



# CONSTRUCTION MANAGEMENT AT-RISK

LESSONS LEARNED  
AND WHAT OWNERS  
SHOULD KNOW

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# CONSTRUCTION MANAGEMENT AT-RISK – LESSONS LEARNED AND WHAT OWNERS SHOULD KNOW

This paper will provide an overview of the Construction Management At-Risk (CMAR) delivery method, offer suggestions to efficiently manage the process, and maximize the benefit this delivery method offers while also effectively managing the risks. It will provide helpful information to assist owners in making informed decisions and provide guidance to keep projects on the right path. The methodology described in this paper is focused on facilitating trust, collaboration, and transparency among parties to aid in successful project outcomes. Our discussion also provides a unique perspective, gathered from lessons learned from overseeing CMAR projects as an Owner's Construction Manager as Advisor (CMA) and through conducting audits of public CMAR projects.

The CMAR delivery method has been utilized for over 50 years and continues to be a popular method for construction project delivery. Like all project delivery methods, there are pitfalls, benefits, costs, and risks. The objective of this paper is not to provide a comparison of the various project delivery methods commonly used, but rather to specifically examine the benefits afforded by the CMAR delivery method and potential challenges the owner and the project delivery team should be aware of before embarking on a CMAR project.

The result is a list of recommendations and solutions to assist owners in maximizing the benefits of this delivery method for achieving better project outcomes.

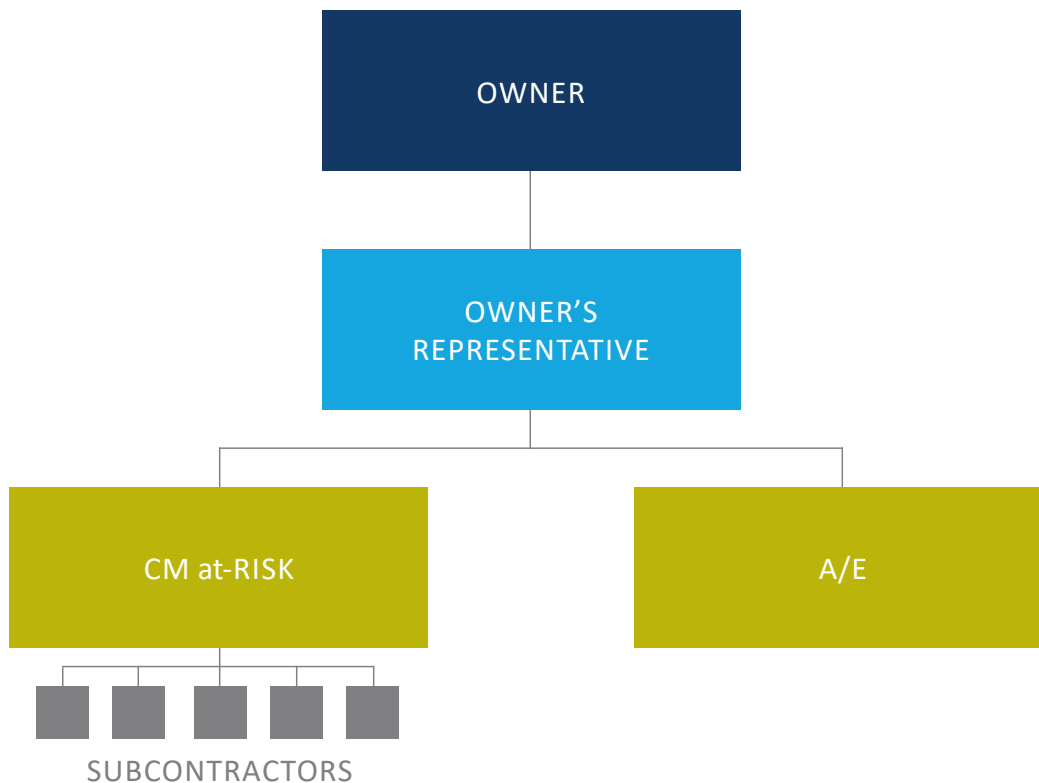
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## DEFINITION OF CMAR

The Association of General Contractors (AGC) defines CMAR as:

A specific variation of construction management in which the public Owner engages both a project designer and a qualified construction manager under a negotiated contract to provide both pre-construction services and construction. The Construction Manager/General Contractor (CM/GC) provides consulting and estimating services during the design phase of the project and acts as the GC during construction, holding the trade contracts and providing the management and construction services during the construction phase. The degree to which the CM/GC provides a cost and schedule commitment to the public Owner is determined

during the negotiation of the final contract. (This is a risk issue. If there is no risk involved, it is not CM/GC).<sup>1</sup>

The Construction Management Association of America (CMAA) defines CMARk as:

In this method, the CM is generally hired as the owner's agent to provide professional CM services early in project development by a qualification-based selection process. When the project design is complete, the CM's role expands to that of a GC and the CM issues contracts directly to subcontractors in an "at-risk" position. In this approach, which can often occur under a guaranteed maximum price (GMP) contract form, the CM will assume additional obligations and will undertake construction responsibilities during the construction phase.<sup>2</sup>

<sup>1</sup> CM/GC Guidelines for Public Owners, second edition 2007 by the Association of General Contractors and the National Association of State Facilities Administrators.

<sup>2</sup> CMAA: Construction Management Standards of Practice 2003

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The vernacular surrounding this delivery method can be confusing as different jurisdictions, owners, and professional associations use different terms to define the parties associated with this project delivery.

## For this paper, we will use the following terms and abbreviations:

- CMAR: Construction Manager At-Risk delivery method
- CMc: Construction Manager as Constructor (defined as “CM/GC” by AGC or “CM” by CMAA)
- CMa: Construction Manager as Agent/ Advisor

## THE NATURE OF CMAR

From these two definitions, we can come to two conclusions about the nature of CMAR: The first is that CMAR is a delivery method where the CMc will serve two roles. The first role is as a consultant to assist the owner and designer during the pre-construction and/or design phase, and the second role is as the at-risk contractor during the construction phase.

The second is that the construction contract value will be set under a negotiated Guaranteed Maximum Price (GMP) contract. The components of the GMP include the Cost of Work, CMc fee (usually percentage of cost), general conditions (GC), general allowances, and contingency. The GMP is typically established once the design has reached a point where the project design is sufficiently developed, and the number and magnitude of the unknowns have been significantly reduced. As an option, the owner and CMc can enter into an “early agreement” that allows construction to start ahead of the completion of design and the establishment of the GMP. This is typically done to reduce the overall project delivery schedule and is a benefit offered by this delivery method over a traditional design-bid-build approach. Regardless of the contract form used, the GMP agreement should contain the CMc’s assumptions, clarifications, and exclusions that form the basis of their

price and construction methods. The owner should also ensure that the contracts of the other members of the project delivery team (designer and CMa) are coordinated among all parties. This is where using an industry-recognized series of contracts, AIA, CMAA, EJCDC, etc., can be beneficial.

## SELECTION OF THE CMc

An owner can derive the most benefit from the CMAR delivery method when it selects a CMc with specific experience in constructing similar types of facilities to the one they seek to build. An added benefit is to select a CMc who has local knowledge where the project will be built. With these qualifications, an owner can benefit from a CMc that will bring relevant cost, schedule, and constructibility insight to the overall project.

In addition, owners should look for a CMc that possesses very robust pre-construction capabilities. This includes a firm with a proven history of existing condition surveys, constructibility reviews, cost control, value engineering, and a demonstrated strong problem-solving capability. Owners are highly encouraged to verify references and make inquiries on the CMc’s past performance on projects, including both construction and pre-construction efforts. Lastly, as the consideration for final selection progresses, owners should evaluate the reasonableness of a CMc’s pre-construction fees, general conditions costs, overhead and profit percentages, contingencies, and other fees and costs. Since these are relatively fixed costs based on project size and duration, these costs should be known early on and can often be used in the evaluation and selection of the CMc.

A CMa can be a valuable technical resource and advocate for the owner to help navigate through the CMAR project delivery process. During the procurement process, they can assist an owner in the CMc selection process. This can include the development of the CMc scope of work, preparation of the CMc Solicitation for Qualification package, review of CMc proposals, and assistance with final evaluation and selection.

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## CMc CONTRACT PROVISIONS

**CMc Pre-Construction Scope of Work.** The services performed by the CMc in the pre-construction phase are usually defined during the selection process and paid for as a lump sum amount. It is crucial for all stakeholders to understand exactly what is expected from the CMc, including deliverables and schedules. This should be clearly laid out in the pre-construction scope of work provided to the CMc offerors along with the anticipated benefits to be provided by this support. -The CMc should, in-turn, clearly identify in its proposal the services to be provided along with their approach to delivering these services to maximize benefit to the owner and the project delivery team. Typical services provided during this phase include estimating, scheduling, constructibility review, value engineering, risk management, and/or design assistance support.

**CMc Construction Scope of Work.** Construction phase services will be defined in the CMc's contract agreement established with the negotiation of the GMP. The scope of work will be defined by the design drawings and project specifications, and any clarifications and/or exclusions that may be included in the CMc's proposal and accepted by the owner. Additional scope of work items can include furniture/fixtures/equipment (FFE) installation, owner move-in support, warranty requirements, etc. Since the design documents are generally not complete at the time of establishing the GMP, the GMP will typically include allowances and/or contingency to accommodate for unknowns and undefined scope.

**CMc Shared Savings Clause.** In a CMAR project delivery with a GMP, there is sometimes a shared savings provision that allows the owner and CMc to share any savings achieved between the final GMP and the final cost of performance. This is intended to encourage the CMc to realize cost savings through such means as increased labor productivity or innovative construction solutions. The shared savings percentage, if utilized, is typically negotiated to a rate that could provide an incentive to the contractor. It is important for both the owner and CMc to clearly define in the contract how these cost savings will be split. Accurate and transparent

cost reporting by the CMc and thorough auditing by the owner is required for an effective shared savings program.

## PRE-CONSTRUCTION SERVICES

**CMc's Pre-Construction Estimates.** A benefit of CMAR project delivery is a high level of cost control from the beginning of the pre-construction process. The CMc normally will produce a series of cost estimates during the design phase, with the final estimate serving as the basis for its GMP proposal at some later stage of design. The estimating effort during design is essential to provide confidence that the project, as designed, can be built within the owner's allowable budget. Should the CMc's estimate fall above the owner's construction budget, the design (including the designer's estimate) and CMc's estimate need to be reconciled to bring the overall costs within the allowable construction budget and/or the owner should be provided with a clear understanding of the reasons for the increased project cost. The CMc should work closely with the owner and design team to define the project scope well enough so that the cost estimates that are developed, are comprehensive and realistic. Scope gaps can lead to inaccurate estimates.

**CMc Review of Design Submissions.** Early involvement of the CMc in the design process will aid in improving the quality and constructibility of the design documents. The CMc should provide a detailed written report of its findings for each design submission, providing input on constructibility, material and equipment selection, site access and utilization, and other logistics that could be incurred during construction. The report should also include the CMc's preliminary construction schedule. Engagement of the CMc's key subcontractors, through design assist agreements, if necessary, during these reviews can also be valuable, especially in providing input on complex project elements such as building envelope, MEP, life safety, and other systems. It is important that the design comments not only be provided in writing, but that the project team meet to discuss them. Typically, these meetings or workshops are facilitated by the CMc.

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**CMc Role in Value Engineering.** Engaging the CMc and its key subcontractors in the value engineering process can be very valuable early in the project design. It is important to ensure that value engineering not just proposes cost cuts in construction, but considers alternatives to the construction to add value to the project and reduce life-cycle costs. The CMc and its key subcontractors can provide input to the owner's team regarding maintainability and operability as well as construction. While a CMc may be tasked with providing value engineering solutions as part of its pre-construction services, owners should also consider the use of a formal value engineering workshop facilitated by an independent third-party certified value specialist (CVS).

**CMc Role in Design Assist.** Design Assist can also be an optional component of a CMAR project delivery in which the construction team, often key subcontractors, are engaged by the owner to collaborate with the design team during the design phase. Design Assist collaboration can reduce construction phase impacts and any additional cost because the CMc and its subcontractors have had the opportunity to weigh in on design elements early on. As with any scope requirements, the Design Assist role needs to be clearly defined in the contract, providing a clear understanding of which key subcontractors and project elements are to be incorporated. Typically providing Design Assist support doesn't guarantee that the subcontractor will ultimately be selected for the construction phase and still needs to compete with others during the development of the GMP or CMc buy-out process.

**CMc Development of Construction Schedule.** By engaging the CMc early in the design process, schedule recommendations can be provided regarding early work packages that would allow the elements of work such as demolition, sitework, and/or foundations to proceed prior to the completion of the final design; or could facilitate the early purchase of long lead material items, thereby reducing overall project duration. If early

work packages are implemented, coordination between each package will need to be carefully reviewed by the owner, design team, and CMc to avoid scope gaps or overlaps. Care should also be taken to assure that final design changes do not impact work that has already been put in place during an early work package. Early work packages should be separate and distinct scopes of work can be completed and turned over to the owner should a GMP agreement between the CMc and owner not be successfully achieved.

The CMc can also provide valuable scheduling input on projects with complex phasing requirements, for example on projects where spaces must remain operational and occupied while construction is occurring in adjacent areas. CMc's should provide input on phasing sequences and examine construction boundaries, shared systems, vibration concerns, dust and noise control, construction access for labor and materials, paths for removal of debris, and materials laydown areas.

It is important that the CMc ensure that construction schedules include correct durations and logic for owner/designer reviews, reviews by code officials and Authorities Having Jurisdiction (AHJ), owner provided FFE, transition times between construction and occupancy, and any work performed by third-party contractors. These durations should be confirmed by the owner, designer, AHJs, and third-party contractors to reduce schedule risk.

**CMc - Project Risk Management.** Another benefit of a CMc's early involvement is the ability for the CMc to weigh in on potential project risks. Having all project participants – owner, designer, CMc, CMA, and end users – participate in a risk workshop can produce a robust risk register with comprehensive risk mitigation strategies. Addressing risk concerns early will reduce the project risks' effect on construction quality, cost, and time. In addition, owners should consider utilizing a cost risk analysis to set appropriate owner and CM contingencies.

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## DEVELOPING AND DEFINING PROJECT COSTS

**Pre-Construction Phase.** Pre-construction services should be clearly defined in the CMc's contract. Payment for these services can be negotiated as a lump sum, but can also be negotiated on a cost-plus, fixed fee basis. Pre-construction fees are typically separate from the GMP for construction.

**GMP Development.** The CMc will typically provide a GMP sometime within the 60-100% design phase. The later in the design phase that the GMP is developed, the more well defined the project and GMP agreement will be, thereby potentially reducing the number of allowances and value of the CM contingency. However, an earlier GMP may reduce the need for, and risk associated with, early work packages to expedite the start of construction along with reducing the owner's risk of cost escalation.

General conditions (GC) consist of costs for onsite project management, administrative personnel, equipment, and utilities needed to manage the project while general and administrative (GA) costs consist of home office overhead costs. The CMc can be compensated for GA/GCs as a percentage of work complete, a fixed price per month of field activity, or a direct cost of work performed. The method for payment of GA/GCs should be discussed early to avoid misalignment and to understand how these costs would be adjusted should there be any time extensions.

The Cost of Work is assembled using "open book" pricing. To maximize the benefits of the "open book" approach, the CMc should be transparent and include the owner in the subcontractor bidding process. The owner should have access to bids, quotes, labor, materials, expenses, and equipment costs detailed in proposals from the CMc and subcontractors. The owner should also require the CMc to secure multiple bids for each feature of work and either pre-qualify its bidders or require that each proposer provide capabilities information as part of their proposal to ensure they have the experience and qualifications to perform the work.

The CMc should share its analysis of subcontractor bids and its methodology for selection with the owner, and the owner should have an opportunity to weigh in on subcontractor selection. A benefit of the CMAR project delivery method is that selection can be made based on a best value basis, and selection of the lowest bid subcontractor is typically not required. The CMc can select subcontractors based upon the value they can provide to the project; however, the approval of recommended subcontractor is typically required by the owner. If there is a large discrepancy in the price for the low bidder, the CMc may recommend award, however, also request an increase in CM contingency to offset the potential risk. A subcontractor will often include conditions, exclusions, and alternate pricing in their proposals resulting in bids that don't represent the same scope. The CMc must account for any adjustments the subcontractor may have made to ensure their analysis and recommendations are based on the same scope and that the full project scope is accounted for. A third party review of the proposed GMP by the CMA can be effective in verifying that there are no gaps or overlaps in the CMc work package breakdown, that recommended subcontractors actually represent the best value, and selection of subcontractors appropriately account for cost and performance risk factors.

**Contingency Use by Owner and CMc.** The CMc will include a CM contingency in its GMP to address various elements of risk such as scope gaps, material and labor price fluctuations, procurement costs, reasonably inferable differing conditions, unanticipated general condition expenses, and reasonable risk items identified during risk management workshops and assigned to the CMc. The GMP agreement should clearly identify what types of expenses can be paid for using CM Contingency and the process by which a CMc can access those funds. Some CMc contracts require owner approval prior to use of CM contingency funds. It should be noted that CM Contingency (and other allowance items) are part of the GMP and therefore neither GCs nor CM Fee should be applied when CM Contingency funds are used.

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Owner scope changes and differing site conditions beyond what the CMc could have reasonably anticipated are typically funded from sources outside of the GMP, such as owner contingency or end-user funding. Since this work is outside of the GMP agreement, a contract change order will be required to incorporate it into the CMc's scope, including CMc overhead and fee. Depending on the scope of change and impact to the schedule, an increase in GC may also be required.

**Pay Application Review.** Before the first pay application is submitted, the owner and CMc should review the proposed method of tracking construction costs to verify that it aligns with the GMP and is reasonable. Costs can be tracked in a Schedule of Values (SOV), cost loaded project schedule, or other contractually agreed upon method. In addition, the owner should verify the cost tracking against the executed subcontractor agreements to verify that these costs align.

The CMc's pay application should be broken out into GC, CMc fee and general allowances, cost of work (materials and labor), CM contingency, and allowance components. Because GMPs require "open book" accounting, the CMc's pay application will be a sizeable document to support its actual costs. Each pay application will need to be closely scrutinized to ensure the payment sought was for actual costs incurred. Some public owners require that subcontracts be procured according to public procurement laws and using an "open-book" approach, where the owner has visibility on the CMc's actual cost of all subcontracted components of work. In others, only the CMc's costs are required to be "open book" and subcontracts do not require "open book."

## CMc AUDIT

Final CMc Audit. To close out the CMc contract and identify any cost savings achieved, a CMc audit should be performed, typically before the last pay application. This audit should be comprehensive to include such tasks as:

- ✓ Verify that the CMc only performed the percentage of work specified in its contract. Most state procurement laws typically specify a limit on how much work the CMc can self-perform and, in some instances, the CMc is not permitted to perform any work directly.
- ✓ Verify that the Cost of Work did not include compensation for any general conditions.
- ✓ Documentation – You should verify that you have all the documentation that is needed to perform a thorough audit. (i.e., change orders, allowances, pay applications, and multiple pay applications if there is more than one phase of the project).
- ✓ Verify that the CM Contingency was properly utilized, and the required authorizations were received.
- ✓ Verify that changes were properly accounted for in the Cost of Work, general conditions and/or CM contingency..
- ✓ Verify that the GMP was properly adjusted to account for changes and allowances
- ✓ Verify that any allowances were properly utilized.
- ✓ Verify that markups were properly applied. Typically, the CMc is not allowed to mark up change orders that are applied to the CM contingency or allowances, but can mark up change orders applied to the owner's contingency.
- ✓ Verify that all required documentation was provided for all open-book costs and those costs align with the costs sought in the pay applications.



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## SUMMARY

1

Spend the time to properly evaluate the CMc during selection. Understanding the qualifications of the CMc in pre-construction services, including design review, cost estimating, constructibility review, value engineering, risk management, etc. can provide an owner with insight into whether the CMc can set the project up for success.

2

Promote collaboration in the design phase. Encourage continuous communication between the CMc and the design team throughout the design to ensure that contract documents are constructible, meet owner budgets and ultimately meet owner programmatic requirements.

3

Actively engage in key subcontractor selection. Owners should review subcontractor proposals and weigh in to ensure the most appropriate subcontractors are selected.

4

Engage the CMc early in schedule development. The schedule should be utilized throughout the design and construction process to reflect the complexity of the project and enable the entire team to define, review, and mitigate project risks. The CMc should maintain the schedule and assist the owner to set attainable durations.

5

Establish partnering relationships. Owners should lead efforts to build trusting relationships between all team members. This can be done through the formal implementation of partnering as well as the use of Lean construction tools. Promote clear and open communication between the CMc, owner, CMa, and design team members. Align roles and responsibilities among the team members to promote collaboration and avoid overlap and conflicts. A positive relationship built upon trust and respect between team members is a key for success of the project.

6

Clearly define allowable use of CM contingency. The GMP contract should define the allowable uses of CM contingency and the means by which the CMc can be compensated. This will reduce conflict and confusion.

7

Rigorously review pay applications. Perform detailed reviews of monthly pay applications and all supporting documentation. Monitor how funds are used to capitalize on open-book GMP benefits.

The CMAR delivery method offers owners multiple advantages to include early engagement with an experienced contractor with insight into cost, schedule, and constructibility as well as greater transparency through the use of a GMP and the ability to fast track construction through the use of early work packages. However, this delivery method does require greater owner oversight and effort to produce the desired results, particularly during the early stages of the project. Owners should be prepared with adequate resources and experience to manage the CMAR delivery method or seek out the assistance of a CMa.

# CONTACT INFORMATION

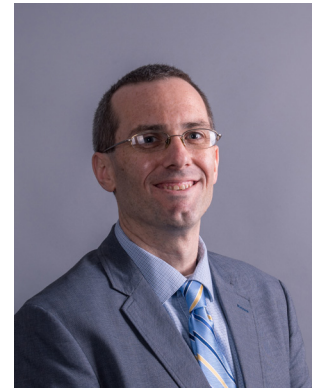
Over the past 10 years, MBP has provided CMa services for public owners on more than 70 CMAR delivery method projects. This experience in managing, auditing, and collecting lessons learned on public projects provides an important perspective of the benefits, risks, and suggested practices to owners associated with the CMAR project delivery method, from selection through construction to closeout.



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