This is satisfactory. Hence by interpolation from Table 4.8 the capacity reduction factor β is 0.975 without eccentricity.

From Table 4.5a, the masonry characteristic strength $f_k = 15\,\mathrm{N/mm^2}$. The material partial safety factor $\gamma_m = 2.8$. Finally, the ultimate vertical design strength per unit length of wall is

$$\frac{\beta t f_k}{\gamma_m} = \frac{0.975 \times 215 \times 15}{2.8} = 1122.99\,\mathrm{N/mm} = 1122.99\,\mathrm{kN\ per\ metre\ run}$$

Example 4.7

Calculate the vertical design strength of the wall shown in Figure 4.29, assuming simple lateral support is provided at the top. The wall is 3.45 m high and is constructed from 27.5 N/mm^2 bricks set in grade (iii) mortar, and both the manufacturing and construction control are normal.

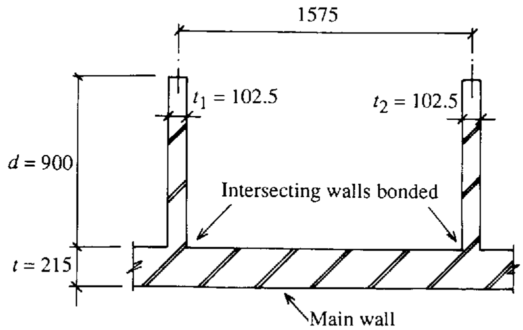

Figure 4.29 *Plan on wall*

The effective height $h_{ef} = h = 3450\,\mathrm{mm}$. The intersecting walls are not long enough (that is $d < 10t$) or thick enough (that is t_1 and $t_2 < t$) to provide enhanced lateral support in the vertical direction; therefore the effective height will govern the slenderness. However, the length of the intersecting walls is greater than $3t$ and they may therefore be considered as equivalent stiffening piers. That is,

$$\frac{\text{Equivalent pier spacing}}{\text{Equivalent pier width}} = \frac{1575}{102.5} = 15.37$$

Equivalent pier thickness $t_p = 3t = 3 \times 215 = 645\,\mathrm{mm}$

$$\frac{\text{Equivalent pier thickness}}{\text{Wall thickness}} = \frac{t_p}{t} = \frac{645}{215} = 3$$

Therefore, by interpolation from Table 4.7, the stiffness coefficient K is 1.19. The effective thickness $t_{ef} = tK = 215 \times 1.19 = 255.85\,\mathrm{mm}$. Thus the slenderness ratio is given by

$$\mathrm{SR} = \frac{h_{ef}}{t_{ef}} = \frac{3450}{255.85} = 13.48 < 27$$

This is satisfactory. By interpolation from Table 4.7, the capacity reduction factor β is 0.90 without eccentricity.

From Table 4.5a, the masonry characteristic strength $f_k = 7.1\ \text{N/mm}^2$. The material partial safety factor $\gamma_m = 3.5$. Thus the ultimate vertical design strength is

$$\frac{\beta t f_k}{\gamma_m} = \frac{0.9 \times 215 \times 7.1}{3.5} = 392.53\ \text{N/mm} = 392.53\ \text{kN per metre run}$$

Example 4.8

Determine the vertical design strength of the wall shown in Figure 4.30. The wall is 3.45 m high, restrained at the top, and constructed from $35\ \text{N/mm}^2$ bricks set in grade (iii) mortar. Both the manufacturing and construction control are to be normal.

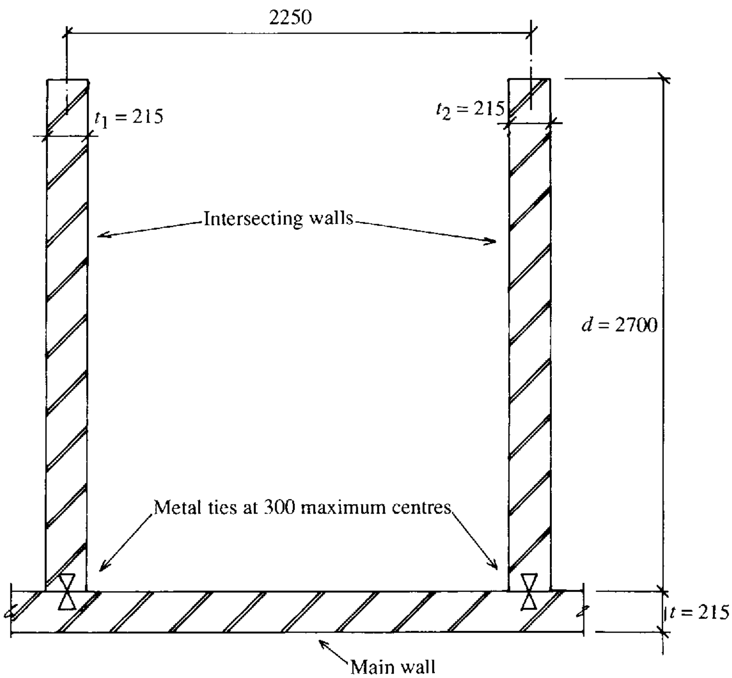

Figure 4.30 *Plan on wall*

The effective height $h_{ef} = 0.75h = 0.75 \times 3450 = 2587.5$ mm. The length of the intersecting walls is greater than $10t = 10 \times 215 = 2150$ mm and their thickness is not less than the main wall, $t = 215$ mm; therefore they may be considered to provide lateral support in the vertical direction. The degree of support will be simple since the intersecting walls are only tied and not bonded to the main wall. Therefore the effective length is the clear distance between simple lateral supports, that is $l_{ef} = L - t_1 = 2250 - 215 = 2035$ mm. As the effective length of 2035 mm is less than the effective height of 2587.5 mm, it will govern the slenderness ratio.

Furthermore, since the length of the intersecting walls is greater than $3t$ they may be considered as equivalent stiffening piers for the purpose of determining the effective thickness:

$$\frac{\text{Equivalent pier spacing}}{\text{Equivalent pier width}} = \frac{2250}{215} = 10.47$$