



## Construction Project Management

An electronic handbook  
compiled and edited by  
Asian Contractor Association  
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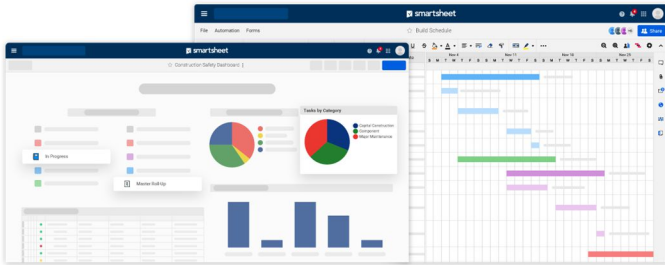


## What Is Construction Project Management (CPM)?

According to the Project Management Institute (PMI), project management is “the art of directing and coordinating human and material resources throughout the life of a project by using modern management techniques to achieve predetermined objectives of scope, cost, time, quality, and participating objectives.” You can extend PMI’s definition to construction project management, wherein a construction project manager uses the same model to achieve the same goal, only in a construction context.

At its most fundamental level, construction project management handles the planning, coordination, and execution of a construction project, whether it’s agricultural, residential, commercial, institutional, industrial, heavy civil, or environmental.

Construction project management typically includes complicated tasks that can shift wildly, depending on the work at hand, and it requires strong skills in communication, deep knowledge of the building process, and the ability to problem-solve. Construction project management is a complex field, requiring knowledge in many different areas like finance, mediation, law, business, and more.



The management of construction projects requires knowledge of modern management as well as an understanding of the design and construction process. Construction projects have a specific set of objectives and constraints such as a required time frame for completion. While the relevant technology, institutional arrangements or processes will differ, the management of such projects has much in common with the management of similar types of projects in other specialty or technology domains such as aerospace, pharmaceutical and energy developments. If you are looking for a software to manage your construction project, take a look at our Top 5 Best Construction Project Management Software.

Generally, project management is distinguished from the general management of corporations by the mission-oriented nature of a project. A project organization

will generally be terminated when the mission is accomplished. According to the Project Management Institute, the discipline of project management can be defined as follows:

Project management is the art of directing and coordinating human and material resources throughout the life of a project by using modern management techniques to achieve predetermined objectives of scope, cost, time, quality and participation satisfaction.

By contrast, the general management of business and industrial corporations assumes a broader outlook with greater continuity of operations. Nevertheless, there are sufficient similarities as well as differences between the two so that modern management techniques developed for general management may be adapted for project management.

## The Basic Ingredients

The basic ingredients for a project management framework may be represented schematically in the figure below. A working knowledge of general management and familiarity with the special knowledge domain related to the project are indispensable. Supporting disciplines such as computer science and decision science may also play an important role. In fact, modern management practices and various special knowledge domains have absorbed various techniques or tools which were once identified only with the supporting disciplines. For example, computer-based information systems and decision support systems are now common-place tools for general management. Similarly, many operations research techniques such as linear programming and network analysis are now widely used in many knowledge or application domains.

Specifically, project management in construction encompasses a set of objectives which may be accomplished by implementing a series of operations subject to resource constraints. There are potential conflicts between the stated objectives with regard to scope, cost, time and quality, and the constraints imposed on human material and financial resources. These conflicts should be resolved at the onset of a project by making the necessary tradeoffs or creating new alternatives. Subsequently, the functions of project management for construction generally include the following:

1. Specification of project objectives and plans including delineation of scope, budgeting, scheduling, setting performance requirements, and selecting project participants.
2. Maximization of efficient resource utilization through procurement of labor, materials and equipment according to the prescribed schedule and plan.

3. Implementation of various operations through proper coordination and control of planning, design, estimating, contracting and construction in the entire process.
4. Development of effective communications and mechanisms for resolving conflicts among the various participants.

### **Nine Distinct Areas**

The Project Management Institute focuses on nine distinct areas requiring project manager knowledge and attention:

1. Project integration management to ensure that the various project elements are effectively coordinated.
2. Project scope management to ensure that all the work required (and only the required work) is included.
3. Project time management to provide an effective project schedule.
4. Project cost management to identify needed resources and maintain budget control.
5. Project quality management to ensure functional requirements are met.
6. Project human resource management to development and effectively employ project personnel.
7. Project communications management to ensure effective internal and external communications.
8. Project risk management to analyze and mitigate potential risks.
9. Project procurement management to obtain necessary resources from external sources.

These nine areas form the basis of the Project Management Institute's certification program for project managers in any industry.

### **Transform construction management with Smartsheet's template set solution.**

This set of templates allows you to track each project with its own dedicated project sheet and get a unified view across all projects in a dashboard. Monitor tasks across projects and capture on-site issues through a simple form on desktop or mobile.

### **History of Construction Management, from the Pyramids to Today**

As long as there have been complex building projects, there have been project managers. For centuries, however, the person overseeing the construction of a complex building was often the architect, which is thought to be the case in ancient structures like the Great Pyramids of Egypt and the aqueducts of Rome.

Into the Renaissance, individual architects began to be known for their designs, like Sir Christopher Wren of England. Wren designed and built buildings in the late 17th and early 18th centuries, including the masterpiece St. Paul's Cathedral, that help give London its rich countenance. Wren had a breadth of knowledge that would foreshadow the types of skills needed on a complicated construction project, with expertise in advanced mathematics and physics, as well as in design. He was on his building sites every day overseeing every phase of the works.

The rules of project management began to take shape across corporate America around the time of World War II, and by the 1950s, they were guiding civil construction projects. This meant that the phases and tenets of managing a construction engineering project were now being applied to a variety of corporate projects.

More and more details of managing a construction project can be done digitally (see software section below), and that trend is expected to grow. Mobile-friendly technology and software are set to play a major role in the field, as a younger workforce is more comfortable with the technology, and it will allow the work to be managed and tracked from anywhere.

### **The Role of a Project Manager in Construction Management**

Construction project managers shoulder the responsibility of keeping the project moving according to plan. The goal is to manage the project so that it finishes on schedule and within budget, while still meeting building codes, plans, and specs. A construction project manager may also be charged with setting the parameters, finances, and calendar; vetting and hiring subcontractors and on-site workers; developing a strategy for potential conflict resolution; and more.

The Construction Management Association of America, a U.S. construction management certification and advocacy body, says the 120 common responsibilities of a construction manager fall into these seven categories:

- Project management planning
- Cost management
- Time management
- Quality management
- Contract administration
- Safety management
- Construction management professional practices (manage the team working on the project, define each person's role and responsibilities, etc.)

## The Role of a Contractor in Construction Management

First up in any construction project is the design phase, and when that's finished, the construction project manager opens the bidding process to interested contractors. To qualify for consideration, contractors must be able to show they can handle public safety; decision-making, engineering, drafting, human resources, and time, cost, and quality management. The contractors who meet these guidelines are then chosen through low-bid selection, best-value selection, or qualifications-based selection — all common measures.

### Construction Project Management Basics: How to Win the Project

When a project owner is ready to get started, the owner will share project information to a large group of contractors, general contractors, or subcontractors to solicit bids. The process starts with a cost estimate from blueprints and material take-offs, telling the owner how much money he or she should expect to pay for the contractor to complete the project.

A contractor can expect two kinds of bids:

- **Open Bid:** Open bids apply to public projects and are usually advertised. With an open bid, any contractor can put in an offer.
- **Closed Bid:** The process for a private project starts with a closed bid, wherein the owner invites a select group of contractors to send in their bids.

Whether the owner chooses an open or a closed bid process for the project, the bids will then come in, and the selection of a contractor can commence based on a number of criteria:

- **Low-Bid Selection:** The bottom line — aka the price — is the main focus for the project owner. The winning contractor is the one who submits the lowest price for the project.
- **Qualifications-Based Selection:** In this process, the project owner asks contractors to submit with their bid a request for qualifications (RFQ), which summarizes the contractor's experience, plans for management, organizational flow, and success in staying on budget and on schedule. The project owner then chooses the contractor with the best qualifications.
- **Best-Value Selection:** In this approach, the project owner considers both the bid price and the contractor's qualifications to find the best combination of cost and skill set.

The next and final step after an owner chooses a contractor is to negotiate a payment agreement. Both parties typically select from four payment models:

- **Lump Sum:** A lump-sum contract is the most prevalent choice. The project owner and the contractor come together on the overall cost for the work, and the owner must pay that amount, regardless of the project's success or if the final bill surpasses the initial quoted price.
- **Cost-Plus-Fee:** As the name suggests, cost-plus-fee includes the total cost of the project as well as a fixed fee percentage of the overall cost to the contractor, all of which the owner must pay. This is the most contractor-friendly arrangement, since it covers all additional costs.
- **Guaranteed Maximum Price:** With a guaranteed maximum price contract, the owner and contractor agree on a set price that the total cost and fee cannot exceed.
- **Unit Price:** If the two parties can't agree on the cost ahead of time, they opt for a unit-price model, in which the owner pays out a specific unit price throughout each phase of the project.

### The Construction Management At-Risk Delivery Method

"CM at-risk" is a delivery method growing in popularity in the United Kingdom and around the world, and it refers to the business relationship between a construction contractor, owner, and architect (or designer). With this plan, the construction manager commits to completing the project for a guaranteed maximum price (GMP) and plays two roles: He or she is a consultant to the owner through development and design (pre-construction services), then shifts to general contractor responsibilities during construction. Thus, the fundamental character of the professional relationship is changed.

In addition to acting in the owner's interest, the construction manager must control construction costs to stay within the GMP. Because the arrangement guarantees a maximum payment, low bids are typically not considered. Instead, the construction manager will work toward fulfilling the financial goal through other avenues.

The advantage of a CM at-risk arrangement is budget management. Before a project's design is completed (six to 18 months of coordination between designer and owner), the construction manager is involved with estimating the cost of constructing a project based on the goals of the designer and owner (design concept) and the project's scope, all while achieving optimal quality. The construction manager will have to be ready for potential changes to balance the costs, schedule, quality, and scope of the project while still meeting the financial goals.

For example, instead of a redesign, the construction manager may suggest modifications instead. Or if the owner decides to expand the project, the team will have to make adjustments before pricing. To keep a handle on the budget

before design is complete and construction crews are called up, the construction manager conducts site visits and purchases major items ahead of demand.

**Advantages:** In this arrangement, the construction manager assumes the risk, so he or she has an incentive to act in the owner's interest and to efficiently manage costs, considering GMP overruns would be the responsibility of the manager's company.

**Drawbacks:** A cost overrun could cost the construction manager a great deal of money. The CM is allowed some mistake-related contingency, so there is a possibility that they will compensate by reducing the scope of the work to fit the GMP. Also, since the GMP is decided before design begins, it is difficult for owners to know whether they received the best possible bid.

**Bottom Line:** An at-risk delivery method is best for large projects — both complete construction and renovation — that are not easy to define, have a possibility of changing in scope, or must meet strict schedule deadlines. It can also be an efficient method in projects containing technical complexity, multi-trade coordination, or multiple phases.

**Accelerated Construction Techniques:** Starting with its Accelerated Bridge Program in the late 2000s, the Massachusetts Department of Transportation began employing accelerated construction techniques, in which it signs contracts with incentives for early completion and penalties for late completion, and uses intense construction during longer periods of complete closure to shorten the overall project duration and reduce cost. The federal and California Departments of Transportation also employed this technique after the Northridge earthquake in 1994 to speed up repair of freeways in the Los Angeles area.

## Business Models for Construction Projects

The bidding process is usually consistent no matter the type of construction project, but you can expect two business models in the construction industry:

- **Design-Bid-Build Contracts:** Both popular and prevalent, design-bid-build contracts allow the owner to choose a contractor after an architect or engineer completes the design phase.
- **Design-Build Contracts:** The opposite of design-bid-build, in a design-build contract, the design and construction phases are handled by the same party (referred to as the design-builder or the design-build contractor). This approach speeds up the project's completion since the design and construction phases can happen simultaneously.

As noted in the two above models, the bidding process begins with the design phase. The design stage itself can be broken down into different approaches.

- **Conceptual/Programming and Feasibility:** This model uses the final vision of the building as the starting point to determine needs, goals, and objectives. Considerations include the building size, the number of rooms, how the space will be used, and even who will be using the space. This information is generally captured in a spreadsheet listing each room, the critical information about those spaces, and the approximate square footage of each area.
- **Schematic Design:** Schematic designs are drawings or sketches used to identify spaces, shapes, and patterns. Not every part of a construction project can be sketched, of course, but those that can be are in this type of design. The drawings note materials, colors, and textures. These sketches can also capture floorplans, where structures like elevators will be placed, and so on.

## 5 Phases of Project Management

According to [PMI](#), “project management is the application of knowledge, skills, tools, and techniques to a broad range of activities in order to meet the requirements of a particular project.” There are five phases of project management and if the lifecycle provides a high-level view of the project, the phases are the roadmap to accomplishing it.



### Phase 1: Project Initiation

This is the start of the project, and the goal of this phase is to define the project at a broad level. This phase usually begins with a business case. This is when you will research whether the project is feasible and if it should be undertaken. If feasibility testing needs to be done, this is the stage of the project in which that will be completed.

Important stakeholders will do their due diligence to help decide if the project is a “go.” If it is given the green light, you will need to create a project charter or a project initiation document (PID) that outlines the purpose and requirements of the project. It should include business needs, stakeholders, and the business case. Note: There are plenty of PID templates that adhere to PMBOK® Guide guidelines available online that you can download to help you get started.

*Tip: When creating a PID, don’t get too bogged down in technical requirements. Those will be clarified and clearly defined in Phase 2.*

### Phase 2: Project Planning

This phase is key to successful project management and focuses on developing a roadmap that everyone will follow. This phase typically begins with setting goals. Two of the more popular methods for setting goals are S.M.A.R.T. and CLEAR:



**S.M.A.R.T. Goals** – This method helps ensure that the goals have been thoroughly vetted. It also provides a way to clearly understand the implications of the goal-setting process.

**Specific** – To set specific goals, answer the following questions: who, what, where, when, which, and why.

**Measurable** – Create criteria that you can use to measure the success of a goal.

**Attainable** – Identify the most important goals and what it will take to achieve them.

**Realistic** – You should be willing and able to work toward a particular goal.

**Timely** – Create a timeframe to achieve the goal.

For more information about S.M.A.R.T. goals and to download free S.M.A.R.T. goal templates, read "[The Essential Guide to Writing S.M.A.R.T. Goals.](#)"

**C.L.E.A.R. Goals** – A newer method for setting goals that takes into consideration the environment of today’s fast-paced businesses.

**Collaborative** – The goal should encourage employees to work together.

**Limited** – They should be limited in scope and time to keep it manageable.

**Emotional** – Goals should tap into the passion of employees and be something they can form an emotional connection to. This can optimize the quality of work.

**Appreciable** – Break larger goals into smaller tasks that can be quickly achieved.  
**Refinable** – As new situations arise, be flexible and refine goals as needed.

During this phase, the scope of the project is defined and a project management plan is developed. It involves identifying the cost, quality, available resources, and a realistic timetable. The project plans also includes establishing baselines or performance measures. These are generated using the scope, schedule and cost of a project. A baseline is essential to determine if a project is on track.

At this time, roles and responsibilities are clearly defined, so everyone involved knows what they are accountable for. Here are some of the documents a PM will create during this phase to ensure the project will stay on track:

- **Scope Statement** – A document that clearly defines the business need, benefits of the project, objectives, deliverables, and key milestones. A scope statement may change during the project, but it shouldn’t be done without the approval of the project manager and the sponsor.
- **Work Breakdown Schedule (WBS)** – This is a visual representation that breaks down the scope of the project into manageable sections for the team.
- **Milestones** – Identify high-level goals that need to be met throughout the project and include them in the Gantt chart.
- **Gantt Chart** – A visual timeline that you can use to plan out tasks and visualize your project timeline.
- **Communication Plan** – This is of particular importance if your project involves outside stakeholders. Develop the proper messaging around the project and create a schedule of when to communicate with team members based on deliverables and milestones.
- **Risk Management Plan** – Identify all foreseeable risks. Common risks include unrealistic time and cost estimates, customer review cycle, budget cuts, changing requirements, and lack of committed resources.

**Tip:** When creating a WBS, work packages shouldn’t be longer than 10 days. Be sure to solicit the input and perspective from team members about their specific tasks.

### Phase 3: Project Execution

This is the phase where deliverables are developed and completed. This often feels like the meat of the project since a lot is happening during this time, like status reports and meetings, development updates, and performance reports. A “kick-off” meeting usually marks the start of the Project Execution phase where the teams involved are informed of their responsibilities.

Tasks completed during the Execution Phase include:

- Develop team
- Assign resources
- Execute project management plans
- Procurement management if needed
- PM directs and manages project execution
- Set up tracking systems
- Task assignments are executed
- Status meetings
- Update project schedule
- Modify project plans as needed

While the project monitoring phase has a different set of requirements, these two phases often occur simultaneously.

**Tip:** Consider using cloud-based project management software so team members can update task status in real time.

#### Phase 4: Project Performance/Monitoring

This is all about measuring project progression and performance and ensuring that everything happening aligns with the project management plan. Project managers will use key performance indicators (KPIs) to determine if the project is on track. A PM will typically pick two to five of these KPIs to measure project performance:



- **Project Objectives:** Measuring if a project is on schedule and budget is an indication if the project will meet stakeholder objectives.
- **Quality Deliverables:** This determines if specific task deliverables are being met.
- **Effort and Cost Tracking:** PMs will account for the effort and cost of resources to see if the budget is on track. This type of tracking informs if a project will meet its completion date based on current performance.
- **Project Performance:** This monitors changes in the project. It takes into consideration the amount and types of issues that arise and how quickly they are addressed. These can occur from unforeseen hurdles and scope changes.

During this time, PMs may need to adjust schedules and resources to ensure the project is on track

**Tip:** Review the business case at the end of each phase and make adjustments to the project plan as needed.

#### Phase 5: Project Closure

This phase represents the completed project. Contractors hired to work specifically on the project are terminated at this time. Valuable team members are recognized. Some PMs even organize small work events for people who participated in the project to thank them for their efforts. Once a project is complete, a PM will often hold a meeting – sometimes referred to as a “post mortem” – to evaluate what went well in a project and identify project failures. This is especially helpful to understand lessons learned so that improvements can be made for future projects.

Once the project is complete, PMs still have a few tasks to complete. They will need to create a project punchlist of things that didn’t get accomplished during the project and work with team members to complete them. Perform a final project budget and prepare a final project report. Finally, they will need to collect all project documents and deliverables and store them in a single place.

**Tip:** Using a cloud-based software solution is an easy way to collect and save all project documents in one location throughout the life of the project.

#### Smartsheet for Project Management

Smartsheet is a spreadsheet-inspired project management platform with powerful collaboration and communication features. By providing a broad range of views including Gantt, calendar, grid, and dashboards, you can manage projects the way you want. Track project requirements, store documents, create timelines, and organize key details.

The Smartsheet Solution Center includes hundreds of pre-built templates and template sets you can customize. The **Project Tracking and Rollup Template Set** is a quick and easy way to get a project up and running and report on risks and milestones to stakeholders.

## ACA Member Services

1. Business and Technical Consultation
2. Asian Subcontractor/Sub-consultant Referral Services
3. Plan Room Services
4. Plan Reading, Cost Estimating Consultation (RSMMeans)
5. Bid/Event Notifications
6. Minority Business Enterprise Certification Application, Renewal and Profile Change Process
7. Proposal Writing and Bid Submission
8. Contract Compliance and Contract Review
9. Non-payment Or Other Disputes With Prime Contractors
10. M/WBE Program Ordinance and Compliance Plan Orientation
11. How To Use Vendor Connection
12. Translations
13. Liaison Services Between Vendors and City Departments
14. Assist Vendors to Resolve Bid or Project Related Issues
15. Assist Vendors to Research Current and Past City Solicitations or Winning Proposals
16. Collective Representation to Improve Asian Vendor Utilization
17. Other Individualized Services Upon Request

## Asian Contractor Association

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in the Greater Austin Metro Area since 2001

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