COST ESTIMATING

The Steps involved in cost estimating are;

1. Materials Estimates: This is the quantity take off step that was already discussed in an earlier section

2. Calculate Material Costs: So here you just need to multiply the quantity by the cost per unit.

3. Equipment Estimates: To figure out this section you might have to understand equipment production rates to calculate the amount of time you will need the equipment. These estimates are in a different study section that I will later show you. So for now let assume they will give you the equipment production rate to do the jobs and the cost of the equipment. You may have to multiply a efficiency factor to increase or decrease the production rate if it is given.

4. Calculate Equipment Costs: Multiple the equipment cost/day by the number of days required to do the work.

5. Personnel Estimates: The exam question will give you crew size, the cost/hr for each crew member, and the production rate of the crew or members.

6. Calculate Personnel Costs: Using the above information multiple number of hours to do the job by the cost per hour to do the job.

7. Sum up all the costs

8. Multiply the overhead and Profit to the total cost

9. Congratulations…You have the total project cost now.

- Doing cost estimates in the real world you will have to use equipment tables, average work rates, labor cost rates, call vendors for equipment costs, etc. However, lucky for you in the PE exam all the costs and work rates will be given so it makes things so much easier, and all you need is to use a little engineering judgment.

- The easiest way to explain cost estimates are just to do practice problems which are the same difficulty as the exam.

Cost Estimating
Practice Problem

The following is the concreting crew size:
1-Foreman, 3-Laborers. The Foreman gets paid $60/hr and the laborer get paid $30/hr. The crew is able to concrete 30 cu. Yards per day. A work day is 8 hours per day. If the crew has to place concrete for 3,078 cubic feet. Find the total cost of the personnel involved in concreting?

Cost Estimating
Solution

Step 1: Convert the CF to CY: 3078CF/27(CF/CY) = 114 Cys

Step 2: Find the cost of the crew per hour
= (1x60) + (3x30) = $150

Step 3: Find the number of hours required for the crew to work
= 114/30 = 3.8 day → 8 hours in a day → 3.8days x 8hr/days = 30.4 hrs
= I always round up in estimates to 31 hrs

Step 4: Total cost for the personnel:
= 31 hours x $150 / hours = $4650

Problem 2: A contractor need to backfill and compact a trench that has the dimensions that are 150 x 50 x 1.5 ft. The contractor is going to use a dump truck that can carry 12 CY, and travels at an average speed of 40 mph. The borrow pit is located 45 miles from the construction site. The truck driver makes $50/hr and works 8 hours per day. Loading time for the truck is 30 minutes and unloading time is 5 minutes. The contractor has to rent the truck at $500 per day. The cost of soil is $20 per CY bank volume basis. The soil has a swell factor of 18% and shrinkage factor of 15%. What is the cost of backfilling the trench.

Solution Problem #2

1. Materials Estimates:
   - How much soil is needed?
   - The volume to be fill is 150ft x 50ft x 1.5ft = 11,250CF = 416.67 CCY
   - BCY = 416.67CCY/(1-.15) = 490 BCY
   - LCY = 490 BCY x 1.18 = 578.4 LCY

2. Calculate Material Costs: $20/BCY x 490 BCY = $9,800

3. Equipment Estimates: You know the cost of one truck is $500/day. So to calculate the equipment costs you need to figure out how long you need the truck.
   - 578.4 LCY need to be transports, the truck can carry 12 CY.
   - 578 LCY/12CY = 48.16 Trucks – round up to 49 Trips
   - Time for one trip = Loading time + unloading time + Travel Time (to and from)
   - Travel time = Distance/Velocity = 45 mile/40miles/hr = 1.125 hrs
   - Travel time = 1.125 + 1.125 + 30/60 + 5/60 = 2.83 hrs
   - Total time required = 2.83 hrs x 49 trips = 138.8 hrs round up 139 hrs
   - Total days = 139/8 = 17.3 → 18 days

4. Calculate Equipment Costs: Multiple the equipment cost/day by the number of days required to do the work.
   - 18 days x $500/day = $9000 → you might be able to get money back for half day however the problem doesn't talk about that so I would not make that assumption.

5. Personnel Estimates: Given at $50/hr

6. Calculate Personnel Costs: $50/hr x 139hr = $6950

7. Sum all the costs = $6950 + $9000 + 9,800 = $25,750

The problem didn't call for overhead and profit so don't worry about it.