

Figure 1.6 Beam B isolated

Total UDL = slab UDL + SW = $(5.4 \times 5 \times 2.5) + (80/100) \times 5 = 71.5 \text{ kN}$

Reactions transmitted to wall and beam B = 71.5/2 = 35.75 kN

Beam B (Figure 1.6) supports the reaction from beam A as a central point load and a UDL due to its self-weight:

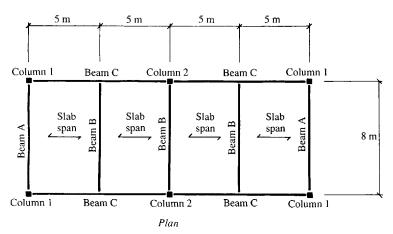
Point load = 35.75 kN

SW UDL = $(80/100) \times 5 = 4 \text{ kN}$

Reactions transmitted to walls = (35.75 + 4)/2 = 19.88 kN

Example 1.4

A 200 mm thick reinforced concrete mezzanine floor slab is simply supported on beams and columns as shown in Figure 1.7. Calculate the beam and column loads if the floor has to carry an imposed load of $5\,\mathrm{kN/m^2}$. The weight of concrete may be taken as $2400\,\mathrm{kg/m^3}$. The beams may be considered to weigh $120\,\mathrm{kg}$ per metre run and the columns $100\,\mathrm{kg}$ per metre run.



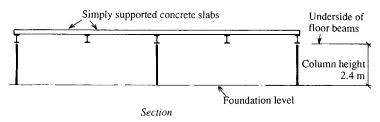


Figure 1.7 Arrangement of mezzanine floor

Slab dead load, 200 mm thick: $0.2 \times 2400/100 = 4.8 \text{ kN/m}^2$

Slab imposed load: 5 kN/m²

Slab combined load: dead

4.8

imposed 5.0

 $9.8 \, kN/m^2$

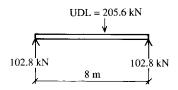


Figure 1.8 Beam A isolated

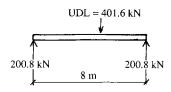


Figure 1.9 Beam B isolated

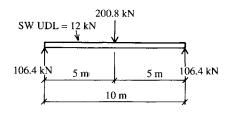


Figure 1.10 Beam C isolated

Beam A (Figure 1.8) supports a UDL from a 2.5 m width of simply supported slab together with its SW:

Total UDL = slab UDL + SW UDL
=
$$(9.8 \times 8 \times 2.5) + (120/100) \times 8 = 196 + 9.6 = 205.6 \text{ kN}$$

Reactions = $205.6/2 = 102.8 \text{ kN}$

Beam B (Figure 1.9) supports a UDL from a 5 m width of simply supported slab together with its SW:

Total UDL = slab UDL + SW UDL
=
$$(9.8 \times 8 \times 5) + (120/100) \times 8 = 392 + 9.6 = 401.6 \text{ kN}$$

Reactions = $401.6/2 = 200.8 \text{ kN}$

Beam C (Figure 1.10) supports a central point load from the beam B reaction together with a UDL due to its SW:

SW UDL =
$$(120/100) \times 10 = 12 \text{ kN}$$

Reactions = $(12 + 200.8)/2 = 212.8/2 = 106.4 \text{ kN}$

Column 1 (Figure 1.11) supports the reactions from beam A and C together with its SW:

Beam A reaction	102.8
Beam C reaction	106.4
$SW = (100/100) \times 2.4$	2.4
Total column load	211.6 kN

Column 2 (Figure 1.12) supports the reactions from one beam B and two beams C together with its SW:

Beam B reaction	200.8
Beam C reaction	106.4
Beam C reaction	106.4
$SW = (100/100) \times 2.4$	2.4
	416.0 kN

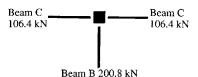


Figure 1.12 Column 2 loads

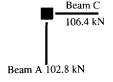


Figure 1.11 Column 1 loads