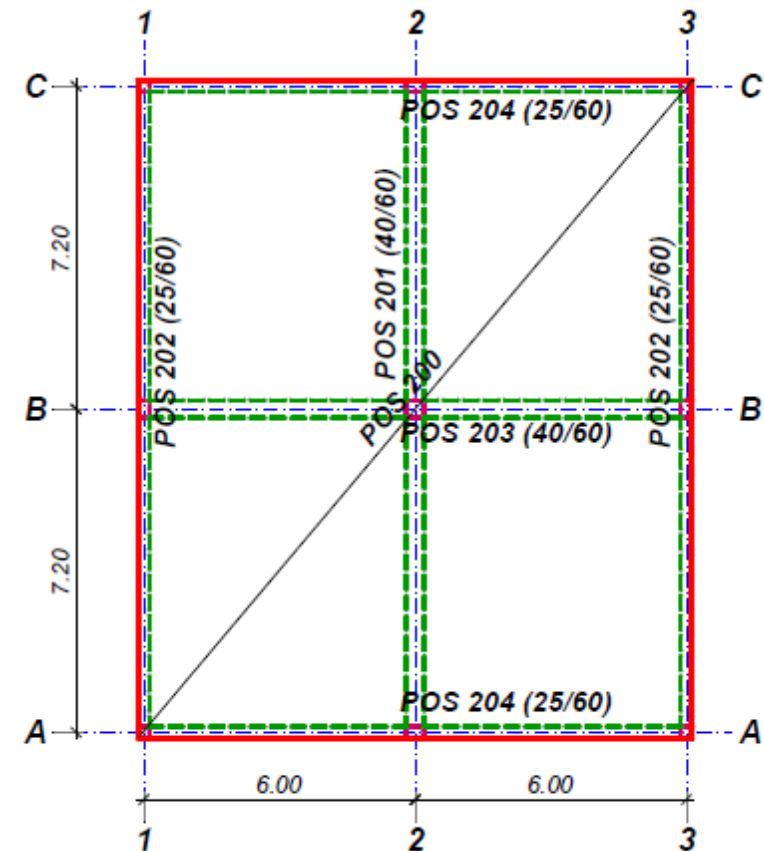


PRORAČUN I ARMIRANJE KRSTASTE PLOČE POS 200

1

Ploču POS 200, debljine 20 cm, oslonjenu na grede POS 201-204, potrebno je proračunati za uticaj sopstvene težine i jednako podeljenog opterećenja $p=10 \text{ kN/m}^2$ koje deluje po čitavoj površini ploče.



Analiza opterećenja

$$g = 0.20 \times 25 = 5.0 \text{ kN/m}^2$$

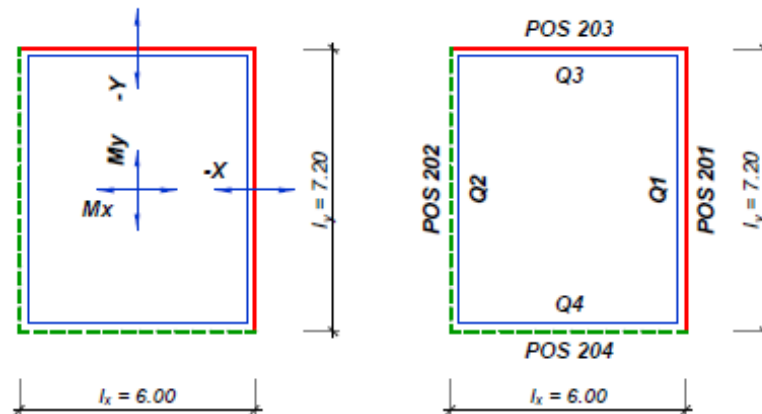
$$p = 10.0 \text{ kN/m}^2$$

Statički uticaji

$$L_y / L_x = 7.2 / 6.0 = 1.20$$

$$G = 5.0 \times 6.0 \times 7.2 = 216 \text{ kN}$$

$$P = 10.0 \times 6.0 \times 7.2 = 432 \text{ kN}$$



$$Q_u = 1.6 \times 216 + 1.8 \times 432 = 1123.2 \text{ kN}$$

$$M_{x,u} = 0.032 \times 1123.2 = 35.94 \text{ kNm/m}$$

$$M_{y,u} = 0.023 \times 1123.2 = 25.83 \text{ kNm/m}$$

$$-X_u = 0.071 \times 1123.2 = 79.75 \text{ kNm/m}$$

$$-Y_u = 0.062 \times 1123.2 = 69.64 \text{ kNm/m}$$

$$Q_{1,G} = 0.331 \times 216 = 71.5 \text{ kN}$$

;

$$Q_{1,P} = 0.331 \times 432 = 143.0 \text{ kN}$$

$$Q_{2,G} = 0.226 \times 216 = 48.8 \text{ kN}$$

;

$$Q_{2,P} = 0.226 \times 432 = 97.6 \text{ kN}$$

$$Q_{3,G} = 0.257 \times 216 = 55.5 \text{ kN}$$

;

$$Q_{3,P} = 0.257 \times 432 = 111.0 \text{ kN}$$

$$Q_{4,G} = 0.186 \times 216 = 40.2 \text{ kN}$$

;

$$Q_{4,P} = 0.186 \times 432 = 80.4 \text{ kN}$$

Dimenzionisanje

gornja zona, kraći pravac

usvojeno: MB 30 $\Rightarrow f_B = 20.5 \text{ MPa}$; RA 400/500 $\Rightarrow \sigma_v = 400 \text{ MPa}$

pretp. $\emptyset 16 \Rightarrow a_{1x} = 2.0 + 1.6/2 = 2.8 \text{ cm} \Rightarrow h_x = d - a_{1x} = 20 - 2.8 = 17.2 \text{ cm}$

$$k = \frac{17.2}{\sqrt{\frac{79.75 \times 10^2}{100 \times 2.05}}} = 2.758 \Rightarrow \varepsilon_b/\varepsilon_a = 2.437/10\text{‰} ; \bar{\mu} = 14.234\%$$

$$A_{ax} = 14.234 \times \frac{100 \times 17.2}{100} \times \frac{2.05}{40} = 12.55 \text{ cm}^2/\text{m}$$

usvojeno: **R \emptyset 16/15** (13.40 cm²/m)

$$A_{ap} = 0.2 \times 12.55 = 2.51 \text{ cm}^2/\text{m} > A_{ap, \min.} = 0.085 \times 20 = 1.70 \text{ cm}^2/\text{m}$$

usvojeno: **R \emptyset 10/30** (2.62 cm²/m)

gornja zona, duži pravac

$$\text{pretp. } \emptyset 16 \Rightarrow a_{1y} = 2.0 + 1.6 + 1.6/2 = 4.4 \text{ cm} \Rightarrow h_y = d - a_{1y} = 20 - 4.4 = 15.6 \text{ cm}$$

$$k = \frac{15.6}{\sqrt{\frac{69.6 \times 10^2}{100 \times 2.05}}} = 2.667 \Rightarrow \varepsilon_b/\varepsilon_a = 2.576/10\text{‰} ; \bar{\mu} = 15.181\%$$

$$A_{ay} = 15.181 \times \frac{100 \times 15.6}{100} \times \frac{2.05}{40} = 12.14 \text{ cm}^2/\text{m}$$

usvojeno: **RØ16/15** (13.40 cm²/m)

$$A_{ap} = 0.2 \times 12.14 = 2.43 \text{ cm}^2/\text{m} > A_{ap, \text{min.}} = 0.085 \times 20 = 1.70 \text{ cm}^2/\text{m}$$

usvojeno: **RØ10/30** (2.62 cm²/m)

donja zona, kraći pravac

$$k = \frac{17.2}{\sqrt{\frac{35.94 \times 10^2}{100 \times 2.05}}} = 4.108 \Rightarrow \varepsilon_b/\varepsilon_a = 1.345/10\text{‰} ; \bar{\mu} = 6.189\%$$

$$A_{ax} = 6.189 \times \frac{100 \times 17.2}{100} \times \frac{2.05}{40} = 5.46 \text{ cm}^2/\text{m}$$

usvojeno: **RØ12/15** (7.53 cm²/m)

donja zona, duži pravac

$$k = \frac{15.6}{\sqrt{\frac{25.83 \times 10^2}{100 \times 2.05}}} = 4.394 \Rightarrow \varepsilon_b/\varepsilon_a = 1.235/10\text{‰} ; \bar{\mu} = 5.388\%$$

$$A_{ay} = 5.388 \times \frac{100 \times 15.6}{100} \times \frac{2.05}{40} = 4.31 \text{ cm}^2/\text{m}$$

usvojeno: **RØ10/15** (5.24 cm²/m)

PRORAČUN GREDA

POS 201 - greda u osi 2

Analiza opterećenja

- sopstvena težina $0.4 \times 0.6 \times 25 = 6.00 \text{ kN/m}$
- od ploče $q_{1,G} = 2 \times 71.5 / 7.2 = 19.86 \text{ kN/m}$
- $g = 24.86 \text{ kN/m}$
- od ploče $q_{1,P} = 2 \times 143.0 / 7.2 = 39.72 \text{ kN/m}$

Maksimalni moment savijanja nad osloncem

$$q_u = 1.6 \times 24.86 + 1.8 \times 39.72 = 112.9 \text{ kN/m}$$

$$M_{u,max} = 112.9 \times 7.2^2 / 8 = 731.4 \text{ kNm}$$

$$\text{pretp. } a_1 = 7 \text{ cm} \quad \Rightarrow \quad b/d/h = 40/60/53 \text{ cm}$$

$$k = \frac{53}{\sqrt{\frac{731.4 \times 10^2}{40 \times 2.05}}} = 1.775 \Rightarrow \begin{cases} \varepsilon_b / \varepsilon_a = 3.5 / 3.591\text{‰} \\ \mu = 39.958\% \end{cases}$$

$$A_a = 39.958 \times \frac{40 \times 53}{100} \times \frac{2.05}{40} = 43.41 \text{ cm}^2$$

usvojeno: **9RØ25** (44.18 cm²)

Maksimalni moment savijanja u polju

7

$$M_{u,max} = 9/128 \times 112.9 \times 7.2^2 = 411.4 \text{ kNm}$$

$$L_0 = 0.75 \times 720 = 540 \text{ cm}$$

$$B = \min. \left\{ \begin{array}{l} 40 + 20 \times 20 = 440 \\ 40 + 0.25 \times 540 = 175 \end{array} \right\} = 175 \text{ cm}$$

Pretpostavlja se da će se neutralna linija naći u ploči:

$$\text{pretp. } a_1 = 7 \text{ cm} \quad \Rightarrow \quad B/b/d/h/d_p = 175/40/60/53/20 \text{ cm}$$

$$k = \frac{53}{\sqrt{\frac{411.4 \times 10^2}{175 \times 2.05}}} = 4.949 \Rightarrow \left\{ \begin{array}{l} \varepsilon_b / \varepsilon_a = 1.067 / 10\text{‰} \\ s = 0.096 \Rightarrow x = 0.096 \times 53 = 5.1 \text{ cm} < d_p = 20 \text{ cm} \\ \bar{\mu} = 4.226\% \end{array} \right.$$

Pretpostavka o položaju neutralne linije je tačna, pa se potrebna površina armature određuje za pravougaoni presek širine $B = 175 \text{ cm}$:

$$A_a = 4.2268 \times \frac{175 \times 53}{100} \times \frac{2.05}{40} = 20.09 \text{ cm}^2$$

usvojeno: **4RØ25** (19.64 cm²)

Kako je usvojena manja površina armature od računski potrebne, ali sa nešto većom statičkom visinom (armatura se može smestiti u jedan red), sprovedeće se približna kontrola nosivosti usvojenog preseka:

$$A_{a,potr.} \times h_{rač.} = 20.09 \times 53 < 19.64 \times 55 = A_{a,usv.} \times h_{stv.}$$

Kontrola glavnih napona zatezanja – srednji oslonac

$$T_u^B = 5/8 \times 112.9 \times 7.2 = 507.9 \text{ kN}$$

$$\tau_n^B = \frac{507.9}{40 \times 0.9 \times 53} = 0.266 \frac{\text{kN}}{\text{cm}^2} \begin{cases} > \tau_r = 0.11 \text{ kN/cm}^2 \\ < 3\tau_r = 0.33 \text{ kN/cm}^2 \end{cases}$$

$$\lambda = \frac{5}{8} \times 7.2 \times \left(1 - \frac{0.11}{0.266}\right) = 2.64 \text{ m}$$

$$\tau_{Ru}^B = \frac{3}{2} \times (0.266 - 0.11) = 0.234 \frac{\text{kN}}{\text{cm}^2}$$

usvojeno: $m=4$; $\alpha = 90^\circ$; $\theta = 45^\circ$:

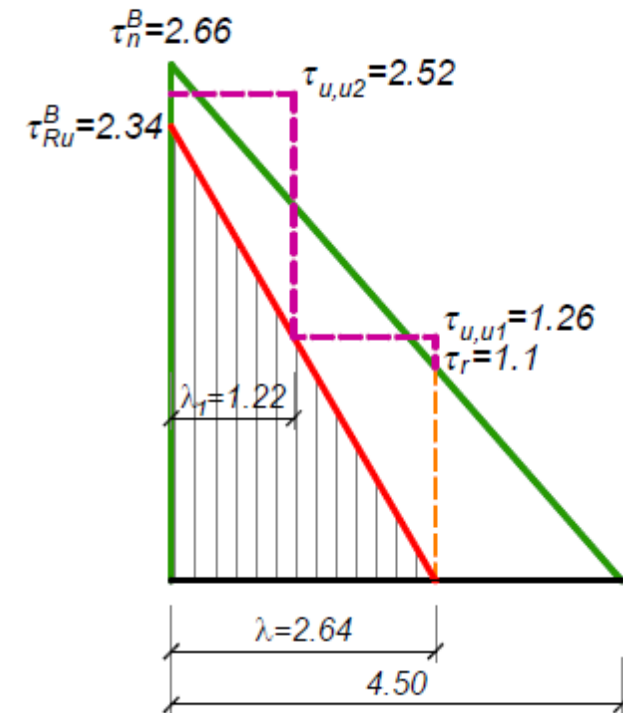
$$e_u = \frac{4 \times 0.785}{40 \times 0.234} \times 40 = 13.4 \text{ cm}$$

usvojeno: **URØ10/12.5** ($m=4$)

$$\tau_{u,u1} = \frac{2 \times 0.785}{40 \times 12.5} \times 40 = 0.126 \frac{\text{kN}}{\text{cm}^2}$$

$$\lambda_1 = \lambda \times \left(1 - \frac{\tau_{u,u1}}{\tau_{Ru}}\right) = 2.64 \times \left(1 - \frac{0.126}{0.234}\right) = 1.22 \text{ m} - \text{dužina na kojoj je potrebno } m=4$$

$\Lambda_A = 0$ («šnic» momenta)



Kontrola glavnih napona zatezanja – krajnji oslonac

$$T_u^A = 3/8 \times 112.9 \times 7.2 = 304.8 \text{ kN}$$

$$\tau_n^A = \frac{304.8}{40 \times 0.9 \times 53} = 0.16 \frac{\text{kN}}{\text{cm}^2} \begin{cases} > \tau_r = 0.11 \text{ kN/cm}^2 \\ < 3\tau_r = 0.33 \text{ kN/cm}^2 \end{cases}$$

$$\lambda = \frac{3}{8} \times 7.2 \times \left(1 - \frac{0.11}{0.16}\right) = 0.84 \text{ m}$$

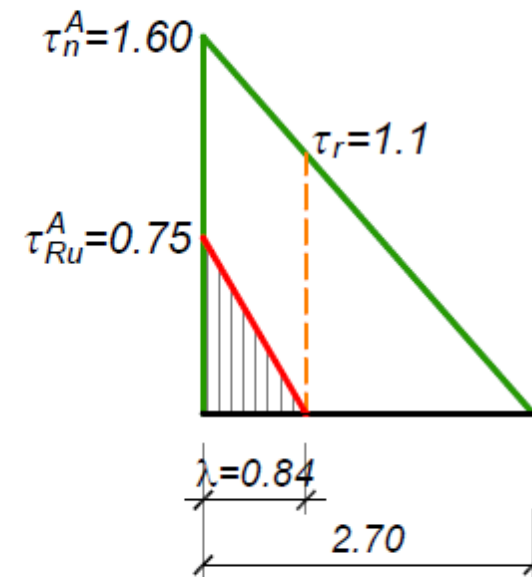
$$\tau_{Ru}^A = 1.5 \times (0.16 - 0.11) = 0.075 \text{ kN/cm}^2$$

usvojeno: $m=2$; $\alpha = 90^\circ$; $\theta = 45^\circ$:

$$e_u = \frac{m \times a_u^{(1)}}{b \times \mu_{uz,min}} = \frac{2 \times 0.785}{40 \times 0.2 \times 10^{-2}} = 19.6 \text{ cm}$$

usvojeno: **URØ10/15** ($m=2$)

$$\Delta A_a = \frac{304.8}{2 \times 40} \times (1 - 0) = 3.81 \text{ cm}^2 \Rightarrow \text{usv.: } \mathbf{2RØ25} \text{ (9.82 cm}^2\text{)}$$



POS 202 - grede u osama 1 i 3

Analiza opterećenja

- sopstvena težina $0.25 \times 0.6 \times 25 = 3.75 \text{ kN/m}$
- od ploče (oba polja) $q_{2,G} = 48.8 / 7.2 = 6.78 \text{ kN/m}$
- $g = 10.53 \text{ kN/m}$
- od ploče $q_{2,P} = 97.6 / 7.2 = 13.56 \text{ kN/m}$

Maksimalni moment savijanja nad osloncem

$$q_u = 1.6 \times 10.53 + 1.8 \times 13.56 = 41.3 \text{ kN/m}$$

$$M_{u,max} = 41.3 \times 7.2^2 / 8 = 267.4 \text{ kNm}$$

$$\text{pretp. } a_1 = 6 \text{ cm} \quad \Rightarrow \quad b/d/h = 25/60/54 \text{ cm}$$

$$k = \frac{54}{\sqrt{\frac{267.4 \times 10^2}{25 \times 2.05}}} = 2.364 \Rightarrow \begin{cases} \varepsilon_b / \varepsilon_a = 3.323 / 10\text{‰} \\ \bar{\mu} = 19.939\% \end{cases}$$

$$A_a = 19.939 \times \frac{25 \times 54}{100} \times \frac{2.05}{40} = 13.80 \text{ cm}^2$$

usvojeno: **5RØ19** (14.18 cm²)

Maksimalni moment savijanja u polju

$$M_{u,max} = 9/128 \times 41.3 \times 7.2^2 = 150.4 \text{ kNm}$$

$$\text{usvojeno: } L_0 = 540 \text{ cm} \Rightarrow B = \min. \left\{ \begin{array}{l} 25 + 8 \times 20 = 185 \\ 25 + \frac{540}{12} = 70 \end{array} \right\} = 70 \text{ cm}$$

Pretpostavlja se da će se neutralna linija naći u ploči:

$$\text{pretp. } a_1 = 6 \text{ cm} \quad \Rightarrow \quad B/b/d/h/d_p = 70/25/60/54/20 \text{ cm}$$

$$k = \frac{54}{\sqrt{\frac{150.4 \times 10^2}{70 \times 2.05}}} = 5.275 \Rightarrow \begin{cases} \varepsilon_b / \varepsilon_a = 0.988 / 10\text{‰} \\ s = 0.09 \Rightarrow x = 0.09 \times 54 = 4.86 \text{ cm} < d_p = 20 \text{ cm} \\ \bar{\mu} = 3.71\% \end{cases}$$

Pretpostavka o položaju neutralne linije je tačna. Sledi:

$$A_a = 3.71 \times \frac{70 \times 54}{100} \times \frac{2.05}{40} = 7.19 \text{ cm}^2$$

usvojeno: **3RØ19** (8.51 cm²)

Kontrola glavnih napona zatezanja – srednji oslonac

$$T_u^B = 5/8 \times 41.3 \times 7.2 = 185.7 \text{ kN}$$

$$\tau_n^B = \frac{185.7}{25 \times 0.9 \times 54} = 0.153 \frac{\text{kN}}{\text{cm}^2} > \tau_r = 0.11 \frac{\text{kN}}{\text{cm}^2}$$

$$\lambda = \frac{5}{8} \times 7.2 \times \left(1 - \frac{0.11}{0.153}\right) = 1.26 \text{ m}$$

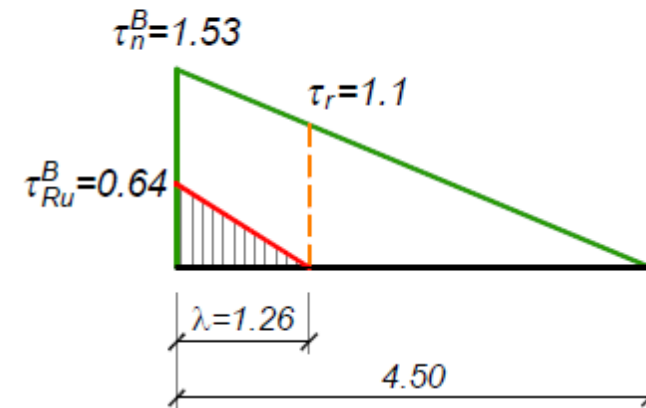
$$\tau_{Ru}^B = 1.5 \times (0.153 - 0.11) = 0.064 \frac{\text{kN}}{\text{cm}^2}$$

usvojeno: $m=2$; $\alpha = 90^\circ$; $\theta = 45^\circ$; GA 240/360:

$$e_u = \frac{2 \times 0.503}{25 \times 0.064} \times 24 = 15.0 \text{ cm}$$

usvojeno: **UØ8/15** ($m=2$)

$\Delta A_a = 0$ (»špic« momenta)



Kontrola glavnih napona zatezanja – krajnji oslonac

$$T_u^A = 3/8 \times 41.3 \times 7.2 = 111.4 \text{ kN}$$

$$\tau_n^A = \frac{111.4}{25 \times 0.9 \times 54} = 0.092 \frac{\text{kN}}{\text{cm}^2} < \tau_r = 0.11 \frac{\text{kN}}{\text{cm}^2}$$

usvojeno: **UØ8/20** ($m=2$)

POS 203 - greda u osi B

Analiza opterećenja

- sopstvena težina $0.4 \times 0.6 \times 25 = 6.00 \text{ kN/m}$
- od ploče $q_{3,G} = 2 \times 55.5 / 6.0 = 18.50 \text{ kN/m}$
- $g = 24.50 \text{ kN/m}$
- od ploče $q_{3,P} = 2 \times 111.0 / 6.0 = 37.00 \text{ kN/m}$

Maksimalni moment savijanja nad osloncem

$$q_u = 1.6 \times 24.5 + 1.8 \times 37.0 = 105.8 \text{ kN/m}$$

$$M_{u,max} = 105.8 \times 6.0^2 / 8 = 476.2 \text{ kNm}$$

$$\text{pretp. } a_1 = 6 \text{ cm} \quad \Rightarrow \quad b/d/h = 40/60/54 \text{ cm}$$

$$k = \frac{54}{\sqrt{\frac{476.2 \times 10^2}{40 \times 2.05}}} = 2.241 \Rightarrow \begin{cases} \varepsilon_b / \varepsilon_a = 3.5 / 9.081\% \\ \bar{\mu} = 22.521\% \end{cases}$$

$$A_a = 22.521 \times \frac{40 \times 54}{100} \times \frac{2.05}{40} = 24.93 \text{ cm}^2$$

usvojeno: **7RØ22** (26.64 cm²)

Maksimalni moment savijanja u polju

$$M_{u,max} = 9/128 \times 105.8 \times 6.0^2 = 267.9 \text{ kNm}$$

$$L_0 = 0.75 \times 600 = 450 \text{ cm}$$

$$B = \min. \left\{ \begin{array}{l} 40 + 20 \times 20 = 440 \\ 40 + 0.25 \times 450 = 152.5 \end{array} \right\} = 152.5 \text{ cm}$$

Pretpostavlja se da će se neutralna linija naći u ploči:

$$\text{pretp. } a_1 = 6 \text{ cm} \quad \Rightarrow \quad B/b/d/h/d_p = 152.5/40/60/54/20 \text{ cm}$$

$$k = \frac{54}{\sqrt{\frac{267.9 \times 10^2}{152.5 \times 2.05}}} = 5.834 \Rightarrow \left\{ \begin{array}{l} \varepsilon_b / \varepsilon_a = 0.878 / 10\text{‰} \\ s = 0.081 \Rightarrow x = 0.081 \times 54 = 4.4 \text{ cm} < d_p = 20 \text{ cm} \\ \bar{\mu} = 3.023\% \end{array} \right.$$

Pretpostavka o položaju neutralne linije je tačna, pa se potrebna površina armature određuje za pravougaoni presek širine $B = 152.5 \text{ cm}$:

$$A_a = 3.023 \times \frac{152.5 \times 54}{100} \times \frac{2.05}{40} = 12.76 \text{ cm}^2$$

usvojeno: **4RØ22** (15.20 cm²)

Kontrola glavnih napona zatezanja – srednji oslonac

$$T_u^B = 5/8 \times 105.8 \times 6.0 = 396.8 \text{ kN}$$

$$\tau_n^B = \frac{396.8}{40 \times 0.9 \times 54} = 0.204 \frac{\text{kN}}{\text{cm}^2} \begin{cases} > \tau_r = 0.11 \text{ kN/cm}^2 \\ < 3\tau_r = 0.33 \text{ kN/cm}^2 \end{cases}$$

$$\lambda = \frac{5}{8} \times 6.0 \times \left(1 - \frac{0.11}{0.204}\right) = 1.73 \text{ m}$$

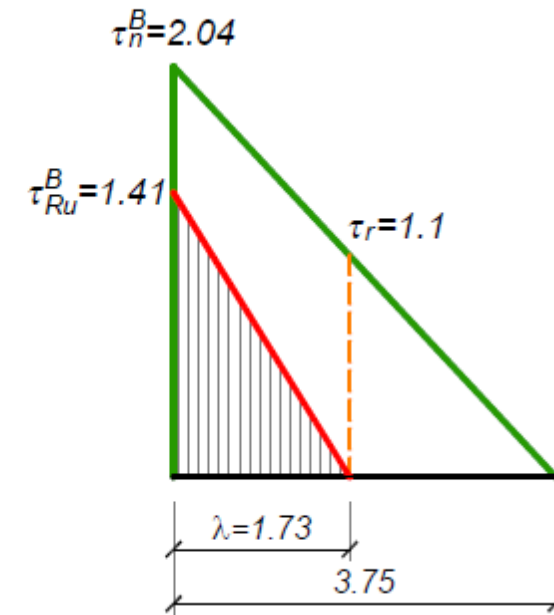
$$\tau_{Ru}^B = \frac{3}{2} \times (0.204 - 0.11) = 0.141 \frac{\text{kN}}{\text{cm}^2}$$

usvojeno: $m=2$; $\alpha = 90^\circ$; $\theta = 45^\circ$:

$$e_u = \frac{2 \times 0.785}{40 \times 0.141} \times 40 = 11.1 \text{ cm}$$

usvojeno: **URØ10/10** ($m=2$)

$\Delta A_a = 0$ («špic» momenta)



Kontrola glavnih napona zatezanja – krajnji oslonac

$$T_u^A = 3/8 \times 105.8 \times 6.0 = 238.1 \text{ kN}$$

$$\tau_n^A = \frac{238.1}{40 \times 0.9 \times 54} = 0.122 \frac{\text{kN}}{\text{cm}^2} \begin{cases} > \tau_r = 0.11 \text{ kN/cm}^2 \\ < 3\tau_r = 0.33 \text{ kN/cm}^2 \end{cases}$$

$$\lambda = \frac{3}{8} \times 6.0 \times \left(1 - \frac{0.11}{0.122}\right) = 0.23 \text{ m}$$

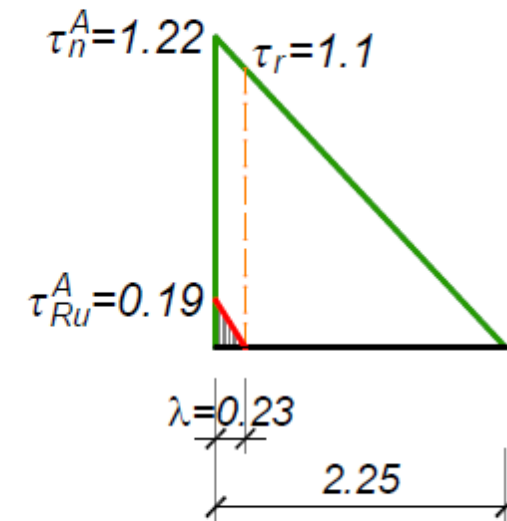
$$\tau_{Ru}^A = 1.5 \times (0.122 - 0.11) = 0.019 \text{ kN/cm}^2$$

usvojeno: $m=2$; $\alpha = 90^\circ$; $\theta = 45^\circ$:

$$e_u = \frac{m \times a_u^{(1)}}{b \times \mu_{uz,min}} = \frac{2 \times 0.785}{40 \times 0.2 \times 10^{-2}} = 19.6 \text{ cm}$$

usvojeno: **URØ10/15** ($m=2$)

$$\Delta A_a = \frac{238.1}{2 \times 40} \times (1 - 0) = 2.98 \text{ cm}^2 \Rightarrow \text{usv.: } \mathbf{2RØ22} \text{ (7.60 cm}^2\text{)}$$



Analiza opterećenja

- sopstvena težina $0.25 \times 0.6 \times 25 = 3.75 \text{ kN/m}$
 - od ploče (oba polja) $q_{4,G} = 40.2 / 6.0 = 6.70 \text{ kN/m}$
 - od ploče $q_{4,P} = 80.4 / 6.0 = 13.40 \text{ kN/m}$
- $g = 10.45 \text{ kN/m}$

Maksimalni moment savijanja nad osloncem

$$q_u = 1.6 \times 10.45 + 1.8 \times 13.40 = 40.8 \text{ kN/m}$$

$$M_{u,max} = 40.8 \times 6.0^2 / 8 = 183.7 \text{ kNm}$$

$$\text{pretp. } a_1 = 6 \text{ cm} \quad \Rightarrow \quad b/d/h = 25/60/54 \text{ cm}$$

$$k = \frac{54}{\sqrt{\frac{183.7 \times 10^2}{25 \times 2.05}}} = 2.852 \Rightarrow \begin{cases} \varepsilon_b / \varepsilon_a = 2.295 / 10\text{‰} \\ \bar{\mu} = 13.241\% \end{cases}$$

$$A_a = 13.241 \times \frac{25 \times 54}{100} \times \frac{2.05}{40} = 9.16 \text{ cm}^2$$

usvojeno: **5RØ16** (10.05 cm²)

Maksimalni moment savijanja u polju

$$M_{u,max} = 9/128 \times 40.82 \times 6.0^2 = 103.3 \text{ kNm}$$

$$\text{usvojeno: } L_0 = 450 \text{ cm} \Rightarrow B = \min. \left\{ \begin{array}{l} 25 + 8 \times 20 = 185 \\ 25 + \frac{450}{12} = 62.5 \end{array} \right\} = 62.5 \text{ cm}$$

Pretpostavlja se da će se neutralna linija naći u ploči:

$$\text{pretp. } a_1 = 6 \text{ cm} \Rightarrow B/b/d/h/d_p = 62.5/25/60/54/20 \text{ cm}$$

$$k = \frac{54}{\sqrt{\frac{103.3 \times 10^2}{62.5 \times 2.05}}} = 6.013 \Rightarrow \begin{cases} \varepsilon_b / \varepsilon_a = 0.847 / 10\text{‰} \\ s = 0.078 \Rightarrow x = 0.078 \times 54 = 4.22 \text{ cm} < d_p = 20 \text{ cm} \\ \bar{\mu} = 2.843\% \end{cases}$$

Pretpostavka o položaju neutralne linije je tačna. Sledi:

$$A_a = 2.843 \times \frac{62.5 \times 54}{100} \times \frac{2.05}{40} = 4.92 \text{ cm}^2 > A_{a,min.} = 0.2 \times 10^{-2} \times 25 \times 60 = 3.0 \text{ cm}^2$$

usvojeno: **3RØ16** (6.03 cm²)

Kontrola glavnih napona zatezanja – srednji oslonac

$$T_u^B = 5/8 \times 40.8 \times 6.0 = 153.1 \text{ kN}$$

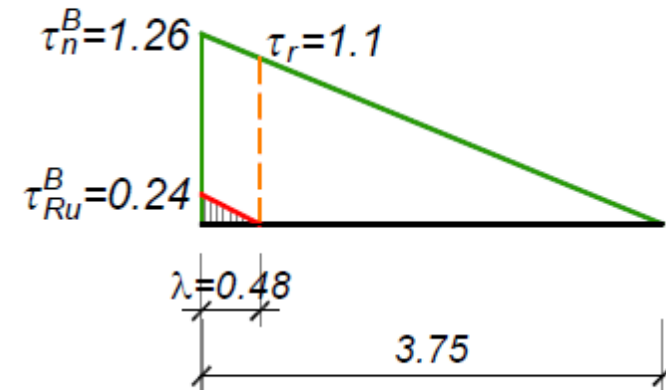
$$\tau_n^B = \frac{153.1}{25 \times 0.9 \times 54} = 0.126 \frac{\text{kN}}{\text{cm}^2} > \tau_r = 0.11 \frac{\text{kN}}{\text{cm}^2}$$

$$\lambda = \frac{5}{8} \times 6.0 \times \left(1 - \frac{0.11}{0.126}\right) = 0.48 \text{ m}$$

usvojeno: $m=2$; $\alpha = 90^\circ$; $\theta = 45^\circ$; GA 240/360:

$$e_u = \frac{m \times a_u^{(1)}}{b \times \mu_{uz,min}} = \frac{2 \times 0.503}{25 \times 0.2 \times 10^{-2}} = 20.1 \text{ cm}$$

usvojeno: **UØ8/20** ($m=2$)

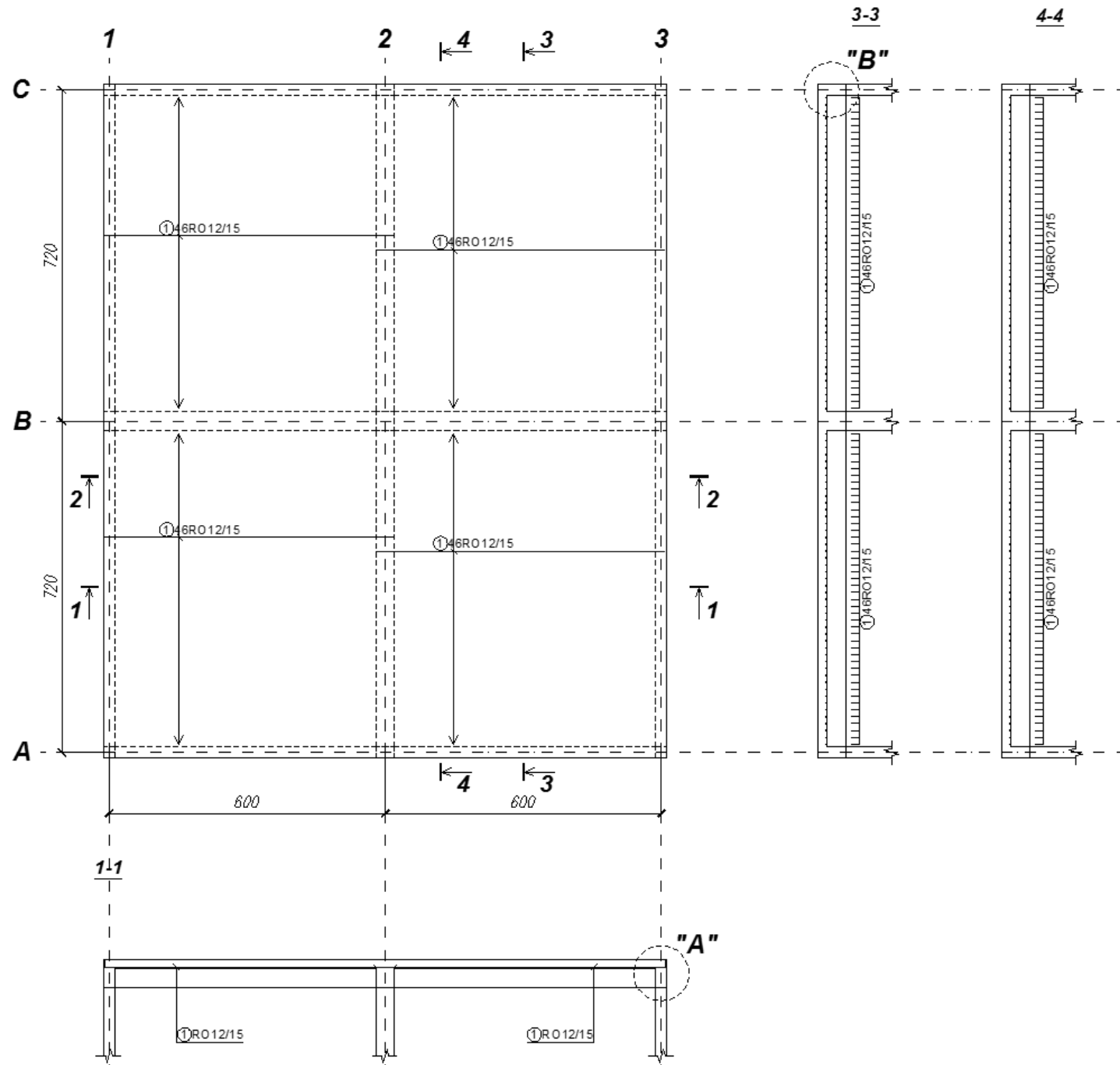


Kontrola glavnih napona zatezanja – krajnji oslonac

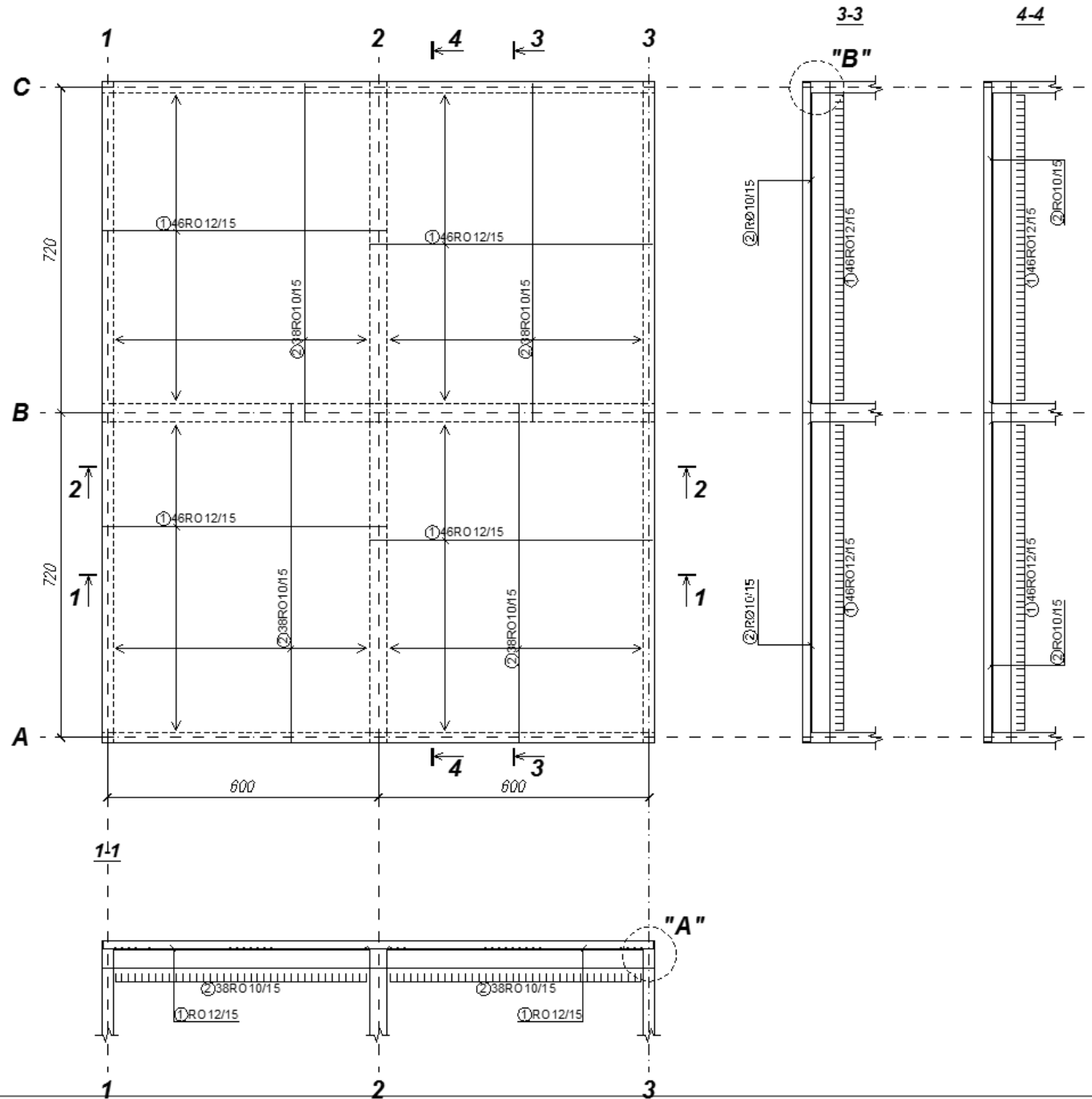
$$T_u^A = 3/8 \times 40.82 \times 6.0 = 91.8 \text{ kN} \Rightarrow \tau_n^A = \frac{91.8}{25 \times 0.9 \times 54} = 0.076 \frac{\text{kN}}{\text{cm}^2} < \tau_r = 0.11 \frac{\text{kN}}{\text{cm}^2}$$

usvojeno: **UØ8/20** ($m=2$)

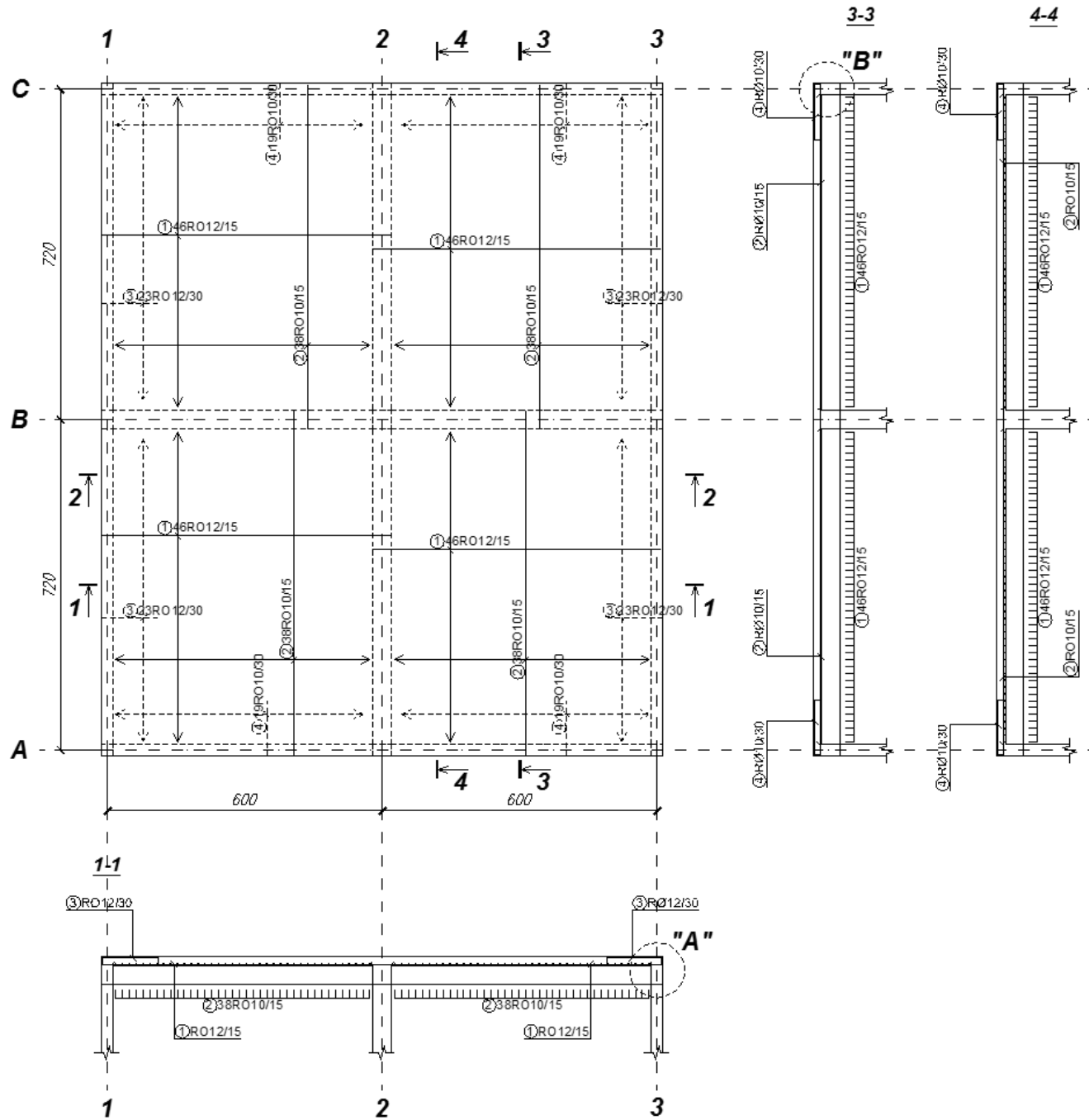
DONJA ZONA



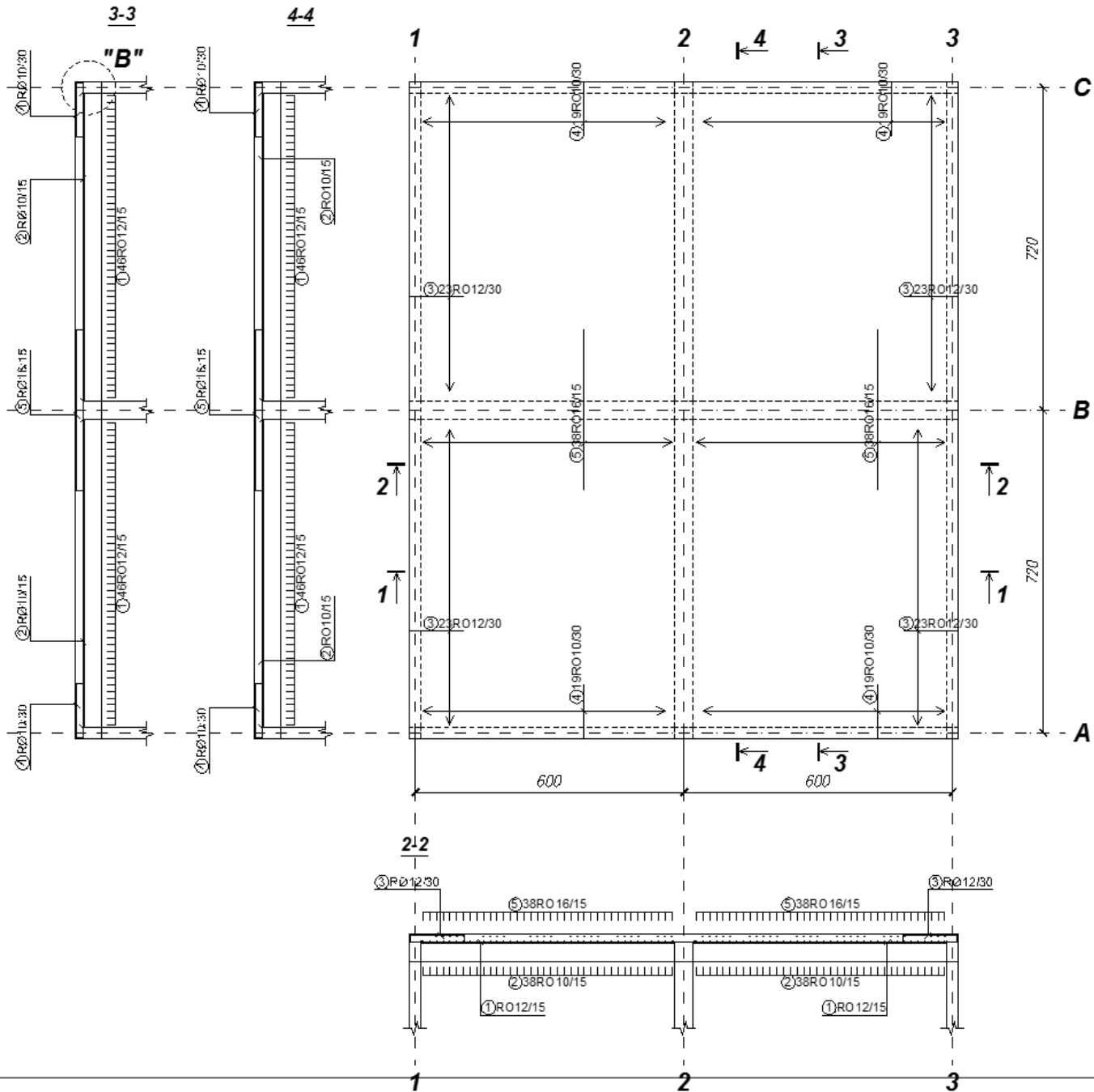
DONJA ZONA



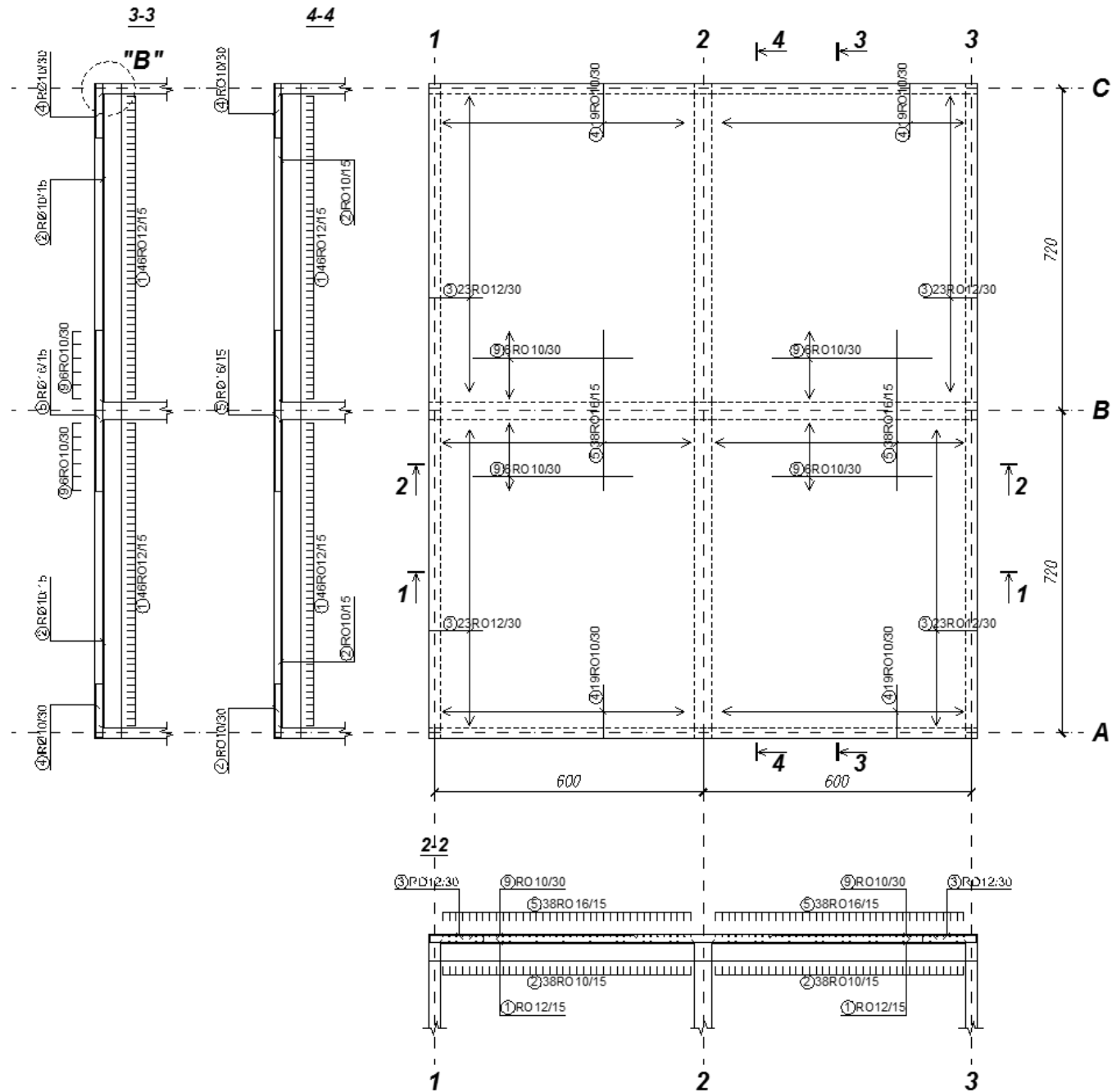
DONJA ZONA

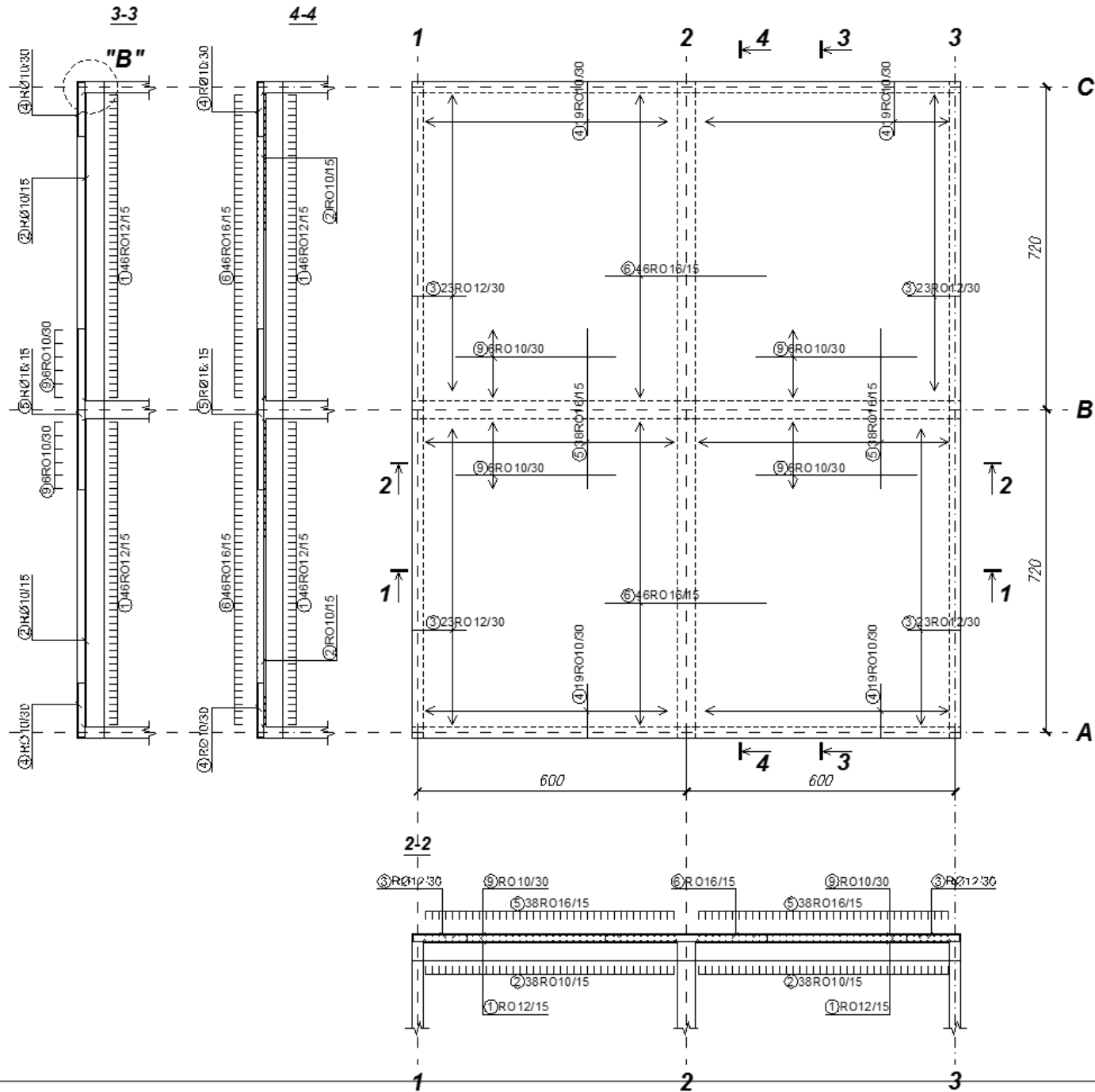


GORNJA ZONA

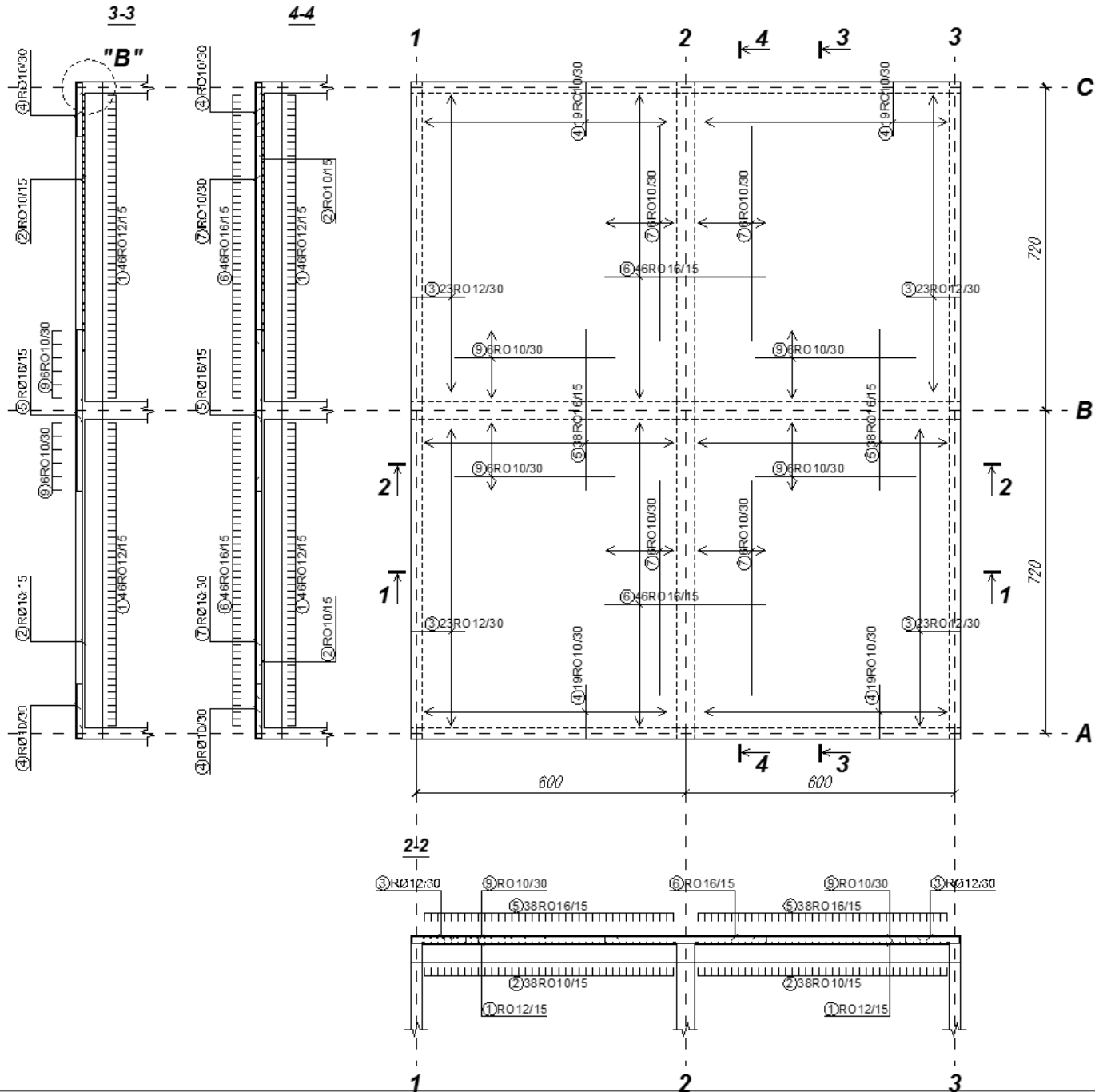


GORNJA ZONA

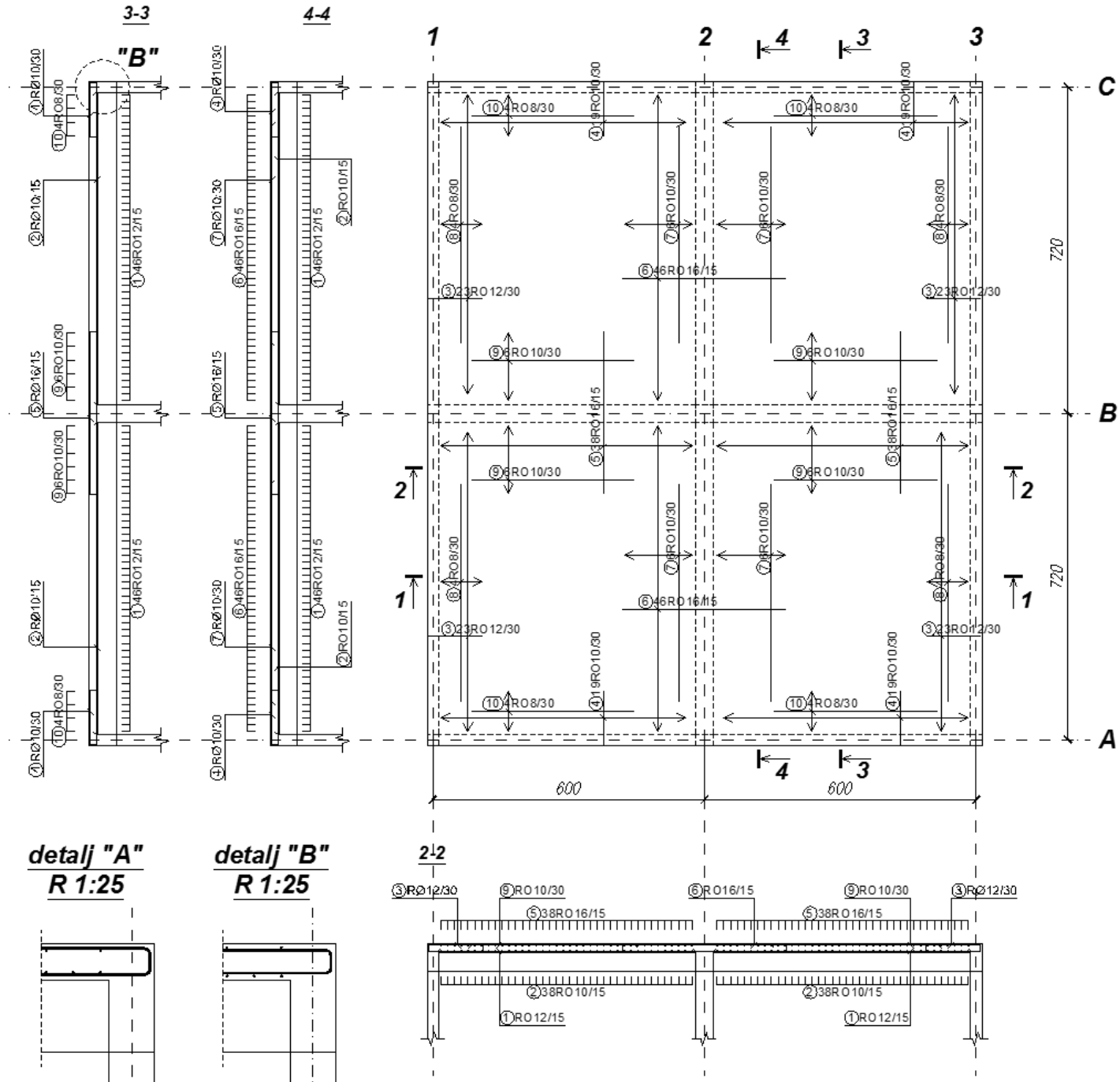


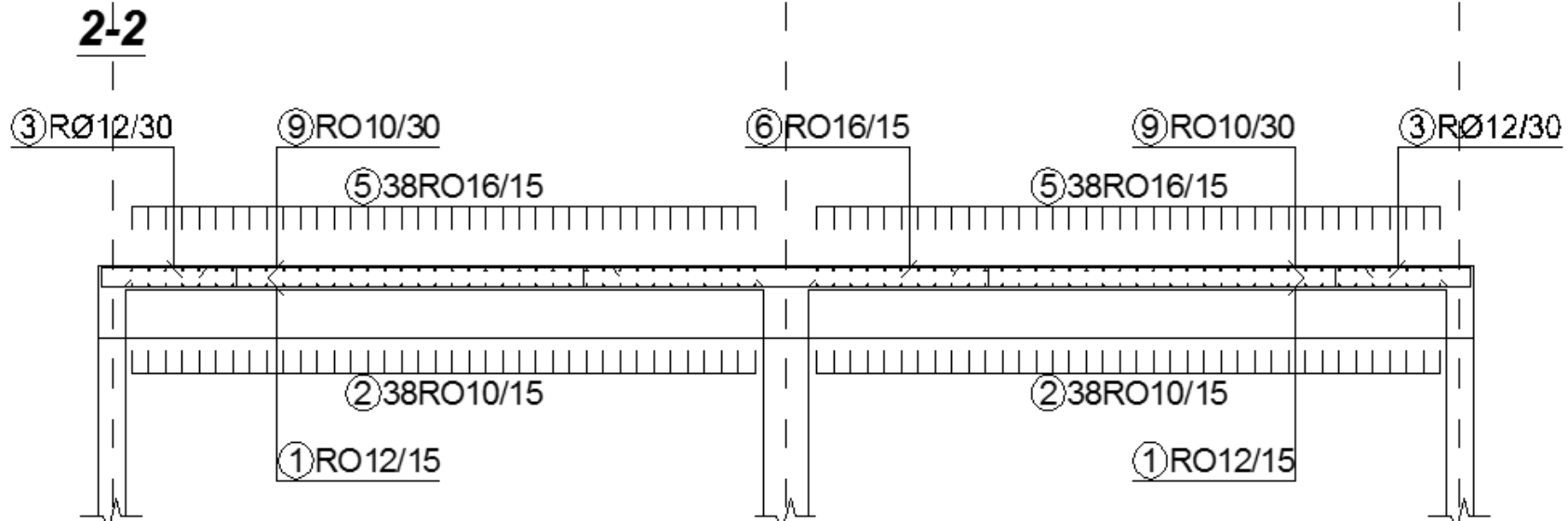


GORNJA ZONA



GORNJA ZONA

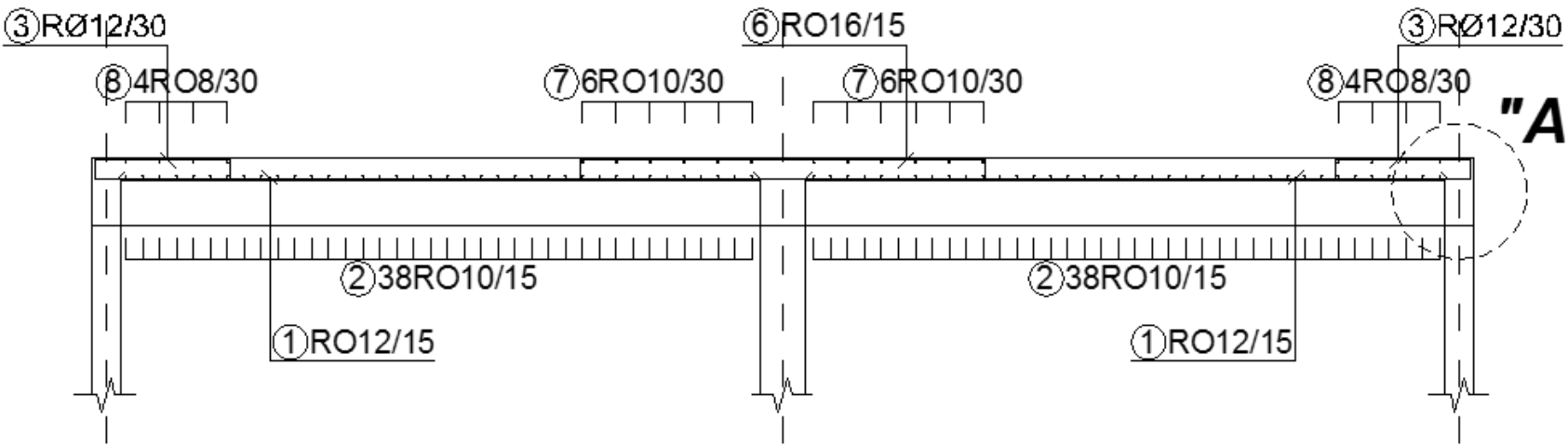




1
1-1

2

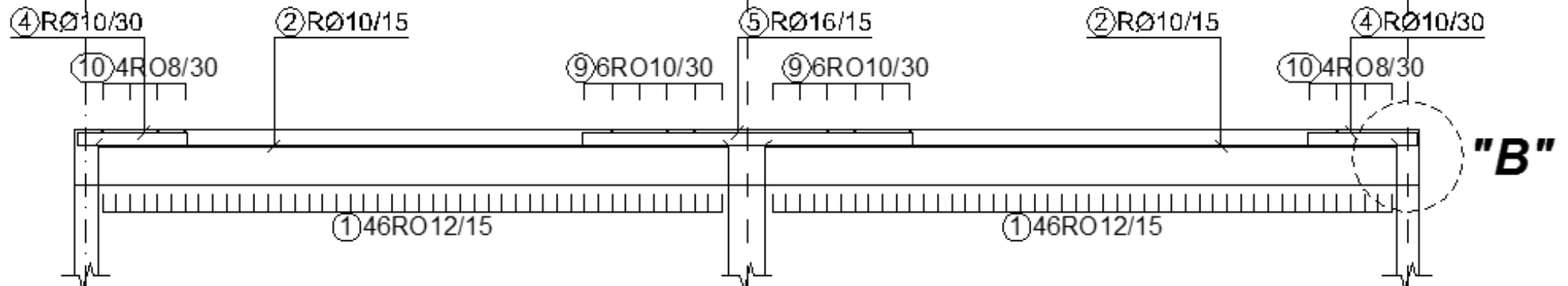
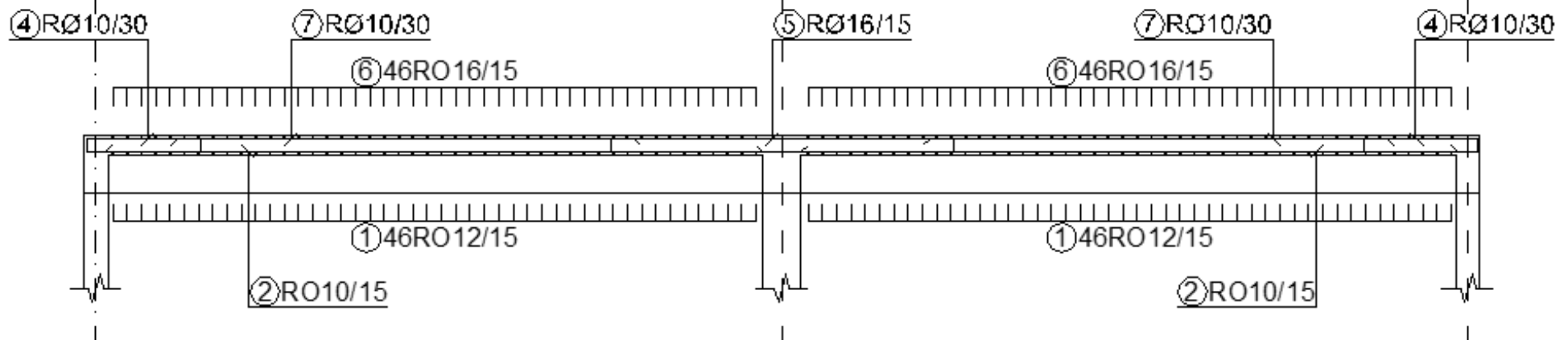
3



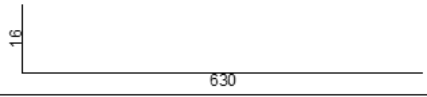
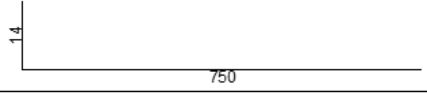
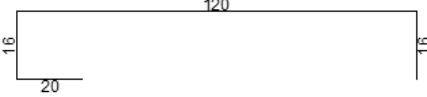
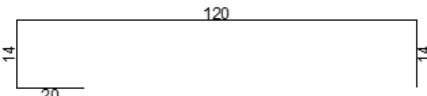
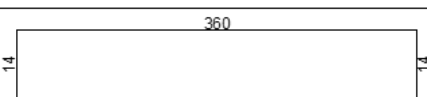
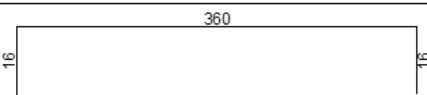
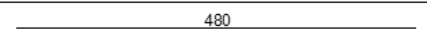
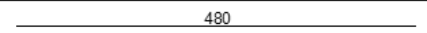


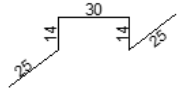
1

2

3

3-3**4-4**

Specifikacija armature

Sipke - specifikacija						
ozn.	oblik i mere [cm]	C	O mm	lg [m]	n [kom]	lgn [m]
POS 200 (1 kom)						
1		RA2	12	6.46	184	1188.64
2		RA2	10	7.64	152	1161.28
3		RA2	12	1.72	92	158.24
4		RA2	10	1.68	76	127.68
5		RA2	16	3.88	76	294.88
6		RA2	16	3.92	92	360.64
7		RA2	10	4.80	24	115.20
8		RA2	8	4.80	16	76.80
9		RA2	10	3.60	24	86.40
10		RA2	8	3.60	16	57.60
11		RA2	10	1.08	560	604.80

Rekapitulacija armature

Sipke - rekapitulacija			
O [mm]	lgn [m]	Jedinicna tezina [kg/m]	Tezina [kg]
RA2			
8	134.40	0.41	54.43
10	2095.36	0.63	1326.36
12	1346.88	0.91	1227.01
16	655.52	1.62	1062.60
Ukupno			3670.40

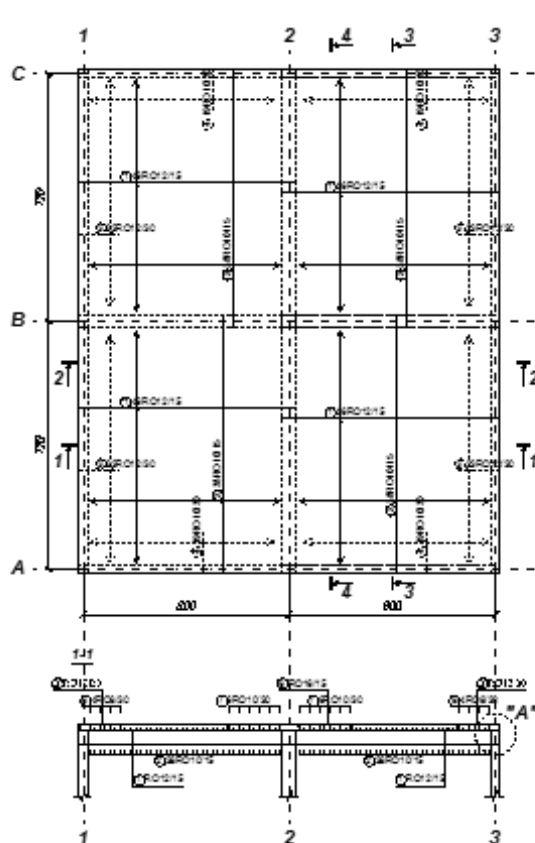
Pečat**GRAĐEVINSKI FAKULTET UNIVERZITETA U BEOGRADU**

ODSEK ZA KONSTRUKCIJE		KATEDRE ZA MATERIJALE I KONSTRUKCIJE	
PROJEKTOVANJE I GRAĐENJE BETONSKIH KONSTRUKCIJA 1		PRIMERI ZA VEZBE - LIST br.6	
PREDMETNI NASTAVNIK: PROF.DR D. NAJDANOVIĆ	ASISTENT: M. STOJANOVIĆ	KANDIDAT:	

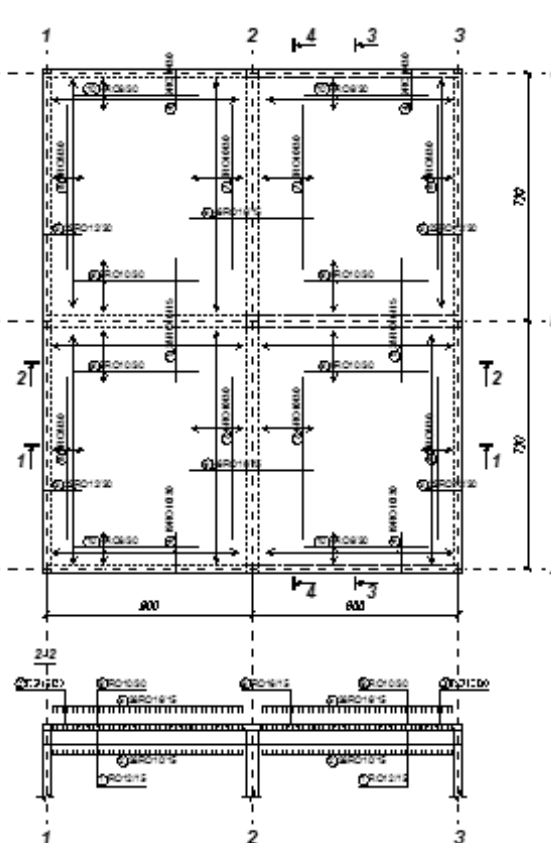
PLAN ARMATURE POS 200

KVALITET MATERIJALA MB 30 RA 400/500	RAZMERA CRTEŽA R 1:100/25	FORMAT CRTEŽA 297x600 mm	ŠKOLSKA 2008/2009.	OVERA:
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DONJA ZONA



GORNJA ZONA



Spika - specifikacija						
cm	oblik i mere (cm)	C	Ø mm	l (m)	n (kom)	lg (m)
POS 200 (i kom)						
1		RA2	12	6.48	154	1155.64
2		RA2	10	7.64	152	1161.28
3		RA2	12	1.72	92	155.24
4		RA2	10	1.65	76	127.60
5		RA2	16	3.55	76	264.80
6		RA2	16	3.92	92	360.64
7		RA2	10	4.80	24	115.20
8		RA2	8	4.80	16	76.80
9		RA2	10	3.60	24	86.40
10		RA2	8	3.60	16	57.60
11		RA2	10	1.02	360	364.80
Spika - raspodela						
C (mm)	lg (m)	Jednina tezna (kg/m)		Tezina (kg)		
RA2						
8	134.40	0.41	54.43			
10	209.28	0.62	1328.36			
12	1348.80	0.91	1227.01			
16	655.52	1.62	1062.80			
Ukupno				3670.40		

GRADJEVINSKI FAKULTET IJA, VEŠTETA I BEOGRADU

PROJEKTOVANJE I IZVEDBA

POSREDOVANJE U PROMETU NEKRETNIM PRAVNIM PREDMETIMA

PRIMER ZA VEŠTAČENJE - LIST 8

PLAN ARMATURE POS 200

M200 RA 400/300 R 1:000/2 230/500 mm