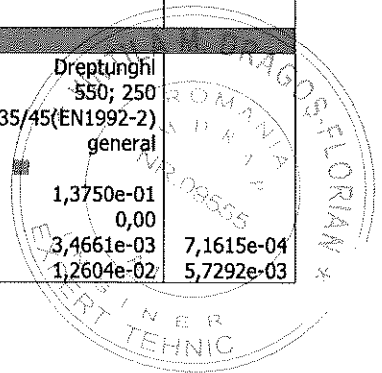
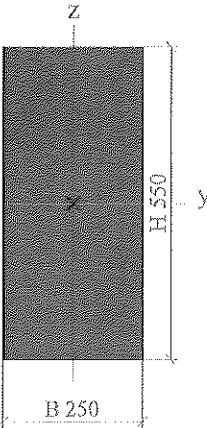
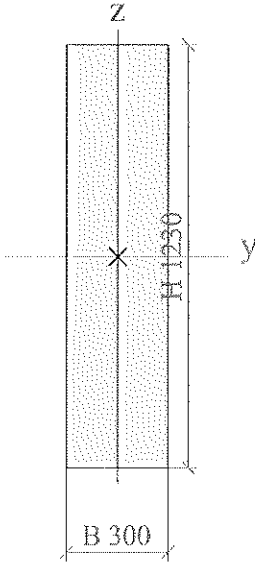
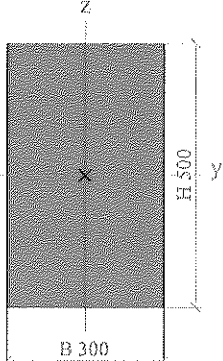
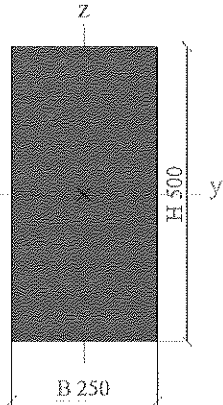
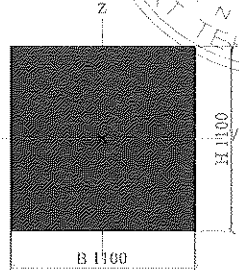


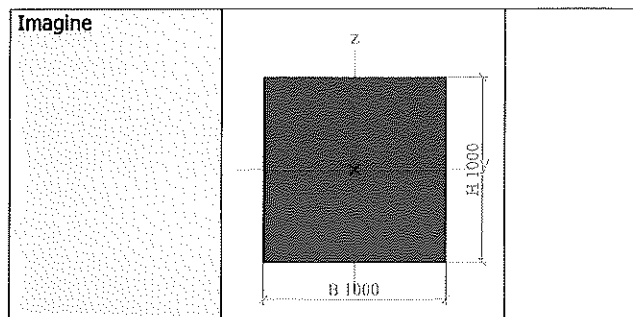
Imagine		
CS06 - Gr.		
Tip	Dreptunghi	
Raport detaliat	550; 300	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	1,6500e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	4,1594e-03	1,2375e-03
W _{el,y} [m³], W _{el,z} [m³]	1,5125e-02	8,2500e-03
Imagine		
CS07 - Gr.		
Tip	Dreptunghi	
Raport detaliat	400; 250	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	1,0000e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	1,3333e-03	5,2083e-04
W _{el,y} [m³], W _{el,z} [m³]	6,6667e-03	4,1667e-03
Imagine		
CS08 - Gr.		
Tip	Dreptunghi	
Raport detaliat	800; 300	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	2,4000e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	1,2800e-02	1,8000e-03
W _{el,y} [m³], W _{el,z} [m³]	3,2000e-02	1,2000e-02

Imagine		
CS09 - Gr.		
Tip	Dreptunghi	
Raport detaliat	800; 250	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	2,0000e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	1,0667e-02	1,0417e-03
W _{el,y} [m³], W _{el,z} [m³]	2,6667e-02	8,3333e-03
Imagine		
CS10 - Gr.		
Tip	Dreptunghi	
Raport detaliat	550; 250	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	1,3750e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	3,4661e-03	7,1615e-04
W _{el,y} [m³], W _{el,z} [m³]	1,2604e-02	5,7292e-03



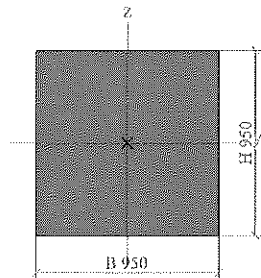
Imagine		
CS11 - Gr.		
Tip	Dreptunghi	
Raport detaliat	1230; 300	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	3,6900e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	4,6522e-02	2,7675e-03
W _{el,y} [m³], W _{el,z} [m³]	7,5645e-02	1,8450e-02
Imagine		
CS12 - Gr.		
Tip	Dreptunghi	
Raport detaliat	500; 300	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	1,5000e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	3,1250e-03	1,1250e-03
W _{el,y} [m³], W _{el,z} [m³]	1,2500e-02	7,5000e-03

Imagine		
CS13 - Gr.		
Tip	Dreptunghi	
Raport detaliat	500; 250	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	1,2500e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	2,6042e-03	6,5104e-04
W _{el,y} [m³], W _{el,z} [m³]	1,0417e-02	5,2083e-03
Imagine		
S01 - St.		
Tip	Dreptunghi	
Raport detaliat	1100; 1100	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	1,2100e+00	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	1,2201e-01	1,2201e-01
W _{el,y} [m³], W _{el,z} [m³]	2,2183e-01	2,2183e-01
Imagine		
S02 - St.		
Tip	Dreptunghi	
Raport detaliat	1000; 1000	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	1,0000e+00	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	8,3333e-02	8,3333e-02
W _{el,y} [m³], W _{el,z} [m³]	1,6667e-01	1,6667e-01



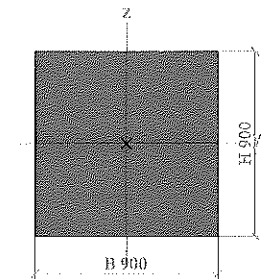
S03 - St.

Tip Dreptunghi
Raport detaliat 950; 950
Material obiect C35/45(EN1992-2)
Fabricatie general
Culoare ■
A [m²] 9,0250e-01
α [deg] 0,00
I_y [m⁴], I_z [m⁴] 6,7876e-02 6,7876e-02
W_{el,y} [m³], W_{el,z} [m³] 1,4290e-01 1,4290e-01
Imagine



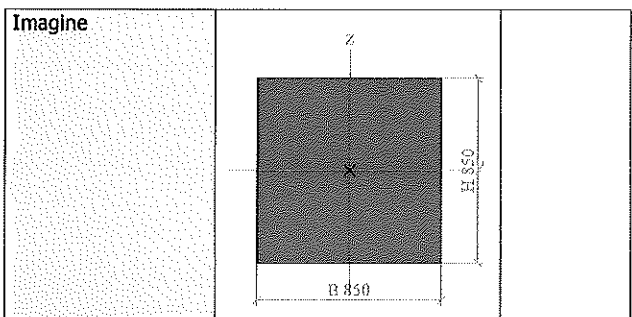
S04 - St.

Tip Dreptunghi
Raport detaliat 900; 900
Material obiect C35/45(EN1992-2)
Fabricatie general
Culoare ■
A [m²] 8,1000e-01
α [deg] 0,00
I_y [m⁴], I_z [m⁴] 5,4675e-02 5,4675e-02
W_{el,y} [m³], W_{el,z} [m³] 1,2150e-01 1,2150e-01
Imagine



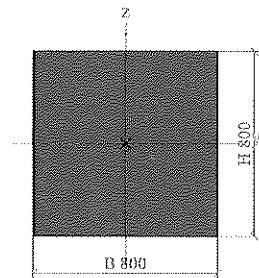
S05 - St.

Tip Dreptunghi
Raport detaliat 850; 850
Material obiect C35/45(EN1992-2)
Fabricatie general
Culoare ■
A [m²] 7,2250e-01
α [deg] 0,00
I_y [m⁴], I_z [m⁴] 4,3501e-02 4,3501e-02
W_{el,y} [m³], W_{el,z} [m³] 1,0235e-01 1,0235e-01



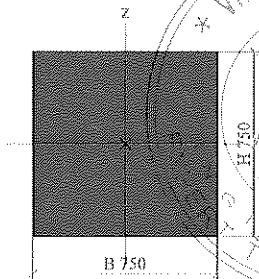
S06 - St.

Tip Dreptunghi
Raport detaliat 800; 800
Material obiect C35/45(EN1992-2)
Fabricatie general
Culoare ■
A [m²] 6,4000e-01
α [deg] 0,00
I_y [m⁴], I_z [m⁴] 3,4133e-02 3,4133e-02
W_{el,y} [m³], W_{el,z} [m³] 8,5333e-02 8,5333e-02
Imagine



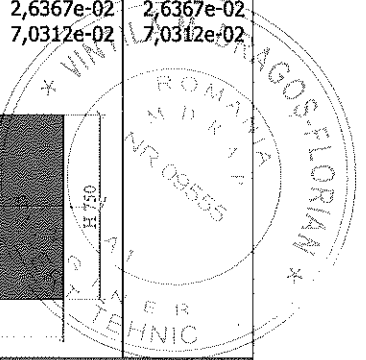
S07 - St.

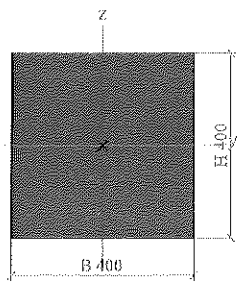
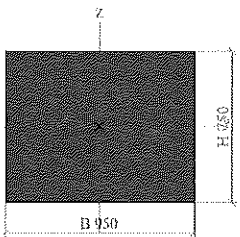
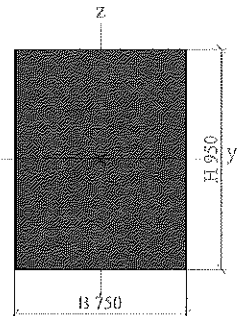
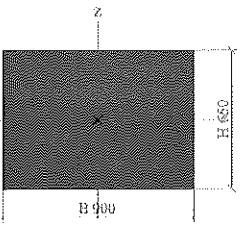
Tip Dreptunghi
Raport detaliat 750; 750
Material obiect C35/45(EN1992-2)
Fabricatie general
Culoare ■
A [m²] 5,6250e-01
α [deg] 0,00
I_y [m⁴], I_z [m⁴] 2,6367e-02 2,6367e-02
W_{el,y} [m³], W_{el,z} [m³] 7,0312e-02 7,0312e-02
Imagine

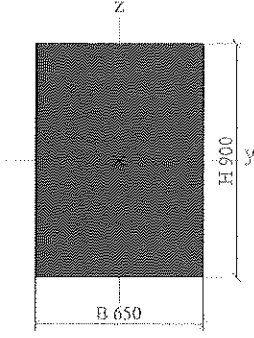
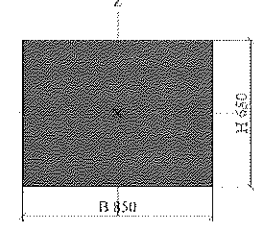
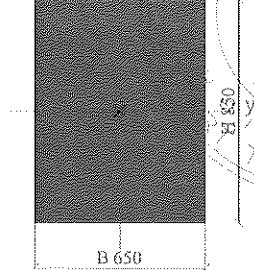


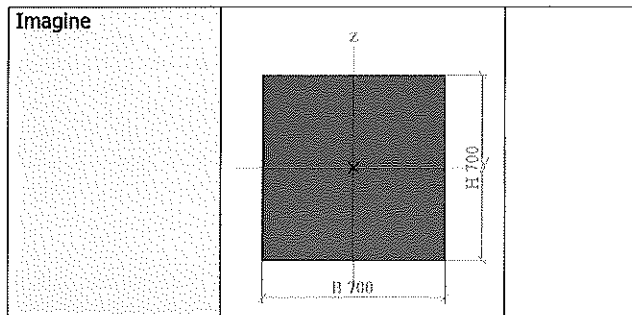
S08 - St.

Tip Dreptunghi
Raport detaliat 700; 700
Material obiect C35/45(EN1992-2)
Fabricatie general
Culoare ■
A [m²] 4,9000e-01
α [deg] 0,00
I_y [m⁴], I_z [m⁴] 2,0008e-02 2,0008e-02
W_{el,y} [m³], W_{el,z} [m³] 5,7167e-02 5,7167e-02



Imagine		
S15.1 - St.		
Tip	Dreptunghi	
Raport detaliat	750; 950	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	7,1250e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	3,3398e-02	5,3586e-02
W _{el,y} [m³], W _{el,z} [m³]	8,9062e-02	1,1281e-01
Imagine		
S15.2 - St.		
Tip	Dreptunghi	
Raport detaliat	950; 750	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	7,1250e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	5,3586e-02	3,3398e-02
W _{el,y} [m³], W _{el,z} [m³]	1,1281e-01	8,9062e-02
Imagine		
S16.1 - St.		
Tip	Dreptunghi	
Raport detaliat	650; 900	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	5,8500e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	2,0597e-02	3,9487e-02
W _{el,y} [m³], W _{el,z} [m³]	6,3375e-02	8,7750e-02
Imagine		
S16.2 - St.		
Tip	Dreptunghi	

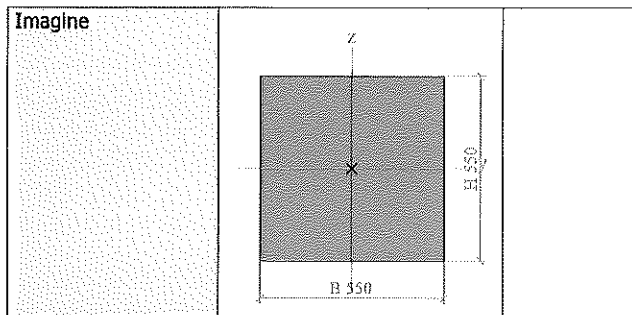
Raport detaliat	900; 650	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	5,8500e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	3,9487e-02	2,0597e-02
W _{el,y} [m³], W _{el,z} [m³]	8,7750e-02	6,3375e-02
Imagine		
S17.1 - St.		
Tip	Dreptunghi	
Raport detaliat	650; 850	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	5,5250e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	1,9453e-02	3,3265e-02
W _{el,y} [m³], W _{el,z} [m³]	5,9854e-02	7,8271e-02
Imagine		
S17.2 - St.		
Tip	Dreptunghi	
Raport detaliat	850; 650	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	5,5250e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	3,3265e-02	1,9453e-02
W _{el,y} [m³], W _{el,z} [m³]	7,8271e-02	5,9854e-02
Imagine		
S18.1 - St.		
Tip	Dreptunghi	
Raport detaliat	600; 800	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	4,8000e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	1,4400e-02	2,5600e-02
W _{el,y} [m³], W _{el,z} [m³]	4,8000e-02	6,4000e-02



S09 - St.		
Tip	Dreptunghi	
Raport detaliat	650; 650	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare	■	
A [m²]	4,2250e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	1,4876e-02	1,4876e-02
W _{el,y} [m³], W _{el,z} [m³]	4,5771e-02	4,5771e-02
Imagine		

S10 - St.		
Tip	Dreptunghi	
Raport detaliat	600; 600	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare	■	
A [m²]	3,6000e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	1,0800e-02	1,0800e-02
W _{el,y} [m³], W _{el,z} [m³]	3,6000e-02	3,6000e-02
Imagine		

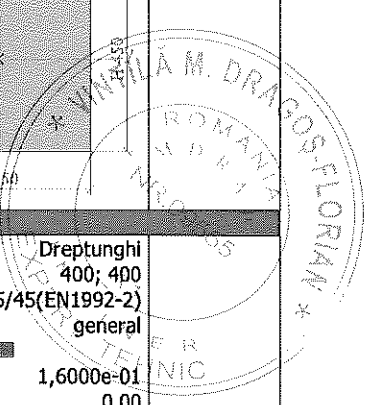
S11 - St.		
Tip	Dreptunghi	
Raport detaliat	550; 550	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare	■	
A [m²]	3,0250e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	7,6255e-03	7,6255e-03
W _{el,y} [m³], W _{el,z} [m³]	2,7729e-02	2,7729e-02

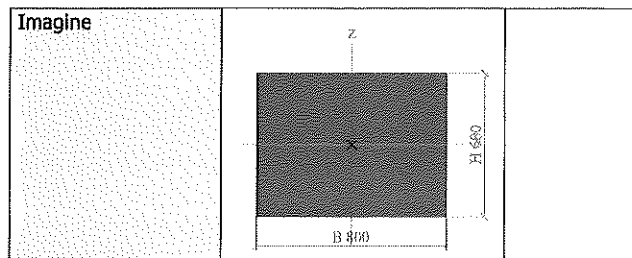


S12 - St.		
Tip	Dreptunghi	
Raport detaliat	500; 500	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare	■	
A [m²]	2,5000e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	5,2083e-03	5,2083e-03
W _{el,y} [m³], W _{el,z} [m³]	2,0833e-02	2,0833e-02
Imagine		

S13 - St.		
Tip	Dreptunghi	
Raport detaliat	450; 450	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare	■	
A [m²]	2,0250e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	3,4172e-03	3,4172e-03
W _{el,y} [m³], W _{el,z} [m³]	1,5187e-02	1,5187e-02
Imagine		

S14 - St.		
Tip	Dreptunghi	
Raport detaliat	400; 400	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare	■	
A [m²]	1,6000e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	2,1333e-03	2,1333e-03
W _{el,y} [m³], W _{el,z} [m³]	1,0667e-02	1,0667e-02

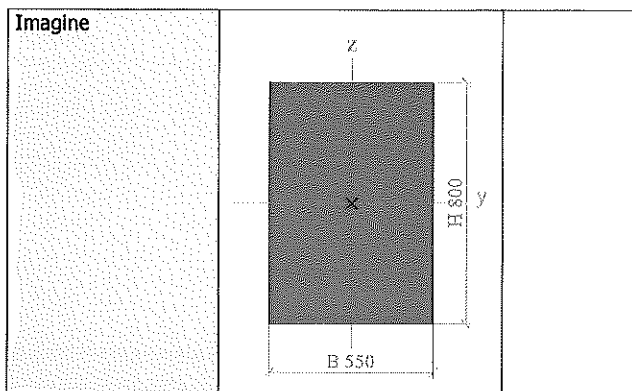




S18.2 - St.		
Tip	Dreptunghi	
Raport detaliat	800; 600	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	4,8000e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	2,5600e-02	1,4400e-02
W _{ely} [m³], W _{elz} [m³]	6,4000e-02	4,8000e-02
Imagine		

S19.1 - St.		
Tip	Dreptunghi	
Raport detaliat	550; 800	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	4,4000e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	1,1092e-02	2,3467e-02
W _{ely} [m³], W _{elz} [m³]	4,0333e-02	5,8667e-02
Imagine		

S19.2 - St.		
Tip	Dreptunghi	
Raport detaliat	800; 550	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	4,4000e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	2,3467e-02	1,1092e-02
W _{ely} [m³], W _{elz} [m³]	5,8667e-02	4,0333e-02



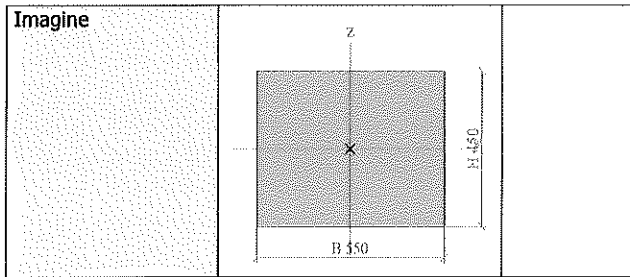
S20.1 - St.		
Tip	Dreptunghi	
Raport detaliat	550; 750	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	4,1250e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	1,0398e-02	1,9336e-02
W _{ely} [m³], W _{elz} [m³]	3,7812e-02	5,1562e-02
Imagine		

S20.2 - St.		
Tip	Dreptunghi	
Raport detaliat	750; 550	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	4,1250e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	1,9336e-02	1,0398e-02
W _{ely} [m³], W _{elz} [m³]	5,1562e-02	3,7812e-02
Imagine		

S21.1 - St.		
Tip	Dreptunghi	
Raport detaliat	500; 700	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	3,5000e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	7,2917e-03	1,4292e-02
W _{ely} [m³], W _{elz} [m³]	2,9167e-02	4,0833e-02

Imagine		
S21.2 - St.		
Tip	Dreptunghi	
Raport detaliat	700; 500	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	3,5000e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	1,4292e-02	7,2917e-03
W _{el,y} [m³], W _{el,z} [m³]	4,0833e-02	2,9167e-02
Imagine		
S22.1 - St.		
Tip	Dreptunghi	
Raport detaliat	500; 650	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	3,2500e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	6,7708e-03	1,1443e-02
W _{el,y} [m³], W _{el,z} [m³]	2,7083e-02	3,5208e-02
Imagine		
S22.2 - St.		
Tip	Dreptunghi	
Raport detaliat	650; 500	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	3,2500e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	1,1443e-02	6,7708e-03
W _{el,y} [m³], W _{el,z} [m³]	3,5208e-02	2,7083e-02

Imagine		
S23.1 - St.		
Tip	Dreptunghi	
Raport detaliat	500; 600	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	3,0000e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	6,2500e-03	9,0000e-03
W _{el,y} [m³], W _{el,z} [m³]	2,5000e-02	3,0000e-02
Imagine		
S23.2 - St.		
Tip	Dreptunghi	
Raport detaliat	600; 500	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	3,0000e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	9,0000e-03	6,2500e-03
W _{el,y} [m³], W _{el,z} [m³]	3,0000e-02	2,5000e-02
Imagine		
S24.1 - St.		
Tip	Dreptunghi	
Raport detaliat	450; 550	
Material obiect	C35/45(EN1992-2)	
Fabricatie	general	
Culoare		
A [m²]	2,4750e-01	
α [deg]	0,00	
I _y [m⁴], I _z [m⁴]	4,1766e-03	6,2391e-03
W _{el,y} [m³], W _{el,z} [m³]	1,8563e-02	2,2688e-02



S24.2 - St.			
Tip	Dreptunghi		
Raport detaliat	550; 450		
Material obiect	C35/45(EN1992-2)		
Fabricatie	general		
Culoare			
A [m ²]	2,4750e-01		
α [deg]	0,00		
I _y [m ⁴], I _z [m ⁴]	6,2391e-03	4,1766e-03	
W _{el,y} [m ³], W _{el,z} [m ³]	2,2688e-02	1,8562e-02	
Imagine			

Explicari simboluri	
A	Arie
α	Unghi rotire sistem principal de axe

Explicari simboluri	
I _y	Moment de inertie pe axa principala y
I _z	Moment de inertie pe axa principala z

Explicari simboluri	
W _{el,y}	Modulul de rezistenta elastic pe axa principala y
W _{el,z}	Modulul de rezistenta elastic pe axa principala z

2.4. Factori rigiditate 1D

50% - Procent Rigiditate Grinzi				
Tip	Procent rigiditate			
Rigiditate axiala [%]	100			
Rigiditate la incovolare [%]	50			
Factor de corectie pt. A _x , Factor de corectie pt. A _y , Factor de corectie pt. A _z	1.000	1.000	1.000	
Factor de corectie pt. I _x , Factor de corectie pt. I _y , Factor de corectie pt. I _z	1.000	0.500	0.500	
80% - Procent Rigiditate Stalpi				
Tip	Procent rigiditate			
Rigiditate axiala [%]	100			
Rigiditate la incovolare [%]	80			
Factor de corectie pt. A _x , Factor de corectie pt. A _y , Factor de corectie pt. A _z	1.000	1.000	1.000	
Factor de corectie pt. I _x , Factor de corectie pt. I _y , Factor de corectie pt. I _z	1.000	0.800	0.800	

2.5. Factori rigiditate 2D

50% - Procent Rigiditate Placa						
Tip	Procent rigiditate					
Rigiditate axiala [%]	100					
Rigiditate la incovolare [%]	50					
Factor de corectie pt. D ₁₁ , Factor de corectie pt. D ₁₂ , Factor de corectie pt. D ₂₂	0.500	0.500	0.500	0.500	1.000	1.000
Factor de corectie pt. D ₃₃ , Factor de corectie pt. D ₄₄ , Factor de corectie pt. D ₅₅						
Factor de corectie pt. d ₁₁ , Factor de corectie pt. d ₁₂ , Factor de corectie pt. d ₂₂	1.000	1.000	1.000	1.000		
Factor de corectie pt. d ₃₃						

3. Actiuni și combinatii

3.1. Cazuri de incarcare

Nume, Descriere, Tip actiune, Tip incarcare	LC01	SW	Permanentă	Greutate proprie
Nume, Descriere, Tip actiune, Tip incarcare	LC02	DW - Distribuita Uniform (Finisaje planseu)	Permanentă	Standard
Nume, Descriere, Tip actiune, Tip incarcare	LC03	DW - Distribuita Liniar (Inchideri / Compartimentari)	Permanentă	Standard
Nume, Descriere, Tip actiune, Tip incarcare	LC04	DW - Distribuita Uniform (Compartimentari Usoare)	Permanentă	Standard
Nume, Descriere, Tip actiune, Tip incarcare	LC05	DW - Distribuita Uniform (Antene)	Permanentă	Standard
Nume, Descriere, Tip actiune, Tip incarcare	LC06	LW - Utila Etaj Curent	Variabila	Static
Nume, Descriere, Tip actiune, Tip incarcare	LC07	LW - Utila Etaj Acoperis	Variabila	Static
Nume, Descriere, Tip actiune, Tip incarcare	LC08	LW - Zapada	Variabila	Static
Nume, Descriere, Tip actiune, Tip incarcare	LC09	Q - Seism „X”	Variabila	Dinamic
Nume, Descriere, Tip actiune, Tip incarcare	LC10	Q - Seism „Y”	Variabila	Dinamic
Nume, Descriere, Tip actiune, Tip incarcare	LC11	Q - Seism „Z”	Variabila	Dinamic
Nume, Descriere, Tip actiune, Tip incarcare	LC12	Q - Seism „X”	Variabila	Dinamic
Nume, Descriere, Tip actiune, Tip incarcare	LC12 EA	Excentricitate accidentala pt. LC12	Variabila	Static
Nume, Descriere, Tip actiune, Tip incarcare	LC13	Q - Seism „Y”	Variabila	Dinamic
Nume, Descriere, Tip actiune, Tip incarcare	LC13 EA	Excentricitate accidentala pt. LC13	Variabila	Static
Nume, Descriere, Tip actiune, Tip incarcare	LC14	Q - Seism „Z”	Variabila	Dinamic

3.2. Spectre seismice

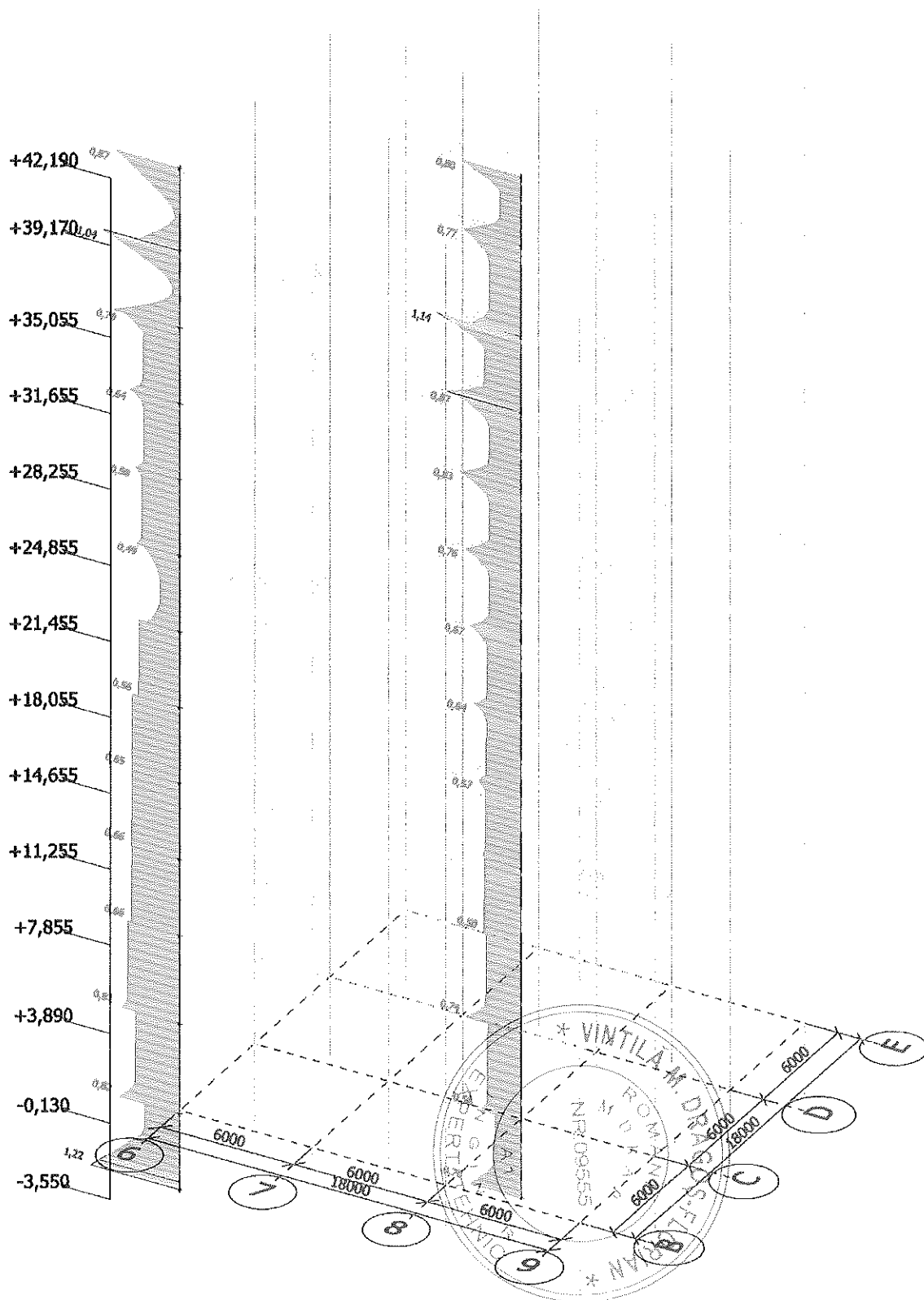
Nume ID unic	Tip de desen	Informatii	Desen
Spectru X / Y	Perioada	Tip normativ - Normativ Romanesc Tip spectru - Orizantal Oras - Alt oras Gamma - factor importanta - 1.4 coef. acceleratie ag - 0.16 ag - acc. teren pe orizontala - 1.56912 TB - 0.07 TC - 0.7 TD - 3 beta0 - 2.75 q - factor de comportare - 2	
Spectru Z	Perioada	Tip normativ - Normativ Romanesc Tip spectru - Vertical Oras - Alt oras Gamma - factor importanta - 1.4 coef. acceleratie ag - 0.11 ag - acc. teren pe orizontala - 1.07877 TB - 0.0315 TC - 0.315 TD - 3 beta0 - 3 q - factor de comportare - 1.5	

3.3. Combinatii

Nume	Descriere	Tip	Cazuri de Incarcare	Coef. [-]
CO1	ULS - Grupare Fundamentala	EN-ULS (STR/GEO) Set B	LC01 - SW LC02 - DW - Distribuita Uniform (Finisaje planseu) LC03 - DW - Distribuita Liniar (Inchideri / Compartimentari) LC04 - DW - Distribuita Uniform (Compartimentari Usoare) LC05 - DW - Distribuita Uniform (Antene) LC06 - LW - Utila Etaj Curent LC07 - LW - Utila Etaj Acoperis LC08 - LW - Zapada	1,00 1,00 1,00 1,00 1,00 1,00 1,00 1,00
CO2	ULS - Grupare Seismica - „-” Excentricitati	EN-Seismic	LC01 - SW LC02 - DW - Distribuita Uniform (Finisaje planseu) LC03 - DW - Distribuita Liniar (Inchideri / Compartimentari) LC04 - DW - Distribuita Uniform (Compartimentari Usoare) LC05 - DW - Distribuita Uniform (Antene) LC06 - LW - Utila Etaj Curent LC07 - LW - Utila Etaj Acoperis LC08 - LW - Zapada LC09 - Q - Seism „X” LC10 - Q - Seism „Y” LC11 - Q - Seism „Z”	1,00 1,00 1,00 1,00 1,00 1,00 1,00 1,00 1,00 1,00
CO3	ULS - Grupare Seismica - „+” Excentricitati	EN-Seismic	LC01 - SW LC02 - DW - Distribuita Uniform (Finisaje planseu) LC03 - DW - Distribuita Liniar (Inchideri / Compartimentari) LC04 - DW - Distribuita Uniform (Compartimentari Usoare) LC05 - DW - Distribuita Uniform (Antene) LC06 - LW - Utila Etaj Curent LC07 - LW - Utila Etaj Acoperis LC08 - LW - Zapada LC12 - Q - Seism „X” LC12_EA - Excentricitate accidentala pt. LC12 LC13 - Q - Seism „Y” LC13_EA - Excentricitate accidentala pt. LC13 LC14 - Q - Seism „Z”	1,00 1,00 1,00 1,00 1,00 1,00 1,00 1,00 1,00 1,00 1,00 1,00
CO4	SLS - Grupare Fundamentala - Cvasi - 2005	Liniar - starea de serviciu	LC01 - SW LC02 - DW - Distribuita Uniform (Finisaje planseu) LC03 - DW - Distribuita Liniar (Inchideri / Compartimentari) LC04 - DW - Distribuita Uniform (Compartimentari Usoare) LC05 - DW - Distribuita Uniform (Antene) LC06 - LW - Utila Etaj Curent LC07 - LW - Utila Etaj Acoperis LC08 - LW - Zapada	1,00 1,00 1,00 1,00 1,00 0,70 0,70
CO5	SLS - Grupare Fundamentala - Cvasi - 2005	Liniar - starea de serviciu	LC01 - SW LC02 - DW - Distribuita Uniform (Finisaje planseu) LC03 - DW - Distribuita Liniar (Inchideri / Compartimentari) LC04 - DW - Distribuita Uniform (Compartimentari Usoare) LC05 - DW - Distribuita Uniform (Antene) LC06 - LW - Utila Etaj Curent LC07 - LW - Utila Etaj Acoperis LC08 - LW - Zapada	1,00 1,00 1,00 1,00 0,70 1,00 0,70
CO6	SLS - Grupare Fundamentala - Cvasi - 2005	Liniar - starea de serviciu	LC01 - SW LC02 - DW - Distribuita Uniform (Finisaje planseu) LC03 - DW - Distribuita Liniar (Inchideri / Compartimentari) LC04 - DW - Distribuita Uniform (Compartimentari Usoare) LC05 - DW - Distribuita Uniform (Antene) LC06 - LW - Utila Etaj Curent LC07 - LW - Utila Etaj Acoperis LC08 - LW - Zapada	1,00 1,00 1,00 1,00 0,70 0,70 1,00
CO7	SLS - Grupare Seismica - „+” Excentricitati - 2005	Infasuratoare - starea de serviciu	LC01 - SW LC02 - DW - Distribuita Uniform (Finisaje planseu) LC03 - DW - Distribuita Liniar (Inchideri / Compartimentari) LC04 - DW - Distribuita Uniform (Compartimentari Usoare) LC05 - DW - Distribuita Uniform (Antene) LC06 - LW - Utila Etaj Curent LC07 - LW - Utila Etaj Acoperis LC08 - LW - Zapada LC12 - Q - Seism „X” LC12_EA - Excentricitate accidentala pt. LC12 LC13 - Q - Seism „Y” LC13_EA - Excentricitate accidentala pt. LC13 LC14 - Q - Seism „Z”	1,00 1,00 1,00 1,00 0,40 0,40 0,40 0,60 0,60 0,18 0,18 0,18

Nume	Descriere	Tip	Cazuri de incarcare	Coef. [-]
CO8	SLS - Grupare Seismica - „+” Excentricitati - 2005	Infasuratoare - starea de serviciu	LC01 - SW	1,00
			LC02 - DW - Distribuita Uniform (Finisaje planseu)	1,00
			LC03 - DW - Distribuita Liniar (Inchideri / Compartimentari)	1,00
			LC04 - DW - Distribuita Uniform (Compartimentari Usoare)	1,00
			LC05 - DW - Distribuita Uniform (Antene)	1,00
			LC06 - LW - Utila Etaj Curent	0,40
			LC07 - LW - Utila Etaj Acoperis	0,40
			LC08 - LW - Zapada	0,40
			LC12 - Q - Seism „X”	0,18
			LC12_EA - Excentricitate accidentala pt. LC12	0,18
			LC13 - Q - Seism „Y”	0,60
			LC13_EA - Excentricitate accidentala pt. LC13	0,60
			LC14 - Q - Seism „Z”	0,18
CO9	SLS - Grupare Seismica - „+” Excentricitati - 2005	Infasuratoare - starea de serviciu	LC01 - SW	1,00
			LC02 - DW - Distribuita Uniform (Finisaje planseu)	1,00
			LC03 - DW - Distribuita Liniar (Inchideri / Compartimentari)	1,00
			LC04 - DW - Distribuita Uniform (Compartimentari Usoare)	1,00
			LC05 - DW - Distribuita Uniform (Antene)	1,00
			LC06 - LW - Utila Etaj Curent	0,40
			LC07 - LW - Utila Etaj Acoperis	0,40
			LC08 - LW - Zapada	0,40
			LC12 - Q - Seism „X”	0,18
			LC12_EA - Excentricitate accidentala pt. LC12	0,18
			LC13 - Q - Seism „Y”	0,18
			LC13_EA - Excentricitate accidentala pt. LC13	0,18
			LC14 - Q - Seism „Z”	0,60

4.1. Verificare capacitate - diagrama de interactiune - UC - Forta axiala si Moment



4.2. Verificare capacitate - diagrama de interactiune

Calcul liniar
Clasa: ULS
Extrema 1D: Element
Selectie: Tot
Filtru: Layer = Stalpi

Stalp <Unnamed Element> 93...Dreptunghi (750; 750)

SR EN 1992-1-1

Section 0 [dx = 0 m]

Lungime element Ld = 3.42 m
Lungime de flambaj y Ly = 6.79 m
Lungime de flambaj z Lz = 6.83 m

Materiale

Beton C35/45(EN1992-2)
Armatura PC52 16...28

Coeficienti

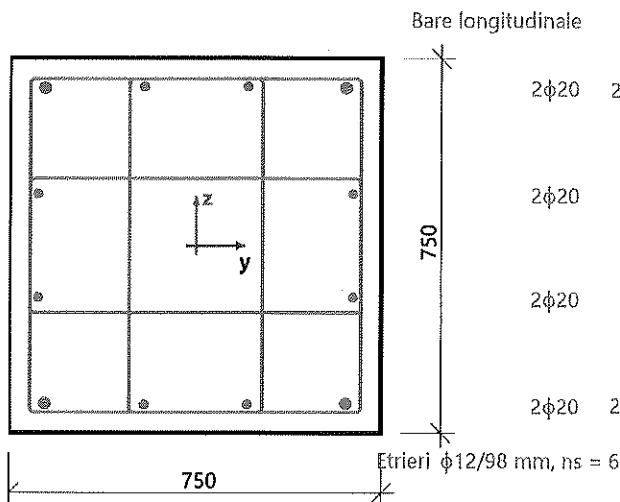
Cod SR EN 1992-1-1
Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura $\gamma_s = 1$

Armatura

Bare long.: 8 ϕ 20 mm + 4 ϕ 25 mm, Arie tot. = 4477 mm²
Etrieri: $\phi = 12$ mm, A_{sw} = 679 mm², A_{sw,s} = 6934 mm²/m

Acoperire etrier:

Sus 35 mm
Jos 35 mm
Stanga 35 mm
Dreapta 35 mm



Caracteristici material

Rezistenta de calcul la compresiune a betonului

$$f_{cd} = \frac{\alpha_{cc} \cdot f_{ck}}{\gamma_c} = \frac{1 \cdot 35}{1.2} = 29.2 \text{ MPa}$$

Limita de curgere de calcul pt. armatura longit.

$$f_{yd} = \frac{f_{yk}}{\gamma_s} = \frac{345}{1} = 345 \text{ MPa} \quad (3.15)$$

Forte

Din analiza FEM

N = -58.7 kN M_y = -659 kNm M_z = 83.4 kNm

Continut combinatie:

LC01+LC02+LC03+LC04+LC05+LC12+0.30*LC13+0.30*LC14+LC12_EA+0.30*LC13_EA

Momente de incovoiere recalculate:

Efect de ordin 2: Da

Imperfectiuni: Da

N_{Ed} = -58.7 kN M_{Edy} = -659 kNm M_{Edz} = 83.4 kNm

Elementul este preluat ca element izolat: Nu

Utilizat pt. calcularea momentelor echivalente: Da

Data de introducere pentru generarea diagramei de interactiune

Metoda cu verificare la diagrama de interactiune N_uM_u
Diviziune deformatii verticale 250
Numar de sectiuni verticale 36
Valoare moment de incovoiere rezultat M_{res} = 665 kNm
Unghiul momentului de incovoiere rezultat corespunzator directiei M_y in planul orizontal M_y-M_z $\alpha_{MyMz} = 7.21^\circ$
Unghiul momentului de incovoiere rezultat corespunzator directiei N in planul vertical N-M_{res} $\alpha_{NM} = -5.04^\circ$



Calcularea rezistentelor

Rezistente in directia pozitiva $N_{Rd+} = 46 \text{ kN}$ $M_{Rdy+} = 512 \text{ kNm}$ $M_{Rdz+} = 69 \text{ kNm}$

Rezistente in directia negativa $N_{Rd-} = -48 \text{ kN}$ $M_{Rdy-} = -543 \text{ kNm}$ $M_{Rdz-} = -65 \text{ kNm}$

Rezumat verificare

Forta: $N_{Ed} = -58.7 \text{ kN}$ $M_{Edy} = -659 \text{ kNm}$ $M_{Edz} = 83.4 \text{ kNm}$

Rezistenta: $N_{Rd} = -48 \text{ kNm}$ $M_{Rdy} = -543 \text{ kNm}$ $M_{Rdz} = 69 \text{ kNm}$

Calcularea verificarii unitare:

$$UC_N = \frac{N_{Ed}}{N_{Rd}} = \frac{-58683}{-48275} = 1.22$$

$$UC_{My} = \frac{M_{Edy}}{M_{Rdy}} = \frac{-659481}{-542521} = 1.22$$

$$UC_{Mz} = \frac{M_{Edz}}{M_{Rdz}} = \frac{83419}{68625} = 1.22$$

$$UC = \max(UC_N, UC_{My}, UC_{Mz}) = \max(1.22; 1.22; 1.22) = 1.22 > 1 \text{ Incorect}$$

Lista cu erori/atentionari/note: E6/1.

Diagrama de interactiune 3D - Sectiune verticala N-M_{res}

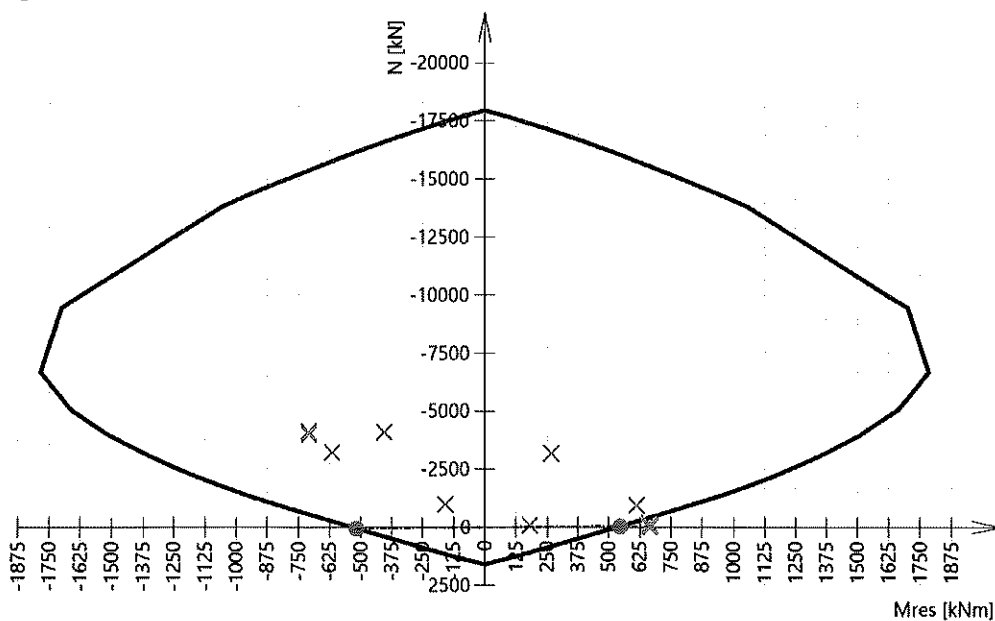
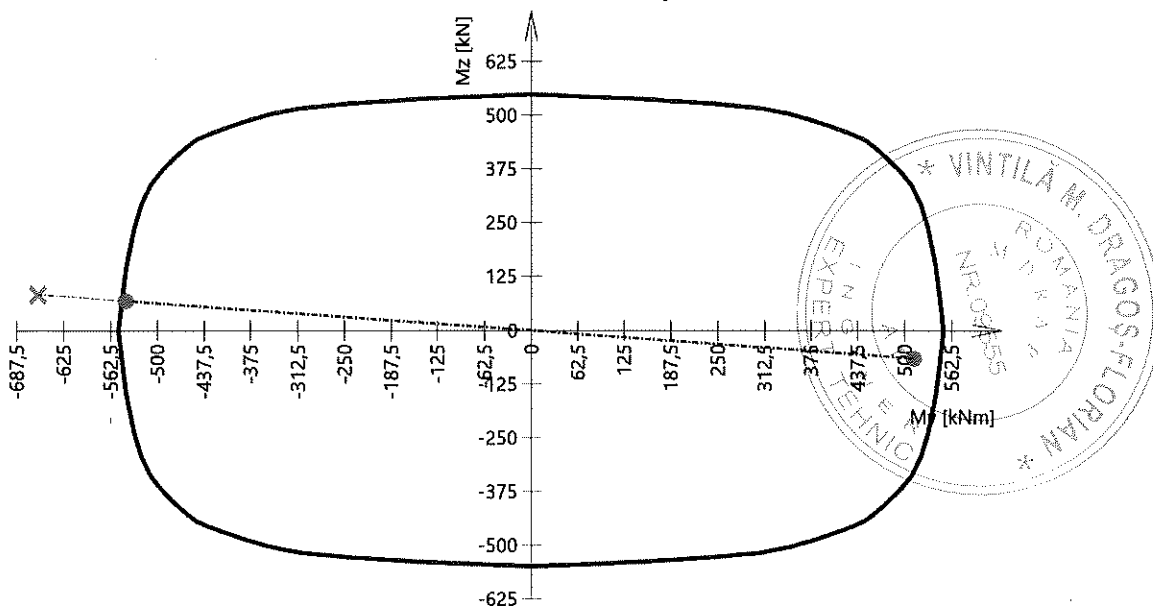


Diagrama de interactiune 3D - Sectiune orizontala M_y-M_z



Explicarea erorilor, atentionarilor si notelor

Index	Tip	Descriere	Solutie
E6/1	Eroare	Combinatia eforturilor interne este in afara diagramei de interactiune 3D.	Modificati (a) dimensiunile sectiunii transversale, (b) procentul de armare si/sau (c) calitatea materialelor utilizate.

Stalp <Unnamed Element> 94...Dreptunghi (1100; 1100)

SR EN 1992-1-1

Section 0 [dx = 0 m]

Lungime element Ld = 3.42 m

Lungime de flambaj y Ly = 6.51 m

Lungime de flambaj z Lz = 6.31 m

Materiale

Beton C35/45(EN1992-2)

Armatura PC52 16...28

Coeficienti

Cod

SR EN 1992-1-1

Parametri beton

$\gamma_c = 1.2$, $\alpha_{cc} = 1$

Parametri armatura

$\gamma_s = 1$

Armatura

Bare long.: 8 ϕ 25 mm + 8 ϕ 28 mm, Arie tot. = 8853 mm²

Etrieri: $\phi = 12$ mm, $A_{sw} = 679$ mm², $A_{sw,s} = 7389$ mm²/m

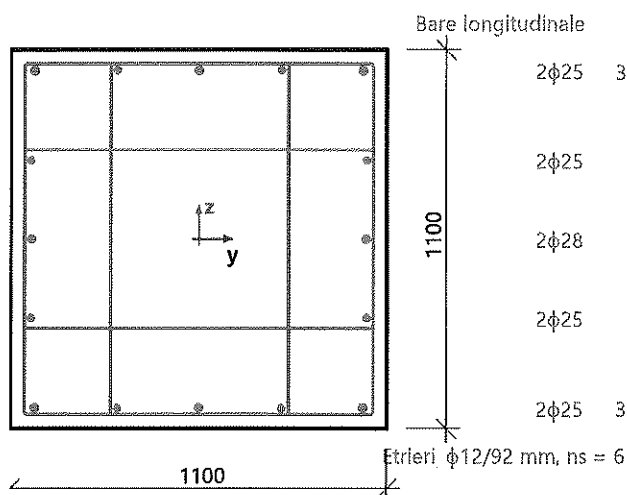
Acoperire etrier:

Sus 35 mm

Jos 35 mm

Stanga 35 mm

Dreapta 35 mm



Caracteristici material

Rezistenta de calcul la compresiune a betonului

$$f_{cd} = \frac{\alpha_{cc} \cdot f_{ck}}{\gamma_c} = \frac{1 \cdot 35}{1.2} = 29.2 \text{ MPa}$$

Limita de curgere de calcul pt. armatura lungit.

$$f_{yd} = \frac{f_{yk}}{\gamma_s} = \frac{345}{1} = 345 \text{ MPa} \quad (3.15)$$

Forte

Din analiza FEM

N = -4887 kN $M_y = -954$ kNm $M_z = 2772$ kNm

Continut combinatie:

LC01+LC02+LC03+LC04+LC05+0.30*LC12+LC13+0.30*LC14+0.30*LC12_EA+LC13_EA

Momente de incovoiere recalculate:

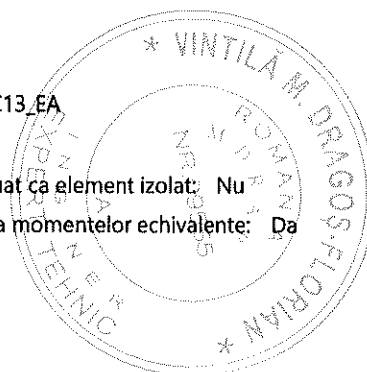
Efect de ordin 2: Da

Imperfectiuni: Da

$N_{Ed} = -4887$ kN $M_{Edy} = -954$ kNm $M_{Edz} = 2772$ kNm

Elementul este preluat ca element izolat: Nu

Utilizat pt. calcularea momentelor echivalente: Da



Data de introducere pentru generarea diagramei de interactiune

Metoda cu verificare la diagrama de interactiune	$N_u M_u$
Diviziune deformatii verticale	250
Numar de sectiuni verticale	36
Valoare moment de incovoiere rezultat	$M_{res} = 2932 \text{ kNm}$
Unghiul momentului de incovoiere rezultat corespunzator directiei M_y in planul orizontal M_y-M_z	$\alpha_{MyMz} = 71^\circ$
Unghiul momentului de incovoiere rezultat corespunzator directiei N in planul vertical $N-M_{res}$	$\alpha_{NM} = -59^\circ$

Calcularea rezistentelor

Rezistente in directia pozitiva $N_{Rd+} = 1475 \text{ kN}$ $M_{Rdy+} = 288 \text{ kNm}$ $M_{Rdz+} = 3958 \text{ kNm}$

Rezistente in directia negativa $N_{Rd-} = -6977 \text{ kN}$ $M_{Rdy-} = -1362 \text{ kNm}$ $M_{Rdz-} = -837 \text{ kNm}$

Rezumat verificare

Forte: $N_{Ed} = -4887 \text{ kN}$ $M_{Edy} = -954 \text{ kNm}$ $M_{Edz} = 2772 \text{ kNm}$

Rezistenta: $N_{Rd} = -6977 \text{ kN}$ $M_{Rdy} = -1362 \text{ kNm}$ $M_{Rdz} = 3958 \text{ kNm}$

Calcularea verificarii unitare:

$$UC_N = \frac{N_{Ed}}{N_{Rd}} = \frac{-4.89 \cdot 10^6}{-6.98 \cdot 10^6} = 0.7$$

$$UC_{My} = \frac{M_{Edy}}{M_{Rdy}} = \frac{-953983}{-1.36 \cdot 10^6} = 0.7$$

$$UC_{Mz} = \frac{M_{Edz}}{M_{Rdz}} = \frac{2.77 \cdot 10^6}{3.96 \cdot 10^6} = 0.7$$

$$UC = \max(UC_N; UC_{My}; UC_{Mz}) = \max(0.7; 0.7; 0.7) = 0.7 \leq 1 \quad \text{OK}$$

Diagrama de interactiune 3D - Sectiune verticala $N-M_{res}$

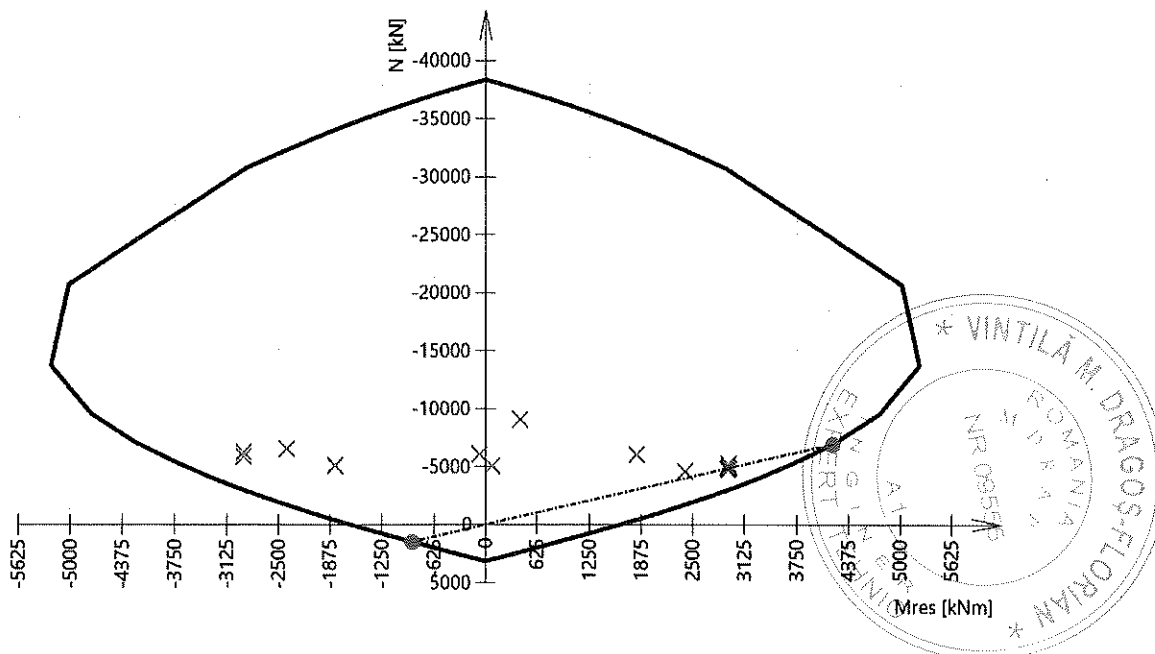
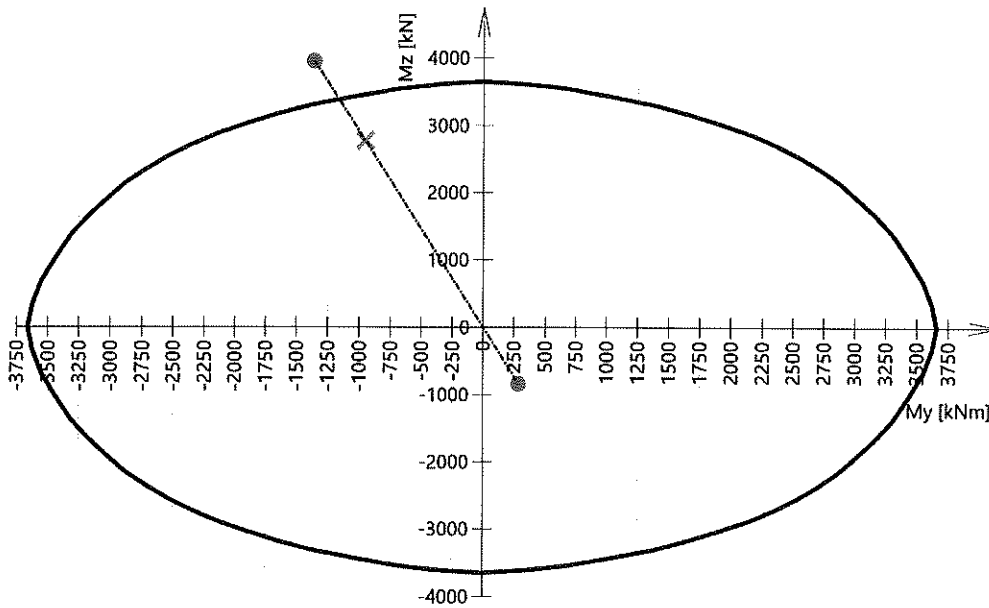


Diagrama de interactiune 3D - Sectiune orizontala M_y - M_z



Stalp <Unnamed Element> 95...Dreptunghi (1000; 1000)

SR EN 1992-1-1

Section 0 [dx = 0 m]

Lungime element $L_d = 4.02$ m
 Lungime de flambaj y $L_y = 8.59$ m
 Lungime de flambaj z $L_z = 8.38$ m

Materiale

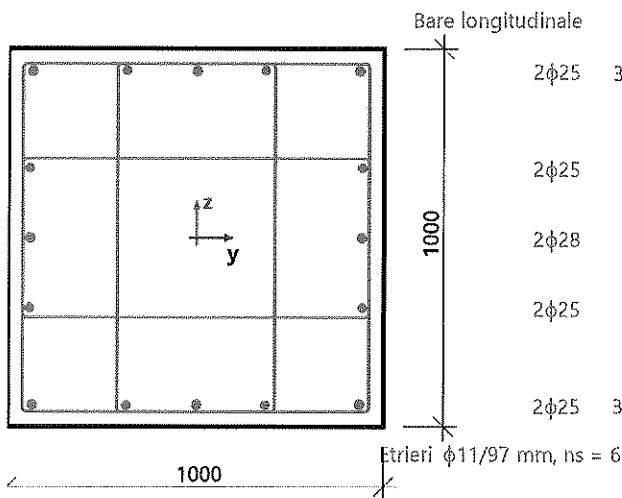
Beton C35/45(EN1992-2)
 Armatura PC52 16...28

Coefficienti

Cod SR EN 1992-1-1
 Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
 Parametri armatura $\gamma_s = 1$

Armatura

Bare long.: $8\phi 25$ mm + $8\phi 28$ mm, Arie tot. = 8853 mm^2
 Etrieri: $\phi = 11$ mm, $A_{sw} = 575 \text{ mm}^2$, $A_{sw,s} = 5931 \text{ mm}^2/\text{m}$
 Acoperire etrier:
 Sus 35 mm
 Jos 35 mm
 Stanga 35 mm
 Dreapta 35 mm



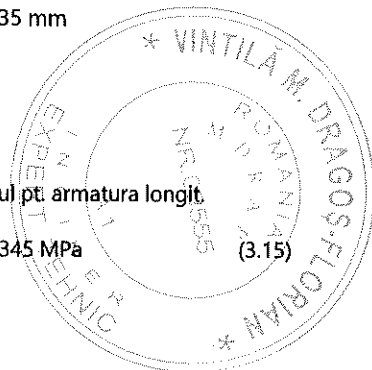
Caracteristici material

Rezistentă de calcul la compresiune a betonului

$$f_{cd} = \frac{\alpha_{cc} \cdot f_{ck}}{\gamma_c} = \frac{1 \cdot 35}{1.2} = 29.2 \text{ MPa}$$

Limita de curgere de calcul pt armatura lungit.

$$f_{yd} = \frac{f_{yk}}{\gamma_s} = \frac{345}{1} = 345 \text{ MPa} \quad (3.15)$$



Forte

Din analiza FEM

$N = -4424 \text{ kN}$ $M_y = -653 \text{ kNm}$ $M_z = 1983 \text{ kNm}$

Continut combinatie:

$LC01+LC02+LC03+LC04+LC05+0.30*LC12+LC13+0.30*LC14+0.30*LC12_EA+LC13_EA$

Momente de incovoiere recalculate:

Efect de ordin 2: Da

Elementul este preluat ca element izolat: Nu

Imperfectiuni: Da

Utilizat pt. calcularea momentelor echivalente: Da

$N_{Ed} = -4424 \text{ kN}$ $M_{Edy} = -653 \text{ kNm}$ $M_{Edz} = 1983 \text{ kNm}$

Data de introducere pentru generarea diagramei de interactiune

Metoda cu verificare la diagrama de interactiune

$N_u M_u$

Diviziune deformatii verticale

250

Numar de sectiuni verticale

36

Valoare moment de incovoiere rezultat

$M_{res} = 2088 \text{ kNm}$

Unghiul momentului de incovoiere rezultat corespunzator
directiei M_y in planul orizontal M_y-M_z

$\alpha_{MyMz} = 71.8^\circ$

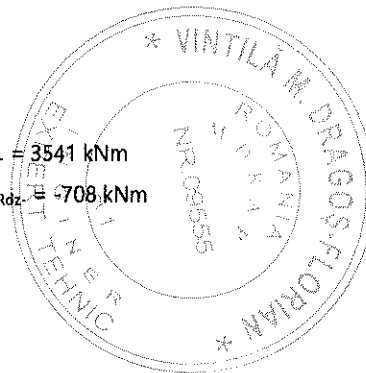
Unghiul momentului de incovoiere rezultat corespunzator
directiei N in planul vertical $N-M_{res}$

$\alpha_{NM} = -64.7^\circ$

Calcularea rezistentelor

Rezistente in directia pozitiva $N_{Rd+} = 1579 \text{ kN}$ $M_{Rdy+} = 233 \text{ kNm}$ $M_{Rdz+} = 3541 \text{ kNm}$

Rezistente in directia negativa $N_{Rd-} = -7899 \text{ kN}$ $M_{Rdy-} = -1165 \text{ kNm}$ $M_{Rdz-} = -708 \text{ kNm}$



Rezumat verificare

Forte: $N_{Ed} = -4424 \text{ kN}$ $M_{Edy} = -653 \text{ kNm}$ $M_{Edz} = 1983 \text{ kNm}$

Rezistenta: $N_{Rd} = -7899 \text{ kNm}$ $M_{Rdy} = -1165 \text{ kNm}$ $M_{Rdz} = 3541 \text{ kNm}$

Calcularea verificării unitare:

$$UC_N = \frac{N_{Ed}}{N_{Rd}} = \frac{-4.42 \cdot 10^6}{-7.9 \cdot 10^6} = 0.56$$

$$UC_{My} = \frac{M_{Edy}}{M_{Rdy}} = \frac{-652729}{-1.17 \cdot 10^6} = 0.56$$

$$UC_{Mz} = \frac{M_{Edz}}{M_{Rdz}} = \frac{1.98 \cdot 10^6}{3.54 \cdot 10^6} = 0.56$$

$$UC = \max(UC_N; UC_{My}; UC_{Mz}) = \max(0.56; 0.56; 0.56) = 0.56 \leq 1 \quad \text{OK}$$

Diagrama de interacțiune 3D - Secțiune verticală N-M_{res}

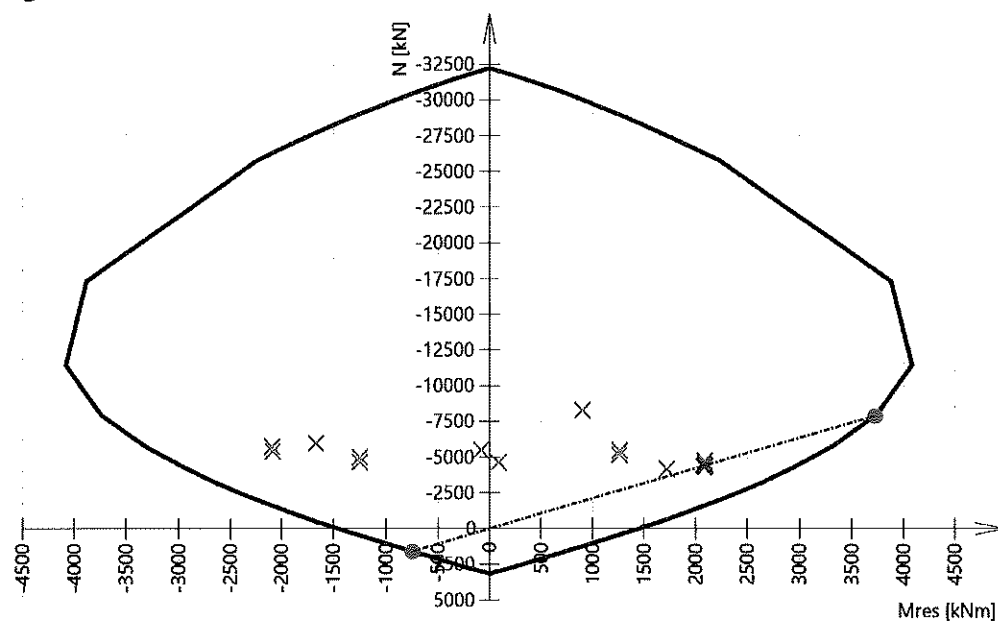
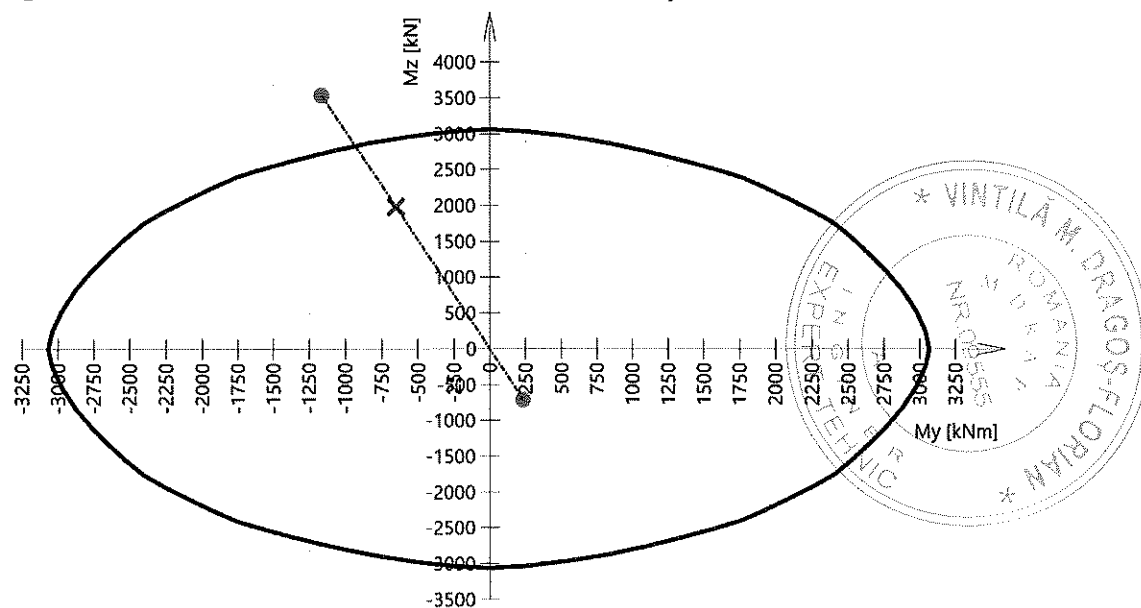


Diagrama de interacțiune 3D - Secțiune orizontală M_y-M_z



Stalp <Unnamed Element> 96..Dreptunghi (700; 700)

SR EN 1992-1-1

Section 0 [dx = 0 m]

Lungime element Ld = 4.02 m

Lungime de flambaj y Ly = 9.73 m

Lungime de flambaj z Lz = 9.73 m

Materiale

Beton C35/45(EN1992-2)

Armatura PC52 16...28

Coeficienti

Cod

SR EN 1992-1-1

Parametri beton

$\gamma_c = 1.2$, $\alpha_{cc} = 1$

Parametri armatura

$\gamma_s = 1$

Armatura

2 ϕ 20 2 ϕ 25 Bare long.: 8 ϕ 20 mm + 4 ϕ 25 mm, Arie tot. = 4477 mm²

2 ϕ 20 Etrieri: $\phi = 11$ mm, $A_{sw} = 575$ mm², $A_{sw,s} = 5877$ mm²/m

2 ϕ 20 Acoperire etrier:

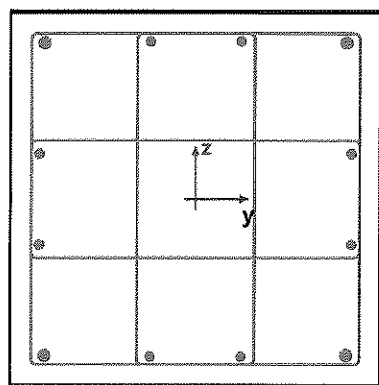
Sus 35 mm

Jos 35 mm

Stanga 35 mm

2 ϕ 20 2 ϕ 25 Dreapta 35 mm

Bare longitudinale



700

700

Etrieri ϕ 11/98 mm, ns = 6

Caracteristici material

Rezistența de calcul la compresiune a betonului

$$f_{cd} = \frac{\alpha_{cc} \cdot f_{ck}}{\gamma_c} = \frac{1 \cdot 35}{1.2} = 29.2 \text{ MPa}$$

Limita de curgere de calcul pt. armatura longit.

$$f_{yd} = \frac{f_{yk}}{\gamma_s} = \frac{345}{1} = 345 \text{ MPa} \quad (3.15)$$

Forte

Din analiza FEM

N = -71.6 kN $M_y = -421$ kNm $M_z = 57.7$ kNm

Continut combinatie:

LC01+LC02+LC03+LC04+LC05+LC12+0.30*LC13+0.30*LC14+LC12_EA+0.30*LC13_EA

Momente de incovoiere recalculat:

Efect de ordin 2: Da

Imperfecțiuni: Da

$N_{Ed} = -71.6$ kN $M_{Edy} = -421$ kNm $M_{Edz} = 57.7$ kNm

Elementul este preluat ca element izolat: Nu

Utilizat pt. calcularea momentelor echivalente: Da

Data de introducere pentru generarea diagramei de interactiune

Metoda cu verificare la diagrama de interactiune

$N_u M_u$

Diviziune deformatii verticale

250

Numar de sectiuni verticale

36

Valoare moment de incovoiere resultant

$M_{res} = 425$ kNm

Unghiul momentului de incovoiere resultant corespunzator
directiei M_y in planul orizontal M_y - M_z

$\alpha_{MyMz} = 7.8^\circ$

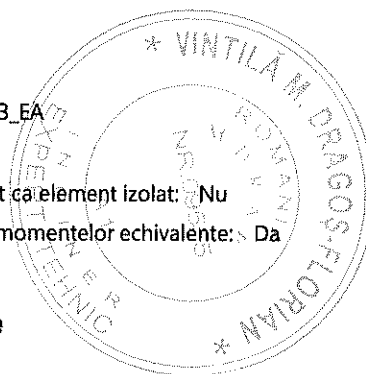
Unghiul momentului de incovoiere resultant corespunzator
directiei N in planul vertical N- M_{res}

$\alpha_{NM} = -9.57^\circ$

Calcularea rezistentelor

Rezistente in directia pozitiva $N_{Rd+} = 79$ kN $M_{Rdy+} = 463$ kNm $M_{Rdz+} = 70$ kNm

Rezistente in directia negativa $N_{Rd-} = -87$ kN $M_{Rdy-} = -512$ kNm $M_{Rdz-} = -64$ kNm



Rezumat verificare

Forte: $N_{Ed} = -71.6 \text{ kN}$ $M_{Edy} = -421 \text{ kNm}$ $M_{Edz} = 57.7 \text{ kNm}$

Rezistentă: $N_{Rd} = -87 \text{ kNm}$ $M_{Rdy} = -512 \text{ kNm}$ $M_{Rdz} = 70 \text{ kNm}$

Calcularea verificării unitare:

$$UC_N = \frac{N_{Ed}}{N_{Rd}} = \frac{-71608}{-87163} = 0.822$$

$$UC_{My} = \frac{M_{Edy}}{M_{Rdy}} = \frac{-420667}{-512050} = 0.822$$

$$UC_{Mz} = \frac{M_{Edz}}{M_{Rdz}} = \frac{57661}{70187} = 0.822$$

$$UC = \max(UC_N, UC_{My}, UC_{Mz}) = \max(0.822; 0.822; 0.822) = 0.822 \leq 1 \quad \text{OK}$$

Diagrama de interacțiune 3D - Secțiune verticală N-M_{res}

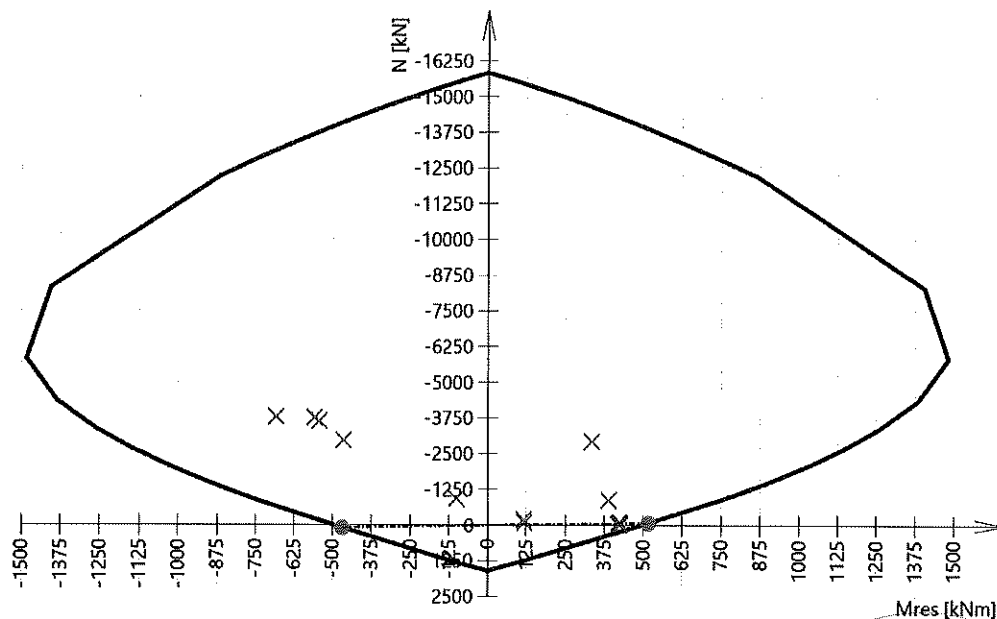
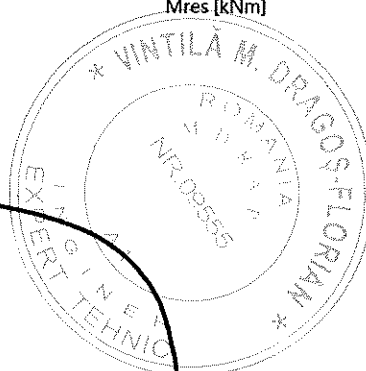
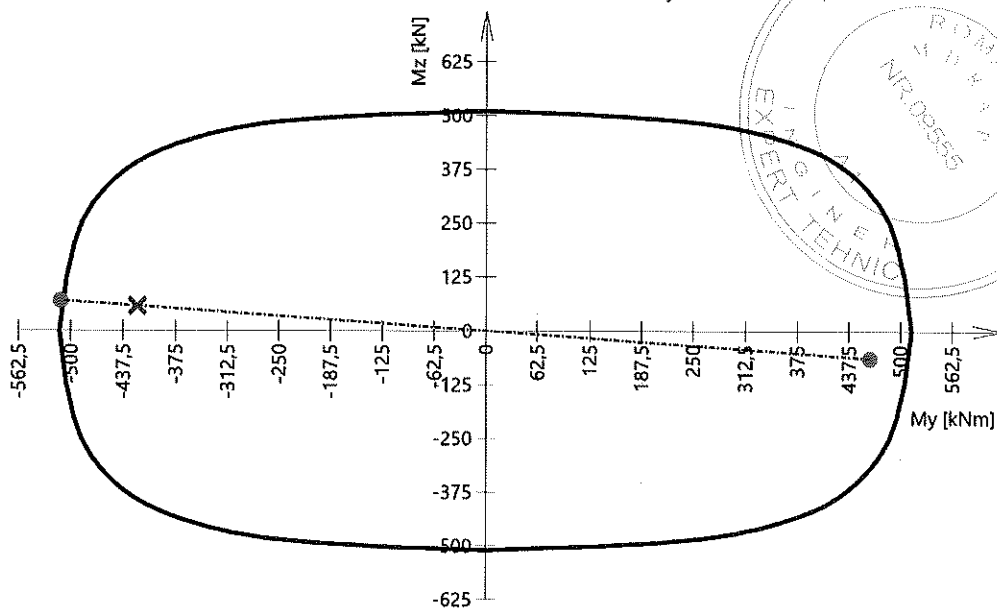


Diagrama de interacțiune 3D - Secțiune orizontală M_y-M_z



Stalp <Unnamed Element> 97... Dreptunghi (950; 950)

SR EN 1992-1-1

Section 0 [dx = 0 m]

Lungime element Ld = 3.97 m

Lungime de flambaj y Ly = 9.25 m

Lungime de flambaj z Lz = 9.06 m

Materiale

Beton C35/45(EN1992-2)

Armatura PC52 16...28

Coeficienti

Cod

SR EN 1992-1-1

Parametri beton

$\gamma_c = 1.2$, $\alpha_{cc} = 1$

Parametri armatura

$\gamma_s = 1$

Armatura

Bare long.: 12 ϕ 25 mm + 4 ϕ 28 mm, Arie tot. = 8353 mm²

Etrieri: $\phi = 10$ mm, $A_{sw} = 471$ mm², $A_{sw,s} = 4780$ mm²/m

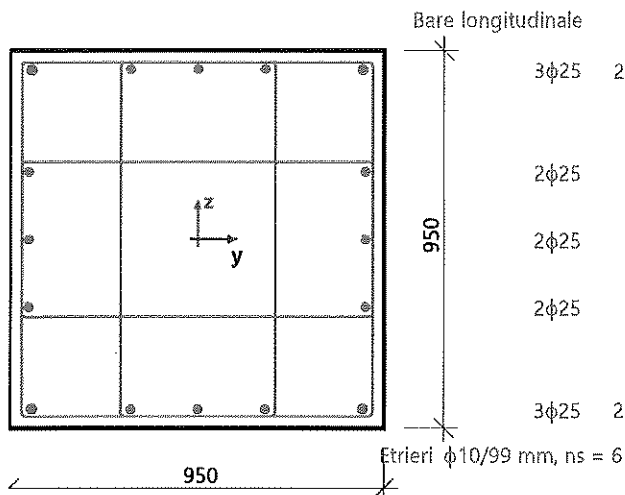
Acoperire etrier:

Sus 25 mm

Jos 25 mm

Stanga 25 mm

Dreapta 25 mm



Caracteristici material

Rezistența de calcul la compresiune a betonului

$$f_{cd} = \frac{\alpha_{cc} \cdot f_{ck}}{\gamma_c} = \frac{1 \cdot 35}{1.2} = 29.2 \text{ MPa}$$

Limita de curgere de calcul pt. armatura longit.

$$f_{yd} = \frac{f_{yk}}{\gamma_s} = \frac{345}{1} = 345 \text{ MPa} \quad (3.15)$$

Forte

Din analiza FEM

N = -3986 kN My = -680 kNm Mz = 2050 kNm

Continut combinatie:

LC01+LC02+LC03+LC04+LC05+0.30*LC12+LC13+0.30*LC14+0.30*LC12_EA+LC13_EA

Momente de incovoiere recalculat:

Efect de ordin 2: Da

Imperfecțiuni: Da

N_{Ed} = -3986 kN M_{Edy} = -680 kNm M_{Edz} = 2050 kNm

Elementul este preluat ca element izolat: Nu

Utilizat pt. calcularea momentelor echivalente: Da

Data de introducere pentru generarea diagramei de interactiune

Metoda cu verificare la diagrama de interactiune

N_uM_u

Diviziune deformatii verticale

250

Numar de sectiuni verticale

36

Valoare moment de incovoiere rezultat

M_{res} = 2160 kNm

Unghiul momentului de incovoiere rezultat corespunzator directiei My in planul orizontal My-Mz

$\alpha_{MyMz} = 71.7^\circ$

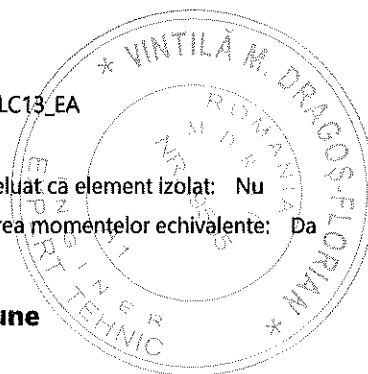
Unghiul momentului de incovoiere rezultat corespunzator directiei N in planul vertical N-M_{res}

$\alpha_{NM} = -61.5^\circ$

Calcularea rezistentelor

Rezistente in directia pozitiva N_{Rd+} = 1353 kN M_{Rdy+} = 231 kNm M_{Rdz+} = 2782 kNm

Rezistente in directia negativa N_{Rd-} = -5409 kN M_{Rdy-} = -923 kNm M_{Rdz-} = -696 kNm



Rezumat verificare

Forte: $N_{Ed} = -3986 \text{ kN}$ $M_{Edy} = -680 \text{ kNm}$ $M_{Edz} = 2050 \text{ kNm}$

Rezistenta: $N_{Rd} = -5409 \text{ kNm}$ $M_{Rdy} = -923 \text{ kNm}$ $M_{Rdz} = 2782 \text{ kNm}$

Calcularea verificarii unitare:

$$UC_N = \frac{N_{Ed}}{N_{Rd}} = \frac{-3.99 \cdot 10^6}{-5.41 \cdot 10^6} = 0.737$$

$$UC_{My} = \frac{M_{Edy}}{M_{Rdy}} = \frac{-679867}{-922571} = 0.737$$

$$UC_{Mz} = \frac{M_{Edz}}{M_{Rdz}} = \frac{2.05 \cdot 10^6}{2.78 \cdot 10^6} = 0.737$$

$$UC = \max(UC_N, UC_{My}, UC_{Mz}) = \max(0.737; 0.737; 0.737) = 0.737 < 1 \quad \text{OK}$$

Diagrama de interactiune 3D - Sectiune verticala N-M_{res}

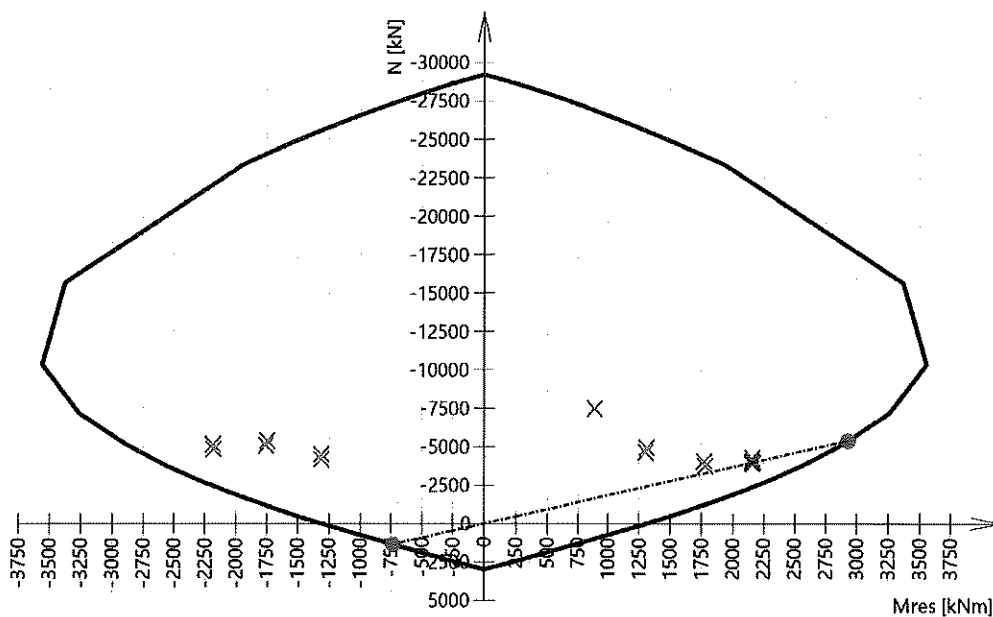
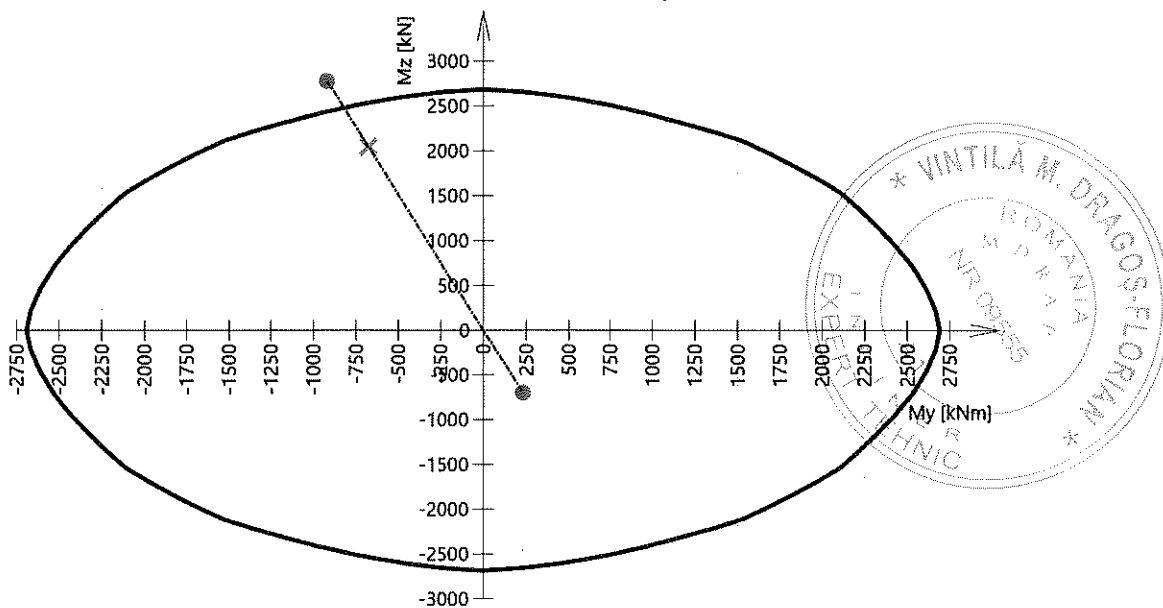


Diagrama de interactiune 3D - Sectiune orizontala M_y-M_z



Stalp <Unnamed Element> 98...Dreptunghi (650; 650)

SR EN 1992-1-1

Section 0 [dx = 0 m]

Lungime element Ld = 3.97 m

Lungime de flambaj y Ly = 10 m

Lungime de flambaj z Lz = 10 m

Materiale

Beton C35/45(EN1992-2)

Armatura PC52 16...28

Coeficienti

Cod

SR EN 1992-1-1

Parametri beton

$\gamma_c = 1.2$, $\alpha_{cc} = 1$

Parametri armatura

$\gamma_s = 1$

Armatura

Bare long.: 8 ϕ 20 mm + 4 ϕ 25 mm, Arie tot. = 4477 mm²

Etrieri: $\phi = 10$ mm, $A_{sw} = 471$ mm², $A_{sw,s} = 4780$ mm²/m

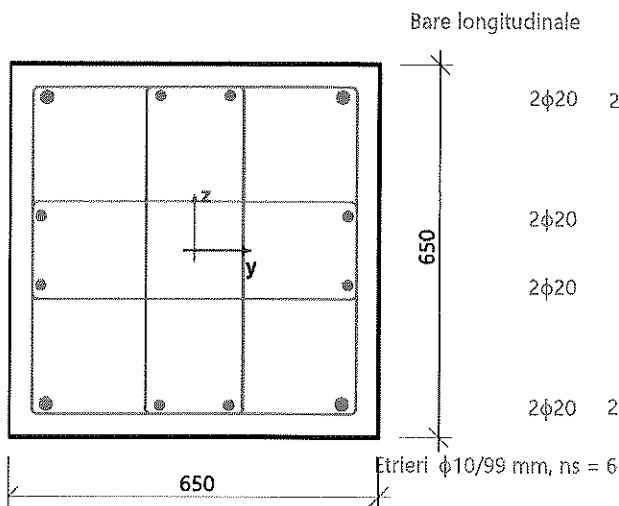
Acoperire etrier:

Sus 35 mm

Jos 35 mm

Stanga 35 mm

Dreapta 35 mm



Caracteristici material

Rezistența de calcul la compresiune a betonului

$$f_{cd} = \frac{\alpha_{cc} \cdot f_{ck}}{\gamma_c} = \frac{1 \cdot 35}{1.2} = 29.2 \text{ MPa}$$

Limita de curgere de calcul pt. armatura longit.

$$f_{yd} = \frac{f_{yk}}{\gamma_s} = \frac{345}{1} = 345 \text{ MPa} \quad (3.15)$$

Forte

Din analiza FEM

N = -155 kN M_y = -402 kNm M_z = 46.1 kNm

Continut combinatie:

LC01+LC02+LC03+LC04+LC05+LC12+0.30*LC13+0.30*LC14+LC12_EA+0.30*LC13_EA

Momente de incovoiere recalulate:

Efect de ordin 2: Da

Imperfecțiuni: Da

N_{Ed} = -155 kN M_{Edy} = -402 kNm M_{Edz} = 46.1 kNm

Elementul este preluat ca element izolat: Nu

Utilizat pt. calcularea momentelor echivalente: Da

Data de introducere pentru generarea diagramei de interactiune

Metoda cu verificare la diagrama de interactiune

N_uM_u

Diviziune deformatii verticale

250

Numar de sectiuni verticale

36

Valoare moment de incovoiere rezultant

M_{res} = 405 kNm

Unghiul momentului de incovoiere rezultant corespunzator directiei M_y in planul orizontal M_y-M_z

$\alpha_{MyMz} = 6.54^\circ$

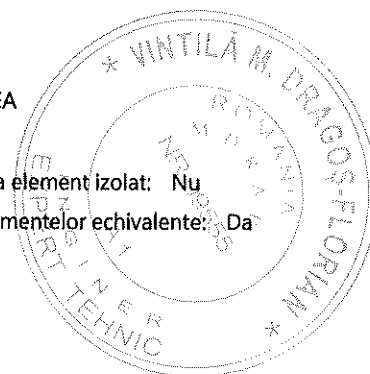
Unghiul momentului de incovoiere rezultant corespunzator directiei N in planul vertical N-M_{res}

$\alpha_{NM} = -20.9^\circ$

Calcularea rezistentelor

Rezistente in directia pozitiva N_{Rd+} = 155 kN M_{Rdy+} = 404 kNm M_{Rdz+} = 57 kNm

Rezistente in directia negativa N_{Rd-} = -191 kN M_{Rdy-} = -497 kNm M_{Rdz-} = -46 kNm



Rezumat verificare

Forte: $N_{Ed} = -155 \text{ kN}$ $M_{Edy} = -402 \text{ kNm}$ $M_{Edz} = 46.1 \text{ kNm}$

Rezistenta: $N_{Rd} = -191 \text{ kNm}$ $M_{Rdy} = -497 \text{ kNm}$ $M_{Rdz} = 57 \text{ kNm}$

Calcularea verificarii unitare:

$$UC_N = \frac{N_{Ed}}{N_{Rd}} = \frac{-154785}{-191009} = 0.81$$

$$UC_{My} = \frac{M_{Edy}}{M_{Rdy}} = \frac{-402398}{-496570} = 0.81$$

$$UC_{Mz} = \frac{M_{Edz}}{M_{Rdz}} = \frac{46142}{56940} = 0.81$$

$$UC = \max(UC_N; UC_{My}; UC_{Mz}) = \max(0.81; 0.81; 0.81) = 0.81 \leq 1 \quad \text{OK}$$

Diagrama de interactiune 3D - Sectiune verticala N-M_{res}

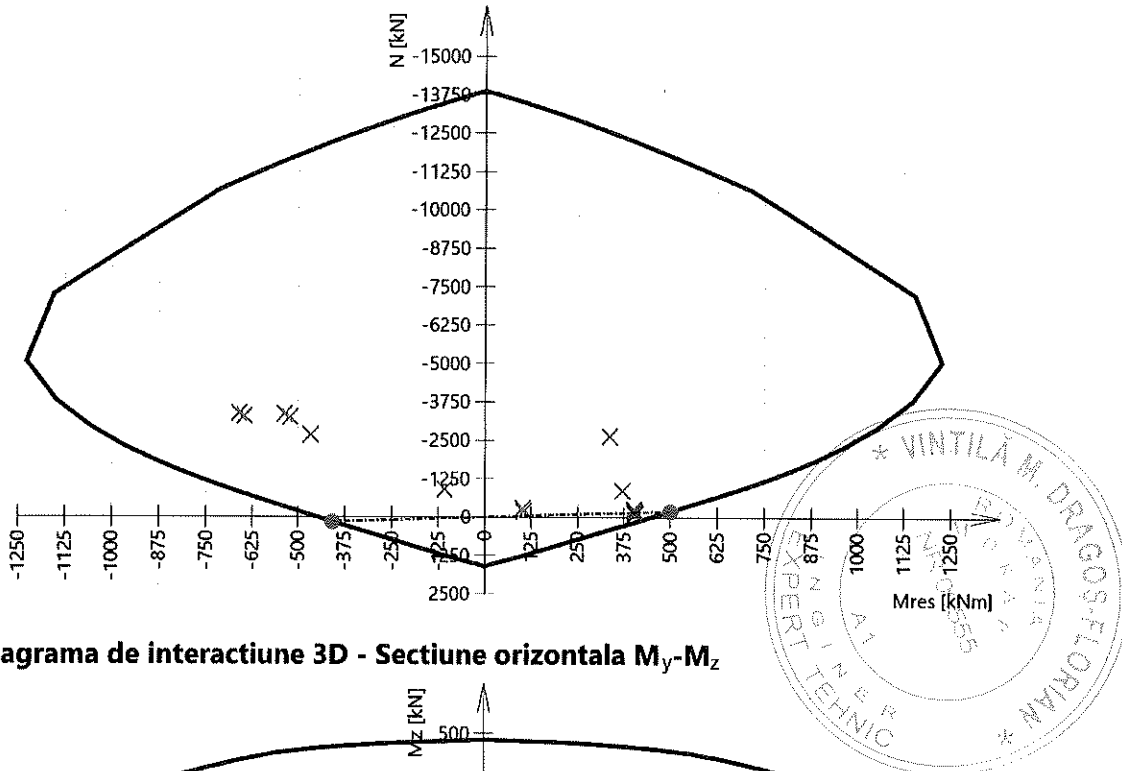
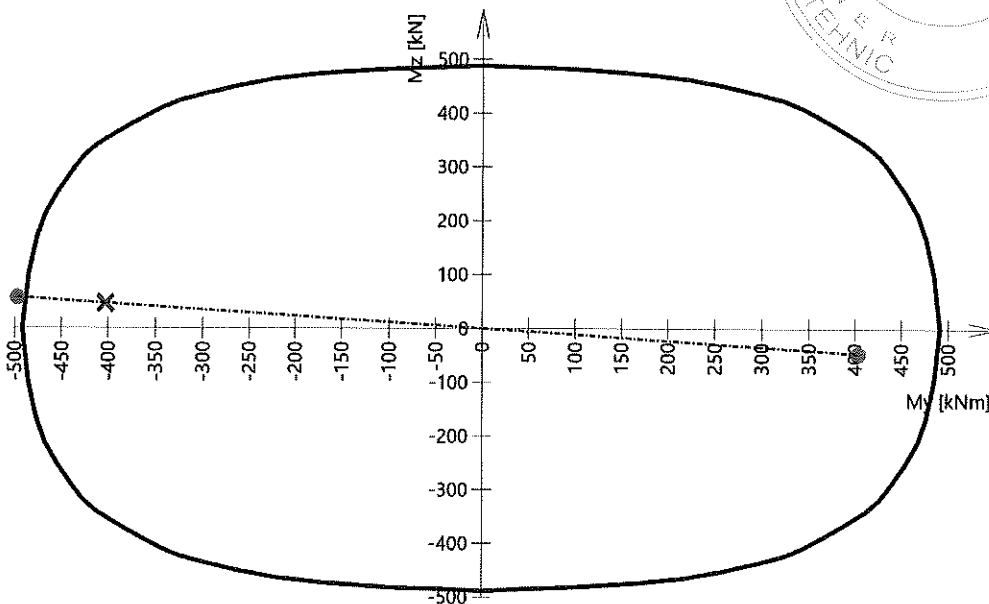


Diagrama de interactiune 3D - Sectiune orizontala M_y-M_z



4.4. Verificare taietoare+torsiune (ULS)

Calcul linlar

Clasa: ULS

Extrema 1D: Element

Selectie: Tot

Stalp <Unnamed Element> 93..Dreptunghi (750; 750)

SR EN 1992-1-1

Section 0 [dx = 0 m]

Lungime element	Ld = 3.42 m
Lungime de flambaj y	Ly = 6.79 m
Lungime de flambaj z	Lz = 6.83 m
Cod	SR EN 1992-1-1

Materiale

Beton	C35/45(EN1992-2)
Armare longit.	PC52 16...28
Armare la forta taietoare	OB37 6...12

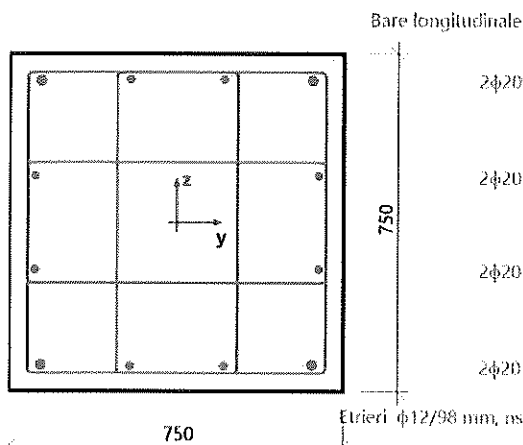
Coefficienti

Cod	SR EN 1992-1-1
Parametri beton	$\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura	$\gamma_s = 1$
Coefficient pt. inaltimea efectiva	$\text{Coeff}_d = 0.9$
Coefficient pt. bratul de parghie	$\text{Coeff}_x = 0.9$

Armatura

Bare long.: 8 ϕ 20 mm + 4 ϕ 25 mm, Arie tot. = 4477 mm²
 Etrieri: $\phi = 12$ mm, $A_{sw} = 679$ mm², $A_{sw,s} = 6936$ mm²/m
 Acoperire etrier:

Sus	35 mm
Jos	35 mm
Stanga	35 mm
Dreapta	35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+LC12+0.30*LC13+0.30*LC14+LC12_EA+0.30*LC13_EA

$N_{Ed} = -3996$ kN $M_{Edy} = -664$ kNm $M_{Edz} = -432$ kNm $V_{Edy} = -25.6$ kN $V_{Edz} = -141$ kN $T_{Ed} = -58.5$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{-25.6^2 + -141^2} = 143 \text{ kN}$$

$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(55.8 - 79.7) = 23.9^\circ$$

Rezumat verificare

$d = 767$ mm $z = 503$ mm $b_w = 464$ mm $b_{w1} = 595$ mm $V_{Rdc} = 507$ kN $V_{Rds} = 712$ kN $V_{Rdmax} = 3434$ kN $V_{Rdmax} = 2619$ kN

$A_k = 316406$ mm² $u_k = 2250$ mm $T_{Rdc} = 218$ kNm $T_{Rds} = 187$ kNm $T_{Rdmax} = 893$ kNm

Tip verificare	Forta	Rezistente	VU (=)	Statut
Verificare la taietoare Vy+Vz	143,1 kN	712,1 kN	0,20	OK
Verificare la torsiune	-58,5 kNm	186,5 kNm	0,31	OK
Verificare de interactiune Vy+Vz+T (beton)			0,12	OK,*
Verificare de interactiune Vy+Vz+T (taietoare)	13,7 kN	23,1 kN	0,59	OK,*
Verificare de interactiune Vy+Vz+T (armare longit.)	351,2 kN	1544,5 kN	0,23	OK,*
Rezumat verificare			0,59	OK,*

Stalp <Unnamed Element> 94..Dreptunghi (1100; 1100)

SR EN 1992-1-1

Section 13 [dx = 3.08 m]

Lungime element Ld = 3.42 m
 Lungime de flambaj y Ly = 6.51 m
 Lungime de flambaj z Lz = 6.31 m
 Cod SR EN 1992-1-1

Materiale

Beton C35/45(EN1992-2)
 Armare longit. PC52 16...28
 Armare la forta taietoare OB37 6...12

Coefficienti

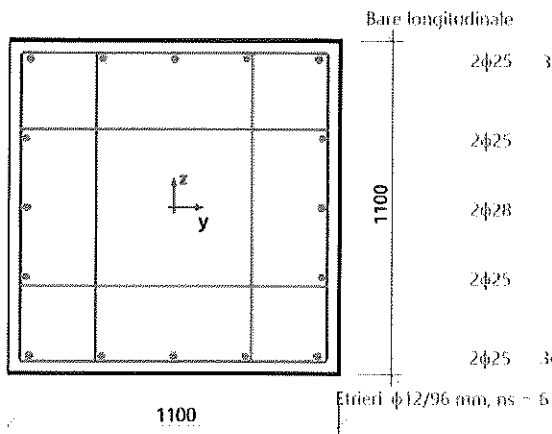
Cod SR EN 1992-1-1
 Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
 Parametri armatura $\gamma_s = 1$
 Coeficient pt. inaltimea efectiva $\text{Coeff}_d = 0.9$
 Coeficient pt. bratul de parghie $\text{Coeff}_z = 0.9$

Armatura

Bare long.: 8 ϕ 25 mm + 8 ϕ 28 mm, Arie tot. = 8853 mm²
 Etrieri: $\phi = 12$ mm, $A_{sw} = 636$ mm², $A_{sw,s} = 6594$ mm²/m

Acoperire etrier:

Sus 35 mm
 Jos 35 mm
 Stanga 35 mm
 Dreapta 35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+LC12+0.30*LC13+0.30*LC14+LC12_EA+0.30*LC13_EA

$N_{Ed} = -6323$ kN $M_{Edy} = -1817$ kNm $M_{Edz} = -503$ kNm $V_{Edy} = -313$ kN $V_{Edz} = -775$ kN $T_{Ed} = -65.6$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{-313^2 + -775^2} = 836 \text{ kN}$$

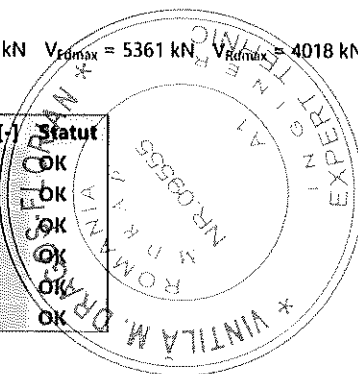
$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(73.1 - 68) = 5.14^\circ$$

Rezumat verificare

d = 1231 mm z = 794 mm $b_w = 853$ mm $b_{w1} = 579$ mm $V_{Rdc} = 1315$ kN $V_{Rds} = 1068$ kN $V_{Rdmax} = 5361$ kN $V_{Rdmin} = 4018$ kN

$A_k = 680625$ mm² $u_k = 3300$ mm $T_{Rdc} = 686$ kNm $T_{Rds} = 382$ kNm $T_{Rdmax} = 2817$ kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taietoare Vy+Vz	835,5 kN	1067,5 kN	0,78	OK
Verificare la torsiune	-65,6 kNm	381,5 kNm	0,17	OK
Verificare de interactiune Vy+Vz+T (beton)			0,23	OK
Verificare de interactiune Vy+Vz+T (taietoare)	21,6 kN	21,6 kN	1,00	OK
Verificare de interactiune Vy+Vz+T (armare longit.)	994,5 kN	3054,3 kN	0,33	OK
Rezumat verificare			1,00	OK



Stalp <Unnamed Element>95...Dreptunghi (1000; 1000)

SR EN 1992-1-1

Section 14 [dx = 4.02 m]

Lungime element Ld = 4.02 m
 Lungime de flambaj y Ly = 8.59 m
 Lungime de flambaj z Lz = 8.38 m
 Cod SR EN 1992-1-1

Materiale

Beton C35/45(EN1992-2)
 Armare longit. PCS2 16...28
 Armare la forta taietoare OB37 6...12

Coefficienti

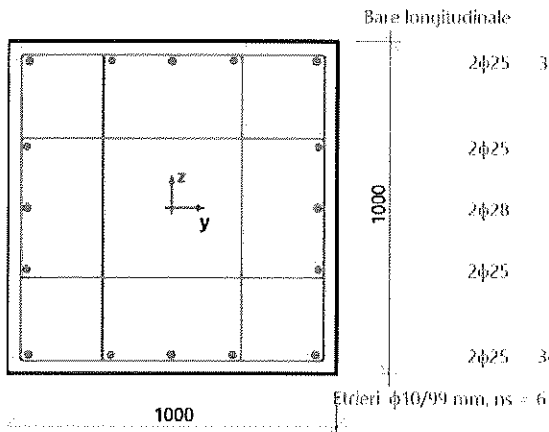
Cod SR EN 1992-1-1
 Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
 Parametri armatura $\gamma_s = 1$
 Coeficient pt. inaltimea efectiva $\text{Coeff}_d = 0.9$
 Coeficient pt. bratul de parghie $\text{Coeff}_z = 0.9$

Armatura

Bare long.: 8 ϕ 25 mm + 8 ϕ 28 mm, Arie tot. = 8853 mm²
 Etrieri: $\phi = 10$ mm, $A_{sw} = 471$ mm², $A_{sw,s} = 4780$ mm²/m

Acoperire etrier:

Sus 35 mm
 Jos 35 mm
 Stanga 35 mm
 Dreapta 35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+0.40*LC08+LC12+0.30*LC13+0.30*LC14+LC12_EA+0.30*LC13_EA

$N_{Ed} = -5740$ kN $M_{Edy} = -2072$ kNm $M_{Edz} = -875$ kNm $V_{Edy} = -275$ kN $V_{Edz} = -714$ kN $T_{Ed} = -76.4$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{-275^2 + -714^2} = 765 \text{ kN}$$

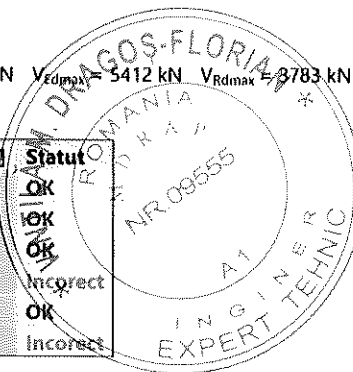
$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(66.3 - 69) = 2.7^\circ$$

Rezumat verificare

d = 1066 mm z = 745 mm $b_w = 1071$ mm $b_{w1} = 674$ mm $V_{Rdc} = 1547$ kN $V_{Rds} = 909$ kN $V_{Edmax} = 5412$ kN $V_{Rdmax} = 3783$ kN

$A_k = 562500$ mm² $u_k = 3000$ mm $T_{Rdc} = 516$ kNm $T_{Rds} = 229$ kNm $T_{Rdmax} = 2116$ kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taietoare Vy+Vz	765,4 kN	908,6 kN	0,84	OK
Verificare la torsiune	-76,4 kNm	228,5 kNm	0,33	OK
Verificare de interactiune Vy+Vz+T (beton)			0,24	OK
Verificare de interactiune Vy+Vz+T (taietoare)	23,6 kN	20,0 kN	1,18	Incorrect
Verificare de interactiune Vy+Vz+T (armare longit.)	969,2 kN	3054,3 kN	0,32	OK
Rezumat verificare			1,18	Incorrect



Stalp <Unnamed Element> 96..Dreptunghi (700; 700)

SR EN 1992-1-1

Section 14 [dx = 4.02 m]

Lungime element Ld = 4.02 m
 Lungime de flambaj y Ly = 9.73 m
 Lungime de flambaj z Lz = 9.73 m
 Cod SR EN 1992-1-1

Materiale

Beton C35/45(EN1992-2)
 Armare longit. PC52 16...28
 Armare la forta taietoare OB37 6...12

Coefficienti

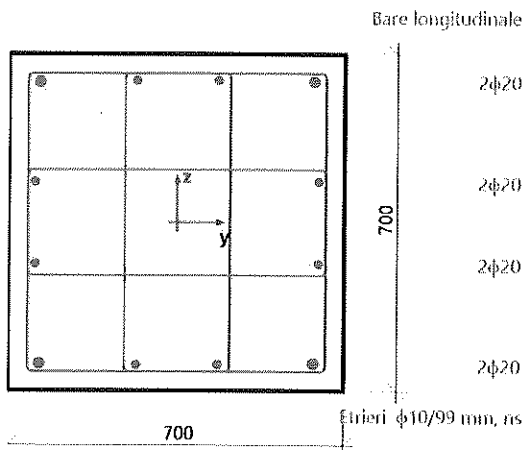
Cod SR EN 1992-1-1
 Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
 Parametri armatura $\gamma_s = 1$
 Coeficient pt. inaltimea efectiva $\text{Coeff}_{d1} = 0.9$
 Coeficient pt. bratul de parghie $\text{Coeff}_2 = 0.9$

Armatura

Bare long.: 8 ϕ 20 mm + 4 ϕ 25 mm, Arie tot. = 4477 mm²
 Etrieri: $\phi = 10$ mm, $A_{sw} = 471$ mm², $A_{sw,s} = 4780$ mm²/m

Acoperire etrier:

Sus 35 mm
 Jos 35 mm
 Stanga 35 mm
 Dreapta 35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+

0.40*LC08-LC12-0.30*LC13-0.30*LC14-LC12_EA-0.30*LC13_EA

$N_{Ed} = -3740$ kN $M_{Edy} = -717$ kNm $M_{Edz} = -524$ kNm $V_{Edy} = -66.1$ kN $V_{Edz} = -166$ kN $T_{Ed} = 3.17$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{(-66.1)^2 + (-166)^2} = 179 \text{ kN}$$

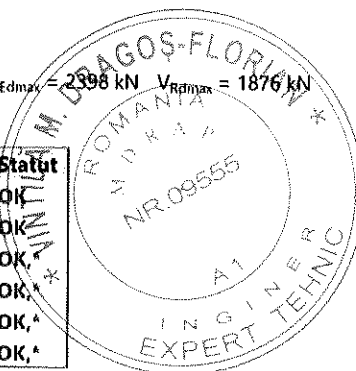
$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(52.8 - 68.3) = 15.5^\circ$$

Rezumat verificare

d = 766 mm z = 516 mm $b_w = 688$ mm $b_{w1} = 416$ mm $V_{Rdc} = 732$ kN $V_{Rds} = 503$ kN $V_{Edmax} = 2398$ kN $V_{Rdmax} = 1876$ kN

$A_k = 275625$ mm² $u_k = 2100$ mm $T_{Rdc} = 177$ kNm $T_{Rds} = 112$ kNm $T_{Rdmax} = 726$ kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taietoare Vy+Vz	178,8 kN	502,8 kN	0,36	OK
Verificare la torsiune	3,2 kNm	112,0 kNm	0,03	OK
Verificare de interactiune Vy+Vz+T (beton)			0,10	OK
Verificare de interactiune Vy+Vz+T (taietoare)	6,3 kN	16,0 kN	0,39	OK
Verificare de interactiune Vy+Vz+T (armare longit.)	190,9 kN	1544,5 kN	0,12	OK
Rezumat verificare			0,39	OK



Stalp <Unnamed Element>97..Dreptunghi (950; 950)

SR EN 1992-1-1

Section 14 [dx = 3.97 m]

Lungime element	Ld = 3.97 m
Lungime de flambaj y	Ly = 9.25 m
Lungime de flambaj z	Lz = 9.06 m
Cod	SR EN 1992-1-1

Materiale

Beton	C35/45(EN1992-2)
Armare longit.	PC52 16...28
Armare la forta taietoare	OB37 6...12

Coeficienti

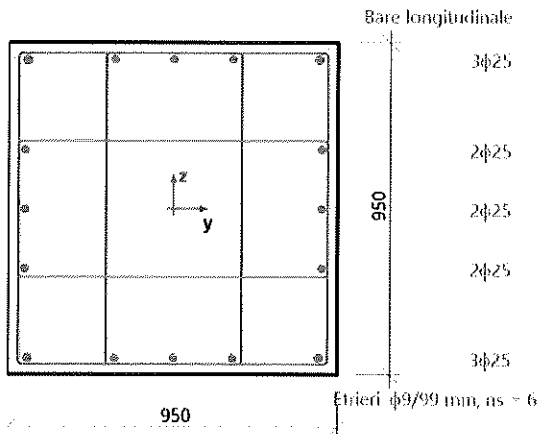
Cod	SR EN 1992-1-1
Parametri beton	$\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura	$\gamma_s = 1$
Coeficient pt. inaltimea efectiva	$\text{Coeff}_d = 0.9$
Coeficient pt. bratul de parghie	$\text{Coeff}_z = 0.9$

Armatura

Bare long.: 12 ϕ 25 mm + 4 ϕ 28 mm, Arie tot. = 8353 mm²
 Etrieri: $\phi = 9$ mm, $A_{sw} = 386$ mm², $A_{sw,s} = 3885$ mm²/m

Acoperire etrier:

Sus	26 mm
Jos	26 mm
Stanga	26 mm
Dreapta	26 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+0.40*LC08+LC12+0.30*LC13+0.30*LC14+LC12_EA+0.30*LC13_EA

$N_{Ed} = -5177$ kN $M_{Edy} = -2106$ kNm $M_{Edz} = -904$ kNm $V_{Edy} = -277$ kN $V_{Edz} = -719$ kN $T_{Ed} = -79.9$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{-277^2 + -719^2} = 770 \text{ kN}$$

$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(66.6 - 68.9) = 2.3^\circ$$

Rezumat verificare

$d = 1012$ mm $z = 730$ mm $b_w = 1018$ mm $b_{w1} = 644$ mm $V_{Rdc} = 1427$ kN $V_{Rds} = 724$ kN $V_{Edmax} = 4903$ kN $V_{Rdmax} = 3539$ kN

$A_k = 507656$ mm² $u_k = 2850$ mm $T_{Rdc} = 442$ kNm $T_{Rds} = 168$ kNm $T_{Rdmax} = 1815$ kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taietoare $V_y + V_z$	770,3 kN	723,6 kN	1,06	Incorect
Verificare la torsiune	-79,9 kNm	167,6 kNm	0,48	OK
Verificare de interactiune $V_y + V_z + T$ (beton)			0,26	OK
Verificare de interactiune $V_y + V_z + T$ (taietoare)	25,3 kN	16,4 kN	1,54	Incorect
Verificare de interactiune $V_y + V_z + T$ (armare longit.)	994,6 kN	2882,0 kN	0,35	OK
Rezumat verificare			1,54	Incorect



Stalp <Unnamed Element> 98..Dreptunghi (650; 650)

SR EN 1992-1-1

Section 8 [dx = 2.38 m]

Lungime element	Ld = 3.97 m
Lungime de flambaj y	Ly = 10 m
Lungime de flambaj z	Lz = 10 m
Cod	SR EN 1992-1-1

Materiale

Beton	C35/45(EN1992-2)
Armare longit.	PC52 16...28
Armare la forta taietoare	OB37 6...12

Coeficienti

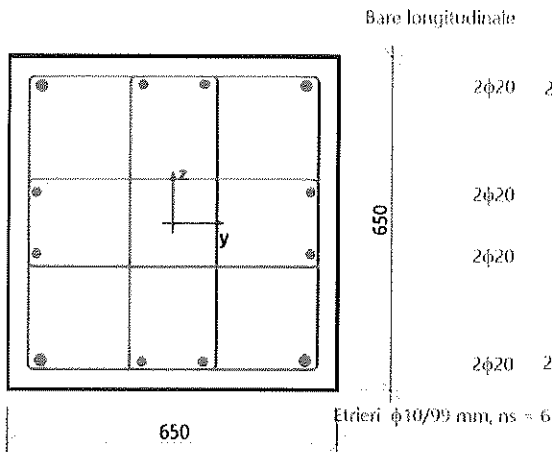
Cod	SR EN 1992-1-1
Parametri beton	$\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura	$\gamma_s = 1$
Coeficient pt. inaltimea efectiva	$\text{Coeff}_d = 0.9$
Coeficient pt. bratul de parghie	$\text{Coeff}_z = 0.9$

Armatura

Bare long.: 8 ϕ 20 mm + 4 ϕ 25 mm, Arie tot. = 4477 mm²
 Etrieri: $\phi = 10$ mm, $A_{sw} = 471$ mm², $A_{sw,s} = 4754$ mm²/m

Acoperire etrier:

Sus	35 mm
Jos	35 mm
Stanga	35 mm
Dreapta	35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+

0.40*LC08-LC12-0.30*LC13-0.30*LC14-LC12_EA-0.30*LC13_EA

$N_{Ed} = -3351$ kN $M_{Edy} = -705$ kNm $M_{Edz} = 507$ kNm $V_{Edy} = -59$ kN $V_{Edz} = -174$ kN $T_{Ed} = 13.2$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{(-59)^2 + (-174)^2} = 183 \text{ kN}$$

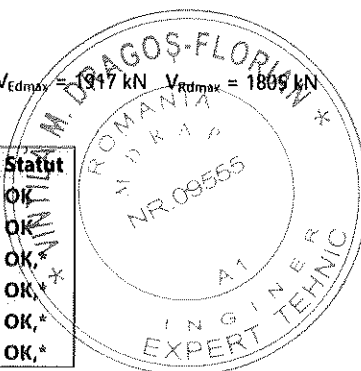
$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(127 - 71.2) = 55.6^\circ$$

Rezumat verificare

d = 371 mm z = 301 mm $b_w = 88.8$ mm $b_{w1} = 687$ mm $V_{Rdc} = 64.2$ kN $V_{Rds} = 291$ kN $V_{Edmax} = 1917$ kN $V_{Rdmax} = 1805$ kN

$A_k = 237656$ mm² $u_k = 1950$ mm $T_{Rdc} = 142$ kNm $T_{Rds} = 96$ kNm $T_{Rdmax} = 581$ kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taietoare $V_y + V_z$	183,3 kN	291,5 kN	0,63	OK
Verificare la torsiune	13,2 kNm	96,0 kNm	0,14	OK
Verificare de interactiune $V_y + V_z + T$ (beton)			0,12	OK,*
Verificare de interactiune $V_y + V_z + T$ (taietoare)	12,8 kN	16,0 kN	0,80	OK,*
Verificare de interactiune $V_y + V_z + T$ (armare longit.)	237,6 kN	1544,5 kN	0,15	OK,*
Rezumat verificare			0,80	OK,*



Stalp <Unnamed Element> 99.. Dreptunghi (900; 900)

SR EN 1992-1-1

Section 14 [dx = 3.4 m]

Lungime element	Ld = 3.4 m
Lungime de flambaj y	Ly = 9.22 m
Lungime de flambaj z	Lz = 9.11 m
Cod	SR EN 1992-1-1

Materiale

Beton	C35/45(EN1992-2)
Armare longit.	PC52 16...28
Armare la forta taietoare	OB37 6...12

Coefficienti

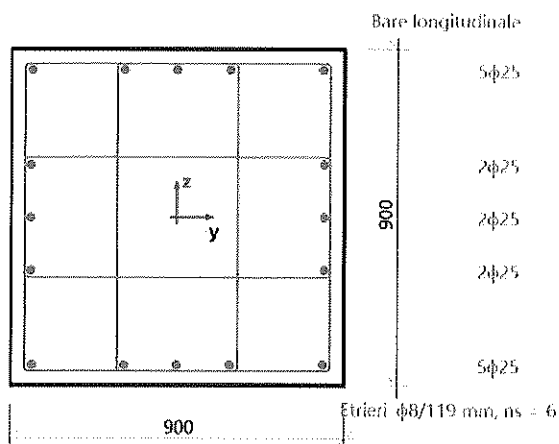
Cod	SR EN 1992-1-1
Parametri beton	$\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura	$\gamma_s = 1$
Coefficient pt. inaltimea efectiva	$\text{Coeff}_d = 0.9$
Coefficient pt. bratul de parghle	$\text{Coeff}_t = 0.9$

Armatura

Bare long.: 16 ϕ 25 mm, Arie tot. = 7854 mm²
Etrieri: $\phi = 8$ mm, $A_{sw} = 302$ mm², $A_{sw,s} = 2528$ mm²/m

Acoperire etrier:

Sus	35 mm
Jos	35 mm
Stanga	35 mm
Dreapta	35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+0.40*LC08+LC12+0.30*LC13+0.30*LC14+LC12_EA+0.30*LC13_EA

$N_{Ed} = -4686$ kN $M_{Edy} = -1662$ kNm $M_{Edz} = -811$ kNm $V_{Edy} = -255$ kN $V_{Edz} = -668$ kN $T_{Ed} = -74.5$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{-255^2 + -668^2} = 715 \text{ kN}$$

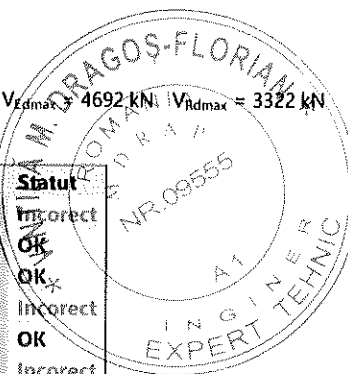
$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(63.6 - 69.1) = 5.57^\circ$$

Rezumat verificare

d = 941 mm z = 666 mm $b_w = 963$ mm $b_{w1} = 663$ mm $V_{Rdc} = 1278$ kN $V_{Rds} = 430$ kN $V_{Edmax} = 4692$ kN $V_{Rdmax} = 3322$ kN

$A_k = 455625$ mm² $u_k = 2700$ mm $T_{Rdc} = 376$ kNm $T_{Rds} = 97.9$ kNm $T_{Rdmax} = 1543$ kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taietoare V_y+V_z	714,7 kN	429,6 kN	1,66	Incorect
Verificare la torsiune	-74,5 kNm	97,9 kNm	0,76	OK
Verificare de interactiune V_y+V_z+T (beton)			0,26	OK
Verificare de interactiune V_y+V_z+T (taietoare)	31,1 kN	12,8 kN	2,42	Incorect
Verificare de interactiune V_y+V_z+T (armare longit.)	935,5 kN	2709,6 kN	0,35	OK
Rezumat verificare			2,42	Incorect



Stalp <Unnamed Element>99..Dreptunghi (650; 650)

SR EN 1992-1-1

Section 14 {dx = 3.4 m}

Lungime element Ld = 3.4 m
Lungime de flambaj y Ly = 10.4 m
Lungime de flambaj z Lz = 10.4 m
Cod SR EN 1992-1-1

Materiale

Beton C35/45(EN1992-2)
Armare longit. PC52 16...28
Armare la forta taietoare OB37 6...12

Coefficienti

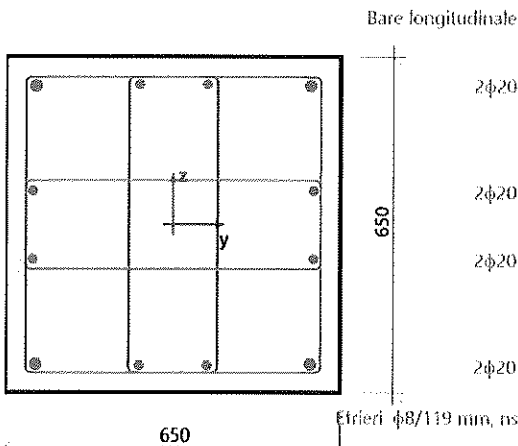
Cod SR EN 1992-1-1
Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura $\gamma_s = 1$
Coefficient pt. inaltimea efectiva $\text{Coeff}_d = 0.9$
Coefficient pt. bratul de parghie $\text{Coeff}_z = 0.9$

Armatura

Bare long.: 8 ϕ 20 mm + 4 ϕ 25 mm, Arie tot. = 4477 mm²
Etrieri: $\phi = 8$ mm, $A_{sw} = 302$ mm², $A_{sw,s} = 2528$ mm²/m

Acoperire etrier:

Sus 35 mm
Jos 35 mm
Stanga 35 mm
Dreapta 35 mm



Forte

Continut combinat: LC01+LC02+LC03+LC04+LC05+0.30*LC06+

0.40*LC08-LC12-0.30*LC13-0.30*LC14-LC12_EA-0.30*LC13_EA

$N_{Ed} = -2997$ kN $M_{Edy} = -661$ kNm $M_{Edz} = -508$ kNm $V_{Edy} = -54.2$ kN $V_{Edz} = -184$ kN $T_{Ed} = 15.4$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

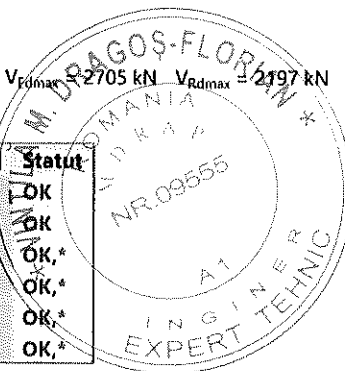
$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{-54.2^2 + -184^2} = 192 \text{ kN}$$

$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(51.8 - 73.6) = 21.8^\circ$$

Rezumat verificare

d = 659 mm z = 461 mm $b_w = 624$ mm $b_{w1} = 545$ mm $V_{Rdc} = 616$ kN $V_{Rds} = 238$ kN $V_{Rdmax} = 2705$ kN $V_{Rdmax} = 2197$ kN
 $A_k = 237656$ mm² $u_k = 1950$ mm $T_{Rdc} = 142$ kNm $T_{Rds} = 51.1$ kNm $T_{Rdmax} = 581$ kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taietoare Vy+Vz	192,0 kN	237,6 kN	0,81	OK
Verificare la torsiune	15,4 kNm	51,1 kNm	0,30	OK
Verificare de interactiune Vy+Vz+T (beton)			0,11	OK,*
Verificare de interactiune Vy+Vz+T (taietoare)	12,1 kN	12,8 kN	0,95	OK,*
Verificare de interactiune Vy+Vz+T (armare longit.)	255,0 kN	1544,5 kN	0,17	OK,*
Rezumat verificare			0,95	OK,*



Stalp <Unnamed Element> 10..Dreptunghi (850; 850)

SR EN 1992-1-1

Section 2 [dx = 0.68 m]

Lungime element	Ld = 3.4 m
Lungime de flambaj y	Ly = 8.48 m
Lungime de flambaj z	Lz = 8.38 m
Cod	SR EN 1992-1-1

Materiale

Beton	C35/45(EN1992-2)
Armare longit.	PC52 16...28
Armare la forta taietoare	OB37 6...12

Coeficienti

Cod	SR EN 1992-1-1
Parametri beton	$\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura	$\gamma_s = 1$
Coeficient pt. inaltimea efectiva	$\text{Coeff}_d = 0.9$
Coeficient pt. bratul de parghie	$\text{Coeff}_f = 0.9$

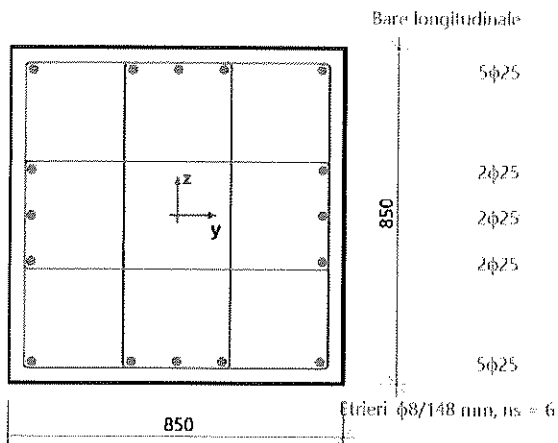
Armatura

Bare long.: $16\phi 25$ mm, Arie tot. = 7854 mm^2

Etrieri: $\phi = 8$ mm, $A_{sw} = 302 \text{ mm}^2$, $A_{sw,s} = 2040 \text{ mm}^2/\text{m}$

Acoperire etrier:

Sus	35 mm
Jos	35 mm
Stanga	35 mm
Dreapta	35 mm



Forte

Continut combinat: LC01+LC02+LC03+LC04+LC05+0.30*LC06+LC12+0.30*LC13-0.30*LC14+LC12_EA+0.30*LC13_EA

$N_{Ed} = -4239$ kN $M_{Edy} = -1529$ kNm $M_{Edz} = -730$ kNm $V_{Edy} = -248$ kN $V_{Edz} = -644$ kN $T_{Ed} = -63.8$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

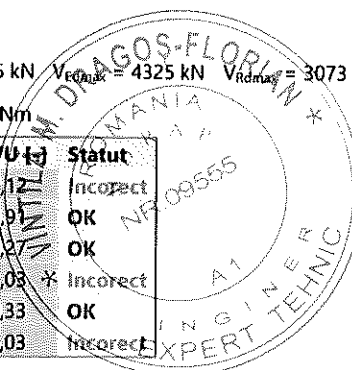
$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{-248^2 + -644^2} = 690 \text{ kN}$$

$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(64.3 - 69) = 4.7^\circ$$

Rezumat verificare

d = 880 mm z = 625 mm $b_w = 911$ mm $b_{w1} = 653$ mm $V_{Rdc} = 1158$ kN $V_{Rds} = 325$ kN $V_{Ed,max} = 4325$ kN $V_{Rd,max} = 3073$ kN
 $A_k = 406406$ mm² $u_k = 2550$ mm $T_{Rdc} = 317$ kNm $T_{Rds} = 70.5$ kNm $T_{Rd,max} = 1300$ kNm

Tip verificare	Forte	Rezistente	VU I-II	Statut
Verificare la taietoare Vy+Vz	690,2 kN	325,1 kN	2,12	Incorrect
Verificare la torsiune	-63,8 kNm	70,5 kNm	0,91	OK
Verificare de interactiune Vy+Vz+T (beton)			0,27	OK
Verificare de interactiune Vy+Vz+T (taietoare)	38,8 kN	12,8 kN	3,03	Incorrect
Verificare de interactiune Vy+Vz+T (armare longit.)	890,4 kN	2709,6 kN	0,33	OK
Rezumat verificare			3,03	Incorrect



Stalp <Unnamed Element> 10..Dreptunghi (600; 600)

SR EN 1992-1-1

Section 1 [dx = 0.34 m]

Lungime element	Ld = 3.4 m
Lungime de flambaj y	Ly = 9.57 m
Lungime de flambaj z	Lz = 9.62 m
Cod	SR EN 1992-1-1

Materiale

Beton	C35/45(EN1992-2)
Armare longit.	PC52 16...28
Armare la forta taietoare	OB37 6...12

Coefficienti

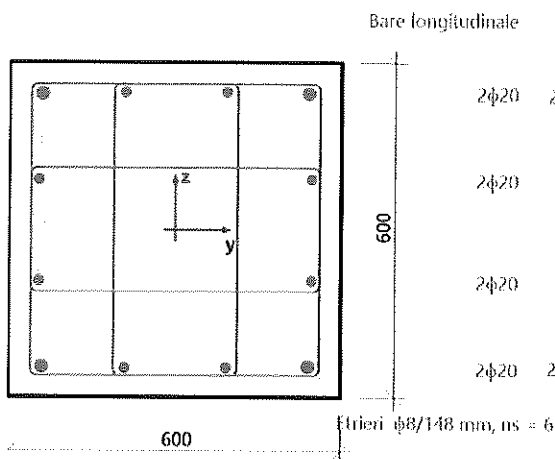
Cod	SR EN 1992-1-1
Parametri beton	$\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura	$\gamma_s = 1$
Coefficient pt. inaltimea efectiva	$Coeff_d = 0.9$
Coefficient pt. bratul de parghie	$Coeff_z = 0.9$

Armatura

Bare long.: 8 ϕ 20 mm + 4 ϕ 25 mm, Arie tot. = 4477 mm²
 Etrieri: $\phi = 8$ mm, $A_{sw} = 302$ mm², $A_{sw,s} = 2040$ mm²/m

Acoperire etrier:

Sus	35 mm
Jos	35 mm
Stanga	35 mm
Dreapta	35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+

0.40*LC08-LC12-0.30*LC13-0.30*LC14-LC12_EA-0.30*LC13_EA

$N_{Ed} = -2657$ kN $M_{Edy} = -571$ kNm $M_{Edz} = -416$ kNm $V_{Edy} = -52.8$ kN $V_{Edz} = -164$ kN $T_{Ed} = 11.6$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{(-52.8)^2 + (-164)^2} = 172 \text{ kN}$$

$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(53.2 - 72.1) = 19^\circ$$

Rezumat verificare

d = 620 mm z = 436 mm $b_w = 630$ mm $b_{w1} = 461$ mm $V_{Rdc} = 592$ kN $V_{Rds} = 181$ kN $V_{Edmax} = 2153$ kN $V_{Rdmax} = 1758$ kN

$A_k = 202500$ mm² $u_k = 1800$ mm $T_{Rdc} = 111$ kNm $T_{Rds} = 35.1$ kNm $T_{Rdmax} = 457$ kNm

Tip verificare	Forte	Rezistente	VU [I]	Statut
Verificare la taietoare Vy+Vz	172,0 kN	181,3 kN	0,95	OK
Verificare la torsiune	11,6 kNm	35,1 kNm	0,33	OK
Verificare de interactiune Vy+Vz+T (beton)			0,12	OK,*
Verificare de interactiune Vy+Vz+T (taietoare)	14,0 kN	12,8 kN	1,09	Incorect
Verificare de interactiune Vy+Vz+T (armare longit.)	223,7 kN	1544,5 kN	0,14	OK,*
Rezumat verificare			1,09	Incorect



Stalp <Unnamed Element> 10..Dreptunghi (800; 800)

SR EN 1992-1-1

Section 2 [dx = 0.68 m]

Lungime element	Ld = 3.4 m
Lungime de flambaj y	Ly = 7.79 m
Lungime de flambaj z	Lz = 7.63 m
Cod	SR EN 1992-1-1

Materiale

Beton	C35/45(EN1992-2)
Armare longit.	PC52 16...28
Armare la forta taietoare	OB37 6...12

Coeficienti

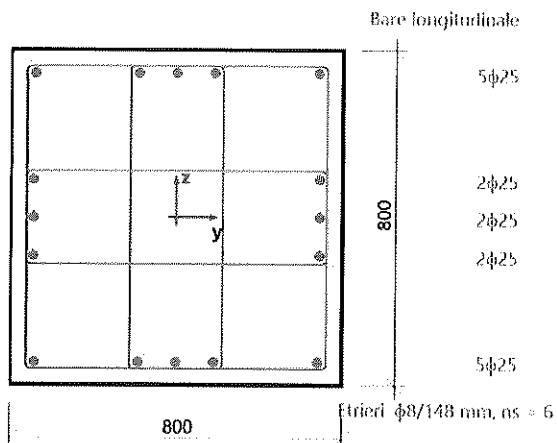
Cod	SR EN 1992-1-1
Parametri beton	$\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura	$\gamma_s = 1$
Coeficient pt. inaltimea efectiva	$\text{Coeff}_{ef} = 0.9$
Coeficient pt. bratul de parghie	$\text{Coeff}_t = 0.9$

Armatura

Bare long.: 16 ϕ 25 mm, Arie tot. = 7854 mm²
Etrieri: $\phi = 8$ mm, $A_{sw} = 302$ mm², $A_{sw,s} = 2040$ mm²/m

Acoperire etrier:

Sus	35 mm
Jos	35 mm
Stanga	35 mm
Dreapta	35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+0.40*LC08+LC12+0.30*LC13+0.30*LC14+LC12_EA+0.30*LC13_EA

$N_{Ed} = -3756$ kN $M_{Edy} = -1368$ kNm $M_{Edz} = -636$ kNm $V_{Edy} = -234$ kN $V_{Edz} = -597$ kN $T_{Ed} = -50.9$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

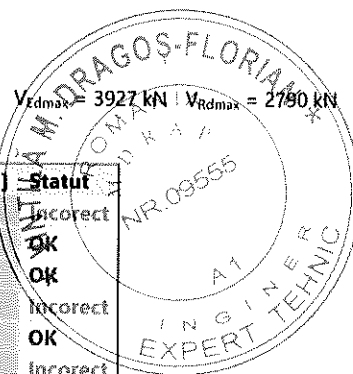
$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{-234^2 + -597^2} = 641 \text{ kN}$$

$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(65 - 68.6) = 3.61^\circ$$

Rezumat verificare

d = 821 mm z = 583 mm $b_w = 859$ mm $b_{w1} = 636$ mm $V_{Rdc} = 1042$ kN $V_{Rds} = 303$ kN $V_{Edmax} = 3927$ kN $V_{Rdmax} = 2780$ kN
 $A_k = 360000$ mm² $u_k = 2400$ mm $T_{Rdc} = 264$ kNm $T_{Rds} = 62.4$ kNm $T_{Rdmax} = 1084$ kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taietoare Vy+Vz	640,8 kN	303,3 kN	2,11	Incorrect
Verificare la torsiune	-50,9 kNm	62,4 kNm	0,82	OK
Verificare de interactiune Vy+Vz+T (beton)			0,28	OK
Verificare de interactiune Vy+Vz+T (taietoare)	37,5 kN	12,8 kN	2,93	Incorrect
Verificare de interactiune Vy+Vz+T (armare longit.)	810,4 kN	2709,6 kN	0,30	OK
Rezumat verificare			2,93	Incorrect



Stalp <Unnamed Element> 10..Dreptunghi (750; 750)

SR EN 1992-1-1

Section 14 {dx = 3.4 m}

Lungime element Ld = 3.4 m
Lungime de flambaj y Ly = 7.15 m
Lungime de flambaj z Lz = 7.02 m
Cod SR EN 1992-1-1

Materiale

Beton C35/45(EN1992-2)
Armare longit. PC52 16...28
Armare la forta taietoare OB37 6...12

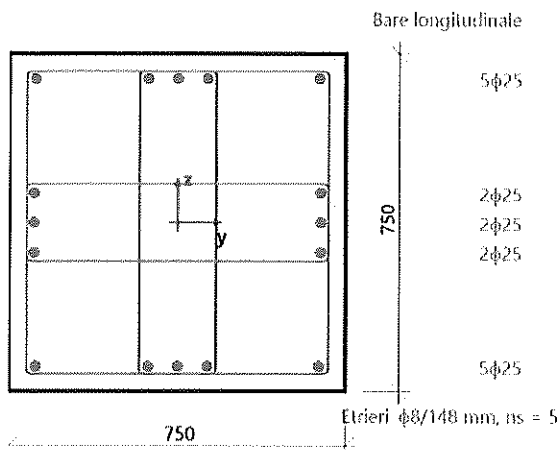
Coefficienti

Cod SR EN 1992-1-1
Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura $\gamma_s = 1$
Coefficient pt. inaltimea efectiva $\text{Coeff}_d = 0.9$
Coefficient pt. bratul de parghie $\text{Coeff}_t = 0.9$

Armatura

Bare long.: 16 ϕ 25 mm, Arie tot. = 7854 mm²
Etieri: $\phi = 8$ mm, $A_{sw} = 251$ mm², $A_{sw,s} = 1700$ mm²/m
Acoperire etier:

Sus 35 mm
Jos 35 mm
Stanga 35 mm
Dreapta 35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+0.40*LC08+LC12+0.30*LC13+0.30*LC14+LC12_EA+0.30*LC13_EA

$N_{Ed} = -3241$ kN $M_{Edy} = -1198$ kNm $M_{Edz} = -540$ kNm $V_{Edy} = -206$ kN $V_{Edz} = -533$ kN $T_{Ed} = -38.4$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{(-206)^2 + (-533)^2} = 571 \text{ kN}$$

$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(65.8 - 68.9) = 3.08^\circ$$

Rezumat verificare

d = 760 mm z = 540 mm $b_w = 804$ mm $b_{w1} = 625$ mm $V_{Rdc} = 919$ kN $V_{Rds} = 234$ kN $V_{Edmax} = 3574$ kN $V_{Rdmax} = 2543$ kN
 $A_k = 316406$ mm² $u_k = 2250$ mm $T_{Rdc} = 218$ kNm $T_{Rds} = 54.9$ kNm $T_{Rdmax} = 893$ kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taietoare Vy+Vz	571,3 kN	234,2 kN	2,44	Incorrect
Verificare la torsiune	-38,4 kNm	54,9 kNm	0,70	OK
Verificare de interactiune Vy+Vz+T (beton)			0,27	OK
Verificare de interactiune Vy+Vz+T (taietoare)	40,2 kN	12,8 kN	3,14	Incorrect
Verificare de interactiune Vy+Vz+T (armare longit.)	707,8 kN	2709,6 kN	0,26	OK
Rezumat verificare			3,14	Incorrect



Stalp <Unnamed Element> 10...Dreptunghi (500; 500)

SR EN 1992-1-1

Section 1 {dx = 0.34 m}

Lungime element Ld = 3.4 m
Lungime de flambaj y Ly = -3.4 m
Lungime de flambaj z Lz = -3.4 m
Cod SR EN 1992-1-1

Materiale

Beton C35/45(EN1992-2)
Armare longit. PC52 16...28
Armare la forta taietoare OB37 6...12

Coefficienti

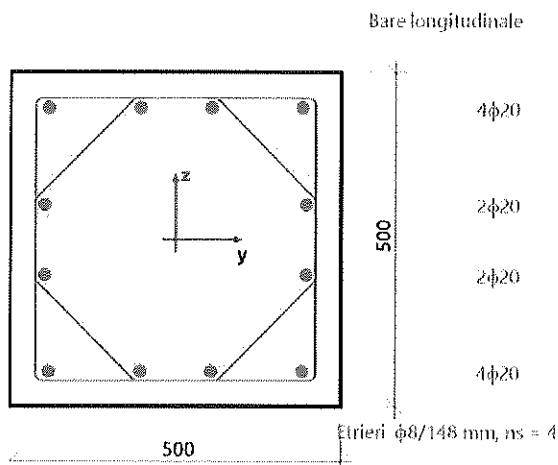
Cod SR EN 1992-1-1
Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura $\gamma_s = 1$
Coefficient pt. inaltimea efectiva $\text{Coeff}_{d1} = 0.9$
Coefficient pt. bratul de parghie $\text{Coeff}_2 = 0.9$

Armatura

Bare long.: 12 ϕ 20 mm, Arie tot. = 3770 mm²
Etrieri: $\phi = 8$ mm, $A_{sv} = 201$ mm², $A_{sv/s} = 1360$ mm²/m

Acoperire etrier:

Sus 35 mm
Jos 35 mm
Stanga 35 mm
Dreapta 35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+

0.40*LC08-LC12-0.30*LC13-0.30*LC14-LC12_EA-0.30*LC13_EA

$N_{Ed} = -1626$ kN $M_{Edy} = -187$ kNm $M_{Edz} = -57.8$ kNm $V_{Edy} = -37.7$ kN $V_{Edz} = -141$ kN $T_{Ed} = 4.42$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{(-37.7)^2 + (-141)^2} = 146 \text{ kN}$$

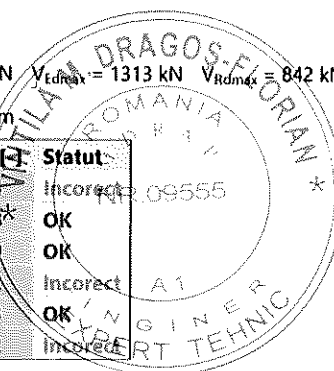
$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(71.6 - 75.1) = 3.42^\circ$$

Rezumat verificare

d = 530 mm z = 340 mm $b_w = 383$ mm $b_{w1} = 329$ mm $V_{Rdc} = 302$ kN $V_{Rds} = 118$ kN $V_{Edmax} = 1313$ kN $V_{Rdmax} = 842$ kN

$A_k = 140625$ mm² $u_k = 1500$ mm $T_{Rdc} = 64.5$ kNm $T_{Rds} = 24.4$ kNm $T_{Rdmax} = 265$ kNm

Tip verificare	Forte	Rezistente	VU (-)	Statut
Verificare la taietoare Vy+Vz	146,2 kN	117,9 kN	1,24	Incorect
Verificare la torsiune	4,4 kNm	24,4 kNm	0,18	OK
Verificare de interactiune Vy+Vz+T (beton)			0,19	OK
Verificare de interactiune Vy+Vz+T (taietoare)	18,2 kN	12,8 kN	1,42	Incorect
Verificare de interactiune Vy+Vz+T (armare longit.)	169,7 kN	1300,6 kN	0,13	OK
Rezumat verificare			1,42	Incorect



Stalp <Unnamed Element> 10..Dreptunghi (650; 650)

SR EN 1992-1-1

Section 2 [dx = 0.68 m]

Lungime element $L_d = 3.4$ m
 Lungime de flambaj y $L_y = 5.94$ m
 Lungime de flambaj z $L_z = 5.84$ m
 Cod SR EN 1992-1-1

Materiale

Beton C35/45(EN1992-2)
 Armare longit. PC52 16...28
 Armare la forta taietoare OB37 6...12

Coefficienti

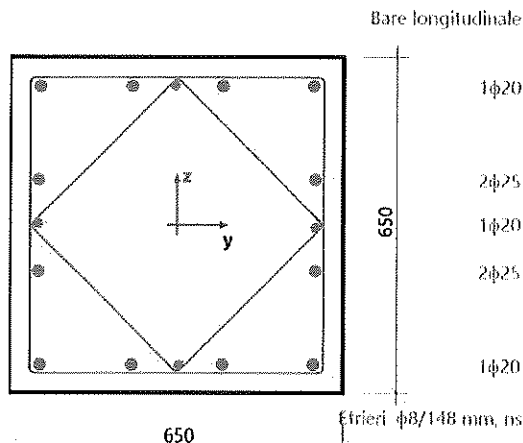
Cod SR EN 1992-1-1
 Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
 Parametri armatura $\gamma_s = 1$
 Coeficient pt. inaltimea efectiva $\text{Coeff}_{d1} = 0.9$
 Coeficient pt. bratul de parghie $\text{Coeff}_2 = 0.9$

Armatura

Bare long.: $4\phi 20$ mm + $12\phi 25$ mm, Arie tot. = 7147 mm²
 Etrieri: $\phi = 8$ mm, $A_{sw} = 201$ mm², $A_{sw,s} = 1360$ mm²/m

Acoperire etrier:

Sus 35 mm
 Jos 35 mm
 Stanga 35 mm
 Dreapta 35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+0.40*LC08+LC12+0.30*LC13+0.30*LC14+LC12_EA+0.30*LC13_EA

$N_{Ed} = -2340$ kN $M_{Edy} = -922$ kNm $M_{Edz} = -389$ kNm $V_{Edy} = -166$ kN $V_{Edz} = -439$ kN $T_{Ed} = -19.5$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{(-166)^2 + (-439)^2} = 469 \text{ kN}$$

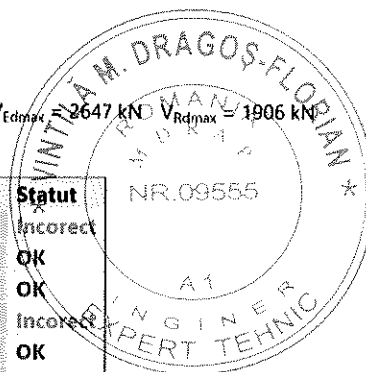
$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(66.7 - 69.2) = 2.51^\circ$$

Rezumat verificare

$d = 646$ mm $z = 465$ mm $b_w = 695$ mm $b_{w1} = 545$ mm $V_{Rdc} = 704$ kN $V_{Rds} = 161$ kN $V_{Edmax} = 2647$ kN $V_{Rdmax} = 1906$ kN

$A_k = 237656$ mm² $u_k = 1950$ mm $T_{Rdc} = 142$ kNm $T_{Rds} = 41.2$ kNm $T_{Rdmax} = 581$ kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taietoare $V_y + V_z$	469,0 kN	161,2 kN	2,91	Incorect
Verificare la torsiune	-19,5 kNm	41,2 kNm	0,47	OK
Verificare de interactiune $V_y + V_z + T$ (beton)			0,28	OK
Verificare de interactiune $V_y + V_z + T$ (taietoare)	43,3 kN	12,8 kN	3,38	Incorect
Verificare de interactiune $V_y + V_z + T$ (armare longit.)	549,0 kN	2465,8 kN	0,22	OK
Rezumat verificare			3,38	Incorect



Stalp <Unnamed Element> 10..Dreptunghi (500; 500)

SR EN 1992-1-1

Section 7 [dx = 1.7 m]

Lungime element	Ld = 3.4 m
Lungime de flambaj y	Ly = 6.97 m
Lungime de flambaj z	Lz = 6.98 m
Cod	SR EN 1992-1-1

Materiale

Beton	C35/45(EN1992-2)
Armare longit.	PC52 16...28
Armare la forta taetoare	OB37 6...12

Coefficienti

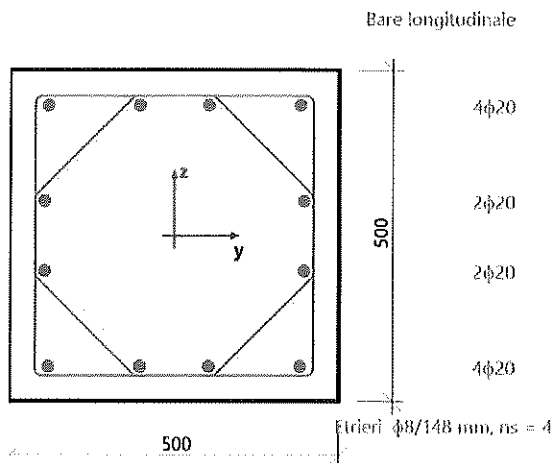
Cod	SR EN 1992-1-1
Parametri beton	$\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura	$\gamma_s = 1$
Coefficient pt. inaltimea efectiva	$\text{Coeff}_d = 0.9$
Coefficient pt. bratul de parghie	$\text{Coeff}_z = 0.9$

Armatura

Bare long.: 12 ϕ 20 mm, Arie tot. = 3770 mm²
 Etrieri: $\phi = 8$ mm, $A_{sw} = 201$ mm², $A_{sw,s} = 1360$ mm²/m

Acoperire etrier:

Sus	35 mm
Jos	35 mm
Stanga	35 mm
Dreapta	35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+

0.40*LC08-LC12-0.30*LC13-0.30*LC14-LC12_EA-0.30*LC13_EA

$N_{Ed} = -1303$ kN $M_{Edy} = -314$ kNm $M_{Edz} = -199$ kNm $V_{Edy} = -33.7$ kN $V_{Edz} = -149$ kN $T_{Ed} = 3.87$ kNm

Rezultanta fortei taetoare

Diferenta dintre unghluri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{-33.7^2 + -149^2} = 153 \text{ kN}$$

$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(57.6 - 77.2) = 19.6^\circ$$

Rezumat verificare

d = 468 mm z = 339 mm $b_w = 513$ mm $b_{w1} = 513$ mm $V_{Rdc} = 367$ kN $V_{Rds} = 118$ kN $V_{Edmax} = 1807$ kN $V_{Rdmax} = 1309$ kN

$A_k = 140625$ mm² $u_k = 1500$ mm $T_{Rdc} = 64.5$ kNm $T_{Rds} = 24.4$ kNm $T_{Rdmax} = 265$ kNm

Tip verificare	Forte	Rezistente	VU [1]	Statut
Verificare la taetoare Vy+Vz	152,5 kN	117,7 kN	1,30	Incorect
Verificare la torsiune	3,9 kNm	24,4 kNm	0,16	OK
Verificare de interactiune Vy+Vz+T (beton)			0,13	OK,*
Verificare de interactiune Vy+Vz+T (taetoare)	18,6 kN	12,8 kN	1,45	Incorect
Verificare de interactiune Vy+Vz+T (armare longit.)	173,2 kN	1300,6 kN	0,13	OK,*
Rezumat verificare			1,45	Incorect



Stalp <Unnamed Element> 10...Dreptunghi (500; 500)

SR EN 1992-1-1

Section 1 [dx = 0.34 m]

Lungime element Ld = 3.4 m
 Lungime de flambaj y Ly = 7.01 m
 Lungime de flambaj z Lz = 7.02 m
 Cod SR EN 1992-1-1

Materiale

Beton C35/45(EN1992-2)
 Armare longit. PC52 16...28
 Armare la forta taietoare OB37 6...12

Coefficienti

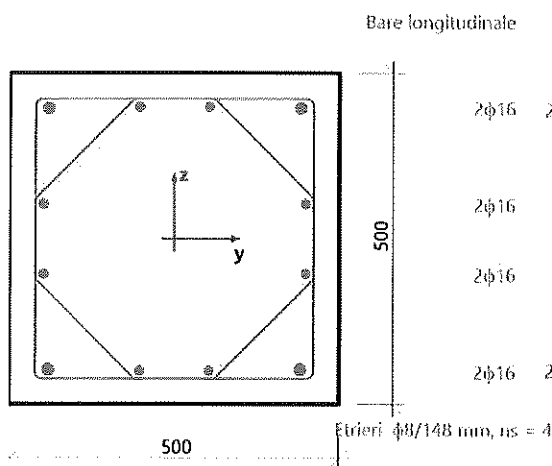
Cod SR EN 1992-1-1
 Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
 Parametri armatura $\gamma_s = 1$
 Coeficient pt. inaltimea efectiva $\text{Coeff}_d = 0.9$
 Coeficient pt. bratul de parghie $\text{Coeff}_z = 0.9$

Armatura

Bare long.: 8 ϕ 16 mm + 4 ϕ 20 mm, Arie tot. = 2865 mm²
 Etrieri: $\phi = 8$ mm, $A_{sw} = 201$ mm², $A_{sw,s} = 1360$ mm²/m

Acoperire etrier:

Sus 35 mm
 Jos 35 mm
 Stanga 35 mm
 Dreapta 35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+

0.40*LC08-LC12-0.30*LC13-0.30*LC14-LC12_EA-0.30*LC13_EA

$N_{Ed} = -996$ kN $M_{Edy} = -282$ kNm $M_{Edz} = -168$ kNm $V_{Edy} = -31.2$ kN $V_{Edz} = -145$ kN $T_{Ed} = 3.1$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{(-31.2)^2 + (-145)^2} = 148 \text{ kN}$$

$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(60 - 77.8) = 17.9^\circ$$

Rezumat verificare

d = 467 mm z = 354 mm $b_w = 511$ mm $b_{w1} = 511$ mm $V_{Rdc} = 306$ kN $V_{Rds} = 123$ kN $V_{Edmax} = 1798$ kN $V_{Rdmax} = 1362$ kN

$A_k = 140625$ mm² $u_k = 1500$ mm $T_{Rdc} = 64.5$ kNm $T_{Rds} = 24.4$ kNm $T_{Rdmax} = 265$ kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taietoare Vy+Vz	148,2 kN	122,7 kN	1,21	Incorect
Verificare la torsiune	3,1 kNm	24,4 kNm	0,13	OK
Verificare de interactiune Vy+Vz+T (beton)			0,12	OK,*
Verificare de interactiune Vy+Vz+T (taietoare)	17,1 kN	12,8 kN	1,33	Incorect
Verificare de interactiune Vy+Vz+T (armare longit.)	164,7 kN	988,5 kN	0,17	OK,*
Rezumat verificare			1,33	Incorect



Stalp <Unnamed Element> 10..Dreptunghi (550; 550)

SR EN 1992-1-1

Section 14 [dx = 3.4 m]

Lungime element Ld = 3.4 m
Lungime de flambaj y Ly = 7.95 m
Lungime de flambaj z Lz = 7.98 m
Cod SR EN 1992-1-1

Materiale

Beton C35/45(EN1992-2)
Armare longit. PC52 16...28
Armare la forta taetoare OB37 6...12

Coefficienti

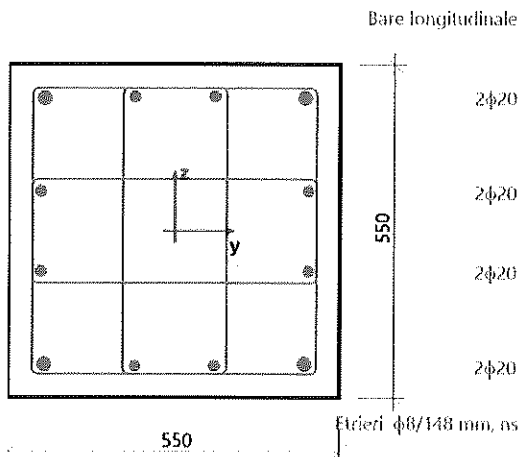
Cod SR EN 1992-1-1
Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura $\gamma_s = 1$
Coefficient pt. inaltimea efectiva $\text{Coeff}_d = 0.9$
Coefficient pt. bratul de parghie $\text{Coeff}_z = 0.9$

Armatura

Bare long.: 8 ϕ 20 mm + 4 ϕ 25 mm, Arie tot. = 4477 mm²
Etieri: $\phi = 8$ mm, $A_{sw} = 251$ mm², $A_{sw,s} = 1700$ mm²/m

Acoperire etieri:

Sus 35 mm
Jos 35 mm
Stanga 35 mm
Dreapta 35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+

0.40*LC08-LC12-0.30*LC13-0.30*LC14-LC12_EA-0.30*LC13_EA

$N_{Ed} = -1940$ kN $M_{Edy} = -420$ kNm $M_{Edz} = -289$ kNm $V_{Edy} = -43.4$ kN $V_{Edz} = -164$ kN $T_{Ed} = 6.79$ kNm

Rezultanta fortei taetoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{(-43.4)^2 + (-164)^2} = 170 \text{ kN}$$

$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(54.9 - 75.2) = 20.3^\circ$$

Rezumat verificare

d = 544 mm z = 387 mm $b_w = 569$ mm $b_{w1} = 518$ mm $V_{Rdc} = 490$ kN $V_{Rds} = 168$ kN $V_{Edmax} = 2122$ kN $V_{Rdmax} = 1508$ kN

$A_k = 170156$ mm² $u_k = 1650$ mm $T_{Rdc} = 85.8$ kNm $T_{Rds} = 29.5$ kNm $T_{Rdmax} = 352$ kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taetoare Vy+Vz	169,8 kN	167,7 kN	1,01	Incorect
Verificare la torsiune	6,8 kNm	29,5 kNm	0,23	OK
Verificare de interactiune Vy+Vz+T (beton)			0,13	OK,*
Verificare de interactiune Vy+Vz+T (taetoare)	15,9 kN	12,8 kN	1,24	Incorect
Verificare de interactiune Vy+Vz+T (armare longit.)	202,8 kN	1544,5 kN	0,13	OK,*
Rezumat verificare			1,24	Incorect



Stalp <Unnamed Element> 10..Dreptunghi (700; 700)

SR EN 1992-1-1

Section 2 [dx = 0.68 m]

Lungime element	Ld = 3.4 m
Lungime de flambaj y	Ly = 6.45 m
Lungime de flambaj z	Lz = 6.33 m
Cod	SR EN 1992-1-1

Materiale

Beton	C35/45(EN1992-2)
Armare longit.	PC52 16...28
Armare la forta taietoare	OB37 6...12

Coefficienti

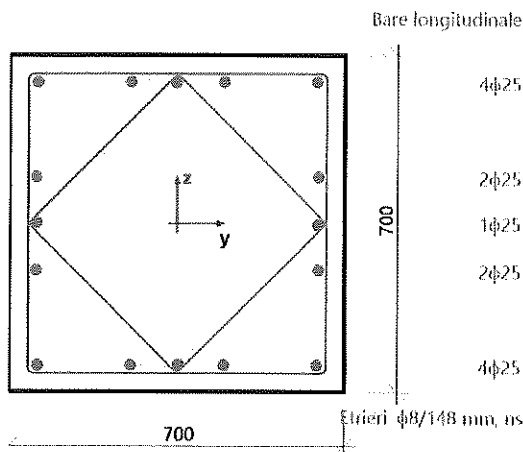
Cod	SR EN 1992-1-1
Parametri beton	$\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura	$\gamma_s = 1$
Coefficient pt. inaltimea efectiva	$\text{Coeff}_d = 0.9$
Coefficient pt. bratul de parghie	$\text{Coeff}_z = 0.9$

Armatura

Bare long.: 16 ϕ 25 mm, Arie tot. = 7854 mm²
Etrieri: $\phi = 8$ mm, $A_{sw} = 201$ mm², $A_{sw,s} = 1360$ mm²/m

Acoperire etrier:

Sus	35 mm
Ios	35 mm
Stanga	35 mm
Dreapta	35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+0.40*LC08+LC12+0.30*LC13+0.30*LC14+LC12_EA+0.30*LC13_EA

$N_{Ed} = -2806$ kN $M_{Edy} = -1087$ kNm $M_{Edz} = -469$ kNm $V_{Edy} = -195$ kN $V_{Edz} = -504$ kN $T_{Ed} = -28.4$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

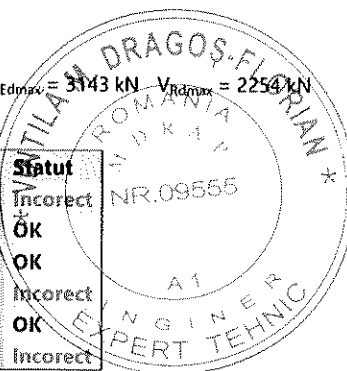
$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{(-195)^2 + (-504)^2} = 540 \text{ kN}$$

$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(66.5 - 68.9) = 2.39^\circ$$

Rezumat verificare

$d = 706$ mm $z = 507$ mm $b_w = 750$ mm $b_{w1} = 591$ mm $V_{Rdc} = 816$ kN $V_{Rds} = 176$ kN $V_{Edmax} = 3143$ kN $V_{Rdmax} = 2254$ kN
 $A_k = 275625$ mm² $u_k = 2100$ mm $T_{Rdc} = 177$ kNm $T_{Rds} = 47.8$ kNm $T_{Rdmax} = 726$ kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taietoare Vy+Vz	540,2 kN	175,7 kN	3,08	Incorrect
Verificare la torsiune	-28,4 kNm	47,8 kNm	0,59	OK
Verificare de interactiune Vy+Vz+T (beton)			0,28	OK
Verificare de interactiune Vy+Vz+T (taietoare)	47,0 kN	12,8 kN	3,67	Incorrect
Verificare de interactiune Vy+Vz+T (armare longit.)	648,2 kN	2709,6 kN	0,24	OK
Rezumat verificare			3,67	Incorrect



Stalp <Unnamed Element> 10..Dreptunghi (550; 550)

SR EN 1992-1-1

Section 0 [dx = 0 m]

Lungime element Ld = 3.4 m
Lungime de flambaj y Ly = 8.32 m
Lungime de flambaj z Lz = 8.35 m
Cod SR EN 1992-1-1

Materiale

Beton C35/45(EN1992-2)
Armare longit. PC52 16...28
Armare la forta taietoare OB37 6...12

Coefficienti

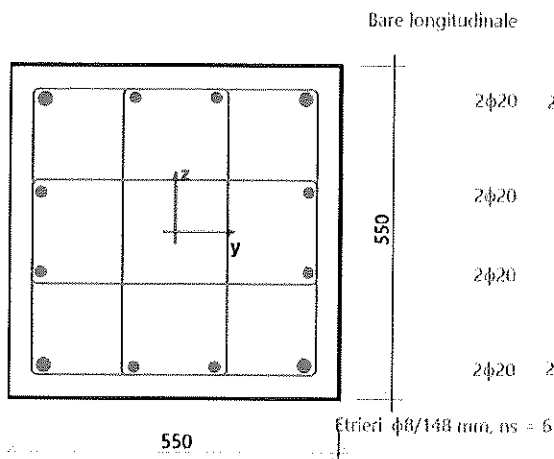
Cod SR EN 1992-1-1
Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura $\gamma_s = 1$
Coefficient pt. inaltimea efectiva $\text{Coeff}_{fd} = 0.9$
Coefficient pt. bratul de parghie $\text{Coeff}_2 = 0.9$

Armatura

Bare long.: 8 ϕ 20 mm + 4 ϕ 25 mm, Arie tot. = 4477 mm²
Etrieri: $\phi = 8$ mm, $A_{sw} = 302$ mm², $A_{sws} = 2040$ mm²/m

Acoperire etrier:

Sus 35 mm
Jos 35 mm
Stanga 35 mm
Dreapta 35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+
0.40*LC08-LC12-0.30*LC13-0.30*LC14-LC12_EA-0.30*LC13_EA

$N_{Ed} = -2303$ kN $M_{Edy} = -469$ kNm $M_{Edz} = -324$ kNm $V_{Edy} = -44$ kN $V_{Edz} = -156$ kN $T_{Ed} = 7.7$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{(-44)^2 + (-156)^2} = 163 \text{ kN}$$

$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(54.5 - 74.3) = 19.8^\circ$$

Rezumat verificare

d = 551 mm z = 386 mm $b_w = 566$ mm $b_{w1} = 489$ mm $V_{Rdc} = 493$ kN $V_{Rds} = 201$ kN $V_{Rdmax} = 2027$ kN $V_{Rdmax} = 1421$ kN
 $A_k = 170156$ mm² $u_k = 1650$ mm $T_{Rdc} = 85.8$ kNm $T_{Rds} = 29.5$ kNm $T_{Rdmax} = 352$ kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taietoare Vy+Vz	162,5 kN	200,9 kN	0,81	OK
Verificare la torsiune	7,7 kNm	29,5 kNm	0,26	OK
Verificare de interactiune Vy+Vz+T (beton)			0,14	OK, *
Verificare de interactiune Vy+Vz+T (taietoare)	13,7 kN	12,8 kN	1,07	Incorect
Verificare de interactiune Vy+Vz+T (armare longit.)	199,9 kN	1544,5 kN	0,13	OK, *
Rezumat verificare			1,07	Incorect



Stalp <Unnamed Element> 10..Dreptunghi (600; 600)

SR EN 1992-1-1

Section 2 (dx = 0.68 m)

Lungime element Ld = 3.4 m
Lungime de flambaj y Ly = 5.5 m
Lungime de flambaj z Lz = 5.4 m
Cod SR EN 1992-1-1

Materiale

Beton C35/45(EN1992-2)
Armare longit. PC52 16...28
Armare la forta taietoare OB37 6...12

Coefficienti

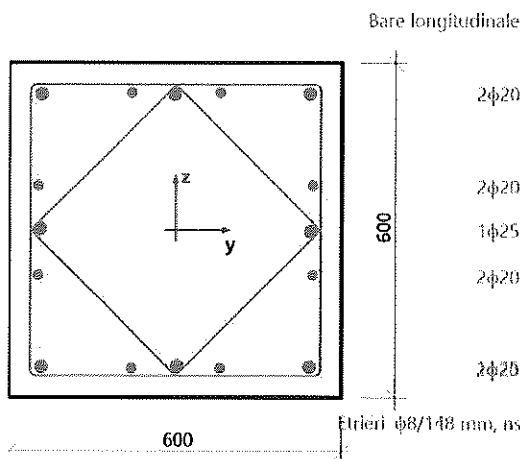
Cod SR EN 1992-1-1
Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura $\gamma_s = 1$
Coefficient pt. inaltimea efectiva $\text{Coeff}_d = 0.9$
Coefficient pt. bratul de parghie $\text{Coeff}_x = 0.9$

Armatura

Bare long.: 8 ϕ 20 mm + 8 ϕ 25 mm, Arie tot. = 6440 mm²
Etrieri: $\phi = 8$ mm, $A_{sw} = 201$ mm², $A_{sw,s} = 1360$ mm²/m

Acoperire etrier:

Sus 35 mm
Jos 35 mm
Stanga 35 mm
Dreapta 35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+0.40*LC08+LC12+0.30*LC13+0.30*LC14+LC12_EA+0.30*LC13_EA

$N_{Ed} = -1886$ kN $M_{Edy} = -760$ kNm $M_{Edz} = -311$ kNm $V_{Edy} = -135$ kN $V_{Edz} = -367$ kN $T_{Ed} = -12.5$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{(-135)^2 + (-367)^2} = 392 \text{ kN}$$

$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(67.2 - 69.8) = 2.56^\circ$$

Rezumat verificare

d = 583 mm z = 421 mm $b_w = 639$ mm $b_{w1} = 500$ mm $V_{Rdc} = 578$ kN $V_{Rds} = 146$ kN $V_{Edmax} = 2195$ kN $V_{Rdmax} = 1584$ kN

$A_k = 202500$ mm² $u_k = 1800$ mm $T_{Rdc} = 111$ kNm $T_{Rds} = 35.1$ kNm $T_{Rdmax} = 457$ kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taietoare Vy+Vz	391,6 kN	145,9 kN	2,68	Incorect
Verificare la torsiune	-12,5 kNm	35,1 kNm	0,36	OK
Verificare de interactiune Vy+Vz+T (beton)			0,27	OK
Verificare de interactiune Vy+Vz+T (taietoare)	39,0 kN	12,8 kN	3,04	Incorect
Verificare de interactiune Vy+Vz+T (armare longit.)	447,2 kN	2221,9 kN	0,20	OK
Rezumat verificare			3,04	Incorect



Stalp <Unnamed Element> 10..Dreptunghi (450; 450)

SR EN 1992-1-1

Section 2 [dx = 0.68 m]

Lungime element	Ld = 3.4 m
Lungime de flambaj y	Ly = 6.38 m
Lungime de flambaj z	Lz = 6.24 m
Cod	SR EN 1992-1-1

Materiale

Beton	C35/45(EN1992-2)
Armare longit.	PC52 16...28
Armare la forta taietoare	OB37 6...12

Coeficienti

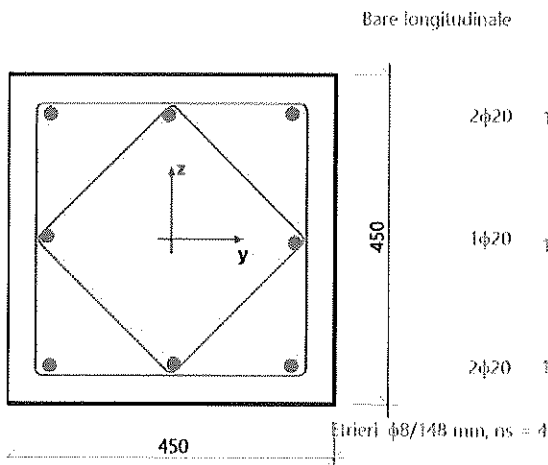
Cod	SR EN 1992-1-1
Parametri beton	$\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura	$\gamma_s = 1$
Coeficient pt. inaltimea efectiva	$\text{Coeff}_d = 0.9$
Coeficient pt. bratul de parghie	$\text{Coeff}_z = 0.9$

Armatura

Bare long.: 8 ϕ 20 mm, Arie tot. = 2513 mm²
 Etrieri: $\phi = 8$ mm, $A_{sw} = 201$ mm², $A_{sw,s} = 1360$ mm²/m

Acoperire etrier:

Sus	35 mm
Jos	35 mm
Stanga	35 mm
Dreapta	35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+
 0.40*LC08-LC12-0.30*LC13-0.30*LC14-LC12_EA-0.30*LC13_EA

$N_{Ed} = -689$ kN $M_{Edy} = -219$ kNm $M_{Edz} = -117$ kNm $V_{Edy} = -24.8$ kN $V_{Edz} = -120$ kN $T_{Ed} = 1.24$ kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

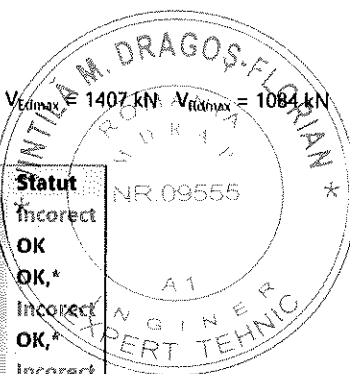
$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{(-24.8)^2 + (-120)^2} = 122 \text{ kN}$$

$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(62.6 - 78.3) = 15.6^\circ$$

Rezumat verificare

$d = 407$ mm $z = 314$ mm $b_w = 460$ mm $b_{w1} = 460$ mm $V_{Rdc} = 232$ kN $V_{Rds} = 109$ kN $V_{Edmax} = 1407$ kN $V_{Rdmax} = 1084$ kN
 $A_k = 113906$ mm² $u_k = 1350$ mm $T_{Rdc} = 47$ kNm $T_{Rds} = 19.8$ kNm $T_{Rdmax} = 193$ kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taietoare Vy+Vz	122,3 kN	108,7 kN	1,12	Incorrect
Verificare la torsiune	1,2 kNm	19,8 kNm	0,06	OK
Verificare de interactiune Vy+Vz+T (beton)			0,12	OK, *
Verificare de interactiune Vy+Vz+T (taietoare)	15,2 kN	12,8 kN	1,19	Incorrect
Verificare de interactiune Vy+Vz+T (armare longit.)	129,7 kN	867,1 kN	0,15	OK, *
Rezumat verificare			1,19	Incorrect



Stalp <Unnamed Element> 10..Dreptunghi (550; 550)

SR EN 1992-1-1

Section 0 [dx = 0 m]

Lungime element Ld = 3.4 m
Lungime de flambaj y Ly = 5.01 m
Lungime de flambaj z Lz = 4.92 m
Cod SR EN 1992-1-1

Materiale

Beton C35/45(EN1992-2)
Armare longit. PC52 16...28
Armare la forta taietoare OB37 6...12

Coefficienti

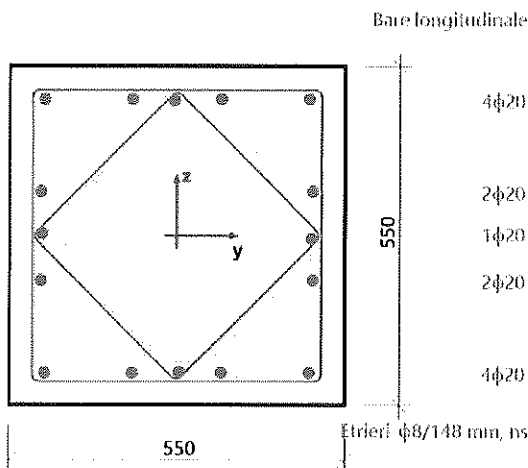
Cod SR EN 1992-1-1
Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura $\gamma_s = 1$
Coefficient pt. inaltimea efectiva $\text{Coeff}_d = 0.9$
Coefficient pt. bratul de parghie $\text{Coeff}_z = 0.9$

Armatura

Bare long.: 16 ϕ 20 mm, Arie tot. = 5027 mm²
Etrieri: $\phi = 8$ mm, A_{sw} = 201 mm², A_{sw,s} = 1360 mm²/m

Acoperire etrier:

Sus 35 mm
Jos 35 mm
Stanga 35 mm
Dreapta 35 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05-LC12-0.30*LC13-0.30*LC14-LC12_EA-0.30*LC13_EA

N_{Ed} = -1367 kN M_{Edy} = -655 kNm M_{Edz} = -248 kNm V_{Edy} = -86.4 kN V_{Edz} = -351 kN T_{Ed} = 7.22 kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{-86.4^2 + -351^2} = 362 \text{ kN}$$

$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(90 - 76.2) = 13.8^\circ$$

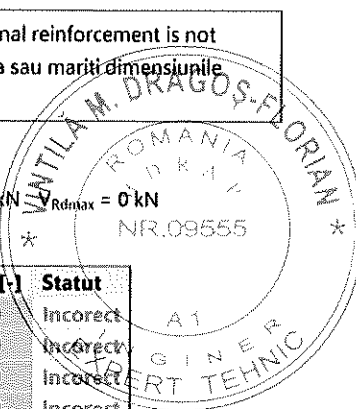
Eroare: Check was not done, because check capacity is not satisfied (defined longitudinal reinforcement is not sufficient to resist combination of the load (N+My+Mz)). Mariti cantitatea de armatura sau mariti dimensiunile sectiunii transv. sau mariti calitatea materialelor utilizate.

Rezumat verificare

d = 0 mm z = 0 mm b_w = 0 mm b_{w1} = 0 mm V_{Rdc} = 0 kN V_{Rds} = 0 kN V_{Edmax} = 0 kN V_{Rdmax} = 0 kN

A_k = 0 mm² u_k = 0 mm T_{Rdc} = 0 kNm T_{Rds} = 0 kNm T_{Rdmax} = 0 kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taietoare Vy+Vz	361,8 kN	-	3,00	Incorect
Verificare la torsiune	7,2 kNm	0,0 kNm	3,00	Incorect
Verificare de interactiune Vy+Vz+T (beton)			3,00	Incorect
Verificare de interactiune Vy+Vz+T (taietoare)	0,0 kN	0,0 kN	3,00	Incorect
Verificare de interactiune Vy+Vz+T (armare longit.)	0,0 kN	0,0 kN	3,00	Incorect
Rezumat verificare			3,00	Incorect



Stalp <Unnamed Element> 11..Dreptunghi (450; 450)

SR EN 1992-1-1

Section 14 {dx = 3,44 m}

Lungime element Ld = 3,44 m
Lungime de flambaj y Ly = 5,94 m
Lungime de flambaj z Lz = 6,17 m
Cod SR EN 1992-1-1

Materiale

Beton C35/45(EN1992-2)
Armare longit. PC52 16...28
Armare la forta taieatoare OB37 6...12

Coeficienti

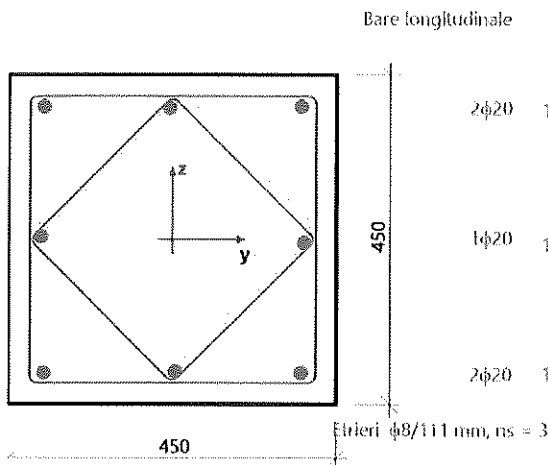
Cod SR EN 1992-1-1
Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura $\gamma_s = 1$
Coeficient pt. inaltimea efectiva $\text{Coeff}_d = 0.9$
Coeficient pt. bratul de parghie $\text{Coeff}_z = 0.9$

Armatura

Bare long.: 8 ϕ 20 mm, Arie tot. = 2513 mm²
Etrieri: $\phi = 8$ mm, $A_{sw} = 151$ mm², $A_{sw,s} = 1364$ mm²/m

Acoperire etrier:

Sus 25 mm
Jos 25 mm
Stanga 25 mm
Dreapta 25 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+

0.30*LC06-LC12-0.30*LC13-0.30*LC14-LC12_EA-0.30*LC13_EA

 $N_{Ed} = -387$ kN $M_{Edy} = -234$ kNm $M_{Edz} = -35.2$ kNm $V_{Edy} = -16.1$ kN $V_{Edz} = -127$ kN $T_{Ed} = -0.899$ kNm

Rezultanta fortei taieatoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{-16.1^2 + -127^2} = 128 \text{ kN}$$

$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(83.1 - 82.8) = 0.347^\circ$$

Rezumat verificare

 $d = 360$ mm $z = 299$ mm $b_w = 454$ mm $b_{w1} = 454$ mm $V_{Rdc} = 185$ kN $V_{Rds} = 104$ kN $V_{Edmax} = 1228$ kN $V_{Rdmax} = 1021$ kN $A_k = 113906$ mm² $u_k = 1350$ mm $T_{Rdc} = 47$ kNm $T_{Rds} = 24.7$ kNm $T_{Rdmax} = 193$ kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taieatoare Vy+Vz	128,2 kN	104,1 kN	1,23	Incorect
Verificare la torsiune	-0,9 kNm	24,7 kNm	0,04	OK
Verificare de interactiune Vy+Vz+T (beton)			0,13	OK
Verificare de interactiune Vy+Vz+T (taieatoare)	17,3 kN	12,8 kN	1,35	Incorect
Verificare de interactiune Vy+Vz+T (armare longit.)	133,5 kN	867,1 kN	0,15	OK
Rezumat verificare			1,35	Incorect



Stalp <Unnamed Element> 11...Dreptunghi (500; 500)

SR EN 1992-1-1

Section 14 [dx = 4.12 m]

Lungime element Ld = 4.12 m
Lungime de flambaj y Ly = 5.85 m
Lungime de flambaj z Lz = 5.75 m
Cod SR EN 1992-1-1

Materiale

Beton C35/45(EN1992-2)
Armare longit. PC52 16...28
Armare la forta taietoare OB37 6...12

Coefficienti

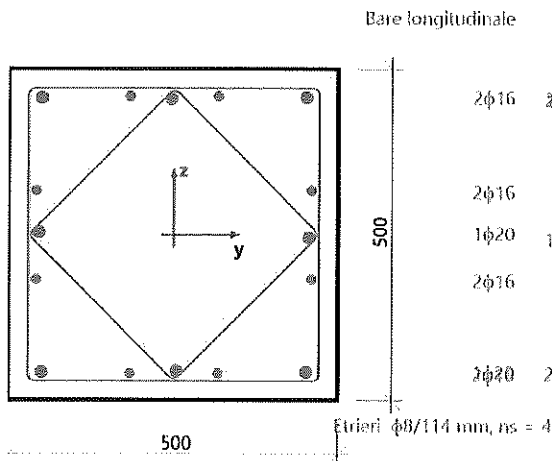
Cod SR EN 1992-1-1
Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura $\gamma_s = 1$
Coefficient pt. inaltimea efectiva $\text{Coeff}_d = 0.9$
Coefficient pt. bratul de parghie $\text{Coeff}_2 = 0.9$

Armatura

Bare long.: 8 ϕ 16 mm + 8 ϕ 20 mm, Arie tot. = 4122 mm²
Etrieri: $\phi = 8$ mm, A_{sw} = 177 mm², A_{sw,s} = 1561 mm²/m

Acoperire etrier:

Sus 25 mm
Jos 25 mm
Stanga 25 mm
Dreapta 25 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC07+0.40*LC08-0.30*LC12-LC13+0.30*LC14-0.30*LC12_EA-LC13_EA

N_{Ed} = -944 kN M_{Edy} = -163 kNm M_{Edz} = -369 kNm V_{Edy} = -136 kN V_{Edz} = -47.5 kN T_{Ed} = -0.467 kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

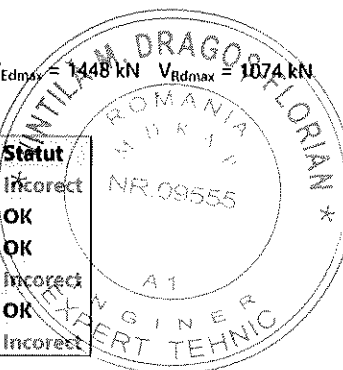
$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{(-136)^2 + (-47.5)^2} = 144 \text{ kN}$$

$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(22.9 - 19.3) = 3.62^\circ$$

Rezumat verificare

d = 482 mm z = 357 mm b_w = 530 mm b_{w1} = 399 mm V_{Rdc} = 342 kN V_{Rds} = 142 kN V_{Edmax} = 1448 kN V_{Rdmax} = 1074 kN
A_k = 140625 mm² u_k = 1500 mm T_{Rdc} = 64.5 kNm T_{Rds} = 28 kNm T_{Rdmax} = 265 kNm

Tip verificare	Forte	Rezistente	VU [-]	Statut
Verificare la taetoare Vy+Vz	144,0 kN	142,3 kN	1,01	Incorect
Verificare la torsiune	-0,5 kNm	28,0 kNm	0,02	OK
Verificare de interactiune Vy+Vz+T (beton)			0,14	OK
Verificare de interactiune Vy+Vz+T (taetoare)	11,6 kN	11,3 kN	1,03	Incorect
Verificare de interactiune Vy+Vz+T (armare longit.)	146,5 kN	1422,0 kN	0,10	OK
Rezumat verificare			1,03	Incorect



Stalp <Unnamed Element> 11..Dreptunghi (400; 400)

SR EN 1992-1-1

Section 5 [dx = 1.21 m]

Lungime element Ld = 3.02 m
Lungime de flambaj y Ly = 5.01 m
Lungime de flambaj z Lz = 4.79 m
Cod SR EN 1992-1-1

Materiale

Beton C35/45(EN1992-2)
Armare longit. PC52 16...28
Armare la forta taietoare OB37 6...12

Coefficienti

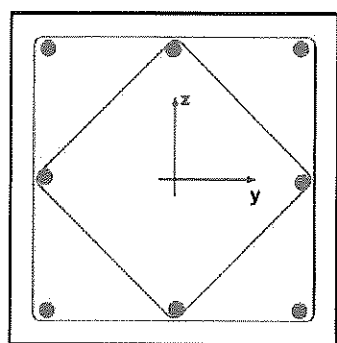
Cod SR EN 1992-1-1
Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura $\gamma_s = 1$
Coefficient pt. inaltimea efectiva $\text{Coeff}_d = 0.9$
Coefficient pt. bratul de parghie $\text{Coeff}_z = 0.9$

Armatura

Bare long.: 8 ϕ 20 mm, Arie tot. = 2513 mm²
Etrieri: $\phi = 7$ mm, A_{sw} = 154 mm², A_{sw,s} = 1070 mm²/m

Acoperire etrier:

Sus 25 mm
Jos 25 mm
Stanga 25 mm
Dreapta 25 mm



Bare longitudinale

2 ϕ 20

1 ϕ 20

1 ϕ 20

1 ϕ 20

2 ϕ 20

1 ϕ 20

Etrieri $\phi 7/144$ mm, ns = 4

Forțe

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC07+

0.40*LC08-LC12-0.30*LC13-0.30*LC14-LC12_EA-0.30*LC13_EA

N_{Ed} = -457 kN M_{Edy} = -31.3 kNm M_{Edz} = -15.1 kNm V_{Edy} = -27.7 kN V_{Edz} = -111 kN T_{Ed} = 0.172 kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{-27.7^2 + -111^2} = 114 \text{ kN}$$

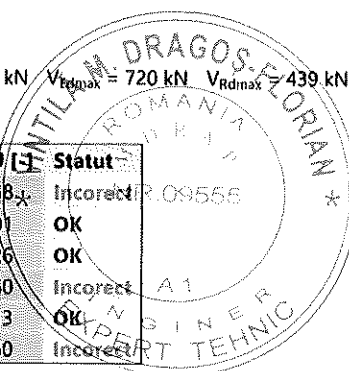
$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(63.6 - 76) = 12.4^\circ$$

Rezumat verificare

d = 433 mm z = 264 mm b_w = 205 mm b_{w1} = 221 mm V_{Rdc} = 298 kN V_{Rds} = 72.1 kN V_{Rdmax} = 720 kN V_{Rdmin} = 439 kN

A_k = 90000 mm² u_k = 1200 mm T_{Rdc} = 33 kNm T_{Rds} = 12.3 kNm T_{Rdmax} = 135 kNm

Tip verificare	Forțe	Rezistente	VU/Σ	Statut
Verificare la taietoare Vy+Vz	114,3 kN	72,1 kN	1,58	Incorect
Verificare la torsiune	0,2 kNm	12,3 kNm	0,01	OK
Verificare de interactiune Vy+Vz+T (beton)			0,26	OK
Verificare de interactiune Vy+Vz+T (taietoare)	15,7 kN	9,8 kN	1,60	Incorect
Verificare de interactiune Vy+Vz+T (armare longit.)	115,5 kN	867,1 kN	0,13	OK
Rezumat verificare			1,60	Incorect



Stalp <Unnamed Element> 11..Dreptunghi (400; 400)

SR EN 1992-1-1

Section 4 (dx = 1.11 m)

Lungime element Ld = 3.7 m
Lungime de flambaj y Ly = 9.15 m
Lungime de flambaj z Lz = 7.03 m
Cod SR EN 1992-1-1

Materiale

Beton C35/45(EN1992-2)
Armare longit. PC52 16...28
Armare la forta taietoare OB37 6...12

Coefficienti

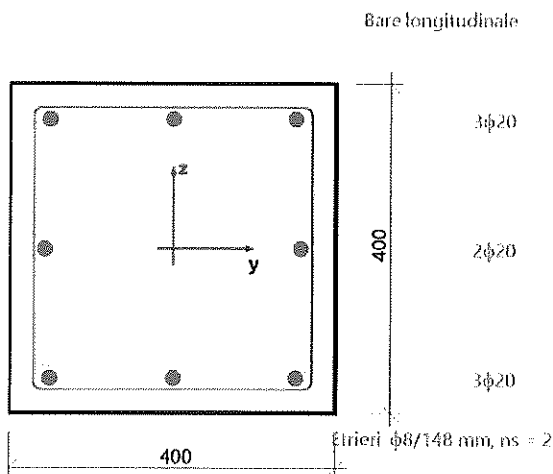
Cod SR EN 1992-1-1
Parametri beton $\gamma_c = 1.2, \alpha_{cc} = 1$
Parametri armatura $\gamma_s = 1$
Coefficient pt. inaltimea efectiva $\text{Coeff}_d = 0.9$
Coefficient pt. bratul de parghie $\text{Coeff}_z = 0.9$

Armatura

Bare long.: 8 ϕ 20 mm, Arie tot. = 2513 mm²
Etrieri: $\phi = 8$ mm, A_{sw} = 101 mm², A_{sw,s} = 679 mm²/m

Acoperire etrier:

Sus 25 mm
Jos 25 mm
Stanga 25 mm
Dreapta 25 mm



Forte

Continut combinatie: LC01+LC02+LC03+LC04+LC05+0.30*LC06+0.40*LC08-0.30*LC12-LC13+0.30*LC14+0.30*LC12_EA+LC13_EA

N_{Ed} = -144 kN M_{Edy} = 9.45 kNm M_{Edz} = -27.3 kNm V_{Edy} = -8.11 kN V_{Edz} = -41.6 kN T_{Ed} = -1.24 kNm

Rezultanta fortei taietoare

Diferenta dintre unghiuri α_M si α_V

$$V_{Ed} = \sqrt{V_{Edy}^2 + V_{Edz}^2} = \sqrt{-8.11^2 + -41.6^2} = 42.4 \text{ kN}$$

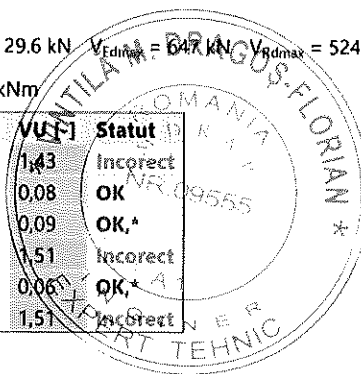
$$\alpha_{MV} = \text{abs}(\alpha_M - \alpha_V) = \text{abs}(161 - 79) = 82.1^\circ$$

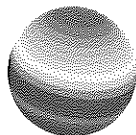
Rezumat verificare

d = 211 mm z = 171 mm b_w = 131 mm b_{w1} = 408 mm V_{Rdc} = 37.6 kN V_{Rds} = 29.6 kN V_{Edmax} = 64.7 kN V_{Rdmax} = 524 kN

A_k = 90000 mm² u_k = 1200 mm T_{Rdc} = 33 kNm T_{Rds} = 15.6 kNm T_{Rdmax} = 135 kNm

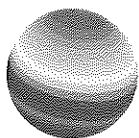
Tip verificare	Forte	Rezistente	VU-1	Statut
Verificare la taietoare Vy+Vz	42,4 kN	29,6 kN	1,43	Incorect
Verificare la torsiune	-1,2 kNm	15,6 kNm	0,08	OK
Verificare de interactiune Vy+Vz+T (beton)			0,09	OK,*
Verificare de interactiune Vy+Vz+T (taietoare)	19,4 kN	12,8 kN	1,51	Incorect
Verificare de interactiune Vy+Vz+T (armare longit.)	50,7 kN	867,1 kN	0,06	OK,*
Rezumat verificare			1,51	Incorect





10 ANEXA 3 – PLANURI

R01_A3_Plan de situatie
R02_A1_Plan piloti cladire
R03_A1_Plan fundatii cladire
R04_A1_Plan cofraj cota -0,07 m Subsol
R05_A1_Plan cofraj cota +3,95 m Parter
R06_A1_Plan cofraj cota +7,93 m Etaj I
R07_A1_Plan cofraj cota +11,33 m Etaj II
R08_A1_Plan cofraj cota +14,73 m Etaj III
R09_A1_Plan cofraj cota +18,13 m Etaj IV
R10_A1_Plan cofraj cota +21,53 m Etaj V
R11_A1_Plan cofraj cota +24,93 m Etaj VI
R12_A1_Plan cofraj cota +28,33 m Etaj VII
R13_A1_Plan cofraj cota +31,73 m Etaj VIII
R14_A1_Plan cofraj cota +35,13 m Etaj IX
R15_A1_Plan cofraj cota +38,23 m Etaj X
R16_A1_Plan cofraj cota +42,25 m Etaj XI
R17_A1_Sectiune B și C
R18_A1_Sectiune D și E
R19_A1_Sectiune 6 și 7
R20_A1_Sectiune 8 și 9



11 ANEXA 4 – RAPORT DE ÎNCERCĂRI

Raport de încercare nr. 1567 / 23.12.2016
pentru determinarea calității betonului și caracteristicilor de armare prin metode nedistructive

I. Date generale:

Date despre client	
Denumirea clientului	SC ECO TERRA PROIECT SRL
Adresa clientului	Bd. Tomis, 269, Constanta, Constanta, 900463, Constanta 900001
Numărul comenzii client/LMC	PV/22.12.2016 intrare 7766/22.12.2016
Date despre probe	
Codul probei:	PPE2 – placă peste etaj 2(cod LMC-UTCB:) PPE4 – placă peste etaj 4 (cod LMC-UTCB:)
Data primirii probelor:	22.12.2016
Laborator care a efectuat eșantionarea	LMC-UTCB
Data eșantionării:	22.12.2016
Locul eșantionării:	Incintă Port Constanța nr. 1, Clădire ANR, Constanța
Tip probă	Elemente din beton armat
Starea probei	-
Observații	Elementele supuse încercării au fost indicate de către client.

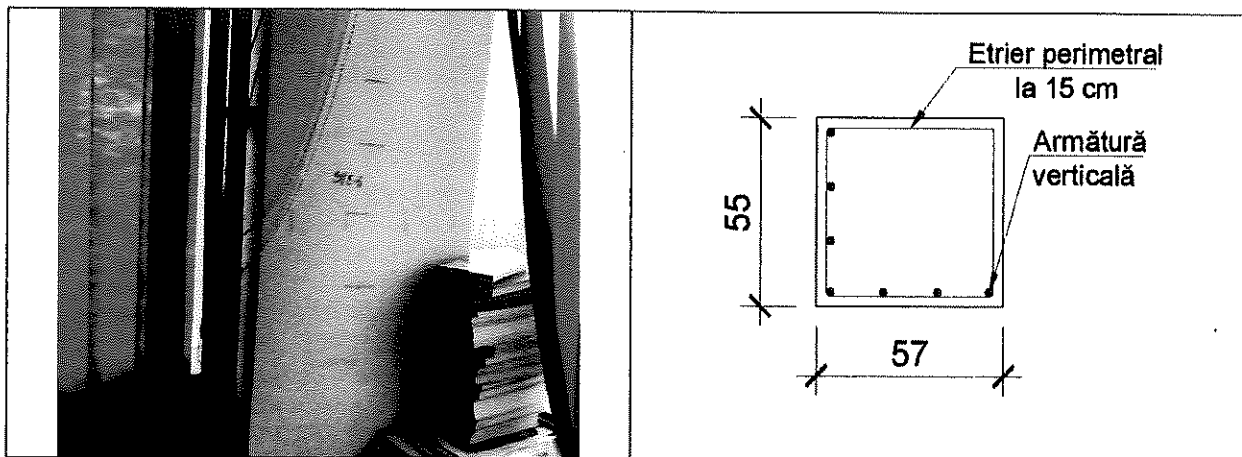
II. Rezultate experimentale

Denumirea aparatelor cu care s-a făcut încercarea:

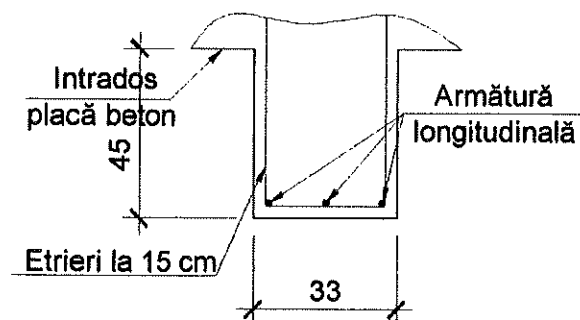
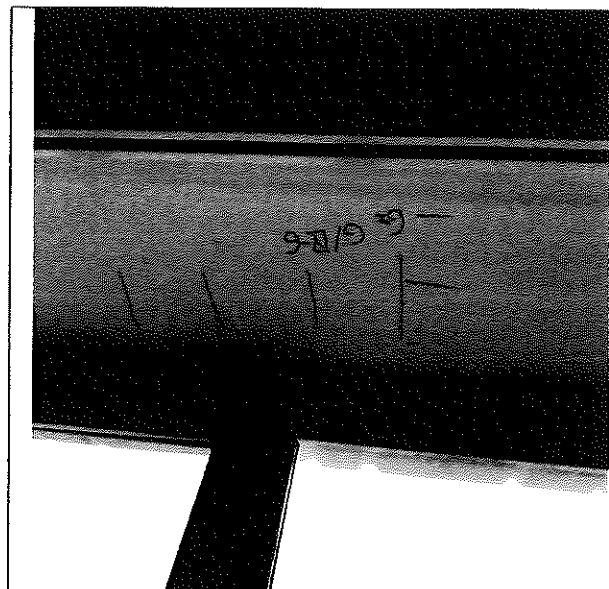
- Georadar Structure scan GSSI
 - Echipament de carotare RIDGID RB-3W;
 - Șubler 0-300 mm, div=0.01 mm INSIZE seria 1712115739;
 - Mașină de încercare la compresiune clasa 1, producător: MATEST, tip: CYBERTRONIC 1,5-15 kN, 25-250 kN, 200-2000 kN, div=1N;
- Abateri de la, adaugiri la, sau excluderi din metoda de încercare : -

Rezultatele determinărilor

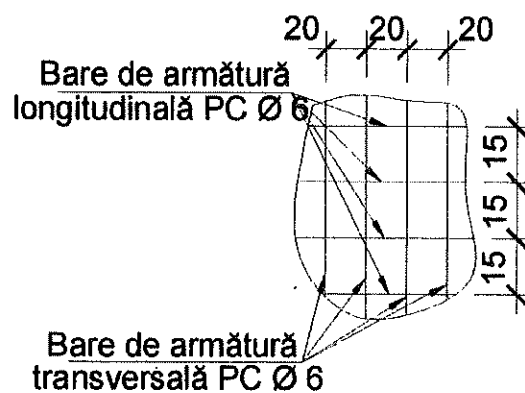
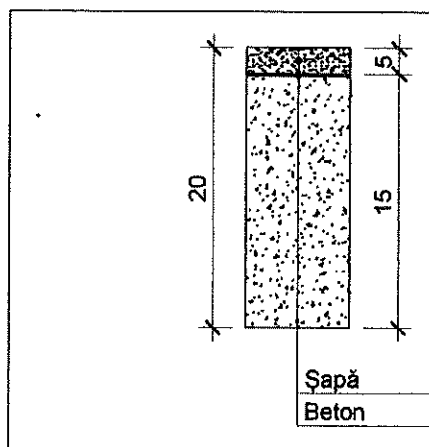
2.1. Element încercat: Etaj 4 stâlp ax E/6



2.2. Element încercat: Etaj 4 grindă ax G/IV-6



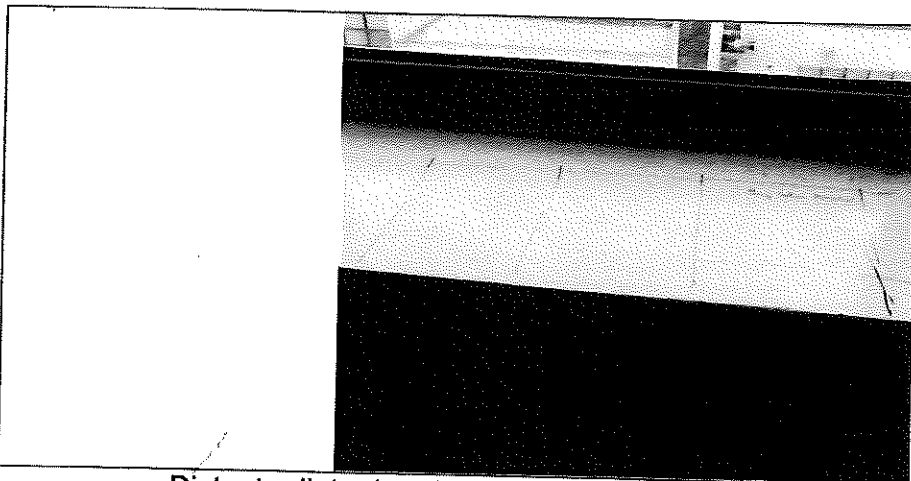
2.3. Element încercat: Etaj 5 placă peste etaj 4



Tabelul II.3.1. Rezultatele determinării de rezistență la compresiune

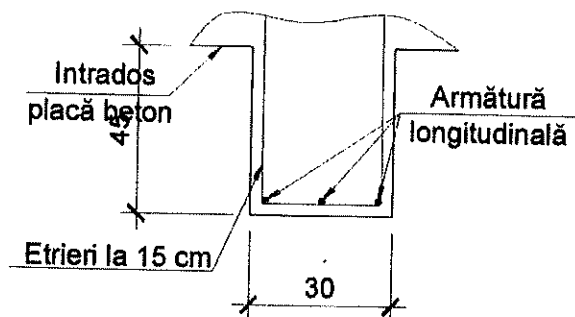
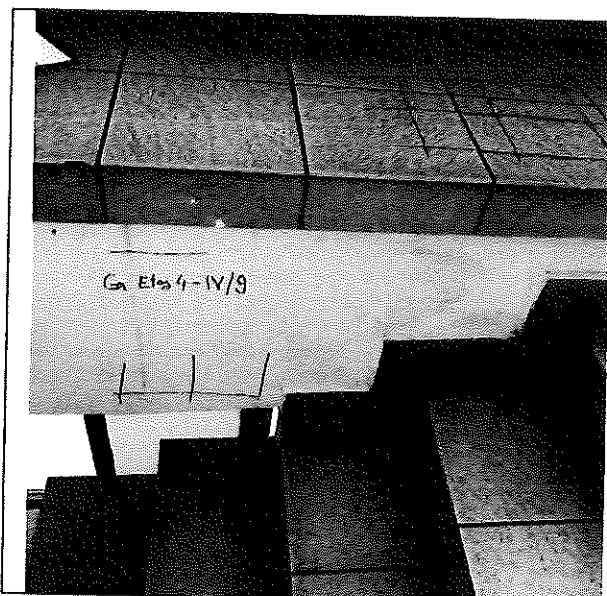
Indicativ epruvetă	Data încercării	d (mm)	h (mm)	h/d	P (kN)	R_{car} (N/mm ²)	Coeficienți corecție		R_o (N/mm ²)
							a	b	
PPE4	23.12.2016	49,0	53,5	1,09	68,711	36,5	1,06	1,032	39,9

2.4. Element încercat: Pervaz fereastră

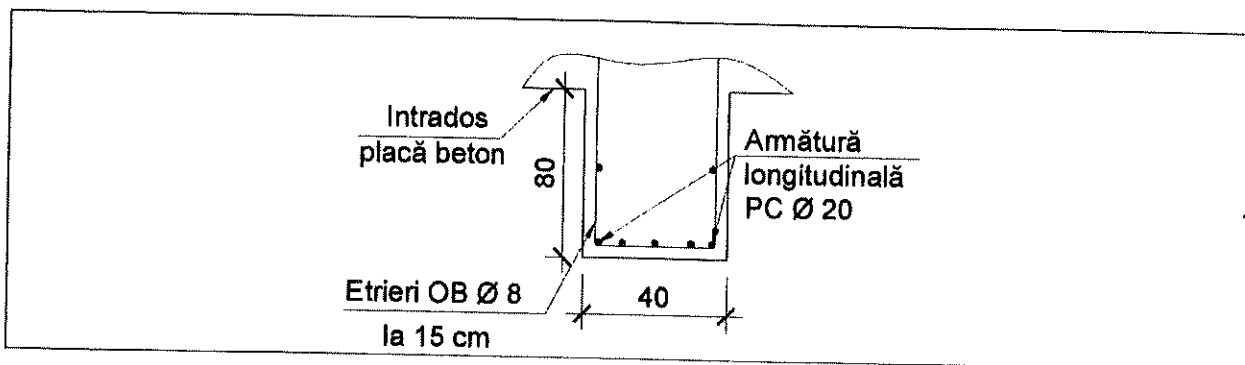


Distanța dintre barele de armare este de 20 cm, pe fiecare direcție.

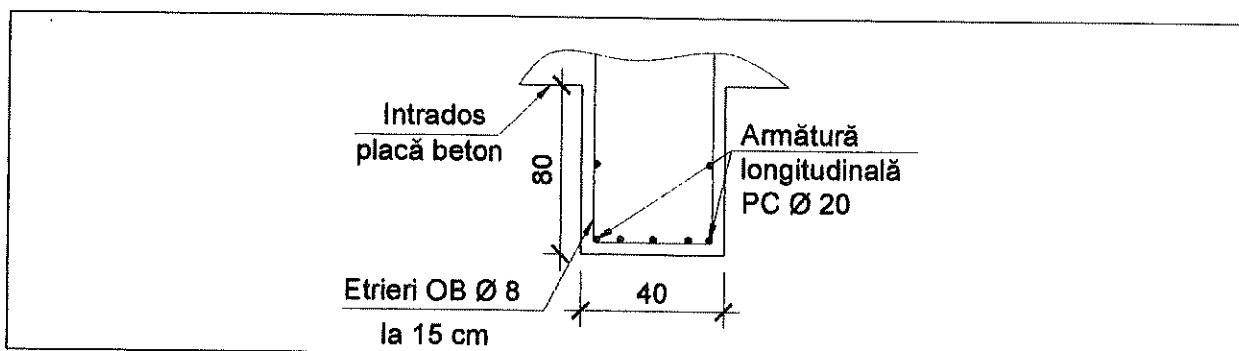
2.5. Element încercat: Etaj 4 grindă ax IV/9



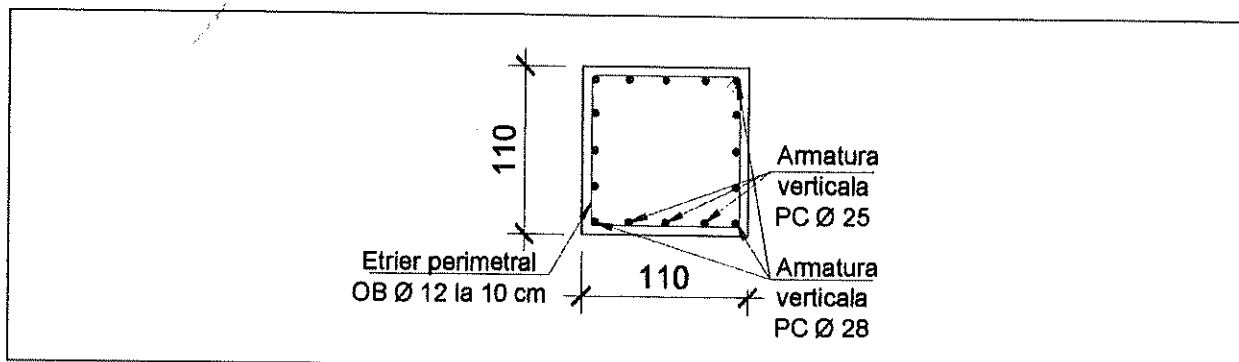
2.6. Element încercat: Etaj 4 grindă ax C/9



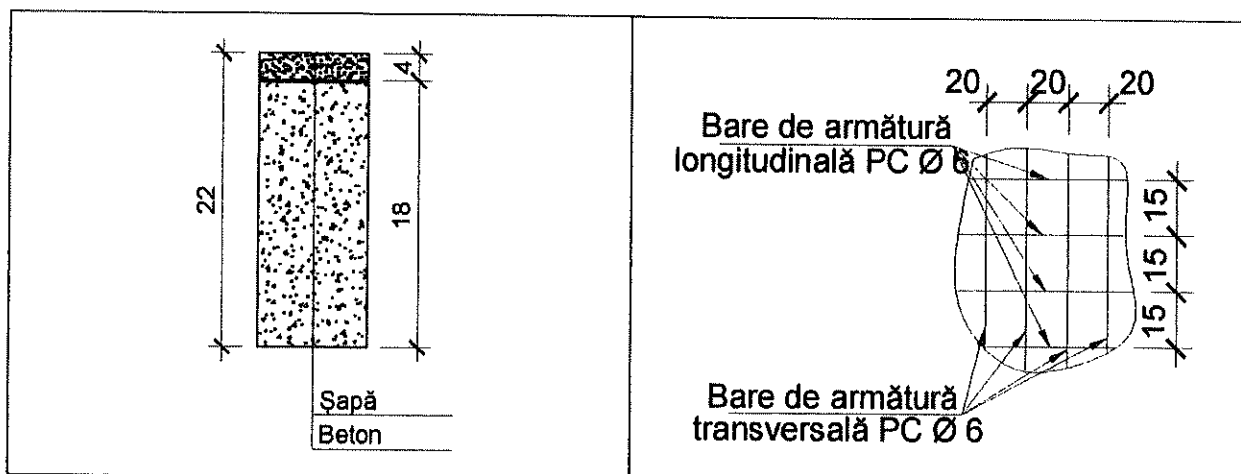
2.6. Element încercat: Subsol grindă ax S/C



2.7. Element încercat: Subsol stâlp ax C/8



2.8. Element încercat: Etaj 3 placă peste etaj 2



Tabelul II.8.1. Rezultatele determinării de rezistență la compresiune

Indicativ epruvetă	Data încercării	d (mm)	h (mm)	h/d	P (kN)	R_{car} (N/mm ²)	Coeficienți corecție		R_c (N/mm ²)
							a	b	
PPE2	23.12.2016	49,0	52,5	1,07	68,550	36,4	1,06	1,025	39,5

III. Observații:

Carotele au fost debitate pentru eliminarea capetelor. Carotele au fost debitate astfel încât înălțimea lor rezultată după prelucrarea suprafețelor de capăt să fie apropiată de un diametru, pentru ca rezistența la compresiune a carotei să fie comparată cu cea rezultată în urma încercării unei epruvete cubice (cap.7.2 SR EN 12504-1).

Epruvetele au fost încercate în stare uscată, fiind condiționate în atmosfera laboratorului.

Suprafața de capăt a probelor s-a îndreptat cu mortar de sulf conform prevederilor NP137-2014, SR EN 12504-1 și SR EN 12390-3. Încercarea propriu-zisă s-a efectuat conform prevederilor SR EN 12390-3, utilizându-se o viteză de încărcare de $0,6 \text{ N/mm}^2$.

NP 137-2014 prevede ca rezistența la compresiune determinată pe carote cu diametrul egal cu înălțimea, cu valori în intervalul 100-150mm este egală cu rezistența determinată pe cuburi cu latura de 150 mm, păstrate în condițiile elementului.

Pentru carote cu diametrul diferit de 100-150mm și înălțimea diferită de diametru se pot aplica prevederile SR EN 12504-1 și normelor locale, adică, în principiu, se pot aplica valorile coeficientului b din NP-137:2014.

IV. Concluzii -

Rezultatele se referă numai la obiectele încercate.

Încercările efectuate nu au fost făcute sub nici o formă de presiune.

Încercările s-au desfășurat în prezența/absența unui reprezentant al clientului.

Prezentul raport de încercare nu poate fi multiplicat decât integral.

Șef laborator,
Specialist încercări nedistructive
Prof.univ.dr. Ing. D.Voinitchi

