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"
  § 55 lb/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/LF, 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

<table>
<thead>
<tr>
<th>Surface</th>
<th>Painted Type</th>
<th>Painted Material</th>
<th>Coverage (sqft/gal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Masonry</td>
<td>Primer</td>
<td>Brick Masonry</td>
<td>300</td>
</tr>
<tr>
<td>Brick Masonry</td>
<td>Primer</td>
<td>Brick Masonry</td>
<td>300</td>
</tr>
<tr>
<td>Exterior Trim</td>
<td>Primer</td>
<td>Exterior Trim</td>
<td>300</td>
</tr>
<tr>
<td>Shingle Siding</td>
<td>Primer</td>
<td>Shingle Siding</td>
<td>290</td>
</tr>
<tr>
<td>Interior Plaster</td>
<td>Primer</td>
<td>Interior Plaster</td>
<td>265</td>
</tr>
<tr>
<td>Interior Doors</td>
<td>Primer</td>
<td>Interior Doors</td>
<td>290</td>
</tr>
</tbody>
</table>

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