

Fig. 12.4 Dimensions for wall A.

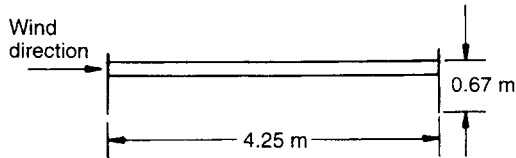


Fig. 12.5 Dimensions for wall B.

Total second moment of area for the building

$$\begin{aligned}\Sigma I &= 12I_A + 4I_B \\ &= 12 \times 1.734 + 4 \times 1.7 = 27.61 \text{ m}^4\end{aligned}$$

Moment carried by wall A

$$\begin{aligned}M_A &= \text{total moment} \times I_A / \Sigma I = (1.734 / 27.61) M \\ &= 0.06266 M\end{aligned}$$

and moment carried by wall B

$$M_B = (1.7 / 27.61) M = 0.0616 M$$

Similarly, shear force carried by wall A

$$SF_A = \text{total force} \times I_A / \Sigma I = 0.06266 F$$

and shear force carried by wall B

$$SF_B = \text{total force} \times I_B / \Sigma I = 0.0616 F$$

The calculated values of the SF are given in [Table 12.3](#).

12.6 DESIGN LOAD

12.6.1 Load combination for ultimate limit state, wall A: clause 22, BS 5628

(a) Sixth floor

(i) Dead and imposed loads

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

Table 12.3 Distribution of bending moment stresses and shear force in walls

<i>Just above floor level</i>	<i>Wall A</i>		<i>Wall B</i>	
	<i>Bending stress (N/mm²)</i>	<i>Shear force (kN)</i>	<i>Bending stress (N/mm²)</i>	<i>Shear force (kN)</i>
<i>6th floor</i>				
wall A	$\frac{M_A Y}{I_A} = \frac{0.06266 \times 131.9^a}{1.734} \times \frac{2.125}{10^3}$			
	± 0.01	5.5	± 0.01	5.41
wall B	$\frac{M_b Y}{I_b} = \frac{0.0616 \times 131.9^a}{1.7 \times 10^3} \times 2.125$			
<i>5th floor</i>				
wall A	$= \frac{0.06266 \times 527.6^a \times 2.125}{1.734 \times 10^3}$			
	± 0.04	11.0	± 0.04	10.83
wall B	$= \frac{0.0616 \times 527.6 \times 2.125}{1.7 \times 10^3}$			
<i>4th floor</i>				
wall A	$= \frac{0.06266 \times 2.125}{1.734 \times 10^3} \times 1187.2^a$			
	$= 0.0000768 \times 1187.2$	± 0.09	16.5	± 0.09
wall B	$= \frac{0.0616 \times 2.125}{1.7 \times 10^3} \times 1187.2^a$			
	$= 0.000077 \times 1187.2$			
<i>3rd floor</i>				
wall A	$= 0.768 \times 10^{-4} \times 2110.54^a$			
	± 0.162	22.0	± 0.163	21.65
wall B	$= 0.77 \times 10^{-4} \times 2110.54^a$			
<i>2nd floor</i>				
wall A	$= 0.768 \times 10^{-4} \times 3297.7^a$			
	± 0.253	27.5	± 0.254	27.06
wall B	$= 0.77 \times 10^{-4} \times 3297.7^a$			
<i>1st floor</i>				
wall A	$= 0.768 \times 10^{-4} \times 4748.71^a$			
	± 0.365	33.0	± 0.366	32.5
wall B	$= 0.77 \times 10^{-4} \times 4748.71^a$			
<i>Ground floor</i>				
wall A	$= 0.768 \times 10^{-4} \times 6463.72^a$			
	± 0.496	38.50	± 0.498	37.9
wall B	$= 0.77 \times 10^{-4} \times 6463.72^a$			

^a From section 12.5.2