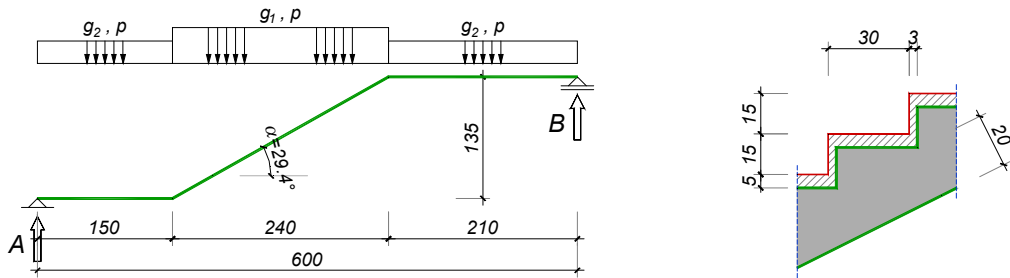
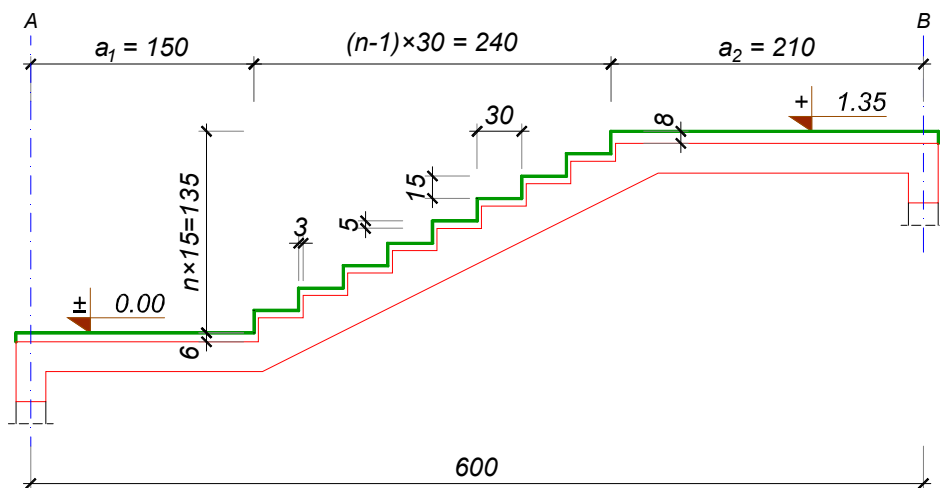


### PRORAČUN STEPENIŠTA POS ST1

Stepenište je statičkog sistema kolenaste ploče, debljine  $d_p = 20$  cm. Savladava visinsku razliku od 135 cm (9 visina po 15 cm). Stepenci su dimenzija  $b/h = 15/30$  cm. Debljina vertikalne obloge stepenika je 3 cm, a horizontalne 5 cm.



$$\operatorname{tg} \alpha = 135/240 = 0.5625 \Rightarrow \alpha = 29.4^\circ$$



Analiza opterećenja

kos deo:

## stalno opterećenje

- težina ploče	$0.20 \times 25.0 / \cos 29.4^\circ$	= 5.74 kN/m <sup>2</sup>
- težina stepenika	$0.5 \times 0.15 \times 24.0$	= 1.80 kN/m <sup>2</sup>
- horizontalna obloga	$0.05 \times 24$	= 1.20 kN/m <sup>2</sup>
- vertikalna obloga	$15/30 \times 0.03 \times 24$	= 0.36 kN/m <sup>2</sup>

ukupno:  $g_2$  = 9.10 kN/m<sup>2</sup>povremeno opterećenje  $p$  = 3.00 kN/m<sup>2</sup>

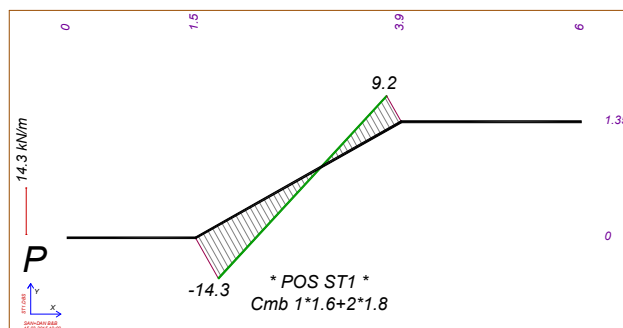
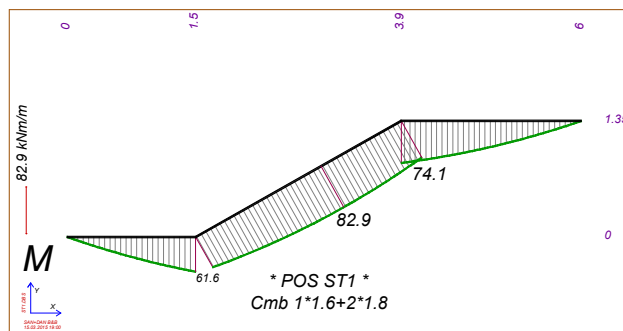
horizontalni delovi:

## stalno opterećenje

- težina ploče	$0.20 \times 25.0$	= 5.00 kN/m <sup>2</sup>
- horizontalna obloga	$0.06 \times 25.0$	= 1.50 kN/m <sup>2</sup>

ukupno:  $g_1$  = 6.50 kN/m<sup>2</sup>povremeno opterećenje  $p$  = 3.00 kN/m<sup>2</sup>

Dijagrami statičkih uticaja dati su u nastavku.



Dimenzionisanje

usvojeno: MB 30  $\Rightarrow f_B = 20.5 \text{ MPa} = 2.05 \text{ kN/cm}^2$   
RA 400/500  $\Rightarrow \sigma_v = 400 \text{ MPa} = 40 \text{ kN/cm}^2$

$\max. M_u = 82.9 \text{ kNm/m}$  (donja zona)

pretp.  $a_1 = 3 \text{ cm}$   $\Rightarrow b/d/h = 100/20/17 \text{ cm}$

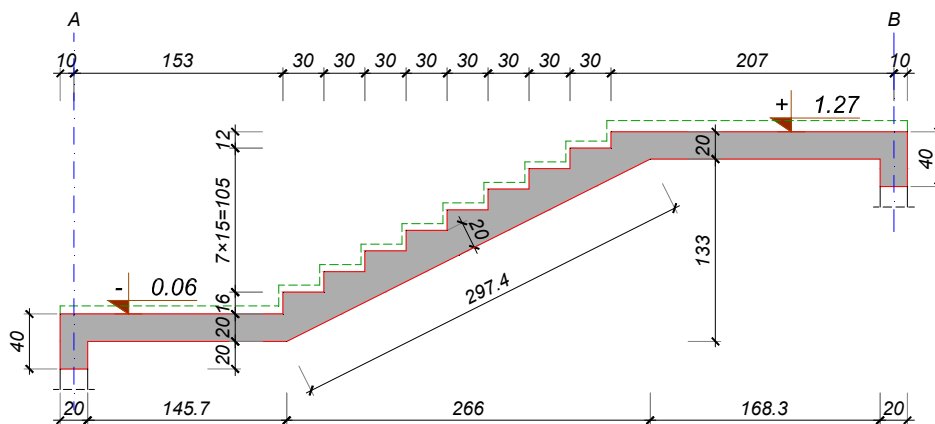
$$k = \frac{17}{\sqrt{\frac{82.9 \times 10^2}{100 \times 2.05}}} = 2.673 \Rightarrow \frac{\epsilon_b}{\epsilon_a} = 2.582 / 10\text{‰}$$

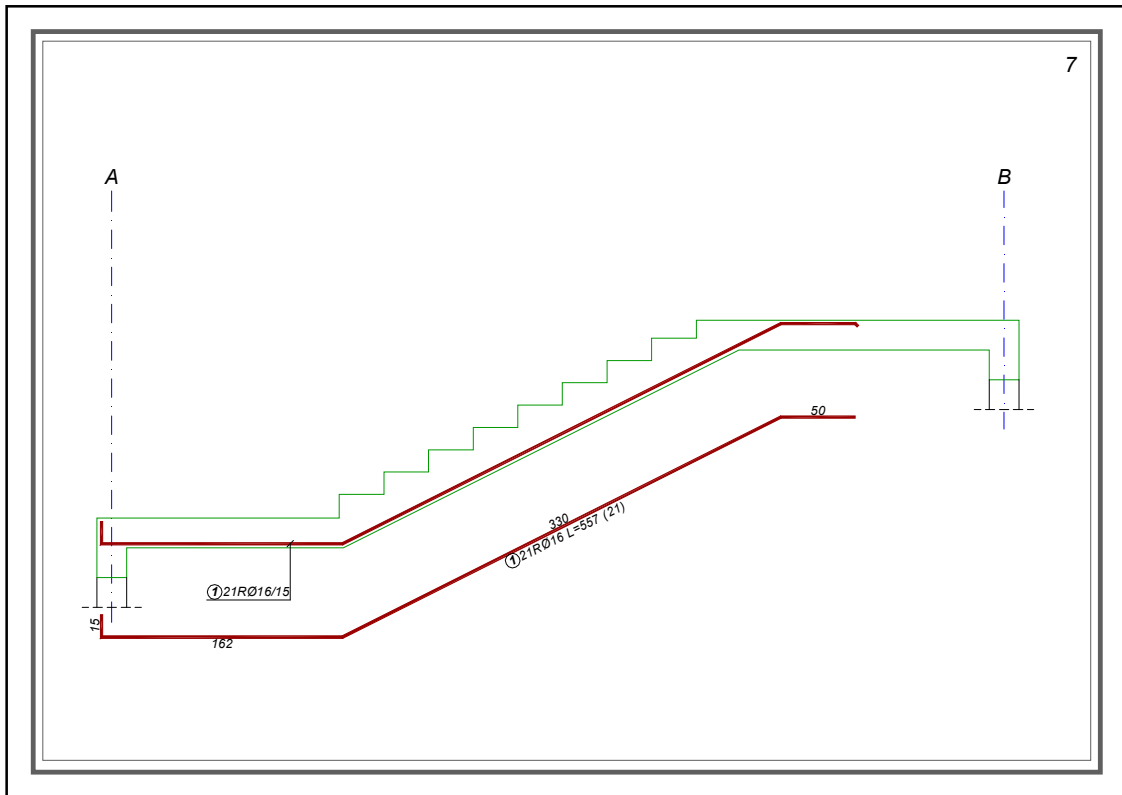
$$\mu = 15.221\%$$

$$A_a = 15.221 \times \frac{100 \times 17}{100} \times \frac{2.05}{40} = 13.26 \text{ cm}^2/\text{m}$$

$$A_{ap} = 0.2 \times 13.26 = 2.65 \text{ cm}^2/\text{m}$$

usvojeno: **RØ 16/15** (13.40 cm<sup>2</sup>/m)  
**RØ 10/25** (3.14 cm<sup>2</sup>/m) - podeona armatura





$M_u = 74.1 \text{ kNm/m}$  (donja zona, presek na desnom podestu)

usv.  $a_1 = a_0 + \varnothing/2 = 2.0 + 1.6/2 = 2.8 \text{ cm}$

$b/d/h = 100/20/17.2 \text{ cm}$

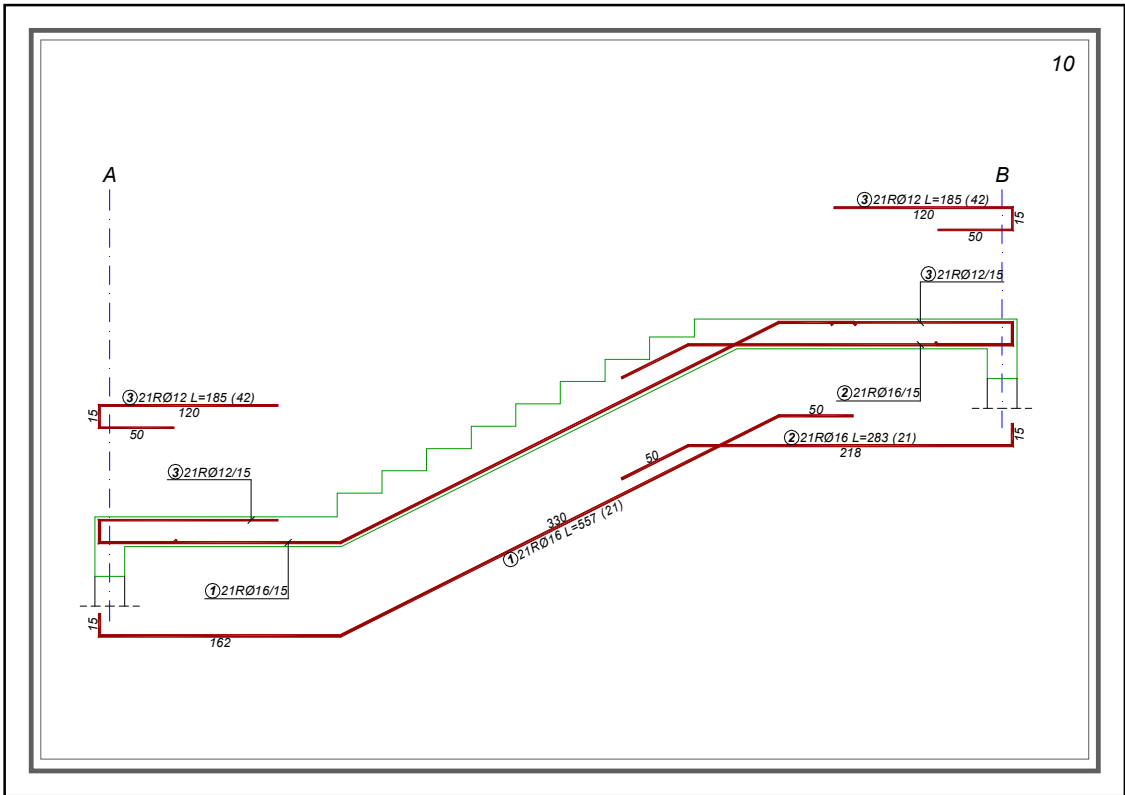
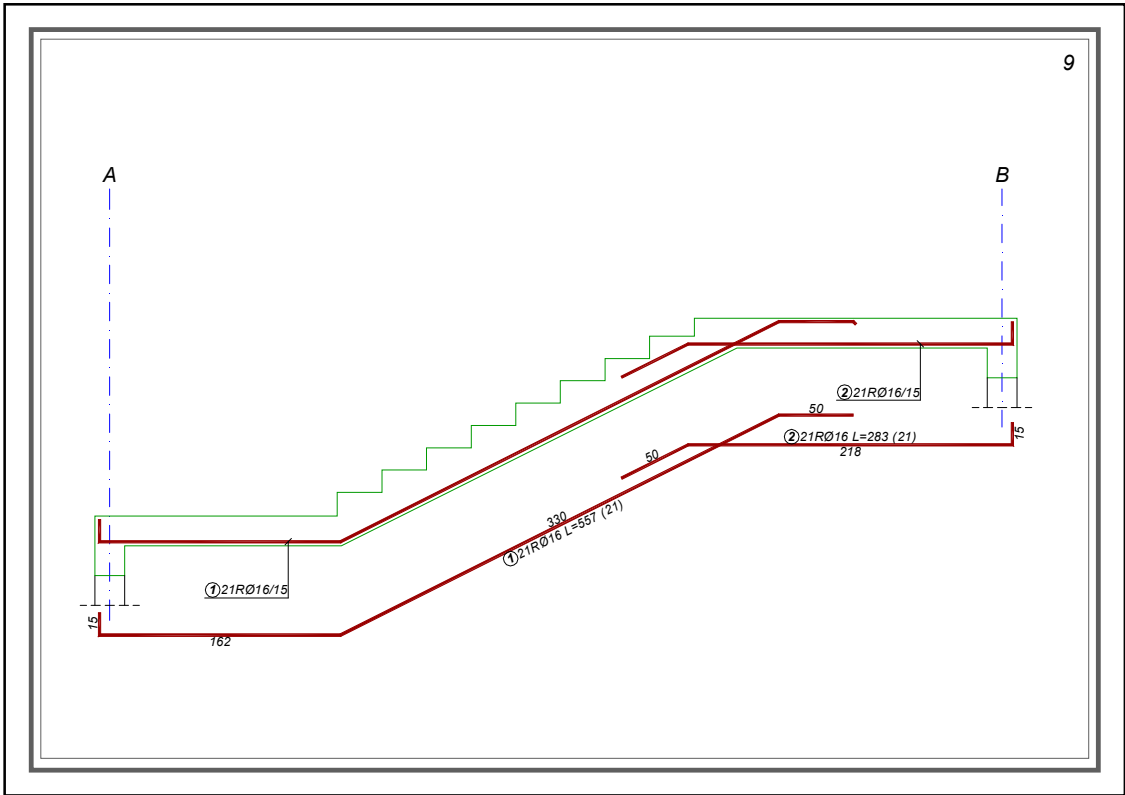
$$A_a = 13.157 \times 17.2 \times \frac{2.05}{40} = 11.60 \text{ cm}^2/\text{m}$$

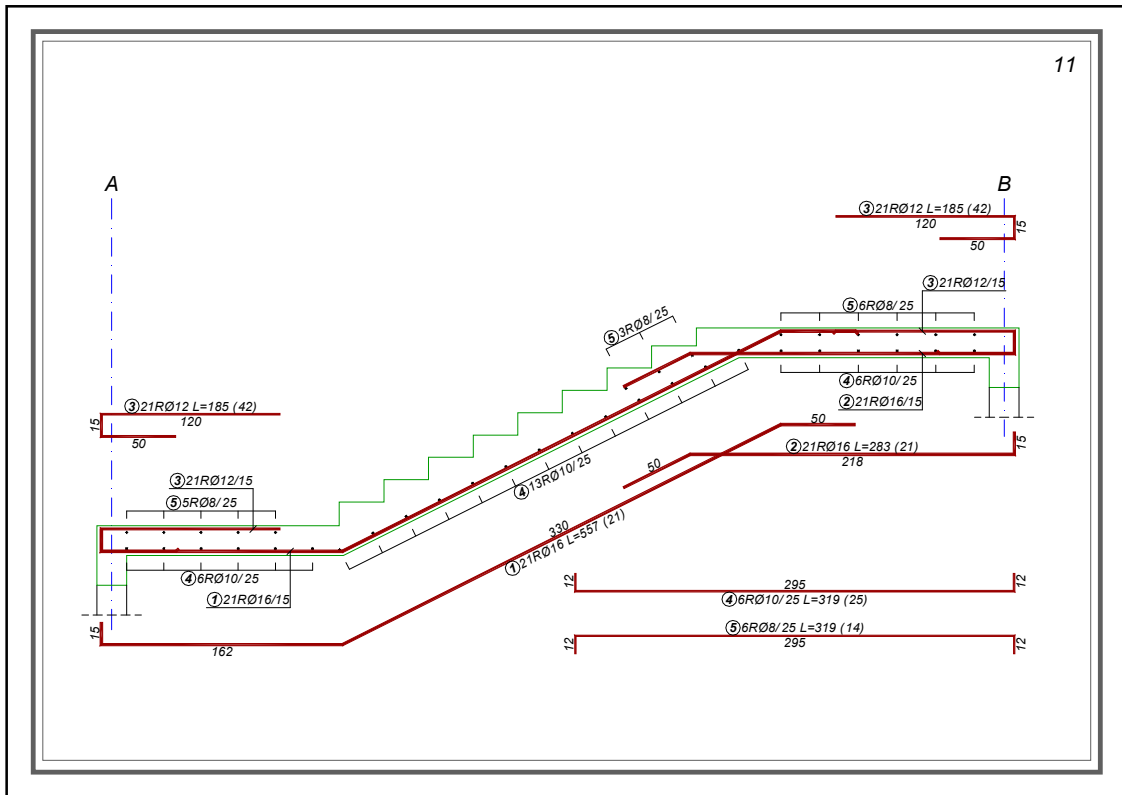
$$\text{usv. } e_a = 15 \text{ cm (kao u polju)} \Rightarrow a_a^{(1)} \geq \frac{A_{a,\text{potr.}} \times e_a}{100} = \frac{11.60 \times 15}{100} = 1.74 \text{ cm}^2$$

usvojeno:

**RØ 16/15** ( $13.40 \text{ cm}^2/\text{m}$ )

**RØ 10/25** ( $3.14 \text{ cm}^2/\text{m}$ ) - podeona armatura





Šipke - specifikacija						
ozn.	oblik i mere [cm]	ozn.	Ø	lg [m]	n [kom]	lgn [m]
POS ST (1 kom)						
1		RA2	16	5.57	21	116.97
2		RA2	16	2.83	21	59.43
3		RA2	12	1.85	42	77.70
4		RA2	10	3.19	25	79.75
5		RA2	8	3.19	14	44.66
Šipke - rekapitulacija						
Ø [mm]	lgn [m]	Jedinična težina [kg/m]		Težina [kg]		
RA2						
8	44.66	0.405		18.09		
10	79.75	0.633		50.48		
12	77.70	0.911		70.78		
16	176.40	1.621		285.94		
Ukupno						425.30

