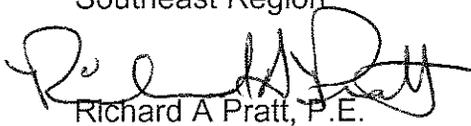


MEMORANDUM

State of Alaska

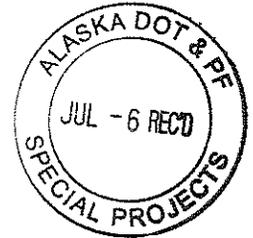
Department of Transportation & Public Facilities
Statewide Design & Engineering Services Division /Bridge Section

TO: Reuben Yost
Project Manager
Southeast Region

FROM: 
Richard A Pratt, P.E.
Chief Bridge Engineer

DATE: June 30, 2009

BRIDGE NO: 2162-2171
TELEPHONE NO: 465-2975
FAX NUMBER: 465-6947
TEXT: 465-3652
TELEPHONE:



CONTACT: Elmer E. Marx, P.E.
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RE: Lynn Canal Highway /
Juneau Access Road
Zones 1, 2 and 3

SUBJECT: Pay Item 501(7) Precast
Concrete Member cost
estimate

The Alaska DOT&PF Bridge Section prepares plans, specifications and cost estimates (PS&E) for bridge related projects throughout the state. The Bridge Section has a complete collection of the historic unit bid price data for bridge projects. Bridge cost data from previously constructed projects are one of the primary tools used to estimate future bridge construction costs. Like most other projects in the State, the bridge construction cost estimate for the Lynn Canal Highway project was prepared using the historic bridge cost bid data.

The Lynn Canal Highway project has been experiencing construction delays. We have been updating the bridge construction cost estimate on an annual basis. The bridge construction cost estimate for the project was last updated in March 2009 using the historic bridge cost data up to and including the 2008 construction season.

On May 19, 2009, we received the Draft Final Report for the *Juneau Access Improvements Project* prepared by FHWA Western Federal Lands Highway Division and David Evans and Associates, Inc. The report provides an Independent Cost Estimate (ICE) that may be used for comparison to the project cost estimate prepared by the Department. According the report authors, the ICE was prepared from a contractor's perspective rather than a historic unit bid price approach. The contractor-based cost data was summarized in the standard Department bid format – that is, in the standard bid tab format with unit bid prices for each pay item. By presenting the project cost in this manner, it allows us to compare the ICE values directly to our historic unit price bid tab data.

We have reviewed the bridge related pay items presented ICE. In general, the bridge related unit bid prices presented in the ICE are within reasonable limits of the historic bid tab data. However, the precast concrete member pay item 501(7), the decked bulb tee girders, is about 40% greater than we would expect to see for this project.

Consistent with FHWA requirements, we collect and retain the bid tab data for the three low project bidders. We have summarized the bid tab data for the last five years of decked bulb tee girder bridges (including recently awarded projects for the 2009 construction season) on the following sheet. This data represents 32 bridges located throughout the state. In our office, we estimate the girder cost as a function of girder weight. The unit cost of the girders has been inflated to reflect 2009 dollars. Please note that the precast concrete member pay item includes all material and labor to fabricate, transport, and install the decked bulb tee girders.

Based upon a statistical analysis of the historic bid tab data, the average unit cost of the girders is about \$0.49 per pound with a standard deviation of about \$0.13 per pound. For a normal bell curve distribution, we would expect current girder bid prices to be between \$0.36 and \$0.62 per pound about 68% of the time – one standard deviation to either side of the average value – and in fact, 68% of the values are within this range.

In preparing the bridge portion of the Engineer's Cost Estimate, we used a unit cost of \$0.45 per pound which is about \$0.04 per pound less than the average. We believe that this value is appropriate considering past bid history and the large number of girders (about 250) that will be purchased as part of this project. In general, projects that contained a larger number of girders resulted in lower unit girder cost. For example, the adjusted unit bid price for the Dayville Road Project (bridge numbers 1203-1208 on the following sheet) was about \$0.34 per pound. Our observation has been that larger construction projects are often more competitively bid than smaller projects and that projects with more girders experience some "economy of scale." The Lynn Canal Highway project is both large and includes a large number of bridge girders.

The ICE report assumes a value of about \$0.63 per pound of precast girder. Based upon the statistical analysis, we expect that the girder cost would be less than \$0.63 per pound about 84% of the time (i.e., 16% of the time the girder cost would be higher). In fact, of the five years of adjusted historic bridge tab data, the ICE value was exceeded only 12% of the time. Although the ICE value falls within the statistical limits of the historic bid tab data, we believe that it is too high for this project.

In preparing the bridge cost estimate, we aim for the low bidder to be lower than our cost estimate and the second low bidder to be higher than our estimate. In a competitive bid situation, using a value of \$0.63 per pound for the precast concrete members would likely result in our cost estimate being higher than the second low bidder.

The precast girder costs are a large portion of the total bridge cost for this project. The bridge cost estimate is sensitive to changes in this pay item. As presented, the ICE bridge cost estimate includes about \$24.7M for the precast girders. The Department's cost estimate includes about \$17.8M for the precast girders. The total bridge cost estimate presented in the ICE is about 24% than the Department's estimate. If the ICE precast girder costs were assumed to be \$0.45 per pound (the Department's value) then the difference between the ICE bridge cost and the Department's bridge cost estimate is reduced to about 10% which is a reasonable value for comparison purposes.

Please do not hesitate to contact Elmer if you have any questions.

EEM/bm

501(7) DECKED BULB-TEE COST SUMMARY

BRIDGE NAME	GIRDER			YEAR	LOW (\$/EA)	2nd (\$/EA)	3rd (\$/EA)	LOW (\$/LBS)	2nd (\$/LBS)	3rd (\$/LBS)	TIME ADJUSTED		
	AREA	LENGTH	WEIGHT								LOW (2009-\$/LBS)	2nd (2009-\$/LBS)	3rd (2009-\$/LBS)
1 Eielson Ramps #2133	7.1625	119.0000	132,965	2004	65,000	60,000	61,000	0.49	0.45	0.46	0.55	0.51	0.52
2 C St. U.C. - EB #2081	7.0064	110.2231	120,474	2004	35,000	35,000	50,000	0.29	0.29	0.42	0.33	0.33	0.47
3 C St U.C. - WB #2082	7.0064	110.2231	120,474	2004	35,000	35,000	50,000	0.29	0.29	0.42	0.33	0.33	0.47
4 Sinona Ck. #648	6.4959	90.0000	91,202	2004	30,000	35,000	31,000	0.33	0.38	0.34	0.37	0.43	0.38
5 Chistochina River #649	6.9959	113.3333	123,687	2004	40,000	43,000	44,000	0.32	0.35	0.36	0.37	0.39	0.40
6 Boston Ck. #2098	7.7698	114.1667	138,380	2004	55,000	55,000	58,825	0.40	0.40	0.43	0.45	0.45	0.48
7 Granite Ck. #2099	7.2698	74.1667	84,112	2004	55,000	40,000	41,066	0.65	0.48	0.49	0.74	0.54	0.55
8 Solomon Gulch #1203	6.6417	125.0000	129,513	2004	55,000	50,000	35,000	0.42	0.39	0.27	0.48	0.44	0.31
9 Abercrombie Ck. #1204	6.5793	125.0000	128,296	2004	35,000	40,000	35,000	0.27	0.31	0.27	0.31	0.35	0.31
10 No Name Ck. #1205	6.5793	125.0000	128,296	2004	35,000	40,000	35,000	0.27	0.31	0.27	0.31	0.35	0.31
11 Lowe River Main #1207	6.5793	125.0000	128,296	2004	35,000	40,000	35,000	0.27	0.31	0.27	0.31	0.35	0.31
12 Lowe River N Ch. #1208	6.5793	125.0000	128,296	2005	70,000	50,000	60,000	0.46	0.33	0.40	0.51	0.36	0.44
13 Summit R.R. O.C. #2084	6.9331	140.0000	151,419	2005	50,000	50,000	45,000	0.70	0.70	0.63	0.77	0.77	0.69
14 Rex R.R. O.H. #1993	6.6000	69.7500	71,815	2005	82,500	112,000		0.53	0.72		0.59	0.80	
15 Indian River # 865	7.0270	141.5000	155,114	2005	60,323	65,000	45,000	0.51	0.55	0.38	0.56	0.60	0.42
16 Clearwater Ck. #2102	7.3345	103.9635	118,953	2005	66,000	60,000	50,000	0.50	0.46	0.38	0.55	0.50	0.42
17 Slana Ck. #655	7.0167	120.1667	131,535	2005	66,000	60,000	50,000	0.50	0.46	0.38	0.55	0.50	0.42
18 Mable Ck. #656	7.0167	120.1667	131,535	2005	66,000	60,000	50,000	0.50	0.46	0.38	0.55	0.50	0.42
19 Washington Ck. #838	7.1625	144.6667	161,643	2006	100,000	85,000	85,000	0.62	0.53	0.53	0.67	0.57	0.57
20 Hicks Ck. #547	6.9432	118.1102	127,930	2006	55,277	55,555	61,111	0.43	0.43	0.48	0.47	0.47	0.51
21 Stariski Ck. #667	7.8290	129.1667	157,754	2006	90,000	74,000	71,100	0.57	0.47	0.45	0.61	0.51	0.49
22 Sunny PT. Dr. U.C.-NB	7.0270	58.5000	64,128	2006	27,000	30,000		0.42	0.47		0.45	0.50	
23 Sunny PT. Dr. U.C.-SB	7.0270	58.5000	64,128	2006	27,000	30,000		0.42	0.47		0.45	0.50	
24 W Lemon Valley U.C. NB	6.5897	119.5000	122,845	2006	60,000	50,000		0.49	0.41		0.53	0.44	
25 W Lemon Valley U.C. SB	6.5897	119.5000	122,845	2006	60,000	50,000		0.49	0.41		0.53	0.44	
26 Julius Ck. #317	6.8291	84.0000	89,489	2006	55,000	40,000	47,000	0.61	0.45	0.53	0.66	0.48	0.57
27 Ohmer Ck. #388	7.0480	113.1667	124,425	2006	65,297	60,000	110,000	0.52	0.48	0.88	0.57	0.52	0.95
28 California Ck. #1027	6.3501	79.0000	78,259	2007	40,000	45,000	35,000	0.51	0.58	0.45	0.54	0.60	0.47
29 South Channel #1386	7.3657	136.2500	156,558	2007	55,000	100,000	104,323	0.35	0.64	0.67	0.37	0.67	0.70
30 Dawson Rd. U.C. #2147	7.6417	129.9792	154,949	2007	70,000	67,500	65,000	0.45	0.44	0.42	0.47	0.46	0.44
31 Gakona River #646	6.9959	110.5000	120,595	2009	80,000	65,800	69,000	0.66	0.55	0.57	0.66	0.55	0.57
32 Tanana River #505	6.9335	148.3750	160,486	2009	114,000	95,000	80,000	0.71	0.59	0.50	0.71	0.59	0.50

Average adjusted cost (three low bidders)= \$0.49 per pound
Standard Deviation = \$0.13 per pound