

# INTRODUCTION

CEM 511  
Construction Cost Estimating

## Role of Estimating

- Cost estimation is the determination of the *probable cost* of a project.
- Although an estimate is not exact it must be relatively accurate reflecting a close approximation of the cost to be incurred.
- An estimate serves a number of different *functions*, depending on the stage of the project, as shown below :

- Feasibility: Initially feasibility of the project need to be determined → Feasibility Estimate (Conceptual)
- Schematic Design (Conceptual design): Sketches are prepared. Major elements are defined → Use a preliminary method to estimate cost. Cost of each element is established (cost plan)
- Design Development: Progressively the scope of the project is defined → A series of preliminary estimates are done during this phase to assure adherence to cost plan.

- Contract Document: Finalize drawings & Specifications: → Designer's estimate to anticipate and check contractor's bid prices
- Bidding Phase: → Contractors prepare detailed estimate to submit bids.
- Construction Phase: → Estimates are prepared for cost for cost Control and for change order evaluations.

## Feasibility Estimate (Conceptual Estimate)

- Needed to make decision go/no go with project
- Anticipated value (profits/benefits) exceed costs
- Costs include:
  - Land
  - Financing cost
  - Consultations/Studies
  - Engineering
  - Project Management
  - Construction
  - Operation & Maintenance
- Construction cost is evaluated by a Conceptual Estimate

## Preliminary Estimates & Cost Planning

- The Conceptual Estimate found during feasibility becomes the initial project *budget*
- Subsequent design development should remain within the limit of this budget
- For that purpose, several preliminary estimates are performed as more details become available through the design.
- Preliminary estimates assign cost to various assemblies (elements) of the project (Cost Plan). {substructure, superstructure, interior partitions & doors, exterior cladding ..etc.}

- Preliminary estimates allow for *Value Analysis*
  - Compare value of an element with its cost →  
Consider alternatives → Select desired option
- The budget may be changed or maintained by adjusting cost of other elements. But, budget changes are done by the owner conscious of the cost implication of his decisions

## Project Delivery Systems & Estimating

Different project Delivery Systems make use of different types of estimates (Conceptual, Preliminary, & Detailed) depending on the project scope definition at that stage



## Traditional Delivery Method (Design-Bid-Build)

- Traditional method is based on preparation of complete project documents (drawings, specifications, contract conditions) before construction starts.
- Generally a general contractor will submit a bid lump sum price for the project
- The conceptual estimate (initial budget) might be the basis for establishing a design fee and to produce a design within the limit of the budget
- Subsequent preliminary estimates will be used to control the budget in order for the owner to receive bids within his budget requirements

# Construction Management Delivery Method

- A professional construction management firm acts on behalf of the owner to manage the delivery process
- Used especially when fast tracking the project is needed
- The project is broken down into several packages. The delivery schedule of the packages is staggered
- A cost plan is made for each package as previously mentioned
- A package may start construction before the completion of design of other packages. *The owner does not know the entire cost until after bid of the last package is selected. He relies on accuracy of preliminary estimates*
- CM should be highly rated in his estimating abilities

## Design-Build Delivery Method

- A single organization takes the responsibilities of design & Construction
- Owner indicates he needs a facility describe by an outline of the components. He specifies general parameters of the facility (Size, location, capacity, other performance measures)
- Contractor/Designer submits a price for the design and construction of the facility
- Contractor/Designer relies on preliminary estimating methods to arrive at his bid price

## Estimates for Different Types of Contracts

- Lump-Sum Contracts: Most widely used method and it follows the discussion of the D-B-B delivery Method
- Cost-Plus Contracts:
  - No firm price. Owner pays contractors cost plus an additional amount for overhead and profit. Therefore, accounting is more important than estimating
  - Generally entered into when scope cannot be well defined, usually no reliable preliminary estimates can be produced
  - If the contract stipulates a maximum price, the contractor uses preliminary estimating methods to establish the maximum.

- **Unit Price Contract:**

- Contract establishes unit prices for work items. Payment is made based on actual quantities of the work item completed.
- Usually used when quantities cannot be determined beforehand, such as in the case of soil excavation.
- The contractor estimate is similar to the detailed estimating procedures. However the unit price incorporates all costs (labor, material, equipment, overhead) and profit.

# Methods of Estimating

- Two Main Categories
  - Preliminary Estimating Methods
  - The Detailed Estimating Method
- Preliminary Estimating Methods are generally used when scope is not complete or when the accuracy is not critical.
- The Detailed Estimating Method requires complete scope. The method is generally used by contractors for preparing bid prices.
- We will consider the detailed method first. Several of the preliminary estimating methods will be discussed later in the course