

**1. TEHNIČKI IZVJEŠTAJ**  
*i uvod u statički proračun*

## 1.1. TEHNIČKI IZVJEŠTAJ

Projektni zadatak je izraditi konstrukciju stambeno poslovnog objekta koji je smješten u ulici Lacina u Mostaru. Objekat je spratnosti Suteren+P+2 približno pravougaonog oblika variabilnih dimenzija cca. 13,00x16,00m. Objekat je okružen stambenim objekta slične spratnosti na relativno malim međusobnim rastojanjima.

### GEOLOŠKO GEOMEHANIČKI USLOVI

Izvršen je obilazak terena lokacije na kojoj se nalazi pomenuti objekat. Iskop suterena je izveden i primjećeno je prisustvo dobro vezanog konglomerata na dubini temeljenja. Može se zaključiti da su uslovi temeljenja dobri. Detaljan izvještaj o karakteristikama stijene dat je u nastavku statickog proračuna.

### OPIS KONSTRUKCIJE

Konstruktivni sistem objekta je armirano betonska konstrukcija sastavljena od međuspratnih konstrukcija koje čine grede i ploče i AB zidova kojim se obezbeđuje prijem horizontalnih sila. Krovna konstrukcija je projektovana kao AB konstrukcija – ravni krov.

Objekat se izvodi u dvije faze i to prva faza suteren kojeg čini ploča na koti -2,50 i ploča na koti ±0,00. Obe ploče su namjenjene kao parking površine. U ovoj fazi potrebno je izraditi rampe sa kojima će se uspostaviti komunikacija sa ulicom. U drugoj fazi razrade konstrukcije potrebno je izvesti dodatna 2 sprata kojeg čine ploče na kotama +3,15, +5,95, +8,75 koje su prema namjeni stambene površine i krovna ploča. U ovoj fazi za ploču na koti ±0,00 ostavljena je mogućnost prenamjene u poslovne prostore ili stambene površine. Ovaj dio razrade konstrukcije bit će dat u sklopu izrade druge faze projektnog rješenja.

Sva opterećenja koja se sa spratova prenose u prizemlje uzeta su u obzir u sklopu ovoga elaborata.

Konstrukcija je temeljena na temeljnim trakama dimenzija b/h=100/80cm i na mjestima manjeg stepena naprazanja b/h=100/60cm.

Vertikalna komunikacija je rješena sa AB stepeništem koje je potrebno izvesti u fazi 2 kao AB stepenište dok se kao komunikacija prizemlja i suterena, a radi jednostavnije izvedbe, izvodi čelično stepenište koje će biti definisano u fazi 2 razrade projektnog rješenja.

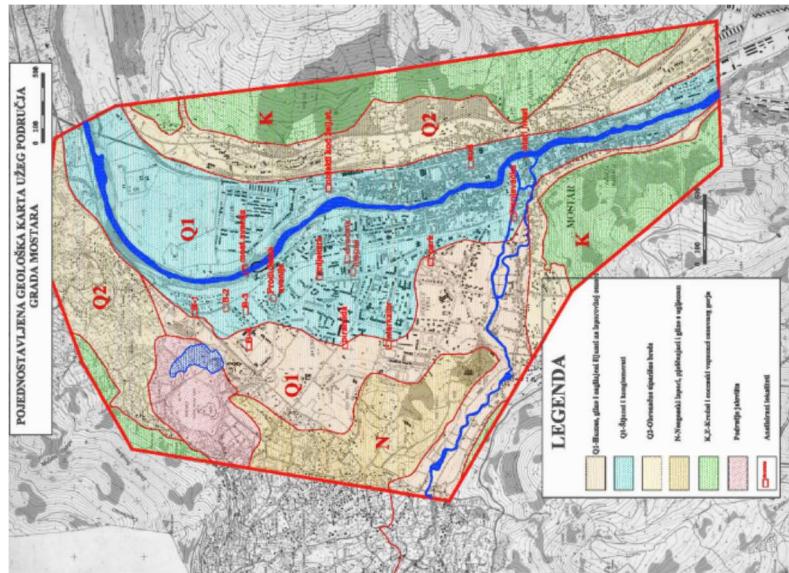
### ANALIZA KONSTRUKCIJE

U sklopu projekta izvršena je 3D analiza konstrukcije korištenjem računarskog programa TOWER 8. Ulazni podaci za analizu dobiveni su iz arhitektonskog projekta, a podaci o opterećenju iz važećih propisa.

Za analizu i projektovanje konstrukcije korišteni su slijedeći propisi:

- Pravilnik o tehničkim mjerama za temeljenje građevina (Sl. list 15/90)
- Pravilnik o tehničkim mjerama i uslovima za izvođenje zidova zgrada (Sl. list 17/70)
- Pravilnik o tehničkim mjerama za izgradnju zgrada u zemljotresnim područjima (Sl. list 31/81 i 29/83)
- Pravilnik o tehničkim normama za dejstva nosivih konstrukcija (Sl. list 26/88)
- Tehnički propisi za upotrebu rebrastog čelika za armirani beton (Sl. list 39/65 i 16/68)
- Pravilnik o tehničkim mjerama i uslovima za upotrebu mrežaste armature u armirano betonskim konstrukcijama (Sl. list 32/69)
- JUS U.C7 121/88 Osnove projektovanja građevinskih konstrukcija
- EN 1991-1-1:2002 – Korisna opterećenja u zgradama
- EN 1991-1-3: 2003 – Proračun dejstva opterećenja snijegom
- EN 1992-1-1:2004 – Proračun AB konstrukcija
- EN 1991-1-4:2005 – Proračun opterećenja vjetrom
- BAS EN 1998-1/NA:2018 – Seizmička karta BiH
- BAS EN 1991-1-3/NA:2018 – Vjetrovna karta BiH

## 1.1.KOEFICIJENTI POSTELJICE I TEMELJENE



SLIKA 1 - Geološka karta grada Mostara

Objekat se nalazi u zoni Q1 (Šljunci i konglomerati). Prema do sada izvedenim objektima i sličnim iskustvima u ovakvom materijalu može se pretpostaviti da se u ovakvim materijalima razlikuju dvije granične vrijednosti geomehaničkih parametara i to:

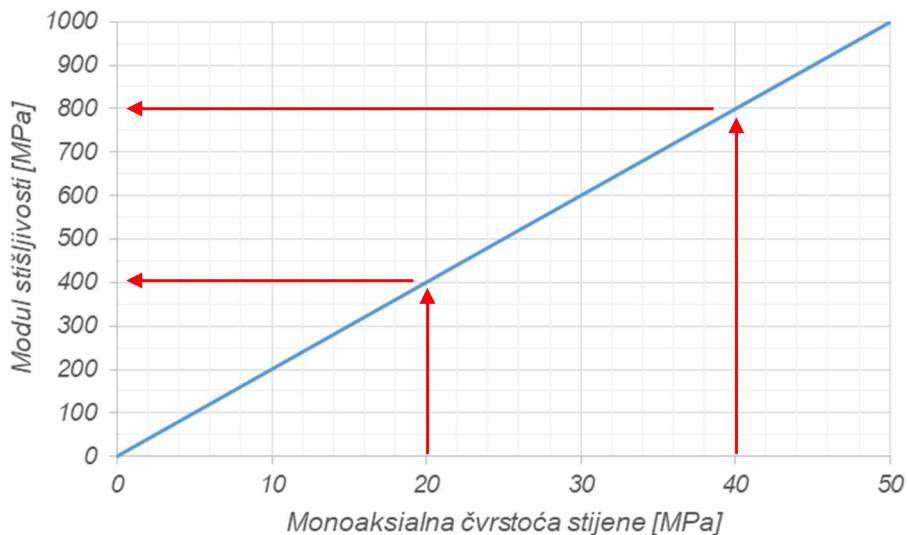
### Šljunak:

Zapreminska težina:  $y=18-20 \text{ [kN/m}^3]$   
Kohezija:  $c=0 \text{ [kN/m}^2]$   
Ugao unutrašnjeg trenja:  $\varphi=28-34 \text{ [°]}$   
Modul stišljivosti:  $M_s=50-65 \text{ [MPa]}$

### Konglomerat:

Zapreminska težina:  $y=20-22 \text{ [kN/m}^3]$   
Kohezija:  $c=100-200 \text{ [kN/m}^2]$   
Ugao unutrašnjeg trenja:  $\varphi>35 \text{ [°]}$   
Monoaksialna čvrstoća na pritisak:  $\sigma_s=20-40 \text{ [MPa]}$

Modul stišljivosti stijene može se u zavisnosti od monoaksialne čvrstoće stijene usvojiti prema SLIKA 2.  
Modul stišljivosti:  $M_s=400-600 \text{ [MPa]}$

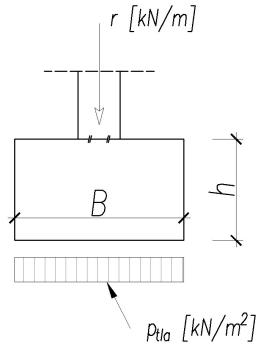


SLIKA 2 – Veza monoaksialne čvrstoće na pritisak i modula stišljivosti stijene

Prema prethodno prikazanim parametrima može se na osnovu odabranog intervala modula stišljivosti sračuna krutost oslonaca (temelja).

Objekat se temelji na temeljnim trakama širine 1m i visine 0,6m na koje se oslanjaju zidovi, i temeljna ploča debljine d=20cm.

Temeljne trake se posmatraju kao linijski ležajevi dok se temeljna ploča tretira kao površinski. Model za proračun koeficijenta posteljice prikazan je u nastavku.



$$\frac{p_{tla}}{s} = \frac{M_s}{k \cdot \phi \cdot B}$$

$$k = \frac{1}{2 \cdot \tan \phi} \rightarrow \text{Uticaj ugla trenja na raspodjelu napona ispod temelja}$$

$$\phi = \frac{\ln(L/B)}{(1-B/L)} \rightarrow \text{Uticaj oblika temelja}$$

$$B/L = 1/15$$

$$\phi = \frac{\ln(15)}{(1-1/15)} = 2,90$$

$$p_{tla} = \frac{r}{B}$$

Pa se koeficijent krunosti linijskog ležaja može napisati kombinacijom jednačina i to:

$$\frac{r}{s} = K_{lin} = \frac{M_s}{k \cdot \phi}$$

Za površinski oslonac ispod ploče mogu se usvojiti sljedeće pretpostavke

$$L \approx B$$

$$\phi = 1$$

$$\frac{p_{tla}}{s} = K_{surf} = \frac{M_s}{k \cdot B}$$

Usvojene vrijednosti modula stišljivosti su 65 i 600 MPa kao donja i gornja granica pa se koeficijenti krutosti za oslonce iznose:

Oslonac	Šljunak ( $\phi=30$ ) $k=0,85$ $M_s=50 \text{ MPa}$	Konglomerat ( $\phi=40$ ) $k=0,70$ $M_s=800 \text{ MPa}$
Linjiski [ $\text{kN}/\text{m}^2$ ] $\phi=2,90$	20 290	395 000
Površinski [ $\text{kN}/\text{m}^3$ ] $\phi=1,00$	3 920	76 200

Prema uvidu u postojeće stanje na terenu utvrđeno je da se objekat nalazi u srednje do dobro vezanom konglomeratu te će se u skladu sa tim usvojiti veće vrijednosti koeficijenata posteljice.

## 1.2. ANALIZA OPTEREĆENJA

### STALNO OPTEREĆENJE

<i>Težina pregradnih zidova</i>	1,50 kN/m <sup>2</sup>
<i>Podovi</i>	2,00 kN/m <sup>2</sup>
<i>Rubni zidani zidovi</i>	2,40 kN/m <sup>2</sup>
<i>Opterećenje ravnog krova</i>	$20 \cdot 0,07 + 25 \cdot 0,10 = 7,20 \text{ kN/m}^2$

Napomena: Sopstvene težine elemenata uzimaju se automatski u softverskom paketu TOWER.

### KORISNO OPTEREĆENJE

<i>Stanovi</i>	2,00 kN/m <sup>2</sup>
<i>Poslovni prostori</i>	3,00 kN/m <sup>2</sup>
<i>Balkoni</i>	4,00 kN/m <sup>2</sup>
<i>Stepeništa i međupodestи</i>	4,00 kN/m <sup>2</sup>
<i>Garaža</i>	$q=5,00 \text{ kN/m}^2$
	$Q=2x40\text{kN na razmaku } 1,20\text{m}$

Intenzitet korisnog opterećenja usvojen je prema standardu **EN 1991-1-1:2002**.

## SEIZMIČKO OPTEREĆENJE

Seizmičko ubrzanje usvaja se prema nacionalnom dodatku **BAS EN 1998-1/NA:2018**.

Seizmičko ubrzanje: 0,26g  
Tip tla: A

U prostornom modelu se objekat modelira globalno pomoću površinskih i linijskih elemenata. Na objekat se nanosi stalno opterećenje i 30% korisnog opterećenja. Frekvencije konstrukcije bez korisnog opterećenja nemaju značajno odstupanje od prirodnih frekvencija konstrukcije uslijed sopstvene težine konstrukcije pa se potresna kombinacija sa stalnim opterećenjem može izbaciti.

Periodi oscilovanja ( $T$ ) su:

Pravac potresa/Tip podloge	Šljunak	Konglomerat
SEIZMIKA X	0,201	
SEIZMIKA Y	0,228	0,191

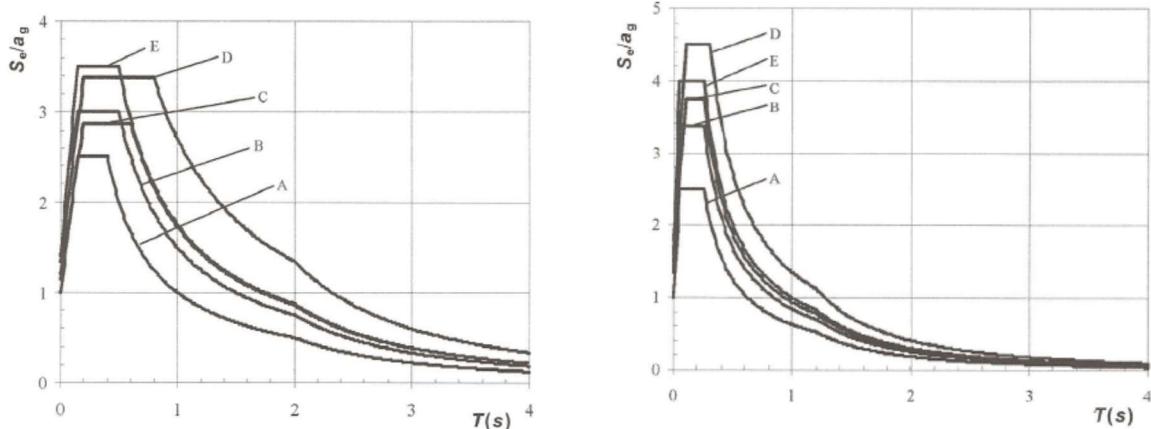
Proračun se provodi metodom ekvivalentnog statičkog opterećenja. Proračun sile se vrši prema spektru odgovora za potresno dejstvo koje daje najveće seizmičko opterećenje. Sopstvene frekvencije konstrukcije u oba slučaja temeljenja su takve da za oba tipa potresa konstrukcija ima rezonantan odgovor i iste vrijednosti amplitude spektralnih ubrzanja.. U nastavku su prikazane vrijednosti dva karakteristična projektna spektra TIP 1 i TIP 2.

$$\begin{aligned} 0 < T < T_B \quad S_e(T) = a_g \cdot S \cdot \left[ 1 + \frac{T}{T_B} \cdot (\eta \cdot 2,5 - 1) \right] \\ T_B < T < T_C \quad S_e(T) = a_g \cdot S \cdot \eta \cdot 2,5 \\ T_C < T < T_D \quad S_e(T) = a_g \cdot S \cdot \eta \cdot 2,5 \cdot \frac{T_C}{T} \\ T_D < T < 4S \quad S_e(T) = a_g \cdot S \cdot \eta \cdot 2,5 \cdot \frac{T_D \cdot T_C}{T} \end{aligned}$$

Kategorija tla	S	$T_{B,(s)}$	$T_{C,(s)}$	$T_{D,(s)}$
A	1,00	0,15	0,40	2,0
B	1,20	0,15	0,50	2,0
C	1,15	0,20	0,60	2,0
D	1,35	0,20	0,80	2,0
E	1,40	0,15	0,50	2,0

Potresno dejstvo tip 1 - Elastični spektar odgovora

Kategorija tla	S	$T_{B,(s)}$	$T_{C,(s)}$	$T_{D,(s)}$
A	1,00	0,05	0,25	1,2
B	1,35	0,05	0,25	1,2
C	1,50	0,10	0,25	1,2
D	1,80	0,10	0,30	1,2
E	1,60	0,05	0,25	1,2



SLIKA 3 - TIP 1 i TIP 2 ELASTIČNOG SPEKTRA ODGOVORA

Raspored masa grupiše se u nivoje međuspratnih konstrukcija. Ukupna horizontalna sila koju izaziva potresno opterećenje računa se prema izrazu:

$$F_b = S_{d(T_1)} \cdot m \cdot \lambda$$

$S_{d(T_1)}$  → Ordinata spektra odgovora

$m$  → Ukupna masa konstrukcije za kombinaciju G+30%Q

$\lambda$  → Korekcioni faktor  $\lambda=1,00$

$$S_e(T) = a_g \cdot S \cdot \eta \cdot 2,5$$

$$S_e(T) = 0,26 \cdot 9,81 \cdot 1,00 \cdot 1,00 \cdot 2,5 = 6,38 \text{ m/s}^2$$

Nivo [m]	Masa [T]
11,25	215
8,45	260
5,65	270
2,50	290
0,00	400
UKUPNO:	1435

$$F_b = 6,38 \cdot 1435 \cdot 1,00 = 9155 \text{ kN}$$

Seizmička sila  $i$ -tog sprata računa se kao:

$$F_i = F_b \cdot \frac{m_i \cdot z_i}{\sum m_i \cdot z_i}$$

Detaljan proračun sprovodi se primjenom softverskog paketa.

## **OPTEREĆENJE SNIJEGOM**

Osnovna vrijednost opterećenja snijegom usvojena je prema nacionalnom dodatku **BAS EN 1991-1-3/NA:2018** i iznosi:

$$s_n = 0,75 \text{ kN/m}^2$$

Dejstvo snijega na konstrukciju razmatra se prema propisu **EN 1991-1-3: 2003**. Topografija terena je zaklonjena pa se faktor topografije usvaja  $C_e=1,20$ . Krov je ravni pa se koeficijent oblika usvaja  $\mu=1,00$ . Termički koeficijent usvaja se  $C_t=1,00$ . Računsko opterećenje snijegom iznosi:

$$s_{n,k} = C_e \cdot C_t \cdot \mu \cdot s_n$$

$$s_{n,k} = 1,20 \cdot 1,00 \cdot 1,00 \cdot 0,75 = 1,00 \text{ kN/m}^2$$

## OPTEREĆENJE VJETROM

Osnovna brzina vjetra:  $V_{b,0} = 35 \text{ m/s}$   
 Kategorija terena: III  
 Visina objekta iznad kote tla  $H=10m$

Osnovna brzina vjetra iznosi:

$$V_b = C_{prob} \cdot C_{dir} \cdot C_{season} \cdot V_{b,0}$$

$C_{season}$  → Faktor sezonskog djelovanja (preporučena vrijednost 1,00)

$C_{dir}$  → Faktor pravca (preporučena vrijednost 1,00)

$C_{prob}$  → Vjerovatnoća pojave prekoračenja (usvojena vrijednost 1,00)

Srednja vrijednost brzine vjetra računa se prema izrazu:

$$V_m = C_{r(z)} \cdot C_{0(z)} \cdot V_{b,0}$$

$C_{r(z)}$  → Koeficijent hrapavosti terena

$C_{0(z)}$  → Koeficijent topografije (Usvojeno 1,00)

$C_{e(z)}$  → Koeficijent izloženosti

Prema propisu **EN 1991-1-4:2005** koeficijent hrapavosti terena može se sračunati prema:

$$k_{r(z)} = 0,19 \cdot \left( \frac{z_0}{z_{0,II}} \right)^{0,07}$$

$$c_{r(z)} = k_{r(z)} \cdot \ln \left( \frac{z}{z_0} \right)$$

Kategorija terena	$z_0$ m	$z_{min}$ m
0 More ili obalno područje izloženo otvorenom moru	0,003	1
I Jezera ili ravnica i horizontalna površina sa zanemarljivom vegetacijom i bez prepreka	0,01	1
II Površina sa niskom vegetacijom, kao što je trava i izolovanim preprekama (drveće, zgrade), koje su udaljene za najmanje 20 visina prepreke	0,05	2
III Površina sa redovnom prekrivenošću vegetacijom ili zgradama, ili, pak, izolovanim preprekama koje su udaljene za najviše 20 visina prepreke (kao što su sela, prigradski tereni, neprekidna šuma)	0,3	5
IV Površina, na kojoj je najmanje 15% površine prekriveno zgradama, čija prosečna visina prelazi 15 m	1,0	10

Napomena: Kategorije terena ilustrovane su u A.1.

**SLIKA 4 - EN 1991-1-4: 2005 Kategorija terena i dužina hrapavosti**

$$k_{r(z)} = 0,19 \cdot \left( \frac{0,30}{0,55} \right)^{0,07} \approx 0,20$$

$$c_{r(z)} = 0,20 \cdot \ln \left( \frac{10}{0,30} \right) = 0,70$$

Koeficijent izloženosti zavisi od intenziteta turbulencije koji je jednak:

$$I_{V(z)} = \frac{k_1}{C_{0(z)} \cdot \ln(z/z_0)} = \frac{1}{1 \cdot \ln(10/0,30)} = 0,30$$

$$q_{p(z)} = 0,50 \cdot (1+7 \cdot I_{v(z)}) \cdot \rho \cdot v_m^2 = 0,50 \cdot (1+7 \cdot I_{v(z)}) \cdot \rho \cdot (c_{r(z)} \cdot c_{0(z)} \cdot v_{b,0})^2$$

$$q_{p(z)} = 0,50 \cdot (1+7 \cdot 0,30) \cdot 1,25 \cdot (0,70 \cdot 1,00 \cdot 35)^2 = 1,20 \text{ kN/m}^2$$

Udarni pritisak vjetra iznosi:

$$q_{p(z)} = 1,20 \text{ kN/m}^2$$

Pritisak vjetra na konstrukciju određuje se prema izrazu:

$$q_{d(z)} = c_s \cdot c_d \cdot q_{w(z)}$$

$c_s \cdot c_d \rightarrow$  Koeficijent konstrukcije (Usvojena vrijednost 1,00)

$$q_{w,d(z)} = c_{pe} \cdot q_{p(z)}$$

$$q_{fr,w,d(z)} = c_{fr} \cdot q_{p(z)}$$

$c_{pe} \rightarrow$  Koeficijent pritiska ovisan od oblika konstrukcije

$c_{fr} \rightarrow$  Koeficijent trenja

Zona	A		B		C		D		E	
$h/d$	$c_{pe,10}$	$c_{pe,1}$								
5	-1,2	-1,4	-0,8	-1,1	-0,5		+0,8	+1,0	-0,7	
1	-1,2	-1,4	-0,8	-1,1	-0,5		+0,8	+1,0	-0,5	
$\leq 0,25$	-1,2	-1,4	-0,8	-1,1	-0,5		+0,7	+1,0	-0,3	

$$+q_{w,d(z)} = 1,20 \text{ kN/m}^2$$

$$-q_{w,d(z)} = 0,60 \text{ kN/m}^2$$

$+q_{w,d(z)} \rightarrow$  Dejstvo sile pritiska vjetra

$-q_{w,d(z)} \rightarrow$  Sišuće dejstvo vjetra

Površina	Koeficijent trenja $c_{fr}$
Glatka (na primer, čelik, gladak beton )	0,01
Hrapava (na primer, hrapav beton, daske premazane smolom)	0,02
Vrlo hrapava (na primer, reljef (ripples), rebra (ribs), preklopi (folds))	0,04

$$q_{fr,w,d(z)} = 0,04 \cdot 1,20 = 0,05 \text{ kN/m}^2$$

Sila trenja djeluje na dužini  $L=15m$  pa je ukupno linijsko opterećenje na ivicama objekta koje izaziva trenje vjetra:

$$q'_{fr,w,d(z)} = L \cdot q_{fr,w,d(z)} = 15 \cdot 0,05 = 0,75 \text{ kN/m}^1$$

*Linjsko opterećenje u nivou međuspratnih konstrukcija od opterećenja vjetrom iznosi:*

$$+q_{w,d}(z) = 1,20 \text{ kN/m}^2$$

$$-q_{w,d}(z) = 0,60 \text{ kN/m}^2$$

$$q_w = 3,15 \cdot (1,20 + 0,60) = 5,67 \approx 6,00 \text{ kN/m}$$

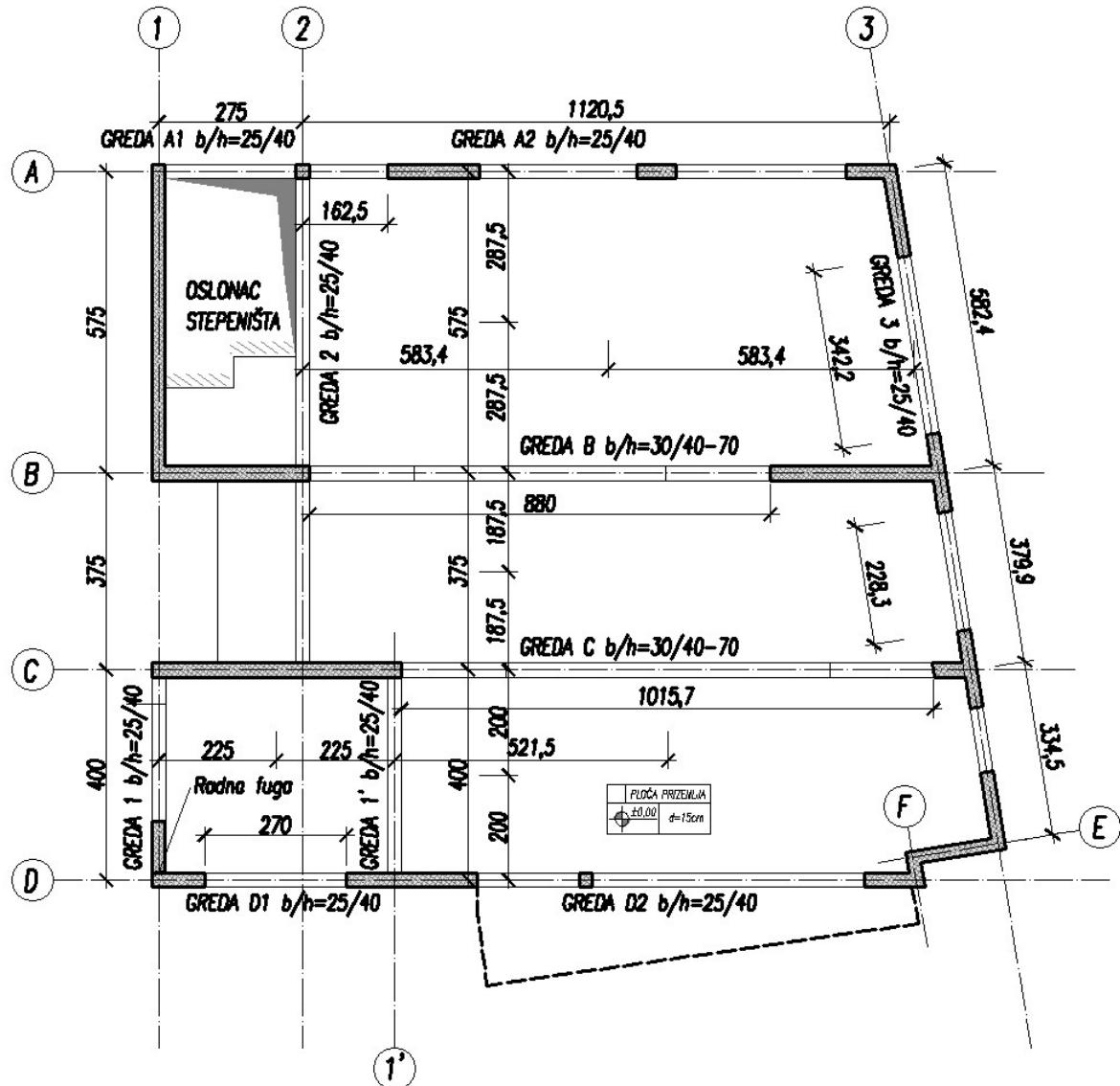
### 1.3.KONSTRUKCIJA I MODELIRANJE

Konstrukcija objekta -1,P,+2 sastavljena je od vertikalnih armirano betonskih zidova, stubova i međuspratnih konstrukcija. Međuspratna konstrukcija je ploča  $d=15\text{cm}$  oslonjena na grede i zidove. Grede su dimenzija od  $d=40\text{cm}$  pa do  $d=70\text{cm}$  konstantne i promjenjive visine.

Objekat se oslanja na temeljnu ploču  $d=20\text{cm}$  i temeljne trake  $b/h=100/80\text{cm}$  i  $b/h=100/60\text{cm}$  ispod nosivih AB zidova. Objekat se temelji na srednje do dobro vezanom konglomeratu.

U softverskom paketu TOWER napravljen je prostorni model sastavljen od površinskih i linijskih elemenata uzimajući pri tome u obzir i sudjelujuću širinu grede. Sudjelujuća širina grede određuje se prema propisu EN 1992-1-1:2004 Proračun armirano betonskih konstrukcija.

#### SUDJELUJUĆA ŠIRINA



SLIKA 5 - POZICIIONI PLAN GREDA NA KOTI +0,00

Sudjelujuća širina računa se prema izrazu:

$$b_{\text{eff},i} = \text{MIN} \begin{cases} 0,20 \cdot l_0 \\ 0,10 \cdot l_0 + 0,20 \cdot b_i \end{cases}$$

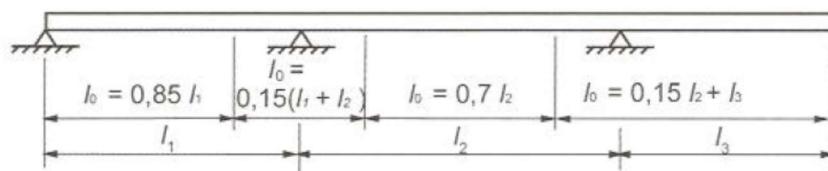
$b_i \rightarrow$  Polovina svjetle širine između posmatrane i susjedne grede

$l_0 \rightarrow$  Razmak nultačaka momenata savijanja

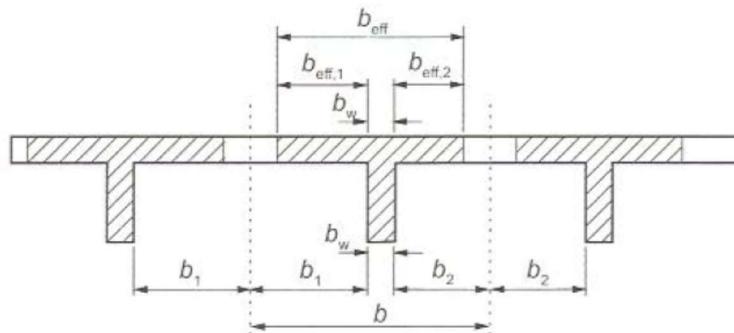
$b_{\text{eff},i} \rightarrow$  Sudjelujuća širina sa posmatrane strane grede

$$b_{\text{eff}} = \sum b_{\text{eff},i} + b_w$$

$b_w \rightarrow$  Širina rebara T grede



SLIKA 6 - Definicija  $l_0$  za određivanje položaja nultačaka



SLIKA 7 - Parametri za određivanje koeficijenata sudjelujuće širine

Pozicija grede	$l [m]$	$l_0 [m]$	$b_1 [m]$	$b_2 [m]$	$b_{\text{eff},1} [m]$	$b_{\text{eff},2} [m]$	$b_w [m]$	$b_{\text{eff}} [m]$
Greda A1	2,75	2,30	0,00	0,00	0,00	0,00	0,25	0,25
Greda A2	1,60	1,10	0,00	2,80	0,00	0,20	0,25	0,45
Greda D1/D2	4,00	3,40	2,00	0,00	0,70	0,00	0,25	0,95
Greda 1	-	-	-	-	-	-	0,25	0,25
Greda 1'	4,00	3,40	2,25	5,20	0,70	1,40	0,25	2,35
Greda 2	5,75	4,90	0,00	5,80	0,00	1,00	0,25	1,25
Greda 3	-	-	-	-	-	-	0,25	0,25

Proračun sudjelujuće širine grede B i C zbog značajnog stepena naprezanja vrši se nezavisno. Sudjelujuća širina se određuje u polju i na mjestima oslanjanja radi uticaja u raspodjeli unutrašnji sili.

### Greda B

U polju  $l_0=0,70 \cdot 8,80=6,20m$

$$b_{\text{eff},1} = \text{MIN} \begin{cases} 0,20 \cdot 6,20m = 1,25m \\ 0,10 \cdot 6,20m + 0,20 \cdot 2,80m = 1,20m \end{cases}$$

$$b_{\text{eff},2} = \text{MIN} \begin{cases} 0,20 \cdot 6,20m = 1,25m \\ 0,10 \cdot 6,20m + 0,20 \cdot 1,80m = 1,00m \end{cases}$$

$$b_{\text{eff}} = 1,00 + 0,30 + 1,20 = 2,50m$$

Na osloncu  $l_0=0,15 \cdot 8,80=1,30m$

$$b_{\text{eff},1} = \text{MIN} \begin{cases} 0,20 \cdot 1,30m = 0,25m \\ 0,10 \cdot 1,30m + 0,20 \cdot 2,80m = 0,70m \end{cases}$$

$$b_{\text{eff},2} = \text{MIN} \begin{cases} 0,20 \cdot 1,30m = 0,25m \\ 0,10 \cdot 1,30m + 0,20 \cdot 1,80m = 0,50m \end{cases}$$

$$b_{\text{eff}} = 0,25 + 0,30 + 0,25 \approx 0,80m$$

### Greda C

U polju  $l_0=0,70 \cdot 10,00=7,00m$

$$b_{\text{eff},1} = \text{MIN} \begin{cases} 0,20 \cdot 7,00m = 0,30m \\ 0,10 \cdot 7,00m + 0,20 \cdot 1,80m = 1,20m \end{cases}$$

$$b_{\text{eff},2} = \text{MIN} \begin{cases} 0,20 \cdot 7,00m = 1,25m \\ 0,10 \cdot 7,00m + 0,20 \cdot 2,00m = 1,10m \end{cases}$$

$$b_{\text{eff}} = 1,10 + 0,30 + 1,20 = 2,60m$$

Na osloncu  $l_0=0,15 \cdot 10,00=1,50m$

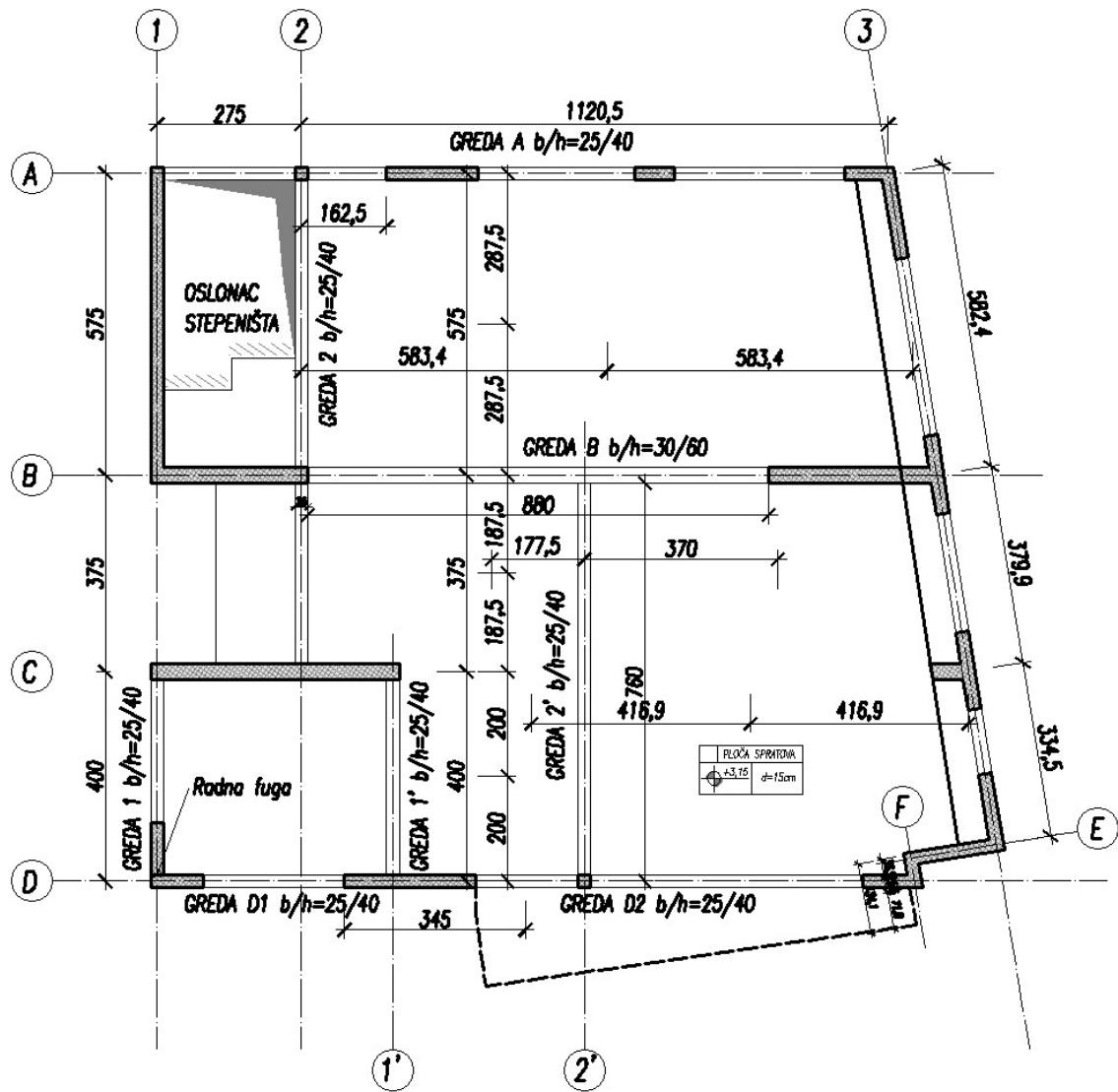
$$b_{\text{eff},1} = \text{MIN} \begin{cases} 0,20 \cdot 1,50m = 0,30m \\ 0,10 \cdot 1,50m + 0,20 \cdot 1,80m = 0,50m \end{cases}$$

$$b_{\text{eff},2} = \text{MIN} \begin{cases} 0,20 \cdot 1,50m = 0,30m \\ 0,10 \cdot 1,50m + 0,20 \cdot 2,00m = 0,55m \end{cases}$$

$$b_{\text{eff}} = 0,25 + 0,30 + 0,50 = 0,90m$$

Sudjelujuća širina za grede B i C je usvojena jednaka i iznosi:

Pozicija grede	$b_{\text{eff}} [m]$	
	Polje	Oslonac
Greda B	2,50	0,80
Greda C		



SLIKA 8 - POZICIIONI PLAN GREDA NA KOTI +3,15; +5,95;

Pozicija grede	$l [m]$	$l_0 [m]$	$b_1 [m]$	$b_2 [m]$	$b_{eff,1} [m]$	$b_{eff,2} [m]$	$b_w [m]$	$b_{eff} [m]$
Greda A1	2,75	2,30	0,00	0,00	0,00	0,00	0,25	0,25
Greda A2	1,60	1,10	0,00	2,80	0,00	0,20	0,25	0,45
Greda D1/D2	4,00	3,40	2,00	0,00	0,70	0,00	0,25	0,95
Greda 1	-	-	-	-	-	-	0,25	0,25
Greda 1'	4,00	3,40	2,25	5,20	0,70	1,40	0,25	2,35
Greda 2	5,75	4,90	0,00	5,80	0,00	1,00	0,25	1,25
Greda 3	-	-	-	-	-	-	0,25	0,25

#### Greda 2'

U polju  $l_0 = 1,00 \cdot 7,60 = 7,60 \text{ m}$

$$b_{eff,1} = \min \begin{cases} 0,20 \cdot 7,60 \text{ m} = 1,50 \text{ m} \\ 0,10 \cdot 7,60 \text{ m} + 0,20 \cdot 1,75 \text{ m} = 1,10 \text{ m} \end{cases}$$

$$b_{eff,2} = \min \begin{cases} 0,20 \cdot 7,60 \text{ m} = 1,50 \text{ m} \\ 0,10 \cdot 7,60 \text{ m} + 0,20 \cdot 3,70 \text{ m} = 1,50 \text{ m} \end{cases}$$

$$b_{eff} = 1,10 + 0,25 + 1,50 = 2,85 \text{ m}$$

## **POZICIIONI PLAN PLOČA**

*Ploče se proračunavaju u sklopu prostornog modela ili na posebnom modelu kako bi se korisno opterećenje dovelo u najnepovoljni dispozicioni položaj.*

*Temeljna ploča POZ TP se računa u sklopu prostornog modela jer su na njoj dominantna horizontalna opterećenja na konstrukciji.*

*Ploča prizemlja POZ 0 računa se u prvoj fazi izrade konstrukcije. U toj fazi pretpostavlja se da će njena namjena biti parking za vozila. U toj fazi objekat nema više etaže pa je ta faza mjerodavna samo za ploču prizemlja. U drugoj fazi broj spratova iznad te ploče je povećan za dvije etaže, međutim, njena namjena je promjenjena. U toj fazi ostavljena je mogućnost za poslovne prostore ili stanove. Nepovoljnija mogućnost su parking mjesta pa se u daljem proračunu posmatra samo taj slučaj.*

*Ploče POZ 1 i 2 su ploče prvog i drugog sprata i opterećene su pretežno mirnim opterećenjem. Namjena prostora na ovim pločama su stanovi.*

*Krovna ploča POZ 3 je gornja ploča. Ova ploča opterećena je slojevima krova i snijegom. Sišuće dejstvo vjetra u odnosu na težinu ostalih slojeva je zanemarivo i neće se posebno tretirati.*

*Sastavili:*

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*Dr. Armin Hadrović dipl.ing.građ.*

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*Abdurahman Halebić mag.ing.građ.*

*Mostar, JUNI 2021*

**PRILOG**  
*iz softverskog paketa TOWER*

## Osnovni podaci o modelu

Datoteka: STATICKI MODEL  
Datum proračuna: 10.7.2021

Način proračuna: 3D model

- |   |  |  |
|---|--|--|
| <input checked="" type="checkbox"/> Teorija I-og reda | <input checked="" type="checkbox"/> Modalna analiza    | <input type="checkbox"/> Stabilnost    |
| <input type="checkbox"/> Teorija II-og reda           | <input checked="" type="checkbox"/> Seizmički proračun | <input type="checkbox"/> Faze građenja |
| <input type="checkbox"/> Nelinearni proračun          |  |  |

### Veličina modela

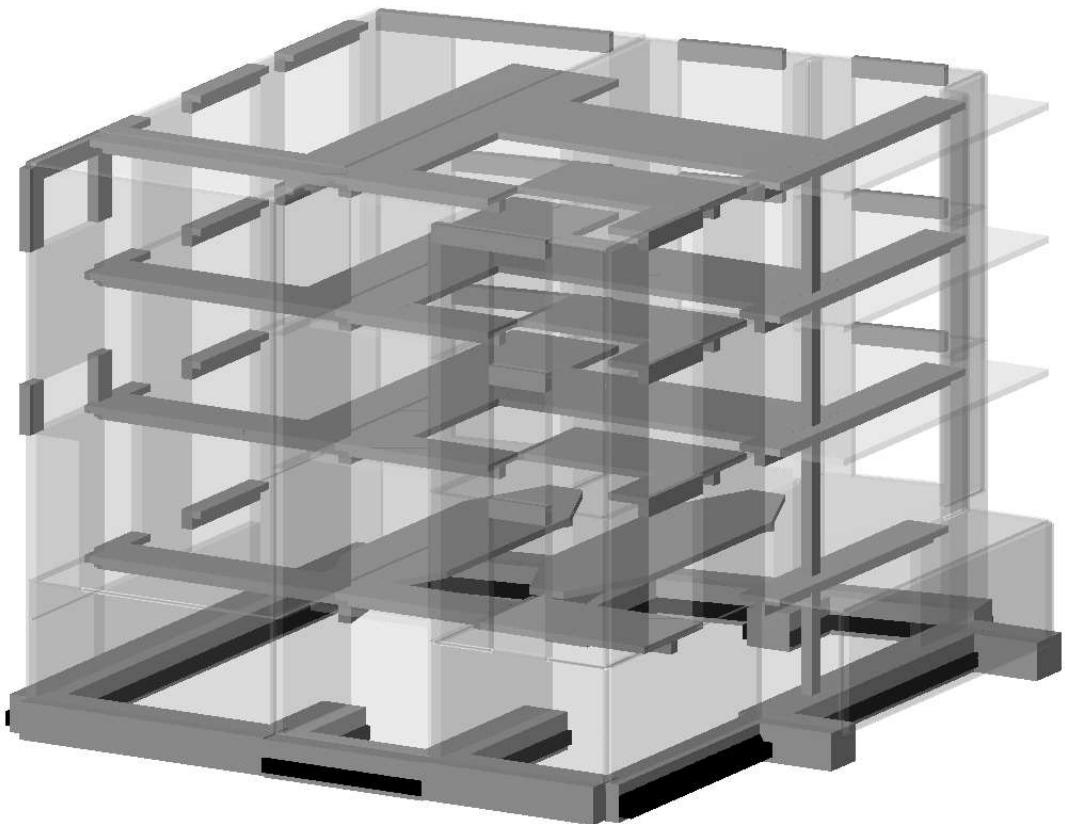
Broj čvorova:	9994
Broj pločastih elemenata:	9854
Broj grednih elemenata:	696
Broj graničnih elemenata:	18852
Broj osnovnih slučajeva opterećenja:	6
Broj kombinacija opterećenja:	36

### Jedinice mjera

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

## Ulagani podaci - Konstrukcija

Mjerodavno opterećenje: Kompletna shema  
EC 2 (EN 1992-1-1:2004), C 25, S500H



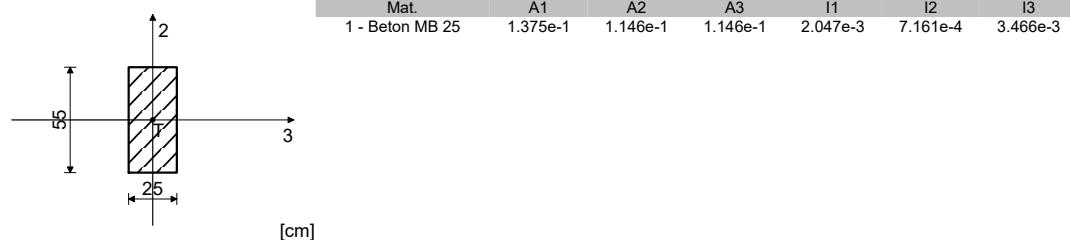
Izometrija  
Armatura u gredama: Aa2/Aa1

Tabela materijala

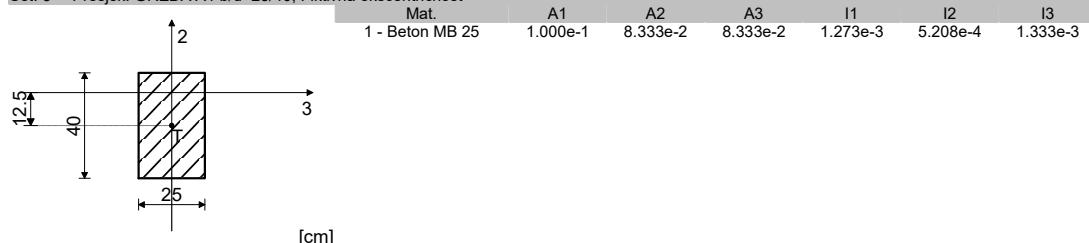
No	Naziv materijala	E[kN/m <sup>2</sup> ]	$\mu$	$\gamma[\text{kN/m}^3]$	$\alpha t[1/\text{C}]$	$E_m[\text{kN/m}^2]$	$\mu_m$
1	Beton MB 25	3.000e+7	0.20	25.00	1.000e-5	3.000e+7	0.20
2	Beton MB 30	3.150e+7	0.20	25.00	1.000e-5	3.150e+7	0.20
3	Beton MB 25	3.000e+7	0.20	12.00	1.000e-5	3.000e+7	0.20
4	Beton MB 25	3.000e+7	0.20	8.00	1.000e-5	3.000e+7	0.20
5	Beton MB 25	3.000e+7	0.20	4.00	1.000e-5	3.000e+7	0.20
6	Beton MB 25	3.000e+7	0.20	6.50	1.000e-5	3.000e+7	0.20
7	Beton MB 25	3.000e+7	0.20	3.75	1.000e-5	3.000e+7	0.20
8	Beton MB 25	3.000e+7	0.20	3.25	1.000e-5	3.000e+7	0.20

Setovi greda

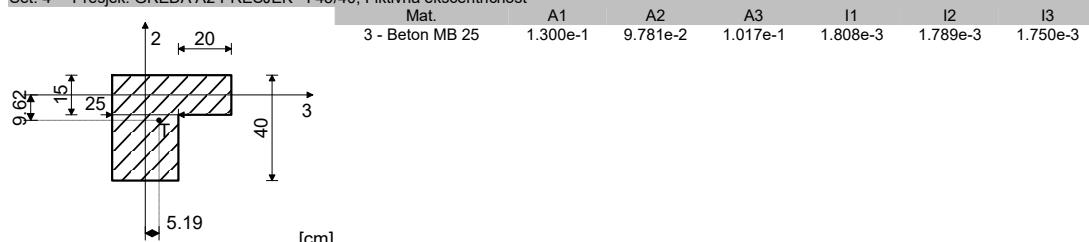
Set: 2 Presjek: b/d=25/55, Fiktivna ekscentričnost



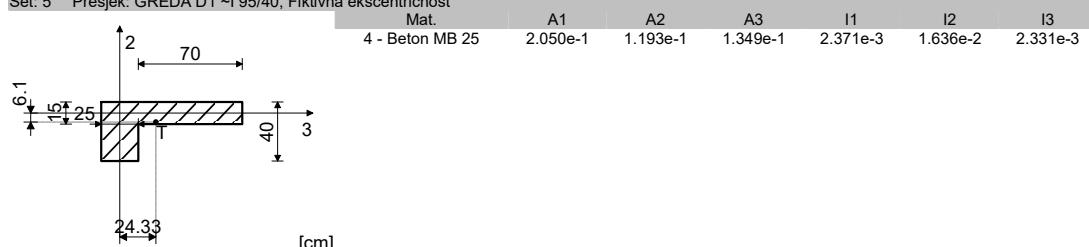
Set: 3 Presjek: GREDA A1 b/d=25/40, Fiktivna ekscentričnost



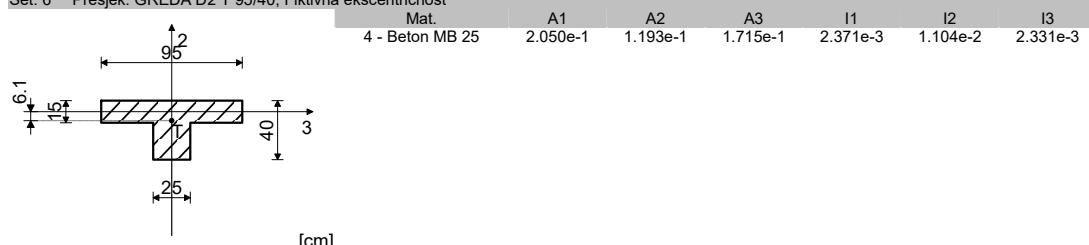
Set: 4 Presjek: GREDA A2 PRESJEK ~I 45/40, Fiktivna ekscentričnost

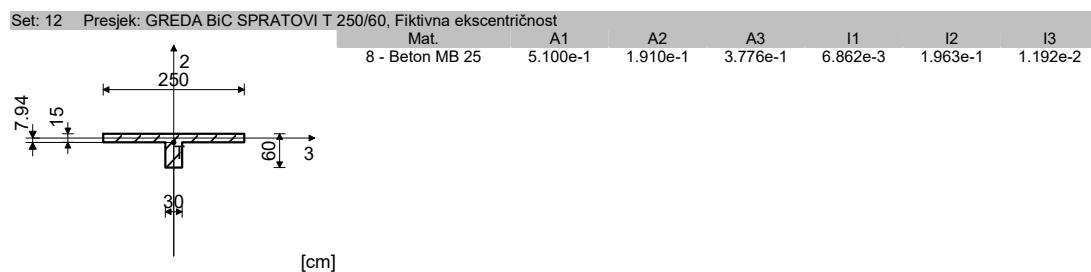
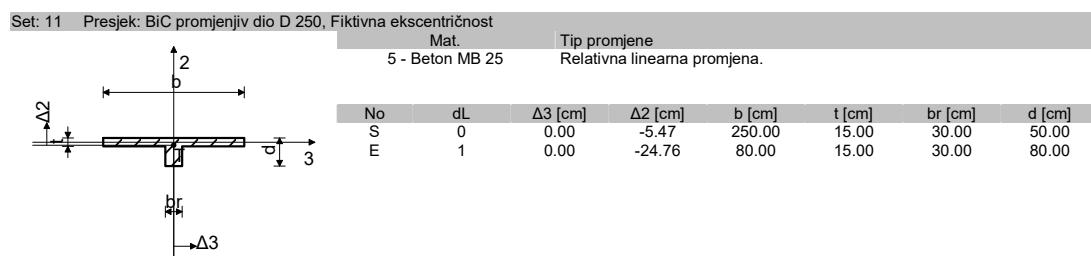
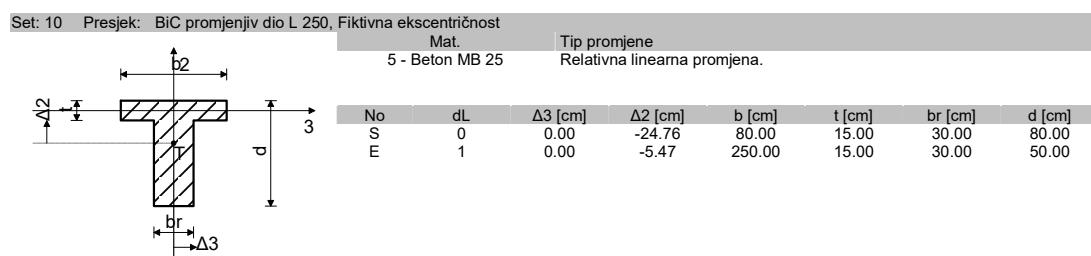
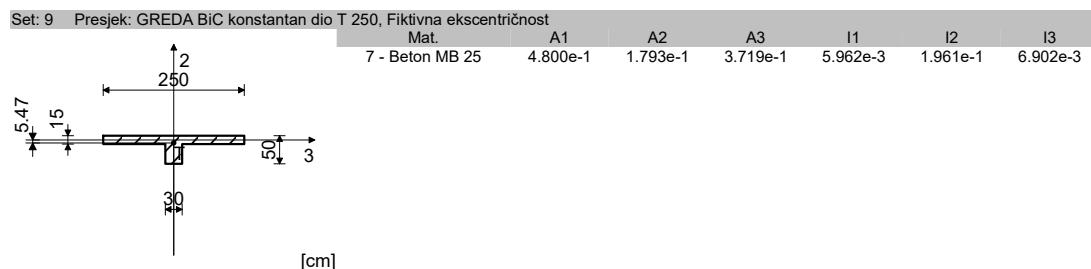
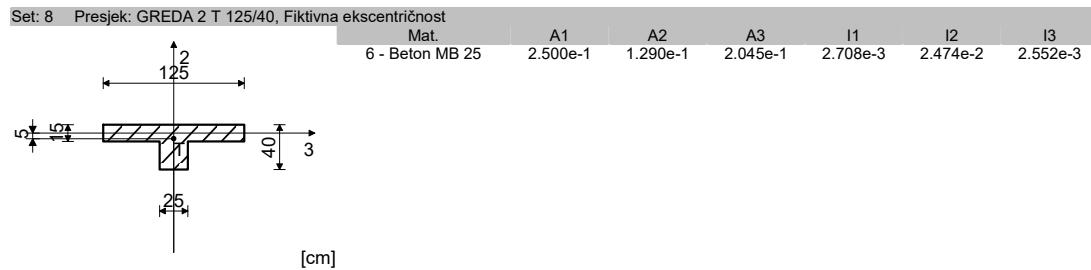
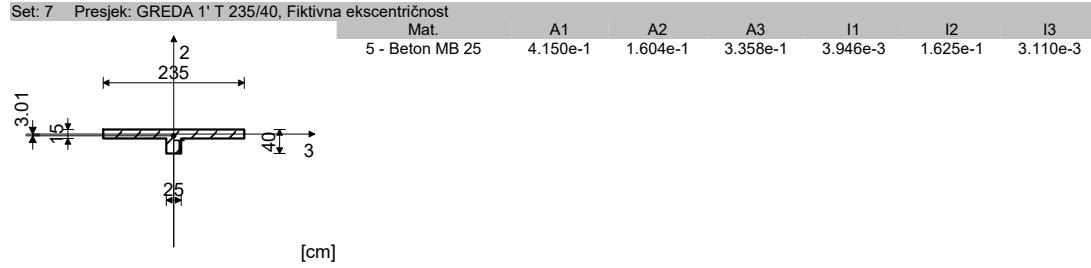


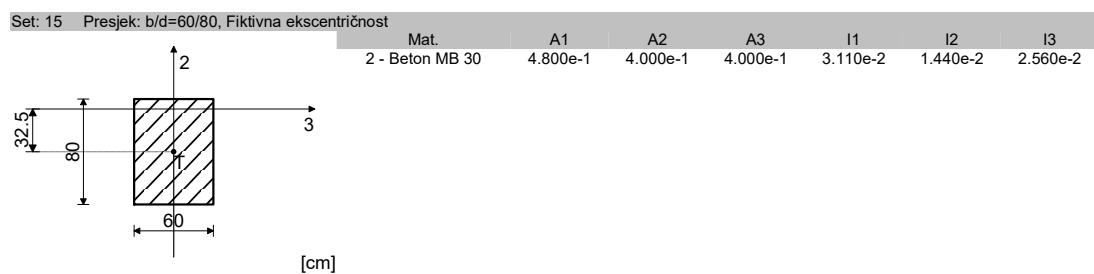
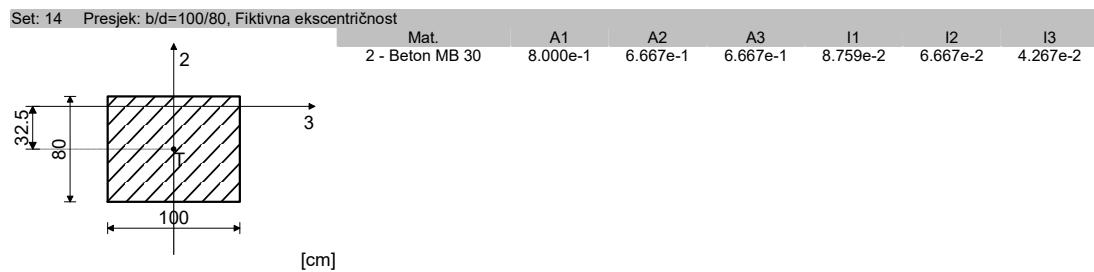
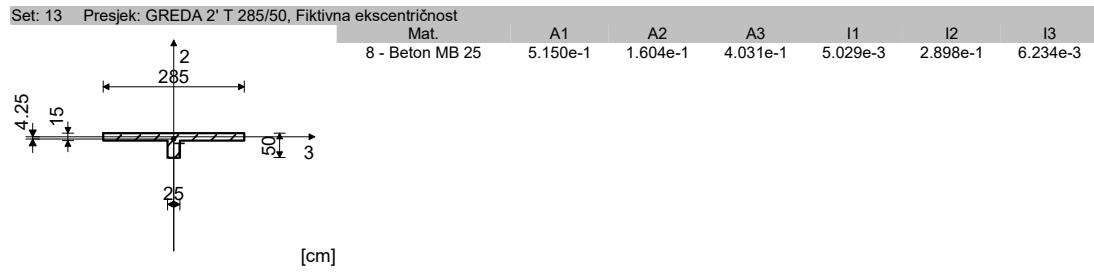
Set: 5 Presjek: GREDA D1 ~I 95/40, Fiktivna ekscentričnost

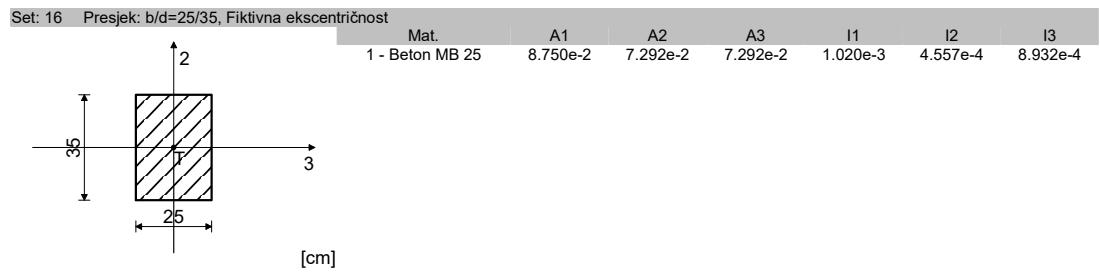


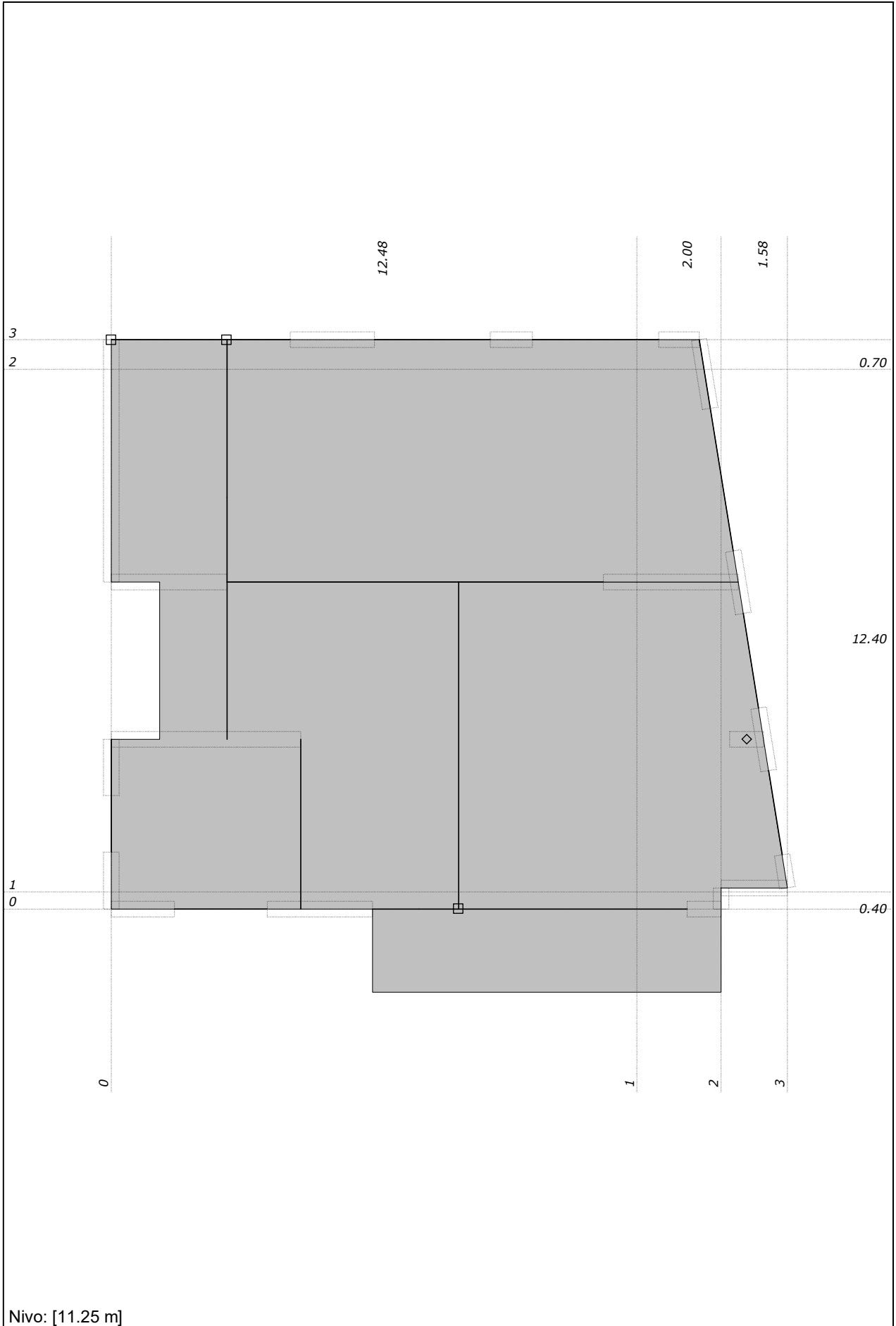
Set: 6 Presjek: GREDA D2 T 95/40, Fiktivna ekscentričnost

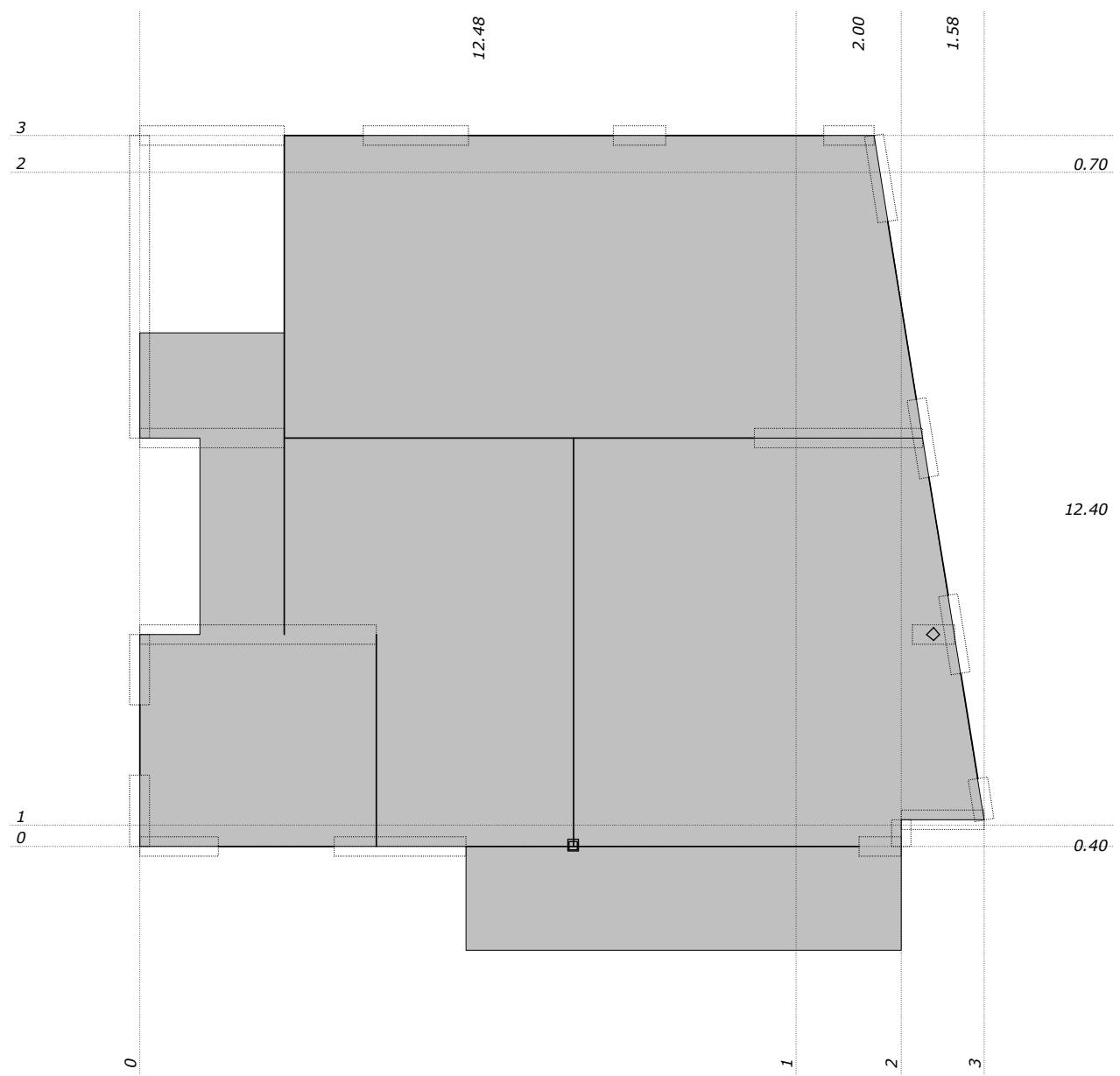




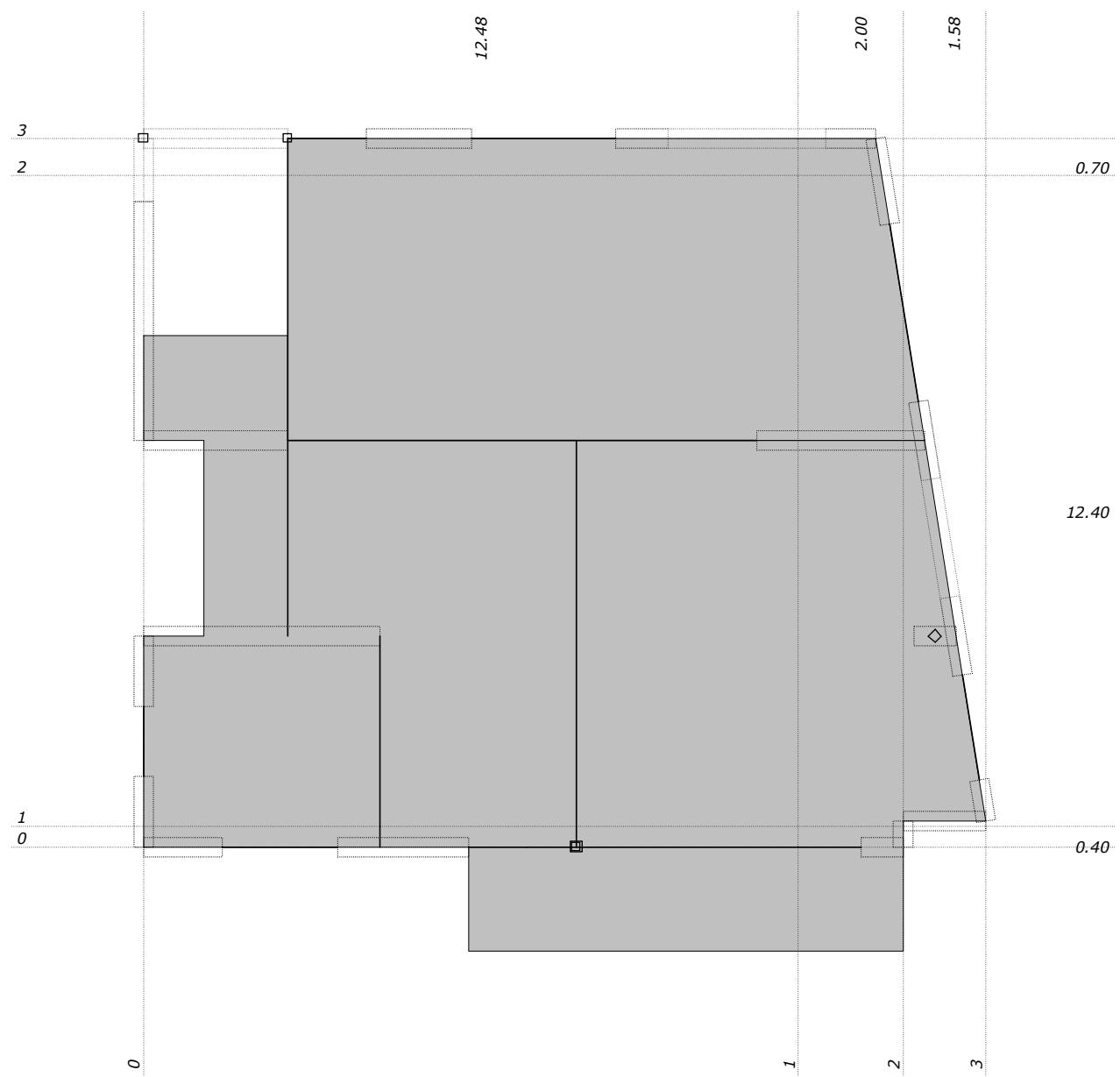




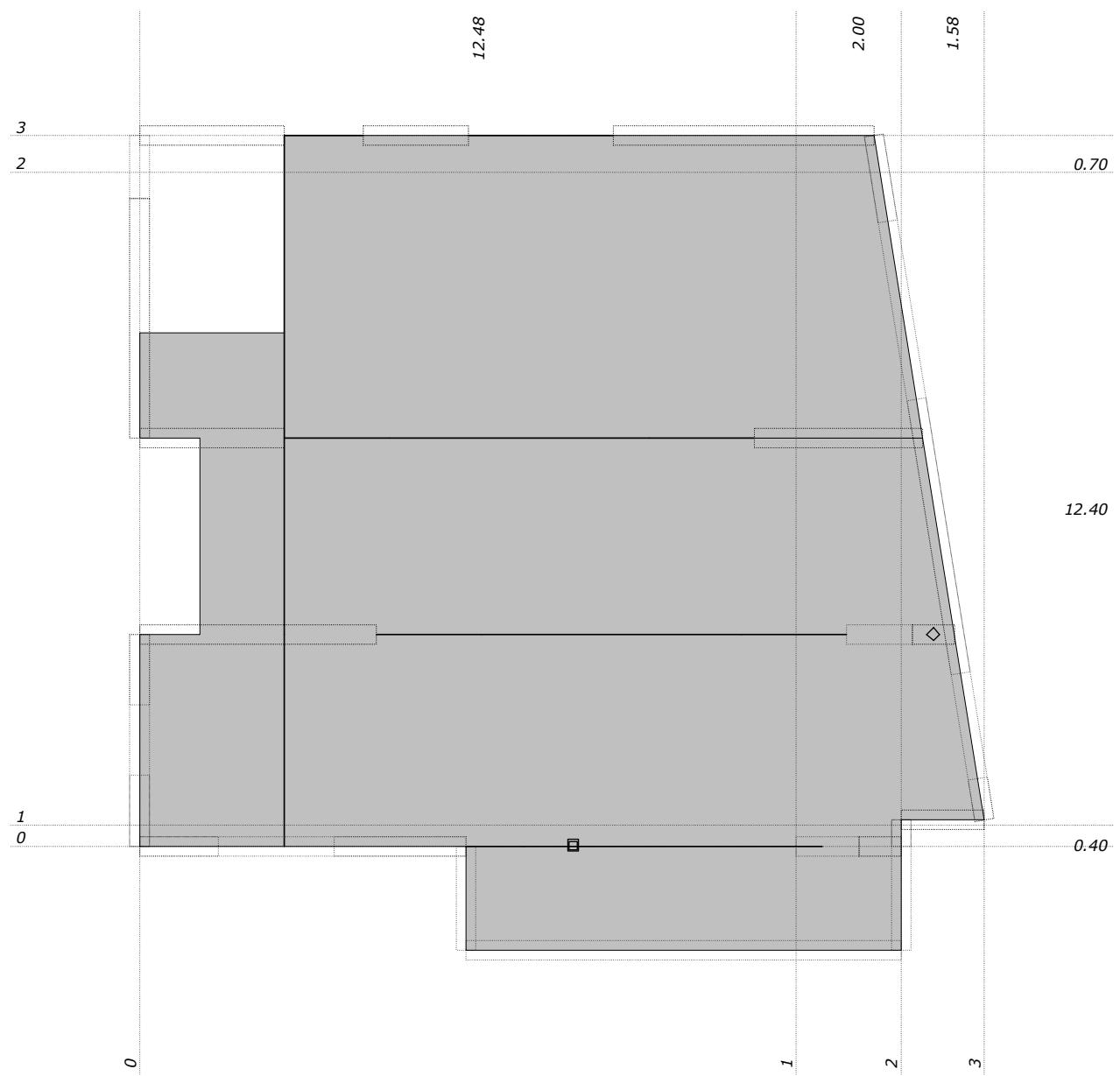




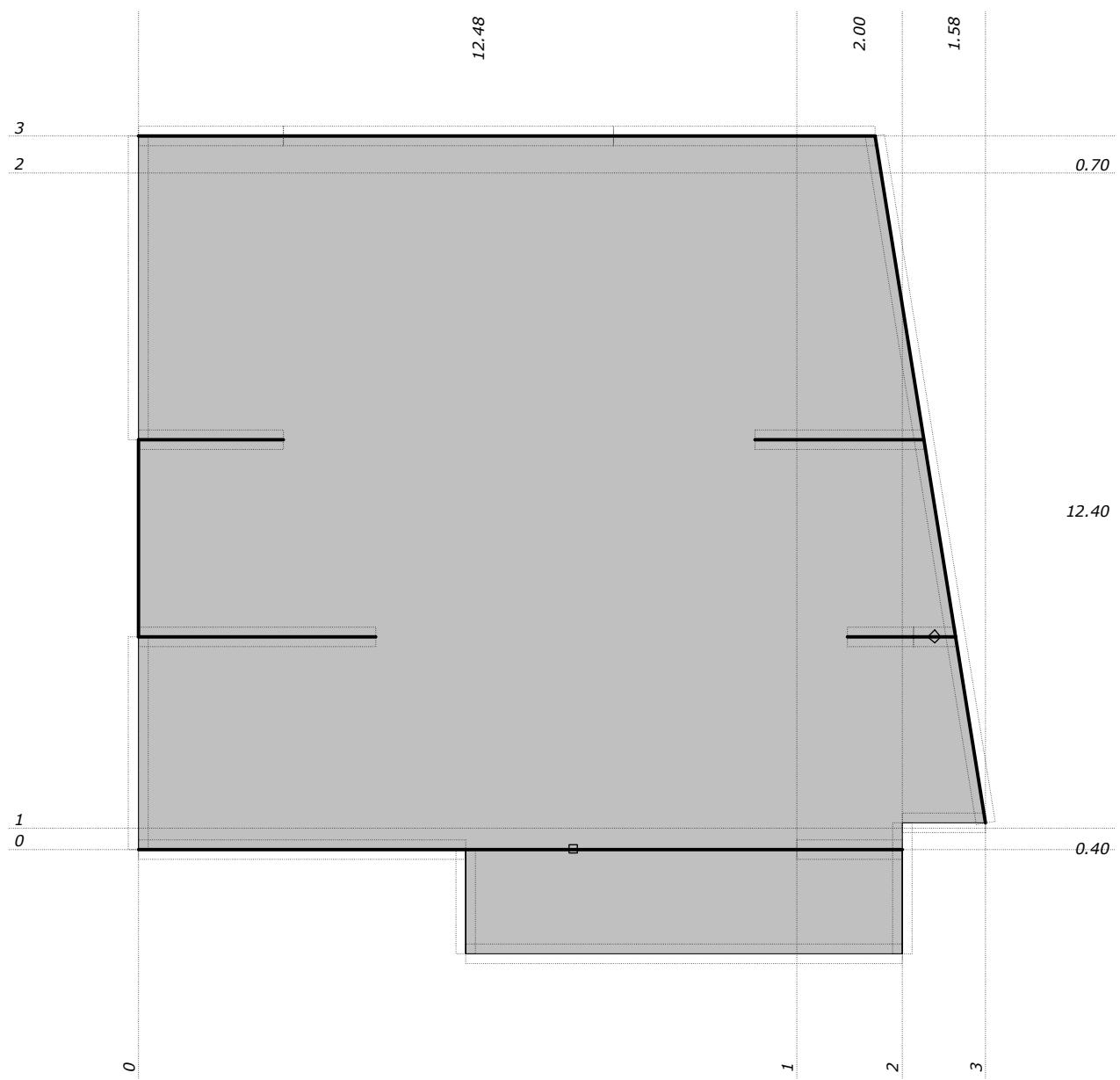
Nivo: [8.45 m]



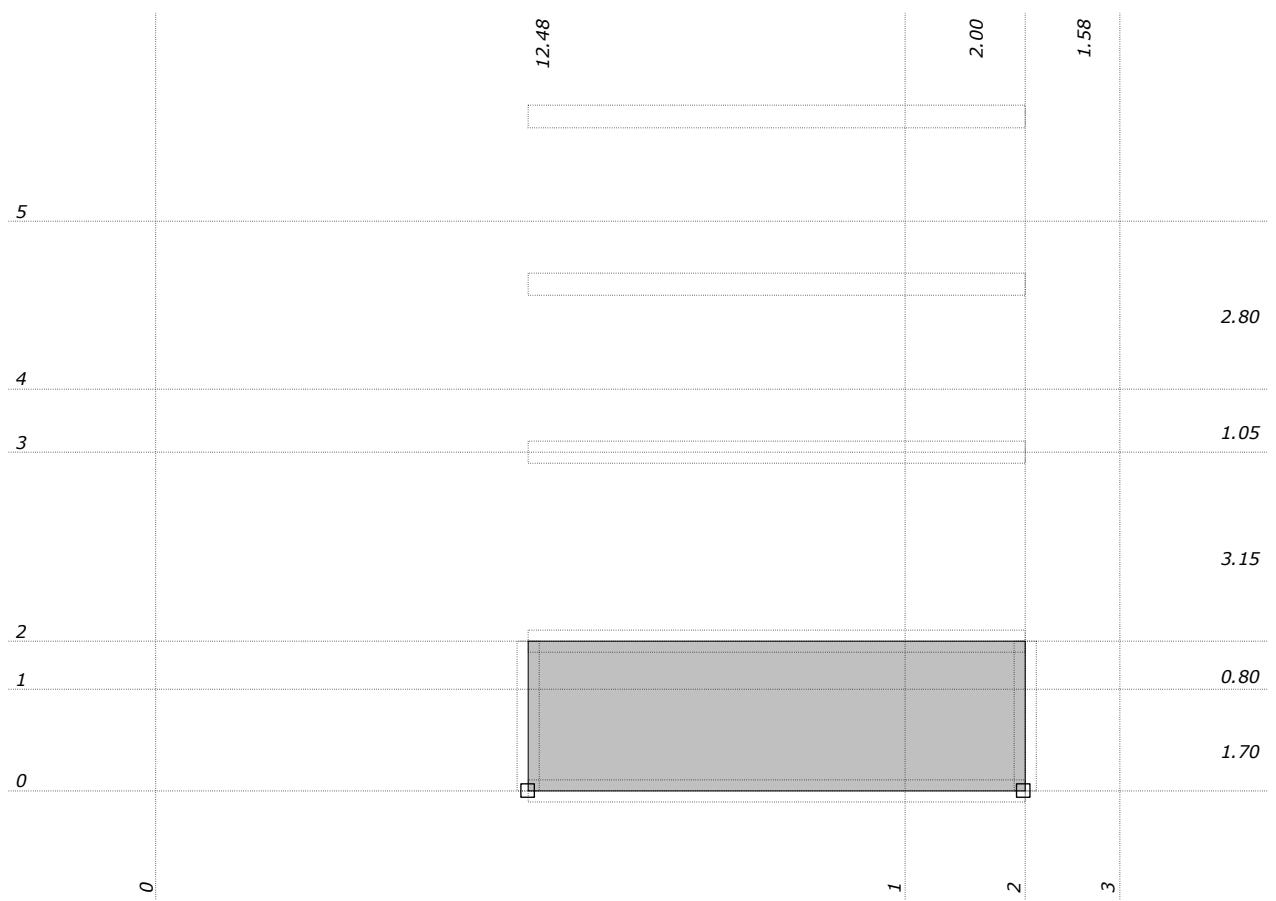
Nivo: [5.65 m]



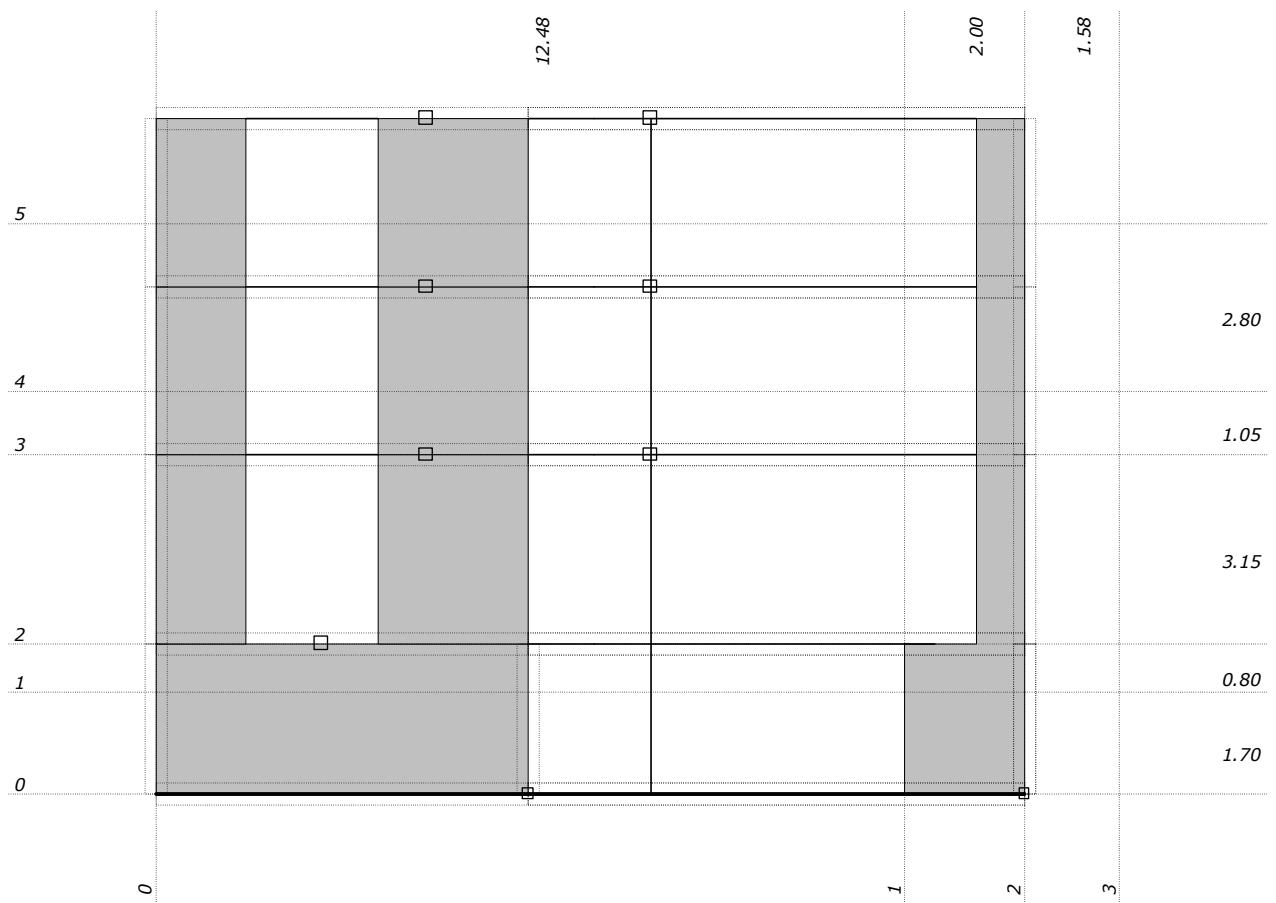
Nivo: [2.50 m]

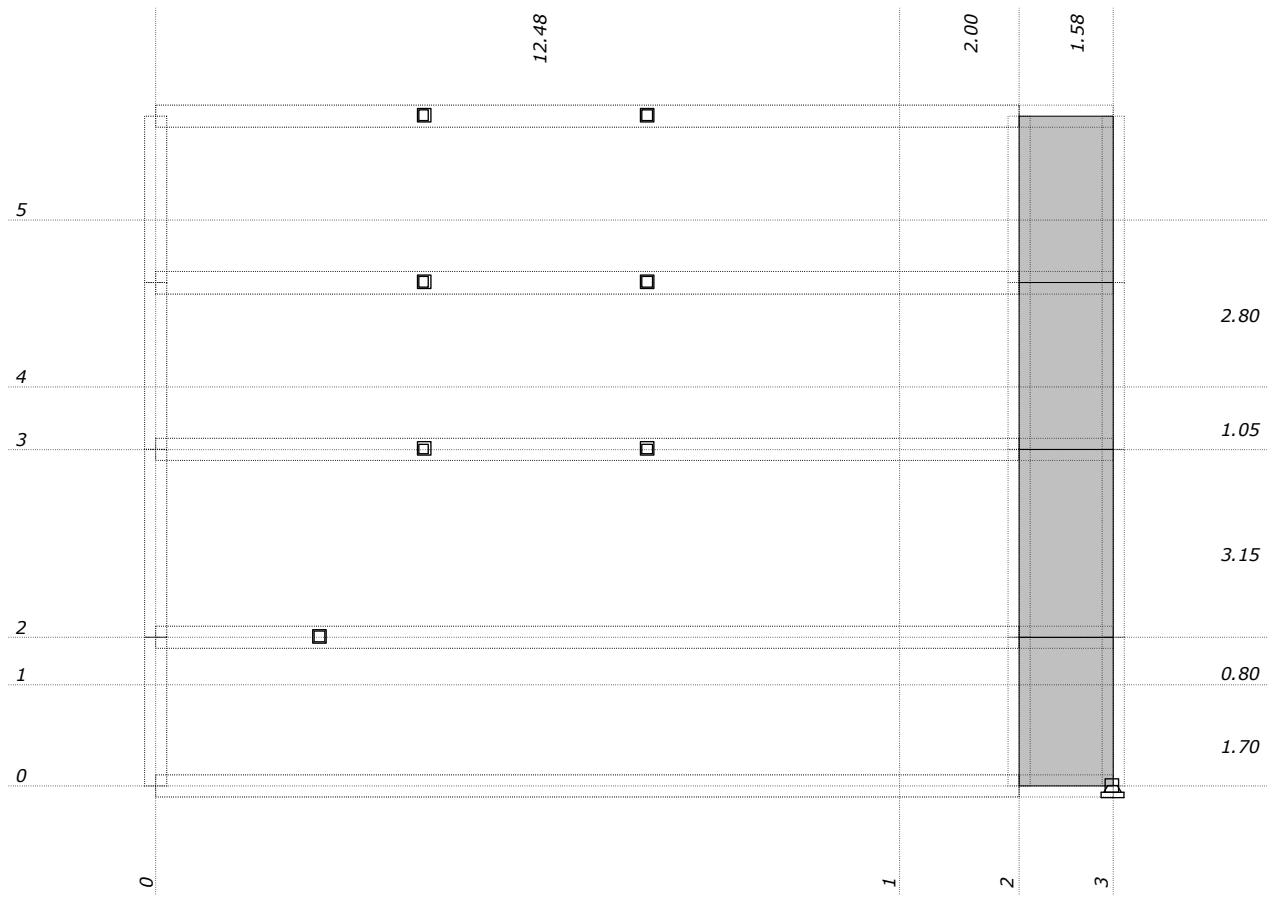


Nivo: [0.00 m]

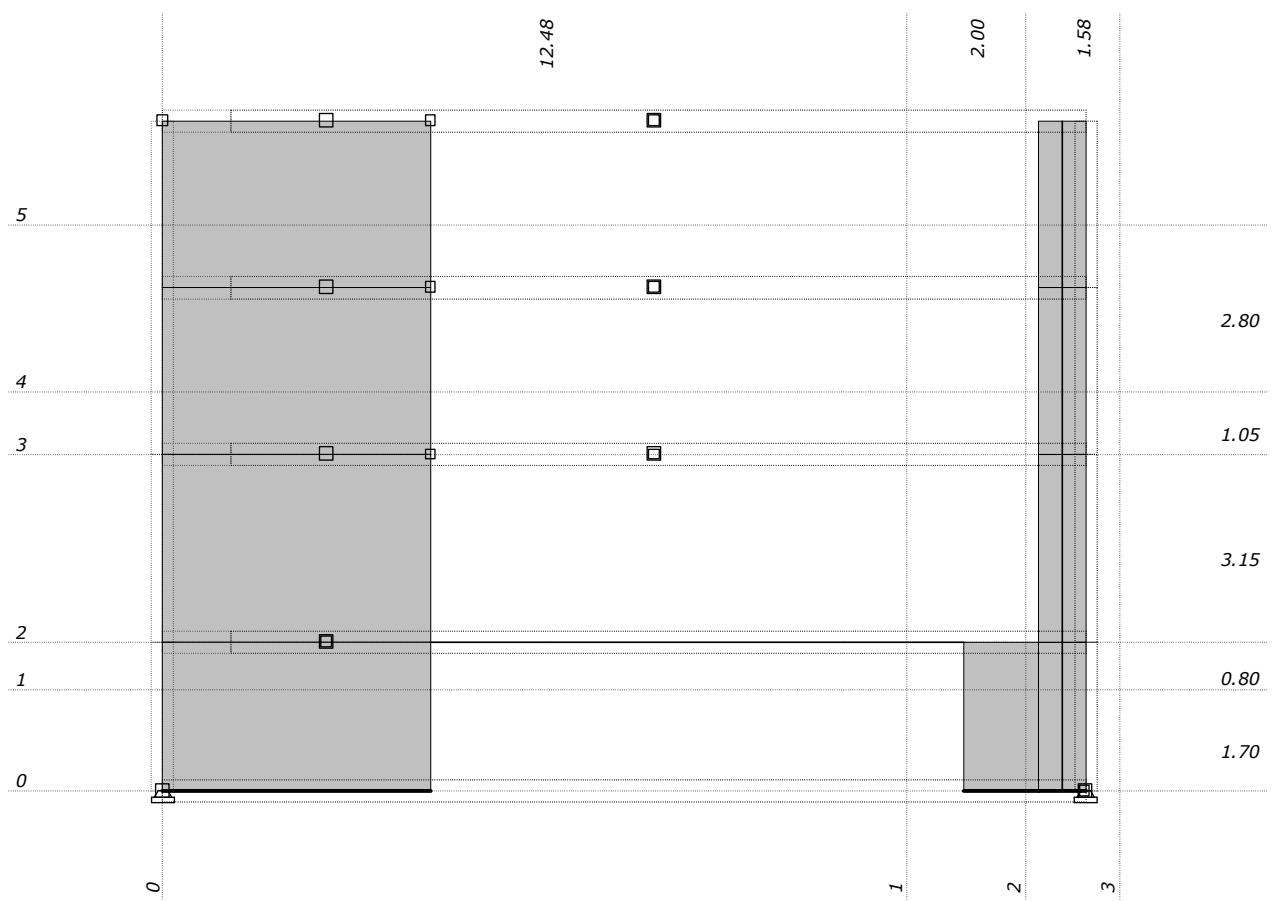


Okvir: H\_7

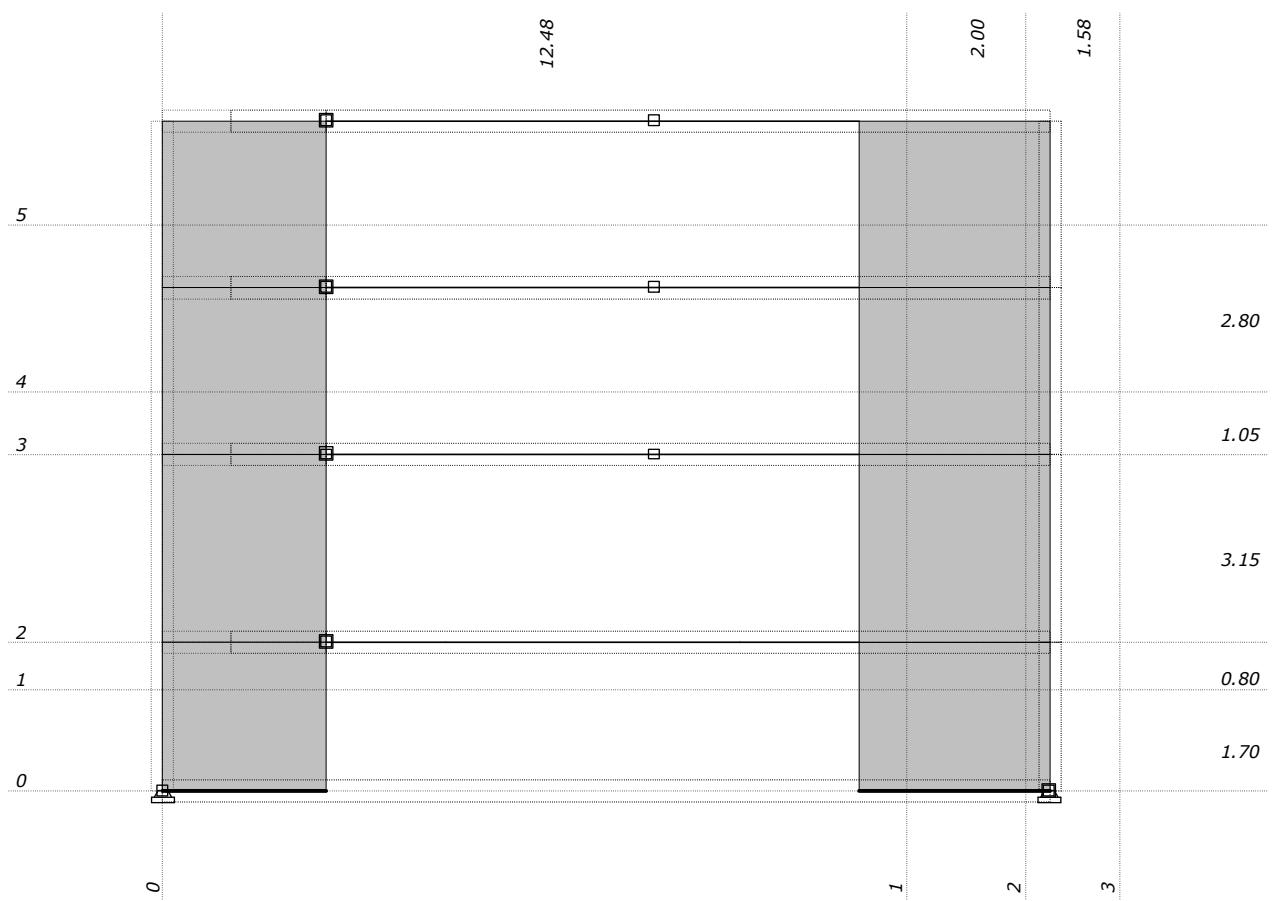




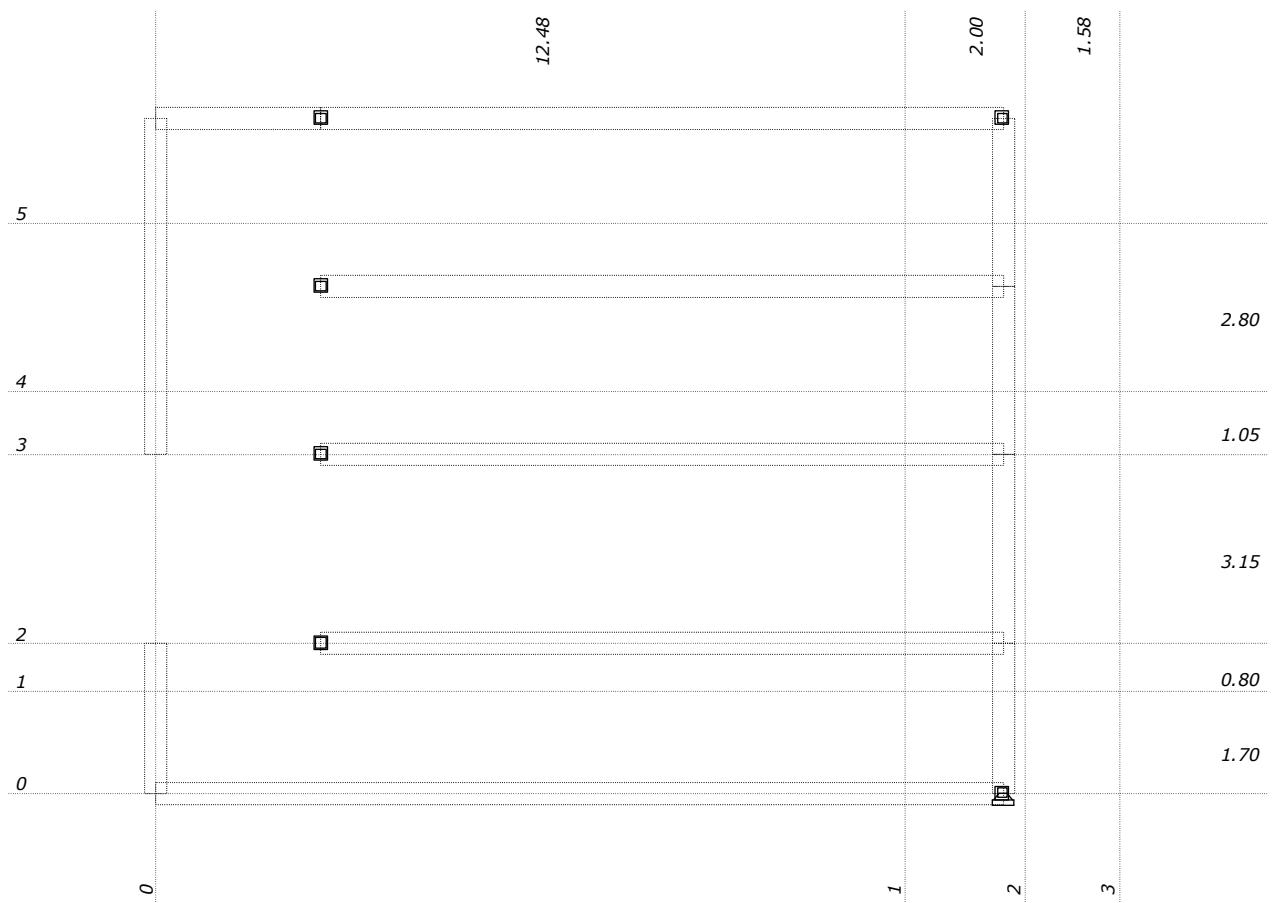
Okvir: H\_8



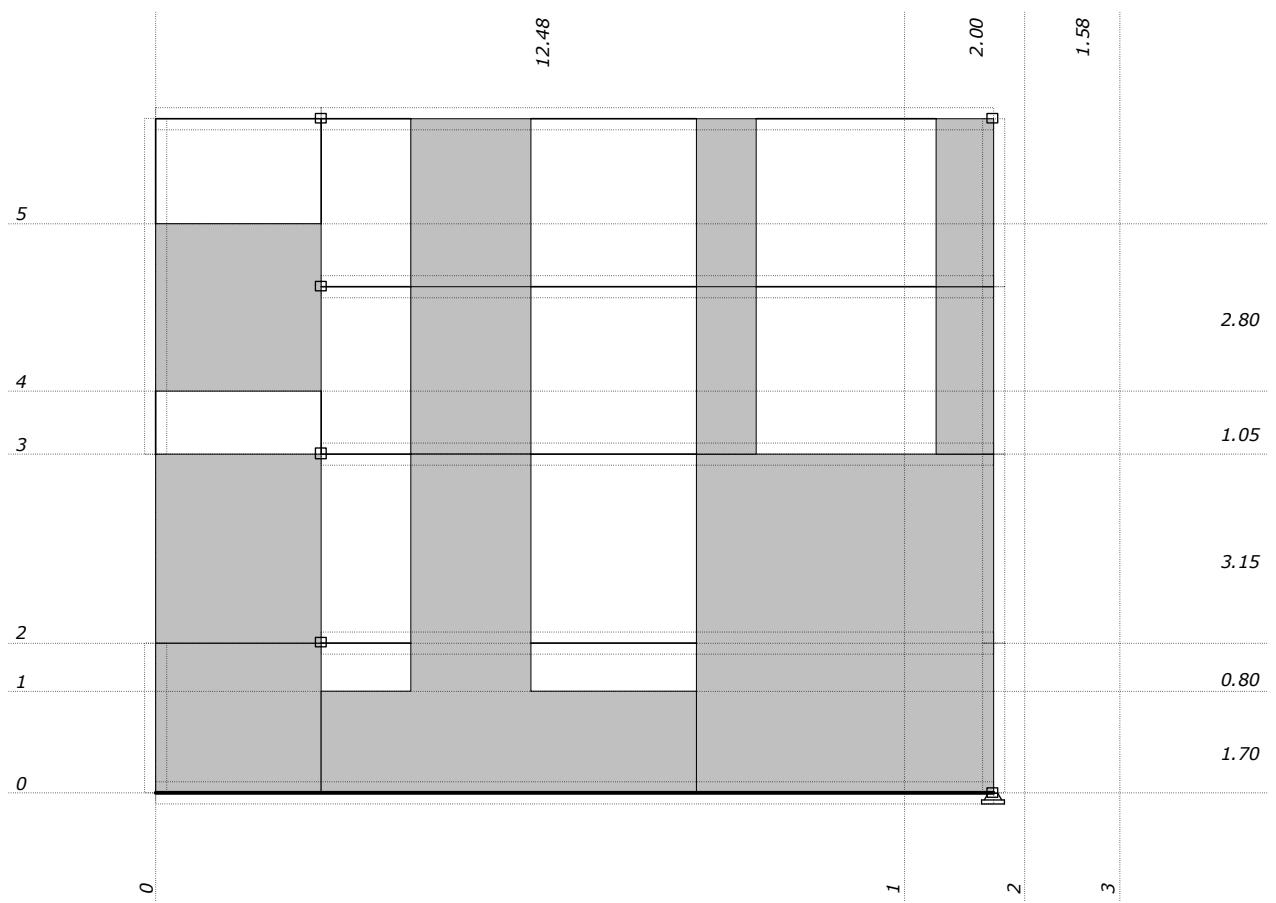
Okvir: H\_4



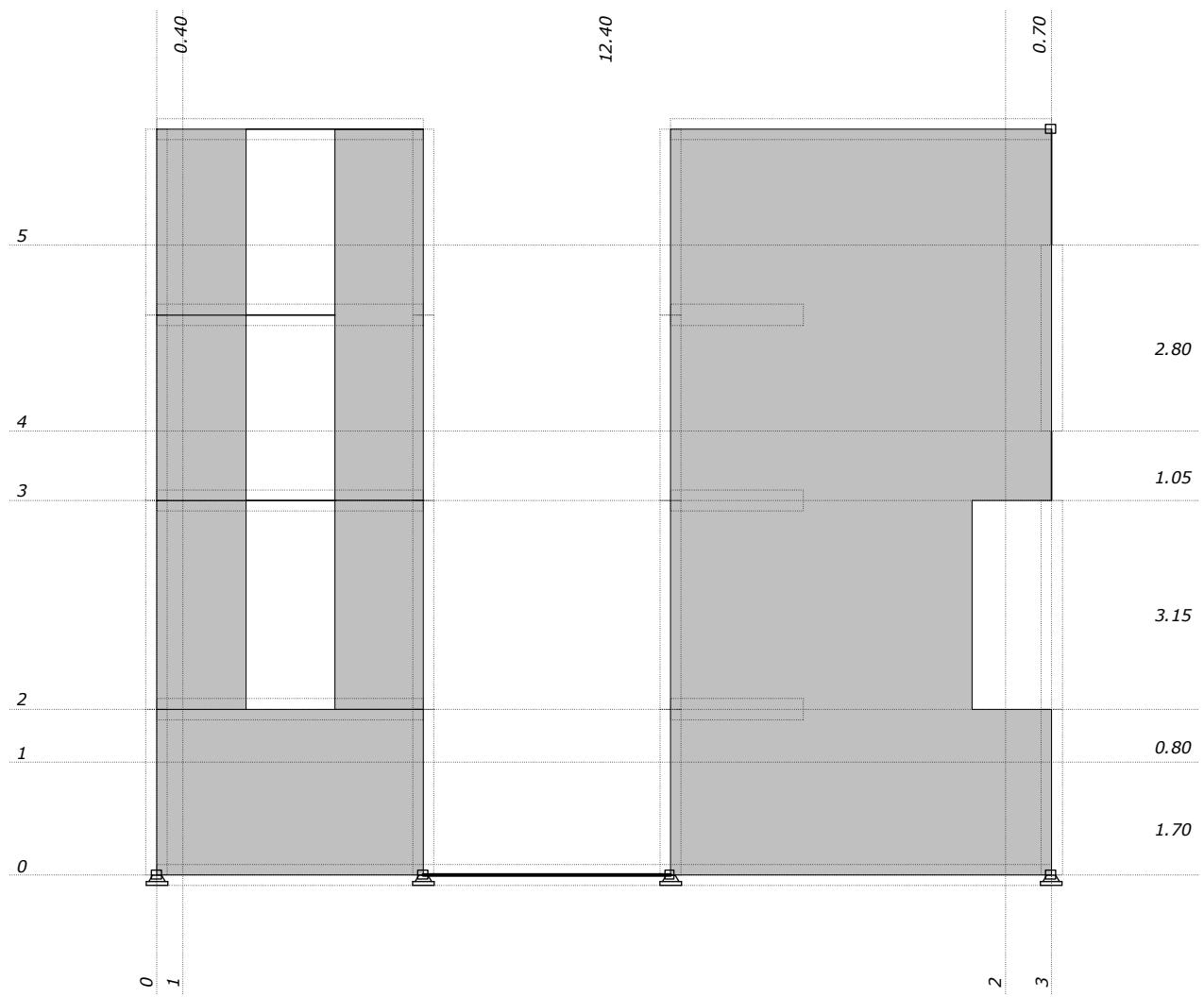
Okvir: H\_3



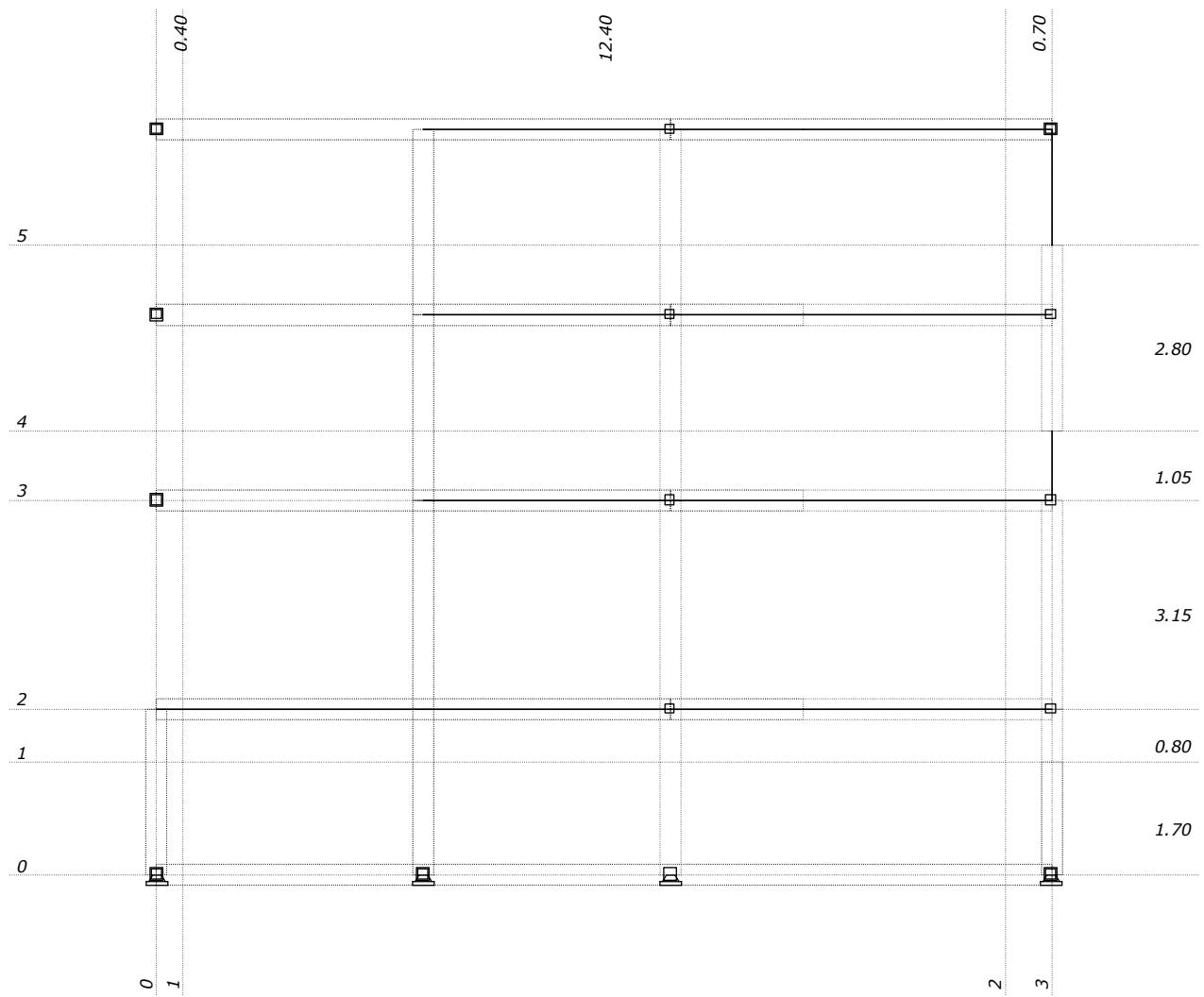
Okvir: H\_6



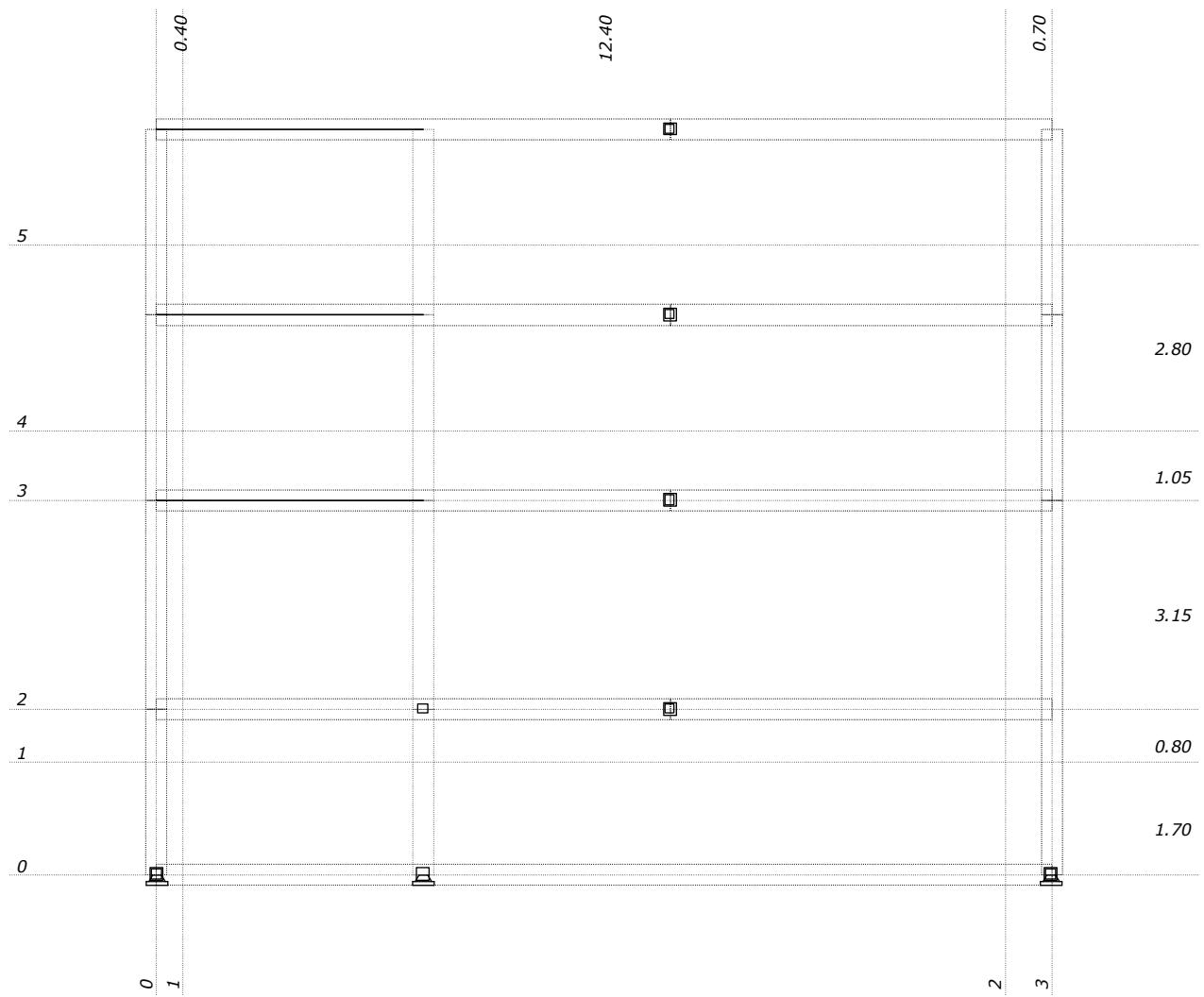
Okvir: H\_1



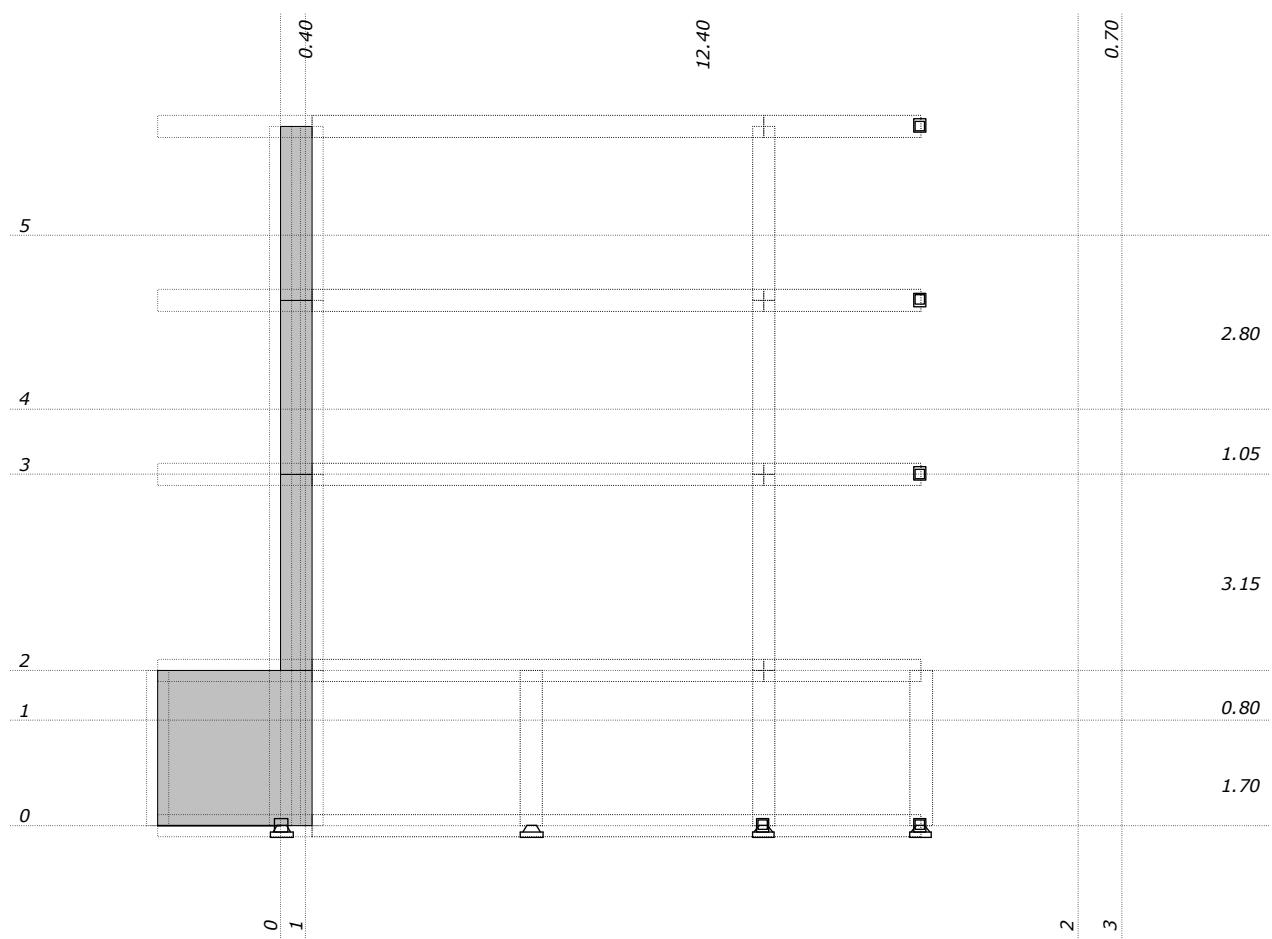
Okvir: V\_1



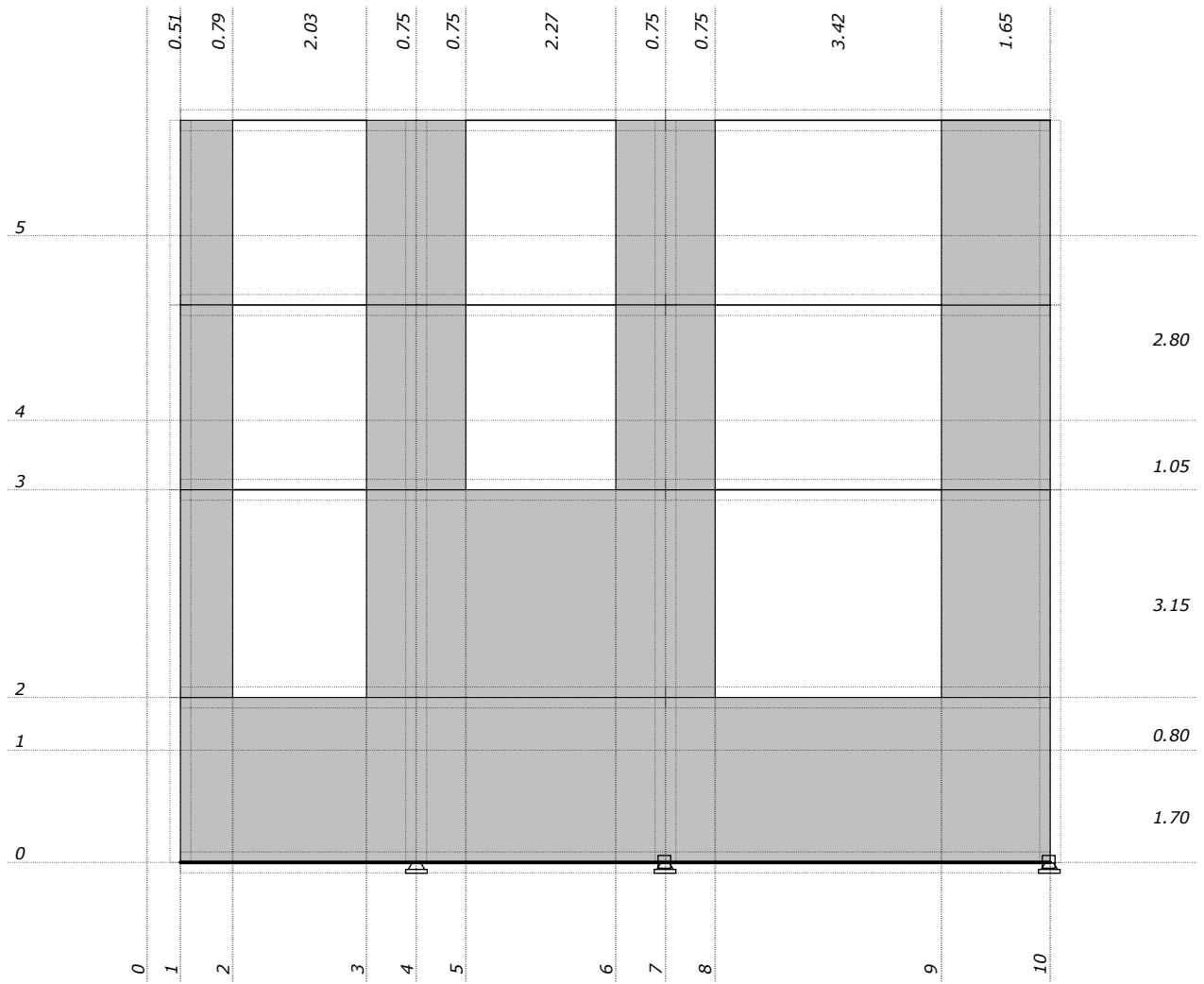
Okvir: V\_3



Okvir: V\_4



Okvir: V\_5



Okvir: K\_2

## ***Ulagni podaci - Opterećenje***

**Lista slučajeva opterećenja**

LC	Naziv
1	STALNO (g)
2	KORISNO
3	VJETAR X
4	VJETAR Y
5	SEIZMIKA X
6	SEIZMIKA Y
7	Komb.: 1.35xI+1.05xII-1.5xIII
8	Komb.: 1.35xI+1.05xII-1.5xIV
9	Komb.: 1.35xI+1.05xII+1.5xIV
10	Komb.: 1.35xI+1.05xII+1.5xIII
11	Komb.: 1.35xI+1.5xII-0.9xIII
12	Komb.: 1.35xI+1.5xII-0.9xIV
13	Komb.: 1.35xI+1.5xII+0.9xIV
14	Komb.: 1.35xI+1.5xII+0.9xIII
15	Komb.: I+1.05xII-1.5xII
16	Komb.: I+1.05xII-1.5xIV
17	Komb.: I+1.05xII+1.5xIV
18	Komb.: I+1.05xII+1.5xIII
19	Komb.: I+1.5xII-0.9xIII
20	Komb.: I+1.5xII-0.9xIV
21	Komb.: I+1.5xII+0.9xIV
22	Komb.: I+1.5xII+0.9xIII
23	Komb.: 1.35xI-1.5xIII
24	Komb.: 1.35xI-1.5xIV
25	Komb.: 1.35xI+1.5xIV
26	Komb.: 1.35xI+1.5xIII
27	Komb.: 1.35xI+1.5xII
28	Komb.: I-1.5xIII
29	Komb.: I-1.5xIV
30	Komb.: I+1.5xIV
31	Komb.: I+1.5xIII
32	Komb.: I+1.5xII
33	Komb.: I+0.3xII-1xV
34	Komb.: I+0.3xII-1xVI
35	Komb.: I+0.3xII+VI
36	Komb.: I+0.3xII+V
37	Komb.: I-1xV
38	Komb.: I-1xVI
39	Komb.: I+VI
40	Komb.: I+V
41	Komb.: 1.35xI
42	Komb.: I

## Modalna analiza

### Napredne opcije seizmičkog proračuna:

Mase grupirane u nivoima izabranih ploča  
 Ploče - redukcija krutosti na savijanje: 0.150  
 Sudjelovanje zidova: 6.000 x d  
 Spriječeno osciliranje u Z pravcu

### Faktori opterećenja za proračun masa

No	Naziv	Koeficijent
1	STALNO (g)	1.00
2	KORISNO	0.00
3	VJETAR X	0.00
4	VJETAR Y	0.00

### Raspored masa po visini objekta

Nivo	Z [m]	X [m]	Y [m]	Masa [T]	T/m <sup>2</sup>
	11.25	7.71	6.46	232.81	1.09
	8.45	7.80	6.30	267.18	1.31
	5.65	7.89	6.33	274.68	1.35
	2.50	8.12	5.98	292.07	1.43
	0.00	7.66	6.18	307.21	1.41
Ukupno:	5.21	7.84	6.24	1373.94	

### Položaj centara krutosti po visini objekta (približna metoda)

Nivo	Z [m]	X [m]	Y [m]
	11.25	0.88	5.21
	8.45	0.88	5.95
	5.65	6.71	7.28
	2.50	13.50	3.41
	0.00	13.44	3.80

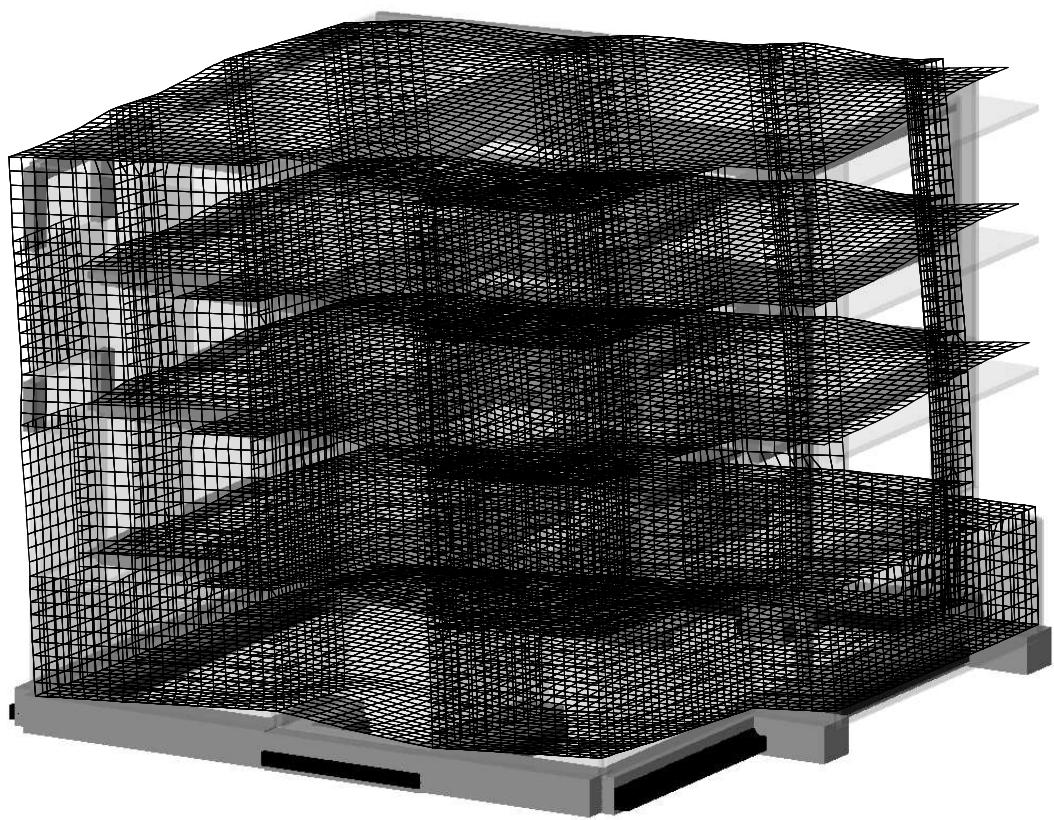
### Ekscentricitet po visini objekta (približna metoda)

Nivo	Z [m]	eox [m]	eoy [m]
	11.25	6.83	1.25
	8.45	6.92	0.35
	5.65	1.18	0.95
	2.50	5.38	2.57
	0.00	5.78	2.38

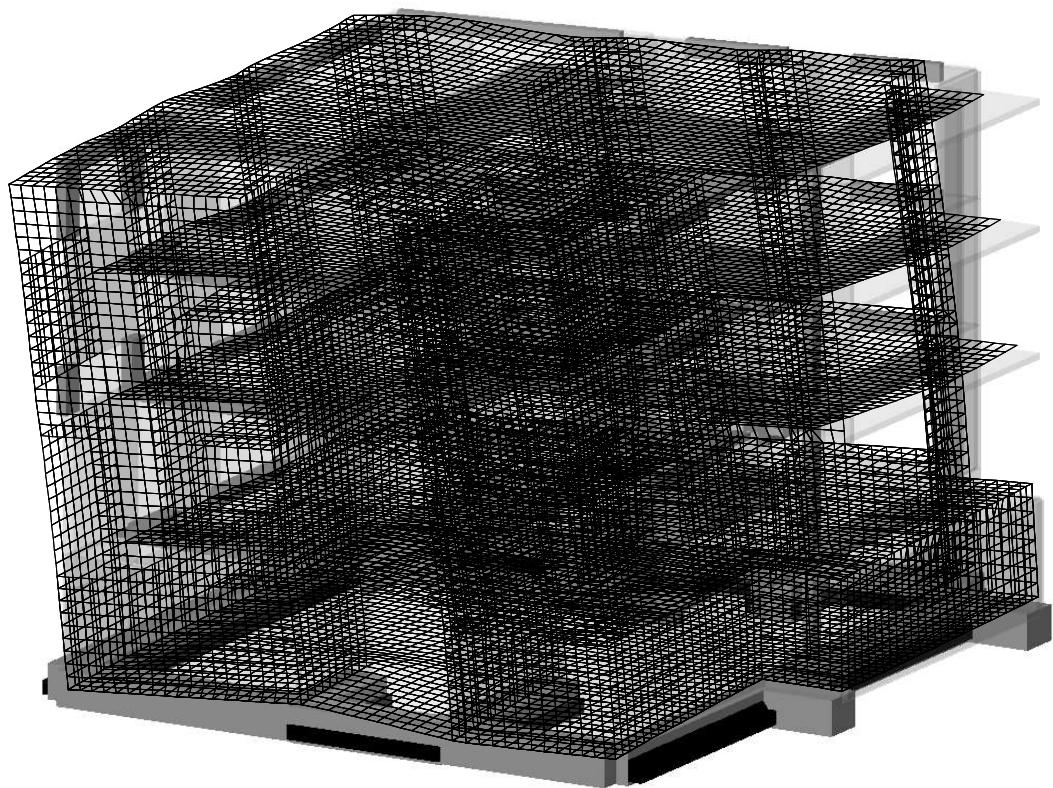
### Periodi osciliranja konstrukcije

No	T [s]	f [Hz]
1	0.2099	4.7631
2	0.2007	4.9836
3	0.1042	9.5943
4	0.0540	18.5154

5	0.0367	27.2370
6	0.0337	29.6383
7	0.0303	33.0270
8	0.0289	34.6022



Izometrija  
Forma osciliranja: 1/8 [T=0.2099sec / f=4.76Hz]



Izometrija  
Forma osciliranja: 2/8 [T=0.2007sec / f=4.98Hz]

## Seizmički proračun

Seizmički proračun: EC8 (EN 1998) (Metoda poprečnih sila)

Razred tla:

Razred važnosti:

Odnos ag/g:

A  
II ( $\gamma=1.0$ )  
0.26

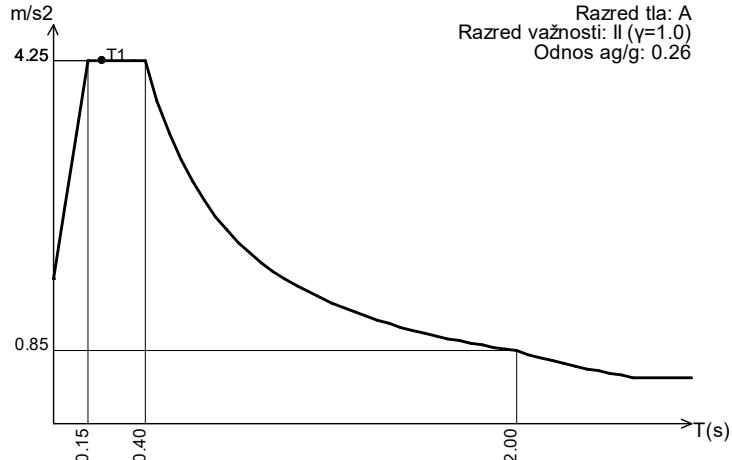
Kut djelovanja potresa:

Naziv	T [sec]	$\alpha [^{\circ}]$	Faktor P.
SEIZMIKA X	0.210	0.00	1.50
SEIZMIKA Y	0.201	0.00	1.50

Tip spektra

Naziv	S	T <sub>b</sub>	T <sub>c</sub>	T <sub>d</sub>
SEIZMIKA X	1.000	0.150	0.400	2.000
SEIZMIKA Y	1.000	0.150	0.400	2.000

Projektni spektar



SEIZMIKA X

Raspored seizmičkih sila po visini objekta (SEIZMIKA X)

Nivo	Z [m]	S [kN]
	11.25	1815.7
	8.45	1565.1
	5.65	1075.9
	2.50	506.18
	0.00	0.00
	$\Sigma =$	4962.8

SEIZMIKA Y

Raspored seizmičkih sila po visini objekta (SEIZMIKA Y)

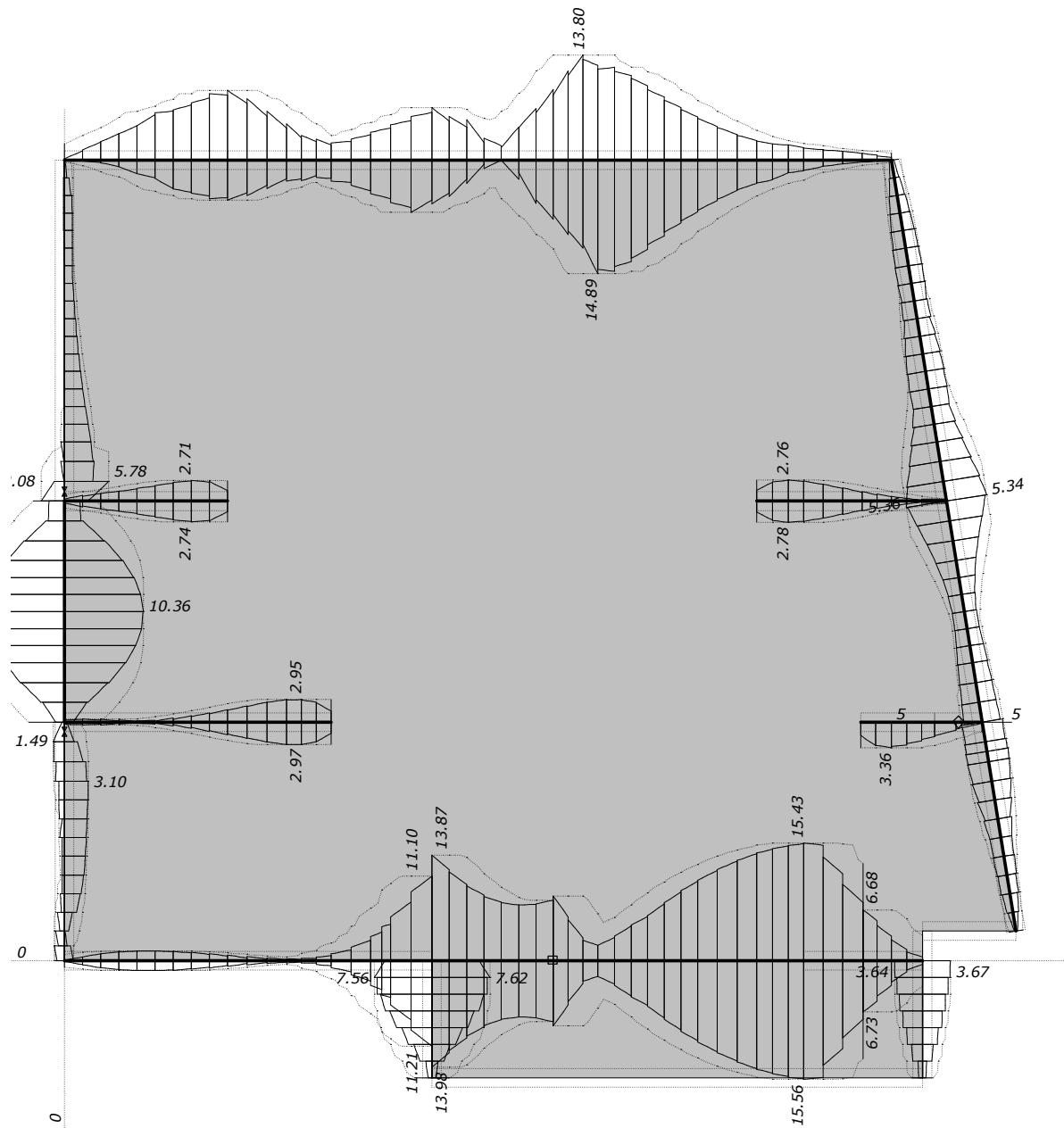
Nivo	Z [m]	S [kN]
	11.25	1815.7
	8.45	1565.1
	5.65	1075.9
	2.50	506.18
	0.00	0.00
	$\Sigma =$	4962.8

Raspored masa po visini objekta

Nivo	Z [m]	X [m]	Y [m]	Masa [T]	T/m <sup>2</sup>
	11.25	7.71	6.46	232.81	1.09
	8.45	7.80	6.30	267.18	1.31
	5.65	7.89	6.33	274.68	1.35
	2.50	8.12	5.98	292.07	1.43
	0.00	7.66	6.18	307.21	1.41
Ukupno:	5.21	7.84	6.24	1373.94	

## Dimenzioniranje (beton)

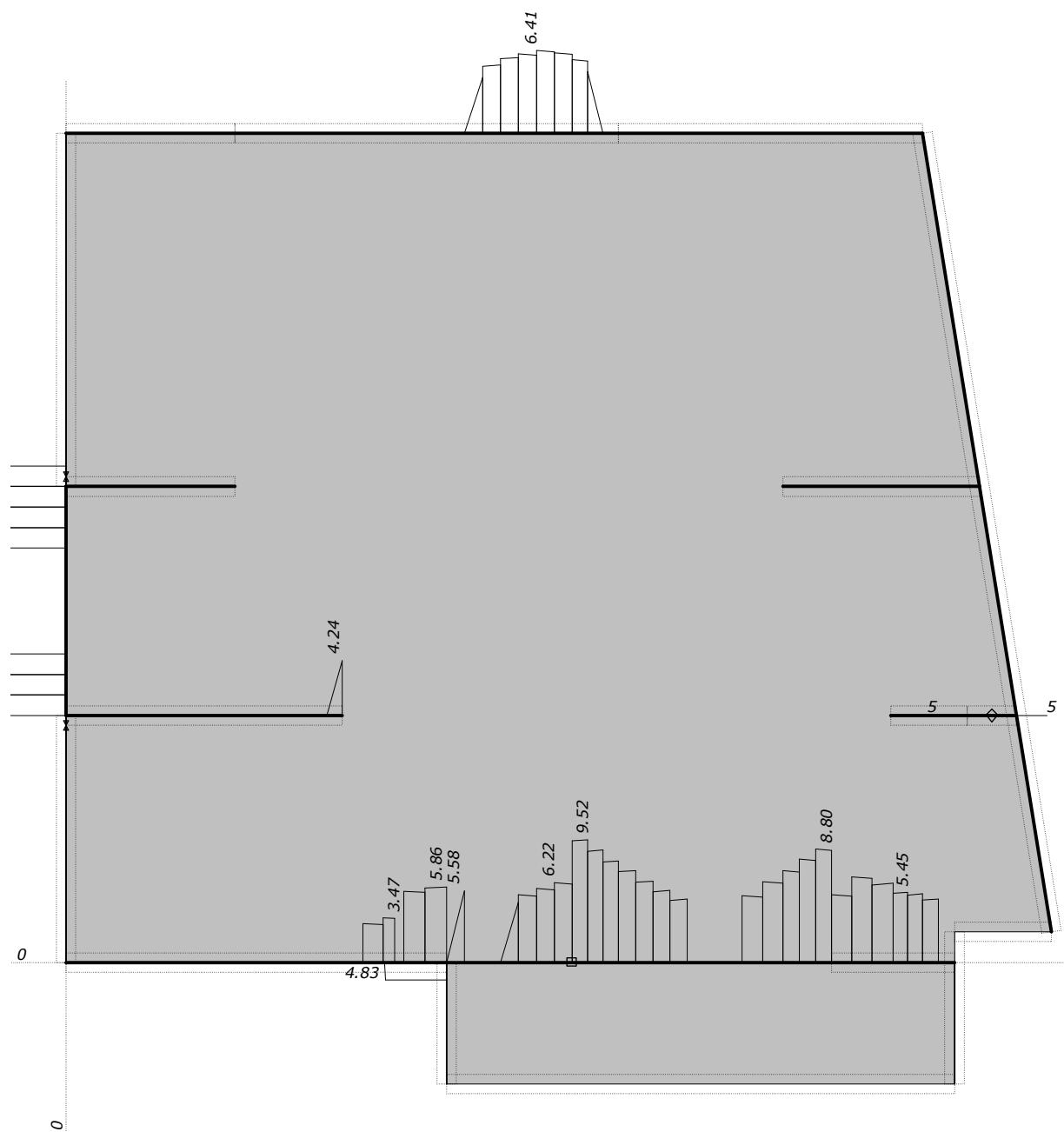
Mjerodavno opterećenje: Kompletna shema  
EC 2 (EN 1992-1-1:2004), C 25, S500H



Nivo: [0.00 m]

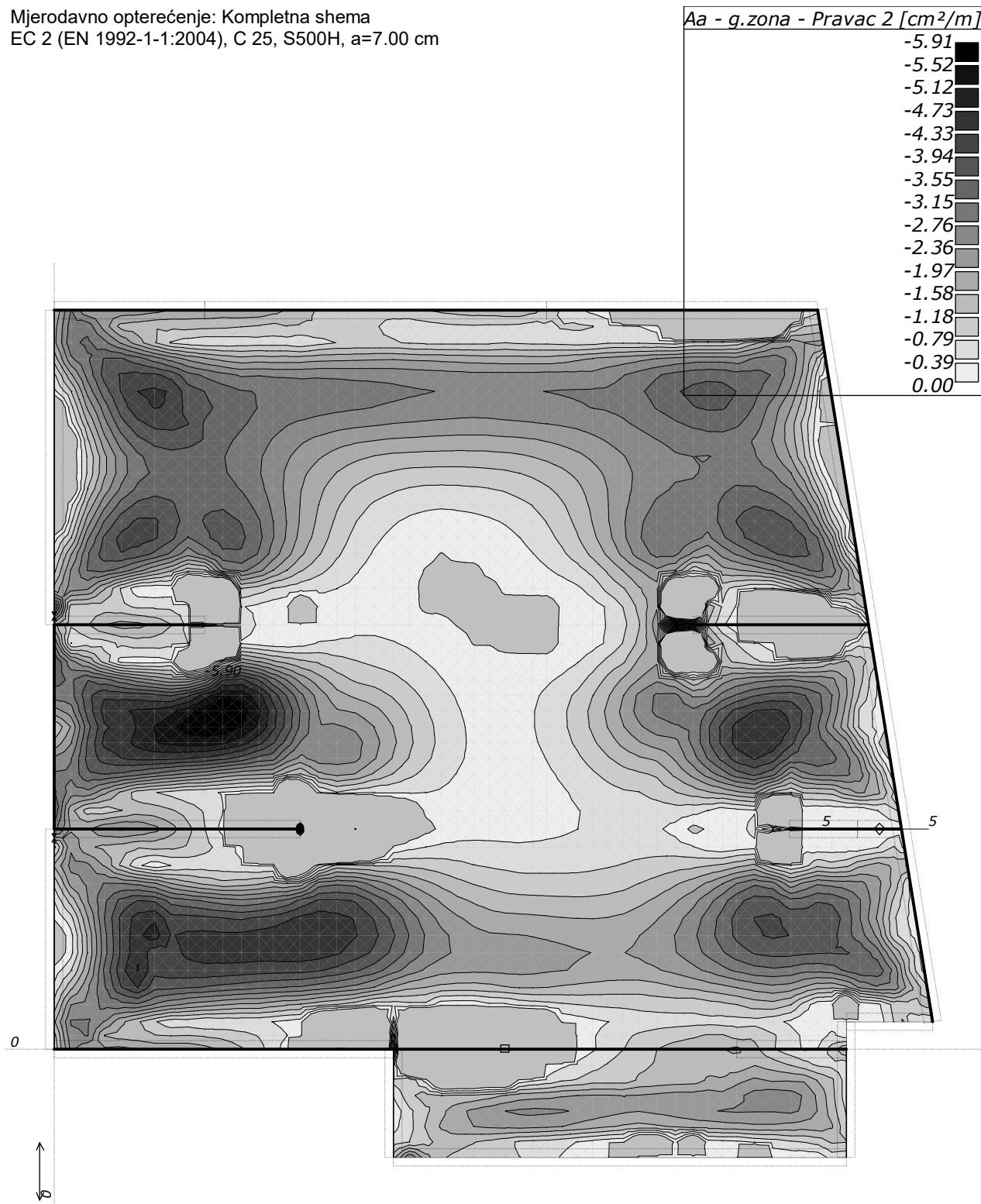
Armatura u gredama: max Aa2/Aa1 = 15.43 / 15.56 cm<sup>2</sup>

Mjerodavno opterećenje: Kompletna shema  
EC 2 (EN 1992-1-1:2004), C 25, S500H

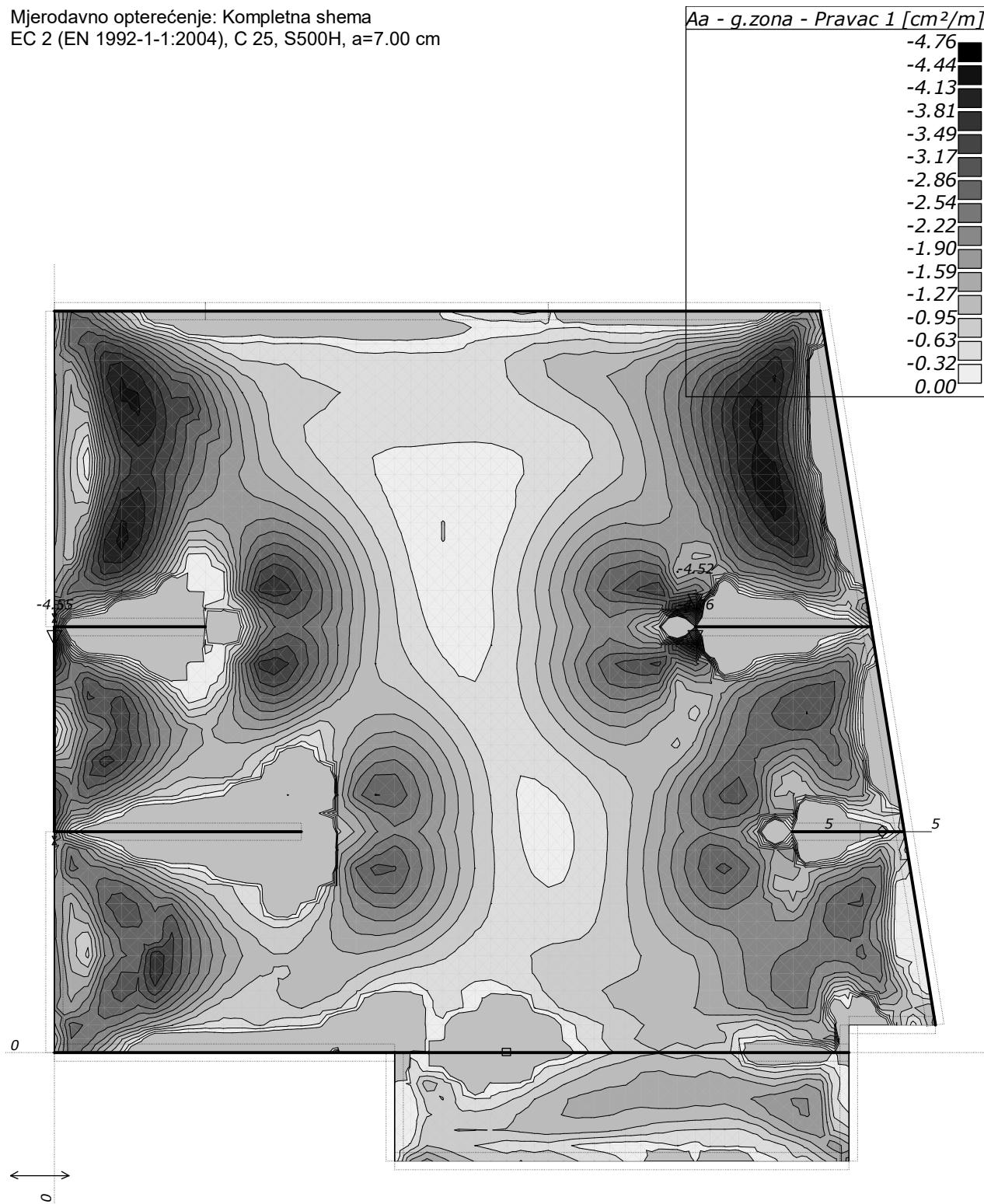


Nivo: [0.00 m]  
Armatura u gredama: max Asw= 9.52 cm<sup>2</sup>

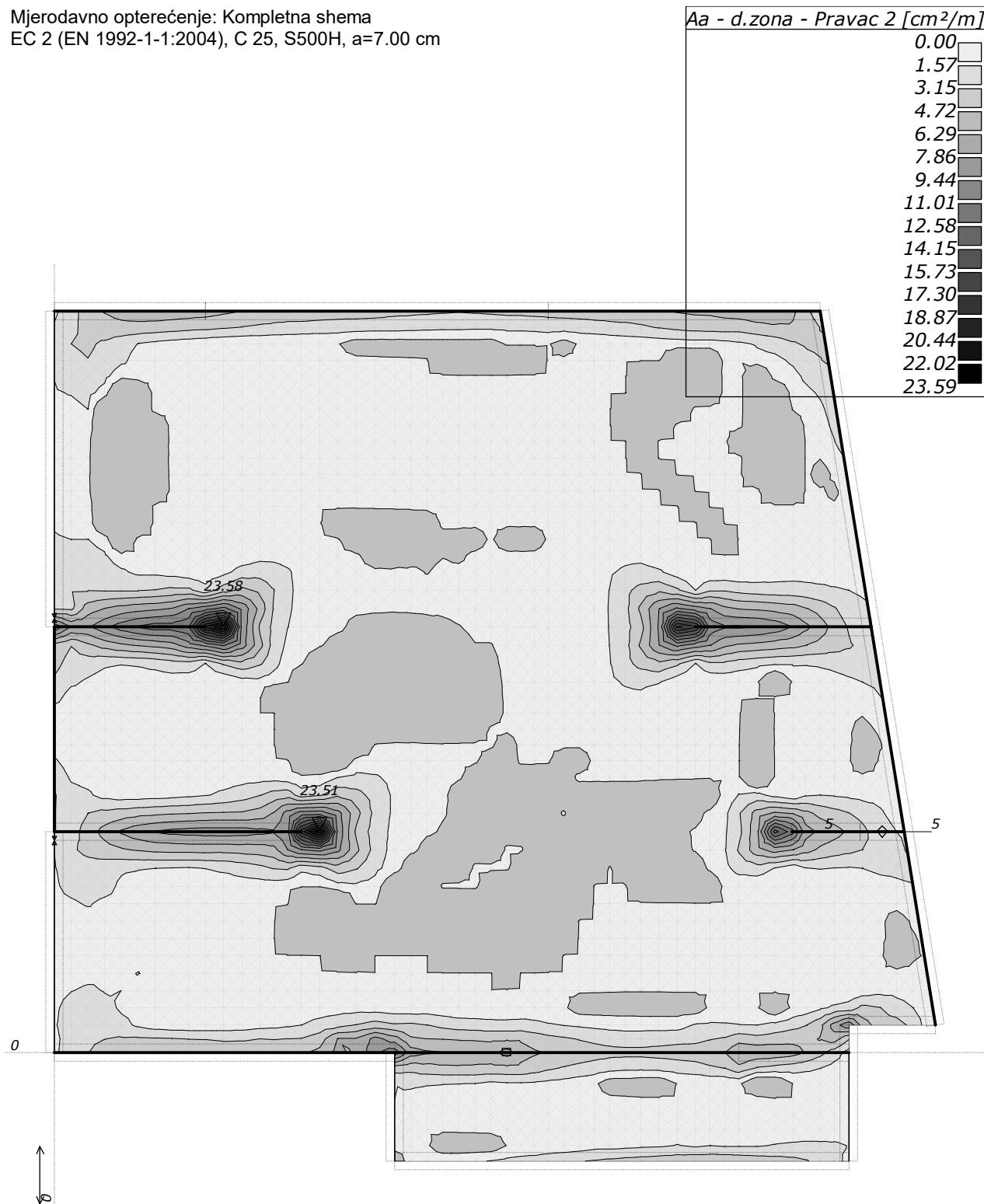
Mjerodavno opterećenje: Kompletna shema  
EC 2 (EN 1992-1-1:2004), C 25, S500H, a=7.00 cm



Mjerodavno opterećenje: Kompletna shema  
EC 2 (EN 1992-1-1:2004), C 25, S500H, a=7.00 cm

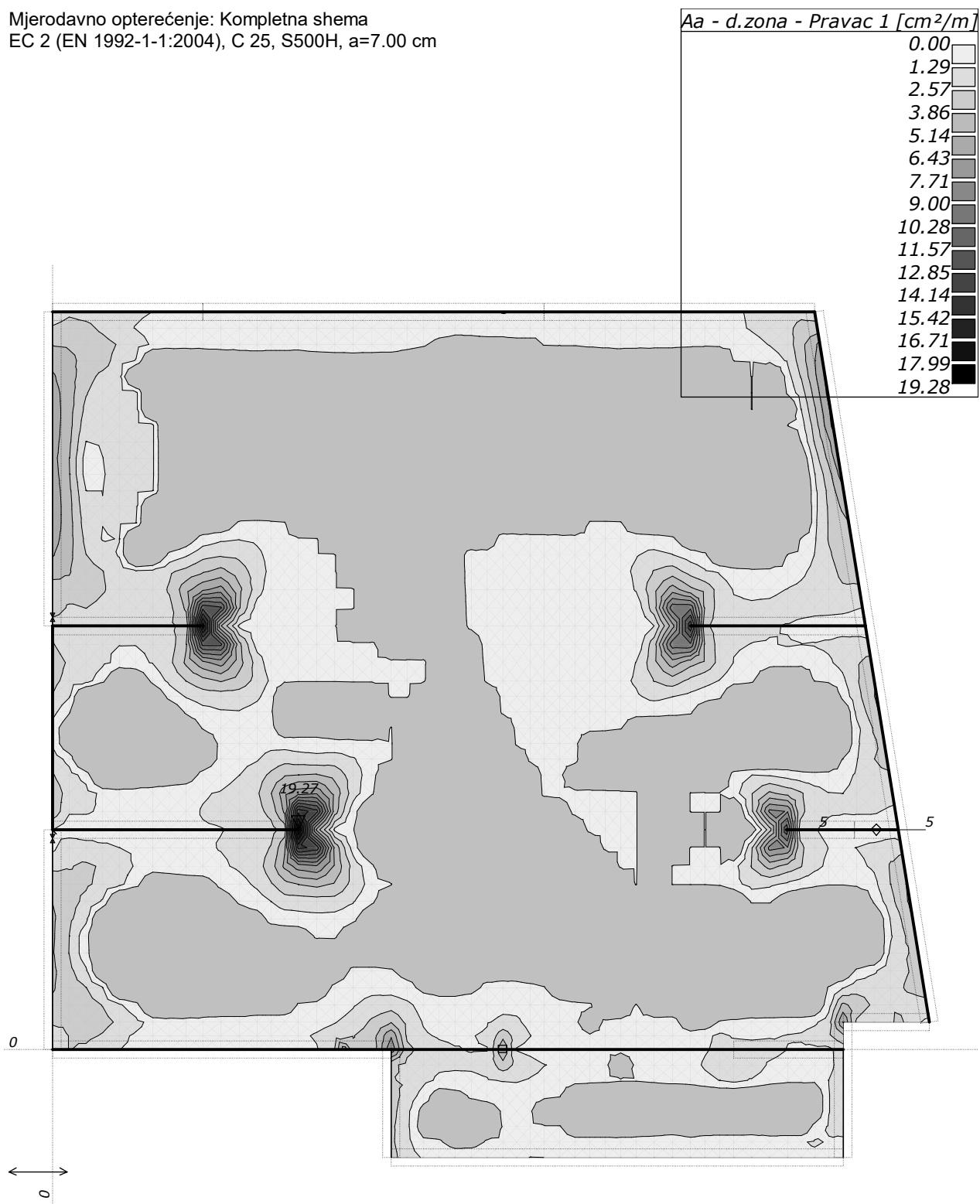


Mjerodavno opterećenje: Kompletna shema  
EC 2 (EN 1992-1-1:2004), C 25, S500H, a=7.00 cm

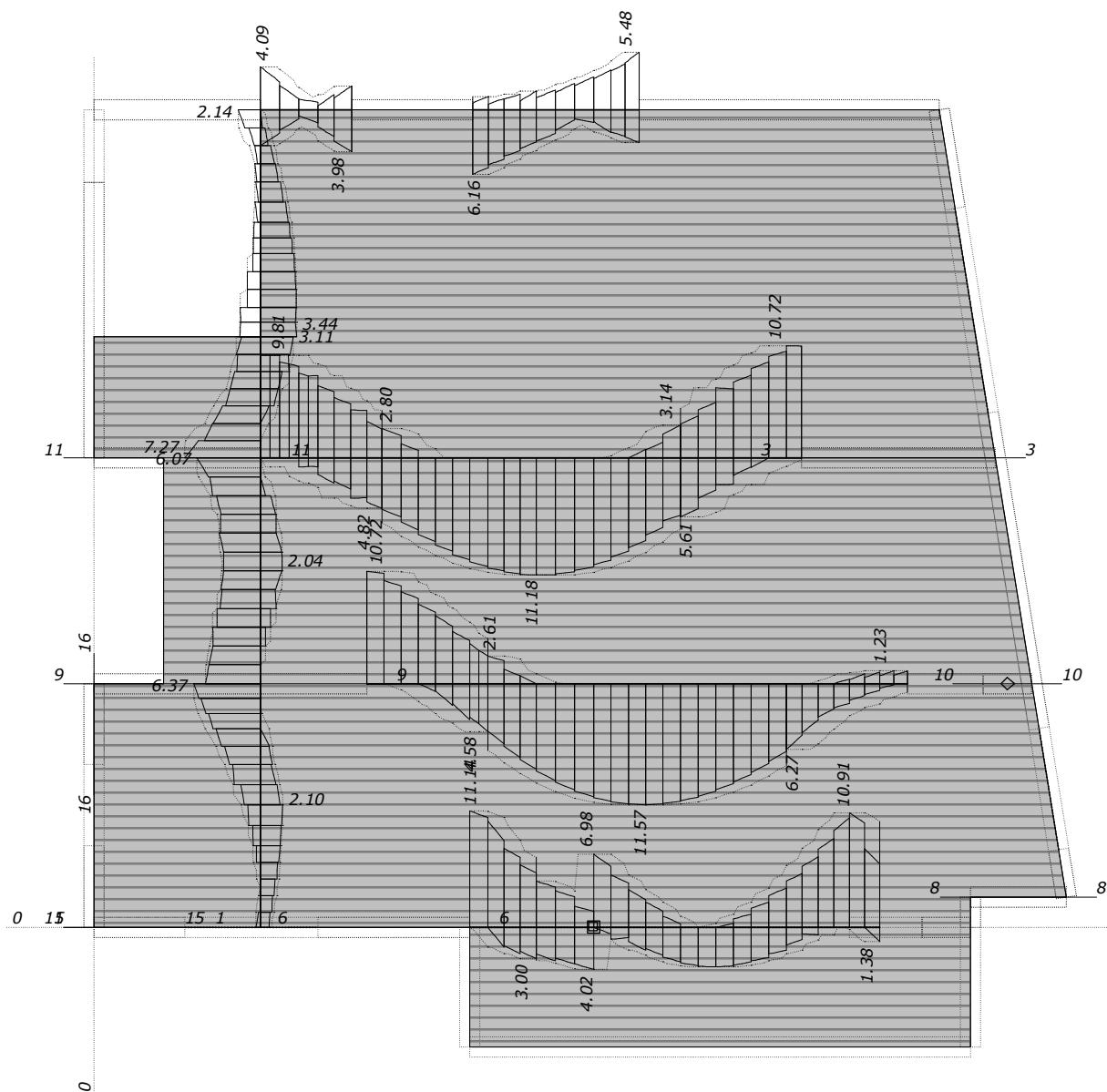


Nivo: [0.00 m]  
Aa - d.zona - Pravac 2 - max Aa2,d= 23.58 cm<sup>2</sup>/m

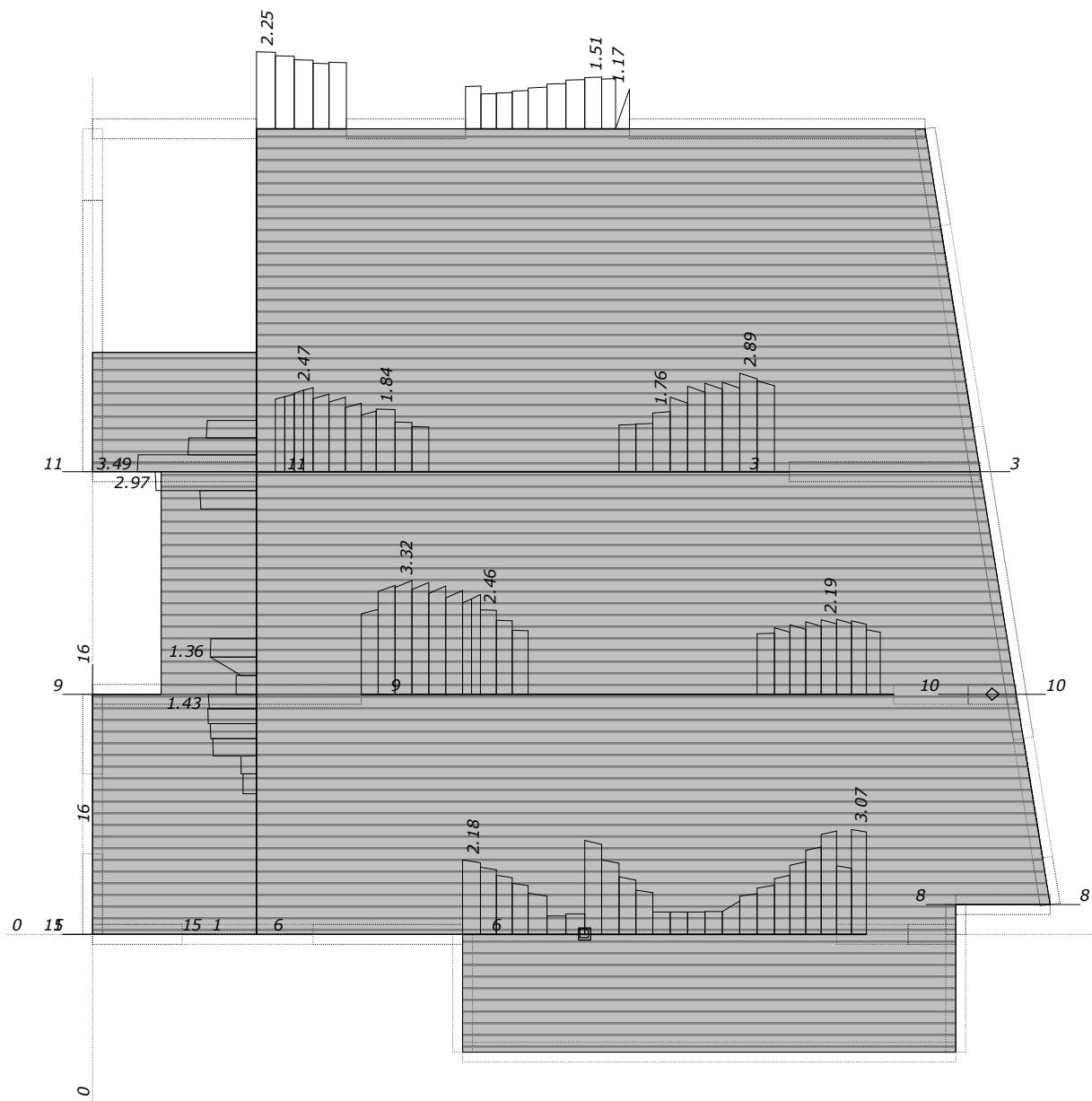
Mjerodavno opterećenje: Kompletna shema  
EC 2 (EN 1992-1-1:2004), C 25, S500H, a=7.00 cm



Nivo: [0.00 m]  
Aa - d.zona - Pravac 1 - max Aa1,d= 19.27 cm<sup>2</sup>/m

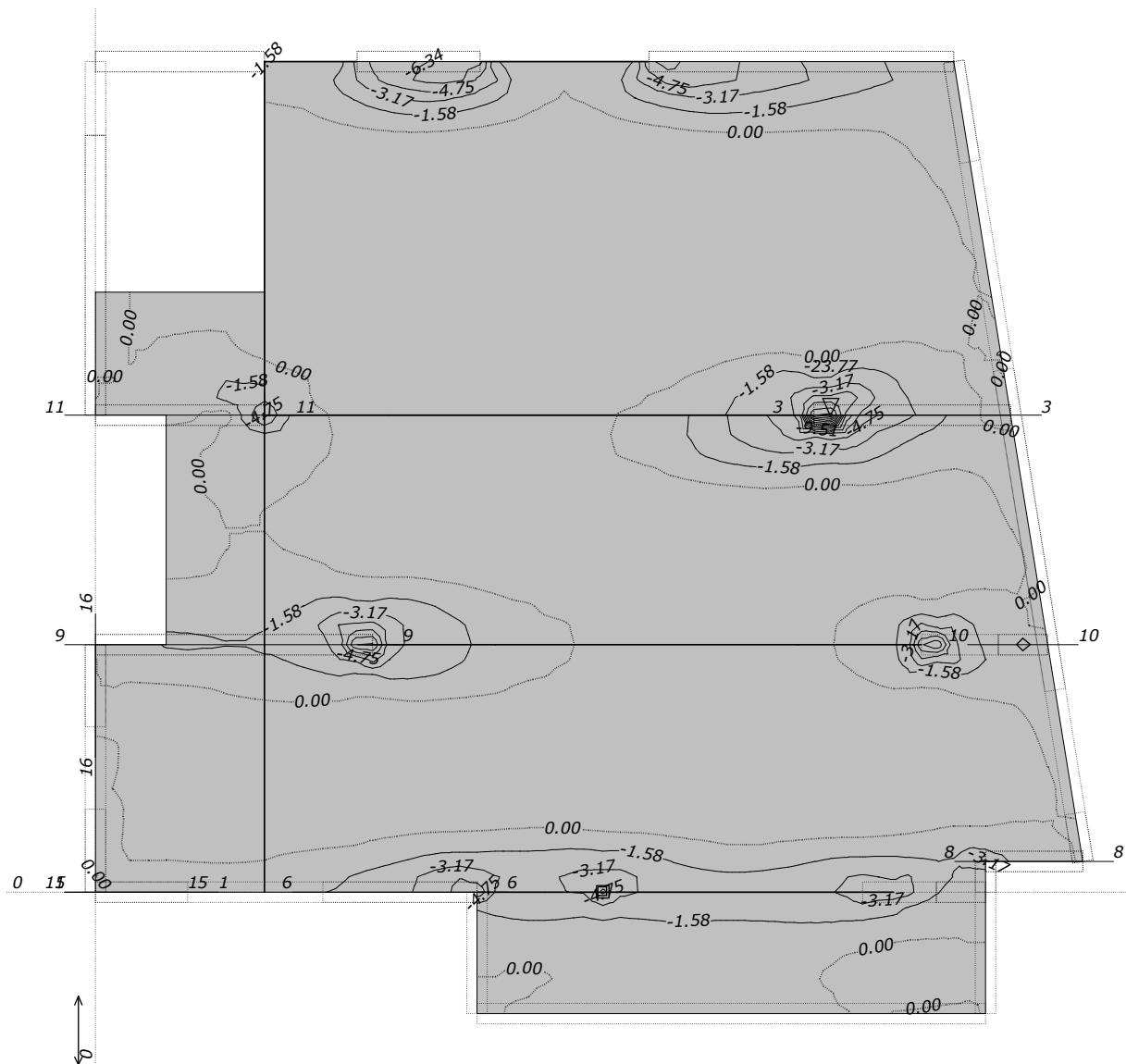


Nivo: [2.50 m]  
Armatura u gredama: max Aa2/Aa1= 11.14 / 11.57 cm<sup>2</sup>



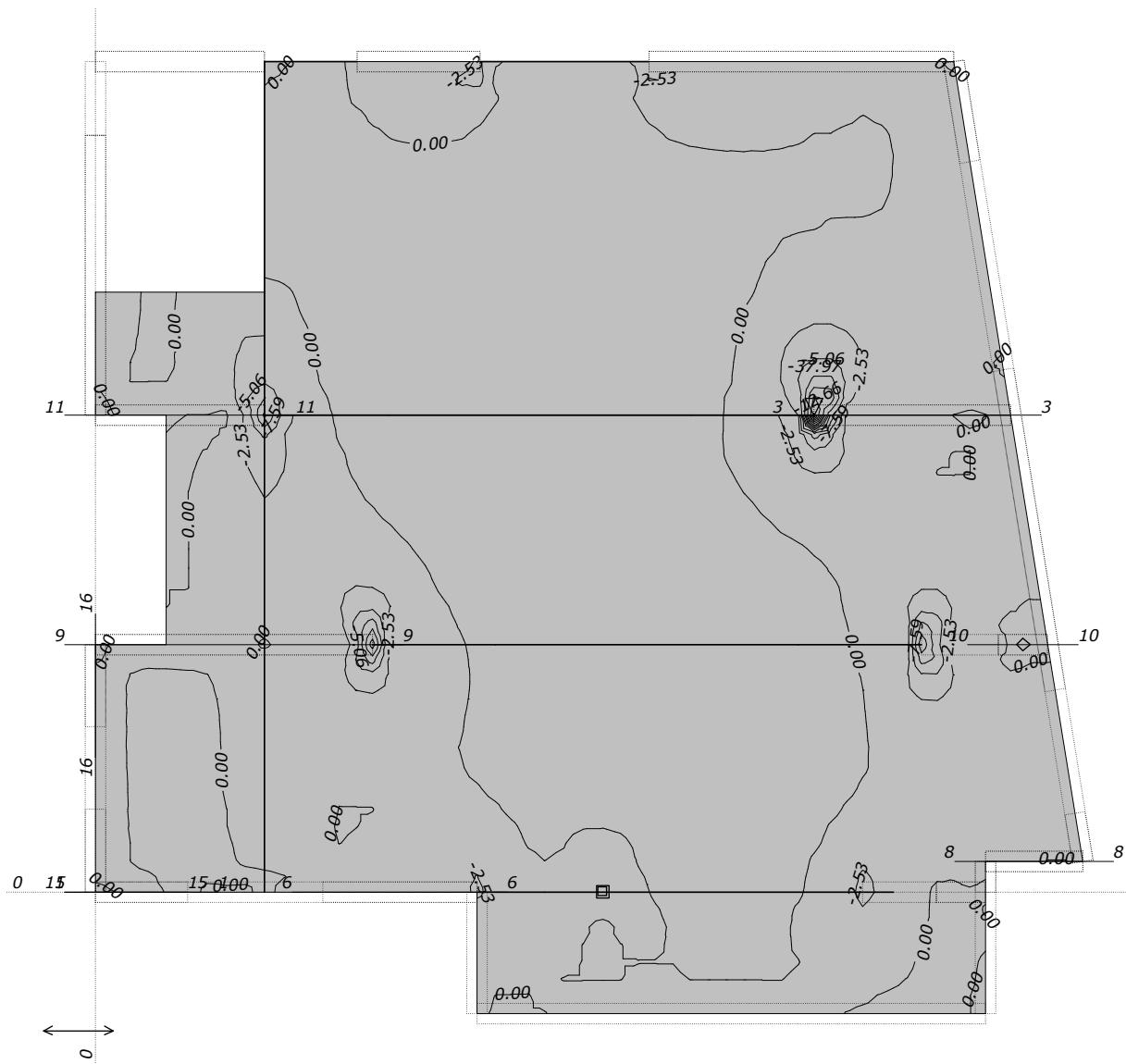
Nivo: [2.50 m]  
Armatura u gredama: max Asw= 3.49 cm<sup>2</sup>

Mjerodavno opterećenje: Kompletna shema  
EC 2 (EN 1992-1-1:2004), C 30, S500H, a=4.00 cm



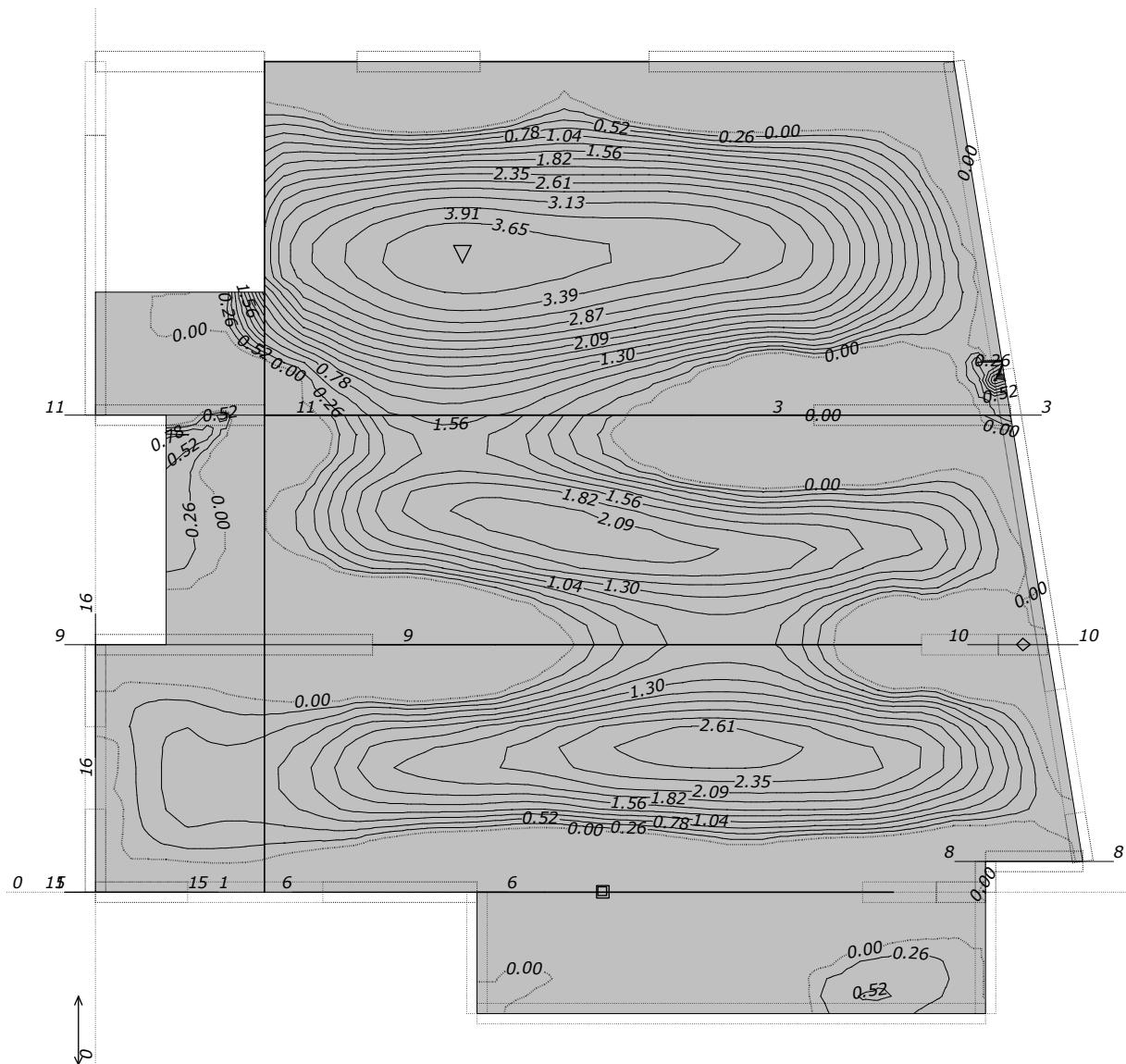
Nivo: [2.50 m]  
Aa - g.zona - Pravac 2 - max Aa2,g = -23.77 cm<sup>2</sup>/m

Mjerodavno opterećenje: Kompletna shema  
EC 2 (EN 1992-1-1:2004), C 30, S500H, a=4.00 cm



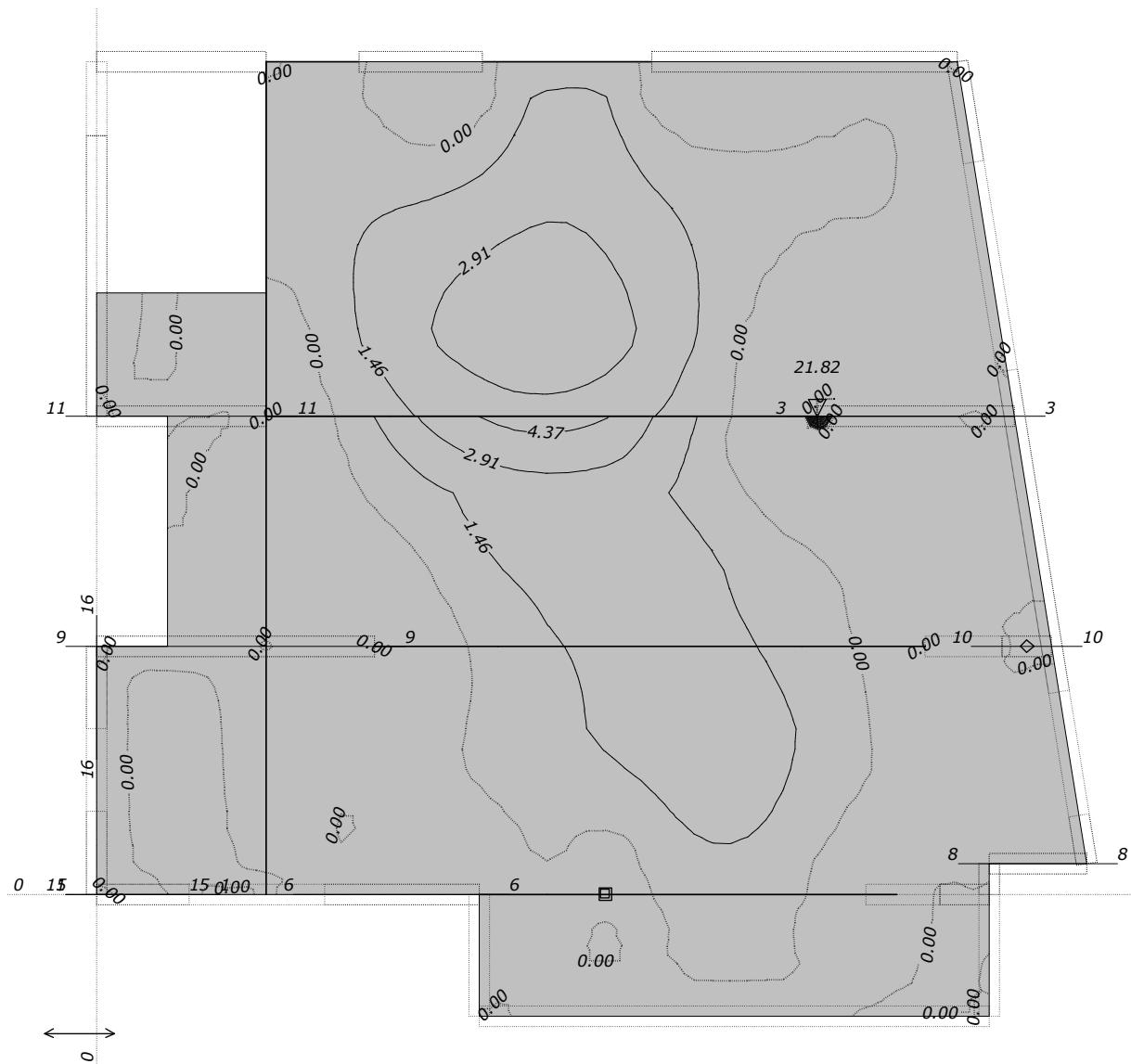
Nivo: [2.50 m]  
Aa - g.zona - Pravac 1 - max Aa1,g = -37.97 cm<sup>2</sup>/m

Mjerodavno opterećenje: Kompletna shema  
EC 2 (EN 1992-1-1:2004), C 30, S500H, a=4.00 cm

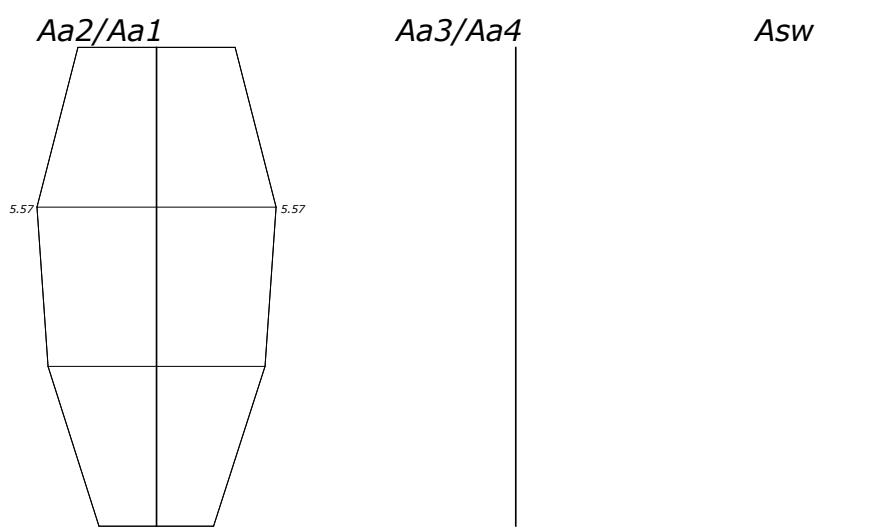


Nivo: [2.50 m]  
Aa - d.zona - Pravac 2 - max Aa2,d= 3.91 cm<sup>2</sup>/m

Mjerodavno opterećenje: Kompletna shema  
 EC 2 (EN 1992-1-1:2004), C 30, S500H,  $a=4.00$  cm



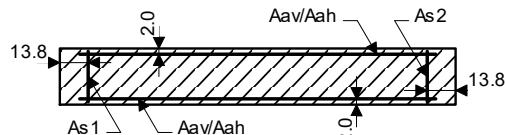
Nivo: [2.50 m]  
 Aa - d.zona - Pravac 1 - max Aa1,d= 21.82  $\text{cm}^2/\text{m}$



Armatura u gredi: (1414-2590)

Okvir: H 1

Presjek 1 - 1 (Z=2.50m)  
 EC 2 (EN 1992-1-1:2004)  
 C 25 ( $\gamma_C = 1.50$ ,  $\gamma_S = 1.15$ ) [SP]  
 Kutna armatura S500N  
 Uzdružna armatura S500N  
 Kompletna shema opterećenja



$$b/d = 25/275 \text{ cm} \quad A_b = 6875 \text{ cm}^2$$

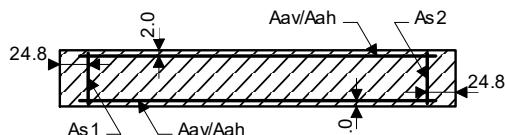
No	N [kN]	T [kN]	M [kNm]
I	-256.0	-33.4	-67.1
II	-15.7	1.7	-0.2
III	-3.7	-22.9	-51.7
IV	-42.9	-39.9	-37.5
V	-183.0	-457.6	-1003.2
VI	-183.0	-457.6	-1003.2

Mjerodavna kombinacija za savijanje: I-1.00xV  
 Mjerodavna kombinacija za posmik: I+VI

$M_{sd} =$	936.08	kNm
$N_{sd} =$	-73.05	kN
$V_{sd} =$	-490.95	kN
$cb/ea =$	-2.439/25.000 %	
$As_1 =$	1.45	$\text{cm}^2$
$As_2 =$	1.45	$\text{cm}^2$
$A_{av} =$	$\pm 2.50$	$\text{cm}^2/\text{m}$
$A_{ah} =$	$\pm 2.57$	$\text{cm}^2/\text{m}$
	(min:10.31)	
	(min:10.31)	
	(min: $\pm 2.50$ )	
	(min: $\pm 2.50$ )	

Okvir: H 1

Presjek 1 - 1 (Z=2.50m)  
 EC 2 (EN 1992-1-1:2004)  
 C 25 ( $\gamma_C = 1.50$ ,  $\gamma_S = 1.15$ ) [SP]  
 Kutna armatura S500N  
 Uzdružna armatura S500N  
 Kompletna shema opterećenja



$$b/d = 25/495.507 \text{ cm} \quad A_b = 12387.7 \text{ cm}^2$$

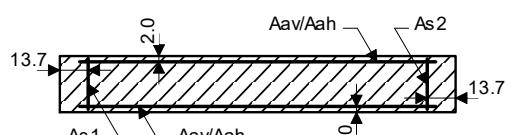
No	N [kN]	T [kN]	M [kNm]
I	-842.3	61.4	464.1
II	-89.0	-2.0	59.6
III	33.9	-59.1	-118.0
IV	-68.7	7.3	-72.0
V	1001.4	-1399.0	-2240.7
VI	1001.4	-1399.0	-2240.7

Mjerodavna kombinacija za savijanje: I+VI  
 Mjerodavna kombinacija za posmik: I-1.00xV

$M_{sd} =$	-1776.59	kNm
$N_{sd} =$	159.13	kN
$V_{sd} =$	1460.41	kN
$cb/ea =$	-1.798/25.000 %	
$As_1 =$	0.00	$\text{cm}^2$
$As_2 =$	0.00	$\text{cm}^2$
$A_{av} =$	$\pm 2.37$	$\text{cm}^2/\text{m}$
$A_{ah} =$	$\pm 4.24$	$\text{cm}^2/\text{m}$
	(min:18.58)	
	(min:18.58)	
	(min: $\pm 2.50$ )	
	(min: $\pm 2.50$ )	

Okvir: H 3

Presjek 1 - 1 (Z=2.50m)  
 EC 2 (EN 1992-1-1:2004)  
 C 25 ( $\gamma_C = 1.50$ ,  $\gamma_S = 1.15$ ) [SP]  
 Kutna armatura S500N  
 Uzdružna armatura S500N  
 Kompletna shema opterećenja



$$b/d = 30/275 \text{ cm} \quad A_b = 8250 \text{ cm}^2$$

No	N [kN]	T [kN]	M [kNm]

I	-884.4	-171.3	-105.1
II	-120.4	-33.6	-17.5
III	-7.9	13.5	-39.1
IV	58.4	12.3	-15.3
V	-104.4	416.6	-760.0
VI	-104.4	416.6	-760.0

$$\begin{aligned}
 M_{sd} &= -101.63 \text{ kNm} \\
 N_{sd} &= -1308.51 \text{ kN} \\
 V_{sd} &= -597.94 \text{ kN} \\
 A_{s1} &= 0.00 \text{ cm}^2 \quad (\min: 12.37) \\
 A_{s2} &= 0.00 \text{ cm}^2 \quad (\min: 12.37) \\
 A_{av} &= \pm 0.00 \text{ cm}^2/\text{m} \quad (\min: \pm 3.00) \\
 A_{ah} &= \pm 3.13 \text{ cm}^2/\text{m} \quad (\min: \pm 3.00)
 \end{aligned}$$

Mjerodavna kombinacija za savijanje:

1.35xI+1.05xII-1.50xIII

Mjerodavna kombinacija za posmik:

I+0.30xII-1.00xV

#### Okvir: H 3

Presjek 1 - 1 (Z=0.00m)

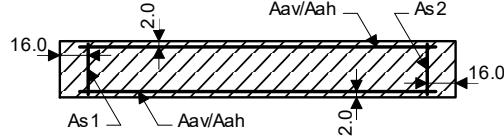
EC 2 (EN 1992-1-1:2004)

C 25 ( $\gamma_C = 1.50$ ,  $\gamma_S = 1.15$ ) [SP]

Kutna armatura S500N

Uzdužna armatura S500N

Kompletna shema opterećenja



$b/d = 30/320 \text{ cm}$   $A_b = 9600 \text{ cm}^2$

No	N [kN]	T [kN]	M [kNm]
I	-986.6	-107.2	328.6
II	-126.7	-35.0	18.7
III	5.4	10.8	-21.0
IV	-28.0	2.9	-1.9
V	16.2	331.9	-416.2
VI	16.2	331.9	-416.2

$$M_{sd} = 494.80 \text{ kNm}$$

$$N_{sd} = -1473.07 \text{ kN}$$

$$V_{sd} = -449.57 \text{ kN}$$

$$A_{s1} = 0.00 \text{ cm}^2 \quad (\min: 14.40)$$

$$A_{s2} = 0.00 \text{ cm}^2 \quad (\min: 14.40)$$

$$A_{av} = \pm 0.00 \text{ cm}^2/\text{m} \quad (\min: \pm 3.00)$$

$$A_{ah} = \pm 2.02 \text{ cm}^2/\text{m} \quad (\min: \pm 3.00)$$

Mjerodavna kombinacija za savijanje:

1.35xI+1.05xII-1.50xIII

Mjerodavna kombinacija za posmik:

I+0.30xII-1.00xV

#### Okvir: H 4

Presjek 1 - 1 (Z=2.50m)

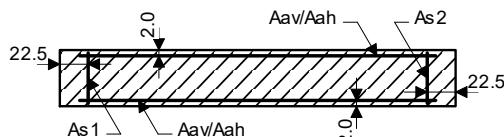
EC 2 (EN 1992-1-1:2004)

C 25 ( $\gamma_C = 1.50$ ,  $\gamma_S = 1.15$ ) [SP]

Kutna armatura S500N

Uzdužna armatura S500N

Kompletna shema opterećenja



$b/d = 30/450 \text{ cm}$   $A_b = 13500 \text{ cm}^2$

No	N [kN]	T [kN]	M [kNm]
I	-900.6	-144.2	-173.5
II	-98.0	-32.3	-20.6
III	-1.9	20.3	-186.1
IV	-53.5	-5.6	18.1
V	-90.8	538.8	-3125.0
VI	-90.8	538.8	-3125.0

$$M_{sd} = -3298.51 \text{ kNm}$$

$$N_{sd} = -991.47 \text{ kN}$$

$$V_{sd} = -692.71 \text{ kN}$$

$$\epsilon_b/\epsilon_a = -3.032/25.000 \%$$

$$A_{s1} = 0.00 \text{ cm}^2 \quad (\min: 20.25)$$

$$A_{s2} = 0.00 \text{ cm}^2 \quad (\min: 20.25)$$

$$A_{av} = \pm 1.75 \text{ cm}^2/\text{m} \quad (\min: \pm 3.00)$$

$$A_{ah} = \pm 2.21 \text{ cm}^2/\text{m} \quad (\min: \pm 3.00)$$

Mjerodavna kombinacija za savijanje: I+VI

Mjerodavna kombinacija za posmik: I+0.30xII-1.00xV

#### Okvir: H 4

Presjek 1 - 1 (Z=2.50m)

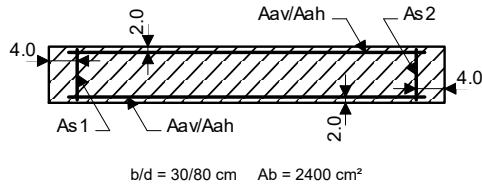
EC 2 (EN 1992-1-1:2004)

C 25 ( $\gamma_C = 1.50$ ,  $\gamma_S = 1.15$ ) [SP]

Kutna armatura S500N

Uzdužna armatura S500N

Kompletna shema opterećenja



b/d = 30/80 cm Ab = 2400 cm<sup>2</sup>

No	N [kN]	T [kN]	M [kNm]
I	-225.4	50.6	5.9
II	-22.4	7.8	-0.8
III	8.3	3.0	-3.1
IV	29.5	-1.8	-0.4
V	154.5	103.0	-176.7
VI	154.5	103.0	-176.7

Mjerodavna kombinacija za savijanje: I+VI

Mjerodavna kombinacija za posmik: I+0.30xII+VI

$$M_{sd} = -170.82 \text{ kNm}$$

$$N_{sd} = -70.93 \text{ kN}$$

$$V_{sd} = 155.99 \text{ kN}$$

$$\epsilon_b/\epsilon_a = -2.986/25.000 \%$$

$$A_{s1} = 2.46 \text{ cm}^2 \quad (\min: 3.60)$$

$$A_{s2} = 2.46 \text{ cm}^2 \quad (\min: 3.60)$$

$$A_{av} = \pm 3.00 \text{ cm}^2/m \quad (\min: \pm 3.00)$$

$$A_{ah} = \pm 2.80 \text{ cm}^2/m \quad (\min: \pm 3.00)$$

**Okvir: H 5**

Presjek 1 - 1 (Z=2.50m)

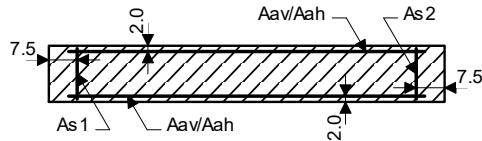
EC 2 (EN 1992-1-1:2004)

C 25 ( $\gamma_C = 1.50$ ,  $\gamma_S = 1.15$ ) [SP]

Kutna armatura S500N

Uzdužna armatura S500N

Kompletna shema opterećenja



b/d = 25/150 cm Ab = 3750 cm<sup>2</sup>

No	N [kN]	T [kN]	M [kNm]
I	-244.3	-43.9	-32.8
II	-37.7	-6.5	-4.7
III	-39.1	-7.2	-17.7
IV	56.5	14.0	5.8
V	-1148.0	-137.5	-469.1
VI	-1148.0	-137.5	-469.1

Mjerodavna kombinacija za savijanje: I-1.00xV

Mjerodavna kombinacija za posmik: I+0.30xII+VI

$$M_{sd} = 436.32 \text{ kNm}$$

$$N_{sd} = 903.65 \text{ kN}$$

$$V_{sd} = -183.30 \text{ kN}$$

$$\epsilon_b/\epsilon_a = -1.068/25.000 \%$$

$$A_{s1} = 14.37 \text{ cm}^2 \quad (\min: 5.63)$$

$$A_{s2} = 14.37 \text{ cm}^2 \quad (\min: 5.63)$$

$$A_{av} = \pm 2.50 \text{ cm}^2/m \quad (\min: \pm 2.50)$$

$$A_{ah} = \pm 1.76 \text{ cm}^2/m \quad (\min: \pm 2.50)$$

**Okvir: H 5**

Presjek 1 - 1 (Z=2.50m)

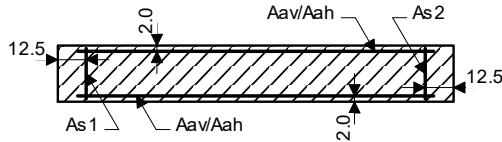
EC 2 (EN 1992-1-1:2004)

C 25 ( $\gamma_C = 1.50$ ,  $\gamma_S = 1.15$ ) [SP]

Kutna armatura S500N

Uzdužna armatura S500N

Kompletna shema opterećenja



b/d = 25/250 cm Ab = 6250 cm<sup>2</sup>

No	N [kN]	T [kN]	M [kNm]
I	-490.9	-54.0	-23.5
II	-74.6	-4.7	-4.0
III	-5.0	-21.2	-98.6
IV	4.5	21.0	19.5
V	1.8	-532.9	-1631.7
VI	1.8	-532.9	-1631.7

Mjerodavna kombinacija za savijanje: I+VI

Mjerodavna kombinacija za posmik: I+0.30xII+VI

$$M_{sd} = -1655.18 \text{ kNm}$$

$$N_{sd} = -489.13 \text{ kN}$$

$$V_{sd} = -588.33 \text{ kN}$$

$$\epsilon_b/\epsilon_a = -3.500/22.978 \%$$

$$A_{s1} = 5.88 \text{ cm}^2 \quad (\min: 9.37)$$

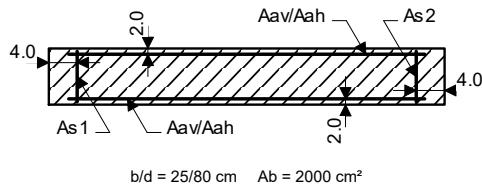
$$A_{s2} = 5.88 \text{ cm}^2 \quad (\min: 9.37)$$

$$A_{av} = \pm 2.50 \text{ cm}^2/m \quad (\min: \pm 2.50)$$

$$A_{ah} = \pm 3.38 \text{ cm}^2/m \quad (\min: \pm 2.50)$$

### Okvir: H\_5

Presjek 1 - 1 (Z=2.50m)  
 EC 2 (EN 1992-1-1:2004)  
 C 25 ( $\gamma_C = 1.50$ ,  $\gamma_S = 1.15$ ) [SP]  
 Kutna armatura S500N  
 Uzdužna armatura S500N  
 Kompletna shema opterećenja



b/d = 25/80 cm Ab = 2000 cm<sup>2</sup>

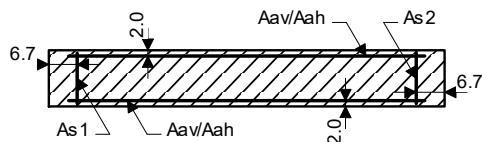
No	N [kN]	T [kN]	M [kNm]
I	-258.1	53.4	6.0
II	-35.5	6.9	-0.3
III	52.2	-5.1	-5.9
IV	45.5	-5.1	-1.0
V	1703.8	-192.8	-184.3
VI	1703.8	-192.8	-184.3

Mjerodavna kombinacija za savijanje: I+VI  
 Mjerodavna kombinacija za posmik: I+0.30xII-1.00xV

$$\begin{aligned} M_{sd} &= -178.33 \text{ kNm} \\ N_{sd} &= 1445.63 \text{ kN} \\ V_{sd} &= 248.29 \text{ kN} \\ cb/ea &= -0.349/25.000 \% \\ As_1 &= 20.61 \text{ cm}^2 \quad (\min: 3.00) \\ As_2 &= 20.61 \text{ cm}^2 \quad (\min: 3.00) \\ A_{av} &= \pm 2.50 \text{ cm}^2/\text{m} \quad (\min: \pm 2.50) \\ A_{ah} &= \pm 4.46 \text{ cm}^2/\text{m} \quad (\min: \pm 2.50) \end{aligned}$$

### Okvir: V\_1

Presjek 1 - 1 (Z=2.50m)  
 EC 2 (EN 1992-1-1:2004)  
 C 25 ( $\gamma_C = 1.50$ ,  $\gamma_S = 1.15$ ) [SP]  
 Kutna armatura S500N  
 Uzdužna armatura S500N  
 Kompletna shema opterećenja



b/d = 25/135 cm Ab = 3375 cm<sup>2</sup>

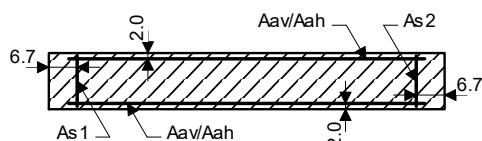
No	N [kN]	T [kN]	M [kNm]
I	-70.4	6.6	-15.4
II	4.2	4.3	-7.1
III	42.0	5.0	-8.8
IV	-31.3	-10.0	20.0
V	1120.2	81.1	-262.3
VI	1120.2	81.1	-262.3

Mjerodavna kombinacija za savijanje: I+0.30xII+VI  
 Mjerodavna kombinacija za posmik: I+0.30xII+VII

$$\begin{aligned} M_{sd} &= -279.84 \text{ kNm} \\ N_{sd} &= 1051.06 \text{ kN} \\ V_{sd} &= 88.99 \text{ kN} \\ cb/ea &= -0.643/25.000 \% \\ As_1 &= 14.39 \text{ cm}^2 \quad (\min: 5.06) \\ As_2 &= 14.39 \text{ cm}^2 \quad (\min: 5.06) \\ A_{av} &= \pm 2.50 \text{ cm}^2/\text{m} \quad (\min: \pm 2.50) \\ A_{ah} &= \pm 0.95 \text{ cm}^2/\text{m} \quad (\min: \pm 2.50) \end{aligned}$$

### Okvir: V\_1

Presjek 1 - 1 (Z=2.50m)  
 EC 2 (EN 1992-1-1:2004)  
 C 25 ( $\gamma_C = 1.50$ ,  $\gamma_S = 1.15$ ) [SP]  
 Kutna armatura S500N  
 Uzdužna armatura S500N  
 Kompletna shema opterećenja



b/d = 25/133.75 cm Ab = 3343.75 cm<sup>2</sup>

No	N [kN]	T [kN]	M [kNm]

I	-192.6	7.7	-13.3
II	-37.2	6.1	-7.0
III	19.9	1.0	-11.6
IV	39.2	-9.6	19.9
V	462.7	19.4	-353.7
VI	462.7	19.4	-353.7

Mjerodavna kombinacija za savijanje:

I+VI

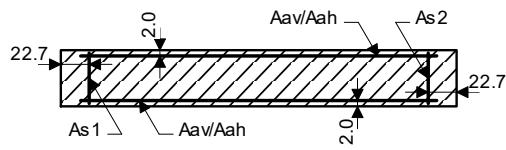
Mjerodavna kombinacija za posmik:

1.35xI+1.05xII-1.50xIV

$$\begin{aligned}
 M_{sd} &= -367.07 \text{ kNm} \\
 N_{sd} &= 270.10 \text{ kN} \\
 V_{sd} &= 31.22 \text{ kN} \\
 \epsilon_b/\epsilon_a &= -1.911/25.000 \% \\
 A_{s1} &= 7.04 \text{ cm}^2 \quad (\min: 5.02) \\
 A_{s2} &= 7.04 \text{ cm}^2 \quad (\min: 5.02) \\
 A_{av} &= \pm 2.50 \text{ cm}^2/m \quad (\min: \pm 2.50) \\
 A_{ah} &= \pm 0.31 \text{ cm}^2/m \quad (\min: \pm 2.50)
 \end{aligned}$$

### Okvir: V 1

Presjek 1 - 1 (Z=2.50m)  
 EC 2 (EN 1992-1-1:2004)  
 C 25 (vC = 1.50, yS = 1.15) [SP]  
 Kutna armatura S500N  
 Uzdružna armatura S500N  
 Kompletna shema opterećenja



$$b/d = 25/455 \text{ cm} \quad A_b = 11375 \text{ cm}^2$$

No	N [kN]	T [kN]	M [kNm]
I	-523.2	-34.7	-115.6
II	-58.5	-15.4	-27.9
III	42.2	-18.3	28.8
IV	-22.8	-48.0	133.2
V	791.7	-347.7	610.2
VI	791.7	-347.7	610.2

Mjerodavna kombinacija za savijanje: I+VI

Mjerodavna kombinacija za posmik: I+0.30xII+VI

$$\begin{aligned}
 M_{sd} &= 494.60 \text{ kNm} \\
 N_{sd} &= 268.45 \text{ kN} \\
 V_{sd} &= -387.10 \text{ kN}
 \end{aligned}$$

$$\begin{aligned}
 \epsilon_b/\epsilon_a &= -0.917/25.000 \% \\
 A_{s1} &= 0.00 \text{ cm}^2 \quad (\min: 17.06) \\
 A_{s2} &= 0.00 \text{ cm}^2 \quad (\min: 17.06) \\
 A_{av} &= \pm 1.39 \text{ cm}^2/m \quad (\min: \pm 2.50) \\
 A_{ah} &= \pm 1.22 \text{ cm}^2/m \quad (\min: \pm 2.50)
 \end{aligned}$$

## Osnovni podaci o modelu

Datoteka: PLOCA POZ 0,00  
Datum proračuna: 10.7.2021

Način proračuna: 2D model (Zp, Xr, Yr)

- |   |   |  |
|---|---|--|
| <input checked="" type="checkbox"/> Teorija I-og reda | <input type="checkbox"/> Modalna analiza    | <input type="checkbox"/> Stabilnost    |
| <input type="checkbox"/> Teorija II-og reda           | <input type="checkbox"/> Seizmički proračun | <input type="checkbox"/> Faze građenja |
| <input type="checkbox"/> Nelinearni proračun          |   |  |

### Veličina modela

Broj čvorova:	2263
Broj pločastih elemenata:	2166
Broj grednih elemenata:	167
Broj graničnih elemenata:	1023
Broj osnovnih slučajeva opterećenja:	5
Broj kombinacija opterećenja:	10

### Jedinice mjera

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

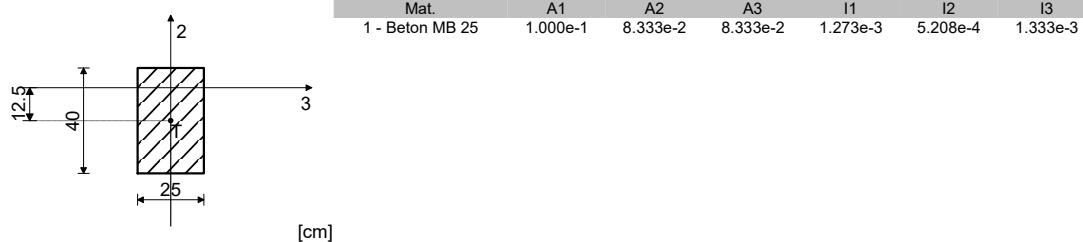
## Ulazni podaci - Konstrukcija

Tabela materijala

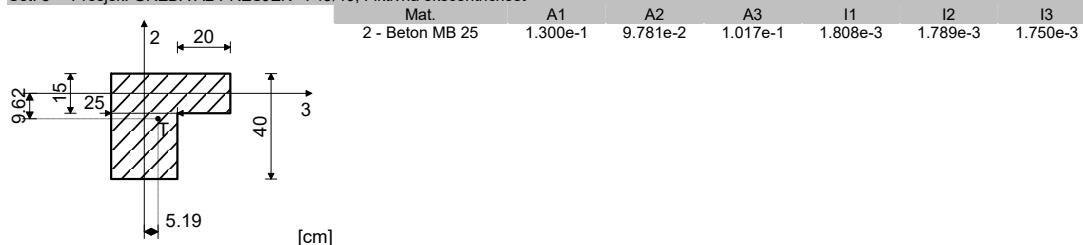
No	Naziv materijala	E[kN/m <sup>2</sup> ]	$\mu$	$\gamma[\text{kN/m}^3]$	$a_t[1/\text{C}]$	$E_m[\text{kN/m}^2]$	$\mu_m$
1	Beton MB 25	3.000e+7	0.20	25.00	1.000e-5	3.000e+7	0.20
2	Beton MB 25	3.000e+7	0.20	12.00	1.000e-5	3.000e+7	0.20
3	Beton MB 25	3.000e+7	0.20	8.00	1.000e-5	3.000e+7	0.20
4	Beton MB 25	3.000e+7	0.20	4.00	1.000e-5	3.000e+7	0.20
5	Beton MB 25	3.000e+7	0.20	6.50	1.000e-5	3.000e+7	0.20
6	Beton MB 25	3.000e+7	0.20	3.75	1.000e-5	3.000e+7	0.20

Setovi greda

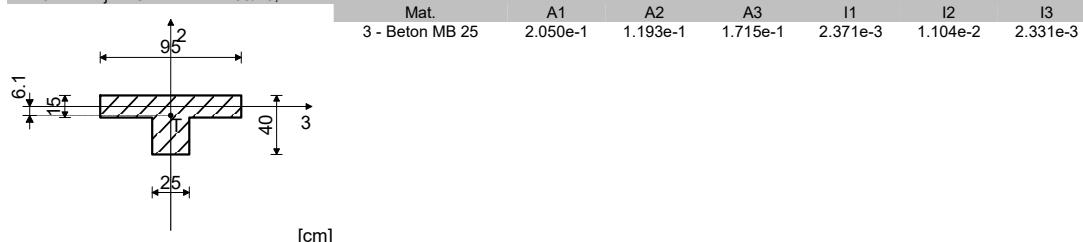
Set: 2 Presjek: GREDA A1 b/d=25/40, Fiktivna ekscentričnost



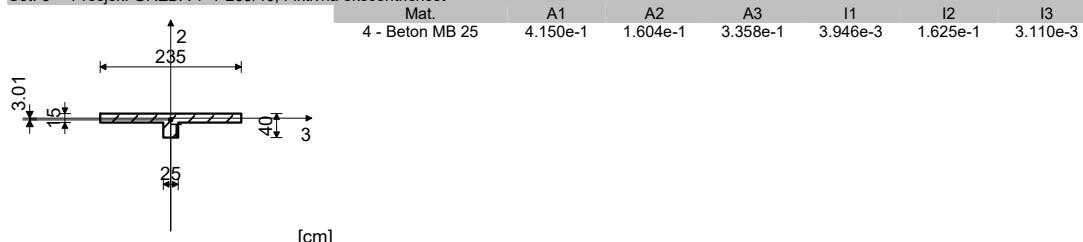
Set: 3 Presjek: GREDA A2 PRESJEK ~1 45/40, Fiktivna ekscentričnost



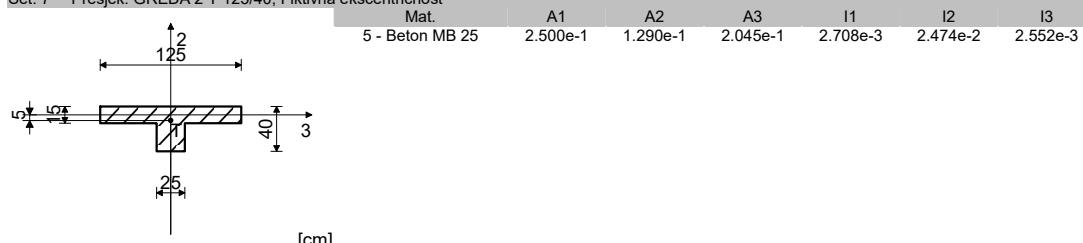
Set: 5 Presjek: GREDA D2 T 95/40, Fiktivna ekscentričnost

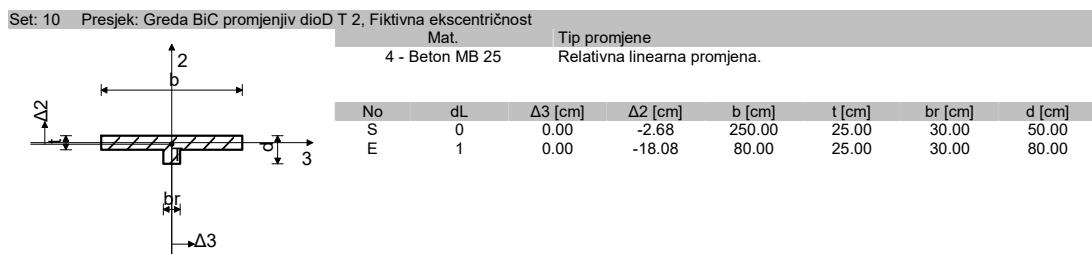
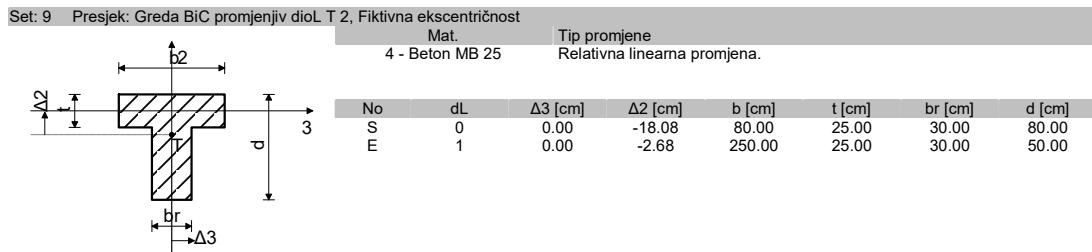
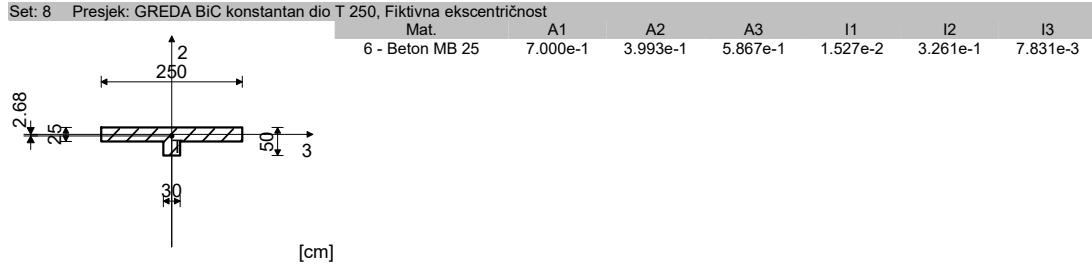


Set: 6 Presjek: GREDA 1' T 235/40, Fiktivna ekscentričnost



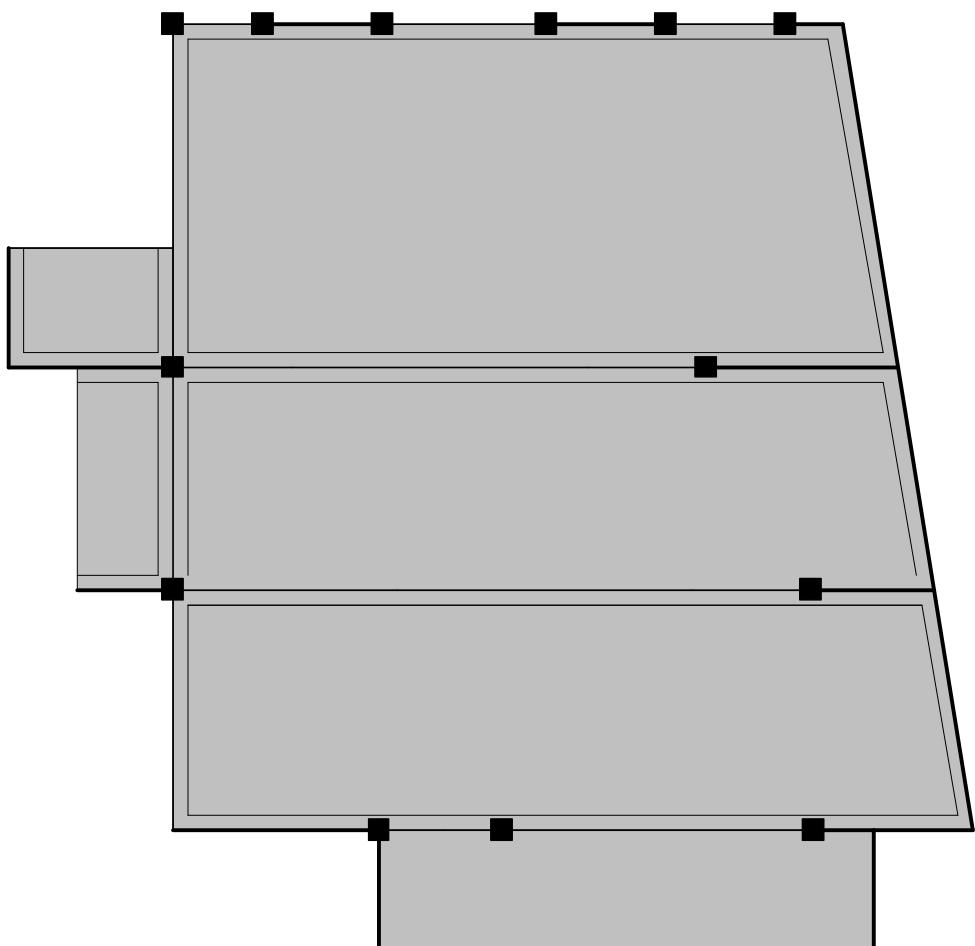
Set: 7 Presjek: GREDA 2 T 125/40, Fiktivna ekscentričnost

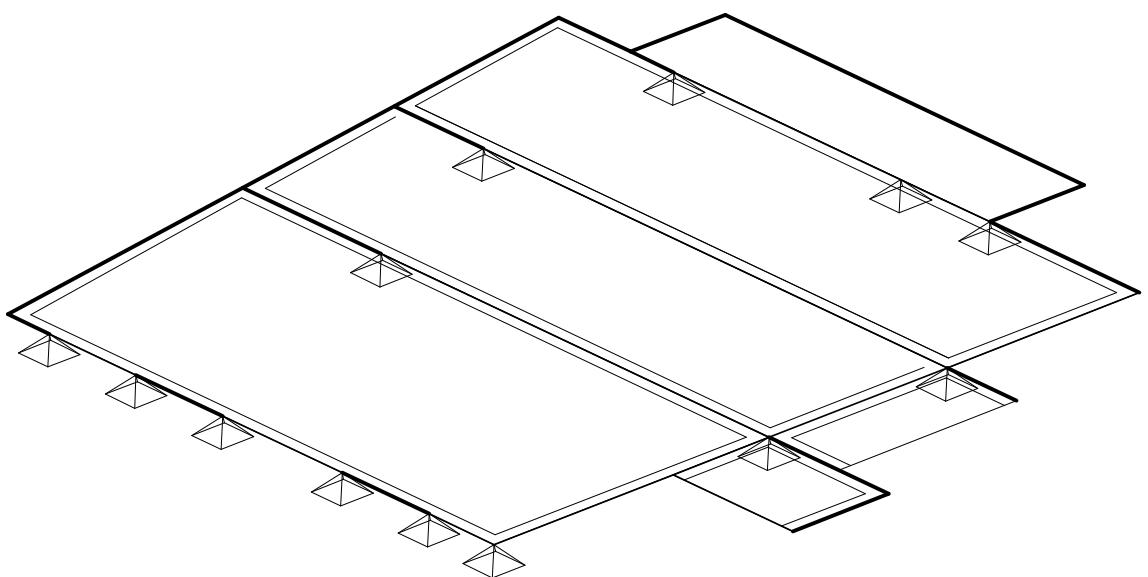




Setovi točkastih ležajeva

	K,R1	K,R2	K,R3	K,M1	K,M2	K,M3
1	1.000e+10	1.000e+10	1.000e+10			
2	1.000e+10	1.000e+10	1.000e+10		1.000e+10	





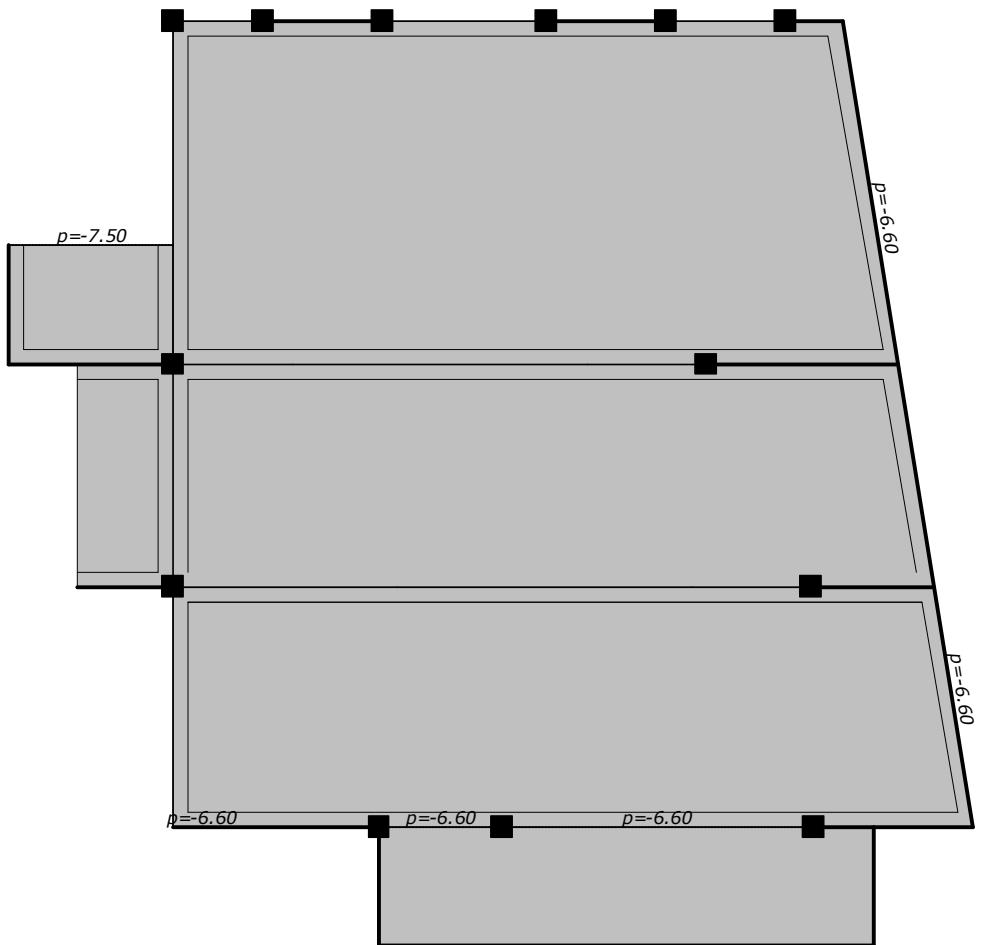
Izometrija

## ***Ulazni podaci - Opterećenje***

**Lista slučajeva opterećenja**

LC	Naziv
1	STALNO (g)
2	KORISNO A - POSLOVNI PROSTOR
3	KORISNO G - GARAZA
4	KORISNO G - GARAZA LOKALNO GREDA B
5	KORISNO G - GARAZA LOKALNO GREDA C
6	Komb.: 1.35xI+1.5xV
7	Komb.: 1.35xI+1.5xIV
8	Komb.: 1.35xI+1.5xIII
9	Komb.: 1.35xI+1.5xII
10	Komb.: I+1.5xV
11	Komb.: I+1.5xIV
12	Komb.: I+1.5xIII
13	Komb.: I+1.5xII
14	Komb.: 1.35xI
15	Komb.: I

Opt. 1: STALNO (g)



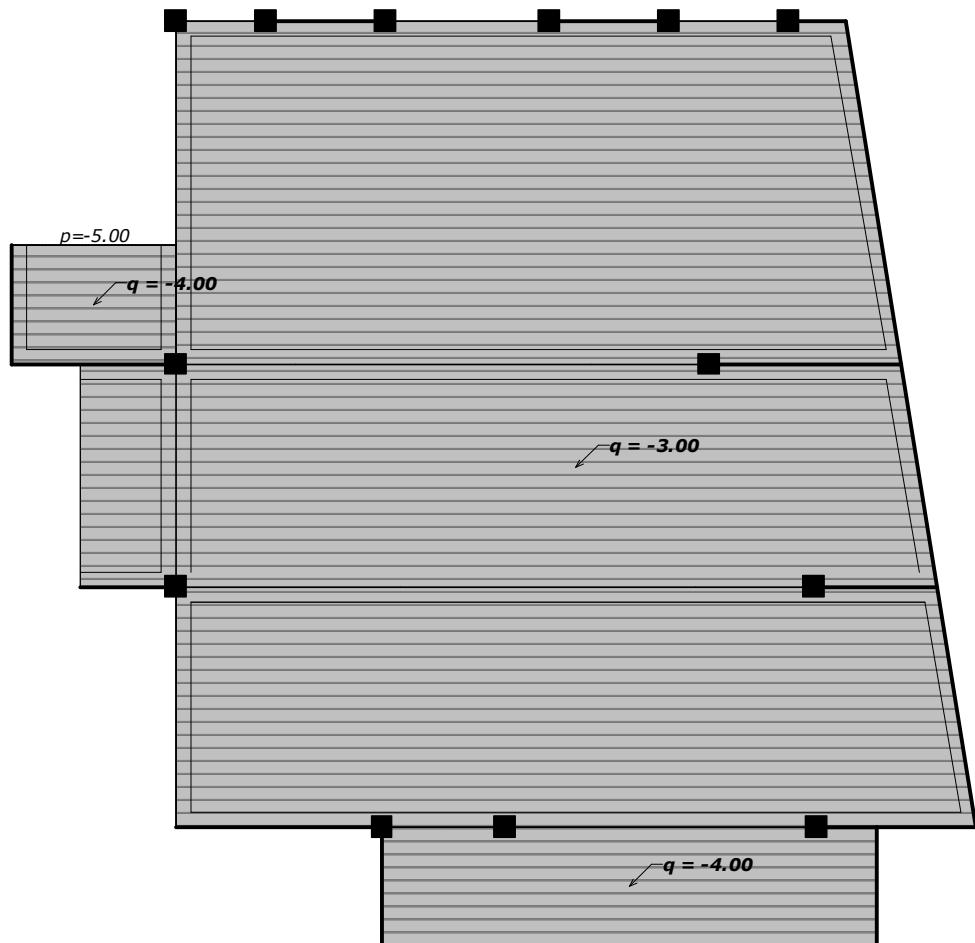
Opt. 1: STALNO (g)



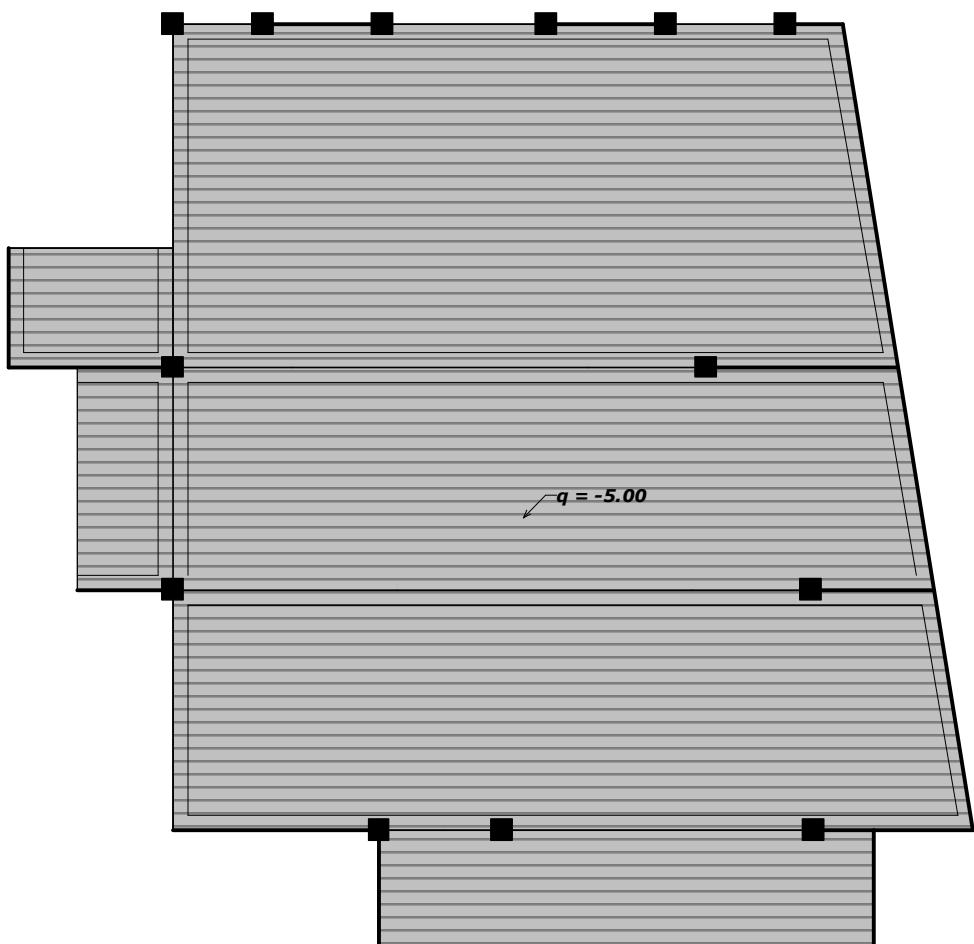
Opt. 1: STALNO (g)



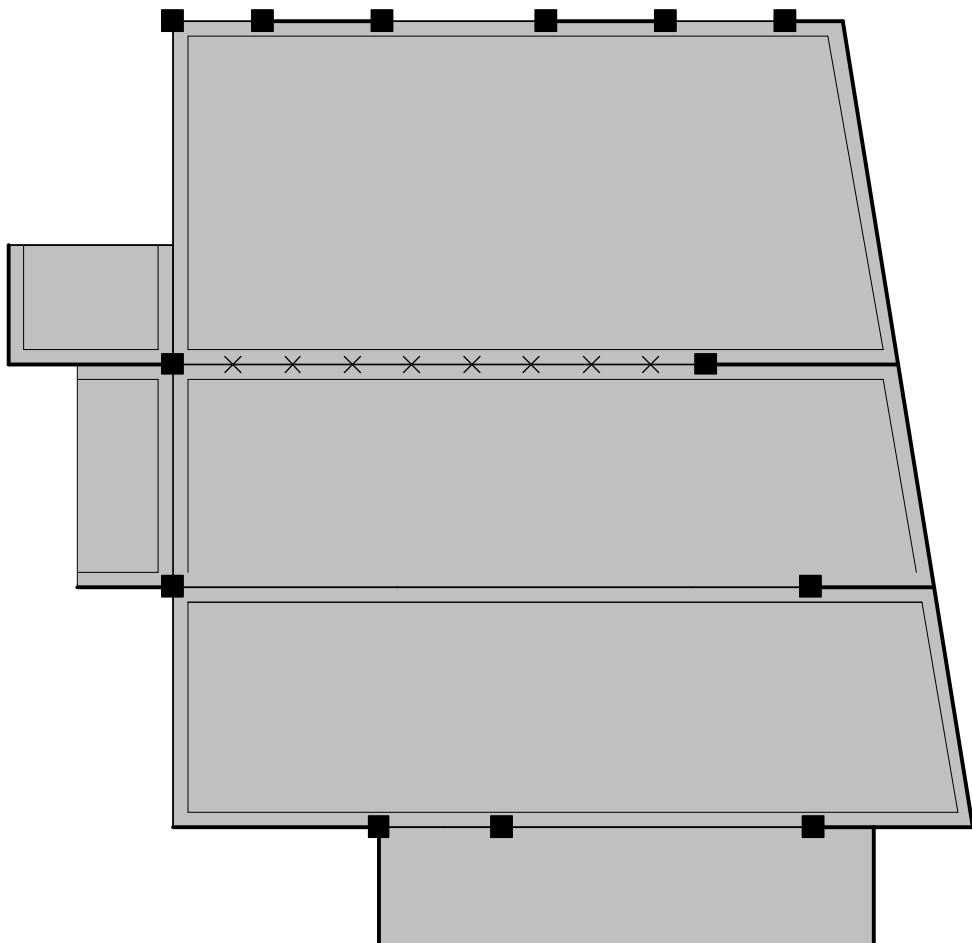
Opt. 2: KORISNO A - POSLOVNI PROSTOR



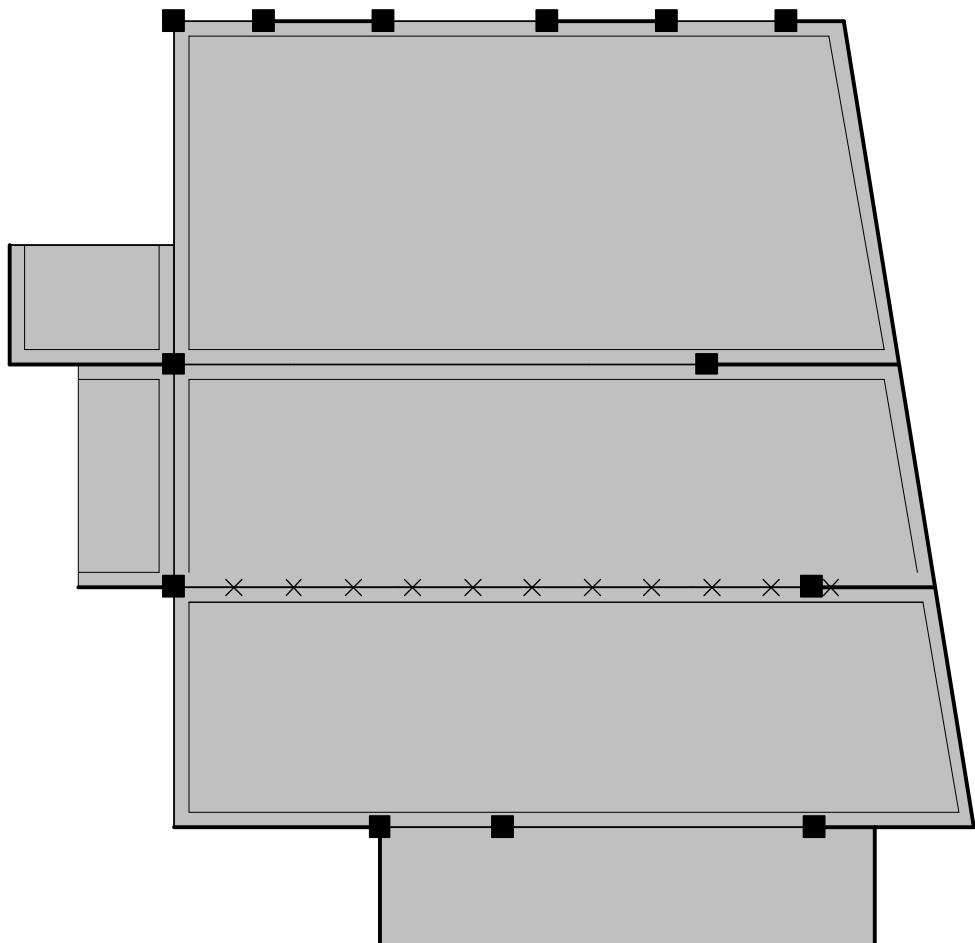
Opt. 3: KORISNO G - GARAZA



Opt. 4: KORISNO G - GARAZA LOKALNO GREDA B

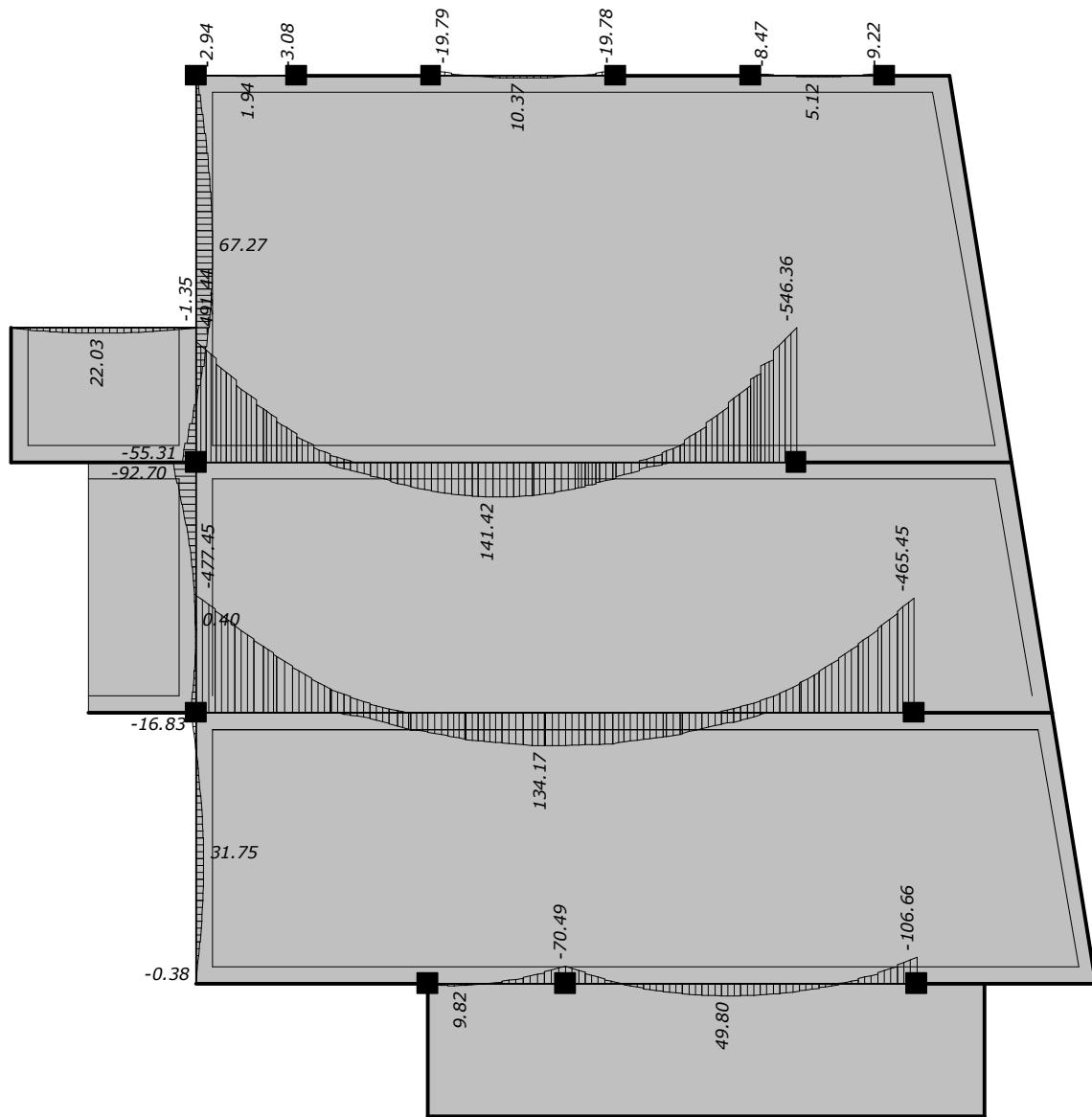


Opt. 5: KORISNO G - GARAZA LOKALNO GREDA C

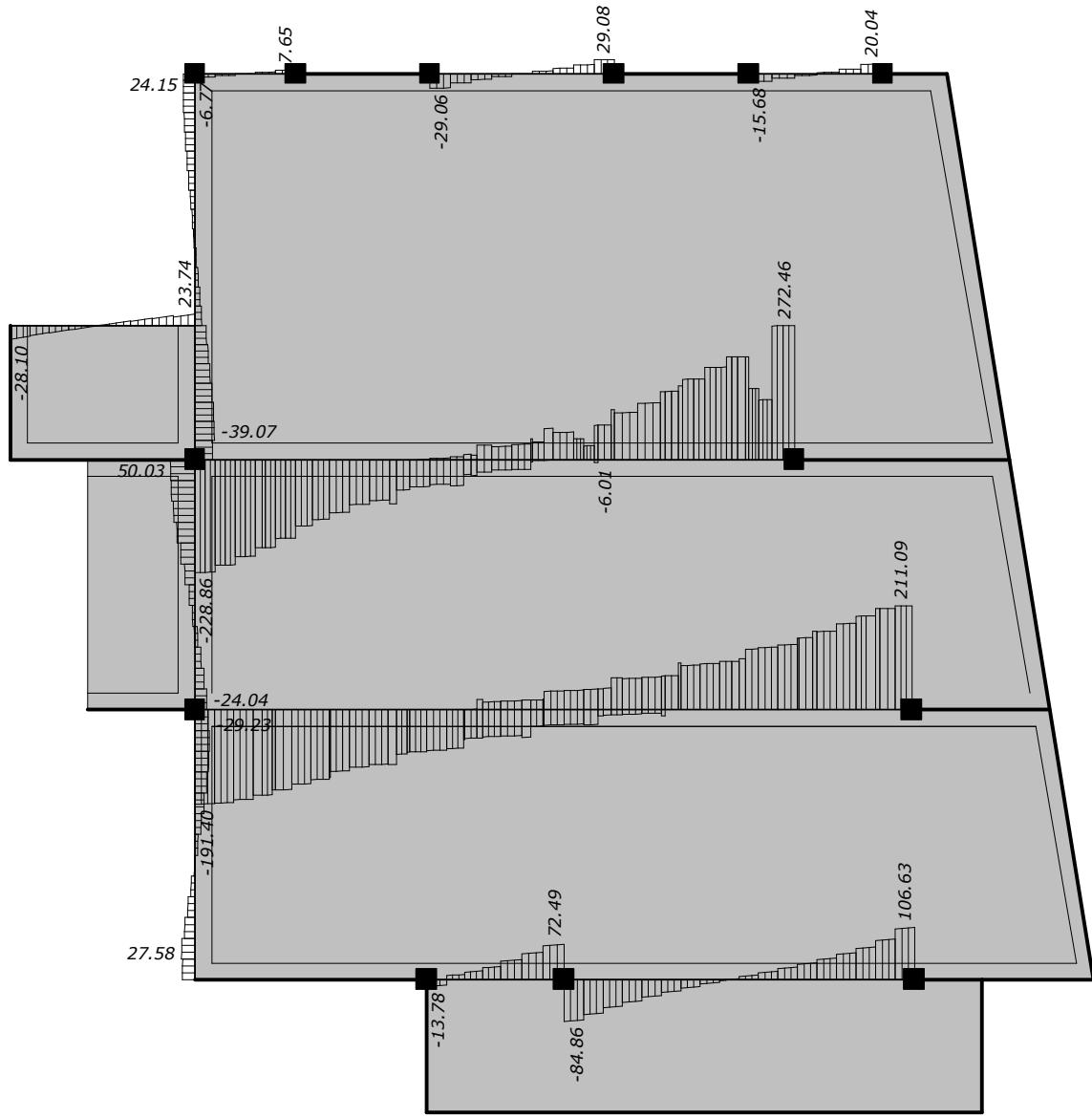


## Statički proračun

Opt. 16: [Anv] 6-15

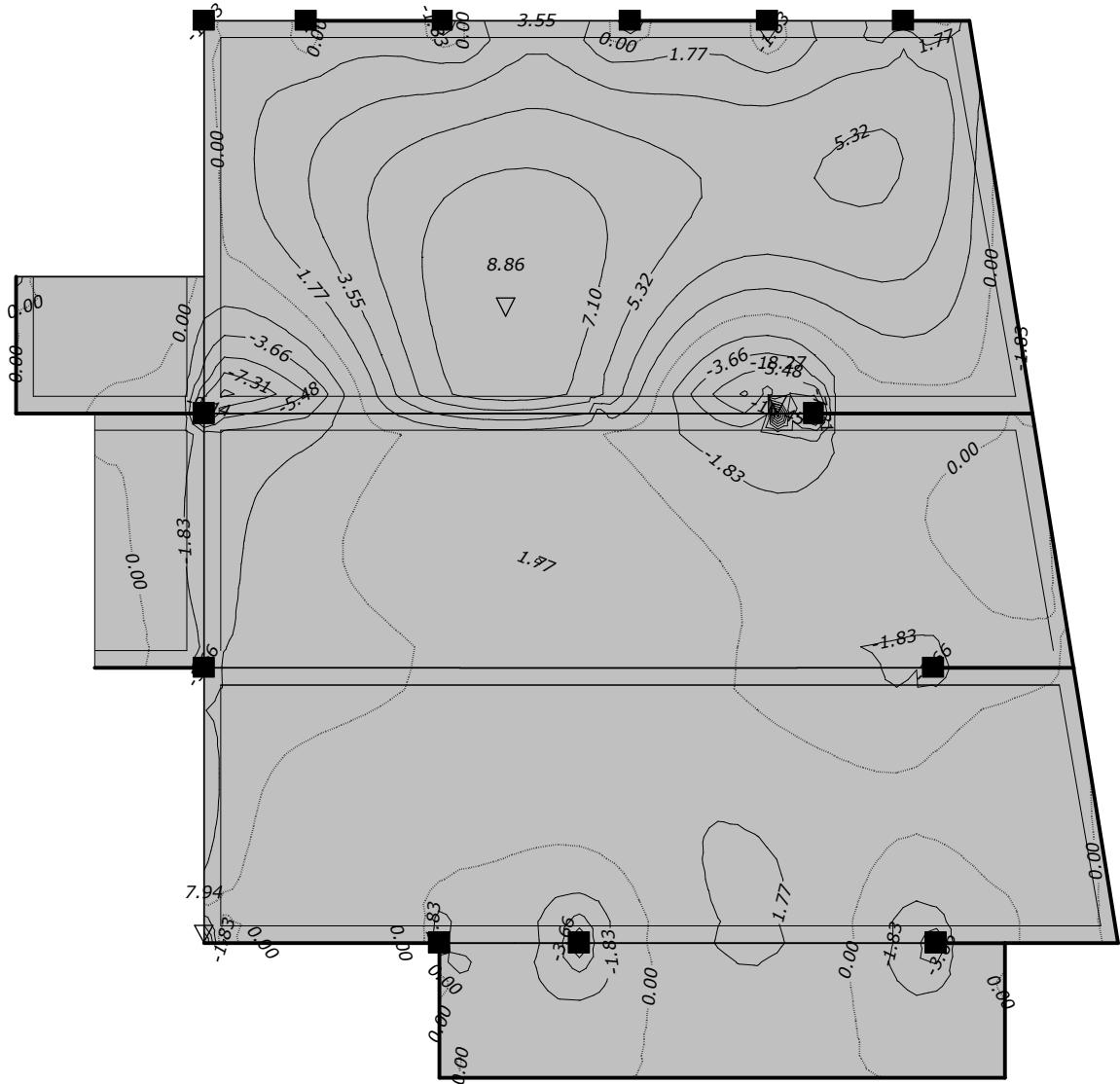


Utjecaji u gredi: max M3= 141.42 / min M3= -546.36 kNm



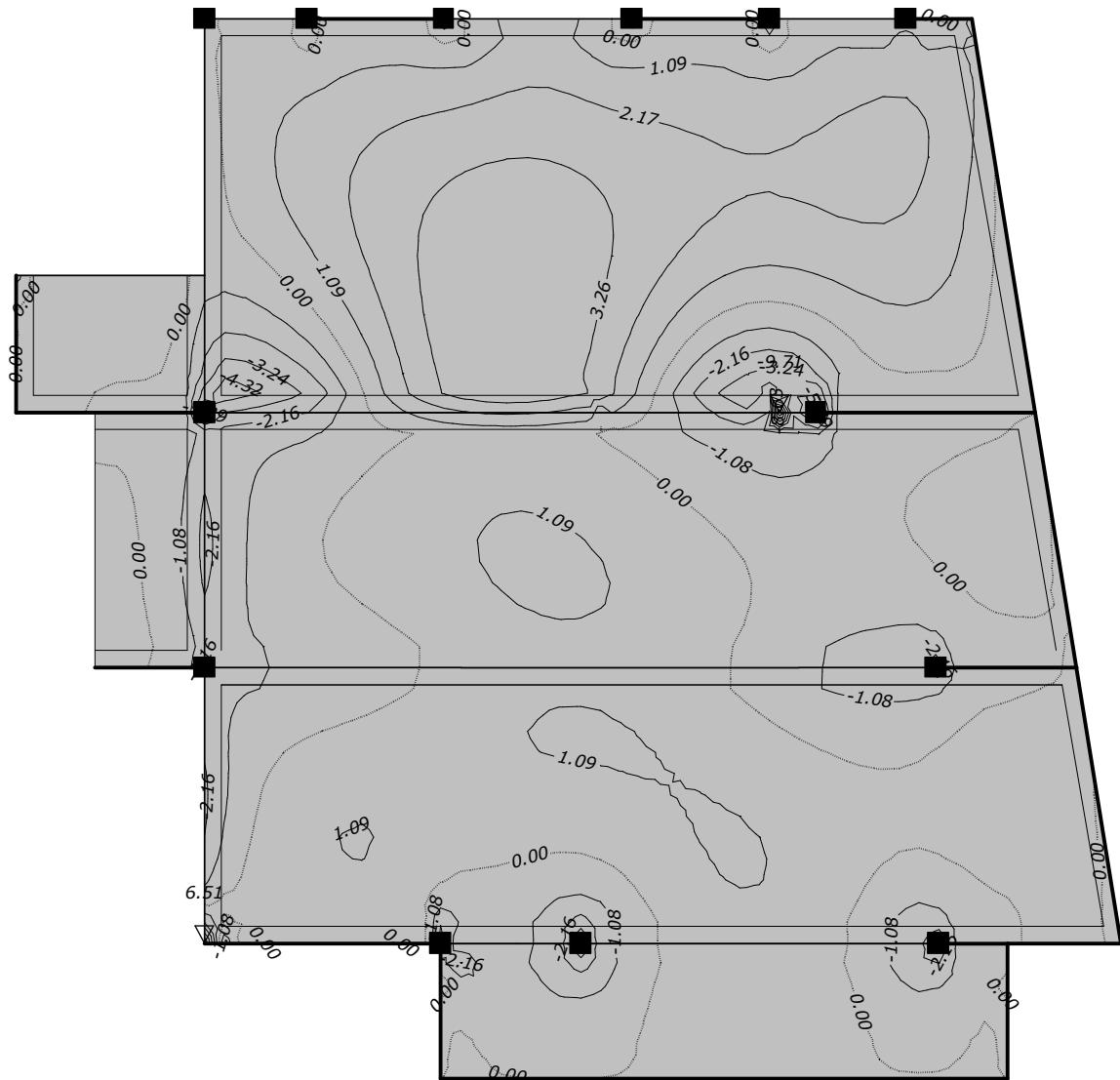
Utjecaji u gredi: max T2= 272.46 / min T2= -228.86 kN

Opt. 1: STALNO (g)

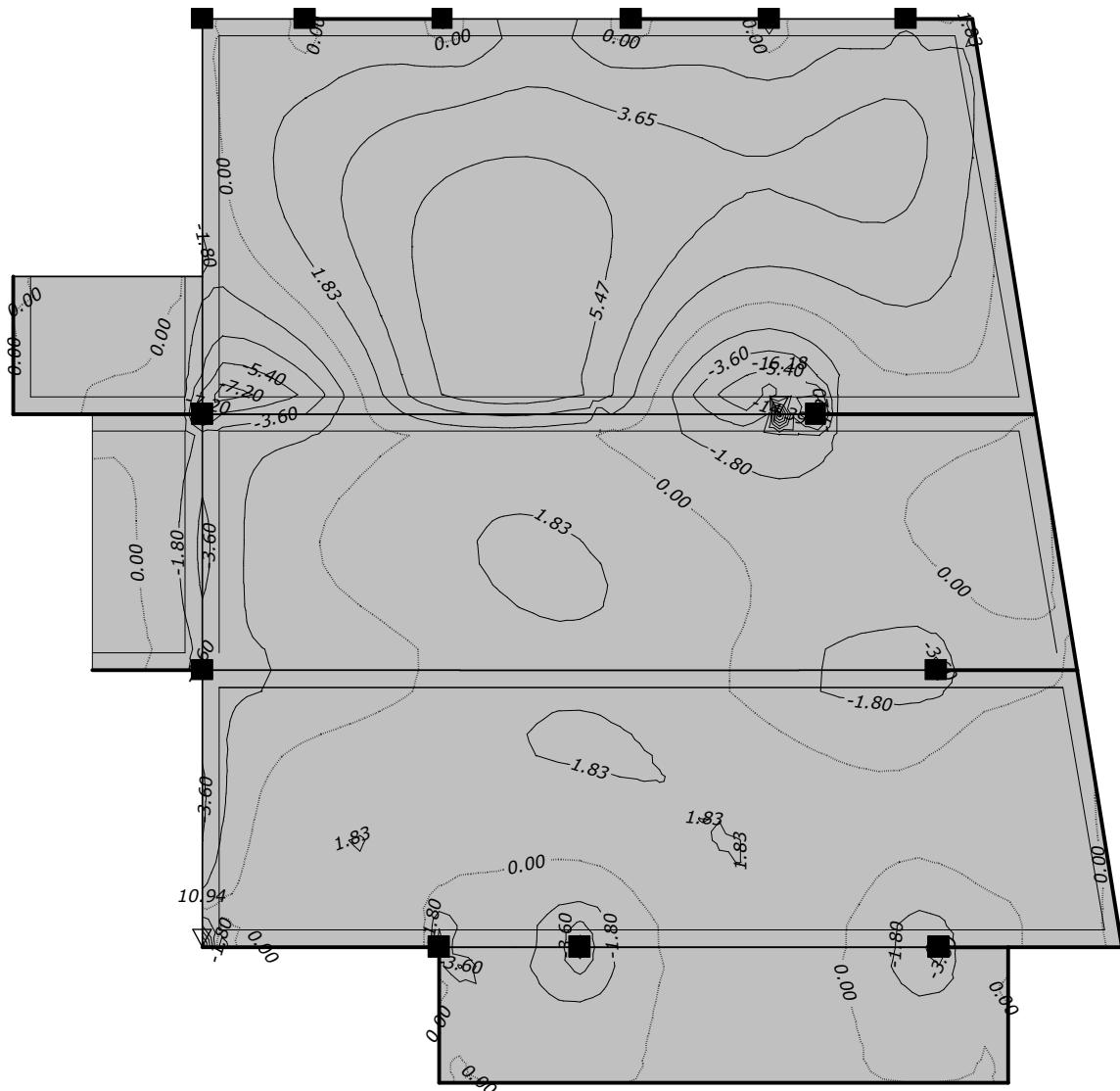


Utjecaji u ploči: max M<sub>x</sub>= 8.86 / min M<sub>x</sub>= -18.27 kNm/m

Opt. 2: KORISNO A - POSLOVNI PROSTOR

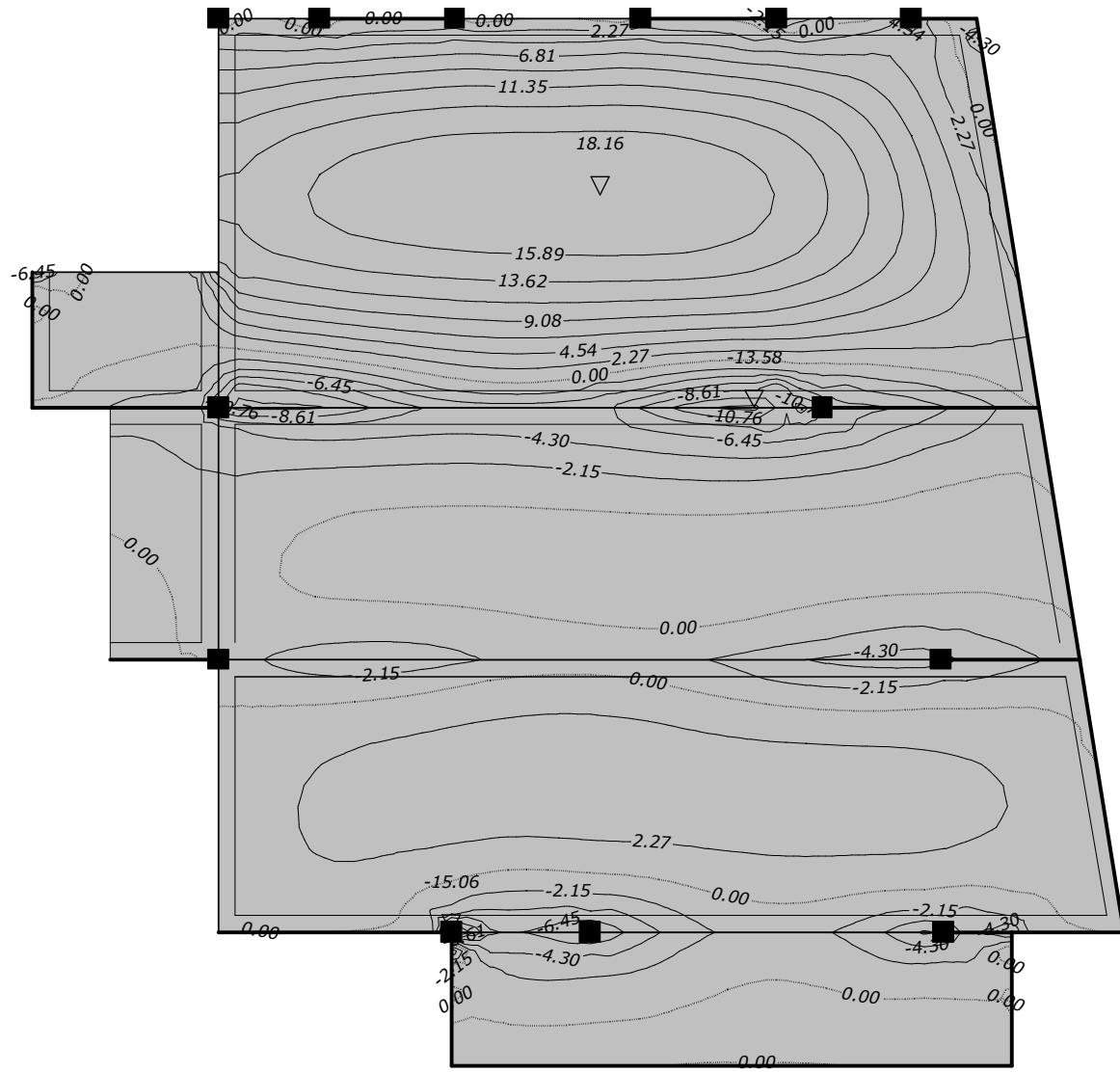


Utjecaji u ploči: max M<sub>x</sub>= 6.51 / min M<sub>x</sub>= -9.71 kNm/m



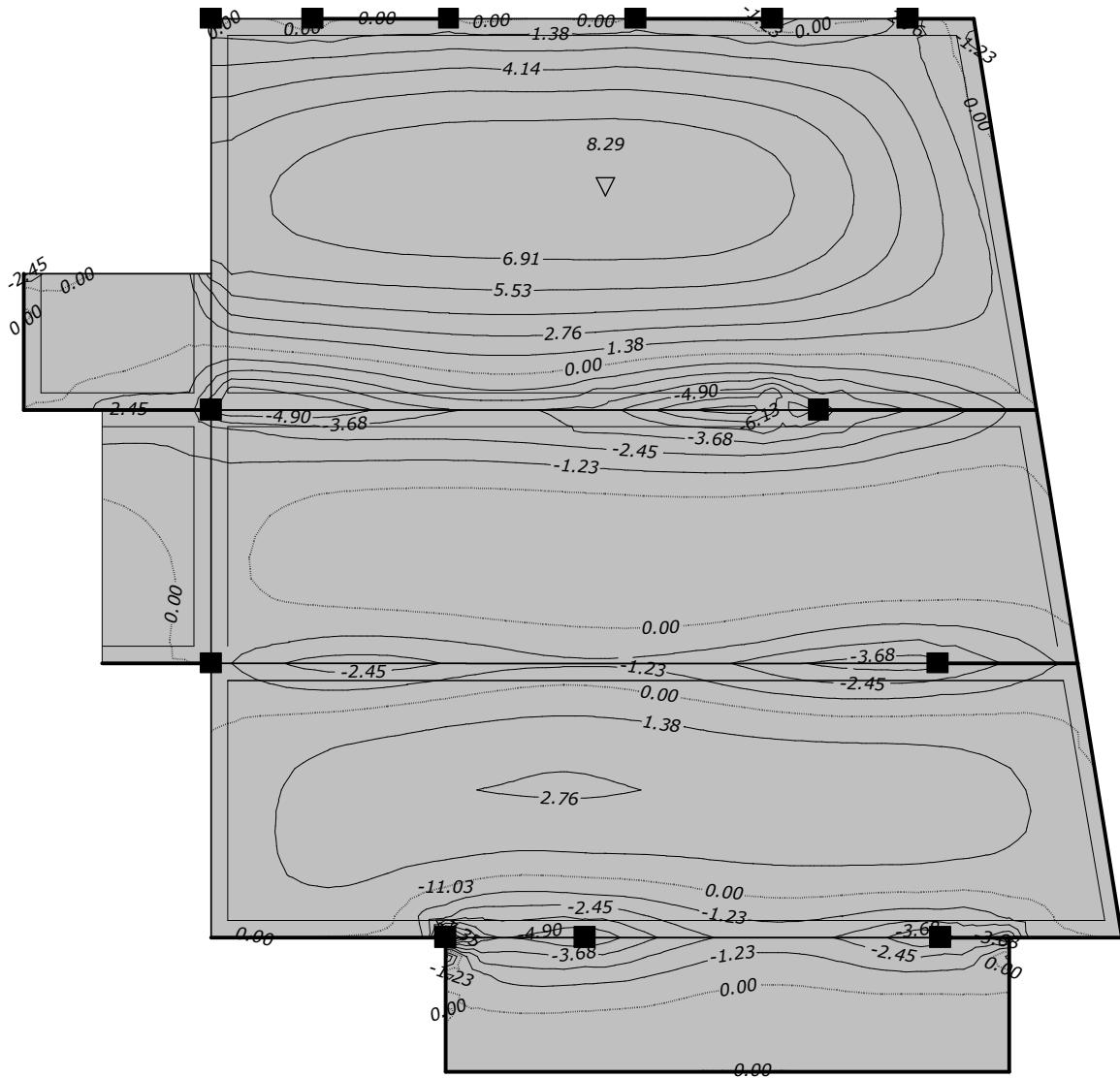
Utjecaji u ploči: max  $M_x = 10.94$  / min  $M_x = -16.18 \text{ kNm/m}$

Opt. 1: STALNO (g)

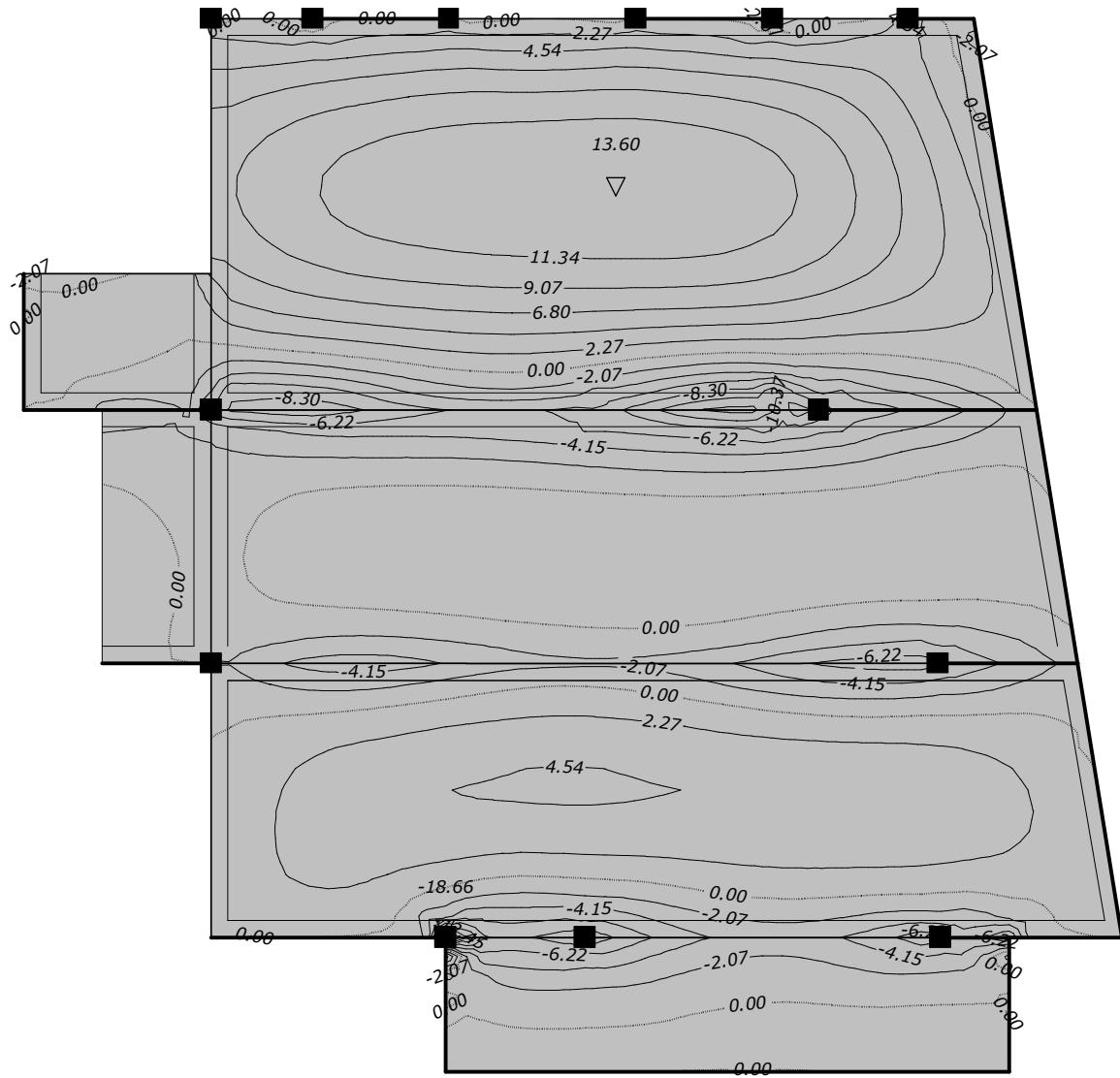


Utjecaji u ploči: max My= 18.16 / min My= -15.06 kNm/m

Opt. 2: KORISNO A - POSLOVNI PROSTOR



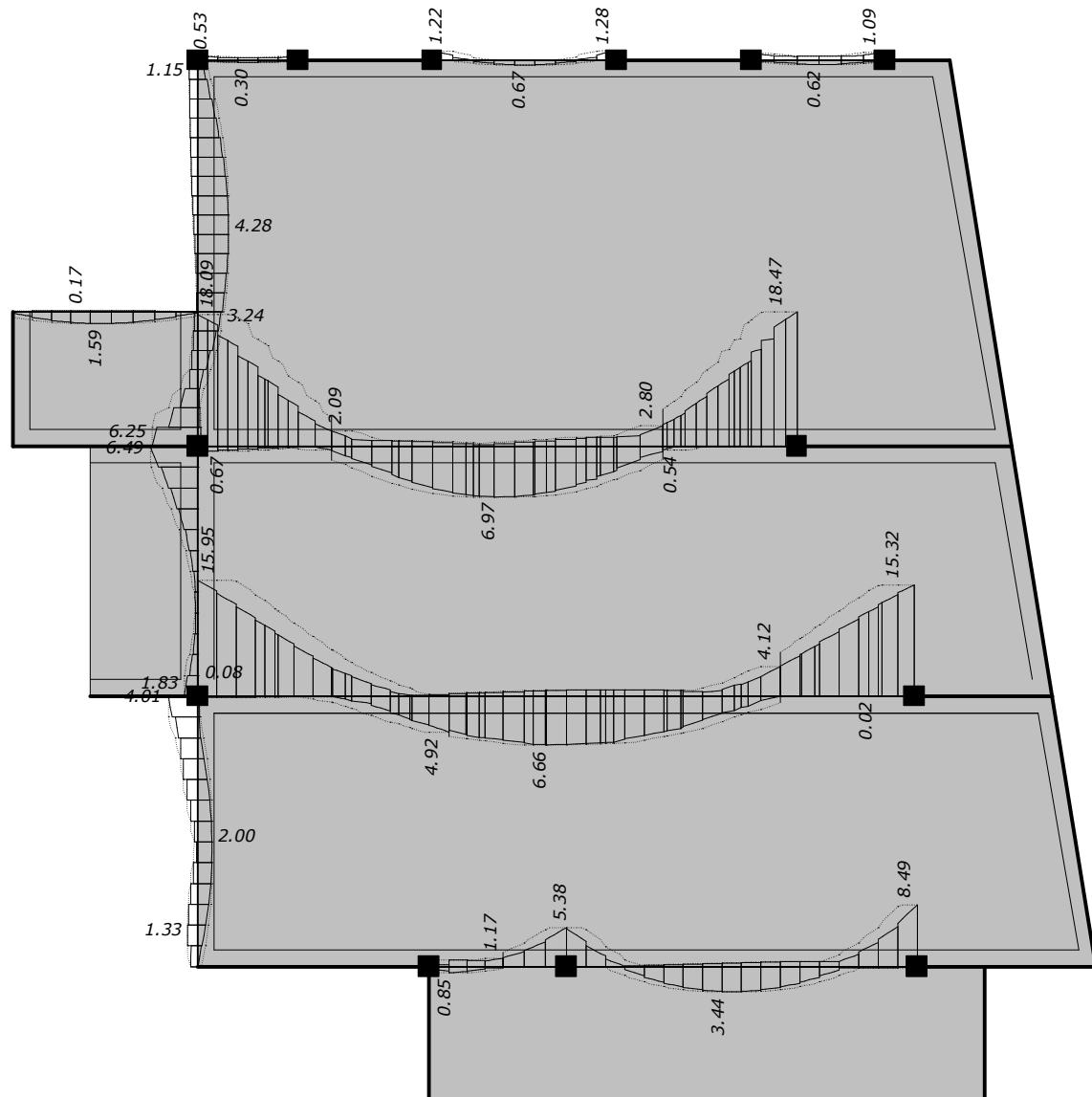
Utjecaji u ploči: max My= 8.29 / min My= -11.03 kNm/m



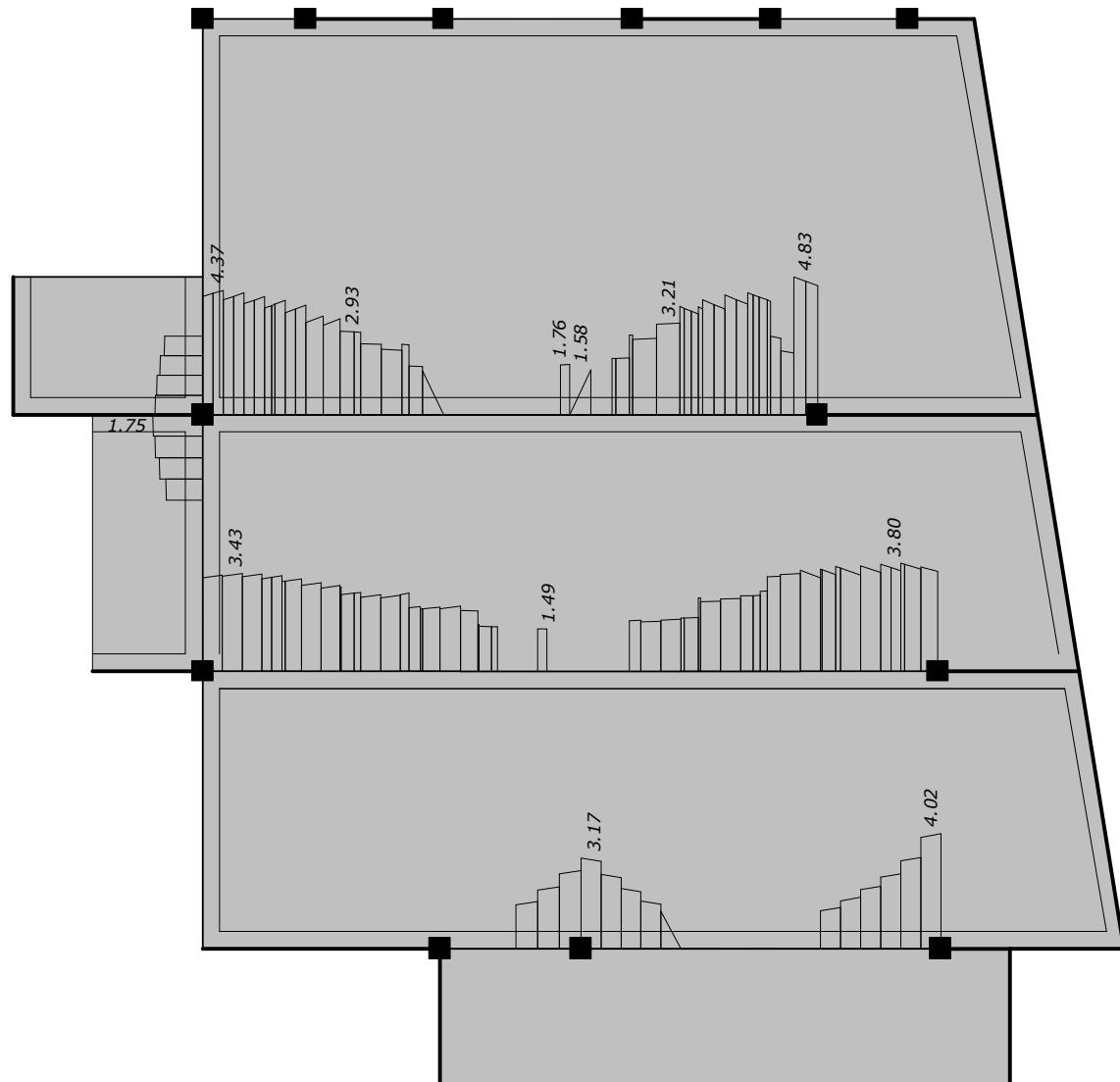
Utjecaji u ploči: max  $My = 13.60$  / min  $My = -18.66$  kNm/m

### Dimenzioniranje (beton)

Mjerodavno opterećenje: Kompletna shema  
EC 2 (EN 1992-1-1:2004), C 25, S500H

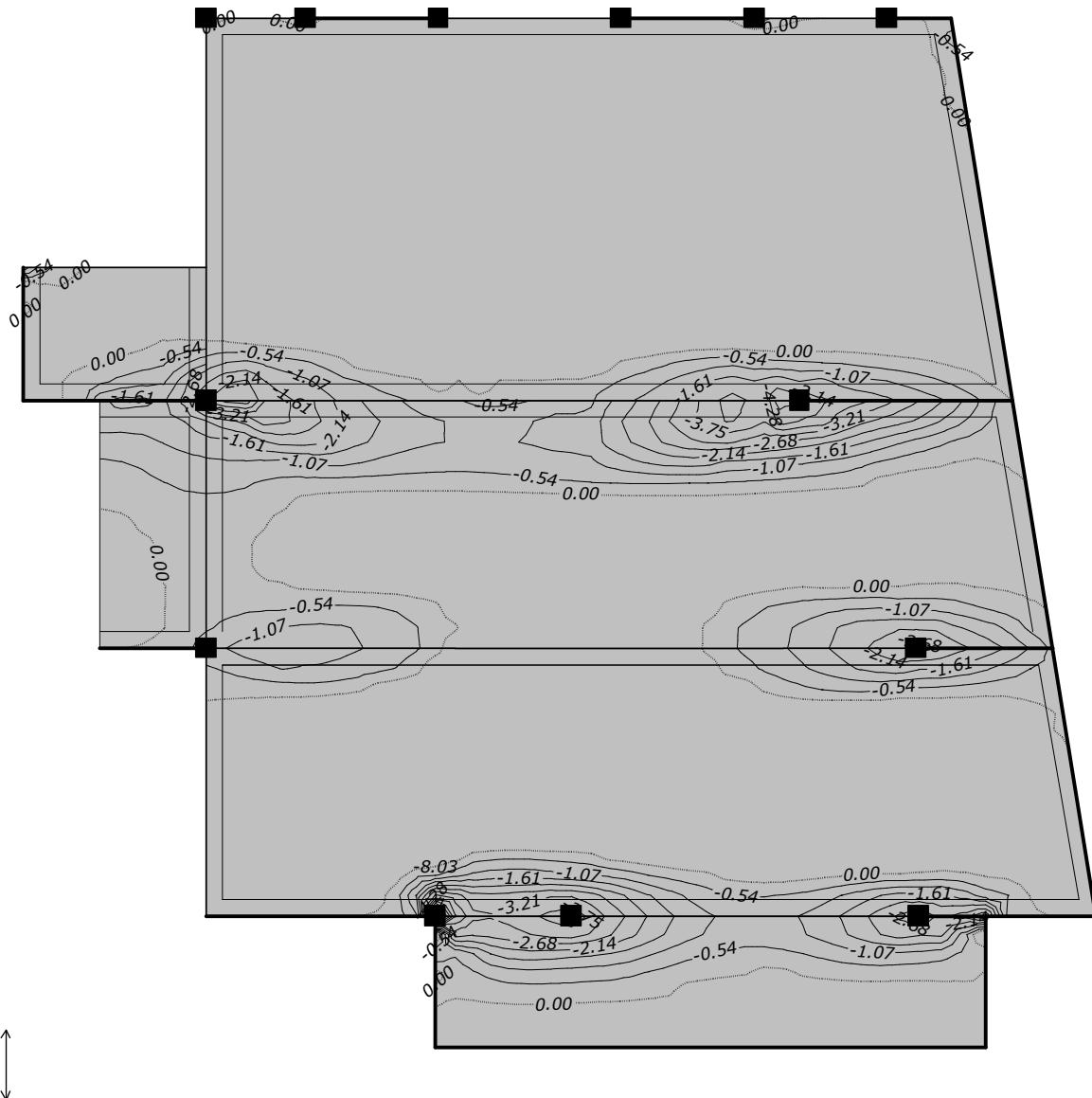


Armatura u gredama: max Aa2/Aa1= 18.47 / 6.97 cm<sup>2</sup>



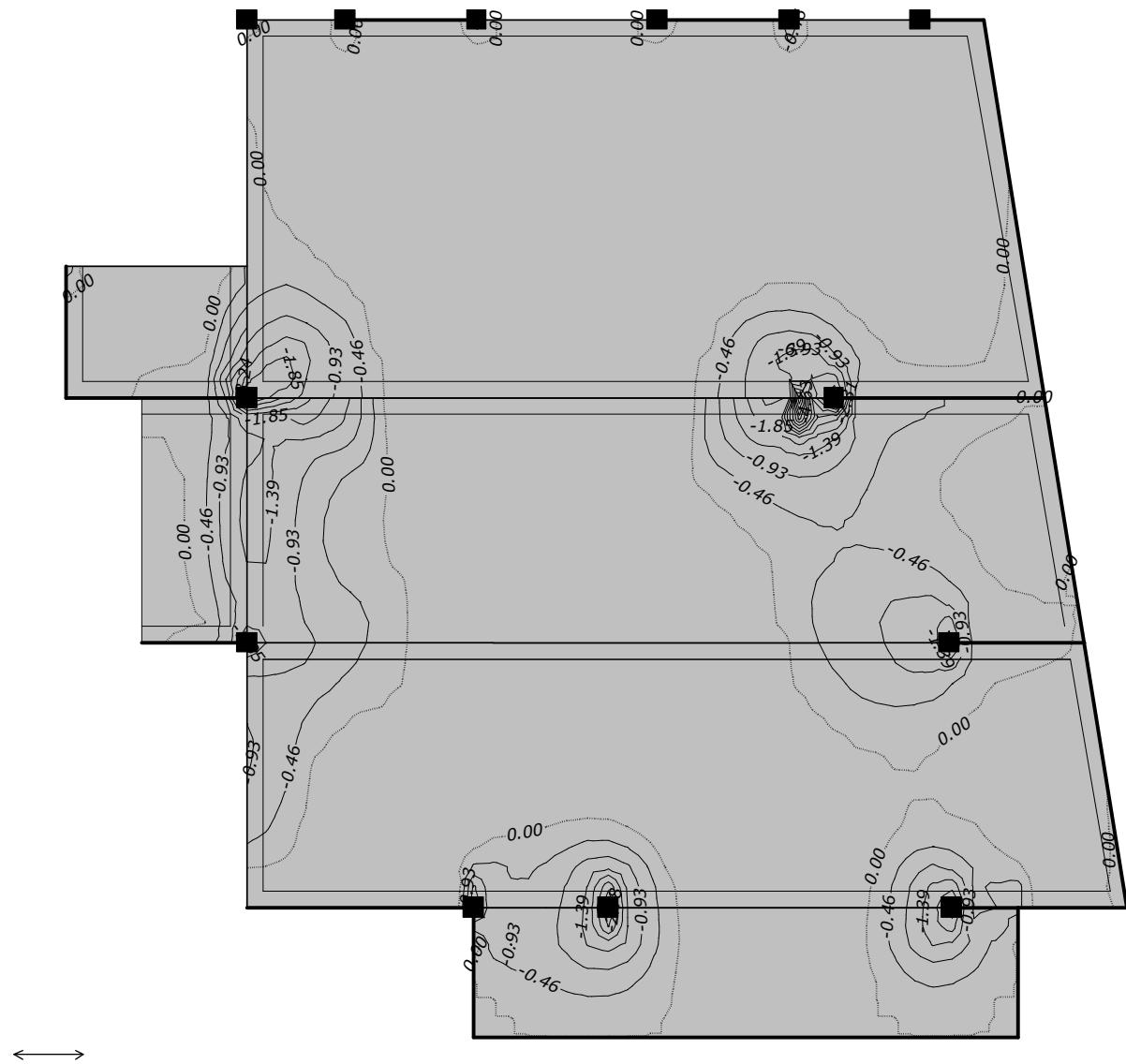
Armatura u gredama: max Asw= 4.83 cm<sup>2</sup>

Mjerodavno opterećenje: Kompletna shema  
EC 2 (EN 1992-1-1:2004), C 25, S500H, a=4.00 cm



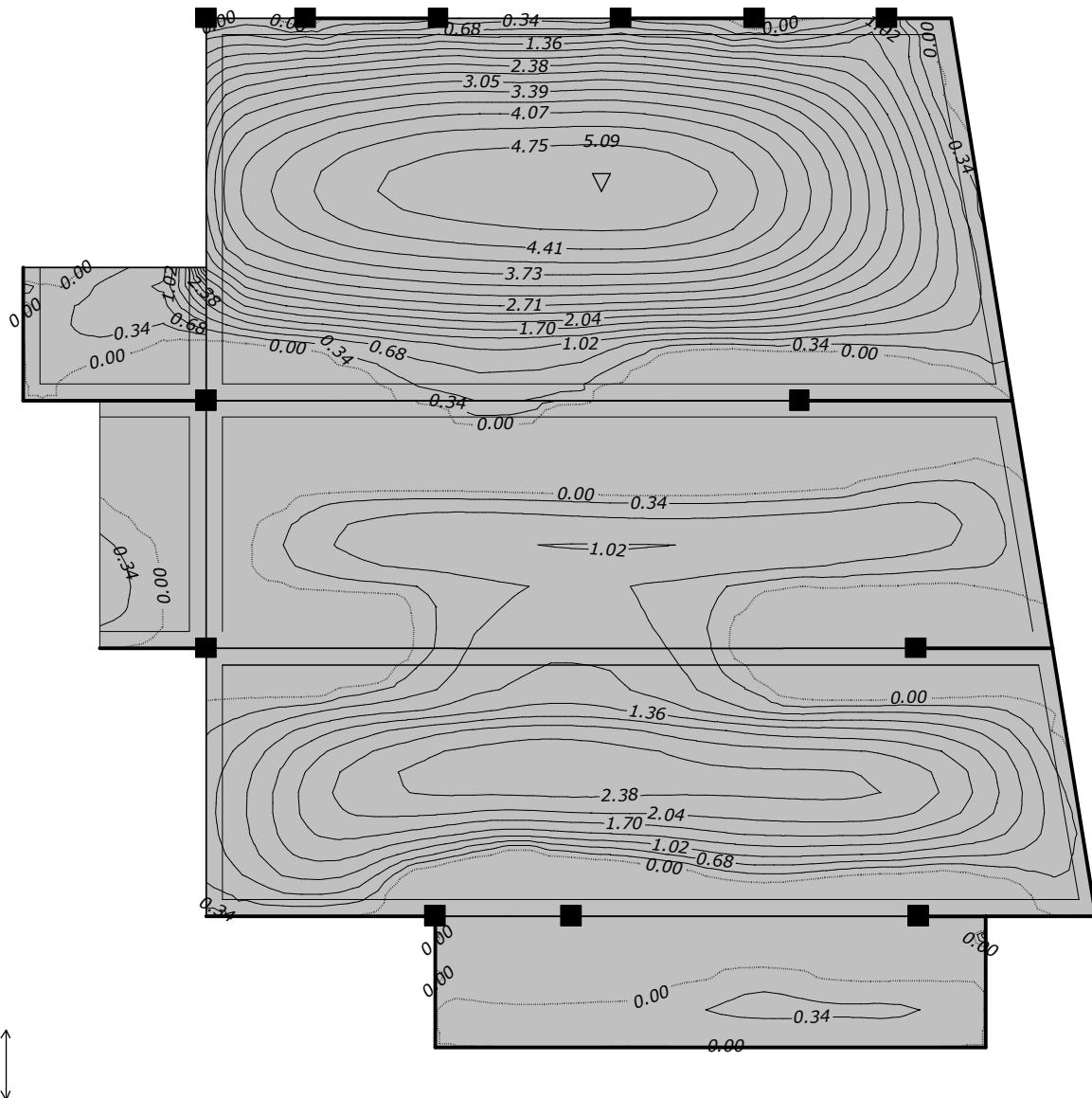
Aa - g.zona - Pravac 2 - max Aa2,g= -8.03 cm<sup>2</sup>/m

Mjerodavno opterećenje: Kompletna shema  
EC 2 (EN 1992-1-1:2004), C 25, S500H, a=4.00 cm



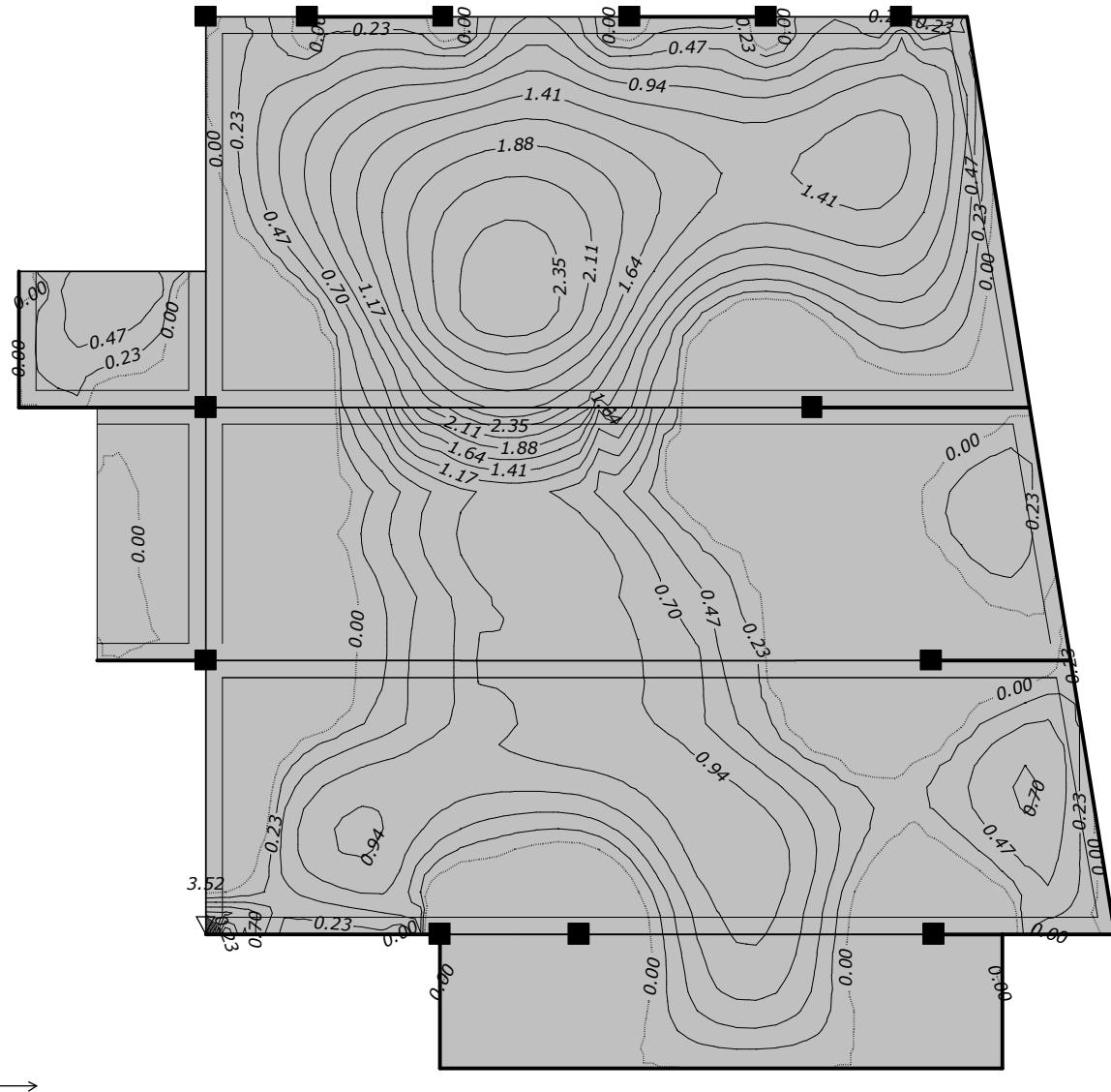
Aa - g.zona - Pravac 1 - max Aa1,g= -6.93 cm<sup>2</sup>/m

Mjerodavno opterećenje: Kompletna shema  
EC 2 (EN 1992-1-1:2004), C 25, S500H, a=4.00 cm



Aa - d.zona - Pravac 2 - max Aa2,d= 5.09 cm<sup>2</sup>/m

Mjerodavno opterećenje: Kompletna shema  
EC 2 (EN 1992-1-1:2004), C 25, S500H, a=4.00 cm



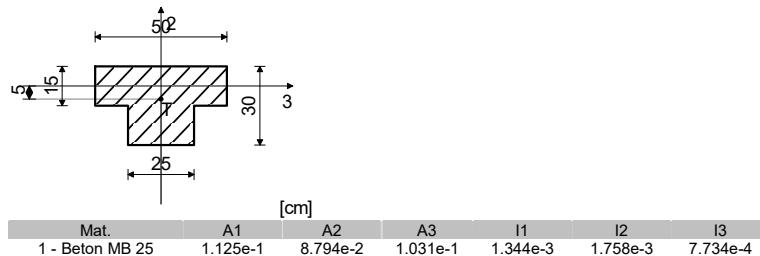
Aa - d.zona - Pravac 1 - max Aa1,d= 3.52 cm<sup>2</sup>/m

Tabela materijala

No	Naziv materijala	E[kN/m <sup>2</sup> ] Em[kN/m <sup>2</sup> ]	$\mu$	$\gamma[\text{kN/m}^3]$ $\alpha[1/\text{C}]$
1	Beton MB 25	3.000e+7 3.000e+7	0.20 0.20	25.00 1.000e-5

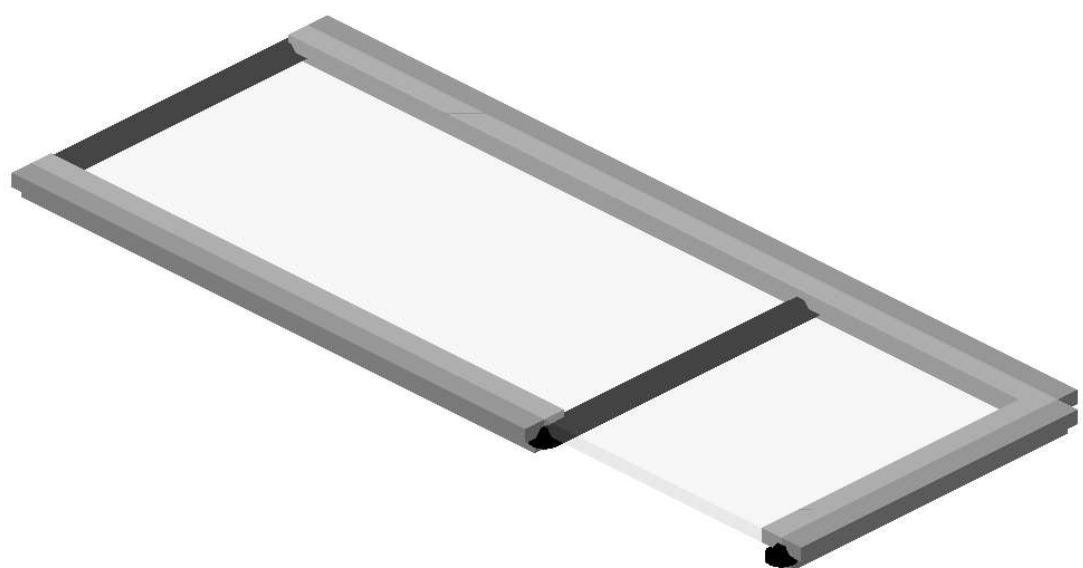
**Setovi greda**

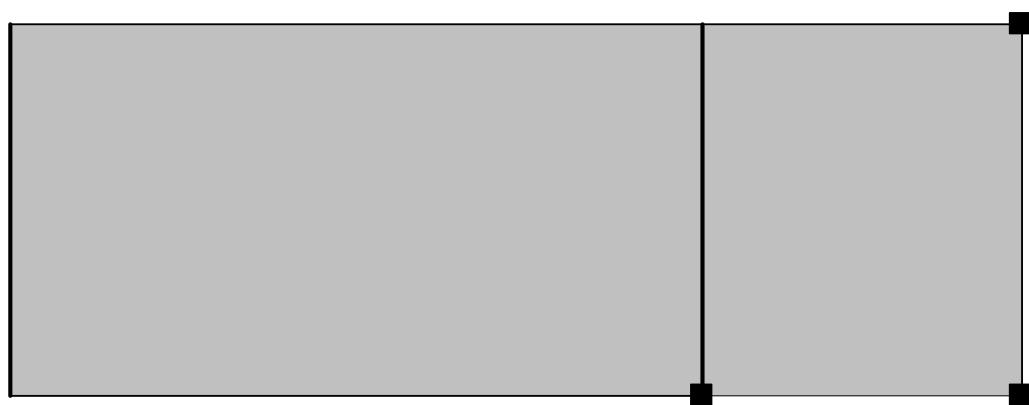
Set: 1 Presjek: T 50/30, Fiktivna ekscentričnost



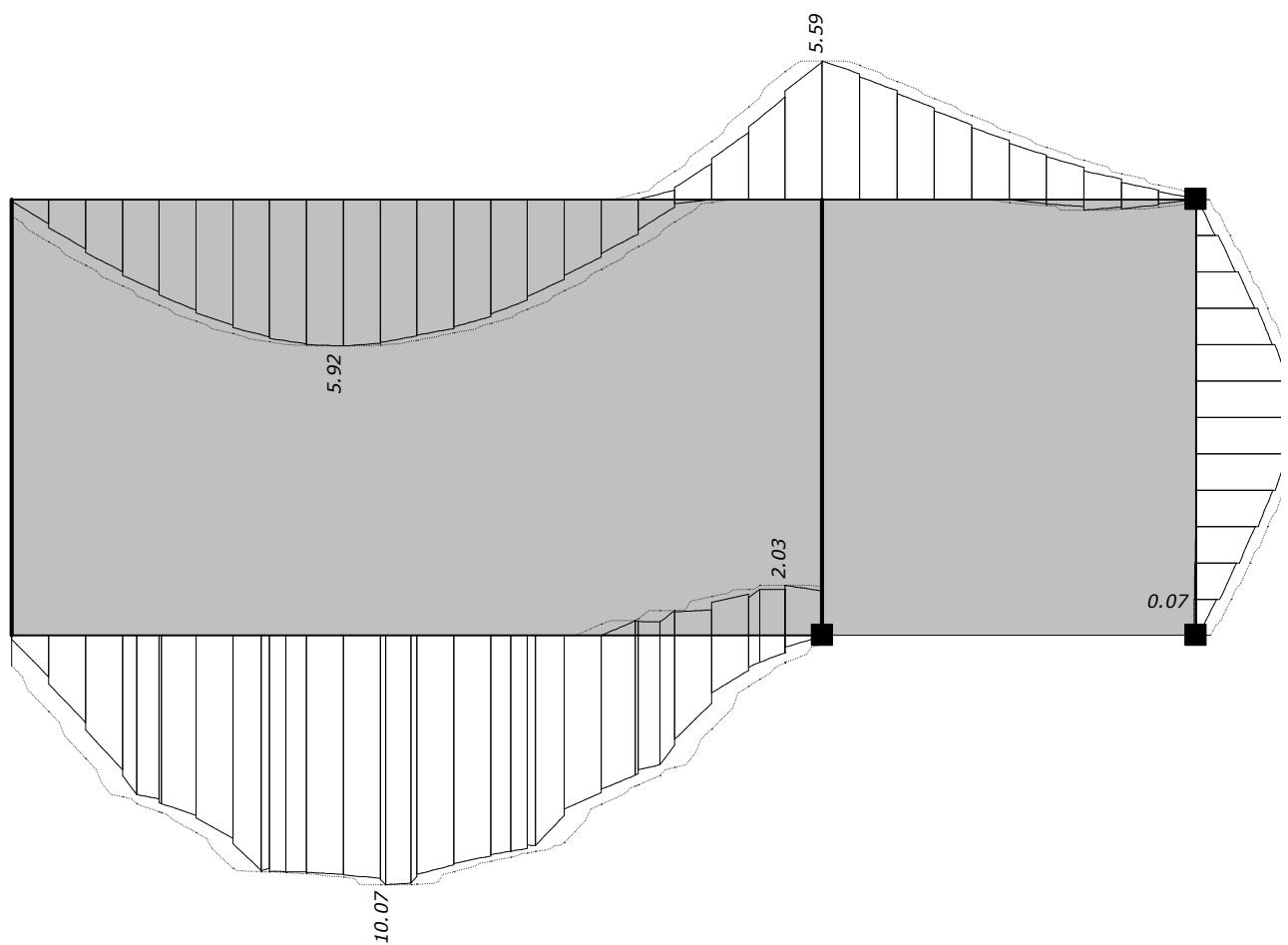
**Setovi točkastih ležajeva**

Set	K,R1	K,R2	K,R3	K,M1	K,M2	K,M3
1	1.000e+10	1.000e+10	1.000e+10			

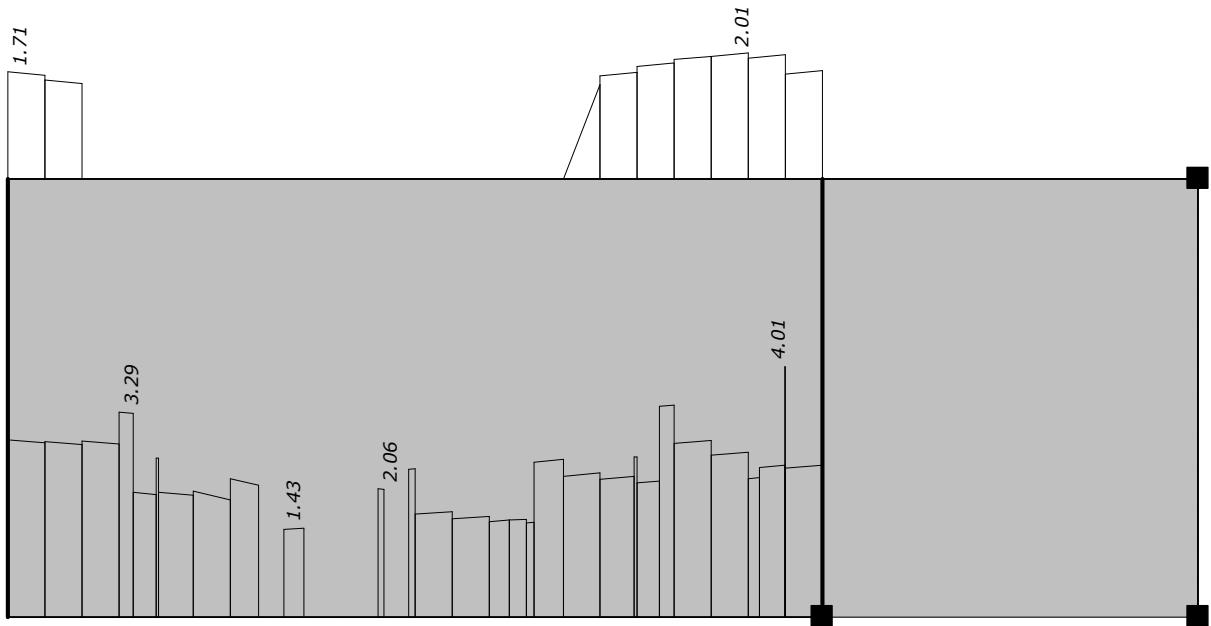




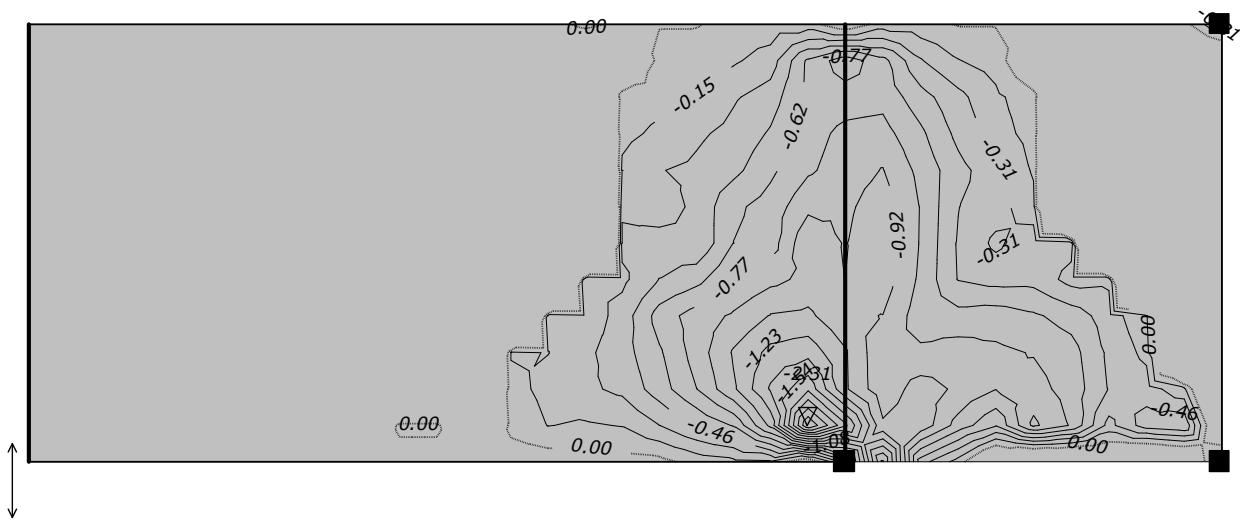




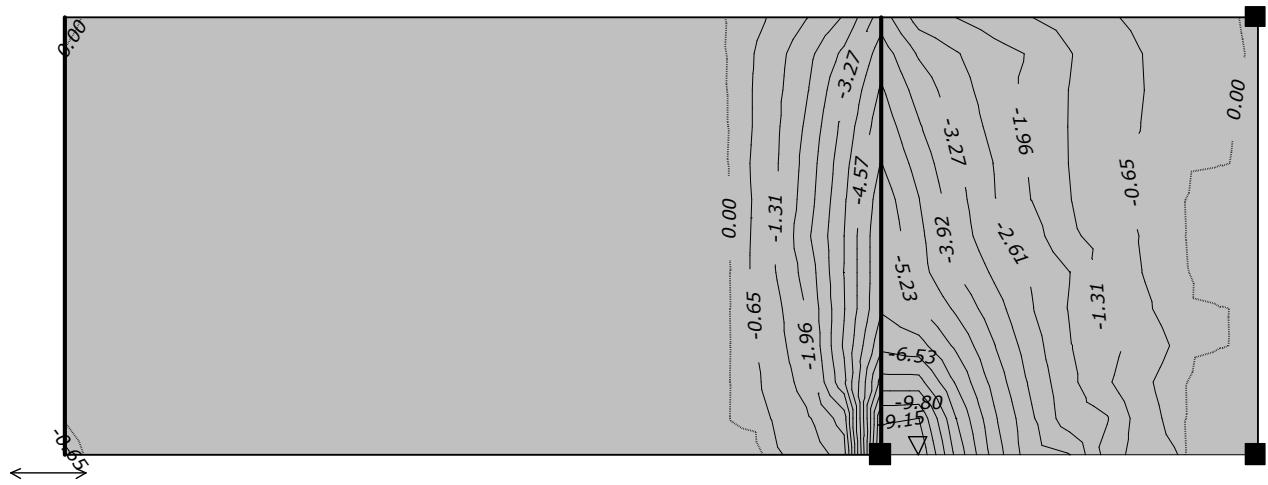
Armatura u gredama: max  $A_{a2}/A_{a1} = 5.59 / 10.07 \text{ cm}^2$



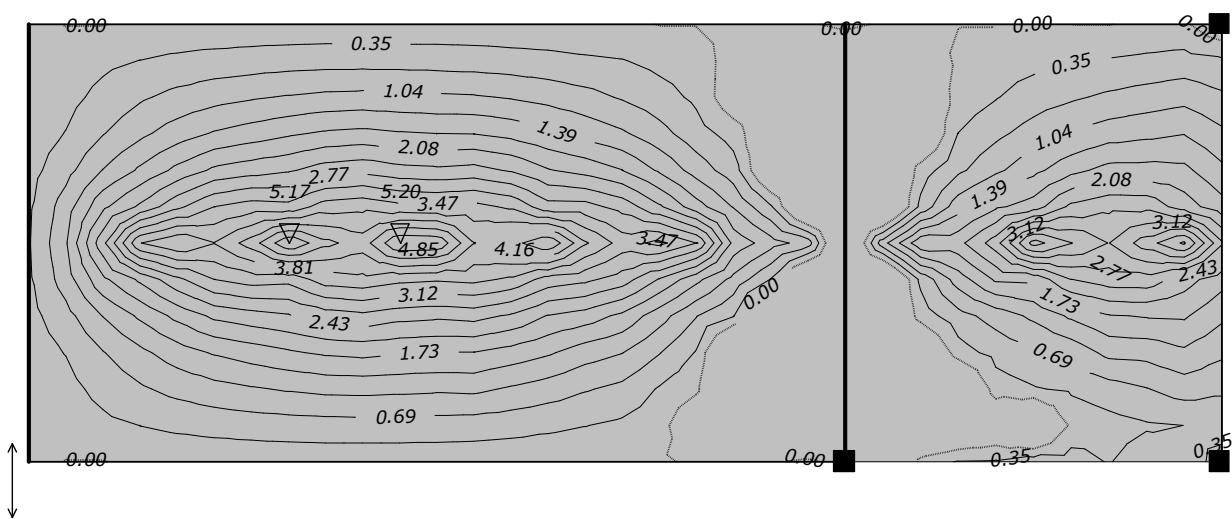
Armatura u gredama: max Asw= 4.01 cm<sup>2</sup>



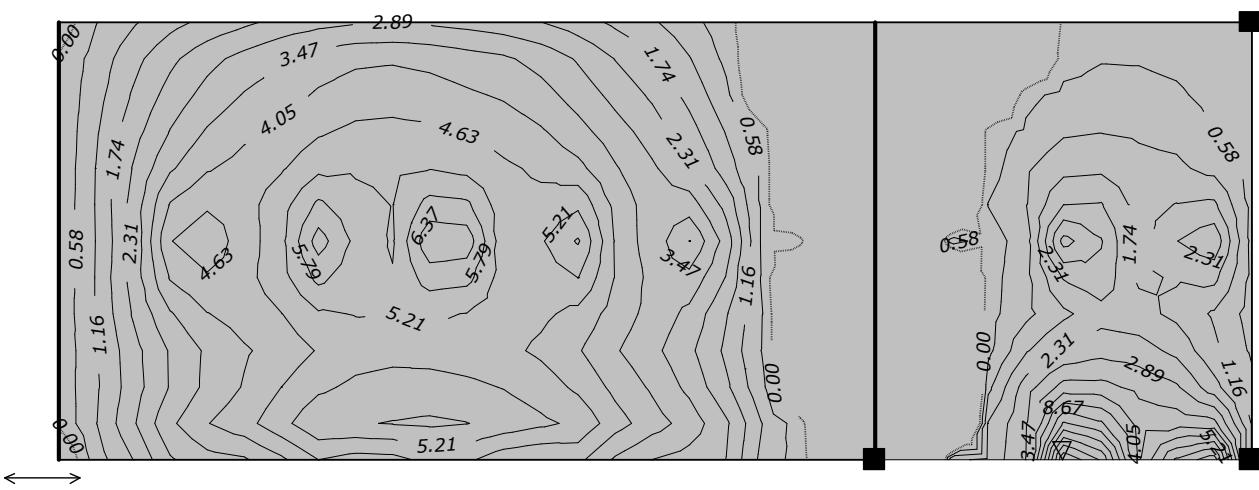
Aa - g.zona - Pravac 2 - max Aa2,g= -2.31 cm<sup>2</sup>/m



Aa - g.zona - Pravac 1 - max Aa1,g= -9.80 cm<sup>2</sup>/m

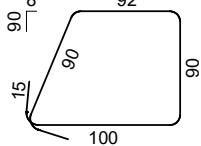
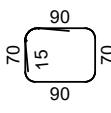
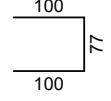
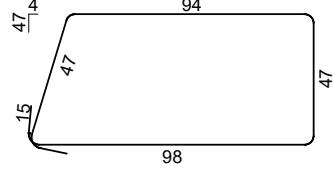
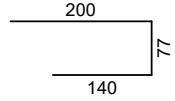
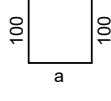
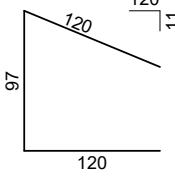
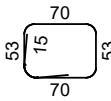


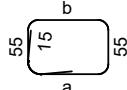
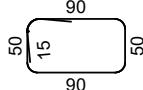
Aa - d.zona - Pravac 2 - max Aa<sub>2,d</sub>= 5.20 cm<sup>2</sup>/m



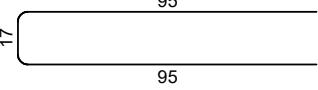
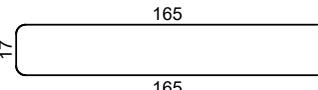
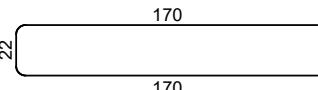
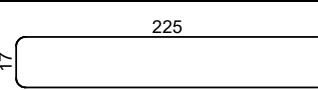
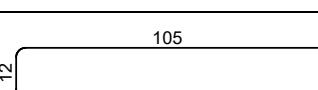
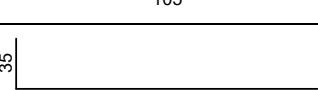
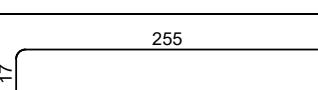
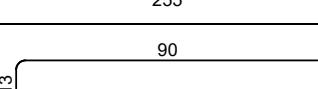
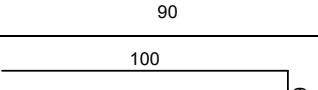
Aa - d.zona - Pravac 1 - max Aa1,d= 8.67 cm<sup>2</sup>/m

## **2. SPECIFIKACIJA ARMATURNOG ČELIKA**

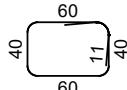
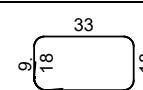
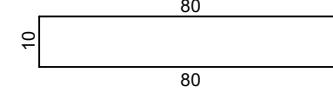
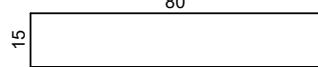
Šipke - specifikacija						
ozn	oblik i mjere [cm]	Ø	lg [m]	n [kom]	lgn [m]	Napomena
ARMATURA TEMELJA						
1		14	4.02	24	96.48	
2	460	16	4.60	30	138.00	
3	380	16	3.80	50	190.00	
4	555	16	5.55	26	144.30	
5	850	16	8.50	11	93.50	
6	250	16	2.50	24	60.00	
7		14	3.50	192	672.00	
8		14	2.77	88	243.76	
9		14	3.16	24	75.84	
10		16	4.17	7	29.19	
11	 2 x : a = 103, 104, 105, 106, 108, 109, 110, 111	16	*3.07	2 x 8	49.12	
12		16	3.37	16	53.92	
13	1200	16	12.00	39	468.00	
14	500	16	5.00	18	90.00	
15		14	2.76	32	88.32	
16	195	16	1.95	24	46.80	
18	310	16	3.10	24	74.40	

Šipke - specifikacija						
ozn	oblik i mjere [cm]	Ø	lg [m]	n [kom]	lgn [m]	Napomena
19	 <p>2 x :  <math>a = 70, 72, 73, 75, 76, 78, 79,</math>  <math>80, 82, 83, 85, 86, 88, 89, 90, 92</math>  <math>b = 70, 72, 73, 75, 76, 78, 79,</math>  <math>80, 82, 83, 85, 86, 88, 89, 90, 92</math></p>	14	*3.02	2 x 16	96.72	
21		14	3.10	39	120.90	
22	450	16	4.50	20	90.00	

Šipke - rekapitulacija				
Ø [mm]	lgn [m]	Jedinična težina [kg/m <sup>3</sup> ]	Težina [kg]	
BS500				
14	1394.02	1.25	1745.31	
16	1527.23	1.62	2475.64	
Ukupno (BS500)				4220.95
Ukupno				4220.95

Šipke - specifikacija						
ozn	oblik i mjere [cm]	Ø	lg [m]	n [kom]	lgn [m]	Napomena
PRIKLJUČNA ARMATURA						
1		8	2.07	243	503.01	
2		16	3.47	5	17.35	
3		16	2.55	200	510.00	
4		10	3.62	54	195.48	
5		16	4.67	2	9.34	
6		8	2.22	77	170.94	
7		20	2.65	6	15.90	
8		20	5.27	2	10.54	
9		8	1.93	29	55.97	
10		10	2.19	10	21.90	

Šipke - rekapitulacija				
Ø [mm]	lgn [m]	Jedinična težina [kg/m <sup>3</sup> ]	Težina [kg]	
BS500				
8	729.92	0.41	298.54	
10	217.38	0.65	141.08	
16	536.69	1.62	869.97	
20	26.44	2.48	65.44	
Ukupno (BS500)				1375.03
Ukupno				1375.03

Šipke - specifikacija						
ozn	oblik i mjere [cm]	Ø	lg [m]	n [kom]	lgn [m]	Napomena
RAMPA						
1		10	2.22	39	86.58	
2	760	16	7.60	8	60.80	
3		8	1.20	100	120.00	
4		14	4.00	69	276.00	
5		8	1.70	197	334.90	
6	300	10	3.00	23	69.00	
7	800	20	8.00	6	48.00	
8	370	14	3.70	8	29.60	
9	620	14	6.20	16	99.20	
10		8	1.75	78	136.50	

Šipke - rekapitulacija				
Ø [mm]	lgn [m]	Jedinična težina [kg/m <sup>3</sup> ]	Težina [kg]	
BS500				
8	591.40	0.41	241.88	
10	155.58	0.65	100.97	
14	404.80	1.25	506.81	
16	60.80	1.62	98.56	
20	48.00	2.48	118.80	
Ukupno (BS500)				1067.02
Ukupno				1067.02

Mreže - specifikacija							
Pozicija	Oznaka mreže	B [cm]	L [cm]	n	Jedinična težina [kg/m <sup>2</sup> ]	Ukupna težina [kg]	Na po me na
RAMPA							
I	Q-524	215	600	6	8.42	651.63	
I-1	Q-524	215	100	2	8.42	36.20	
I-2	Q-524	215	300	2	8.42	108.61	
I-3	Q-524	215	400	6	8.42	434.42	
II	Q-221	215	600	4	3.57	184.01	
Ukupno						1414.86	

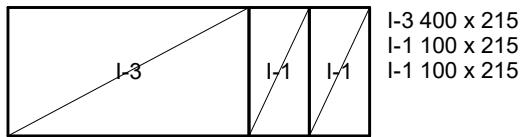
Mreže - rekapitulacija						
Oznaka mreže	B [cm]	L [cm]	n	Jedinična težina [kg/m <sup>2</sup> ]	Ukupna težina [kg]	Neto ugrađena težina [kg]
Q-221	215	600	4	3.57	184.01	184.01
Q-524	215	600	13	8.42	1411.87	1230.86
Ukupno					1595.87	1414.86

Mreže - plan rezanja

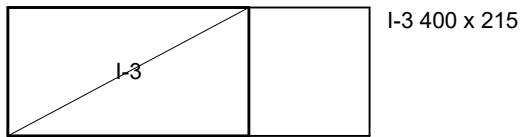
RAMPA

Q-524 (600 cm x 215 cm)

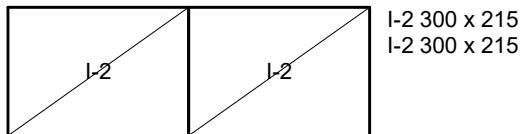
1x



5x



1x



Šipke - specifikacija						
ozn	oblik i mjere [cm]	Ø	lg [m]	n [kom]	lgn [m]	Napomena
PLOČA -2,50						
1	300	10	3.00	160	480.00	
2	1200	10	12.00	64	768.00	
3	100 13 100	10	2.13	149	317.37	
4	169 16 40 170 170	10	3.80	18	68.40	
5	100 11 100	10	2.11	198	417.78	
6	1200	20	12.00	8	96.00	
7	860	10	8.60	20	172.00	
8	400	20	4.00	8	32.00	
9	800	20	8.00	12	96.00	
10	400	16	4.00	4	16.00	
11	400	16	4.00	4	16.00	
12	865	20	8.65	4	34.60	

Šipke - rekapitulacija				
Ø [mm]	lgn [m]	Jedinična težina [kg/m <sup>3</sup> ]	Težina [kg]	
BS500				
10	2223.55	0.65	1443.08	
16	32.00	1.62	51.87	
20	258.60	2.48	640.04	
Ukupno (BS500)				2134.99
Ukupno				2134.99

Mreže - specifikacija						
Pozicija	Oznaka mreže	B [cm]	L [cm]	n	Jedinična težina [kg/m <sup>2</sup> ]	Ukupna težina [kg]
PLOČA -2,50						
I	Q-335	215	600	11	5.39	764.98
I-9	Q-335	215	255	2	5.39	59.11
I-20	Q-335	210	600	2	5.39	135.85
I-21	Q-335	210	255	1	5.39	28.87
I-22	Q-335	215	600	1	5.39	69.54
I-23	Q-335	215	465	1	5.39	53.89
I-24	Q-335	215	457	1	5.39	53.03
I-25	Q-335	215	600	2	5.39	139.09
I-26	Q-335	215	433	1	5.39	50.21
I-27	Q-335	215	409	1	5.39	47.40
I-28	Q-335	215	385	1	5.39	44.58
I-29	Q-335	209	352	1	5.39	39.74
I-30	Q-335	187	600	1	5.39	60.41
I-31	Q-335	97	600	1	5.39	31.38
II	Q-335	215	600	7	5.39	486.81
II-1	Q-335	210	360	1	5.39	40.76
II-2	Q-335	137	273	1	5.39	20.20
II-3	Q-335	195	532	1	5.39	55.98
II-4	Q-335	215	360	1	5.39	41.73
II-5	Q-335	215	600	1	5.39	69.54
II-6	Q-335	215	350	1	5.39	40.57
II-7	Q-335	215	600	1	5.39	69.54
II-8	Q-335	215	600	1	5.39	69.54
II-9	Q-335	215	255	1	5.39	29.56
II-10	Q-335	215	255	1	5.39	29.56
II-11	Q-335	215	600	1	5.39	69.54
II-12	Q-335	215	197	3	5.39	68.67
II-13	Q-335	215	600	1	5.39	69.54
II-14	Q-335	215	532	1	5.39	61.72
II-15	Q-335	215	120	1	5.39	13.91
II-16	Q-335	100	532	1	5.39	28.63
II-17	Q-335	215	600	1	5.39	69.54
II-18	Q-335	137	133	1	5.39	9.84
II-19	Q-335	54	345	1	5.39	10.14

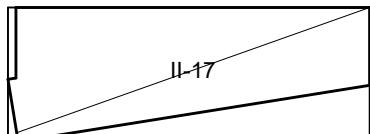
Mreže - rekapitulacija						
Oznaka mreže	B [cm]	L [cm]	n	Jedinična težina [kg/m <sup>2</sup> ]	Ukupna težina [kg]	Neto ugrađena težina [kg]
Q-335	215	600	44	5.39	3059.93	2803.39
Ukupno					3059.93	2803.39

Mreže - plan rezanja

PLOČA -2,50

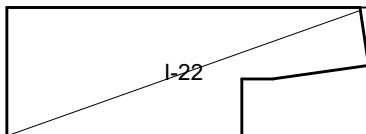
Q-335 (600 cm x 215 cm)

1x



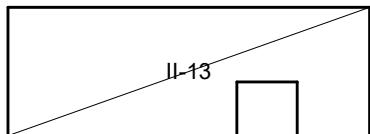
II-17 600 x 215

1x



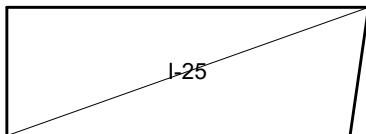
I-22 600 x 215

1x



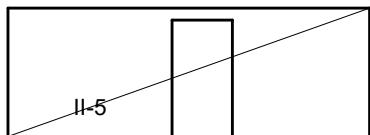
II-13 600 x 215

2x



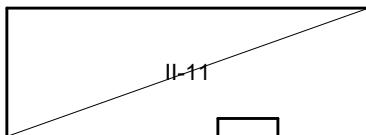
I-25 600 x 215

1x



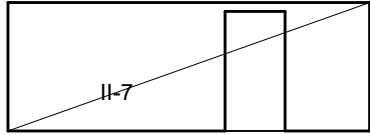
II-5 600 x 215

1x



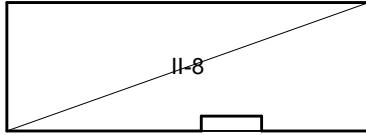
II-11 600 x 215

1x



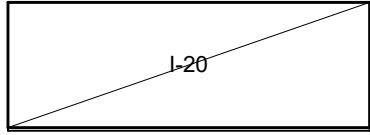
II-7 600 x 215

1x



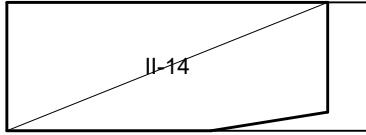
II-8 600 x 215

2x



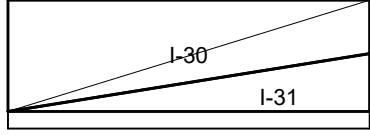
I-20 600 x 210

1x



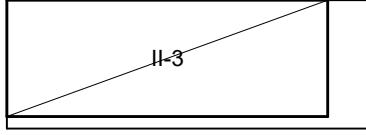
II-14 532 x 215

1x



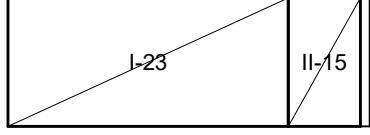
I-30 600 x 187  
I-31 600 x 97

1x



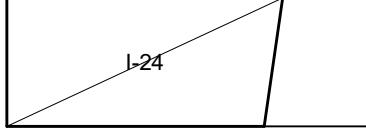
II-3 532 x 195

1x



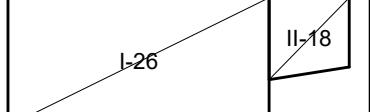
I-23 465 x 215  
II-15 120 x 215

1x



I-24 457 x 215

1x



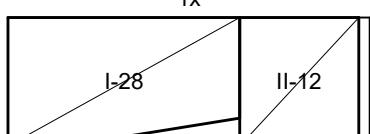
I-26 433 x 215  
II-18 133 x 137

1x



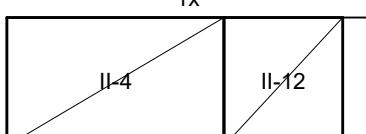
I-27 409 x 215

1x



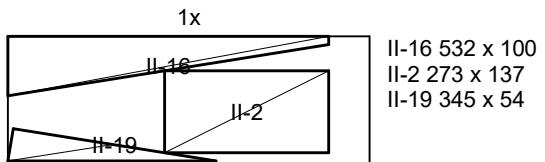
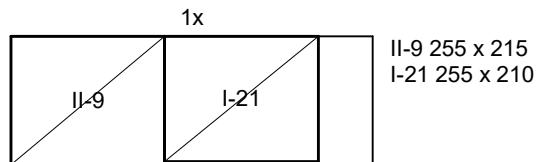
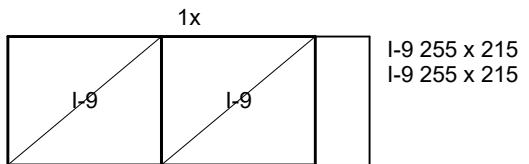
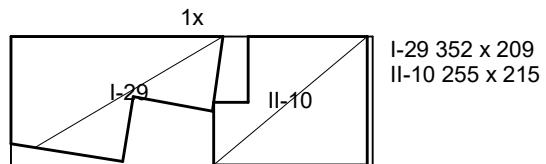
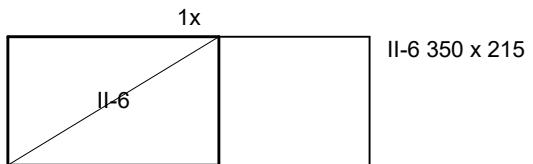
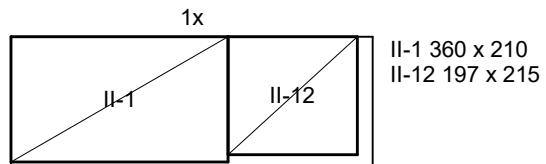
I-28 385 x 215  
II-12 197 x 215

1x

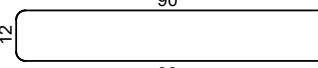
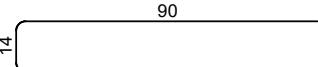
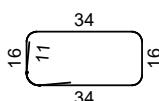
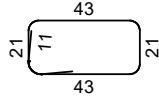
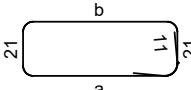
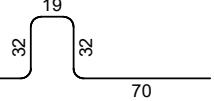
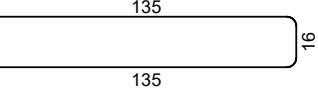
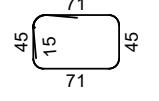
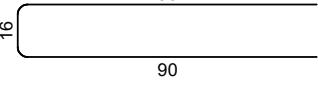
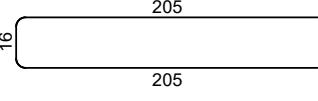
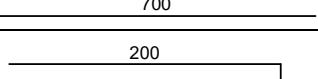
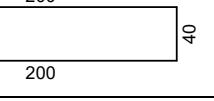
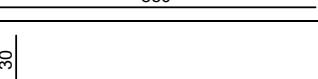
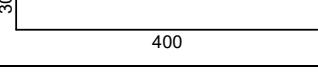


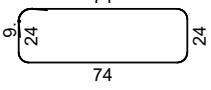
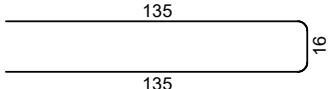
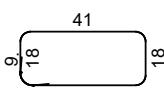
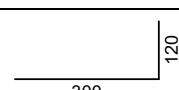
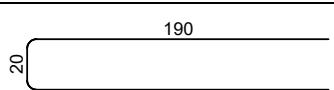
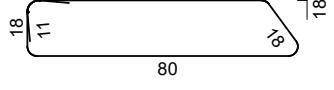
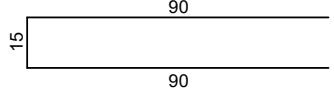
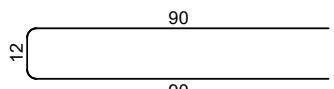
II-4 360 x 215  
II-12 197 x 215

Mreže - plan rezanja



Šipke - specifikacija						
ozn	oblik i mjere [cm]	Ø	lg [m]	n [kom]	lgn [m]	Napomena
ZIDOVNI - FAZA 1						
1	195	8	1.95	6	11.70	
2	80 19 80	10	1.79	133	238.07	
3	100 19 100	10	2.19	246	538.74	
4	240	10	2.40	6	14.40	
5	140 19 140	10	2.99	41	122.59	
6	600 49 50	14	6.50	8	52.00	
7	235	16	2.35	10	23.50	
8	220 20	16	2.40	6	14.40	
9	360	16	3.60	34	122.40	
10	400	16	4.00	54	216.00	
11	100 17 100	10	2.17	23	49.91	
12	500	16	5.00	150	750.00	
13	900	16	9.00	2	18.00	
14	1000	16	10.00	2	20.00	
15	1200	16	12.00	19	228.00	
16	510	20	5.10	21	107.10	
17	600 49 50	20	6.50	12	78.00	
18	800	20	8.00	8	64.00	
19	1000	20	10.00	8	80.00	
20	1200	20	12.00	22	264.00	
21	28 18 18 28	8	1.10	29	31.90	
22	34 16 16 34	8	1.18	49	57.82	

Šipke - specifikacija						
ozn	oblik i mjere [cm]	Ø	lg [m]	n [kom]	lgn [m]	Napomena
23		8	1.92	25	48.00	
24		8	1.94	26	50.44	
25		10	1.22	40	48.80	
26		10	1.50	88	132.00	
27	 4 x : a = 46, 47, 48, 49, 50, 52, 53, 54, 55, 57, 58, 59, 60, 61, 63, 64, 65, 66, 67, 69, 70, 71, 72, 74 b = 46, 47, 48, 49, 50, 52, 53, 54, 55, 57, 58, 59, 60, 61, 63, 64, 65, 66, 67, 69, 70, 71, 72, 74	10	*1.83	4 x 24	175.84	
28		10	2.23	20	44.60	
29		8	2.86	89	254.54	
30		14	2.62	89	233.18	
31		16	1.96	8	15.68	
32		16	4.26	8	34.08	
33		10	7.00	6	42.00	
34		12	4.40	12	52.80	
35		16	8.50	12	102.00	
36		16	4.30	74	318.20	

Šipke - specifikacija						
ozn	oblik i mjere [cm]	Ø	lg [m]	n [kom]	lgn [m]	Napomena
37		8	2.14	7	14.98	
38		10	2.86	34	97.24	
39		8	1.36	129	175.44	
40		20	4.20	12	50.40	
41	350	16	3.50	8	28.00	
42	600	16	6.00	4	24.00	
43	600	8	6.00	10	60.00	
44		10	4.00	18	72.00	
45		10	1.81	24	43.44	
46		10	2.14	7	14.98	
47		8	1.95	68	132.60	
48		8	1.92	76	145.92	
49	240	12	2.40	12	28.80	
50	865	12	8.65	4	34.60	

Šipke - rekapitulacija			
Ø [mm]	lgn [m]	Jedinična težina [kg/m <sup>3</sup> ]	Težina [kg]
BS500			
8	983.34	0.41	402.19
10	1634.61	0.65	1060.86
12	116.20	0.92	106.90
14	285.18	1.25	357.05
16	1914.26	1.62	3103.02
20	643.50	2.48	1592.66
Ukupno (BS500)			6622.68
Ukupno			6622.68

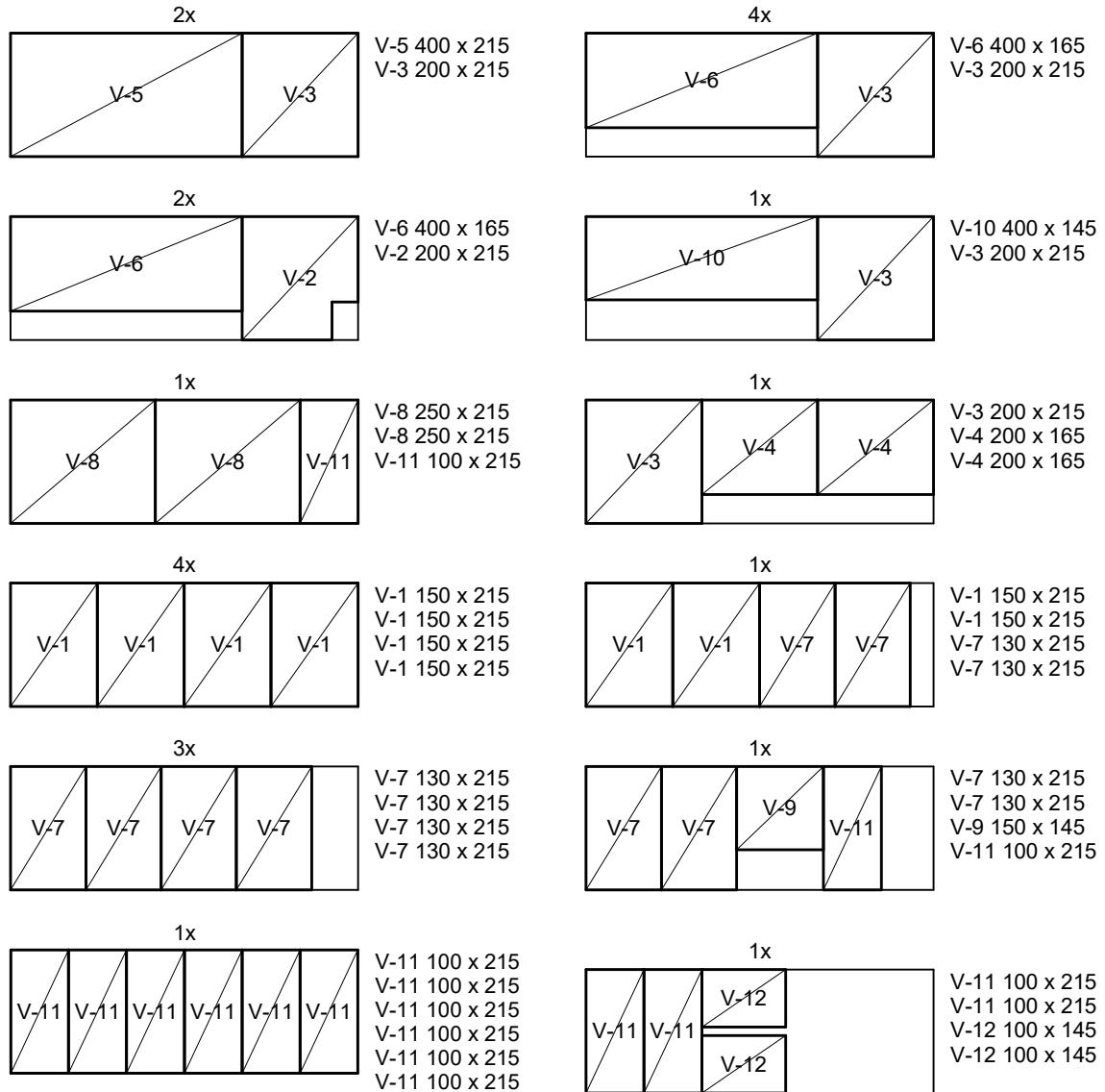
Mreže - specifikacija						
Pozicija	Oznaka mreže	B [cm]	L [cm]	n	Jedinična težina [kg/m <sup>2</sup> ]	Ukupna težina [kg]
ZIDOVI - FAZA 1						
I-1	Q-524	154	400	2	8.42	103.98
I-2	Q-524	215	400	6	8.42	434.42
I-3	Q-524	135	230	2	8.42	52.28
I-8	Q-524	140	250	2	8.42	58.93
II-1	Q-424	190	300	2	6.82	77.77
IV-1	Q-335	154	400	2	5.39	66.58
IV-2	Q-335	138	400	2	5.39	59.30
IV-3	Q-335	215	395	4	5.39	183.13
IV-4	Q-335	215	400	4	5.39	185.45
V-1	Q-257	215	150	18	4.12	239.40
V-2	Q-257	215	200	2	4.12	35.47
V-3	Q-257	215	200	8	4.12	141.87
V-4	Q-257	165	200	2	4.12	27.22
V-5	Q-257	215	400	2	4.12	70.93
V-6	Q-257	165	400	6	4.12	163.31
V-7	Q-257	215	130	16	4.12	184.43
V-8	Q-257	215	250	2	4.12	44.33
V-9	Q-257	145	150	1	4.12	8.97
V-10	Q-257	145	400	1	4.12	23.92
V-11	Q-257	215	100	10	4.12	88.67
V-12	Q-257	145	100	2	4.12	11.96
Ukupno						2262.32

Mreže - rekapitulacija						
Oznaka mreže	B [cm]	L [cm]	n	Jedinična težina [kg/m <sup>2</sup> ]	Ukupna težina [kg]	Neto ugrađena težina [kg]
Q-257	215	600	22	4.12	1170.39	1038.01
Q-335	215	600	12	5.39	834.53	480.22
Q-424	215	600	1	6.82	88.00	77.77
Q-524	215	600	10	8.42	1086.05	643.76
Ukupno					3178.97	2239.76

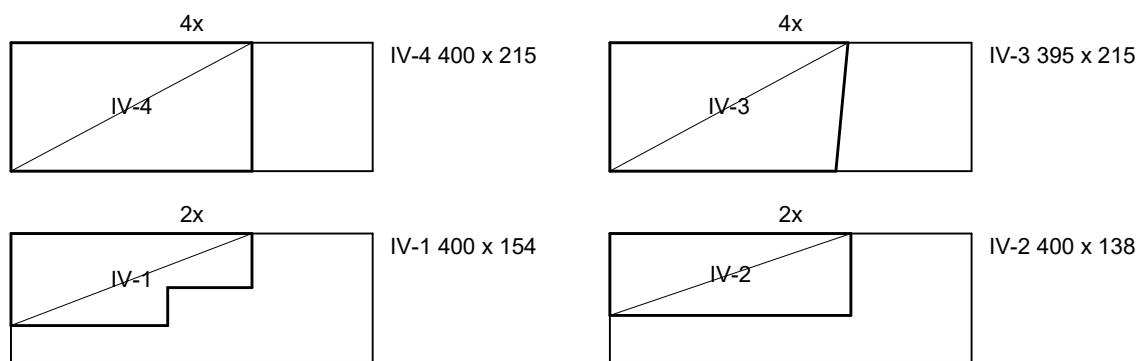
Mreže - plan rezanja

ZIDOVNI - FAZA 1

Q-257 (600 cm x 215 cm)

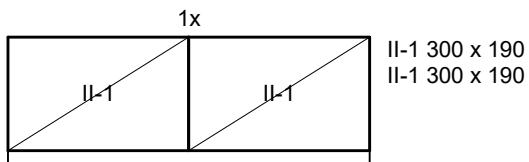


Q-335 (600 cm x 215 cm)

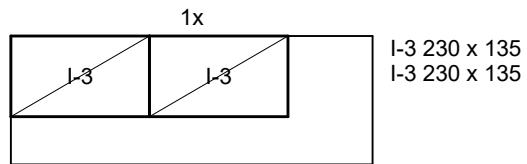
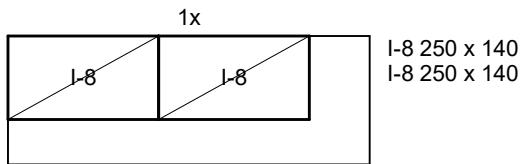
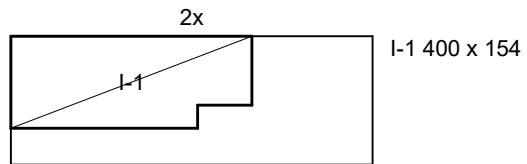
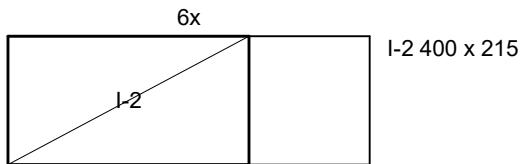


Mreže - plan rezanja

Q-424 (600 cm x 215 cm)



Q-524 (600 cm x 215 cm)



Šipke - specifikacija						
ozn	oblik i mjere [cm]	Ø	lg [m]	n [kom]	lgn [m]	Napomena
PLOČA 0,00						
1	200	10	2.00	334	668.00	
2	90 18 90	10	1.98	156	308.88	
3	90 15 90	10	1.95	65	126.75	
4	600	16	6.00	2	12.00	
5	840	16	8.40	2	16.80	
6	295 30	16	3.25	3	9.75	
7	400	16	4.00	3	12.00	
8	33 9 18 33	8	1.20	17	20.40	
9	90 8 90	8	1.88	222	417.36	
10	500	12	5.00	2	10.00	
11	650	16	6.50	18	117.00	

Šipke - rekapitulacija			
Ø [mm]	lgn [m]	Jedinična težina [kg/m <sup>3</sup> ]	Težina [kg]
BS500			
8	437.76	0.41	179.04
10	1103.63	0.65	716.26
12	10.00	0.92	9.20
16	167.55	1.62	271.60
Ukupno (BS500)			1176.10
Ukupno			1176.10

Mreže - specifikacija							
Pozicija	Oznaka mreže	B [cm]	L [cm]	n	Jedinična težina [kg/m <sup>2</sup> ]	Ukupna težina [kg]	
PLOČA 0,00							
I-1	Q-524	215	590	1	8.42	106.79	
I-2	Q-524	139	590	1	8.42	69.11	
I-4	Q-524	215	200	4	8.42	144.81	
I-5	Q-524	215	400	5	8.42	362.02	
I-6	Q-524	168	400	1	8.42	56.72	
I-7	Q-524	215	80	1	8.42	14.48	
I-8	Q-524	215	560	1	8.42	101.36	
I-9	Q-524	215	590	5	8.42	533.97	
II-1	Q-257	215	370	1	4.12	32.78	
II-2	Q-257	195	370	1	4.12	29.72	
II-3	Q-257	215	370	1	4.12	32.78	
II-4	Q-257	215	209	1	4.12	18.54	
II-5	Q-257	215	187	1	4.12	16.55	
II-6	Q-257	215	161	1	4.12	14.32	
II-7	Q-257	215	370	1	4.12	32.81	
II-8	Q-257	215	136	1	4.12	12.08	
II-9	Q-257	163	111	1	4.12	7.46	
II-10	Q-257	210	150	1	4.12	12.99	
II-11	Q-257	215	500	1	4.12	44.33	
II-12	Q-257	186	370	1	4.12	28.41	
II-14	Q-257	215	300	9	4.12	239.40	
II-15	Q-257	215	200	2	4.12	35.47	
II-16	Q-257	215	370	3	4.12	98.42	
III-1	Q-424	215	400	3	6.82	176.01	
III-2	Q-424	108	400	2	6.82	58.67	
III-3	Q-424	215	200	1	6.82	29.33	
III-4	Q-424	215	300	2	6.82	88.00	
IV-1	Q-335	215	374	1	5.39	43.35	
IV-2	Q-335	215	373	1	5.39	43.27	
IV-3	Q-335	215	373	1	5.39	43.23	
IV-4	Q-335	215	374	1	5.39	43.31	
IV-5	Q-335	215	374	1	5.39	43.40	
IV-6	Q-335	215	375	1	5.39	43.44	
IV-7	Q-335	215	375	1	5.39	43.46	
IV-8	Q-335	120	337	1	5.39	21.75	
IV-9	Q-335	215	250	2	5.39	57.95	

Mreže - specifikacija							
Pozicija	Oznaka mreže	B [cm]	L [cm]	n	Jedinična težina [kg/m <sup>2</sup> ]	Ukupna težina [kg]	
IV-10	Q-335	215	400	1	5.39	46.36	
V-1	R-424	215	200	3	4.38	56.50	
V-2	R-424	215	400	3	4.38	113.00	
VI-1	R-257	215	300	3	2.73	52.81	
Ukupno						3049.20	

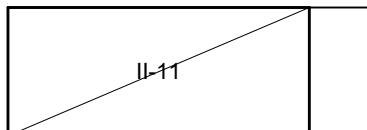
Mreže - rekapitulacija						
Oznaka mreže	B [cm]	L [cm]	n	Jedinična težina [kg/m <sup>2</sup> ]	Ukupna težina [kg]	Neto ugrađena težina [kg]
Q-257	215	600	14	4.12	744.79	644.32
Q-335	215	600	10	5.39	695.44	422.30
Q-424	215	600	5	6.82	440.02	352.02
Q-524	215	600	13	8.42	1411.87	1354.46
R-257	215	600	2	2.73	70.41	52.81
R-424	215	600	3	4.38	169.51	169.51
Ukupno					3532.03	2995.41

Mreže - plan rezanja

PLOČA 0,00

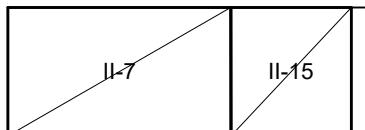
Q-257 (600 cm x 215 cm)

1x



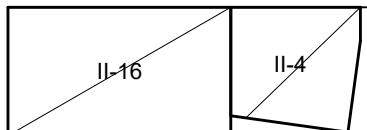
II-11 500 x 215

1x



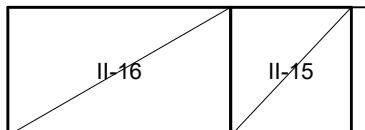
II-7 370 x 215  
II-15 200 x 215

1x



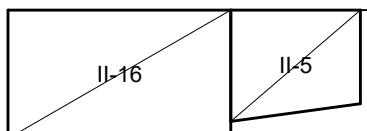
II-16 370 x 215  
II-4 209 x 215

1x



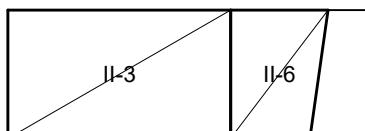
II-16 370 x 215  
II-15 200 x 215

1x



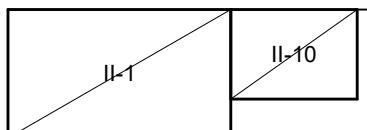
II-16 370 x 215  
II-5 187 x 215

1x

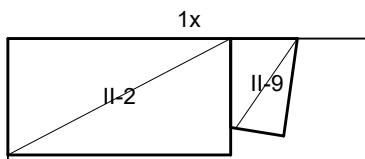


II-3 370 x 215  
II-6 161 x 215

1x

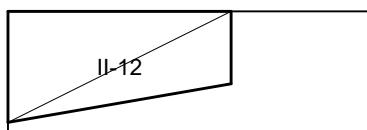


II-1 370 x 215  
II-10 150 x 210

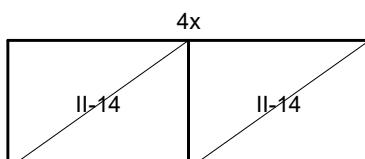


II-2 370 x 195  
II-9 111 x 163

1x

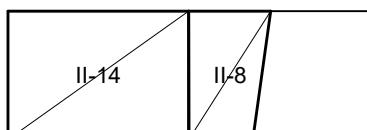


II-12 370 x 186



II-14 300 x 215  
II-14 300 x 215

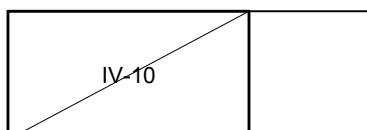
1x



II-14 300 x 215  
II-8 136 x 215

Q-335 (600 cm x 215 cm)

1x



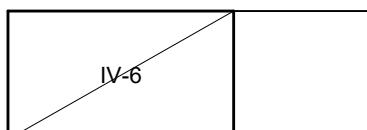
IV-10 400 x 215

1x

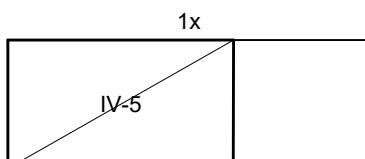


IV-7 375 x 215

1x

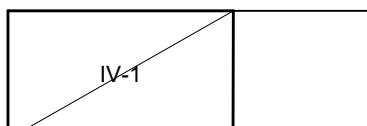


IV-6 375 x 215

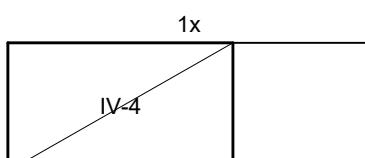


IV-5 374 x 215

1x

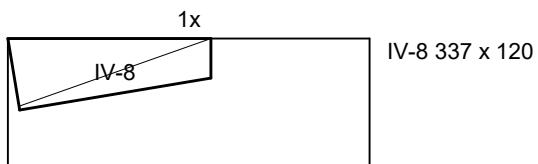
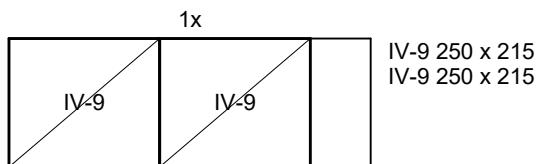
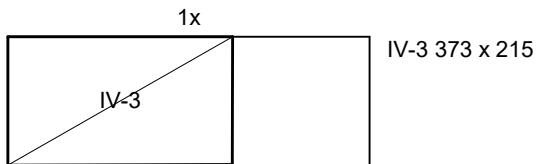
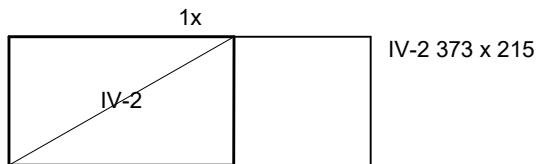


IV-1 374 x 215

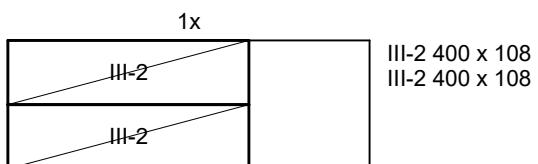
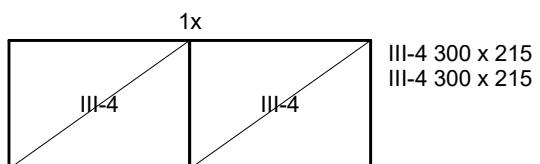
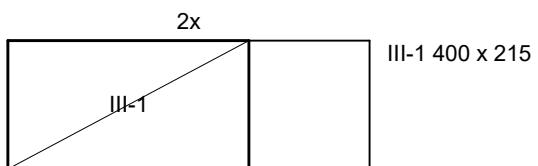
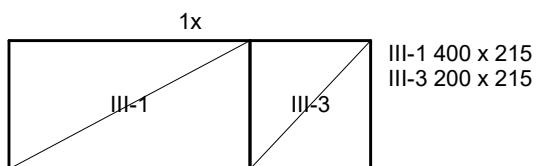


IV-4 374 x 215

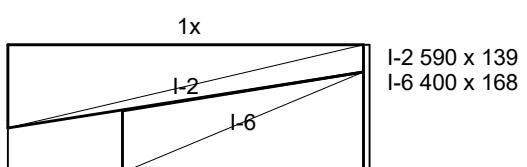
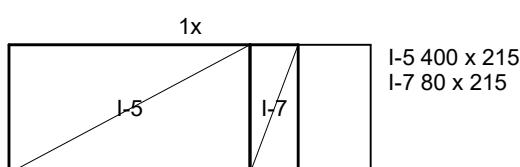
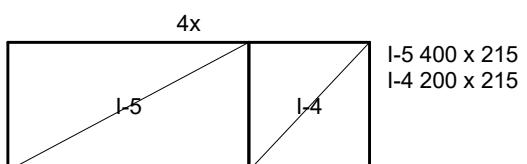
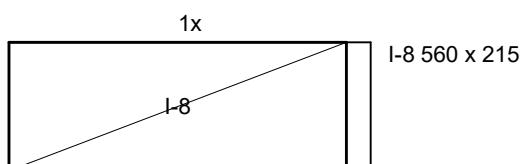
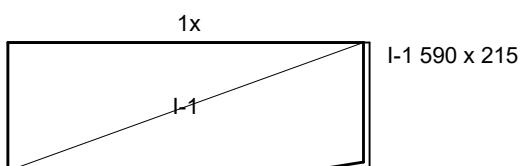
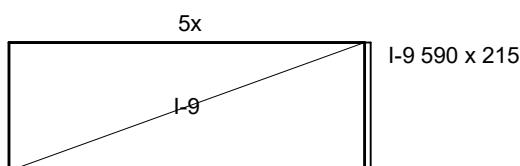
Mreže - plan rezanja



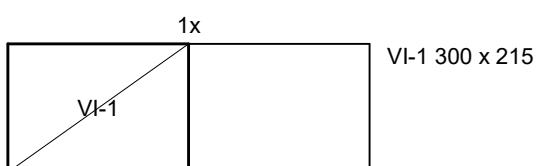
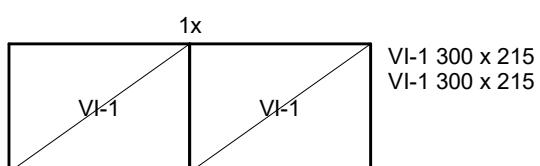
Q-424 (600 cm x 215 cm)



Q-524 (600 cm x 215 cm)

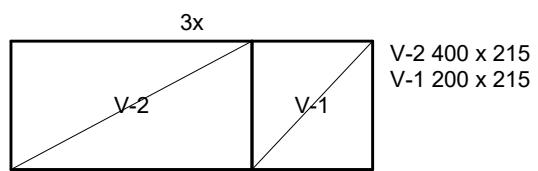


R-257 (600 cm x 215 cm)



Mreže - plan rezanja

R-424 (600 cm x 215 cm)



### **3. *DOKAZNICE RADOVA***

## **1.1. ISKOPI ZA TEMELJNE TRAKE**

**Za temelje 100/60**

$$0,40 \cdot (14,69+12,23+14,02+3,28+2,13) = 18,54 m^3$$

**Za temelje 100/80**

$$0,60 \cdot (6,91+3,02) = 5,96 m^3$$

**UKUPNO ISKOPA:** **24,50 m<sup>3</sup>**

## **1.2. PODBETONI**

**Podbeton ispod trake  
100/80:**

$$0,10 \cdot (14,69+12,23+14,02+3,28+2,13) = 4,64 m^3$$

**Podbeton ispod trake  
100/60:**

$$0,10 \cdot (6,91+3,02) = 1,00 m^3$$

**Podbeton ispod  
temelja u osi 3u:**

$$1,15 \cdot 1,55 \cdot 0,70 \cdot 13,30 = 16,60 m^3$$

**UKUPNO PODBETONA:** **22,24 m<sup>3</sup>**

## **1.3. BETON TEMELJNIH TRAKA**

**Za temelje 100/60**

$$20,40 \cdot (14,69+12,23+14,02+3,28+2,13) = 18,54 m^3$$

**Za temelje 100/80**

$$0,60 \cdot (6,91+3,02) = 5,96 m^3$$

**UKUPNO ISKOPA:** **24,50 m<sup>3</sup>**

## **1.4. BETON TEMELJNE PLOČE**

**Temeljna ploča i  
rampa**

$$201,86 \cdot 0,20 + 1,22 \cdot 4,03 + 59,02 m^3$$

$$0,15 \cdot (3,50 \cdot 6,50 + 3,70 \cdot 10,00) + 0,30 \cdot 7,20 + 0,50 \cdot 0,40 \cdot 2 \cdot 6,50 =$$

**UKUPNO ISKOPA:** **59,02 m<sup>3</sup>**

## **1.5. BETON ZIDOVА I STUBOVA**

**Temeljna ploča i  
rampa**

$$4,35 \cdot 0,20 \cdot 2 + (11,4m \cdot 0,20 + 36,9m \cdot 0,25 + 12,6m \cdot 0,30) \cdot 2,35 50,00 m^3$$

$$+ (32,4m \cdot 0,25 + 12,6m \cdot 0,30) \cdot 1,00$$

**UKUPNO ISKOPA:** **50,00 m<sup>3</sup>**

## **1.6. BETON PLOČE NA KOTI 0,00 I GREDA**

**Temeljna ploča i  
rampa**

$$12 \cdot 6 \cdot 0,25 + 130 \cdot 0,15 + 3,35 = 40,80 m^3$$

**UKUPNO ISKOPA:** **40,80 m<sup>3</sup>**

#### **4. *PREDMJER RADOVA***

Građevinski projekt stambeno-poslovnog objekta ulica Lacina							
Red. broj	Opis pozicije	VRSTA RADOVA	Jed. Mjere	Količina	Jed. cijena [BAM/KM]	Ukupna vrijednost [BAM/ KM]	
	1	<b>PRIPREMNI RADOVI</b>					
	1,1	<b>Geodetski radovi</b>					
1.		Postavljanje i obezbjeđenje profila za iskolčenje objekta površine preko 100 m <sup>2</sup> .	pcs/com	1			
<b>UKUPNO PRIPREMNI RADOVI:</b>							
	2	<b>ZEMLJANI RADOVI</b>					
	2,1	<b>Iskopi</b>					
3.		Iskop tvrde stijena za temeljne trake dimenzija 0,60x1,00 i 0,40x1,00 (mjereno od dna ploče). U cijenu uračunat sav potreban rad i odvoz na deponiju.	m <sup>3</sup>	5,72			
<b>TOTAL EARTHWORKS / UKUPNO ZEMLJANI RADOVI:</b>							
	3	<b>Armirački radovi</b>					
25.		Doprema i postavljanje mreže iz valjane čelične žice ČBM-50-MAG 500/560, sa promjerom od 4 do 12 mm, masa od 2,1 do 3kg/m <sup>2</sup>	kg	11.375,0			
26.		Doprema i postavljanje rebraste armature BSt 500-B promjera preko 12 mm, za zahtjevno armiranje.	kg	16.110,0			
<b>Total reinforcing works / Ukupno armirački radovi:</b>							

	<b>4</b>	<b>Radovi od betona</b>				
29.		Doprema i ugrađivanje podložnog betona C16/20 u presjek do 0.15 m <sup>3</sup> /m <sup>2</sup> .		m <sup>3</sup>	22,4	
30.		Doprema i ugrađivanje betona C25/30, XC2, u pojedinačne blok-temelje ili temeljne ploče.		m <sup>3</sup>	84,9	
32.		Doprema i ugrađivanje betona C25/30 XC4, XD1, XF2, u nosive AB zidove i stubove.		m <sup>3</sup>	50,0	
32.		Doprema i ugrađivanje betona C25/30 XC4, XD1, XF2, u gornju ploču debljine d=25cm i d=15cm i betonske grede visine od d=40cm do d=70cm.		m <sup>3</sup>	40,8	
<b>Ukupno radovi od betona:</b>						
<b>UKUPNO RADOVI KOJI NISU OBUHVĀČENI OPISOM:</b>						

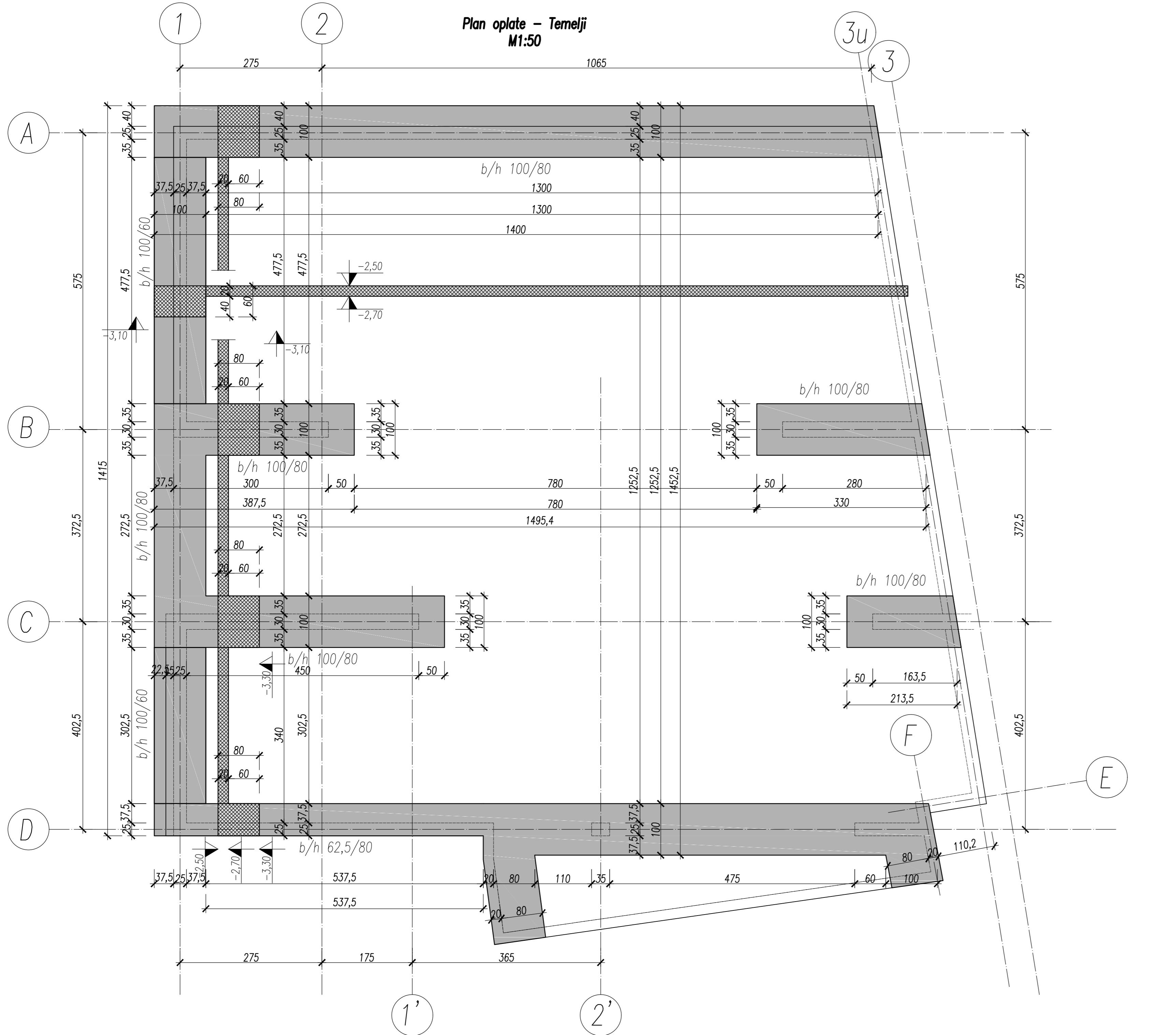
**REKAPITULACIJA  
OBJEKAT LACINA - FAZA 1**

<b>Geodetski radovi</b>	
<b>Zemljani radovi</b>	
<b>Armirački radovi</b>	
<b>Radovi sa cementnim betonom</b>	
<b>TOTAL/UKUPNO:</b>	
Nepredviđeni radovi 7% (obavezno ponuditi)	
<b>total km (pdv excludede)/UKUPNO KM BEZ PDV:</b>	
PDV 17%	
<b>UKUPNO KM SA PDV:</b>	

## **5. TEHNIČKI NACRTI**

# Plan oplate – Temelji M1:50

M1:50



# AGENDA

Oborení presjek

1

Presjk

Zidovi koji se nastavljaju na etaži iznad posmatrane ploče/presieka

 Zid koji se ne nastavlja

*iznad posmatrane ploč*

P.- Gornja kota ploče

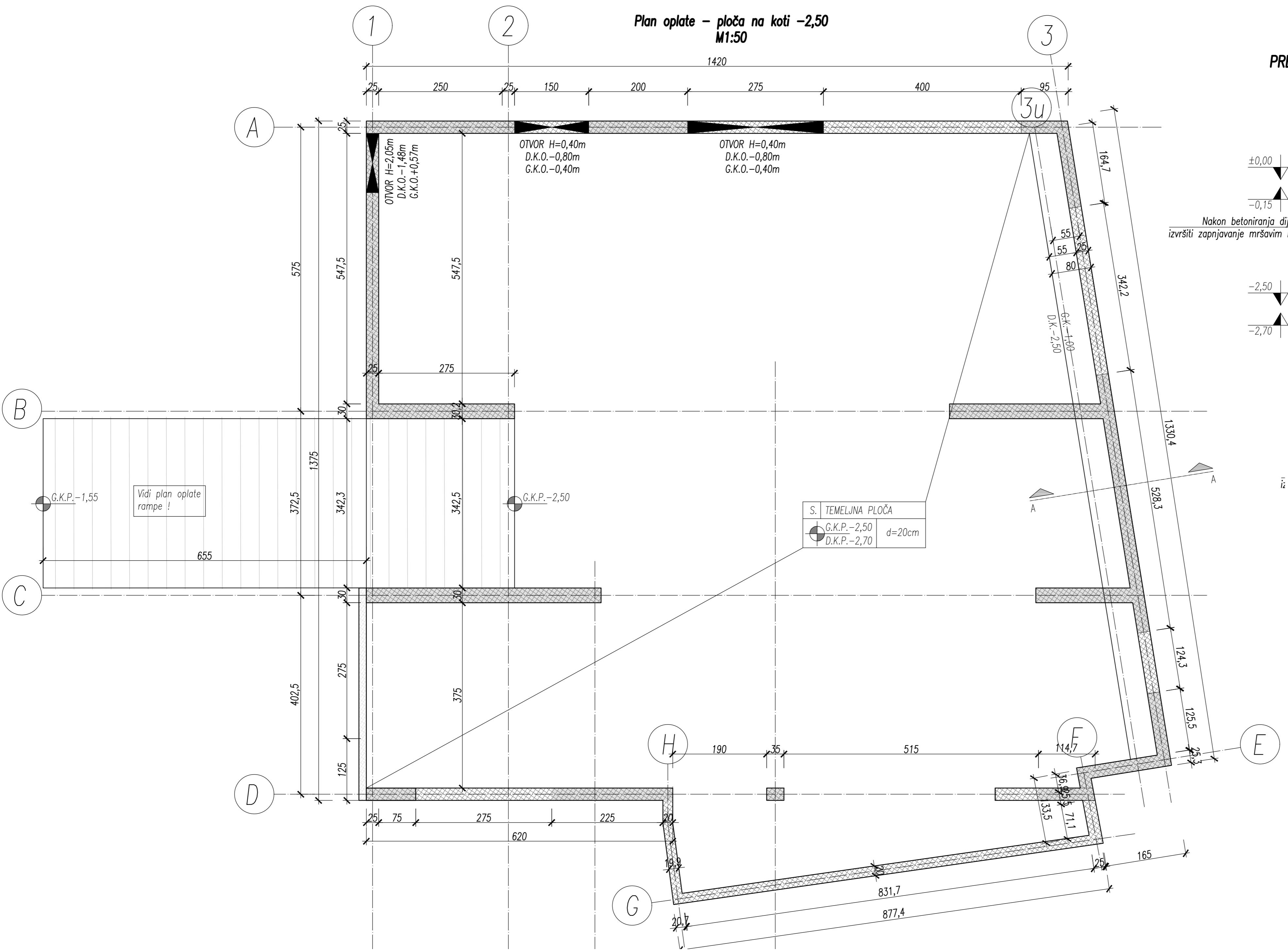
P.- Donja kota ploče  
Q. Gornja kota strana

0.- Donja kota otvora

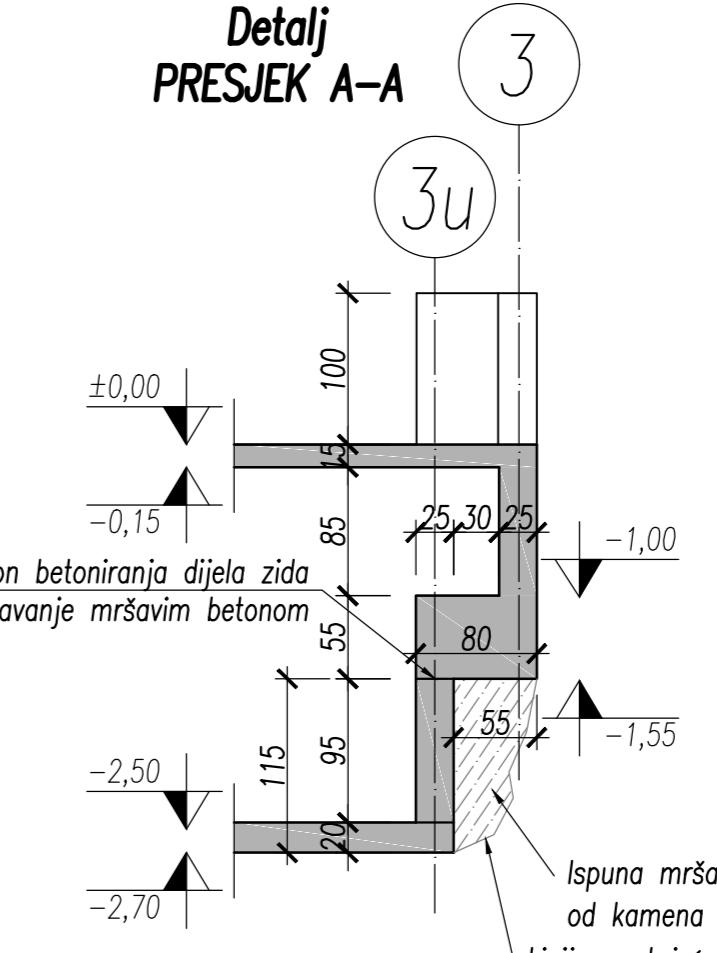
## 3. Benja Kold Øverd

*Plan oplate - ploča na koti -2,50  
M1:50*

M1:50



## *Detalj* **PRESJEK A-A**



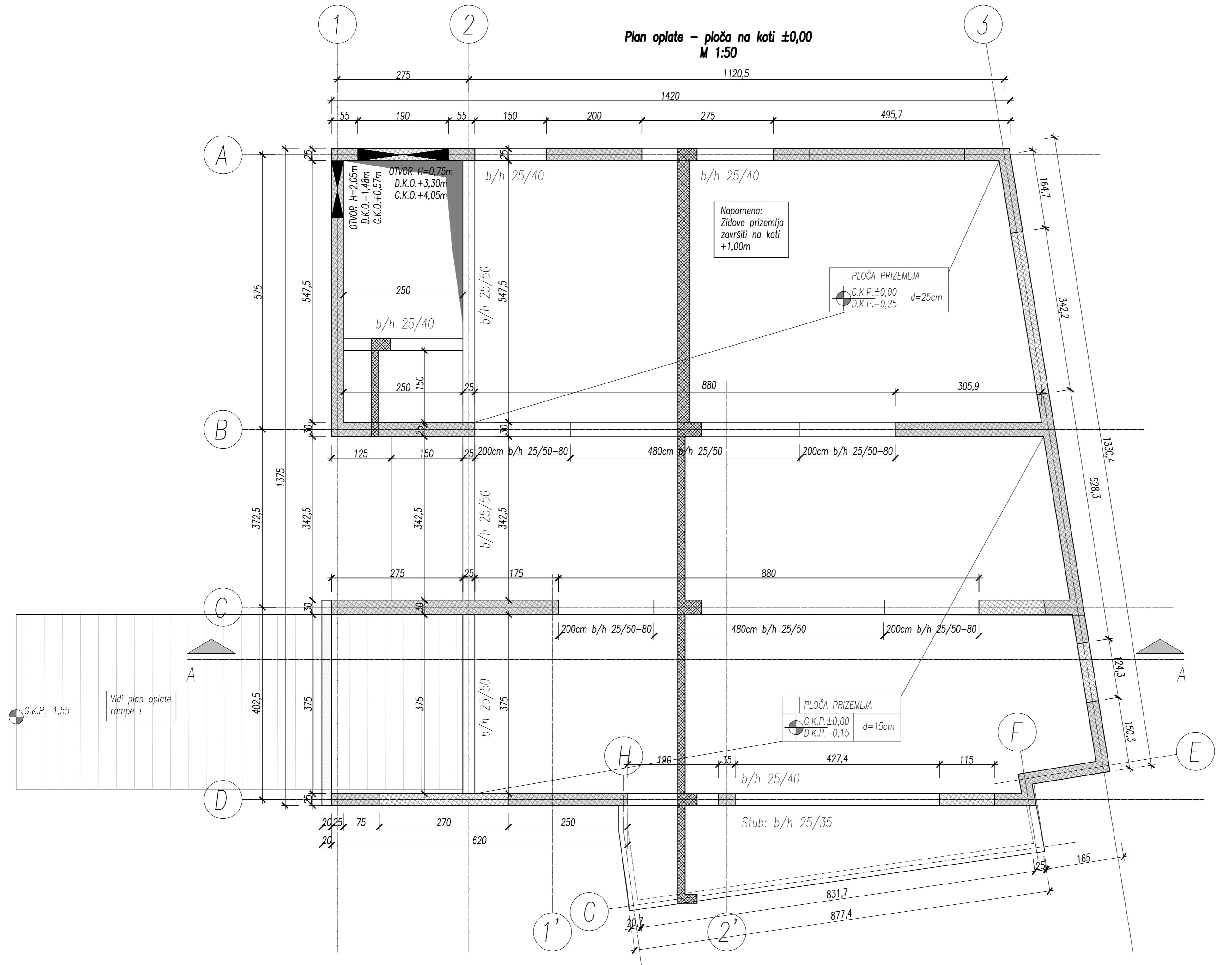
Nakon  
izvršiti zapnju

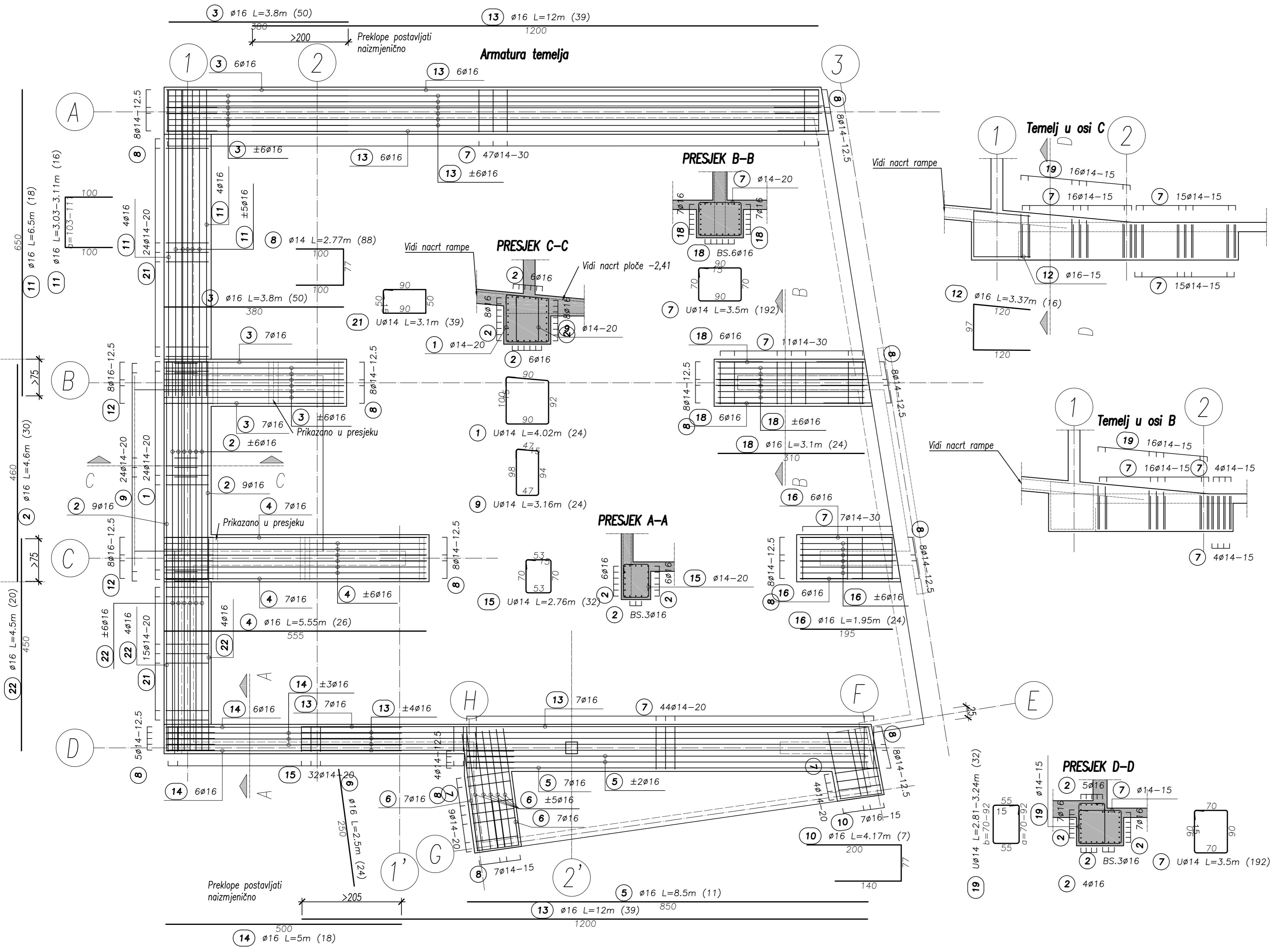
on betoniranja dijela zida

Ispuna mršavim betonom sa ispunom od kamena C12/16  
inija postojeće stijene

LEGENDA	
	Oboreni presjek
	Presjek
	Zidovi koji se nastavljaju na etaži iznad posmatrane ploče/presjeka
	Zid koji se ne nastavlja na etaži iznad posmatrane ploče/presjeka
G.K.P.-	Gornja kota ploče
D.K.P.-	Donja kota ploče
G.K.O.-	Gornja kota otvora
D.K.O.-	Donja kota otvora

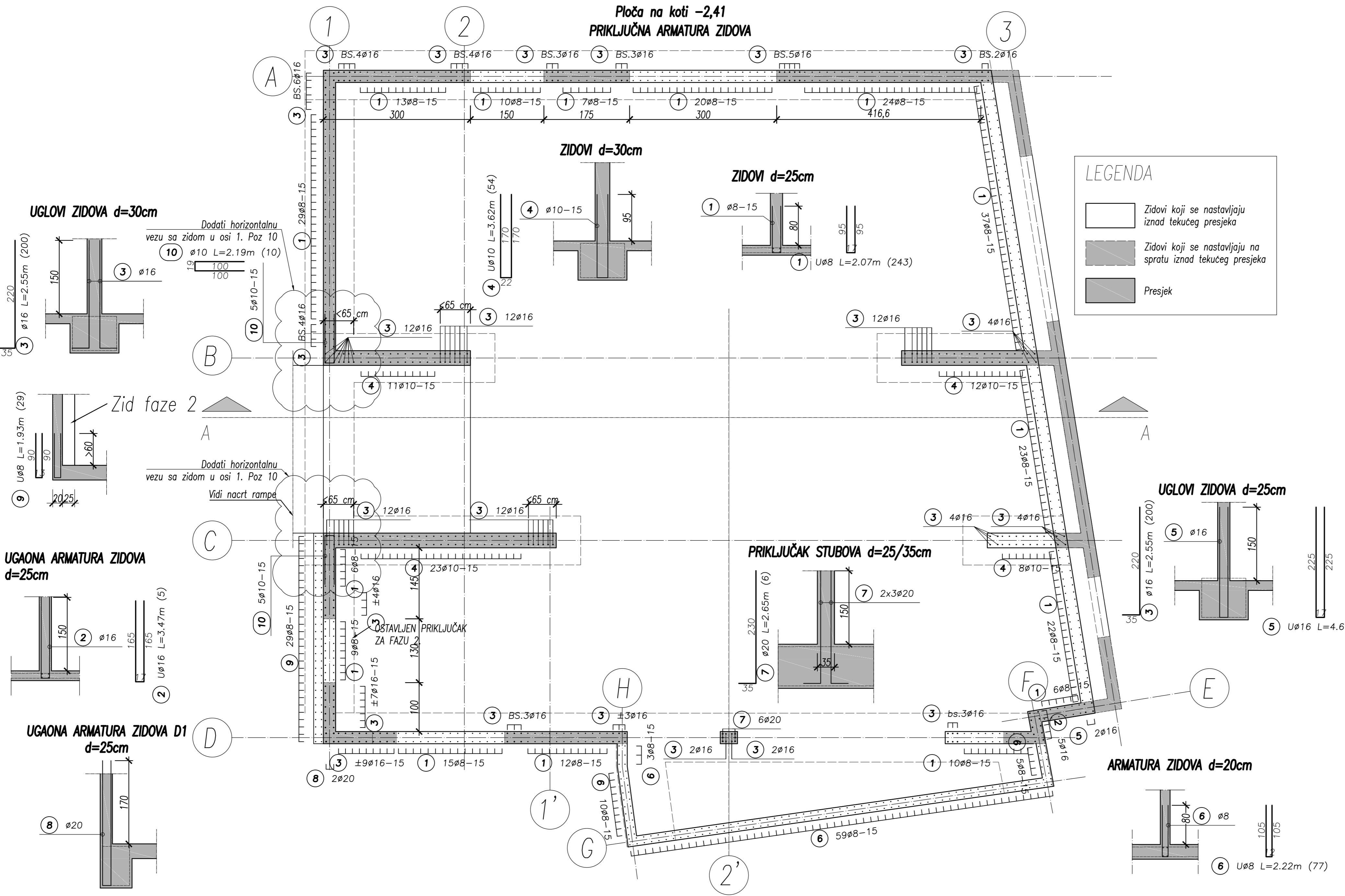
LEGENDA	
	Oboren presjek
	Presjek
	Zidovi koji se nastavljaju na etaži iznad posmatrane ploče/presjeka
	Zid koji se ne nastavlja na etaži iznad posmatrane ploče/presjeka
G.K.P.- Gornja kota ploče	
D.K.P.- Donja kota ploče	
G.K.O.- Gornja kota otvora	
D.K.O.- Donja kota otvora	





Minimalni prečnici povijanja $D_{min}$		(prema: DIN EN1992-1-1/NA Tabela NA.8.1)			
Vilice, ukosnice, kuke		Skretanje armaturnih šipki			
Za promjer šipke:		Minimalne vrijednosti prečnika povijanja šipki prema datim uslovima:			
$\emptyset < 20 \text{ mm}$	$\emptyset \geq 20 \text{ mm}$	$c_v > 100 \text{ mm} \text{ i } > 7 \emptyset$	$c_v > 50 \text{ mm} \text{ i } > 3 \emptyset$	$c_v \leq 50 \text{ mm ili } \leq 3 \emptyset$	
$D_{min}$	$4,0 \emptyset$	$7,0 \emptyset$	$10 \emptyset$	$15 \emptyset$	$20 \emptyset$

Ploča na koti -2,41  
PRIKLJUČNA ARMATURA ZIDOVA



Minimalni prečnici povijanja  $D_{min}$   
(prema: DIN EN1992-1-1/NA Tabela NA.8.1)

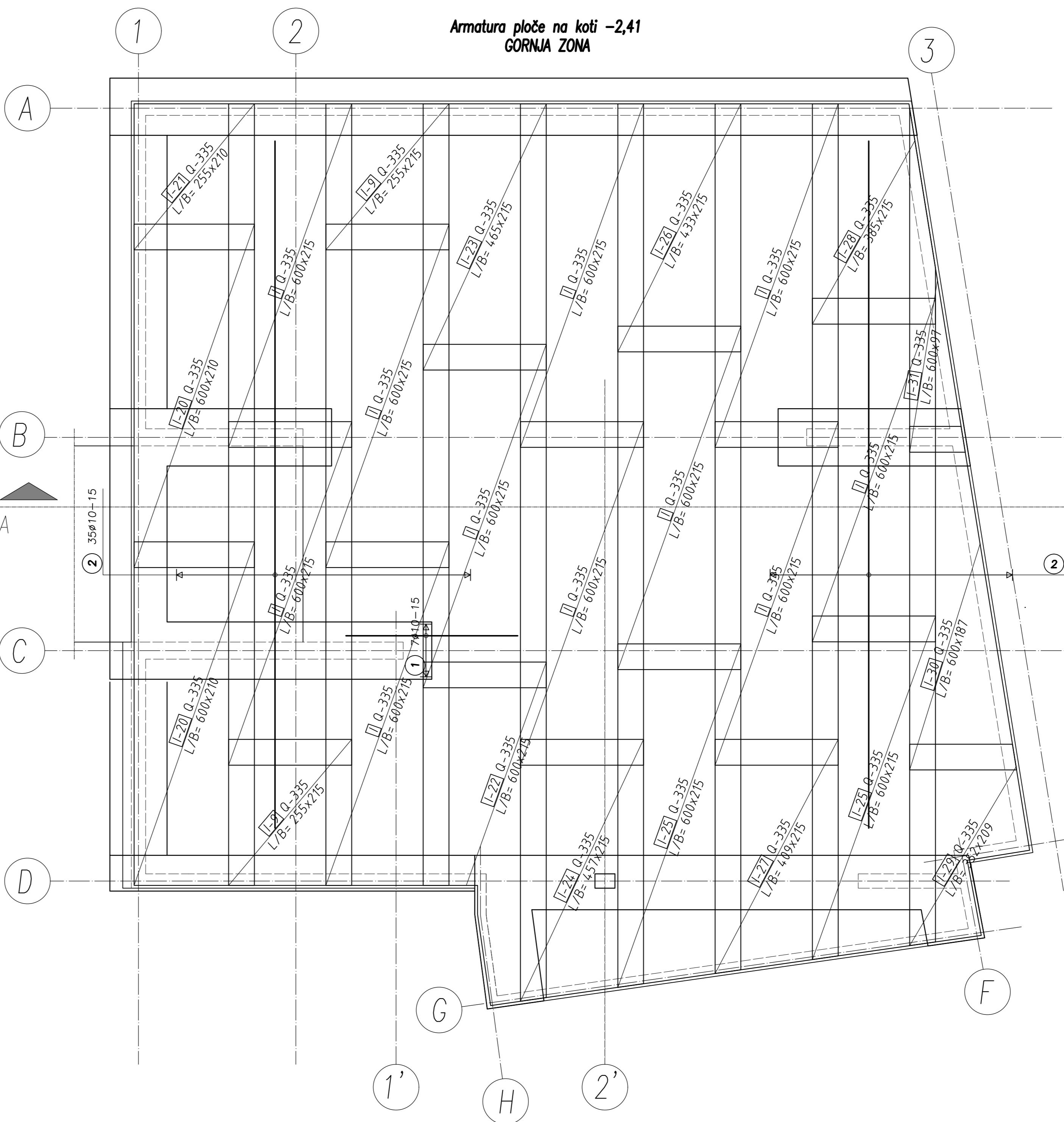
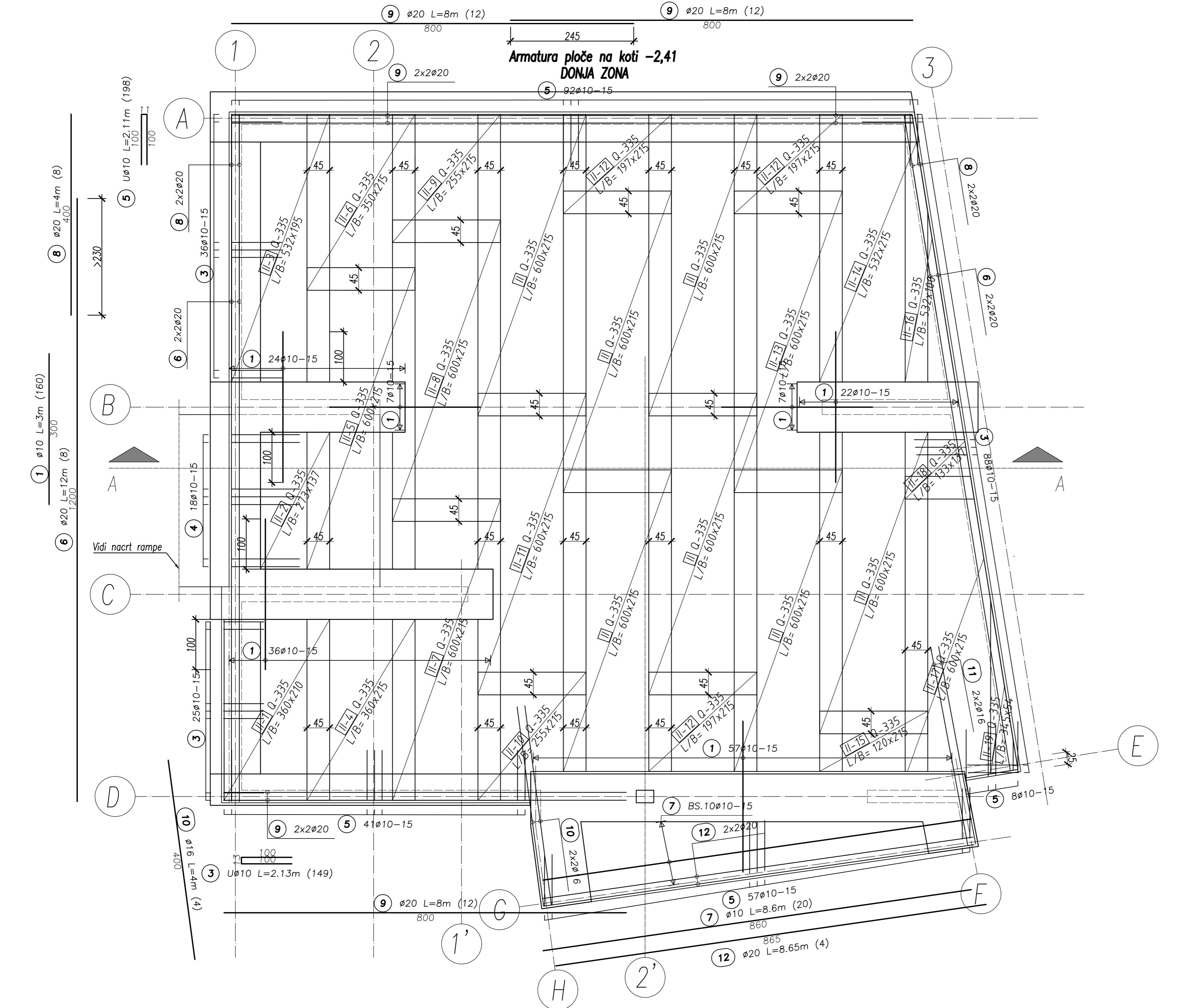
Vilice, ukosnice, kuke	Skretanje armaturnih šipki

Za promjer šipke:

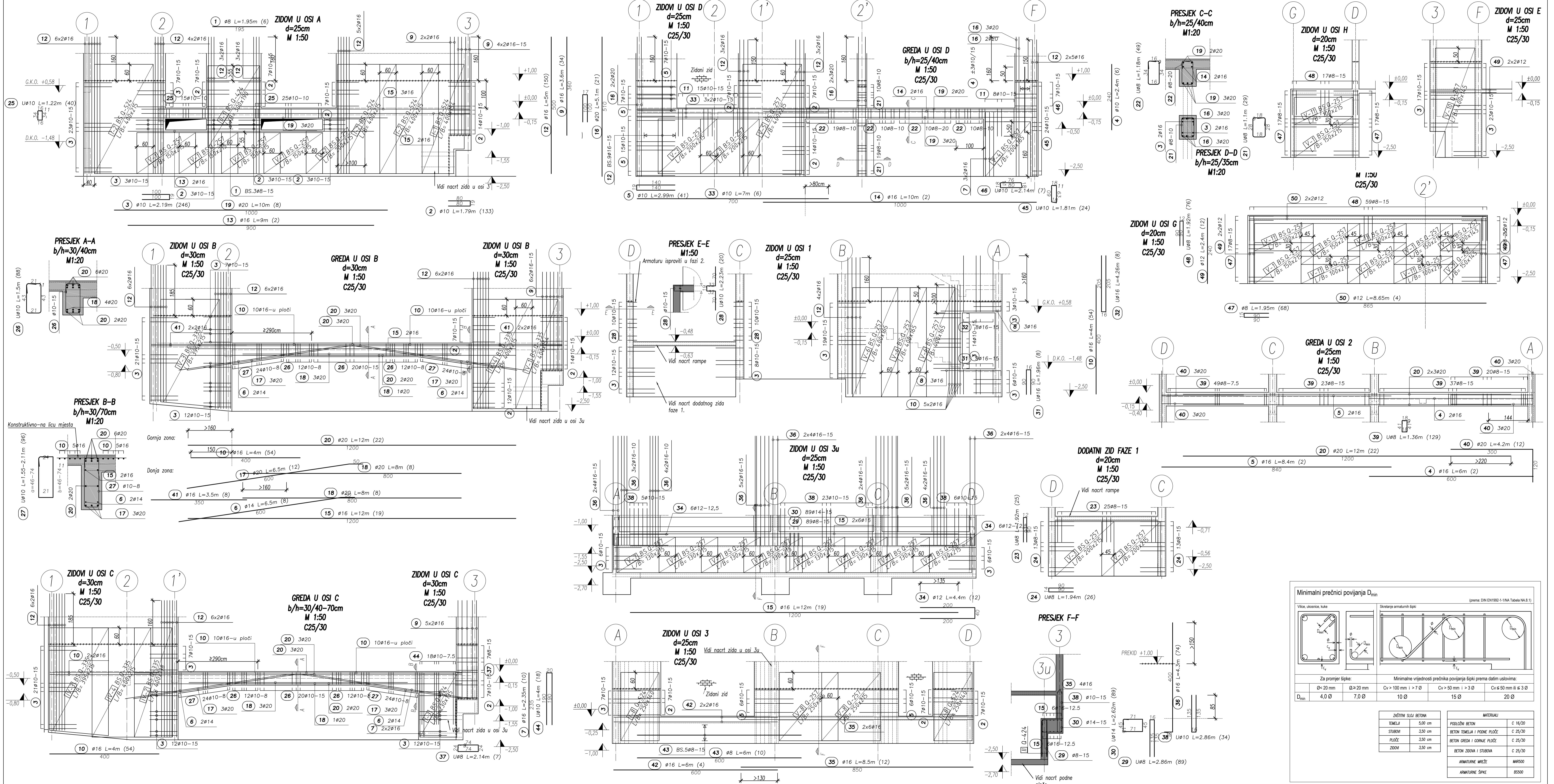
Minimalne vrijednosti prečnika povijanja šipki prema datim uslovima:
0 < 20 mm      Ø ≥ 20 mm      Cv > 100 mm i > 7 Ø      Cv > 50 mm i > 3 Ø      Cv ≤ 50 mm ili ≤ 3 Ø
D <sub>min</sub> 4,0 Ø      7,0 Ø      10 Ø      15 Ø      20 Ø

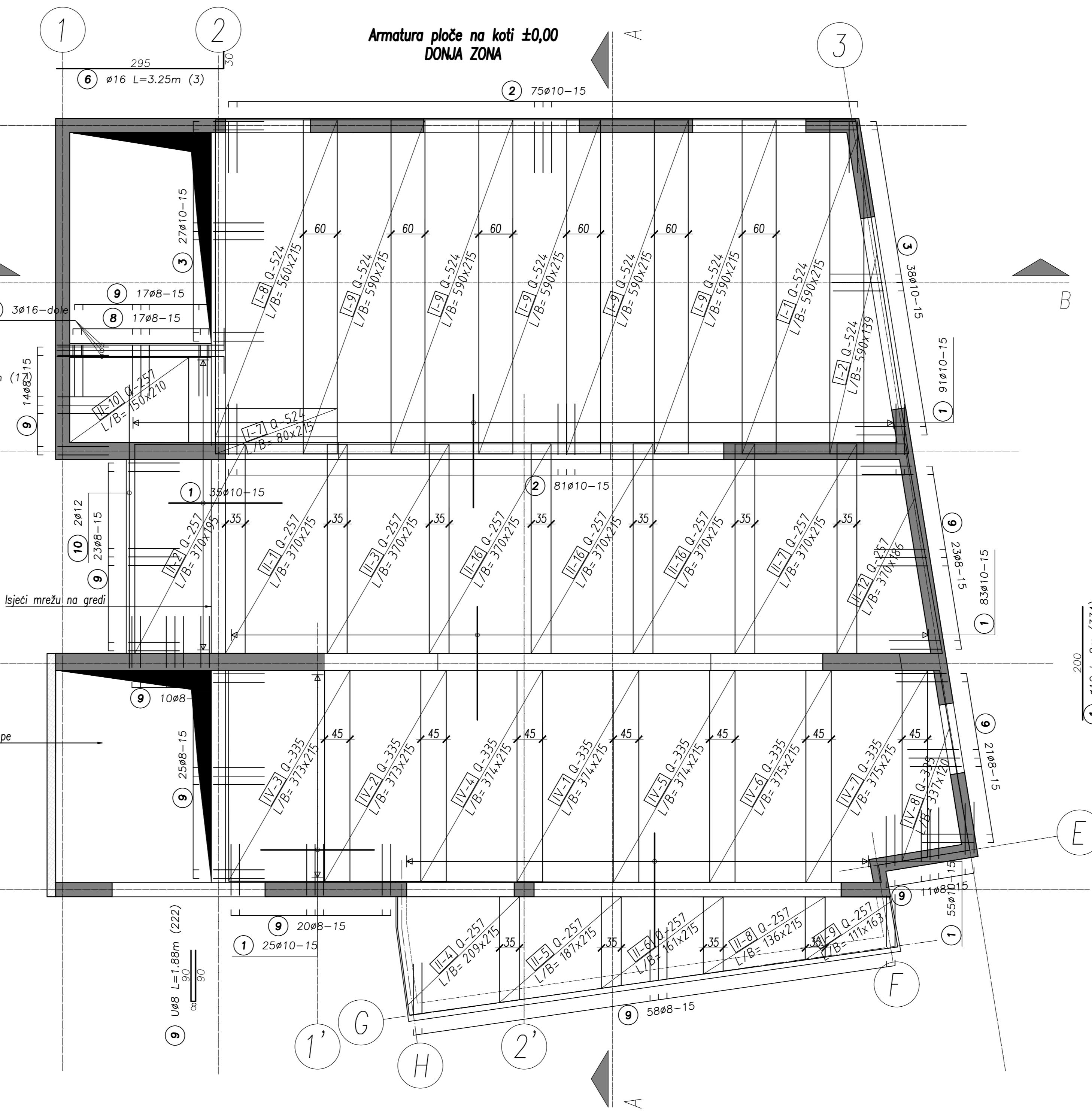
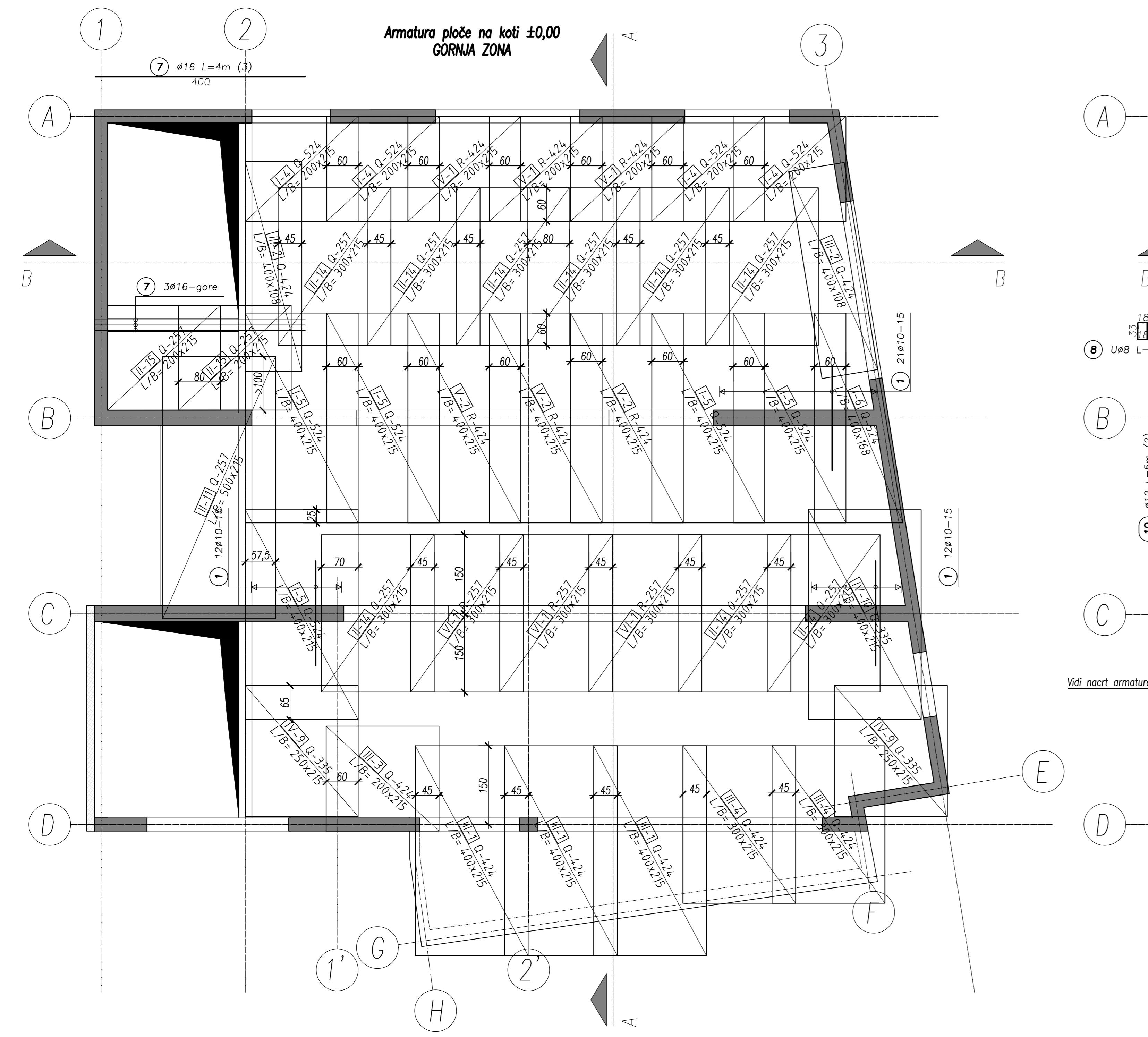
**ZAŠTITNI SLOJ BETONA**

MATERIJALI		
TEMELJI	5,00 cm	C 16/20
STUBOVI	3,50 cm	C 25/30
PLOČE	3,50 cm	C 25/30
ZIDOV	3,50 cm	C 25/30
ARMATURNE MREŽE	MAR500	
ARMATURNE ŠIPKE	BS500	



Minimalni prečnici povijanja $D_{min}$		(prema: DIN EN1992-1-1/NA Tabela 1)				
Vilice, ukosnice, kuke		Skretanje armaturnih šipki				
Za promjer šipke:		Minimalne vrijednosti prečnika povijanja šipki prema datim uslovima:				
$\emptyset < 20 \text{ mm}$	$\emptyset \geq 20 \text{ mm}$	$c_v > 100 \text{ mm} \text{ i } i > 7 \emptyset$	$c_v > 50 \text{ mm} \text{ i } i > 3 \emptyset$	$c_v \leq 50 \text{ mm ili } i \leq$		
$D_{min}$	$4,0 \emptyset$	$7,0 \emptyset$	$10 \emptyset$	$15 \emptyset$	$20 \emptyset$	





## Minimalni prečnici povijanja $D_{min}$

(prema: DIN EN1992-1-1/NA Tabela 1)

Vilice, ukosnice, kuke

Skretanje armaturnih šipki

Za promjer šipke:

Minimalne vrijednosti prečnika povijanja šipki prema datim uslovima:

	$\emptyset < 20 \text{ mm}$	$\emptyset \geq 20 \text{ mm}$	$c_v > 100 \text{ mm} \text{ i } > 7 \emptyset$	$c_v > 50 \text{ mm} \text{ i } > 3 \emptyset$	$c_v \leq 50 \text{ mm} \text{ ili } \leq$
$D_{min}$	4,0 $\emptyset$	7,0 $\emptyset$	10 $\emptyset$	15 $\emptyset$	20 $\emptyset$

### ZAŠITNI SLOJ BETONA

TEMELJI	5,00 cm
STUBOVI	3,50 cm
PLOČE	3,50 cm
ZIDOVI	3,50 cm

### MATERIJALI

PODLOŽNI BETON	C 16
BETON TEMELJA I PODNE PLOČE	C 25
BETON GREDA I GORNJE PLOČE	C 25
BETON ZIDOVA I STUBOVA	C 25
ARMATURNE MREŽE	MAR
ARMATURNE ŠIPKE	BS5