

CHAPTER 10

Building Structures Design Examples

Work in Chapter 10 consists of discussions of the design of structural systems for several example buildings. The purpose of this work is to illustrate the process of dealing with the design of the whole building structure, whereas work in earlier chapters is focused on limited topics. The work here is linked to other chapters by using elements of the buildings here for some of the example exercise problems in other chapters. Buildings of similar size, shape, and purpose often have several alternatives for their basic construction, with each choice generally satisfying the goals for the building. To illustrate that situation, several different schemes are presented for some of the buildings used here for examples.

10.1 GENERAL CONCERNS FOR STRUCTURAL DESIGN

This section treats a number of issues that relate to the general work of designing building structures. Many of these issues are also discussed in other parts of the book.

Design Process and Methods

In general, the design work for a building consists of the conceptualization and decision process by which the final form and fabric of the finished building is descriptively determined. The output of the *design work* is the recorded description of the desired object. The work of generating the ideas and recording them is called *designing*. The displayed collection of recorded ideas, usually in some combination of graphic and written documents, is called the *design*. The person who generates the ideas is the *designer*.

Design work may be viewed as the collection of decisions that determine the finished image of the designed object.

Designers exert some judgment in making some of these decisions, although other sources strongly influence some decisions. How this all works for a specific design case depends on many factors. Some buildings are built using mostly predesigned, prefabricated, off-the-shelf parts, which reduces the design work to selecting and arranging of cataloged items. Other buildings may use newly developed materials or old materials put together in new ways, requiring considerable imagination and innovation in the design work. A particular building may be simple in its form and use, while others are complex and multifunctioning and present problems that are difficult to analyze. What exactly is involved in design work and how it is accomplished varies from case to case, even when the design work is done by the same persons.

Figure 10.1 presents an image of the design process viewed as a succession of activities. While a particular design is finished when the designer completes the design work and communicates the description to the persons who will create the actual object, the continuation of the project through final occupancy and use of the building has effects on final evaluation of the design and on ongoing design activities of the working designer.

Design of buildings is often thought of as being primarily the function of the architect. While it is true that architects often serve as prime designers for buildings, there is typically a long list of other participants in the design process. The fact that innovation and creative design occur to the extent that they do is more impressive when the collective restraints of all of these influential parties is considered. Clearly, effective designers learn to deal with these realities as well as with the creative process of design.

It is foolish to think of design work as flowing easily from one decision to the next, progressing smoothly toward a final statement. A final, conclusive statement must be achieved,