Međuspratne konstrukcije

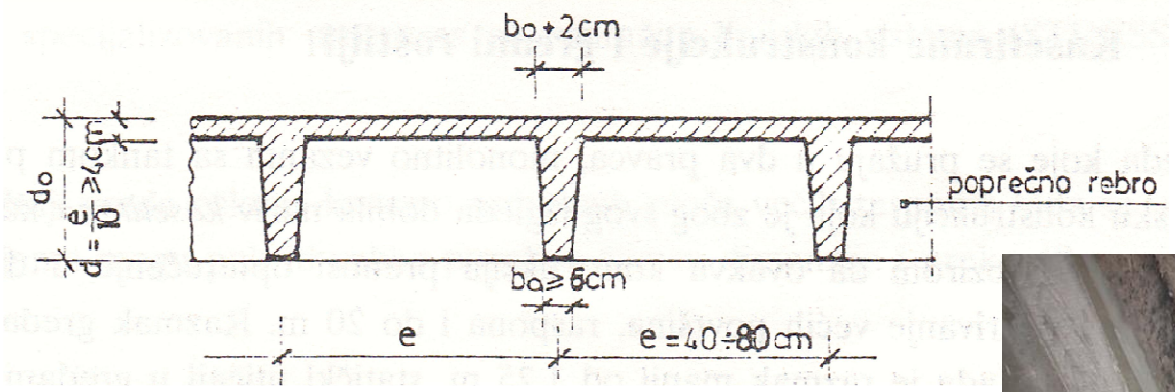
Podela prema načinu izvođenja

A) Monolitne – livene na licu mesta
B) Polumontažne
C) Montažne

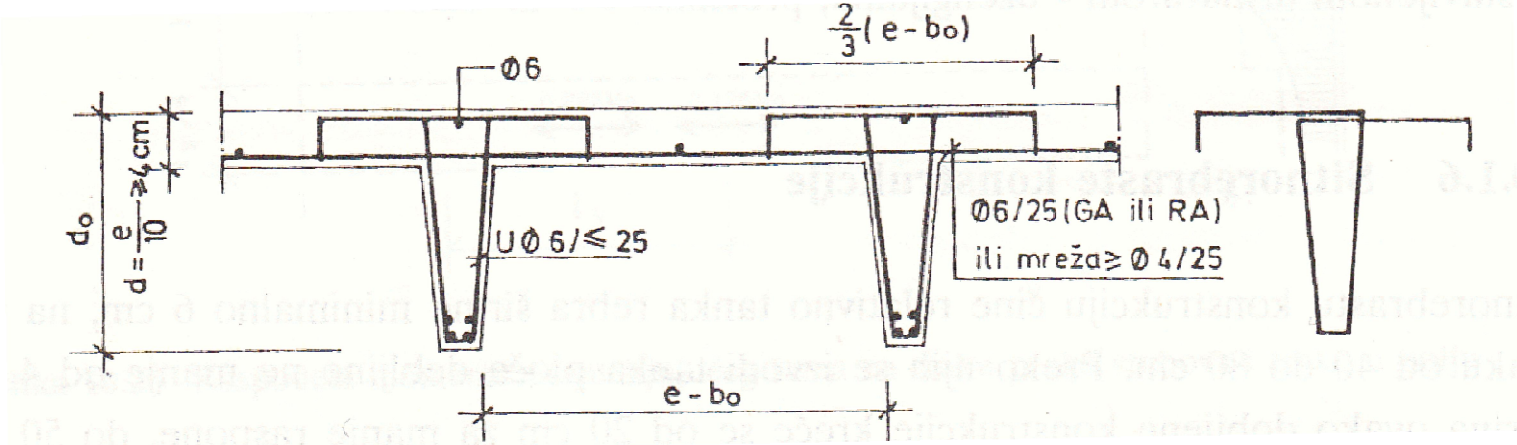
Monolitne kostrukcije se dele na

a) Ploče u jednom pravcu oslonjene na grede
b) Ploče u da pravca (krstasto armirane) oslonjene na grede
c) Pečurkaste ploče i ploče direktno oslonjene na stubove
d) Sitnorebraste konstrukcije
e) Kasetirane konstrukcije

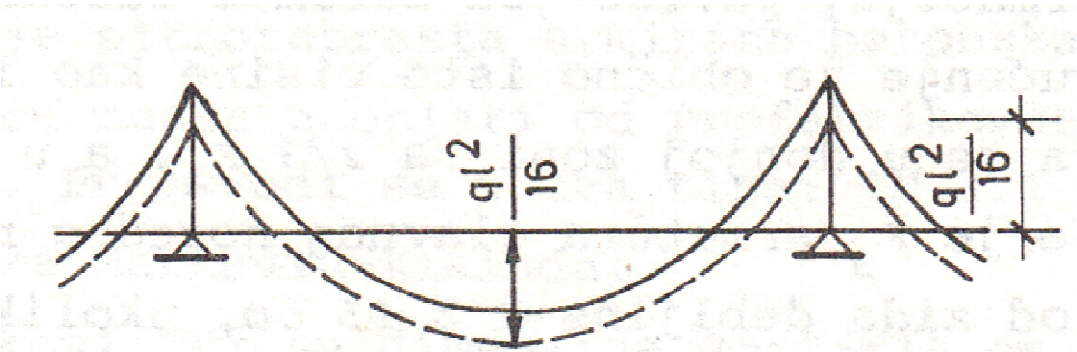
Sitnorebraste konstrukcije

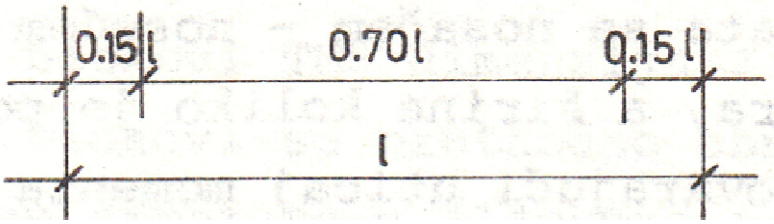


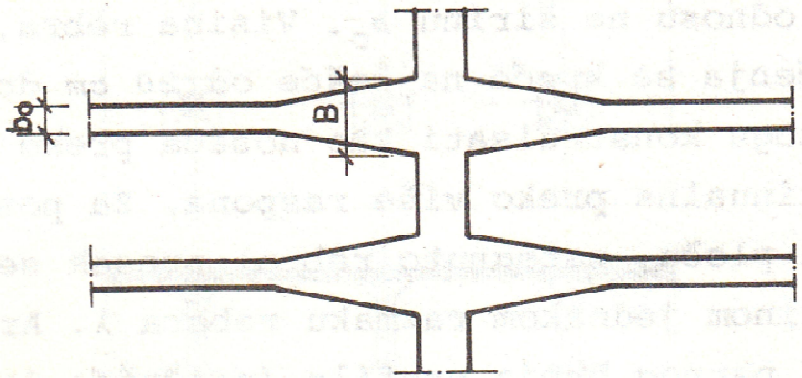
Rasponi 3 do 12 m.
Komplikovana oplata.
Poprečna rebra.

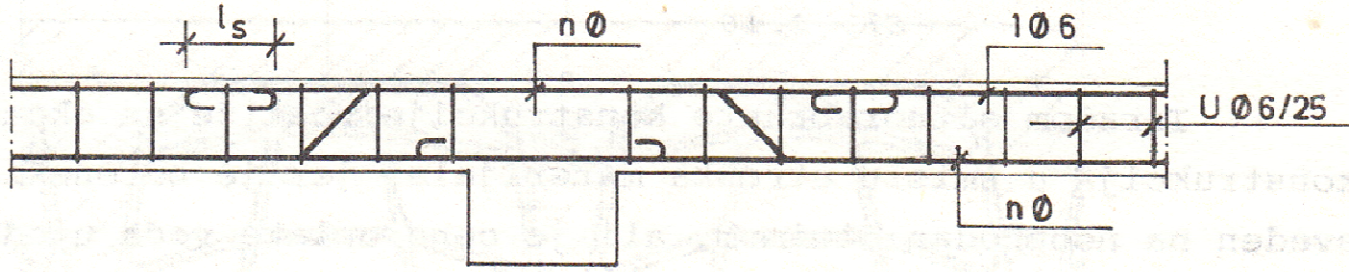


Kontinualne sitnorebraste tavanice





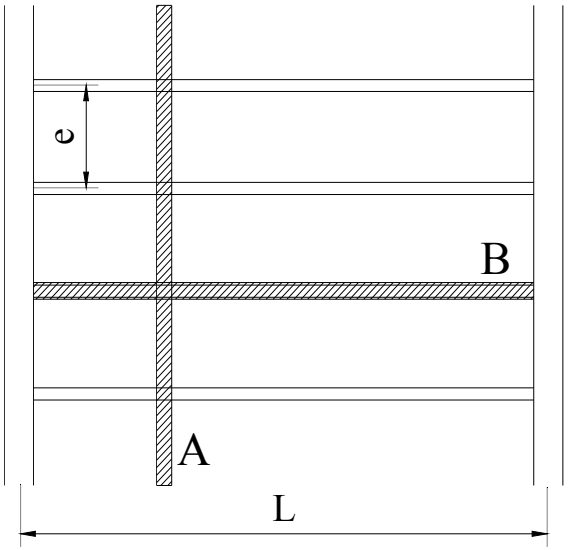




Zbog male krutosti aktivnog preseka nad osloncem:

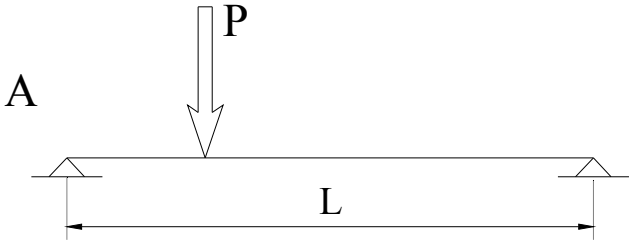
- vute
- preraspodela

Linijska opterećenja na sitnorebrastu tavanicu

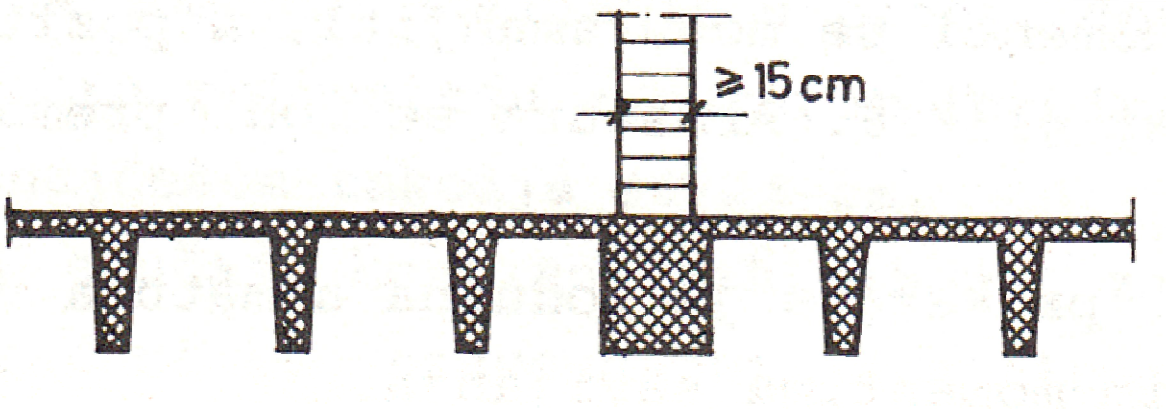


$P=g_z H_z e$

$g_z[kN/m^2]$

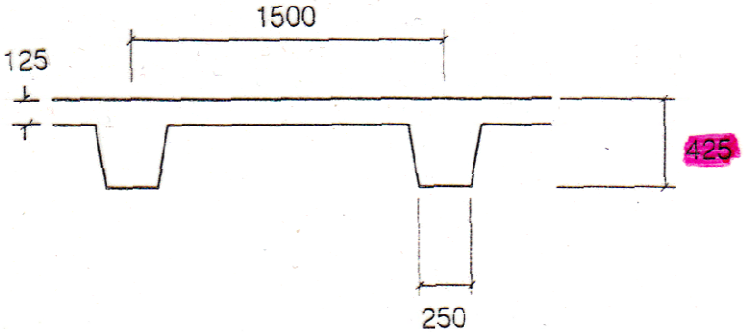


B

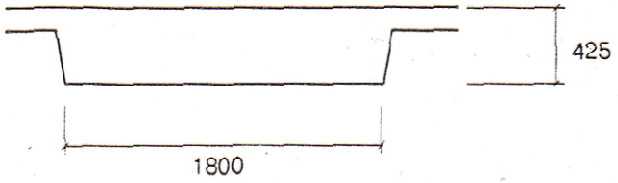


Primeri sitnorebrastih tavanica

No. of floors	Rib			Beam			Materials per m^2 of floor area		Design load kN/m^2	Stability	Notes (See page 3)
	Span m	Depth mm	Span/depth ratio	Span m	B × D mm	Span/depth ratio	Concrete m^3	Rebar kg			
11	9·0	425	21·1	9·0	1800 ×425	21·1	0·27	38·5	5·0	Shear walls	Grade C35 Code BS 8110



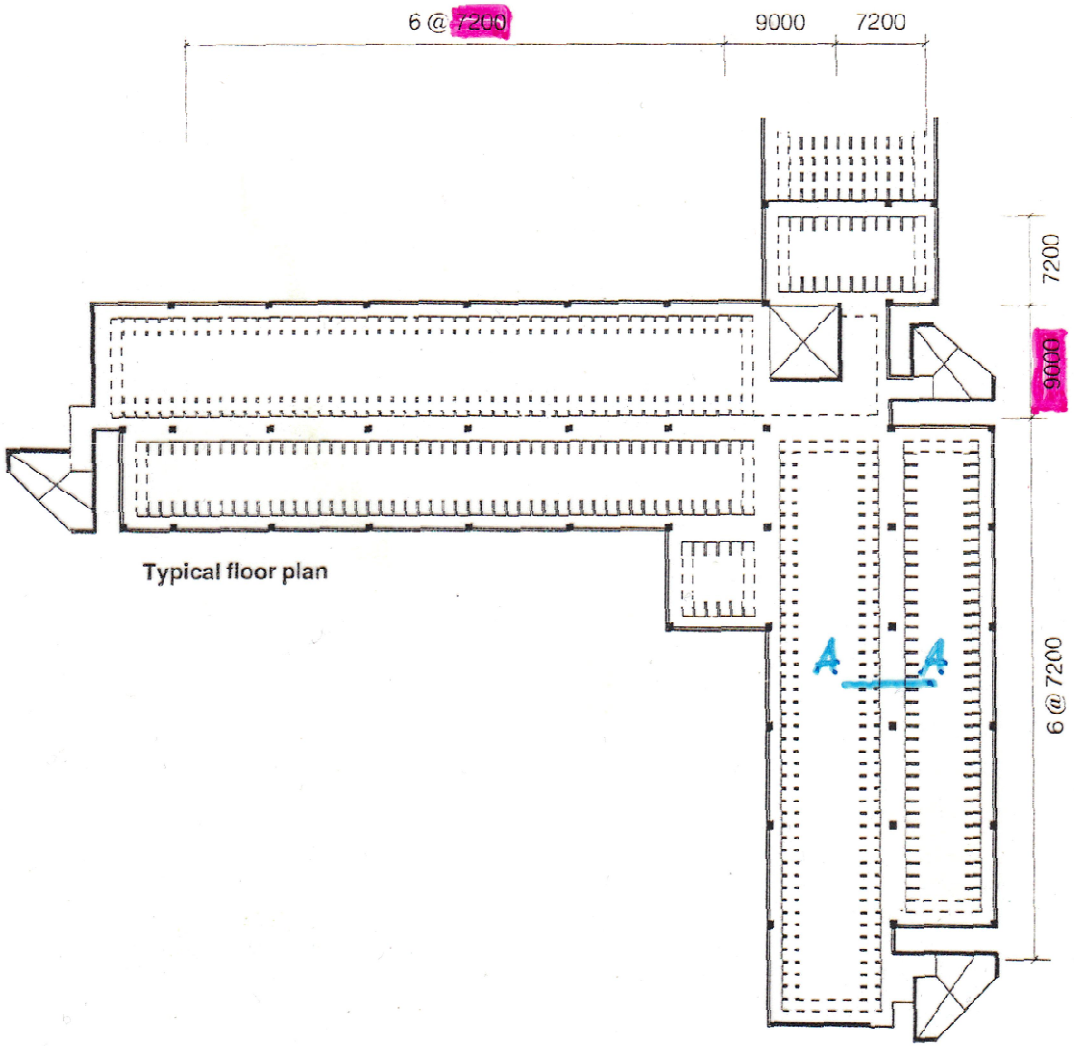
Tipično rebro



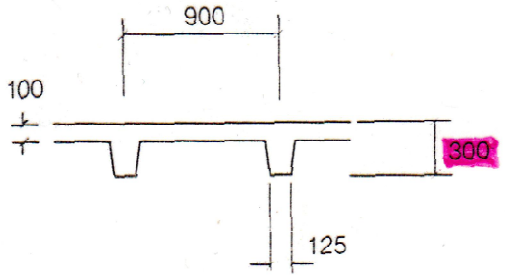
Tipična greda

Primeri sitnorebrastih tavanica

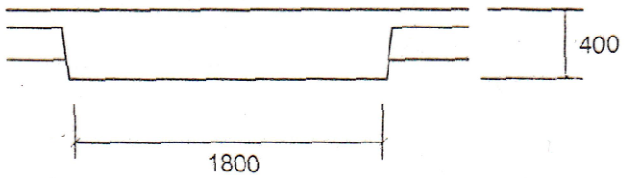
No. of floors	Rib			Beam			Materials per m² of floor area		Design load kN/m²	Stability	Notes
	Span m	Depth mm	Span/depth ratio	Span m	B × D mm	Span/depth ratio	Concrete m³	Rebar kg			
5	9·0	300	30·0	7·2	1800 ×400	18·0	0·32	29·0	5·0	Shear walls	Grade C35 Code BS 8110



Typical floor plan

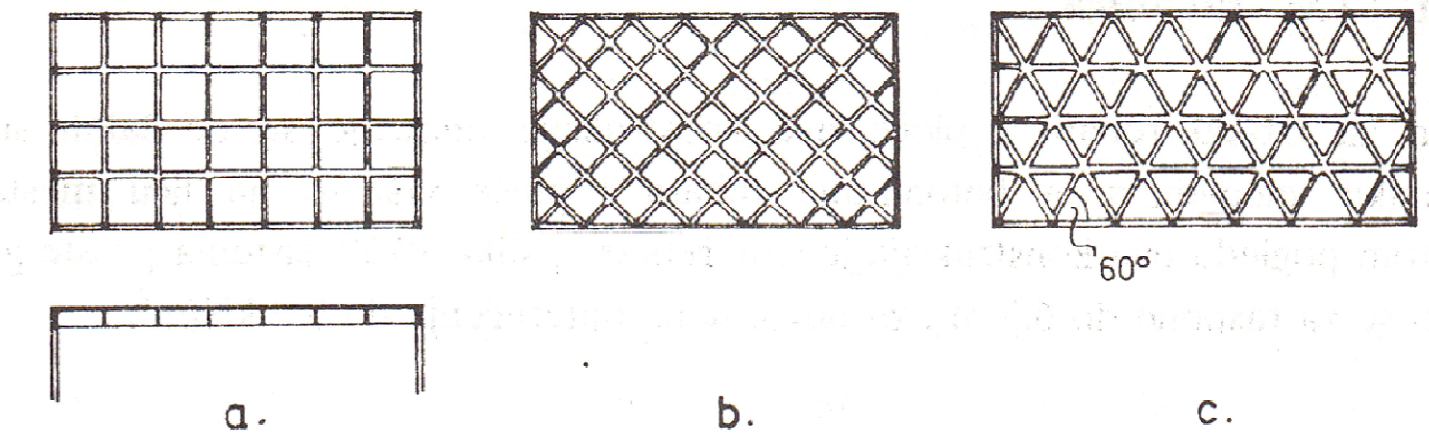


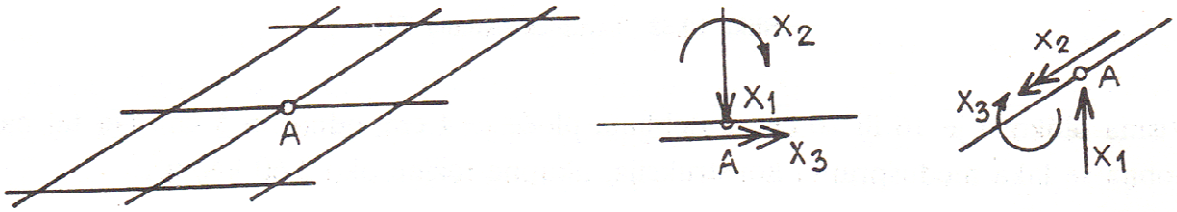
Tipično rebro



Tipična greda A-A

Kasetirane konstrukcije i gredni roštilji



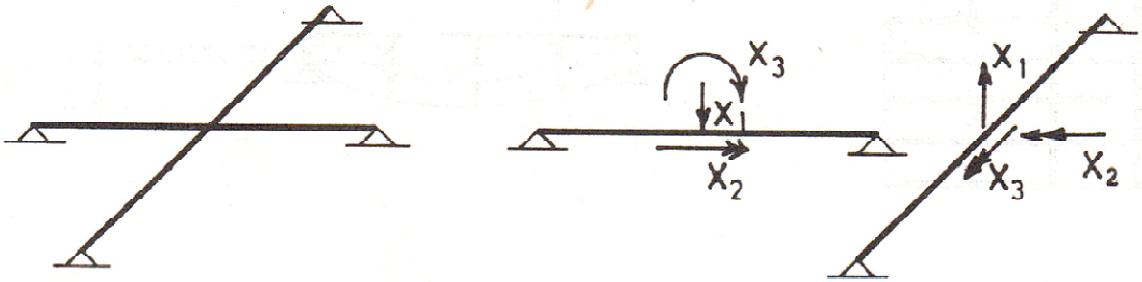


Rasponi do 20m

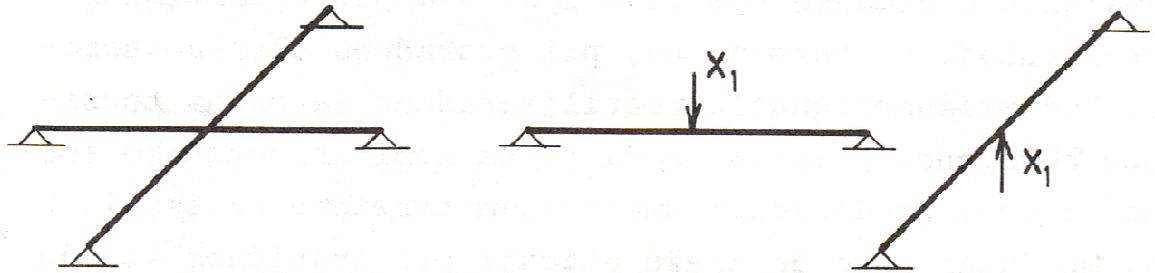
za e<1.25m proračun kao za krstaste

za e≥1.25m kao za gredne roštilje

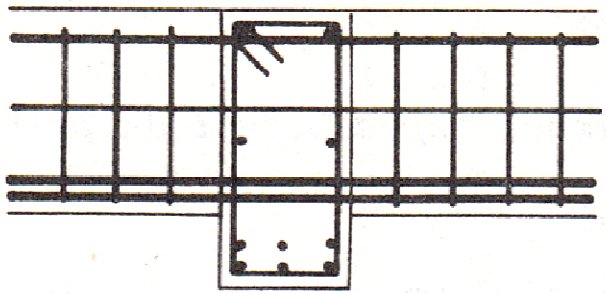
Statički nepoznate sile veze u grednom roštilju:

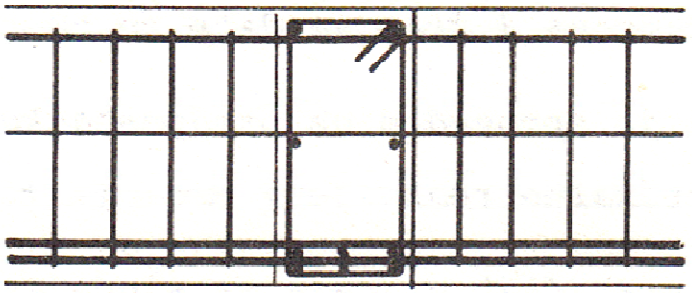


uz zanemarenje momenata, sila X_1 iz uslova jednakih pomeranja:



Ukrštanje armature greda roštilja





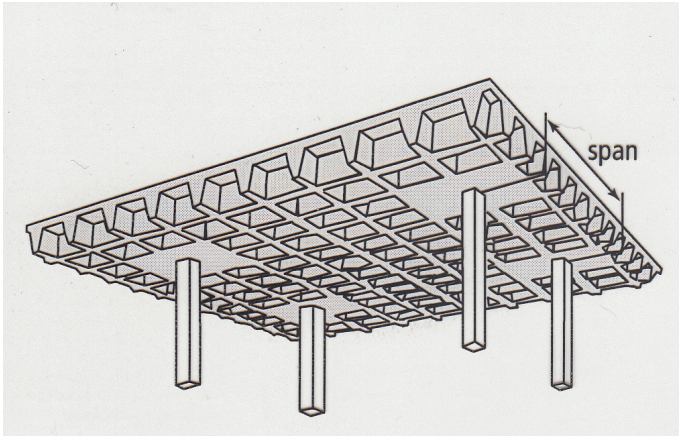
Kasetirane tavanice (Waffle Slabs)

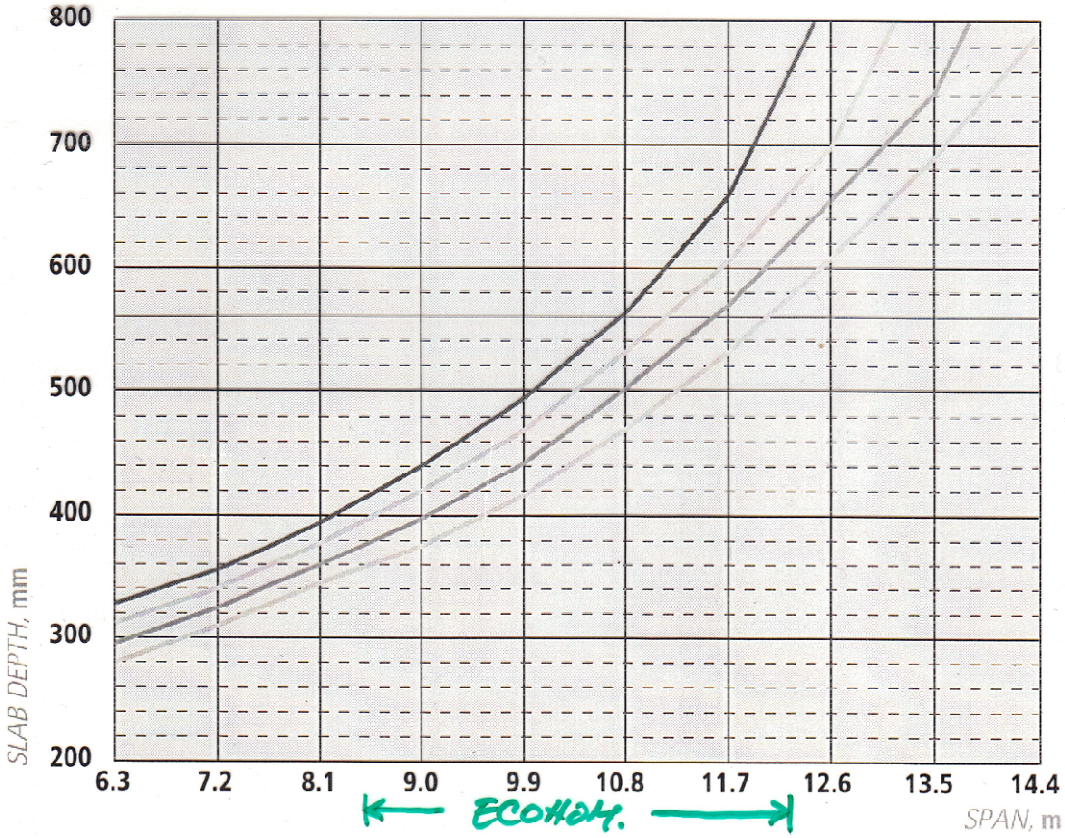
Proračun kao za ravne ploče

Smanjena sopstvena težina.

Ekonomične do 12m.

Debljina diktirana ugibom, smicanjem u rebrima i probijanjem stuba.





Korisno opterećenje p

= 2.5 kN/m² = 5.0 kN/m² = 7.5 kN/m² =10.0 kN/m²

Povoljno:

-može doprineti arhitekturi,

-razvod instalacija

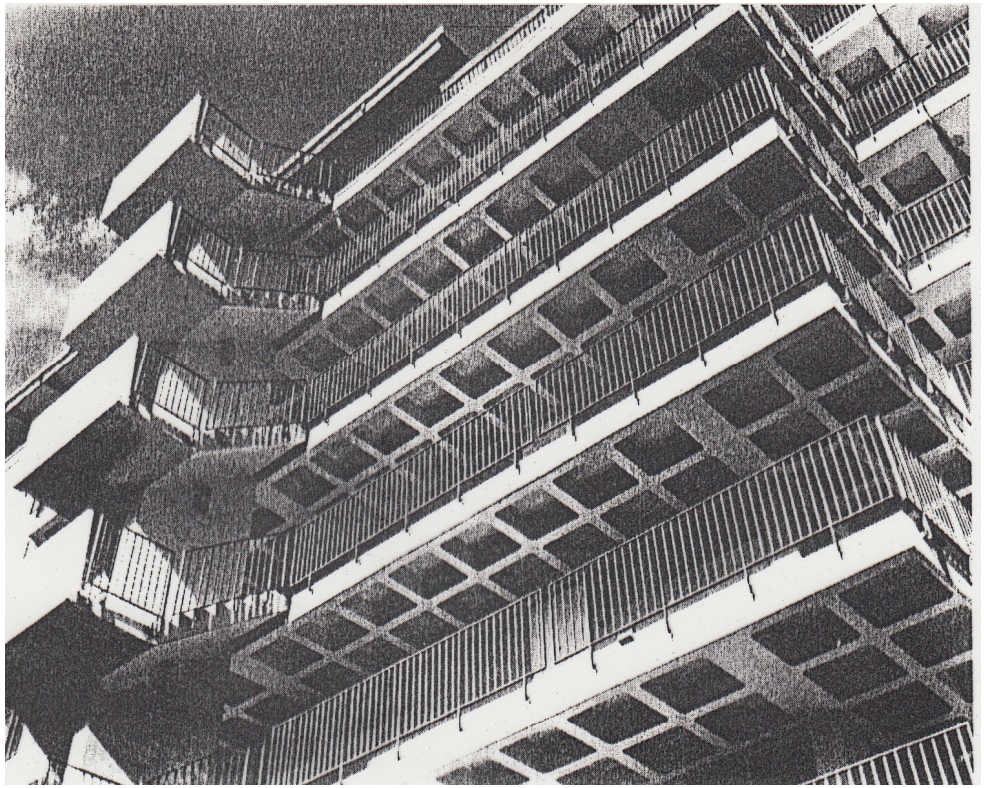
-manja težina

Nepovoljno:

-skuplja oplata,

-nešto veća debljina

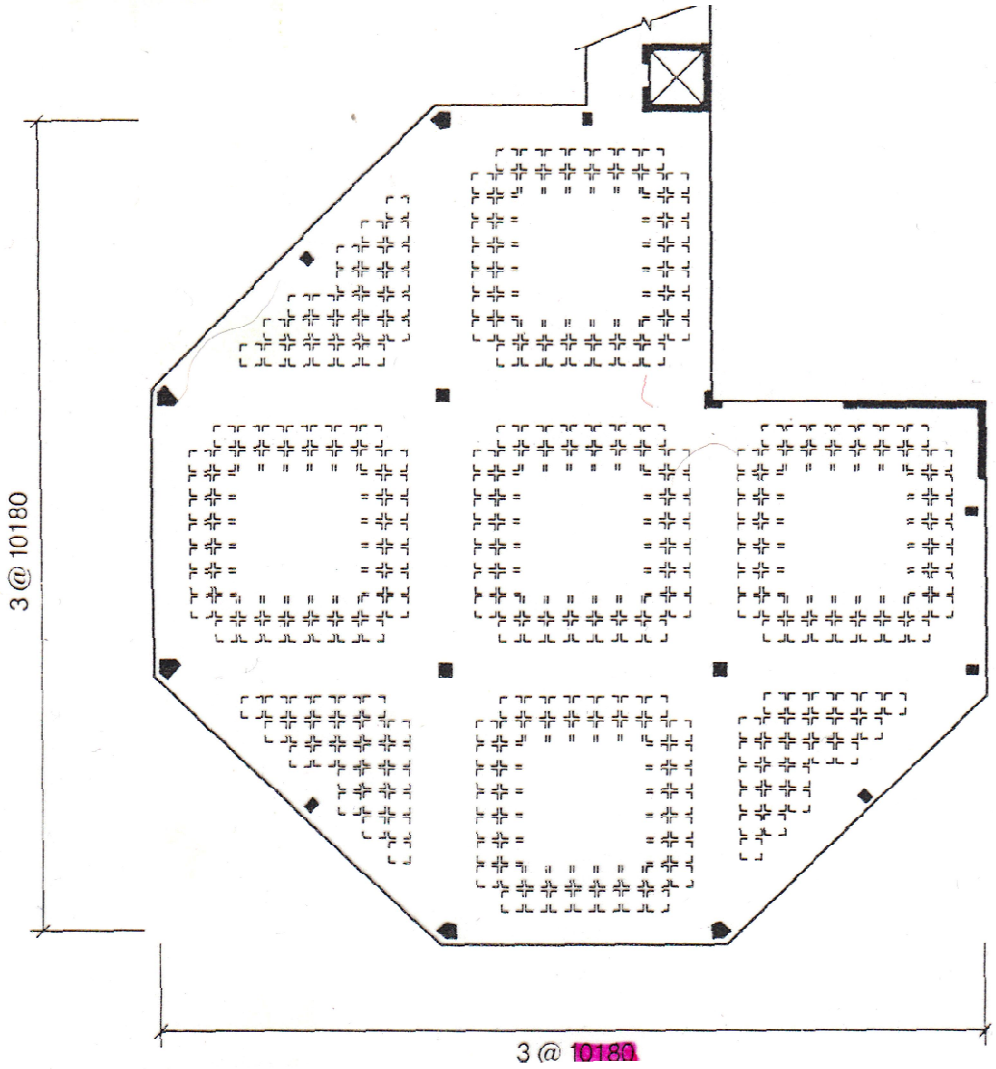
-bez prefabrikacije - sporija izrada

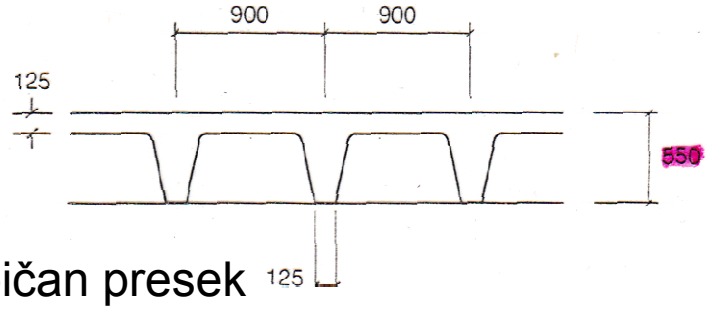


Oplata kasetirane tavanice

Primeri kasetirnih tavanica – klasično armirana

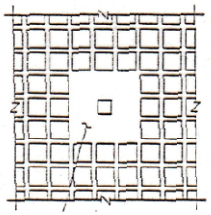
No. of floors	Column spacing m	Depth mm	Span/depth ratio	Materials per m^2 of floor area			Design load kN/m^2	Stability	Notes
				Concrete m^3	Rebar kg	Strand kg			
3	10·18 × 10·18	550	18·5	0·396	37·0	—	9·0	Shear walls	Grade C35 Code BS 8110

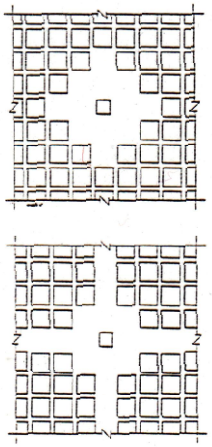




Tipičan presek

Zona oslonca

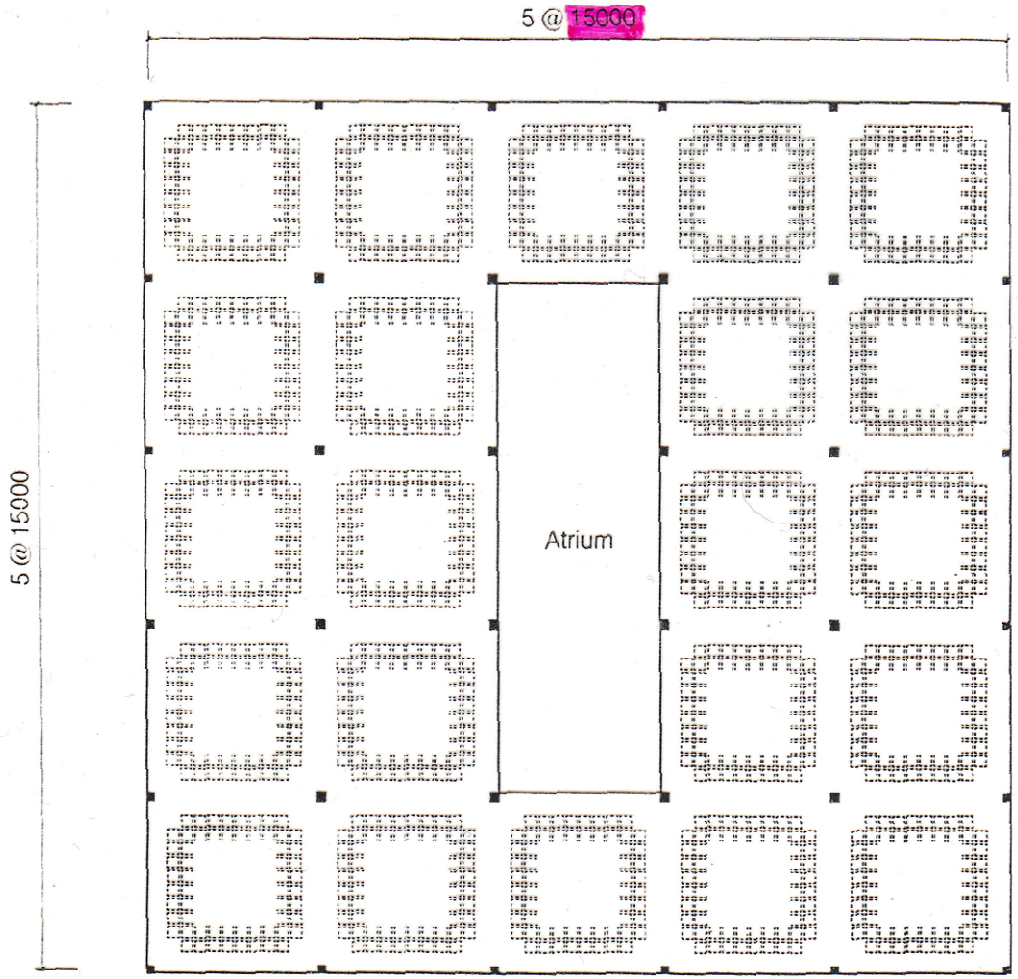


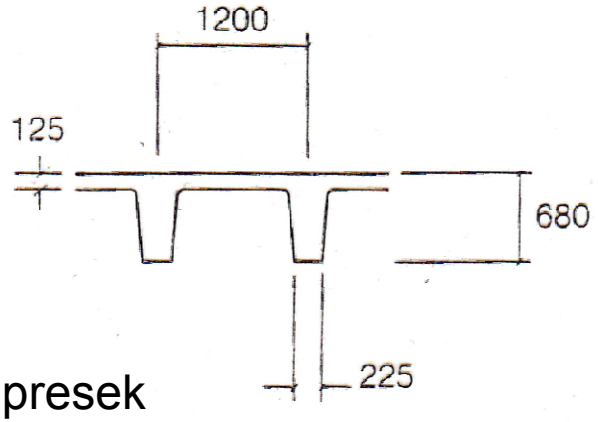


Ojačanje ili kapitel

Primeri kasetirnih tavanica – prethodno napregnuta

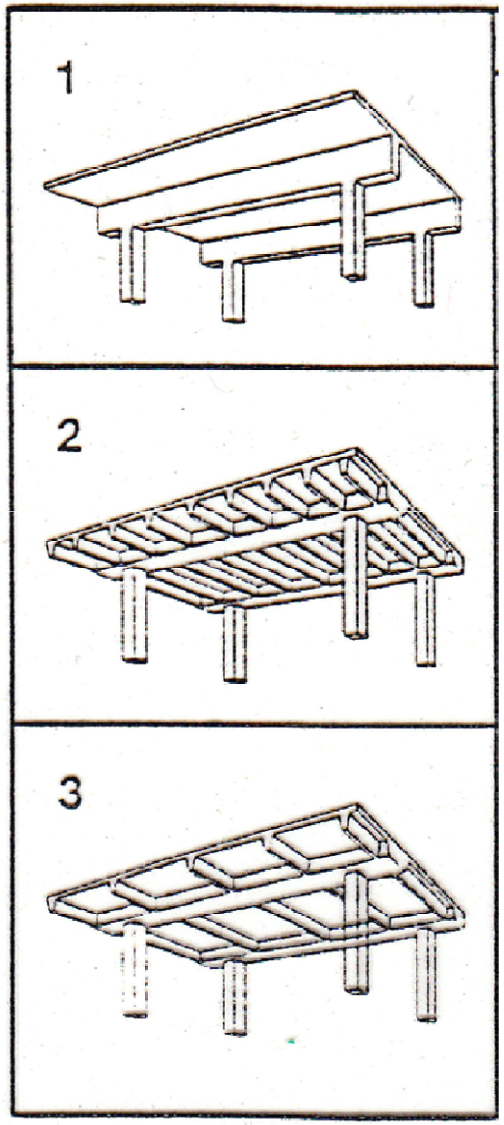
No. of floors	Column spacing m	Depth mm	Span/depth ratio	Materials per m² of floor area			Design load kN/m²	Stability	Notes
				Concrete m³	Rebar kg	Strand kg			
2	15·0×15·0	680	22·1	0·480	20·4	9·26	7·0	Frame action	Grade C40 Code BS 8110 CS TR No.17*



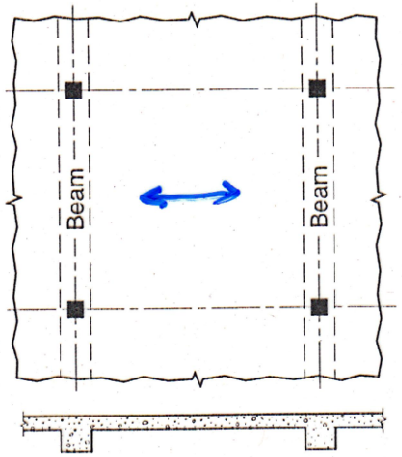


Tipičan presek

Uobičajeni sistemi ploča u jednom pravcu

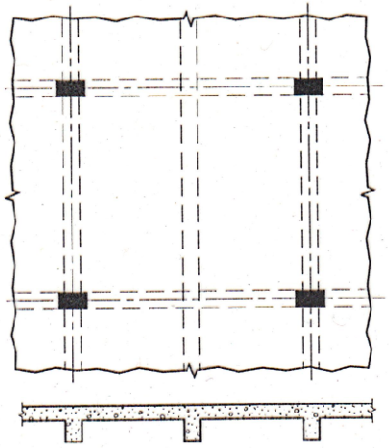


Ploča u jednom pravcu oslonjena na grede

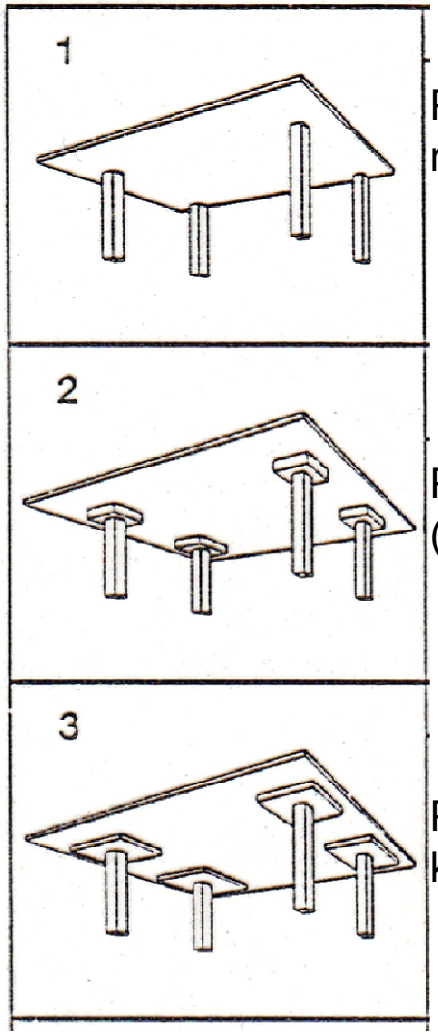


Sitnorebrasta tavanica

¨Krupno rebro¨



Uobičajeni sistemi ploča u dva pravca

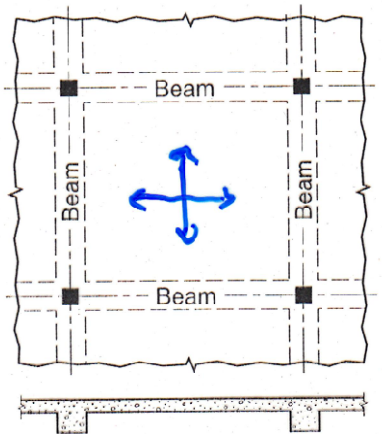


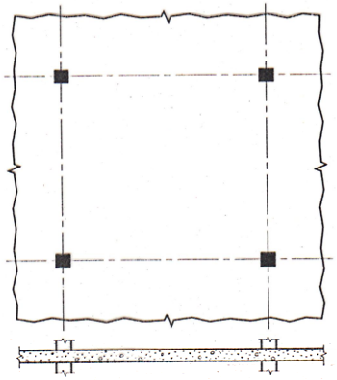
Ploča direktno oslonjena na stubove

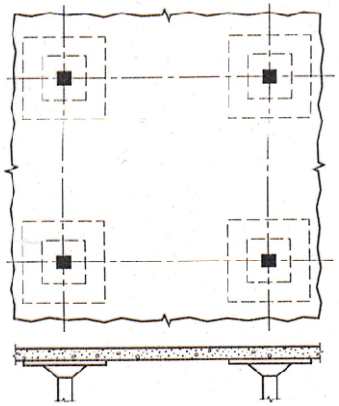
Ploča sa kapitelima (¨pečurkasta¨)

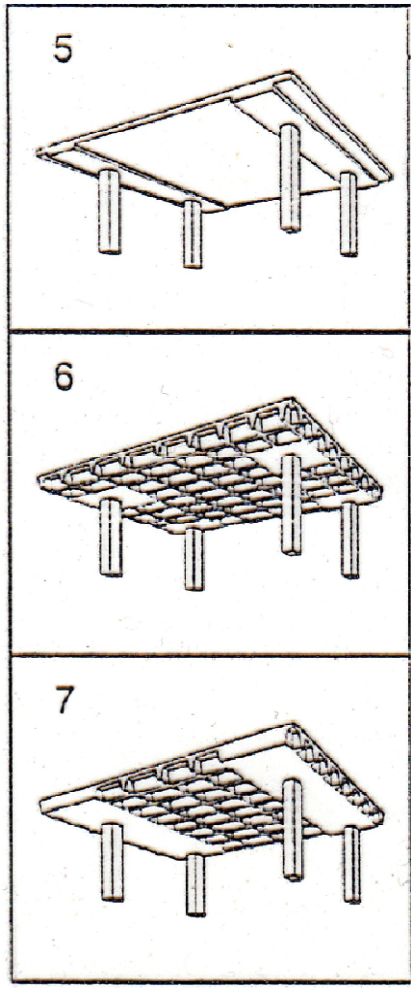
Ploča sa širokim ravnim kapitelima (¨Drop panel¨)

Krstasta ploča





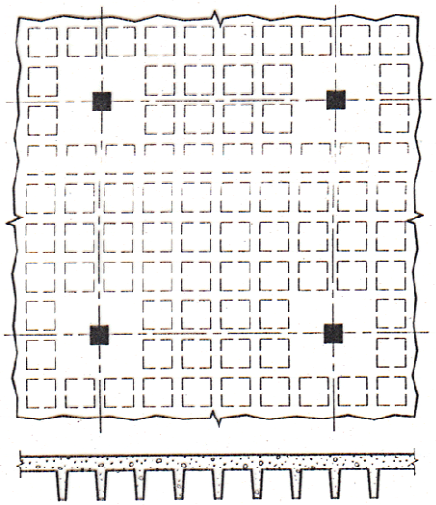




Ploča sa ojačanjem
preko stubova

Kasetirana ploča

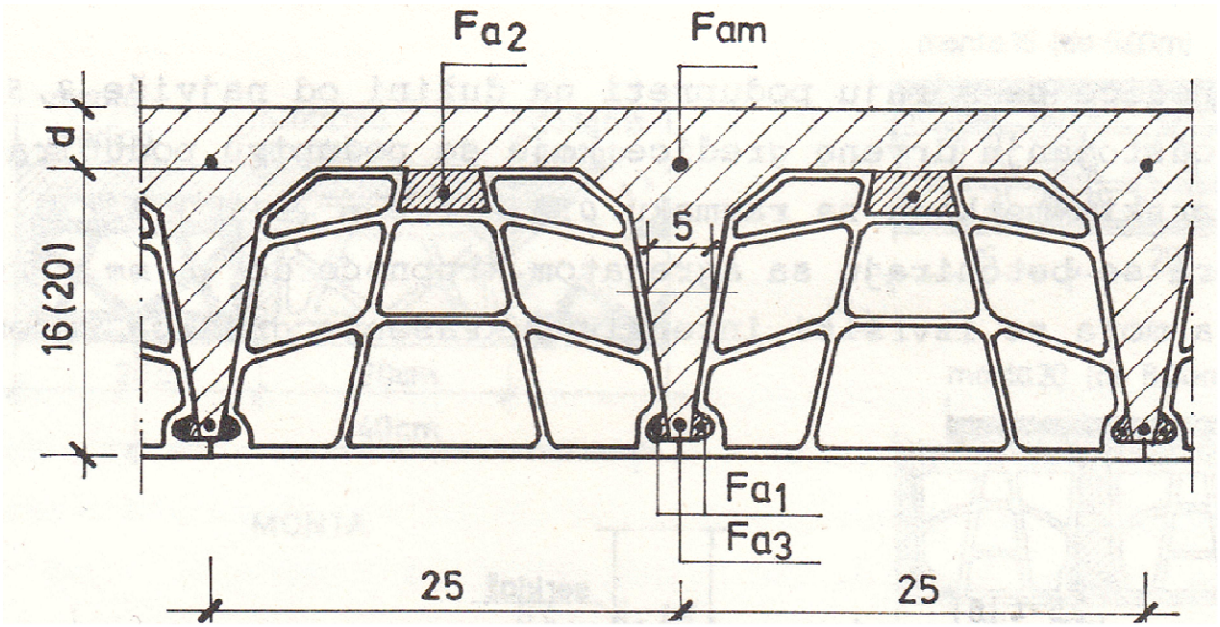
Kasetirana ploča sa
ojačanjem preko stubova

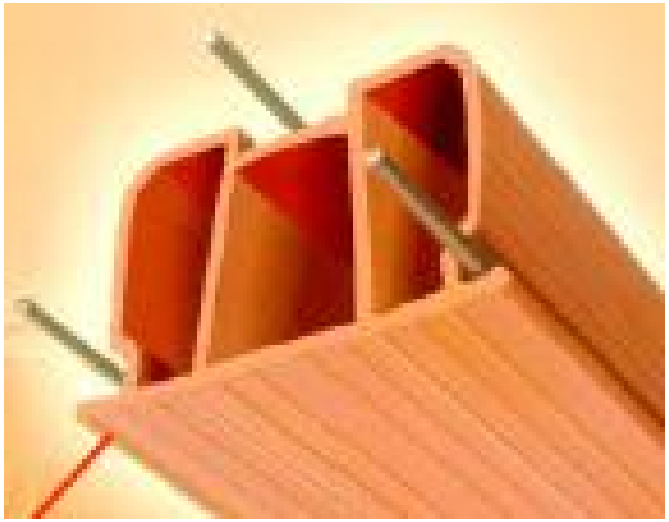


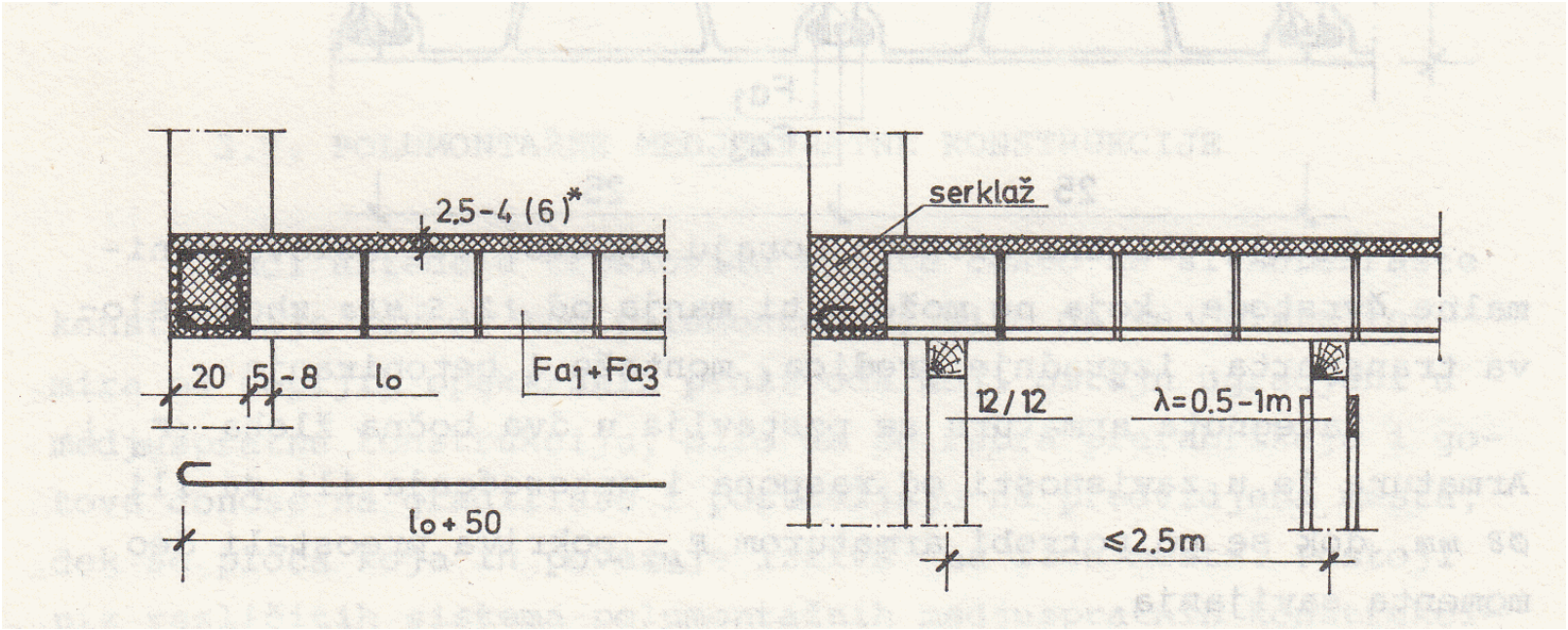
Polumontažne međuspratne konstrukcije

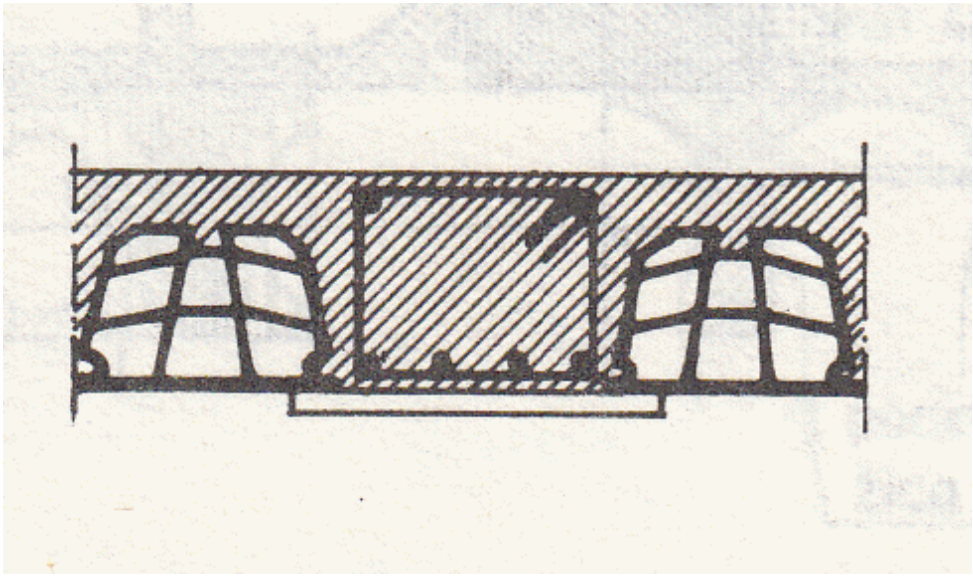
Prednost ovih konstrukcija je tome što ne zahtevaju oplatu
jer se obrazuju od šupljih opekarskih ili sličnih proizvoda

TM međuspratne konstrukcije

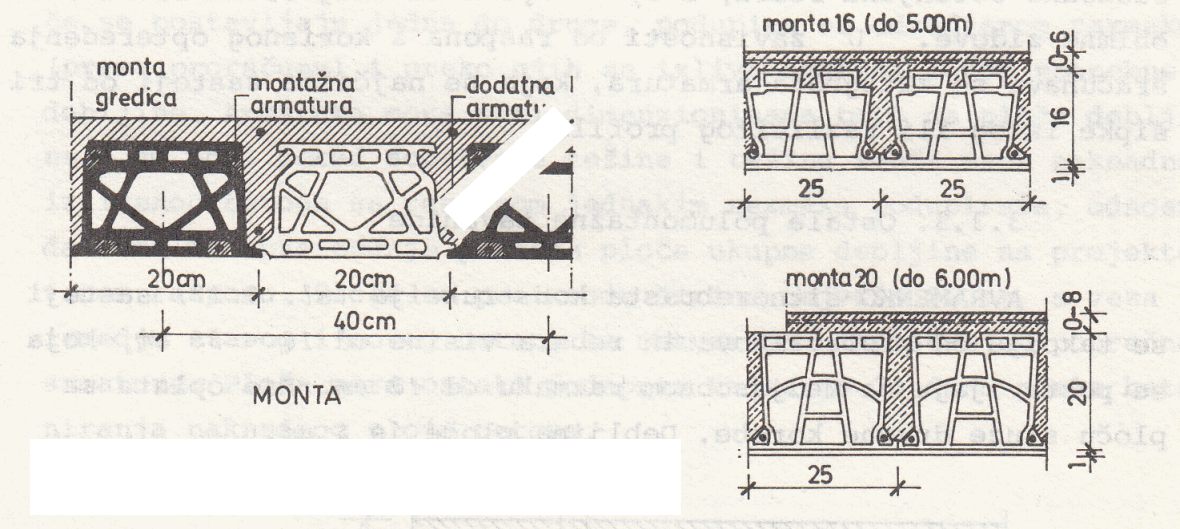




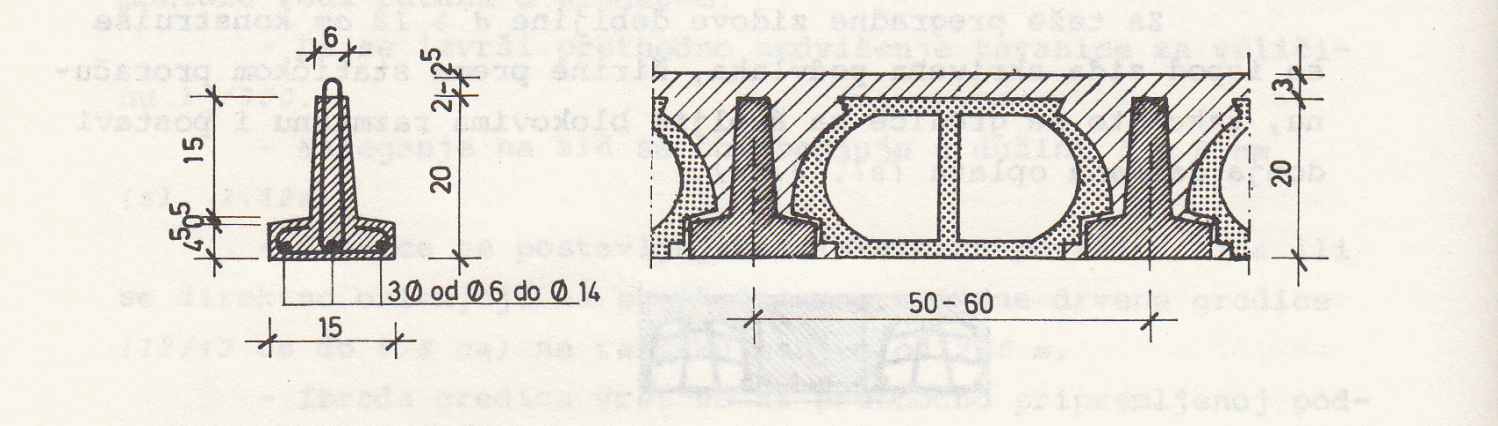

2.5-4 (6)*
20
5-8
lo
Fa1+Fa3
lo+50
serklaž
12/12
λ=0.5-1m
≤2.5m



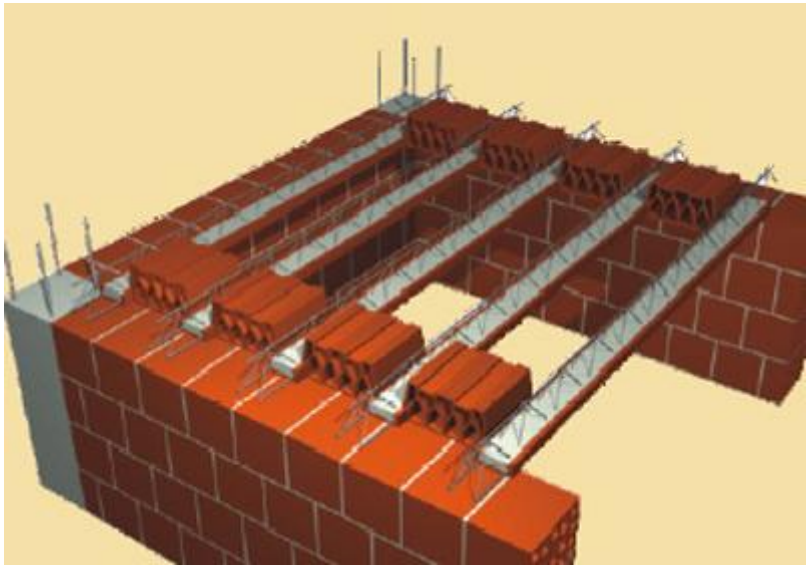
Polumontažna međuspratna konstrukcija MONTA

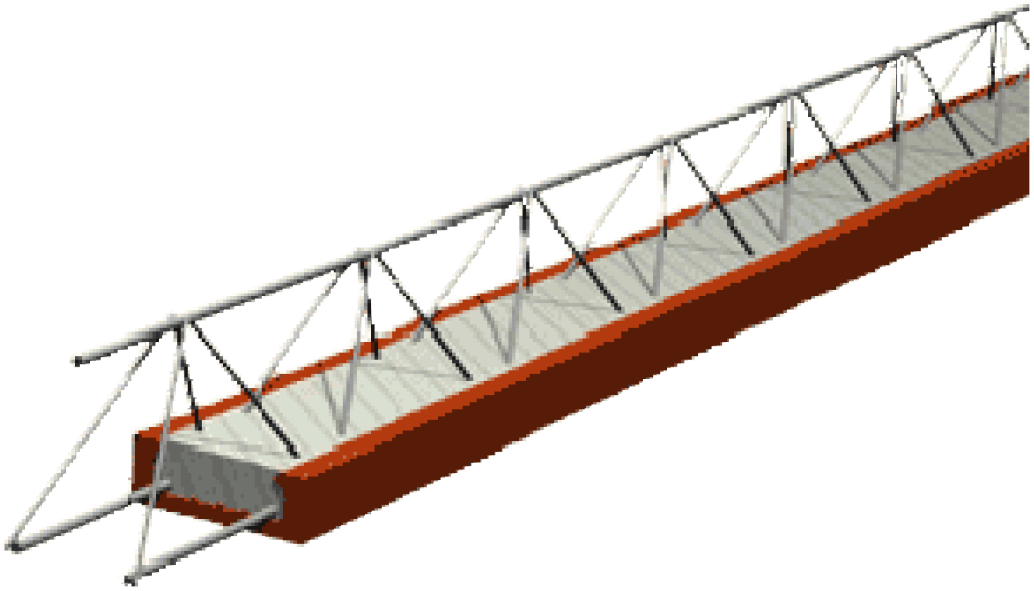


Polumontažna međuspratna konstrukcija KAT

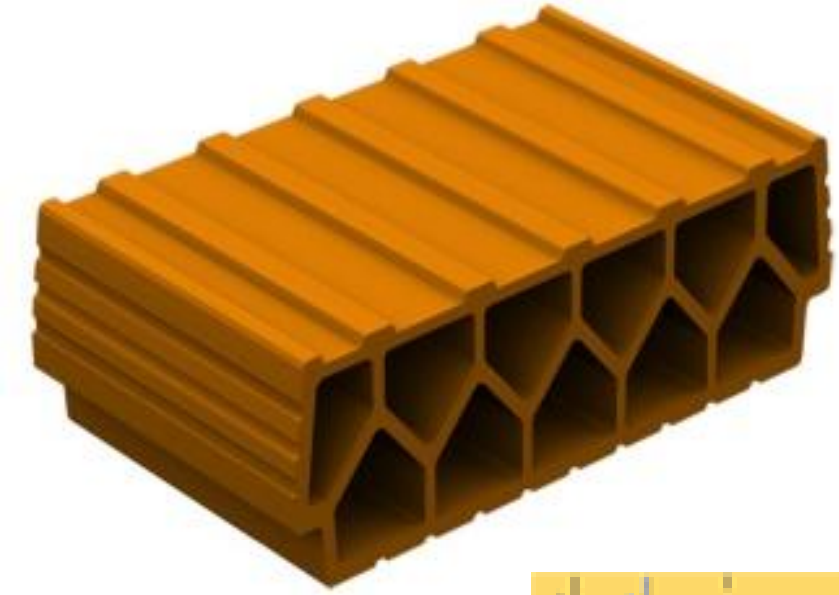


Polumontažne fert gredice LMT






~150cm
~150cm
~150cm
10
5
5
10
A-ČIST OTVOR
B-DUŽINA KANALICE = A+10
C-DUŽINA REŠETKASTOG NOSAČA = A+30



Primer

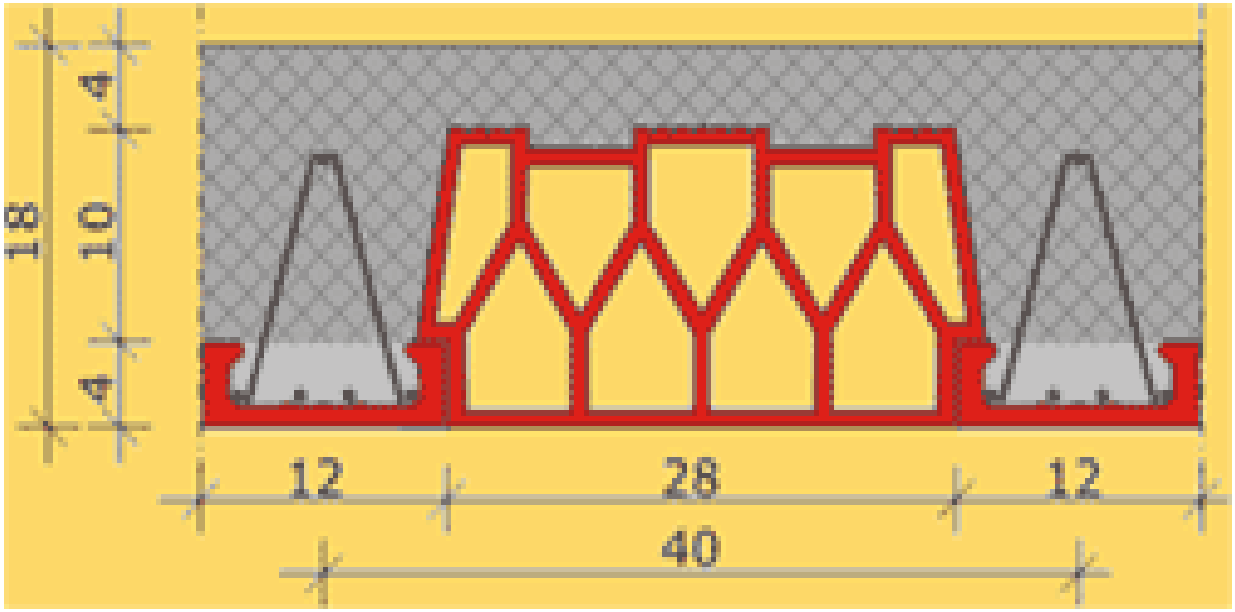
Dimenzije (cm): 25x28x14

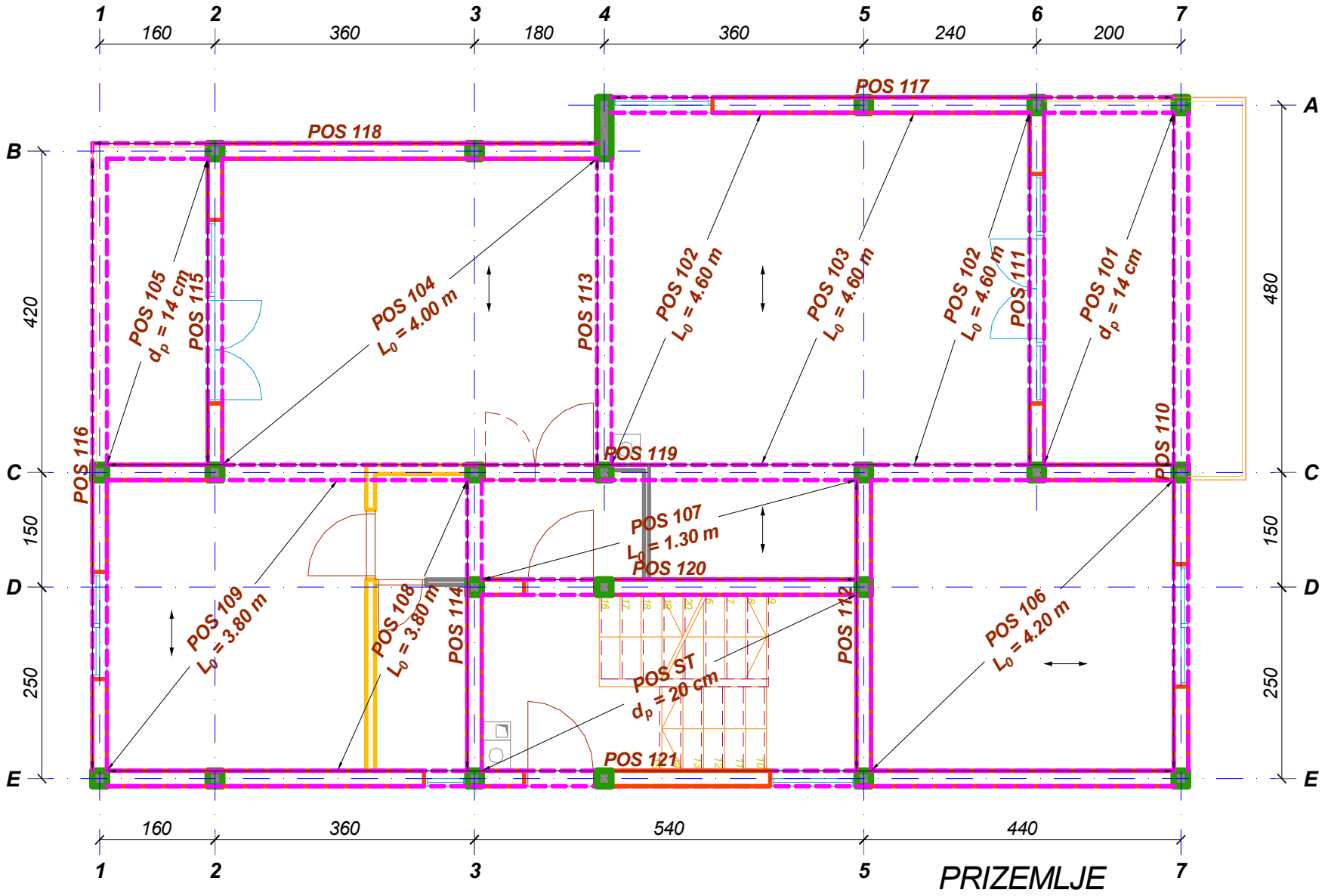
NF (kom.): 6,8

Masa (kg): 7,5

Potrošnja opeke (kom/m^2): 10

Klasična FERT ispuna




1
2
3
4
5
6
7
160
360
180
360
240
200
A
B
C
D
E
420
150
250
480
150
250
POS 117
POS 118
POS 105
d_p = 14 cm
POS 115
POS 104
L_0 = 4.00 m
POS 113
POS 102
L_0 = 4.60 m
POS 103
L_0 = 4.60 m
POS 102
L_0 = 4.60 m
POS 111
POS 101
d_p = 14 cm
POS 116
POS 119
POS 110
POS 107
L_0 = 1.30 m
POS 120
POS 109
L_0 = 3.80 m
POS 108
L_0 = 3.80 m
POS 114
POS 112
POS 106
L_0 = 4.20 m
POS ST
d_p = 20 cm
POS 121
160
360
540
440
1
2
3
5
7
PRIZEMLJE

POS 102 *- LMT tavanica d = 16+4 cm*

Tavanica je sistema proste grede, raspona L = 4.8 m.

$g = 4.5\ kN/m^2$; $p = 2\ kN/m^2$

Statički uticaji:

$A_g = 10.8\ kN/m^1$; $B_g = 10.8\ kN/m^1$; $A_p = B_p = 4.8\ kN/m^1$

$M_{u,max} = 31.1\ kNm/m^1$ ($x = 2.40\ m$)

usvojeno: RA 400/500

$h = 20 - 2.5 = 17.5\ cm \Rightarrow A_{a,potr.} = 31.1 \times 10^2/(0.9 \times 17.5 \times 40) = 4.94\ cm^2/m$

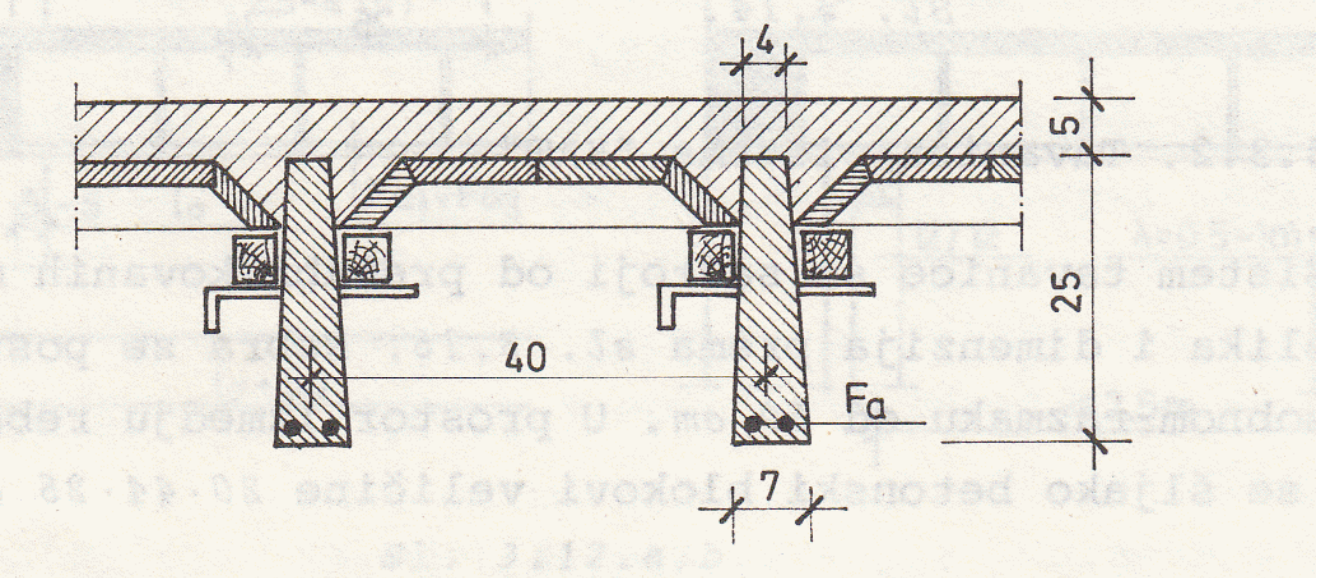
Za jedno rebro: $A_a = 0.40 \times 4.94 = 1.97\ cm^2$

ugrađena armatura rešetke: 2Ø8 (GA 500/560) - ekvivalentno 1.25 cm^2 *RA 400/500*

potrebna dodatna armatura: $\Delta Aa = 0.72\ cm^2$

Usvojeno 1RØ10

AVRAMENKO sirnorebraste konstrukcije



OMNIJA međuspratne konstrukcije