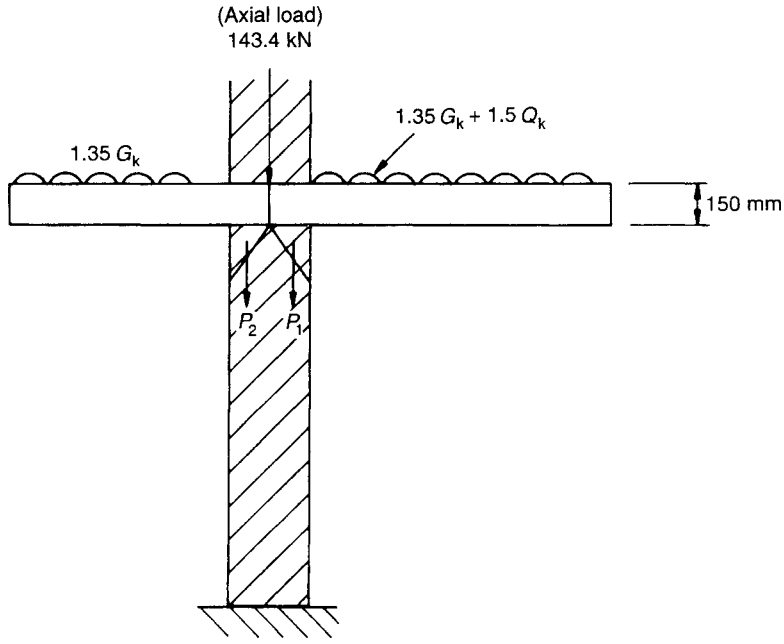

Fig. 12.9 Calculation of eccentricity of the loading (not to scale).

$$e_{cc} = 11.66 \times 17.08 + \frac{172.56 \times 51.25}{199.93} + 15.71 \times 85.45$$

$$= \frac{199.15 + 8897.19 + 1342.42}{199.93}$$

$$= \frac{10\,438.76}{199.93} = 52.21\,\text{mm}$$

$$\text{eccentricity} = 52.21 - 51.25 = 0.96\,\text{mm}$$

Total e_{cc}

$$e_i = M_i/N_i + e_2$$

$$= 0.96 + \frac{0.75 \times 2.850 \times 10^3}{450} = 0.96 + 4.75$$

$$= 5.71 = 0.056\,t$$

$$\phi_i = 1 - \frac{2e_i}{t}$$

$$= 1 - \frac{2 \times 0.056\,t}{t} = 0.88$$

$$f_k = \frac{324.9 \times 3}{0.59 \times 102.5} = 16.12\,\text{N/mm}^2 < 1.15 \times 15 = 17.25\,\text{N/mm}^2$$

EC6 allows the use of the value from the national code. Hence 50N/mm^2 brick in 1:$\frac{1}{4}$:3 mortar will be sufficient.

In the absence of test data a formula as given below is suggested for use:

$$f_k = k\delta f_b^{0.65} f_m^{0.25}\ \text{N/mm}^2$$
$$= 0.5 \times 0.85 \times f_b^{0.25} \times 16^{0.25}$$

or

$$f_b^{0.65} = \frac{16.12}{0.5 \times 0.85 \times 2} = 19$$
$$f_b = 100\,\text{N/mm}^2$$

Therefore, 100N/mm^2 bricks are required which is much higher than the previous case. It would be better and economical to do tests on prisms to obtain the characteristic strength.

For the ground floor

$$\text{design characteristic shear stress } f_{v,k} = \gamma_Q \gamma_m \frac{\text{shear force}}{\text{area}} \leqslant f_{vk0} + 0.4\sigma_d$$
$$= \frac{1.5 \times 3.5 \times 38.5 \times 10^3}{102.5 \times 4250} \leqslant 0.3$$
$$+ \frac{0.4 \times 1 \times 168.08 \times 10^3}{102.5 \times 1000}$$
$$= 0.464\text{N/mm}^2 < 0.96\text{N/mm}^2 \quad \text{(safe)}$$

γ_G has been taken as 1 for favourable effect.

The allowable shear due to precompression in BS 5628 is higher than in the Eurocode, but it does not make much difference to the design.

12.8 DESIGN OF PANEL FOR LATERAL LOADING: BS 5628 (LIMIT STATE)

To explain the principle of the design only panel B between sixth floor and roof will be considered. The low precompression on the inner leaf is ignored in this design. Assume:

- Inner leaf 102.5mm brickwork in 1:1:6 mortar
- Outer leaf 102.5mm brickwork with facing brick in 1:1:6 mortar
- Boundary conditions: two sides simply supported and two sides fixed as shown in Fig. 12.10.