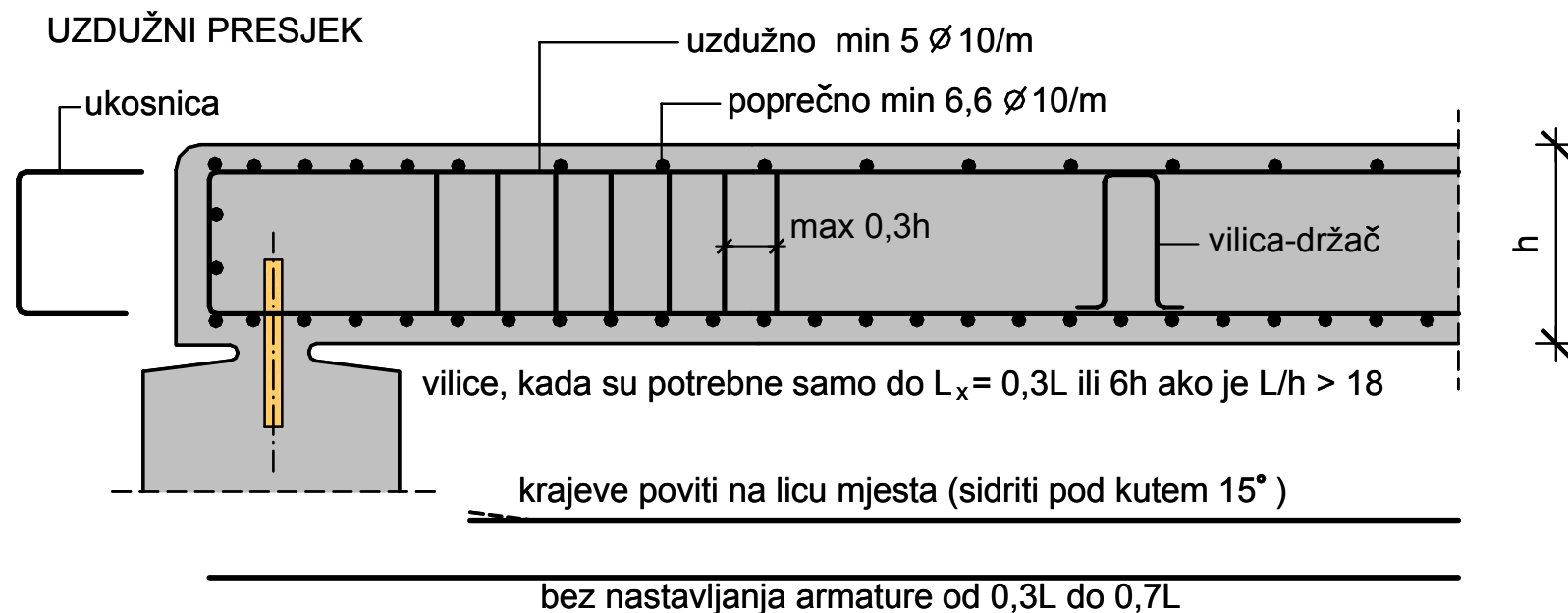


ARMIRANJE I PREDNAPINJANJE

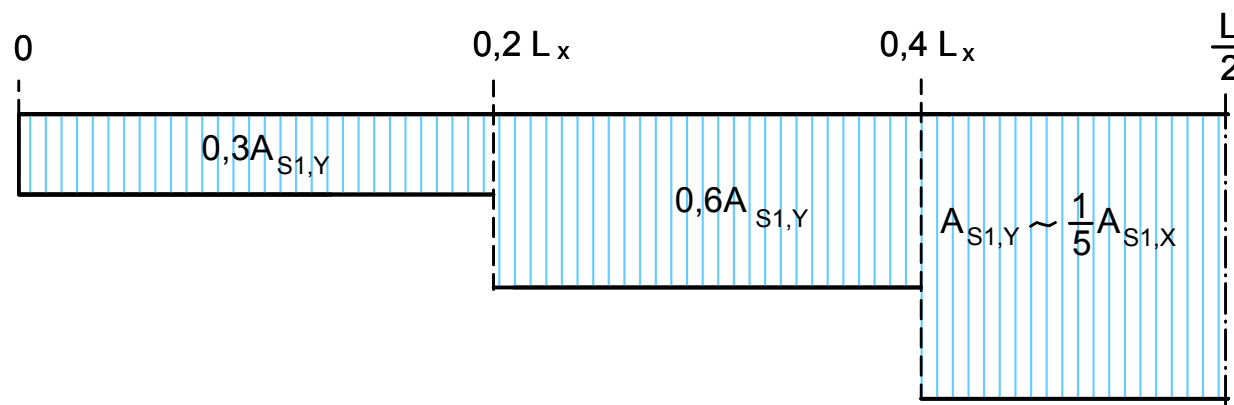
Pločasti mostovi
Rebrasti mostovi
Sandučasti mostovi
Stupovi
Lukovi

PLOČASTI MOSTOVI

Armiranje punih ploča mekom armaturom

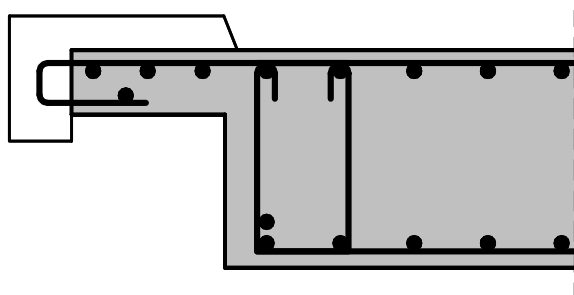


RASPODJELA POPREČNE ARMATURE

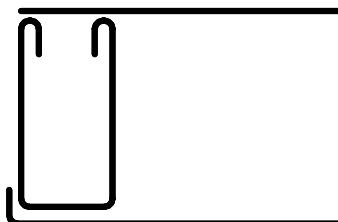


Armiranje punih ploča mekom armaturom

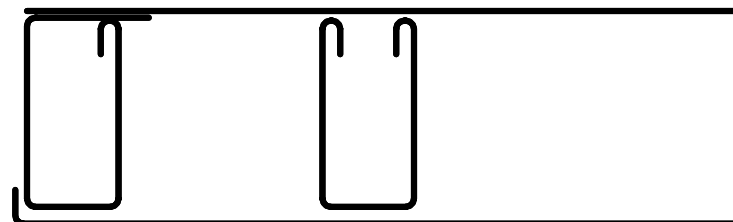
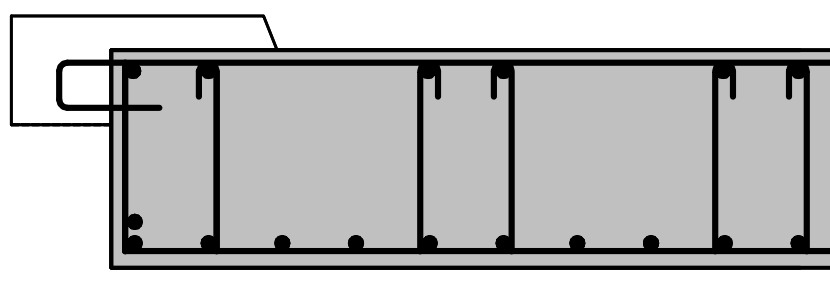
Bez posmične armature (vilica)



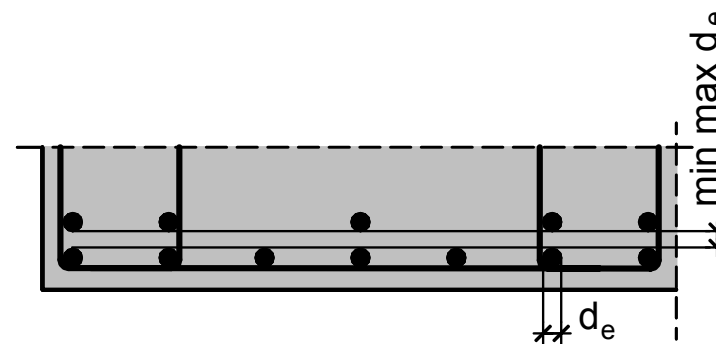
rubna vilica
 $e=150 - 250\text{mm}$



s vilicama na razmaku $v \geq 0,4\text{m}$

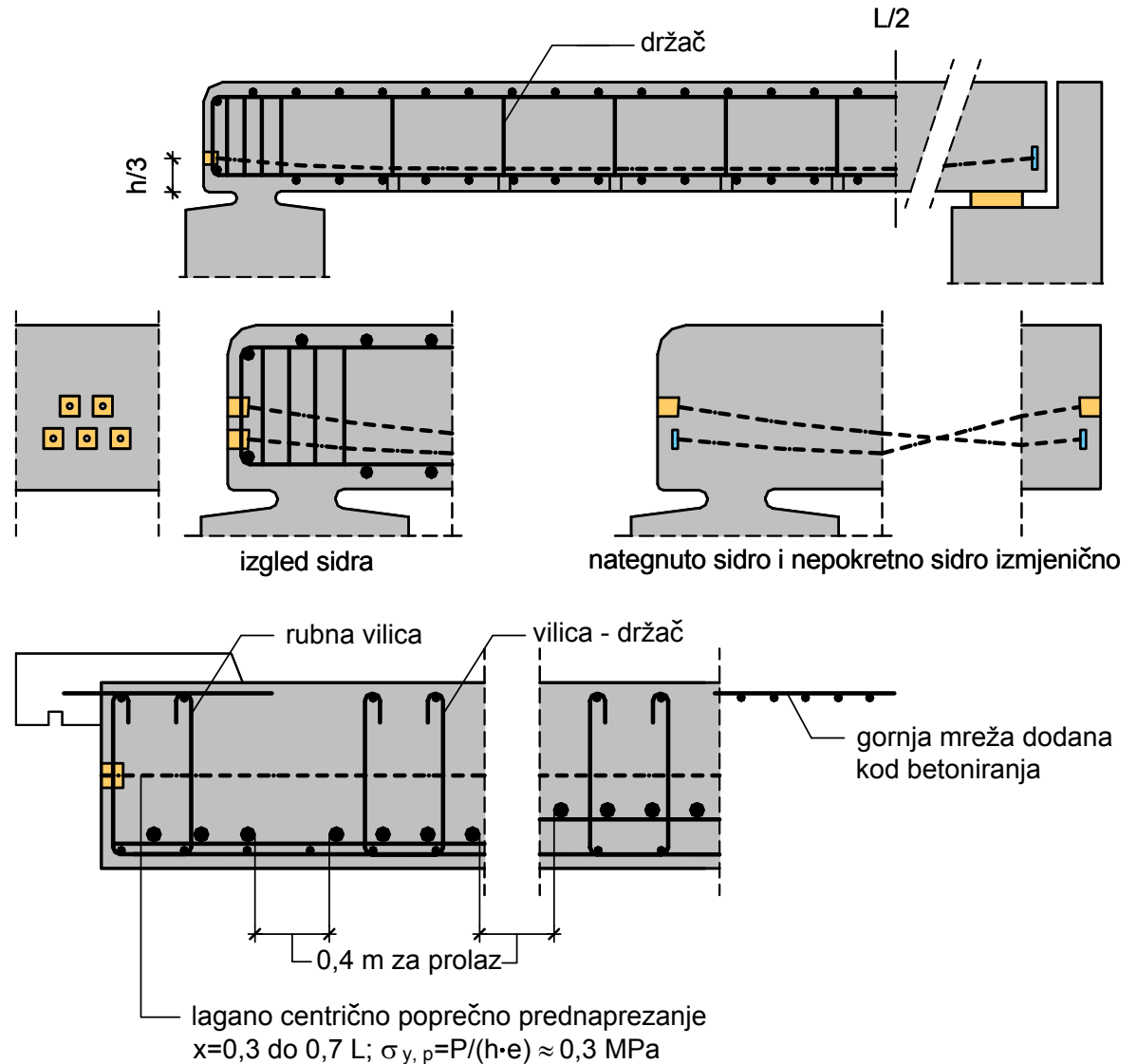


glavna armatura u 2 reda:
razmak između redova min max d_e

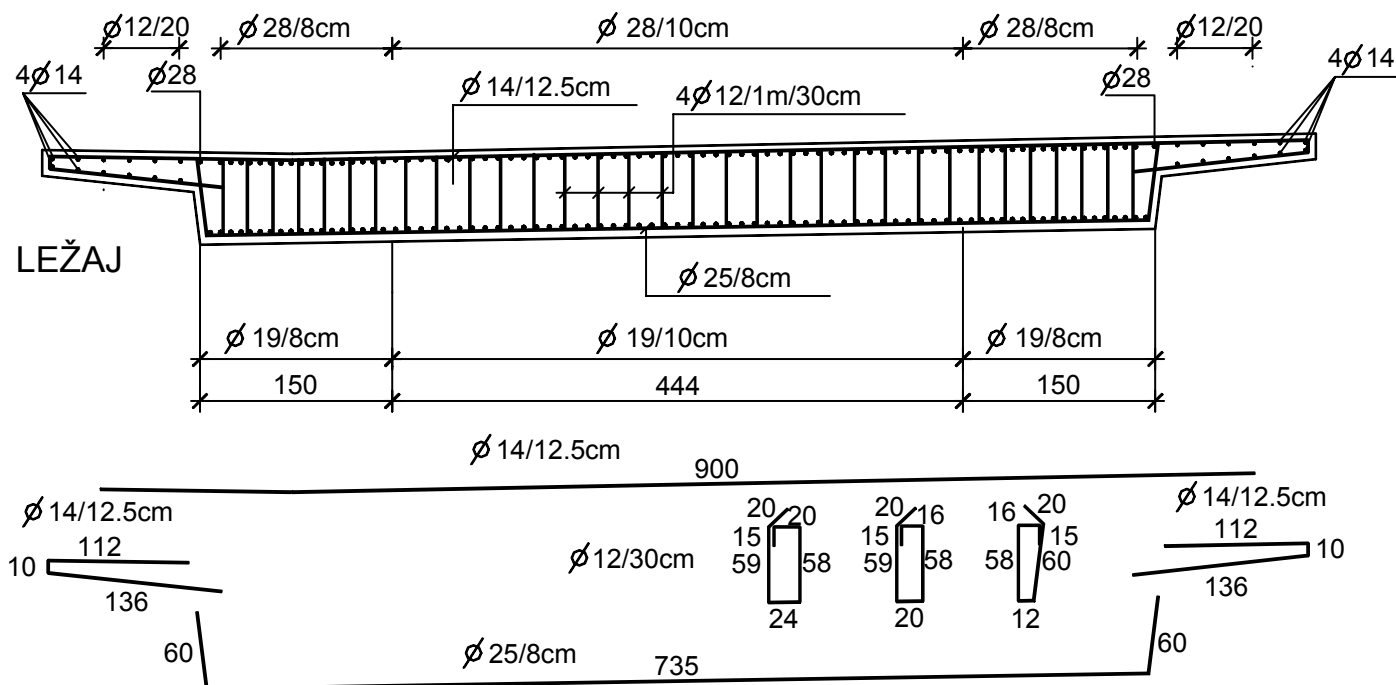
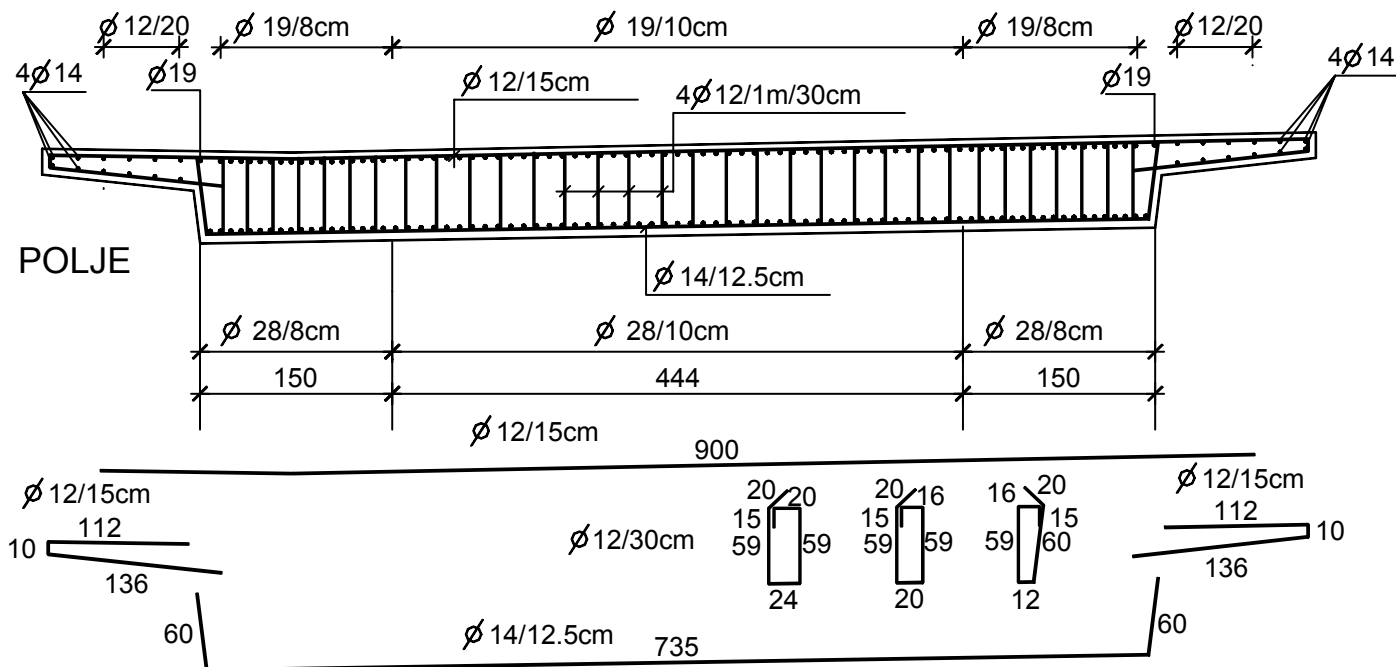


Pune ploče od prednapetog betona

- uzdužni kabele iznad donje mreže na držače
- Ispitivanja na posmik - sidrenje na $h/3$
- Poprečno: grupe na 40 cm – prolaz osoblja pri izvedbi
- Poprečna armatura za sile cijepanja od sidrenja kabela
- $b < 10\text{m}$ - lagano centrično prednapinjanje u srednjoj $1/3L$ (protiv uzdužnih pukotina)
- $b > 10\text{m}$ – poprečno prednap. i na ležajima (zbog temp. i utjecaja od spriječenih deformacija)

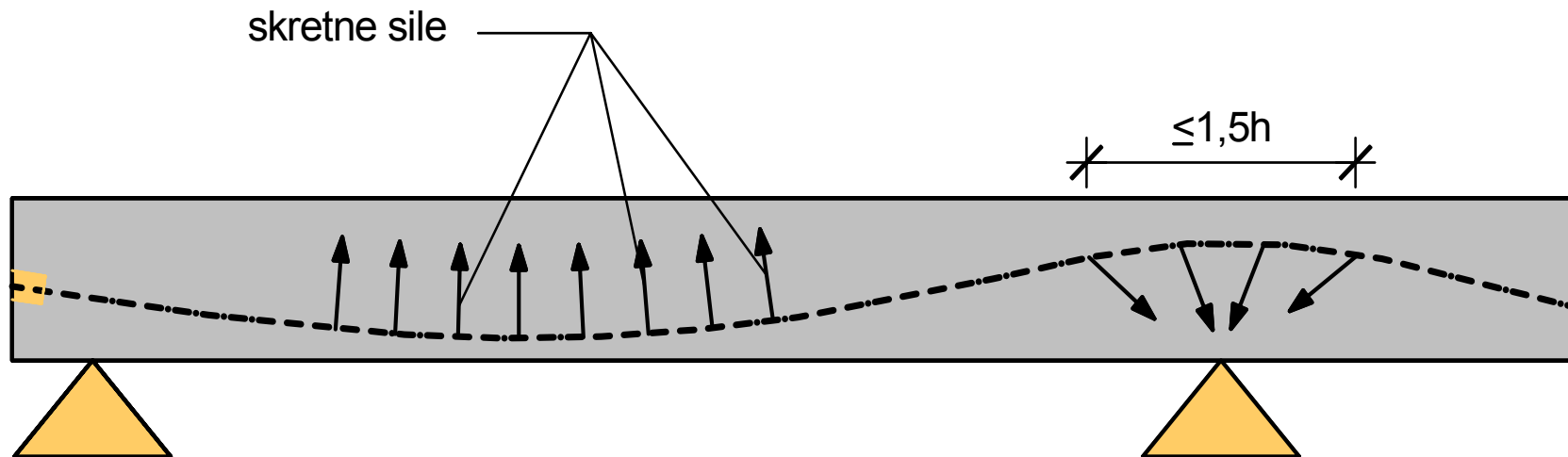


Primjer pločastog
mosta, KM 5.1,
str.301



Pune ploče od prednapetog betona

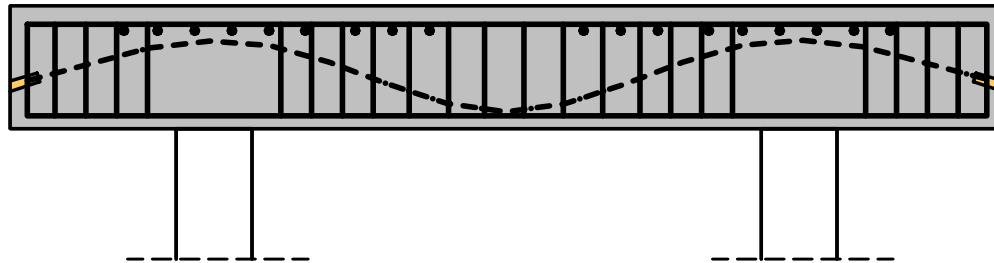
- skretne sile direktno predati na ležaje
- što veće skretne sile naspram gore u polju



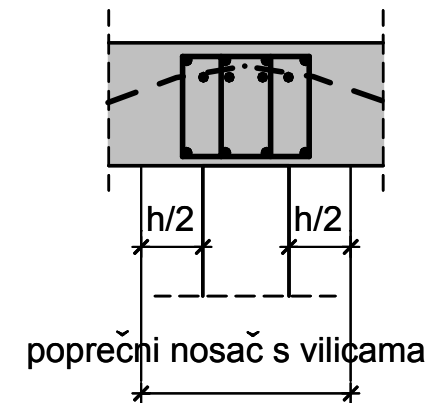
Pune ploče od prednapetog betona

- Poprečni kabeli - ispod uzdužnih kabela,
- linija prema dijagramu momenata savijanja i poprečnih sila

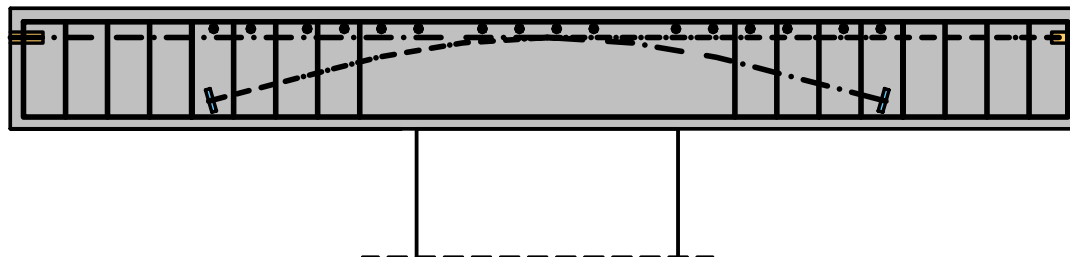
poprečni presjek nad srednjim osloncem



uzdužni presjek

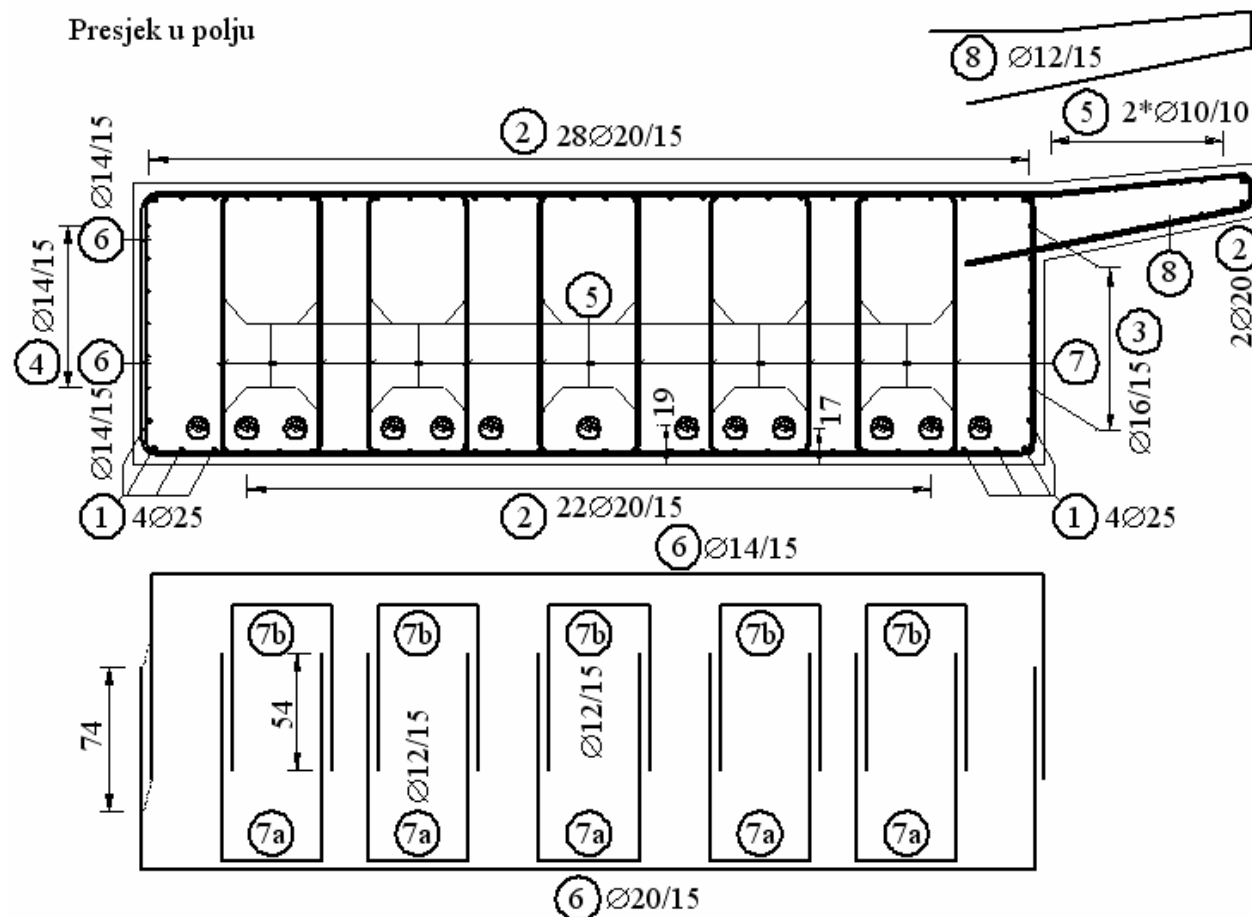


vođenje uzdužnih kabela koncentrirano iznad stupova;
poprečni nosač s armaturom za ovješnje za indirektno oslanjanje

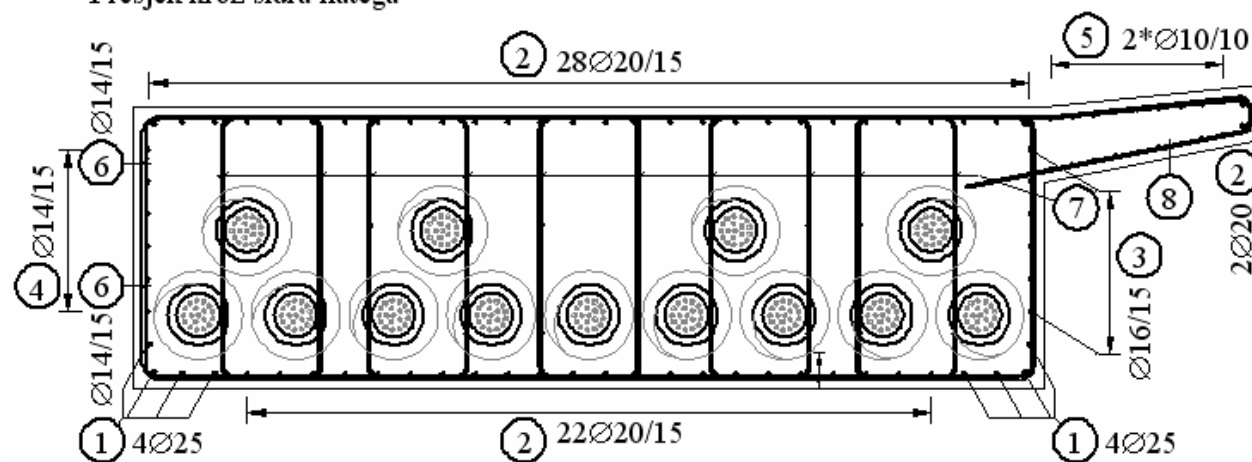


Primjer Pločasti željeznički most, BK•RP, str.627

Presjek u polju

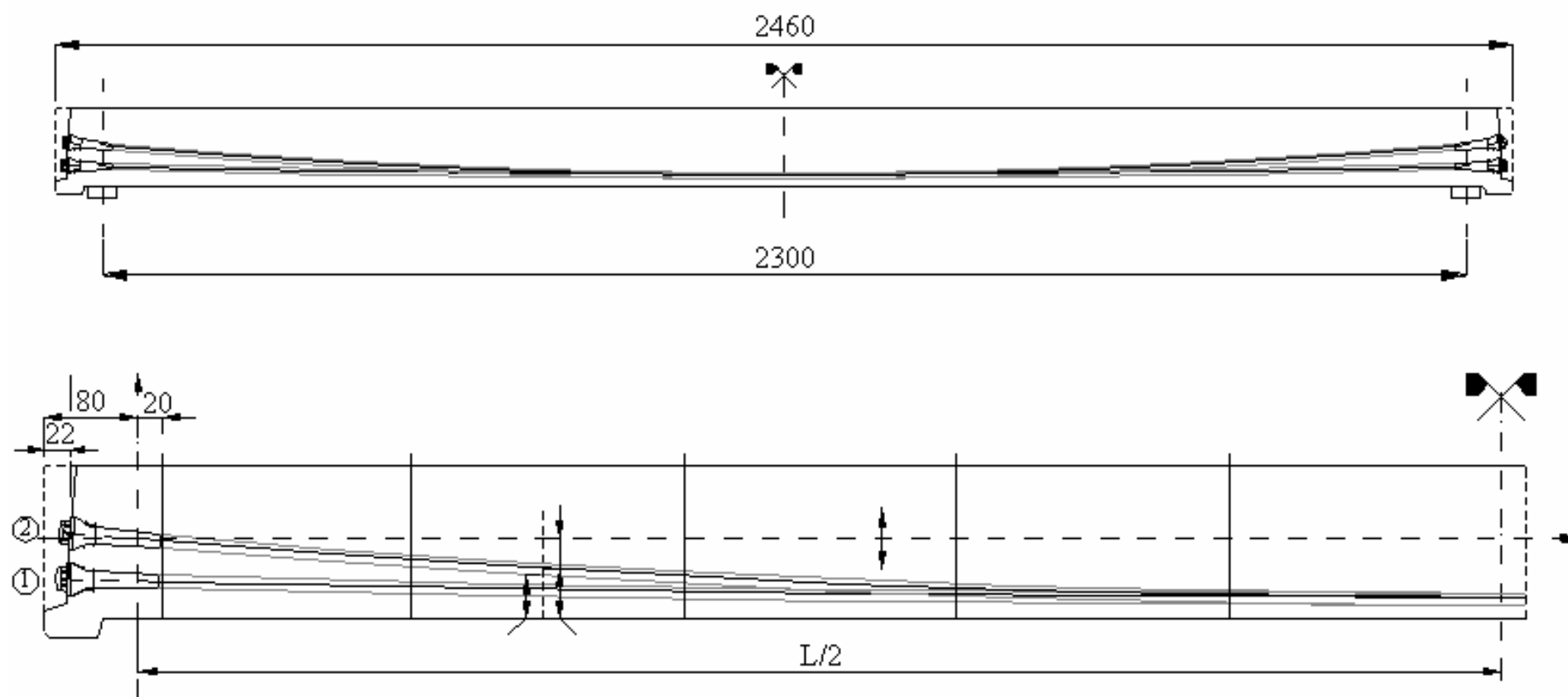


Presjek kroz sidra natega



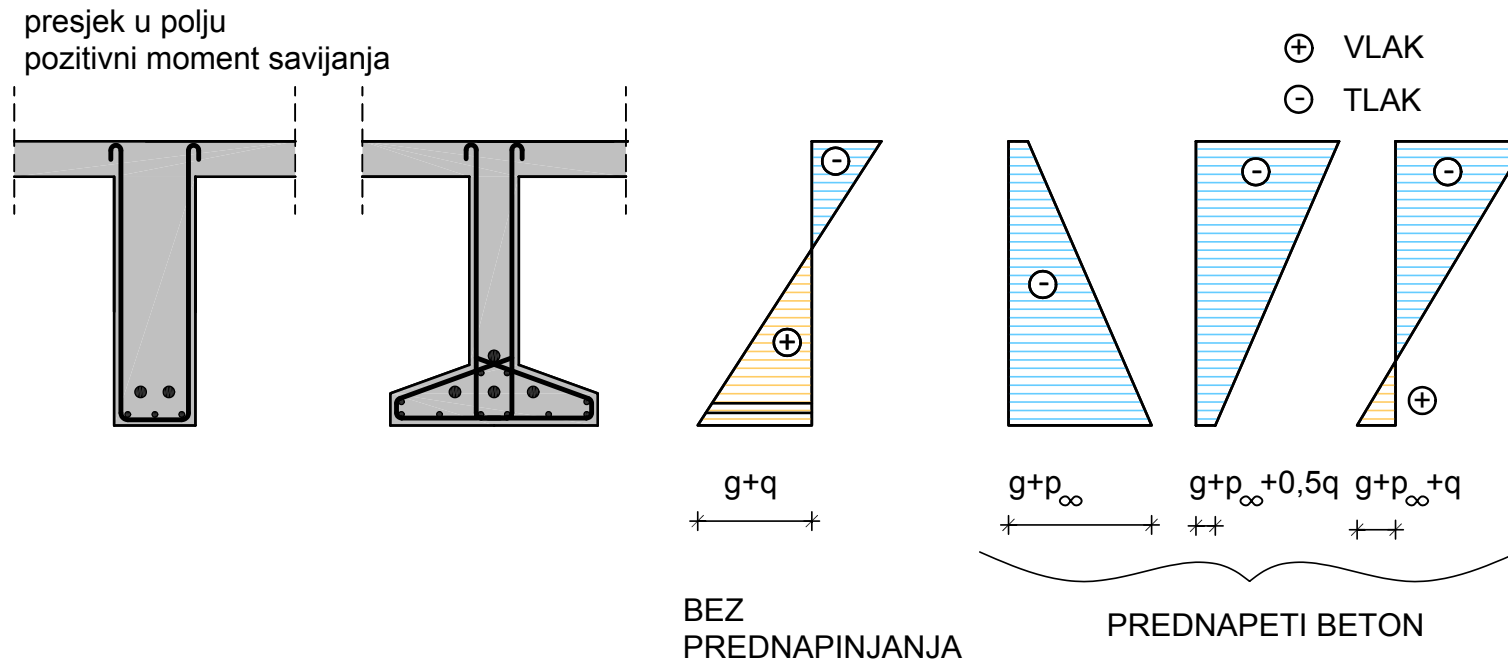
Primjer Pločasti željeznički most, BK•RP, str.627

Uzdužni presjek kroz rasponski sklop i vođenje natega
Vertikalne koordinate natega dane su z tablici 7.3.



REBRASTI MOSTOVI - ROŠTILJI

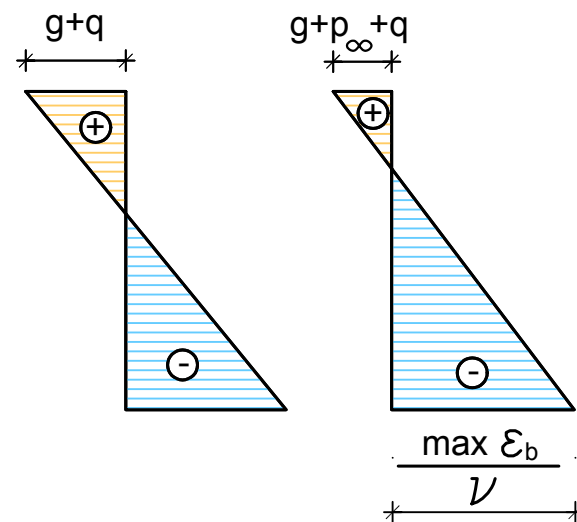
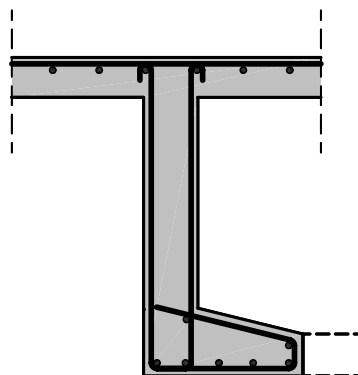
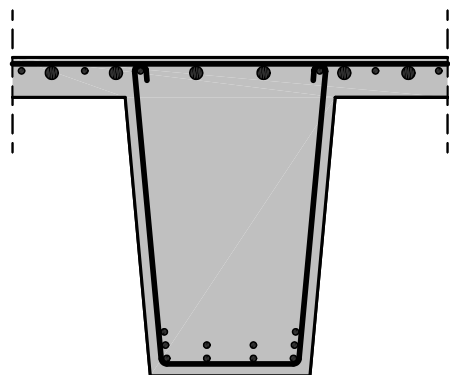
Naponi od pozitivnih momenata savijanja



- Valja paziti da tlačni naponi od prednapinjanja na donjem rubu nisu preveliki jer će se greda izobličiti prema gore od puzanja – pogodno je djelomično prednapinjanje
- Širina vlačnog pojasa može se odrediti i tako da za opterećenje $g+0,5q$ ostane rezerva tlaka u prednapetom vlačnom pojasu

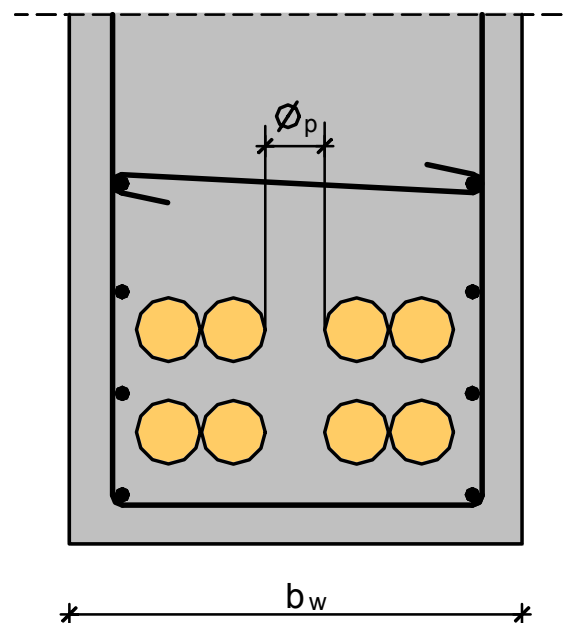
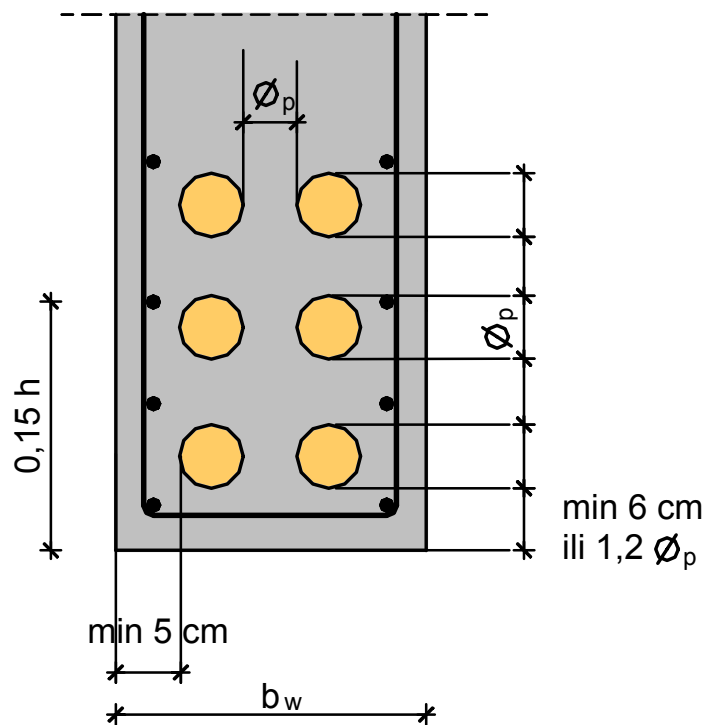
Naponi od negativnih momenata savijanja

presjek nad srednjim ležajem
negativni moment savijanja



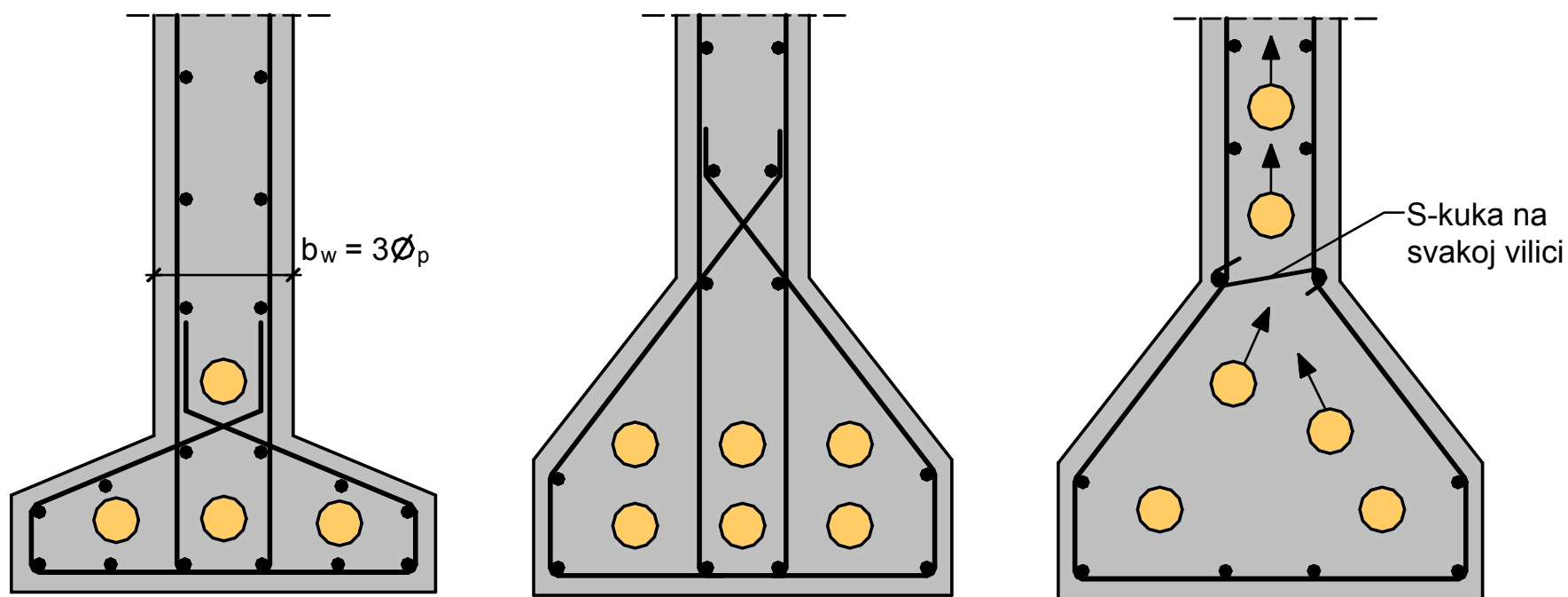
Prednapinjanje rebrastih grednih mostova

- Sila po kabelu 300 – 600 kN – sidra nisu prevelika – lakši smještaj
- 3 žice min.
- U L/2 kabeli što niže



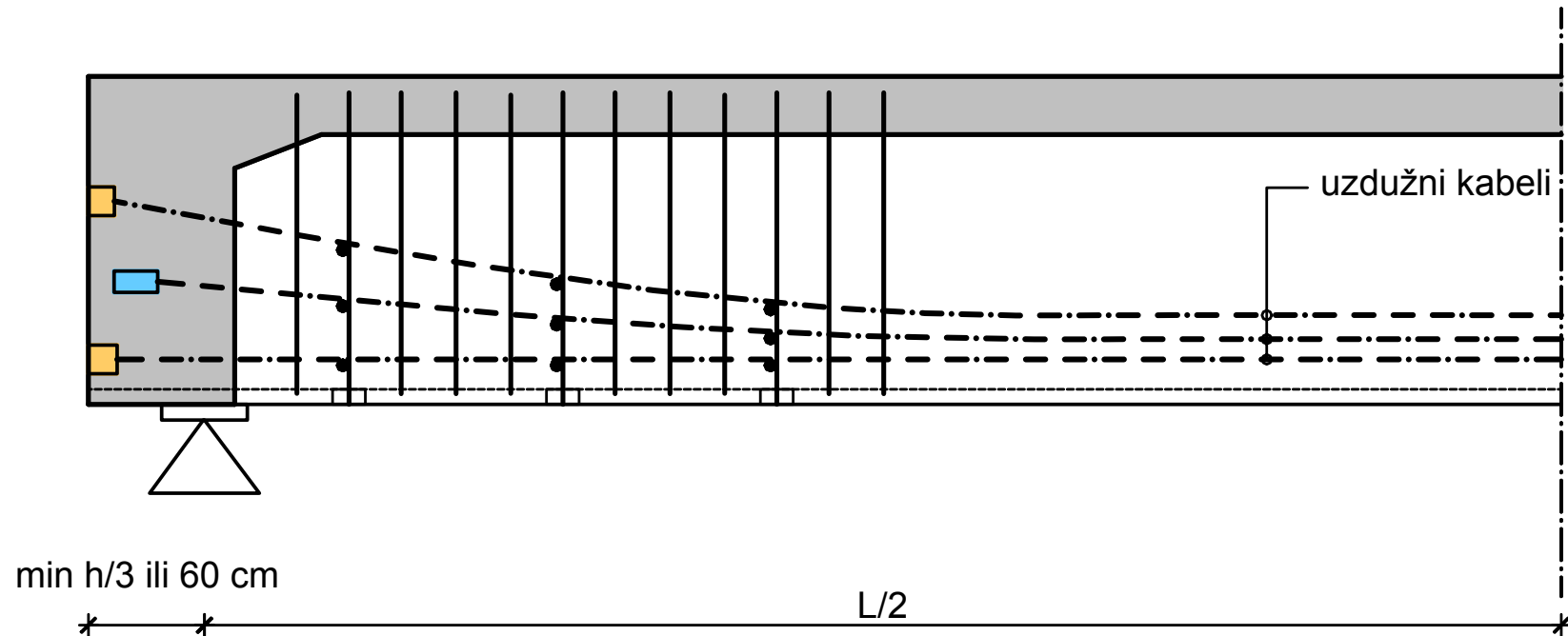
Prednapinjanje rebrastih grednih mostova

Kabeli u proširenom donjem pojasu glavnih nosača i oblikovanje vilica



Područja gdje se kabeli vode prema gore

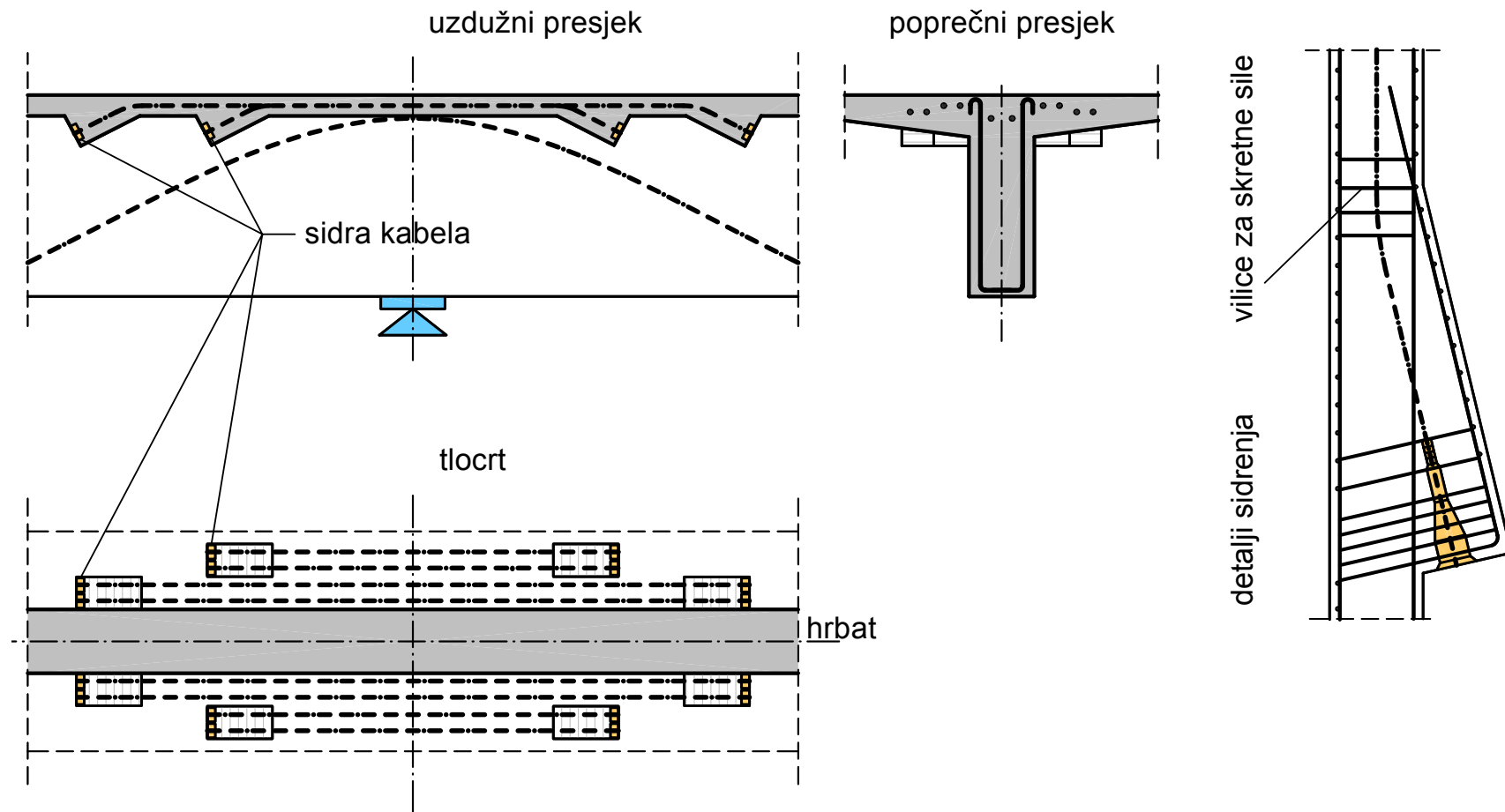
Vođenje kabela u glavnom nosaču. Usidrenje na krajevima grede



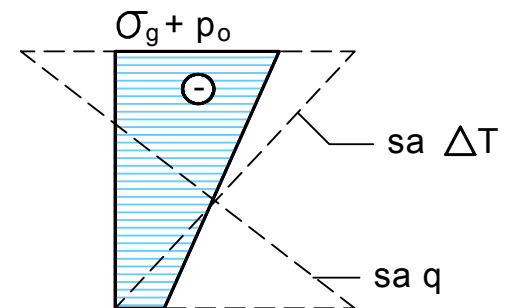
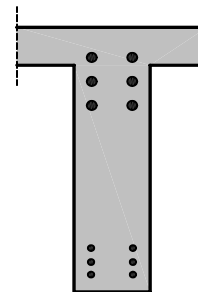
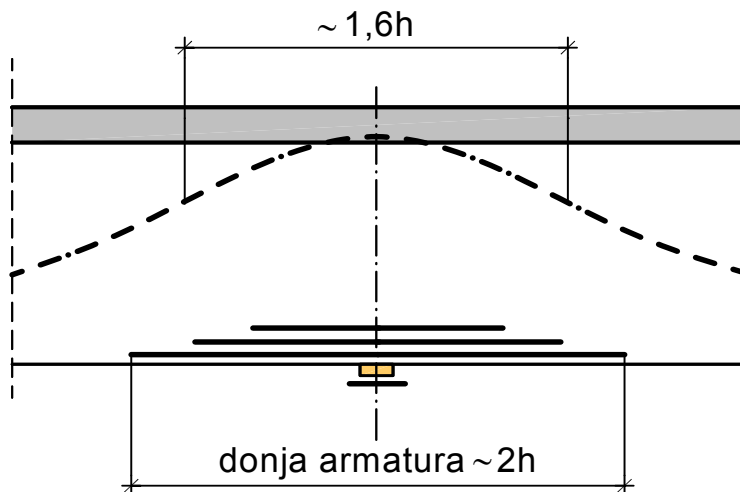
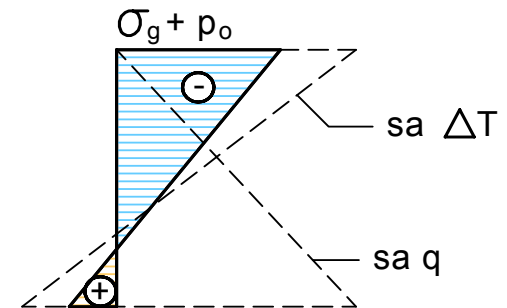
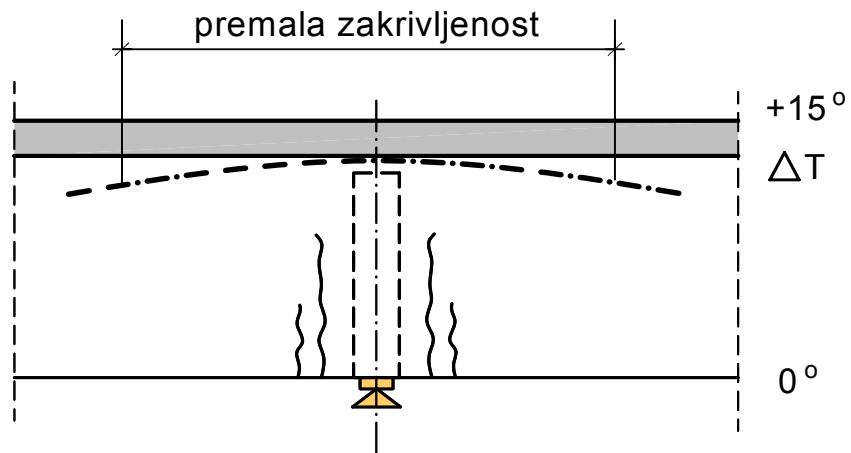
- Produljenje kraja grede preko ležaja – radi uvođenja sile prednapinjanja i ležajne reakcije
- Proste grede: naizmjenično pokretna i nepokretna sidra
- Armatura za zadržavanje projektiranog položaja pri betoniranju i vibriranju

Prednapinjanje kontinuiranih nosača iznad srednjih oslonaca

- paziti na pomak dijagrama vlačnih sila
- vilice za sile cijepanja i skretne sile

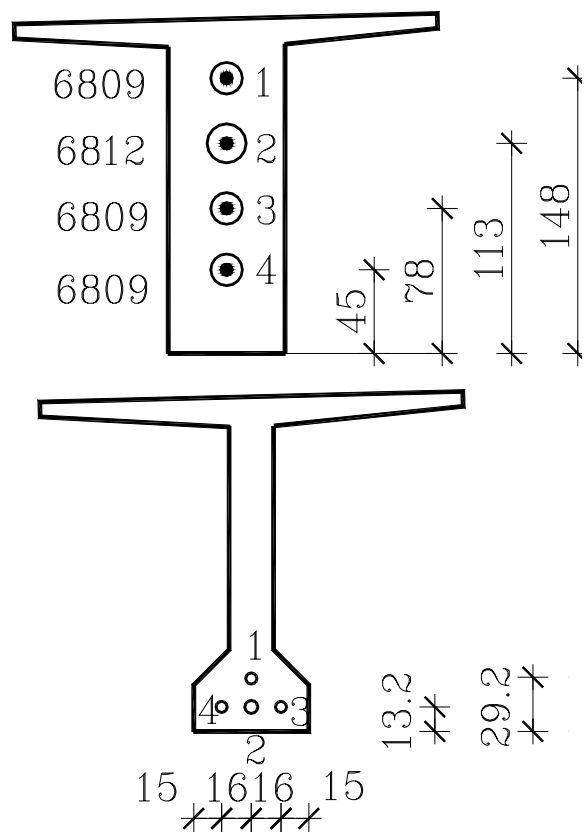


Prednapinjanje kontinuiranih nosača iznad srednjih oslonaca

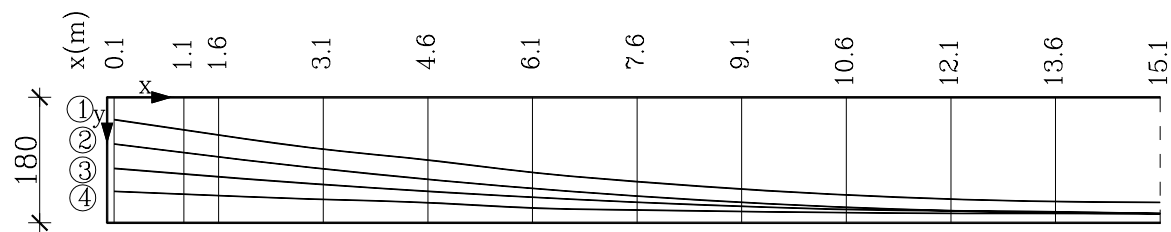


PREDGOTOVLJENI NOSAČI, KM 5.5, str.331

- Raspored kabela na čelu i u sredini nosača

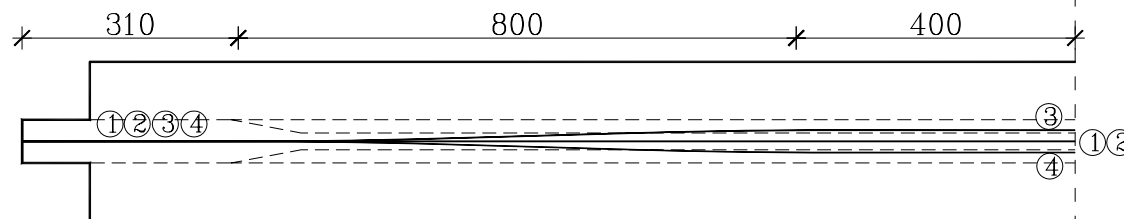


- Linije vođenja kabela u nosaču



udaljenost osi kabela od gornjeg ruba (cm)

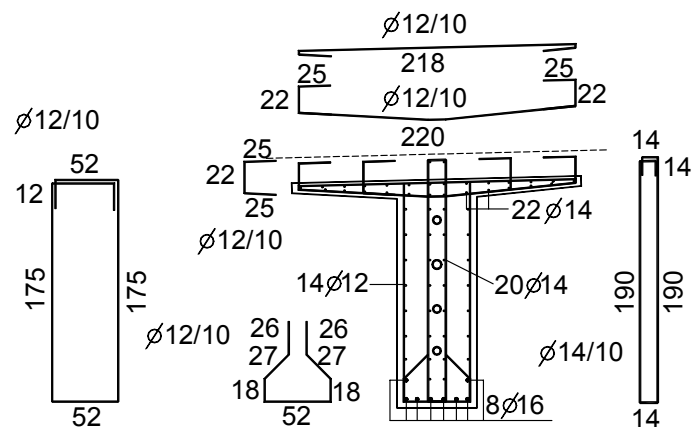
kabel 1	32.00	46.85	54.14	74.43	92.33	107.84	120.97	131.71	140.06	146.03	149.61	150.80
kabel 2	67.00	79.47	85.60	102.64	117.68	130.71	141.74	150.76	157.78	162.79	165.80	166.80
kabel 3	102.00	110.10	114.08	125.14	134.91	143.37	150.57	156.39	160.94	164.20	166.15	166.80
kabel 4	135.00	138.97	140.92	146.35	151.15	155.30	158.81	161.69	163.92	165.52	166.48	166.80



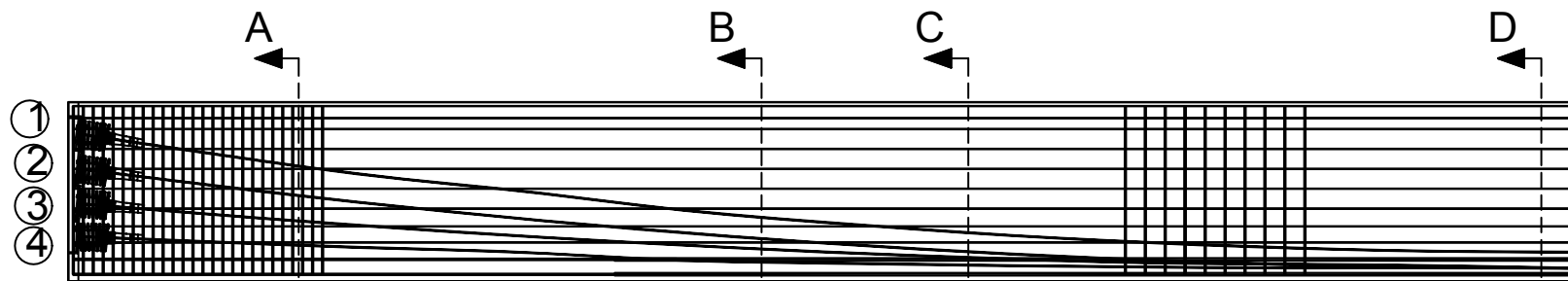
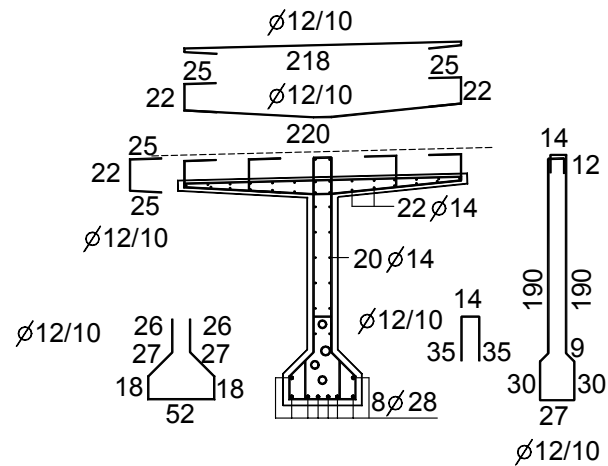
udaljenost osi kabela od osi nosača horizontalno (cm)

kabel 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
kabel 2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
kabel 3	0.00	0.00	0.00	0.00	1.00	4.29	8.64	12.83	15.61	16.00	16.00	16.00
kabel 4	0.00	0.00	0.00	0.00	-1.00	-4.29	-8.64	-12.83	-15.61	-16.00	-16.00	-16.00

A-A



B-B



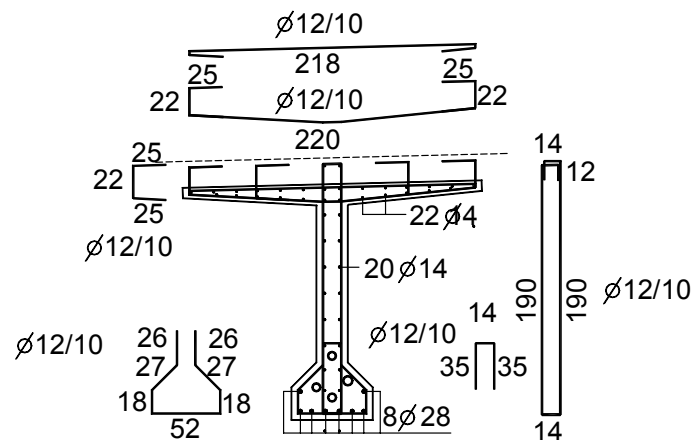
UZDUŽNA ARMATURA

srednji nosač	8 ϕ 16	8 ϕ 28
rubni nosač	8 ϕ 16	8 ϕ 19

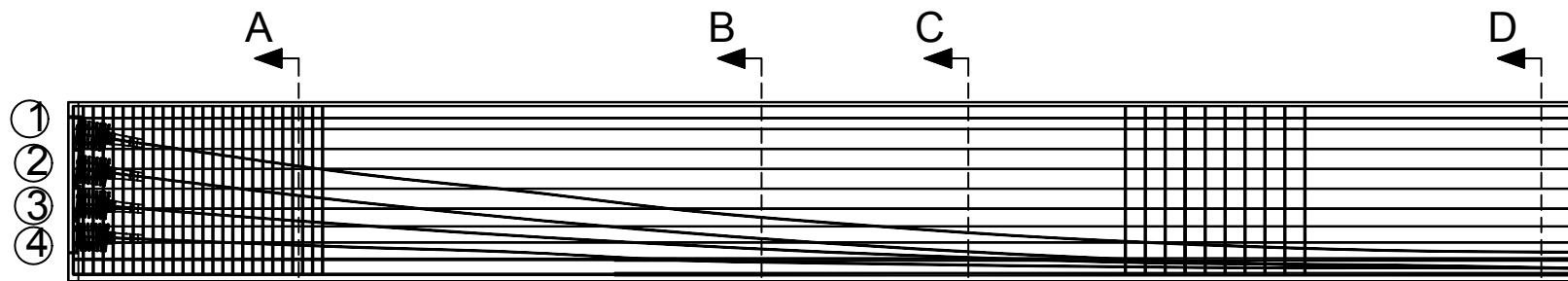
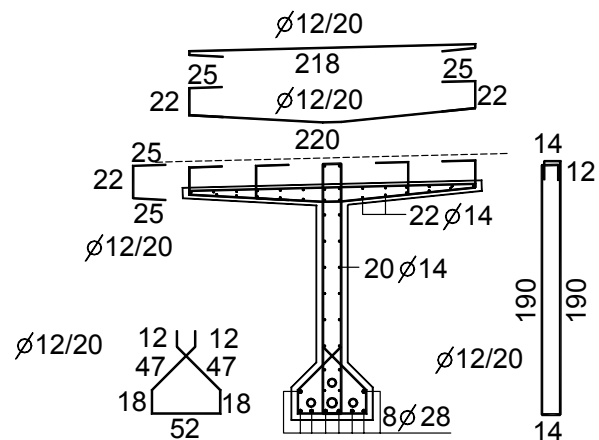
VILICE

srednji nosač	ϕ 14/10	ϕ 12/10	ϕ 12/20
rubni nosač	ϕ 14/10	ϕ 12/10	ϕ 12/20
	610	450	450

C-C



D-D



UZDUŽNA ARMATURA

srednji nosač	8 Ø16	8 Ø28
rubni nosač	8 Ø16	8 Ø19

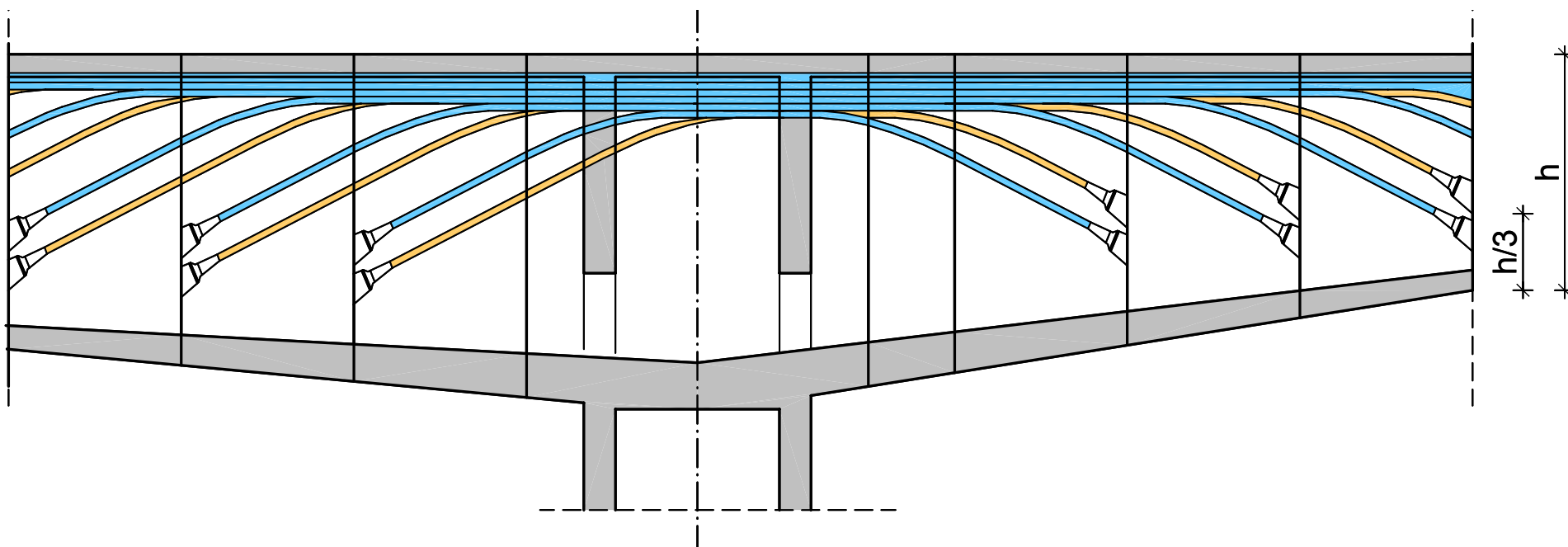
VILICE

srednji nosač	Ø 14/10	Ø 12/10	Ø 12/20
rubni nosač	Ø 14/10	Ø 12/10	Ø 12/20
	610	450	450

SANDUČASTI MOSTOVI

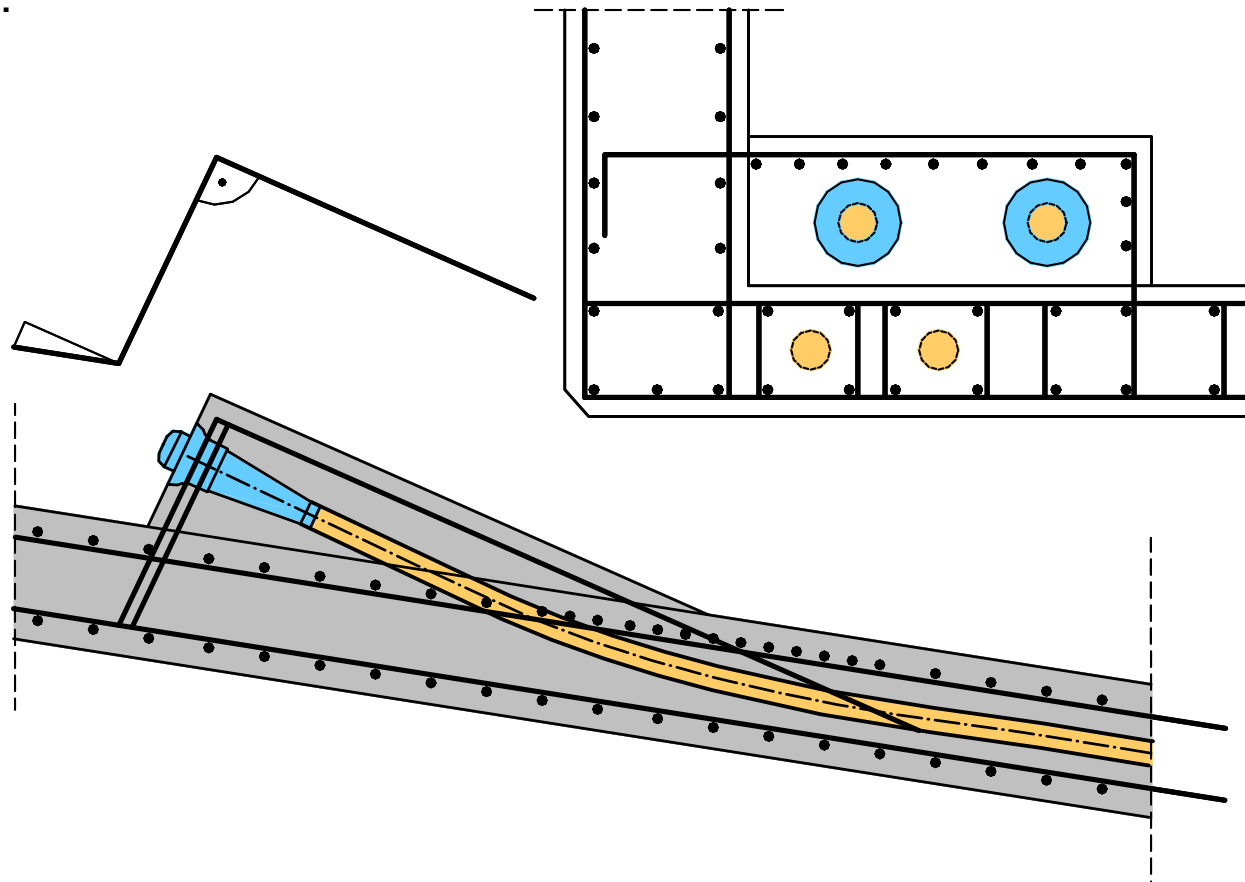
PREDNAPINJANJE SANDUČASTIH NOSAČA GRAĐENIH KONZOLNOM GRADNjom

- Na kraju svakoga segmenta - sidriti minimalno 2 kabela $\Rightarrow$ minimalan broj kabela prve faze dva puta veći od broja segmenata.
- Prostor za smještaj i vođenje tih kabela ograničen je većim brojem rupa potrebnih za sidrenje krletke $\Rightarrow$ dio kabela moramo postaviti u hrptove.
- Zbog svoje vertikalne komponente, koja smanjuje dijagram poprečnih sila od vlastite težine, ovi se kabele prvi sidre $\Rightarrow$ sidrenje je što niže, kako bi vertikalna komponenta sile prednapinjanja bila što veća i nalazi se otprilike na $h/3$ od donjeg ruba poprečnog presjeka



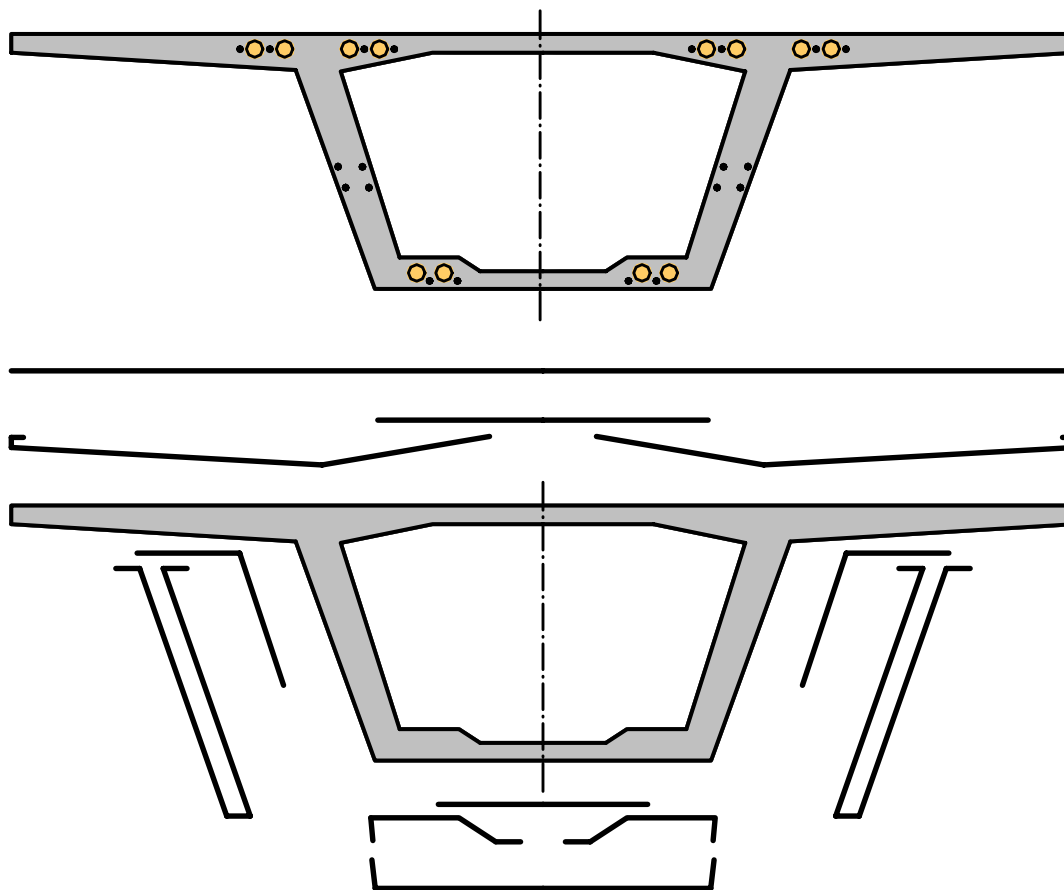
PREDNAPINJANJE SANDUČASTIH NOSAČA GRAĐENIH KONZOLNOM GRADNjom

- Tijekom izvedbe najprije se ugrađuju samo zaštitne cijevi, u koje se postupno uvlače jedino oni kabeli koji se prednapinju na kraju tog segmenta.
- Kabeli koji se prednapinju naknadno, kad je most već završen, uvlače se u prethodno ugrađene zaštitne cijevi i sidre u istakama ploče ili rebra s unutarnje strane nosača.



PREDNAPINJANJE SANDUČASTIH NOSAČA GRAĐENIH UZDUŽNIM POTISKIVANJEM

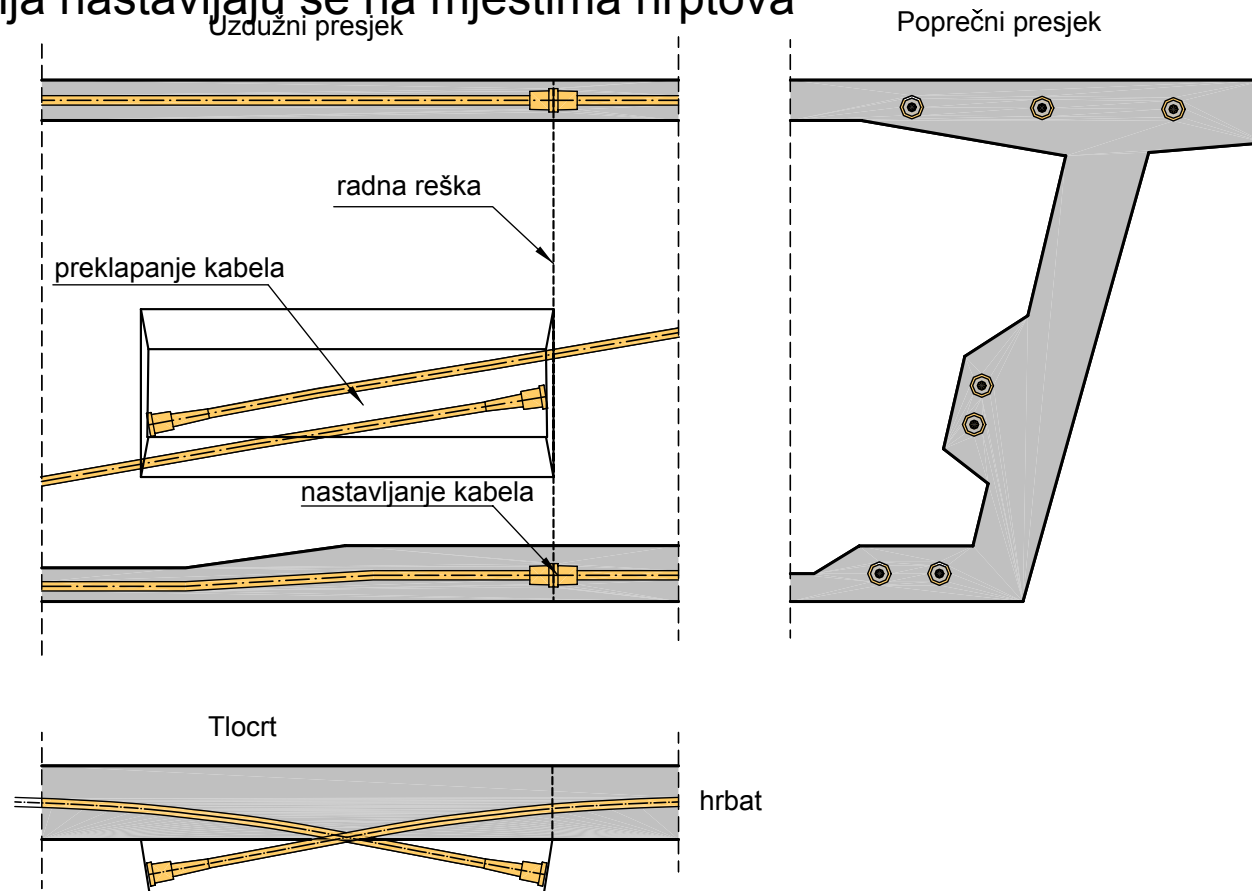
- 1. faza – TIJEKOM IZGRADNJE – CENTRIČNO PREDNAPINJANJE
 - kabelima položenim u gornjoj i donjoj ploči sanduka
 - preuzimaju se istodobno negativni i pozitivni momenti savijanja
 - nastavljane na radnim reškama $\Rightarrow$ tanje donje ploče potrebno je podebljati na mjestima nastavljanja.



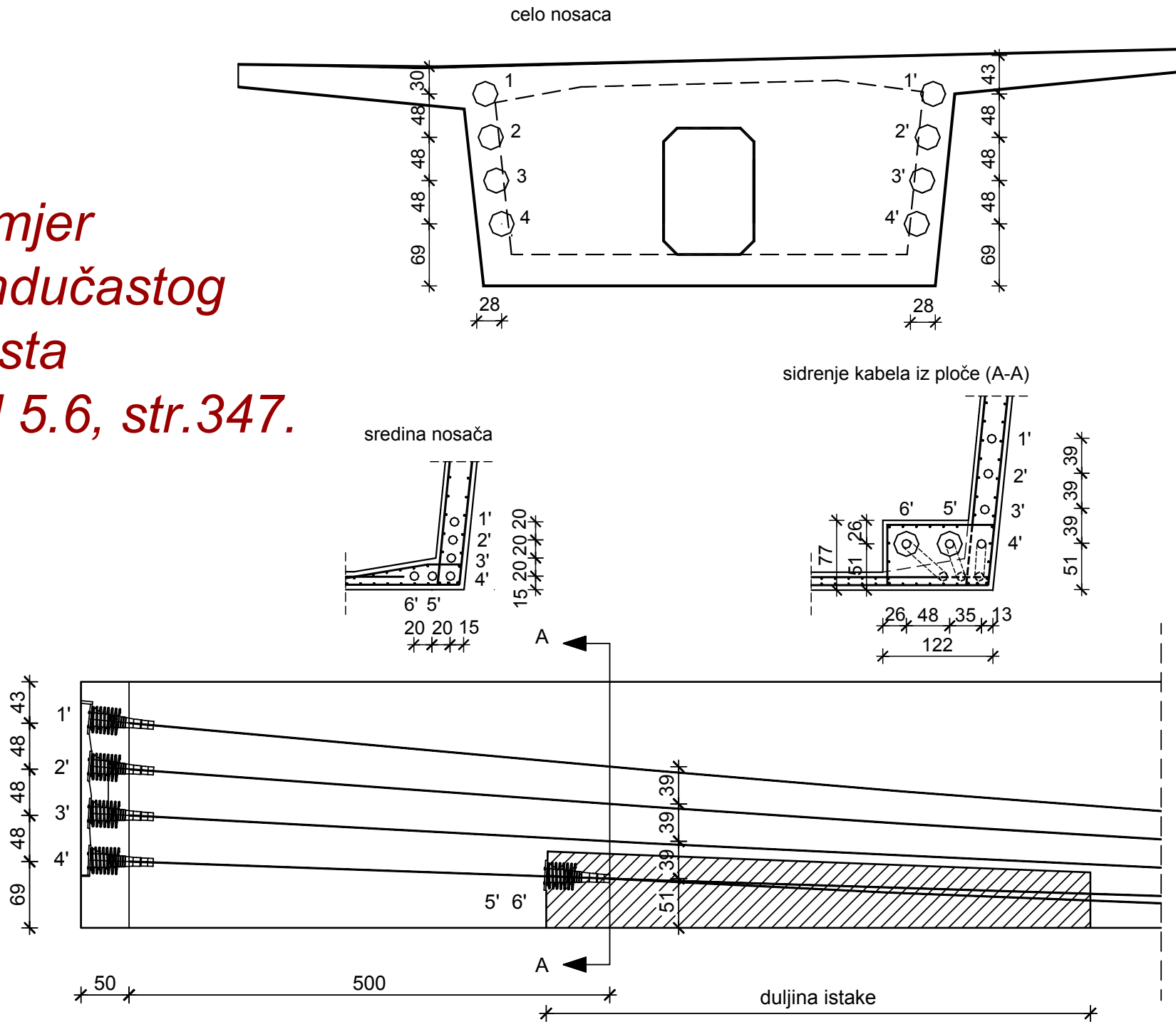
Moguće je i vanjsko centr. prednapinjanje pomoću istaka (kod velikih L ili L/h), uklanjanje za konačno stanje

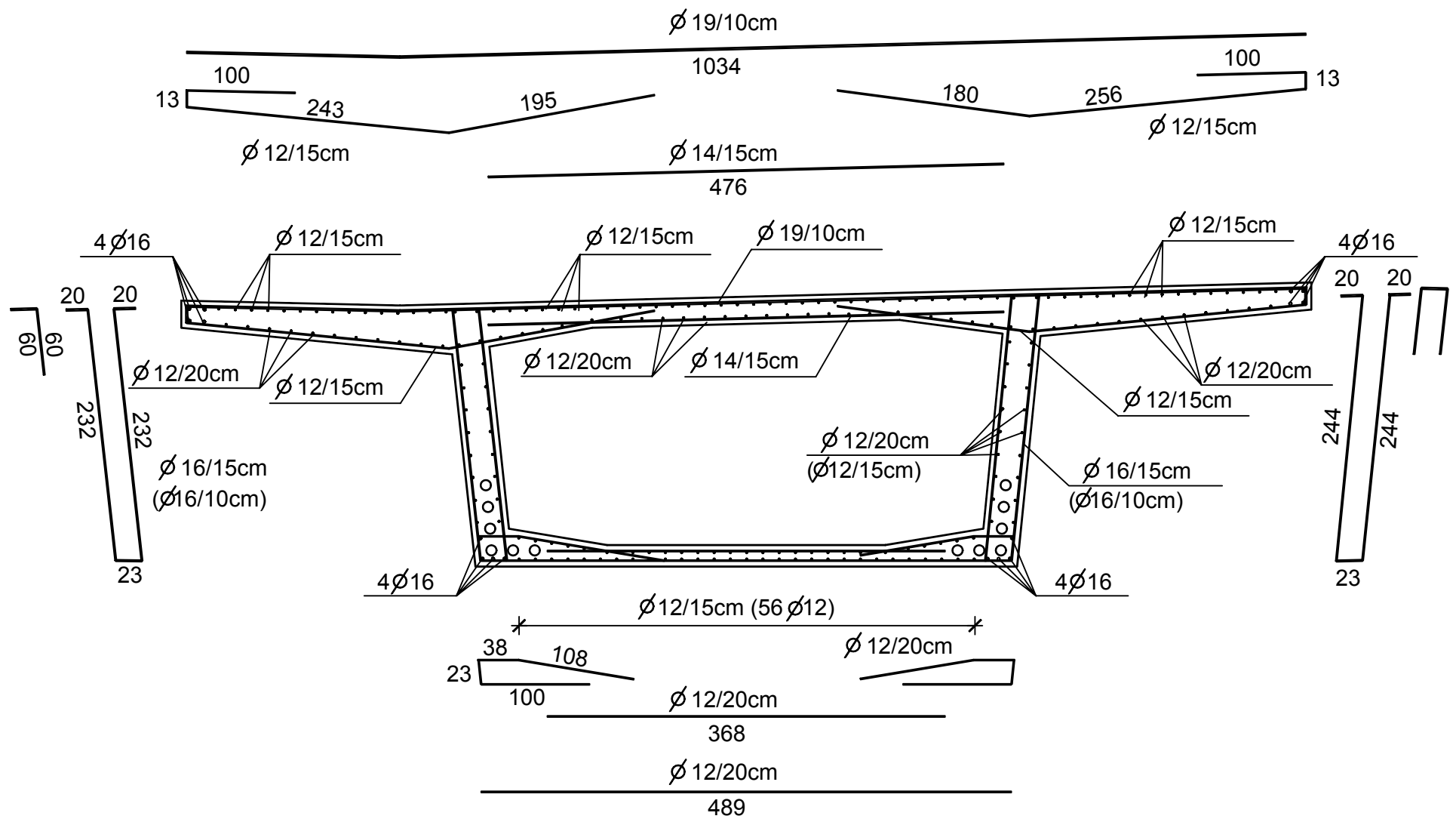
PREDNAPINJANJE SANDUČASTIH NOSAČA GRAĐENIH UZDUŽNIM POTISKIVANJEM

- 2. faza – KONAČNO STANJE – KONTINUITETNO PREDNAPINJANJE
 - u ugrađene zaštitne cijevi u hrptovima sanduka,
 - nakon što je konstrukcija potisnuta u konačni položaj,
 - uvlače se, mogu se protezati kroz više polja (3-4) i prednapinju
 - na mjestima preklapanja nastavljaju se na mjestima hrptova



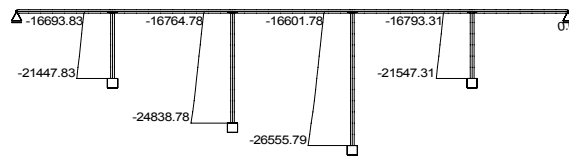
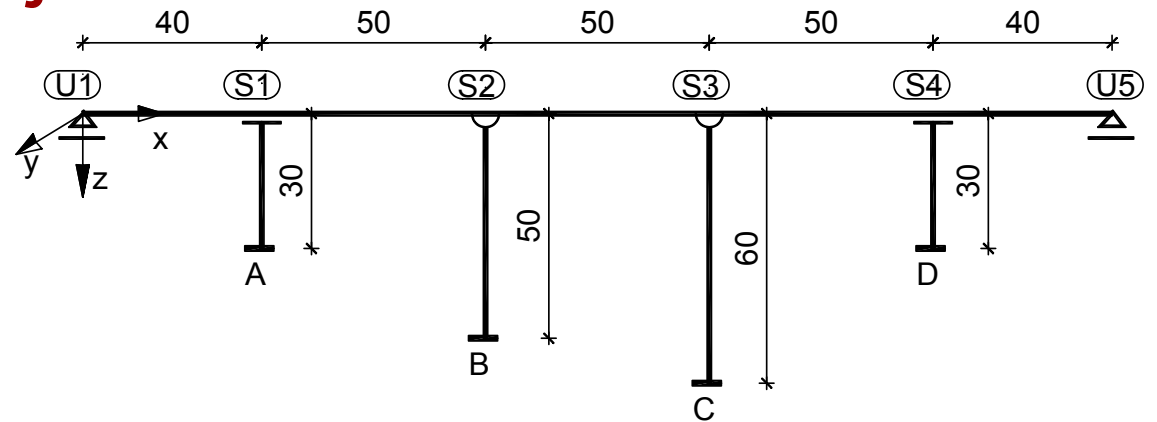
*Primjer
sandučastog
mosta
KM 5.6, str.347.*



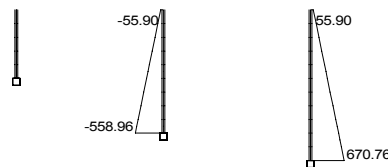


STUPOVI MOSTOVA (SEIZMIČKI PRORAČUN)

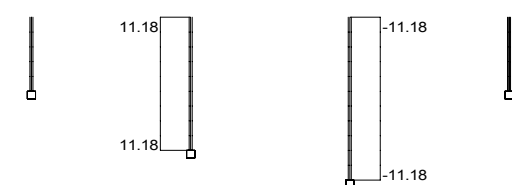
Primjer vijadukta, vj.03



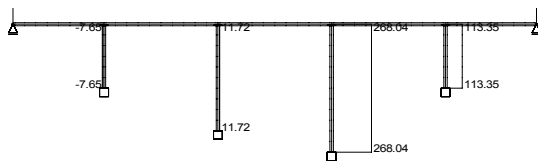
$N(G)$



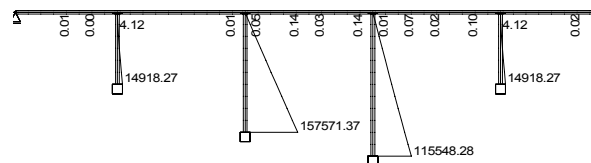
$M_y(P)$



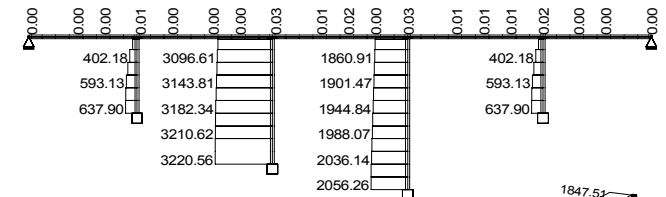
$V_z(P)$



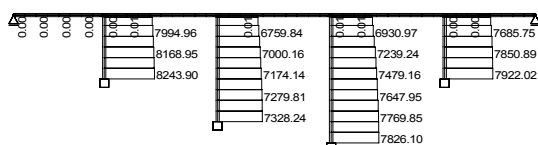
$N(P)$



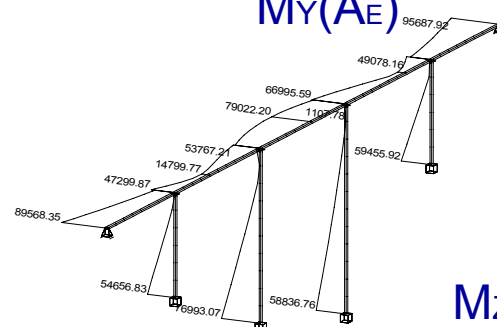
$M_y(AE)$



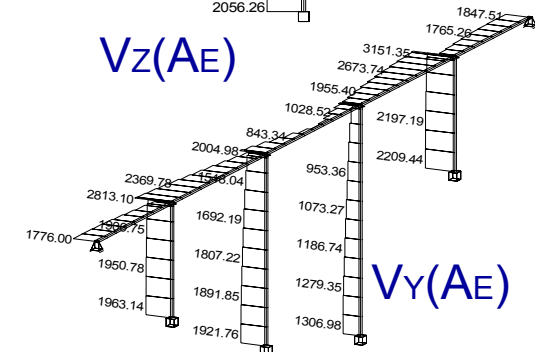
$V_z(AE)$



$N(AE)$

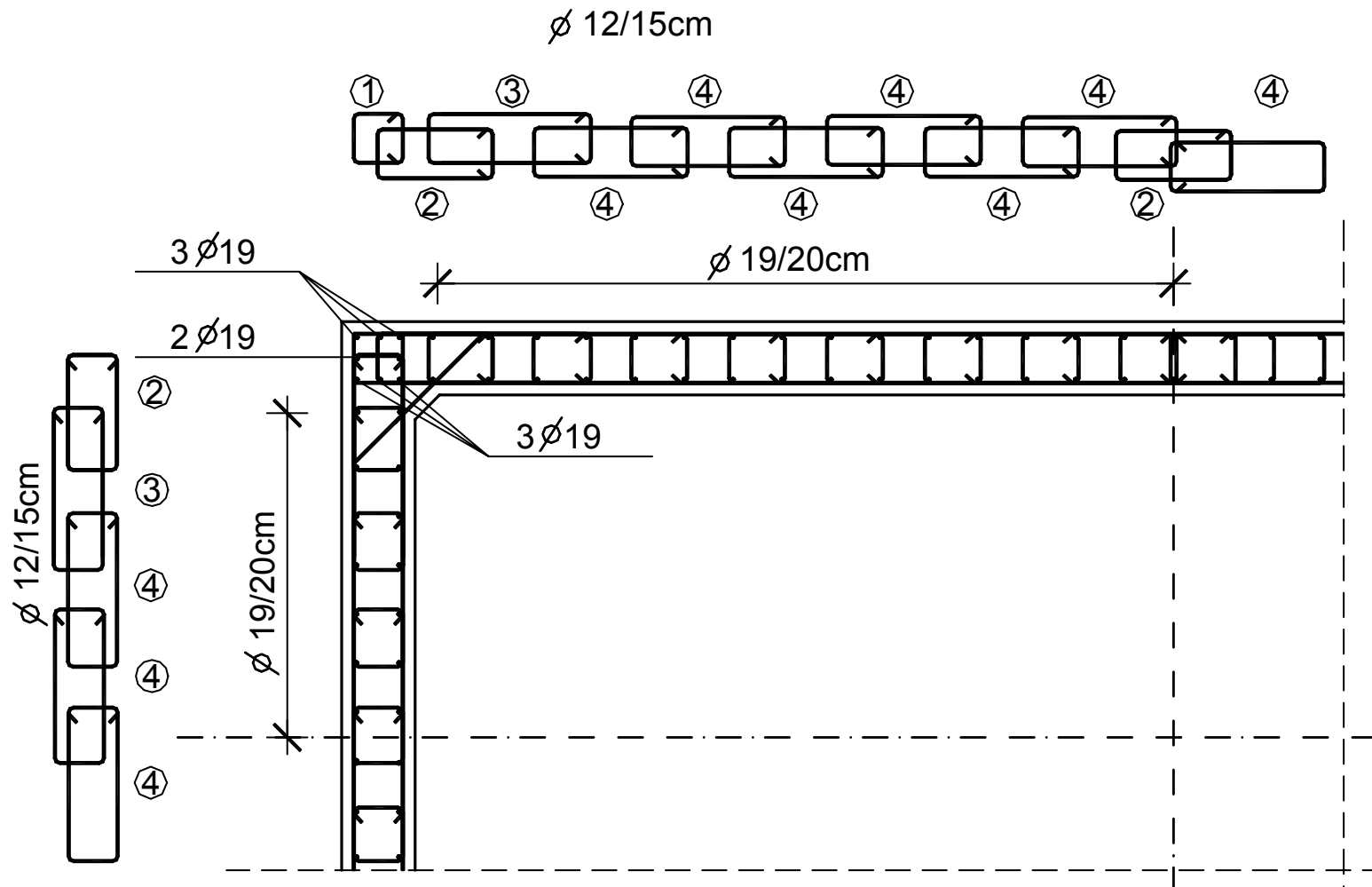


$M_z(AE)$



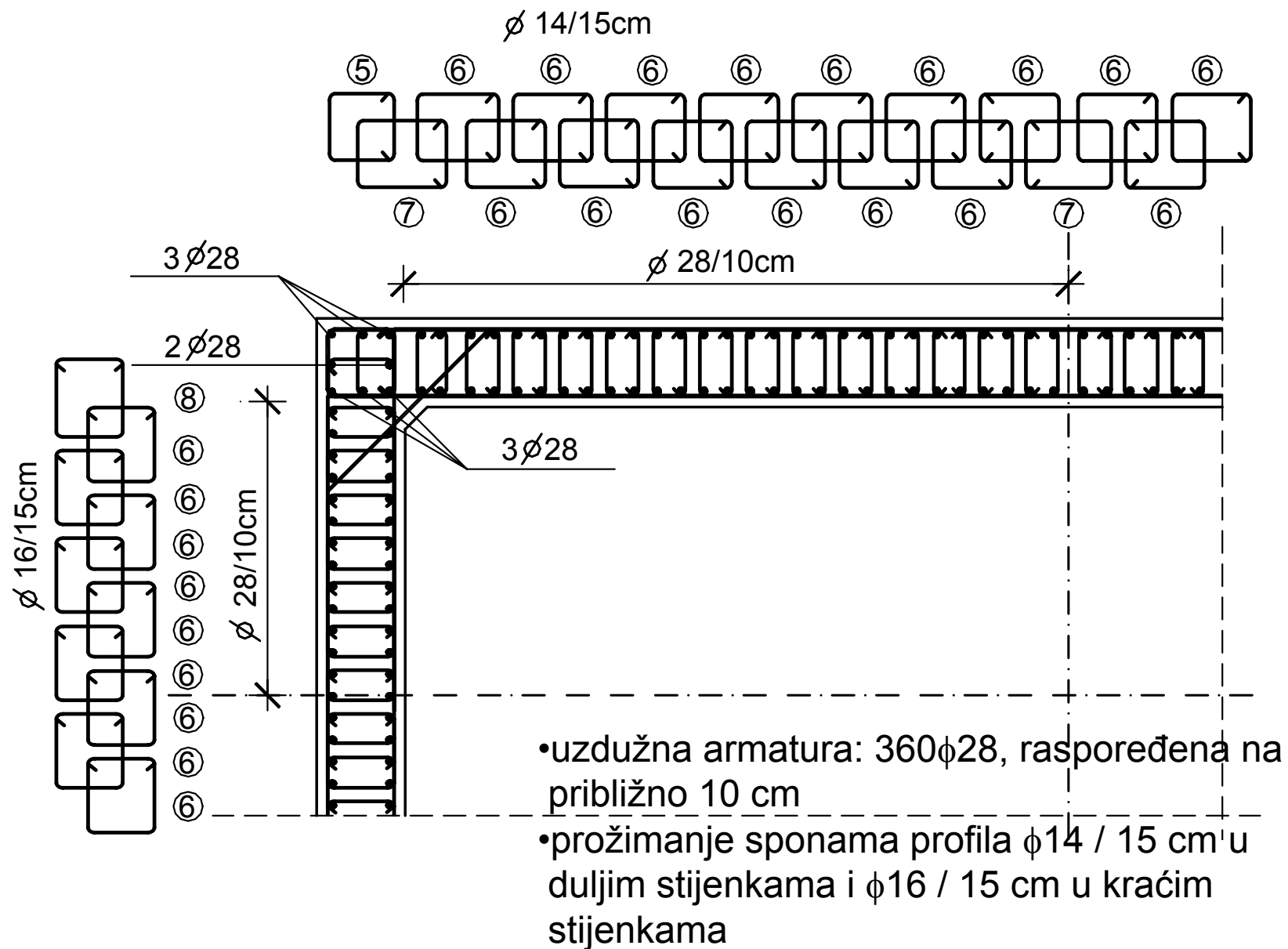
$V_y(AE)$

Primjer vijadukta – rubni stupovi S1, S4

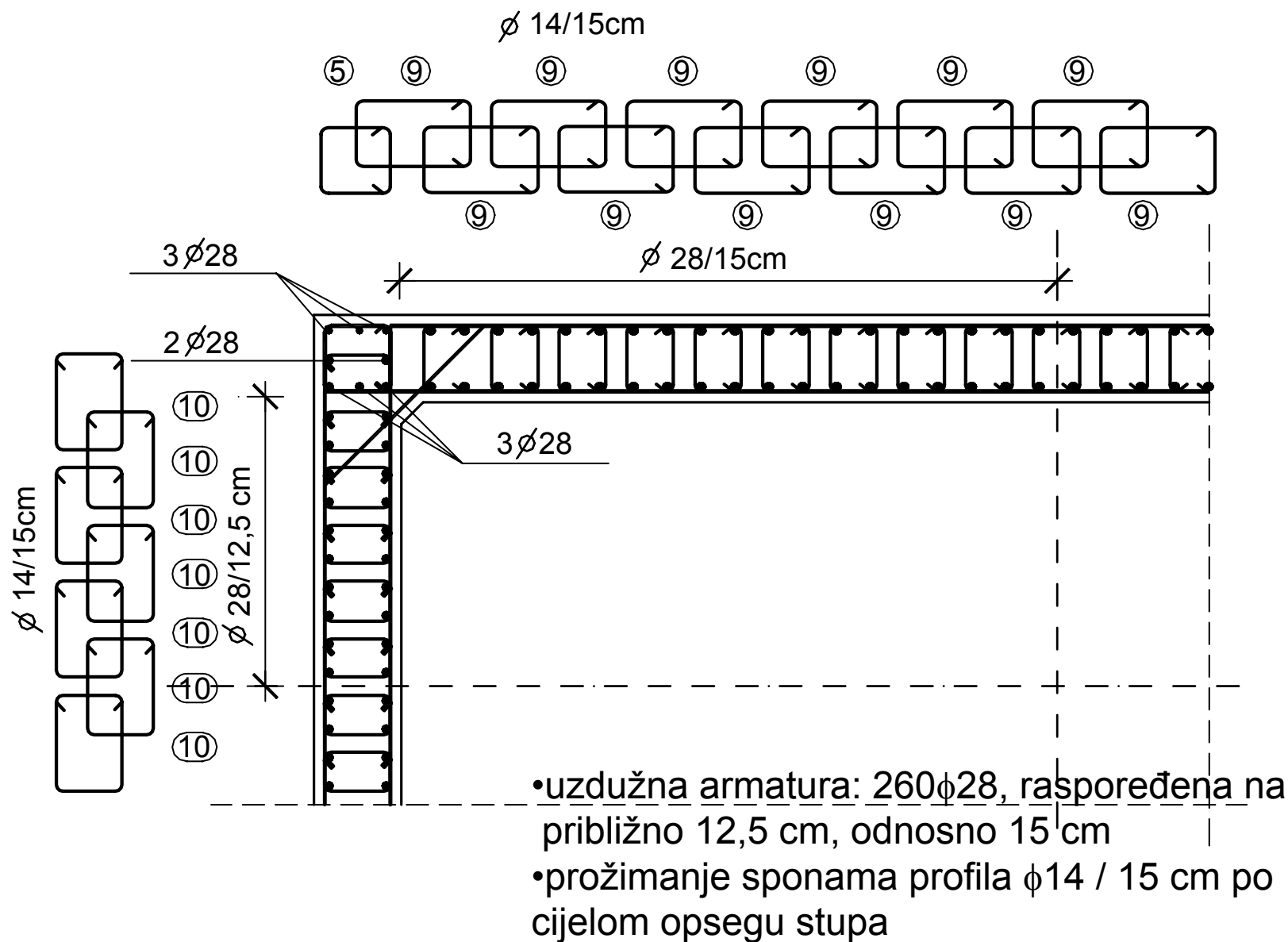


- uzdužna armatura: $188\phi 19$, raspoređena na približno 20 cm
- prožimanje sponama profila $\phi 12$ na razmaku 15 cm po visini plastičnoga zgloba

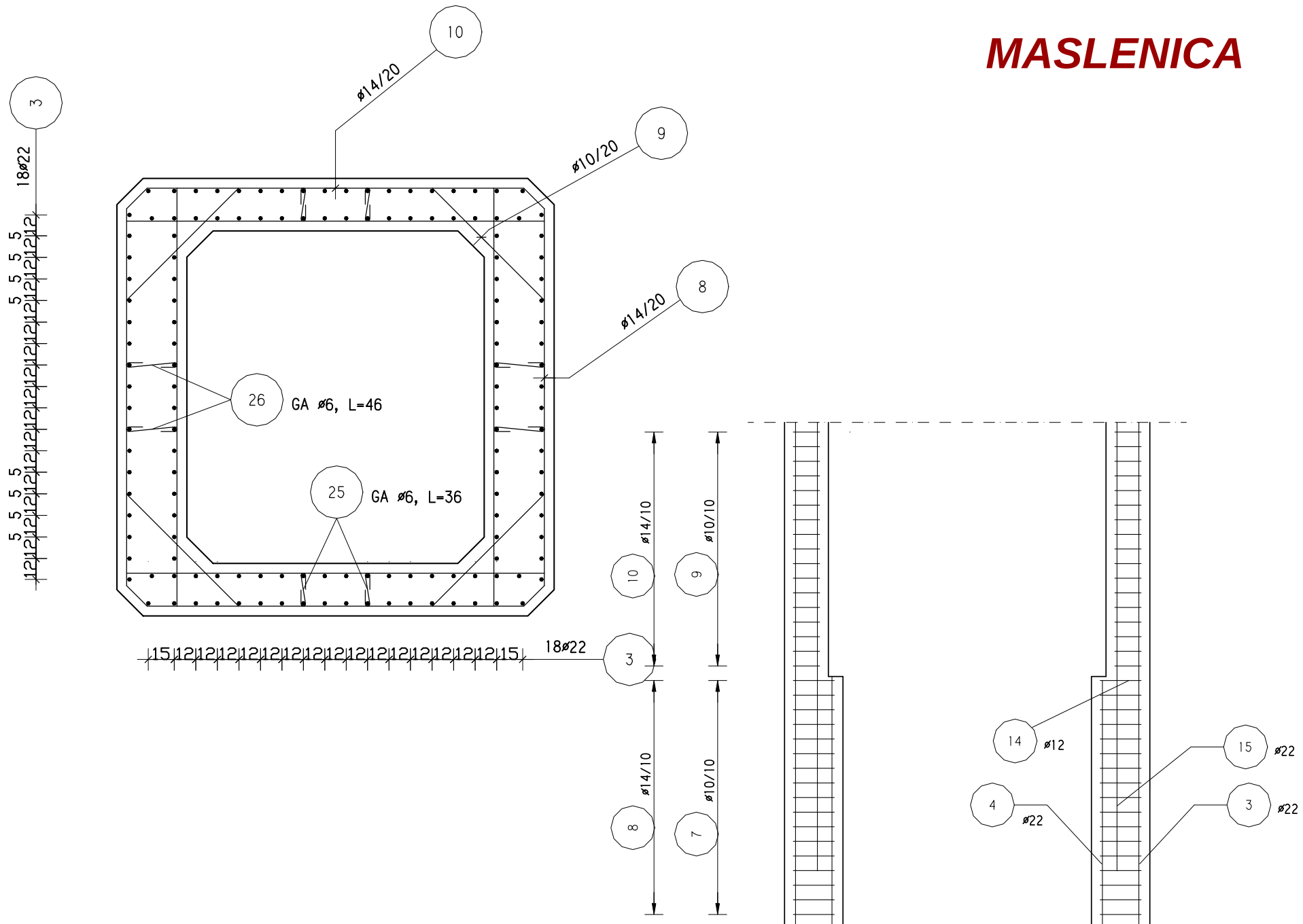
Primjer vijadukta –stup S2



Primjer vijadukta –stup S3



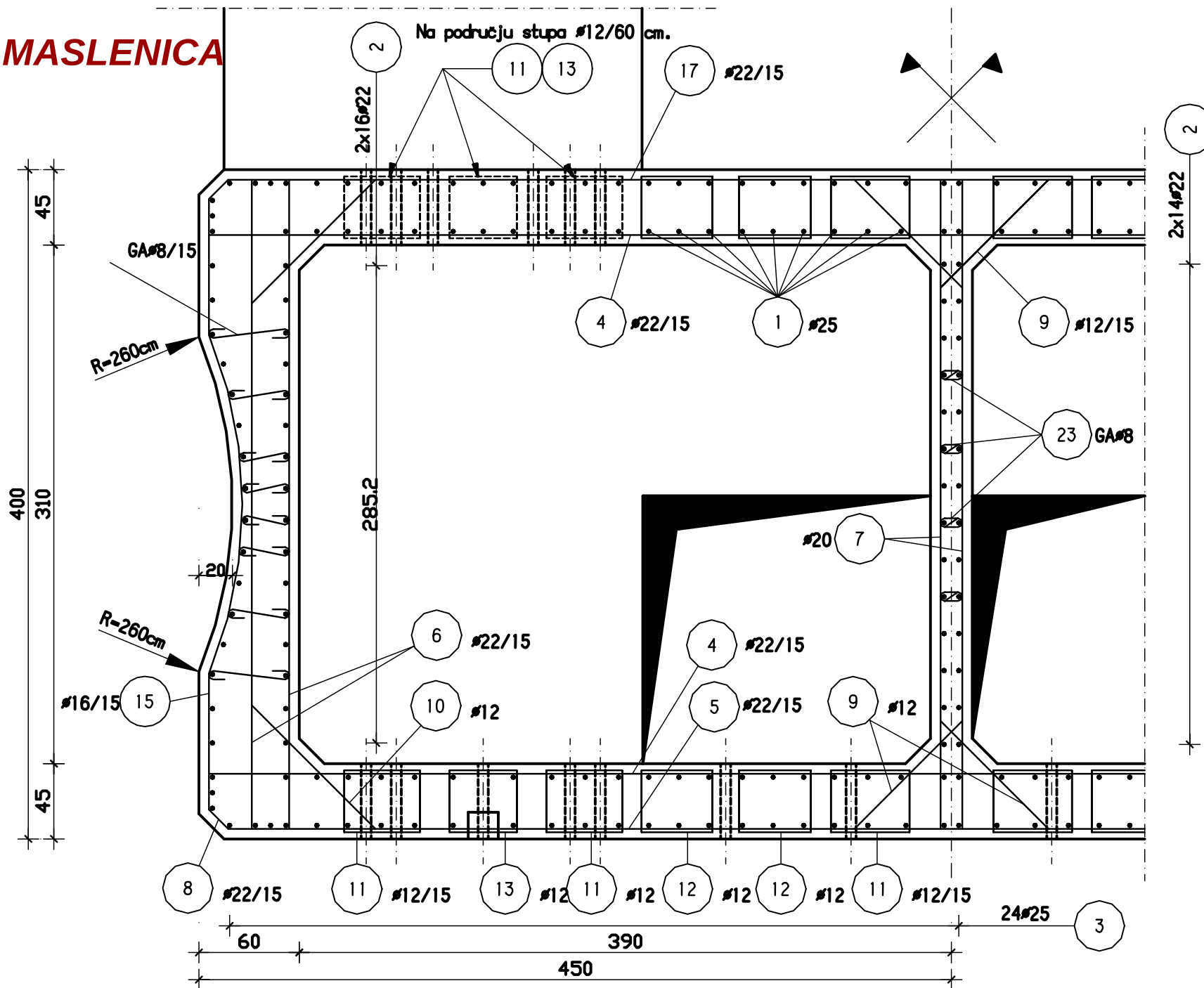
MASLENICA

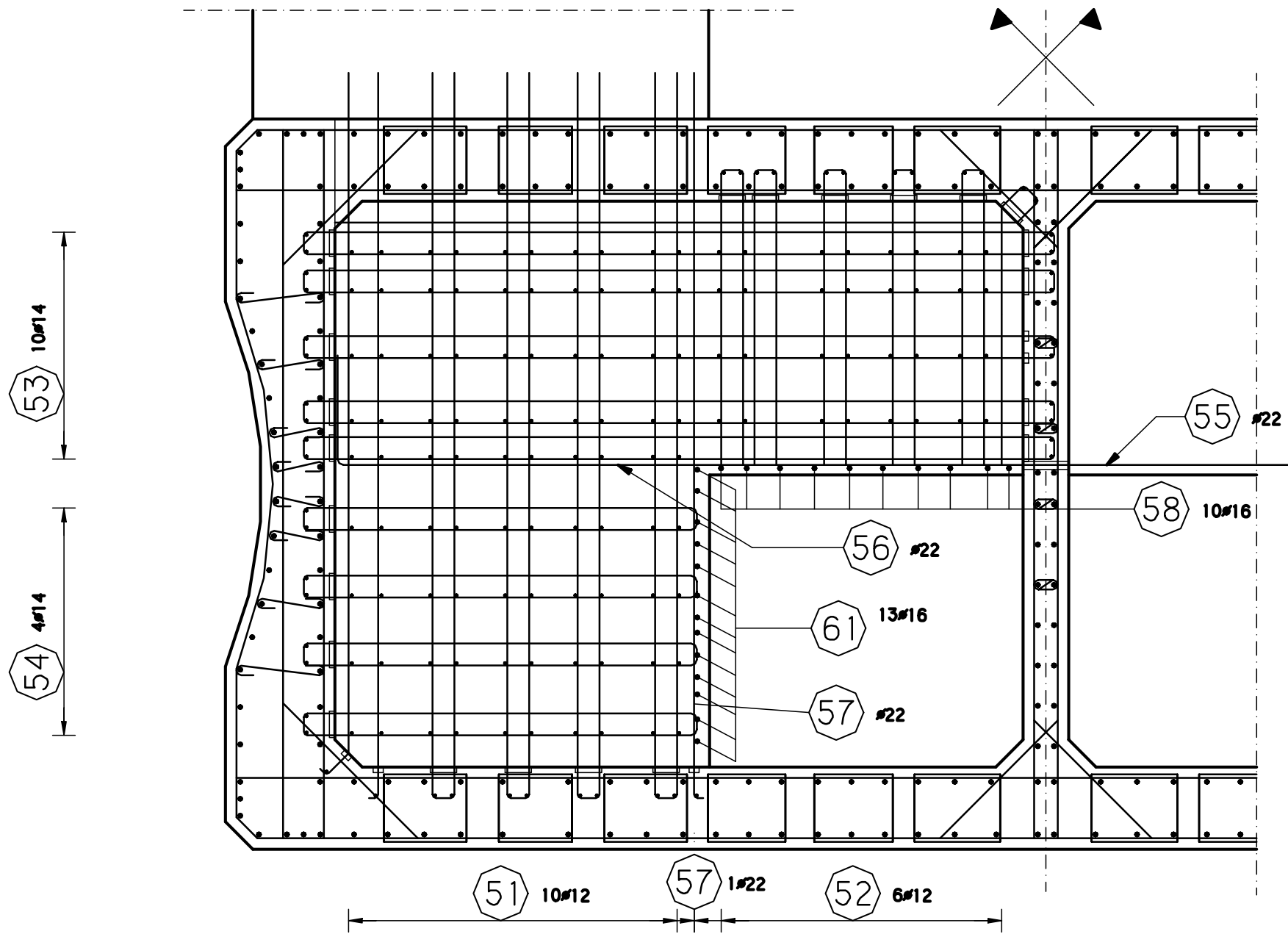


LUK

UZDUŽNA ARM: Ø20 - Ø28 / 15 - 20 cm
POPREČNA ARM: Ø16 – Ø22 / 15 - 20 cm

MASLENICA





Technical drawing of a reinforced concrete beam cross-section. The main section is rectangular with a total width of 790 mm and a total height of 240 mm. It features a central web with two large rectangular voids, each 425 mm wide and 160 mm high. The top and bottom flanges are 68 mm thick. Reinforcement includes top and bottom longitudinal bars ($\varnothing 16/20\text{cm}$), vertical web bars ($\varnothing 12/20\text{cm}$), and horizontal web bars ($\varnothing 19/20\text{cm}$). The drawing includes detailed views of the corner reinforcement and the void reinforcement.

Skica armature luka u poprečnom presjeku