

**ESSAY. Write your answer in the space provided or on a separate sheet of paper.**

1) What is the definition of the quantity takeoff?

Answer: The quantity takeoff is where the estimator prepares a complete list of materials, labor, and equipment necessary to complete a construction project.

2) How does the quantity takeoff fit into the overall estimating process?

Answer: It must be complete before a company can determine the cost of materials, labor, and equipment, which are a necessary part of a complete bid.

**ESSAY. Write your answer in the space provided or on a separate sheet of paper.**

- 1) Using Figures 34-3 and 34-4, determine the base cost per square foot for an 85,000-square-foot, steel-frame parking garage with face-brick over concrete block exterior.  
Answer: \$81.70 per square foot
- 2) Using Figures 34-3 and 34-4, determine base perimeter for an 85,000-square-foot parking garage.  
Answer: 529 feet
- 3) Using Figures 34-3 and 34-4, determine the perimeter adjustment for an 85,000-square-foot parking garage.  
Answer: \$1.80 per square foot
- 4) Using Figures 34-3 and 34-4, determine the story-height adjustment for an 85,000-square-foot parking garage.  
Answer: \$0.85 per square foot
- 5) Using Figures 34-3 and 34-4, determine the added cost for a 12-inch by 18-inch traffic sign.  
Answer: \$97.50 per each
- 6) What items would you include on an 8-foot-high, wood-framed, interior wall for a residence?  
Answer: The items should include: sole plate, wood studs, top plate, 1/2-inch drywall, paint, and base.
- 7) Your company just completed a 1,100-square-foot convince store for a client for \$225,000. Next year, the same client wants to build a 1,300-square-foot convince store in the same city. Determine the estimated cost of the convince store using an inflation factor of 4 percent per year.  
Answer: First adjust for size using an E of 0.9 using Eq. 34-1 as follows:

$$\text{Cost} = \text{Cost} \times \text{TCM} = \$225,000 \left( \frac{1,300}{1,100} \right)^{0.9} = \$261,504$$

Finally, adjust for inflation using Eq. 34-4 as follows:

$$\text{Cost}_{t+n} = \text{Cost}_t (1 + \overline{f})^n = \$261,504(1 + 0.04)^1 = \$271,964$$

Use \$272,000

- 8) Using Figures 34-3 and 34-4, determine the cost for a 180-foot by 269-foot, three-story, precast concrete parking garage with face-brick over concrete block exterior. The parking garage is expected to have a 460 parking stalls and one parking attendant booth. The average story height is 11.0 feet.

Answer: The area and perimeter of the parking garage is determined as follows:

$$\text{Area} = (180 \text{ ft})(269 \text{ ft})(3 \text{ stories}) = 145,260 \text{ sf}$$

$$\text{Perimeter} = 180 \text{ ft} + 269 \text{ ft} + 180 \text{ ft} + 269 \text{ ft} = 898 \text{ ft}$$

From Figure 34-3, the cost per square foot for a 145,000-square-foot parking garage with precast concrete parking garage with face-brick over concrete block exterior is \$66.80. From Figure 34-3, the base perimeter is 723 feet and the perimeter adjustment is \$1.10 per square foot per 100 foot of perimeter. The perimeter adjustment is as follows:

$$\text{Perimeter Add} = \left( \frac{898 \text{ ft} - 723 \text{ ft}}{100 \text{ ft}} \right) \$1.10/\text{sft} = \$1.93/\text{sft}$$

From Figure 34-4, the base story height is 10 feet and, from Figure 34-3, the adjustment for the story height is \$0.65 per square foot per foot of height. The story-height adjustment is as follows:

$$\text{Story-Height Add} = (1 \text{ ft}) (\$0.65/\text{ft-sft}) = \$0.65/\text{sft}$$

The base cost per square foot is as follows:

$$\text{Cost} = \$66.80 + \$1.93 + \$0.65 = \$69.38/\text{sft}$$

The base cost is calculated as follows:

$$\text{Cost} = (145,260 \text{ sft}) (\$69.38/\text{sft}) = \$10,078,139$$

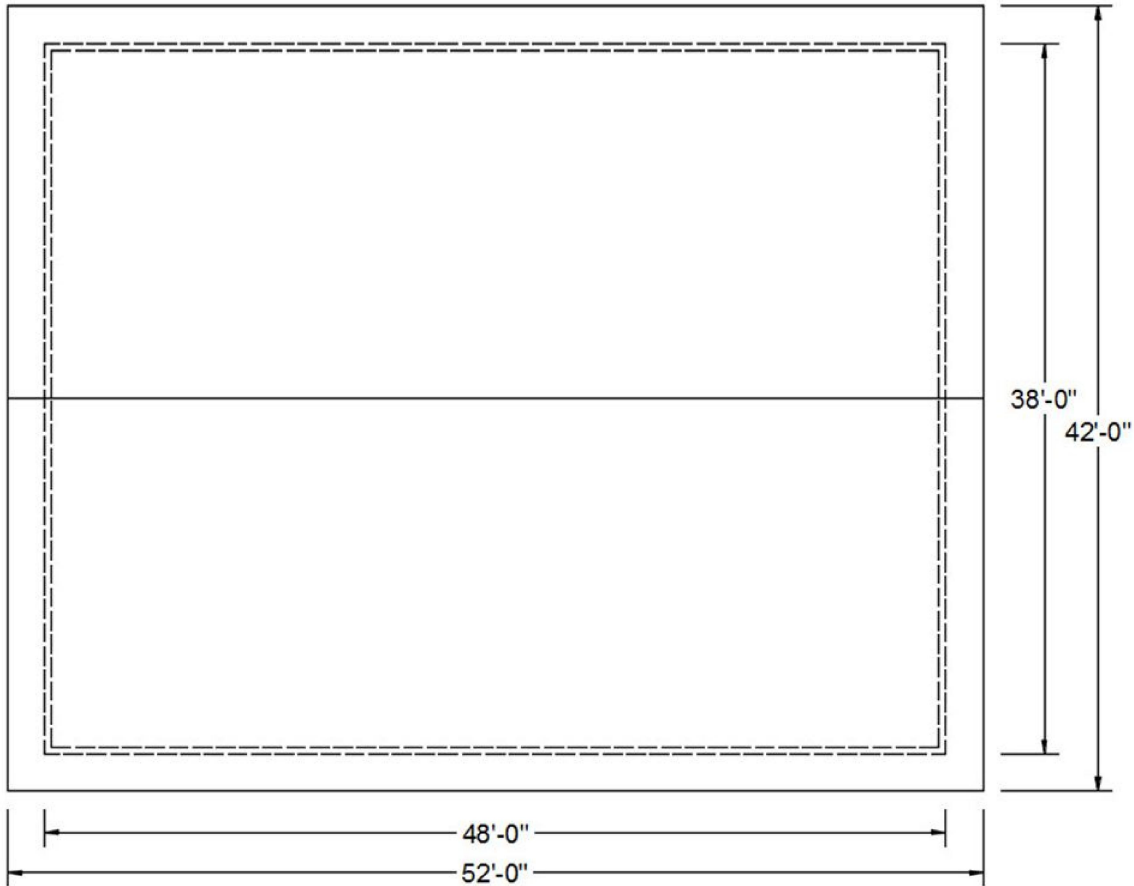
Add the following costs to the base cost: one 3500# elevator at \$173,000; parking booth at \$13,800; 460 painted parking stalls at \$8.60 per stall; and 460 precast parking bumpers at \$63.00 per stall.

$$\text{Cost} = \$10,078,139 + \$173,000 + \$13,800 + 460(\$8.60 + \$63.00) = \$10,297,874$$

Use \$10,300,000

9) Roof Takeoff Workbook from Chapters 33 and 34

Using the worksheet from Chapters 33 and 34, prepare a bid for the following roof. The slope of the roof is 4:12, the shingles are to be 20-year three-tab, the underlayment is to be 15# felt, the vents are to be turtle, there are two HVAC flashings, and one plumbing flashing.



Answer: **Takeoff**

**Client Information**

Name:
Address:
City:
State:
Zip Code:
Phone #:

**Project Information**

Name:
Address:
City:
State:
Zip Code:
Phone #:

**Roof Information**

Roof Slope:	4	:12
Shingle Type:	20-year Three Tab	
Underlayment:	15# Felt	
Ridge(s):	52	ft
No. of Ridges:	1	ea
Hip(s)/Valley(s):	--	ft
Horiz. Perimeter:	104	ft
Sloped Perimeter:	84	ft
Horiz. Counter:	--	ft
Sloped Counter:	--	ft
HVAC Flashings:	2	ea
Plumbing Flashings:	1	ea
Vent Type:	Turtle	
Plan View Area:	2,184	sft
Unit Price:	1.52	/sft

#### Roof Area

Area	Length	Width
1	52	42
2		
3		
4		
5		
6		
7		
8		
9		
10		

#### Bid

Bill To:	Ship To:

Materials	Quantity	Unit Price	Total
20-year Three Tab	71 bundle	12.39	879.69
20-year Three Tab Cap	3 bundle	15.75	47.25
Roofing Nails	25 lbs	1.39	34.75
15# Felt	8 rolls	14.95	119.60
Underlayment Nails	40.0 C	1.00	40.00
10' Drip Edge	20 ea	2.99	59.80
10' Counter Flashing	-- ea	3.99	--
20' Ridge Vent	-- ea	42.00	--
Turtle Vents	18 ea	7.00	126.00

HVAC Flashing	2 ea	9.00	18.00
Plumbing Flashing	1 ea	4.00	4.00
		Subtotal	1,329.09
Tax (6.5%)			86.39
Roofing Crew	59.6 hrs	35.00	2,086.00
		Total	3,501.48

Half of the payment is due at delivery of materials. The remaining payment is due upon completion of the roofing.

By: \_\_\_\_\_ Date: \_\_\_\_\_.

### **Pricing Data**

	Item	Price
<b>Shingles</b>		
20-year Three Tab	12.39	\$/bundle
25-year Architectural	15.98	\$/bundle
30-year Architectural	16.65	\$/bundle
40-year Architectural	17.35	\$/bundle
<b>Cap Shingles</b>		
20-year Three Tab	15.75	\$/bundle
25-year Architectural	31.29	\$/bundle
30-year Architectural	33.29	\$/bundle
40-year Architectural	35.29	\$/bundle
<b>Underlayment</b>		
15# Felt	14.95	\$/roll
30# Felt	13.95	\$/roll
<b>Flashings &amp; Vents</b>		
Drip Edge	2.99	\$/ea
Counter	3.99	\$/ea
Ridge Vent	42.00	\$/ea
Turtle Vents (61 sq in)	7.00	\$/ea
HVAC Pipe Flashing	9.00	\$/ea
Plumbing Flashing	4.00	\$/ea
<b>Nails</b>		
Roofing Nails	1.39	\$/lb
Underlayment Nails	1.00	\$/C
Item	Labor Productivity	
20-year Three Tab	2.50	1hr/squ
25-year Architectural	2.80	1hr/squ
30-year Architectural	3.00	1hr/squ
40-year Architectural	3.20	1hr/squ