



Improved Documentation Could Better Substantiate Highway Construction Contract Change Order Costs

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Marlene Hartinger, Chief Auditor
Jim Scott, Principal Internal Auditor

AUDIT SERVICES

Oregon Department of Transportation

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CIAC Audit Subcommittee Members:

Sharon Smith, Commissioner

Kris Strickler, Director

Bob Gebhardt, Chief Administrative Officer

Tom McClellan, DMV Administrator

Mac Lynde, Deputy Administrator, Delivery & Operations Division

Dear Subcommittee Members:

This is the final report of a series on project delivery included in our 2018 – 2019 Audit Plan, and the second of two recent reports on highway construction contract change orders (CCOs). With project delivery a priority for the department and its stakeholders, we looked at ODOT's practices related to change order pricing.

Highway construction contract change orders are not directly subject to competitive bidding. As a result, Resident Engineers employed a variety of practices to independently estimate or otherwise justify costs of change orders. In total, we tested cost estimating approaches for 337 pay items with an authorized cost of almost \$13.1 million from 41 CCOs.

Based on our work, for greater transparency and accountability we recommend that ODOT improve certain aspects of CCO supporting documentation, provide additional guidance on evaluating contractor cost reduction proposals, and take steps to better assure that unbalanced bids are not adversely affecting highway construction contracts.

In its response, management agreed with the recommendations and provided a description of their planned actions along with the anticipated completion dates.

We appreciate the courtesies and cooperation extended to us by staff from the ODOT Contract Administration Unit and Resident Engineer Offices. Please contact me if you have questions about this report or the audit process.

Sincerely,



Marlene V. Hartinger, MBA, CPA, CIA
Chief Auditor

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IMPROVED DOCUMENTATION COULD BETTER SUBSTANTIATE HIGHWAY CONSTRUCTION CONTRACT CHANGE ORDER COSTS

EXECUTIVE SUMMARY

This audit is one of a series on project delivery, and the second of two reports¹ on Oregon Department of Transportation (ODOT) highway construction contract change orders (CCOs). Our audit objective was to analyze the consistency in approach used by Resident Engineers (REs)² in estimating cost changes for CCOs. This topic emerged from discussions with Associated General Contractors, Oregon-Columbia Chapter. We also looked at other cost aspects of CCOs as described starting in Question 18 below.

A CCO modifies the contract between ODOT and the contractor and takes precedence over all other contract documents. CCOs may be needed to correct deficiencies in the bid documents or plans, respond to contractor requests to change materials or methods, address emergent issues such as landslides or unforeseen conflicts, incorporate new requirements into the project, or modify non-financial terms of the contract such as the project completion date.

Since CCOs were not directly subject to the competitive bidding process, REs employed various other practices to estimate and evaluate CCO costs. To compare cost estimating practices, we reviewed CCOs that were signed off by the Contract Administration Unit in fiscal year 2018 with a net cost exceeding \$100,000 and individual pay items that exceeded \$100,000 regardless of the total net amount of the change order. In total, we tested cost estimating approaches for 337 pay items with an authorized cost of almost \$13.1 million from 41 CCOs. Because of the detailed nature of the analysis, we chose a **question** and *answer* format to present the results of our review.

Based on our work, we recommend that ODOT improve certain aspects of CCO supporting documentation, provide additional guidance on evaluating contractor cost reduction proposals, and take steps to better assure that unbalanced bids are not adversely affecting highway construction contracts.

¹ The first report on CCOs (19-03) assessed the significance of change orders in terms of time and cost, as well as timeliness of change order payments. That report can be found on ODOT's web site at <https://www.oregon.gov/ODOT/Programs/Internal%20Audit%20Reports/19-03%20Construction%20Change%20Orders.pdf>.

² Resident Engineers were formerly known as project managers.

AUDIT RESULTS

RES USED VARIOUS METHODS IN DEVELOPING INDEPENDENT COST ESTIMATES

1. What direction does the ODOT Construction Manual provide REs regarding preparation of independent cost estimates for CCOs?

The ODOT Construction Manual requires that the CCO documentation include an independent calculation with a cost justification or analysis for all CCOs with a change in costs. For this audit, we considered an independent cost estimate to be supporting documentation that recorded the RE's calculation of a CCO pay item cost and showed that cost (could be total or incremental). Supporting documentation that referred to a calculation method but did not record a specific cost, as well as other approaches, we considered justification and not a cost estimate.

2. What portion of the time did ODOT REs document independent cost estimates?

ODOT REs documented independent cost estimates for about 51% of the authorized costs we reviewed.

3. What were the different practices used by REs in estimating costs?

The different practices used by REs to estimate costs included time and materials, comparison with other bids or installation costs, third-party estimates,³ comparison with or use of the original bid price, corrections to the contractor's proposal, factor analysis that justified a cost adjustment, tracking reported actual costs, and using a third-party quote for restocking material.⁴

4. How widespread were cost estimating practices among the REs included in our review?

Only four methods cited above were used by more than one RE. Time and materials was by far the most common basis used for cost estimates in our test population, employed by 15 of 21 REs. The other methods used by more than one RE included comparison with other bids or installation costs (6 REs), comparison with or use of the original bid price (5 REs), and third-party estimates (4 REs).

³ We counted cost estimates prepared by consultants working on behalf of ODOT and other ODOT employees as prepared by ODOT REs.

⁴ An estimate for costs less than \$3,200 did not have sufficient documentation to determine the method used.

5. What components made up ODOT time and material cost estimates?

ODOT time and material cost estimates included some combination of labor, equipment, and materials.

6. What sources of information for the cost estimates were cited in the CCO documentation?

CCOs did not always cite the sources for the resources needed and the associated estimated costs of labor, equipment, and material. When sources were documented, for labor REs typically cited the use of fully burdened labor rates or the higher of BOLI/Davis-Bacon wage rates. For equipment, the Rental Rate Blue Book was most commonly specified. Estimated materials costs generally came from suppliers' quotes, online supply sites, or subcontractor agreements. Although the source for the resources needed was seldom documented, some REs did outline assumptions made in preparing the estimate.

7. Does the ODOT Construction Manual require ODOT REs to prepare specific documentation for their independent cost estimate?

No, though the Construction Manual provides Cost Estimate (734-1877) and Wage Determination (734-1870) forms as an option for time and materials estimates.

8. How frequently were those forms used for time and materials estimates?

The Cost Estimate form was used for 59 of the 85 pay items (69.4%) with a documented ODOT cost estimate based on time and materials. The Wage Determination form was used for only one pay item.

REs ALSO JUSTIFIED CCO COSTS WITHOUT SUBMITTING A COST ESTIMATE

9. Other than cost estimates, what other approaches did REs use to justify CCO costs?

Other approaches used by REs to justify CCO costs included comparison of the contractor's proposal with or use of the original bid price without a corresponding cost estimate and comparison with external costs such as other bids. Some documentation evidenced review of a contractor's proposal through marked up contractor submissions or email exchanges but did not specify the basis used. Additional approaches included tracking costs, using an invoice as the

basis, and evaluating the percent of change order value represented by the item.⁵

10. How widespread was each method used?

Of the 12 REs that used a method other than an independent cost estimate, comparison with or use of the original bid price was the most common, used by 8 REs. The other two methods used by more than one RE included reviewing the contractor's proposal (3 REs) and comparing the proposed CCO cost with other bids (2 REs).

**JUSTIFICATION FOR USE OF
ORIGINAL BID ITEM UNIT
PRICES WAS NOT CLEARLY
DOCUMENTED**

11. Regardless of whether or not a cost estimate was documented, how often was CCO work paid for at the original bid item unit price?

In 105 of the 337 cases, work was paid for at the original bid unit price.

12. What criteria did REs use to determine the reasonableness of original bid unit prices?

When original bid prices were used, the CCO documentation did not include any discussion on steps taken to assess the reasonableness of the original bid unit prices.

13. For instances in which the original bid unit price was used, how did the contractor's unit price compare with the unit price of the final engineer's estimate? ⁶

The contractor's price was below the final engineer's estimate in 52 of 105 cases, agreed with the final engineer's estimate in 10 cases, and was above the final engineer's estimate in 43 cases. In dollar terms, the net difference was about \$181,400 above the amount indicated by the final engineer's estimate.

Moreover, six items were identified by the Office of Project Letting for monitoring due to the potential of unbalanced bidding; however, the CCO documentation did not include evidence that noted the monitoring recommendation or justified the decision to use the contractor's original bid price in light of such potential.

⁵ Justifications for about \$1 million in costs had insufficient documentation to determine the method used. In some cases, an RE may have documented a cost justification that did not tie directly to the CCO pay items.

⁶ Although the final engineer's estimate attempts to set a "fair" value, it should not be considered a precise calculation of the amount that should be paid for a specified scope of work.

**SUPPORT FROM
CONTRACTOR ON
PROPOSED COSTS NOT
CONSISTENTLY INCLUDED
IN CCO DOCUMENTATION**

14. Did the CCO documentation consistently include the contractor's estimated cost?

CCO documentation included the contractor's estimated cost for about \$8 million of the almost \$13.1 million in CCO authorized costs included in the analysis. For an additional \$0.7 million of authorized costs, CCO documentation referred to but did not provide the contractor's estimated costs.

15. When the contractor's estimated cost was provided, did the CCO documentation consistently include a quote, proposal, or similar supporting cost documentation from the contractor?

CCO documentation included supporting cost documentation from the contractor for about \$6.4 million of the \$8 million of CCO authorized costs that included the contractor's proposed costs.

16. When original bid unit prices were not used, how often did the CCO pay item unit price agree with the contractor's proposal and how often with the ODOT cost estimate?

Excluding items with a CCO cost based on the original bid price or tracked costs, in terms of frequency the contractor's proposed cost agreed with the CCO unit price about 70% of the time, ODOT estimated costs agreed with the CCO unit price about 10% of the time, and there was insufficient documentation to determine about 15% of the time. In dollar terms, these rates were 52%, 14%, and 30% respectively of the \$7.7 million in such CCO costs.⁷

17. How often were reported actual costs used?

Reported actual costs, either tracked or invoiced, were used as the basis for the CCO cost for 16 pay items (4.7%).

**OTHER COST ANALYSES
IDENTIFIED POTENTIAL
RISKS WARRANTING
ODOT ACTION**

18. In addition to cost estimation and cost justification practices discussed above, what other construction contract cost aspects were reviewed as part of this audit?

As part of the combined audit, we also reviewed contractor cost reduction proposals from contracts that reached third notification in CY 2017 and contract change orders signed off by the Contract Administration Unit in fiscal year 2018. Last, for contracts that reached third notification in CY 2017 we

⁷ The remainders for both frequency and dollars were made up of low count, low value other categories.

looked at differences between the contractor's bid unit price and the final engineer's estimate unit price in terms of the relationship between actual quantities and bid quantities, and the hypothetical effect on determining the low bid based on actual quantities at the bidders' unit bid prices.

19. What was the dollar range of contractor cost reduction proposals included in the audit?

There were nine contractor cost reduction proposals in our audit population, but we excluded one from our analysis because it was structured as an adjustment to a lump sum item. The dollar values of the reported savings for the others ranged from about \$9,700 to \$2 million. The contractors received 50% of the reported savings after applied ODOT costs were deducted, though in one case the savings were not paid to the contractor because the anticipated reduction for one bid item did not occur.

20. What observations emerged from the review of contractor cost reduction proposals?

We noted four observations from our review of contractor cost reduction proposals:

- First, REs seldom documented a cost evaluation of the bid items affected, even when bid unit prices exceeded the final engineer's estimate by more than 25%. Section 140.70 of the Standard Specifications describes the terms that apply when a contractor submits a written proposal that modifies plans, specifications, or other contract documents for the sole purpose of reducing the total cost of construction. This section also gives the ODOT Engineer the flexibility to disregard the Schedule of Items and establish prices that represent a fair measure of the value of the work to be performed or deleted as a result of the cost reduction proposal. For the eight proposals we reviewed, we did not see any examples of the adjustments allowed by the Standard Specifications, and found only one instance when a cost evaluation was documented.*
- Second, we have questions about the approach or costs included in calculating the amount due to the contractor in two instances. In one case, the savings were based on anticipated additional flagging hours that were not part of the original contract or included*

in an approved CCO. In the second case, the amount paid to the contractor appeared to include lost subcontractor profit due to reduced subcontractor work resulting from the proposal if accepted.

- *Third, ODOT costs were not always deducted as part of calculating the amount due the contractor and the documentation was not clear whether no costs were incurred by ODOT in those cases.*
- *Fourth, one of the contractor cost reduction proposals included a penny bid item (that is, the bid unit price was \$0.01/ton of cement). CAU management reported that penny bids can create challenges in determining the appropriate amount of savings in cost reduction proposals.*

21. For projects that reached third notification in CY2017, what was the relationship between a contractor's bid unit price in relation to the final engineer's estimate and the actual quantity in relation to the bid quantity?

For bid items with unit pricing, the number of items where the paid quantity was higher than the bid quantity was not independent of the contractor's unit price in relationship to the final engineer's estimate unit price. That is, there were more items where the paid quantity was higher than the bid quantity if the contractor's unit price was higher than the final engineer's estimate. Likewise, there were fewer items where the paid quantity was higher than the bid quantity if the contractor's unit price was lower than the final engineer's estimate.

22. For projects that reached third notification in CY2017, how sensitive was the determination of the winning bid in relation to changes in quantity, assuming the bidders' original bid unit price does not change?

Using original bid item costs to determine the updated winning contractor, applying the actual quantities paid at the original bid unit price would have resulted in 12 different winning contractors from the 80 contracts that reached Third Notification in CY2017. In dollar terms, ODOT would have paid about \$1.1 million less out of the \$276.1 million paid for the original bid items if the revised new bidders had been awarded the contract. This analysis assumes that the bidders' unit prices would not have changed with the new (actual) quantities and does not take into account the uncertainty

surrounding the pricing of CCOs that were not reflected in changes in quantities of original bid items that would affect the revised total contract cost.

RECOMMENDATIONS

- A. Assure that the level of CCO documentation aligns with the desired level of transparency and accountability. Examples include documentation sufficient to identify the relationship between the CCO cost and the contractor's proposed cost, and circumstances under which consideration of the final engineer's estimate in relation to original bid prices, when used for CCO costs, must be included in supporting documentation.
- B. Include in the CCO documentation the contractor's written cost estimate when provided.
- C. Provide additional guidance on evaluating cost reduction proposals.
- D. Periodically review bid prices for the potential of unbalanced bidding that could affect the award of contracts and total cost to the public under various actual scenarios.

OBJECTIVE, SCOPE AND METHODOLOGY

Our audit objective was to analyze the consistency in approach used by Resident Engineers in estimating cost changes for CCOs. The scope included CCOs that were signed off by the Contract Administration Unit in calendar year 2018 with a total net cost exceeding \$100,000 and individual pay items that exceeded \$100,000 regardless of the total net amount of the change order. We excluded transactions related to dispute settlements and analyzed transactions related to contractor cost reduction proposals separately. We also looked at two cost aspects that could be affected by unbalanced bids: contractor cost reduction proposals and determining the low bid.

To achieve our audit objective, we took the following steps:

- Identified CCOs within our audit scope
- Extracted general information for each CCO from a database maintained by CAU
- Reviewed CCO supporting documentation available on the CAU shared drive and —
 - Identified the cost justification basis for each CCO pay item when available

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- Verified the existence of specific supporting documents such as cost estimate and wage determination forms
 - Recorded various information from the ODOT and contractor costs estimates available in the supporting documentation, as well as other documents in the CCO support
- Analyzed and summarized information in various ways

In analyzing the eight contractor cost reduction proposals in our test population,⁸ we took the following steps:

- Determined whether supporting documentation included a cost evaluation or justification
- Compared the winning contractor's overall bid total with the final engineer's estimate
- Compared the extended cost (quantity x unit price) of all affected pay items with the cost derived using unit prices from the final engineer's estimate
- Determined whether ODOT costs were deducted from the savings credited to the proposal
- Reviewed the CCO documentation to identify any extenuating circumstances
- Looked for trends, exercising caution due to the small number of cases

We also performed bid analysis for the 80 projects that reached third notification in CY17. To do so, we applied the unit price from each bidder to the actual quantities paid for under each contract and derived a hypothetical revised bid price. The low revised bidder was identified and compared to the actual low bid contractor based on bid quantities to identify different outcomes. For those contracts in which the winning bidder and low revised bidder was different, we also computed the theoretical cost difference between the two based on actual quantities paid.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We

⁸ A ninth proposal was an adjustment to a lump sum item and excluded from our analysis. Also, one of the eight was ultimately not paid because anticipated savings did not occur.

believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

MANAGEMENT RESPONSE



Oregon

Kate Brown, Governor

Department of Transportation
Construction Section
800 Airport Road, SE
Salem, OR, 97301-4792
Phone: (503) 986-3000
Fax: (503) 986-3096

April 3, 2020

Marlene Hartinger
ODOT Chief of Audits Services
355 Capitol St. NE
Salem, OR 97301

RE: Response to Internal Audit of Approach used by Resident Engineers in estimating cost changes for Contract Change Orders

Dear Ms. Hartinger:

Please accept this as our response to the April 2020 audit report that assessed ODOT's Approach used by Resident Engineers in estimating cost changes for Contract Change Orders (CCOs).

We welcome this audit of ODOT CCO estimating process for current challenges and opportunities for future improvements. The work by your team furthers our on-going continuous improvement efforts in our construction program.

We have carefully reviewed each recommendation and provide our response below.

Recommendation A

Assure that the level of CCO documentation aligns with the desired level of transparency and accountability. Examples include documentation sufficient to identify the relationship between the CCO cost and the contractor's proposed cost, and circumstances under which consideration of the final engineer's estimate in relation to original bid prices, when used for CCO costs, must be included in supporting documentation.

Management Response

We agree with this recommendation. ODOT Construction Section will work to develop guidance in the Construction Manual Chapter 15. Further, documentation will support ODOT's Transparency and Accountability public reporting as provided at the website <https://www.oregon.gov/odot/TAP/Pages/ProjectInformation.aspx>. ODOT Construction Section anticipates completing this guidance by April 2021.

Recommendation B

Include in the CCO documentation the contractor's written cost estimate when provided.

Management Response

We agree with this recommendation. ODOT will reinforce the guidance developed in Recommendation 1 during Quarterly and Annual Resident Engineer meetings along with including this guidance in new Resident Engineer and Assistant Resident Engineer Orientations. ODOT Construction Section anticipates this effort will be a routine review agenda item during Resident Engineer meetings.

Recommendation C

Provide additional guidance on evaluating cost reduction proposals.

Management Response

We agree with this recommendation. Documentation and instruction developed for Recommendation 1 will include instruction for cost reduction proposals guidance. ODOT Construction Section anticipates completing this effort by April 2021.

Recommendation D

Periodically review bid prices for the potential of unbalanced bidding that could affect the award of contracts and total cost to the public under various actual scenarios.

Management Response

We agree with this recommendation. ODOT Project Controls Office and Construction routinely review bids on bid day to assess unbalanced bids. Specification and process work will be conducted to bolster ODOT's ability to assess and monitor unbalanced bids at bid time and through the project's life. ODOT Construction Section anticipates completing this evaluation by April 2021.

Thank you for your staff's efforts in reviewing this portion of ODOT bidding processes and the recommendation noted above. We look forward to incorporating these recommendations as we work to continually improve our business practices.

Sincerely,



Joseph J. Squire, PE
State Construction & Materials Engineer