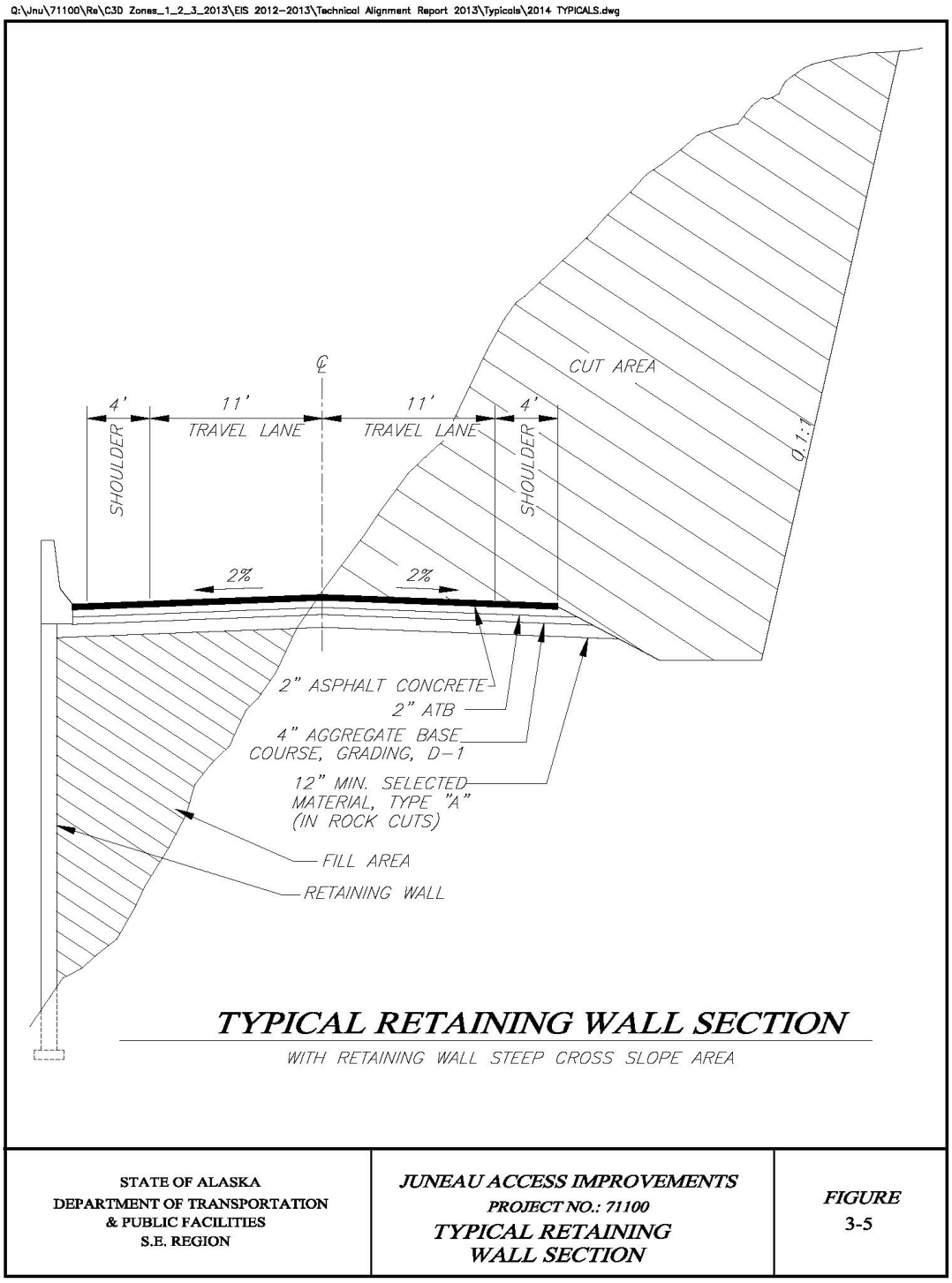

Figure 3-5: Typical Retaining Wall Section (Steep)

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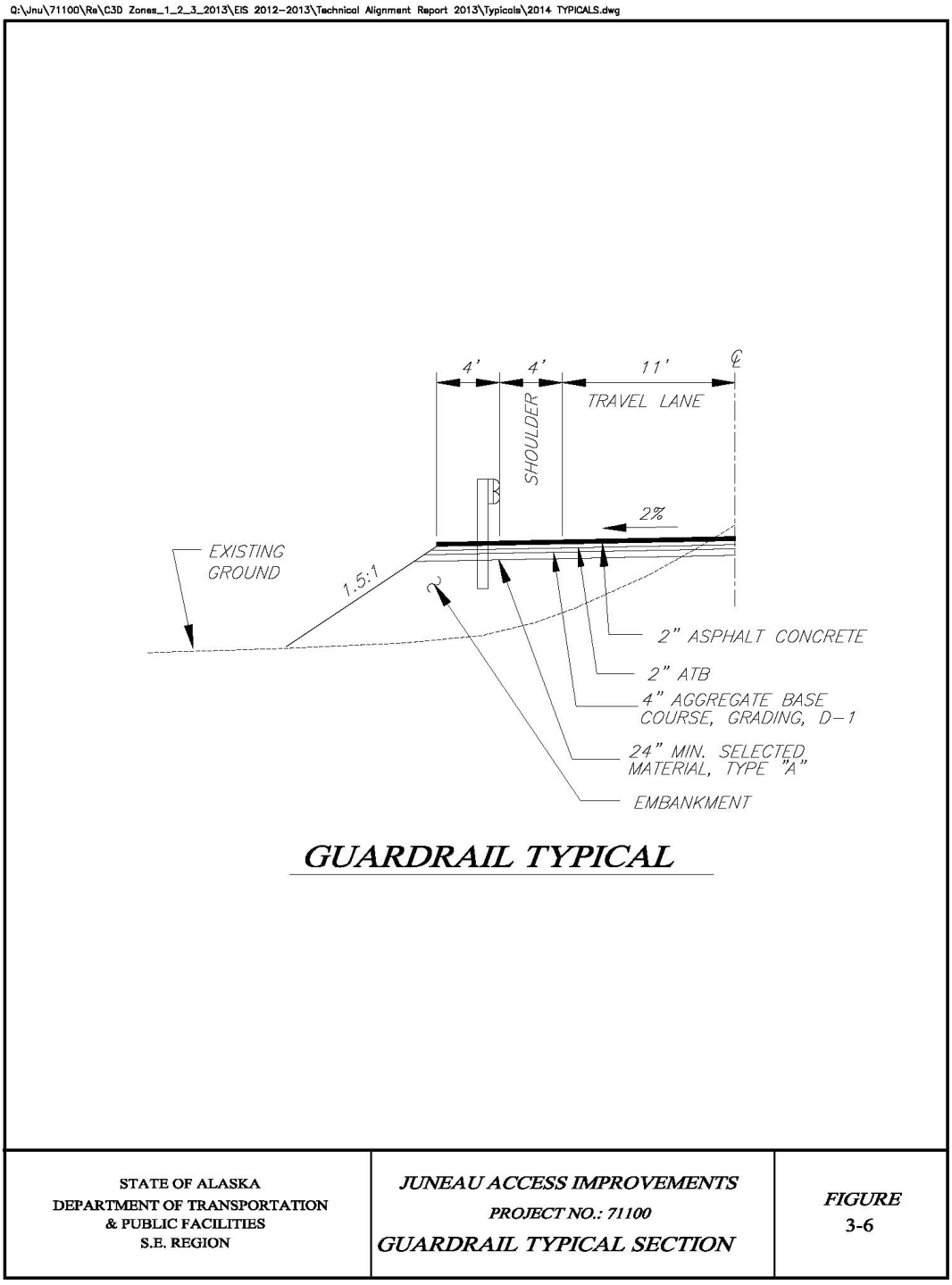

Figure 3-6: Guardrail Typical Section

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3.2 Alignment Discussion Overview

3.2.1 East Lynn Canal Discussion

Note: The stationing along this route has changed from the 2006 Final EIS (FEIS) and 2008 Corps of Engineers Permit Alignment due to the numerous alignment revisions. The stationing provided in the discussion reflects stationing on the revised plan sheets in Attachment A.

Station 64+75 (Milepost [MP] 40.5) to Station 570+00 (MP 50.1) – Echo Cove to Berners Bay Crossing – (Plan Sheets 1 - 7) – This segment had minor alignment revisions for better bridge crossings, to minimize wetland impacts, and to avoid eagle nests.

In 2011, the pioneer road from Echo Cove to Cascade Point was reconstructed and widened. The current alignment between Station 64+75 and Station 207+00 will straddle the Goldbelt Cascade Point Road centerline alignment.

The curve at station 255+00 was lengthened to shift the alignment into a rock outcropping in order to generate material. Just beyond this at station 277+00, the crossing of Sawmill Creek was shifted downhill to avoid multiple converging creeks and boggy terrain. The crossing of Boulder Creek at station 393+00 was also shifted to take advantage of a better crossing. Here the alignment was shifted uphill.

Additional adjustments to the alignment were made between Station 207+00 and Station 410+00 to avoid emergent wetlands and minimize impacts to lower value wetlands.

Beginning approximate station 410+00 and extending to 520+00 the alignment is shifted uphill to follow geotechnical investigative recommendations, to meet commitments for a minimum 50 foot offset from the water, and to avoid the primary zones (330-foot radius around the nest tree) of eagle nests #076, #119, and #074.

From Station 520+00 forward, the alignment was optimized by making minor downhill shifts where possible, and by following the curvature of the terrain more closely. Two new eagle nests were identified in this area. Nest #294 at station 521+60 Left and nest #292 at station 561+40 Right both required shifting the alignment to avoid the nests. To optimize the first bridge crossing at Berners Bay (Antler Slough) and to reduce shoreline impacts, the alignment was shifted about 500 feet upstream at station 572+00.

Station 570+00 (MP 50.1) to Station 756+50 (MP 53.6) - Berners Bay Crossing – (Plan Sheets 7 - 9) – This segment is largely unchanged but does have some minor alignment revisions to better line up with the bridge crossings. A bridge was added to cross a newly identified anadromous fish stream and avoid riparian wetlands.

Station 756+50 (MP 53.6) to Station 1401+00 (MP 65.8) – Berners Bay Crossing to Independence Lake – (Plan Sheets 9 - 19) – This 12.2-mile segment was revised at multiple points to minimize or eliminate impacts to wetlands, to better avoid eagle nests, to make use of better stream crossings and foundation soils, to avoid steep ravine areas, to minimize cut heights,

and to use the existing Jualin Road corridor where feasible.

Station 1401+00 (MP 65.8) to Station 1520+00 (MP 68.1) – Independence Lake North – (Plan Sheets 19 - 20) – The alignment was shifted uphill to decrease the amount of marine fill and for better confined crossings through two debris flows and avalanche chutes.

Station 1520+00 (MP 68.1) to Station 1615+00 (MP 69.9) – Met Point South – (Plan Sheets 20 - 22) – In this segment, the alignment was shifted uphill in a couple areas to avoid boulder debris and to move the bridge crossing 10E to avoid complex channel morphology, debris deposition, and to reduce marine fill. Also two new eagle nests were identified in 2012, nest #236 at station 1521+00 Right and #233 at station 1573+00 Right, causing minor shifts to avoid the nests.

Station 1615+00 (MP 69.9) to Station 2096+00 (MP 79.0) – Met Point North to Level Point – (Plan Sheets 22 - 29) – This segment is characterized by numerous active debris flows and rockfall hazards. Geotechnical investigations identified large areas of steep talus slopes requiring special consideration for crossing. The general recommendation was to avoid cuts through the talus fields. The alignment has been shifted in many locations to provide for better crossings over the mapped debris flows and both horizontal and vertical adjustments for crossing the talus slopes. The majority of alignment shifts have been uphill to minimize these hazards. The original alignment closely followed the beach, therefore the shifts have also resulted in less marine fill. A large heavy-duty bridge was added at station 1735+58 to cross below an unstable talus slope and steep cliff face.

Also, seven new eagle nests were identified in 2012. The new nests and respective locations are; #105 at station 1650+00 Left, #102 at station 1713+00 Left, #149 at station 1714+00 Left, #212 at station 1912+00 Right, #211 at station 1952+00 Right, #033 at station 2014+00 Left, and #157 at station 2098+00 Left.

Station 2096+00 (MP 79.0) to Station 2635+00 (MP 89.2) – Level Point to Katzehin River – (Plan Sheets 29 - 37) – This segment is also characterized by numerous active debris flows and rockfall hazards. The alignment has been shifted either uphill or downhill in many locations to minimize the risks from these hazards. Shifts were also made to move bridge crossings into more favorable terrain. Numerous steep talus slopes present unique construction challenges.

From station 2140+00 to 2203+00, the alignment has predominantly been shifted uphill to minimize the risk from cutting through talus slopes. A better bridge crossing of Yeldagala Creek at station 2245+00 resulted in an uphill shift. The alignment remained shifted uphill to optimize the crossings of many debris flows and rockfall hazards.

A major shift is at Gran Point, station 2357+00, where the alignment now travels through two tunnels to avoid the hazards due to the rock cliffs and to shield the sea lion haulout. The alignment remains uphill to station 2454+00 to avoid very steep and difficult terrain.

Another major shift is at station 2540+00 where the alignment follows the contours at the water's edge and places deep water fill from station 2565+50 to 2581+00. The decision was made to

shift the alignment into the water to avoid rockfall hazards from the cliffs above.

Between station 2595+00 and 2629+00, the alignment had minor shifts to better fit the terrain and to eliminate marine wetlands impacts.

Three new eagle nests were identified in 2012 within this segment. Nest #157 is at the beginning of this segment but was discussed in the previous segment. Nest #029 is at station 2233+00 Left, #024 is at station 2451+00 Left, and #204 is at station 2501+60 Right.

Station 2635+00 (MP 89.2) to Station 2771+86 (MP 91.8) – South Katzehin River to Katzehin Ferry Terminal – (Plan Sheets 37 - 38) – The Katzehin River Bridge was skewed to minimize exposure to the rockfall hazard along the southern bank of the river and to avoid a slough immediately north of the river. The need for a wildlife undercrossing was identified at station 2704+00 resulting in the need for bridge 20E. Its length is 130 feet.

The alignment on this segment was kept at the base of the mountain between station 2725+00 and the ferry terminal at station 2770+00 to eliminate estuarine wetlands impacts and to avoid eagle nest #196 at station 2740+00 Left. The ferry terminal fill was moved south to avoid the runout of an avalanche path.

3.2.2 West Lynn Canal Discussion

The alignment along the west side of Lynn Canal is mainly unchanged except for minor shifts to avoid new eagle nests identified in 2012; revised plan and profile sheets are included in Attachment B.

Nest #402, station 5675+53 Right, is situated at the top of steep terrain above the beach. The alignment consists of a through cut with steep terrain above making any uphill alignment shift difficult. The profile was raised to increase the distance from the cut limit to the nest.

At station 5745+37, nest #403 and the roadway are on a slight bench with steep slopes both uphill and downhill with very little room for shifting. The nest is situated uphill of the road. The roadway was shifted towards the seaward side to maximize the distance between the road and nest, thereby increasing retaining wall height.

Nest #406, station 5940+00 Right, is over the bank near the beach. The road would be in a through cut at a knob with a bench area both before and after the knob. The profile was raised to lessen the height of cut and to increase the distance between the nest and cut limit.

3.3 Drainage and Bridges

Table 3-1, East Lynn Canal Bridge Summary, has been updated to include the new Alternative 2B bridges. Geotechnical investigation identified numerous new bridge locations due to the need to span active debris flows or other drainages.

Bridges north of station 1300+00 have been divided into 3 classifications; standard, special, and heavy duty. Standard bridges are planned at crossings that can be spanned using common length concrete girders that are readily available. Special bridges are those that require girder lengths

longer than those for standard bridges, require special foundation design, or may require other elements such as curvature. Heavy Duty bridges are those required at special crossings such as avalanche chutes or very difficult crossings. These bridges are required to address various hazards such as avalanche side loading and extreme topographic conditions. Figure 3-7, Bridge Elevations (originally Figure 3-8), was updated to distinguish between multiple span bridges for major and minor crossings.

Table 3-2 (originally Table 3-3) was updated to summarize the avalanche zones along the East Lynn Canal route. Avalanche sheds are anticipated at avalanche path numbers ELC019, ELC020, and ELC021 (paths are identified in Appendix J, *Snow Avalanche Report*, of the Supplemental Draft EIS, October 2004, and the 2014 Update to Appendix J). These paths have a combined width of 1,500 feet at this point, so it is assumed that the final design will include sheds with a total length of approximately 1,500 feet to mitigate for these high hazard avalanche zones.

Table 3-1: East Lynn Canal Bridge Summary

Bridge No.	Begin Station	Highway Milepost	Length (ft)	Intermediate Piers	Name
1E	276+72	44.4	128	0	Sawmill Creek (A)
2E	391+98	46.6	128	0	Boulder Creek
3E	572+17	50.0	144	0	unnamed (A)
4Ea	641+86	51.3	2,759	19	Antler/Gilkey Rivers (A)
4Eb	671+09	51.9	128	0	Wildlife Undercrossing
4Ec	694+48	52.3	118	0	Wildlife Undercrossing
4Ed	723+79	52.9	118	0	unnamed
5E	728+39	53.0	2,881	20	Berners/Lace Rivers (A)
6E	921+15	56.7	288	2	Slate Creek (A) (SP)
7E	1306+03	64.0	118	0	Sweeny Creek (A)
8E	1343+71	64.7	60	0	Sherman Creek (A)
9E	1453+18	66.8	144	0	Independence Creek (A)
10E	1561+01	68.8	128	0	unnamed
11E	1669+80	70.9	144	0	unnamed (SP)
12E	1677+80	71.1	144	0	unnamed (HD)
13E	1681+30	71.2	118	0	unnamed
14E	1703+78	71.6	128	0	unnamed (HD)
15E	1735+58	72.2	400	3	(HD)
16E	1784+50	73.1	300	0	unnamed (HD)
17E	1984+00	76.9	160	0	unnamed (SP)
18E	2039+52	77.9	300	0	unnamed (HD)
19E	2244+80	81.8	160	0	Yeldagalga Creek (SP)
20E	2260+80	82.1	128	0	unnamed
21E	2282+00	82.5	128	0	unnamed (HD)
22E	2293+37	82.7	128	0	unnamed (HD)
23E	2320+84	83.2	150	0	unnamed (HD)
24E	2337+93	83.5	144	0	unnamed (HD)
25E	2422+39	85.1	128	0	unnamed
26E	2481+03	86.2	128	0	unnamed (SP)
27E	2589+53	88.3	128	0	unnamed
28Ea	2637+65	89.2	2,590	18	Katzehin River (A)
28Eb	2703+45	90.4	128	0	Wildlife Undercrossing
Total Bridges 32		Total Length 12,563			

(A) = Anadromous fish stream
(SP) = Special Bridge
(HD) = Heavy Duty Bridge
* Bridges not labeled as SP or HD are Standard Bridges

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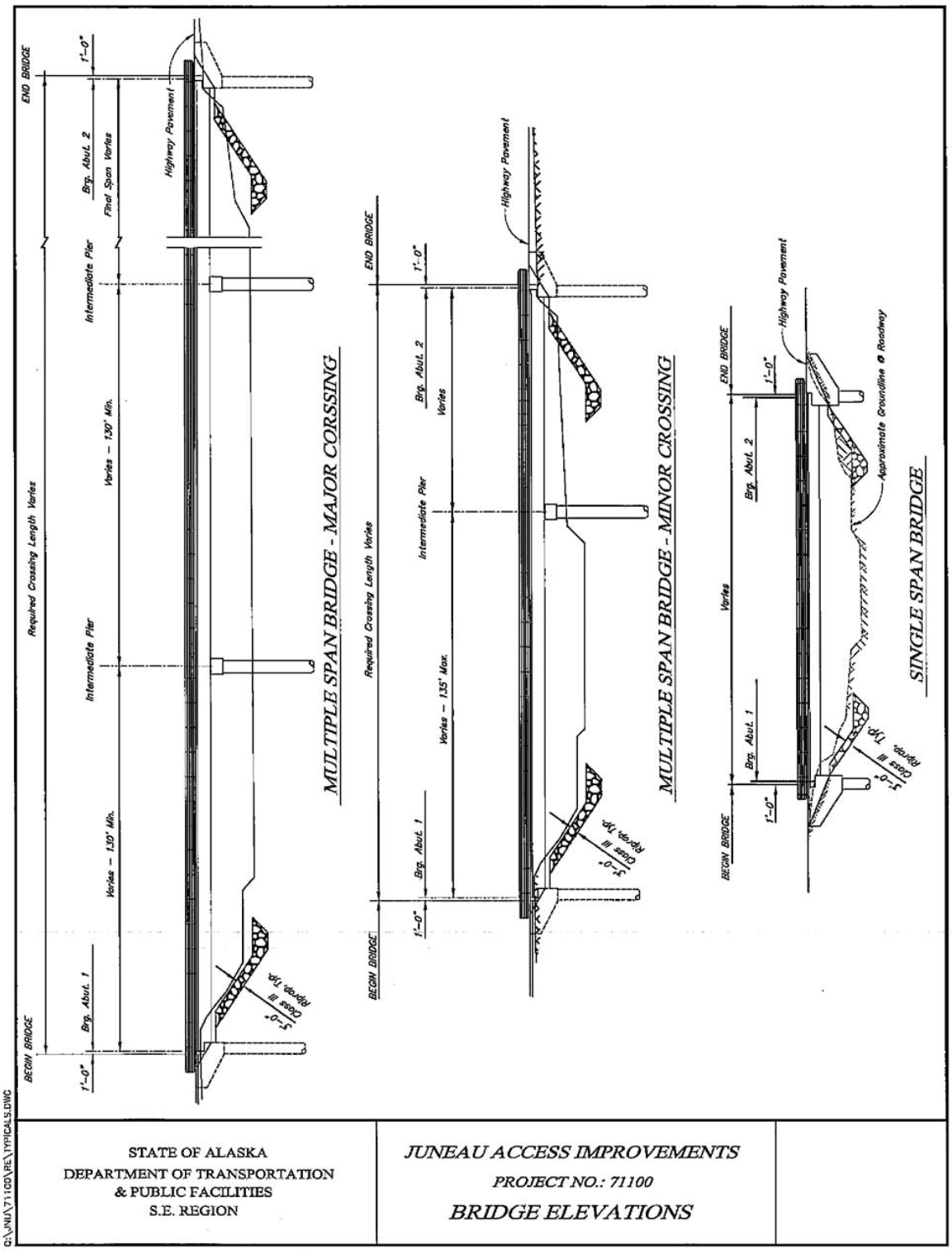

Figure 3-7: Bridge Elevations

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Table 3-2: East Lynn Canal Snow Avalanche Summary

ID	Station	ID	Station
LC001	353+50	LC020	2102+65
LC002	1490+68	LC021	2114+62
LC003	1514+45	LC022	2122+86
LC003-1	1517+42	LC023	2128+85
LC004	1629+60	LC024	2140+96
LC005	1678+60	LC025	2282+59
LC005-1	1692+00	LC026	2294+14
LC006	1704+50	LC026-1	2308+00
LC007	1721+25	LC027	2311+00
LC008	1733+70	LC028	2321+34
LC009	1748+30	LC028-1	2328+33
LC010	1752+82	LC028-2	2331+98
LC011	1757+83	LC029	2338+67
LC001	353+50	LC020	2102+65
LC002	1490+68	LC021	2114+62
LC003	1514+45	LC022	2122+86
LC003-1	1517+42	LC023	2128+85
LC004	1629+60	LC024	2140+96
LC005	1678+60	LC025	2282+59
LC005-1	1692+00	LC026	2294+14
LC006	1704+50	LC026-1	2308+00
LC007	1721+25	LC027	2311+00

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3.4 Maintenance and Operational Requirements

Revised highway maintenance cost estimates are included in Attachment C.

3.5 Marine Terminal Plans and Costs

Revised marine terminal plans and cost updates are included in Attachment D.

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4. Highway Costs

4.1 Engineer's Estimate Discussion

The engineer's estimates for Alternatives 2B, 3, 4B, and 4D highway segments have been updated to reflect current layouts, quantities, and unit prices for construction year 2012; see Attachment E. The estimates for Alternatives 2B and 3 were also updated to include camp costs, which were not included in the original estimates in the 2006 FEIS and but were identified as necessary in the subsequent 2009 cost report. Adjustments have also been made to costs related to preliminary development, mitigation, right of way, maintenance building, and avalanche control Capital Improvement Plan (CIP). Right of way, maintenance building, and avalanche control CIP only apply to Alternatives 2B and 3. The M&O facility estimates are based on costs for similar recently constructed facilities. The Indirect Cost Allocation Plan (ICAP) rate has also increased from 4.66 percent used in the 2009 cost report to 4.79 percent for Alternative 2B and from 4.3 percent used in the 2006 FEIS to 4.79 percent for Alternatives 3, 4B and 4D.

Unit prices were updated to reflect inflation costs from year 2008 to year 2012. The 2009 cost report included unit prices from the 2008 construction year for Alternative 2B only. The inflation rate was obtained by comparing the Construction Cost Indices for years 2008 and 2012 provided by the Washington State Department of Transportation. This resulted in an inflation rate of 8.3% over the 4-year period. The unit prices in the 2009 cost report were updated based on this inflation rate and the resulting unit prices were also applied to Alternatives 3, 4B, and 4D.

Additional field reconnaissance and data on debris flows, avalanche areas, talus fields, and wildlife undercrossings since the 2006 FEIS has increased the number and magnitude of bridges required to pass these areas. These improvements are included in the Alternative 2B estimate. Avalanche sheds were also added to this alternative to mitigate high hazard avalanche zones. The estimate for the sheds was based on a comparison with other recently planned and/or constructed snow sheds, including the Snoqualmie Pass area in the State of Washington. Applying an average unit cost of $17 thousand per lineal foot to the three avalanche sheds briefly discussed in Section 3.3 yields a cost of approximately $25.5 million. This cost is included in the updated estimate for Alternative 2B.

The preceding improvements are exclusive to the northern 28-mile segment of Alternative 2B, which was in the Final Design Phase until it was determined a supplemental EIS was required. Given the fact that more detailed information is available for this segment, and additional costs have been identified and included in the estimate, the construction contingency for this segment was reduced from 15 percent to 10 percent in the current estimate. The contingency is still higher than other Alternative 2B segments, in part to address potential higher costs for new bridge crossings at active debris flows. Geotechnical investigation identified locations that may require special design that could result in higher construction costs.

The contingency for all other segments within this alternative remains at 5 percent, which was the original contingency contained within the 2009 cost report.

The construction contingency for the West Lynn Canal portion of Alternative 3 has been set at 30 percent, due to the much more limited data available for this road segment. However, the

segment on the east side of Lynn Canal has a construction contingency of 5 percent, which is consistent with the other alternatives that include this segment.