

Instructor's Guide to Accompany

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**ESTIMATING FOR  
RESIDENTIAL  
CONSTRUCTION**

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**David J. Pratt, 2E**



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Estimating for Residential Construction, 2E  
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# NOTE TO INSTRUCTOR

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Answers and solutions are provided in this manual for end-of-chapter review questions.

In all cases, the answers are based directly on the material contained in the text. Solutions follow the same format and procedures outlined in the text.

Note that all prices used in the text are for illustrative purposes only. Actual prices of construction work vary considerably from place to place and from time to time, and should be carefully considered before using in actual estimates.

We have tried to avoid errors in the text and in the solutions contained hereunder but, no doubt, some will have slipped by us. It would be much appreciated if you would inform us of any mistakes you find. Our address is given below. Thank you.

David J. Pratt  
Southern Alberta Institute of Technology  
130116 Avenue N.W.  
Calgary, Alberta, Canada  
T2N 4N3



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## CHAPTER 1—Introduction to Building Cost Estimates

### REVIEW QUESTIONS

1. Explain what a building cost estimate is.

A building cost estimate is an attempt to determine the likely cost of some building work before the work is done.

2. Explain the following terms:

- a. Spec builder
- b. Production builder
- c. Custom home builder

a. Spec builders buy land for building homes; this is often in the form of housing lots in a new subdivision. They decide on the type of houses to build and make many in-house decisions about the design of the homes they will build. Because this business involves a certain amount of speculation, this group is often referred to as speculative builders.

b. Production builders build production homes that are generally a series of homes of basically the same design, almost like on a production line.

c. Custom home builders build houses to meet the owner's specific design. Some owners employ architectural consultants to prepare plans and specifications for their home; others rely on the builder to prepare a design that meets their requirements.

3. Compare the risks taken by a spec builder with those taken by a custom home builder.

Unlike spec builders, the builders of custom homes do not have to buy building lots, nor do they need to construct show homes. Also, the owner that hires custom home builders usually makes all the design decisions. The risks taken by builders in the custom home market are associated with the prices they offer owners; if they underestimate the costs, they can lose money on the project.

4. Describe the process by which builders are selected for large multi-unit residential projects.

Builders will usually be selected following competitive bid; the owner usually awards the contract to the lowest priced bidder.

5. What is a firm price contract?

A firm price contract requires the builder to complete the project as described in the plans and specifications for a fixed sum.

6. How can you provide incentive for a builder to exercise cost control with a cost plus contract?

To provide a cost control incentive, provisions have to be included in the contract that allow the fee to increase when savings are made and to decrease when project costs exceed expectations. These provisions result in what is known as a variable fee cost plus contract.

7. How would a builder determine the feasibility of an owner's custom home proposal?

Since a feasible project is one where the anticipated value of all benefits exceeds the estimated total cost of putting the project in place; a builder determines the feasibility of an owner's custom home by estimating the cost of the proposed home and comparing this with the assessed value of the home.

8. How can value analysis be used with the design of a house?

Value analysis is used to compare the estimated cost of a component or element of a house with the perceived value of that element. If the sum allocated to the component is justified by the value, the component is accepted. Following this procedure, only features that provide value at a reasonable cost will be incorporated into the house design.

9. Describe the value-based approach to setting the sales price of a home.

To arrive at the sales price of a home using the value-based approach, the builder investigates the current market prices of homes and sets the price to be competitive with homes that are similar to the type it intends to construct.

10. How is estimating used in the cost control process?

The cost control process begins with an accurate estimate from which budgets may be established. Further estimating is needed each month to determine how much work has been done and how much it has cost to do that work.

11. Describe the following methods of preliminary estimating:

- a. Cost per unit
  - b. Cost per unit area
  - c. Cost per unit volume
  - d. Assembly
- a. After completing an apartment building, the analyst divides the construction cost by the number of suites it contains to determine the cost per suite. This unit cost is then used as a guide to the price of future apartment projects. Simply multiply the number of suites in the proposed facility by the unit price per suite to estimate the total building cost.
  - b. First, divide the construction cost of a new building by its gross floor area to obtain a *cost per unit area*. Then, to estimate the construction cost of a future building, multiply the gross floor area of the proposed building by the *cost per unit area*.
  - c. First, divide the construction cost of a new building by its volume to obtain a *cost per unit volume*. Then, to estimate the construction cost of a future building, multiply the volume of the proposed building by the *cost per unit volume*.
  - d. A few key project elements such as continuous footings, foundation walls, and suchlike are measured and priced to quickly estimate the price of a new project without having to separately measure all of



the many individual project components as you do with a detailed estimate.

12. What is the most accurate method of estimating the cost of a building project, and why is it more accurate than other methods?

The detailed estimating method is considered to be the most accurate because it is far more likely than other methods to produce a price that is an accurate forecast of the actual costs of building a project.

13. What is listed on a bill of materials, and what format is usually adopted for a bill of materials?

A bill of materials lists the quantities of all materials required to construct a project. Bills of material are usually divided into categories that correspond to the type of materials obtained from specialized suppliers, such as:

- Gravel materials
- Concrete materials
- Carpentry materials

Categories can be further divided into packages, for example, carpentry materials may comprise:

- Cribbing package
- Main floor framing package
- Roof framing package

14. On what kind of project would you find architects in the role of prime consultant?

Architects are employed as prime consultants on most large multi-unit developments and on other projects where the size of the job justifies the expense.

15. What is usually contained in a set of drawings for a new house?

A set of drawings for a new home will usually include the following:

- A plot plan that provides information about the site of the home and shows property lines together with the location of the building on the lot
- Plan views of each level of the proposed building
- Building elevations that show what the building will look like as viewed from the front, sides, and back
- Cross sections that show the construction of foundations, floors, walls and roofs
- Additional sketches and information about building components

16. On a site visit, why is it important to investigate the condition of structures adjacent to the site of the new project?

If the owner of an adjacent property claims that their property has been damaged by work operations on your site, information gathered at the initial site visit could be important in determining if damage occurred before or after your project work began.

**PRACTICE PROBLEMS**

1. Based on the following information, how much would the amount paid to this subcontractor be?
  - a. The subtrade's bid indicated that they would excavate trenches for \$15.00 per cubic yard; they would lay pipes for \$2.75 per foot, and they would backfill trenches for \$12.00 per cubic yard.
  - b. The quantity of work completed on the job was 120 cubic yards of excavation and backfill and 92 feet of pipe.

Excavate Trenches	120 cu. yds. @ \$15.00 =	\$1800.00
Lay Pipes	92 cu. yds. @ \$2.75 =	\$ 253.00
Backfill Trenches	120 cu. yds. @ \$12.00 =	<u>\$1440.00</u>
		<u>\$3493.00</u>

2. What would the range of prices be for a 2,200 square foot home when the builder's cost ranges from \$65.00 to \$120.00 per square foot?

Low Price:	2200 sq. ft. @	\$65.00 = \$143,000
High Price:	2200 sq. ft. @	\$120.00 = \$264,000

3. A 3,000 square feet custom home was recently constructed at a cost of \$331,500 that includes \$23,000 for heating and ventilating the house. What would be the estimated cost of a new home of 3,500 square feet, if it was similar to the previous home in all respects except that a more expensive HVAC system is required that is expected to cost \$9.00 per square foot?

Unit Cost of House Less HVAC	= (\$331,500 - \$23,000)/3,000 SF
	= \$308,500/3,000 SF
	= \$102.83
Estimated Price of New Home	= 3,500 SF × (\$102.83 + \$9.00)
	= 3,500 SF × \$111.83
	= \$391,405

**CHAPTER 2—Arithmetic and Principles of Measurement****REVIEW QUESTIONS**

1. What units of measurement would you use to measure the following items of work?
  - a. Floor sheathing
  - b. Trench excavation
  - c. Footing drains
  - d. Duplex electrical receptacles