

## Lamela B1-B2

### Kontrola nosivosti prečki

#### Prečke u zidu u osi S

Prečka na koti +5,20, na dijelu između osa 12 i 13, je ojačana prema Detalju 8 datom u prilogu. Ojačana prečka je dimenzija 60/65 cm i sila u njoj je 1103 kN (prilog, strana B1-B2/2). Napon smicanja u ovoj prečki je:

$$\tau_n = \frac{1103}{0,9 \times 60 \times 59} = 0,346 \frac{kN}{cm^2} = 3,46 MPa < 5\tau_r = 6,5 MPa$$

dok je nosivost ukupnih uzengija (3×UØ10/15) jednaka

$$T_{u,u} = 6 \times \frac{0,785 \times 100}{15} \times 50 = 1572 kN > 1103 kN$$

Ostale prečke u zidu su dimenzija 20/82 cm, raspona L = 1.01 m. Svi zidovi su od betona MB 40. Maksimalna transverzalna sila se javlja u prečki na koti +8,20 na dijelu 12-13 i iznosi 907 kN (prilog, strana B1-B2/2). Maksimalni napon smicanja je:

$$\tau_n = \frac{876}{0,9 \times 20 \times 76} = 0,640 \frac{kN}{cm^2} = 6,40 MPa < 5\tau_r = 6,5 MPa$$

Sve prečke su armirane poprečnom armaturom UØ10/15. Nosivost prečki u odnosu na ovako usvojenu armaturu je

$$T_{u,u} = 2 \times \frac{0,785 \times 100}{15} \times 50 = 524 kN$$

Prečke u kojima je ova sila prekoračena su ojačane karbonskom tkaninom, prema detaljima 6 i 7 u prilogu.

#### Detalj 6

Za ojačanje se koristi SikaWrap-230 C tkanina debljine 0,131 mm, sa maksimalnim računskim naponom od 2300 MPa.

Usvojena tkanina prema detalju 6 (4 jednostruke trake širine 10 cm) može prihvatiti silu od

$$T_{u,t} = 4 \times 2 \times 0,0131 \times 10 \times 230 = 241 kN$$

Ukupna sila koju mogu prihvatiti uzengije i tkanina je

$$T_{u,u} + T_{u,t} = 524 + 241 = 765 kN > 618 kN = \max T_u$$

što je veće od maksimalne sile u prečkama (osa S, kota +14.20).

Prianjanje tkanine je obezbeđeno postavljanjem laminata Sika CarboDur Lamelle. Širina laminata je određena iz graničnog napona prianjanja od 2.3 MPa (MB 40).

Sila koju može prihvatiti jednostruka traka širine 10 cm, debljine 0,131 mm je:

$$T_{u,t}^{(1)} = 0,0131 \times 10 \times 230 = 30,1 kN$$

Širina laminata se usvaja tako da ne bude prekoračen napon prijanjanja od 2,3 MPa (MB 40).  
Usvojen je laminat Sika CarboDur Lamelle S 1012, dužine 110 cm, širine 10 cm, debljine 1,2 mm:

$$\tau_p = \frac{4 \times 30,1}{110 \times 10} = 0,11 \frac{kN}{cm^2} < 0,23 \frac{kN}{cm^2}$$

### Detalji 7

Usvojena tkanina prema detalju 7 (4 dvostruke trake širine 10 cm) može prihvatiti silu od

$$T_{u,t} = 4 \times 2 \times 2 \times 0,0131 \times 10 \times 230 = 482 \text{ kN}$$

Ukupna sila koju mogu prihvatiti uzengije i tkanina je

$$T_{u,u} + T_{u,t} = 524 + 482 = 1006 \text{ kN} > 907 \text{ kN} = T_{u,max}$$

što je veće od maksimalne sile u prečki (osa S, kota +8.20).

Sila koju može prihvatiti dvostruka traka širine 10 cm, debljine 0,131 mm je:

$$T_{u,t}^{(1)} = 2 \times 0,0131 \times 10 \times 230 = 60,3 \text{ kN}$$

Usvojen je laminat Sika CarboDur Lamelle S 1512, dužine 110 cm, širine 15 cm, debljine 1,2 mm:

$$\tau_p = \frac{4 \times 60,3}{110 \times 15} = 0,146 \frac{kN}{cm^2} < 0,23 \frac{kN}{cm^2}$$

### **Detalji 5 - prečke u zidu u osi R**

Sve prečke u zidu su dimenzija 20/84 cm, raspona L = 1.01 m. Maksimalna transverzalna sila se javlja u prečki na koti +11,20 na dijelu 5-7 i iznosi 651 kN (prilog, strana B1-B2/3). Maksimalni napon smicanja je:

$$\tau_n = \frac{651}{0,9 \times 20 \times 78} = 0,464 \frac{kN}{cm^2} = 4,64 \text{ MPa} < 5\tau_r = 6,5 \text{ MPa}$$

Nosivost uzengija i način ojačanja je u svemu isti kao u zidu u osi S, pa se prema detalju 5 ojačavaju prečke na +8,20 i +11,20 između osa 5 i 7.

### **Prečke u zidu u osi P**

Prečke u polju 5-7 su dimenzija 20/52 cm, raspona L = 1.01 m. Maksimalna sila se javlja u prečki na koti +20,20 na dijelu 5-7 i iznosi 362 kN (prilog, strana B1-B2/4). Maksimalni napon smicanja je:

$$\tau_n = \frac{362}{0,9 \times 20 \times 46} = 0,437 \frac{kN}{cm^2} = 4,37 \text{ MPa} < 5\tau_r = 6,5 \text{ MPa}$$

Nosivost usvojenih uzengija UØ10/15 je takođe dovoljna.

Ostale prečke u ovom zidu, u poljima 7-8 i 14-15, su dimenzija 20/100 cm. Maksimalna sila se javlja u prečki na koti +17,20 na dijelu 14-15 i iznosi 481 kN (prilog, strana B1-B2/4). Maksimalni napon smicanja je:

$$\tau_n = \frac{481}{0,9 \times 20 \times 94} = 0,284 \frac{kN}{cm^2} = 2,84 MPa < 5\tau_r = 6,5 MPa$$

Nosivost usvojenih uzengija UØ10/15 je takođe dovoljna.

### Ojačanje zidova

Ojačanje zidova u osama 10, 12 i 15 je sprovedeno tako što je nedostajuća količina vertikalne armature kompenzovana karbonskom tkaninom SikaWrap-230 C tkanina debljine 0,131 mm, sa maksimalnim računskim naponom od 2300 MPa.

#### Detalj 1 - zid u osi 10

Zid je armiran armaturom ±Q335. Maksimalno potrebna površina armature u zidu je ±4,41 cm<sup>2</sup>/m (prilog, strana B1-B2/6, presjek 4-4). Potrebna površina tkanine na jednom licu zida je:

$$A_{a,t} = (4,41 - 3,35) \times \frac{500}{2300} = 0,23 \frac{cm^2}{m}$$

Za usvojenu jednostruku tkaninu širine 15 cm potrebno osno rastojanje traka je:

$$e = \frac{1 \times 15 \times 0,0131}{0,23} = 0,85 m$$

Usvojeno je ojačanje prema detalju 1 u prilogu, jednostrukom tkaninom širine 15 cm na osnom rastojanju od 55 cm. Ukupna ekvivalentna površina armature i tkanine na jednom licu zida je:

$$A_{a,u} + A_{a,t} = 3,35 + \frac{15 \times 0,0131}{0,55} \times \frac{2300}{500} = 3,35 + 1,64 = 4,99 \frac{cm^2}{m} > 4,41 \frac{cm^2}{m}$$

Sila koju može prihvatiti jednostruka traka širine 15 cm, debljine 0,131 mm je:

$$T_{u,t}^{(1)} = 0,0131 \times 15 \times 230 = 45,2 kN$$

Usvojen je laminat Sika CarboDur Lamelle S 512, dužine 165 cm, širine 5 cm, debljine 1,2 mm:

$$\tau_p = \frac{3 \times 45,2}{165 \times 5} = 0,164 \frac{kN}{cm^2} < 0,23 \frac{kN}{cm^2}$$

#### Detalj 2 - zid u osi 12 (dio P-R)

Zid je armiran armaturom ±Q335. Maksimalno potrebna površina armature u zidu je ±5,52 cm<sup>2</sup>/m (prilog, strana B1-B2/7, presjek 10-10). Potrebna površina tkanine na jednom licu zida je:

$$A_{a,t} = (5,52 - 3,35) \times \frac{500}{2300} = 0,47 \frac{cm^2}{m}$$

Za usvojenu dvostruku tkaninu širine 15 cm potrebno osno rastojanje traka je:

$$e = \frac{2 \times 15 \times 0,0131}{0,47} = 0,83 m$$

Usvojeno je ojačanje prema detalju 2 u prilogu, dvostrukom tkaninom širine 15 cm na osnovom rastojanju od 65 cm. Ukupna ekvivalentna površina armature i tkanine na jednom licu zida je:

$$A_{a,u} + A_{a,t} = 3,35 + \frac{2 \times 15 \times 0,0131}{0,65} \times \frac{2300}{500} = 3,35 + 2,78 = 6,13 \frac{\text{cm}^2}{\text{m}} > 5,52 \frac{\text{cm}^2}{\text{m}}$$

Sila koju može prihvatiti dvostruka traka širine 15 cm, debljine 0,131 mm je:

$$T_{u,t}^{(1)} = 0,0131 \times 2 \times 15 \times 230 = 90,4 \text{ kN}$$

Usvojen je laminat Sika CarboDur Lamelle S 1012, dužine 325 cm, širine 10 cm, debljine 1,2 mm:

$$\tau_p = \frac{5 \times 90,4}{325 \times 10} = 0,139 \frac{\text{kN}}{\text{cm}^2} < 0,23 \frac{\text{kN}}{\text{cm}^2}$$

### Detalj 3 - zid u osi 12 (dio S-T)

Zid je armiran armaturom  $\pm Q335$ . Maksimalno potrebna površina armature u zidu je  $\pm 4,04 \text{ cm}^2/\text{m}$  (prilog, strana B1-B2/8, presjek 15-15). Potrebna površina tkanine na jednom licu zida je:

$$A_{a,t} = (4,04 - 3,35) \times \frac{500}{2300} = 0,15 \frac{\text{cm}^2}{\text{m}}$$

Usvojeno je ojačanje prema detalju 3 u prilogu, jednostrukom tkaninom širine 15 cm na osnovom rastojanju od 65 cm. Ukupna ekvivalentna površina armature i tkanine na jednom licu zida je:

$$A_{a,u} + A_{a,t} = 3,35 + \frac{15 \times 0,0131}{0,65} \times \frac{2300}{500} = 3,35 + 1,39 = 4,74 \frac{\text{cm}^2}{\text{m}} > 4,04 \frac{\text{cm}^2}{\text{m}}$$

Sila koju može prihvatiti jednostruka traka širine 15 cm, debljine 0,131 mm je:

$$T_{u,t}^{(1)} = 0,0131 \times 15 \times 230 = 45,2 \text{ kN}$$

Usvojen je laminat Sika CarboDur Lamelle S 512, dužine 390 cm, širine 5 cm, debljine 1,2 mm:

$$\tau_p = \frac{6 \times 45,2}{390 \times 5} = 0,139 \frac{\text{kN}}{\text{cm}^2} < 0,23 \frac{\text{kN}}{\text{cm}^2}$$

### Detalj 4 - zid u osi 15 (dio kod ose S)

Zid je armiran armaturom  $\pm Q335$ . Maksimalno potrebna površina armature u zidu je  $\pm 3,89 \text{ cm}^2/\text{m}$  (prilog, strana B1-B2/9, presjek 16-16).

Usvojeno je ojačanje prema detalju 4 u prilogu, jednostrukom tkaninom širine 15 cm na osnovom rastojanju od 75 cm. Ukupna ekvivalentna površina armature i tkanine na jednom licu zida je:

$$A_{a,u} + A_{a,t} = 3,35 + \frac{15 \times 0,0131}{0,75} \times \frac{2300}{500} = 3,35 + 1,21 = 4,56 \frac{\text{cm}^2}{\text{m}} > 4,04 \frac{\text{cm}^2}{\text{m}}$$

Sila koju može prihvatiti jednostruka traka širine 15 cm, debljine 0,131 mm je:

$$T_{u,t}^{(1)} = 0,0131 \times 15 \times 230 = 45,2 \text{ kN}$$

Usvojen je laminat Sika CarboDur Lamelle S 512, dužine 360 cm, širine 5 cm, debljine 1,2 mm:

$$\tau_p = \frac{5 \times 45,2}{360 \times 5} = 0,126 \frac{kN}{cm^2} < 0,23 \frac{kN}{cm^2}$$

#### Detalj 4 - zid u osi 15 (dio kod ose T)

Zid je armiran armaturom  $\pm Q335$ . Maksimalno potrebna površina armature u zidu je  $\pm 5,23 \text{ cm}^2/\text{m}$  (prilog, strana B1-B2/10, presjek 19-19). Potrebna površina tkanine na jednom licu zida je:

$$A_{a,t} = (5,23 - 3,35) \times \frac{500}{2300} = 0,41 \frac{cm^2}{m}$$

Za usvojenu dvostruku tkaninu širine 15 cm potrebno osno rastojanje traka je:

$$e = \frac{2 \times 15 \times 0,0131}{0,41} = 0,96 \text{ m}$$

Usvojeno je ojačanje prema detalju 4 u prilogu, dvostrukom tkaninom širine 15 cm na osnovom rastojanju od 75 cm. Ukupna ekvivalentna površina armature i tkanine na jednom licu zida je:

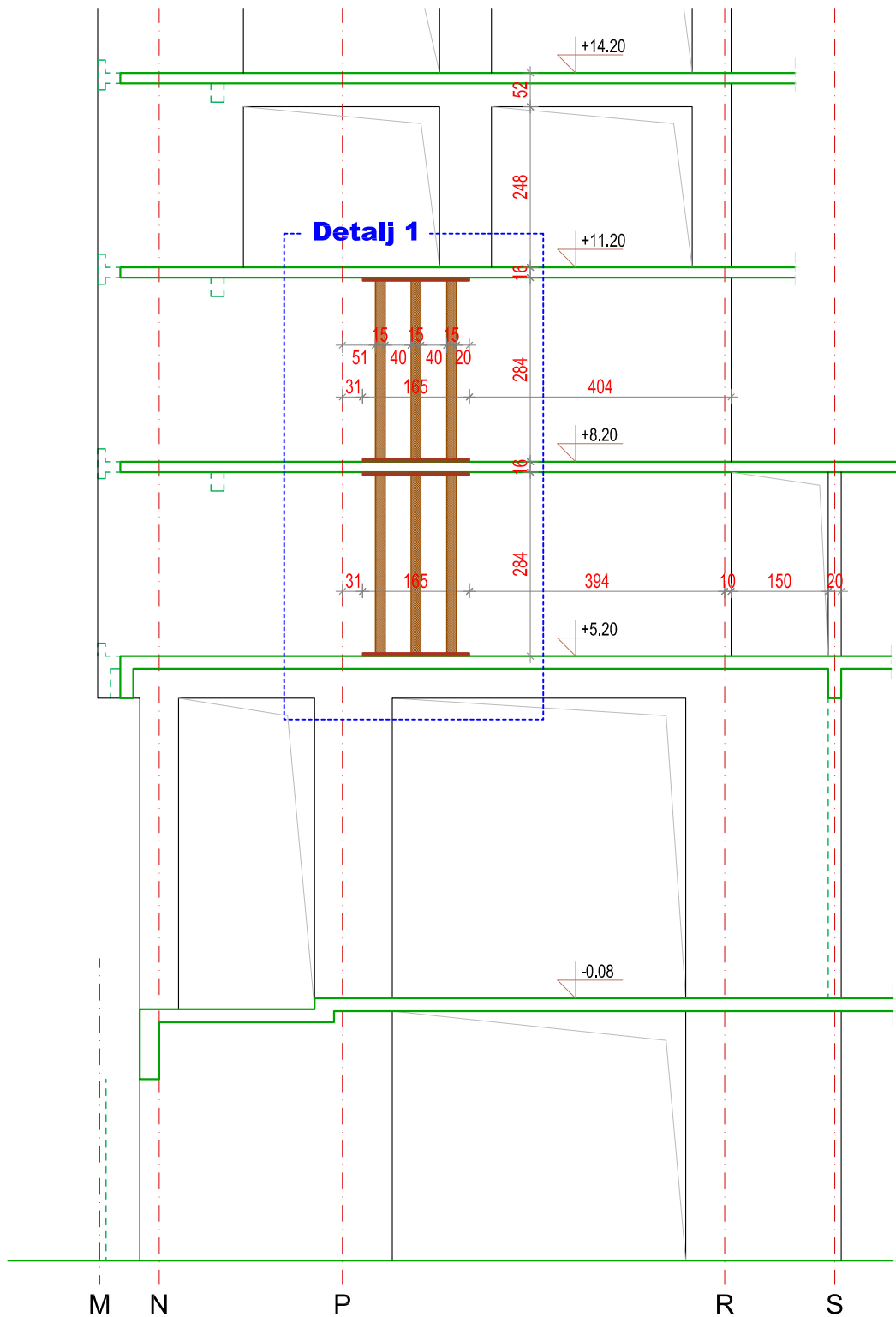
$$A_{a,u} + A_{a,t} = 3,35 + \frac{2 \times 15 \times 0,0131}{0,75} \times \frac{2300}{500} = 3,35 + 2,41 = 5,76 \frac{cm^2}{m} > 5,23 \frac{cm^2}{m}$$

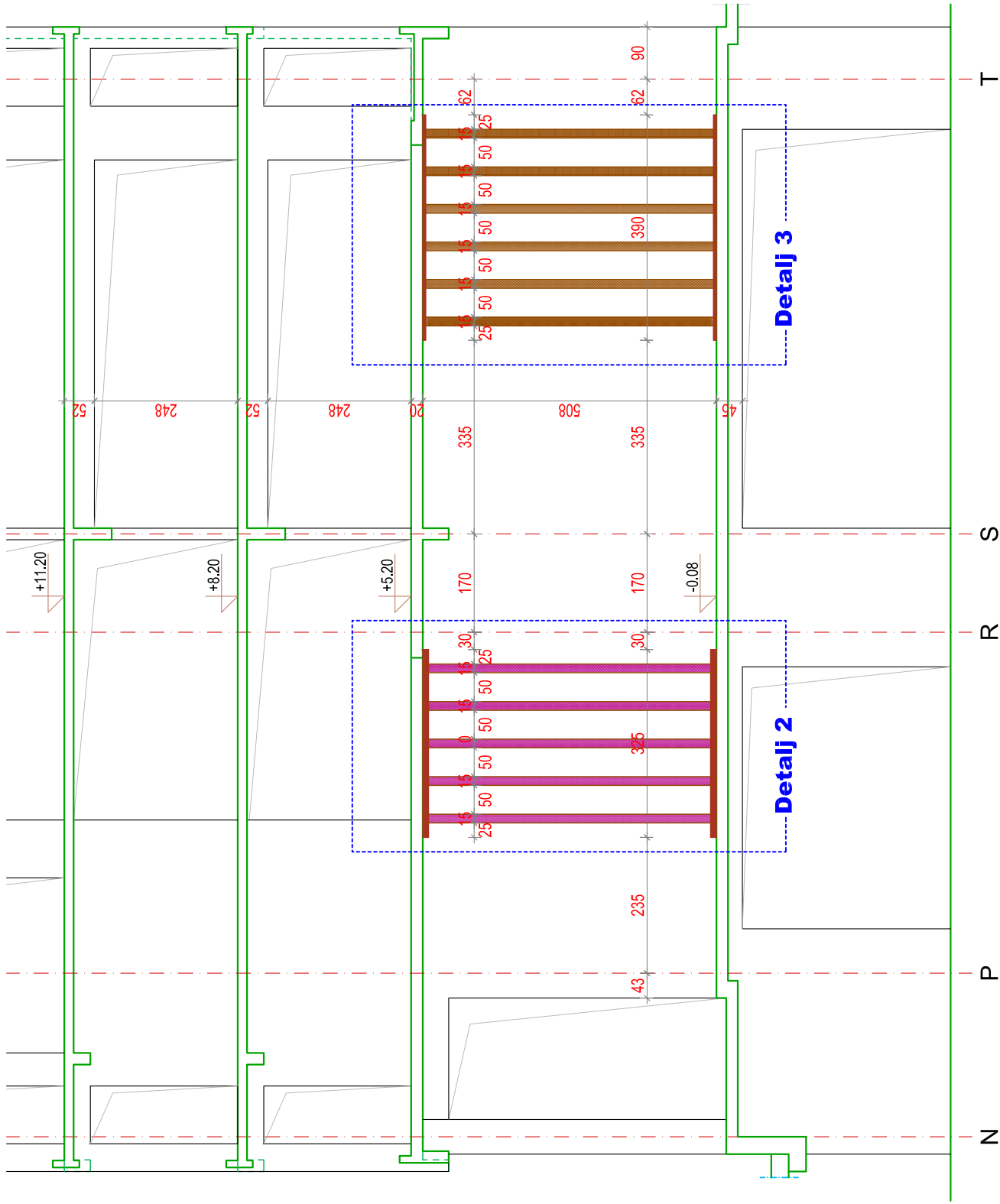
Sila koju može prihvatiti dvostruka traka širine 15 cm, debljine 0,131 mm je:

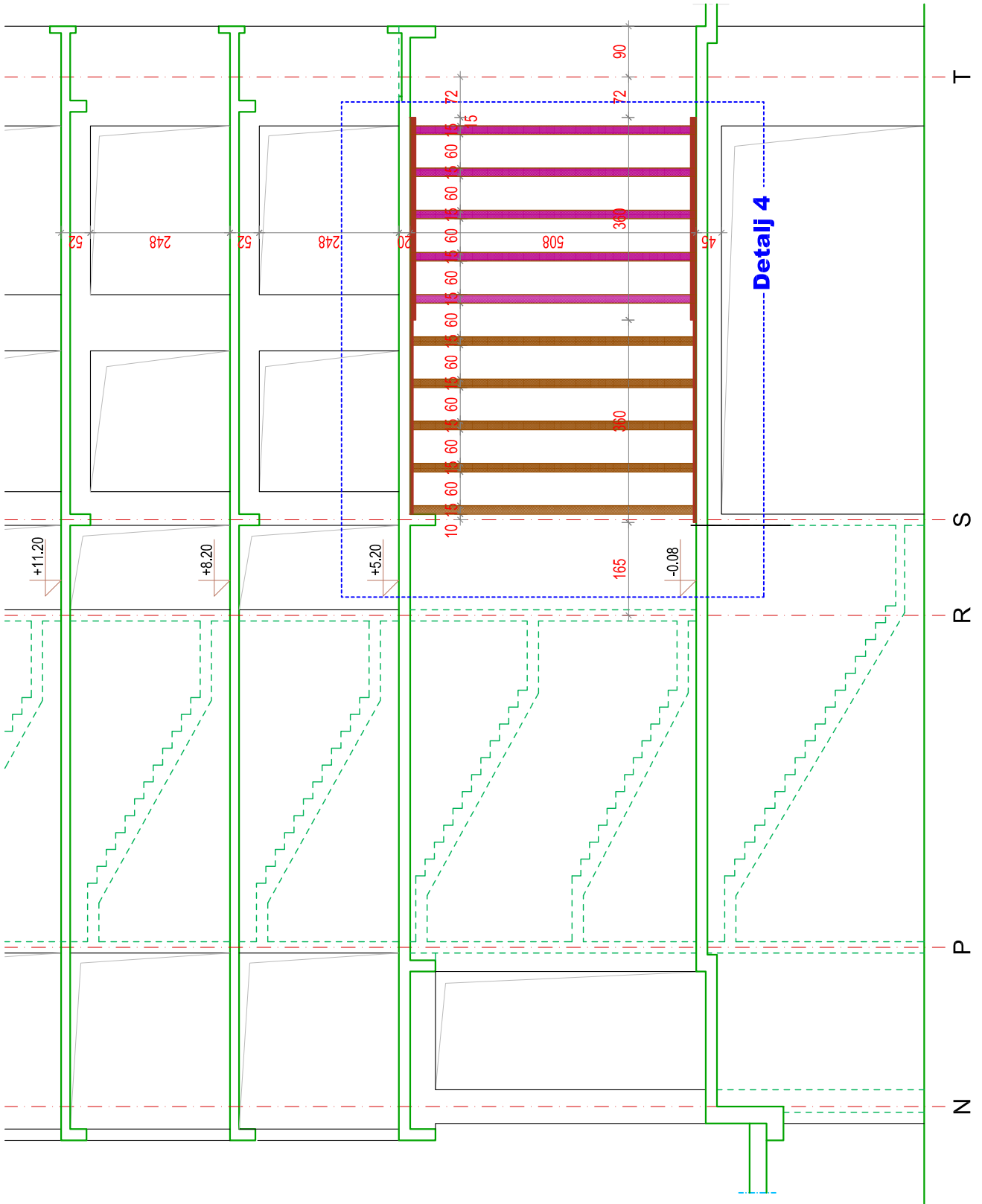
$$T_{u,t}^{(1)} = 0,0131 \times 2 \times 15 \times 230 = 90,4 \text{ kN}$$

Usvojen je laminat Sika CarboDur Lamelle S 1012, dužine 360 cm, širine 10 cm, debljine 1,2 mm:

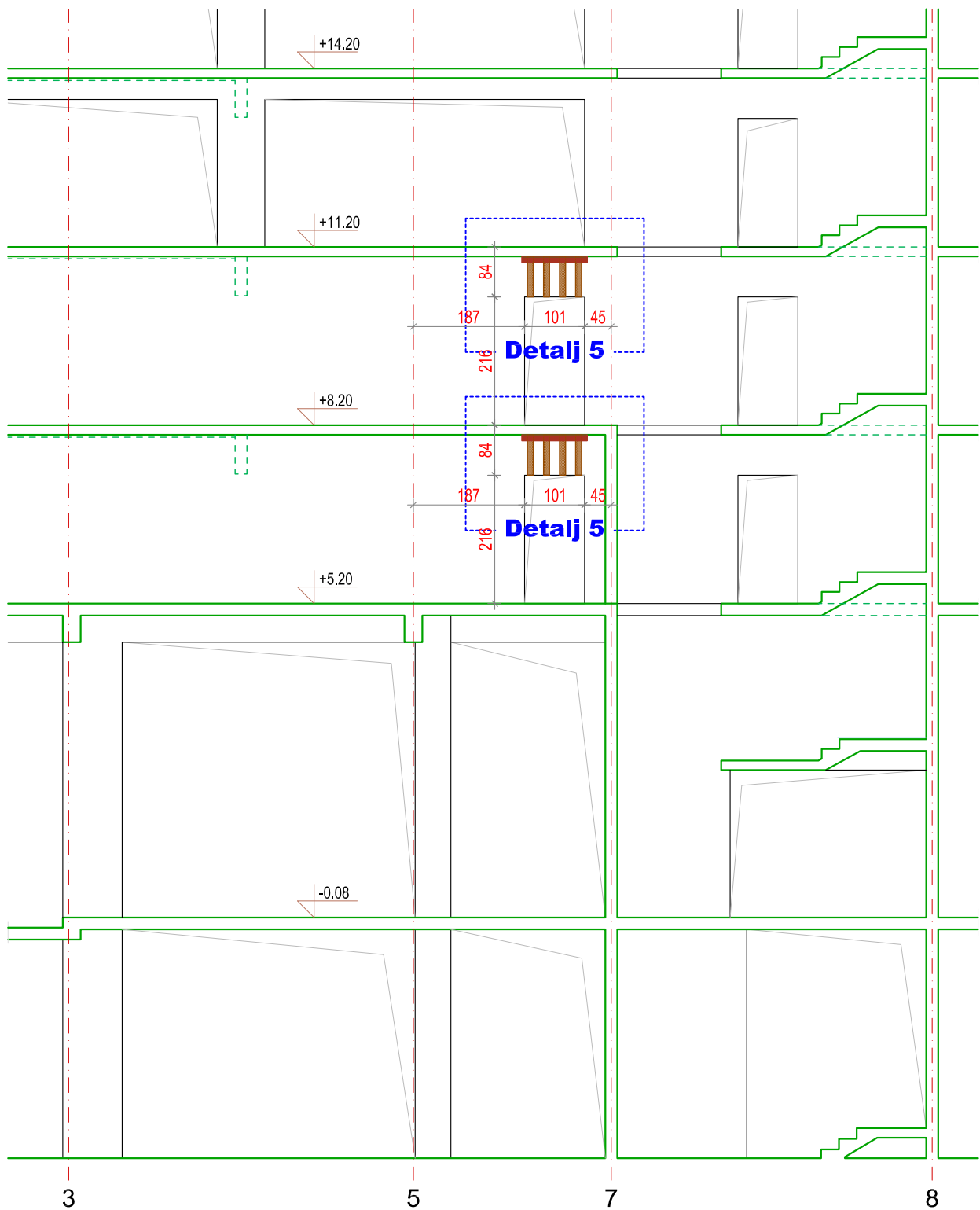
$$\tau_p = \frac{5 \times 90,4}{360 \times 10} = 0,126 \frac{kN}{cm^2} < 0,23 \frac{kN}{cm^2}$$

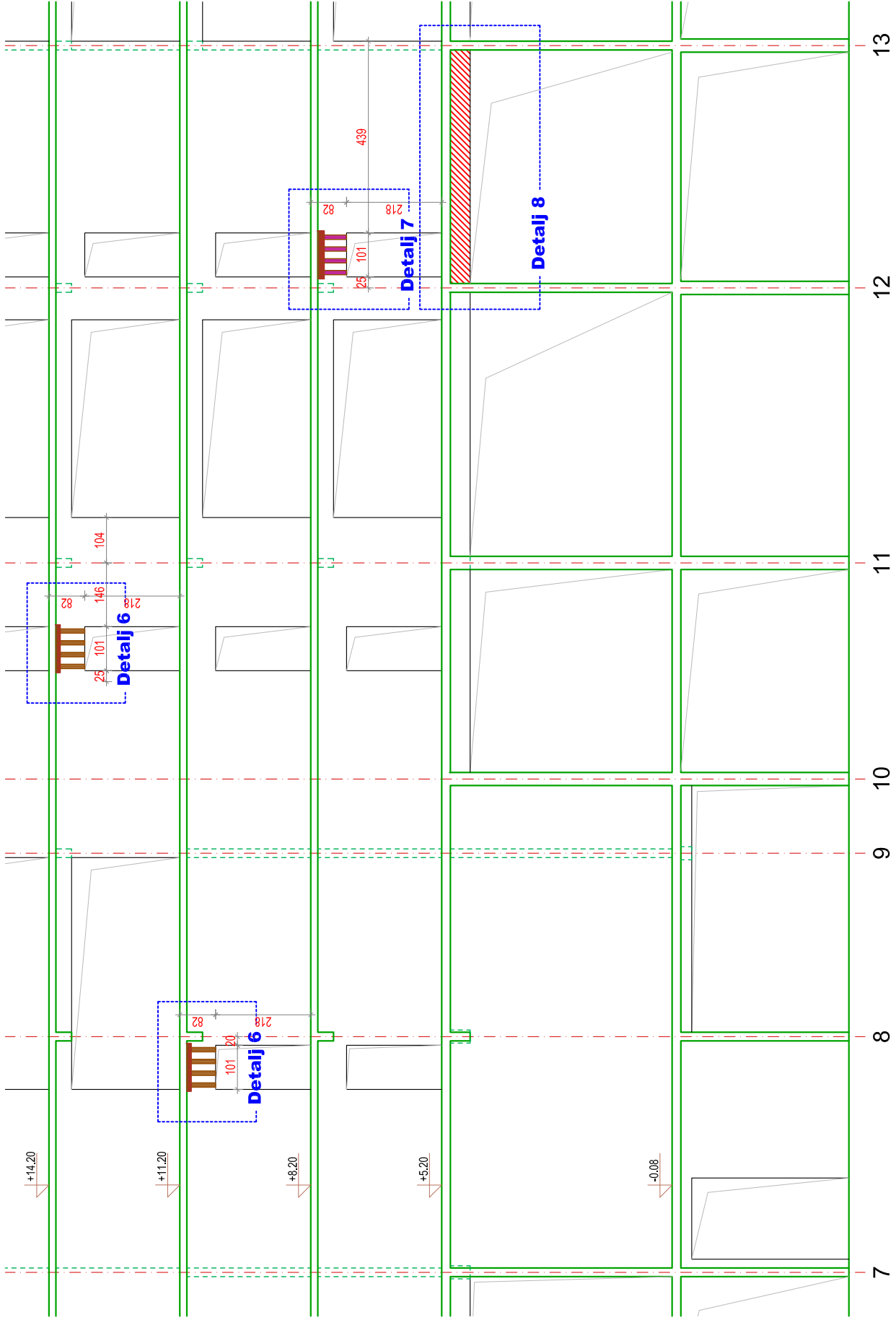






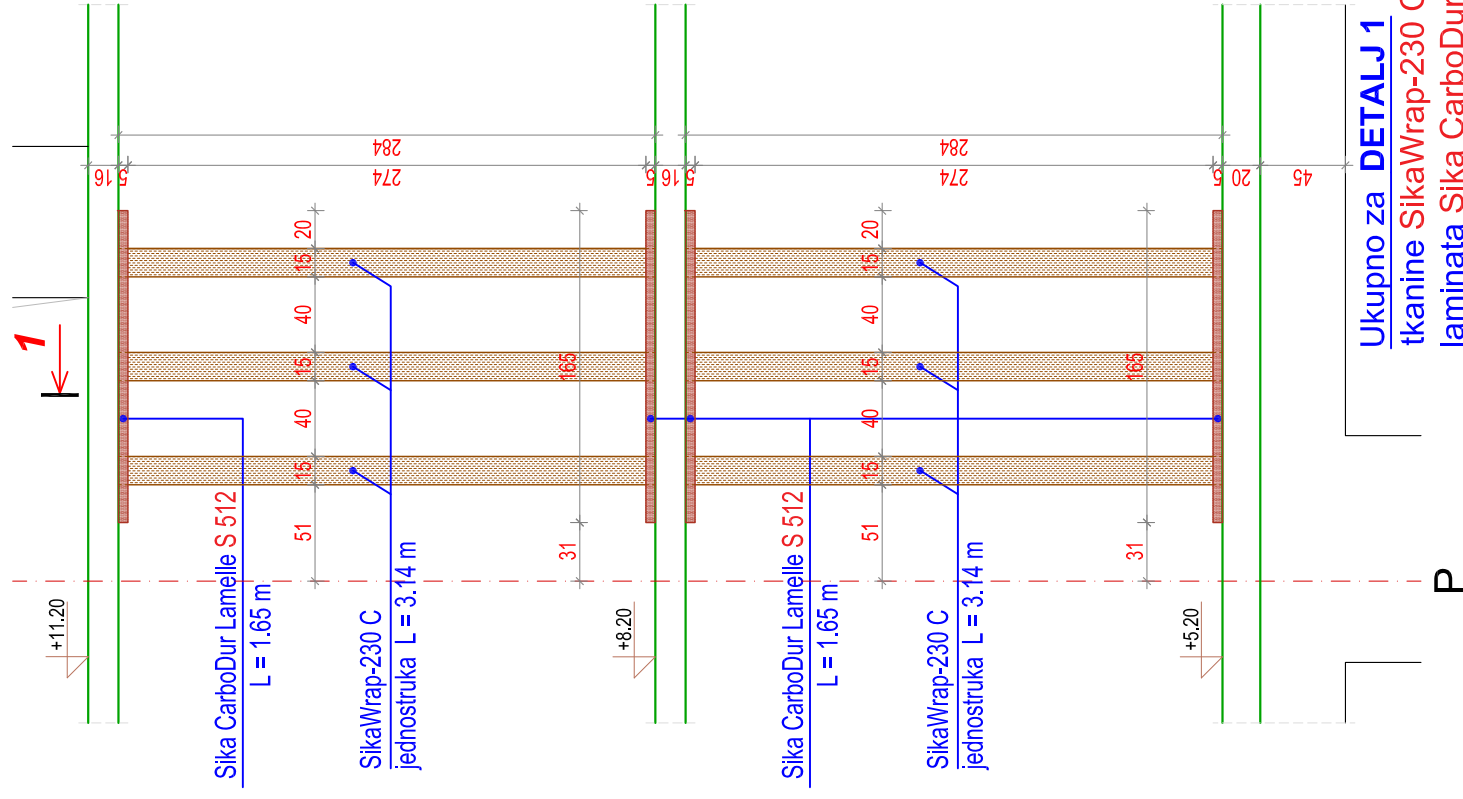






**LAMELA B1-B2**  
**ZID U OSI S**

**1-1**



Sika CarboDur Lamelle S 512  
L = 1.65 m

SikaWrap-230 C  
jednostruka L = 3.14 m

Sika CarboDur Lamelle S 512  
L = 1.65 m

Sika CarboDur Lamelle S 512  
L = 1.65 m

SikaWrap-230 C  
jednostruka L = 3.14 m

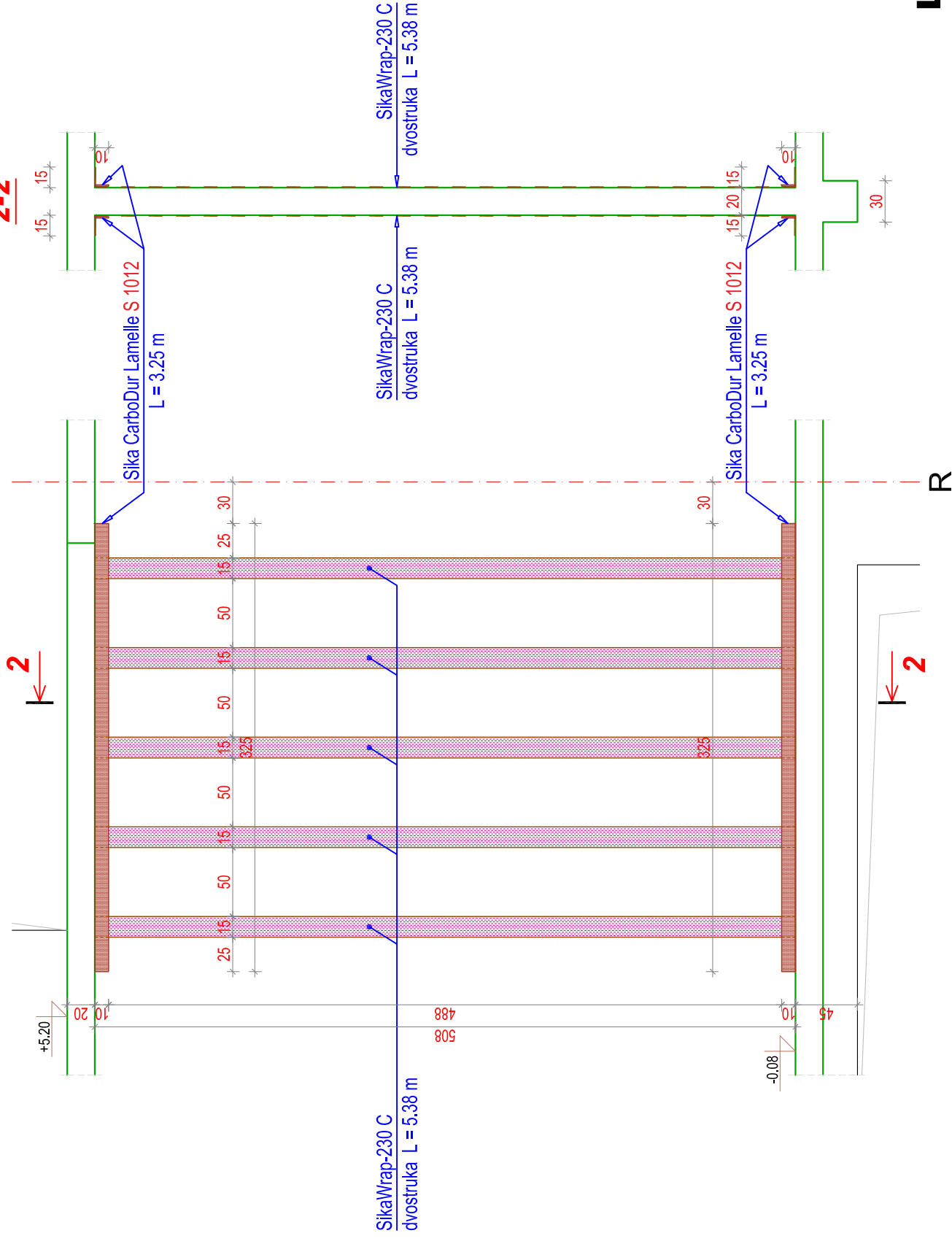
Sika CarboDur Lamelle S 512  
L = 1.65 m

Ukupno za **DETALJ1**  
tkanine SikaWrap-230 C  
laminata Sika CarboDur Lamelle S 512

$$2 \times 2 \times 3 \times 3.14 \times 0.15 = 5.652 \text{ m}^2$$
$$2 \times 2 \times 2 \times 1.65 = 13.200 \text{ m}^1$$

**LAMELA B1-B2**  
**ZID U OSI 10**  
**DETALJ 1**  
**R 1:40**

**2-2**



**LAMELA B1-B2**  
**ZID U OSI 12**  
**DETALJ 2**  
**R 1:40**

**Ukupno za DETALJ 2**

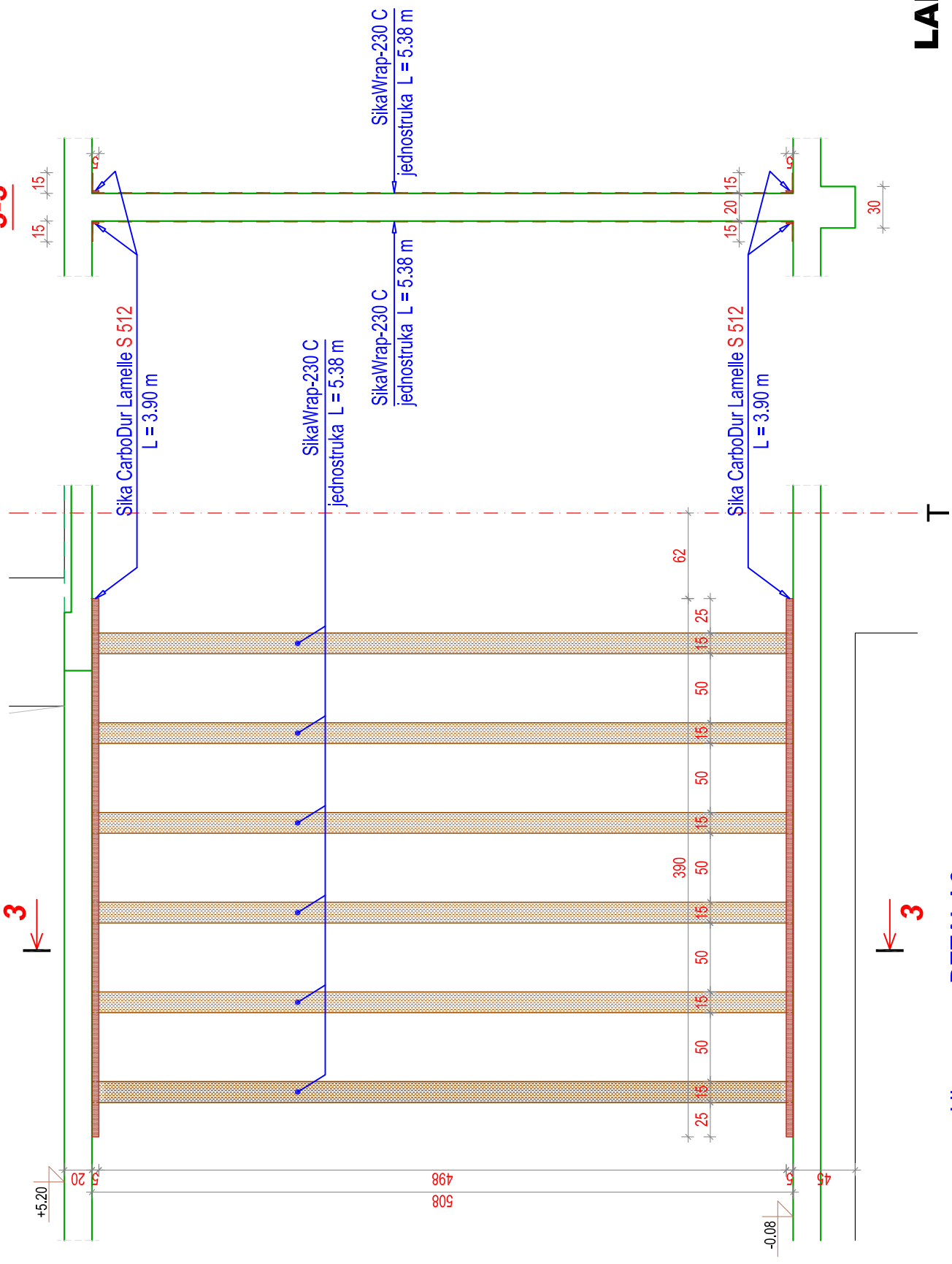
tkanine SikaWrap-230 C

$2 \times 5 \times 5.38 \times 2 \times 0.15 = 16.140 \text{ m}^2$

laminata Sika CarboDur Lamelle S 1012

$2 \times 2 \times 3.25 = 13.000 \text{ m}^1$

**3-3**

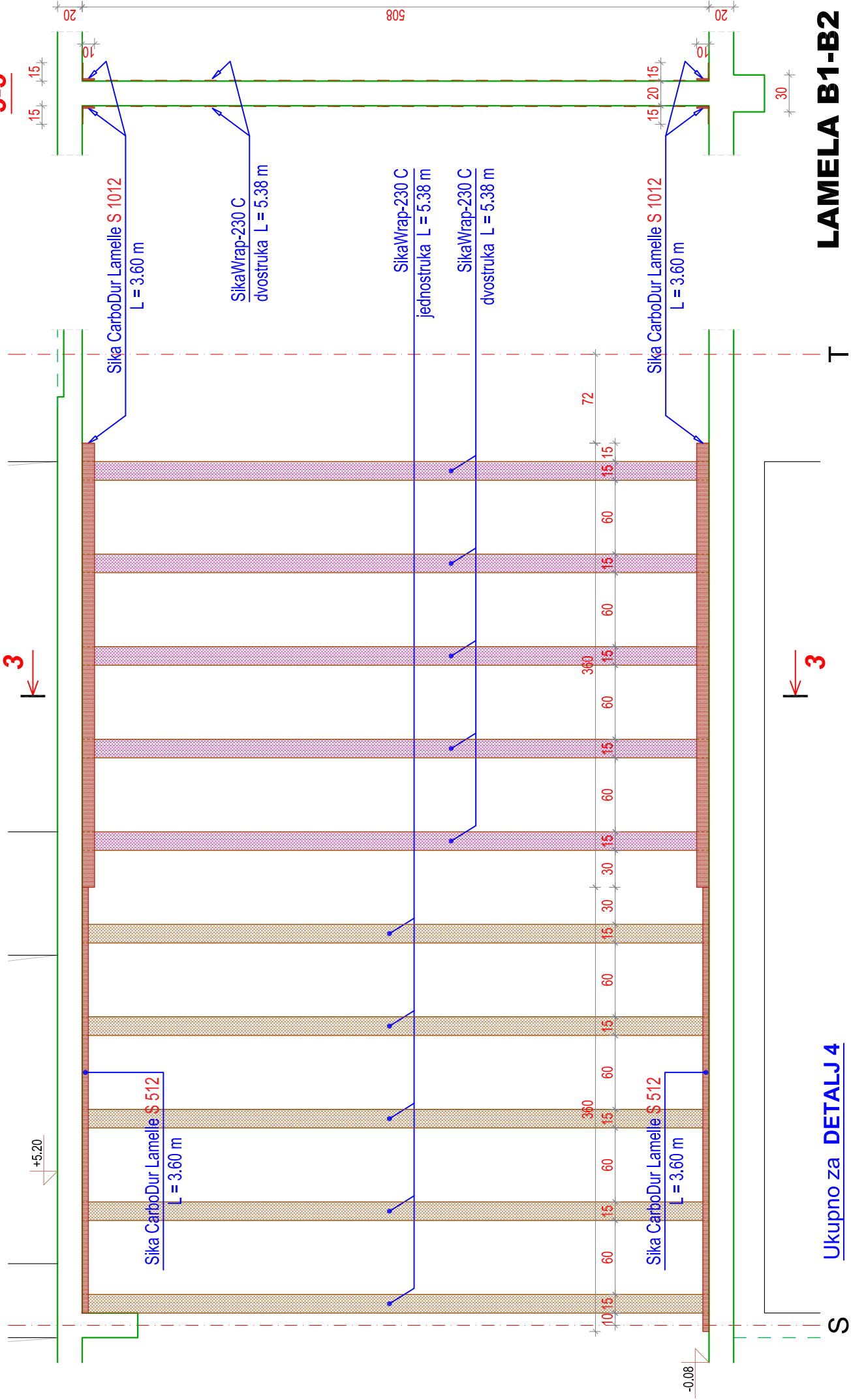


**LAMELA B1-B2**  
**ZID U OSI 12**  
**DETALJ 3**  
**R 1:40**

**Ukupno za DETALJ 3**

tkanine SikaWrap-230 C  $2 \times 6 \times 5.38 \times 0.15 = 9.684 \text{ m}^2$   
laminata Sika CarboDur Lamelle S 512  $2 \times 2 \times 3.90 = 15.600 \text{ m}^1$

**3-3**

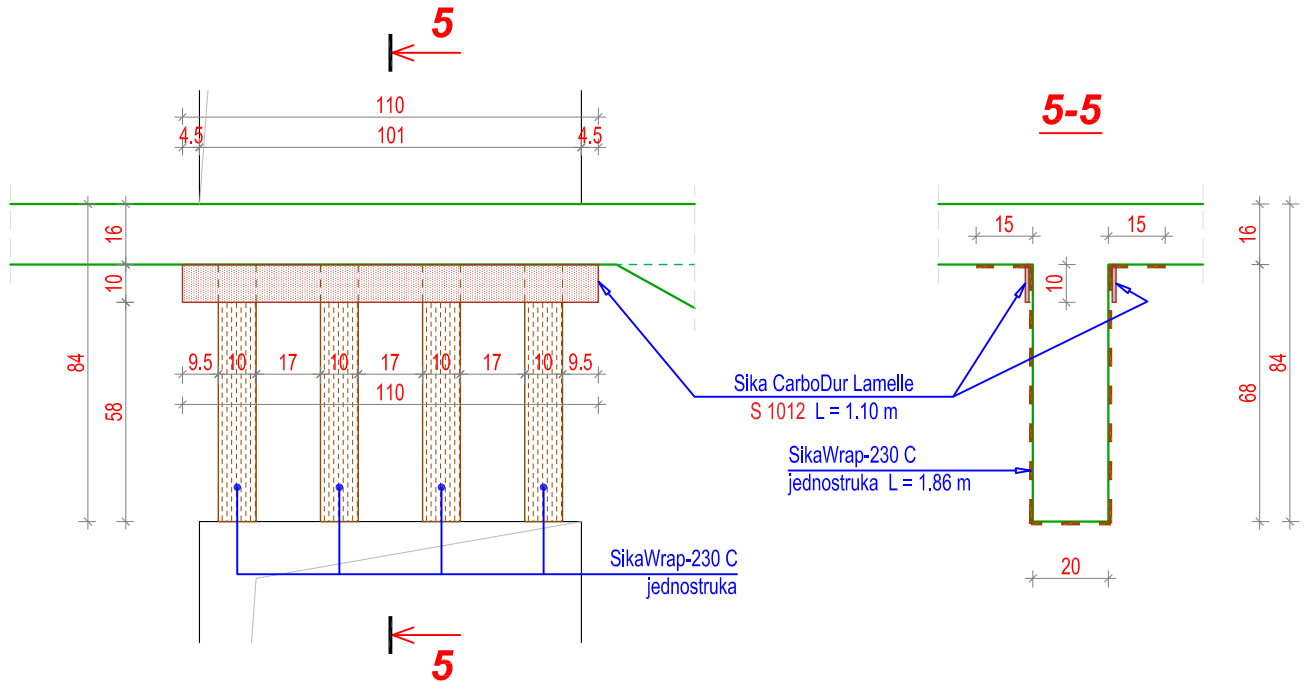


**LAMELA B1-B2**  
**ZID U OSI 15**  
**DETALJ 4**  
**R 1:40**

Ukupno za **DETALJ 4**

- tkanine SikaWrap-230 C  $2 \times 5 \times 5.38 \times (2+1) \times 0.15 = 24.210 \text{ m}^2$
- laminata Sika CarboDur Lamelle S 512  $2 \times 2 \times 3.60 = 14.400 \text{ m}^1$
- laminata Sika CarboDur Lamelle S 1012  $2 \times 2 \times 3.60 = 14.400 \text{ m}^1$

## DETALJ 5 (2 kom.)



Ukupno za 2 DETALJA 5

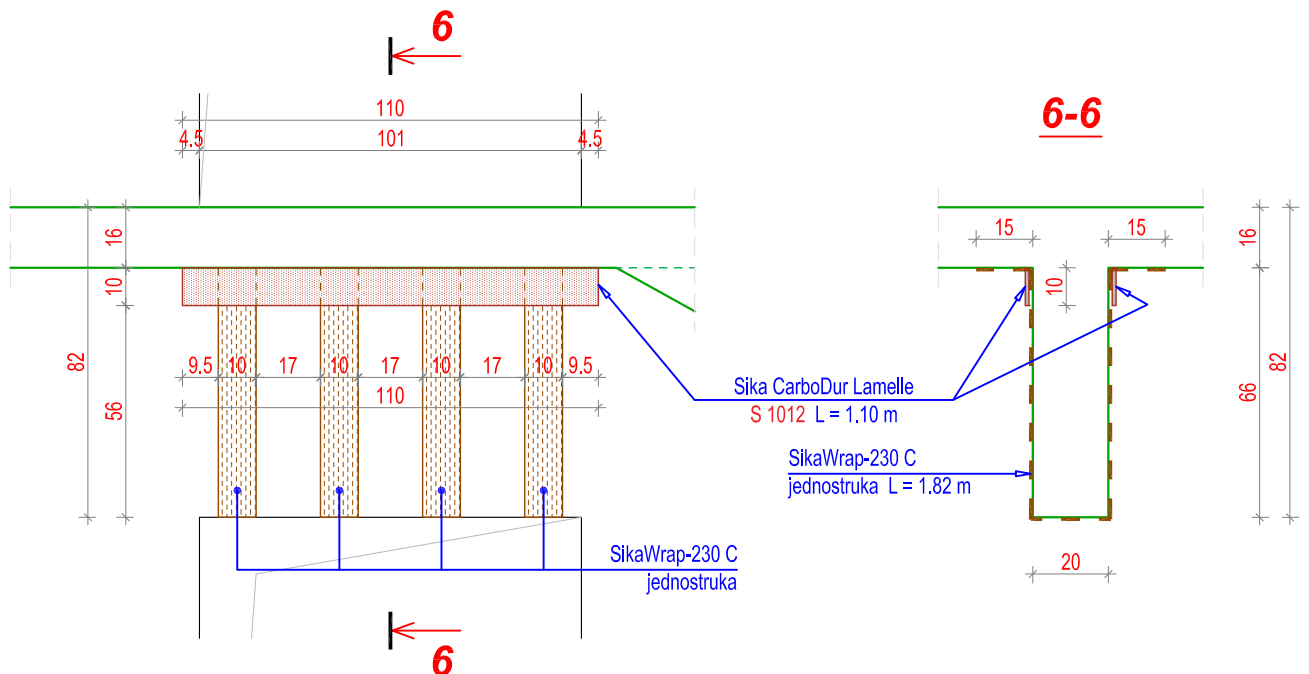
tkanine SikaWrap-230 C

$$2 \times 4 \times 1.86 \times 0.10 = 1.488 \text{ m}^2$$

laminata Sika CarboDur Lamelle S 1012:

$$2 \times 2 \times 1.10 = 4.400 \text{ m}^1$$

## DETALJ 6 (2 kom.)



Ukupno za 2 DETALJA 6

tkanine SikaWrap-230 C

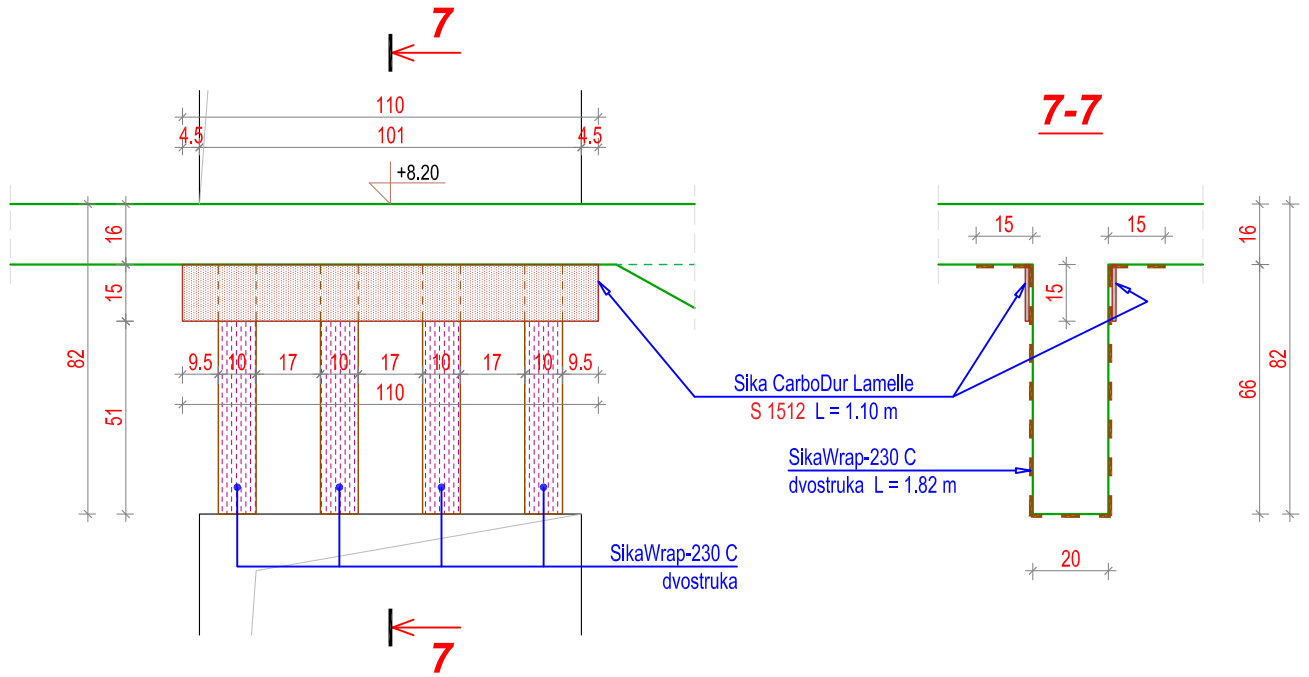
$$2 \times 4 \times 1.82 \times 0.10 = 1.456 \text{ m}^2$$

laminata Sika CarboDur Lamelle S 1012:

$$2 \times 2 \times 1.10 = 4.400 \text{ m}^1$$

**LAMELA B1-B2**  
**ZIDOVI U OSAMA R i S**  
**DETALJI 5 i 6**  
**R 1:20**

# DETALJ 7 (1 kom.)



Ukupno za **DETALJ 7**

tkanine SikaWrap-230 C

$$4 \times 1.82 \times 2 \times 0.10 = 1.456 \text{ m}^2$$

laminata Sika CarboDur Lamelle S 1512:

$$2 \times 1.10 = 2.200 \text{ m}^1$$

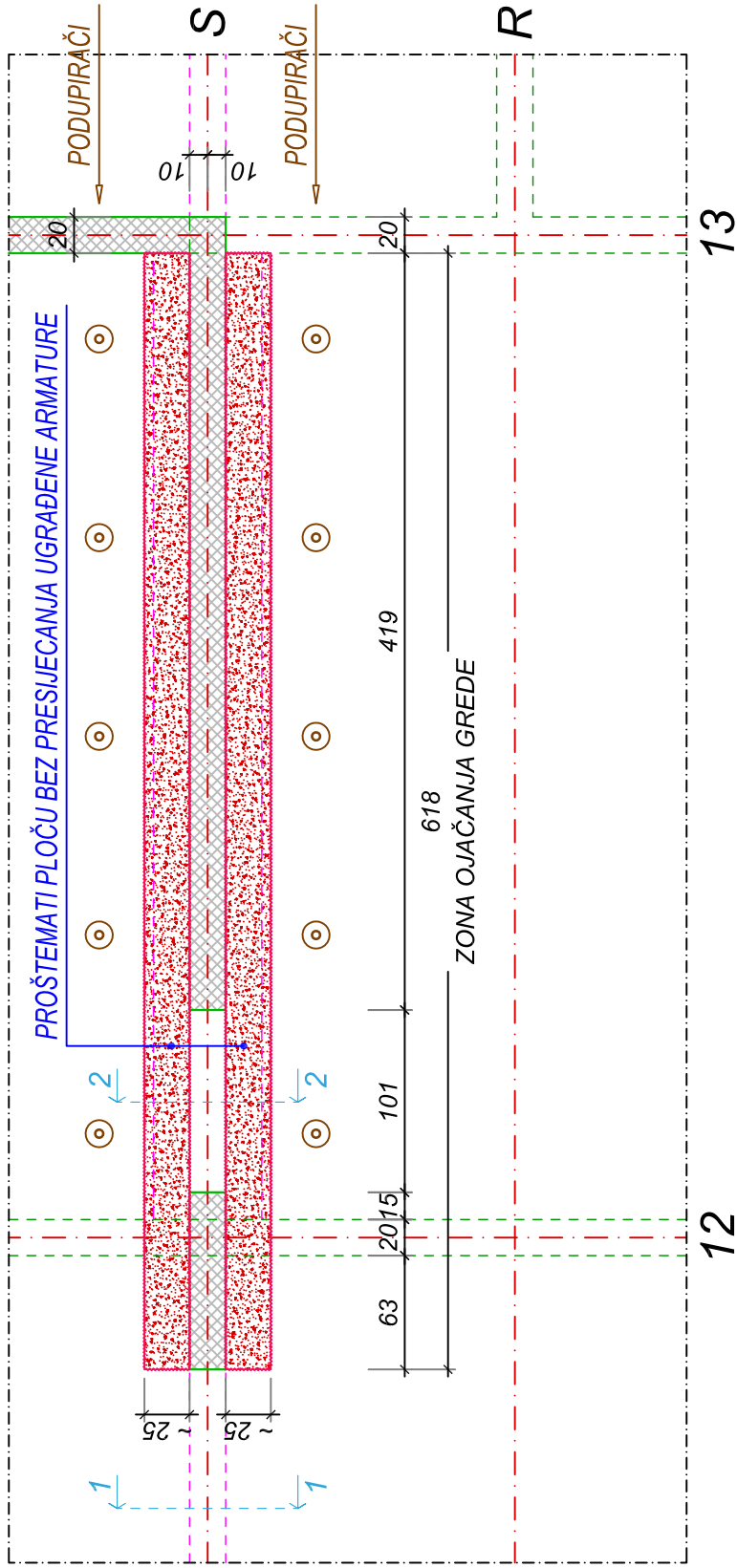
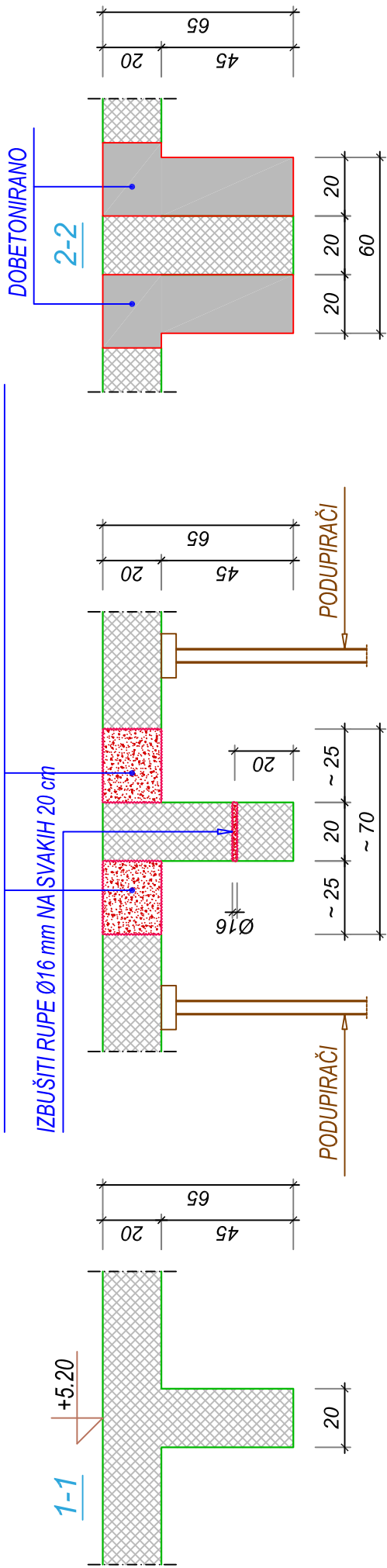
**LAMELA B1-B2**  
**ZID U OSI S**  
**DETALJ 7**  
**R 1:20**



**LAMELA B1-B2**  
**ZID U OSI S**  
**DETALJ 8**  
**R 1:40/20**

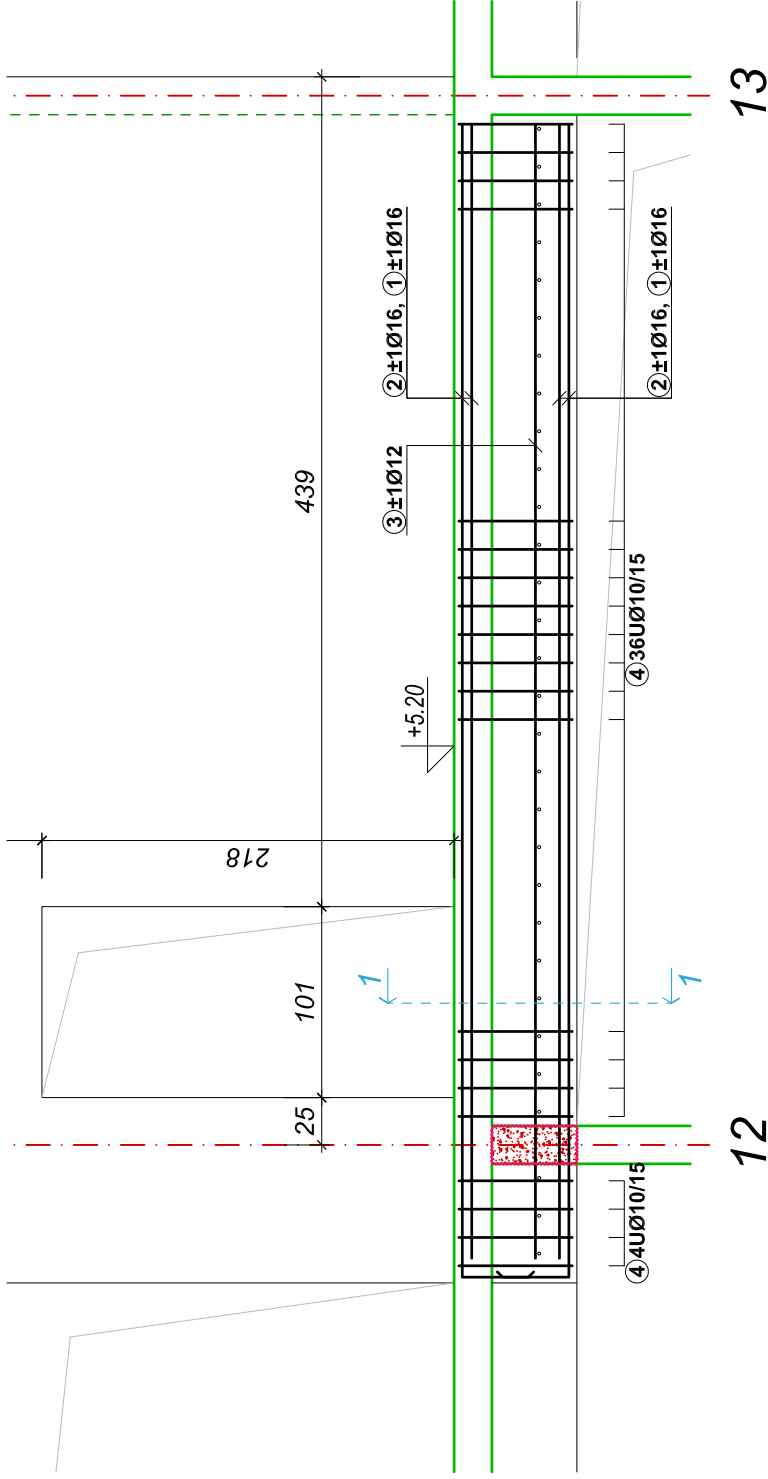
PROŠTEMATI PLOČU U ŠIRINI ~25 cm BEZ PRESIJEKANJA UGRAĐENE ARMATURE

IZBUŠITI RUPE Ø16 mm NA SVAKIH 20 cm

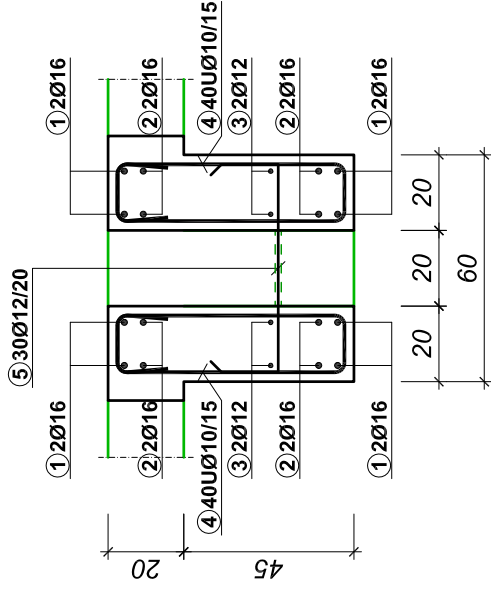


12

13



1-1

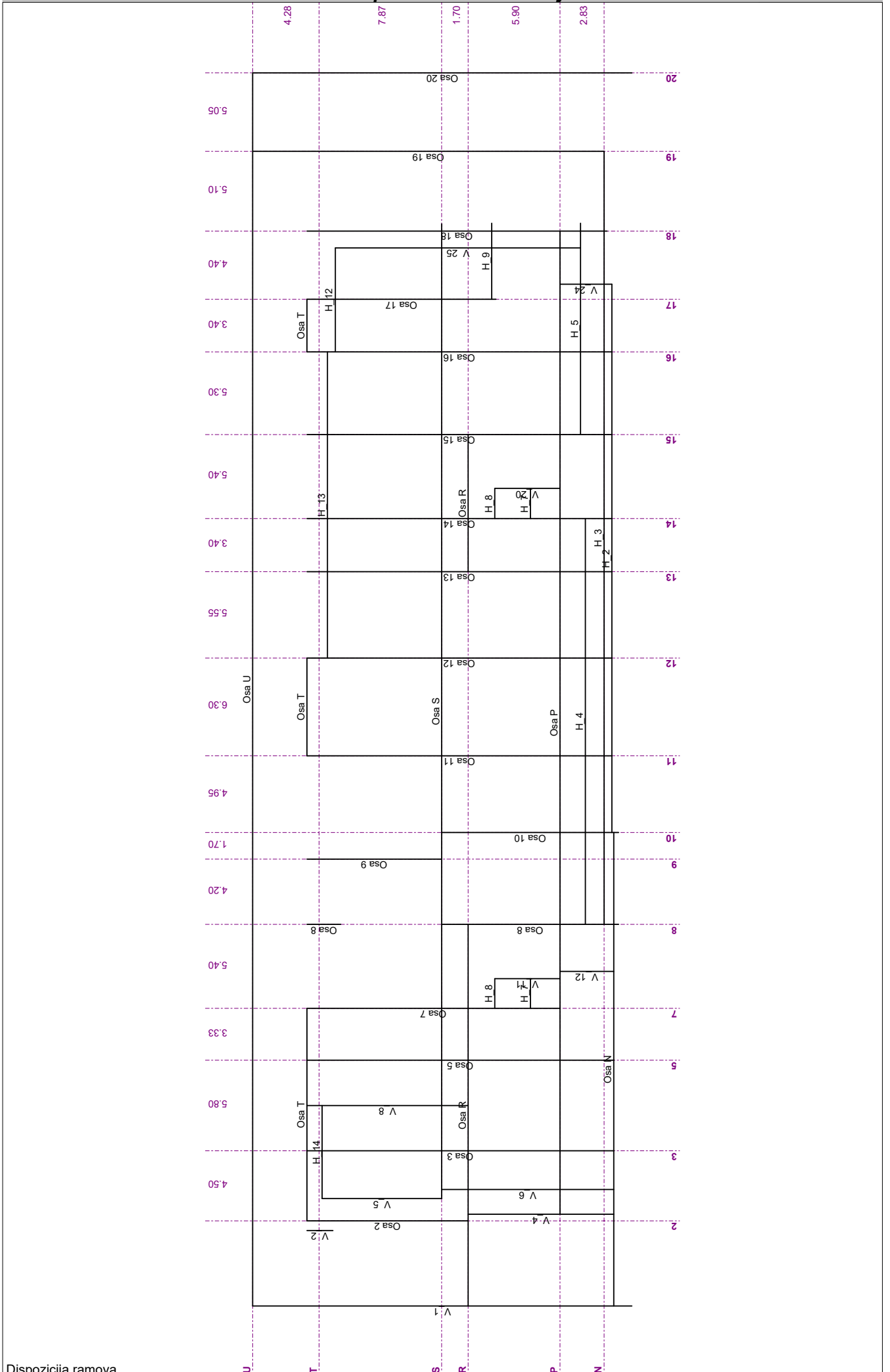


Šipke - specifikacija		Nova greda na +5.20 (1 kom)				
ozn.	oblik i mere [cm]	Ø	lg [m]	n [kom]	lgn [m]	
1	610	16	6.45	8	51.60	
2	600	16	6.00	8	48.00	
3	600	12	6.00	4	24.00	
4	60 60	10	1.87	80	149.60	
5	55	12	0.85	30	25.50	

Šipke - rekapitulacija			
Ø [mm]	lgn [m]	Jed. težina [kg/m <sup>3</sup> ]	Težina [kg]
B500B			
10	149.60	0.62	92.30
12	49.50	0.89	43.96
16	99.60	1.58	157.37
Ukupno (B500B)			293.63

**LAMELA B1-B2**  
**ZID U OSI S**  
**DETALJ 8**  
**R 1:40/20**

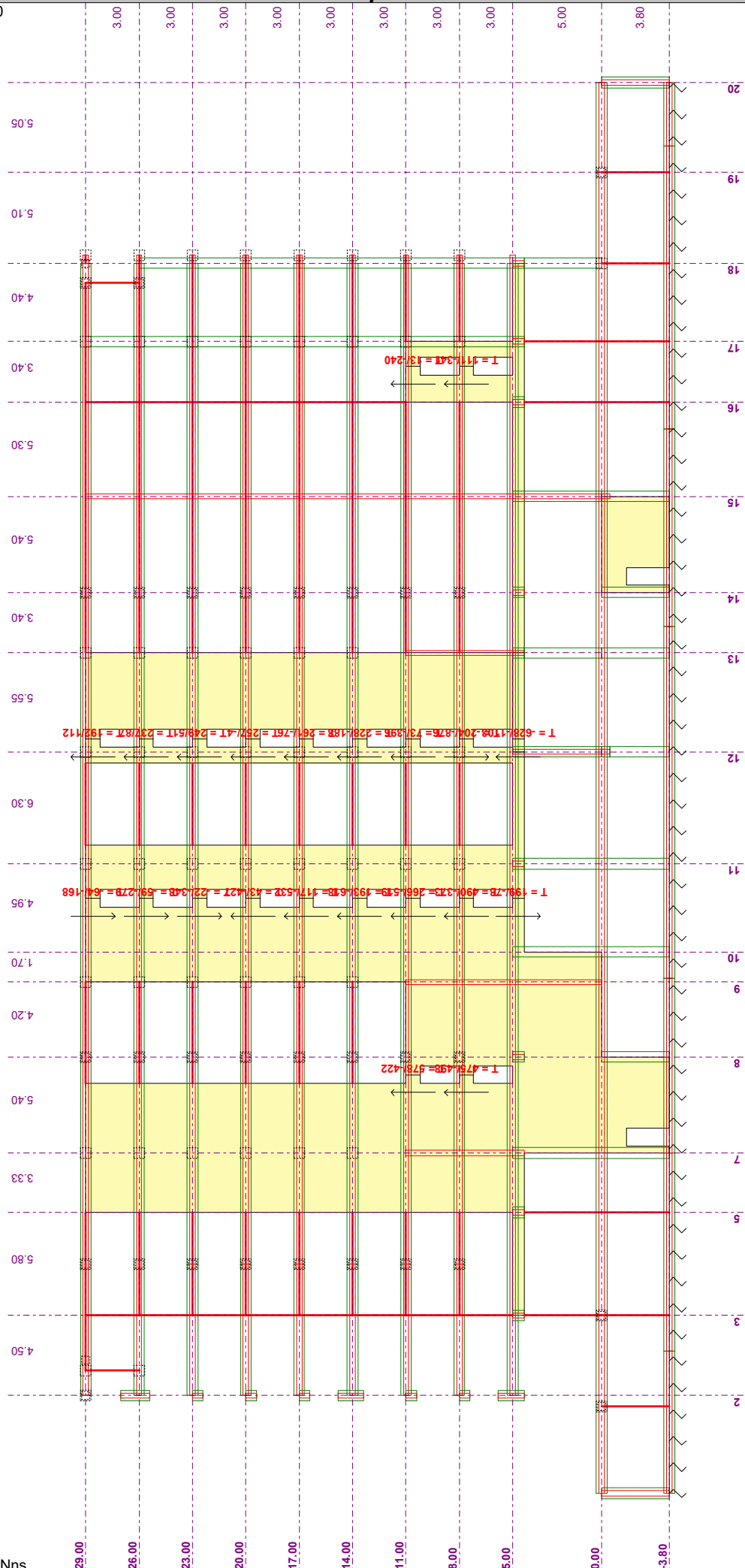
**Ulazni podaci - Konstrukcija**



Dispozicija ramova

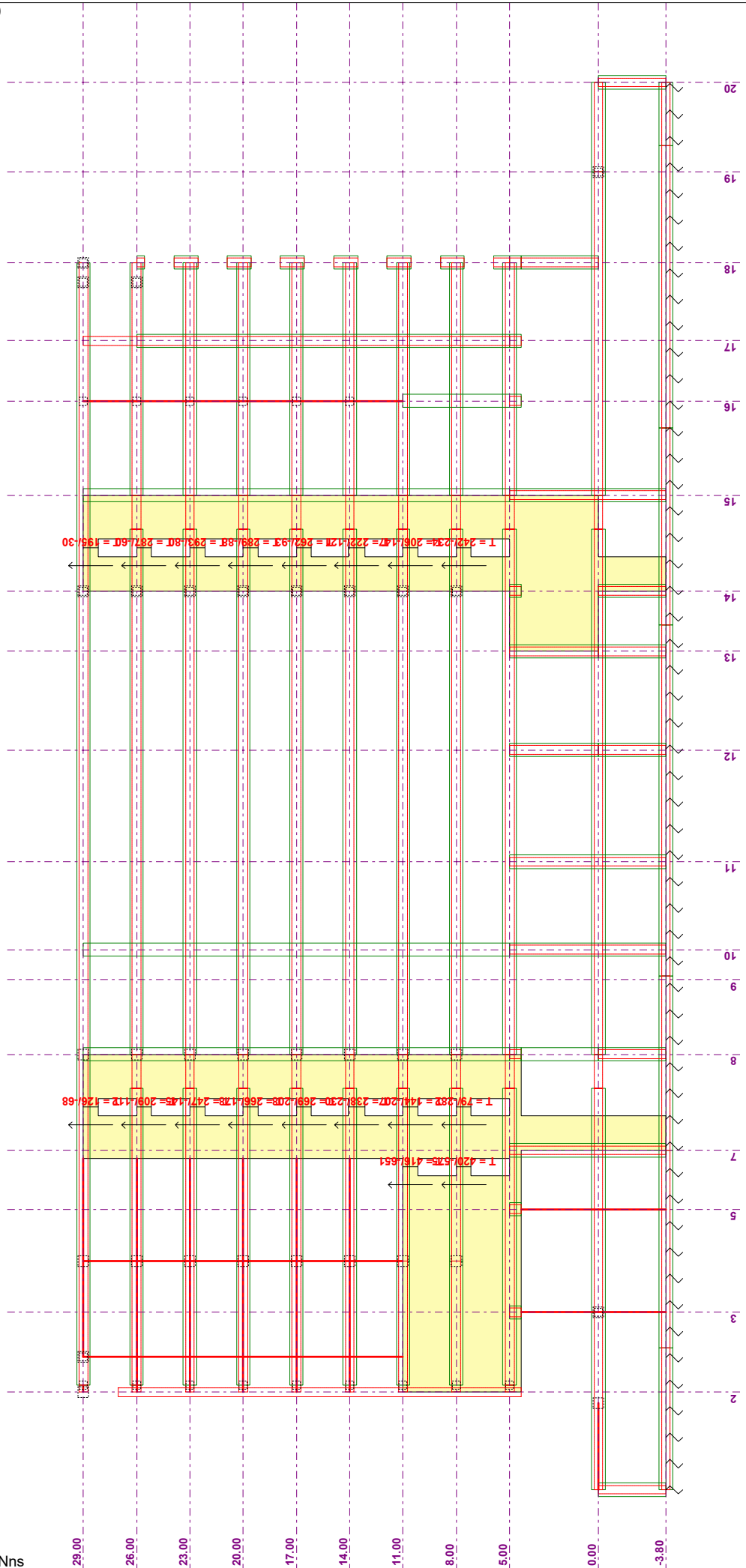
# Statički proračun

Opt. 16: [Anv] 6-10



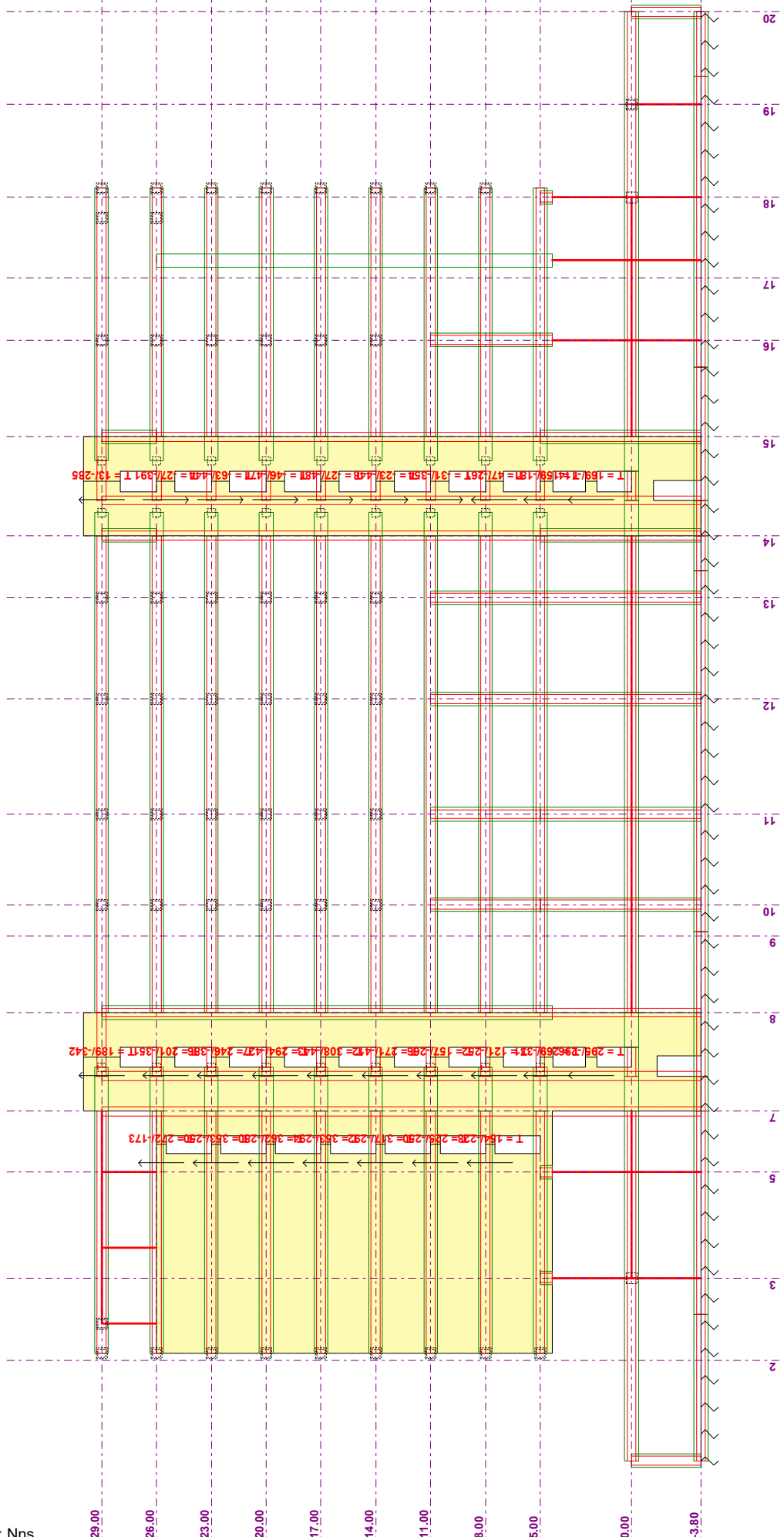
Ram: Osa S  
Vektorski presezi: Nns

Opt. 16: [Anv] 6-10



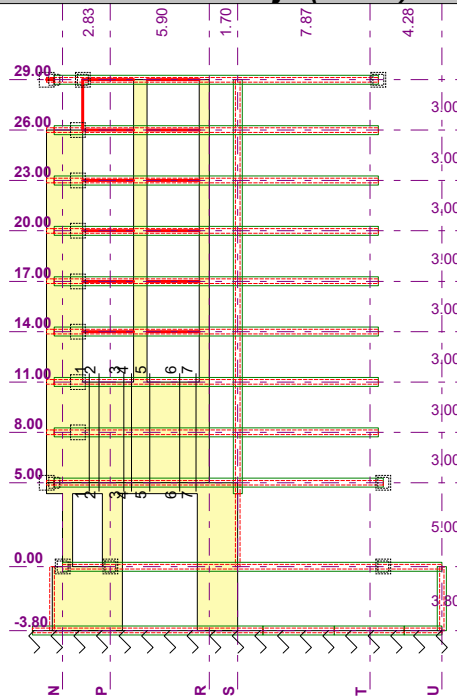
Ram: Osa R  
Vektorski presezi: Nns

Opt. 16: [Anv] 6-10



Ram: Osa P  
Vektorski presezi: Nns

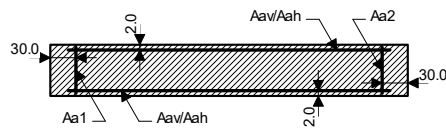
## Dimenzionisanje (beton)



Ram: Osa 10  
Dispozicija preseka

### Presek 1 - 1 (X=30.42m)

PBAB 87  
MB 40  
Ugaona armatura MA 500/560  
Podužna armatura MA 500/560  
Dimenzionisanje grupe slučajeva opterećenja: 6-10



$$b/d = 20/600 \text{ cm} \quad A_b = 12000 \text{ cm}^2$$

Merodavna kombinacija za savijanje:

$$1.60xI + 1.80xII$$

Merodavna kombinacija za smicanje:

$$1.30xI + 0.65xII + 1.30xIV$$

$$M_u = 470.79 \text{ kNm}$$

$$N_u = -604.47 \text{ kN}$$

$$T_u = 887.24 \text{ kN}$$

$$A_{a1} = 0.00 \text{ cm}^2 \quad (\text{min: } 18.00)$$

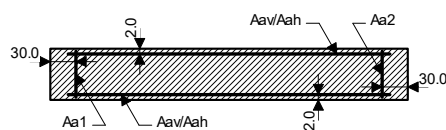
$$A_{a2} = 0.00 \text{ cm}^2 \quad (\text{min: } 18.00)$$

$$A_{av} = \pm 0.00 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 1.50)$$

$$A_{ah} = \pm 1.63 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 2.00)$$

### Presek 2 - 2 (X=30.42m)

PBAB 87  
MB 40  
Ugaona armatura MA 500/560  
Podužna armatura MA 500/560  
Dimenzionisanje grupe slučajeva opterećenja: 6-10



$$b/d = 20/600 \text{ cm} \quad A_b = 12000 \text{ cm}^2$$

Merodavna kombinacija za savijanje:

$$1.60xI + 1.80xII$$

Merodavna kombinacija za smicanje:

$$1.30xI + 0.65xII + 1.30xIV$$

$$M_u = 282.60 \text{ kNm}$$

$$N_u = -500.52 \text{ kN}$$

$$T_u = 757.11 \text{ kN}$$

$$A_{a1} = 0.00 \text{ cm}^2 \quad (\text{min: } 18.00)$$

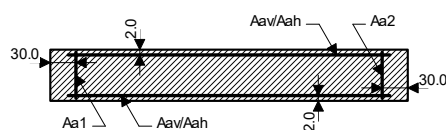
$$A_{a2} = 0.00 \text{ cm}^2 \quad (\text{min: } 18.00)$$

$$A_{av} = \pm 0.00 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 1.50)$$

$$A_{ah} = \pm 1.39 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 2.00)$$

### Presek 3 - 3 (X=30.42m)

PBAB 87  
MB 40  
Ugaona armatura MA 500/560  
Podužna armatura MA 500/560  
Dimenzionisanje grupe slučajeva opterećenja: 6-10



$$b/d = 20/600 \text{ cm} \quad A_b = 12000 \text{ cm}^2$$

Merodavna kombinacija za savijanje:

$$1.60xI + 1.80xII$$

Merodavna kombinacija za smicanje:

$$1.30xI + 0.65xII - 1.30xIV$$

$$M_u = -268.68 \text{ kNm}$$

$$N_u = -434.36 \text{ kN}$$

$$T_u = -2215.94 \text{ kN}$$

$$A_{a1} = 0.00 \text{ cm}^2 \quad (\text{min: } 18.00)$$

$$A_{a2} = 0.00 \text{ cm}^2 \quad (\text{min: } 18.00)$$

$$A_{av} = \pm 0.00 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 1.50)$$

$$A_{ah} = \pm 4.06 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 2.00)$$

**Presek 4 - 4 (X=30.42m)**

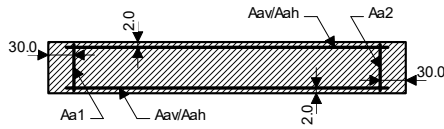
PBAB 87

MB 40

Ugaona armatura MA 500/560

Podužna armatura MA 500/560

Dimenzionisanje grupe slučajeva opterećenja: 6-10



$$b/d = 20/600 \text{ cm} \quad A_b = 12000 \text{ cm}^2$$

Merodavna kombinacija za savijanje:

$$1.60xI + 1.80xII$$

Merodavna kombinacija za smicanje:

$$1.30xI + 0.65xII - 1.30xIV$$

$$M_u = 41.48 \text{ kNm}$$

$$N_u = -567.86 \text{ kN}$$

$$T_u = -2403.69 \text{ kN}$$

$$A_{a1} = 0.00 \text{ cm}^2 \quad (\text{min: } 18.00)$$

$$A_{a2} = 0.00 \text{ cm}^2 \quad (\text{min: } 18.00)$$

$$A_{av} = \pm 0.00 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 1.50)$$

$$A_{ah} = \pm 4.41 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 2.00)$$

**Presek 5 - 5 (X=30.42m)**

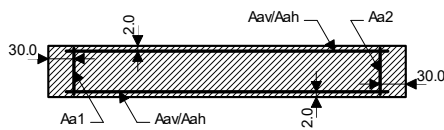
PBAB 87

MB 40

Ugaona armatura MA 500/560

Podužna armatura MA 500/560

Dimenzionisanje grupe slučajeva opterećenja: 6-10



$$b/d = 20/600 \text{ cm} \quad A_b = 12000 \text{ cm}^2$$

Merodavna kombinacija za savijanje:

$$1.60xI + 1.80xII$$

Merodavna kombinacija za smicanje:

$$1.30xI + 0.65xII - 1.30xIV$$

$$M_u = 188.61 \text{ kNm}$$

$$N_u = -948.50 \text{ kN}$$

$$T_u = -1451.97 \text{ kN}$$

$$A_{a1} = 0.00 \text{ cm}^2 \quad (\text{min: } 18.00)$$

$$A_{a2} = 0.00 \text{ cm}^2 \quad (\text{min: } 18.00)$$

$$A_{av} = \pm 0.00 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 1.50)$$

$$A_{ah} = \pm 2.66 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 2.00)$$

**Presek 6 - 6 (X=30.42m)**

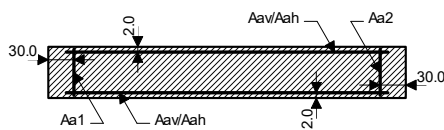
PBAB 87

MB 40

Ugaona armatura MA 500/560

Podužna armatura MA 500/560

Dimenzionisanje grupe slučajeva opterećenja: 6-10



$$b/d = 20/600 \text{ cm} \quad A_b = 12000 \text{ cm}^2$$

Merodavna kombinacija za savijanje:

$$1.60xI + 1.80xII$$

Merodavna kombinacija za smicanje:

$$1.30xI + 0.65xII + 1.30xIV$$

$$M_u = 160.51 \text{ kNm}$$

$$N_u = -1068.01 \text{ kN}$$

$$T_u = 1155.60 \text{ kN}$$

$$A_{a1} = 0.00 \text{ cm}^2 \quad (\text{min: } 18.00)$$

$$A_{a2} = 0.00 \text{ cm}^2 \quad (\text{min: } 18.00)$$

$$A_{av} = \pm 0.00 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 1.50)$$

$$A_{ah} = \pm 2.12 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 2.00)$$

**Presek 7 - 7 (X=30.42m)**

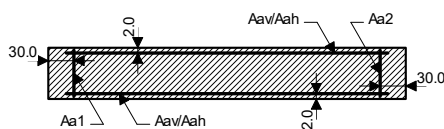
PBAB 87

MB 40

Ugaona armatura MA 500/560

Podužna armatura MA 500/560

Dimenzionisanje grupe slučajeva opterećenja: 6-10



$$b/d = 20/600 \text{ cm} \quad A_b = 12000 \text{ cm}^2$$

Merodavna kombinacija za savijanje:

$$1.30xI + 0.65xII + 1.30xIV$$

Merodavna kombinacija za smicanje:

$$1.30xI + 0.65xII - 1.30xIV$$

$$M_u = -771.65 \text{ kNm}$$

$$N_u = -131.99 \text{ kN}$$

$$T_u = -752.32 \text{ kN}$$

$$\epsilon_b/\epsilon_a = -0.443/10.000 \%$$

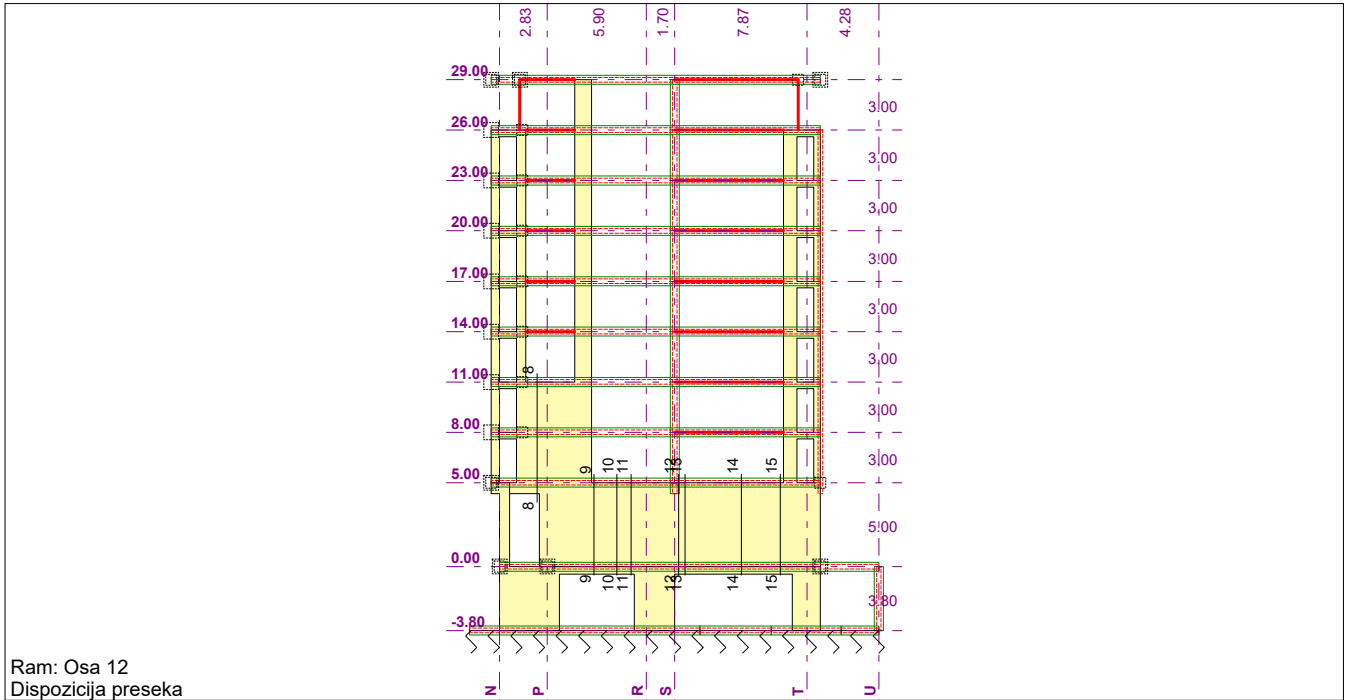
$$A_{a1} = 0.00 \text{ cm}^2 \quad (\text{min: } 18.00)$$

$$A_{a2} = 0.00 \text{ cm}^2 \quad (\text{min: } 18.00)$$

$$A_{av} = \pm 0.25 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 1.50)$$

$$A_{ah} = \pm 1.38 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 2.00)$$

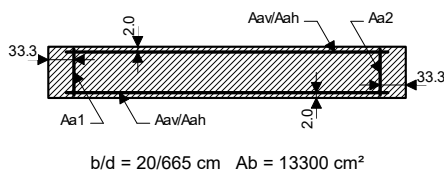




Ram: Osa 12  
Dispozicija preseka

Presek 8 - 8 (X=41.67m)  
PBAB 87  
MB 40  
Ugaona armatura MA 500/560  
Podužna armatura MA 500/560  
Dimenzionisanje grupe slučajeva opterećenja: 6-10

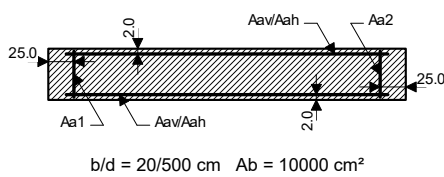
Merodavna kombinacija za savijanje:  
1.60xI+1.80xII  
Merodavna kombinacija za smicanje:  
1.30xI+0.65xII+1.30xIV  
Mu = 433.71 kNm  
Nu = -1135.33 kN  
Tu = 1282.90 kN



Aa1 = 0.00 cm<sup>2</sup> (min:19.95)  
Aa2 = 0.00 cm<sup>2</sup> (min:19.95)  
Aav = ±0.00 cm<sup>2</sup>/m (min:±1.50)  
Aah = ±2.12 cm<sup>2</sup>/m (min:±2.00)

Presek 9 - 9 (X=41.67m)  
PBAB 87  
MB 40  
Ugaona armatura MA 500/560  
Podužna armatura MA 500/560  
Dimenzionisanje grupe slučajeva opterećenja: 6-10

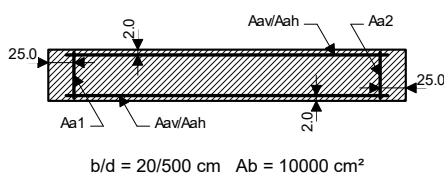
Merodavna kombinacija za savijanje:  
1.60xI+1.80xII  
Merodavna kombinacija za smicanje:  
1.30xI+0.65xII+1.30xIV  
Mu = -258.31 kNm  
Nu = -1894.34 kN  
Tu = 2059.52 kN



Aa1 = 0.00 cm<sup>2</sup> (min:15.00)  
Aa2 = 0.00 cm<sup>2</sup> (min:15.00)  
Aav = ±0.00 cm<sup>2</sup>/m (min:±1.50)  
Aah = ±4.53 cm<sup>2</sup>/m (min:±2.00)

Presek 10 - 10 (X=41.67m)  
PBAB 87  
MB 40  
Ugaona armatura MA 500/560  
Podužna armatura MA 500/560  
Dimenzionisanje grupe slučajeva opterećenja: 6-10

Merodavna kombinacija za savijanje:  
1.60xI+1.80xII  
Merodavna kombinacija za smicanje:  
1.30xI+0.65xII+1.30xIV  
Mu = -950.35 kNm  
Nu = -1679.97 kN  
Tu = 2510.65 kN



Aa1 = 0.00 cm<sup>2</sup> (min:15.00)  
Aa2 = 0.00 cm<sup>2</sup> (min:15.00)  
Aav = ±0.00 cm<sup>2</sup>/m (min:±1.50)  
Aah = ±5.52 cm<sup>2</sup>/m (min:±2.00)

**Presek 11 - 11 (X=41.67m)**

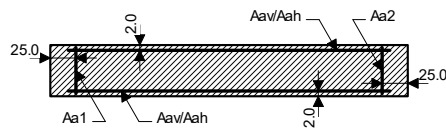
PBAB 87

MB 40

Ugaona armatura MA 500/560

Podužna armatura MA 500/560

Dimenzionisanje grupe slučajeva opterećenja: 6-10



$$b/d = 20/500 \text{ cm} \quad A_b = 10000 \text{ cm}^2$$

Merodavna kombinacija za savijanje:

$$1.60xI + 1.80xII$$

Merodavna kombinacija za smicanje:

$$1.30xI + 0.65xII + 1.30xIV$$

$$M_u = -696.46 \text{ kNm}$$

$$N_u = -1010.22 \text{ kN}$$

$$T_u = 1878.15 \text{ kN}$$

$$A_{a1} = 0.00 \text{ cm}^2 \quad (\text{min: } 15.00)$$

$$A_{a2} = 0.00 \text{ cm}^2 \quad (\text{min: } 15.00)$$

$$A_{av} = \pm 0.00 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 1.50)$$

$$A_{ah} = \pm 4.13 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 2.00)$$

**Presek 12 - 12 (X=41.67m)**

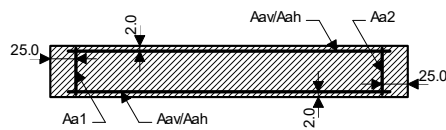
PBAB 87

MB 40

Ugaona armatura MA 500/560

Podužna armatura MA 500/560

Dimenzionisanje grupe slučajeva opterećenja: 6-10



$$b/d = 20/500 \text{ cm} \quad A_b = 10000 \text{ cm}^2$$

Merodavna kombinacija za savijanje:

$$1.30xI + 0.65xII + 1.30xIII$$

Merodavna kombinacija za smicanje:

$$1.30xI + 0.65xII - 1.30xIV$$

$$M_u = 876.99 \text{ kNm}$$

$$N_u = 12.98 \text{ kN}$$

$$T_u = -1523.34 \text{ kN}$$

$$\epsilon_b/\epsilon_a = -0.561/10.000 \text{ ‰}$$

$$A_{a1} = 0.00 \text{ cm}^2 \quad (\text{min: } 15.00)$$

$$A_{a2} = 0.00 \text{ cm}^2 \quad (\text{min: } 15.00)$$

$$A_{av} = \pm 0.86 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 1.50)$$

$$A_{ah} = \pm 3.35 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 2.00)$$

**Presek 13 - 13 (X=41.67m)**

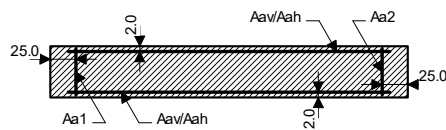
PBAB 87

MB 40

Ugaona armatura MA 500/560

Podužna armatura MA 500/560

Dimenzionisanje grupe slučajeva opterećenja: 6-10



$$b/d = 20/500 \text{ cm} \quad A_b = 10000 \text{ cm}^2$$

Merodavna kombinacija za savijanje:

$$1.30xI + 0.65xII + 1.30xIII$$

Merodavna kombinacija za smicanje:

$$1.30xI + 0.65xII + 1.30xIV$$

$$M_u = 1164.08 \text{ kNm}$$

$$N_u = -350.95 \text{ kN}$$

$$T_u = 971.55 \text{ kN}$$

$$\epsilon_b/\epsilon_a = -0.686/10.000 \text{ ‰}$$

$$A_{a1} = 0.00 \text{ cm}^2 \quad (\text{min: } 15.00)$$

$$A_{a2} = 0.00 \text{ cm}^2 \quad (\text{min: } 15.00)$$

$$A_{av} = \pm 0.31 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 1.50)$$

$$A_{ah} = \pm 2.14 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 2.00)$$

**Presek 14 - 14 (X=41.67m)**

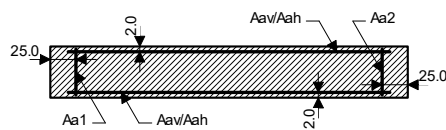
PBAB 87

MB 40

Ugaona armatura MA 500/560

Podužna armatura MA 500/560

Dimenzionisanje grupe slučajeva opterećenja: 6-10



$$b/d = 20/500 \text{ cm} \quad A_b = 10000 \text{ cm}^2$$

Merodavna kombinacija za savijanje:

$$1.60xI + 1.80xII$$

Merodavna kombinacija za smicanje:

$$1.30xI + 0.65xII + 1.30xIV$$

$$M_u = 309.32 \text{ kNm}$$

$$N_u = -1491.12 \text{ kN}$$

$$T_u = 1514.26 \text{ kN}$$

$$A_{a1} = 0.00 \text{ cm}^2 \quad (\text{min: } 15.00)$$

$$A_{a2} = 0.00 \text{ cm}^2 \quad (\text{min: } 15.00)$$

$$A_{av} = \pm 0.00 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 1.50)$$

$$A_{ah} = \pm 3.33 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 2.00)$$

**Presek 15 - 15 (X=41.67m)**

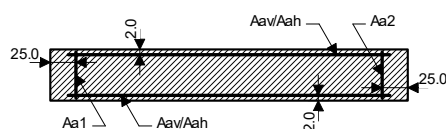
PBAB 87

MB 40

Ugaona armatura MA 500/560

Podužna armatura MA 500/560

Dimenzionisanje grupe slučajeva opterećenja: 6-10



$$b/d = 20/500 \text{ cm} \quad A_b = 10000 \text{ cm}^2$$

Merodavna kombinacija za savijanje:

$$1.60xI + 1.80xII$$

Merodavna kombinacija za smicanje:

$$1.30xI + 0.65xII + 1.30xIV$$

$$M_u = -135.62 \text{ kNm}$$

$$N_u = -1180.37 \text{ kN}$$

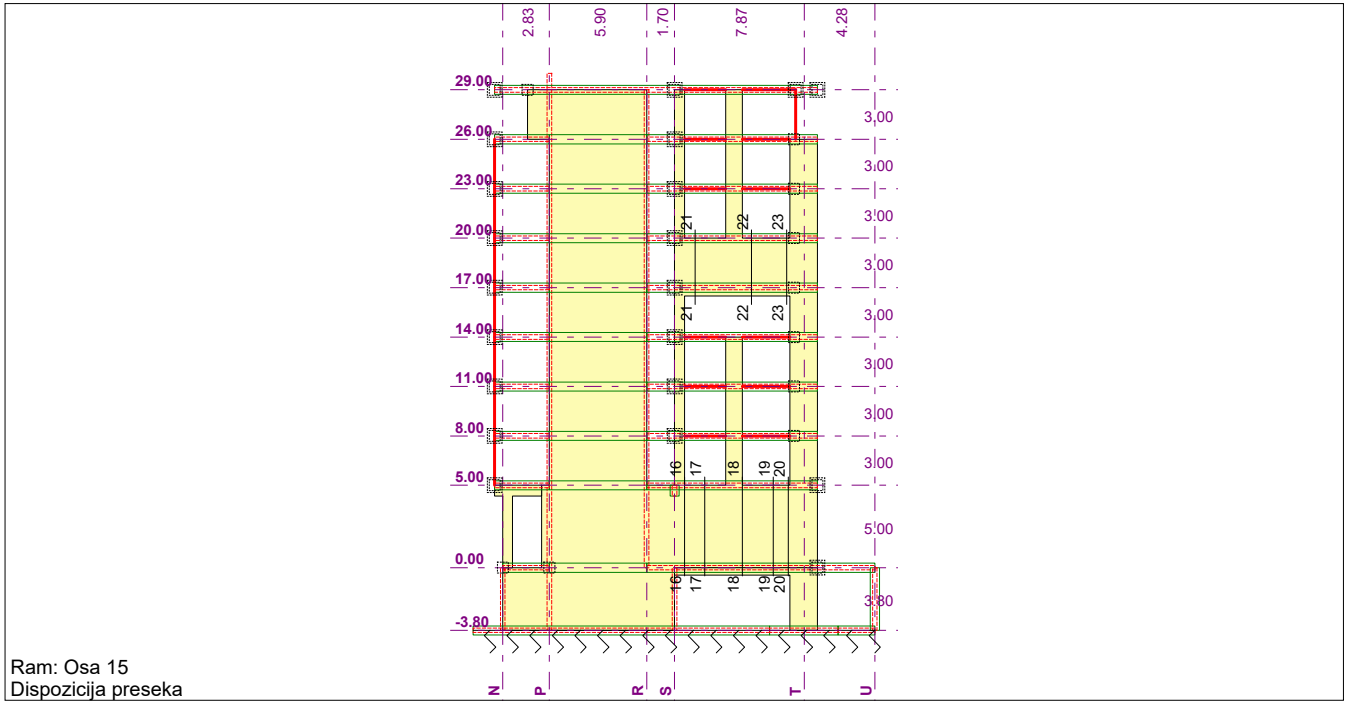
$$T_u = 1835.31 \text{ kN}$$

$$A_{a1} = 0.00 \text{ cm}^2 \quad (\text{min: } 15.00)$$

$$A_{a2} = 0.00 \text{ cm}^2 \quad (\text{min: } 15.00)$$

$$A_{av} = \pm 0.00 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 1.50)$$

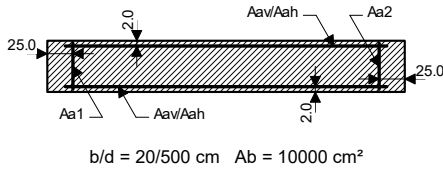
$$A_{ah} = \pm 4.04 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 2.00)$$



Ram: Osa 15  
Dispozicija preseka

Presek 16 - 16 (X=56.02m)  
PBAB 87  
MB 40  
Ugaona armatura MA 500/560  
Podužna armatura MA 500/560  
Dimenzionisanje grupe slučajeva opterećenja: 6-10

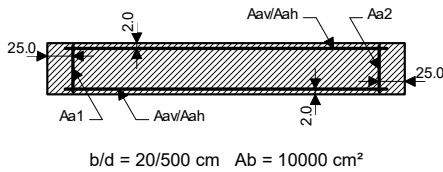
Merodavna kombinacija za savijanje:  
1.30xI+0.65xII+1.30xIV  
Merodavna kombinacija za smicanje:  
1.30xI+0.65xII-1.30xIV  
Mu = -599.95 kNm  
Nu = -52.35 kN  
Tu = -1767.58 kN



$\epsilon_b/\epsilon_a = -0.464/10.000 \text{ ‰}$   
Aa1 = 0.00 cm<sup>2</sup> (min:15.00)  
Aa2 = 0.00 cm<sup>2</sup> (min:15.00)  
Aav = ±0.44 cm<sup>2</sup>/m (min:±1.50)  
Aah = ±3.89 cm<sup>2</sup>/m (min:±2.00)

Presek 17 - 17 (X=56.02m)  
PBAB 87  
MB 40  
Ugaona armatura MA 500/560  
Podužna armatura MA 500/560  
Dimenzionisanje grupe slučajeva opterećenja: 6-10

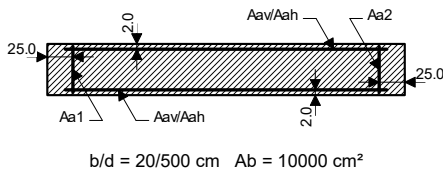
Merodavna kombinacija za savijanje:  
1.60xI+1.80xII  
Merodavna kombinacija za smicanje:  
1.30xI+0.65xII-1.30xIV  
Mu = -648.22 kNm  
Nu = -965.96 kN  
Tu = -1454.47 kN



Aa1 = 0.00 cm<sup>2</sup> (min:15.00)  
Aa2 = 0.00 cm<sup>2</sup> (min:15.00)  
Aav = ±0.00 cm<sup>2</sup>/m (min:±1.50)  
Aah = ±3.20 cm<sup>2</sup>/m (min:±2.00)

Presek 18 - 18 (X=56.02m)  
PBAB 87  
MB 40  
Ugaona armatura MA 500/560  
Podužna armatura MA 500/560  
Dimenzionisanje grupe slučajeva opterećenja: 6-10

Merodavna kombinacija za savijanje:  
1.60xI+1.80xII  
Merodavna kombinacija za smicanje:  
1.30xI+0.65xII+1.30xIV  
Mu = -812.85 kNm  
Nu = -1299.62 kN  
Tu = 1855.50 kN



Aa1 = 0.00 cm<sup>2</sup> (min:15.00)  
Aa2 = 0.00 cm<sup>2</sup> (min:15.00)  
Aav = ±0.00 cm<sup>2</sup>/m (min:±1.50)  
Aah = ±4.08 cm<sup>2</sup>/m (min:±2.00)

**Presek 19 - 19 (X=56.02m)**

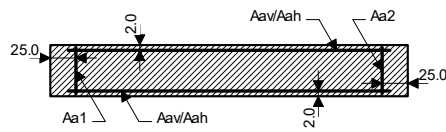
PBAB 87

MB 40

Ugaona armatura MA 500/560

Podužna armatura MA 500/560

Dimenzionisanje grupe slučajeva opterećenja: 6-10



$$b/d = 20/500 \text{ cm} \quad A_b = 10000 \text{ cm}^2$$

Merodavna kombinacija za savijanje:

$$1.60xI + 1.80xII$$

Merodavna kombinacija za smicanje:

$$1.30xI + 0.65xII + 1.30xIV$$

$$M_u = 218.94 \text{ kNm}$$

$$N_u = -1513.02 \text{ kN}$$

$$T_u = 2375.11 \text{ kN}$$

$$A_{a1} = 0.00 \text{ cm}^2 \quad (\text{min: } 15.00)$$

$$A_{a2} = 0.00 \text{ cm}^2 \quad (\text{min: } 15.00)$$

$$A_{av} = \pm 0.00 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 1.50)$$

$$A_{ah} = \pm 5.23 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 2.00)$$

**Presek 20 - 20 (X=56.02m)**

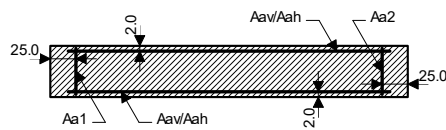
PBAB 87

MB 40

Ugaona armatura MA 500/560

Podužna armatura MA 500/560

Dimenzionisanje grupe slučajeva opterećenja: 6-10



$$b/d = 20/500 \text{ cm} \quad A_b = 10000 \text{ cm}^2$$

Merodavna kombinacija za savijanje:

$$1.60xI + 1.80xII$$

Merodavna kombinacija za smicanje:

$$1.30xI + 0.65xII + 1.30xIV$$

$$M_u = -177.88 \text{ kNm}$$

$$N_u = -847.72 \text{ kN}$$

$$T_u = 1691.05 \text{ kN}$$

$$A_{a1} = 0.00 \text{ cm}^2 \quad (\text{min: } 15.00)$$

$$A_{a2} = 0.00 \text{ cm}^2 \quad (\text{min: } 15.00)$$

$$A_{av} = \pm 0.00 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 1.50)$$

$$A_{ah} = \pm 3.72 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 2.00)$$

**Presek 21 - 21 (X=56.02m)**

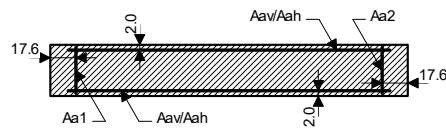
PBAB 87

MB 40

Ugaona armatura MA 500/560

Podužna armatura MA 500/560

Dimenzionisanje grupe slučajeva opterećenja: 6-10



$$b/d = 20/352 \text{ cm} \quad A_b = 7040 \text{ cm}^2$$

Merodavna kombinacija za savijanje:

$$1.30xI + 0.65xII + 1.30xIV$$

Merodavna kombinacija za smicanje:

$$1.30xI + 0.65xII - 1.30xIV$$

$$M_u = -798.06 \text{ kNm}$$

$$N_u = 51.27 \text{ kN}$$

$$T_u = -1281.72 \text{ kN}$$

$$\epsilon_b/\epsilon_a = -0.749/10.000 \text{ ‰}$$

$$A_{a1} = 0.70 \text{ cm}^2 \quad (\text{min: } 10.56)$$

$$A_{a2} = 0.70 \text{ cm}^2 \quad (\text{min: } 10.56)$$

$$A_{av} = \pm 1.50 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 1.50)$$

$$A_{ah} = \pm 4.01 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 2.00)$$

**Presek 22 - 22 (X=56.02m)**

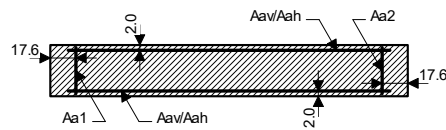
PBAB 87

MB 40

Ugaona armatura MA 500/560

Podužna armatura MA 500/560

Dimenzionisanje grupe slučajeva opterećenja: 6-10



$$b/d = 20/352 \text{ cm} \quad A_b = 7040 \text{ cm}^2$$

Merodavna kombinacija za savijanje:

$$1.60xI + 1.80xII$$

Merodavna kombinacija za smicanje:

$$1.30xI + 0.65xII + 1.30xIV$$

$$M_u = -893.22 \text{ kNm}$$

$$N_u = -156.33 \text{ kN}$$

$$T_u = 1652.30 \text{ kN}$$

$$\epsilon_b/\epsilon_a = -0.853/10.000 \text{ ‰}$$

$$A_{a1} = 0.00 \text{ cm}^2 \quad (\text{min: } 10.56)$$

$$A_{a2} = 0.00 \text{ cm}^2 \quad (\text{min: } 10.56)$$

$$A_{av} = \pm 1.24 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 1.50)$$

$$A_{ah} = \pm 5.16 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 2.00)$$

**Presek 23 - 23 (X=56.02m)**

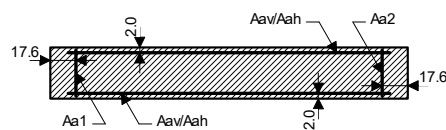
PBAB 87

MB 40

Ugaona armatura MA 500/560

Podužna armatura MA 500/560

Dimenzionisanje grupe slučajeva opterećenja: 6-10



$$b/d = 20/352 \text{ cm} \quad A_b = 7040 \text{ cm}^2$$

Merodavna kombinacija za savijanje:

$$1.30xI + 0.65xII + 1.30xIV$$

Merodavna kombinacija za smicanje:

$$1.30xI + 0.65xII + 1.30xIV$$

$$M_u = 970.90 \text{ kNm}$$

$$N_u = -195.75 \text{ kN}$$

$$T_u = 1601.69 \text{ kN}$$

$$\epsilon_b/\epsilon_a = -0.898/10.000 \text{ ‰}$$

$$A_{a1} = 0.00 \text{ cm}^2 \quad (\text{min: } 10.56)$$

$$A_{a2} = 0.00 \text{ cm}^2 \quad (\text{min: } 10.56)$$

$$A_{av} = \pm 1.27 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 1.50)$$

$$A_{ah} = \pm 5.01 \text{ cm}^2/\text{m} \quad (\text{min: } \pm 2.00)$$