

5. Zadatak: Odrediti potrebnu količinu armature u stubu na osnovu zadanih parametara:

$$l=2.5 \text{ m} \quad k=1.0$$

$$\text{MB 30} \quad \rightarrow \quad f_b = 20.5 \text{ MPa}$$

$$\text{RA 400/500} \quad \rightarrow \quad \sigma_v = 400 \text{ MPa}$$

$$b/d=30/30 \text{ cm}$$

$$N_g=93.35 \text{ kN} \quad N_p=124.47 \text{ kN}$$

$$l_k = k \cdot l = 1.0 \cdot 2.5 = 2.5 \text{ m}$$

$$i_{b\min} = \sqrt{\frac{I}{A}} = \frac{d}{\sqrt{12}} = \frac{30}{\sqrt{12}} = 8.66 \text{ cm}$$

$$\lambda_k = \frac{l_k}{i_{b\min}} = \frac{250}{8.66} = 28.86 \approx 25 \quad \Rightarrow \text{Stub se računa kao centrično pritisnut}$$

$$A_{a1} = A_{a2} = \frac{A_a}{2} \quad \Rightarrow \quad A_{a1} + A_{a2} = A_a$$

$$N_u = A_a \cdot \sigma_v + A_b \cdot f_B = A_b \cdot f_B \left(1 + \mu \cdot \frac{\sigma_v}{f_B} \right) = A_b \cdot f_B (1 + \bar{\mu}) \quad \bar{\mu} = \mu \cdot \frac{\sigma_v}{f_B}$$

Granična vrijednost normalne sile u stubu:

$$N_u = 1.9 \cdot 93.35 + 2.1 \cdot 124.47 = 438.76 \text{ kN}$$

$$\bar{\mu} = \frac{N_u}{f_B \cdot A_b} - 1 = \frac{438.76}{20.5 \cdot 10^{-1} \cdot 30^2} - 1 = -0.762 \quad \Rightarrow \quad \mu_{\min} = 0.3 \cdot \left(1 + \frac{\sigma_b}{f_B} \right) \quad [\%]$$

$$\sigma_b = \frac{N_u}{A_b} = \frac{438.6}{30^2} = 0.488 \text{ kN/cm}^2 = 4.88 \text{ MPa}$$

$$\Rightarrow \quad \mu_{\min} = 0.3 \cdot \left(1 + \frac{4.88}{20.5} \right) = 0.38 \%$$

$$A_a = \mu_{\min} \cdot A_b = \frac{0.38}{100} \cdot 30^2 = 3.42 \text{ cm}^2$$

usvojeno 4RØ12 (4.52 cm²)

Uzengije:

$$e_{\max} \leq \left\{ \begin{array}{c} 15 \cdot \Phi \\ b \\ 30 \text{ cm} \end{array} \right\} = \left\{ \begin{array}{c} 15 \cdot 1.2 = 18 \\ 30 \\ 30 \end{array} \right\} \Rightarrow e_{\text{usv}} = 15 \text{ cm}$$

usvojeno URØ8/15

6. Zadatak: Odrediti potrebnu količinu armature u stubu na osnovu zadanih parametara:

$$\text{MB 30} \rightarrow f_b = 20.5 \text{ MPa}$$

$$\text{RA 400/500} \rightarrow \sigma_v = 400 \text{ MPa}$$

$$b/d = 25/50 \text{ cm}$$

$$N_g = 980 \text{ kN} \quad N_p = 620 \text{ kN}$$

Granična vrijednost normalne sile u stubu:

$$N_u = 1.9 \cdot 980 + 2.1 \cdot 620 = 3164 \text{ kN}$$

$$\sigma_b \approx \frac{N_u}{A_b} = \frac{3164}{50 \cdot 25} = 2.531 \text{ kN/cm}^2 = 25.31 \text{ MPa} > f_b$$

$$N_u = A_a \cdot \sigma_v + A_b \cdot f_B = A_b \cdot f_B \left(1 + \mu \cdot \frac{\sigma_v}{f_B} \right) = A_b \cdot f_B (1 + \bar{\mu})$$

$$\bar{\mu} = \frac{N_u}{f_B \cdot A_b} - 1 = \frac{3164}{20.5 \cdot 10^{-1} \cdot 25 \cdot 50} - 1 = 0.235$$

$$\mu = \frac{\bar{\mu} \cdot f_B}{\sigma_v} \cdot 100 = 0.235 \cdot \frac{20.5}{400} \cdot 100 = 1.204 \%$$

$$\sigma_b = \frac{N_u}{A_b} = \frac{438.6}{30^2} = 0.488 \text{ kN/cm}^2 = 4.88 \text{ MPa}$$

$$A_a = \mu \cdot A_b = \frac{1.204}{100} \cdot 50 \cdot 25 = 15.05 \text{ cm}^2$$

usvojeno 6RØ19 (17.01 cm²)

Uzengije:

$$e_{\max} \leq \left\{ \begin{array}{c} 15 \cdot \Phi \\ b \\ 30 \text{ cm} \end{array} \right\} = \left\{ \begin{array}{c} 15 \cdot 1.9 = 28.5 \\ 25 \\ 30 \end{array} \right\} \Rightarrow e_{\text{usv}} = 20 \text{ cm}$$

usvojeno URØ8/20