Estimating Steel Structures & Division 9

Week 3

Construction Estimation, Planning and Control

Materials

- Standard shapes
  - § W sections, C channels, Structural T, Angles, Pipes, Tubes, Rods and Plates
- Fabricated members, Built-up sections
  - § Adding plates to beam flanges,
  - § Stiffeners to beam webs
  - § Built up girder plates: Weld together steel plates

Estimating Steel

- Unit of measure:
  - § Lb, hundredweight (cwt), tons
- W 18 x 55 Grade 50
  - § W section, depth: 18"
  - § 55lb/LF
  - § Yield strength 50,000psi
- Weight of steel: 490 lb/cf
- Estimate LF and of sections and multiply by nominal weight of sections (steel handbook)
  - § Nominal weight +/- 2%
- Typical connections
  - § Bolts and welds
- Take into account main members and detailed sections
- Cost of drawing, fabrication, delivery, welding and painting, erection

Players

- Supplier provides steel based on
  - § Takes total linear footage of steel, wt/ft, shape and grade of steel: Base price of steel
- Steel Fabrication (Sub/supplier)
  - § Prepare shop drawings (5-10% of base price)
  - § Fabricate steel (50-100% of base price)
  - § Shop painting (8-12% of base price)
  - § Field painting (Table 11.3: sqft/ton)
  - § Shipping costs
- General Contractor (Usually sub-contracts the whole process)
  - § Erection on site (Specialized equipment, expertise, safety issues

Division 9: Finishes

- Involves plaster, gypsum board, flooring systems, painting and wall coverings

Painting

- Estimate depends on:
  - § Area, type of surface material, painting method used
- Eg: 2x paint required for brick masonry compared to interior dry walls

Amount Covered by One Gallon of Paint in SF

Surface	Coat	Painting Method		
		Brush	Roller	Spray
Wood Siding	Prime	250	225	290
	Others	270	250	290
Exterior Trim	Prime	400	----	----
	First	475	----	----
	Second	520	----	----
Shingle Siding	Prime	270	255	300
	Others	360	340	380
Brick Masonry	Prime	180	135	160
	First	270	225	290
	Second	340	305	360
Interior Plaster or Drywall	Prime	400	380	495
	Others	450	425	495
Interior Doors and Windows	Prime	400	----	----
	First	425	----	----
	Second	450	----	----

Source: 1998 R.S. Means Building Construction Cost Data

Life Cycle Costs

- $20/ga paint : future application 1 in 5 yrs
- $15/ga paint : future application 1 in 3 yrs
- The pov of the owner
- The pov of the contractor
- What about design-build-maintain?

Steps

- Decide on time window for life cycle analysis: time interval *t*
- Calculate future costs of maintenance
  - § Use inflation rate
- Calculate comparable present costs
  - = Current cost of installation + present value of future maintenance over time period *t*
  - § Use market rate of return
- Compare present costs