$$\text{stress} = (0.95 \times 0.9)/1.4 - 1.4 \times 0.09$$

$$\text{(proportionally reduced from (12.18))}$$

$$= 0.61 - 0.126 = 0.484\,\text{N/mm}^2 \text{ (no tension)} \qquad (12.20)$$

• Leeward side

$$\text{dead} + \text{wind} = 1.4\,G_k + 1.4\,W_k \qquad (12.21)$$

$$\text{stress} = 0.95 + 0.126 = 1.08\,\text{N/mm}^2 \qquad (12.22)$$

(iii) Dead, imposed and wind loads

$$\text{dead} + \text{imposed} + \text{wind} = 1.2\,G_k + 1.2\,Q_k + 1.2\,W_k \qquad (12.23)$$

$$\text{stress} = (0.95 \times 1.2)/1.4 + (1.2 \times 0.20)/1.6 \pm 1.2 \times 0.09$$

$$= 0.814 + 0.15 \pm 0.108$$

$$= 1.07 \text{ or } 0.856\,\text{N/mm}^2 \quad \text{(no tension)} \qquad (12.24)$$

In this case also the severe loading condition appears to be (12.17).

(d) Third floor

(i) Design and imposed loads

$$\text{design} + \text{imposed} = 1.4\,G_k + 1.6\,Q_k$$

$$= 1.4 \times 94.04 + 1.6 \times 15.12$$

$$= 131.66 + 24.19 = 155.85\,\text{kN/m} \qquad (12.25)$$

$$\text{stress} = (131.66 \times 10^3)/(102.5 \times 10^3)$$

$$+ (24.19 \times 10^3)/(102.5 \times 10^3)$$

$$= 1.28 + 0.24 = 1.52\,\text{N/mm}^2 \qquad (12.26)$$

(ii) Dead and wind loads

• Windward side

$$\text{dead} + \text{wind} = 0.9\,G_k + 1.4\,W_k \qquad (12.27)$$

$$\text{stress} = (0.9 \times 1.28)/1.4 - 1.4 \times 0.162$$

$$= 0.823 - 0.227 = 0.596\,\text{N/mm}^2 \quad \text{(no tension)} \quad (12.28)$$

• Leeward side

$$\text{dead} + \text{wind} = 1.4\,G_k + 1.4\,W_k \qquad (12.29)$$

$$\text{stress} = 1.28 + 0.227 = 1.51\,\text{N/mm}^2 \qquad (12.30)$$

(iii) Dead, live and wind loads

$$\text{dead} + \text{live} + \text{wind} = 1.2\,G_k + 1.2\,Q_k + 1.2\,W_k \tag{12.31}$$

$$\text{stress} = (1.28 \times 1.2)/1.4 + (0.24 \times 1.2)/1.6 \pm 1.2 \times 0.162$$

$$= 1.097 + 0.18 \pm 0.194$$

$$= 1.47 \text{ or } 1.08\,\text{N/mm}^2 \text{ (no tension develops)} \tag{12.32}$$

The critical load combination is (12.25) and the load is $155.85\,\text{kN/m}$.

(e) Second floor

(i) Design and imposed loads

$$\text{design} + \text{imposed} = 1.4\,G_k + 1.6\,Q_k$$

$$= 1.4 \times 118.72 + 1.6 \times 16.2$$

$$= 166.2 + 25.9 = 192.10\,\text{kN/m} \tag{12.33}$$

$$\text{stress} = (1.4 \times 118.72 \times 10^3)/(102.5 \times 10^3)$$

$$+ (1.6 \times 16.2 \times 10^3)/(102.5 \times 10^3)$$

$$= 1.62 + 0.25 = 1.87\,\text{N/mm}^2 \tag{12.34}$$

(ii) Dead and wind loads

● Windward side

$$\text{dead} + \text{wind} = 0.9\,G_k + 1.4\,W_k \tag{12.35}$$

$$\text{stress} = (0.9 \times 1.62)/1.4 - (1.4 \times 0.253)$$

$$= 1.04 - 0.35 = 0.69\,\text{N/mm}^2 \quad \text{(no tension)} \tag{12.36}$$

● Leeward side

$$\text{dead} + \text{wind} = 1.4\,G_k + 1.4\,W_k \tag{12.37}$$

$$\text{stress} = 1.62 + 1.4 \times 0.253 = 1.97\,\text{N/mm}^2 \tag{12.38}$$

(iii) Dead, imposed and wind loads

$$\text{dead} + \text{imposed} + \text{wind} = 1.2\,G_k + 1.2\,Q_k + 1.2\,W_k \tag{12.39}$$

$$\text{stress} = (1.62 \times 1.2)/1.4 + (0.25 \times 1.2)/1.6 + 1.2 \times 0.253$$

$$= 1.39 + 0.19 \pm 0.30$$

$$= 1.88 \text{ or } 1.28\,\text{N/mm}^2 \text{ (no tension)} \tag{12.40}$$