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Construction Manager/General Contractor Issue Identification

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Final Report 2012-25

Your Destination... Our Priority



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Executive Summary

The construction manager-at-risk (CMR) project delivery method, also termed construction manager/general contractor (CM/GC) project delivery in several states' enabling legislation, is an integrated team approach to the planning, design, and construction of a project to control schedule and budget and assure quality for the project owner. The team consists of the owner, the designer, which might be an in-house engineer, and the at-risk construction manager.

The Minnesota Department of Transportation (MnDOT) requested services from the Construction Management and Technology (CMAT) program at Iowa State University to help with the process of obtaining enabling legislation and implementing the CM/GC project delivery method.

MnDOT identified key issues that needed further research. Iowa State used three methods to research the questions.

NCHRP Synthesis 402 and Other Pertinent Literature Review

The researchers performed a review of NCHRP Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs and other literature written since the publication of the synthesis for guidance on five specific MnDOT topics.

RFP/RFQ Content Analysis

The researchers analyzed 30 Request for Proposal (RFP)/Request for Qualifications (RFQ) solicitation documents.

CM/GC Experience Questionnaire

A questionnaire structured specifically to answer MnDOT questions was sent to agencies in states that have used CM/GC.

Survey questions and responses, as well as the targeted literature review and RFP/RFQ content analysis, are covered in the standalone white papers that were developed and included at the end of this report to present the results of this investigation.

These were the first five topics identified, presented to the stakeholder group, and, then, developed into white papers:

- CM/GC Project Selection
- CM/GC Selection Process
- CM/GC Selection Requirements
- Subcontractors
- Cost Negotiations

These are additional topics identified, developed into standalone white papers, and included at the end of this report:

- Including Cost in the CM/GC Selection Process
- Design Contract Modifications
- Owner Process to Validate Cost
- Role of Independent Cost Estimator (ICE)
- Contractor Bid Process

1. Introduction

The construction manager-at-risk (CMR) project delivery method, also termed construction manager/general contractor (CM/GC) project delivery in several states' enabling legislation, is an integrated team approach to the planning, design, and construction of a project to control schedule and budget and assure quality for the project owner. The team consists of the owner, the designer, which might an in-house engineer, and the at-risk construction manager.

A CMR contract includes preconstruction and construction services. The CMR is usually selected early in the design process and collaborates with the owner and designer during all phases of the project, including but not limited to planning, design, third-party coordination, constructability reviews, cost engineering reviews, value engineering, material selection, and contract package development.

The CMR and designer must commit to a high degree of collaboration. This is especially vital when the agency is using CMR to implement new construction technologies.

A guaranteed maximum price (GMP) is established when the design of a specific feature of work is nearly complete (progressive GMP) or when the entire design is at a point where the CMR can reduce the magnitude of necessary contingencies. The CMR warrants to the owner that the project will be built at a price not to exceed the GMP. Thus, the CMR assumes the risk of meeting the GMP.

After design is complete, the CMR acts as the general contractor during the construction phase of the project. Strang (2002) describes the relationship change like this: "The construction manager is an agent of the Owner in managing the design process, but takes the role of a vendor when a total cost guarantee is given."

CMR is widely used in the airport, transit, and water/wastewater industries, as well as in the building construction industry, where it first evolved. Several transit megaprojects in Utah and Oregon have been successfully delivered using CMR (Touran et al. 2009).

In a 2008 presentation to the Western Association of State Highway and Transportation Officials (WASHTO) by Jane Lee of the Oregon Department of Transportation (ODOT), Lee expresses the essential motivation for this synthesis by listing Oregon's six reasons for using CMR project delivery:

1. Collaboration and cost control
2. Concurrent execution of design and construction
3. Well suited for complex projects, tight timeframes
4. Owner, A/E [architect/engineer], CM/GC have mutual project goals
5. Risk management: Team identifies - Owner controls
6. Collaborative process minimizes risk of construction and design disputes (Lee 2008)

Lee uses the words "collaboration" and "control" twice in her description. The Utah DOT (UDOT) confirms Lee's focus on collaboration and control and adds "to introduce innovation and new technologies" as another reason for using CMR (Alder 2007).

The aspect of owner “control” usually extends to the three salient aspects of project delivery: control over the details of design (i.e., quality), cost control, and schedule control (Scott et al. 2006).

One early study of alternative project delivery methods found that owners’ main goals for using design-build (DB) project delivery were compressing the schedule and controlling cost (Songer and Molenaar 1996). However, another study found that DOTs were often reluctant to use DB project delivery because they lost control over the details of design (Scott et al. 2006).

Taking the facts from these four studies and combining them with Lee’s reasons for using CMR project delivery leads to the inference that CMR may furnish a project delivery method that satisfies owners’ need for control over cost and schedule without losing control over the design.

PROJECT DELIVERY METHODS

For the past two decades, public owners have been demanding that the design and construction industries enhance quality, decrease cost, and compress the delivery period for public projects. As a result, both the owners and the industry have experimented with various forms of project delivery methods.

As alternative project delivery methods proliferated, the industry has coined various names for variations on the basic themes. Some of these have been codified in enabling legislation. For example, CMR is also called CM/GC and GC/CM in various state codes. The Veterans Administration calls it construction manager as constructor (CMc) to differentiate it from construction manager as agent (CMa), also called Agency CM, which is actually a management method and not a project delivery method (Bearup et al. 2007).

This terminology confusion makes understanding the definitions for alternative project delivery methods a substantial challenge in selecting the method most appropriate to the owner’s needs and desires, especially if an agency is new to alternative project delivery.

To address the issue of varying terms-of-art, this synthesis uses the same set of standard project delivery definitions used in other Transportation Research Board (TRB) reports (Touran et al. 2009; Scott et al. 2006). These definitions will be used to communicate the technical contractual aspects of the commonly used project delivery methods. However, this report does not change the specific term applied to CMR in quotations cited, to preserve the integrity of the cited information.

Project delivery method is a term used to refer to all of the contractual relations, roles, and responsibilities of the entities involved in a project. The Texas DOT (TxDOT) defines project delivery methods as follows:

“A project delivery method equates to a procurement approach and defines the relationships, roles, and responsibilities of project team members and sequences of activities required to complete a project. A contracting approach is a specific procedure used under the large umbrella of a procurement method to provide techniques for bidding, managing, and specifying a project.” (Walewski et al. 2001)

The Associated General Contractors of America (AGC) defines the project delivery method as “the comprehensive process of assigning the contractual responsibilities for designing and constructing a project... a delivery method identifies the primary parties taking contractual responsibility for the performance of the work” (AGC 2004). The different methods are distinguished by the way the contracts between the owner, the designer, and the builder are formed and the technical relationships that evolve between each party inside those contracts.

The Construction Industry Institute (CII) posits that there are really only three fundamental project delivery methods: design-bid-build (DBB), DB, and CMR (CII 2003). While there is a multitude of names for project delivery methods throughout the industry, CII has simplified the categorization process by focusing specifically on the contracts. Therefore, this report will focus its information in those three categories.

The AGC also distinguishes between the delivery method and the management method. The management method “is the mechanics by which construction is administered and supervised” (AGC 2004). This function is either retained by the owner agency or out-sourced. An example of out-sourcing the management process is to hire an Agency CM. Theoretically, any management method may be used with any delivery method. As an example, the owner may hire an Agency CM to manage a DBB, DB, or even a CMR project on its behalf. This is a common practice in the transit sector (Touran 2009; FTA 2006).

The standardized definitions and a brief explanation with a graphic displaying the contractual relationships are included in the following figures to put the content of this report into context.

Note that the lines of communication shown in the figures represent the ability to exchange information through the use of formal and informal requests for information between various entities on the project. The lines of contractual coordination designate contract requirements to exchange information and other services during design and construction.

DESIGN-BID-BUILD (DBB)

DBB is the traditional project delivery method in which an owner either completes the design using its own design professionals or retains a designer to furnish complete design services. It then advertises and awards a separate construction contract based on the completed construction documents. In either case, the owner is responsible for the details of design and warrants the quality of the construction documents to the construction contractor.

Figure 1 shows that the owner is squarely situated between the designer and the builder in the project delivery process.

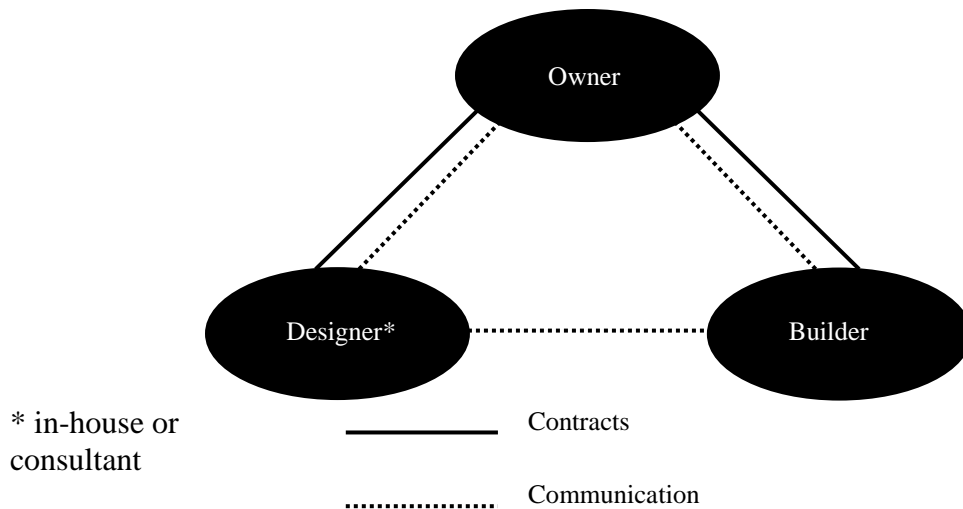


Figure 1. Design-Bid-Build (adapted from AIACC 1996)

In DBB, the owner “owns” the details of design during construction and, as a result, is financially liable for the cost of any errors or omissions encountered in construction, which is called the “Spearin Doctrine” (Mitchell 1999).

Public DBB projects are generally awarded on a low-bid basis with no contractual incentive for the builder to minimize the cost growth in this delivery system. In fact, there can be an opposite effect. A builder who has submitted a low bid may need to look to post-award changes as a means to make a profit on the project after bidding the lowest possible margin to win the project (Scott et al. 2006).

DBB projects can also be awarded on a negotiated basis and a best-value basis. In both cases, the probability that the project will be awarded to a builder who has submitted a mistakenly low bid is reduced (Scott et al. 2006). In addition, the motivation of the builder in both cases is to complete the project in a manner that will get it invited back to do the next negotiated contract or that will reflect well in the next best-value selection.

Regardless of the award method, DBB is distinguished by little builder input to the design. Thus, the owner relies on the designer alone for constructability review, if there is any, and trusts the designer to ensure that the design does not exceed the budget.

CONSTRUCTION MANAGER-AT-RISK (CMR)

CMR projects are characterized by a contract between an owner and a CM who will be at risk for the final cost and time of construction. In this agreement, the owner authorizes the CM to make input during project design. The owner will either complete the design with its own design personnel or out-source the design work to a consultant.

UDOT does it both ways, depending on project requirements. UDOT reported that the major issue with using in-house designers is ensuring that they can commit to a design schedule in the same way as consultants do.

The original idea of CMR is to furnish professional management of all phases of a project's life to an owner whose organization may not have those capabilities internally (Strang 2002). CMR project delivery involves two contracts. The first is for preconstruction services during design and the second is for the construction itself.

Typically, CMR contracts contain a provision in which the CMR stipulates a GMP above which the owner is not liable for payment if the project scope does not change after the GMP is established. Often these contracts include incentive clauses in which the CMR and owner can share any cost savings realized below the GMP.

Some states, like Oklahoma, take the GMP, convert it to a firm-fixed-price contract, and administer the construction as if it were a traditional DBB project thereafter.

CMR contracts can contain provisions for the CMR to handle some aspects of design. For example, a CMR storm water improvement project in Florida required the CMR to hire licensed design professionals and conduct a formal technical peer review of the design consultant's construction documents (Kwak and Bushey 2000).

But, most commonly, the owner retains the traditional responsibility by keeping a separate design contract and furnishing the CMR with a full set of plans and specifications upon which all construction subcontracts are based, as seen in Figure 2.

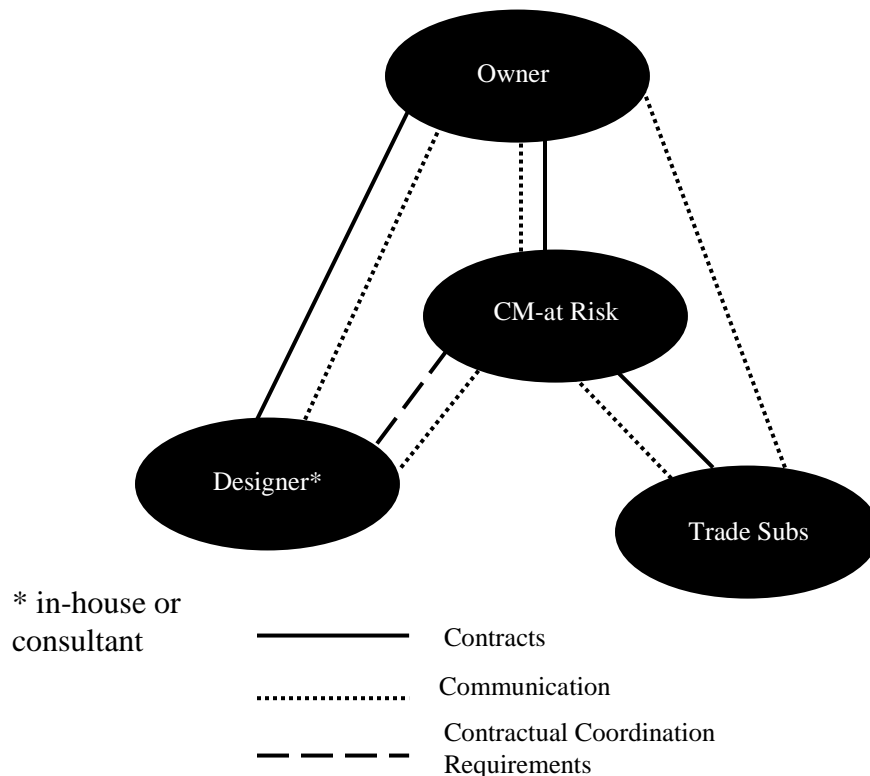


Figure 2. Construction Manager-at-Risk (adapted from AIACC 1996)

According to AGC (2004), the defining characteristics of the CMR are the following:

- The designer and the CMR hold separate contracts with the owner (as opposed to DB)
- The CMR is chosen based on criteria other than just the lowest construction cost (as opposed to DBB)

Enhanced constructability, real-time construction pricing capability, and speed of implementation are the major reasons why an owner would select the CMR method. In addition, transportation agencies use it to implement new and innovative technologies and to create an environment of rich collaboration in which to deliver complex projects. Unlike DBB, CMR brings the builder into the design process at a stage where definitive input can have a positive impact on the project.

In CMR, the CM essentially becomes the general contractor at the time the GMP is established. In some markets, CM/GC is used to distinguish a contract where the contractor self-performs some portion of the work from CMR where the prime contract holder subcontracts all the construction work (AGC 2004). However, as both variations would conform to the contractual relationships shown in Figure 2, this report uses these terms interchangeably.

The CMR can and is expected to provide realistic project cost estimates early in the project life cycle. It is anticipated that after an adequate amount of design is complete to define the project's scope of work sufficiently, the owner will enter into a contract with the CMR for providing construction services. Many states reserve the right to go out for bid if they think that the CMR's price is not competitive (Minchin et al. 2007).

To reiterate, there are two types of CM arrangements: Agency CM and CMR. This synthesis focuses strictly on CMR. In Agency CM, the CM is not contractually responsible for the project costs or schedule. The Agency CM role is purely consultative and must not be confused with the CMR who ultimately must deliver the project within contractually set time and cost limits. Thus, Agency CM is not a project delivery method, but rather a project management method (Bearup et al. 2007).

DESIGN-BUILD (DB)

DB is a project delivery method in which the owner procures both design and construction services in the same contract from a single, legal entity referred to as the design-builder. The method typically uses request for qualifications (RFQ)/request for proposal (RFP) procedures rather than DBB invitation for bid procedures.

Many DB process variations exist, but all involve three major components. The owner develops an RFQ/RFP that describes essential project requirements in performance terms. Next, proposals are evaluated, and, finally, with evaluation complete, the owner engages in some process that leads to the contract award for both design and construction services.

The DB entity is liable for all design and construction costs and normally must provide a firm, fixed price in its proposal (El Wardani et al. 2006, Ibbs et al. 2003, Graham 1997).

Figure 3 clearly shows that, from the owner's standpoint, the DB project chain of responsibility is considerably simplified.

As in CMR, the builder has early constructability input to the design process. Given the owner no longer owns the details of design, the owner's relationship with the design-builder is based on a strong degree of mutual professional trust. The design-builder literally controls this project delivery process. As a result, DB is the delivery method that has the greatest ability to compress the project delivery period and, as a result, is often used for "fast-track" projects (Alder 2007).

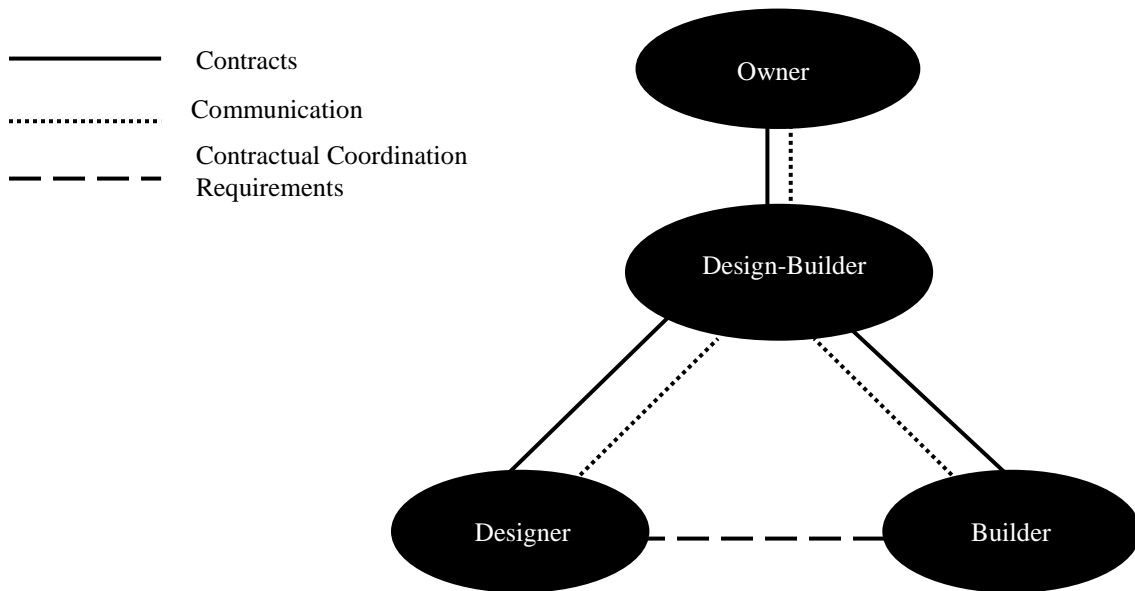


Figure 3. Design-Build (adapted from AIACC 1996)

Figure 4 is adapted from a Federal Transit Administration (FTA) manual and it summarizes the difference between variations on the three project delivery methods in terms of distribution of risk and control between the owner and its contractors. CMR is on the risk/control scale between the versions of DBB and variations of DB project delivery.

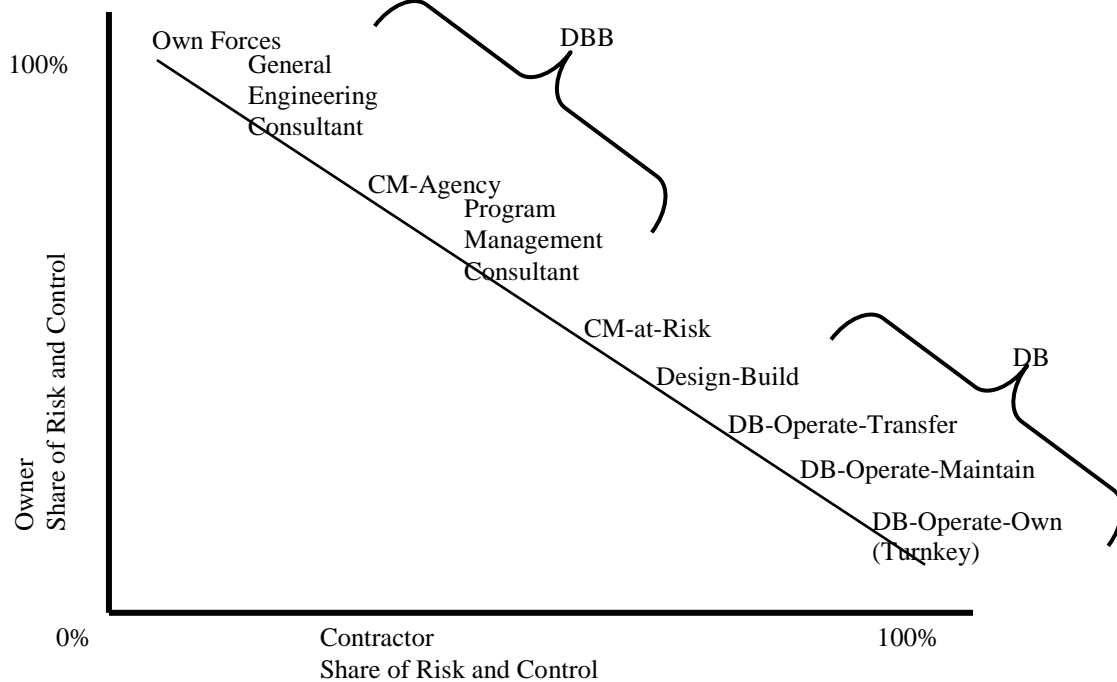


Figure 4. Project Delivery Methods Ranked by Risk/Control Shares (adapted from FTA 2006)

The figure tracks with the ODOT and UDOT reasons for using CMR cited by Lee (2008) and Alder (2007), showing that CMR furnishes more owner control than DB, yet allows an equitable sharing of project risk with the contractor. Therefore, the figure confirms the inference that CMR may be used on projects where the owner desires a high degree of collaboration, but wants to maintain control over the design and other salient aspects of the project.

KEY DEFINITIONS

As can be seen in the previous section, a precise definition of the common terms associated with CMR project delivery is essential to the ability to understand its advantages and disadvantages, as put into context with other project delivery methods in use by public transportation agencies. To facilitate reading and understanding the remainder of this work, key terms are defined as follows.

Construction Manager-at-Risk (CMR) Contract

A contract between an owner and a construction manager who will be at risk for the final cost and time of construction. In this agreement, the owner authorizes the CM to provide input during project design. It may consist of two separate contracts: preconstruction services and construction. It is also called construction manager/general contractor (CM/GC), general contractor/construction manager (GC/CM), and construction manager as constructor (CMc).

This synthesis takes the approach that no matter what the specific term seems to imply, all of the above designations are the same project delivery method because they involve separate design

and construction contracts held by the owner and involve the constructor in the design process through preconstruction services.

Letter of Interest (LOI)

Solicitation document that merely asks contractors to respond indicating their desire to compete for a CMR without requiring them to submit a list of specific qualifications. Typically, LOIs are used to negotiate a CMR contract with a GC based on the owner's past experience with the respondents.

Request for Qualifications (RFQs)

Solicitation document requiring contractors to submit specific information on their qualifications, which may include but are not limited to the qualifications of key personnel, past experience on related projects, quality management and other plans, details of their preconstruction services package, and other evaluation factors. RFQs do not require submission of cost or pricing information.

Request for Proposals (RFPs)

Solicitation document requiring contractors to submit specific information, which may include but is not limited to the qualifications of their key personnel, past experience on related projects, quality management and other plans, details of their preconstruction services package, proposed schedule and cost or pricing information, as well as any other evaluation factors.

Preconstruction Services

The activities conducted by the CMR during the design phase. These include but are not limited to the following:

- Cost estimates at predetermined stages of design development
- Prepare the schedule for the design phase as well as a preliminary schedule for the construction phase
- Perform value engineering analysis
- Perform a constructability review
- Develop the construction logistics plan
- Preparation of [trade subcontractor] bid packages, bid evaluation, and, if required, preparation of recommendations to the owner for the award of trade contracts
- Market surveys of construction materials and equipment that have relatively long delivery requirements
- Early purchase of... long-lead items (Martinez and MacMurray 2007)
- Other services required in the contract

Preconstruction Cost Model

A breakdown of the project scope of work in dollar terms. In CMR project delivery, the contractor's first preconstruction task is typically the development of this tool in collaboration with the designer. The purpose of the preconstruction cost model is to "validate the owner's budget" (Ladino et al. 2008) and be able to price various alternatives during design in a manner that directly reflects how and when they will be built (Van Winkle 2007). In addition, the model

evolves as the design progresses and is used to support required cost estimates (City of Tempe 2007).

Guaranteed Maximum Price (GMP)

A sum of money that represents the cost of work, overhead, CMR fees (profit), and a contingency in a CMR project (Kwak and Bushey 2000).

Progressive GMP

An alternate way to establish a GMP by breaking the project into phases or work packages and asking the CMR to generate individual GMPs for each phase or package. The final GMP becomes the sum of the individual GMPs plus any remaining project-level contingencies.

Contingency

The amount budgeted to cover costs that may result from incomplete design, unforeseen and unpredictable conditions, or uncertainties within the defined project scope. The amount of the contingency will depend on the status of design, procurement, and construction; and the complexity and uncertainties of the component parts of the project (DOE 1997).

2. Methodology

Special Experimental Projects Number 14 (SEP-14) was launched to allow the FHWA the ability to implement, on an experimental basis, various contracting practices suggested by DOTs (TRB 1991). Under SEP-14 and later laws allowing the use of alternative practices, agencies must request approval for use of the alternatives.

It has been stated that, “Quasi-public and government organizations predominately use the design-bid-build method, but clearly, many have tried other methods and most would consider either CM-at-risk or design-build to be the best-value alternatives. Changing the delivery methods used, in the case of these organizations, will often require changing laws and politics, but that is happening, too, because the public is best served when it gets the best value for its tax dollars.... CM-at-risk will likely become the more dominant delivery method for this group as long as the experience is positive (Doren 2005).”

In addition to the federal laws, DOTs must consider state and local laws pertaining to project delivery and contracting. To implement alternative project delivery methods, DOTs should establish methods of selecting projects that are appropriate for alternatives, such as CMR, and procedures for execution.

The FHWA Every Day Counts initiative is encouraging the use of delivery methods other than DBB by DOTs across the country. The Minnesota DOT (MnDOT) already has an established DB process in the toolbox and will likely benefit from a similar CM/GC process.

Working toward a process to use CM/GC, MnDOT is working with industry partners to support the passage of legislation in Minnesota to allow for CM/GC. To do this, MnDOT identified industry stakeholders to engage and address concerns and work through ideas about CM/GC as follows.

TASK 1: CM/GC TASK FORCE GROUP KICK-OFF

MnDOT identified key stakeholders to engage in the outreach process and held a meeting to identify issues of concern. The stakeholders include the Association of General Contractors of Minnesota (AGC of MN), the American Council of Engineering Companies (ACEC), contractors, designers, and MnDOT. The purpose of this meeting was to identify areas of concern and rank them in order of need for additional investigation and discussion.

This meeting identified 10 different general topic areas with a number of specific questions in each area (see Appendix A). The topics and questions were ranked for critical analysis.

TASK 2: ISSUE ANALYSIS

Based on the ranking of issues in Task 1, a critical analysis of the issues was completed and presented at a stakeholder meeting. The basis for the critical analysis includes information from the National Cooperative Highway Research Program (NCHRP) Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs, a content analysis of RFP/RFQ documents, and a questionnaire.

Five topics were identified originally, presented to the stakeholder group, and, then, developed into white papers, which are included at the end of this report:

- CM/GC Project Selection
- CM/GC Selection Process
- CM/GC Selection Requirements
- Subcontractors
- Cost Negotiations

Additional topics were identified later and developed into white papers, which are also included at the end of this report:

- Including Cost in the CM/GC Selection Process
- Design Contract Modifications
- Owner Process to Validate Cost
- Role of Independent Cost Estimator (ICE)
- Contractor Bid Process

NCHRP Synthesis 402 and Other Pertinent Literature Review

The researchers performed a review of NCHRP Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs and other literature written since the publication of the synthesis for guidance on the first five specific MnDOT topics.

RFP/RFQ Content Analysis

The researchers analyzed 30 RFP/ RFQ solicitation documents. Table 1 summarizes the states from which the documents were taken, the number of respective documents, and the years in which the solicitations were issued.

Table 1. Summary of RFP/RFQ Documents Analyzed

State	Documents (#)		Solicitation Year(s)
	RFP	RFQ	
Arizona		6	2005-2008
Colorado	1*	1*	2003-2007
Connecticut	1	–	2008
Florida	1	–	2006-2007
New York/New Jersey	–	1	2006
Oregon	2	–	2008
Tennessee	1	–	2008
Texas	2	1	2007-2009
Utah	11	3	2005-2008

* Combined RFQ + RFP

CM/GC Experience Questionnaire

A questionnaire structured specifically to answer MnDOT questions was sent to agencies in states that have used CM/GC:

- Seven total respondents
- Florida, Arizona, Colorado DOT (CDOT), Colorado FHWA, Central Federal Lands Highway Division (FHWA-CFLHD), Oregon DOT (ODOT), Utah DOT (UDOT), Michigan DOT (MDOT)
- One construction management company, one municipal government, one public transportation agency, four DOTs

Survey questions and responses are covered in the standalone white papers at the end of this report.

TASKS 3-5: FINALIZE WHITE PAPERS, DRAFT FINAL REPORT, FINAL REPORT

The white papers are finalized to be standalone documents. The white papers are also included in this report, comprising the remainder of this document after Appendix A.

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Appendix A. MnDOT CM/GC Investigation Topics and Questions

On October 10, 2011, members from MnDOT, the FHWA, AGC, Iowa State University, and the construction and consulting industries in Minnesota met to discuss the MnDOT path forward with the CM/GC project delivery methodology.

The result of this meeting is an extensive list of questions for Iowa State to possibly investigate (Table A.1). AGC of MN agreed to identify the top five issues for more detailed investigation and white papers for those five topics, and five additional topics identified later, complete this report.

Table A-1. Specific Questions Identified for 10 CM/GC Topic Areas

General Topic	Specific Questions
CM/GC Selection Process	<ul style="list-style-type: none"> • Relationships between CM/GC and owner, owner to public, need clarity and transparency in the selection process. • Specifically, how is the CM/GC chosen? • How do you make the procedures transparent? • Confine subjectivity of selection process. • Protest of selection?—are overhead and profit being put in the first contract, and are they being exposed? • With a shortlist, what becomes public? • What numbers, specifically, throughout the process are put out for public knowledge? • Open books—exposure of overhead and profit from P/T award? Is this included in bid for phase 2? Would it need to be audited? Do they go low and recoup in negotiation process?
CM/GC Selection Requirements	<ul style="list-style-type: none"> • Industry members do not want to be precluded from the selection process just because they do not have CM/GC listed on their resume. • If using a two-step selection process, what do they consider in Step 1 (RFQ) and in Step 2 (RFP)?
Requirements/ Specifications	<ul style="list-style-type: none"> • Negotiated standard specs? Federal clauses still apply, state administers. Is there a savings to DOT? Risk transfer? Exculpatory language? Evaluation of risk then assignment? • Are there new specs required when using CM/GC? • Federal Requirements—DBE sub—higher quote but still take and meet goal

General Topic	Specific Questions
Project Selection	<ul style="list-style-type: none"> • Can CM/GC only be used on high price projects? • How do you pick the project? • Where do other transportation agencies use CM/GC? • What are good candidate projects? • If using federal funds – how do you authorize the project? What hurdles have we faced? What have other states done on federally funded projects?
CM/GC-Designer Selection	<ul style="list-style-type: none"> • Would CM/GC have any say on the selection of the designer? • CM/GC or Designer role in selecting the other? • Hiring process for consultant?
Fees	<ul style="list-style-type: none"> • How do they assure that the fee for the first contract (preconstruction services) is adequate for the value of the risk? • How can we bring cost into the selection process? What are other states doing? Can we just have them bid overhead/profit on the proposed construction? • For the phase 1 P/T contract, how do we figure the contractor’s overhead? Their overhead is based on all of this heavy equipment, but the equipment won’t be used in Phase 1. Do other states cap the overhead/profit during phase 1?
Cost Negotiations	<ul style="list-style-type: none"> • Are subs precluded if GMP is not negotiated? • Is prime excluded if going DBB? • What are the procedures/rules for the negotiated estimate? • What is the cut off for GMP negotiations? Who selects ICE/what are the conditions of selection?, who shares what information in the GMP negotiating process? • Engineer’s Estimate: How have other state’s dealt with the federal regulation regarding confidentiality of the engineer’s estimate when they allow the CM/GC or third party independent estimator to see it. • We know UDOT is doing the ICE. But how does it work? What are other people doing to insure the agency is getting a fair/reasonable price?

General Topic	Specific Questions
Subcontractors	<ul style="list-style-type: none"> • How do you minimize “bid shopping”? • If there is a self-performance requirement, what all does this include? Does this include simple things such as signposts? • Do contracts between subs and GC change and how? • Who selects the subs and how? • Subcontractors feel like they will be giving their profit to the GC. (How does where the money go differ from CMR?) • Contractors have requested a min self-performing requirement in the legislation. But, what if we break out smaller packages (signal poles, early steel, removals) before the large package. The CM/GC won't be able to meet the min self-performing on the small project.
Legislative Issues	<ul style="list-style-type: none"> • Will the legislation limit the number of projects, maximum dollar amount of the projects, or the scope of the project? • GMP in legislation?
Topics Beyond Scope of Work	<ul style="list-style-type: none"> • Is more staff required to implement CM/GC? • Insurance change, in P/T stage? • How will MnDOT staff a CM/GC project? • How would the contractors have to change their business models? • How do they implement CM/GC from the industry view?

Appendix B. CM/GC Investigation White Papers

B-1. CM/GC Project Selection

The Minnesota Department of Transportation (MnDOT) requested services from the Construction Management and Technology (CMAT) program at Iowa State University to help with the process of obtaining enabling legislation and implementing the construction manager/general contractor (CM/GC) project delivery method. MnDOT identified key issues that needed further research. Iowa State used three methods to research the questions.

NCHRP Synthesis 402 and Other Pertinent Literature Review

The researchers performed a review of NCHRP Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs and other literature written since the publication of the synthesis for guidance on five specific MnDOT topics.

RFP/RFQ Content Analysis

The researchers analyzed 30 Request for Proposal (RFP)/Request for Qualifications (RFQ) solicitation documents. Table 1 summarizes the states from which the documents were taken, the number of respective documents, and the years in which the solicitations were issued.

Table B-1. Summary of RFP/RFQ Documents Analyzed

State	Documents (#)		Solicitation Year(s)
	RFP	RFQ	
Arizona		6	2005-2008
Colorado	1*	1*	2003-2007
Connecticut	1	–	2008
Florida	1	–	2006-2007
New York/New Jersey	–	1	2006
Oregon	2	–	2008
Tennessee	1	–	2008
Texas	2	1	2007-2009
Utah	11	3	2005-2008

* Combined RFQ + RFP

CM/GC Experience Questionnaire

A questionnaire structured specifically to answer MnDOT questions was sent to agencies in states that have used CM/GC:

- Seven total respondents
- Florida, Arizona, Colorado DOT (CDOT), Colorado Federal Highway Administration-Central Federal Lands Highway Division (FHWA-CFLHD), Oregon DOT (ODOT), Utah DOT (UDOT), Michigan DOT (MDOT)
- One construction management company, one municipal government, one public transportation agency, four DOTs

PROBLEM OVERVIEW

A concern when first implementing CM/GC is how to correctly choose to use CM/GC for a given project. There is a concern that CM/GC can only be used on high-priced projects. Furthermore, the actual logistics of who picks that project and how they come to the decision is something that needs to be investigated.

The factors considered in the decision and the most important aspects of the project are explained. In addition, examples of good candidate projects and places where other agencies use the CM/GC delivery method are provided.

NCHRP Synthesis 402 and Other Pertinent Literature Review

According to Gransberg and Shane (2010, 28), “The selection of a project delivery method for a particular project is dependent on a number of factors. These project factors may include:

- time constraints,
- flexibility needs,
- preconstruction services needs,
- design process interaction, and
- financial constraints (Gordon 1994).’

Furthermore, Alder (2007) states, “In general, DB will support large projects with little right of way or utility risk while CMGC is more useful for projects with right of way and utility concerns and where UDOT [Utah Department of Transportation] wants to control design and select innovative solutions that a contractor is not experienced with.”

As for the agency, factors to consider in whether the agency is prepared to use CM/GC state that the agency needs to consider the following (Gransberg and Shane 2010):

- Construction sophistication
- Current capabilities
- Risk aversion
- Restrictions on methods
- Other external factors (Gordon 1994)

Also, according to Touran et al. (2009), the following project level issues need to be considered to determine the right delivery method for any given project: “project size-complexity, cost, schedule, risk management, risk allocation, and LEED [Leadership in Energy and Environmental Design] certification.” Touran, et al. (2009) also noted that there are several agency-level issues that need to be considered, such as agency experience, staffing required, staff capability, agency goals and objectives, agency control of project, and third-party agreement.

RFP/RFQ Content Analysis

Although the reasons for choosing CM/GC are not always apparent in the solicitation documents, the one reason that did come up more than any other was to reduce/compress/accelerate the project delivery method, which appeared in five of the 30 documents.

This top reason was followed by project life cycle issues (maintenance/operations), which was stated in four of the 30 documents, and to promote value engineering, which was reported in three of the 30 documents.

CM/GC Experience Questionnaire

High price projects only?

- No. CM/GC has been used on projects as small as \$500,000.

Who picks the projects?

- Project manager
- Project manager consults with office leadership and client agency
- Upper management
- Project manager, region manager, corporate board
- Local offices identify potential innovative projects and submit them to a committee for review. The committee reviews each project and makes recommendations to leadership for final approval.

How do you pick the projects?

- No formal procedure, just look at project requirements and fit best delivery method to that particular procurement based on project needs and constraints
- Colorado uses the innovative delivery selection matrix developed in collaboration with CDOT and the University of Colorado in Boulder
- Michigan compiled an Innovative Construction Contracting Guide that provides guidance to Project Managers on several delivery options available for implementation on various projects

Factors to consider when deciding to use CM/GC?

- Budget, time, workforce, coordination, complexity
- Schedule, innovation, project complexity, cost, owner experience/availability, level of design, initial project risk assessment, level of oversight and control, competition and

contractor experience

- Constructability issues, bridge replacements, advanced purchase of materials to meet schedule, alternative means and method that may apply, project with schedule or budget constraints
- Third-party constraints (utilities, right-of-way, jurisdictions, regulators), opportunities for innovation and creativity, urgency for completion, firm cap on funding, need for flexibility during construction, need for risk management during construction
- The need for risk and innovation management; where contractor's construction experience could benefit the design; where there is a need to get started quickly; where the budget control is important; however you must pick the primary and secondary goal. You cannot maximize speed and budget. Flexibility—do you know what you want? Do you know what the local community wants? Do you need the flexibility to adjust the project in the design process? Control—you want to make the design decisions and not leave it to the contractors.
- Project type, complexity and risk profile

What aspects are the most important in selecting a CM/GC project?

- Is there sufficient in-house staff to manage the project effectively
- Is in-house staff open minded with alternative delivery value so as not to feel adversarial
- Does in-house staff have the technical expertise to manage the project or does this need to be outsourced to a CM/GC
- Is the design engineer open minded with alternative delivery value so as not to feel adversarial
- Are other agency departments ready for alternative delivery such as legal, procurement, inspections and risk management
- Size, type
- Innovation, risk, owner project management, schedule, scope, budget, and project goals
- Constructability issues, bridge replacements, advanced purchase of materials to meet schedule, alternative means and methods that may apply, project with schedule or budget constraints
- Opportunities for innovations, need for creativity, risk management opportunities, significant constructability issues
- Price can be an important consideration. Type and size does not matter.
- Project type, complexity and risk profile

Where do other agencies use CM/GC?

- Water/wastewater plants
- Storm drain
- Waterline replacement
- Sewer rehab
- Bridge replacement
- Roadway
- Electrical
- Freeway bridge over a scenic waterway bearing endangered species, with two cities and two parks immediately adjacent and multiple utility constraints

- A lot of structure projects
- Bridge repair project
- Train project in a sensitive environmental area
- Green field construction projects
- Urban reconstruction projects
- New technology projects using Accelerated Bridge Replacement
- Port authority building/wharf project
- Complex slope stability project

What are good candidate projects?

- Multi-phase projects that require intensive coordination with various stakeholders
- Projects with complexity and several time/material constraints
- Constructability issues
- Bridge replacements
- Advanced purchase of materials to meet schedule
- Alternative means and methods that may apply
- Project with schedule or budget constraints
- Projects with a fixed budget
- Those with difficult third-party constraints (utilities, right-of-way, jurisdictions, regulators) that are most effectively and efficiently worked out with the contractor as one of the collaborators
- Projects with challenging technical elements offering opportunities for innovation and creativity
- Projects with high urgency for completion
- Projects that will benefit from risk management during construction
- Complex projects with high risk, especially unknown risk
- Projects that require an emergency response
- Projects that need to start early
- Projects that would benefit from contractor knowledge and experience
- Projects where you are not sure of the design solution and contractor input could help
- Projects that are not mitigatable in a DB contract
- Projects that are complex and require contractor input prior to construction

SUMMARY

In general, someone with a high position in the agency decides the delivery method for a given project. Some factors to consider are budget, time, workforce, coordination, complexity, third-party constraints, and the need for risk management during construction. Furthermore, some examples of good CM/GC projects are multi-phase projects that require intensive coordination with various stakeholders, projects with constructability issues, projects with the need for advanced purchase of materials to meet schedule, and projects with challenging technical elements offering opportunities for innovation and creativity.

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B-2. CM/GC Selection Process

The Minnesota Department of Transportation (MnDOT) requested services from the Construction Management and Technology (CMAT) program at Iowa State University to help with the process of obtaining enabling legislation and implementing the construction manager/general contractor (CM/GC) project delivery method. MnDOT identified key issues that needed further research. Iowa State used three methods to research the questions.

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RFP/RFQ Content Analysis

The researchers analyzed 30 Request for Proposal (RFP)/Request for Qualifications (RFQ) solicitation documents. Table 1 summarizes the states from which the documents were taken, the number of respective documents, and the years in which the solicitations were issued.

Table B-2. Summary of RFP/RFQ Documents Analyzed

State	Documents (#)		Solicitation Year(s)
	RFP	RFQ	
Arizona		6	2005-2008
Colorado	1*	1*	2003-2007
Connecticut	1	–	2008
Florida	1	–	2006-2007
New York/New Jersey	–	1	2006
Oregon	2	–	2008
Tennessee	1	–	2008
Texas	2	1	2007-2009
Utah	11	3	2005-2008

* Combined RFQ + RFP

CM/GC Experience Questionnaire

A questionnaire structured specifically to answer MnDOT questions was sent to agencies in states that have used CM/GC:

- Seven total respondents
- Florida, Arizona, Colorado DOT (CDOT), Colorado Federal Highway Administration-Central Federal Lands Highway Division (FHWA-CFLHD), Oregon DOT (ODOT), Utah DOT (UDOT), Michigan DOT (MDOT)
- One construction management company, one municipal government, one public transportation agency, four DOTs

PROBLEM OVERVIEW

One major part of using the CM/GC project delivery method is choosing the CM/GC. MnDOT wants to know which types of solicitation documents are used when choosing the CM/GC.

Given this is a new delivery method in the state, MnDOT also wanted to know how to make the CM/GC selection process completely transparent so there is less questioning of the process. Along with this, they wanted to know how to confine the subjectivity of the selection process.

Furthermore, MnDOT wanted to know how members of the industry could protest if they were not the chosen CM/GC, when they thought they should have been.

Another issue of concern was whether or not the proposals will become public.

NCHRP Synthesis 402 and Other Pertinent Literature Review

In NCHRP Synthesis 402, Gransberg and Shane (2010, 48) state, “the owner publishes transparent prequalification criteria along with its procedures for using the input from contractor’s proposals in determining the outputs of the evaluations. This puts all the contractors on an even footing and makes the defense against a possible protest stronger. Second, once published, the owner follows its evaluation procedures to the letter, collecting documentation along the way to prove that the decisions made for the project flow directly from the published evaluation plan and its attendant criteria. Finally, the CMR [construction manager-at-risk] selection program is logical and the decisions that flow out of it are based on defensible logic.”

RFP/RFQ Content Analysis

From the content analysis of the solicitation documents, various preconstruction services are found. The most frequently stated are constructability reviews, preparing project estimates, preparing project schedules, value engineering, and design reviews. All of these services were requested by 50 percent or more of the documents.

Also in the content analysis, the researchers found 19 of the projects used RFPs and 11 used RFQs. Only one used a two-step process of an RFP + RFQ. In addition, 11 solicitation documents indicated that a shortlist would be generated, consisting of anywhere from two to five proposers. Twenty-eight reported that interviews would be held. Eighteen used price as a selection criterion.

The only consistent content provided by agencies was the description of the scope of work. However, there were many RFQ/RFP submittal requirements that appeared in 50 percent or more (at least 15) of the 30 documents, as shown in Table 2.

Table B-3. Top RFQ/RFP Submittal Requirements by Number of Times Appearing in the 30 Documents

Rank	Submittal Requirements	Documents (#)
1	Past CMR project experience	27
2	Organizational structure/chart	23
3/4	References from past projects	22
3/4	Qualifications of other key personnel	22
5	Past related project experience (non-CMR)	21
6	Adequate bonding capacity	15

CM/GC Experience Questionnaire

How is CM/GC chosen?

- RFP (5)
- Request for Letters of Interest (4)
- RFQ (3)
- RFQ + RFP (1)
- We use a request for proposal with prices on representative sample items. One project asked for profit and overhead costs for construction. We do not ask for fees because we are selecting the contractor as a consultant to help in design and asking for a fee is a violation of the Brooks act.
- The FHWA SEP-14 website has the work plan and draft RFQ
- Four out of seven agencies replied that they create a shortlist

How do you make the process transparent?

- Grading also becomes public record
- Results are sent to all competing firms. Selection record is kept on file.
- Non-disclosure agreements and conflict of interest forms, scoring rankings sent out to contractors, debriefings with required commenting by scoring panels
- By source selection authority above the contracting officer
- Unsuccessful proposers have opportunity to review the selection scoring and may request and receive a post-selection debrief from the agency
- The selection criteria are detailed in the RFP. We have a contractor as a voting member of

the selection team that is recommended by the Association of General Contractors. We have an American Consulting Engineers Council (ACEC) representative as a voting member. We debrief the contractors on the selection results. We make the technical portion of the winning contractor's proposal available for review.

- The owner's team meets and scores each proposal and provides comments on why scores were obtained. Debrief sessions can be requested also.

Will proposals become public?

- Made available after the successful CM is under contract
- Public
- Always confidential
- Confidential
- Confidential except for awarded proposal (after award)
- They are open to the public because the bid opening process goes through our PDDBS system that makes them open to the public
- Confidential until a project is awarded, then they can be FOIA'ed [Freedom of Information Act]

SUMMARY

CM/GC projects can use an RFQ, RFP, or a two-step RFQ + RFP. All methods have been used by various states. The most important part of the process is keeping the entire process transparent. Transparency can be accomplished in various ways, including releasing the grading scores to the public or having an AGC or ACEC member on the selection committee.

Keeping the process transparent is important so that the agency can defend its decision if needed. Whether or not the proposals become public is an individual state decision.

References

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B-3. CM/GC Selection Requirements

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* Combined RFQ + RFP

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PROBLEM OVERVIEW

Another major concern is what the requirements entail when selecting the CM/GC. Given CM/GC uses quality-based selection (QBS), the question of whether or not price will be considered comes up.

Furthermore, if price is used as one of the selection factors, how will it be evaluated? Will only unit bid items be evaluated, or will overhead and profit be included as well?

NCHRP Synthesis 402 and Other Pertinent Literature Review

The three basic selection models for choosing the project delivery method are the one-step qualifications-based construction manager-at-risk (CMR) model, the one-step best-value CMR selection model, and the two-step best-value CMR selection model.

For the synthesis, 82 different documents, case studies, interviews, or literature reviews were considered to determine which models were used the most frequently, and what each model entailed (Gransberg and Shane 2010).

- One-step qualifications-based CMR selection model: This method was used by 31 of the 82. Some of the common requirements of the Statement of Qualifications (SOQ) include the following:
 - “Qualifications of the CMR project manager
 - Past CMR project experience
 - Past related project experience (non-CMR)
 - References from past projects
 - Organizational structure/chart
 - Qualification of the CMR preconstruction services manager
 - Construction quality management plan
 - Declaration of self-performed work
 - Preliminary project schedule” (Gransberg and Shane 2010, 35)
- One-step best-value CMR selection model: This method is used by 36 of the 82 analyzed. Gransberg and Shane (2010, 36) state, “In this model, the competing CMR firms are asked to furnish their qualifications, proposed fees, and other technical information such as a conceptual schedule or manufactures’ catalog cuts for specific alternative technical concepts. The selection panel then evaluates the proposal and selects the winner using a best-value award algorithm that was published in the RFP.”

Some documents also asked for specific constructions costs. These include “cost of preparing and submitting the application for Leadership in Energy and Environmental Design (LEED)

certification. Others ask for mobilization costs and unit prices for a limited number of pay items” (Gransberg and Shane 2010, 36).

“The cost information contained in the proposal act as an owner’s risk mitigation tool to control total cost in GMP [guaranteed maximum price] negotiations by locking down the indirect costs and fees. Some agencies also lock down a few items of direct construction cost if it appears appropriate for their project. There are two major disadvantages of this model.

“First, agencies need to keep in mind that best-value is not low bid. However, the temptation to allow an unexpectedly low proposed cost to override the remainder of the evaluated criteria will be strong.

“Second, furnishing proposed costs demands that the project be developed to the point where reasonable number can be generated. This pushes CMR selection to appoint [sic] after design has begun, and reduces the opportunity for the CMR to add value through its input” (Gransberg and Shane 2010, 37).

- Two-step best-value CMR selection model: This model was used by 15 of the 82 analyzed. In this model, “the agency issues an RFQ and evaluates the qualifications of the respondents. It then develops a short list of the most qualified firms and invites the short listed competitors to submit a proposal in response to an RFP” (Gransberg and Shane 2010, 38). The proposal will include a pricing aspect.

“The cost-related portion of the proposal generally asks for the CMR’s proposed fees for preconstruction, construction, and sometimes its general conditions... [and] may also contain elements of construction direct costs. The competing contractors will need design information to generate proposed costs. Additionally, this model allows the agency to ask for possible design alternatives during the selection process and use that information to identify the best-value proposal” (Gransberg and Shane 2010, 38).

RFP/RFQ Content Analysis

In the content analysis, the researchers found that 19 of the projects used RFPs and 11 used RFQs. Only one used a two-step process of RFQ + RFP. Also, 11 solicitation documents indicated that a shortlist would be generated, consisting of anywhere from two to five proposers. Twenty-eight reported that interviews would be held. Eighteen used price as a selection criterion.

CM/GC Experience Questionnaire

How is CM/GC chosen?

- RFP (5)
- Request for Letters of Interest (4)
- RFQ (3)
- RFQ + RFP (1)

- We use a request for proposal with prices on representative sample items. One project asked for profit and overhead costs for construction. We do not ask for fees because we are selecting the contractor as a consultant to help in design and asking for a fee is a violation of the Brooks act.
- The FHWA SEP-14 website has the work plan and draft RFQ
- Four out of seven agencies replied that they create a shortlist

SUMMARY

CM/GC projects can use an RFQ, RFP, or a two-step RFQ + RFP. All methods have been used by various states. In addition, if price is a component of the selection process, the agency can ask for a number of prices such as mobilization costs or unit prices for a limited number of pay items.

References

Gransberg, D. D., and Shane, J. S. (2010). *NCHRP Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs*. Transportation Research Board, National Research Council. pp. 35-38.

B-4. Subcontractors

The Minnesota Department of Transportation (MnDOT) requested services from the Construction Management and Technology (CMAT) program at Iowa State University to help with the process of obtaining enabling legislation and implementing the construction manager/general contractor (CM/GC) project delivery method. MnDOT identified key issues that needed further research. Iowa State used three methods to research the questions.

NCHRP Synthesis 402 and Other Pertinent Literature Review

The researchers performed a review of NCHRP Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs and other literature written since the publication of the synthesis for guidance on five specific MnDOT topics.

RFP/RFQ Content Analysis

The researchers analyzed 30 Request for Proposal (RFP)/Request for Qualifications (RFQ) solicitation documents. Table 1 summarizes the states from which the documents were taken, the number of respective documents, and the years in which the solicitations were issued.

Table B-5. Summary of RFP/RFQ Documents Analyzed

State	Documents (#)		Solicitation Year(s)
	RFP	RFQ	
Arizona		6	2005-2008
Colorado	1*	1*	2003-2007
Connecticut	1	–	2008
Florida	1	–	2006-2007
New York/New Jersey	–	1	2006
Oregon	2	–	2008
Tennessee	1	–	2008
Texas	2	1	2007-2009
Utah	11	3	2005-2008

* Combined RFQ + RFP

CM/GC Experience Questionnaire

A questionnaire structured specifically to answer MnDOT questions was sent to agencies in states that have used CM/GC:

- Seven total respondents
- Florida, Arizona, Colorado DOT (CDOT), Colorado Federal Highway Administration-Central Federal Lands Highway Division (FHWA-CFLHD), Oregon DOT (ODOT), Utah DOT (UDOT), Michigan DOT (MDOT)
- One construction management company, one municipal government, one public transportation agency, four DOTs

PROBLEM OVERVIEW

A major area of concern is how subcontractors are dealt with throughout the CM/GC process. One such concern is whether or not the subcontractors who gave quotes to the prime contractor are precluded from participating in the project if the prime contractor that is hired for preconstruction services is not contracted for the construction services.

Another concern was that bid shopping would occur if CM/GC project delivery was used, and how could it be minimized.

MnDOT also wanted to know who selects the subcontractors, how the subcontractors are selected, and any other restrictions on the selection of subcontractors.

Finally, some of the contractors were concerned about whether or not the contracts between the prime contractors and the subcontractors change.

NCHRP Synthesis 402 and Other Pertinent Literature Review

Gransberg and Shane (2010, 68) state, “owners who select CMR [construction manager-at-risk] project delivery to control costs can allow their CMR the ability to select the subcontractors that it prefers. This is concluded for three reasons:

- To get real-time pricing information, the CMR is able to communicate with the subcontractors it knows during preconstruction.
- To obtain real-time technical information about best practices for subcontractor trade means and methods, the CMR is also able to communicate with the subcontractors it knows to be subject matter experts during preconstruction.
- Studies have shown that competitive pricing is ‘preserved’ without competitive bidding. Therefore, requiring the CMR to award subcontractor work packages to an open field of competitors does not appear to save money.”

RFP/RFQ Content Analysis

According to the content analysis, 10 of the 30 solicitation documents required that the proposer submit a subcontracting plan in their proposal. One asked for a list of proposed subcontractors. Three stated that the CMR is free to choose its own subcontractors, while another three stated that the CMR is required to accept bids. The remainder were silent on this issue.

CM/GC Experience Questionnaire

Are subs precluded if GMP is not negotiated?

The subcontractors are not precluded if a guaranteed maximum price (GMP) is not negotiated. The subs may choose to partner with another prime if this happens.

How do you minimize bid shopping?

Bid shopping is not perceived by any respondents in this survey. The behavior of the prime with regard to subs is the same as with any traditional DBB project. Bid shopping is minimized by the following:

- Selecting a CM/GC on qualifications and not price
- Having an open cost model
- Development of a subcontractor plan during the design phase
- Contractor requirement to use subs that have been signed to a contract; owner gets copy of signed subcontract
- Switching subs after bid award not allowed without agency approval

However, if bid shopping were to occur, some states reported that the state procurement laws would apply, and another replied that the owner retains the decision control over the project, so the decision would be up to the owner.

Who selects subs and how?

In every response, the CM/GC selects the subcontractors.

- Two of the states required that the contractors provide a subcontractor selection plan either in their proposals or during the design phase.
- Another state said, “a CM/GC may not subcontract out any portion of the work without agency’s prior written consent.” The agency also retains the right to audit and monitor the subcontracting process to protect the agency’s interest.
- Some states require that all subcontractors are firm-fixed price, low price, but the CM/GC can prequalify bidders.
- Most respondents said the subcontractors are selected by the CM/GC, and the subcontractors’ books must be open.
- One agency requires that the bidding is open to all subcontractors, and the prime must take the lowest bid.

SUMMARY

Regardless of whether or not the prime is allowed to bid on a project if it goes out to the open market, the different states each reported that the subcontractors are still able to be involved in the project. Bid shopping was not recognized by any state. Every state reported that the CM/GC is allowed to choose the subcontractors. However, all states had different restrictions on the CM/GC.

References

Gransberg, D. D., and Shane, J. S. (2010). *NCHRP Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs*. Transportation Research Board, National Research Council. pp. 68.

B-5. Cost Negotiations

The Minnesota Department of Transportation (MnDOT) requested services from the Construction Management and Technology (CMAT) program at Iowa State University to help with the process of obtaining enabling legislation and implementing the construction manager/general contractor (CM/GC) project delivery method. MnDOT identified key issues that needed further research. Iowa State used three methods to research the questions.

NCHRP Synthesis 402 and Other Pertinent Literature Review

The researchers performed a review of NCHRP Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs and other literature written since the publication of the synthesis for guidance on five specific MnDOT topics.

RFP/RFQ Content Analysis

The researchers analyzed 30 Request for Proposal (RFP)/Request for Qualifications (RFQ) solicitation documents. Table 1 summarizes the states from which the documents were taken, the number of respective documents, and the years in which the solicitations were issued.

Table B-6. Summary of RFP/RFQ Documents Analyzed

State	Documents (#)		Solicitation Year(s)
	RFP	RFQ	
Arizona	–	6	2005-2008
Colorado	1*	1*	2003-2007
Connecticut	1	–	2008
Florida	1	–	2006-2007
New York/New Jersey	–	1	2006
Oregon	2	–	2008
Tennessee	1	–	2008
Texas	2	1	2007-2009
Utah	11	3	2005-2008

* Combined RFQ + RFP

CM/GC Experience Questionnaire

A questionnaire structured specifically to answer MnDOT questions was sent to agencies in states that have used CM/GC:

- Seven total respondents
- Florida, Arizona, Colorado DOT (CDOT), Colorado Federal Highway Administration-Central Federal Lands Highway Division (FHWA-CFLHD), Oregon DOT (ODOT), Utah DOT (UDOT), Michigan DOT (MDOT)
- One construction management company, one municipal government, one public transportation agency, four DOTs

PROBLEM OVERVIEW

An important part of using CM/GC is knowing how to handle the pricing of the project. Since the CM/GC is chosen prior to completed design, a different approach is needed than typical design-bid-build (DBB) projects

In addition, since the CM/GC is involved early on in the project under the preconstruction contract, there is a possibility that the contractor will not be hired on under the construction contract. Therefore, many issues arise such as whether or not subcontractors can be involved in the project if the CM/GC has used information from these subcontractors and does not win the construction award.

Another concern is whether or not the prime can then bid on the project if it is out for open bids.

Many agencies use a guaranteed maximum price (GMP) when negotiating prices with the CM/GC. There is an issue as to how long to allow negotiations to take place and when is the cut-off for the GMP negotiations.

Many states use an Independent Cost Estimator's (ICE) and Engineer's estimate to determine if the contractor is providing a fair price for the project or proposed pieces of the project. Some points of question on this topic include who selects the ICE and what are the criteria for the selection?

Furthermore, with three estimates, there is a question as to who gets to see which estimates. If an agency did not use an ICE, they were asked what other method they used to ensure they were getting a fair price on the project.

NCHRP Synthesis 402 and Other Pertinent Literature Review

Gransberg and Shane (2010, 75) noted that "of all the agencies interviewed, only one had ever had that experience [owner and the construction manager-at-risk/CMR unable to negotiate a final GMP]. Its solution was to complete the design and advertise the project as a DBB project."

Another option would be to use the method used by Pinal County, Florida and "open negotiations with the contractor who was ranked second by the selection panel" (Gransberg and Shane 2010, 75).

RFP/RFQ Content Analysis

According to the content analysis, six of the 30 solicitation documents stated that the GMP was negotiated after 100 percent design. Only three stated that this would occur before 100 percent design.

Three solicitation documents stated that the CMR is free to pick and choose its own subcontractors, while another three stated that the CMR is required to accept bids. The rest were silent on this issue.

CM/GC Experience Questionnaire

Can subs be involved after a GMP is not negotiated?

- Yes
- Yes because they would not have a contract directly with the agency, or the CM
- It is not explicitly stated in the contract, but may be clarified in the termination document
- Yes, but they may pick another prime to partner with

Is prime excluded if going DBB?

- Depends on agency procurement's SOP [standard operating procedures]
- No. GC will not be allowed to be the prime on the project. May be a subcontractor though.
- Yes
- Not explicitly stated in contract. That may be clarified in the termination document.
- We have decided we would let the contractor bid on a project that went to commutative bid. We would be curious to see what they would do; hold their price or lower it.
- Yes, this can verify their price was reasonable.

What is the cut-off for GMP negotiations?

- Shortly after selection and acceptance of most qualified bidders for each scope of service
- When no agreement can be reached on the cost
- Three tries
- Agency discretion
- When the contracting offeror cannot make the determination that the proposed price is fair and reasonable based on many factors
- The second bid opening
- If the CM/GC's price is greater than 10 percent of the owner's or ICE's estimate.

When will no more negotiations take place?

- After GMP proposal is submitted
- When we feel that the CM/GC will not budge on their costs and we do not feel that the costs are reasonable
- After three openings and negotiations
- Agency discretion
- When the contracting offeror cannot make the determination that the proposed price is fair and reasonable based on many factors; usually give the offeror the opportunity for a best and final offer

- After the second bid opening if the total price does not meet our expectations we put the project out for open competition. We have not done that for any project but have come very close on some.
- When a price cannot be reached that is within 10 percent of the owner's or ICE's estimate

Independent cost estimator?

Overview of Utah's cost validation: We look at the CM/GC's proposed price and validate the cost against the ICE, the Engineers Estimate, and the prices they gave us for selected items offered in their original proposal. They give us a projected cost in their original proposal. It is called a cost model. This model is updated as the design progresses. They know what the Engineers Estimate is at any time in the design process. We have measurement and payment meetings so they know what is included in each line item as the details in the cost model evolve from a projected cost to a bid list with all items identified to include quantities, which they have evaluated and verified. On larger projects, we do what we call a blind bid opening where they know if they are within 10 percent of the ICE for every line item. When we find large variances, we go through more measurement and payment discussion so that everyone knows what is included in each line item.

Who selects the ICE?

- CDOT HQ is selecting an ICE independently
- Serve as the ICE
- Agency project team selects the ICE
- Program manager
- Owner's team

What are the criteria for the selection?

- RFP
- Competitive process will be established that will select based on demonstrated appropriate experience and proposed approach to supporting the agency in achieving the negotiating goals
- They are prequalified on a pool contract for constructability services
- Experience on similar work

Who can see CM/GC's estimate?

- Owner and designer, engineer estimator
- All three
- Everyone
- Anyone. We want open prices during design. We need to know how design decisions are affecting price and that we can stay in budget.
- Owner and owner's consultant

Who can see the designer's estimate?

- Everyone
- All three
- Everyone
- Anyone. We want open prices during design. We want the CM/GC contractor to know what we think it will cost. We want a discussion of our cost expectations with the contractor. We want the contractor to tell us why something may cost more and know why. We want an opportunity to find a less costly solution. And we need to know how design decisions are affecting price so we can stay in budget.
- CMGC, owner

Who can see the ICE's estimate?

- Everyone
- All three
- Everyone
- No one. To provide an element of competition.
- Owner

Why do these parties not get to see these numbers?

- These are for checks and balances. In CM/GC, we negotiate assumptions and risk, never prices.
- We want an independent estimate for comparison
- To ensure independent estimate is truly independent

What kind of involvement does the ICE have in the negotiations? Does the ICE get to sit in on the meetings between the owner, designer, and CM/GC?

- ICE can be involved but cannot actively share their prices. This is optional and up to the project manager.
- In our case, we lead the negotiations
- Yes
- The ICE is involved in the design. We get great construction ideas from them. They help keep the contractor honest about production rates and means and methods. The ICE goes to the bid openings with us. First, we meet without the contractor and review his bid price. We evaluate the variances and formulate specific questions for them to answer when we discuss the bid opening results with them.
- Minimal, No.

What do you use besides an ICE?

- Other bid prices for similar work, geographic location, project requirements and constraints, labor, materials, OH [overhead] and profit rates typical for this type of work and location

SUMMARY

In some states, the prime is excluded if the project goes out to open bid, but not in all states. The number of times the prices will be negotiated is different for each state. Most states use ICE to validate prices. Each state has their own system for which parties can view which estimates.

References

Gransberg, D. D., and Shane, J. S. (2010). *NCHRP Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs*. Transportation Research Board, National Research Council. pp. 2, 51-64, 75.

B-6. Including Cost in the CM/GC Selection Process

The Minnesota Department of Transportation (MnDOT) requested services from the Construction Management and Technology (CMAT) program at Iowa State University to help with the process of obtaining enabling legislation and implementing the construction manager/general contractor (CM/GC) project delivery method. MnDOT identified key issues that needed further research. Iowa State used three methods to research the questions.

NCHRP Synthesis 402 and Other Pertinent Literature Review

The researchers performed a review of NCHRP Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs and other literature written since the publication of the synthesis for guidance on five specific MnDOT topics.

RFP/RFQ Content Analysis

The researchers analyzed 30 Request for Proposal (RFP)/Request for Qualifications (RFQ) solicitation documents. Table 1 summarizes the states from which the documents were taken, the number of respective documents, and the years in which the solicitations were issued.

Table B-7. Summary of RFP/RFQ Documents Analyzed

State	Documents (#)		Solicitation Year(s)
	RFP	RFQ	
Arizona		6	2005-2008
Colorado	1*	1*	2003-2007
Connecticut	1	–	2008
Florida	1	–	2006-2007
New York/New Jersey	–	1	2006
Oregon	2	–	2008
Tennessee	1	–	2008
Texas	2	1	2007-2009
Utah	11	3	2005-2008

* Combined RFQ + RFP

CM/GC Experience Questionnaire

A questionnaire structured specifically to answer MnDOT questions was sent to agencies in states that have used CM/GC:

- Seven total respondents
- Florida, Arizona, Colorado DOT (CDOT), Colorado Federal Highway Administration-Central Federal Lands Highway Division (FHWA-CFLHD), Oregon DOT (ODOT), Utah DOT (UDOT), Michigan DOT (MDOT)
- One construction management company, one municipal government, one public transportation agency, four DOTs

PROBLEM OVERVIEW

A common problem for agencies when first initiating CM/GC is determining how to get a price from the contractor without a defined scope. MnDOT wants to know how other owners address this problem.

NCHRP Synthesis 402 and Other Pertinent Literature Review

The three basic selection models for choosing the project delivery method are the one-step qualifications-based construction manager-at-risk (CMR) model, the one-step best-value CMR selection model, and the two-step best-value CMR selection model.

For the synthesis, 82 different documents, case studies, interviews, or literature reviews were considered to determine which models were used the most frequently, and what each model entailed (Gransberg and Shane 2010).

- One-step qualifications-based CMR selection model: This method was used by 31 of the 82. Some of the common requirements of the Statement of Qualifications (SOQ) include the following:
 - “Qualifications of the CMR project manager
 - Past CMR project experience
 - Past related project experience (non-CMR)
 - References from past projects
 - Organizational structure/chart
 - Qualification of the CMR preconstruction services manager
 - Construction quality management plan
 - Declaration of self-performed work
 - Preliminary project schedule” (Gransberg and Shane 2010, 35)
- One-step best-value CMR selection model: This method is used by 36 of the 82 analyzed. Gransberg and Shane (2010, 36) state, “In this model, the competing CMR firms are asked to furnish their qualifications, proposed fees, and other technical information such as a conceptual schedule or manufactures’ catalog cuts for specific alternative technical concepts. The selection panel then evaluates the proposal and selects the winner using a best-value award algorithm that was published in the RFP.”

Some documents also asked for specific constructions costs. These include “cost of preparing and submitting the application for Leadership in Energy and Environmental Design (LEED) certification. Others ask for mobilization costs and unit prices for a limited number of pay items” (Gransberg and Shane 2010, 36).

“The cost information contained in the proposal act as an owner’s risk mitigation tool to control total cost in GMP [guaranteed maximum price] negotiations by locking down the indirect costs and fees. Some agencies also lock down a few items of direct construction cost if it appears appropriate for their project. There are two major disadvantages of this model.

“First, agencies need to keep in mind that best-value is not low bid. However, the temptation to allow an unexpectedly low proposed cost to override the remainder of the evaluated criteria will be strong.

“Second, furnishing proposed costs demands that the project be developed to the point where reasonable number can be generated. This pushes CMR selection to appoint [sic] after design has begun, and reduces the opportunity for the CMR to add value through its input” (Gransberg and Shane 2010, 37).

- Two-step best-value CMR selection model: This model was used by 15 of the 82 analyzed. In this model, “the agency issues an RFQ and evaluates the qualifications of the respondents. It then develops a short list of the most qualified firms and invites the short listed competitors to submit a proposal in response to an RFP” (Gransberg and Shane 2010, 38). The proposal will include a pricing aspect.

“The cost-related portion of the proposal generally asks for the CMR’s proposed fees for preconstruction, construction, and sometimes its general conditions... [and] may also contain elements of construction direct costs. The competing contractors will need design information to generate proposed costs. Additionally, this model allows the agency to ask for possible design alternatives during the selection process and use that information to identify the best-value proposal” (Gransberg and Shane 2010, 38).

RFP/RFQ Content Analysis

Through the content analysis, the researchers found that 19 projects used only an RFP, which by definition includes a price component. In addition, one project used a two-step process of an RFQ and an RFP. This topic was chosen after the content analysis was completed, so further analysis was not completed.

CM/GC Experience Questionnaire

This topic was selected for investigation after the questionnaire was distributed and returned, so it was not addressed specifically through this method. However, the researchers found that five of the seven questionnaire respondents used RFPs (and RFPs include a price component by definition), and one used a combination RFQ and RFP.

SUMMARY

Owners are using price as a component in the selection of a CM/GC on these projects. This may be done through a single-step RFP or in a multiple-step situation. Between these two, it appears that the single step is used most often.

References

Gransberg, D. D., and Shane, J. S. (2010). *NCHRP Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs*. Transportation Research Board, National Research Council. pp. 48.

B-7. Design Contract Modifications

The Minnesota Department of Transportation (MnDOT) requested services from the Construction Management and Technology (CMAT) program at Iowa State University to help with the process of obtaining enabling legislation and implementing the construction manager/general contractor (CM/GC) project delivery method. MnDOT identified key issues that needed further research. Iowa State used three methods to research the questions.

NCHRP Synthesis 402 and Other Pertinent Literature Review

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RFP/RFQ Content Analysis

The researchers analyzed 30 Request for Proposal (RFP)/Request for Qualifications (RFQ) solicitation documents. Table 1 summarizes the states from which the documents were taken, the number of respective documents, and the years in which the solicitations were issued.

Table B-8. Summary of RFP/RFQ Documents Analyzed

State	Documents (#)		Solicitation Year(s)
	RFP	RFQ	
Arizona	–	6	2005-2008
Colorado	1*	1*	2003-2007
Connecticut	1	–	2008
Florida	1	–	2006-2007
New York/New Jersey	–	1	2006
Oregon	2	–	2008
Tennessee	1	–	2008
Texas	2	1	2007-2009
Utah	11	3	2005-2008

* Combined RFQ + RFP

CM/GC Experience Questionnaire

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- Seven total respondents
- Florida, Arizona, Colorado DOT (CDOT), Colorado Federal Highway Administration-Central Federal Lands Highway Division (FHWA-CFLHD), Oregon DOT (ODOT), Utah DOT (UDOT), Michigan DOT (MDOT)
- One construction management company, one municipal government, one public transportation agency, four DOTs

PROBLEM OVERVIEW

A common issue with the implementation of CM/GC is how to change the design contracts to reflect early contractor involvement in the design process. One concern is the clauses to add to the design contracts. Another is how this changes the selection process.

NCHRP Synthesis 402 and Other Pertinent Literature Review

Gransberg and Shane state that “both the CMR [construction manager-at-risk] preconstruction services contract and the engineering design contract have language that makes ‘coordination/collaboration among team members’ an explicit contractual requirement” (Gransberg and Shane 2010).

Furthermore, one of the case studies performed added a “clause in their design contract that puts 10 percent of the design fee at risk for the quality of the construction documents (measured by the number of design changes made during construction owing to errors and omissions)” (Gransberg and Shane 2010).

Table 2 (reprinted from the synthesis) summarizes the number of times a modification was made to a design contract.

Table B-9. Design Contract Modifications to Accommodate CMR Project Delivery

DBB Design Contract Modification	Number (out of 8)
Coordination of design packages with construction bid packages	6
Joint coordination with third parties during design	6
Facilitate CMR design reviews	5
Joint value engineering with CMR	5
Design milestones specified to match preconstruction services	4
Mandatory budget review points	3
Requirement to respond to CMR comments and incorporate as appropriate	2
Requirement to notify CMR of major design changes	2
Allow the CMR to assist in material selection decisions based on market surveys	2
Design in accordance with CMR designated means and methods	2
Pass design changes through CMR for cost/schedule impact validation	1
Over-the-shoulder review of construction submittals with trade subs	1
Expedited review of construction submittals at CMR's request	1
Design fee at risk for design quality	1
Collaborate with CMR on cost model development	1
Participate in joint scheduling conference	1
Collaborate with CMR to define required right-of-way	1
Provide CMR design products to facilitate CMR-obtained permitting	1
Furnish graphic design support to CMR public relations effort	1
Joint planning and participation in public outreach meetings	1

RFP/RFQ Content Analysis

Design contract modifications were not reviewed in the content analysis.

CM/GC Experience Questionnaire

This topic was selected for investigation after the questionnaire was distributed and returned, so it was not addressed through this method.

SUMMARY

There is a need to modify the design contract to encourage collaboration and a working relationship between the designer and the CM. This collaboration and relationship is accomplished through different methods involving fees and contract language.

References

Gransberg, D. D., and Shane, J. S. (2010). *NCHRP Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs*. Transportation Research Board, National Research Council. pp. 15.

B-8. Owner Process to Validate Cost

The Minnesota Department of Transportation (MnDOT) requested services from the Construction Management and Technology (CMAT) program at Iowa State University to help with the process of obtaining enabling legislation and implementing the construction manager/general contractor (CM/GC) project delivery method. MnDOT identified key issues that needed further research. Iowa State used three methods to research the questions.

NCHRP Synthesis 402 and Other Pertinent Literature Review

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RFP/RFQ Content Analysis

The researchers analyzed 30 Request for Proposal (RFP)/Request for Qualifications (RFQ) solicitation documents. Table 1 summarizes the states from which the documents were taken, the number of respective documents, and the years in which the solicitations were issued.

Table B-10. Summary of RFP/RFQ Documents Analyzed

State	Documents (#)		Solicitation Year(s)
	RFP	RFQ	
Arizona		6	2005-2008
Colorado	1*	1*	2003-2007
Connecticut	1	–	2008
Florida	1	–	2006-2007
New York/New Jersey	–	1	2006
Oregon	2	–	2008
Tennessee	1	–	2008
Texas	2	1	2007-2009
Utah	11	3	2005-2008

* Combined RFQ + RFP

CM/GC Experience Questionnaire

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- One construction management company, one municipal government, one public transportation agency, four DOTs

PROBLEM OVERVIEW

One concern with implementing CM/GC is validating the cost of the project. Specifically, how can the owner validate that the cost is in the public's best interest? In addition, there is a question of how the process of negotiation works, and what information the contractor needs to share with the owner.

NCHRP Synthesis 402 and Other Pertinent Literature Review

Gransberg and Shane (2010) identified a model of the costs involved in a CM/GC project that can "be used to validate the owner's project budget at a point where design effort is not lost and where the CMR [construction manager-at-risk] can furnish up-to-date market information," as shown in Figure B-1.

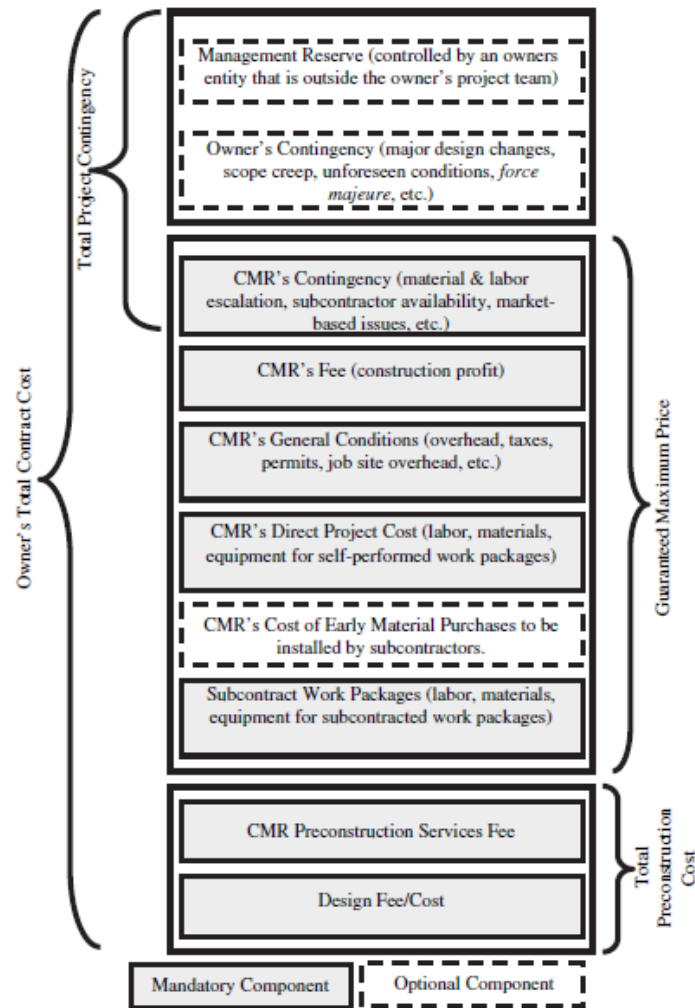


Figure B-1. Guaranteed Maximum Price Model (Gransberg and Shane 2010)

In addition, rather than only validating the cost provided by the CM/GC, the CM/GC can be used to validate the owner’s proposed budget (Ladino et al. 2008).

In the case studies completed by Gransberg and Shane (2010), four of the seven projects had the CM/GC validate the agency estimates during the preconstruction services portion of the project.

RFP/RFQ Content Analysis

This topic was chosen after the content analysis for this investigation was completed, so further analysis was not completed.

CM/GC Experience Questionnaire

What do you use to verify the CM/GC’s cost estimate?

- Engineer’s estimate and independent cost estimator
- Other bid prices for similar work, geographic location, project requirements and constraints, labor, materials, OH [overhead] and profit rates typical for this type of work and location

- Oregon uses an ICE [independent cost estimator]. Participates in negotiation sessions with the CM/GC.
- We look at their proposed price and validate the cost against the ICE, the Engineers Estimate, and the prices they gave us for selected items offered in their original proposal. They give us a projected cost in their original proposal. It is called a cost model. This model is updated as the design progresses. They know what the Engineers Estimate is at any time in the design process. We have measurement and payment meetings so they know what is included in each line item as the details in the cost model evolve from a projected cost to a bid list with all items identified to include quantities, which they have evaluated and verified. On larger projects, we do what we call a blind bid opening where they know if they are within 10 percent of the ICE for every line item. When we find large variances, we go through more measurement and payment discussion so that everyone knows what is included in each line item.
- Department Engineers Estimate and an ICE

What are your procedures for validation?

- Compare with similar projects
- Both the ICE and Engineer are involved from the beginning and the ICE is never shown to the contractor
- The independent estimator participates in negotiation sessions with the CM/GC
- We look at their proposed price and validate the cost against the ICE, the Engineers Estimate, and the prices they gave us for selected items offered in their original proposal. They give us a projected cost in their original proposal. It is called a cost model. This model is updated as the design progresses. They know what the Engineers Estimate is at any time in the design process. We have measurement and payment meetings so they know what is included in each line item as the details in the cost model evolve from a projected cost to a bid list with all items identified to include quantities, which they have evaluated and verified. On larger projects, we do what we call a blind bid opening where they know if they are within 10 percent of the ICE for every line item. When we find large variances, we go through more measurement and payment discussion so that everyone knows what is included in each line item.
- None formally established

What do you use besides an ICE?

- Other bid prices for similar work, geographical location, project requirements and constraints, labor, materials, OH and profit rates typical for this type of work and location.

SUMMARY

There are several different considerations in cost validation. The first consideration is that not only does the CM/GC's proposal need to be validated, but so does the owner's budget. Different methods can be used to accomplish these two tasks. The CM/GC can be used to validate the owner's budget. An ICE can be used to validate both the CM/GC and the owner.

References

- Gransberg, D. D., and Shane, J. S. (2010). *NCHRP Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs*. Transportation Research Board, National Research Council.
- Ladino, M. J., K. A. Reedy, and J. E. Carlson, “Alternative Project Delivery in Horizontal Construction,” presentation, Annual Meeting, Associated General Contractors of America, Las Vegas, Nevada, March 2008, 25 pp.

B-9. Role of the Independent Cost Estimator (ICE)

The Minnesota Department of Transportation (MnDOT) requested services from the Construction Management and Technology (CMAT) program at Iowa State University to help with the process of obtaining enabling legislation and implementing the construction manager/general contractor (CM/GC) project delivery method. MnDOT identified key issues that needed further research. Iowa State used three methods to research the questions.

NCHRP Synthesis 402 and Other Pertinent Literature Review

The researchers performed a review of NCHRP Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs and other literature written since the publication of the synthesis for guidance on five specific MnDOT topics.

RFP/RFQ Content Analysis

The researchers analyzed 30 Request for Proposal (RFP)/Request for Qualifications (RFQ) solicitation documents. Table 1 summarizes the states from which the documents were taken, the number of respective documents, and the years in which the solicitations were issued.

Table B-11. Summary of RFP/RFQ Documents Analyzed

State	Documents (#)		Solicitation Year(s)
	RFP	RFQ	
Arizona		6	2005-2008
Colorado	1*	1*	2003-2007
Connecticut	1	–	2008
Florida	1	–	2006-2007
New York/New Jersey	–	1	2006
Oregon	2	–	2008
Tennessee	1	–	2008
Texas	2	1	2007-2009
Utah	11	3	2005-2008

* Combined RFQ + RFP

CM/GC Experience Questionnaire

A questionnaire structured specifically to answer MnDOT questions was sent to agencies in states that have used CM/GC:

- Seven total respondents
- Florida, Arizona, Colorado DOT (CDOT), Colorado Federal Highway Administration-Central Federal Lands Highway Division (FHWA-CFLHD), Oregon DOT (ODOT), Utah DOT (UDOT), Michigan DOT (MDOT)
- One construction management company, one municipal government, one public transportation agency, four DOTs

PROBLEM OVERVIEW

Several agencies choose to use an Independent Cost Estimator (ICE) to validate costs, so an explanation of the ICE process is needed.

NCHRP Synthesis 402 and Other Pertinent Literature Review

Gransberg and Shane (2010) recognize the Utah Department of Transportation (UDOT) as using an ICE, beginning very early in the project development process, but do not address the role of the ICE in detail.

RFP/RFQ Content Analysis

This topic was chosen after the content analysis for this project was completed, so further analysis was not completed. However, the ICE role was likely not addressed in these documents.

CM/GC Experience Questionnaire

Independent cost estimator?

Overview of Utah's cost validation: We look at the CM/GC's proposed price and validate the cost against the ICE, the Engineers Estimate, and the prices they gave us for selected items offered in their original proposal. They give us a projected cost in their original proposal. It is called a cost model. This model is updated as the design progresses. They know what the Engineers Estimate is at any time in the design process. We have measurement and payment meetings so they know what is included in each line item as the details in the cost model evolve from a projected cost to a bid list with all items identified to include quantities, which they have evaluated and verified. On larger projects, we do what we call a blind bid opening where they know if they are within 10 percent of the ICE for every line item. When we find large variances, we go through more measurement and payment discussion so that everyone knows what is included in each line item.

Who selects the ICE?

- CDOT HQ is selecting an ICE independently
- Serve as the ICE
- Agency project team selects the ICE
- Program manager
- Owner's team

What are the criteria for the selection?

- RFP
- Competitive process will be establish that will select based on demonstrated appropriate experience and proposed approach to supporting the agency in achieving the negotiating goals
- They are prequalified on a pool contract for constructability services
- Experience on similar work

Who can see CM/GC's estimate?

- Owner and designer, engineer estimator
- All three
- Everyone
- Anyone. We want open prices during design. We need to know how design decisions are affecting price and that we can stay in budget.
- Owner and owners consultant

Who can see the designer's estimate?

- Everyone
- All three
- Everyone
- Anyone. We want open prices during design. We want the CM/GC contractor to know what we think it will cost. We want a discussion of our cost expectations with the contractor. We want the contractor to tell us why something may cost more and know why. We want an opportunity to find a less costly solution. And we need to know how design decisions are affecting price so we can stay in budget.
- CMGC, owner

Who can see the ICE's estimate?

- Everyone
- All three
- Everyone
- No one. To provide an element of competition.
- Owner

Why do these parties not get to see these numbers?

- These are for checks and balances. In CM/GC, we negotiate assumptions and risk never prices.
- We want an independent estimate for comparison
- To ensure independent estimate is truly independent

What kind of involvement does the ICE have in the negotiations? Does the ICE get to sit in on the meetings between the owner, designer, and CM/GC?

- ICE can be involved but cannot actively share their prices. This is optional and up to the project manager.
- In our case we lead the negotiations
- Yes
- The ICE is involved in the design. We get great construction ideas from them. They help keep the contractor honest about production rates and means and methods. The ICE goes to the bid openings with us. First, we meet without the contractor and review his bid price. We evaluate the variances and formulate specific questions for them to answer when we discuss the bid opening results with them.
- Minimal, No.

SUMMARY

An ICE can be used at various times throughout a CM/GC project to validate the cost of the owner and the CM/GC. The ICE estimate may be kept confidential or may be shared with the various parties involved, to different extents.

References

Gransberg, D. D., and Shane, J. S. (2010). *NCHRP Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs*. Transportation Research Board, National Research Council.

B-10. Contractor Bid Process

The Minnesota Department of Transportation (MnDOT) requested services from the Construction Management and Technology (CMAT) program at Iowa State University to help with the process of obtaining enabling legislation and implementing the construction manager/general contractor (CM/GC) project delivery method. MnDOT identified key issues that needed further research. Iowa State used three methods to research the questions.

NCHRP Synthesis 402 and Other Pertinent Literature Review

The researchers performed a review of NCHRP Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs and other literature written since the publication of the synthesis for guidance on five specific MnDOT topics.

RFP/RFQ Content Analysis

The researchers analyzed 30 Request for Proposal (RFP)/Request for Qualifications (RFQ) solicitation documents. Table 1 summarizes the states from which the documents were taken, the number of respective documents, and the years in which the solicitations were issued.

Table B-12. Summary of RFP/RFQ Documents Analyzed

State	Documents (#)		Solicitation Year(s)
	RFP	RFQ	
Arizona		6	2005-2008
Colorado	1*	1*	2003-2007
Connecticut	1	–	2008
Florida	1	–	2006-2007
New York/New Jersey	–	1	2006
Oregon	2	–	2008
Tennessee	1	–	2008
Texas	2	1	2007-2009
Utah	11	3	2005-2008

* Combined RFQ + RFP

CM/GC Experience Questionnaire

A questionnaire structured specifically to answer MnDOT questions was sent to agencies in states that have used CM/GC:

- Seven total respondents
- Florida, Arizona, Colorado DOT (CDOT), Colorado Federal Highway Administration-Central Federal Lands Highway Division (FHWA-CFLHD), Oregon DOT (ODOT), Utah DOT (UDOT), Michigan DOT (MDOT)
- One construction management company, one municipal government, one public transportation agency, four DOTs

PROBLEM OVERVIEW

Transportation owners typically receive unit price contracts when projects are 100 percent designed. This is different with CM/GC, so questions regarding how much cost information the contractor needs to share and when are frequent. The questions include, when the contractor shares information with the owner, what information is shared, and what format the CM/GC uses to submit their costs.

NCHRP Synthesis 402 and Other Pertinent Literature Review

Gransberg and Shane created a model for developing the guaranteed maximum price (GMP) based on typical characteristics of CM/GC projects as shown in Figure B-2.

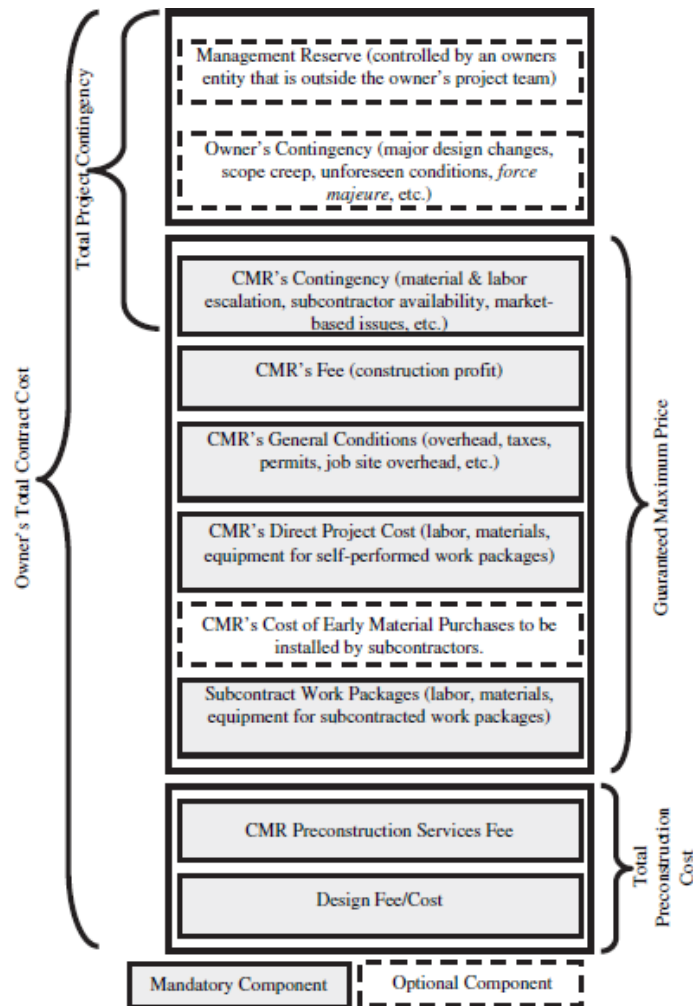


Figure B-2. Guaranteed Maximum Price Model (Gransberg and Shane 2010)

This model can be changed according to owner and project needs. Gransberg and Shane (2010) note that “the least complicated GMP would have the following elements:

- Project direct costs
- Subcontractor work package costs
- CMR self-performed work package costs
- Indirect costs: CMR’s general conditions/overhead costs
- Profit: Percentage mark-up or lump sum fee
- CMR project contingency”

Gransberg and Shane (2010) further provide an example of a CM/GC fee structure, as shown in Figure B-3.

Services	Pre-Construction Fee	Construction Fee	General Conditions/Overhead	CMR Direct Cost	Sub-Work Package Costs	Owner Expense
Contractor Home Office Staff and Services						
Corporate executives	X	X				
Safety manager	X	X				
Contractor Job Site Office Staff and Services						
Project manager		X				
Engineering and layout			X			
Project Cost Control						
Validation of project budget	X					
CPM schedule with updates	X		X			
Subcontractor Selection						
Participate in setting sub prequal.	X					
Set work package plans	X					
Analyze subcontractor bids	X	X				
Contract Document Coordination						
Review for constructability	X					
Coordinate design packages with work packages	X					
Review of proper phasing	X	X				
Quality Control						
Prepare QC plan	X					
Arrange QC testing and inspections			X			
Independent verification testing					X	
Acceptance testing						X
Insurance, Bonds, and Permits						
Builder's risk			X			
Utility development fees				X	X	
State DEQ general permit						X
Job Site Facilities and Services						
Temporary field office				X		
Project signs			X			
Temporary Facilities						
Temporary telephone			X			
Final clean-up				X	X	
Project Work Package #1—Sitework						
Utility relocations				X		
Earthwork—drainage				X		
Project Work Package #2—Bridge A						
Drill piers					X	
Precast concrete installation					X	

After "CM/GC Fee Structure Sample," Grand County, Colorado (2007).
Shows all categories and typical examples of cost types.
DEQ = Department of Environmental Quality.

Figure B-3. Sample CM/GC Fee Structure Extract from Grand County, Colorado

RFP/RFQ Content Analysis

This contractor bid process topic was chosen after the content analysis for this project was completed, so further analysis was not completed. However, this topic was likely not addressed in these documents.

CM/GC Experience Questionnaire

If price is a selection factor, how are the construction related-price factors incorporated in the GMP?

- In my experience, price factors are based on CM [contractor manager] estimates and projected costs depending on the level of design (30, 60, 90, or 100 percent). The awarded CM will need to eventually advertise for bid by the subcontracting community. Only the General Condition Costs and related fees would be considered price factors in the selection process. Note: More commonly than not, I have seen where the introduction of pricing in the selection process has worked against the agency. The intent of using CM/GC is to promote an “extension of agency staff” in the hopes that a qualified team makes the best decisions for the project to be completed as cost effectively as possible. The CM costs as a percentage of overall project costs are diminished when the CM removes risk to the agency and finds a way to complete the project more efficiently. By including a cost component to the selection process, the agency is reverting back to the low-bid mentality where less experienced General Contractors may risk their company and reputation to win a project. The agency needs to consider selection based on qualification and then discuss the CM costs—if they cannot come to terms, then discussions with the next ranked firm commences.
- CM/GC Management Price Percentage that is derived from their project, overhead and G&A [general and administrative] costs
- We have not used a GMP and CMR. We used straight CM/GC to get to construction award in two-step process
- Only the fee percentage was considered
- We no longer use the term GMP to refer to the total price because that would include the cost of risk and our objective is to eliminate or control risk

If price is a selection factor, does this include overhead/profit on the proposed construction? How?

- Yes, as a percentage
- Yes, by the contractor incorporating it into his unit prices and us reviewing and evaluating his price proposal during various phases of negotiations
- Only the fee percentage was considered
- Yes, we ask for fully loaded numbers. One project was an exception and asked for direct costs with project and overhead listed separately

Are fees for preconstruction services a selection factor in award? How?

- No. this has been designated as a Brooks Act Compliance issue
- Yes. They need to bid their fees and they are evaluated
- No
- No we believe this violates the Brooks Act
- No

How do you award the construction contract?

- GMP contract; contractor's books are audited, savings are shared
- GMP contract; contractor's books are audited, savings go to owner
- GMP contract, contractor's books are auditable, savings are shared or go to owner. Agencies "audit" project from month to month payment application reviews and approvals
- GMP that includes Variable Quantity Units on some elements. Lump sum items within the GMP are fixed; variable quantities are paid by measurement. The sum is the Contract Price which cannot exceed the GMP
- Contract Unit Price
- We use an open book process. We do not use the term GMP for the total cost of the project because GMP means the contractor has bid risk in his prices. When you say GMP, you are really saying closed book and lump sum to include the cost of risk. Most of our projects have used GMP to include risk on specific items in the bid. Items where we understand the risk and ask the contractor to give us a lump sum cost. If the risk is unknown and cannot be quantified we ask for a Unit price and as the owner, we hold the contingency. That way we only pay the actual cost and not the cost plus risk. We prefer to use the term Target Maximum Price because when we hold the contingency on some items the cost may exceed the proposed total price of the project and we will use contingency to cover these increases. These increases are usually paid as overruns but could also be paid for in change orders. For example, soft spots can be estimated but not accurately predicted. The bid price can assume 0 percent for soft spot repairs, payout for a unit price, and cover the cost with contingency funding.
- Mountain View corridor is unique in that they asked the contractors for direct cost with profit, overhead, and mobilization costs separated out as indirect costs. One advantage of this approach is reduced cost for speeding up construction. Indirect costs are paid on a monthly schedule and when construction ends, early that cost is avoided.
- The other advantage of this approach is a knowledge of contractors actual cost (no overhead or profit included) to perform the work so that when money is saved on one portion of the project and additional funds become available then additional work can be easily added because the costs to do so are known and predictable. This works particularly well where there is not enough funding to do the entire project and the owner is trying to complete as much as possible with available funds.
- GMP and Contingencies are negotiated during the design phase

Questions specifically regarding the format of the submitted costs, i.e., line item bid, were not included in the questionnaire, as this topic was added after the questionnaire was distributed and returned.

SUMMARY

Both prior to award and after the award of a CM/GC project, the contractor may be asked by the owner for specific information regarding different costs for the project. These costs can be requested as percentages, lump sums, or unit prices.

References

Gransberg, D. D., and Shane, J. S. (2010). *NCHRP Synthesis 402: Construction Manager-at-Risk Project Delivery for Highway Programs*. Transportation Research Board, National Research Council. pp. 66.