



Oregon

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TO: Matthew Garrett
Director, Department of Transportation

FROM: Jim Cox 
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SUBJECT: Findings of Fact Exemption # 2004-53 Final Evaluation Report
Bundle A02: Interstate 5 Clarks Branch to Tunnel Mill Race Section
Design-Build Project
Key No. C13111

The post-construction evaluation for the Bundle A02 Interstate 5 Clarks Branch to Tunnel Mill Race Section 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 evaluation compares the expected benefits of using design-build delivery method described in the adoption findings with the project results.

The Interstate 5 Clarks Branch to Tunnel Mill Race Section project was granted an exemption (# 2004-53) by the Director of the Department of Transportation (ODOT), under the statute in force at that time (ORS 279.015). The statute was revised by 2005 (ORS 279C.335). Both current and previous statutes require that the post-construction evaluation be submitted to the Director of ODOT and made available for public review.

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 (10) business days at:

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

Enclosure: Interstate 5 Clarks Branch to Tunnel Mill Race Section Final Evaluation Report

**Final Evaluation
For The
Interstate 5 Clarks Branch to Tunnel Mill Race Section
Design-Build Project
(as required by ORS 279C.355)**

Project Name: Bundle A02: Interstate 5 Clarks Branch to Tunnel Mill Race Section

Exemption Number: 2004-53

Contract Number: C13111

Key Number: K13711

FAP: OTIA-SO-S0001 (197) OTIA III

Design-Builder: CH2M Hill Constructors, Inc.

Designer: CH2M Hill, Inc.

Project Description

The Interstate 5 Clarks Branch to Tunnel Mill Race Section Design-Build project is located in Lane County, Oregon, between Creswell and Cottage Grove and in Douglas County, Oregon, between Roseburg and Dole. The project includes: bridge replacement (9) and repair (2); utility facility relocations / protection-in-place; drainage and erosion control; pavement; ancillary work, including access to private and public property; signing and striping; and environmental protection and / or mitigation.

I. Introduction

On January 18, 2005, the Oregon Department of Transportation's (ODOT) Interstate 5 Clarks Branch to Tunnel Mill Race Section Design-Build Project (the "Clarks Branch to Tunnel Mill Race" 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 October 4, 2004, and there were no comments received from the public.

ORS 279.103 (now ORS 279C.355) requires an evaluation of the public improvement project upon its completion. The evaluation must include the following:

1. The actual project cost as compared with original project estimates.
2. The amount of any guaranteed maximum price.
3. The number of project change orders issued by the public agency.

4. A narrative description of successes and failures during the design, engineering, and construction of the project.
5. 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 hard bid (design-bid-build) project. The second evaluation, reported in Section III, compares actual results of the project with what was expected in the original exemption findings. Dollar amounts provided in this report are rounded to the nearest whole dollar.

II. Comparison of the Clarks Branch to Tunnel Mill Project Actual Results vs. a Typical Design-Bid-Build Project

A. Schedule and Project Duration

Under the traditional design-bid-build model 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 model 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 Clarks Branch to Tunnel Mill Race project completed under the design-bid-build method of delivery would typically take approximately 18 months for design and 24 months for construction, rendering a total project length of 42 months, or three and one half (3 ½) years. The Clarks Branch to Tunnel Mill Race project, utilizing the design-build method of project delivery, took only 26 months; construction commenced on March 16, 2005, and was completed on May 18, 2007, saving approximately 16 months.

Additionally Design-Builder worked closely with ODOT to implement strategies and staging and traffic control and mobility expectations to minimize disruptions in work zones within the project limits. The Design-Builder constructed detour structures that allowed for free traffic movement during construction. The detour structures were built to allow for a change in traffic direction when construction crews were building respective permanent structures. This concept allowed for fewer duplicate structures being built, but, rather, use of a single detour structure in each project location. This was an important factor in ODOT replacing weight restricted bridge structures, allowing for unrestricted traffic flow on a major north-south freight corridor 16 months sooner than estimated under the design-bid-build project delivery method.

B. Costs

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

The total construction cost for the project was \$39,257,726, inclusive of change orders, as enumerated in the below table. (Change order amounts in parenthesis are cost savings.)

Base contract amount: **\$34,826,500**

Change Order Item	Amount
LF of Median Barrier Coast Fk R	\$ 295,800
Reduce BI 0007, PC1B	\$ (10,830)
Reduce BI 0012, PC6B	\$ (68,400)
Reduce BI 0013, PC7B	\$ (89,586)
Reduce BI 0015, PC9B	\$ (7,560)
Reduce BI 0016, PC10B	\$ (25,026)
PC6J-Credit to ODOT Abutment Redesign	\$ (23,789)
PC-1L-Trunnell Rd Design Phase 1	\$ 145,283
PC-1L-Trunnell Rd Design Phase 1	\$ 42,284
PC-1L-Trunnell Rd Design Phase 2	\$ 510,376
PC1K-Design Add'l Scope	\$ 66,706
PC3K-Safety Add'l Scope	\$ 178,227
PC5K Mobilization Add'l Scope	\$ 17,632
PC10K-Roadway Add'l Scope	\$ 57,719
PC11K-Detour/Stage Constr Add'l Scope	\$ 258,105
PC2L-Hwy 1 Quality Trunnell Rd	\$ 65,540
PC3L-Hwy Safety Trunnell Rd	\$ 165,503
PC4L-Hwy 1 Environmental Trunnell Rd	\$ 53,917
PC5L-Hwy1 Mobilization Trunnell Rd	\$ 265,864
PC6L-Hwy 1 Substr Trunnell Rd	\$ 473,039
PC7L-Hwy 1 Superstr Trunnell Rd	\$ 838,022
PC8L-Hwy1 Bridge Removal Trunnell Rd	\$ 282,717
PC9L-Hwy1 Earthwork Trunnell Rd	\$ 1,030,300
PC10L-Hwy 1 Roadway Trunnell Rd	\$ 208,284
PC10L-Hwy 1 Comb Use Signs Trunnell Rd	\$ (18,850)
Add'l Design Br 07757B PC1G	\$ 63,629
Add'l Environmental Br 07757B PC4G	\$ 33,226
Add'l Sub-Str Work Br 07757B PC6G	\$ 305,660
Add'l Super-Str Work Br 07757B PC7G	\$ 171,429
Add'l Roadway Work Br 07757B PC10G	\$ 187,306
Credit for Deletion of Epoxy Coat Rebar	\$ (125,275)
Price Center PC10C-Add Lime to AC	\$ 4,338

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Credit for Change in Key Personnel	\$ (10,000)
Reduce Price Center PC1A - Design	\$ (56,336)
Reduce Price Center PC2A - Quality	\$ (4,113)
Reduce Price Center PC3A - Safety	\$ (22,093)
Reduce Price Center PC4A - Environmental	\$ (14,161)
Reduce Price Center PC5A - Mob	\$ (35,272)
Reduce Price Center PC17A - Br Repair	\$ (154,385)
Reduce Price Center PC1E - Design	\$ (182,716)
Reduce Price Center PC2E - Quality	\$ (6,855)
Reduce Price Center PC3E - Safety	\$ (20,290)
Reduce Price Center PC4E - Environmental	\$ (13,986)
Reduce Price Center PC5E - Mob	\$ (35,272)
Reduce Price Center PC17E - Br Repair	\$ (388,521)
Accept "as-is" Paving-After Cut-off Date	\$ (2,395)
Accept "as-is" Paving With Failing SE	\$ (525)
Accept "as-is" Placed w/o Mix Design	\$ (7,778)
50 % of Traffic Control Warning Striping	\$ 5,340
Assist ODOT Maint. In Restoring Rdway	\$ 13,952
Flood Sealing Decks on C6 NB/SB	\$ 23,144
Credit for NCR #41	\$ (4,201)
Credit for NCR #43	\$ (3,900)
Total Change Order Amount	\$ 4,431,226

Base contract amount plus change orders: **\$39,257,726**

For the cost comparison below we added the change order cost increase to the design-bid-build estimate and used 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 Model vs. Estimated Cost under Design-Bid-Build Model

Estimated Cost for Hypothetical Design-Bid-Build Delivery:	Amount
Design (15 % of Construction Value)	\$ 4,862,663
Environmental/Permitting (5 % of Construction Value)	\$ 1,620,888
Construction Value	\$32,417,750
ODOT Construction Engineering/Construction Management (10 % of Construction Value)	\$ 3,241,775
Change Order Costs	\$ 4,431,226
Total Estimated Cost:	\$46,574,301

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Actual Cost for Clarks Branch to Tunnel Mill Race Design-Build Delivery:	Amount
ODOT Preliminary Design and partial Permitting	\$1,994,390
Final Design and partial Permitting - Design-Builder (Design Services)	\$4,212,000
Construction (Construction & Engineering Services)	\$30,614,500
ODOT Project Management (Engineering)	\$2,064,124
Change Order Costs	\$ 4,431,226
Total Actual Cost :	\$43,316,240
Difference between Hard Bid (Design-Bid-Build) and Design-Build in Total Cost Savings:	\$3,258,061

The construction value assigned to the hypothetical design-bid-build project utilized the design-build construction costs estimated for Interstate 5 Clarks Branch to Tunnel Mill Race Section project. It does not include adjustments for inflation. If inflation is factored in, at a nominal three (3) %, 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 numbers used in arriving at the hypothetical design-bid-build design and construction and environmental values were developed, consistent with ODOT experience and history of bid item averages, as percentages that are based off the estimated construction value for design-bid-build delivery method.

C. Conclusion

The use of design-build contracting resulted in the Clarks Branch to Tunnel Mill Race project being opened for public use up to 16 months earlier than would have been anticipated under a design-bid-build contracting model. Also of note, the Design-Builder constructed detour structures that allowed for free traffic movement during construction. The detour structures were built to allow for a change in traffic direction when construction crews were building respective permanent structures. This concept allowed for fewer duplicate structures being built, but, rather, use of a single detour structure in each project location. This was an important factor in ODOT replacing weight restricted bridge structures, allowing for unrestricted traffic flow on a major north-south freight corridor 16 months sooner than estimated under the design-bid-build project delivery method.

The adjusted figures in the above table indicate a cost savings of approximately seven (7) % in comparing design-build cost with estimated design-bid-build cost. This does not take into account the efficiencies and savings of the actual construction time period,

approximately 16 months, which was substantially shorter than, and occurs earlier in the process than would have occurred in a design-bid-build project.

III. Interstate 5 Clarks Branch to Tunnel Mill Race Section Actual Results vs. estimated results stated in the original exemption findings

The comparisons made in this section are between the original Clarks Branch to Tunnel Mill Race project estimated results in the exemption and the actual project results.

A. Project Successes

Among the successes experienced on the Clarks Branch to Tunnel Mill Race project were:

1. **Early Completion.** The contract was completed as scheduled as required by the contract completion date of May 18, 2007. That is 16 months earlier than it would have been if the project was delivered using design-bid-build.
2. **Direct Cost Savings.** Based upon original exemption findings for this project, ODOT estimated a direct cost savings of \$1,067,500 by utilizing design-build delivery method versus design-bid-build. The project achieved a cost savings of \$3,258,061. Therefore, the project resulted in an approximate direct cost savings of \$2,190,561, exceeding ODOT's estimated direct cost savings by more than two (2) times
3. **Reviews:** Bridge plans were well laid out and reviews made easier. Comments were received quickly and action taken quickly. Audits, quality and corrective actions were quick. Aggressive review times enabled work to continue quickly when questions or changes were encountered.
4. **Innovations:**
 - a. **Mobility successes.** Design-Builder "learned a lot about mobility and staging based on strategies and methods implemented on this project. Staging and night closures worked well, provided ample time to complete the work.
 - b. **Rubble from bridge demolition was used as fill material for another ODOT bridge project.** Collaboration between the Design-Builder and an ODOT contractor for a nearby project saved time and money, while recycling used construction materials. The Design-Builder and the contractor for the other project agreed to exchange the aggregate free of charge, avoiding disposal costs for the design-build project and the cost of purchasing 30,000 cubic yards of new fill material on the other project.

The exchange of materials produced other economic and environmental dividends. In addition to keeping the rubble out of a landfill, the two

contractors also saved money on transportation costs. Because the two work sites were less than two miles apart, fuel costs and pollution emissions were vastly decreased.

- c. Concrete Box Beams were reused on detour bridges saving over \$500,000. The Design-Builder designed and built detour bridges in a way that allowed beams from a detour bridge to be reused. One of the longer bridges was replaced early in the project and when it was completed, the detour bridge was dismantled and the beams were reused on three (3) other shorter detour bridges. Eighty beams were reused during this project, resulting in a cost savings of over \$500,000.
- 5. Awards. The Design-Builder was awarded 41% of the \$50,000 environmental excellence award for exceeding contract requirements.
- 6. Claims Avoidance. The project was completed within the adjusted contract time frame with zero (0) days of liquidated damages assessed.
- 7. No negative comments were received about the rest area closure.
- 8. The dedication of Oregon Bridge Delivery Partners program and project management technical staff throughout project development and construction contributed to success with the permitting processes.
- 9. Safety. Safety was reported as good on the project.

B. Project Failures

- 1. Load ratings and scope of work for repair bridges were not provided by ODOT during the solicitation phase of the project. Estimating the quantity and cost of work for repair bridges was very difficult by the proposing design-build teams. Their price proposals for this work item, on average were five (5) times higher than expected by ODOT. This was due to the high level of risks being passed to the proposing design-build teams.

ODOT project team recommended that ODOT complete load ratings for repair bridges and include results and a repair scope of work for each repair bridge in future solicitation documents.

- 2. Public Involvement Performance Specifications in the contract were not specific on timelines for issuing news releases. This resulted in news releases not being submitted in a timely manner to properly inform the public of events.
- 3. The project spanned ODOT Regions 2 and 3 and the Design-Builder encountered different practices in the areas of Traffic Control and Public Involvement. The lack of a coordinated effort by ODOT created problems in maintaining consistent and efficient Traffic Control and Public Involvement measures throughout the project area of impact.

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 Clarks Branch to Tunnel Mill Race project and 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 Clarks Branch to Tunnel Mill Race project. In fact, four (4) Design-Build teams submitted Statements of Qualifications and three (3) 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 model when compared to the traditional hard bid (design-bid-build) model. ODOT concluded that if Oregon experienced similar results, it could expect to realize a total savings of approximately \$1,067,500. Actual experienced savings exceeded the original estimated savings stated in the original exemption findings.
 - a. **Bid Documents.** In the original exemption findings ODOT projected that by eliminating the separation between the design and build phases in the solicitation process using the design-build method, ODOT could reduce preliminary engineering costs by approximately \$75,000 on the Clarks Branch to Tunnel Mill Race project, as compared to the design-bid-build model. Project data indicates preliminary engineering costs were actually \$510,130 more than anticipated.
 - b. **Maintenance.** N/A
 - c. **Inflation.** In the original exemption findings ODOT assumed that using design-build would result in project completion one (1) year earlier than if the project was delivered using design-bid-build. ODOT estimated a savings of approximately \$375,000 at three (3) % inflation for one (1) year. The completion of project work 16 months ahead of the estimated design-bid-build schedule resulted in greater cost savings compared to that for the assumed 12 months time savings.

IV. Summary

In conclusion, the Clarks Branch to Tunnel Mill Race project met or exceeded expectations in ODOT's original exemption findings, supporting granting an exemption from competitive bidding – except for in preliminary engineering, which was more expensive than anticipated. The project was completed on schedule. Whether evaluating the project on the basis of comparisons to the comparable design-bid-build

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delivery method or expectations contained in the original exemption findings, the design-build delivery model implemented on the Clarks Branch to Tunnel Mill Race project saved the Oregon Department of Transportation significant dollar amounts.

SUMMARY COMPARISON			
Evaluation Factor	Clarks Branch Project (Design-Build) Original	Clarks Branch Project (Design-Build) Actual	Theoretical Design-Bid-Build
Project Cost	\$43,692,368	\$43,316,240.03	\$46,574,301
Project Duration	26 months	26 months	42 months