

(CM/GC) **Construction Manager/General Contractor**

Manual | Volume 25 Version 1

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**Colorado Department of Transportation**

Alternative Delivery Program

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## Preface

This manual is for use by Contractors, Consultants, and CDOT personnel to better understand the steps required to deliver a CM/GC project at CDOT from initial project scoping through construction completion.

Local agencies and CDOT staff supporting their projects should use this manual as a guide to best practice. Additionally, the CDOT Local Agency Manual should be consulted for approvals and processes specific to local agencies. The CDOT CM/GC manual and delivery process have received FHWA approval. For a Local Agency to utilize its own CM/GC process it must be proposed to CDOT and FHWA and approved prior to the Intergovernmental Agreement (IGA) or initiation of the procurement.

This manual is revised from the 2015 CDOT CM/GC Manual. Major updates include:

* Clarified that no construction activities, including state-funded early release packages, can begin before NEPA is complete.
* Added that a full project cost estimate must be sent to FHWA before authorizing any construction services, including early work packages.
* Maintained stricter language prohibiting CM/GC contractors from preparing NEPA documentation or making decisions but clarified they may provide input on constructability and mitigation.
* Added a reminder that updates to CM/GC procurement procedures must be sent to FHWA for review and approval.
* Adjusted timing of FHWA authorization construction services, requiring Division Administrator approval of price analysis and agreed price before authorization (not prior to beginning negotiations).
* Included FHWA approvals for preconstruction price and construction price analysis.
* Added a requirement for the development of a project specific Evaluation Manual and Evaluation Training prior to distributing proposals to the evaluation team.
* Added clarifying language that Long-lead time packages (LLTP) will be procured as construction contracts separate from the preconstruction contract.
* Added the requirement that the project’s preconstruction schedule must accommodate time for three rounds of negotiation and the time required to off-ramp a package if necessary.
* Added the requirement that the acceptable estimate delta be set and recorded prior to the start of negotiations.
* Added the requirement from SB 21-260 that alternative delivery projects must maintain a public facing dashboard, updated monthly, to report the ongoing status and health of the project.

# : An Introduction to CM/GC

Construction Manager/General Contractor (CM/GC) is a project delivery method used where the Colorado Department of Transportation (CDOT) enters separate contracts with a Construction Manager (CM) and a General Contractor (GC). The Construction Manager is hired during the preconstruction phase to provide input and guidance on the development of the project scope. If a Construction Agreed upon Price (CAP) is negotiated successfully, the Contractor takes on the role of General Contractor (GC) during construction. For design, CDOT may use its in-house design staff or hire a design consultant using the CDOT consultant selection procedures detailed in the Project Development Manual.

The CM selection is not based on a low-bid procurement. The CM selection is based on qualifications, experience, and project approach and how those factors contribute to meeting the project goals. Project construction cost is negotiated with the Contractor after the design development process reaches an agreed upon level of completeness.

CDOT also hires an independent cost estimator (ICE) for the preconstruction phase to provide construction takeoff cost estimates and analyses information, this service is procured by requesting a Task Order from the Alternative Delivery Program who maintains personal services contracts for this purpose.

CM/GC is an appropriate delivery method for complex, time-sensitive projects, with specialized scope items that can leverage the benefits of early contractor involvement and collaboration between CDOT, the designer, and the contractor to optimize cost, schedule, and constructability.

The CM/GC delivery method has five major project phases:

1. Designer and CM Procurement
2. Preconstruction Phase
3. CAP Negotiations
4. GC Construction Contract Award
5. Construction Phase

Each phase is discussed later in this manual with steps and recommendations on how to deliver a CM/GC project at CDOT.

## Legislation and Regulation

In the Code of Federal Regulations, **23 CFR 635 Subpart E – Construction Manager / General Contractor (CM/GC) Contracting** prescribes policies, requirements, and procedures relating to the use of the CM/GC method of contracting on Federal-aid projects. Citations are included throughout the manual to denote the included FHWA requirements. Any changes to CDOT CM/GC procurement procedures shall be sent to FHWA for review and approval.[[1]](#footnote-1)

At the State level, Colorado has enacted legislation **Colorado Revised Statute §24-93-101, Integrated Project Delivery Method for Public Projects Act (IPD)** that governs CM/GC delivery. The key feature of the legislation is that it defines IPD as a project delivery method between an agency and a single entity for any combination of design and construction and provides for the agency to select the entity that provides the best overall value to the State.

Any local agency pursuing the use of an Alternative Delivery method must provide CDOT with a memorandum confirming its jurisdiction and authority to utilize the selected method.

## CM/GC at CDOT

CDOT began using CM/GC in 2009 with the 2400V Switchgear Replacement Project at the Eisenhower Johnson Memorial Tunnels complex. CM/GC is now a commonly used method to deliver CDOT projects. It is essential that project teams coordinate with the CDOT Alternative Delivery Program to ensure consistent implementation of best practice for delivering CM/GC projects.

For a list of active CDOT Alternative Delivery Projects, and the most up-to-date CM/GC information, visit CDOT’s Alternative Delivery web page: <https://www.codot.gov/business/alternativedelivery>

## CM/GC Project Team

In CM/GC, CDOT is the primary Project Manager much like in Design Bid Build (DBB). With this method, CDOT takes on new roles managing separate contracts with a selected Construction Manager (CM), a Design Consultant team, and an ICE firm. CDOT must establish a collaborative environment that encourages innovation and open communication amongst the CM/GC team.

Proficient Project Managers are required for CM/GC to work well as they must actively provide leadership and guidance in both the preconstruction and construction phases of the project. Project Managers are responsible for making the final decisions on budget, design, and construction methods; and must be comfortable making risk-based decisions timely to meet project deadlines.

The CDOT team relies on the Contractor to bring the following expertise to the project during the design phase:

* The skills and knowledge to estimate the quantities of materials, labor, and equipment needed to construct the project.
* The skills and knowledge to determine the tasks needed to complete the project and to estimate the costs, duration, and sequence of these tasks.
* An understanding of the availability, cost, capacities of materials, labor, and equipment
* The skills and knowledge to identify potential risks (including financial risks) and methods or solutions to mitigate them during the design process.
* The skills and knowledge to review the design plans and provide suggestions and methods to improve the design for constructability, add innovative value engineering solutions, maximize scope, and optimize schedule and cost.

Once a CAP is negotiated successfully and a construction contract is awarded, the Contractor’s role changes to that of a General Contractor (GC) during construction. This is a very traditional role and is similar to the responsibilities of a GC on a DBB. The Contractor is responsible for managing any retained or assigned risk and their portion of any shared risks.

## CM/GC Frequently Asked Questions (FAQs)

1. **What are the benefits of CM/GC project delivery?**

The benefits of CM/GC project delivery include schedule acceleration of Long Lead-Time Procurement (LLTP) phases, early Contractor involvement, increased value through innovation and Value Engineering, team collaboration, production-based estimating, risk mitigation and sharing, and improved third-party interaction.

1. **What are the challenges of CM/GC project delivery?**

CM/GC projects can be challenging when there are schedule driven aspects of the project, cost estimating is not performed proactively, or the CDOT project team does not have the experience to make quick, effective decisions or mediate disagreements between team members.

1. **What is the CAP and LLTP CAP?**

The Contractor price proposal is submitted by the CM when a construction package is at an agreed upon level of completeness. If the CM’s price proposal and the ICE estimate are within a percentage difference acceptable to CDOT (and FHWA if required[[2]](#footnote-2)) then CDOT approves the negotiated price as the Constructed Agreed upon Price (CAP) and awards a GC contract for construction. The Long Lead Time Procurement Construction Agreed Price (LLTP CAP) is a CAP for items that must be ordered and/or procured in advance of the construction phase for which it will be used. The CAP and LLTP CAP include the cost of the bid items with the GC Management Price Percentage applied to each item. The CAP and all force account items will be the maximum contract amount for the construction contract.

1. **Why are risk-based decisions a major part of CM/GC project delivery?**

The success of the project greatly depends on properly identifying risks and allocating them to the entity that can best manage them. Therefore, risk management must be involved in each phase of project delivery and decision-making. CM/GC allows the flexibility to share risk, negotiate risk, or assign risk between CDOT, the Designer, and the Contractor.

# : Transparency, Accountability, and Reporting

## Preface

In the summer of 2021 Senate Bill 21-260 (SB 21-260) was enacted into law. Section 24-93-110 of this bill details the stipulations for Alternative Delivery projects to comply with transparency and accountability requirements.

To receive Chief Engineer authorization, all projects considering alternative delivery must hold a Project Delivery Selection Matrix (PDSM) workshop with key project stakeholders to determine the most appropriate delivery method for the project. At the conclusion of the workshop, the project team will be required to draft a report, as part of the PDSM documentation, to provide a summary of the discussions and highlight the reasons why the selected delivery method was deemed most appropriate for the project. For projects ≥$75M, the report must be kept in draft form until industry input has been considered and TC approval granted.

## SB 21-260 requirements for Projects Over Seventy-Five million dollars (≥$75M)

### Industry Review Meeting

Prior to any project ≥$75M requesting approval from the Chief Engineer to use an Alternative Delivery Method the project must hold a public meeting with the construction industry and the public to discuss the justification for selecting a particular delivery method for the project and to solicit feedback and comments regarding that selection.

The project team will present project background information, the recommended delivery method, and highlights the conclusions of the draft PDSM to the construction industry and the public. The project team will be required to document any questions and feedback received in response to the meeting. The project team shall also allow for questions and comments to be submitted in writing.

The questions received, and any necessary CDOT response will be published on the project website procurement page. The feedback must be considered and allowed to inform the draft PDSM prior to seeking Transportation Commission Approval.

### Transportation Commission Presentation and Approval

For projects ≥$75M, CDOT shall obtain approval for the use of the recommended Alternative Delivery method from the Transportation Commission.

The project team should work with their Regional Transportation Director to get on the schedule for the Transportation Commission. The project team should be prepared to accommodate the Transportation Commission as they may require a workshop session in addition to a request for approval to use an alternative delivery method.

The project team will present project background information, the recommended delivery method, and highlights the conclusions of the draft PDSM. When the Transportation Commission has had an opportunity to ask questions and provide feedback, they will resolve to approve the recommendation of the delivery method for the project.

## SB 21-260 requirements for all projects using an alternative delivery method.

All projects using an alternative delivery method regardless of expected cost of completion, shall:

* Publish the Final PDSM and the Chief Engineer’s Approval memorandum as justification for selecting an alternative delivery method on the project website procurement page.
* Include the justification for selecting the alternative delivery method in any Request for Qualifications (RFQ) and Request for Proposal (RFP).
* Publish evaluation scores for each step of the procurement on the project website procurement page following contract award.
* Provide, maintain, and update on the project website, a dashboard that illustrates the ongoing status of the project from the time that the contract is executed until final acceptance of the project.

## Chief Engineer Approval to use an Alternative Delivery Method

The PDSM documentation should be finalized to include industry, public, and Transportation Commission feedback if required. The Project Team will then send a memorandum to the Chief Engineer requesting approval to use an alternative delivery method. The memo should briefly detail basic project information, the recommended delivery method, and highlight the conclusions of the PDSM.  (For the approval process to use CM/GC on a local agency project please see the CDOT Local Agency Manual)

## Project Dashboard information

The project team is required, through all stages of the project, to report the ongoing status and health of the project. This data shall be updated monthly and will be used to compile information on the status and health of the Alternative Delivery Program. When construction is complete, the final dashboard report shall show the entire project lifecycle.

The information required to be recorded and updated monthly is:

### Schedule

#### Preconstruction Milestone Dates: proposed and actual.

* Request for Qualifications published.
* Proposers shortlisted.
* Final Request for Proposals published.
* Notice of Selection.
* Award of the Contract.
* Notice to Proceed.
* Notice to Proceed Construction (if applicable).
* Begin Construction.
* Completion of Preconstruction Activities

#### Scheduled Construction Activities

* Projects with multiple construction packages may have multiple dashboards in addition to a dashboard that illustrates the performance of the overall project/program health.

#### Project Progress

* The dashboard shall illustrate a baseline schedule for both design and construction activities.
* The dashboard shall be updated monthly to show actual progress in both design and construction activities based on verified salient activities.
* Remaining schedule for both design and construction activities shall be clearly illustrated.

\*The project progress shall display the baseline in a contrasting color to ensure each criterion described above is easily discernible when displayed as a graphic.

#### Change Order Impact

* Change orders to the contract are required to be shown on the dashboard so that the impact, negative or positive, to the schedule is apparent.

\*The impact shall be shown in a contrasting color to the baseline and progress schedule so that the public will be able to understand the impact the change order will have on the project.

### Budget

* The dashboard shall establish a budget baseline showing the initial project contract amount.
* The dashboard shall be updated monthly to show the expenditures to date based on the monthly project progress payments.
* Remaining budget available to the project.
* Change orders to the contract shall be shown on the dashboard so that the impact, negative or positive, to the budget is apparent.

\*The budget shall be displayed in contrasting colors to ensure that each criterion is discernible when displayed as a graphic.

### Narrative of the graphics for ADA compliance

The project team shall provide, in narrative form, an explanation of the project performance metrics describing:

* the baseline metrics.
* the current progress of the metrics.
* the impact of change to the metrics.
* remaining work planned.

## Project Closeout

All projects, regardless of size, shall hold an all hands meeting with the design staff and the construction staff to discuss Lessons Learned at the completion of the project. All projects will generate a report that captures the Lessons Learned and submit the final report to the Alternative Delivery Program for distribution, archiving, and consideration for programmatic change.  A template for this report will be provided to the project team and will include the following entry requirements:

* Subject
* Abstract
* Driving Event/Trigger
* Lesson Learned
* Recommendation/Discussion
* Manual/Contract/Document Reference update suggested.

# : CM/GC Procurement

Upon meeting the requirements of SB 21-260 and receiving approval from the Chief Engineer to use CM/GC, the project team can move forward with procurement.

## Executive Oversight Committee

The project team should establish an Executive Oversight Committee (EOC). The EOC provides overall policy guidance for the project and the CM procurement process. The EOC should consist of three to five members comprising executive level staff with representation from the CDOT Region, CDOT Headquarters, and the Federal Highway Administration (FHWA). The project team may also consider including funding partners for participation on the EOC.

The EOC:

* confirms the project goals.
* confirms the release of the Letters of Interest (LOIs).
* approves the release of the RFP.
* confirms the Evaluation Plan.
* confirms the short-listed firms.
* presents the recommended apparent successful proposer to the Chief Engineer, who will ultimately make the final selection.

## CM Procurement

### CM Procurement Schedule

The flowchart in **Figure 3-1** provides a general overview of the CM procurement process. The procurement of a contractor for CM services takes approximately two to five months from the Request for Proposal (RFP) development to a Notice to Proceed (NTP).

Depending on the complexity of the project, the preparation of the RFP can take between two to eight weeks to get to advertisement, four to six weeks for Contractors to prepare proposals, three to six weeks for CDOT to evaluate proposals and interview short-listed Contractors, and four to six weeks to select a CM and negotiate a Contract.

#

### Figure 3-1. Project Selection and Procurement Flowchart

**CDOT and FHWA**

Determine if the project will require a project specific stewardship agreement.

**Project Scoping**

Develop Scope of Work, assess project risks and project goals.

**Establish the Project Executive Oversight Committee**

**RTD and Chief Engineer concur with**

**CM/GC delivery.**

Prepare memo of Concurrence for RTD and Chief Engineer Signature

**RFP Preparation**

Region works with Alternative Delivery Program and Engineering Contracts to develop RFP and scoring elements. Project website created to show relevant project data.

**FHWA attendance**

**RFP Submittals and Short list**

Once RFPs are submitted, Evaluation Team should have at least 1 week to do their review. If a project has more proposers potentially more time should be given. After proposals are scored a shortlist is determined.

**Advertisement of RFP**

**(Requires EOC Concurrence to advertise)**

RFP is advertised through Engineering Contracts

Proposal scoring meetings should be scheduled and scoring panel members trained prior to receiving proposals.

**Project Delivery Selection Matrix (PDSM)**

Determine project delivery method.

**FHWA Responsibility**

**CDOT Responsibility**

**Legend:**

**Contractor Responsibility**

**FHWA Approval**

FHWA approves FMIS action for CM/GC Contractor Pre-Construction Services prior to release of RFP.

4-6 weeks

3-6 weeks

4-6 weeks

2-8 weeks

**FHWA Approval**

FHWA approves FMIS action for CM Pre-Construction Services

**Project Scoping and Delivery Method Selection**

Contractor signs Contract

**Contract Signing and NTP**

Contract is signed by Contractor, Chief Engineer, AG, and CDOT Controller. NTP is sent after all signatures are returned to Engineer Contracts.

**RTD and Chief Approval/Award Notifications**

RTD verbally approves final selection and memo is sent to Chief Engineer for signature.

**One-on-One Meetings**

Meetings can be scheduled and held with potential proposers up until the RFP is advertised. Scoring panel members should not be identified.

**Interviews and Price Component Opened**

All shortlisted proposers are offered interviews. Evaluation Team will score and rank each interview.

**RTD and Chief Engineer Approval/Shortlist Notification**

RTD verbally approves selection and memo is sent to Chief Engineer for signature. Proposers are sent their ranking and offered interviews.

**Mandatory Pre-Proposal Meeting**

This meeting should cover project overview, scoring overview, question and answer session, and introduce potential proposers to the project team.

**FHWA** may review RFP depending on stewardship agreement.

**Request for Letters of Interest (optional)**

Project team can request letters of interest so that one-on-one meetings with potential proposers can be scheduled.

**Procurement Process**

**Procurement Process Timeline**

**CM/GC Project Delivery Method Selected**

**Goal Setting Workshop**

### CDOT Requirements for Obtaining a CM Services Contract

CDOT requires the following steps to obtain an executed CM Services Contract (responsible persons are identified in parentheses after each step):

1. Ensure that the proposed CM service is consistent with CDOT’s Long-Range Plan, Statewide Transportation Improvement Program, the CDOT budget, and the Obligation Plan (Program Engineer, Resident Engineer, and Business Office).
2. Develop scope of work (Resident Engineer).
3. Prepare a contract cost estimate (Resident Engineer).
4. Prepare a CM selection request, including the Disadvantaged Business Enterprise (DBE) goal, for the Chief Engineer’s approval for advertisement (Resident Engineer and Region ~~EEO [Equal Employment Opportunity]~~ Civil Rights Manager).
5. Establish a CM Evaluation Team per the project evaluation manual and with guidance from the Alternative Delivery Program (Resident Engineer).
6. Create a selection schedule (Resident Engineer and the Engineering Contracts Program Staff).
7. Advertise an Invitation for CM Services on the Internet and, as needed, in special journals (Contract Officer).
8. Create and distribute the selection information and instruction package to the CM/GC and CCA community (Contract Officer).
9. Coordinate and facilitate Evaluation Team to achieve consensus and make a recommendation to the Chief Engineer (Contract Officer).
10. Obtain RTD’s [verbal] approval of the selection results (Resident Engineer).
11. Obtain the Chief Engineer’s [written] approval of the selection results (Contract Officer).
12. Send Chief Engineer’s Approval Memo to FHWA for information or approval if the project has a project specific oversight agreement that requires approval.
13. Notify contractors of selection results (Contract Officer).
14. Finalize scope of work, and for project-specific funds-encumbered contracts, negotiate work hours and the cost proposal (Resident Engineer and the contractor representative), and submit those to the Agreements Program.
**Note:** For task order contracts, this step is done for each task order request.
15. ~~Obtain and review the contractor’s financial information, insurance information, and initial cost proposal (Contract Officer). (Only for Brooks Act CMGC Contracts.)~~
16. ~~Initiate audit evaluation (Contract Officer). (Only for Brooks Act CMGC Contracts.)~~
17. ~~Analyze audit evaluation report and negotiate contractor fee and final contract cost exhibit (Contract Officer). (Only for Brooks Act CMGC Contracts.)~~
18. Prepare final contract and route the contract for approval and signatures. Distribute executed contract (~~Procurement and Business Offices~~ Contract Officer).
19. Issue the Notice-to-Proceed to the contractor (~~Agreements Program Staff~~ Contract Officer).
20. Debrief contractors on selection results. In-person debriefs are optional and up to the Resident Engineer and Project Team.
21. Compile selection documentation and transmit the selection file to the CDOT Records Center (Contract Officer).

The Resident Engineer is responsible for the submittal of the Contract Certification and Contractor Evaluation forms that are part of the Colorado State Controllers Contract Management System (CMS). ~~(p. 1-34­–1-35)~~

Note: Items appearing above in red have been updated to reflect current practice and have been modified from the *CDOT* *Project Development Manual* dated January 31, 2013. Steps 14-16 are no longer required.

### Requests for Letters of Interest

Issuing a Request for Letters of Interest (LOIs) is optional based on CDOT’s desire to seek industry interest and early exchange of information with potential Proposers. The Request for LOIs also provides notice to Proposers to request one-on-one meetings.

The Request for LOIs must include the project name and description, project number, and sub-account. The project description should include a summary of the reasons the project has been selected as a CM/GC project with information on the anticipated RFP process and schedule. The schedule should include the anticipated NTP and significant project Milestone dates. The Request for LOI should also include the project goals previously determined during the project scoping. Finally, it must include the Project Manager name and email address for receipt of the LOIs, the deadline to request one-on-one meetings, and a link to the project website where all project information can be found.

### Pre-Proposal Meeting

All CM/GC projects shall include a mandatory Pre-Proposal Meeting during the CM procurement process, the purpose of which is to introduce all Contractors to the CM/GC delivery method, provide Contractors with an overall introduction to the project as scoped, and allow Contractors to ask questions about the project and process. The CDOT project management team shall be present. The RFP shall list the date, time, and approximate duration of the meeting.

At the Pre-Proposal Meeting, the project management team is responsible for giving a presentation on the project scope and CM/GC process. The project portion of the presentation should match what was written in the RFP and any reference documentation. Aerials, project scope, stage of design when contracted, project goals, and an overall picture of the project helps the Contractors with their proposals.

### Contractor One-On-One Meetings

The advertisement of the Request for LOIs initiates an industry review process. Contractors may request an informal one-on-one meeting with CDOT. These meetings provide the Contractor an opportunity to ask questions regarding the project, established goals, and the CM procurement process. Prime Contractors interested in an informal project briefing with CDOT must submit a LOI for the project including a request for the briefing. One-on-one meetings are not required for submitting a proposal but are no longer offered after issuance of the RFP.

### Request for Proposals

The CM RFP is a two-phase procurement consisting of a short-listing process based on proposals followed by interviews of the short-listed Proposers by a Evaluation Team. ~~Proposers are required to submit a GC Management Price Proposal at the interview.~~

Contractors interested in submitting proposals to CDOT are requested to submit one package that is inclusive of preconstruction CM Services, with the option of construction if they are selected and CDOT accepts a CAP. Selection is determined on a best-value basis in accordance with the evaluation criteria set forth in Section 3 of the RFP, “Proposal Content and Evaluation Criteria.”

The RFP must follow federal regulations, State statues, and the *Colorado Code of Regulations* and include the following evaluation factors and sub-factors that shall be used to evaluate the proposals and capabilities of participating entities:

* Price
* Design and technical approach to the project.
* Past performance and experience (CM/GC experience not mandatory)
* Project management capabilities, including financial resources, equipment, management personnel, project schedule, and management plan.
* Craft labor capabilities, including adequacy of craft labor supply and access to federal or state-approved apprenticeship programs, if available[[3]](#footnote-3).

The RFP may contain other relevant factors as determined by the Department in accordance with state statutes. [[4]](#footnote-4)

The format of the RFP should generally follow the CM Services contract template and includes:

SECTION 1 – SCOPE OF WORK AND PROJECT INFORMATION

SECTION 2 – CM PROPOSAL REQUIREMENTS AND INSTRUCTIONS

SECTION 3 –PROPOSAL CONTENT AND EVALUATION CRITERIA

## Evaluation Manual

The project team is responsible for working with the Alternative Delivery Program to develop a project specific evaluation manual for the evaluation of CM proposals and interviews. The evaluation phase of the selection process must be managed by a CDOT Contract Officer and observed by a representative from the Alternative Delivery Program.

CM/GC proposal packages are reviewed by an evaluation team, the Evaluation Team, in accordance with the evaluation criteria set forth in Section 3.2 of the RFP, “Evaluation Criteria for Proposals.” Evaluation Team members score the proposals, interviews, ~~and the GC Management Price Percentage proposal~~ using standard scoring forms contained in the RFP.

Standard proposal evaluation criteria include the following:

CM Project Management Team

Contractor Capability

Strategic Project Approach

Approach to Cost, Schedule, and Risk

Because the CDOT RFP template contains only standard evaluation criteria the project team is encouraged to include additional criteria that reflect the unique characteristics of the project to better help determine the submitter’s overall qualifications.

### Evaluation Team Members

CM/GC Evaluation Team members should be individuals who have specific project knowledge, an understanding of the project goals, and a specialty or expertise relevant to the project. In addition, previous CM/GC experience is highly desirable for as many Evaluation Team members as possible. Evaluation Team members typically consist of the following:

* A Program Engineer Level Manager (PEIII or higher)
* CDOT Project Manager
* CDOT specialty personnel, if applicable
* CDOT personnel from other regions and work units

CDOT has developed the CM Evaluation Manual to promote objectivity and transparency. Evaluation Team members are required to read and follow all scoring guidelines. All Evaluation Team members must sign Non-Disclosure Agreements and Conflict of Interest Disclaimers as part of the procurement and cannot directly be contacted by or contact anyone outside of the Engineering Contracts Officer about the project until the CM/GC Services Contract has been executed.

Evaluation Team membership is confidential to maintain objectivity, prevent contact during procurement, and ensure that all Contractor communication goes through the CDOT Project Manager.

### CM Evaluation Training

The ADP will use the project specific evaluation manual to develop the evaluation training. All members of the Evaluation Team must attend evaluation training before they receive the proposals and scoring books. The training will cover the roles and responsibilities of the evaluation team members, the evaluation workflow, and how to effectively use the provided score sheets. The project manager is encouraged to share a brief overview of the project goals, complexities, risks, schedule, and budget to assist evaluators in understanding what the project team values in a CM.

### Proposal and Review

Selection Team Panel members individually review and score each proposal category according to the criteria set forth in the RFP.

Weights are assigned to each category prior to evaluation and are consistent on all scoring forms. Comments by Evaluation Team members are required on all scoring forms so that all Proposers may receive constructive feedback on their proposals and performance. Scoring for the proposal and Oral Interview Criteria forms are based on the *Qualitative Assessment Guidelines* in the RFP, which are applied to all sections except the CM/GC Management Price Percentage. As shown in detail in the Evaluation Manual.

### Short-Listing

The Evaluation Team shall complete a short list evaluation based on the Proposer-submitted proposal package and the criteria in Section 3.2 of the RFP, “Evaluation Criteria for Proposals.” A minimum of three short-listed Proposers shall be invited to Oral Interview Meetings with the Evaluation Team to be further evaluated based on criteria in Section 3.3 of the RFP, “Evaluation Criteria for Oral Interviews.” If warranted by the preliminary results, and at the discretion of the Chief Engineer, additional Proposers may be short-listed.

The Contract Officer prepares the short-list recommendation memorandum for verbal concurrence by the Regional Transportation Director and for written approval by the Chief Engineer.

### Interviews

An oral interview is a mandatory part of the selection process after the CDOT Contract Officer notifies the short list of Proposers. Proposers that are not short-listed may request a mock scored interview to gain experience if the Proposer has never been interviewed by CDOT on prior CM selections. CDOT will conduct a scored mock interview for non-selected Proposers but there will be no opportunity for award or selection.

The interview not only provides an opportunity for the Proposer to present its qualifications and ideas but also allows the Evaluation Team to observe the project team and see how the team members work together. Therefore, the Proposer is advised to bring all key members of its project team to the interview.

Oral interviews consist of three parts:

1. **Short Presentation**A 15-minute presentation summarizes the proposal and describes the Contractor’s innovative ideas and unique resources. This is the part of the interview where the Proposers need to communicate to the Evaluation Team the reasons they should be chosen. What strategies and abilities do the Proposers bring to this CM/GC project that makes them the best candidate? Proposers are advised to limit the presentation to the most critical points of the proposal and focus on what their team can bring to the table and why.
2. **Team Challenge**The Proposers are given a written challenge to review and propose a course of action to address the elements in the problem.
3. **Question-and-Answer Session**The questions asked in this session will be standard questions for all Proposers. Although the initial questions for each Proposer are identical, the follow-up questions to clarify Proposer answers vary. The interview presentation and question/answer scoring are based on the following criteria:
	* Project Understanding
	* Project Approach
	* Project Innovation
	* Communication Skills
	* Understanding of CM/GC Delivery Method

Oral interviews are assessed based on the evaluation criteria for oral interviews listed in the RFP. Qualitative assessments shall be based on the Qualitative Assessment Guidelines used to evaluate the proposal. Evaluation Team members should anticipate spending one full day conducting interviews.

### The Team Challenge

The Proposers are presented with a written challenge to review, and they must propose a course of action to address the elements in the problem. The Proposer is typically given 15 minutes to prepare a response or solution, and 5 minutes to present a formal response or solution to the Evaluation Team. Scoring for this challenge is based upon the following criteria:

* Challenge Understanding
* Recognition of Key Points and Ideas
* Team Collaboration
* Communication Skills
* Understanding of CM/GC Delivery Method, CSS, and Environmental Commitments
* Understanding of Project Goals

**Team Challenge Examples:**

**Example 1:**

The early Construction Phase CAP proposals for girder procurement and construction are within 10 percent of the Independent Cost Estimate. The initial bid on CAP #2 for the final Construction Phase of the project is more than 10 percent over the ICE Estimate and would put the total cost of the project over the Fixed Limit of Construction Cost, and it is above the aggregate of previous OPCCs. This final CAP needs to be under the project budget and must complete the remaining work on the project. Your team must present ways that the project can get back on track and include discussion on all available paths.

**Example 2:**

Your team was awarded the CM/GC Services for the I-70 Bridge to Nowhere Preconstruction Phase in April 2014. The CDOT Project Manager set very challenging goals and an aggressive schedule that requires the first CAP for construction Package #1 to be proposed one week after the signing of the decision document. Package #2, delivering the Bridge to Nowhere using the ABC delivery method, and Package #3, the construction of the roadway to Nowhere, are scheduled three months after Package #1 and cannot be constructed simultaneously.

Three days before the deadline for CAP #1, the CDOT Project Manager phones your team and reports that the Suppliers that were added to the assumptions in the cost model as probable Suppliers have refused to give the ICE and CDOT any prices or quotes because they feel it would be unfair to you to release that information. The CDOT Project Manager has asked you to resolve the situation.

Your Traffic Control Subcontractor calls you that afternoon and has decided not to give you a bid, backing out of a quote that was quite competitive, and the next lowest quote represents a 20 percent increase in traffic control prices. This changes an assumption in the cost model and past cost estimates have been close to the 10 percent limit.

### GC Management Price Percentage

Current practice is to state a standard 10.5% GC Management Price Percentage in the RFP and contract. This is at the direction of the Chief Engineer and is subject to change as other factors informing this decision change.

~~At the Oral Interviews, short-listed Proposers are required to submit a sealed GC Management Price Proposal that will be evaluated based on criteria in Section 3.4 of the RFP, “Evaluation Criteria for GC Management Price Percentage Proposals.” The GC Management Price Percentage Proposals must also include a summary of components used in establishing the GC Management Price Percentage. The GC Management Price Percentage remains sealed until after the qualitative scoring and is opened after the Proposer Interviews. Proposers shall state their proposal GC Management Price Percentage identified as a percentage and carried out to four decimal points (e.g., 0.0000%), which will be applied to all Construction Phases.~~

~~The GC Management Price Percentage shall include all profit, general and administrative (G & A) costs, regional and home office overhead, and non-reimbursable costs identified in Appendix C of the RFP. The GC Management Price Percentage shall not change regardless of the final, negotiated amount of the CAP for early Construction and Construction Phases.~~

~~The GC Management Price Percentage breakdown shall show the breakdown of all components used in establishing the percentage. The intent of the GC Management Fee is to define the cost and level of effort for the GC to deliver the project within the CAP. The GC Management Price Percentage shall exclude all Proposer costs for risk related to performance of the construction work. Risk is to be priced into subcontracted amounts and negotiated into self-performed work, as part of the overall direct cost of the Work.~~

~~The GC Management Price Percentage score is determined by comparing each firm’s sealed GC Management Price Percentage with the lowest GC Management Price Percentage being equivalent to the maximum score of 15 points. To score each fee percentage, the Evaluation Team will use the following example formula:~~

**~~Example: Scoring of the GC Management Price Percentage~~**

~~Assume the lowest GC Price Percentage is 10 percent.~~

~~FIRM A: 10% X 15 points = 15 points~~

 ~~10%~~

~~FIRM B: 10% X 15 points = 11.5 points~~

 ~~13%~~

~~FIRM C: 10% X 15 points = 9.38 points~~

 ~~16%~~

### Selection of the CM

The score from the qualitative evaluations from all Evaluation Team members is averaged to produce the total overall qualitative score for each Proposer. The average qualitative scores are added to the GC Management Price Percentage score. The Proposer with the highest total score in all three sections is selected.

## The CM Preconstruction Fee

The CM provides a variety of services during preconstruction involving cost estimating, value engineering, constructability reviews, and construction expertise. The selected Proposer is compensated for these CM Services during the Preconstruction Phase. CDOT establishes a lump sum amount for these services and states the Contract amount in the RFP, along with a completed Appendix A, “Preconstruction Roles and Responsibilities Matrix,” which details the Preconstruction Phase services anticipated for the project.

## Procuring a Design Consultant for a CM/GC Project

For CM/GC projects, CDOT enters a separate Contract with a Design Consultant who is required to work in partnership with CDOT and the CM. Procurement of the Design Consultant can be accomplished through CDOT’s typical consultant selection methods in accordance with the *CDOT Project Development Manual*. The consultant Contract should be written to require the consultant to work together with the CM, and the Scope of Work should detail the unique services expected under the CM/GC project delivery. The consultant should be prepared to incorporate the Contractor’s ideas on phasing, materials, constructability, traffic control, and other project approaches with the goal of mitigating project risk.

## Procuring a Consultant Construction Engineer for a CM/GC Project

It is highly recommended that the Construction Project Engineer is actively involved in the Preconstruction Phase so that they are familiar with the details of the Construction Phase that were developed and agreed to during the design development. If the Construction Project Engineer is to be a consultant, it is recommended that the consultant is procured during the preconstruction phase. It is possible to procure a consultant Project Engineer prior to authorization of the Construction Phase by utilizing a Task Order driven contract and executing a Design Phase Task Order to get the CM team up to speed for several months prior to the Contractor Construction Notice-to-Proceed.

## Procuring an ICE for a CM/GC Project

Hiring a qualified ICE is a key component in the CM/GC process and is critical to the development of the project CAP and understanding of the Contractor’s means and methods. CDOT maintains a Non-Project Specific (NPS) Contract with an ICE Consultant.

Typical consultant task orders are generated by the PM and processed through the Region Business Office. ICE consultant contracts are managed through the Alternative Delivery Program and processed using personal services contracting staff at headquarters.

To initiate an ICE consultant contract, the PM will contact the Alternative Delivery Program Manager to discuss available ICE consultants under contract and request the outline agreement (O/L) contract or number for the ICE to be used for the project. The PM will initiate contact with the prospective ICE consultant to work through hours and amount of the services needed for the task order.

The PM should substantiate the task order amount using projected number of meetings such as OPCC and CAP negotiation meetings. Also consider if there is specialized project work, such as tunneling, bridge moves, etc. requiring a cost estimator that is familiar with that type of work.

## CM/GC Procurement for CDOT Priority Projects

Upon a written declaration of an emergency by the Chief Engineer, with concurrence from the Procurement Director ("Emergency Declaration"), a project may follow the emergency contracting process for CM Pre-Construction Services. The Contracting Officer in Engineering Contract Services is available to provide support when an Emergency Declaration is issued.

The expedited emergency services solicitation requires a minimum of three firms to be invited to compete, but only for the services necessary to resolve the immediate emergency identified in CDOT’s Emergency Declaration. A Speed Memo will be issued for these limited services, allowing work to proceed before a formal contract is finalized. The contract will be issued as soon as practicable—please coordinate with the Alternate Delivery Contracting Officer in CDOT’s Engineering Contract Services team.

If a project does not meet the criteria for an Emergency Declaration but still requires an expedited contracting process, a justification must be submitted to the Alternate Delivery Contracting Officer. Such requests are subject to approval by the Engineering Contract Services Manager and the CDOT Controller Delegates.

For these rush contracts, the contract can be executed within three business days. To facilitate this process, the CDOT Project Manager must complete a Contract Routing "Rush" Cover Sheet for CM Pre-Construction Services or GC Construction Services.

The expedited contract procedure is intended for exceptional circumstances. Project teams are expected to allocate sufficient time for contract processing under the standard timeline. This procedure should not be used to compensate for inadequate project planning when traditional procurement timeframes would otherwise be feasible.

## Concurrent Procurement Recommendations

To maximize the benefits of CM/GC, concurrent procurement of the Design Consultant, CM, and the ICE Consultant is recommended based on CDOT’s experience and industry feedback. Early selection of the CM maximizes the potential for team collaboration and allows the Contractor to provide early input into the design decisions. The CM can provide input into the risk management and offer innovative construction methods that may direct design development. Engaging the ICE early in the process allows the ICE to develop an understanding of the project goals, risks, design decisions, and assumptions and thus more accurately prepare the Independent Cost Estimate.

## Contracting and Standard CM Services Agreement Template

CDOT awards one CM Contract to the top ranked Proposer based on a best-value selection with Chief Engineer approval. The selected CM is awarded a Contract for Preconstruction CM Services. Once design of one or more construction packages is sufficient to prepare, negotiate, and accept a CAP proposal, a GC Construction Contract is drafted, signed, and executed.

CDOT has developed the Standard CM Services Agreement Template, which strives to fairly allocate risk between the parties while promoting a collaborative process that makes full use of the advantages of the CM/GC Project Delivery Method. The Contract defines the scope of services that the CM will provide during the Preconstruction Phase, provides direction on developing an Opinion of Probable Construction Cost (OPCC), defines the CAP negotiation process, and allows for award of the construction package(s).

# : Preconstruction Phase

The start of the preconstruction phase marks the beginning of the collaborative partnering between CDOT, the Design Consultant, and the Contractor. The unique roles and defined responsibilities of each member during the preconstruction phase of the project are described in this chapter. The project team’s focus should be on building this partnership and open communication to minimize risk, review constructability, improve the project schedule, explore innovations, and maximize work within the budget.

## Preconstruction Roles and Responsibilities

### CDOT Project Manager

In CM/GC, the CDOT Project Manager takes the lead role in managing and facilitating the preconstruction phase. CDOT Project Managers should be aware that their role in a CM/GC project may require more active team coordination and direct involvement than other project delivery methods. The CDOT Project Manager is responsible for guiding design decisions while overseeing the collaborative effort between the Design Consultant and Contractor. The CDOT Project Manager is responsible for facilitating this collaborative process through active communication and project team meetings that include a Partnering Workshop, Project Scoping Workshop, Value Engineering (VE) Workshop, Design Review Meetings, Risk Workshop, and Cost Model Review Meetings. The CDOT Project Manager also leads the Cost Model and estimate review process, questioning both the Contractor and Independent Cost Estimator (ICE) estimates. The CDOT Project Manager serves as a facilitator between team members and later as the lead negotiator for CDOT during the CAP Proposal process.

### Design Consultant

In CM/GC, as with traditional DBB projects, the Design Consultant contracts directly with and takes direction from CDOT in the development of the design. The role of the Design Consultant does not change as much as the role of the CDOT Project Manager for a CM/GC project. As in a DBB, the Design Consultant’s main roles are to design the project, manage the design, and communicate with the CDOT Project Manager. However, the Design Consultant does give up some of the control over design decisions due to CDOT’s greater involvement. The Design Consultant is required to work with the Contractor and CDOT, manage the iterative design process that is vital to CM/GC success, and expect changes in the design. The Design Consultant must keep the CDOT Project Manager informed and involved in all design reviews and risk decisions.

### Independent Cost Estimator

The ICE is CDOT’s primary estimator during the preconstruction phase of a CM/GC project. The ICE uses production-based estimates and solicits quotes in the same manner that a contractor estimates and bids a project. The ICE has the responsibility to question the Contractor’s prices, quotes, methods, and estimate to ensure that CDOT is receiving a fair and open price from the Contractor. If the project has specialty work that is outside of the ICE’s expertise, the ICE is required to use specialty estimators to provide accurate cost estimates. The ICE is also expected to know the local markets and network with Subcontractors and DBEs to build a trusted network to solicit quotes. The ICE needs to work with the Contractor to understand the competitive market near the project site, regionally, nationally, and globally. The ICE is required to bring on subject matter expertise if the ICE lacks in-house knowledge of a major work item.

### Construction Manager

A Contractor is selected to serve as the Construction Manager during the preconstruction phase. As part of the design team, the CM provides input on schedule, phasing, constructability, material availability, and cost throughout the design phase of the project. With input from CDOT and the ICE, the CM is responsible for identifying project risks and providing Opinions of Probable Construction Cost (OPCC) that help guide the design development and establish project risk pools. The CM tasks during the Preconstruction Phase include, but are not limited to:

* reviewing construction plans to provide input on constructability, construction phasing, traffic control, materials, and design decisions.
* developing design alternatives and innovations that improve project schedule and cost.
* evaluating project risks and developing a Risk Register and Risk Management Plan.
* establishing the Cost Model and OPCCs at required Milestones.
* conducting VE Workshops.
* obtaining Subcontractor quotes and coordinating with Subcontractors to meet project DBE goals.
* identifying long lead items (material, equipment, and/or utility relocations) that should be procured through the LLTP CAP process.
* preparing all reports and plans required by the Contract including: a Subcontractor Selection Plan, a Quality Control Plan, a Material Sourcing Plan, a Worker and Public Safety Plan, an Innovation Tracking and Performance Report, and a Procurement Proposal and Report for each LLTP CAP.

## Preconstruction Roles and Responsibilities Matrix

The RFP and CM Services Agreement contain a Preconstruction Roles and Responsibilities Matrix. The matrix provides a comprehensive list of activities that are assigned to the appropriate responsible party and coordinated with all team members. CDOT project staff prepares the initial matrix as part of the RFP and assigns either primary, secondary, or collaborative responsibility roles to the Contractor, Design Consultant, and CDOT. A template matrix is available to teams and provides suggested responsibilities for the various activities. However, because each project is unique, the matrix must be revised to meet the specific requirements of each project. The matrix is reviewed with the selected Contractor and revised accordingly, and then it becomes part of the CM Services Agreement.

**Continuous Design Consultant Responsibilities:**

Collaborate with Contractor for Innovative Designs, Assist with Risk Management, Support Constructability Analysis, Evaluate Contractor Alternatives

**OPCC#3**

**ICE Estimate**

**Cost Model Review Meeting**

Constructability Report

Update Schedule

**OPCC#2**

**ICE Estimate**

**OPCC#1**

**ICE Estimate**

Constructability Report

Update Schedule

Subcontractor Plan

Material Sourcing Plan

Quality Control Plan

Worker and Public

 Safety Plan

Risk Management

 Plan/ Risk Register

Cost Model

Preliminary Schedule

Communication and

 Document Control

 Plan

**Contractor Responsibilities**

Preliminary Design Schedule

60% Plans and Specs

Quantities Estimate

**FOR Design Submittal**

90% Plans and Specs

Quantities Estimate

Final Design Reports

**FIR Design Submittal**

30% Plans and Specs

Quantities Estimate

**Continuous Contractor Responsibilities:**

Collaborate with CDOT and Design Consultant for Innovative Designs, Review Constructability, Review Construction Plans and Specs, Monitor Schedule Impacts, Recommend Long Lead Procurement Items, and Risk Management

90% Design Development

**FOR Meeting**

60% Design Development

**All Clearances and Form 1180 are required prior to CAP**

**Plans and Specs**

Prepare Plans and Specifications package for CAP. Note changes for Contractor between CAP and final Construction Set

**FIR Meeting**

**Consultant Responsibilities**

30% Design Development

**Partnering Workshop**

**Project Scoping Workshop**

### Figure 4-1

### PRECONSTRUCTION PHASE FLOWCHART

(Design Development to CAP Proposal)

**CAP Proposal**

(See Chapter 4 for CAP process)

**Legend/Notes:**

**Risk Management Meeting** **Process Step** – described in more

 detail in workflow narrative on the

**Cost Estimate Review Meeting**  following page

1. The Risk Management Meeting includes the Design Consultant, Contractor, ICE and CDOT. The purpose of the meeting is to review project risks and associated costs, mitigation plans, identify the responsible party to manage the risk, and establish risk pools.
2. The Cost Estimate Review Meeting includes the Design Consultant, Contractor, ICE and CDOT. The purpose of the meeting is to review and compare the Contractor’s OPCC and the ICE estimate, review pricing assumptions, review quantities, and reconcile pricing differences.
3. The Risk Management Meeting and Cost Estimate Meeting may be combined, particularly in later OPCC submittal where most project risks have already been identified.
4. This flowchart shows three typical OPCC submittals. At the option of CDOT, OPCC submittals may occur independently from FIR and FOR design submittals. More OPCC’s may be required if the Contractor Estimate and ICE Estimate are not within an acceptable percentage.

**1**

**11**

**11**

**10**

**9**

**8**

**7**

**7**

**5**

Constructability Report

Update Schedule

Value Engineering Workshop

**6**

**2**

**3**

**4**

**1**

## Preconstruction Phase Workflow

The Preconstruction Phase is shown schematically on the flowchart in **Figure 4-1**. The flowchart details the basic steps in the process leading from preliminary design to the development of the final Plans and Specifications that are used to develop the CAP. The following list, which corresponds to the numbered Process Steps as depicted in **Figure 4-1**, provides a brief description of the steps involved in the process. These steps are described in greater detail later in this chapter.

### Partnering Workshop and Project Scoping Workshop

The CM/GC Preconstruction Phase begins with a Partnering Workshop and Project Scoping Workshop. These can be conducted separately, but they are often combined into a multiday workshop spanning two to three days. It is often facilitated by a third party experienced in Partnering, with the goal to develop trust, respect, and cooperation among all key players. The Project Scoping Meeting is used to review the team’s roles and responsibilities, preliminary schedule, project elements, and scope.

### Prepare Risk Management Plan/Risk Register

Following initial project discussions, the Contractor prepares the project Risk Register as part of the Risk Management Plan. The Risk Register is a tool used to identify, assess, mitigate, and monitor project risks. The Risk Register includes a matrix that identifies each risk; its risk level, cost impact, schedule impact, and responsible party; approaches to minimize risk, and results of the risk mitigation. The Risk Register is continually reviewed by the project team and updated by the Contractor throughout the Preconstruction Phase to assist with key decisions on design development, risk, and project costs.

### Prepare Cost Model

Following initial project discussions, the Contractor prepares the project Cost Model with the assistance of CDOT and the Design Consultant. The Cost Model is an open and transparent document that defines the Contractor’s pricing assumptions to communicate to CDOT and the ICE. It defines the Contractor’s costs related to labor, materials, equipment, subcontractor, and supplier quotes, means and methods, production rates, risk, direct costs, and mobilization. The Cost Model is continually reviewed by the project team and updated by the Contractor at each pricing milestone and Opinion of Probable Construction Cost (OPCC) submittal to assist with cost reviews by CDOT and pricing by the ICE.

### 30% Design Development

The Design Consultant proceeds with 30% design plans, collaborating with CDOT and the Contractor on key design decisions. During the 30% Design Development stage, the Contractor prepares a Project Schedule, performs constructability reviews, and offers suggestions for construction phasing and innovative design alternatives. At the end of the 30% design, the Design Consultant submits FIR Plans and Specifications for CDOT’s review and comment. The Contractor also reviews the FIR Plans and Specifications and offers redline comments to improve the plans for constructability, clarify ambiguities, and provide consistency with the Contractor’s proposed means and methods.

### Value Engineering Workshop

A Value Engineering (VE) Workshop is required if the project has federal funding and is over $40 million, however, CDOT may decide a VE Workshop is beneficial for smaller projects. Typically, the VE Workshop occurs during the 30% design development stage and is facilitated by a third-party consultant not directly involved in the design process. The FHWA Area Engineer should be included in the workshop.

### Cost Model Review Meeting

The Contractor updates the Cost Model based on the 30% design plans and a Cost Model Review Meeting is held with CDOT, the Contractor, the ICE, and Engineering Estimate and Marketing Analysis (EEMA) if available. The Cost Model Review Meeting may occur at the beginning of the Preconstruction Phase if preliminary design development occurred prior to procurement of the CM/GC. At this meeting CDOT, the Contractor, and the ICE review the Cost Model for all pricing assumptions and means and methods that will be used to prepare the OPCC submittals.

### OPCC #1 and ICE Submittal

The Contractor submits an Opinion of Probable Construction Cost (OPCC) to the CDOT Project Manager at the established pricing milestone, typically at 30 percent coinciding with the FIR plan submittal. The ICE prepares an independent estimate and submits it to the CDOT Project Manager. If desired by the CDOT Project Manager, and if the project schedule allows, EEMA may provide an optional unit priced project estimate that can be used for general guidance during cost estimate reviews.

### Risk Management Meeting

A Risk Management Meeting is held following the submittal of the OPCC to review project risks, discuss mitigation and associated costs, identify the responsible party to manage the risk, and establish risk pools. During this meeting, the CDOT Project Manager and Contractor agree on how risks and contingencies are quantified and assigned. The ICE and Design Consultant participate in this discussion to assist CDOT, stay informed, and understand risk and contingency assignments. At the conclusion of the Risk Management Meeting, the Contractor updates the Risk Register for newly identified risks and risks that have been mitigated and establishes or adjusts the Risk Pools that have been agreed to by the ICE and CDOT.

### Cost Estimate Review Meeting

A Cost Estimate Review Meeting is held following the Risk Management Meeting and includes the Design Consultant, Contractor, ICE, and CDOT. EEMA may also attend this meeting to provide guidance to the CDOT Project Manager. The purpose of the meeting is to review and compare the Contractor’s OPCC and the ICE Estimate, review pricing assumptions, review quantities, and reconcile pricing differences. Prior to the meeting, the CDOT Project Manager reviews the OPCC and ICE Estimate and identifies all bid items that have significant variances. During the Cost Review Meeting, the CDOT Project Manager, ICE, and Contractor attempt to reconcile pricing differences for these identified items. The CDOT Project Manager also compares the OPCC to the ICE to determine whether they are within a percentage difference acceptable to CDOT. The reconciliation process gives all parties the opportunity to understand each other’s perspectives about pricing assumptions and risk assignment.

### Update Risk Register, Cost Model, OPCC, and Schedule

At the conclusion of the Cost Review Meeting, the Contractor must update the OPCC, Risk Register, Cost Model, and Schedule to reflect all changes resulting from the Design Review Meeting, Risk Management Meeting, and Cost Review Meeting.

### Subsequent OPCC Submittals

Design development continues in this cycle of design submittals, OPCC and ICE cost estimate submittals, risk assessment, and cost reviews for all established pricing milestones. Typically, these coincide with the FIR, Design Office Review (DOR), and FOR Submittals at 30%, 60%, and 90% designs. However, additional OPCC submittals may be required if design refinements are required or if significant pricing variances remain. The goal, through this iterative process, is to narrow pricing differences throughout the CM/GC Preconstruction Phase, such that any LLTP CAP submittals and the CAP Proposal are within a percentage of the ICE Estimate that is acceptable to CDOT.

## Key Elements of the Preconstruction Phase

CM/GC project delivery requires a collaborative effort between CDOT, the Design Consultant, and the Contractor. All parties must act as an integrated team working to develop innovative design solutions that incorporate the Contractor’s proposed means and methods. This section describes the processes, meetings, workshops, and reports that CDOT has established to assist CDOT Project Managers in facilitating the Preconstruction Phase and provides additional details for the items introduced in the Preconstruction Phase workflow narrative.

### Partnering

Partnering is critical to the success of a CM/GC project, and the CM Preconstruction Phase begins with a Partnering Workshop. Partnering is a process for developing a spirit of teamwork and cooperation through shared goals, defined issue resolution procedures, clear action plans, and the monitoring of team performance to ensure that goals are achieved. Additional information on partnering can be obtained from the 2006 *CDOT Partnering Guidelines.*

Depending on the complexity of the project, the Partnering Workshop can be expected to last from a half day up to two full days. CDOT often engages with an independent third-party consultant to facilitate the workshop. The partnering consultant can also be a resource during the project if partnering and cooperation of team members starts to break down. The partnering consultant typically can be procured through Procurement Services while the CM Service Agreement is awarded.

The following persons shall attend the workshop: CDOT's Resident Engineer, Project Engineer, and key project personnel; the Contractor's on-site project manager and key project supervision personnel; and the subcontractors' key project supervision personnel. The following personnel shall also be invited to attend as needed: project design engineer, construction management personnel, key local government personnel, suppliers, key CDOT specialty personnel, CDOT EEO office personnel, design consultants, CDOT maintenance superintendent, CDOT environmental manager, key railroad personnel, and key utility personnel.

### Project Scoping Workshop

The Project Scoping Workshop initiates the design development process and is used to define project responsibilities and establish procedures and protocols to be followed during the Preconstruction Phase. At the option of the CDOT Project Manager, the Project Scoping Workshop is often combined with the Partnering Workshop into a multiday workshop spanning two to four days.

The Project Scoping Workshop should cover at least the following items:

* Introduce the project, CM/GC, partnering session, and the project stakeholders.
* Discuss roles and responsibilities related to the CM/GC process.
* Present project goals and objectives.
* Discuss project status, funding, and preliminary schedule.
* Present project elements and scope.
* Identify project risks and develop an initial Risk Management Plan.
* Establish OPCC pricing milestones (e.g. 30%, 60%, and 90%).
* Discuss the basic elements of the Cost Model.
* Review relevant Plans, Specifications, and reports.
* Conduct project site and equipment tour.
* Schedule progress meetings, FIR, and FOR meetings.
* Establish Communication and Document Control Plan.

The CDOT Project Manager prepares the Project Scoping Workshop agenda.

### Collaborative Design Development

Design development is an iterative process in CM/GC project delivery, where the Design Consultant and Contractor collaborate under the direction of the CDOT Project Manager. At each agreed-to milestone, typically at 30%, 60%, and 90% complete designs, the Design Consultant prepares a review set of construction Plans and Specifications. CDOT, the Design Consultant, and the Contractor participate in project design review sessions at the close of each FIR and FOR submittal and as construction documents are finalized for each CAP Package. The purposes of the project design review sessions are to (1) assure consistency with the design intent; (2) ensure complete, coordinated, constructible, and cost-effective designs for all disciplines; (3) assure that the design documents are code compliant; (4) endeavor to confirm that all work has been included and described in sufficient detail to assure complete pricing of work; (5) allow for phased construction; and (6) identify errors and omissions.

The Contractor provides the Design Consultant written reviews and redlined hard copies of Drawings, Plans, and Specifications. The Design Consultant collects all design review comments from the various participants, provides reports to CDOT, and ensures that with the issuance of each progress set of design documents, all comments have either been incorporated or resolved to the satisfaction of CDOT.

### Addressing Complex Construction and Developing an Innovative Approach

CM/GC Project Delivery is particularly well suited to address complex construction projects and to use construction techniques that are unfamiliar to CDOT. In recent years CDOT has used the CM/GC project delivery method to perform electrical switchgear improvements, Accelerated Bridge Construction (ABC), interchange projects, and tunneling projects. The advanced construction methods required by these projects were developed through the collaborative design process that incorporated the specialty contractor’s expertise and experience.

The CM/GC project delivery method provides the opportunity to incorporate innovative approaches into the design development. The Contractor should provide input on the design during the design process and particularly at the Design Review meetings and VE Workshop. CDOT and the Design Consultant must be open to the Contractor’s suggestions and review innovative methods and materials under consideration.

To monitor and track this process, the Contractor is responsible for preparing an **Innovation Tracking and Performance Report**. This report tracks all innovations offered by the Contractor, CDOT, and Design Consultant team members from the Procurement Phase through the Preconstruction Phase. It also tracks the performance of these innovations during any Construction Phase or LLTP of the Project.

### Assessing and Improving Constructability

As part of the collaborative design process, the Contractor provides constructability reviews for the feasibility and practicality of any proposed means and methods; selected materials, equipment, and labor; material availability; site improvements; earthwork and foundation considerations; and coordination of the Drawings and Specifications, verification of quantities, and so forth. Through this review the Contractor should provide alternatives that provide cost or schedule savings or limit impacts on the traveling public.

The Design Consultant then has the opportunity to tailor the design to the Contractor’s preferred means and methods. Some of the most valuable input that the Contractor provides is a review of the actual construction phasing and traffic control that the Contractor uses during construction. By collaboratively developing construction phasing plans, the project team can be assured that construction schedules are accurate and can be accomplished during construction. Significant design decisions can be made that reduce construction impacts on the traveling public. The CM/GC Project Delivery method allows CDOT to evaluate and direct decisions regarding construction phasing, schedule, and impacts on traffic, thereby determining solutions that provide the best value to the public.

To document and facilitate this process the Contractor is responsible for developing a **Constructability Report** after review of each Milestones plan submittal, which includes a review of the cost and risks associated with the constructability of the proposed design.

### Value Engineering Requirement

A formal VE Workshop is required if the project has federal funding and is over $40 million, however, CDOT may decide it is beneficial to conduct a VE Workshop for smaller projects. The CDOT Project Manager works with FHWA to determine the focus of the VE study, which may include cost and/or schedule improvements. Typically, the VE Workshop occurs during, or prior to, the 30% design development stage. The CDOT Project Manager should make sure to invite the FHWA Area Engineer to the workshop.

The VE Workshop is facilitated by a third-party engineering consultant not directly involved in the design process. The CM may be included in the VE Workshop, if the Contractor has not been involved in advancing the preliminary design. However, cost savings because of the Contractor’s participation in the VE Workshop are not shared. Cost saving concepts developed through the VE Workshop during the Preconstruction Phase may be incorporated into the Contract Documents at the discretion of the CDOT Project Manager.

In CM/GC, value engineering by the CM occurs throughout the Preconstruction Phase during the iterative design and review process. Because the Contractor is involved in the design development, Value Engineering Change Proposals (VECPs) are not accepted during the Construction Phase. CDOT Standard Specification Sections 104 is revised to state that VECP’s are allowed during the construction of CM/GC Projects.

### NEPA Process and CM/GC

Although project design can be accelerated and advanced through CM/GC, CDOT Project Managers need to be aware that the design must progress in accordance with the Code of Federal Regulations (CFRs) which allows preliminary design activities to proceed prior to conclusion of the National Environmental Policy Act (NEPA) process, if preliminary activities do not materially affect the objective consideration of alternatives in the NEPA review process. CDOT is also at risk for design alternatives that are determined not to meet previously approved environmental assessments, and written approval from the FHWA is required to advance the design past the conceptual design.

The CM/GC contractor must not prepare NEPA documentation or have any decision-making responsibility with respect to the NEPA process. However, the CM/GC contractor may be requested to provide information about the project and possible mitigation actions, including constructability information, and its work product may be considered in the NEPA analysis and included in the record.[[5]](#footnote-5)

*CDOT shall not initiate construction activities (even on an at-risk basis) or allow such activities to proceed prior to the completion of the NEPA process. CDOT shall not perform or contract for construction services (including early work packages of any kind) prior to the completion of the NEPA process.*[[6]](#footnote-6)

### Construction Plans and Specifications

Development of the construction plans proceeds in similar fashion to DBB except that the process is more iterative involving the Contractor for constructability reviews and design alternatives. CDOT design reviews occur at the FIR and FOR levels. CDOT specialty staff should be made aware of the limited time available for these reviews. For CM/GC projects, the FOR review often requires a quick turnaround because revisions to the construction plans may affect the CM’s CAP Proposal that is typically prepared following the FOR submittal. To ensure few changes after the CAP, the plans may be advanced to 100% stamped plans if the project schedule allows.

Development of the construction specifications also proceeds in similar fashion involving the Contractor for selection of materials, equipment, and alternative methods. Modifications that are proposed by the Contractor are included in Project Special Provisions and approved by CDOT. CDOT specification reviews occur at the FIR and FOR levels. Again, CDOT specialty staff should be made aware of the review time available for these reviews so as not to adversely affect the CM’s schedule and CAP Proposal that is typically prepared following the FOR submittal.

### CDOT Owner Controlled Insurance Program

During the Preconstruction Phase, the project team should coordinate with CDOT Risk Management to discuss details that will affect the Owner Controlled Insurance Program (OCIP) such as schedule, unique project risks, design costs, construction costs, and the potential lines of insurance coverage that may be included in the OCIP. With project specific information, CDOT can better determine the covered and costs for the project that will affect the Contractor’s insurance requirements and project cost estimates.

Typically, around the 30% level, the project team should meet with CDOT Risk Management to discuss OCIP draft specifications and identify which lines of insurance coverage need to be included in the OCIP, which lines of coverage need to be provided by the Contractor, and which need to be quoted by the Contractor and then analyzed By CDOT in a feasibility study. Typically, around the 60% level, the Contractor will be required to provide insurance quotation documentation, along with all other applicable documentation to CDOT Risk Management for the feasibility study.

The requirements and procedures for CDOT insurance program are subject to change, therefore the Region should contact CDOT Risk Management at the beginning of the Preconstruction phase to obtain the most current requirements.

### Construction Schedules

The Contractor is responsible for preparing and maintaining an overall Project Schedule, with input from the Design Consultant and CDOT. The Project Schedule must be in a Critical Path Method (CPM) format that is coordinated with the Design Consultant’s design schedule, CDOT and FHWA review processes, and agreed-upon Milestone dates. The schedule must have reasonable detail to allow for assessment of potential LLTP proposals. The Project Schedule is updated following each OPCC submittal and at Milestone dates as determined at the Project Scoping Workshop.

### Subcontracting and Supplier Plan

As part of the Cost Model, the Contractor must prepare a Subcontracting Plan**.** The Subcontracting Plan shall be started during the 30% design phase and updated and included with each OPCC prepared by the Contractor. The Subcontracting Plan is also included in the CAP Proposal final package for EEO review.

As part of the Supplier and Subcontractor outreach, the Contractor is expected to solicit and obtain three or more quotes for subcontracted work and materials to ensure competitive pricing. However, if approved by the CDOT Project Manager, the project team may decide to use a Subcontractor that provides the best value if it is determined to be in the best interest of the project.

## Risk Management

The following section provides a summary of risk management and the tools that CDOT has developed to assist with risk management on CM/GC projects. Personnel involved with CM/GC contracting are encouraged to read the NCHRP Report 658, *Guidebook on Risk Analysis Tools and Management Practices to Control Transportation Project Costs* for additional guidance on risk management.

Risk management is the identification, analysis, planning, allocation, and control of project risks. It is central to CM/GC project delivery. Throughout the project, the Design Consultant, Contractor, and CDOT collectively collaborate to identify project risks, propose mitigation, and actively control risks. The Contractor is primarily responsible for identifying construction risks and takes the lead in tracking project risks, preparing the associated cost and schedule impacts and monitoring and controlling risk during the Construction Phase. The ICE provides support in verifying the costs associated with the risks. The Design Consultant is responsible for advancing and refining the design to minimize or eliminate identified risks. CDOT’s Project Manager is ultimately responsible for deciding which party owns and controls the risk and determines the Contract dollars assigned to the project risk pools. Understanding which risks can and must be controlled by CDOT and which risks can and are best shared with or allocated to the Contractor, results in an efficient and effective CAP Proposal and overall lower project cost.

The risk analysis process generally includes the following five steps, which are described in detail in subsequent sections:

1. Identify the risk.

2. Assess and analyze the risk.

3. Mitigate and plan for the risk.

4. Allocate the risk.

5. Monitor and control the risk.

#### Figure 3-2. Collaborative Risk Management Process

### Identify the Risk

General project risks are first identified during CDOT’s project delivery method selection process described in Chapter 2 of this manual. During the delivery method selection process, the PDSM likely has identified project-specific risks that would benefit from early contractor collaboration and led to the selection of the CM/GC project delivery method. During the CM procurement phase, the Contractor further identifies the project risks and proposes methods for controlling those risks. These early identified risks become the basis of the initial project risk matrix, which is prepared by the Contractor. The project team reviews the risk matrix during the Project Scoping Workshop to reach a consensus of project risks, agree on the likelihood that the risk will occur, and discuss a general approach to mitigate the risk or maximize an opportunity to provide value to the project. Additional project risks are then identified and addressed throughout an iterative design development process, as illustrated in the Preconstruction Phase flowchart in **Figure 3-1**.

#### *What are considered Project Risks?*

A project risk is an uncertain event or condition that, if it occurs, has a negative or positive effect on a project’s objectives, cost, schedule, or quality. Typical examples include unknown soil conditions, adverse groundwater conditions, hazardous materials, utility conflicts and delays, third-party processes and approvals, innovations, improved means and methods, and constructability problems.

#### *What are not considered Project Risks?*

Project risks do not include internal business risks. All the Contractor’s internal risks that are inherent in all projects, such as labor and equipment availability and failure, worker attrition, equipment failure, and capital expenditures, are completely accepted by the Contractor. Although these are real costs and risks to the Contractor, they are not common or shared project risks and must be managed solely by the Contractor as part of the Contractor’s business. Similarly, CDOTs internal organizational processes, as important as they are to executing the project, are considered risks that are completely accepted by CDOT. CDOT’s Resident Engineer or Program Engineer must be involved in any discussions where CDOT’s Risk Pools are developed for these organizational process risks.

#### Access and Analyze the Risk

During the Preconstruction Phase, the project team collaboratively assesses the project risks through a series of Risk Management Meetings. These meetings are typically held at established pricing milestones following 30%, 60%, and 90% submittals, although often additional meetings are required.

Initial Risk Management Meetings typically focus on identifying and assessing project risks and investigating innovative design solutions. During later meetings, the focus shifts to discussions of the cost and schedule impacts, risk allocation, and development of the risk pools, if necessary.

#### Mitigate and Plan for the Risk

In a traditional DBB, without the benefit of the CM/GC collaborative process, project risks result in the Contractor adding contingency to the bid. In D-B, there is more opportunity to properly allocate and manage risk but still the Contractor must often add contingencies to the bid to cover risk that the Contractor is not able to effectively manage. In CM/GC, there is a unique opportunity to advance and refine the design to reduce Contractor- identified risk. Risks that have been eliminated through design changes can then be either removed from the Risk Register or noted as having been resolved. If the project risk cannot be eliminated, it remains on the Risk Register and the Contractor must prepare a mitigation plan for the risk. Mitigation can involve design changes, development of Risk Pools, Owner-accepted risk, Contractor-accepted risk, and avoidance of risk to eliminate or reduce the risk.

Some risk can be mitigated by early-stage construction packages or through the LLTP process. The Contractor should look for any material or equipment that is likely to benefit from early procurement. These items can then be procured prior to the Construction Phase through an LLTP CAP. Likewise, the project team should review the project and identify construction phases that are likely to benefit from staged construction packages. For example, an early construction package could be procured to allow for utility construction to proceed or to allow the project schedule to advance for a phase of construction while project details are resolved on subsequent phases.

#### Allocate the Risk

Once a risk has been identified and quantified, it is assigned to either CDOT or the Contractor. The goal is to assign the risk to the party who is best able to control the risk. Risks can be allocated solely to the Contractor or CDOT, or they can be shared. Risk is accounted for in three ways: (1) risk that is allocated to the Contractor is included within the Contractor’s bid items; (2) risk that is allocated to CDOT is accounted for in the CDOT Risk Pool; and (3) risk that is to be shared is accounted for in the Shared Risk Contingency Pool. Additionally, risk for minor overruns and Contract changes are addressed by a CDOT Risk Pool similar to DBB Force Accounts. Minor Contract Revisions (MCRs) for CM/GC projects can usually be significantly less than for traditional DBB because of the risk mitigation process and cost allocation to risk pools.

The Contractor and CDOT develop risk pools for risks that need to be addressed through the CDOT Risk Pool or Shared Risk Contingency Pool by following four steps:

1. The CM submits drafts of the items, including estimates for those items, to be covered by MCRs, Overruns, CDOT Risk Pools, and Shared Risk Contingency Pools for CDOT review and acceptance.
2. The CM submits drafts of the definitions for Shared Risk Contingency Pools for CDOT review and acceptance.
3. CM submittals are reviewed by CDOT, with technical input from the Design Consultant and cost validation from the ICE.
4. Once accepted, CDOT adds the items and definitions to the Risk Register as a Project Special Provision for team review, acceptance, and signing.

#### Monitor and Control the Risk

The objectives of risk monitoring and control are to systematically track the identified risks, identify any new risks, and effectively manage the contingency reserve. Risk monitoring and updating occurs after the risk mitigation and planning processes and then continues through the Preconstruction and Construction Phases. The list of risks and associated risk management strategies are likely to change as the project matures and new risks develop, or anticipated risks are mitigated.

Periodic project risk reviews repeat the tasks of identification, assessment, analysis, mitigation, planning, and allocation. Regularly scheduled project risk management meetings can be used to ensure that project risk is continually reviewed. If unanticipated risks emerge, or a risk’s impact is greater than expected, the planned response or risk allocation may not be adequate. At this point, the project team must perform additional planning to control the risk. Changes to project risks must be documented using the established Risk Register. During the Construction Phase, CDOT and the Contractor monitor contingencies and the Risk Pools to ensure that the established Risk Pools are adequate for the actual realized project risks.

### Risk Register

The Risk Register is a tool used to document the risk management process. The purpose of the Risk Register is to define the risks, document the risks, identify cost and schedule impacts associated with the risks, and produce detailed mitigation plans for the risks. Each Risk Register includes the agreement of how CDOT and the Contractor defined the risks, who is responsible for the risks, and how the risks are to be paid for during construction. The Contractor is responsible for preparing and updating the Risk Register with input from CDOT, the ICE, and the Design Consultant.

By the end of the Preconstruction Phase, the Risk Register describes all known project risks, defines the project Risk Pools, and becomes part of the Contract Documents. This Risk Register includes the agreements between CDOT and the Contractor that defines risk management for the construction package(s). The Risk Register is formalized with the Construction Agreement and is a Contract Document that is signed and agreed to by both parties so that miscommunications and disputes during construction are limited. Copies of the Risk Register are made available to the design team, CDOT, and the Contractor construction teams as the project goes into construction. During the Construction Phase, the Contractor is responsible for monitoring and controlling the risks that have been allocated to the Contractor through the Risk Register.

The outline and CDOT template for a typical Risk Register includes the following:

**Section 1 –** Project Overview, Purpose, and Procedure

1. Project overview (a full description of the project from the RFP with any changes that have occurred during the design development)
2. Project goals (as previously developed during the RFP and Project Scoping Workshop)
3. Purpose of the Risk Register
4. Risk Register procedure and methodology.

**Section 2 –** Construction Phase Risk Categories and Definitions

1. Construction package (list the construction package(s) determined in the Preconstruction Phase)
2. Definition of the established Risk Pools and Agreements
3. A list of each identified risk specifying which Risk Pool the item will be paid from
4. Revisions to CDOT standard payment Specifications for all Shared Risk Pool items, which define how the item will be paid and shared.

**Section 3 –** Risk Matrix

1. Identifies each risk, risk level, cost impact, schedule impact, approach to minimize risk, responsible party, and result of risk mitigation (The sample Risk Matrix in **Figure 4-3** illustrates a first level of risk identification to determine and assign potential risks. As the Preconstruction Phase advances, a second level analysis (**Figure 4-4**) is performed to further allocate and price the risk.

**Section 4 –** Agreement and Signature Page

### Contingency Pricing, Risk Pools, and Force Accounts

Contingency is bid into every project, regardless of contracting method, and is reflective of the risks present at the time the contract is bid. Typically, higher risk means higher contingency and lower risk means lower contingency. One of the major benefits of CM/GC contracting is that it allows the owner and contractor to collaboratively work together during the design phase to better understand, manage, and reduce risks on the project, thereby lowering contingency costs.

For CDOT CM/GC projects, risk is paid for by three separate means: (1) through the Contractor’s bid for risk that the Contractor has accepted, (2) through the CDOT Risk Pool for risk that CDOT has accepted, and (3) through the Shared Risk Contingency Pool for risk that has been shared.

#### Contractor Risk

The Contractor must include contingency in the Contractor’s bid items for common construction risks, such as labor availability, material pricing fluctuations and availability, schedule delays, and Subcontractor management. CDOT and the ICE will review the Contractor’s estimating assumptions to fully understand any contingency that the Contractor has assigned to the work. If the contingency is considered high, CDOT can work with the Contractor to reduce risks that are contributing to the high contingency, mitigate the risk through the Shared Contingency Risk Pool, or remove the risk from the Contractor entirely by accepting the risk in the CDOT Risk Pool.

#### CDOT Risk Pool

The CDOT Project Manager should consider taking ownership of the risk if CDOT has a better opportunity to manage the risk than the Contractor or if the risk is completely beyond the control of the Contractor (e.g., weather, changes in site conditions, etc.). The CDOT Project Manager may also consider taking ownership of the risk if he or she believes the probability of the risk occurring is less than the Contractor’s assessed probability. For example, a Contractor is including a high contingency in a bid item to cover the cost of potential weather delays that could increase the rental costs for a specialty piece of equipment. CDOT may decide to take that risk and include this price within the CDOT Risk Pool. If the weather delay occurs, CDOT is responsible to pay the Contractor. However, if the weather delay does not occur then CDOT has saved the contingency cost without sharing the cost savings with the Contractor.

#### Shared Risk Contingency Pool

The Shared Risk Contingency Pool is often the best tool for managing project risks that have a high amount of uncertainty, along with a high likelihood of occurring, but still have the potential for the Contractor to control. Typically, these items are identified and proposed by the Contractor who submits a plan to CDOT for review and approval. The potential amount of the shared risk is defined in the Risk Register along with a payment specification (a Project Special Provision). If the risk is encountered during construction, the Contractor is paid per the agreed-to payment specification. However, if the entire estimated risk is not recognized, CDOT and the Contractor share the savings as identified in the Risk Register. Typically, Shared Risk Contingency Pools are split equally, but the amounts could vary if either CDOT or the Contractor is assuming more risk. Ultimately this is part of the negotiation and how CDOT plans to manage the risk.

CM/GC Project Special Provisions are required to contractually define shared risks. **Figure 4-5** shows a sample risk sharing Project Special Provision from a recent CDOT tunnel project. The Contractor identified a project risk associated with not knowing the amount of shotcrete that would be required to compensate for irregularities in the excavated surface. Although to some extent the Contractor could control the excavation, there was a high likelihood that additional shotcrete would be necessary beyond the neat line calculations from the construction plans. The Contractor proposed a unit price and a Shared Risk Pool, which was reviewed by the ICE, approved by CDOT, and documented in the Risk Register.

**REVISION OF SECTION 641**

**TUNNEL SHOTCRETE**

Section 641A of the Project Special Provision is hereby revised as follows:

 **Add the following to 641A.14:**

Additional shotcrete for initial support shall be compensated through a shared risk pool as established in (e) below for structural shotcrete.

* + 1. The following Shared Risk Pool (shotcrete) has been established as compensation in the event that the actual volume of shotcrete to reach required thickness is increased due to irregularities in the excavated surface. The quantity will be measured based on the delivered quantity of shotcrete as defined in revision to section 641 in the special provisions. The basis of volume shall be cumulative over the length of the tunnel. In the event that the total Shared Risk Pool is not utilized, the savings will be shared between Contractor and the Owner based on percentages below.

Shared Risk Contingency Pool:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Cost/Cubic Yard | Total Additional Cubic Yards | Total Risk Pool | Contractor’s Share | Owner’sShare |
| $700.00 | 350 | $245,000 | 50% | 50% |

* + 1. In the event that the actual volume exceeds that as specified above the same unit rates shall apply.

**Figure 4-5: Example Risk Sharing Project Special Provision**

The motivation for using the Shared Contingency Risk Pool is that it provides an incentive for the Contractor to control risk and maintain good production methods during construction. Under DBB or D-B project delivery methods, the savings of unrealized risks are kept entirely by the Contractor. Shared Risk Pools allows CDOT the ability to recover a share of the unrecognized risk and collaboratively assist with controlling the risk when possible. However, to ensure fair pricing, the ICE is heavily relied upon to review all unit item costs and total estimated costs associated with any Contractor-proposed shared risks. If the Contractor and CDOT cannot agree to an appropriate shared risk item price or total amount of the pool, the CDOT Project Manager may decide to accept the risk entirely into the CDOT Risk Pool.

#### Establishing Dollar Amounts for the Risk Pools

There is no standard formula to establish the dollar amounts to include in the risk pools for identified risks. The CDOT Project Manager must use some judgment and work collaboratively with the Contractor and the ICE to include sufficient funds to cover the likelihood of the risks occurring without overestimating the contingency such that it falsely limits the budget available for the project’s intended scope of work.

To provide guidance to CDOT Project Managers, one way of viewing a simplified approach to risk allocation is to review the probability that a risk may occur. Generally, if the probability of a risk occurring is high, the entire amount of the risk should be considered for the risk pool. If both CDOT and the Contractor agree that the probability of a risk is low, it is often accepted entirely by one of the parties or alternatively included in the risk pool with a reduced amount (relative to its probability of occurrence). Challenges occur, however, when CDOT and the Contractor are not in agreement on the probability of the occurrence of the risk. An approach for the CDOT Project Manager to consider is to accept the risk into the CDOT Risk Pool when the Contractor considers the probability of the risk occurring to be higher than CDOT’s assessment. Otherwise, from CDOT’s perspective, for shared risks, the Contractor can receive additional compensation for avoiding risks that are unlikely to occur.

The Risk Matrix can be an effective tool to assist in these discussions and in establishing appropriate amounts to include in the risk pools. The risk matrix should show the probability of the risk occurring and the total maximum cost impact if the risk does occur. To establish the contingency, a weighted average or expected value of the risk is then obtained by multiplying the probability of the risk occurring by the cost impact.

Contractors that routinely deal with risk may have more detailed methods involving complex simulations or other risk management informational systems. In these circumstances, the CDOT Project Manager must collaborate with the Contractor to understand the approach and methods used in the risk analysis.

#### Risk Management as it Relates to the OPCC process and CAP Proposal

Developing the Risk Register and Risk Pools is integral to the preparation of the Contractor’s Opinion of Probable Construction Cost (OPCC) and the CAP Proposal. The Contractor and ICE are better able to prepare accurate estimates as project risks are identified and mitigated, and defining and establishing the Risk Pools allows the Contractor and ICE to remove contingencies from the bid items. The OPCC becomes more accurate with each successive pricing milestone. The open-book format allows CDOT to fully understand the contingencies within the OPCC and the Risk Pools provide a tool to separate risk from discussions surrounding bid item costs. When this collaborative and open process is well executed, it leads to a CAP Proposal that does not contain any surprises and is easily agreed to by CDOT.

#### Force Accounts for CDOT Risk Pool and Shared Risk Contingency Pool

Once the project moves into the Construction Phase, the previously established CDOT Risk Pool and Shared Contingency Risk Pool become planned Force Accounts. The requirements for the use of Force Accounts are described further in Chapter 4 of this manual and are specified in the Revision of Section 109 - Construction Manager/General Contractor Force Accounts. The CDOT Project Manager modifies Section 109 to define project-specific requirements and definitions determined through the risk management process.

### Risk Management Meetings

A Risk Management Meeting is typically held at each pricing milestone and includes the Design Consultant, Contractor, ICE, and CDOT. EEMA may also attend this meeting to provide guidance. The purpose of the meeting is to review project risks, discuss mitigation and associated costs, identify the responsible party to manage the risk, and establish risk pools.

During this meeting, the CDOT Project Manager and Contractor agree on how risks and contingencies are quantified and assigned. The ICE and Design Consultant participate in this discussion to assist CDOT, stay informed, and understand risk and contingency assignment. Adjustments to plans and quantities may be needed based on discussion at the Risk Management Meeting. During early risk meetings, a significant amount of time is spent identifying risks and assigning time and cost impacts for each risk. During subsequent meetings, the focus of the meetings is to identify any new risks that have been encountered. The Contractor updates the Risk Register at the conclusion of the Risk Management Meeting to include newly identified risks, risks that have been mitigated, and any necessary adjustments to the Risk Pools that have been agreed to by the ICE and CDOT.

## Estimating CM/GC Projects

One of the most important processes in the Preconstruction Phase is the development of interim pricing that leads toward successfully establishing an acceptable CAP. As the design progresses, the Contractor and the ICE prepare interim estimates, called Opinions of Probable Construction Cost (OPCC), at established pricing milestones. Pricing milestones allow CDOT to expose pricing disagreements early in the CM/GC process, which allows time for both CDOT and the Contractor to resolve these inconsistencies prior to the final CAP commitment. Project risks and costs are reviewed through a series of Design Review Meetings, Risk Management Meetings, and Cost Estimate Review Meetings. The goal of this iterative and open process is to continually review pricing, cost assumptions, and risks to create a CAP proposal that is within an acceptable percentage of the ICE estimate and allow CDOT to proceed directly to awarding the Contract at the completion of the Preconstruction Phase.

### Cost Model

Successful price justification in CM/GC relies on open communication to thoroughly document the assumptions used by the Contractor to price the work. The Cost Model is an open and transparent model that the Contractor develops and uses through the Preconstruction Phase so that estimates and assumptions are communicated to CDOT, the Design Consultant, and the ICE. The Cost Model includes a Summary of Approximate Quantities (SAQ) for the Plans and Specifications at the time of the estimate, along with a list of the pricing assumptions and other notes associated with each bid item (see **Figure 3-6)**. Details include, but are not limited to, labor hours and rates, materials, equipment, subcontractor, and supplier quotes, means and methods, production rates, risks, direct costs, and mobilization. The format of the Cost Model varies depending on the Contractor, but it must clearly communicate how the item costs were derived. CDOT and the ICE review the Cost Model and must concur with the assumptions made by the Contractor.

Initially, CDOT, the Contractor, ICE, and Design Consultant will need to determine and agree to the most appropriate CDOT cost data number, units of measure, and quantities for all items. As design progresses, the Contractor and ICE will reconcile quantities for major items, and will perform independent takeoffs for materials, labor, and equipment.

In an open-book process, the Contractor prepares an initial Cost Model that is reviewed by the project team at the Project Scoping Meeting. The Cost Model is further refined following completion of the 30% design and is thoroughly reviewed by CDOT and the ICE at a Cost Model Review Meeting. The Cost Model is again refined with each subsequent pricing milestone and is used as the basis for each Opinion of Probable Construction Cost (OPCC) and any LLTP CAP or any Construction CAP proposal when submitted.

When updating the Cost Model, the Contractor should review risks, market conditions, and potential challenges in the current design that could impact schedule or cost. The Contractor should propose innovations or alternative designs that minimize risk or add value to the project. The Cost Model is then used to communicate and document the history and pricing assumptions made throughout the design development.

### Pricing Milestones

The number of pricing milestones varies based on the complexity of the project; however, logical pricing milestones are built into the typical design process. For example, 30%, 60%, and 90% review meetings can correspond with the design FIR, DOR, and FOR meetings. Pricing milestones are determined by the CDOT Project Manager and are established and agreed to at the Project Scoping Meeting. Ideally, the first pricing milestone occurs as soon as major project requirements are identified so that construction costs can be compared with the Fixed Limit of Construction Cost established for the project. For each pricing milestone, the Contractor submits an Opinion of Probable Construction Cost (OPCC), and the ICE submits an Independent Cost Estimate.

### Opinion of Probable Construction Cost Submittals

The Contractor is responsible for preparing an Opinion of Probable Construction Cost (OPCC) at each agreed-to pricing milestone. Each OPCC is independently prepared but in coordination with the Design Consultant, CDOT, and the ICE. Estimates must be based on quantitative takeoffs whenever possible and must be supported in sufficient depth and organization to be used in preparing budgets, bid schedules, Specifications, and Risk Pools. The specific cost coding structure, estimating guidelines, assumptions, and contents of the cost estimates are mutually agreed to by the Contractor, CDOT, and the ICE prior to development of the first cost estimate to assure that estimates developed by all parties can be compared and reconciled. Each OPCC is produced in an open-book process through the Preconstruction Phase of the Project so that CDOT and the ICE can make accurate assumptions, calculate prices, and determine the amount of risk in the project.

When preparing any OPCC and in development of the Schedule of Bid Items, documents must include:

* the cost of all labor, materials, equipment, bond premiums, and actual costs of procurement or construction that the Contractor will use for the duration of such LLTP Phase or Construction Phase to complete the Work.
* the General Conditions to be incorporated in the Work.
* all indirect costs for review and approval by CDOT.
* The Subcontracting Plan

For each OPCC, the Contractor must acquire multiple quotes from potential Subcontractors and Suppliers. This information is shared in the open Cost Model and the Contractor allows potential Suppliers and Subcontractors to share their information, quotes, and product data with the ICE, CDOT, and the Design Consultant.

The Contractor must also submit a Material Sourcing Plan,a written plan that details how the Contractor intends to handle bids from material vendors for any LLTP CAP or Construction CAP proposals. The Material Sourcing Planis started during the 30% design phase and is updated with each Opinion of Probable Construction Cost (OPCC). The Material Sourcing Plan, when fully developed, also is included in the final CAP Proposal package.

**Figure 4-7. Sample Cost Item Estimate**

**Figure 4-7. Sample Cost Item Estimate**

**Figure 4-7. Sample Cost Item Estimate**

### ICE Estimate

CDOT contracts with an ICE firm who develops an Independent Cost Estimate for comparison with each of the Contractor’s OPCC submittals. The ICE Estimate is a production-based estimate, similar to the one shown in **Figure 3-6**, that uses the same assumptions agreed to and documented in the Cost Model. This estimate serves as the official CDOT Engineer’s Estimate once accepted by EEMA.

### CDOT Engineering Estimates and Marketing Analysis Involvement

At the beginning of a CM/GC project, the CDOT Project Manager should consult with Engineering Estimate and Marketing Analysis (EEMA) to inform them of the project, discuss their availability, and understand the support they can provide during the estimating process. It is recommended that EEMA attend the Cost Model Review Meeting and Cost Estimate Review Meetings. If desired by the CDOT Project Manager, and if the project schedule allows, EEMA can provide an optional unit priced project estimate that can be used for general guidance during cost estimate reviews.

It should be noted that the EEMA estimate is a unit price estimate based on historical bids and cost items. This bid format does not necessarily account for project risks, and it may not correlate with the production-based estimates of the Contractor and ICE. It can serve, however, as a starting point to identify and discuss bid items that are unique to the project and require additional assessment to understand the details of the pricing assumptions.

### Reviewing Project Risk in OPCC Submittals

As described in Section 3.4.3, a Risk Management Meeting is held at each pricing milestone to review project risks and costs that affect the OPCC and Risk Pools. Based on the results of the Risk Management Meeting, the Contractor and ICE may also need to modify the OPCC and ICE Estimate prior to the Cost Estimate Review Meeting. As the project design development progresses, Risk Management Meetings may be combined with the Cost Estimate Review Meetings, at the option of the CDOT Project Manager.

### Cost Estimate Review Meetings and Acceptable Pricing Differences

The Cost Estimate Review Meeting is held following each Risk Management Meeting (or optionally in combination with the Risk Management Meetings in later OPCC submittals) and includes CDOT, the Contractor, the ICE, and the Design Consultant. EEMA may also attend this meeting to provide guidance to the CDOT Project Manager. **It is highly recommended that the CDOT Project Manager request the assistance of someone with prior CM/GC cost estimating experience if the CDOT Project Manager has not previously managed a CM/GC project.** The purpose of the Cost Estimate Review Meeting is to review and compare the Contractor’s OPCC and the ICE estimate, review pricing assumptions in the Cost Model, review quantities, and reconcile pricing differences.

Prior to the meeting, the CDOT Project Manager reviews the OPCC and ICE Estimate and identifies all bid items that have significant variances. The CDOT Project Manager also compares the OPCC with the ICE Estimate to see if they are within a Total Percentage Difference\* acceptable to CDOT. If the Independent Cost Estimate and Contractor’s OPCC are not within a percentage acceptable to CDOT, the Project Manager conducts a review to determine where the cost estimates differ and what assumptions or details were used to determine each difference.

\* The Total Percentage difference is calculated by:

* Find the absolute value of the difference between the two numbers. |a-b|
* Find the average of the two numbers.

$$ \frac{(a+b)}{2}$$

* Divide the absolute difference by the average.

$$\frac{|a-b|}{\frac{(a+b)}{2}}$$

* Multiply the result by 100 to express as a percentage.

$$\left(\frac{|a-b|}{\frac{(a+b)}{2}}\right)X 100=\%$$

The CDOT Project Manager can implement a variety of methods to identify those items that warrant additional discussion. One method is to identify all items that have greater than a 10 percent variance. However, the CDOT Project Manager may elect to ignore bid items that exceed 10 percent if they are considered insignificant to the overall cost of the project. Another method is to review only high-dollar differences in excess of a set dollar amount and still review any item that has a very large percentage difference, as this may indicate items for which the Contractor or ICE have made incorrect pricing assumptions. For example, review all items that have a difference of $50,000 or more, along with any item that has over a 150 percent variance. Although it is important to reconcile individual bid items, the overarching objective is to reach a consensus on the entire project cost.

During the Cost Estimate Review Meeting, the CDOT Project Manager, ICE, and Contractor attempt to reconcile pricing differences for every item identified by the CDOT Project Manager as having a significant variance. The reconciliation process gives all parties the opportunity to understand each other’s perspectives about pricing assumptions and risk assignment. For the integrity of the process, it is important that the CDOT Project Manager question equally the Contractor’s OPCC and the ICE Estimate. The objective is to narrow pricing differences throughout the CM/GC preconstruction process, with the end goal of having the CAP Proposal within a percentage of the ICE Estimate that is acceptable to CDOT. The acceptable percentage varies depending on the project size and complexity and may range from 2 to 10 percent (see Chapter 4 in this manual for additional information regarding an acceptable CAP Proposal percentage).

### Fixed Limit of Construction Costs

The Fixed Limit of Construction Cost is the total dollar amount that CDOT makes available for the cost of performance of all Construction CAPs and LLTP CAPs to complete the work. During the preparation of each OPCC, the Contractor is responsible for notifying the CDOT Project Manager if it appears that the OPCC will exceed the applicable portion of the Fixed Limit of Construction Cost and making reasonable recommendations for corrective action consistent with the Fixed Limit of Construction Cost. The CDOT Project Manager should work with the Contractor and Design Consultant to reconcile the cost, including approving redesign; providing constructability reviews and reports, deductive alternatives; reductions in work; requesting additional value engineering; and making modifications to the Contract Documents.

### Subsequent OPCC Submittals and Changes during an OPCC

OPCC and ICE cost estimate submittals are prepared for all established pricing milestones. Additional OPCC submittals may be required if design refinements are required, if significant pricing variances remain, or if there are significant material cost escalations. The Contractor is required to notify CDOT if any changes occur that will significantly alter a previously supplied OPCC. Through the iterative process of OPCC submittals, Risk Management Meetings, and Cost Estimate Review Meetings, the Contractor refines the Cost Model and project estimate. At the conclusion of each Cost Estimate Review Meeting, the Contractor must update the Risk Register, Cost Model, and Schedule to reflect all changes authorized at the meetings.

The Contractor, in preparing his or her OPCC, must communicate with CDOT and the Design Consultant any proposed materials, equipment, labor, and types of construction that are to be included in the Contract Documents. The Contractor may also make reasonable adjustments in the Scope of Work and propose revisions to the Specifications for review and approval by the CDOT Project Manager. Likewise, the Design Consultant must communicate changes to the design Drawings or Specifications that affect the Contractor’s and ICE’s pricing assumptions.

# : CAP Proposals and the Contracting Process

As the Preconstruction Phase nears completion, the focus of the process moves toward the development of a Construction Agreed Price (CAP) and if successfully negotiated an award of a construction contract to perform the work. Chapter 5 describes the steps involved in developing and negotiating the CAP, and the processes required by CDOT and FHWA to execute a construction contract.

***For CM/GC to be an effective use of the taxpayer investment CDOT shall do everything it can to maintain leverage throughout the negotiation.*** Ensuring that the negotiation does not become a critical path element, is key to maintaining that leverage. It is extremely important that a project manager ensure that the preconstruction schedule can accommodate all three rounds of negotiation completely, and if necessary, the off-ramp process to advertise the package.

Providing adequate time, not influenced by political pressure or arbitrary deadline, will allow the owner to not feel pressured to accept any cost proposal that does not meet the previously agreed upon criteria of the project team. The owner may also have at their disposal the off-ramp, if negotiations are unsuccessful, which balances the pressure between the Contractor and the Owner.

It is extremely important that a project manager ensure that the preconstruction schedule can accommodate all three rounds of negotiation completely, and if necessary, the off-ramp process to advertise the package.

Another contribution to maintaining the owners leverage during negotiation, is to determine the parameters that will guide their negotiation strategy **prior** to beginning the negotiation process. This includes determining the acceptable estimate delta, that will be used to determine if a Construction Agreed Price will be accepted. For more information on determining the acceptable estimate delta, refer to section 4.4.

## Preliminary Construction Cost Estimate

As required by the project specific stewardship and oversight agreement, the Division Administrator must review/approve the price estimate for construction costs for the entire project before authorization of construction services for any construction package (including authorization of an early work package or LLTP).[[7]](#footnote-7)

## Construction Agreed Price (CAP)

The Construction Agreed Price (CAP) is the maximum amount that will be incorporated into the standard GC Construction Services Contract to accomplish the construction phase. The CAP is the sum of the direct cost of construction and the GC Management Price Percentage for a specific construction package. The total Contract Amount is the sum of the CAP and all established Risk Pools and Force Accounts. The basis for the CAP Proposal is the open book Cost Model developed during the preconstruction phase and refined through a series of Opinion of Probable Construction Cost (OPCC) submittals and review meetings, as described in Chapter 4 of this Manual. The Contractor will propose a CAP and, if necessary, CDOT and the Contractor negotiate the direct cost of construction for that package to agree on a final CAP. Multiple CAPs may be developed and accepted to facilitate project construction phasing or long-lead procurement items. Once a CAP Proposal is approved by CDOT and FHWA[[8]](#footnote-8) when required, the Contractor is awarded a construction contract to perform the work.

Payment for the construction of the project is paid through the Schedule of Bid items developed during the Preconstruction Phase and in accordance with the Standard Specifications for Road and Bridge Construction or as modified through the Project Special Provisions. The CAP is not a lump sum contract (although some bid items may be lump sum) and most items are measured and paid at actual quantities. A CAP will not be increased except for change orders, agreed overrun items, and agreed upon risk pool items approved by CDOT. Revisions to Standard Specification 109 are used to document which items are eligible for approved overruns. The Contractor assumes all risk with performance of the bid items, including management of its subcontractors, suppliers, and any associated cost impacts over and above a CAP not listed as overrun items in the construction specifications or agreed to as risk pool items in the executed Risk Register. CDOT will assume the risk and issue a Change Order for any changes to the project scope that occurs between CAP acceptance and the final 100% PS&E package.

## Long Lead Time Procurement (LLTP) CAP

The Long Lead Time Procurement (LLTP) CAP is a price submitted by the CM for items which must be ordered and/or procured in advance of the Construction Phase for which it will be used. The LLTP CAP is the price of the item(s) and the CM/GC Management Price Percentage. The LLTP CAP is established through the same procedures as a CAP Proposal, depending on the cost of the item(s) being procured and the source of funding. *Construction services (including early work packages of any kind) shall not be initiated prior to the completion of the NEPA process.[[9]](#footnote-9)*

acc

**FHWA Review**

FHWA receives owner/ICE estimate, 1180, 463, 128, and any additional materials,

Acceptable estimate delta determined, and Memo signed.

CDOT Form 1180 to Region OFMB

All Clearance Letters

Forms: 128,463, 464’s, 859

**ICE Estimate**

**FHWA Acceptance Letter**

 If a PoDI, a concurrence letter is prepared for the FHWA Operations Engineer for signature, along with bid tabs of CAP. Once signed the letter is sent to Contract Award Office.

Prepare Final Documentation in Preparation for CAP Proposal

**1**

Final Risk Register

Final Cost Model

Final Construction

 Schedule

Subcontracting Plan

Material Sourcing Plan

**Award and Contract Timeline**

1-2 weeks

1-2 weeks

3-4 weeks

Contractor signs Contract

Update Risk Register

**2**

**3**

**4**

**5**

**6**

**6**

**7**

**8**

**Construction Notice to Proceed**

**CDOT Controller**

Sign Contract

**Chief Engineer**

Contract is routed to Chief Engineer for Signature

**Contract Award Office**

Purchase Order is generated. Contract is generated and sent to Contractor for Signature

**OFMB & Region Finance Office**

Create Project Financial Statement Form 65

**Business Programs Office**

Review for Compliance with DBE Goals

**Contracting Office**

Forward CAP Tabulation to Contract Award Office who will notify the Business Programs Office and finance office of the apparent low bidder (successful CAP)

**Region Project Staff**

Begin compiling CAP Contract Forms: Exhibits I through Q, EBS file, CDOT Forms. PR is created and approved by Region. PR# is sent to Contract Award Office

**CAP Acceptance Letter**

(Becomes Exhibit H of Contract). Send to Chief Engineer for Signature, then forward to Contract Award Office, Engineering Contracting, OFMB, EEMA, EEO, and Projects and Grants.

**CAP is accepted by CDOT and FHWA**

Produce CAP Tabulations Analysis for CAP Opening

**1**

**Legend:**

**Process Step** – described in

More detail in workflow

narrative on the following page

**Contractor Responsibility**

**CDOT Responsibility**

**FHWA Responsibility**

**CAP Award and Contract Process**

**CAP Proposals Process**

**NO**

**YES**

**CAP Proposal #3**

**ICE Estimate**

**CDOT may elect to advertise project as a Design-Bid-Build**

**CAP Review Meeting**

Is CAP within acceptable % to CDOT and FHWA?

**NO**

**YES**

**CAP Proposal #2**

Update Cost Model

**ICE Estimate**

CAP Negotiations &

Assumption Resolution Meeting

**CAP Review Meeting**

Is CAP within acceptable % to CDOT and FHWA?

**NO**

**YES**

**CAP Proposal #1**

Update Cost Model

CAP Negotiations &

Assumption Resolution Meeting

**CAP Review Meeting**

Is CAP within acceptable % to CDOT and FHWA?

### Figure 5-1

### CAP PROPOSAL AND CONTRACT PROCESS

### FLOWCHART

## CAP Proposals, Award and Contract Process Workflow

The CAP proposal and contracting process is shown schematically on the flowchart in Figure 5-1. The flowchart details the basic steps in the process leading from the Construction Agreed Price (CAP) Proposal to award and contracting. The following narrative corresponds to the numbered Process Steps as depicted in the flowchart and provides a brief description of the steps involved in the process. These steps are described in further detail throughout Chapter 5 of this manual.

### Prepare Final Documentation Required for CAP Proposal

Once CDOT and the Contractor have agreed that it is appropriate to submit a CAP or LLTP CAP Proposal, the Contractor must update the Cost Model and Risk Register to reflect any changes from the last Opinion of Probable Construction Cost (OPCC) submittal. The Contractor also updates the Construction Schedule, Subcontracting Plan, and Material Sourcing Plan, and submits the documents to CDOT and the Independent Cost Estimator (ICE) to use as the basis for preparing the ICE Estimate.

CDOT is responsible for obtaining all Clearance letters for Environmental, Utilities, and Right-of-Way, and preparing Form 1180 – STANDARDS CERTIFICATION AND PROJECT PLANS, SPECIFICATIONS & ESTIMATE APPROVAL for submittal to the Region Office of Financial Management and Budget (OFMB), along with Form 128 – CATEGORICAL EXCLUSION DETERMINATION, Form 463 – DESIGN DATA, Form 464 – DESIGN EXCEPTION VARIANCE REQUEST, and Form 859 – PROJECT CONTROL DATA.

If the ICE Estimate and the Contractor's Proposed Price from the 90% OPCC submittal are within a 10% difference, and the Project Manager is confident that the price will be within 10% of the final accepted price, the Project Manager should begin the 1180 process. This is done by submitting the more conservative value (the higher of the ICE Estimate or the Contractor's Proposed Price) to the Region Business Manager.

#### CAP Proposal Round #1

The Contractor prepares the CAP Proposal based on the issued construction plans and specifications, open book Cost Model, established Risk Register and Risk Pools, final Summary of Approximate Quantities, and all assumptions previously discussed and agreed to during the Preconstruction Phase. The ICE prepares an independent estimate using the same established criteria. The CDOT Project Manager adds the ICE Estimate and CAP Proposal unit costs into the template CAP comparison spreadsheet and sends it to the review team (RE, PE III, EEMA, FHWA, ICE, etc.)

#### CAP Review Meeting

CDOT, the ICE, and the Contractor meet to review the CAP Proposal. If the CM CAP Proposal and ICE Estimate are within the established acceptable estimate delta, then CDOT will continue to negotiate until the conclusion of the CAP Proposal Round to reduce costs and have the ICE Estimate and the CM’s CAP Proposal converge as close as practical. If the CM CAP Proposal and ICE Estimate are not within the established acceptable estimate delta, then CDOT will complete the documentation of the round and move on to the next round.

#### CAP Negotiations and Assumption Resolution Meetings

If the CAP Proposal is not within a percentage difference acceptable to CDOT, then the CDOT Project Manager and Contractor must negotiate to resolve major pricing differences. This may involve revisiting pricing assumptions made by both the Contractor and the ICE, similarly to the Cost Estimate Review Meetings held during the OPCC process. The negotiations may take place in open forum meetings or through one-on-one discussions between CDOT and the Contractor.

#### CAP Proposals Rounds #2 and #3

The negotiation process continues if the first CAP Proposal is not accepted. To help resolve pricing differences, subsequent negotiations should be elevated to include executive level personnel from CDOT and the Contractor. Negotiation meetings may also involve additional personnel such as construction managers with specialty experience in the type of construction required for the project.

#### Failure to Reach an Agreement

A CAP proposal can be offered and negotiated up to three times. After the third and final attempt at a CAP negotiation, CDOT reserves the right to prepare the plans, specifications, and estimate package for advertisement, and the CM/GC Services Contractor will not be allowed to bid.

#### CAP Approval

If a CAP Proposal is within a percentage difference acceptable to CDOT, then the Project Manager initiates the contracting process by preparing a CAP Acceptance Letter and obtaining the Chief Engineer’s signature.

#### FHWA Approval

All Clearance letters and CDOT Forms are submitted to FHWA for their review and approval. The established CAP construction plans and specifications are also submitted to FHWA. FHWA will authorize funds for the Construction Phase after a CAP has been agreed to and approved by the Chief Engineer.

#### Contracting

 The Alternative Delivery Contracts officer will prepare the contract documents and route for signatures. The award and contracting process generally takes between four to eight weeks to complete and issue the Notice to Proceed.

## CAP Proposal and Negotiations

A Construction Agreed Price (CAP) can be prepared for the entire project, a severable phase of the project, or for long-lead procurement items. The Contractor prepares a CAP Proposal once CDOT and the Contractor have agreed that the design has advanced to a point to be able to establish a CAP. Typically, the design will be 90% complete or greater. Following the CAP, the Design Consultant is still responsible for completing a stamped set of 100% Plans, Specifications and Estimate (PS&E). CDOT is responsible for any changes that occur between the CAP and the 100% PS&E, and significant changes may require additional CAP negotiations. Therefore, all major items that affect pricing or schedule should be accounted for in the plans used to establish the CAP. If the project schedule allows, the plans may be advanced to 100% prior to establishing the CAP to reduce the risk of changes.

If a CAP Proposal is desired, the Design Consultant issues a CAP bid set of construction Plans and Specifications, along with the Summary of Approximate Quantities (SAQ) to be used by the Contractor when preparing the CAP Proposal. Alternatively, the Contractor may prepare the SAQ with CDOT’s approval and confirmation of the estimated quantities. CDOT will prepare a comparison template based on the SAQ; therefore, when preparing the CAP Proposal and ICE Estimate, it is very important that the Contractor and ICE use the same SAQ and do not modify the format or reorder the bid items.

The CDOT Project Manager prepares a Bid Package to be used by the Contractor in preparing the CAP Proposal. The Bid Package consists of the Plans, Specifications, SAQ, and all required Bid Forms. The Contractor prepares the CAP Proposal based on the Bid Package and open book Cost Model that was refined during the Preconstruction Phase and the OPCC submittal process. The ICE Estimate uses the same project documentation to prepare their independent estimate. Both the CAP Proposal and ICE Estimate are submitted to the CDOT Project Manager who prepares a CAP comparison spreadsheet. The comparison spreadsheet is used to identify price and percentage differences of the individual bid items and the total bid amount. This comparison spreadsheet is then sent to the review team which typically consists of the Resident Engineer, Program Engineer, EEMA, FHWA, and ICE.

#### Acceptable Estimate Delta

The CDOT Project Manager should review the overall project total and individual bid items for major discrepancies. Even if the initial submittals from the Independent Cost Estimator and the Construction Manager are within the acceptable estimate delta CDOT will not reveal this to the contractor and will continue to negotiate until the conclusion of the CAP proposal round.

There is no set amount for an acceptable percentage. The acceptable percentage will depend on the overall project size and complexity, but it typically ranges from 2% to 10%. The acceptable percentage is not a contractual provision but is determined by the Project Team for the specific project. **The acceptable percentage shall be determined prior to entering CAP negotiations.**

The decision to accept a CAP Proposal is a collaborative decision between the CDOT Project Manager, and the established review team. CDOT must decide if any price differences will be saved if the project is competitively bid, recognizing that there are additional cost and schedule impacts involved with bidding the project.

#### Determining the Acceptable Estimate Delta

When determining the acceptable estimate delta, CDOT will hold a workshop with the project management team, specifically to discuss what will become the acceptable estimate delta.

The workshop will produce a heat map that will document and communicate the rationale that was used to begin the discussion as to what is an acceptable estimate delta for the specific project.

The first step in the workshop will be to identify risks/issues/concerns that would affect the variability of the estimates. The results of the brainstorming and discussion will then be organized into common inputs or similar risks. These criteria will be presented in a table, and each entry will be assigned an adjectival rating system (red, yellow, or green).

The workshop participants will deliberate and rate each criterion as a consensus, using the adjectival rating (red, yellow green), the deliberations will be recorded, and documented next to each criterion in a column described as Comments/Additional Narrative.

We then look at the results and see where our project lies on the heat map, and the resulting estimate delta percentage. Finally, we discuss the results and do a reality check on whether that percentage makes sense.

The project team will then write a memo for approval and use the Comments/Additional Narrative to capture the workshop deliberations and forward it to the appropriate authority for concurrence.

If a project has an acceptable estimate delta between 0%-5% the approval may come from the Regional Transportation Director or their delegate. If the Project has an acceptable estimate delta above 5% then they will also need Chief Engineer concurrence.

The approved memo will document the decision and should be kept with the project files prior to the beginning of negotiations with the contractor.

#### Negotiations and the Escalation Ladder

If the percentage difference between the CAP Proposal and ICE Estimate is not acceptable to CDOT, then CAP negotiations begin. The first CAP Proposal review is like the Cost Estimate Reviews performed during the OPCC submittal process. If the CDOT Project Manager has not previously managed a CM/GC project, it is highly recommended that the CDOT Project Manager seeks the assistance of a team member with prior CM/GC CAP negotiation experience. The Alternative Delivery Program can provide this assistance upon request. During the initial negotiations, the CDOT Project Manager, ICE, and Contractor attempt to reconcile pricing differences that are contributing to the pricing variance. The negotiations may take place in open forum meetings or through one-on-one discussions between CDOT and the Contractor. At this stage the CDOT Project Manager should promote open and honest discussions to help resolve discrepancies.

After the initial negotiations the Contractor prepares a second CAP Proposal based on the results of the negotiations and any revision made to the Cost Model. The ICE again prepares an independent estimate using the revised criteria and the CDOT Project Manager prepares a CAP Proposal comparison. If the CAP Proposal pricing differences have been resolved, then the CAP Proposal is accepted and CDOT initiates the contracting process. If the percentage difference is not acceptable, then a second round of negotiations occurs. However, these negotiations should be elevated to a higher level of project management within the Contractor’s organization and CDOT, including the involvement of the Program Engineer and Region Transportation Director. Often a new perspective from senior management can open up new lines of communication to help resolve differences.

The second round of negotiation meetings may also benefit from the involvement of additional personnel such as construction managers with specialty experience in the type of construction required for the project. CDOT may consult with CDOT or consultant construction managers that have unique experience with the complexities of construction methods for a particular project and provide valuable insight into the Contractor’s methods and means.

If a third CAP Proposal and subsequent negotiations is required, the stakes become high for both CDOT and the Contractor. Failure to reach an agreement will result in significant losses to both parties. The Contractor risks losing a contract for a project that they have helped direct and for which they have significant knowledge of the project details. CDOT risks losing the Contractor’s expertise, and the risk management strategies incorporated into the CM/GC delivery method. For these reasons, negotiations for the third CAP Proposal should be elevated to include the highest level of management, including executive level personnel from CDOT and the Contractor.

At this stage, negotiations can become very intense, and it may be helpful to refer to the partnering workshop held at the beginning of the Preconstruction Phase. The partnering session should have identified an escalation ladder to help resolve conflicts and can remind all parties of the mutual goals that were established for the project. A second partnering session can also be conducted to bring the team back together.

#### Revealing Pricing Differences

Typically, the ICE Estimate and amount of any pricing differences are not revealed to the Contractor, however, the CDOT Project Manager has the flexibility to reveal pricing if it helps to advance negotiations. For example, if a particular bid item has a significant difference, revealing the pricing information may provide the Contractor an opportunity to explain the difference. It may be discovered that the ICE’s pricing assumptions are inaccurate and that the ICE should seek out additional experts to refine the estimate. Conversely, it may convince the Contractor to re-evaluate its methods or revisit its pricing assumptions.

#### Expected Timeframe for Negotiations

The evaluation and negotiations for each CAP Proposal typically takes between ten days to several weeks but will depend on the difference between the CAP Proposal and the ICE Estimate, and the number of bid items to be resolved. The use of pricing milestones and OPCC submittals during the Preconstruction Phase are implemented so that ideally the CAP Proposal process is streamlined. However, sufficient time should be allowed for the ICE Estimator to become familiar with any changes to the construction plans that have occurred since the last OPCC. Prior to CAP negotiations, the CDOT Project Manager should inform EEMA, CDOT senior management, and FHWA of the upcoming CAP schedule so that they can commit to the timeframes and meetings required for negotiations.

#### Failure to Reach an Agreement

The Contractor will have the opportunity to prepare and submit up to three CAP proposals. If an agreement is not reached after the third and final attempt, CDOT reserves the right to proceed with advertising the project as a traditional bid. In this case, the project team will prepare the plans, specifications, and estimate package for advertisement and draft a letter, on behalf of region management, to the FHWA Area Engineer[[10]](#footnote-10) (regardless of oversight) and the CDOT Chief Engineer, explaining that an agreement could not be reached with the CM and recommending that the project be advertised for competitive bidding. The CM/GC will not be allowed to bid on the construction but will continue in their preconstruction role for the remaining CM scope as previously agreed.

#### Contract Award and Contracting

If a CAP Proposal is within a percentage difference acceptable to CDOT then CDOT initiates the contracting process by preparing a CAP Acceptance Letter for the Chief Engineer’s signature and a letter of concurrence for FHWA’s signature. The CDOT Project Manager and Region Project Staff prepare all required Contract Exhibits.

## FHWA Oversight and Requirements

FHWA may provide project oversight if the CM/GC project includes federal funding. FHWA’s level of involvement will depend on if –the project is identified by the Division Office as having an elevated level of risk (threat or opportunity) and, therefore, warrant an increased level of Federal Oversight to ensure the successful project and/or Federal Highway Program delivery. If identified as such, CDOT must meet with the FHWA Operations Engineer assigned to the project to determine what project elements FHWA will be involved in. The FHWA Operation Engineer, along with their team leader, will then create a project specific stewardship agreement that will detail FHWA’s participation.

For all CM/GC projects, regardless of level of oversight, FHWA will:

* Approve FMIS action for the Construction Manager (CM)
* Approve FMIS for the Construction Phase after the CAP has been approved by the CDOT Chief Engineer
	+ Environmental clearance
	+ ROW Certification Letter
	+ Utility Certification Letter
	+ 100% plans or approved CAP package plans and specifications which may be less than 100%.
	+ Value Engineering Study (if required)
	+ CDOT Forms 65, 1180, 128, 463, 464, and 859

(The final form 65 comes after the letting so one provided before that will not match the Accepted CAP exactly)

If the project is identified as having elevated risk FHWA may, with a project specific stewardship and oversight agreement:

* Review project level RFP procedures (specific attention to goals and selection criteria)
* Approve FMIS action for the Construction Manager (CM)
* Review 30% plans
* Review 90% plans
* Participate in the CAP negotiation meeting(s)
* All normal FHWA oversight approvals (design variances, proprietary items, etc.)
* Perform periodic construction inspections.
* Perform a final inspection and project acceptance.

## CDOT Processes and Strategy for Delivery

### Single Package vs. Multiple Packages

An advantage of CM/GC project delivery is that it allows the flexibility to perform construction in phases through multiple packages as project segments are identified and approved for construction. Reasons for using multiple packages could include project phasing to match funding schedules, being able to construct a phase of the project while right-of-way is secured for additional phases or releasing a utility package in advance of roadway construction to advance the project schedule.

Each CAP package must be a severable and independent phase of the construction, such that CDOT is not obligated to have the Contractor construct any other portions of the work. Each phase of the work must obtain all required clearance, is awarded through the CAP Proposal and contracting process, and will require FHWA concurrence if the project is federally funded. Different SAP sub-account numbers may be required for each phase, depending on the number of phases, schedule, and funding sources. The CDOT Project Manager must work with FHWA to determine the account numbers. For this reason, a single package may be more efficient as the CAP Proposal and contracting process is only performed once. Using a single package also allows CDOT to evaluate the entire project CAP to ensure that the established project budget is not exceeded.

### Long Lead Time Procurement

Another advantage of CM/GC project delivery is the ability to secure construction materials and equipment during the Preconstruction Phase to reduce delays during construction. Materials may also be procured early in the design process to avoid price escalations for volatile construction materials, such as steel girders.

Items that are identified with long lead times are procured through a Long Lead Time Procurement (LLTP) CAP Proposal, like the CAP Proposal process, and will require federal approvals if federal funds are used to procure the LLTP materials. *CDOT shall not perform or contract for construction services (including early work packages of any kind) prior to the completion of the NEPA process.*[[11]](#footnote-11)

CDOT Owner Controlled Insurance Program

The Contractor’s CAP Proposal must be coordinated with CDOT Risk Management and the Owner Controlled Insurance Program (OCIP). Prior to submitting the CAP Proposal, the project team should finalize all the details and assumptions in the cost model, including the elimination of any costs for insurance that is covered by the OCIP and set up a project planned Force Account for the incentives, if necessary. As soon as the CAP is accepted, the project team must inform Risk Management so that they can create the Project Insurance Manual. Upon award, the Contractor and all eligible subcontractors must enroll in the OCIP.

The Contractor’s CAP Proposal must be coordinated with CDOT Risk Management and the Owner Controlled Insurance Program (OCIP).  Prior to submitting the CAP Proposal, the project team should finalize all the details and assumptions in the cost model, including the elimination of any costs for insurance that is covered by the OCIP and set up a project planned Force Account for the incentives if necessary.  As soon as the CAP is accepted, the project team must inform CDOT Risk Management. The Contractor is required to submit OCIP Form B; OCIP Form S (1); and a signed Affidavit to be reviewed and verified by CDOT Risk Management and the OCIP Broker, before any final contract is signed.  Upon award or during the review the OCIP Broker can introduce the subs of the OCIP program which would include forms, enrollment, and responsibilities of the enrolled contractors.   The Contractor and all eligible subcontractors must enroll in the OCIP.

### Posting Bid Tab Information to CDOT’s Website

Following award of the Contract, the Region must send the bid tabulation to the Contract Officer so that they will be posted on the CDOT bid tabulation webpage. The approved PS&E packages should be electronically sent to the CDOT print center, for parties interested in viewing the information. In addition, the bid tabulation and approved PS&E package can also be posted to the project website, depending on the file size.

### Construction Contract

The CDOT Project Manager and Region Project Staff are responsible for preparing and assembling the Contract Exhibits as described in the following table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Exhibit** | **Description** | **Responsibility** | **Stage When Prepared** |
|  |  |  |  |
| Exhibit A | Accepted CAP Proposal | Contractor | Procurement Phase |
| Exhibit B | Performance Bond | Contractor | Contracting Phase |
| Exhibit C | Payment Bond | Contractor | Contracting Phase |
| Exhibit D | Federal Requirements | Contract Award Team | Contracting Phase |
| Exhibit E | Notification of Commitments within 10% of Original CAP Package | Contract Award Team | Contracting Phase |
| Exhibit F | Sample Funding Letter | Contract Award Team | Contracting Phase |
| Exhibit G | Contract Modification Order (CDOT Form 90) | Contract Award Team | Contracting Phase |
| Exhibit H | CAP Acceptance letters (signed) | Signed by Chief, then sent to Contract Award Team | Contracting Phase |
| Exhibit I | Contractor’s Certification | Contractor | Contracting Phase |
| Exhibit J | Contractor’s Certificate of Insurance | Contractor | Contracting Phase |
| Exhibit K | Contractor’s fee proposal | Contractor | Procurement Phase |
| Exhibit L | Form 715 (Note that Form 714 needs to be sent to the business office for their review) | Contractor | Prior to Contracting Phase |
| Exhibit M | Anti-Collusion Affidavit | Contractor | Contracting Phase |
| Exhibit N | CAP Project Special Provisions | Project Manager | Contracting Phase |
| Exhibit O | CAP Standard Special Provisions | Project Manager | Contracting Phase |
| Exhibit P | CAP Plans | Project Manager | Contracting Phase |
| Exhibit Q | CAP Supplemental Specs | Project Manager | Contracting Phase |
| Exhibit R | CAP Revisions to Plans & Specs | Project Manager | Contracting Phase |
|  |  |  |  |

#### CM/GC Specifications - Revision of Sections 104 and 109

In addition to the project specifications developed by the project team during the Preconstruction Phase, all GC construction contracts will include revisions to Section 104 and 109 of the CDOT Standard Specifications.

Section 104 is revised to state that Value Engineering Change Proposals (VECP) will not be allowed during the construction of CM/GC Projects.

GC contracts are not lump sum, and most items will be measured, and actual quantities will be paid up to the quantity shown in the bid schedule. Section 109 is revised to specify the terms of use of the Force Accounts and Risk Pools established during the Preconstruction Phase. The CDOT Project Manager modifies this section to define project specific requirements and identify all bid items that are eligible for payment for quantity overruns. Items not identified in this specification will be paid for at original contract unit prices for the installed and accepted quantities of work up to the original quantities shown in the CAP Proposal.

### Force Accounts

CM/GC contracts typically will include at least two separate Force Accounts established during the Preconstruction Phase: the 700-71001 Shared Risk Contingency Pool F/A and the 700-71002 CDOT Risk Pool F/A. Other traditional Force Accounts, such as On-the-Job Training, Incentives, and Fuel Cost Adjustments can be part of the GC Contract.

#### Using the F/A Shared Risk Contingency Pool

The Contractor has been involved in the design development and prepared quantity estimates and verifications. For this reason, the Contractor is paid original contract unit prices for the installed and accepted quantities of work up to the original quantities shown in the CAP Proposal, except as defined in the CDOT Standard Specifications subsections 104.02, 104.03, and 108.11 as approved by the Engineer. However, when assessing project risks and establishing the risk pools, CDOT may decide to take the risk for overruns on certain items. Overruns approved by the Engineer on original quantities as accepted in the CAP Proposal are paid for under the existing line item and will be reconciled against the CDOT Risk Pool Force Account. The specific items for which overruns will be paid must be listed in the Revisions to Section 109.

If items and their original quantities shown in the CAP Proposal change or are modified by CDOT between acceptance of the CAP Proposal and issuance of the 100% PS&E, the Contractor is paid through the CDOT Risk Pool at the original contract unit prices for the installed and accepted quantities that have changed.

#### Using the F/A Shared Risk Contingency Pool

Extra work performed that the Contactor and CDOT have agreed to share risk under is paid for as stipulated in the Risk Register and compensated out of the planned Force Account Item F/A Shared Risk Contingency Pool. The shared risk compensations, components, and total amounts for each of the items agreed upon are paid as defined in the Project Special Provisions contained in the project Risk Register. All cost savings in the Shared Risk Contingency Pool, not resulting in the reduction of work or operating performance, is shared as defined in the project Risk Register between the Contractor and CDOT.

Revisions to Section 109 should be reviewed to specify which F/A items will include the GC Management Price Percentage. Generally, force account work will not be eligible for the GC Management Price Percentage with the following exceptions: Minor Contract Revisions, Partnering, Fuel Cost Adjustment, Asphalt Cement Cost Adjustment, On the Job Training, Interim Surface Repair, Environmental Health and Safety Management and Obtain Power from Xcel Energy, or as defined through Revisions to Section 109.

### DBE and ESB Requirements

The scope of work for each LLTP and Construction Phase shall be submitted to the Regional Civil Rights Office prior to the CAP Proposal to determine the Contract Goal. With the CAP Proposal, the Contractor must submit a Form 1414, Anticipated DBE Participation Plan documenting its proposed DBE participation for the phase. Approval of the CAP shall be treated as selection as the lowest apparent bidder and all procedures of the then current DBE Standard Special Provision shall apply. CDOT may also establish an ESB incentive and/or goal for the construction phase of the contract and the applicable ESB Standard Special Provision shall apply.

### OJT

The Contractor will be required to meet the on-the-job training requirements as specified by CDOT and established prior to the CAP Proposal. With the CAP Proposal, the Contractor must submit a plan detailing the Contractor’s plan to meet the OJT requirements for the construction phase.

### SAP

Using Project Builder (CJ20N) upon project set-up, the CDOT Project Manager will need to identify CM/GC for the Contract Delivery Method.

#### Adding Milestones Dates in SAP Project Builder (CJ20N)

When setting up your project in SAP, as with all projects, set up the template as directed in Design Bulletin 2014-3 “Milestone Dates in SAP Project Builder (CJ20N).” Enter milestones as applicable to a CM/GC delivery.  These adjustments include, but are not limited to, the following:

* Notice to proceed for preconstruction, (Construction Manager NTP).
* LLTP CAP and expected date of payment for item(s).
* Separate construction early work items CAP and expected date of payment for that work (e.g. advanced utility work).

Added milestones do not require Usage numbers.  Additional information is available in the Design Bulletin “Milestone Dates in SAP Project Builder” using the embedded link “Add Milestone Dates to WBS Template.doc”.

Additional milestones should be shown when other departments/approvals are included with that work and/or if a budget action will be needed with that scheduled item.

### Funding Mechanisms

As with all projects, the source of project funding may require the project to meet certain requirements, stipulations, and reporting requirements. Funding sources are continually changing and CDOT Project Managers are encouraged to review the project funding requirements early in the CM/GC process and revise the CM/GC Services Contract and structure the CAP Bid Package accordingly.

# : CM/GC Construction Phase

During the Construction Phase of the project, the goal of CDOT, the GC Contractor, and the Design Consultant is to construct the project in accordance with the Contract Documents while controlling the risks that were identified in the Preconstruction Phase. The Construction Phase of a CM/GC project is administered similarly to a DBB project, with slight differences related to bid item measurement and payment, risk management, and applying the Risk Pools that were established during the Preconstruction Phase. The details of these CM/GC-specific Construction Phase elements are discussed in the following Chapter.

In an effective CM/GC project, the Construction Phase should progress with less change orders and disputes than can be experienced with DBB. The main difference with CM/GC project delivery is that the Contractor has been involved in the design development and construction plan reviews. Because the Contractor has had the opportunity to review and verify quantities, the Contractor is less likely to consider a claim for additional compensation for issues related to the design. Additionally, many of the project’s risks and unknowns have been accounted for in the Risk Pools developed during the Preconstruction Phase. These planned contingencies provide a system that allows the Construction Phase to continue forward when problems are encountered.

## General Contractor’s Role during Construction

Once a construction contract is executed, the role of the GC is a very traditional role, with similar responsibilities of a General Contractor on a DBB. The Contractor is responsible to ensure all environmental, safety, and permit commitments, which are specified in the Plans, Specifications, and Contract Documents, are implemented during construction. The Contractor also manages its risk by implementing the procedures defined in the Contractor’s Risk Register.

The Contractor is also responsible for tracking the performance, cost and time savings of the innovative construction methods that are incorporated on the project. This is accomplished by updating the Innovative Tracking and Performance Report that was developed during the Preconstruction Phase.

## Design Support during Construction

The Design Consultant should be retained during the Construction Phase to address Contractor questions or changed field conditions, and to provide consultation to the CDOT Project Manager. Continuing the spirit of partnership from the Preconstruction Phase, the Design Consultant is expected to respond in a timely and cooperative manner to inquiries from CDOT and the Contractor. To facilitate communication, it is recommended that the Design Consultant is involved in construction progress meetings and is made aware of the construction schedule.

## Project Manager Support during Construction

The CDOT Project Manager is expected to have a significant role during the Construction Phase and is responsible for administering the Risk Pools developed during the Preconstruction Phase. To support the CDOT Project Manager, the CDOT construction Project Engineer is also expected to understand the provisions within the Risk Register and the established Risk Pools. It is highly recommended that the construction Project Engineer, whether the construction Project Engineer is CDOT personnel or a consultant, is actively involved in the Preconstruction Phase so that they are familiar with the details of the Contractor’s Risk Management Plan, the Risk Pools, and the construction methods discussed during design development.

## Quality Assurance/Quality Control Roles

QA/QC for CM/GC projects is performed as it would be for a DBB project. Construction Management, Testing and Inspection will be through CDOT or a Consultant Project Engineer and staff. The Contractor will have developed a Quality Control Plan during the Preconstruction Phase that should be referenced during the Construction Phase.

## Phasing and Packages

With CM/GC projects, it can often be the case that multiple construction packages overlap or are constructed simultaneously. Each CAP package is treated as a separate construction Contract, and therefore must be tracked separately. This will require accurate tracking of pay items and construction progress to enter the required data in SAP and Site Manager.

Some construction packages may not have 100% PS&E sets prior to NTP. In this case, CDOT assumes the risk of changes between the CAP Proposal quantities and 100% PS&E quantities. Increases are paid through the CDOT Risk Pool and decreases are not paid and/or removed from the project with a change order. The CDOT Project Manager and CDOT Project Engineer work together to make sure the changes are covered and understood with all team members.

## Measurement and Payment

Measurement and payment for Contract bid items is performed like a DBB project, except that the Contractor shall accept payment at the original contract unit prices for the installed and accepted quantities of work up to the original quantities shown in the CAP Proposal. Quantity overruns are not paid, except for items that are defined in Revision to Section 109 of the Standard Specifications.

## Applying the Risk Register during Construction

The most unique element of the CM/GC Construction Phase is the application of the Risk Register during construction. The Risk Register contains mitigation plans for all risks that were identified during the Preconstruction Phase and is used by the Contractor to monitor project risks. The Contractor must immediately notify the CDOT Project Manager once a project risk is encountered. The CDOT Project Engineer must review and approve any work associated with mitigating the risk. The additional work will be paid through the CDOT Risk Pool for risks that were previously allocated to CDOT in the signed Risk Register. For risks that were shared by CDOT and the Contractor, the additional work will be paid through the Shared Risk Contingency Pool, as defined in the special provision contained in the signed Risk Register.

### Risk Pools and Force Accounts

Once the project moves into the Construction Phase, the previously established CDOT Risk Pool and Shared Contingency Risk Pool become planned Force Accounts. As with DBB projects, Force Accounts are managed by CDOT and are applied using standard CDOT Force Account procedures and the revisions to Section 109 of the Standard Specifications. Minor Contract Revisions are still paid through the MCR Force Account item.

Both CDOT and the Contractor must continually and collaboratively monitor the Risk Pools to ensure that adequate contingency is available to complete the project.

## Change Orders

One of the major advantages of CM/GC projects is that the Contractor is involved during the design development, which can lead to fewer Change Orders during construction. Additionally, the Risk Pools make provisions for many of the situations that would otherwise require major Change Orders in DBB projects. However, projects may still experience change of conditions, fluctuations in market conditions, and unforeseen circumstances that will require a Change Order.

The Change Order and Contract Modification Order (CMO) processes remain the same as on DBB projects. However, for CM/GC projects, the open book Cost Model that was used to develop the CAP Proposal can be a useful reference to understand what was assumed during estimating and quickly establish fair pricing for the Change Order. For Major Change Orders, the ICE Estimator should be consulted to perform an independent cost analysis.

## Monitoring Environmental Commitments

Prior to Construction a tracking spreadsheet should be developed to monitor the environmental impacts and mitigation efforts identified in the environmental assessment. The tracking spreadsheet should be continually reviewed and updated throughout the Construction Phase.

## Monitoring Subcontractor and DBE Participation

DBE plans and FHWA labor compliance reports are required, just as with DBB projects. These plans are developed during the Preconstruction Phase. The Contractor is responsible for monitoring the plans during construction and must make adjustments as needed to comply with project goals.

## Disputes and Resolutions

As with Change Orders, disputes and claims should be minimized with the CM/GC project delivery due to the collaboration that is instrumental to CM/GC. Should disputes and claims arise, resolution is handled in the same way as DBB projects per the Standard Specifications. The CDOT Project Manager should refer to the partnering session and conflict escalation ladder defined during the Preconstruction Phase to facilitate discussions and confirm that the appropriate senior management is engaged in the dispute resolution.

1. See FHWA CFR 2017 Title 23 vol1 sec 635.504(c)(1) [↑](#footnote-ref-1)
2. See FHWA CFR 2017 Title 23 vol1 sec 635.506 (d)(3) and (4) [↑](#footnote-ref-2)
3. See C.R.S. § 24-93-106 (Item 1) [↑](#footnote-ref-3)
4. See C.R.S. § 24-93-106 (Item 2) [↑](#footnote-ref-4)
5. FHWA CFR 2017 Title 23 vol1 sec 635.505(g) [↑](#footnote-ref-5)
6. FHWA CFR 2017 Title 23 vol1 sec 635.505(b) [↑](#footnote-ref-6)
7. FHWA CFR 2017 Title 23 vol1 sec 635.506(d)(2) [↑](#footnote-ref-7)
8. FHWA CFR 2017 Title 23 vol1 sec 635-506(d)(4) [↑](#footnote-ref-8)
9. FHWA CFR 2017 Title 23 vol1 sec 635-505(b) [↑](#footnote-ref-9)
10. FHWA CFR 2017 Title 23 vol1 sec 635.504(b)(6) and 635.506(e) [↑](#footnote-ref-10)
11. FHWA CFR 2017 Title 23 vol1 sec 635.505(b) [↑](#footnote-ref-11)