

Construction Management Standards of Practice

2010 Edition



**Advancing Professional Construction/
Program Management Worldwide.**

7926 Jones Branch Drive, Suite 800
McLean, VA 22102-3303 USA
703.356.2622 | 703.356.6388 fax
www.cmaanet.org

2.0 Project Management

2.1 Introduction

This section discusses the broad subject of project management, which is defined by CMAA as "The use of integrated systems and procedures by a team of professionals during project design and construction." The section focuses on the key components of a Project Management Plan and its development throughout the various project phases. In general terms it outlines key goals and elements of managing a project under the Construction Management format. The general approach addressed here is expanded upon in subsequent Standards of Practice sections on Cost, Time and Quality Management, Contract Administration, Risk Management, Sustainability and Safety.

2.2 Pre-Design Phase

Project Organization

During this phase of the project the owner must assemble and organize a project team composed of design and Construction Management professionals as well as other key professional, technical and administrative staff necessary to assure the success of the project. This project team must organize its activities to deliver a project that meets the owner's requirements.

The project team should include representatives of the owner, the Construction Manager (CM), the design professional, and any specialty professionals that may be required. In some delivery systems, the general contractor is part of the pre-design team. Basic project purposes, goals and parameters of performance – particularly cost, time, and quality – should be determined and documented by the owner and provided to the project team at the earliest opportunity.

The CM and the design professionals should be hired as early as possible. In situations where the CM is hired first, the CM should assist the owner in developing a list of qualified design firms. Additionally, the CM should assist the owner in developing and transmitting the requests for proposals, reviewing the proposals, conducting interviews, evaluating candidates and making recommendations for the award of the design contract. When the design professional is hired first, he may assist the owner in a similar manner in the selection of a CM.

The organization of the project should be guided by the following principles:

- The owner, design professional and CM must establish a relationship of mutual trust and respect. The design professional and CM, while clearly

having different roles and responsibilities, should function as equals and be so treated by the owner in order to gain the full benefit of the team's collective effort.

- It is recommended that the procedures outlined in the CMAA document "How to Select a CM" be used in the CM selection process.
- Each team member must know and understand the other members' responsibilities, in addition to the overall project requirements, prior to signing individual contracts. The best way to accomplish this is by all parties performing a joint review of their respective contracts. The owner, CM, and design professional should then create a responsibility matrix which documents all tasks, action items and authority of all team members.

Project Management Plan

The CM should work with the owner and the design professional to define the project requirements in the Project Management Plan (PMP). This document, prepared by the CM, should outline the strategies for fulfilling the requirements of the project. The owner should review and approve the PMP before the project proceeds. This document may then be used to measure the performance of the project team and the overall success of the project. Therefore, it is critical that it be understood at the outset by all team members.

The PMP typically establishes the scope, budget, schedule, environmental conditions, and the basic systems to be utilized. It also defines the methods and procedures to be followed as well as the basis for claims avoidance on the project. Many conceptual design and estimating iterations may be required before a project meets the owner's time, cost and performance requirements. Once these requirements are established and approved by the owner, the team must be committed to completing the project within those requirements. The PMP and the commitment of all stakeholders to meet its requirements form the foundation for a successful project.

Typically, the scope of a project is documented by a combination of conceptual drawings, descriptive narratives, performance parameters, and the budget for the project. The type of information and amount of detail may vary considerably based upon the type of project. Documentation of overall cost and time is the CM's responsibility, with input from the other team members. The establishment of basic systems and procedures by the CM links the task elements of the Plan.

A typical PMP may include the following basic components. Some of the components may be developed in later phases of the project as part of the Construction Management Plan:

- Project description
- Scope of work
- Milestone schedule
- Master schedule
- Quality management approach
- Safety management plan
- Reference to project documents
- Project organization chart and staffing plan
- Explanation of roles, responsibilities and authority of team members

- Project budget/work breakdown structure
- Certification under the LEED® program (Leadership in Energy and Environmental Design)
- Logistics including temporary construction support requirements, i.e. laydown or marshalling area
- Environmental/archeological considerations
- Reference to project procedures manual
- Management information system
- Communications protocol
- Bid packaging and contracting strategy, and delivery system evaluation
- Site mobilization and utilization phase

Project Procedures Manual

The Project Procedures Manual should be developed as a team effort, assembled and edited by the CM. It should be written so that the responsibilities of the team, levels of authority, communication protocol and the systems, methods and procedures to be followed for project execution are clearly defined and understood.

The Manual should address:

- Cost controls and the systems required for monitoring and controlling project costs
- Quality control and quality assurance program established by the Team and how it is to be implemented
- The project schedule and how it is to be developed, implemented and maintained
- Document control and specific project systems, methods and procedures (i.e., bidding, payments, change orders, submittals, correspondence, reports, performance records, claim resolutions, etc.)
- Functional responsibilities and limits of authority
- Correspondence distribution matrix
- Safety program
- Check lists
- Listing of meetings (i.e. type, frequency)
- Sample forms to be used
- Detailed bidding and construction phase procedures
- Coordination among various prime contractors
- LEED requirements

Pre-Design Project Conference

The CM should plan, conduct and document a pre-design project conference which addresses the Project Management Plan with respect to the design phase. The conference purpose is to achieve commitment to the project goals and procedures from the owner, the design professional, and the CM.

Management Information System

The CM should establish a management information system that will inform the team

about the overall project status and forecast compared to the Project Management Plan. This system should address team information needs, data sources and control elements for time and cost. The system should provide a sound basis for managing the project and identifying and evaluating problem areas and variances. Distribution, frequency of reports, and the policy for record retention should also be established.

A comprehensive account of the project can be achieved with record keeping systems such as:

- General correspondence files (in and out)
- Periodic reports (daily, weekly, monthly)
- Drawing schedules, submittals (shop drawings, payments, samples)
- Transmittals
- Change requests and authorizations
- Procurement
- Material control
- Meeting minutes
- Confirmation of oral instructions and field directives
- Controlled inspections
- Notice of non-conforming contract work
- Weather conditions
- Scheduling records
- Progress photographs

The financial status reports must enable both the owner and the CM to control the available funds in the project. The format of reports should accommodate a continuing input of data. This data should serve as a budgeting and cost control tool on a contract phase and total project basis.

Financial reporting should cover budgeted, authorized and committed funds, expenditures to date, cost to complete, invoices, payments and retention, change orders, projected total costs and projected cash flow.

The CM should coordinate with the owner's and the design professional's staff to determine the format and frequency of reports required by the team members. Information should include schedule and progress reporting, drawing schedules, budget versus cost of services, and change requests (approved and pending) for design services. The first reports should be issued during the pre-design phase and on an agreed frequency thereafter.

2.3 Design Phase

During the design phase the team must continually communicate and consult on all substantive issues. As the process proceeds from schematic through final design, the team must consider the issues critical to each particular phase, moving from general decisions in the early phase to detailed decisions as design progresses. There should be periodic constructability reviews by the CM. The owner and the CM should agree on the scope and number of constructability reviews required. The CM should also coordinate with any needed Value Engineering and alternative studies. The goal is to complete a set of documents defining a project which can be bid in the current local marketplace within the owner's budget and time requirements.

The design professional has total responsibility for design implementation and execution. The role of the CM during this phase should be to assist the team by carrying out the activities listed below. Although the designer is responsible for design decisions to meet the project requirements, the owner as well as CM and other stakeholders can also have decision making responsibility.

Design Document Review

The CM should review the design documents periodically, focusing on the need for clarity, constructability, consistency and coordination among the trades and contractors as appropriate.

Document Distribution

The CM should coordinate the distribution of information among all team members and the transmittal of all documents to regulatory agencies.

Contract Agreements

The CM should develop and/or review appropriate construction contract agreements for inclusion in the bid documents.

General and Supplementary General Conditions

The CM should develop or review general and special conditions consistent with project requirements.

Public Relations

The CM should assist the owner in public relations activities, particularly those with respect to the owner's organization and community relations. The CM should assist the owner in developing interest among bidders for the project(s) also.

Project Funding

The CM should assist the owner in preparation of documents necessary to secure funding for the overall project.

Meetings

The CM should conduct periodic project meetings to assess progress, verify adherence to the PMP, document performance, plan for completion, and take action to resolve current problems. At a minimum, these meetings should be held at the end of each design phase. A final team review should be conducted prior to release of each bid package. Recommended subjects for each project meeting include:

- Review of the project budget and a current estimate of what construction costs the drawings and specifications currently represent, making allowances and assumptions for detail not shown or known

- Review of the Master Schedule, Milestone Schedule and any additional detailed sub schedules for the project
- Discussion and resolution of any issues which have become evident through previous review of documents and/or team discussion and have not been addressed

Cost Control

During the design process the CM develops and maintains cost control procedures to monitor and control project expenditures, both current and projected, within the allocated budget.

Schedule Control

During the design process the CM develops, implements, and modifies the master schedule and the milestone schedule, periodically updating them to reflect actual performance to date. The CM also establishes forecast dates for the completion of the project and advises the owner and designer relative to performance against that baseline.

LEED Compliance

Either the CM or the LEED Professional shall provide guidance and oversight during design to assure the established LEED goals are being addressed. The CM should have a LEED accredited professional on staff.

Ongoing Consulting Activities

The CM makes recommendations to team members regarding constructability, cost, phasing and sequencing of construction, construction duration, impact of alternative construction methods and separation of contract categories.

At the end of the design phase, designated representatives of each team member review all design documents and concur that they are complete, coordinated, adequately representative of the owner's needs, and suitable for construction.

2.4 Procurement Phase

The goal in this phase is to secure bidders for each bid package who are qualified, competitive, interested in the work, and capable of doing the work within the project time requirements.

Bidding and Contracting Process

The bidding and contracting process is a key element in the success of the project. The CM is responsible for performing or assisting the owner with the following procurement phase activities:

- Solicitation and pre-qualification of bidders and guidelines by which bidders will be evaluated
- Notices and advertisements

- Bidders' interest campaign
- Delivery of bid documents
- Information to bidders
- Issuance of addenda
- Bid opening and evaluation
- Monitoring compliance with and execution of construction contracts
- Arrangement for owner purchased equipment and materials
- Provision for permits, insurance and labor affidavits

Meetings

The following meetings may be part of the bid and award process:

- Pre-bid meetings
- Bid openings
- Pre-award conferences

Each of the above tasks and meetings are described in more detail in Section 6.0, Contract Administration.

2.5 Construction Phase

The goal in this phase is to expedite and improve the efficiency of the construction process through professional planning and execution of project activities, all focused upon fulfilling the owner's scope, cost, quality, and time requirements.

Prior to construction, the CM should develop a project specific Construction Management Plan that clearly identifies the roles, responsibilities and authority of the project team and the procedures to be followed during construction.

Below is an outline of key construction phase activities. A detailed identification of separate elements is presented in Section 6.0, Contract Administration.

On-Site Facilities

The CM should verify that office facilities and site work required for general access and utilities to all on-site organizations are provided. The cost of the work may be paid directly by the owner or by the CM as a reimbursable cost. Alternatively, some or all of the work may be included in individual construction contracts.

Coordination

The CM provides coordination and leadership of the individual professionals and contractor(s) in meeting the project requirements. To help accomplish this, all communications with professionals and contractor(s) are either through the CM or with his prior knowledge. There is no circumventing of formally established lines of communication by the owner, design professional or individual contractor(s).

Meetings

There are three (3) basic categories of meetings involved in the construction phases: pre-construction, progress, and special meetings.

The purpose of pre-construction meetings is to orient all on-site contractors to project procedures and site utilization requirements and to review near term and long term activity plans. The CM will discuss a comprehensive list of contract communication, administrative and coordination requirements including the lines of communication, shop drawing procedures, and general written communication protocol.

Progress meetings are designed to monitor compliance with schedules and the requirements of the contract documents to coordinate the contractor(s) efforts and to allow short- and mid-term planning and problem solving. The CM organizes, conducts, and records regularly scheduled progress meetings involving the CM, contractor's principal personnel, the design professional, and the owner, as required. Meetings may be conducted weekly, bi-weekly or at least once a month.

Special meetings are called, as necessary, to resolve issues of an immediate or short term planning nature that cannot wait until the regularly scheduled progress meetings, or to discuss issues requiring detailed discussions not suitable for the progress meeting. Although the CM has primary responsibility for determining the need for these meetings, the owner, design professional or contractor may call a special meeting through the CM.

Time Management

The CM establishes procedures for planning and monitoring compliance with the project time line, which relates to the master and detailed construction schedules. This procedure involves the owner and design professional at appropriate time intervals.

It is important that this process also involve the on-site contractors in the development and updating of project schedules. The CM should generate cooperation and obtain commitment from each contractor to complete the project within the owner's time requirements and as required by the contract documents.

The CM should also look for opportunities to recover schedule slippages as appropriate. The time management process also forms the basis for evaluating and resolving time related contract claims.

Budget and Cost Monitoring

For the benefit of the owner, the CM maintains responsibility for tracking, projecting, and monitoring costs through the construction phase. As contracts are awarded, the individual line item estimates are replaced with actual committed amounts, plus cost estimates for any unknowns or contingencies. The goal is to manage the incurred costs, estimated costs and costs to complete in order to stay within the budget.

Payment Requests

The CM should implement procedures for processing contractor's payments in conformance with contract requirements. Monthly meetings should be scheduled to review and discuss the pay request.

Change Orders

The specific, documented procedures for initiating and approving contractor change orders are implemented by the project team. The CM should take the lead in administering this procedure.

Claims Management

The CM establishes methods and procedures to minimize the impact of claims through prompt and equitable resolution with minimal disruption to the ongoing construction effort. Procedures should address receiving and disposition of claims submitted, merit evaluation, entitlement evaluation, negotiation and settlement procedures, handling of disputes, and appeal procedures. All claims and potential claims should be discussed weekly at the progress meetings.

Quality Management

The CM monitors contractor compliance with the quality level expected for the project.

The CM develops procedures for monitoring the quality of work being performed. The CM's responsibilities for quality control or quality assurance should be clearly spelled out in the CM's contract.

In most cases the construction contractor is responsible for the quality control function and compliance with the quality required by the contract documents.

The CM arranges for and coordinates field testing which is not a part of individual contractor's work scope.

Acceptance and Performance Testing

If so required by the contract, the CM will monitor the acceptance and performance testing to see that it is conducted in accordance with contract requirements. The contractor will need to provide opportunity for observation of these tests by the CM as well as filing all appropriate test reports.

Final Inspection and Punch Lists

After receiving written requests from the contractor, the inspection staff will consider whether the contract work is substantially complete and will conduct a final inspection with the contractor, project staff and owner's representatives. During the final inspection, the CM develops the project punch list of remaining contract work. If the remaining items are not critical to occupancy or use, the contract will be declared substantially complete. The CM must monitor the completion of the remaining punch list items which should be completed by the time frame specified in the bid

documents. Upon completion of the punch list, the CM will issue a final inspection report.

Owner Occupancy (Partial Acceptance/Beneficial Occupancy)

Upon declaring the contract substantially complete, the CM will assist the owner in taking beneficial occupancy of the project. This may include filing of the appropriate reports and approvals before governing boards or other owner representatives. In certain circumstances, partial acceptance can be taken for project elements that are substantially complete.

Owner Purchased Materials and Equipment

Prior to construction, the CM should identify long lead materials and equipment for pre-purchasing, and other materials and equipment, which could be direct purchased to the owner's advantage. During construction, the CM coordinates scheduling, on-site delivery and storage, and installation and start-up requirements for these materials and equipment.

Record Drawings

Record drawings should be provided by the contractor(s) doing the work and, minimally, be in the form of a dedicated set of contract drawings and specifications marked up as the work is installed. The CM should monitor the record drawing process monthly during construction in conjunction with review of contractor application for payment, and should receive these drawings at the completion of construction for transmittal to the owner, together with a set of specifications.

Record Keeping

A smooth, efficient and expeditious flow of paperwork is critical to project operations. The CM should establish systems for flow of all project related paperwork.

Management Reporting

The CM has a responsibility for establishing a management reporting system to keep the various team members informed on project status.

The CM should determine the type, format, frequency and distribution of information and reports required in accordance with the Construction Management Plan and the Project Procedures Manual.

LEED Management

The CM shall establish a tracking system to monitor compliance with the established LEED goals for the project. Closely associated with acceptance and performance testing is commissioning for the purposes of LEED certification. The CM should be familiar with these requirements and is referred to in the United States Green Building Council publications for reference. The CM, in coordination with the project designer, oversees the commissioning process when an independent commissioning agent is retained. Otherwise, the CM will be responsible for the commissioning

process. While commissioning is underway, the CM must complete and submit all LEED documentation for certification of points obtainable during the construction process and in accordance with contract documents. It is strongly recommended that, for a LEED project, the CM have a LEED Accredited Professional on staff as an integral part of the project management team.

2.6 Post-Construction Phase

Expeditious and effective project close-out is a critical element of a successful project. The CM's responsibility in this phase typically consists of the following:

- Obtaining LEED certification
- Completion of punch list items not required for substantial completion
- Facilitating owner occupancy
- Assembling record drawings for as-built documentation
- Warranty, guaranty, and operation and maintenance manuals
- Pursuing resolution of warranty items
- Documentation of final pay quantities and costs
- Preparing contract files for transfer to owner
- Final payment and contract acceptance

Assembling Record Drawings for As-Built Documentation

As indicated in the previous section, record drawings are maintained by the contractor and should be inspected monthly during the construction process to ensure the timely submittal of complete documentation to the owner at project completion. These record drawings are then submitted to the owner or design team for generation of the as-built documentation. The CM must ensure that accurate and timely as-built drawings and specifications are provided to the owner as soon after completion of construction as possible.

Warranty, Guaranty, and Operation and Maintenance Manuals

Prior to project close-out, the CM must gather all warranty, guaranty and O&M manuals, ensure that all comply with contract requirements and submit these to the owner. If specialized training is required, the CM oversees training by the contractor, which usually must occur before formal acceptance of the project.

Warranty Administration

If requested by the owner, the CM should manage the resolution of all issues identified as warranty issues, including evaluating whether the issue is in fact a warranty issue, notification of the prime contractor and appropriate sales and suppliers, and verification that warranty work is satisfactorily completed.

Documentation of Final Pay Quantities and Costs

The CM must compile documentation to support final quantities and final payment of unit price items and change order work. Documentation must be sufficient for audit purposes.

Preparing Contract Files for Transfer to Owner

The CM must prepare the contract files in accordance with the owner's requirements to facilitate their transfer to the owner for archiving.

Final Payment and Contract Acceptance

The CM should support the owner to accept the contract as complete and process the final payment.

Final Payment and Closing the Contract

The CM assembles all documents relating to final payment, including retention, unresolved change orders and unpaid invoices, for approval by the owner. Once approval is received for the final payment, which resolves all outstanding financial obligations with the contractor, the payment is processed and the contract closed. If there are any claims or adjustments requested by the contractor, the contract cannot be closed until these are completely resolved.

Additional information can be found in the sections on Cost Management, Time Management, and Contract Administration for specifics and detail.