

A.3 Construction Manager / General Contractor (CM/GC)

Also known as Construction Manager at Risk (CMR)

What is it?

Construction manager / general contractor (CM/GC) is a project delivery method in which the State Transportation Agency (STA) holds contracts with two parties: the design consultant and the Construction Manager/General Contractor firm. However, unlike the typical design-bid-build system, here, the CMGC's services are retained early on the design phase. As a result, the CMGC has an input during design and controls the entire construction phase. Under this method, the CMGC is said to be "at Risk" because the project is delivered under a Guaranteed Maximum Price (GMP) that is negotiated during the design phase (1, 2).

Why use it?

The CM/GC delivery method provides the following advantages (2, 3):

- Allows fast-tracking of design and construction activities resulting in potential time savings ,
- Allows for innovation and constructability recommendations during design, but the STA retains significant control over design,
- Once GMP is established the CM/GC invests more in cost engineering and constructability reviews in order to minimize risks,
- Fixes project costs and completion responsibility, and
- CM/GC services provided during preconstruction reduce design costs by reducing the amount of detail that is required and by focusing the early design effort on constructible solutions

What does it do?

Under the CM/GC delivery method, the STA selects a CMGC firm to perform preconstruction and construction management services. During the design phase, the CMGC firm acts in an advisory/management role. It provides constructability reviews, value engineering suggestions, construction estimates, and other construction-related recommendations (1, 4). At some point on or before design reaches 100% completion, the STA and CMGC firm negotiate a GMP, which is based on a partially completed design and includes the CMGC estimate of the cost for the remaining design elements (1).

Once the GMP is established, the CMGC firm starts the construction phase, thus allowing an overlap of the design and construction phases. During construction, the CMGC firm acts as a general contractor and

performs contractually obligated work. The contractor holds the construction contract and risk for any construction costs that exceed the GMP (1).

How to use it?

Upon selection of the CM/GC method as a project's delivery method, the process can be divided into three parts:

1. **Project development and CMGC selection** – As a first step in the project development phase, the STA identifies and allocates the risks associated with the project. The second step is to develop preliminary documents including environmental, right of way, and utilities (1). The third step is to develop preliminary design documentation, which should be minimal in order to maximize the effectiveness of the CM/GC method but enough to conduct effective procurement of a CM/GC firm. The project goals and objectives should guide the STA through these steps. In case of the CMGC selection, the procurement is generally made using a qualifications-based selection (5). Here, the STA negotiates a fee for the pre-construction services with the highest ranked proposer awarded the project (1).
2. **Pre-construction services and GMP negotiation** – The pre-construction services include almost anything the agency requires from the CMGC firm. Typical CM/GC packages include costs estimates, schedule analysis, work sequence, risk identification, mitigation and pricing, constructability reviews, development of work packages for bid, and development of a GMP that meets owner requirements and budget restraints (2). During this stage of the project delivery process, the STA and CMGC should begin negotiations for the GMP. This payment provision is described more in detail in the payment provisions appendix of this guidebook. The GMP is a maximum price to which the CM/GC firm will commit to deliver the project for a quantified scope of work expressed in the design documents. It includes project direct costs, indirect costs, a profit, and the project contingency (2). The GMP can be negotiated any time during the design phase. It should be taken into account that when the GMP is negotiated closer to the design completion it will include less contingency. Conversely, when the GMP is negotiated earlier in the design, the overall costs may be higher due to a larger contingency; however, it allows construction to start earlier. Some special aspects to consider in the GMP are the CMGC self-performance limits which is regulated by laws in some states, subcontract competition and selection constraints, and the use of a shared savings clause which allows sharing a percentage of any GMP savings with the CM/GC firm upon project completion (2).

3. **Construction services** – During the construction phase of the project, the STA should provide a method to review and respond to construction issues compatible with the GMP contract requirements, and maintain an accounting system that supports the review of contractor invoices and justifications, and make timely payments to the CM/GC firm. Key aspects to consider are strong communication between the STA and the CMGC, subcontractor control, quality control, contract changes procedures, and invoicing system.

When to use it?

The CM/GC delivery method is most advantageous (1, 6):

- On projects where the STA has limited management resources,
- On projects where there is limited time or funding,
- When there is a need for immediate transportation improvements,
- On project where the design is complex, difficult to define, subject to change and there are several design options, and
- When the project is sequence or schedule sensitive.

The CMR methods is less suitable for straight-forward projects, projects with easily defined scope and low risk, and projects that lack schedule sensitivity.

Limitations

Some of the major risks and disadvantages of a CM/GC delivery method are (2, 3):

- Project price is negotiated with a CM and not competitively bid,
- CMGC input may not be included by designer,
- Use of GMP may lead to a large contingency to cover uncertainties and incomplete design elements ,
- Use of GMP can lead to disputes over the completeness of the design and contract changes, and
- CMGC design input does not necessarily translates into better design quality

Who uses it?

STAs that have executed or experimented with CM/GC projects are: Alaska, Arizona, Florida, Oregon, and Utah (2). With the passage of the Moving Ahead for Progress in the 21st Century Act (MAP-21) on July 2012, SEP-14 approval is no longer required for CM/GC projects as long as the state statutes allow for it. STAs with full authority to use CMGC are: Alaska, Arizona, California, Colorado, Connecticut, Florida, Idaho, Michigan, Minnesota, New Mexico, Oregon, and Utah (7).

Examples

Example 1) Florida Department of Transportation

The Florida Department of Transportation (FDOT) is using the CM/GC delivery method on the Miami Intermodal Center (MIC). The MIC is transportation hub that will provide connectivity between all forms of ground transportation available in the county and includes road, bridge, and interchange construction to improve access to the Miami International Airport; rail components; bus facilities; and airport landside improvements (2). FDOT made the decision to use CM/GC before starting design. Given that this is a complex project that combines horizontal and vertical construction the DOT viewed CMR as an opportunity to increase technical expertise. Other reasons to use CM/GC were a desire to improve coordination requirements and early contractor involvement, reduce the project delivery period, establish project budget at an early stage of design development, and redistribute risks (2).

The CMGC firm was selected early in the design process, immediately after the consultant. FDOT issued a request for letters of interest, and the solicitation document contained a description of the scope of work and preliminary plans and specifications. Competing CMGC firms were required to show past CM/GC experience, past project experience, and CMGC firm's project manager qualifications. The winner was determined by the results of the scoring of the selection panel as published in the advertisement. The GMP was established before 100% design was reached. The CMGC firm can self-perform up to 50% of the work, and must publicly accept bids to conduct subcontract selection. The project has an approximated cost of \$1.7 billion and is scheduled to be completed by 2014.

Example 2) Oregon Department of Transportation

Another example of CM/GC is Oregon Department of Transportation's (ODOT) I-5 Willamette River Bridge Project (2). This project consisted on the removal of the old Willamette River Bridge, construction of a new 1,800-foot long bridge to replace the old bridge, replacement of the old Canoe Canal Bridge, reconstruction of approximately 2,500 feet of road approaching and between bridges, and modifications several ramps. The project had a total cost of \$150 million. The decision to use this delivery method was made before 30% design completion was reached and the main reason was to gain experience before using the CM/GC method on a much larger bridge project over the Columbia River. Some of the project specific reasons for choosing CM/GC included budget and schedule control issues, and a desire to redistribute risks.

The CMGC firm was chosen as soon as possible after the consultant selection. ODOT issued an RFP, which contained five unit prices for major pay items. The solicitation documents included a description of the scope of work, quality management roles and responsibilities, and design criteria checklists.

Contractor were required to submit past CM/GC experience, past related project experience, qualifications of the project management, construction manager, and project principal, construction quality management plan and public relations plan, preliminary project schedule, and proposed preconstruction services fee, post-construction services fee, and general conditions. The winning CM/GC firm was determined by the output from the weighted scores given the selection panel. Here, price carried 15% of the weight.

The GMP was defined before 100% design was reached. It included a single transparent project contingency and the CMGC firm was allowed to keep any remaining contingency as a shared savings clause. The CMGC firm was also allowed to self-perform 30% of the work, and there were no restrictions regarding subcontractor selection.

References

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