- Leeward side

$$\text{dead} + \text{imposed} = 1.4G_k + 1.2W_k$$

$$\text{stress} = 1.4 \times 0.455 + 0.598 = 1.23\,\text{N/mm}^2$$

The design is similar to the inner leaf and will not be considered any further. The slight tension which is developing is of no consequence, since 6 to 10% of the dead and imposed load will be transferred to the outer leaf even in cases where the slab is supported on the inner skin. The bending stress caused by the wind will be smaller if S_2 factor is assumed variable as explained in section 12.5.2: the staircase and lift well will also provide the stability against the wind which has been neglected. However, any facing brick having water absorption between 7 and 12% in 1:¼:3 mortar may be used, provided that it satisfies the lateral load design. The grade of mortar is kept the same as for the inner leaf.

Characteristic flexural strength:

$$f_{ky} = 0.14 \times 3.5 \quad (\gamma_m = 3.5)$$

$$= 0.49\,\text{N/mm}^2 < 0.5\,\text{N/mm}^2 \quad \text{(Table 3)}$$

Design characteristic shear as in inner leaf:

$$0.15 < 0.35 + \frac{0.9 \times (7 \times 7.26 \times 0.3 \times 3.5) \times 10^3}{102.5 \times 10^3} \times 0.6 = 0.65\,\text{N/mm}^2 \text{ (safe)}$$

Instead of the conventional design calculations described in this chapter a more sophisticated analysis of the structure is possible by idealizing it as a frame with vertical loading as shown in Fig. 12.7. Similarly, the structure can be idealized and replaced by a two-dimensional frame (Fig. 12.8) and analysed as discussed in Chapter 6 for wind loading.

12.7 DESIGN CALCULATION ACCORDING TO EC6 PART 1–1 (ENV 1996–1:1995)

To demonstrate the principle of design according to EC6, the wall A in the ground floor will be redesigned. The dead and live loading is taken as calculated before and as in Table 12.1. The bending moments and shear forces due to wind loading are given in Table 12.3. The category of manufacturing and execution controls are assumed to be II and C respectively; thus γ_m=3 as given in Table 4.6.

Load combination for ultimate limit state:

$$\text{permanent} + \text{variable} = 1.35\,G_{kj} + 1.5\,Q_{ki}$$

$$\text{stress} = (1.35 \times 168.08 + 1.5 \times 22.68)/102.5$$

$$= 2.2 + 0.33 = 2.53\,\text{N/mm}^2$$

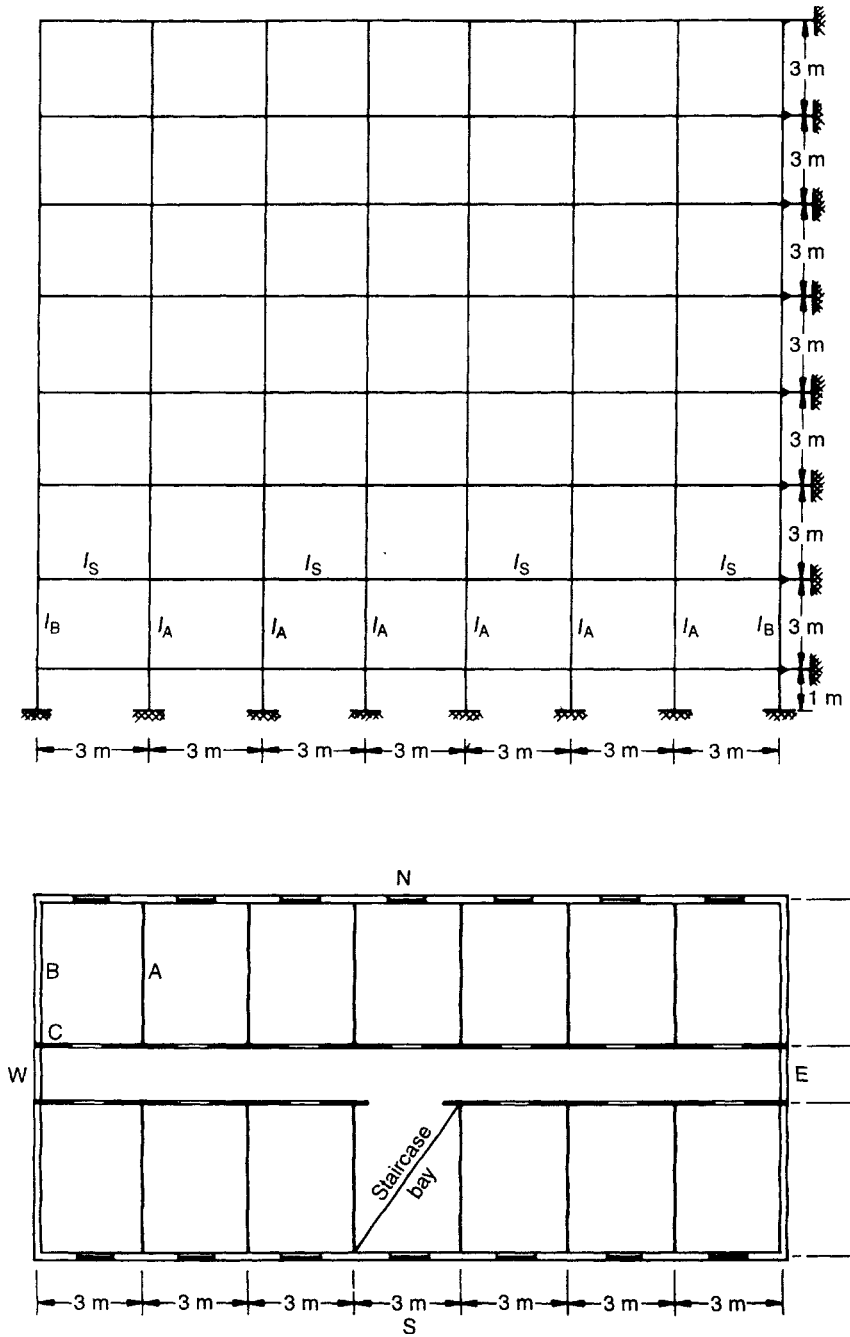

Fig. 12.7 Idealized structure for vertical load design.