Scope of this class

- Prerequisites: CE3331, CE3332
  - Simple material take-off
  - Estimating cycle times
  - Scheduling
  - Cash flow analysis

  … these topic will be repeated!

Scope of this class

- Emphasis on material take-off
  - Specifically divisions 3, 4, 5
- Emphasis on cost control
  - Appropriate material and equipment choice
  - Understanding behavior of money over time
- Emphasis on integrating time + cost
  - Direct and indirect cost analysis
- Emphasis on risk analysis
  - Make contingency plans and formally capture uncertainties
- Emphasis on novel methods
  - Sustainable construction, value engineering, 3D/4D CAD applications

Scope of this class

- Emphasis on construction process more than on construction methods
- Emphasis on construction management decision making
- Emphasis on appropriate use of software and modeling methods to understand construction processes

Software

- MS Excel
- RiskAmp Analysis
- Michigan Engineer’s Resource Library (MERL) for MDOT bids
- Working knowledge of AutoCAD
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?

The bidding process: Lab

- Planning the bid
- Pre-bid day activities
- Bid-day activities
- Post-bid activities

Syllabus

- Class Home Page

The Construction Industry

- The Interface between Infrastructure and Design
  - The human element plays a critical role
- Construction Industry: 8.2% of GDP (2000)
- Employs 6 million people
- ~ $819 Billion in economic activity
- Fragmented
- Very low profit margins (2-3%)

What is estimating?

- The process of determining the anticipated cost of materials, labor, and equipment of a proposed project
  

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

What does estimating involve?
- Studying scope of work
- Preparing cost estimates
  - Material take-off
  - Equipment requirements
- Estimating time to completion
  - Labor productivity
  - Risk … what can go wrong?

Estimating costs?
- 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 time?
- 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

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

- Payment schedules
- Balanced bids
- Conversion ratios
- Percentage completion
- Cost control