Quantifications of Transitions to Progressive Design Build: FHWA Findings

Independent Cost Estimator
Qualifications Based Selection
Work Packaging

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Project Delivery Methods

- **Design-Bid-Build (D-B-B)**
  - Owner
  - Designer
  - Contractor
  - Guaranteed Maximum Price

- **Progressive Design-Build (PDB)**
  - Owner
  - Designer
  - Construction Manager
  - General Contractor

- **Design-Build (D-B)**
  - Owner
  - Designer
  - Design-Build Firm
Objectives

• Describe Progressive Design-Build Processes
  – Independent Cost Estimator (ICE)
  – Qualifications Based Selection
  – Work Packaging

• Promote Discussion
Agenda

• FHWA ACM Research Project
• Progressive Design-Build
• Independent Cost Estimator
• Qualifications Based Selection
• Work Packaging
• Discussion
A Study of Cost, Benefits and Risks Associated with ACMs

- Federal Highway Research Study

- Two-Year Investigation into ACM Performance
A Study of Cost, Benefits and Risks Associated with ACMs

- Quantify for ACMs
  - Cost
  - Schedule
  - Quality
  - Risks
  - Lessons Learned
Data Collection Overview

Research Data Collection
- 291 projects
  - 134 D-B-B projects
  - 34 CM/GC projects
  - 39 D-B/LB projects
  - 84 D-B/BV projects
- 28 agencies
- Completed 2004-2015
TRR Publications

• Paper: 17-04745 - Roles and Responsibilities of the Independent Cost Estimator in Construction Manager/General Contractor in Highway Construction

• Paper: 17-05805 - Comparison of Qualifications-Based Selection and Best Value Procurement for Construction Manager/General Contractor Highway Construction

• Paper: 17-06114 - Exploration of Early Work Packaging in Construction Manager/General Contractor Highway Projects
Progressive Design-Build

Modified from FHWA EDC 2013
CM/GC versus PDB

• For Transportation (FHWA), Both Require
  – An Independent Cost Estimator
  – Qualifications Based Procurement
  – Potential Benefit: Work Packaging
Roles and Responsibilities of the Independent Cost Estimator in CM/GC

TRR Paper Number 17-04745
Independent Cost Estimator (ICE)

- ICE and CM/GC hired 30% design
- All (3) entities develop estimate
- During negotiation (3) estimates are compared for accuracy
- After agreed upon price, construction contract is executed
ICE State-of-Practice

- Arizona, Colorado, Massachusetts, Minnesota, Michigan, and Utah
- Agency manuals with significant discussion of ICE
- Majority require
  - Cost Based Estimate
  - Bid Reconciliation Involvement
  - Attend Project Meetings
ICE Survey Findings

- Average Cost 0.9%
- Majority hired 0-30% design completion
- Majority perform 3 estimates, with up to 5 estimates performed
- Most common complication is means and methods

<table>
<thead>
<tr>
<th>Percent of Award Cost</th>
<th>Number of Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.25% to 0.50%</td>
<td>7</td>
</tr>
<tr>
<td>0.51% to 1.00%</td>
<td>8</td>
</tr>
<tr>
<td>1.00% to 2.00%</td>
<td>1</td>
</tr>
<tr>
<td>2.00% to 3.00%</td>
<td>2</td>
</tr>
<tr>
<td>Average Percent of Award Cost</td>
<td>0.88%</td>
</tr>
</tbody>
</table>
Overall Findings and Lessons Learned

• ICE should be an involved project team member
  – Involve ICE in preliminary engineering
  – Involve ICE in pre-construction meetings
  – Develop culture of collaboration
• ICE needs construction and/or construction estimating exp.
• ICE can provide design/construction support
• ICE is a value added CM/GC process
ICE Adding Value

• Average ICE Cost 0.9%

“The ICE absolutely adds value to the process... The ICE gives you a comfort level that you are not being taken to the cleaners.”

“I felt much more comfortable knowing that we were getting a production based estimate rather than an engineer’s estimate. I don’t think I could have ever been comfortable that we were getting a fair market price without an ICE. It is piece of mind.”

“The ICE... also can provide input and insight into the schedule of the project, risks that are misplaced that could be shared or kept under the ownership of the department to minimize cost, they give a good check on quantities and planned quality.”
CDOT CMGC ICE Lessons Learned

- ICE needs to be flexible, have negotiation skills, may need project specific specialty estimating.
- Strong project manager/project director with negotiation skills.
- Competitive pricing can be a challenge.
- Negotiation can be challenging—Start high negotiate to the middle.
- Open Cost Model expectations must be specific and detailed.
- Perception of not getting lowest price in a culture of low bid.
- Resistance to culture change and industry acceptance.
- Recommend official ICE strategic plan for any entity.
- Hire ICE AS EARLY AS POSSIBLE
Comparison of Qualification Based Selection and Best Value Procurement

TRR Paper Number 17-05805
# QBS versus BV Procurement

## One-Step QBS Selection Process

<table>
<thead>
<tr>
<th>Process</th>
<th>Contractor Statement of Qualifications</th>
<th>Evaluation of Qualifications</th>
<th>Qualifications Based Selection</th>
<th>Award</th>
<th>Precon. Services</th>
<th>Develop GMP</th>
<th>Able to reach GMP agreement with CM?</th>
<th>Award</th>
<th>Build</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adv RFQ</td>
<td>Org Chart</td>
<td>Project Exp.</td>
<td>Key Staff Exper.</td>
<td>Mngmnt Plans</td>
<td>&quot;Other&quot; Require</td>
<td>Advertise as D-B-B</td>
<td>Low-Bid Selection</td>
<td>YES</td>
<td>Build</td>
</tr>
</tbody>
</table>

## One-Step BV Selection Process

<table>
<thead>
<tr>
<th>Process</th>
<th>Contractor Proposal</th>
<th>Eval of Fees &amp; Qualifications</th>
<th>Best Value Selection</th>
<th>Award</th>
<th>Precon. Services</th>
<th>Develop GMP</th>
<th>Able to reach GMP agreement with CM?</th>
<th>Award</th>
<th>Build</th>
</tr>
</thead>
</table>

## Two-Step BV Selection Process

<table>
<thead>
<tr>
<th>Process</th>
<th>Contractor Statement of Qualifications</th>
<th>Evaluation Qualif.</th>
<th>Shortlist Invite to RFP</th>
<th>Contractor Proposal</th>
<th>Best Value Selection</th>
<th>Award</th>
<th>Precon. Services</th>
<th>Develop GMP</th>
<th>Able to reach GMP agreement with CM?</th>
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Proposal Components used in GMP Development

Gransberg et al 2010
Cost in CM/GC Procurement Legislation

- **Cost Not Allowed**
  - Arizona
  - Michigan

- **Either/No Rule**
  - California
  - Minnesota
  - Nevada
  - Utah
  - Florida
  - Tennesee

- **Cost Required**
  - Alaska
  - Connecticut
  - Colorado
  - Idaho
  - Maryland
  - Oregon
  - Rhode Island
  - Washington
Submittal Requirements for Success

• Review Contractor References
• Perform Contractor Interviews
• Educate Selection Party
• Include a Diverse Selection Panel
Qualification Based

• Opportunities
  – Ability to Select Solely on Qualifications
  – Difficult to Develop Pricing
  – Pricing Increases Negotiation
  – Price Detracts from Quality/Innovation

• Obstacles
  – Receiving a Fair Market Price; Mitigated by
    • Independent Cost Estimator
    • GMP Protocols in GMP
    • Having 2nd Contractor as an Option
CDOT CMGC Qualification Based/BV

**Opportunities**
- Ability to Select Solely on Qualifications
- Should remove profit, back office overhead and administrative from prices
- Can be difficult to develop pricing
- Pricing Increases Negotiation
- Early Contractor involvement can provide value

**Obstacles**
- Receiving a Fair Market Price; Mitigated by
  - Independent Cost Estimator
  - Competitive bid packaging
  - Low bid process as alternative
- Package severability KEY
- Work packaging must be strategic and specifically tailored to each project
Early Work Packaging Used For

- Procuring Long Lead Items and/or Volatile Priced Items
- Schedule Acceleration
  - Overlap Design and Construction
  - Perform Early Work Including
    - Right of Way
    - Utility
    - Subsurface
    - Prep Work
  - Avoid Environmental Restrictions or Disadvantageous Seasons
Early Work Packaging Benefits

• Expedite Project Completion
• Mitigate Project Risks
• Reduce Project Costs
• Minimize Impact to the Public
Early Work Packaging Implementation Factors

- Maintain Severability
- Proactive Planning
- Involve Contractors and Stakeholders
- Only Use After Progressive Design-Build Experience is Gained
CDOT CMGC Early Work Packaging

Preconstruction Contract

Prelim. Design  Design Package 1  Construction Package 1

Long Lead Time Procurements

GMP 1

GMP 2

Design Package 2  Construction Package 2

GMP ‘N’

Design Package ‘N’  Construction Package ‘N’

FHWA  Prog. D-B  ICE  QBS  Work Packaging
CDOT CMGC Packaging Lessons Learned

- Every project is unique and the packaging must fit the project schedule and phasing.
- Each package has to be as severable as possible.
- Each package needs to be strategically planned.
- Challenges with overlapping items, traffic control, mobilization, overhead, offices, yards, and other items.
- Challenges in pricing but can reduce risk, schedule, and impact.
CDOT CMGC LLTP and Early Work Packaging Benefits

- Expedite Project Completion
- Expedite equipment and material purchases
- Mitigate Project Risks
- Mitigate construction phasing challenges
- Reduce Project Costs
- Minimize Impact to the Public
- Better understanding of construction cost estimating for CDOT
Conclusions

• Independent Cost Estimator
• Qualification Based Selection
• Early Work Packaging
Questions/Comments

• General Feedback or any Negative Experiences with
  – ICE
  – QBS
  – Work Packaging
• Any Research Ideas on the Above Processes?
• CM/GC Practices Applicability to Progressive DB
• General Comments