12
STRUCTURAL MASONRY

Extensive structural engineering design is beyond the intended scope of this text. This chapter discusses only the general concepts of masonry bearing wall design. For detailed methods of analysis, design formulas, and sample calculations, the reader should consult Schneider and Dickey's *Reinforced Masonry Design* (1989); Amrhein's *Reinforced Masonry Engineering Handbook* (1992); Drysdale, Hamid, and Baker's *Masonry Structures Behavior and Design* (1999); or the *Masonry Designer's Guide* (Matthys, 1993), based on the Masonry Standards Joint Committee Code and Specifications published by The Masonry Society (TMS).

12.1 MASONRY STRUCTURAL SYSTEMS

The general concept of a masonry bearing wall structure is combined action of the floor, roof, and walls in resisting applied loads. The bearing walls can be considered as continuous vertical members supported laterally by the floor and roof systems. Vertical live loads and dead loads are transferred to the walls by the floor and roof systems acting as horizontal flexural members. The floor and roof systems also act as diaphragms to transfer lateral loads to the walls. Vertical and lateral loads applied from only one side of a wall will induce bending moment. The total moment is a result of the combined loading. Since compressive loads counteract some of the tension from this bending moment, the primary stresses that control loadbearing systems are compression and shear. *Figures 12-1 and 12-2* illustrate the typical forces acting on masonry bearing walls.

12.1.1 Axial Load Distribution

Normal axial load distribution in masonry is based on the units being laid in running bond pattern with a minimum overlap between units of one-fourth the unit length. Units laid in stack bond must be reinforced with bond beams or joint reinforcement to achieve the same distribution of axial loads.

When a superimposed axial load is applied to a masonry wall laid in running bond, it is assumed to be distributed uniformly through a triangular section of the wall (*see Fig. 12-3*). Bearing pads or plates are used to distrib-

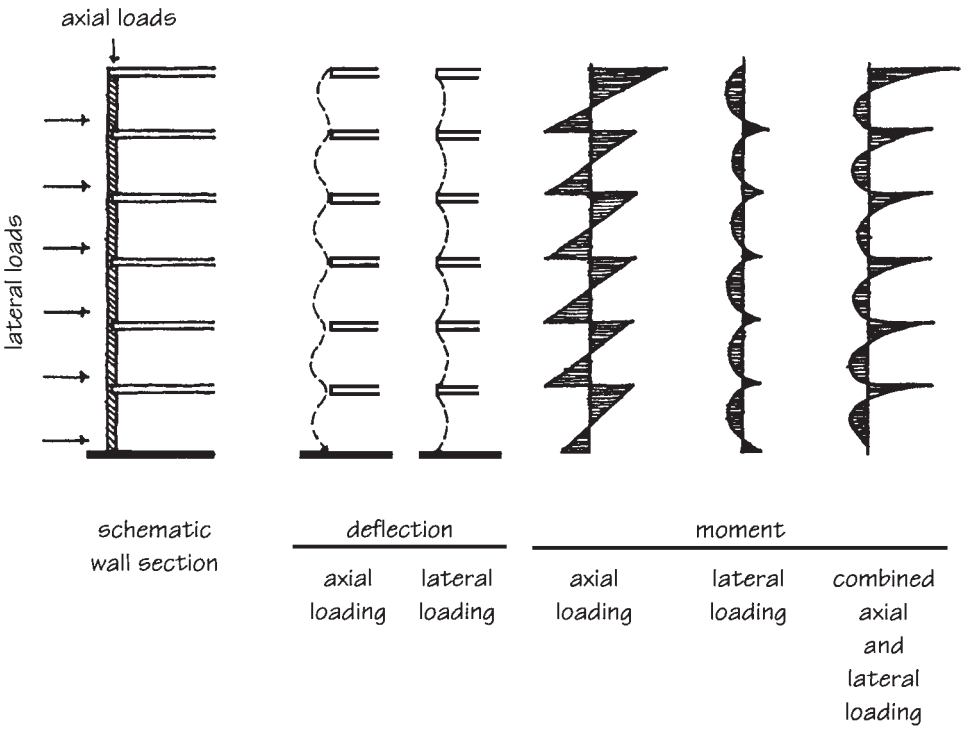

Figure 12-1 Forces acting on a bearing wall.

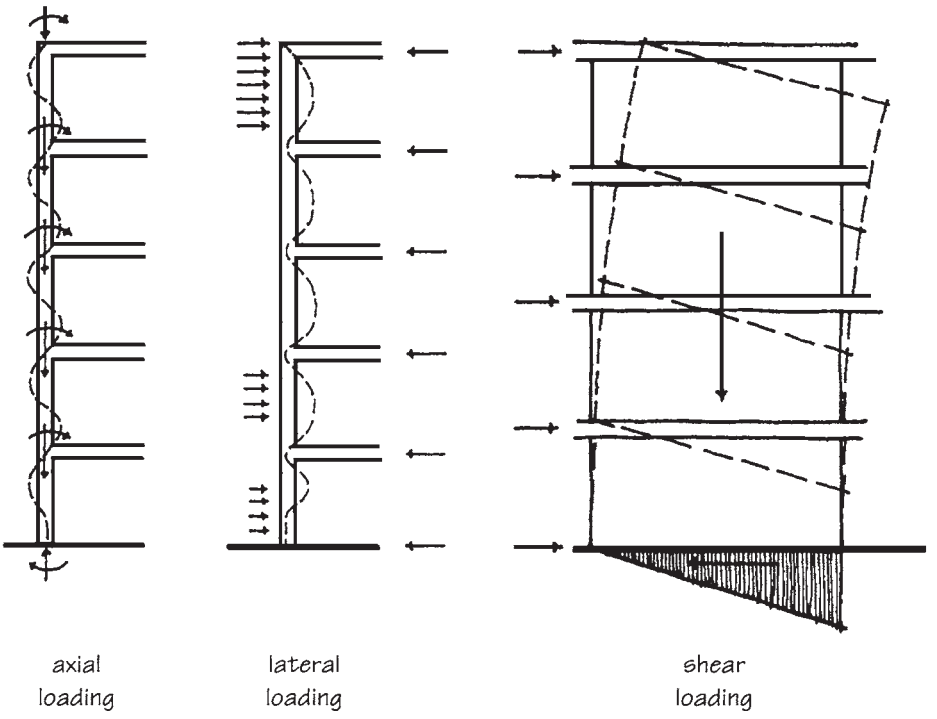

Figure 12-2 Loading on masonry bearing walls and shear walls. (*From BIA,* Recommended Practice for Engineered Brick Masonry.)