

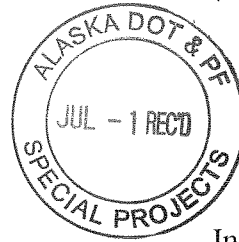


U.S. Department  
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**Federal Highway  
Administration**

**Western Federal Lands Highway Division**

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June 25, 2009



Mr. Reuben Yost, Juneau Access Project Manager

In Reply Refer To: HFL-  
#28063L\_MST

Dear Mr. Yost:

Independent Cost Assessment of the Juneau Access Project  
AK STA 2009(1)

## **Background**

Western Federal Lands Highway Division (WFLHD) has been requested by Alaska Department of Transportation to perform an independent construction cost estimate. This independent estimate is intended to provide a reasonable forecast of what WFLHD would estimate for this project in 2009 dollars. The East Lynn Canal Highway, also known as the Juneau Access Improvements Project, has been broken into five zones and is described in the Financial Plan 2007 Annual Update prepared by Alaska Department of Transportation and Public Facilities (AKDOT & PF) as follows:

“The April 2006 FHWA ROD for the Juneau Access Improvements Project selected Alternative 2B, East Lynn Cannel Highway to Katzehin with shuttle to Haines and Skagway as the proposed action. This alternative will construct a 50.8 mile highway from the end of the existing 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.”

In an effort to better analyze the cost of the whole project for planning purposes, the AKDOT&PF has decided that it would be advantageous to prepare an independent construction cost estimate. The costs related to the risks on the project will be addressed separately as a contingency for the project, not in the unit prices.

## **Approach**

WFL has retained the services of David Evans and Associates (DEA) with subconsultants Aadland Evans Contractors LLC (AECI) and Elting NW (Elting) to perform this independent estimate of Zones 1, 2, and 3 with a narrative assessment being performed on Zones 4 and 5. The method used for estimating Zones 1, 2 and 3 cost is from a contractor bidding perspective and bid tab data is only used where pricing can't be determined. WFL with the DEA Team additionally provided a contractor based narrative assessment of Zones 4 and 5, but cost is

forecasted based on per mile cost perspective. WFL elected to use national data of similar large scale projects, other large similar terrain planning projects in SE Alaska, and recently completed projects by WFL within the five state regions our office manages to provide a forecasted estimate on Zones 4 and 5, given that Zones 4 and 5 are in an early development level of completeness. The DEA Team independent cost assessment and narrative assessments for both forecasted construction packages are attached. WFL developed (for some cost driver items-see below) an additional independent bid tab assessment to verify the estimate provided by the DEA team (zones 1, 2, & 3) is within reason.

### **Zones 1, 2, and 3 WFL Consultant Validation Findings**

WFLHD has evaluated many items from the DEA team estimate that had an item total price above \$3,000,000 through a bid tab verification process. This included the following items:

<b>Item Number</b>	<b>Item Description</b>
203 (2)	Rock Excavation
203 (3)	Unclassified Excavation
401 (2)	Asphalt Cement, Grade 58-28
501 (1)	Class A Concrete
501 (2)	Class A-A Concrete
501 (7B)	Precast Concrete Member (143' Decked Bulb Tee)
503 (1)	Reinforcing Steel
504 (2)	Structural Steel
507 (1)	Steel Bridge Railing
511 (1)	Mechanically Stabilized Earth Wall
640 (1)	Mobilization And Demobilization
642 (1)	Construction Surveying

In researching these items on a bid tab basis, three different data sets were researched; 1) Projects within Alaska and contracted by WFL, 2) Any projects within WFL (average unit price found), 3) Large projects within the Federal Highway System nationwide. These sources provided a reasonable cross section for pricing and a basis for comparison for the unit price data generated by DEA. After the information was generated, each item was compared in depth to the DEA pricing (zones 1, 2, & 3) to verify if there were any differences and why those differences occurred.

Item Number and Description	Unit	Unit Costs	
		WFL	DEA
203(2) Rock Excavation	CY	\$ 12.50	\$ 12.03
203(3) Unclassified Excavation	CY	\$ 9.00	\$ 4.12
401(2) Asphalt Cement, Grade 58-28	T	\$ 641.00	\$ 691.56
501(1) Class A Concrete	CY*	\$ 1,200.00	\$ 926.33
501(2) Class A-A Concrete	CY*	\$ 1,600.00	\$ 1249.98
501(7B) Precast Concrete Member (143' Decked Bulb Tee)	LF	\$ 750.00	\$ 674.94
503(1) Reinforcing Steel	LB	\$ 1.85	\$ 1.72
504(2) Structural Steel	LB	\$ 3.00	\$ 2.90
507(1) Steel Bridge Railing	LF	\$ 180.00	\$ 181.76
511(1) Mechanically Stabilized Earth Wall	SF**	\$ 72.00	\$ 85.15
640(1) Mobilization And Demobilization	LS	\$13,000,000.00	\$10,790,670.33
642(1) Construction Surveying	LS	\$ 3,250,000.00	\$ 3,944,475.38

\* Lump sum converted to cubic yard

\*\* Costs is for MSE with welded wire face

### **203(2) Rock Excavation** – Rock that cannot be excavated without blasting or ripping.

This item is defined by AKDOT&PF Standard Specifications for Highway Construction as 'Rock that cannot be excavated without blasting or ripping.' The item WFLHD used in this case assumed blasting was required; as a result WFL costs are significantly higher. In developing the WFL estimate, roadway excavation unit prices were used (+40% for possible ripping and location) because the description of work better matched the AKDOT&PF work description. WFL unit prices for this item ranged from \$4.50/cy to \$16.00/cy with an average of \$12.50/cy.

- o Cost Increase - \$840,000

### **203(3) Unclassified Excavation** – All materials of whatever character encountered in the work. May include rock, common, or muck.

This item is similar to the FP-03 Section 204 Excavation and Embankment definition of Unclassified Borrow. WFL estimates for similar items have assumed an average haul of 15 to 20 miles. This could account for the increase in cost if waste sites are readily available in segments 1, 2 and 3. WFL prices have averaged out to about \$9/cy.

- o Cost Increase - \$3,840,000

**401(2) Asphalt Cement – Grade 58-28**

In today's economy, asphalt cement is a product with volatile prices. The current price WFLHD is using is \$641 per ton. Comparing this to Alaska Asphalt Material Price Index seems to indicate that prices are increasing. The WFLHD price is a combined total from the quotes given for the asphalt binder by US Oil in Tacoma, WA and shipping rates by Alaska Marine Lines.

- Cost Reduction - \$265,000

**501(1) Class A Concrete – Reinforced and non-reinforced concrete structures**

These items consist of work that furnishes, places, finishes and cures concrete. WFL had three projects in the last three years that had quantities ranging from 70 cy to 664 cy. In addition, unit prices were pulled from other Federal Lands projects; these unit prices ranged from \$800/cy to \$1600/cy with the average being \$1200/cy.

- Cost Increase - \$2,265,000

**501(2) Class AA Concrete – Cast-in-place bridge decks**

This item was compared to Concrete Class C(AE) that Federal Lands would typically use. The unit prices pulled were from Federal Lands projects in California and Colorado. These quantities ranged from 4 cy to 105 cy. The unit prices ranged from \$400/cy to \$2800/cy with the average being \$1600/cy. Given the small amount of concrete the estimate was weighted to reduce the unit cost. Average price used = \$1600/cy.

- Cost Increase - \$350,000

**501(7 B) Precast Concrete Member (143' Decked Bulb Tee)**

This cost also differed between WFL and DEA. WFL bid results on similar girders are between \$570 and \$1300/lf. The \$1000/lf cost was on a small project with reasonable access and the low of \$570/lf was on a larger scale project with more difficult access. Based on our understanding of the proposed project, WFL would estimate the per lf girder cost at \$750/lf

- Cost Increase - \$2,450,000

**503(1) Reinforcing Steel**

WFL had unit prices ranging from \$0.68/lb to \$12.00/lb (WFL Project AK PFH 40(3) Slo Duc Bridge-constructed in 2008 in Kake SE Alaska) with an average coming in at \$2.12/lb. Taking into consideration the location and the quantity, the average unit price would be \$1.85/lb.

- Cost Increase - \$190,000

#### **504(2) Structural Steel**

WFL had unit prices ranging from \$2.11/lb to \$5.36/lb with an average coming in at \$3.00/lb. WFL quantities were limited to 3 bridges in the last 3 years.

- Cost Increase - \$127,000

#### **507(1) Steel Bridge Railing**

WFL had unit prices ranging from \$85.50/lf to \$500/lf with an average coming in at \$180/lf. WFL quantities were from several projects in Alaska that consisted of only one bridge and several multi-bridge projects in Idaho.

- Cost Reduction - \$25,000

#### **511(1) Mechanically Stabilized Earth Wall**

WFL and Federal Lands has data for Hilfiker type (welded wire faced MSE walls) and unit cost on the low end was approximately \$40/sf and up to \$110/sf on the high end. The average yielded a unit price of \$72/sf. If the project walls are anticipated to be concrete faced, the cost would be higher than that of the welded wire walls by approximately 25% (\$90/lf).

- Cost Reduction - \$295,000

#### **640(1) – Mobilization and Demobilization**

WFL has found on our SE Alaska Projects that mobilization costs are 10% of the construction item total. This however doesn't reflect large (> \$100million) which might require larger contractor overhead, and camp development costs. WFL would estimate the project mobilization amount at \$13,000,000.

- Cost Increase - \$2,210,000

#### **642(1) – Construction Surveying**

WFL has found on our SE Alaska project that surveying costs are running 2.5% of the cost of the construction. This would amount to approximately \$3,250,000.

- Cost Reduction - \$695,000

The total from WFL would show an increase to the DEA bid items of approximately \$11,000,000. If WFLHD were to estimate these zones as one contract, we would increase the DEA Team price for Zones 1, 2 and 3 by the \$11M, but our verification process was limited to a few items and didn't assess camp costs, length of the contract, etc. The unit price analysis did not reveal any substantial discrepancies therefore we recommend using the DEA Team independent estimate number.

## Zones 4 and 5 Cost Forecast Development

WFL with its consultant team (DEA team) conducted in an in-depth assessment of the plans and reports prepared for Zones 4 and 5. Based on this review an assessment was develop which describes issues, concerns, and opportunities for what our team observed as well as suggesting how WFL would cost a project in similar terrain and level of completeness. For this WFL elected to use national data of similar large scale projects, other large similar terrain planning projects in WFL is developing in SE Alaska, and recently completed projects by WFL within the five state regions our office manages to provide a forecasted estimate on Zones 4 and 5.

### ➤ *Comparison of Similar Contract Dollar Road Project*

WFL gathered two similar Federal Lands construction contracts for comparisons. The first project is Hoover Dam By-Pass and the second was the Saddle Road Highway on the Big Island of Hawaii. A third project was researched, the Woodrow Wilson Bridge Rehabilitation. This project was selected due to the same type of piling used ( 48" dia with 1" wall thickness) and \$100 million dollar contract value. Each project had an Engineers Estimate over \$100 million in expected value.

The design teams were interviewed on the first two projects to see how bid prices were determined and to see what type of range of bid prices were received from contractors for this dollar value contract.

<i>Project</i>	<i>Eng Est</i>	<i>Low</i>	<i>Range</i>
Hoover Dam By-Pass	\$106M	\$123M	\$123M-\$165M or 16% to 56% High
Saddle Road Hawaii	\$72M	\$87M	\$87-\$95M; 21% - 32% High
Woodrow Wilson	unavailable	\$125M	\$125M-\$187M 50% Range

The first two projects employed bid tab assessment with market research to determine the engineers estimate. Both project teams felt comfortable with the pricing developed, believed they have managed the risk by supplementing the higher risk items with market research and did do reasonably well with the forecast compared to the low bid. When compared to the average bidder's costs, the agencies numbers were underestimated by applying bid tab numbers from smaller contract with similar work efforts. Although this information doesn't factor directly into a suggested cost per mile forecast, it does provide insight that, as the design effort is furthered, expanding beyond bid tab assessment to better capture large scale project costs would be beneficial.

➤ *Similar Geographically Located Planning Cost Estimates for a Two-Lane Paved facility*

The Bradfield Planning Project or SE AK Mid Region Access Study has recently completed planning level estimates for a variety of routes which have similar terrain and project length to the Juneau Access Project. We have summarized the cost on a per mile basis for a global assessment.

Corridor	Cost	Length	Cost/Mile
Bradfield Alignment w/Duck Pt segment	\$718,000,000	112 miles	\$6.4M/mile* \$12M/mile*
Aaron Creek Alignment	\$1,055,000,000	143 miles	\$7.4M/mile*
Stikine River Alignment	\$1,141,000,000	173 miles	\$6.6M/mile*

\*w/25% contingency

➤ *Similar Geographically Located Completed Roadway Project for a Two-Lane Paved facility*

WFL recently completed a multi-year project on Prince of Whales Islands called the Coffman Cove Road. Construction for this project began in 2004 and was completed in 2008. It was advertised in multiple phases with different contractors completing the work for each phase. This project scope was to re-build an existing logging road to a 2 lane paved road through rock cuts, muskeg bogs, and over fish streams. Access to the project was limited but was sufficient to allow all necessary field investigation to take place prior to advertisement of contract packages. The completed project including contract growth was approximately \$3M/mile.

➤ Constructor Work up estimating ( DEA team work effort)

See "DEA Final Report Dated June 18th, 2009"

Zones 1, 2 and 3 Average Cost per mile = \$6.1M/mile

WFL review of the completed plans to date, combined with similar on-going planning level estimates, and utilizing the DEA Team assessment (Zones 4 & 5) and cost per mile for Zones 1, 2, and 3 leads WFL to suggest a reasonable price to assume for forecasting a project (Zones 4 & 5) of this magnitude, length, features, and terrain would be \$7 M/mile.

### **Contingency Factor Suggestions**

WFL Project Design Development Manual (PDDM) defines WFL policy for contingency of project at various phases of development. WFL team has studied the plans as compared to plan packages our office routinely advertises, for all zones and made the following assessment:

Project	Suggested Contingency
➤ Zones 1, 2 , and 3	5%
➤ Zone 4 and 5	30%

## Conclusions

Based on our research both through bid tabs and national research, the DEA estimate for zones 1, 2 and 3 appears to be within a reasonable range of the anticipated cost. Some of the individual items may be either high or low, but the overall cost was reasonable given the situation with large bonding requirement, remote location, multi-year construction and recent bidding trends on major projects. Some overall reductions in cost could be applied from WFL Bid Tab and similar in-kind project research, and if the project were bid this year, WFL is seeing bids 15% on average lower than the engineers estimate. This is due to the current economic environment and through direct discussion with Associated General Contractor organization they anticipate that these trends will continue, returning to past levels once the economy has fully recovered. WFL estimated cost with contingency for Zones 1, 2, and 3 is \$153.3 million

The DEA team provided a written assessment of issues and opportunities for Zone 4 and 5. The Zone 4 and 5 project includes many logistical concerns still to be address by AKDOT, but in researching similar projects throughout the country and the FWHA system, the maximum costs that could be found for non-bridge only projects were around 7.2 million per mile on average (specifically for the Bradfield alignment). The Bradfield only has a 1/3 of the bridges as Zone 4, no avalanche structures estimated, but has 80% more tunnel. One segment (dropped from further study) of the Bradfield did extend south to Duck Point; this segment is more extreme than Zone 4 and follows the coast line. This segment's cost per mile is \$12.5M/mile with a 25% contingency applied. Without more certain plans, staging, bridge design, tunnel designs, material development, retaining wall assessments, geotechnical investigation we have determined that the Zone 4 and 5 construction cost should be forecasted at \$9.1 million per mile (7.0 million per mile with a 30% contingency factor applied) until more time is invested to optimize and investigate the alignment. Therefore the forecasted cost for Zones 4 and 5 is \$249.3 million.

Total cost for all zones with contingency estimated by WFLHD is \$402.6 million if the entire project was bid and awarded in 2009. Note that this is an estimated construction contract cost; no DOT&PF construction engineering (CE) or indirect cost allocation plan (ICAP) costs have been included. Should you have any questions or comments, please don't hesitate to contact me at 360-619-7787.

Sincerely yours,



Michael S. Traffalis  
Project Manager

Enclosures: WFLHD Backup Development Notebook- 1 copy  
DEA Final Report Volume 1 dated June 24<sup>th</sup>, 2009- 3 copies  
DEA Final Report Volume 2 dated June 18<sup>th</sup>, 2009- 3 copies