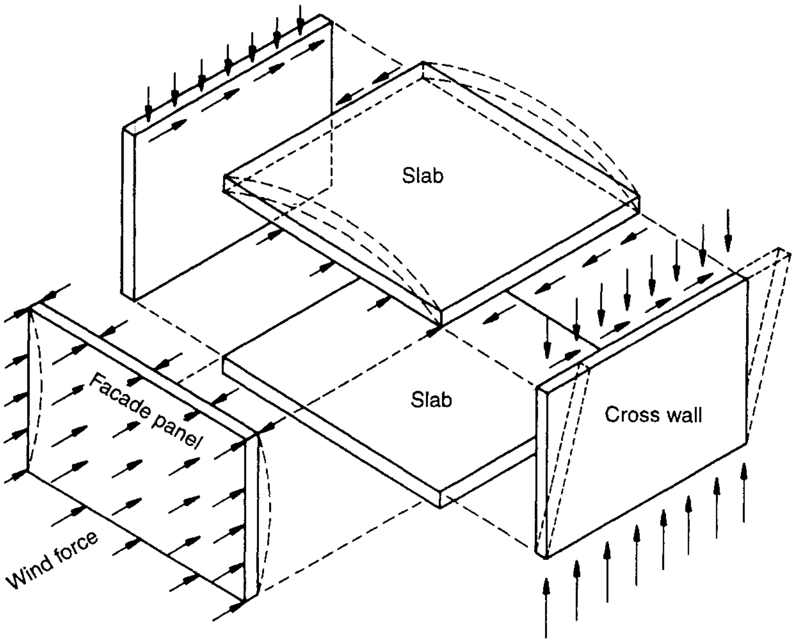

Fig. 6.1 The action of wind forces on a building. Wind force is resisted by the facade panel owing to bending, and transferred via floor slabs to the cross or shear wall and finally to the ground. (Structural Clay Products Ltd.)

stability is provided in various types of masonry buildings, through suitable wall arrangements.

6.3 THEORETICAL METHODS FOR WIND LOAD ANALYSIS

The calculation of the lateral stiffness and stresses in a system of symmetrically placed shear walls without openings subjected to wind loading is straightforward and involves simple bending theory only. Figure 6.2 gives an illustration of such a system of shear walls.

Because of bending and shear the walls deform as cantilevers, and since the horizontal diaphragm is rigid the deflections at slab level must be the same. The deflection of individual walls is given by:

$$\Delta_1 = \frac{W_1 h^3}{3EI_1} + \frac{\lambda W_1 h}{AG} \tag{6.1}$$

$$\Delta_2 = \frac{W_2 h^3}{3EI_2} + \frac{\lambda W_2 h}{AG} \tag{6.2}$$

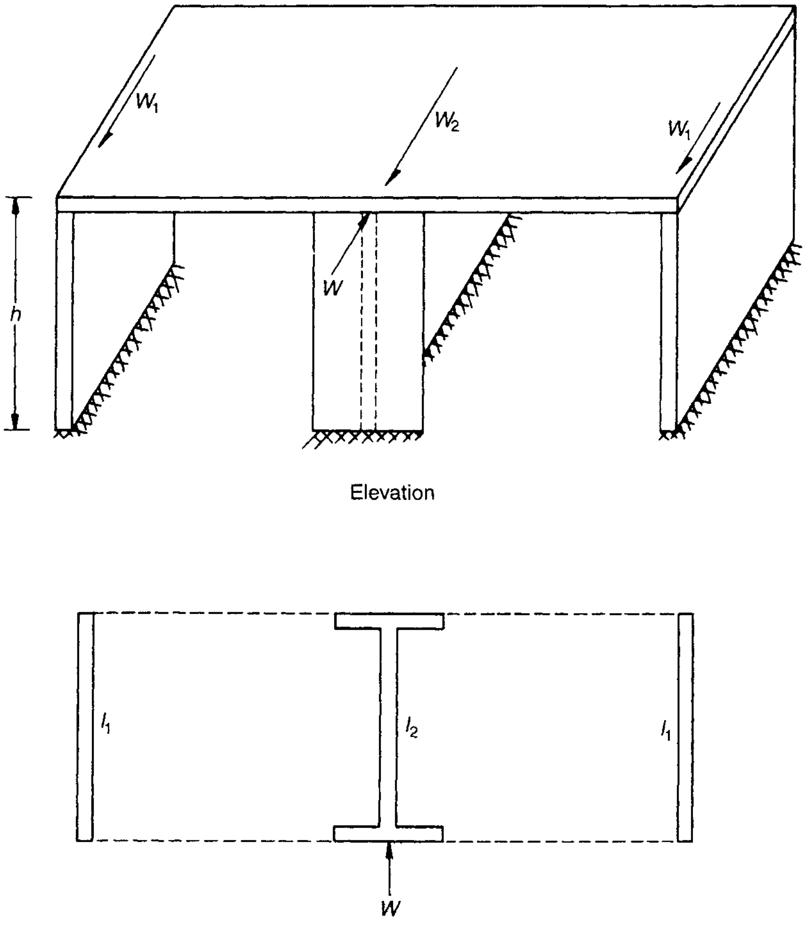

Fig. 6.2 A system of shear walls resisting wind force.

$$\Delta_1 = \Delta_2 \tag{6.3}$$

$$2W_1 + W_2 = W \tag{6.4}$$

where W_1, W_2=lateral forces acting on individual walls, Δ_1, Δ_2=deflections of walls, A=area of walls, h=height, E=modulus of elasticity, G=modulus of rigidity, I_1, I_2=second moments of areas and λ=shear deformation coefficient (1.2 for rectangular section, 1.0 for flanged section).

The proportion of the lateral load carried by each wall can be obtained from equations (6.1) to (6.4). The first term in equations (6.1) and (6.2) is