



Oregon

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File Code:

TO: Matthew Garrett
Director, Department of Transportation

FROM: Jim Cox 
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SUBJECT: Findings of Fact Exemption # 2005-51 Final Evaluation Report
Bundle No. 215, I-5: McKenzie River - Goshen Grade
Design-Build Project
Key No. K14036

The post-construction evaluation for the Bundle No. 215, I-5: McKenzie River – Goshen Grade Design-Build project is enclosed for your review as required by ORS 279C.355.

Use of the design-build project delivery method requires an exemption from letting the construction contract through competitive low bid (ORS 279C.335). The exemption process includes the development and adoption of findings prior to awarding the design-build contract, and a post-construction evaluation of the project.

The I-5: McKenzie River – Goshen Grade project was granted exemption 2005-51 by the Director of the Department of Transportation (ODOT), under ORS 279C.335. The statute requires that the post-construction evaluation be submitted to the Director of ODOT and made available for public review. The evaluation compares the actual project results with the expected benefits of using design-build delivery method described in the adoption findings and with the estimated results had the project been delivered using design-bid-build. The results of those comparisons are summarized in the following table.

PROJECT DELIVERY RESULTS COMPARISON SUMMARY			
Factors	Exemption Findings Estimate	Actual Project Results	Hypothetical Design-Bid-Build Estimate
Cost	\$55 to \$65 Million	\$66,993,137	\$72,855,508
Duration	24 Months	42 Months	54 Months

No formal action by the Director of ODOT is required. The final evaluation report will be posted on the ODOT Design-Build website within ten business days at:

<http://www.oregon.gov/ODOT/HWY/MPB/mrg.shtml>

Enclosure: I-5: McKenzie River – Goshen Grade Final Evaluation Report

**Final Evaluation
For The
I-5: McKenzie River – Goshen Grade
Design-Build Project**
(as required by ORS 279C.355)

Project Name: Bundle No. 215, I-5: McKenzie River – Goshen Grade

Exemption Number: 2005-51

Contract Number: C13266

Key Number: K14036

FAP: ACIM-OTIA-S001 (207)

Design-builder: Hamilton Construction Co.

Designer: David Evans and Associates

Project Description

The design-build Interstate - 5 (I-5): McKenzie River – Goshen Grade bridge replacement and repair project was located in Lane County, Oregon, between Coburg and Goshen. This project included replacing five bridges, widening the interstate to three lanes in each direction, and repairing three bridges on I-5. The new bridges were built to current design standards and now provide increased capacity for heavy loads and to accommodate future traffic capacity requirements.

I. Introduction.

On September 21, 2005 the Oregon Department of Transportation's (ODOT) I-5: McKenzie River – Goshen Grade design-build project received an order from the ODOT Director granting an exemption from competitive bidding to allow the use of the design-build project delivery method. ORS 279C.335(2) permits the Director of Transportation to grant exemptions to ODOT from the requirement for competitive bidding on approval of specific findings. Under ORS 279C.335(4) a public hearing must be held before the findings are adopted, allowing an opportunity for interested parties to comment on the draft findings. The public hearing was held on September 01, 2005 and there were no comments received.

ORS 279C.355 requires an evaluation of the public improvement project upon its completion. The evaluation includes, but is not limited to the following matters:

1. The actual project cost as compared with original project estimates.
2. The number of project change orders issued by the public agency.

3. A narrative description of successes and failures during the design, engineering, and construction of the project.
4. An objective assessment of the use of the alternative contracting process as compared to the findings required by ORS 279.015 (now ORS 279C.335).

In the following sections, two types of comparisons are made. The first evaluation, reported in Section II, compares actual results of the project with results that would be expected on a typical design-bid-build project. The second evaluation, reported in Section III, compares actual results of the project with the expected results described in the original exemption findings. Notice-to-Proceed was issued to the design-builder on May 26, 2006 and construction was completed on November 30, 2009. Dollar amounts provided in this report are rounded to the nearest whole dollar.

II. Comparison of the I-5: McKenzie River – Goshen Grade Project Actual Results vs. a Typical Design-Bid-Build Project

A. Schedule and Project Duration

Under the traditional design-bid-build method ODOT obtains all environmental clearances and permits, and completes biddable final plans and specifications prior to advertising and awarding the construction contract to the lowest responsive bidder. Under the design-build contracting method, design, permitting, and construction are performed by the design-builder under one contract. Because the design-builder is responsible for both design and construction, it can begin construction before plans and specifications are finalized, and construction activities can be phased in a manner that is most efficient for the particular project.

A project equivalent to the I-5: McKenzie River – Goshen Grade project completed under the design-bid-build method of delivery would typically take approximately 18 months for design and permitting, and 36 months for construction, rendering a total project length of 54 months, or four and a half years. Using design-build method the I-5: McKenzie River – Goshen Grade project took only 42 months; from Notice-to-Proceed on May 26, 2006 to construction completion on November 30, 2009, or approximately 12 months earlier than the estimated duration if the design-bid-build method had been utilized. Prolonged project closeout activities resulted in Third Notification being issued on April 15, 2011.

Additionally, due to the need to start construction before the next available in-water work period there was a short timeline for the design-builder to implement design, to acquire permits, right of way and easements, and to commence construction activities. In comparison to the 18 months for design and permitting required for design-bid-build method, the design-builder took less than one year to acquire permits and advance design far enough to start on-site construction on this project, which included environmental permitting for permanent jurisdictional water and wetland impacts, rail road coordination, right of way acquisition, and re-construction/re-alignment of I-5.

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B. Costs

The following tables provide actual change order costs and a comparison of actual project costs utilizing the design-build contracting method with what would have been expected under the design-bid-build method, based upon ODOT historical experience.

The actual total construction cost for the project was \$62,122,508, inclusive of change orders, as enumerated in the below table. (Change order amounts in parenthesis are cost savings)

Base contract amount: \$ 59,725,000

Change Order Item	Amount
Wage Difference Operator Class 1 Large Crane	\$ 13,947
Wage Difference Operator Class 2 Plant Operator	\$ 11,548
Wage Difference Operator Class 3 Hoe Operator	\$ 3,702
Wage Difference Operator Class 3 Hoe Operator	\$ 55,576
Wage Difference Operator Class 4 Dozer	\$ 11
Wage Difference Operator Class 5 Roller	\$ 9,399
Wage Difference Operator Class 5 Roller	\$ 371
Wage Difference Operator Class 6 Oiler	\$ 691
Wage Difference Operator Class 6 Oiler	\$ 3,890
Wage Difference Operator Class 1 Large Crane	\$ 3,432
Wage Difference Operator Class 2 Plant Operator	\$ 1,969
Wage Difference Operator Class 3 Hoe Operator	\$ 2,027
Wage Difference Operator Class 4 Dozer	\$ 18,613
Wage Difference Operator Class 4 Dozer	\$ 3
Wage Difference Operator Class 5 Roller	\$ 3,159
Wage Difference Operator Class 5 Roller	\$ 103
Wage Difference Operator Class 6 Oiler	\$ 238
Wage Difference Operator Class 6 Oiler	\$ 1,019
Payment for TPN	\$ 22,390
8% Contractor Administrative Mark-up	\$ 3,582
Price Center PC1F-ADD'L Design NB BR	\$ 20,323
Price Center PC2F-ADD'L Quality NB BR	\$ 2,467
Price Center PC5F-ADD'L Mob NB BR	\$ 15,484
Price Center PC6F-ADD'L New BR Substructure NB	\$ 148,691
Price Center PC1G-ADD'L Design SB BR	\$ 20,323
Price Center PC2G-ADD'L Quality SB BR	\$ 1,515
Price Center PC5G-ADD'L Mob SB BR	\$ 16,775
Price Center PC6G-ADD'L New BR Substructure SB	\$ 163,362
BPA Utility Relocation Construction Support	\$ 17,534

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Price Center PC1A-ADD'L Design NB Goshen	\$ 18,449
Price Center PC6A-ADD'L Substructure NB Goshen	\$ 38,365
Price Center PC6B-ADD'L Substructure SB Goshen	\$ 38,365
Price Center PC1B-ADD'L Design SB Goshen	\$ 18,449
Design & Construction I-5 NB Ramp @ Franklin Blvd	\$ 30,000
BPA Access Road	\$ 253,521
R/R Existing wearing course W/L3 Dense	\$ 46,650
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Payment for Changes @ Franklin Br's	\$ 319,254
Staged Demo of Existing NB I-5 Franklin	\$ 13,971
Open Road vs safe speed for reverse curve	\$ 62,044
Credit for Right of Way Acquisition Expenses Per DB 140.01(c)	\$ (211,789)
Deck Texturing & Superset Extender 2059	\$ 74,233
Deck Texturing & Superset Extender 2059	\$ 74,233
Deck Texturing & Superset Extender 2071	\$ 71,913
Deck Texturing & Superset Extender 2048	\$ 11,599
Motorcycle signs	\$ 2,112
Mill & Inlay Travel Lanes, South Unit	\$ 196,000
Compensate the DB for Site Work for BPA	\$ 128,938
Partial Credit, Quality, Safety, TPDT, Environment NB	\$ (28,800)
Partial Credit, Quality, Safety, TPDT, Environment SB	\$ (31,200)
G-1 Inlet for NB I-5 McKenzie Diversion	\$ 19,026
Payment for Changes in Exp JT @ Franklin Blvd N	\$ 40,999
Credit for Beam Cleaning Not Provided	\$ (10,000)
Change Top Lift Paving, Open Grade Dense	\$ 88,386
Add Paving to the South End of Project	\$ 233,200
Payment for Resisting Joint Details	\$ 51,799
Franklin Blvd Waterline Resolution	\$ 250,000
Total Change Order Amount	\$ 2,408,508

Base contract amount plus change orders: \$62,133,508

For the cost comparison below we also add the change order cost increase to the design-bid-build estimate and use the following assumptions:

- Fifteen percent (15 %) of the change order cost is related to design/engineering, a common percentage in the industry, and the remainder to construction.
- The change orders would have been issued in a design-bid-build project.

Actual Costs Under Design-Build Method vs. Estimated Cost Under Design-Bid-Build Method

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Estimated Cost for Hypothetical Design-Bid-Build Delivery:	Amount
Design (15 % of Construction Value)	\$ 8,128,500
Environmental/Permitting (5 % of Construction Value)	\$ 2,709,500
Construction Value	\$ 54,190,000
ODOT Construction Engineering/Construction Management (10 % of Construction Value)	\$ 5,419,000
Change Order Costs	\$ 2,408,508
Total Estimated Cost:	\$ 72,855,508
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Actual Cost for I-5: McKenzie River – Goshen Grade Design-Build Delivery:	Amount
ODOT Preliminary Design and Partial Permitting	\$ 1,886,802
Final Design and Partial Permitting - Design-Builder (Design Services)	\$ 5,535,000
Construction (Construction & Engineering Services)	\$ 54,190,000
ODOT Project Management	\$ 2,972,827
Change Order Costs (Source - CCO Table Total)	\$ 2,408,508
Total Actual Cost :	\$ 66,993,137
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Difference Between Hard Bid (Design-Bid-Build) and Design-Build in Total Cost Savings:	\$ 5,862,371

The construction value assigned to the hypothetical design-bid-build project uses the actual design-build construction cost for the project. It does not include adjustments for inflation. If inflation is factored in and attributed to the time period difference between actual completion of the design-build project versus the time the hypothetical design-bid-build project would have concluded, the difference in cost grows wider. The hypothetical design-bid-build cost for design, construction engineering/management and environmental/permitting were calculated using percentages of construction cost. Those percentages were developed by ODOT based on experience and history and are commonly used to develop project estimate.

C. Conclusion

The use of design-build contracting resulted in the I-5: McKenzie River – Goshen Grade project being opened for public use about 12 months earlier than it would have been anticipated under the design-bid-build contracting method. Also of note, the design-builder’s traffic control plan eliminated or minimized any impacts to traffic flow by maintaining a minimal of two-lanes of traffic in each direction of I-5 during all construction phases.

The actual cost of the project was \$66,993,137, when compared to the estimated cost for delivery of the project using design-bid-build of \$72,855,508 ODOT realizes an estimated cost savings of \$5,862,371. The calculated amounts in the above Actual Costs Under Design-Build Method vs. Estimated Cost Under Design-Bid-Build Method table indicate a cost savings of approximately 8% when comparing actual design-build cost with estimated design-bid-build cost.

This does not take into account the cost efficiencies and savings resulting from construction acceleration using design-build as compared to the traditional design-bid-build delivery method.

III. I-5: McKenzie River – Goshen Grade Actual Project Results vs. Estimated Results Stated in the Original Exemption Findings

In this section the actual project results are compared to the original estimated project results in the exemption findings for the I-5: McKenzie River – Goshen Grade project.

A. Project Successes.

Successes experienced on the I-5: McKenzie River – Goshen Grade project were:

1. On time Completion –Prior to award, ODOT moved the completion deadline 18 months to compensate for delays in contract award and deficiencies in the estimated construction schedule. The exemption findings estimated 24 months for project completion, with the 18 month extension the estimated project completion date adjusts to 42 months. Actual completion took 42 months.

The project completed on time as scheduled in the contract. Actual project completion would have been delayed if the design-builder had not implemented efficiencies in design and construction mobilization. Design-builder acquired permits, right of way and easements and advanced design far enough to start on-site construction in less than 12 months. If the traditional design-bid-build method had been utilized, it would have added approximately one year to the actual completion date, due to construction not being able to start on the first available in-water work window.

2. Direct Cost Savings – The exemption order for this project estimated a maximum direct cost savings of \$2,283,500 in utilizing design-build method versus design-bid-build. In comparison of actual project cost with estimated design-bid-build cost, the project achieved a direct cost savings of about \$5,862,371 or approximately more than one and half times the savings estimated in the exemption order.

3. Innovations:

- a. Mobility – Design-builder maintained traffic flow by utilizing nighttime short duration rolling closures, portable changeable message signs, and fixed and mobile advisory radio.

Construction work required temporary widening of existing paved shoulders to accommodate the flow of traffic while the Goshen Grade bridges over highway 18 were under staged construction. Traffic staging avoided lengthy detours and lane restrictions. Rolling closures were used sparingly and at nighttime and no truck restrictions occurred during construction. The design-builder's innovative design, staging, traffic control and construction methods allowed for on-time completion of the project and the removal of weight restrictions from bridge structures, further accelerating full operational use of a critical north-south freight corridor.

- b. Construction Methods – Original project permits required coffer dams to be installed for the demolition of existing bridge bents at the McKenzie River bridge site. After contract award river levels significantly dropped and exposed large amounts of grouted riprap, which made the coffer dam approach in-effective and changed project site conditions. Design-builder worked with Regulatory Agencies to develop and implement alternative containment and isolation methods and removal of excess riprap no longer required by the new bridge design, which significantly improved river habitat for endangered species.
- c. Traffic Control – Design-builder maintained two lanes of traffic in each direction throughout the project by utilizing nighttime 20-minute maximum rolling closures while switching between construction phases, and critical work activities.

Design-builder staged a majority of construction activities to be off-road and during non peak hours and weekends, which substantially decreased complaints from the traveling public.

- d. Value Engineering – Design-builder discovered an error in the ODOT provided BRASS Load Rating Software used to calculate load rates for bridges. Due to initial load rating results ODOT had determined the NB and SB McKenzie Overflow structures required repairing. The design-builder recalculated and corrected the load rates, which proved the structures did meet current load weight requirements, eliminating the need for repairs. This resulted in ODOT receiving a credit of approximately \$60,000 from the design-builder.
- e. Environmental Stewardship:

- (1) The design-builder's team put forth an extra effort in working closely with National Marine Fisheries Services, Oregon Department of Fish and

Wildlife, Division of State Lands, and Friends of the McKenzie River to aid in a successful outcome. This close coordination with the Regulatory Agencies included periodic site visits during demolition, drilled shaft and fish salvage work. This was the first time for the Regulatory Agencies to be on-site during the construction phase and observe these activities first-hand.

- (2) The contract included up to \$50,000 available as an Environmental Excellence Award. The design-builder's award of \$49,000 represents recognition for excellence in the following areas.

- (a) **Habitat Enhancement** - Demolition of the existing McKenzie River Bridges resulted in a significant loss of bat habitat, specifically for Townsend's big-eared bats which use cavernous habitat. Although, the environmental performance standards for this project did not require the design-builder to provide bat habitat, bat crevices were included in the bridge design as stated in the design-builder's proposal. In addition to the crevice boxes, the design-builder voluntarily investigated options for adding cave habitat to the new northbound and southbound bridges.

The design-builder's innovative problem solving gained accolades for them and for ODOT from the highest level in ODFW. A picture of the McKenzie River Bridge bat boxes is included in an exhibit at the Oregon Zoo that highlights the benefit the OTIA III Program has had on creating and restoring bat habitat.

- (b) **Protection of Regulated Areas** - Design-builder elected to use locally-distributed biodiesel at the McKenzie River Bridge site as the primary fuel for three cranes, two forklifts, one track hoe, three diesel welders, and one diesel air compressor. Design-builder used approximately 250 gallons of biodiesel per week which equates to over 20,000 gallons of biodiesel being used instead of conventional fuels.

Additionally, the design-builder began using vegetable oil in their pile driving hammer for the first time during this project and continues to use vegetable oil in all their pile driving hammers.

The use of biodiesel provides environmental benefits that exceed the basic Contract requirements.

- (c) **Protective Design Features** – Through active coordination and participation with the Regulatory Agencies the design-builder developed a trusting relationship with these agencies that allowed innovative demolition methods and habitat enhancement opportunities to be quickly implemented. Furthermore, agencies praised the design-builder for its aggressive and proactive

approach to permit and environmental performance standard compliance.

4. Awards: ODOT and the design-builder's team placed third in the Daily Journal of Commerce's 2010 Top Projects public works/infrastructure/transportation - \$50.1M to \$100M category. Projects were rated on the following:
 - How well the project fulfills its intent.
 - How well challenges and obstacles were overcome.
 - How well the project finished with regard to budget and timeline, and overall quality of work.
5. Claims Avoidance – There were no claims filed against this project. The design-builder cooperated well with ODOT in resolving several very difficult situations involving third-party impacts on the project that required significant changes in the Design-Builder's plans.

B. Project Failures – There were no failures identified specific to the use of the design-build method for this project. The following project issues should be evaluated for possible impacts and ways to avoid them for future ODOT bridge projects.

1. After contract award the primary contact for the railroad changed resulting in difficulties in coordination and executing work within rail right of way. This difficulty significantly slowed project progress for the Franklin Blvd work site throughout design and construction phases.
2. Obtaining right of way from Bonneville Power Administration (BPA) was a major issue. The BPA right of way file took much longer than expected, over five years and is still open and has been moved to the ODOT Right-of-Way Unit for final resolution. This delay significantly increased project Right-of-Way acquisition costs.

A new mechanism for acquiring right of way from public agencies and utilities needs to be developed and used for future design-build projects.

C. Comparison to Original ORS 279.103 Exemption Findings. The comparisons made in this section are between the original findings presented in support of an exemption for the I-5: McKenzie River – Goshen Grade project and the actual design-build project performance.

1. Impact on Competition – In the original exemption findings ODOT suggested that there would be no impairment of competition under a solicitation process utilizing technical and price-based evaluation and selection factors, as many firms had expressed interest in the I-5: McKenzie River – Goshen Grade project. In fact, three design-build teams submitted statement of qualifications and three proposed on this project, resulting in a competitive procurement.

2. Net Cost Savings – In the original exemption findings, ODOT presented data from national studies that indicated cost savings could be expected in several areas through utilization of the design-build project delivery method when compared to the traditional design-bid-build method. ODOT concluded that if Oregon experienced similar results by eliminating the separation between design and construction phases, it could expect to realize a total savings of approximately \$2,283,500. Actual project savings exceeded the original exemption findings estimated savings by about \$3,579,000.
3. Schedule Changes – No schedule changes occurred after contract award.
4. Commercial Traffic/Industry Savings – ODOT has developed a standardized evaluation process to estimate the financial impact a project will have on the traveling public. This process uses several key project factors in estimating road user cost; these factors include construction duration, average daily traffic volume, detours, speed reductions and length of the project areas. Utilizing these factors ODOT estimates that by maintaining posted speed limits and two-lanes of traffic in each direction on I-5, and performing majority of work off-road and during non peak hours the design-builder limited additional month road user costs incurred by motor freight industry and traveling public to about \$30,000. Any reductions in posted speed limits or lane restrictions would have led to higher incurred road user costs.

IV. Summary.

In conclusion, the I-5: McKenzie River – Goshen Grade project met or exceeded the expectations presented in ODOT's original exception findings; this supports the granting of an exemption from competitive bidding. The project demonstrated that the design-build method saves ODOT time and money for construction projects as compared to traditional design-bid-build method.

The project was completed in more time than what was estimated in the exemption findings, however project completion time was increased by ODOT before contract award and the project completed on-time per the contract. The project was completed with no construction contract claims. Whether evaluating the project on the basis of comparisons to a comparable design-bid-build project or expectations contained in the original exemption findings, the design-build delivery method implemented on the I-5: McKenzie River – Goshen Grade project saved ODOT significant dollar amounts.

PROJECT DELIVERY RESULTS COMPARISON SUMMARY			
Evaluation Factors	I-5: McKenzie River – Goshen Grade Project (Design-Build) Exemption Findings	I-5: McKenzie River – Goshen Grade Project (Design-Build) Actual	Hypothetical (Design-Bid-Build) Estimated
Project Cost	\$55 to \$65 Million	\$66,993,137	\$72,855,508
Project Duration	24 Months	42 Months	54 Months

The public benefited from this project through improved safety by increasing both the flow of traffic and increased allowable load capacities for interstate commerce along this portion on the interstate highway system.