

**Colorado Department of Transportation Work Plan for SEP 14  
(Special Experimental Project) 14 Construction Manager at Risk Contract  
November 9<sup>th</sup>, 2009**

**2400 Medium Voltage Switchgear  
CDOT Project Number: IM 0703-248  
CDOT Subaccount Number: 17148**

**Mark Vessely  
Resident Engineer, Region 1 Mountain Residency  
P.O. BOX 599  
Dumont, Colorado 80436**

## **Introduction**

The Colorado Department of Transportation (CDOT) submits this work plan for review and approval as a Construction Manager/General (Construction Manager/General Contractor) also known as CM at Risk (Construction Manager at Risk) under the provisions of Special Experimental Project No. 14 (SEP 14) for use of innovative contracting practices.

The proposed CM/GC contracting method is an innovative process that has been successfully utilized in the private and public sector for construction of buildings, roadways, bridges, and ITS (Intelligent Transportation System) projects. The CM/GC contracting method utilizes an integrated team approach applying project management techniques to planning, design, and construction. The team consists of Department staff, an engineering firm, and a CM/GC firm. The A/E firm is procured through the standard department Consultant Selection process or NPS (Non-Project-Specific) available firms. The CM/GC firm is selected through a qualification-based, Request for Proposal process. This method provides both pre-construction and construction services throughout the project development process.

CDOT traditionally has used Design-Build, Modified-Design-Build, and Design-Bid-Build methods of contracting. However, we look for opportunities to use alternative and innovative contracting to maximize quality, safety, and deliverables while providing opportunity for innovation in design and construction methods. The CM/GC method utilized for this project would be our first undertaking with this particular contract delivery method. CDOT has established policy and guidelines for undertaking innovative contracting methods including CM/GC. As with CDOT's previous experiences with design-build and modified design-build, the department will assess and utilize lessons learned and processes developed from consultants and agencies that have had demonstrated successful results in managing CM/GC processes as a means to ensure that program and project objectives are delivered.

## **Purpose**

CDOT's approach to managing transportation projects has been through the use of the traditional design-bid-build process where a low bid is used to select a contractor. This process works well on conventional transportation projects where there is significant prior experience and expertise. Many of these projects do not have challenges that require innovative approaches to the design and construction phases. While the majority of the projects that CDOT delivers can be approached with the conventional development process, there are certain projects that are better managed under a different method that includes construction management during the design process. These projects may have the following criteria:

- Projects with limited budgets that require reliable cost control early in the project development process and where CM/GC alternatives can help contain costs

- Projects where construction input is required or recommended during the design process;
- Complex or unique construction where contractors timely input and experience is invaluable;

The proposed CM/GC method of contracting will place the responsibility of developing and integrating this project under a collaborative team that will include a single Contractor. This approach will provide deliverables with accurate function and quality, provide efficient project scheduling, coordination, and collaboration which will result in cost and time savings.

### **General Description of CM/GC**

"CM/GC augments the traditional scope of work of the general contractor with that of a construction manager under a single contractor with the owner. At an early point in the design phase, the owner, using a competitive selection process, selects a contractor to provide construction management and general contracting services. By joining the project team during design, the CM/GC firm can collaborate with the architect/engineer (A/E) on the development of the design and preparation of the design documents. Once the design has progressed to an acceptable level, the CM/GC firm submits a guaranteed maximum price (GMP) for the project to the owner. After agreement on a GMP is reached, the CM/GC firm undertakes the construction of the facility. The CM/GC firm procures subcontracts with trade contractors using multiple bid packages to construct the project and manages the construction process on behalf of the owner. General conditions work is typically self-performed by the CM/GC firm, and in some cases, the CM/GC firm may be allowed to self-perform portions of the trade work.

The CM/GC contracting method can benefit a construction project in a variety of ways. The process of selecting a CM/GC firm typically involves the consideration of more information than simply price. Owners can craft their own responsibility-based selection criteria tailored to the specific, and often unique, requirements of the project. This allows the owner to make a more informed selection to better benefit the project. Following CM/GC firm selection early interaction between the A/E and CM/GC firm allows for improving constructability, conducting value engineering reviews, and ongoing owner operations. Opportunities for saving cost result from the early input of construction knowledge and project management skills. Total project time is often reduced as a result of the ability to overlap the design and construction phases, the elimination of a stand alone bid period, and early determination of efficient and effective construction methods. One significant benefit of the CM/GC method comes from the close interaction of the project team members. Early involvement of the CM/GC firm helps build positive relationships between the team members that result in a collaborative, team approach to the project."

(Oregon Public Contracting Coalition Guide to CM/GC Contracting, February 2002)

### **Why CM/GC for this project?**

The proposed project is composed of work that requires a carefully managed collaborative process that will benefit from contractor support, experience, and value engineering suggestions during the entire project development process. The project scope does not fit the mold of the traditional road project and with a contractor onboard early as an advisor to the project team and designer, design and construction coordination should reduce time and costs.

This approach should significantly reduce the overall project schedule, reduce conflicts on the site and help prevent cost overruns. A reduction in design errors and omissions, change orders, and warranty issues is also anticipated.

The CM/GC firm's primary emphasis is to integrate design and construction phases of the project allowing creativity in developing the design that achieves the owner's goals.

The benefits of Construction Management at Risk are:

- Reliable cost control early in the project;
- Construction can be tailored to the strengths, talents, and resources of the CM/GC firm during the design phase;
- Opportunity to fast track material or items that have long lead times;
- Often results in lower cost than traditional design-bid-build because of the contractor involvement during the design phase;
- CM/GC firm serving as the General Contractor will self-perform work that is critical to quality and schedule;
- Improve coordination of construction;
- Provides the opportunity for accelerated project delivery and/or phased construction.
- A spirit of cooperation between the owner, designer, construction contractor, and trade contractors due to a defined allocation of project responsibilities and the CM/GC firm's interest in obtaining strong references for future work;
- Negotiate prices and scope with the contractor;
- Change the scope to fit the budget during the design process.

The CM/GC method allows the client to establish total cost, materials, and schedule before the design stage is complete. Conversely, design bid build costs are not known until bids are received at the end of the construction document phase. The CM/GC firm is chosen based on qualifications, and then the entire operation is centralized under a single contract. The owner, designer, and the CM/GC firm work together in order to review and refine the design. Then, the CM/GC firm gives the owner a guaranteed maximum price, and coordinates all subcontract work. The CM/GC firm then acts as the general contractor during the construction of the project and pre-qualifies and establishes procedures for all the construction trade contractors. Cost savings can be realized in a number of ways. By hiring the CM/GC firm during the design phase, early coordination is possible, which can increase the speed of the project and strengthen coordination between the designer, owner, and the CM/GC firm.

### **Innovative Contract Features**

The CM/GC firm will provide advisory professional management assistance prior to construction (design phase services). The CM/GC will have the latitude to recommend and implement design changes, provided a benefit is recognized.

Disadvantages of traditional "low bid" contract award:

- It discourages (or precludes) innovation in design and construction or installation methods.
- It does not allow the owner to consider any factors other than price in selecting the contractor (except at a fairly low responsibility pre qualification level),
- The contractor may have significantly reduced their profitability and may try to cut costs during design and construction, adversely affecting quality, and,
- It does not permit a meaningful dialogue between the owner and the individual bidders to work out the appropriate solution to the transportation agency's needs.

### **Scope**

#### **Project Description**

The 2400v Medium Voltage Switchgear is not a typical roadway transportation construction project. It involves the replacement of electrical and mechanical systems within the 2400V MCC (motor control center) at the EJMT (Eisenhower Johnson Memorial Tunnels) at both the east and west tunnel complexes. This is highly specialized electrical design and construction work that must be closely monitored by CDOT maintenance and project staff in the development of design

plans, delivering fully functioning new systems, promoting efficient and safe construction, and providing improvement to tunnel operations.

Existing conditions and tunnel ventilation restrictions provide unique challenges to the design and construction phases of this project. In addition continued service to the safety systems, including lighting and fire protection, within each complex area must be maintained throughout construction. To compound these challenges, experiences on previous tunnel equipment and panel replacement projects have highlighted the need for a more improved collaborative communication and feedback process. Accuracy in plans and estimates has also been challenging due to use of different terminology, having limited on-site experience to determine accurate purpose and operational functionality of equipment and workspaces, and limited estimator experience with electrical construction projects.

CDOT has already begun the project development process for this project and expects to have 15% plans, initial specifications based on a previous electrical replacement project at the EJMT, and a preliminary report detailing options, concepts, and design evaluation complete by mid-November 2009. This initial work is being managed and delivered by Hatch Mott and MacDonald, Inc through a NPS (non-project specific) task order with Parsons Transportation Group.

CDOT is currently evaluating continuing design through its current NPS task order or pursuing a project specific contract RFP for an A/E firm concurrently with its selection of a CM/GC firm.

## **Phasing**

### Phase 1: CM/GC Firm Selection Process (Estimated 16 weeks)

CDOT will advertise and solicit for a qualified CM/GC firm for this project through an RFP process. This process will include a Letter of Interest, a Request for Qualifications, and a Request for Proposal.

Submitted proposals will be opened and ranked. After the initial scoring of the submitted proposals, a maximum of four (4) of the top ranked proposers will be invited to interview. Upon completion of interviews, the proposals will receive final evaluation and scoring. Negotiations will begin with the top ranked proposer. Upon completion of negotiations and expiration of all protest periods, CDOT will execute the contract and issue the design phase notice to proceed to the selected CM/GC firm. The CDOT Project Management Team is working to create a formal process for selection similar to our typical consultant selection process.

### Phase 2: Design Phase Services (Estimated 18 weeks)

The CM/GC firm will begin the project in an agency support role for the design phase services and will hold the construction contract with the authority for construction of the project pending bid opening, scope and final price negotiation.

Design Phase Services by the CM/GC firm may include the following:

- Provide input and advise project team on development of language and terminology for the PS&E package that will be adopted by the owner, design, and CM/GC for the duration of the project;
- Provide detailed cost estimating and knowledge of marketplace conditions;
- Jointly schedule and attend regular meetings with CDOT and the design services consultant staff;

- Review and evaluate with CDOT and the designer all preliminary, advanced, and final design documents at milestones established by CDOT;
- Provide recommendations and studies on design options, alternatives, value engineer, and constructability;
- Prepare and update a project schedule and cost estimate on a monthly basis. Additional changes and updates will be required as necessary;
- Provide for construction phasing and scheduling that will minimize tunnel system operations;
- Determine the division of work to facilitate bidding and award of subcontracts;
- Advise owner and designer of ways to gain efficiencies in project delivery;
- Facilitate the construction and purchase of materials that require long lead times;
- Develop a Guaranteed Maximum Price (GMP) within CDOT's established Target GMP.
- Provide monthly invoices that detail hours worked by CM/GC staff and billing;

At a point determined by CDOT prior to construction, the CM/GC firm will assume the risk of delivering the project through a guaranteed maximum price contract. The CM/GC firm will be responsible for construction means and methods, and will be required to solicit bids from pre-qualified subcontractors to perform the work. The CM/GC firm is responsible for self-performing a minimum of 33% of the construction work.

### Phase 3: Construction Phase Services (Estimated 52 weeks)

Construction Phase Services by the CM/GC firm may include the following:

- Schedule, coordinate, and manage site operations and construction activities;
- Work within the tunnel ventilation and operation restrictions;
- Coordinate with Tunnel Maintenance and CDOT Construction staff with regards to schedule and progress;
- Coordinate with the consultant designer and CDOT staff on any changes that are required during construction;
- Procure materials and equipment;
- Provide, implement, and document quality controls in accordance to CDOT's (or project) QC/QA program;
- Address all federal, state, and local permitting requirements;
- Maintain a safe work site for all project team members, construction personnel, and tunnel staff;
- Manage self-performed work, subcontractor work, and suppliers while communicating weekly and daily progress to CDOT project staff;
- Complete project construction of the project as described by the final plans and specifications within the GMP;
- Communicate any changes, dangers, or issues immediately to CDOT project team.

### **Measures and Reporting**

The intent of this pilot project is to evaluate its merits and risks, its impact on quality, safety, cost savings, and time savings. CDOT will retain the services of a consultant designer throughout construction both as support and to assist in the evaluation of this project delivery method.

CDOT will be producing a step-by-step process for future CM/GC projects, initial, interim, and final reports that will detail the aspects of CM/GC. The initial report will be prepared at the approximate time of the award of the pre-construction service contractors. The initial report will include a description of the CM/GC process to date, problems encountered, benefits received, and lessons learned.

An interim report will be submitted at the end of design and contractor negotiations after the bid is opened. The interim report will include a summary of the process to date, problems encountered, benefits received, and lessons learned.

A final report and process summary will be submitted upon completion of both contracts and CDOT project Acceptance. The report will contain an overall evaluation of the project by the CDOT Project Team, evaluations of the consultant and contractor during the process, a summary of lessons learned, and recommendations for improving this process for future CDOT projects. In addition, the relationships between the CDOT project team, consultant, and contractor will be discussed, quality of the final project, number of changes to the original scope of work, additional cost, problems encountered, and benefits received. In addition to the reports, the contractor will be evaluated by the Consultant Evaluation Form during the design process and by the Contractor Evaluation Form during construction. These evaluations will be used on future proposal evaluations as criteria for selection.