- With only one slab loaded with superimposed load, W_2=9.2 and W_3=5.7.

Taking moments about centre line

$$\Sigma W e_x = W_2 (t/3) - W_3 (t/3)$$

$$e_x = (9.2 - 5.7) \times (t/3) / [9.2 + 5.7 + 177.4 + (1.4 \times 17)]$$

$$= 0.5534 \text{ mm}$$

From equation (5.2)

$$e_t = 0.6 \times 0.5534 + 102.5 [(1/2400) \times (19.4)^2 - 0.015]$$

$$= 0.332 + 14.536 = 14.868 \text{ mm}$$

So that, since e_t is greater than e_x, e_m=e_t=0.145t, which is greater than 0.05t, with the result that:

$$\beta = 1.1 [1 - (2 \times 0.145)] = 0.78$$

Design vertical load resistance
Assume t in mm and f_k in N/mm²:

$$\text{design vertical load resistance} = (\beta t f_k)/\gamma_m$$

$$= 0.78 \times 102.5 \times f_k/3.5$$

$$= 22.84 f_k \quad (\text{N/mm or kN/m})$$

Determination of f_k
We have

$$\text{design vertical load} = \text{design vertical load resistance}$$

$$(177.4 + 9.2 + 9.2 + 23.8) \text{ kN/m} = 22.84 f_k \text{ kN/m}$$

$$f_k = 9.61 \text{ N/mm}^2$$

Modification factors for f_k

- Horizontal cross-sectional area of wall=0.1025×4.25=0.44 m². Since A>0.2 m², no modification factor for area.
- Narrow masonry wall. Since wall is one brick thick, modification factor=1.15.

Required value of f_k

$$f_k = 9.61/1.15 = 8.35 \text{N/mm}^2$$

Selection of brick/mortar combination

Use Fig. 4.1 to select a suitable brick/mortar combination. Any of the following would provide the required value of f_k.

Mortar designation	*Compressive strength of bricks* (N/mm^2)
(iii)	35.0
(ii)	29.0
(i)	22.5

(b) Using ENV 1996–1–1

The dimensions, loadings and safety factors used here are the same as those given above in section (a). The reinforced concrete floor slabs are assumed to be of the same thickness as the walls (102.5 mm) and the modular ratio E_{slab}/E_{wall} taken as 2.

Loading
As for section (a).

Safety factors
For material strength, γ_m=3.0
For loading, γ_f (DL)=1.35
γ_f(LL)=1.5

Design vertical loading (Fig. 5.16)

Loading from above (W_1)=1.35×105+1.5×19=170.25kN/m

Load from left (W_2)

dead load only=1.35×4.1=5.535kN/m

imposed load=5.535+1.5×2.2=8.835kN/m

Load from right (W_3)

dead load only=5.535 kN/m

imposed load=8.835 kN/m

Wall self-weight=1.35×17=22.95kN/m