A Guidebook for Construction Manager/General Contractor (CMGC) Contracting for Highway Projects

2014 TxDOT Short Course

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NCHRP SYNTHESIS 402

- Developed late 2008 to 2009 published in 2010
- Review and document state of practice of CMR project delivery in transportation
- Provide characteristics of CMR
- Describe how agencies evaluate project characteristics and requirements to make the decision to use CMR project delivery
- Basis for the Guidebook (Developed between 2011 and 2013)
A Guidebook for CMGC Contracting for Highway Projects

- What is CMGC (aka CMR)?
- What types of projects?
- What are the benefits of this delivery method?
- When to select CMGC for project delivery?
Phase I – CMGC Theory ABOUT Practice

From Theory Synthesis 402
- Fundamental understanding of the definitions and salient components of a successful CMGC program
  - Code project characteristics and criteria for:
    - Agency implementation
    - Procurement/Pricing
    - Contract Administration

To CMGC Baseline Theory
- Define current state of practice
  - Identify CMGC delivery models
  - Describe advantages and disadvantages of each model

Phase II – CMGC Theory FOR Practice

From CMGC Baseline Theory
- Document the CMGC Guidebook topical content
  - Map a path from the baseline theory to CMGC program requirements
  - Validate the CMGC Guidebook topical content
  - Organize the CMGC Guidebook topical content

To CMGC Program Requirements

Phase III – CMGC Theory IN Practice

From CMGC Program Requirements
- Document the proposed CMGC model(s)
  - Create the “business” case and key messages for upper management
  - Map a path from CMGC program requirements to CMGC models for program management
  - Develop decision support for CMGC project and model selection

To CMGC Recommended Practice
- Catalog best practices contract administration
Guidebook Chapters

1. Introduction
2. CMGC Procurement and Selection
3. CMGC Design and Preconstruction Services
4. Project Pricing Structure
5. Project Administration
Introduction

CMGC Procurement and Selection

CMGC Design and Preconstruction Services

Project Pricing Structure

Project Administration
Objectives

- Present purpose of the guidebook
- Establish audience for the guidebook
- Provide an understanding of the CMGC process
- Justification for using CMGC
- Describe the added value of implementing CMGC
Introduction

Major benefits of CMGC

- Ability to fast-track
- Construction input into design
- Early knowledge of costs
- Ability to bid early work packages
- Owner control of design
- Flexibility during design/construction
- Shared risk allocation
Introduction
1. Introduction
2. CMGC Procurement and Selection
3. CMGC Design and Preconstruction Services
4. Project Pricing Structure
5. Project Administration
Objectives

- Provide the background necessary to understand the CMGC procurement process
- Provide guidance regarding how to solicit, evaluate, and select a CMGC contractor
CMGC Procurement and Selection

FIGURE 2.5 CMGC Selection Framework

QBS Parameters

QBS Evaluation Criteria

QBS Evaluation Rating Systems

QBS Award Algorithms

Best-Value Parameters

Best-Value Evaluation Criteria

Best-Value Evaluation Rating Systems

Best-Value Award Algorithms
CMGC Procurement and Selection

- Self-perform versus subcontracting.
- Incorporating a shared savings.
- Select the CMGC as soon as practical.
## CMGC Procurement and Selection

### Table 2.6: CMGC Fee Structure

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Description</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separate breakout</td>
<td>Separate lump sums or percentages for PSF, JGC, HOO, and CMF</td>
<td>• Increased transparency</td>
<td>• Difficult to adjust with confidence if scope changes occur</td>
</tr>
<tr>
<td>PSF + Construction Fee</td>
<td>Lump sum for JGC, HOO, and CMF</td>
<td>• Fixes time-related costs up front</td>
<td>• Decreased transparency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reduces cost of changes to direct costs only.</td>
<td>• Possible dispute over adjustment if a scope change increases project duration.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Easy to develop fully loaded unit prices</td>
<td></td>
</tr>
<tr>
<td>PSF + CMF + indirect cost</td>
<td>Indirect cost is a lump sum for JGC and HOO</td>
<td>• Separates costs from profit</td>
<td>• Creates a potential for manipulating the numbers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Enhances quantifying cost of extending project time</td>
<td></td>
</tr>
</tbody>
</table>
Objectives

- Provide background regarding the mechanics of the CMGC preconstruction process

- Provide a basic explanation of the suite of possible preconstruction services and where they add value and should be included.

- Provide details on effective practices for scheduling of design and construction work packages and the process.

- Provide guidance on release for construction design packages
### CMGC Design and Preconstruction Services

**Table 3.1 Menu of Possible Preconstruction Services**

<table>
<thead>
<tr>
<th>Design Related:</th>
<th>Schedule Related:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Validate agency/consultant design</td>
<td>- Validate agency/consultant schedules</td>
</tr>
<tr>
<td>- Assist/input to agency/consultant design</td>
<td>- Prepare project schedules</td>
</tr>
<tr>
<td>- Design reviews</td>
<td>- Develop sequence of design work</td>
</tr>
<tr>
<td>- Design charrettes</td>
<td>- Construction phasing</td>
</tr>
<tr>
<td>- Constructability reviews</td>
<td>- Schedule risk analysis/control</td>
</tr>
<tr>
<td>- Operability reviews</td>
<td></td>
</tr>
<tr>
<td>- Regulatory reviews</td>
<td></td>
</tr>
<tr>
<td>- Market surveys for design decisions</td>
<td></td>
</tr>
<tr>
<td>- Verify/take-off quantities</td>
<td></td>
</tr>
<tr>
<td>- Assistance shaping scope of work</td>
<td></td>
</tr>
<tr>
<td>- Feasibility studies</td>
<td></td>
</tr>
<tr>
<td>- Encourage innovation</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost Related:</th>
<th>Administrative Related:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Validate agency/consultant estimates</td>
<td>- Coordinate contract documents</td>
</tr>
<tr>
<td>- Prepare project estimates</td>
<td>- Coordinate with 3rd party stakeholders</td>
</tr>
<tr>
<td>- Cost engineering reviews</td>
<td>- Public information/public relations</td>
</tr>
<tr>
<td>- Early award of critical bid packages</td>
<td>- Attend public meetings</td>
</tr>
<tr>
<td>- Life cycle cost analysis</td>
<td>- Biddability reviews</td>
</tr>
<tr>
<td>- Value analysis/engineering</td>
<td>- Subcontractor bid packaging</td>
</tr>
<tr>
<td>- Material cost forecasting</td>
<td>- Prequalifying subcontractors</td>
</tr>
<tr>
<td>- Cost risk analysis</td>
<td>- Assist in right-of-way acquisition</td>
</tr>
<tr>
<td>- Cash flow projections/Cost control</td>
<td>- Assist in permitting actions</td>
</tr>
<tr>
<td>- Shape the project scope to meet the budget</td>
<td>- Study labor availability/conditions</td>
</tr>
<tr>
<td></td>
<td>- Prepare sustainability certification application</td>
</tr>
<tr>
<td></td>
<td>- Follow environmental commitments</td>
</tr>
<tr>
<td></td>
<td>- Follow terms of Federal Grant</td>
</tr>
<tr>
<td></td>
<td>- Coordinate site visits for subcontractors</td>
</tr>
<tr>
<td></td>
<td>- Teamwork/Partnering meetings/sessions</td>
</tr>
</tbody>
</table>
Design Input

- Design validation as opposed to technical design review
- Compare the scope of work with both the required budget and schedule
Scheduling

- Successful CMGC projects emphasize the need to develop design work package schedules that seamlessly flow into the construction bid package sequence of work as part of the preconstruction process.
Constructability Reviews

- Pricing alternative design solutions
- Improving the efficiency of construction through matching the design to the contractor’s actual means, methods, and equipment
- Early construction cost estimating
1. Introduction
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Objectives

- Defining Project Pricing Structure (PPS)
- Developing Cost Model
- Cost Model Components
Project Pricing Structure

- Owner’s Total Contract Costs
  - Total Project Contingency
    - Management Reserve (controlled by an owner entity that is outside the owner’s project team)
    - Owner’s Contingency (major design changes, scope creep, unforeseen conditions, force majeure, etc.)
  - Prime’s Contingency (material & labor escalation, subcontractor availability, market-based issues, etc.)
  - Prime’s Fee (Profit)
  - Prime’s General Conditions (overhead, taxes, permits, job site overhead, etc.)
  - Prime’s Direct Project Cost (labor, materials, equipment for self-performed work packages)
  - Prime’s Cost of Early Material Purchases to be installed by subcontractors.
  - Subcontract Work Packages (labor, materials, equipment for subcontracted work packages)
- Preconstruction Services Fee
- Design Fee/In-house Design Cost

Total Preconstruction Cost

CMR Guaranteed Maximum Price

Mandatory GMP Component
Optional GMP Component
## Project Pricing Structure

<table>
<thead>
<tr>
<th>Item</th>
<th>Costs NOT TO BE included in CMGC Construction Fee Percentage</th>
<th>Costs TO BE included in CMGC Construction Fee Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.1</td>
<td>Mobilization</td>
<td>Project Principal – all costs</td>
</tr>
<tr>
<td>E.2</td>
<td>Project Manager</td>
<td>Cost Estimator services during Construction Phase – all costs. (Note: Cost Estimator services during Pre-construction Phase are reimbursable as included in the Pre-construction Services Fee)</td>
</tr>
<tr>
<td>E.3</td>
<td>Construction Manager/Superintendent</td>
<td>Project Manager relocation, housing, and subsistence costs</td>
</tr>
<tr>
<td>E.4</td>
<td>All other on-site, construction management staff, as approved by the Agency</td>
<td>Construction Manager/Superintendent relocation, housing, and subsistence costs</td>
</tr>
<tr>
<td>E.5</td>
<td>On-site administrative staff, including clerical and secretarial staff</td>
<td>Additional CMGC staff relocation, housing, and subsistence cost</td>
</tr>
<tr>
<td>E.6</td>
<td>All project direct costs related to Safety</td>
<td>Home, branch and regional office administrative support staff and all related costs</td>
</tr>
<tr>
<td>E.7</td>
<td>All project direct costs related to Quality Control</td>
<td>Home, branch and regional office safety support staff and all related costs</td>
</tr>
<tr>
<td>E.8</td>
<td>Project office costs for cleaning, set-up/demob, maintenance, security, utilities, rent/lease, equipment, and furniture</td>
<td>Home, branch and regional office quality control support staff and all related costs</td>
</tr>
<tr>
<td>E.9</td>
<td>Materials and equipment handling, including shipping/transport to site and storage costs</td>
<td>Profit</td>
</tr>
<tr>
<td>E.10</td>
<td>Costs to co-locate with Agency staff</td>
<td></td>
</tr>
<tr>
<td>E.11</td>
<td>Job site temporary toilet facilities/maintenance</td>
<td></td>
</tr>
<tr>
<td>E.12</td>
<td>Partnering workshops</td>
<td></td>
</tr>
<tr>
<td>E.13</td>
<td>Construction rental equipment</td>
<td></td>
</tr>
<tr>
<td>E.14</td>
<td>Actual cost of permits</td>
<td></td>
</tr>
<tr>
<td>E.15</td>
<td>All project direct costs related to implementation of Agency-approved sustainable practices</td>
<td></td>
</tr>
<tr>
<td>E.16</td>
<td>All project direct costs related to implementation of Agency-approved DMEF program</td>
<td></td>
</tr>
<tr>
<td>E.17</td>
<td>Construction equipment and vehicles at Proposer’s internal cost rate, including costs of maintenance and fuel</td>
<td></td>
</tr>
<tr>
<td>E.18</td>
<td>All costs related to cell phones, radios, fax machines, pagers, computers and software</td>
<td></td>
</tr>
<tr>
<td>E.19</td>
<td>All costs of capital and interest, licenses and taxes required by law.</td>
<td></td>
</tr>
<tr>
<td>E.20</td>
<td>Miscellaneous project office costs, including but not limited to, drinking water, printing, reproduction, postage, delivery, and supplies</td>
<td></td>
</tr>
</tbody>
</table>
Cost model…

… reflects all the financial aspects of the project scope of work as it is developed.

… acts as the metric with which the value of all design alternatives are measured and compared to the target budget.

… needs approval by the agency at different stages of the project shows the agreement on the cost between two parties at that point.

… is compared with the engineers’ estimates and the project’s approved budget helps identify possible deviations from planned scope and their origins.
Collaboration on scope and cost...

...leads to assessing scope in the context of cost as well as assessing the cost of key construction means and methods and materials.

...improves the accuracy of the cost estimate and eventually the final target price.

...ensures that the project scope fits within the agency’s budget.

...may include investigating alternatives to the scope, evaluating different means and methods of implementing construction and assessing material procurement strategies including the costs associated with these inputs.
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5

Project Administration

Objectives

- Provide background regarding the CMGC project administration
- Provide guidance on monitoring the CMGC project
- Provide details on effective practices for quality management on CMGC projects
- Provide information on common practices for dispute resolution on CMGC projects
Summary

- Published by AASHTO late 2014 or early 2015
- “Boot-leg” copy available
- Contact Stu Anderson –
  s-anderson5@tamu.edu
Summary

QUESTION AND ANSWER OR DISCUSSION