

CHAPTER

7

Masonry Structures

This chapter deals with aspects of the use of masonry construction for structures. Most of the masonry seen as a finished surface in new construction these days is either nonstructural or of a few limited types of structural masonry. (See Figure 7.1) Much of what must be dealt with in using masonry falls in the general category of building construction rather than with strictly structural design considerations. One must learn a great deal about materials and processes of masonry construction to become generally capable of using it. For that large body of information we refer the reader to the various sources, including textbooks, handbooks, and industry standards. The discussion in this chapter is limited to the most common uses of structural masonry and the general design considerations relating to building structures.

7.1 GENERAL CONCERNS FOR MASONRY

There are many types of masonry and many factors that must be dealt with in producing good masonry structures.

Units

Masonry consists of a solid mass produced by bonding separate units. The traditional bonding material is mortar. The units include a range of materials, the common ones being stone, brick, and concrete blocks (now called CMUs, for concrete masonry units). Many other units are used for special construction, but these three types are used for most structural masonry.

The structural character of masonry depends greatly on the material and form of the units. From a material point of view, the high-fired clay products (brick and tile) are the strongest, producing very strong construction when achieved

with the proper mortar, a good arrangement of units, and high-quality construction craft and work in general. This is particularly important if the general class of the masonry construction is the traditional, unreinforced variety.

Mortar

Mortar is usually composed of water, cement, and sand, with some materials added to make the wet mortar stickier (so that it adheres to the units during the laying up of the construction), is faster setting (hardening), and is generally more workable during the work. Building codes establish various requirements for the mortar, including the classification of the mortar and details of its use during construction.

The quality of the mortar is obviously important to the structural integrity of the masonry, both as a structural material in its own right and as a bonding agent that holds the units together. While the integrity of the units is dependent on the manufacturer or natural source, the quality of the finished mortar work is dependent primarily on the skill and care of the persons who produce the work.

There are several classes of mortar established by codes. The highest grades are required for uses involving major structural tasks for bearing walls, shear walls, columns, and heavy-load bearing supports. Specifications for the materials and required properties determined by tests are spelled out in detail. Still, the finished product is highly skill dependent.

Reinforcement

Although some joint reinforcing is typical in all structural masonry these days, the term *reinforced masonry* is reserved for a class of construction in which major vertical and horizontal reinforcement is used, making the finished work quite analogous to reinforced concrete construction.