

housing, nursing homes, and other occupancies are particularly suited to the linear orientation of loadbearing walls and the characteristic fire resistance of masonry. Office buildings, schools, manufacturing facilities, and other occupancies requiring large open spaces might combine a loadbearing masonry wall system at the core and perimeter with interior columns of steel, concrete, or masonry. Loadbearing masonry exterior walls should also be considered in lieu of frame-and-veneer systems whenever the selected veneer is a masonry material with structural capability, such as brick, concrete block, or mortar-bedded stone. Structural masonry is discussed at length in Chapter 12.

## 8.1 SINGLE-WYTHER WALLS

Within the restrictions of height-to-thickness ratios prescribed by the model building codes (see Chapter 12), walls may be empirically designed with a single unit thickness of clay, concrete, stone, or glass masonry (see *Fig. 8-2*). Single-wythe walls of hollow units provide the options of grouting the cores for greater mass, stability, and water-penetration resistance, or adding steel reinforcement for flexural strength. Grouted, reinforced concrete block and hollow brick walls of a single 8-in., 10-in., or 12-in. thickness can be used in low-, medium-, and high-rise loadbearing structures and in multi-story curtain wall applications (see *Fig. 8-3*).

Hollow structural clay tile can be used in single-wythe construction of interior walls and partitions, and in some instances of exterior walls. Facing tile and Type II glazed tile provide a finished surface on both faces of a single-wythe wall, with only one unit thickness for simplified construction. Standard structural tile designed to receive plaster applications can also be used in through-the-wall applications of one wythe. Type I glazed units are designed for finished exposure on only one side, where the other wall face will be concealed or will receive a plaster finish.

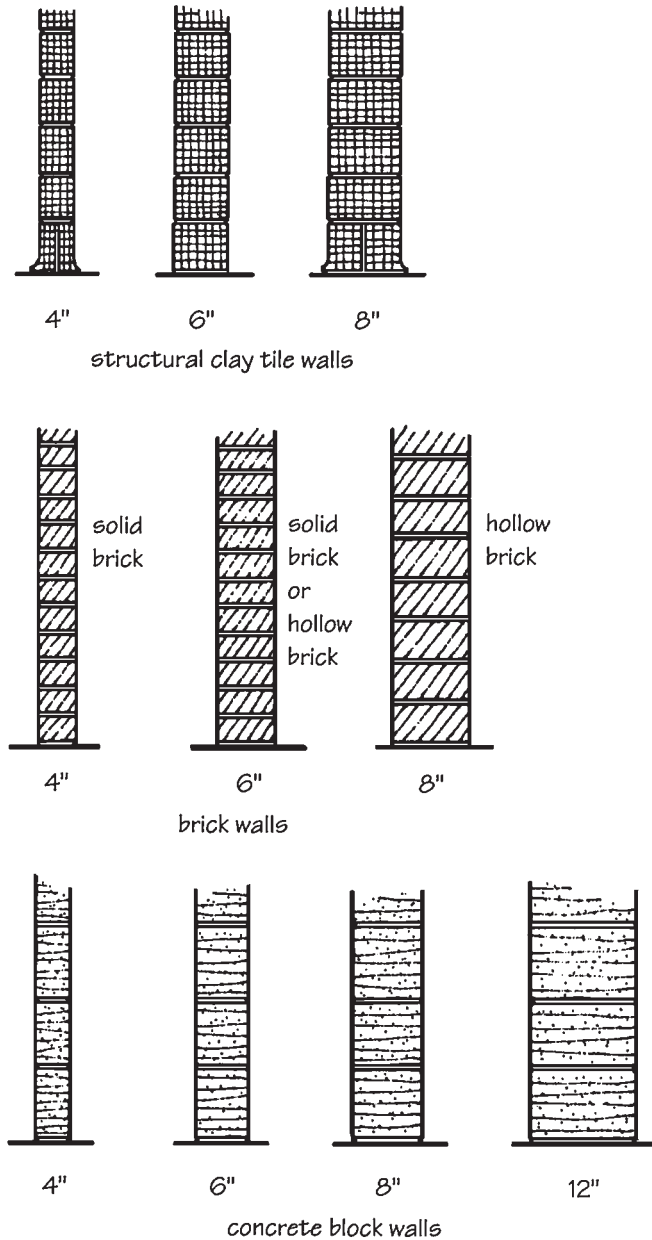
Hollow clay brick and solid brick with a 6-in. bed depth are often used in single-wythe construction, and in some instances, codes permit 4-in. walls. Hollow brick sections are usually at least 8 in. thick. Hollow architectural concrete blocks have decorative finishes on only one side. The opposite wall face must receive paint, plaster, gypsum board, or other material if exposed to view. Single-wythe walls of brick or block may be loadbearing or non-loadbearing.

Glass block masonry is used for high-security glazing, and for glazed areas requiring light control and/or heat-gain reductions. The units are used only in single-wythe construction, and do not have loadbearing capabilities.

## 8.2 MULTI-WYTHER WALLS

For larger horizontal or vertical spans between lateral supports or stiffeners, or for greater resistance to fire, sound, and heat transmission, wall thicknesses are increased by adding additional wythes of masonry of the same type unit or of a different material.

Multi-wythe masonry walls have been used in building construction throughout history. Strength, stability, and insulating value all depended on mass, and code requirements for empirically based, unreinforced bearing walls prescribed substantial thicknesses. The Monadnock Building in Chicago, completed in 1891, is 16 stories high with unreinforced loadbearing brick walls ranging in thickness from 12 in. at the top to more than 6 ft at the ground. At that time, wall wythes were bonded together with masonry unit headers as shown in *Fig. 8-4*. In 8-in. walls, header courses extend the full width of the wall section, allowing moisture to penetrate easily from exterior



**Figure 8-2** Single-wythe walls.

to interior. For the most part, masonry headers have been replaced by metal wall ties placed in the mortar bed joints. Today, masonry walls do not generally exceed 12 in. in thickness except under special conditions or circumstances. Multiple wythes that are connected to one another exhibit composite action in response to loads (see Fig. 8-5). Wythes that are flexibly connected react to loads differently (see Fig. 8-6).

Cavity walls consist of two or more wythes of masonry units separated by an air space at least 2 in. wide. The wythes may be brick, clay tile, concrete block, or stone, anchored to one another with metal ties which span the open collar joint (see Fig. 8-7). One of the major advantages of cavity wall construc-