Construction Estimation, Planning and Control

CE4333
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Week 1

Introductions

Syllabus

- Class Home Page

The Construction Industry

- The Interface between Infrastructure and Design
- Construction Industry: 8.2% of GDP (Y2K)
- Employs 6 million people
- ~ $819 Billion in economic activity
- Fragmented
- Very low profit margins (2-3%)

Introduction

- What are we estimating?
- Cost …

<table>
<thead>
<tr>
<th></th>
<th>Unit Rates</th>
<th>Quantity</th>
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</thead>
<tbody>
<tr>
<td>Material</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Equipment</td>
<td>√</td>
<td>√</td>
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<tr>
<td>Labor</td>
<td>√</td>
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- … and Time

Questions

- How much material do we need?
  - Basic Quantity take-off + % Waste
- What is the nature of the work?
- What is the expected labor productivity?
- What kind of supervision is expected?
- What kind of skilled labor is available?
- Judgement!!
What is used?

- Project drawings and specifications
- Nationally published cost manuals
- Time schedule
- Estimator’s ability to judge the nature of the job
- Historical information

Estimating What?

- Determine direct costs
  - + Indirect costs (tax, bonds, insurance, field costs, home-office costs)
  - + Contingencies (unexpected events)
  - + Profit

  Estimate of the amount of money the contractor receives

Estimating What?

- Time taken to complete project
- Directly related to direct costs for estimating labor and equipment
- Indirect costs are also dependent
- Very critical in litigation

  Time is money

Players

- Contractor
  - To bid a job
  - To control cash flow
  - Level of accuracy +/-2%
  - Set up payment schedules
- Owner
  - Buy, build or lease
  - Project budgeting and financing
  - Bid negotiation
  - Set up payment schedules

Types of Estimates

- Preliminary
  - Conceptual: precedence
  - Low effort
  - Accuracy: +/-20%
  - Do we want to do this job?
- Detailed
  - To the last bolt: Needs plans and specs, CSI MasterFormat
  - Months
  - Accuracy: +/-2.5%
  - Are we being competitive

Detailed Estimates

- Who: Contractor
- For: Owner
- Determine:
  - Costs of MLE
  - Sub-contract
  - Overhead & Profit (O&H)
- Use:
  - Complete set of Bid Documents
- Goal:
  - A bid price
The Counting & Paperwork
- Quantity take off
- Estimating labor
- Estimating equipment
- Bid Documents
- Understanding bonds, taxes, insurance

The Decision-Maker's Perspective
- Buy, Build or Lease a facility?
- How do you analyze a competitive bid?
- How do you control cash flow?
- What kind of material to use and why?
- How to estimate labor productivity?
- How to estimate equipment productivity?

Preparing Detailed Estimates
- Table 1.2
- Table 1.3 (CSI Format)
- Table 1.4
- Table 1.5, 1.6, 1.7 (WBS Format)

Bid analysis
- CSI Format
- Lowest responsible bidder
- Payment schedules
- Balanced bids
- Conversion ratios
- Percentage completion
- Cost control