

4.6 Potrebno je dimenzionirati nosač prikazan na crtežu ako je poprečni presjek pravokutnog oblika, omjera stranica $b/h=0.25$. Poznato je:

$$L = 6 \text{ m}$$

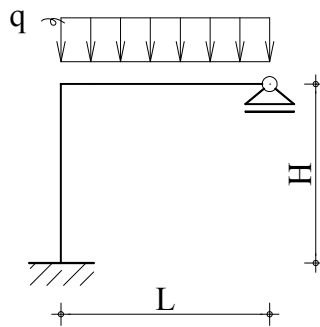
$$H = 5 \text{ m}$$

$$q = 20 \text{ kN/m}$$

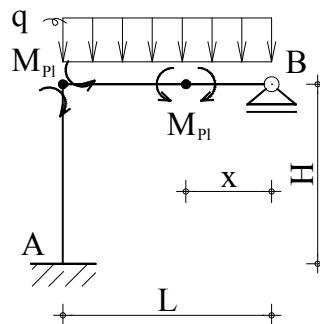
$$\sigma_R = 24.0 \frac{\text{kN}}{\text{cm}^2}$$

$$v = 2.0$$

$$b/h = 1/4$$



$$q_{pl} = q \cdot v = 20 \text{ kN/m} \cdot 2 = 40 \text{ kN/m}$$



Uvjet za moment plastičnosti u polju

$$R_B \cdot x - \frac{q_{pl} \cdot x^2}{2} = M_{pl} \quad (1)$$

Potrebno je odrediti udaljenost na kojoj se od ležaja javlja moment plastičnosti u polju

$$\sum V = 0$$

$$R_A - q_{pl} \cdot x = 0 \Rightarrow R_B = q_{pl} \cdot x$$

$$q_{pl} \cdot x^2 - \frac{q_{pl} \cdot x^2}{2} = M_{pl}$$

$$\frac{q_{pl} \cdot x^2}{2} = M_{pl}$$

$$q_{pl} = \frac{2 \cdot M_{pl}}{x^2}$$

Uvjet za moment plastičnosti u spoju grede i stupa

$$R_B \cdot L - \frac{q \cdot L^2}{2} = -M_{pl}$$

$$q_{pl} \cdot x \cdot L - \frac{q_{pl} \cdot L^2}{2} = -\frac{q_{pl} \cdot x^2}{2}$$

$$\frac{x^2}{2} + xL - \frac{L^2}{2} = 0$$

(2)

$$x^2 + 12x - 36 = 0$$

$$x_1 = 2.485\text{m}$$

$$x_2 = -14.485\text{m}$$

$$M_{pl} = \frac{q_{pl} \cdot x^2}{2} = \frac{40 \cdot 2.485^2}{2} = 123.52\text{kNm}$$

$$M_{pl} = \sigma_R \cdot W_{pl} = \sigma_R \cdot \frac{b \cdot h^2}{4} = \sigma_R \cdot \frac{h^3}{16} = 123.52\text{kNm}$$

$$h = 19.92\text{cm}$$

Odabrano:

$$h = 20\text{cm}$$

$$b = 5\text{cm}$$