

**Juneau Access Improvements
2009 FFY Cost Report**

July, 2009

**State Project No.: 71100
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Introduction

The Alaska Department of Transportation and Public Facilities (DOT&PF) prepared a Juneau Access Improvements Project Initial Financial Plan in March 2006 to satisfy the requirement for \$100-500 million projects established in the Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). This plan was based on the April 2006 Federal Highway Administration (FHWA) Record of Decision (ROD) which selected Alternative 2B, East Lynn Canal Highway to Katzehin with shuttles to Haines and Skagway, as the proposed action. The selected alternative would construct a 50.8 mile highway from the end of Glacier Highway at Echo Cove around Berners Bay to Katzehin, construct a ferry terminal at the end of the new highway, and run shuttle ferries to both Haines and Skagway from the Katzehin Ferry Terminal.

The FHWA ROD and the US Department of Agriculture Forest Service (USFS) non-objection to right-of-way appropriation were challenged in the United States District Court for the District of Alaska by Southeast Alaska Conservation Council, et al. on August 16, 2006. Briefing on the merits of the complaint was not concluded until June 30, 2008. A 2007 Financial Plan Update was prepared in October 2007 in accordance with the Federal Highway Administration (FHWA) March 22, 2007 Guidance, however little additional design work occurred as the project was put on hold pending the outcome of the litigation.

DOT&PF began preparing a 2008 Update in October of 2008 by conducting a new Unit Price Analysis. DOT&PF and FHWA recognized that a new cost estimate would have marginal value if based on a preliminary alignment that was inconsistent with the latest geotechnical information for the project. Therefore DOT&PF and FHWA agreed to delay the 2008 Update (for Federal Fiscal Year 2009) until early 2009 so that design work sessions could be held with DOT&PF engineers and geologists and the consultant team that prepared the Zone 4 (see Attachment A, Zone map) geology report. These work sessions were held in November and December 2008 and resulted in a new Zone 4 preliminary alignment that was consistent with the known surface geology data. This alignment was used to develop the February 2009 DOT&PF cost estimate included in this report.

In October 2008 DOT&PF decided that it would be beneficial to obtain an independent cost estimate for the highway portion of the project, to be included in the new Financial Plan Update.

An independent estimate would address the request from several state legislators as well as members of the public who expressed concern that the highway, particularly Zone 4, could cost much more than DOT&PF has estimated. The independent estimate would be based on the DOT&PF preliminary alignment and the preparers of the independent estimate would be given the DOT&PF plans, specifications, and quantity estimates, but the latest DOT&PF cost estimates would not be made available. For that reason the DOT&PF estimate completed in February was held until the independent estimate was completed and both are being released as attachments to this report.

On February 13, 2009 the Alaska District Court issued an Order and Opinion concluding the Juneau Access Improvements Project FEIS was inadequate because it did not evaluate an alternative that improved transportation in Lynn Canal solely through the increased use of existing assets. On March 3, 2009 the District Court issued a Judgment vacating the ROD. Although the Court action setting aside the ROD negated the SAFETEA-LU requirement for a Financial Plan update, FHWA and DOT&PF determined that the independent cost effort should continue and both estimates should be released in a cost estimate report.

On June 4, 2009 the State of Alaska filed a Notice of Appeal with the District Court, appealing the District Court Judgment to the Ninth Circuit Court of Appeals. The following day FHWA and the USFS filed a similar Notice of Appeal.

1. Cost Estimate

With the exception of Zone 4 work described below, little additional design work has been completed on the project since the release of the 2007 Financial Plan Update. DOT&PF had elected to place design and related geotechnical work on hold pending the outcome of the lawsuit. For Zones 1 through 3 and Zone 5, the unit quantities for the 2009 cost estimate are based on the same Lynn Canal Highway design documents detailed in the 2007 Update with only minor revisions. The unit prices have been revised to reflect the most recent applicable cost information (See Attachments B and C).

The 2007 preliminary alignment for Zone 4 has been revised in response to geologic conditions identified in the December 2006 Phase 1 Zone 4 Geotechnical Investigation by Golder Associates. A team of DOT&PF engineers and geologists worked with Golder staff in November and December 2008 and adjusted the alignment to address remaining major stability and hazard issues. The resulting alignment and quantity estimates include changes to retaining walls, more bridge structures, and the addition of two short tunnel segments. To address the potential for increased cost due to unknowns, the estimate now contains a stand alone contingency item for each zone in addition to potential contingency amounts contained within major bid items due to cost comparison differences. Also, the Vessel Design and Construction Cost item now includes a single shuttle, rather than two, as explained below.

The current updated estimate for Alternative 2B, for costs to be incurred after September 30, 2008 is as follows:

Highway Design Engineering	\$14,500,000
Mitigation	900,000
ROW Acquisition	1,500,000
Highway ICAP (4.66%)	16,200,000
Highway Construction Engineering (6.0%)	19,700,000
Avalanche CIP	3,200,000
Maintenance Building	1,100,000
Highway Construction	327,700,000
Katzehin Ferry Terminal	17,000,000
Vessel Design & Construction	13,400,000
SUBTOTAL	415,200,000
Contingency	34,100,000
FFY 2009 ESTIMATED COMPLETION COST	\$449,300,000

Total project costs, including approximately \$25.2 million spent to date for preliminary design, EIS preparation, mitigation, litigation, and final design, are now estimated at \$474 million.

Changes from 2007 estimate by Zone

The Zone starting and ending points for the 2009 estimate are the same as described for the 2007 Update, as shown below. The location and mile points for each Zone are shown on Attachment A.

Zone Descriptions:

Zone 1: Echo Cove to Antler Slough

Zone 2: Berners Bay Crossing

Zone 3: Lace River to Sweeny Creek

Zone 4: Sweeny Creek to Katzehin River

Zone 5: Katzehin River to Katzehin Ferry Terminal

The current construction cost estimate for each zone, including contingency, are shown below with 2007 Update figures for comparison.

<u>Zone</u>	<u>FFY 2009 Update</u>	<u>2007 Update</u>
Zone 1	\$ 43,000,000	\$ 29,400,000
Zone 2	65,000,000	50,200,000
Zone 3	33,100,000	21,600,000
Zone 4*	228,500,000	127,000,000
Zone 5 Highway	33,800,000	24,400,000
Katzehin Ferry Terminal	17,000,000	16,000,000
Shuttle Ferries	13,400,000	65,000,000
Total Construction	\$ 433,800,000	\$ 333,600,000

*Zone 4 FFY 2009 Update includes \$1.5 million for right-of-way acquisition at Comet, \$1.1 million for a maintenance building and rest stop to be constructed at Comet, and \$3.2 million for avalanche program capital costs.

The change in costs for Zones 1-3 and 5 are due primarily to increases in unit prices (cost inflation) captured by an October 2008 price analysis of recent bids but also reflect inclusion of a five percent contingency for each zone. The Zone 4 estimated cost reflects the recent period (2007-08) of high inflation in construction costs but also the inclusion of additional bridges,

retaining walls, and tunnel segments that were added to the preliminary design in 2008. Also, to address the more preliminary nature of the design for Zone 4 combined with the more complex geology, a contingency was set at 15 percent.

The construction cost of the Katzehin ferry terminal, the Comet rest stop/ maintenance facility, and the avalanche control equipment were all adjusted for inflation. No additional design work has been conducted for these project elements.

The number of project specific shuttles included in the estimate has changed. The Final Environmental Impact Statement (FEIS) estimated that two new shuttles would be required for the East Lynn Canal Highway alternative (in addition to the M/V Aurora), as other existing vessels that could become available, such as the M/V Malaspina, would not function efficiently as short run shuttles. The Katzehin-Skagway shuttle would have a 53-vehicle capacity, while the Haines-Skagway shuttle would have a 16-vehicle capacity. Consequently the 2006 and 2007 project cost estimates included the cost of these two new ferries.

Currently the Alaska Marine Highway System (AMHS) vessel replacement plan calls for a total of three identical 60-vehicle vessels to replace both the Malaspina and the Taku. In the summer one shuttle would operate on the Ketchikan-Prince Rupert run and two would operate in Lynn Canal; in the event of a breakdown two vessels could still cover the two runs. In winter only one of these vessels would operate in Lynn Canal as each shuttle is rotated into winter layup. When the East Lynn Canal Highway is constructed the Lynn Canal vessels would provide service first to Slate Cove and ultimately to the Katzehin terminal. Because existing vessels will be replaced as Lynn Canal shuttles independent of the Juneau Access project (and have features not required by this project in order to be able to function in other areas), the replacement costs are not included in the cost to complete the East Lynn Canal Highway project. Therefore this estimate only includes the cost of the small Haines/Skagway shuttle, adjusted for inflation in steel vessel construction costs.

2. WFLHD Independent Cost Estimate

In order to obtain an independent assessment of the probable cost of the highway portion of the project, DOT&PF developed a work agreement with the Western Federal Lands Highway Division (WFLHD) of the FHWA. This Division is separate from the Alaskan Division of the FHWA and has had no previous involvement with the project. WFLHD designs and constructs transportation projects on federal lands in the northwestern states, including roads in National Parks and in the National Forest. As such they have extensive experience in constructing remote roads in Alaska and have both in-house staff and consultant teams with road and bridge design and construction experience.

WFLHD utilized an existing WFLHD contract with the engineering firm David Evans and Associates, Inc. (DEA), including some of its construction subcontractors, to obtain a contractor's perspective on the cost of highway construction. The DEA assessment resulted in an estimated construction cost for Zones 1-3 and a project approach with risk identification for Zones 4-5. WFLHD then did a cost per mile cost estimate for Zones 4-5 and set a contingency percentage for these two zones based on topography, geology, and level of current design. WFLHD's analysis of the cost of highway construction, including DEA's contractor based assessment, is included as Attachment D of this report.

WFLHD estimates the construction cost of Zones 1-3 to be \$153.3 million, including a 5 percent contingency. They estimate the construction cost of Zones 4-5 at \$249.3 million, including a 30 percent contingency. Based on these estimates the total cost of highway construction contracts would be \$402.6 million. As with the DOT&PF estimate, construction engineering and inspection costs (CE), as well as Indirect Cost Allocation Plan (ICAP) costs, can then be calculated using standard percentages for the project. The resulting costs to complete the entire project, based on WFLHD's highway cost estimate, are shown on the following page.

Highway Design Engineering*	\$14,500,000
Mitigation*	900,000
ROW Acquisition*	1,500,000
Highway ICAP (4.66%)	16,700,000
Highway CE (6.0%)	20,300,000
Avalanche CIP*	3,200,000
Maintenance Building*	1,100,000
Highway Construction	337,800,000
Katzehin Ferry Terminal*	17,000,000
Vessel Design & Construction*	13,400,000
SUBTOTAL	426,400,000
Contingency	64,800,000
FFY 2009 ESTIMATED COMPLETION COST	\$491,200,000

*non-highway costs supplied by DOT&PF

3. Estimate Similarities and Differences

In general, the WFLHD estimate corroborates the DOT&PF estimate as it is within nine percent of it. While differences in individual unit items are to be expected due to the differences in estimate methods, in most areas the differences are not significant. The DOT&PF estimate is based on unit price analysis, which relies on actual past bids submitted for specific items required to complete highway construction projects. This method does not anticipate future price changes, and adjustments to the past unit price data to account for different construction conditions (e.g. more difficult access, remote location, greater quantities) are necessarily subjective. The WFLHD Zone 1-3 costs are based on a likely contractor's bid, which involves calculating the costs of materials, shipping, labor, fuel, equipment, and profit. This provides a single contractor's assessment of probable costs, and often identifies project specific

parameters that affect costs. However, as a single contractor's perspective, it does not fully capture the cost suppressing effect of competitive bidding. The WFLHD costs for Zones 4-5 are based on costs per mile incurred on similar projects. This approach acknowledges the lower level of design information but cannot capture all the information currently known and therefore a larger contingency is required.

A side by side comparison of zone costs, including contingency, ICAP, and CE but no right-of-way, avalanche capital or maintenance station costs, is shown below.

<u>Zones</u>	<u>DOT&PF Estimate</u>	<u>WFLHD Estimate</u>
Zones 1-3	\$ 141,100,000	\$ 169,300,000
Zones 4-5	256,600,000	270,300,000
Total Highway Construction Cost	\$ 397,700,000	\$ 439,600,000

This comparison shows that while the WFLHD estimate for Zones 4-5 is within 5 percent of DOT&PF's estimate, the Zone 1-3 estimate is 20 percent higher than the DOT&PF estimate. The small percentage difference between the Zones 4-5 estimates is the result of WFLHD's use of a higher contingency percentage (30%) than that used by DOT&PF (15%). This is not true of the Zone 1-3 estimates; both use a five percent contingency based on the relatively complete nature of the plans and less complex geology of this segment.

A comparison of the individual unit price estimates for Zones 1-3 indicates that much of the \$28.2 million difference between the zone totals is due to estimated bridge costs and the inclusion of camp costs in the WFLHD estimate. The bridge girder items 501(7A-C) account for \$6.9 million of the estimate difference. Temporary work bridges for the Lace and Antler river bridges (identified as stand-alone costs in the WFLHD estimate for clarity) account for another \$6.1 million. Camp and per diem costs identified in the WFLHD estimate account for \$14.4 million of the difference.

4. Conclusion

The two 2009 estimates of total costs to complete the project are \$449 million and \$491 million. The resulting \$42 million difference between the two estimates is within ten percent of either estimate. DOT&PF Southeast Region staff reviewed the WFLHD independent estimate and found no fatal flaws, nor anything that would indicate that the DOT&PF estimate had a fatal flaw. Furthermore, a combination of information from both estimates would likely result in an estimate close to the middle of the range. The DOT&PF estimating team agrees that WFLHD has identified some costs that the DOT&PF estimate may not have adequately captured, which could raise the overall DOT&PF estimate. Conversely, there are unit items where the DOT&PF team believes its estimate may have the more likely unit costs, which could lower the WFLHD estimate. Two specific instances are discussed below.

The current DOT&PF estimate does not identify stand alone camp costs for any of the project zones. For Zones 1-3 this was based in part on the fact that the construction project could be developed primarily from the Glacier Highway end with workers housed on the road system. (The current Alaska Department of Labor and Workforce Development policy does not require meals and lodging or per diem for workers that were living within 65 road miles of the project midpoint for a year before the project began.) For all zones DOT&PF estimators considered that camp costs would be offset, and therefore covered within certain unit prices, by the economy of scale for many of the unit items. Through WFLHD's contractor bidding approach it is clear that for at least Zones 3 and 4, a camp would be necessary for efficient construction, and camp costs would not be inconsequential. Therefore DOT&PF recognizes that camp costs of several million dollars should be identified within future estimates for these zones.

On the other hand, DOT&PF bridge engineers believe that the WFLHD estimated costs for constructing the Lace and Antler river bridges are too high based on recent prices paid for similar bridge construction throughout the state (see Attachment E, DOT&PF Bridge Cost Analysis Memorandum). Normally DOT&PF does not pay for temporary work bridges as a separate item, although most multi span bridges require them. The contractor puts the cost of a temporary work bridge within the bridge unit bid prices. Therefore, the bridge unit prices used in DOT&PF's unit price analysis already have temporary bridge costs included. As explained in the attached bridge memorandum, bridge girder prices seem too high in the WFLDH estimate,

even with the temporary bridge costs separated out. While the Lace and Antler bridge sites are not on the current road system, they are less remote than some of the bridge projects considered in the unit price analysis. Based on years of experience with bridges throughout the state, the DOT&PF Bridge Section does not believe these bridges would be uniquely difficult to construct. Therefore the overall Lace and Antler bridge prices in the independent estimate may not be representative of competitive bid prices.

The purpose of this report is to provide FHWA and the public the latest information on the likely capital cost of the East Lynn Canal Highway and Katzehin shuttle system. Until a new or reinstated ROD is in place, there is no requirement for a single official estimate of the cost to complete the project. In the interim the cost can be stated as a range of \$449 million to \$491 million created by the two estimates. For those desiring a single estimate number, the midpoint of \$470 million is reasonable at this time.

ATTACHMENT A

ZONE LOCATIONS AND MILE POINTS

ATTACHMENT B

UPDATED ENGINEER'S ESTIMATE

ATTACHMENT C
UPDATED ENGINEER'S ESTIMATE -- UNIT PRICE ANALYSIS

ATTACHMENT D
WFLHD INDEPENDENT ESTIMATE OF HIGHWAY COSTS

ATTACHMENT E

DOT&PF BRIDGE COST ANALYSIS MEMORANDUM