Univerzitet Crne Gore
Građevinski fakultet u Podgorici
Menađment u građevinarstvu

BETONSKE KONSTRUKCIJE

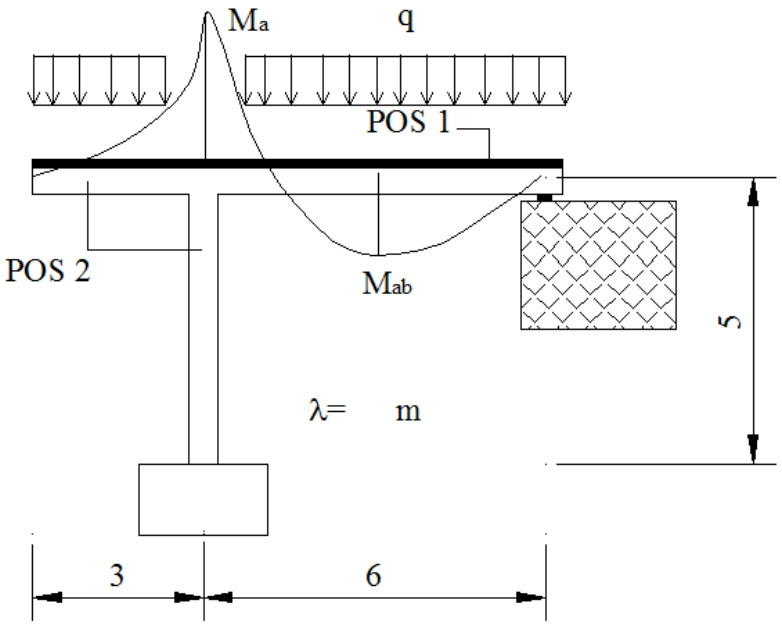
VJEŽBA 3.

Zadatak1.

Za konstrukciju prikazanu na slici dimenzionisati presjeke za vrijednosti maksimalnih momenata. Za određivanje graničnih uticaja koristiti globalni koeficijent sigurnosti γ=1.8.

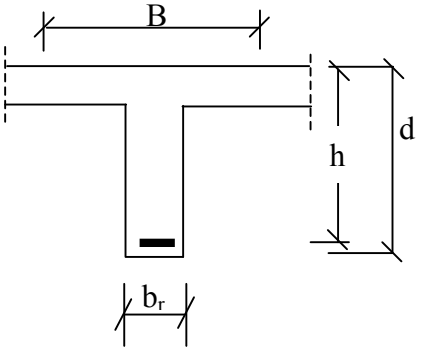
MB30 RA400/500 b_r= 25cm d_p= 10cm

M_a= 950 kNm M_{ab}= 700 kNm



Nacrtati raspored armature u podužnom i poprečnim presjecima u razmjeri 1:10.

Rješenje:



MB 30 f_b= 2.05 kN/cm^2

RA 400/500 σ_v= 40 kN/cm^2

M_{abu}= 1.8x700= 1260 kNm

M_{au} = 1.8x950= 1710 kNm

b_r = 25 cm d_p = 10 cm

a) Slobodno dimenzionisanje presjeka u polju grede rama

$$B=\min\begin{cases} b_r+20d_p=25+20\cdot 10=225cm \\ b_r+0.25l_0=25+0.25\cdot 0.75\cdot 600=137.5cm \Rightarrow B=137.5cm>5b_r=125cm \\ e=600cm \end{cases}$$

može se primijeniti uprošćeni postupak

Neka je $\sigma_{bp}=0.7\cdot f_b=0.7\cdot 20.5=14.35MPa$

$$_{potr}h=\frac{M_{abu}}{\sigma_{bp}\cdot b\cdot d_p}+\frac{d_p}{2}=\frac{1260\cdot 100}{1.435\cdot 137.5\cdot 10}+\frac{1}{2}\cdot 10=68.86cm$$

Za usvojeno σ_{bp} moramo provjeriti položaj neutralne ose.

$$\varepsilon_{bp}=2.0\cdot\left(1-\sqrt{1-\frac{\sigma_{bp}}{f_b}}\right)=2.0\cdot\left(1-\sqrt{1-\frac{14.35}{20.5}}\right)=0.904‰$$

$$x=\frac{1}{1+\frac{\varepsilon_{a1}}{\varepsilon_{bp}}}\left(h-0.5\cdot d_p\right)+0.5\cdot d_p=\frac{1}{1+\frac{10}{0.904}}\cdot\left(68.86-0.5\cdot 10\right)+0.5x10=10.29cm>d_p=10cm$$

Pretpostavka da presjek radi kao ″T″ je važeća.

$$A_a=\frac{M_{au}}{\sigma_v\cdot\left(h-\frac{d_p}{2}\right)}=\frac{1260x100}{40\cdot\left(68.86-\frac{10}{2}\right)}=49.32cm^2$$ usvaja se: $10R\phi 25(49.1cm^2)$

Ako se armatura raporedi 2x4+2, onda je a_h=3.13 cm, a_a=8.45 cm.

$d=h+a_a$=68.86+8.45=77.34 cm usvojene dimenzije grede: 25/80

b) Vezano dimenzionisanje nad osloncem

M_a=950 *kNm*, M_{au}=1.8x950=1710 *kNm*

$$M_{abu}=\left(\frac{h}{k^*}\right)^2\cdot b\cdot f_b=\left(\frac{68.8}{1.719}\right)^2\cdot 25\cdot 2.05/100=820.95kNm$$

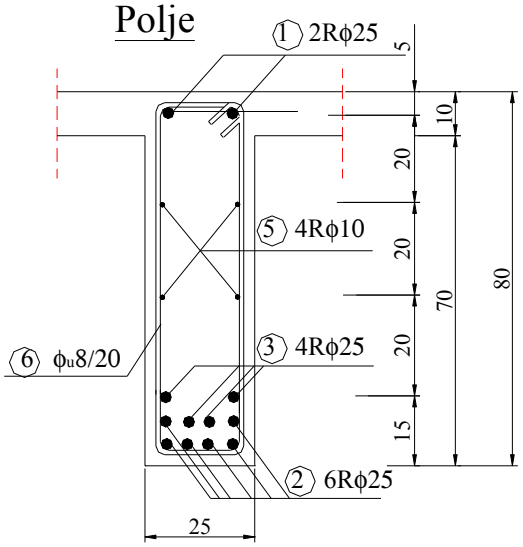
ΔM_a= 1710-820.95=889.05 kNm

$$A_{a1}=\left(\frac{\mu^*}{100}\right)\cdot b\cdot h\cdot\frac{f_b}{\sigma_v}+\frac{\Delta M_a}{\sigma_v x\left(h-a_a\right)}=\frac{43.589}{100}\cdot 25\cdot 68.8\cdot\frac{2.05}{40}+\frac{889.05\cdot 100}{40\cdot\left(68.8-5\right)}$$

A_{a1}=38.4+34.83=73.24 cm^2 usvaja se: $15R\phi 25(73.6cm^2)$

$$A_{a2}=\frac{\Delta M_a}{\sigma_v\cdot\left(h-a_a\right)}=\frac{889.05\cdot 100}{40\cdot\left(68.8-5\right)}=34.83cm^2$$ usvaja se: $8R\phi 25(39.3cm^2)$

Polje



Oslonac