



Oregon

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TO: Matthew Garrett
Director, Department of Transportation

FROM: Jim Cox *JRC*
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SUBJECT: Findings of Fact Exemption # 2004-51 Final Evaluation Report
Interstate 5 Sutherlin to Roseburg Section
Design-Build Project
Key No. K13467

The post-construction evaluation for the Bundle 353 Interstate 5 Sutherlin to Roseburg 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 described in the adoption findings with the project results.

The Interstate 5 Sutherlin to Roseburg Section project was granted an exemption (#2004-51) 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 10 business days at:

http://www.oregon.gov/ODOT/HWY/MPB/sutherlin_roseburg.shtml

Enclosure: Interstate 5 Sutherlin to Roseburg Section Final Evaluation Report

**Final Evaluation
For The
Interstate 5 Sutherlin to Roseburg Section
Design-Build Project**
(as required by ORS 279C.355)

Project Name: Bundle 353: Interstate 5 Sutherlin to Roseburg Section

Exemption Number: 2004-51

Contract Number: C13070

Key Number: K13467

FAP: OTIA-IM-S001 (192) OTIA III

Design-Builder: CH2M Hill Constructors, Inc.

Designer: CH2M Hill, Inc.

Project Description

The Interstate 5 (I-5) Sutherlin to Roseburg Section Design-Build project was located in Douglas County, Oregon, between Sutherlin and Roseburg. The project included replacing nine bridges and repairing one bridge on I-5. Five of the bridges were replaced as part of the statewide OTIA III Bridge Program. This project also included 8.4 miles of interstate maintenance which included guardrail and concrete barrier improvements, drainage, rumble strips, striping, and pavement preservation. This was the first corridor-level design-build project on the I-5 system.

I. Introduction

On September 16, 2004, the Oregon Department of Transportation's (ODOT) I-5 Sutherlin to Roseburg Section Design-Build Project (the "Sutherlin to Roseburg Section" 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 May 27, 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 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 Sutherlin to Roseburg Section 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 Sutherlin to Roseburg Section 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 more than three and one half (3 ½) years. The Sutherlin to Roseburg Section project, utilizing the design-build method of project delivery, took 48 months; construction commenced on December 3, 2004, and was completed on November 30, 2008. The duration of the project was affected by the addition of work including procurement of additional right-of-way, Interstate maintenance and median barriers, asphalt grinding and paving, asphalt striping inlay, and new ramp and signal construction. The additional work required the project schedule to be extended 24 months beyond its original contracted completion date of November 20, 2006. For comparison purposes, it is assumed that the additional work would have been added if the project were delivered using design-bid-build and the schedule would have also been extended by 24 months.

Additionally, because this is a design-build project, the method of contracting is innovative from the typical ODOT contracting standards. The Design-Build team designed and built eight (8) new bridges which included detour alignments in less than two (2) years of construction. Also included was rehabilitation of the I-5 NB and SB freeway roadway sections from MP 125.38 to MP 136.52. The designs were produced and submitted to ODOT for review and acceptance of design and then incorporated into

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the project substantially reducing time for acceptance of as-built drawings in comparison with other projects.

The Design-Builder designed the Highway 138 overcrossing bridge as a voided slab which was uncommon to ODOT. This design allowed for a thinner superstructure which maintained the required under-bridge clearance for Highway 138 and the vertical profile for I-5.

B. Costs

The following tables provide actual change 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 \$46,965,263, inclusive of change orders, as enumerated in the below table. (Change order amounts in parenthesis are cost savings.)

Base contract amount: **\$34,797,732**

Change Order Item	Amount
CC01 Median Barrier Replacement	\$ 2,386,000
Detour Str & Appurtenance 4 Lane Traffic	\$ 1,970,000
Add Rogers Rd NB Repair #7627B	\$ 772,400
Add Rogers Rd SB Repair #7627A	\$ 731,500
Interstate Maintenance MP 127.25-128.45	\$ 1,268,018
Various Design Cost Changes (Credit)	\$ (7,324)
Various Design Cost Changes (Credit)	\$ (21,973)
Various Design Cost Changes (Credit)	\$ (7,324)
Various Design Cost Changes (Credit)	\$ (7,324)
Various Design Cost Changes (Credit)	\$ 2,455
Various Design Cost Changes (Credit)	\$ 2,455
Various Design Cost Changes (Credit)	\$ (7,324)
Various Design Cost Changes (Credit)	\$ 2,455
Various Design Cost Changes (Credit)	\$ (7,324)
SB Off Ramp Impr @ Sutherlin Intchg	\$ 210,115
42" Tall type F Rail Rogers Rd SB-Credit	\$ (38,122)
42" Tall type F Rail Rogers Rd NB-Credit	\$ (51,979)
Stearns Lane Future Widening	\$ 47,294
North Roseburg Intch Improve (Design)	\$ 462,392
Add'l 2" Grinding @ Deady OC	\$ 16,310
Additional Paving and Barrier	\$ 550,343
Type C Protective Fence @ SB COPR/CO Rd	\$ 19,173
Type C Protective Fence @ NB COPR/CO Rd	\$ 19,173

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Traff Cntl For Type C Prot Fence SB	\$ 2,400
Traff Cntl For Type C Prot Fence NB	\$ 3,200
Edenbower Pavement Drain	\$ 20,902
Material Change (Inlay Thermo Tape)	\$ 477,945
Reduction in Rumble Striping Install	\$ (6,287)
Add'l Temp Striping for Interstate	\$ 6,233
N Roseburg Add'l Illum Design Service	\$ 23,690
Bridge Width Dispute Resolution	\$ 450,000
N Roseburg Sign Install & Ramp Constr	\$ 2,900,000
West Side Intchg Flagging	\$ 75,375
Inlet Adjustment - Credit	\$ (8,050)
3M Tape Deduction - Credit	\$ (83,150)
Add'l SB/NB Off Ramp Paving @ N Rsbg Intc	\$ 11,888
Total Change Order Amount	\$12,185,531

Base contract amount plus change orders: \$ 46,965,263

For the cost comparison below we also 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 and PE (15 % of Construction Value)	\$ 5,744,652
Environmental/Permitting (5 % of Construction Value)	\$ 1,914,884
Construction Value	\$ 38,297,678
ODOT Construction Engineering/Construction Management (10 % of Construction Value)	\$ 3,829,768
Change Order Costs	\$ 12,185,531
Total Estimated Cost:	\$ 61,972,512
Actual Cost for Clarks Branch to Tunnel Mill Race Design-Build Delivery:	Amount
ODOT Preliminary Design and partial Permitting	\$ 865,648

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Final Design and partial Permitting - Design-Builder (Design Services)	\$ 3,656,000
Construction	\$ 31,123,732
ODOT Project Management	\$ 1,525,750
Change Order Costs	\$ 12,185,531
Total Actual Cost :	\$ 49,356,661
Difference between Hard Bid (Design-Bid-Build) and Design-Build in Total Cost Savings:	\$ 12,615,851

The construction value assigned to the hypothetical design-bid-build project utilized the actual construction costs estimated for the Sutherlin to Roseburg 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 Sutherlin to Roseburg Section bridges and highways being opened for public use up to 18 months sooner than would have been anticipated under a design-bid-build contracting model that included the scope additions of this design-build project. Without additional scope additions, the project was anticipated to be complete by November 20, 2006. As a result of the additional work scope, the project took 24 more months to complete. If the same scope had been added to a design-bid-build schedule, it would have taken even longer since all the added work would have been designed before any construction could start. Therefore, given the added scope, it reasonable to conclude the use of design-build contracting provided an earlier project completion.

If this project had been a traditional design-bid-build project with the same additional scope added, it would have added at least the same 24 month timeline to complete.

The actual cost of the project was \$49,356,661 compared to the estimated cost for delivery of a similar project using design-bid-build of \$61,972,512 which results in an estimated saving for \$12,615,851. The calculated amounts in the above Actual Costs under Design-Build Model vs. Estimated Cost under Design-Bid-Build Model table indicate a cost savings of approximately 20 % in comparing actual 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 48 months, which was substantially shorter than, and occurs earlier in the process than would have occurred in a design-bid-build project.

III. Sutherlin to Roseburg Section Actual Results vs. Contract Requirements

The comparisons made in this section are between the original Sutherlin to Roseburg Section project estimated results in the exemption and the actual project results.

A. Project Successes.

Among the successes experienced on the Sutherlin to Roseburg Section project were:

1. **Early Completion.** The project was completed on November 30, 2008, which was beyond the original expected contract completion date of November 20, 2006. However, additional work was added to this project during the construction phase, which would be assumed to have been added if this project had been a traditional design-bid-build project, which would have added the same 24 months to complete, for a total of 66 months to complete. The design-build project was completed in 48 months, or 18 months earlier than would have been expected if the same scope changes had been added to a design-bid-build project.
2. **Direct Cost Savings.** The exemption order for this project estimated a direct cost savings of about \$2,045,000 from using the design-build delivery method when compared to the estimated cost of delivering the project using design-bid-build. When comparing the cost of the completed project to the estimated cost of delivering the project using design-bid-build there was a direct cost savings of about \$10,571,000 or more than five (5) times the savings estimated in the exemption order.
3. **Innovations.** Design-Builder designed and built eight (8) new bridges which included detour alignments in less than two (2) years of construction. Also included was rehabilitation of the I-5 NB and SB freeway roadway section from MP 125.38 to MP 136.52. The designs were produced and submitted to ODOT for review and acceptance of design and then incorporated into the project in substantially reduced design to construction timelines by comparison to typical design-bid-build projects. The bridge at the Sutherlin Interchange was constructed with a voided slab which was uncommon to ODOT. The voided slab allowed for a thinner superstructure which maintained under-bridge clearance for Highway 138 and also maintained the vertical alignment of I-5, preventing costly realignment of the I-5 profile.
4. **Awards.**
 - a. Mix designs for concrete and Hot Mix Asphalt Concrete (HMAC) were submitted to, reviewed by, and approved by ODOT. ODOT awarded the

Design-Builder \$176,256.06 in HMAC smoothness bonus and HMAC Incentive for exceeding requirements.

- b. The Design-Builder was awarded first place paving award for State Highways – High Volume category by the Asphalt Pavement Association of Oregon.
- c. The Design-Builder was also awarded 48 % of the \$50,000 environmental excellence award for exceeding contract requirements.

5. Safety. N/A.

6. Claims Avoidance. N/A

B. Project Failures.

1. Safety. No project specific safety incidents reported. However, during the course of work there were a few traffic accidents that occurred in the detour configurations. Fault of the accidents were attributed to the drivers and citations were issued. Accidents resulted in minor injuries to the vehicle occupants.
2. Work Zone Traffic Control Measures. Congestion occurred during heavy traffic flow due to Design-Builder work vehicles parked alongside the roadway shoulders. Under direction from ODOT the Design-Builder relocated their work vehicles and designated roadway shoulders for short term parking only.

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 Sutherlin to Roseburg Section 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 Sutherlin to Roseburg Section project. In fact, six (6) design-build teams submitted Statement 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 design-bid-build model. ODOT concluded that if Oregon experienced similar results, it could expect to realize a total savings of approximately \$2,045,000. 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 construction phases using

the design-build method, ODOT could reduce preliminary engineering costs by approximately \$100,000 on the Sutherlin to Roseburg Section project, as compared to the design-bid-build model. Project data on preliminary engineering indicates a savings of about \$2,625,000.

- b. Inflation. In the original exemption findings ODOT assumed that using design-build would result in project completion 1 year earlier than if the project was delivered using design-bid-build. ODOT estimated savings of approximately \$735,000 at three (3) % inflation rate. The completion of project work 18 months ahead of the estimated design-bid-build schedule resulted in greater cost savings compared to that for the assumed 12 months time savings. In addition, construction material costs increased an average of approximately 10 % annually during the project period.
3. Schedule Changes. ODOT approved additional work and features on this project, resulting in extending the scope of the contract. Without those scope additions, the project was anticipated to be complete by November 20, 2006. All original contracted work was substantially completed on time, except for a small portion of sidewalk and striping that required schedule delay to accommodate additional time needed to address right-of-way and utility issues that were outside the Design-Builders control.

ODOT issued the following amendments to the original contract time, extending contract completion by approximately 24 months to accommodate schedule delays and added work. Contract time change amendments are listed chronically.

- a. Added - Asphalt striping Inlay extended original final contract completion date by 12 days
- b. Schedule delay - Purchasing additional right-of-way for Sutherlin Interchange extended revised final contract completion date by 48 days.
- c. Added - New ramp and signal construction extended revised final contract completion date by approximately 10 months.
- d. Added - Onsite work and contract time extension extended revised final contract completion date by approximately nine (9) months.
- e. Delays in project close out extended revised final contract completion date by approximately three (3) months.

If this project had been a traditional design-bid-build project with the same additional work and delays, it could be assumed to have added at least the same additional 24 months to complete.

4. Commercial Traffic/Industry Savings. Design-Builder's scheduling and staging of work activities and temporary traffic control measures exceeded ODOT's quality,

technical approach, schedule and safety expectations. Through the use of the design-build delivery method and exceptional traffic control measures ODOT and the Design-Builder jointly saved the traveling public significant inconvenience by eliminating traffic delays, detours and slower posted speeds sooner than what would have been needed if design-bid-build had been utilized. ODOT estimates that it saved the industry and public an estimated additional road user costs of about \$760,000 per month by avoiding the additional 18 months needed to complete the project if the design-bid-build delivery method had been utilized.

D. Lessons Learned:

1. Design-Builder expedited the environmental permitting process and ensured full compliance by maintaining a direct relationship with regulatory agencies and environmental specialists throughout the project.
2. Design-Builder had representatives from their environmental / planning, design, and construction functions collaborate with ODOT and attend pre-design and post-design working sessions, accelerating the design acceptance process.
3. Design-Builder's Quality Plan was a key deliverable from an independent firm. Initially the independent firm had difficulty carrying out the quality functions. ODOT initiated a special partnering session addressing Agency's concerns to the independent quality team and Design-Builder staff resulting in a second layer of quality assurance, and excellent documentation of job site compliance and non-compliance.

IV. Summary.

In conclusion, the Sutherlin to Roseburg Section project exceeded expectations in ODOT's original exemption findings, supporting granting an exemption from competitive bidding. The project demonstrated that the design-build method saves ODOT time and money for construction projects as compared to the traditional design-bid-build method.

The project was completed ahead of schedule with no 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 model implemented on the Sutherlin to Roseburg Section project saved ODOT significant dollar amounts. Furthermore, ODOT saved motor freight industry and traveling public about \$13,680,000 in additional road user costs by completing the project 18 months earlier than the estimated completion timeline needed if design-bid-build delivery method had been utilized.

SUMMARY COMPARISON			
Evaluation Factor	Sutherlin to Roseburg Section (Design-Build) Projected	Sutherlin to Roseburg Section (Design-Build) Actual	Typical Design-Bid-Build
Project Cost	\$48,879,690	\$49,356,661	\$61,972,512
Project Duration	23 Months	48 Months (see note below)	66 Months (see note below)

Note: See Sections II.A. and III.C.3. – discussion on added scope and extending project duration.