

non-profit associations, privately funded schools, hospitals, publicly traded companies, etc. Anything, in other words, that is not the government.

Private construction projects come in all different shapes and sizes, and this is when it's useful to look at the character of the work performed to segment private construction into different subcategories. These subcategories would include:

Residential Construction: Whenever construction work is being performed to a single-family residence or a residential facility with (usually) less than 3 or 4 units. If you are working on an apartment complex this would more likely be considered a commercial project instead of a residential project. Similarly, if you are working at a condominium, the work would be residential if upon a single unit, but if on the entire complex or the common elements, the work would more likely be considered commercial.

Commercial Construction: Commercial construction is the construction of any buildings or similar structures for commercial purposes. Commercial construction includes a huge variety of projects including building restaurants, grocery stores, skyscrapers, shopping centers, sports facilities, hospitals, private schools and universities, etc.

Industrial Construction: This is a relatively small segment of the construction industry. These projects include power plants, manufacturing plants, solar wind farms, refineries, etc. While termed "industrial construction," it is pretty interchangeable with "commercial construction."

2) STATE CONSTRUCTION PROJECTS

Some people get confused by the term "state" when talking about state construction projects because the term "state" can refer to projects commissioned by a county, city, municipality, government board, public school board or any other state-funded entity. The term "state construction" means, therefore, any government funded construction that is not "federal" – which is discussed in the next section.

State construction projects can take a variety of forms.

They can be pretty traditional projects like the construction of a public school or government building (like a court room). These projects can also be pretty sophisticated, such as the construction of a bridge, sewer line, highways, etc.

3) FEDERAL CONSTRUCTION PROJECTS

Federal construction projects are very similar to state projects. Just like state projects they can take on a variety of forms: very simple and traditional, and very complex. And the stuff being constructed can be pretty similar to the stuff constructed by state authority: courthouses, government buildings, flood control projects, etc.

Major Types of Construction Projects In planning for various types of construction, the methods of procuring professional services, awarding construction contracts, and financing the constructed facility can be quite different. The broad spectrum of constructed facilities may be classified into four major categories, each with its own characteristics.

1.5.1 Residential Housing Construction Residential housing construction includes houses and high-rise apartments. During the development and construction of such projects, the developers usually serve as surrogate owners and take charge, making necessary contractual agreements for design and construction, and arranging the financing and sale of the completed structures. Residential housing designs are usually performed by architects and engineers, and the construction executed by builders who hire subcontractors for the structural, mechanical, electrical and other specialty work.

Figure 1.3: Level of influence vs. project duration The residential housing market is heavily affected by general economic conditions. Often, a slight increase in total demand will cause a substantial investment in construction, since many housing projects can be started at different locations by different individuals and developers at the same time. Because of the relative ease of

entry, many new builders are attracted to the residential housing construction. Hence, this market is highly competitive, with potentially high risks as well as high rewards.

1.5.2 Institutional and Commercial Building Construction Institutional and commercial building encompasses a great variety of project types and sizes, such as schools and universities, medical centers and hospitals, sports facilities, shopping centers, warehouses and light manufacturing plants, and skyscrapers for offices and hotels. The owners of such buildings may or may not be familiar with construction industry practices, but they usually are able to select competent professional consultants and arrange the financing of the constructed facilities themselves. Specialty architects and engineers are often engaged for designing a specific type of building, while the builders or general contractors undertaking such projects may also be specialized in only that type of building. Because of the higher costs and greater sophistication of institutional and commercial buildings in comparison with residential housing, this market segment is shared by fewer competitors. Since the construction of some of these buildings is a long process which once started will take some time to proceed until completion, the demand is less sensitive to general economic conditions than that for housing construction.

1.5.3 Specialized Industrial Construction Specialized industrial construction usually involves very large scale projects with a high degree of technological complexity, such as oil refineries, steel mills, chemical processing plants and coal-fired or nuclear power plants. The owners usually are deeply involved in the development of a project, and prefer to work with designers-builders such that the total time for the completion of the project can be shortened. They also want to pick a team of designers and builders with whom the owner has developed good working relations over the years. Although the initiation of such projects is also affected by the state of the economy, long range demand forecasting is the most important factor since such projects are capital intensive and require considerable amount of planning and construction time. Governmental regulation such as environmental protection can also influence decisions on these projects.

1.5.4 Infrastructure and Heavy Construction Infrastructure and heavy construction includes projects such as highways, tunnels, bridges, pipelines, drainage systems and sewage treatment

plants. Most of these projects are publicly owned and therefore financed either through bonds or taxes. This category of construction is characterized by a high degree of mechanization, which has gradually replaced some labor intensive operations. The engineers and builders engaged in infrastructure construction are usually highly specialized since each segment of the market requires different types of skills. However, demands for different segments of infrastructure and heavy construction may shift with saturation in some segments. For example, as the available highway construction projects are declining, some heavy construction contractors quickly move their work force and equipment into the field of mining where jobs are available.

The Construction Process is composed of six distinct stages, which are:

- Concept.
- Contracts and Bid Documents.
- Bidding.
- Construction.
- Construction Payments.
- Completion.

the functions of a Construction Manager?

Construction Management is the overall planning, coordination and control of a project from inception to completion aimed at meeting a client's requirements in order to produce a functionally and financially viable project.

eConstruction Management is project management that applies to the construction sector.

The functions of construction management typically include the following:

1. Specifying project objectives and plans including delineation of scope, budgeting, scheduling, setting performance requirements, and selecting project participants.
2. Maximizing resource efficiency through procurement of labour, materials and equipment.
3. Implementing various operations through proper coordination and control of planning, design, estimating, contracting and construction in the entire process.
4. Developing effective communications and mechanisms for resolving conflicts.

Main responsibilities of a Construction Manager

The most common responsibilities of a Construction Manager can be classified as follows:

- Project Management;
- Planning;
- Cost Management;
- Time Management;
- Quality Management;
- Contract Administration;
- Safety Management;

Construction management Professional Practice (which includes specific activities like defining the responsibilities and management structure of the project management team, organizing and leading by implementing project controls, defining roles and responsibilities and developing communication protocols, and identifying elements of project design and construction likely to give rise to disputes and claims.

For those currently looking for a job as a Construction Manager, there could not be a better time. The sector is growing, and there are plenty of opportunities available. Check out our top Construction Manager jobs, or call our teams around the UK (links below) to talk over your job search or job vacancy requirements.

Construction Planning

An administrative process by which suitable line of action is selected out of the various alternatives available for the project work is called planning

Importance of construction project/construction planning:

- Planning helps to minimize the cost by optimum utilization of available resources.
- Planning reduces irrational approaches, duplication of works and inter departmental conflicts.
- Planning encourages innovation and creativity among the construction managers.
- Planning imparts competitive strength to the enterprise.

Importance of Construction Management:

- Construction management practices invariably lead to “maximum production at least cost”. A good construction management, results in completion of a construction project with in the stipulated budget.
- Construction management provides importance for optimum utilization of resources. In other words, it results in completion of a construction project with judicious use of available resources.
- Construction management provides necessary leadership, motivates employees to complete the difficult tasks well in time and extracts potential talents of its employees.
- Construction management is beneficial to society as the effective and efficient management of construction projects will avoid, escalation of costs, time overrun, wastage of resources, unlawful exploitation of labor and pollution of environment.

Stages of construction planning

1. Pretender planning
2. Contract planning

Pretender planning

The majority of work secured by a contractor is done so by some form of competitive tendering process.

The importance of gaining as much information as possible about the proposed contract and site cannot be over emphasized.

The contract documentation and tender drawings will provide a useful starting point but most Estimators will need to visit the proposed site to get a ‘feel’ for the contract and the environment in which the work will take place.

The initial examination of a site may be divided into 3 stages:

- The Site Visit
- The Desk Top Study
- Soil Exploration / insitu testing (These usually result in laboratory analysis of soil samples and a formal report for use by the tender team).

The extent of this investigation is in reality often limited to the site visit and desk top information which increases the risks taken by the contractor.

The extent upon which the estimator will complete each of these stages will depend upon the complexity of the contract, the need to secure the new work.

Thus the site visit and the recording of such information to relay back to the tender team will have a profound effect upon the tender figure eventually arrived at and submitted to the client.

Site visit will vary according to whether the site is Compact (Traditional enclosed area) or Extended (sewers runs, pipelines or coastal defences).

Considerations will include:

- Access and egress points to the site present
- Temporary roads and access points needed
- Ground conditions especially where bore hole information has not been provided within the contract documents.
- Standing surface water / ponding
- Excavations which can be examined.
- Water courses
- Surface contamination
- Existing buildings on the site
- Dumped rubbish or other clearance items
- Excavation challenges including machinery assessment removal of or storage of spoil
- Obvious service location and type of service
- Potential vandalism in the area
- Security arrangements and the type of hoarding or fencing required
- Temporary buildings location and type
- Adjacent buildings type and proximity
- Crane operation and access
- Local restrictions pedestrian restrictions / police restrictions local events
- Local knowledge

Many other considerations will apply on a site by site basis and most companies adopt a standardized site visit report or check list to ensure that items are not overlooked.

The Preliminaries section is very important in establishing the overall tender costs and will contribute a considerable percentage to the overall

Contract planning

It is the planning after the acceptance of a tender and award after a contract. It includes following

1. Preparation of labor requirement
2. Material statement chart

3. Master plan for carrying the work
4. Detailed drawings
5. Dates are decided for making orders for supply of material
6. Sequence of operations and their inter relationship to be planned

Methods of construction management

1. Critical path method
2. Program evaluation and review technique
3. Lean construction method
4. Line of balance method

Among the above first two are mostly followed

CRITICAL PATH METHOD

The critical path method (CPM) is a project modeling technique developed in the late 1950s by Morgan R. Walker of DuPont and James E. Kelley Jr. of Remington Rand.

CPM is commonly used with all forms of projects, including construction, aerospace and defense, software development, research projects, product development, engineering, and plant maintenance, among others. Any project with interdependent activities can apply this method of mathematical analysis.

The essential technique for using CPM is to construct a model of the project that includes the following:

1. A list of all activities required to complete the project (typically categorized within a work breakdown structure),
2. The time (duration) that each activity will take to complete,
3. The dependencies between the activities and,
4. Logical end points such as milestones or deliverable items.

PROGRAM EVALUATION REVIEW TECHNIQUE

The **program** (or **project**) **evaluation and review technique**, commonly abbreviated **PERT**, is a statistical tool, used in project management, which was designed to analyze and represent the tasks involved in completing a given project. First developed by the United States Navy in the 1950s

PERT is a method to analyze the involved tasks in completing a given project, especially the time needed to complete each task, and to identify the minimum time needed to complete the total project.

PERT VS CPM

COMPARISON	PERT	CPM
Meaning	PERT is a project management technique, used to manage uncertain activities of a project.	CPM is a statistical technique of project management that manages well defined activities of a project.
What is it?	A technique of planning and control of time.	A method to control cost and time.
Focus on	Event	Activity
Model	Probabilistic Model	Deterministic Model
Estimates	Three time estimates	One time estimate
Appropriate for	High precision time estimate	Reasonable time estimate
Management of	Unpredictable Activities	Predictable activities
Nature of jobs	Non-repetitive nature	Repetitive nature
Critical and Non-critical activities	No differentiation	Differentiated
Suitable for	Research and Development Project	Non-research projects like civil construction, ship building etc.

COST OPTIMIZATION

Cost optimization optimizes cost and one or more responses at the same time to determine the factor settings that are both cost-effective and produce acceptable values for the responses. Often the factor settings that produce the best results are the most expensive to do. Cost optimization determines a compromise between minimizing cost and optimizing the responses.