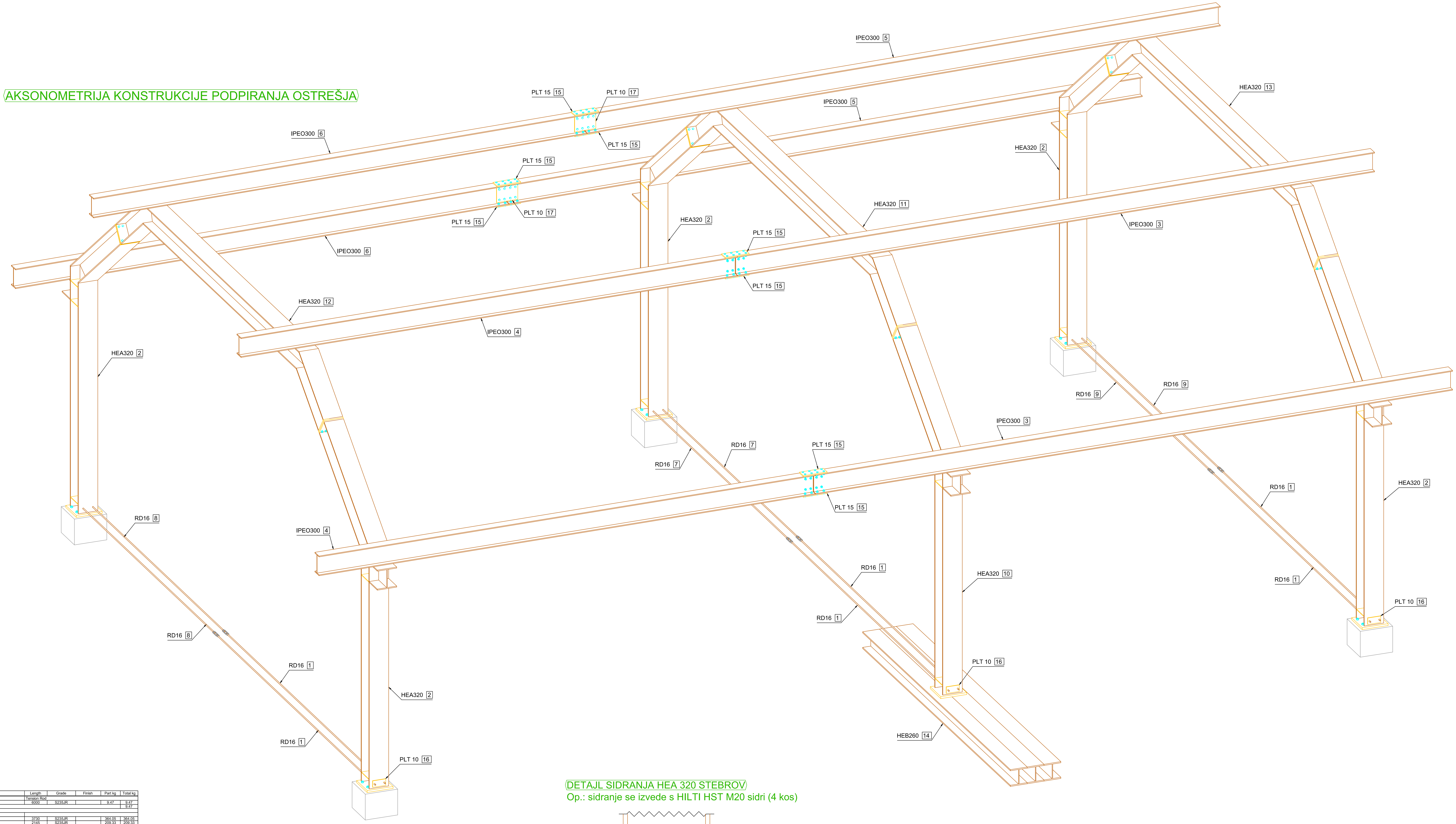
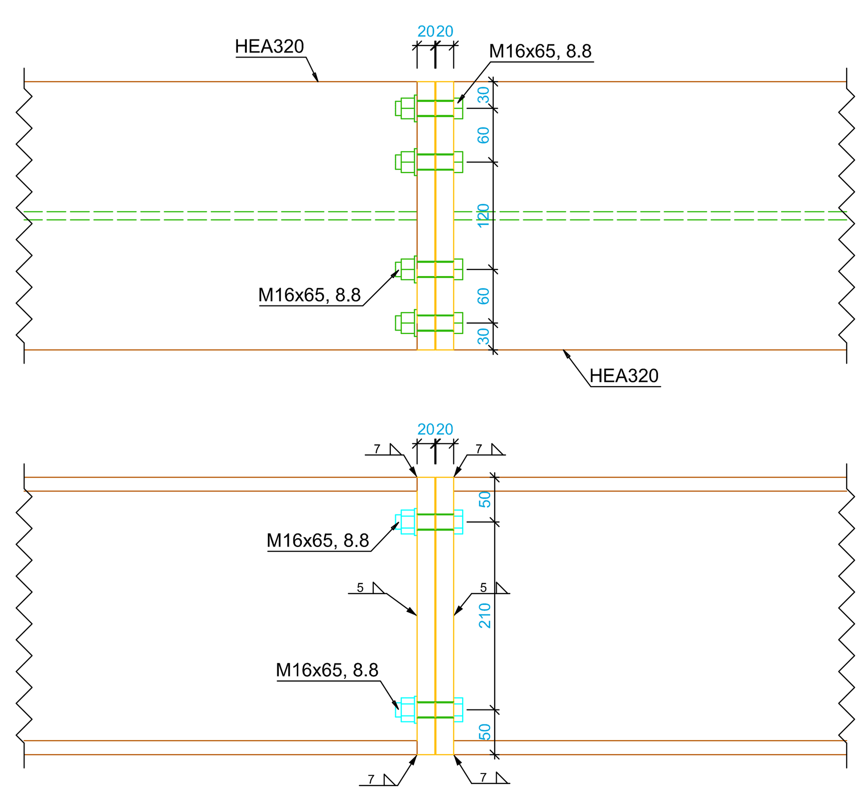
AKSONOMETRIJA KONSTRUKCIJE PODPIRANJA OSTREŠJA



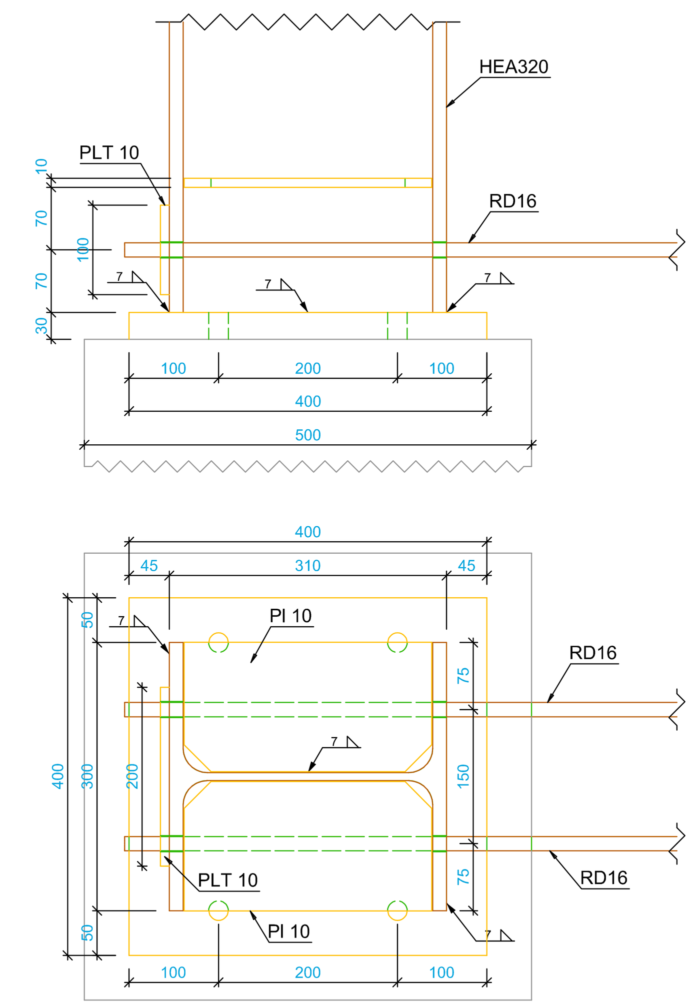
Mark	Qty.	Description	Length	Grade	Finish	Part kg	Total kg
1	**6**	**RD16**	Tension Rod				
1004	1	RD16	6000	S235JR		9.47	9.47
							9.47
2	**5**	**HEA320**					
1000	1	HEA320	3730	S235JR		364.05	364.05
1001	1	HEA320	2145	S235JR		209.33	209.33
1020	1	PL 30x400x400	400	S235JR		37.68	37.68
1003	1	HEA320	305	S235JR		29.77	29.77
1017	1	PL 20x310x300	310	S235JR		14.6	14.6
1016	6	PL 10x277x144.75	277	S235JR		3.08	18.46
							673.89
3	**2**	**IPEO300**					
1007	1	IPEO300	9892	S235JR		487.68	487.68
							487.68
4	**2**	**IPEO300**					
1009	1	IPEO300	7705	S235JR		379.88	379.88
							379.88
5	**2**	**IPEO300**					
1006	1	IPEO300	9895	S235JR		487.83	487.83
							487.83
6	**2**	**IPEO300**					
1008	1	IPEO300	7708	S235JR		379.99	379.99
							379.99
7	**2**	**RD16**	Tension Rod				
1011	1	RD16	5475	S235JR		8.64	8.64
							8.64
8	**2**	**RD16**	Tension Rod				
1012	1	RD16	5345	S235JR		8.44	8.44
							8.44
9	**2**	**RD16**	Tension Rod				
1010	1	RD16	5570	S235JR		8.79	8.79
							8.79
10	**1**	**HEA320**					
1000	1	HEA320	3730	S235JR		364.05	364.05
1001	1	HEA320	2145	S235JR		209.33	209.33
1022	1	PL 30x400x400	400	S235JR		37.68	37.68
1003	1	HEA320	305	S235JR		29.77	29.77
1017	1	PL 20x310x300	310	S235JR		14.6	14.6
1016	6	PL 10x277x144.75	277	S235JR		3.08	18.46
							673.89
11	**1**	**HEA320**					
1014	1	HEA320	6138	S235JR		599.07	599.07
1002	2	HEA320	1152	S235JR		112.45	224.91
1017	2	PL 20x310x300	310	S235JR		14.6	29.2
							853.18
12	**1**	**HEA320**					
1015	1	HEA320	6008	S235JR		586.34	586.34
1002	2	HEA320	1152	S235JR		112.45	224.91
1017	2	PL 20x310x300	310	S235JR		14.6	29.2
							840.45
13	**1**	**HEA320**					
1013	1	HEA320	6234	S235JR		608.45	608.45
1002	2	HEA320	1152	S235JR		112.45	224.91
1017	2	PL 20x310x300	310	S235JR		14.6	29.2
							862.56
14	**1**	**HEB260**					
1005	3	HEB260	5530	S235JR		514.3	1542.89
							1542.89
15	**8**	**PL 15x370x142**	Plate				
1018	1	PL 15x370x142	370	S235JR		6.19	6.19
							6.19
16	**6**	**PL 10x200x100**					
1019	1	PL 10x200x100	200	S235JR		1.57	1.57
							1.57
17	**4**	**PL 10x330x240**	Plate				
1021	1	PL 10x330x240	330	S235JR		6.22	6.22
							6.22
						Combined Total	**11805.54**

ČELNI SPOJ HEA 320 NOSILCEV



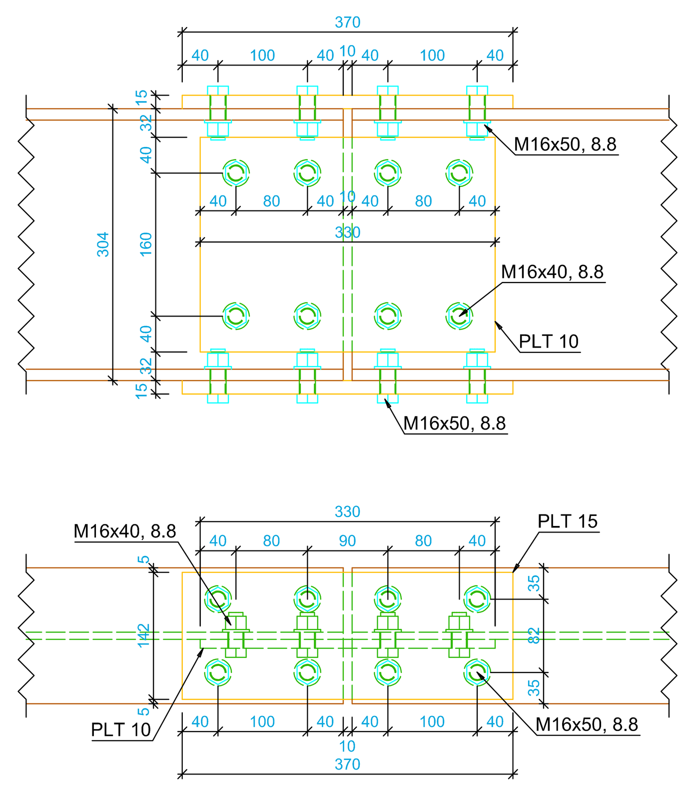
DETAJL SIDRANJA HEA 320 STEBROV

Op.: sidranje se izvede s HILTI HST M20 sidri (4 kos)

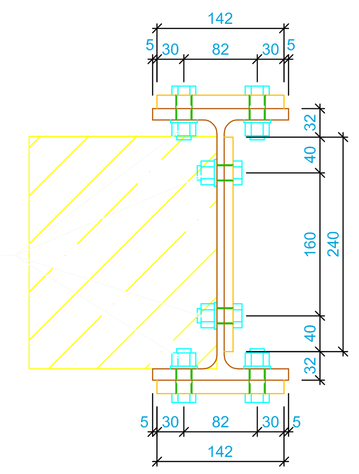


PODALJŠEVANJE IPO300 NOSILCEV

Op.: podaljševanje se izvede na cca 1/4 daljšega polja



Na strani lesenega nosilca je potrebno navariti matice na nosilec IPEO300. Lesen nosilec se na mestu spoja zareže za debelino matic. IPEO300 nosilec se na cca 1,0m privijači v leseno lego z M12 navojnimi palicami pred montažo HEA320 jarmov.



Opombe:
- MERE NUJNO KONTROLIRATI IN PRILAGODITI DEJANSKEM STANJU!!!
- pri izdelavi jeklene konstrukcije upoštevati tudi ostalo projektno dokumentacijo
- izdelava in montaža nosilne jeklene konstrukcije mora biti v skladu z SIST ENV 1090-1
- vsi sočelni zvar morajo biti izvedeni s prevaritvijo korena
- kvaliteta zvarov mora biti v skladu z aneksom H SIST ENV 1090-1
- obseg konstrole zvarov mora biti v skladu z tabelo 8 točke 12.4. SIS ENV 1090-1
- varilne deformacije predvidi izvajalec
- vsi neoznačeni zvari so debeline a = 0,7*tmin (tmin = tanjša pločevina v spoju)

Lokacija: *Glavni trg 17, 2366 Muta*

Naročnik: *Občina MUTA*

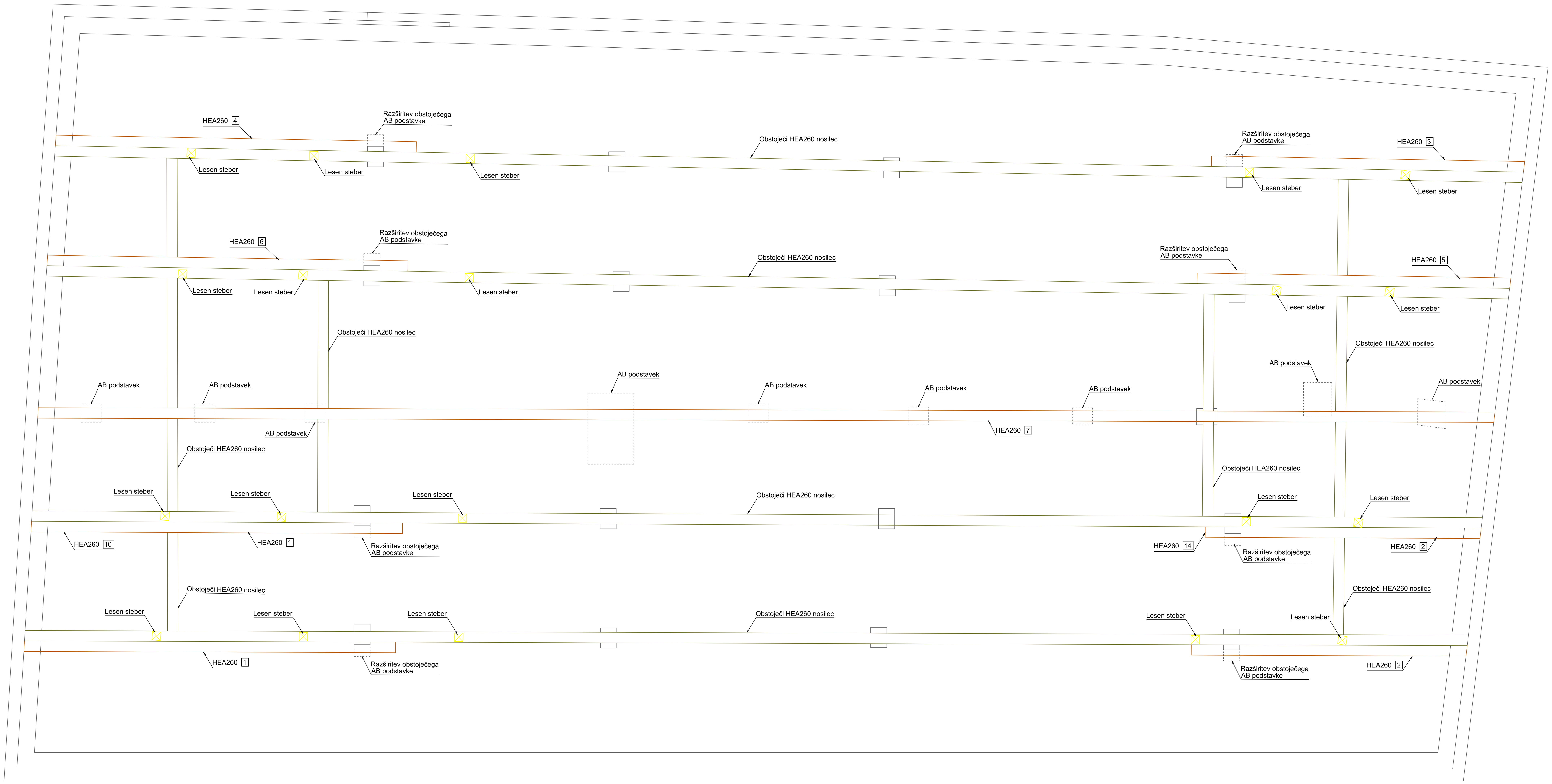
Projekt: *Obnova graščine KIENHOFEN - podpiranje ostrešja*

	Datum	Ime in priimek
Pregledal	2.6.2018	Bojan Čas
Risal	2.6.2018	Miha Jeršin
Material	S235JR	
Merilo	1:20, 1:5	

Številka projekta: *21/2016, KM-STROK-7_2017*

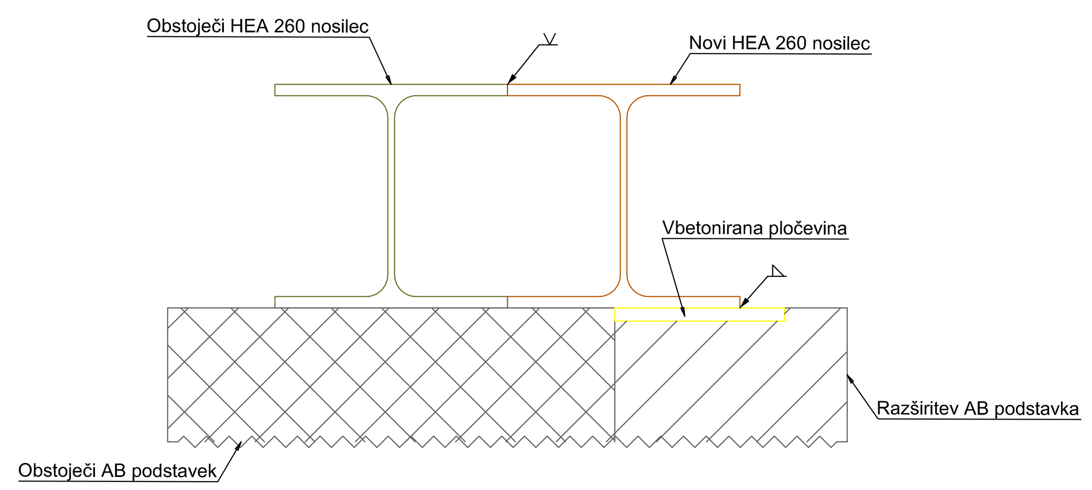
Številka risbe: *AKSONOMETRIJA IN DETAJLI*

Rev0



Tloris dodatnih HEA 260 nosilcev

Detajl novih HEA 260 nosilcev - Merilo 1:5



Mark	Qty.	Description	Length	Grade	Finish	Part kg	Total kg
1	**2**	**HEA260**					
1000	1	HEA260	9210	S235JR		628.11	628.11
							628.11
2	**2**	**HEA260**					
1001	1	HEA260	6839	S235JR		466.41	466.41
							466.41
3	**1**	**HEA260**					
1006	1	HEA260	7761	S235JR		529.3	529.3
							529.3
4	**1**	**HEA260**					
1003	1	HEA260	8948	S235JR		610.25	610.25
							610.25
5	**1**	**HEA260**					
1005	1	HEA260	7775	S235JR		530.28	530.28
							530.28
6	**1**	**HEA260**					
1004	1	HEA260	8947	S235JR		610.16	610.16
							610.16
7	**1**	**HEA260**					
1002	1	HEA260	36121	S235JR		2463.48	2463.48
							2463.48
						Combined Total	**6932.52**

Opombe:
- MERE NUJNO KONTROLIRATI IN PRILAGODITI DEJANSKEM STANJU!!!
- pri izdelavi jeklene konstrukcije upoštevati tudi ostalo projektno dokumentacijo
- izdelava in montaža nosilne jeklene konstrukcije mora biti v skladu z SIST ENV 1090-1
- vsi sočelni zvar morajo biti izvedeni s prevaritvijo korena
- kvaliteta zvarov mora biti v skladu z aneksom H SIST ENV 1090-1
- obseg konstrole zvarov mora biti v skladu z tabelo 8 točke 12.4. SIS ENV 1090-1
- varilne deformacije predvidi izvajalec
- vsi neoznačeni zvari so debeline a = 0,7*tmin (tmin = tanjša pločevina v spoju)

Lokacija: *Glavni trg 17, 2366 Muta*

Naročnik: *Občina MUTA*

Projekt: *Obnova graščine KIENHOFEN - Ojačitev talnih HEA 260 nosilcev*

	Datum	Ime in priimek
Pregledal	2.6.2018	Bojan Čas
Risal	2.6.2018	Miha Jeršin
Material	S235JR	
Merilo	1:40, 1:5	

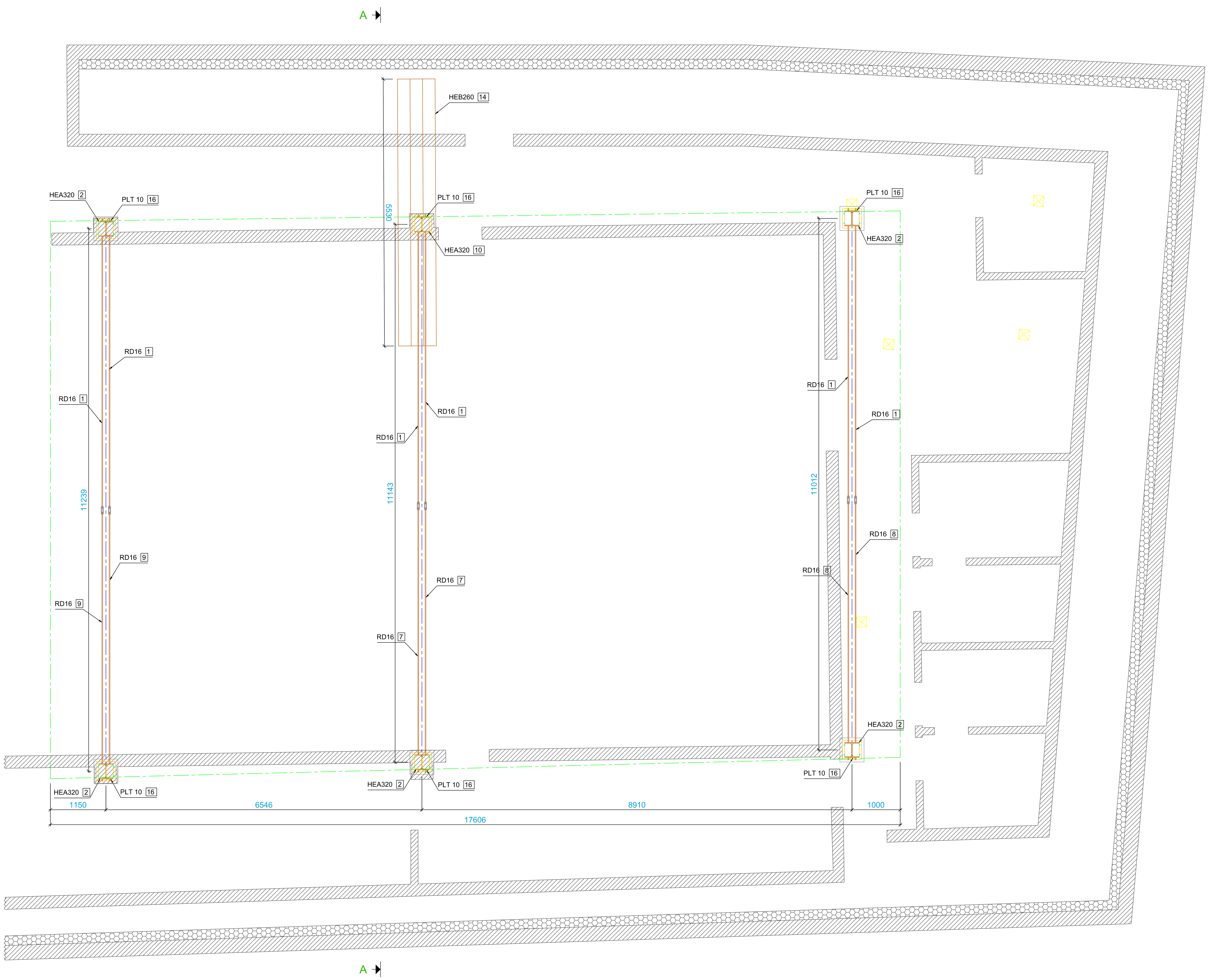
AERIS

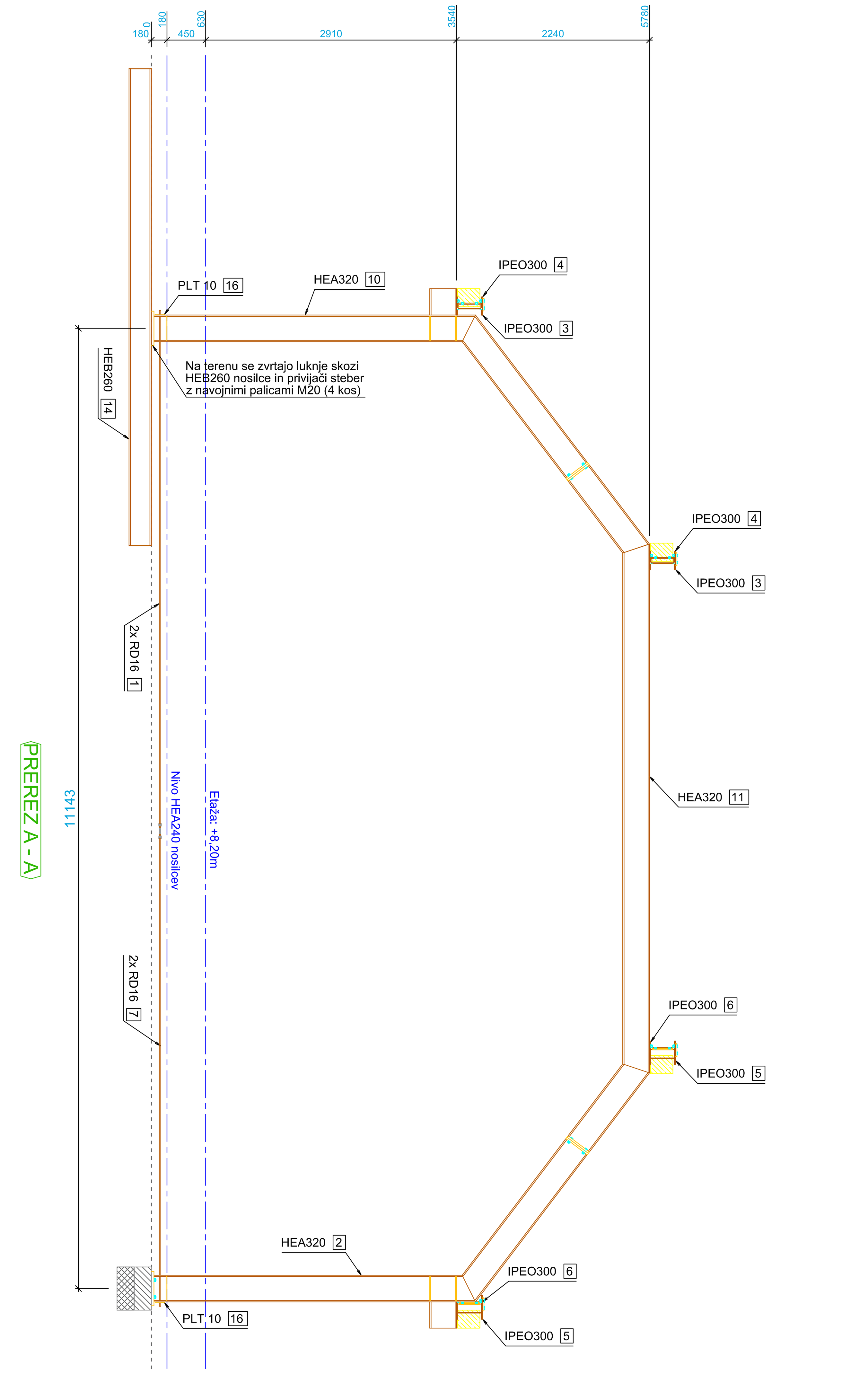
Številka projekta: *21/2016, KM-STROK-7_2017*

Številka risbe: *Tloris ojačitev talnih HEA 260 nosilcev*

Rev0

TLORIS STEBROV JEKLENE KONSTRUKCIJE PODPIRANJA OSTREŠJA





Opombe:
- MERE NUJNO KONTROLIRATI IN PRILAGODITI DEJANSKEM STANJU!!!
- pri izdelavi jeklene konstrukcije upoštevati tudi ostalo projektno dokumentacijo
- izdelava in montaža nosilne jeklene konstrukcije mora biti v skladu z SIST ENV 1090-1
- vsi sočelni zvar morajo biti izvedeni s prevaritvijo korena
- kvaliteta zvarov mora biti v skladu z aneksom H SIST ENV 1090-1
- obseg konstrole zvarov mora biti v skladu z tabelo 8 točke 12.4. SIS ENV 1090-1
- varilne deformacije predvidi izvajalec
- vsi neoznačeni zvari so debeline a = 0,7*tmin (tmin = tanjša pločevina v spoju)

Lokacija: *Glavni trg 17, 2366 Muta*

Naročnik: *Občina MUTA*

Projekt: *Obnova graščine KIENHOFEN - podpiranje ostrešja*

	Datum	Ime in priimek
Pregledal	2.6.2018	Bojan Čas
Risal	2.6.2018	Miha Jeršin
Material	S235JR	
Merilo	1:33 1/3	

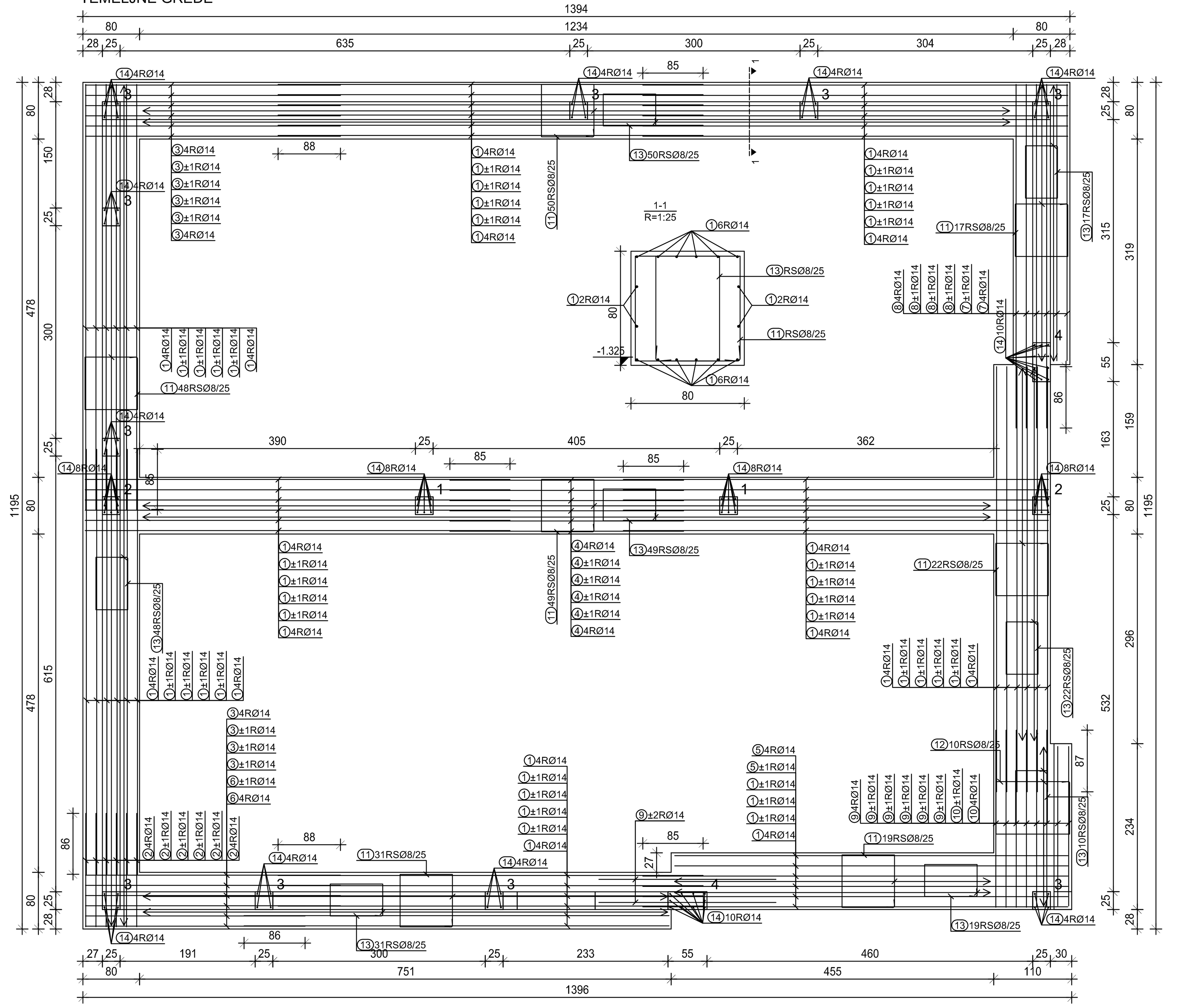
AERIS

Številka projekta: 21/2016, KM-STROK-7_2017

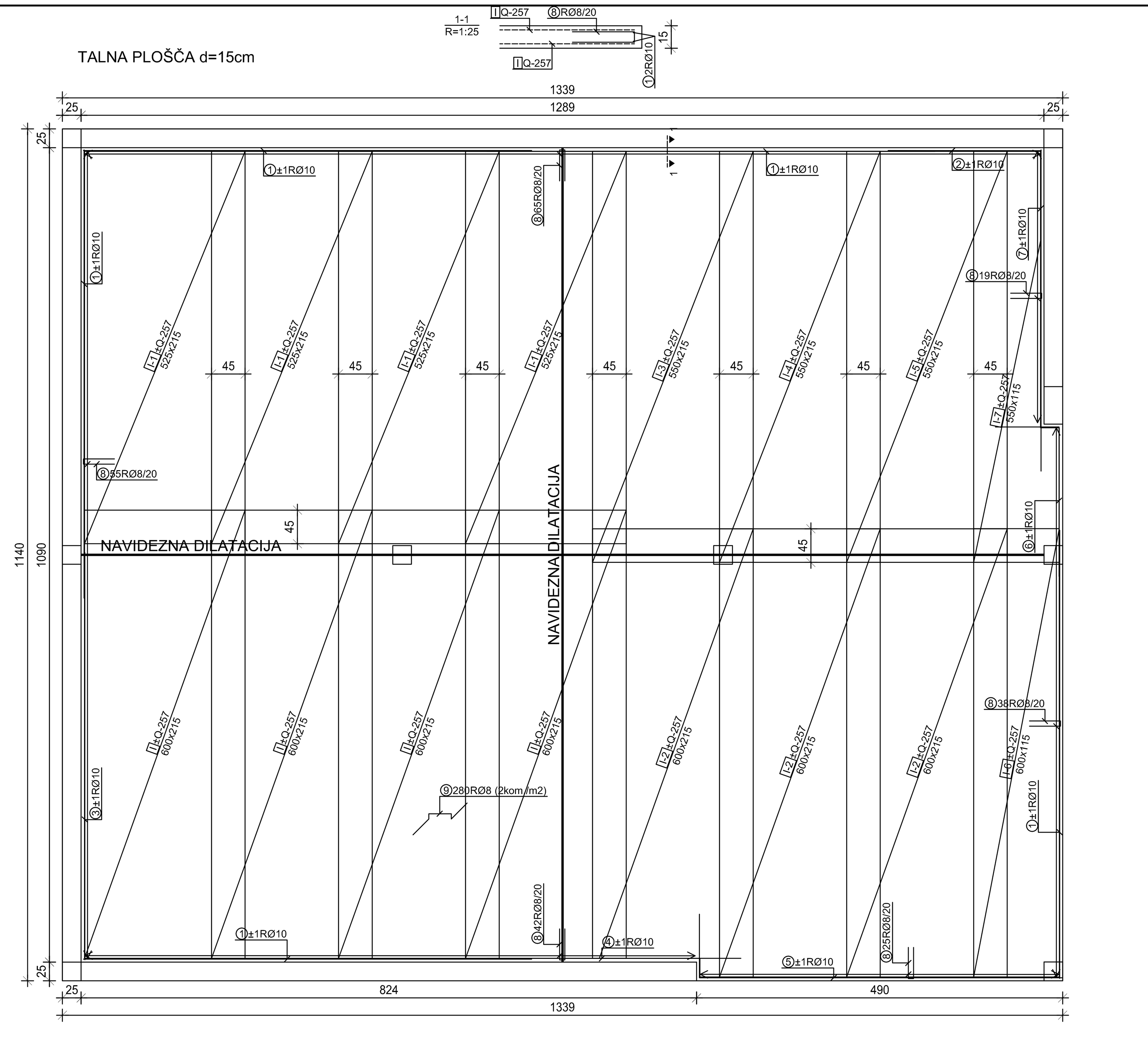
Številka risbe: ARHITEKTURA

Rev0

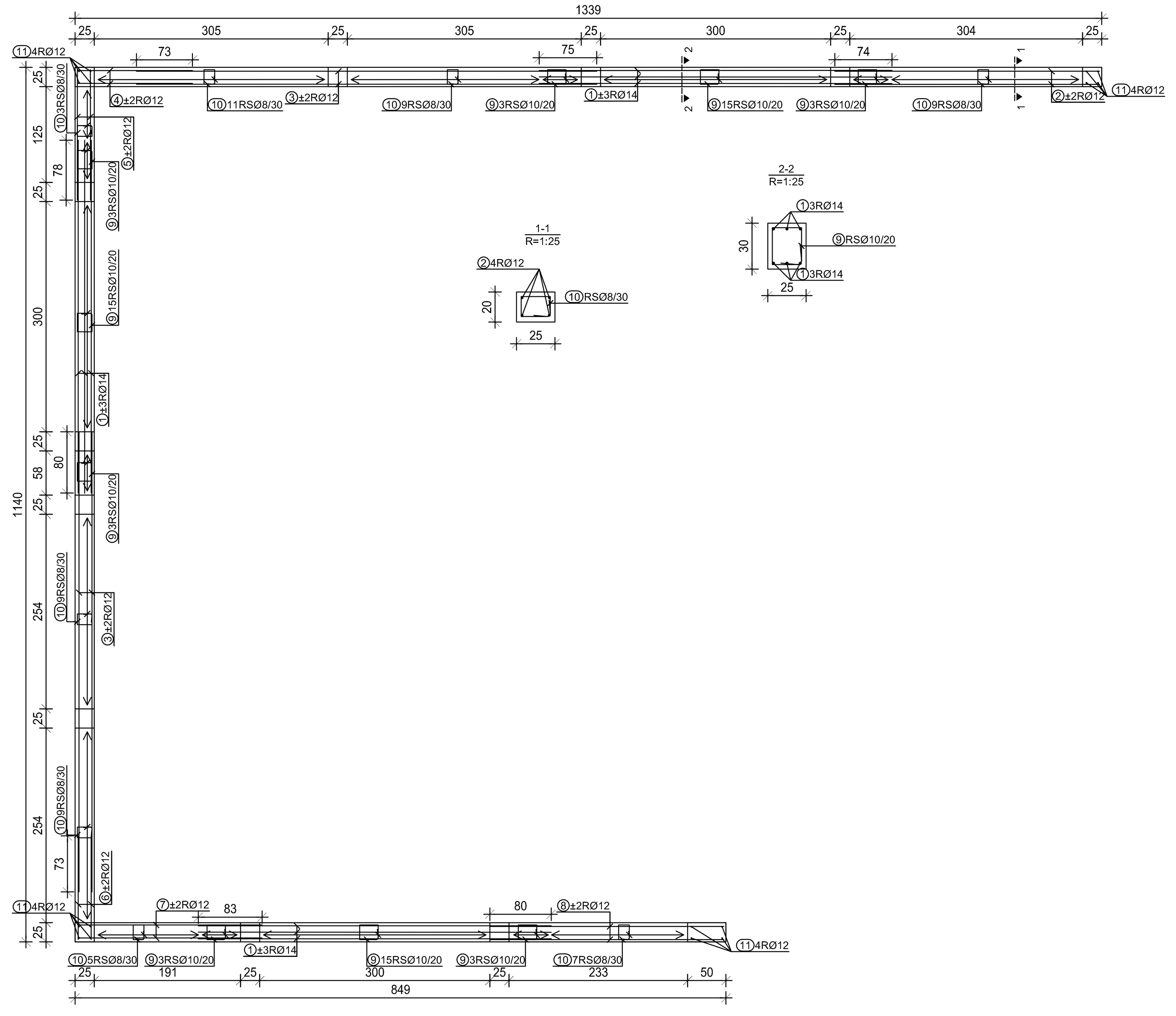
TEMELJNE GREDE



TALNA PLOŠČA d=15cm



PREKLADE IN VEZI NA KOTI +2.37



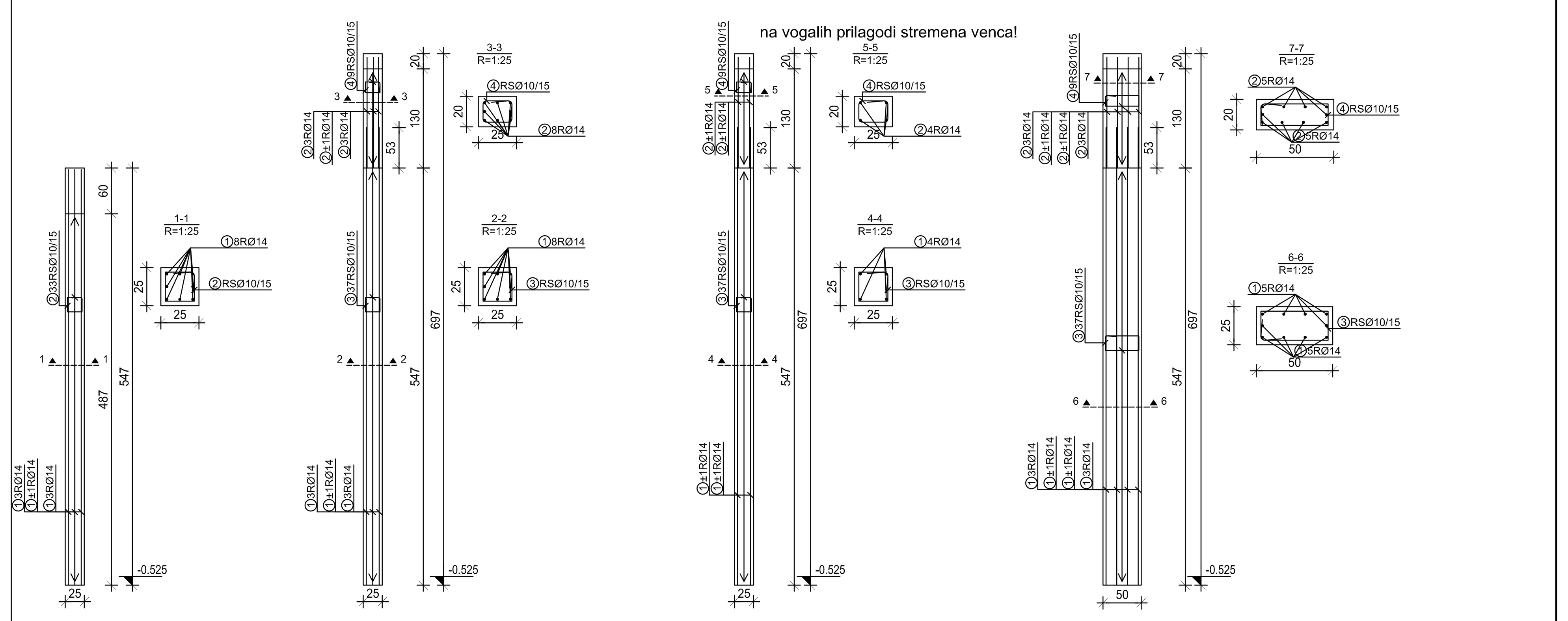
STEBRI1 25/25 notranji (2kom.)

STEBRI2 25/25 zunanji (2kom.)

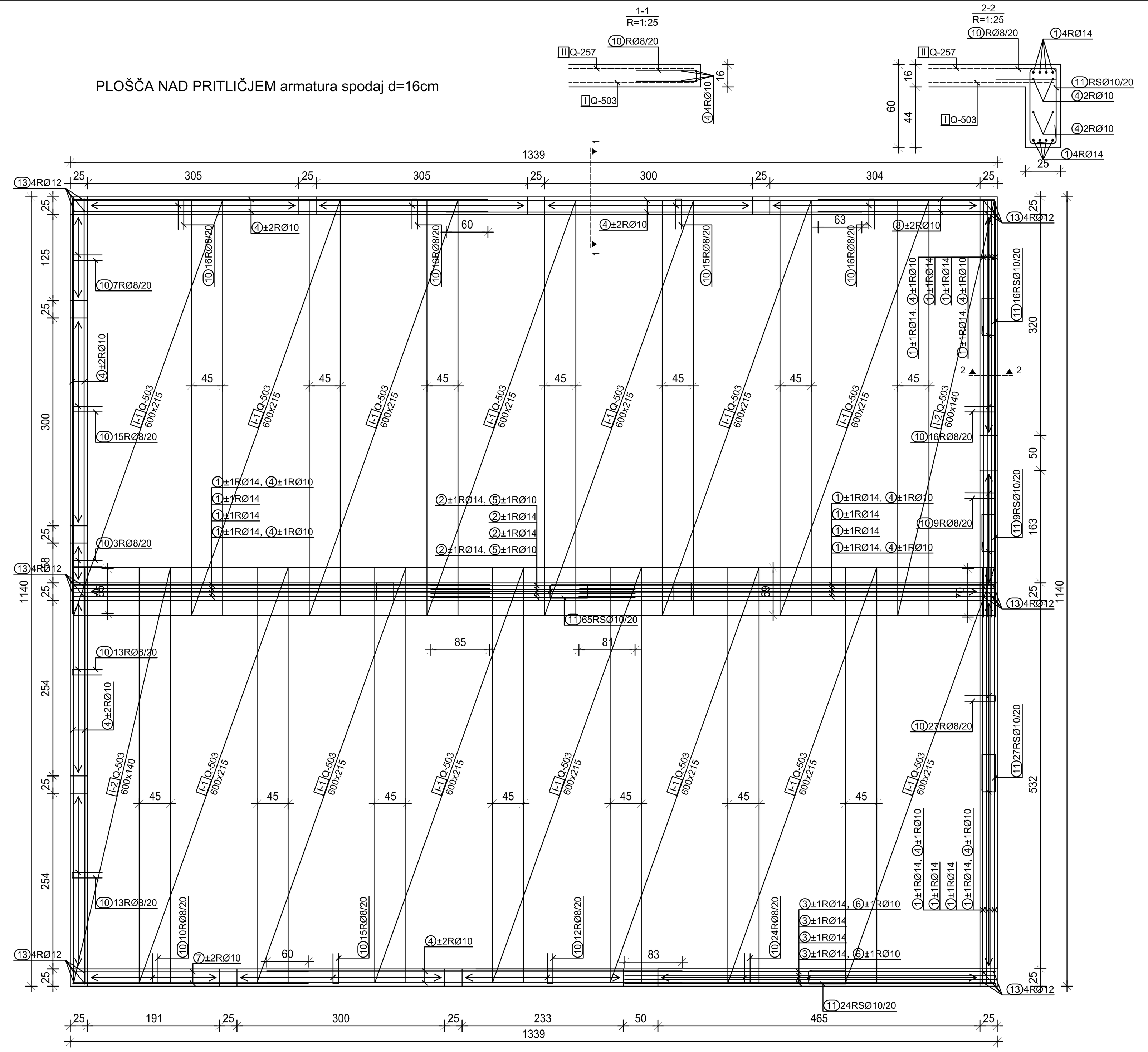
STEBRI3 25/25 zunanji (12kom.)

na vogalih prilagodi stremena venca!

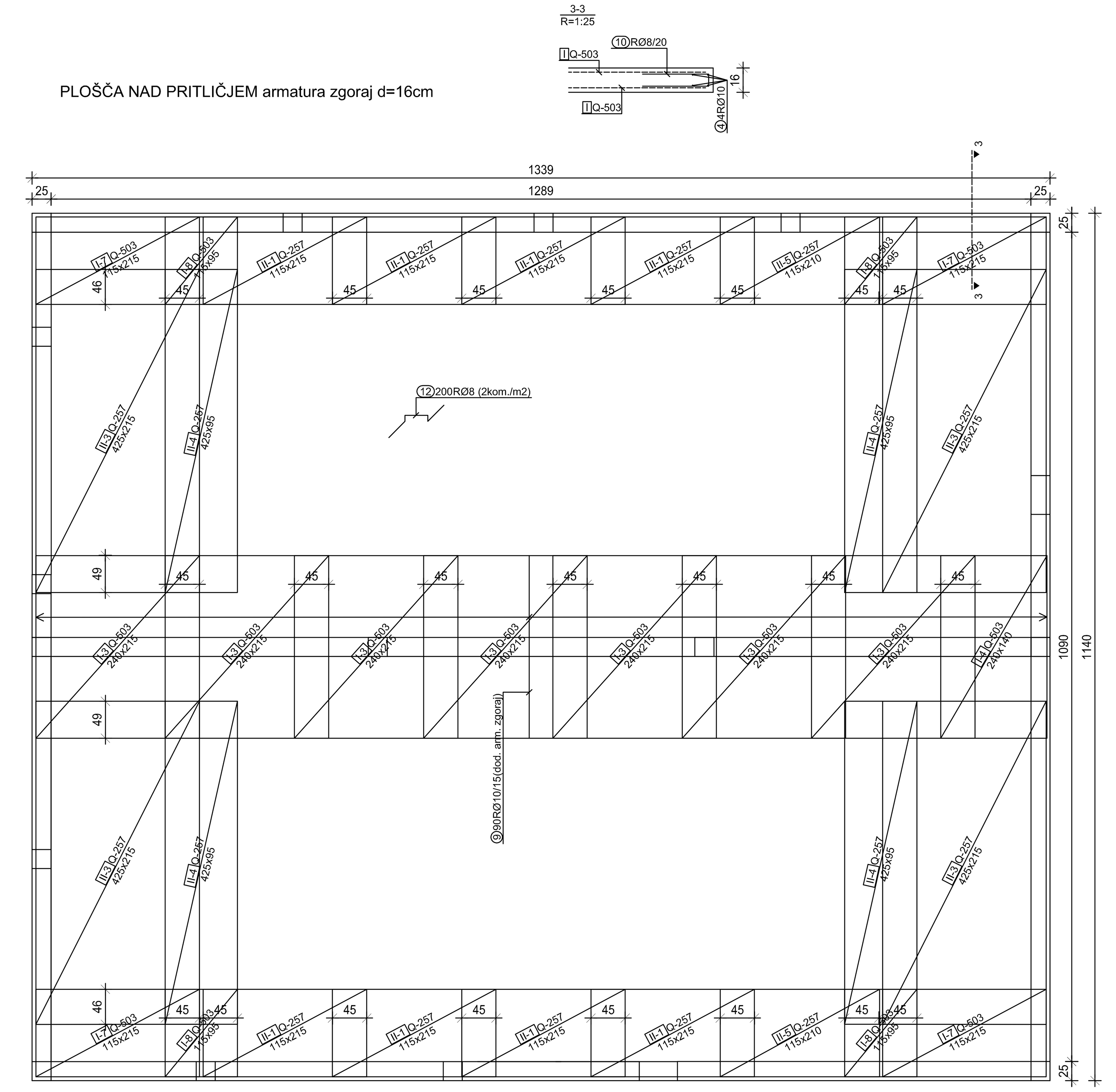
STEBRI4 25/50 zunanji (2kom.)



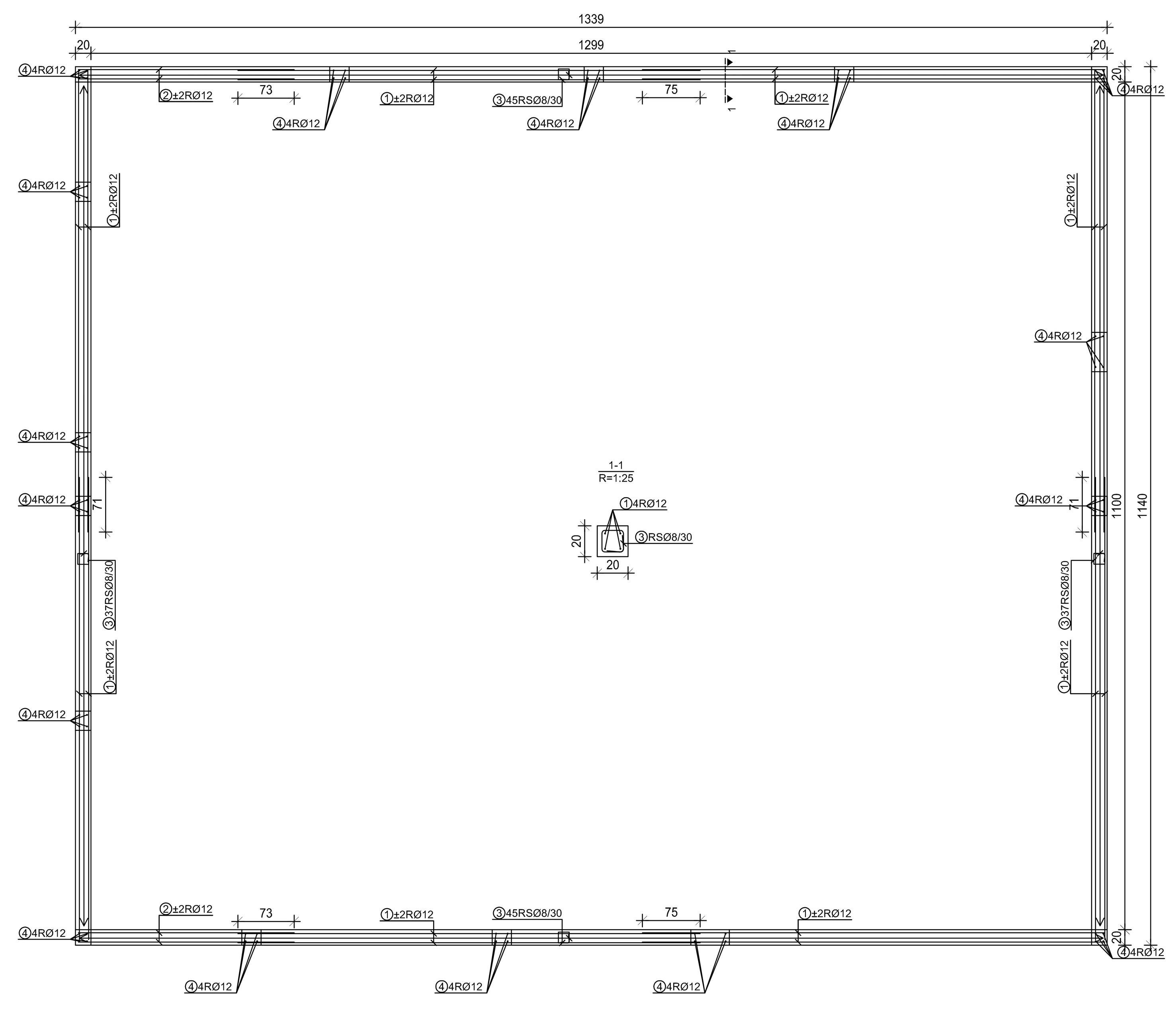
PLOŠČA NAD PRITLIČJEM armatura spodaj d=16cm



PLOŠČA NAD PRITLIČJEM armatura zgoraj d=16cm



VENEC



MATERIALI :

BETON :	C25/30 (SIST EN 206:2013, XC2 - temelji elem.v stiku z zem., XC1 - ostalo)
REBRASTA ARMATURA :	B500B
ARMATURNA MREŽE :	B500B

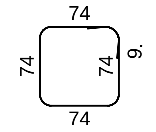
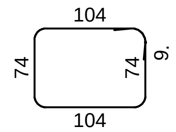
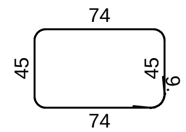
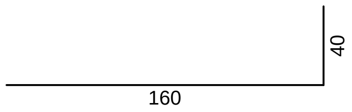
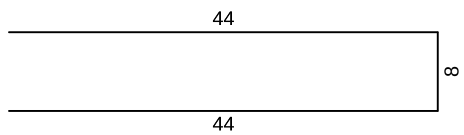
ZAŠČITNA PLAST BETONA V cm

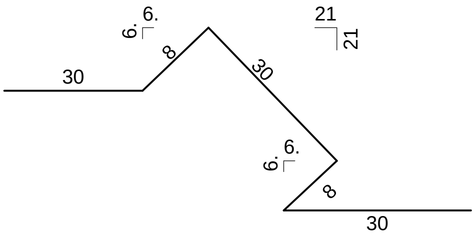
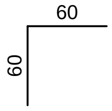
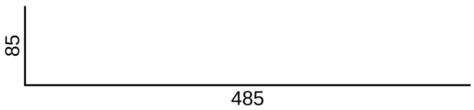
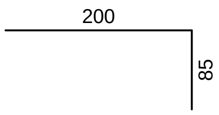
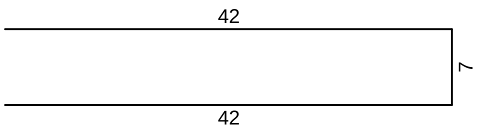
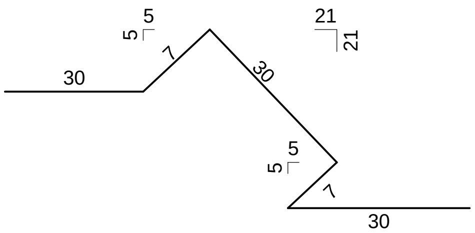
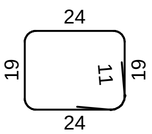
ELEMENTI	TEMELJI	STENE	STEBRI	STOPNICE	PLOŠČA
a=	3,0	/	3,0	/	2,5

Konstrukcija spada skladno s SIST EN 13670:2010 v 2. izvedbeni razred

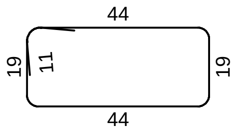
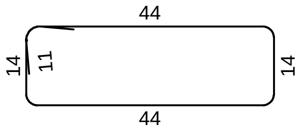
OPOMBE:
- VSE MERE KONTROLIRATI NA OBJEKTU SAMEM!
- VELJAJO IZKLJUČNO IZPISANE KOTE - NE MERI PO NAČRTU!
- SPREMEMBE IN DOPOLNITVE PROJEKTOV SO MOŽNE LE Z PRISTANKOM PROJEKTANTOV!
- ZA TOČNE DIMENZIJE IN PREBOJE GLEJ NAČRT ARHITEKTURE IN USTREZNH INŠTALACIJ!
- PRI IZVEDBI GLEJ TUDI ARMATURNE NAČRTE PRILEŽNIH ELEMENTOV!
- IZVLEČEK IN RAZREZ ARMATURE JE PRIKAZAN NA PRILOŽENIH A4 LISTIH!

investitor: OBČINA MUTA, GLAVNI TRG 17, 2366 MUTA	Projektiranje in tehnično svetovanje Matej Dežman s.p. Šentilj pod Turjakom 37C, 2382 Mislinja mob: 031 422 074 e-mail:dezman.matej@gmail.com		**vsebina risbe:** ARMATURA GASILSKI MUZEJ	
objekt in lokacija: OBNOVA GRAŠČINE KIENHOFEN UREDITEV DVORANE IN STOPNIŠČA Z DVIGALOM			**odgovorni vodja projekta:** PIA PLAN. KORACA, u.d.i.a, ZAPS 0421A	
vrsta projekta: PZI			**odgovorni projektant:** BOJAN ČAS, u.d.i.g., IZS G-2319	
			sodelavci:	
vrsta načrta: GRADBENE KONSTRUKCIJE (3)	**št. načrta:** 04/2018	**datum:** JULIJ 2018	**merilo:** 1:50	**list številka:** LIST G3.1

Palice - specifikacija						
ozn	oblika in mere [cm]	Ř	lg [m]	n [kos]	lgn [m]	Opomba
temeljna greda (1 kos)						
1	600	14	6.00	138	828.00	
2	160	14	1.60	16	25.60	
3	360	14	3.60	26	93.60	
4	330	14	3.30	16	52.80	
5	555	14	5.55	6	33.30	
6	310	14	3.10	6	18.60	
7	390	14	3.90	6	23.40	
8	485	14	4.85	10	48.50	
9	250	14	2.50	18	45.00	
10	225	14	2.25	6	13.50	
11		8	3.14	236	741.04	
12		8	3.74	10	37.40	
13		8	2.56	246	629.76	
14		14	2.00	92	184.00	
plošča nad pritličjem (1 kos)						
1	600	14	6.00	32	192.00	
2	295	14	2.95	8	23.60	
3	535	14	5.35	8	42.80	
4	600	10	6.00	36	216.00	
5	295	10	2.95	4	11.80	
6	535	10	5.35	4	21.40	
7	340	10	3.40	4	13.60	
8	255	10	2.55	4	10.20	
9	240	10	2.40	90	216.00	
10		8	0.96	227	217.92	
11		10	1.68	141	236.88	

Palice - specifikacija						
ozn	oblika in mere [cm]	Ř	lg [m]	n [kos]	lgn [m]	Opomba
12		8	1.06	200	212.00	
13		12	1.20	24	28.80	
talna plošča (1 kos)						
1	600	10	6.00	10	60.00	
2	205	10	2.05	2	4.10	
3	545	10	5.45	2	10.90	
4	340	10	3.40	2	6.80	
5		10	5.70	2	11.40	
6		10	2.85	2	5.70	
7	430	10	4.30	2	8.60	
8		8	0.91	244	222.04	
9		8	1.04	280	291.20	
preklade in vezi na koti +2.37 (1 kos)						
1	460	14	4.60	18	82.80	
2	345	12	3.45	4	13.80	
3	600	12	6.00	8	48.00	
4	150	12	1.50	4	6.00	
5	170	12	1.70	4	6.80	
6	135	12	1.35	4	5.40	
7	240	12	2.40	4	9.60	
8	305	12	3.05	4	12.20	
9		10	1.08	63	68.04	

Palice - specifikacija						
ozn	oblika in mere [cm]	Ř	lg [m]	n [kos]	lgn [m]	Opomba
10	19 9 14 14 19	8	0.84	62	52.08	
11	60 60	12	1.20	16	19.20	
venec (1 kos)						
1	600	12	6.00	32	192.00	
2	280	12	2.80	8	22.40	
3	14 14 14 9 14	8	0.74	164	121.36	
4	60 60	12	1.20	64	76.80	
stebri1 25/25 notranji (2 kos)						
1	545	14	5.45	16	87.20	
2	19 19 11 19 19	10	0.98	66	64.68	
stebri2 25/25 zunanji (2 kos)						
1	600	14	6.00	16	96.00	
2	145	14	1.45	16	23.20	
3	19 19 11 19 19	10	0.98	74	72.52	
4	19 14 11 14 19	10	0.88	18	15.84	
stebri3 25/25 zunanji (12 kos)						
1	600	14	6.00	48	288.00	
2	145	14	1.45	48	69.60	
3	19 19 11 19 19	10	0.98	444	435.12	
4	19 14 11 14 19	10	0.88	108	95.04	
stebri4 25/50 zunanji (2 kos)						
1	600	14	6.00	20	120.00	
2	145	14	1.45	20	29.00	

Palice - specifikacija						
ozn	oblika in mere [cm]	Ř	lg [m]	n [kos]	lgn [m]	Opomba
3		10	1.48	74	109.52	
4		10	1.38	18	24.84	

Palice - izvleček			
Ř [mm]	lgn [m]	Teža enote [kg/m']	Teža [kg]
S500			
8	2524.80	0.40	997.30
10	1718.98	0.62	1060.61
12	441.00	0.89	391.61
14	2420.50	1.21	2928.80
Skupaj (S500)			5378.32
Skupaj			5378.32

Mreže - specifikacija							
Pozicija	Oznaka mreže	B [cm]	L [cm]	n	Teža enote [kg/m2]	Skupna teža [kg]	Opomba
plošča nad pritličjem (1 kos)							
I-1	Q-503	215	600	14	7.90	1425.71	
I-2	Q-503	140	600	2	7.90	132.33	
I-3	Q-503	215	240	7	7.90	285.35	
I-4	Q-503	140	240	1	7.90	26.49	
I-7	Q-503	215	115	4	7.90	78.13	
I-8	Q-503	95	115	4	7.90	34.52	
II-1	Q-257	215	115	8	4.02	79.52	
II-3	Q-257	215	425	4	4.02	146.80	
II-4	Q-257	95	425	4	4.02	64.84	
II-5	Q-257	210	115	2	4.02	19.38	
Skupaj						2293.07	
talna plošča (1 kos)							
I	Q-257	215	600	8	4.02	414.86	
I-1	Q-257	215	525	8	4.02	363.10	
I-2	Q-257	215	600	6	4.02	311.15	
I-3	Q-257	215	550	2	4.02	95.10	
I-4	Q-257	215	550	2	4.02	95.10	
I-5	Q-257	215	550	2	4.02	95.09	
I-6	Q-257	115	600	2	4.02	55.35	
I-7	Q-257	115	550	2	4.02	50.72	
Skupaj						1480.46	

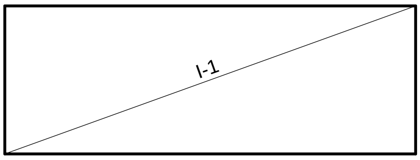
Mreže - izvleček						
Oznaka mreže	B [cm]	L [cm]	n	Teža enote [kg/m2]	Skupna teža [kg]	Neto vgrajena teža [kg]
Q-503	215	600	21	7.90	2140.11	1982.50
Q-257	215	600	39	4.02	2022.46	1780.63
Skupaj					4162.57	3763.13

Mreže - načrt razreza

plošča nad pritličjem

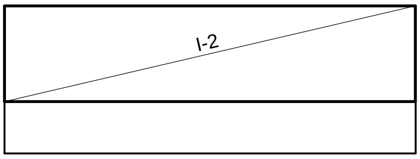
Q-503 (600 cm x 215 cm)

14x



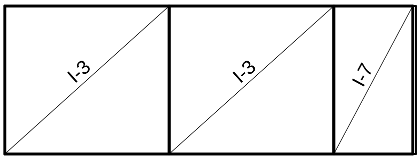
I-1 600 x 215

2x



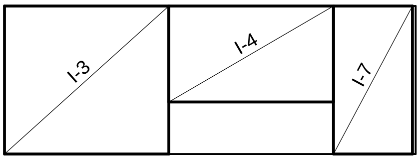
I-2 600 x 140

3x



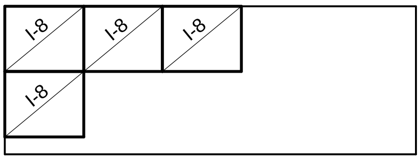
I-3 240 x 215
I-3 240 x 215
I-7 115 x 215

1x



I-3 240 x 215
I-4 240 x 140
I-7 115 x 215

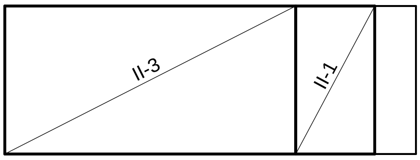
1x



I-8 115 x 95
I-8 115 x 95
I-8 115 x 95
I-8 115 x 95

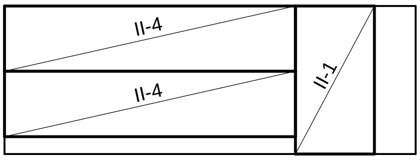
Q-257 (600 cm x 215 cm)

4x



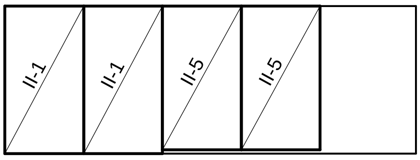
II-3 425 x 215
II-1 115 x 215

2x



II-4 425 x 95
II-4 425 x 95
II-1 115 x 215

1x

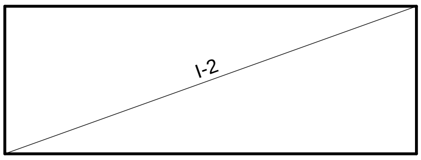


II-1 115 x 215
II-1 115 x 215
II-5 115 x 210
II-5 115 x 210

talna plošča

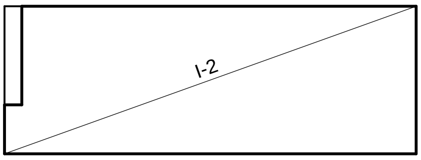
Q-257 (600 cm x 215 cm)

4x



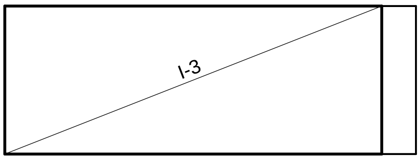
I-2 600 x 215

2x



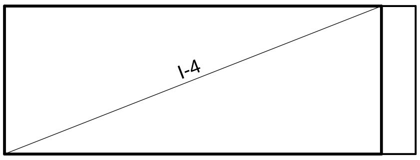
I-2 600 x 215

2x



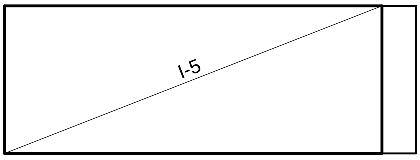
I-3 550 x 215

2x



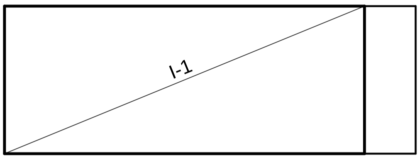
I-4 550 x 215

2x



I-5 550 x 215

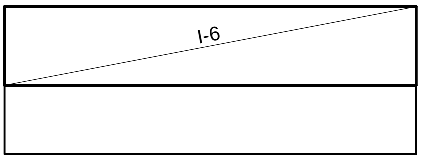
8x



I-1 525 x 215

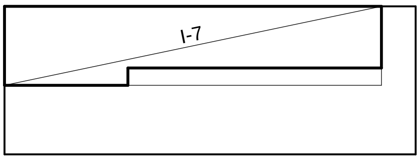
Mreže - načrt razreza

2x



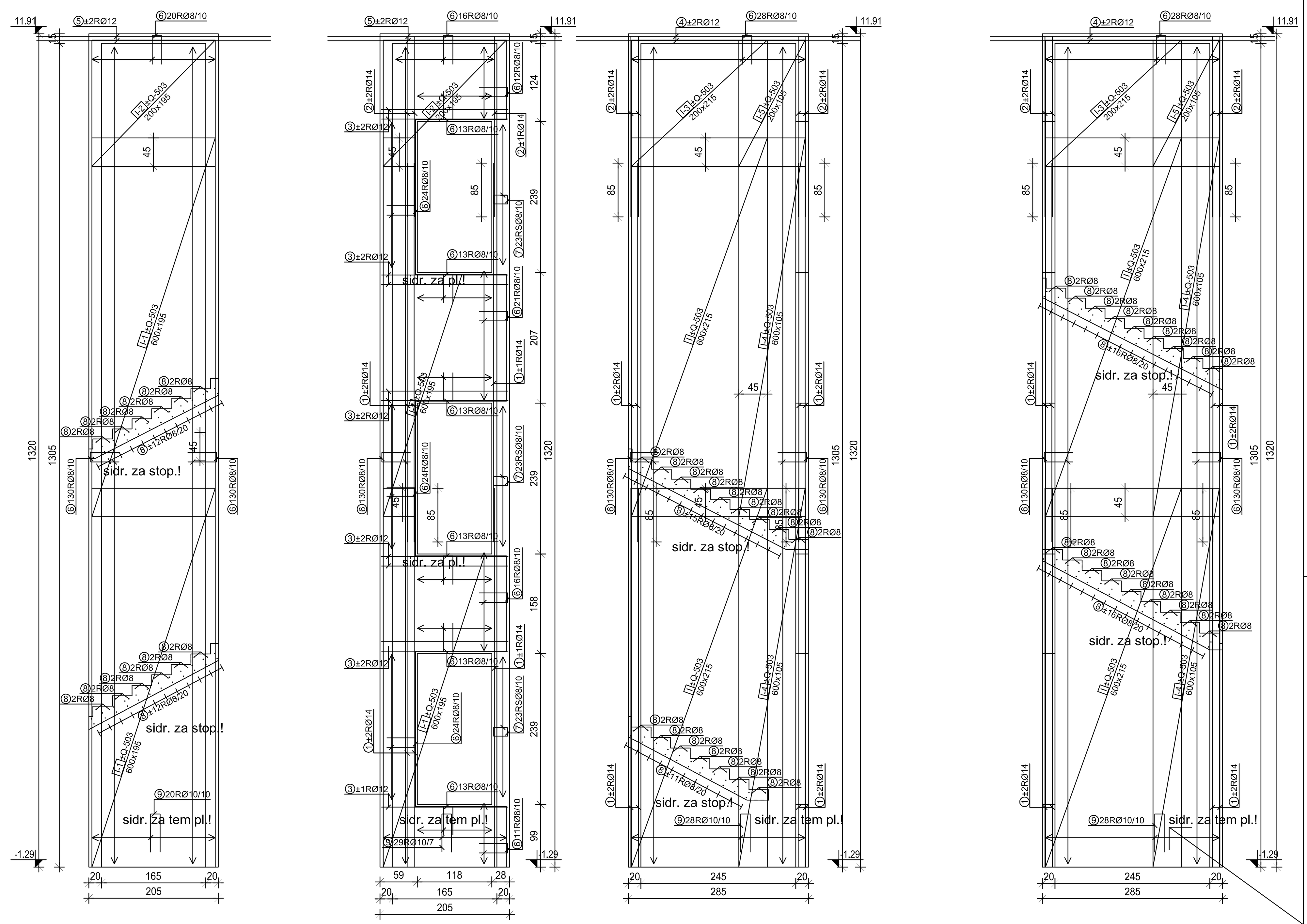
I-6 600 x 115

2x

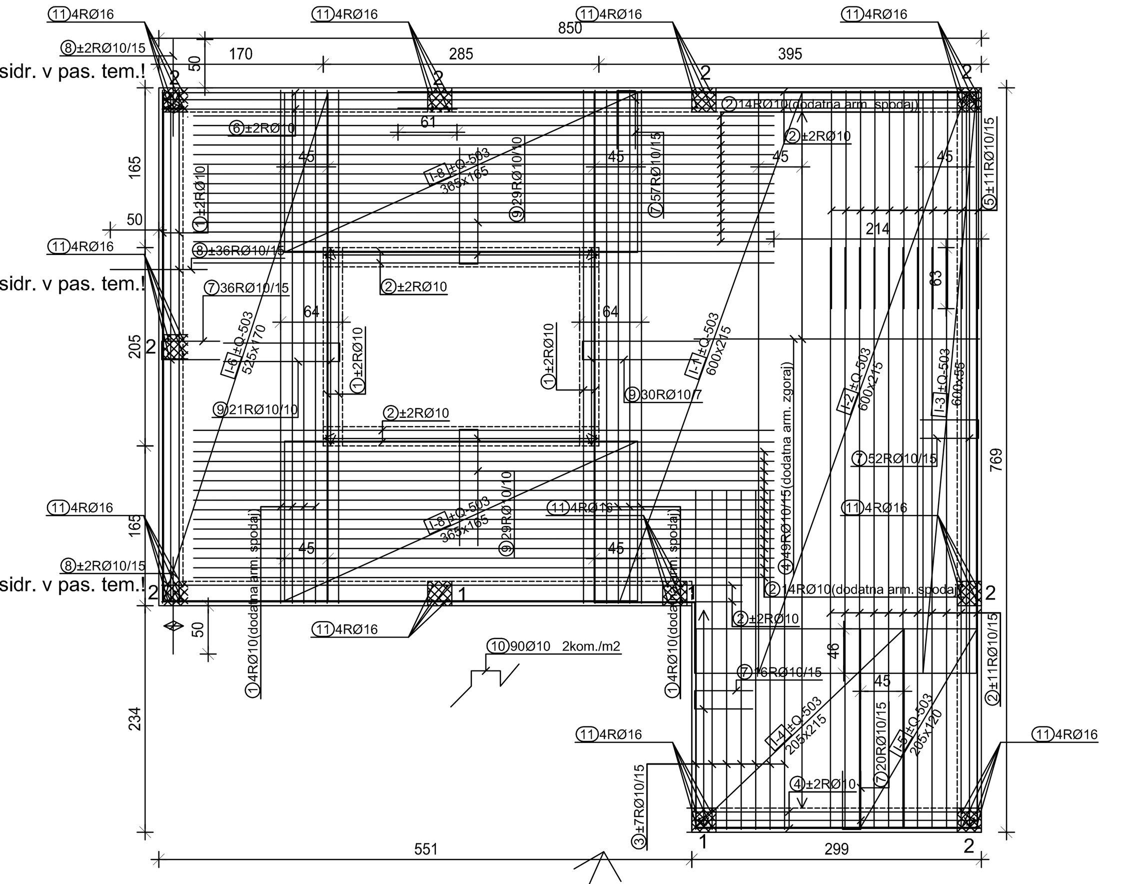


I-7 550 x 115

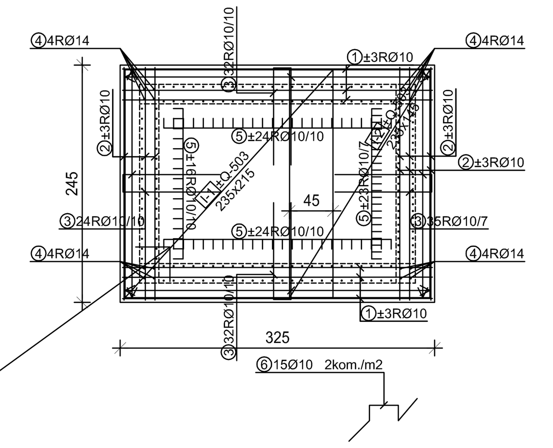
DVIGALNI JAŠEK - distančniki za mreže sten se naj naročijo posebaj, niso narisani!



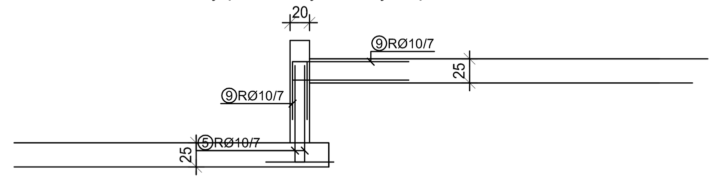
TEMELJNA PLOŠČA d=25cm



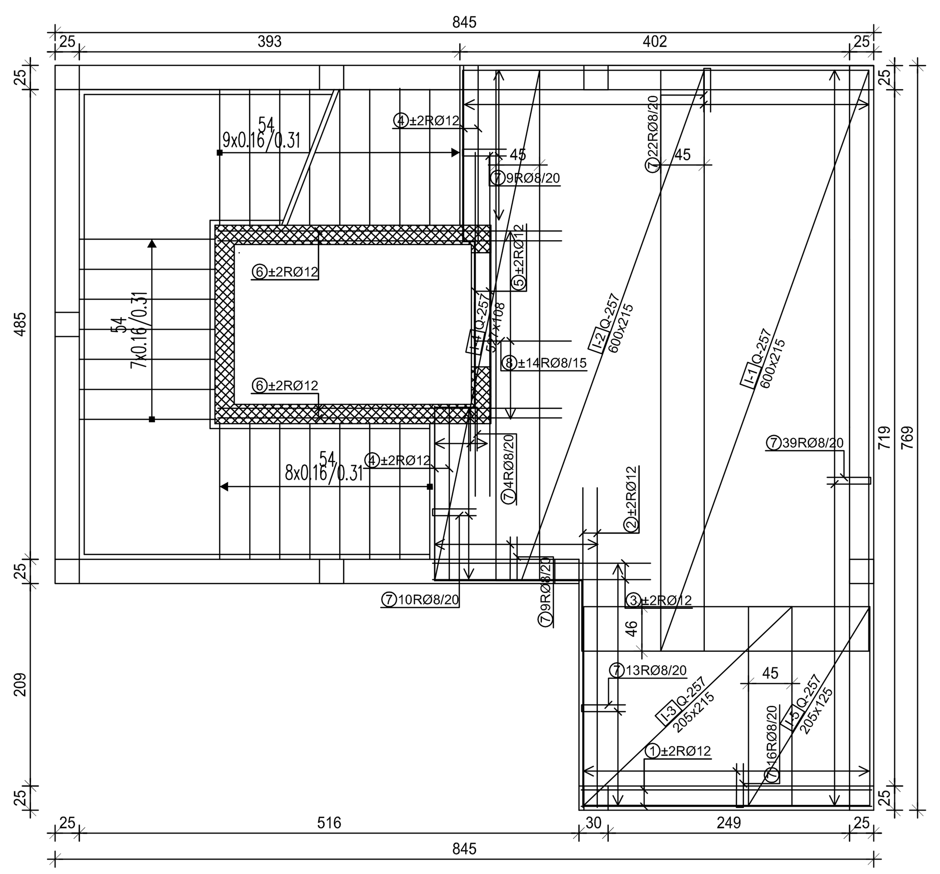
TEMELJNA PLOŠČA DVIGALA d=25cm



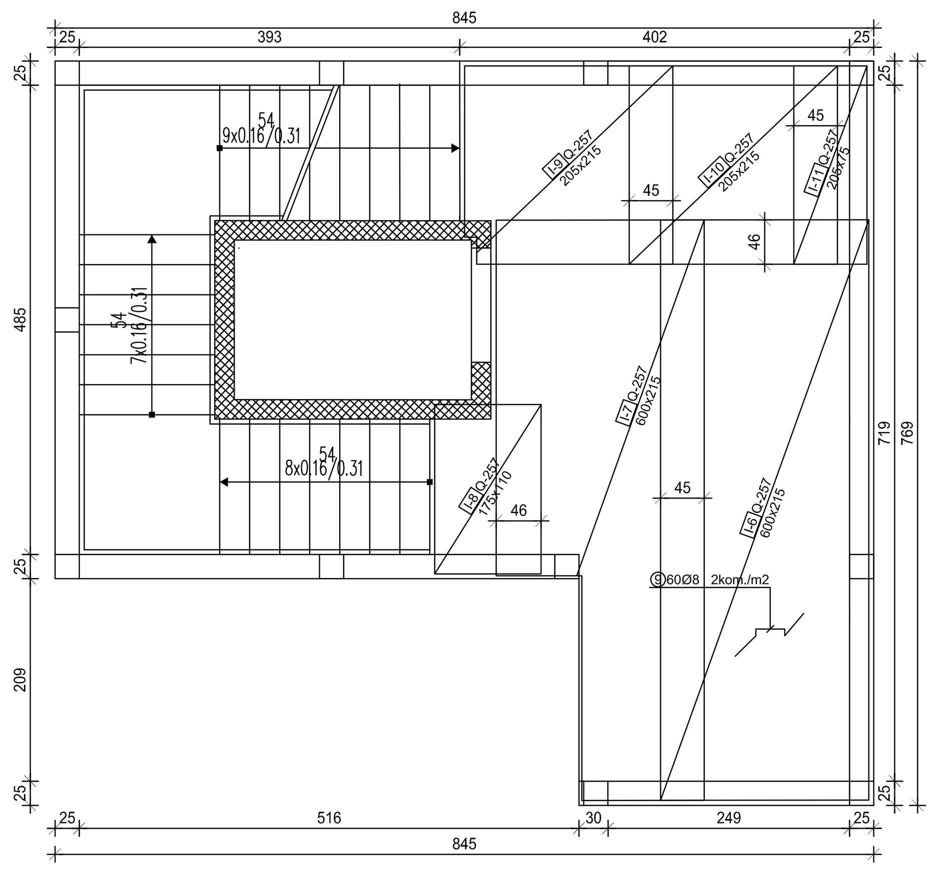
detajl presidranja temeljnih plošč!!!!



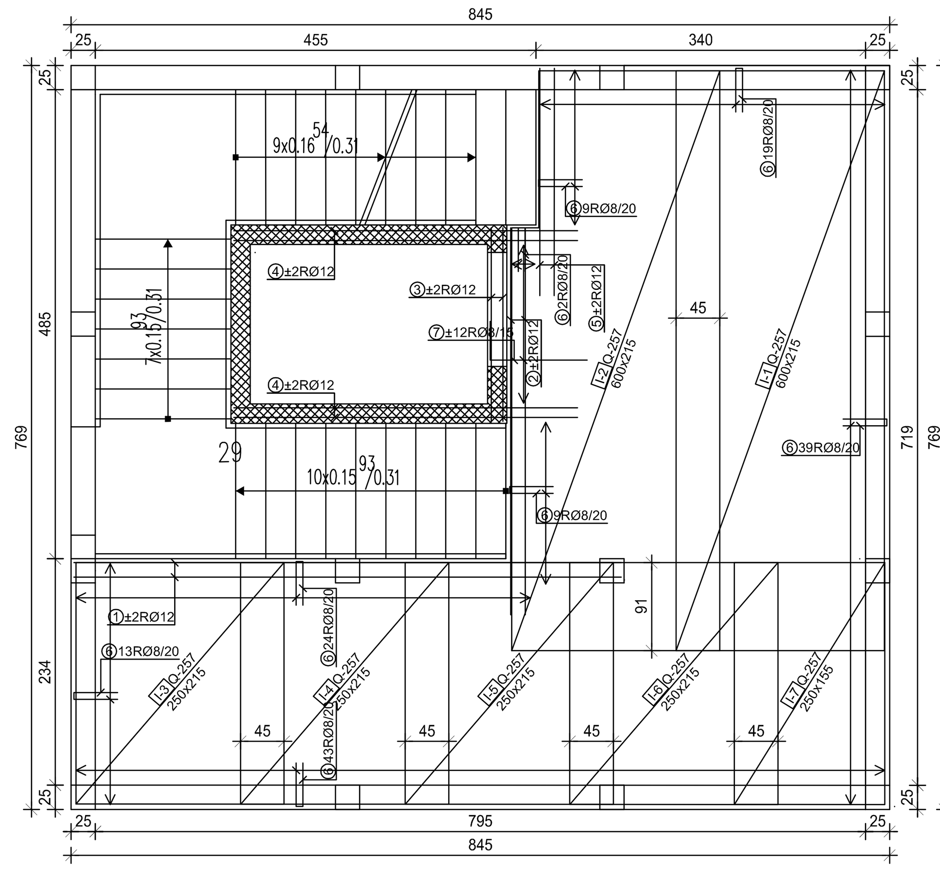
PLOŠČA NA KOTI +3.57 armatura spodaj d=15cm



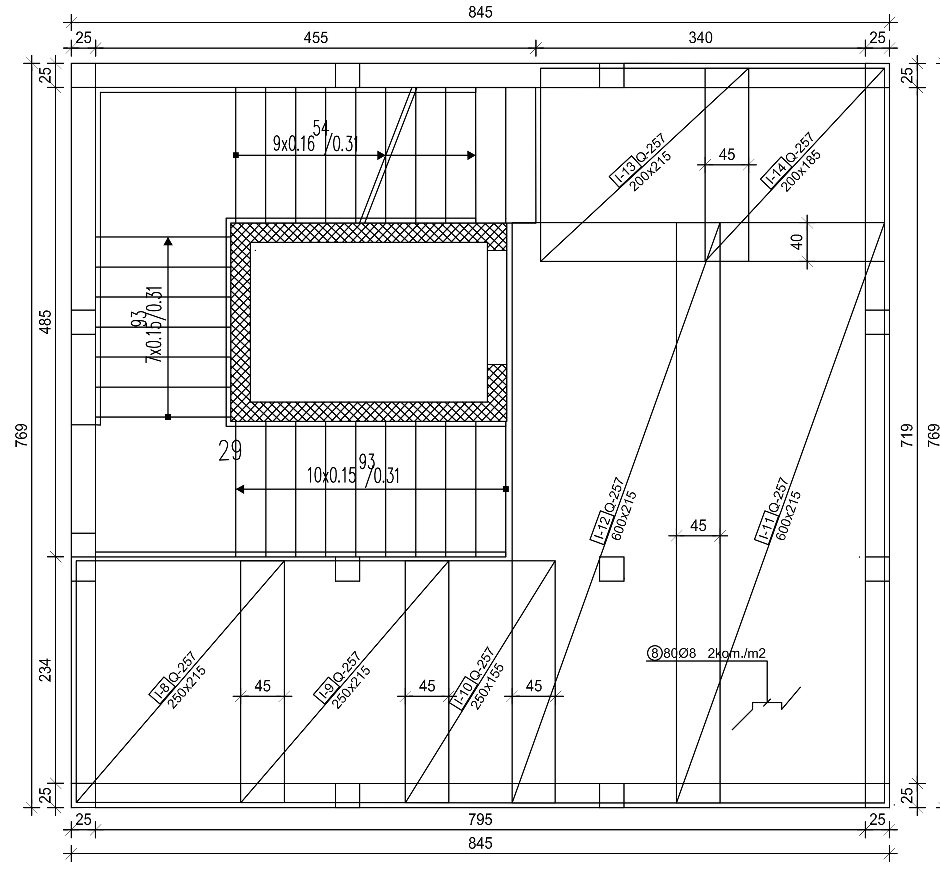
PLOŠČA NA KOTI +3.57 armatura zgoraj d=15cm



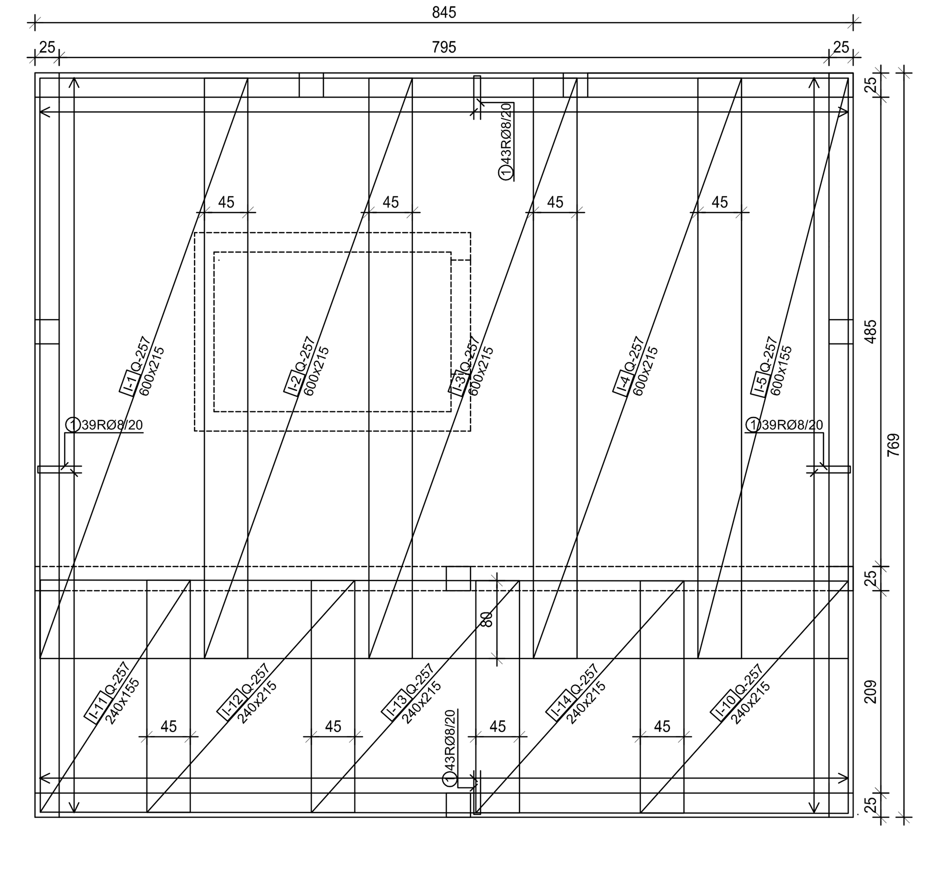
PLOŠČA NA KOTI +8.03 armatura spodaj d=15cm



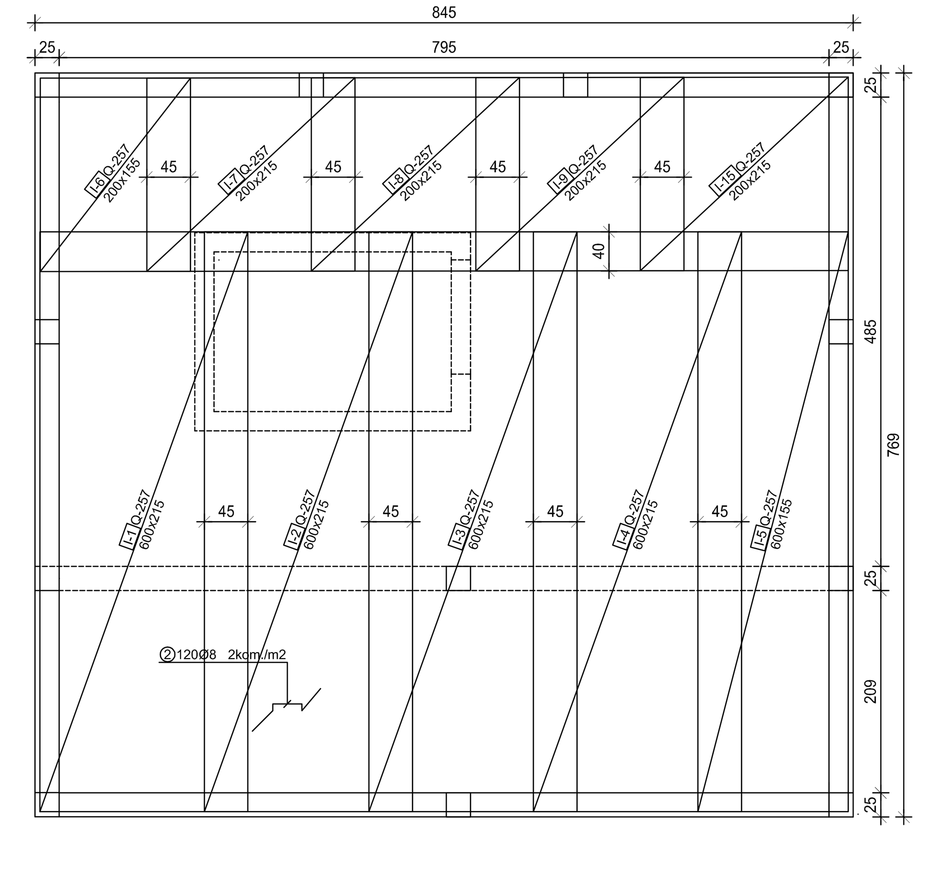
PLOŠČA NA KOTI +8.03 armatura zgoraj d=15cm



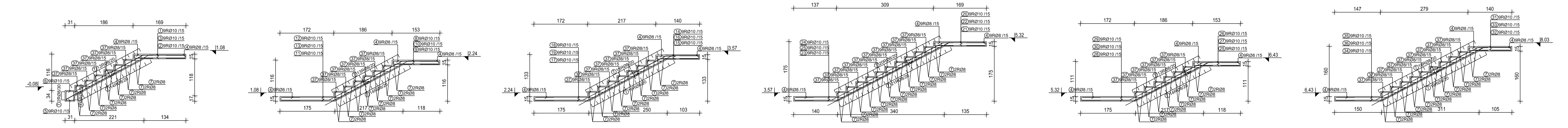
STREŠNA PLOŠČA armatura spodaj d=15cm



STREŠNA PLOŠČA armatura zgoraj d=15cm



RAME - rame kjer je možno bočno povezati z obodnimi vezmi!!!!



MATERIALI :

BETON :	C25/30 (SIST EN 206:2013, XC2 - temelji elem.v stiku z zem., XC1 - ostalo)
REBRASTA ARMATURA :	B500B
ARMATURNA MREŽE :	B500B

ZAŠČITNA PLAST BETONA V cm

ELEMENTI	TEMELJI	STENE	STEBRI	STOPNICE	PLOŠČA
a=	3,0	2,5-3,0	3,0	2,5	2,5

Konstrukcija spada skladno s SIST EN 13670:2010 v 2. izvedbeni razred

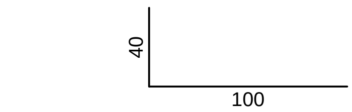
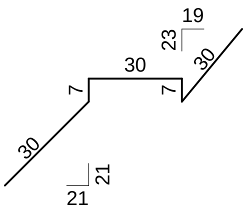
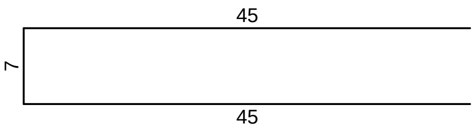
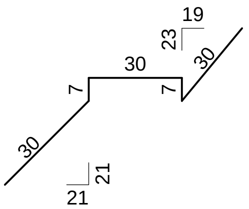
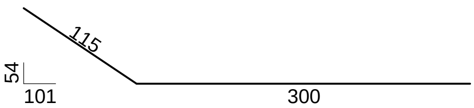
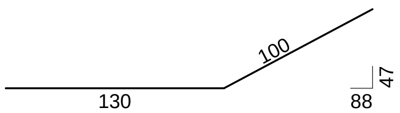
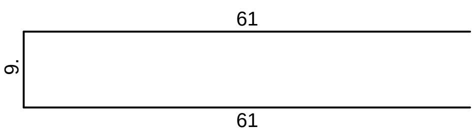
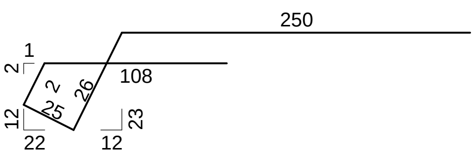
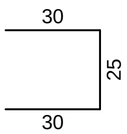
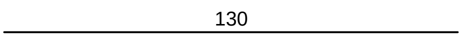
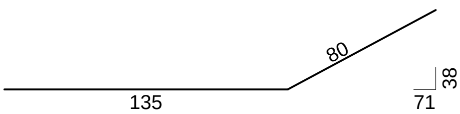
OPOMBE:
- VSE MERE KONTROLIRATI NA OBJEKTU SAMEM!
- VELJAJO IZKLJUČNO IZPISANE KOTE - NE MERI PO NAČRTU!
- SPREMEMBE IN DOPOLNITVE PROJEKTOV SO MOŽNE LE Z PRISTANKOM PROJEKTANTOV!
- ZA TOČNE DIMENZIJE IN PREBOJE GLEJ NAČRT ARHITEKTURE IN USTREZNH INŠTALACIJ!
- PRI IZVEDBI GLEJ TUDI ARMATURNE NAČRTE PRILEŽNIH ELEMENTOV!
- IZVLEČEK IN RAZREZ ARMATURE JE PRIKAZAN NA PRILOŽENIH A4 LISTIH!

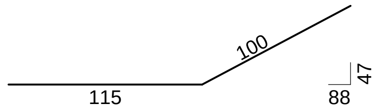
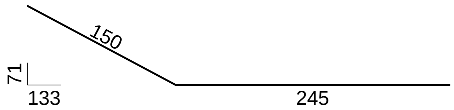
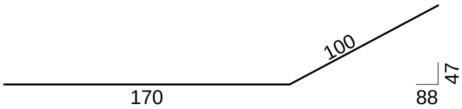
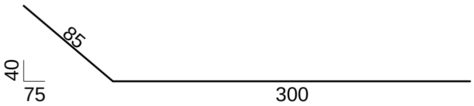
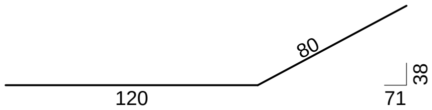
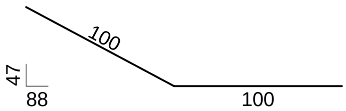
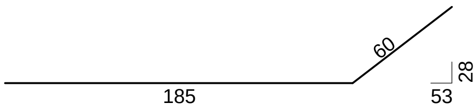
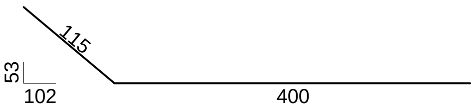
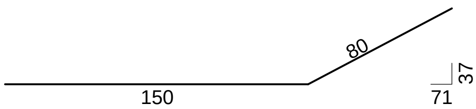
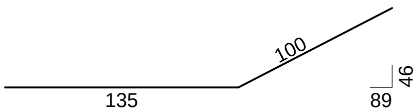
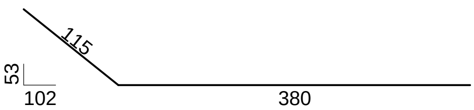
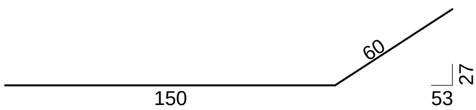
investitor: OBČINA MUTA GLAVNI TRG 17 2366 MUTA	Projektiranje in tehnično svetovanje Matej Dežman s.p. Šentilj pod Turjakom 37C, 2382 Mislinja mob: 031 422 074 e-mail:dezman.matej@gmail.com	**vsebina risbe:** ARMATURA STOPNIŠČNI PRIZIDEK
objekt in lokacija: OBNOVA GRAŠČINE KIENHOFEN UREDITEV DVORANE IN STOPNIŠČA Z DVIGALOM		**odgovorni vodja projekta:** PIA PLAN. KORACA, u.d.i.a, ZAPS 0421A
vrsta projekta: PZI		**odgovorni projektant:** BOJAN ČAS, u.d.i.g., IZS G-2319
		sodelavci:
vrsta načrta: GRADBENE KONSTRUKCIJE (3)	**št. načrta:** 04/2018 · **datum:** JULIJ 2018	**merilo:** 1:50 · **list številka:** LIST G3.2

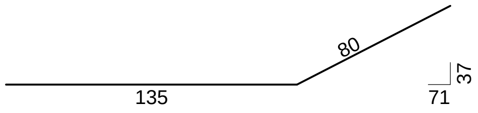
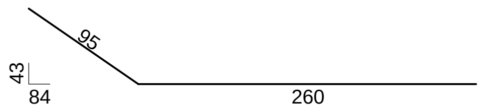
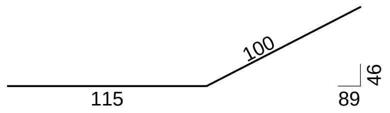
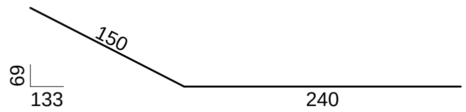
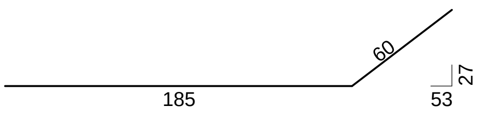
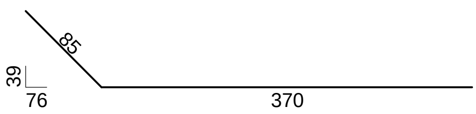
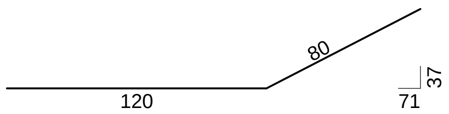
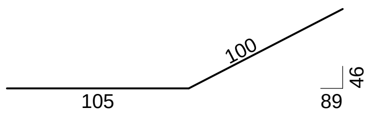
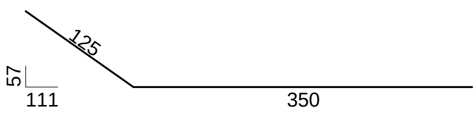
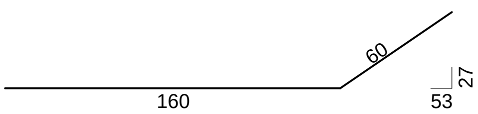
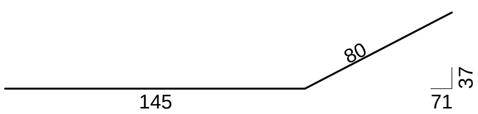
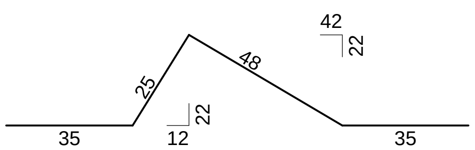
Palice - specifikacija						
ozn	oblika in mere [cm]	Ř	lg [m]	n [kos]	lgn [m]	Opomba
dvigalni jašek (1 kos)						
1	600	14	6.00	44	264.00	
2	285	14	2.85	22	62.70	
3	200	12	2.00	22	44.00	
4	450	12	4.50	8	36.00	
5	370	12	3.70	8	29.60	
6	45 15 45	8	1.05	1212	1272.60	
7	22 14 14 9. 22	8	0.90	69	62.10	
8	80 40	8	1.20	256	307.20	
9	60 15 60	10	1.35	105	141.75	
temeljna plošča dvigala (1 kos)						
1	320	10	3.20	12	38.40	
2	240	10	2.40	12	28.80	
3	100 18 100	10	2.18	123	268.14	
4	60 100	14	1.60	16	25.60	
5	100 40	10	1.40	174	243.60	
6	30 16 16 30 19 23 30 21 21	10	1.22	15	18.30	
temeljna plošča (1 kos)						
1	530	10	5.30	20	106.00	
2	600	10	6.00	66	396.00	
3	350	10	3.50	14	49.00	
4	295	10	2.95	53	156.35	
5	225	10	2.25	22	49.50	
6	305	10	3.05	4	12.20	

Palice - specifikacija

ozn	oblika in mere [cm]	Ř	lg [m]	n [kos]	lgn [m]	Opomba
7	60 / 19 / 60	10	1.39	181	251.59	
8	100	10	1.00	80	80.00	
9	120 / 19 / 120	10	2.59	109	282.31	
10	30 / 16 / 16 / 30 / 19 / 23 / 30 / 21 / 21	10	1.22	90	109.80	
11	60 / 100	16	1.60	44	70.40	
	plošča na koti +3.57 (1 kos)					
1	300	12	3.00	4	12.00	
2	330	12	3.30	4	13.20	
3	225	12	2.25	4	9.00	
4	180	12	1.80	8	14.40	
5	355	12	3.55	4	14.20	
6	355	12	3.55	8	28.40	
7	45 / 7 / 45	8	0.97	122	118.34	
8	40 / 100	8	1.40	28	39.20	
9	19 / 23 / 30 / 30 / 7 / 7 / 30 / 21 / 21	8	1.04	60	62.40	
	plošča na koti +8.03 (1 kos)					
1	565	12	5.65	4	22.60	
2	400	12	4.00	4	16.00	
3	200	12	2.00	4	8.00	
4	355	12	3.55	8	28.40	
5	235	12	2.35	4	9.40	
6	45 / 7 / 45	8	0.97	158	153.26	

Palice - specifikacija						
ozn	oblika in mere [cm]	Ř	lg [m]	n [kos]	lgn [m]	Opomba
7		8	1.40	24	33.60	
8		8	1.04	80	83.20	
strešna plošča (1 kos)						
1		8	0.97	164	159.08	
2		8	1.04	120	124.80	
stopniščne rame (1 kos)						
1		10	4.15	9	37.35	
2		10	2.30	9	20.70	
3		10	2.30	9	20.70	
4		8	1.31	153	200.43	
5		10	4.11	9	36.99	
6		10	0.85	9	7.65	
7		8	1.30	294	382.20	
8		10	3.60	9	32.40	
9		10	2.15	9	19.35	

Palice - specifikacija						
ozn	oblika in mere [cm]	Ř	lg [m]	n [kos]	lgn [m]	Opomba
10		10	2.15	9	19.35	
11		10	3.95	9	35.55	
12		10	2.65	9	23.85	
13		10	2.70	9	24.30	
14		10	3.85	9	34.65	
15		10	2.00	9	18.00	
16		10	2.00	9	18.00	
17		10	4.30	9	38.70	
18		10	2.45	9	22.05	
19		10	2.50	9	22.50	
20		10	5.15	9	46.35	
21		10	2.30	9	20.70	
22		10	2.35	9	21.15	
23		10	4.95	9	44.55	
24		10	2.10	9	18.90	

Palice - specifikacija						
ozn	oblika in mere [cm]	Ř	lg [m]	n [kos]	lgn [m]	Opomba
25		10	2.15	18	38.70	
26		10	3.55	9	31.95	
27		10	2.15	9	19.35	
28		10	3.90	9	35.10	
29		10	2.45	9	22.05	
30		10	2.50	9	22.50	
31		10	4.55	9	40.95	
32		10	2.00	9	18.00	
33		10	2.05	9	18.45	
34		10	4.75	9	42.75	
35		10	2.20	9	19.80	
36		10	2.25	9	20.25	
37		8	1.43	396	566.28	

Palice - izvleček			
Ř [mm]	lgn [m]	Teža enote [kg/m']	Teža [kg]
S500			
8	3564.69	0.40	1408.05
10	3145.33	0.62	1940.67
12	285.20	0.89	253.26
14	352.30	1.21	426.28
16	70.40	1.58	111.23
Skupaj (S500)			4139.49
Skupaj			4139.49

Mreže - specifikacija							
Pozicija	Oznaka mreže	B [cm]	L [cm]	n	Teža enote [kg/m2]	Skupna teža [kg]	Opomba
dvigalni jašek (1 kos)							
I	Q-503	215	600	8	7.90	815.28	
I-1	Q-503	195	600	8	7.90	739.44	
I-2	Q-503	195	200	4	7.90	123.24	
I-3	Q-503	215	200	4	7.90	135.88	
I-4	Q-503	105	600	8	7.90	398.16	
I-5	Q-503	105	200	4	7.90	66.36	
Skupaj						2278.36	
temeljna plošča dvigala (1 kos)							
I-1	Q-503	215	235	2	7.90	79.84	
I-2	Q-503	145	235	2	7.90	53.85	
Skupaj						133.68	
temeljna plošča (1 kos)							
I-1	Q-503	215	600	2	7.90	203.82	
I-2	Q-503	215	600	2	7.90	203.82	
I-3	Q-503	55	600	2	7.90	52.49	
I-4	Q-503	215	205	2	7.90	69.69	
I-5	Q-503	120	205	2	7.90	39.02	
I-6	Q-503	170	525	2	7.90	141.02	
I-8	Q-503	165	365	4	7.90	190.32	
Skupaj						900.17	
plošča na koti +3.57 (1 kos)							
I-1	Q-257	215	600	1	4.02	51.86	
I-2	Q-257	215	600	1	4.02	51.85	
I-3	Q-257	215	205	1	4.02	17.73	
I-4	Q-257	108	527	1	4.02	22.96	
I-5	Q-257	125	205	1	4.02	10.34	
I-6	Q-257	215	600	1	4.02	51.84	
I-7	Q-257	215	600	1	4.02	51.81	
I-8	Q-257	110	175	1	4.02	7.74	
I-9	Q-257	215	205	1	4.02	17.72	
I-10	Q-257	215	205	1	4.02	17.72	
I-11	Q-257	75	205	1	4.02	6.22	
Skupaj						307.78	
plošča na koti +8.03 (1 kos)							
I-1	Q-257	215	600	1	4.02	51.82	
I-2	Q-257	215	600	1	4.02	51.80	
I-3	Q-257	215	250	1	4.02	21.58	
I-4	Q-257	215	250	1	4.02	21.59	
I-5	Q-257	215	250	1	4.02	21.60	
I-6	Q-257	215	250	1	4.02	21.62	
I-7	Q-257	155	250	1	4.02	15.63	

Mreže - specifikacija							
Pozicija	Oznaka mreže	B [cm]	L [cm]	n	Teža enote [kg/m2]	Skupna teža [kg]	Opomba
I-8	Q-257	215	250	1	4.02	21.59	
I-9	Q-257	215	250	1	4.02	21.61	
I-10	Q-257	155	250	1	4.02	15.58	
I-11	Q-257	215	600	1	4.02	51.82	
I-12	Q-257	215	600	1	4.02	51.79	
I-13	Q-257	215	200	1	4.02	17.26	
I-14	Q-257	185	200	1	4.02	14.88	
Skupaj						400.15	
strešna plošča (1 kos)							
I-1	Q-257	215	600	2	4.02	103.63	
I-2	Q-257	215	600	2	4.02	103.63	
I-3	Q-257	215	600	2	4.02	103.64	
I-4	Q-257	215	600	2	4.02	103.64	
I-5	Q-257	155	600	2	4.02	74.90	
I-6	Q-257	155	200	1	4.02	12.47	
I-7	Q-257	215	200	1	4.02	17.30	
I-8	Q-257	215	200	1	4.02	17.30	
I-9	Q-257	215	200	1	4.02	17.31	
I-10	Q-257	215	240	1	4.02	20.75	
I-11	Q-257	155	240	1	4.02	14.96	
I-12	Q-257	215	240	1	4.02	20.76	
I-13	Q-257	215	240	1	4.02	20.76	
I-14	Q-257	215	240	1	4.02	20.76	
I-15	Q-257	215	200	1	4.02	17.30	
Skupaj						669.11	

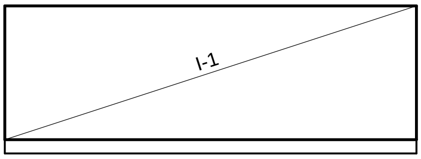
Mreže - izvleček						
Oznaka mreže	B [cm]	L [cm]	n	Teža enote [kg/m2]	Skupna teža [kg]	Neto vgrajena teža [kg]
Q-503	215	600	37	7.90	3770.67	3112.49
Q-257	215	600	31	4.02	1607.60	1359.01
Skupaj					5378.27	4471.50

Mreže - načrt razreza

dvigalni jašek

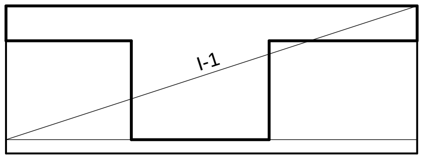
Q-503 (600 cm x 215 cm)

4x



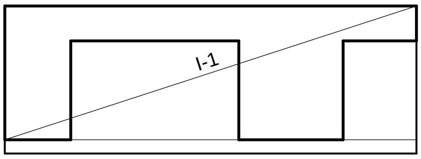
I-1 600 x 195

2x



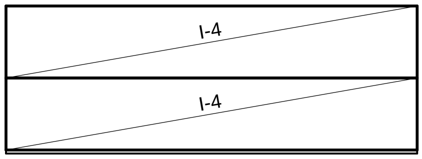
I-1 600 x 195

2x



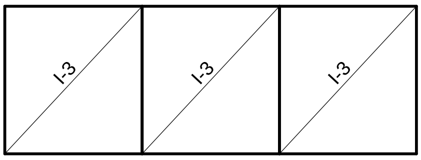
I-1 600 x 195

4x



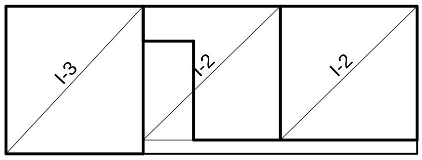
I-4 600 x 105
I-4 600 x 105

1x



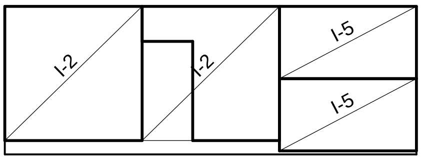
I-3 200 x 215
I-3 200 x 215
I-3 200 x 215

1x



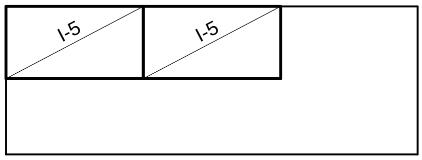
I-3 200 x 215
I-2 200 x 195
I-2 200 x 195

1x



I-2 200 x 195
I-2 200 x 195
I-5 200 x 105
I-5 200 x 105

1x

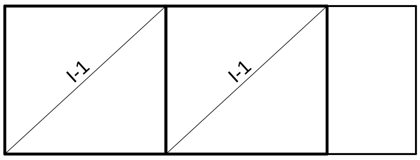


I-5 200 x 105
I-5 200 x 105

temeljna plošča dvigala

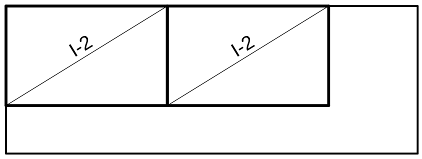
Q-503 (600 cm x 215 cm)

1x



I-1 235 x 215
I-1 235 x 215

1x

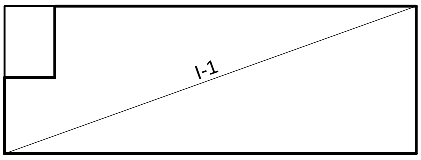


I-2 235 x 145
I-2 235 x 145

temeljna plošča

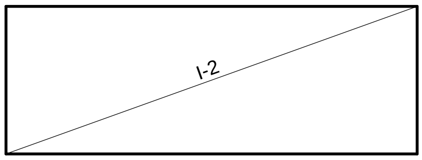
Q-503 (600 cm x 215 cm)

2x



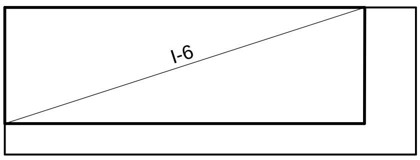
I-1 600 x 215

2x



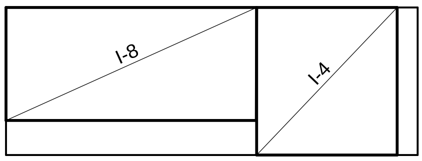
I-2 600 x 215

2x



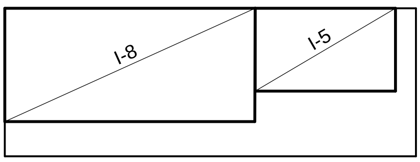
I-6 525 x 170

2x



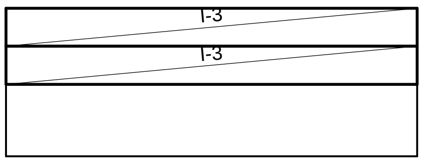
I-8 365 x 165
I-4 205 x 215

2x



I-8 365 x 165
I-5 205 x 120

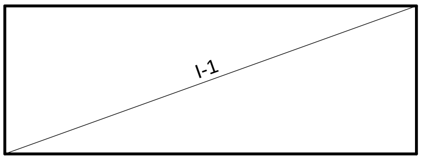
1x



I-3 600 x 55
I-3 600 x 55

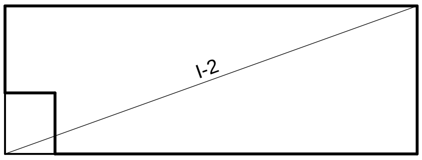
Mreže - načrt razreza
plošča na koti +3.57
Q-257 (600 cm x 215 cm)

1x



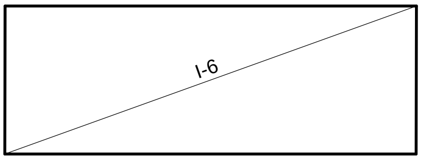
I-1 600 x 215

1x



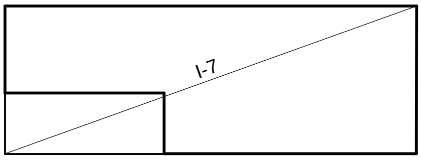
I-2 600 x 215

1x



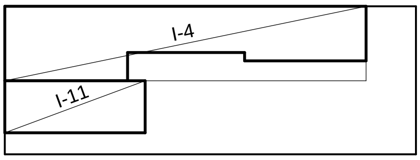
I-6 600 x 215

1x



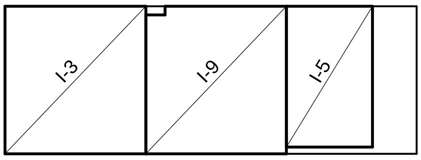
I-7 600 x 215

1x



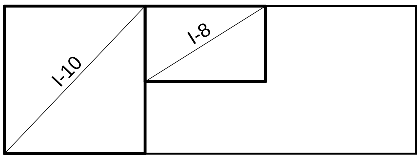
I-4 527 x 108
I-11 205 x 75

1x



I-3 205 x 215
I-9 205 x 215
I-5 205 x 125

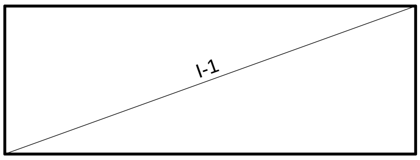
1x



I-10 205 x 215
I-8 175 x 110

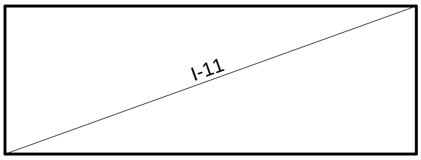
plošča na koti +8.03
Q-257 (600 cm x 215 cm)

1x



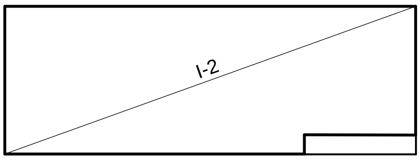
I-1 600 x 215

1x



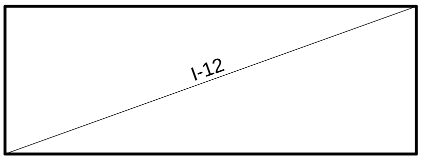
I-11 600 x 215

1x



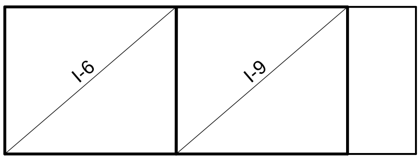
I-2 600 x 215

1x



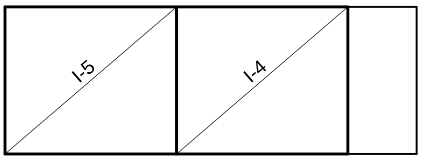
I-12 600 x 215

1x



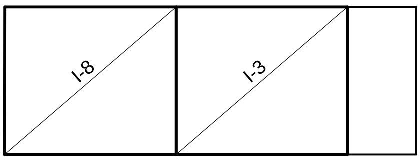
I-6 250 x 215
I-9 250 x 215

1x



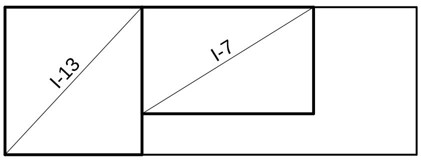
I-5 250 x 215
I-4 250 x 215

1x



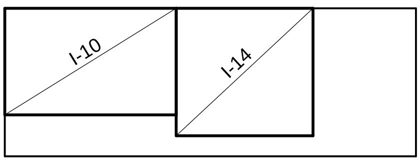
I-8 250 x 215
I-3 250 x 215

1x



I-13 200 x 215
I-7 250 x 155

1x



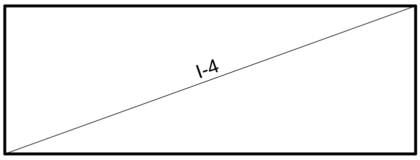
I-10 250 x 155
I-14 200 x 185

Mreže - načrt razreza

strešna plošča

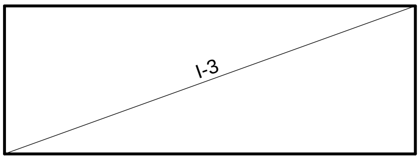
Q-257 (600 cm x 215 cm)

2x



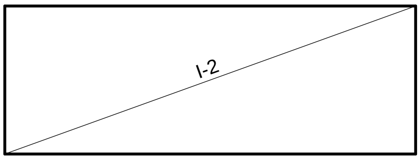
I-4 600 x 215

2x



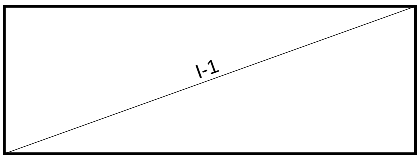
I-3 600 x 215

2x



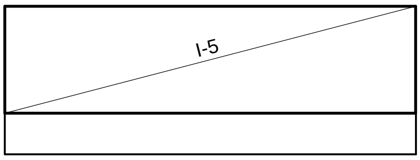
I-2 600 x 215

2x



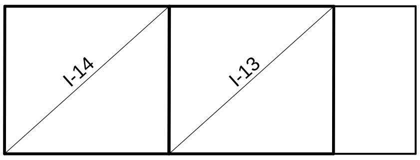
I-1 600 x 215

2x



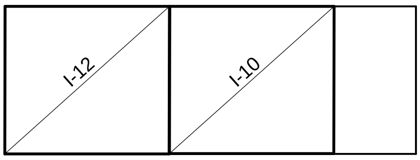
I-5 600 x 155

1x



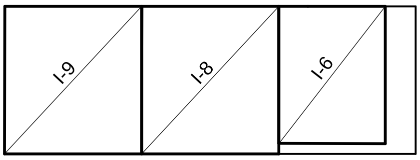
I-14 240 x 215
I-13 240 x 215

1x



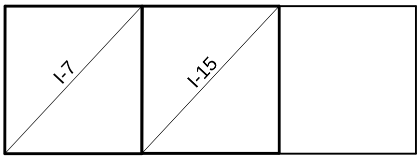
I-12 240 x 215
I-10 240 x 215

1x



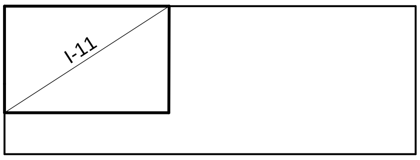
I-9 200 x 215
I-8 200 x 215
I-6 200 x 155

1x



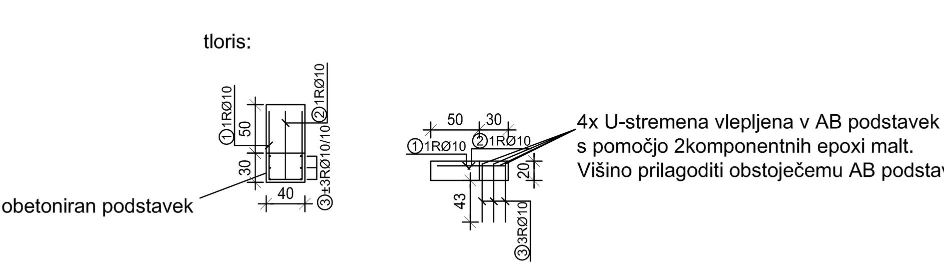
I-7 200 x 215
I-15 200 x 215

1x

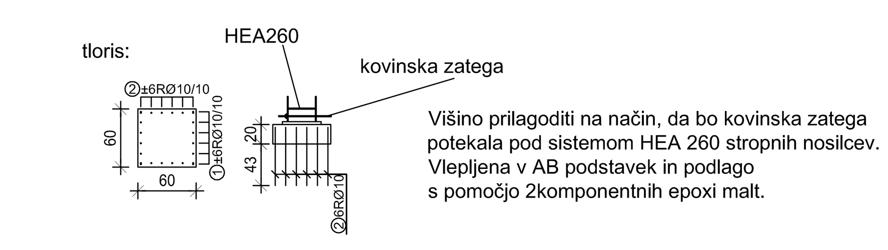


I-11 240 x 155

RAZŠIRITEV OBSTOJEČIH AB PODSTAVKOV (8X)



NOV AB PODSTAVEK (6X)



MATERIALI :

BETON :	C25/30 (SIST EN 206:2013, XC2 - temelji elem.v stiku z zem., XC1 - ostalo)
REBRASTA ARMATURA :	B500B
ARMATURNA MREŽE :	B500B

ZAŠČITNA PLAST BETONA V cm

ELEMENTI	TEMELJI	STENE	STEBRI	STOPNICE	PLOŠČA
a=	/	/	3,0	/	/

Konstrukcija spada skladno s SIST EN 13670:2010 v 2. izvedbeni razred

OPOMBE:
- VSE MERE KONTROLIRATI NA OBJEKTU SAMEM!
- VELJAJO IZKLJUČNO IZPISANE KOTE - NE MERI PO NAČRTU!
- SPREMEMBE IN DOPOLNITVE PROJEKTOV SO MOŽNE LE Z PRISTANKOM PROJEKTANTOV!
- ZA TOČNE DIMENZIJE IN PREBOJE GLEJ NAČRT ARHITEKTURE IN USTREZNH INŠTALACIJ!
- PRI IZVEDBI GLEJ TUDI ARMATURNE NAČRTE PRILEŽNIH ELEMENTOV!
- IZVLEČEK IN RAZREZ ARMATURE JE PRIKAZAN NA PRILOŽENIH A4 LISTIH!

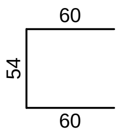
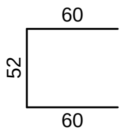
investitor:		vsebina risbe:
OBČINA MUTA GLAVNI TRG 17 2366 MUTA	Projektiranje in tehnično svetovanje Matej Dežman s.p. Šentilj pod Turjakom 37C, 2382 Mislinja mob: 031 422 074 e-mail:dezman.matej@gmail.com	ARMATURA STOPNIŠČNI PRIZIDEK
objekt in lokacija: OBNOVA GRAŠČINE KIENHOFEN UREDITEV DVORANE IN STOPNIŠČA Z DVIGALOM		odgovorni vodja projekta: PIA PLAN. KORACA, u.d.i.a, ZAPS 0421A
vrsta projekta: PZI		odgovorni projektant: BOJAN ČAS, u.d.i.g., IZS G-2319 sodelavci:

vrsta načrta:	št. načrta:	datum:	merilo:	list številka:
GRADBENE KONSTRUKCIJE (3)	04/2018	JULIJ 2018	1:50	LIST G3.3

Palice - specifikacija						
ozn	oblika in mere [cm]	Ř	lg [m]	n [kos]	lgn [m]	Opomba
stene - stene1,2,3,4,5 (1 kos)						
1	600	14	6.00	50	300.00	
2	325	14	3.25	30	97.50	
3	600	10	6.00	58	348.00	
4	300	10	3.00	30	90.00	
5	99. 19 11 19 99.	10	2.58	91	234.78	
6	250	14	2.50	20	50.00	
7	225	10	2.25	28	63.00	
8	54 19 11 19 54	10	1.68	32	53.76	
9	19 11 19 19 19	10	0.98	53	51.94	
10	104 19 11 19 104	10	2.68	62	166.16	
11	44 19 11 19 44	10	1.48	106	156.88	
12	24 19 11 19 24	10	1.08	46	49.68	
13	600	12	6.00	16	96.00	
14	235	12	2.35	8	18.80	
15	24 19 19 9. 24	8	1.04	60	62.40	
16	295	14	2.95	6	17.70	
17	295	10	2.95	4	11.80	
18	85 85	14	1.70	192	326.40	
19	50 140	16	1.90	16	30.40	
vertikalne vezi 1 25/25 (3 kos)						
1	600	16	6.00	12	72.00	
2	335	16	3.35	12	40.20	

Palice - specifikacija						
ozn	oblika in mere [cm]	Ř	lg [m]	n [kos]	lgn [m]	Opomba
3	19 / 19 11 19 / 19	10	0.98	168	164.64	
vertikalne vezi 2 25/25 (8 kos)						
1	600	16	6.00	64	384.00	
2	260	16	2.60	32	83.20	
3	19 / 19 11 19 / 19	10	0.98	680	666.40	
vertikalne vezi 3 25/25 (2 kos)						
1	440	16	4.40	8	35.20	
2	19 / 19 11 19 / 19	10	0.98	58	56.84	
vertikalne vezi 4 25/25 (2 kos)						
1	600	16	6.00	8	48.00	
2	365	16	3.65	8	29.20	
3	19 / 19 11 19 / 19	10	0.98	116	113.68	
vertikalne vezi 5 25/25 (1 kos)						
1	380	16	3.80	4	15.20	
2	19 / 19 11 19 / 19	10	0.98	25	24.50	
vertikalne vezi 6 25/25 (1 kos)						
1	380	16	3.80	4	15.20	
2	19 / 19 11 19 / 19	10	0.98	22	21.56	
RAZŠIRITEV OBSTOJEČIH AB PODSTAVKOV (8 kos)						
1	70 / 34 / 70	10	1.74	8	13.92	
2	70	10	0.70	8	5.60	
3	60 / 32 / 60	10	1.52	48	72.96	

Palice - specifikacija

ozn	oblika in mere [cm]	Ř	lg [m]	n [kos]	lgn [m]	Opomba
NOV AB PODSTAVEK (6 kos)						
1		10	1.74	72	125.28	
2		10	1.72	72	123.84	

Palice - izvleček			
Ř [mm]	lgn [m]	Teža enote [kg/m']	Teža [kg]
S500			
8	62.40	0.40	24.65
10	2615.22	0.62	1613.59
12	114.80	0.89	101.94
14	791.60	1.21	957.84
16	752.60	1.58	1189.11
Skupaj (S500)			3887.13
Skupaj			3887.13

Vhodni podatki - Konstrukcija

Shema nivojev

Naziv	z [m]	h [m]
nivo vrha atike	6.75	1.55
nivo strehe	5.20	5.20

Naziv	z [m]	h [m]
nivo temeljev	0.00	

Tabele materialov

No	Naziv materiala	E[kN/m2]	μ	γ[kN/m3]	αt[1/C]	Em[kN/m2]	μm
1	C 25/30	3.100e+7	0.20	25.00	1.000e-5	3.100e+7	0.20
2	Opečni zid	3.100e+7	0.20	18.00	1.000e-5	3.100e+7	0.20

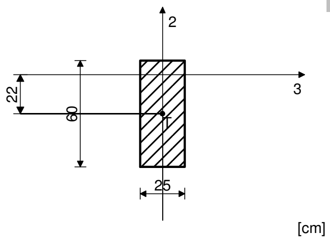
Seti plošč

No	d[m]	e[m]	Material	Tip preračuna	Ortotropija	E2[kN/m2]	G[kN/m2]	α
<1>	0.160	0.080	1	Tanka plošča	Izotropna			
<2>	0.250	0.125	2	Opeka/Bloki	Izotropna			

Seti gred

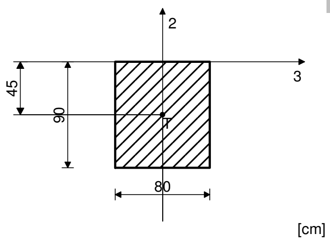
Set: 2 Prerez: b/d=25/60, Fiktivna ekscentričnost

Mat.	A1	A2	A3	I1	I2	I3
1 - C 25/30	1.500e-1	1.250e-1	1.250e-1	2.307e-3	7.812e-4	4.500e-3



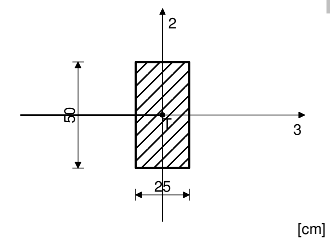
Set: 3 Prerez: b/d=80/90, Fiktivna ekscentričnost

Mat.	A1	A2	A3	I1	I2	I3
1 - C 25/30	7.200e-1	6.000e-1	6.000e-1	7.206e-2	3.840e-2	4.860e-2



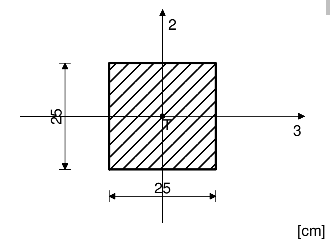
Set: 4 Prerez: b/d=25/50, Fiktivna ekscentričnost

Mat.	A1	A2	A3	I1	I2	I3
1 - C 25/30	1.250e-1	1.042e-1	1.042e-1	1.788e-3	6.510e-4	2.604e-3



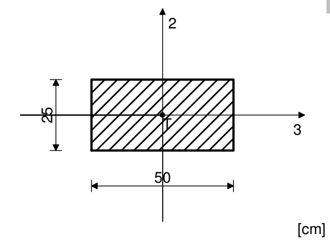
Set: 5 Prerez: b/d=25/25, Fiktivna ekscentričnost

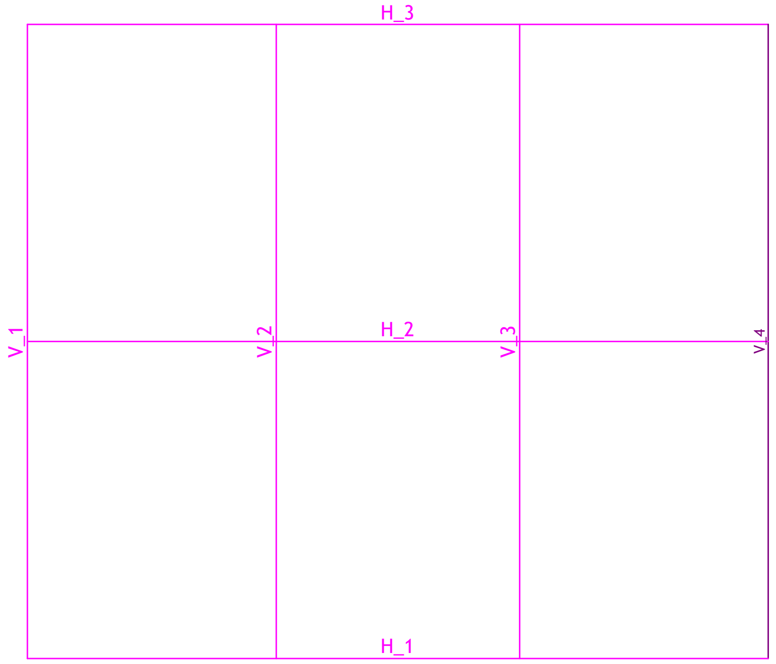
Mat.	A1	A2	A3	I1	I2	I3
1 - C 25/30	6.250e-2	5.208e-2	5.208e-2	5.501e-4	3.255e-4	3.255e-4



Set: 6 Prerez: b/d=50/25, Fiktivna ekscentričnost

Mat.	A1	A2	A3	I1	I2	I3
1 - C 25/30	1.250e-1	1.042e-1	1.042e-1	1.788e-3	2.604e-3	6.510e-4



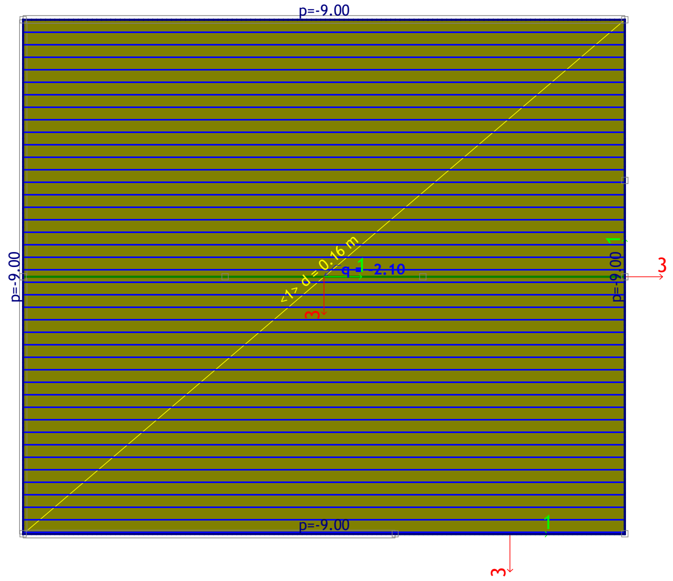


Dispozicija okvirjev

Vhodni podatki - Obtežba

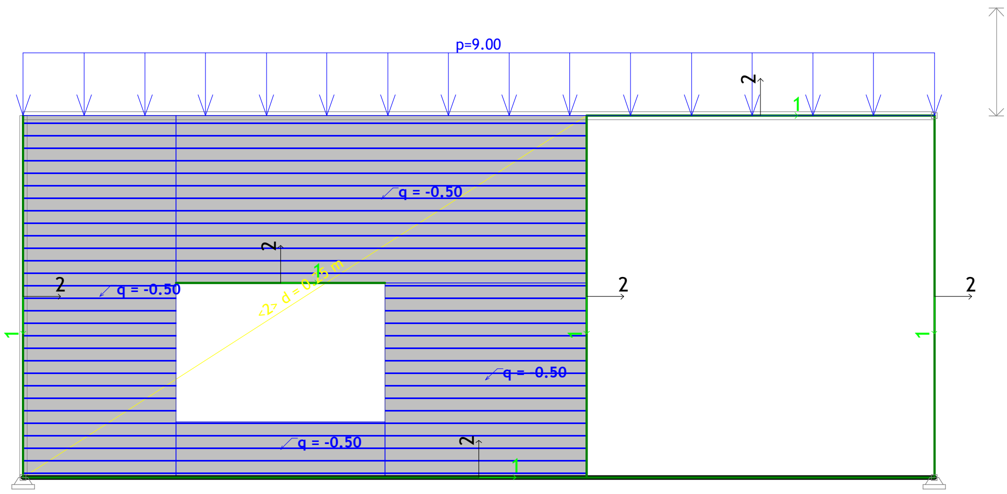
Lista obtežnih primerov	
LC	Naziv
1	stalna + lastna (g)
2	koristna obtežba
3	Komb.: MSN1 (1.35xI+1.5xII)
4	Komb.: MSU1 (I+II)

Obt. 1: stalna + lastna (g)



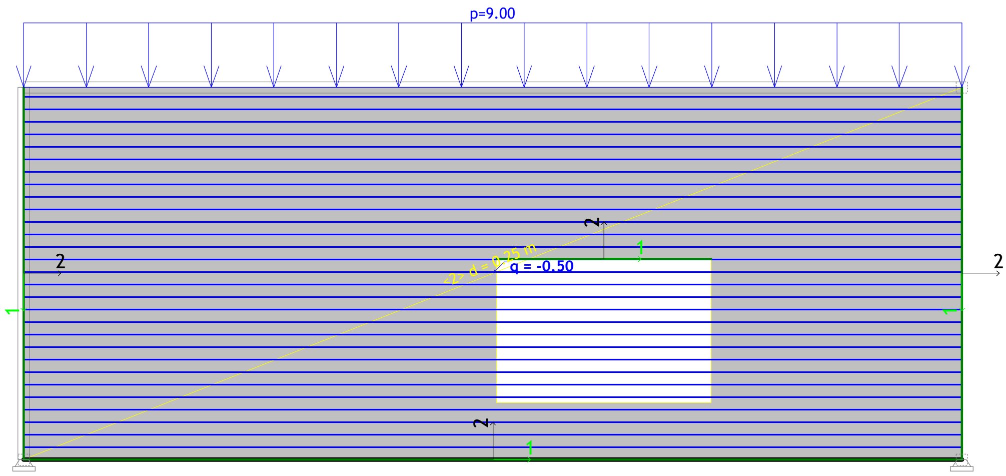
Nivo: nivo strehe [5.20 m]

Obt. 1: stalna + lastna (g)



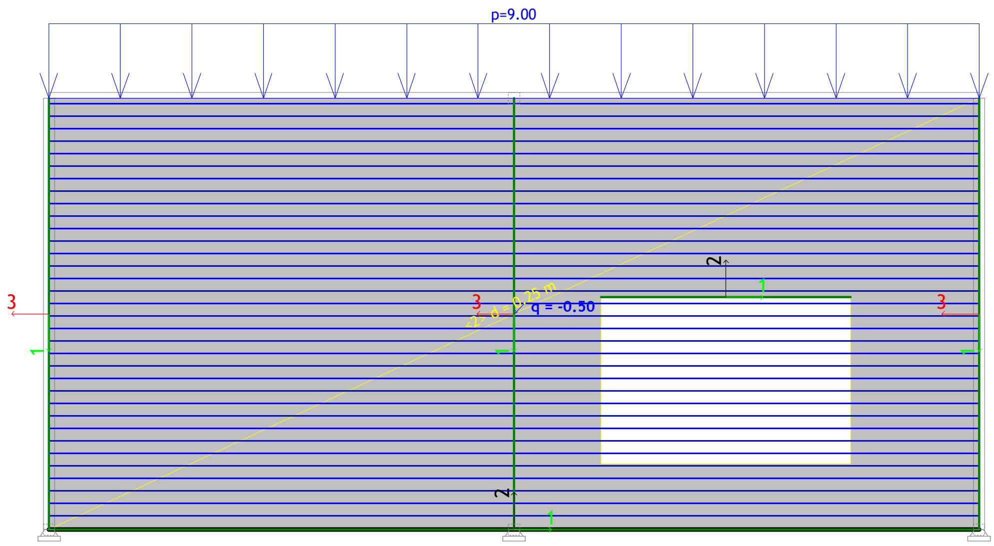
Okvir: H_1

Obt. 1: stalna + lastna (g)



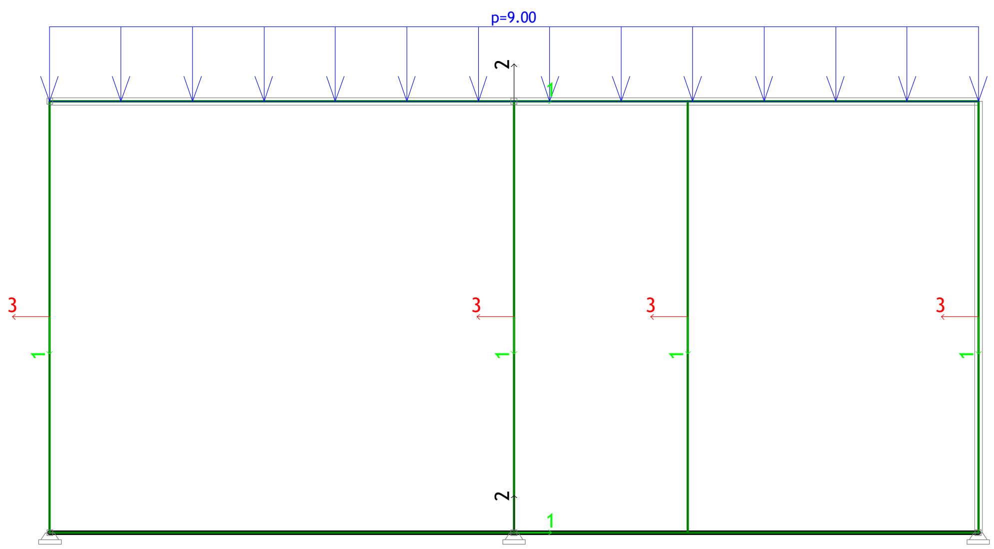
Okvir: H_3

Obt. 1: stalna + lastna (g)



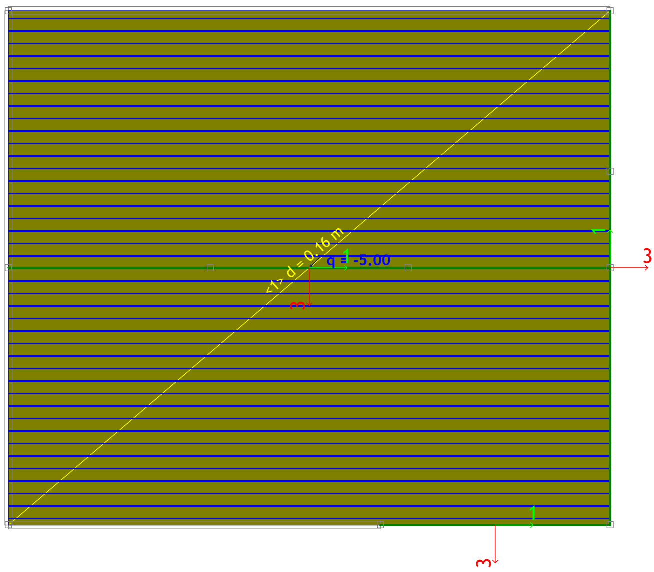
Okvir: V_1

Obt. 1: stalna + lastna (g)



Okvir: V_4

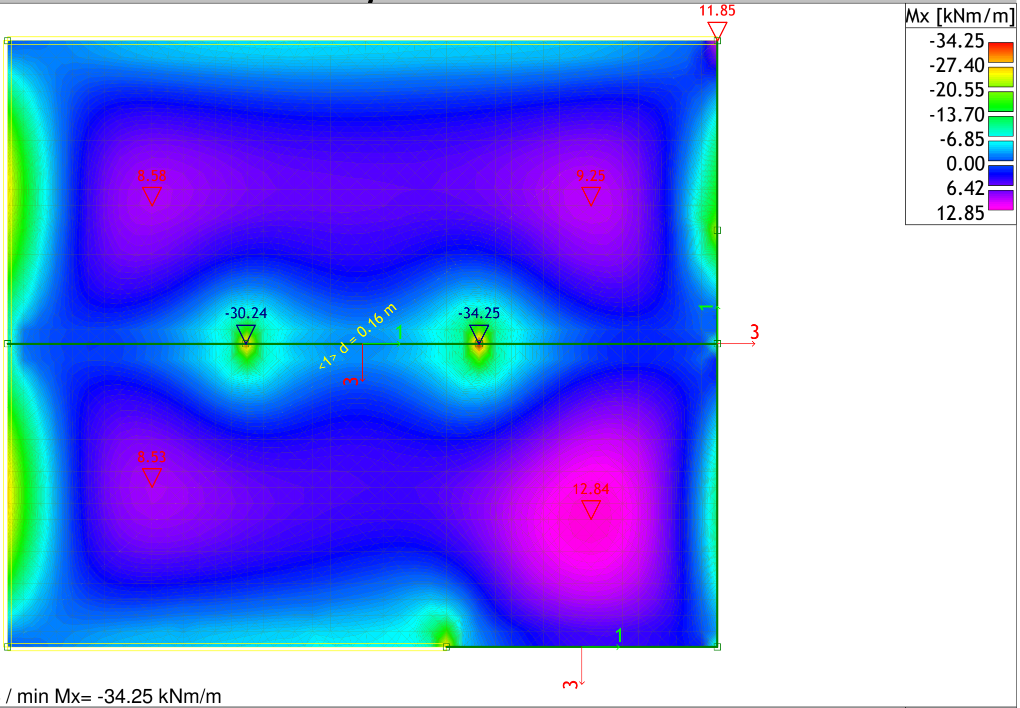
Obt. 2: koristna obtežba



Nivo: nivo strehe [5.20 m]

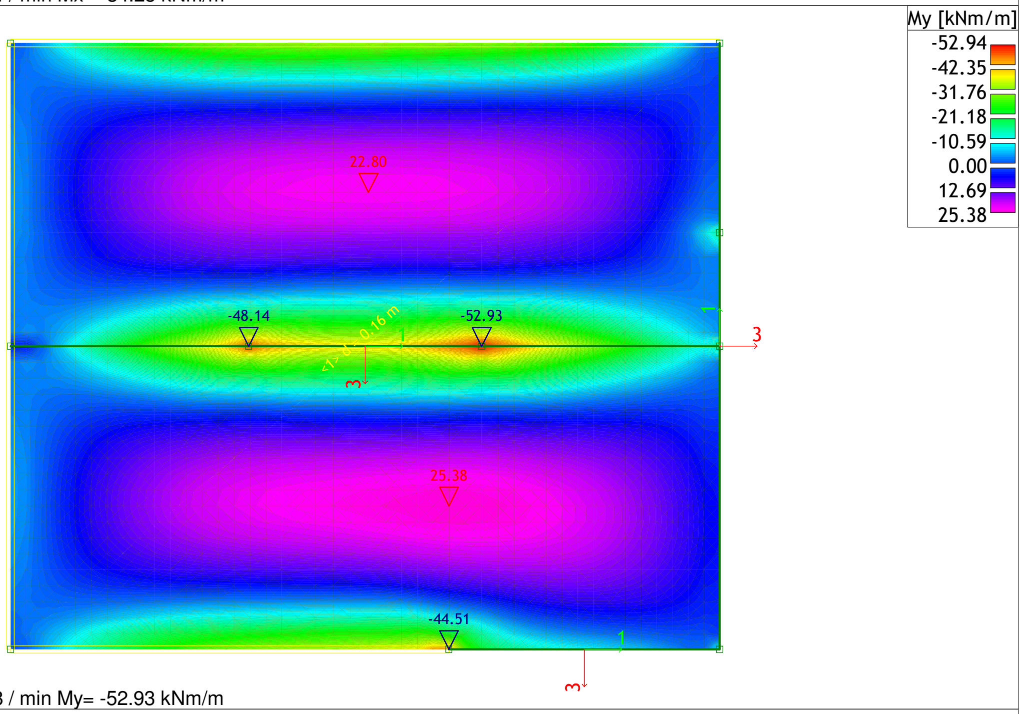
Statični preračun

Obt. 3: MSN1



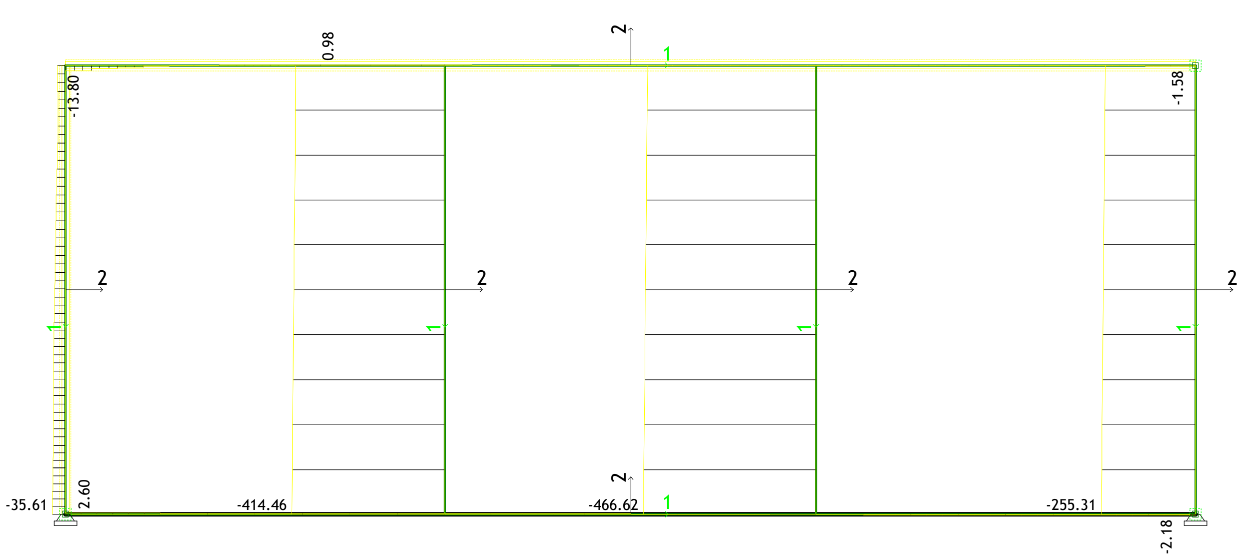
Nivo: nivo strehe [5.20 m]
Vplivi v plošči: max Mx= 12.84 / min Mx= -34.25 kNm/m

Obt. 3: MSN1



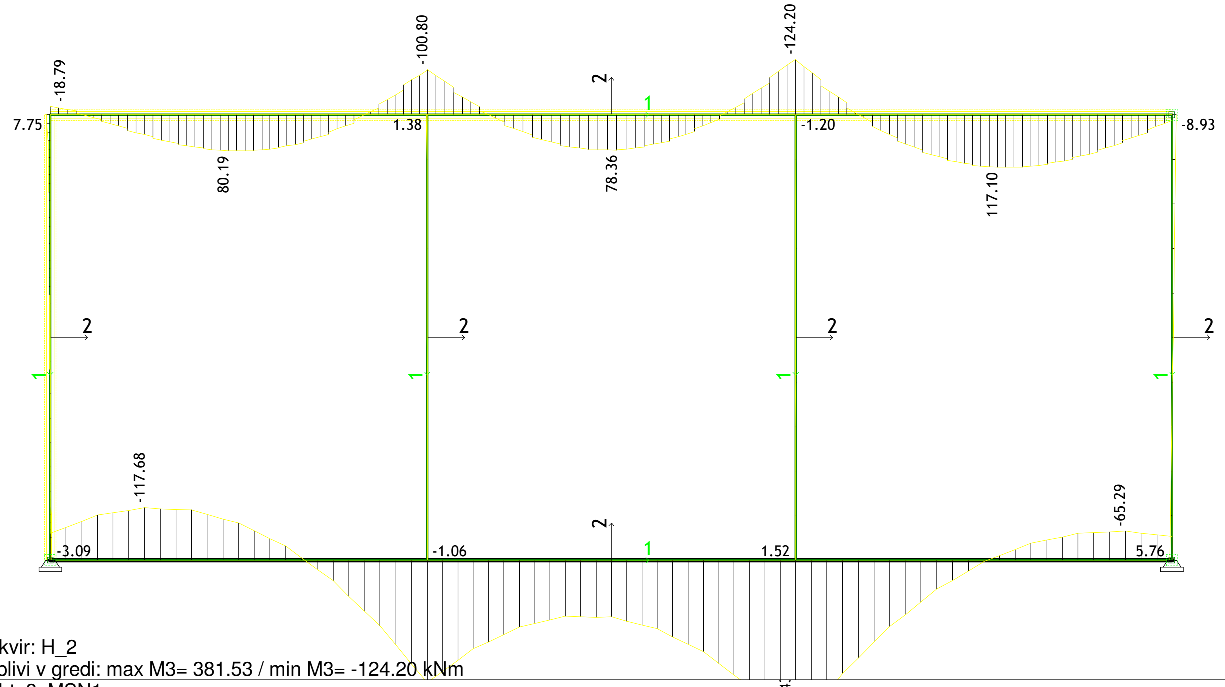
Nivo: nivo strehe [5.20 m]
Vplivi v plošči: max My= 25.38 / min My= -52.93 kNm/m

Obt. 3: MSN1



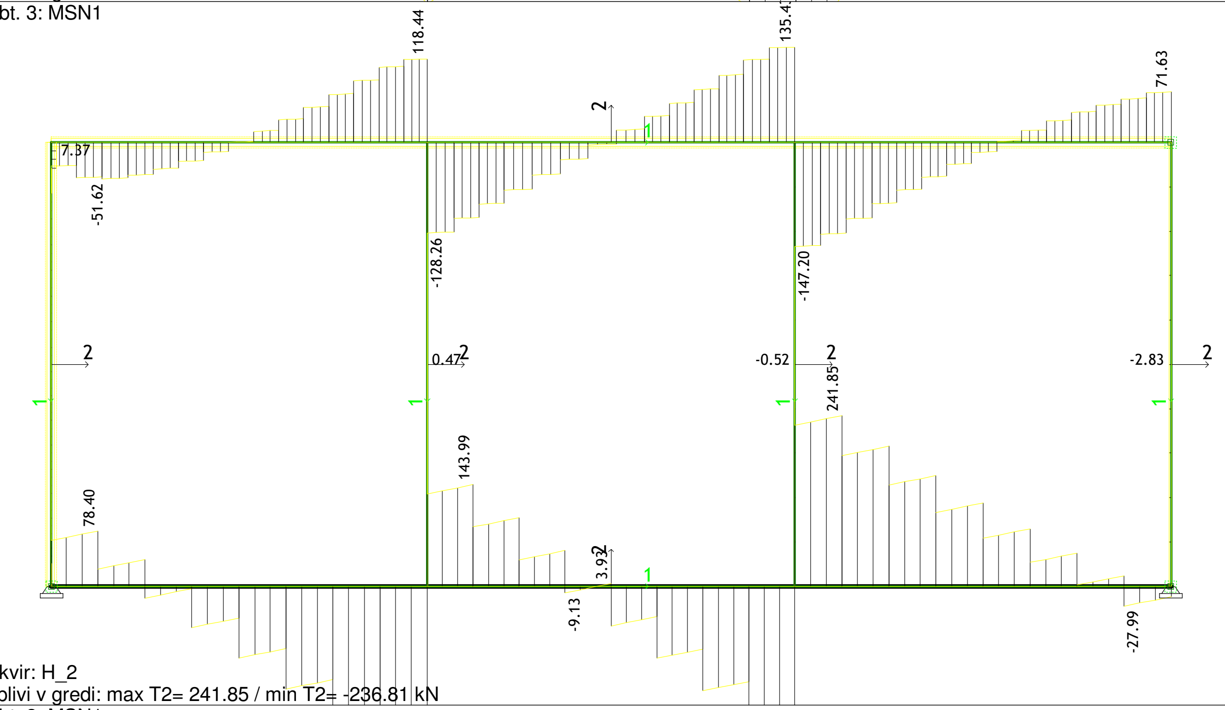
Okvir: H_2
Vplivi v gredi: max N1= 2.60 / min N1= -466.62 kN

Obt. 3: MSN1



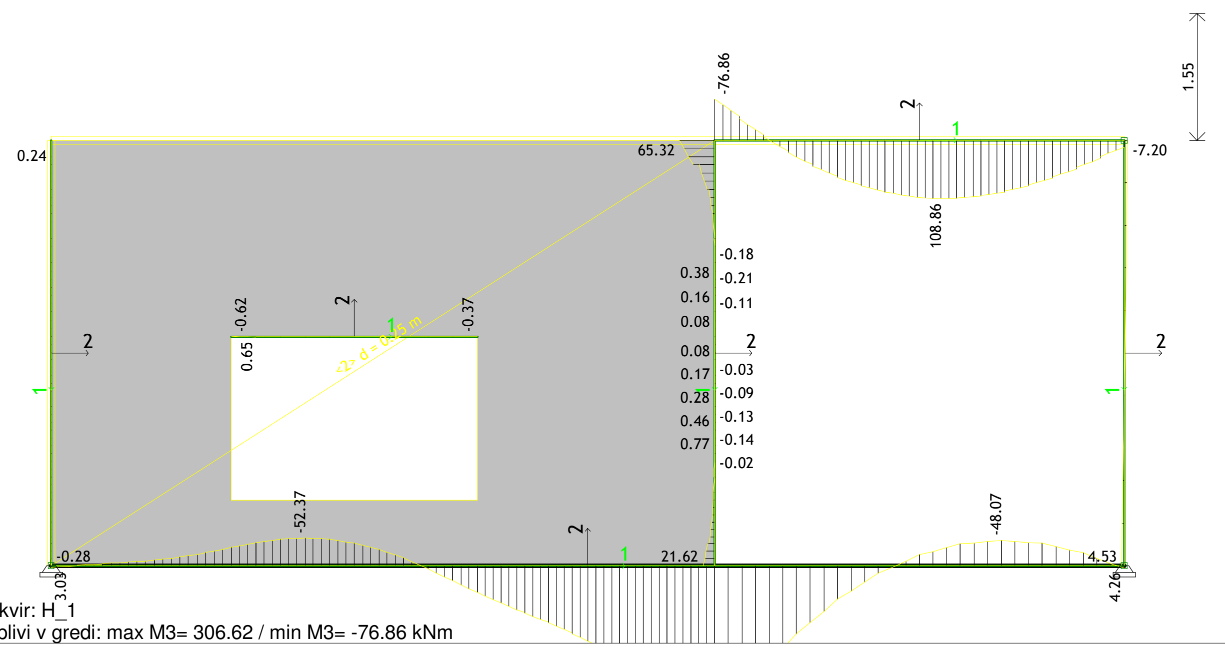
Okvir: H_2
Vplivi v gredi: max M3= 381.53 / min M3= -124.20 kNm

Obt. 3: MSN1



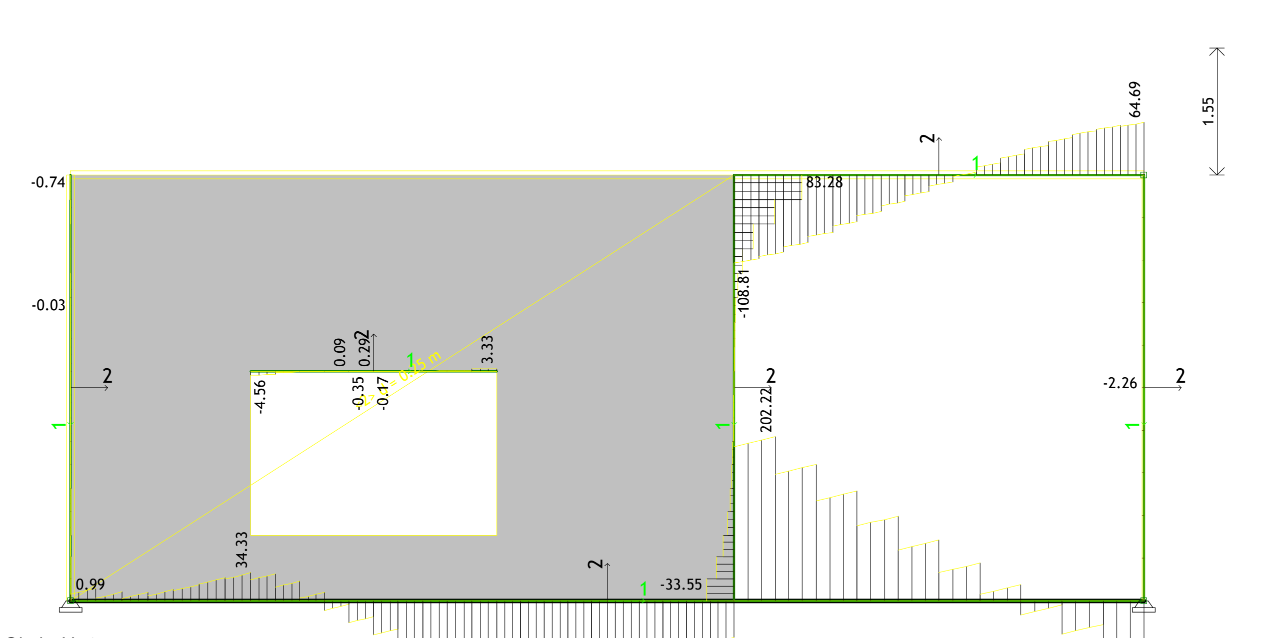
Okvir: H_2
Vplivi v gredi: max T2= 241.85 / min T2= -236.81 kN

Obt. 3: MSN1



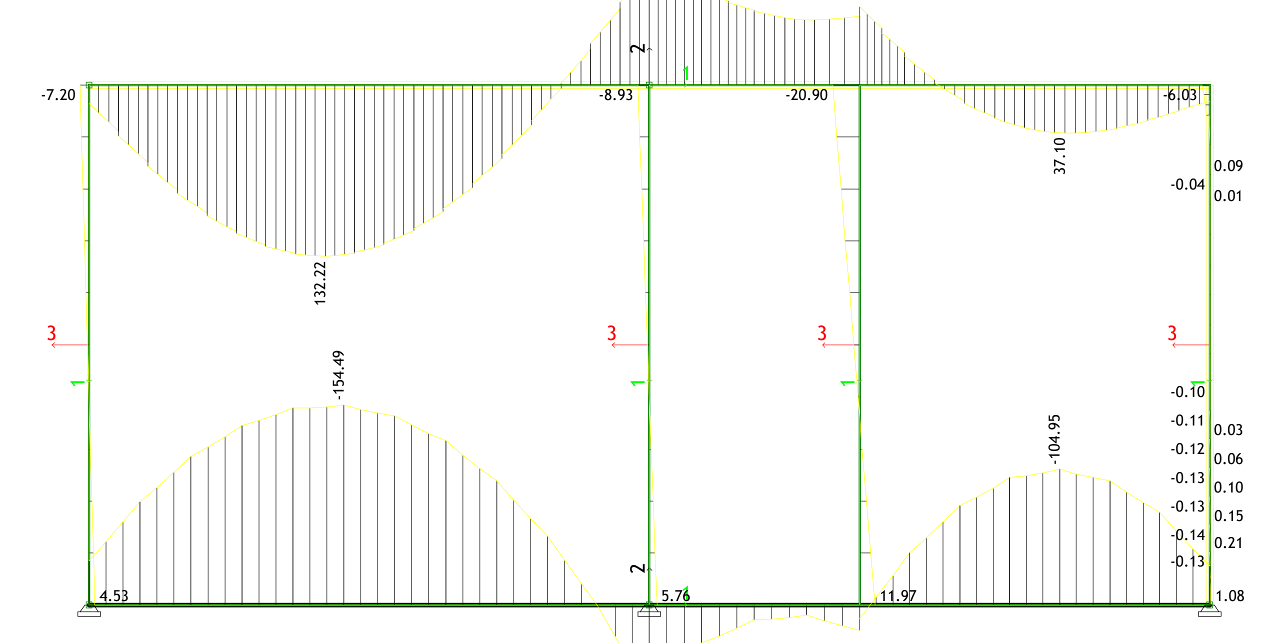
Okvir: H_1
Vplivi v gredi: max M3= 306.62 / min M3= -76.86 kNm

Obt. 3: MSN1



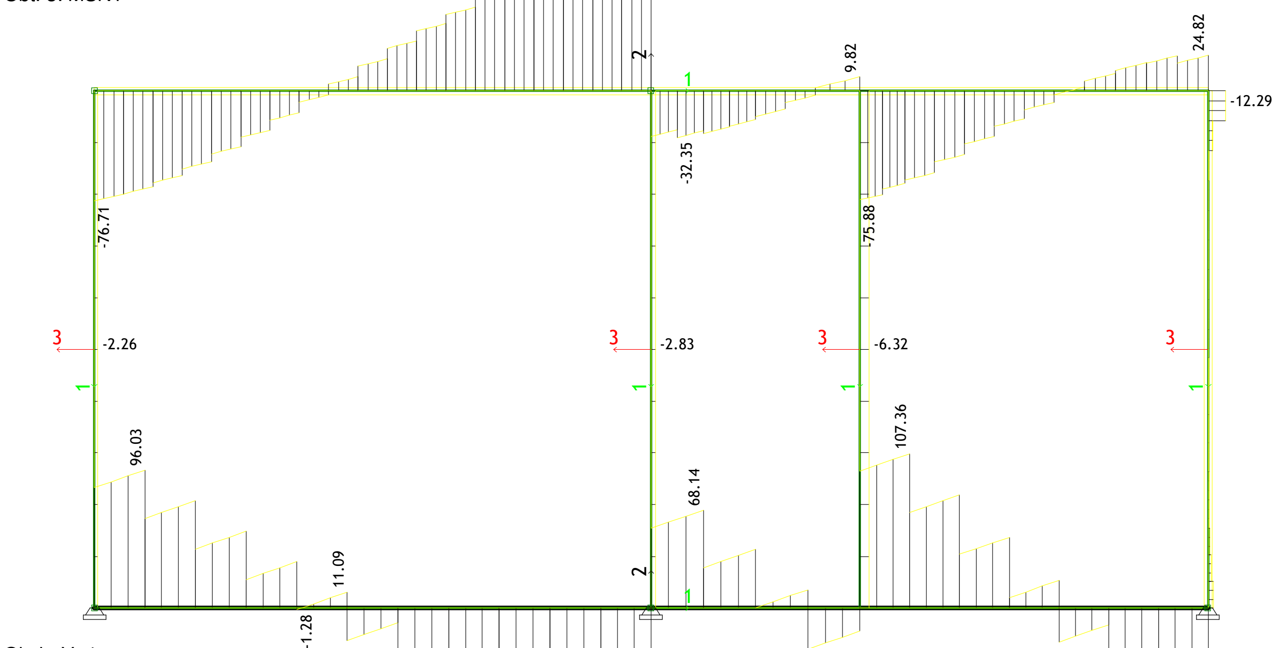
Okvir: H_1
Vplivi v gredi: max T2= 202.22 / min T2= -108.81 kN

Obt. 3: MSN1



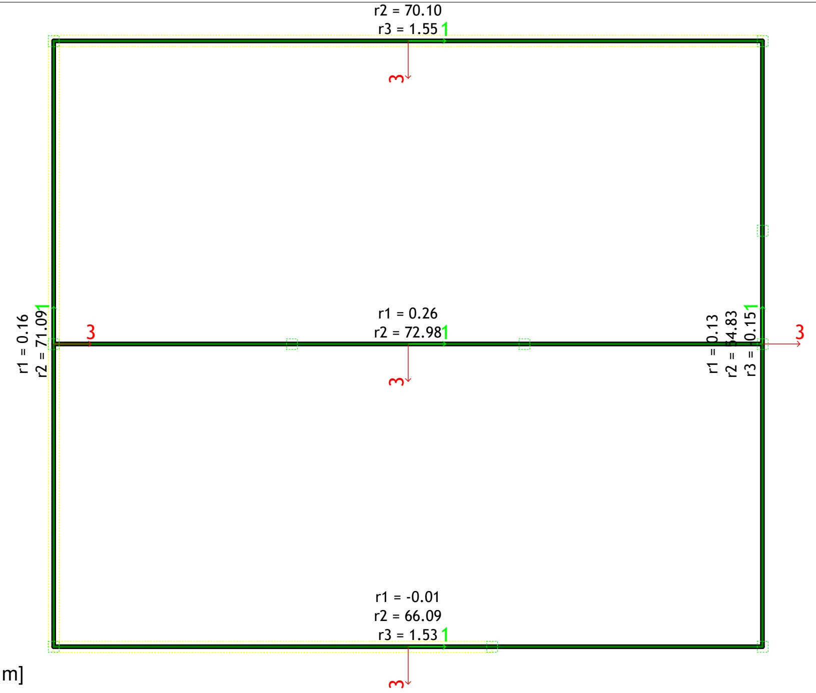
Okvir: V_4
Vplivi v gredi: max M3= 132.22 / min M3= -154.49 kNm

Obt. 3: MSN1



Okvir: V_4
Vplivi v gredi: max T2= 107.36 / min T2= -138.39 kN

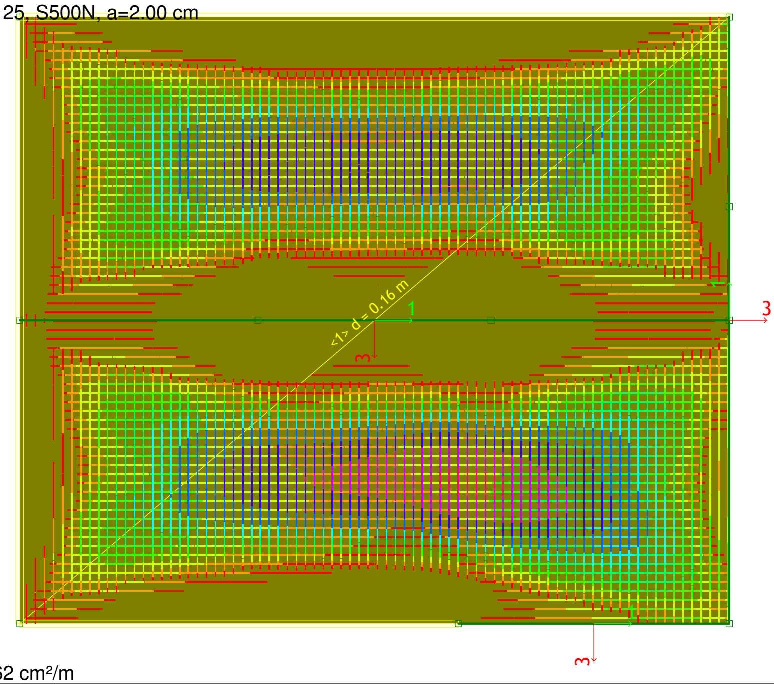
Obt. 4: MSU1



Nivo: nivo temeljev [0.00 m]
Reakcije podpor

Dimenzioniranje (beton)

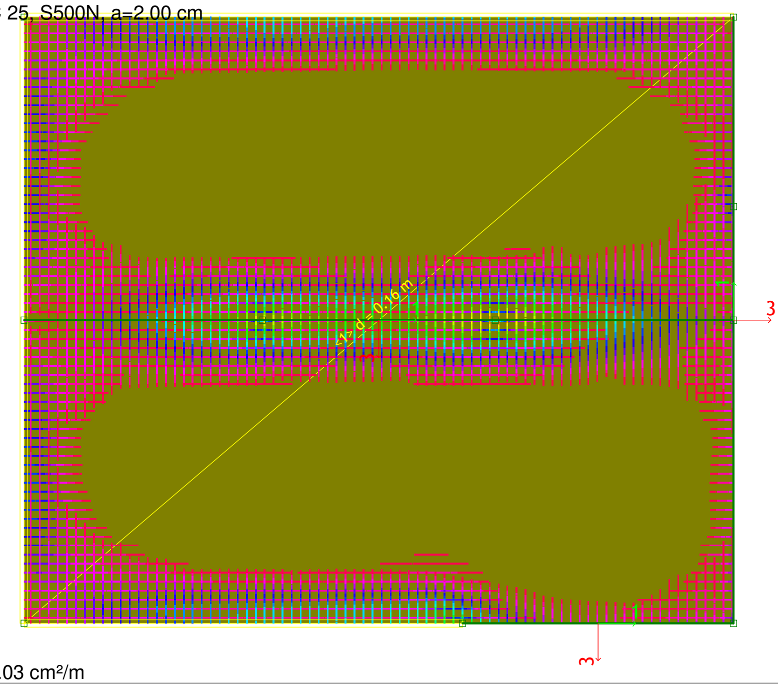
Merodajna obtežba: 1.35xI+1.50xII
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=2.00 cm



Aa - sp.cona [cm²/m]
0.00
0.50
1.00
1.50
2.00
2.50
3.00
3.50
4.00
4.50
4.63

Nivo: nivo strehe [5.20 m]
Aa - sp.cona - max Aa,s= 4.62 cm²/m

Merodajna obtežba: 1.35xI+1.50xII
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=2.00 cm



Aa - zg.cona [cm²/m]
-9.04
-9.00
-8.50
-8.00
-7.50
-7.00
-6.50
-6.00
-5.50
-5.00
-4.50
-4.00
-3.50
-3.00
-2.50
-2.00
-1.50
-1.00
-0.50
0.00

Nivo: nivo strehe [5.20 m]
Aa - zg.cona - max Aa,z= -9.03 cm²/m

3. NAČRT GRADBENIH KONSTRUKCIJ IN DRUGI GRADBENI NAČRTI

3.1 NASLOVNA STRAN S KLJUČNIMI PODATKI O NAČRTU

INVESTITOR	:	Občina MUTA Glavni trg 17 2366 Muta
OBJEKT	:	OBNOVA GRAŠČINE KIENHOFEN UREDITEV DVORANE IN STOPNIŠČA Z DVIGALOM
VRSTA PROJEKTNE DOKUMENTACIJE	:	PZI
ZA GRADNJO	:	REKONSTRUKCIJA, SPREMEMBA NAMEMBNOSTI, DOZIDAVA, ODSTRANITEV
PROJEKTANT	:	ARH DEKO, d.o.o. Glavni trg 28, 2380 Slovenj Gradec
Odgovorna oseba žig in podpis	:	Pia Planinšec Koraca, univ. dipl. inž. arh.
ODGOVORNI PROJEKTANT	:	dr. Bojan Čas, univ.dipl.inž.grad.
Identifikacijska številka	:	IZS G-2319
Osebni žig in podpis	:	
ŠTEVILKA NAČRTA/PROJEKTA	:	KM-STROK-7_2017, 21/2016
KRAJ IN DATUM	:	Ljubljana, JULIJ 2018
ODGOVORNI VODJA PROJEKTA	:	Pia Planinšec Koraca, univ.dipl.inž.arh.
Identifikacijska številka	:	ZAPS 0421- A
Osebni žig in podpis	:	

3.2 KAZALO VSEBINE NAČRTA ŠT. : KM-STROK-7_2017

3.3 IZJAVA ODGOVORNEGA PROJEKTANTA NAČRTA GRADBENIH KONST. V PZI

ODGOVORNI PROJEKTANT

dr. Bojan Čas, univ.dipl.inž.grad.

IZJAVLJAM,

1. da je načrt gradbenih konstrukcij skladen s prostorskim aktom,
2. da je načrt gradbenih konstrukcij skladen z gradbenimi predpisi,
3. da je načrt gradbenih konstrukcij skladen s projektnimi pogoji oziroma soglasji za priključitev,
4. da so bile pri izdelavi načrta gradbenih konstrukcij upoštevane vse ustrezne bistvene zahteve in da je načrt izdelan tako, da bo gradnja, izvedena v skladu z njim, zanesljiva,
5. da so v načrtu gradbenih konstrukcij upoštevane zahteve elaboratov.

ODGOVORNI PROJEKTANT	:	dr. Bojan Čas, univ.dipl.inž.grad.
Identifikacijska številka	:	IZS G-2319
Osebni žig in podpis	:	

ŠTEVILKA NAČRTA	:	KM-STROK-7_2017
KRAJ IN DATUM	:	Ljubljana , JULIJ 2018

3.4 TEHNIČNO POROČILO S STATIČNIM IZRAČUNOM IN PRILOGAMI

3.4.1 TEHNIČNO POROČILO

SPLOŠNO

Naročnik, Občina Muta namerava pristopiti k spremembi namembnosti ter rekonstrukciji obstoječih podstrešnih prostorov na zgradbi občinske uprave Občine Muta – zgradba Graščina Kienhofen. Strešna konstrukcija z neizkoriščeno podstreho se nahaja nad prostori prvega nadstropja zgradbe. V podstrešnih prostorih želi Naročnik urediti večnamensko dvorano s pripadajočimi pomožnimi ter pisarniškimi prostori.

Pred nekaj leti je bilo takrat zelo dotrajano ostrešje zgradbe v celoti odstranjeno ter nadomeščeno z novim, klasičnim lesenim ostrešjem. Ob priliki menjave strešne konstukcije se je nad stropno konstrukcijo prvega nadstropja zgradbe vgradil sistem kovinskin nosilcev, ki omenjeno prenovljeno leseno ostrešje podpirajo.

Ob predvideni preureditvi podstrehe v namene večnamenske dvorane se število ter razporeditev lesenih stebrov, ki podpirajo vmesne lege na novo izgrajenega klasičnega lesenega ostrešja, izkazuje kot še posebej problematična. Z namenom doseganja odprtih prostorov bo potrebno podporne lesene stebre odstraniti, preostale konstrukcije ostrešja pa ekvivalentno podpreti z nadomestnimi konstrukcijskimi sistemi.

Poleg navedenega bo Naročnik, na Z delu zgradbe dogradil sodobni večetažni stopniščni prizidek z dvigalom ter na novo zgradil tudi pritlični objekt za namene Gasilskega muzeja.

OBSTOJEČE LESENO OSTREŠJE

Obstoječe ostrešje je v osnovi zasnovana kot dvokapnica z naklonom strešin okirno 37^0. Na obeh bočnih ostraneh zgoraj predstavljene strešne konstrukcije sta izdelani prečni strešini enakega naklona. Nosilna konstrukcija obstoječega lesenega ostrešja je zasnovana kot sistem kapnih (b/h = 16/18 cm) ter dvojnih vmesnih leg (b/h = 22/26 cm), ki so podprte s sistemom lesenih stebrov (b/h = 21/21 cm). Na nivojih vmesnih leg so te lege medsebojno povezane s pomočjo lesenih škarnikov. Leseni stebri ter lesene lege so dodatno medsebojno povezani s pomočjo vgrajnih lesenih ročic (b/h = 12/16 cm). Leseni podporni stebri se nahajajo na medosnih razdaljah okvirno 3.00 m – 3.85 m. Preko lesenih kapnih ter vmesnih leg so vgrajeni leseni špirovci prečnih dimenzij b/h = 12/16 cm.

Obstoječi leseni stebri so podprti s sistemom vzdolžnih kontinuirnih kovinskih nosilcev HEA 260, ki so se ob zadnji rekonstrukciji vgradili na betonske nastavke nad obstoječo stropno konstrukcijo nad 1.nadstropjem zgradbe.

OBSTOJEČA STROPNA KONSTRUKCIJA NAD PROSTORI 1. NADSTROPJA

Današnjo stropno konstrukcijo nad prostori 1. nadstropja predstavlja sistem precej dotrajanih lesenih stropov – tramovni sestav. Predvsem zaradi dotrajanosti ter nevarnosti uporabe se je del teh lesenih tramovnih stropov, ob zadnji prenovi ostrešja zgradbe, odstranil ter nadomestil z novim lesenih stropom (sistem lesenih stropnikov ter gornje lesene pohodne površine).

Nad opisanim sistemom lesenih stropov pa, kot že omenjeno, poteka sistem vzdolžnih kontinuirnih kovinskih nosilcev HEA 260, ki so točkovno podprti z betonskimi podstavki. Le ti so bili izdelani nad masivnim zidovjem 1.nadstropja zgradbe.

ODSTRANITEV VEČJEGA ŠTEVILA LESENIH STEBROV, NADOMESTNE PODPORNE KONSTRUKCIJE

Da bi bilo mogoče zagotoviti odprt prostor, ki bo služil v namene občinske dvorane, je predvidena odstranitev večjega števila lesenih podpornih strobrov, ki podpirajo notranje in zunanje vmesne lege lesenega ostrešja. Ostrešju dela zgradbe bomo zagotovili nadomestno podpiranje z uporabo kovinskih konstrukcij in sicer:

1. zunanje ter notranje vmesne lege se bočno ojačajo z dodajanjem kovinskih nosilcev IPE 0 300 (standardni profil, široka pasnica). Dolžina teh kovinskih nosilcev znaša okvirno 15.50 m (vijačenje kovinskih nosilcev na lokaciji gradbišča),
2. v predhodni točki predstavljene kovinske ojačitve vmesnih leg podpremo s tremi primarnimi kovinskimi okvirji, ki so izdelani iz standardnih vročevaljanih nosilcev HEA 320. Te kovinske okvirje sestavljajo naslednji elementi (vijačenje delov kovinskega okvirja na lokaciji gradbišča):

   - kovinska stebra višine okvirno 4.0 m, ki sta "temeljena" na vrhu masivnega zidovja prve etaže. Stebra sta locirana tik ob notranji tlorisni liniji zunanjih vmesnih leg,
   - s kovinskima stebroma togo povezana poševna elementa okvirja, ki potekata vzporedno z linijo lesenih špirovcev ostrešja od zunanje do notranje ojačane lesene vmesne lege. Ta kovinski del okvirja je dolžine okvirno 3.4 m
   - horizontalni element kovinskega okvirja, ki je togo povezan poševnima elementoma kovinskega okvirja. Ta element poteka tik pod nivojem vgradnje notranjih lesenih leg in je dolžine okvirno 6.10 m.
   - v območju naleganja kovinskega okvirja na zidovje prve etaže sta oba kovinska stebra medsebojno povezana z dvema kovinskima zategama ϕ16 mm.

3. Vse tri kovinske okvirje – njihove stebre – podpremo na nosilno zidovje nadstropja. Na teh mestih pred montažo kovinskih okvirjev izdelamo primerna ležišča.

OJAČEVANJE OBSTOJEČE STROPNE KONSTRUKCIJE NAD 1.NADSTROPJEM, IZGRADNJA NOVE POHODNE POVRŠINE

Poleg izgradnje večnamenske občinske dvorane, ob ureditvi katere bo potrebno odstraniti večje število lesenih stebrov in zagotoviti ekvivalentno podpiranje lesenega ostrešja, se bo izgradila tudi nova pohodna površina nad 1. nadstropjem.

Konstrukcijsko osnovo te pohodne površine predstavljajo, nad 1. nadstropjem, že vgrajeni kontinuirni kovinski nosilci HEA 260, katerim izvedemo ojačitve krajnih polj (ojačitev sega še 1m v notranje polje) z bočnim dodajanjem dodatnih kovinskih nosilcev HEA 260.

Med pasnice sistema predhodno navedenih kovinskih kontrinuirnih nosilcev se gradijo leseni stropniki prečnih dimenzij 6/22 cm na medosnih razdaljah 60 cm. Sistem lesenih stropnikov se stabilizira z vgradnjo samoreznih vijakov (preko zgornje pasnice kovinskega nosilca HEA 260 v lesen stropnik) ter z vgradnjo zvezne povezovalne pohodne površine iz OSB 22 mm plošč (vgradnja plošč na pero in utor).

PODKONSTRUKCIJA DVIGNJENE POVRŠINE ODRA TER TEHNIČNIH PROSTOROV

Podkonstrukcija dvignjenih pohodnih površin odra ter tehničnih prostorov je zasnovana kot sistem paralelnih paličnih nosilcev, ki nalegajo na spodnje kovinske stropne nosilce POZ KN2, POZ KN3 ter POZ KN4. Omenjene lesene palične nosilce položimo ter pritrdimo na prej urejeno konstrukcijo nove pohodne površine nad 1.N (sistem lesenih stropnikov, OSB plošč).
Gornji pas lesene palične konstrukcije predstavljajo leseni elementi prečnih dimenzoj b/h=18/22cm, spodnji pas, vertikale ter diagonale pa so prav tako lesene, prečnih dimenzij b/h=14/14cm.

Med zgornje pasove paralelnih paličnih konstrukcij so, kot v nižjeležeči stropni konstrukciji, vgrajeni leseni stropniki prečnih dimenzij 8/22 cm na medosnih razdaljah 60 cm. Ti bodisi nalegajo na zgornje pasnice paličij ali pa so na njih bočno pritrjeni spomočjo kovinskih elementov – npr. BMF sistem.
Preko omenjenih lesenih stropnikov se vgradi povezovalna pohodna površina OSB 22 mm plošč (vgradnja plošča na pero in utor).

NOV ZUNANJI STOPNIŠČNI PRIZIDEK Z DVIGALOM

Stopniščni prizidek z dvigalom je okvirnih tlorisnih dimenzij 7.70m x 8.45m, višina atike strešne konstrukcije sega okvirno 12.50m na urejen okolni teren. Za natančnejšo predstavo glej grafične priloge ter pozicijske načrte.

Nov stopniščni prizidek je zasnovan kot armiranobetonska okvirno stenasta konstrukcija. Armiranobetonske stene dvigalnega jaška so debeline 20cm, obodni armiranobetonski stebri konstrukcije so prečnih dimenzij 25/25cm, povezovalni armiranobetonski nosilci/grede pa so širine 25cm ter višine 50cm (nad pritličjem) 110cm (nad 1. nadstropjem) ter 100-105cm nad 2. nadstropjem. Med obodnimi armiranobetonskimi stebri v pritličju ter nadstropju so mestoma vgrajene nosilne opečne stene debeline 25cm, ki so povezane s sistemom horizontalnih in vertikalnih armiranobetonskih vezi

Armiranobetonske stopne/medetažne konstrukcije, stopniščni podesti ter stopniščne rame so debeline 15cm.

Stopniščni prizidek je temeljen na armiranobetonski temeljni plošči, s poglobitvijo za dvigalni jašek, debeline 25cm.

Med stopniščnim prizidkom ter ojačanimi vmesnimi legami POZ VL1 / POZ VL1/A se predela obstoječe leseno ostrešje. Vgradijo se novi leseni špirovci POZ ŠP3 prečnih dimenzij 12/20cm, ki so vgrajeni na medsebojnih razdaljah okvirno 95cm.

NOV OBJEKT GASILSKEGA MUZEJA

Ob novem zunanjem stopnišču je predvidena izgradnja pritličnega objekta, ki bo služil za namene Gasilsega muzeja. Objekt je zasnovan kot kombinacija nosilnih opečnih zidov s sistemom povezovalnih horizontalnih in vertikalnih armiranobetonskih vezi ter armiranobetonskih konstrukcij.

Objekt je okvirnih tlorisnih dimenzij 11.90m x 13.90m. Vrh zidu atike, ki sočasno služi kot varovalna ograja pohodne strešne površine, se nahaja okvirno 6.50m nad urejenim okolnim terenom. Za natančnejšo predstavo glej grafične priloge ter pozicijske načrte.

Strešno/stropno konstrukcijo nad prostori pritličja predstavlja monolitna armiranobetonska plošča debeline 16cm (POZ 141P). Le ta je po svojem obodu podprta z nosilnimi opečnimi zidovi debeline 25cm ter mestoma tudi z armiranobetonskimi nosilci prečnih dimenzij b/h=25/60cm (POZ 135P, POZ 136P). Po celotni dolžini – vzdolž daljše stranice zgradbe je omenjena armiranobetonska plošča na sredini razpona podprta z armiranobetonskim nosilcem b/h=25/60cm (POZ 137P).

Armiranobetonski nosilec POZ 137P je v notranjosti prostora na tretinah razpona podprt z armiranobetonskimi stebri prečnih dimenzij b/h=25/25cm (POZ 138P).

Nad okenskimi odprtinami POZ 131P – POZ 133P so izvedene armiranobetonske preklade prečnega prereza b/h=25/30cm.

Objekt je temeljen na sistemu medsebojno povezanih pasovnih armiranobetonskih temeljev prečnih dimenzij b/h=80/80cm.

V RAČUNIH UPORABLJENI VHODNI PODATKI TER MATERIALNE KARAKTERISTIKE

- Kvaliteta uporabljenih betonov C 25/30,
- Kvaliteta uporabljene rebraste armature bo S 500B, mrežaste pa MAG 500/560.

- Kovinske konstrukcije (spojni elementi, ležišča, zatege…) so izdealni iz materiala kvalitete S235.

- Za izdelavo ostrešja uporabimo les II. Kategorije (C 24 po Eurocode 5) - iglavci, naravno sušen les (relativna vlaga < 18%), ki ga je potrebno ustrezno zaščititi po JUS (JUS U.C9.500, itd..). Leljeni lesenih nosilci so skladno z Eurocode 5 kvalitete oziroma trdnostnega razreda LH25.

- Pritrjevanje (ostrešje) se izvede z običajnimi lesnimi spojnimi sredstvi (veznimi pločevinami, vijaki, skobami, žičniki, itd.) in načini (zaseki, spahi, čepi, itd.) kot tudi s pomočjo posebej izdelanih kovinskih elementov (glej statične izračune in ostale grafične podlage)

- Kovinska vezna sredstva je potrebno ustrezno zaščititi (AKZ zaščita, vroče pocinkanje, itd.).

V RAČUNIH UPOŠTEVANE OBTEŽBE IN ZAKONODAJA

Vplivi na konstrukcije / upoštevane obtežbe so privzete iz standardov SIST EN 199_ (Evrokod). Osnovne so:

- SIST EN 1991-1-1, Evrokod 1, Splošni vplivi – prostorninske teže, lastna teža, koristne obtežbe stavb, z nacionalnim dodatkom SIST EN 1991-1-1:2004/A101,
- SIST EN 1991-1-3:2004, Eurocode 1: Vplivi na konstrukcije 1-3. del: Splošni vplivi – obtežba snega,
- SIST EN 1991-1-4:2005, Eurocode 1: Vplivi na konstrukcije 1-4. del: Splošni vplivi – obtežba vetra,
- SIST EN 1992-1-1:2005, projektiranje betonskih konstrukcij, splošna pravila in pravila za stavbe,
- SIST EN 1993-1-1:2005, projektiranje jeklenih konstrukcij, splošna pravila in pravila za stavbe,
- SIST EN 1995-1-1:2005, projektiranje lesenih konstrukcij, splošna pravila in pravila za stavbe,
- SIST EN 1998-1:2005, Evrokod 8: Projektiranje potresnoodpornih konstrukcij – 1.del: Splošna pravila, potresni vplivi in pravila za stavbe, z nacionalnim dodatkom SIST EN 1998-1:2005/A101.

Velikosti obtežb, katere so bile merodajne za izvedbo izračunov, so razvidne iz statičnega izračuna.

ZAKLJUČEK

Vsi vgrajeni materiali morajo ustrezati veljavnim standardom in predpisom, za kar je odgovoren izvajalec.

Vsa dela lahko izvajajo samo strokovno usposobljene osebe za to vrsto zahtevanih del. Dela se morajo izvajati pod strokovnim nadzorom.

Grafično je objekt predstavljen v mapi 1 – Načrt arhitekture (PGD, maj 2018) številka 21/2016, ki ga je izdelalo podjetje ARH DEKO d.o.o., Glavni trg 28, 2380 Slovenj Gradec.

Obstoječa zgradba je z vgrajenimi gradbenimi materiali in izvedenim temeljenjem primerna za izvedbo tovrstnega posega.

Sestavil: dr. Bojan ČAS, univ.dipl.inž.grad.

3.4.2 STATIČNI IZRAČUN

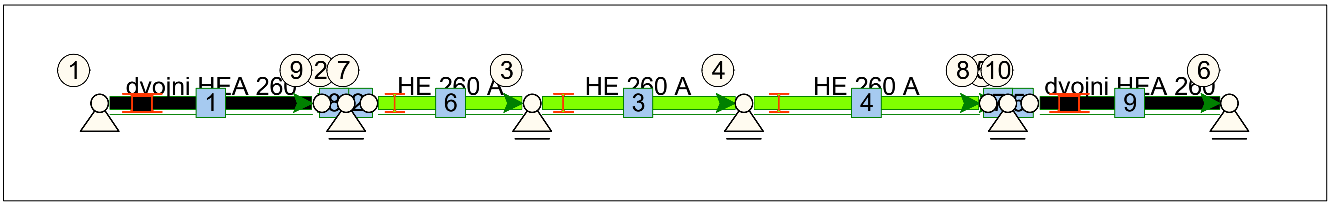
3.4.3 PRILOGE K STATIČNEMU RAČUNU

3.5 POZICIJSKI NAČRTI

3.6 ARMATURNI NAČRTI

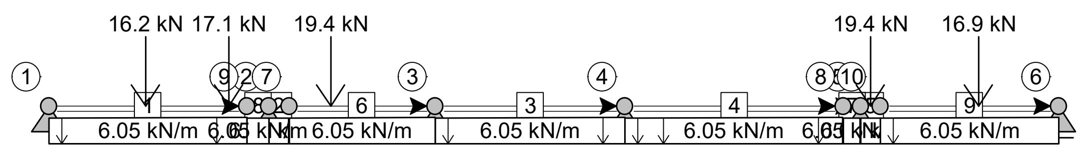
3.7 IZVEDBENI NAČRTI KOVINSKIH KONSTRUKCIJ

Geometry



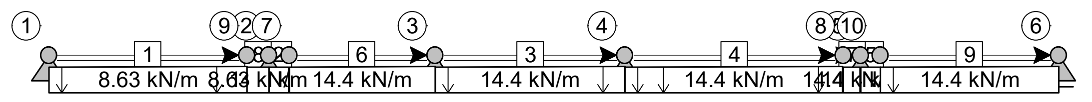
A1 : G

G + Self-weight is added automatically.



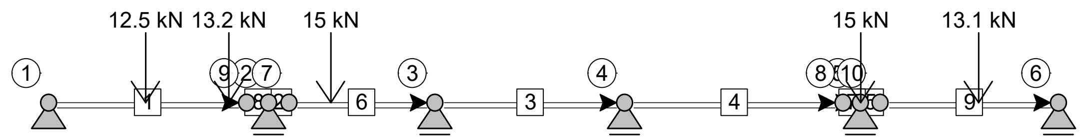
A2 : Q

Q



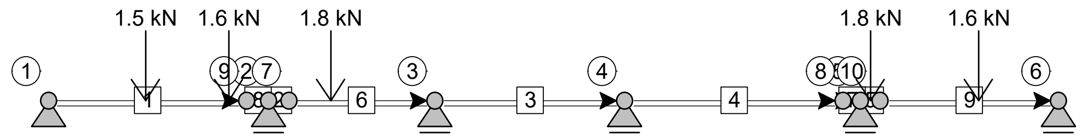
A3 : S

S

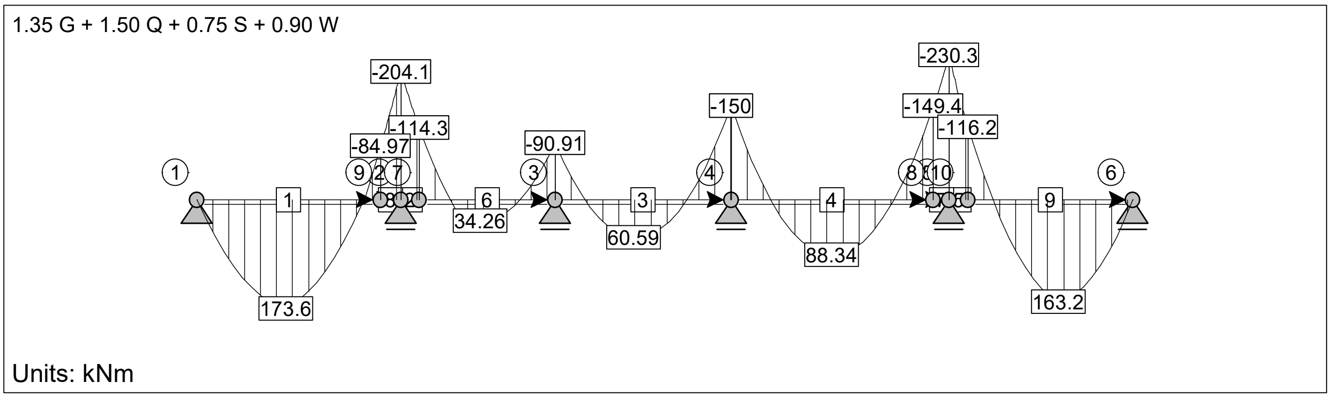


A4 : W

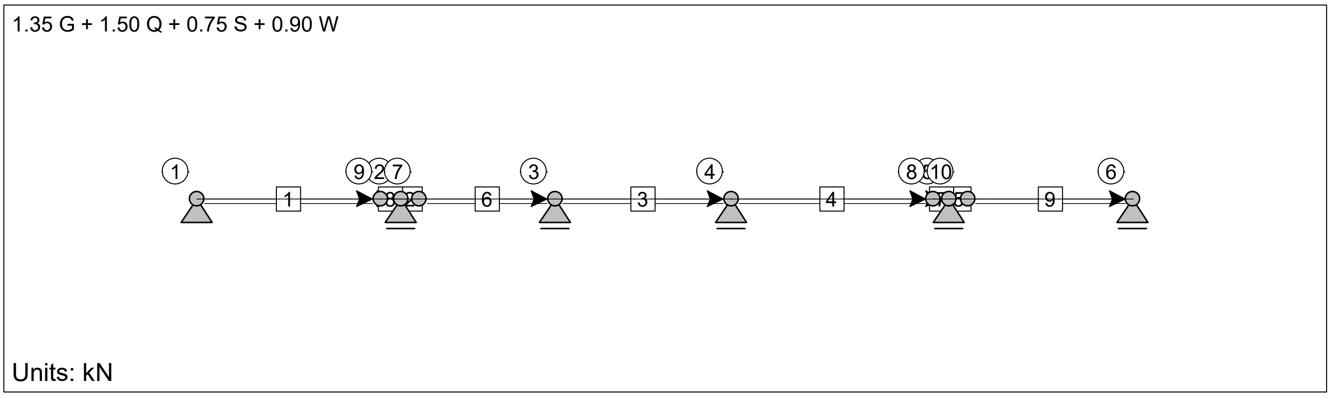
W



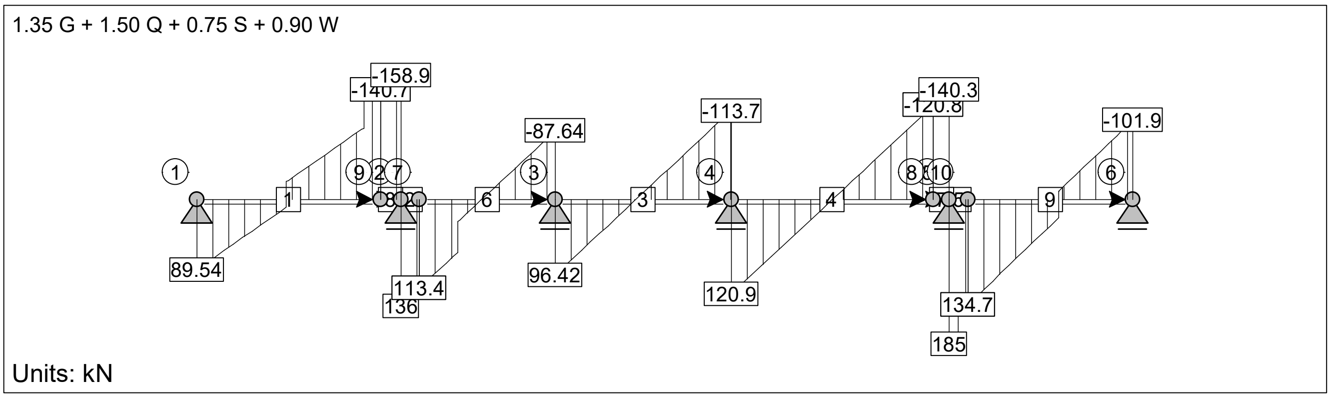
LC1: MSN1: Bending Moments My



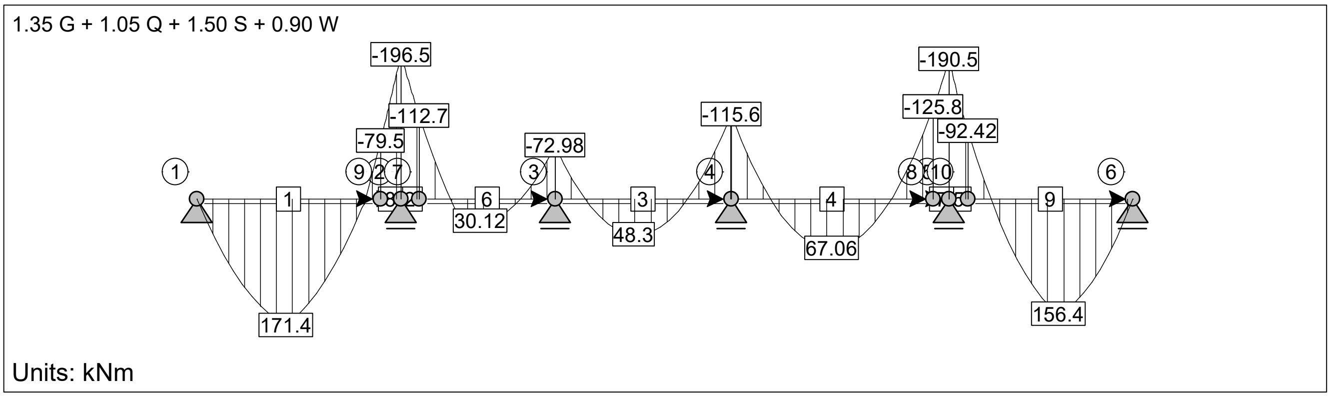
LC1: MSN1: Axial Forces Fx



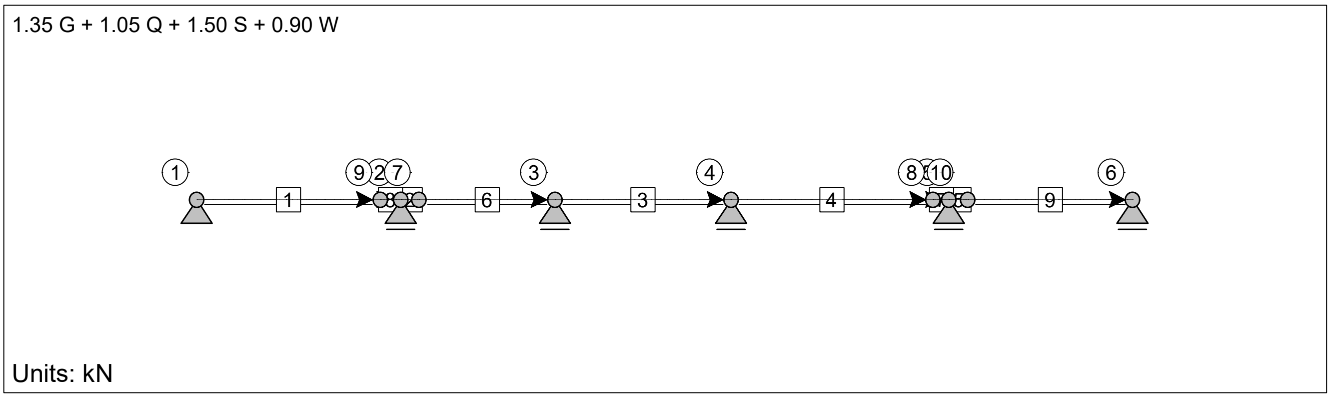
LC1: MSN1: Shear Forces Fz



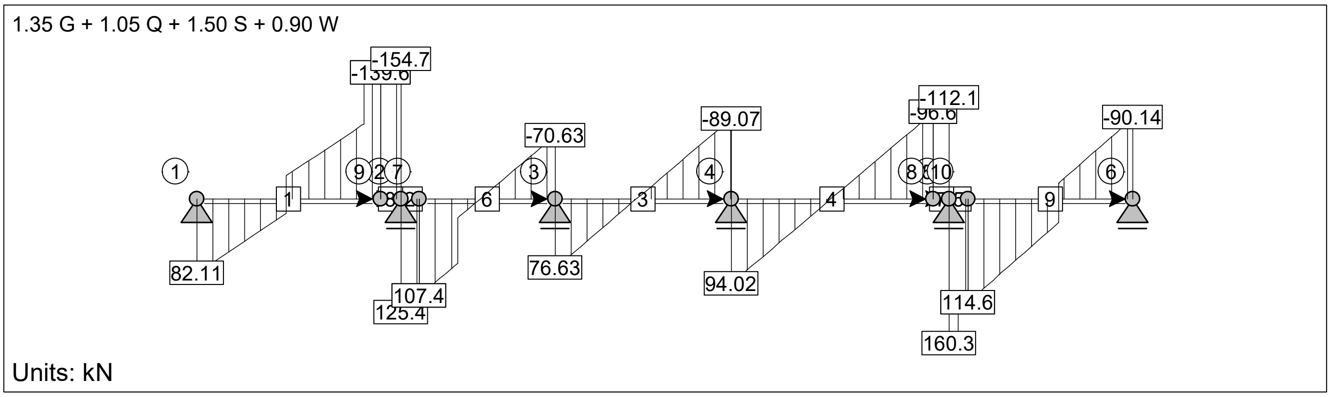
LC2: MSN2: Bending Moments My



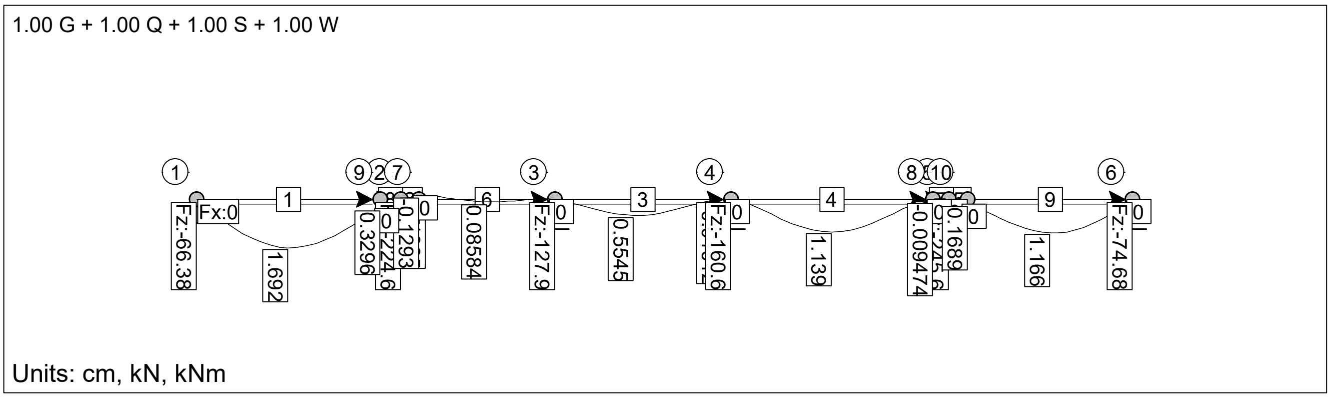
LC2: MSN2: Axial Forces Fx



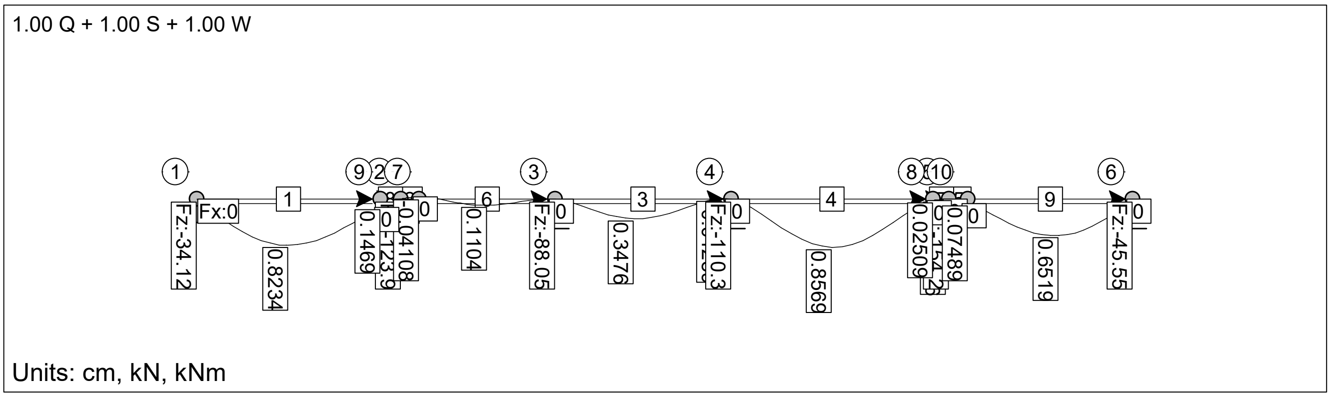
LC2: MSN2: Shear Forces Fz



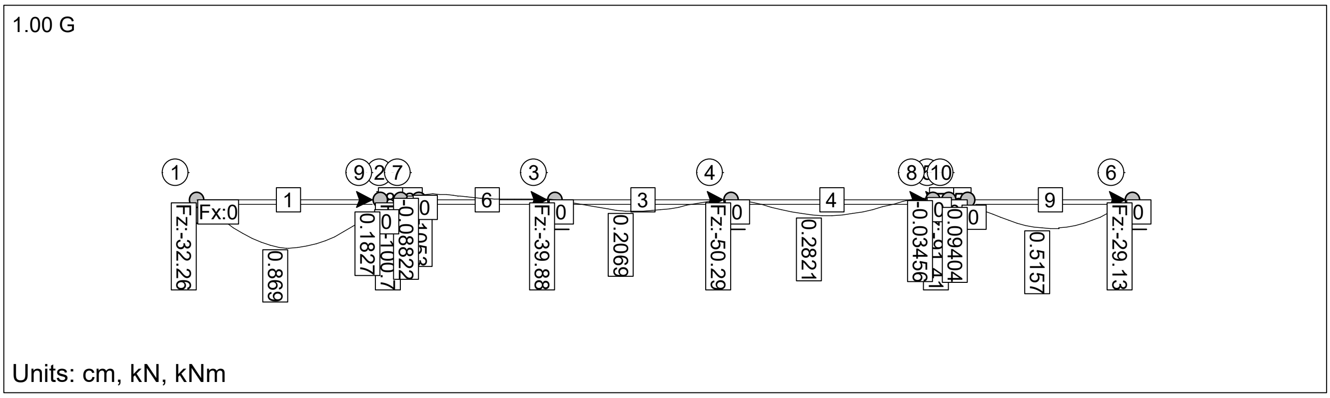
LC3: MSUtot: Displacements and Reactions



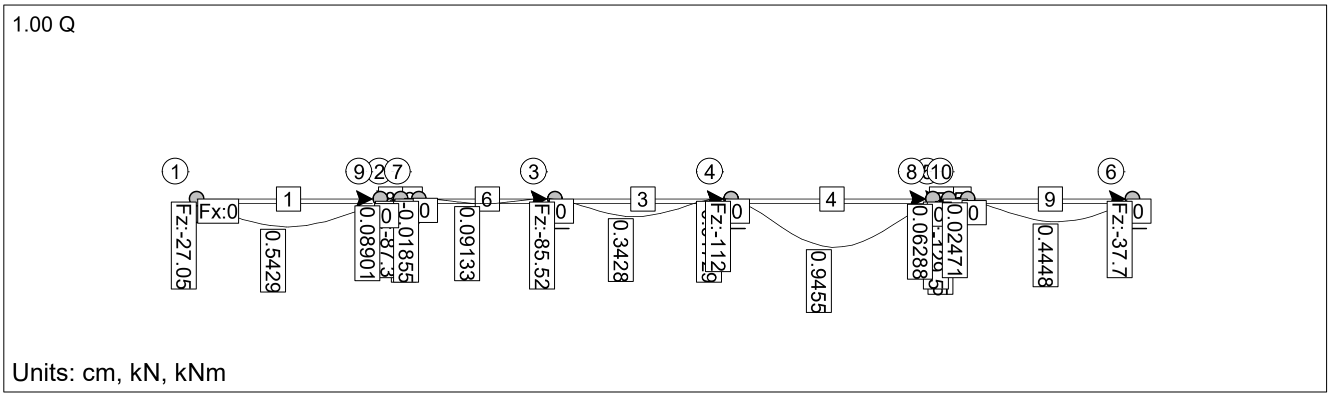
LC4: MSUinst: Displacements and Reactions



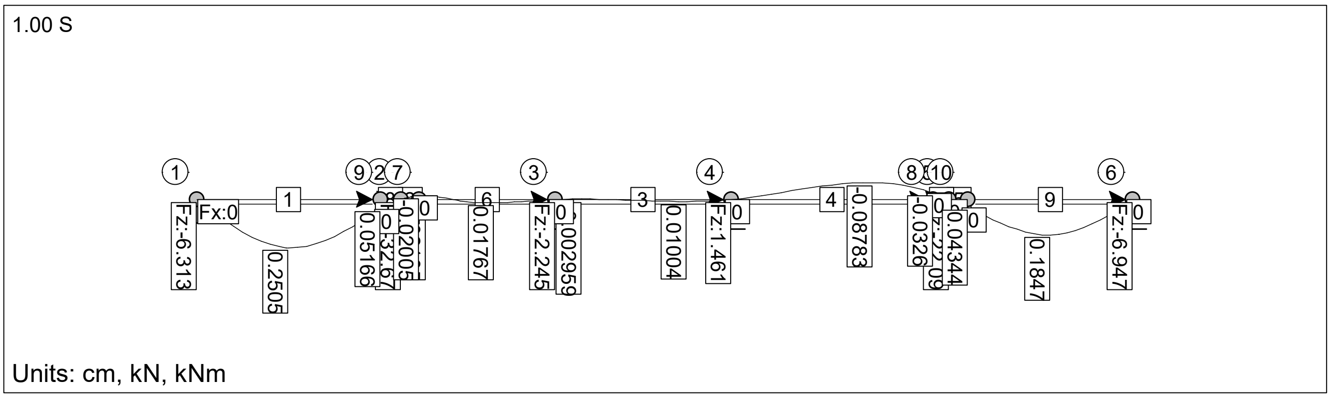
LC5: Load case: 5: Displacements and Reactions



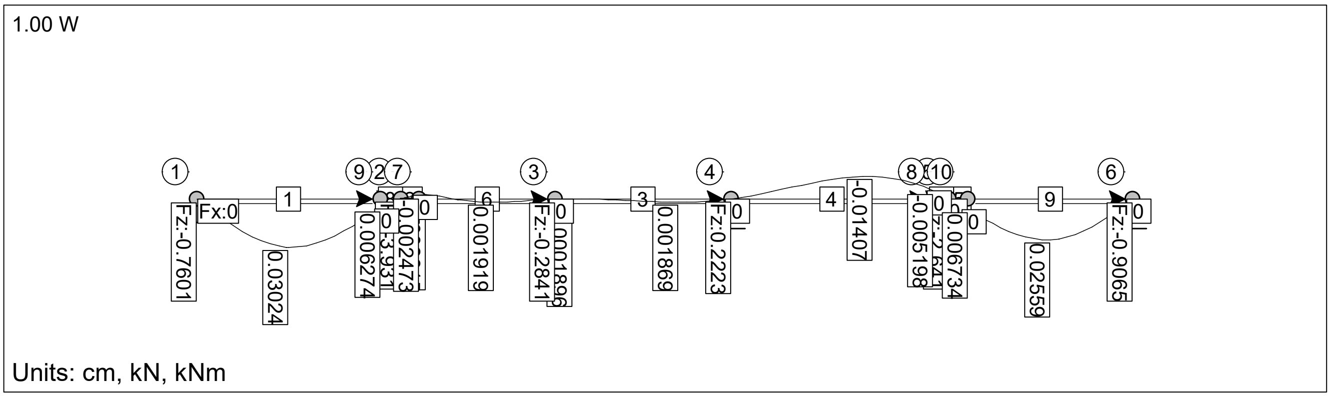
LC6: Load case: 6: Displacements and Reactions



LC7: Load case: 7: Displacements and Reactions



LC8: Load case: 8: Displacements and Reactions



Element 1 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

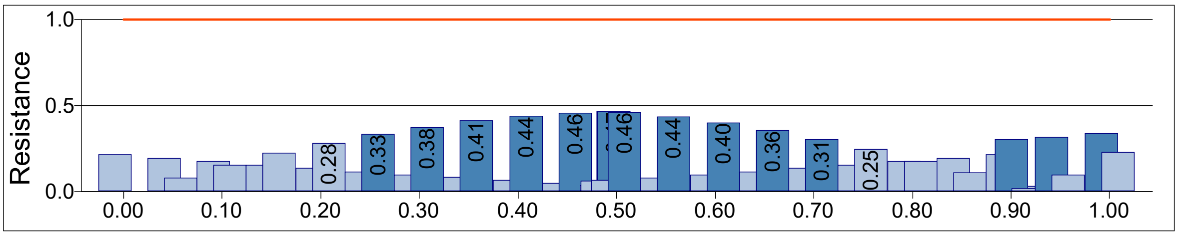
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

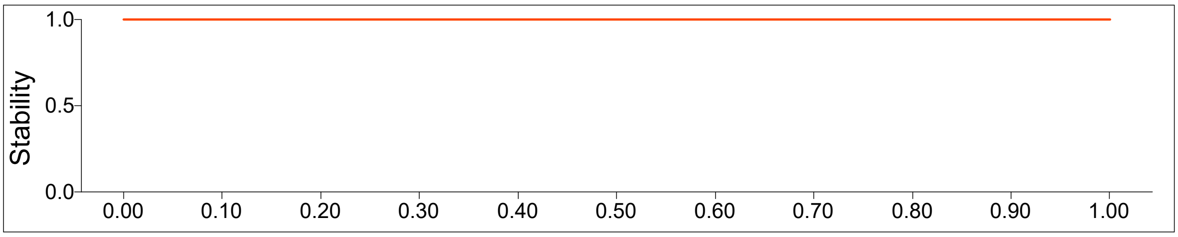
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



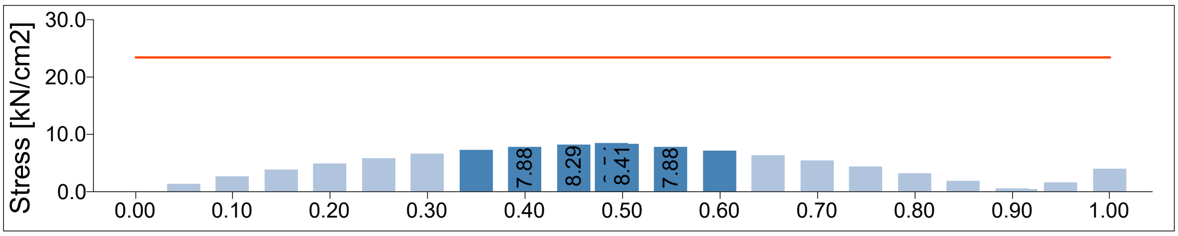
Element stability



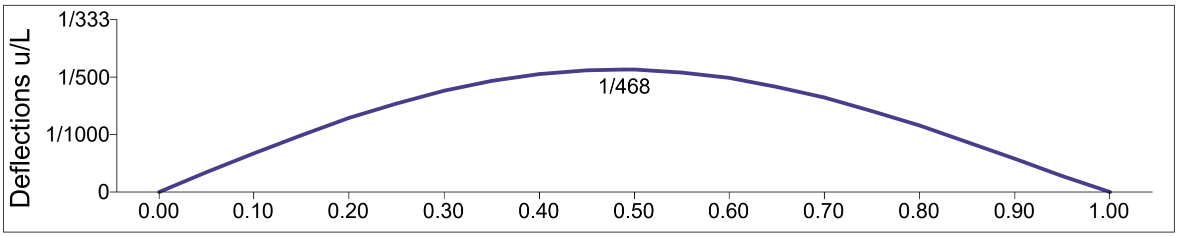
Element stability was not checked!

Serviceability Limit States

Serviceability stresses



Element deflections (local)



Element 2 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

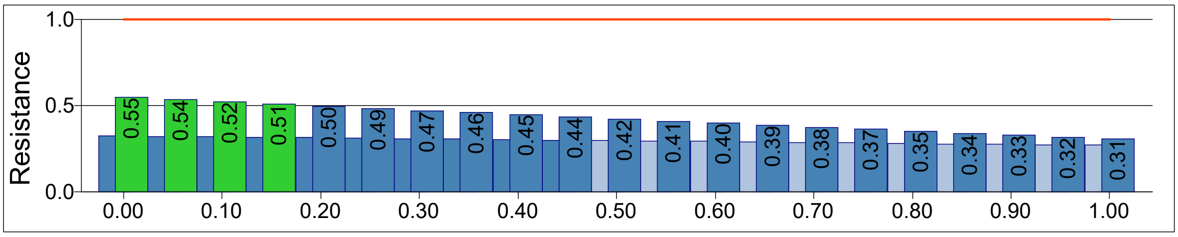
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

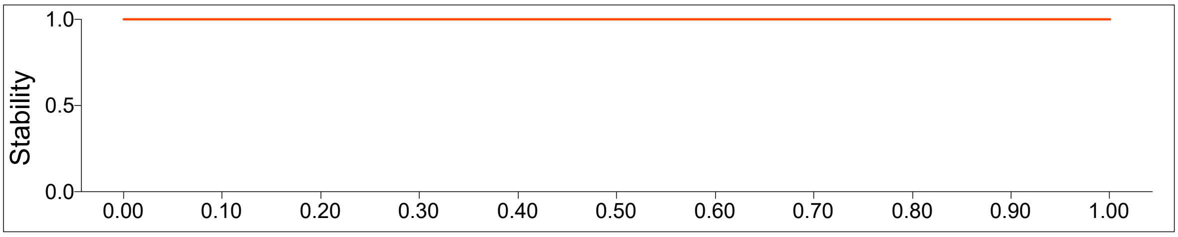
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



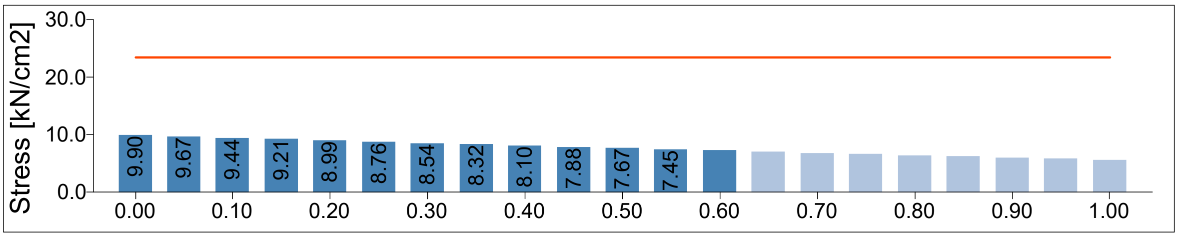
Element stability



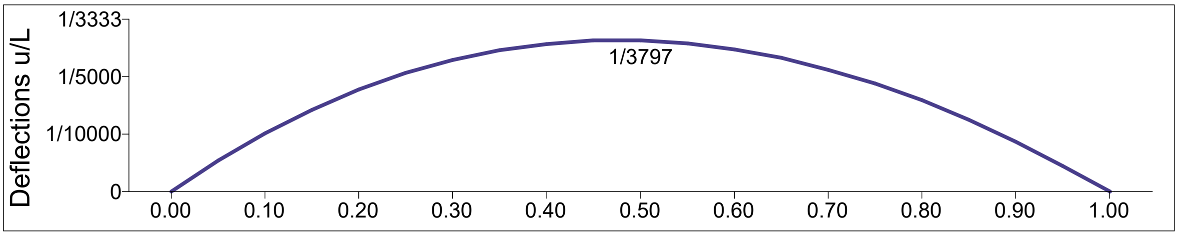
Element stability was not checked!

Serviceability Limit States

Serviceability stresses



Element deflections (local)



Element 3 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

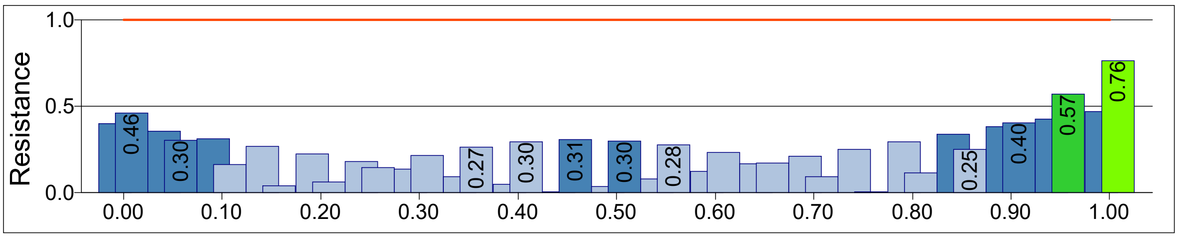
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

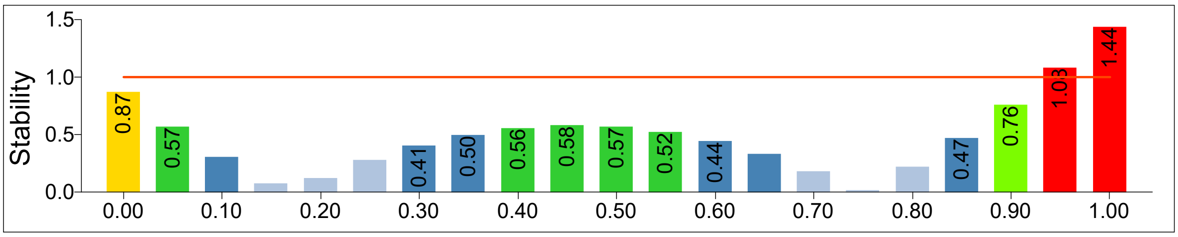
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



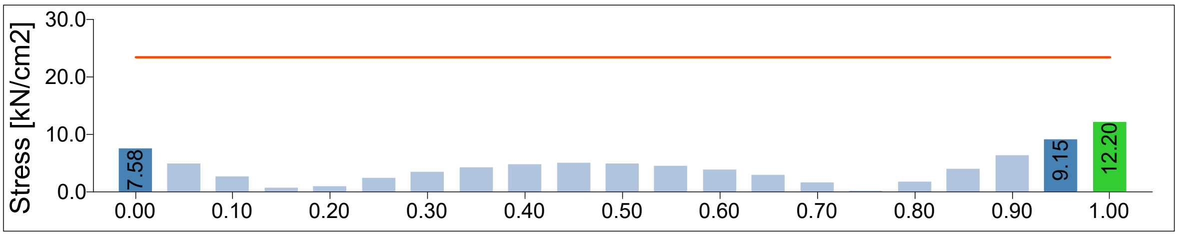
Element stability



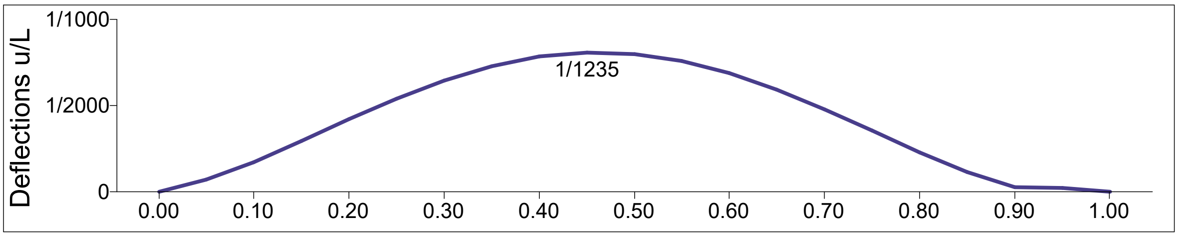
Element was classified into class 1. At least one stablity check has failed. The compentent check is lateral-torsional stability check [1.437 > 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability stresses



Element deflections (local)



Element 4 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

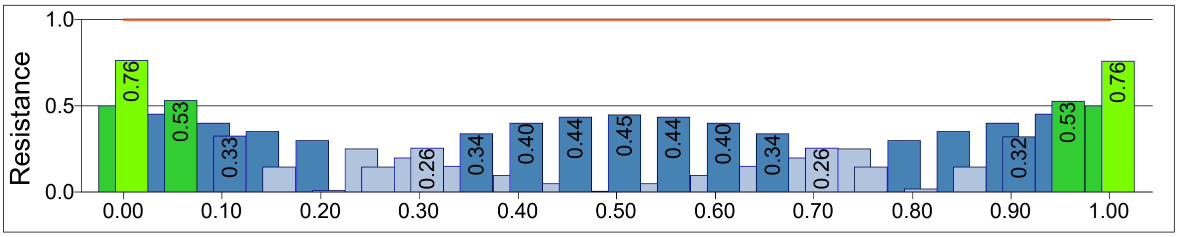
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

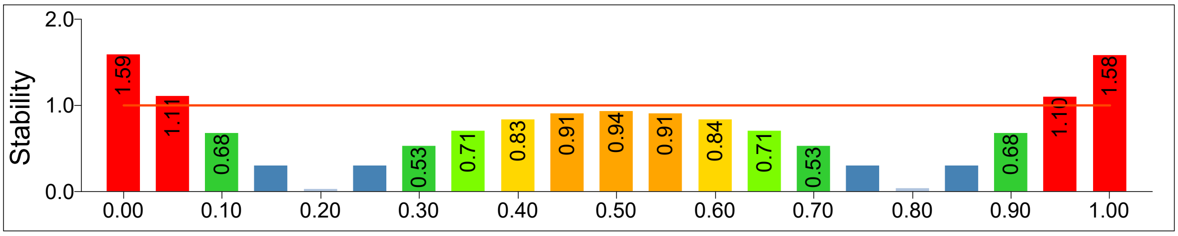
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



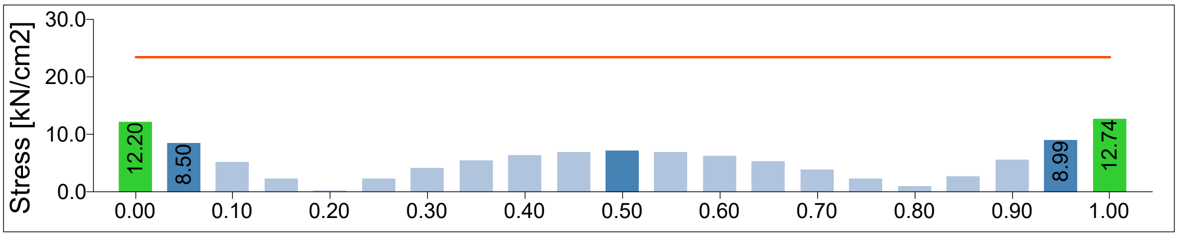
Element stability



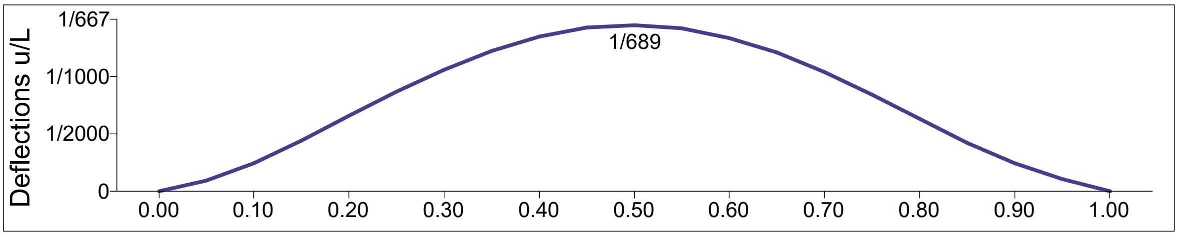
Element was classified into class 1. At least one stablity check has failed. The compentent check is lateral-torsional stability check [1.589 > 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability stresses



Element deflections (local)



Element 5 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

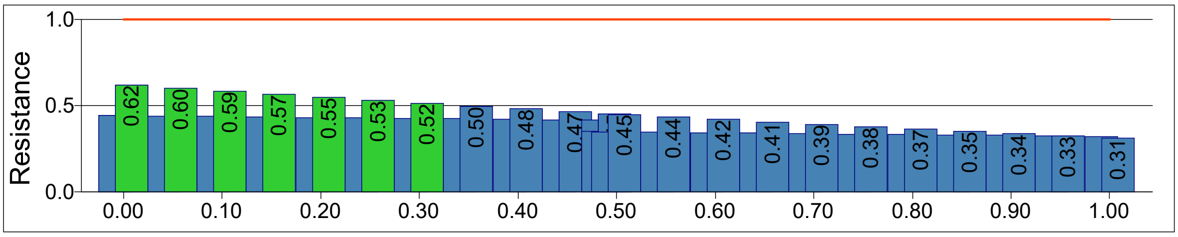
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

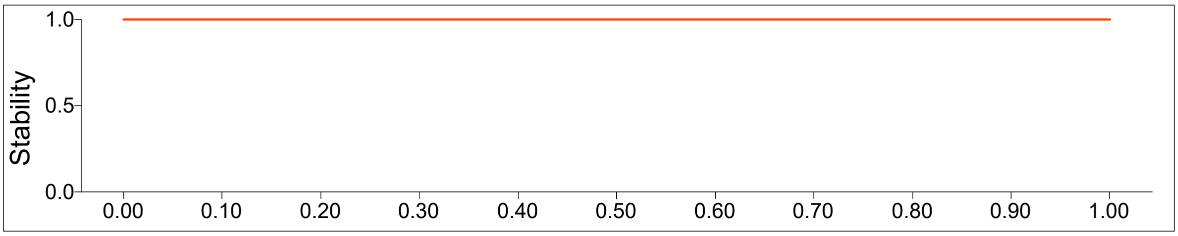
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



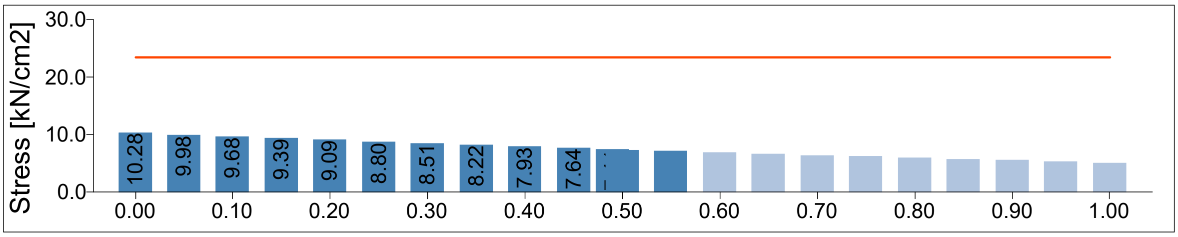
Element stability



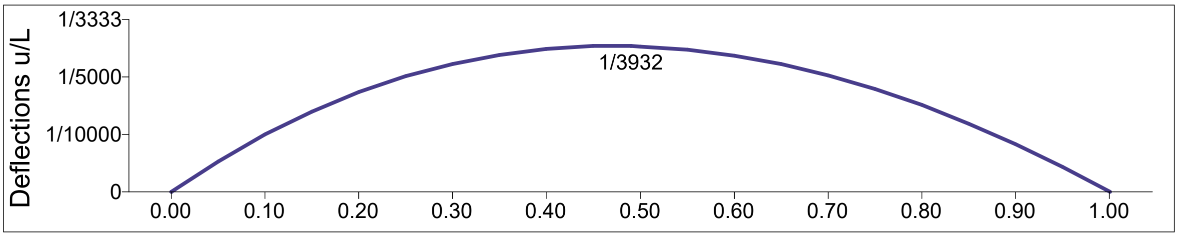
Element stability was not checked!

Serviceability Limit States

Serviceability stresses



Element deflections (local)



Element 6 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

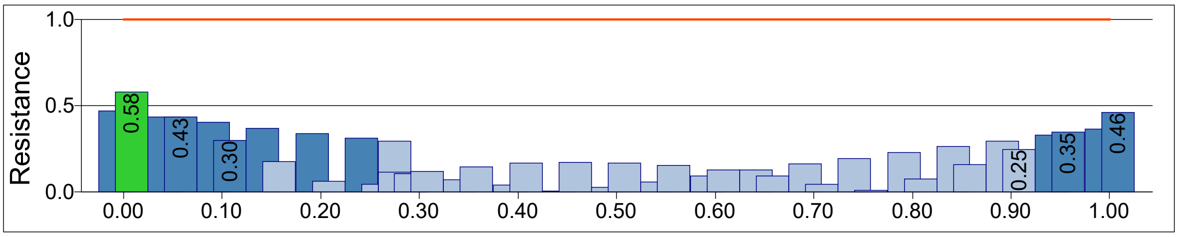
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

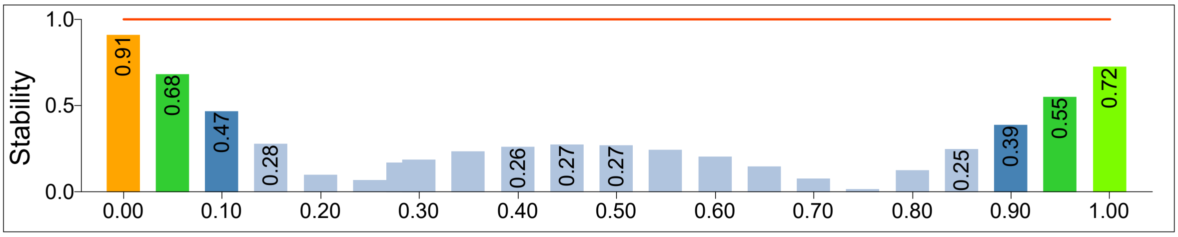
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. All stability checks have passed. The compentent check is lateral-torsional stability check [0.911 <= 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 7 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

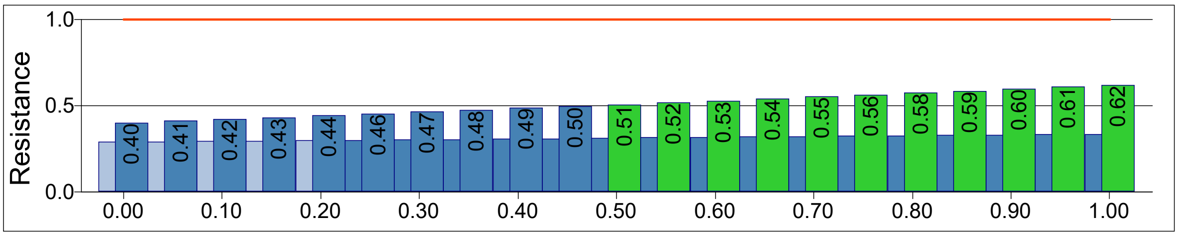
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

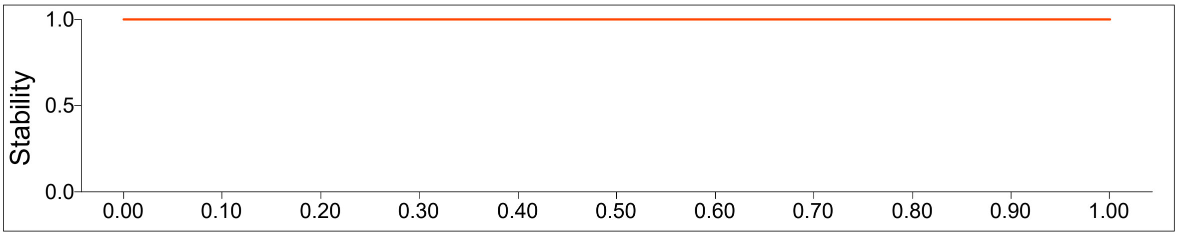
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element stability was not checked!

Serviceability Limit States

Serviceability limit states were not calculated.

Element 8 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

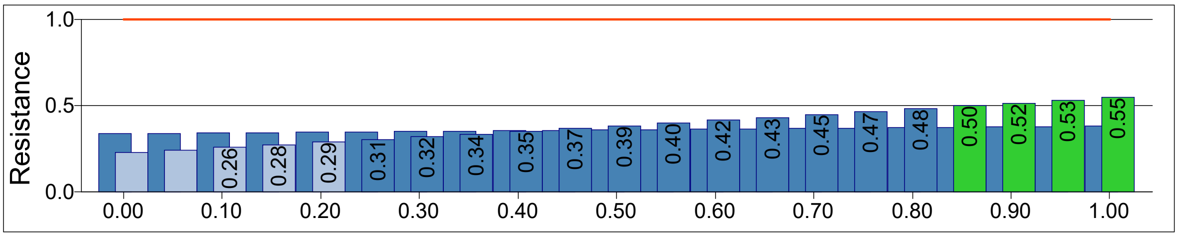
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

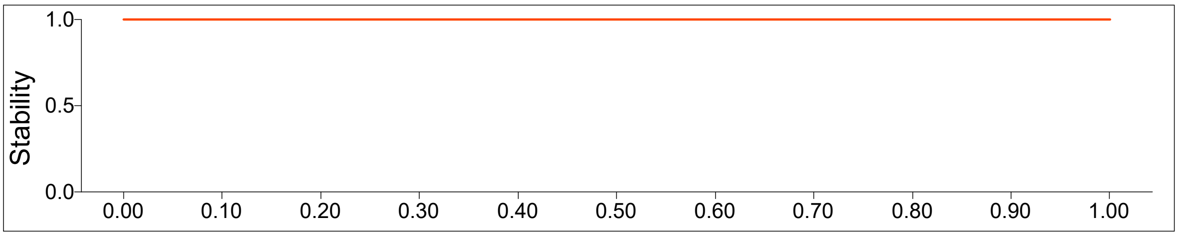
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element stability was not checked!

Serviceability Limit States

Serviceability limit states were not calculated.

Element 9 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

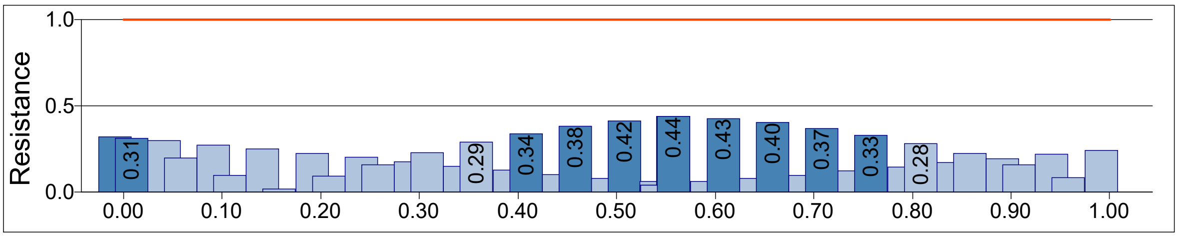
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

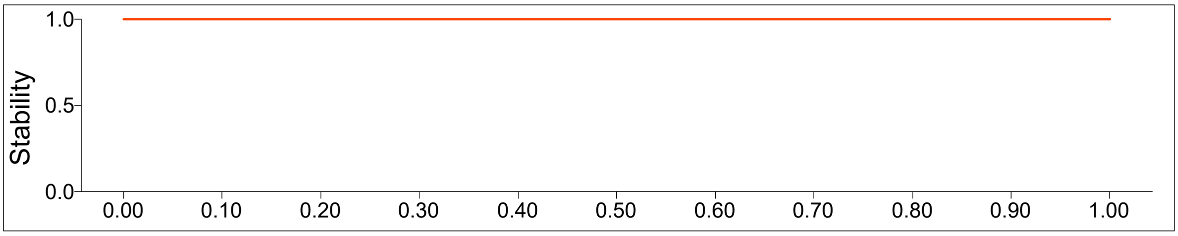
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability

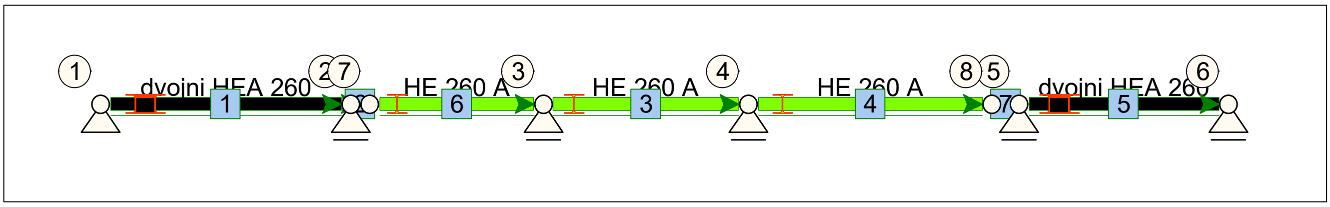


Element stability was not checked!

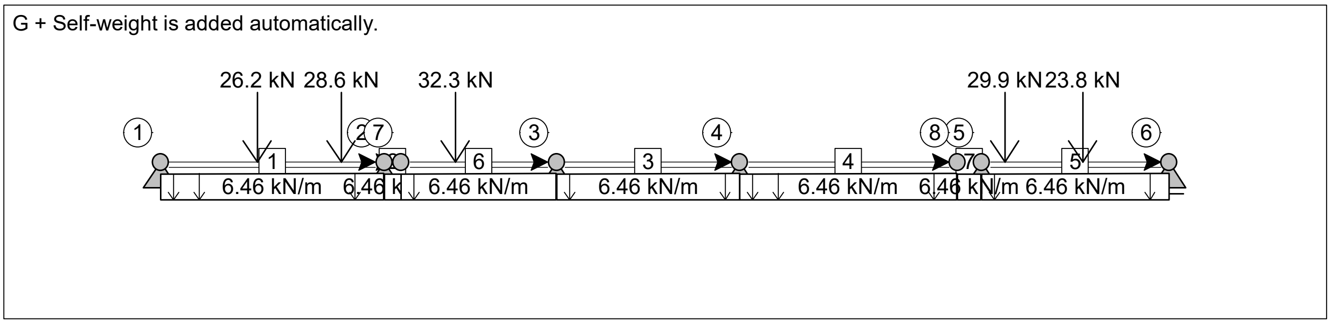
Serviceability Limit States

Serviceability limit states were not calculated.

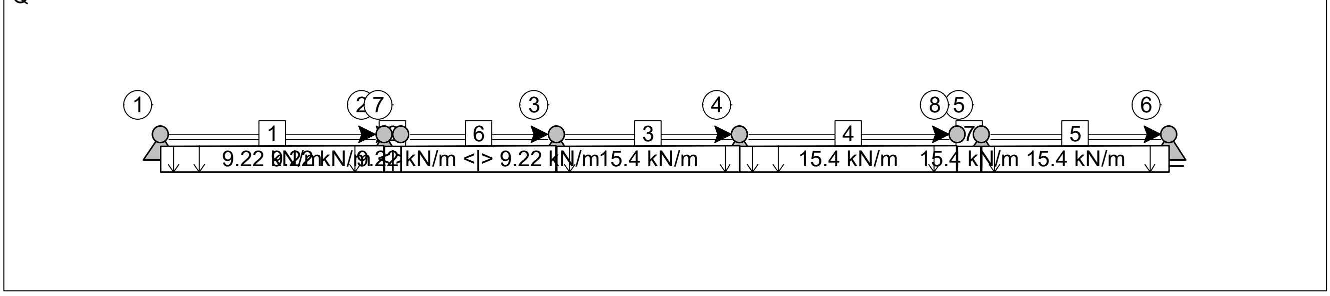
Geometry



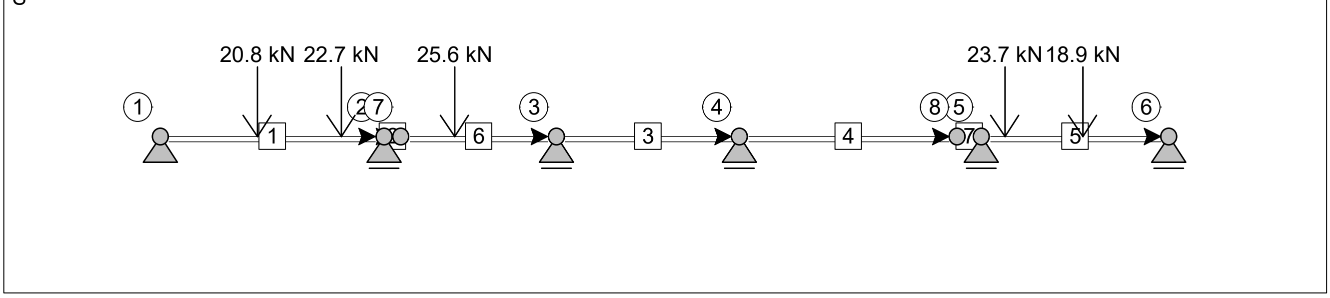
A1 : G



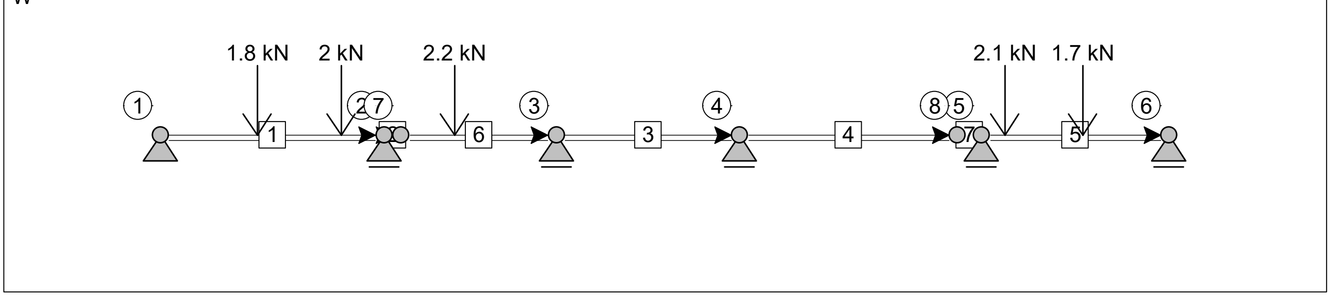
A2 : Q



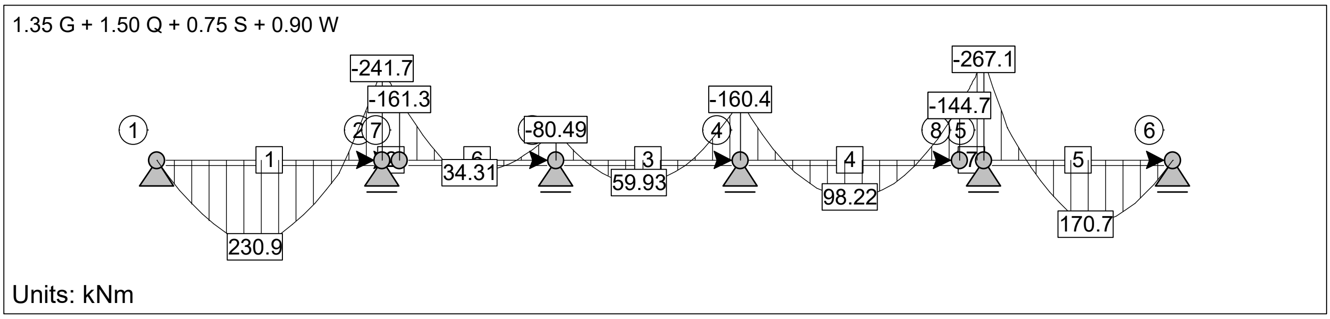
A3 : S



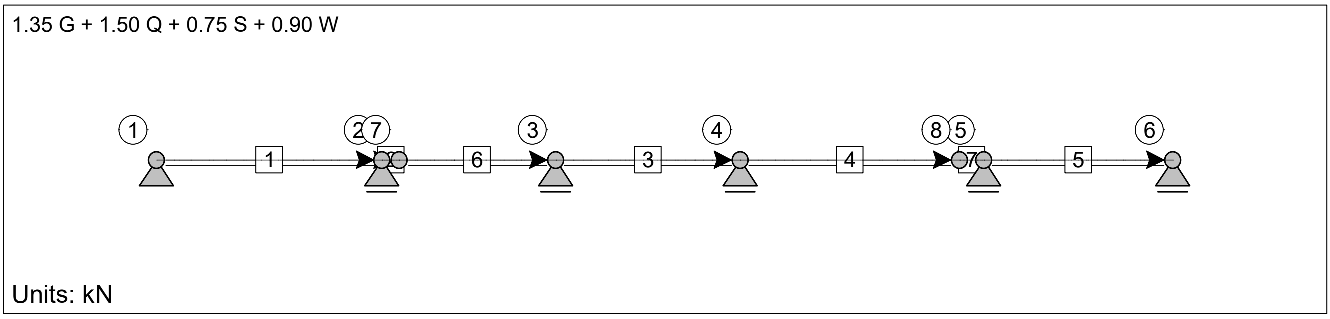
A4 : W



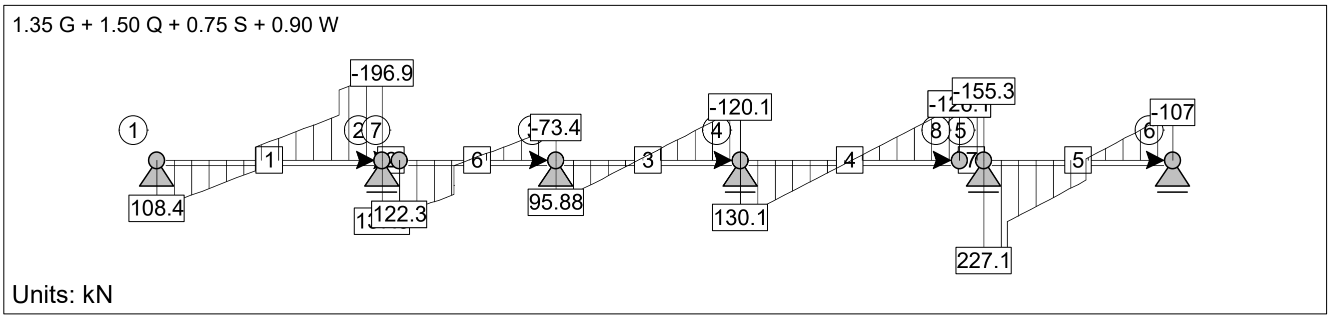
LC1: MSN1: Bending Moments My



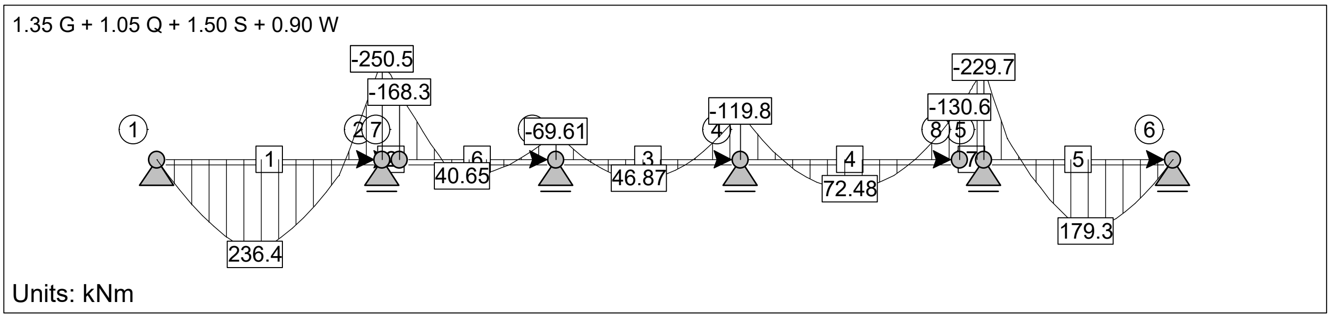
LC1: MSN1: Axial Forces Fx



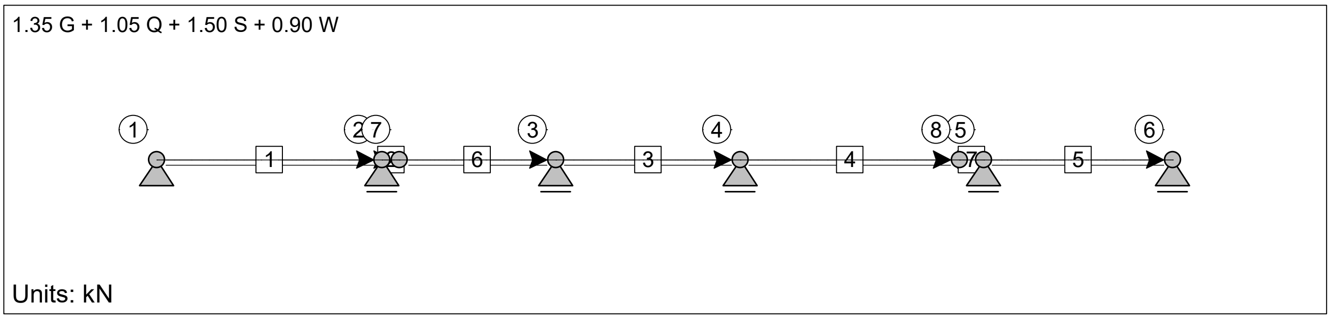
LC1: MSN1: Shear Forces Fz



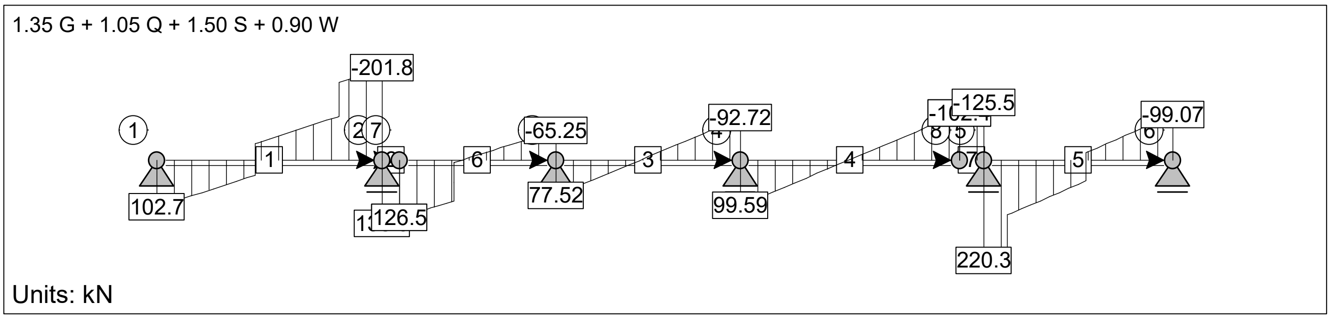
LC2: MSN2: Bending Moments My



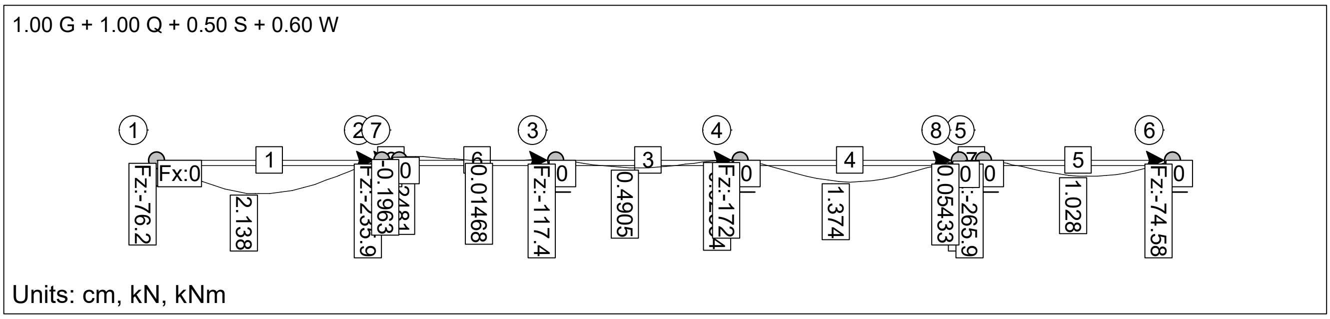
LC2: MSN2: Axial Forces Fx



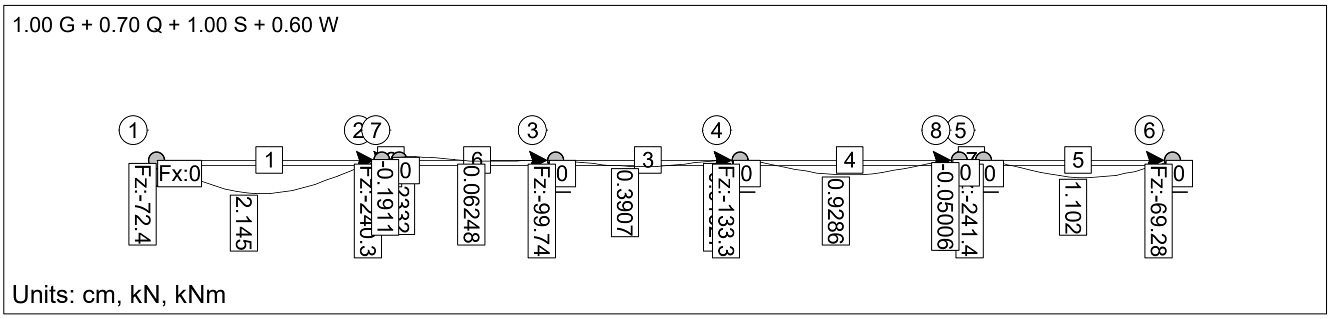
LC2: MSN2: Shear Forces Fz



LC3: MSU1: Displacements and Reactions



LC4: MSU2: Displacements and Reactions



Element 1 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

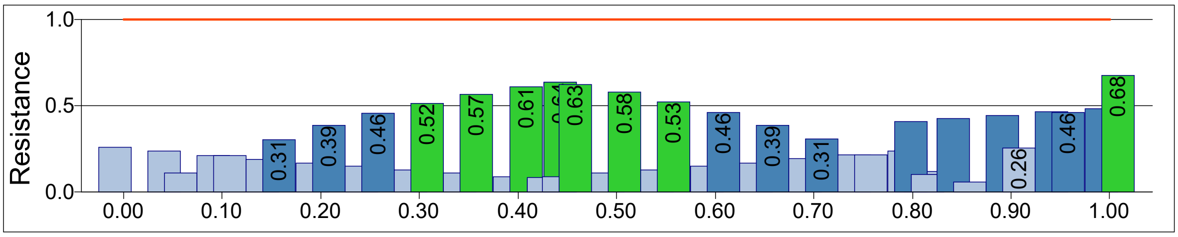
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

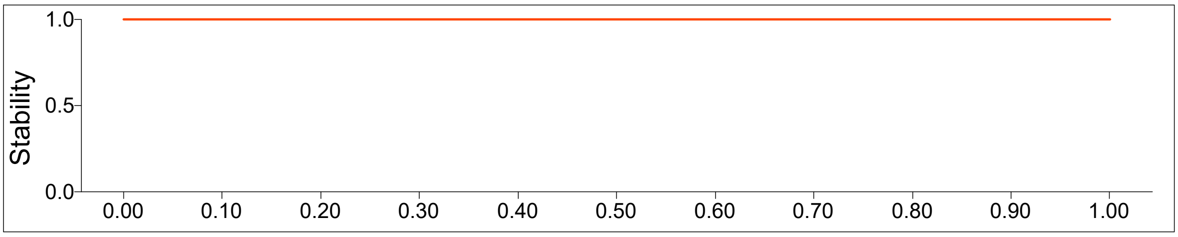
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



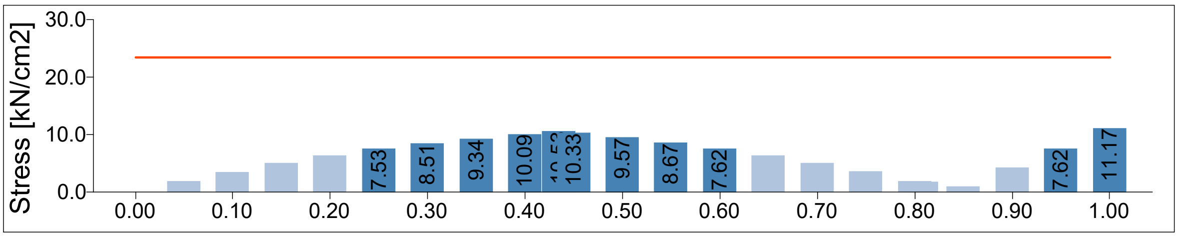
Element stability



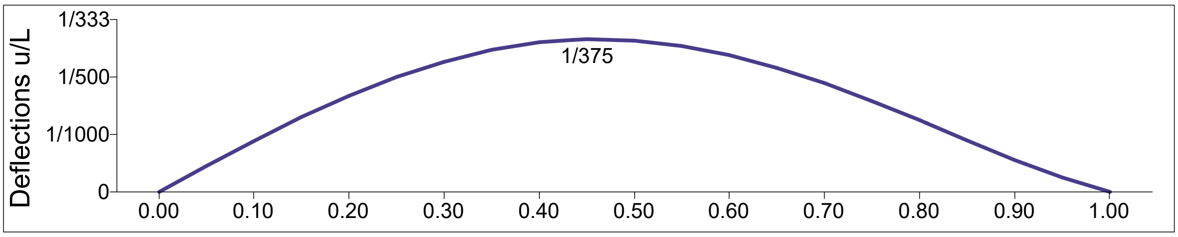
Element stability was not checked!

Serviceability Limit States

Serviceability stresses



Element deflections (local)



Element 2 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

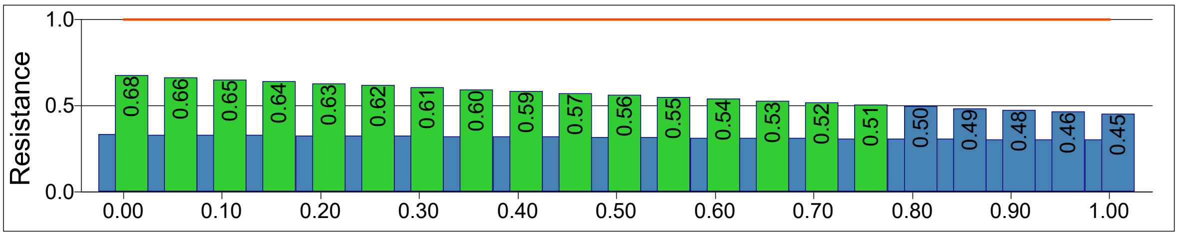
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

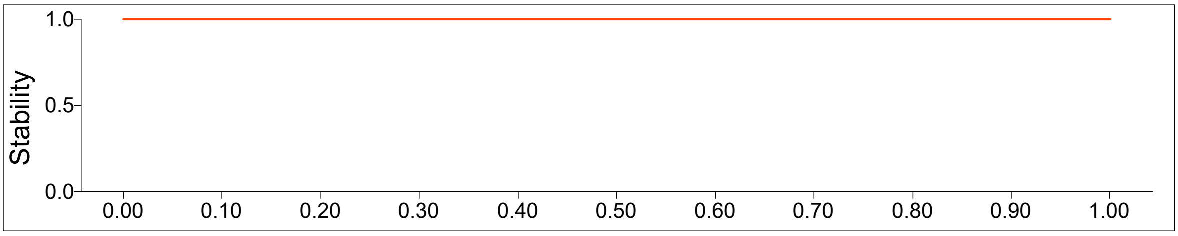
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



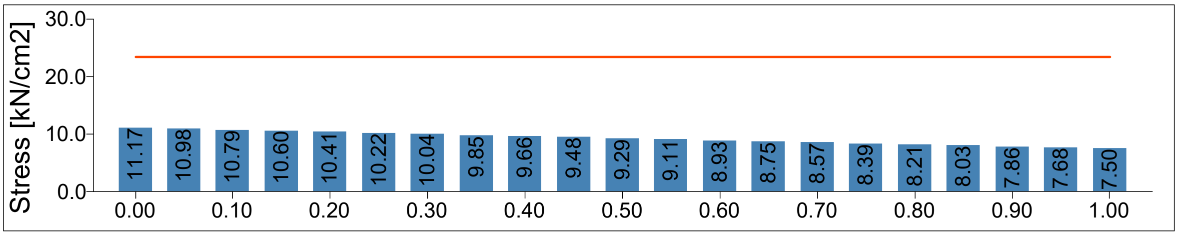
Element stability



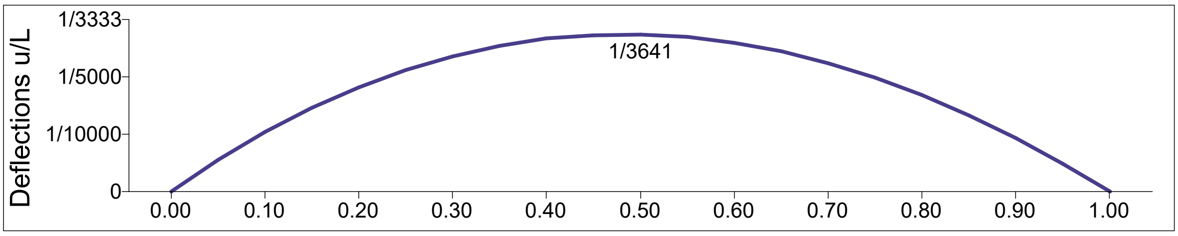
Element stability was not checked!

Serviceability Limit States

Serviceability stresses



Element deflections (local)



Element 3 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

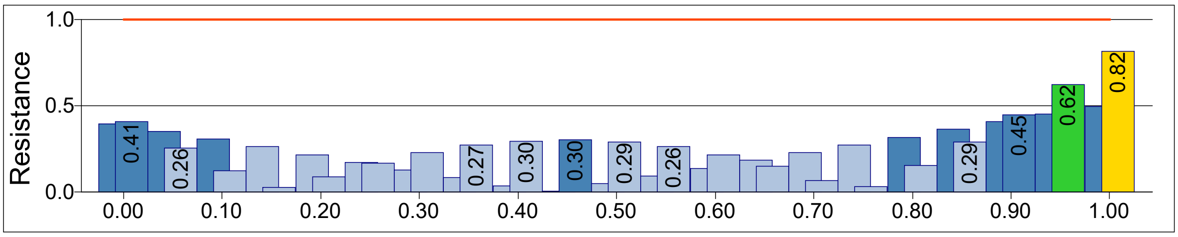
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

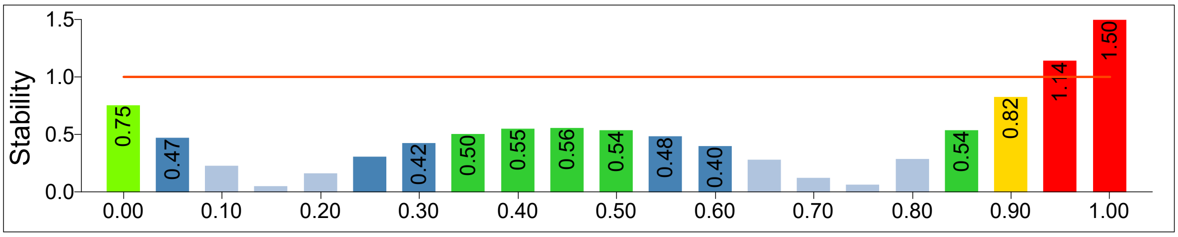
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



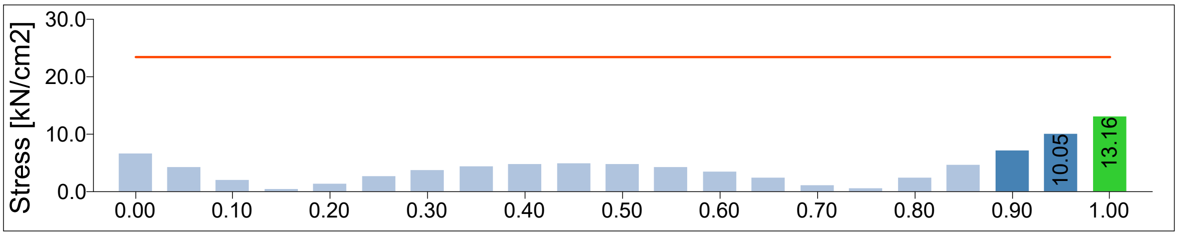
Element stability



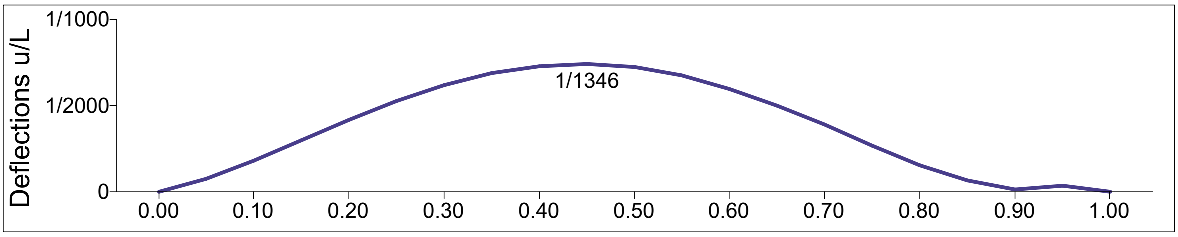
Element was classified into class 1. At least one stablity check has failed. The compentent check is lateral-torsional stability check [1.496 > 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability stresses



Element deflections (local)



Element 4 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A],   h = 25.00,   b = 26.00,   tw = 0.75,   tf = 1.25,   r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

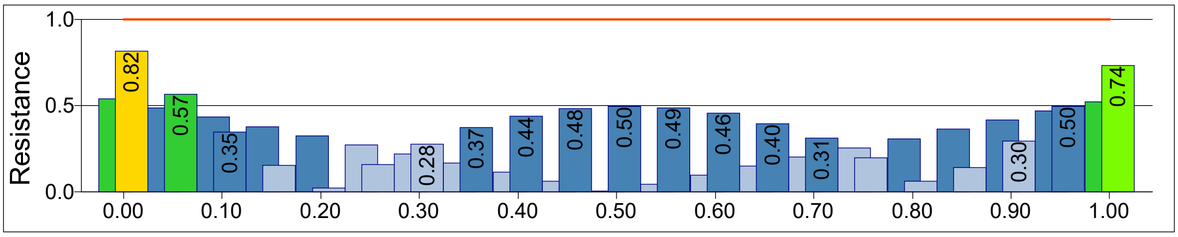
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

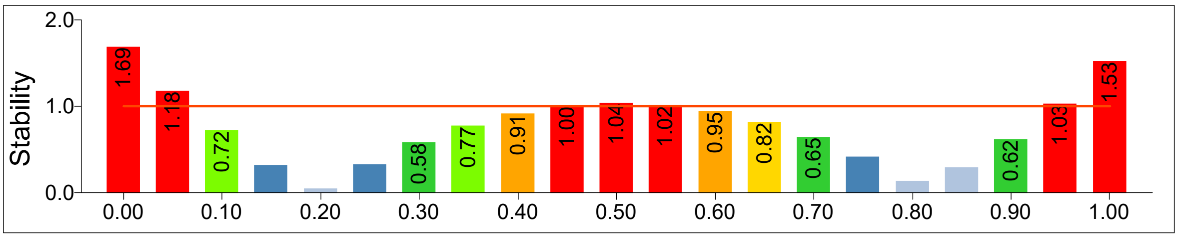
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



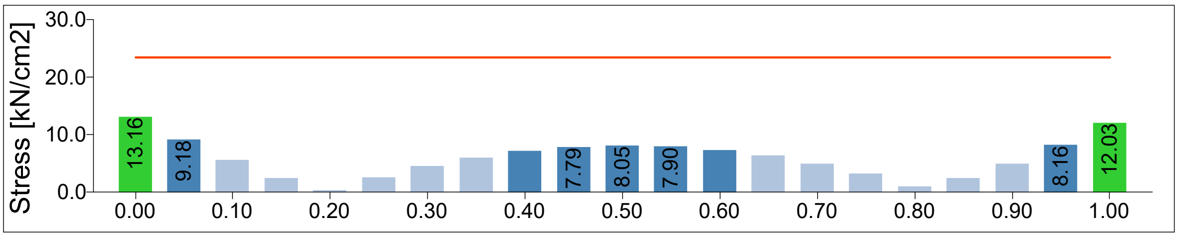
Element stability



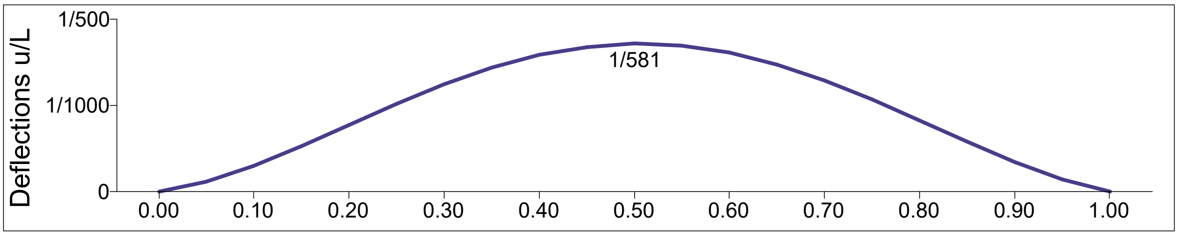
Element was classified into class 1. At least one stablity check has failed. The compentent check is lateral-torsional stability check [1.692 > 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability stresses



Element deflections (local)



Element 5 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

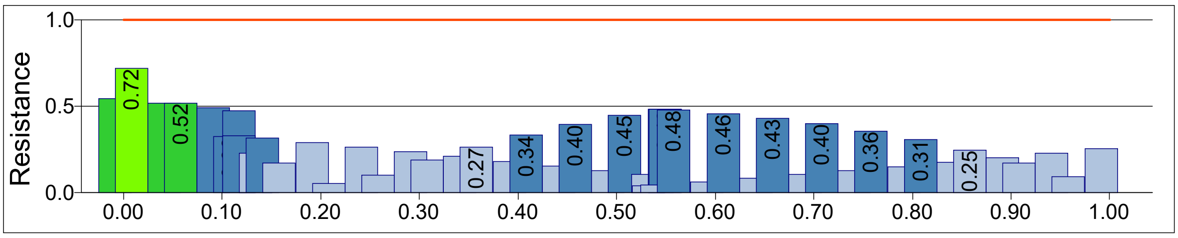
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

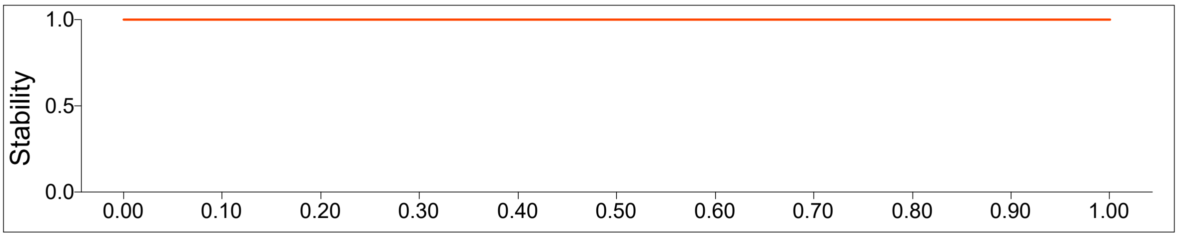
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



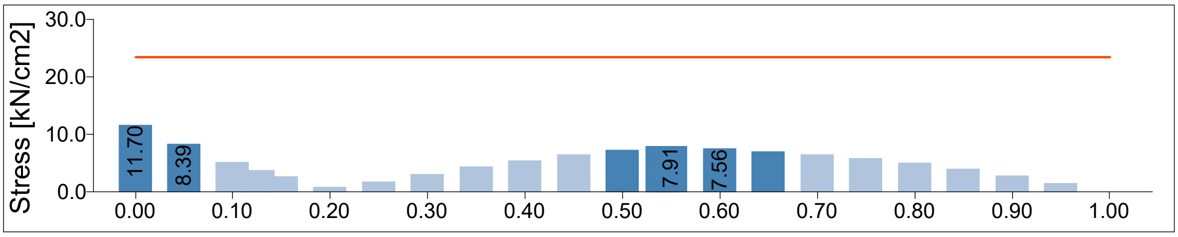
Element stability



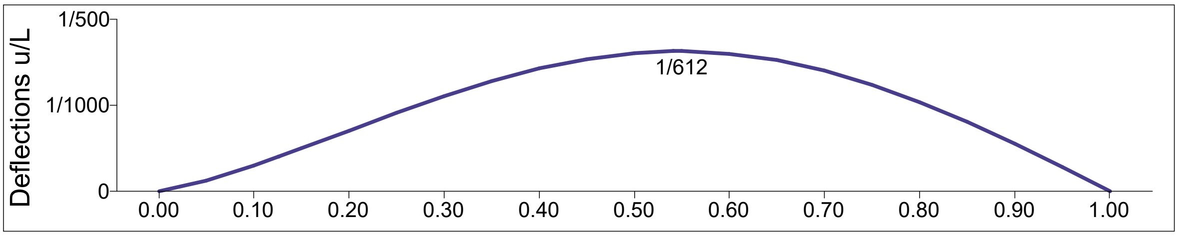
Element stability was not checked!

Serviceability Limit States

Serviceability stresses



Element deflections (local)



Element 6 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

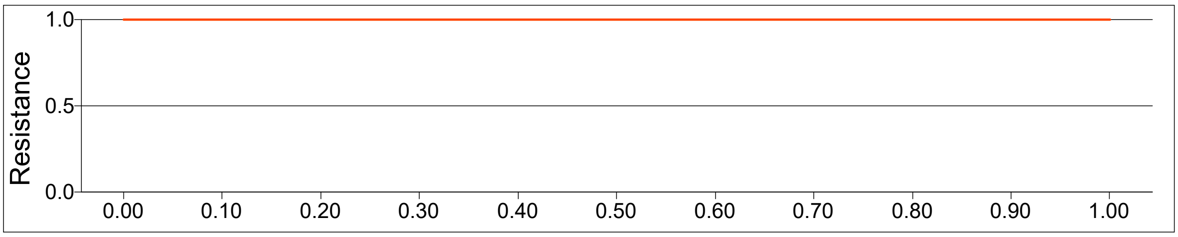
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

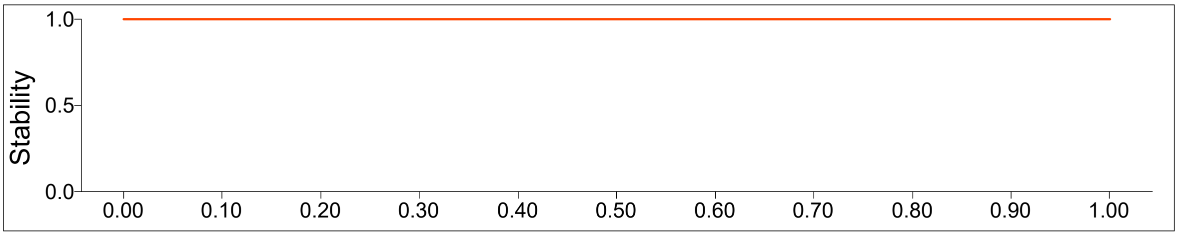
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element stability was not checked!

Serviceability Limit States

Serviceability limit states were not calculated.

Element 7 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

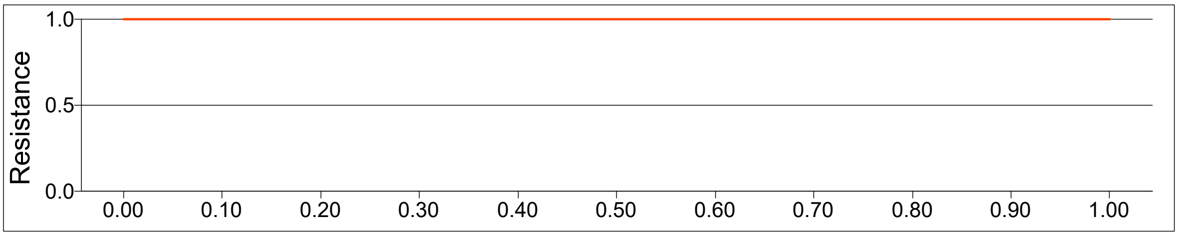
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

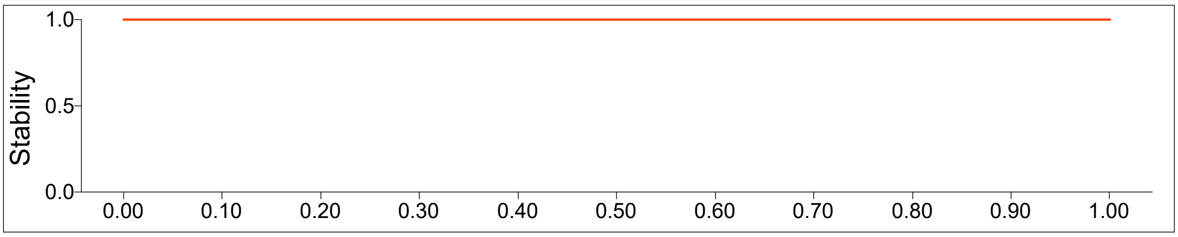
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability

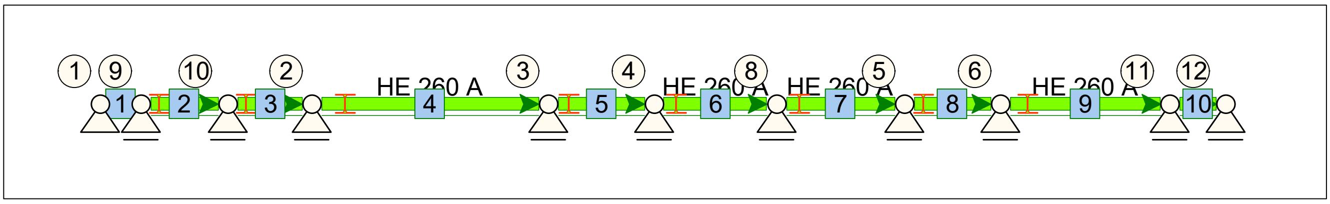


Element stability was not checked!

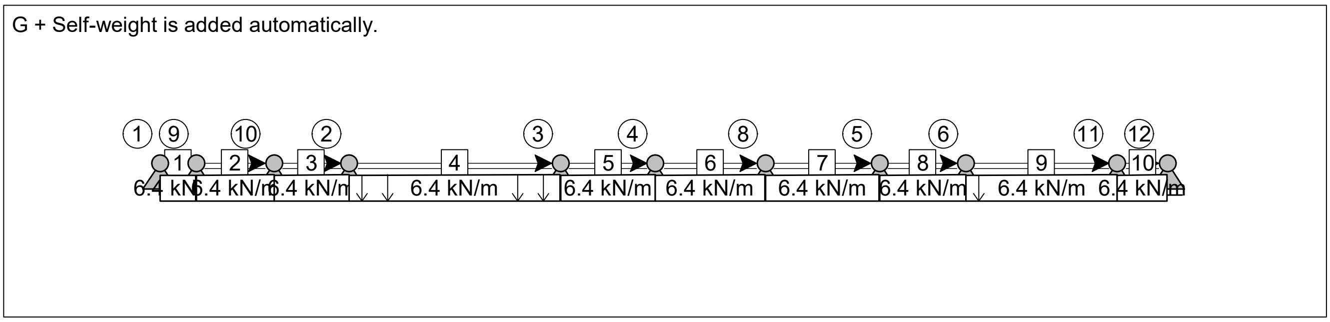
Serviceability Limit States

Serviceability limit states were not calculated.

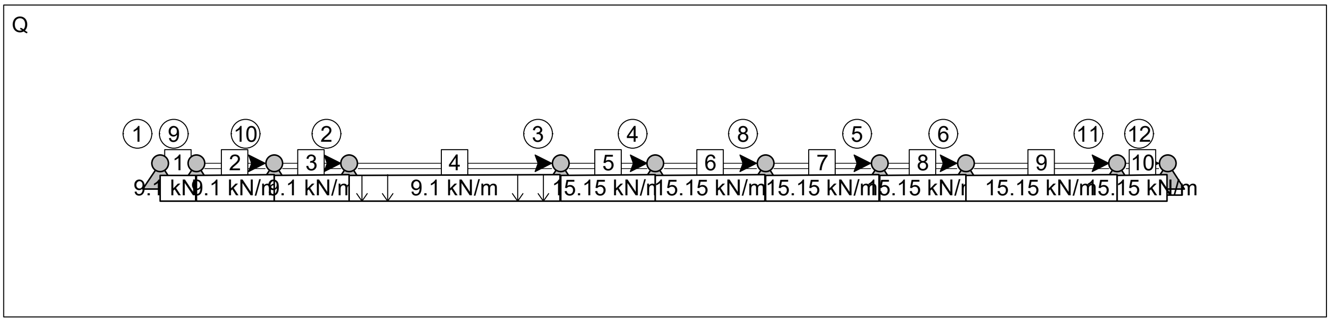
Geometry



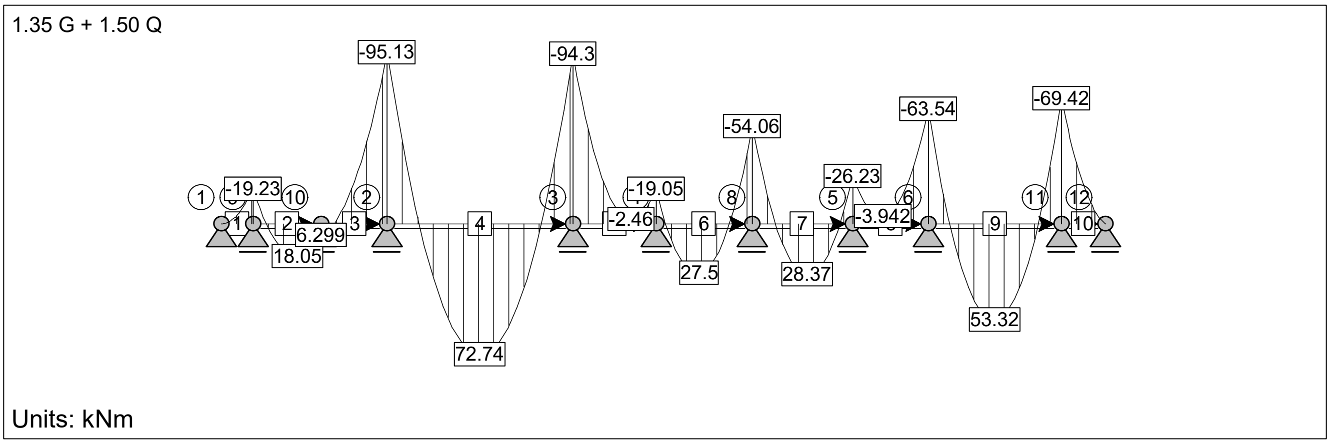
A1 : G



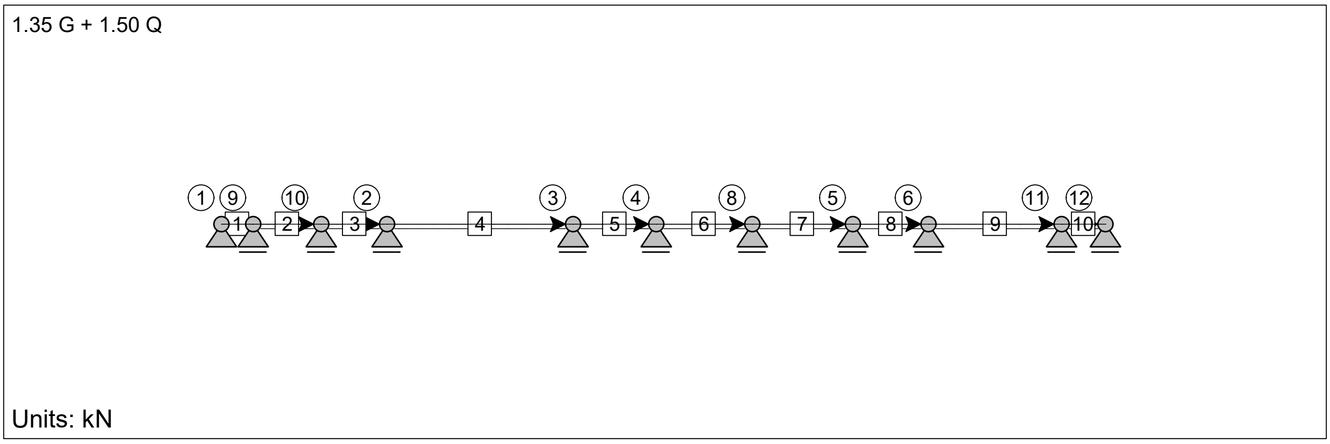
A2 : Q



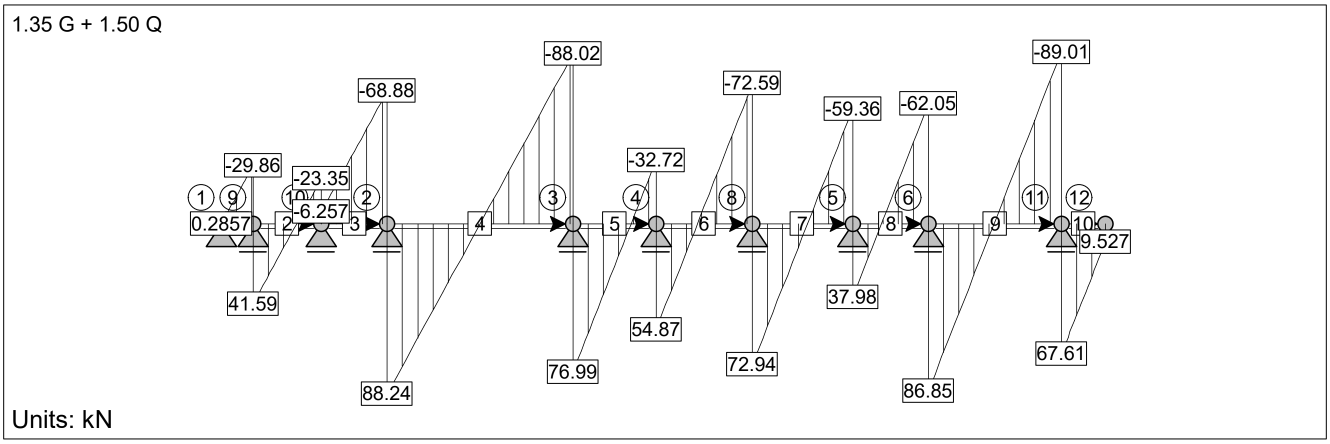
LC1: MSN1: Bending Moments My



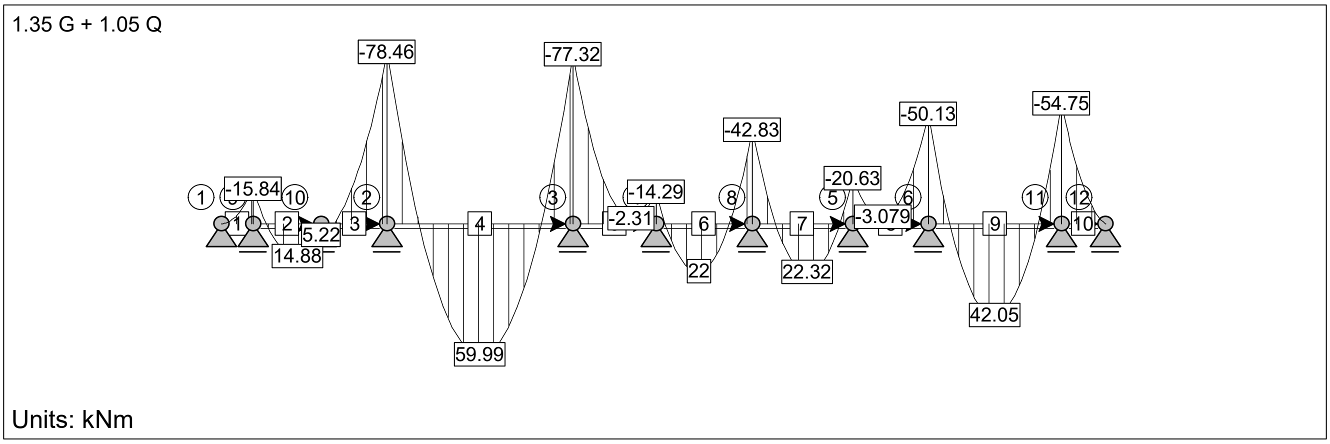
LC1: MSN1: Axial Forces Fx



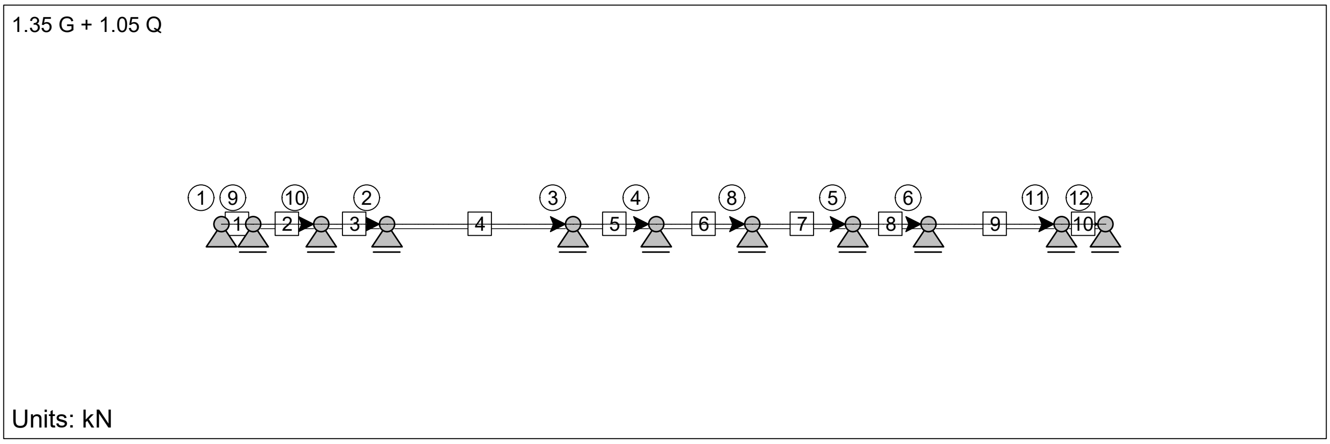
LC1: MSN1: Shear Forces Fz



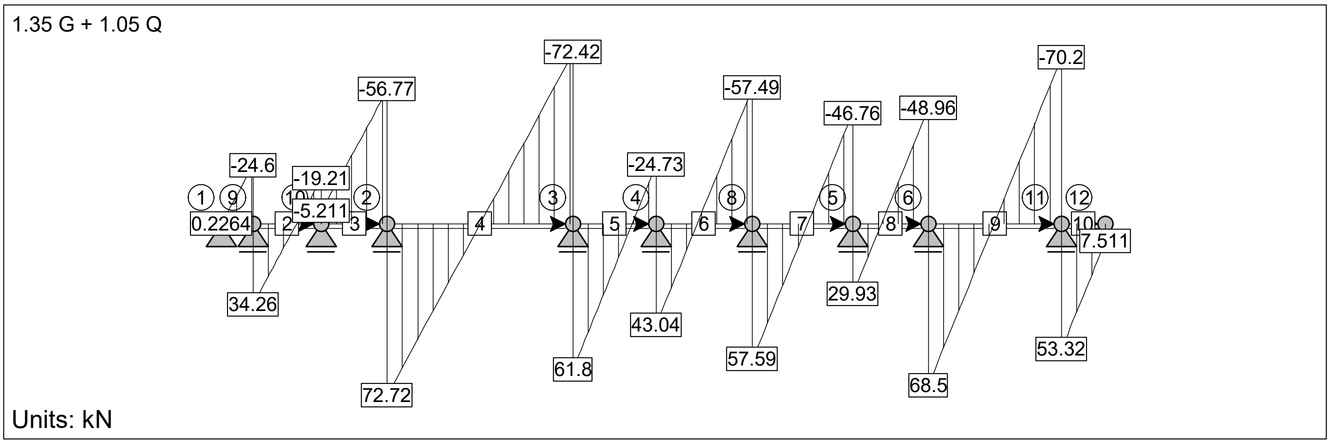
LC2: MSN2: Bending Moments My



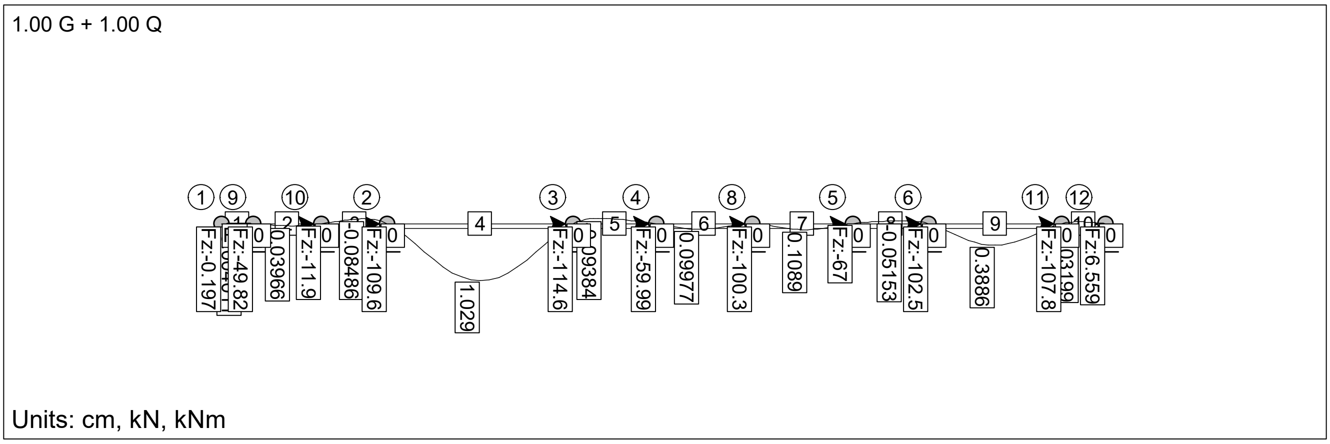
LC2: MSN2: Axial Forces Fx



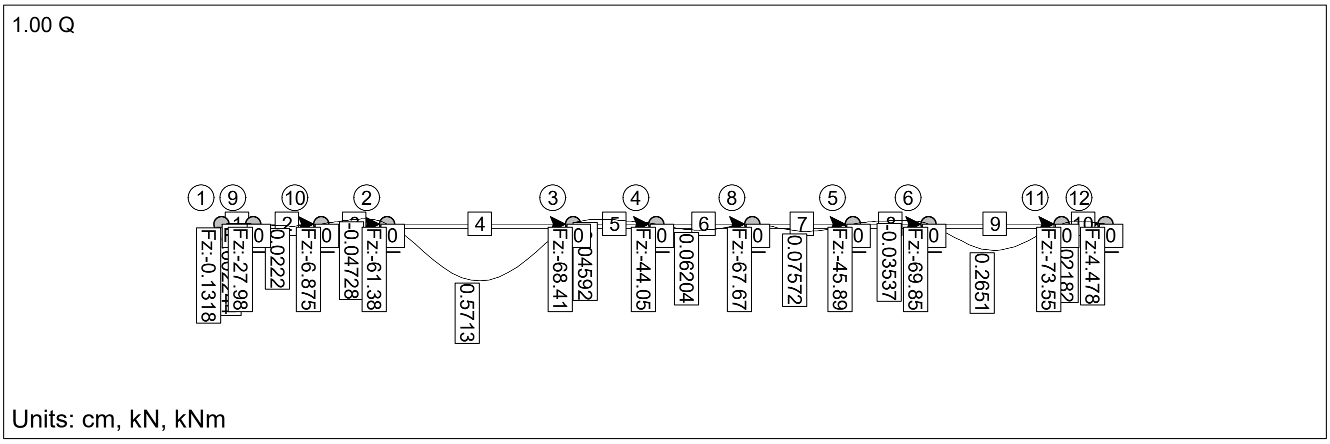
LC2: MSN2: Shear Forces Fz



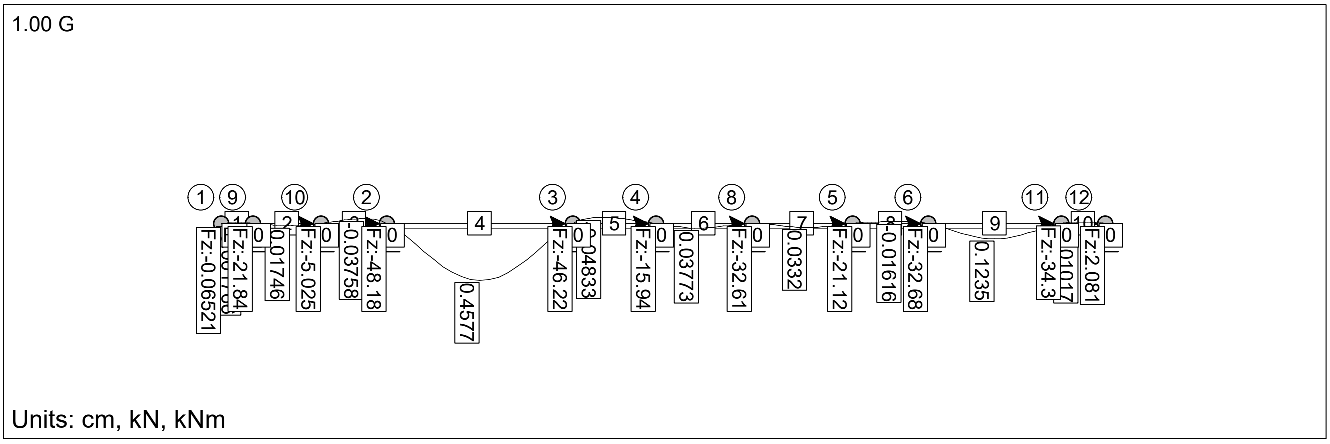
LC3: MSUtot: Displacements and Reactions



LC4: MSUinst: Displacements and Reactions



LC5: MSU g: Displacements and Reactions



Element 1 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

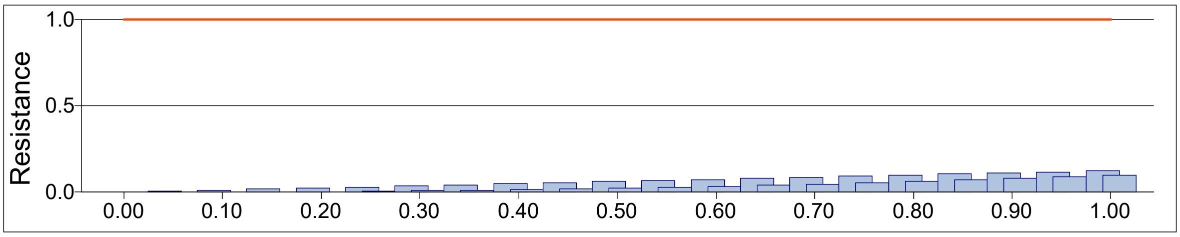
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

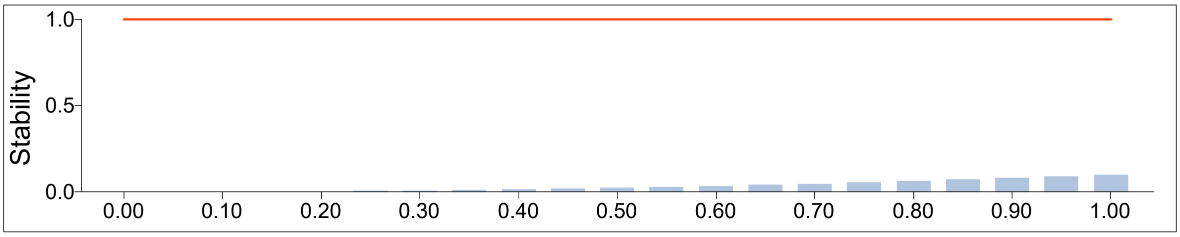
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. All stability checks have passed. The compentent check is lateral-torsional stability check [0.098 <= 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 2 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

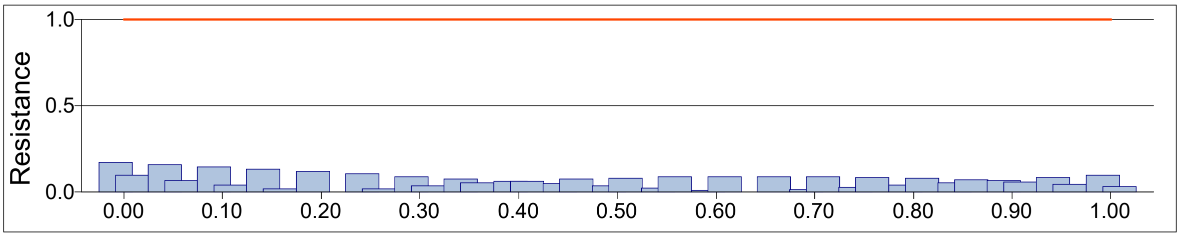
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

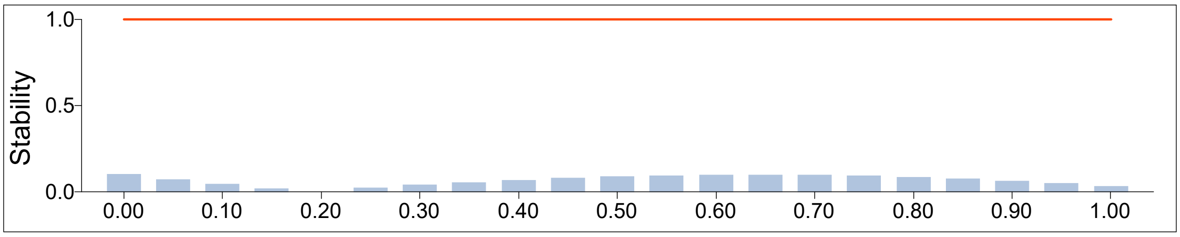
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. All stability checks have passed. The compentent check is lateral-torsional stability check [0.105 <= 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 3 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

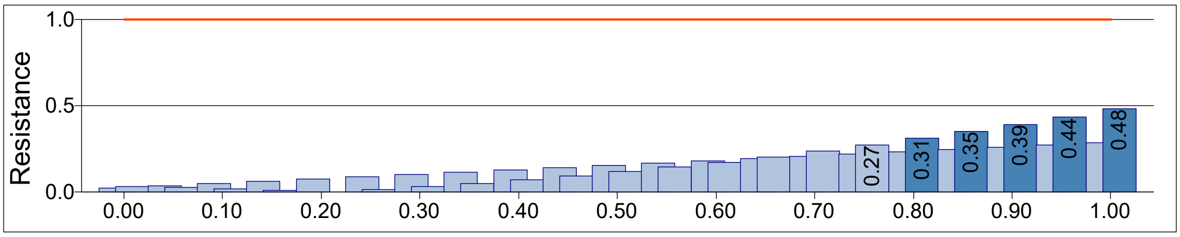
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

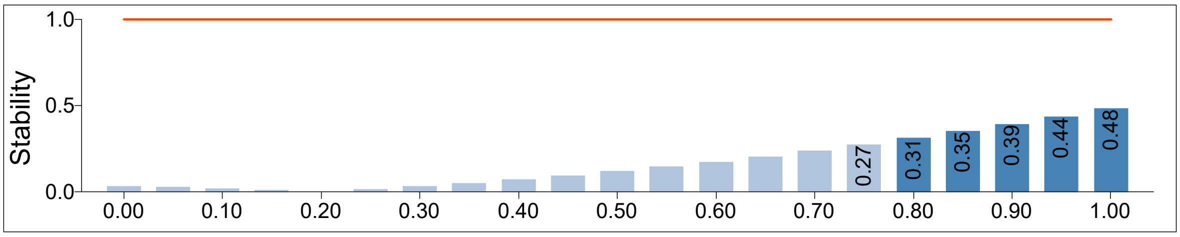
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. All stability checks have passed. The compentent check is lateral-torsional stability check [0.484 <= 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 4 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

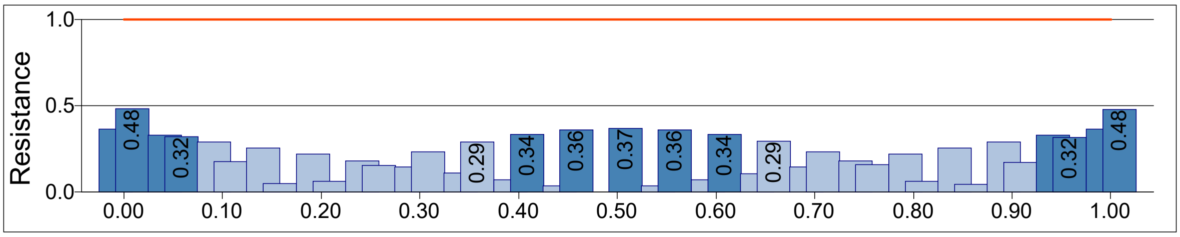
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

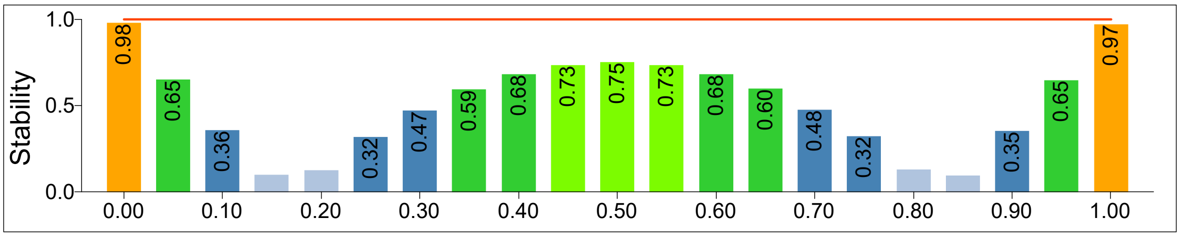
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. All stability checks have passed. The compentent check is lateral-torsional stability check [0.982 <= 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 5 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

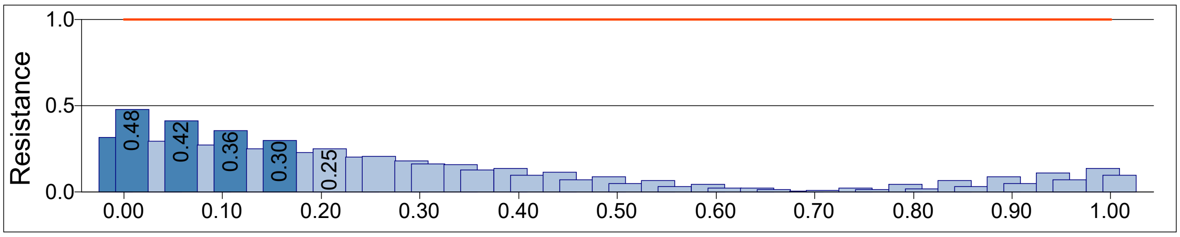
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

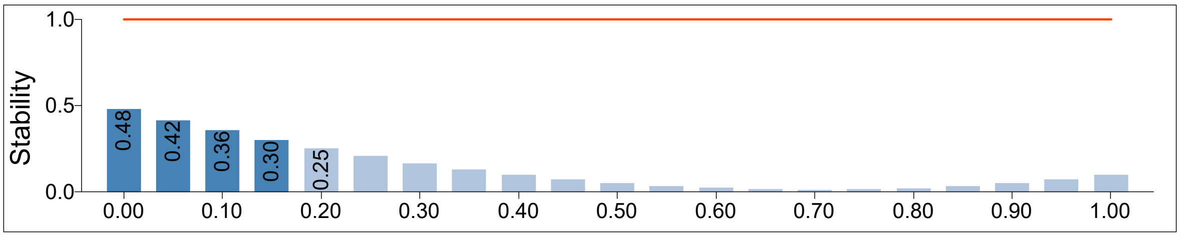
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. All stability checks have passed. The compentent check is lateral-torsional stability check [0.480 <= 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 6 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

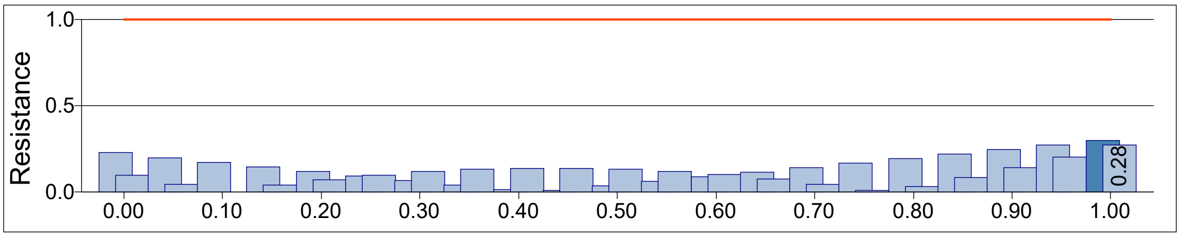
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

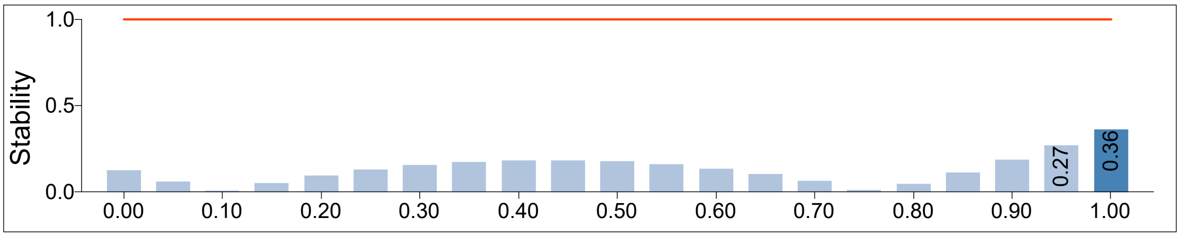
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. All stability checks have passed. The compentent check is lateral-torsional stability check [0.360 <= 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 7 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

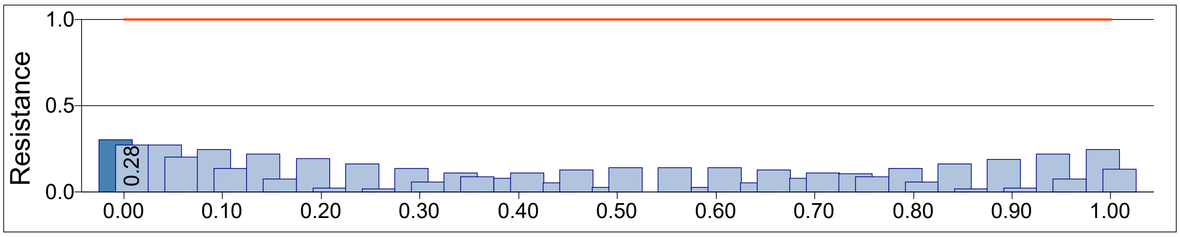
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

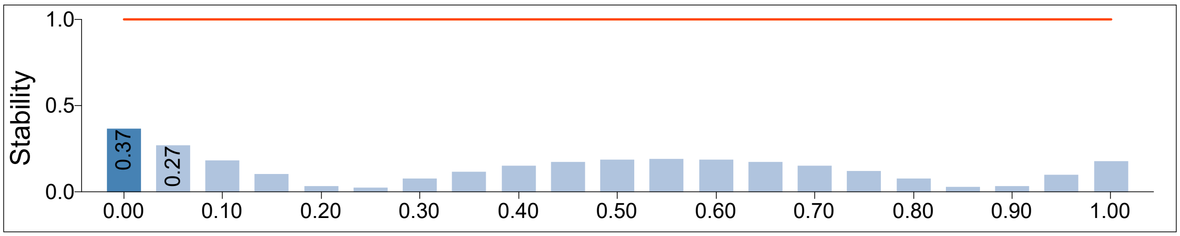
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. All stability checks have passed. The compentent check is lateral-torsional stability check [0.367 <= 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 8 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

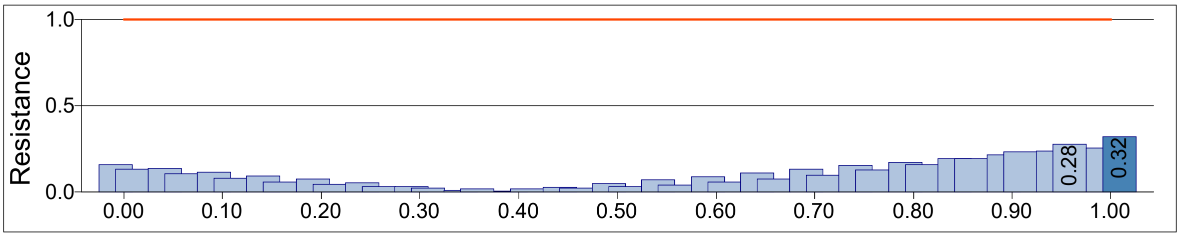
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

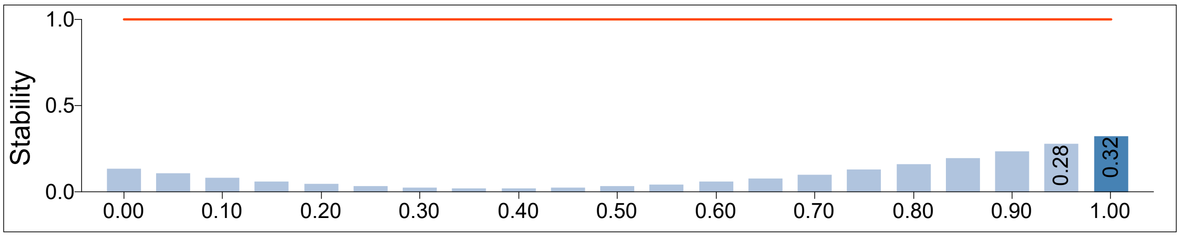
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. All stability checks have passed. The compentent check is lateral-torsional stability check [0.323 <= 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 9 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

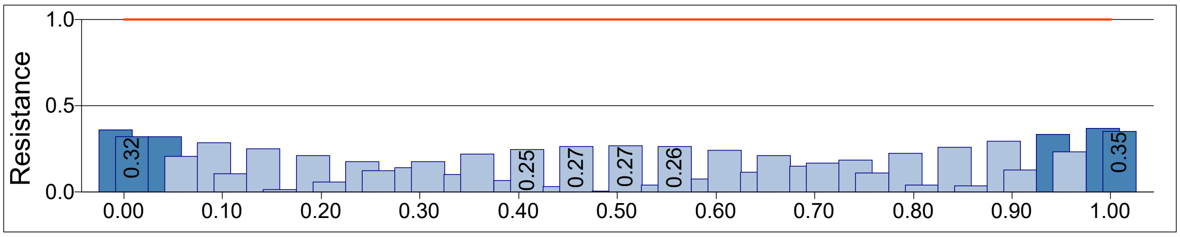
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

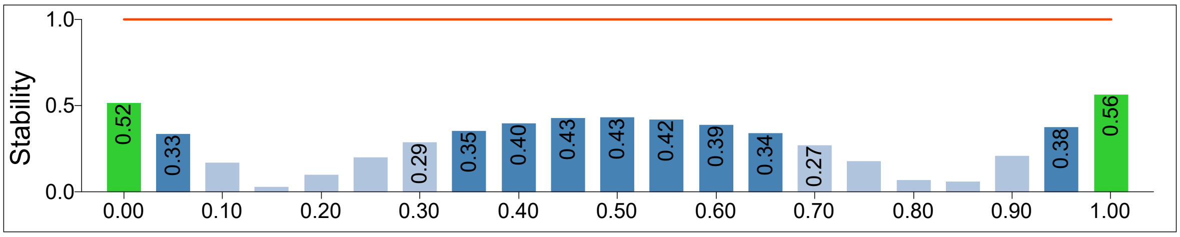
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. All stability checks have passed. The compentent check is lateral-torsional stability check [0.564 <= 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 10 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

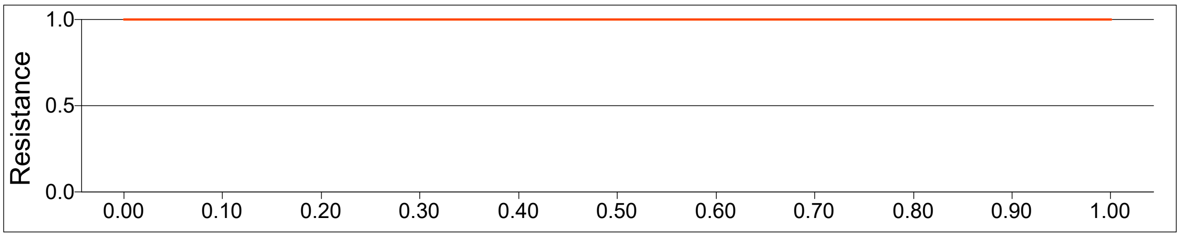
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

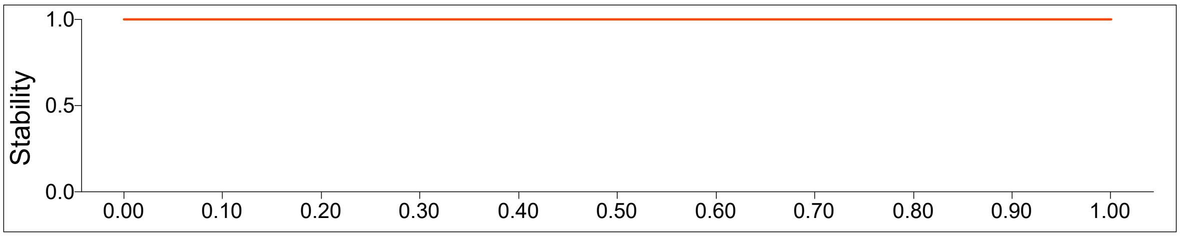
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability

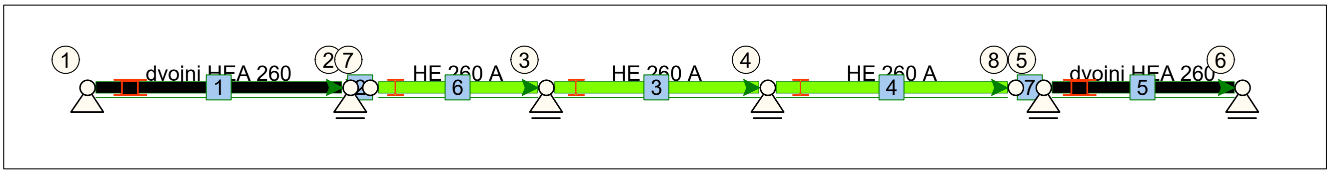


Element stability was not checked!

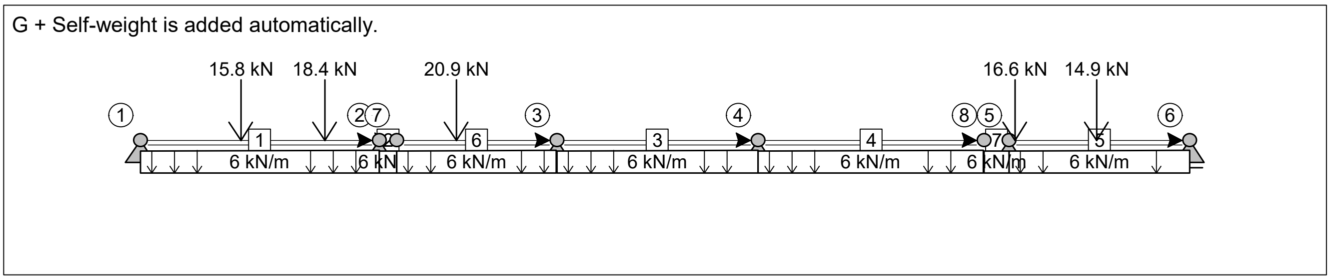
Serviceability Limit States

Serviceability limit states were not calculated.

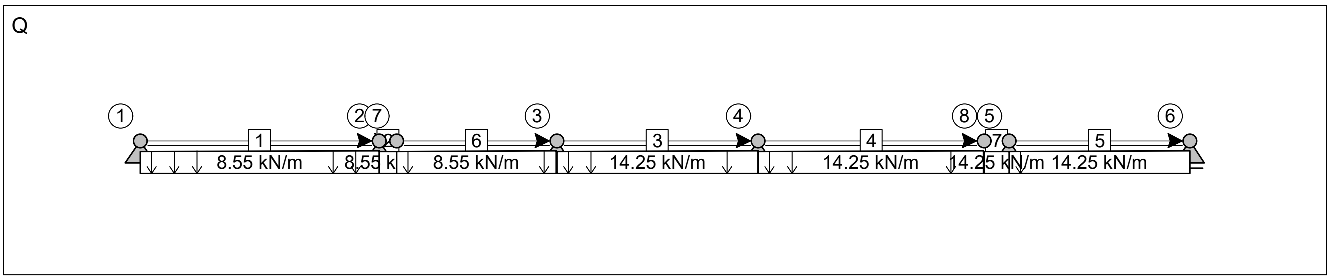
Geometry



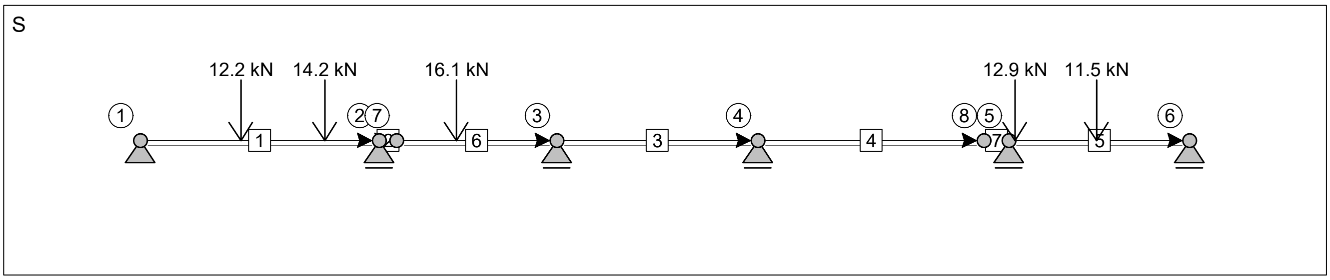
A1 : G



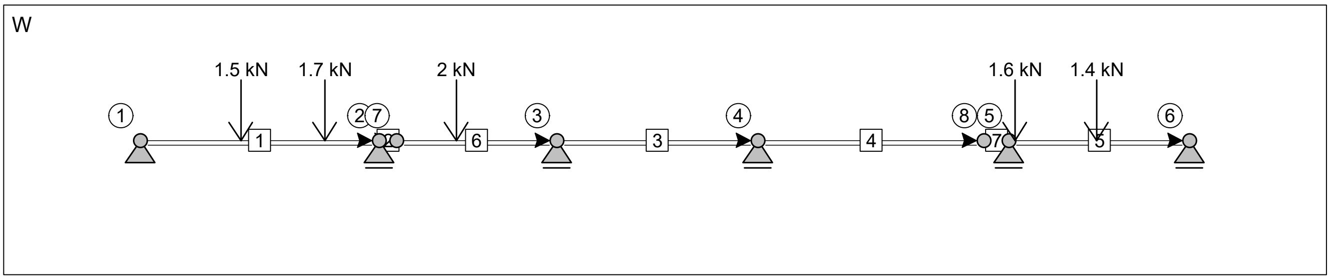
A2 : Q



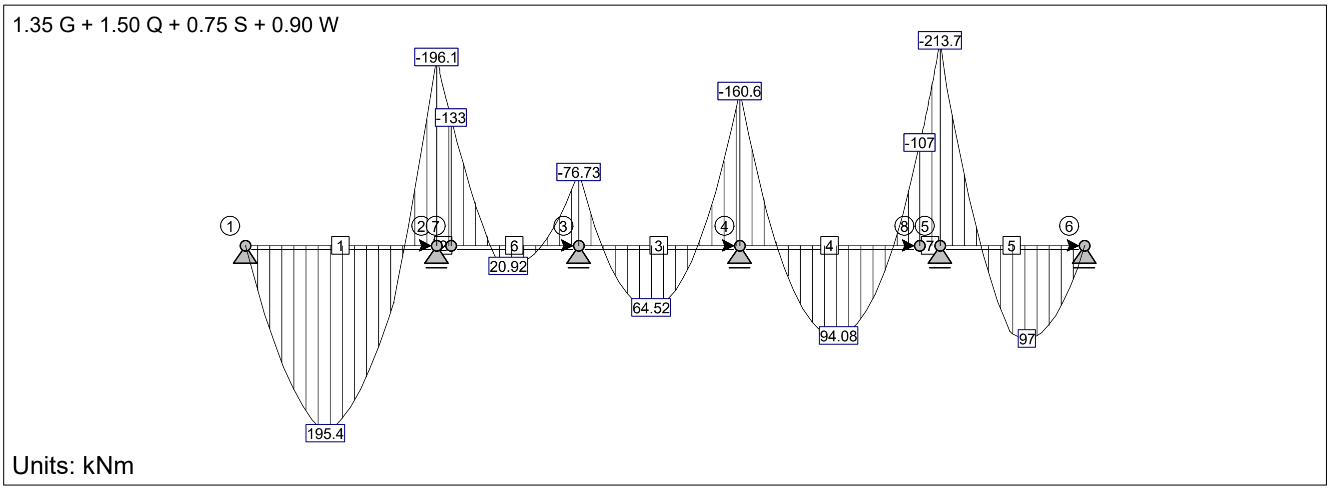
A3 : S



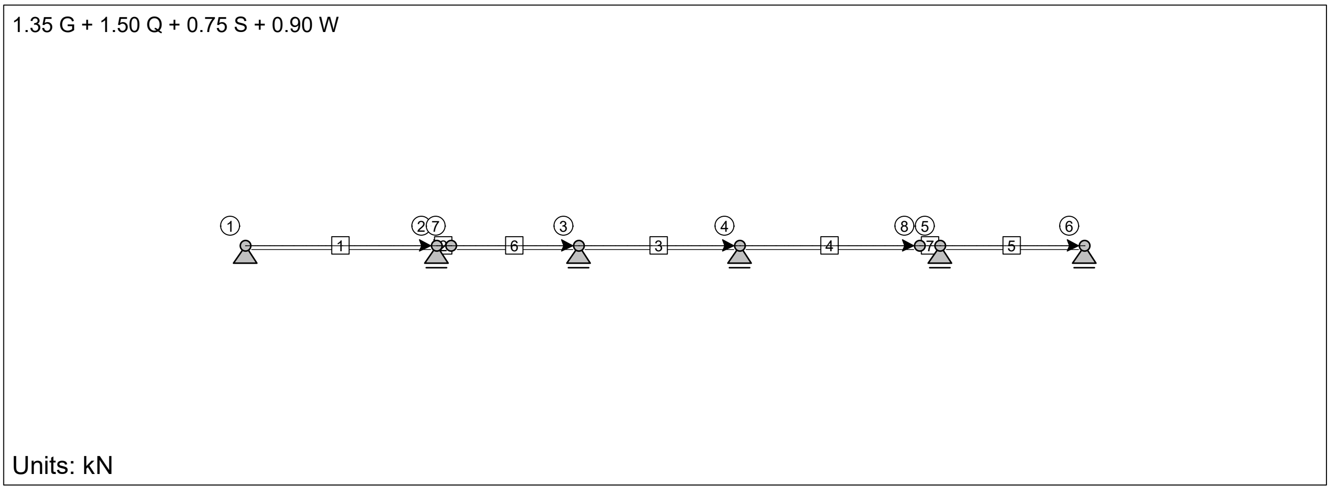
A4 : W



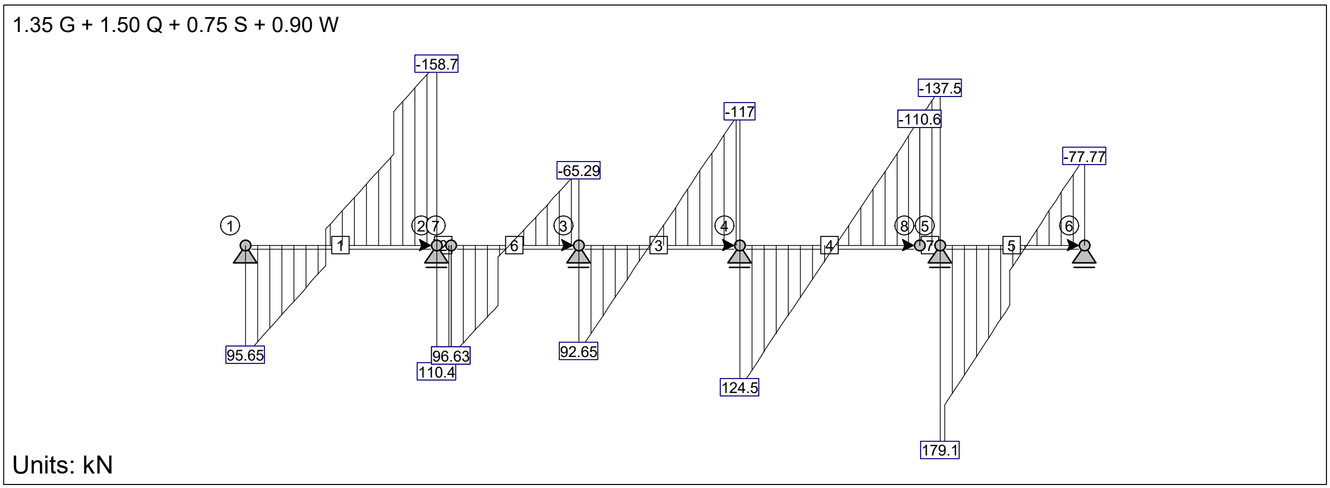
LC1: MSN1: Bending Moments My



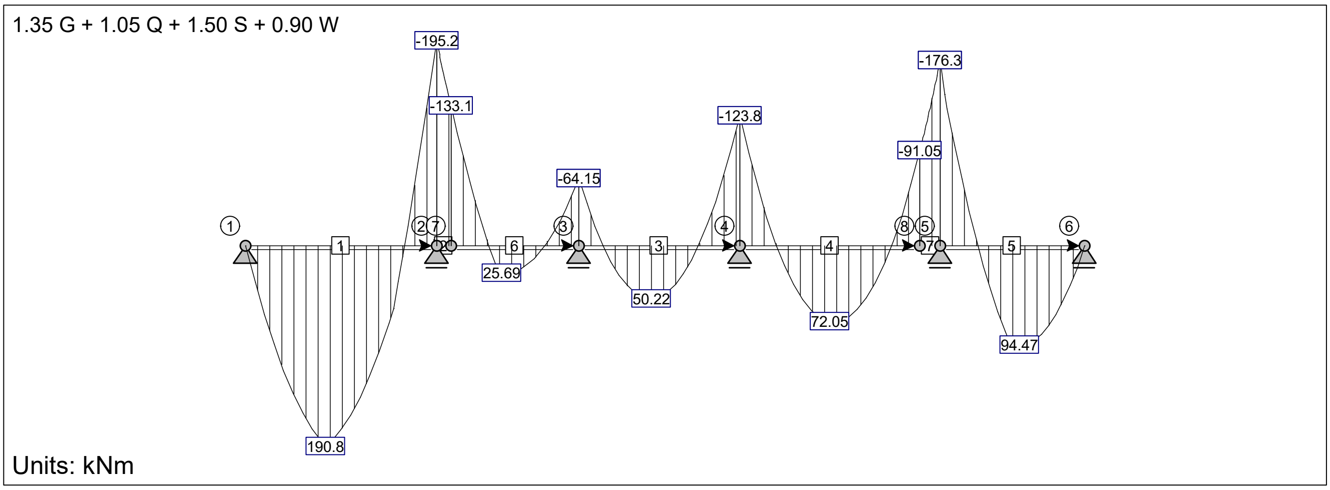
LC1: MSN1: Axial Forces Fx



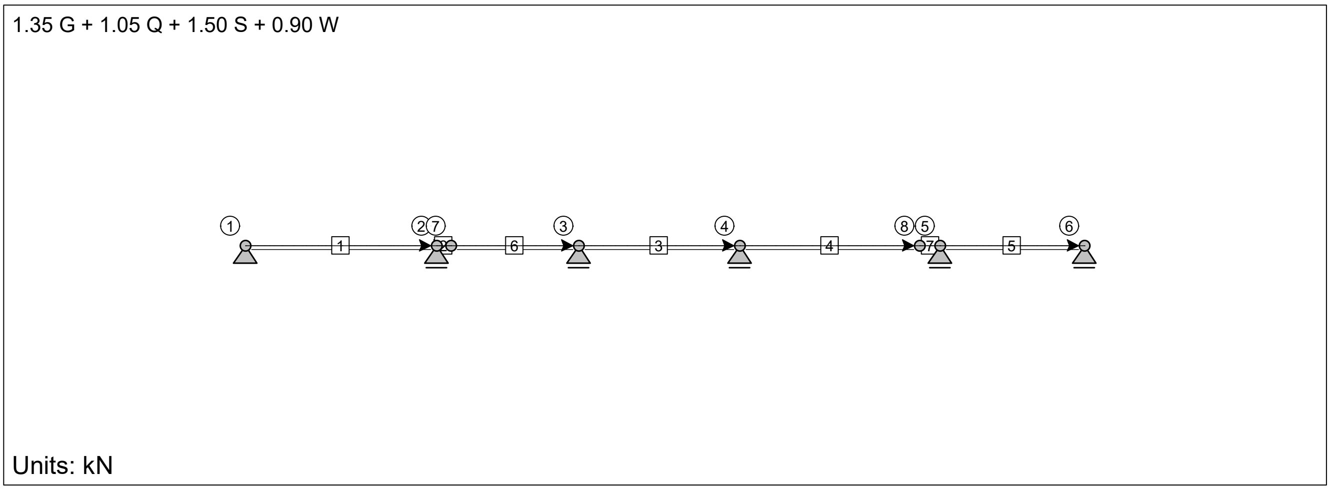
LC1: MSN1: Shear Forces Fz



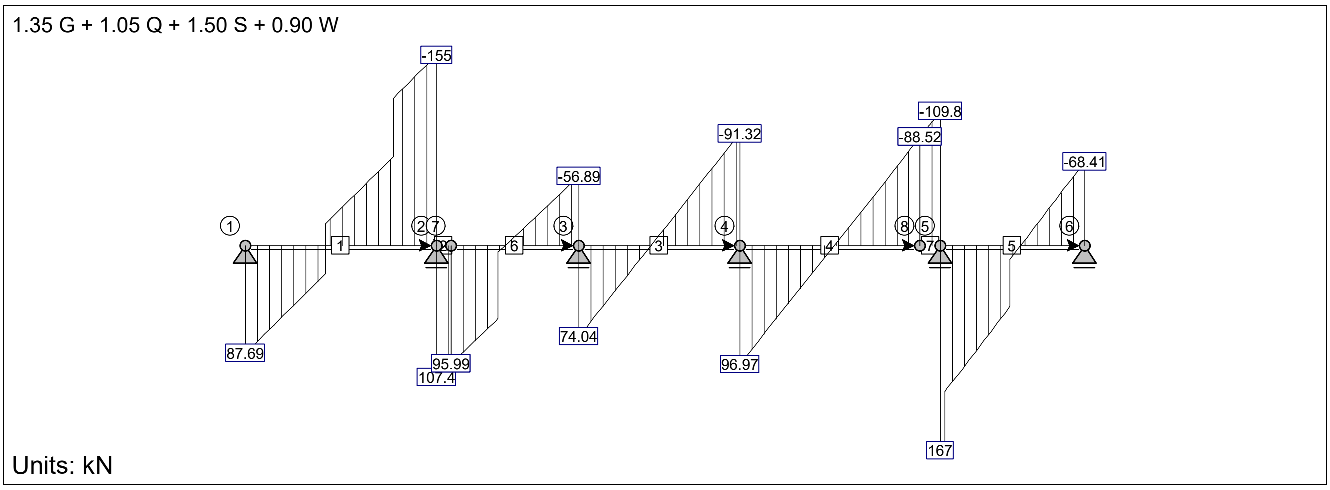
LC2: MSN2: Bending Moments My



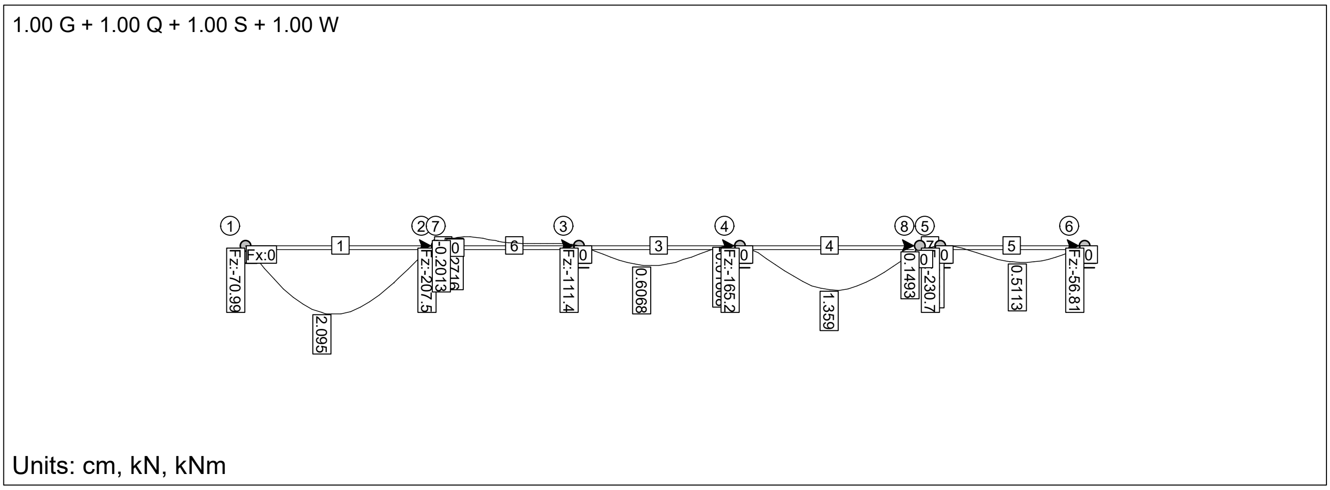
LC2: MSN2: Axial Forces Fx



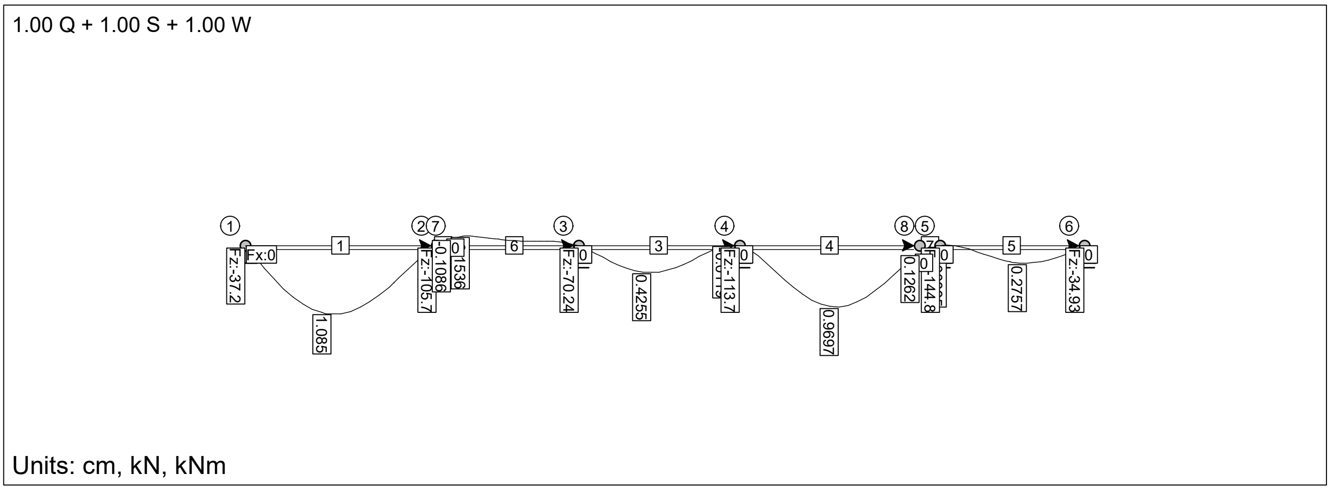
LC2: MSN2: Shear Forces Fz



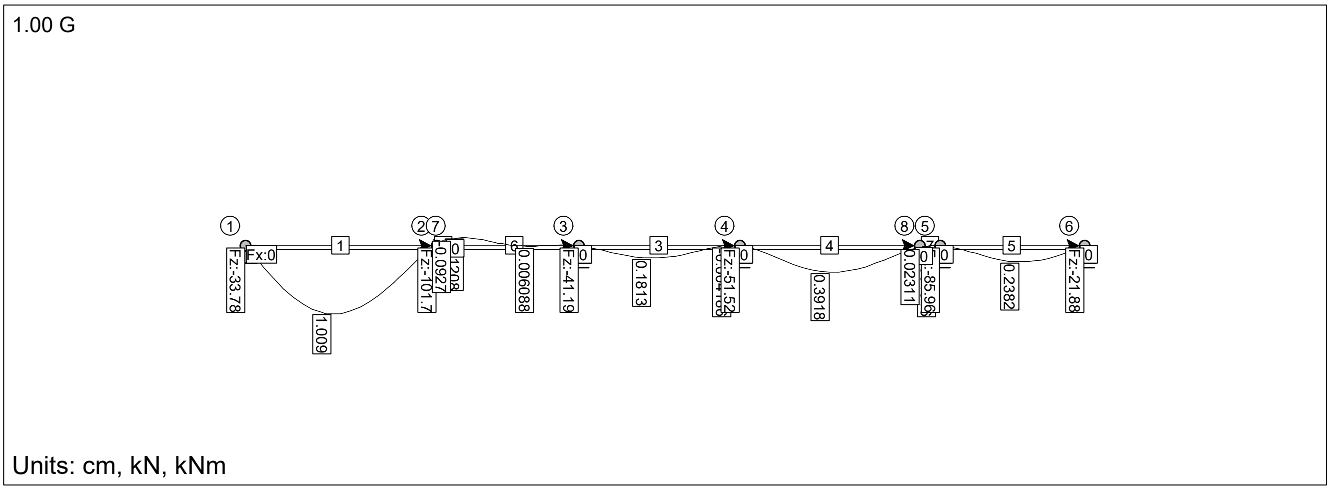
LC3: MSUtot: Displacements and Reactions



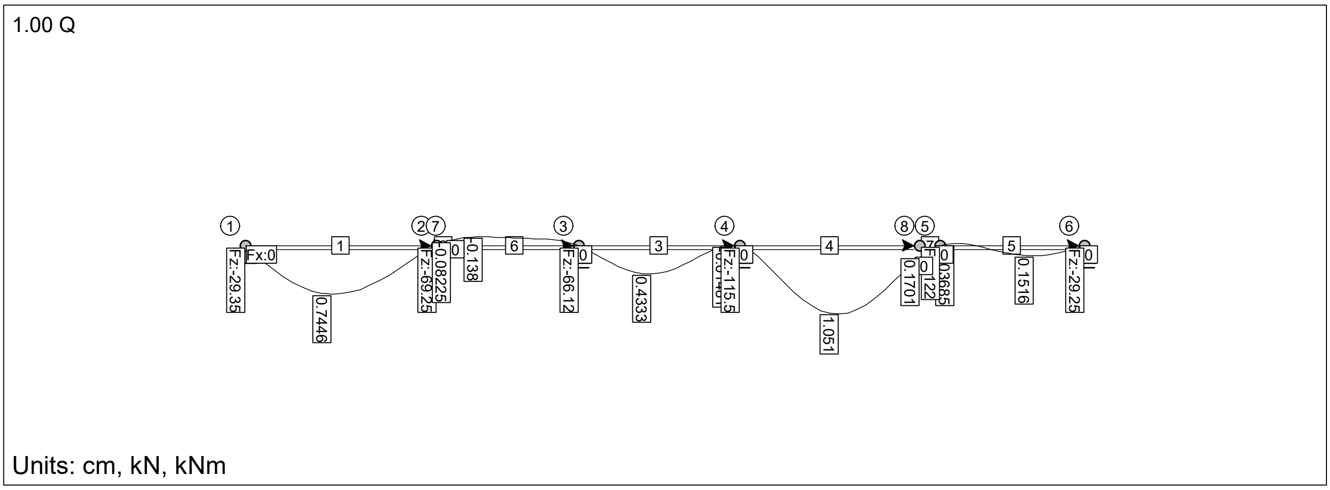
LC4: MSUinst: Displacements and Reactions



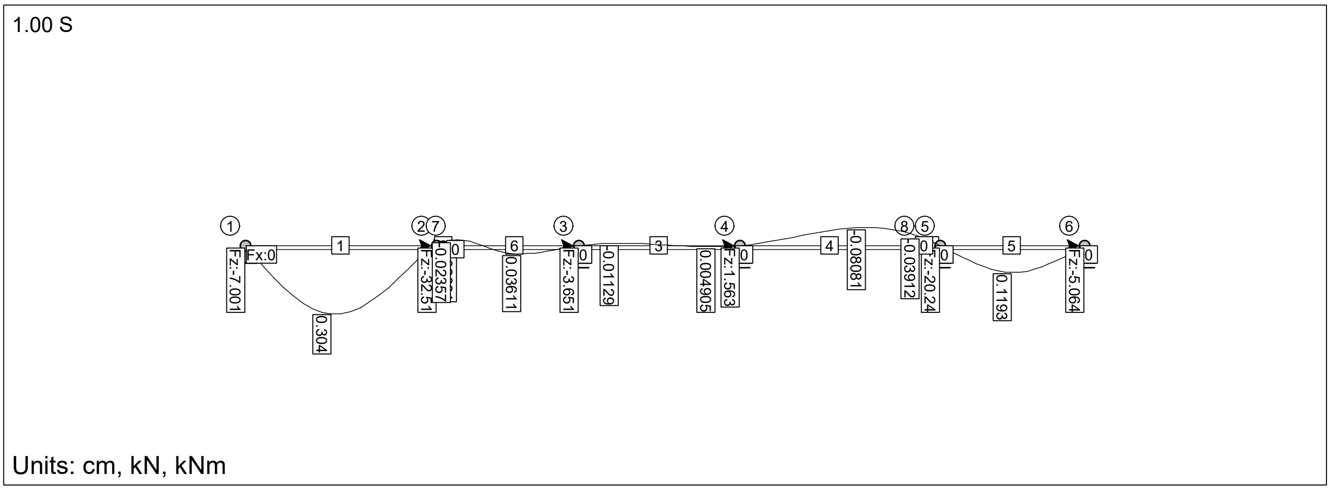
LC5: Load case: 5: Displacements and Reactions



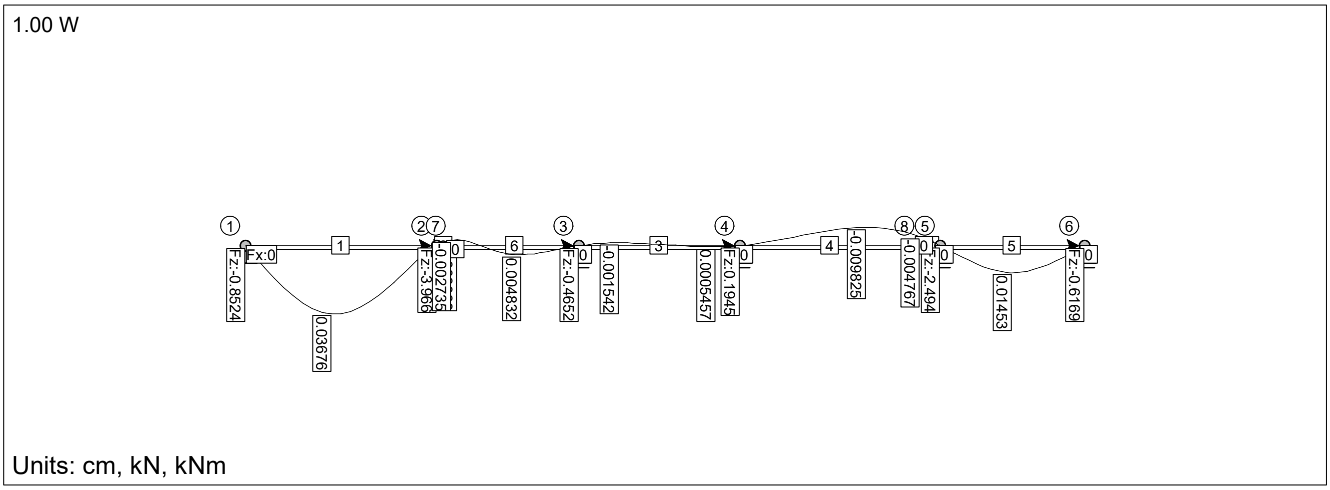
LC6: Load case: 6: Displacements and Reactions



LC7: Load case: 7: Displacements and Reactions



LC8: Load case: 8: Displacements and Reactions



Element 1 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

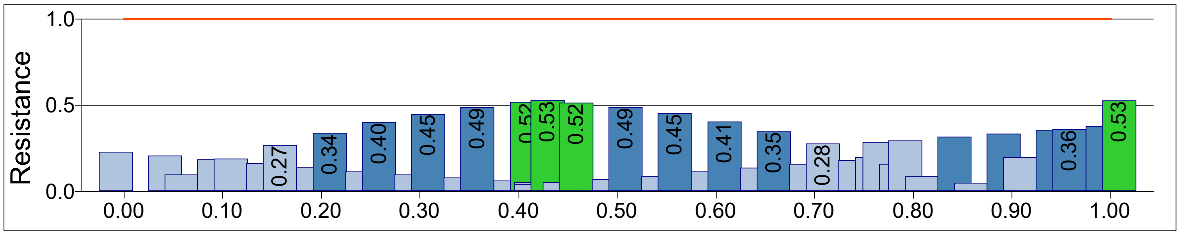
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

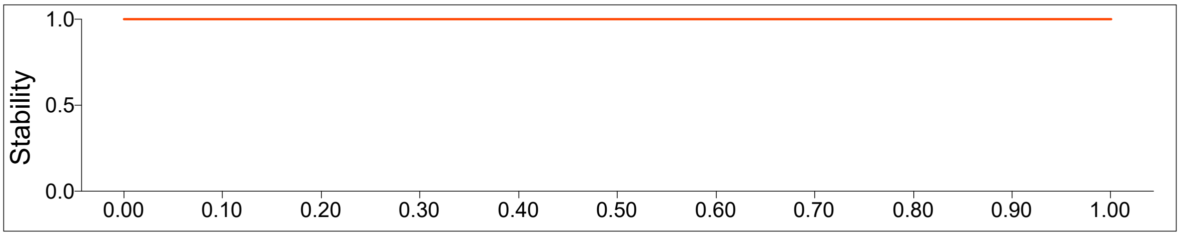
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element stability was not checked!

Serviceability Limit States

Serviceability limit states were not calculated.

Element 2 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

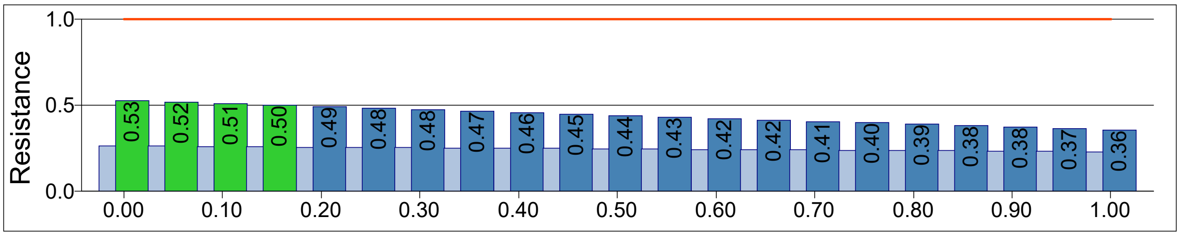
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

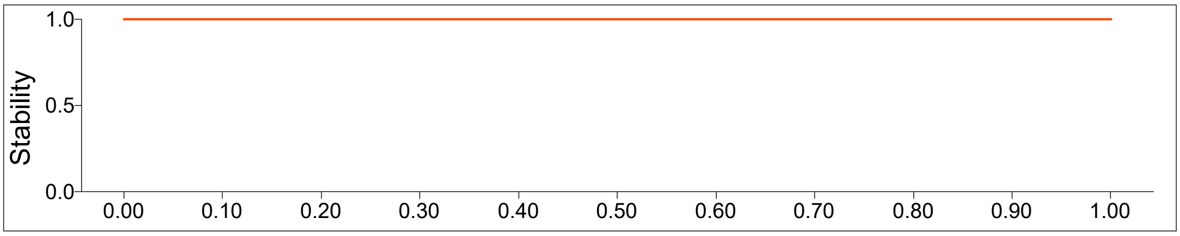
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element stability was not checked!

Serviceability Limit States

Serviceability limit states were not calculated.

Element 3 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

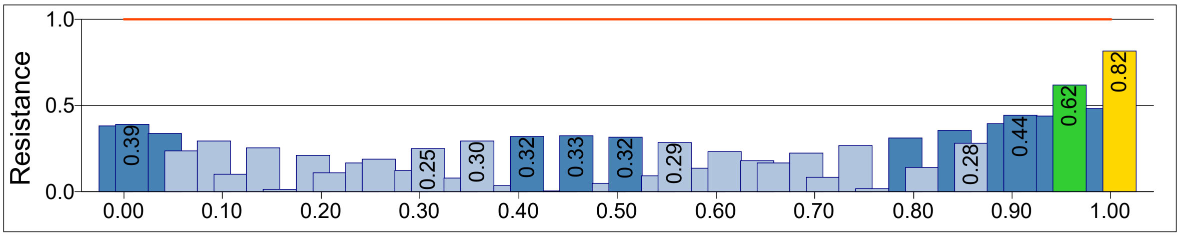
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

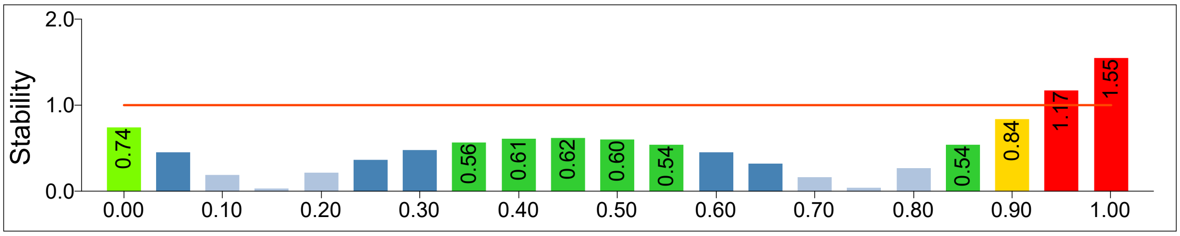
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. At least one stablity check has failed. The compentent check is lateral-torsional stability check [1.546 > 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 4 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

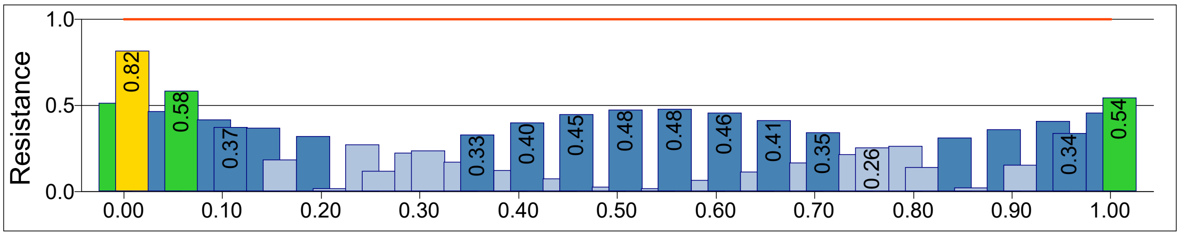
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

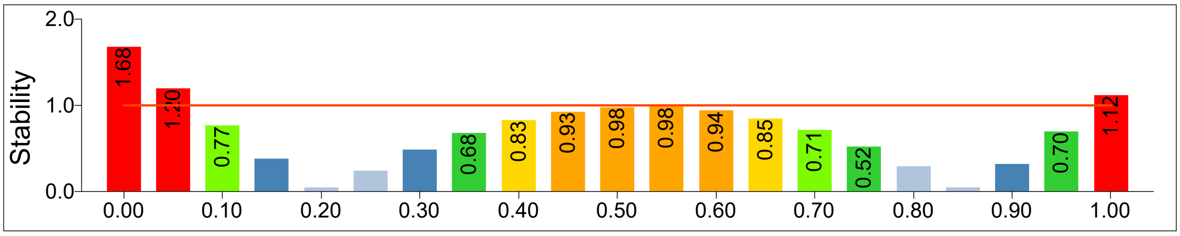
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. At least one stablity check has failed. The compentent check is lateral-torsional stability check [1.679 > 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 5 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

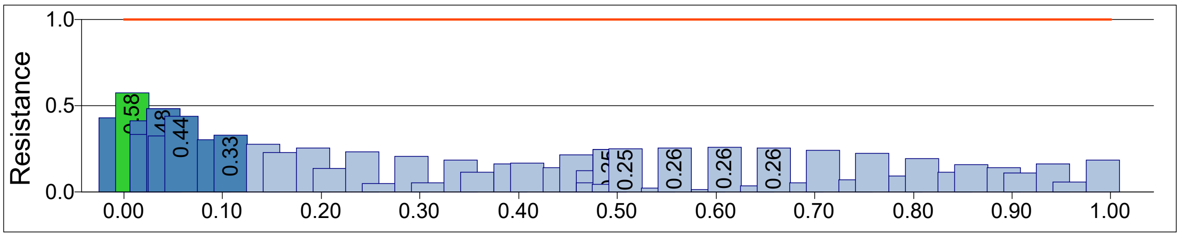
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

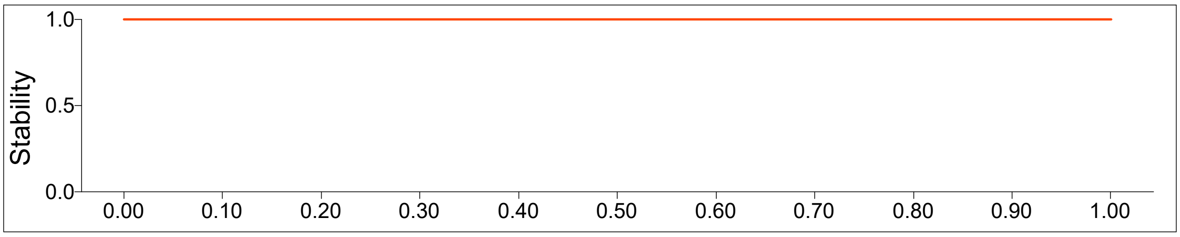
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element stability was not checked!

Serviceability Limit States

Serviceability limit states were not calculated.

Element 6 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

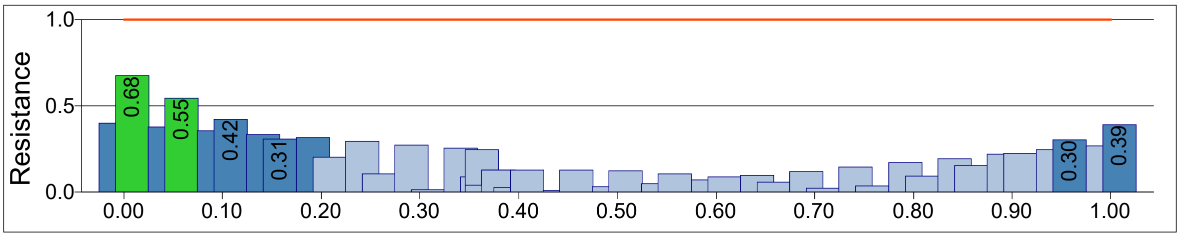
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

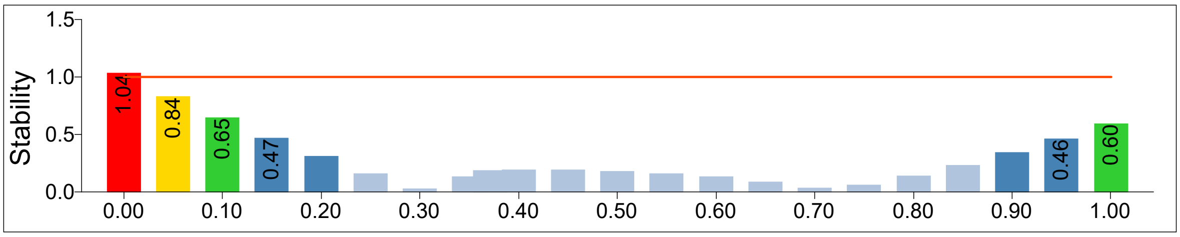
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. At least one stablity check has failed. The compentent check is lateral-torsional stability check [1.035 > 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 7 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

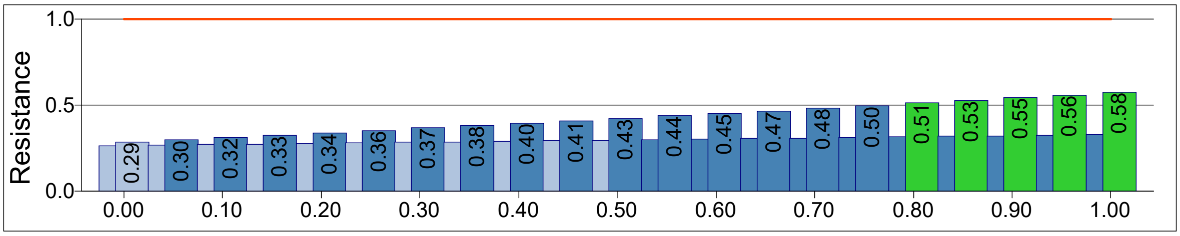
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

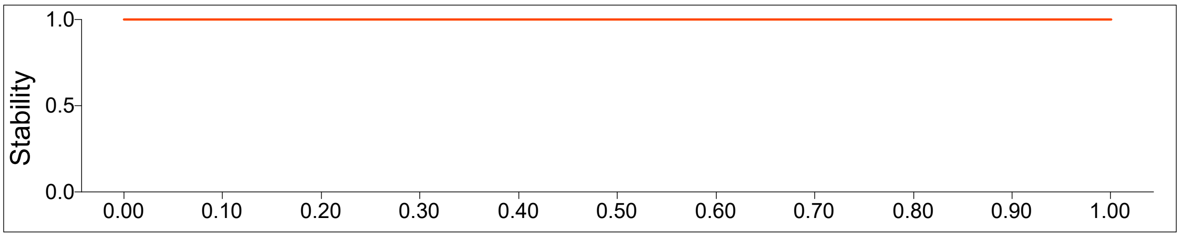
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability

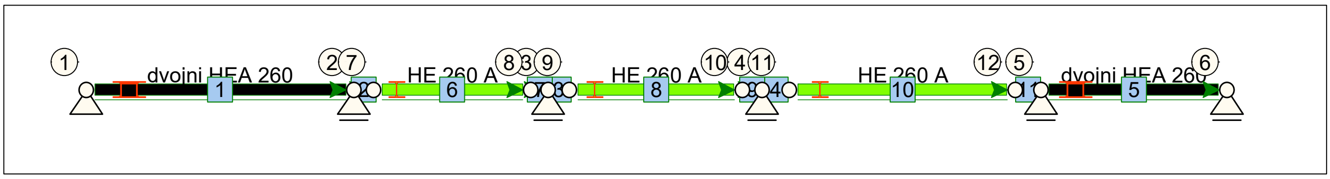


Element stability was not checked!

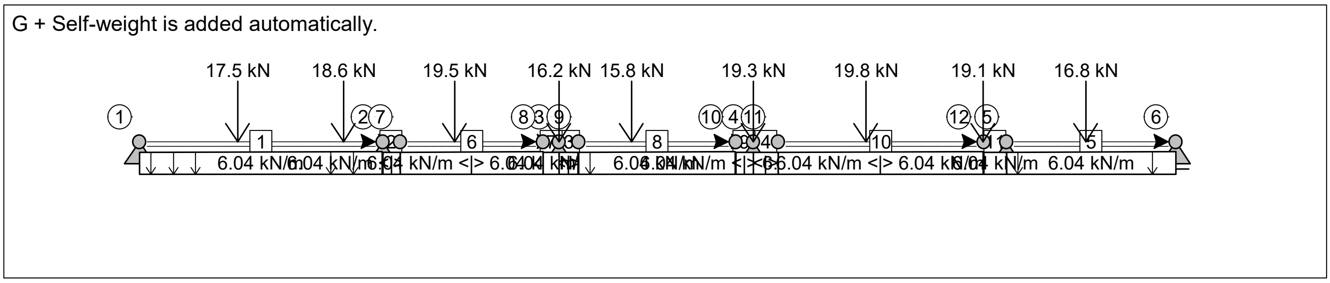
Serviceability Limit States

Serviceability limit states were not calculated.

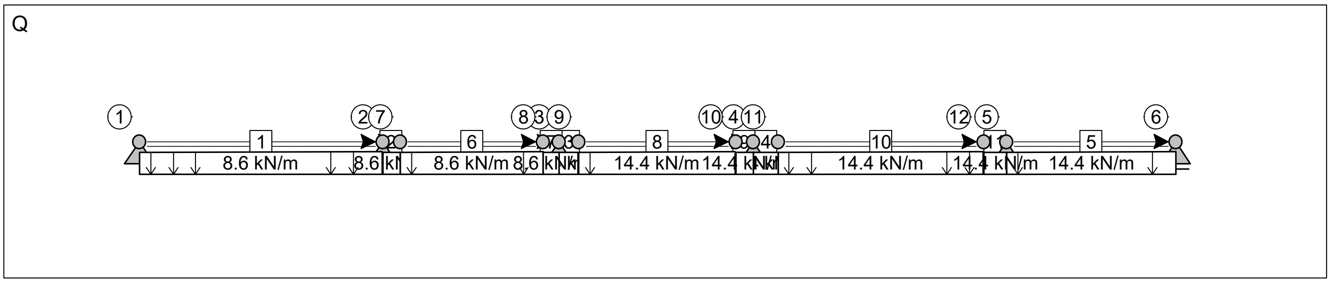
Geometry



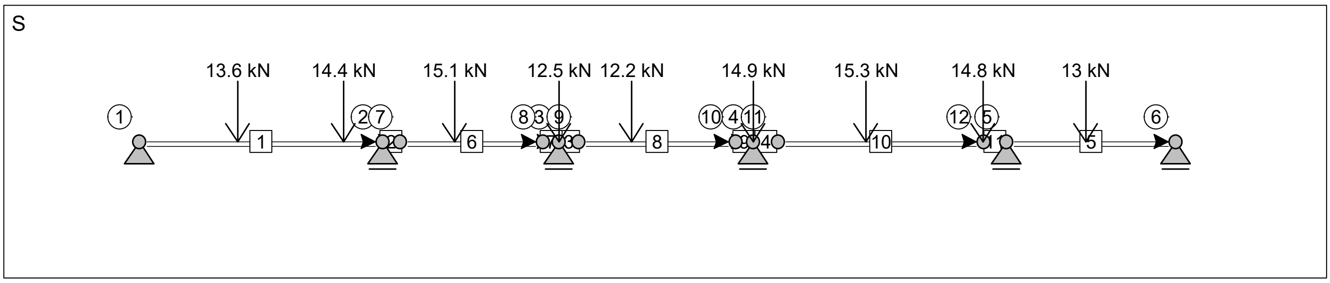
A1 : G



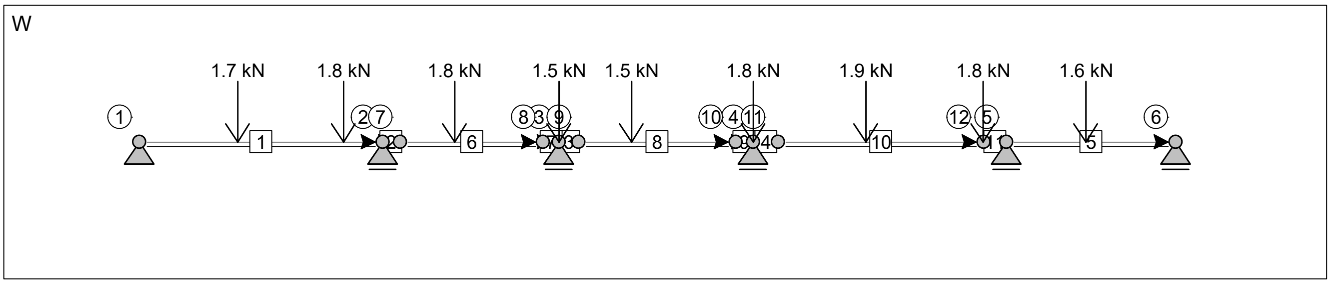
A2 : Q



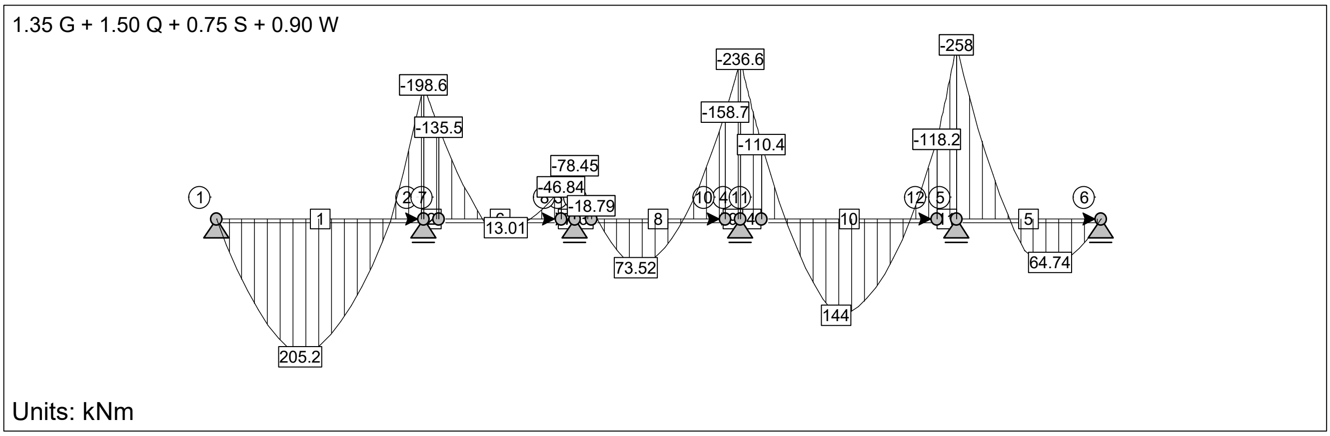
A3 : S



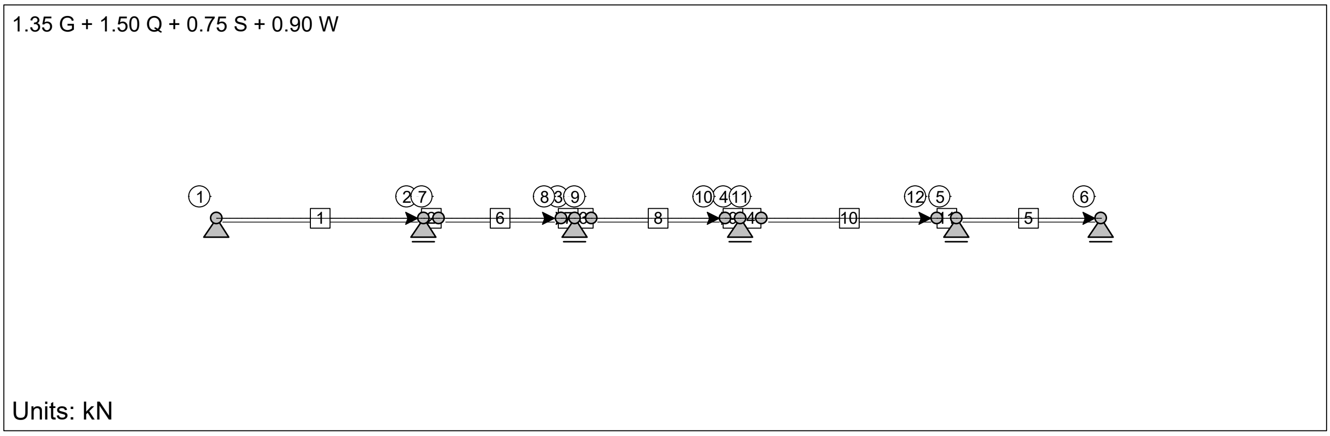
A4 : W



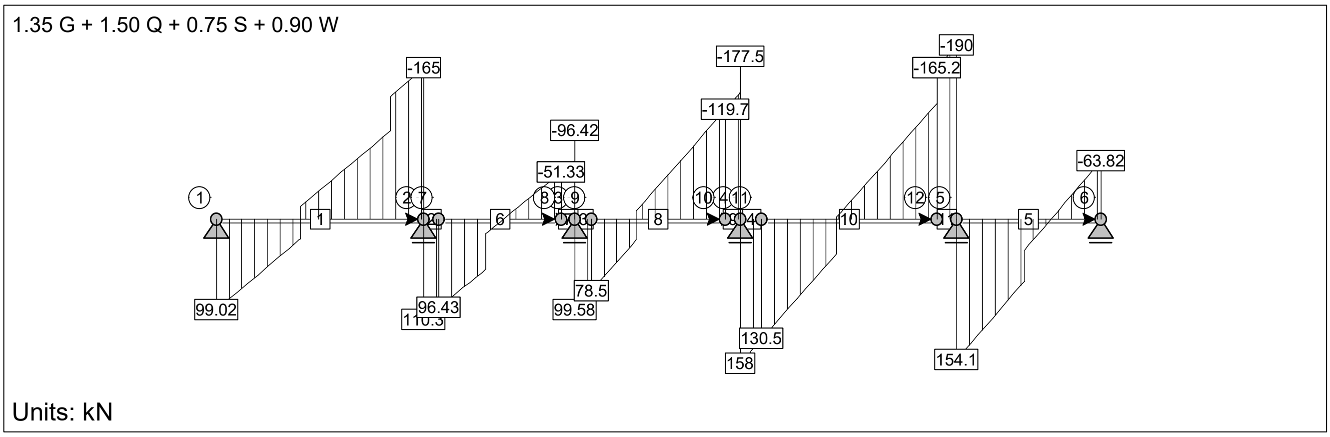
LC1: MSN1: Bending Moments My



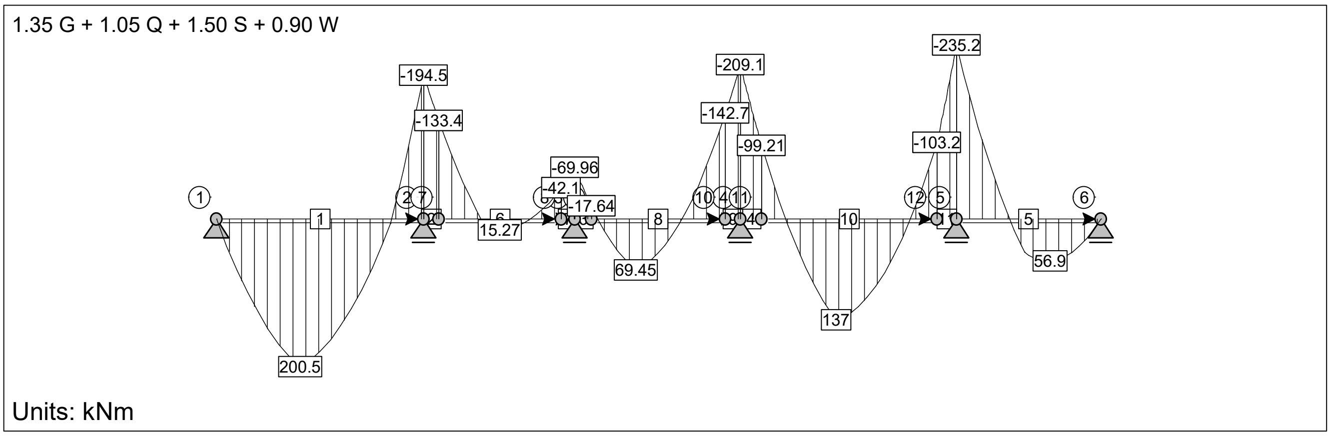
LC1: MSN1: Axial Forces Fx



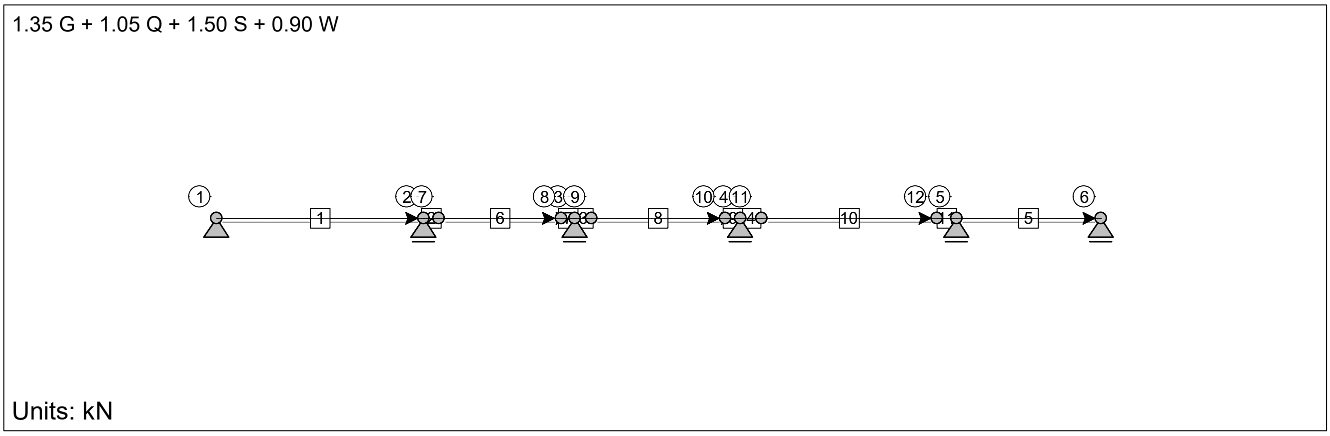
LC1: MSN1: Shear Forces Fz



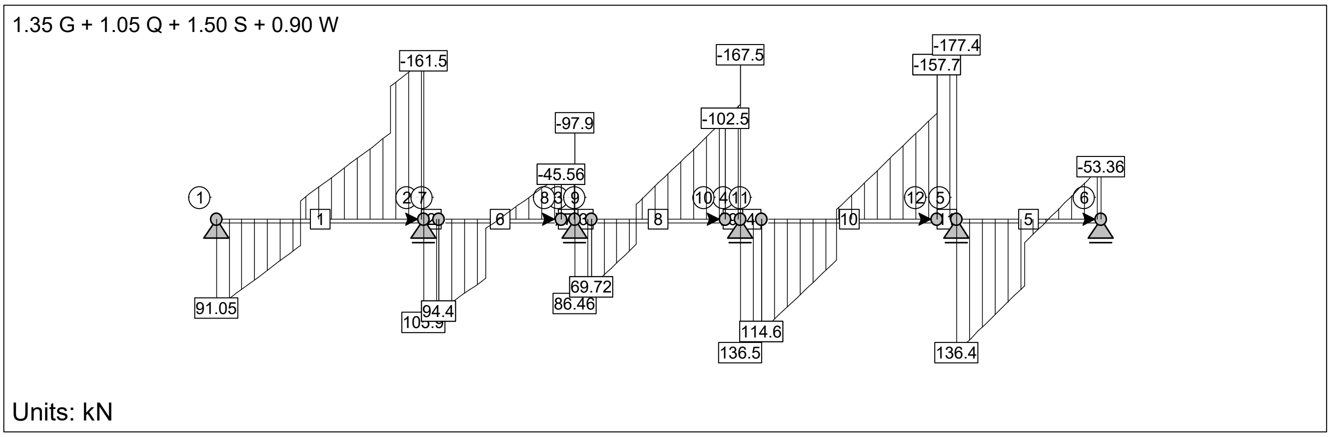
LC2: MSN2: Bending Moments My



LC2: MSN2: Axial Forces Fx

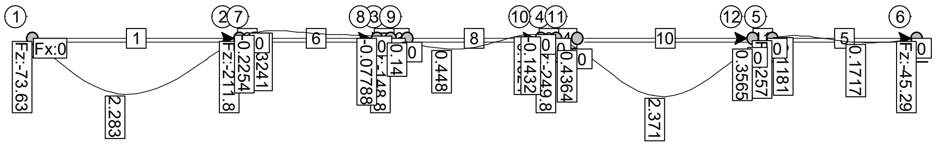


LC2: MSN2: Shear Forces Fz



LC3: MSUtot: Displacements and Reactions

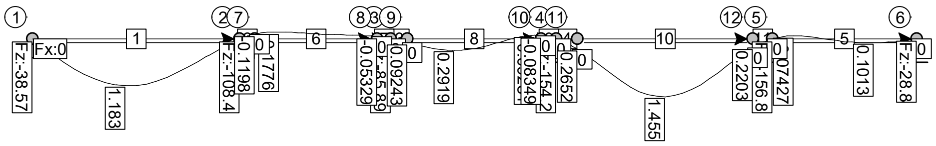
1.00 G + 1.00 Q + 1.00 S + 1.00 W



Units: cm, kN, kNm

LC4: MSUinst: Displacements and Reactions

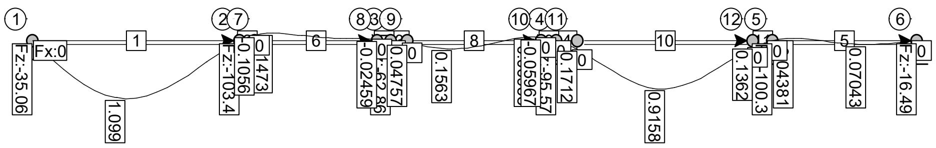
1.00 Q + 1.00 S + 1.00 W



Units: cm, kN, kNm

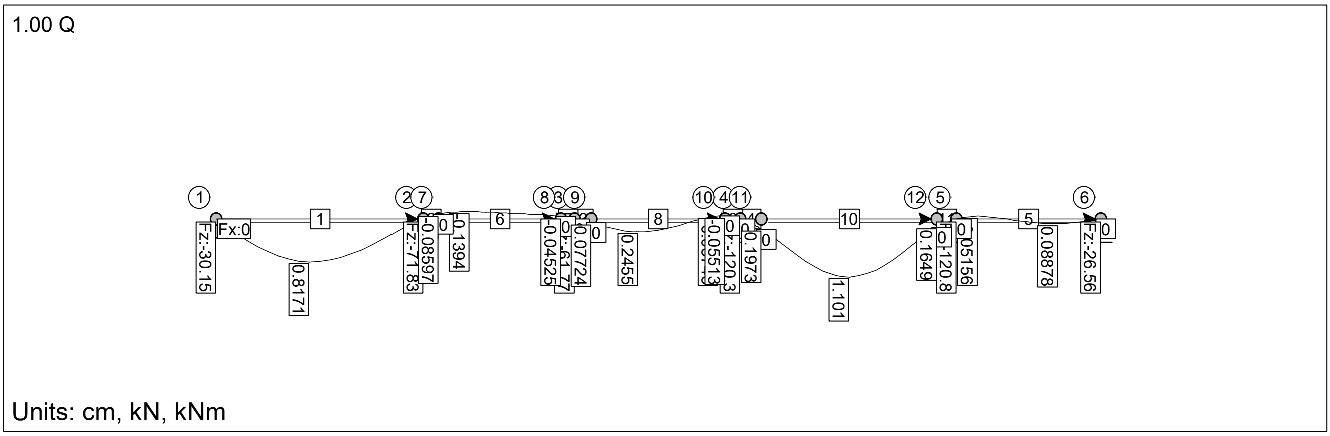
LC5: Load case: 5: Displacements and Reactions

1.00 G

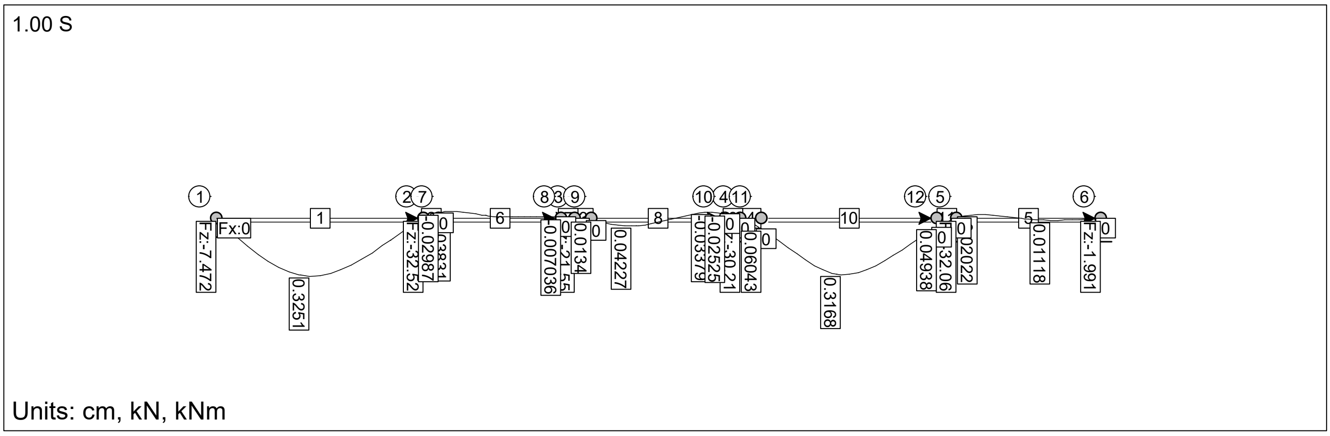


Units: cm, kN, kNm

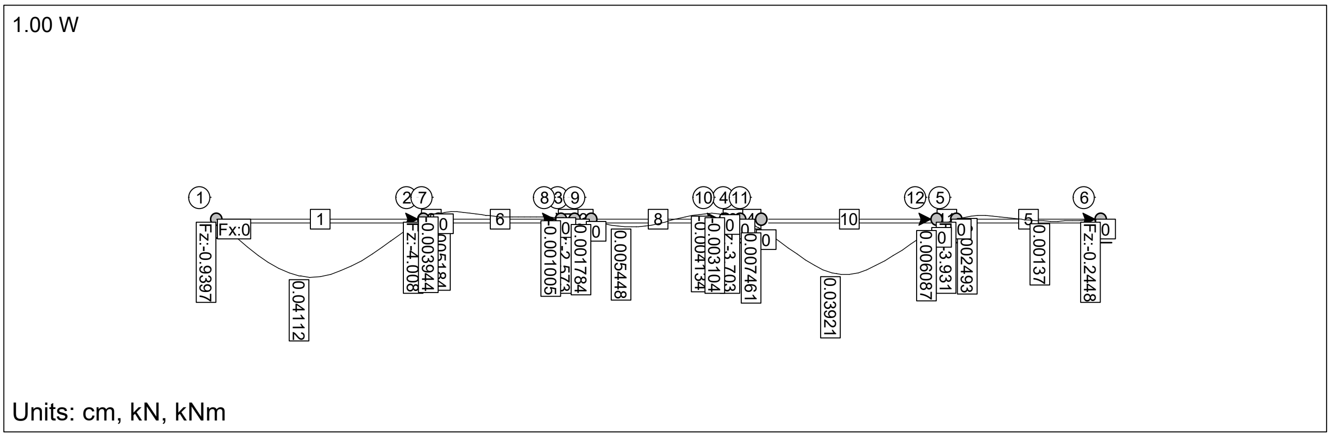
LC6: Load case: 6: Displacements and Reactions



LC7: Load case: 7: Displacements and Reactions



LC8: Load case: 8: Displacements and Reactions



Element 1 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

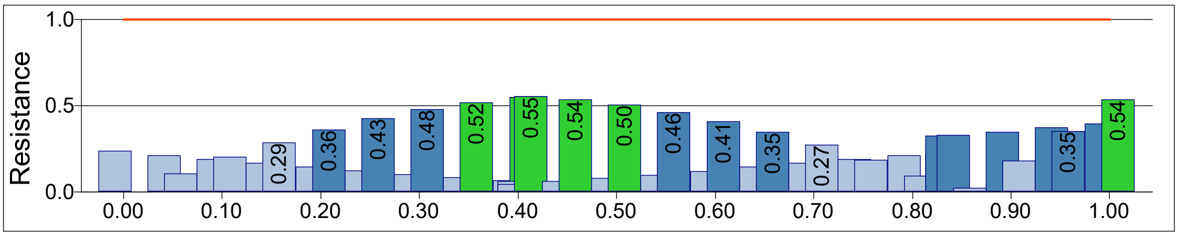
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

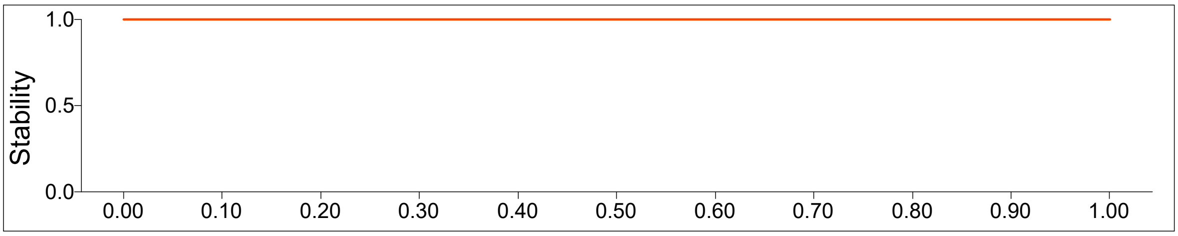
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



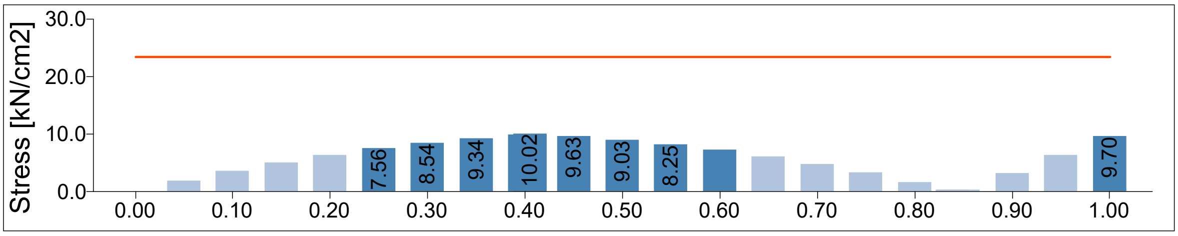
Element stability



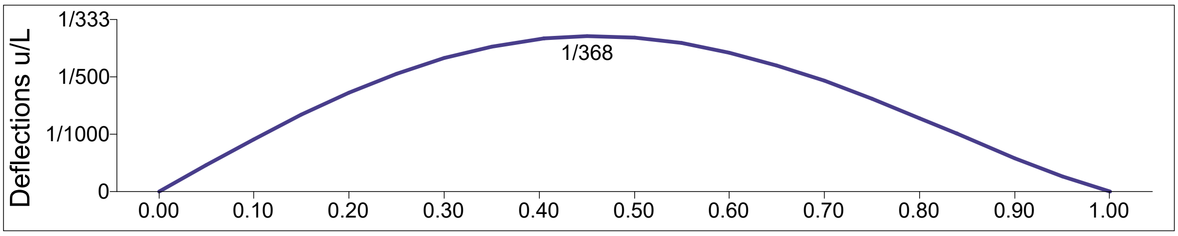
Element stability was not checked!

Serviceability Limit States

Serviceability stresses



Element deflections (local)



Element 2 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

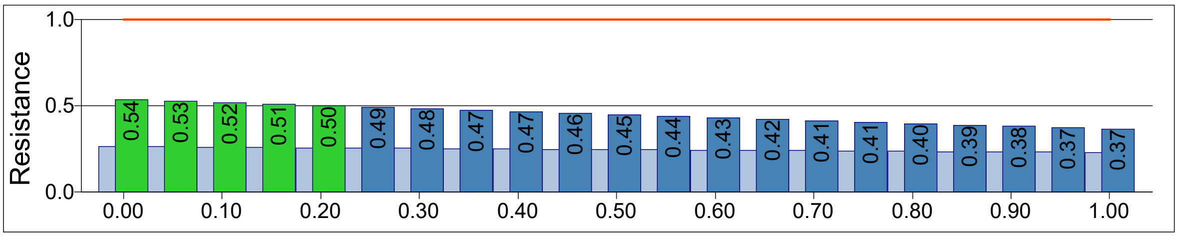
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

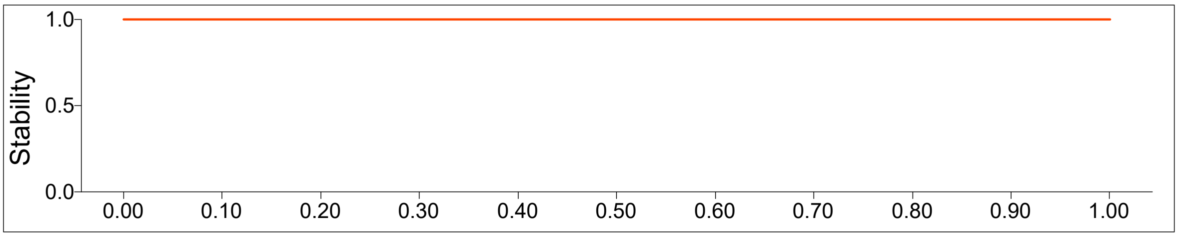
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element stability was not checked!

Serviceability Limit States

Serviceability limit states were not calculated.

Element 3 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

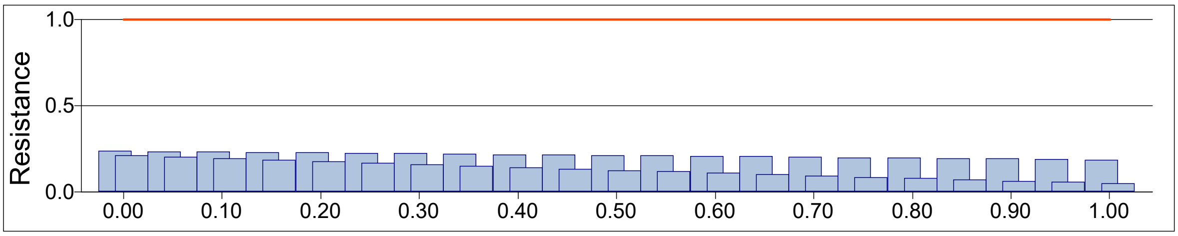
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

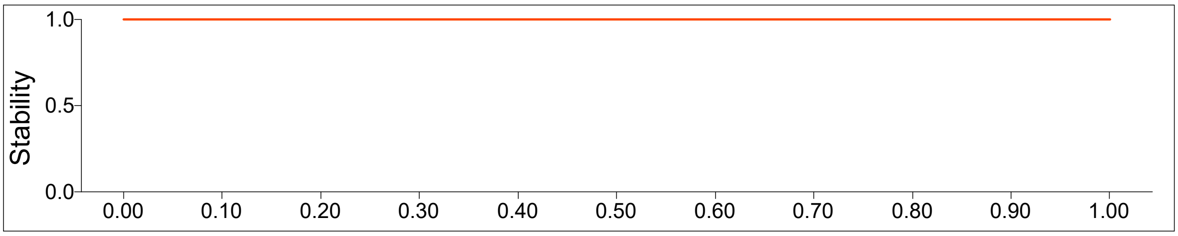
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element stability was not checked!

Serviceability Limit States

Serviceability limit states were not calculated.

Element 4 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

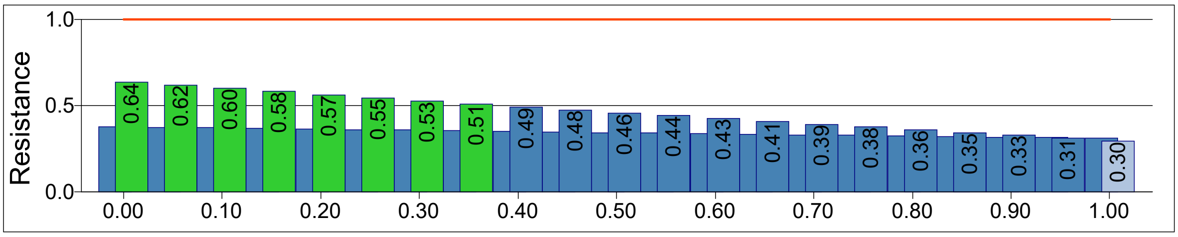
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

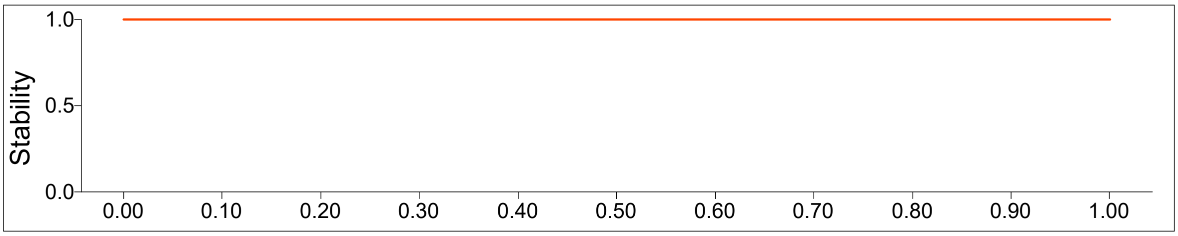
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element stability was not checked!

Serviceability Limit States

Serviceability limit states were not calculated.

Element 5 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

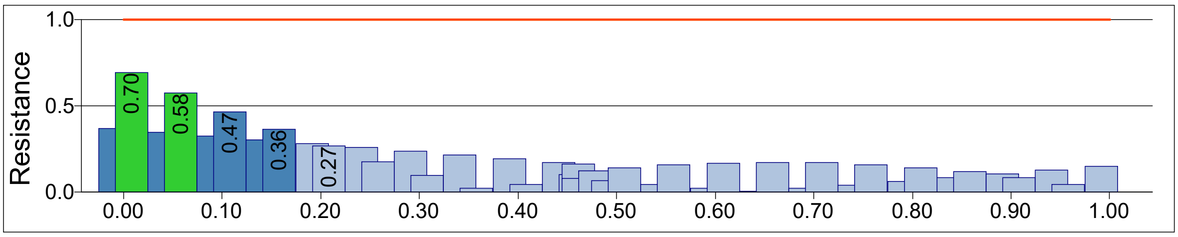
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

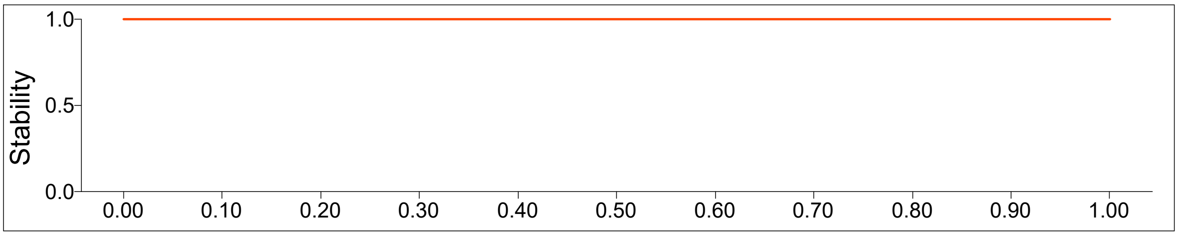
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element stability was not checked!

Serviceability Limit States

Serviceability limit states were not calculated.

Element 6 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

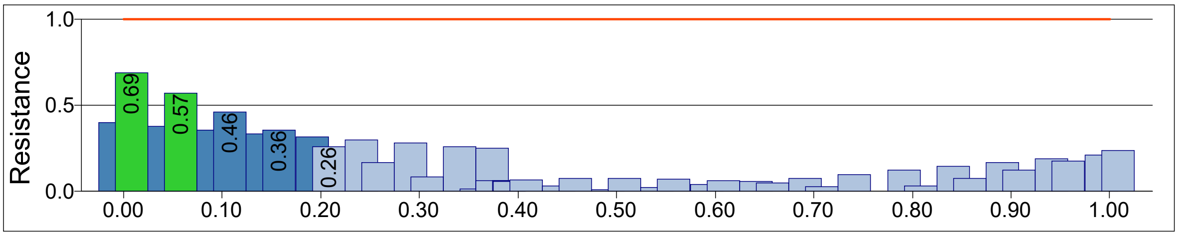
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

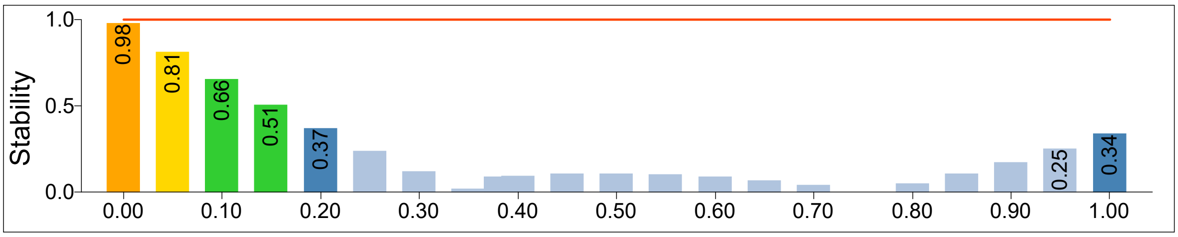
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. All stability checks have passed. The compentent check is lateral-torsional stability check [0.981 <= 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 7 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

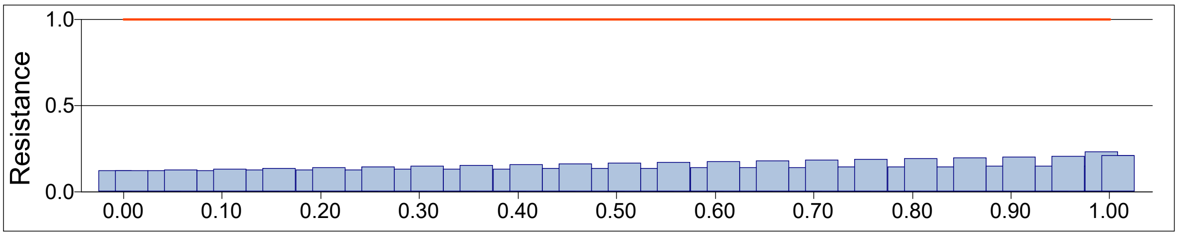
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

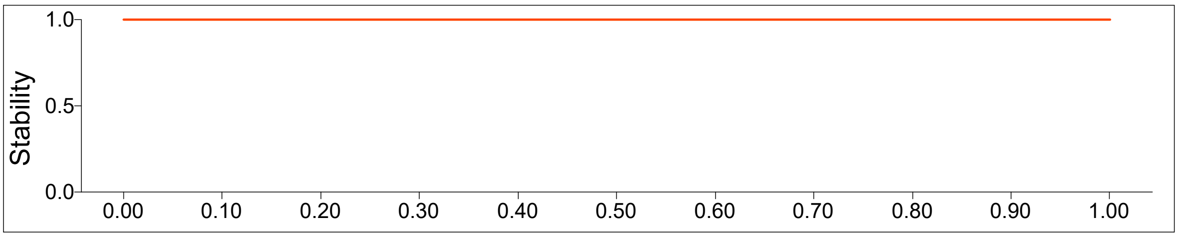
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element stability was not checked!

Serviceability Limit States

Serviceability limit states were not calculated.

Element 8 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

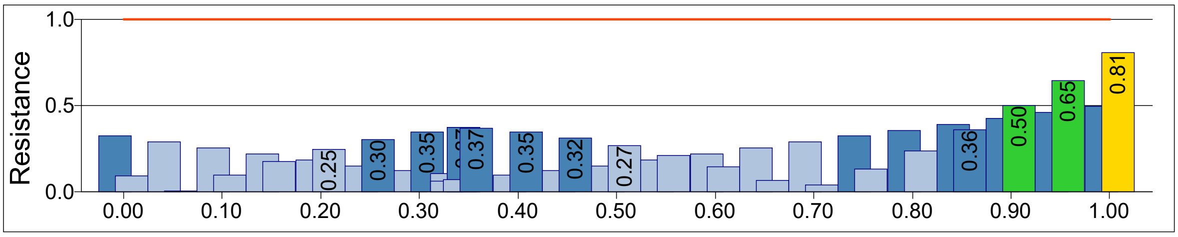
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

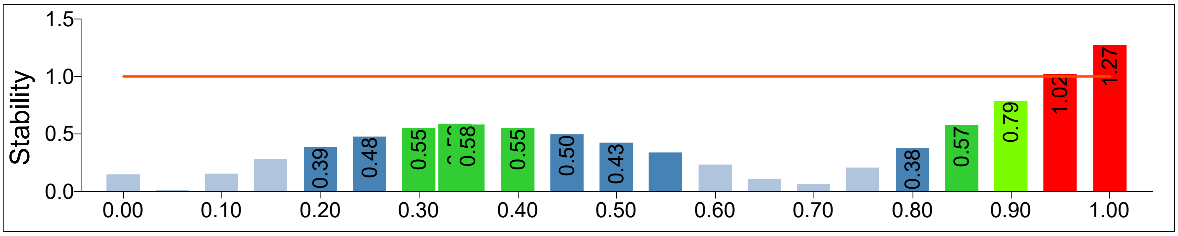
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. At least one stablity check has failed. The compentent check is lateral-torsional stability check [1.273 > 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 9 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

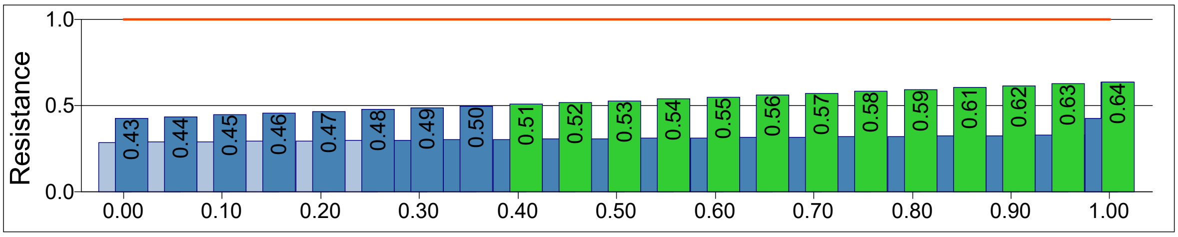
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

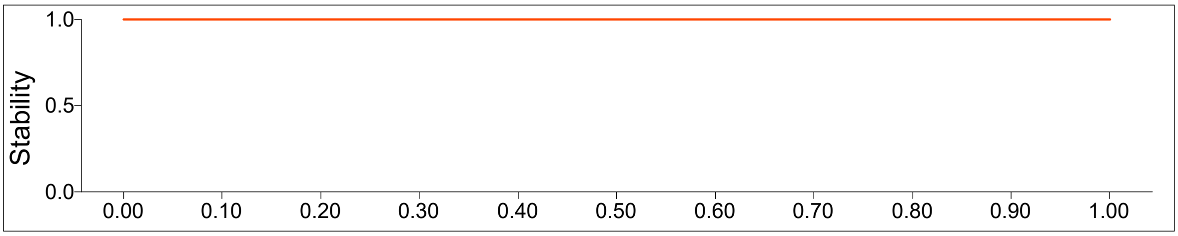
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element stability was not checked!

Serviceability Limit States

Serviceability limit states were not calculated.

Element 10 design results (Building code - EC3):

Cross-section [cm]
[HE 260 A], h = 25.00, b = 26.00, tw = 0.75, tf = 1.25, r = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

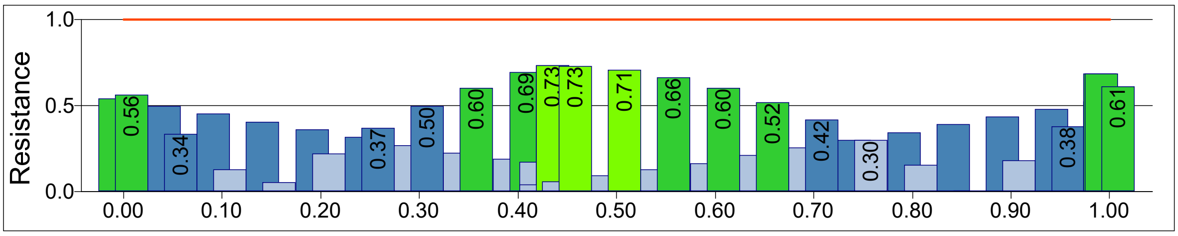
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

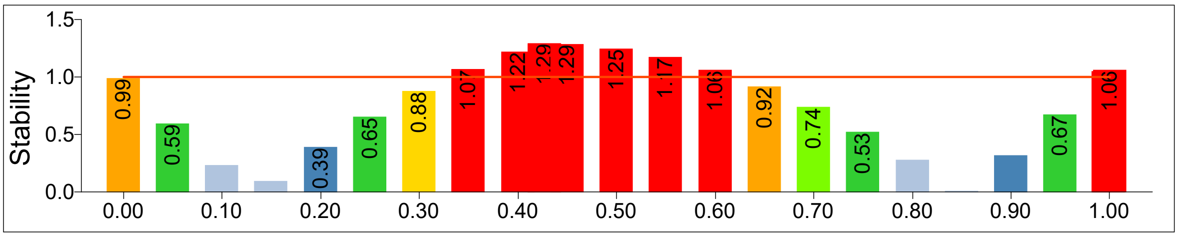
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. At least one stablity check has failed. The compentent check is lateral-torsional stability check [1.293 > 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 11 design results (Building code - EC3):

Cross-section [cm]
[dvojni HEA 260], h = 25.00, b = 52.00, tw = 0.75, tf = 1.25, of = 12.63, w = 2.40

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

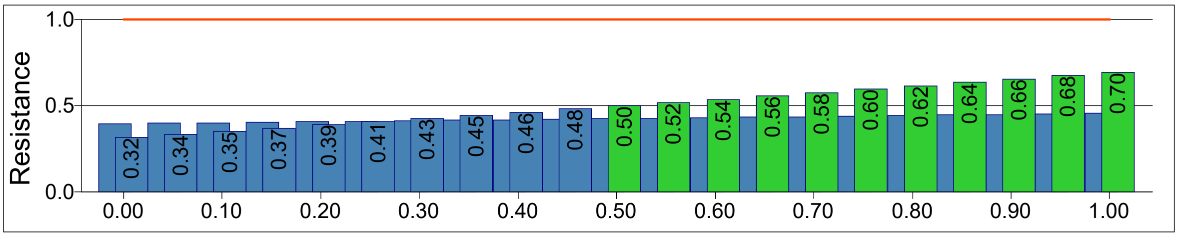
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

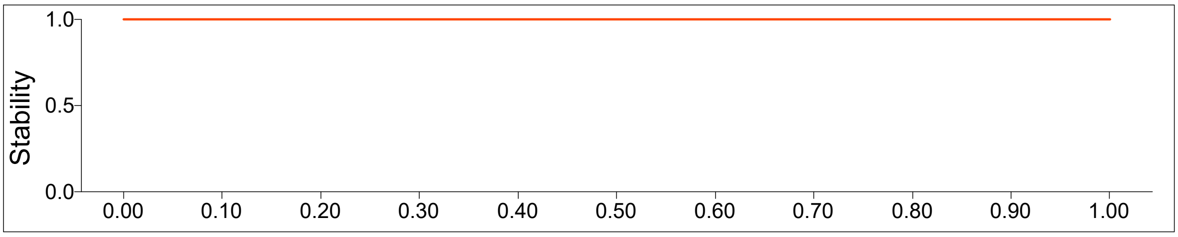
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability

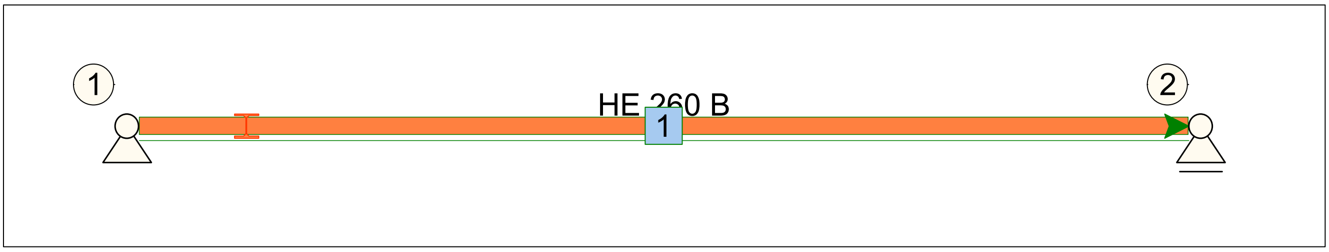


Element stability was not checked!

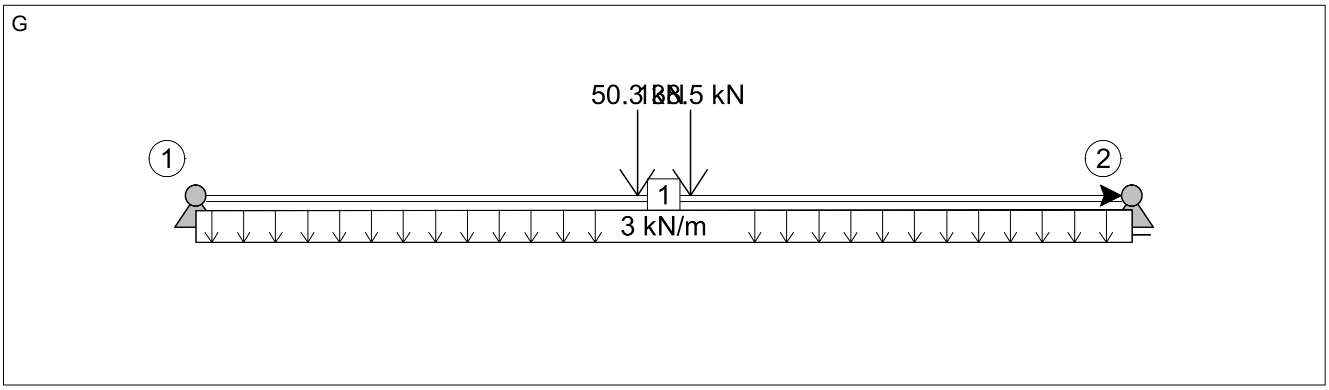
Serviceability Limit States

Serviceability limit states were not calculated.

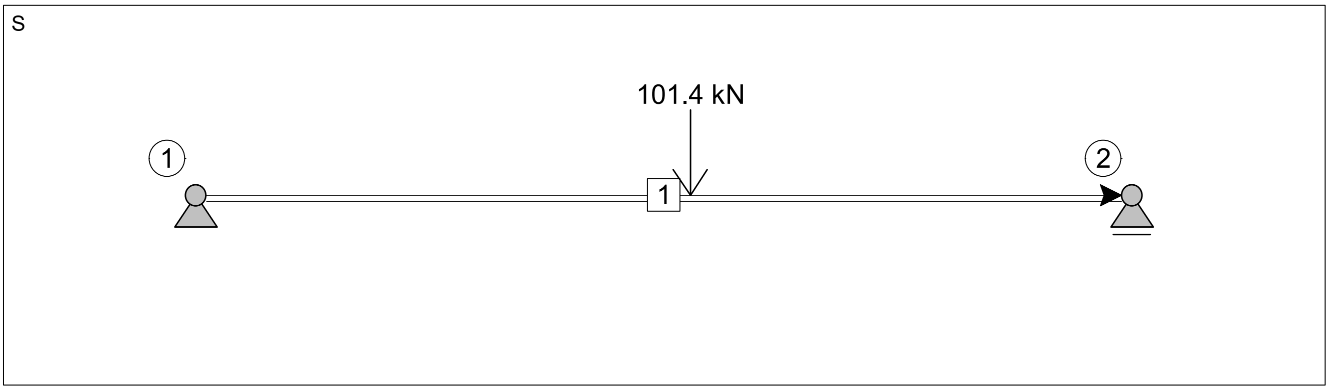
Geometry



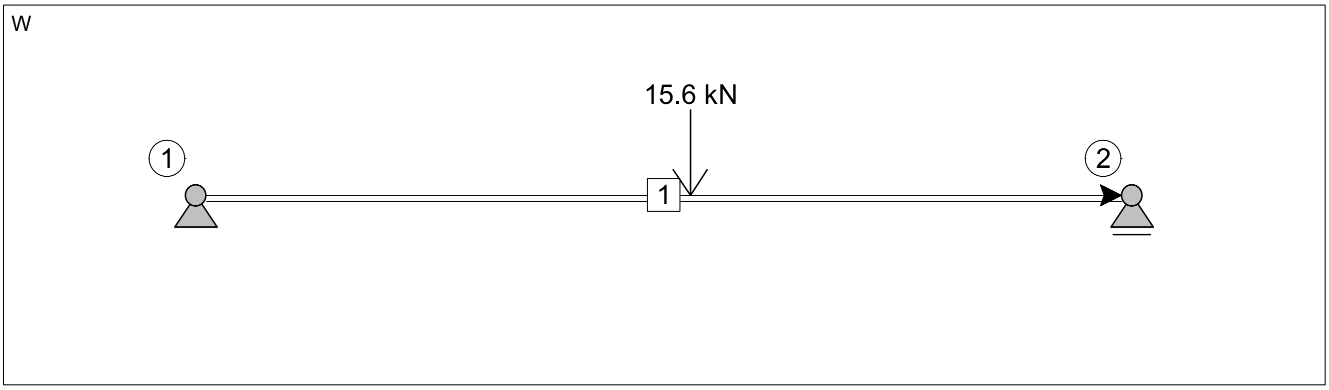
A1 : G



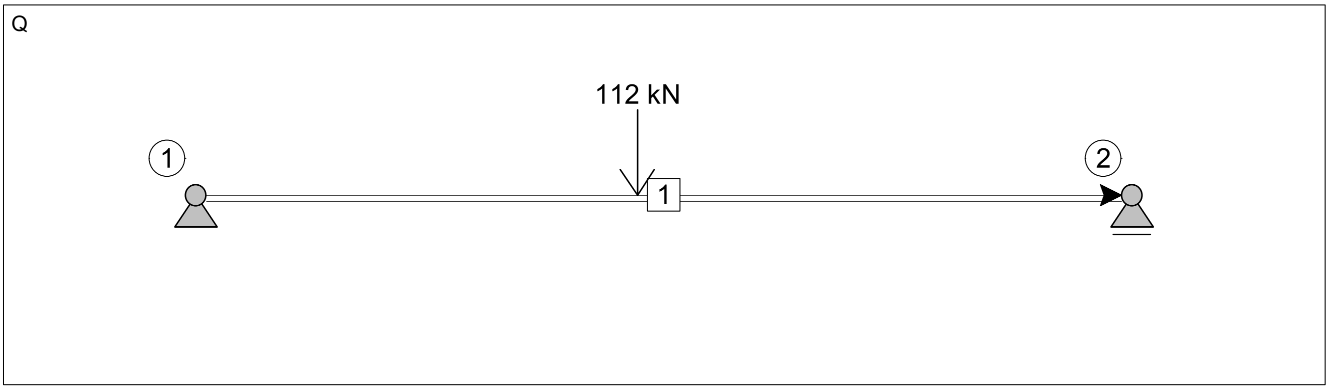
A2 : S



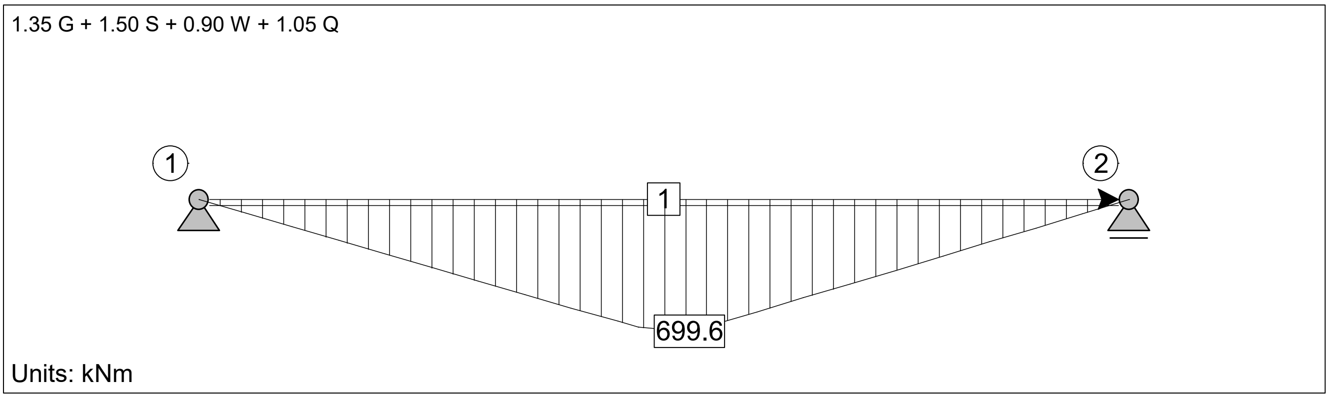
A3 : W



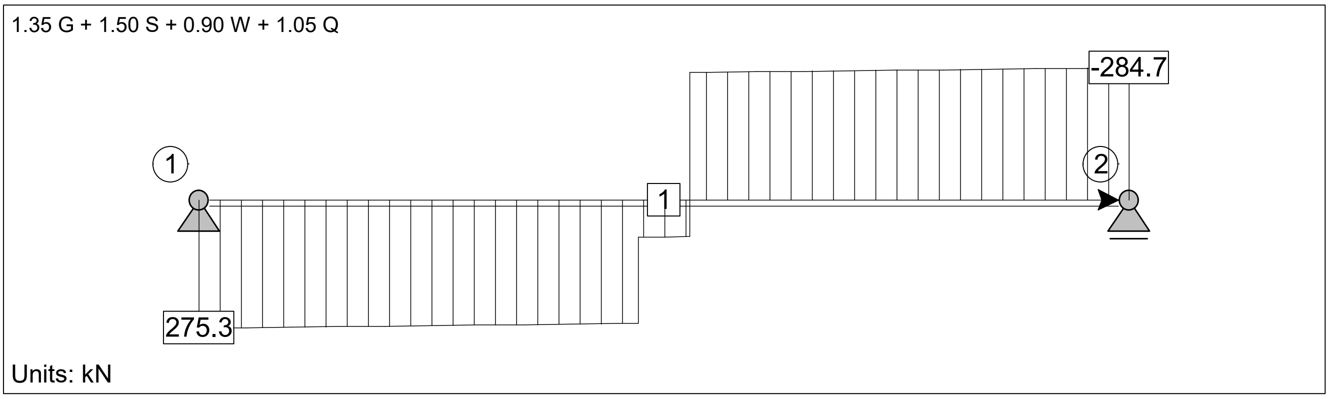
A4 : Q



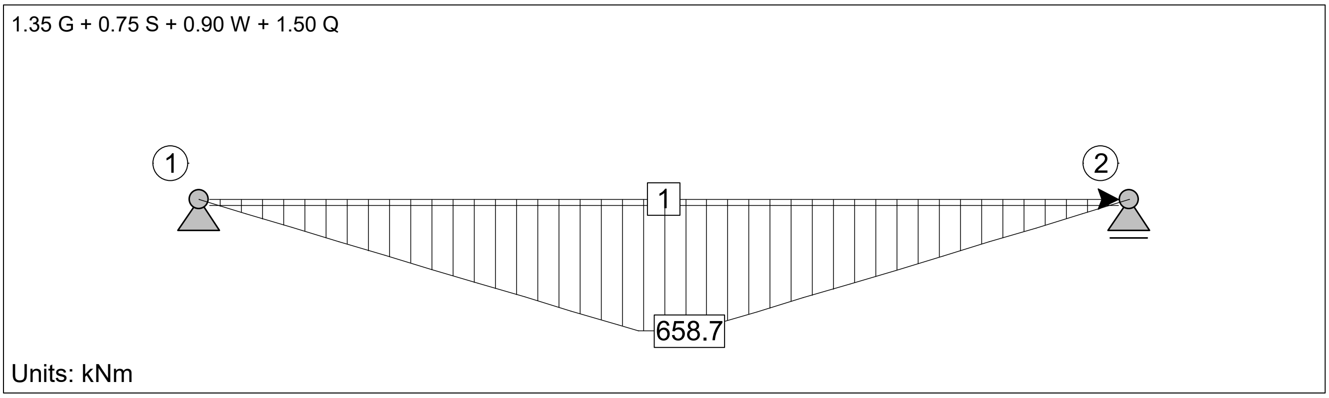
LC1: MSN1: Bending Moments My



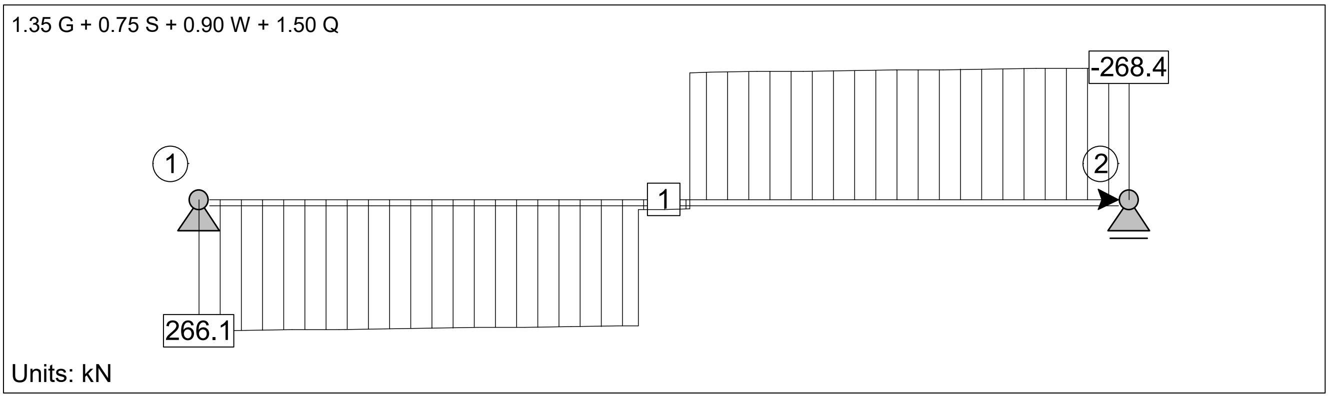
LC1: MSN1: Shear Forces Fz



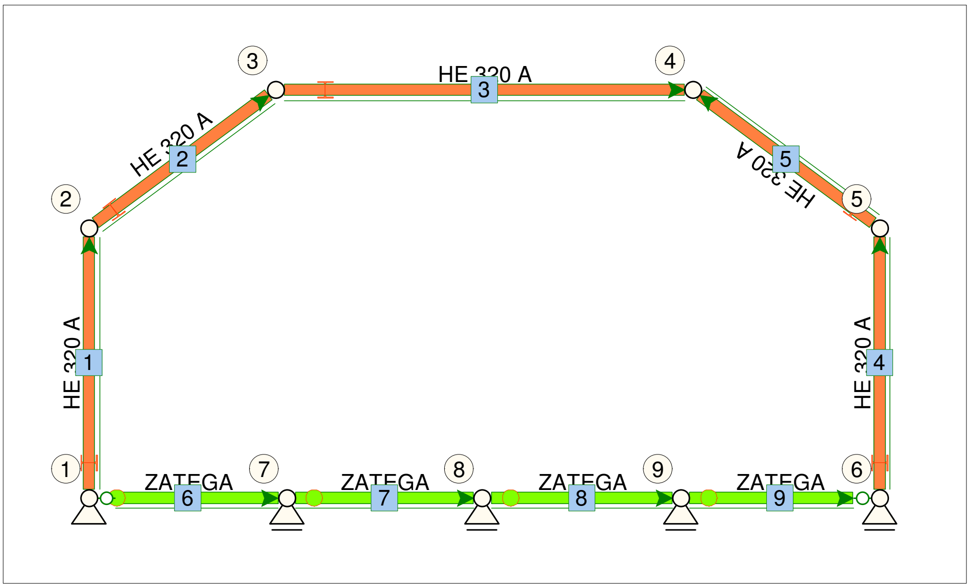
LC2: MSN2: Bending Moments My



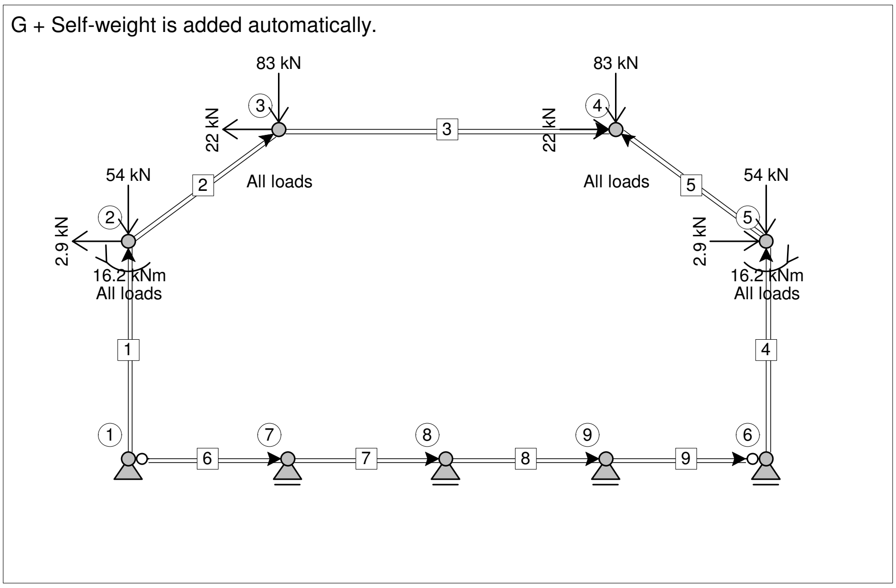
LC2: MSN2: Shear Forces Fz



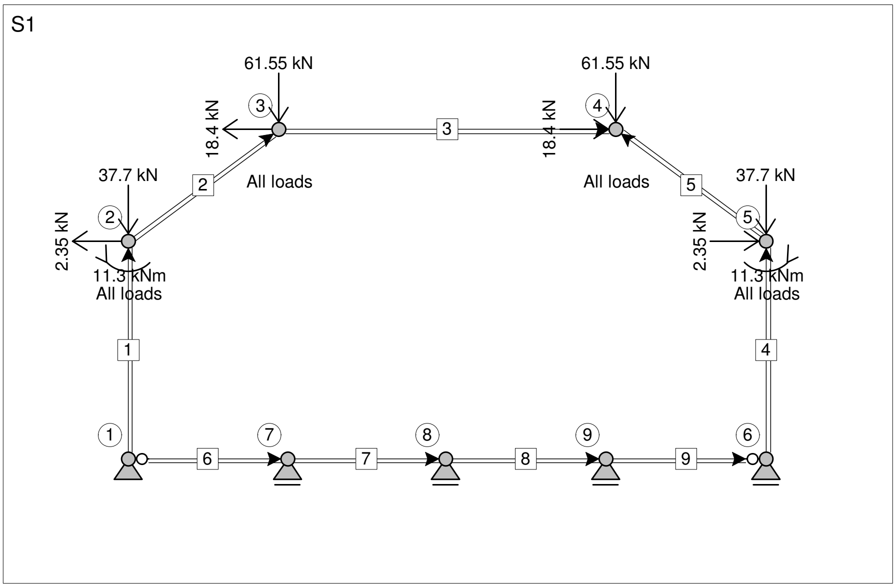
Geometry



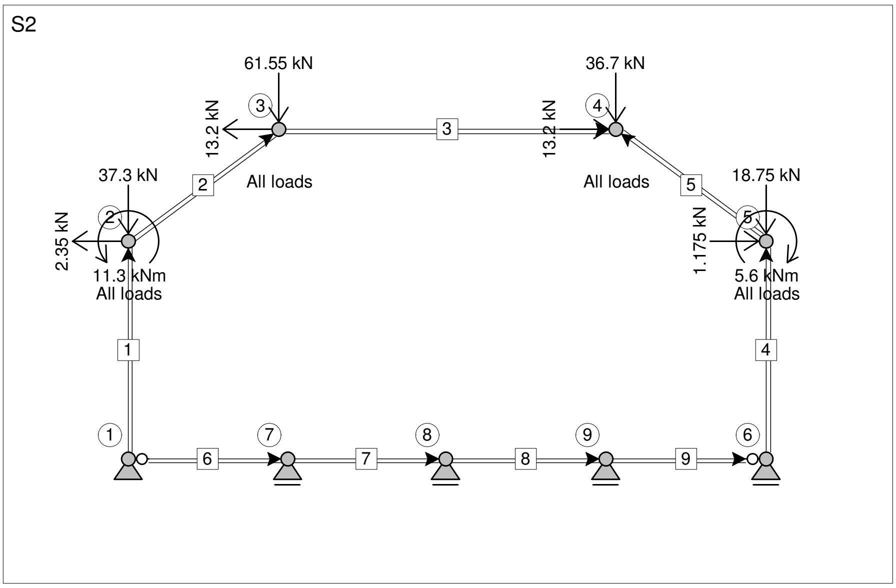
A1 : G



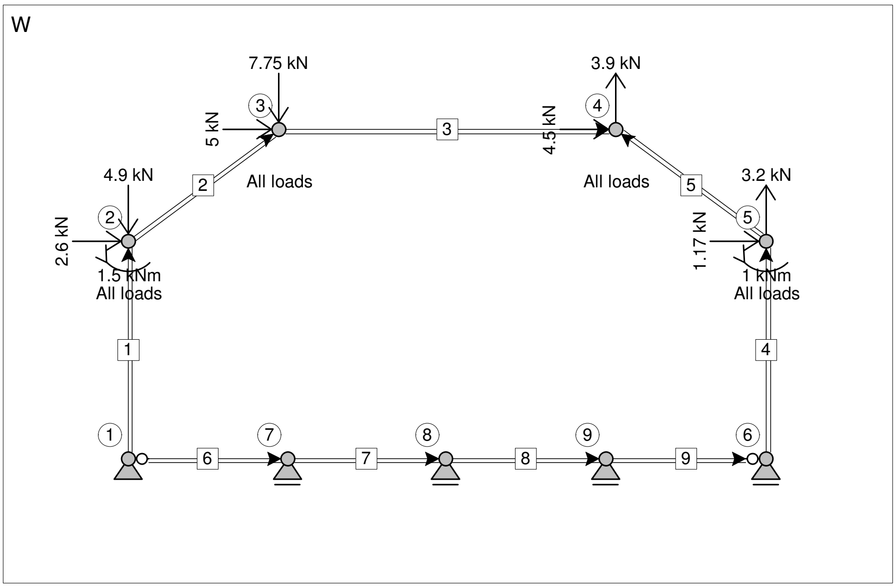
A2 : S1



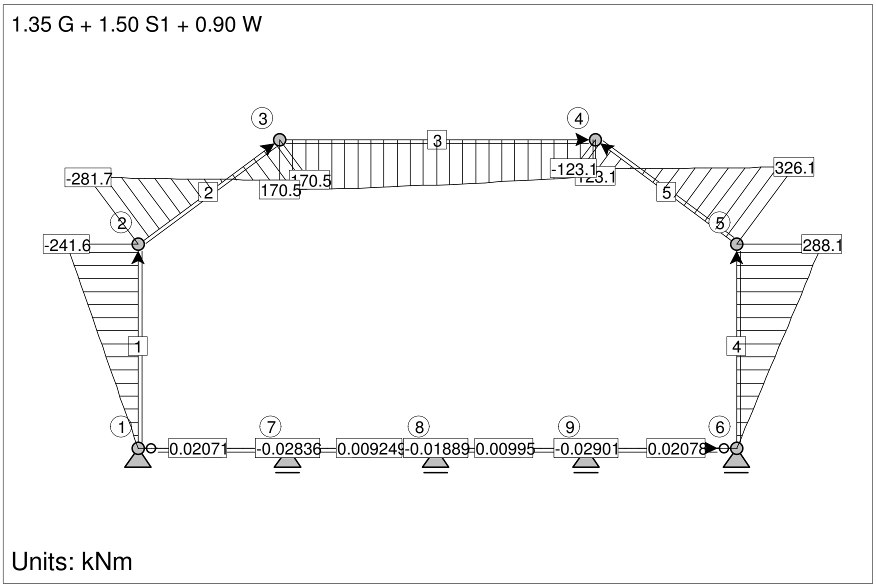
A3 : S2



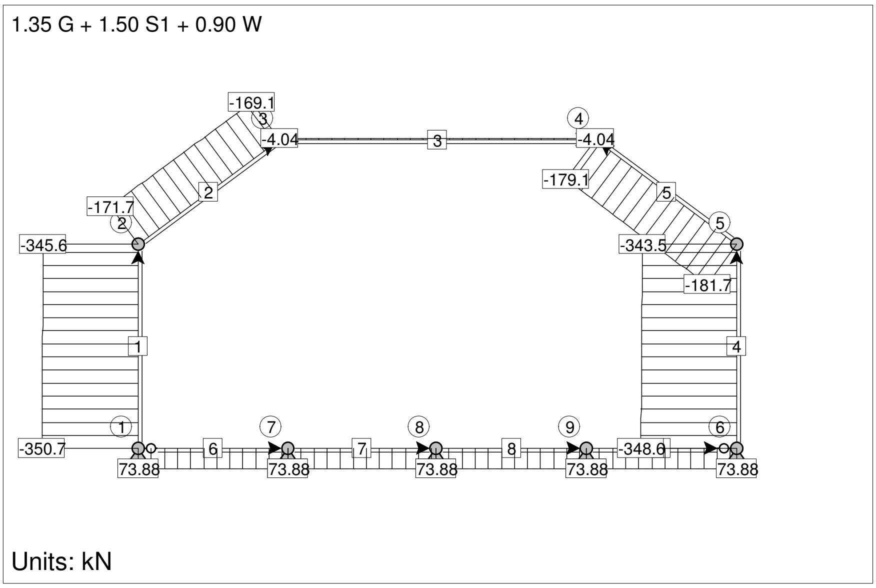
A4 : W



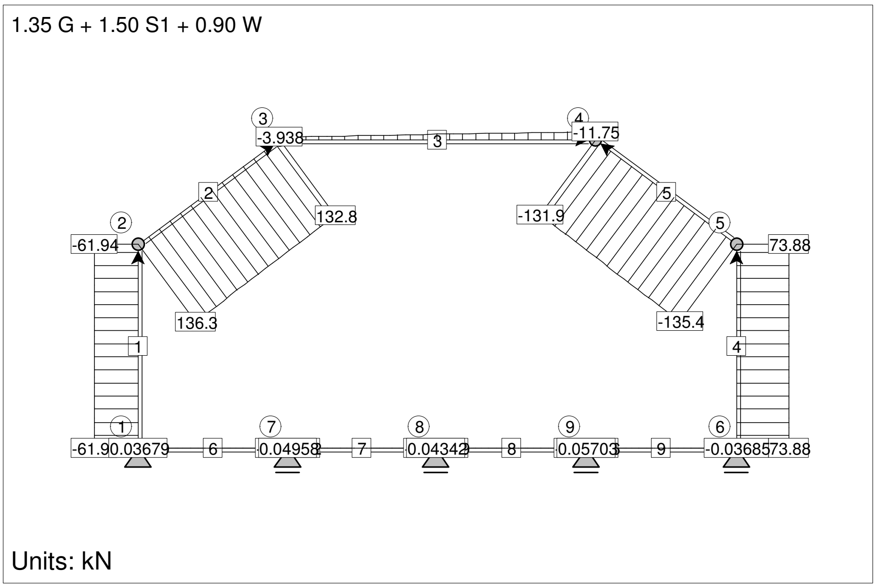
LC1: MSN1: Bending Moments My



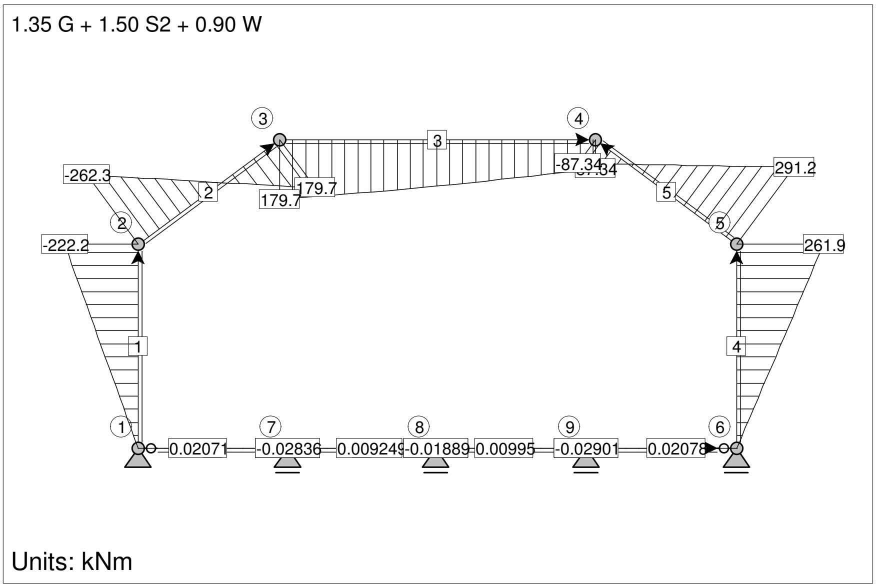
LC1: MSN1: Axial Forces Fx



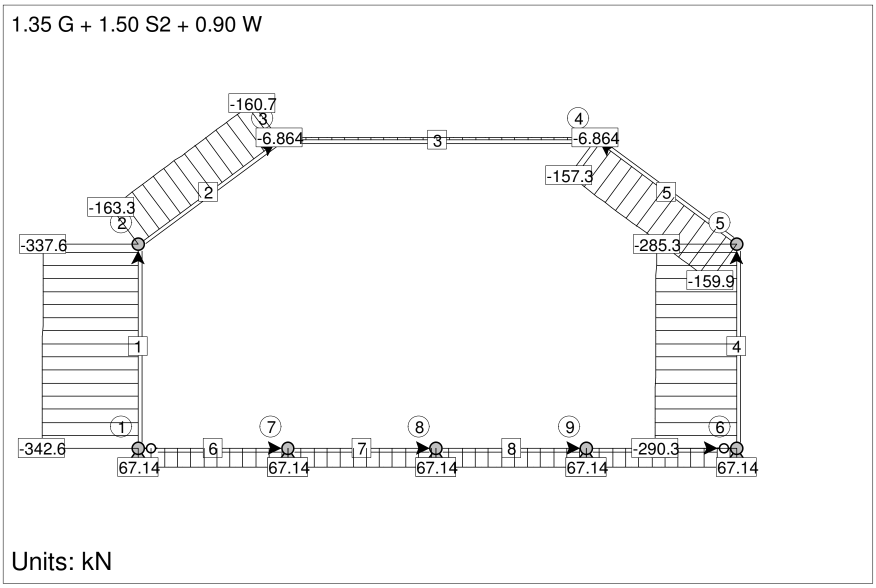
LC1: MSN1: Shear Forces Fz



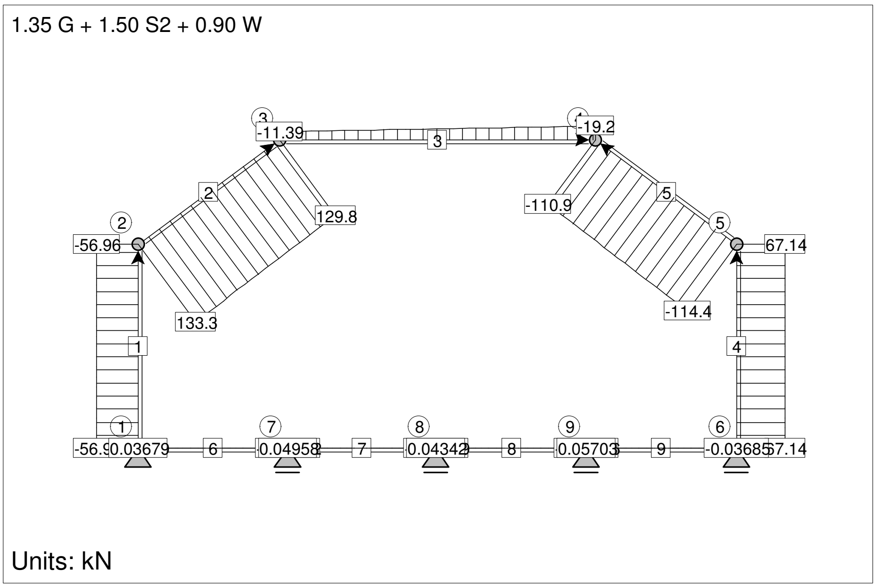
LC2: MSN2: Bending Moments My



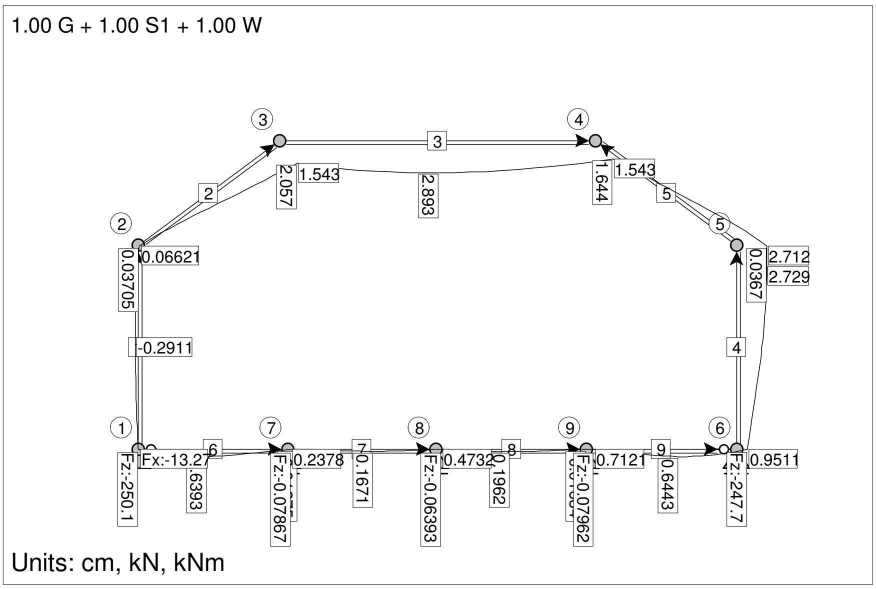
LC2: MSN2: Axial Forces Fx



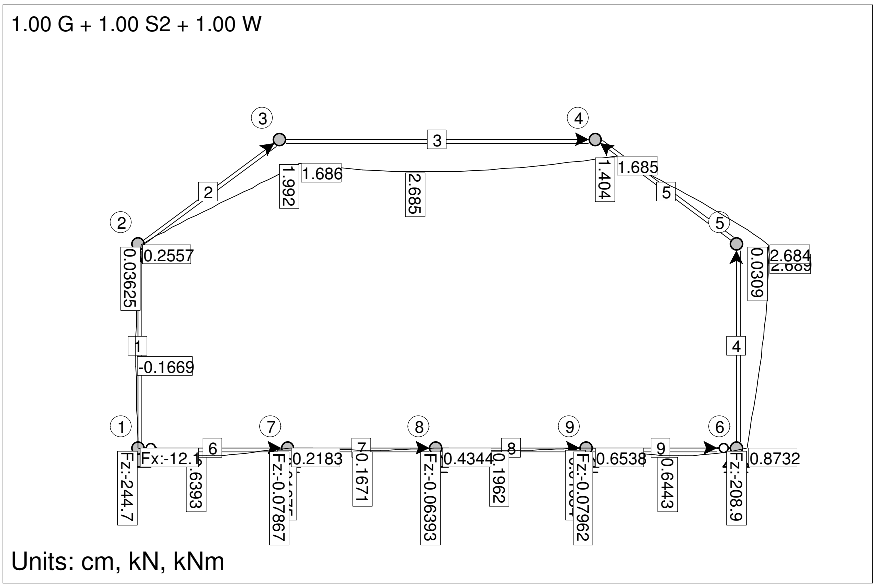
LC2: MSN2: Shear Forces Fz



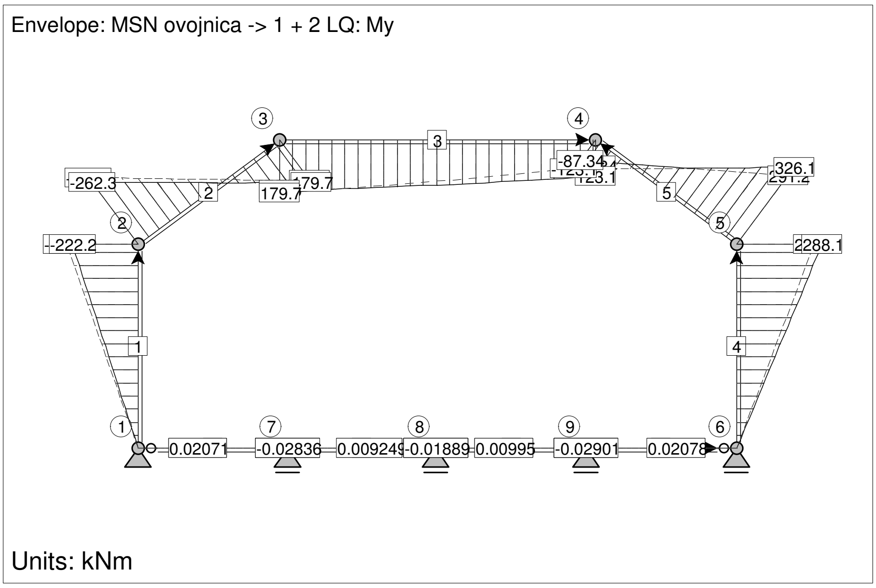
LC3: MSU1: Displacements and Reactions



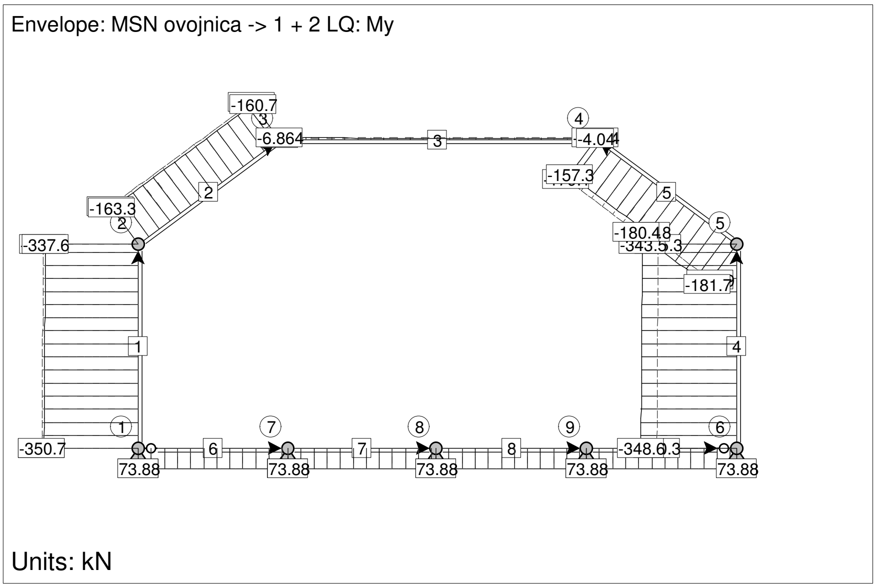
LC4: MSU2: Displacements and Reactions



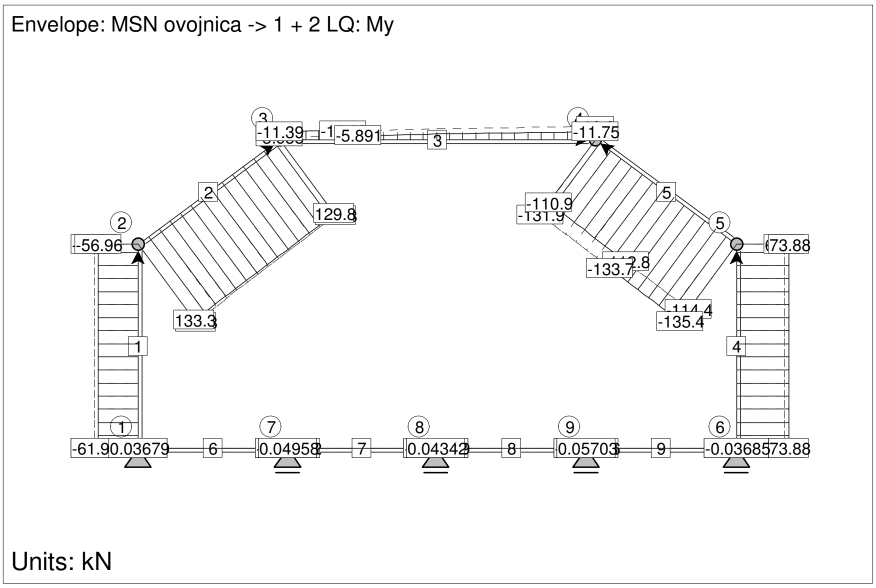
EN1: MSN ovojnica: Bending Moments My



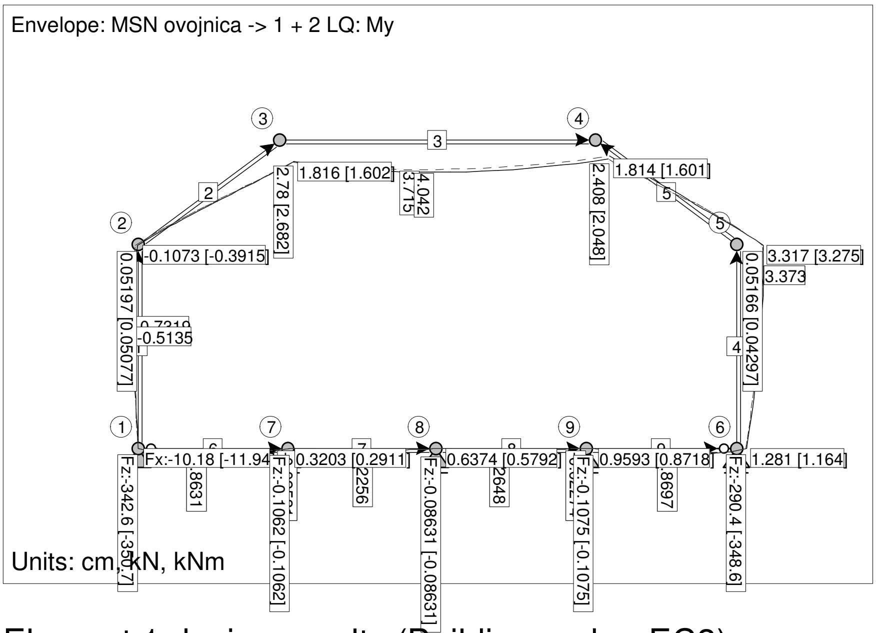
EN1: MSN ovojnica: Axial Forces Fx



EN1: MSN ovojnica: Shear Forces Fz



EN1: MSN ovojnica: Displacements and Reactions



Element 1 design results (Building code - EC3):

Cross-section [cm]
[HE 320 A], h = 31.00, b = 30.00, tw = 0.90, tf = 1.55, r = 2.70

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

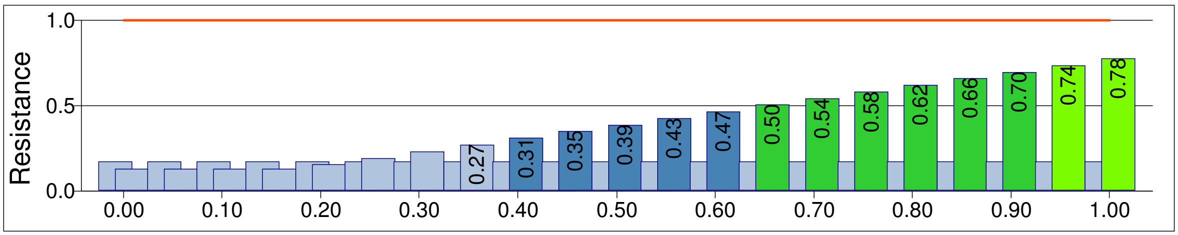
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

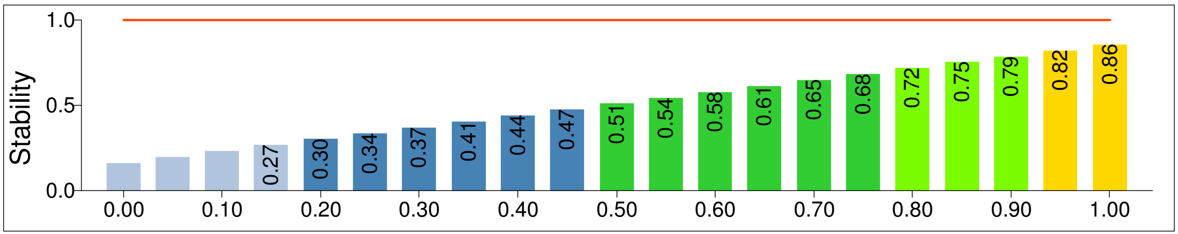
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. All stability checks have passed. The compentent check is axial compression and bending stability check [0.857 <= 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 2 design results (Building code - EC3):

Cross-section [cm]
[HE 320 A], h = 31.00, b = 30.00, tw = 0.90, tf = 1.55, r = 2.70

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

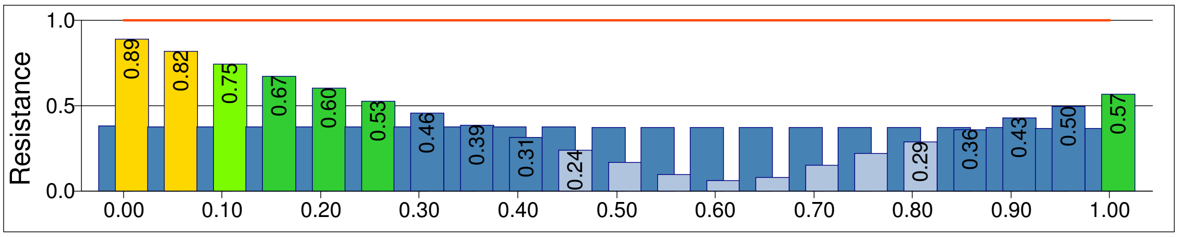
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

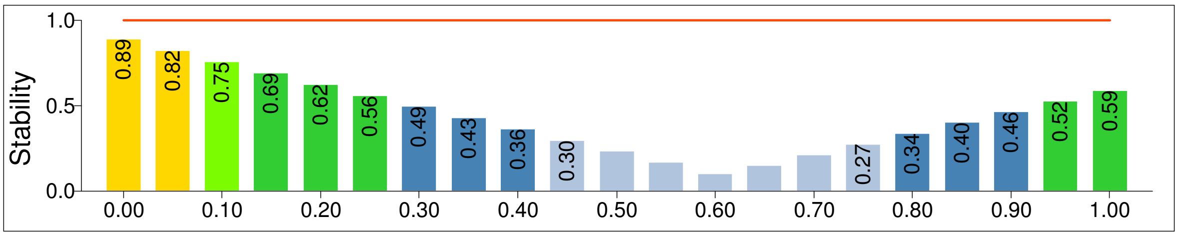
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. All stability checks have passed. The compentent check is axial compression and lateral-tolsional stability check [0.885 <= 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 3 design results (Building code - EC3):

Cross-section [cm]
[HE 320 A], h = 31.00, b = 30.00, tw = 0.90, tf = 1.55, r = 2.70

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

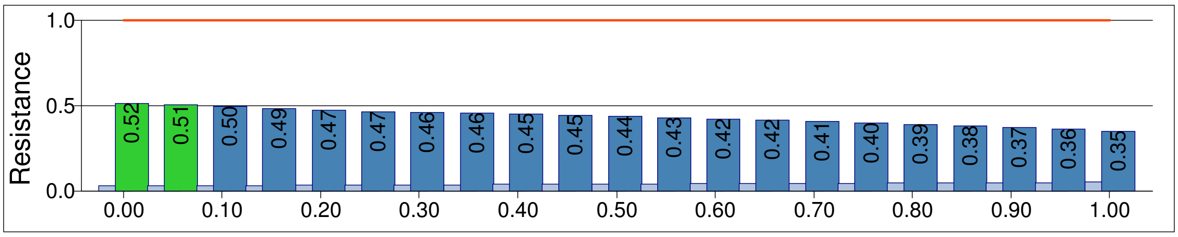
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

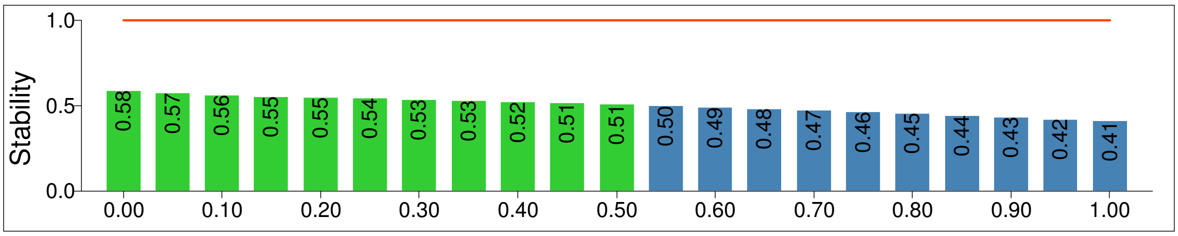
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. All stability checks have passed. The compentent check is lateral-torsional stability check [0.585 <= 1.0] in load case '[U] MSN2'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 4 design results (Building code - EC3):

Cross-section [cm]
[HE 320 A], h = 31.00, b = 30.00, tw = 0.90, tf = 1.55, r = 2.70

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

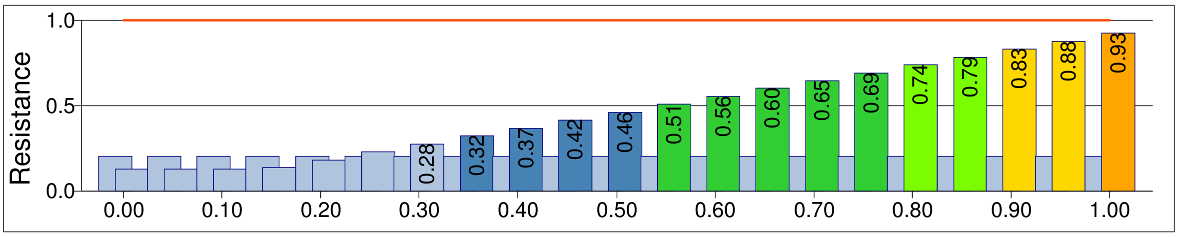
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

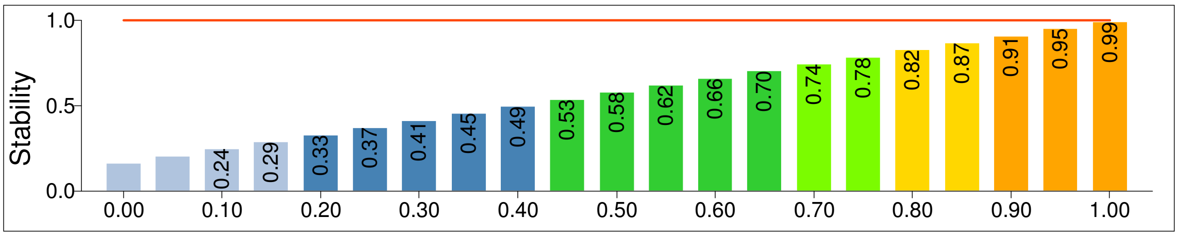
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability



Element was classified into class 1. All stability checks have passed. The compentent check is axial compression and bending stability check [0.990 <= 1.0] in load case '[U] MSN1'.

Serviceability Limit States

Serviceability limit states were not calculated.

Element 5 design results (Building code - EC3):

Cross-section [cm]
[HE 320 A], h = 31.00, b = 30.00, tw = 0.90, tf = 1.55, r = 2.70

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

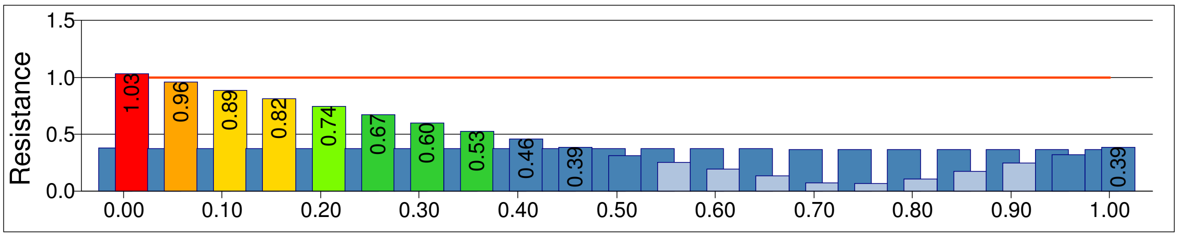
Lateral-torsional supports and buckling fields

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

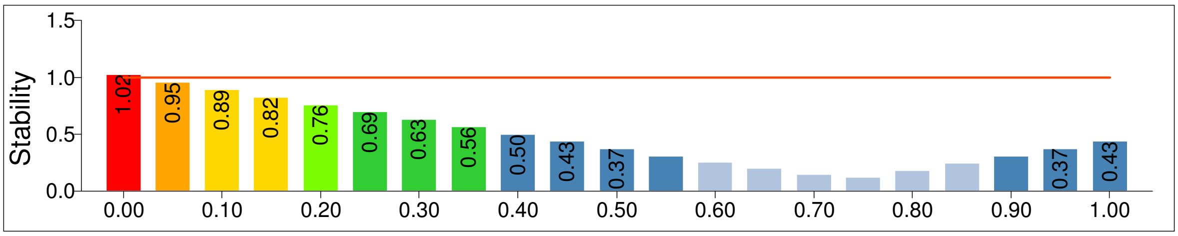
Relative load position used in LT calculation is -1.00 (unfavourable).

Ultimate Limit States

Cross-section resistance



Element stability

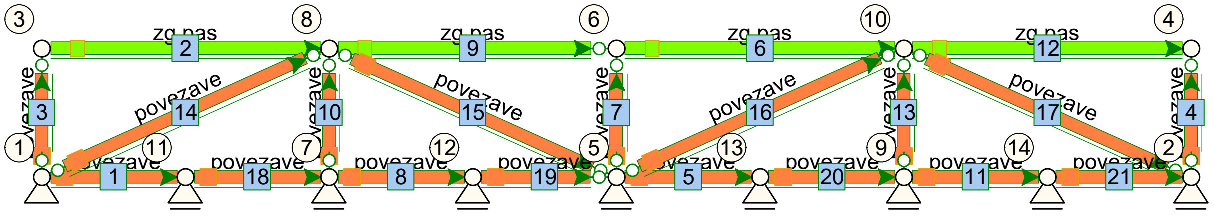


Element was classified into class 1. At least one stablity check has failed. The compentent check is axial compression and lateral-tolsional stability check [1.017 > 1.0] in load case '[U] MSN1'.

Serviceability Limit States

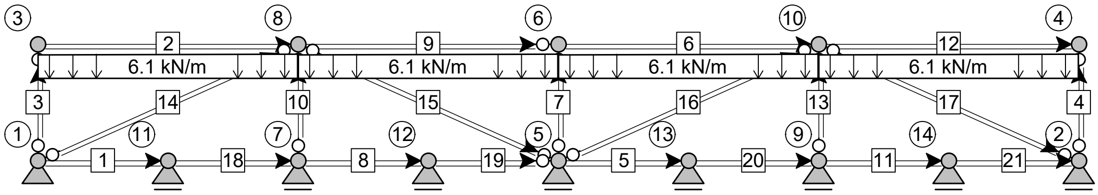
Serviceability limit states were not calculated.

Geometry



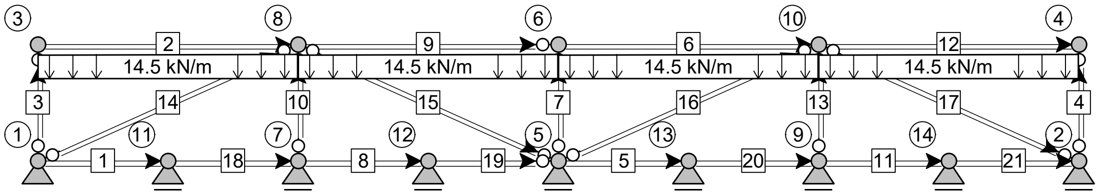
A1 : G

G + Self-weight is added automatically.



A2 : Q

Q



Element 1 design results (Building code - EC5):

Cross-section [cm]
[povezave],   h = 14.00,   b = 14.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

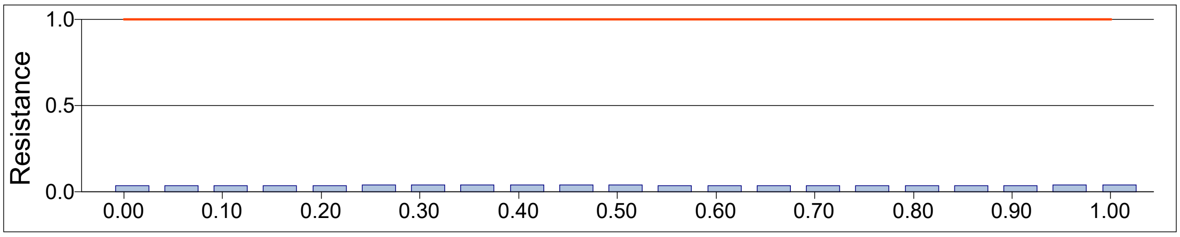
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

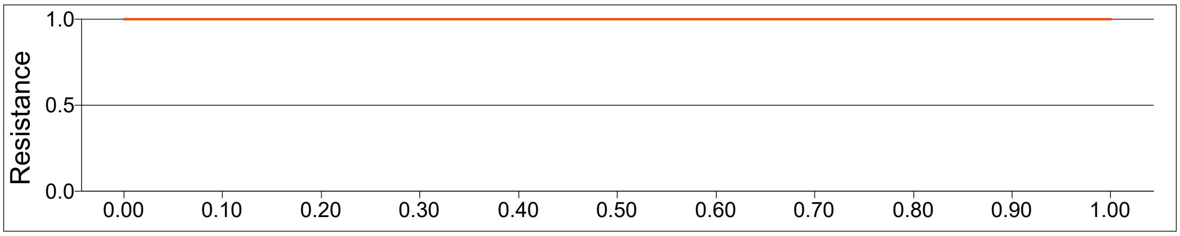
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 2 design results (Building code - EC5):

Cross-section [cm]
[zg.pas], h = 22.00, b = 18.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

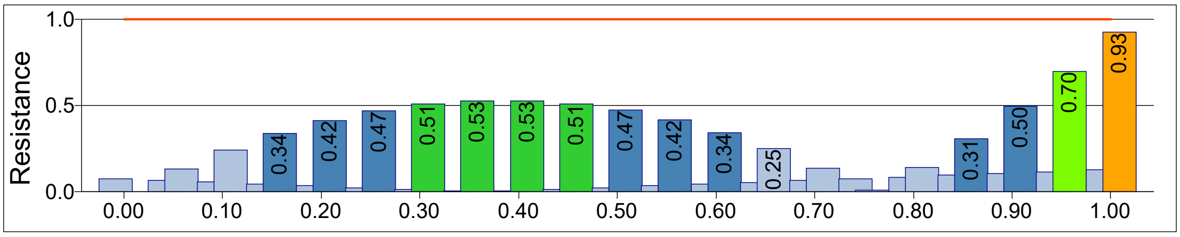
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

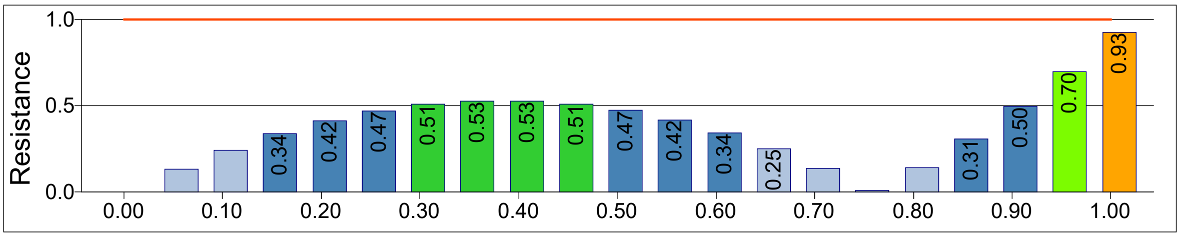
Element service class 2

Ultimate Limit States

Shear & CS Resistance

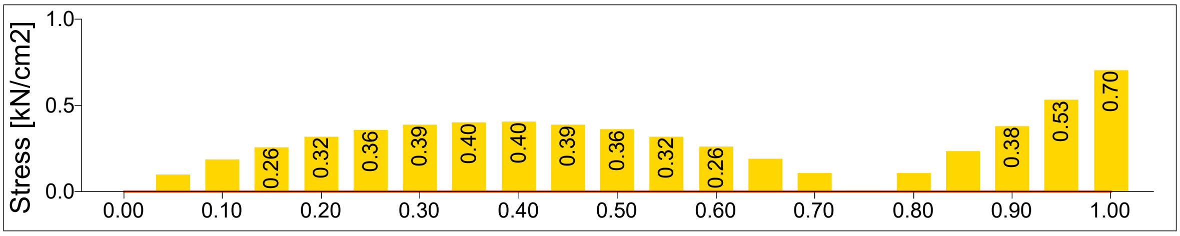


Stability Resistance

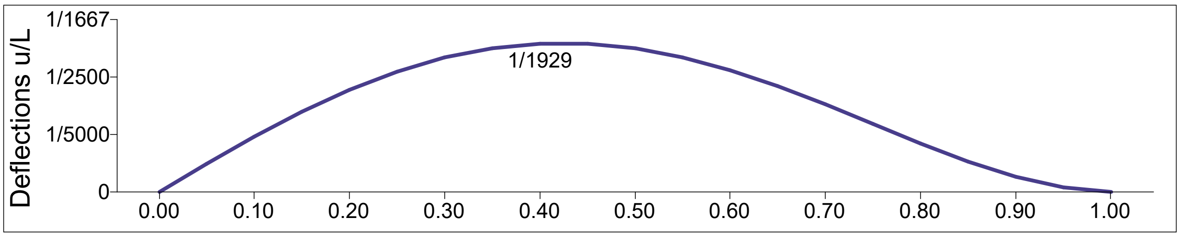


Serviceability Limit States

Serviceability stresses



Element deflections (local)



Element 3 design results (Building code - EC5):

Cross-section [cm]
[povezave], h = 14.00, b = 14.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

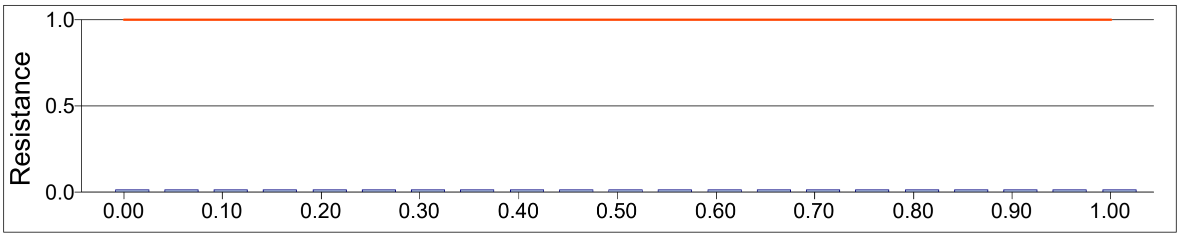
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

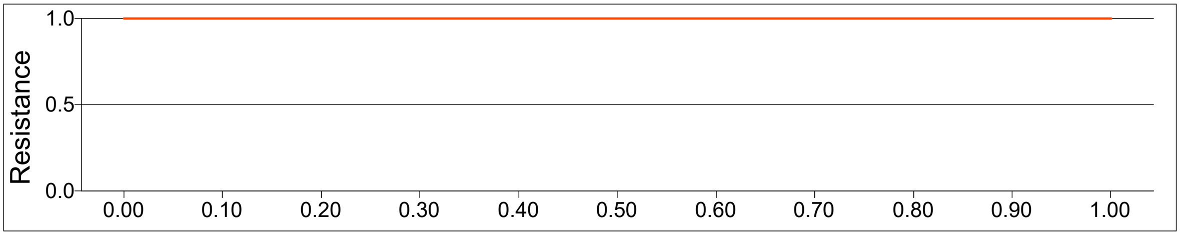
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 4 design results (Building code - EC5):

Cross-section [cm]
[povezave], h = 14.00, b = 14.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

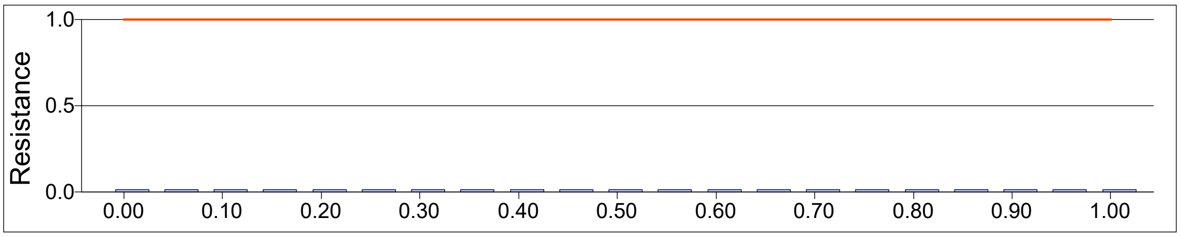
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

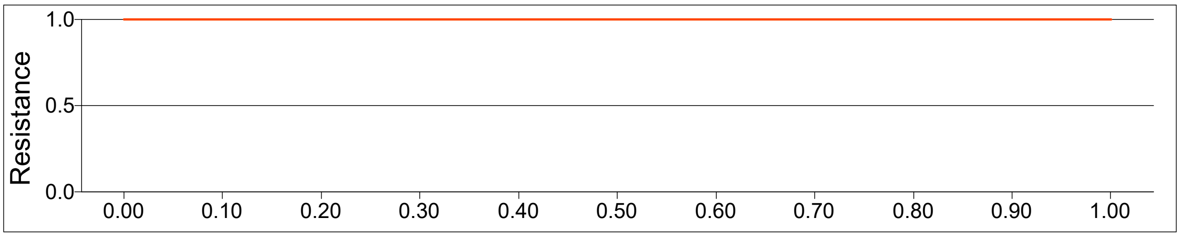
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 5 design results (Building code - EC5):

Cross-section [cm]
[povezave], h = 14.00, b = 14.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

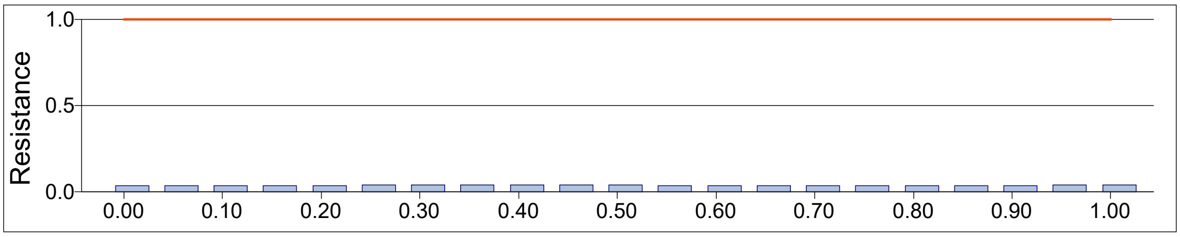
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

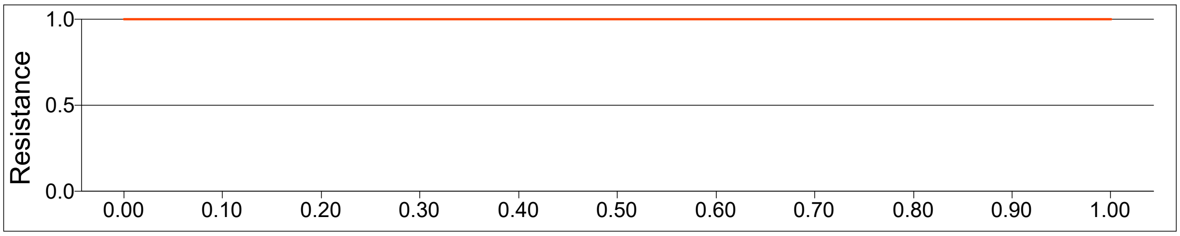
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 6 design results (Building code - EC5):

Cross-section [cm]
[zg.pas], h = 22.00, b = 18.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

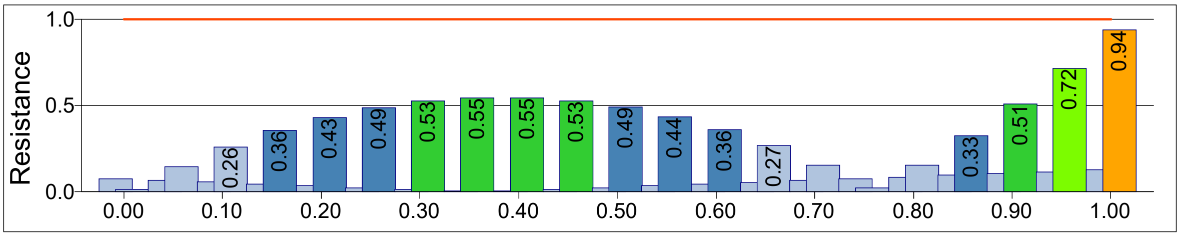
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

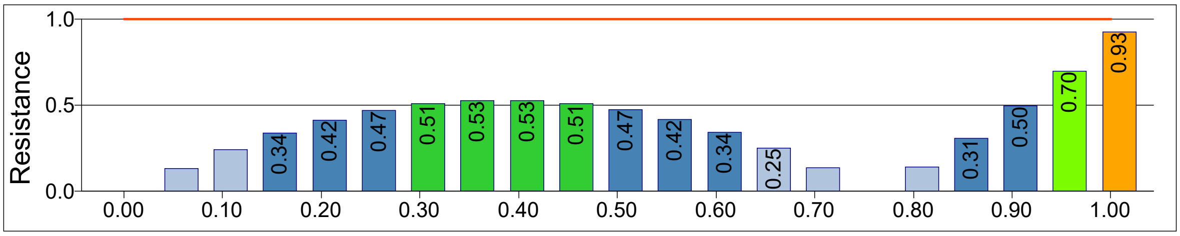
Element service class 2

Ultimate Limit States

Shear & CS Resistance

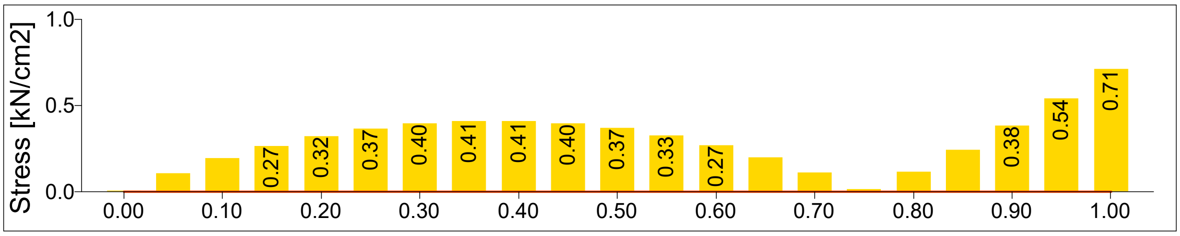


Stability Resistance

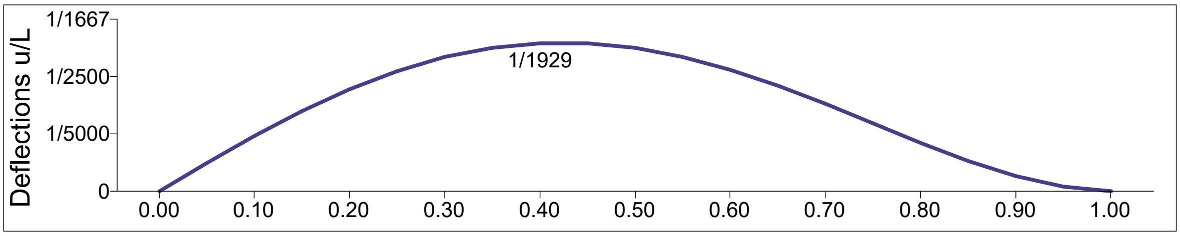


Serviceability Limit States

Serviceability stresses



Element deflections (local)



Element 7 design results (Building code - EC5):

Cross-section [cm]
[povezave], h = 14.00, b = 14.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

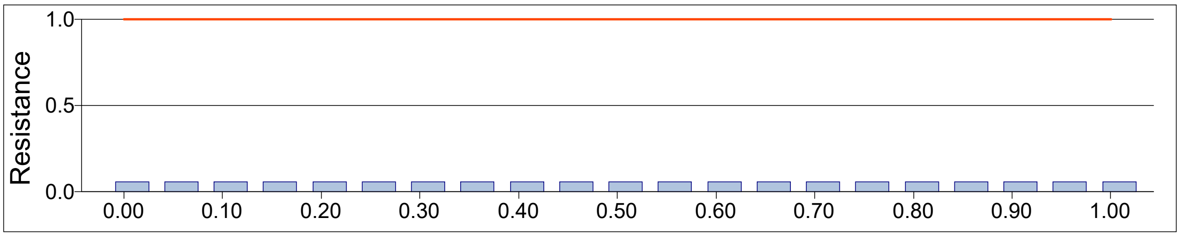
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

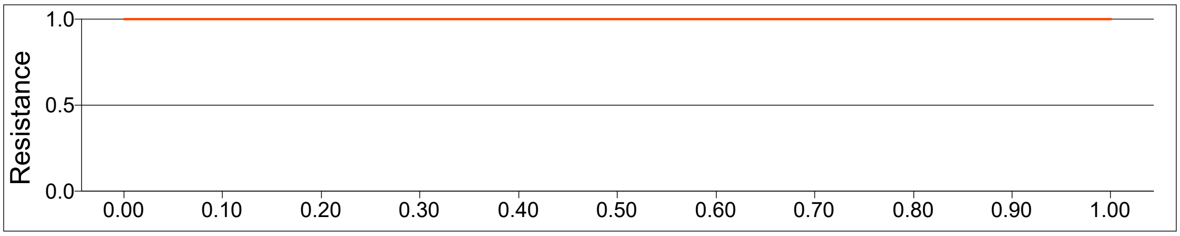
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 8 design results (Building code - EC5):

Cross-section [cm]
[povezave],   h = 14.00,   b = 14.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

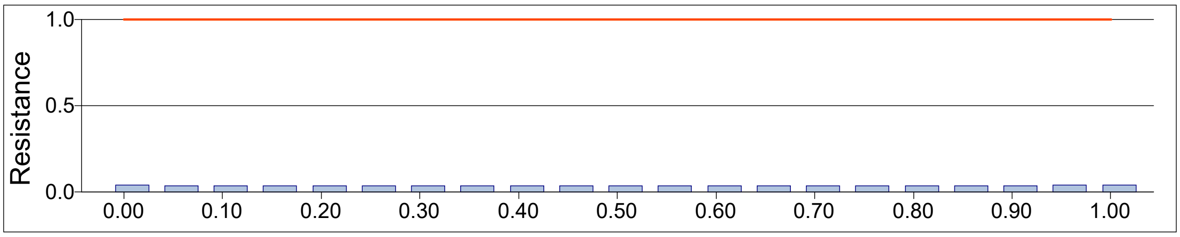
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

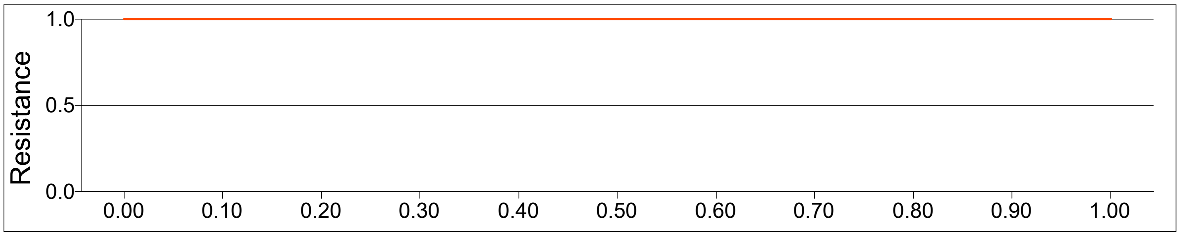
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 9 design results (Building code - EC5):

Cross-section [cm]
[zg.pas], h = 22.00, b = 18.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

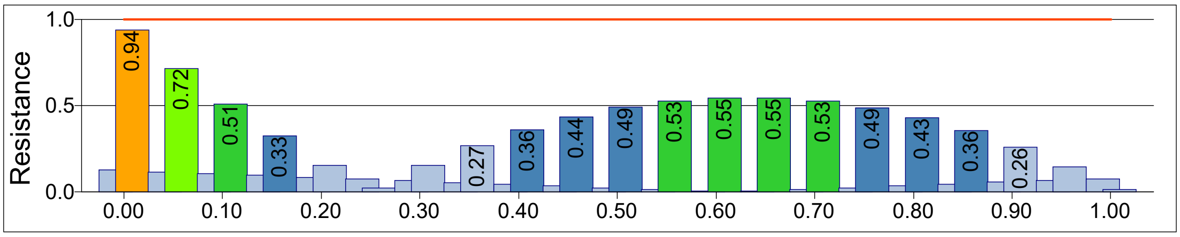
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

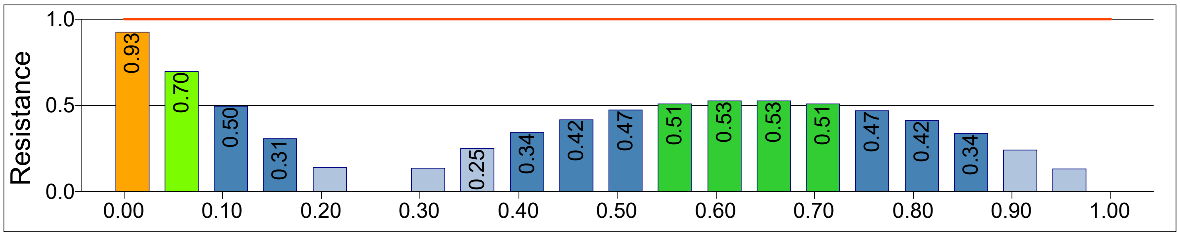
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 10 design results (Building code - EC5):

Cross-section [cm]
[povezave], h = 14.00, b = 14.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

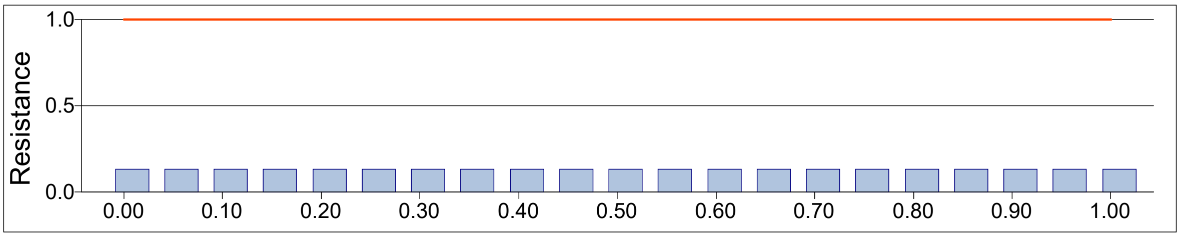
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

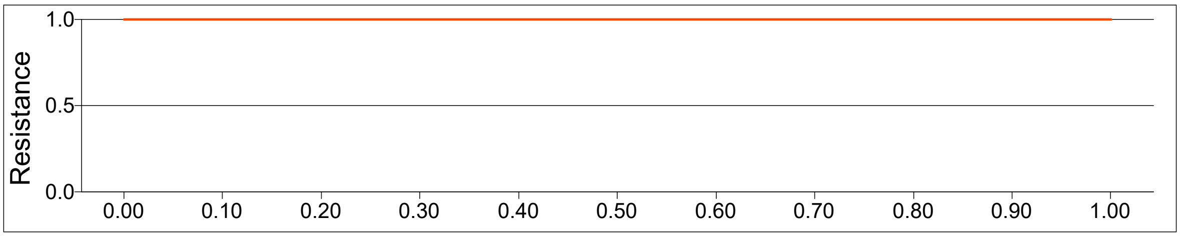
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 11 design results (Building code - EC5):

Cross-section [cm]
[povezave], h = 14.00, b = 14.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

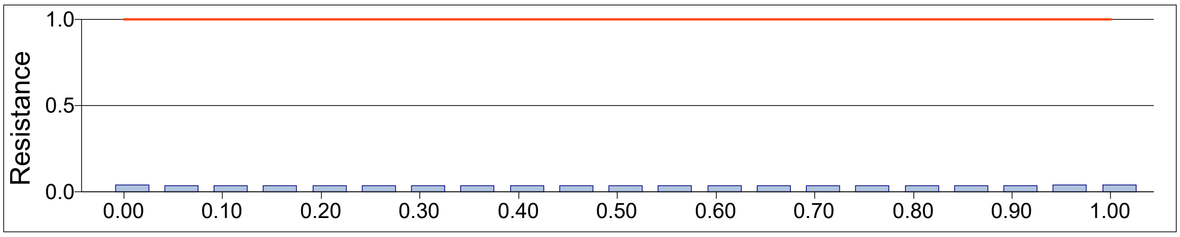
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

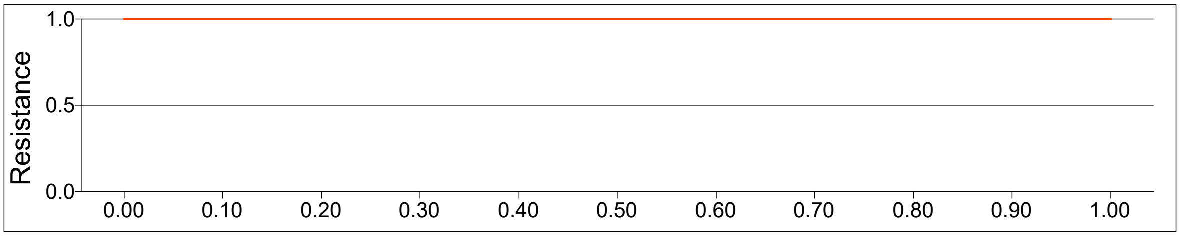
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 12 design results (Building code - EC5):

Cross-section [cm]
[zg.pas], h = 22.00, b = 18.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

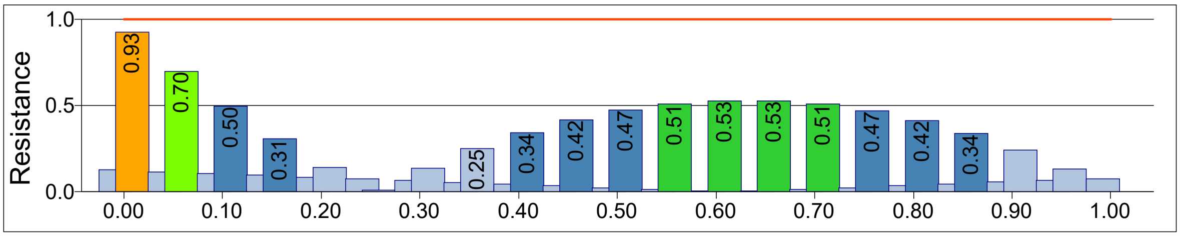
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

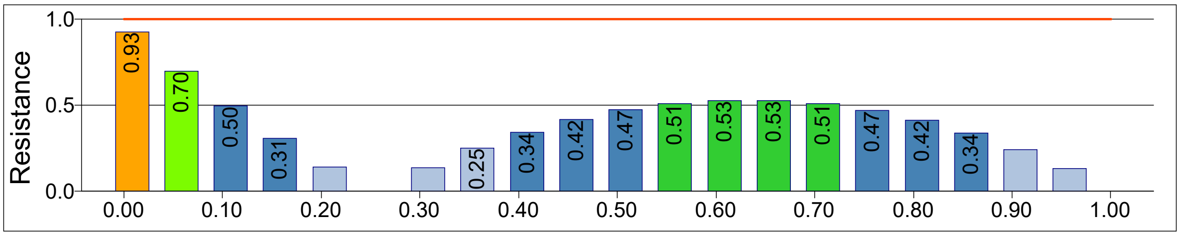
Element service class 2

Ultimate Limit States

Shear & CS Resistance

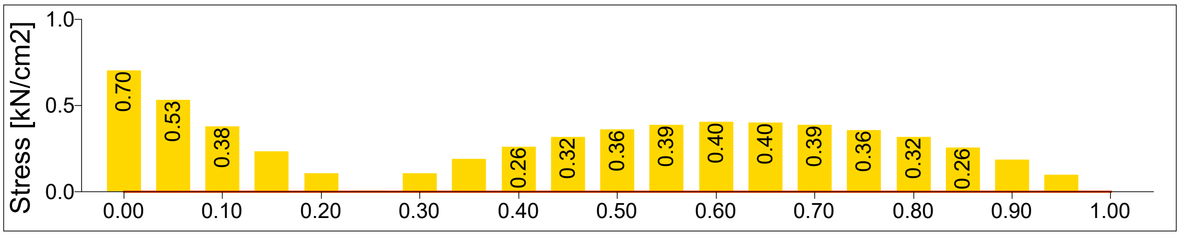


Stability Resistance

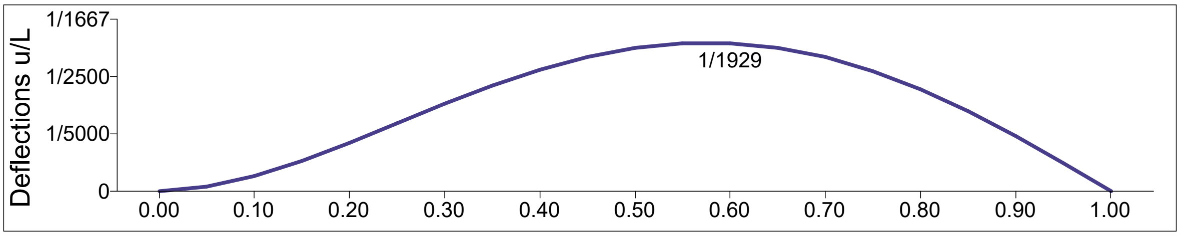


Serviceability Limit States

Serviceability stresses



Element deflections (local)



Element 13 design results (Building code - EC5):

Cross-section [cm]
[povezave], h = 14.00, b = 14.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

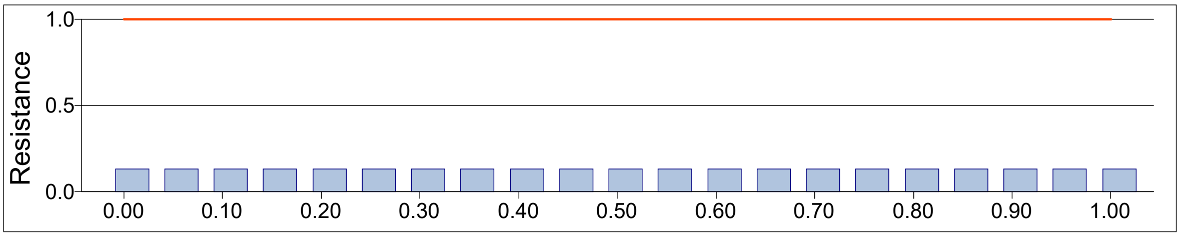
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

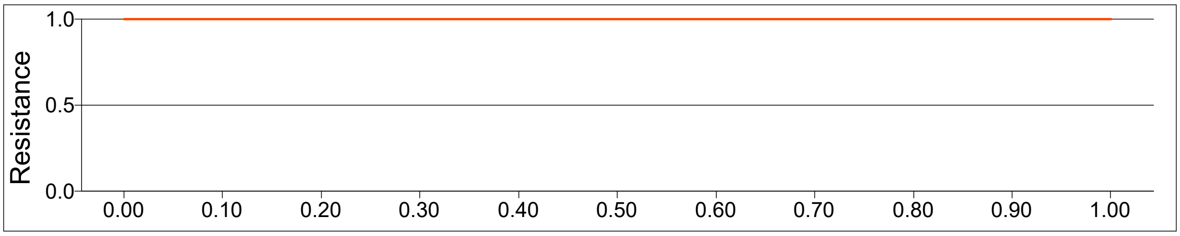
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 14 design results (Building code - EC5):

Cross-section [cm]
[povezave], h = 14.00, b = 14.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

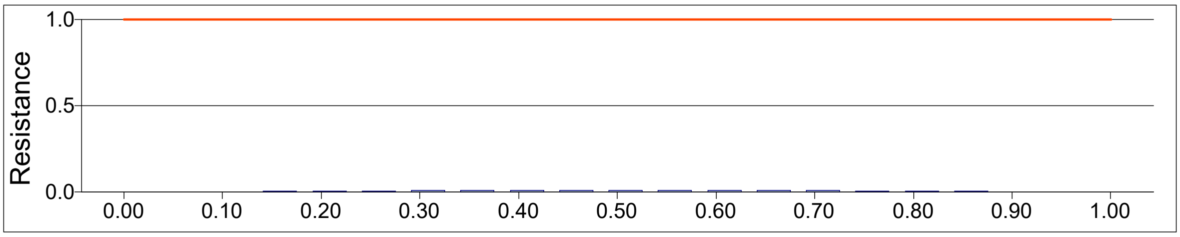
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

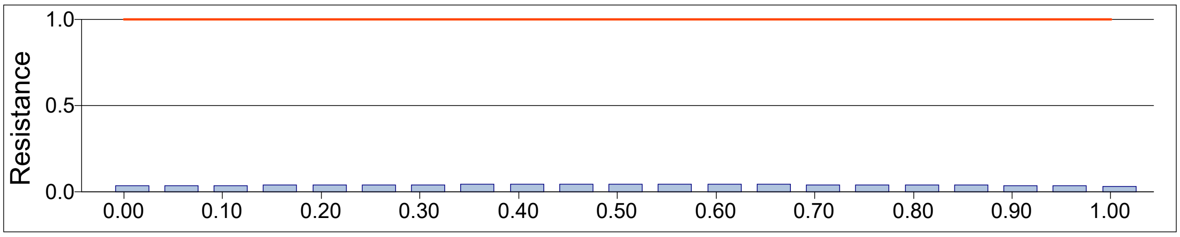
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 15 design results (Building code - EC5):

Cross-section [cm]
[povezave], h = 14.00, b = 14.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

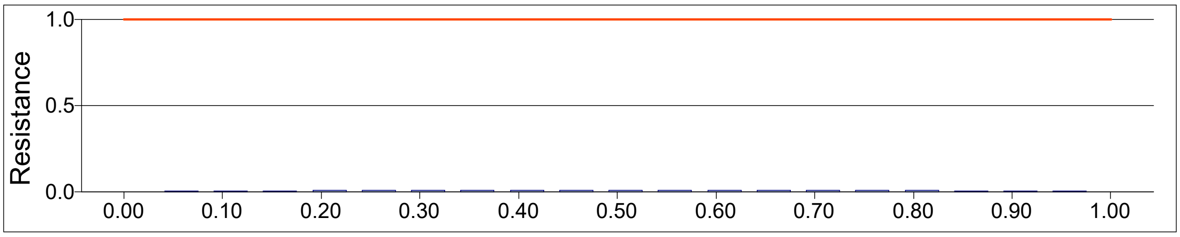
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

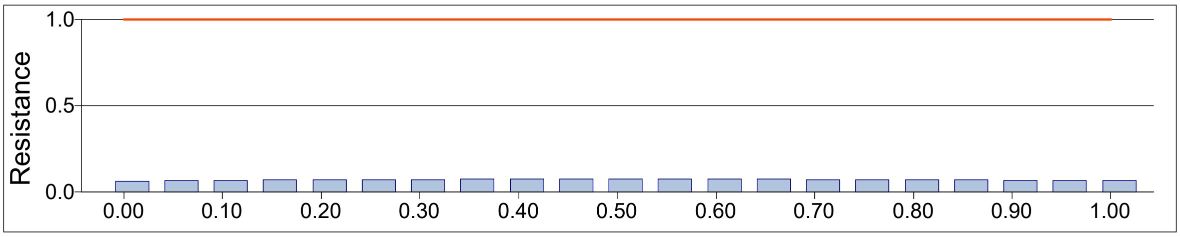
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 16 design results (Building code - EC5):

Cross-section [cm]
[povezave], h = 14.00, b = 14.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

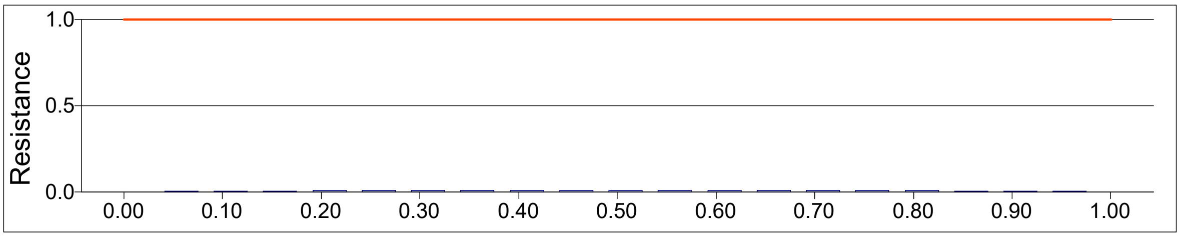
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

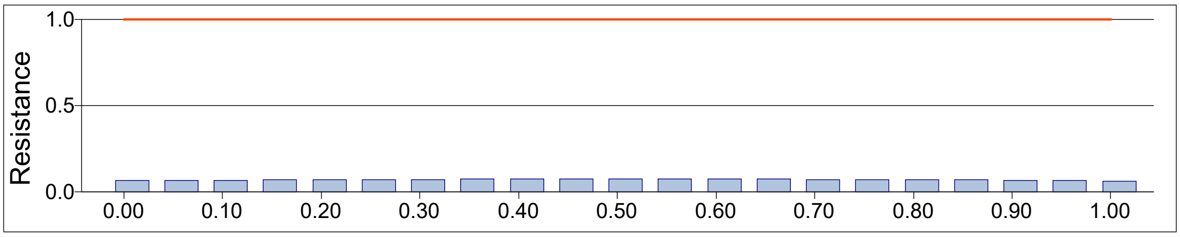
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 17 design results (Building code - EC5):

Cross-section [cm]
[povezave], h = 14.00, b = 14.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

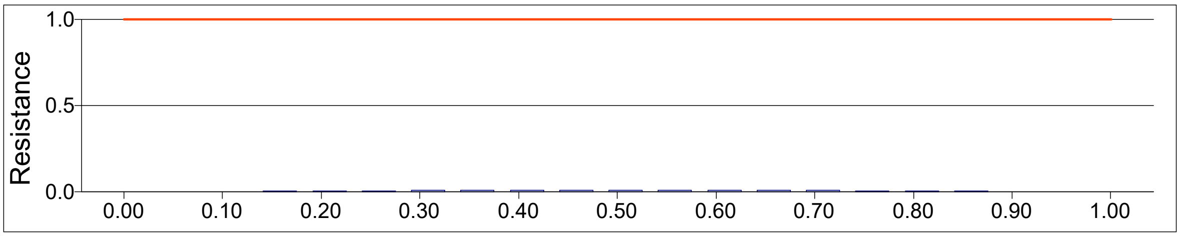
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

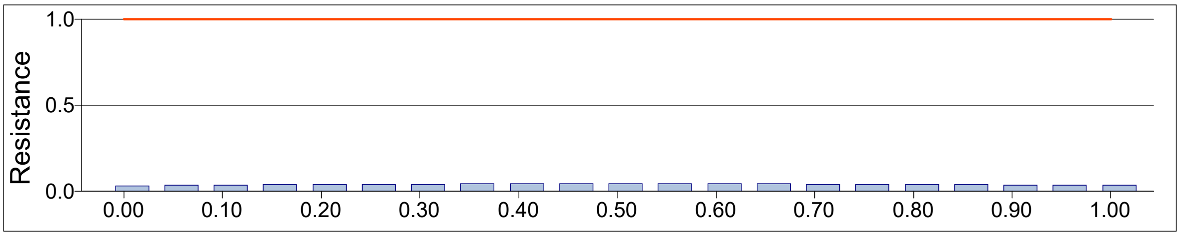
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 18 design results (Building code - EC5):

Cross-section [cm]
[povezave], h = 14.00, b = 14.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

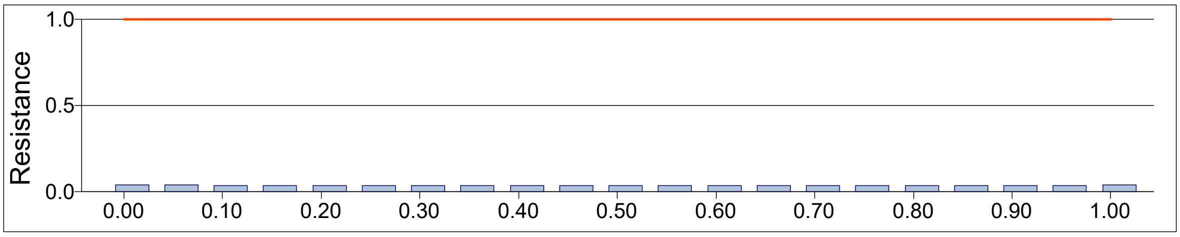
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

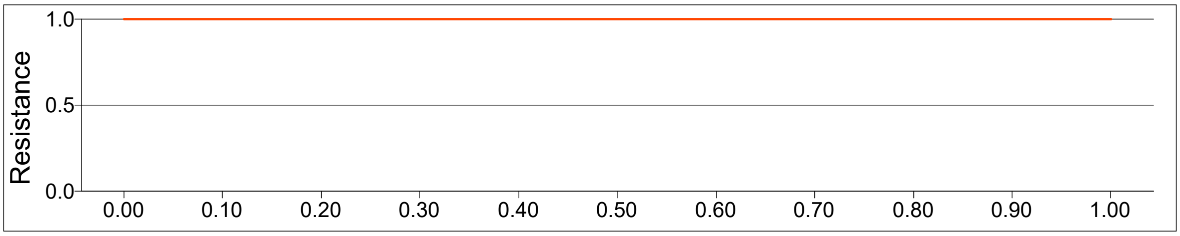
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 19 design results (Building code - EC5):

Cross-section [cm]
[povezave], h = 14.00, b = 14.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

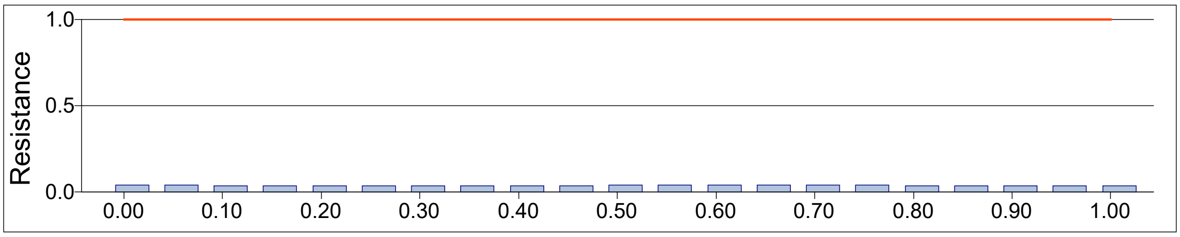
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

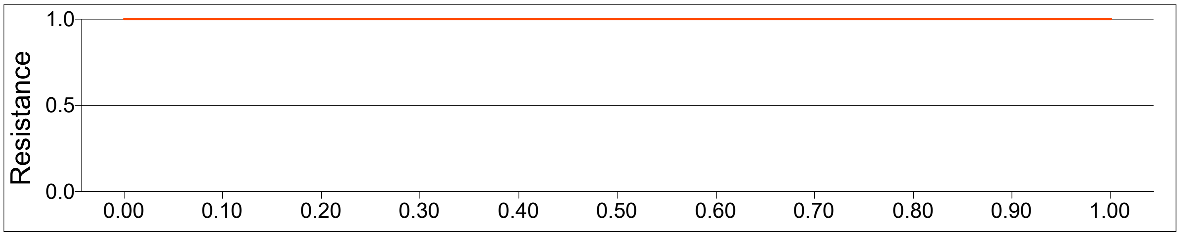
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 20 design results (Building code - EC5):

Cross-section [cm]
[povezave], h = 14.00, b = 14.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

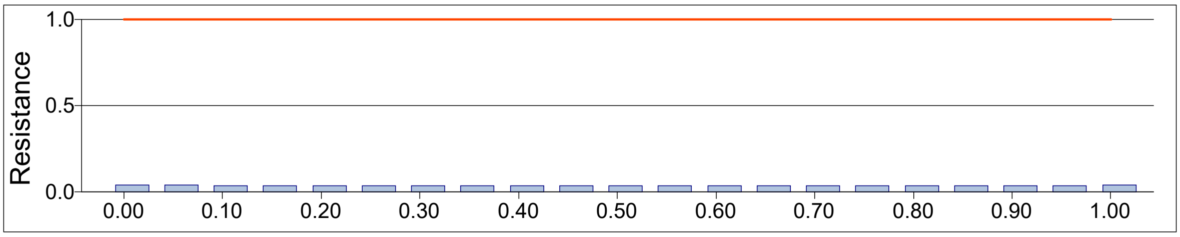
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

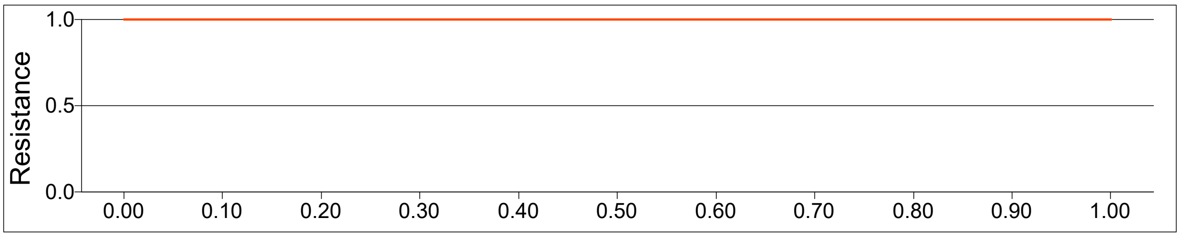
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 21 design results (Building code - EC5):

Cross-section [cm]
[povezave], h = 14.00, b = 14.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

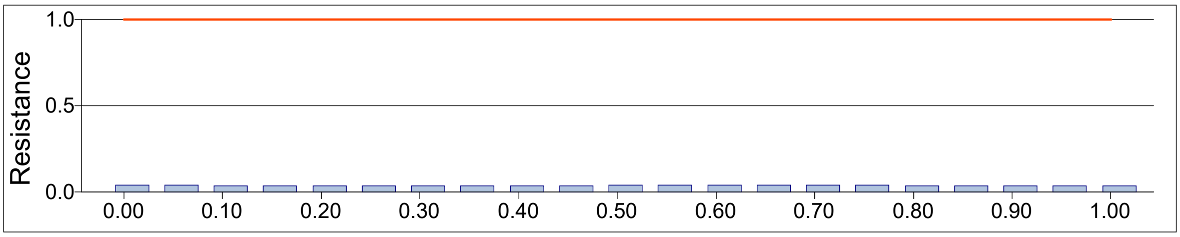
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

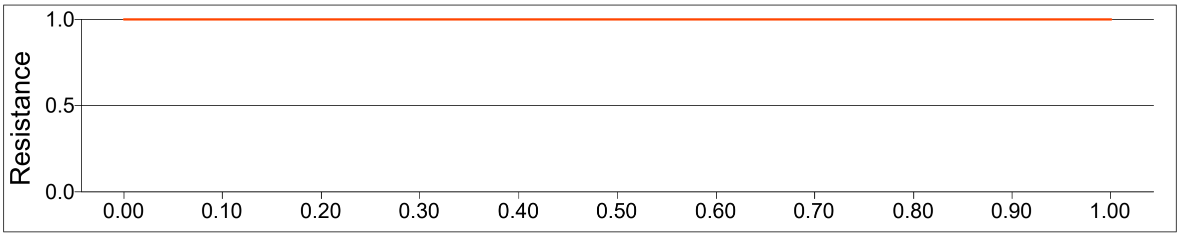
Element service class 2

Ultimate Limit States

Shear & CS Resistance



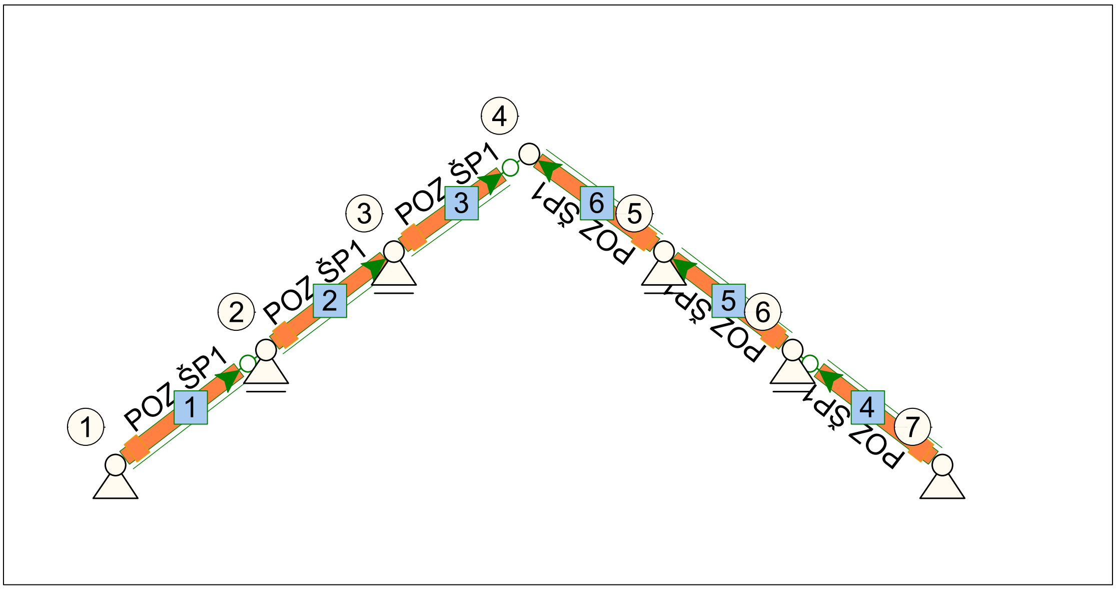
Stability Resistance



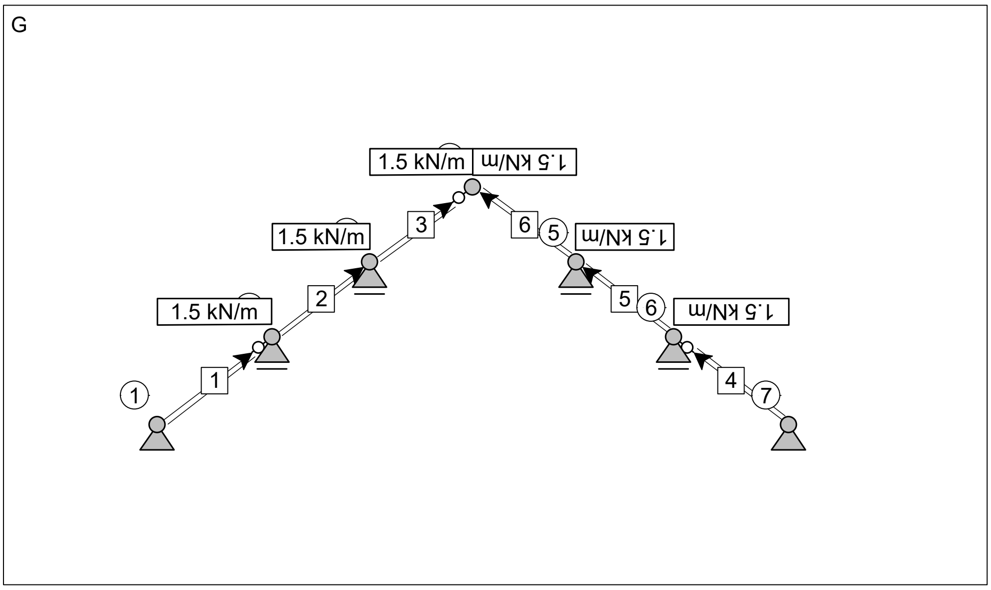
Serviceability Limit States

Serviceability limit states were not calculated.

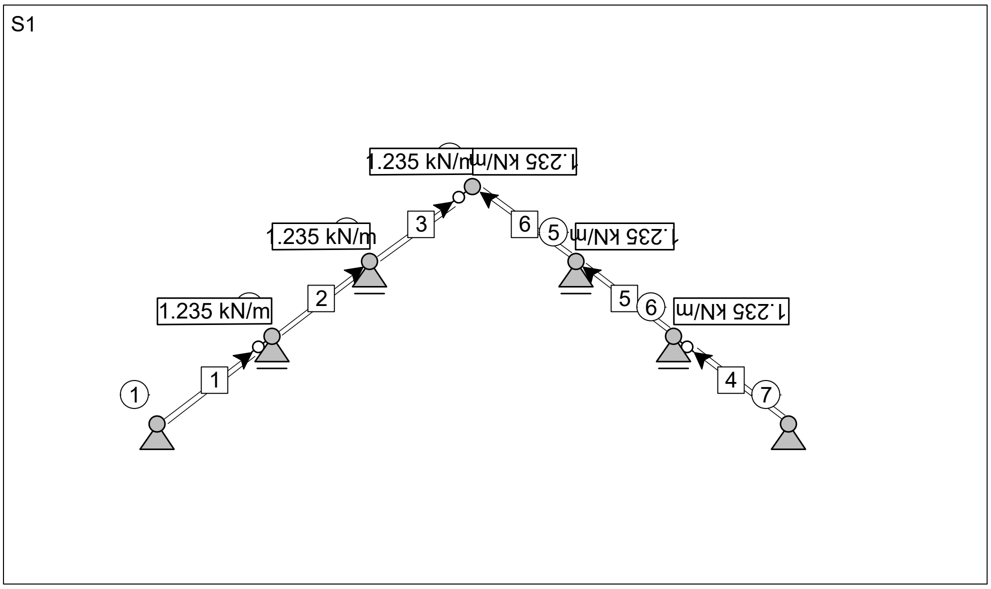
Geometry



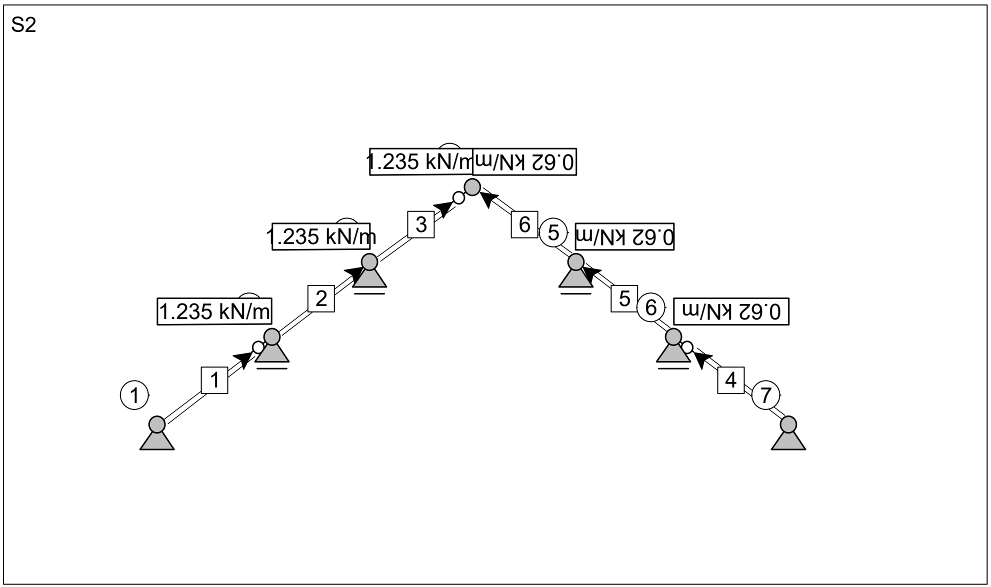
A1 : G



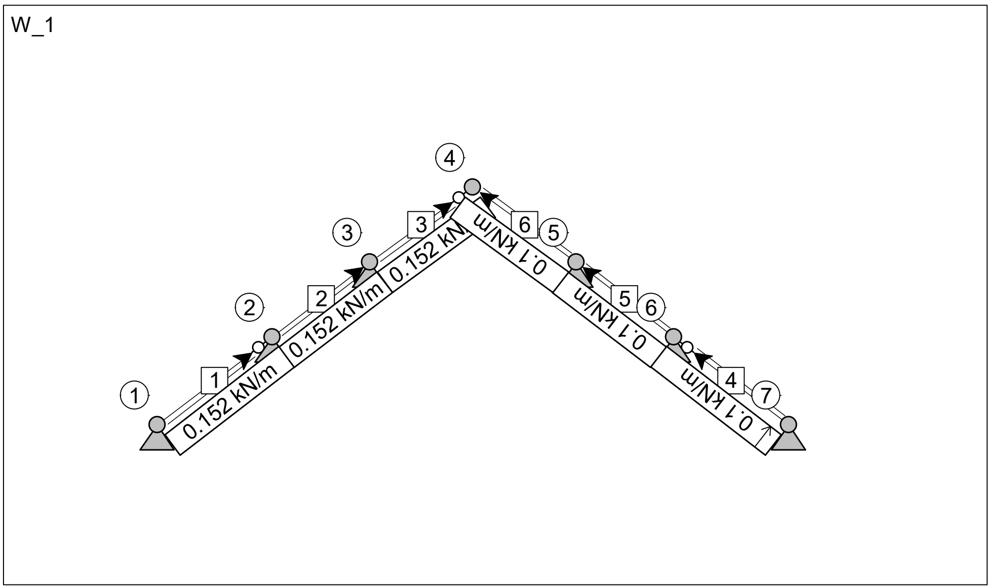
A2 : S1



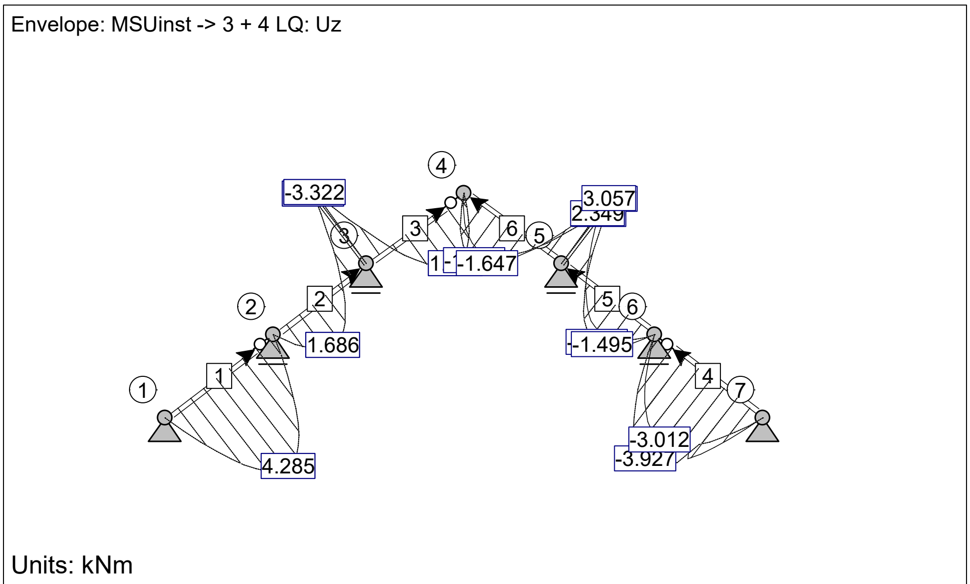
A3 : S2



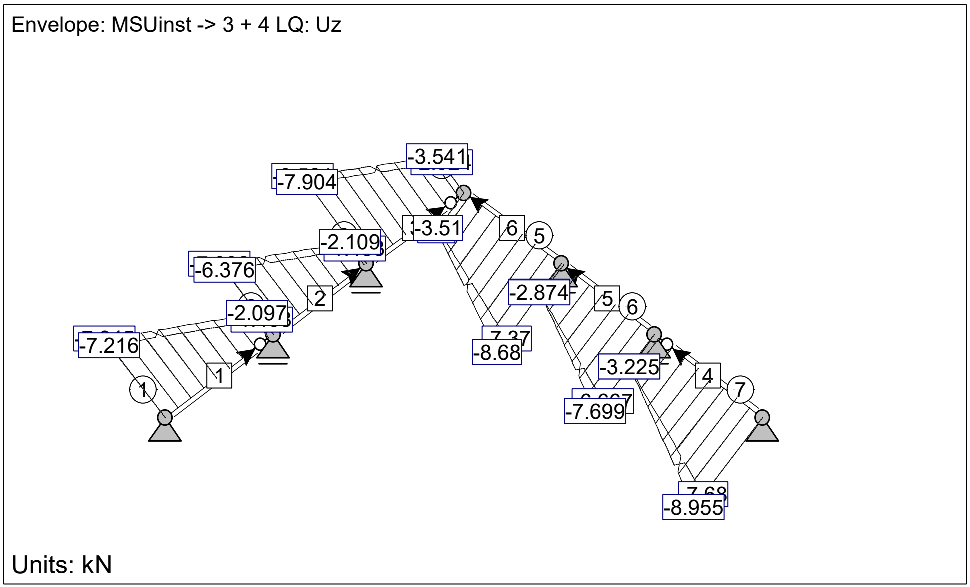
A4 : W_1



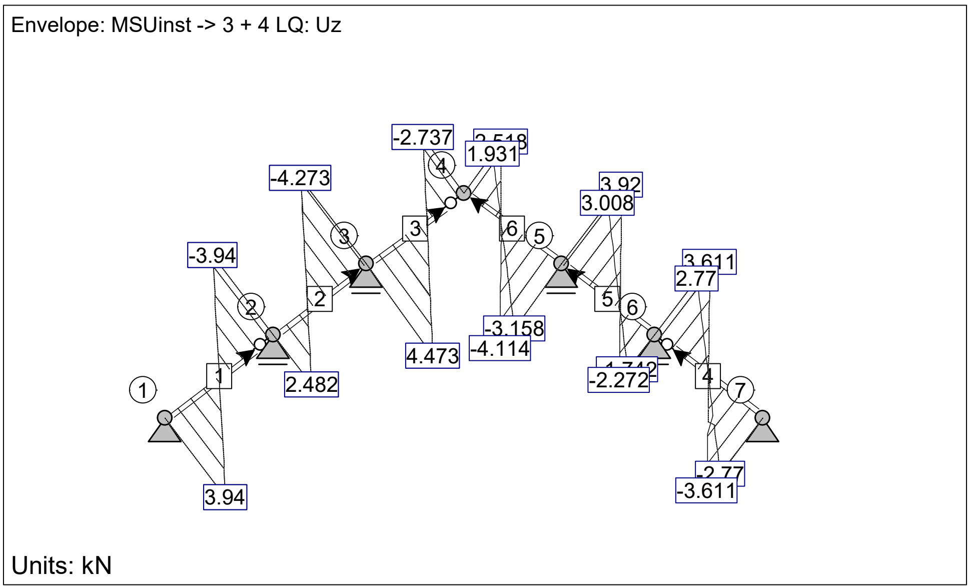
EN1: MSUinst: Bending Moments My



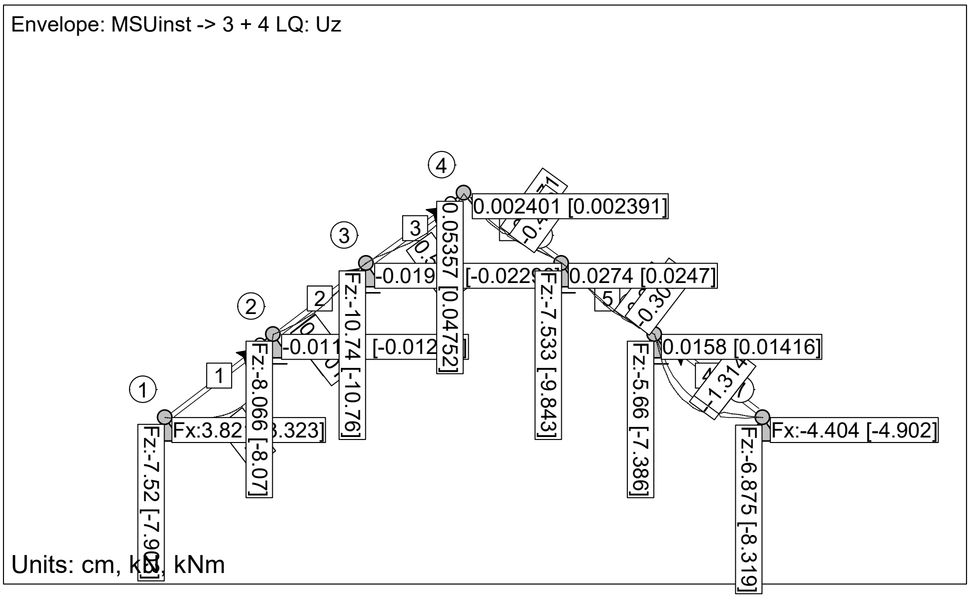
EN1: MSUinst: Axial Forces Fx



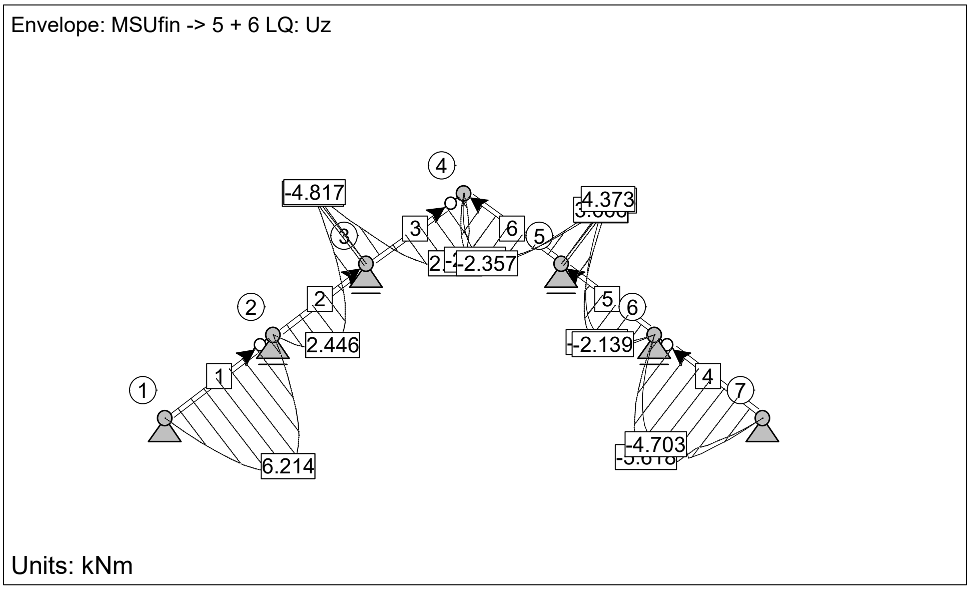
EN1: MSUinst: Shear Forces Fz



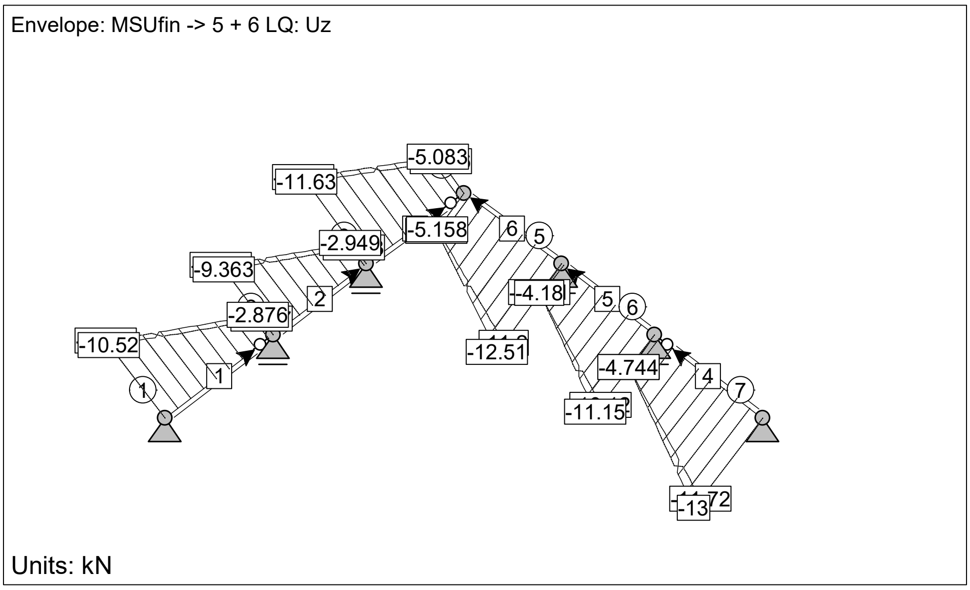
EN1: MSUinst: Displacements and Reactions



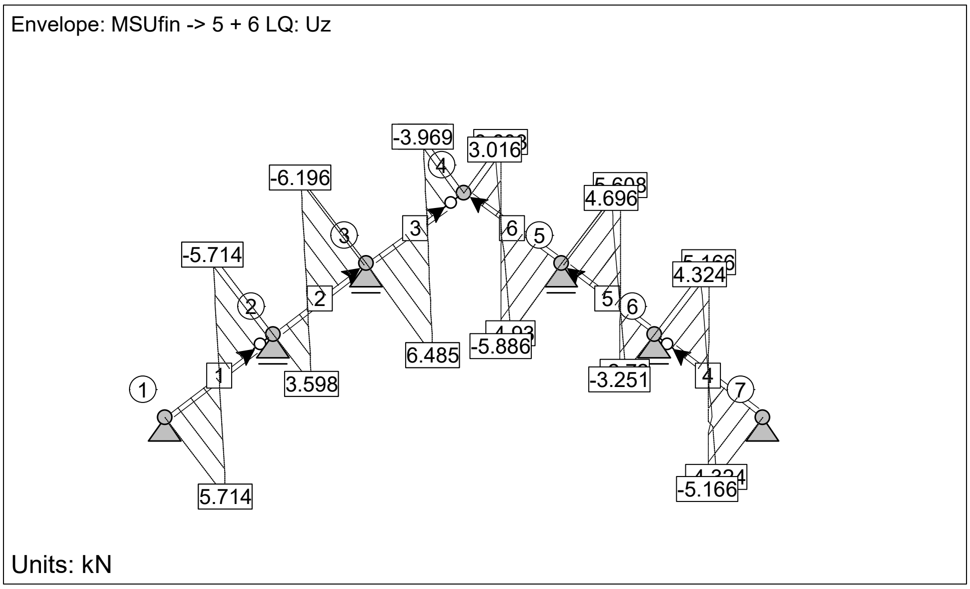
EN2: MSUfin: Bending Moments My



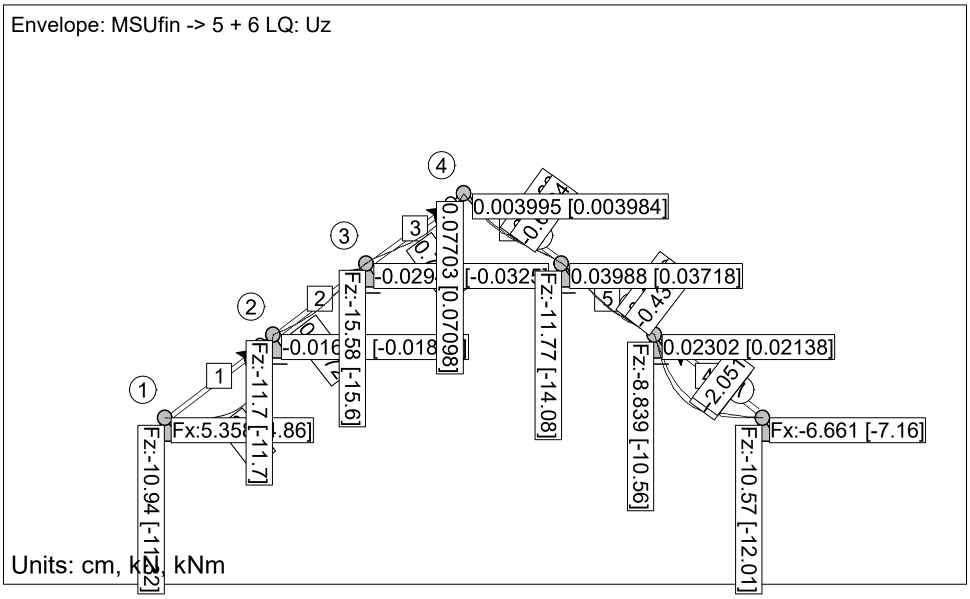
EN2: MSUfin: Axial Forces Fx



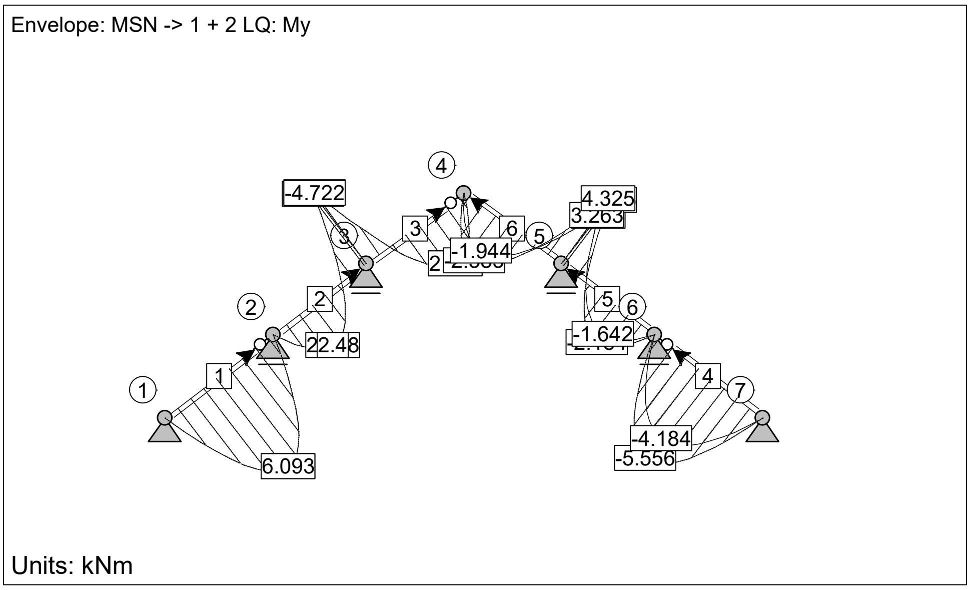
EN2: MSUfin: Shear Forces Fz



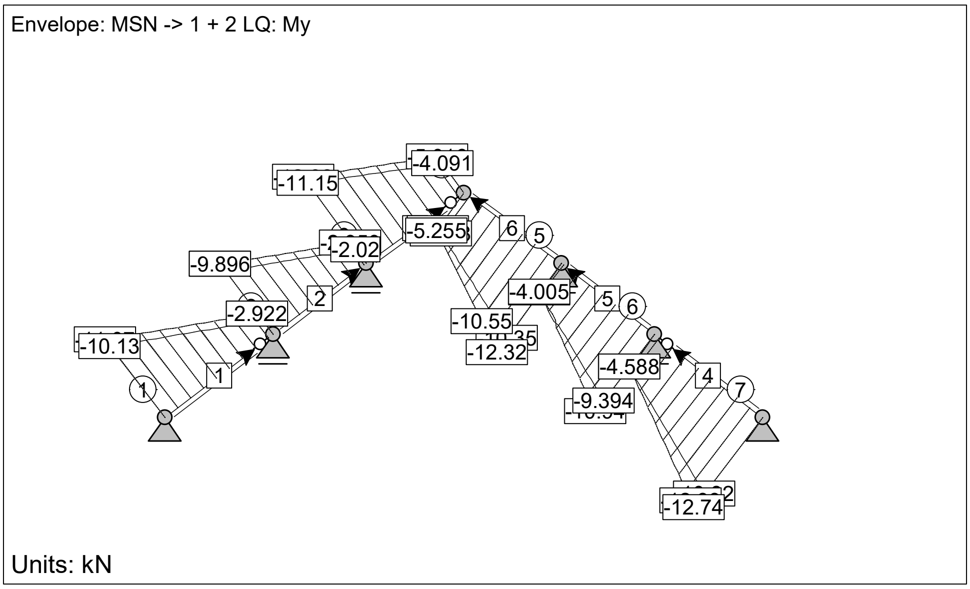
EN2: MSUfin: Displacements and Reactions



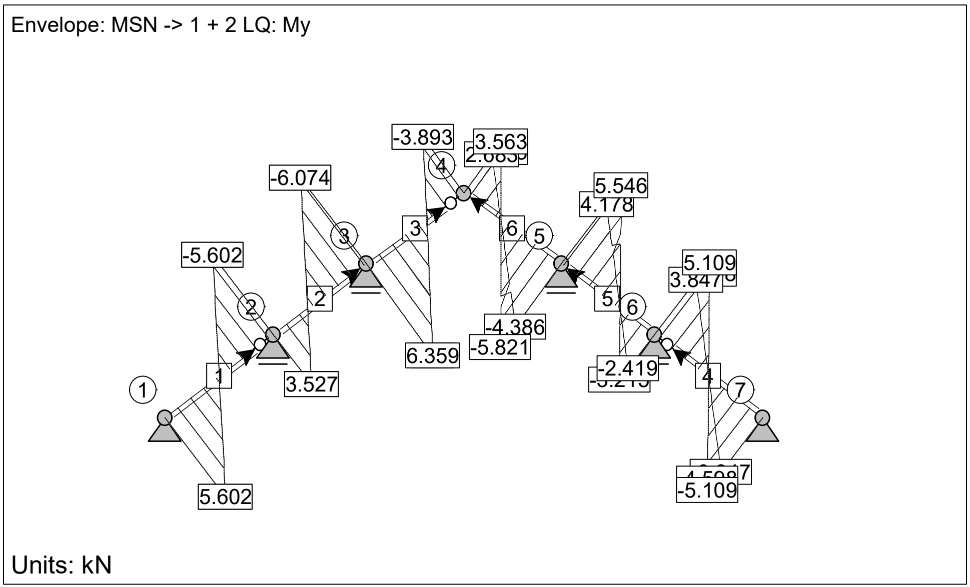
EN3: MSN: Bending Moments My



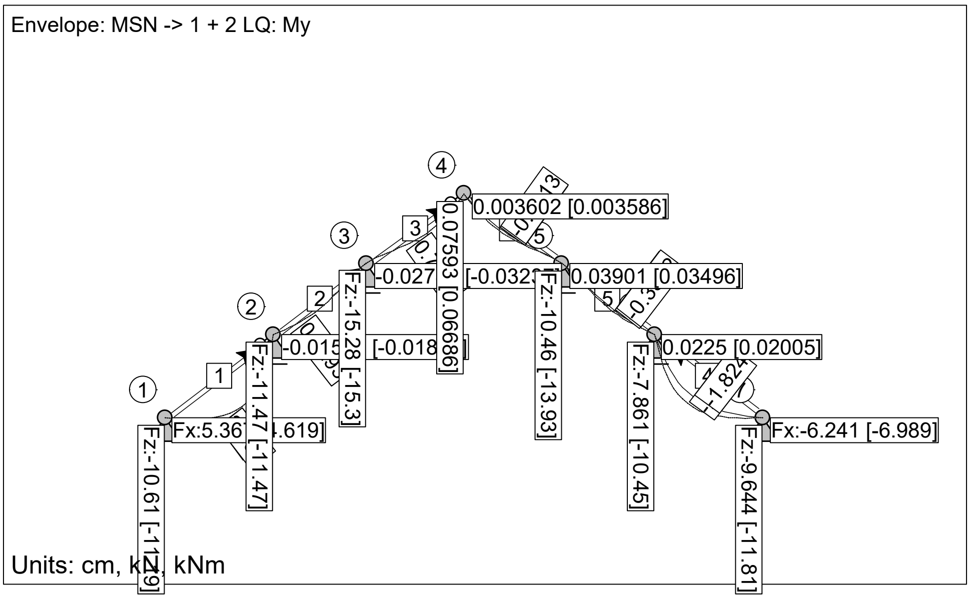
EN3: MSN: Axial Forces Fx



EN3: MSN: Shear Forces Fz



EN3: MSN: Displacements and Reactions



Element 1 design results (Building code - EC5):

Cross-section [cm]
[POZ ŠP1], h = 16.00, b = 12.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

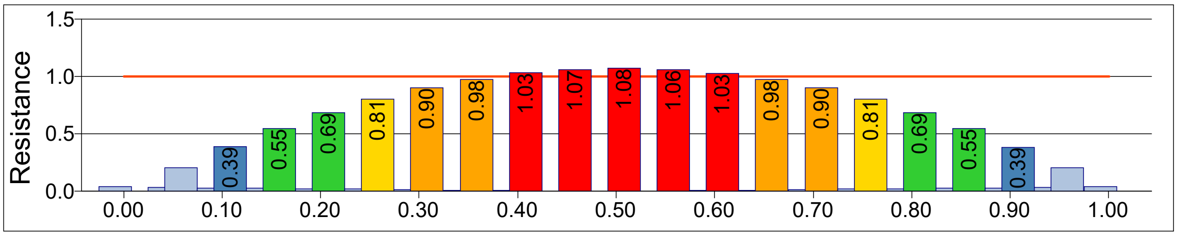
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

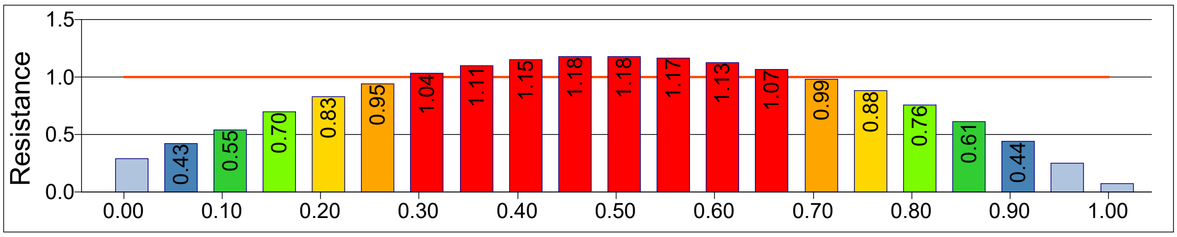
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 2 design results (Building code - EC5):

Cross-section [cm]
[POZ ŠP1], h = 16.00, b = 12.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

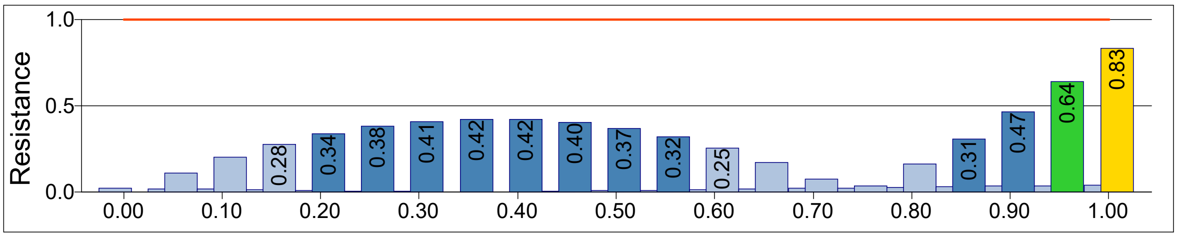
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

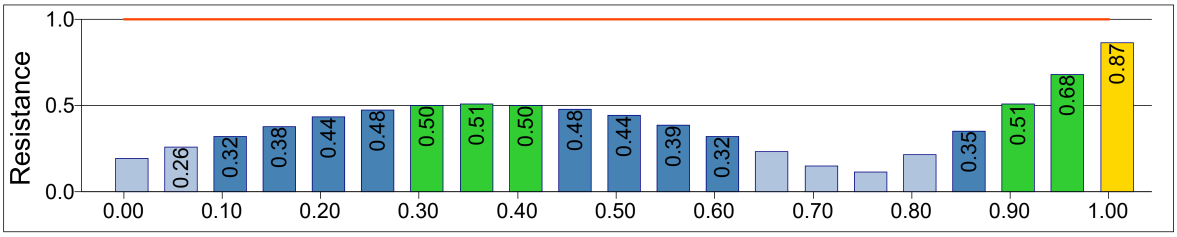
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 3 design results (Building code - EC5):

Cross-section [cm]
[POZ ŠP1],   h = 16.00,   b = 12.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

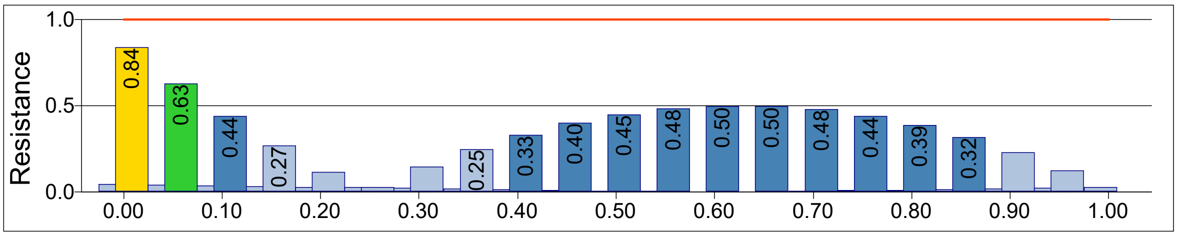
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

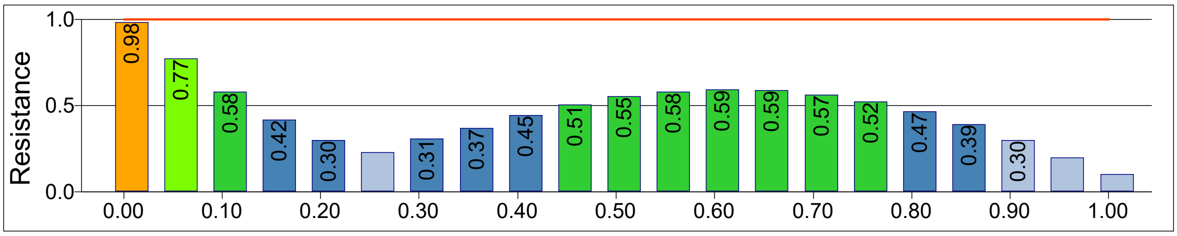
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 4 design results (Building code - EC5):

Cross-section [cm]
[POZ ŠP1], h = 16.00, b = 12.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

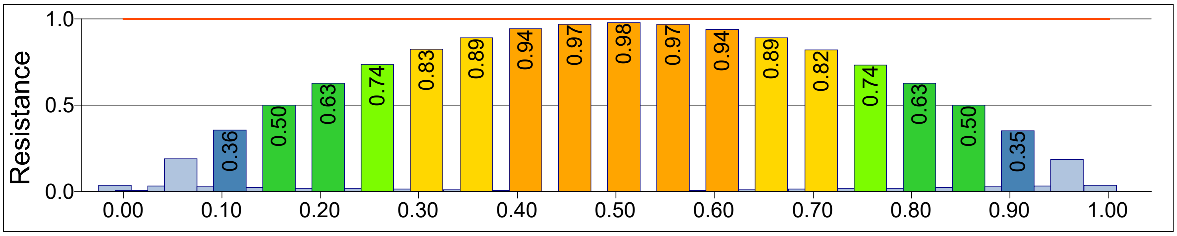
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

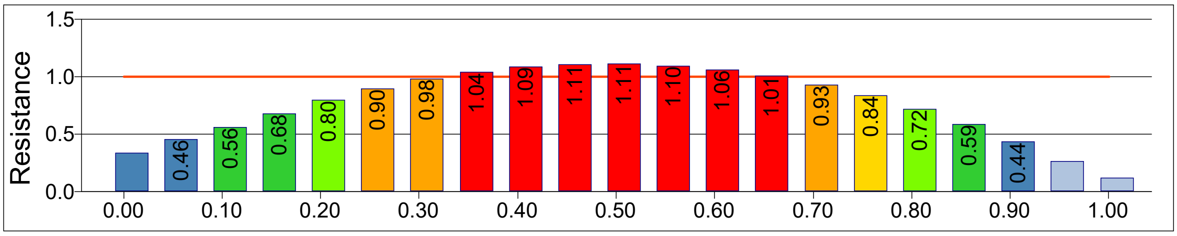
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 5 design results (Building code - EC5):

Cross-section [cm]
[POZ ŠP1], h = 16.00, b = 12.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

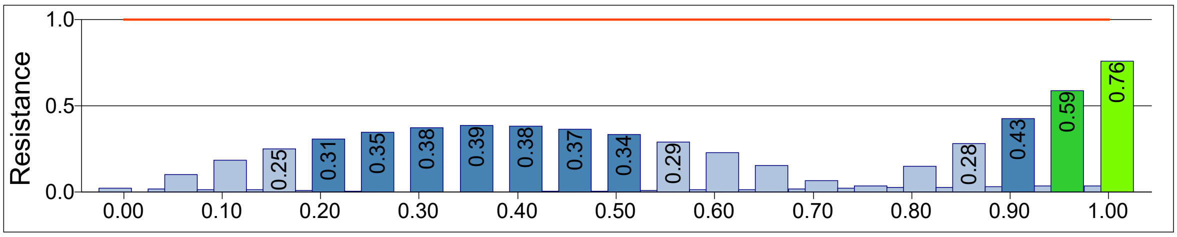
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

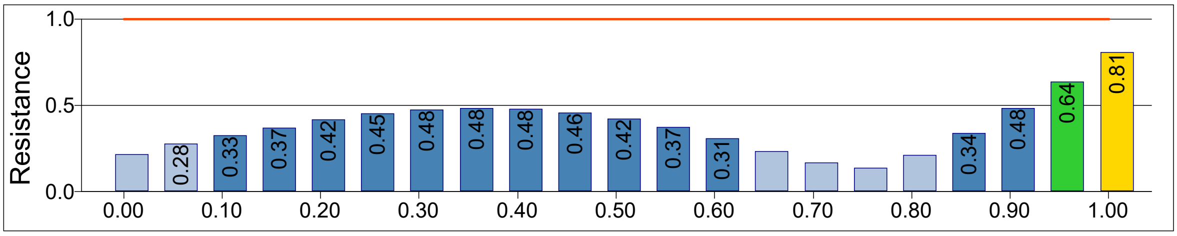
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 6 design results (Building code - EC5):

Cross-section [cm]
[POZ ŠP1], h = 16.00, b = 12.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

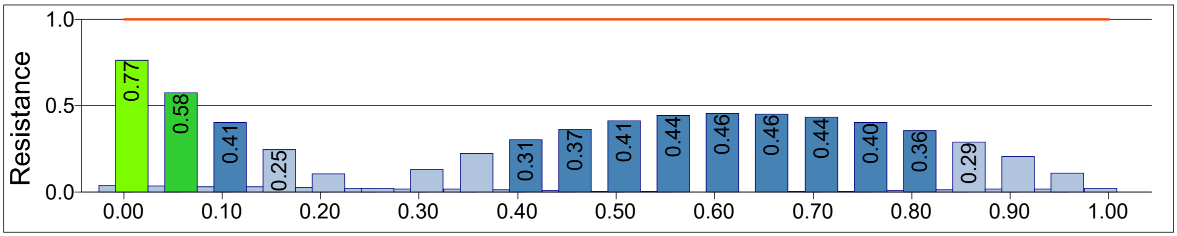
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

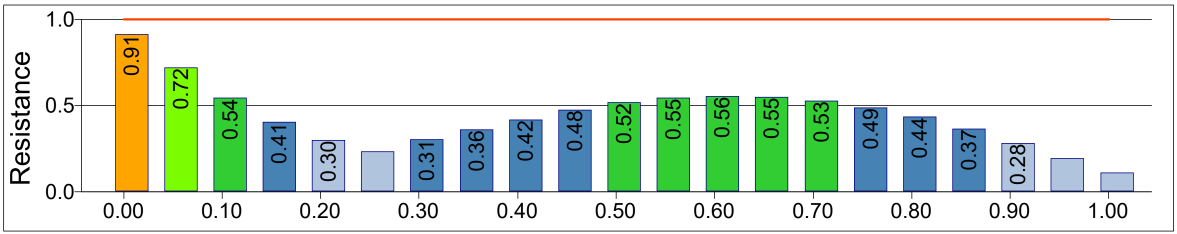
Element service class 2

Ultimate Limit States

Shear & CS Resistance



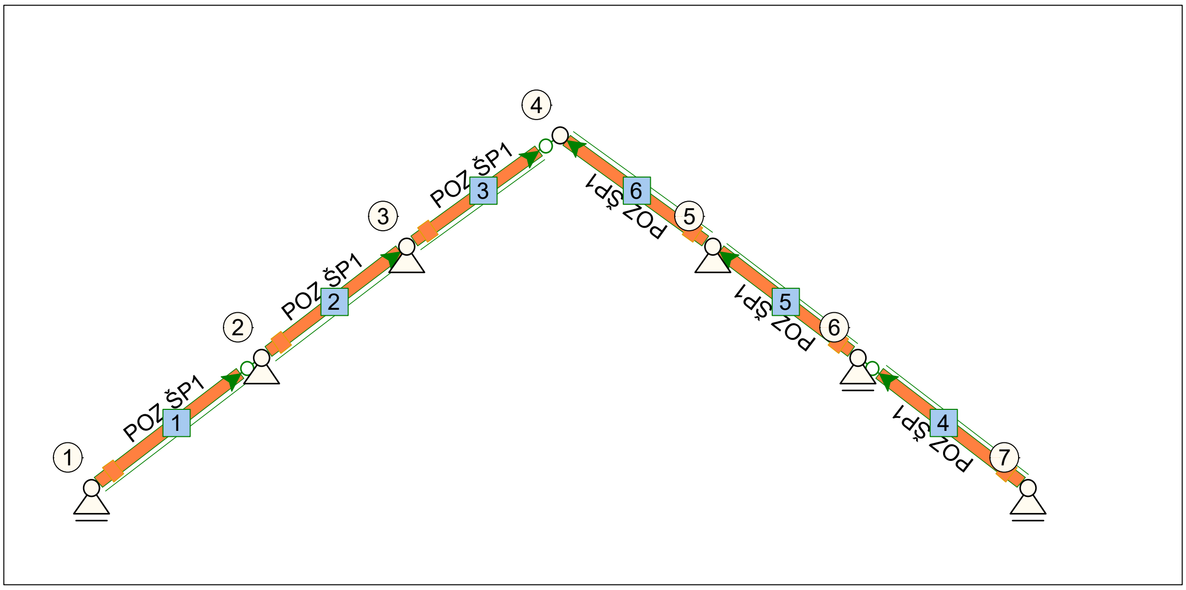
Stability Resistance



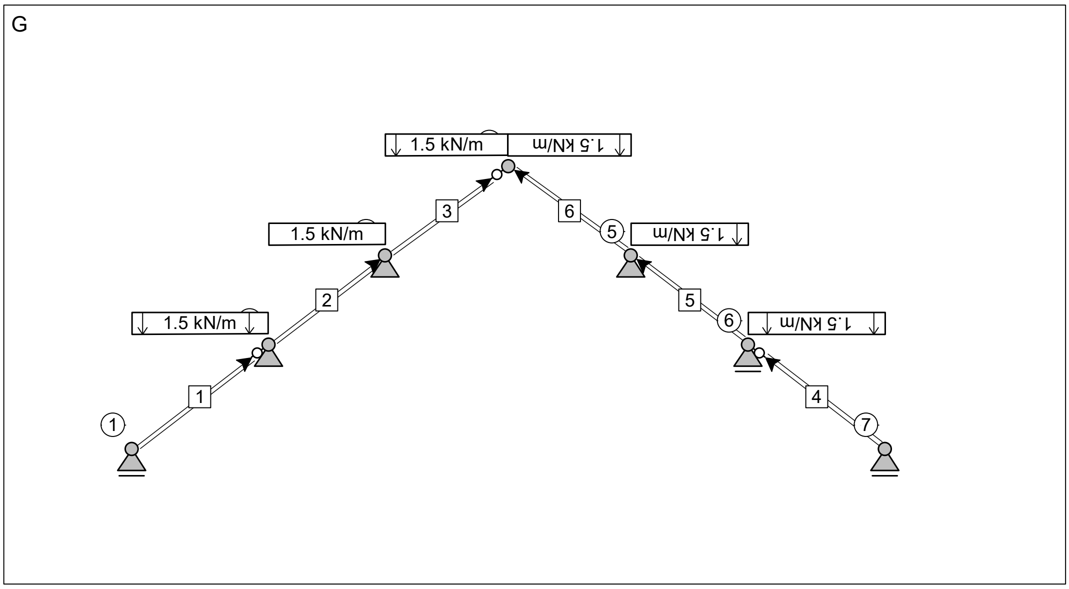
Serviceability Limit States

Serviceability limit states were not calculated.

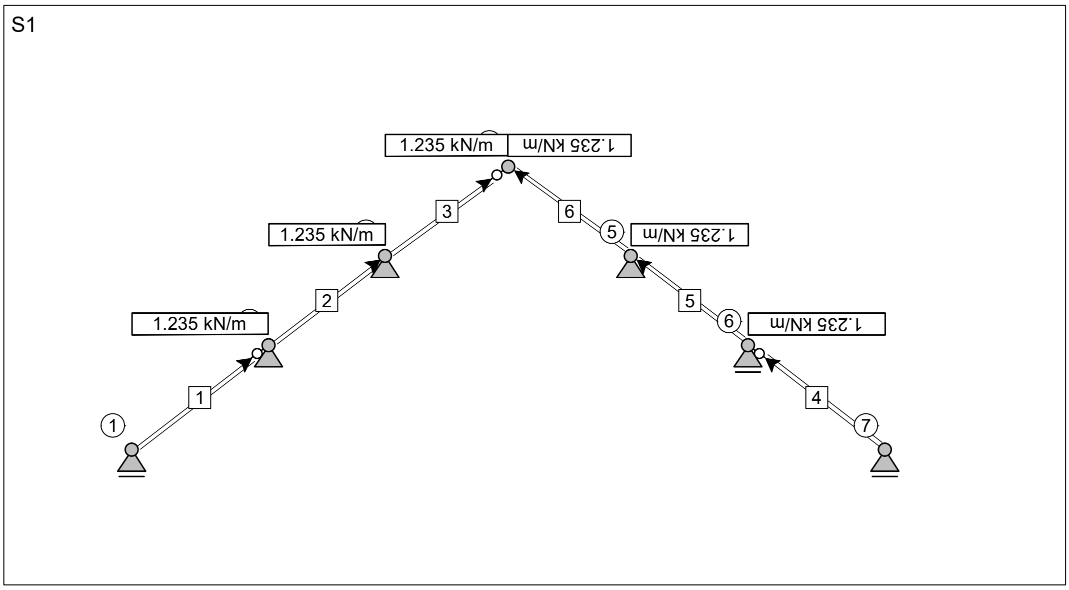
Geometry



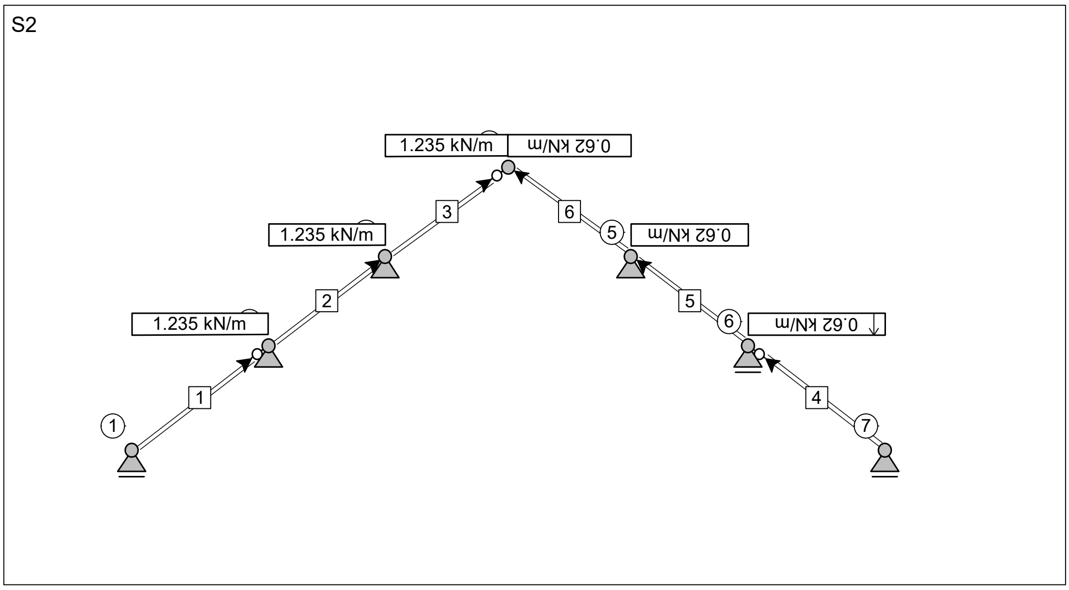
A1 : G



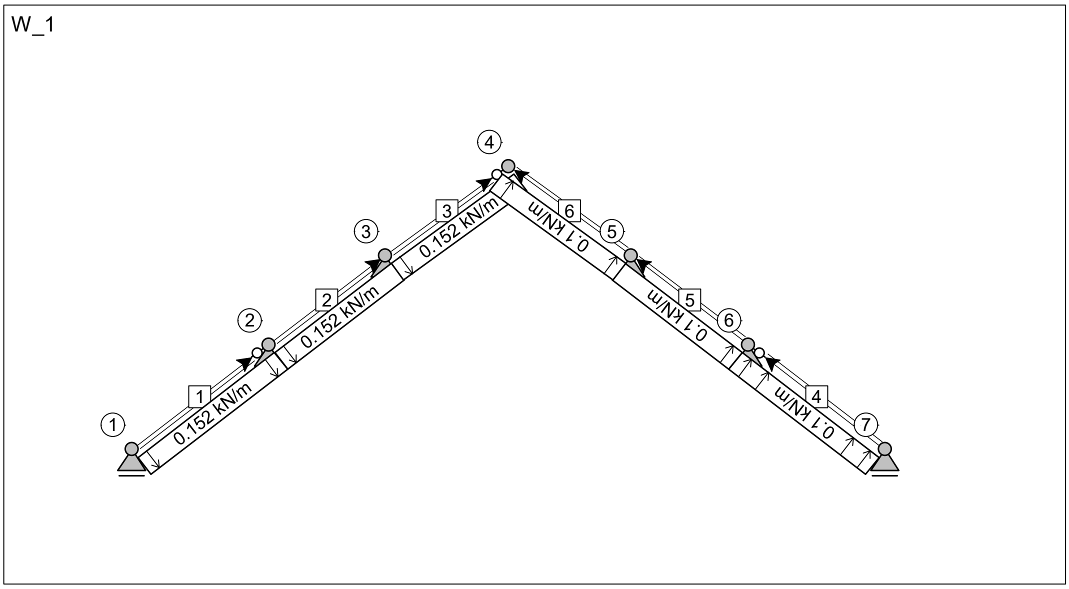
A2 : S1



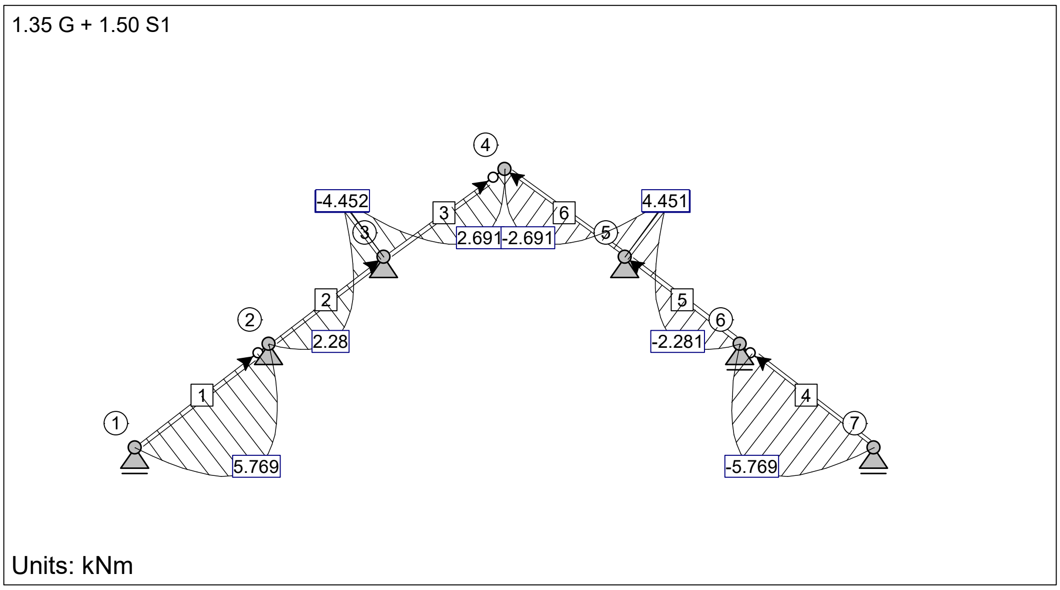
A3 : S2



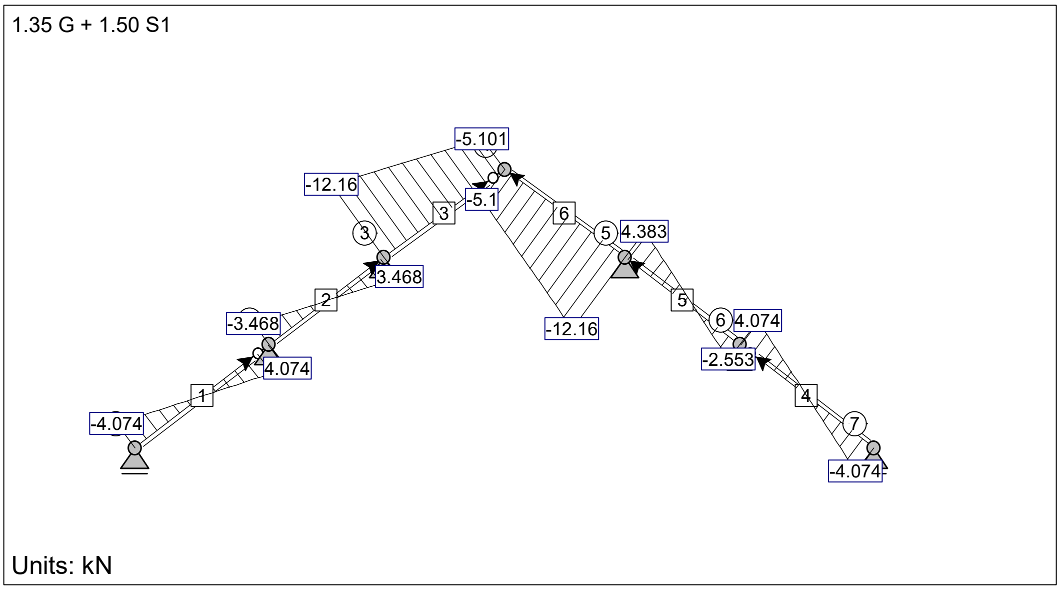
A4 : W_1



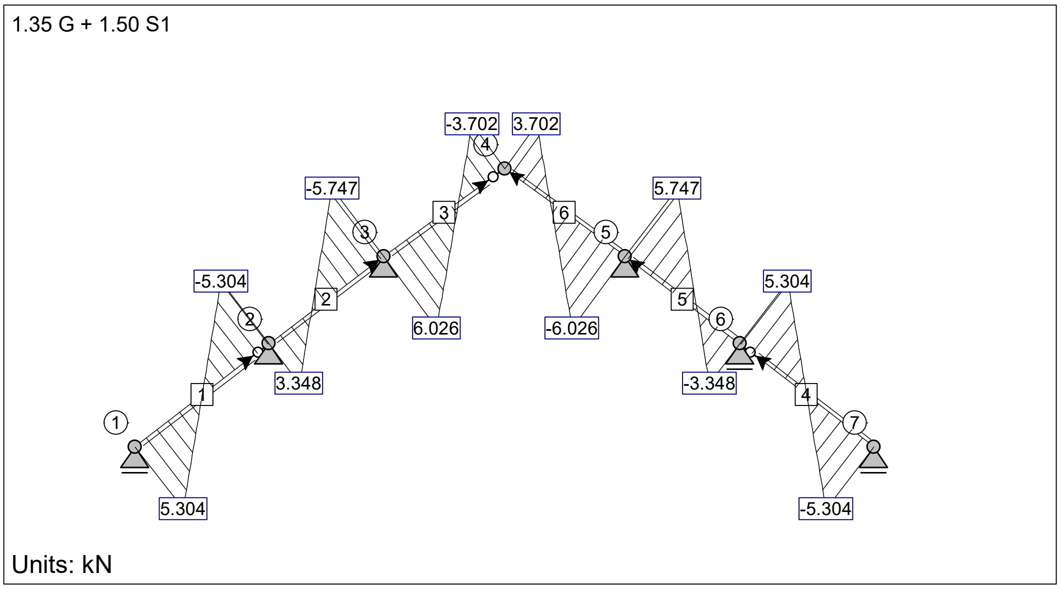
LC11: MSN3: Bending Moments My



LC11: MSN3: Axial Forces Fx



LC11: MSN3: Shear Forces Fz



Element 1 design results (Building code - EC5):

Cross-section [cm]
[POZ ŠP1],   h = 16.00,   b = 12.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

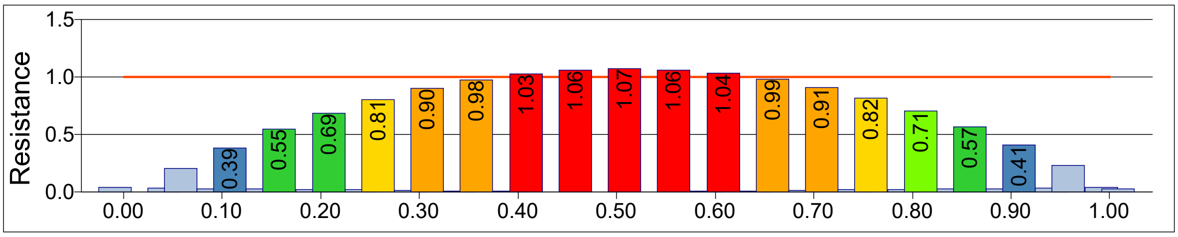
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

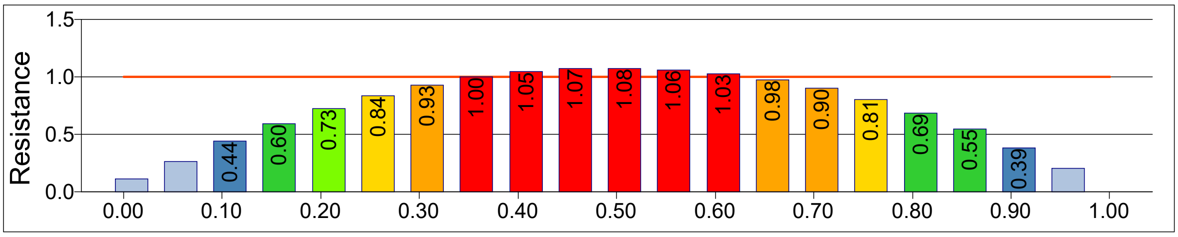
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 2 design results (Building code - EC5):

Cross-section [cm]
[POZ ŠP1], h = 16.00, b = 12.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

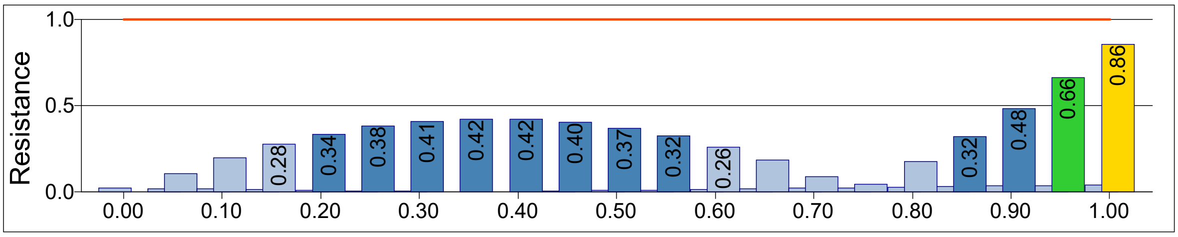
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

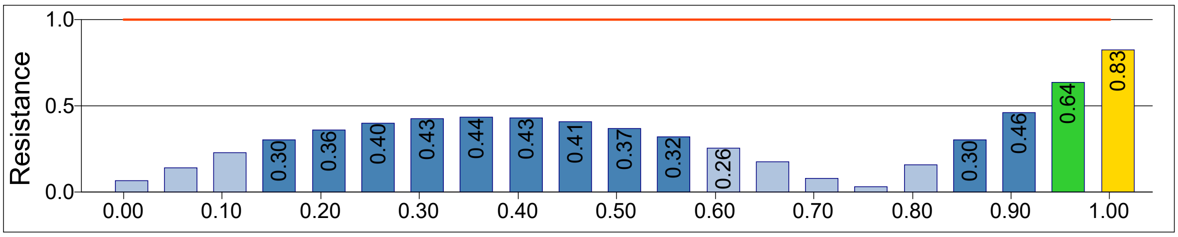
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 3 design results (Building code - EC5):

Cross-section [cm]
[POZ ŠP1], h = 16.00, b = 12.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

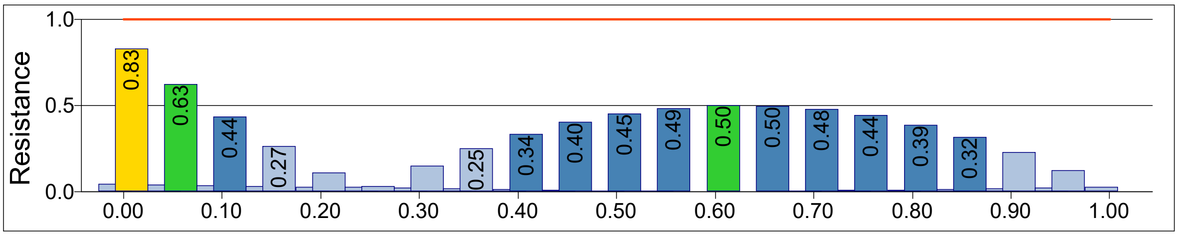
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

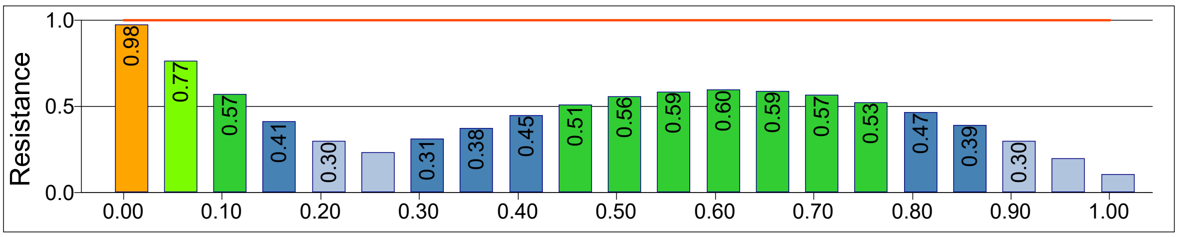
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 4 design results (Building code - EC5):

Cross-section [cm]
[POZ ŠP1], h = 16.00, b = 12.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

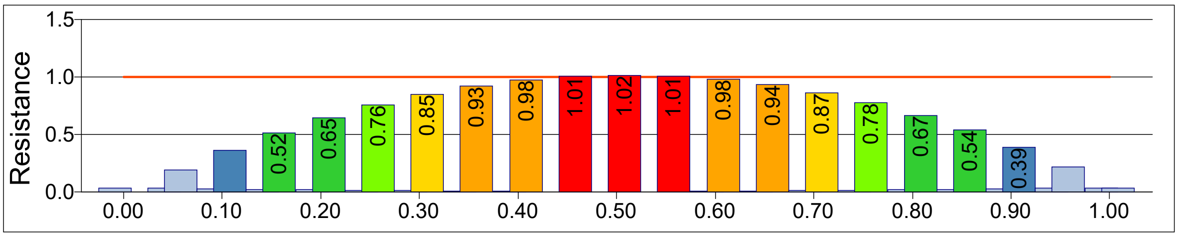
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

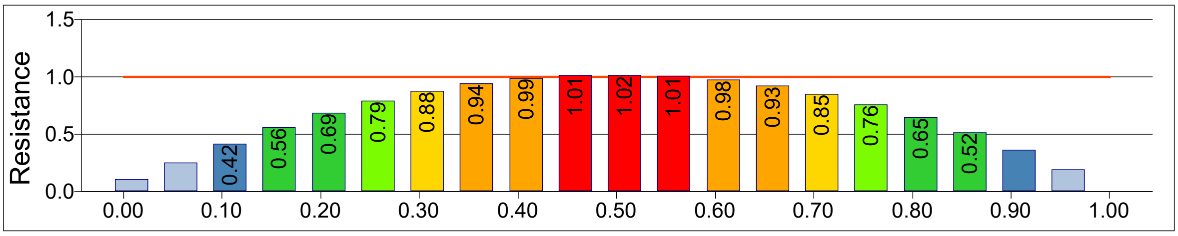
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 5 design results (Building code - EC5):

Cross-section [cm]
[POZ ŠP1], h = 16.00, b = 12.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

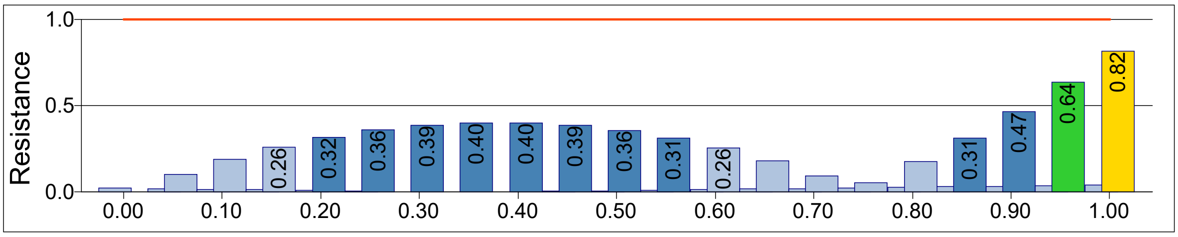
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

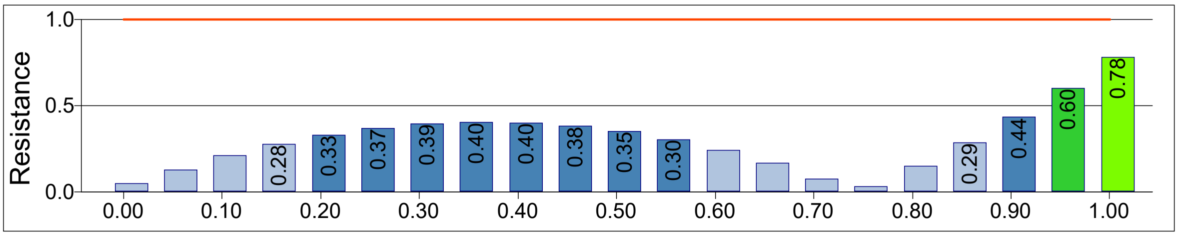
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 6 design results (Building code - EC5):

Cross-section [cm]
[POZ ŠP1], h = 16.00, b = 12.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

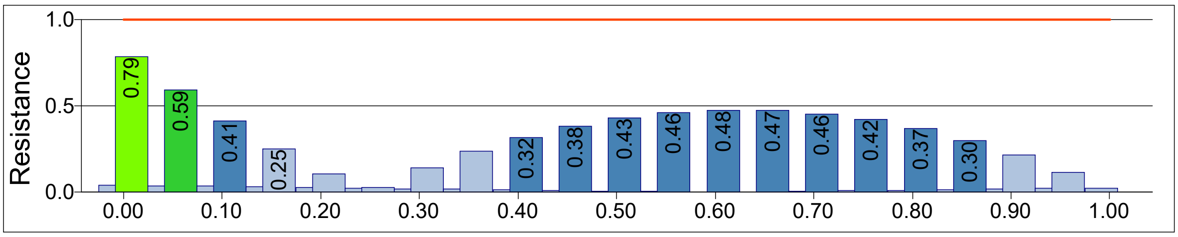
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

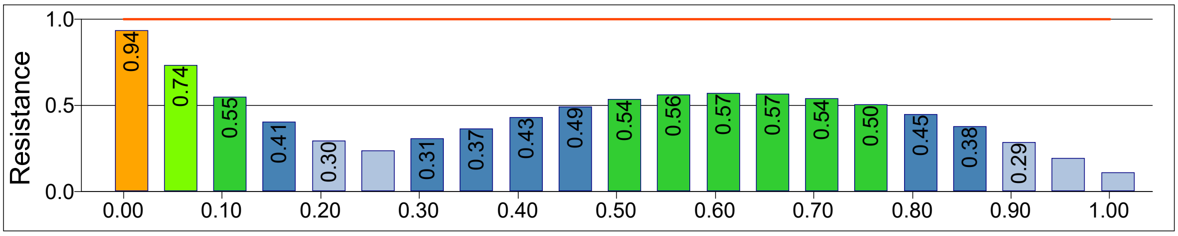
Element service class 2

Ultimate Limit States

Shear & CS Resistance



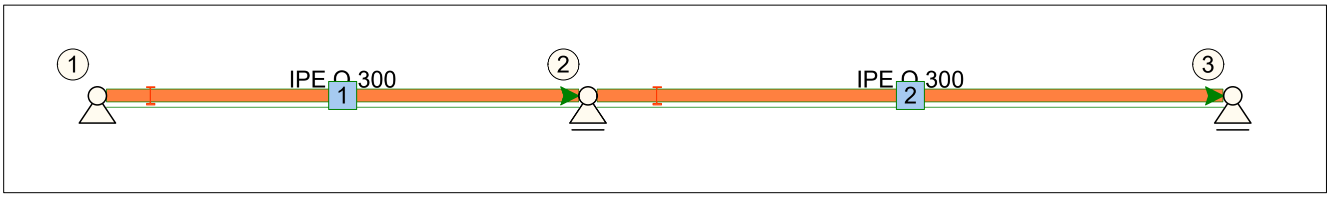
Stability Resistance



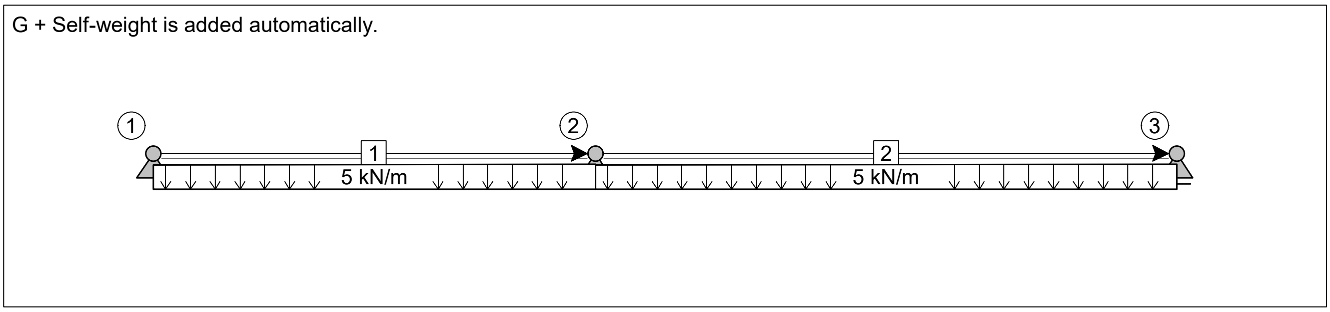
Serviceability Limit States

Serviceability limit states were not calculated.

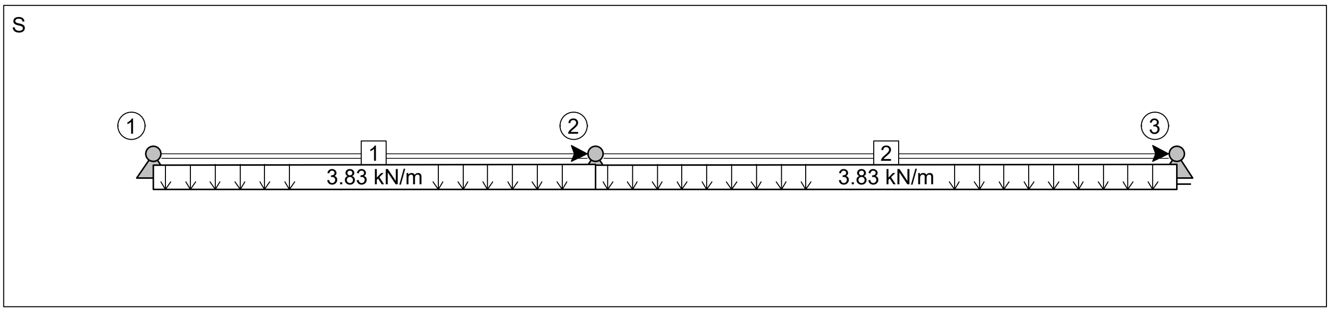
Geometry



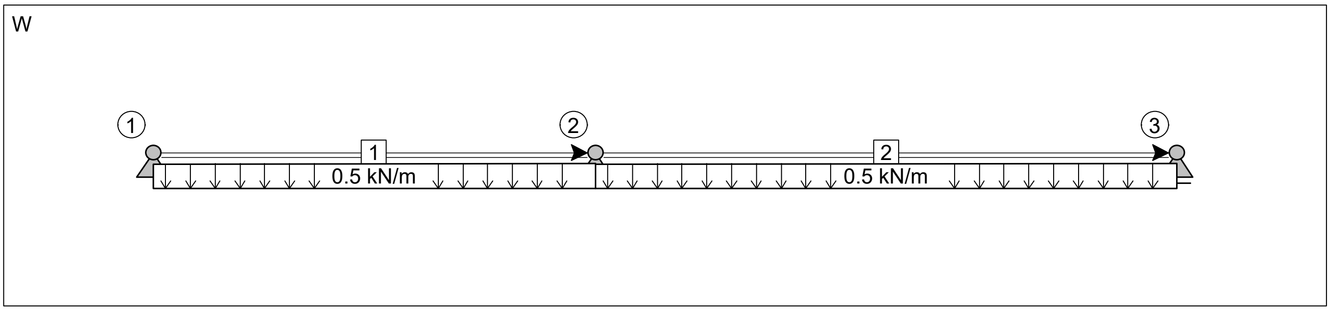
A1 : G



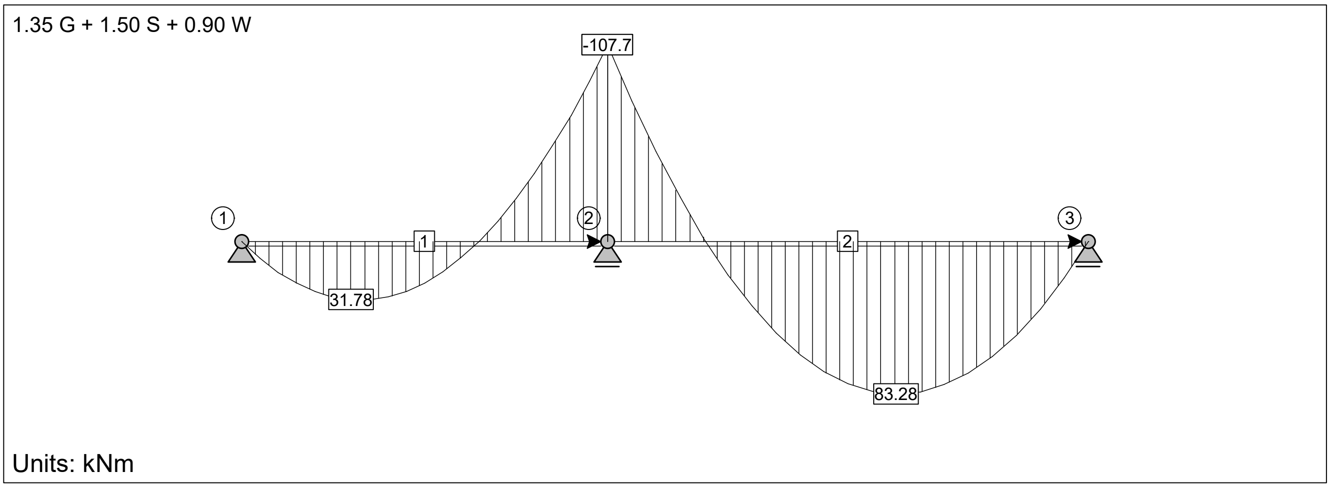
A2 : S



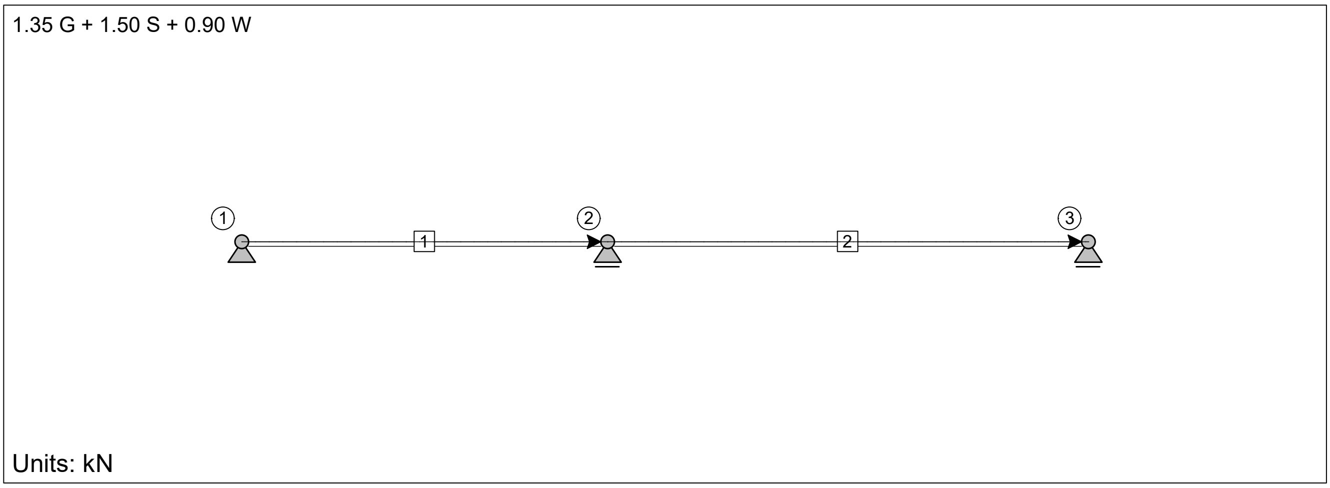
A3 : W



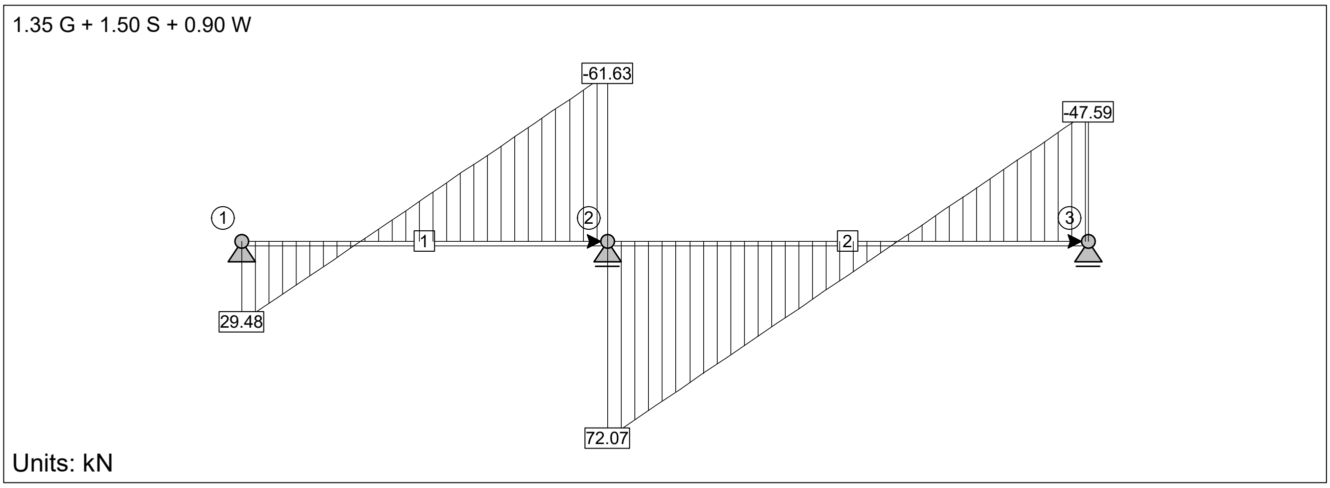
LC1: MSN: Bending Moments My



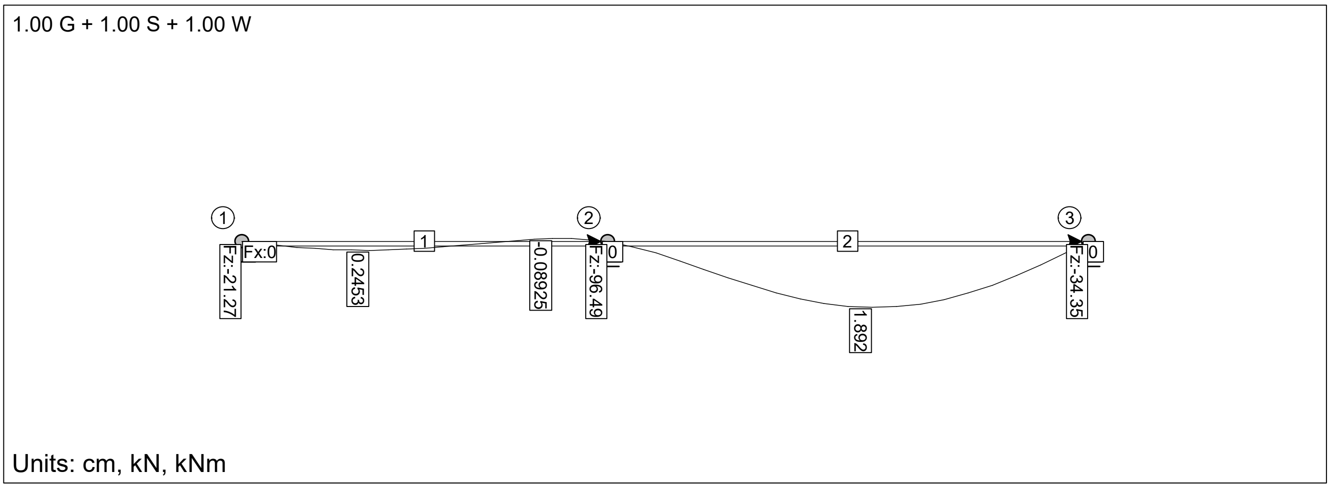
LC1: MSN: Axial Forces Fx



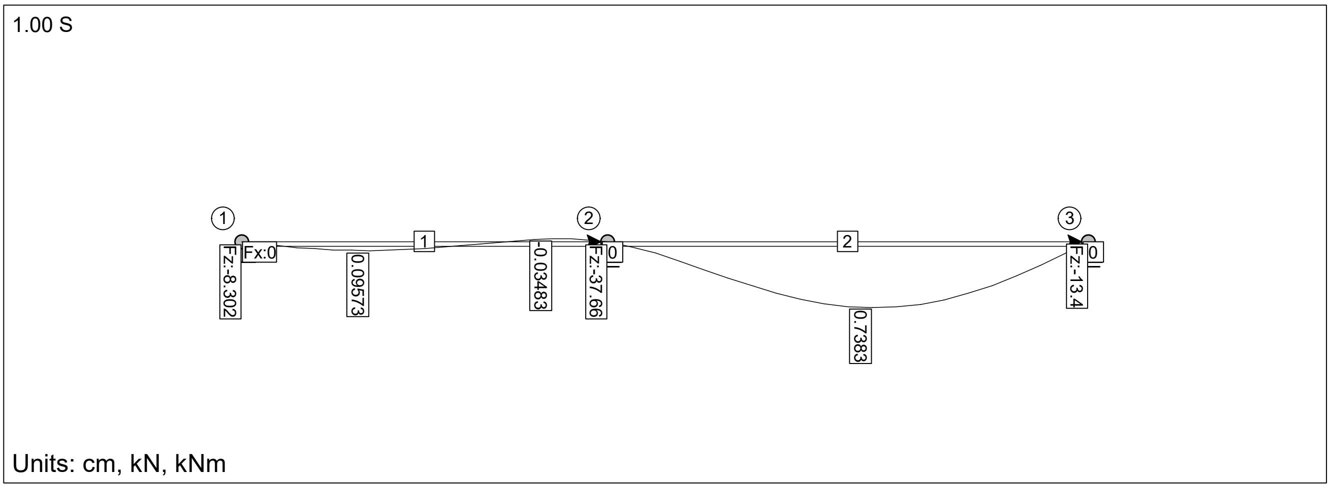
LC1: MSN: Shear Forces Fz



LC2: MSU tot: Displacements and Reactions



LC4: S: Displacements and Reactions



Element 1 design results (Building code - EC3):

Cross-section [cm]
[IPE O 300], h = 30.40, b = 15.20, tw = 0.80, tf = 1.27, r = 1.50

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

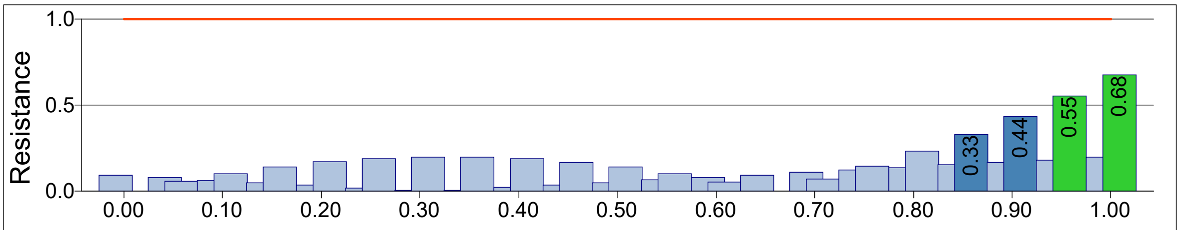
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

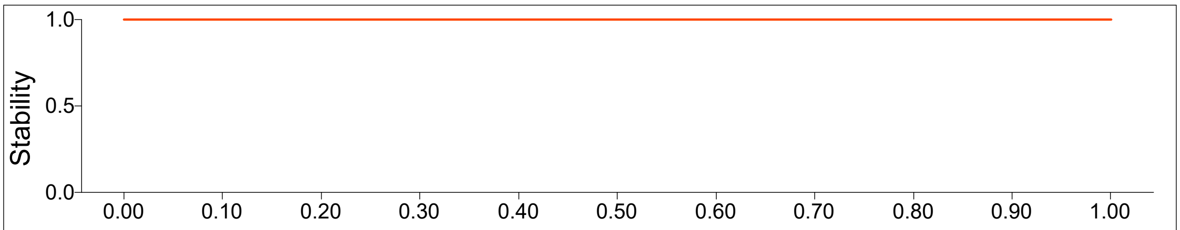
Lateral-torsional buckling mode is fully supported.

Ultimate Limit States

Cross-section resistance



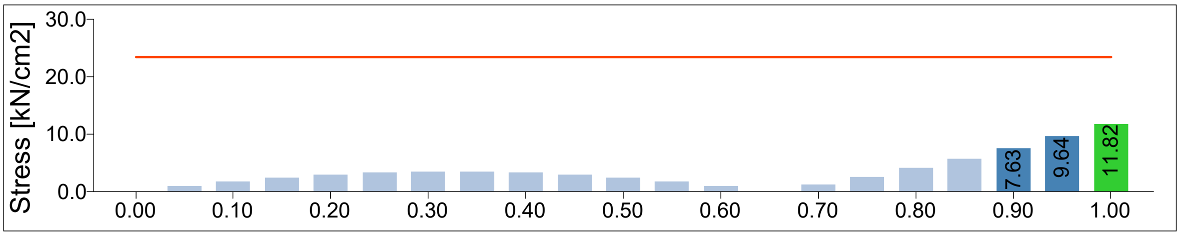
Element stability



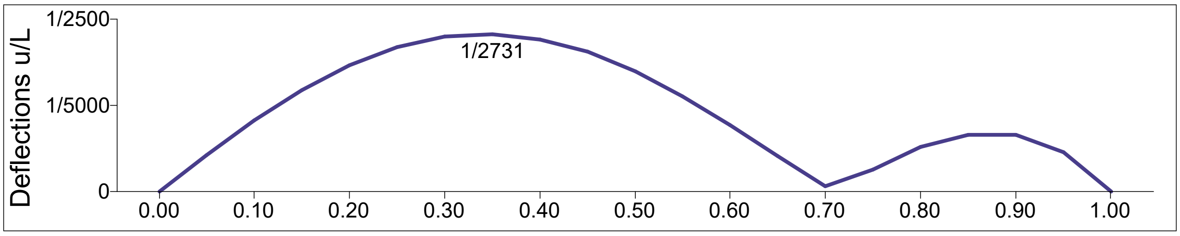
Element stability was not checked!

Serviceability Limit States

Serviceability stresses



Element deflections (local)



Element 2 design results (Building code - EC3):

Cross-section [cm]
[IPE O 300], h = 30.40, b = 15.20, tw = 0.80, tf = 1.27, r = 1.50

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

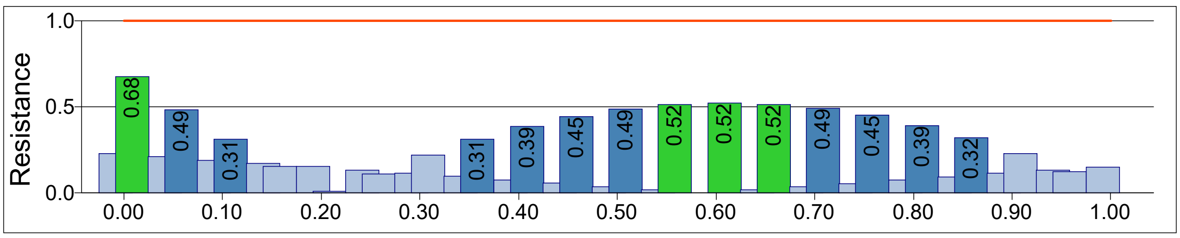
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

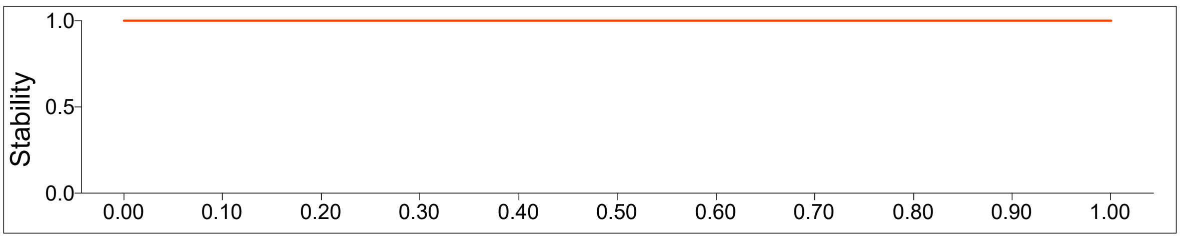
Lateral-torsional buckling mode is fully supported.

Ultimate Limit States

Cross-section resistance



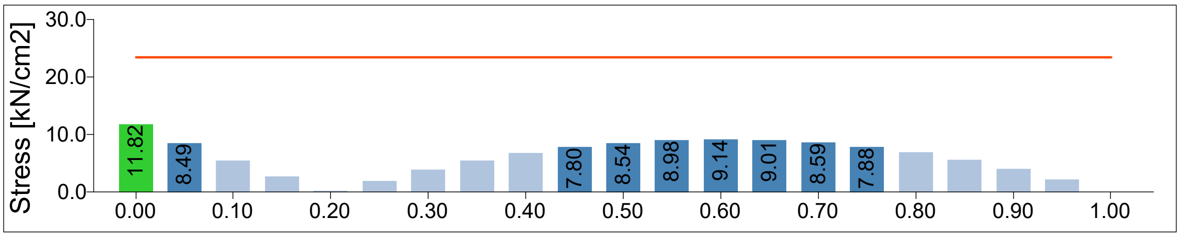
Element stability



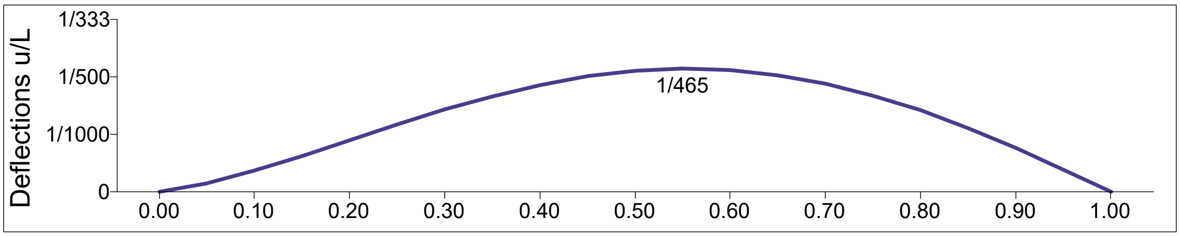
Element stability was not checked!

Serviceability Limit States

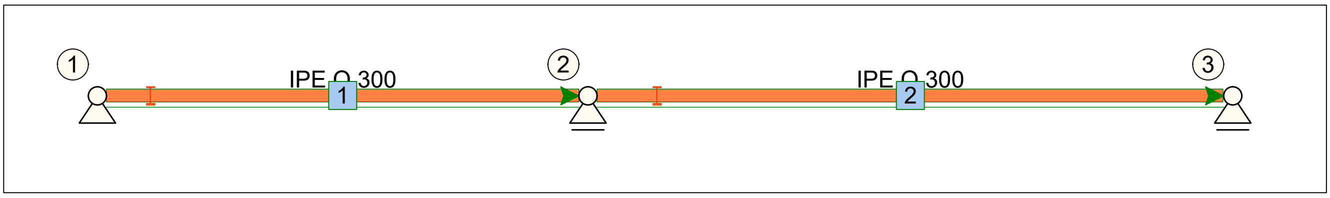
Serviceability stresses



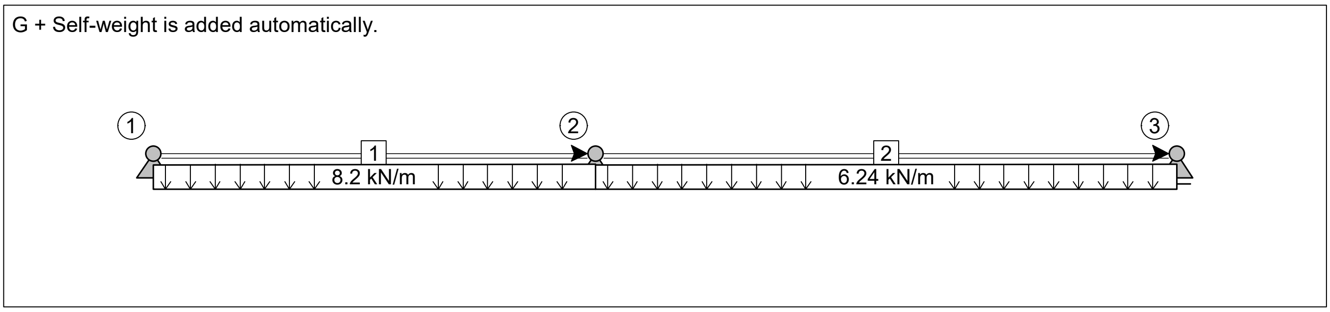
Element deflections (local)



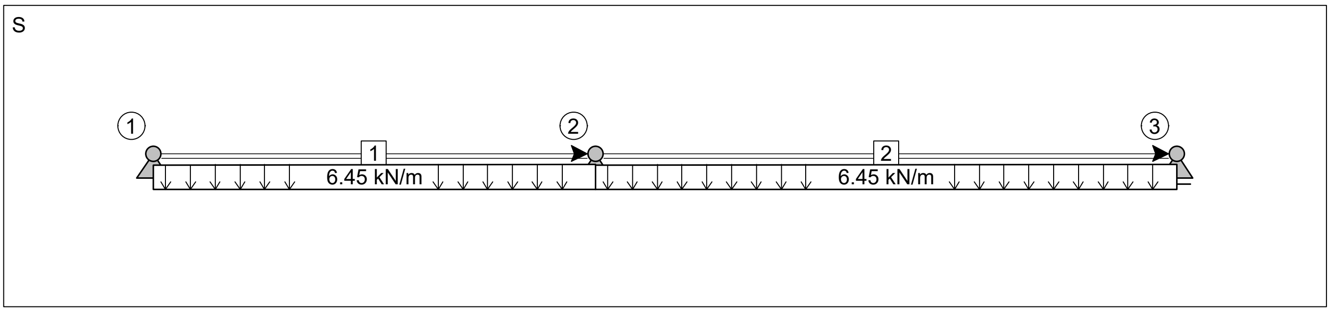
Geometry



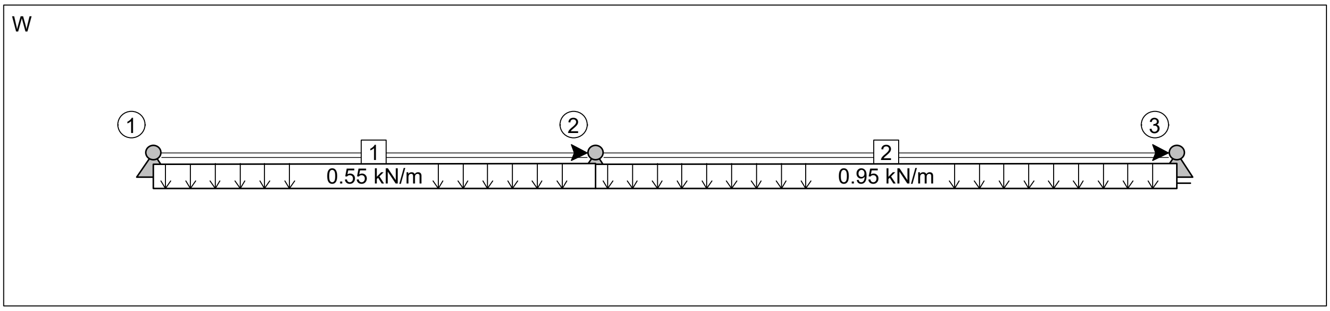
A1 : G



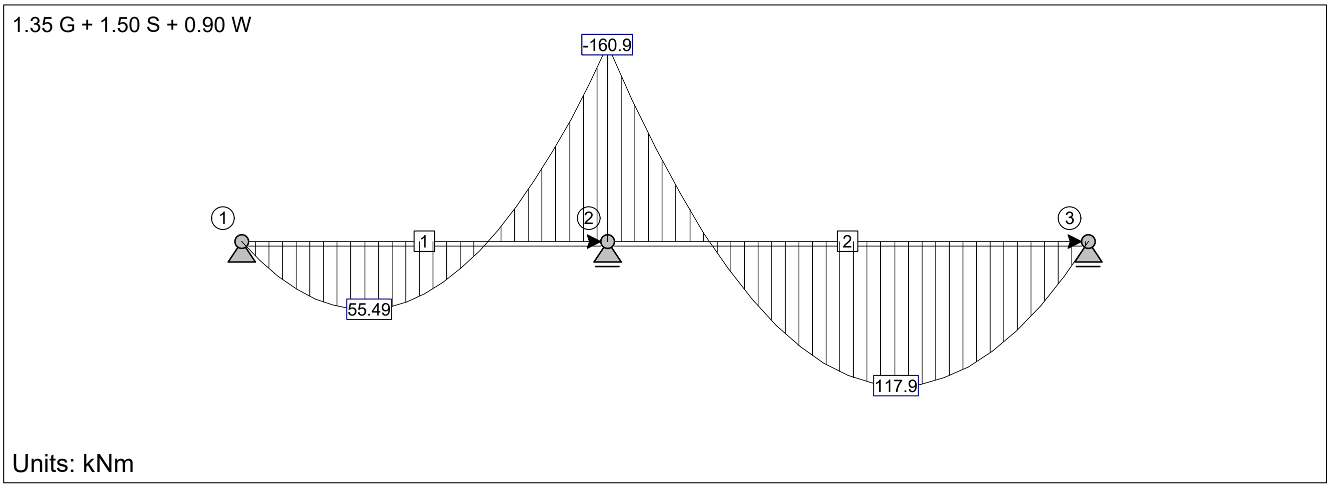
A2 : S



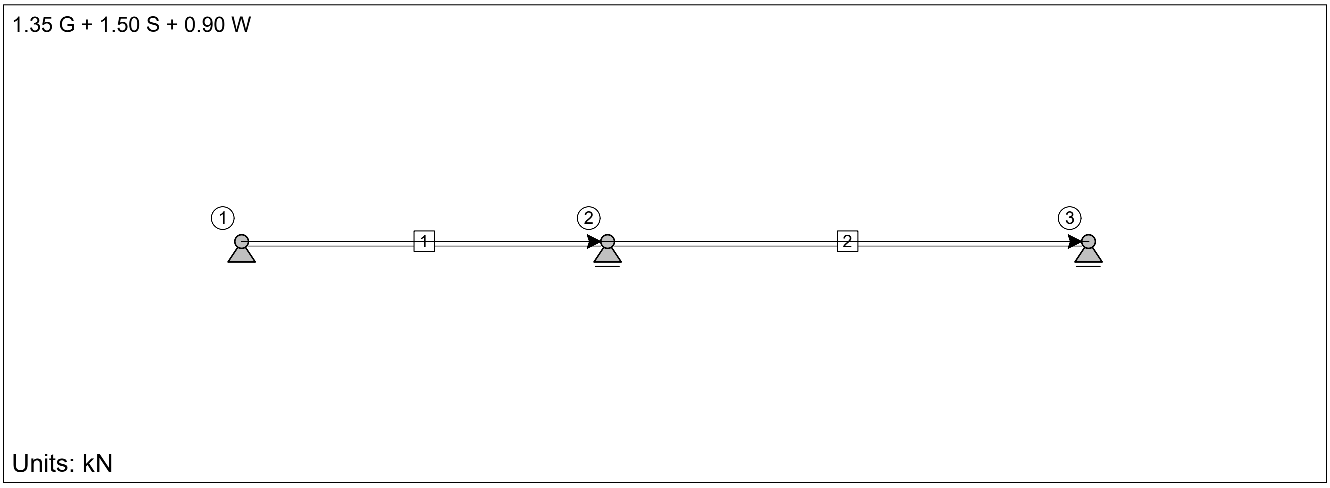
A3 : W



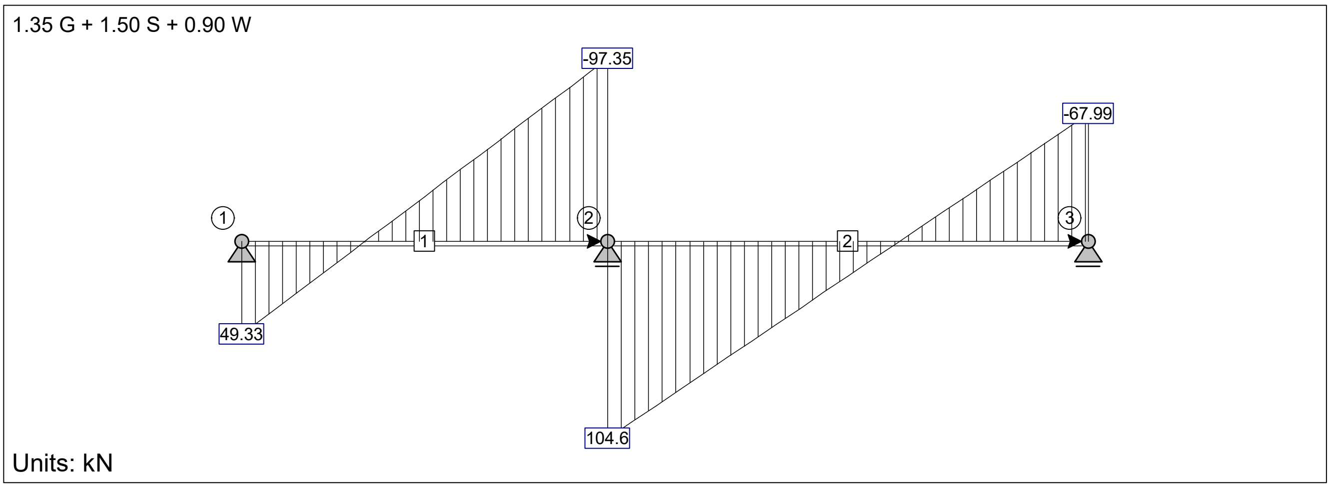
LC1: MSN: Bending Moments My



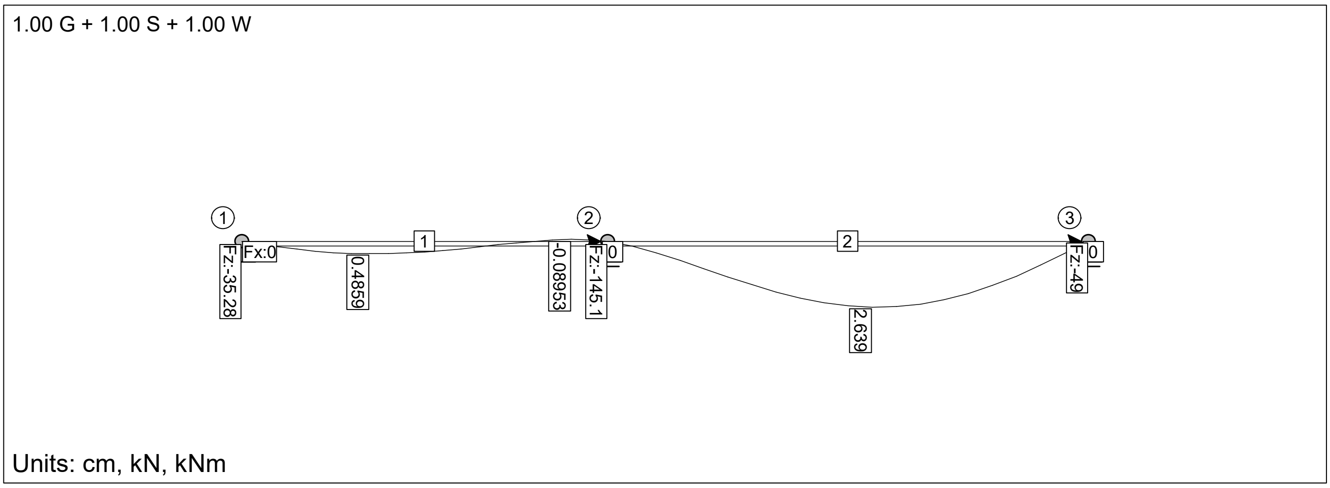
LC1: MSN: Axial Forces Fx



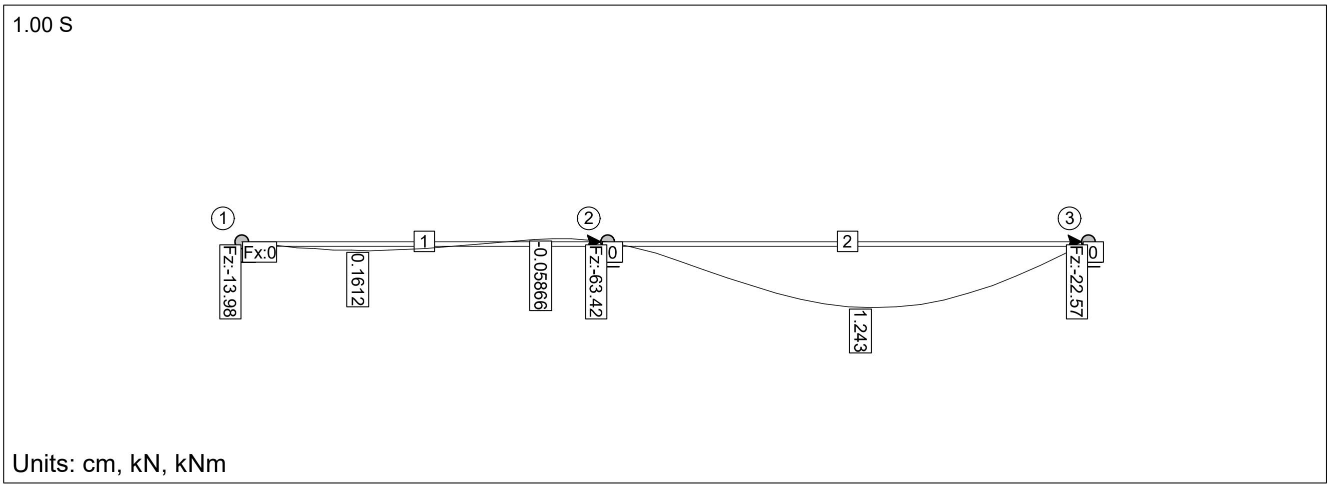
LC1: MSN: Shear Forces Fz



LC2: MSU tot: Displacements and Reactions



LC4: S: Displacements and Reactions



Element 1 design results (Building code - EC3):

Cross-section [cm]
[IPE O 300],   h = 30.40,   b = 15.20,   tw = 0.80,   tf = 1.27,   r = 1.50

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

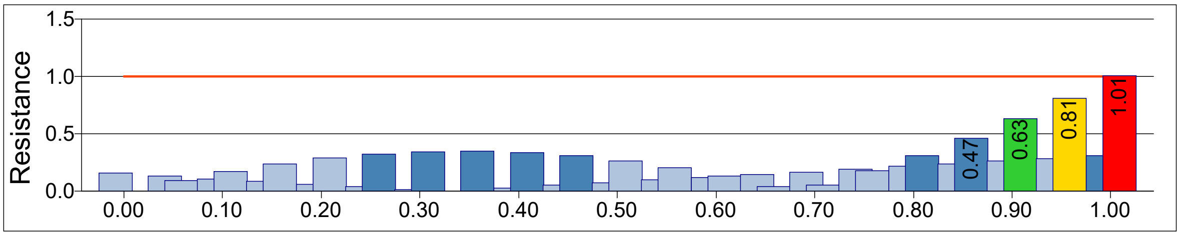
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

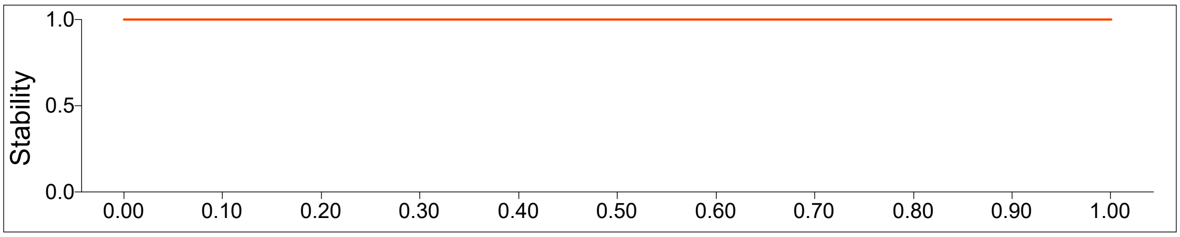
Lateral-torsional buckling mode is fully supported.

Ultimate Limit States

Cross-section resistance



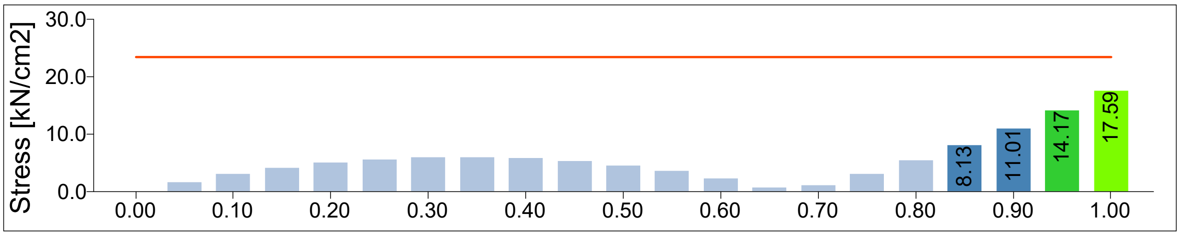
Element stability



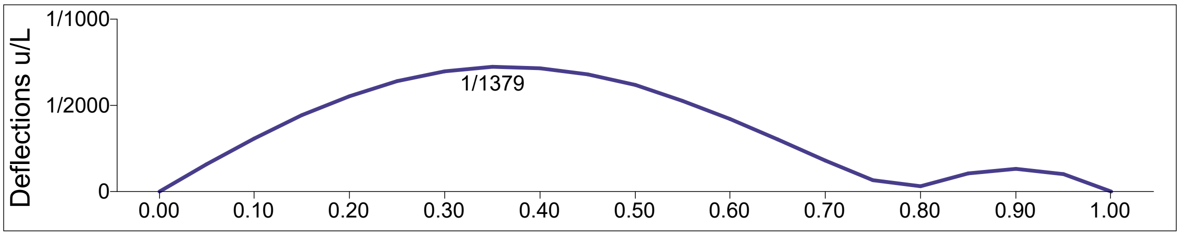
Element stability was not checked!

Serviceability Limit States

Serviceability stresses



Element deflections (local)



Element 2 design results (Building code - EC3):

Cross-section [cm]
[IPE O 300], h = 30.40, b = 15.20, tw = 0.80, tf = 1.27, r = 1.50

Element supports width left = 0.00 cm, right = 0.00 cm

Steel: S 235

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

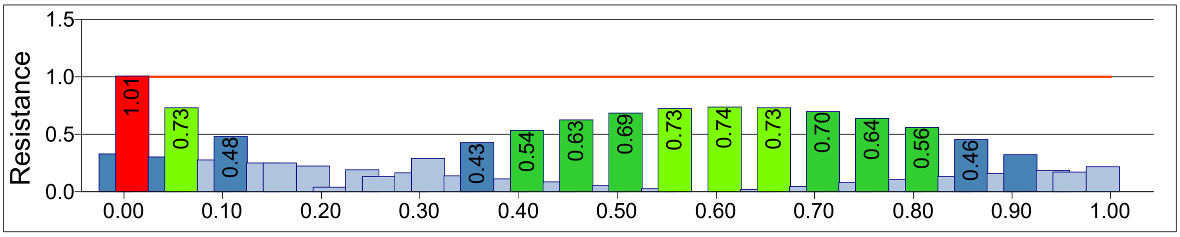
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

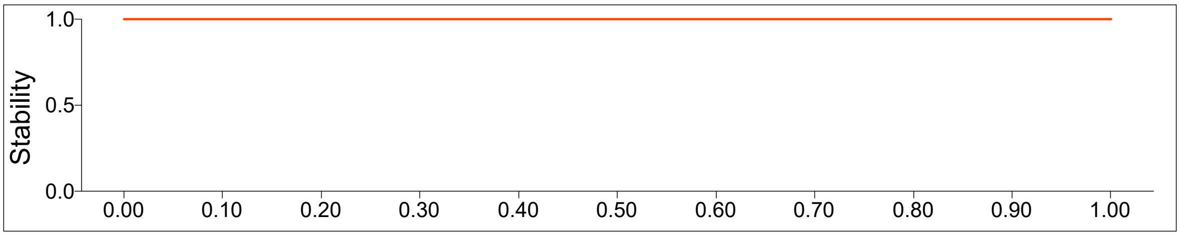
Lateral-torsional buckling mode is fully supported.

Ultimate Limit States

Cross-section resistance



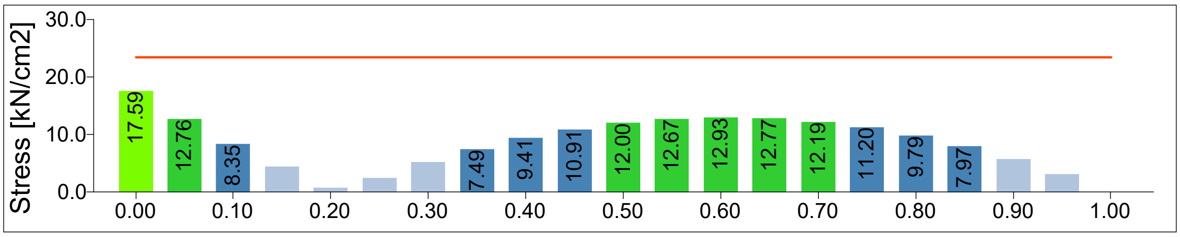
Element stability



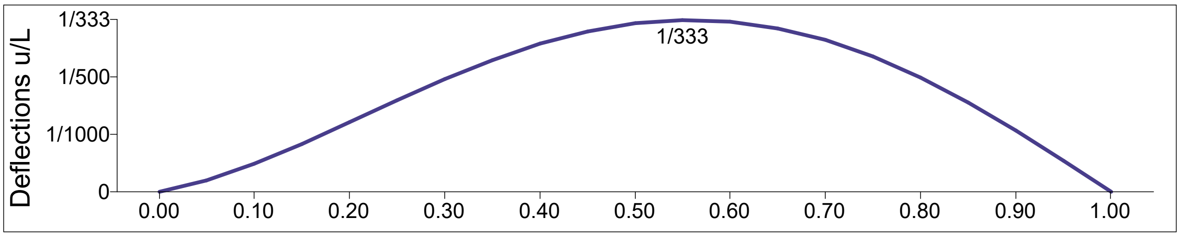
Element stability was not checked!

Serviceability Limit States

Serviceability stresses



Element deflections (local)



Izvajalec: /

Št. projekta: **21/2016, KM-STROK-7_2017**
Projekt: **Obnova graščine KIENHOFEN - Konstrukcija podpiranja ostrešja**
Datum: **2.jun.18**

SPISEK PROFILOV

Pozicija	Naziv	Kvaliteta	Dolžina (mm)	Količina	Skupna dolžina (m)	Teža na meter (kg/m)	Teža na kos (kg/kos)	Skupna Teža (kg)
1014	HEA320	S235JR	6138	1	6,14	97,60	599,1	599,1
1002	HEA320	S235JR	1152	6	6,91	97,60	112,4	674,6
1000	HEA320	S235JR	3730	6	22,38	97,60	364,0	2.184,3
1001	HEA320	S235JR	2145	6	12,87	97,60	209,4	1.256,1
1003	HEA320	S235JR	305	6	1,83	97,60	29,8	178,6
1015	HEA320	S235JR	6008	1	6,01	97,60	586,4	586,4
1013	HEA320	S235JR	6234	1	6,23	97,60	608,4	608,4
1005	HEB260	S235JR	5530	3	16,59	93,00	514,3	1.542,9
1007	IPEO300	S235JR	9892	2	19,78	49,30	487,7	975,4
1009	IPEO300	S235JR	7705	2	15,41	49,30	379,9	759,7
1006	IPEO300	S235JR	9895	2	19,79	49,30	487,8	975,6
1008	IPEO300	S235JR	7708	2	15,42	49,30	380,0	760,0
1004	RD16	S235JR	6000	6	36,00	1,60	9,6	57,6
1011	RD16	S235JR	5475	2	10,95	1,60	8,8	17,5
1012	RD16	S235JR	5345	2	10,69	1,60	8,6	17,1
1010	RD16	S235JR	5570	2	11,14	1,60	8,9	17,8
				50				**11.211,15**

Izvajalec: /

Št. projekta: **21/2016, KM-STROK-7_2017**
Projekt: **Obnova graščine KIENHOFEN - Ojačitve talnih HEA 260 nosilcev**
Datum: **2.jun.18**

SPISEK PROFILOV

Pozicija	Naziv	Kvaliteta	Dolžina (mm)	Količina	Skupna dolžina (m)	Teža na meter (kg/m)	Teža na kos (kg/kos)	Skupna Teža (kg)
1005	HEA260	S235JR	7775	1	7,78	68,20	530,3	530,3
1004	HEA260	S235JR	8947	1	8,95	68,20	610,2	610,2
1002	HEA260	S235JR	36121	1	36,12	68,20	2.463,5	2.463,5
1006	HEA260	S235JR	7761	1	7,76	68,20	529,3	529,3
1003	HEA260	S235JR	8948	1	8,95	68,20	610,3	610,3
1001	HEA260	S235JR	6839	2	13,68	68,20	466,4	932,8
1000	HEA260	S235JR	9209	2	18,42	68,20	628,1	1.256,1
				9				**6.932,39**

STATIČNI IZRAČUN

OBČINA MUTA
Glavni trg 17
2366 MUTA

PREUREDITEV KONSTRUKCIJE OSTREŠJA TER MEDETAŽNE KONSTRUKCIJE NAD NADSTROPJEM GRAŠČINA KIENHOFEN, DOGRADITEV STOPNIŠČA, GASILSKEGA MUZEJA

1. KARAKTERISTIKE UPORABLJENIH MATERIALOV

Beton C 25/30 (MB 30)

$f_{ck.C25} := 2.5kN \cdot cm^{-2}$ karakteristična tlačna trdnost

$\gamma_{m.c} := 1.5$ materialni varnostni faktor za beton

$f_{cd.C25} := \dfrac{f_{ck.C25}}{\gamma_{m.c}} = 1.67 \cdot \dfrac{kN}{cm^2}$ projektna tlačna trdnost

$E_{c.C25} := 3050kN \cdot cm^{-2}$ elastični modul betona

$\tau_{Rd.C25} := 0.03kN \cdot cm^{-2}$ osnovna projektna strižna trdnost betona

$f_{ctm.C25} := 0.26kN \cdot cm^{-2}$

$f_{cm.C25} := f_{ck.C25} + 0.8kN \cdot cm^{-2} = 3.3 \cdot kN \cdot cm^{-2}$

Rebrasta armatura in mrežasta armatura kvalitete S500B

$f_{yk} := 50kN \cdot cm^{-2}$ karakteristična vrednost meje elastičnosti armature

$\gamma_{m.s} := 1.15$ materialni varnostni faktor za jeklo

$f_{yd} := \dfrac{f_{yk}}{\gamma_{m.s}}$ $f_{yd} = 43.48 \cdot kN \cdot cm^{-2}$ projektna vrednost meje elastičnosti armature

$E_s := 21000kN \cdot cm^{-2}$ elastični modul jekla

Kovinske konstrukcije in kovinska spojna sredstva S235

$f_{ykS235} := 23.5kN \cdot cm^{-2}$ karakteristična trdnost na meji elastičnosti

materialni varnostni faktor za beton

$f_{ydS235} := \dfrac{f_{ykS235}}{\gamma_{m.s}}$ $f_{ydS235} = 20.43 \cdot kN \cdot cm^{-2}$ projektna trdnost jekla

Les trdnostnega razreda C24

$f_{mk} := 2.4kN \cdot cm^{-2}$	karakteristična upogibna trdnost
$f_{c0k} := 2.1kN \cdot cm^{-2}$	karakteristična tlačna trdnost v smeri vlaken
$f_{c90k} := 0.53kN \cdot cm^{-2}$	karakteristična tlačna trdnost pravokotno na vlakna
$f_{vk} := 0.25kN \cdot cm^{-2}$	karakteristična strižna trdnost lesa
$E_{0mean} := 1100kN \cdot cm^{-2}$	srednja vrednost elastičnega modula vzporedno z vlakni

$E_{0.05} := 740kN \cdot cm^{-2}$ elastični modul lesa z upoštevanjem 5% fraktile

$E_{90mean} := 370kN \cdot cm^{-2}$ elastični modul lesa pravokotno na vlakna

$G_{mean} := 690kN \cdot cm^{-2}$ srednja vrednost strižnega modula lesa

$G_{0.05} := 463kN \cdot cm^{-2}$ strižni modul lesa z upoštevanjem 5% fraktile

$\rho_k := 350kg \cdot m^{-3}$ karakteristična gostota lesa

$\gamma_m := 1.3$ materialni varnostni faktor lesa pri običajnih obtežnih kombinacijah

$\gamma_{m.acc} := 1.0$ materialni varnostni faktor lesa pri nezgodnih obtežnih kombinacijah

$k_{mod} := 0.8$ faktor trajanja obtežbe (masivni les, "short term")

$k_{mod.acc} := 1.1$ faktor trajana obtežbe (masivni les "instantaneous")

$k_{def} := 0.8$ faktor povečevanja deformacij zaradi trajanja obtežbe

$\Psi_{0.sneg} := 0.5$

$\Psi_{0.veter} := 0.6$ kombinacijski faktorji

$\Psi_{0.koristna} := 0.7$

$\Psi_{2.sneg} := 0$

$\Psi_{2.veter} := 0$

$\Psi_{2.koristna} := 0.6$

$f_{md} := \frac{k_{mod} \cdot f_{mk}}{\gamma_m} = 1.48 \cdot kN \cdot cm^{-2}$ projektna upogibna trdnost

$f_{c0d} := \frac{k_{mod} \cdot f_{c0k}}{\gamma_m} = 1.29 \cdot kN \cdot cm^{-2}$ projektna tlačna trdnost lesa

$f_{c90d} := \frac{k_{mod} \cdot f_{c90k}}{\gamma_m} = 0.33 \cdot kN \cdot cm^{-2}$ projektna tlačna trdnost lesa pravokotno na vlakna

$f_{vd} := \frac{k_{mod} \cdot f_{vk}}{\gamma_m} = 0.15 \cdot kN \cdot cm^{-2}$ projektna strižna trdnost lesa pravokotno na vlakna

$f_{md.acc} := \frac{k_{mod.acc} \cdot f_{mk}}{\gamma_{m.acc}} = 2.64 \cdot kN \cdot cm^{-2}$ projektna upogibna trdnost v primeru nezgodnega slučaja

$$f_{c0d.acc} := \frac{k_{mod.acc} \cdot f_{c0k}}{\gamma_{m.acc}} = 2.31 \cdot kN \cdot cm^{-2}$$

projektna tlačna trdnost lesa v primeru nezgodnega slučaja

$$f_{c90d.acc} := \frac{k_{mod.acc} \cdot f_{c90k}}{\gamma_{m.acc}} = 0.58 \cdot kN \cdot cm^{-2}$$

projektna tlačna trdnost lesa pravokotno na vlakna v primeru nezgodnega slučaja

2. KARAKTERISTIČNE OBTEŽBE ELEMENTOV ZGRADBE

2.1. Streha

$alfa := 37$

$e_{šp} := 95cm$

STALNA:

kritina - opeka: $g_1 := 0.65kN \cdot m^{-2} \cdot (cos(°(alfa)))^{-1}$

prečne letve: $g_2 := 4cm \cdot 5cm \cdot 6kN \cdot m^{-3} \cdot 5 \cdot (1m\,cos(°(alfa)))^{-1}$

vzdolžne letve: $g_3 := 5cm \cdot 8cm \cdot 6kN \cdot m^{-3} \cdot \left(e_{šp} \cdot cos(°(alfa))\right)^{-1}$

polni opaž: $g_4 := 2.0cm \cdot 100cm \cdot 6kN \cdot m^{-3} \cdot (1 \cdot m \cdot cos(°(alfa)))^{-1}$

lastna teža: $g_5 := 12cm \cdot 16cm \cdot 6kN \cdot m^{-3} \cdot \left(e_{šp} \cdot cos(°(alfa))\right)^{-1}$

TI: $g_6 := 25cm \cdot 0.5kN \cdot m^{-3} \cdot (cos(°(alfa)))^{-1} = 0.16 \cdot kN \cdot m^{-2}$

Instalacijski kanal: $g_7 := 0.05kN \cdot m^{-2}$

Knauf plošče ali Farmacell $g_8 := 1.25cm \cdot 12kN \cdot m^{-3} = 0.15 \cdot kN \cdot m^{-2}$

$g_{tot.šp} := g_1 + g_2 + g_3 + g_4 + g_5 + g_6 + g_7 + g_8$

$g_{tot.šp} = 1.58 \cdot kN \cdot m^{-2}$

SPREMENLJIVA - SNEG (EN 1991-1-3:2003, SNOW LOAD):

Objekt se nahaja v coni A3, nadmorska višina 366 m.n.m.

$s_k := 1.293 \cdot \left[1 + \left(\frac{366}{728}\right)^2\right] kN \cdot m^{-2} = 1.62 \cdot kN \cdot m^{-2}$ ... karakteristična vrednost obtežbe snega

$c_e := 1$ ... faktor izpostavljenosti

$c_t := 1$ ... faktor temperature

$\mu := 0.8 \cdot \frac{(60 - alfa)}{30} = 0.61$ ... oblikovni koeficient za naklone strešin med 30^0 in 60^0...BREZ SNEGOBRANOV

$\mu := 0.8$ ... oblikovni koeficient za strehe s snegobrani

$q_{sneg.šp} := s_k \cdot c_e \cdot c_t \cdot \mu$ ... obtežba snega

$q_{sneg.šp} = 1.3 \cdot kN \cdot m^{-2}$

SPREMENLJIVA - VETER (EN 1991-1-3:2003, WIND LOAD):

$z_0 := 0.3m$ ... osnovna dolžina "hrapavosti" (roughness lenght)

$z_{min} := 5m$ ... minimalna višina (minimum height)

$z := 5m$ ... višina površine nad terenom (height above ground)

$z_{max} := 200m$ ... maksimalna višina (maximum height)

$z_{0.II} := 0.05m$ ... osnovna dolžina "hrapavosti", II kategorija terena

$v_{b.0} := 20\frac{m}{s}$ ... osnovna referenčna hitrost vetra (fundamental value of wind velocity)

$\rho := 1.25kg\cdot m^{-3}$ ... gostota zračne mase

$c_{dir} := 1$ ... faktor smeri delovanja vetra (directional factor)

$c_{season} := 1$ ... "sezonski" faktor (seasonal factor)

$c_0 := 1$ ... ortografski faktor (ortography factor)

$k_I := 1$ ... faktor turbolence (turbolence factor)

$v_b := c_{dir}\cdot c_{season}\cdot v_{b.0} = 20\frac{m}{s}$ ... osnovna hitrost vetra (basic wind velocity)

$k_r := 0.19\cdot\left(\frac{z_0}{z_{0.II}}\right)^{0.07} = 0.215$ ... faktor terena (terrain factor)

$c_r := k_r\cdot ln\left(\frac{z}{z_0}\right) = 0.61$ ... faktor "hrapavosti" (roughness factor)

$v_m := c_r\cdot c_0\cdot v_b = 12.12\frac{m}{s}$ ... povprečna hitrost vetra (mean wind velocity)

$l_v := \frac{k_I}{c_0\cdot ln\left(\frac{z}{z_0}\right)} = 0.36$ ... intenzivnost turbolence (turbolence intensity)

$q_p := \left(1 + 7\cdot l_v\right)\cdot\frac{1}{2}\cdot\rho\cdot v_m^{\ 2} = 0.32\cdot kN\cdot m^{-2}$ ... pritisk vetra pri največji hitrosti zračne mase (peak velocity pressure)

KOEFICIENTI ZUNANJEGA PRITISKA, PRITISK VETRA

$\Theta := 0$

$c_{e.F} := 0.35$ $\quad w_{e.F} := q_p\cdot c_{e.F} = 0.11\cdot kN\cdot m^{-2}$

$c_{e.G} := 0.7$ $\quad w_{e.G} := q_p\cdot c_{e.G} = 0.22\cdot kN\cdot m^{-2}$

$c_{e.H} := 0.5$ $\quad w_{e.H} := q_p \cdot c_{e.H} = 0.16 \cdot kN \cdot m^{-2}$

$c_{e.I} := -0.35$ $\quad w_{e.I} := q_p \cdot c_{e.I} = -0.11 \cdot kN \cdot m^{-2}$

$c_{e.J} := -0.65$ $\quad w_{e.J} := q_p \cdot c_{e.J} = -0.21 \cdot kN \cdot m^{-2}$

$c_{e.K} := -0.4$ $\quad w_{e.K} := q_p \cdot c_{e.K} = -0.13 \cdot kN \cdot m^{-2}$

$c_{e.L} := -1.35$ $\quad w_{e.L} := q_p \cdot c_{e.L} = -0.43 \cdot kN \cdot m^{-2}$

$c_{e.M} := -0.8$ $\quad w_{e.M} := q_p \cdot c_{e.M} = -0.26 \cdot kN \cdot m^{-2}$

$c_{e.N} := -0.2$ $\quad w_{e.N} := q_p \cdot c_{e.N} = -0.06 \cdot kN \cdot m^{-2}$

$q_{veter.šp.P} := w_{e.H} = 0.16 \cdot kN \cdot m^{-2}$ ... izbrana povprečna obtežba vetra PRITISK

$q_{veter.šp.S} := w_{e.I} = -0.11 \cdot kN \cdot m^{-2}$ ... izbrana povprečna obtežba vetra SRK

KUMULATIVNA HORIZONTALNA SILA VETRA NA STREŠINO V VZDOLŽNI SMERI

$A_{streha} := 200m^2 \cdot (cos(°(alfa)))^{-1} = 250.43\, m^2$ ... površina ostrešja

$F_{w.streha} := A_{streha} \cdot \left(w_{e.H} - w_{e.I}\right) \cdot sin(°(alfa)) = 41.02 \cdot kN$

2.2. Strop nad pritličjem

$e_{stropnik} := 60cm$

STALNA - LASTNA TEŽA:

pohodna površina: $g_1 := 2cm \cdot 25kN \cdot m^{-3} = 0.5 \cdot kN \cdot m^{-2}$

estrih: $g_2 := 6cm \cdot 20kN \cdot m^{-3} = 1.2 \cdot kN \cdot m^{-2}$

TI: $g_3 := 3cm \cdot 1kN \cdot m^{-3} = 0.03 \cdot kN \cdot m^{-2}$

OSB plošča: $g_4 := 2.2cm \cdot 6kN \cdot m^{-3} = 0.13 \cdot kN \cdot m^{-2}$

lastna teža stropnika: $g_5 := 10cm \cdot 24cm \cdot 6kN \cdot m^{-3} \cdot \dfrac{1}{e_{stropnik}} = 0.24 \cdot kN \cdot m^{-2}$

$g_{strop} := g_1 + g_2 + g_3 + g_4 + g_5 = 2.1 \cdot kN \cdot m^{-2}$

SPREMENLJIVA - KORISTNA OBTEŽBA:

$q_{strop} := 5kN \cdot m^{-2}$ ... skladno s SIST EN 1991-1-1:2004

3. OSTREŠJE

3.1. Špirovci POZ ŠP1 in POZ ŠP2

3.1.1 Statični sistem

Računski model glej PRILOGA 1!

$e_{šp} := 95cm$ ... povprečni medosni razmak špirovcev

$alfa := 37$ ... naklon strešine

3.1.2 Računska obtežba

$faktor_{q1} := 1.5$

$faktor_{q.2} := 1.5 \cdot \Psi_{0.sneg} = 0.75$

$faktor_{q3} := 1.5 \cdot \Psi_{0.veter} = 0.9$

$q_{d.1} := 1.35 \cdot g_{tot.šp} + faktor_{q1} \cdot q_{sneg.šp} + faktor_{q3} \cdot q_{veter.šp.P} \cdot (cos(°(alfa)))^{-2} = 4.3 \cdot kN \cdot m^{-2}$

$q_{d.2} := 1.35 \cdot g_{tot.šp} + faktor_{q.2} \cdot q_{sneg.šp} + faktor_{q1} \cdot q_{veter.šp.P} \cdot (cos(°(alfa)))^{-2} = 3.48 \cdot kN \cdot m^{-2}$

$q_{d.šp} := max\left(q_{d.1}, q_{d.2}\right) \cdot e_{šp} = 4.09 \cdot kN \cdot m^{-1}$

3.1.3 Obremenitve in dimenzioniranje

Glej PRILOGA 1, VGRAJENI ŠPIROVCI b/h=12/16cm USTREZAJO!

3.1.4 Kontrola povesov

$l_{max} := 3.85m$

$f_{dop.inst} := \frac{l_{max}}{300}$ $f_{dop.inst} = 1.28 \cdot cm$ ... dopustni povesi zaradi spremenljive obtežbe

$f_{dop.fin} := \frac{l_{max}}{200}$ $f_{dop.fin} = 1.93 \cdot cm$ ... dopustni trajni povesi

$faktor_{w1} := \Psi_{0.veter} = 0.6$ ... povesi zaradi obtežbe snega

$faktor_{w2} := 1 + k_{def} = 1.8$

$faktor_{w3} := 1 + \Psi_{2.sneg} \cdot k_{def} = 1$

$faktor_{w4} := 1 + \Psi_{2.veter} \cdot k_{def} = 1$

$f_g := 0.276cm$

$f_s := 0.226cm$ ... računske vrednosti povesov odčitane iz RM, PRILOGA 1

$f_w := 0.043cm$

$f_{inst} := f_g + f_s + faktor_{w1} \cdot f_w \qquad f_{inst} = 0.53 \cdot cm$

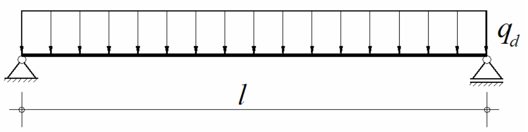
$kontrola(f_{dop.inst} > f_{inst}) = \text{"JE izpolnjena"}$ ... kontrola povesov zaradi trenutne obtežbe

$f_{fin} := faktor_{w2} f_g + faktor_{w3} \cdot f_s + faktor_{w4} \cdot f_w = 0.77 \cdot cm$

$kontrola(f_{dop.fin} > f_{fin}) = \text{"JE izpolnjena"}$ ... kontrola povesov zaradi dolgotrajnih vplivov

3.1.A Špirovci POZ ŠP3

3.1.A1 Statični sistem



$l := 3.75m$ ... osnovni razpon

$e_{šp} := 95cm$ ... povprečni medosni razmak špirovcev

$alfa := 5$ ... naklon strešine

3.1.A2 Računska obtežba

$faktor_{q1} := 1.5$

$faktor_{q.2} := 1.5 \cdot \Psi_{0.sneg} = 0.75$

$faktor_{q3} := 1.5 \cdot \Psi_{0.veter} = 0.9$

$g_{klimat} := 0.5kN \cdot m^{-2}$

$q_{d.1} := 1.35 \cdot (g_{tot.šp} + g_{klimat}) + faktor_{q1} \cdot q_{sneg.šp} + faktor_{q3} \cdot q_{veter.šp.P} \cdot (cos(°(alfa)))^{-2} = 4.9 \cdot kN \cdot m^{-2}$

$q_{d.2} := 1.35 \cdot (g_{tot.šp} + g_{klimat}) + faktor_{q.2} \cdot q_{sneg.šp} + faktor_{q1} \cdot q_{veter.šp.P} \cdot (cos(°(alfa)))^{-2} = 4.02 \cdot kN \cdot m^{-2}$

$q_{d.šp} := max(q_{d.1}, q_{d.2}) \cdot e_{šp} = 4.65 \cdot kN \cdot m^{-1}$

3.1.A3 Obremenitve in dimenzioniranje

$$M_d := q_{d.šp} \cdot \frac{l^2}{8} = 8.18 \cdot kN \cdot m$$ ... maksimalni upogibni moment

$$W_{potr} := \frac{M_d}{f_{md}} \qquad W_{potr} = 553.58 \cdot cm^3$$

IZBEREMO ŠPIROVCE dimenzij b/h=12/20cm!

$$W_{dej} := \frac{12cm \cdot (20cm)^2}{6} \qquad W_{dej} = 800 \cdot cm^3$$

$$kontrola\left(W_{dej} > W_{potr}\right) = \text{"JE izpolnjena"}$$

$$I_{dej} := \frac{12cm \cdot (20cm)^3}{12} \qquad I_{dej} = 8000 \cdot cm^4$$

3.1.A4 Kontrola povesov

$$l_{max} := l = 3.75\, m$$

$$f_{dop.inst} := \frac{l_{max}}{300} \qquad f_{dop.inst} = 1.25 \cdot cm$$ ... dopustni povesi zaradi spremenljive obtežbe

$$f_{dop.fin} := \frac{l_{max}}{200} \qquad f_{dop.fin} = 1.88 \cdot cm$$ ... dopustni trajni povesi

$$faktor_{w1} := \Psi_{0.veter} = 0.6$$ ... povesi zaradi obtežbe snega

$$faktor_{w2} := 1 + k_{def} = 1.8$$

$$faktor_{w3} := 1 + \Psi_{2.sneg} \cdot k_{def} = 1$$

$$faktor_{w4} := 1 + \Psi_{2.veter} \cdot k_{def} = 1$$

$$f_s := \frac{5 \cdot \left(q_{sneg.šp} \cdot e_{šp}\right) \cdot l^4}{384 \cdot E_{0mean} \cdot I_{dej}} \qquad f_s = 0.36 \cdot cm$$ ... povesi zaradi obtežbe snega

$$f_w := \frac{5 \cdot \left(q_{veter.šp.P} \cdot e_{šp}\right) \cdot l^4}{384 \cdot E_{0mean} \cdot I_{dej}} \qquad f_w = 0.04 \cdot cm$$ ... povesi zaradi obtežbe vetra

$$f_g := f_s \cdot \frac{\left(g_{tot.šp} + g_{klimat}\right)}{q_{sneg.šp}} \qquad f_g = 0.58 \cdot cm$$ ... povesi zaradi stalne obtežbe

$$f_{inst} := f_g + f_s + faktor_{w1} \cdot f_w \qquad f_{inst} = 0.96 \cdot cm$$

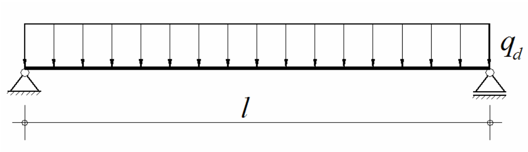
$kontrola(f_{dop.inst} > f_{inst}) = \text{"JE izpolnjena"}$ ... kontrola povesov zaradi trenutne obtežbe

$f_{fin} := faktor_{w2} f_g + faktor_{w3} \cdot f_s + faktor_{w4} \cdot f_w = 1.45 \cdot cm$

$kontrola(f_{dop.fin} > f_{fin}) = \text{"JE izpolnjena"}$ ... kontrola povesov zaradi dolgotrajnih vplivov

3.2. Vmesna lega - lege POZ VL1

3.2.1 Statični sistem



$l_1 := 4.0m$ ... osnovni razpon

$l_2 := l_1 - 2 \cdot 1.0m = 2\,m$ ... razpon med ročicami

$l_{eff} := \dfrac{l_1 + l_2}{2} = 3\,m$ ... efektivni - računski razpon

$e_{šp} := 95cm$ ... medosni razmak špirovcev

3.2.2 Obtežba

STALNA: $g_{lega} := 4.43kN \cdot \dfrac{1}{e_{šp}} + 22cm \cdot 26cm \cdot 6kN \cdot m^{-3} = 5.01 \cdot kN \cdot m^{-1}$

SPREMENLJIVA - OBTEŽBA SNEGA:

$s_{lega} := 3.64kN \cdot \dfrac{1}{e_{šp}} = 3.83 \cdot kN \cdot m^{-1}$

SPREMENLJIVA - OBTEŽBA VETRA:

$w_{lega} := 0.44kN \cdot \dfrac{1}{e_{šp}} = 0.46 \cdot kN \cdot m^{-1}$

RAČUNSKA OBTEŽBA:

$faktor_{q1} := 1.5$

$faktor_{q.2} := 1.5 \cdot \Psi_{0.sneg} = 0.75$

$faktor_{q3} := 1.5 \cdot \Psi_{0.veter} = 0.9$

$q_{d.1} := 1.35 \cdot g_{lega} + faktor_{q1} \cdot s_{lega} + faktor_{q3} \cdot w_{lega} = 12.92\,m \cdot kN \cdot m^{-2}$

$q_{d.2} := 1.35 \cdot g_{lega} + faktor_{q.2} \cdot s_{lega} + faktor_{q1} \cdot w_{lega} = 10.33\,m \cdot kN \cdot m^{-2}$

$$q_d := max(q_{d.1}, q_{d.2}) = 12.92 \cdot kN \cdot m^{-1}$$

3.2.3 Obremenitve in dimenzioniranje

$$M_d := q_d \cdot \frac{l_{eff}^2}{8} = 14.54 \cdot kN \cdot m$$ ... maksimalni upogibni moment

$$W_{potr} := \frac{M_d}{f_{md}} \qquad W_{potr} = 984.35 \cdot cm^3$$

VGRAJENA JE VMESNA LEGA dimenzij b/h=21/26cm!

$$W_{dej} := \frac{21cm \cdot (26cm)^2}{6} \qquad W_{dej} = 2366 \cdot cm^3$$

$$kontrola(W_{dej} > W_{potr}) = \text{"JE izpolnjena"}$$

$$I_{dej} := \frac{21cm \cdot (26cm)^3}{12} \qquad I_{dej} = 30758 \cdot cm^4$$

3.2.4 Kontrola povesov

$$f_{dop.inst} := \frac{l_{eff}}{300} \qquad f_{dop.inst} = 1 \cdot cm$$ ... dopustni povesi zaradi spremenljive obtežbe

$$f_{dop.fin} := \frac{l_{eff}}{200} \qquad f_{dop.fin} = 1.5 \cdot cm$$ ... dopustni trajni povesi

$$faktor_{w1} := \Psi_{0.veter} = 0.6$$

$$faktor_{w2} := 1 + k_{def} = 1.8$$

$$faktor_{w3} := 1 + \Psi_{2.sneg} \cdot k_{def} = 1$$

$$faktor_{w4} := 1 + \Psi_{2.veter} \cdot k_{def} = 1$$

$$f_s := \frac{5 \cdot s_{lega} \cdot l_{eff}^4}{384 \cdot E_{0mean} \cdot I_{dej}} \qquad f_s = 0.12 \cdot cm$$ ... povesi zaradi obtežbe snega

$$f_w := \frac{5 \cdot w_{lega} \cdot l_{eff}^4}{384 \cdot E_{0mean} \cdot I_{dej}} \qquad f_w = 0.01 \cdot cm$$ ... povesi zaradi obtežbe vetra

$$f_g := f_s \cdot \frac{g_{lega}}{s_{lega}} \qquad f_g = 0.16 \cdot cm$$ ... povesi zaradi stalne obtežbe

$$f_{inst} := f_g + f_s + faktor_{w1} \cdot f_w \qquad f_{inst} = 0.28 \cdot cm$$

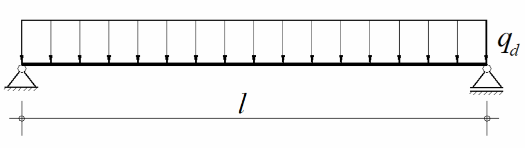
$$kontrola(f_{dop.inst} > f_{inst}) = \text{"JE izpolnjena"}$$ ... kontrola povesov zaradi trenutne obtežbe

$f_{fin} := faktor_{w2} f_g + faktor_{w3} \cdot f_s + faktor_{w4} \cdot f_w = 0.41 \cdot cm$

$kontrola(f_{dop.fin} > f_{fin}) = $ "JE izpolnjena" ... kontrola povesov zaradi dolgotrajnih vplivov

3.3. Vmesna lega - lege POZ VL2

3.3.1 Statični sistem



$l_1 := 4.6m$ ... osnovni razpon

$l_2 := l_1 - 2 \cdot 1.0m = 2.6\,m$ ... razpon med ročicami

$l_{eff} := \dfrac{l_1 + l_2}{2} = 3.6\,m$ ... efektivni - računski razpon

$e_{šp} := 95cm$ ... medosni razmak špirovcev

3.3.2 Obtežba

STALNA: $g_{lega} := 7.44kN \cdot \dfrac{1}{e_{šp}} + 22cm \cdot 26cm \cdot 6kN \cdot m^{-3} = 8.17 \cdot kN \cdot m^{-1}$

SPREMENLJIVA - OBTEŽBA SNEGA:

$$s_{lega} := 6.13kN \cdot \frac{1}{e_{šp}} = 6.45 \cdot kN \cdot m^{-1}$$

SPREMENLJIVA - OBTEŽBA VETRA:

$$w_{lega} := 0.52kN \cdot \frac{1}{e_{šp}} = 0.55 \cdot kN \cdot m^{-1}$$

RAČUNSKA OBTEŽBA:

$$faktor_{q1} := 1.5$$

$$faktor_{q.2} := 1.5 \cdot \Psi_{0.sneg} = 0.75$$

$$faktor_{q3} := 1.5 \cdot \Psi_{0.veter} = 0.9$$

$$q_{d.1} := 1.35 \cdot g_{lega} + faktor_{q1} \cdot s_{lega} + faktor_{q3} \cdot w_{lega} = 21.21\,m \cdot kN \cdot m^{-2}$$

$$q_{d.2} := 1.35 \cdot g_{lega} + faktor_{q.2} \cdot s_{lega} + faktor_{q1} \cdot w_{lega} = 16.7\,m \cdot kN \cdot m^{-2}$$

$$q_d := max(q_{d.1}, q_{d.2}) = 21.21 \cdot kN \cdot m^{-1}$$

3.3.3 Obremenitve in dimenzioniranje

$$M_d := q_d \cdot \frac{l_{eff}^{\;2}}{8} = 34.36 \cdot kN \cdot m$$ ... maksimalni upogibni moment

$$W_{potr} := \frac{M_d}{f_{md}} \qquad W_{potr} = 2326.2 \cdot cm^3$$

VGRAJENA JE VMESNA LEGA dimenzij b/h=21/26cm!

$$W_{dej} := \frac{21cm \cdot (26cm)^2}{6} \qquad W_{dej} = 2366 \cdot cm^3$$

$$kontrola\left(W_{dej} > W_{potr}\right) = \text{"JE izpolnjena"}$$

$$I_{dej} := \frac{21cm \cdot (26cm)^3}{12} \qquad I_{dej} = 30758 \cdot cm^4$$

3.3.4 Kontrola povesov

$$f_{dop.inst} := \frac{l_{eff}}{300} \qquad f_{dop.inst} = 1.2 \cdot cm$$ ... dopustni povesi zaradi spremenljive obtežbe

$$f_{dop.fin} := \frac{l_{eff}}{200} \qquad f_{dop.fin} = 1.8 \cdot cm$$ ... dopustni trajni povesi

$$faktor_{w1} := \Psi_{0.veter} = 0.6$$

$$faktor_{w2} := 1 + k_{def} = 1.8$$

$$faktor_{w3} := 1 + \Psi_{2.sneg} \cdot k_{def} = 1$$

$$faktor_{w4} := 1 + \Psi_{2.veter} \cdot k_{def} = 1$$

$$f_s := \frac{5 \cdot s_{lega} \cdot l_{eff}^{\;4}}{384 \cdot E_{0mean} \cdot I_{dej}} \qquad f_s = 0.42 \cdot cm$$ ... povesi zaradi obtežbe snega

$$f_w := \frac{5 \cdot w_{lega} \cdot l_{eff}^{\;4}}{384 \cdot E_{0mean} \cdot I_{dej}} \qquad f_w = 0.04 \cdot cm$$ ... povesi zaradi obtežbe vetra

$$f_g := f_s \cdot \frac{g_{lega}}{s_{lega}} \qquad f_g = 0.53 \cdot cm$$ ... povesi zaradi stalne obtežbe

$$f_{inst} := f_g + f_s + faktor_{w1} \cdot f_w \qquad f_{inst} = 0.97 \cdot cm$$

$$kontrola\left(f_{dop.inst} > f_{inst}\right) = \text{"JE izpolnjena"}$$ ... kontrola povesov zaradi trenutne obtežbe

$$f_{fin} := faktor_{w2} f_g + faktor_{w3} \cdot f_s + faktor_{w4} \cdot f_w = 1.4 \cdot cm$$

$kontrola(f_{dop.fin} > f_{fin}) = \text{"JE izpolnjena"}$ ... kontrola povesov zaradi dolgotrajnih vplivov

3.4. Nova kovinska vmesna lega - lege POZ VL1/A

3.4.1 Statični sistem

Glej PRILOGA 2!

3.4.2 Obtežba

STALNA: $g_{lega} := 4.43kN \cdot \frac{1}{e_{šp}} + 22cm \cdot 26cm \cdot 6kN \cdot m^{-3} = 5.01 \cdot kN \cdot m^{-1}$

SPREMENLJIVA - OBTEŽBA SNEGA:

$$s_{lega} := 3.64kN \cdot \frac{1}{e_{šp}} = 3.83 \cdot kN \cdot m^{-1}$$

SPREMENLJIVA - OBTEŽBA VETRA:

$$w_{lega} := 0.44kN \cdot \frac{1}{e_{šp}} = 0.46 \cdot kN \cdot m^{-1}$$

RAČUNSKA OBTEŽBA:

$$faktor_{q1} := 1.5$$

$$faktor_{q.2} := 1.5 \cdot \Psi_{0.sneg} = 0.75$$

$$faktor_{q3} := 1.5 \cdot \Psi_{0.veter} = 0.9$$

$$q_{d.1} := 1.35 \cdot g_{lega} + faktor_{q1} \cdot s_{lega} + faktor_{q3} \cdot w_{lega} = 12.92\, m \cdot kN \cdot m^{-2}$$

$$q_{d.2} := 1.35 \cdot g_{lega} + faktor_{q.2} \cdot s_{lega} + faktor_{q1} \cdot w_{lega} = 10.33\, m \cdot kN \cdot m^{-2}$$

$$q_d := max(q_{d.1}, q_{d.2}) = 12.92 \cdot kN \cdot m^{-1}$$

3.4.3 Obremenitve in dimenzioniranje

Glej PRILOGA 2!
izberemo vročevaljani profil IPE O 300 (standardni profil, široka pasnica)!

3.4.4 Kontrola povesov

$l_{max} := 8.8m$

$f_{dop.inst} := \frac{l_{max}}{300}$ $f_{dop.inst} = 2.93 \cdot cm$ ... dopustni povesi zaradi spremenljive obtežbe

$f_{dop.tot} := \frac{l_{max}}{200}$ $f_{dop.fin} = 1.8 \cdot cm$ ... dopustni trajni povesi

$f_g := 1.19cm$ ... povesi zaradi stalne obtežbe

$f_s := 0.84cm$ ... povesi zaradi obtežbe snega

$f_w := 0.17cm$ ... povesi zaradi obtežbe vetra

$f_{inst} := f_s + f_w$ $f_{inst} = 1.01 \cdot cm$

$kontrola(f_{dop.inst} > f_{inst}) = \text{"JE izpolnjena"}$ ... kontrola povesov zaradi trenutne obtežbe

$f_{fin} := f_g + f_s + f_w = 2.2 \cdot cm$

$kontrola(f_{dop.tot} > f_{fin}) = \text{"JE izpolnjena"}$ ... kontrola povesov zaradi dolgotrajnih vplivov

3.5. Nova kovinska vmesna lega - lege POZ VL2/A

3.5.1 Statični sistem

Glej PRILOGA 3!

3.5.2 Obtežba

STALNA:

$$g_{lega} := 7.23kN \cdot \frac{1}{e_{šp}} + 22cm \cdot 26cm \cdot 6kN \cdot m^{-3} = 7.95 \cdot kN \cdot m^{-1}$$

SPREMENLJIVA - OBTEŽBA SNEGA:

$$s_{lega} := 5.95kN \cdot \frac{1}{e_{šp}} = 6.26 \cdot kN \cdot m^{-1}$$

SPREMENLJIVA - OBTEŽBA VETRA:

$$w_{lega} := 0.53kN \cdot \frac{1}{e_{šp}} = 0.56 \cdot kN \cdot m^{-1}$$

RAČUNSKA OBTEŽBA:

$$faktor_{q1} := 1.5$$

$$faktor_{q.2} := 1.5 \cdot \Psi_{0.sneg} = 0.75$$

$$faktor_{q3} := 1.5 \cdot \Psi_{0.veter} = 0.9$$

$$q_{d.1} := 1.35 \cdot g_{lega} + faktor_{q1} \cdot s_{lega} + faktor_{q3} \cdot w_{lega} = 20.63\, m \cdot kN \cdot m^{-2}$$

$$q_{d.2} := 1.35 \cdot g_{lega} + faktor_{q.2} \cdot s_{lega} + faktor_{q1} \cdot w_{lega} = 16.27\, m \cdot kN \cdot m^{-2}$$

$$q_d := max(q_{d.1}, q_{d.2}) = 20.63 \cdot kN \cdot m^{-1}$$

3.5.3 Obremenitve in dimenzioniranje

Glej PRILOGA 3!
izberemo vročevaljani profil IPE O 300 (standardni profil, široka pasnica)!

3.5.4 Kontrola povesov

$l_{max} := 8.8m$

$f_{dop.inst} := \frac{l_{max}}{300}$ $\qquad f_{dop.inst} = 2.93 \cdot cm$ ... dopustni povesi zaradi spremenljive obtežbe

$f_{dop.tot} := \frac{l_{max}}{200}$ $\qquad f_{dop.fin} = 1.8 \cdot cm$ ... dopustni trajni povesi

$f_g := 1.19cm$ ... povesi zaradi stalne obtežbe

$f_s := 1.24cm$ ... povesi zaradi obtežbe snega

$f_w := 0.2cm$ ... povesi zaradi obtežbe vetra

$f_{inst} := f_s + f_w$ $\qquad f_{inst} = 1.44 \cdot cm$

$kontrola\left(f_{dop.inst} > f_{inst}\right) = \text{"JE izpolnjena"}$ ... kontrola povesov zaradi trenutne obtežbe

$f_{fin} := f_g + f_s + f_w = 2.63 \cdot cm$

$kontrola\left(f_{dop.tot} > f_{fin}\right) = \text{"JE izpolnjena"}$ ... kontrola povesov zaradi dolgotrajnih vplivov

3.6. Nov kovinski osrednji okvir - POZ OKV 2

3.6.1 Statični sistem

Glej PRILOGA 3!

3.6.2 Obtežba na nivoju vmesnih leg POZ VL2

STALNA: $G_z := 82.93kN$ $\qquad G_x := 2.15kN \cdot \frac{1}{e_{šp}} \cdot \frac{5(6.7m + 8.8m)}{8} = 21.92 \cdot kN$

SPREMENLJIVA - OBTEŽBA SNEGA:

$S_z := 61.55kN$ $\qquad S_x := 1.8kN \cdot \frac{1}{e_{šp}} \cdot \frac{5(6.7m + 8.8m)}{8} = 18.36 \cdot kN$

SPREMENLJIVA - OBTEŽBA VETRA:

$W_z := 7.75kN$ $\qquad W_x := 0.49kN \cdot \frac{1}{e_{šp}} \cdot \frac{5(6.7m + 8.8m)}{8} = 5 \cdot kN$

RAČUNSKA OBTEŽBA:

$$faktor_{q1} := 1.5$$

$$faktor_{q.2} := 1.5 \cdot \Psi_{0.sneg} = 0.75$$

$$faktor_{q3} := 1.5 \cdot \Psi_{0.veter} = 0.9$$

$$Q_{d1} := 1.35 \cdot G_z + faktor_{q1} \cdot S_z + faktor_{q3} \cdot W_z = 211.26 \cdot kN$$

$$Q_{d2} := 1.35 \cdot G_z + faktor_{q.2} \cdot S_z + faktor_{q1} \cdot W_z = 169.74 \cdot kN$$

$$Q_d := max\left(Q_{d1}, Q_{d2}\right) = 211.26 \cdot kN$$

3.6.3 Obtežba na nivoju vmesnih leg POZ VL1

$$ročica := 30cm$$

STALNA:

$$G_z := 54kN \qquad G_x := 0.28kN \cdot \frac{1}{e_{šp}} \cdot \frac{5(6.7m + 8.8m)}{8} = 2.86 \cdot kN$$

$$M_G := ročica \cdot G_z = 16.2 \cdot kN \cdot m$$

SPREMENLJIVA - OBTEŽBA SNEGA:

$$S_z := 37.7kN \qquad S_x := 0.23kN \cdot \frac{1}{e_{šp}} \cdot \frac{5(6.7m + 8.8m)}{8} = 2.35 \cdot kN$$

$$M_S := ročica \cdot S_z = 11.31 \cdot kN \cdot m$$

SPREMENLJIVA - OBTEŽBA VETRA:

$$W_z := 4.91kN \qquad W_x := 0.32kN \cdot \frac{1}{e_{šp}} \cdot \frac{(6.7m + 8.8m)}{2} = 2.61 \cdot kN$$

$$M_W := ročica \cdot W_z = 1.47 \cdot kN \cdot m$$

RAČUNSKA OBTEŽBA:

$$faktor_{q1} := 1.5$$

$$faktor_{q.2} := 1.5 \cdot \Psi_{0.sneg} = 0.75$$

$$faktor_{q3} := 1.5 \cdot \Psi_{0.veter} = 0.9$$

$$Q_{d1} := 1.35 \cdot G_z + faktor_{q1} \cdot S_z + faktor_{q3} \cdot W_z = 133.87 \cdot kN$$

$$Q_{d2} := 1.35 \cdot G_z + faktor_{q.2} \cdot S_z + faktor_{q1} \cdot W_z = 108.54 \cdot kN$$

$$Q_d := max(Q_{d1}, Q_{d2}) = 133.87 \cdot kN$$

3.6.4 Obremenitve in dimenzioniranje

Glej PRILOGA 4!
Okvir je grajen iz vočevaljanih profilov HEA 320!

3.6.5 Kontrola povesov in premikov

Kontrola izvedena v sklopu PRILOGE 4.

3.6.6 Dimenzionoranje kovinske zatege, ki povezuje ležišči okvirja POZ OKV2

$$N_{Ed} := 77.1kN$$

$$A_{potr} := \frac{N_{Ed}}{f_{ydS235}} = 3.77 \cdot cm^2$$

$$d_{potr} := \sqrt{\frac{4 \cdot A_{potr}}{\pi}} = 2.19 \cdot cm$$

$$d_{potr1\_2} := \sqrt{\frac{4 \cdot A_{potr}}{2\pi}} = 1.55 \cdot cm$$

Izberem dve kovinski zategi premera 16 mm, kvaliteta materiala S235 JR

3.6.6 Dimenzionoranje ležišča kovinskega okvirja POZ OKV2

$$R_z := 138.5kN + 101.4kN + 15.6kN = 255.5 \cdot kN$$

$$\sigma_{dop.opečni.zid} := 0.07kN \cdot cm^{-2}$$

$$A_{kont.potr} := \frac{R_z}{\sigma_{dop.opečni.zid}} = 3650 \cdot cm^2$$

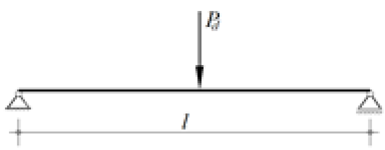
$$š_{zid} := 60cm$$

$$l_{ležišče} := \frac{A_{kont.potr}}{š_{zid}} = 60.83 \cdot cm$$

Izdelamo armiranobetonska ležišča na vrhu nosilnih zidov nadstropja v tlorisni izmeri vsaj 60/60cm.

3.7. Podporni kovinski nosilec POZ KN6 ležišča kovinskega okvirja POZ OKV2

3.7.1 Statični sistem



$l := 530cm$ ... razpon

3.7.2 Obtežbe

Akcija POZ OKV2

$G_1 := 138.5kN$

$S := 101.4kN$

$W := 15.6kN$

$P_d := 1.35 \cdot G_1 + 1.5 \cdot S + 1.5 \cdot \Psi_{0.veter} \cdot W = 353.12 \cdot kN$

Akcija POZ KN1

$G_2 := 50.29kN$

$Q := 112kN$

4.1.3 Obremenitve in dimenzioniranje

Za izračun NSK uporabim programsko opremo FRAME 2D - glej PRILOGA 4B!

$M_{Ed} := 700kN \cdot m$

$$W_{potr} := \frac{M_{Ed}}{f_{ydS235}} = 3425.53 \cdot cm^3$$

$V_{Ed} := 284.7kN$

$$A_{w.potr} := \frac{V_{Ed}}{\frac{f_{ydS235}}{\sqrt{2}}} = 19.7 \cdot cm^2$$

IZBEREMO TRI VZPOREDNO POLOŽENE KOVINSKE PROFILE HEB 260!

$$W_{potr\_1} := \frac{W_{potr}}{3} = 1141.84 \cdot cm^3$$

$W_{dej\_1} := 1150cm^3$

$kontrola\left(W_{dej\_1} > W_{potr\_1}\right) = \text{"JE izpolnjena"}$

$A_{w.dej} := 3 \cdot 26cm \cdot 1cm = 78 \cdot cm^2$

$kontrola\left(A_{w.dej} > A_{w.potr}\right) = \text{"JE izpolnjena"}$

$I_{dej} := 3 \cdot 14920cm^4 = 44760 \cdot cm^4$

$$f_{dop} := \frac{l}{300} = 1.77 \cdot cm$$

$$I_{potr} := \frac{(G_1 + G_2 + S + W + Q) \cdot l^3}{48 \cdot E_s \cdot f_{dop}} = 34927.74 \cdot cm^4$$

$$kontrola(I_{dej} > I_{potr}) = \text{"JE izpolnjena"}$$

3.8. Nov kovinski osrednji okvir - POZ OKV 1 in 3

Geometrijske dimenzije okvirja so enake, obtežbe, ki nanj delujejo pa so faktorirane z naslednjim faktorjem

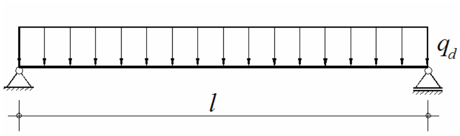
$$faktor := \frac{2m + \frac{8.8m}{2}}{\frac{6.7m}{2} + \frac{8.8m}{2}} = 0.83$$

Izberem enake dimenzije OKV 1 in 3 kot smo izbrali pri OKV2!

4.0 NOVA POHODNA POVRŠINA NA NIVOJU STROPA NAD NADSTROPJEM

4.1 Stropniki POZ STR 301 med nivojem kovinskih stropnih nosilcev - DVORANA

4.1.1 Statični sistem



$l := 325cm$ ... razpon

$e_{stropnik} := 60cm$ ... rasterski razmik nosilcev/stropnikov

4.1.2 Obtežbe

RAČUNSKA OBTEŽBA:

$$q_{d.površinska} := 1.35 \cdot g_{strop} + 1.5 \cdot q_{strop} = 10.34 \cdot kN \cdot m^{-2}$$

$$q_d := q_{d.površinska} \cdot e_{stropnik} = 6.2 \cdot kN \cdot m^{-1}$$

4.1.3 Obremenitve in dimenzioniranje

$$M_d := \frac{q_d \cdot l^2}{8} = 8.19 \cdot kN \cdot m$$

$$V_d := q_d \cdot \frac{l}{2} = 10.08 \cdot kN$$

$R_G := g_{strop} \cdot \frac{l}{2} = 3.42 \cdot kN \cdot m^{-1}$ ... reakcija stalne obtežbe na tekoči meter

$R_Q := q_{strop} \cdot \frac{l}{2} = 8.13 \cdot kN \cdot m^{-1}$ ... reakcija koristne obtežbe na tekoči meter

$W_{potr} := \frac{M_d}{f_{md}}$ $W_{potr} = 554.49 \cdot cm^3$

IZBEREM STROPNIKE b/h=8/22cm

$W_{dej} := \frac{8cm \cdot (22cm)^2}{6}$ $W_{dej} = 645.33 \cdot cm^3$

$kontrola(W_{dej} > W_{potr}) = \text{"JE izpolnjena"}$

$I_{dej} := \frac{8cm \cdot (22cm)^3}{12}$ $I_{dej} = 7098.667 \cdot cm^4$

4.1.4 Kontrola povesov

$f_{dop.inst} := \frac{l}{300}$ $f_{dop.inst} = 1.08 \cdot cm$ ... dopustni povesi zaradi spremenljive obtežbe

$f_{dop.fin} := \frac{l}{200}$ $f_{dop.fin} = 1.63 \cdot cm$ ... dopustni trajni povesi

$f_q := \frac{5 \cdot q_{strop} \cdot e_{stropnik} \cdot l^4}{384 \cdot E_{0mean} \cdot I_{dej}}$ $f_q = 0.56 \cdot cm$ ... povesi zaradi spremenljive obtežbe

$f_g := f_q \cdot \frac{g_{strop}}{q_{strop}}$ $f_g = 0.23 \cdot cm$ ... povesi zaradi stalne obtežbe

$faktor_{w1} := \Psi_{0.koristna} = 0.7$

$faktor_{w2} := 1 + k_{def} = 1.8$

$faktor_{w3} := 1 + \Psi_{2.koristna} \cdot k_{def} = 1.48$

$f_{inst} := f_g + faktor_{w1} \cdot f_q$ $f_{inst} = 0.63 \cdot cm$

$kontrola(f_{dop.inst} > f_{inst}) = \text{"JE izpolnjena"}$ ... kontrola povesov zaradi trenutne obtežbe

$f_{fin} := faktor_{w2} f_g + faktor_{w3} \cdot f_q = 1.25 \cdot cm$

$kontrola(f_{dop.fin} > f_{fin}) = \text{"JE izpolnjena"}$ ... kontrola povesov zaradi dolgotrajnih vplivov

4.1.5 Kontrola vibracij medetažne konstrukcije

Karakteristike izbrane medetažne konstrukcije v prečni smeri

$E_{0mean.precno} := 300 kN \cdot cm^{-2}$ ... povprečna vrednost elastičnega modula lesa

$b := 100cm$ ... širina prečnega prereza v prečni smeri

$h := 2.2cm$ ... višina prečnega prereza v prečni smeri

$$EI_B := E_{0mean.precno} \cdot \frac{b \cdot h^3}{12} = 26620 \cdot kN \cdot cm^2$$

... upogibna togost medetažne konstrukcije v prečni smeri

$B := 10m$ ... širina stropne konstrukcije

Karakteristike izbrane medetažne konstrukcije v vzdolžni smeri

$E_{0mean.vzdolzno} := 1100 kN \cdot cm^{-2}$ ... povprečna vrednost elastičnega modula lesa

$L := l = 3.25\, m$ ... razpon primarnega nosilca, razpon stropne konstrukcije

$b := 8cm$ ... širina prečnega prereza primarnega nosilca

$h := 22cm$ ... višina prečnega prereza primarnega nosilca

$EI_L := E_{0mean.vzdolzno} \cdot \frac{b \cdot h^3}{12} = 7808533.33 \cdot kN \cdot cm^2$ ... vzdolžna upogibna togost medetažne konstrukcije

$f_{mej\_1.razred} := 8$

$f_{mej\_2.razred} := 6$ ... mejna vrednost lastne frekvence (enota Hz=s^{-1}), skladno z EN1995-1-1

Maksimalni vertikalni pomik primarne nosilne konstrukcije zaradi delovanja vertikalne koncentrirane obtežbe F na kateremkoli mestu stropne konstrukcije z upoštevanjem raznosa obtežb

Predpostavim, da ob stalni obtežbi medetažne konstrukcije na sredin razpona deluje tudi koncentrirana obtežba vrednosti F=4.5kN (skladno s SIST EN 1991-1-1:2004)!

$$F := 4.5kN$$

$$w := \frac{F \cdot L^3}{48 \cdot EI_L} = 0.41 \cdot cm$$

Masa stropne konstrukcije s stalno obtežbo

$$masa := \frac{g_{strop} + 0.5 kN \cdot m^{-2}}{9.81 \cdot m \cdot s^{-2}} = 265.24 \cdot \frac{kg}{m^2}$$

... masa stropne konstrukcije, dodam še nekaj kg obtežbe na kvadratni meter površine - druge stalne obtežbe

Izračun prve lastne frekvence v vzdolžni smeri medetažne konstrukcije

$$f_1 := \frac{\pi}{2\cdot\left(\frac{L}{m}\right)^2}\cdot\sqrt{\frac{\frac{EI_L}{e_{stropnik}\cdot N\cdot m}}{\left(\frac{masa}{kg\cdot m^{-2}}\right)}} = 10.42$$

$$kontrola\left(f_1 > f_{mej\_1.razred}\right) = \text{"JE izpolnjena"}$$

Izračun hitrosti odziva konstrukcije na vzbujanje z enotnim impulzom 1 Ns

$$n_{40} := \left[\left[\left(\frac{40}{f_1}\right)^2 - 1\right]\cdot\left(\frac{B}{L}\right)^4\cdot\frac{EI_L}{EI_B}\right]^{\frac{1}{4}} = 24.52$$

... število prvih nihajnih oblik z lastno frekvenco do 40 Hz

$$v := \frac{4\cdot\left(0.4 + 0.6\cdot n_{40}\right)}{\frac{masa}{kg\cdot m^{-2}}\cdot\frac{B}{m}\cdot\frac{L}{m} + 200}\cdot\frac{m}{N\cdot s^2} = 0.006853\cdot\frac{m}{N\cdot s^2}$$

... hitrost odziva konstrukcije na vzbujanje z enotnim impulzom 1Ns

Kriterij uporabnosti, 1.pogoj vibracij

$$a := \frac{w}{F} = 0.92\cdot\frac{mm}{kN}$$

... koeficient a, na podlagi katerega odčitamo koeficient b

$$b := 120$$

... odčitam iz priložene tabele

Kriterij uporabnosti, 2.pogoj vibracij

$$\zeta := 0.01$$

... privzeti koeficient materialnega dušenja

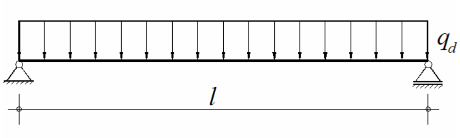
$$rezultat_{vmesni.1} := b^{\left(f_1\cdot\zeta-1\right)}\cdot\frac{m}{N\cdot s^2} = 0.0137\cdot\frac{m}{N\cdot s^2}$$

$$kontrola\left(rezultat_{vmesni.1} > v\right) = \text{"JE izpolnjena"}$$

IZBRANI STROPNIKI POZ STR 301, b/h=8/22cm, e=60cm USTREZAJO!!!

4.2 Stropniki POZ STR 302 med nivojem kovinskih stropnih nosilcev - PISARNE

4.2.1 Statični sistem



$l := 350cm$ ... razpon

$e_{stropnik} := 60cm$ ... rasterski razmik nosilcev/stropnikov

4.2.2 Obtežbe

RAČUNSKA OBTEŽBA:

$$q_{d.površinska} := 1.35 \cdot g_{strop} + 1.5 \cdot q_{strop} \cdot \frac{3kN \cdot m^{-2}}{5kN \cdot m^{-2}} = 7.34 \cdot kN \cdot m^{-2}$$

$$q_d := q_{d.površinska} \cdot e_{stropnik} = 4.4 \cdot kN \cdot m^{-1}$$

4.2.3 Obremenitve in dimenzioniranje

$$M_d := \frac{q_d \cdot l^2}{8} = 6.74 \cdot kN \cdot m$$

$$V_d := q_d \cdot \frac{l}{2} = 7.7 \cdot kN$$

$$R_G := g_{strop} \cdot \frac{l}{2} = 3.68 \cdot kN \cdot m^{-1}$$ ... reakcija stalne obtežbe na tekoči meter

$$R_Q := q_{strop} \cdot \frac{l}{2} = 8.75 \cdot kN \cdot m^{-1}$$ ... reakcija koristne obtežbe na tekoči meter

$$W_{potr} := \frac{M_d}{f_{md}} \qquad W_{potr} = 456.46 \cdot cm^3$$

IZBEREM STROPNIKE b/h=8/22cm

$$W_{dej} := \frac{8cm \cdot (22cm)^2}{6} \qquad W_{dej} = 645.33 \cdot cm^3$$

$$kontrola\left(W_{dej} > W_{potr}\right) = \text{"JE izpolnjena"}$$

$$I_{dej} := \frac{8cm \cdot (22cm)^3}{12} \qquad I_{dej} = 7098.667 \cdot cm^4$$

4.2.4 Kontrola povesov

$f_{dop.inst} := \frac{l}{300}$ $\quad f_{dop.inst} = 1.17 \cdot cm$ ... dopustni povesi zaradi spremenljive obtežbe

$f_{dop.fin} := \frac{l}{200}$ $\quad f_{dop.fin} = 1.75 \cdot cm$ ... dopustni trajni povesi

$f_q := \frac{5 \cdot q_{strop} \cdot e_{stropnik} \cdot l^4}{384 \cdot E_{0mean} \cdot I_{dej}}$ $\quad f_q = 0.75 \cdot cm$ ... povesi zaradi spremenljive obtežbe

$f_g := f_q \cdot \frac{g_{strop}}{q_{strop}}$ $\quad f_g = 0.32 \cdot cm$ ... povesi zaradi stalne obtežbe

$faktor_{w1} := \Psi_{0.koristna} = 0.7$

$faktor_{w2} := 1 + k_{def} = 1.8$

$faktor_{w3} := 1 + \Psi_{2.koristna} \cdot k_{def} = 1.48$

$f_{inst} := f_g + faktor_{w1} \cdot f_q$ $\quad f_{inst} = 0.84 \cdot cm$

$kontrola(f_{dop.inst} > f_{inst}) =$ "JE izpolnjena" ... kontrola povesov zaradi trenutne obtežbe

$f_{fin} := faktor_{w2} f_g + faktor_{w3} \cdot f_q = 1.68 \cdot cm$

$kontrola(f_{dop.fin} > f_{fin}) =$ "JE izpolnjena" ... kontrola povesov zaradi dolgotrajnih vplivov

4.2.5 Kontrola vibracij medetažne konstrukcije

Karakteristike izbrane medetažne konstrukcije v prečni smeri

$E_{0mean.precno} := 300 kN \cdot cm^{-2}$ ... povprečna vrednost elastičnega modula lesa

$b := 100 cm$ ... širina prečnega prereza v prečni smeri

$h := 2.2 cm$ ... višina prečnega prereza v prečni smeri

$EI_B := E_{0mean.precno} \cdot \frac{b \cdot h^3}{12} = 26620 \cdot kN \cdot cm^2$

... upogibna togost medetažne konstrukcije v prečni smeri

$B := 10 m$ ... širina stropne konstrukcije

Karakteristike izbrane medetažne konstrukcije v vzdolžni smeri

$E_{0mean.vzdolzno} := 1100 kN \cdot cm^{-2}$ ... povprečna vrednost elastičnega modula lesa

$L := l = 3.5\,m$ ... razpon primarnega nosilca, razpon stropne konstrukcije

$b := 8cm$ ... širina prečnega prereza primarnega nosilca

$h := 22cm$ ... višina prečnega prereza primarnega nosilca

$EI_L := E_{0mean.vzdolzno} \cdot \frac{b \cdot h^3}{12} = \blacksquare \cdot kN \cdot cm^2$ ... vzdolžna upogibna togost medetažne konstrukcije

$f_{mej\_1.razred} := 8$

$f_{mej\_2.razred} := 6$

... mejna vrednost lastne frekvence (enota Hz=s^{-1}), skladno z EN1995-1-1

Makslimalni vertikalni pomik primarne nosilne konstrukcije zaradi delovanja vertikalne koncentrirane obtežbe F na kateremkoli mestu stropne konstrukcije z upoštevanjem raznosa obtežb

Predpostavim, da ob stalni obtežbi medetažne konstrukcije na sredin razpona deluje tudi koncentrirana obtežba vrednosti F=4.5kN (skladno s SIST EN 1991-1-1:2004)!

$F := 4.5kN$

$$w := \frac{F \cdot L^3}{48 \cdot EI_L} = 0.51 \cdot cm$$

Masa stropne konstrukcije s stalno obtežbo

$$masa := \frac{g_{strop} + 0.5 kN \cdot m^{-2}}{9.81 \cdot m \cdot s^{-2}} = 265.24 \cdot \frac{kg}{m^2}$$

... masa stropne konstrukcije, dodam še nekaj kg obtežbe na kvadratni meter površine - druge stalne obtežbe

Izračun prve lastne frekvence v vzdolžni smeri medetažne konstrukcije

$$f_1 := \frac{\pi}{2 \cdot \left(\frac{L}{m}\right)^2} \cdot \sqrt{\frac{\frac{EI_L}{e_{stropnik} \cdot N \cdot m}}{\left(\frac{masa}{kg \cdot m^{-2}}\right)}} = 8.98$$

$kontrola\left(f_1 > f_{mej\_1.razred}\right) = \text{"JE izpolnjena"}$

Izračun hitrosti odziva konstrukcije na vzbujanje z enotnim impulzom 1 Ns

$$n_{40} := \left[\left[\left(\frac{40}{f_1}\right)^2 - 1\right] \cdot \left(\frac{B}{L}\right)^4 \cdot \frac{EI_L}{EI_B}\right]^{\frac{1}{4}} = 24.63$$

... število prvih nihajnih oblik z lastno frekvenco do 40 Hz

$$v := \frac{4\cdot\left(0.4 + 0.6\cdot n_{40}\right)}{\frac{masa}{kg\cdot m^{-2}}\cdot\frac{B}{m}\cdot\frac{L}{m} + 200}\cdot\frac{m}{N\cdot s^{2}} = 0.006402\cdot\frac{m}{N\cdot s^{2}}$$

... hitrost odziva konstrukcije na vzbujanje z enotnim impulzom 1Ns

Kriterij uporabnosti, 1.pogoj vibracij

$$a := \frac{w}{F} = 1.14\cdot\frac{mm}{kN}$$

... koeficient a, na podlagi katerega odčitamo koeficient b

$$b := 110$$

... odčitam iz priložene tabele

Kriterij uporabnosti, 2.pogoj vibracij

$$\zeta := 0.01$$

... privzeti koeficient materialnega dušenja

$$rezultat_{vmesni.1} := b^{\left(f_1\cdot\zeta-1\right)}\cdot\frac{m}{N\cdot s^{2}} = 0.0139\cdot\frac{m}{N\cdot s^{2}}$$

$$kontrola\left(rezultat_{vmesni.1} > v\right) = \text{"JE izpolnjena"}$$

IZBRANI STROPNIKI POZ STR 302, b/h=8/22cm, e=60cm USTREZAJO!!!

4.3. Obstoječi/prenovljen vzdolžni kovinski nosilec POZ KN1

4.3.1 Statični sistem

Glej PRILOGA 5!

4.3.2 Zvezna obtežba

STALNA:

$$g_{nosilec} := g_{strop}\cdot\left(\frac{2.8m}{2} + \frac{2.95m}{2}\right) = 6.04\cdot kN\cdot m^{-1}$$

SPREMENLJIVA - KORISTNA OBTEŽBA:

$$q_{nosilec.dvorana} := q_{strop}\cdot\left(\frac{2.8m}{2} + \frac{2.95m}{2}\right) = 14.38\cdot kN\cdot m^{-1}$$

$$q_{nosilec.pisarne} := q_{strop}\cdot\left(\frac{2.8m}{2} + \frac{2.95m}{2}\right)\cdot\frac{3kN\cdot m^{-2}}{5\,kN\cdot m^{-2}} = 8.63\cdot kN\cdot m^{-1}$$

4.3.3 Koncentrirane obtežbe

STALNA:

$$g_{lega} := 4.4kN\cdot\frac{1}{e_{šp}} + 22cm\cdot 26cm\cdot 6kN\cdot m^{-3} = 4.97\cdot kN\cdot m^{-1}$$

SPREMENLJIVA - OBTEŽBA SNEGA:

$$s_{lega} := 3.65kN\cdot\frac{1}{e_{šp}} = 3.84\cdot kN\cdot m^{-1}$$

SPREMENLJIVA - OBTEŽBA VETRA:

$$w_{lega} := 0.45kN \cdot \frac{1}{e_{šp}} = 0.47 \cdot kN \cdot m^{-1}$$

4.3.4 Obremenitve in dimenzioniranje

Glej PRILOGA 5!

Ojačamo prvo in zadnje polje kontinuirnega nosilca in sicer z bočnim dodajanjem ojačitve - dodatni profil HEA 260, ojačitev sega še 1m v sosednje notranje polje!

4.3.5 Kontrola povesov

$$l_{max} := 7.95m$$

$$f_{dop.inst} := \frac{l_{max}}{300} \qquad f_{dop.inst} = 2.65 \cdot cm$$

... dopustni povesi zaradi spremenljive obtežbe

$$f_{dop.tot} := \frac{l_{max}}{250} \qquad f_{dop.tot} = 3.18 \cdot cm$$

... dopustni skupni povesi

$$f_g := 0.87cm$$

$$f_q := 0.54cm$$

... povesi izvrednoteni z računalniškim programom

$$f_s := 0.25cm$$

$$f_w := 0.03cm$$

$$f_{inst} := f_q + f_s + f_w = 0.82 \cdot cm$$

$$kontrola\left(f_{inst} < f_{dop.inst}\right) = \text{"JE izpolnjena"}$$

$$f_{tot} := f_g + f_q + f_s + f_w = 1.69 \cdot cm$$

$$kontrola\left(f_{tot} < f_{dop.tot}\right) = \text{"JE izpolnjena"}$$

4.4. Obstoječi/prenovljen vzdolžni kovinski nosilec POZ KN2

4.4.1 Statični sistem

Glej PRILOGA 6!

4.4.2 Zvezna obtežba

STALNA:

$$g_{nosilec} := g_{strop} \cdot \left(\frac{2.9m}{2} + \frac{3.25m}{2}\right) = 6.46 \cdot kN \cdot m^{-1}$$

SPREMENLJIVA - KORISTNA OBTEŽBA:

$$q_{nosilec.dvorana} := q_{strop} \cdot \left(\frac{2.9m}{2} + \frac{3.25m}{2} \right) = 15.38 \cdot kN \cdot m^{-1}$$

$$q_{nosilec.pisarne} := q_{strop} \cdot \left(\frac{2.9m}{2} + \frac{3.25m}{2} \right) \cdot \frac{3kN \cdot m^{-2}}{5\, kN \cdot m^{-2}} = 9.22 \cdot kN \cdot m^{-1}$$

4.4.3 Koncentrirane obtežbe

STALNA:

$$g_{lega} := 7.34kN \cdot \frac{1}{e_{šp}} + 22cm \cdot 26cm \cdot 6kN \cdot m^{-3} = 8.07 \cdot kN \cdot m^{-1}$$

SPREMENLJIVA - OBTEŽBA SNEGA:

$$s_{lega} := 6.05kN \cdot \frac{1}{e_{šp}} = 6.37 \cdot kN \cdot m^{-1}$$

SPREMENLJIVA - OBTEŽBA VETRA:

$$w_{lega} := 0.53kN \cdot \frac{1}{e_{šp}} = 0.56 \cdot kN \cdot m^{-1}$$

4.4.4 Obremenitve in dimenzioniranje

Glej PRILOGA 6!

Ojačamo prvo in zadnje polje kontinuirnega nosilca in sicer z bočnim dodajanjem ojačitve - dodatni profil HEA 260, ojačitev sega še 1m v sosednje notranje polje!

4.4.5 Kontrola povesov

$$l_{max} := 8.05m$$

$$f_{dop.inst} := \frac{l_{max}}{300} \qquad f_{dop.inst} = 2.68 \cdot cm$$ ... dopustni povesi zaradi spremenljive obtežbe

$$f_{dop.tot} := \frac{l_{max}}{250} \qquad f_{dop.tot} = 3.22 \cdot cm$$ ... dopustni skupni povesi

$$f_g := 1.16cm$$

$$f_q := 0.72cm$$ ... povesi izvrednoteni z računalniškim programom

$$f_s := 0.45cm$$

$$f_w := 0.04cm$$

$$f_{inst} := f_q + f_s + f_w = 1.21 \cdot cm$$

$kontrola(f_{inst} < f_{dop.inst}) = \text{"JE izpolnjena"}$

$f_{tot} := f_g + f_q + f_s + f_w = 2.37 \cdot cm$

$kontrola(f_{tot} < f_{dop.tot}) = \text{"JE izpolnjena"}$

4.5. Nov/dodaten vzdolžni kovinski nosilec POZ KN3

4.5.1 Statični sistem

Glej PRILOGA 7!

4.5.2 Zvezna obtežba

STALNA: $g_{nosilec} := g_{strop} \cdot \left(\frac{3.25m}{2} + \frac{2.8m}{2}\right) = 6.36 \cdot kN \cdot m^{-1}$

SPREMENLJIVA - KORISTNA OBTEŽBA:

$$q_{nosilec.dvorana} := q_{strop} \cdot \left(\frac{3.25m}{2} + \frac{2.8m}{2}\right) = 15.13 \cdot kN \cdot m^{-1}$$

$$q_{nosilec.pisarne} := q_{strop} \cdot \left(\frac{3.25m}{2} + \frac{2.8m}{2}\right) \cdot \frac{3kN \cdot m^{-2}}{5\,kN \cdot m^{-2}} = 9.07 \cdot kN \cdot m^{-1}$$

4.5.3 Obremenitve in dimenzioniranje

Glej PRILOGA 7!

Izberem nov kovinski nosilec HEA 260!

4.5.4 Kontrola povesov

$l_{max} := 7.6m$

$f_{dop.inst} := \frac{l_{max}}{300}$ $\quad f_{dop.inst} = 2.53 \cdot cm$ ... dopustni povesi zaradi spremenljive obtežbe

$f_{dop.tot} := \frac{l_{max}}{250}$ $\quad f_{dop.tot} = 3.04 \cdot cm$ ... dopustni skupni povesi

$f_g := 0.45cm$ ... povesi izvrednoteni z računalniškim programom

$f_q := 0.57cm$

$f_{inst} := f_q = 0.57 \cdot cm$

$kontrola(f_{inst} < f_{dop.inst}) = \text{"JE izpolnjena"}$

$f_{tot} := f_g + f_q = 1.02 \cdot cm$

$kontrola\left(f_{tot} < f_{dop.tot}\right) = \text{"JE izpolnjena"}$

4.6. Obstoječi/prenovljen vzdolžni kovinski nosilec POZ KN4

4.6.1 Statični sistem

Glej PRILOGA 8!

4.6.2 Zvezna obtežba

STALNA: $g_{nosilec} := g_{strop} \cdot \left(\frac{2.8m}{2} + \frac{2.9m}{2}\right) = 5.99 \cdot kN \cdot m^{-1}$

SPREMENLJIVA - KORISTNA OBTEŽBA:

$$q_{nosilec.dvorana} := q_{strop} \cdot \left(\frac{2.8m}{2} + \frac{2.9m}{2}\right) = 14.25 \cdot kN \cdot m^{-1}$$

$$q_{nosilec.pisarne} := q_{strop} \cdot \left(\frac{2.8m}{2} + \frac{2.9m}{2}\right) \cdot \frac{3kN \cdot m^{-2}}{5\,kN \cdot m^{-2}} = 8.55 \cdot kN \cdot m^{-1}$$

4.6.3 Koncentrirane obtežbe

STALNA:

$$g_{lega} := 7.34kN \cdot \frac{1}{e_{šp}} + 22cm \cdot 26cm \cdot 6kN \cdot m^{-3} = 8.07 \cdot kN \cdot m^{-1}$$

SPREMENLJIVA - OBTEŽBA SNEGA:

$$s_{lega} := 6.05kN \cdot \frac{1}{e_{šp}} = 6.37 \cdot kN \cdot m^{-1}$$

SPREMENLJIVA - OBTEŽBA VETRA:

$$w_{lega} := 0.53kN \cdot \frac{1}{e_{šp}} = 0.56 \cdot kN \cdot m^{-1}$$

4.6.4 Obremenitve in dimenzioniranje

Glej PRILOGA 8!

Ojačamo prvo in zadnje polje kontinuirnega nosilca in sicer z bočnim dodajanjem ojačitve - dodatni profil HEA 260, ojačitev sega še 1m v sosednje notranje polje!

4.6.5 Kontrola povesov

$l_{max} := 8.20m$

$f_{dop.inst} := \frac{l_{max}}{300}$ $\qquad f_{dop.inst} = 2.73 \cdot cm$ $\qquad$ ... dopustni povesi zaradi spremenljive obtežbe

$$f_{dop.tot} := \frac{l_{max}}{250} \qquad f_{dop.tot} = 3.28 \cdot cm$$ ... dopustni skupni povesi

$$f_g := 1.0cm$$

$$f_q := 0.74cm$$ ... povesi izvrednoteni z računalniškim programom

$$f_s := 0.3cm$$

$$f_w := 0.04cm$$

$$f_{inst} := f_q + f_s + f_w = 1.08 \cdot cm$$

$$kontrola\left(f_{inst} < f_{dop.inst}\right) = \text{"JE izpolnjena"}$$

$$f_{tot} := f_g + f_q + f_s + f_w = 2.08 \cdot cm$$

$$kontrola\left(f_{tot} < f_{dop.tot}\right) = \text{"JE izpolnjena"}$$

4.7. Obstoječi/prenovljen vzdolžni kovinski nosilec POZ KN5

4.7.1 Statični sistem

Glej PRILOGA 9!

4.7.2 Zvezna obtežba

STALNA:

$$g_{nosilec} := g_{strop} \cdot \left(\frac{2.8m}{2} + \frac{2.95m}{2}\right) = 6.04 \cdot kN \cdot m^{-1}$$

SPREMENLJIVA - KORISTNA OBTEŽBA:

$$q_{nosilec.dvorana} := q_{strop} \cdot \left(\frac{2.8m}{2} + \frac{2.95m}{2}\right) = 14.38 \cdot kN \cdot m^{-1}$$

$$q_{nosilec.pisarne} := q_{strop} \cdot \left(\frac{2.8m}{2} + \frac{2.95m}{2}\right) \cdot \frac{3kN \cdot m^{-2}}{5\,kN \cdot m^{-2}} = 8.63 \cdot kN \cdot m^{-1}$$

4.7.3 Koncentrirane obtežbe

STALNA:

$$g_{lega} := 4.4kN \cdot \frac{1}{e_{šp}} + 22cm \cdot 26cm \cdot 6kN \cdot m^{-3} = 4.97 \cdot kN \cdot m^{-1}$$

SPREMENLJIVA - OBTEŽBA SNEGA:

$$s_{lega} := 3.65kN \cdot \frac{1}{e_{šp}} = 3.84 \cdot kN \cdot m^{-1}$$

SPREMENLJIVA - OBTEŽBA VETRA:

$$w_{lega} := 0.45kN \cdot \frac{1}{e_{šp}} = 0.47 \cdot kN \cdot m^{-1}$$

4.7.4 Obremenitve in dimenzioniranje

Glej PRILOGA 9!

Ojačamo prvo in zadnje polje kontinuirnega nosilca in sicer z bočnim dodajanjem ojačitve - dodatni profil HEA 260, ojačitev sega še 1m v sosednje notranje polje! Prav tako izvedemo enake ojačitve tudi nad notranjimi podporami in sicer 1m v levo in desno polje.

4.7.5 Kontrola povesov

$l_{max} := 8.75m$

$f_{dop.inst} := \frac{l_{max}}{300}$ $\quad f_{dop.inst} = 2.92 \cdot cm$ ... dopustni povesi zaradi spremenljive obtežbe

$f_{dop.tot} := \frac{l_{max}}{250}$ $\quad f_{dop.tot} = 3.5 \cdot cm$ ... dopustni skupni povesi

$f_g := 1.1cm$

$f_q := 1.1cm$ ... povesi izvrednoteni z računalniškim programom

$f_s := 0.325cm$

$f_w := 0.04cm$

$$f_{inst} := f_q + f_s + f_w = 1.47 \cdot cm$$

$$kontrola(f_{inst} < f_{dop.inst}) = \text{"JE izpolnjena"}$$

$$f_{tot} := f_g + f_q + f_s + f_w = 2.57 \cdot cm$$

$$kontrola(f_{tot} < f_{dop.tot}) = \text{"JE izpolnjena"}$$

4.8. Lesena palična konstrukcija pododerja POZ PAL1

4.9.1 Statični sistem

Glej PRILOGA 9A!

4.9.2 Zvezna obtežba

STALNA: $$g_{nosilec} := g_{strop} \cdot \left(\frac{2.6m}{2} + \frac{3.2m}{2}\right) = 6.1 \cdot kN \cdot m^{-1}$$

SPREMENLJIVA - KORISTNA OBTEŽBA:

$$q_{nosilec} := q_{strop} \cdot \left(\frac{2.6m}{2} + \frac{3.2m}{2} \right) = 14.5 \cdot kN \cdot m^{-1}$$

4.9.3 Obremenitve in dimenzioniranje

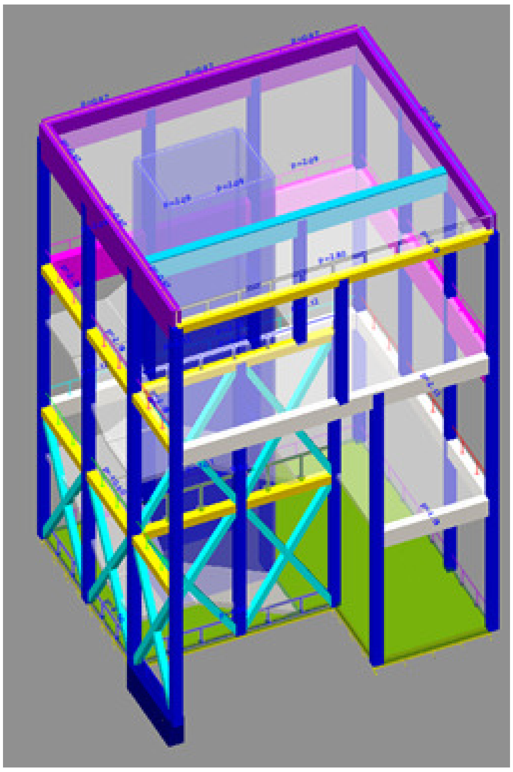
Glej PRILOGA 9A!

Izberemo leseno paličje, ki se "položi" nad vzdolžne kovinske nosilce POZ KN2, POZ KN3, POZ KN4.
Zgornji pas paličja b/h=18/22cm,
Spodnji pas, vertikale ter diagonale b/h=14/14cm.

5.0 NOV STOPNIŠČNI PRIZIDEK

Statično ter linearno dinamično analizo novega stopniščnega dela z dvigalnim jaškom skladno s sistemom standardov Evrokod smo izvedli s pomočjo računalniškega programa Tower 3D Model Builder 7.0

5.1 Računski model



5.2 Obtežbe

5.2.1 Vertikalne obtežbe

5.2.1.1 Lastna teža konstrukcije ter teža vgrajenih naprav

Uporabljena programska oprema avtomatično upošteva lastno težo vgrajenih elementov

5.2.1.2 Stalna obtežba streh

Sikaplan tesnilna folija: $g_1 := 0.1kN \cdot m^{-2}$

Geotekstil: $g_2 := 0.03kN \cdot m^{-2}$

Polistiren: $g_3 := 20cm \cdot 1kN \cdot m^{-3}$

Parna zapora: $g_4 := 0.03kN \cdot m^{-2}$

Teža morebiti vgrajenih klimatov: $g_6 := 0.5kN \cdot m^{-2}$

$$g_{tot} := g_1 + g_2 + g_3 + g_4 + g_5 + g_6$$

$$g_{tot} = 1.1 \cdot kN \cdot m^{-2}$$

5.2.1.2/B Stalna obtežba ravnih streh - lesene podkonstrukcija

Sikaplan tesnilna folija: $g_1 := 0.1kN \cdot m^{-2}$

Geotekstil: $g_2 := 0.03kN \cdot m^{-2}$

Polistiren: $g_3 := 20cm \cdot 1kN \cdot m^{-3}$

Parna zapora: $g_4 := 0.03kN \cdot m^{-2}$

Teža morebiti vgrajenih klimatov: $g_6 := 0.5kN \cdot m^{-2}$

Lesena konstrukcija: $g_7 := 12cm \cdot 20cm \cdot 6kN \cdot m^{-3} \cdot \frac{1}{0.5m}$

spuščen strop: $g_8 := 0.1kN \cdot m^{-2}$

$$g_{tot} := g_1 + g_2 + g_3 + g_4 + g_5 + g_6 + g_7 + g_8$$

$$g_{tot} = 1.49 \cdot kN \cdot m^{-2}$$

5.2.1.3 Stalna obtežba medetažnih konstrukcij

finalni pohodnih sloj - kamen: $g_1 := 2cm \cdot 25kN \cdot m^{-3}$

Estrih: $g_2 := 6cm \cdot 22kN \cdot m^{-3}$

TI: $g_3 := 5cm \cdot 1kN \cdot m^{-3}$

spuščen strop: $g_4 := 0.1kN \cdot m^{-2}$

$$g_{tot} := g_1 + g_2 + g_3 + g_4$$

$$g_{tot} = 1.97 \cdot kN \cdot m^{-2}$$

5.2.1.4 Stalna obtežba stopnišč

finalni pohodnih sloj - kamen: $g_1 := 2cm \cdot 25kN \cdot m^{-3}$

stopnice: $g_2 := 30cm \cdot 17cm \cdot \frac{1}{2} \cdot \frac{1m}{30cm} \cdot 25kN \cdot m^{-3} \cdot \frac{1}{1m} = 2.13 \cdot kN \cdot m^{-2}$

$$g_{tot} := g_1 + g_2$$

$$g_{tot} = 2.63 \cdot kN \cdot m^{-2}$$

5.2.1.5 Obtežba snega

$$q_{sneg} := q_{sneg.šp} = 1.3 \cdot kN \cdot m^{-2}$$

5.2.1.6 Servisna obtežba

V primeru servisiranja dvigala se le ta "obesi" na stropno ploščo. To obtežbo upoštevamo kot koncentrirano silo ki gravitacijsko prijemlje na sredini stropne plošče

$$Q_{servisna} := 30kN$$

5.2.1.7 Koristna obtežba medetažnih konstrukcij skladno z Evrokod 1

javni prostori, stopnišča (kategorija C5) $q := 5kN \cdot m^{-2}$

strehe (kategorija H) $q := 0.75kN \cdot m^{-2}$

5.2.1.8 Obtežba fasade

$$g_{fasada} := 0.5kN \cdot m^{-2}$$

5.2.2 Horizontalna - seizmična obtežba

MASE ZA DOLOČITEV POTRESNEGA VPLIVA

Za določitev potresnega vpliva upoštevamo težnostne sile (mase) z naslednjo kombinacijo stalne in koristne obtežbe:

$$\sum G_{kj} \quad "+" \quad \sum \psi_{Ei} \cdot Q_{ki} \,,$$

kjer je:

G_{kj} - karakteristična vrednost stalnega vpliva *j*,

Q_{ki} - karakteristična vrednost spremenljivega vpliva *i*,

Ψ_{Ei} - kombinacijski koeficient spremenljivega vpliva *i*.

Koeficienti Ψ_{Ei} upoštevajo verjetnost, da koristna obtežba Q_{ki} med potresom ni prisotna po celi konstrukciji in jih izračunamo z izrazom:

$$\psi_{Ei} = \varphi \cdot \psi_{2i} \,.$$

Pri tem je Ψ_{2i} kombinacijski faktor za različne tipe obtežb:

objekti, kjer se zbirajo ljudje (kategorija C) Ψ_{2i} = 0.6,

strehe (kategorija H) Ψ_{2i} = 0,

sneg Ψ_{2i} = 0.

Faktor φ je odvisen od tipa spremenljive obtežbe, od lege etaže in od tega ali so etaže zasedene neodvisno ena od druge. V našem primeru predpostavimo, da so etaže zasedene neodvisno, tako ima faktor φ naslednje vrednosti:

za kategorijo C, za vrhnjo etažo: φ = 1.0,

za kategorijo C, za ostale etaže: φ = 0.5,

SPEKTER ODZIVA

Projektni pospešek temeljnih tal določimo iz karte potresne nevarnosti Slovenije (Lapajne, 2001) za povratno dobo 475 let. Za okolico Prevalj je po tej karti predviden pospešek 0.125 g. Pri določitvi potresnega spektra upoštevamo vpliv temeljnih tal (kategorija tal C, Poročilo o pregledu temeljnih tal in izvedbi geomehanskih raziskav, ZAG Ljubljana) in naslednje parametre, ki so povzeti po EuroCode 8:

α = 0.100 - s pospeškom prostega pada g normiran projektni pospešek temeljnih tal a_g,

S = 1.15 - parameter tal (kategorija C),

T_B = 0.2 - mejna vrednost nihajnega časa, pri kateri se začne omejeno območje s konstantno vrednostjo spektralnega pospeška (kategorija C),

T_C = 0.60 - mejna vrednost nihajnega časa, pri kateri se konča omejeno območje s konstantno vrednostjo spektralnega pospeška (kategorija C),

T_D = 2.00 - vrednost nihajnega časa, pri kateri se začne območje konstantne vrednosti spektralnega pomika (kategorija C),

Predpostavko, da konstrukcija lahko prenaša obtežbo tudi v nelinearnem območju, zajamemo s faktorjem obnašanja konstrukcije q, s katerim reduciramo elastični spekter in dobimo projektni spekter:

$$q = q_0 \cdot k_D \cdot k_R \cdot k_W \geq 1.5,$$

kjer je:

q_0 -osnovna vrednost faktorja obnašanja, ki je odvisen od tipa konstrukcije (3.5 – sistem z jedrom),

k_D -faktor, ki upošteva razred duktilnosti (0.75 – DCM),

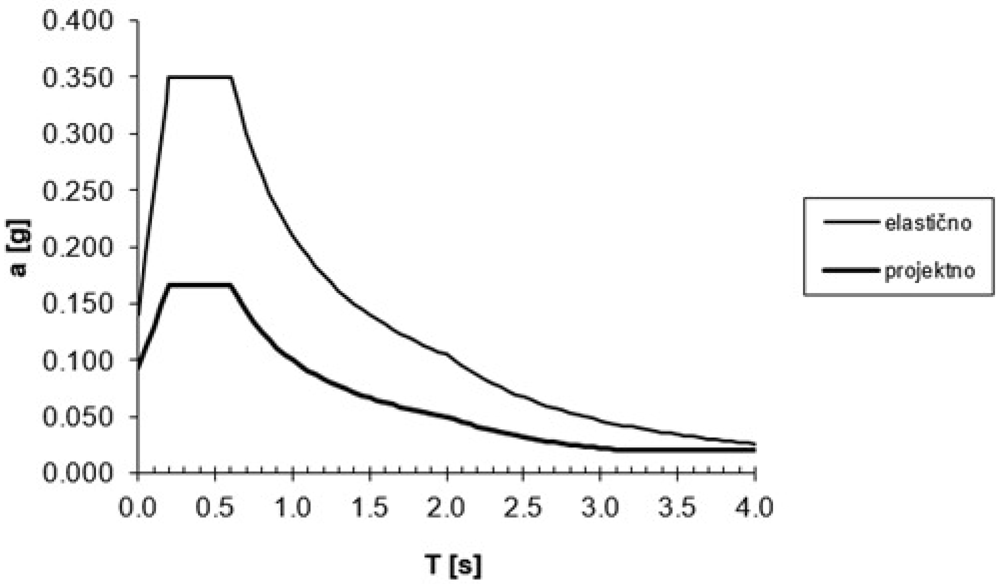
k_R -faktor, ki upošteva regularnost konstrukcije po višini (0.8 – regularnost po višini, delno neregularne konstrukcije),

k_W -faktor, ki upošteva vrsto porušnega mehanizma (1.0).

$$q = 3.5 \cdot 0.75 \cdot 0.8 \cdot 1.0 = 2.1$$

Poleg navedenega upoštevamo tudi faktor pomembnosti

$\gamma_I := 1.2$ ... stavbe, katerih potresna odpornost je pomembna glede na posledice porušitve, npr. šole, dvorane za srečanja, kulturne ustanove in podobno



5.2.3 Računska obtežba skladno s SIST EN 1990

5.2.3.1 Varnostni faktorji za obtežbo

EQU	*stalna in začasna projektna stanja*		
	neugodna	$\gamma_{G,sup}$	1'10
	ugodna	$\gamma_{G,inf}$	0'90
	spremenljivi vplivi		
	neugodna	γ_Q	1'50
	ugodna	γ_Q	0'00
STR	*stalna in začasna projektna stanja*		
	neugodna	$\gamma_{G,sup}$	1'35
	ugodna	$\gamma_{G,inf}$	1'00
	spremenljivi vplivi		
	neugodna	γ_Q	1'50
	ugodna	γ_Q	0'00
GEO	*stalna in začasna projektna stanja*		
	neugodna	$\gamma_{G,sup}$	1'00
	ugodna	$\gamma_{G,inf}$	1'00
	spremenljivi vplivi		
	neugodna	γ_Q	1'30
	ugodna	γ_Q	0'00

5.2.3.2 Kombinacijski faktorji za stavbe

vpliv	ψ_0	ψ_1	ψ_2
kategorija A: bivalni prostori	0'70	0'50	0'30
kategorija B: pisarne	0'70	0'50	0'30
kategorija C: stavbe, kjer se zbirajo ljudje	0'70	0'70	0'60
kategorija D: trgovine	0'70	0'70	0'60
kategorija E: skladišča	1'00	0'90	0'80
kategorija F: prometne površine (teža vozila do 30 kN)	0'70	0'70	0'60
kategorija G: prometne površine (teža vozila med 30 kN in 160 kN)	0'70	0'50	0'30
kategorija H: strehe	0'00	0'00	0'00
sneg (nadmorska višina nad 1000 m)	0'70	0'50	0'20
sneg (nadmorska višina pod 1000 m)	0'50	0'20	0'00
veter	0'60	0'20	0'00
temperarurne spremembe (ne pri požaru)	0'60	0'50	0'00

5.2.3.1 MSN - mejna stanja nosilnosti

Stalna in začasna projektna stanja:

$$\sum_{j\geq 1} \gamma_{G,j} G_{k,j} + \gamma_P P + \gamma_{Q,1} Q_{k,1} + \sum_{i>1} \gamma_{Q,i} \psi_{0,i} Q_{k,i}$$

Nezgodna projektna stanja:

$$\sum_{j\geq 1} G_{k,j} + P + A_d + (\psi_{1,1} \text{ ali } \psi_{2,1}) Q_{k,1} + \sum_{i>1} \gamma_{Q,i} \psi_{2,i} Q_{k,i}$$

Potresna projektna stanja:

$$\sum_{j\geq 1} G_{k,j} + P + A_{Ed} + \sum_{i\geq 1} \psi_{2,i} Q_{k,i}$$

Za določitev maksimalnih učinkov vplivov preverimo več obtežnih kombinacij. Za določitev notranjih sil preverimo kombinacijo stalne in koristne obtežbe ter kombinacijo stalne, koristne in projektne reducirane potresne obtežbe

kombinacija 1 = 1.35*G + 1.5*$Q_{koristna}$ + 1.5*0.5*Q_{sneg} + 1.5*0.7*$Q_{servisna}$

kombinacija 2 = 1.00*G + 0.6*$Q_{koristna}$ + 0.6*$Q_{servisna}$ + 1.0*γ_I*$A_{reducirano}$

Za kontrolo etažnih pomikov pri potresni obtežbi potrebno preverimo kombinacijo stalne, koristne obtežbe z elastično (nereducirano) potresno obtežbo:

kombinacija 3 = 1.0*G + 0.6*$Q_{koristna}$ + 0.6*$Q_{servisna}$ + 1.0*γ_I*$A_{elastično}$

5.3 Izračun OSNIH TOGOSTI nadomestnih tlačno/nateznih diagonal opečnega zidovja

$G_w := 30kN \cdot cm^{-2}$ ... strižni modul zidovja (modularni opečni blok MO15, MM5)

$E_w := 500kN \cdot cm^{-2}$ ... elastični modul zidovja (modularni opečni blok MO15, MM5)

5.3.1 Diagonala 1

$h_w := 3.5m$ ... višina zidu

$l_w := 2.6m$ ... povprečna dolžina zidu

$d_w := 25cm$ ... debelina zidu

$A_w := l_w \cdot d_w = 6500 \cdot cm^2$ ... horizontalna površina zidu

$d_w := \sqrt{h_w^2 + l_w^2} = 4.36\,m$ ... dolžina diagonale zidu

$K_{el.h} := \frac{G_w \cdot A_w}{h_w} = 55714.29 \cdot kN \cdot m^{-1}$ ... horizontalna togost nadomestne diagonale

$\Theta := atan\left(\frac{h_w}{l_w}\right) = 0.93$ ... naklon diagonale v radianih

$K_{el.d} := \frac{K_{el.h}}{(cos(\Theta))^2} = 156675.82 \cdot kN \cdot m^{-1}$ ... osna togost nadomestne diagonale

$A_{diagonala} := \frac{K_{el.d} \cdot d_w}{E_w} \cdot 0.5 \cdot 0.5 = 0.03\,m^2$ ... prečni prerez nadomestne diagonale
(faktor 0.5 - vpliv prečne diagonale
faktor 0.5 - vpliv razpokanosti)

$a_{diagonala} := \sqrt{A_{diagonala}} = 0.18\,m$ ... stranica kvadratne nadomestne diagonale

5.4 ANALIZA REZULTATOV - kontrola premikov konstrukcije

Pri analizi pomikov konstrukcije upoštevam razpokane prereze stebrov in sicer s faktorjem 0.5 reduciramo strižne prereze ter upogibne ter torzijske vztrajnostne momente prečnih prerezov stebrov!

5.4.1 RELATIVNI PREMIKI PO ETAŽAH

$\gamma := 2.1$ ... privzeti redukcijski faktor objekta

$$U_{3\_2} := \sqrt{(3.36cm)^2 + (4.81cm)^2} - \sqrt{(2.32cm)^2 + (3.43cm)^2} = 1.73 \cdot cm$$

$$h_{et} := 3.90m$$

$$kontrola\left(U_{3\_2} < \gamma \cdot 0.004 \cdot h_{et}\right) = \text{"JE izpolnjena"}$$

$$U_{2\_1} := \sqrt{(2.32cm)^2 + (3.43cm)^2} - \sqrt{(1.11cm)^2 + (1.64cm)^2} = 2.16 \cdot cm$$

$$h_{et} := 4.45m$$

$$kontrola\left(U_{2\_1} < \gamma \cdot 0.004 \cdot h_{et}\right) = \text{"JE izpolnjena"}$$

$$U_{1\_0} := \sqrt{(1.11cm)^2 + (1.64cm)^2} = 1.98 \cdot cm$$

$$h_{et} := 4.00m$$

$$kontrola\left(U_{1\_0} < \gamma \cdot 0.004 \cdot h_{et}\right) = \text{"JE izpolnjena"}$$

5.4.2 MAKSIMALNI HORIZONTLANI POMIKI VRHA NOVEGA DVIGALNEGA JAŠKA V PRIMERU POTRESNE OBTEŽBE

$U_x := 3.144cm$ ... potres v smeri X - dejanski pomiki
$U_y := 0.946cm$

$U_x := 0.954cm$ ... potres v smeri Y - dejanski pomiki
$U_y := 4.209cm$

5.4.2.1.Rezultirajoči horizontalni pomik

$$U_{rez} := \sqrt{U_x^{\,2} + U_y^{\,2}} = 4.316 \cdot cm$$

5.4.2.2. Dopustni horizontalni pomik

$$U_{dop} := \frac{12.5m}{500} = 2.5 \cdot cm$$

$$kontrola\left(U_{dop} > U_{rez}\right) = \text{"NI izpolnjena"}$$

$$faktor_{prekoračitev} := \frac{U_{rez}}{U_{dop}} = 1.73$$ ... še dopustna prekoračitev

Takšne horizontalne pomike registriramo le v najbolj kritični točki konstrukcije! Takšne premike konstrukcije v primeru delovanja seizmične obtežbe dovolim, saj so relativni premiki v dopustnih mejah! Uporabim pa dilatacijo primerne širine!

5.5. DILATIRANJE NOVE KONSTRUKCIJE OD OSNOVNEGA OBJEKTA

Za pravilno izbiro širine dilatacije bi potrebovali tudi izvrednotene pomike v primeru seizmične obtežbe za osnovni objekt. Menimo, da **dilatacija izbrane 5 cm zadošča**.

5.6. ANALIZA REZULTATOV - DIMENZIONIRANJE ELEMENTOV KONSTRUKCIJE

5.6.1 Stropne, medetažne konstrukcije ter stopnišča

POZ 301P,
POZ 201aP, POZ 201bP, POZ 206P, POZ 207P, POZ 208P, POZ 209P, POZ 210P,
POZ 101P, POZ 106P, POZ 107P, POZ 108P, POZ 109P, POZ 210P,
POZ 001P,

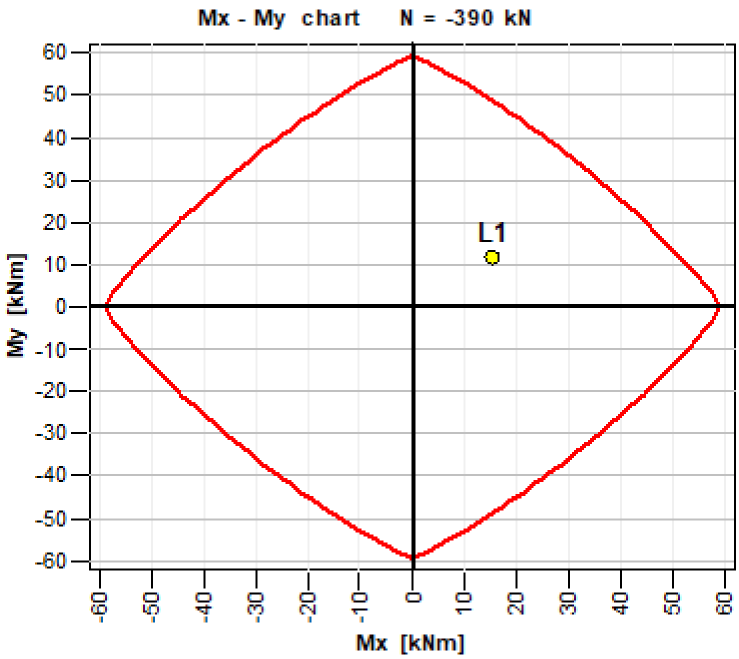
Glej PRILOGO 10!

5.6.2 Stebri, vertikalne AB vezi

POZ 111P, POZ 211P, POZ 311P

5.6.2.1 Dimenzioniranje - upogibne obremenitve

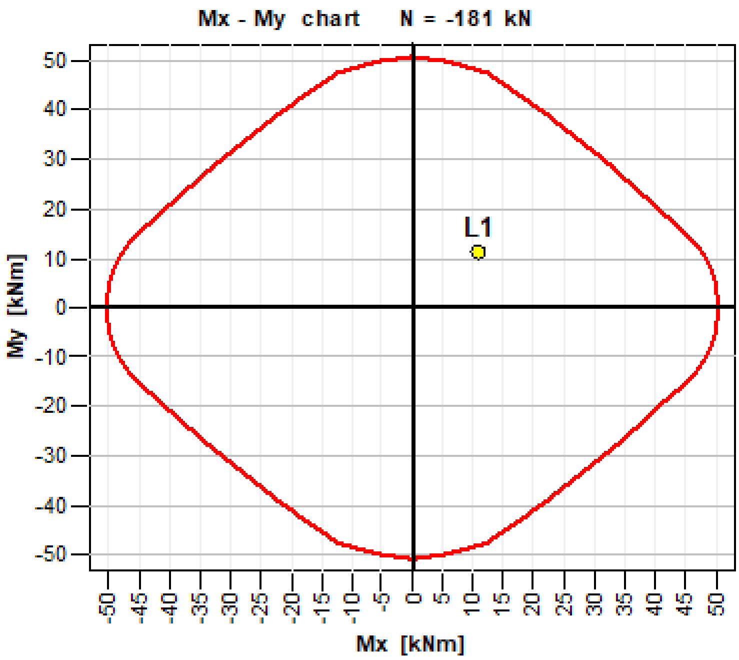
interakcijski diagram pri: N_{min} $M_{y.max}$ $M_{z.max}$



$N_{min} := -389kN$

$M_{y.max} := 15.42kN\cdot m$

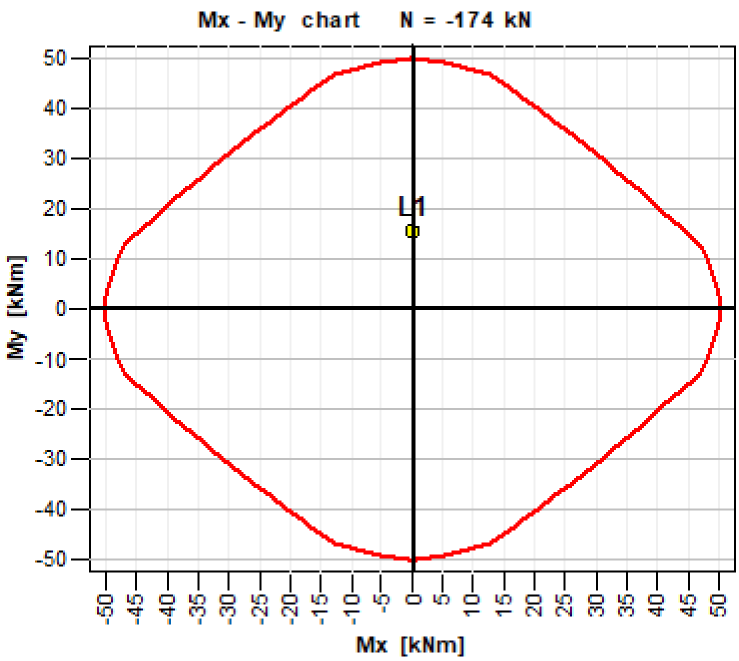
$M_{z.max} := 11.5kN\cdot m$



$N_{min} := -181kN$

$M_{y.max} := 10.9kN \cdot m$

$M_{z.max} := 11.3kN \cdot m$



$N_{min} := -174kN$

$M_{y.max} := 0kN \cdot m$

$M_{z.max} := 15.42kN \cdot m$

Vgradimo štiri vzdolžne palice ϕ16mm - v vsak vogal kvadratnega prečnega prereza b/=25/25cm, po eno palico.

5.6.2.2 Dimenzioniranje - strižne obremenitve

$V_{y.max} := 25.5kN$

$V_{z.max} := 16.85kN$

$b := 25cm$

$a := 3cm$ ... dimenzije in zaščitni sloj prečnega prereza

$d := 25cm - 3cm = 22 \cdot cm$

$V_{sd} := \sqrt{V_{y.max}^2 + V_{z.max}^2} = 30.56 \cdot kN$ ... maksimalna prečna sila

$N_{sd} := 0kN$ ... ugodni vpliv tlačne osne sile zanemarimo

$A_{s.l} := 2A_{\phi}(1.6) \cdot cm^2$

$C_{Rd.c} := \frac{0.18}{\gamma_{m.c}} = 0.12$ $k := \min\left(1 + \sqrt{\frac{200mm}{d}}, 2.0\right) = 1.95$ $k_1 := 0.15$

$\rho_l := min\left(\frac{A_{s.l}}{b \cdot d}, 0.02\right) = 0.007$ $\sigma_{cp} := min\left(\frac{-N_{sd}}{b \cdot h}, 0.2 \cdot f_{cd.C25}\right) = 0 \cdot MPa$ (sigma + ali -)

$v_{min} := 0.035 \cdot k^{1.5} \cdot \left(\frac{f_{ck.C25}}{MPa}\right)^{0.5} = 0.48$

$V_{Rd.c.min} := \left(v_{min} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right) \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 26.28 \cdot kN$

$V_{Rd.c.1} := \left[C_{Rd.c} \cdot k \cdot \sqrt[3]{\left(100 \cdot \rho_l \cdot \frac{f_{ck.C25}}{MPa}\right)} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right] \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 33.96 \cdot kN$

$V_{Rd.c} := max(V_{Rd.c.min}, V_{Rd.c.1}) = 33.96 \cdot kN$

$\boxed{kontrola(V_{sd} \le V_{Rd.c}) = \text{"JE izpolnjena"}}$ $V_{sd} \div V_{Rd.c} = 0.9$

Potrebna je minimalna strižna armatura!

Minimalna stemenska armatura

$A_{sw.min} := 0.08 \cdot \left(\frac{MPa}{f_{yk}}\right) \cdot \sqrt{\left(\frac{f_{ck.C25}}{MPa}\right)} \cdot b = 2 \cdot \frac{cm^2}{m}$

$n := 2$

$A_{sw.min.n} := \frac{A_{sw.min}}{n}$ $A_{sw.min.n} = 1 \cdot \frac{cm^2}{m}$

Maksimalna razdalja med stremeni

$s_{max} := 0.75 \cdot d = 16.5 \cdot cm$

Izberem stremena ϕ10/15cm!

$A_{sw.dej} := A_{\phi}(1) \cdot \frac{cm^2}{0.15m}$ $A_{sw.dej} = 5.24 \cdot \frac{cm^2}{m}$

$\boxed{kontrola(A_{sw.min.n} \le A_{sw.dej}) = \text{"JE izpolnjena"}}$

5.6.3 AB horizontalni nosilci POZ 302P, POZ 303P, POZ 304P

$M_{y.max} := 53.34kN \cdot m$

$M_{y.min} := -55.16kN \cdot m$ ... največje obremenitve prečnih prerezov

$V_{z.max} := 43.22kN$

$b := 25cm$

$h := 100cm$ ... dimenzije prečnih prerezov

$a := 3cm$

$d := h - a = 97 \cdot cm$

5.6.3.1 Dimenzioniranje - upogibne obremenitve

Računsko potreba upogibna armatura

$$k_d := \frac{max\left(\left|M_{y.min}\right|, M_{y.max}\right)}{b \cdot d^2 \cdot f_{cd.C25}} \qquad k_d = 0.0141$$

$k_s := 1.033$ ... Rogač, Saje, Lozej, Priročnik za dimenzioniranje AB konstrukcij

$$A_{s.potr} := k_s \cdot \frac{max\left(\left|M_{y.min}\right|, M_{y.max}\right)}{d \cdot f_{yd}} \qquad A_{s.potr} = 1.35 \cdot cm^2$$

Izberem armaturne palice 2ϕ14 zgoraj in spodaj, ob straneh, na dveh nivojih konstruktivno 2 ϕ 10

$A_{s.dej} := 2A_{\phi}(1.4) \cdot cm^2 \qquad A_{s.dej} = 3.08 \cdot cm^2$

$kontrola\left(A_{s.dej} > A_{s.potr}\right) =$ "JE izpolnjena"

5.6.3.2 Dimenzioniranje - strižne obremenitve

$V_{sd} := V_{z.max} = 43.22 \cdot kN$ ... maksimalna prečna sila

$N_{sd} := 0kN$ ... ugodni vpliv tlačne osne sile zanemarimo

$A_{s.l} := 2A_{\phi}(1.4) \cdot cm^2$

$$C_{Rd.c} := \frac{0.18}{\gamma_{m.c}} = 0.12 \qquad k := \min\left(1 + \sqrt{\frac{200mm}{d}}, 2.0\right) = 1.45 \qquad k_1 := 0.15$$

$$\rho_l := min\left(\frac{A_{s.l}}{b \cdot d}, 0.02\right) = 0.001 \qquad \sigma_{cp} := min\left(\frac{-N_{sd}}{b \cdot h}, 0.2 \cdot f_{cd.C25}\right) = 0 \cdot MPa$$ (sigma + ali -)

$$v_{min} := 0.035 \cdot k^{1.5} \cdot \left(\frac{f_{ck.C25}}{MPa}\right)^{0.5} = 0.31$$

$$V_{Rd.c.min} := \left(v_{min} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right) \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 74.41 \cdot kN$$

$$V_{Rd.c.1} := \left[C_{Rd.c} \cdot k \cdot \sqrt[3]{\left(100 \cdot \rho_l \cdot \frac{f_{ck.C25}}{MPa}\right)} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right] \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 62.18 \cdot kN$$

$$V_{Rd.c} := max\left(V_{Rd.c.min}, V_{Rd.c.1}\right) = 74.41 \cdot kN$$

$\boxed{kontrola\left(V_{sd} \le V_{Rd.c}\right) = \text{"JE izpolnjena"}}$ $V_{sd} \div V_{Rd.c} = 0.58$

Potrebna je minimalna strižna armatura!

Minimalna stemenska armatura

$$A_{sw.min} := 0.08 \cdot \left(\frac{MPa}{f_{yk}}\right) \cdot \sqrt{\left(\frac{f_{ck.C25}}{MPa}\right)} \cdot b = 2 \cdot \frac{cm^2}{m}$$

$$n := 2$$

$$A_{sw.min.n} := \frac{A_{sw.min}}{n} \qquad A_{sw.min.n} = 1 \cdot \frac{cm^2}{m}$$

Maksimalna razdalja med stremeni

$$s_{max} := 0.75 \cdot d = 72.75 \cdot cm$$

Izberem stremena ϕ10/25cm!

$$A_{sw.dej} := A_{\phi}(1) \cdot \frac{cm^2}{0.25m} \qquad A_{sw.dej} = 3.14 \cdot \frac{cm^2}{m}$$

$\boxed{kontrola\left(A_{sw.min.n} \le A_{sw.dej}\right) = \text{"JE izpolnjena"}}$

5.6.4 AB horizontalni nosilec POZ 305aP

$M_{y.max} := 50.58 kN \cdot m$

$M_{y.min} := -38.01 kN \cdot m$ ... največje obremenitve prečnih prerezov

$V_{z.max} := 30.53 kN$

$b := 25cm$

$h := 60cm$ ... dimenzije prečnih prerezov

$a := 3cm$

$d := h - a = 57 \cdot cm$

5.6.4.1 Dimenzioniranje - upogibne obremenitve

Računsko potreba upogibna armatura

$$k_d := \frac{max(|M_{y.min}|, M_{y.max})}{b \cdot d^2 \cdot f_{cd.C25}} \qquad k_d = 0.0374$$

$k_s := 1.033$ ... Rogač, Saje, Lozej, Priročnik za dimenzioniranje AB konstrukcij

$$A_{s.potr} := k_s \cdot \frac{max(|M_{y.min}|, M_{y.ma}}{d \cdot f_{yd}} \qquad A_{s.potr} = 2.11 \cdot cm^2$$

Izberem armaturne palice 2ϕ14 zgoraj in spodaj, ob straneh, na dveh nivojih konstruktivno 2 ϕ 10

$$A_{s.dej} := 2 A_{\phi}(1.4) \cdot cm^2 \qquad A_{s.dej} = 3.08 \cdot cm^2$$

$$kontrola(A_{s.dej} > A_{s.potr}) = \text{"JE izpolnjena"}$$

5.6.4.2 Dimenzioniranje - strižne obremenitve

$V_{sd} := V_{z.max} = 30.53 \cdot kN$ ... maksimalna prečna sila

$N_{sd} := 0kN$ ... ugodni vpliv tlačne osne sile zanemarimo

$$A_{s.l} := 2 A_{\phi}(1.4) \cdot cm^2$$

$$C_{Rd.c} := \frac{0.18}{\gamma_{m.c}} = 0.12 \qquad k := \min\left(1 + \sqrt{\frac{200mm}{d}}, 2.0\right) = 1.59 \qquad k_1 := 0.15$$

$$\rho_l := min\left(\frac{A_{s.l}}{b \cdot d}, 0.02\right) = 0.002 \qquad \sigma_{cp} := min\left(\frac{-N_{sd}}{b \cdot h}, 0.2 \cdot f_{cd.C25}\right) = 0 \cdot MPa$$

(sigma + ali -)

$$v_{min} := 0.035 \cdot k^{1.5} \cdot \left(\frac{f_{ck.C25}}{MPa}\right)^{0.5} = 0.35$$

$$V_{Rd.c.min} := \left(v_{min} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right) \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 50.11 \cdot kN$$

$$V_{Rd.c.1} := \left[C_{Rd.c} \cdot k \cdot \sqrt[3]{\left(100 \cdot \rho_l \cdot \frac{f_{ck.C25}}{MPa}\right)} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right] \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 47.78 \cdot kN$$

$$V_{Rd.c} := max(V_{Rd.c.min}, V_{Rd.c.1}) = 50.11 \cdot kN$$

$$\boxed{kontrola(V_{sd} \le V_{Rd.c}) = \text{"JE izpolnjena"}} \qquad V_{sd} \div V_{Rd.c} = 0.61$$

Minimalna stemenska armatura

$$A_{sw.min} := 0.08 \cdot \left(\frac{MPa}{f_{yk}}\right) \cdot \sqrt{\left(\frac{f_{ck.C25}}{MPa}\right)} \cdot b = 2 \cdot \frac{cm^2}{m}$$

$$n := 2$$

$$A_{sw.min.n} := \frac{A_{sw.min}}{n} \qquad A_{sw.min.n} = 1 \cdot \frac{cm^2}{m}$$

Maksimalna razdalja med stremeni

$$s_{max} := 0.75 \cdot d = 42.75 \cdot cm$$

Izberem stremena ϕ10/25cm!

$$A_{sw.dej} := A_{\phi}(1) \cdot \frac{cm^2}{0.25m} \qquad A_{sw.dej} = 3.14 \cdot \frac{cm^2}{m}$$

$$\boxed{kontrola(A_{sw.min.n} \leq A_{sw.dej}) = \text{"JE izpolnjena"}}$$

5.6.5 AB horizontalni nosilec POZ 305bP

$$M_{y.max} := 10.54kN \cdot m$$

$$M_{y.min} := -14.20kN \cdot m$$

... največje obremenitve prečnih prerezov

$$V_{z.max} := 23.1kN$$

$$b := 25cm$$

$$h := 25cm$$

... dimenzije prečnih prerezov

$$a := 3cm$$

$$d := h - a = 22 \cdot cm$$

5.6.5.1 Dimenzioniranje - upogibne obremenitve

Računsko potreba upogibna armatura

$$k_d := \frac{max(|M_{y.min}|, M_{y.max})}{b \cdot d^2 \cdot f_{cd.C25}} \qquad k_d = 0.0704$$

$$k_s := 1.049$$

... Rogač, Saje, Lozej, Priročnik za dimenzioniranje AB konstrukcij

$$A_{s.potr} := k_s \cdot \frac{max(|M_{y.min}|, M_{y.max})}{d \cdot f_{yd}} \qquad A_{s.potr} = 1.56 \cdot cm^2$$

Izberem armaturne palice 2ϕ14 zgoraj in spodaj.

$$A_{s.dej} := 2A_{\phi}(1.4) \cdot cm^2 \qquad A_{s.dej} = 3.08 \cdot cm^2$$

$$kontrola(A_{s.dej} > A_{s.potr}) = \text{"JE izpolnjena"}$$

5.6.5.2 Dimenzioniranje - strižne obremenitve

$V_{sd} := V_{z.max} = 23.1 \cdot kN$ ... maksimalna prečna sila

$N_{sd} := 0kN$ ... ugodni vpliv tlačne osne sile zanemarimo

$A_{s.l} := 2A_{\phi}(1.4) \cdot cm^2$

$C_{Rd.c} := \dfrac{0.18}{\gamma_{m.c}} = 0.12$ $k := \min\left(1 + \sqrt{\dfrac{200mm}{d}}, 2.0\right) = 1.95$

$\rho_l := min\left(\dfrac{A_{s.l}}{b \cdot d}, 0.02\right) = 0.006$ $\sigma_{cp} := min\left(\dfrac{-N_{sd}}{b \cdot h}, 0.2 \cdot f_{cd.C25}\right) = 0 \cdot MPa$ (sigma + ali -)

$$v_{min} := 0.035 \cdot k^{1.5} \cdot \left(\frac{f_{ck.C25}}{MPa}\right)^{0.5} = 0.48$$

$$V_{Rd.c.min} := \left(v_{min} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right) \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 26.28 \cdot kN$$

$$V_{Rd.c.1} := \left[C_{Rd.c} \cdot k \cdot \sqrt[3]{\left(100 \cdot \rho_l \cdot \frac{f_{ck.C25}}{MPa}\right)} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right] \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 31.07 \cdot kN$$

$$V_{Rd.c} := max\left(V_{Rd.c.min}, V_{Rd.c.1}\right) = 31.07 \cdot kN$$

$\boxed{kontrola\left(V_{sd} \le V_{Rd.c}\right) = \text{"JE izpolnjena"}}$ $V_{sd} \div V_{Rd.c} = 0.74$

Minimalna stemenska armatura

$$A_{sw.min} := 0.08 \cdot \left(\frac{MPa}{f_{yk}}\right) \cdot \sqrt{\left(\frac{f_{ck.C25}}{MPa}\right)} \cdot b = 2 \cdot \frac{cm^2}{m}$$

$n := 2$

$A_{sw.min.n} := \dfrac{A_{sw.min}}{n}$ $A_{sw.min.n} = 1 \cdot \dfrac{cm^2}{m}$

Maksimalna razdalja med stremeni

$s_{max} := 0.75 \cdot d = 16.5 \cdot cm$

Izberem stremena ϕ10/15cm!

$A_{sw.dej} := A_{\phi}(1) \cdot \dfrac{cm^2}{0.15m}$ $A_{sw.dej} = 5.24 \cdot \dfrac{cm^2}{m}$

$\boxed{kontrola\left(A_{sw.min.n} \le A_{sw.dej}\right) = \text{"JE izpolnjena"}}$

5.6.6 AB horizontalni nosilec POZ 202P

$M_{y.max} := 6.04kN \cdot m$

$M_{y.min} := 0kN \cdot m$ ... največje obremenitve prečnih prerezov

$V_{z.max} := 14.7kN$

$b := 25cm$

$h := 25cm$ ... dimenzije prečnih prerezov

$a := 3cm$

$d := h - a = 22 \cdot cm$

5.6.6.1 Dimenzioniranje - upogibne obremenitve

Računsko potreba upogibna armatura

$$k_d := \frac{max(|M_{y.min}|, M_{y.max})}{b \cdot d^2 \cdot f_{cd.C25}} \qquad k_d = 0.03$$

$k_s := 1.033$ ... Rogač, Saje, Lozej, Priročnik za dimenzioniranje AB konstrukcij

$$A_{s.potr} := k_s \cdot \frac{max(|M_{y.min}|, M_{y.max})}{d \cdot f_{yd}} \qquad A_{s.potr} = 0.65 \cdot cm^2$$

Izberem armaturne palice 2ϕ14 zgoraj in spodaj.

$A_{s.dej} := 2A_{\phi}(1.4) \cdot cm^2 \qquad A_{s.dej} = 3.08 \cdot cm^2$

$kontrola(A_{s.dej} > A_{s.potr}) =$ "JE izpolnjena"

5.6.6.2 Dimenzioniranje - strižne obremenitve

$V_{sd} := V_{z.max} = 14.7 \cdot kN$ ... maksimalna prečna sila

$N_{sd} := 0kN$ ... ugodni vpliv tlačne osne sile zanemarimo

$A_{s.l} := 2A_{\phi}(1.4) \cdot cm^2$

$$C_{Rd.c} := \frac{0.18}{\gamma_{m.c}} = 0.12 \qquad k := \min\left(1 + \sqrt{\frac{200mm}{d}}, 2.0\right) = 1.95$$

$$\rho_l := min\left(\frac{A_{s.l}}{b \cdot d}, 0.02\right) = 0.006 \qquad \sigma_{cp} := min\left(\frac{-N_{sd}}{b \cdot h}, 0.2 \cdot f_{cd.C25}\right) = 0 \cdot MPa$$ (sigma + ali -)

$$v_{min} := 0.035 \cdot k^{1.5} \cdot \left(\frac{f_{ck.C25}}{MPa}\right)^{0.5} = 0.48$$

$$V_{Rd.c.min} := \left(v_{min} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right) \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 26.28 \cdot kN$$

$$V_{Rd.c.1} := \left[C_{Rd.c} \cdot k \cdot \sqrt[3]{\left(100 \cdot \rho_l \cdot \frac{f_{ck.C25}}{MPa}\right)} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right] \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 31.07 \cdot kN$$

$$V_{Rd.c} := max\left(V_{Rd.c.min}, V_{Rd.c.1}\right) = 31.07 \cdot kN$$

$$\boxed{kontrola\left(V_{sd} \le V_{Rd.c}\right) = \text{"JE izpolnjena"}} \qquad V_{sd} \div V_{Rd.c} = 0.47$$

Minimalna stemenska armatura

$$A_{sw.min} := 0.08 \cdot \left(\frac{MPa}{f_{yk}}\right) \cdot \sqrt{\left(\frac{f_{ck.C25}}{MPa}\right)} \cdot b = 2 \cdot \frac{cm^2}{m}$$

$$n := 2$$

$$A_{sw.min.n} := \frac{A_{sw.min}}{n} \qquad A_{sw.min.n} = 1 \cdot \frac{cm^2}{m}$$

Maksimalna razdalja med stremeni

$$s_{max} := 0.75 \cdot d = 16.5 \cdot cm$$

Izberem stremena ϕ10/15cm!

$$A_{sw.dej} := A_{\phi}(1) \cdot \frac{cm^2}{0.15m} \qquad A_{sw.dej} = 5.24 \cdot \frac{cm^2}{m}$$

$$\boxed{kontrola\left(A_{sw.min.n} \le A_{sw.dej}\right) = \text{"JE izpolnjena"}}$$

5.6.7 AB horizontalni nosilci POZ 203P, POZ 204P

$$M_{y.max} := 123.56 kN \cdot m$$

$$M_{y.min} := -149.07 kN \cdot m$$

... največje obremenitve prečnih prerezov

$$V_{z.max} := 86.94 kN$$

$$b := 25cm$$

$$h := 105cm$$

... dimenzije prečnih prerezov

$$a := 3cm$$

$$d := h - a = 102 \cdot cm$$

5.6.7.1 Dimenzioniranje - upogibne obremenitve

Računsko potreba upogibna armatura

$$k_d := \frac{max\left(\left|M_{y.min}\right|, M_{y.max}\right)}{b \cdot d^2 \cdot f_{cd.C25}} \qquad k_d = 0.0344$$

$k_s := 1.033$ ... Rogač, Saje, Lozej, Priročnik za dimenzioniranje AB konstrukcij

$$A_{s.potr} := k_s \cdot \frac{M_{y.max}}{d \cdot f_{yd}} \qquad A_{s.potr} = 2.88 \cdot cm^2$$

Izberem armaturne palice 3ϕ14 zgoraj in spodaj, ob straneh, na dveh nivojih konstruktivno 2 ϕ 10

$$A_{s.dej} := 3 A_{\phi}(1.4) \cdot cm^2 \qquad A_{s.dej} = 4.62 \cdot cm^2$$

$$kontrola\left(A_{s.dej} > A_{s.potr}\right) = \text{"JE izpolnjena"}$$

5.6.7.2 Dimenzioniranje - strižne obremenitve

$V_{sd} := V_{z.max} = 86.94 \cdot kN$ ... maksimalna prečna sila

$N_{sd} := 0kN$ ... ugodni vpliv tlačne osne sile zanemarimo

$$A_{s.l} := 3 A_{\phi}(1.4) \cdot cm^2$$

$$C_{Rd.c} := \frac{0.18}{\gamma_{m.c}} = 0.12 \qquad k := \min\left(1 + \sqrt{\frac{200mm}{d}}, 2.0\right) = 1.44 \qquad k_1 := 0.15$$

$$\rho_l := min\left(\frac{A_{s.l}}{b \cdot d}, 0.02\right) = 0.002 \qquad \sigma_{cp} := min\left(\frac{-N_{sd}}{b \cdot h}, 0.2 \cdot f_{cd.C25}\right) = 0 \cdot MPa$$

(sigma + ali -)

$$v_{min} := 0.035 \cdot k^{1.5} \cdot \left(\frac{f_{ck.C25}}{MPa}\right)^{0.5} = 0.3$$

$$V_{Rd.c.min} := \left(v_{min} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right) \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 77.34 \cdot kN$$

$$V_{Rd.c.1} := \left[C_{Rd.c} \cdot k \cdot \sqrt[3]{\left(100 \cdot \rho_l \cdot \frac{f_{ck.C25}}{MPa}\right)} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right] \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 73.04 \cdot kN$$

$$V_{Rd.c} := max\left(V_{Rd.c.min}, V_{Rd.c.1}\right) = 77.34 \cdot kN$$

$$\boxed{kontrola\left(V_{sd} \le V_{Rd.c}\right) = \text{"NI izpolnjena"}} \qquad V_{sd} \div V_{Rd.c} = 1.12$$

Potrebna je strižna armatura!

$$A_{sw} := \frac{V_{sd}}{0.9 \cdot d \cdot f_{yd}} \qquad A_{sw} = 2.18 \cdot \frac{cm^2}{m}$$

$n := 2$

$$A_{sw.n} := \frac{A_{sw}}{n} \qquad A_{sw.n} = 1.09 \cdot \frac{cm^2}{m}$$

Minimalna stemenska armatura

$$A_{sw.min} := 0.08 \cdot \left(\frac{MPa}{f_{yk}}\right) \cdot \sqrt{\left(\frac{f_{ck.C25}}{MPa}\right)} \cdot b = 2 \cdot \frac{cm^2}{m}$$

$n := 2$

$$A_{sw.min.n} := \frac{A_{sw.min}}{n} \qquad A_{sw.min.n} = 1 \cdot \frac{cm^2}{m}$$

Maksimalna razdalja med stremeni

$$s_{max} := 0.75 \cdot d = 76.5 \cdot cm$$

Izberem stremena ϕ10/25cm!

$$A_{sw.dej} := A_{\phi}(1) \cdot \frac{cm^2}{0.25m} \qquad A_{sw.dej} = 3.14 \cdot \frac{cm^2}{m}$$

$$\boxed{kontrola\left(A_{sw.min.n} \le A_{sw.dej}\right) = \text{"JE izpolnjena"}}$$

5.6.8 AB horizontalni nosilci POZ 205P

$M_{y.max} := 61.1 kN \cdot m$

$M_{y.min} := -32.14 kN \cdot m$ ... največje obremenitve prečnih prerezov

$V_{z.max} := 88.34 kN$

$b := 25cm$

$h := 50cm$ ... dimenzije prečnih prerezov

$a := 3cm$

$d := h - a = 47 \cdot cm$

5.6.8.1 Dimenzioniranje - upogibne obremenitv

Računsko potreba upogibna armatura

$$k_d := \frac{max\left(\left|M_{y.min}\right|, M_{y.max}\right)}{b \cdot d^2 \cdot f_{cd.C25}} \qquad k_d = 0.0664$$

$k_s := 1.049$ ... Rogač, Saje, Lozej, Priročnik za dimenzioniranje AB konstrukcij

$$A_{s.potr} := k_s \cdot \frac{M_{y.max}}{d \cdot f_{yd}} \qquad A_{s.potr} = 3.14 \cdot cm^2$$

Izberem armaturne palice 3ϕ14 zgoraj in spodaj, ob straneh, na dveh nivojih konstruktivno 2 ϕ 10

$A_{s.dej} := 3A_{\phi}(1.4)\cdot cm^2$ $\qquad A_{s.dej} = 4.62\cdot cm^2$

$kontrola(A_{s.dej} > A_{s.potr}) = \text{"JE izpolnjena"}$

5.6.8.2 Dimenzioniranje - strižne obremenitve

$V_{sd} := V_{z.max} = 88.34\cdot kN$ ... maksimalna prečna sila

$N_{sd} := 0kN$ ... ugodni vpliv tlačne osne sile zanemarimo

$A_{s.l} := 3A_{\phi}(1.4)\cdot cm^2$

$C_{Rd.c} := \dfrac{0.18}{\gamma_{m.c}} = 0.12$ $\qquad k := \min\left(1 + \sqrt{\dfrac{200mm}{d}}, 2.0\right) = 1.65$ $\qquad k_1 := 0.15$

$\rho_l := min\left(\dfrac{A_{s.l}}{b\cdot d}, 0.02\right) = 0.004$ $\qquad \sigma_{cp} := min\left(\dfrac{-N_{sd}}{b\cdot h}, 0.2\cdot f_{cd.C25}\right) = 0\cdot MPa$ (sigma + ali -)

$$v_{min} := 0.035\cdot k^{1.5}\cdot\left(\frac{f_{ck.C25}}{MPa}\right)^{0.5} = 0.37$$

$$V_{Rd.c.min} := \left(v_{min} + k_1\cdot\frac{\sigma_{cp}}{MPa}\right)\cdot\frac{b}{mm}\cdot\frac{d}{mm}\cdot N = 43.67\cdot kN$$

$$V_{Rd.c.1} := \left[C_{Rd.c}\cdot k\cdot\sqrt[3]{\left(100\cdot\rho_l\cdot\frac{f_{ck.C25}}{MPa}\right)} + k_1\cdot\frac{\sigma_{cp}}{MPa}\right]\cdot\frac{b}{mm}\cdot\frac{d}{mm}\cdot N = 49.9\cdot kN$$

$$V_{Rd.c} := max(V_{Rd.c.min}, V_{Rd.c.1}) = 49.9\cdot kN$$

$\boxed{kontrola(V_{sd} \le V_{Rd.c}) = \text{"NI izpolnjena"}}$ $\qquad V_{sd} \div V_{Rd.c} = 1.77$

Potrebna je strižna armatura!

$A_{sw} := \dfrac{V_{sd}}{0.9\cdot d\cdot f_{yd}}$ $\qquad A_{sw} = 4.8\cdot\dfrac{cm^2}{m}$

$n := 2$

$A_{sw.n} := \dfrac{A_{sw}}{n}$ $\qquad A_{sw.n} = 2.4\cdot\dfrac{cm^2}{m}$

Minimalna stemenska armatura

$$A_{sw.min} := 0.08\cdot\left(\frac{MPa}{f_{yk}}\right)\cdot\sqrt{\left(\frac{f_{ck.C25}}{MPa}\right)}\cdot b = 2\cdot\frac{cm^2}{m}$$

$n := 2$

$$A_{sw.min.n} := \frac{A_{sw.min}}{n} \qquad A_{sw.min.n} = 1 \cdot \frac{cm^2}{m}$$

Maksimalna razdalja med stremeni

$$s_{max} := 0.75 \cdot d = 35.25 \cdot cm$$

Izberem stremena ϕ10/25cm!

$$A_{sw.dej} := A_{\phi}(1) \cdot \frac{cm^2}{0.25m} \qquad A_{sw.dej} = 3.14 \cdot \frac{cm^2}{m}$$

$$\boxed{kontrola\left(A_{sw.min.n} \le A_{sw.dej}\right) = \text{"JE izpolnjena"}}$$

5.6.9 AB horizontalni nosilci POZ 103P, POZ 104P, POZ 105P

$$M_{y.max} := 59.45 kN \cdot m$$

$$M_{y.min} := -78.13 kN \cdot m$$

... največje obremenitve prečnih prerezov

$$V_{z.max} := 72.5 kN$$

$$b := 25cm$$

$$h := 50cm$$

... dimenzije prečnih prerezov

$$a := 3cm$$

$$d := h - a = 47 \cdot cm$$

5.6.9.1 Dimenzioniranje - upogibne obremenitv

Računsko potreba upogibna armatura

$$k_d := \frac{max\left(\left|M_{y.min}\right|, M_{y.max}\right)}{b \cdot d^2 \cdot f_{cd.C25}} \qquad k_d = 0.0849$$

$k_s := 1.06$ ... Rogač, Saje, Lozej, Priročnik za dimenzioniranje AB konstrukcij

$$A_{s.potr} := k_s \cdot \frac{\left|M_{y.min}\right|}{d \cdot f_{yd}} \qquad A_{s.potr} = 4.05 \cdot cm^2$$

Izberem armaturne palice 3ϕ14 zgoraj in spodaj, ob straneh, na dveh nivojih konstruktivno 2 ϕ 10

$$A_{s.dej} := 3 A_{\phi}(1.4) \cdot cm^2 \qquad A_{s.dej} = 4.62 \cdot cm^2$$

$$kontrola\left(A_{s.dej} > A_{s.potr}\right) = \text{"JE izpolnjena"}$$

5.6.9.2 Dimenzioniranje - strižne obremenitve

$V_{sd} := V_{z.max} = 72.5 \cdot kN$ ... maksimalna prečna sila

$N_{sd} := 0kN$ ... ugodni vpliv tlačne osne sile zanemarimo

$A_{s.l} := 3A_{\phi}(1.4) \cdot cm^2$

$C_{Rd.c} := \frac{0.18}{\gamma_{m.c}} = 0.12$ $k := \min\left(1 + \sqrt{\frac{200mm}{d}}, 2.0\right) = 1.65$ $k_1 := 0.15$

$\rho_l := min\left(\frac{A_{s.l}}{b \cdot d}, 0.02\right) = 0.004$ $\sigma_{cp} := min\left(\frac{-N_{sd}}{b \cdot h}, 0.2 \cdot f_{cd.C25}\right) = 0 \cdot MPa$ (sigma + ali -)

$v_{min} := 0.035 \cdot k^{1.5} \cdot \left(\frac{f_{ck.C25}}{MPa}\right)^{0.5} = 0.37$

$V_{Rd.c.min} := \left(v_{min} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right) \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 43.67 \cdot kN$

$V_{Rd.c.1} := \left[C_{Rd.c} \cdot k \cdot \sqrt[3]{\left(100 \cdot \rho_l \cdot \frac{f_{ck.C25}}{MPa}\right)} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right] \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 49.9 \cdot kN$

$V_{Rd.c} := max\left(V_{Rd.c.min}, V_{Rd.c.1}\right) = 49.9 \cdot kN$

$\boxed{kontrola\left(V_{sd} \le V_{Rd.c}\right) = \text{"NI izpolnjena"}}$ $V_{sd} \div V_{Rd.c} = 1.45$

Potrebna je strižna armatura!

$A_{sw} := \frac{V_{sd}}{0.9 \cdot d \cdot f_{yd}}$ $A_{sw} = 3.94 \cdot \frac{cm^2}{m}$

$n := 2$

$A_{sw.n} := \frac{A_{sw}}{n}$ $A_{sw.n} = 1.97 \cdot \frac{cm^2}{m}$

Minimalna stemenska armatura

$A_{sw.min} := 0.08 \cdot \left(\frac{MPa}{f_{yk}}\right) \cdot \sqrt{\left(\frac{f_{ck.C25}}{MPa}\right)} \cdot b = 2 \cdot \frac{cm^2}{m}$

$n := 2$

$A_{sw.min.n} := \frac{A_{sw.min}}{n}$ $A_{sw.min.n} = 1 \cdot \frac{cm^2}{m}$

Maksimalna razdalja med stremeni

$s_{max} := 0.75 \cdot d = 35.25 \cdot cm$

Izberem stremena ϕ10/25cm!

$$A_{sw.dej} := A_{\phi}(1) \cdot \frac{cm^2}{0.25m} \qquad A_{sw.dej} = 3.14 \cdot \frac{cm^2}{m}$$

$$\boxed{kontrola\left(A_{sw.min.n} \le A_{sw.dej}\right) = \text{"JE izpolnjena"}}$$

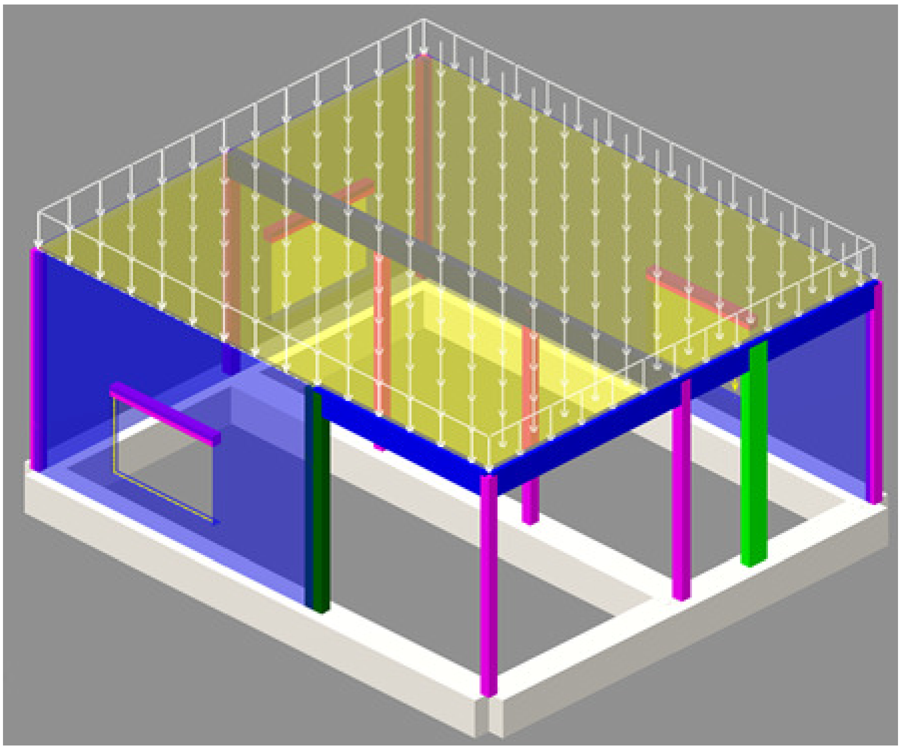
5.6.10 Horizontalne in vertikalne AB vezi

Na vseh križanjih nosilnih zidov, na njihovih prostih konceh ter po potrebi na vsake 5.0m proste dolžine nosilnega zidu je nujno izdelati VERTIKALNE ARMIRANOBETONSKE VEZI!. Te naj bodo minimalnih dimenzij 25cm / 25cm ter armirane z 4ϕ14 vzdolžnimi palicami, ki bodo obdane s stremeni ϕ10/15cm. HORIZONTALNE ARMIRANOBETONSKE VEZI izdelamo na vertikalnih zaključkih zidov in na nosilnih zidovih pod AB ploščami. Te armiramo z 4ϕ12 vzdolžnimi palicami, ki bodo obdane s stremeni ϕ8/30cm.

6.0 NOVA ZGRADBA GASILSKEGA MUZEJA

6.1 AB pohodna stropna plošča POZ 141P

6.1.1 Računski model



Glej PRILOGA 11!

6.1.2 Vertikalne obtežbe

6.1.2.1 Lastna teža konstrukcije

Uporabljena programska oprema avtomatično upošteva lastno težo vgrajenih elementov

6.1.2.2 Stalna obtežba strehe

kamnita pohodna obloga: $g_1 := 2cm \cdot 25kN \cdot m^{-3} = 0.5 \cdot kN \cdot m^{-2}$

estrih: $g_2 := 6cm \cdot 25kN \cdot m^{-3} = 1.5 \cdot kN \cdot m^{-2}$

TI: $g_3 := 30cm \cdot 1kN \cdot m^{-3} = 0.3 \cdot kN \cdot m^{-2}$

HI: $g_4 := 1cm \cdot 10kN \cdot m^{-3} = 0.1 \cdot kN \cdot m^{-2}$

spuščen strop: $g_5 := 1.5cm \cdot 9kN \cdot m^{-3} = 0.14 \cdot kN \cdot m^{-2}$

$$g_{tot} := g_1 + g_2 + g_3 + g_4 + g_5$$

$$g_{tot} = 2.54 \cdot kN \cdot m^{-2}$$

6.1.2.3 Obtežba snega

$$q_{sneg} := q_{sneg.šp} = 1.3 \cdot kN \cdot m^{-2}$$

6.1.2.4 Koristna obtežba medetažnih konstrukcij skladno z Evrokod 1

strehe (kategorija I, C5) $q := 5kN \cdot m^{-2}$

6.1.2.5 Obtežba fasade

$g_{fasada} := 0.5kN \cdot m^{-2}$

6.1.3 Obremenitve in dimenzioniranje

Glej PRILOGA 11!

6.2 AB nosilec POZ 137P

$M_{Ed.max} := 117.10kN \cdot m$

$M_{Ed.min} := -124.2kN \cdot m$ ... največje obremenitve prečnih prerezov

$V_{z.max} := 147.20kN$

$b := 25cm$

$h := 60cm$ ... dimenzije prečnih prerezov

$a := 3cm$

$d := h - a = 57 \cdot cm$

6.2.1 Dimenzioniranje - upogibne obremenitv

Računsko potreba upogibna armatura

$$M_{Ed} := 1.25\, max\left(\left|M_{Ed.max}\right|, \left|M_{Ed.min}\right|\right) = 155.25 \cdot kN \cdot m$$

$$k_d := \frac{M_{Ed}}{b \cdot d^2 \cdot f_{cd.C25}} \qquad k_d = 0.1147$$

$$k_s := 1 + 0.033 \cdot \frac{k_d + 0.027}{0.064} \qquad k_s = 1.07$$

$$A_{s.potr} := k_s \cdot \frac{M_{Ed}}{d \cdot f_{yd}} \qquad A_{s.potr} = 6.72 \cdot cm^2$$

Izberem armaturne palice 2ϕ19 + ϕ14 zgoraj in spodaj, ob straneh, na dveh nivojih konstruktivno 2 ϕ 10

$$A_{s.dej} := 2A_{\phi}(1.9) \cdot cm^2 + A_{\phi}(1.4) \cdot cm^2 \qquad A_{s.dej} = 7.21 \cdot cm^2$$

$$kontrola\left(A_{s.dej} > A_{s.potr}\right) = \text{"JE izpolnjena"}$$

6.2.2 Dimenzioniranje - strižne obremenitve

$V_{sd} := V_{z.max} = 147.2 \cdot kN$ ... maksimalna prečna sila

$N_{sd} := 0kN$ ... ugodni vpliv tlačne osne sile zanemarimo

$A_{s.l} := 2A_{\phi}(1.9) \cdot cm^2 + A_{\phi}(1.4) \cdot cm^2$

$C_{Rd.c} := \dfrac{0.18}{\gamma_{m.c}} = 0.12$ $\quad k := \min\left(1 + \sqrt{\dfrac{200mm}{d}}, 2.0\right) = 1.59$ $\quad k_1 := 0.15$

$\rho_l := min\left(\dfrac{A_{s.l}}{b \cdot d}, 0.02\right) = 0.005$ $\quad \sigma_{cp} := min\left(\dfrac{-N_{sd}}{b \cdot h}, 0.2 \cdot f_{cd.C25}\right) = 0 \cdot MPa$ (sigma + ali -)

$$v_{min} := 0.035 \cdot k^{1.5} \cdot \left(\frac{f_{ck.C25}}{MPa}\right)^{0.5} = 0.35$$

$$V_{Rd.c.min} := \left(v_{min} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right) \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 50.11 \cdot kN$$

$$V_{Rd.c.1} := \left[C_{Rd.c} \cdot k \cdot \sqrt[3]{\left(100 \cdot \rho_l \cdot \frac{f_{ck.C25}}{MPa}\right)} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right] \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 63.44 \cdot kN$$

$$V_{Rd.c} := max\left(V_{Rd.c.min}, V_{Rd.c.1}\right) = 63.44 \cdot kN$$

$\boxed{kontrola\left(V_{sd} \le V_{Rd.c}\right) = \text{"NI izpolnjena"}}$ $\quad V_{sd} \div V_{Rd.c} = 2.32$

Potrebna je strižna armatura!

$A_{sw} := \dfrac{V_{sd}}{0.9 \cdot d \cdot f_{yd}}$ $\quad A_{sw} = 6.6 \cdot \dfrac{cm^2}{m}$

$n := 2$

$A_{sw.n} := \dfrac{A_{sw}}{n}$ $\quad A_{sw.n} = 3.3 \cdot \dfrac{cm^2}{m}$

Minimalna stemenska armatura

$$A_{sw.min} := 0.08 \cdot \left(\frac{MPa}{f_{yk}}\right) \cdot \sqrt{\left(\frac{f_{ck.C25}}{MPa}\right)} \cdot b = 2 \cdot \frac{cm^2}{m}$$

$n := 2$

$A_{sw.min.n} := \dfrac{A_{sw.min}}{n}$ $\quad A_{sw.min.n} = 1 \cdot \dfrac{cm^2}{m}$

Maksimalna razdalja med stremeni

$s_{max} := 0.75 \cdot d = 42.75 \cdot cm$

Izberem stremena ϕ10/20cm!

$$A_{sw.dej} := A_{\phi}(1)\cdot\frac{cm^2}{0.20m} \qquad A_{sw.dej} = 3.93\cdot\frac{cm^2}{m}$$

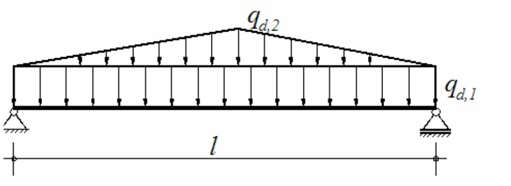
$$\boxed{kontrola\left(A_{sw.min.n} \le A_{sw.dej}\right) = \text{"JE izpolnjena"}}$$

6.3 AB nosilec POZ 135P, POZ 136P

Ga izvedemo kot AB nosilec POZ 137P - glej predhodno točko!

6.4 AB preklade POZ 131P, POZ 132P, POZ 133P

6.4.1 Statični sistem



$l := 3.00m \qquad b := 25cm \qquad a := 3cm$

$h := 30cm \qquad d := h - a = 27\cdot cm$

6.4.2 Obtežbe

lastna teža nosilca: $q_{d1} := 1.35\cdot 25cm\cdot 30cm\cdot 25kN\cdot m^{-3} = 2.53\cdot kN\cdot m^{-1}$

akcija gornjih opečnih zidov in AB plošče:

$$q_{d.plošča} := 1.35\cdot\left(2.09kN\cdot m^{-2} + 16cm\cdot 25kN\cdot m^{-3}\right) + 1.5\cdot 5kN\cdot m^{-2} = 15.72\cdot kN\cdot m^{-2}$$

$$q_{d2} := 1.35\cdot 0.866\cdot l\cdot 30cm\cdot 18kN\cdot m^{-3} + q_{d.plošča}\cdot\frac{l}{2} = 42.52\cdot kN\cdot m^{-1}$$

6.4.3 Dimenzioniranje - upogibne obremenitve

$$M_{sd} := \frac{1}{8}\cdot q_{d1}\cdot l^2 + \frac{1}{12}\cdot q_{d2}\cdot l^2$$ ... upogibni moment v polju

$$M_{sd} = 34.74\cdot kN\cdot m$$

... prečna sila ob podpori

$$V_{sd} := \frac{1}{2}\cdot q_{d1}\cdot l + \frac{1}{4}\cdot q_{d2}\cdot l$$

$$V_{sd} = 35.69\cdot kN$$

Računsko potreba upogibna armatura v polju

$$k_d := \frac{M_{sd}}{b\cdot d^2\cdot f_{cd.C25}} \qquad k_d = 0.1144$$

$$k_s := 1 + 0.033\cdot\frac{k_d + 0.027}{0.064} \qquad k_s = 1.07$$

$$A_{s.potr} := k_s \cdot \frac{M_{sd}}{d \cdot f_{yd}} \qquad A_{s.potr} = 3.17 \cdot cm^2$$

Izberem zgoraj in spodaj armaturne palice 3ϕ14

$$A_{s.dej} := 3 A_{\phi}(1.4) \cdot cm^2 \qquad A_{s.dej} = 4.62 \cdot cm^2$$

$$kontrola\left(A_{s.dej} > A_{s.potr}\right) = \text{"JE izpolnjena"}$$

6.4.4 Dimenzioniranje - strižne obremenitve

$V_{sd} = 35.69 \cdot kN$ ... maksimalna prečna sila

$N_{sd} := 0kN$ ... ugodni vpliv tlačne osne sile zanemarimo

$$A_{s.l} := 3 A_{\phi}(1.4) \cdot cm^2$$

$$C_{Rd.c} := \frac{0.18}{\gamma_{m.c}} = 0.12 \qquad k := \min\left(1 + \sqrt{\frac{200mm}{d}}, 2.0\right) = 1.86 \qquad k_1 := 0.15$$

$$\rho_l := min\left(\frac{A_{s.l}}{b \cdot d}, 0.02\right) = 0.007 \qquad \sigma_{cp} := min\left(\frac{-N_{sd}}{b \cdot h}, 0.2 \cdot f_{cd.C25}\right) = 0 \cdot MPa$$ (sigma + ali -)

$$v_{min} := 0.035 \cdot k^{1.5} \cdot \left(\frac{f_{ck.C25}}{MPa}\right)^{0.5} = 0.44$$

$$V_{Rd.c.min} := \left(v_{min} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right) \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 29.98 \cdot kN$$

$$V_{Rd.c.1} := \left[C_{Rd.c} \cdot k \cdot \sqrt[3]{\left(100 \cdot \rho_l \cdot \frac{f_{ck.C25}}{MPa}\right)} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right] \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 38.83 \cdot kN$$

$$V_{Rd.c} := max\left(V_{Rd.c.min}, V_{Rd.c.1}\right) = 38.83 \cdot kN$$

$$\boxed{kontrola\left(V_{sd} \le V_{Rd.c}\right) = \text{"JE izpolnjena"}} \qquad V_{sd} \div V_{Rd.c} = 0.92$$

Minimalna stemenska armatura

$$A_{sw.min} := 0.08 \cdot \left(\frac{MPa}{f_{yk}}\right) \cdot \sqrt{\left(\frac{f_{ck.C25}}{MPa}\right)} \cdot b = 2 \cdot \frac{cm^2}{m}$$

$$n := 2$$

$$A_{sw.min.n} := \frac{A_{sw.min}}{n} \qquad A_{sw.min.n} = 1 \cdot \frac{cm^2}{m}$$

Maksimalna razdalja med stremeni

$$s_{max} := 0.75 \cdot d = 20.25 \cdot cm$$

Izberem stremena ϕ10/20cm!

$$A_{sw.dej} := A_{\phi}(1) \cdot \frac{cm^2}{0.20m} \qquad A_{sw.dej} = 3.93 \cdot \frac{cm^2}{m}$$

$$\boxed{kontrola\left(A_{sw.min.n} \le A_{sw.dej}\right) = \text{"JE izpolnjena"}}$$

6.5 AB stebri POZ 138P

6.5.1 Splošno

Glede na izkušnje izberem prečne dimenzije stebra 25cm / 25cm. Izberem armaturo 3ϕ14 po vsaki stranici vzdolžno ter stremena ϕ10mm/15cm po vsej višini armiranobetonskega stebra!

6.5.2 Kontrola uklona stebra

$A_s := 8 A_{\phi}(1.4) \cdot cm^2 = 12.32 \cdot cm^2$ ... vzdolžna armatura

$b := 25cm$ ... dimenzija prereza

$h := 25cm$ ... dimenzija prereza

$a := 2.5 \cdot cm$ ... zaščitna plast betona

$d := h - a = 0.23\, m$ ... statična višina

$L := 5.2m$ ... dolžina stebra

$L_0 := L$ ... uklonska dolžina

Obremenitve

$M_{Ed} := 0kN \cdot m$ ... projektni upogibni moment MSN

$M_{Eqp} := 0kN \cdot m$ ... projektni upogibni moment MSU

$N_{Ed} := 466kN$ ... projektna osna sila

Ali je kontrola uklona potrebna

$$I := \frac{b \cdot h^3}{12} = 32552.08 \cdot cm^4$$

$A_c := b \cdot h = 625 \cdot cm^2$ ... karakteristike prečnega prereza

$$i := \sqrt{\frac{I}{A_c}} = 0.07\, m$$

$\lambda := \frac{L_0}{i} = 72.05$ ... vitkost stebra

$A := 0.7 \quad B := 1.1 \quad C := 0.7$ ... koeficienti za določitev mejne vitkosti (če se koeficientov A,B,C ne računa)

$n := N_{Ed} \div \left(A_c \cdot f_{cd.C25}\right) = 0.45$ ... normirana osna sila

$\lambda_{lim} := \dfrac{20A \cdot B \cdot C}{\sqrt{n}} = 16.12$ ... mejna vitkost stebra

$kontrola\left(\lambda \le \lambda_{lim}\right) = \text{"NI izpolnjena"}$

Kontrola uklona, metoda izolirane palice (metoda, ki temelji na nazivni ukrivljenosti)

$M_{Ed} = 0 \cdot kN \cdot m$ ... projektni upogibni moment MSN

$N_{Ed} = 466000 N$ ... projektna osna sila

$M_{Eqp} = 0 \cdot kN \cdot m$ ... projektni upogibni moment MSU

ekscentričnost zaradi TPR

$e_0 := \dfrac{M_{Ed}}{N_{Ed}} = 0$

ekscentričnost zaradi geometrijske nepopolnosti

$e_i := \dfrac{L_0}{400} = 0.01\, m$

ekscentričnost zaradi TDR, e2

$\varepsilon_{yd} := f_{yd} \div E_s = 0.21 \cdot \%$

$\kappa_0 := \varepsilon_{yd} \div (0.45 \cdot d) = 0.0204 \cdot m^{-1}$

$n := N_{Ed} \div \left(A_c \cdot f_{cd.C25}\right) = 0.45$

$n_{bal} := 0.4$

$\omega := \left(A_s \cdot f_{yd}\right) \div \left(A_c \cdot f_{cd.C25}\right) = 0.51$ $n_u := 1 + \omega = 1.51$

$K_r := min\left[\left(n_u - n\right) \div \left(n_u - n_{bal}\right), 1\right] = 0.96$

$\beta := 0.35 + \dfrac{f_{ck.C25}}{200MPa} - \dfrac{\lambda}{150} = -0.01$

$\varphi_{tk} = 2.94$ ... končni koeficient lezenja

$\varphi_{ef} := \varphi_{tk} \cdot \dfrac{M_{Eqp}}{M_{Ed}} = 0$ ... efektivni koeficient lezenja

$K_\varphi := 1 + \beta \cdot \varphi_{ef} = 1$

$\kappa := K_r \cdot K_\varphi \cdot \kappa_0 = 0.02 \cdot m^{-1}$

$c := 10$ (za konstanten prerez: c=10, za konstanten potek momentov: c=8)

$$e_2 := \frac{\kappa \cdot L_0^2}{c} = 0.05\,m$$

$e_{tot} := e_0 + e_i + e_2 = 0.07\,m$ celotna ekscentričnost

$M_{Ed.u} := N_{Ed} \cdot e_{tot} = 30.73 \cdot kN \cdot m$ upogibni moment z upoštevanjem učinkov TDR

Računsko potreba upogibna armatura v polju

$k_d := \dfrac{M_{Ed.u}}{b \cdot d^2 \cdot f_{cd.C25}}$ $k_d = 0.1457$

$k_s := 1 + 0.033 \cdot \dfrac{k_d + 0.027}{0.064}$ $k_s = 1.09$

$A_{s.potr} := k_s \cdot \dfrac{M_{Ed.u}}{d \cdot f_{yd}}$ $A_{s.potr} = 3.42 \cdot cm^2$

Izberem zgoraj in spodaj armaturne palice 3ϕ14

$A_{s.dej} := 3 A_{\phi}(1.4) \cdot cm^2$ $A_{s.dej} = 4.62 \cdot cm^2$

Vgrajena vzdolžna armatura 3ϕ14 po vsaki stranici zadošča!

6.6 AB stebri POZ 139P in 140P

So prečnih dimenzij okvirno b/h=25/50cm. Jih armiram kot stebre POZ 138P in sicer izberem armaturo 3ϕ14 po vsaki stranici vzdolžno ter stremena ϕ10mm/15cm po vsej višini armiranobetonskega stebra!

6.7 Horizontalne in vertikalne AB vezi

Na vseh križanjih nosilnih zidov, na njihovih prostih konceh ter po potrebi na vsake 5.0m proste dolžine nosilnega zidu je nujno izdelati VERTIKALNE ARMIRANOBETONSKE VEZI!. Te naj bodo minimalnih dimenzij 25cm / 25cm ter armirane z 4ϕ14 vzdolžnimi palicami, ki bodo obdane s stremeni ϕ10/15cm. HORIZONTALNE ARMIRANOBETONSKE VEZI izdelamo na vertikalnih zaključkih zidov in na nosilnih zidovih pod AB ploščami. Te armiramo z 4ϕ12 vzdolžnimi palicami, ki bodo obdane s stremeni ϕ8/30cm.

6.8 Armiranobetonski pasovni temelji POZ PT002P

6.8.1 Splošno

Objekt bo temeljen na sistemu pasovnih armiranobetonskih temeljev. Nosilnost temeljih tal ocenimo na σ_{dop}=200 kN/m^2. Po izdelavi izkopa ter pred izdelavo temeljne plošče mora temeljna tla pregledati pooblaščena geotehnična institucija.

$$\sigma_{dop} := 250 kN \cdot m^{-2}$$

6.8.2 Statični sistem (gemetrija in podpiranje)

Glej PRILOGA 11!

Predpostavimo, da je objekt temeljen na dobro utrjeni podlagi z modulom reakcije temeljnih tal v vrednosti 30000kN/m^3!

$$M_{Ed.max} := 381.53 kN \cdot m$$

$V_{z.max} := 241.85kN$ ... največje obremenitve prečnih prerezov

$b := 80cm$

$h := 80cm$ ... dimenzije prečnih prerezov

$a := 5cm$

$d := h - a = 75 \cdot cm$

6.8.3 Dimenzioniranje - upogibne obremenitve

$M_{Ed} := M_{Ed.max} = 381.53 \cdot kN \cdot m$

$k_d := \dfrac{M_{Ed}}{b \cdot d^2 \cdot f_{cd.C25}}$ $\quad k_d = 0.0509$

$k_s := 1 + 0.033 \cdot \dfrac{k_d + 0.027}{0.064}$ $\quad k_s = 1.04$

$A_{s.potr} := k_s \cdot \dfrac{M_{Ed}}{d \cdot f_{yd}}$ $\quad A_{s.potr} = 12.17 \cdot cm^2$

Izberem armaturne palice 5ϕ19 zgoraj in spodaj, ob straneh, na dveh nivojih konstruktivno 2 ϕ 10

$A_{s.dej} := 5 A_{\phi}(1.9) \cdot cm^2$ $\quad A_{s.dej} = 14.18 \cdot cm^2$

$kontrola(A_{s.dej} > A_{s.potr}) = \text{"JE izpolnjena"}$

6.8.2 Dimenzioniranje - strižne obremenitve

$V_{sd} := V_{z.max} = 241.85 \cdot kN$ ... maksimalna prečna sila

$N_{sd} := 0kN$ ... ugodni vpliv tlačne osne sile zanemarimo

$A_{s.l} := 5 A_{\phi}(1.9) \cdot cm^2$

$C_{Rd.c} := \dfrac{0.18}{\gamma_{m.c}} = 0.12$ $\quad k := \min\left(1 + \sqrt{\dfrac{200mm}{d}}, 2.0\right) = 1.52$

$\rho_l := \min\left(\dfrac{A_{s.l}}{b \cdot d}, 0.02\right) = 0.002$ $\quad \sigma_{cp} := \min\left(\dfrac{-N_{sd}}{b \cdot h}, 0.2 \cdot f_{cd.C25}\right) = 0 \cdot MPa$ (sigma + ali -)

$v_{min} := 0.035 \cdot k^{1.5} \cdot \left(\dfrac{f_{ck.C25}}{MPa}\right)^{0.5} = 0.33$

$$V_{Rd.c.min} := \left(v_{min} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right) \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 196.07 \cdot kN$$

$$V_{Rd.c.1} := \left[C_{Rd.c} \cdot k \cdot \sqrt[3]{\left(100 \cdot \rho_l \cdot \frac{f_{ck.C25}}{MPa}\right)} + k_1 \cdot \frac{\sigma_{cp}}{MPa}\right] \cdot \frac{b}{mm} \cdot \frac{d}{mm} \cdot N = 197.36 \cdot kN$$

$$V_{Rd.c} := max\left(V_{Rd.c.min}, V_{Rd.c.1}\right) = 197.36 \cdot kN$$

$$\boxed{kontrola\left(V_{sd} \le V_{Rd.c}\right) = \text{"NI izpolnjena"}} \qquad V_{sd} \div V_{Rd.c} = 1.23$$

Potrebna je strižna armatura!

$$A_{sw} := \frac{V_{sd}}{0.9 \cdot d \cdot f_{yd}} \qquad A_{sw} = 8.24 \cdot \frac{cm^2}{m}$$

$$n := 2$$

$$A_{sw.n} := \frac{A_{sw}}{n} \qquad A_{sw.n} = 4.12 \cdot \frac{cm^2}{m}$$

Minimalna stemenska armatura

$$A_{sw.min} := 0.08 \cdot \left(\frac{MPa}{f_{yk}}\right) \cdot \sqrt{\left(\frac{f_{ck.C25}}{MPa}\right)} \cdot b = 6.4 \cdot \frac{cm^2}{m}$$

$$n := 2$$

$$A_{sw.min.n} := \frac{A_{sw.min}}{n} \qquad A_{sw.min.n} = 3.2 \cdot \frac{cm^2}{m}$$

Maksimalna razdalja med stremeni

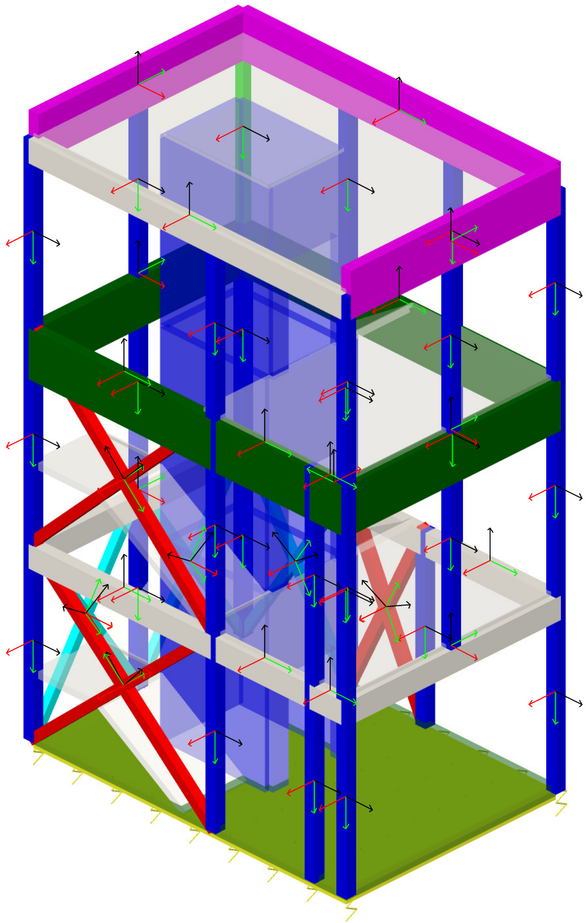
$$s_{max} := 0.75 \cdot d = 56.25 \cdot cm$$

Izberem stremena ϕ10/20cm!

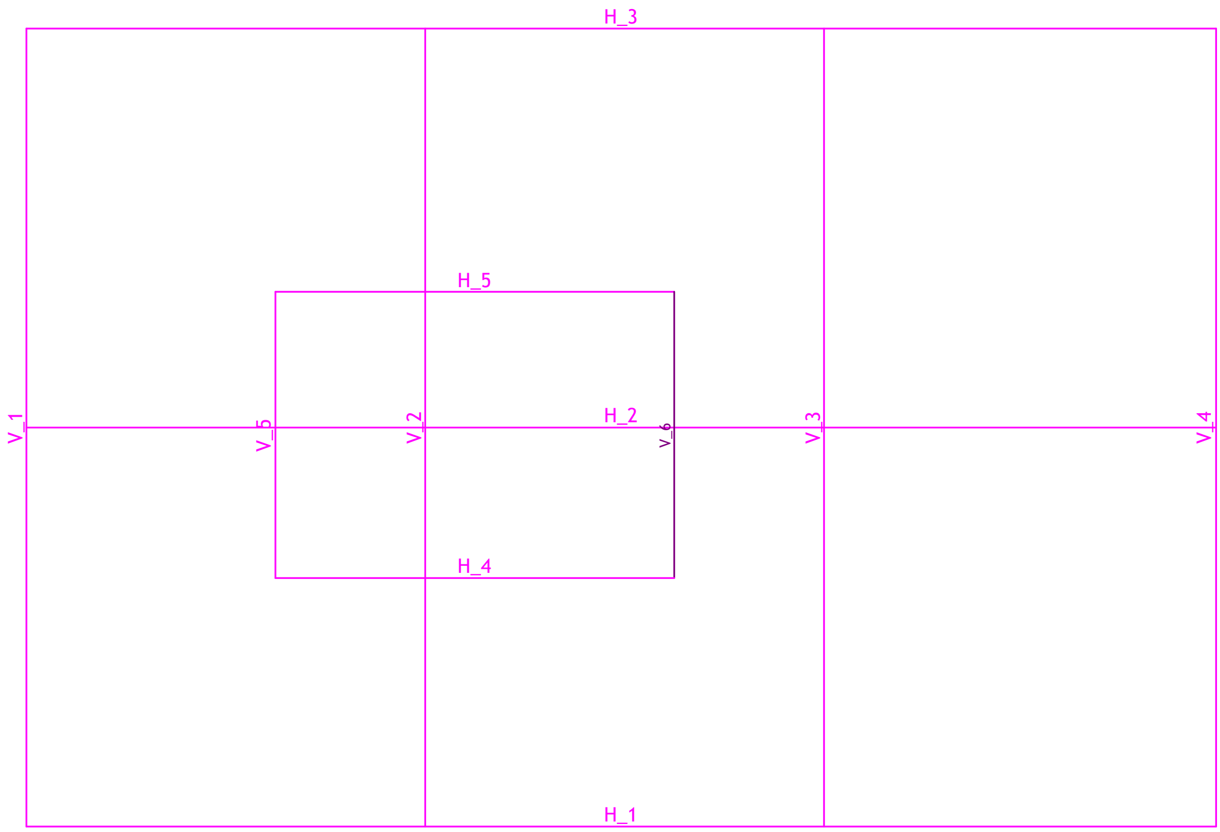
$$A_{sw.dej} := A_{\phi}(1.2) \cdot \frac{cm^2}{0.25m} \qquad A_{sw.dej} = 4.52 \cdot \frac{cm^2}{m}$$

$$\boxed{kontrola\left(A_{sw.min.n} \le A_{sw.dej}\right) = \text{"JE izpolnjena"}}$$

Tolikšno strižno armaturo vgradim le obojestransko ob območjih naleganj notranjih stebrov POZ 138P. Sicer vgradim stremensko armaturo ϕ12/50cm.



Izometrija



Dispozicija okvirjev

Shema nivojev

Naziv	z [m]	h [m]
kota strop nad 2N	12.40	3.90
kota strop nad 1N	8.50	1.75
podest4	6.75	1.10
podest3	5.65	1.60

Naziv	z [m]	h [m]
kota strop nad P	4.05	1.50
podest2	2.55	1.20
podest1	1.35	1.35
kota talne plošče	0.00	

Tabele materialov

No	Naziv materiala	E[kN/m2]	μ	γ[kN/m3]	αt[1/C]	Em[kN/m2]	μm
1	C 25/30	3.100e+7	0.20	25.00	1.000e-5	3.100e+7	0.20
2	opečni zid	5.000e+6	0.30	0.00	1.000e-5	2.100e+8	0.30

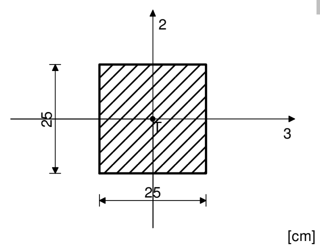
Seti plošč

No	d[m]	e[m]	Material	Tip preračuna	Ortotropija	E2[kN/m2]	G[kN/m2]	α
<2>	0.200	0.100	1	Tanka plošča	Izotropna			
<3>	0.150	0.075	1	Tanka plošča	Izotropna			
<4>	0.250	0.125	1	Tanka plošča	Izotropna			

Seti gred

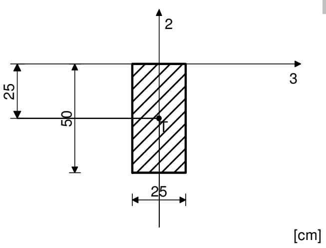
Set: 2 Prerez: b/d=25/25, Fiktivna ekscentričnost

Mat.	A1	A2	A3	I1	I2	I3
1 - C 25/30	6.250e-2	5.208e-2	5.208e-2	5.501e-4	3.255e-4	3.255e-4



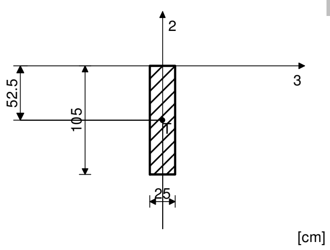
Set: 3 Prerez: b/d=25/50, Fiktivna ekscentričnost

Mat.	A1	A2	A3	I1	I2	I3
1 - C 25/30	1.250e-1	1.042e-1	1.042e-1	1.788e-3	6.510e-4	2.604e-3



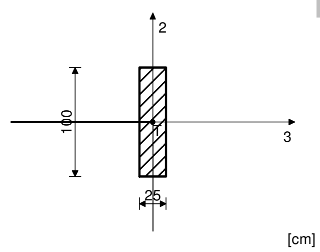
Set: 4 Prerez: b/d=25/105, Fiktivna ekscentričnost

Mat.	A1	A2	A3	I1	I2	I3
1 - C 25/30	2.625e-1	2.188e-1	2.188e-1	4.649e-3	1.367e-3	2.412e-2



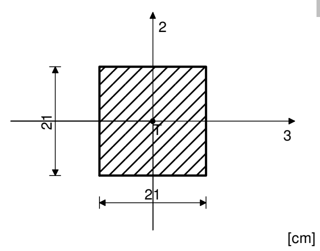
Set: 5 Prerez: b/d=25/100, Fiktivna ekscentričnost

Mat.	A1	A2	A3	I1	I2	I3
1 - C 25/30	2.500e-1	2.083e-1	2.083e-1	4.388e-3	1.302e-3	2.083e-2

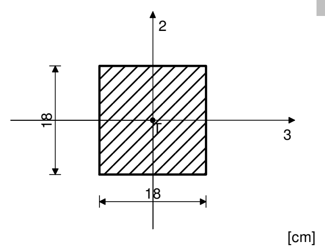


Set: 7 Prerez: b/d=21/21, Fiktivna ekscentričnost

Mat.	A1	A2	A3	I1	I2	I3
2 - opečni zid	4.410e-2	3.675e-2	3.675e-2	2.739e-4	1.621e-4	1.621e-4



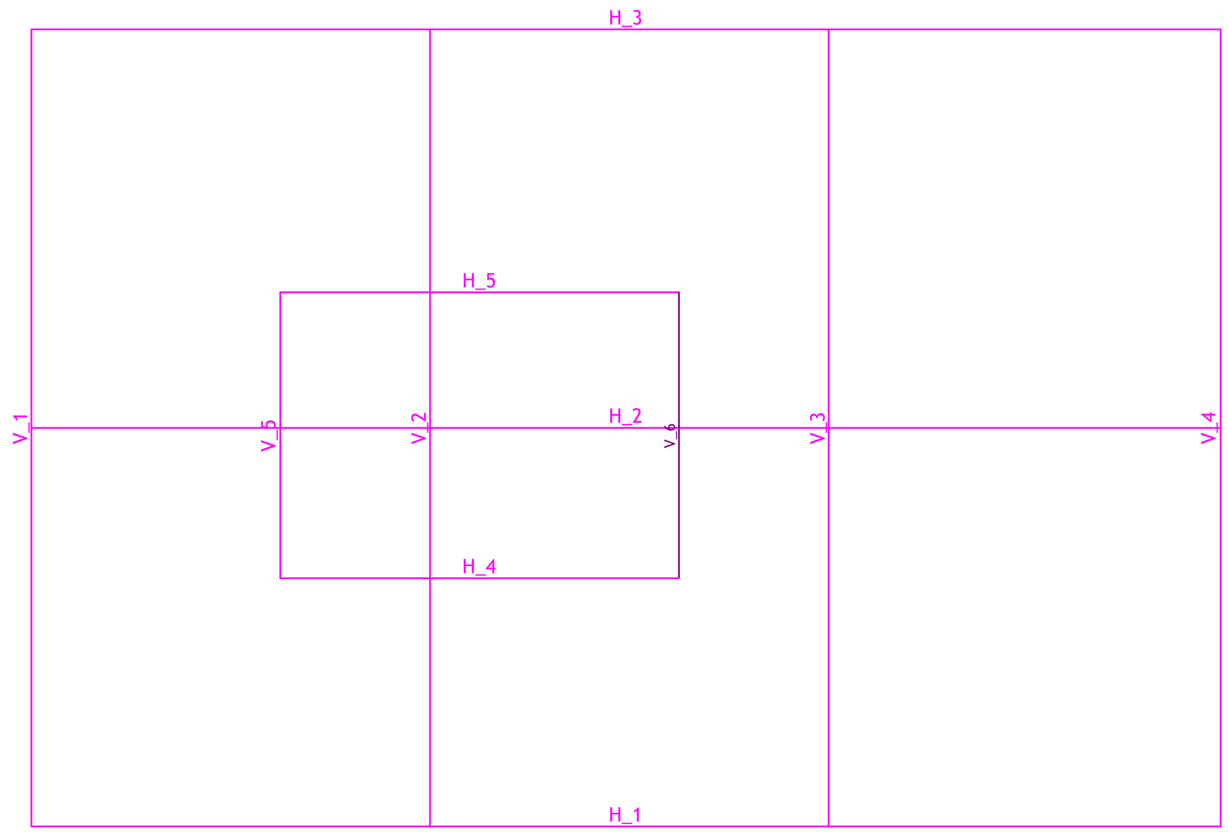
Set: 8 Prerez: b/d=18/18, Fiktivna ekscentričnost



Mat.	A1	A2	A3	I1	I2	I3
2 - opečni zid	3.240e-2	2.700e-2	2.700e-2	1.478e-4	8.748e-5	8.748e-5

Seti površinskih podpor

Set	K,R1	K,R2	K,R3
1	1.000e+10	1.000e+10	2.000e+4



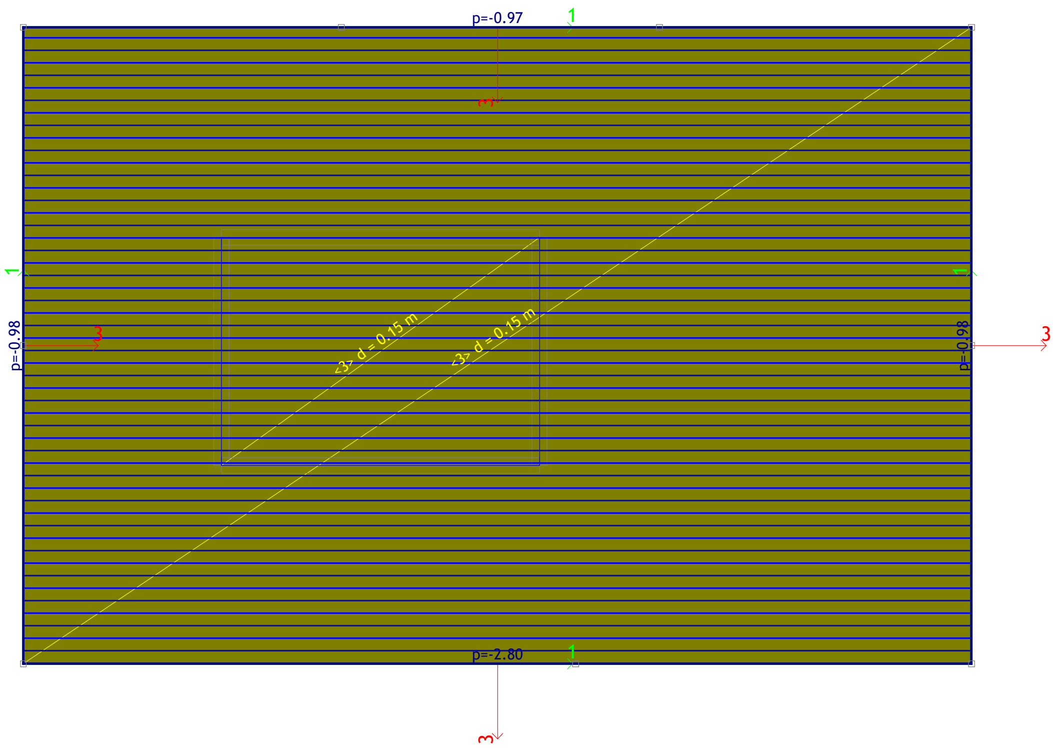
Dispozicija okvirjev

Lista obtežnih primerov

LC	Naziv
1	lastna+stalna+fasada (g)
2	koristna
3	sneg
4	dvigalo
5	potres X
6	potres Y

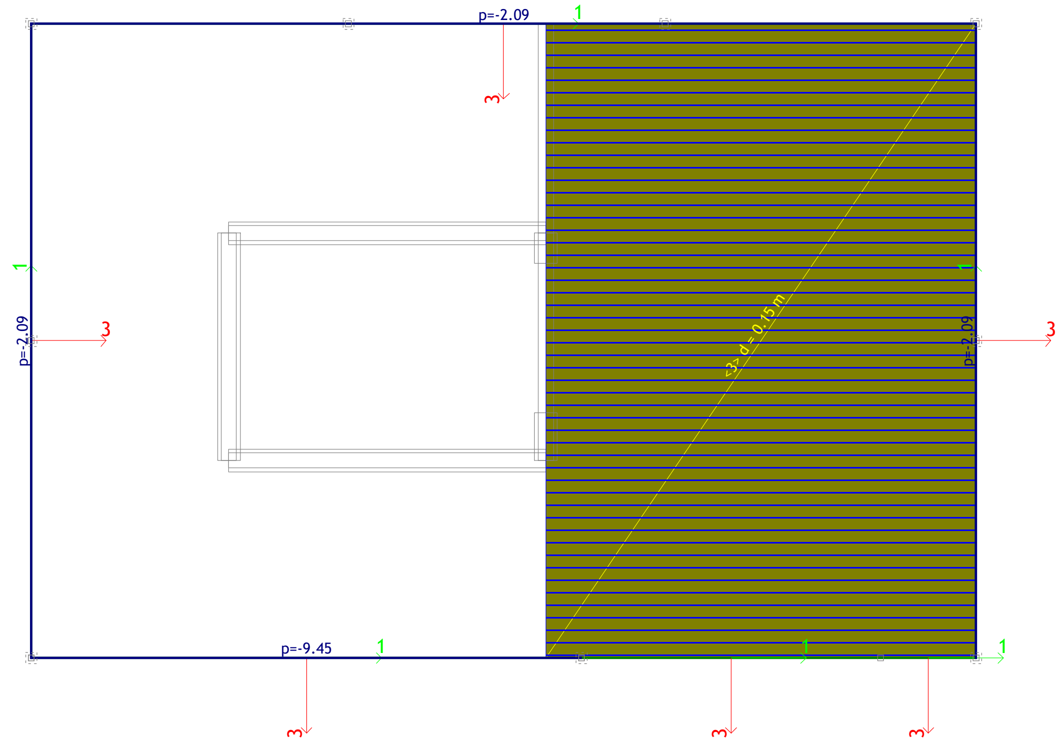
LC	Naziv
7	Komb.: MSN1 (1.35xI+1.5xII+0.75xIII+1.05xIV)
8	Komb.: MSN2 (1.35xI+1.05xII+1.5xIII+1.05xIV)
9	Komb.: MSN3 - potres X (I+0.6xII+0.6xIV+V)
10	Komb.: MSN4 - potres Y (I+0.6xII+0.6xIV+VI)
11	Komb.: MSU1 - potres X (I+0.6xII+0.6xIV+2.1xV)
12	Komb.: MSU2 - potres Y (I+0.6xII+0.6xIV+2.1xVI)

Obt. 1: lastna+stalna+fasada (g)



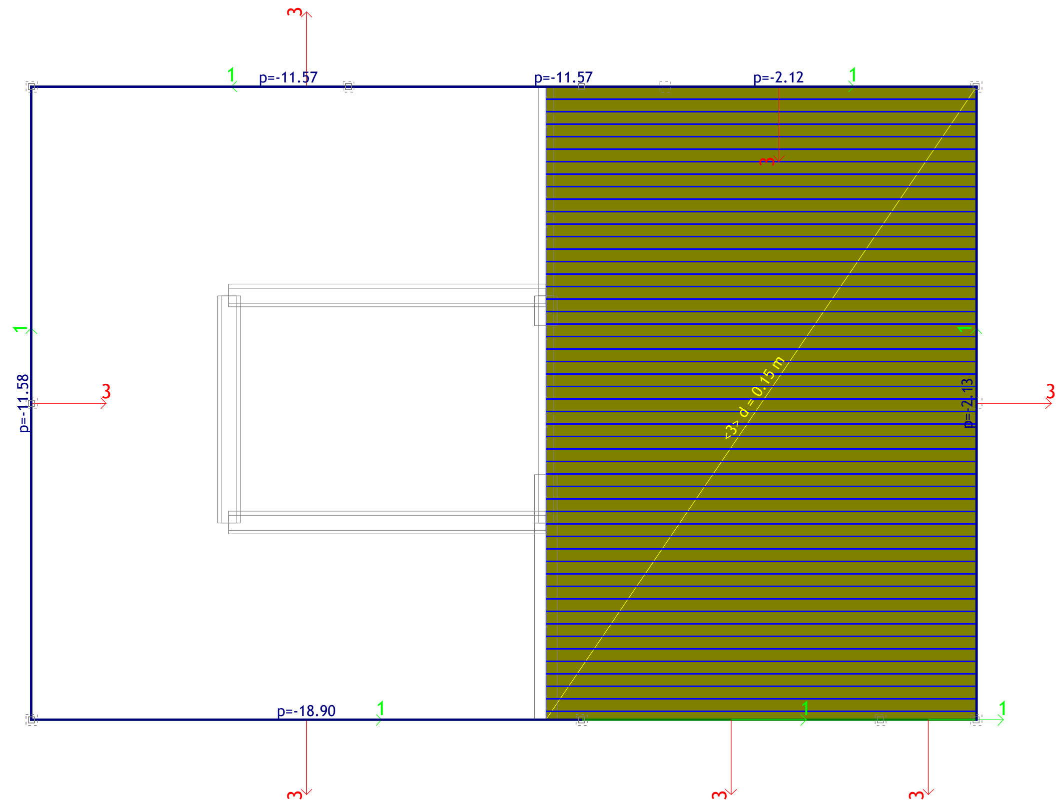
Nivo: kota strop nad 2N [12.40 m]

Obt. 1: lastna+stalna+fasada (g)



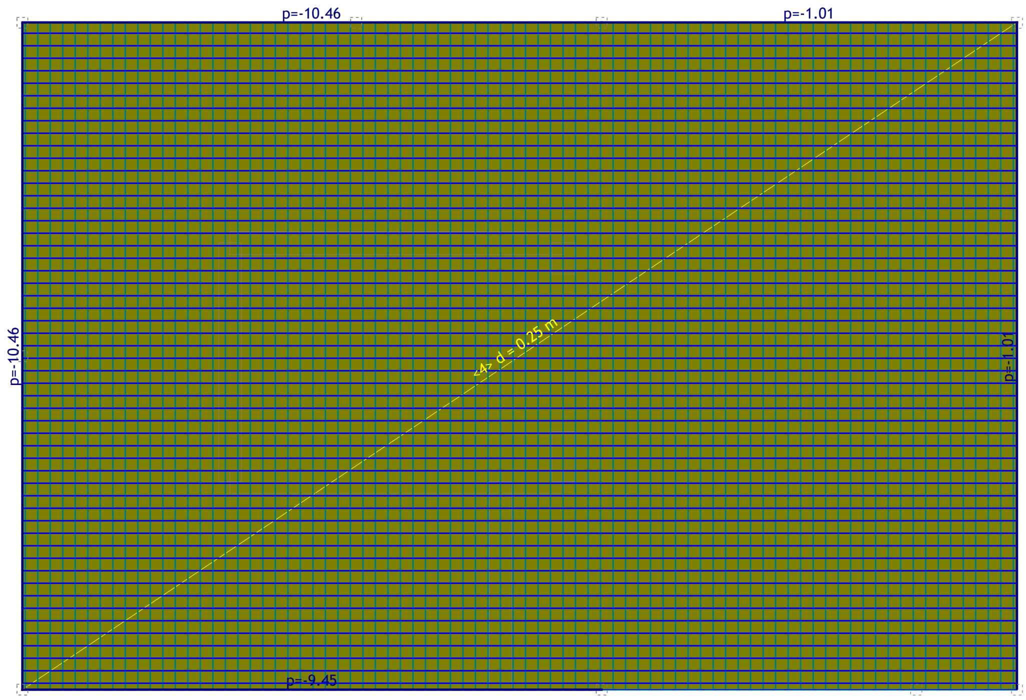
Nivo: kota strop nad 1N [8.50 m]

Obt. 1: lastna+stalna+fasada (g)



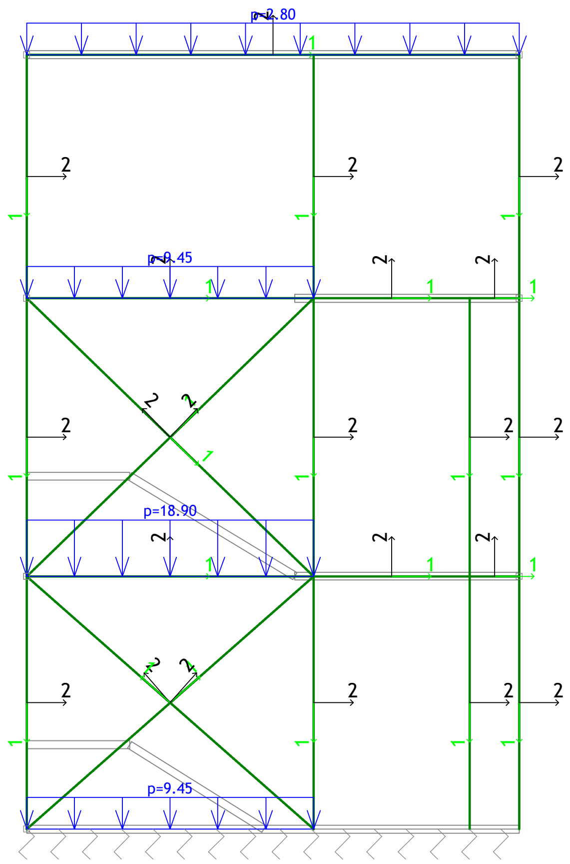
Nivo: kota strop nad P [4.05 m]

Obt. 1: lastna+stalna+fasada (g)



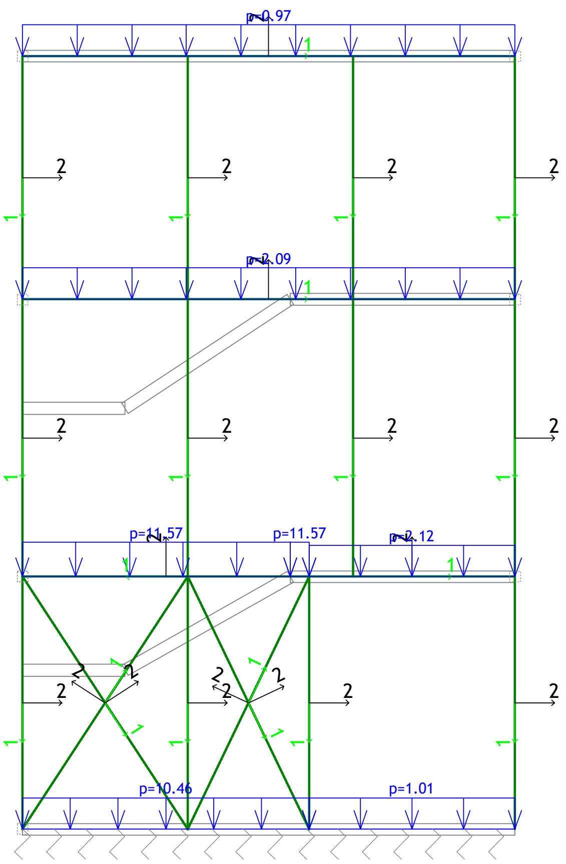
Nivo: kota talne plošče [0.00 m]

Obt. 1: lastna+stalna+fasada (g)



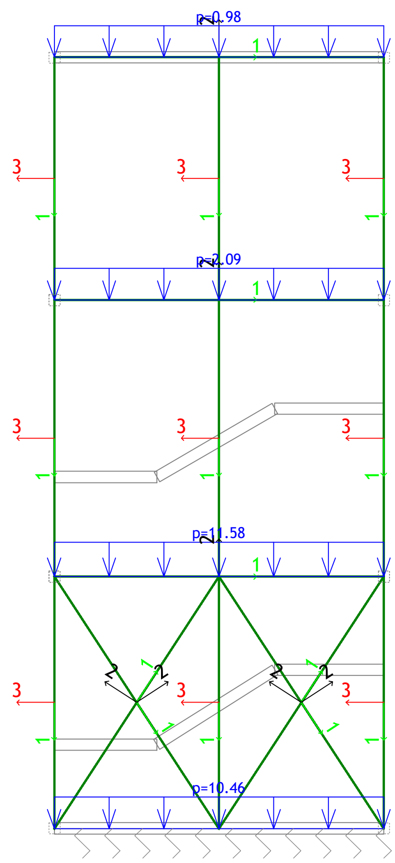
Okvir: H_1

Obt. 1: lastna+stalna+fasada (g)



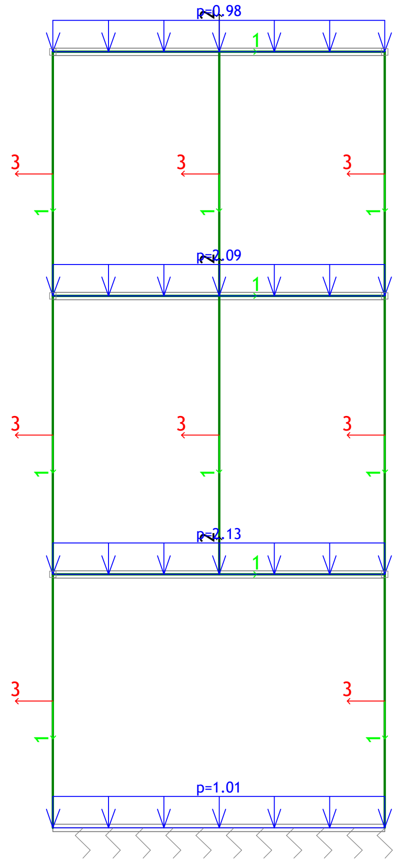
Okvir: H_3

Obt. 1: lastna+stalna+fasada (g)



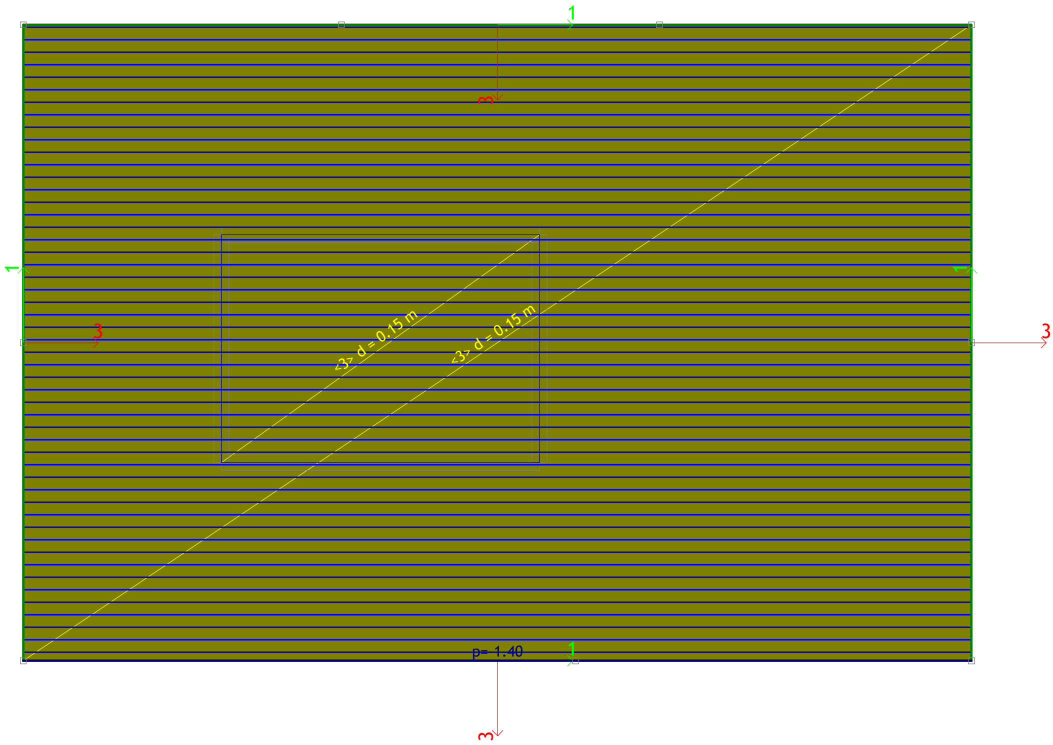
Okvir: V_1

Obt. 1: lastna+stalna+fasada (g)



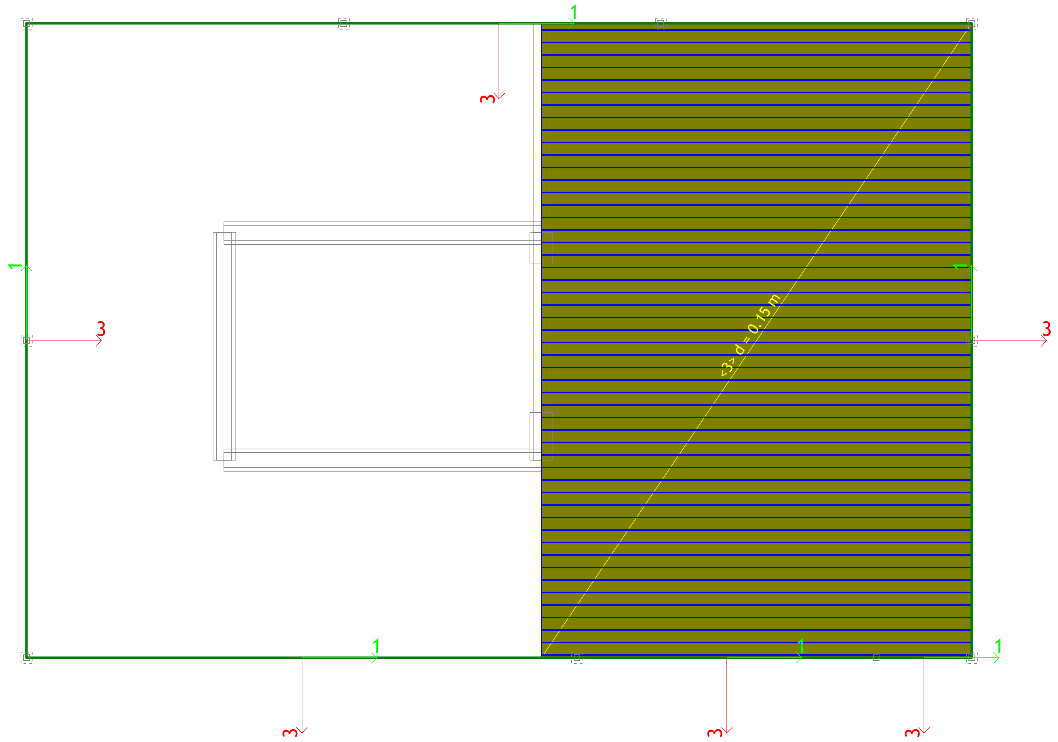
Okvir: V_4

Obt. 2: koristna



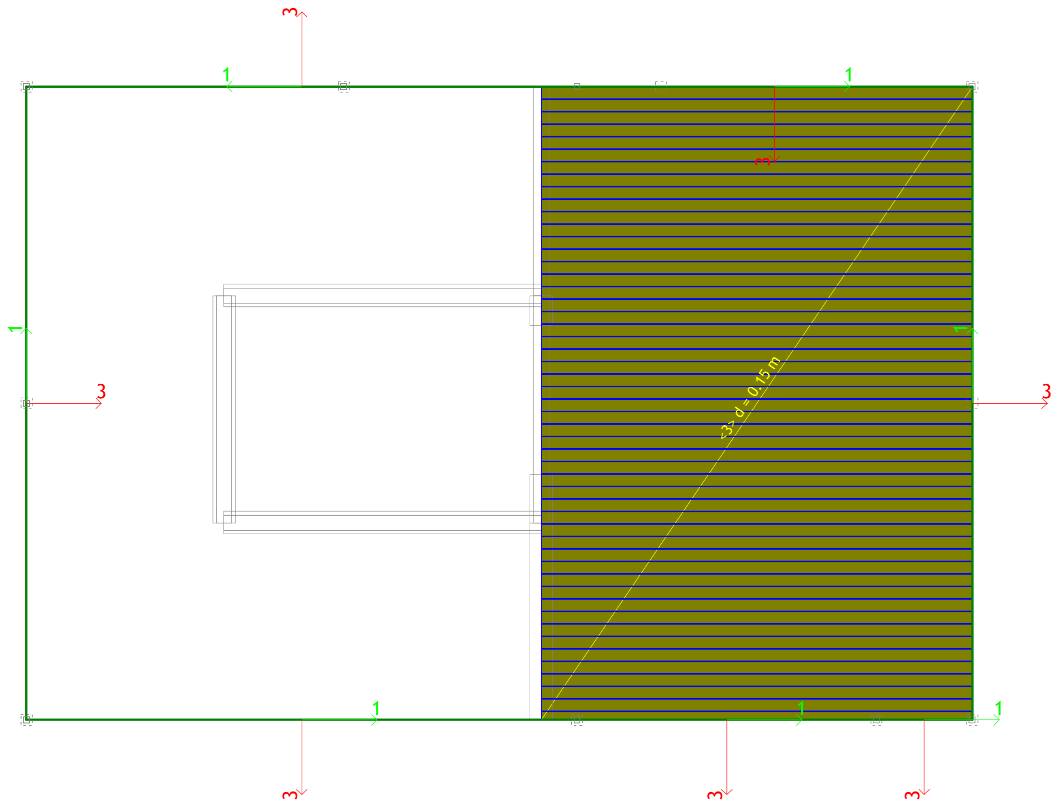
Nivo: kota strop nad 2N [12.40 m]

Obt. 2: koristna



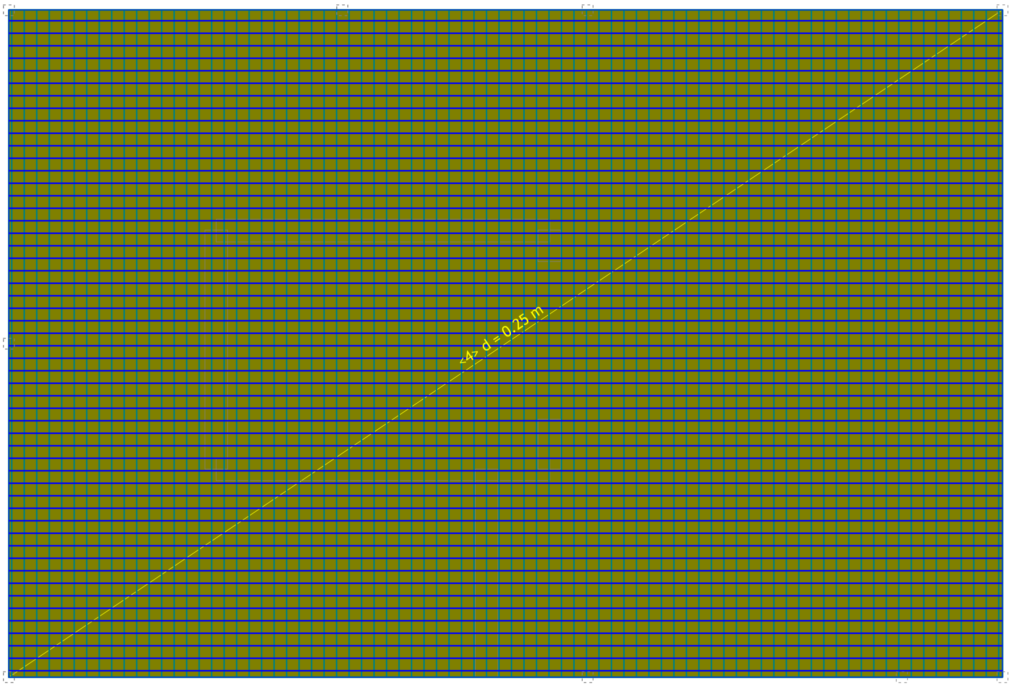
Nivo: kota strop nad 1N [8.50 m]

Obt. 2: koristna



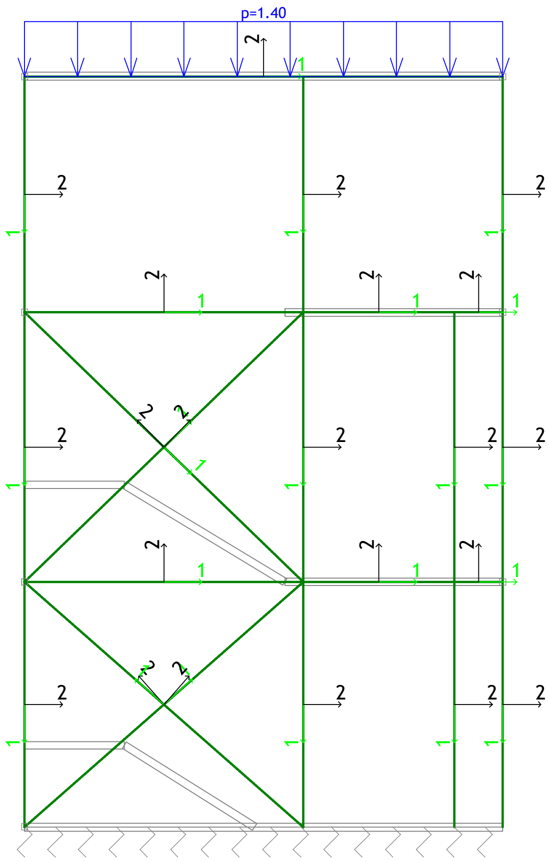
Nivo: kota strop nad P [4.05 m]

Obt. 2: koristna



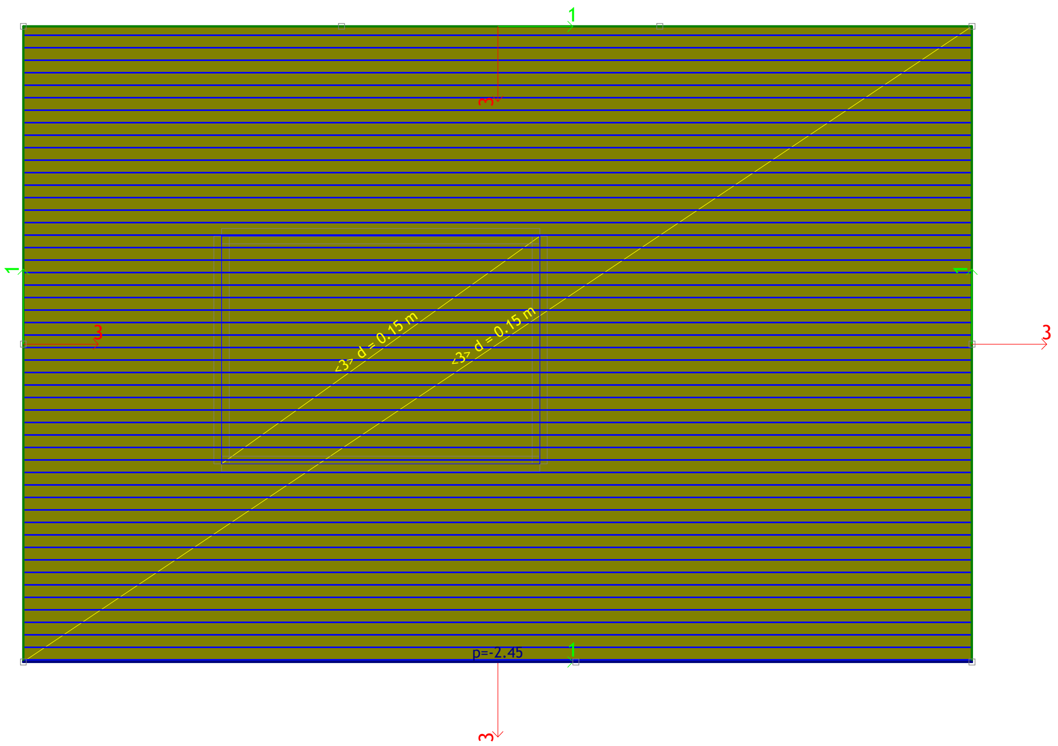
Nivo: kota talne plošče [0.00 m]

Obt. 2: koristna



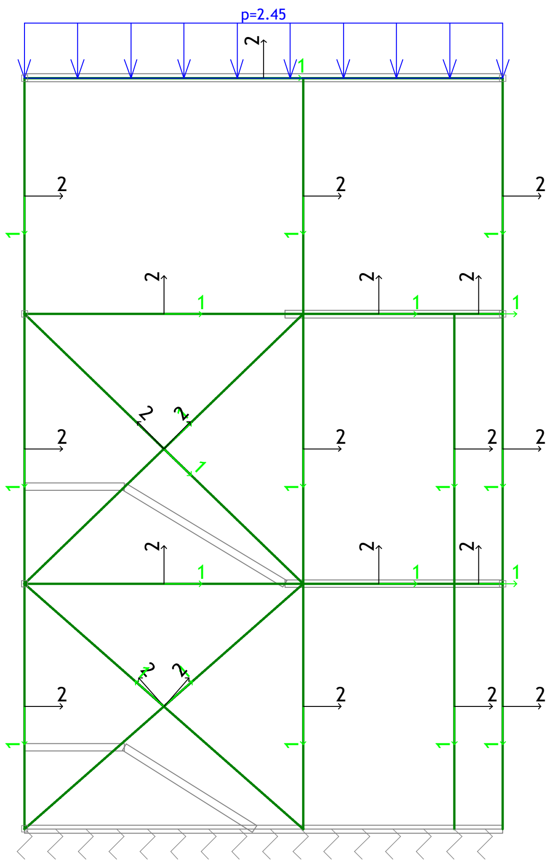
Okvir: H_1

Obt. 3: sneg



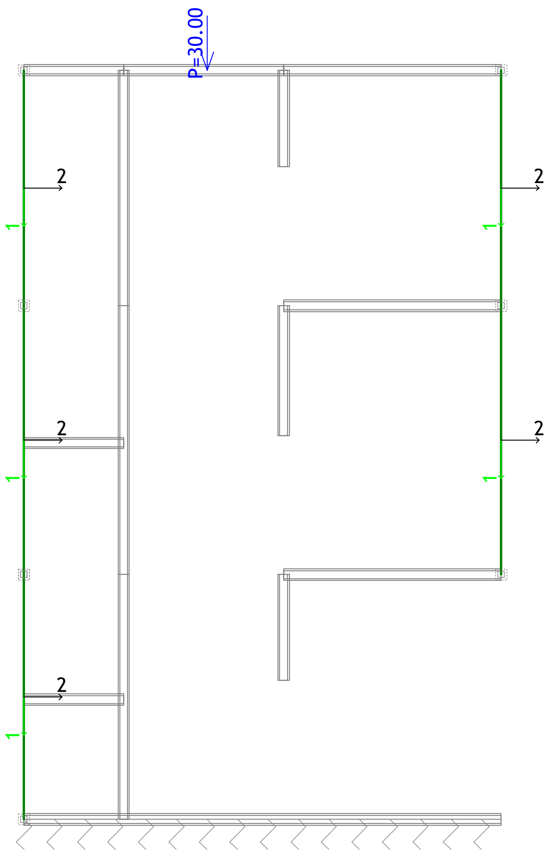
Nivo: kota strop nad 2N [12.40 m]

Obt. 3: sneg



Okvir: H_1

Obt. 4: dvigalo



Okvir: H_2

Faktorji obtežb za preračun mas			
No	Naziv	Koeficient	
1	lastna+stalna+fasada (g)	1.00	
2	koristna	0.30	
3	sneg	0.00	
4	dvigalo	0.00	

Seizmični preračun: EC8 (EN 1998) SLO

Kategorija tal:	C
Kategorija pomena:	III (γ=1.2)
Razmerje ag/g:	0.10
Koeficient dušenja:	0.05

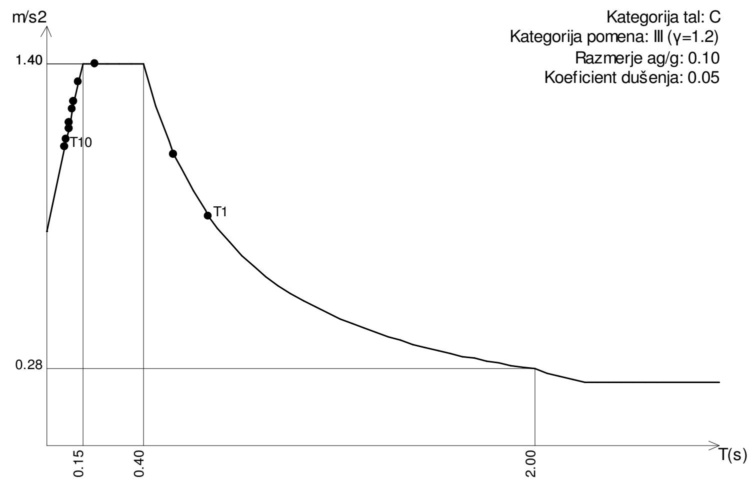
Faktorji smeri potresa:

Obtežni primer	Kot α[°]	k,α	k,α+90°	kz	Faktor O.
potres X	0	1.000	0.300	0.000	2.100
potres Y	90	1.000	0.300	0.000	2.100

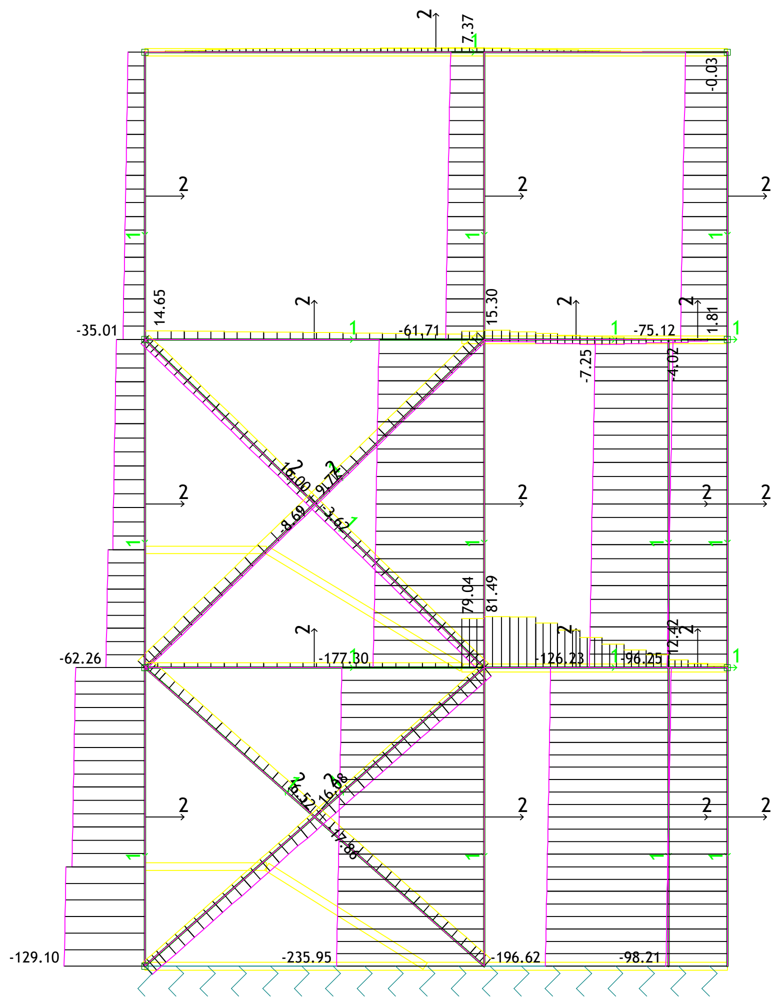
Tip spektra

Obtežni primer	S	Tb	Tc	Td
potres X	1.000	0.150	0.400	2.000
potres Y	1.000	0.150	0.400	2.000

Projektni spekter



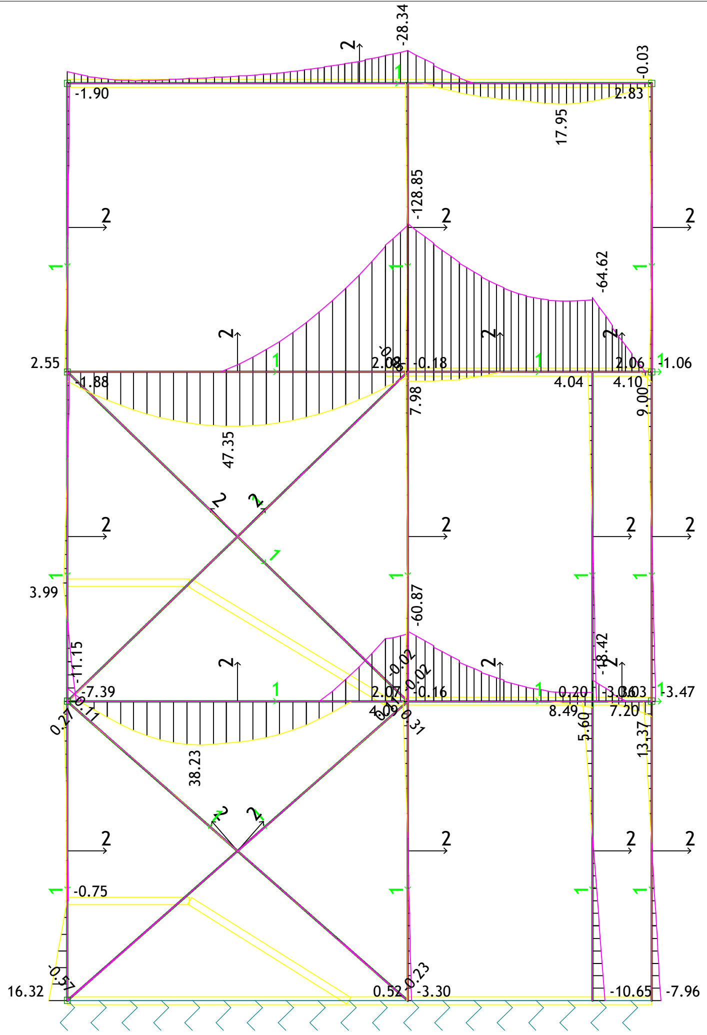
Obt. 14: [ovojnica MSN] 7-10



Okvir: H_1

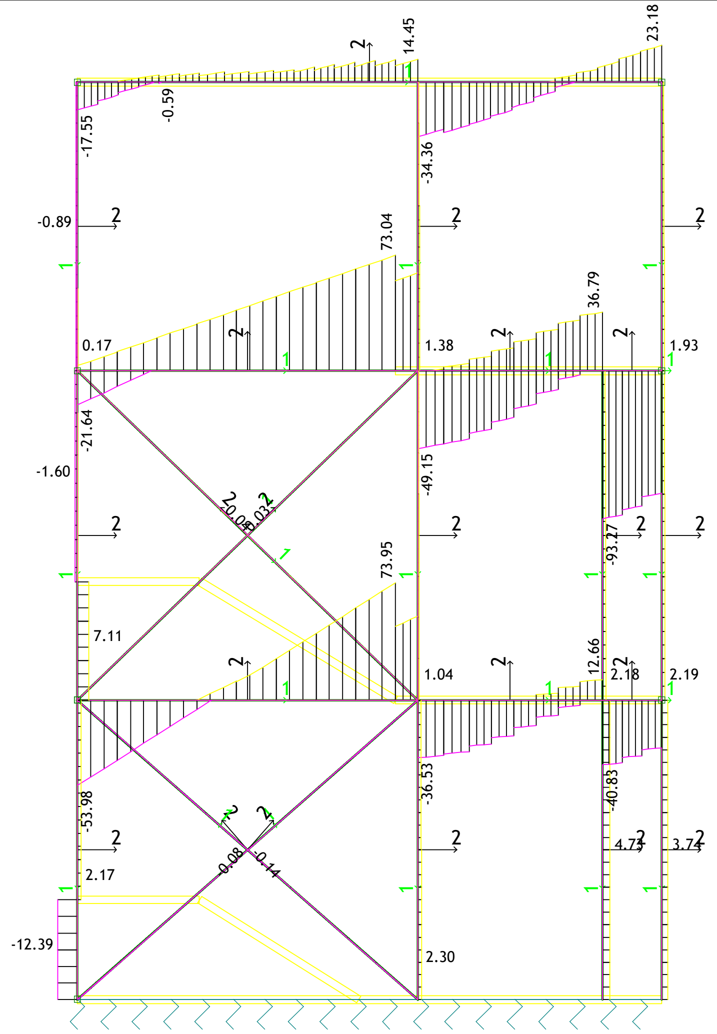
Vplivi v gredi: max N1= 81.49 / min N1= -235.95 kN

Obt. 14: [ovojnica MSN] 7-10



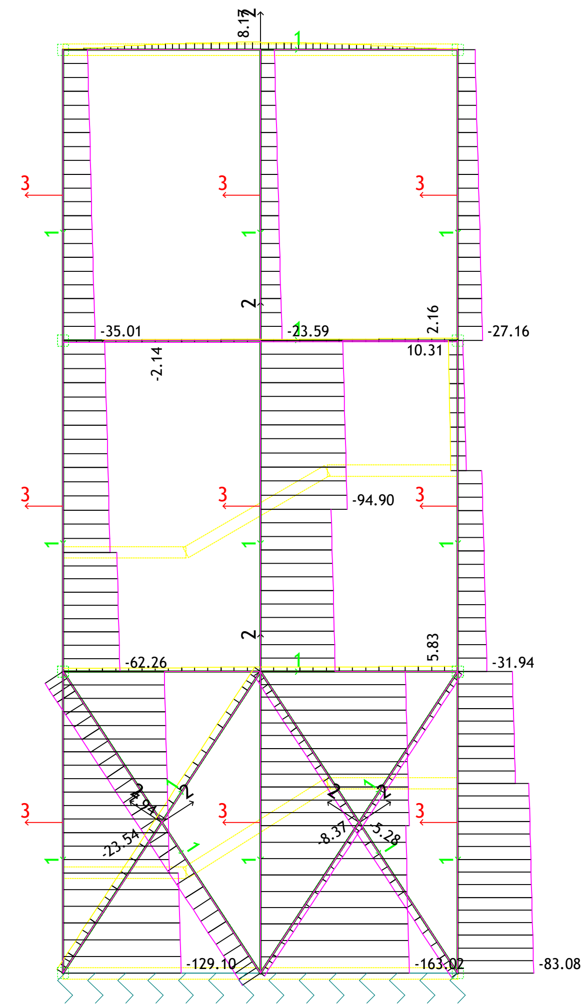
Okvir: H_1
Vplivi v gredi: max M3= 47.35 / min M3= -128.85 kNm

Obt. 14: [ovojnica MSN] 7-10



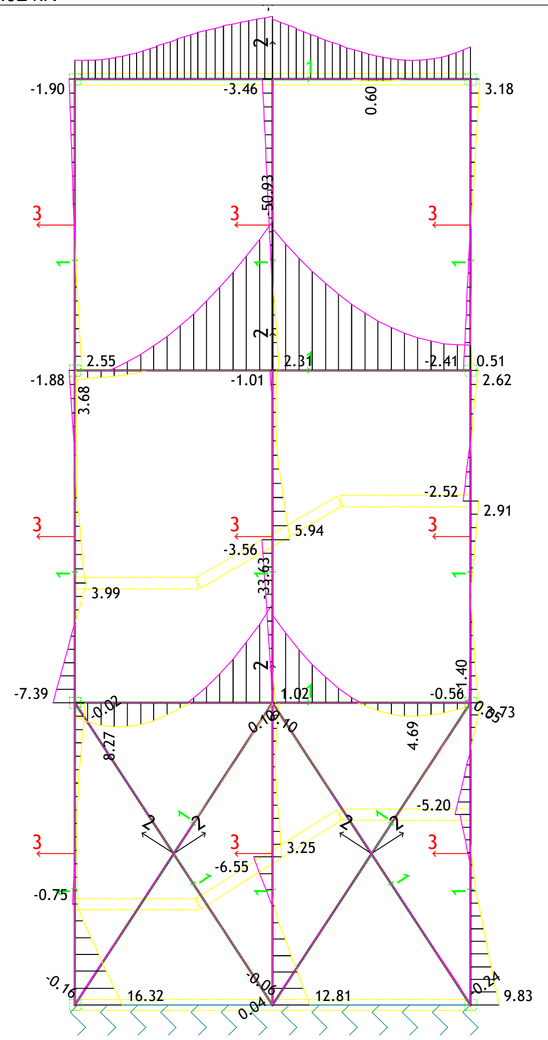
Okvir: H_1
Vplivi v gredi: max T2= 73.95 / min T2= -93.27 kN

Obt. 14: [ovojnica MSN] 7-10



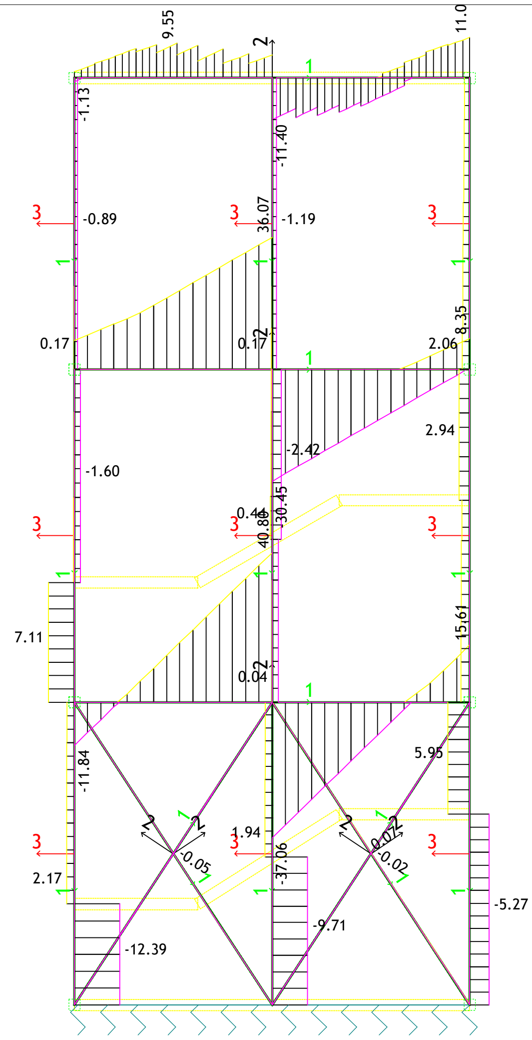
Okvir: V_1
Vplivi v gredi: max N1= 10.31 / min N1= -163.02 kN

Obt. 14: [ovojnica MSN] 7-10



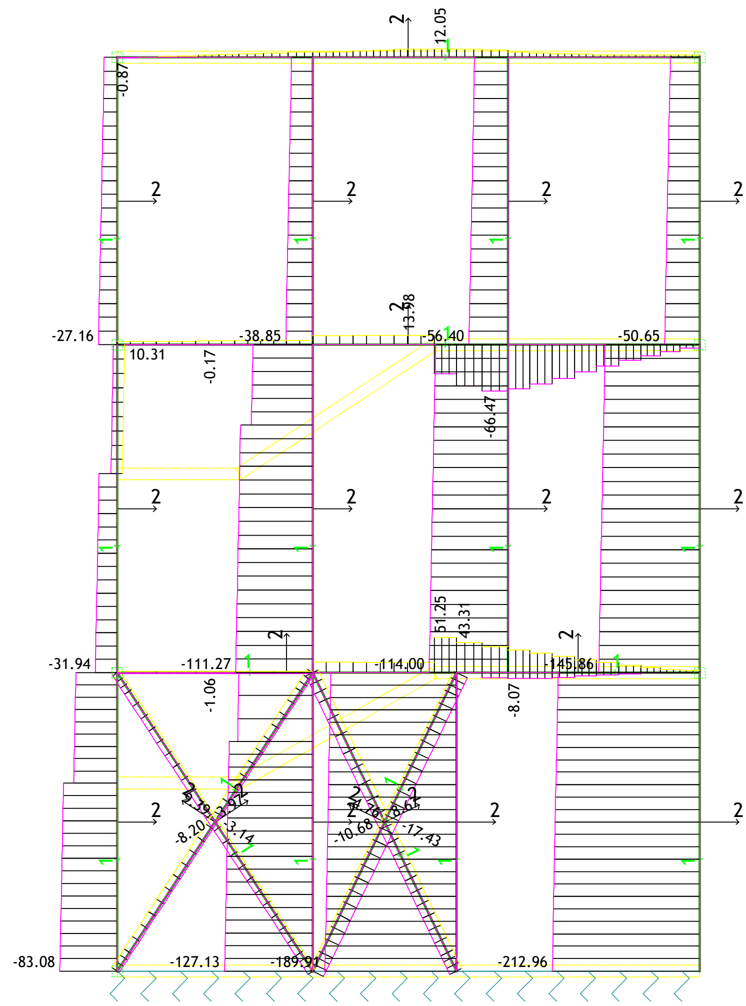
Okvir: V_1
Vplivi v gredi: max M3= 16.32 / min M3= -50.93 kNm

Obt. 14: [ovojnica MSN] 7-10



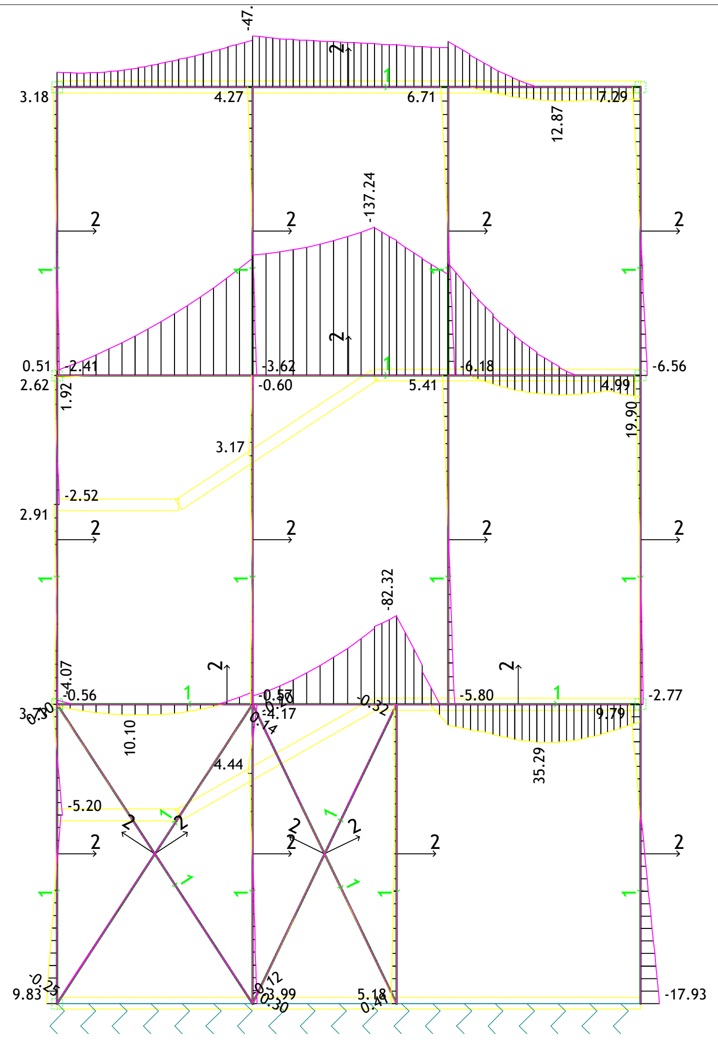
Okvir: V_1
Vplivi v gredi: max T2= 40.80 / min T2= -37.06 kN

Obt. 14: [ovojnica MSN] 7-10



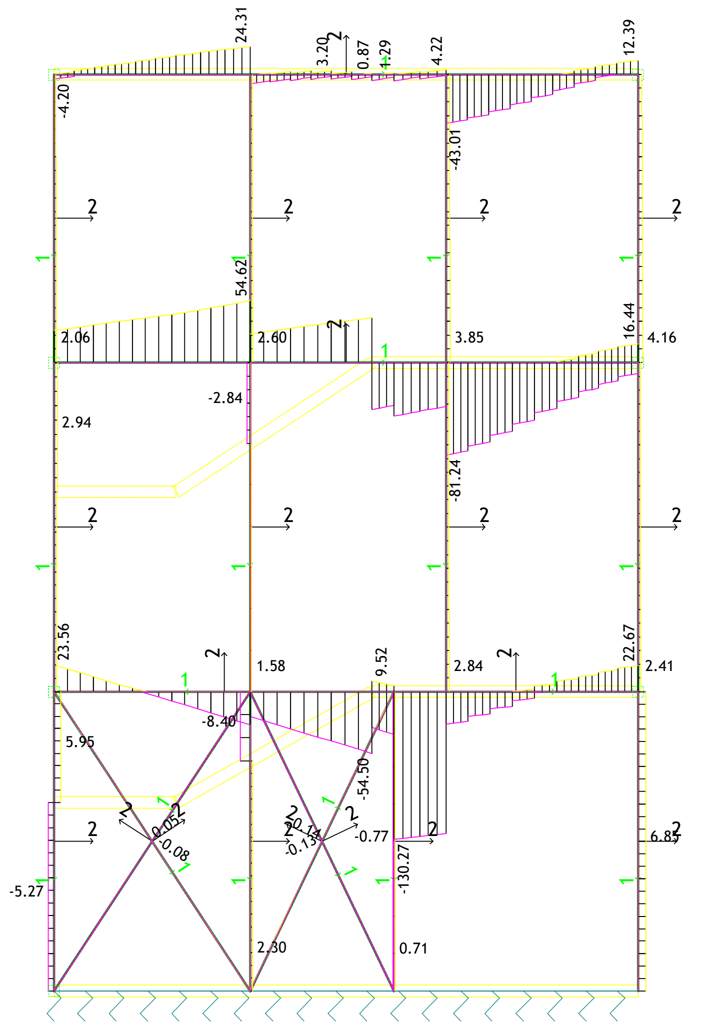
Okvir: H_3
Vplivi v gredi: max N1= 51.25 / min N1= -212.96 kN

Obt. 14: [ovojnica MSN] 7-10



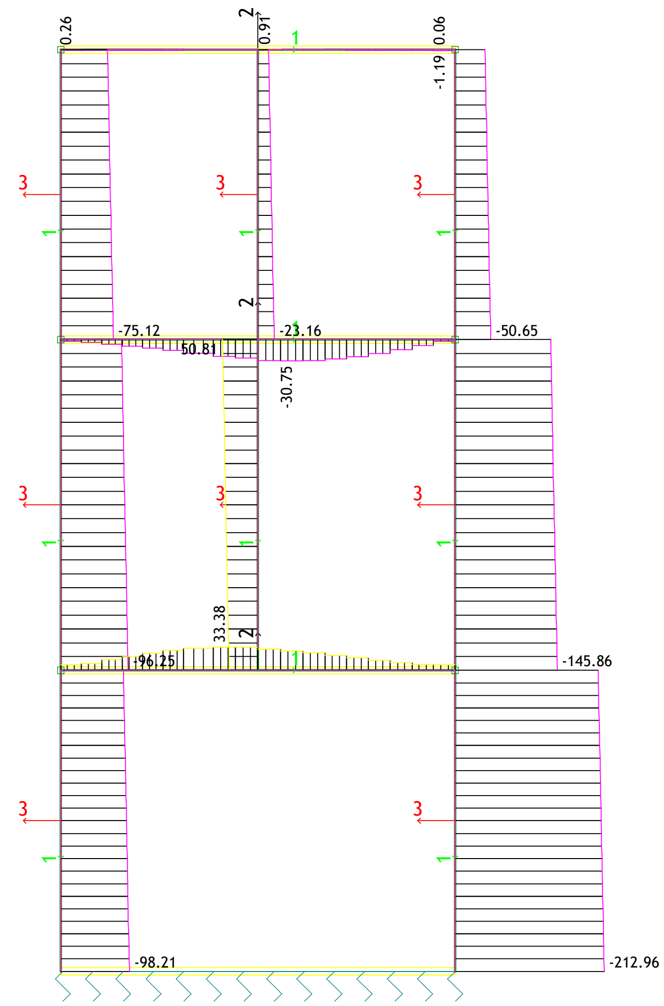
Okvir: H_3
Vplivi v gredi: max M3= 35.29 / min M3= -137.24 kNm

Obt. 14: [ovojnica MSN] 7-10



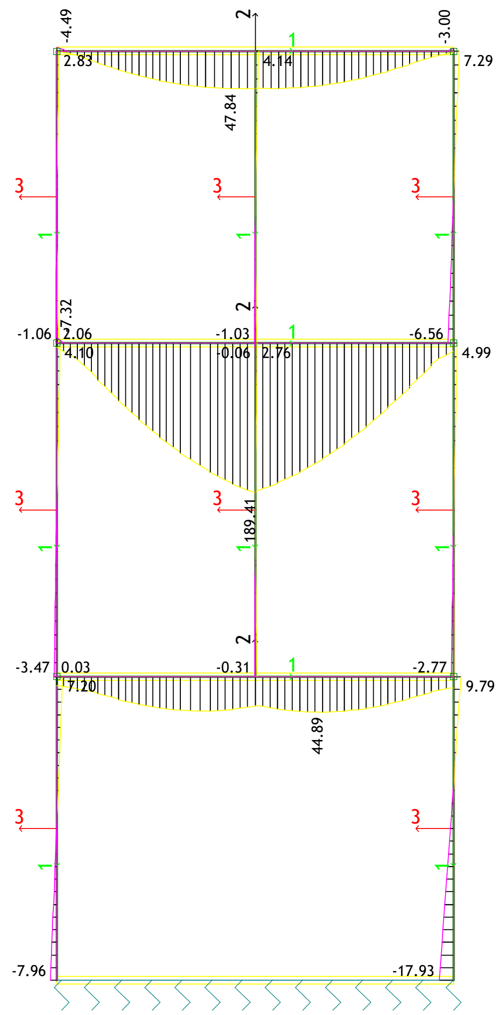
Okvir: H_3
Vplivi v gredi: max T2= 54.62 / min T2= -130.27 kN

Obt. 14: [ovojnica MSN] 7-10



Okvir: V_4
Vplivi v gredi: max N1= 50.81 / min N1= -212.96 kN

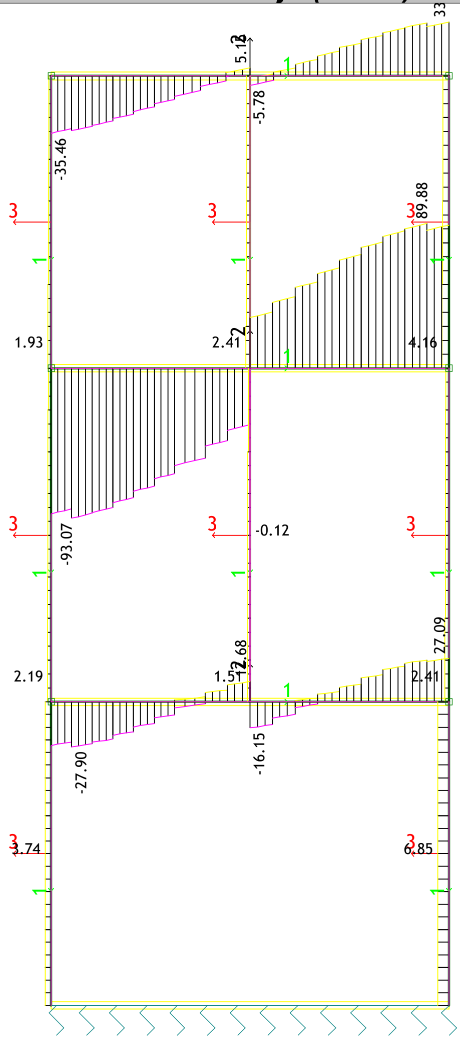
Obt. 14: [ovojnica MSN] 7-10



Okvir: V_4
Vplivi v gredi: max M3= 189.41 / min M3= -17.93 kNm

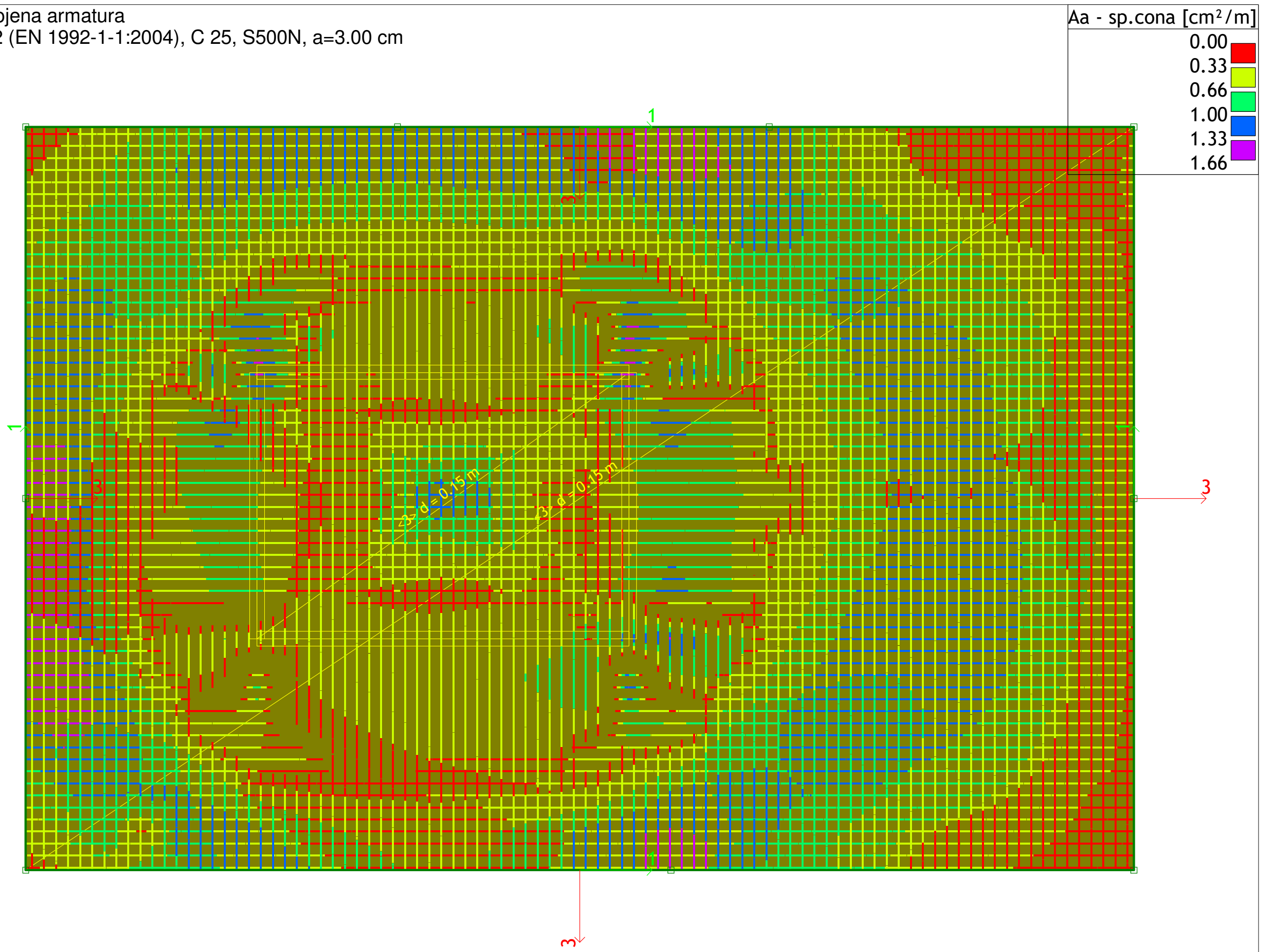
Dimenzioniranje (beton)

Obt. 14: [ovojnica MSN] 7-10



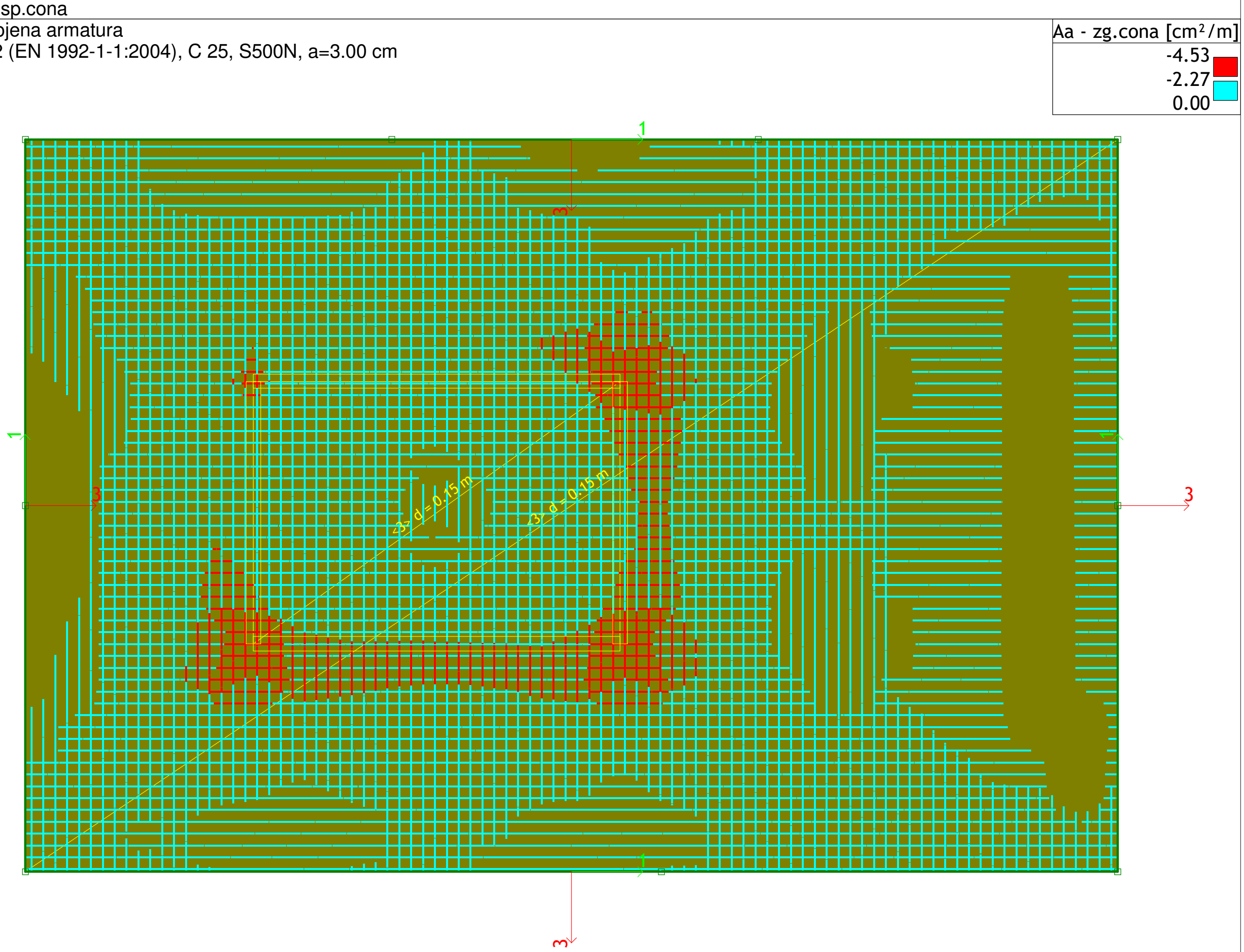
Okvir: V_4
Vplivi v gredi: max T2= 89.88 / min T2= -93.07 kN

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



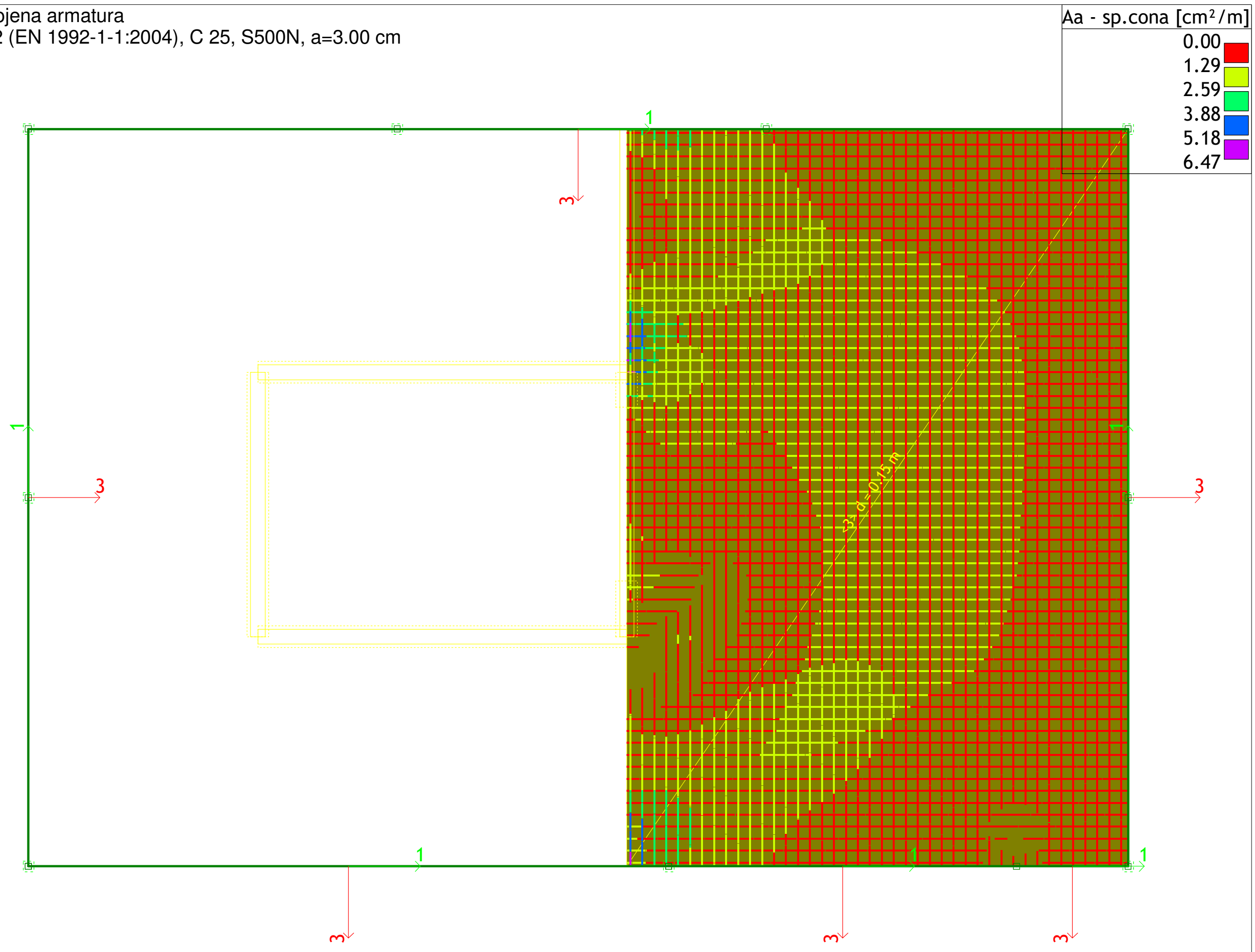
Nivo: kota strop nad 2N [12.40 m]
Aa - sp.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



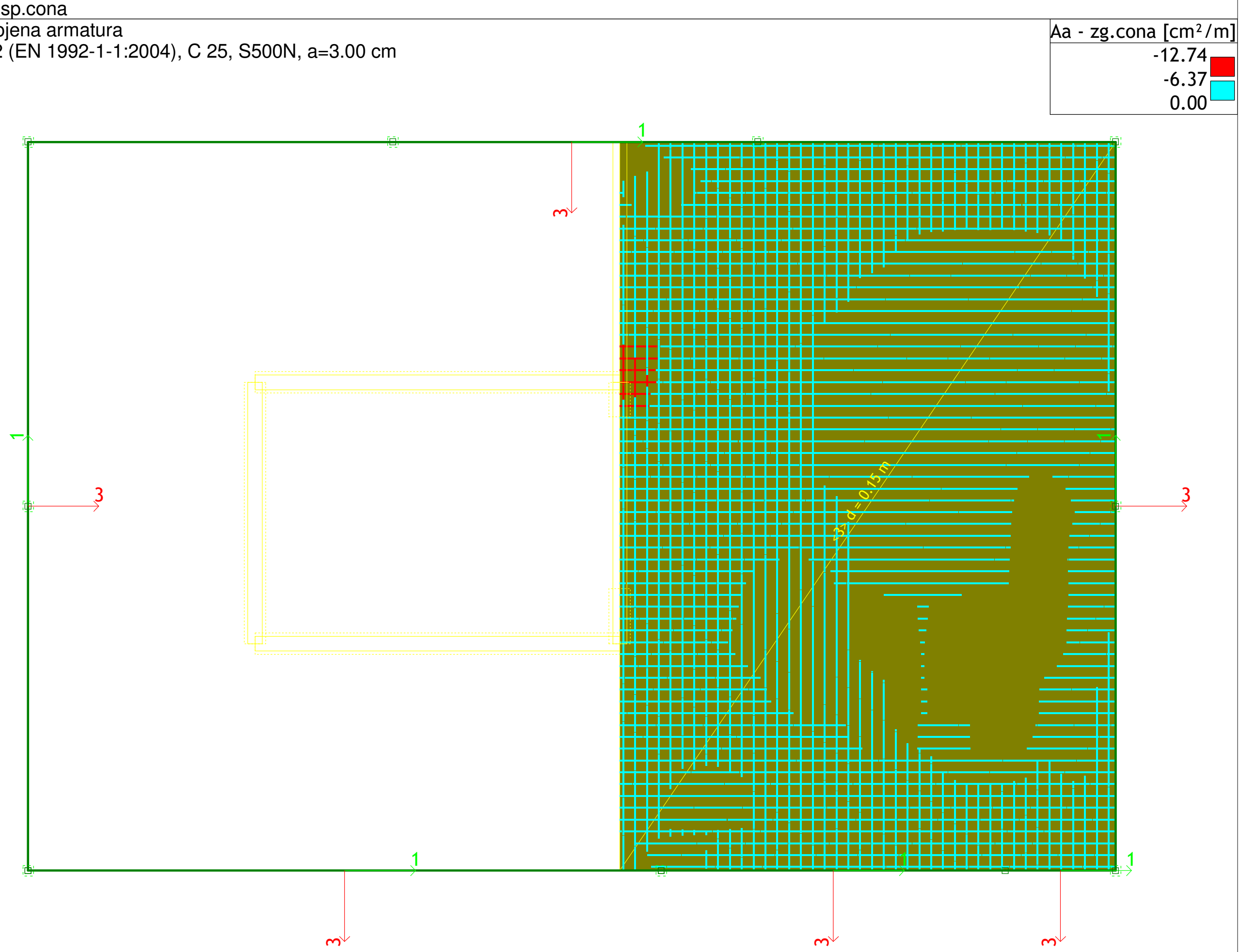
Nivo: kota strop nad 2N [12.40 m]
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



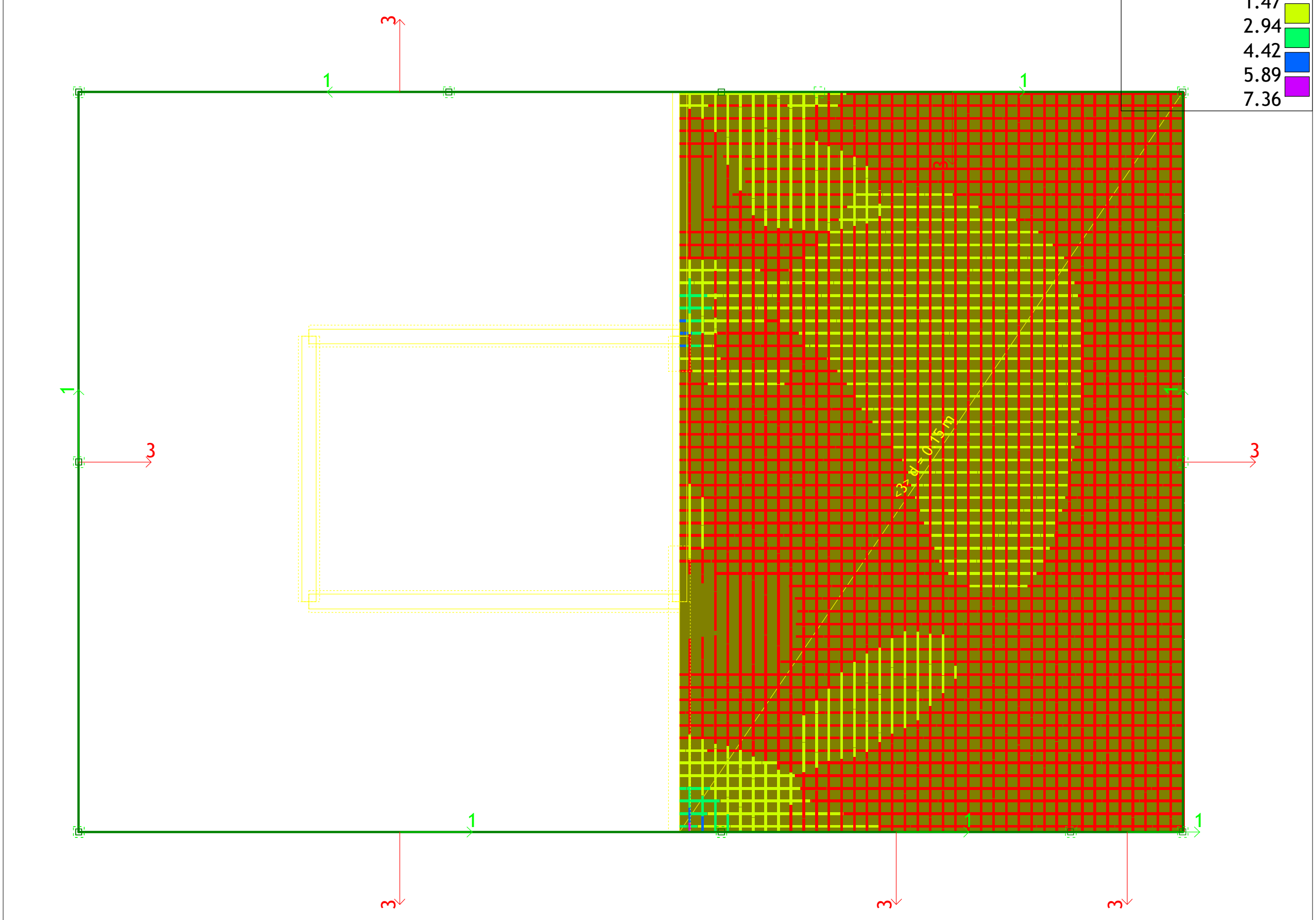
Nivo: kota strop nad 1N [8.50 m]
Aa - sp.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



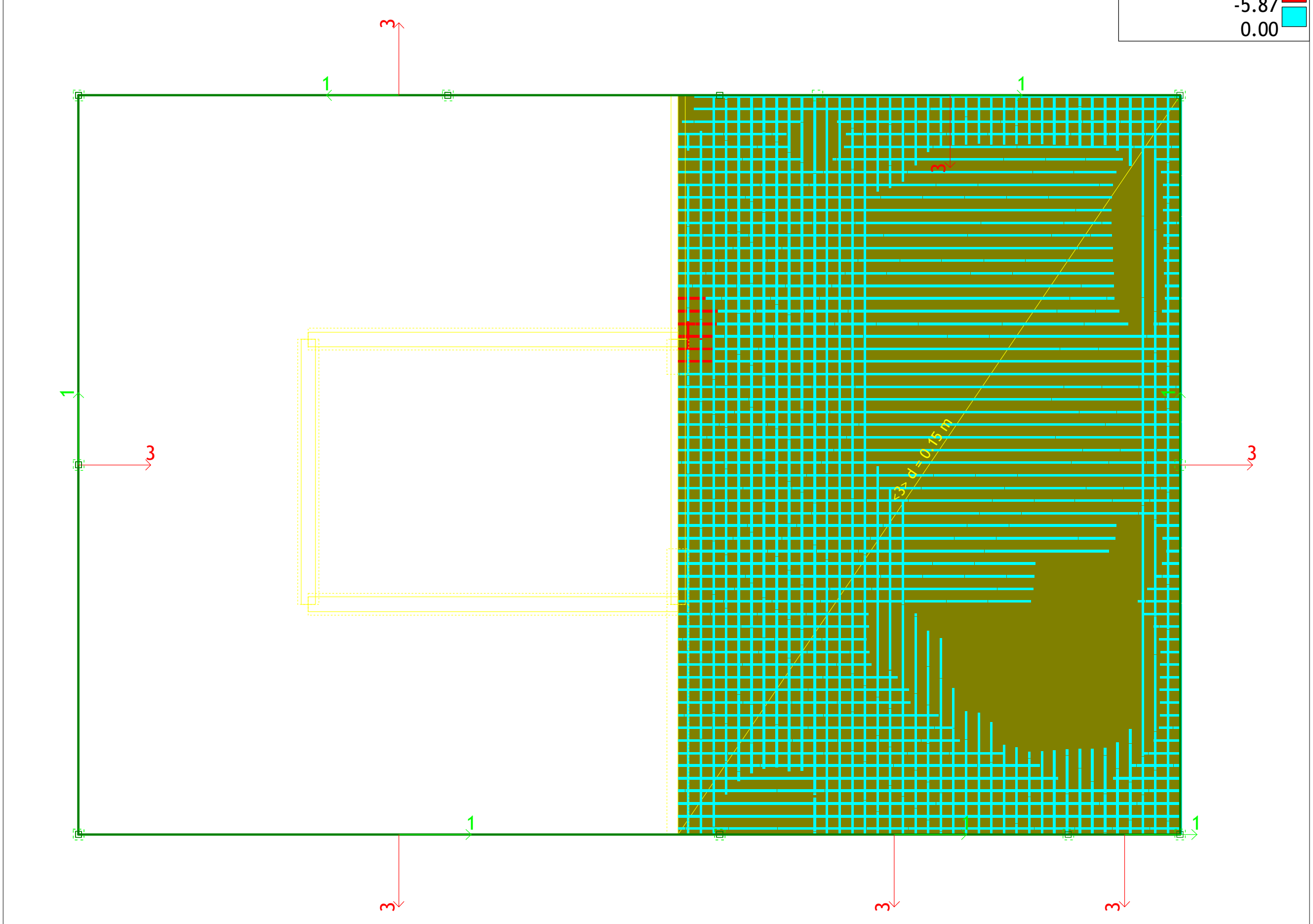
Nivo: kota strop nad 1N [8.50 m]
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



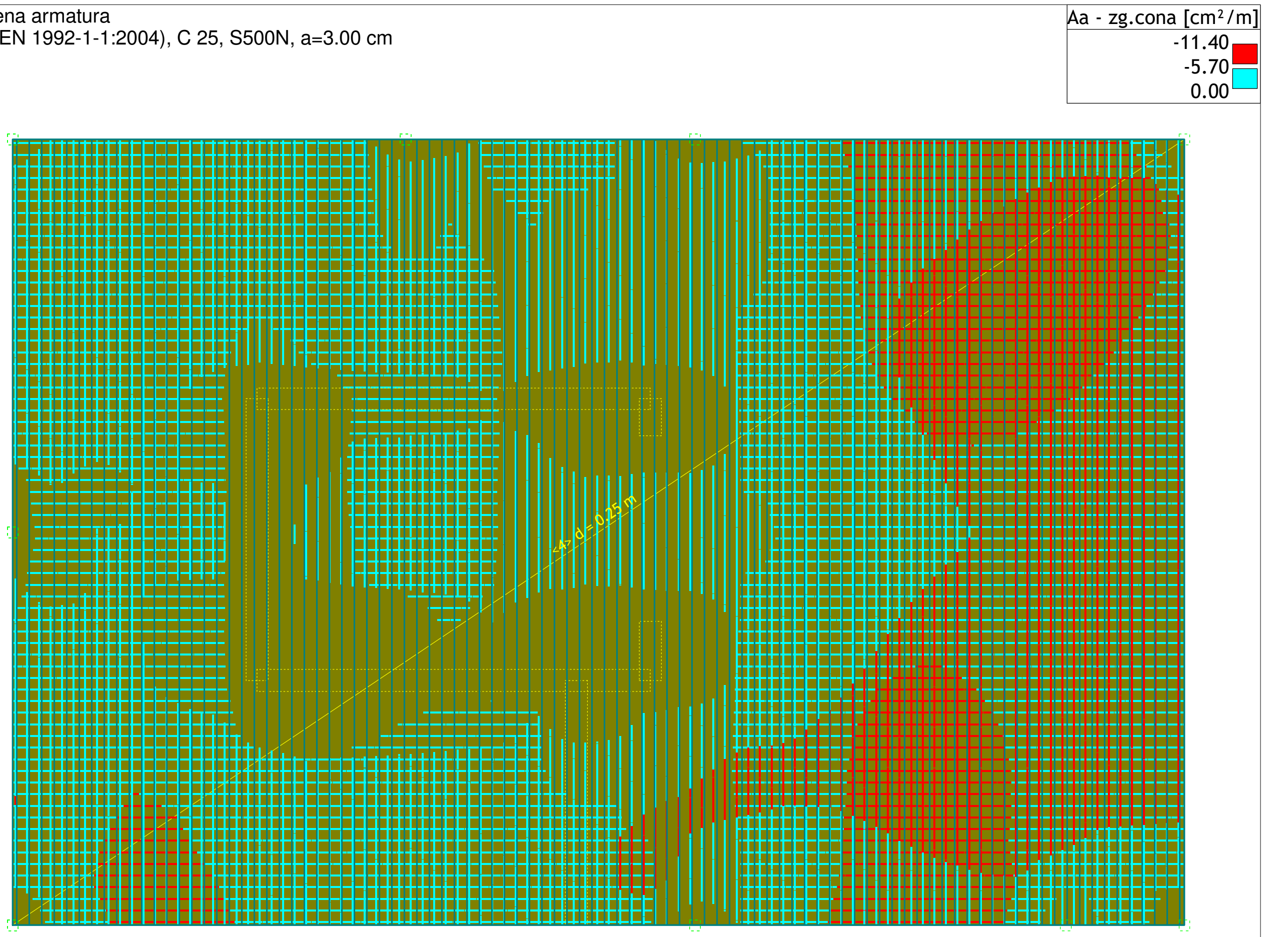
Nivo: kota strop nad P [4.05 m]
Aa - sp.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



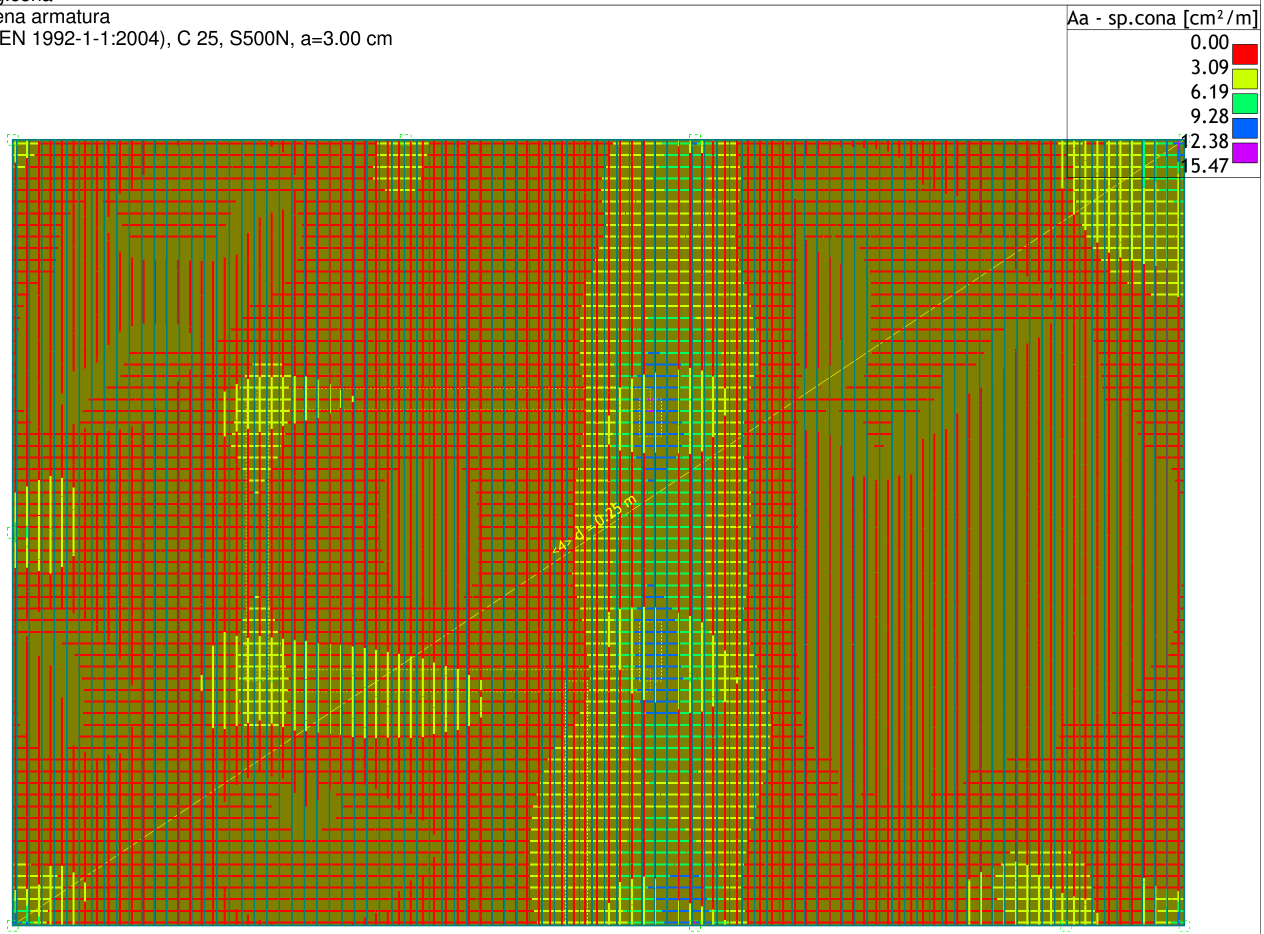
Nivo: kota strop nad P [4.05 m]
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



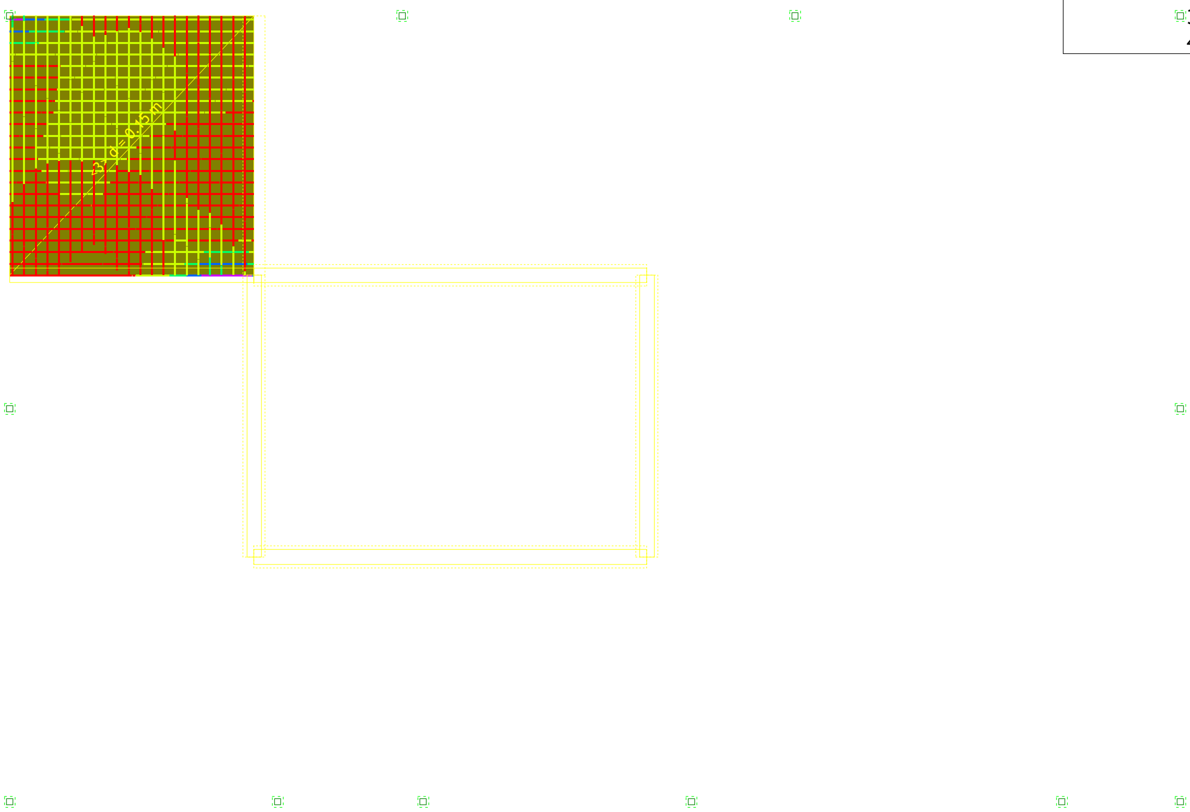
Nivo: kota talne plošče [0.00 m]
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



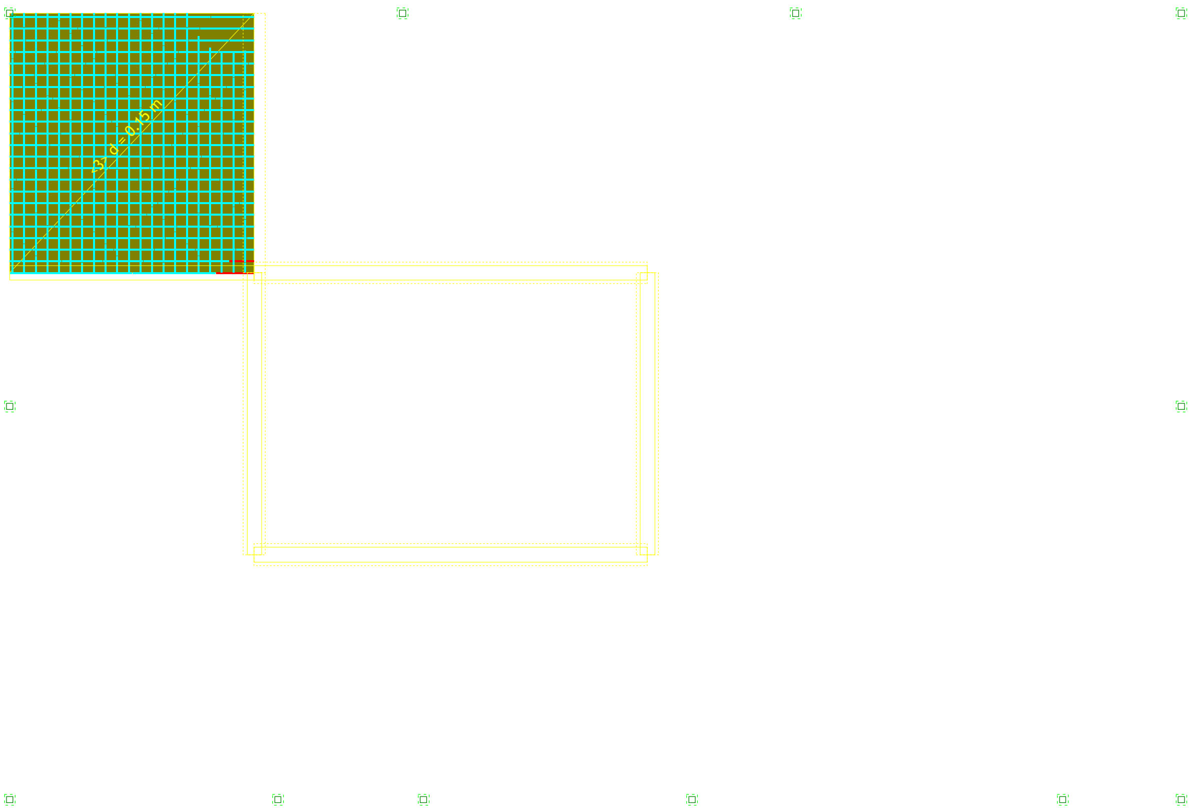
Nivo: kota talne plošče [0.00 m]
Aa - sp.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



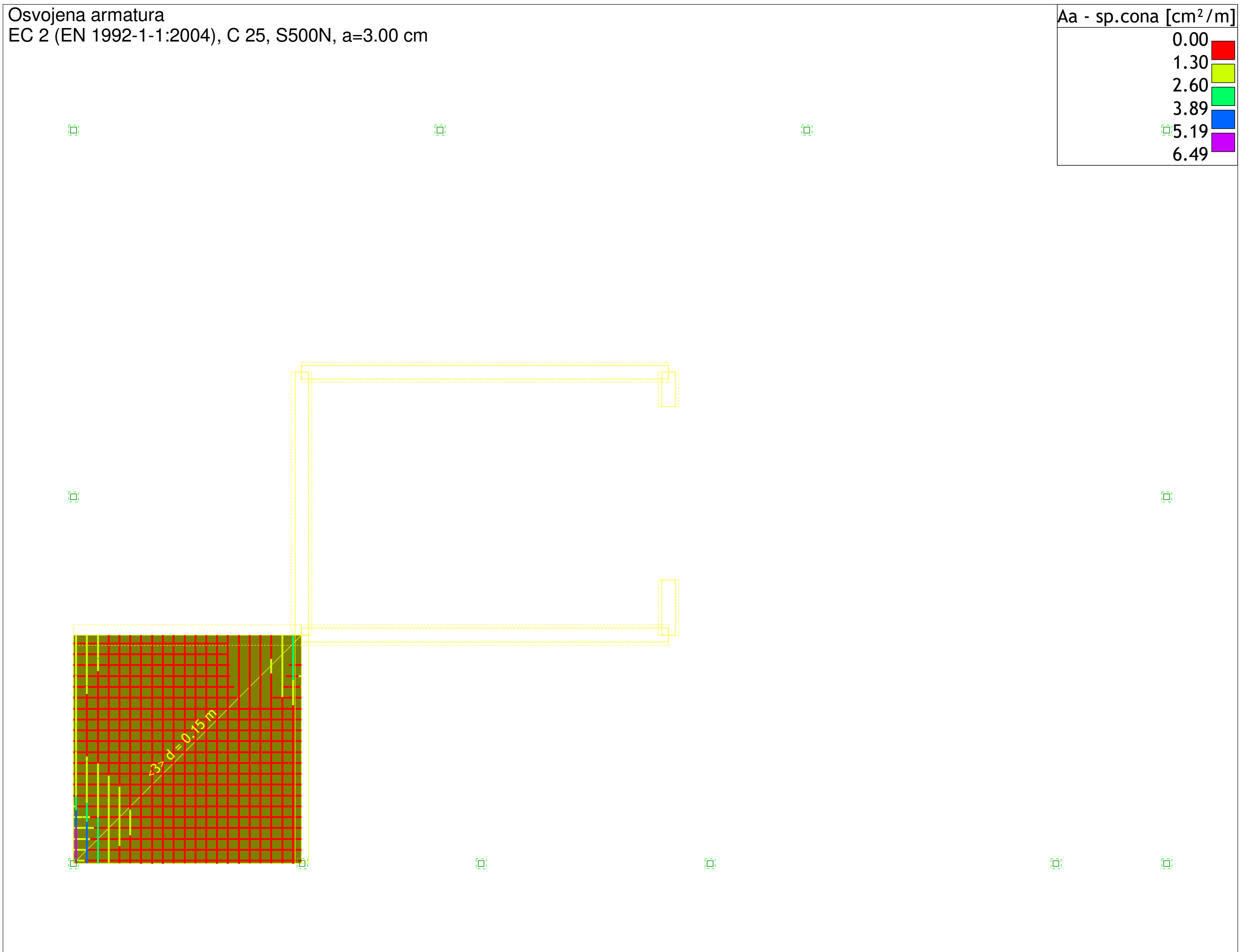
Nivo: podest4 [6.75 m]
Aa - sp.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



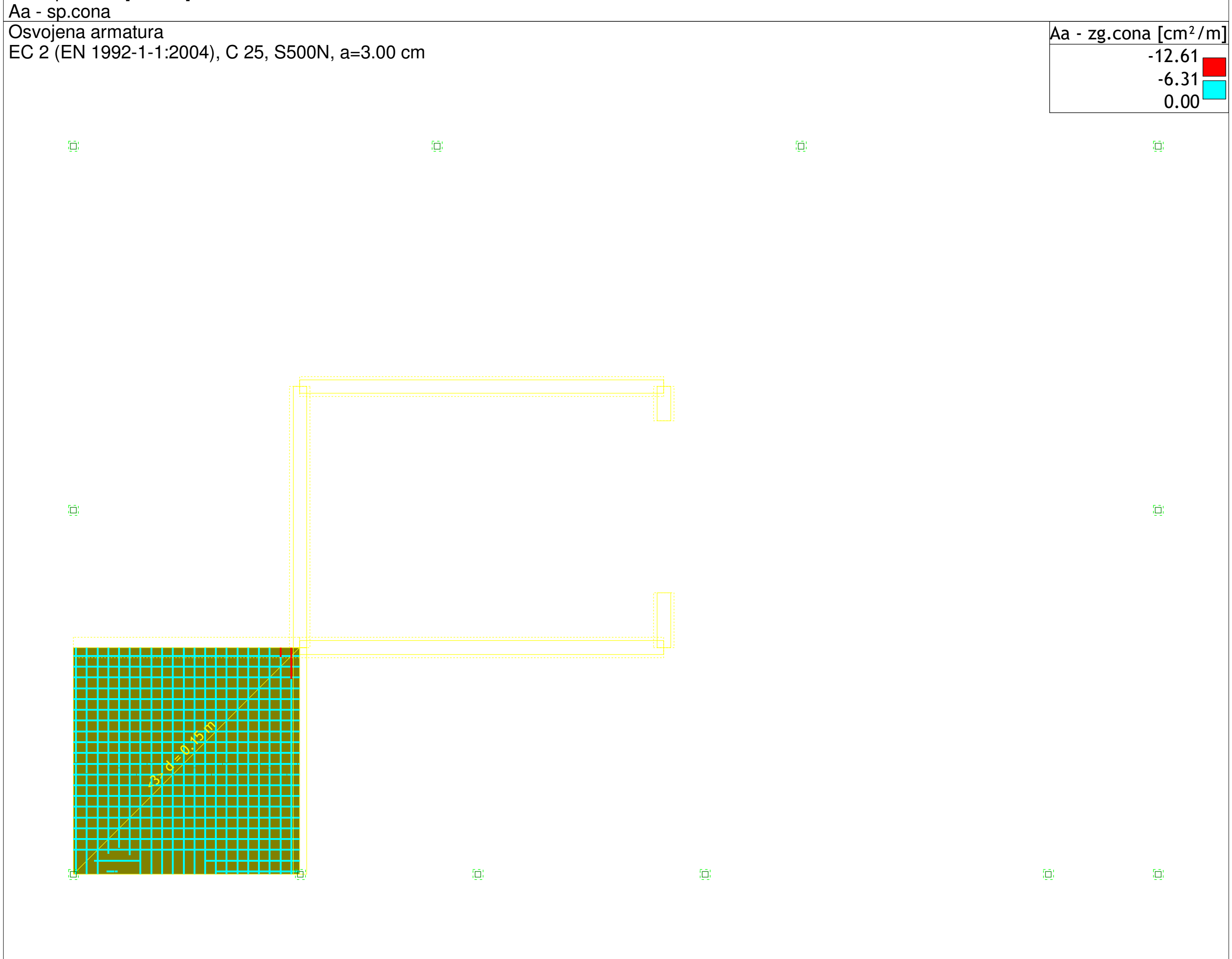
Nivo: podest4 [6.75 m]
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



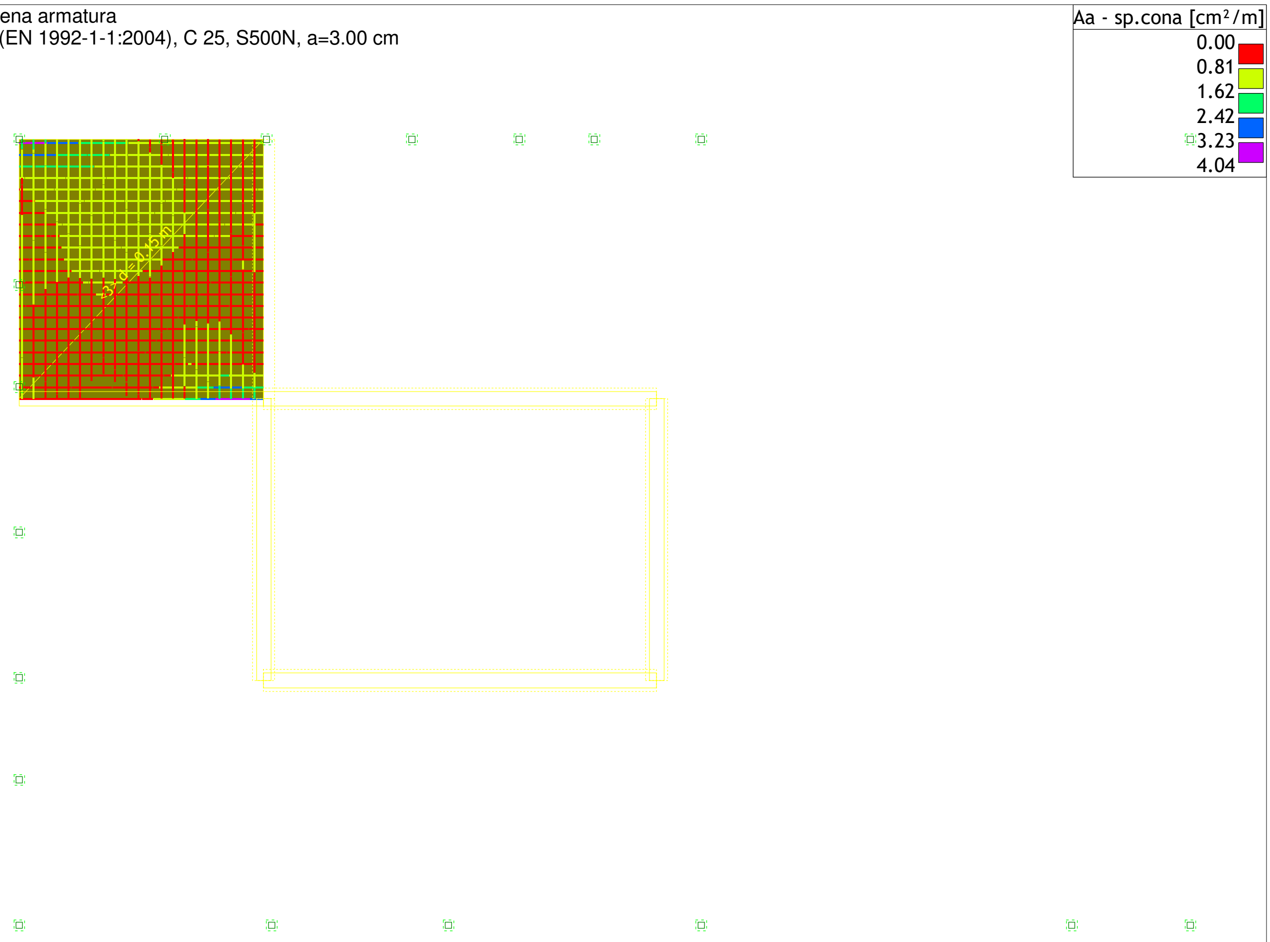
Nivo: podest3 [5.65 m]
Aa - sp.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



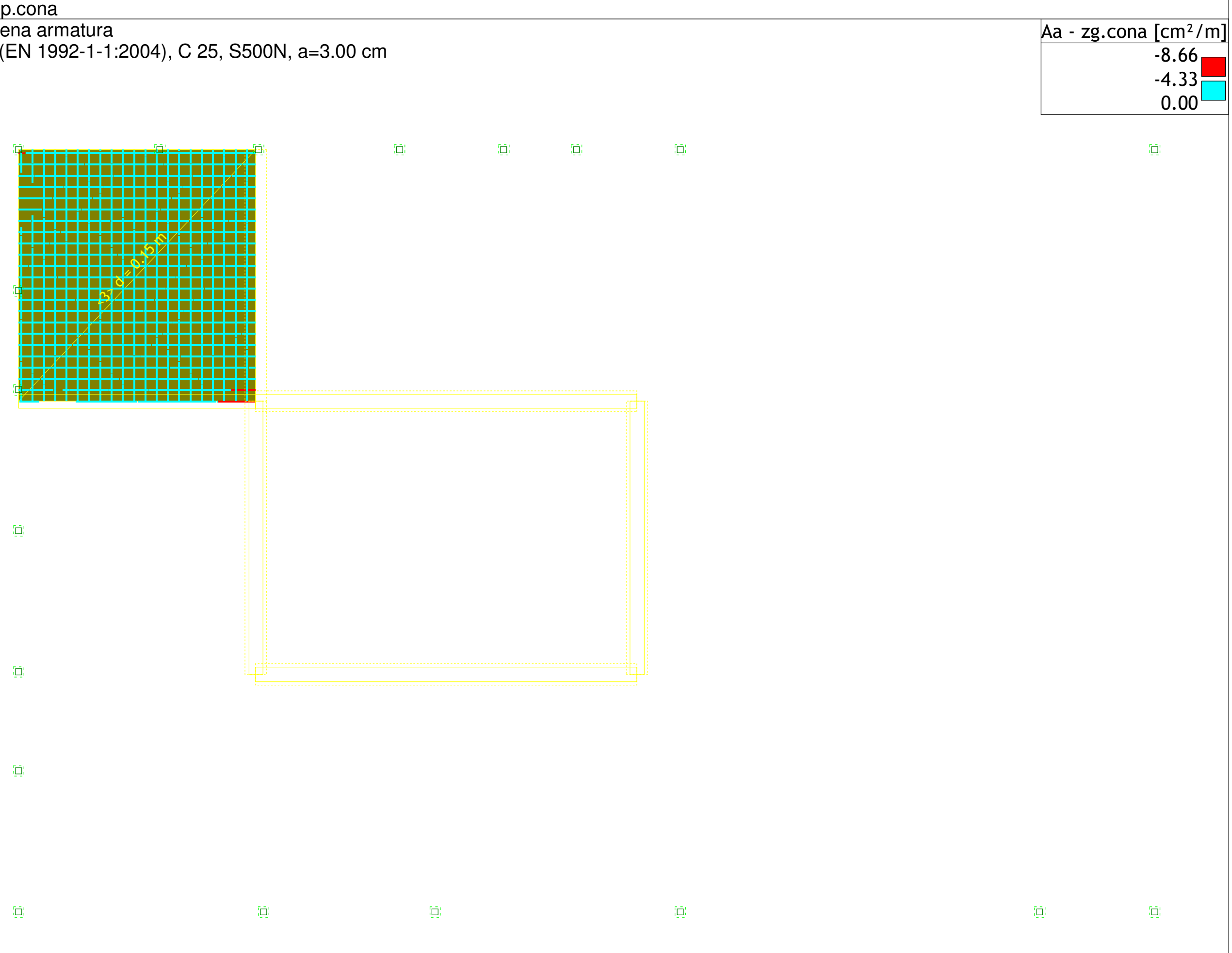
Nivo: podest3 [5.65 m]
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



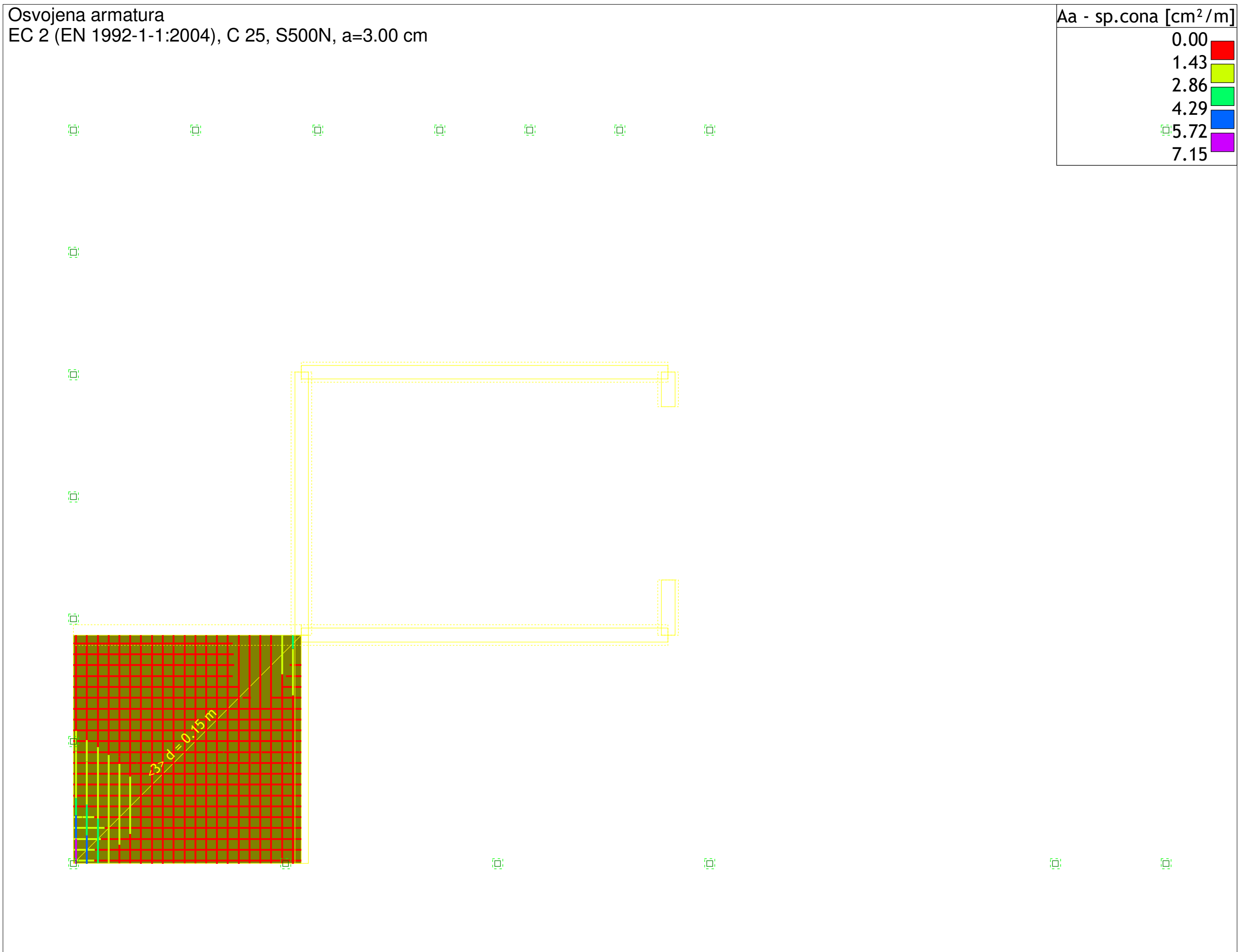
Nivo: podest2 [2.55 m]
Aa - sp.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



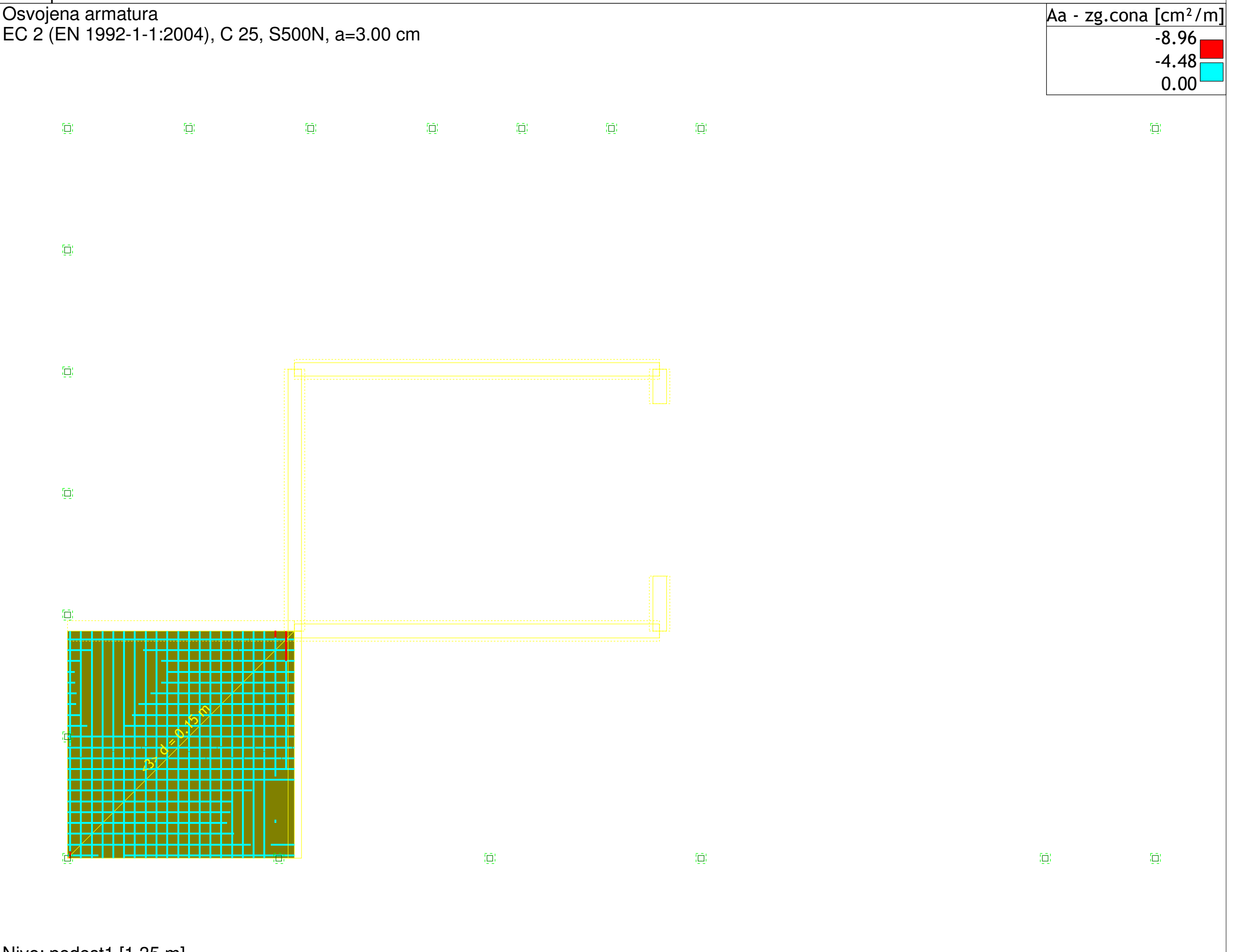
Nivo: podest2 [2.55 m]
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



Nivo: podest1 [1.35 m]
Aa - sp.cona

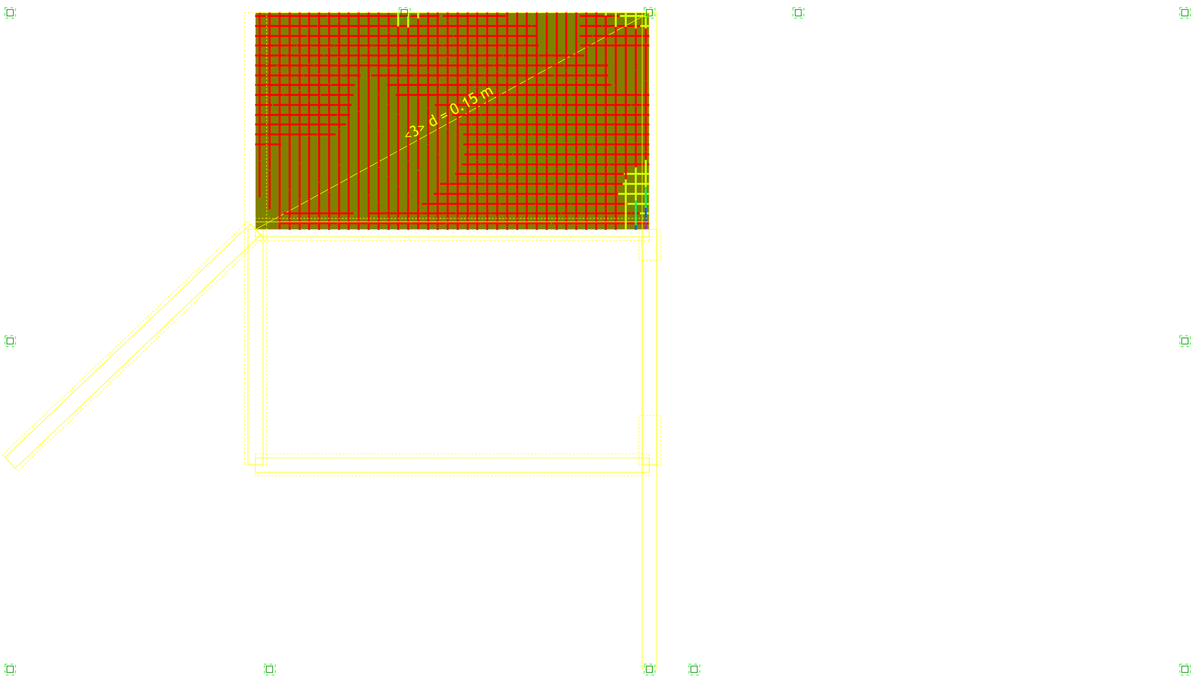
Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



Nivo: podest1 [1.35 m]
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm

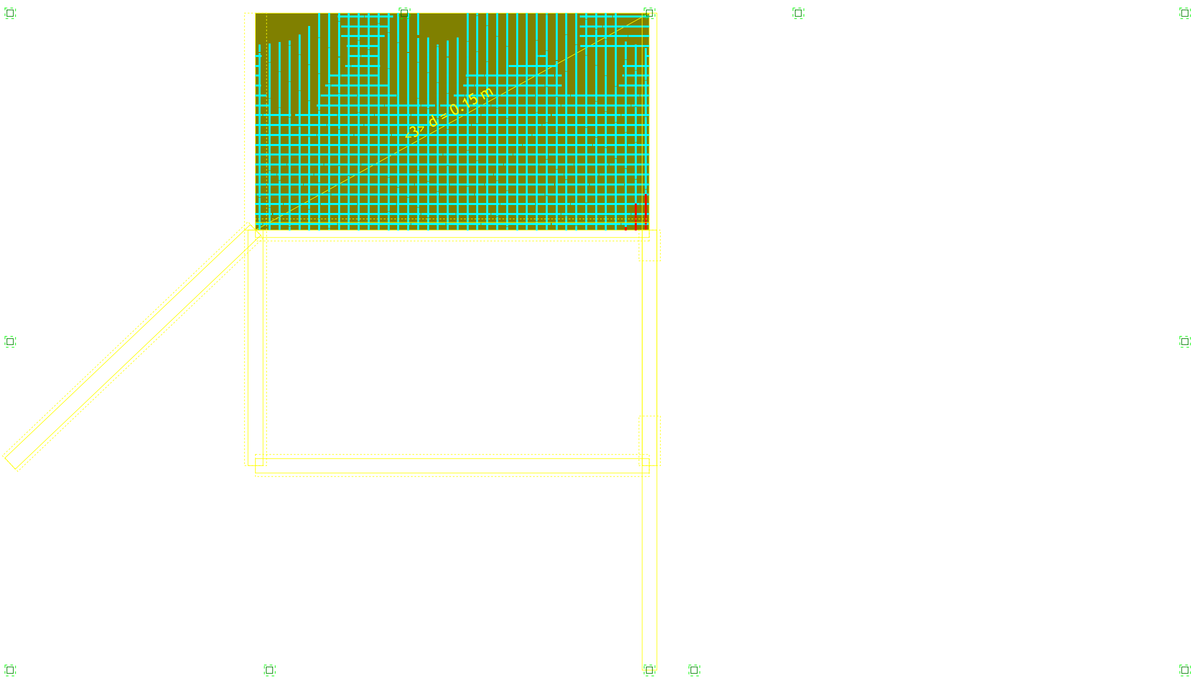
Aa - sp.cona [cm²/m]
0.00
1.75
3.50
5.25
7.00
8.75



Pogled: stopniščna rama6
Aa - sp.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm

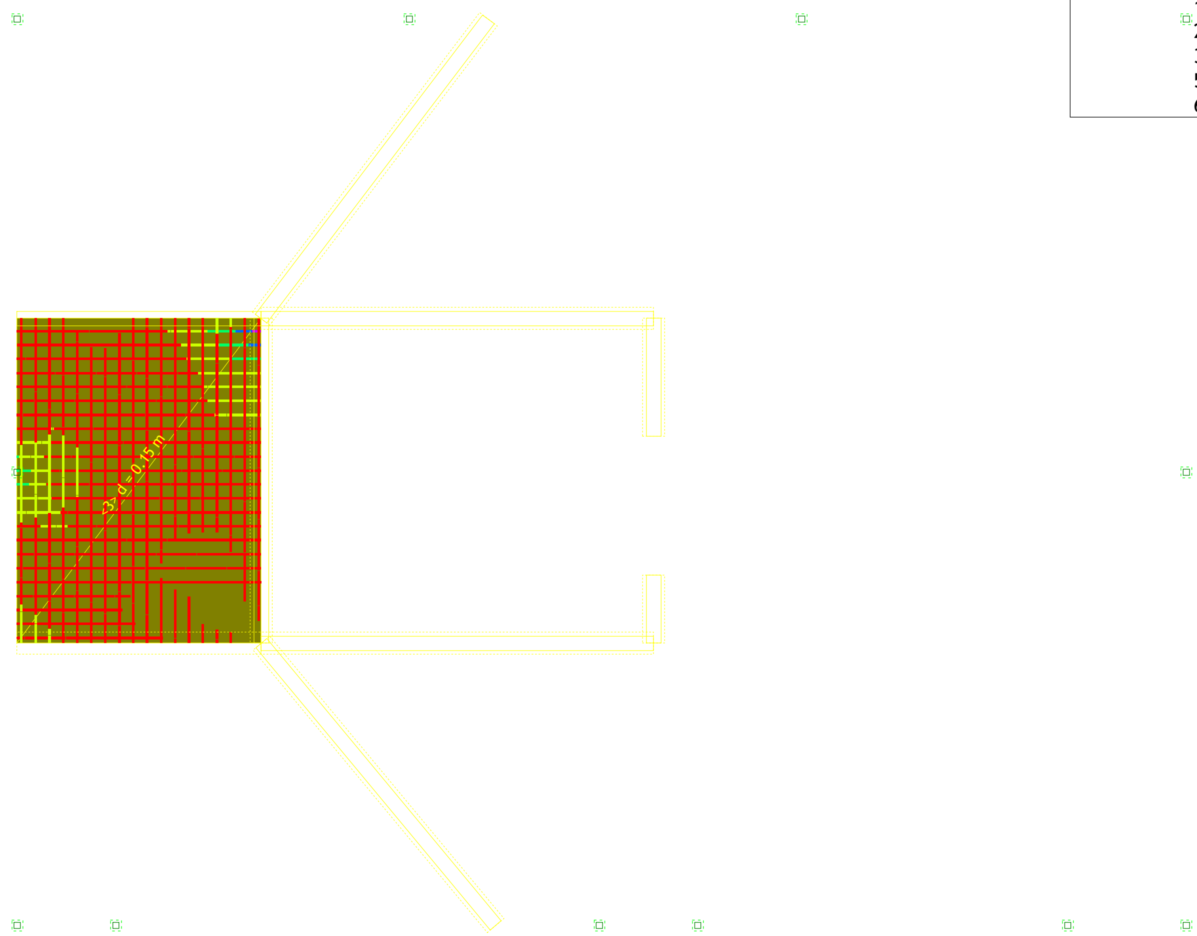
Aa - zg.cona [cm²/m]
-10.94
-5.47
0.00



Pogled: stopniščna rama6
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm

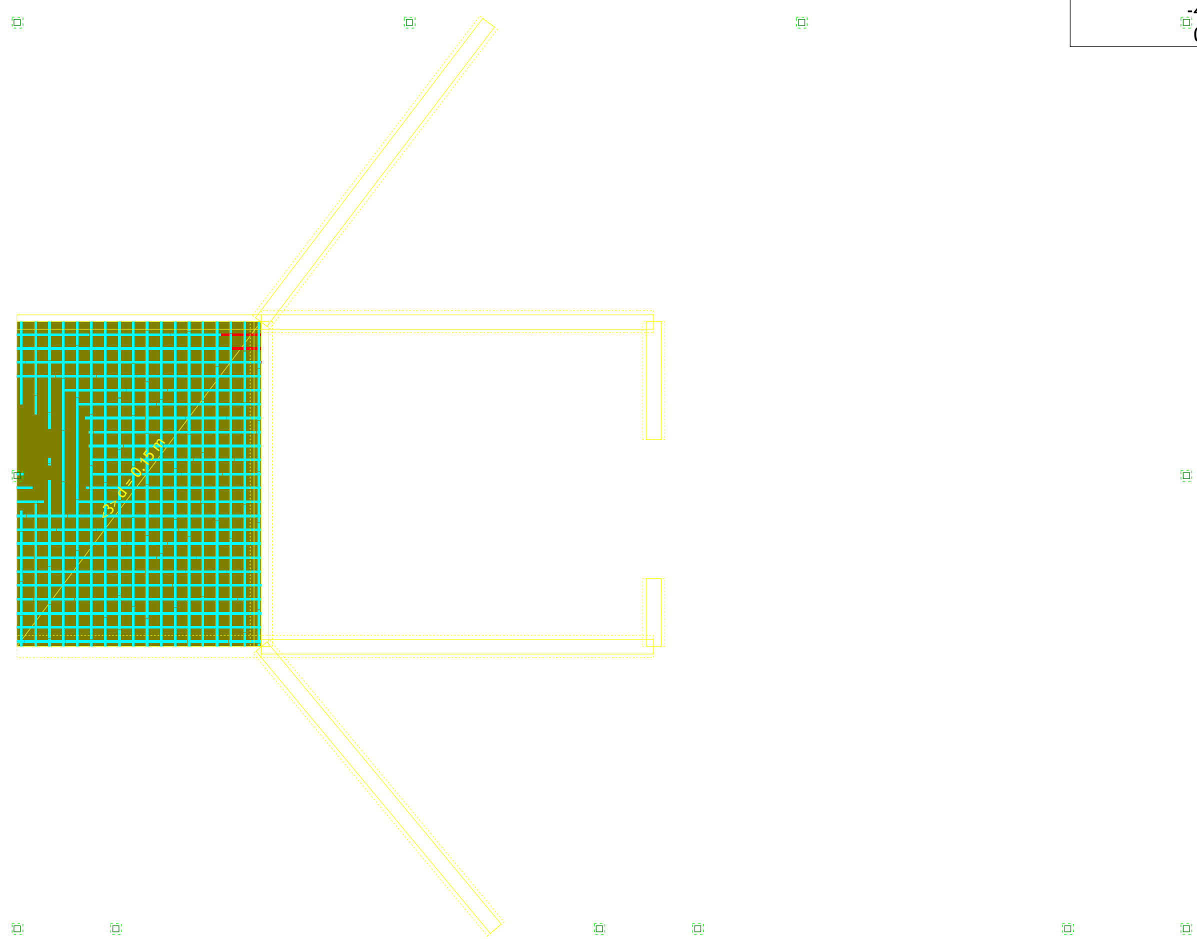
Aa - sp.cona [cm²/m]
0.00
1.27
2.54
3.81
5.08
6.35



Pogled: stopniščna rama5
Aa - sp.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm

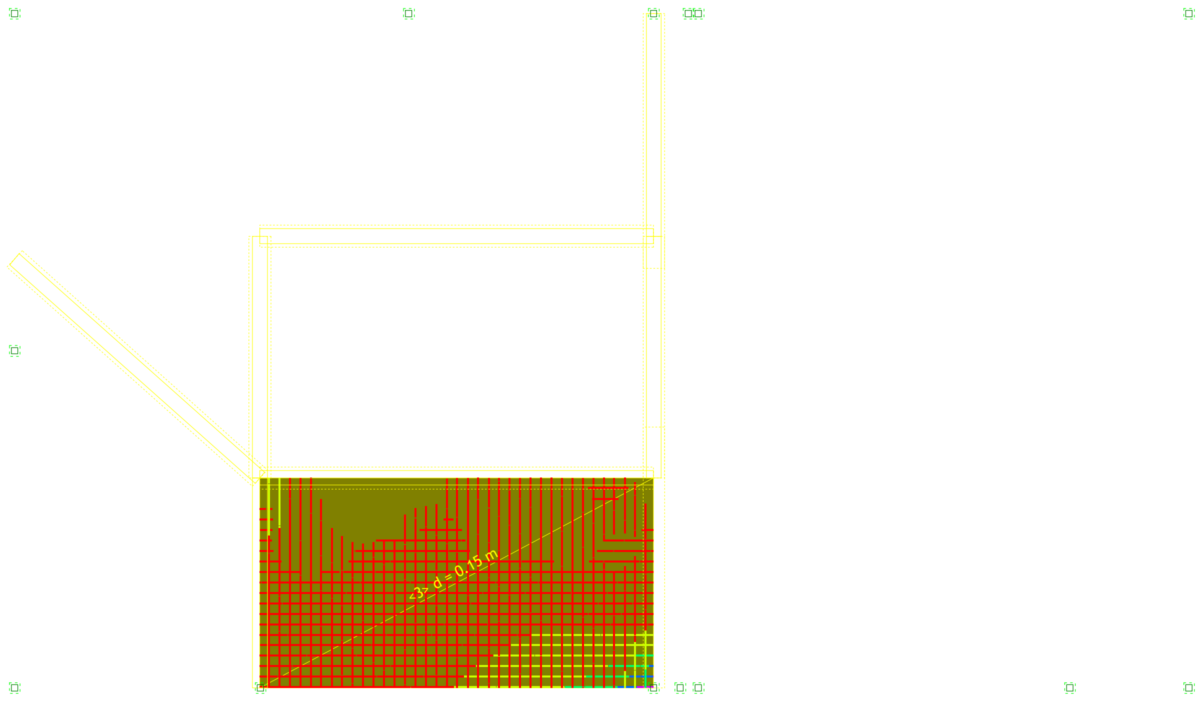
Aa - zg.cona [cm²/m]
-8.61
-4.31
0.00



Pogled: stopniščna rama5
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm

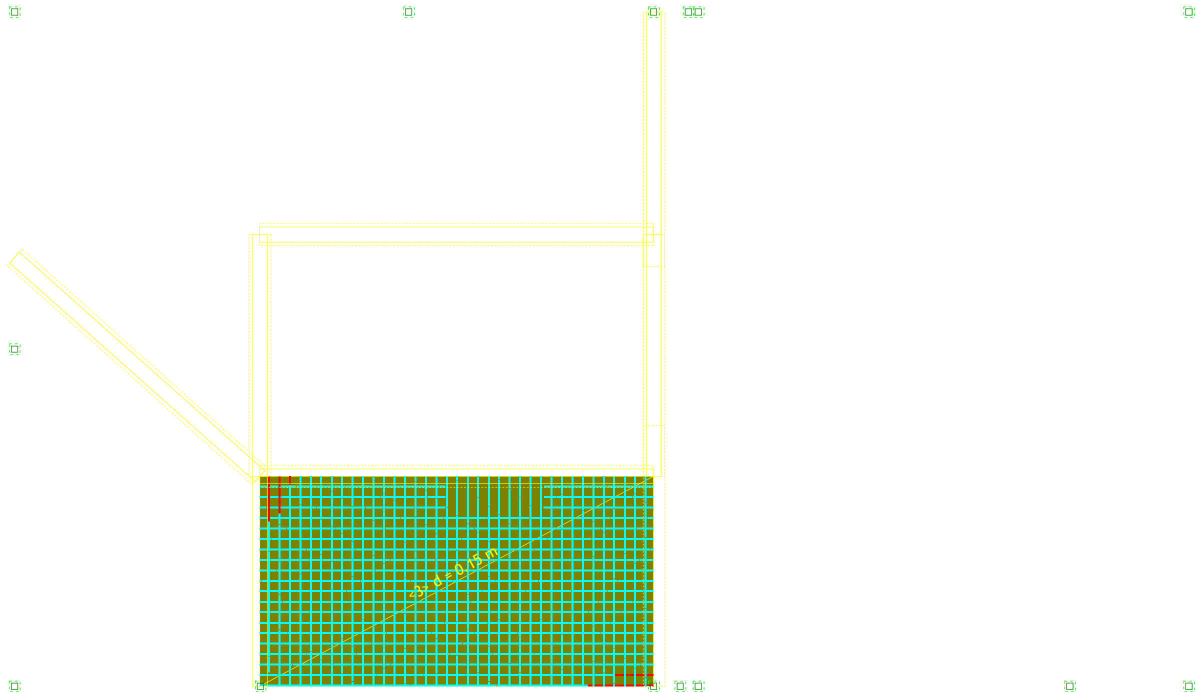
Aa - sp.cona [cm²/m]
0.00
2.53
5.06
7.59
10.12
12.65



Pogled: stopniščna rama4
Aa - sp.cona

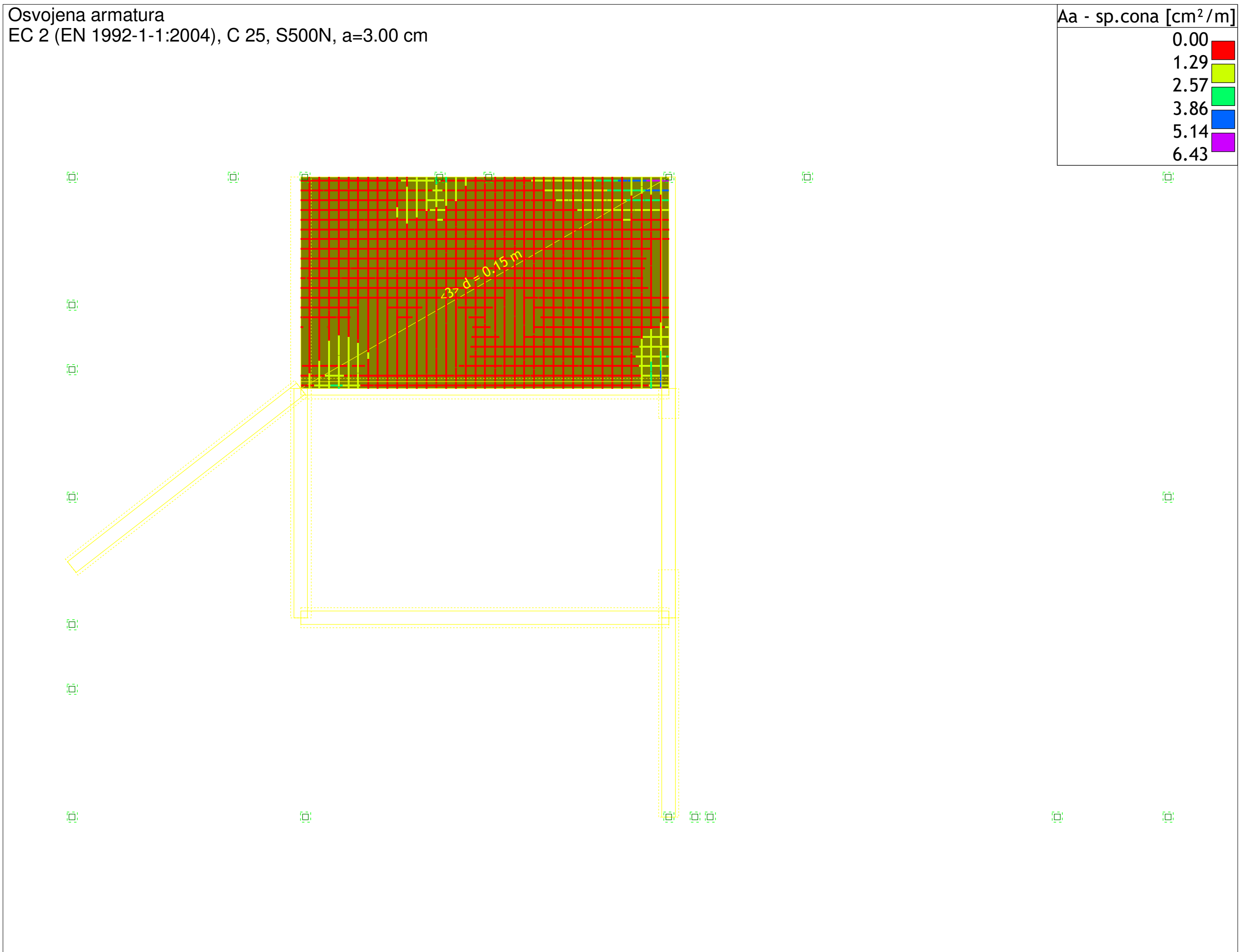
Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm

Aa - zg.cona [cm²/m]
-11.06
-5.53
0.00



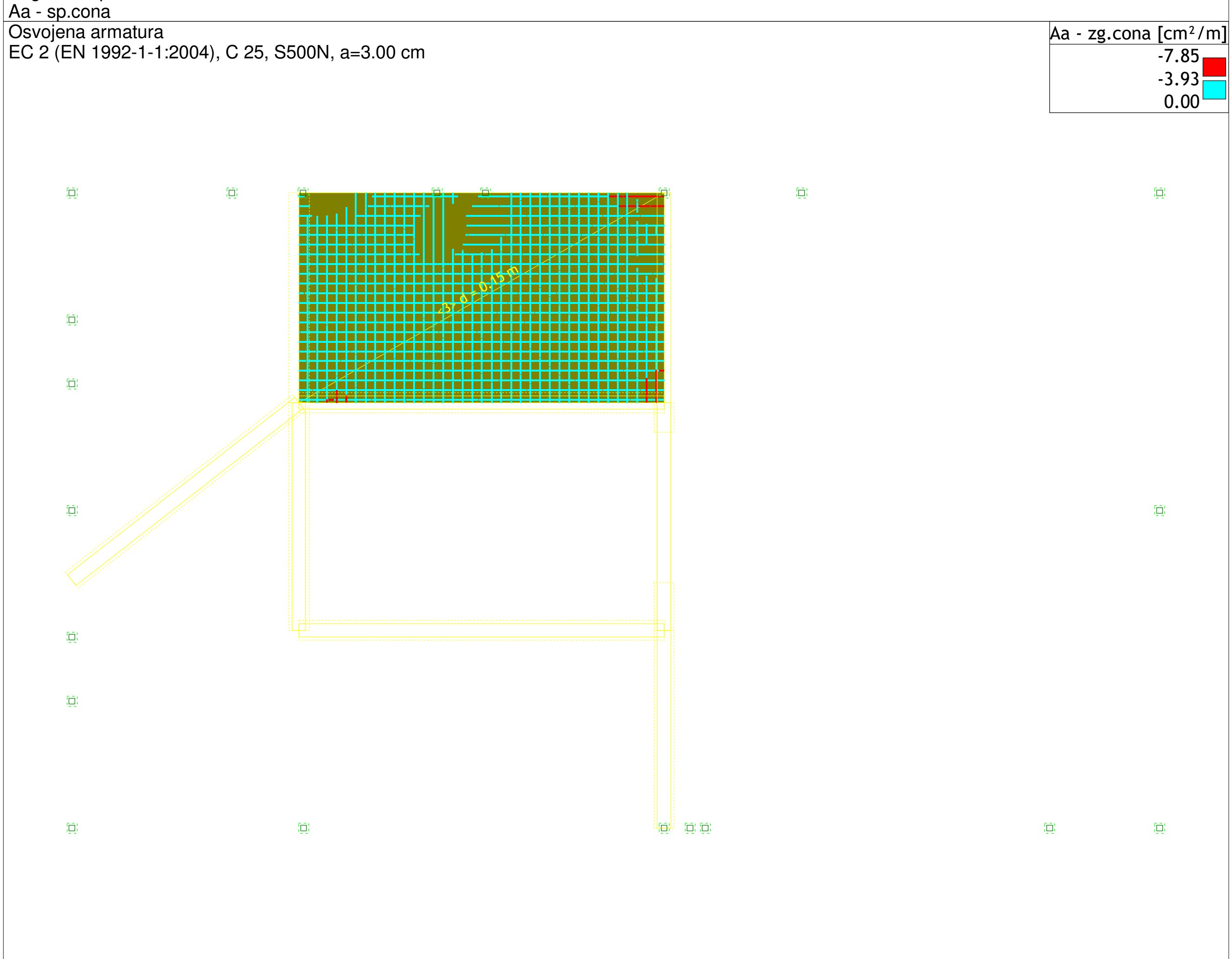
Pogled: stopniščna rama4
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



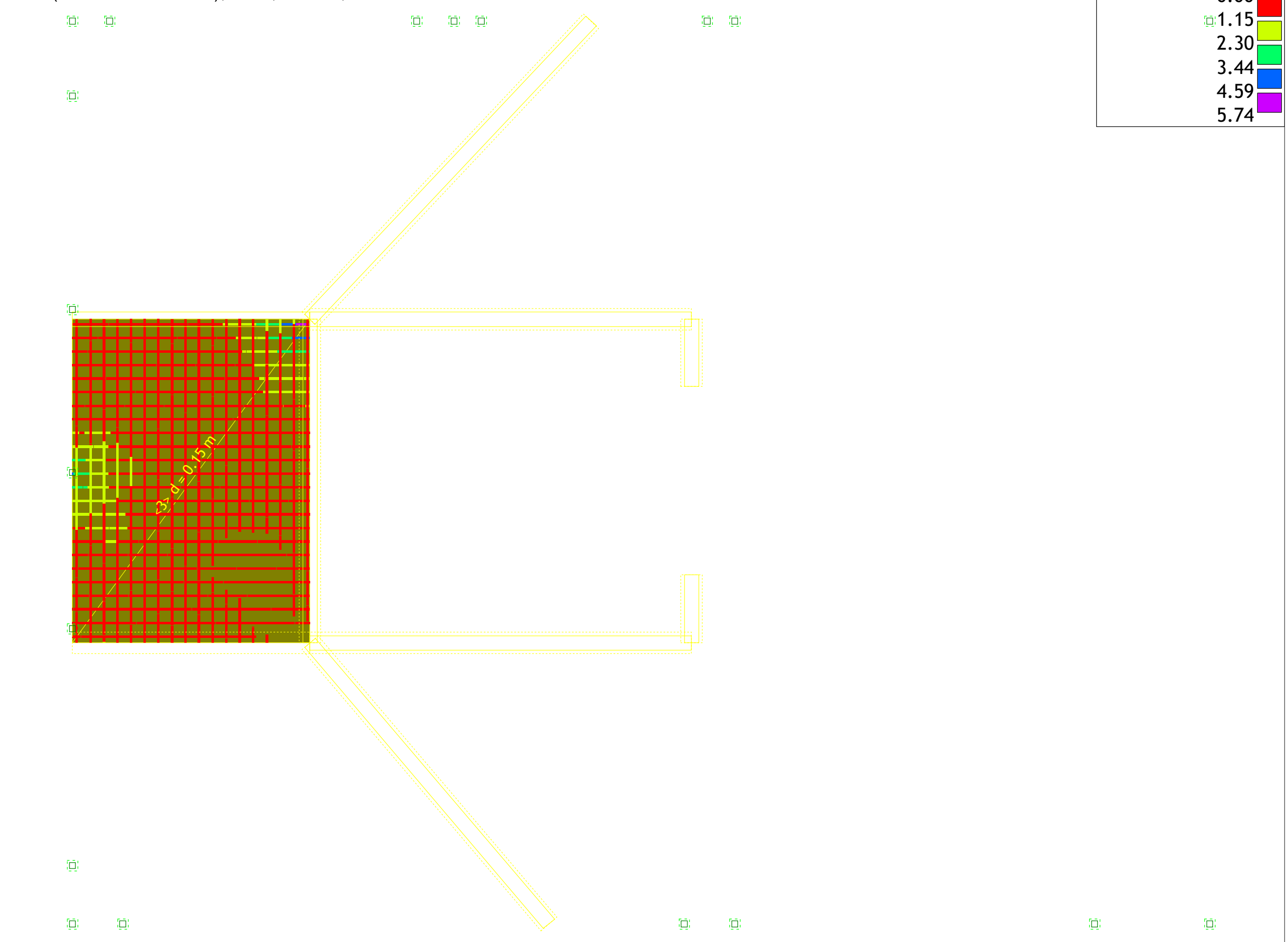
Pogled: stopniščna rama 3
Aa - sp.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



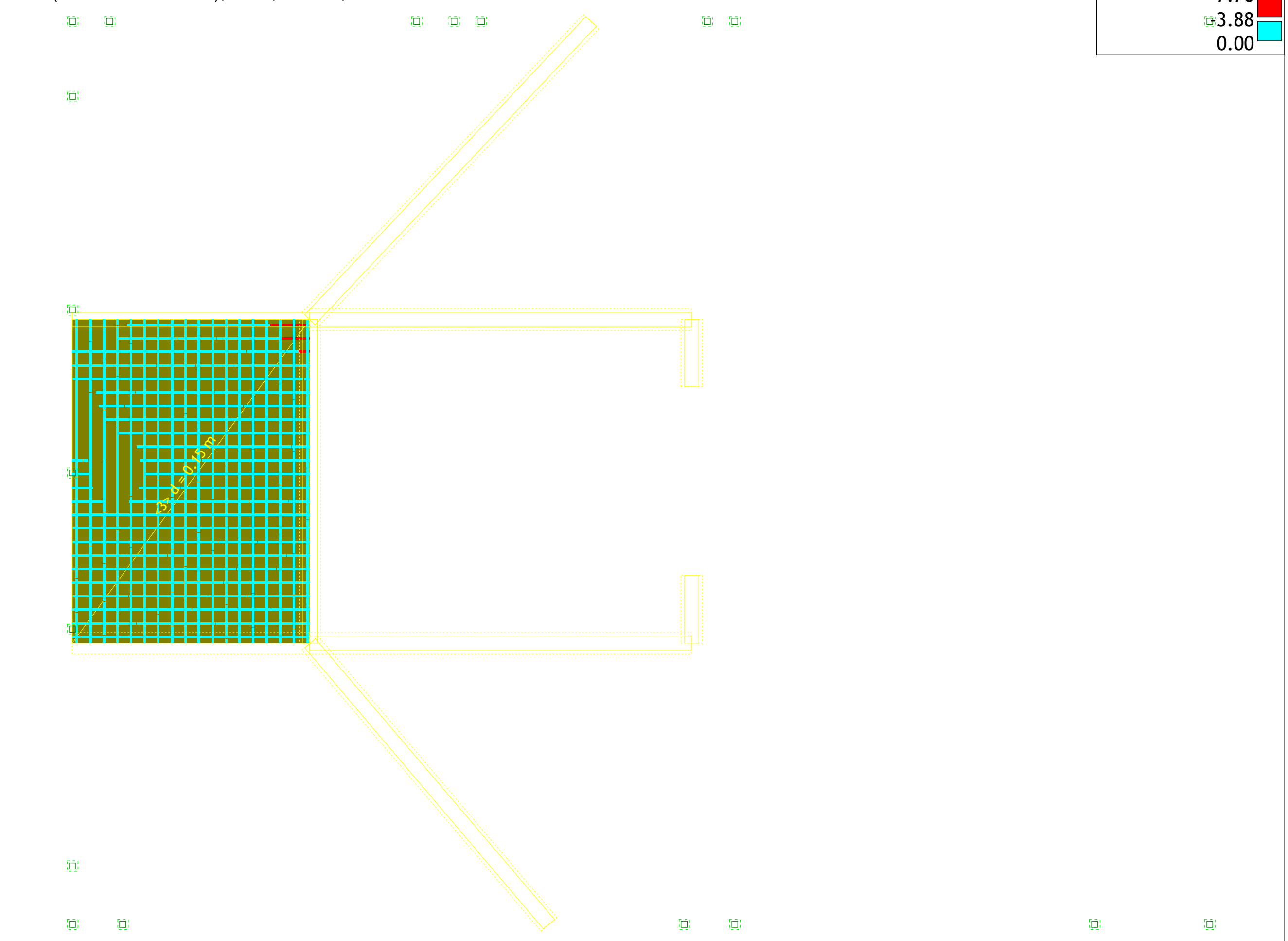
Pogled: stopniščna rama 3
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



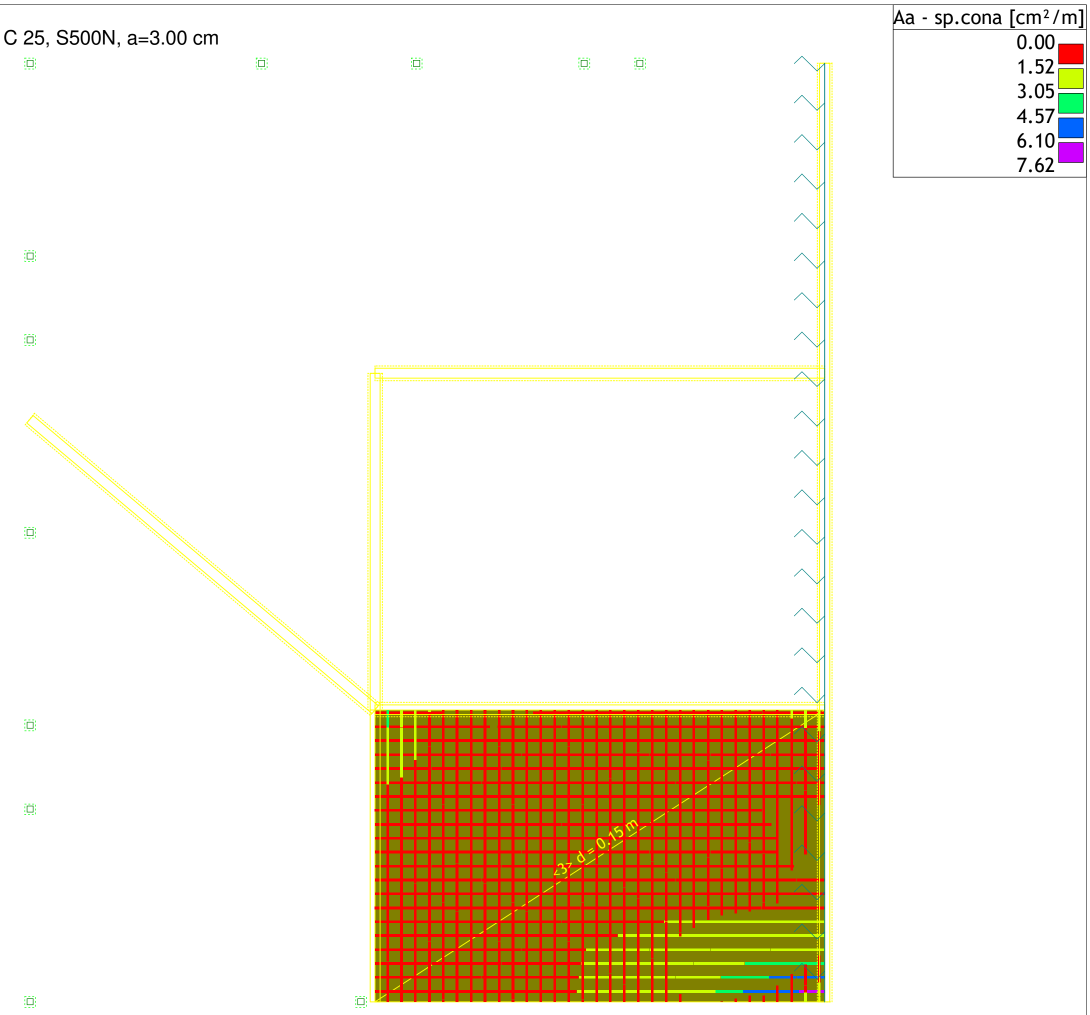
Pogled: stopnišča rama 2
Aa - sp.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



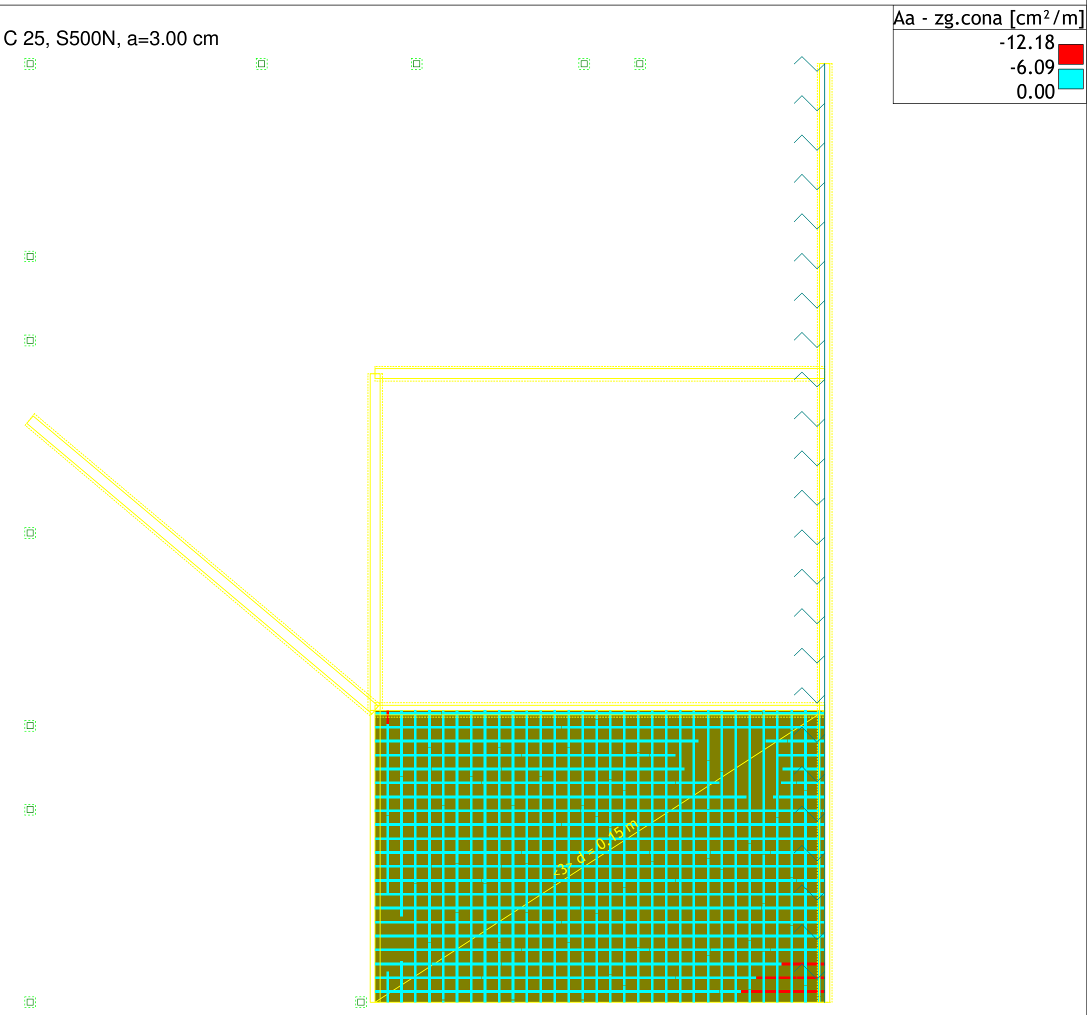
Pogled: stopnišča rama 2
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



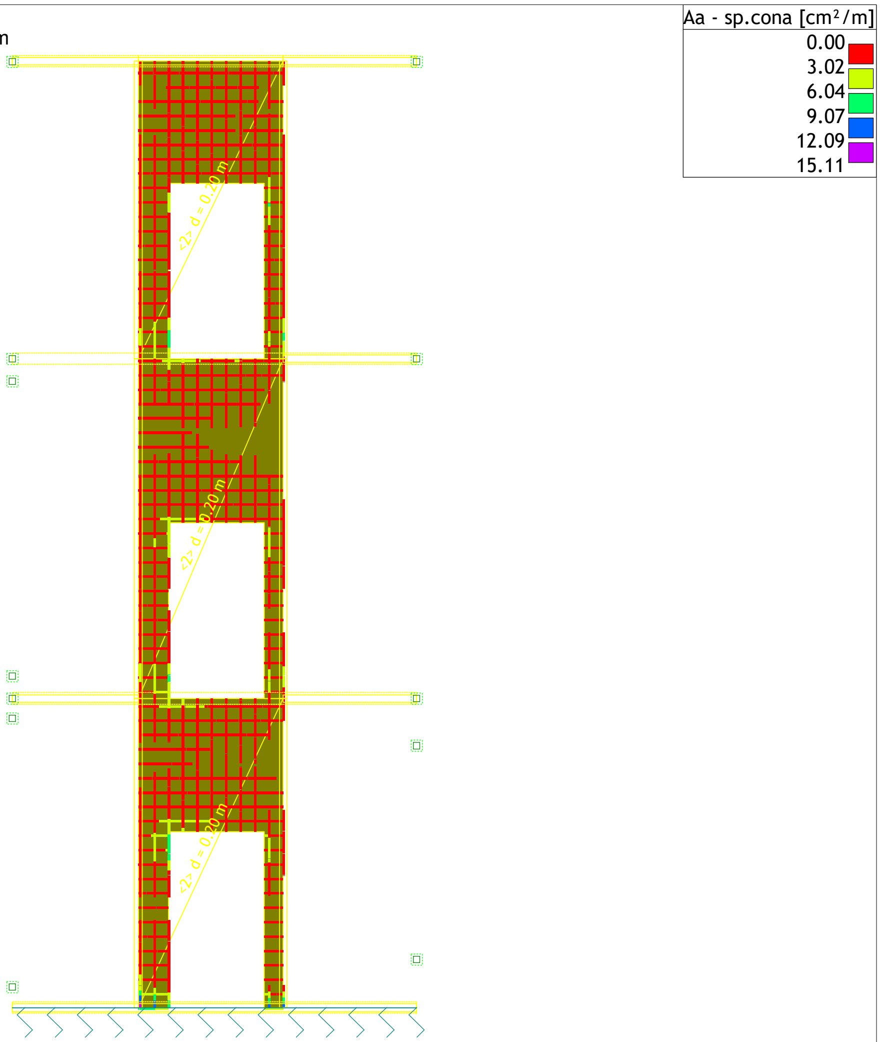
Pogled: stopnišča rama 1
Aa - sp.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



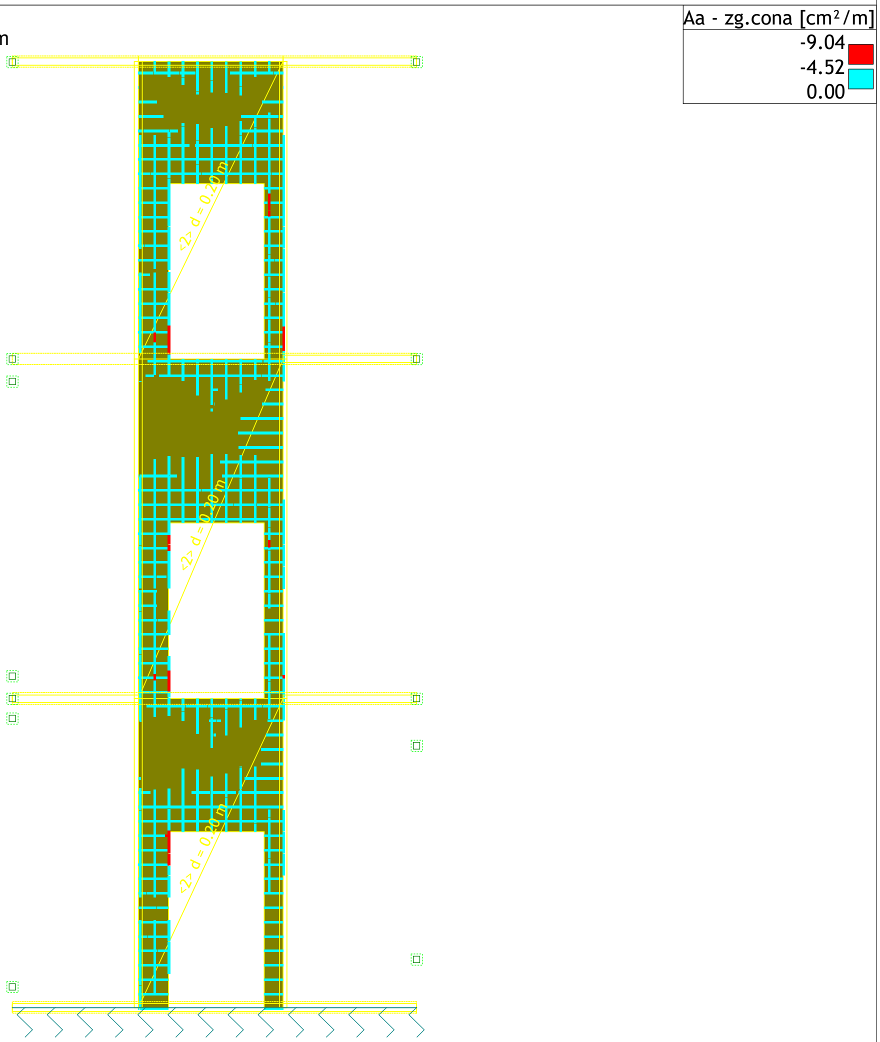
Pogled: stopnišča rama 1
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



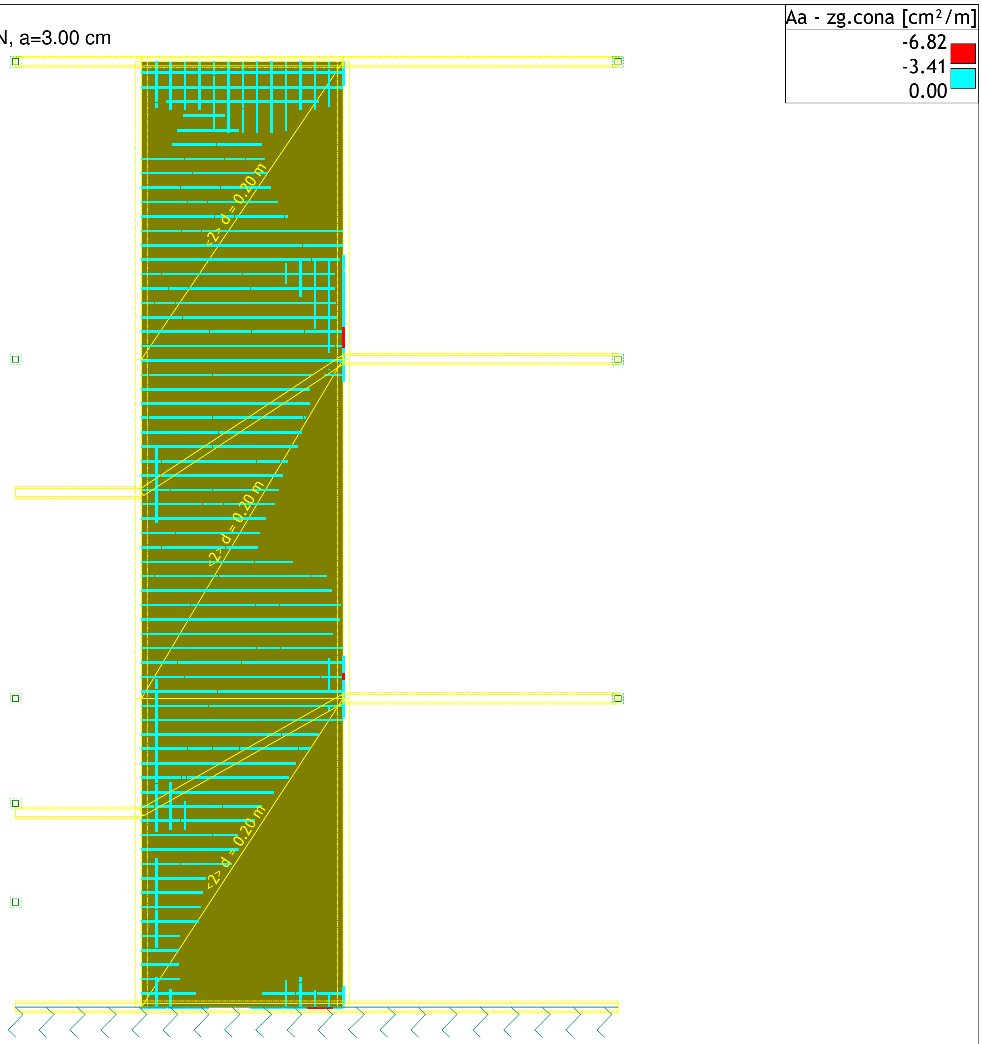
Okvir: V_6
Aa - sp.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



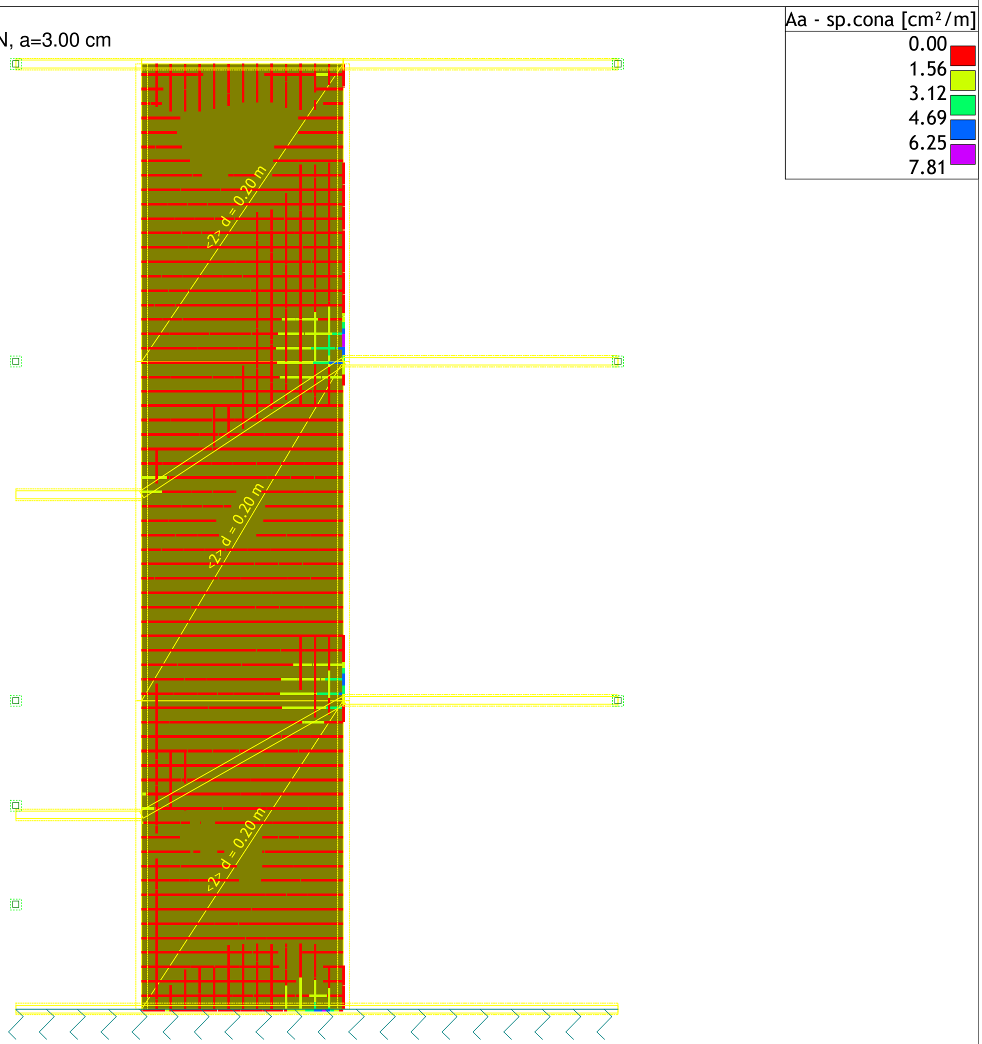
Okvir: V_6
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



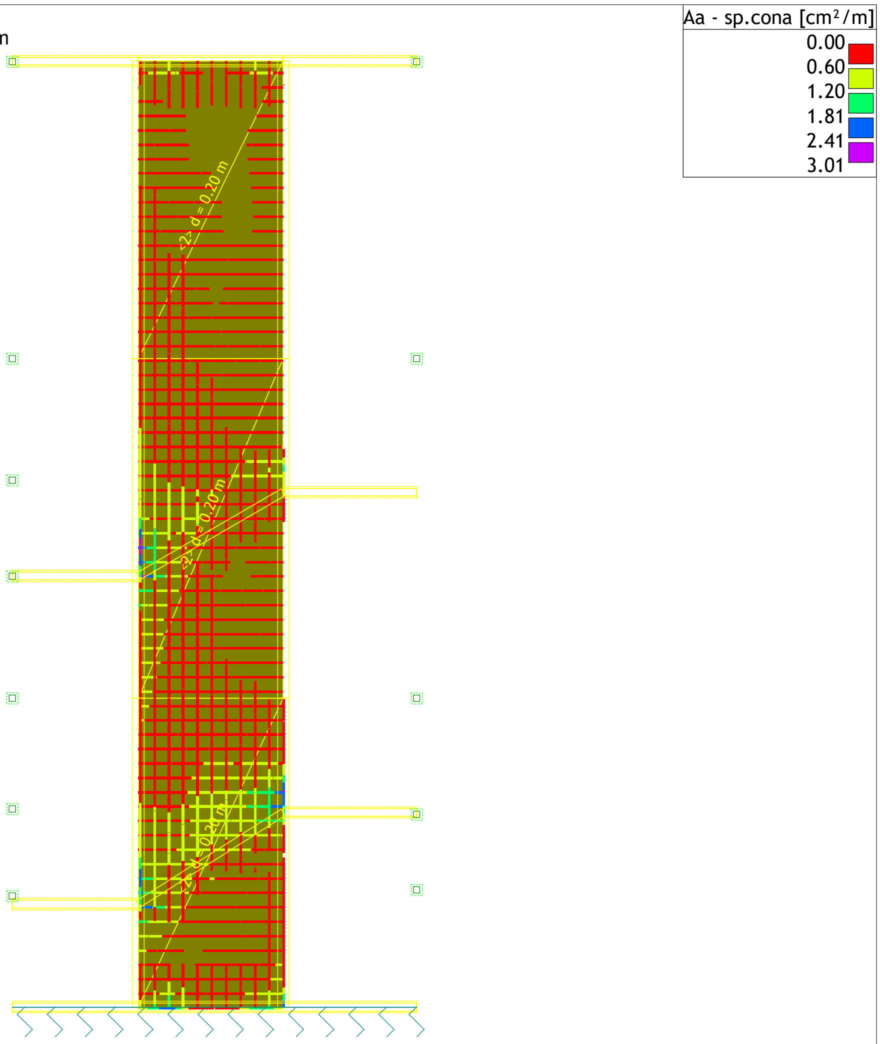
Okvir: H_5
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



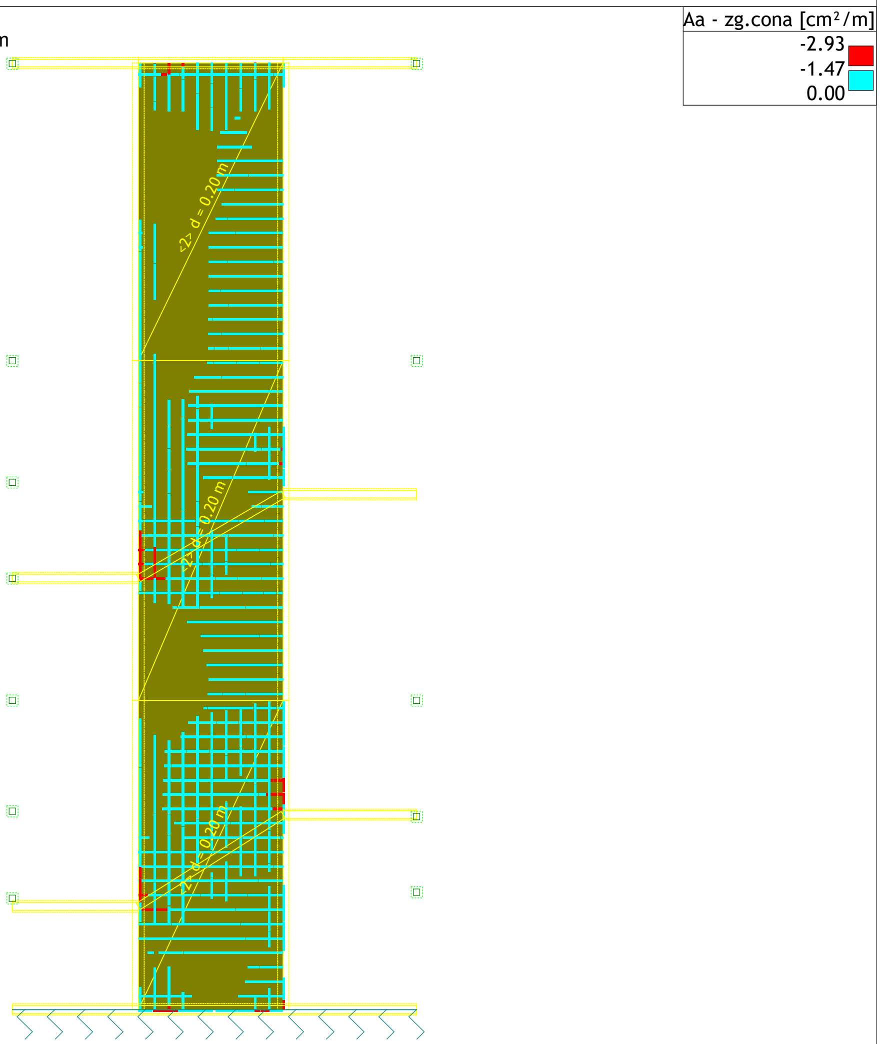
Okvir: H_5
Aa - sp.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



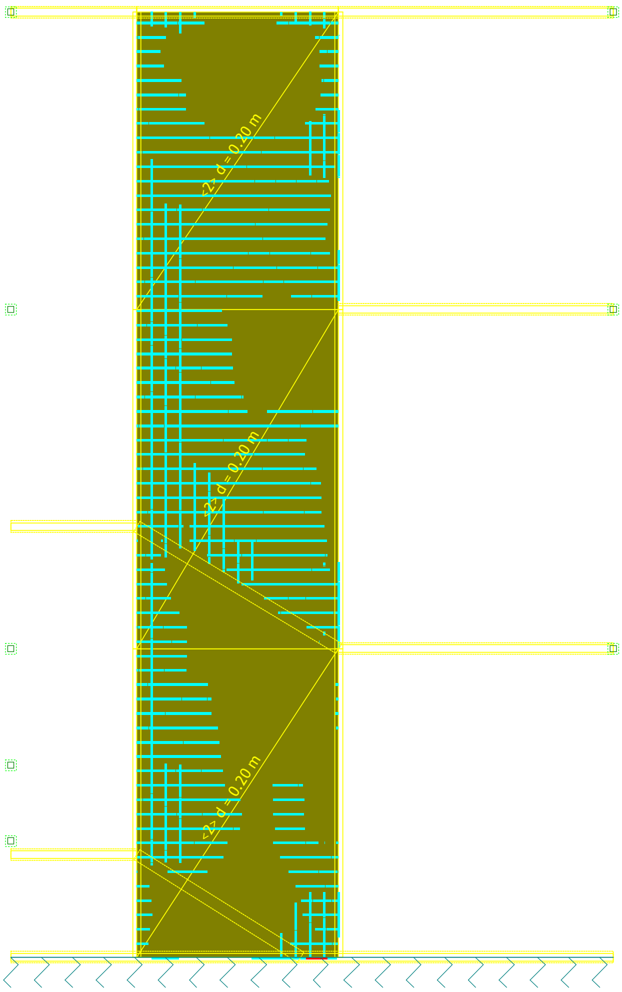
Okvir: V_5
Aa - sp.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



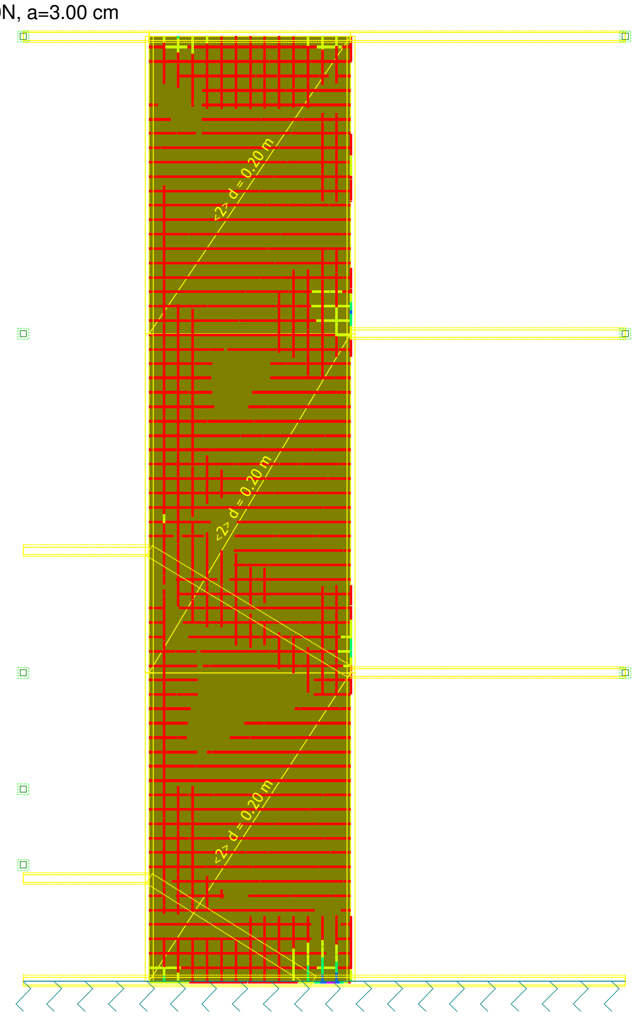
Okvir: V_5
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm



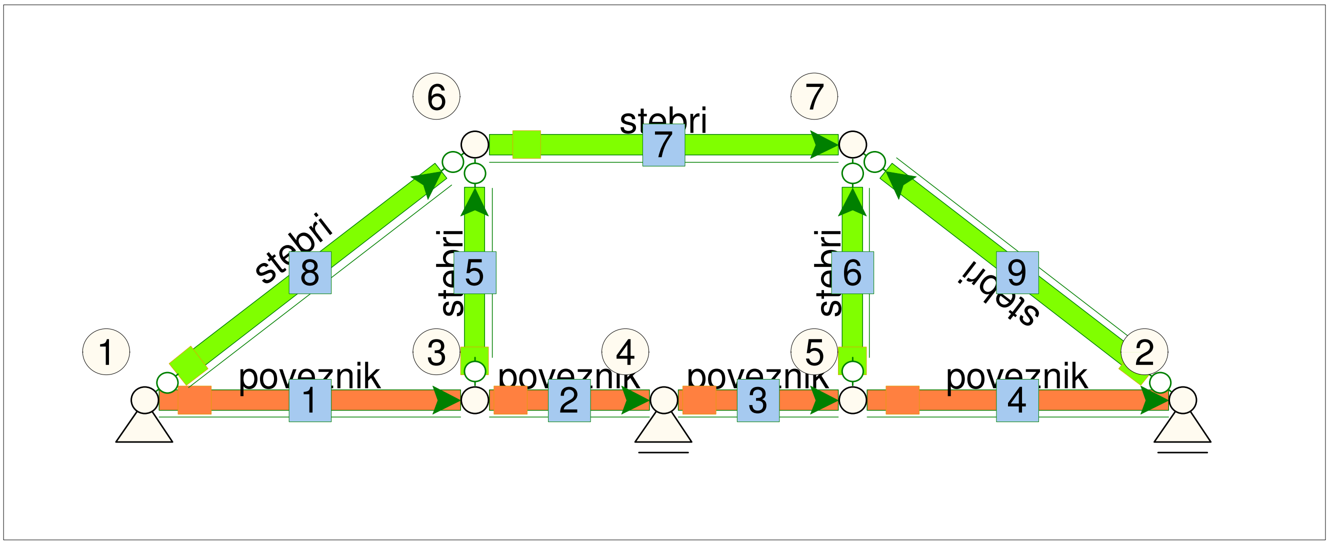
Okvir: H_4
Aa - zg.cona

Osvojena armatura
EC 2 (EN 1992-1-1:2004), C 25, S500N, a=3.00 cm

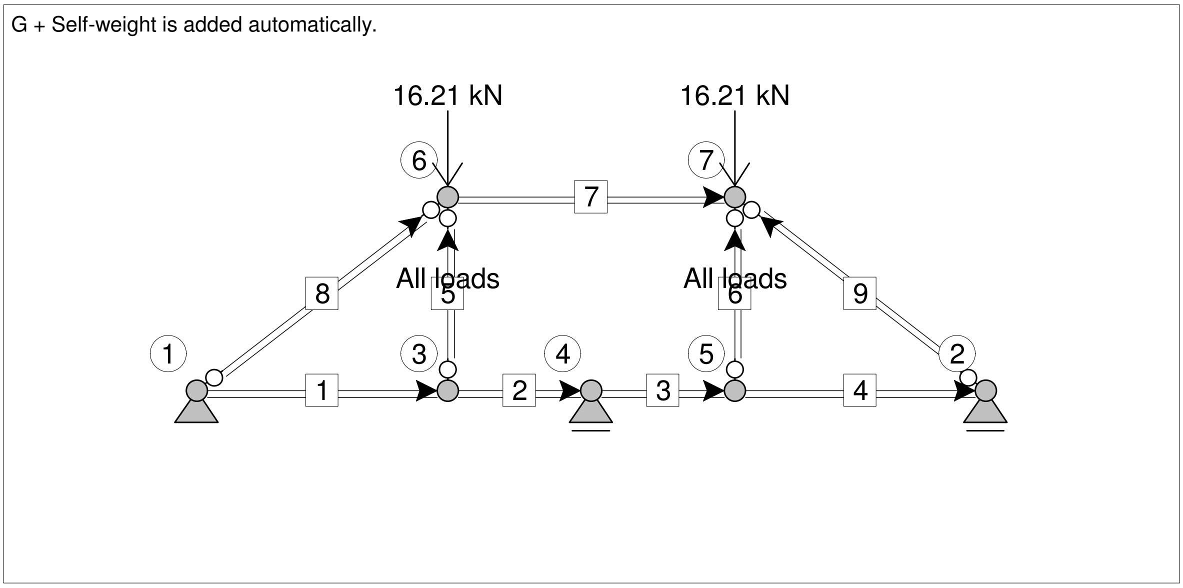


Okvir: H_4
Aa - sp.cona

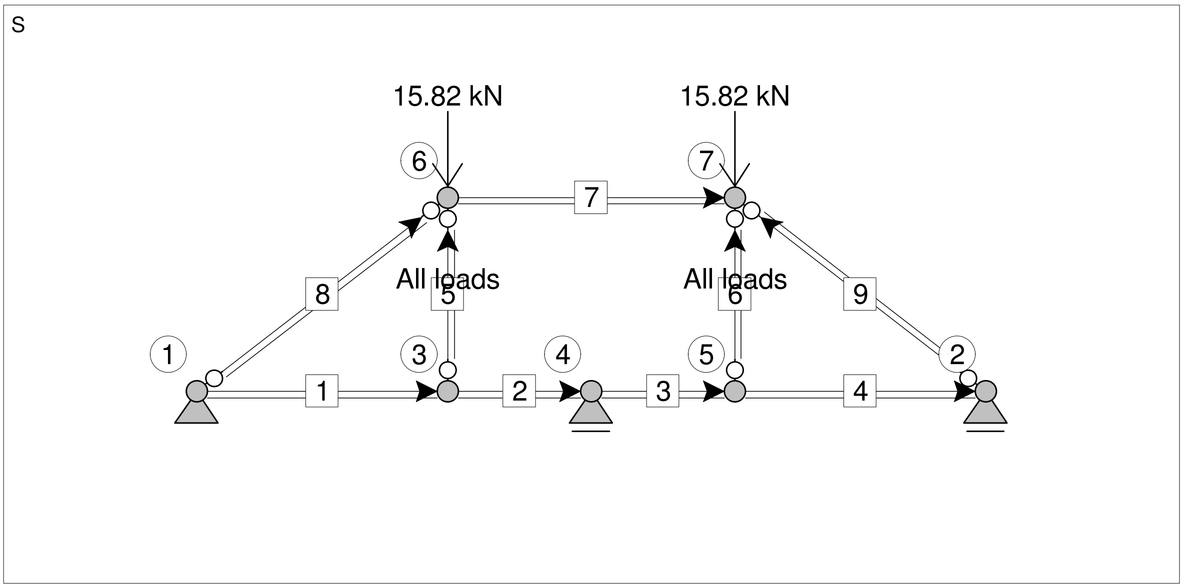
Geometry



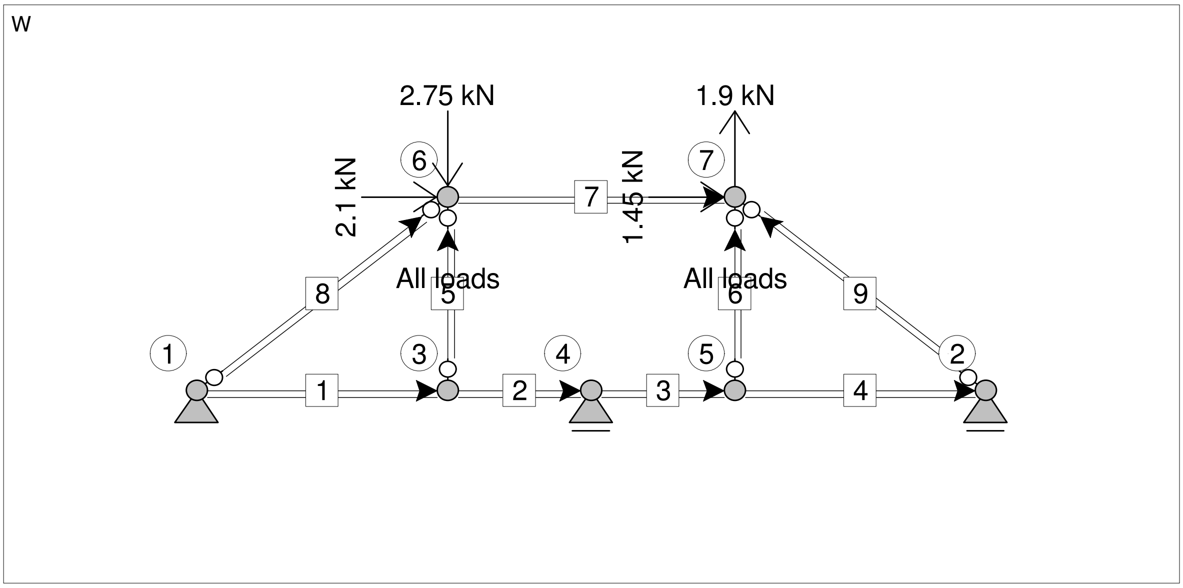
A1 : G



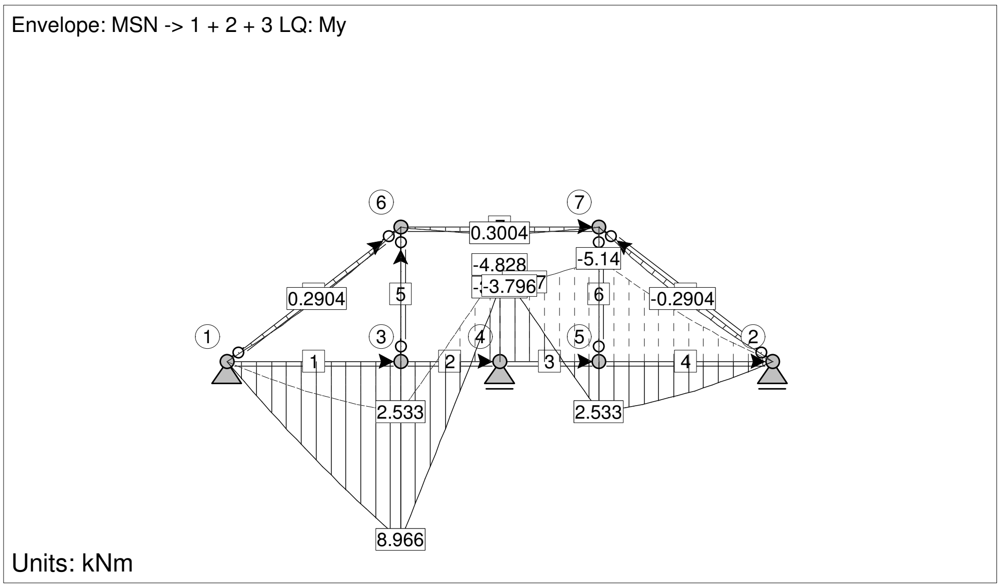
A2 : S



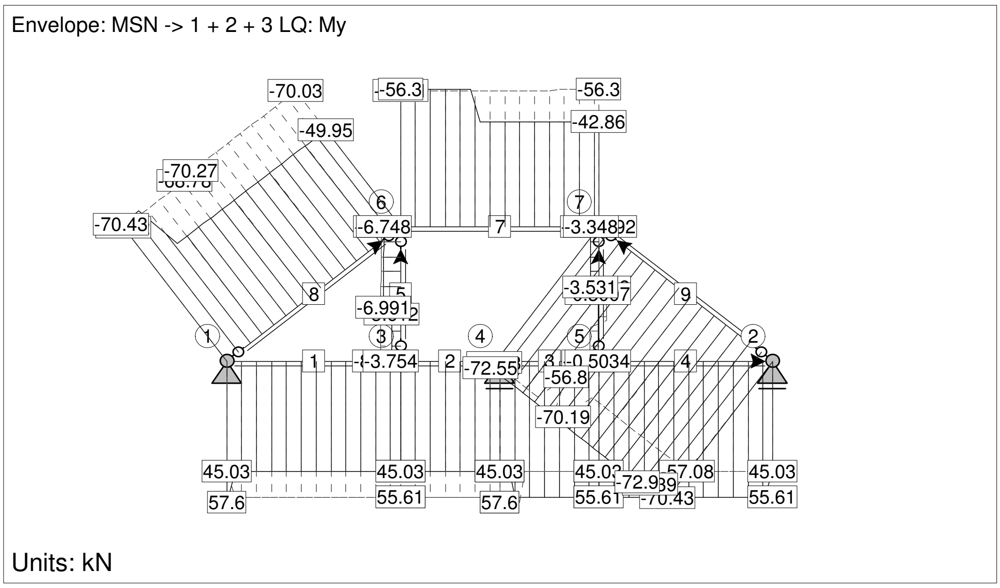
A3 : W



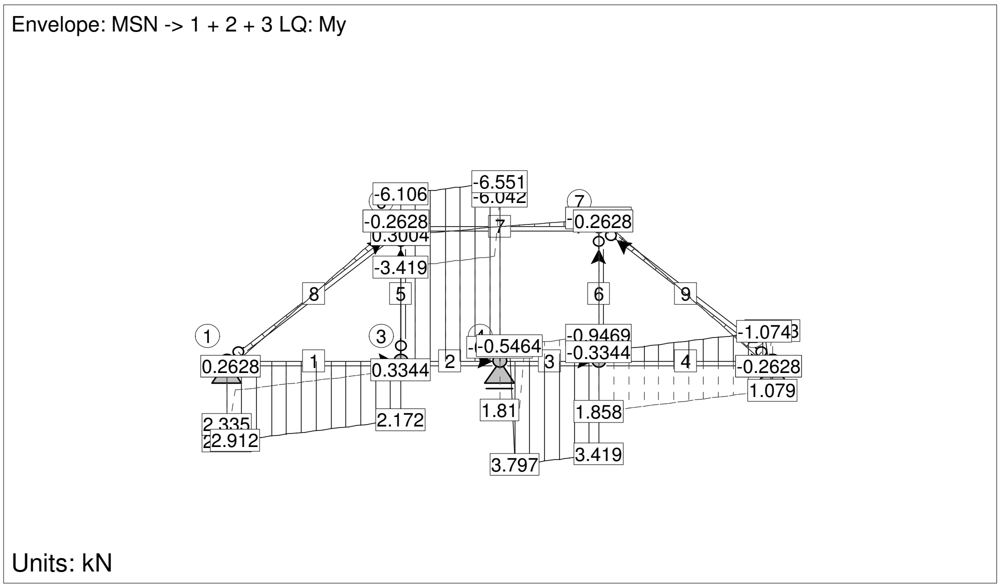
EN1: MSN: Bending Moments My



EN1: MSN: Axial Forces Fx



EN1: MSN: Shear Forces Fz



Element 1 design results (Building code - EC5):

Cross-section [cm]
[poveznik], h = 20.00, b = 24.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

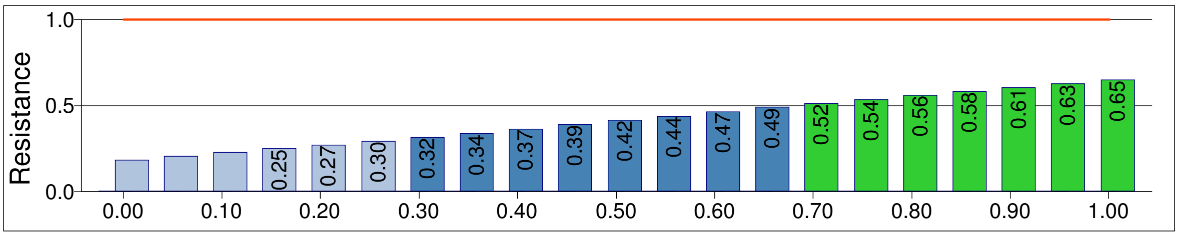
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

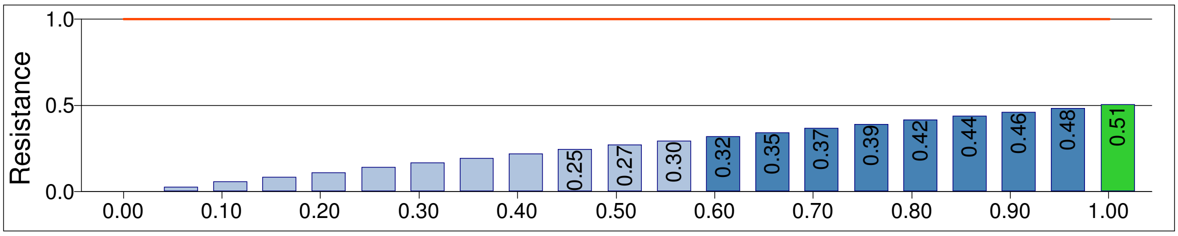
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 2 design results (Building code - EC5):

Cross-section [cm]
[poveznik], h = 20.00, b = 24.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

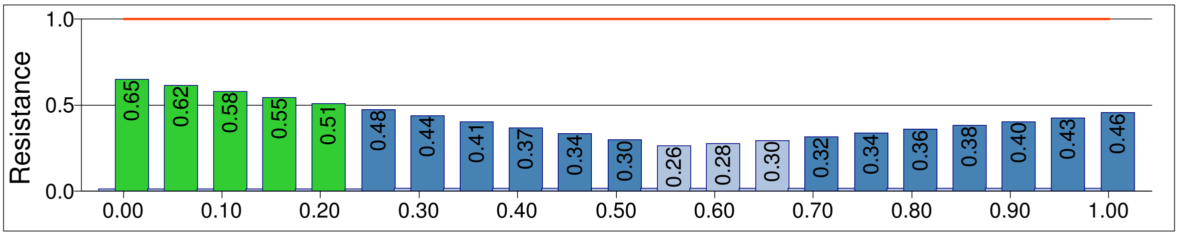
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

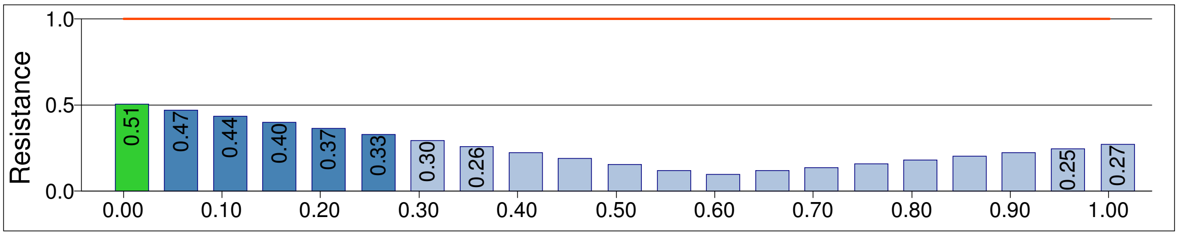
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 3 design results (Building code - EC5):

Cross-section [cm]
[poveznik], h = 20.00, b = 24.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

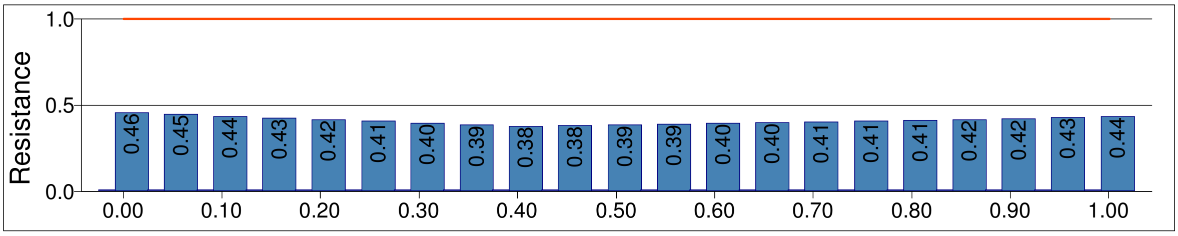
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

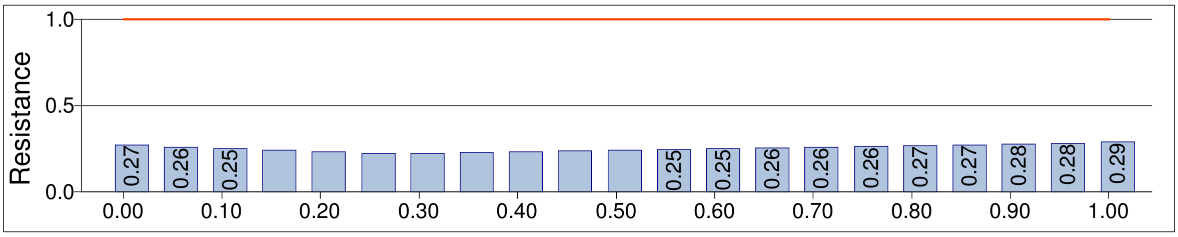
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 4 design results (Building code - EC5):

Cross-section [cm]
[poveznik], h = 20.00, b = 24.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

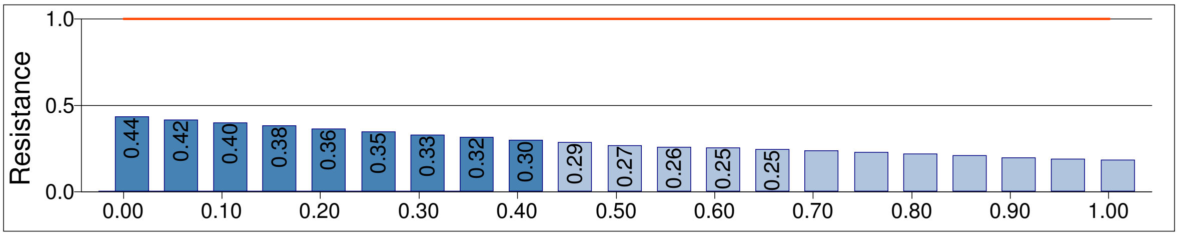
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

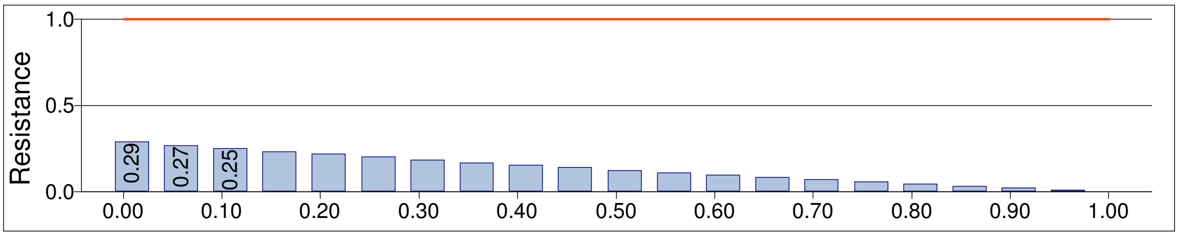
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 5 design results (Building code - EC5):

Cross-section [cm]
[stebri],   h = 18.00,   b = 18.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

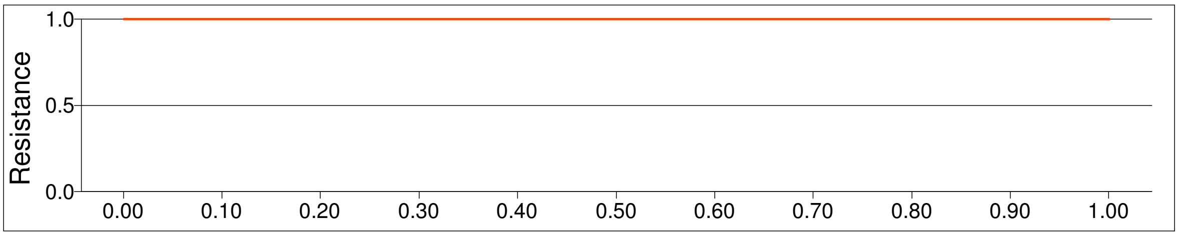
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

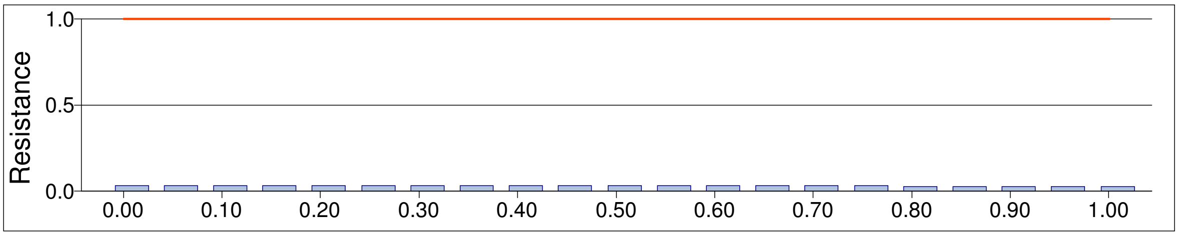
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 6 design results (Building code - EC5):

Cross-section [cm]
[stebri], h = 18.00, b = 18.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

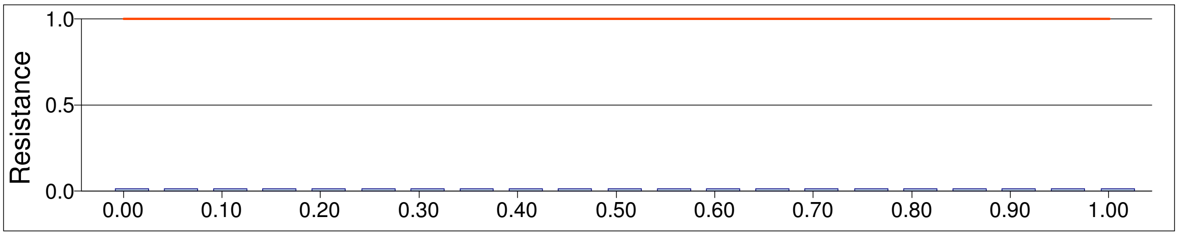
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

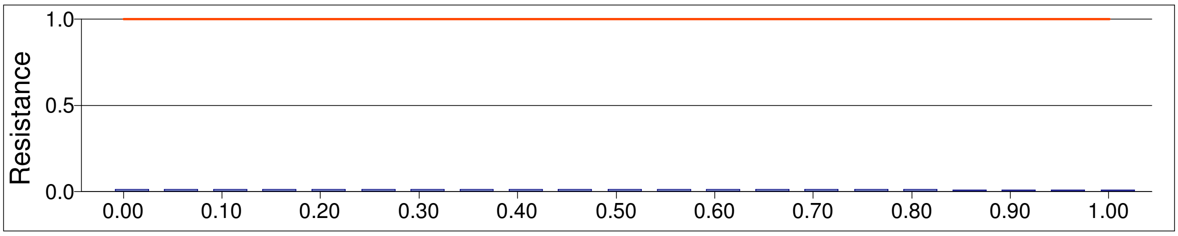
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 7 design results (Building code - EC5):

Cross-section [cm]
[stebri], h = 18.00, b = 18.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

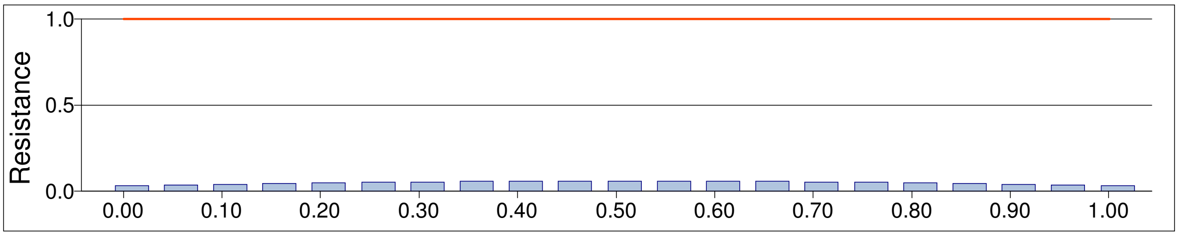
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

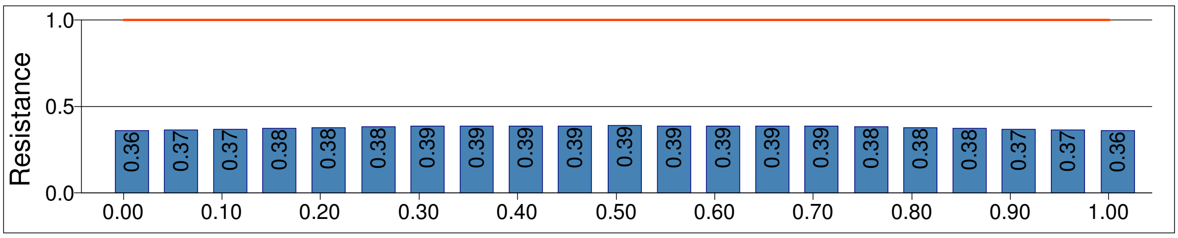
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 8 design results (Building code - EC5):

Cross-section [cm]
[stebri], h = 18.00, b = 18.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

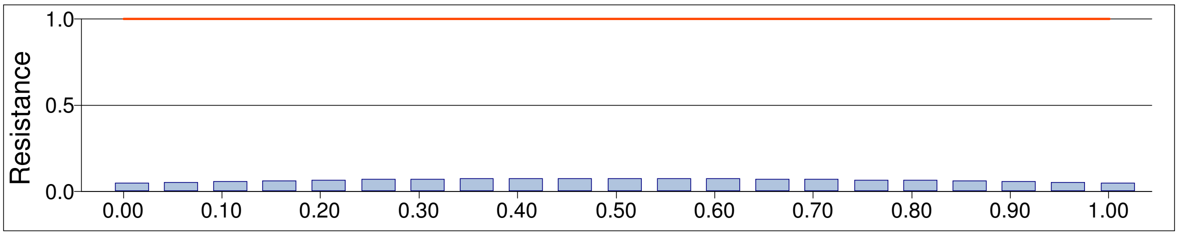
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

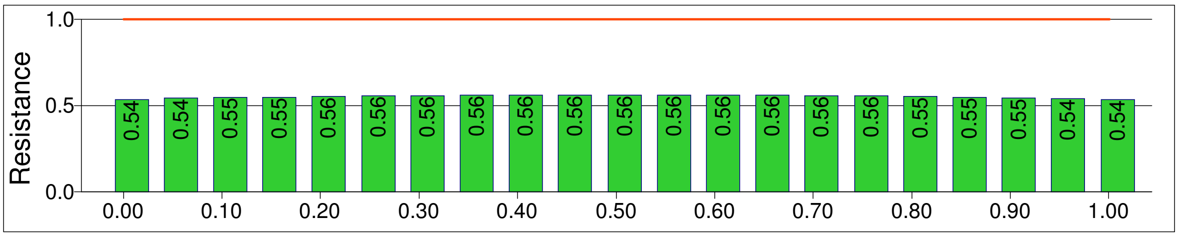
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

Element 9 design results (Building code - EC5):

Cross-section [cm]
[stebri], h = 18.00, b = 18.00

Element supports width left = 0.00 cm, right = 0.00 cm

Timber: C24 (solid)

Supports and buckling fields around y axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

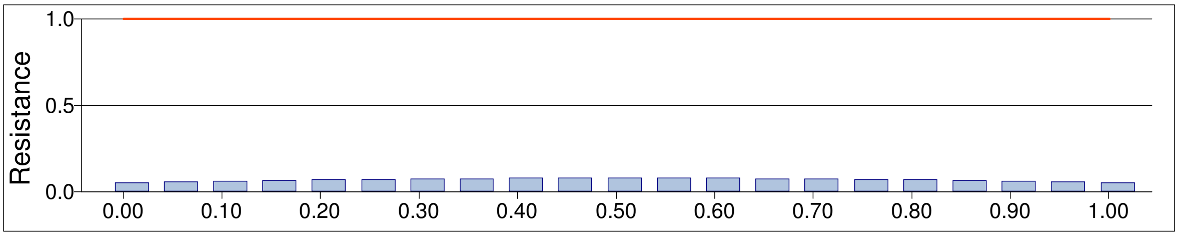
Supports and buckling fields around z axis

Field	x start	x end	buckl. coeff.
1	0.000	1.000	1.000

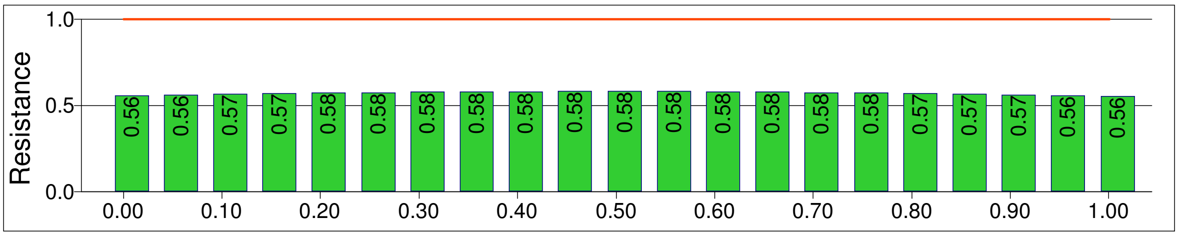
Element service class 2

Ultimate Limit States

Shear & CS Resistance



Stability Resistance



Serviceability Limit States

Serviceability limit states were not calculated.

3.1 NASLOVNA STRAN S KLJUČNIMI PODATKI O NAČRTU

ŠTEVILČNA OZNAKA NAČRTA IN VRSTA NAČRTA

3. NAČRT GRADBENIH KONSTRUKCIJ IN DRUGI GRADBENI NAČRTI
(načrt arhitekture; načrt krajinske arhitekture; načrt gradbenih konstrukcij in drugi gradbeni načrti; načrt električnih inštalacij in električne opreme; načrt strojnih inštalacij in strojne opreme; načrt telekomunikacij; tehnološki načrt; načrti izkopov in osnovne podgradnje)

INVESTITOR

OBČINA MUTA
Glavni Trg 17, 2366 Muta
(ime, priimek in naslov investitorja oziroma njegov naziv in sedež)

OBJEKT

OBNOVA GRAŠČINE KIENHOFEN,
UREDITEV DVORANE IN STOPNIŠČA Z DVIGALOM
(poimenovanje objekta, na katerega se gradnja nanaša)

VRSTA PROJEKTNE DOKUMENTACIJE

PROJEKT ZA IZVEDBO
(idejna zas., idejni projekt, projekt za pridobitev gradbenega dovoljenja, projekt za izvedbo, projekt izvedenih del)

ZA GRADNJO

REKONSTRUKCIJA, SPREMEMBA NAMEMBNOSTI, DOZIDAVA, ODSTRANITEV
(nova gradnja, dozidava, nadzidava, rekonstrukcija, odstranitev objekta, sprememba namembnosti)

PROJEKTANT

PROJEKTIRANJE IN TEHNIČNO SVETOVANJE, MATEJ DEŽMAN S.P.,
ŠENTILJ POD TURJAKOM 37C, 2382 MISLINJA,
MATEJ DEŽMAN dipl.inž.grad.
(naziv projektanta, sedež, ime in podpis odgovorne osebe projektanta, žig)

ODGOVORNI PROJEKTANT

BOJAN ČAS univ. dipl.inž.grad., IZS G – 2319
(ime in priimek, strokovna izobrazba, osebni žig, podpis)

ŠTEVILKA NAČRTA, KRAJ IN DATUM IZDELAVE NAČRTA

04/2018, MISLINJA, JULIJ 2018
(številka načrta, evidentirana pri projektantu, kraj in datum izdelave načrta)

ODGOVORNI VODJA PROJEKTA

PIA PLANINŠEC KORACA, univ.dipl.inž.arh., ZAPS 0421 A
(ime in priimek, strokovna izobrazba, osebni žig, podpis)

3.2 KAZALO VSEBINE NAČRTA: NAČRT GRADBENIH KONSTRUKCIJ IN DRUGI GRADBENI NAČRTI št. 04/2018

3.3 ARMATURNI NAČRTI