

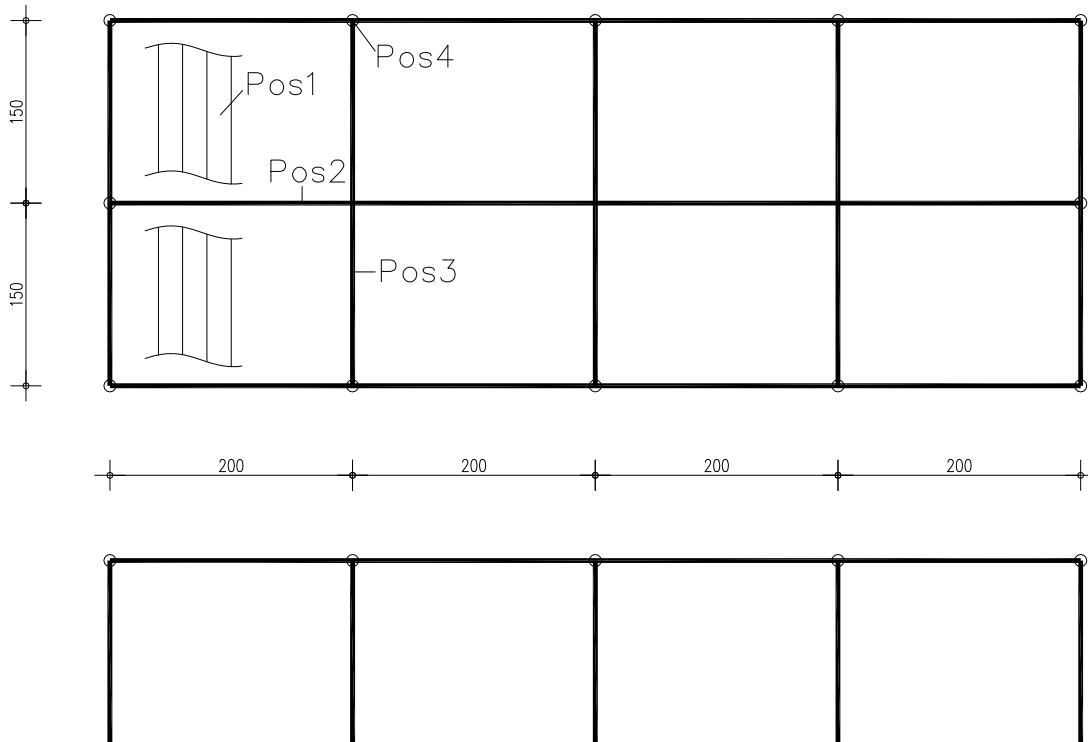


Osmisliti drvenu platformu. Platforma je predviđena kao sastavni dio nekog ugostiteljskog objekta. Dimenzionisati elemente platforme. Dispoziciju nacrtati u razmjeri 1:50.

Povremeno opterećenje na platformi $p = 2.0kN / m^2$

Građa: četinari II klase

I varijanta.



RJEŠENJE ZADATKA

Pos 1- daske platforme (pretpostavka $b/h = 5/2cm$, $\lambda = 2.0m$)

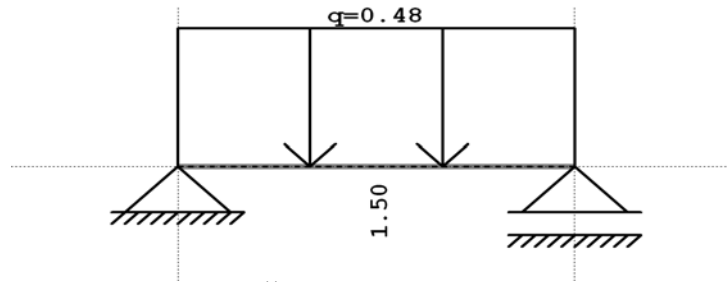
1. Analiza opterećenja

- sop. težina..... $g = 0.05 \cdot 8 = 0.4kN / m^2$
- p-(povremeno opterećenje)..... $2.0kN / m^2$
 $2.4kN / m^2$

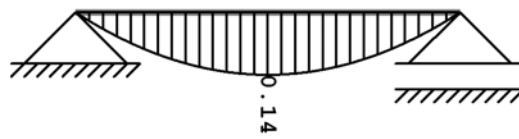
$$2.4 \cdot 0.2 = 0.48kN / m^2$$



2. Statički uticaji



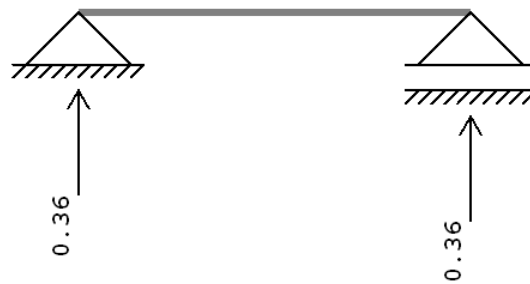
Šema opterećenja



Dijagram momenata M



Dijagram transverzalnih sila T



Reakcije



3. Dimenzionisanje

$$\max \sigma_m = \frac{M}{W}$$

$$W = \frac{b \cdot h^2}{6} = \frac{20 \cdot 5^2}{6} = 100 \text{ cm}^3 \quad I = 208.333 \text{ cm}^4$$

$$\max \sigma_m = \frac{0.14 \cdot 100}{100} = 0.14 \text{ kN / cm}^2 < \sigma_{md} = 1.0 \text{ kN / cm}^2 = 10 \text{ MPa}$$

Tabela 5.3, str. 142,
“Zidane i drvene
konstrukcije”

$$f = \frac{\sigma}{384} \cdot \frac{2l^4}{EI} = 0.013 \cdot \frac{0.48 \cdot 10^{-2} \cdot 150^4}{1000 \cdot 208.333} = 0.15 \text{ cm}$$

$$f_{dop} = \frac{l}{300} = 0.50 \text{ cm}$$

$$\max f < f_{dop}$$

Usvojeno Pos1: b/h=5/20

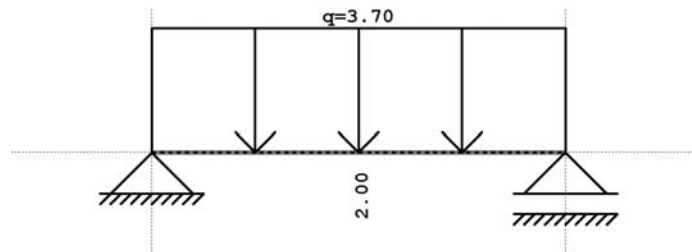


Pos 2- Podužni nosači- (pretpostavka $b/h = 12/12$)

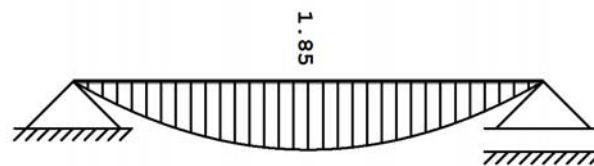
1. Analiza opterećenja

- reakcija od Pos 1..... $\frac{0.36 \cdot 2}{0.20} = 3.6 \text{ kN} / \text{m}^2$
 - sopstveno opterećenje..... $0.12 \cdot 0.12 \cdot 8 = 0.1 \text{ kN} / \text{m}^2$
-
- $3.70 \text{ kN} / \text{m}^2$

2. Statički utcaji



Šema opterećenja



Dijagram momenata M



Dijagram transverzalnih sila T



Reakcije



3. Dimenzionisanje

$$W = \frac{b \cdot h^2}{6} = 288 \text{ cm}^3$$

$$I = \frac{b \cdot h^3}{12} = 1728 \text{ cm}^4$$

$$\sigma_{\max} = \frac{1.85 \cdot 100}{288} = 0.64 \text{ kN / cm}^2 < 1.0 \text{ kN / cm}^2 = 10 \text{ Mpa}$$

$$f_{\max} = 0.013 \cdot \frac{2l^4}{EI} \cdot 0.013 \cdot \frac{3.70 \cdot 200^4 \cdot 10^{-2}}{1000 \cdot 4096} = 0.45 \text{ cm}$$

$$f_{\text{dop}} = \frac{l}{300} = \frac{200}{300} = 0.666 \text{ cm}$$

Tabela 5.3, str. 142,
“Zidane i drvene
konstrukcije”

Usvojen presjek b/h=12/12

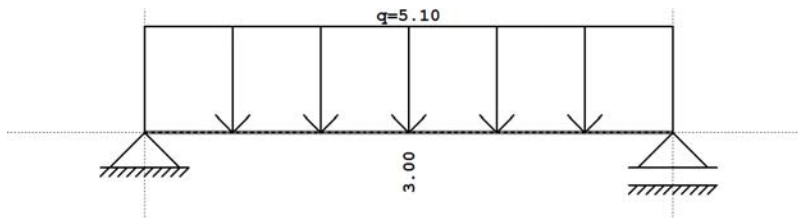


Pos 3- poprečni nosač- (pretpostavka $b/h = 12/18$)

1. Analiza opterećenja

- reakcija od Pos 2..... $\frac{2 \cdot 3.70}{1.5} = 4.93 \text{ kN} / \text{m}^2$
 - sopstvena težina..... $0.12 \cdot 0.18 \cdot 8 = 0.17 \text{ kN} / \text{m}^2$
-
- $q = 5.10 \text{ kN} / \text{m}^2$

2. Statički uticaji



Šema opterećenja

5.74



Dijagram momenata M



Dijagram transverzalnih sila T



Reakcije



3. Dimenzionisanje

$$W = \frac{12 \cdot 18^2}{6} = 648 \text{ cm}^2$$

$$I = \frac{12 \cdot 18^3}{12} = 5832 \text{ cm}^2$$

$$\sigma_{\max} = \frac{5.74 \cdot 100}{648} = 0.886 \text{ kN / cm}^2 < 1.0 \text{ kN / cm}^2 = 10 \text{ MPa}$$

$$f_{\max} = 0.013 \cdot \frac{2l^4}{EI} = 0.013 \cdot \frac{5 \cdot 10 \cdot 10^{-2} \cdot 300^4}{1000 \cdot 5832} = 0.91 \text{ cm} < \frac{l}{300} = 1.0 \text{ cm}$$

Tabela 5.3, str. 142,
“Zidane i drvene
konstrukcije”

Usvaja se: b/h=12/18



Pos 4- stub- (pretpostavka $b/h = 12/12$)

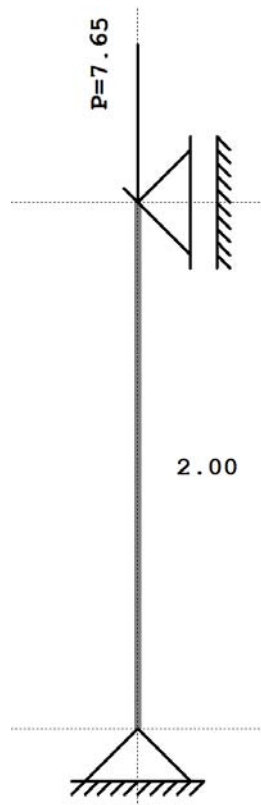
1. Analiza opterećenja

- reakcija od Pos 3..... $7.65kN$
- sopstvena težina..... $0.12 \cdot 0.12 \cdot 2 \cdot 8 = 0.40kN$

$$Q = 7.65kN$$

Sopstvena težina stuba nije uzeta u obzir jer ne pravi mnogo veće uticaje na samom stubu . Kada se uzima sop. težina samog stuba treba je uzeti kao jednakopodjeljeno opterećenje duž ose stuba.

2. Statički uticaji



$\beta = 1.0$
Ojlerov slučaj za
obostrano zglobno
oslonien stub.



3. Dimenzionisanje

$$I = \frac{b \cdot h^3}{12} = \frac{h^4}{12} = 1728 \text{ cm}^4$$

$$A = 12 \cdot 12 = 144 \text{ cm}^2$$

$$i_{x=y(\min)} = \sqrt{\frac{I_{\min}}{A}} = \sqrt{\frac{1728}{144}} = 3.46 \text{ cm}$$

$$\text{Dužina izvijanja } l_i = 1.0 \cdot l = 1.0 \cdot 200 = 200 \text{ cm}$$

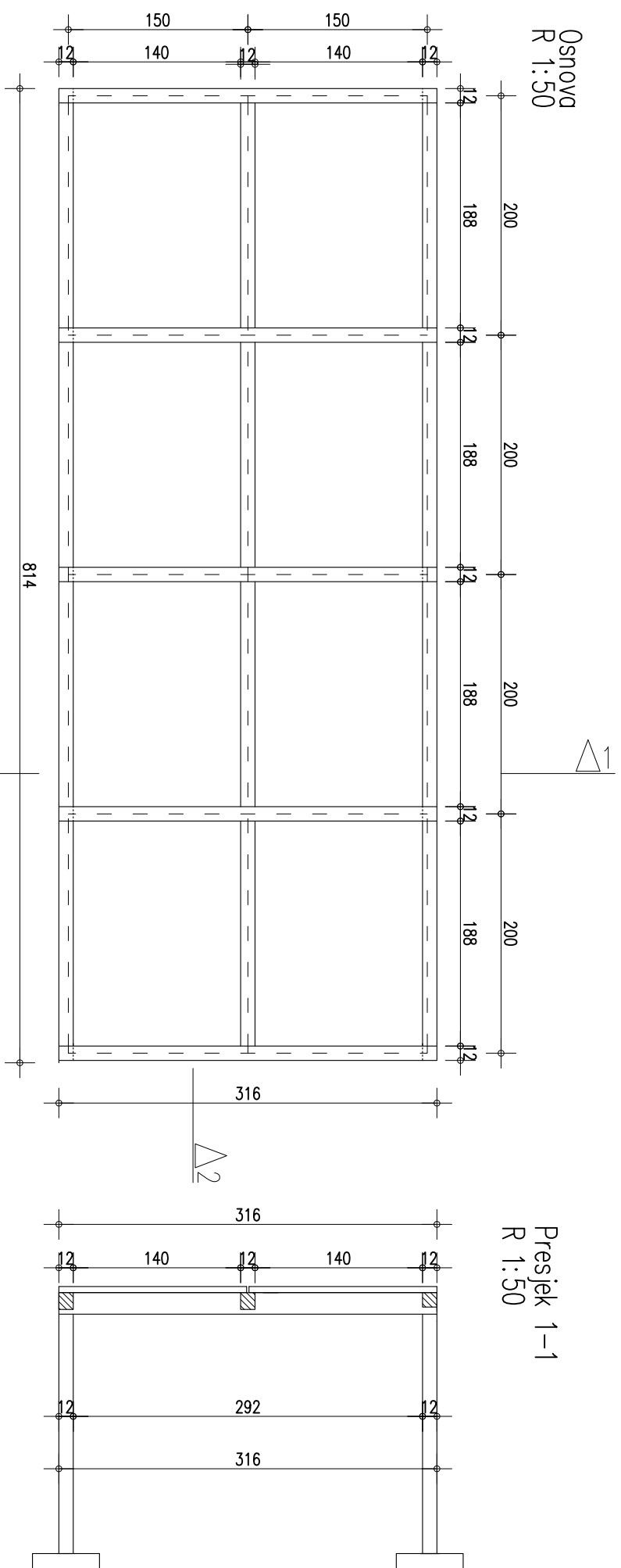
$$\text{Vitkost } \lambda = \frac{l_i}{i_{\min}} = \frac{200}{3.46} = 57.8$$

$$\lambda \rightarrow \omega, \lambda \leq 75 \Rightarrow \omega = \frac{1}{1 - 0.8 \left(\frac{\lambda}{100} \right)^2} = \frac{1}{1 - 0.8 \left(\frac{57.8}{100} \right)^2} = 1.365$$

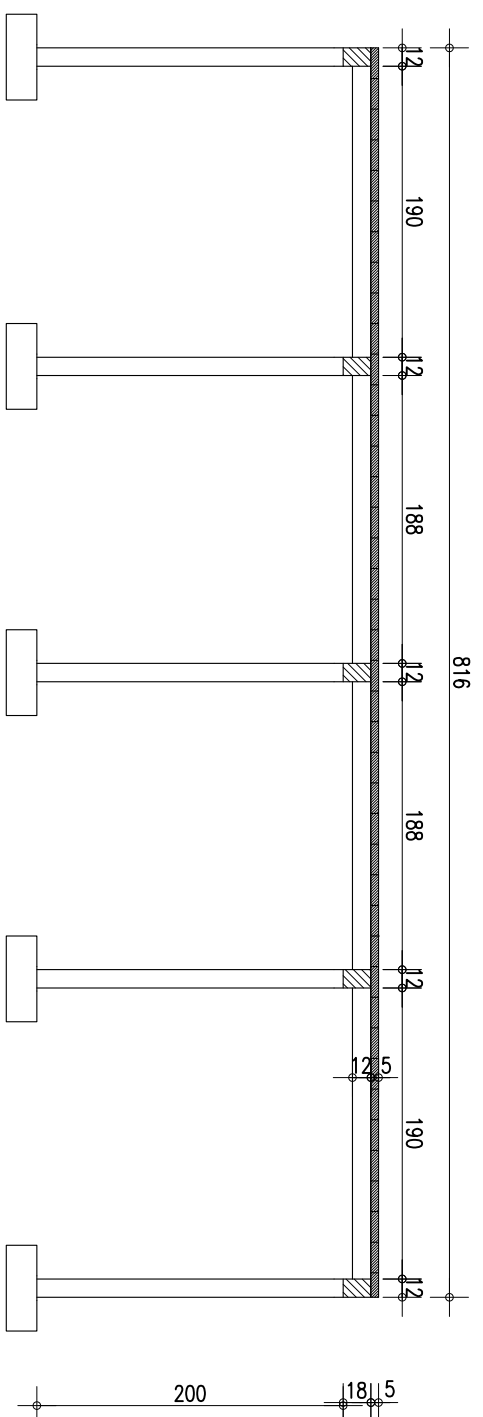
$$\sigma_{\max} = \frac{R}{A} \cdot \omega = \frac{7.65}{144} \cdot 1.36 = 0.07 \text{ kN / cm}^2 < 0.85 \text{ kN / cm}^2 = 8.5 \text{ MPa}$$

Tabela 5.3, str. 142,
“Zidane i drvene
konstrukcije”

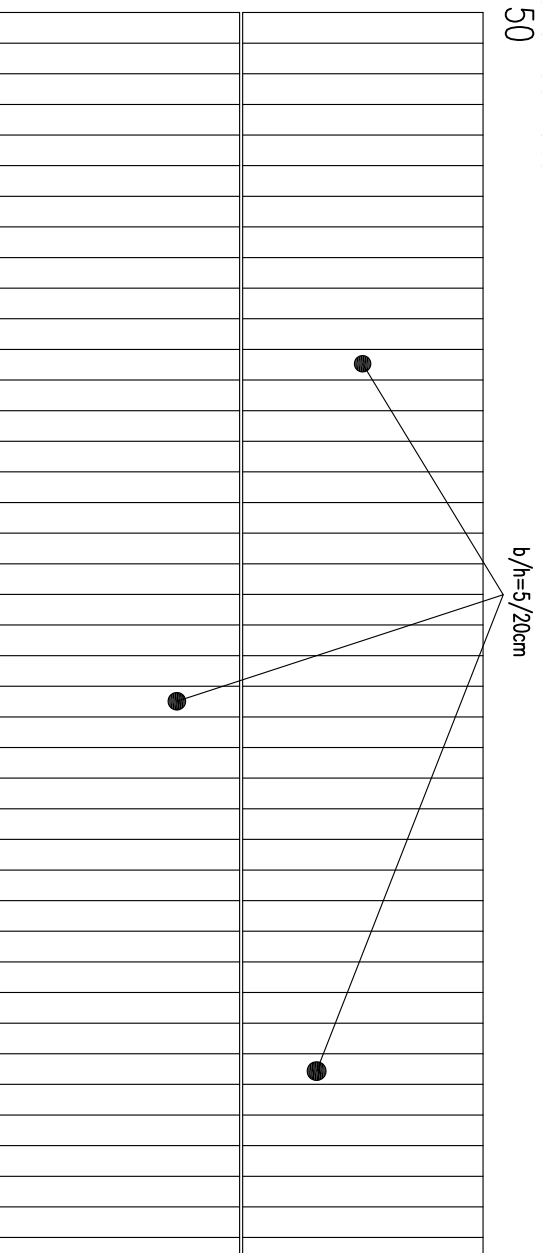
Usvaja se: b/h=12/12



Presjek 2-2
R 1:50

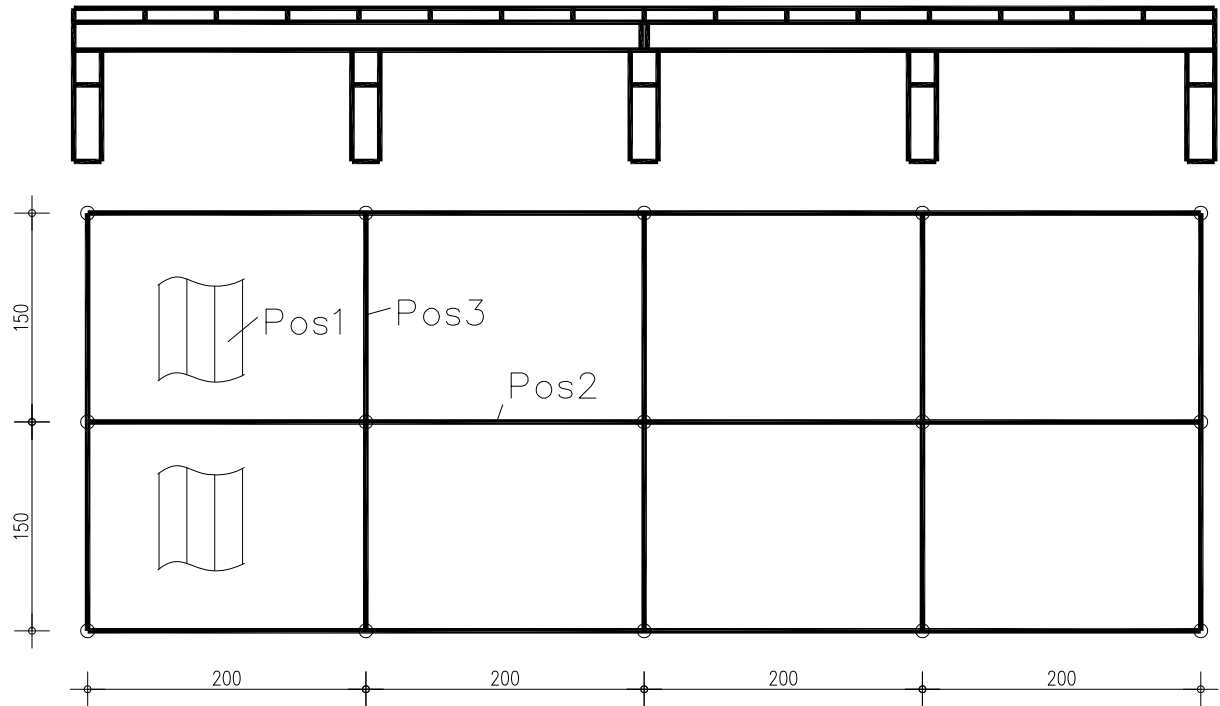


Osnova-sematski
R 1:50





II varijanta.



RJEŠENJE ZADATKA

Pos 1- daske platforme (pretpostavka $b/h = 3.8/20cm$)

1. Analiza opterećenja

- sop. težina..... $g = 0.038 \cdot 8 = 0.304kN / m^2$
- p-(povremeno opterećenje)..... $2.0kN / m^2$
 $2.304kN / m^2$

$$2.304 \cdot 0.2 = 0.461kN / m^2$$



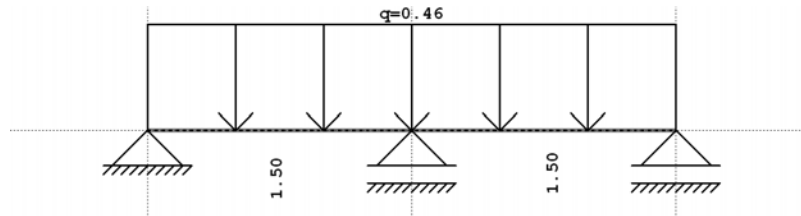
2. Statički uticaji

$$M_1 = -0.125 \cdot 2l^2 = 0.129$$

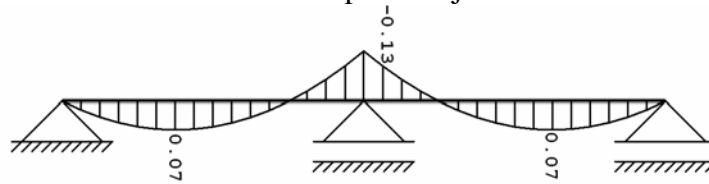
$$M_2 = 0.0703 \cdot 2l^2 = 0.07$$

$$R_1 = 0.375 \cdot 2l^2 = 0.25kN$$

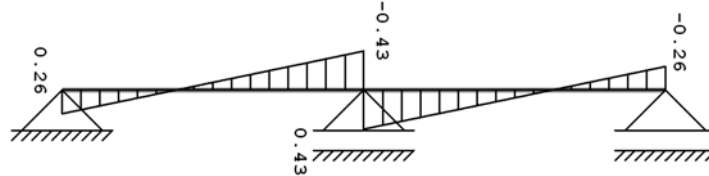
$$R_2 = 1.250 \cdot 2l^2 = 0.864kN$$



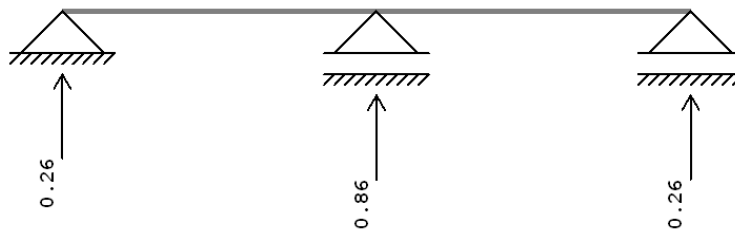
Šema opterećenja



Dijagram momenata M



Dijagram transverzalnih sila T



Reakcije



3. Dimenzionisanje

$$I = \frac{3.8^3 \cdot 20}{12} = 91.45 \text{ cm}^4$$

$$W = \frac{3.8^2 \cdot 20}{6} = 48.13 \text{ cm}^3$$

$$\max \sigma = \frac{0.129 \cdot 100}{91.45} = 0.14 \text{ kN / cm}^2 < 1.0 \text{ kN / cm}^2 = 10 \text{ MPa}$$

$$\max f = 0.0054 \cdot \frac{0.461 \cdot 10^{-2} \cdot 150^4}{1000 \cdot 91.45} = 0.13 \text{ cm} < f_{dop} = \frac{l}{300} = 0.50 \text{ cm}$$

Tabela 5.3, str. 142,
"Zidane i drvene
konstrukcije"

Usvojeno Pos1: b/h=3.8/20

Pos 2- Podužni nosači- (pretpostavka $b/h = 12/14$)

1. Analiza opterećenja

- reakcija od Pos 1..... $\frac{0.86}{0.20} = 4.32 \text{ kN / m}^2$
 - sopstveno opterećenje..... $0.12 \cdot 0.14 \cdot 8 = 0.13 \text{ kN / m}^2$
-
- 4.454 kN / m^2

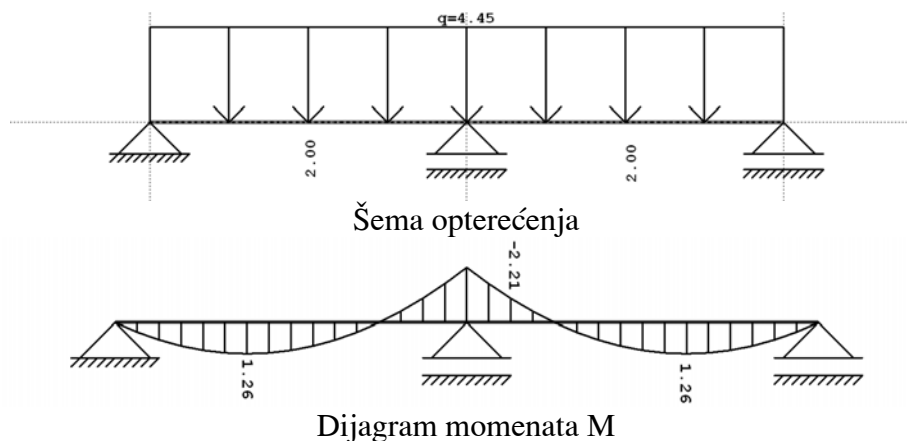
2. Statički uticaji

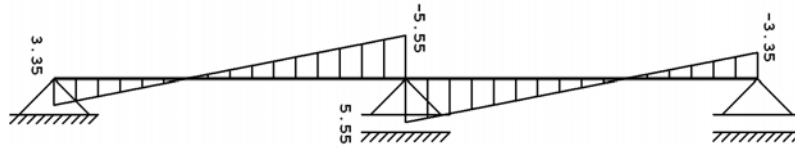
$$M_1 = 0.125 \cdot 2l^2 = 2.225$$

$$M_2 = 0.0703 \cdot 2l^2 = 1.25$$

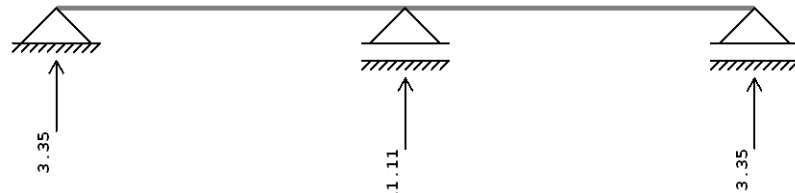
$$R_1 = 1.250 \cdot 2l^2 = 11.125$$

$$R_2 = 0.375 \cdot 2l^2 = 3.34$$





Dijagram transverzalnih sila T



Reakcije

3. Dimenzionisanje

$$W = \frac{12 \cdot 14^2}{6} = 392 \text{ cm}^3$$

$$I = \frac{12 \cdot 14^3}{12} = 2744 \text{ cm}^4$$

$$\sigma_{\max} = \frac{2.2 \cdot 100}{392} = 0.568 \text{ kN / cm}^2 < 1.0 \text{ kN / cm}^2 = 10 \text{ MPa}$$

$$f_{\max} = 0.0054 \cdot \frac{4.45 \cdot 10^{-2} \cdot 200^4}{1000 \cdot 2744} = 0.14 \text{ cm} < f_{dop} = 0.66$$

Tabela 5.3, str. 142,
"Zidane i drvene
konstrukcije"

Usvaja se: b/h=12/14

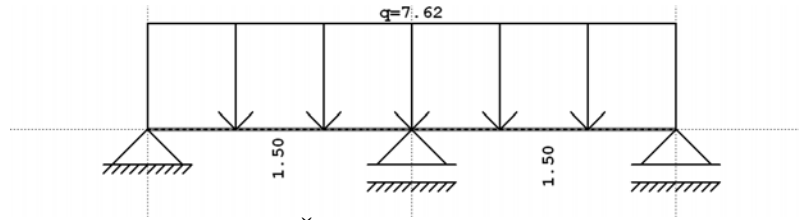
Pos 3- poprečni nosač- (pretpostavka $b/h = 14/22$)

1. Analiza opterećenja

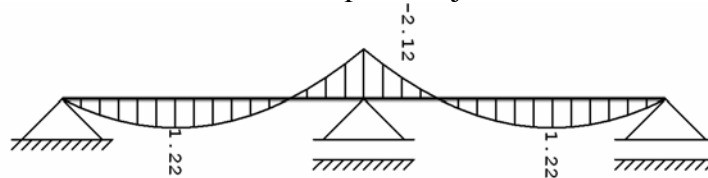
- reakcija od Pos 2..... $\frac{11.11}{1.5} = 7.42 \text{ kN / m}^2$
 - sopstvena težina..... $0.14 \cdot 0.18 \cdot 8 = 0.20 \text{ kN / m}^2$
-
- $q = 7.622 \text{ kN / m}^2$



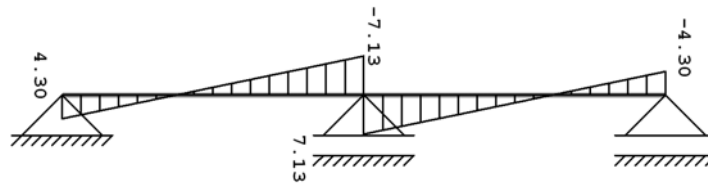
2. Statički utcaji



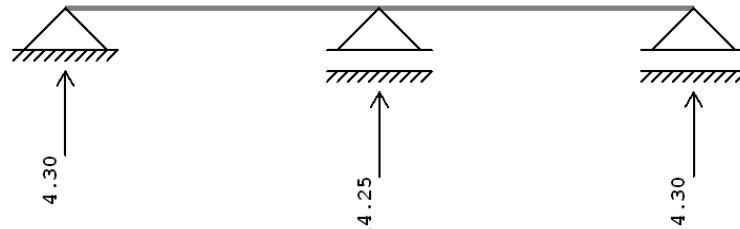
Šema opterećenja



Dijagram momenata M



Dijagram transverzalnih sila T



Reakcije

3. Dimenzionisanje

$$W = \frac{14 \cdot 18^2}{6} = 756 \text{ cm}^3$$

$$I = \frac{14 \cdot 18^3}{12} = 6804 \text{ cm}^4$$

$$\sigma_{\max} = \frac{214}{756} = 0.283 \text{ kN/cm}^2 < 1.0 \text{ kN/cm}^2 = 10 \text{ MPa}$$

$$f_{\max} = 0.0054 \cdot \frac{7.622 \cdot 10^{-2} \cdot 756^4}{6804 \cdot 1000} = 0.031 \text{ cm} < f_{\text{dop}}$$

Tabela 5.3, str. 142,
“Zidane i drvene
konstrukcije”

Usvaja se: b/h=14/22



Pos 4- stub- (pretpostavka $b/h = 14/14$)

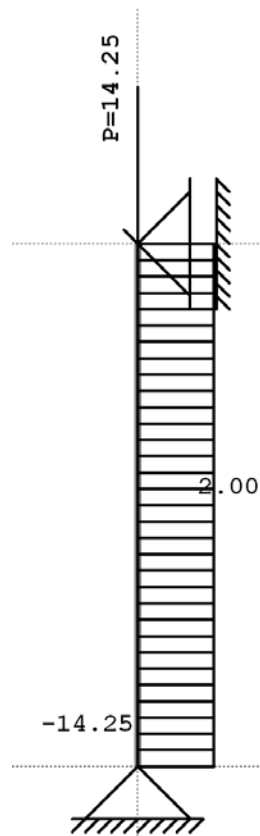
1. Analiza opterećenja

- reakcija od Pos 3..... $14.25kN$
- sopstvena težina..... $0.14 \cdot 0.14 \cdot 2 \cdot 8 = 0.31kN$

$$Q = 14.25kN$$

Sopstvena težina stuba nije uzeta u obzir jer ne pravi mnogo veće uticaje na samom stubu . Kada se uzima sop. težina samog stuba treba je uzeti kao jednakopodjeljeno opterećenje duž ose stuba.

2. Statički uticaji



$$\beta = 1.0$$

Ojlerov slučaj za obostrano zglobno oslonien stub.



3. Dimenzionisanje

$$I = \frac{b \cdot h^3}{12} = \frac{h^4}{12} = 3201.33 \text{ cm}^4$$

$$A = 16 \cdot 16 = 196 \text{ cm}^2$$

$$i_{x=y(\min)} = \sqrt{\frac{I_{\min}}{A}} = \sqrt{\frac{3201.333}{196}} = 4.04 \text{ cm}$$

$$\text{Dužina izvijanja } l_i = 1.0 \cdot l = 1.0 \cdot 200 = 200 \text{ cm}$$

$$\text{Vitkost } \lambda = \frac{l_i}{i_{\min}} = \frac{200}{4.04} = 49.50$$

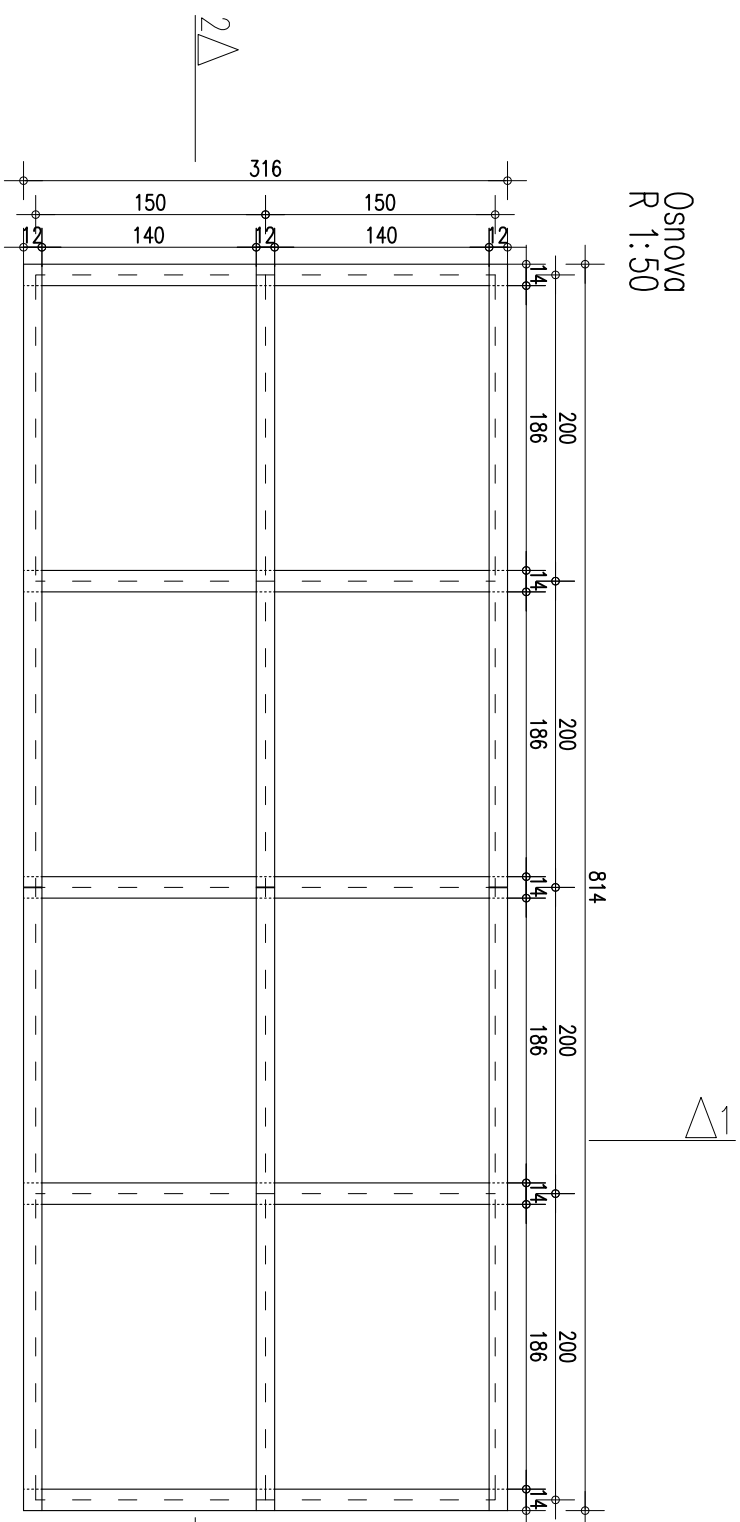
$$\lambda \rightarrow \omega, \lambda \leq 75 \Rightarrow \omega = \frac{1}{1 - 0.8 \left(\frac{\lambda}{100} \right)^2} = \frac{1}{1 - 0.8 \left(\frac{49.50}{100} \right)^2} = 1.25$$

$$\sigma_{\max} = \frac{R}{A} \cdot \omega = \frac{14.25}{196} \cdot 1.25 = 0.091 \text{ kN / cm}^2 < 0.85 \text{ kN / cm}^2 = 8.5 \text{ MPa}$$

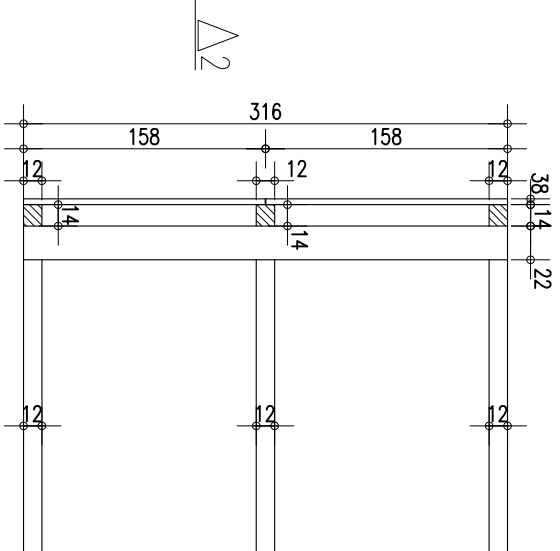
Tabela 5.3, str. 142,
“Zidane i drvene
konstrukcije”

Usvaja se: b/h=14/14

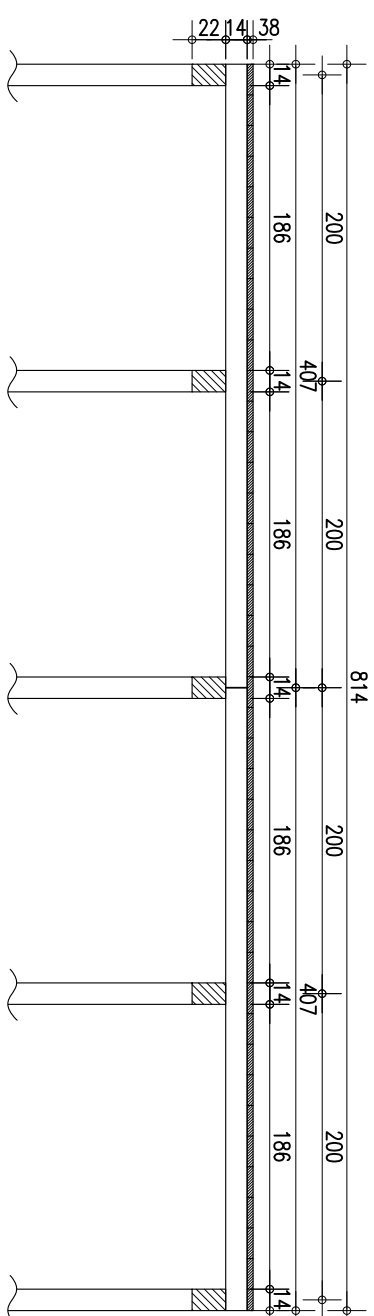
Osnova
R 1:50



Presjek 1-1
R 1:50



Presjek 2-2
R 1:50



Osnova – sematski
R 1:50

