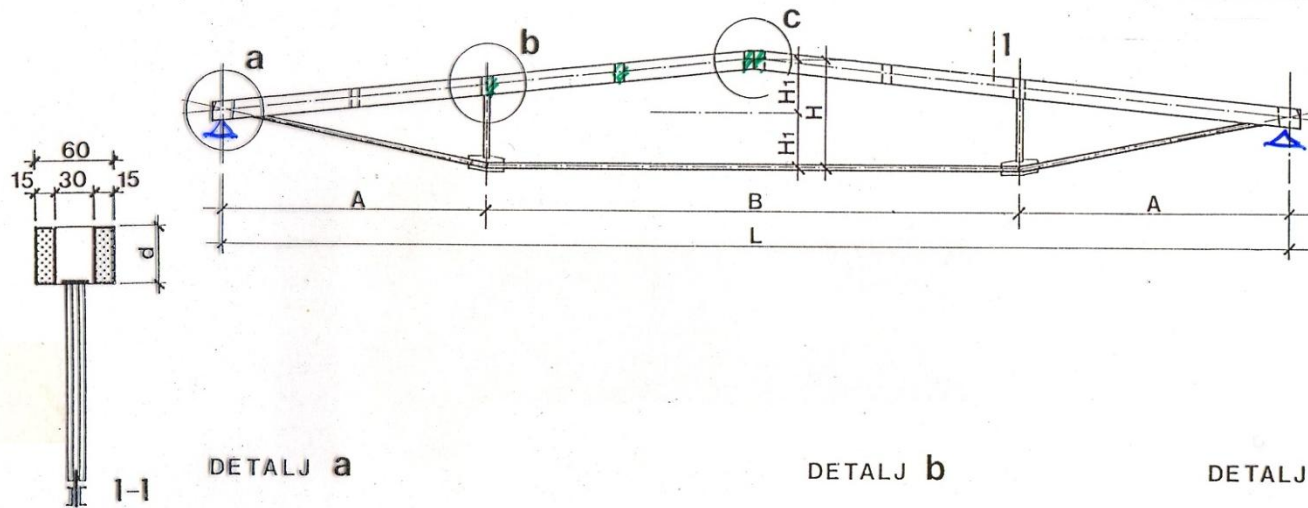
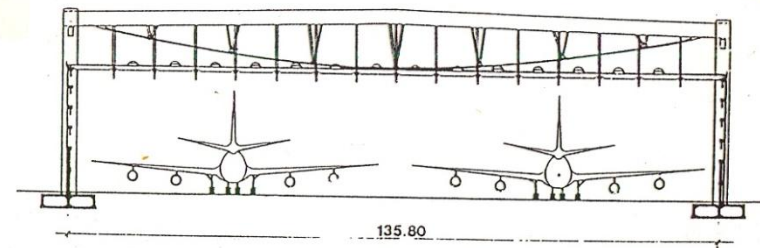
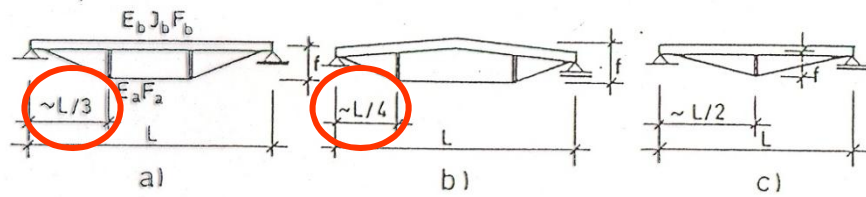


Projektovanje i građenje betonskih konstrukcija 2

Industrijske montažne hale

DVOPOJASNI GLAVNI NOSAČI (GN)

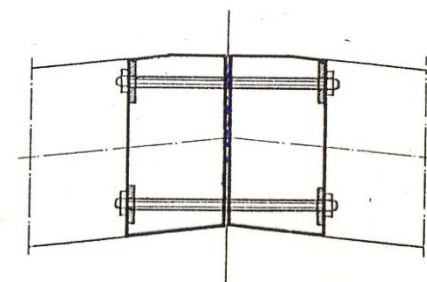
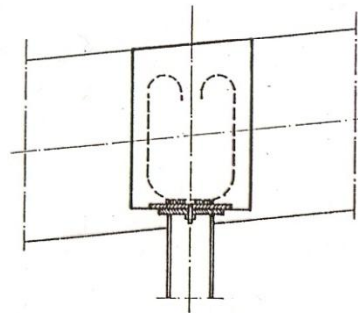
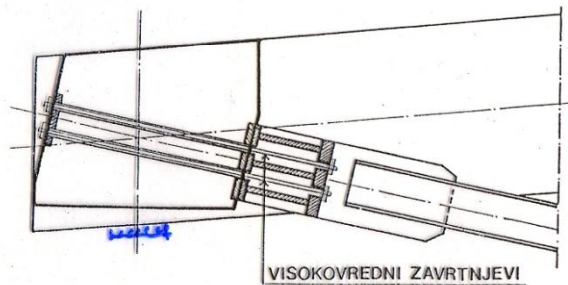
Oblici glavnih nosača

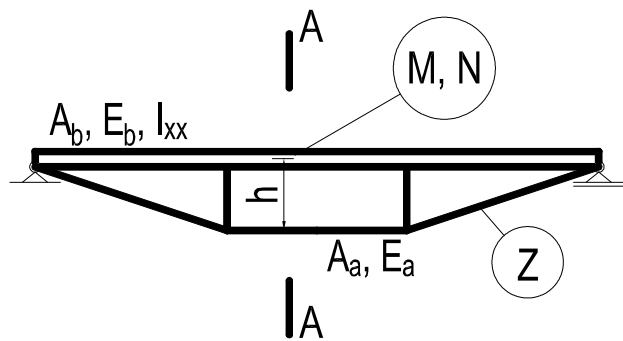


DETALJ a

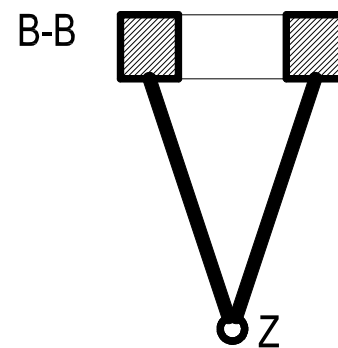
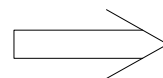
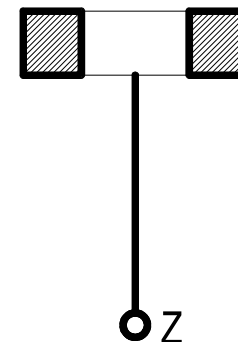
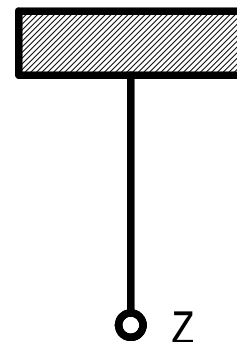
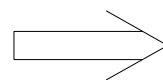
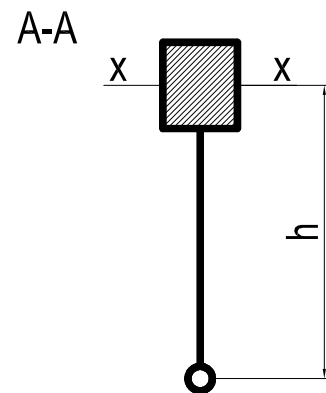
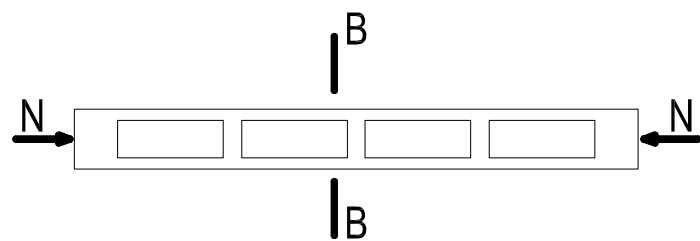
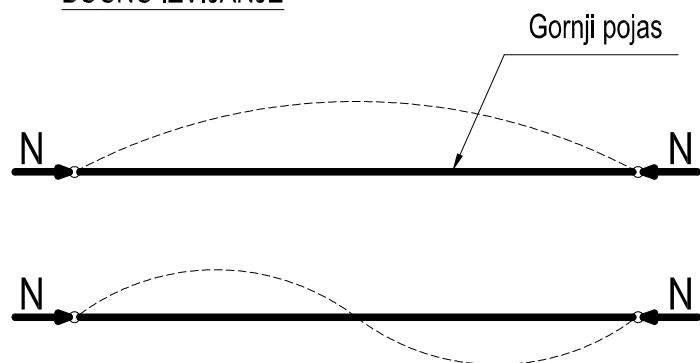
DETALJ b

DETALJ c

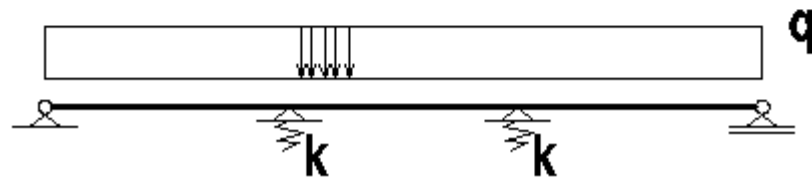
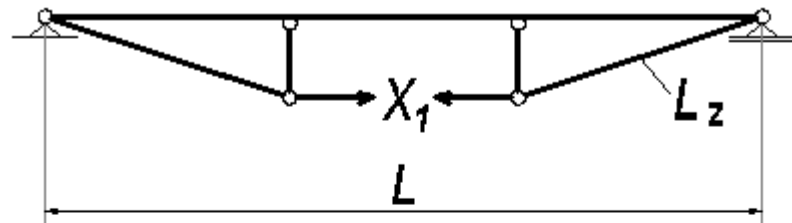




BOČNO IZVIJANJE



STATIČKI SISTEM

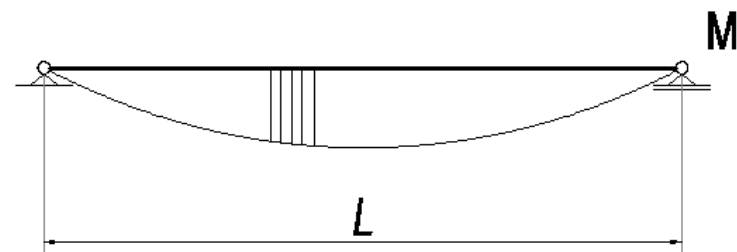
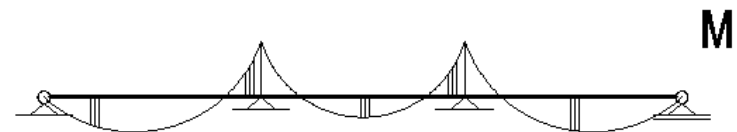


Uslovna jednačina pomeranja

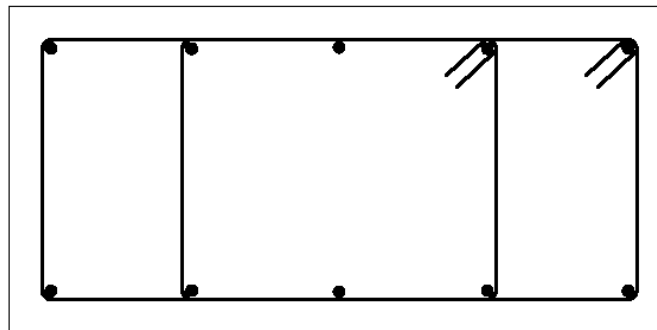
$$\delta_{ij} = \int_0^L \frac{M \bar{M}}{E_b I_b} ds + \int_0^L \frac{N \bar{N}}{E_b A_b} ds + \int_0^{L_z} \frac{Z \bar{Z}}{E_a A_a} ds$$

a) $A_a \rightarrow \infty \Rightarrow k \rightarrow \infty$

b) $A_a \rightarrow 0 \Rightarrow k \rightarrow 0$



- Kod velikih raspona:
 - proračun po teoriji II reda,
 - geometrijske karakteristike sa prslinama u betonu,
 - uzima se u obzir tečenje i skupljanje betona i uticaj temperature.
- U gornjem pojasu treba težiti da vrednosti M^+ i M^- budu približne
- Armiranje gornjeg pojasa:



$$\mu' = 0.4\%$$

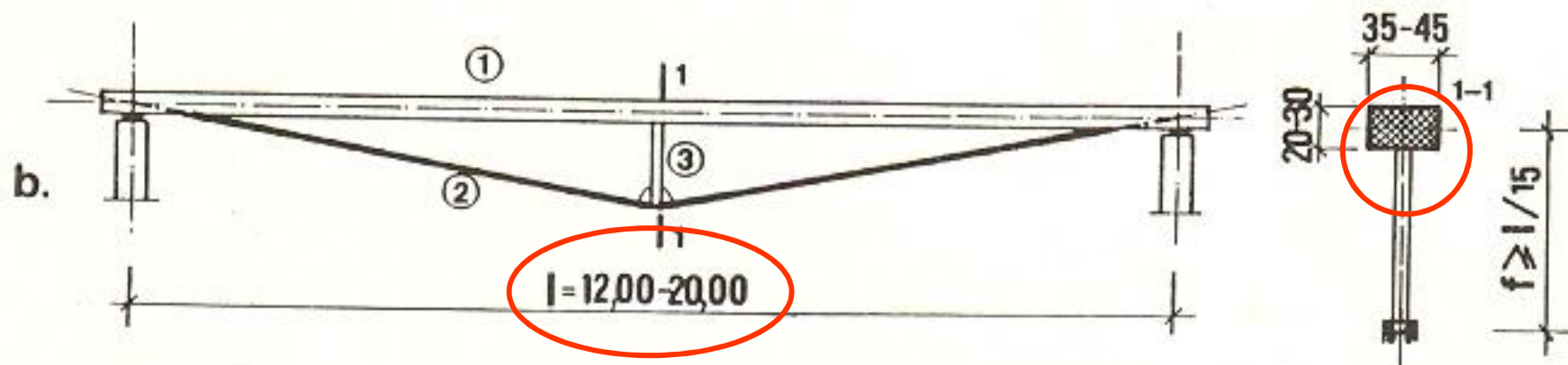
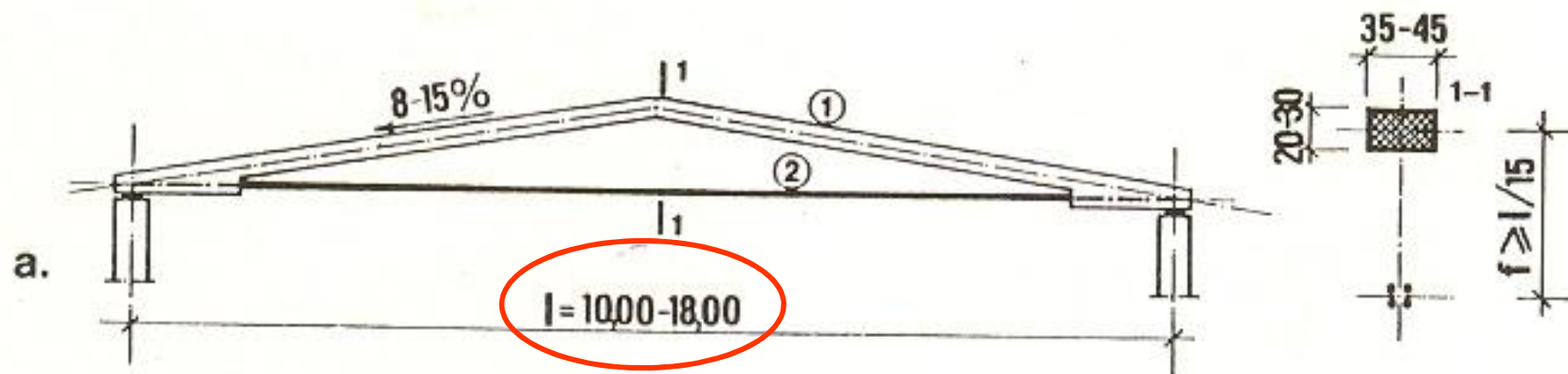
$$\mu = 0.4\%$$

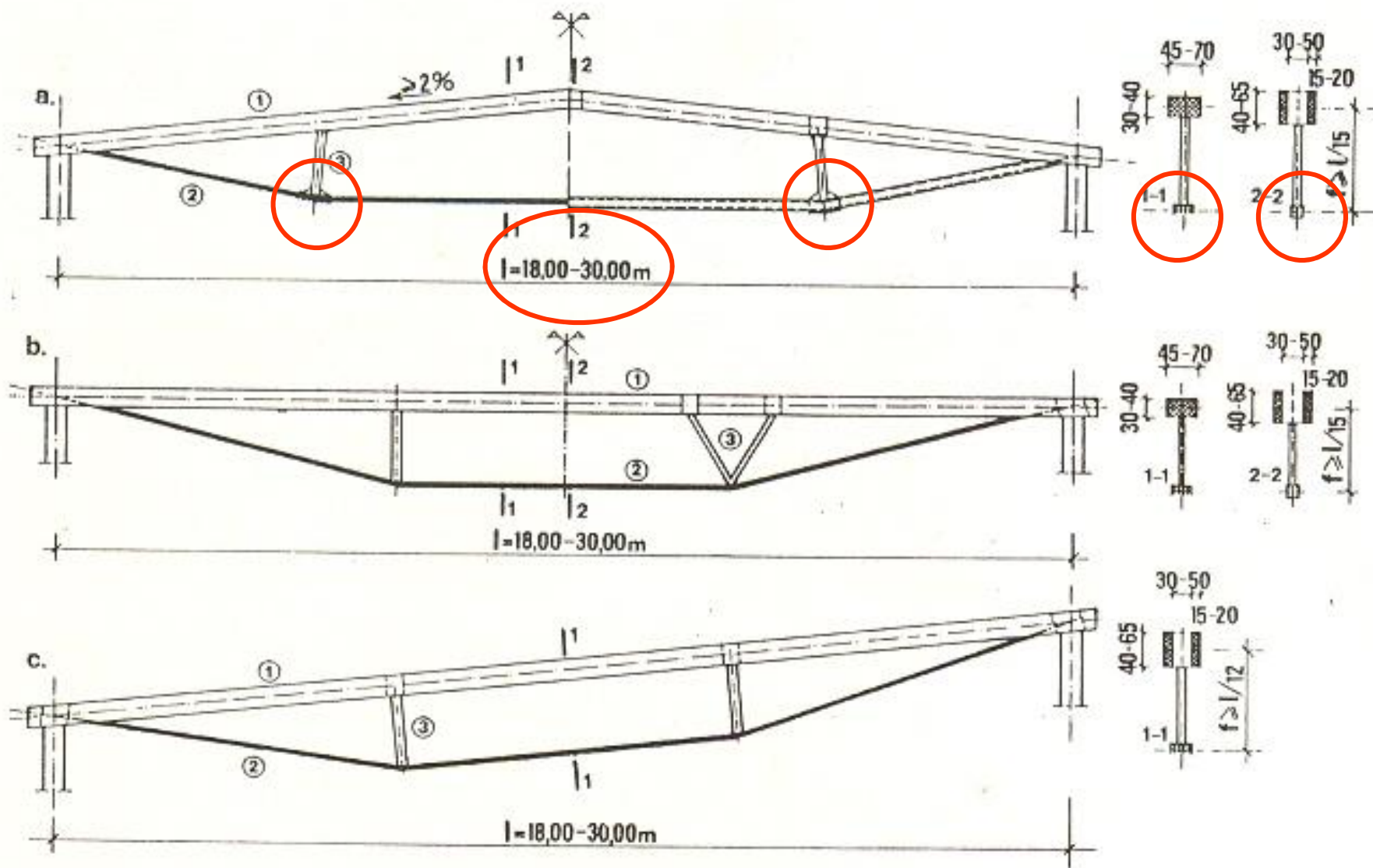
- Donji pojas:
 - a) AB zatega (dobra vatrootpornost)
 - b) Čelik
 - okruglo ("betonsko") gvožđe
 - valjani profili
 - c) Kablovi za prednaprezanje (visokokvalitetni čelik)
- Od nivoa prednaprezanja zavisi slika presečnih sila i deformacija. Anvelopa uticaja po fazama i kombinacijama opt.



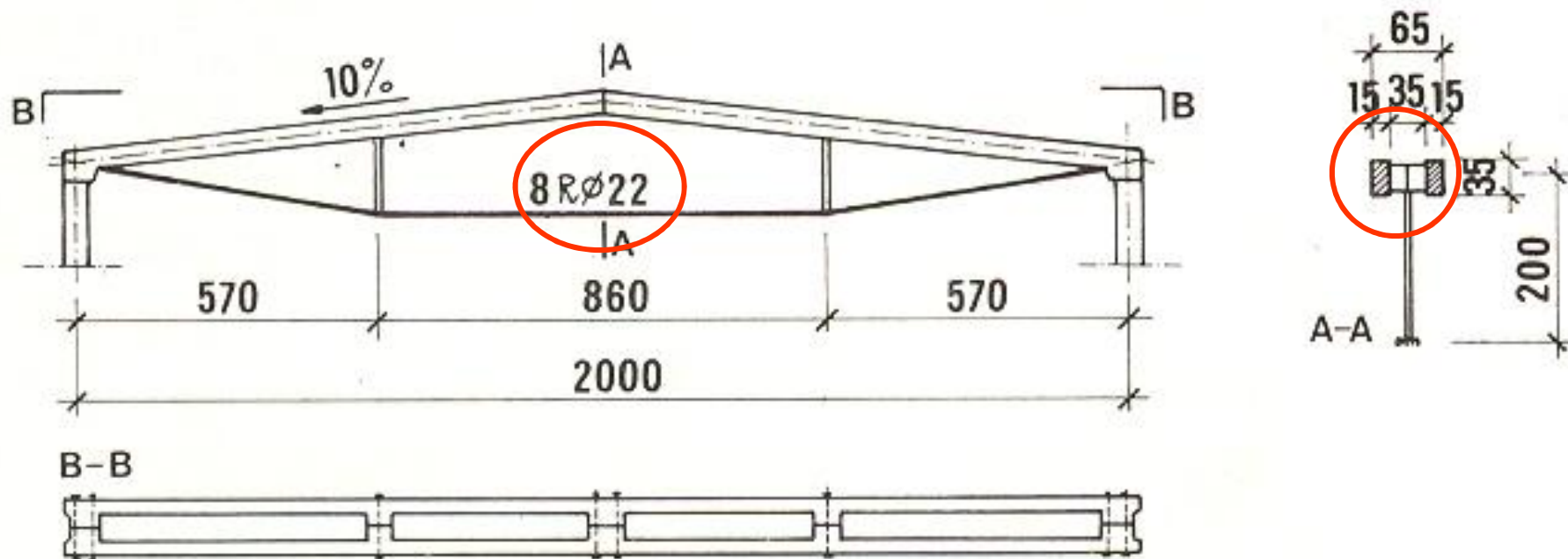
- Oslonački čvor → sidrenje zatege (!)
- Način izrade → najčešće u horizontalnom položaju, zatim okretanje u vertkalu, podizanje i montiranje.

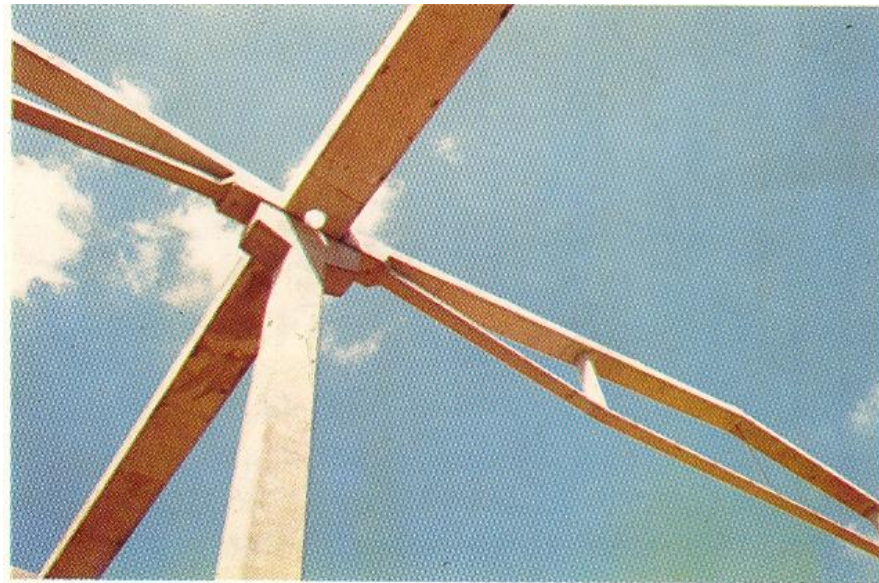
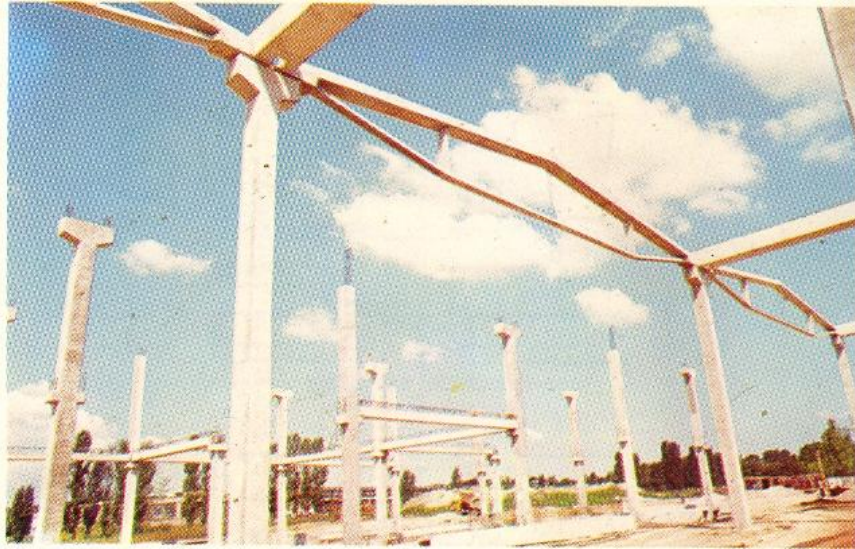
Nosači sa čeličnom zategom



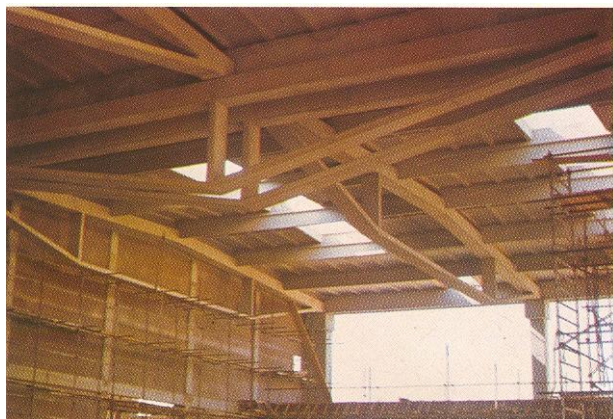


Nosači sa udvojenim gornjim pojasom

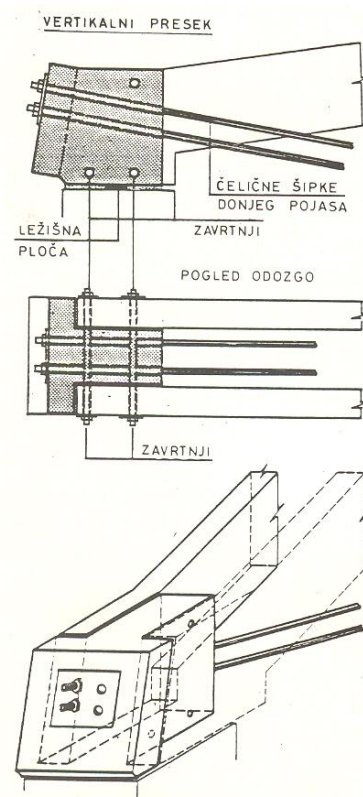




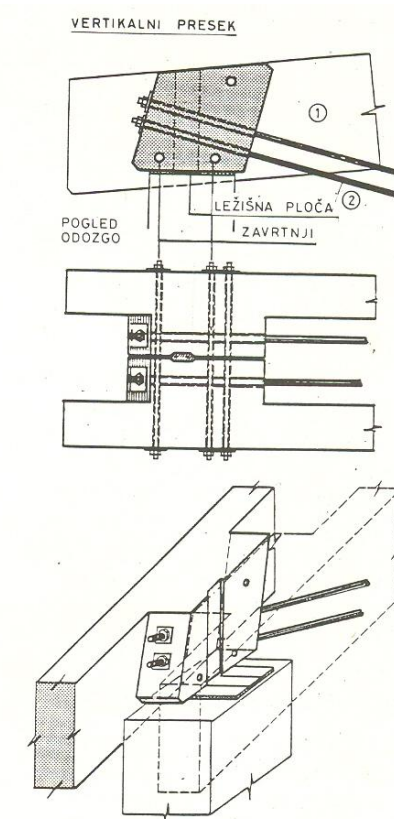




Oslonački detalji

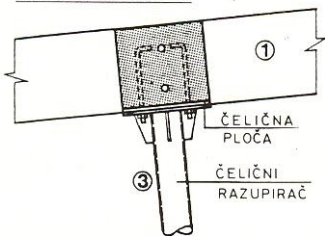


etali montažno demontažnog razvrstavanja

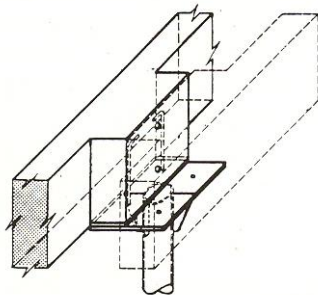
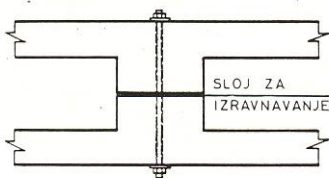


Detalji veza

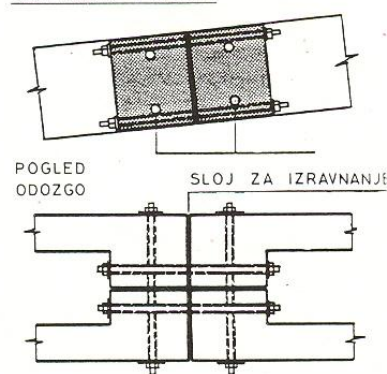
VERTIKALNI PRESEK



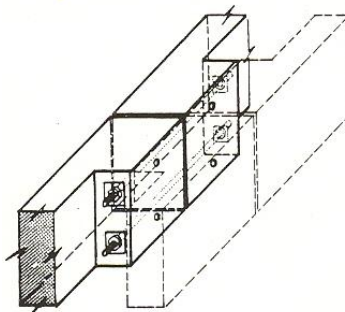
POGLED ODOZGO



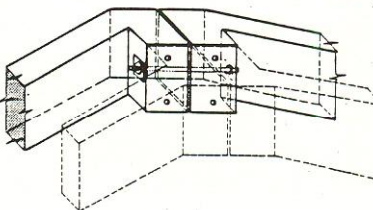
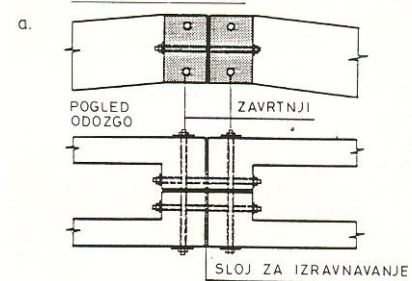
VERTIKALNI PRESEK



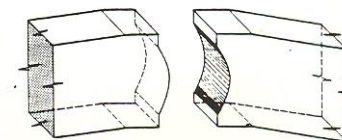
POGLED ODOZGO



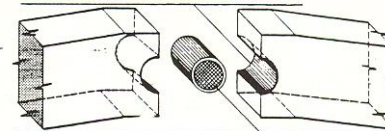
VERTIKALNI PRESEK



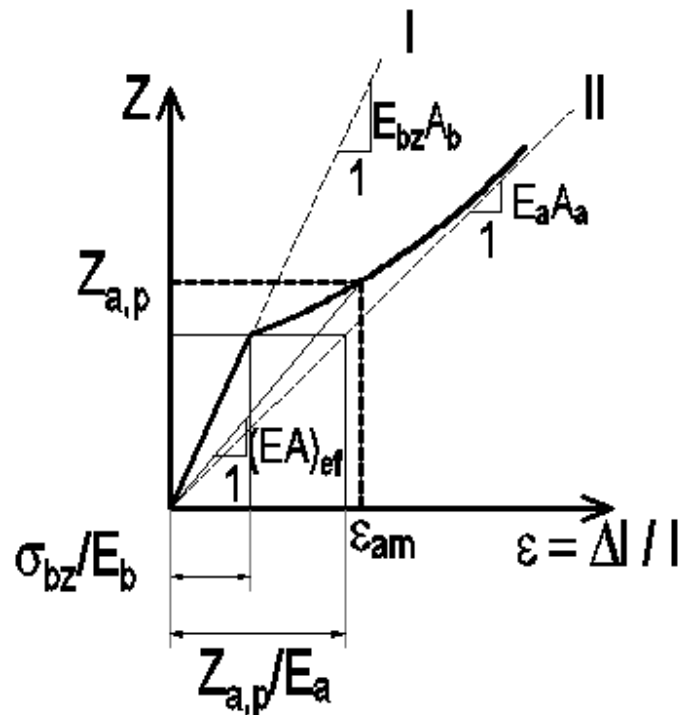
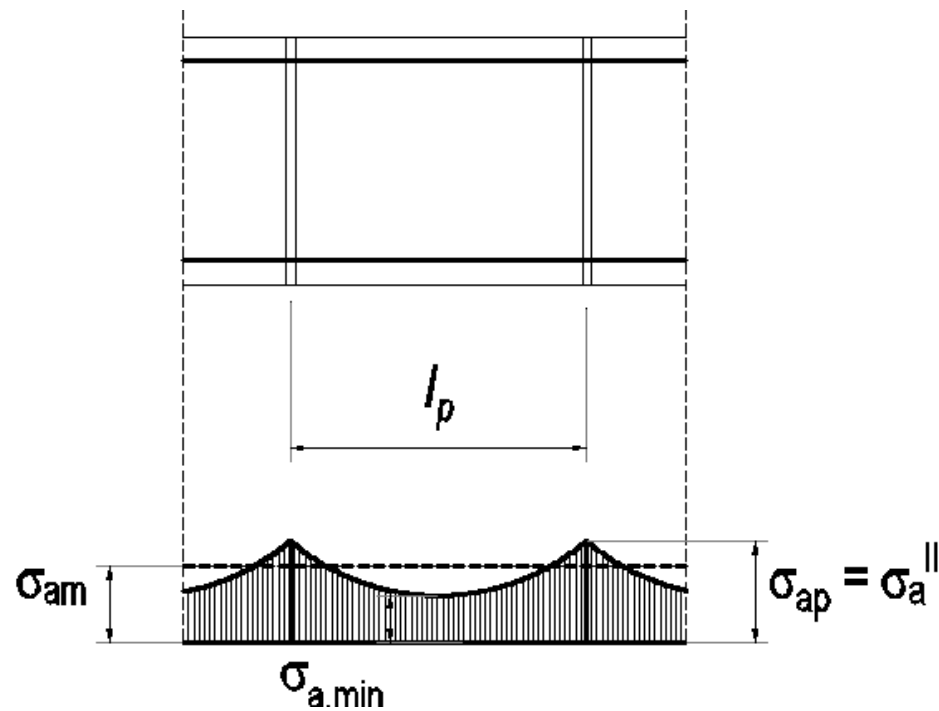
b.



CILINDRIČNI ČELIČNI ELEMENT



ČELIČNI CILINDAR NAPUNJEN BETONOM



$$Z/A_b = \sigma_b \geq \sigma_{bz} \implies \text{prslne} \\ (Z \geq Z_{ap})$$

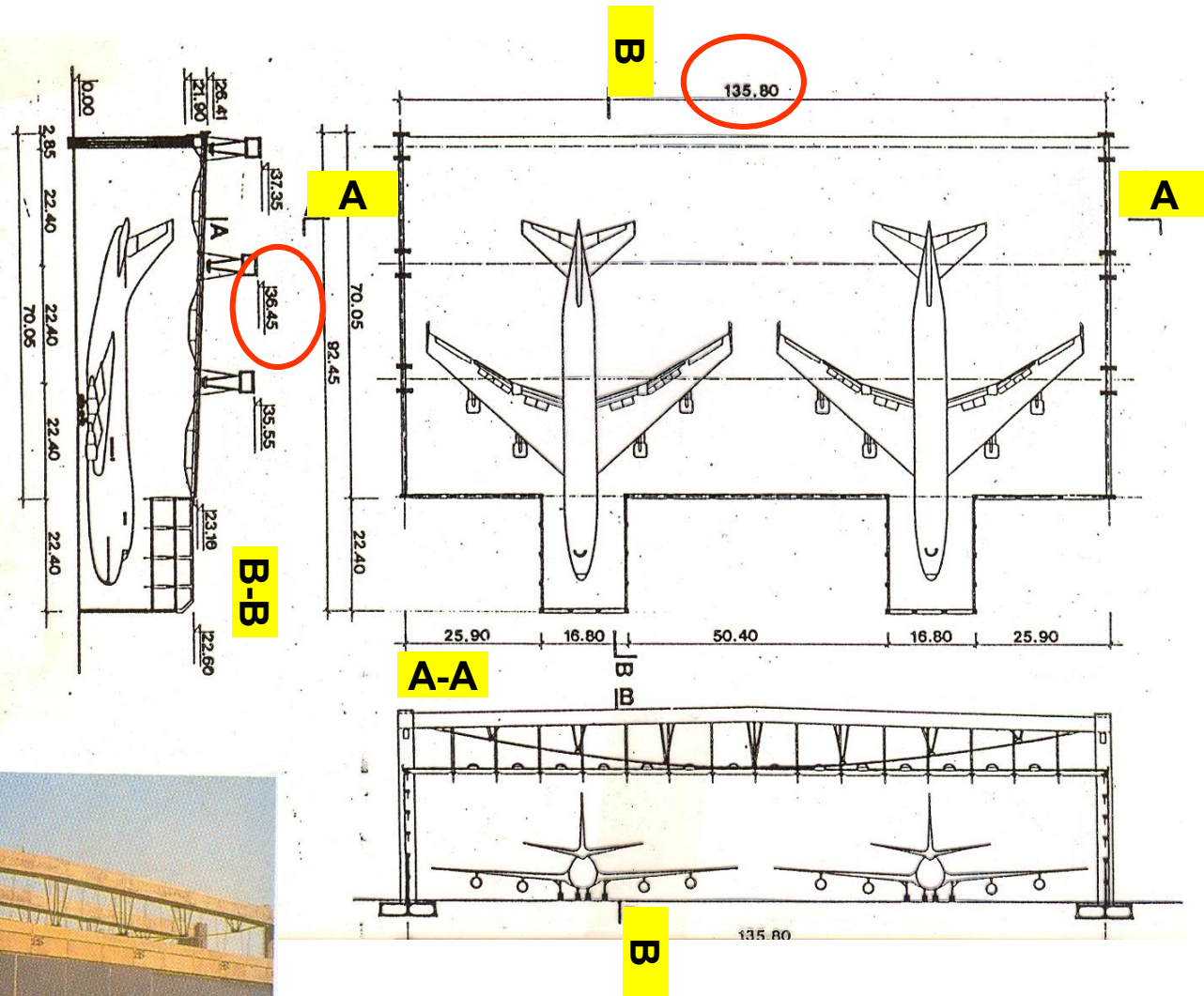
$$(EA)_{ef} = f(Z)$$

$$E_{am} = \sigma_{am}/E_a = Z/(EA)_{ef}$$

$$\text{npr. Branson } Z \geq Z_{ap}$$

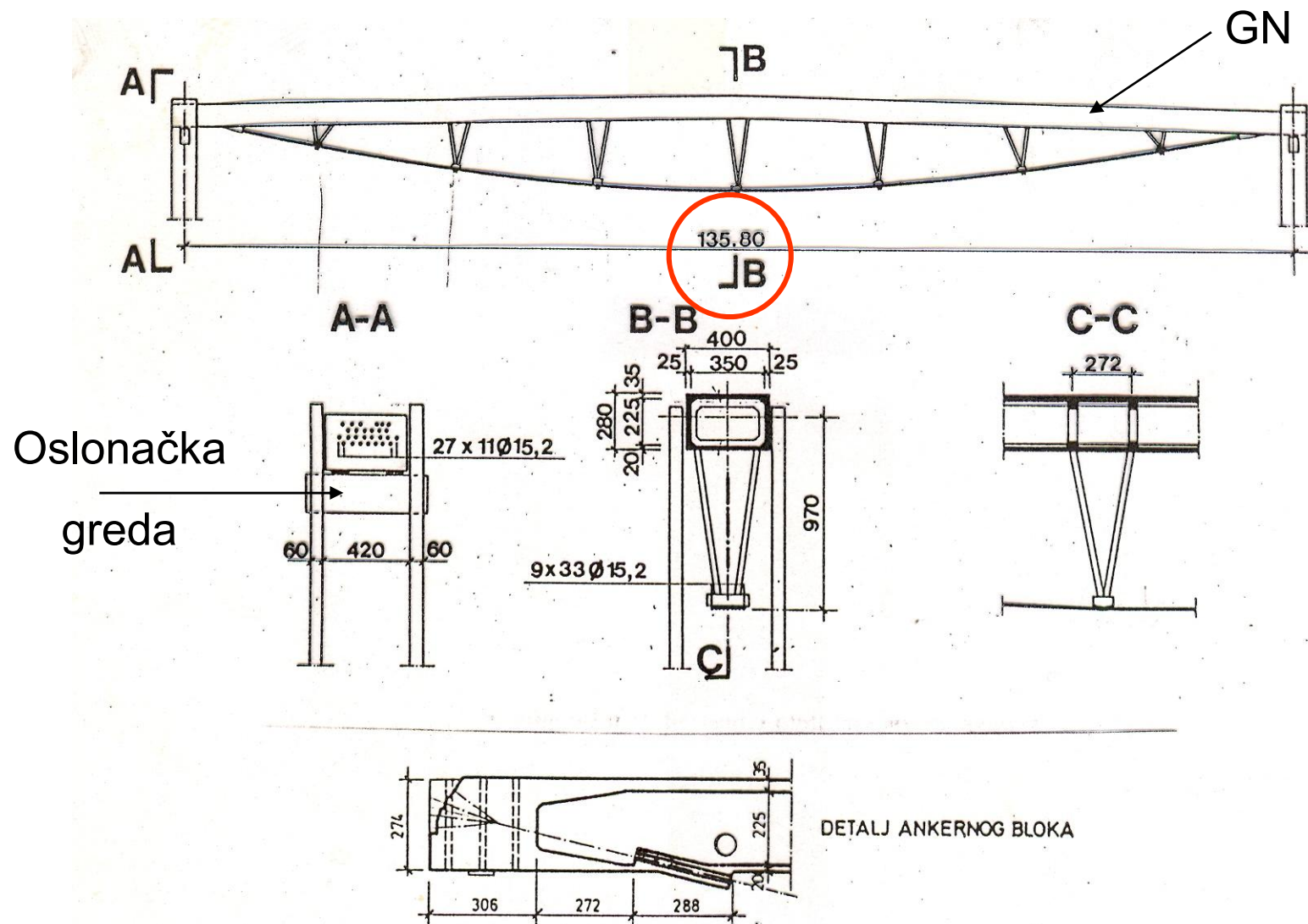
$$A_{ef} = (Z_{ap}/Z)^3 A_b + [1 - (Z_{ap}/Z)^3] A_a$$

$$(EA)_{ef} = E_a A_{ef}$$



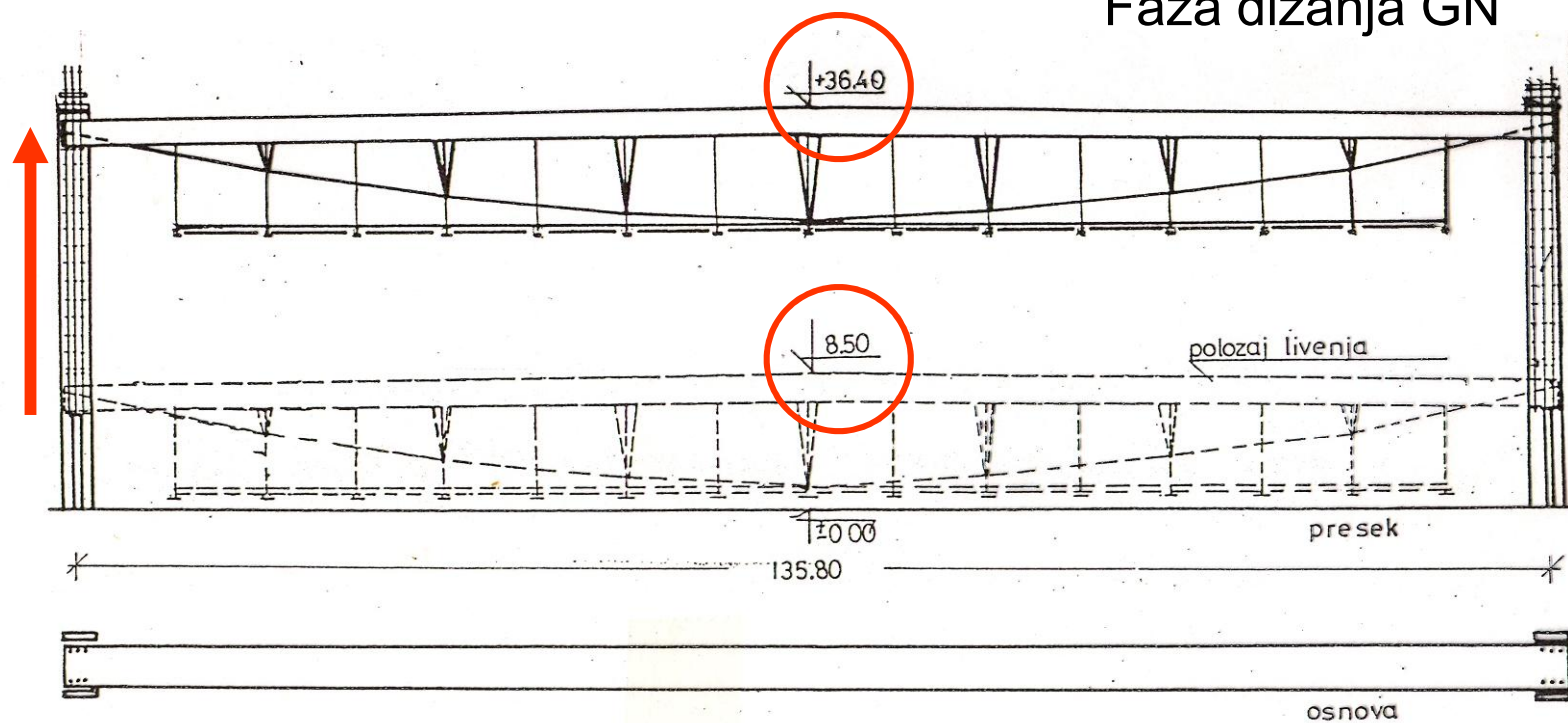
Hangar JAT-a

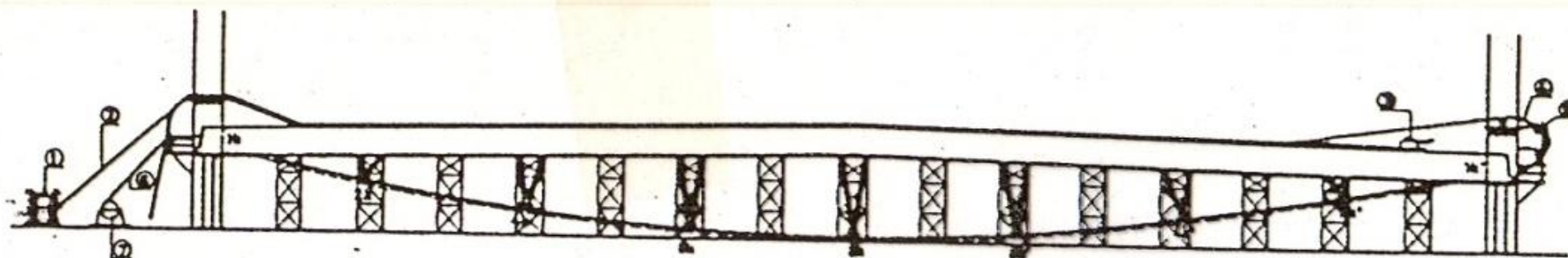
Geometrija glavnog nosača



Faza izrade GN

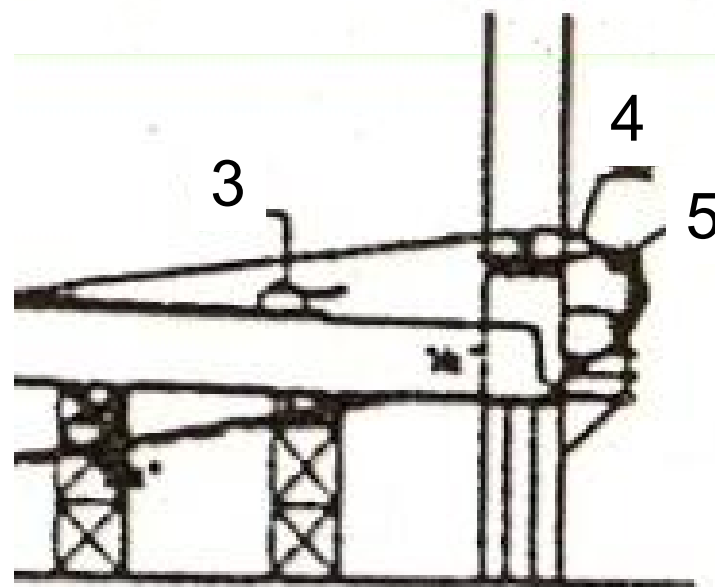
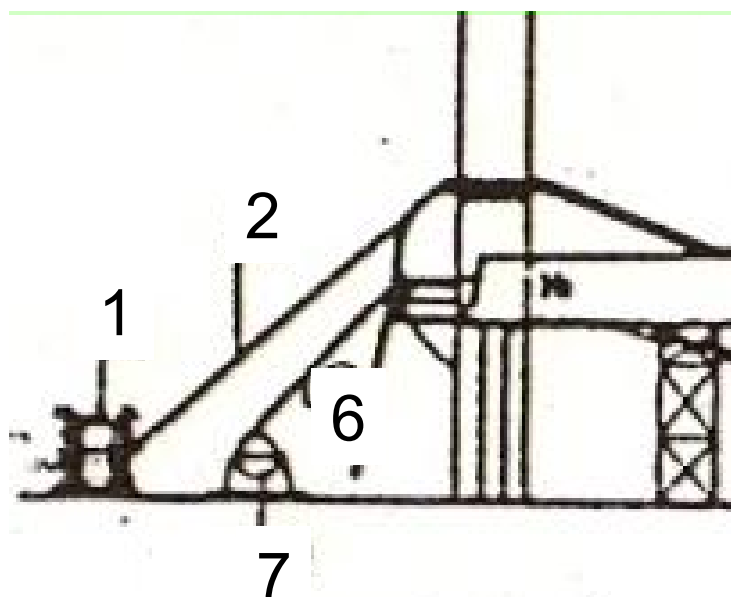
Faza dizanja GN



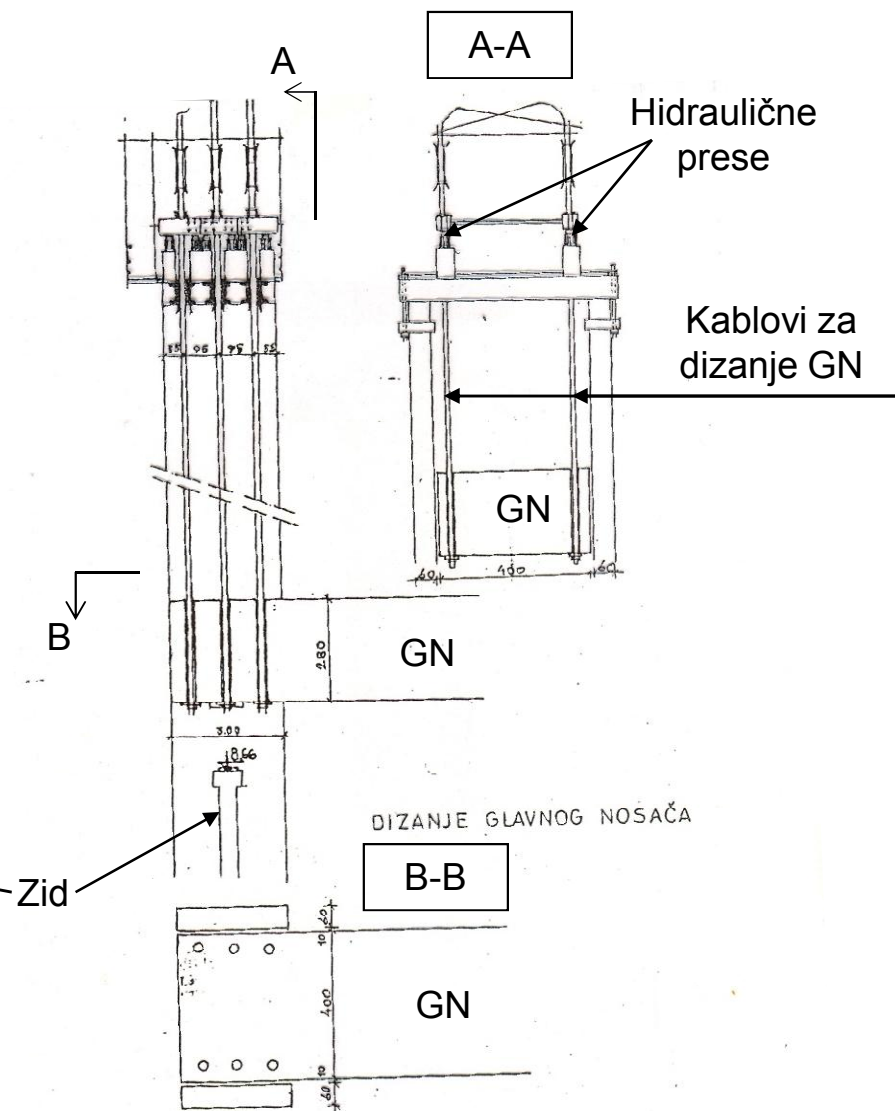
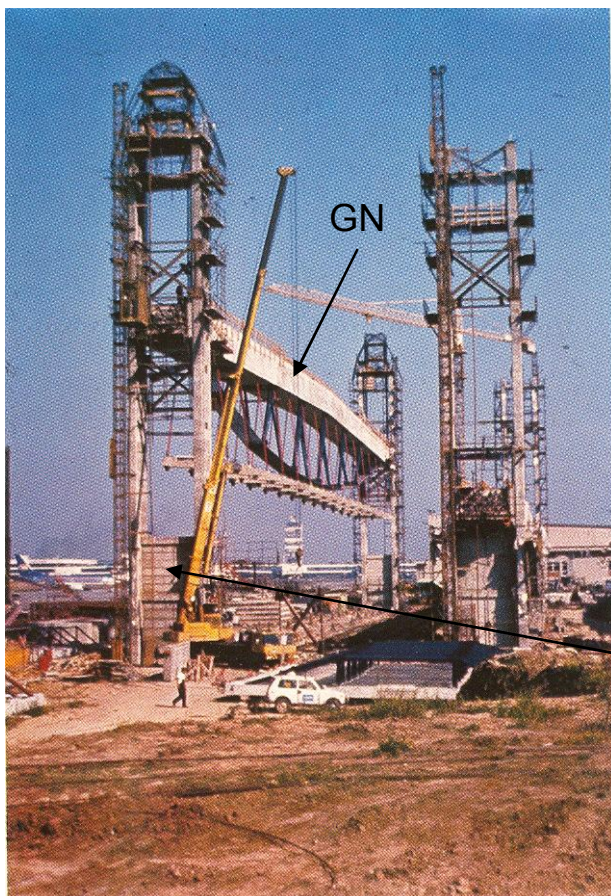


1.koševi za užad
2.užad 2 Ø 15,2 mm
3.vitlo za krojenje

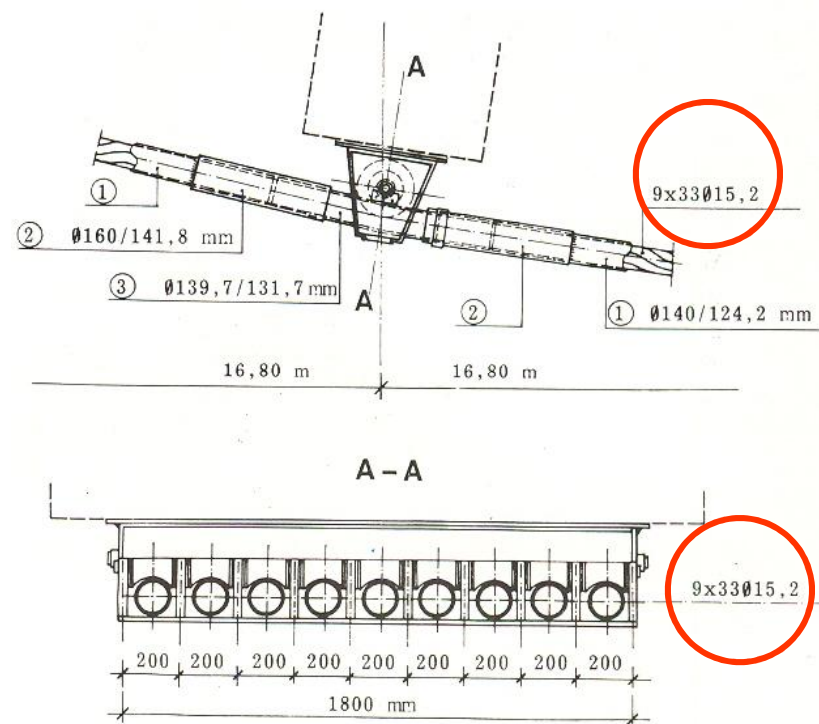
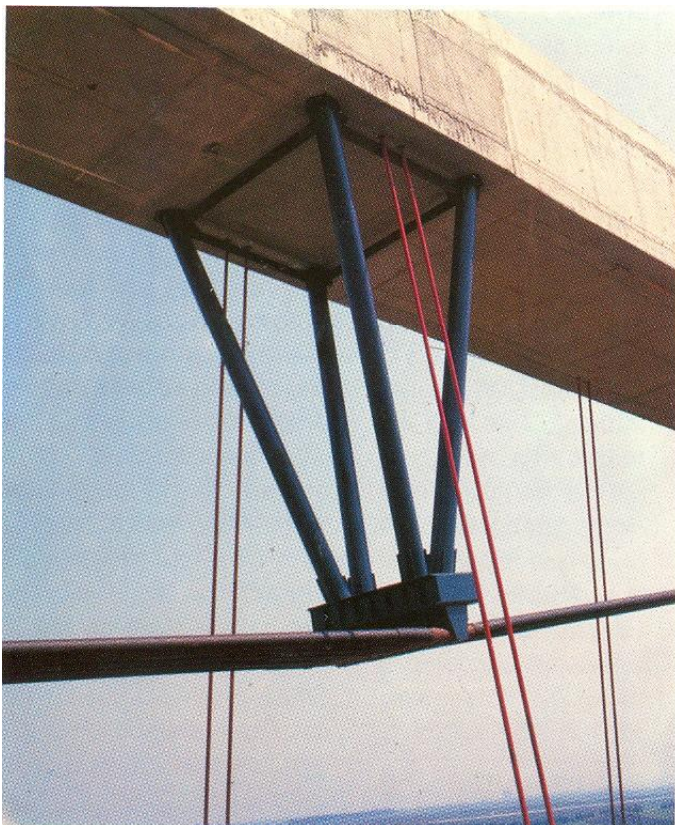
4.snopovi užadi(11,6,5)koja se uvlače
5.skela i rolne za uvlačenje kablova
6.vučna sajla
7.vitlo za povlačenje užadi



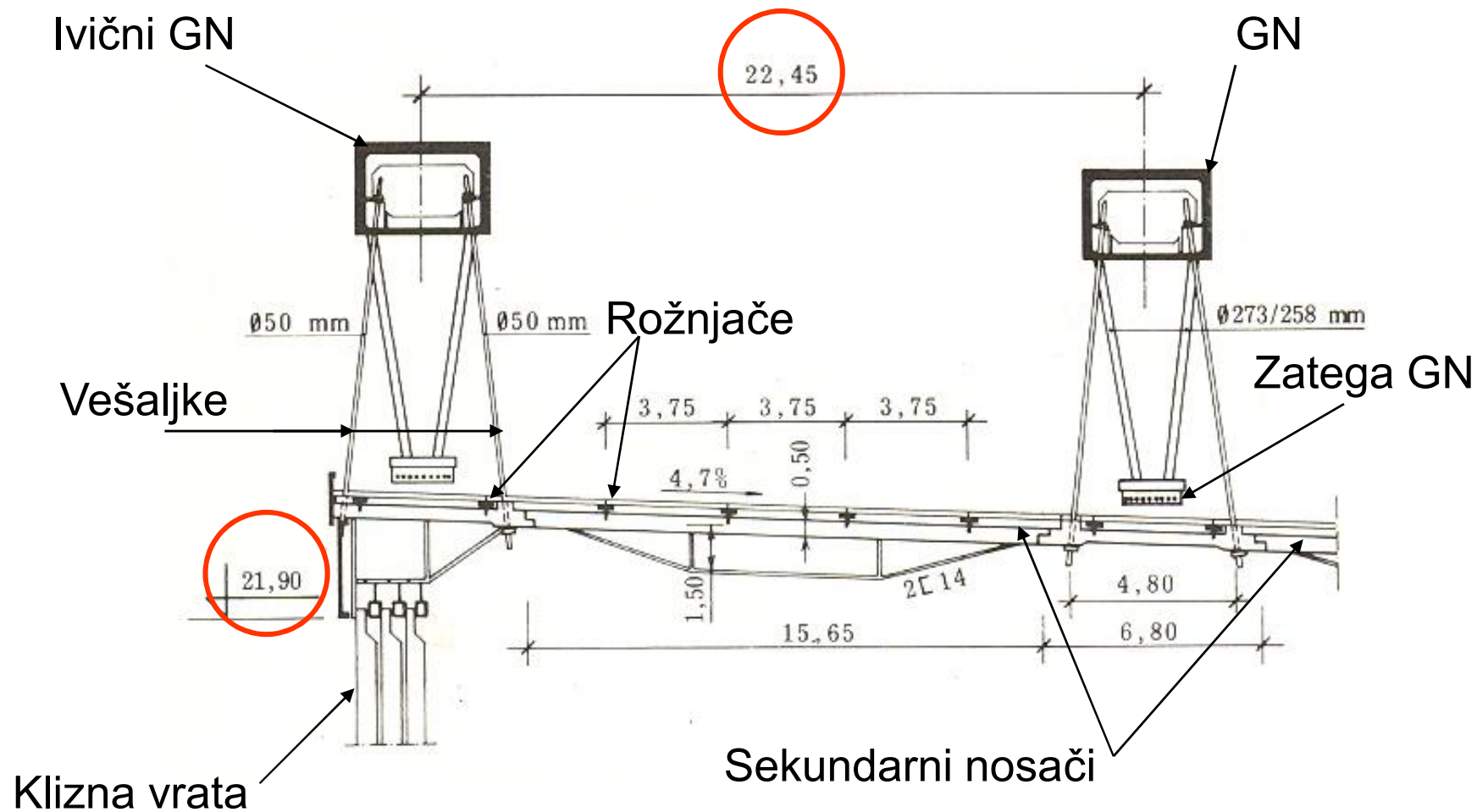
Dizanje GN



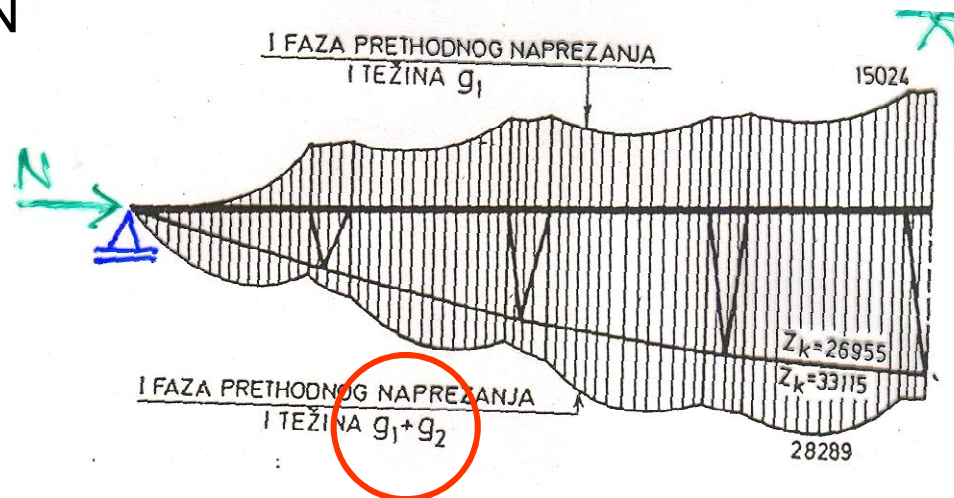
Detalj zatege



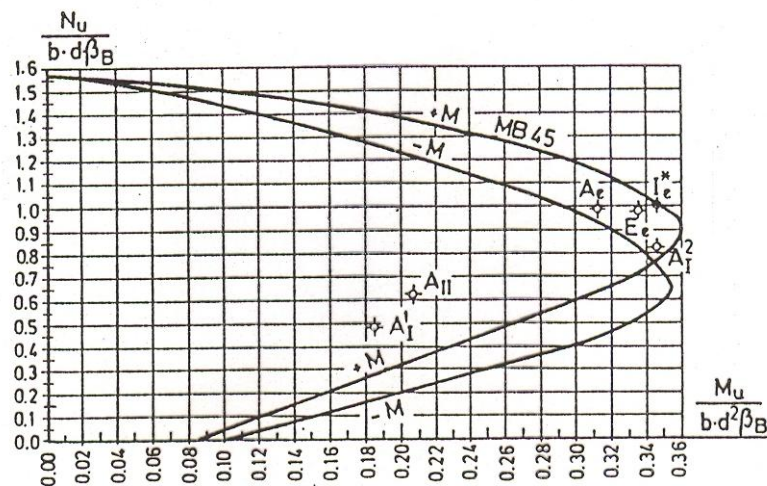
Poprečni presek



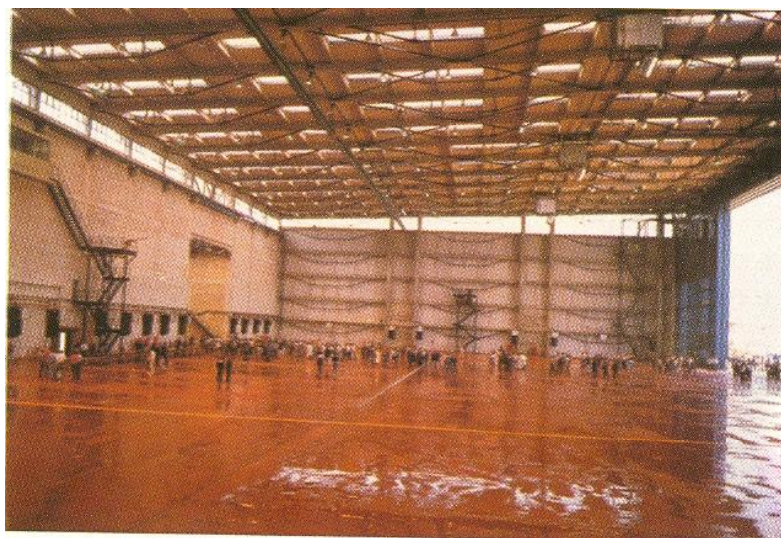
Dijagram momenta savijanja GN



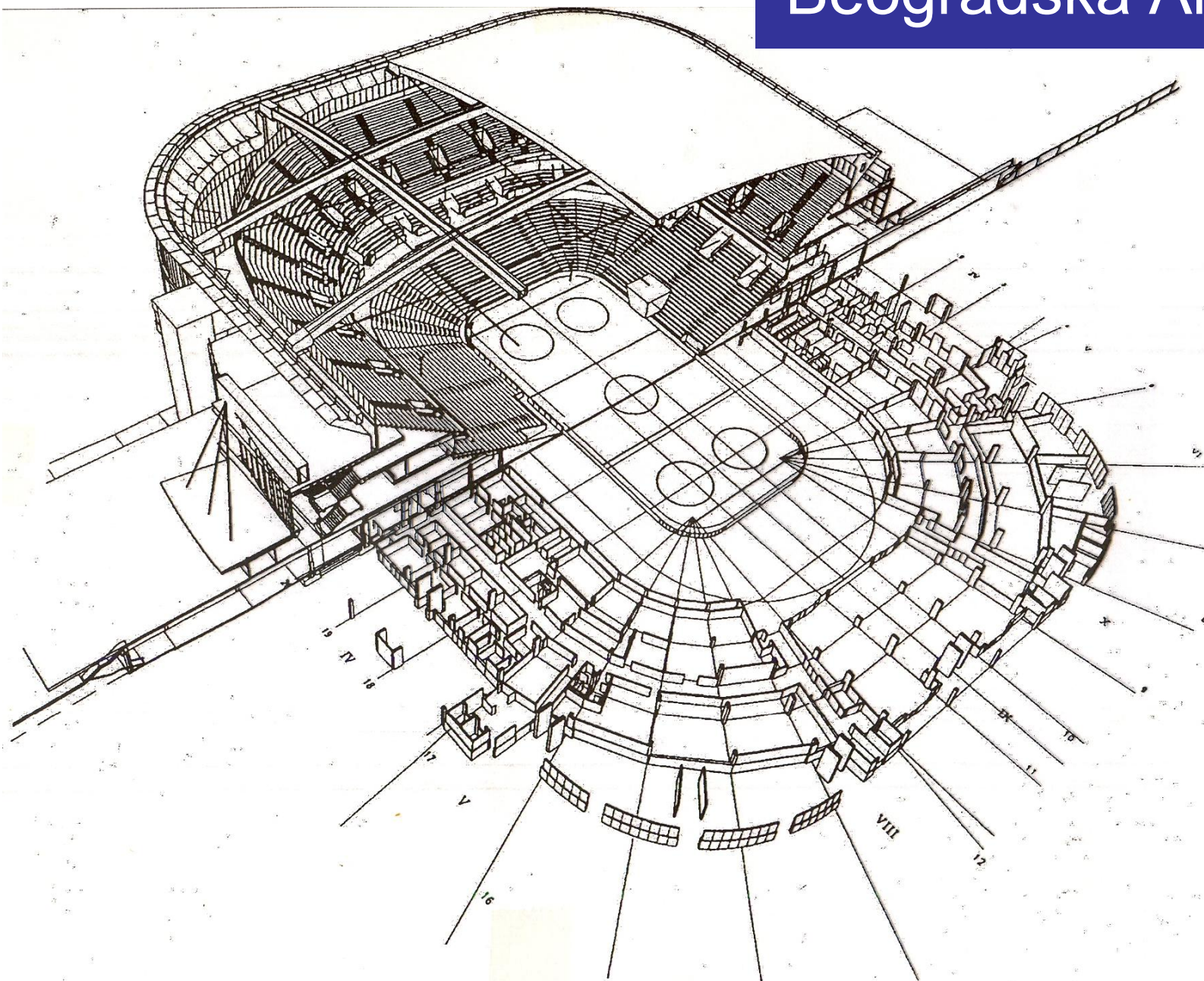
Dijagram interakcije GN



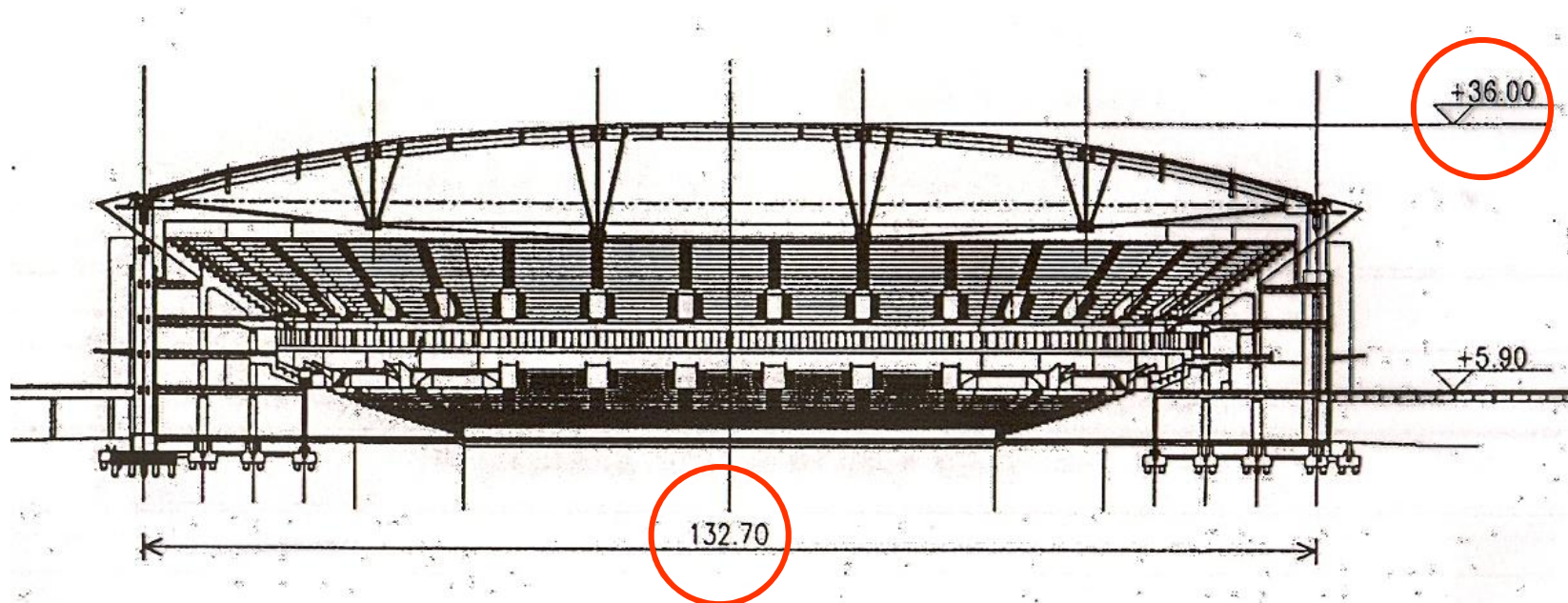
Završen hangar



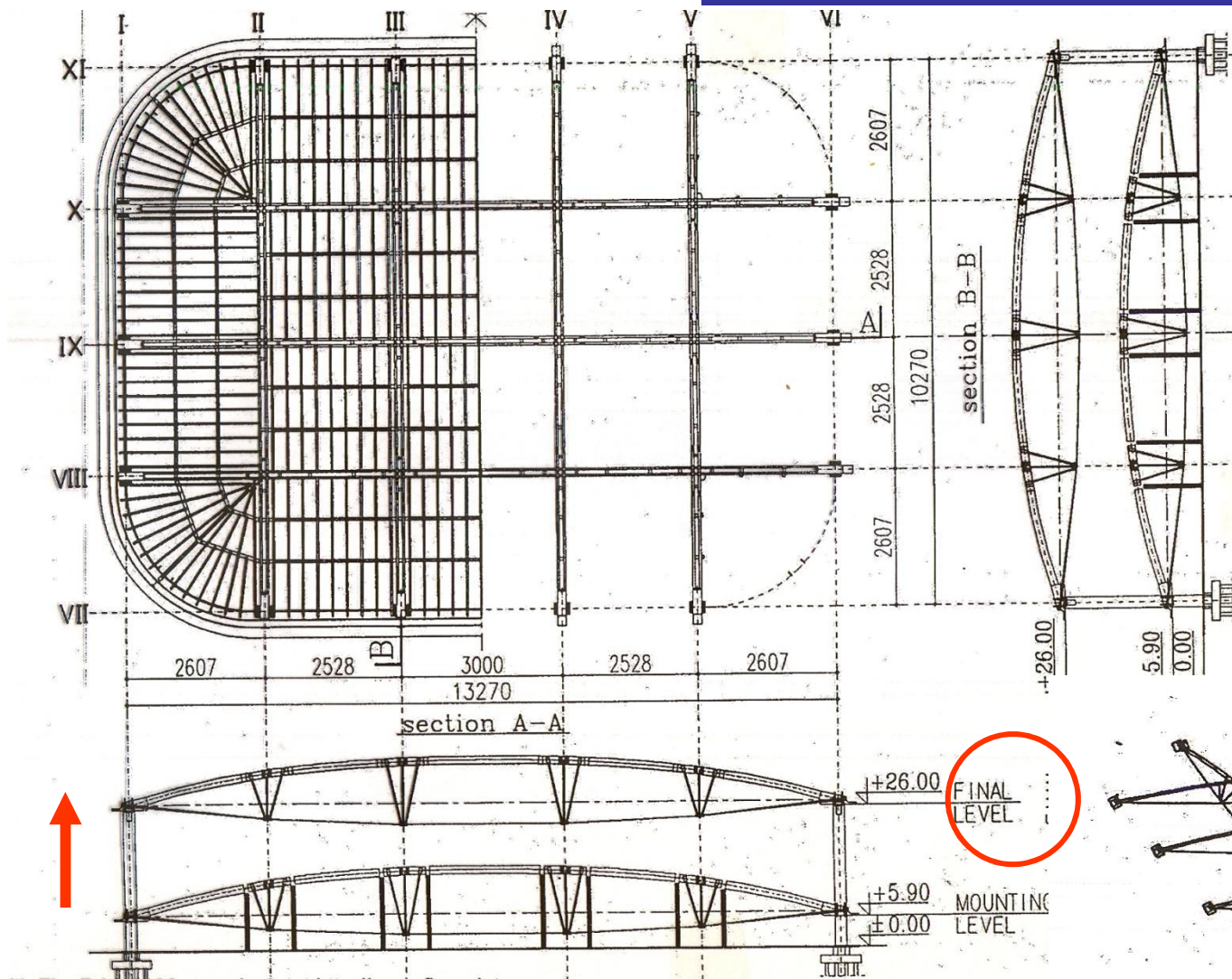
Beogradska Arena



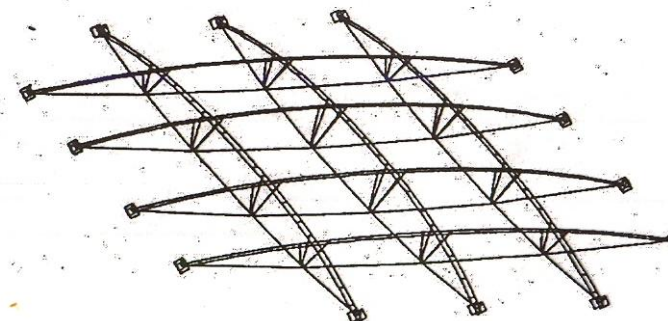
Podužni presek



Dispozicija krovne kon.



Proračunski model

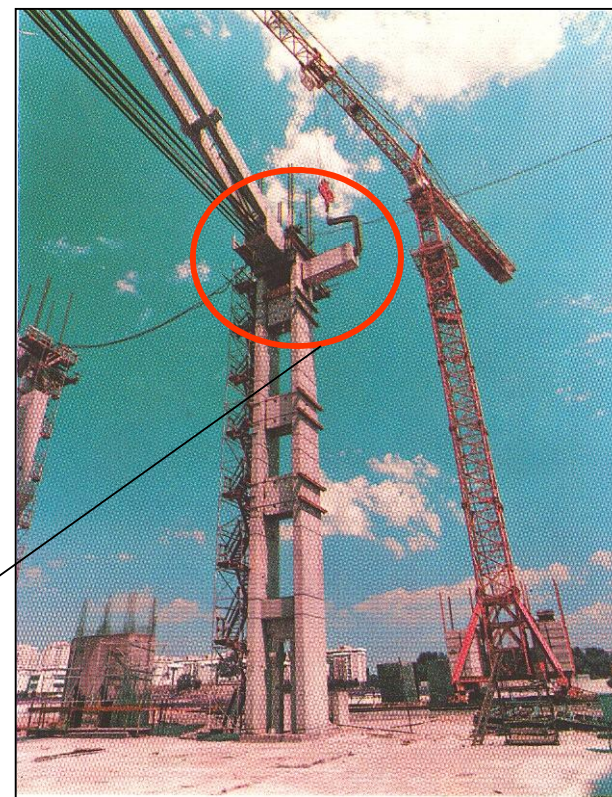


Faze građenja



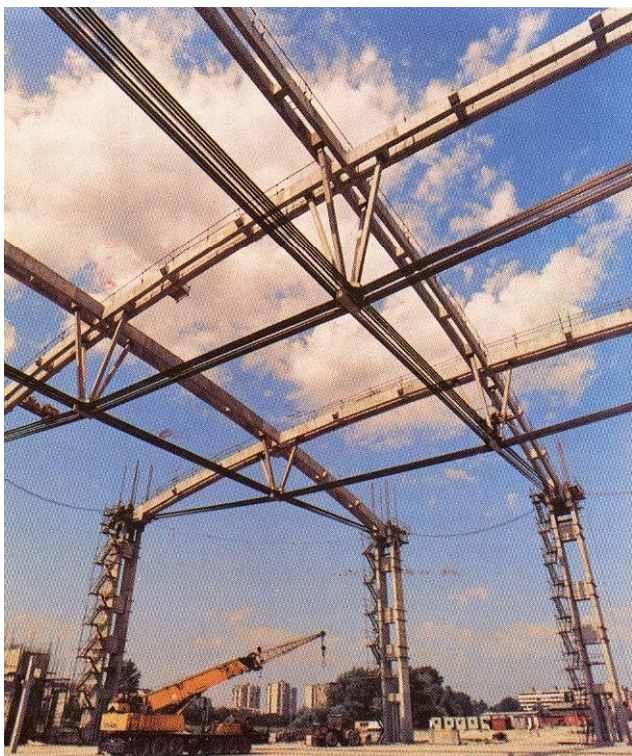


Montaža
oslonache grede



Montaža oslonache
grede - detalj





Montaža sek. nosača



Završena konstrukcija krova



Sekundarni nosači

Dejstvo vetra na industrijsku halu

$$q_w = \frac{1}{2} \rho \cdot (v_{m,50,10} \cdot \overset{1.0}{\cancel{k_t}} \cdot \overset{\approx 1.0}{\cancel{k_T}})^2 \cdot 10^{-3} \cdot \overset{1.0}{\cancel{S_z^2}} \cdot \overset{1.0}{\cancel{K_z^2}} \cdot G_z \cdot C_p$$

$$q_w = \frac{1}{2} \rho \cdot (v_{m,50,10})^2 \cdot 10^{-3} \cdot G_z \cdot C_p$$

1.0 (h ≤ 10m, B)

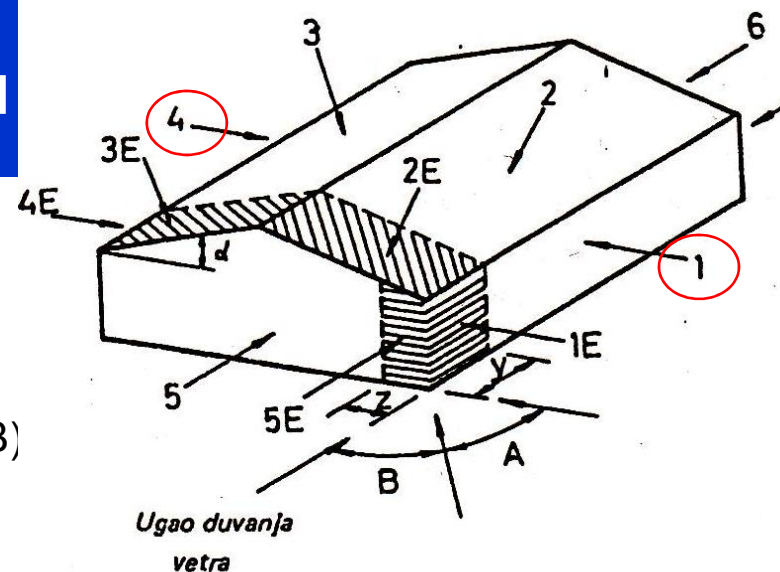
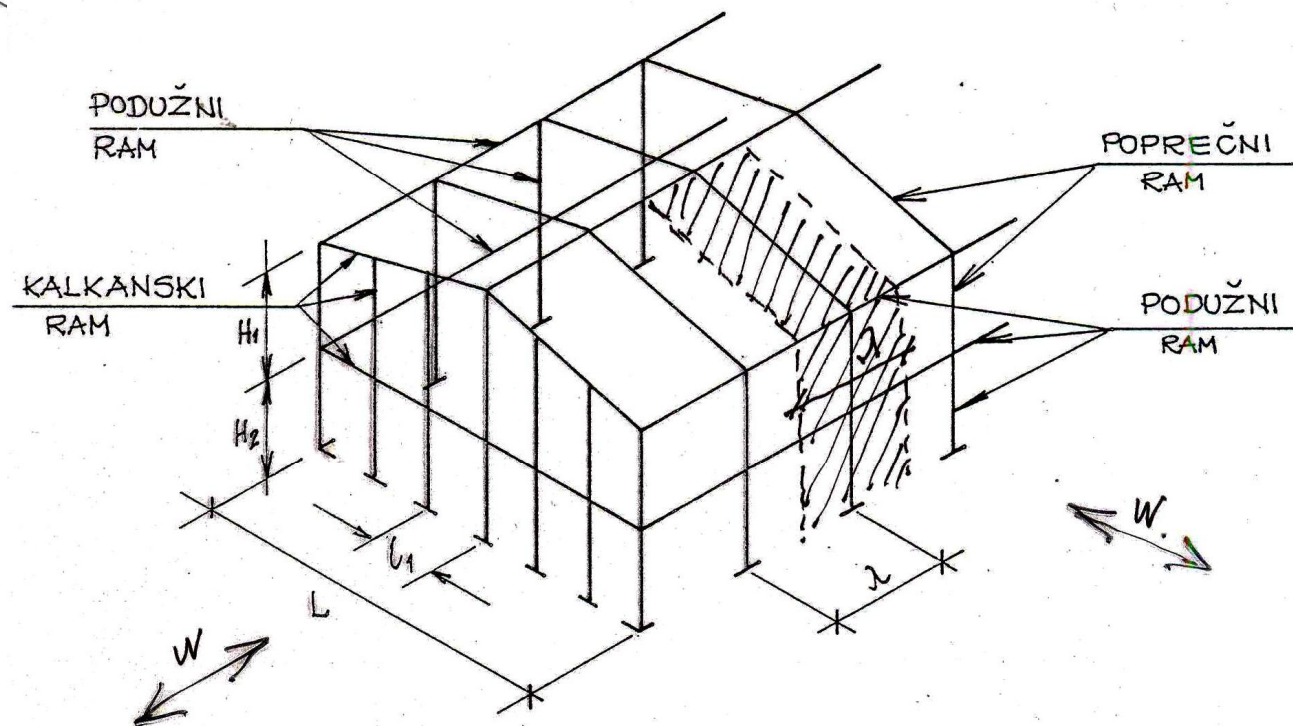
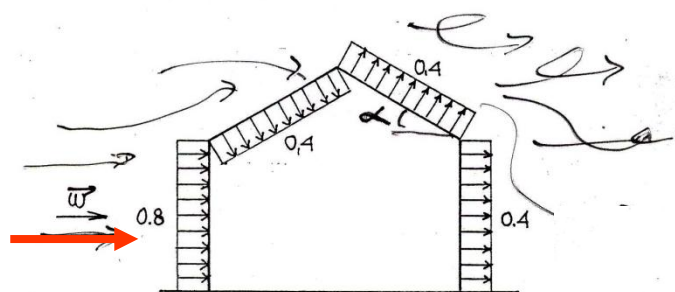


Tabela 2 – Kombinovani koeficijenti ($G \cdot C_{pe}$)

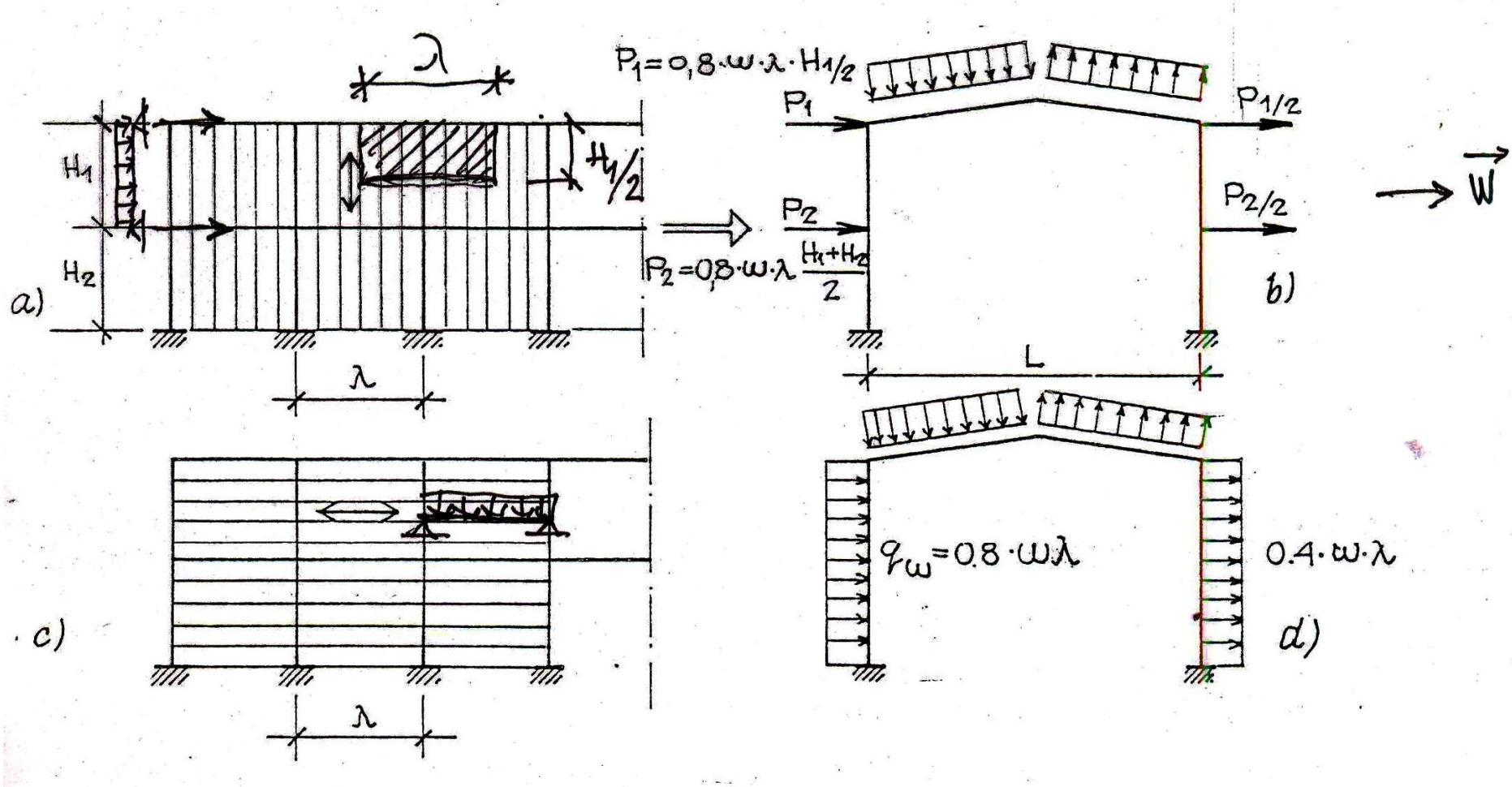
Vrednosti ($C_{pe}G$) za:								
Slučaj A – Vetar uglavnom UPRAVAN na sleme								
Nagib krovne ravni α	Izložena površina zgrade							
	1	2	3	4	1E	2E	3E	4E
0° do 5°	0,75	-1,3	-0,7	-0,55	1,15	-2,0	-1,0	-0,8
20°	1,0	-1,3	-0,9	-0,8	1,5	-2,0	-1,3	-1,2
20° do 45°	1,05	0,4	-0,8	-0,7	1,3	0,5	-1,0	-0,9
90°	1,05	1,05	-0,7	-0,7	1,3	1,3	-0,9	-0,9

Slučaj B – Vetar uglavnom PARALELAN sa slemenom													
Slučaj	Nagib α	Izložena površina zgrade											
		1	2	3	4	5	6	1E	2E	3E	4E	5E	6E
B1	0–90°	0	-1,3	-0,7	0	0,75	-0,55	0	-2,0	-1,0	0	1,15	-0,8
B2	>20°	-0,85	-1,3	-0,7	-0,85	0	0	-0,9	-2,0	-1,0	-0,9	0	0

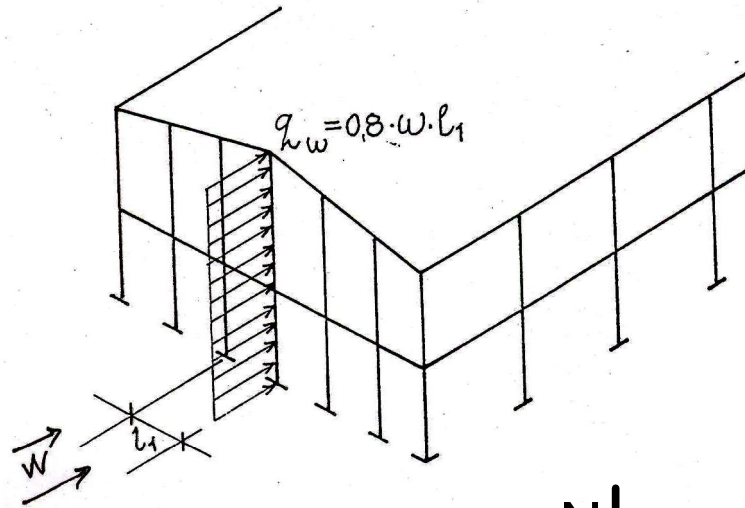
Dejstvo vetra na industrijsku halu – poprečni pravac



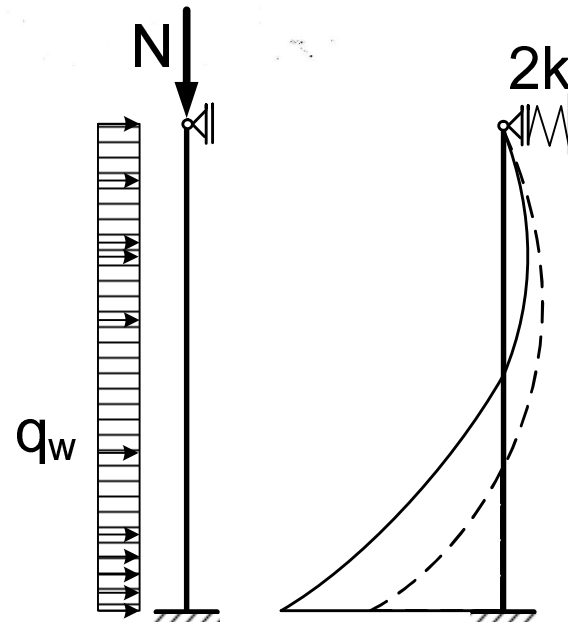
- Poprečni pravac



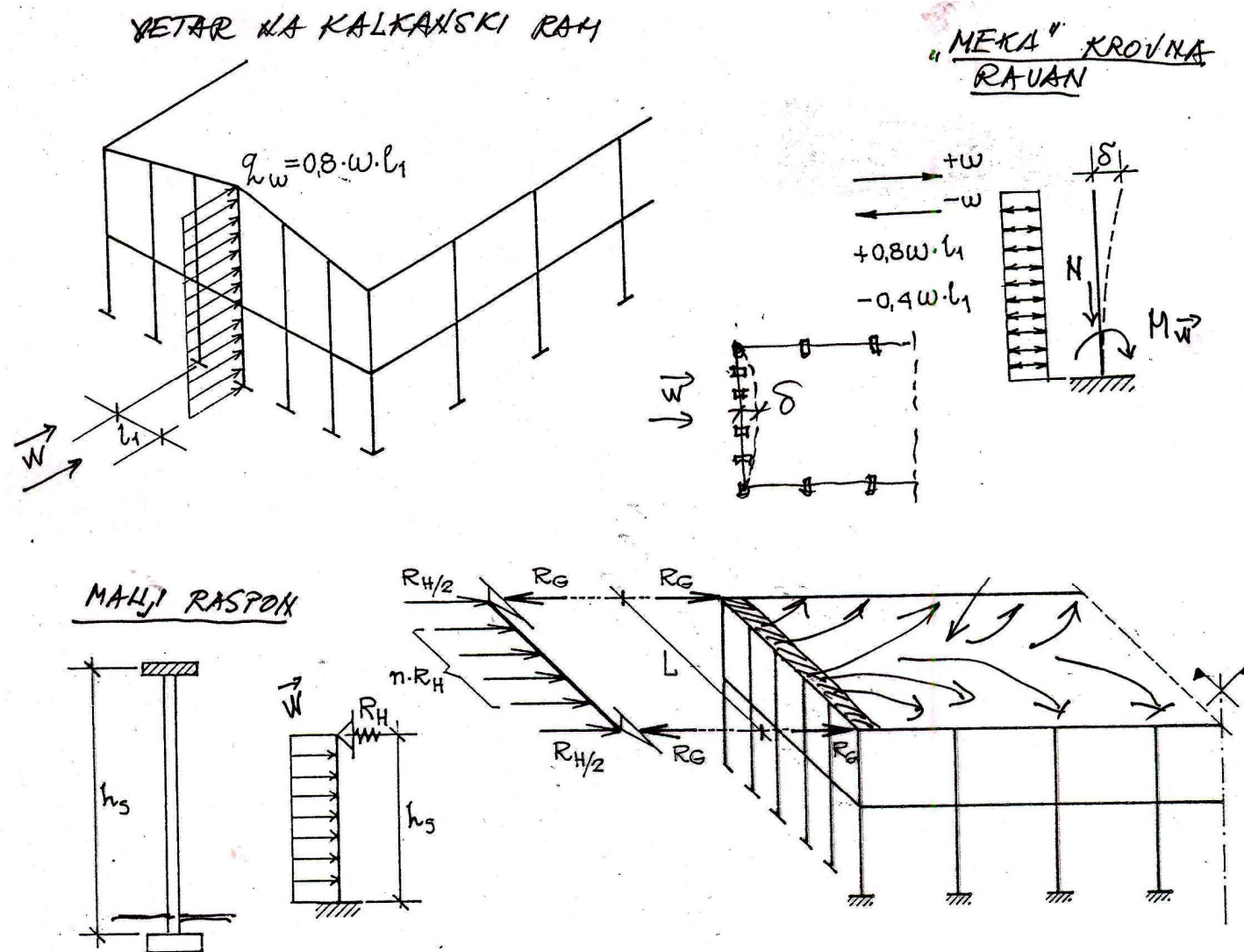
- Podužni pravac – kruta krovna ravan



k - krutost podužnog
rama



- Podužni pravac – meka krovna ravan – manji raspon



- Podužni pravac – meka krovna ravan – veći raspon

