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# Evaluation of I-15 Devore (08-0A4224) Long-Life Pavement Rehabilitation Costs

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Partnered Pavement Research Program Contract  
Strategic Plan Element 4.15:  
Development of Integrated Pavement Strategy Decision Support System  
Including Life Cycle Cost Analysis

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## **1.0 INTRODUCTION**

This technical memorandum summarizes the analysis performed in evaluating the costs associated with Long-Life Pavement Rehabilitation Strategies (LLPRS). This study is part of the effort to ultimately develop an Integrated Pavement Strategy Decision Support System to allow engineers to analyze efficient allocation of financial resources when planning pavement projects at both project and network levels. To develop a decision support system, which will include life-cycle cost analysis to compare different rehabilitation alternatives, actual cost data are needed from many rehabilitation projects such as the Interstate 15 Devore Project.

For this study, cost performances were analyzed for a long-life pavement project on Interstate 15 in Devore (EA 08-0A4224) between the junctions of Interstate 10 and Interstate 210.

### **1.1 Project Description**

This Long Life rehabilitation project involved a 16-km stretch (26.3 lane-km) of Interstate 15. The project involved reconstruction of outer truck lane. The contract was awarded to Coffman Specialties, Inc. at \$13,235,000. Construction was begun in July 2004 and was completed in January 2005.

### **1.2 Definitions**

For this analysis, the original contract amount and the actual cost of the project are compared. Included in this comparison are the original bid cost, actual bid cost, and the total costs which include contract change orders. The “original bid cost” consists of the costs of the bid items as proposed by the contractor before construction. The “actual bid cost” is the actual amount expended for these bid items at the end of the project. The engineer’s estimate, which

includes the bid estimate, supplemental work, state-furnished materials, and contingencies anticipated by Caltrans, is also included for comparison.

To analyze the expenditures for these projects, costs were divided into several categories:

- The total cost is divided into direct, indirect, and administrative costs.
- Direct costs consist of cost of the pavement or work done directly relating to building the pavement.
- Indirect costs include non-pavement construction items such as traffic handling, drainage, and roadside and operational costs.
- Administrative costs are non-construction related items and include administration-related costs, state-furnished materials, and supplemental work.

See Appendix for a complete list and description of each subcategory.

For each cost category, the percentage of the total cost and a cost multiplier is calculated.

Each multiplier represents a ratio of each amount to the direct cost:

$$\text{Multiplier} = (\text{Line Item Cost Category})/(\text{Direct Cost})$$

The multiplier illustrates the correlation between direct costs and other cost categories.

The multiplier was developed by Caltrans, and it is meant to be used as a tool for roughly estimating other costs when the direct costs are known.

Also determined is the percentage difference between the original bid amount and the actual bid amount.

## **2.0 RESULTS**

Table 1 presents the results of the cost analysis. As the table shows, the original bid amount plus the cost of state-furnished materials and supplemental work for the I-15

rehabilitation project was \$14,952,400. Figure 1 illustrates the cost breakdown of the original bid plus the cost of state-furnished materials.

For this project, the original bid accounts for a large portion of the total cost due to direct costs. Replacement of the concrete pavement with rapid strength concrete is a major contributor to the direct costs and makes up about 34 percent of the total bid cost. When the original bid cost (Figure 1) is compared to the actual bid cost shown in Figure 2, the cost allocations are very similar. However, as shown in Table 1, the total dollar amount of the original bid cost is slightly greater than the actual bid cost by 1.28 percent. This slight difference is due to overestimation of quantities such as striping, pavement markers, and asphalt emulsion.

Although the actual bid cost is less than the contract amount, the total cost of the project is nonetheless greater than original bid cost. This slight cost overrun can be explained by the cost expended for contract change orders (CCO). Figure 3 illustrates the cost allocations for these CCOs along with the bid items costs.

Table 1 shows that the total cost of the CCOs is \$559,281. Although the amount spent for incentives was \$600,000 (Appendix A), the total cost of the CCOs is less because of credits from adjusting quantities for striping and paint binder.

The total cost breakdown, comprised of the actual bid cost and the CCOs combined, is shown in Figure 4. The CCOs for this project accounted for 3.7 percent of the total cost. In comparison with the engineer's estimate and the total cost of the project (Table 1), the cost difference is about \$3,315,690 (21.6 percent). However, this difference is not due to the CCOs; rather it is due to the engineer's estimate and the total cost underestimating both the quantities and unit costs of the direct costs. As shown in Table 1, the engineer's estimate anticipates CCO charges by including costs for "supplemental work." Specifically, the actual bid cost of the rapid

strength concrete was \$2,795,845 over the engineer's estimate. Appendix A includes a detailed breakdown of individual item costs. As shown in Table 1, the engineer's estimate multipliers are greater than those of the actual total cost. This is also due to underestimation of the direct costs.

### **3.0 CONCLUSIONS**

Overall, the major reason for the difference between the engineer's estimate and the actual cost of the project is underestimation of the cost of the bid items that are directly related to construction of the pavement. To get a better prediction of the cost allocations for similar projects, the given multipliers for each category in relation to the total cost can be used as a guide. These findings are based on the circumstances limited specifically to I-15 project costs.

**Table 1 Project Cost Breakdown**

**Direct Costs**

Category	Engineer's Estimate			Original Bid			Actual Bid Cost			% Dif-ference <sup>1</sup>	CCO			Total Cost			Cost/ lane mile <sup>3</sup>
	Amount	%	Multi-plier <sup>2</sup>	Amount	%	Multi-plier <sup>2</sup>	Amount	%	Multi-plier <sup>2</sup>		Amount	%	Multi-plier <sup>2</sup>	Amount	%	Multi-plier <sup>2</sup>	10.00 lane-mi.
	Repair Existing Pavement	\$5,075,595	42.28	0.89	\$7,785,550	55.24	0.89	\$8,623,534	62.03		0.93	10.76	\$2,400	0.43	0.07	\$8,625,934	59.65
Earthwork	\$362,163	3.02	0.06	\$514,500	3.65	0.06	\$503,200	3.62	0.05	-2.20	\$0	0.00	0.00	\$503,200	3.48	0.05	\$50,320
Pavement Striping	\$259,601	2.16	0.05	\$482,090	3.42	0.05	\$108,256	0.78	0.01	-77.54	\$29,889	5.34	0.93	\$138,145	0.96	0.01	\$13,815
Open Graded Surface	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0
Subtotal (Direct Costs)	\$5,697,359	47.46	1.00	\$8,782,140	62.32	1.00	\$9,234,990	66.43	1.00	5.16	\$32,289	5.77	1.00	\$9,267,279	64.09	1.00	\$926,728

**Indirect Costs**

Category	Engineer's Estimate			Original Bid			Actual Bid Cost			% Dif-ference <sup>1</sup>	CCO			Total Cost			Cost/ lane mile <sup>3</sup>
	Amount	%	Multi-plier <sup>2</sup>	Amount	%	Multi-plier <sup>2</sup>	Amount	%	Multi-plier <sup>2</sup>		Amount	%	Multi-plier <sup>2</sup>	Amount	%	Multi-plier <sup>2</sup>	10.00 lane-mi.
	Traffic Hand-ling																
Traffic Control	\$2,209,274	18.40	0.39	\$2,403,880	17.06	0.27	\$1,820,878	13.10	0.20	-24.25	-\$324,785	-58.07	-10.06	\$1,496,093	10.35	0.16	\$149,609
Temporary Detours	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$15,700	2.81	0.49	\$15,700	0.11	0.00	\$1,570
Perm. Widening for Construction Traffic Handling	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0
Others	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0
Drain-age																	
Dikes/Curbs	\$17,790	0.15	0.00	\$23,410	0.17	0.00	\$18,462	0.13	0.00	-21.14	\$0	0.00	0.00	\$18,462	0.13	0.00	\$1,846
Modify within Pavement	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0
Repair Existing	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0
Upgrade/ New	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0
Storm Water Upgrades	\$10,350	0.09	0.00	\$10,000	0.07	0.00	\$10,000	0.07	0.00	0.00	\$0	0.00	0.00	\$10,000	0.07	0.00	\$1,000
Safety																	
Identified in Safety Analysis	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0
Guardrail/ Barriers	\$199,026	1.66	0.03	\$224,150	1.59	0.03	\$176,359	1.27	0.02	-21.32	\$15,589	2.79	0.48	\$191,948	1.33	0.02	\$19,195
Meet 3R Design Standards	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0
Other Safety Upgrades	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0

<sup>1</sup> % Difference = (Actual - Original) / Original

<sup>2</sup> Multiplier = (Cost Category)/(Direct Pavement Cost)

<sup>3</sup> Lane Mile Cost = (Total Cost)/(Lane Miles)

**Indirect Costs (continued)**

Category		Engineer's Estimate			Original Bid			Actual Bid Cost				% Dif-ference <sup>1</sup>	CCO			Total Cost			Cost/ lane mile <sup>3</sup>
		Amount	%	Multi-plier <sup>2</sup>	Amount	%	Multi-plier <sup>2</sup>	Amount	%	Multi-plier <sup>2</sup>	Amount		%	Multi-plier <sup>2</sup>	Amount	%	Multi-plier <sup>2</sup>	10.00 lane-mi.	
Road-side	Embankment Upgrades	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0	
	Erosion Control	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0	
	Roadside/ Ditch Paving	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0	
	Landscaping	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0	
	Environmental Mitigation	\$67,300	0.56	0.01	\$60,000	0.43	0.01	\$60,000	0.43	0.01	0.00	\$25,000	4.47	0.77	\$85,000	0.59	0.01	\$8,500	
Right of Way	New Right of Way	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0	
	Temp. Con-struction Easements	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0	
	Utility Relocations	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0	
Bridges	All Work Done on Bridges	\$31,000	0.26	0.01	\$44,500	0.32	0.01	\$42,000	0.30	0.00	-5.62	\$0	0.00	0.00	\$42,000	0.29	0.00	\$4,200	
Oper-ational	Lane Additions	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0	
	Other Widen-ing (beyond 3R Stds)	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0	
	ITS/Fiber Optic	\$45,000	0.37	0.01	\$63,500	0.45	0.01	\$57,300	0.41	0.01	-9.76	\$48,354	8.65	1.50	\$105,654	0.73	0.01	\$10,565	
	Electrical Code Upgrades	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0	
	New Electrical	\$4,500	0.04	0.00	\$20,000	0.14	0.00	\$20,000	0.14	0.00	0.00	\$0	0.00	0.00	\$20,000	0.14	0.00	\$2,000	
	Sign Structures	\$27,000	0.22	0.00	\$70,000	0.50	0.01	\$70,000	0.50	0.01	0.00	\$0	0.00	0.00	\$70,000	0.48	0.01	\$7,000	
	Roadside Signs	\$0	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0	
<b>Subtotal (Indirect Costs)</b>		<b>\$2,611,241</b>	<b>21.75</b>	<b>0.46</b>	<b>\$2,919,440</b>	<b>20.72</b>	<b>0.33</b>	<b>\$2,274,999</b>	<b>16.37</b>	<b>0.25</b>	<b>-22.07</b>	<b>-\$220,142</b>	<b>-39.36</b>	<b>-6.82</b>	<b>\$2,054,856</b>	<b>14.21</b>	<b>0.22</b>	<b>\$205,486</b>	

**Administrative Costs**

Category		Engineer's Estimate			Original Bid			Actual Bid Cost				Dif-ference <sup>1</sup>	CCO			Total Cost			Cost/ lane mile <sup>3</sup>
		Amount	%	Multi-plier <sup>2</sup>	Amount	%	Multi-plier <sup>2</sup>	Amount	%	Multi-plier <sup>2</sup>	Amount		%	Multi-plier <sup>2</sup>	Amount	%	Multi-plier <sup>2</sup>	10.00 lane-mi.	
Administrative Related		\$1,978,400	16.48	0.35	\$1,533,420	10.88	0.17	\$1,533,420	11.03	0.17	0.00	\$747,135	133.59	23.14	\$2,280,555	15.77	0.25	\$228,055	
State Furnished Materials		\$858,000	7.15	0.15	\$858,000	6.09	0.10	\$858,000	6.17	0.09	0.00	\$0	0.00	0.00	\$858,000	5.93	0.09	\$85,800	
Supplemental Work		\$859,400	7.16	0.15	\$0	0.00	0.00	\$0	0.00	0.00	0.00	\$0	0.00	0.00	\$0	0.00	0.00	\$0	
Subtotal (Administrative Costs)		\$3,695,800	30.79	0.65	\$2,391,420	16.97	0.27	\$2,391,420	17.20	0.26	0.00	\$747,135	133.59	23.14	\$3,138,555	21.70	0.34	\$313,855	

<sup>1</sup> % Difference = (Actual - Original) / Original

<sup>2</sup> Multiplier = (Cost Category)/(Direct Pavement Cost)

<sup>3</sup> Lane Mile Cost = (Total Cost)/(Lane Miles)

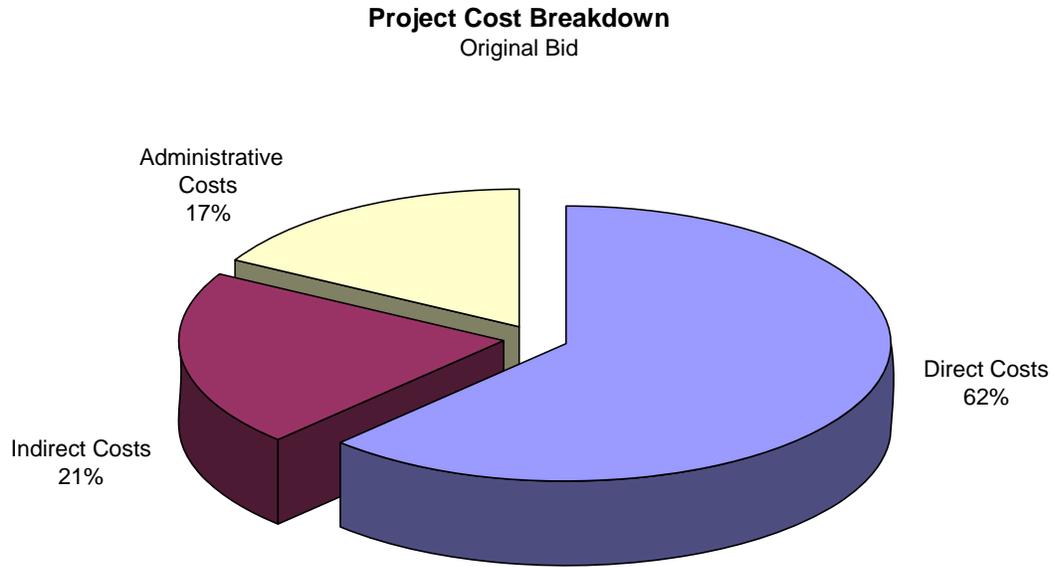
**Total (All Costs)**

Engineer's Estimate			Original Bid			Actual Bid Cost			Dif- ference <sup>1</sup>	CCO			Total Cost			Cost/lane mile <sup>3</sup>
Amount	%	Multi- plier <sup>2</sup>	Amount	%	Multi- plier <sup>2</sup>	Amount	%	Multi- plier <sup>2</sup>		Amount	%	Multi- plier <sup>2</sup>	Amount	%	Multi- plier <sup>2</sup>	10.00 lane-mi.
\$12,004,400	100	2.11	\$14,093,000	100	1.60	\$13,901,409	100	1.51	-1.36	\$559,281	100	17.32	\$14,460,690	100	1.56	\$1,446,069

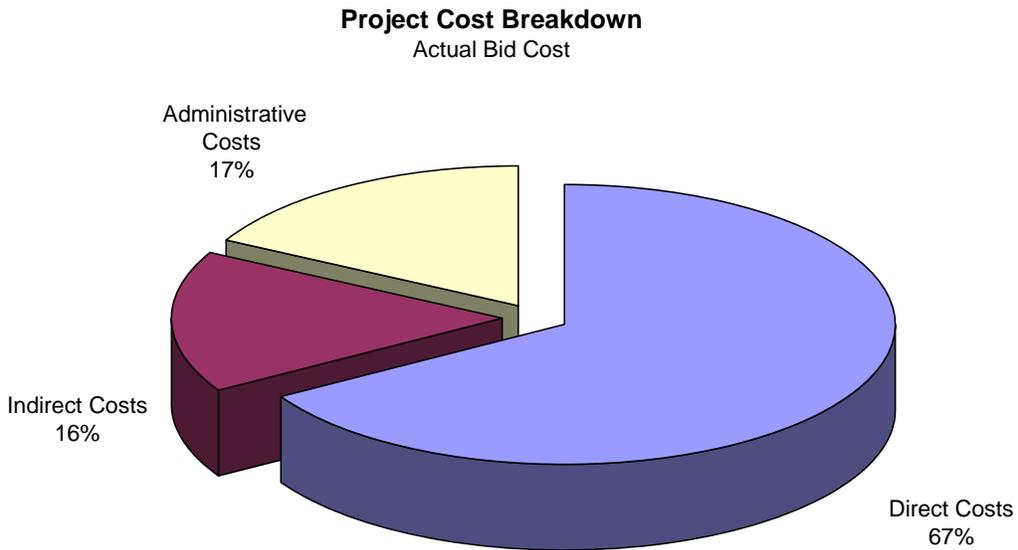
<sup>1</sup> % Difference = (Actual - Original) / Original

<sup>2</sup> Multiplier = (Cost Category)/(Direct Pavement Cost)

<sup>3</sup> Lane Mile Cost = (Total Cost)/(Lane Miles)

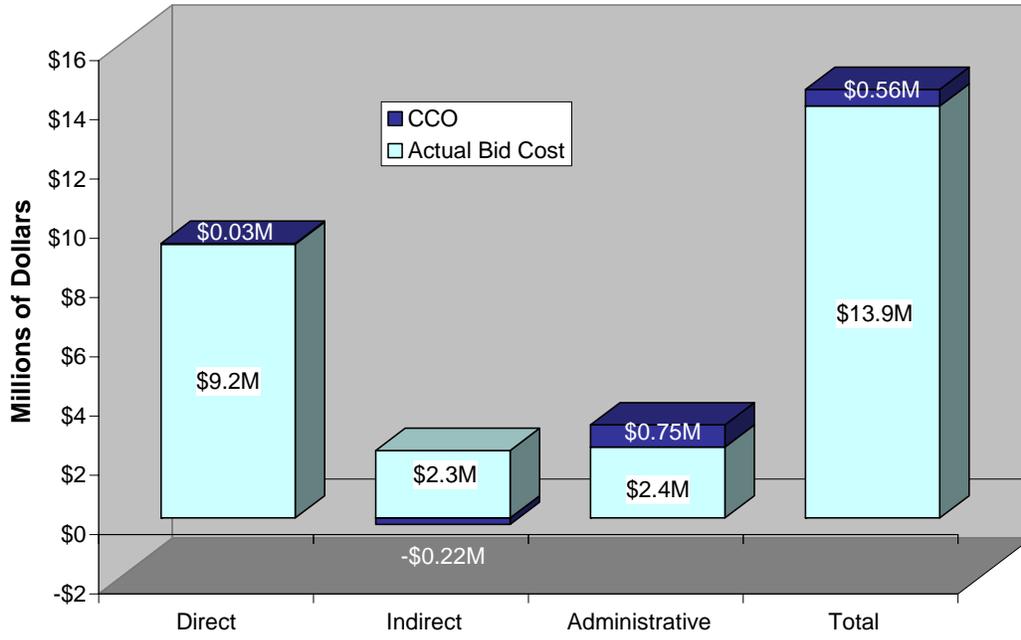


**Figure 1. Breakdown of the original bid costs.**

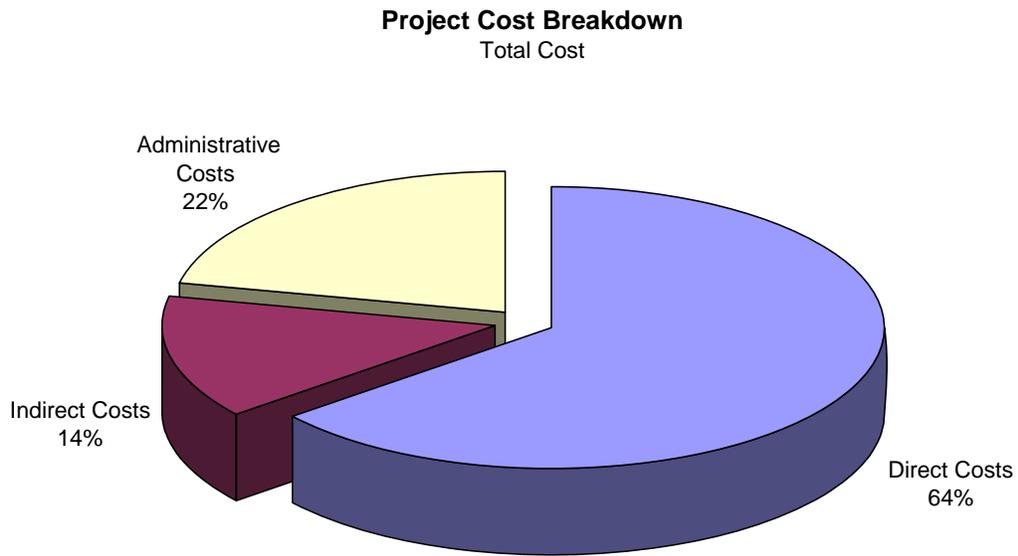


**Figure 2. Breakdown of the actual bid costs.**

### Total Cost Distributions



**Figure 3. Actual bid costs and CCO distributions.**



**Figure 4. Breakdown of the total cost.**

## 4.0 APPENDIX A

**Table A1 Cost Categories and Descriptions**

Category	Code	Item	Description	Sample Items (Not a Complete List)
Direct	D-010	Repair Exist Pavement	Work done to existing pavement to repair deficiencies and extend life	Overlays, Reconstruct Existing, Replace AC, PCC Slab Replacement, Cold Planing, Grinding
	D-020	Earthwork	Work done to embankment to construct pavement repairs and eliminate dropoffs	Shoulder Backing, Embankment reconstruction next to pavement
	D-030	Pavement Striping	Work done to restripe new pavement	Permanent traffic stripes and markers
	I-034	Open Graded Surface	Placement of open graded surfaces on top of pavement	OGAC, RAC-O
Traffic Handling	I-011	Traffic Control	Costs incurred to manage traffic during construction	Traffic Control, Construction Area Signs, Temporary Signing and Striping, Temporary Barriers, Portable Message Signs
	I-012	Temporary Detours	Temporary pavement, bridges, and drainage built to handle traffic during construction	Asphalt Concrete, Aggregate Base and Subbase, Earthwork related to detours
	I-013	Permanent Widening for Construction Traffic Handling	Permanent pavement placed to be used for traffic handling during construction	Asphalt Concrete, Aggregate Base and Subbase, Earthwork related widening work
	I-014	Others	Work not covered under above items	
Drainage	I-021	Dikes/Curbs	Replace existing dikes and curbs	Place Dike (Type ___), Minor Concrete Curb. Includes costs to replace existing dikes and curbs
	I-022	Modify within Pavement	Work done to adjust drainage systems to match new pavement profile	Adjust or replace inlets, manholes
	I-023	Repair Existing	Work done to repair existing deficiencies	Replaced damaged pipes, inlets. Fix ponding or other drainage deficiencies
	I-024	Upgrade/New	Improvements to overall drainage system	New systems placed due to widenings, realignments
	I-025	Storm Water Upgrades	Work done to address storm water issues	Detention Basins, Catch Basins, Litter Catchers
Safety	I-031	Identified in Safety Analysis	Work done to address site specific issues raised in the project safety analysis	Associated paving and earthwork for realignments, left or right turns lanes
	I-032	Guardrail/Barriers	Replacement and upgrade of guardrails and barriers	Metal Beam Guardrail, Concrete Barriers, End Anchors, Crash Cushions
	I-033	Meet 3R Design Standards	Work done to upgrade facility to meet 3R Design Standards	Shoulder Widening, Lane Widening, Vertical Clearance
	I-035	Other Safety Upgrades	Safety work not identified in above items	
Roadside	I-041	Embankment Upgrades	Work done to pavement not impacted by paving operations	Flattening Slopes
	I-042	Erosion Control	All erosion control work done to new or existing pavements	
	I-043	Roadside/Ditch Paving	Paving work done to the roadside	
	I-044	Landscaping	Upgrade or addition of landscaping	
	I-045	Environmental Mitigation	Work done to meet environmental commitments	
Right of Way	I-051	New Right of Way	New Right of Way	Costs are incurred prior to construction and are found separately in the Right of Way costs
	I-052	Temp. Construction Easements	Temporary Construction Easements	
	I-053	Utility Relocations	Utility Relocations	

<b>Category</b>	<b>Code</b>	<b>Item</b>	<b>Description</b>	<b>Sample Items (Not a Complete List)</b>
Bridges	I-061	All Works Done on Bridges	All work done to bridges	Replacement, Widening, Bridge Rail Upgrade
Operational	I-071	Lane Additions	Work done to add lanes not required for traffic handling during construction	Auxiliary, Truck, Passing, and Turn Lanes not constructed for traffic handling or safety reasons
	I-072	Other Widening (beyond 3R Stds)	Other widening work performed that is not required for traffic handling during construction	Additional shoulder widening beyond 3R Design Standards
	I-073	ITS/Fiber Optic	All work to upgrade or install new Intelligent Transportation elements	Cameras, Radios, Changeable Message Signs, Fiber Optics
	I-074	Electrical Code Upgrades	Upgrades to existing electrical systems to meet current code	Usually part of a lump sum item. Need cost breakdown from electrical
	I-075	New Electrical	New non-ITS electrical systems	New Lighting, Traffic Signals, Ramp Meters
	I-076	Sign Structures	Replacement or construction of new sign structures	Furnish and Place Sign Structure
	I-077	Roadside Signs	Replacement or construction of new roadside signs	Roadside Signs
Administrative	I-080	Administrative Related	Administrative Related Costs	Mobilization, Time Related Overhead
	I-090	State Furnished Materials	State Furnished Materials	Found Separately. Includes COZEEP, additional traffic control, etc.
		Supplemental Work	Supplemental Work	Found Separately

**Table A2 Engineer's Estimate, Original Bid Costs, Actual Bid Costs**

Bid No.	Item Code	Item Descriptions	Engineer's Estimate		Original Contract		Actual Contract		Cost Code
			Quantity	Amount	Quantity	Amount	Quantity	Actual	
1	70012	Progress Schedule (Critical Path Method)	1	\$16,200.00	1	\$15,000.00	1	\$15,000.00	I-080
2	70018	Time-Related Overhead	1	\$934,200.00	1	\$200,000.00	1	\$200,000.00	I-080
3	71325	Temporary Fence (Type ESA)	1460	\$105,120.00	1460	\$21,900.00	1460	\$21,900.00	I-011
4	73026	300-mm Temporary Culvert	350	\$15,750.00	350	\$24,500.00	285	\$19,950.00	I-011
5	74019	Prepare Storm Water Pollution Prevention Plan	1	\$10,350.00	1	\$10,000.00	1	\$10,000.00	I-025
6	74020	Water Pollution Control	1	\$67,300.00	1	\$60,000.00	1	\$60,000.00	I-045
7	120090	Construction Area Signs	1	\$63,000.00	1	\$50,000.00	1	\$50,000.00	I-011
8	120100	Traffic Control System	1	\$500,165.40	1	\$150,000.00	1	\$150,000.00	I-011
9	120151	Temporary Traffic Stripe (Tape)	210000	\$705,600.00	210000	\$787,500.00	42949	\$161,058.75	I-011
10	120152	Temporary Pavement Marking (Tape)	50	\$2,250.00	50	\$3,000.00	0	\$0.00	I-011
11	120165	Channelizer (Surface Mounted)	800	\$18,000.00	800	\$24,000.00	770	\$23,100.00	I-011
12	32056	Flashing Arrow Sign	11	\$24,750.00	11	\$33,000.00	11	\$33,000.00	I-011
13	120300	Temporary Pavement Marker	3660	\$6,588.00	3660	\$10,980.00	631	\$1,893.00	I-011
14	32057	Quick Change Moveable Barrier System	1	\$688,400.00	1	\$1,170,000.00	1	\$1,170,000.00	I-011
15	128650	Portable Changeable Message Sign	5	\$22,500.00	5	\$37,500.00	14	\$105,000.00	I-011
16	129000	Temporary Railing (Type K)	550	\$24,750.00	550	\$44,000.00	405.95	\$32,476.00	I-011
17	129100	Temporary Crash Cushion Module	190	\$32,400.70	190	\$47,500.00	210	\$52,500.00	I-011
18	150662	Remove Metal Beam Guard Railing	250	\$13,500.00	250	\$16,250.00	318.59	\$20,708.35	I-032
19	150701	Remove Yellow Painted Traffic Stripe	11900	\$26,775.00	11900	\$35,700.00	2290	\$6,870.00	D-030
20	150711	Remove Painted Traffic Stripe	26400	\$24,816.00	26400	\$31,680.00	16131	\$19,357.20	D-030
21	150771	Remove Asphalt Concrete Dike	2750	\$9,872.50	2750	\$13,750.00	2235	\$11,175.00	I-021
22	32058	Reset Concrete Barrier (Type K)	3000	\$67,500.00	3000	\$60,000.00	760	\$15,200.00	I-032
23	153103	Cold Plane Asphalt Concrete Pavement	49700	\$101,388.00	49700	\$173,950.00	67781.5	\$237,235.25	D-010
24	157561	Bridge Removal (Portion), Location A	1	\$1,600.00	1	\$2,500.00	0	\$0.00	I-061
25	157562	Bridge Removal (Portion), Location B	1	\$1,400.00	1	\$2,500.00	1	\$2,500.00	I-061
26	157563	Bridge Removal (Portion),	1	\$800.00	1	\$2,500.00	1	\$2,500.00	I-061

Bid No.	Item Code	Item Descriptions	Engineer's Estimate		Original Contract		Actual Contract		Cost Code
			Quantity	Amount	Quantity	Amount	Quantity	Actual	
		Location C							
27	157564	Bridge Removal (Portion), Location D	1	\$800.00	1	\$2,500.00	1	\$2,500.00	I-061
28	157565	Bridge Removal (Portion), Location E	1	\$800.00	1	\$2,500.00	1	\$2,500.00	I-061
29	190101	Roadway Excavation	9400	\$338,400.00	9400	\$470,000.00	9174	\$458,700.00	D-020
30	190185	Shoulder Backing	890	\$23,763.00	890	\$44,500.00	890	\$44,500.00	D-020
31	260201	Class 2 Aggregate Base	4180	\$187,640.20	4180	\$334,400.00	4259.49	\$340,759.20	D-010
32	390155	Asphalt Concrete (Type A)	17500	\$708,750.00	17500	\$1,050,000.00	17697.74	\$1,061,864.40	D-010
33	32060	Asphalt Concrete Base (Type C)	12800	\$576,000.00	12800	\$768,000.00	12444.36	\$746,661.60	D-010
34	394040	Place Asphalt Concrete Dike (Type A)	730	\$1,971.00	730	\$2,555.00	615	\$2,152.50	I-021
35	394044	Place Asphalt Concrete Dike (Type C)	150	\$540.00	150	\$525.00	80	\$280.00	I-021
36	394046	Place Asphalt Concrete Dike (Type D)	1660	\$4,614.80	1660	\$5,810.00	1387	\$4,854.50	I-021
37	394049	Place Asphalt Concrete Dike (Type F)	220	\$792.00	220	\$770.00	0	\$0.00	I-021
38	397001	Asphaltic Emulsion (Paint Binder)	600	\$140,400.00	600	\$300,000.00	13.92	\$6,960.00	D-030
39	401108	Replace Concrete Pavement (Rapid Strength Concrete)	10100	\$3,072,420.00	10100	\$5,050,000.00	11736.53	\$5,868,265.00	D-010
40	32061	Seal Pavement Joint (Silicone)	8900	\$55,447.00	8900	\$35,600.00	8900	\$35,600.00	D-010
41	32062	Seal Pavement Joint (Asphalt Rubber)	6900	\$36,915.00	6900	\$27,600.00	0	\$0.00	D-010
42	404094	Seal Longitudinal Isolation Joint	10000	\$62,400.00	10000	\$40,000.00	11049.71	\$44,198.84	D-010
43	420201	Grind Existing Concrete Pavement	76500	\$274,635.00	76500	\$306,000.00	72237.42	\$288,949.68	D-010
44	510502	Minor Concrete (Minor Structure)	8	\$25,600.00	8	\$32,000.00	8	\$32,000.00	I-061
45	833129	Concrete Barrier (Type 25A Modified)	8	\$4,000.00	8	\$4,800.00	0	\$0.00	I-032
46	839303	Single Thrie Beam Barrier (Steel Post)	880	\$54,806.40	880	\$70,400.00	846.88	\$67,750.40	I-032
47	839565	Terminal System (Type SRT)	3	\$4,050.00	3	\$6,300.00	3	\$6,300.00	I-032
48	839568	Terminal Anchor Assembly (Type SFT)	4	\$2,250.00	4	\$2,400.00	4	\$2,400.00	I-032
49	32063	Transition Railing (Type TB)	4	\$9,720.00	4	\$12,000.00	4	\$12,000.00	I-032
50	32064	Transition Railing (Type WB)	16	\$43,200.00	16	\$52,000.00	16	\$52,000.00	I-032
51	840515	Thermoplastic Pavement Marking	24	\$1,080.00	24	\$1,560.00	11.7	\$760.50	D-030

Bid No.	Item Code	Item Descriptions	Engineer's Estimate		Original Contract		Actual Contract		Cost Code
			Quantity	Amount	Quantity	Amount	Quantity	Actual	
52	840560	Thermoplastic Traffic Stripe (Sprayable)	81000	\$33,210.00	81000	\$44,550.00	50674	\$27,870.70	D-030
53	850122	Pavement Marker (Retroreflective-Recessed)	4900	\$33,320.00	4900	\$68,600.00	3317	\$46,438.00	D-030
54	860403	Highway Lighting	1	\$4,500.00	1	\$20,000.00	1	\$20,000.00	I-075
55	860501	Sign Illumination	1	\$27,000.00	1	\$70,000.00	1	\$70,000.00	I-076
56	860811	Detector Loop	1	\$39,000.00	1	\$50,000.00	0.966	\$48,300.00	I-073
57	32065	Pavement Sensors	3	\$6,000.00	3	\$13,500.00	2	\$9,000.00	I-073
58	999990	Mobilization	1	\$1,028,000.00	1	\$1,318,420.00	1	\$1,318,420.00	I-080
		<b>Totals</b>		<b>\$10,287,000.00</b>		<b>\$13,235,000.00</b>		<b>\$13,043,408.87</b>	

**Table A3 Contract Change Orders (CCOs)**

<b>CCO No.</b>	<b>Item Description</b>	<b>Amount</b>	<b>Cost Code</b>
1	Flagging & Traffic Control	\$69,554.04	I-011
2	Additional Funds	\$0.00	I-080
3	Federal Apprentice Program	\$1,916.00	I-080
4	Asphalt Price Index Fluctuation	\$30,000.00	D-010
5	Water Pollution Control Maint. Sharing	\$25,000.00	I-045
6	Additional Funds	\$0.00	I-080
7	Tow Truck Service Patrol	\$62,040.00	I-080
8	Revise AC Type	\$0.00	D-010
9	Additional AC for emergency crossovers	\$15,700.00	I-012
10	CCTV Equipment	\$28,680.77	I-073
11	Quick Change Moveable Barrier System	\$382,626.95	I-011
12	Quick Change Moveable Barrier System	\$0.00	I-011
13	ADDCO Traffic Management	\$106,942.00	I-011
14	ADDCO Traffic Management	\$0.00	I-011
15	Incentive-Disincentive & extended LC Hrs	\$600,000.00	I-080
16	Incentive-Disincentive Payment	\$0.00	I-080
17		\$0.00	I-080
18	Public Awareness Campaign	\$41,764.56	I-080
19	Restriping Paint & Tape	\$0.00	D-030
20	Adjusting Traffic Stripe Item #9	-\$600,000.00	I-011
21	Reduction in Paint Binder	-\$293,040.00	I-011
22	Eliminating Item #41	-\$27,600.00	D-010
23	Detector Loop Stubout	\$19,672.99	I-073
24	Eliminating Crossovers	\$0.00	I-012
25	Additional Striping	\$29,888.86	D-030
26	Maintain Existing Facilities	\$10,000.00	I-080
27	Eliminating Item #10, #24, #37, #45	-\$11,070.00	I-080
28	Contractor's Downtime	\$4,272.23	I-080
29	Metal Beam Guardrail	\$10,792.79	I-032
30	Concrete Barrier End Modifications	\$4,796.37	I-032
31	Quick Change Moveable Barrier System	\$9,132.03	I-011
32	QCQA	\$34,869.10	I-080
33	Adjustment for extra PCMS Quantity	\$3,342.80	I-080
	<b>Total</b>	<b>\$559,281.49</b>	

**Table A4 State Furnished Materials**

<b>Item Code</b>	<b>Item Description</b>	<b>Quantity</b>	<b>Amount</b>
66022	Right of Way Delay	LS	\$50,000
66062	COZEEP Contract	LS	\$288,000
066083A	Public Awareness Campaign	LS	\$160,000
066084A	Emergency Callbox Relocation by Sandbag	LS	\$25,000
066092A	Construction and Traffic Monitoring	LS	\$240,000
66105	Resident Engineer's Office	LS	\$57,200
066430A	Sampling, Fabricating and Transporting Additional Pavement Samples	LS	\$36,000
66852	Type 334 Controller Cabinet	LS	\$1,800
	<b>Total</b>		<b>\$858,000</b>

**Table A5 Supplemental Work**

<b>Item Code</b>	<b>Item Description</b>	<b>Quantity</b>	<b>Amount</b>
66008	Incentive Payment	LS	\$600,000
66015	Federal Trainee Program	LS	\$6,400
66065	Tow Truck Service Patrol	LS	\$100,000
66070	Maintain Traffic	LS	\$50,000
66595	Water Pollution Control Maintenance Sharing	LS	\$10,000
66596	Additional Water Pollution Control	LS	\$4,000
66597	Storm Water Sampling and Analysis	LS	\$15,000
66610	Partering	LS	\$25,000
66666	Compensation Adjustments for Price Index	LS	\$30,000
06666A	Pre-Operational Conference	LS	\$1,500
66920	Disputes Review Board	LS	\$7,500
066921A	Value Analysis	LS	\$10,000
	<b>Total</b>		<b>\$859,400</b>