

STATIČKI PRORAČUN
UZ PROJEKAT GALERIJE FRESAKA I KULE SA VIDIKOVCEM
PROFESORA MILUTINOVIĆ VELJKA, U PIPERIMA

OVLAŠĆENI PROJEKTANT

ANALIZA OPTEREĆENJA

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Osnovni podaci za objekat

Lokacija	Piperi, Crna Gora
Seizmička zona	IX
Osnovna brzina vetra	$v_{m,50,10}= 19 \text{ m/s}$
Opterećenje od snega	$s= 1,00 \text{ kN/m}^2$
Vrsta objekta	specijalni
Konstrukcija	zidana i armirano betonska, livena na licu mesta
Način fundiranja	Plitko
Krov	Drveni sa crepom

krovni pokrivač kule

	d	zap. Tež.	g	
	cm	kN/m ³	kN/m ²	
mediteran crep (d=3.8cm)	3,8	11,80	0,45	
hidroizolacija	0,4	10,00	0,04	
potkonstrukcija drvo (po m2)	100,0	0,15	0,15	
termoizolacija	8,0	1,30	0,10	
opšivka	100,0	0,15	0,15	
		g=	0,89	kN/m ²
dodatno stalno		g=	0,90	kN/m ²

etaže kule

	d	zap. Tež.	g	
	cm	kN/m ³	kN/m ²	
kamena obloga	3,0	28,00	0,84	
cementni malter	2,5	21,00	0,53	
AB ploča	12,0	25,00	3,00	
cementni malter	2,0	21,00	0,42	
		g=	4,79	kN/m ²
dodatno stalno		g=	1,80	kN/m ²

zid-ograda

	spratna visina:		3,15	m
	d	zap. Tež.	g	
	cm	kg/m ³	kN/m	
opeka	25,0	16,00	4,00	
cementni malter	5,0	21,00	1,05	
kamena obloga	5,0	28,00	1,40	
ograda	1,0	28,00	0,28	
		g=	6,73	kN/m'
dodatno stalno		g=	21,20	kN/m'

ova veličina se menja s obzirom na visinu zida koja se menja po lučnoj krivini

Osnovni podaci o modelu

Datoteka: hemofarm velkulgal.twp
Datum proračuna: 27.12.2010

Način proračuna: 3D model

- ☒ Teorija I-og reda ☒ Modalna analiza ☐ Stabilnost
☐ Teorija II-og reda ☒ Seizmički proračun ☐ Faze građenja
☐ Nelinearan proračun

Veličina modela

Broj čvorova: 3908
Broj pločastih elemenata: 3039
Broj grednih elemenata: 1274
Broj graničnih elemenata: 7128
Broj osnovnih slučajeva opterećenja: 5
Broj kombinacija opterećenja: 2

Jedinice mera

Dužina: m [cm,mm]
Sila: kN
Temperatura: Celsius

Ulazni podaci - Konstrukcija

Šema nivoa

Naziv	z [m]	h [m]
Pk	15.00	2.75
	12.25	1.25
4 sprat - vidikovac	11.00	2.75
3 sprat 5.68	8.25	2.75

2 sprat 2.96	5.50	2.75
1 sprat 0.00	2.75	2.75
Pr -2.75	0.00	1.20
Temelji	-1.20	

Tabela materijala

No	Naziv materijala	E[kN/m ²]	μ	γ[kN/m ³]	α[1/C]	Em[kN/m ²]	μm
1	Beton MB 30	3.150e+7	0.20	25.00	1.000e-5	3.150e+7	0.20
2	Opeka	5.800e+6	0.20	16.50	1.000e-5	3.150e+7	0.20

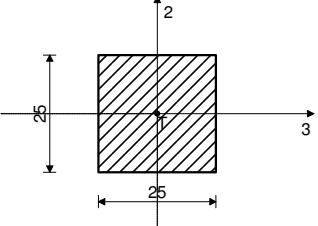
Setovi ploča

No	d[m]	e[m]	Materijal	Tip proračuna	Ortotropija	E2[kN/m ²]	G[kN/m ²]	α
<1>	0.120	0.060	1	Tanka ploča	Izotropna			
<2>	0.200	0.100	1	Tanka ploča	Izotropna			
<3>	0.350	0.175	1	Tanka ploča	Izotropna			

Setovi greda

Set: 1 Presek: b/d=25/25, Fiktivna ekscentričnost

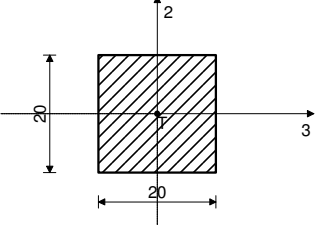
Mat.	A1	A2	A3	I1	I2	I3
1 - Beton MB 30	6.250e-2	5.208e-2	5.208e-2	5.501e-4	3.255e-4	3.255e-4



[cm]

Set: 4 Presek: b/d=20/20, Fiktivna ekscentričnost

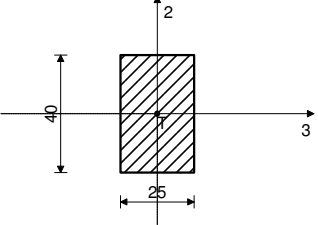
Mat.	A1	A2	A3	I1	I2	I3
1 - Beton MB 30	4.000e-2	3.333e-2	3.333e-2	2.253e-4	1.333e-4	1.333e-4



[cm]

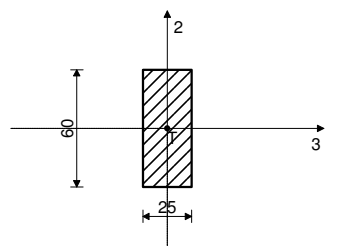
Set: 5 Presek: b/d=25/40, Fiktivna ekscentričnost

Mat.	A1	A2	A3	I1	I2	I3
1 - Beton MB 30	1.000e-1	8.333e-2	8.333e-2	1.273e-3	5.208e-4	1.333e-3



[cm]

Set: 7 Presek: b/d=25/60, Fiktivna ekscentričnost

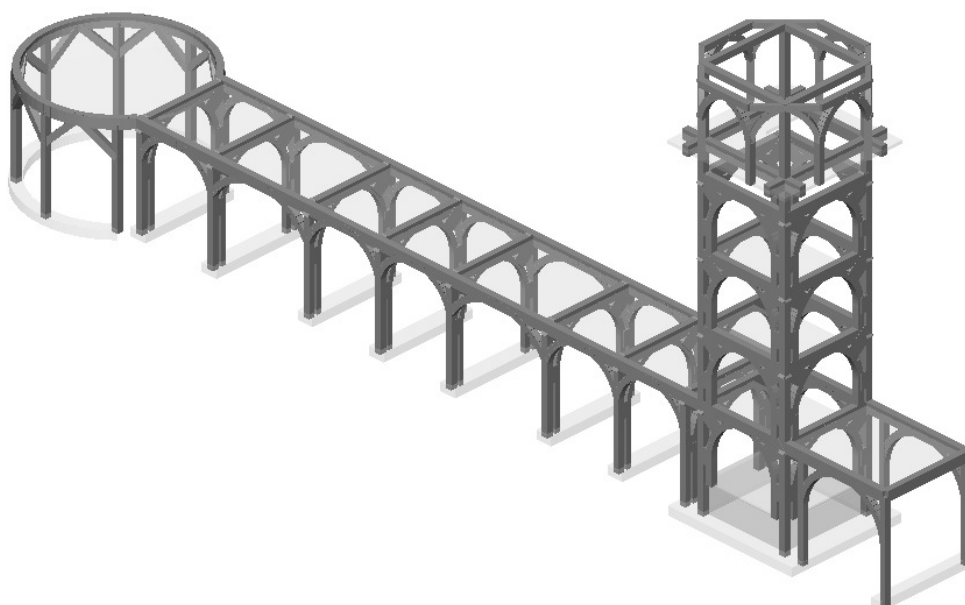


[cm]

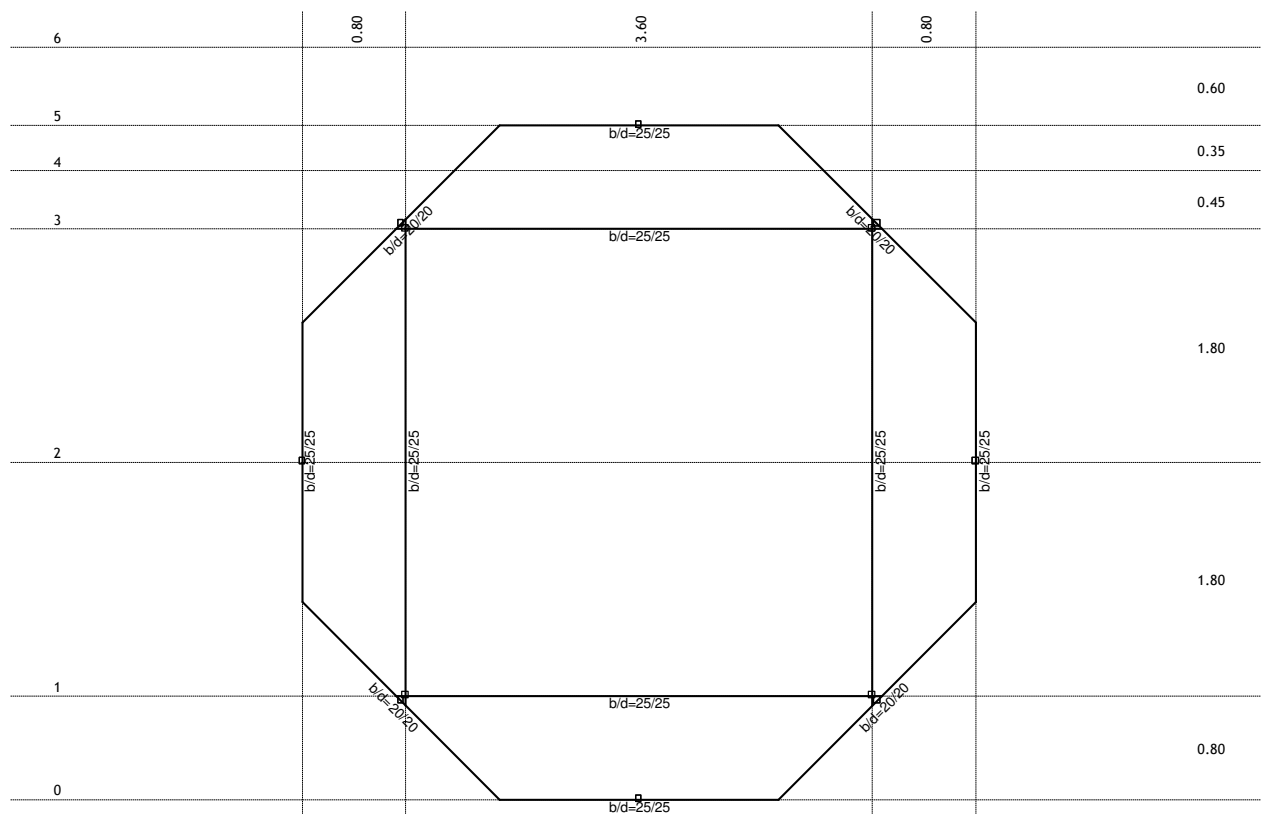
Mat.	A1	A2	A3	I1	I2	I3
2 - Opeka	1.500e-1	1.250e-1	1.250e-1	2.307e-3	7.812e-4	4.500e-3

Setovi površinskih oslonaca

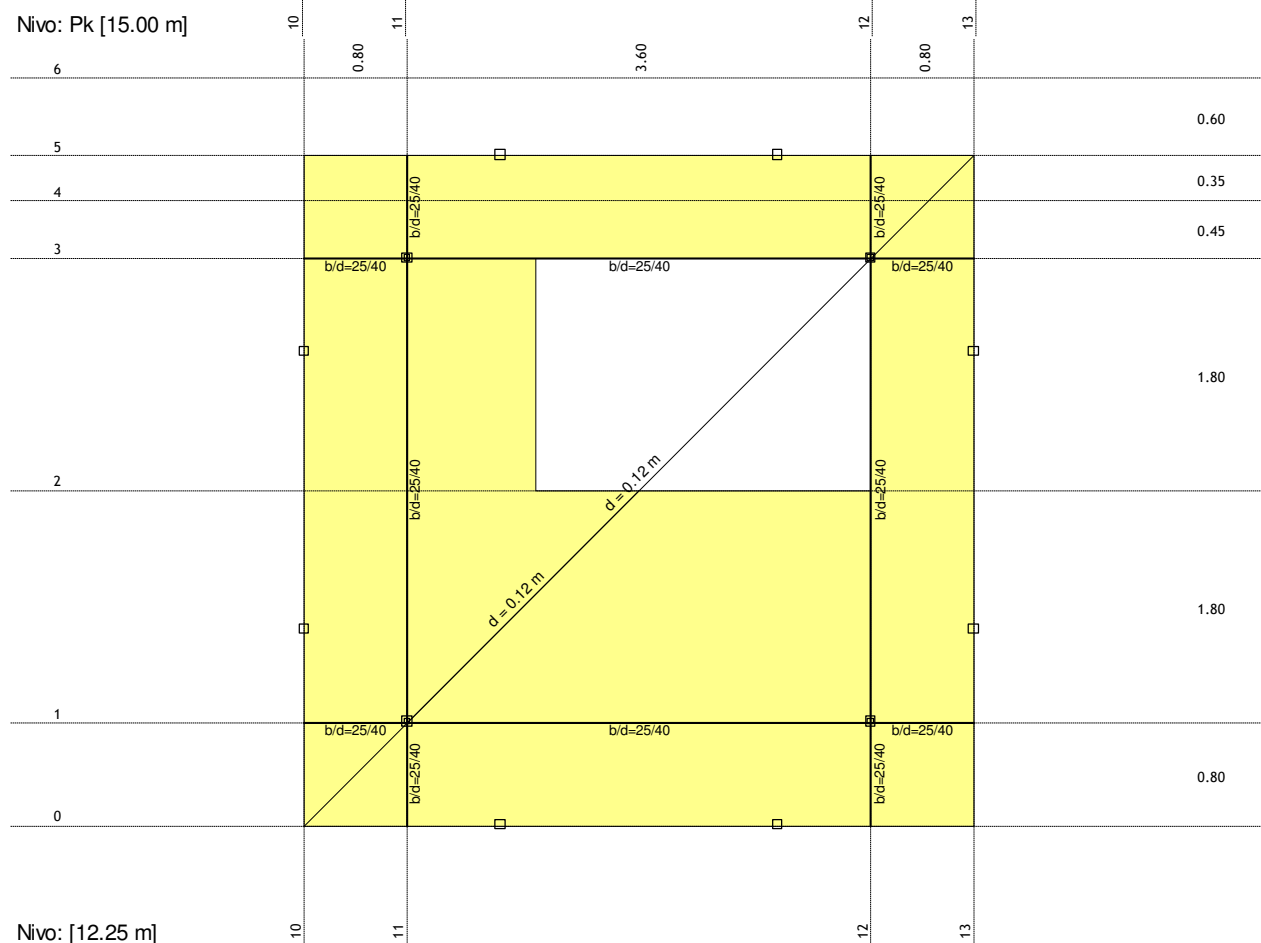
Set	K,R1	K,R2	K,R3
1	4.500e+3	4.500e+3	4.500e+3



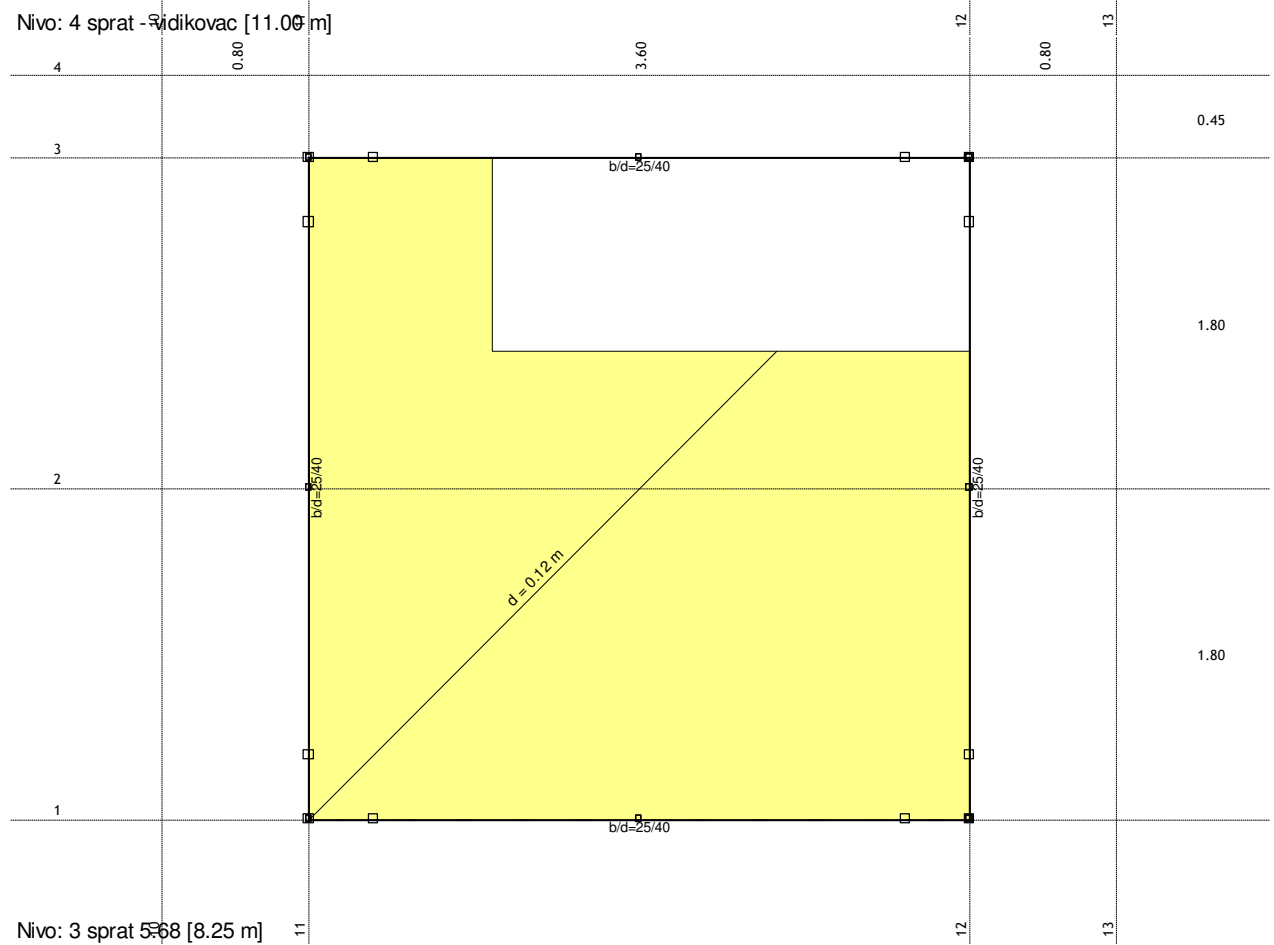
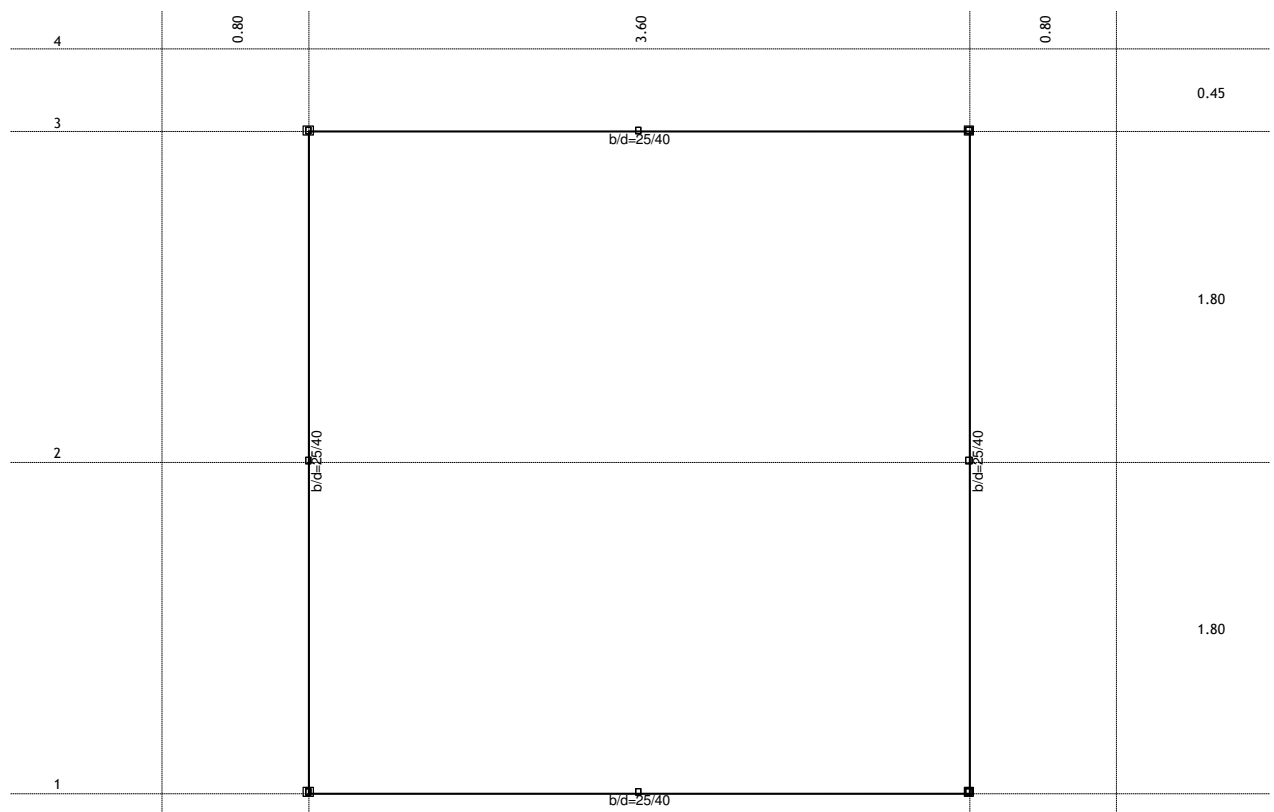
Izometrija (Top)

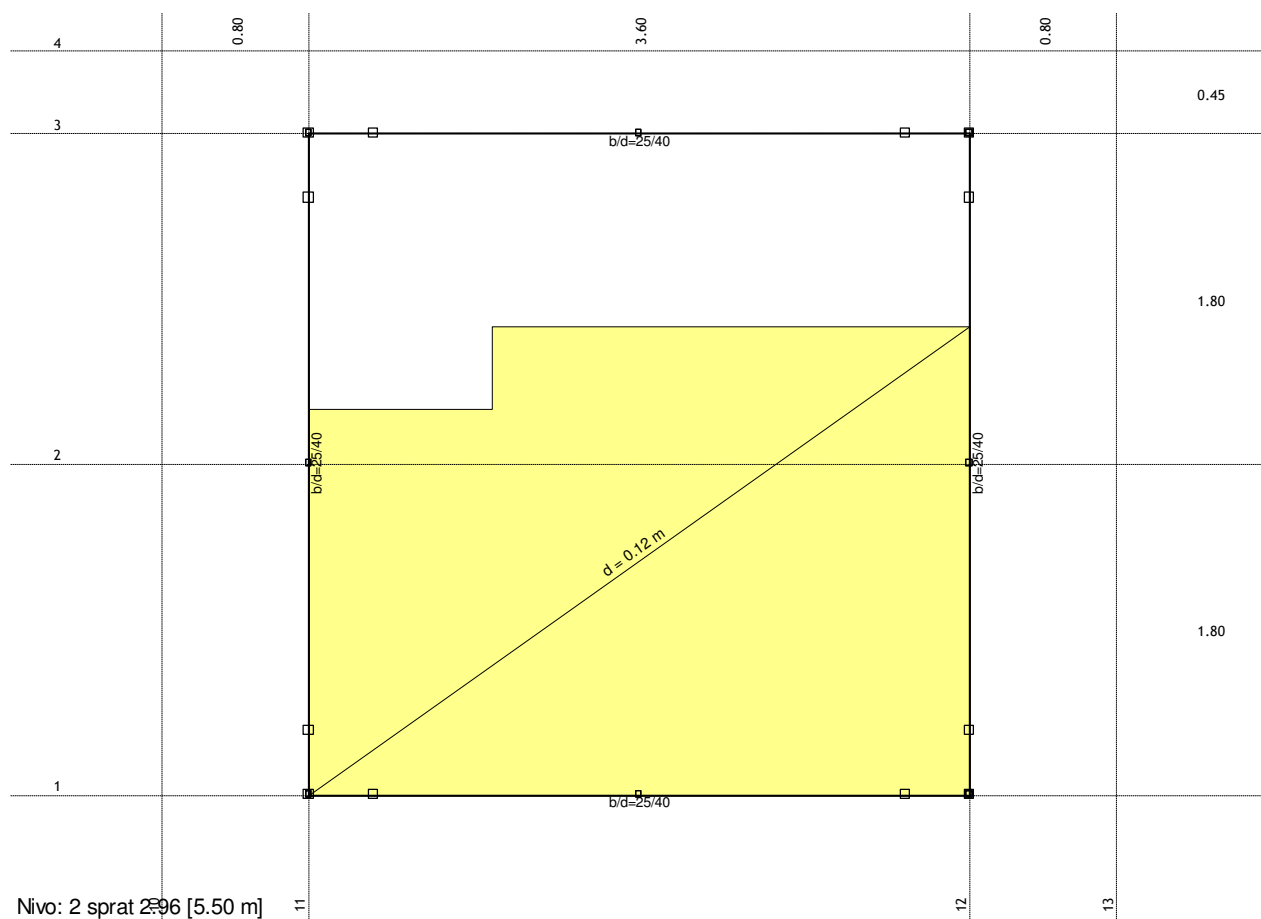


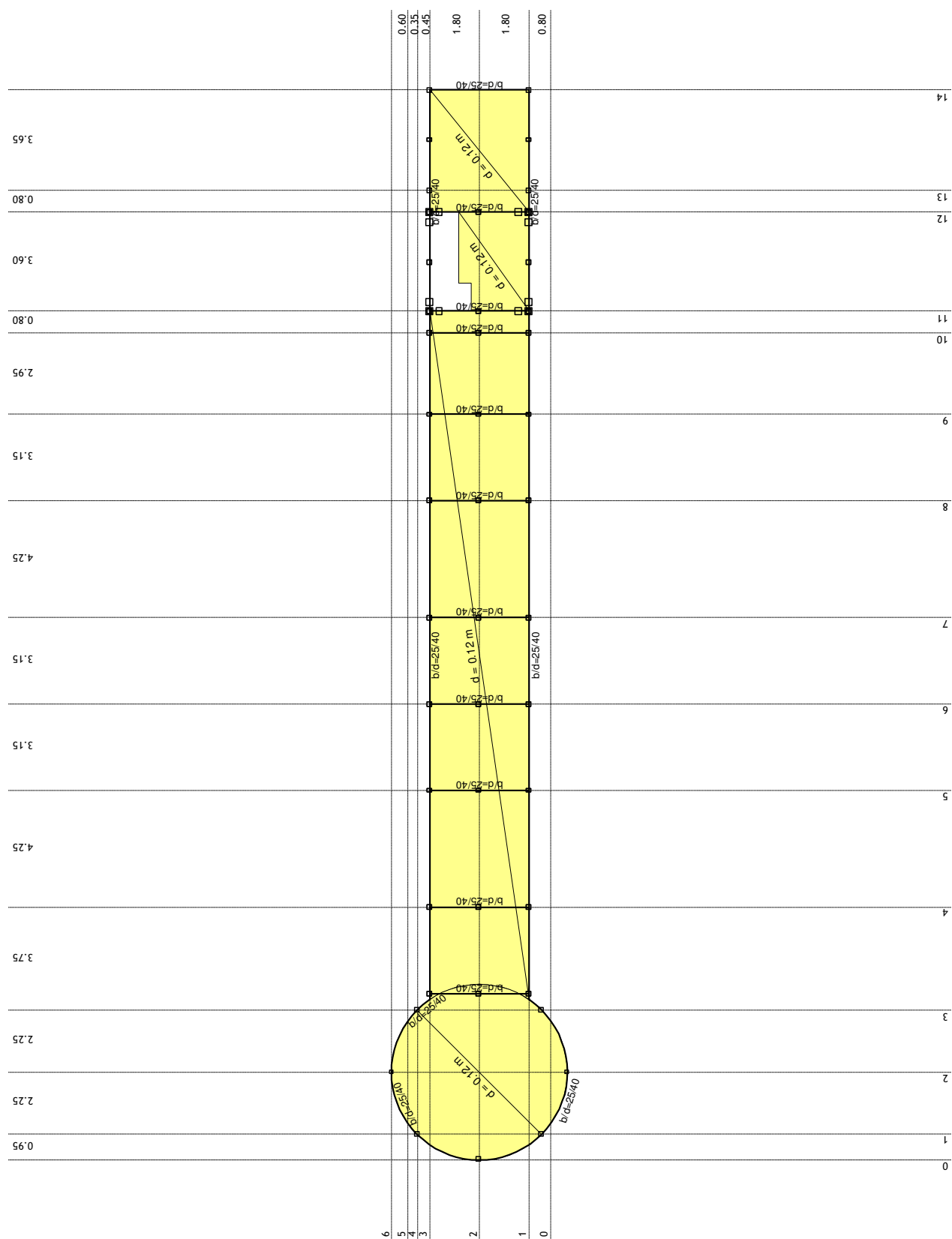
Nivo: Pk [15.00 m]



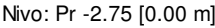
Nivo: [12.25 m]



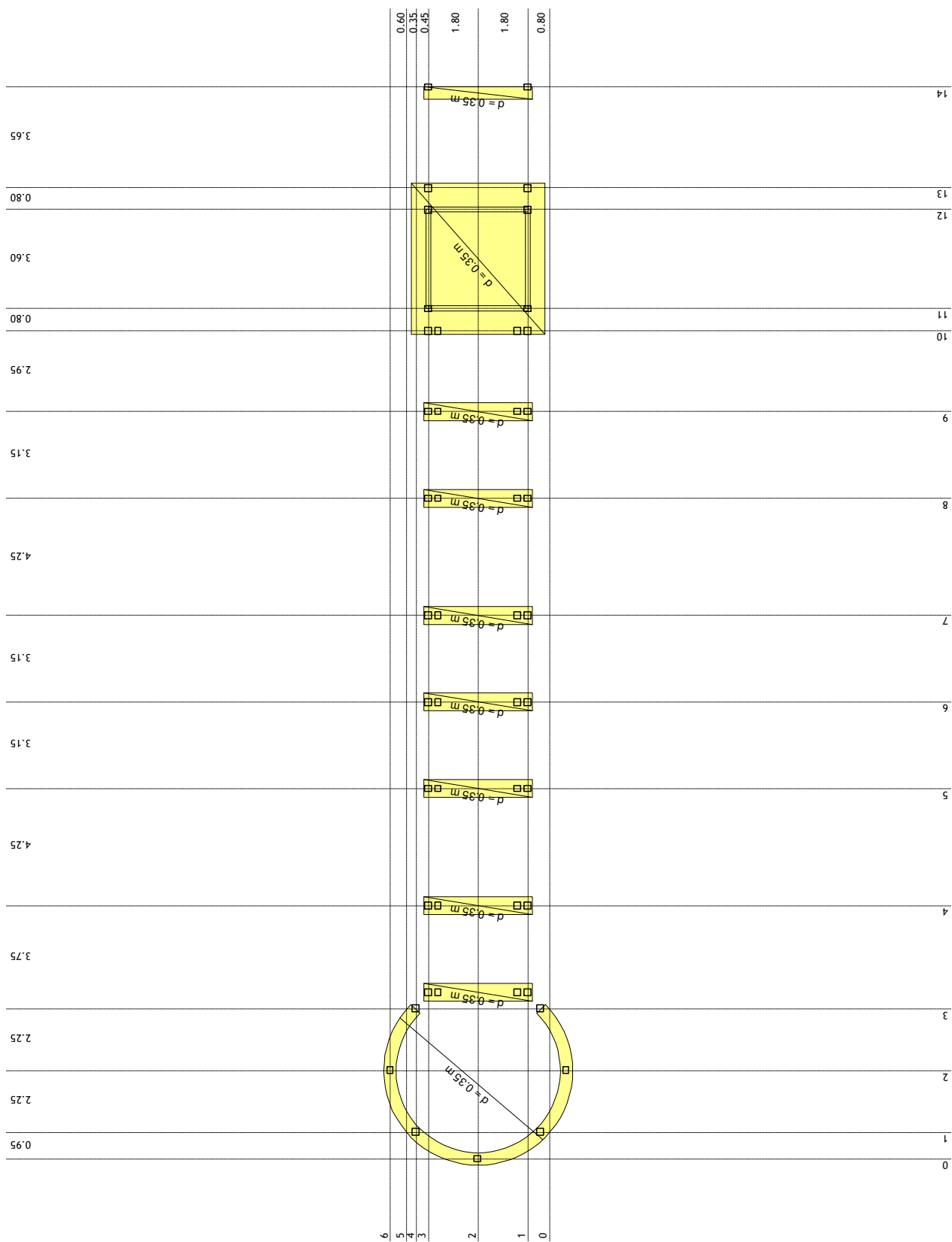




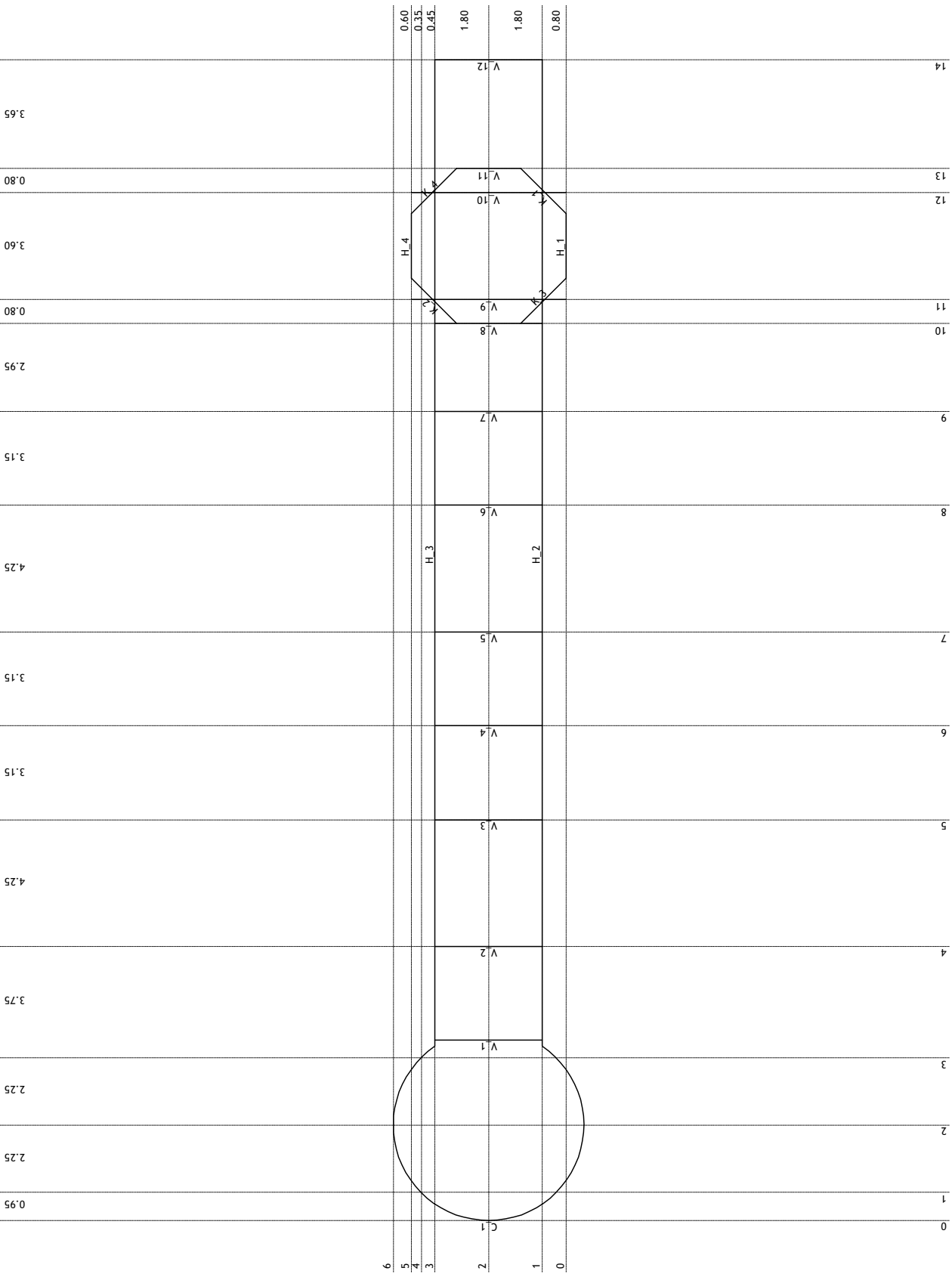
Nivo: 1 sprat 0.00 [2.75 m]



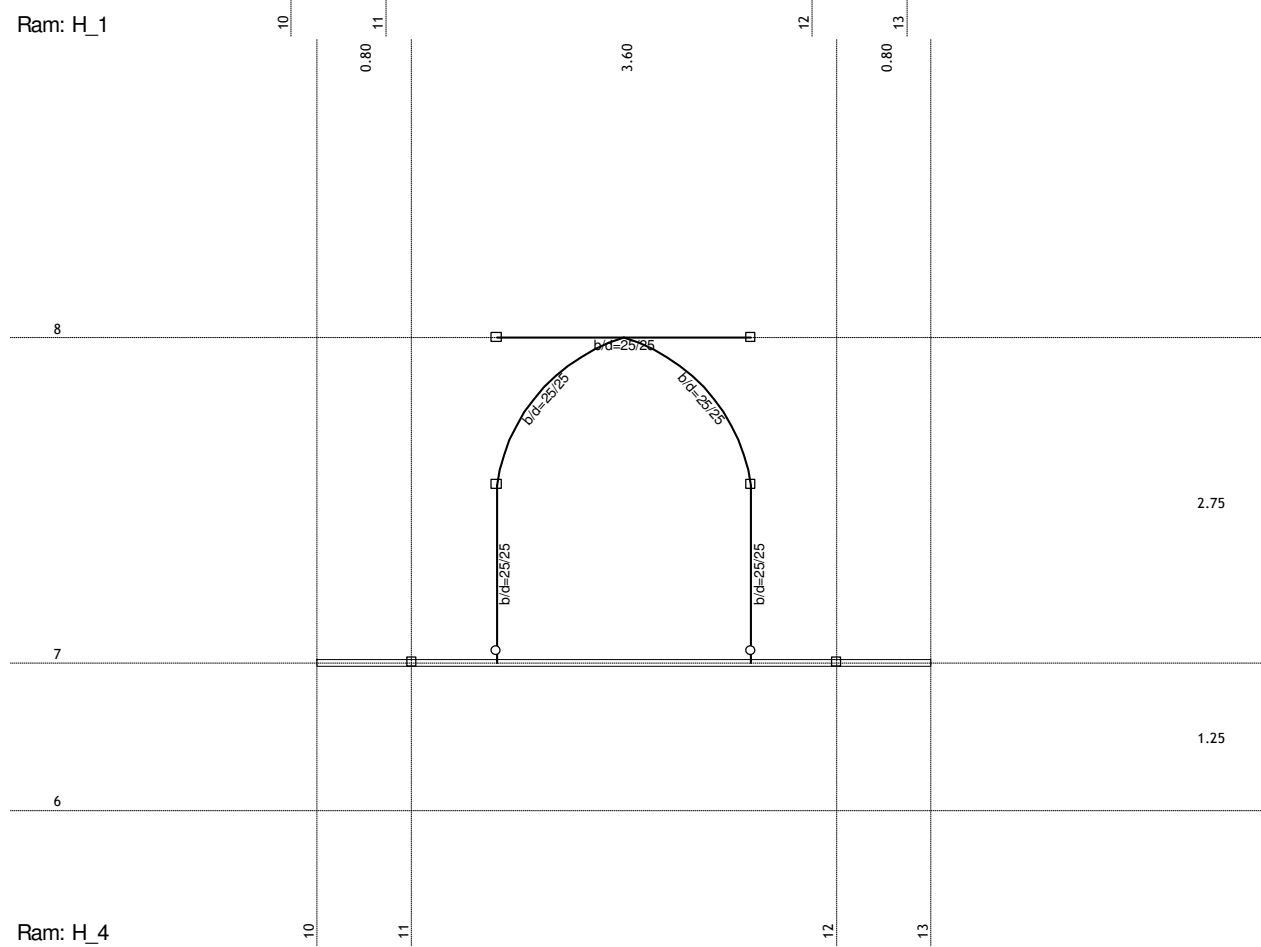
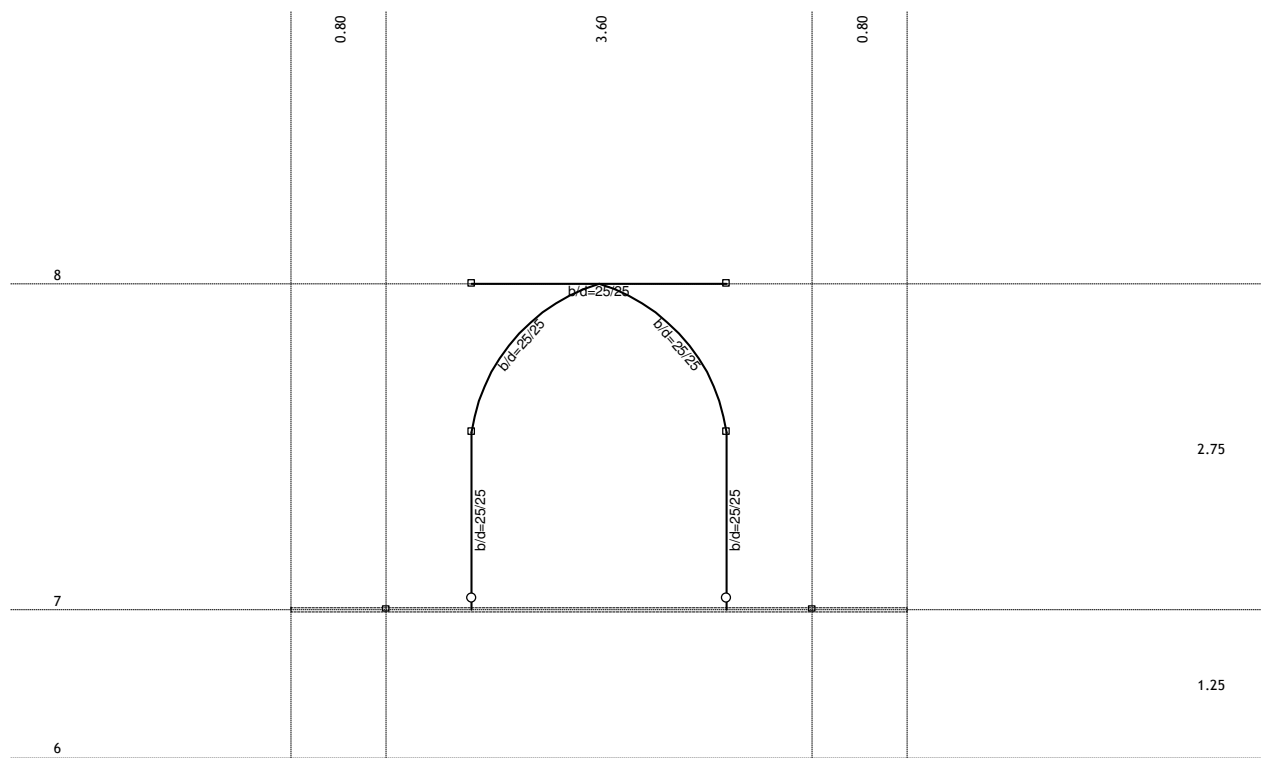
Nivo: Pr -2.75 [0.00 m]

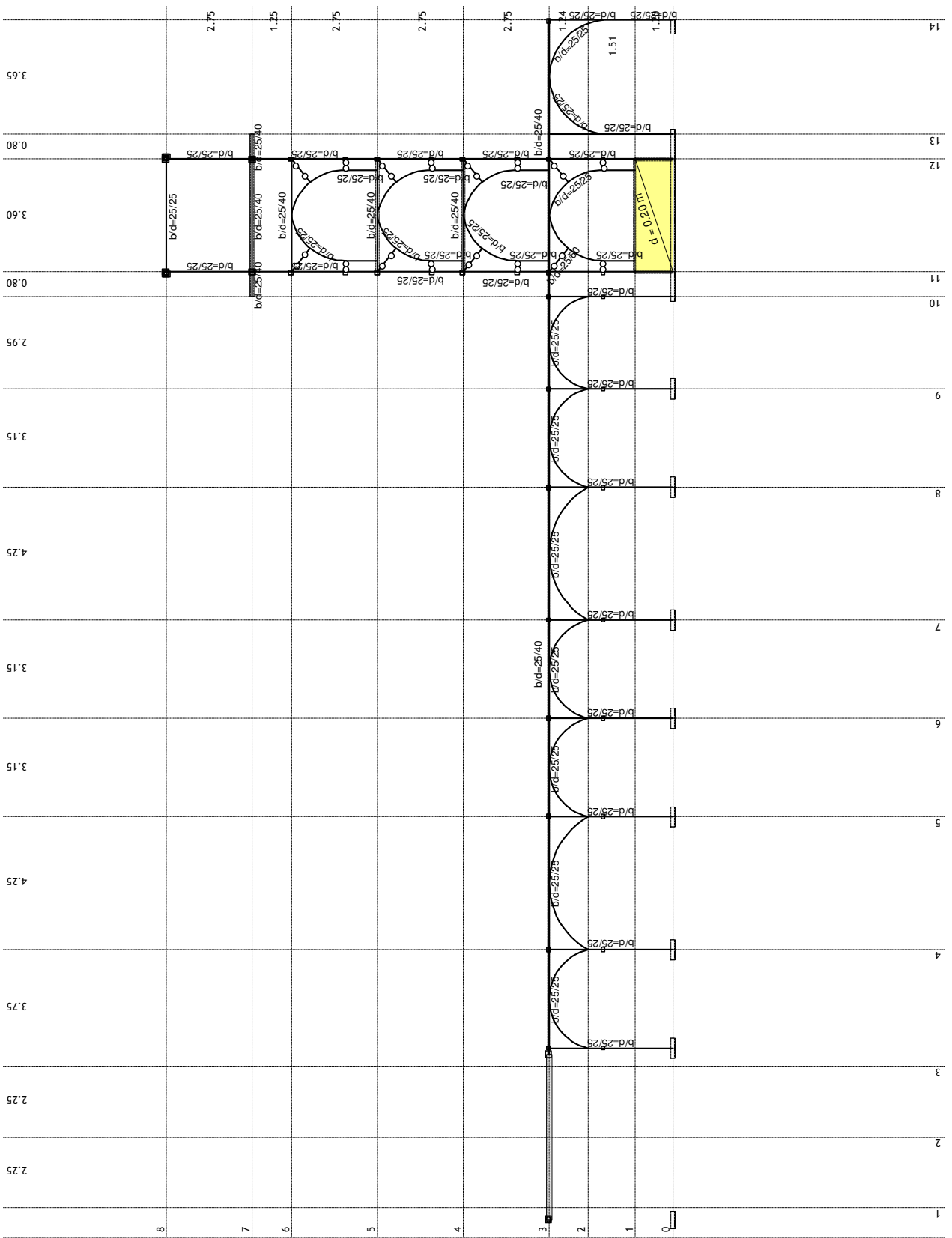


Nivo: Temelji [-1.20 m]

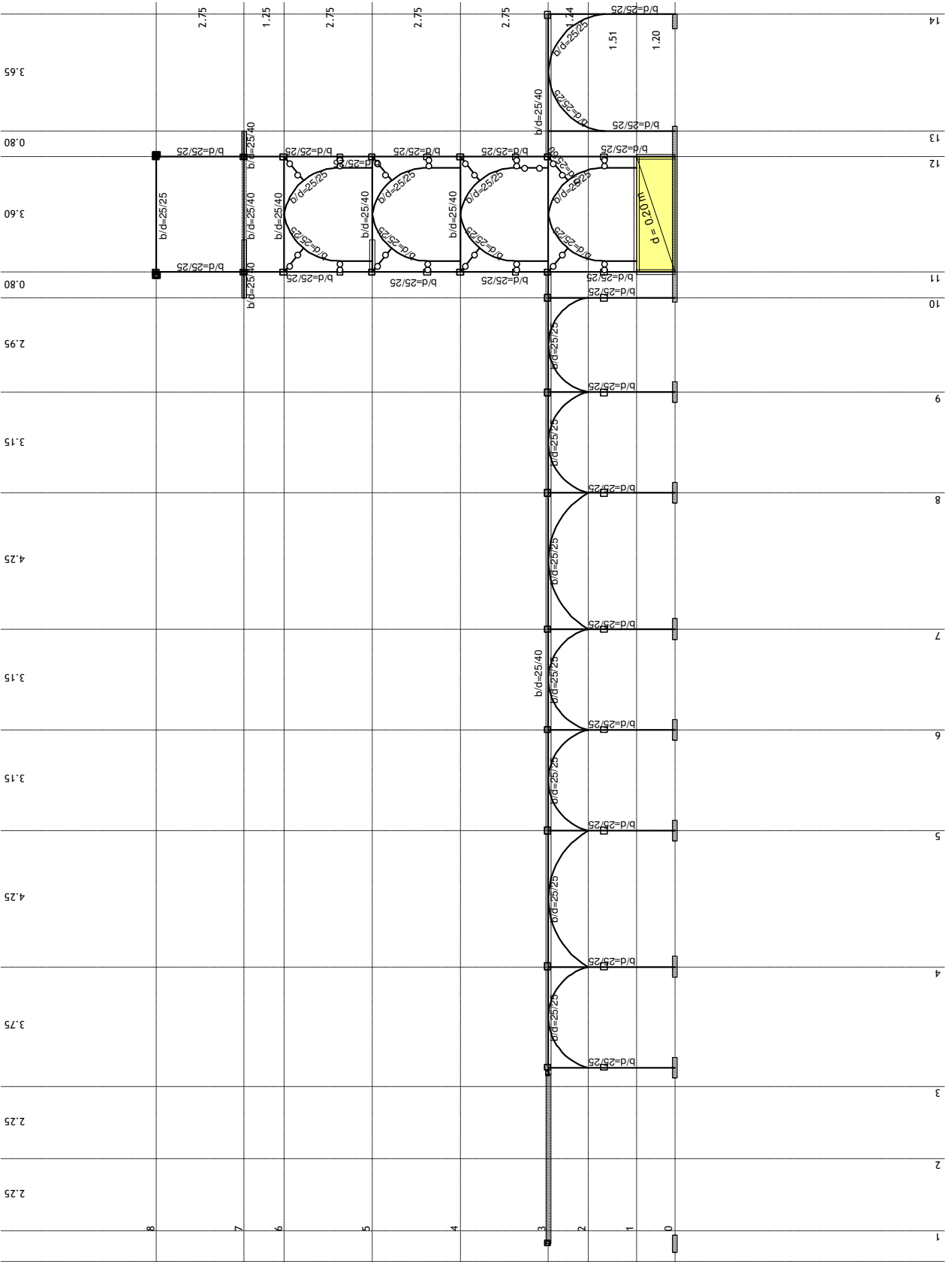


Dispozicija ramova



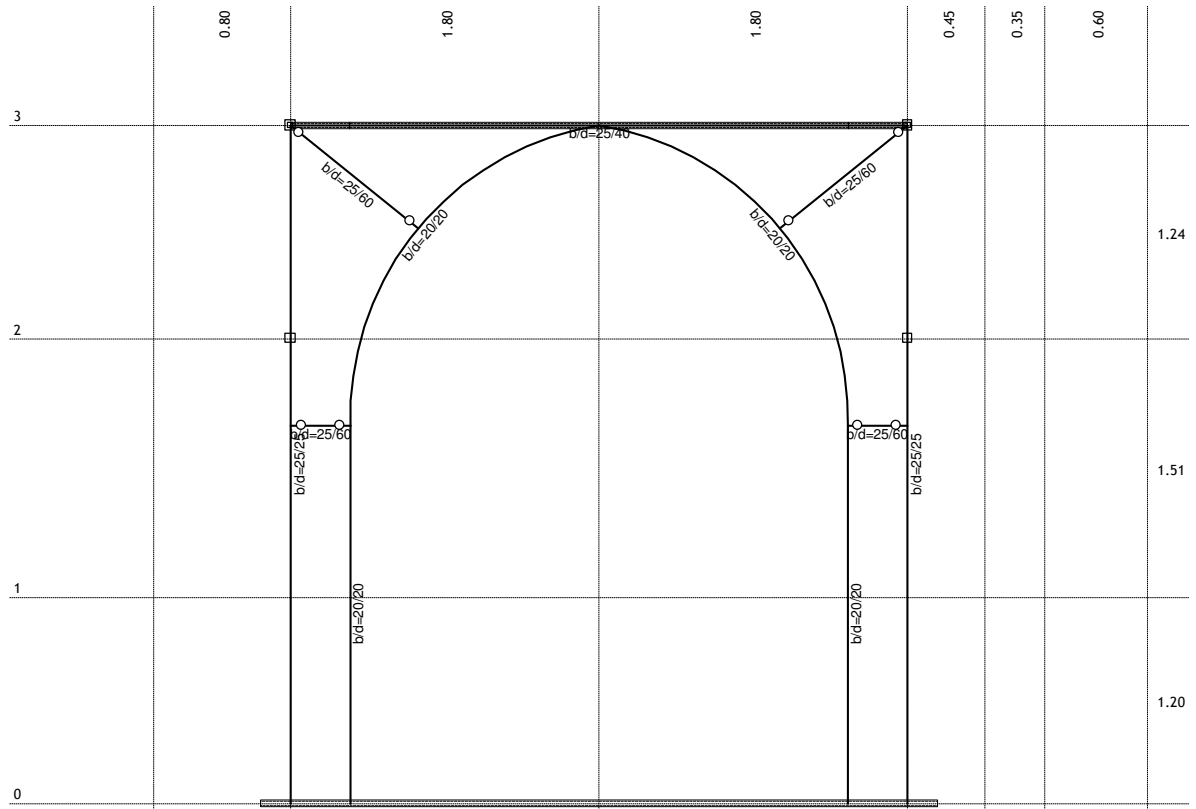


Ram: H_2

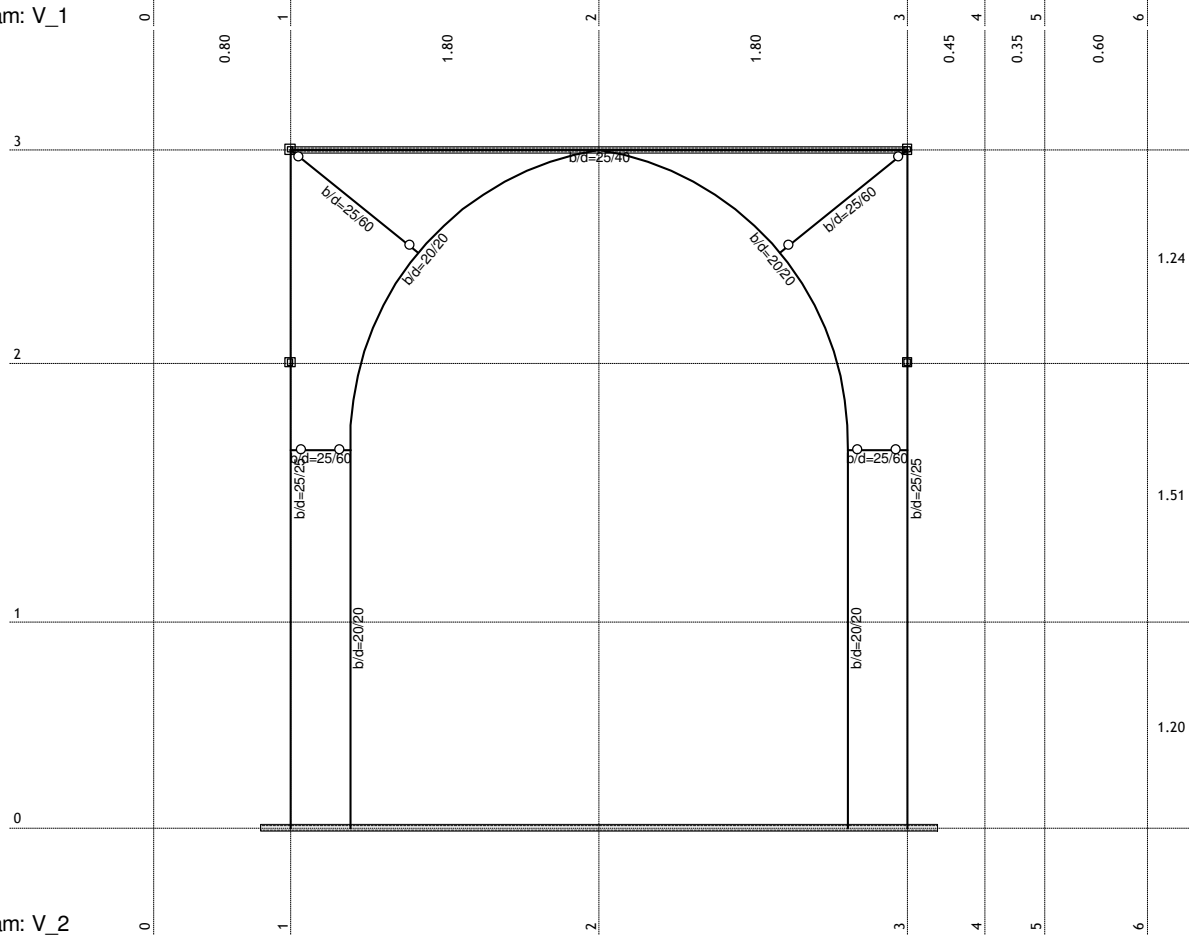


Ram: H_3

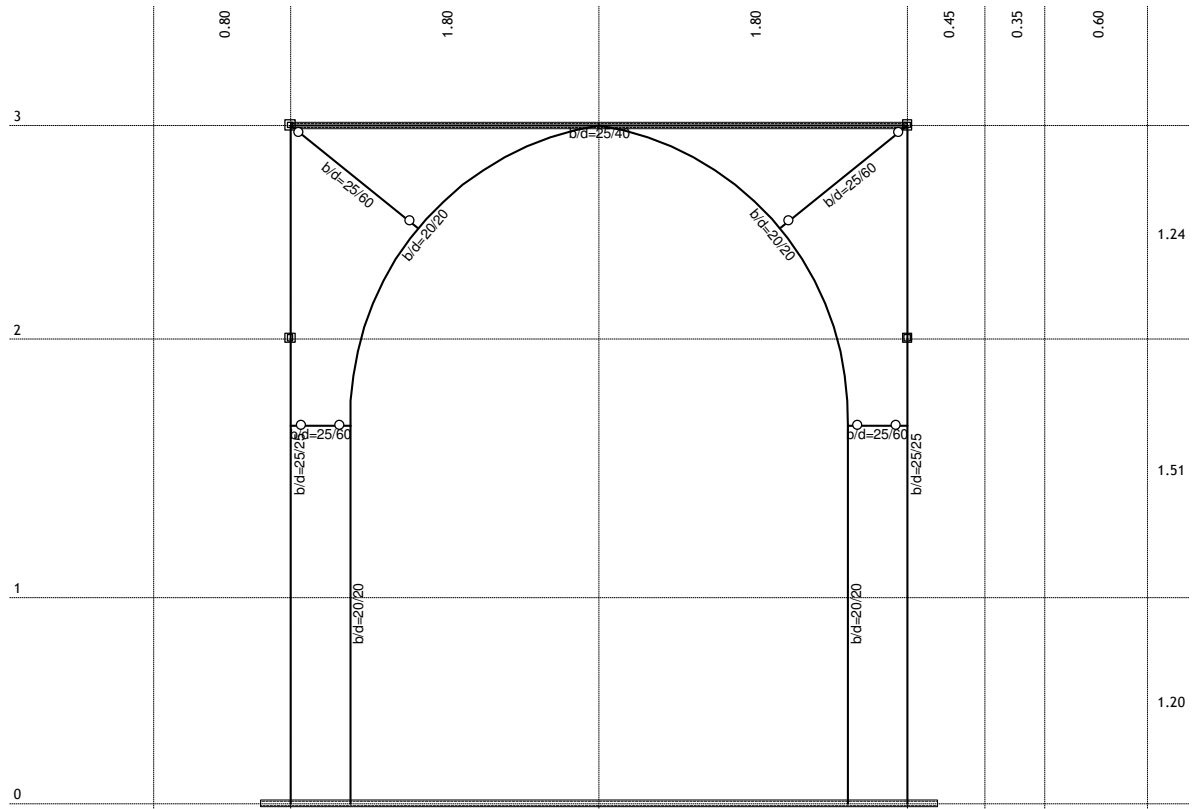
Ram: V_1



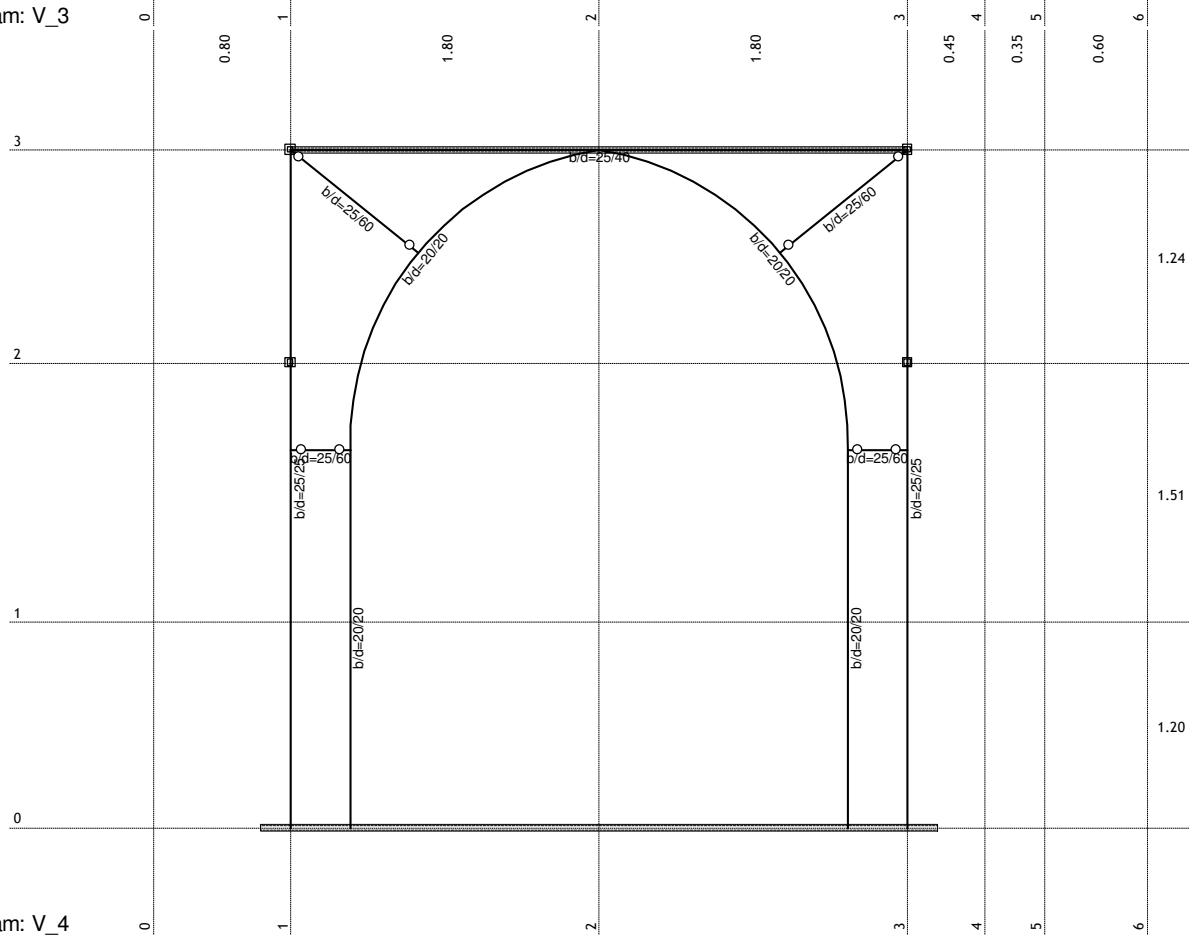
Ram: V_2



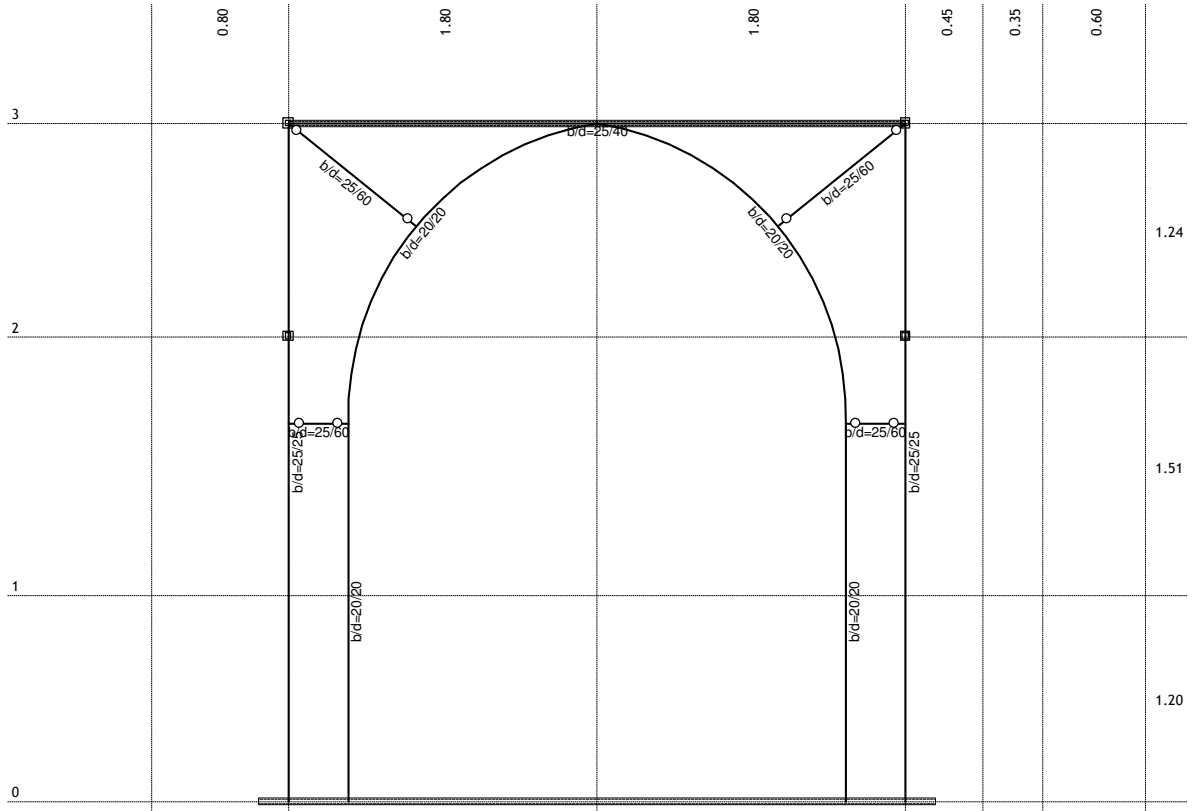
Ram: V_3



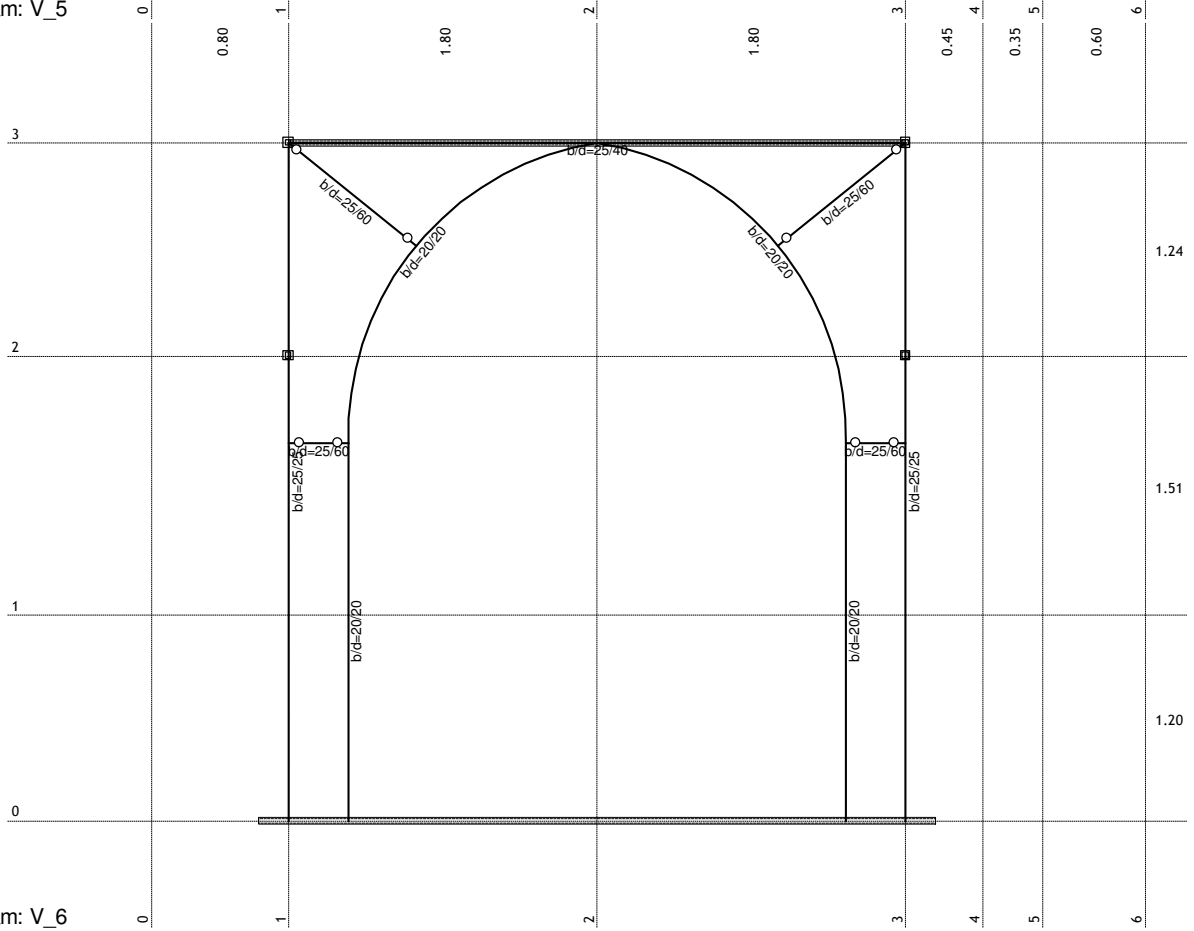
Ram: V_4



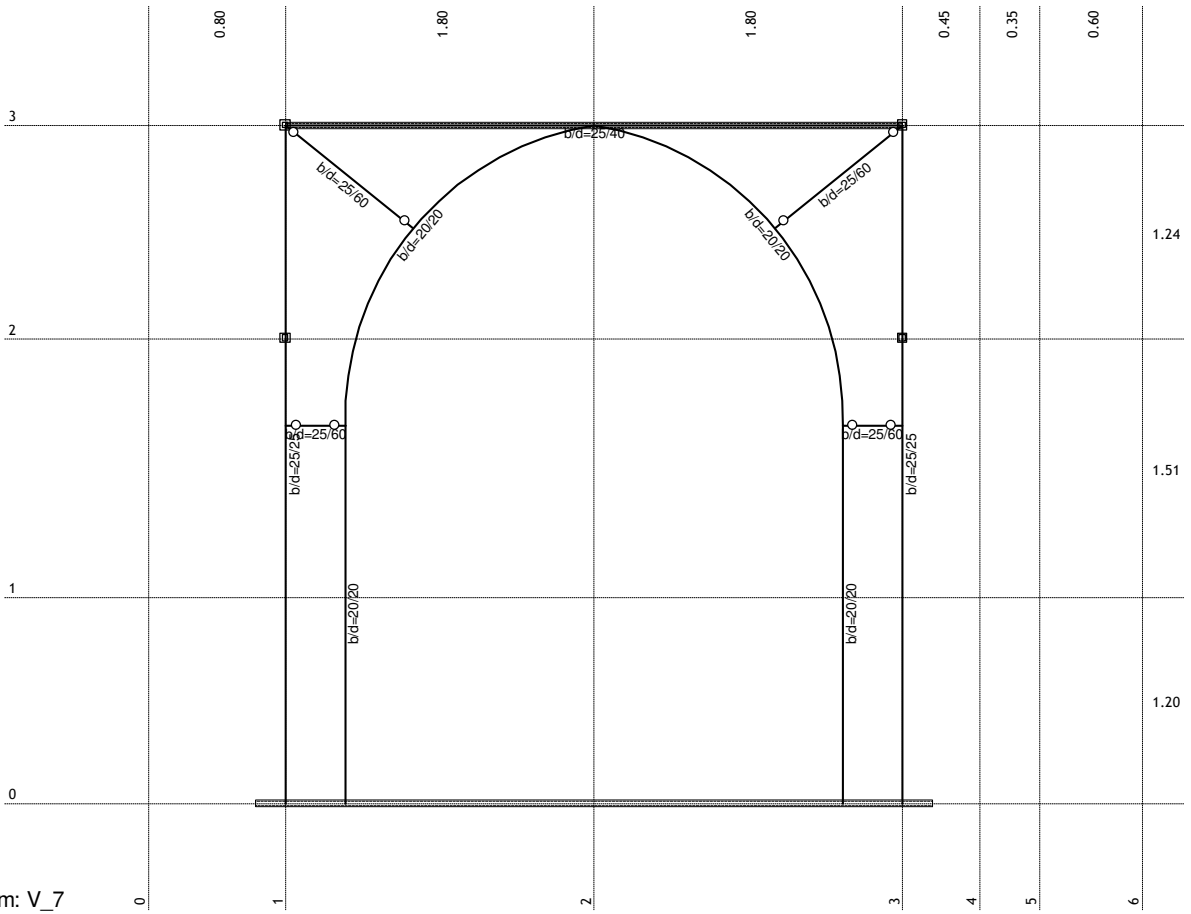
Ram: V_5

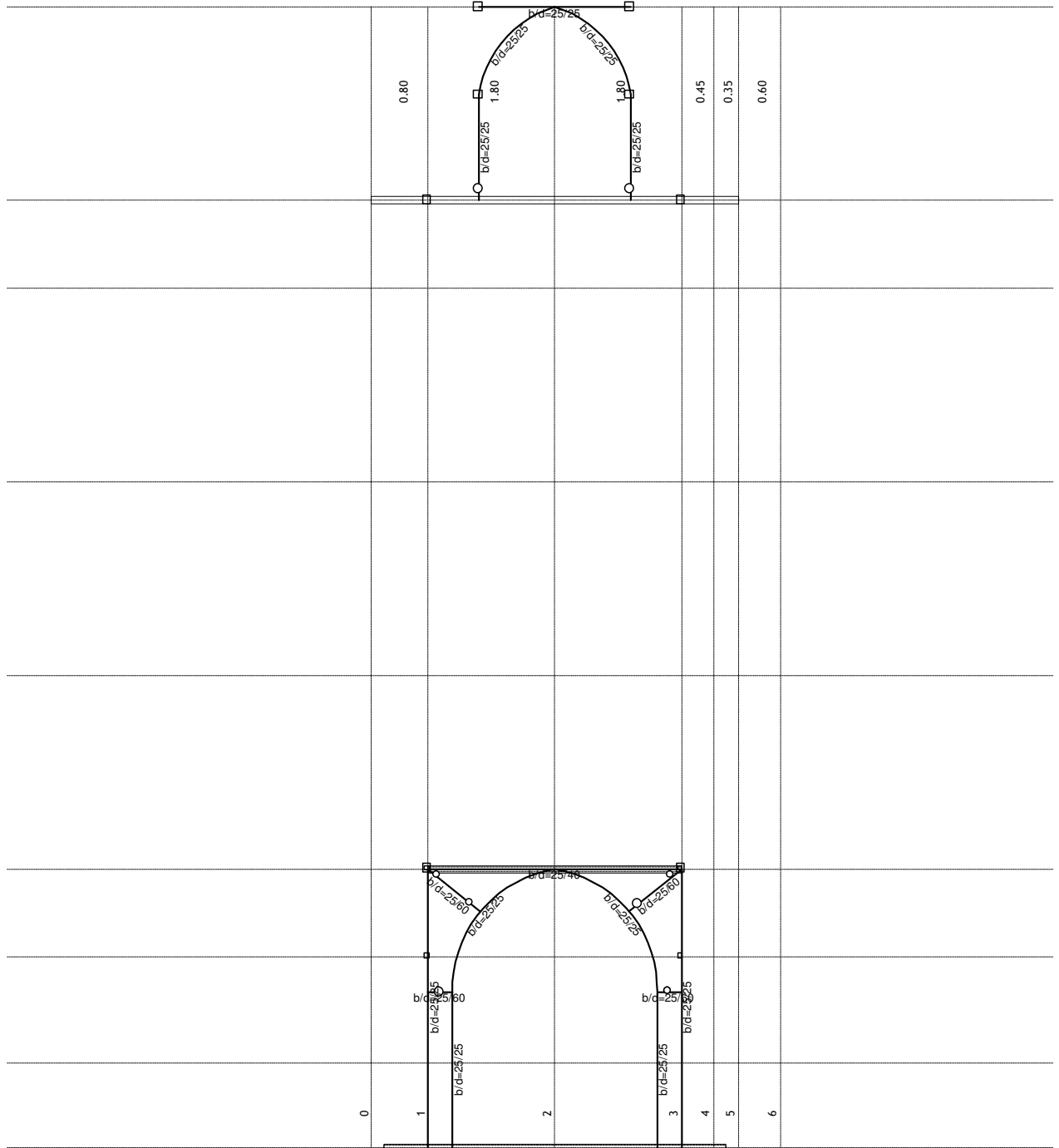


Ram: V_6



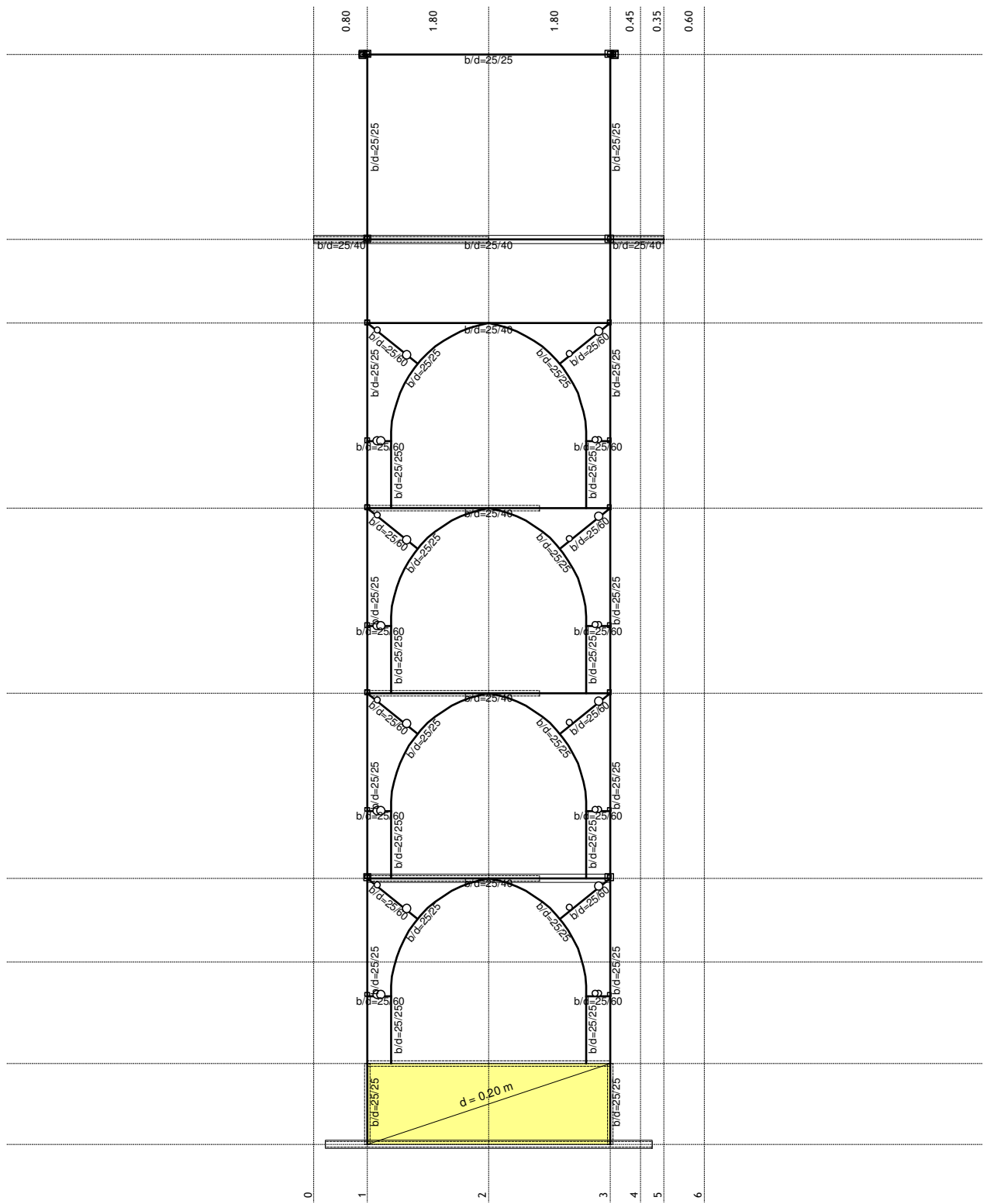
Ram: V_7



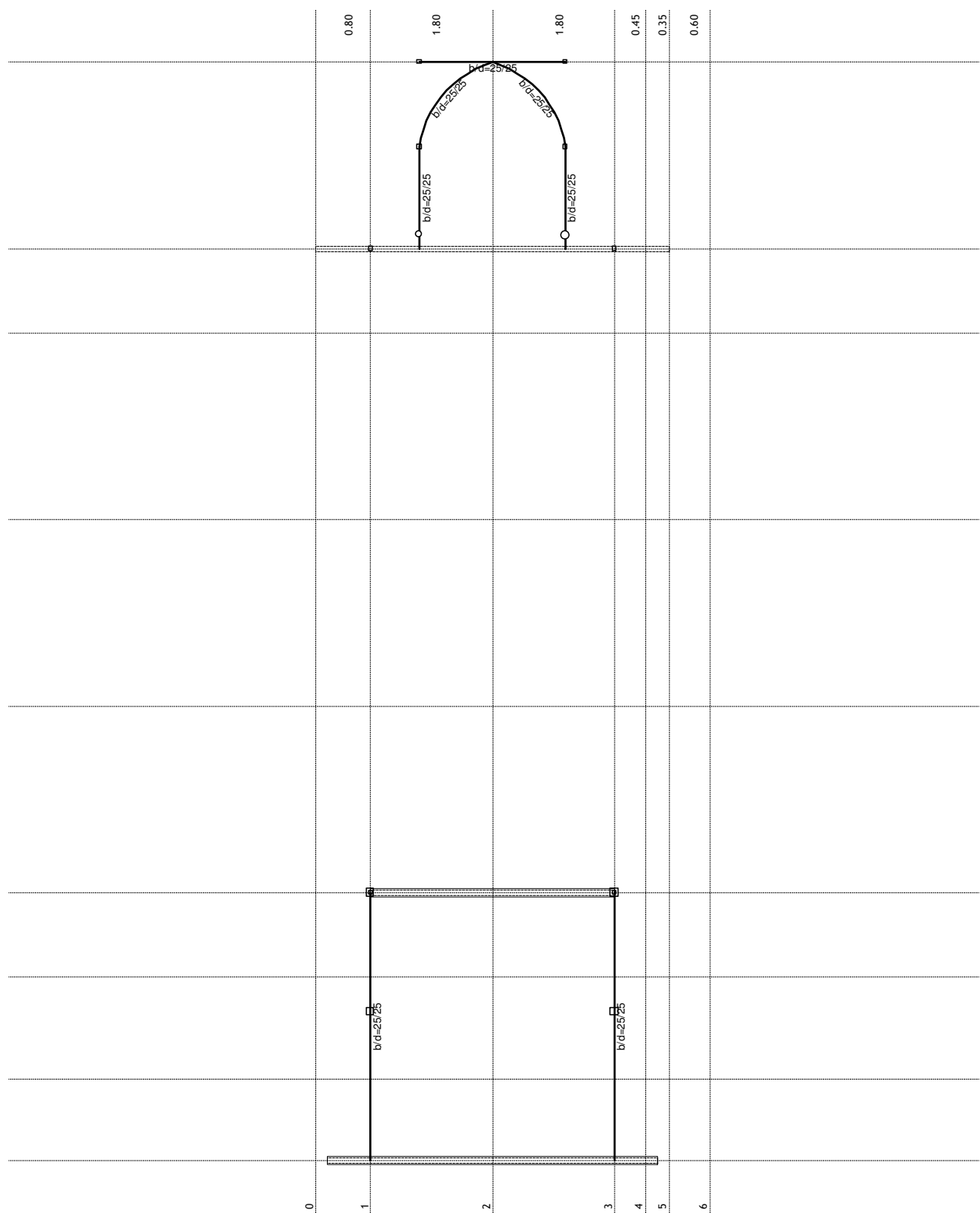


Ram: V_8



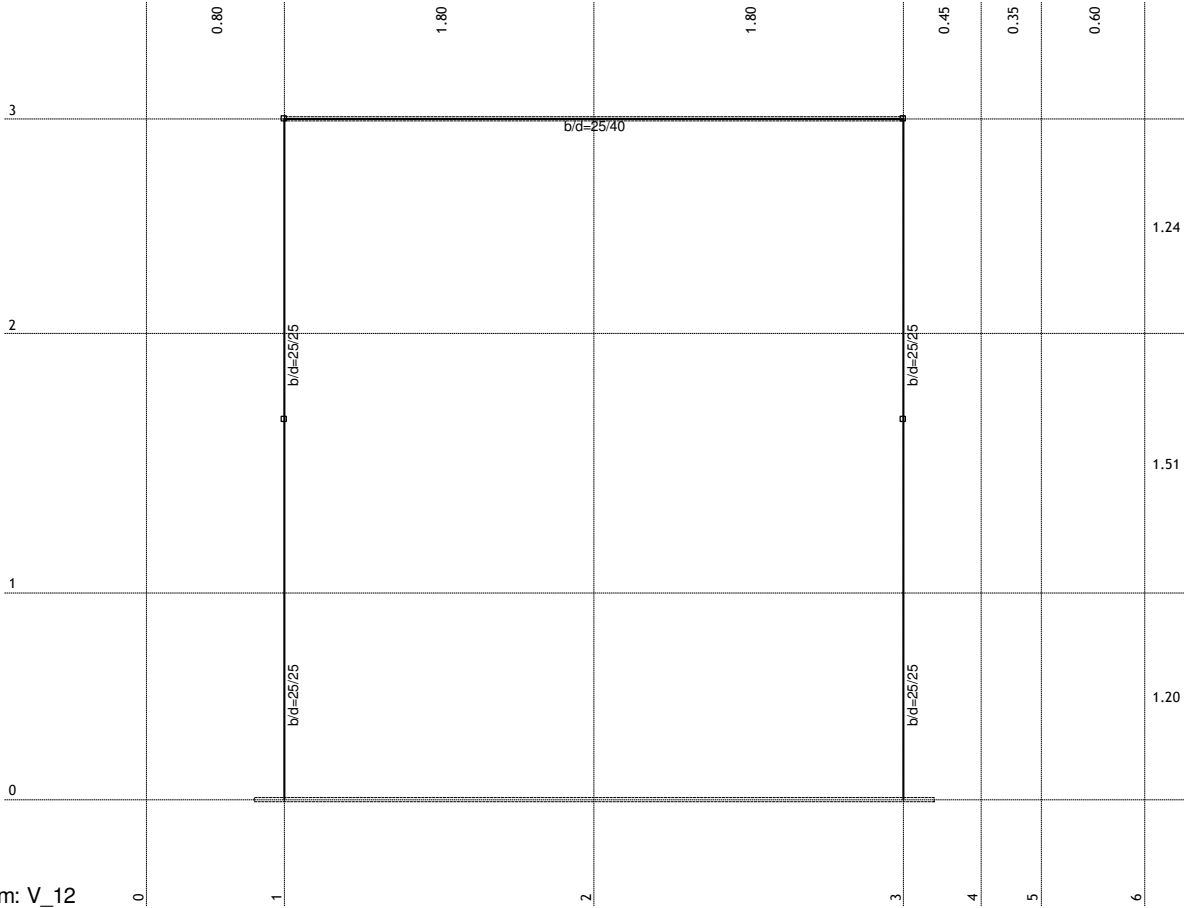


Ram: V_10



Ram: V_11

Ram: V_12

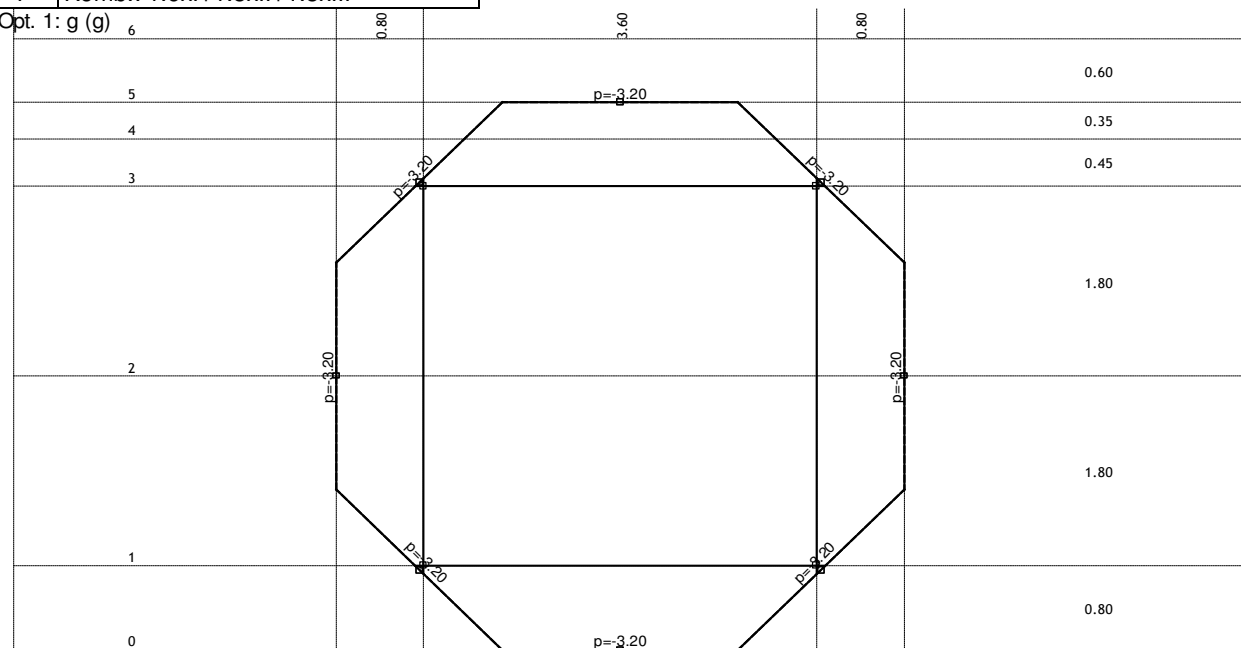


Ulazni podaci - Opterećenje

Lista slučajeva opterećenja

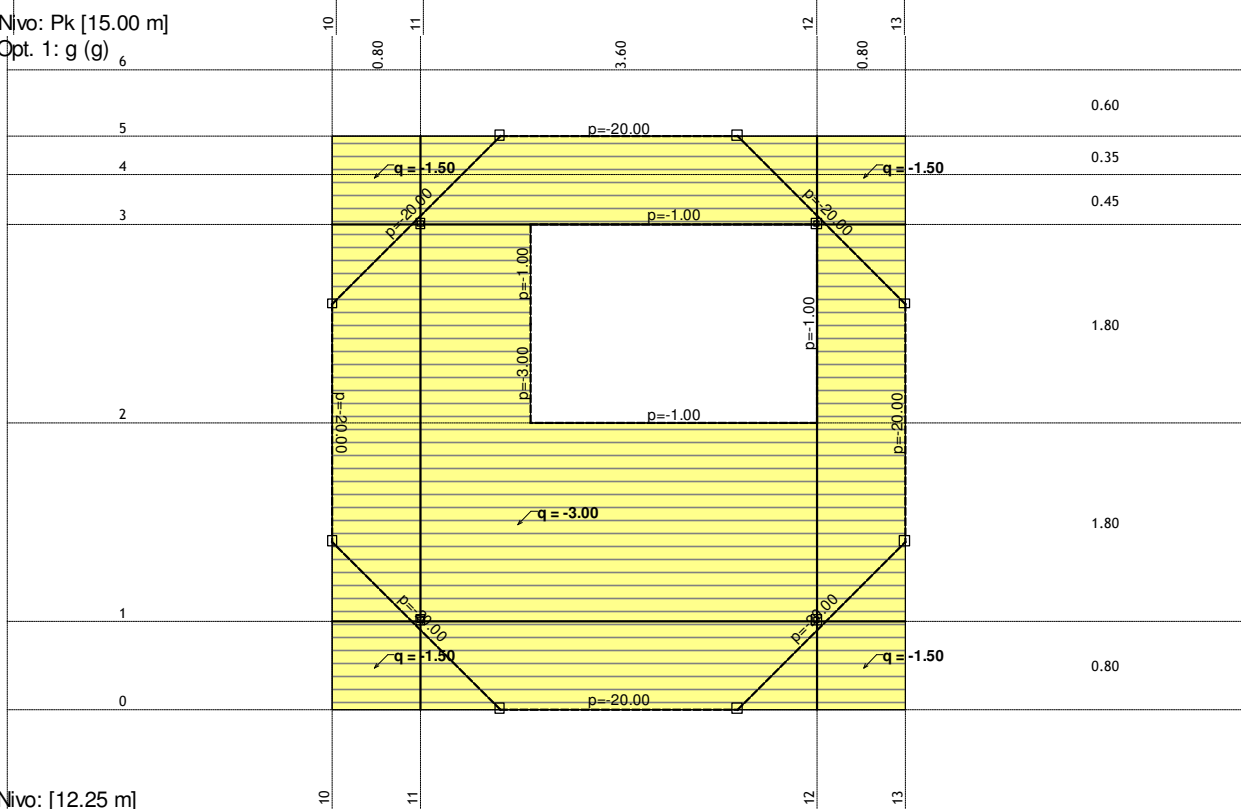
No	Naziv
1	g (g)
2	p
3	sneg
4	Sy
5	Sx
6	Komb.: I+II+III
7	Komb.: 1.6xI+1.8xII+1.8xIII

Opt. 1: g (g)

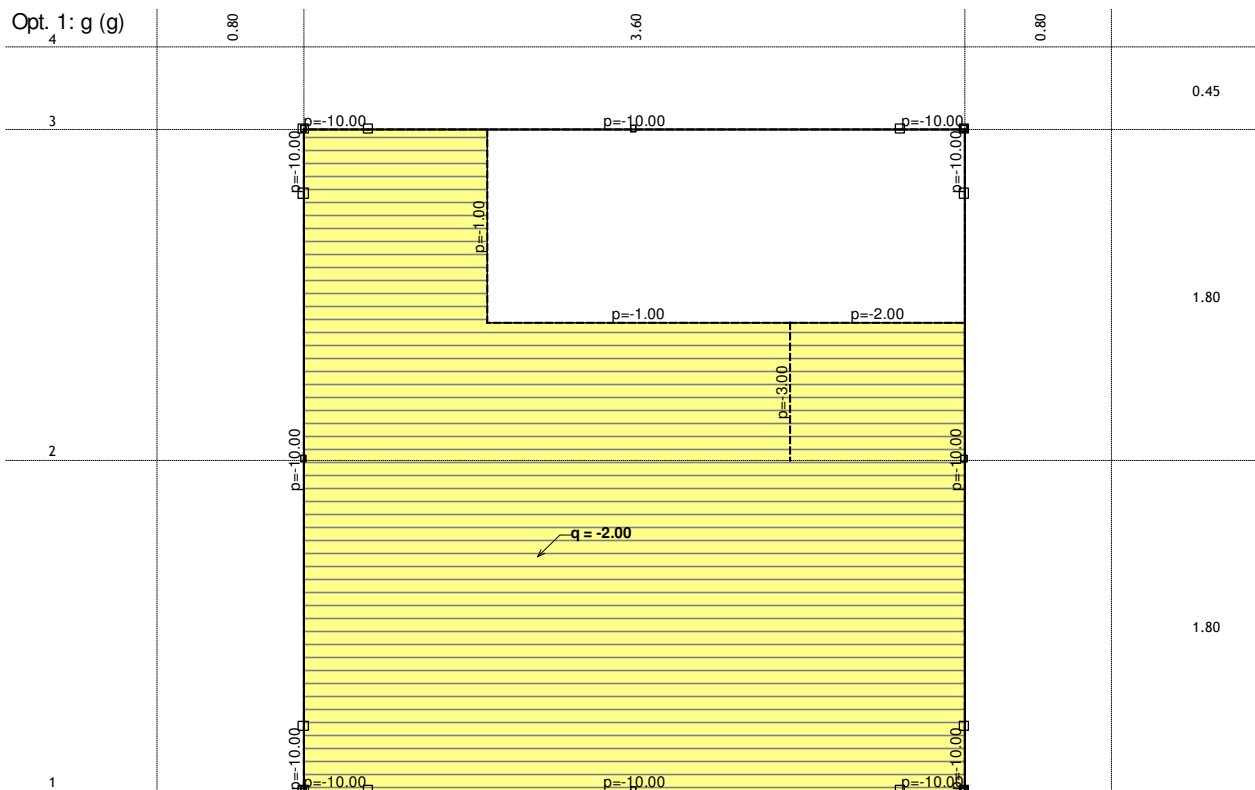


Nivo: Pk [15.00 m]

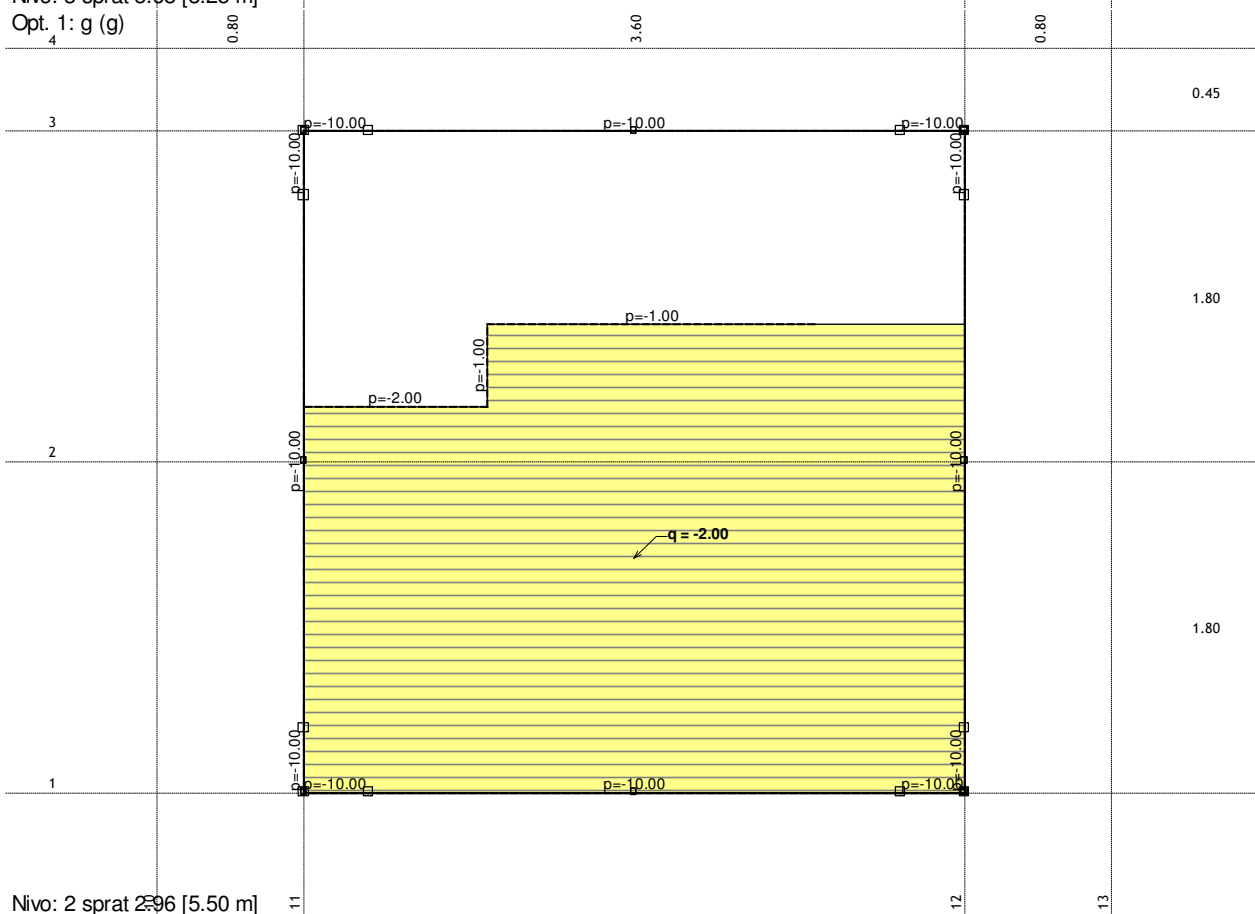
Opt. 1: g (g)



Nivo: [12.25 m]

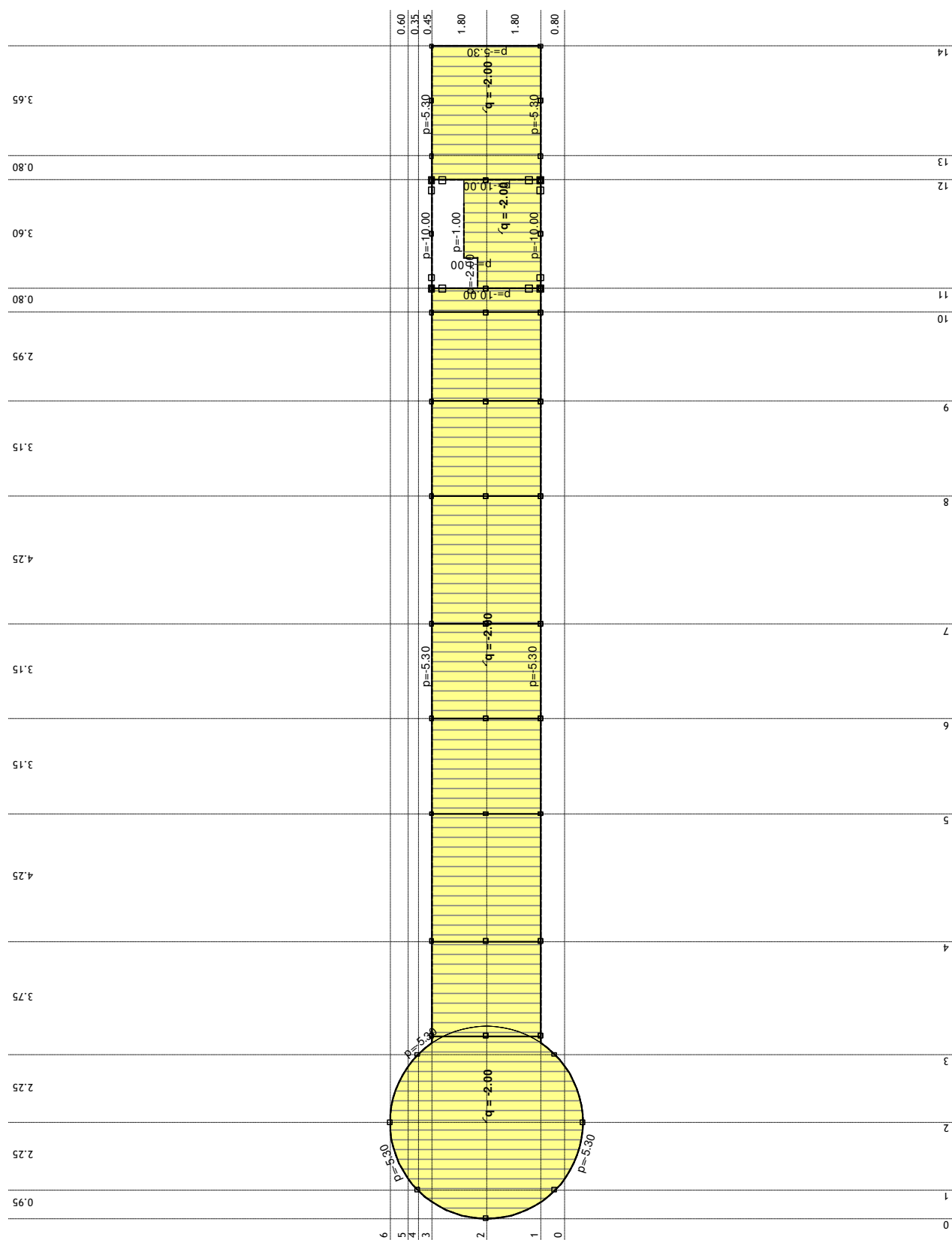


Nivo: 3 sprat 5.68 [8.25 m]

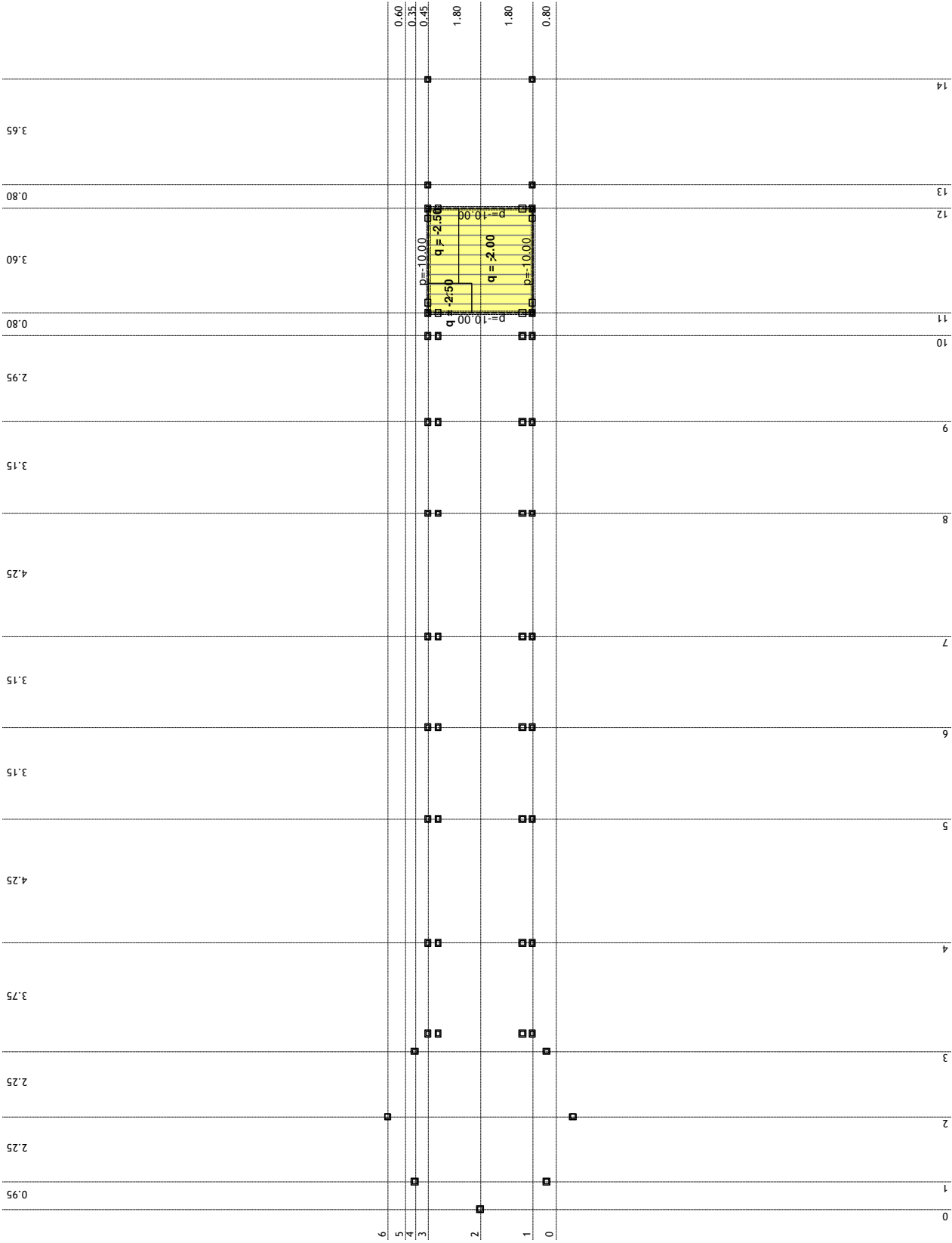


Nivo: 2 sprat 2.96 [5.50 m]

Nivo: 1 sprat 0.00 [2.75 m]

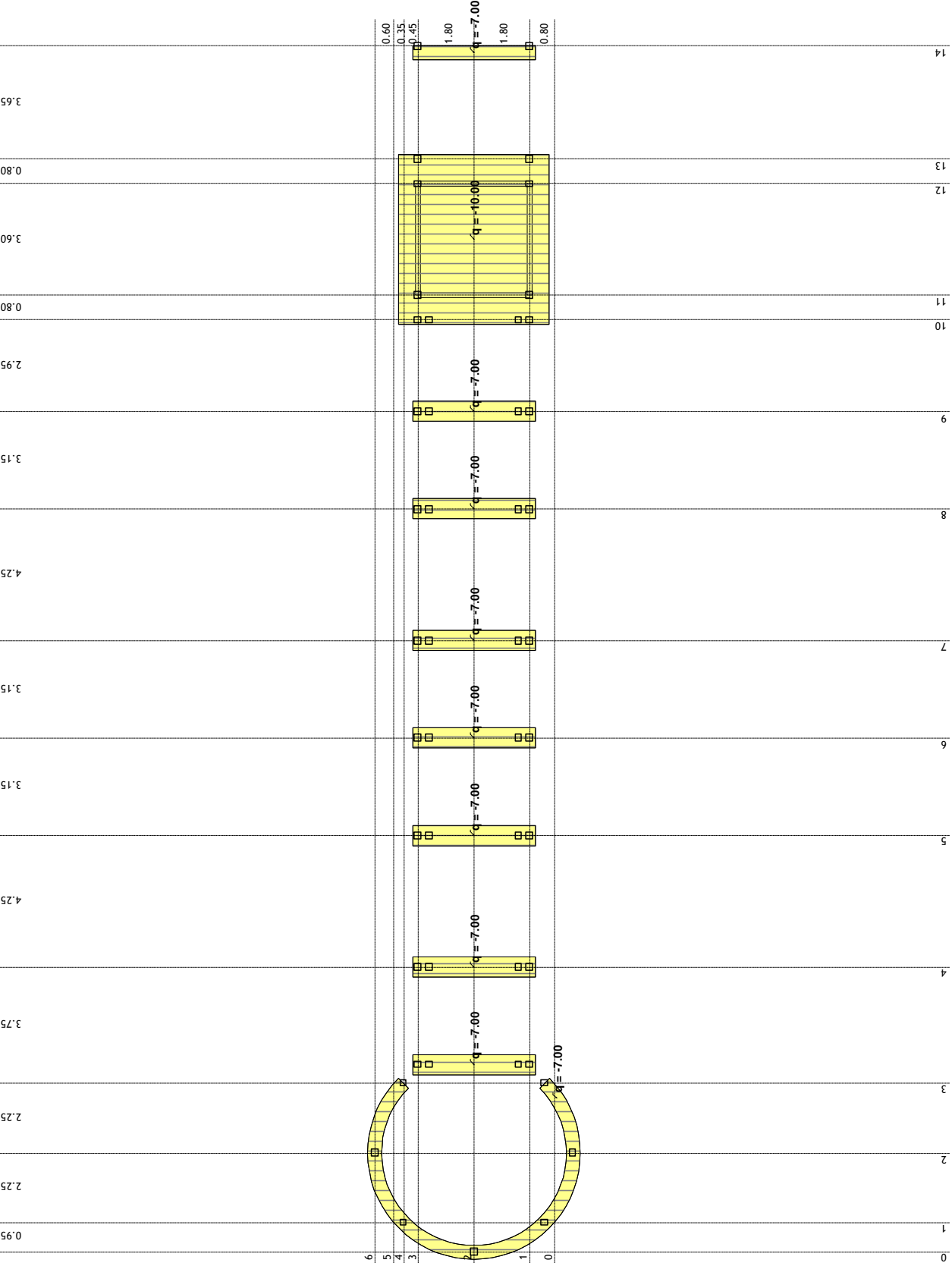


Opt. 1: g (g)



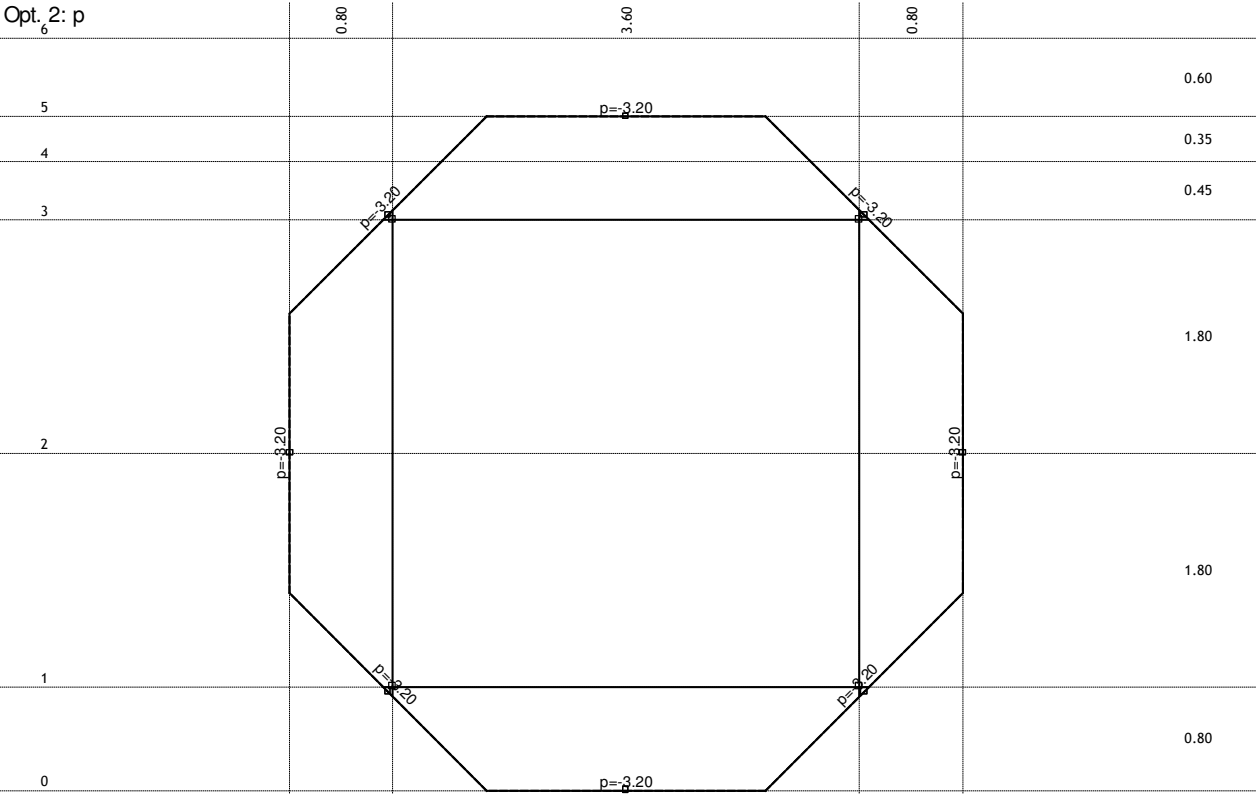
Nivo: Pr -2.75 [0.00 m]

Opt. 1: g (g)

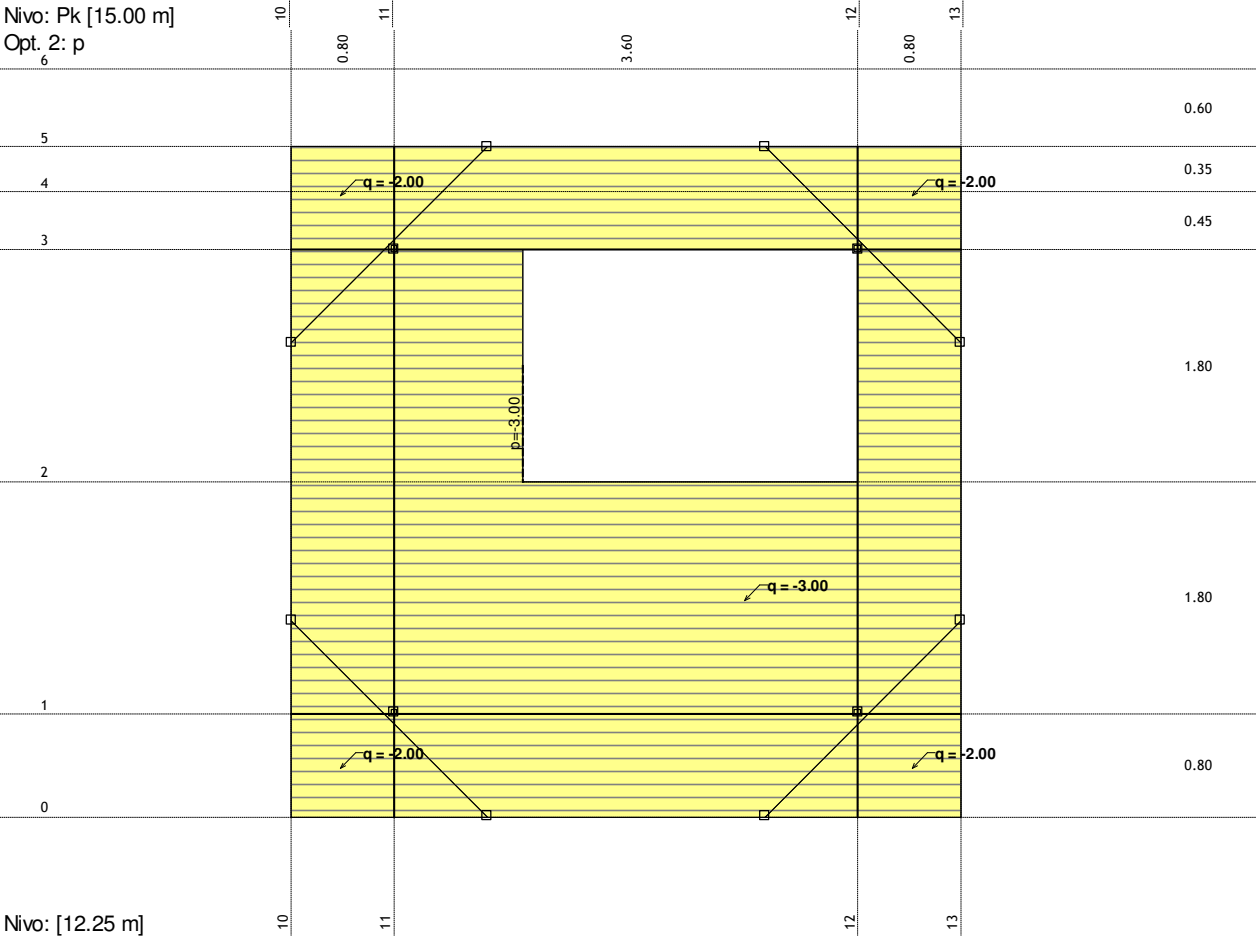


Nivo: Temelji [-1.20 m]

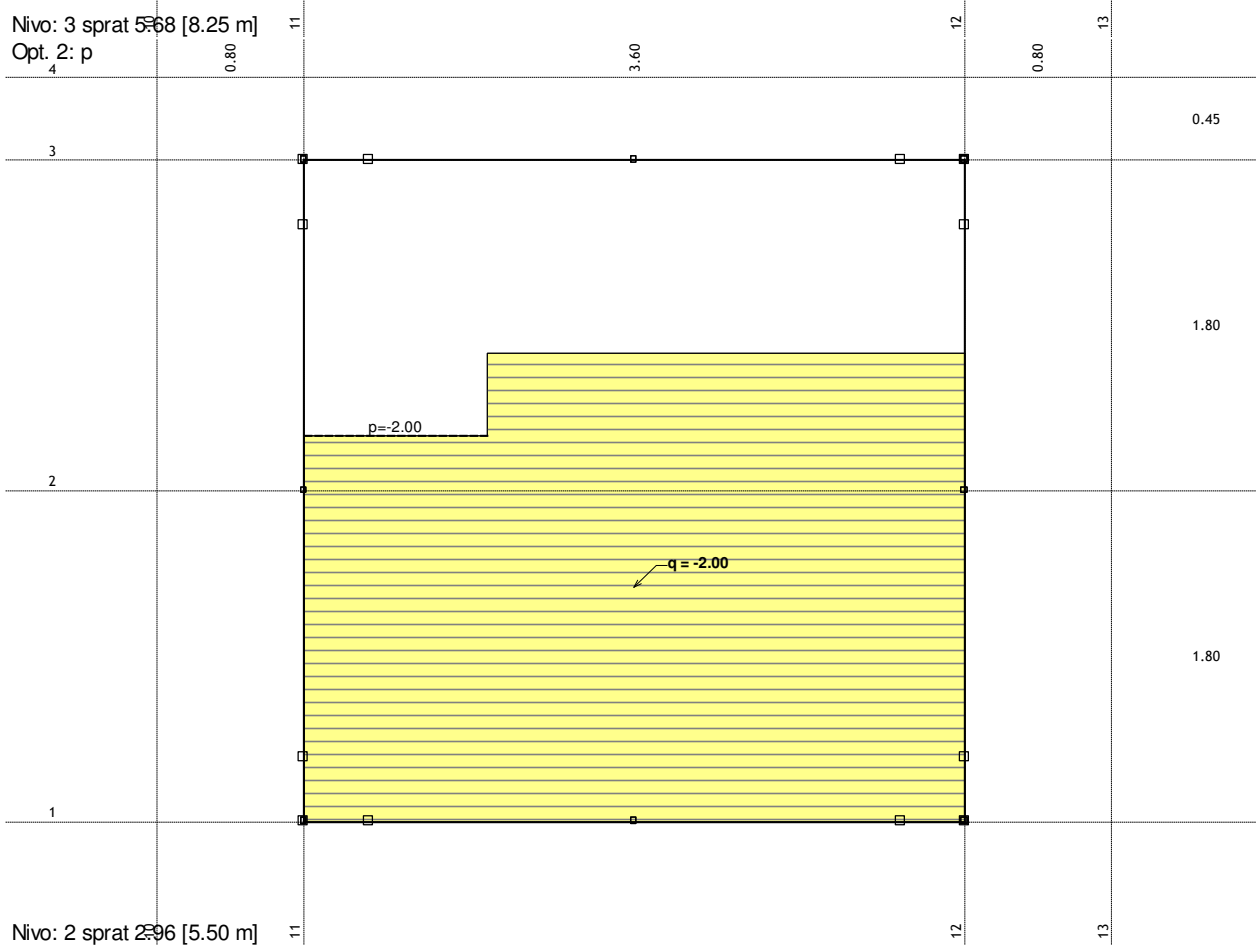
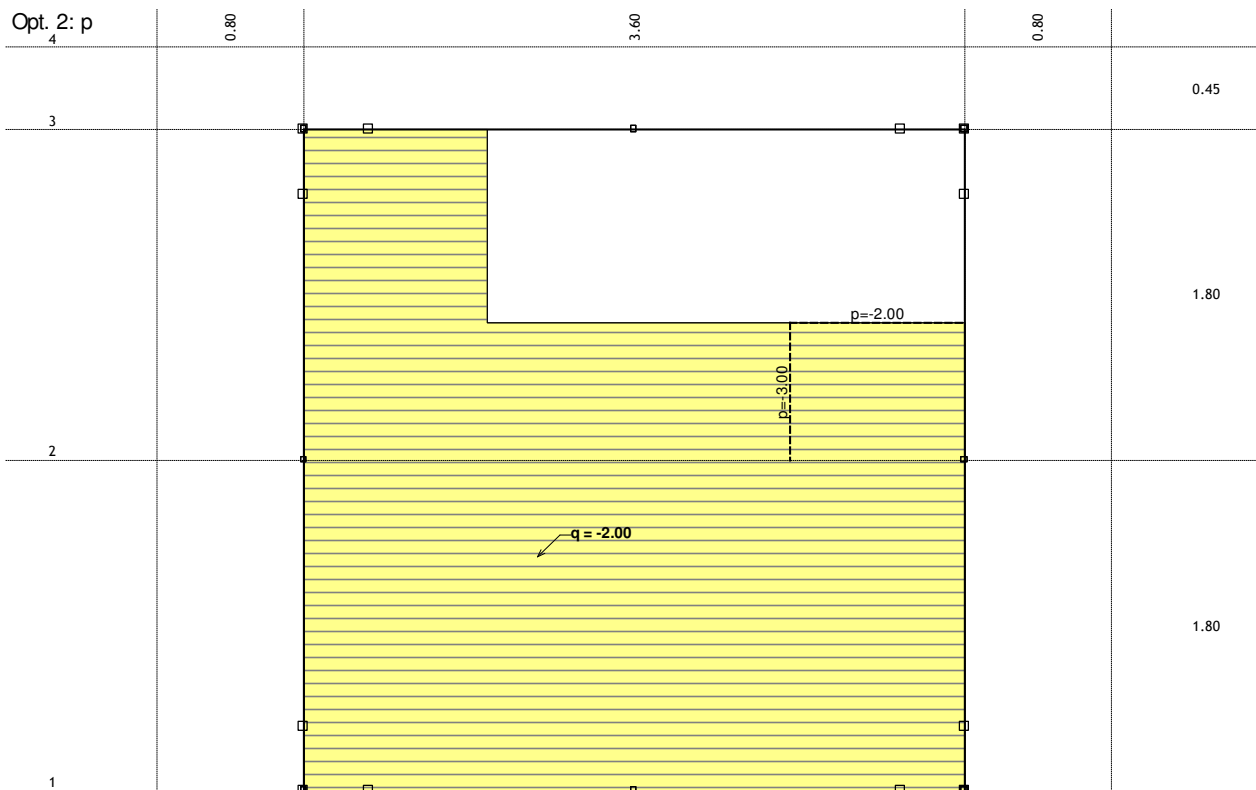
Opt. 2: p

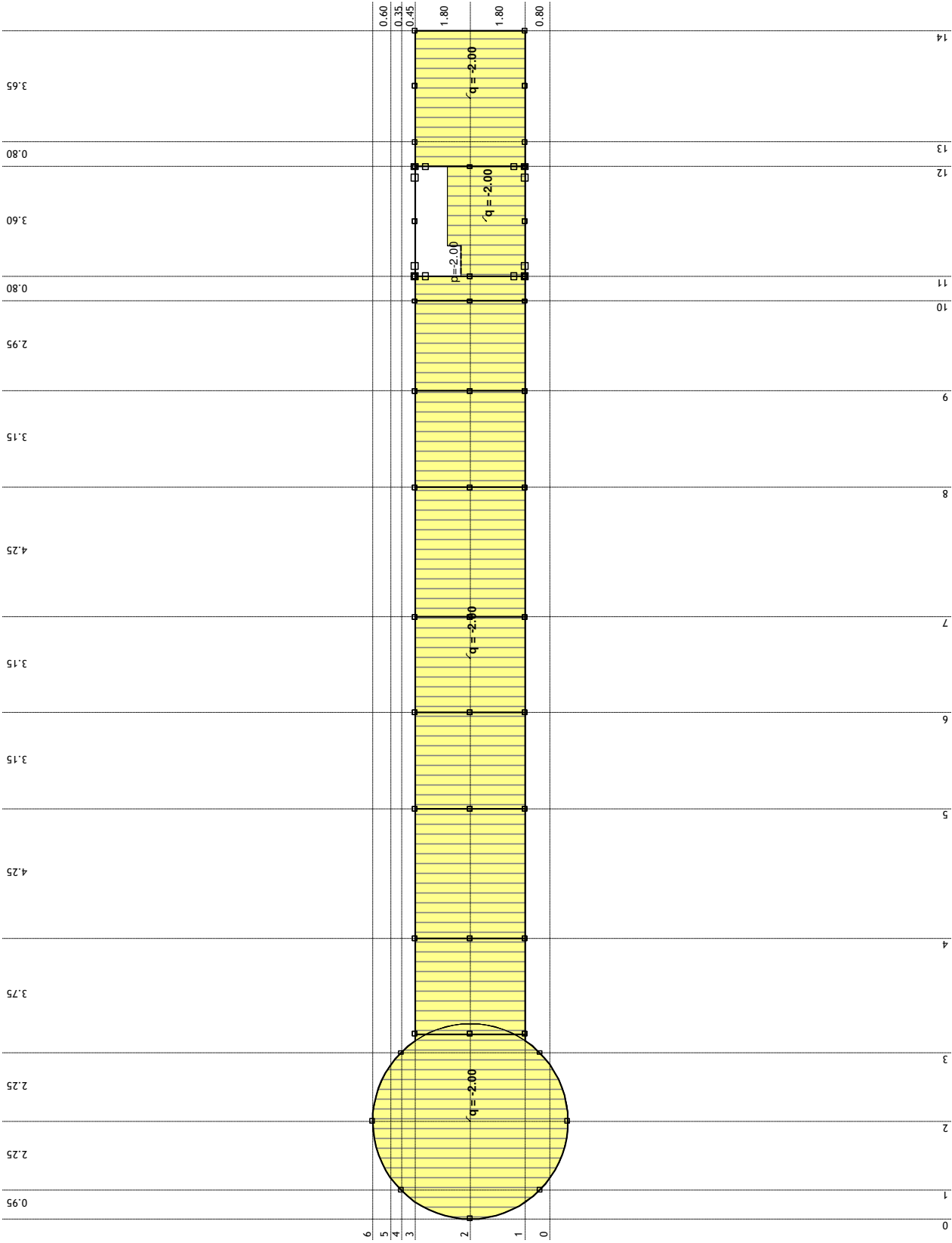


Nivo: Pk [15.00 m]
Opt. 2: p

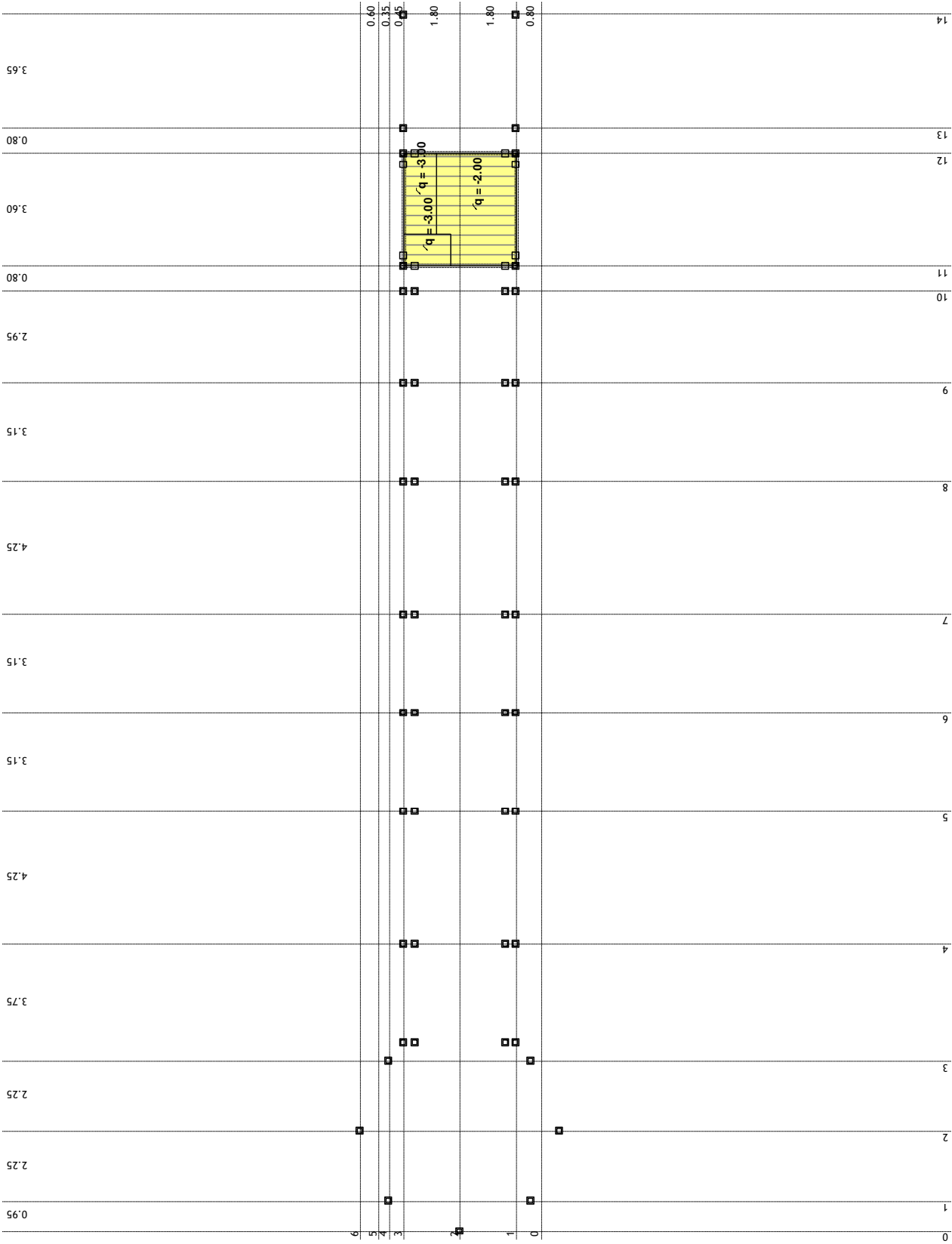


Nivo: [12.25 m]





Opt. 2: p



Nivo: Pr -2.75 [0.00 m]

Opt. 3: sneg

0.80 3.60 0.80

5 0.60

4 0.35

3 0.45

2 1.80

1 1.80

0 0.80

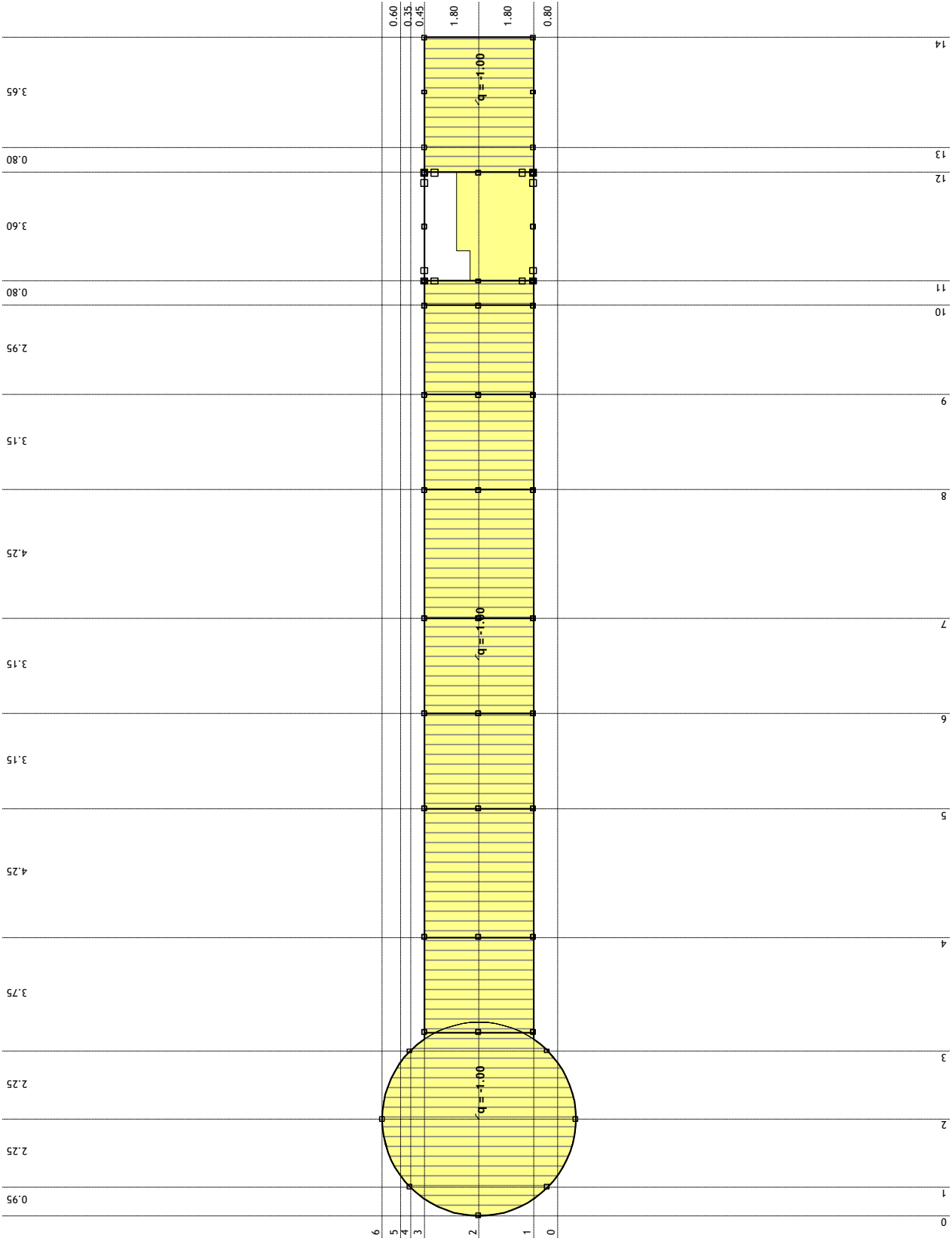
Nivo: Pk [15.00 m]

10 11 12 13

p=1.30 p=1.80 p=1.30 p=1.80 p=1.30 p=1.80 p=1.30 p=1.80

Nivo: Pk [15.00 m]	10	11	12	13
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Opt. 3: sneg



Nivo: 1 sprat 0.00 [2.75 m]

SEIZMIČKI UTICAJI

Modalna analiza

Napredne opcije seizmičkog proračuna:

Ploče - redukcija krutosti na savijanje: 0.010
Multiplikator krutosti oslonaca: 10000.000
Sprečeno oscilovanje u Z pravcu

Faktori opterećenja za proračun masa

No	Naziv	Koeficijent
1	g (g)	1.00
2	p	0.50
3	sneg	0.50

Raspored masa po visini objekta

Nivo	Z [m]	X [m]	Y [m]	Masa [T]	T/m2
Pk	15.00	1.80	1.87	36.79	
	12.25	1.77	1.76	60.05	2.69
4 sprat - vidikovac	11.00	1.80	1.80	14.75	
3 sprat 5.68	8.25	1.79	1.76	41.39	4.05
2 sprat 2.96	5.50	1.80	1.73	40.10	4.59
1 sprat 0.00	2.75	-11.33	1.79	264.16	1.81
Pr -2.75	0.00	-0.32	1.81	42.66	3.29
Temelji	-1.20	-6.77	1.80	105.29	1.88
Ukupno:	4.32	-5.58	1.79	605.19	

Položaj centara krutosti po visini objekta

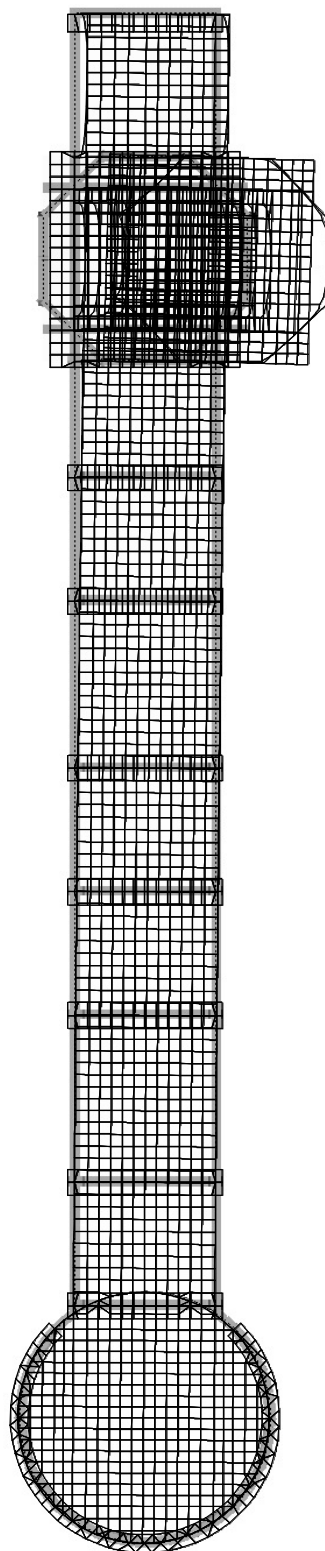
Nivo	Z [m]	X [m]	Y [m]
Pk	15.00	1.80	1.80
	12.25	1.80	1.80
4 sprat - vidikovac	11.00	1.80	1.80
3 sprat 5.68	8.25	1.80	1.80
2 sprat 2.96	5.50	1.80	1.80
1 sprat 0.00	2.75	-8.60	1.80
Pr -2.75	0.00	1.59	1.80
Temelji	-1.20	1.69	1.80

Ekscentricitet po visini objekta

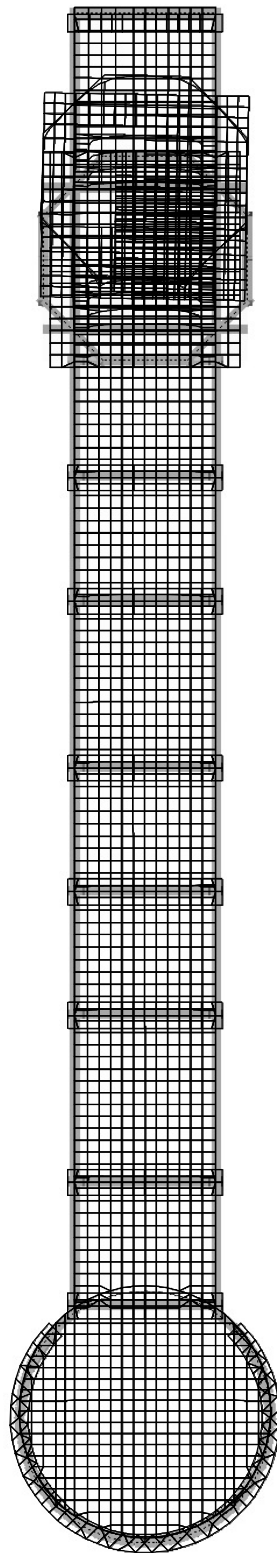
Nivo	Z [m]	eox [m]	eoy [m]
Pk	15.00	0.00	0.07
	12.25	0.03	0.04
4 sprat - vidikovac	11.00	0.00	0.00
3 sprat 5.68	8.25	0.01	0.04
2 sprat 2.96	5.50	0.00	0.07
1 sprat 0.00	2.75	2.73	0.01
Pr -2.75	0.00	1.91	0.01
Temelji	-1.20	8.46	0.00

Periodi oscilovanja konstrukcije

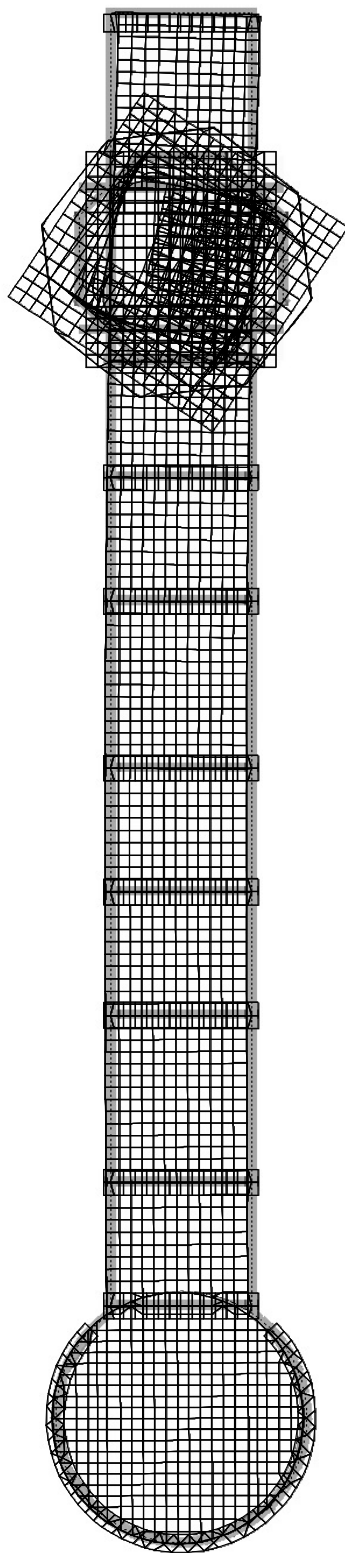
No	T [s]	f [Hz]
1	0.5684	1.7593
2	0.5453	1.8338
3	0.4446	2.2492



Izometrija (Top)
Forma oscilovanja: 1/3 [$T=0.5684\text{sec}$ / $f=1.76\text{Hz}$]



Izometrija (Top)
Forma oscilovanja: 2/3 [T=0.5453sec / f=1.83Hz]



Izometrija (Top)
Forma oscilovanja: 3/3 [T=0.4446sec / f=2.25Hz]

Seizmički proračun

Seizmički proračun: JUS (Ekvivalentno statičko opterećenje)

Kategorija tla:	I
Seizmička zona:	IX ($K_s = 0.100$)
Kategorija objekta:	II
Vrsta konstrukcije:	1
Kota uklještenja:	$Z_d = 0.00$ m
15% sile iznad kote:	$Z_g = 15.17$ m
Ploče - redukcija krutosti na savijanje:	0.010
Multiplikator krutosti oslonaca:	10000.000

Ugao dejstva zemljotresa:

Naziv	T [sec]	α [°]
Sy	0.568	90.00
Sx	0.545	0.00

Raspored seizmičkih sila po visini objekta (Sy)

Nivo	Z [m]	S [kN]
Pk	15.00	81.18
	12.25	111.29
4 sprat - vidikovac	11.00	23.58
3 sprat 5.68	8.25	51.34
2 sprat 2.96	5.50	33.04
1 sprat 0.00	2.75	103.61
Pr -2.75	0.00	2.05
Temelji	-1.20	0.00
	$\Sigma=$	406.09

Raspored seizmičkih sila po visini objekta (Sx)

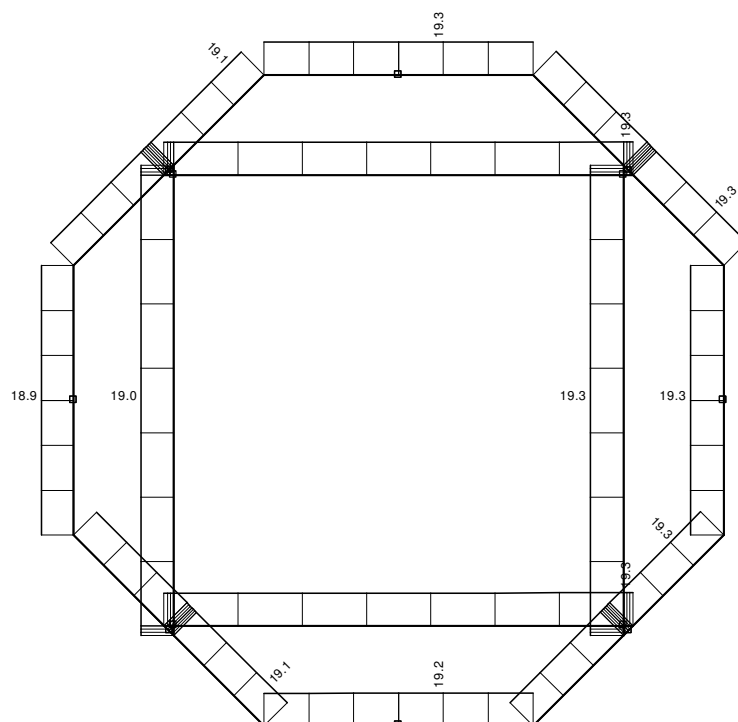
Nivo	Z [m]	S [kN]
Pk	15.00	84.62
	12.25	116.01
4 sprat - vidikovac	11.00	24.58
3 sprat 5.68	8.25	53.52
2 sprat 2.96	5.50	34.44
1 sprat 0.00	2.75	108.00
Pr -2.75	0.00	2.13
Temelji	-1.20	0.00
	$\Sigma=$	423.31

Raspored masa po visini objekta

Nivo	Z [m]	X [m]	Y [m]	Masa [T]	T/m2
Pk	15.00	1.80	1.87	36.79	
	12.25	1.77	1.76	60.05	2.69
4 sprat - vidikovac	11.00	1.80	1.80	14.75	
3 sprat 5.68	8.25	1.79	1.76	41.39	4.05
2 sprat 2.96	5.50	1.80	1.73	40.10	4.59
1 sprat 0.00	2.75	-11.33	1.79	264.16	1.81
Pr -2.75	0.00	-0.32	1.81	42.66	3.29
Temelji	-1.20	-6.77	1.80	105.29	1.88
Ukupno:	4.32	-5.58	1.79	605.19	

Statički proračun

Opt. 4: Sy

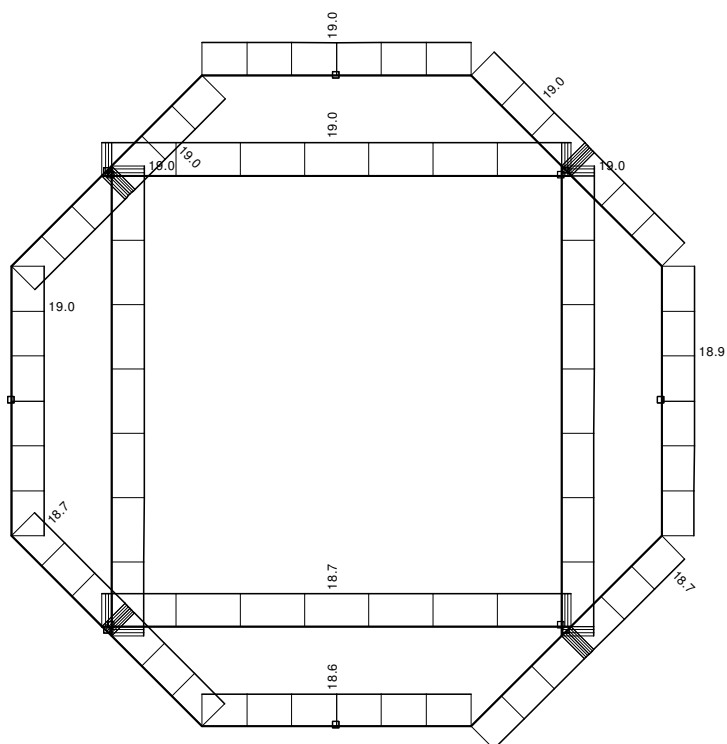


Nivo: Pk [15.00 m]

Uticaji u gredi: max $Y_p = 19.3$ / min $Y_p = 18.9$ m / 1000

$\max Y_p = 19.3 \text{ mm} < H/600 = 15170/600 = 25.28 \text{ mm}$

Opt. 5: Sx

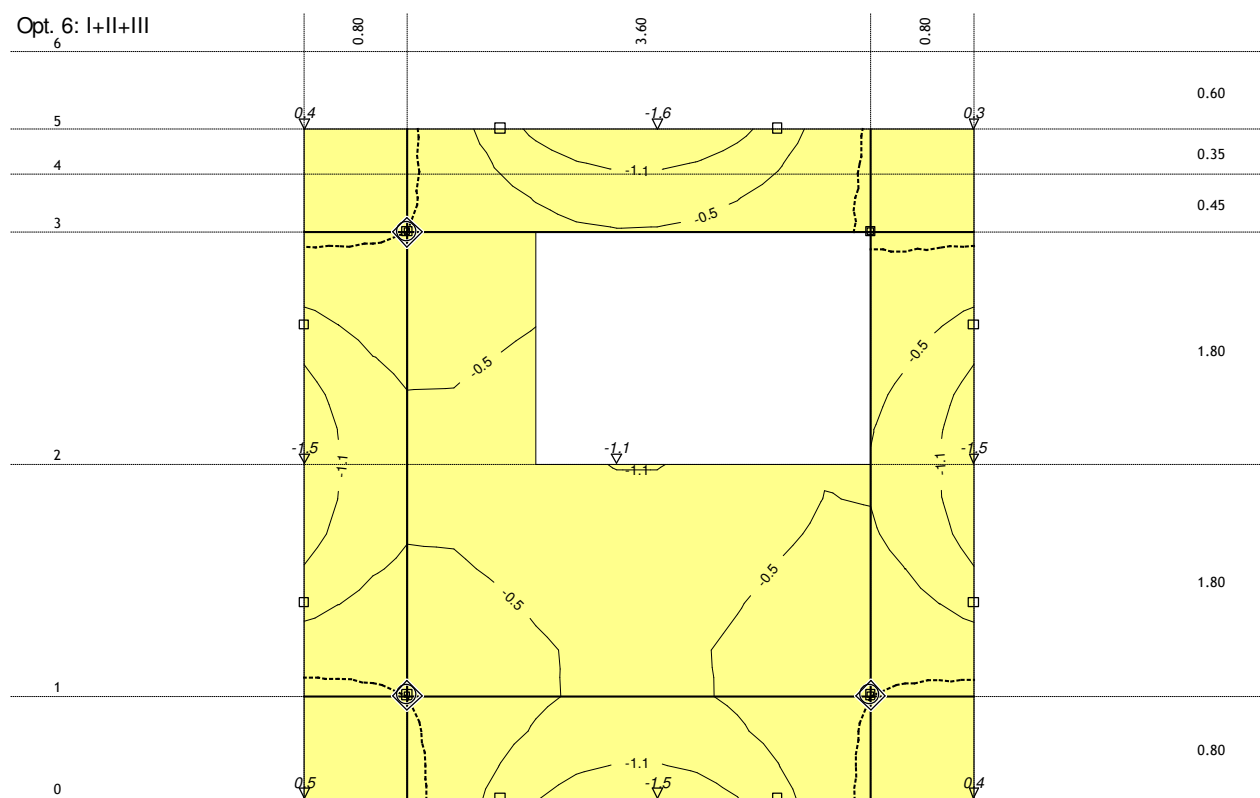


Nivo: Pk [15.00 m]

Uticaji u gredi: max $X_p = 19.0$ / min $X_p = 18.6$ m / 1000

$\max X_p = 19.0 \text{ mm} < H/600 = 15170/600 = 25.28 \text{ mm}$

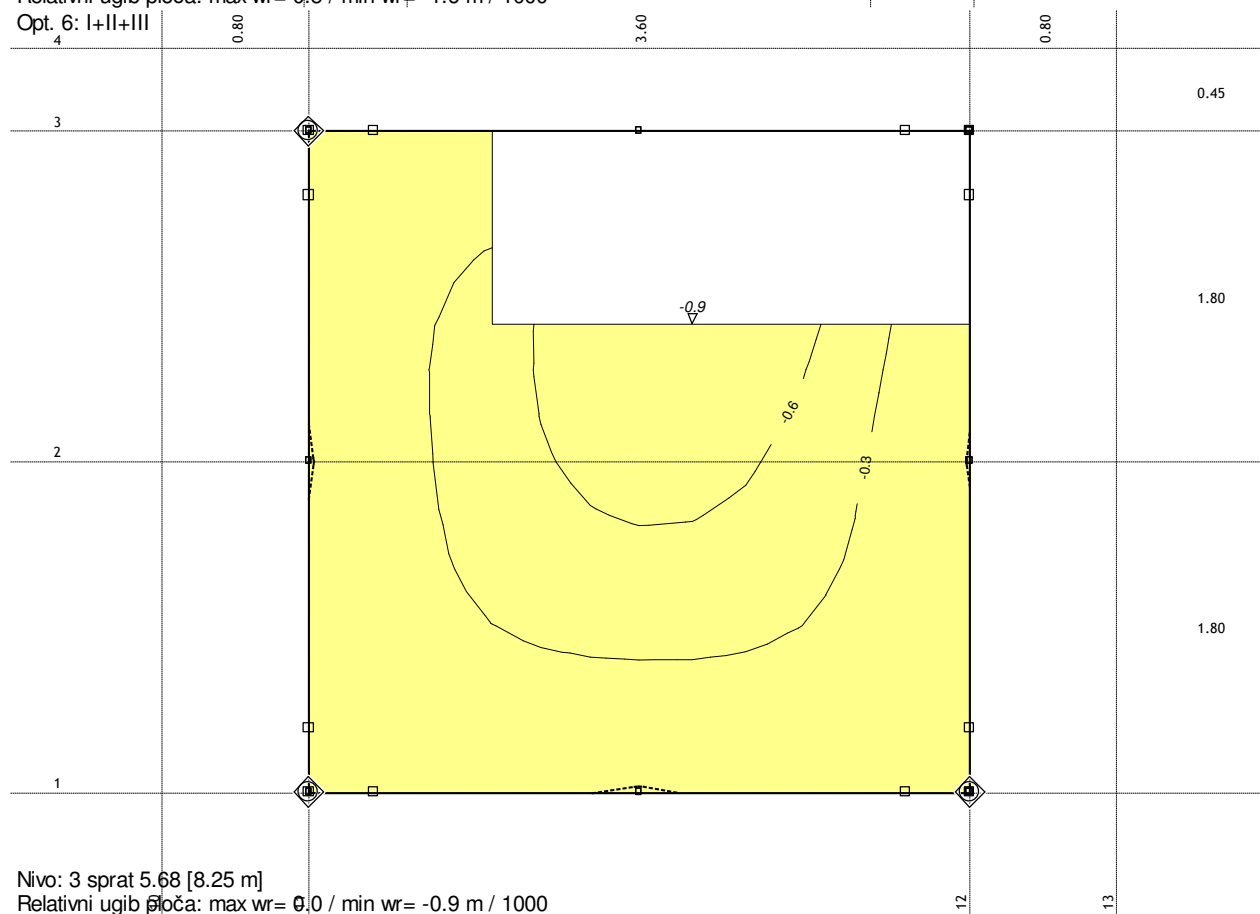
Opt. 6: I+II+III



Nivo: [12.25 m]

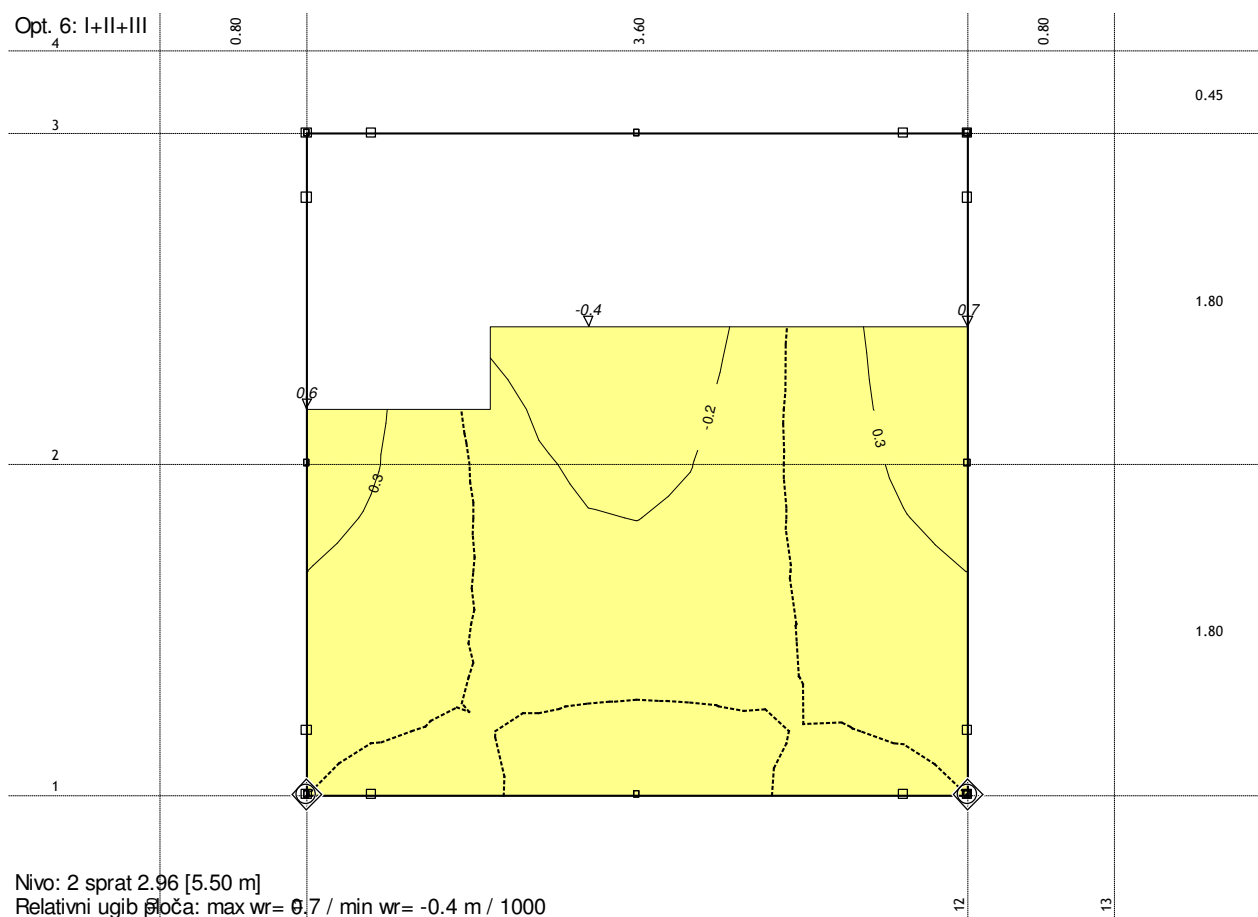
Relativni ugib ploča: max w_r = 0.5 / min w_r = -1.6 m / 1000

Opt. 6: I+II+III

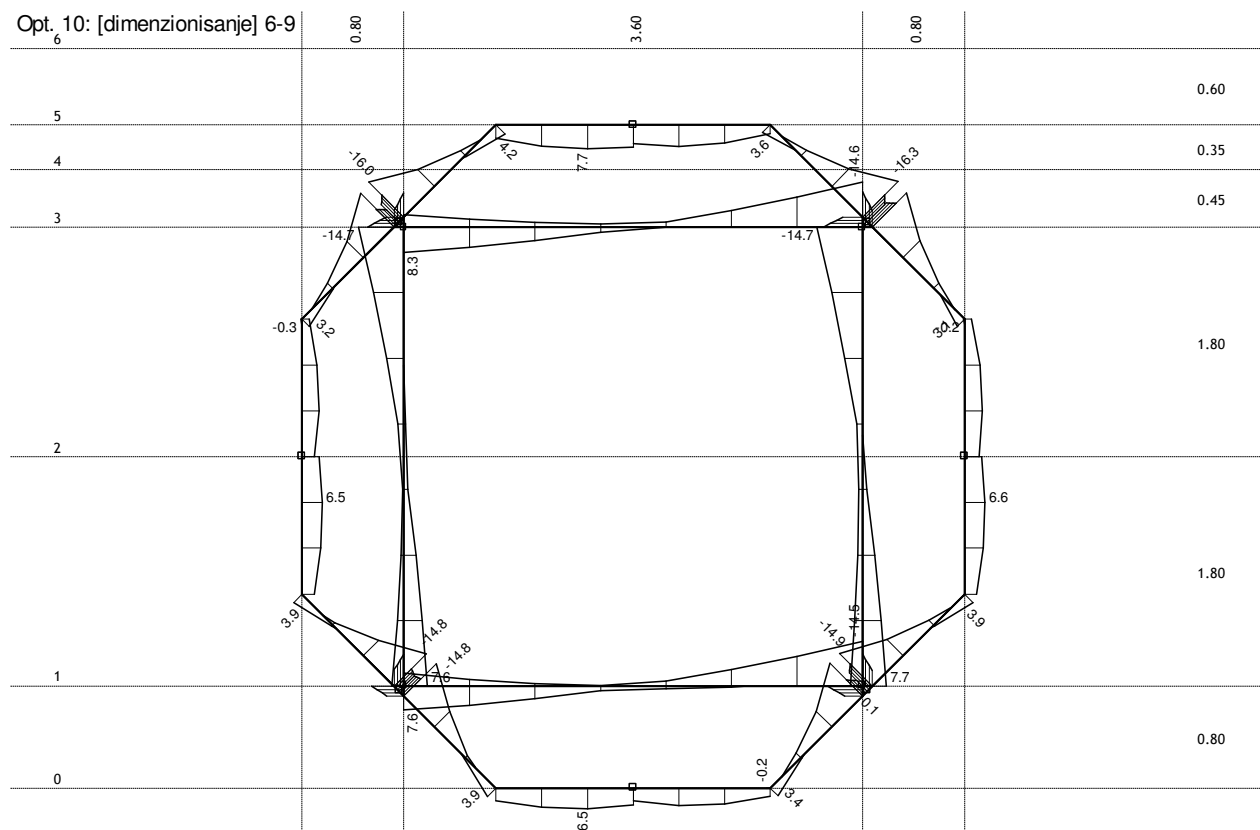


Nivo: 3 sprat 5.68 [8.25 m]

Relativni ugib ploča: max w_r = 0.0 / min w_r = -0.9 m / 1000



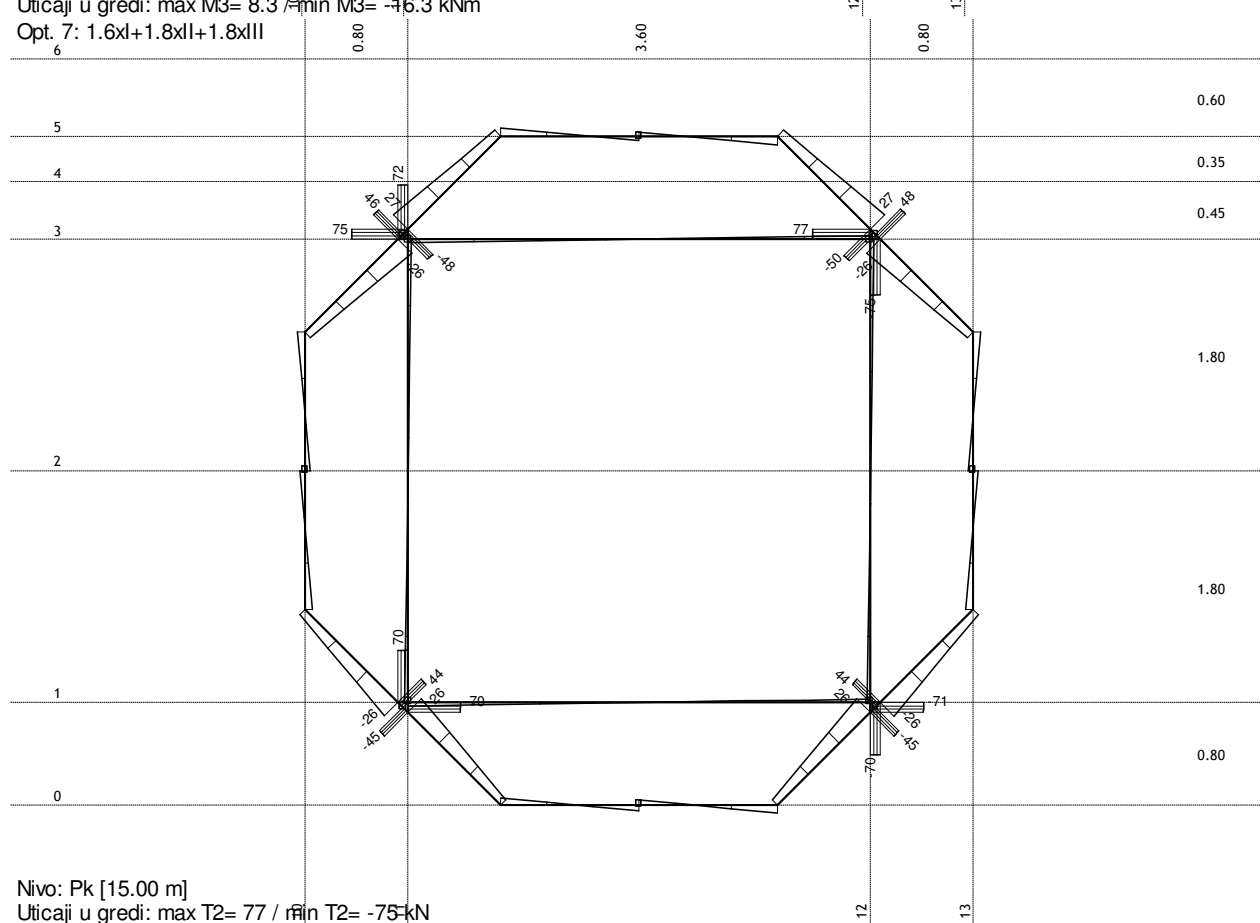
Opt. 10: [dimenzionisanje] 6-9



Nivo: Pk [15.00 m]

Uticaji u gredi: max M3= 8.3 / min M3= -16.3 kNm

Opt. 7: 1.6xI+1.8xII+1.8xIII



Nivo: Pk [15.00 m]

Uticaji u gredi: max T2= 77 / min T2= -75 kN

Proračun nosivosti preseka na T-sile

presek 25/25 cm

Beton:

MB - marka betona: 30 $\rightarrow \tau_r = 0,110 \text{ kN/cm}^2$

AB presek:

b - širina preseka: 25 cm

d - visina preseka: 25 cm

h - st. visina približna: 21 cm

max T-sila sa koef. sig. 77 kN

Uzengije:

GA, RA, MA? RA $\rightarrow \sigma_v = 40 \text{ kN/cm}^2$

Ø preseka: 8 mm $\rightarrow a_{u,1} = 0,503 \text{ cm}^2$

razmak e= 10 cm (preporučeno: 5; 7,5; 10; 12,5; 15; 17,5; 20...cm)

sečnost 2

ugao nagiba α : 90 °

ugao Θ (25-55°): 45 °

Proračun:

$$\tau_{u,u} = \frac{m \cdot a_u^{(1)}}{b \cdot e_u} \cdot \sigma_v \cdot (\cos \alpha + \sin \alpha \cdot \operatorname{ctg} \theta)$$

$$\tau_{u,u} = 0,161 \text{ kN/cm}^2$$

$$\tau_{Ru,A} = \frac{3}{2} \cdot (\tau_{u,A} - \tau_r)$$

$$\tau_{Ru,A} = 0,161 \text{ kN/cm}^2$$

$$\rightarrow \tau_{u,A} = 0,217 \text{ kN/cm}^2$$

$\tau_r < \tau_{u,A} < 3\tau_r$ - deo sile prihvata beton a deo prihvataju uzengije ili koso gvožđe.

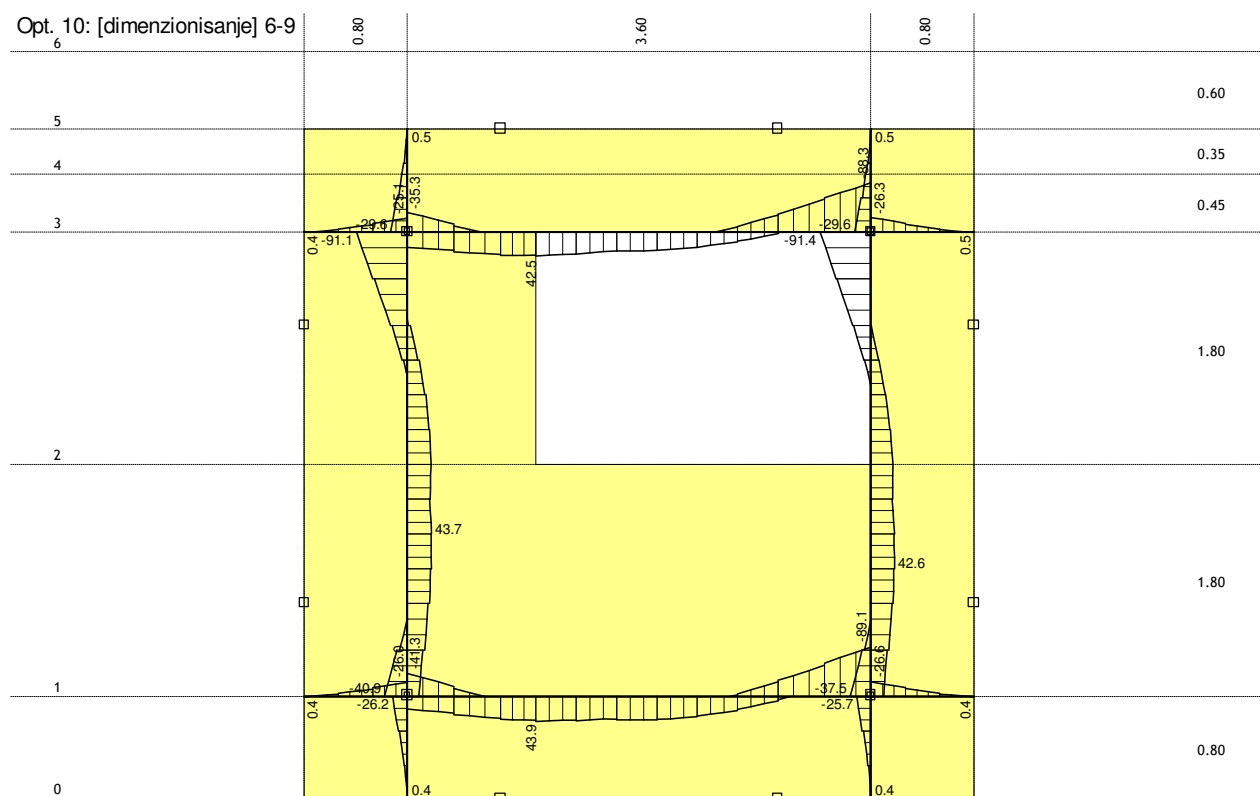
$$\tau_{u,A} = \frac{T_u}{0,9 \cdot h \cdot b}$$

$$\rightarrow T_u = 102,7 \text{ kN}$$

Nosivost preseka je 102,7kN za slučaj kada u nosivosti učestvuju i beton i uzengije prečnika 8mm na međusobnom rastojanju od 10cm.

Sila na AB preseku od 77kN je manja od granične sile koja iznosi 102,7kN te je nosivost zadovoljena.

	0.80
	3.60
	0.80

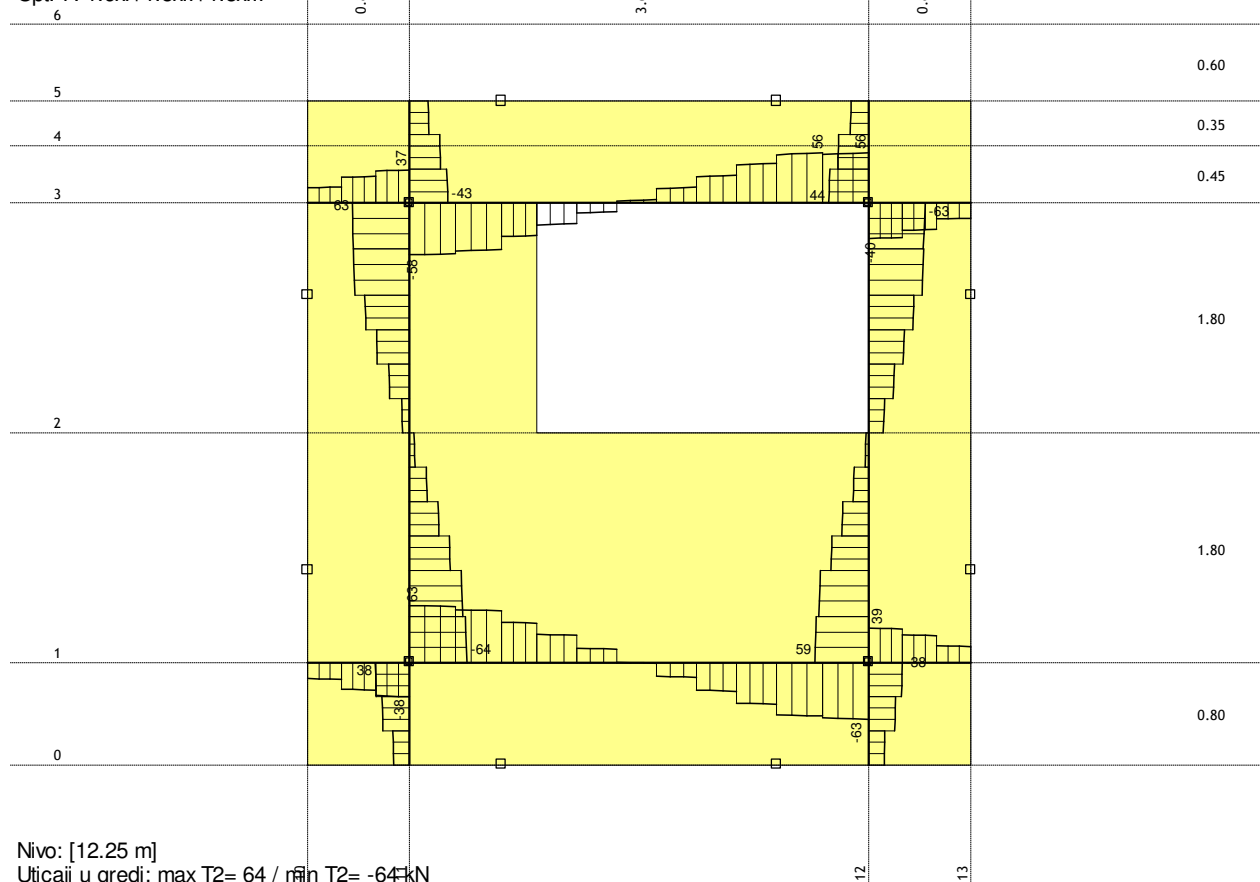


Nivo: [12.25 m]

Uticaji u gredi: max $M_3 = 43.97$ min $M_3 = -91.4$ kNm

Opt. 7: $1.6x_I + 1.8x_{II} + 1.8x_{III}$

$M_3 = -91.4 \text{ kNm}$



Technical drawing of a staircase section (Nivo 4 sprat) showing dimensions and structural elements. The drawing includes a plan view and a section view.

Plan View Dimensions:

- Overall width: 3.60
- Overall depth: 0.80
- Staircase width: 0.35
- Staircase depth: 0.45
- Staircase width: 1.80
- Staircase depth: 1.80
- Staircase width: 0.80

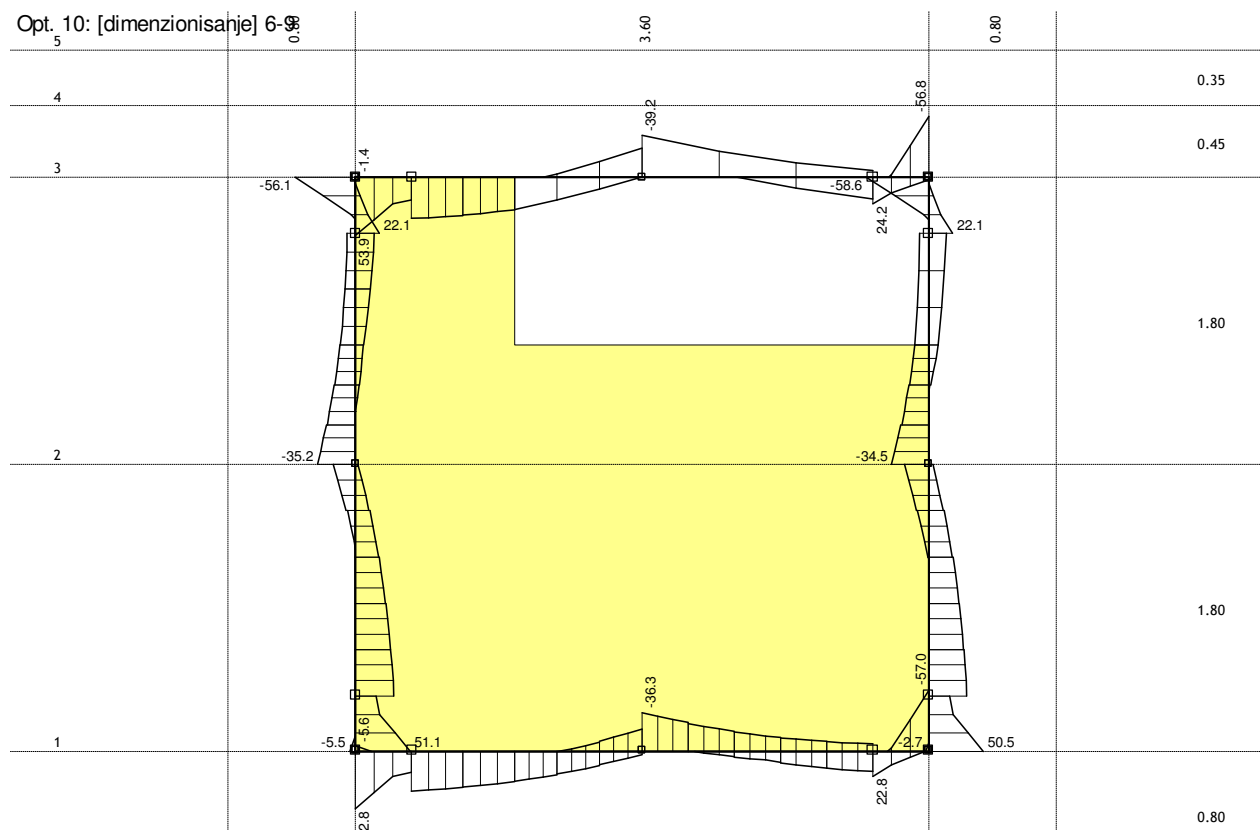
Section View Dimensions:

- Overall height: 3.60
- Overall width: 0.80
- Staircase width: 0.35
- Staircase depth: 0.45
- Staircase width: 1.80
- Staircase depth: 1.80
- Staircase width: 0.80

Labels and Notes:

- Opt₅ 10: [dimenzionisanje] 6.9
- Nivo 4 sprat - vidikovac [11.00 m]

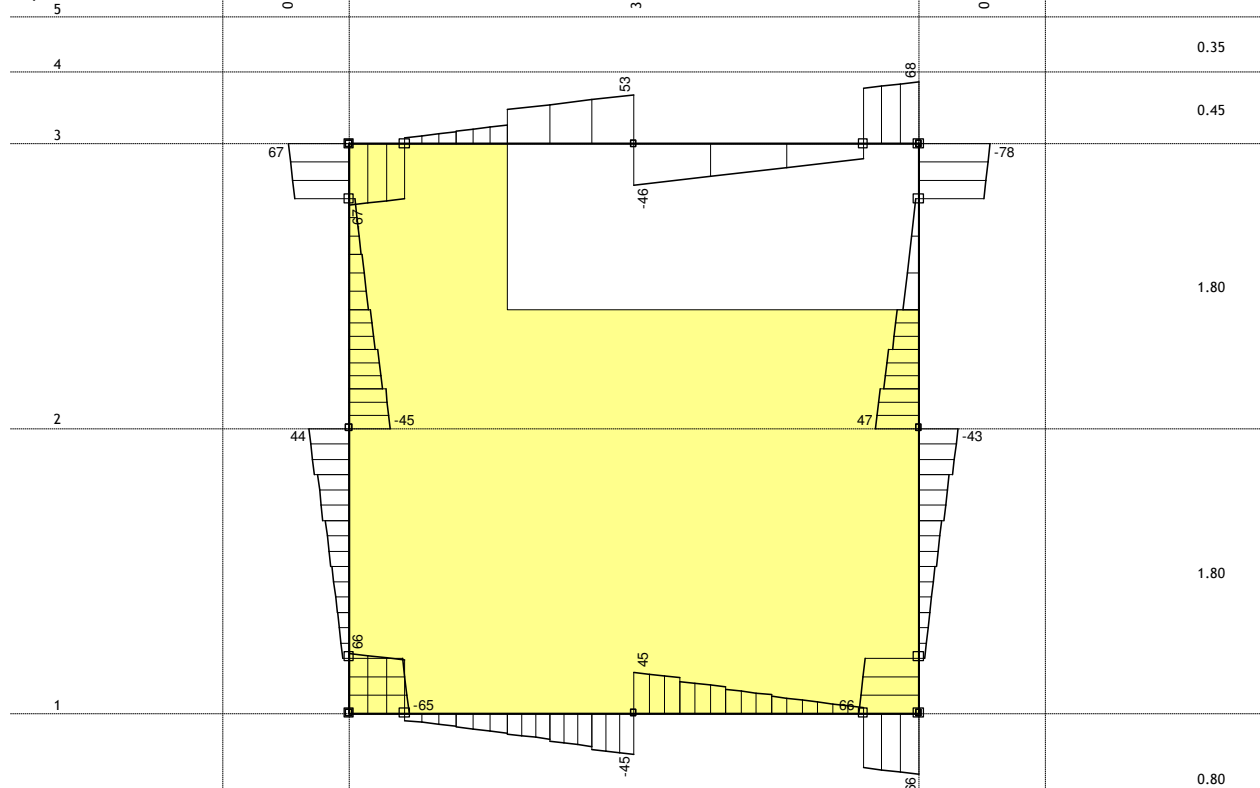
Opt. 10: [dimenzionisanje] 6-9



Nivo: 3 sprat 5.68 [8.25 m]

Uticaji u gredi: max M_3 = 53.9 / min M_3 = -58.6 kNm

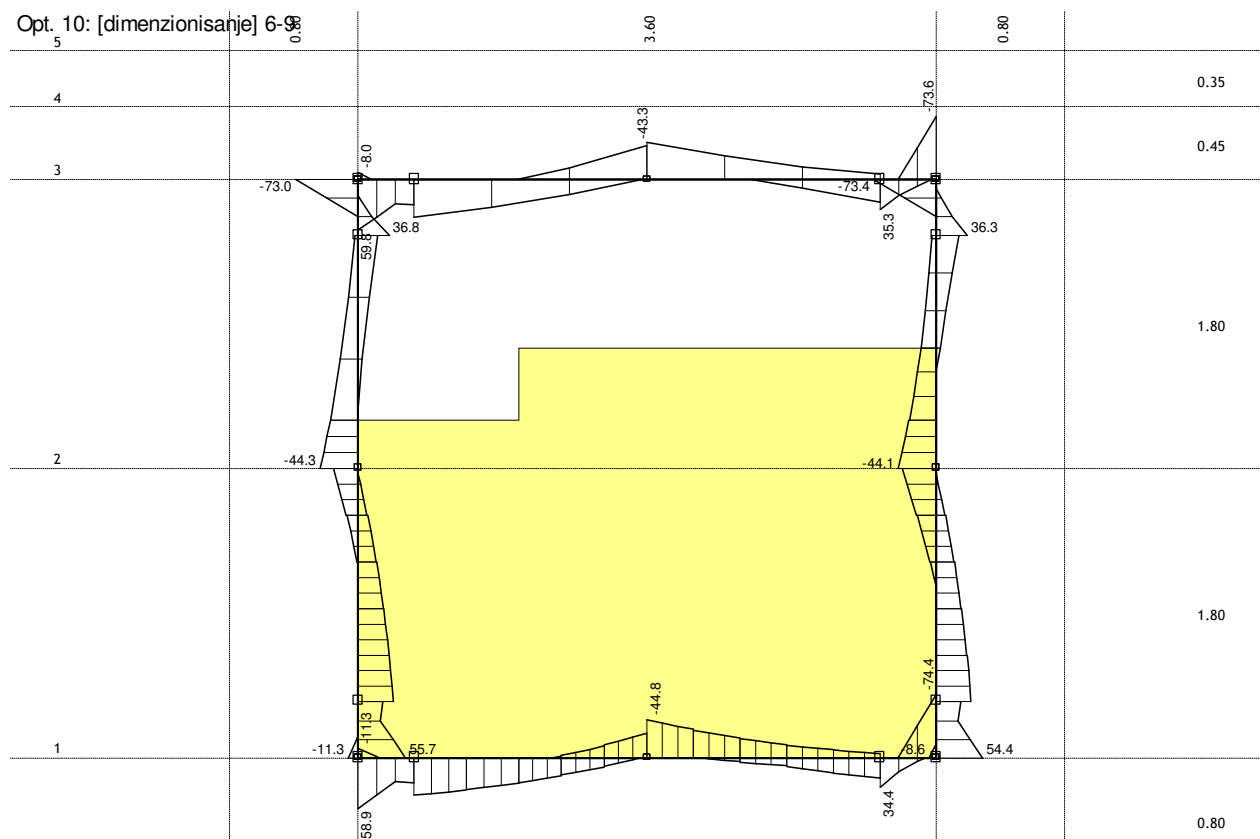
Opt. 7: 1.6xI+1.8xII+1.8xIII



Nivo: 3 sprat 5.68 [8.25 m]

Uticaji u gredi: max T_2 = 68 / min T_2 = -78 kN

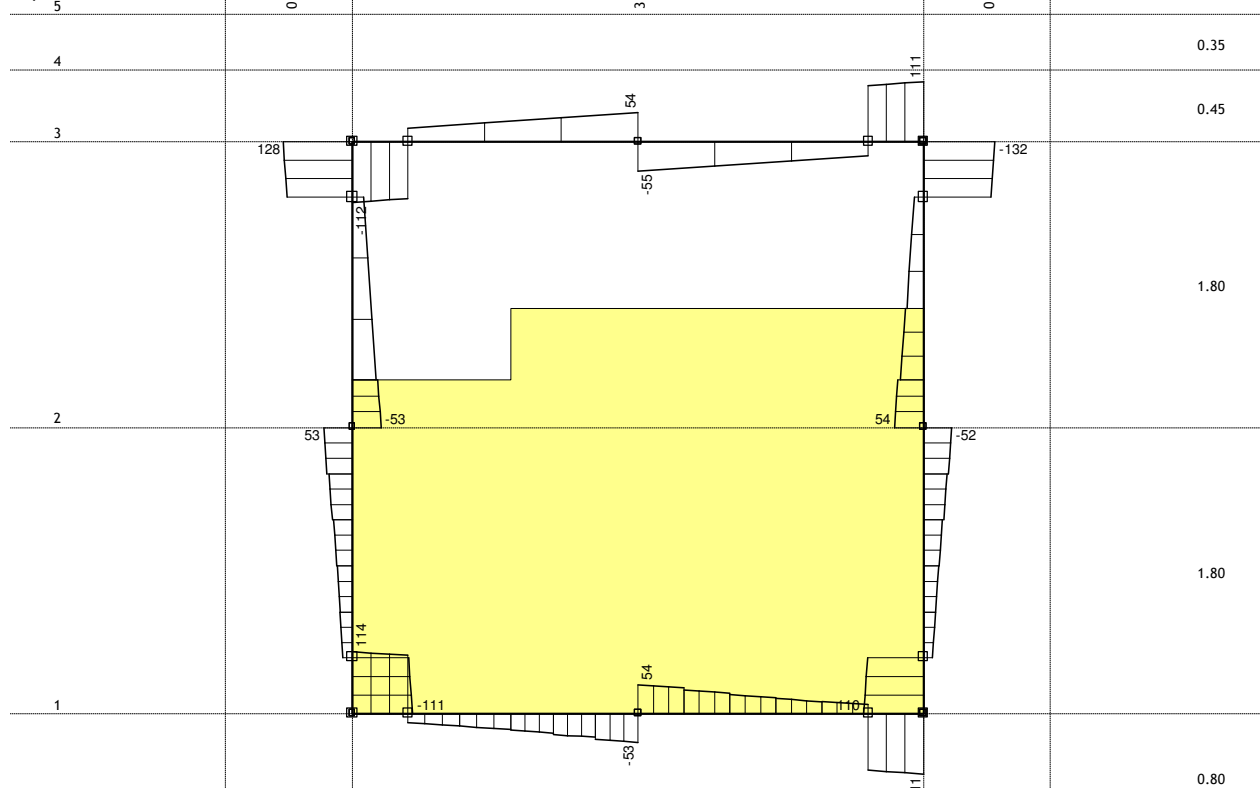
Opt. 10: [dimenzionisanje] 6-9



Nivo: 2 sprat 2.96 [5.50 m]

Uticaji u gredi: max $M_3 = 59.8$ / min $M_3 = -74.4$ kNm

Opt. 7: 1.6xI+1.8xII+1.8xIII



Nivo: 2 sprat 2.96 [5.50 m]

Uticaji u gredi: max $T_2 = 128$ / min $T_2 = -132$ kN

Proračun nosivosti preseka na T-sile

presek 25/40 cm

Beton:

MB - marka betona: 30 $\rightarrow \tau_r = 0,110 \text{ kN/cm}^2$

AB presek:

b - širina preseka: 25 cm

d - visina preseka: 40 cm

h - st. visina približna: 36 cm

max T-sila sa koef. sig. 132 kN

Uzengije:

GA, RA, MA? RA $\rightarrow \sigma_v = 40 \text{ kN/cm}^2$

Ø preseka: 8 mm $\rightarrow a_{u,1} = 0,503 \text{ cm}^2$

razmak e= 10 cm (preporučeno: 5; 7,5; 10; 12,5; 15; 17,5; 20...cm)

sečnost 2

ugao nagiba α : 90 °

ugao Θ (25-55°): 45 °

Proračun:

$$\tau_{u,u} = \frac{m \cdot a_u^{(1)}}{b \cdot e_u} \cdot \sigma_v \cdot (\cos \alpha + \sin \alpha \cdot \operatorname{ctg} \theta)$$

$$\tau_{u,u} = 0,161 \text{ kN/cm}^2$$

$$\tau_{Ru,A} = \frac{3}{2} \cdot (\tau_{u,A} - \tau_r)$$

$$\tau_{Ru,A} = 0,161 \text{ kN/cm}^2$$

$$\rightarrow \tau_{u,A} = 0,217 \text{ kN/cm}^2$$

$\tau_r < \tau_{u,A} < 3\tau_r$ - deo sile prihvata beton a deo prihvataju uzengije ili koso gvožđe.

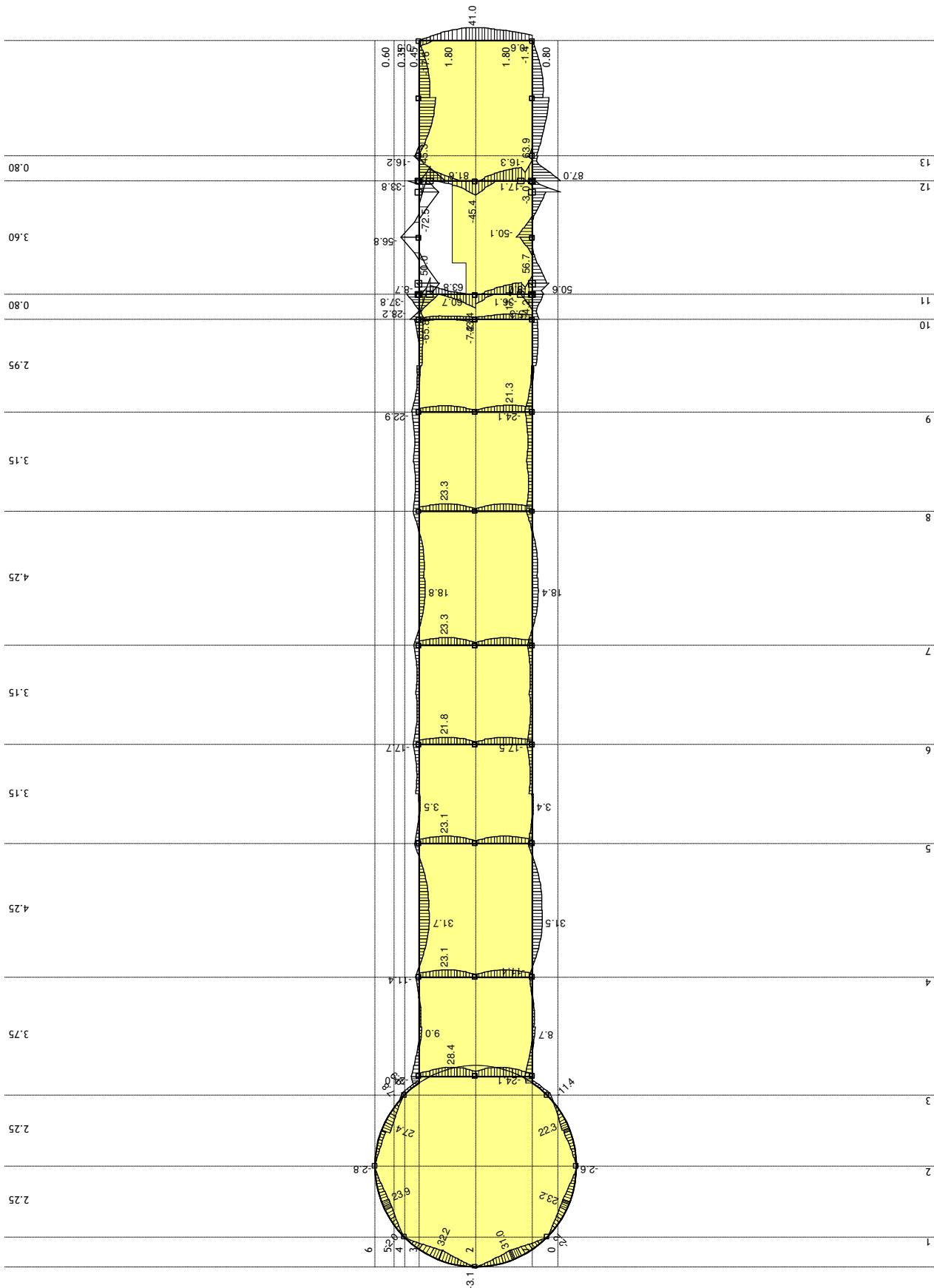
$$\tau_{u,A} = \frac{T_u}{0,9 \cdot h \cdot b}$$

$$\rightarrow T_u = 176,0 \text{ kN}$$

Nosivost preseka je 176kN za slučaj kada u nosivosti učestvuju i beton i uzengije prečnika 8mm na međusobnom rastojanju od 10cm.

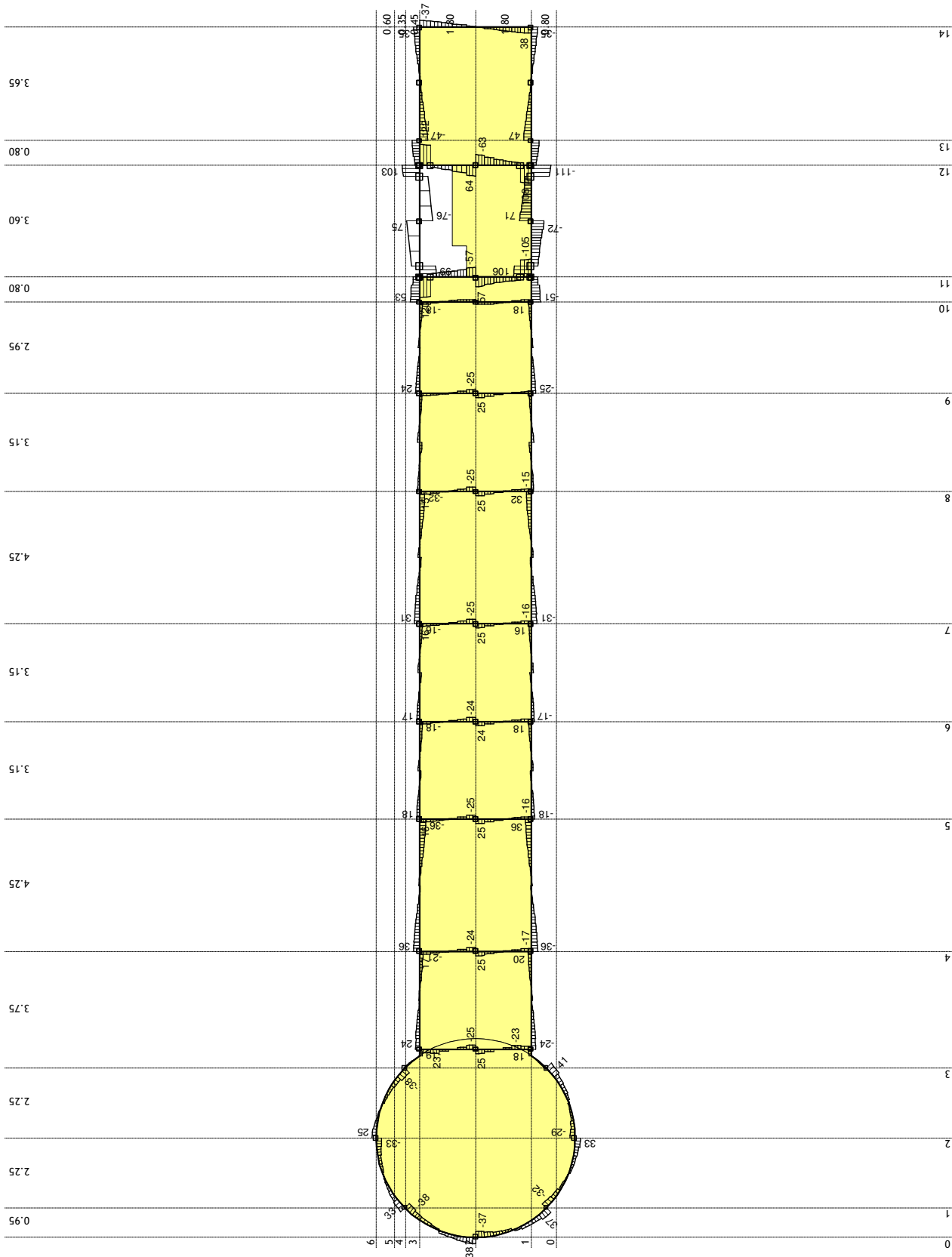
Sila na AB preseku od 132kN je manja od granične sile koja iznosi 176kN te je nosivost zadovoljena.

Opt. 10: [dimensionisanje] 6-9



Nivo: 1 sprat 0.00 [2.75 m]
Utica u gredi: max M3= 87.0 / min M3= -72.5 kNm

Opt. 7: 1.6xI+1.8xII+1.8xIII



Nivo: 1 sprat 0.00 [2.75 m]
Uticaji u gredi: max T2= 120 / min T2= -122 kN

The architectural floor plan depicts a church interior with a central nave, a side chapel, and a chancel. The nave is characterized by a series of pointed arches supported by columns, with a vaulted ceiling. The side chapel, located on the left, features a semi-circular apse. The chancel, at the bottom, includes a semi-circular apse and a rectangular area. Dimensions are provided for various parts of the building, such as the nave width (11.1m), chancel width (1.2m), and apse diameter (2.0m). The plan is oriented with the entrance at the top and the altar at the bottom.

Uticaji u gredi: $\max \sigma_{,0} = 0.6$ / $\min \sigma_{,0} = -5.4$ MPa

DUKILNOST STUBOVA
USVOJENA ARMATURA PRESEKA

MB 30 → $f_b =$ $f_{bk} = 2,050$
RA 400/500 → $\sigma_v =$ $\sigma_v = 40$

$$Ab, i = Ab \cdot \left(1 + \mu \cdot \frac{E_a}{E_b} \right)$$

$$\frac{E_a}{E_b} \approx 10$$

$$\frac{\sigma_o}{\beta_p} \leq 0.35$$

$$\sigma_o = \frac{N}{Ab, i}$$

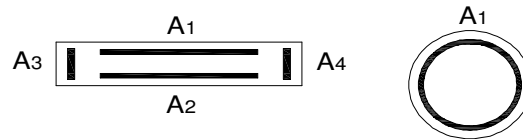
$$N = N_g + N_p$$

$$\beta_p = 0.7 \cdot \beta_k$$

usvojen min % armiranja: 0,8 %

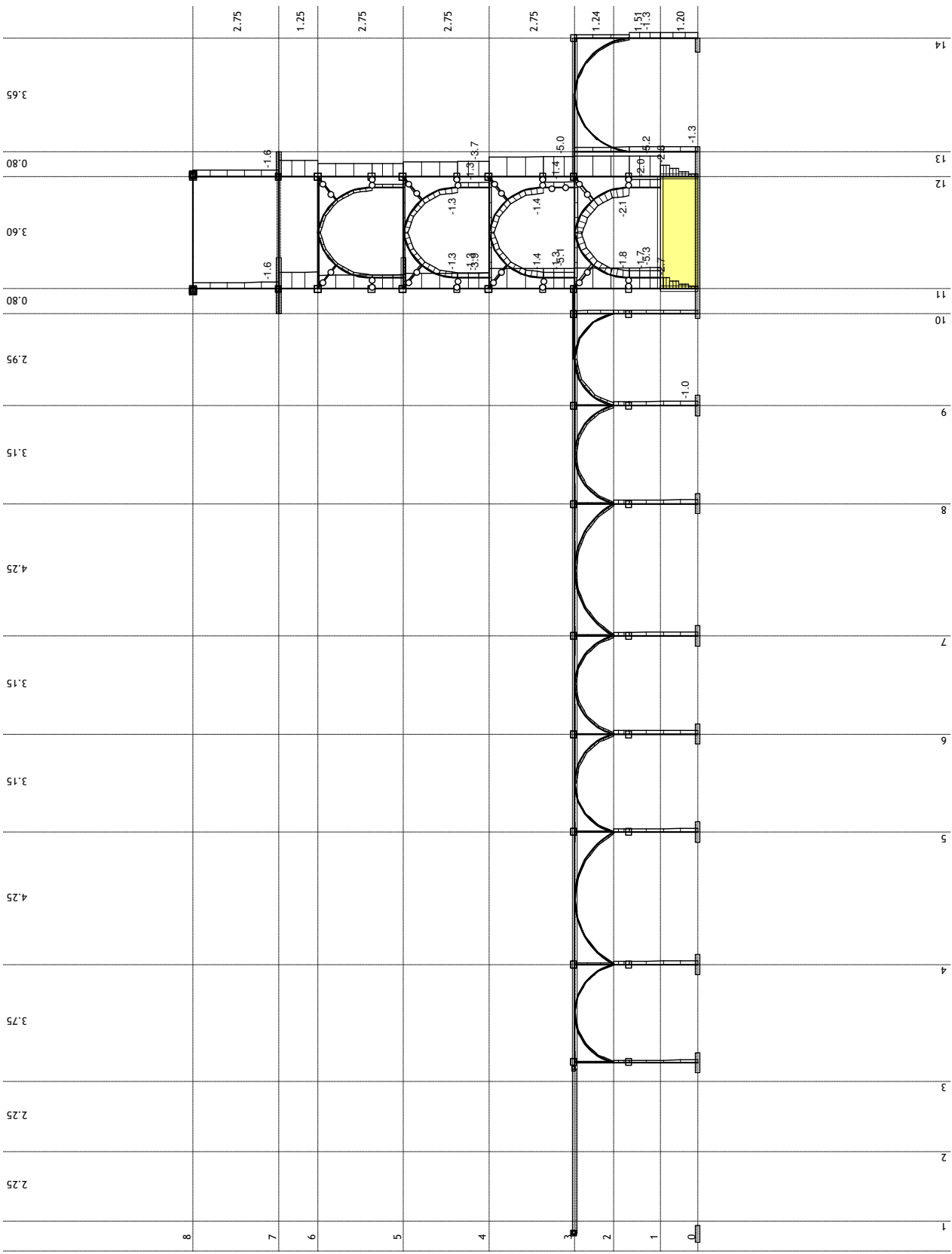
za stubove:
 $\sigma_{dop} = 7,35 \text{ kN/cm}^2$

Aa1/Aa2 - Armatura dobijena dimenzionisanjem stubova na koso savijanje - G+P+vetar/seizmika
Aa3/Aa4



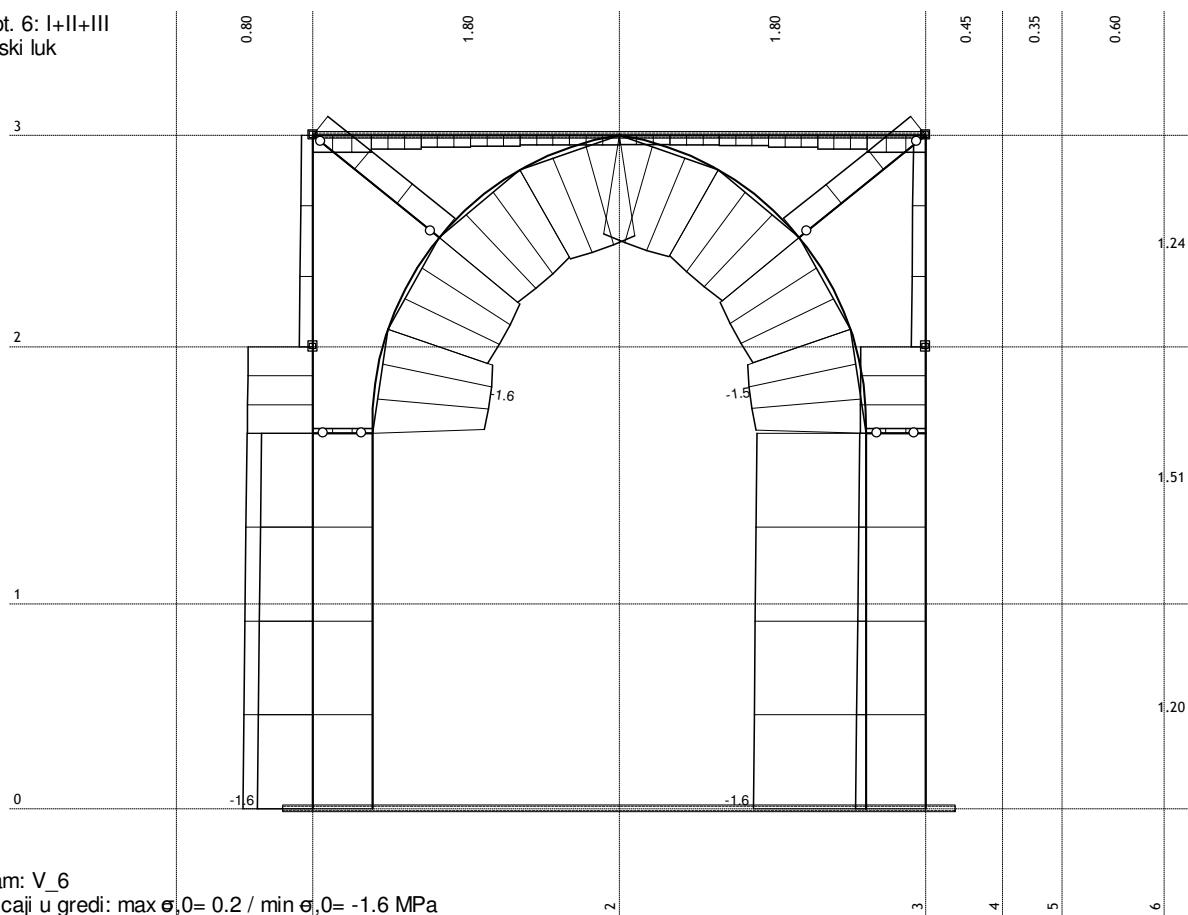
pozicije stubova	•/■	b	d	Ab	N_{g+p}	σ_o	μ_{potr}	Aa1/Aa2	Aa3/Aa4	Usvojena armatura	Napomena	μ_{st}	μ_{potr2}
	presek	cm	cm	cm ²	kN	Mpa	%	cm ²	cm ²			%	%
osa 3	■	25	25	625	329	5,27	min	1,10	1,30	8 RØ 14		1,97	min
osa 3'	■	25	25	625	337	5,39	min	1,10	1,30	8 RØ 14		1,97	min
osa 2	■	25	25	625	335	5,36	min	3,00	2,50	8 RØ 14		1,97	min
osa 2'	■	25	25	625	325	5,20	min	2,50	3,00	8 RØ 14		1,97	min
galerija	■	35	25	875	138	1,58	min	1,00	1,00	8 RØ 14		1,41	min

Opt. 6: I+II+III



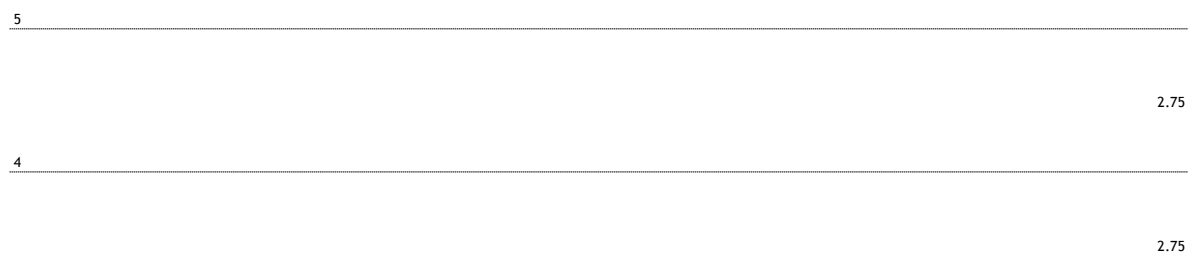
Ram: H_3
Uticaji u gredi: max $\sigma_0 = 0.7$ / min $\sigma_0 = -5.3$ MPa

Opt. 6: I+II+III
tipski luk

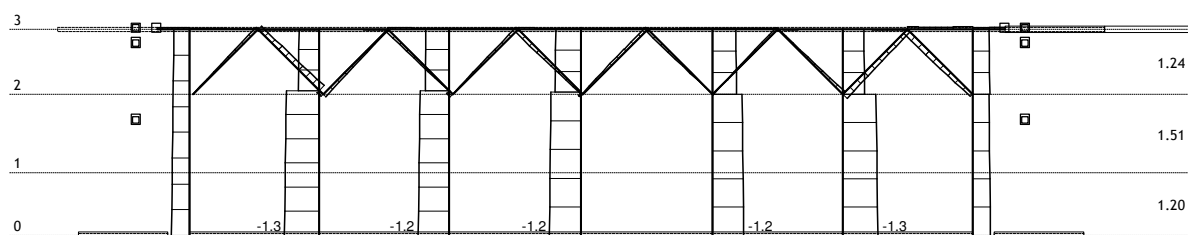


Ram: V_6
Utjecaji u gredi: max $\sigma_{t,0} = 0.2$ / min $\sigma_{t,0} = -1.6$ MPa
Opt. 6: I+II+III
stubovi gumna

2.75



2.75

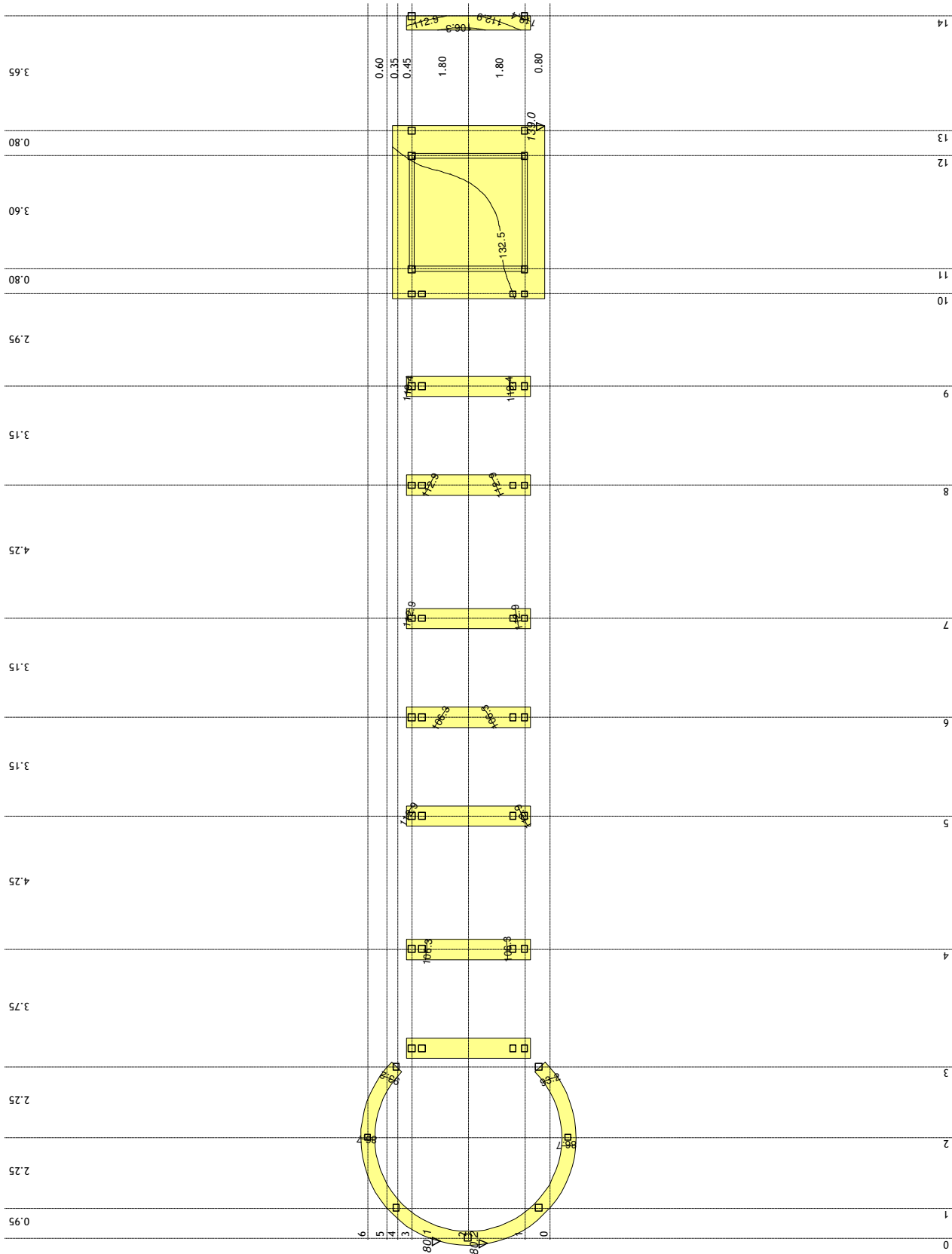


2.75

Ram: C_1
Utjecaji u gredi: max $\sigma_{t,0} = 0.2$ / min $\sigma_{t,0} = -1.3$ MPa

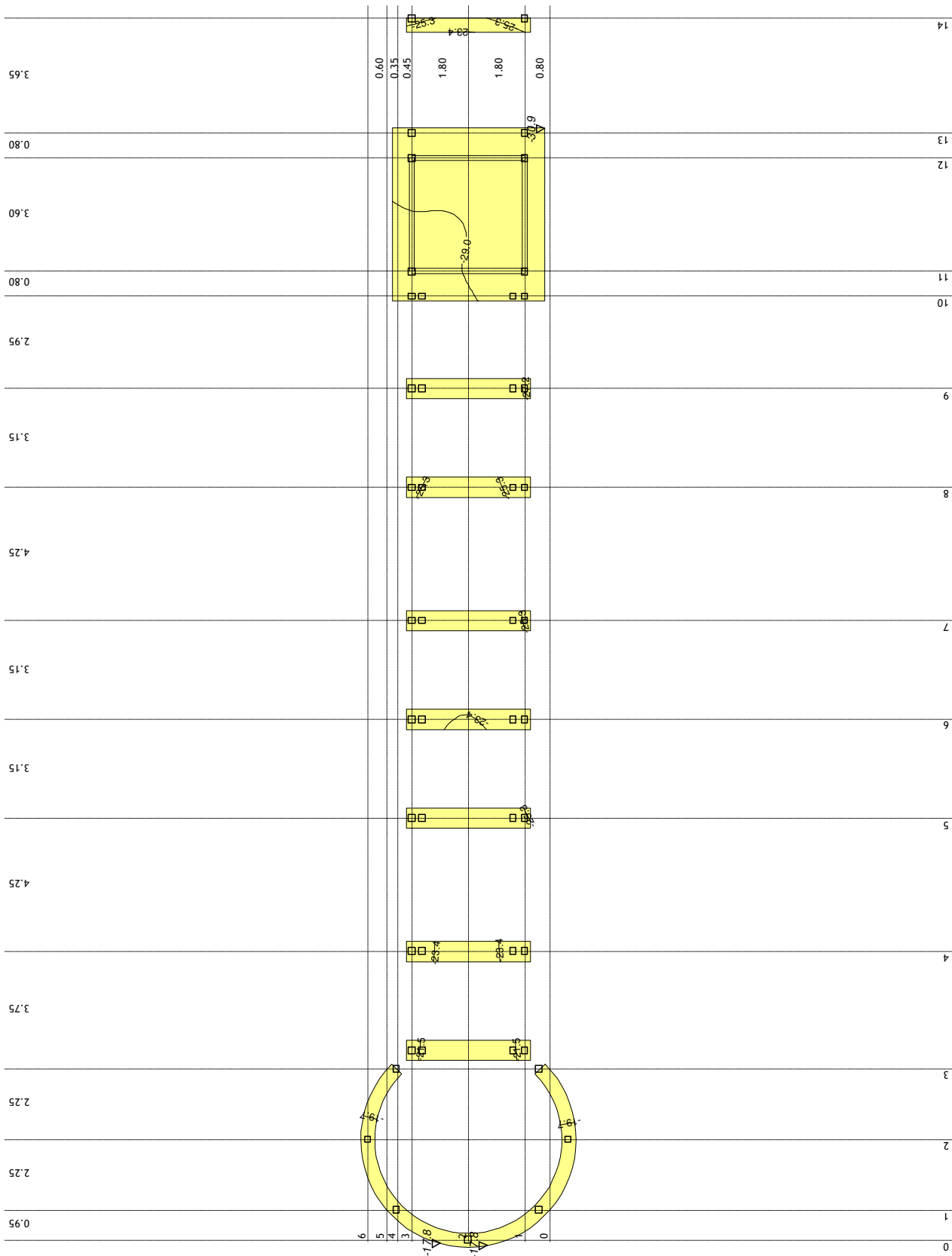
FUNDIRANJE

Opt. 6: I+II+III



Nivo: Temelji [-1.20 m]
Utica u pov. osloncu: max σ_{tla} = 139.0 / min σ_{tla} = 80.1 kN/m²

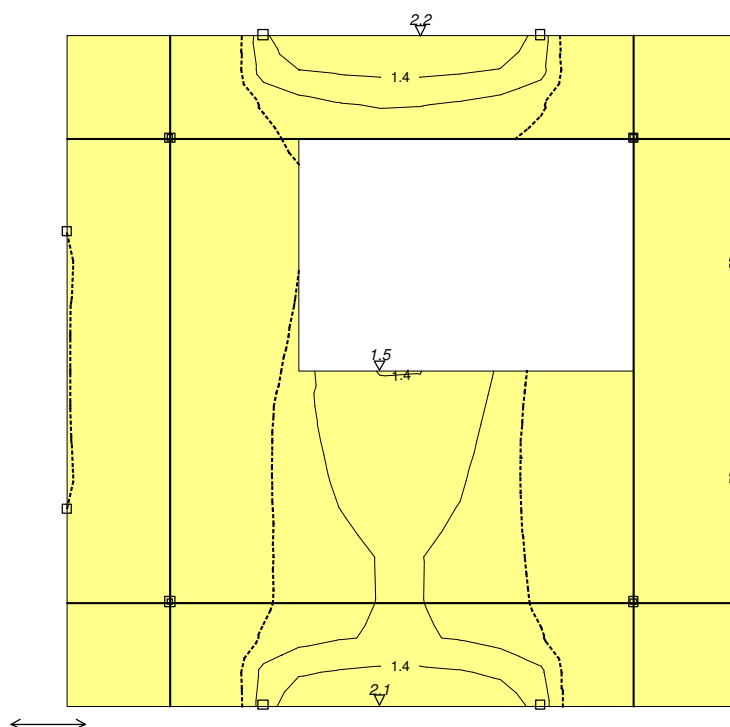
Opt. 6: I+II+III



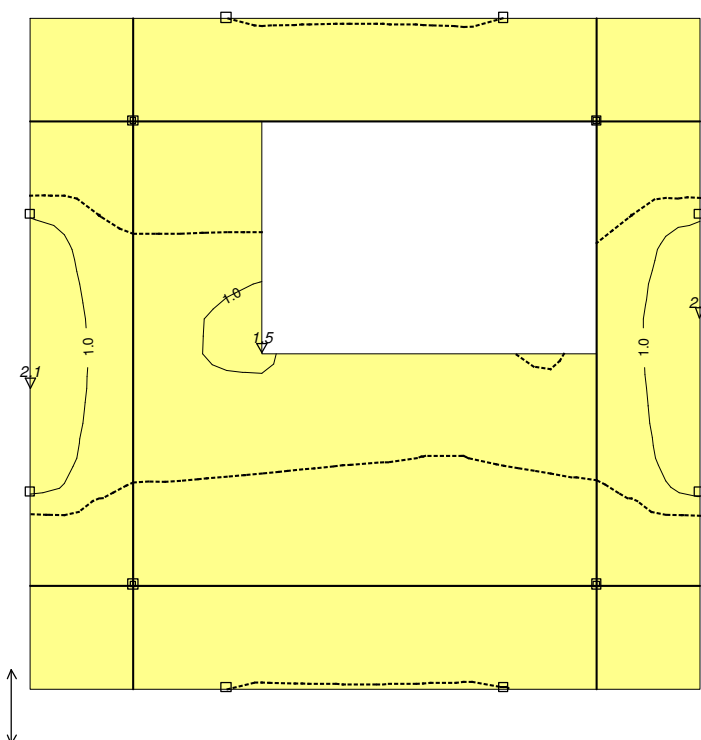
Nivo: Temelji [-1.20 m]
Uticaji u pov. osloncu: max s,tla= -17.8 / min s,tla= -30.9 m / 1000

Dimenzionisanje (beton)

Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, $a=2.00$ cm

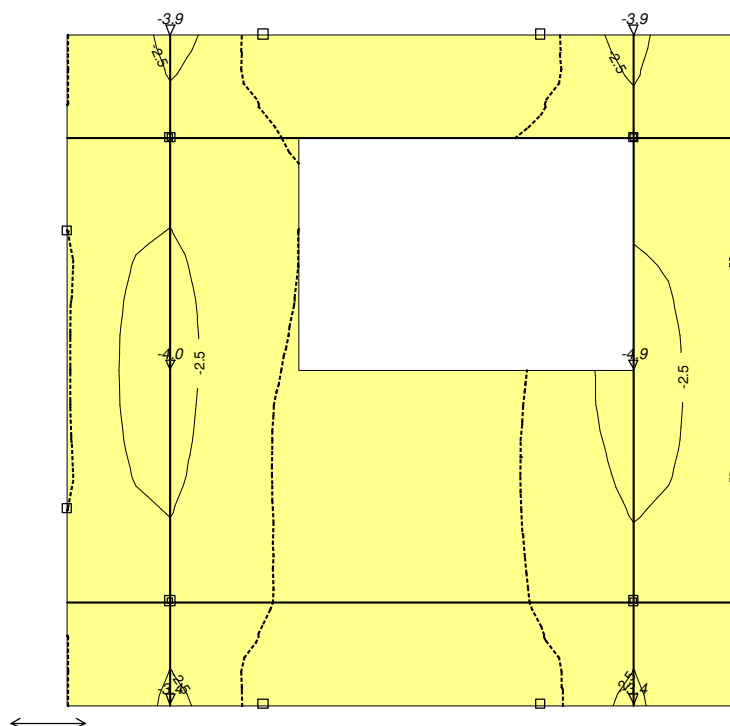


Nivo: [12.25 m]
Aa - d.zona - Pravac 1 - max Aa1,d= 2.2 cm²/m
Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, $a=2.00$ cm

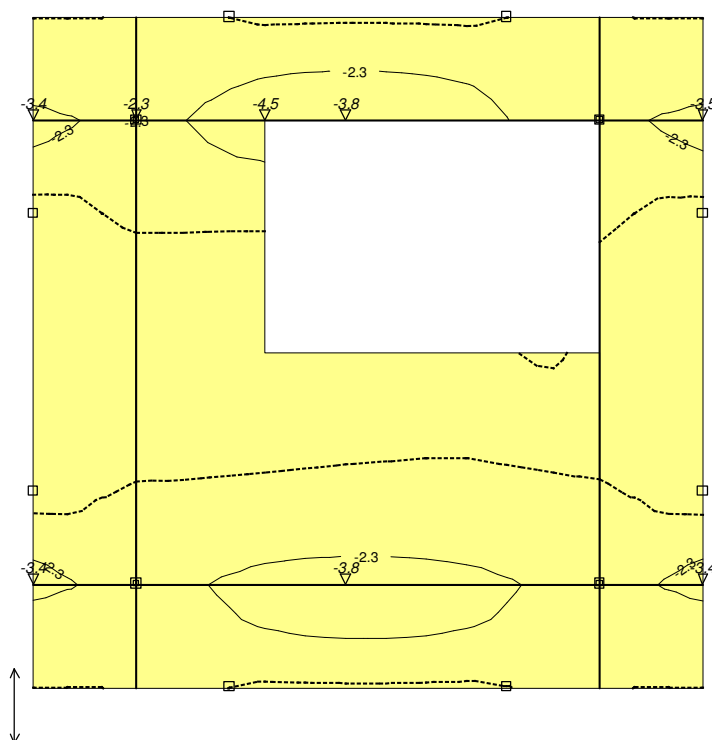


Nivo: [12.25 m]
Aa - d.zona - Pravac 2 - max Aa2,d= 2.1 cm²/m

Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, a=2.00 cm

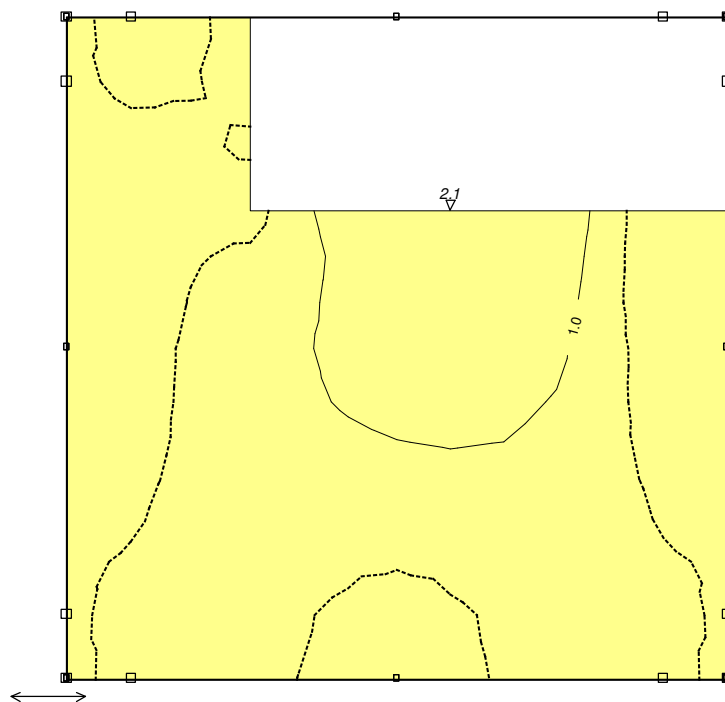


Nivo: [12.25 m]
Aa - g.zona - Pravac 1 - max Aa1,g= -4.9 cm2/m
Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, a=2.00 cm

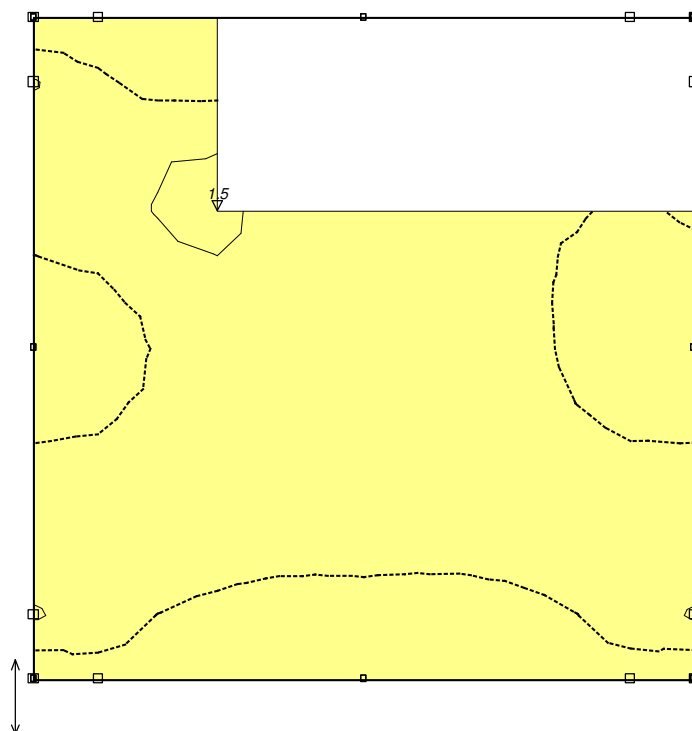


Nivo: [12.25 m]
Aa - g.zona - Pravac 2 - max Aa2,g= -4.5 cm2/m

Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, a=2.00 cm

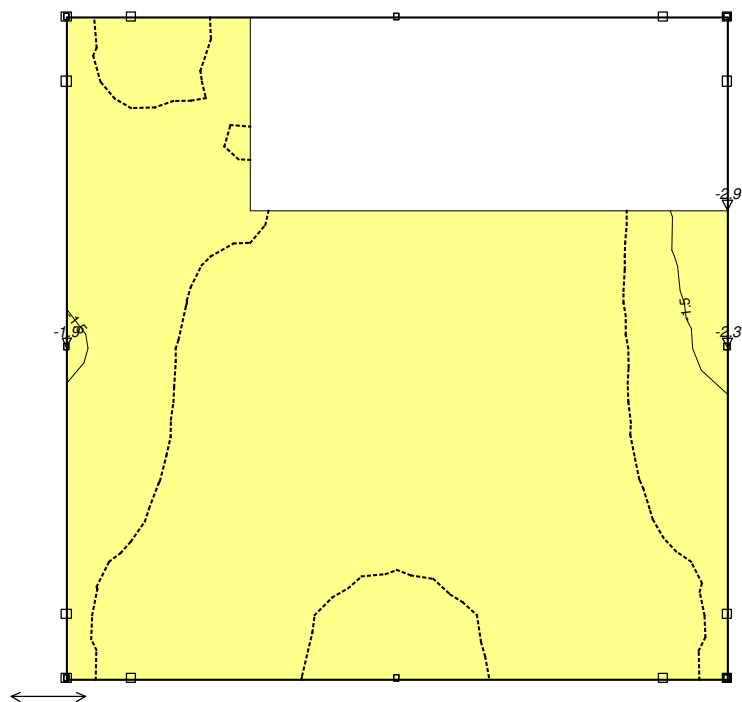


Nivo: 3 sprat 5.68 [8.25 m]
Aa - d.zona - Pravac 1 - max Aa1,d= 2.1 cm²/m
Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, a=2.00 cm

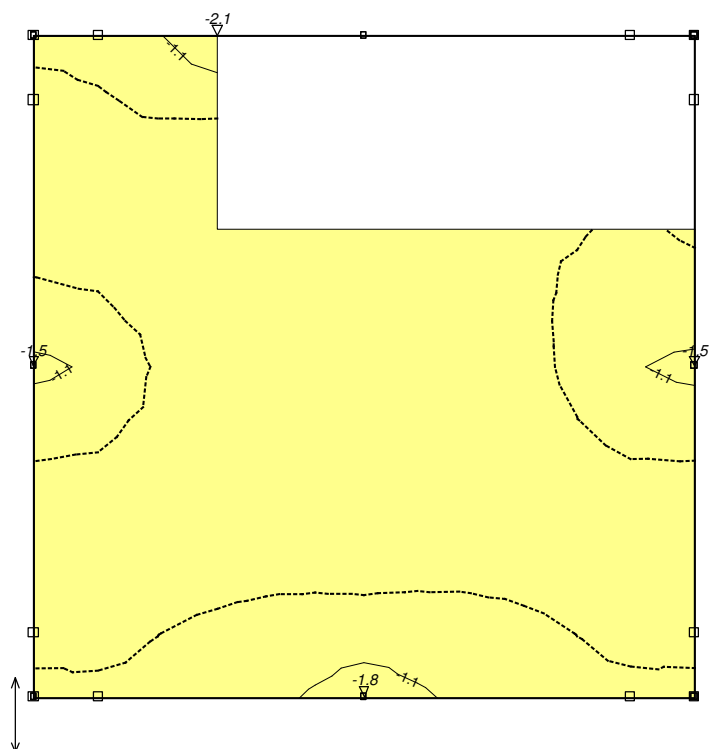


Nivo: 3 sprat 5.68 [8.25 m]
Aa - d.zona - Pravac 2 - max Aa2,d= 1.5 cm²/m

Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, a=2.00 cm

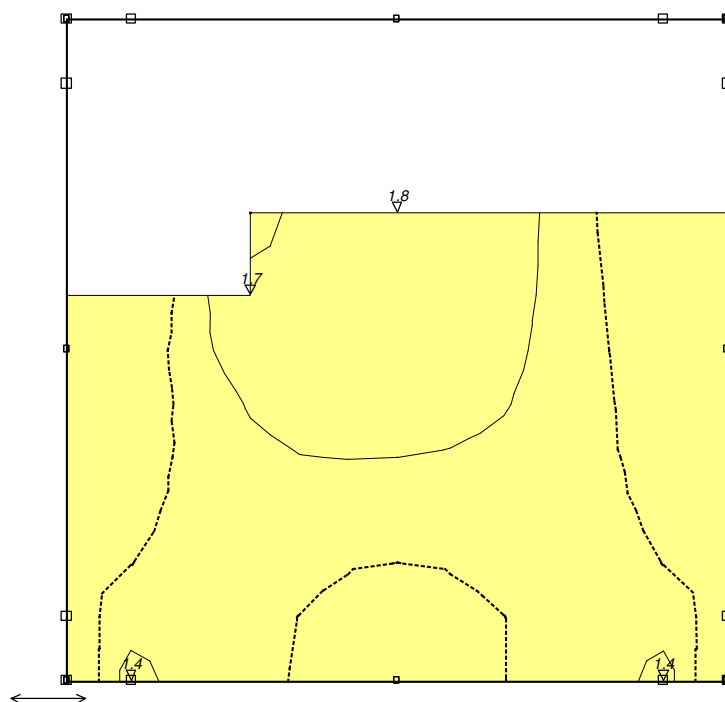


Nivo: 3 sprat 5.68 [8.25 m]
Aa - g.zona - Pravac 1 - max Aa1,g= -2.9 cm²/m
Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, a=2.00 cm

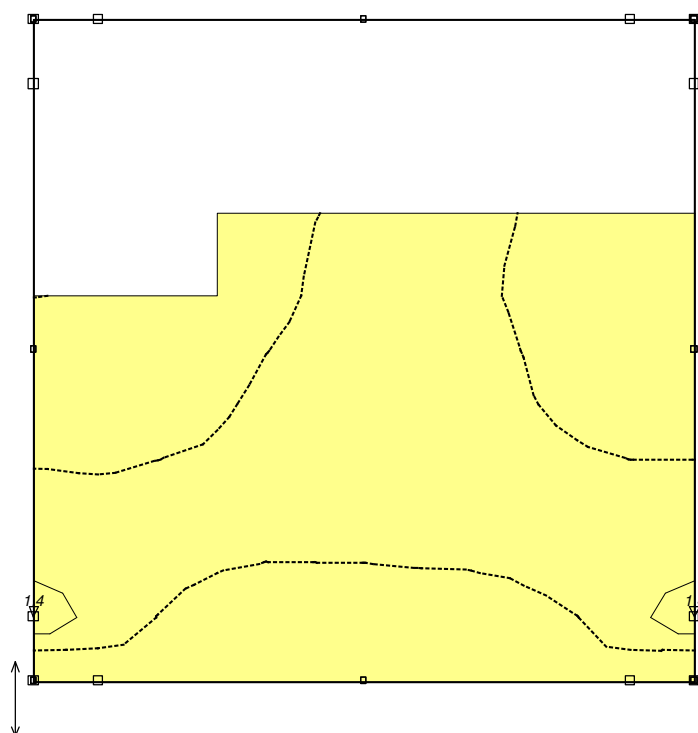


Nivo: 3 sprat 5.68 [8.25 m]
Aa - g.zona - Pravac 2 - max Aa2,g= -2.1 cm²/m

Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, a=2.00 cm

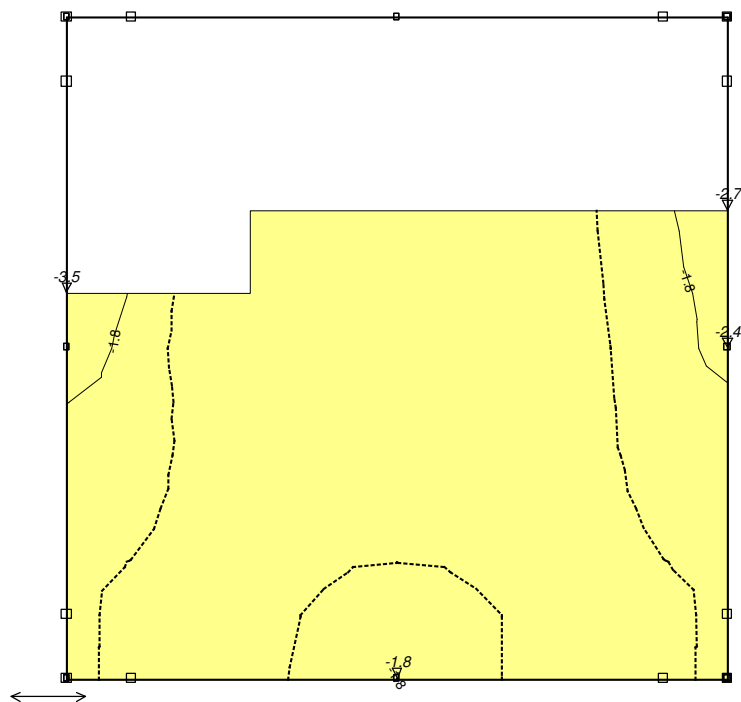


Nivo: 2 sprat 2.96 [5.50 m]
Aa - d.zona - Pravac 1 - max Aa1,d= 1.8 cm²/m
Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, a=2.00 cm

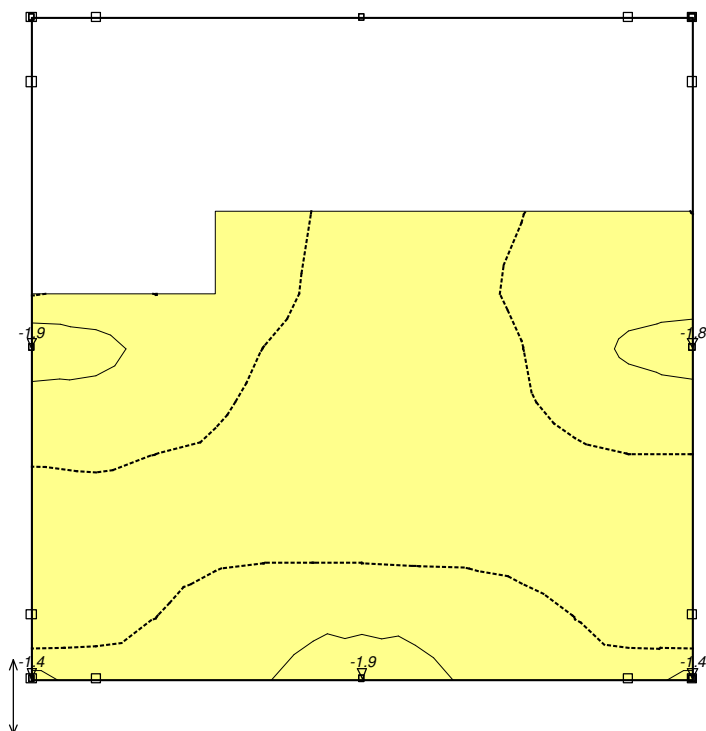


Nivo: 2 sprat 2.96 [5.50 m]
Aa - d.zona - Pravac 2 - max Aa2,d= 1.4 cm²/m

Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, a=2.00 cm

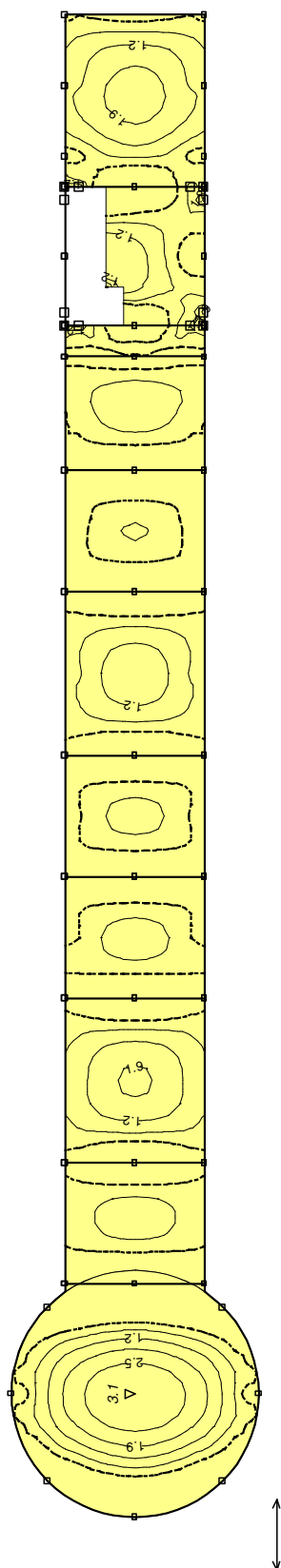


Nivo: 2 sprat 2.96 [5.50 m]
Aa - g.zona - Pravac 1 - max Aa1,g= -3.5 cm²/m
Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, a=2.00 cm



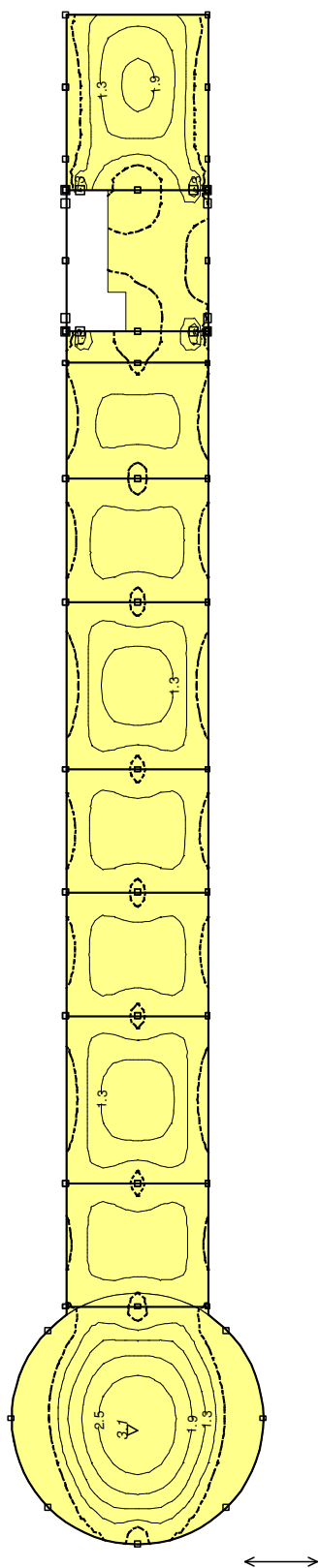
Nivo: 2 sprat 2.96 [5.50 m]
Aa - g.zona - Pravac 2 - max Aa2,g= -1.9 cm²/m

Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, a=2.00 cm



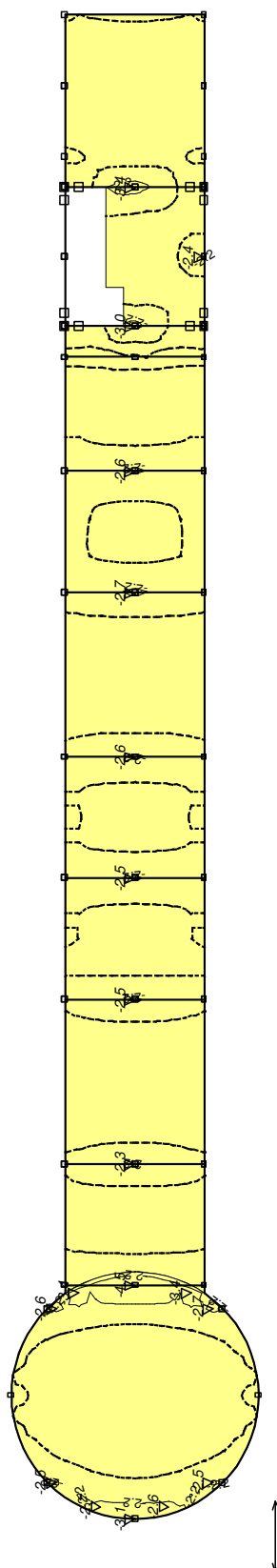
Nivo: 1 sprat 0.00 [2.75 m]
Aa - d.zona - Pravac 1 - max Aa1,d= 3.1 cm²/m

Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, a=2.00 cm



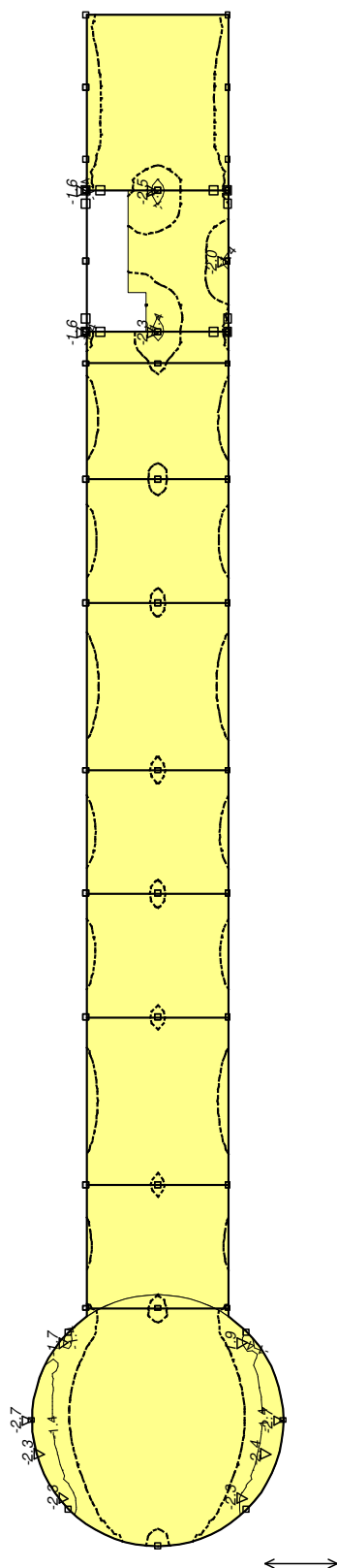
Nivo: 1 sprat 0.00 [2.75 m]
Aa - d.zona - Pravac 2 - max Aa2,d= 3.1 cm²/m

Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, a=2.00 cm



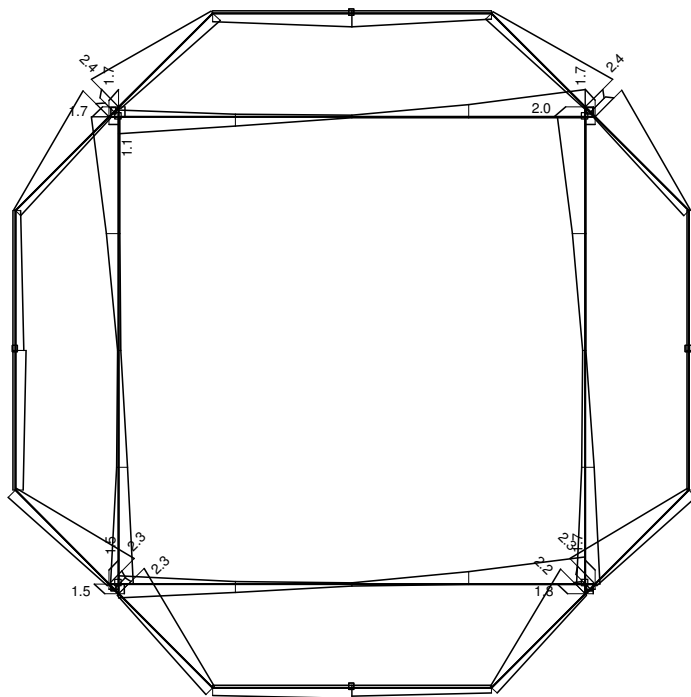
Nivo: 1 sprat 0.00 [2.75 m]
Aa - g.zona - Pramac 1 - max Aa1,g= -4.5 cm²/m

Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, a=2.00 cm

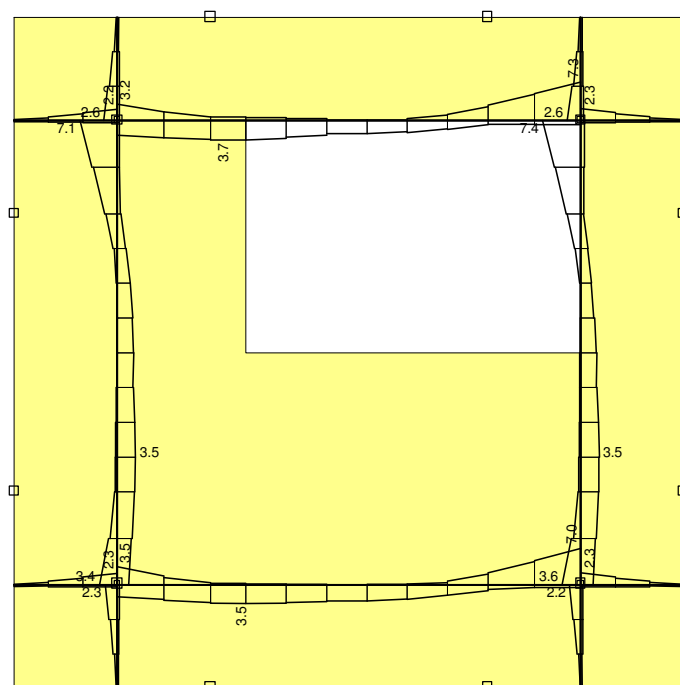


Nivo: 1 sprat 0.00 [2.75 m]
Aa - g.zona - Pravac 2 - max Aa2,g= -2.7 cm²/m

Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500

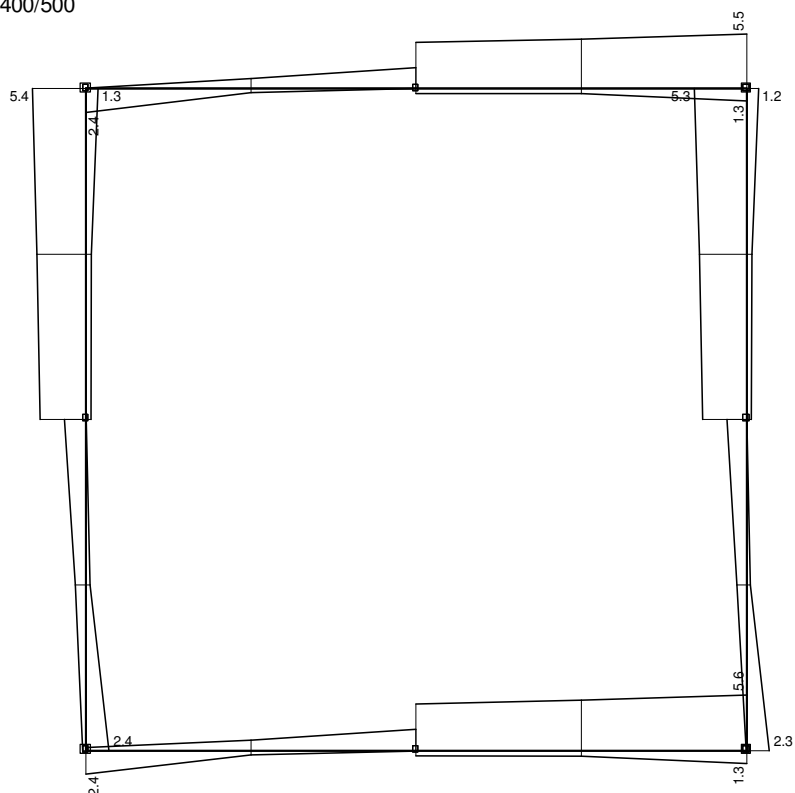


Nivo: Pk [15.00 m]
 Armatura u gredama: max Aa2/Aa1= 2.4 cm2
 Merodavno opterećenje: 6-9
 PBAB 87, MB 30, RA 400/500

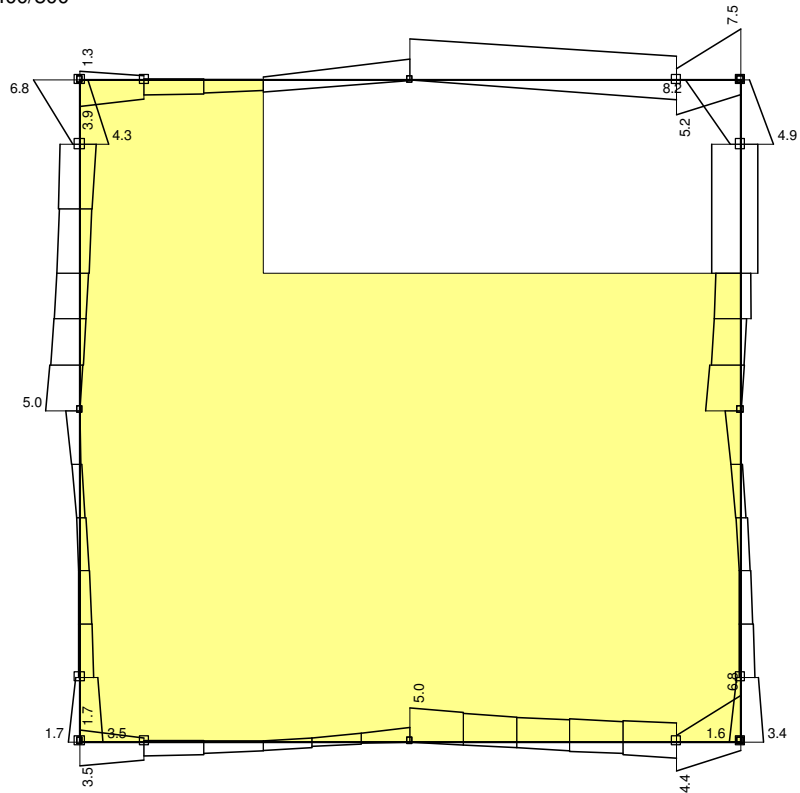


Nivo: [12.25 m]
Armatura u gredama: max $A_{a2}/A_{a1} = 7.4 \text{ cm}^2$

Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500

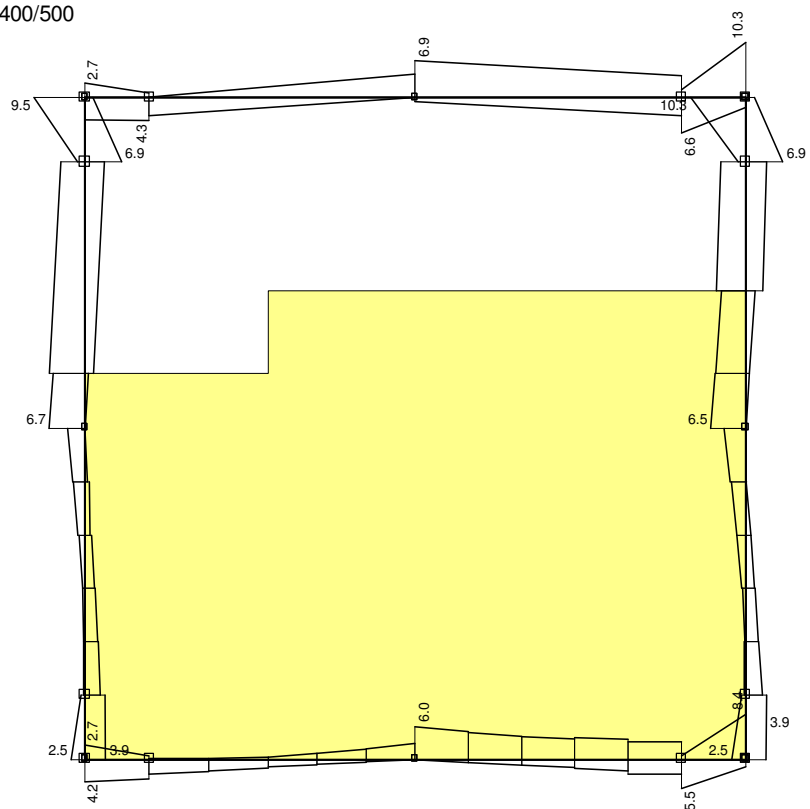


Nivo: 4 sprat - vidikovac [11.00 m]
Armatura u gredama: max $A_{a2}/A_{a1} = 5.6 \text{ cm}^2$
Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500



Nivo: 3 sprat 5.68 [8.25 m]
Armatura u gredama: max $A_{a2}/A_{a1} = 8.2 \text{ cm}^2$

Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500

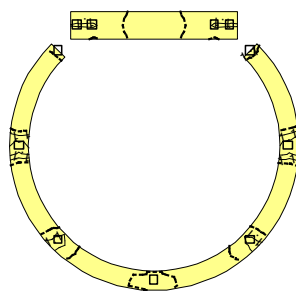
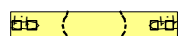
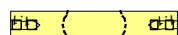
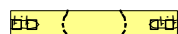
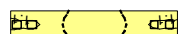
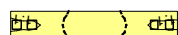
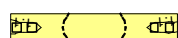
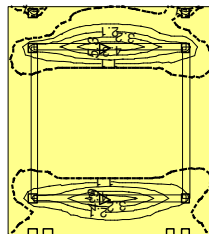
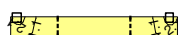


Nivo: 2 sprat 2.96 [5.50 m]
Armatura u gredama: max $A_{a2}/A_{a1} = 10.3 \text{ cm}^2$

Nivo: 1 sprat 0.00 [2.75 m]

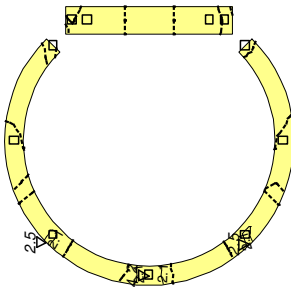
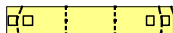
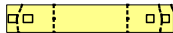
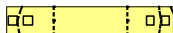
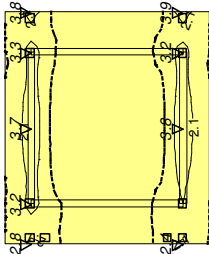
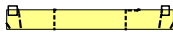
Armatura u gredama: $\max A_{a2}/A_{a1} = 9.8 \text{ cm}^2$

Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, a=4.00 cm



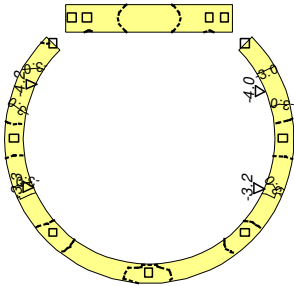
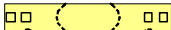
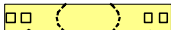
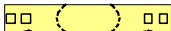
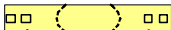
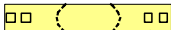
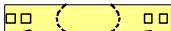
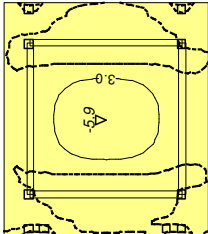
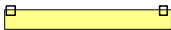
Nivo: Temelji [-1.20 m]
Aa - d.zona - Pravac 1 - max Aa1,d= 5.3 cm²/m

Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, a=4.00 cm



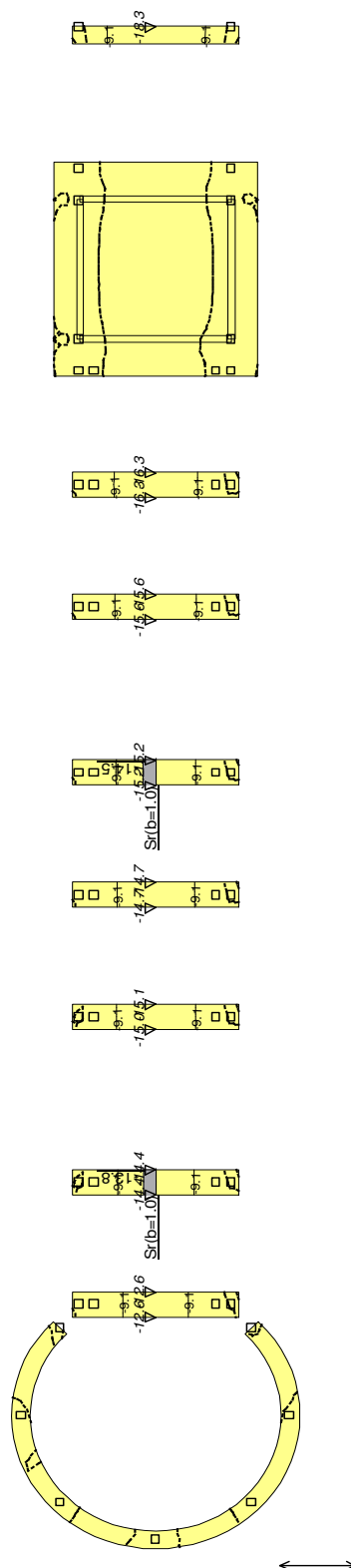
Nivo: Temelji [-1.20 m]
Aa - d.zona - Pravac 2 - max Aa2,d= 4.2 cm2/m

Merodavno opterećenje: 6-9
PBAB 87, MB 30, RA 400/500, a=4.00 cm



Nivo: Temelji [-1.20 m]
Aa - g.zona - Pravac 1 - max Aa1,g= -5.9 cm2/m

Merodavno opterečenje: 6-9
PBAB 87, MB 30, RA 400/500, a=4.00 cm



Nivo: Temelji [-1.20 m]
Aa - g.zona - Pravac 2 - max Aa2,g= -18.3 cm²/m

Ovlašćeni projektant