The National Academies of Sciences, Engineering, and Medicine

Training on Post-Award Contract Administration for Highway Projects Delivered using D-B and CM-GC

Based on NCHRP Research Report 939 Volumes 1, 2, and 3

Session 6 of 8: October 27, 2022

Agenda

- 10:00-10:10 am   Welcome and reminders
- 10:10-10:20 am   Cost-comparison spreadsheet
- 10:20-10:30 am   Cost-modeling approach
- 10:30-10:40 am   CM-GC bid validation
- 10:40-10:50 am   Independent cost estimator
- 10:50-11:00 am   Opinion of probable construction cost
- 11:00-11:10 am   Risk pools
- 11:10-11:45 am   Peer Exchange: Panel Discussion
- 11:45-12:00 pm   Wrap-up (+poll)

Note: All times are in Pacific Daylight Time (PDT)

Review: Last Session's Learning Objectives

- **Phases and strategies** – Introduce the *preconstruction* phase and the *preconstruction services quality* strategy

- **Tools** – Explain the following tools, illustrated with examples from DOTs:

  - ➢ In-progress design workshops
  - ➢ Over-the-shoulder reviews
  - ➢ Open-book estimating
  - ➢ Scope validation period
  - ➢ Public announcement
  - ➢ Delegation of authority

- **Peer exchange** – Discuss issues affecting agencies' implementation of these tools in ACM projects

Review: Last Session's Takeaway Points

- **In-progress design workshops** support problem-solving and a consistent understanding of the project design across team members.
- **Over-the-shoulder reviews** allow the agency to provide informal feedback on design and gauge if it meets the agency's requirements.
- **Open-book estimating** allows the agency to review the contractor's estimating records.
- **Scope validation period** helps identify project scope issues early to avoid later disputes and/or extra cost and time.
- **Public announcements** help the public understand the advantages of using D-B or CM-GC.
- **Delegation of authority** empowers the resident engineer with decision-making privileges to make timely decisions for the project.

Overall Learning Objectives

1. Navigate and interpret the information in the D-B and CM-GC Guidebooks that is relevant to your project.

2. Select and implement appropriate tools for various types of D-B and CM-GC projects for all phases of contract administration.

Today's Learning Objectives

- **Phases and strategies** – Review the *preconstruction* phase and the *preconstruction services quality* strategy

- **Tools** – Explain the following tools, illustrated with examples from DOTs:

  - Cost-comparison spreadsheet
  - Cost-modeling approach
  - CM-GC bid validation
  - Independent cost estimator
  - Opinion of probable construction cost
  - Risk pools

- **Peer exchange** – Discuss issues affecting tools for enhancing quality in the preconstruction phase
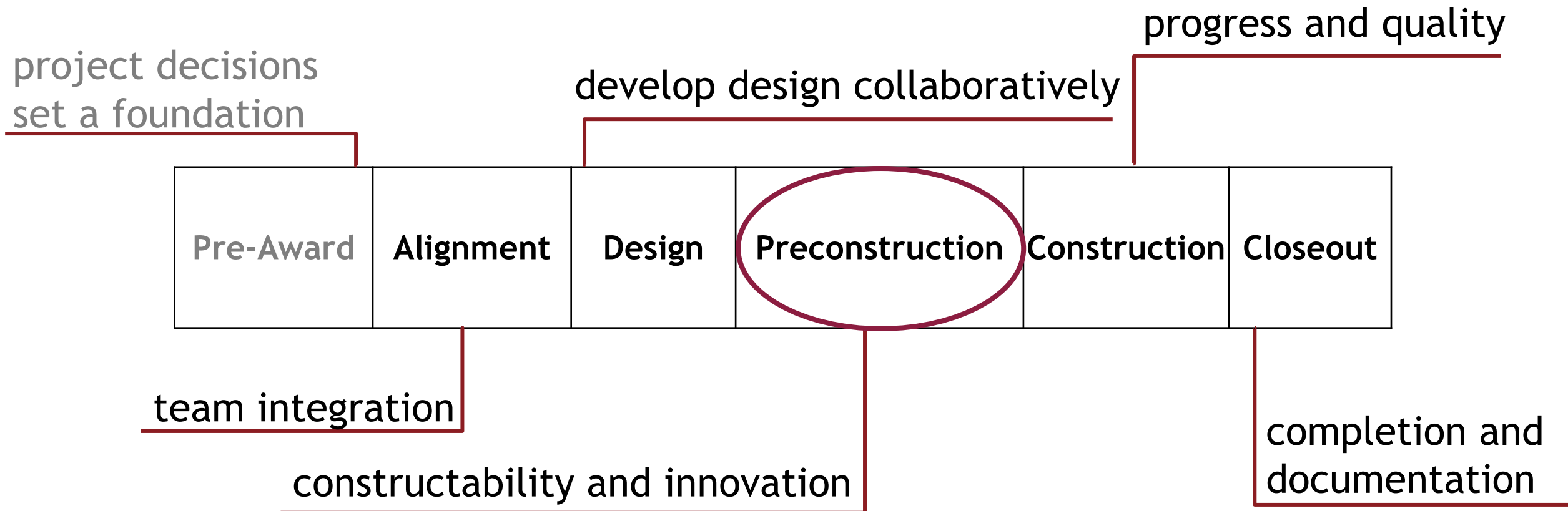
Logistics Reminders

- Please make sure you are registered (only once)
- Please make sure your name is correct on Zoom
- Download the *Guidebooks for Post-Award Contract Administration* [Vol. 1](#) *and* [2](#)
- No formal break; please take one if/as needed
- Actively engage and participate when prompted
- Use the chat feature as needed
- Ask for help
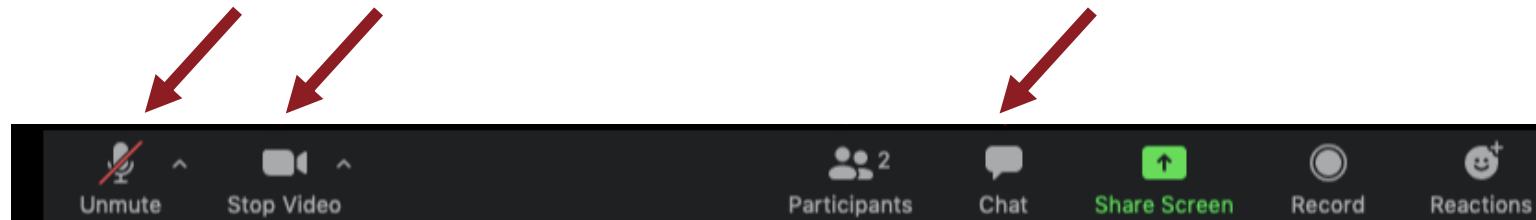
Contract Administration Phases

The guidebooks describe the following phases of D-B and CM-GC contract administration

progress and quality

project decisions set a foundation

develop design collaboratively

Pre-Award	Alignment	Design	Preconstruction	Construction	Closeout

team integration

constructability and innovation

completion and documentation

Preconstruction Phase Administration

- The preconstruction phase allows the CM-GC to provide input on the design to enhance constructability and innovation

- Key activities include:
  - Review CM-GC input for design
  - Approve design changes based on CM-GC input
  - Negotiate GMP
  - Manage CM-GC documentation

Pre-Award	Alignment	Design	Preconstruction	Construction	Closeout

Overarching Contract Administration Strategies for D-B and CM-GC

Alignment Strategy

Scope Strategy

Design Quality Strategy

Preconstruction Services Quality Strategy

Construction Quality Strategy

Construction Efficiency Strategy

Preconstruction Services Quality Strategy

- ## Definition
  - Ensure quality of preconstruction services through active participation in design reviews and verifying competitive pricing of estimates

- ## Example of a tool within this strategy:

  - In-progress design workshops

    Meetings between the designer, contractor, and agency to discuss and verify the design process

  - Opinion of probable construction cost

    Iterative process for monitoring and validating the development of the cost estimate at key design milestones

Today's Learning Objectives

- **Phases and strategies** – Review the *preconstruction* phase and the *preconstruction services quality* strategy
- **Tools** – Explain the following tools, illustrated with examples from DOTs:
  - ➢ Cost-comparison spreadsheet
  - ➢ Cost-modeling approach
  - ➢ CM-GC bid validation
  - ➢ Independent cost estimator
  - ➢ Opinion of probable construction cost
  - ➢ Risk pools
- **Peer exchange** – Discuss issues affecting tools for enhancing quality in the preconstruction phase

Cost-Comparison Spreadsheet

Cost-Comparison Spreadsheet

- ## What is it?

  - Spreadsheet used to compare the line-by-line estimates of the CM-GC, independent cost estimator, design team, and/or the agency's estimating division

- ## Why use it?

  - Verify competitive pricing and estimating assumptions

  - Facilitate discussion of items with cost discrepancies

  - Help with negotiating an agreed-upon price

ALIGNMENT   SCOPE   PRECONSTRUCTION QUALITY

Cost-Comparison Spreadsheet

- When to use it?
  - At design milestone reviews

	Contract Administration Phase					Project Complexity			Project Size		
21 Cost-Comparison Spreadsheet	Alignment	Design	Preconstruction	Construction	Closeout	Noncomplex	Moderately Complex	Complex	≤ $10 million	$10 million–$50 million	> $50 million
			✓			◗	●	●	◗	●	●

Note: ● = Recommended; ◗ = Consider case by case; ○ = Not recommended.

21 CM-GC

Cost-Comparison Spreadsheet

- How to use it?
  - Include a column for each estimate (CM-GC, ICE, etc.)
  - Include a column for percent difference
  - Designate a percentage not to exceed
  - Agency reviews and calculates percentages, but estimates remain blind to other estimating parties
  - Discuss items with larger percent variations, unless dollar value is small
  - Discuss items with larger dollar variations

Cost-Comparison Spreadsheet

- Synthesis of Examples
  - Focus on achieving agreement on the total project cost and clarity on cost assumptions

- Guidebook Example
  - CM-GC p.124-125

Example: Cost-Comparison Spreadsheet

Item#	Description	Unit of Measure	Quantity	CM-GC Unit Price	CM-GC Total Cost	Internal Unit Price	Internal Total Cost	Variation (Above or Below Internal Estimate)
1	Item 1	CYD	5,000	$ 25.00	$125,000.00	$ 20.00	$100,000.00	$(25,000.00)
2	Item 2	CYD	2,000	$ 30.00	$ 60,000.00	$ 40.00	$ 80,000.00	$ 20,000.00
3	Item 3	Ton	500	$ 45.00	$ 22,500.00	$ 60.00	$ 30,000.00	$ 7,500.00
4	Item 4	LF	2,500	$ 3.00	$ 7,500.00	$ 2.00	$ 5,000.00	$ (2,500.00)

21 CM-GC

Today's Learning Objectives

- **Phases and strategies** – Review the *preconstruction* phase and the *preconstruction services quality* strategy
- **Tools** – Explain the following tools, illustrated with examples from DOTs:
  - ➤ Cost-comparison spreadsheet
  - ➤ Cost-modeling approach
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  - ➤ Independent cost estimator
  - ➤ Opinion of probable construction cost
  - ➤ Risk pools
- **Peer exchange** – Discuss issues affecting tools for enhancing quality in the preconstruction phase

Cost-Modeling Approach

Cost-Modeling Approach

- ## What is it?
  - List of assumptions regarding construction means and methods agreed to by the agency and CM-GC

- ## Why use it?
  - Create a shared understanding of the project that helps minimize differences in cost estimates

Cost-Modeling Approach

- When to use it?
  - Early in design to get scope and cost assumptions aligned

	Contract Administration Phase					Project Complexity			Project Size		
	Alignment	Design	Preconstruction	Construction	Closeout	Noncomplex	Moderately Complex	Complex	≤ $10 million	$10 million–$50 million	> $50 million
22 Cost-Modeling Approach			✓			◗	●	●	◗	●	●

Note: ● = Recommended; ◗ = Consider case by case; ○ = Not recommended.

Cost-Modeling Approach

- How to use it?
  - Project team discusses assumptions about construction
  - Meeting with CM, ICE, agency PM, agency cost estimator, and others
  - Identify self-perform work, percentages for profit, overhead, and self-perform work

22 CM-GC

Cost-Modeling Approach

- Synthesis of Examples
  - Agency provides CM-GC with a specification describing the characteristics of the cost model
    - When initial model is needed
    - Frequency of updates
    - Actions needed when model estimate exceeds budget
    - Format and detail of model and supporting documentation needed

- Guidebook Example
  - CM-GC p.127-130

Example: Cost-Model Summary with Notes

ITEM NO.	ITEM	UNIT	QUANTITY	COMMENTS
202-00035	REMOVAL OF PIPE	LF	53	REMOVAL OF PIPE JUST EAST OF DOGHOUSE RAIL BRIDGE, SEE SHEET 29, QUANTITIES HAVE BEEN ADJUSTED IN THIS SOAQ TO MATCH CP1A. ADDED 30 LF FOR REMOVAL OF 12" CMP AT CLEAR CREEK HOUSE DRIVEWAY.
202-00246	REMOVAL OF ASPHALT MAT (PLANING) (SPECIAL)	SY	935	1 MOBILIZATIONS FOR PROFILING CONTRACTOR. MUST GRIND OFF STRIPING.
202-00495	REMOVAL OF PORTIONS OF PRESENT STRUCTURE	LS	1	AREA 5 ALONG LENGTH OF THE WALL. REMOVE ROCKFALL FENCE ABOVE SHORING AREA 5.
202-XXXXX	REMOVAL OF GUARDRAIL (SPECIAL)	LF	1,270	TRANSPORT TO EMPIRE YARD
203-00062	EMBANKMENT MATERIAL (COMPLETE IN PLACE) (SPECIAL)	CY		EMBANKMENT VOLUME WITHIN AVERAGE END VOLUME AS SHOWN ON CLEAR CREEK CHANNEL CROSS SECTIONS.

22 CM-GC

Example: Barton Road TI, Caltrans (1)

Caltrans met with the CM-GC and the ICE

- Established baseline production rates
- Discussed assumptions about construction means and methods that impact estimates and schedules
- Established a communication plan for any changes in project scope, quantities, and phasing.

A description of the cost model and its requirements were described in the Preconstruction Services Contract.

Example: Barton Road TI, Caltrans (2)

Cost Model backup documentation needed for GMP:

- Unit prices and quantity take-offs

- Details of all allowances and unit price work

- Material costs, equipment costs, labor costs, General Conditions costs, hourly labor rates, and total cost

- Subcontractor cost with overhead and profit

- Production rates, transportation, and other facilities and services

Example: Barton Road TI, Caltrans (3)

Cost Model backup documentation needed for GMP:

- All fixed equipment, site improvements, utility, and equipment installations

- Copies of quotations from subcontractors and suppliers

- Project overhead

- Allocated general and administrative expenses

- Bonds, taxes, insurance

Example: Barton Road TI, Caltrans (4)

Cost Model backup documentation needed for GMP:

- The Construction Manager's profit

- Memoranda, narratives, consultant's reports, etc.

- List of all assumptions, descriptions, and breakdown of all allowances.

Today's Learning Objectives

- **Phases and strategies** – Review the *preconstruction* phase and the *preconstruction services quality* strategy

- **Tools** – Explain the following tools, illustrated with examples from DOTs:
  - ➤ Cost-comparison spreadsheet
  - ➤ Cost-modeling approach
  - ➤ CM-GC bid validation
  - ➤ Independent cost estimator
  - ➤ Opinion of probable construction cost
  - ➤ Risk pools

- **Peer exchange** – Discuss issues affecting tools for enhancing quality in the preconstruction phase

CM-GC Bid Validation

CM-GC Bid Validation

- ## What is it?
  - Process for checking the fairness of the CM-GC's bid proposal, typically using the cost-comparison spreadsheet
  - A culmination of the opinion of probable cost process
  - A bid may be for the entire project, work packages, or long lead time items
  - Independent estimate is a proxy for competitive bidding

CM-GC Bid Validation

- Why use it?
  - Verify competitive pricing and estimating assumptions
  - Facilitate discussion of items with cost discrepancies
  - Help with negotiating an agreed-upon price

CM-GC Bid Validation

- When to use it?
  - At the end of preconstruction and at the end of an iterative OPCC process

	Contract Administration Phase					Project Complexity			Project Size		
	Alignment	Design	Preconstruction	Construction	Closeout	Noncomplex	Moderately Complex	Complex	< $10 million	$10 million–$50 million	> $50 million
23 Construction Manager–General Contractor Bid Validation			✓			◗	●	●	◗	●	●

Note: ● = Recommended; ◗ = Consider case by case; ○ = Not recommended.

CM-GC Bid Validation

- How to use it?
  - Agency uses agency estimator or independent estimator
  - Bottom-up estimates are created
  - Use cost-comparison spreadsheet

CM-GC Bid Validation

- Synthesis of Examples
  - Agency provides CM-GC with a specification describing the characteristics of the cost model
    - When initial model is needed
    - Frequency of updates
    - Actions needed when model estimate exceeds budget
    - Format and detail of model and supporting documentation needed

- Guidebook Example
  - CM-GC p.133-136

Example: CM-GC Bid Validation, ADOT

The CMAR Contractor shall **meet** with the Project Manager and Design Consultant to **review any GMP Proposal and all supporting documentation**. All **Assumptions and Clarifications** should be provided, as well as a **description and breakdown of all allowances**. In the event the Project Manager or Design Consultant discovers **inconsistencies or inaccuracies** in the information presented, the CMAR Contractor shall **adjust** the GMP Proposal and the accompanying documentation as necessary.

23 CM-GC

Today's Learning Objectives

- **Phases and strategies** – Review the *preconstruction* phase and the *preconstruction services quality* strategy

- **Tools** – Explain the following tools, illustrated with examples from DOTs:

  - ➤ Cost-comparison spreadsheet
  - ➤ Cost-modeling approach
  - ➤ CM-GC bid validation
  - ➤ **Independent cost estimator**
  - ➤ Opinion of probable construction cost
  - ➤ Risk pools

- **Peer exchange** – Discuss issues affecting tools for enhancing quality in the preconstruction phase

Independent Cost Estimator

Independent Cost Estimator

- ## What is it?
  - Consultant hired by the agency to prepare a production-based cost estimate to compare to the CM-GC estimate
- ## Why use it?
  - Verify that the CM-GC estimate is competitive
  - Discover discrepancies in the estimating assumptions

ALIGNMENT   PRECONSTRUCTION
             QUALITY

Independent Cost Estimator

- When to use it?
  - Contract with the ICE at the same time as the CM-GC

	Contract Administration Phase					Project Complexity			Project Size		
	Alignment	Design	Preconstruction	Construction	Closeout	Noncomplex	Moderately Complex	Complex	≤ $10 million	$10 million–$50 million	> $50 million
24 Independent Cost Estimator			✓			◗	●	●	◗	●	●

Note: ● = Recommended; ◗ = Consider case by case; ○ = Not recommended.

Independent Cost Estimator

- How to use it?
  - ICE participates in review meetings for the cost model, risk management, and cost estimate
  - Discuss construction means and methods assumptions and quantities
  - Agency compares ICE estimate to CM-GC estimate and uses that information to negotiate an agreed upon price with the CM-GC

Independent Cost Estimator

- Synthesis of Examples
  - Involve ICE early and to all meetings where decisions impact cost
  - Agency sees ICE estimate, but CM-GC does not

- Guidebook Example
  - CM-GC p.138-139

Example: ICE Procurement, CDOT

- PM contacts prospective ICE consultant to work through hours and amount of the services needed.

- Rule of thumb for the ICE contract is 0.4-0.5% of the construction budget.

- Substantiate ICE budget using the projected number of meetings, Owner Controlled Insurance Program (OCIP), and the CAP negotiation meetings.

- Also consider if there is specialized project work.

24 CM-GC

Example: Role of ICE, ADOT

- Engage in a constructive dialog with the Department, the Designer and the Contractor during the Preconstruction Phase.

- Develop a detailed independent cost estimate for the contract items and also review the Contractor's schedule and Cost Model.

- Identify cost and/or schedule variances, validate the Contractor's price structure, and assist in negotiation of the GMP.

24 CM-GC

Today's Learning Objectives

- **Phases and strategies** – Review the *preconstruction* phase and the *preconstruction services quality* strategy

- **Tools** – Explain the following tools, illustrated with examples from DOTs:
  - ➢ Cost-comparison spreadsheet
  - ➢ Cost-modeling approach
  - ➢ CM-GC bid validation
  - ➢ Independent cost estimator
  - ➢ Opinion of probable construction cost
  - ➢ Risk pools

- **Peer exchange** – Discuss issues affecting tools for enhancing quality in the preconstruction phase

Opinion of Probable Construction Cost

Opinion of Probable Construction Cost

- What is it?
  - Iterative process for monitoring and validating the development of the cost estimate at key design milestones

- Why use it?
  - Verify that the CM-GC estimate is competitive
  - Provides agency with an early indication of project cost
  - Discover discrepancies in the estimating assumptions

ALIGNMENT SCOPE PRECONSTRUCTION QUALITY

Opinion of Probable Construction Cost

- When to use it?
  - Preconstruction phase

	Contract Administration Phase					Project Complexity			Project Size		
	Alignment	Design	Preconstruction	Construction	Closeout	Noncomplex	Moderately Complex	Complex	≤ $10 million	$10 million–$50 million	> $50 million
26 Opinion of Probable Construction Cost Process			✓			◗	●	●	◗	●	●

Note: ● = Recommended; ◗ = Consider case by case; ○ = Not recommended.

Opinion of Probable Construction Cost

- How to use it?
  - ICE and/or agency staff prepare a production-based estimate
  - Prior to estimating, a basic cost model and assumptions are developed collaboratively
  - OPCCs are prepared with key submittals
  - OPPC estimates are good-faith estimates and nonbinding
  - Cost comparison spreadsheet used for comparison
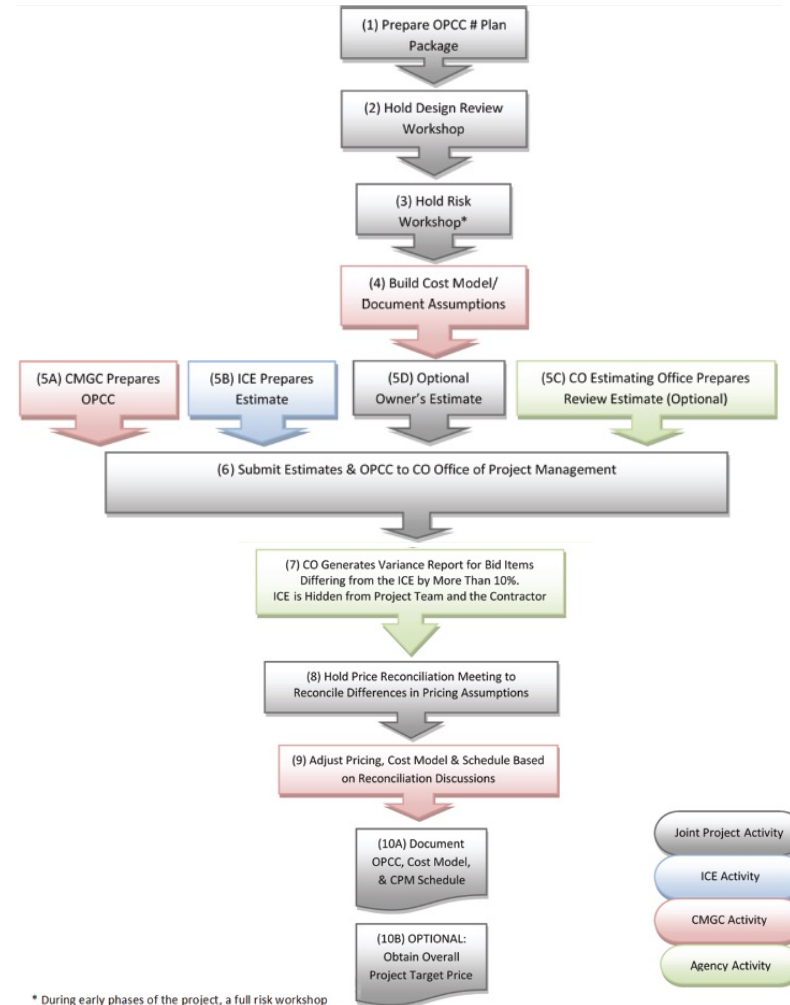 - Discuss cost deviations and clarify and revise assumptions

Opinion of Probable Construction Cost

- Synthesis of Examples
  - Agency communicates when each OPCC is due
  - Determine level of detail for costs for labor, material, equipment, bonds, general conditions, indirects
  - Obtain input through workshops and communication with the designer, agency groups, etc.
  - Agency process for cost variances warranting reconciliation
- Guidebook Example
  - CM-GC p.147-152
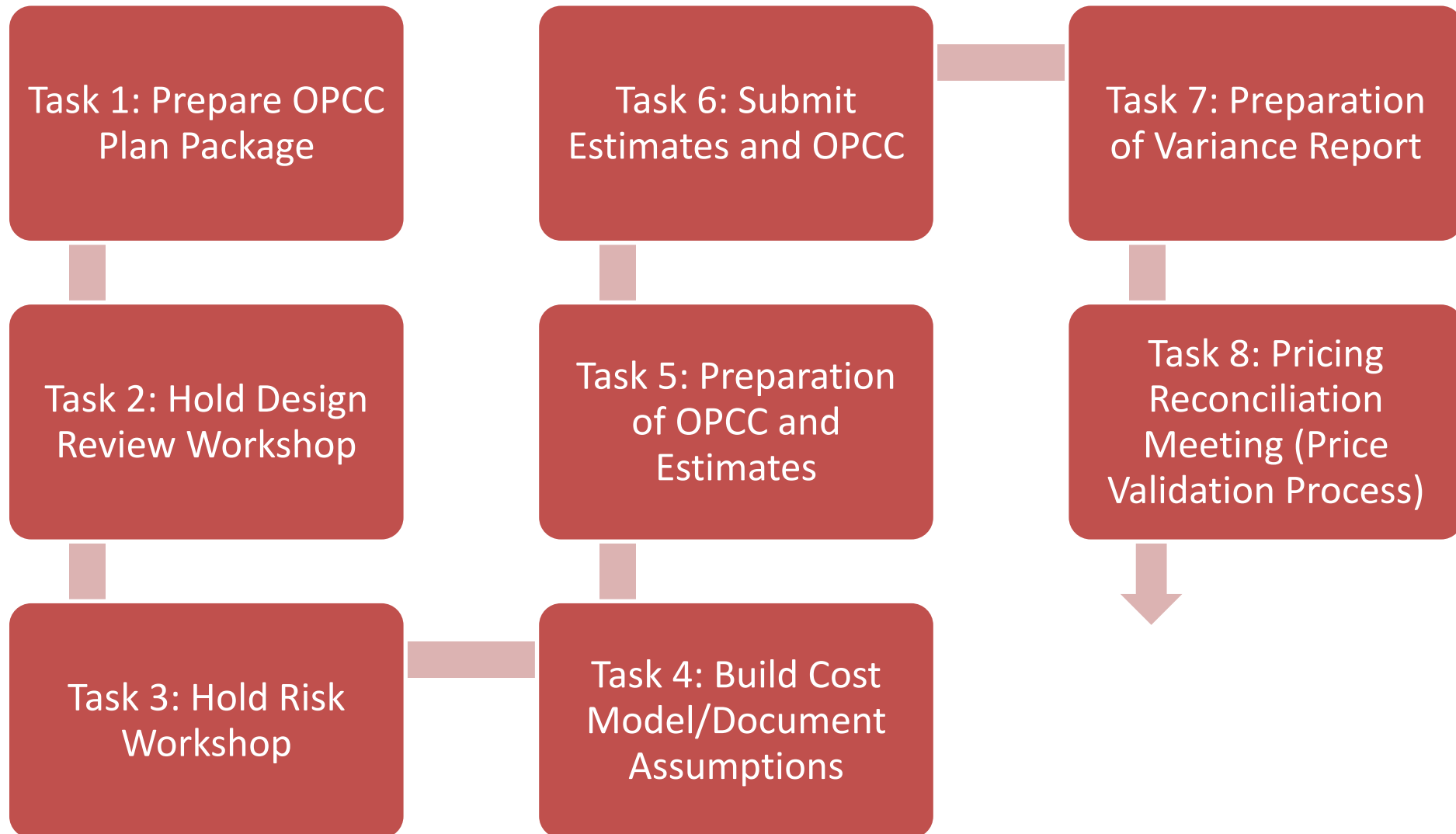
Example: Winona Bridge, MnDOT (1)

Minnesota DOT used their OPCC process to establish interim cost estimates. This effort helped the project team clearly state assumptions and adjust the design to meet budget constraints better.

| Welcome | Cost-comp. | Cost-model | Bid valid. | ICE | OPCC | Risk Pools | Peer X |

Example: Winona Bridge, MnDOT (3)

Example: Winona Bridge, MnDOT (2)

Task 1: Prepare OPCC Plan Package

Task 2: Hold Design Review Workshop

Task 3: Hold Risk Workshop

Task 4: Build Cost Model/Document Assumptions

Task 5: Preparation of OPCC and Estimates

Task 6: Submit Estimates and OPCC

Task 7: Preparation of Variance Report

Task 8: Pricing Reconciliation Meeting (Price Validation Process)

Today's Learning Objectives

- **Phases and strategies** – Review the *preconstruction* phase and the *preconstruction services quality* strategy

- **Tools** – Explain the following tools, illustrated with examples from DOTs:

  ➢ Cost-comparison spreadsheet

  ➢ Cost-modeling approach

  ➢ CM-GC bid validation

  ➢ Independent cost estimator

  ➢ Opinion of probable construction cost

  ➢ Risk pools

- **Peer exchange** – Discuss issues affecting tools for enhancing quality in the preconstruction phase

Risk Pools

Risk Pools

- ## What is it?
  - A fund set aside to cover risks that may occur on a project
  - Not for contractor risks associated with equipment and labor
  - Not for cost overruns or scope changes

Risk Pools

- ## Why use it?
  - Mechanism for quantifying and assigning risk
  - Encourages avoiding, mitigating, and eliminating risk and keeping costs low
  - Avoids contractor adding cost to the proposal to cover contingencies for risk they are not best able to manage
  - Source of funds to cover risks without creating change orders

Risk Pools

- ## When to use it?
  - Developed during preconstruction and implemented during construction

	Contract Administration Phase					Project Complexity			Project Size		
	Alignment	Design	Preconstruction	Construction	Closeout	Noncomplex	Moderately Complex	Complex	≤ $10 million	$10 million–$50 million	> $50 million
27 Risk Pools			✓	✓		○	●	●	◗	●	●

Note: ● = Recommended; ◗ = Consider case by case; ○ = Not recommended.

Risk Pools

- How to use it?
  - Collaboratively identify, analyze, and assign risk to the party best able to manage those risks
  - Assign risk to agency, contractor, or shared
  - Estimate cost of handling each risk and create risk pools to cover risks
  - Agency compares CM-GC risk cost estimate with ICE
  - Convert risk pools into planned force accounts

Risk Pools

- ## Synthesis of Examples
  - Agency should document the process for developing risk pools that include
    - Work items typically included in risk pools
    - Clarify when risks are covered by agency risk pool or the shared risk pool
    - Process for estimating a dollar amount for risk pools
    - Guidance on how shared savings is split
    - Process for converting risk pools to force accounts
    - Guidance for approving payment out of a risk pool

Risk Pools

- Guidebook example
  - CM-GC Page 154-157

27 CM-GC

Example: DOT Risk Pools

Risk: if weather delays occur, rental cost for specialty piece of equipment will increase

Risk allocation:

- If allocated to the contractor, then the bid item will include a high contingency that the owner will pay whether or not the risk occurs.

- If the DOT takes the risk and funds a DOT Risk Pool, then the DOT may save money if the risk does not occur, and does not pay the contractor's contingency cost.

Risk Pools

Agency tip

Shared Risk Pools allows the DOT 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.

Today's Learning Objectives

- **Phases and strategies** – Review the *preconstruction* phase and the *preconstruction services quality* strategy

- **Tools** – Explain the following tools, illustrated with examples from DOTs:

  - Cost-comparison spreadsheet
  - Cost-modeling approach
  - CM-GC bid validation
  - Independent cost estimator
  - Opinion of probable construction cost
  - Risk pools

- **Peer exchange** – Discuss issues affecting tools for enhancing quality in the preconstruction phase

Q and A

- Chat or raise your hand
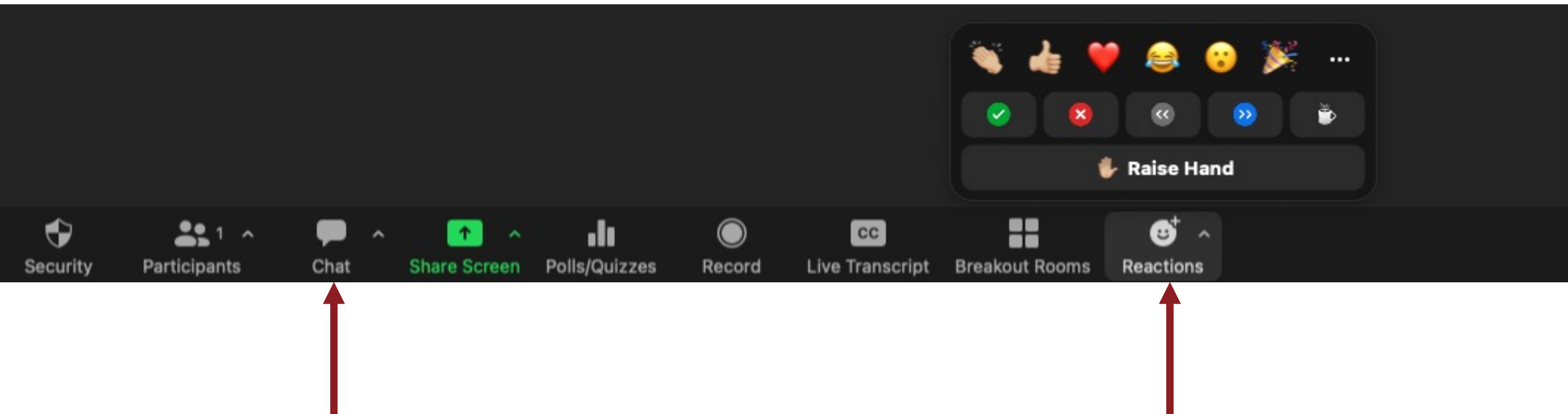
Peer Exchange

Peer Exchange: Panel Discussion on Preconstruction Tools

Holli Pick,

Alternative Delivery Program Manager, Oregon DOT

Wylie Bearup,

Former City Engineer & Streets Transportation Director, City of Phoenix

Ben Rowles,

Construction Manager, Colorado DOT

Wrap-up

Today's Learning Objectives

- **Phases and strategies** – Review the *preconstruction* phase and the *preconstruction services quality* strategy

- **Tools** – Explain the following tools, illustrated with examples from DOTs:

  ➢ Cost-comparison spreadsheet

  ➢ Cost-modeling approach

  ➢ CM-GC bid validation

  ➢ Independent cost estimator

  ➢ Opinion of probable construction cost

  ➢ Risk pools

- **Peer exchange** – Discuss issues affecting tools for enhancing quality in the preconstruction phase

Key Takeaway Points

- **A Cost-comparison spreadsheet** compares the estimates across key stakeholders to verify pricing and assumptions.

- **A Cost-modeling approach** develops a list of assumptions regarding the construction phase of the project to help reduce differences in cost estimates.

- **CM-GC bid validation** uses the **cost-comparison spreadsheet** to verify the fairness of the bid proposal.

- **An independent cost estimator (ICE)** is a consultant who verifies that the estimate is competitive and helps identify differences in the assumptions.

- **Opinion of probable construction cost (OPCC)** helps monitors the development of the cost estimate at key design milestones.

- **Risk pools** quantify and assign risk, also setting aside a fund to cover risks that might materialize on a project.

Progress Update

- **Sessions** – completed 6 of 8
- **Phases** – completed 4 of 6
- **Strategies** – completed 4 of 6
- **Tools** – completed 29 of 36
- **Peer exchange** – engaged with 13 expert guests and 300+ participants

NEXT: Construction Phase Administration!

Next: Session 7

- Thursday November 17, at 10:00 AM Pacific

- For preparation, preview the following 5 tools:
    - Contractor-controlled quality control testing
    - Contractor involvement in establishing quality control standards
    - Incentive/Disincentive program for superior quality
    - Real-time electronic quality management information
    - Dual construction engineering inspection roles

Learning Assessment

1. Single Answer: A cost-comparison spreadsheet is...
2. Single Answer: An independent cost estimator is...
3. T/F: Risk pools are used to cover...
4. Open feedback.

OPEN DISCUSSION