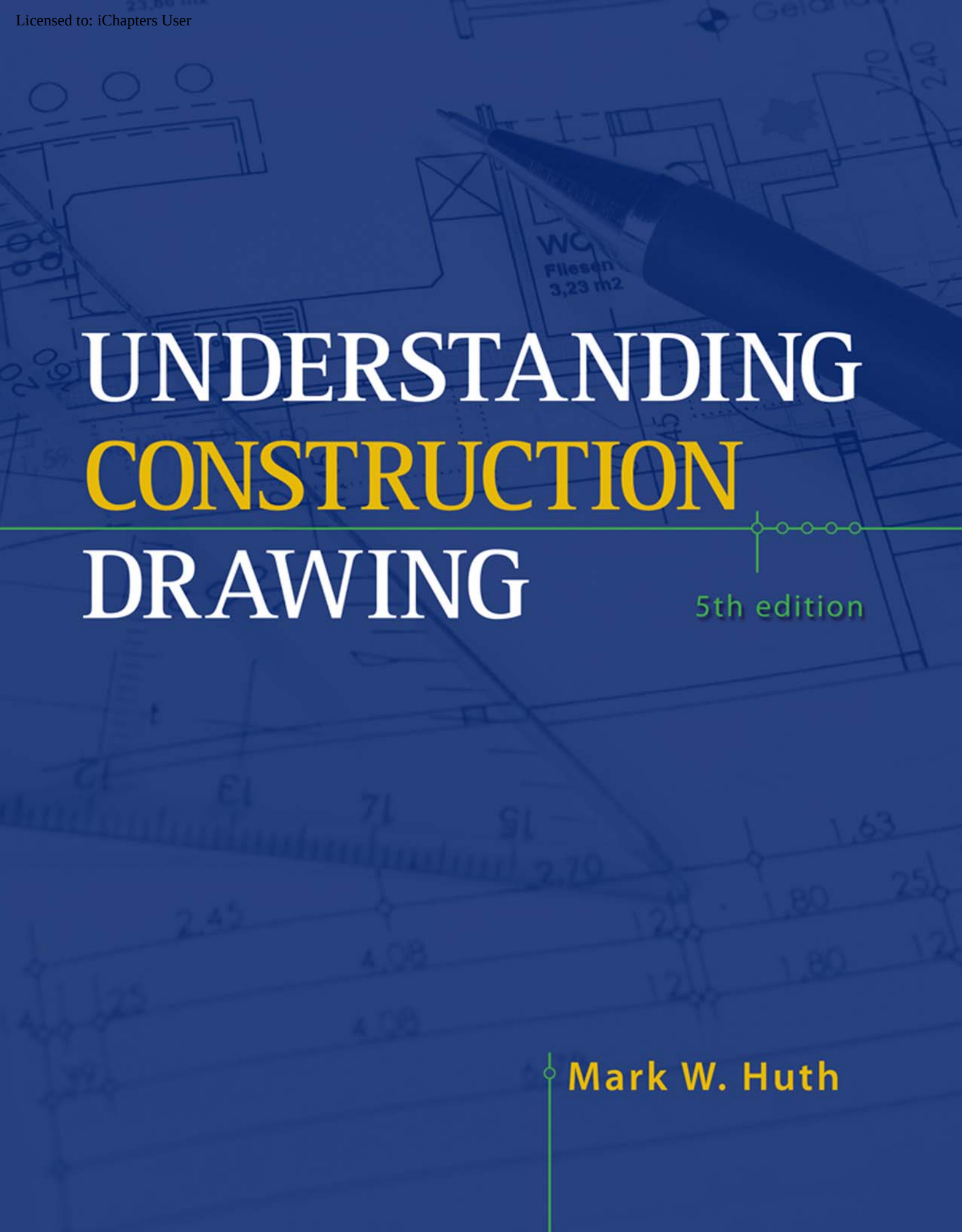

UNDERSTANDING CONSTRUCTION DRAWING

5th edition

Mark W. Huth

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UNIT 1

The Design-Construction Sequence and the Design Professions

Objectives

After completing this unit, you will be able to perform the following tasks:

- Name the professions included in the design and planning of a house or light commercial building.
- List the major functions of each of these professions in the design and planning process.
- Identify the profession or agency that should be contacted for specific information about a building under construction.

The construction industry employs about 15 percent of the working people in the United States and Canada. More than 60 percent of these workers are involved in new construction. The rest are involved in repairing, remodeling, and maintenance. As the needs of our society change, the demand for different kinds of construction increases. Homeowners and businesses demand more energy-efficient buildings. The shift toward automation in business and industry means that new offices are needed. Our national centers of commerce and industry are shifting. These are only a few of the reasons that new housing starts are considered important indicators of our economic health.

There are four main classifications of construction: residential, commercial, industrial, and civil. *Residential construction* includes single-family homes, small apartment buildings, and condominiums, **Figure 1–1(A).** *Commercial construction* includes office and apartment buildings, hotels, stores, shopping centers, and other large buildings, **Figure 1–1(B).** *Industrial construction* includes structures other than buildings, such as refineries and paper mills, that are built for industry, **Figure 1–1(C).** *Civil construction,* **Figure 1–1(D),**

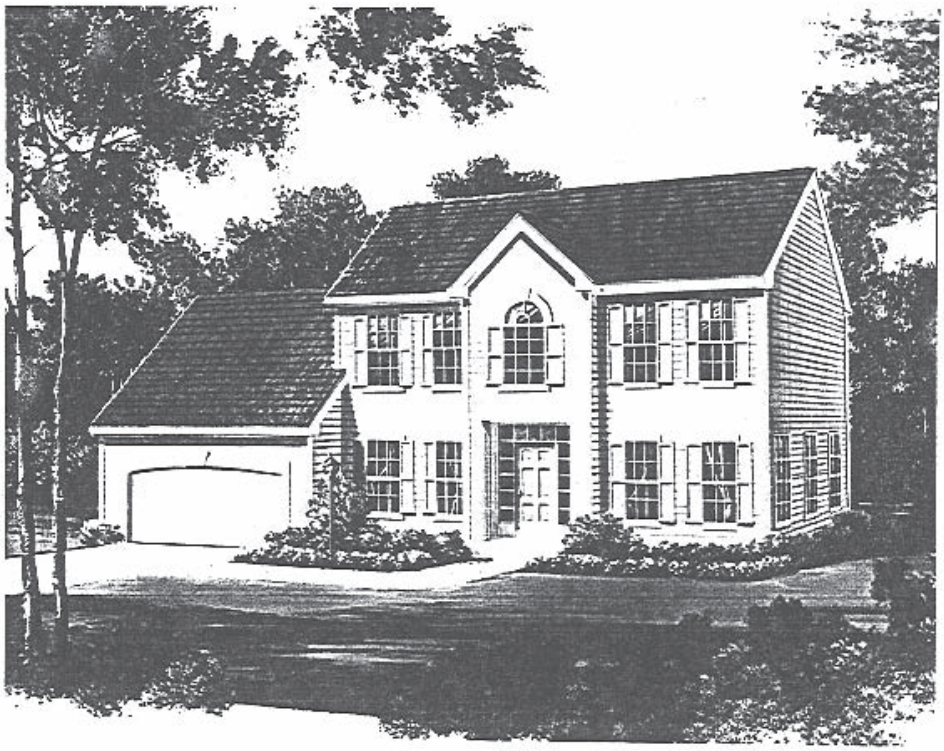

Figure 1–1(A). Residential construction.

Figure 1–1(B). Commercial construction.

Figure 1–1(C). Industrial construction. Delta Energy Center, water treatment tanks and buildings in the foreground. *Courtesy of Bechtel Corporation. Photographer: Terry Lowenthal. Used by permission.*

is more closely linked with the land and refers to highways, bridges, airports, and dams, for example.

The Design Process

The design process starts with the owner. The owner has definite ideas about what is needed but may not be expert at describing that need or desire in terms the builder can understand. The owner contacts an architect to help plan the building.

The architect serves as the owner's agent throughout the design and construction process. Architects combine their knowledge of construction—of both the mechanics and the business—with artistic or aesthetic knowledge and ability. They design buildings for appearance and use.

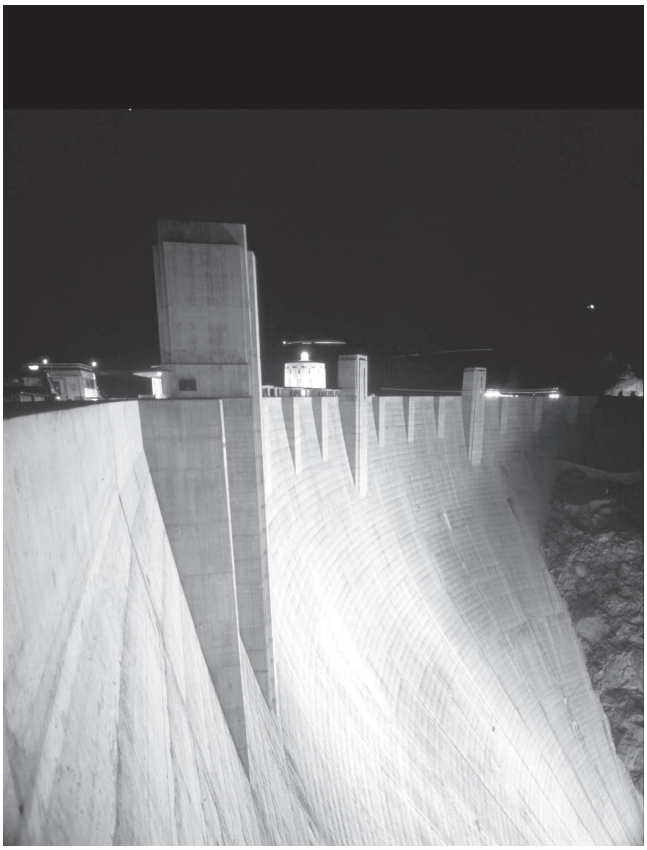

Figure 1–1(D). Civil construction. At 726 feet, Hoover Dam is the highest dam in the United States. *Courtesy of Bechtel Corporation. Photographer: Ray Frayne. Used by permission.*

The architect helps the owner determine how much space is needed, how many rooms are needed for now and in the future, what type of building best suits the owner's lifestyle or business needs, and what the costs will be. As the owner's needs take shape, the architect makes rough sketches to describe the planned building. At first these may be balloon diagrams, **Figure 1–2,** to show traffic flow and the number of rooms. Eventually, the design of the building begins to take shape, **Figure 1–3.**

Before all the details of the design can be finalized, other construction professionals become involved. Building codes specify requirements to ensure that buildings are safe from fire hazards, earthquakes, termites, surface water, and other concerns of the community. Most building codes are based on a model code. For example, the International Code Council (I.C.C.) publishes several model codes, one of which is the *International Residential Code® for One- and*

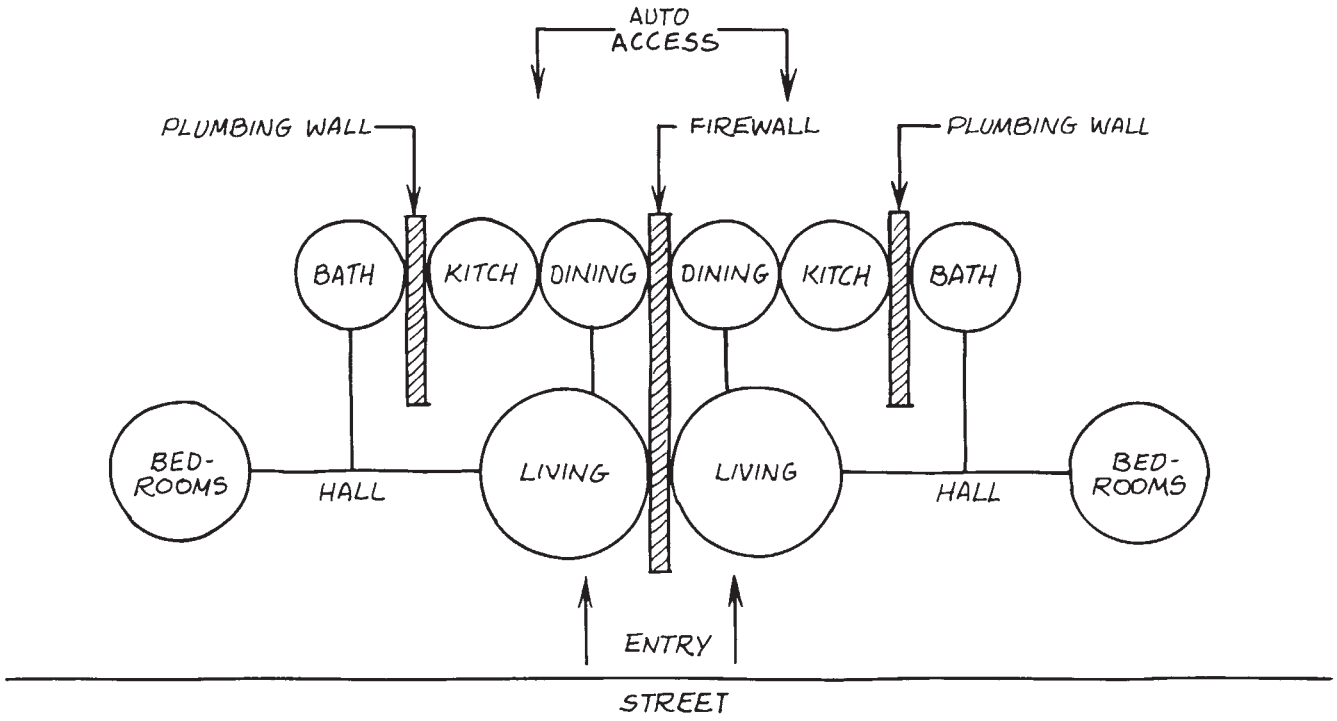

Figure 1–2. Balloon sketch of Duplex.

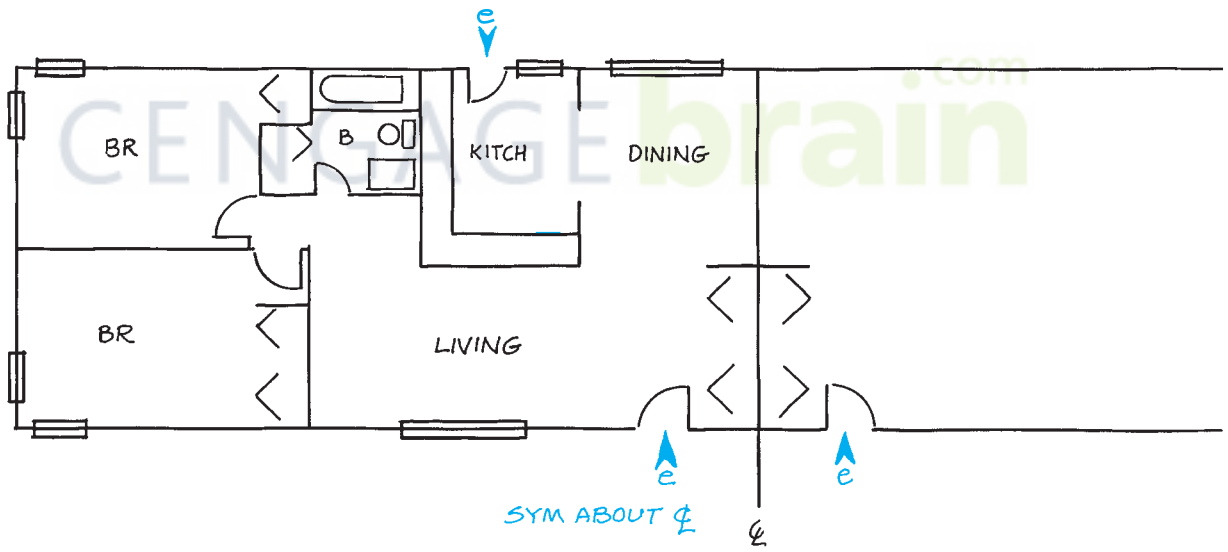

Figure 1–3. Straight line sketch of Duplex.

Two-Family Dwellings, **Figure 1–4.** This often is called simply the Residential Code. It is a model code, because it is a model that may be used by state and local building authorities as a basis for their own local code. A model code has no authority on its own. The government having jurisdiction in a locale must adopt its own building code. Very often the government body having jurisdiction (called the *Authority Having Jurisdiction,* or AHJ) adopts the model code. Sometimes the AHJ adds specific clauses to the model, and, in rare cases, it writes an all-new code. State building codes allow local governments to adopt a local building code, but they require that the local code be at least as stringent as the state code.

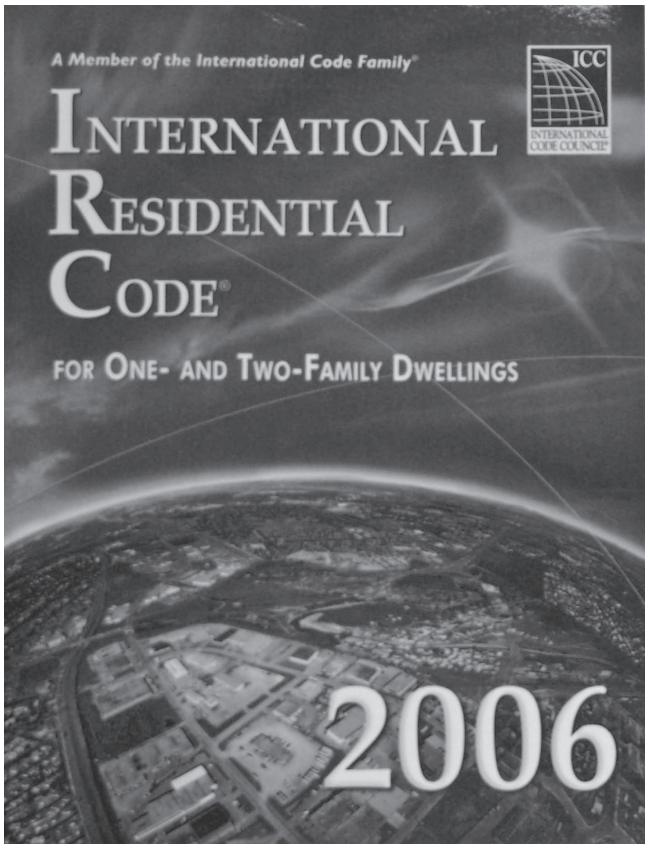

Figure 1–4. *2006 International Residential Code® for One- and Two-Family Dwellings.*

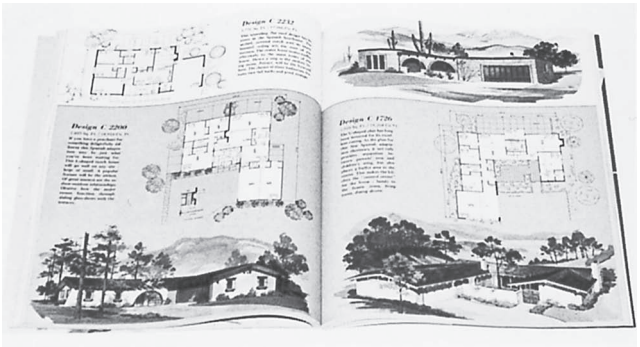

Figure 1–5. Stock plans can be ordered from catalogs.

The local building code is administered by a building department of the local government. The building department reviews the architect's plans before construction begins and inspects the construction throughout its progress to ensure that the code is followed.

Most communities also have zoning laws. *A zoning law* divides the community into zones where only certain types of buildings are permitted. Zoning laws prevent such problems as factories and shopping centers being built in the same neighborhood as homes.

Building departments usually require that very specific procedures are followed for each construction project. A building permit is required before construction begins. The building permit notifies the building department about planned construction. Then, the building department can make sure that the building complies with all the local zoning laws and building codes. When the building department approves the completed construction, it issues a *certificate of occupancy*. This certificate is not issued until the building department is satisfied that the construction has been completed according to the local code. The owner is not permitted to move into the new building until the certificate of occupancy has been issued.

If the building is more complex than a home or simple frame building, engineers may be hired to help design the structural, mechanical, electrical, or other aspects of the building. Consulting engineers specialize in certain aspects of construction and are employed by architects to provide specific services. Finally, architects and their consultants prepare construction drawings that show all aspects of the building. These drawings tell the contractor specifically what to build.

Many homes are built from stock plans available from catalogs of house designs, building materials dealers, or magazines, **Figure 1–5.** However, many states require a registered architect to approve the design and supervise the construction.

Starting Construction

After the architect and the owner decide on a final design, the owner obtains financing. The most common way of financing a home is through a mortgage. A *mortgage* is a guarantee that the loan will be paid in installments. If the loan is not paid, the lender has the right to sell the building in order to recover the money owed. In return for the use of the lender's money, the borrower pays interest—a percentage of the outstanding balance of the loan.

When financing has been arranged (sometimes before it is finalized), a contractor is hired. Usually a

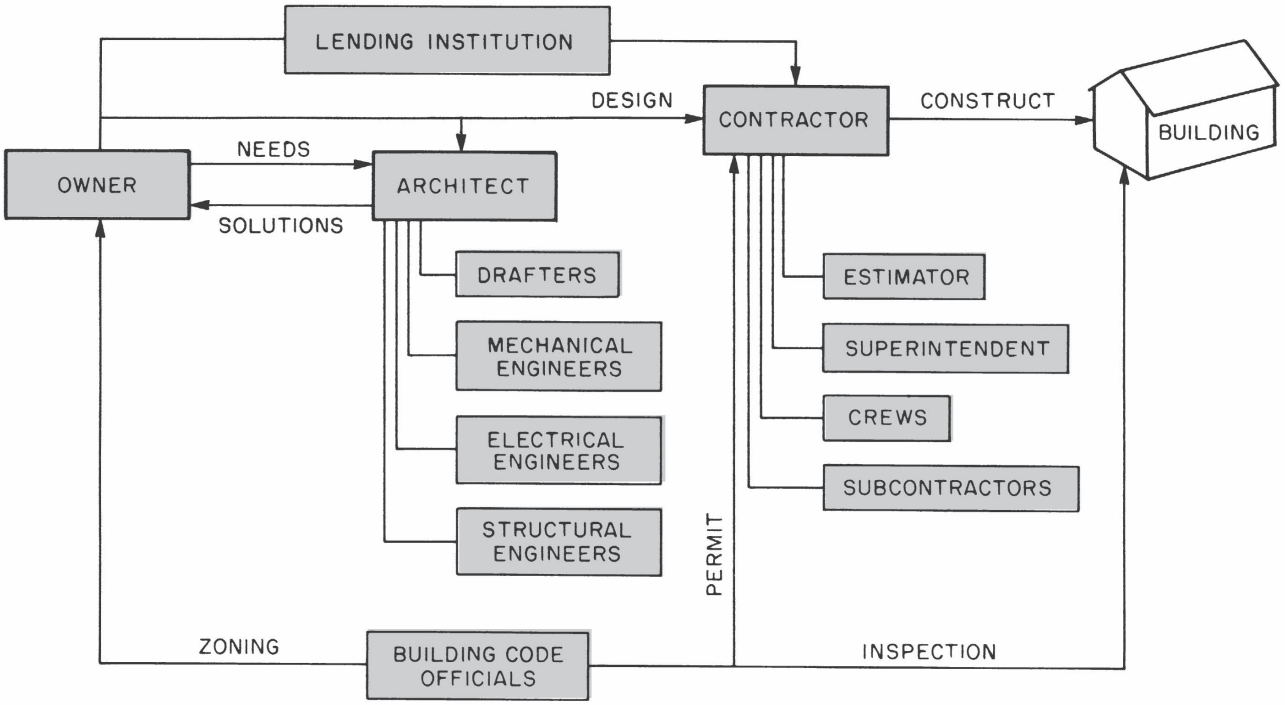

Figure 1–6. Design and construction team.

general contractor is hired with overall responsibility for completing the project. The general contractor in turn hires subcontractors to complete certain parts of the project. All stages of construction may be subcontracted. The parts of home construction most often subcontracted are plumbing and heating, electrical, drywall, painting and decorating, and landscaping. The relationships of all the members of the design and construction team are shown in **Figure 1–6.** Utility installers should carefully investigate all the drawings, especially the architectural drawings, in order to determine the installation locations of their equipment.

✓ CHECK YOUR PROGRESS

Can you perform these tasks?

- List construction design professions.
- Describe what work is done by each of these professions.
- Name the profession responsible for each major part of the design-construction progress.

ASSIGNMENT

1. Who acts as the owner's agent while the building is being constructed?
2. Who designs the structural aspects of a commercial building?
3. Who would normally hire an electrical engineer for the design of a store?
4. Who is generally responsible for obtaining financing for a small building?

5. To whom would the general contractor go if there were a problem with the foundation design for a home?
6. If local building codes require specific features for earthquake protection, who is responsible for seeing that they are included in a home design?
7. Whom would the owner inform about last-minute changes in the interior trim when the building is under construction?
8. What regulations specify what parts of the community are to be reserved for single-family homes only?
9. Who issues the building permit?
10. What regulations are intended to ensure that all new construction is safe?