

Chapter 6

Introduction to Construction Management

CHAPTER HIGHLIGHTS

- ☞ *Introduction*
- ☞ *Conceptual and feasibility studies*
- ☞ *Engineering design*
- ☞ *Contracting and procurement*
- ☞ *Construction*
- ☞ *Commissioning*
- ☞ *Utilization and maintenance*
- ☞ *Types of construction projects*

INTRODUCTION

The civil engineering projects begins with an idea to fulfill the required demands and to provide basic amenities to the citizens. Generally, a project ends with infrastructure of facilities, recreational amenities, and industrial plants in operation, etc., in reality.

The various phases through which civil engineering projects have undergone are as follows:

1. Conceptual and feasibility studies
2. Engineering design
3. Contracting and procurement
4. Construction
5. Commissioning
6. Utilization and maintenance

Even though, every civil engineering project is unique in its character and varies with respect to types and degree of detail; during the life cycle, it certainly passes through the phases mentioned above.

CONCEPTUAL AND FEASIBILITY STUDIES

Ideas generated by individuals or a group of people are studied in this stage.

The important points carried out in this phase to establish the viability of a project are:

1. Conceptual development of model and its studies
2. Technical and economic feasibility studies
3. Environmental impact assessment
4. Land and geological survey of location of the project
5. Enumeration of major problems in translating the project into reality

Outcome of this stage is a report, dealing with investigation and studies concerning the problems to be encountered and their solutions.

ENGINEERING DESIGN

All the technical issues related to project are carried out and the engineers come out with best possible alternatives.

This phase is generally carried out in two phases:

1. Preliminary design
2. Detailed design

Lets us learn more about the designs.

Preliminary design: Primarily this stage involves studies of various design alternatives, their architectural aspects, and economic comparative studies.

Apart from this, detailed field investigation including soil testing, geological, hydrological data collection, market survey, etc., are also conducted.

Detailed design: In this stage, a project is broke down into various components. Each of the components or elements are designated and separately analyzed.

The detailed drawings, design details and specifications of various items of works are the outcome of this phase.

CONTRACTING AND PROCUREMENT

During this phase of a project, the bill of quantities is prepared and final cost estimate is worked out. Several agreements and relationships exist between different parties or persons involved in the project are defined and addressed in this stage.

The outcome of this stage is a contract document, which is an official and legal document describing the relationship among the various parties involved and the terms and conditions to execute the construction of the project.

CONSTRUCTION

Construction is considered to be an important phase of the project as huge amount of money is invested on this. Various issues related to project management are involved in this phase. Those are:

1. Methods of construction
2. Material, labour and equipment management
3. Construction planning and scheduling
4. Resource allocation
5. Quality check/quality conformation
6. Construction Safety
7. Organization management, subcontracting
8. Method of Reporting
9. Methods to resolve various issues and arbitration, etc.

Outcome of this phase of project is facilities or structures.

COMMISSIONING

Commissioning of a project is meant to check whether the project has been carried following the contract document.

The following are the activities generally carried out during this stage.

- Check the functioning of the entire system and each component, such that they act as desired and compliance with design and specification.
- To remove the defects identified, if any, during construction phase.

UTILIZATION AND MAINTENANCE

Maintenance is an important stage of a project when the life cycle costs are considered. The infrastructure facilities created should be fully utilized. Its maintenance should be given proper emphasis to improve the level of service.

TYPES OF CONSTRUCTION PROJECTS

Civil engineering or construction projects can be broadly classified as follows.

1. Building projects
2. Heavy engineering projects
3. Industrial projects

Let us learn more about the types of construction projects.

Building Projects

These can be further classified into:

1. Residential building
2. Commercial and other buildings:
 - (a) Residential buildings generally signify single, double or multi-storied human habitats. Commercial and other building includes hospitals, temples, cinema halls, government building, recreational facilities, offices, etc.
 - (b) In this type of projects, generally the architect act as a group leader and he coordinates the person from different disciplines, such as structural engineer, HVAC engineer, electrical engineer during design phase of the project.
 - (c) The construction phase of project is coordinated generally by the civil engineer.

Building construction, especially in India is labour intensive. This part is governed by many local as well as general laws, such as municipal laws, building laws, etc.

Heavy Engineering Projects

1. Heavy engineering projects include primary infrastructural facilities, such as transportation system, railways, road, bridges, hydraulic structures (i.e., dams, barrages, irrigation system, hydroelectric power), water supply systems, waste water treatment systems, power line transmissions, etc.
2. Generally, governments finance these projects as the primary intention is to help the public with infrastructure facilities.
3. These are equipment intensive and large volume of materials are used.
4. Design and construction phases of projects are coordinated by civil engineers by considering the inputs from the various departments or persons.

Industrial Projects

1. These projects include power plants, petroleum refineries, petrochemical and fertilizer plants, heavy manufacturing plants, large steel plants, aircraft industry, etc.
2. These are highly specialized projects and, generally, dominated by large construction firms.
3. Construction of this type of projects requires highest level of engineering expertise good number of skilled labours.

Construction projects can be further classified into two categories:

- (a) Public projects
- (b) Private projects

Public Projects

These are primarily infrastructure projects funded by government.

Different departments set different rules and guidelines to carry out the construction projects under their supervision.

For example, in India the Central Public Works Department (CPWD) describe, what to do, when to do and how to do the projects with reference to construction.

Similarly, state governments maintain their own rules and manuals to contract and execute the works under them.

Contractors are generally selected based on competitive bidding in public projects.

Low cost bidding system followed by technical and financial evaluation is preferred in most of the cases.

Private Projects

1. Depending on the type and nature of a project, the owner or project manager selects and coordinates with the project team.
2. Whom to select, how to select and what kind of information exchange systems will exist between various project team members, etc., is decided by the project owner.
3. In private projects, based on work quality and reputation the project owner selects the designer or contractor. Here, another important criterion is negotiated money (or) competitive bidding.

EXERCISES

1. Railway projects are treated as _____.
(A) light construction (B) heavy construction
(C) industrial construction (D) None of these
2. Power stations are generally treated as _____.
(A) light construction
(B) heavy construction
(C) industrial construction
(D) electrical construction
3. The first stage of a construction is _____.
(A) preparation of estimate
(B) initiation of proposal
(C) selection of site
(D) preparation of tender
4. Pre-tender stage requires _____.
(A) acquisition of land
(B) finalisation of alignment of works
(C) finalisation of designs and preparation of estimate
(D) All of these
5. The final selection of construction site, is done by _____.
(A) local civil authority representative
(B) representative of engineer authority
(C) representative of administration
(D) All of these
6. Construction team means _____.
(A) an Engineer (B) an Architect
(C) a Contractor (D) All of these
7. For the execution of a project, a contractor is _____.
(A) a person (B) a firm
(C) an agency (D) All of these
8. The objective of technical planning, is _____.
(A) preparation of specifications and estimates
(B) initiating the procurement action of resources
(C) taking remedial action for likely bottle-neck in the execution
(D) All of these
9. A construction schedule is prepared, after collecting _____.
(A) number of operations
(B) output of labor and machinery
(C) quantity of various items
(D) All of these
10. Modular co-ordination of construction means, proper _____.
(A) planning
(B) planning and designing
(C) planning and execution
(D) planning, designing and execution

ANSWER KEYS

Exercises

1. B 2. C 3. B 4. D 5. D 6. D 7. D 8. D 9. D 10. D