Oregon Department of Transportation

Special Experimental Project No. 14 (SEP-14) Final Evaluation Report

for the

Project: I-5: Willamette River Bridge, Bundle 220
Lane County

Construction Manager / General Contractor ("CM/GC") Method

Key Number 14259
ODOT Contract No. C13480

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Table of Contents

1 – Introduction

The Oregon Department of Transportation (ODOT) submits this final evaluation report under the provisions of Special Experimental Project No. 14 (SEP-14) for the use of the alternative contracting method Construction Manager / General Contractor ("CM/GC") for transportation projects. The purpose of this final evaluation report is to fulfill the reporting requirements of the Work Plan for SEP-14 regarding the evaluation of the CM/GC contracting method as provided by ODOT to the Federal Highway Administration (FHWA) on May 17, 2007.

This final report includes a brief scope of the CM/GC project, a brief history of the contracting process, and summary evaluation of project innovations, along with suggestions, lessons learned, and recommendations pertaining to the use of the CM/GC project delivery and contracting method on other projects.

The CM/GC contracting method is an innovative process which is being considered and utilized by State transportation agencies for construction of highways, buildings, and bridges. CM/GC may be defined as an integrated team approach applying modern management techniques to the planning, design and construction of a project in order to control time and cost, and to assure quality for the project owner. The team consists of the Agency (ODOT), the Architectural & Engineering (A&E) firm (retained by the Agency), and the CM/GC. The A&E is selected utilizing a standard qualification-based consultant selection process, and the CM/GC is selected utilizing a qualification-based Request for Proposal (RFP). The CM/GC Contract includes both Pre-construction and Construction Phase Services.

2 – Background

2-1: The Project

The I-5 Willamette River Bridge, Bundle 220 CM/GC project (the "I-5 Willamette River Bridge project") replaced two (2) bridges on Interstate 5 (I-5) in Lane County, Oregon, the 1800-foot Willamette River Bridge, and the 100-foot Canoe Canal (a.k.a. "Patterson Slough") Bridge. ODOT built detour bridges at both locations in 2004. ODOT decommissioned the existing Willamette River Bridge. Both detour bridges and the decommissioned bridge were removed as part of the project. I-5 runs generally north-south in the project area, forming the boundary between the cities of Eugene to the west and Springfield to the east. The project area is located within the urban growth boundary of both cities.

In addition to crossing the Willamette River, the new north-bound and south-bound bridges crossed multi-use paths, Franklin Boulevard, two (2) Union Pacific Railroad tracks, and the north-bound I-5 to west-bound Franklin Boulevard off-ramp. With I-5 being the West Coast's major trade corridor and one of the top freight routes in the nation, traffic flow had to be accommodated on all of these facilities during construction.

The new Willamette River Bridges were constructed at the same location as the old Willamette River Bridge, but required roadway alignment adjustments in the immediate project area as the bridge design dictated. The new Willamette River Bridges were designed to eventually carry up to six (6) lanes of traffic (three lanes in each direction) to accommodate the 20-year design for future traffic needs. The Canoe Canal Bridge was also designed to eventually carry up to six (6) lanes of traffic to accommodate the 20-year design for future traffic needs. The new bridges will keep I-5 traffic moving safely over the Willamette River for the next 100 years and the bridges were designed and constructed to have significantly less environmental impact on the Willamette River than the previous bridge. As part of ODOT's commitment to the Eugene-Springfield communities, ODOT also

made improvements to the park lands in the project area to enhance the natural habitat and improve mobility for park path users.

The A&E contract was awarded in May 2008 and the CM/GC Contract was awarded in June 2008.

Notice-to-Proceed for the CM/GC Contract was issued on June 17, 2008 and construction was completed on July 30, 2015. Additional work to construct a bike/pedestrian viaduct that provided significantly safer passage between the cities of Eugene and Springfield and established additional connectivity with the other shoreline and commercial pathways in the Glenwood area of Springfield was included in the project scope of work. Funding sources for the project were Oregon Transportation Investment Act and Federal Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) earmarked funds. The Guaranteed Maximum Price (GMP) for the CM/GC Contract was $149,599,363.56, and the Adjusted CM/GC Contract Amount (total amount paid to the CM/GC) was $148,824,363.56.

The initial CM/GC Contract scope of work consisted of the contractor providing Pre-construction services. Under the provisions of the CM/GC Contract, ODOT utilized Early Work Amendments (EWAs) and Contract Change Orders (CCOs) to add construction work in phases to the Contract's scope of work.

2-2: Pre-Construction Phase

The scope of the Pre-construction Phase was to produce the final design and specifications for the replacement of the I-5 Willamette River Bridge and I-5 Canoe Canal Bridge while successfully deploying the first CM/GC delivery method on an ODOT project. During the pre-construction phase the CM/GC provided the following services:

- Collaborate with the Agency and A&E to develop the project
- Collaborate on project goals and outcomes with the Project Development Team consisting of representatives from ODOT, FHWA, Lane County, and Cities of Eugene and Springfield, and the Community Advisory Group consisting of representatives from local neighborhood associations, parks departments, a park advisory committee and the University of Oregon
- Identify and mitigate risk through analysis and assessment
- Develop and update project schedules
- Develop detailed cost estimates
- Collaborate with ODOT and A&E in development of project permitting and design development packages including early work packages.
- Perform constructability reviews, review plans, specifications, reports, and other information

2-3: Construction Phase

Under the CM/GC Contract and under EWAs and CCOs for the construction phase, the CM/GC provided collaboration with ODOT and the A&E to execute the project, performed all required construction work utilizing subcontractors and its own forces, developed and updated project schedules, provided reporting and project management of its own forces and subcontractors, and provided materials, tools, equipment, labor and professional and non-professional services.

2-4: Best Value Contracting

ODOT utilized the best value CM/GC method to address project needs by evaluating components which include contractor's organization, personnel qualifications and expertise, understanding of roles and responsibilities, project approach, fees, and interviews, as well as price, which results in a "Best Value" selection of the prime contractor. This procurement method encompasses the Oregon Legislature's focus on economic efficiency and stimulation and provides recognition of the value to the public of employing enhanced contracting methods, which will accomplish the required work in the most effective manner.

ODOT received permission to use best value contracting in the form of the CM/GC method for the complicated construction constraints and technical requirements of the I-5 Willamette River Bridge project. ODOT's Director approved exemption Number 2007-51 to the low bid process on December 2, 2007, as provided for in the Oregon Revised Statutes 279C.335. FHWA approved ODOT's use of the best value CM/GC method on May 22, 2007.

3 – Report

3-1: Project Costs

- **3-1.1: Early Work Amendments and Contract Change Orders**

There were 14 EWAs, 136 CCOs, and a GMP Amendment issued for the project.

- **3-1.2: Extra Work Orders**

There were three (3) Extra Work Orders issued for the project. These were for erosion control maintenance, potholing, and replacement of temporary impact attenuator components.

- **3-1.3: State Force Orders**

There were 14 State Force Orders issued for the project. These were for Railroad Protective Costs, Utilities and Local Government Payments, and State Furnished Materials.

Table 1 – I-5 Willamette River Bridge Project Costs

Description	Estimate	Final Cost	Variance Over/(Under)
Pre-Construction Phase	$ 2,291,299.00	$ 2,165,140.00	$ (126,159.00)
Construction (*)	$ 177,625,034.53	$ 146,659,223.56	$(30,965,810.97)
Adjusted Contract Amount	*$ -*	***$ 148,824,363.56***	*$ -*
State Force Orders	$ -	$ 1,390,528.60	$ 1,390,528.60
Contingency	$ 80,195.47	$ -	$ (80,195.47)
Engineering (*)	$ 1,500,000.00	$ 12,702,311.15	$ 11,202,311.15
Subtotal Cost	*$ -*	***$ 14,092,839.75***	*$ -*
Totals	**$ 181,496,529.00**	**$ 162,917,203.31**	**$ (18,579,325.69)**

(*) Final Construction Cost: Combined amounts for project Adjustments, EWAs, CCOs, and Extra Work Orders.
(*) *Engineering Estimated Cost: ODOT authorized amount to start pre-construction.*

4 – Conclusions

4-1: Final Project Remarks

- **CM/GC Method Effects on Work Performance, Quality, and Completion Time:**
  - Work Performance and Monitoring: The CM/GC process enabled the project team to work side by side to track the work progress. The CM/GC completed a 3D model of the project site, which not only allowed the project team to verify that the engineer's estimated quantities were accurate during the estimating process, but it also worked as the baseline for monthly quantity checks. On a typical project, the Owner has to either estimate the percentage complete or they have to have their surveyors gather data and calculate earthwork volumes based on average end areas. Utilizing 3D modeling, the Owner is able to not only gather the data, but is also able to print out 3D drawings showing the area or earthwork volume being calculated along with the associated quantities. The Owner can then collect a few confidence points to verify the data being presented is accurate. The 3D model also provided the means for the Contractor to utilize GPS guided grading equipment.
  - Quality: The atmosphere of the project fostered collaboration among the project team and key stakeholders, which created a project team that looked out for each other. The project team worked very closely with DMWESB contractors to make sure that they were spending the time up front to get their work planned before arriving on site. This included getting the appropriate approvals and all the necessary documentation needed before they installed their work product.
  - Completion time: Project construction completed on July 30, 2015 and the new bridges opened to traffic per the final Contract. Completion of the I-5 Willamette River Bridge project restored and enhanced a vital transportation link in the highway connecting the Western U.S to Canada and Mexico. At the same time, it has made travel easier for local drivers and has improved access for emergency vehicles and commuters between two vibrant Oregon communities.

    The original estimated completion date was December 12, 2012. Changes in project scope to build two separate north and south bound bridges and ODOT commitments to local communities added approximately 31 months to the project schedule. In spite of the additional time, the project still took significantly less time than the estimated time required if the project had been delivered under the design-bid-build method.
  - Costs: ODOT estimated approximately $164M for project construction costs. Actual project construction costs were $146,659,223.56, approximately $17M less than the original cost estimate.
- **Project Innovations:**
  - The I-5 Willamette River Bridge north and south bound structures incorporates three distinct methods of bridging – reinforced box, reinforced deck girder and signature arch span – with a focus on addressing the purpose of the Project while considering environmental and public concerns.

- Instead of disposing of all the materials from the demolished temporary detour bridge into a landfill, ODOT salvaged more than 200 concrete and steel beams, and sold them to other agencies that include Multnomah County, the City of Florence, and the U.S. Forest Service. ODOT realized significant savings by avoiding the cost to move and store or dispose of the beams.
- ODOT reused 50 precast box girders from the demolished temporary detour structure to construct a viaduct to extend the south bank multi-use path along the Willamette River. The new path significantly improved commuter safety for cyclists and pedestrians, and provides a beautiful view of the river and the I-5 Willamette River Bridge.
- ODOT's requirement to stay within the existing right-of-way resulted in the reconstruction of the I-5 freeway and connector ramps within their current right-of-way footprints. This required complicated construction sequencing, resulting in nine traffic control stages which the A&E consultant roadway engineers modeled in 3-D. These models accurately reflected the precise size, location, and elevation of each temporary and permanent construction feature to identify and resolve potential construction conflicts before they could lead to construction delays in the field. Construction progressed with no significant conflicts or modeling busts.

- **Awards**:
  - The I-5 Willamette River Bridge project received 21 awards for excellence in multiple categories including; concrete construction, engineering, best transportation projects, safety, public relations and participation, video and electronic multimedia, and Oregon heritage. The project received more awards than any other single project in the Oregon Transportation Investment Act III State Bridge Program.

4-2: Lessons Learned and Recommendations Pertaining to the use of the CM/GC Project Delivery and Contracting Method on Other Projects

a. Project Development and Management:

- Spend more time up front defining the risks involved in the project and how the risks should be distributed. Understand what risks can be insured, and what risks are better paid out of pocket.
- Listen to the CM/GC and take advantage of their experience and expertise, attempt to understand why they want to build the project in a certain way.
- Do not use the CM/GC method if your highest priority is a low bid price. A CM/GC is selected based on its reputation, previous performance, qualifications, experience, and your expectation that they could perform the job.
- Provide pricing guidelines for CM/GC-owned equipment and construction materials in the RFP, establish clear expectations for monitoring/recording/reporting equipment costs and other items in the estimate that are not paid by invoice.
- Do not use construction managers or design consultants to review cost estimates. Use estimators that have experience estimating similar work.

Consider the Colorado and Utah methods of determining ranges of acceptable prices.

- Owner needs to insure that internal groups are in alignment with owner's approach in managing CM/GC projects and how negotiations are organized and conducted.
- To ensure stability and alignment in how the project moves forward through the pre-construction phase to the construction phase, bring the Project manager on board before the selection of the CM/GC.
- Committing to early work packages for major/critical project work to be performed by the CM/GC creates trade-offs between making schedule and controlling cost, competitive pricing is difficult to achieve.
- Provide a collaborative and cooperative environment for the project team and key stakeholders to work together, enhancing the project team's ability to develop and implement workable solutions to mitigate environmental impacts.
- For the procurement process, the owner will benefit in knowing actual overhead cost of the CM/GC by being more specific in what the CM/GC has to include in their fee. Fee should include detailed information and break down of what constitutes overhead cost, such as local office and staffing requirements.

b. Benefits of CM/GC Contract:

- CM/GC engages at-risk construction expertise early in the design process to enhance constructability, manage risk, and facilitate concurrent execution of design and construction without the owner giving up control over the details of design.
- Selection of the designer and contractor is based on qualifications / expertise, while preserving competitive bidding at the subcontractor / trade level.
- The later in the design process that a GMP is established, the less "risk protection contingency" is required to cover the risk.

c. Establishing GMP:

- The CM/GC and ODOT had different views regarding certain pricing issues including use of lump sum prices and the extent to which the CM/GC and its subcontractors were subject to audit and reconciliation, which was an issue for ODOT's ability to more easily confirm costs and realize cost savings.
  - These differing views caused a postponement of the setting of the GMP, but the parties did ultimately reach agreement on the final adjusted Contract price of $148,824,363.56 and GMP (the GMP was set at $149,599,363.56), using the pricing within the EWAs and CCOs as the basis.
  - <u>Recommended Improvement</u> - A clearer process and Contract terms for pricing, auditing, and reconciliation of costs and transitioning from EWAs and CCOs to a GMP.

d. Project Cost Documentation:

- Cost documentation primarily did not follow the schedule of values or task item breakdown that comprised the EWAs and CCOs.
  - Recommended Improvement – Owner and CM/GC make advance preparation to correlate the pay estimate and EWA / CCO itemization, to the manner in which costs would be recorded in cost documentation (and system) maintained by the CM/GC. Require the CM/GC to provide a monthly reconciliation of overall costs invoiced and paid to vendors, trades, etc.

e. Ensuring Project Records Exist:

- Lack of detail pricing or basis for estimates made it difficult to reconcile line items of work and identify cost savings that may have been realized.
  - Lesson Learned - The level of detail that is provided in the cost estimates and pricing during the development of the EWAs and CCOs serves to allow verification of the accuracy of the pricing during the change order review / negotiation process, but also verification of the reasonableness of assumptions made.

f. Importance of Contract Language:

- The CM/GC Contract attempted to establish a method by which savings that could be recovered, and adjustments in pricing made, to reflect "changes in Work or in the means, methods, or materials".
  - There was a difference in opinion between the parties that centered on the use of the term "lump sum" and its intended meaning.
  - Recommended Improvement – Include clearer language in the CM/GC Contract regarding permissible pricing and when and how cost and pricing issues will be addressed and resolved. And require the CM/GC (and its subcontractors) to create, preserve and make available to ODOT on request detailed records for all internal and external costs, expenses and expenditures and for all pricing and assumptions used.

g. Cost Estimate:

- During EWA negotiations ODOT placed too much importance on the value of the independent cost estimates as being a guarantee that the pricing was accurate.
  - Recommended Improvement – Obtain detailed pricing information from CM/GC and trades for use in negotiations and monitoring of project costs.

5 – Summary:

The use of the CM/GC contracting method accomplished the purposes stated in the Work Plan of producing a savings in time and cost for the project and enhancing ODOT's efficiency in its use of tax dollars for transportation projects while allowing for innovation in design and construction methods.