

Q1

$$\begin{aligned}\text{effective span} &= 7800 + \frac{n}{2} \\ &= 7800 + \frac{360}{2} \\ &= 7800 \text{ mm}\end{aligned}$$

(EC1, Table A1) characteristic permanent action  $G_k$   
 $= 0.36 (78) = 28.08 \text{ kN/m}^2$

(EC1, Table 6.1/6.2 pg 21)  
Table 6.1 - C5

Table 6.2 Imposed Load  $5.0 \text{ kN/m}^2$

$$Q_k = 4.00 \text{ N/m}^2$$

$$q_k = 3.00 \text{ N/m}^2$$

(E6.106, ECO NA tab A1.213, NA pg 4)

Design Value of action

$$\gamma = 0.925 \quad (0.925 \times 1.35 \times 28.08) + (1.5 \times 3.00)$$

$$\gamma_g = 1.35 \quad = 35.0649 + 4.5 = 39.6 \text{ kN/m}$$

$$\gamma_{Q1} = 1.50$$

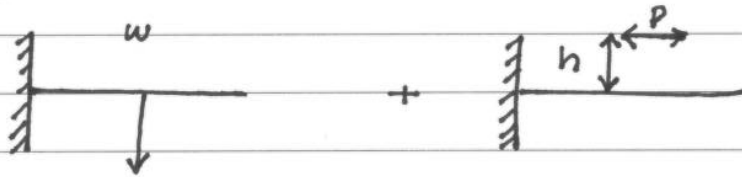
$$\gamma_i = 1.50 \quad 1.5 \times 2.81 \times 4$$

$$\gamma_{21} = 0.7 \quad = 16.8 \text{ kN/m}$$

~~(E6.106, ECO NA tab A1.213, NA pg 4)~~

(ECO, NA Table A1.1 Pg 2)

Design value of the applied IBM, MEB



$$MED = \frac{wL^2}{2} + Ph$$

$$= \frac{39.6 + 7.98^2}{2} + 16.8$$

$$= 68.4 \text{ KN/m}$$

$$\begin{aligned} \text{b.) } VED &= wL \\ &= 39.6 \times 7.98 \\ &= 316 \text{ KN/m} \end{aligned}$$

Q2

C30/37

exposure = XCI

fire 3 hours, width 45

Adev = 5mm

(EC2, 4.4.1.1)

( $C_{nom} = C_{min} + A_{dev}$  pg 49)

Equation 4.2 pg 49

$C_{min}$ :  $C_{min b}$

Table 4.2 2X40  $\phi$

$$\begin{aligned} \text{Area} &= 2\pi r^2 = 2(\pi)(20)^2 \\ &= 2513 \text{ mm}^2 \end{aligned}$$

Equivalent  $\phi$  for one bar

$$2513 = \pi r^2$$

$$r = 28.3 \quad d = 56.6$$

$C_{min b} = 56.6$  for bar

$$= 56.6 - 10 = 46.6 \text{ mm (links)}$$

(Page 50, Table 4.2) max  $a_g \leq 40$

$\therefore$  no increas

$$C_{min b} (\text{link}) = 10 \text{ mm} (< 46.6 \text{ mm})$$

Large value (46.6)

(pg 49 Table 4.2)

XCI - C30/37

$C_{min dur}$  for XCI and C30/37 = 25mm

$$25 \text{ mm} < 46.6$$

4.4.1.1

$$C_{nom} = 46.6 + 5 = 51.6 \text{ mm (to centre of bar)}$$
$$= 51.6 + 10 + \frac{40}{2} = 81.6 \text{ mm}$$

Centre table

check fire

$$180 \text{ mins} - \text{axial distance}$$
$$= 48.6 \text{ m} < (81.6)$$

$$C_{nom} = 51.6 \text{ mm}$$

↑

Larger than fire

