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naziv načrta: **2.1_NAČRT S PODROČJA GRADBENIŠTVA**

podpodročje: **GRADBENE KONSTRUKCIJE**

za objekt: **08 - SKLADIŠČE SOLI S PRALNICO**

INVESTITOR		
ime in priimek ali naziv družbe		**DARS D.D.**
naslov ali poslovni naslov družbe		**ULICA XIV. DIVIZIJE 4, 3000 CELJE**
PODATKI O GRADNJI		
naziv gradnje		**OBNOVA CESTNINSKE POSTAJE IN IZPOSTAVE DOB**
VRSTE GRADNJE	☑	**NOVOGRADNJA - NOVOZGRAJEN OBJEKT**
označiti vse ustrezne vrste gradnje	☐	**NOVOGRADNJA - PRIZIDAVA**
	☐	**REKONSTRUKCIJA**
	☐	**SPREMEMBA NAMEMBNOSTI**
	☐	**ODSTRANITEV CELOTNEGA OBJEKTA**
	☐	**LEGALIZACIJA**
	☐	**MANJŠA REKONSTRUKCIJA**
PODATKI O PROJEKTNI DOKUMENTACIJI		
vrsta dokumentacije		**PROJEKT ZA IZVEDBO**
številka projekta		**KGIP 2024/011**
PODATKI O NAČRTU		
strokovno področje načrta		**NAČRT S PODROČJA GRADBENIŠTVA**
naziv načrta		**STATIČNI PRERAČUN, ARMATURNI NAČRTI, NAČRT JK**
številka načrta		**102 / 2024_08**
datum izdelave		**MAJ 2025**
datum izdelave po recenziji		**OKTOBER 2025**
PODATKI O PROJEKTANTU NAČRTA		
projektant načrta (naziv družbe)		**SPINA NOVO MESTO D.O.O.**
naslov		**RESSLOVA ULICA 7A**
odgovorna oseba projektanta načrta		
podpis odgovorne osebe projektanta načrta		
PODATKI O IZDELOVALCU NAČRTA		
ime in priimek pooblaščenega arhitekta, pooblaščenega inženirja		
identifikacijska številka		
podpis pooblaščenega arhitekta, pooblaščenega inženirja		
PODATKI O VODJI PROJEKTIRANJA		
VODJA PROJEKTIRANJA		
identifikacijska številka		
podpis vodje projektiranja		

2.2 KAZALO VSEBINE NAČRTA GRADBENE KONSTRUKCIJE

2.1 NASLOVNA STRAN

2.2 KAZALO VSEBINE NAČRTA GRADBENE KONSTRUKCIJE

2.3 KAZALO VSEBINE PROJEKTA

2.4 IZJAVA PROJEKTANTA NAČRTA

2.5 TEHNIČNO POROČILO

2.6 RISBE

2.3 KAZALO VSEBINE PROJEKTA

KAZALO NAČRTOV

PZI

naziv načrta	številka načrta
1_NAČRT S PODROČJA ARHITEKTURE	**2024/011**
0_Zbirni načrt	2024/011/PZI/0
1_O1 Načrt arhitekture za objekt O1 (Upravna stavba)	2024/011/PZI/1_O1
1_O2.1 Načrt arhitekture za objekt O2.1 (Nadstrešnica za osebna vozila)	2024/011/PZI/1_O2.1
1_O2.2 Načrt arhitekture za objekt O2.2 (Nadstrešnica za osebna vozila)	2024/011/PZI/1_O2.2
1_O3 Načrt arhitekture za objekt O3 (Nadstrešnica za osebna vozila)	2024/011/PZI/1_O3
1_O4-7 Načrt arhitekture za objekt O4-7 (O4: Velike Garaže, O5: Male garaže, O6: Prizidava garaže za plužne skupine, O7: Prizidava garaže k O4)	2024/011/PZI/1_O4-7
1_O8 Načrt arhitekture za objekt O8 (Skladišče soli s pralnico)	2024/011/PZI/1_O8
1_O9 Načrt arhitekture za objekt O9 (Nadstrešnica za pregledna vozila)	2024/011/PZI/1_O9
1_O10 Načrt arhitekture za objekt O10 (Lopa za hrambo kosilnic)	2024/011/PZI/1_O10
1_O11 Načrt arhitekture za objekt O10 (Mešalne naprave NaCl + CaCl)	2024/011/PZI/1_O11
1_O12+13 Načrt arhitekture za objekt O12+13 (O12: Zbiralnik za deževnico - podzemni, O13: Ploščad z nadstrešnico za ekološki otok + strojnica za O12)	2024/011/PZI/1_O12+ 13
1_O14 Načrt arhitekture za objekt O14 (Cisterni za plin z AB varovalnim zidom)	2024/011/PZI/1_O14
1_O15 Načrt arhitekture za objekt O15 (Oporni zid)	2024/011/PZI/1_O15
1_EO Načrt arhitekture za EO (Enostavni objekti)	2024/011/PZI/1_EO
1_NNO Načrt NNO (Načrt notranje opreme)	2024/011/PZI/1_NNO
1_O1 Načrt arhitekture za objekt O1-ZUKN (Začasno upravno kontejnersko naselje)	2024/011/PZI/1_O1- ZUKN
2.1_NAČRT S PODROČJA GRADBENIŠTVA, GRADBENE KONSTRUKCIJE	**102/2024**
GK ZA OBJEKT 1 - UPRAVNA STAVBA	102/2024_01
GK ZA OBJEKT 2 - NADSTREŠNICA ZA OSEBNA VOZILA	102/2024_02
GK ZA OBJEKT 3 - NADSTREŠNICA ZA OSEBNA VOZILA	102/2024_03
GK ZA OBJEKT 4 - VELIKE GARAŽE	102/2024_04
GK ZA OBJEKT 5 - MALE GARAŽE	102/2024_05
GK ZA OBJEKT 6 - PRIZIDAVA GARAŽE ZA PLUŽNA VOZILA	102/2024_06
GK ZA OBJEKT 7 - PRIZIDAVA GARAŽE K O4	102/2024_07
GK ZA OBJEKT 8 - SKLADIŠČE SOLI S PRALNICO	102/2024_08
GK ZA OBJEKT 9 - NADSTREŠNICA ZA PREGLEDNA VOZILA	102/2024_09
GK ZA OBJEKT 10 - LOPA ZA HRAMBO KOSILNIC	102/2024_10
GK ZA OBJEKT 11 - MEŠALNE NAPRAVE NACL	102/2024_11
GK ZA OBJEKT 12-13 - ZBIRALNIK ZA DEŽEVNICO + PLOŠČAD	102/2024_12+13
GK ZA OBJEKT 14 - UNP CISTERNA	102/2024_14
GK ZA OBJEKT 15 - OPORNI ZID	102/2024_15
GK ZA OBJEKT 16 - VKOPANA VISTERNA S PRETAKALNO PLOŠČADJO	102/2024_16

2.2_NAČRT S PODROČJA GRADBENIŠTVA, ZUNANJA IN PROMETNA UREDITEV Z ODVODNJAVANJEM	**KGIP 2024/011/2.2**

3_NAČRT S PODROČJA ELEKTROTEHNIKE, TEHNIČNO VAROVANJE	**PR25E034-TV**

3_NAČRT S PODROČJA ELEKTROTEHNIKE, TK + SNVP	**PE02/24-12**
3/I_NAČRT S PODROČJA ELEKTROTEHNIKE, OBJEKT O1+O2+ZU (Upravna stavba, nadstrešnice, zunanja ureditev)	PE02/24-12
3/I_NAČRT S PODROČJA ELEKTROTEHNIKE, OBJEKT 3+9+10+14 - Lopa, nadstrešnici in plinohrami	PE02/24-12
3/I_NAČRT S PODROČJA ELEKTROTEHNIKE, OBJEKT O4 do O7 - Velike in male garaže	PE02/24-12
3/I_NAČRT S PODROČJA ELEKTROTEHNIKE, OBJEKT O8 - Skladišče soli s pralnico	PE02/24-12
3/I_NAČRT S PODROČJA ELEKTROTEHNIKE, OBJEKT O11+O12+O13 - Mešalnica soli, črpališče in nadstrešnica	PE02/24-12

4_NAČRT S PODROČJA STROJNIŠTVA	**D-005/24**
4-NAČRT STROJNIH INŠTALACIJ, UPRAVNI OBJEKT O1	D-005/24/1
4-NAČRT STROJNIH INŠTALACIJ, GARAŽNI OBJEKT Z NADSTREŠNICO	D-005/24/2
4-NAČRT STROJNIH INŠTALACIJ, PRALNICA IN SKLADIŠČE SOLI - O8	D-005/24/3
4-NAČRT STROJNIH INŠTALACIJ, PRALNICA IN SKLADIŠČE SOLI - O12	D-005/24/4
4-NAČRT STROJNIH INŠTALACIJ, MEŠALNE NAPRAVE ZA NACL IN CACL	D-005/24/5
4-NAČRT STROJNIH INŠTALACIJ, PLINSKA CENTRALA	D-005/24/6

6_NAČRT S PODROČJA POŽARNE VARNOSTI	**KGIP 2024/011/6- PZI**

7_NAČRT S PODROČJA GEOTEHNOLOGIJE IN RUDARSTVA; Geološko geomehansko poročilo	**5697-140/2024-01**

8_NAČRT S PODROČJA GEODEZIJE; Goedetski načrt	**KOSTAK d.d.-2024- 132**

11_DRUGI NAČRTI	
VARNOSTNI NAČRT	**01/05/2025**
POPIS DEL S PREDRAČUNOM	

KAZALO ELABORATOV IN ŠTUDIJ
PZI

naziv elaborata, študije	št.
ELABORAT EKSPLOZIJSKE OGROŽENOSTI Z OCENO TVEGANJA ZA AVTOCESTNO BAZO DOB	CPV-30067/2025
TEHNIČNO POROČILO ELABORATA ENERGIJSKE UČINKOVITOSTI STAVB IN ANALIZA OSONČENOSTI	KGIP 2024/011_ure
izkaz energijskih karakteristik prezračevanja stavbe	KGIP 2024/011_ure
ELABORAT ZAŠČITE PRED HRUPOM V STAVBAH	KGIP 2024/011_zz
izkaz energijskih karakteristik prezračevanja stavbe	D-005/24/1
izkaz požarne varnosti	KGIP 2024/011-6pzi
izkaz zaščite pred hrupom	KGIP 2024/011_zz
NAČRT GOSPODARJENJA Z GRADBENIMI ODPADKI	KGIP 2024/011_nggo

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2.4 IZJAVA PROJEKTANTA NAČRTA IN POOBLAŠČENEGA STROKOVNJAKA, KI JE IZDELAL NAČRT V PZI

PROJEKTANT	
projektant (naziv družbe)	**SPINA NOVO MESTO D.O.O.**
naslov	**RESSLOVA ULICA 7A, 8000 NOVO MESTO**
odgovorna oseba projektanta	

IN POOBLAŠČENI STROKOVNJAK, KI JE IZDELAL NAČRT	

IZJAVLJAVA:

da načrt

vrsta dokumentacije	**PZI**
strokovno področje načrta	**GRADBENIŠTVO**
naziv načrta	**08 - SKLADIŠČE SOLI S PRALNICO**
številka načrta	**102 / 2024_08**
datum izdelave	**MAJ 2025**
datum izdelave po recenziji	**OKTOBER 2025**

upošteva relevantne predpise in druge normativne dokumente ter da so upoštevane ustrezne bistvene in druge zahteve.

pooblaščeni strokovnjak	
identifikacijska številka	
podpis pooblaščenega strokovnjaka	
odgovorna oseba projektanta	
podpis odgovorne osebe projektanta	

2.5 TEHNIČNO POROČILO

1.0 SPLOŠNO

Predmet načrta je dimenzioniranje nosilnih konstrukcij objektov, kateri se rekonstruirajo oz. izvedejo v sklopu rekonstrukcije obstoječe avtocestne baze DOB.

Investitor želi delno povečati obstoječo bazo z rekonstruiranjem obstoječih objektov oz. gradnjo novih objektov. Nekateri objekti se tudi odstranijo.

Lokacija objekta:

- Koordinate: 45.92912718309849, 14.851619754443233 z =~ 307,26 m
- občina: IVANČNA GORICA



Slika 1: Lokacija objekta

2.0 PODLOGE ZA PROJEKTIRANJE

Risbe:

[1] Načrt s področja arhitekture – DGD & PZI, projektant KOSTAK GIP d.o.o., CKŽ 47, 8270 KRŠKO

[2] PID PROJEKT: Arhitektura - Objekt: CP in AB – izpostava DOB – Čelna cestninska postaja, Šifra projekta: 0022.0167, Št. Projekta: 06/2000, projektivno podjetje: Constructa inženiring d.o.o., datum: november 2000

[3] PID PROJEKT: Arhitektura - Objekt: CP in AB – izpostava DOB – Čelna cestninska postaja, Šifra projekta: 0022.0167.2.31, Št. Projekta: 06/2000, projektivno podjetje: Constructa inženiring d.o.o., datum: april 2001

[4] PID PROJEKT: Konstrukcija, Statični izračin - Objekt: CP in AB – izpostava DOB – Čelna cestninska postaja, Šifra projekta: 0022.0184, Št. Projekta: 2/01, projektivno podjetje: Vegrad d.d., datum: marec 2001

[5] PID PROJEKT: Konstrukcija, Armaturni načrti - Objekt: CP in AB – izpostava DOB – Čelna cestninska postaja, Šifra projekta: 0022.0184, Št. Projekta: 2/01, projektivno podjetje: Vegrad d.d., datum: marec 2001

Poročila:

[6] Geološko geomehansko poročilo št. 5697-140/2024-01, izdelalo podjetje Geologija d.o.o. Idrija, geološke raziskave in projektiranje, Prešernova ulica 2, 5280 Idrija, izdelal Jože Janež, univ. dipl. inž. geol., avgust 2024

Standardi in smernice:

[7]	SIST EN 1990:2004	Osnove projektiranja konstrukcij
[8]	SIST EN 1991-1-1:2004	Vplivi na konstrukcije – 1-1. del: Splošni vplivi – Gostote, lastna teža, koristne obtežbe stavb
[9]	SIST EN 1991-1-3:2004	Vplivi na konstrukcije – 1-3. del: Splošni vplivi – Obtežba snega
[10]	SIST EN 1991-1-4:2004	Vplivi na konstrukcije – 1-4. del: Splošni vplivi – Vplivi vetra
[11]	SIST EN 1992-1-1:2005	Projektiranje betonskih konstrukcij – 1-1. del: Splošna pravila in pravila za stavbe
[12]	SIST EN 1993-1-1:2005	Projektiranje jeklenih konstrukcij – 1-1. del: Splošna pravila in pravila za stavbe
[13]	SIST EN 1995-1-1:2005	Projektiranje lesenih konstrukcij - 1-1. del: Splošna pravila in pravila za stavbe
[14]	SIST EN 1997-1:2005	Geotehnično projektiranje - 1. del: Splošna pravila
[15]	SIST EN 1998-1:2005	Projektiranje potresnoodpornih konstrukcij – 1. del: Splošna pravila, potresni vplivi in pravila za stavbe

3.0 GEOLOŠKO-GEOMEHANSKE IN HIDROGEOLOŠKE RAZMERE

Povzetek iz geomehanskega poročila:

TERENSKE RAZISKAVE

Na širšem obravnavanem območju so izvedli 2 razkopa. Na mikrolokaciji objektov so lahko geološke razmere dolenjskega krasa (neravna skalna podlaga) precej drugačne. Zaradi globine temeljenja in razlike v nosilnosti gline in apnenca so diferencialni posedki lahko veliki.
Nobeden od razkopov ni dosegel gladine podzemne vode.
Oba razkopa sta bila izvedena v umetni nasip, pliocensko - pleistocensko glino ter jurske apnence.
V razkopih so popisali naslednjo sestavo tal:
R1
0 – 0,4 m: asfalt
0,4 – 0,60 m: umetni nasip: svetel melj s peskom in gruščem
0,5 – 0,60 m: umetni nasip: vlažen glinast melj s peskom v zahodnem delu razkopa
0,60 – 1,00 m: umetni nasip: pesek v vzhodnem delu razkopa
0,60 – 1,40 m: rjava pusta poltrdna glina
0,85 – 1,40 m: na posameznih mestih, v zahodnem delu razkopa izdanja raščena kamninska podlaga siv apnenec
R2
0 – 1,0 m: umetni nasip: melj s peskom in gruščem v vzhodnem delu razkopa
0 – 1,70 m: rjava pusta poltrdna glina s preperelim peskom in gruščem
1,70 – 2,0 m: rjava pusta poltrdna glina s preperelim peskom in gruščem, na posameznih mestih izdanja raščena kamninska podlaga siv apnenec
Umetni nasip je zelo heterogen in različnih globin na posameznih mestih v razkopih.

GEOMEHANSKE RAZMERE

Geološko podlago na območju obravnavane lokacije sestavlja pliocenska - pleistocenska glina (SLOJ 2) in raščena kamninska podlaga – apnenec (SLOJ 3). Na njih so odloženi umetni nasipi (SLOJ 1).

SLOJ 1: Umetni nasip

– Specifična teža γ = 19,5 – 20,5 kN/m3

Geološko geomehansko poročilo 13

– Strižni kot ϕ = 30 – 33°
– Kohezija c = 0 kPa
– Modul stisljivosti Me = 35 – 45 MPa
– Evd = 43,1 MN/m2
– kategorija izkopa: 3 – Zemljine predvidene za vgradnjo ali predelavo – lahek izkop. (TSPI – PGV.05.100: 2023)

SLOJ 2: Rjava pusta poltrdna glina

– Specifična teža γ = 18 – 19 kN/m3
– Strižni kot ϕ = 26-28°
– Kohezija c = 5 - 15 kPa
– Modul stisljivosti Me = 15 - 20 MPa
– Evd = 26,5 MN/m2
– kategorija izkopa: 3 – Zemljine predvidene za trajno deponiranje – lahek izkop (TSPI – PGV.05.100: 2023)
– zmrzlinska odpornost: neodporna.

– Vodoprepustnost: slabo prepustne do neprepustne plasti.

SLOJ 3: Jurski apnenec – raščena kamninska podlaga
– Prostorninska teža γ = 26 - 27 kN/m3
– Strižni kot ϕ > 50°
– Kohezija c > 100 kPa
– Kategorija izkopa = 5A –kamnine – zahteven razkop (TSPI – PGV.05.100: 2023)
– Zmrzlinska odpornost: zmrzlinsko odporno
– Vodoprepustnost: dobro vodoprepustne plasti s kraško poroznostjo.
– Apnenci so trne in visoko nosilne hribine.

POGOJI TEMELJENJA:
Globina točkovnih temeljev je predvidena od 1,45 m do 2,55 m.
Teren je primeren za gradnjo, vendar je treba upoštevati, da je kamninska podlaga neravna, zato se bosta v nivoju dna temeljev pojavljala deloma apnenec in deloma glina.
Načeloma bi vse točkovne temelje morali temeljiti na podlago iz apnenca, pasovne temelje in temeljno oz. talno ploščo pa lahko postavimo na glinasta tla, sanirana s tamponsko blazino. V kolikor bo globina skalne podlage prevelika, da bi točkovne temelje temeljili direktno vanjo, bi morali tudi vse točkovne temelje izvesti na saniranih tleh – tamponski blazini.
Za predhodne izračune naj projektant upošteva nosilnost temeljnih tal na glini RA = 150 kN/m2 in posedke v rangu 2 do 3 cm.
Pri temeljenju na apnencu se lahko upošteva nosilnost temeljnih tal RA = 500 kN/m2, brez posedkov!
Pogoje temeljenja je nujno čim bolj izenačiti! Ker so objekti velikih dimenzij, je potrebo za natančno določitev načina temeljenja (točkovni temelji, pasovni temelji, talna plošča), globine in dimenzije temeljev ter debeline tamponske blazine v fazi PZI izvesti dodatne raziskave s strukturnim vrtanjem na lokacijah ključnih temeljev.

Nezavarovane začasne delovne vkopne brežine se do globine 2,5 m lahko v umetnem nasipu in glini izvaja v naklonu do 2:3. V primeru potrebe po bolj strmih vkopnih brežinah jih je potrebno podpirati, da se zagotovi varno delo v gradbeni jami.

OPOZORILO:
Geološko podjetje zaradi prepletene komunalne infrastrukture ni moglo opraviti večjega števila raziskav. Ob izvedbi izkopa je zahtevana prisotnost geomehanika, kateri po pregledu raščenih tal poda navodila za izvedbo ustrezne priprave tal pod temelji.

4.0 GRADBENA KONSTRUKCIJA

Celotno baza sestavlja več objektov.
V sklopu rekonstrukcije se nekateri podreje, nekateri se rekonstruirajo oz. se izvede nove prizidke.
Pozicijsko je celoten projekt razčlenjen na sledeče objekte:

01 – Upravna stavba
02 - Nadstrešnica za osebna vozila
03 - Nadstrešnica za osebna vozila
04 - Velike garaže
05 - Male garaže
06 - Prizidava garaže za plužne skupine
07 – Prizidava garaže k 04
08 - Skladišče soli s pralnico
09 - Nadstrešnica za pregledna vozila
10 - Lopa za hrambo kosilnic
11 – Mešalne naprave NaCl
12+13 – Zbiralnik za deževnico + ploščad
14 – UNP cisterna
15 - Oporni zid
16 - Vkopana cisterna s pretekalno ploščadjo



Slika 2: Lokacija objekta

4.1 08 – SKLADIŠČE SOLI S PRALNICO

Predvidena je izvedba novega objekta za skladišče soli skupaj s pralnico vozil. Objekt je tlorisnih dimenzij a/b=29,90x15,00m s prizidkoma velikosti 8,10x15,00m oz. 38,00x5,80m. Glavni objekt je v slemenu višine +13,30m, prizidka sta max. Višine 7,95m.

4.1.1 AB temelji

AB temelji so pasovni, dimenzij b/h=300/80cm; b/h=160/80cm.

4.1.2 AB stene

AB stene so maksimalne višine 12,60m in debeline 40cm. Glavne stene so do podane višine lahko zasute s soljo.
Nižje stene višine 8,75m so debeline 30cm. Na delu se nad spodnjimi stenami izvedejo AB stebri dimenzij b/h=30/30cm, na vrhu povezani z nosilci. Na njih se naslanja lesena konstrukcija.

4.1.3 Lesena strešna konstrukcija

Strešna konstrukcija je lesena, izvedena iz primarnih in sekundarnih lepljenih nosilcev. Sekundarni nosilci so dimenzij b/h=20/28cm.
Primarni nosilci so različnih dimenzij:

- Nosilci nad glavno halo so lepljeni nosilci dimenzij b/h=20/130cm-230cm.
- Nosilci nad pralnico – b/h=20/100cm
- Nosilci nadstrešnice – b/h=20/48cm

V ravnini strehe se izvede horizontalno zavetrovanje iz lesenih leg dimenzij b/h?14/14cm. Lepljenci so sidrani v spodnjo AB konstrukcijo s pomočjo sidrnih pločevin, katere se vgradijo v betonsko konstrukcijo.

5.0 POMIKI IN POVESI

5.1 Vodoravni in etažni pomiki

Da se izognemo poškodbam nekonstrukcijskih elementov v stavbi se omeji velikost etažnega pomika, in sicer:

- po standardu SIST EN 1990:2000 je vodoravni etažni pomik za večnadstropne stavbe omejen na vrednost h/300 (h … višina etaže), celotni vodoravni pomik pa ne sme biti večji od H/500 (H … višina celotne stavbe);
- po standardu SIST EN 1998-1:2006 so omejitve vodoravnih etažnih pomikov povzete v spodnji preglednici:

Vrsta stavbe	Največji dovoljeni etažni pomik
Stavbe, ki imajo na konstrukcijo pritrjene nekonstrukcijske elemente iz krhkih materialov	dr v ≤ 0,005 h
Stavbe z duktilnimi nekonstrukcijskimi elementi	dr v ≤ 0,0075 h
Stavbe, pri katerih so nekonstrukcijski elementi pritrjeni na konstrukcijo tako, da deformacije konstrukcije nanj ne vplivajo	dr v ≤ 0,010 h

dr … projektni etažni pomik
h … etažna višina
v … redukcijski faktor (0,40 za razred pomembnosti III in IV oz. 0,50 za razred pomembnosti I in II)

Preprečiti je potrebno tudi trke med konstrukcijsko neodvisnimi (dilatacijskimi) enotami iste stavbe pri čemer je potrebno upoštevati tako horizontalne pomike zaradi horizontalno delujočih vplivov (npr. veter) kot tudi pomike zaradi potresnih vplivov, pri čemer je pomik zaradi projektnega potresnega vpliva enak ds = q x de (q … faktor obnašanja, de … pomik določen z linearno analizo z uporabo projektnega spektra).

5.2 Povesi

Omejitvene vrednosti povesov oz. navpičnih pomikov konstrukcij so prikazane v spodnji tabeli.

Tabela 1: Omejitev navpičnih pomikov konstrukcij

Del konstrukcije	Mejne vrednosti	
	wmax	w2 + w3
Strehe nasploh	L/250 *	L/250
Pohodne strehe (ne le pri vzdrževanju)	L/250	L/300
Stropovi nasploh	L/250	L/300
Strehe in stropovi, ki nosijo krhke obloge (npr. mavec) in zelo toge predelne stene	L/300	L/350
Stropovi, ki podpirajo stebre, razen v primeru, če so ti upogibki izračunani pri celoviti analizi konstrukcije	L/400	L/500

6.0 MATERIALI

6.1 Beton

Za posamezne konstrukcijske elemente se uporabi v spodnji tabeli naveden beton:

Tabela 2: Trdnostni razredi, sestave in lastnosti uporabljenih betonov

Konstrukcijski element	Trdnostni razred betona	Stopnja izpostavljenosti	Prodor vode	Zaščitna plast
Podložni beton	C12/15	X0	-	-
Točkovni temelji	C25/30	XC2		25 mm
Talna plošča	C30/37	XC4,XD3,XF4,XA1	PV-I	35 mm
Stene in stebri	C30/37	XC4,XD3,XF1,XA1	-	35 mm
Zunanje stene		XF1, XC4		
Etažne plošče - ostalo	C25/30	XC2		25 mm

Predvidena življenjska doba konstrukcije je 50 let (stavbe in druge običajne konstrukcije) kar ustreza 4. kategoriji priporočene projektne življenjske dobe po SIST EN 1990:2004.

Izvajalec mora pred začetkom betonskih del izdelati projekt betona, s katerim se določijo sestave betonske mešanice, predpišejo konsistence betona v betonarni, med in po transportu in pred vgrajevanjem, predpišejo načini in najdaljši možni čas vgrajevanja betona, temperature vgrajevanja in temperatura vgrajevanega betona, prekinitve betoniranja, nega betona in vsi ostali ukrepi in kontrole, ki so zahtevane po veljavnih standardih.

6.2 Armatura

Za armiranje se uporabi mehko rebrasto armaturo kvalitete B 500-B, in sicer tako za palično armaturo kot tudi za varjene armaturne mreže. Za elemente, kateri niso primarni potresni elementi, se lahko izvedejo z armaturo 500-A.

Dolžina prekrivanja armaturnih palic je min. 60x Φ.

6.3 Konstrukcijsko jeklo

Uporabi se konstrukcijsko jeklo kvalitete:

- Jeklene konstrukcije - notranje: S 235-JR, antikorozijska zaščita-C2, trajnost H.
- Jeklene konstrukcije - zunanje: S 235-J2, antikorozijska zaščita-C4, trajnost H.
- Jeklene konstrukcije – skladišče soli,… - S 235-J2, antikorozijska zaščita-C3, trajnost H.

Vse zunanje konstrukcije so vročecinkane.
Pri izdelavi jeklenih konstrukcije se upoštevajo tolerance, navedene v standardu SIST EN 1090-2: Izvedba jeklenih in aluminijastih konstrukcij: Tehnične zahteve za izvedbo jeklenih konstrukcij. Izvedba jeklenih in aluminijastih konstrukcij - 2. del: Tehnične zahteve za izvedbo jeklenih konstrukcij. Razred izvedbe konstrukcije je EX2.

Delavniški načrti konstrukcije so obvezni in jih mora izvajalec izdelati pred naročilom materiala ter poslati v pregled projektantu gradbenih konstrukcij. Pred začetkom gradnje morata delavniške načrte pisno potrditi projektant gradbenih konstrukcij in projektant arhitekture! Brez pisne potrditve gradnja ni dovoljena!

6.4 Protipožarna zaščita

Zahtevana požarna odpornost s požarno študijo je sledeča:

- Nosilne konstrukcije stavbe (zidovi): R 60
- Stebri in nosilci: R60
- Nosilna strešna konstrukcija: R60
- Nenosilne konstrukcije (predelne stene, obešene konstrukcije): EI60
- Nosilne in nenosilne konstrukcije na meji požarnega sektorja: (R)EI60

Betonska konstrukcija je dimenzionirana skladno s standardom SIST EN 1992-1-2: 2005. Najmanjša osna oddaljenost posamezne palice ne bo sme biti manjša od tiste, ki je zahtevana za razred R60, če je armatura v enem sloju, oziroma ne manjša od polovice srednje osne oddaljenosti, če so palice v več slojih.

7.0 ANALIZA OBTEŽB

7.1 Lastna teža in stalna obtežba

7.1.1 Lastna teža

Računalniški program Tower – 3D upošteva lastno težo avtomatično glede na podane dimenzije elementa ter glede na izbran material. Upoštevana je specifična teža materialov, in sicer:

- γBET = 25 kN/m3,
- γJEKLO = 78,5 kN/m3.

7.1.2 Stalna obtežba – glej analizo obtežb pri preračunih konstrukcij

7.2 Koristna obtežba – glej analizo obtežb pri preračunih konstrukcij

7.2.1 Sneg

7.2.1.1 Obtežba snega na strehi

- nadmorska višina ..... 310 m
- lokacija objekta A2

---

karakteristična obt. snega na tleh (sk) 1,52 kN/m2

- naklon strehe (α1 = α2) ..... 0°
- oblikovni koeficient obtežbe snega (μ1 = μ2) 0,80

- **obtežba snega (ver. obt. po tlorisni projekciji) (s): 1,22 kN/m2**

7.2.1.2 Nazgodno projektno stanje s snegom

Obtežba snega se skladno z nacionalnim dodatkom upošteva kot nezgodna le v krajih, ki so višje nad 1500 m nad morjem, zato se obtežba snega kot nezgodno stanje ne upošteva.

7.2.2 Veter

7.2.2.1 Splošno

VETER:	vb,o =	20,00	m/s	vb = 20,00	m/s
	z =	8,50	m	… višina objekta	
		II		… kategorija terena (tabela 4.1)	
	zo =	0,05	m		
	z min =	2,00	m	kr = 0,19	
	vm =	19,52		cr = 0,98	
	qb =	0,25	kN/m^2	lv = 0,19	
	qb (z) =	0,56	kN/m^2	...tlak pri največji hitrosti ob sunkih	

7.3.1 Seizmična obtežba

7.3.2 Značilnosti tal in potresni vpliv

7.3.2.1 Tip tal

Tabela 3: Tip tal

Tip tal		Faktor tal [S]	Opis stratigrafskega profila
☑	A	1,00	Skala ali druga skladi podobna geološka formacija, na kateri je največ 5 m slabšega površinskega materiala
☐	B	1,20	Zelo gost pesek, prod ali zelo toga glina debeline vsaj nekaj deset metrov, pri katerih mehanske značilnosti z globino postopoma naraščajo
☐	C	1,15	Globoki sedimenti gostega ali srednje gostega peska, proda ali toge gline globine nekaj deset do več sto metrov
☐	D	1,35	Sedimenti rahlih do srednje gostih nevezljivih zemljin (z nekaj mehkimi vezljivimi plastmi ali brez njih) ali pretežno mehkih do trdnih vezljivih zemljin
☐	E	1,70	Profil tal, kjer površinska aluvialna plast z debelino med okrog 5 in 20 metri in vrednostmi v_s, ki ustrezajo tipoma C ali D, leži na bolj togem materialu z v_s > 800 m/s

* tip tal določen s strani geomehanika v Geološko geomehanskem poročilu

7.3.2.2 Kategorija pomembnosti objekta

Tabela 4: Kategorije pomembnosti objekta

Ktg. p.		γ_I	Opis stratigrafskega profila
☐	I	0,8	Stavbe manjše pomembnosti za varnost ljudi, npr. kmetijski objekti ipd.
☑	II	1,0	Običajne stavbe, ki ne sodijo v druge kategorije
☐	III	1,2	Stavbe, katerih potresna odpornost je pomembna glede na posledice porušitve, npr. šole, dvorane za srečanja, kulturne ustanove ipd.
☐	IV	1,4	Stavbe, katerih integriteta med potresi je življenjskega pomena za civilno zaščito, npr. bolnišnice, gasilske postaje, elektrarne ipd.

7.3.2.3 Projektni pospešek tal

Objekt se nahaja pri kraju Šentvid pri Stični. Na podlagi karte potresne nevarnosti v Sloveniji (MOP, 2021) s povratno dobo 475 let v območje osrednje Slovenije je upoštevan projektni pospešek tal **ag = 0,250g**.

7.0 RAČUNSKA ANALIZA

7.1 Računski model

Statična analiza je izvedena s prostorskim 3D modelom, sestavljenega iz linijskih in ploskovnih končnih elementov ter iz 2D ploskovnih in linijskih elementov za analizo posameznih konstrukcijskih sklopov. Izvedena je analiza z metodo končnih elementov po teoriji prvega reda.

Potresni vpliv na konstrukcijo je izveden z modalno analizo.

7.2 Programska oprema

Pri računski analizi se je uporabila naslednja programska oprema:

- Tower – 3D Model Builder 8.4 [8443]
- RFEM – Preračuni lesene konstrukcije
- MS Office – Excel

8.0 KOMBINACIJE VPLIVOV

8.1 Mejno stanje nosilnosti

$$\sum_{j\geq 1}\gamma_{G,j}G_{k,j} + \gamma_P P + \gamma_{Q,1}Q_{k,1} + \sum_{i>1}\gamma_{Q,i}\psi_{0,i}Q_{k,i}$$ ... stalna in začasna projektna stanja

$$\sum_{j\geq 1}G_{k,j} + P + A_{Ed} + (\psi_{1,1}\ ali\ \psi_{2,1})Q_{k,1} + \sum_{i>1}\psi_{2,i}Q_{k,i}$$ ... nezgodna projektna stanja

$$\sum_{j\geq 1}G_{k,j} + P + A_{Ed} + \sum_{i\geq 1}\psi_{2,i}Q_{k,i}$$ ... potresna projektna stanja

8.2 Mejno stanje uporabnosti

$$\sum_{j\geq 1}G_{k,j} + Q_{k,1} + \sum_{i>1}\psi_{0,i}Q_{k,i}$$ ... karakteristična kombinacija

$$\sum_{j\geq 1}G_{k,j} + \psi_{1,1}Q_{k,1} + \sum_{i>1}\psi_{2,i}Q_{k,i}$$ ... pogosta kombinacija [2]

$$\sum_{j\geq 1}G_{k,j} + \sum_{i\geq 1}\psi_{2,i}Q_{k,i}$$ ... navidezno stalna kombinacija [1, 3]

1 ... kontrola širine razpok pri AB elementih in prednapetih betonskih elementih z nepovezanimi kabli
2 ... kontrola širine razpok pri prednapetih betonskih elementih s povezanimi kabli
3 ... kontrola širine povesov AB elementov (gred, plošč ali konzol)

8.3 Kombinacijski faktorji

Vpliv	ψ_0	ψ_1	ψ_2
Koristna obtežba v stavbah (EN 1991-1-1)			
Kategorija A: bivalni prostori	0,7	0,5	0,3
Kategorija B: pisarne	0,7	0,5	0,3
Kategorija C: stavbe, kjer se zbirajo ljudje	0,7	0,7	0,6
Kategorija D: trgovine	0,7	0,7	0,6
Kategorija E: skladišča	1,0	0,9	0,8
Kategorija F: prometne površine (vozilo s težo ≤ 30 kN)	0,7	0,7	0,6
Kategorija G: prometne površine (30 kN < teža vozila ≤ 160 kN)	0,7	0,5	0,3
Kategorija H: strehe	0	0	0
Obtežba snega na stavbah (EN 1991-1-3)			
Kraji z nadmorsko višino nad 1.000 m	0,7	0,5	0,2
Kraji z nadmorsko višino pod 1.000 m	0,5	0,2	0
Obtežba vetra na stavbah (EN 1991-1-4)	0,6	0,2	0
Sprememba temperature (ne pri požaru) v stavbah	0,6	0,5	0

9.0 STROKOVNI NADZOR IN KONTROLA KVALITETE

Kakovost vgrajenih materialov mora ustrezati odgovarjajočim standardom, predpisom in tehničnim pogojem.
Vsa dela se morajo izvajati v skladu s tehničnimi predpisi in predpisi iz varstva pri delu ter v skladu s predloženimi tehnološkimi navodili in navodili projektantov.
Tekom izvajanja gradbenih del mora investitor zagotoviti strokovni nadzor nad izvajanjem del. Vse eventualne spremembe in dopolnitve projekta morajo biti opravljene z vednostjo in soglasjem projektanta.

Izdelal:

2.52 STATIČNI PRERAČUN

VSEBINA

8 SKLADIŠČE SOLI S PRALNICO

8.1 ANALIZA OBTEŽB
8.2-8.5 LESENA KONSTRUKCIJA
8.6 AB KONSTRUKCIJA

08 SKLADIŠČE SOLI S PRALNICO

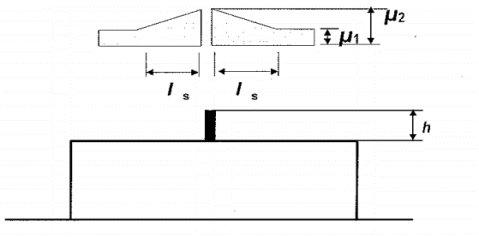
AO ANALIZA OBTEŽB

α =	**2**	°	… naklon strehe
μ =	0,80		
Hnm =	**310**	m	… nadmorska višina
Veter - cona	**1**		… vetrovna cona
Sneg - cona	**A2**		… sneg cone

STALNA	PV paneli		0,25 kN/m2
	instalacije		0,50 kN/m2
	strešni paneli		0,50 kN/m2
	obešen strop		0,30 kN/m^2
		g =	1,55 kN/m^2
SNEG		μ*1,293*(1+(Hnm/728)2)=	1,22 kN/m^2
		q =	1,22 kN/m^2

SNEG KOPIČENJE OB OVIRAH

sk =	1,22	kN/m2
h =	3,5	m
γ =	2	kN/m3
μ2,rač = γ*h/sk =	5,74	
μ2,dej=max(μ2,rač; 2) =	2,00	
sk(μ2) =	2,44	kN/m2
ls = 2h =	7,00	m



SOL NACL

h =	**6,50**	m	
γzemljine =	21,60	kN/m3	...trikotni razpored obtežbe
ϕ =	32,00	°	
ko = 1- sinϕ =	0,47		...mirni zemeljski pritisk
qzgoraj,stalna =	0,00	kN/m2	…obtežba na nivoju terena

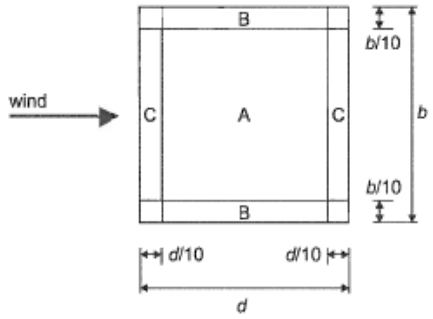
qzgoraj =	0,00	kN/m2
qspodaj =	66,00	kN/m2

HORIZONTALNA OBTEŽBA

VETER	vb,o =	20,00	m/s		vb =	20,00 m/s
	z =	13,50	m	… višina objekta		
		II		… kategorija terena (tabela 4.1)		
	zo =	0,05	m			
	z min =	2,00	m		kr =	0,19
	vm =	21,27			cr =	1,06
	qb =	0,25	kN/m^2		lv =	0,18
	qb (z) =	0,64	kN/m^2	...tlak pri največji hitrosti ob sunkih		

Veter X: nadstrešnica

b =	10,20	m		Maks vsi ϕ	… zapolnjenost
d=	5,90	m	cf =	0,30	… koeficient celotne sile
α=	3,00	°	cp,net,A=	0,65	we,A= 0,41 kN/m2
d/10 =	0,59	m	cp,net,B=	1,95	we,B= 1,24 kN/m2
b/10 =	1,02	m	cp,net,C=	1,20	we,C= 0,76 kN/m2



ϕ=	1,00	… zapolnjenost	
cf =	-1,35	… koeficient celotne sile	
cp,net,A=	-1,65	we,A=	-1,05 kN/m2
cp,net,B=	-2,00	we,B=	-1,27 kN/m2
cp,net,C=	-2,35	we,C=	-1,50 kN/m2

Sila trenja	ctr =	0,02	hrapava površina
	Atr =	120,36	m2
	Ftr =	1,53	kN

POTRES: ag = 0.25 g ...projektni pospešek tal

tip tal A

q = 1,5

SPINA Novo mesto, d.o.o.

POZ X01 – SEKUNDARNI b/h = **20** / **28** cm

MATERIAL **GL 24c** fm,k = **2,40** kN/cm2 fv,k = **0,40** kN/cm2
- lepljen: γm= **1,25** Eo,mean = **1160** kN/cm2
- srednje trajanje o **M** kmod = **0,80**
- razred vlažnosti **2 (12% do 20%)** fc,90,k= **0,30** kN/cm2

GEOMETRIJA emax = 2,05 m Wy = 2613,33 cm3
L = 4,90 m Iy = 36586,6667 cm4

OBTEŽBA	lastna teža		b*h*5 =	0,28 kN/m
	stalna	1,55	*e =	3,18 kN/m
	sneg	1,22	*e =	2,51 kN/m
	sneg - kopičenje	2,44	*e =	5,00 kN/m
	veter - tlak	0,41	*e =	0,85 kN/m
	veter - srk	-1,05	*e =	-2,15 kN/m

PRERAČUN Glej izpiske iz programa!

KONTROLE

TLAK - PRAVOKOTNO Ved = 22,08 kN

Dimenzije ležišča a = 20,00 cm
b = 10,00 cm

fc,90,d = Ved /a*b = 0,11 kN/cm2 < fc,90d = 0,15 kN/cm^2

POMIKI L = 490 cm

Trenutni upogib	winst(g) =	0,65 cm	kdef,g =	0,80	
	winst(q) =	0,47 cm	kdef,q =	0,25	
winst = winst(g)+	winst(q) =	1,12 cm	< L/300 =	1,63 cm	

Končni upogib wfin = winst(g)*(1+kdef,g) + winst(q)*(1+Ψ_2*kdef,q)
wfin = 1,76 cm < L/200 = 2,45 cm

VIJAČENJE KOVINSKI ČEVLJI
TIP SIMSPON STRONG TIE **BSD A/200; B/280**

Fved = 22,00 kN < R1,k = **47,20**

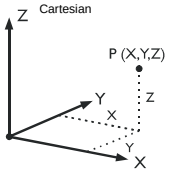
Artikel	Verbindungsmittel		Charakter. Tragfähigkeiten - Nadelholz C24 [kN]					
	Hauptträger	Nebenträger	$R_{1,k}$			$R_{2,k}$		
	Anzahl	Anzahl	CNA4,0x40	CNA4,0x50	CNA4,0x60	CNA4,0x40	CNA4,0x50	CNA4,0x60
BSD A/100	16	8	9.9	13	15.9	10.3	13.4	16.4
BSD A/120	20	10	14.2	18.5	22.5	14.6	19.1	23.2
BSD A/140	24	12	19.1	24.8	29.9	19.6	25.5	28.3
BSD A/160	28	14	24.5	31.8	37.8	25.1	31.1	33
BSD A/180	32	16	30.4	39.3	42.5	29.3	35.5	37.8
BSD A/200	36	18	36.6	44.4	47.2	32.9	40	42.5

MODEL - GENERAL DATA

General	Model name		:	Sekundarci
	Project name		:	DARS-DOB
	Type of model		:	2D-XZ (ux/uz/φy)
	Positive direction of global axis Z		:	Upward
	Classification of load cases and combinations		:	According to Standard: EN 1990 National Annex: CEN - EU
	☒ Automatically create combinations		:	☒ Load Combinations

FE MESH SETTINGS

General	Target length of finite elements	l_{FE}	:	0.5 m
	Maximum distance between a node and a line to integrate it into the line	ε	:	0.0 m
	Maximum number of mesh nodes (in thousands)		:	500
Members	Number of divisions of members with cable, elastic foundation, taper, or plastic characteristic		:	10
	☒ Activate member divisions for large deformation or post-critical analysis			
	☒ Use division for members with node lying on them			
Surfaces	Maximum ratio of FE rectangle diagonals	Δ_D	:	1.800
	Maximum out-of-plane inclination of two finite elements	α	:	0.50 °
	Shape direction of finite elements		:	Triangles and quadrangles ☒ Same squares where possible



1.1 NODES

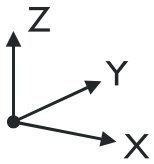
Node No.	Node Type	Reference Node	Coordinate System	Node Coordinates X [m]	Z [m]	Comment
1	Standard	-	Cartesian	0.000	0.000	
2	Standard	-	Cartesian	4.900	0.000	

1.2 LINES

Line No.	Line Type	Nodes No.	Line Length L [m]		Comment
1	Polyline	1,2	4.900	X	

1.3 MATERIALS

Matl. No.	Modulus E [kN/cm²]	Modulus G [kN/cm²]	Poisson's Ratio ν [-]	Spec. Weight γ [kN/m³]	Coeff. of Th. Exp. α [1/℃]	Partial Factor γ_M [-]	Material Model
1	Glulam Timber GL24c | DIN 1052:2008-12						
	1160.00	59.00	8.831	5.00	5.00E-06	1.30	Isotropic Linear Elastic



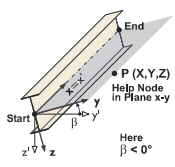
1.7 NODAL SUPPORTS

Support No.	Nodes No.	Rotation [°] about Y	Support or Spring [kN/m] [kNm/rad] $u_{X'}$	$u_{Z'}$	$\varphi_{Y'}$	Comment
1	1	0.00	☒	☒	☐	
2	2	0.00	☐	☒	☐	



1.13 CROSS-SECTIONS

Section No.	Matl. No.	J [cm⁴] A [cm²]	I_y [cm⁴] A_y [cm²]	I_z [cm⁴] A_z [cm²]	Principal Axes α [°]	Rotation α' [°]	Overall Dimensions [mm] Width b	Height h
1	T-Rectangle 200/280							
	1	560.00	36586.67	466.67	0.00	0.00	200.0	280.0



1.17 MEMBERS

Mbr. No.	Line No.	Member	Rotation Type	Rotation β[¡¿½]	Cross-Section Start	Cross-Section End	Hinge No. Start	Hinge No. End	Ecc. No.	Div. No.	Length L [m]	
1	1	Beam	Angle	0.00	1	1	-	-	-	-	4.900	X

MODEL

In Y-direction



0.651 m

2.1 LOAD CASES

Load Case	Load Case Description	EN 1990 | CEN Action Category	Self-Weight - Factor in Direction Active	X	Y	Z
LC1	Lastna, stalna	Permanent	☒	0.000		-1.000
LC2	Sneg	Snow (H ≤ 1000 m a.s.l.)	☐			
LC3	Veter	Wind	☐			

2.1.1 LOAD CASES - CALCULATION PARAMETERS

Load Case	Load Case Description	Calculation Parameters	
LC1	Lastna, stalna	Method of analysis	: ⊙ Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: ⊙ Newton-Raphson
		Activate stiffness factors of:	: ☒ Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: ☒ Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC2	Sneg	Method of analysis	: ⊙ Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: ⊙ Newton-Raphson
		Activate stiffness factors of:	: ☒ Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: ☒ Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)
LC3	Veter	Method of analysis	: ⊙ Geometrically linear analysis
		Method for solving system of nonlinear algebraic equations	: ⊙ Newton-Raphson
		Activate stiffness factors of:	: ☒ Cross-sections (factor for J, I_y, I_z, A, A_y, A_z)
			: ☒ Members (factor for GJ, EI_y, EI_z, EA, GA_y, GA_z)

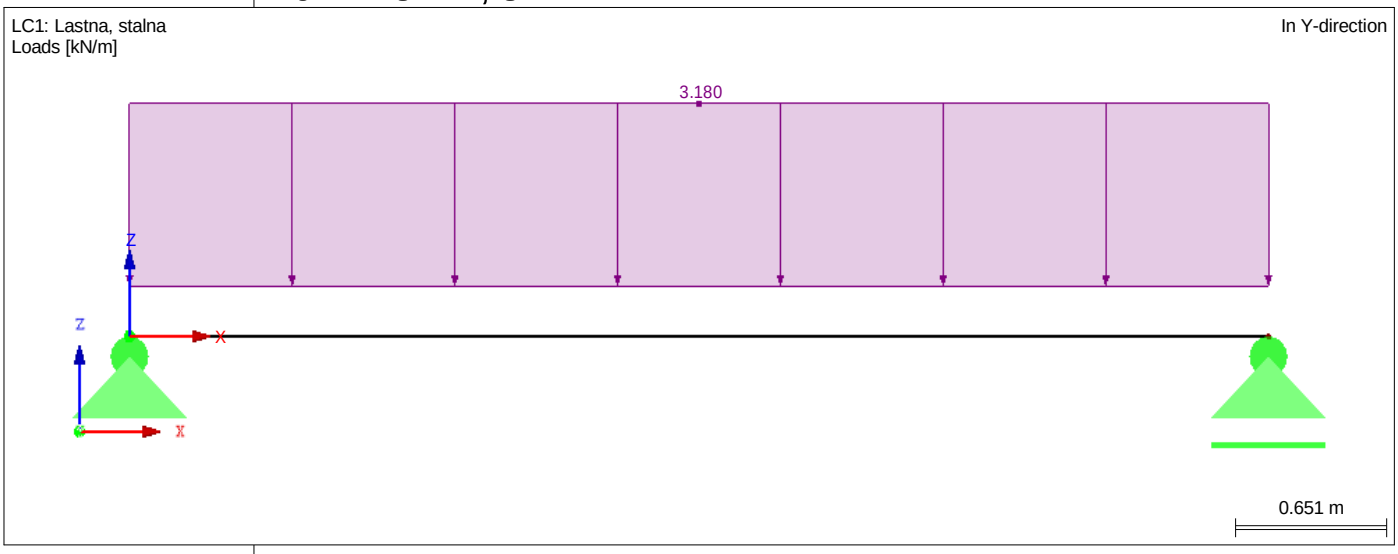
2.5 LOAD COMBINATIONS

Load Combin.	Load Combination DS	Description	No.	Factor	Load Case	
CO1	ULS	1.35*LC1	1	1.35	LC1	Lastna, stalna
CO2	ULS	1.35*LC1 + 1.5*LC2	1	1.35	LC1	Lastna, stalna
			2	1.50	LC2	Sneg
CO3	ULS	1.35*LC1 + 1.5*LC2 + 0.9*LC3	1	1.35	LC1	Lastna, stalna
			2	1.50	LC2	Sneg
			3	0.90	LC3	Veter
CO4	ULS	1.35*LC1 + 1.5*LC3	1	1.35	LC1	Lastna, stalna
			2	1.50	LC3	Veter
CO5	ULS	1.35*LC1 + 0.75*LC2 + 1.5*LC3	1	1.35	LC1	Lastna, stalna
			2	0.75	LC2	Sneg
			3	1.50	LC3	Veter
CO6	S Ch	LC1	1	1.00	LC1	Lastna, stalna
CO7	S Ch	LC1 + LC2	1	1.00	LC1	Lastna, stalna
			2	1.00	LC2	Sneg
CO8	S Ch	LC1 + LC2 + 0.6*LC3	1	1.00	LC1	Lastna, stalna
			2	1.00	LC2	Sneg
			3	0.60	LC3	Veter
CO9	S Ch	LC1 + LC3	1	1.00	LC1	Lastna, stalna
			2	1.00	LC3	Veter
CO10	S Ch	LC1 + 0.5*LC2 + LC3	1	1.00	LC1	Lastna, stalna
			2	0.50	LC2	Sneg
			3	1.00	LC3	Veter

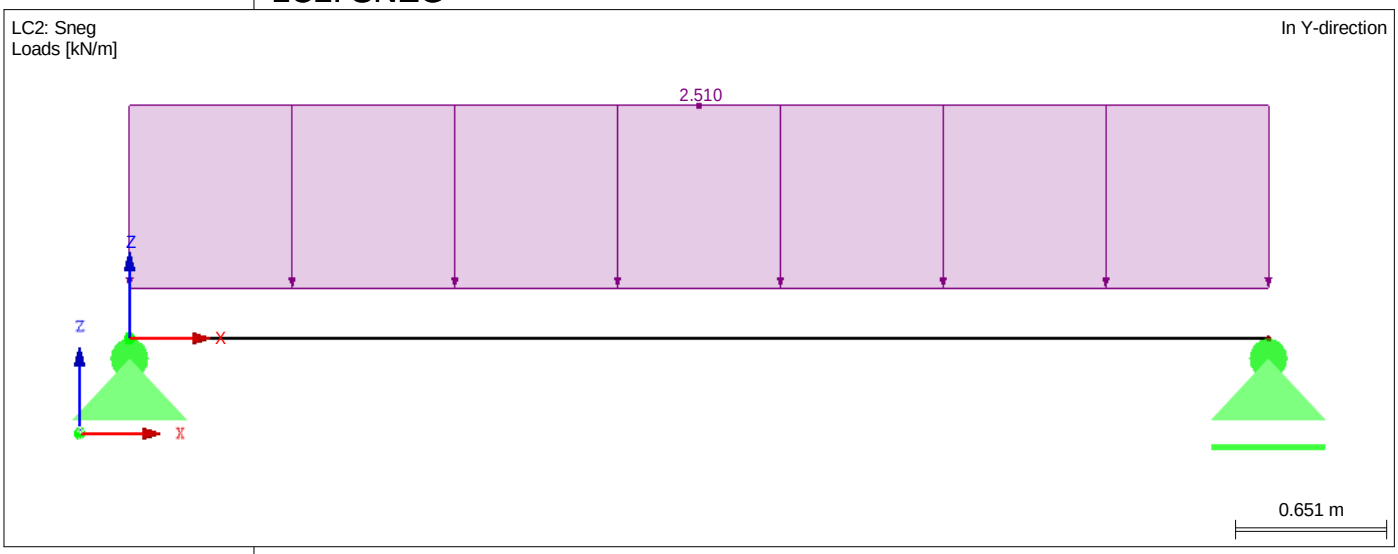
2.7 RESULT COMBINATIONS

Result Combin.	Description	Loading
RC1	ULS (STR/GEO) - Permanent / transient - Eq. 6.10	CO1/p to CO5/p
RC2	SLS - Characteristic	CO6/p to CO10/p

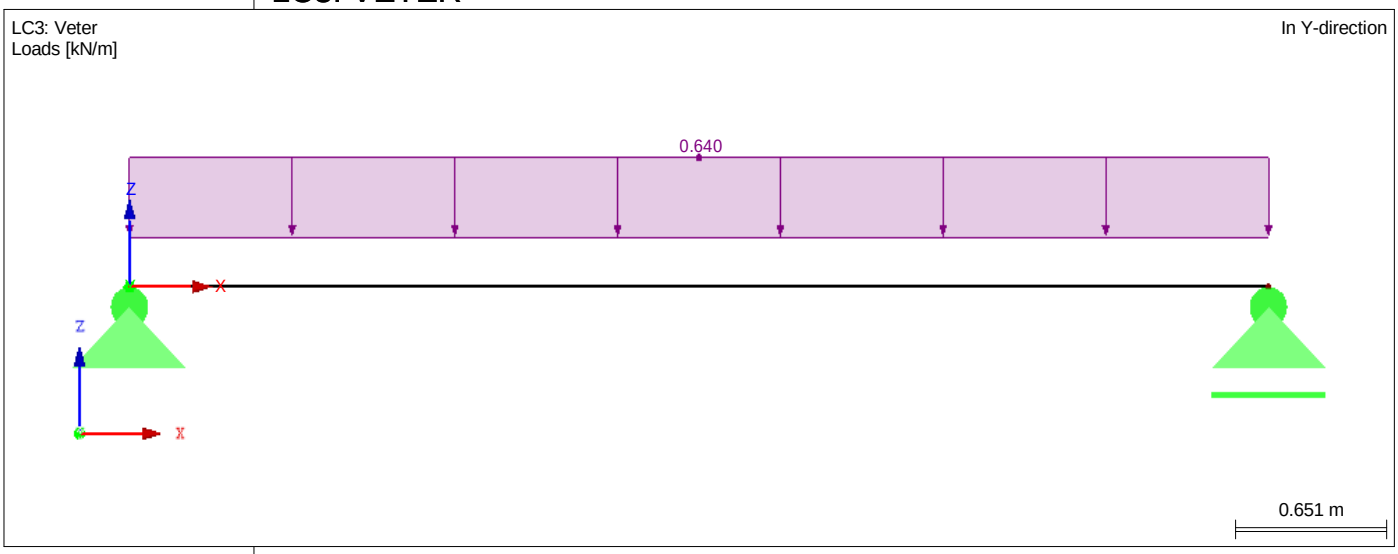
LC1: LASTNA, STALNA



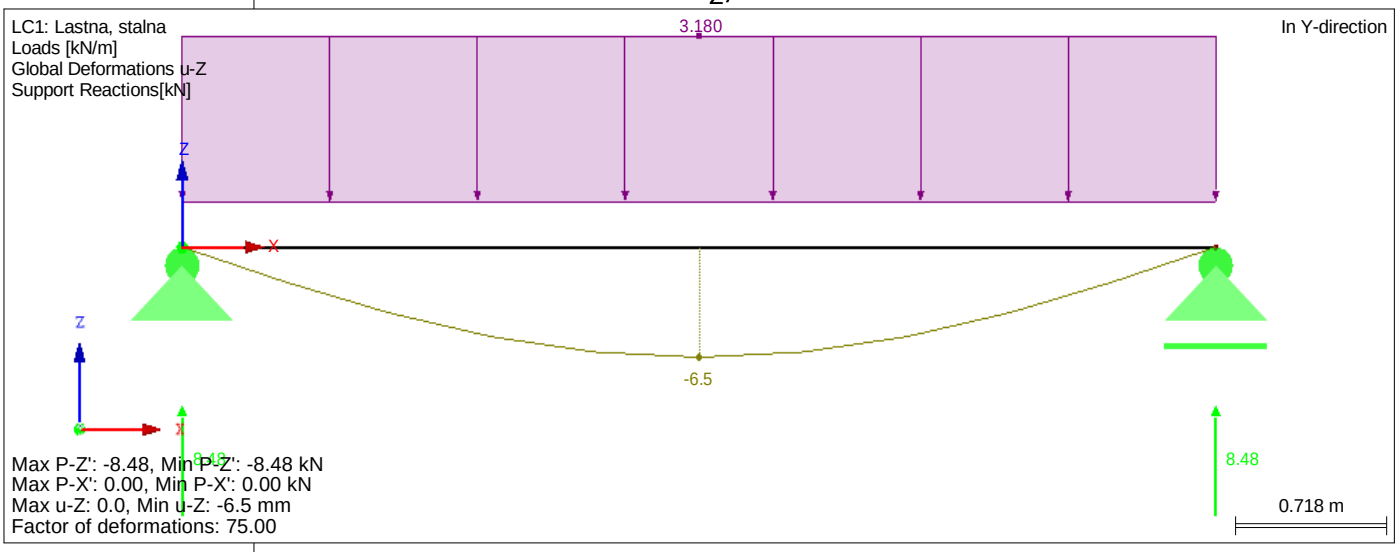
LC2: SNEG



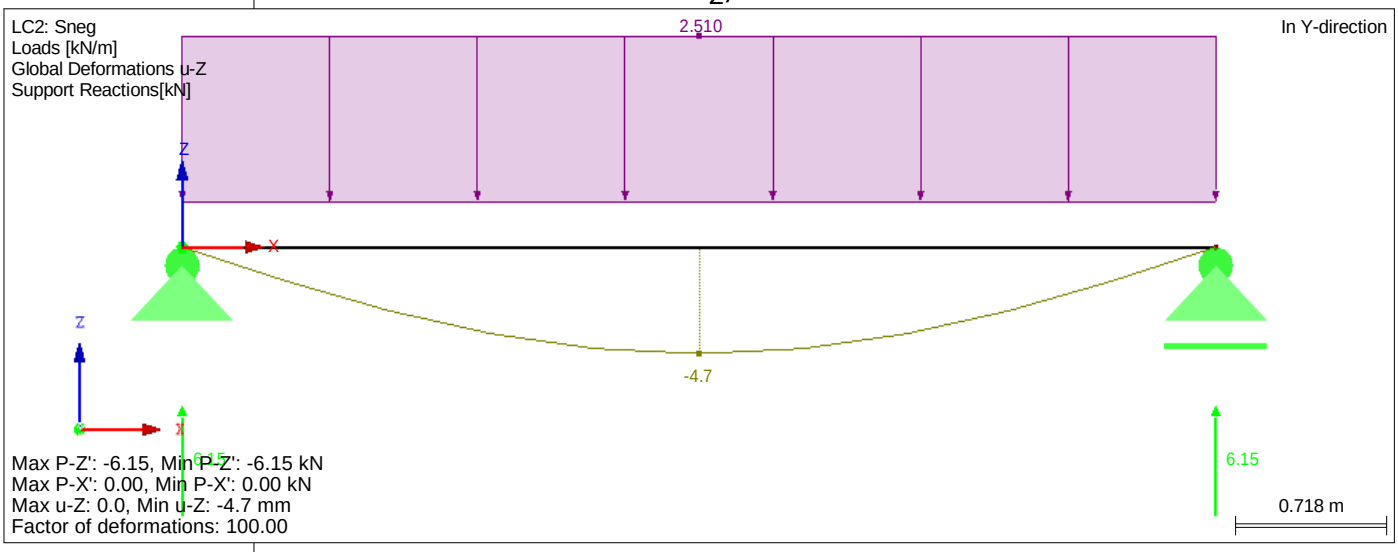
LC3: VETER



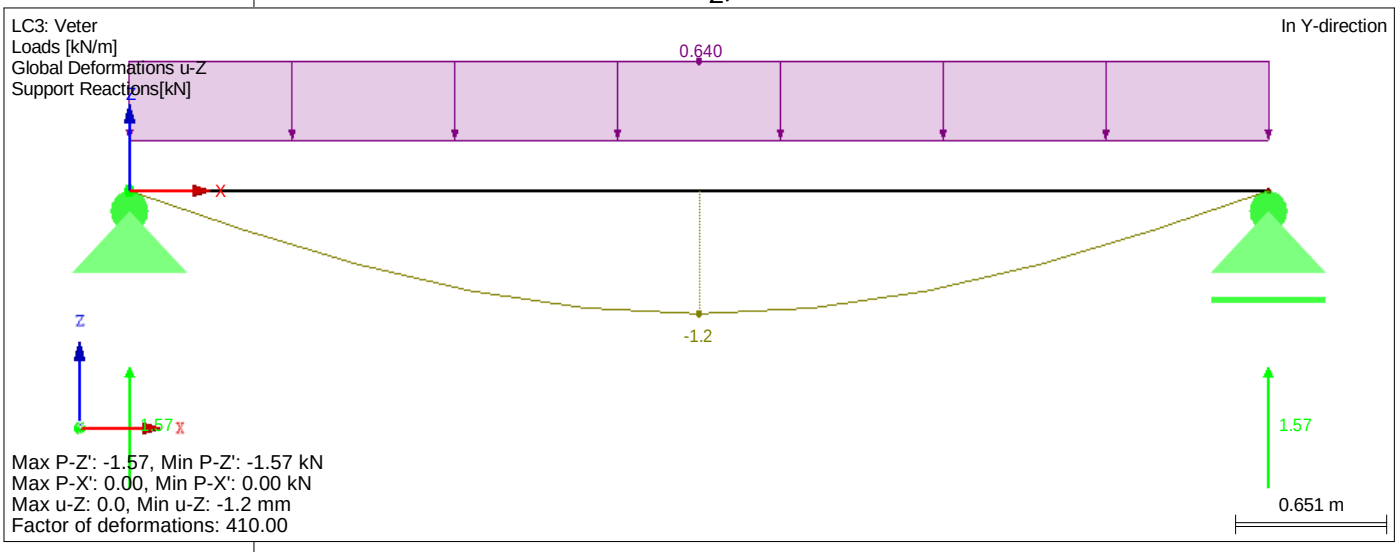
GLOBAL DEFORMATIONS u_Z, SUPPORT REACTIONS



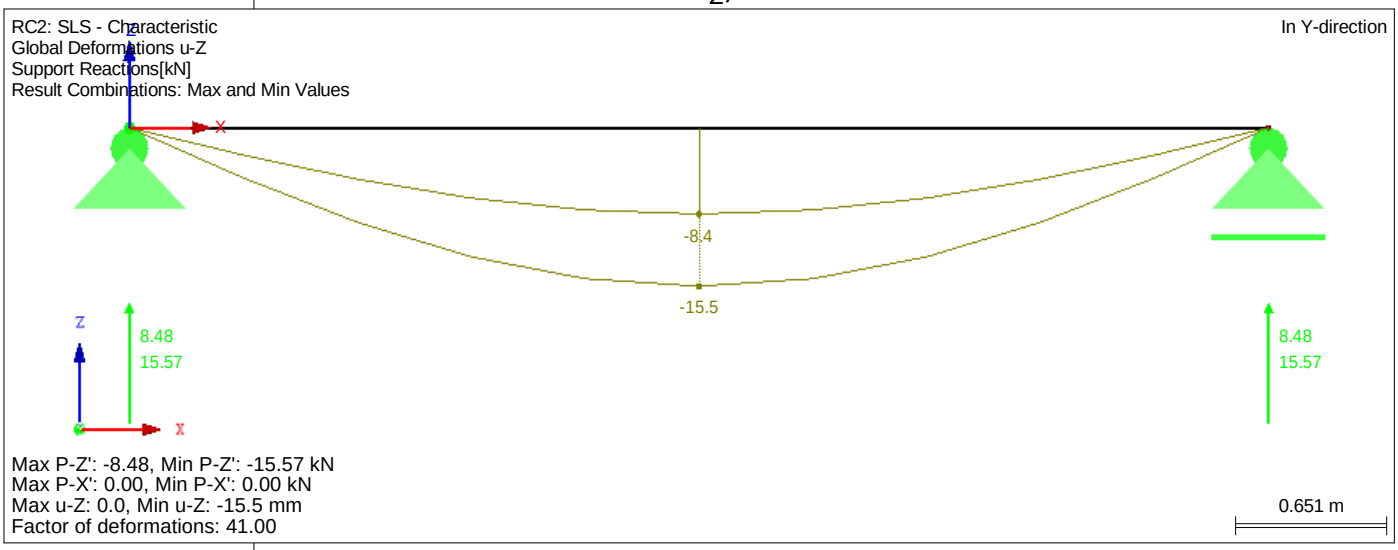
GLOBAL DEFORMATIONS u_Z, SUPPORT REACTIONS



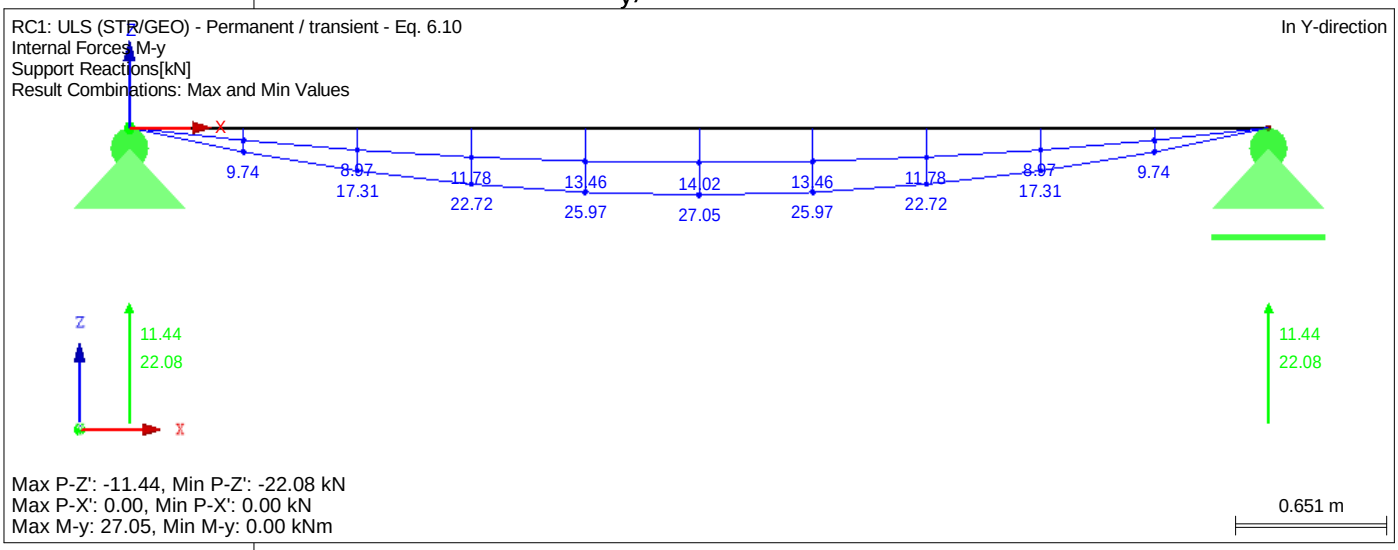
GLOBAL DEFORMATIONS u_Z, SUPPORT REACTIONS



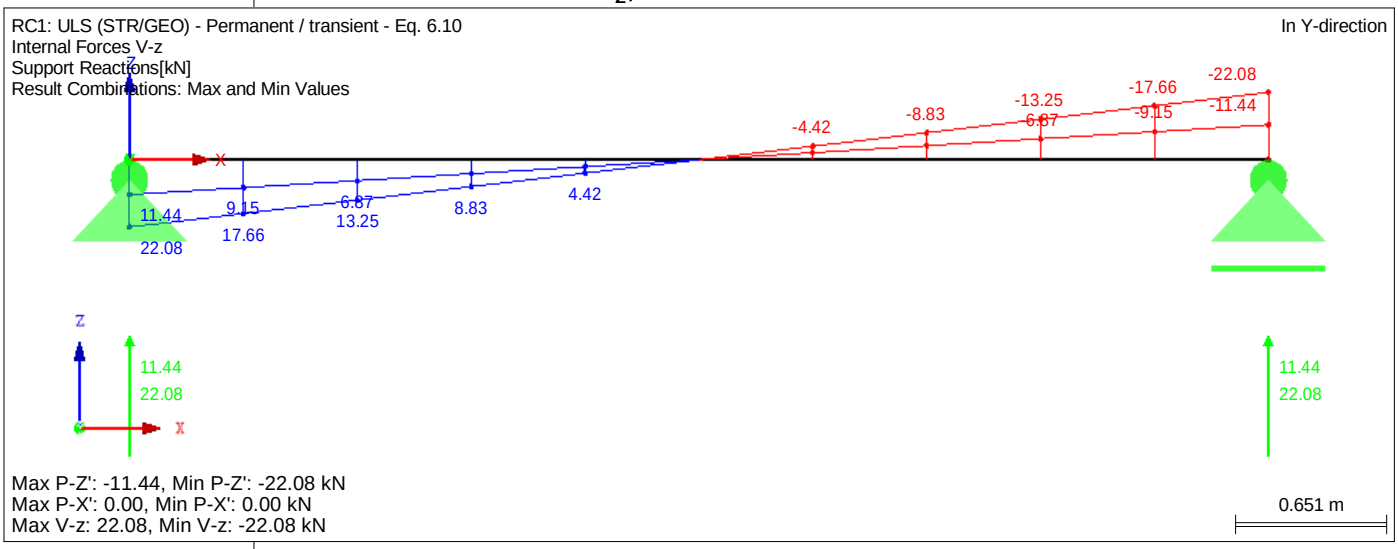
GLOBAL DEFORMATIONS u_Z, SUPPORT REACTIONS



INTERNAL FORCES M_y, SUPPORT REACTIONS



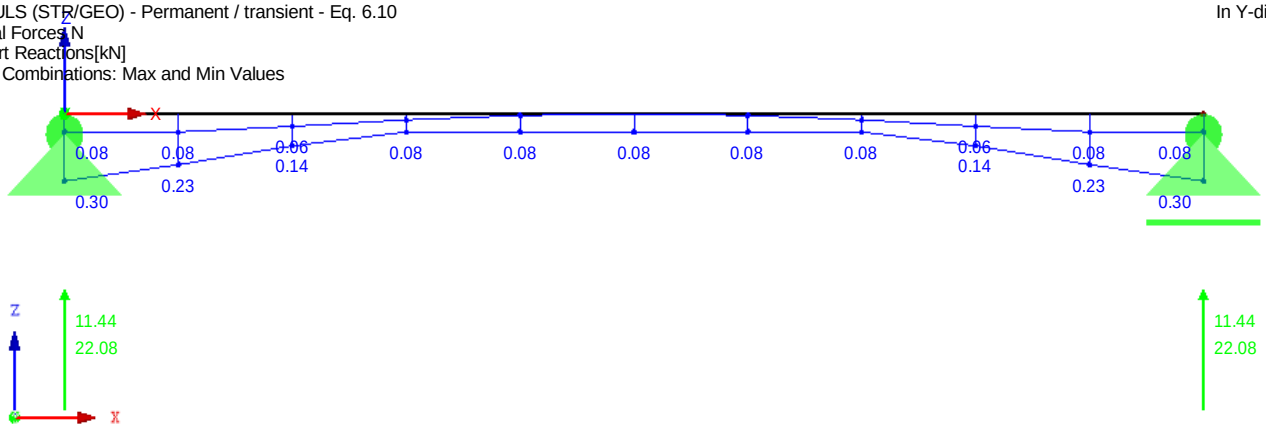
INTERNAL FORCES V_z, SUPPORT REACTIONS



INTERNAL FORCES N, SUPPORT REACTIONS

RC1: ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces N
Support Reactions[kN]
Result Combinations: Max and Min Values

In Y-direction



Max P-Z': -11.44, Min P-Z': -22.08 kN
Max P-X': 0.00, Min P-X': 0.00 kN
Max N: 0.30, Min N: 0.00 kN

0.651 m

1.1.1 GENERAL DATA

Members to design:		All	
Design according to Standard:		SIST EN 1995-1-1/A101:2006-03	
Ultimate Limit State Design			
Load combinations to design:	CO1	1.35*LC1	
	CO2	1.35*LC1 + 1.5*LC2	
	CO3	1.35*LC1 + 1.5*LC2 + 0.9*LC3	
	CO4	1.35*LC1 + 1.5*LC3	
	CO5	1.35*LC1 + 0.75*LC2 + 1.5*LC3	
Serviceability Limit State Design			
Load combinations to design:	CO6	LC1	
	CO7	LC1 + LC2	
	CO8	LC1 + LC2 + 0.6*LC3	
	CO9	LC1 + LC3	
	CO10	LC1 + 0.5*LC2 + LC3	

1.2 MATERIALS

Matl. No.	Description	Factor Category	Comment
1	Glulam Timber GL24c | DIN 1052 - 08	Glued Laminated Timber	

1.3.1 CROSS-SECTIONS

T-Rectangle 200/280



Sect. No.	Matl. No.	Cross-section Description [mm]	Max Design Ratio	Comment
1	1	T-Rectangle 200/280	0.95	

1.4 LOAD DURATION AND SERVICE CLASS

LC/CO/ RC	LC, CO or RC Description	Load Case Type	Classification of Load Duration
LC1	Lastna, stalna	Permanent	Permanent
LC2	Sneg	Snow (H ≤ 1000 m a.s.l.)	Medium-term
LC3	Veter	Wind	Short-term
CO1	1.35*LC1	-	Permanent
CO2	1.35*LC1 + 1.5*LC2	-	Medium-term
CO3	1.35*LC1 + 1.5*LC2 + 0.9*LC3	-	Short-term
CO4	1.35*LC1 + 1.5*LC3	-	Short-term
CO5	1.35*LC1 + 0.75*LC2 + 1.5*LC3	-	Short-term
CO6	LC1	-	Permanent
CO7	LC1 + LC2	-	Medium-term
CO8	LC1 + LC2 + 0.6*LC3	-	Short-term
CO9	LC1 + LC3	-	Short-term
CO10	LC1 + 0.5*LC2 + LC3	-	Short-term

Service Class SECL
Service Class 1: Identical for All Members/Sets of Members

1.5 EFFECTIVE LENGTHS - MEMBERS

Member No.	Buckling Possible	Buckling About Axis y Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Buckling About Axis z Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Lateral-Torsional Buckling Possible	Define L_{cr}	L_{cr} [m]
1	☒	☒	1.000	4.900	☒	1.000	4.900	☒	Manually	4.900

1.9 SERVICEABILITY

No.	Reference to	Members/Sets No.	Reference Length Manually	Reference Length L [m]	Direct.	Precamber $w_{c,y}$[mm]	Precamber $w_{c,z}$[mm]	Beam Type
1	Member	1	☐	4.900	y; z	0.0	0.0	Beam

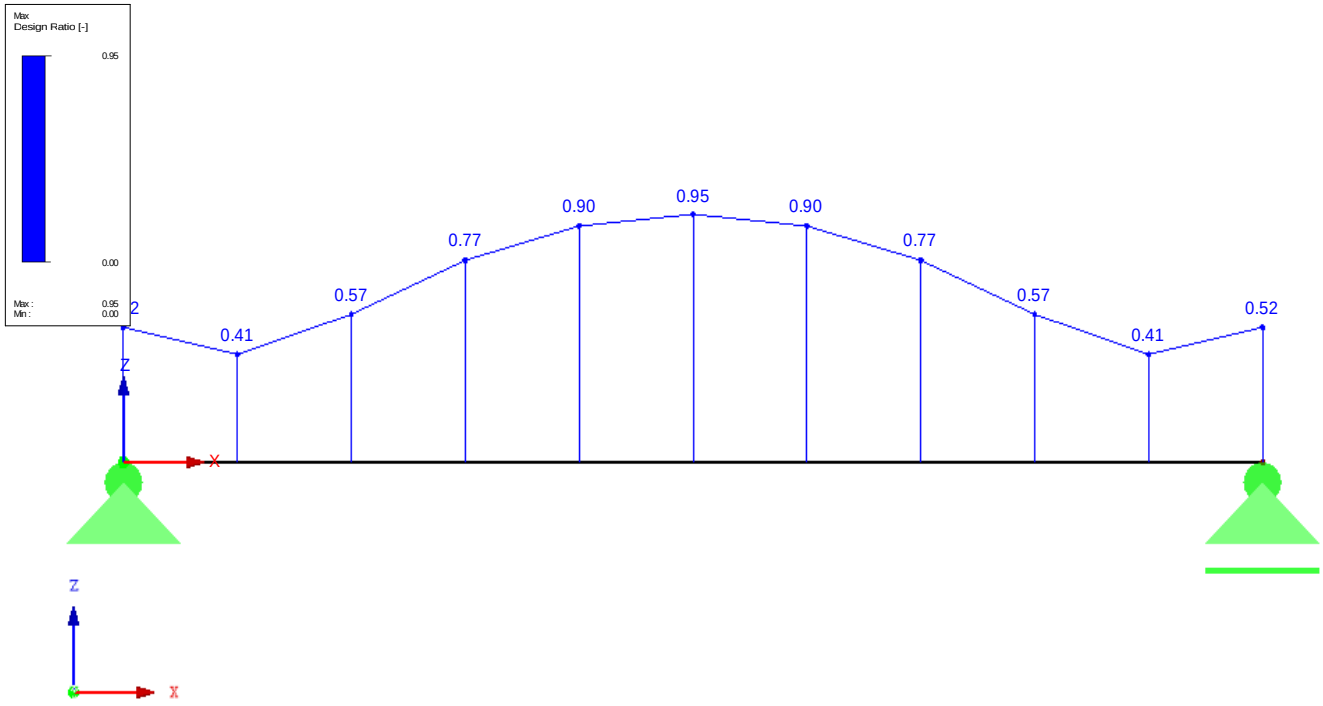
2.4 DESIGN BY MEMBER

Member No.	Location x [m]	LC/CO/ RC	Design		Design No.	Description
1	**Cross-section No. 1 - T-Rectangle 200/280**					
	0.000	CO2	0.52	≤ 1	111)	Cross-section resistance - Shear due to shear force Vz acc. to 6.1.7
	2.450	CO2	0.63	≤ 1	151)	Cross-section resistance - Uniaxial bending acc. to 6.1.6
	2.450	CO2	0.63	≤ 1	311)	Flexural member without compression force acc. to 6.3.3 - Bending about y-axis
	0.000	CO6	0.00	≤ 1	400)	Serviceability - Negligible deformations
	2.450	CO8	0.95	≤ 1	401)	Serviceability - Design situation Characteristic acc. to 7.2 - Inner span, z-direction

DESIGN: ULTIMATE LIMIT STATE - CROSS-SECTION DESIGN

RF-TIMBER Pro CA2
Ultimate Limit State - Cross-Section Design

In Y-direction



Max Design Ratio: 0.95

0.651 m

SPINA Novo mesto, d.o.o.

POZ X02 – PRIMARCI b/h = **20** / **130** cm
230 cm

MATERIAL **GL28c** fm,k = **2,80** kN/cm2 fv,k = **0,35** kN/cm2
- lepljen: γm= **1,25** Eo,mean = **1200** kN/cm2
- srednje trajanje o **M** kmod = **0,80**
- razred vlažnosti **2 (12% do 20%)** fc,90,k= **0,25** kN/cm2

GEOMETRIJA emax = 4,90 m Wy = 56333,33 cm3
L = 14,60 m Iy = 3661666,67 cm4

OBTEŽBA lastna teža b*h*5 = 1,30 kN/m

Sekundar	stalna	8,48	kN	* 2 =	16,96 kN
	sneg	6,15	kN	* 2 =	12,3 kN
	veter - tlak	1,57	kN	* 2 =	3,14 kN
	veter - srk	0,00	kN	* 2 =	0,00 kN

PRERAČUN Glej izpiske iz programa!

KONTROLE

TLAK - PRAVOKOTNO Ved = 318 kN

Dimenzije ležišča a = 20,00 cm
b = 30,00 cm

fc,90,d = Ved /a*b = 0,53 kN/cm2 < fc,90d = 0,15 kN/cm^2

Potrebna ojačitev z vijaki!!!

POMIKI L = 1460 cm

Trenutni upogib	winst(g) =	0,46	cm	kdef,g =	0,80	
	winst(q) =	0,27	cm	kdef,q =	0,25	
winst = winst(g)+	winst(q) =	0,73	cm	< L/300 =	4,87	cm

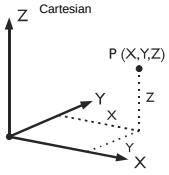
Končni upogib wfin = winst(g)*(1+kdef,g) + winst(q)*(1+Ψ_2*kdef,q)
wfin = 1,17 cm < L/200 = 7,30 cm

MODEL - GENERAL DATA

General	Model name		:	Primarci
	Project name		:	DARS-DOB
	Type of model		:	2D-XZ (ux/uz/φy)
	Positive direction of global axis Z		:	Upward
	Classification of load cases and combinations		:	According to Standard: EN 1990 National Annex: CEN - EU
	☒ Automatically create combinations		:	☒ Load Combinations

FE MESH SETTINGS

General	Target length of finite elements	l_{FE}	:	0.5 m
	Maximum distance between a node and a line to integrate it into the line	ε	:	0.0 m
	Maximum number of mesh nodes (in thousands)		:	500
Members	Number of divisions of members with cable, elastic foundation, taper, or plastic characteristic		:	10
	☒ Activate member divisions for large deformation or post-critical analysis			
	☒ Use division for members with node lying on them			
Surfaces	Maximum ratio of FE rectangle diagonals	Δ_D	:	1.800
	Maximum out-of-plane inclination of two finite elements	α	:	0.50 °
	Shape direction of finite elements		:	Triangles and quadrangles ☒ Same squares where possible



1.1 NODES

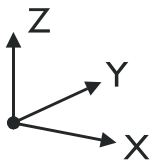
Node No.	Node Type	Reference Node	Coordinate System	Node Coordinates X [m]	Z [m]	Comment
1	Standard	-	Cartesian	0.000	0.000	
2	Standard	-	Cartesian	14.600	0.000	
3	Standard	-	Cartesian	19.050	0.000	
4	Standard	-	Cartesian	9.525	0.000	
5	Standard	-	Cartesian	1.905	0.000	
6	Standard	-	Cartesian	3.810	0.000	
7	Standard	-	Cartesian	5.715	0.000	
8	Standard	-	Cartesian	7.620	0.000	
9	Standard	-	Cartesian	11.430	0.000	
10	Standard	-	Cartesian	13.335	0.000	
11	Standard	-	Cartesian	15.240	0.000	
12	Standard	-	Cartesian	17.145	0.000	

1.2 LINES

Line No.	Line Type	Nodes No.	Line Length L [m]		Comment
1	Polyline	1,4	9.525	X	
2	Polyline	3,4	9.525	X	

1.3 MATERIALS

Matl. No.	Modulus E [kN/cm²]	Modulus G [kN/cm²]	Poisson's Ratio ν [-]	Spec. Weight γ [kN/m³]	Coeff. of Th. Exp. α [1/℃]	Partial Factor γ_M [-]	Material Model
1	Glulam Timber GL28c | DIN 1052:2008-12						
	1260.00	72.00	7.750	5.00	5.00E-06	1.30	Isotropic Linear Elastic



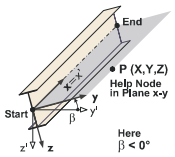
1.7 NODAL SUPPORTS

Support No.	Nodes No.	Rotation [°] about Y	Support or Spring [kN/m] [kNm/rad] $u_{X'}$	$u_{Z'}$	$\varphi_{Y'}$	Comment
1	1	0.00	☒	☒	☐	
2	2	0.00	☐	☒	☐	



1.13 CROSS-SECTIONS

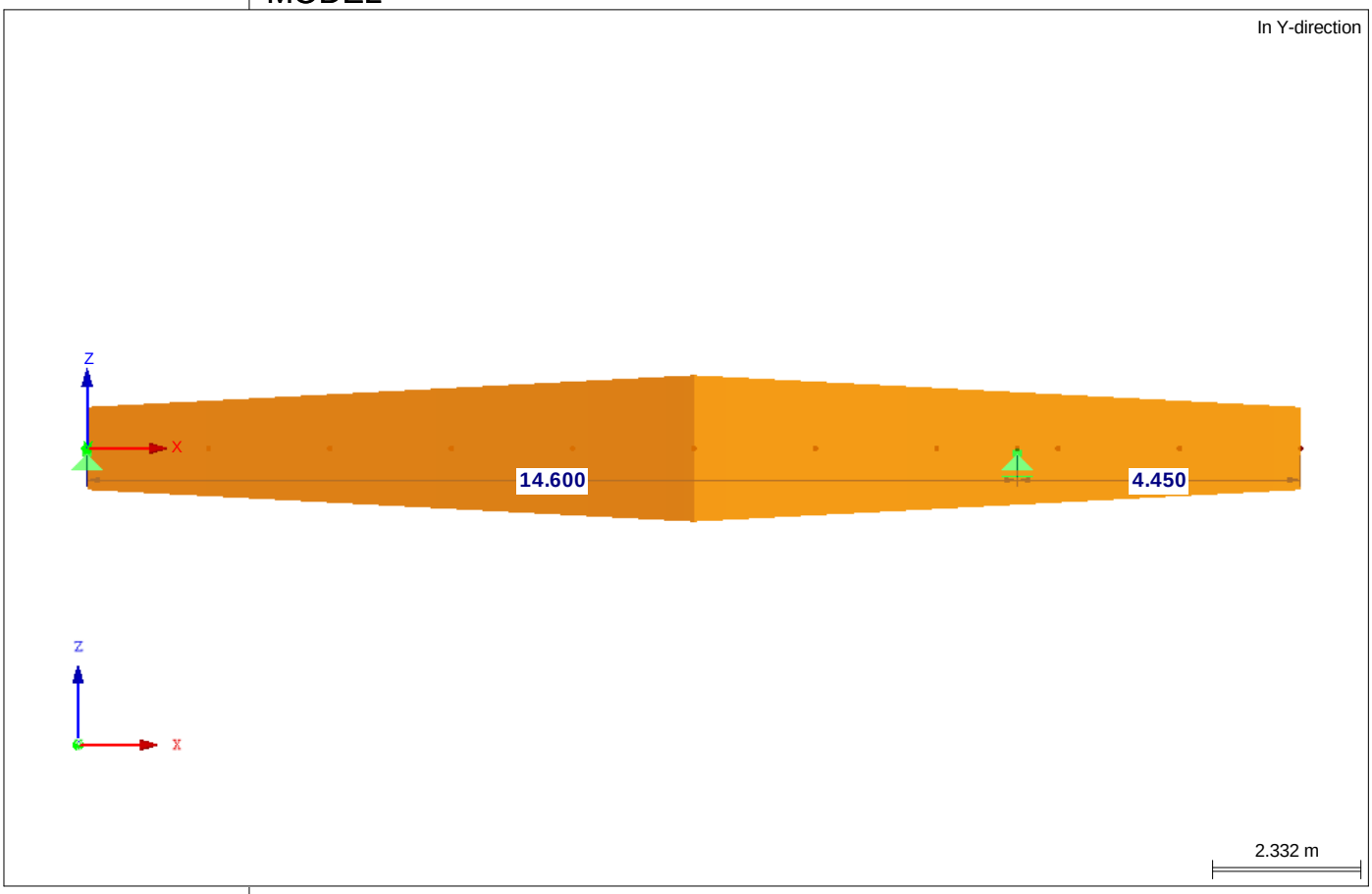
Section No.	Matl. No.	J [cm⁴] A [cm²]	I_y [cm⁴] A_y [cm²]	I_z [cm⁴] A_z [cm²]	Principal Axes α [°]	Rotation α' [°]	Overall Dimensions [mm] Width b	Height h
1	T-Rectangle 200/1300							
	1	2600.00	3661666.75	2166.67	0.00	0.00	200.0	1300.0
2	T-Rectangle 200/2300							
	1	4600.00	20278334.00	3833.33	0.00	0.00	200.0	2300.0



1.17 MEMBERS

Mbr. No.	Line No.	Member	Rotation Type	Rotation β[¡¿½]	Cross-Section Start	Cross-Section End	Hinge No. Start	Hinge No. End	Ecc. No.	Div. No.	Length L [m]	
1	1	Beam	Angle	0.00	1	2	-	-	-	-	Linear	X
2	2	Beam	Angle	0.00	1	2	-	-	-	-	Linear	X

MODEL



2.1 LOAD CASES

Load Case	Load Case Description	EN 1990 | CEN Action Category	Self-Weight - Factor in Direction Active	X	Y	Z
LC1	Lastna, stalna	Permanent	☒	0.000		-1.000
LC2	Sneg	Snow (H ≤ 1000 m a.s.l.)	☐			
LC3	Veter	Wind	☐			

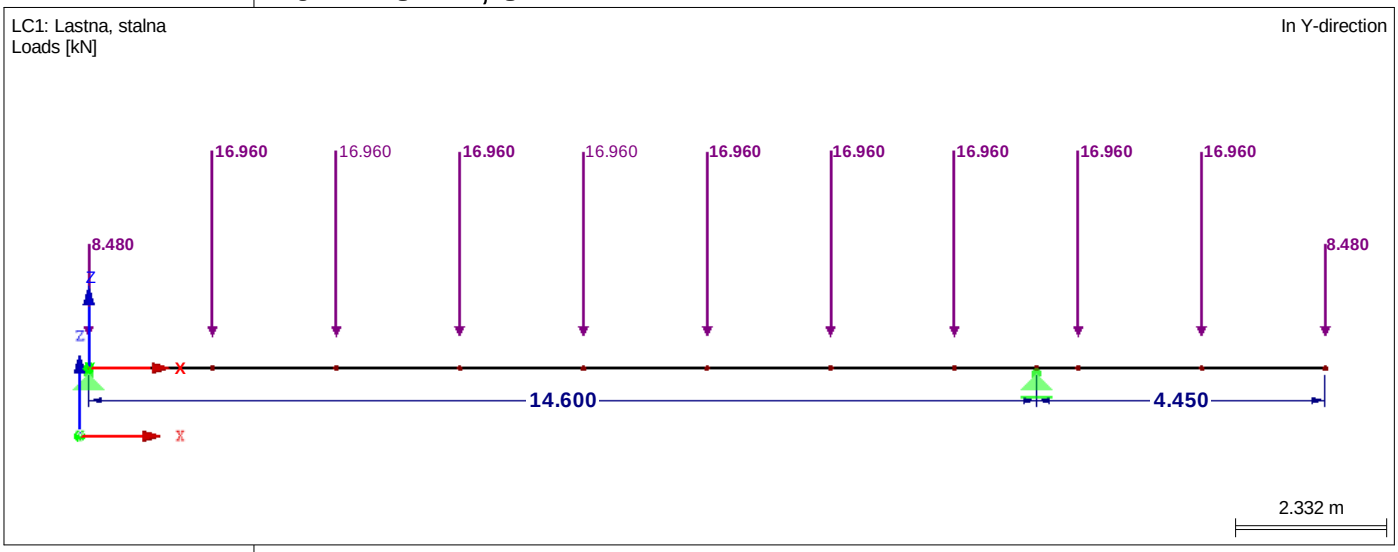
2.5 LOAD COMBINATIONS

Load Combin.	Load Combination DS	Description	No.	Factor	Load Case	
CO1	ULS	1.35*LC1	1	1.35	LC1	Lastna, stalna
CO2	ULS	1.35*LC1 + 1.5*LC2	1	1.35	LC1	Lastna, stalna
			2	1.50	LC2	Sneg
CO3	ULS	1.35*LC1 + 1.5*LC2 + 0.9*LC3	1	1.35	LC1	Lastna, stalna
			2	1.50	LC2	Sneg
			3	0.90	LC3	Veter
CO4	ULS	1.35*LC1 + 1.5*LC3	1	1.35	LC1	Lastna, stalna
			2	1.50	LC3	Veter
CO5	ULS	1.35*LC1 + 0.75*LC2 + 1.5*LC3	1	1.35	LC1	Lastna, stalna
			2	0.75	LC2	Sneg
			3	1.50	LC3	Veter
CO6	S Ch	LC1	1	1.00	LC1	Lastna, stalna
CO7	S Ch	LC1 + LC2	1	1.00	LC1	Lastna, stalna
			2	1.00	LC2	Sneg
CO8	S Ch	LC1 + LC2 + 0.6*LC3	1	1.00	LC1	Lastna, stalna
			2	1.00	LC2	Sneg
			3	0.60	LC3	Veter
CO9	S Ch	LC1 + LC3	1	1.00	LC1	Lastna, stalna
			2	1.00	LC3	Veter
CO10	S Ch	LC1 + 0.5*LC2 + LC3	1	1.00	LC1	Lastna, stalna
			2	0.50	LC2	Sneg
			3	1.00	LC3	Veter

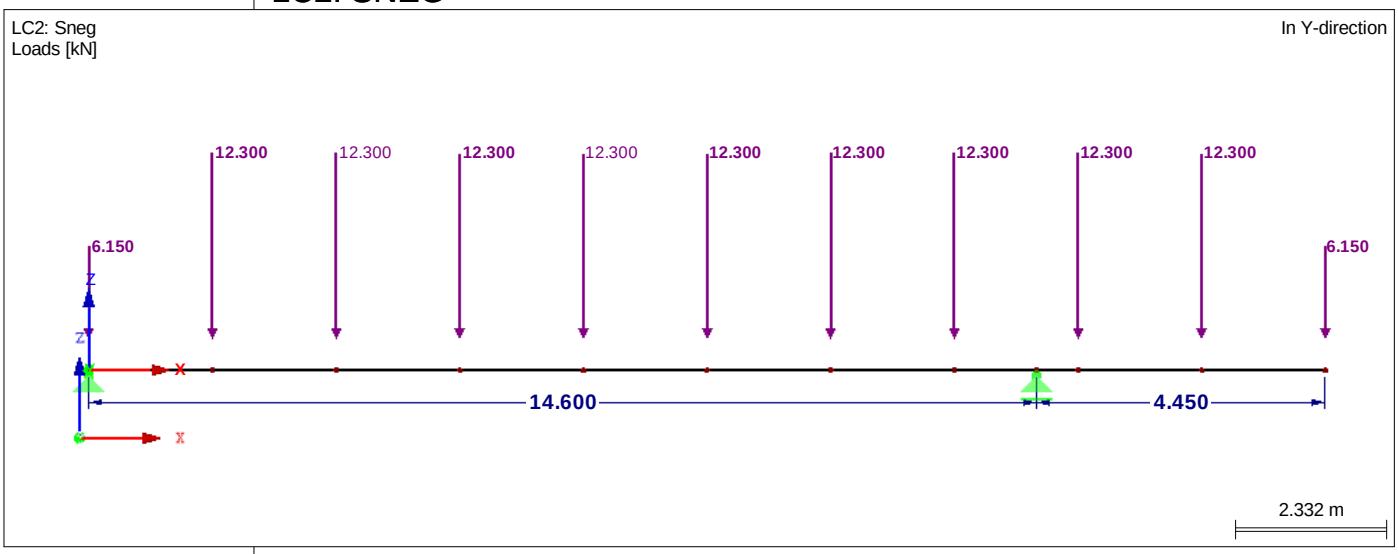
2.7 RESULT COMBINATIONS

Result Combin.	Description	Loading
RC1	ULS (STR/GEO) - Permanent / transient - Eq. 6.10	CO1/p to CO5/p
RC2	SLS - Characteristic	CO6/p to CO10/p

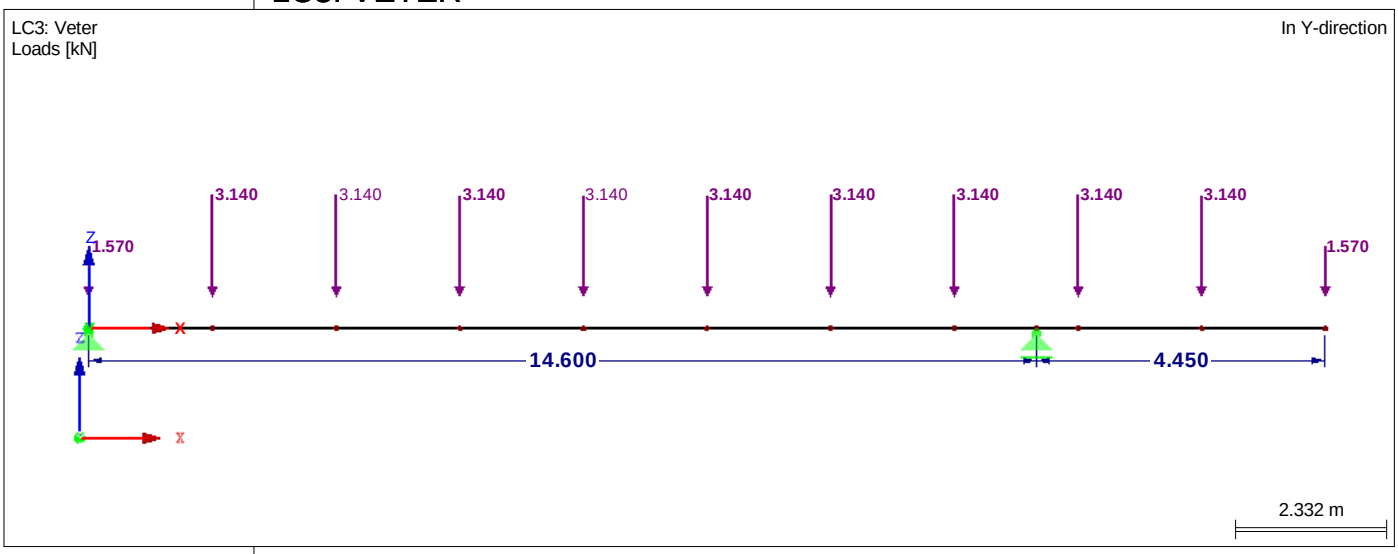
LC1: LASTNA, STALNA



LC2: SNEG



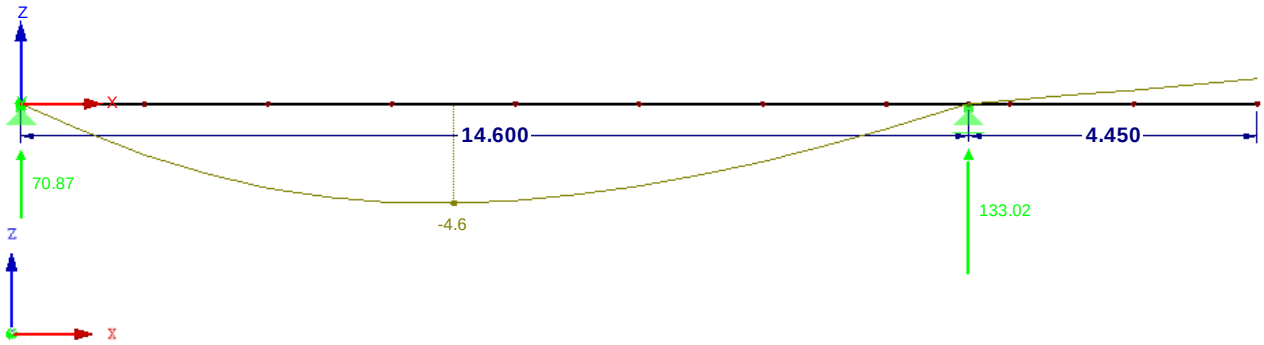
LC3: VETER



GLOBAL DEFORMATIONS u_Z, SUPPORT REACTIONS

LC1: Lastna, stalna
Global Deformations u-Z
Support Reactions[kN]

In Y-direction



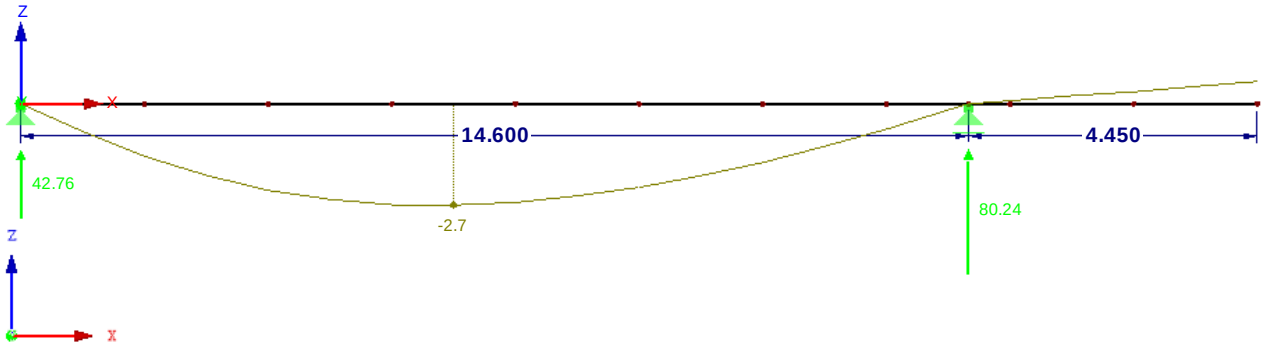
Max P-Z': -70.87, Min P-Z': -133.02 kN
Max P-X': 0.00, Min P-X': 0.00 kN
Max u-Z: 1.2, Min u-Z: -4.6 mm
Factor of deformations: 330.00

2.332 m

GLOBAL DEFORMATIONS u_Z, SUPPORT REACTIONS

LC2: Sneg
Global Deformations u-Z
Support Reactions[kN]

In Y-direction



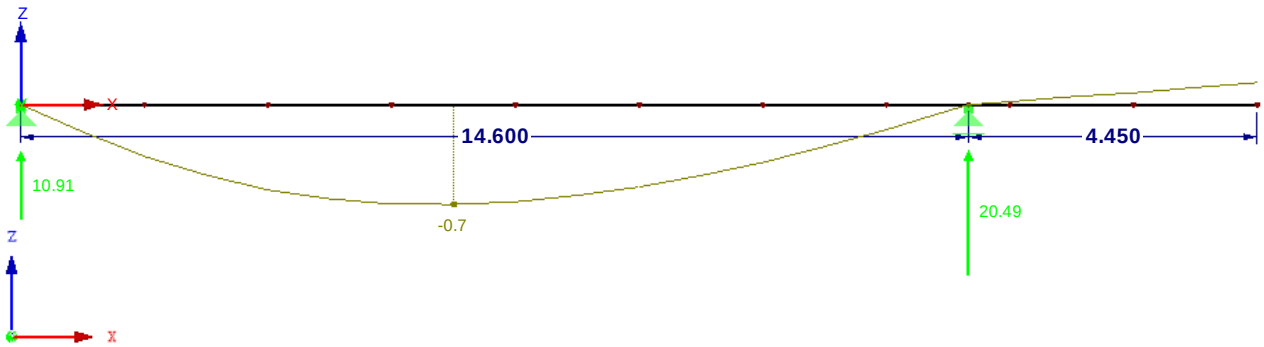
Max P-Z': -42.76, Min P-Z': -80.24 kN
Max P-X': 0.00, Min P-X': 0.00 kN
Max u-Z: 0.6, Min u-Z: -2.7 mm
Factor of deformations: 570.00

2.332 m

GLOBAL DEFORMATIONS u_Z, SUPPORT REACTIONS

LC3: Veter
Global Deformations u-Z
Support Reactions[kN]

In Y-direction



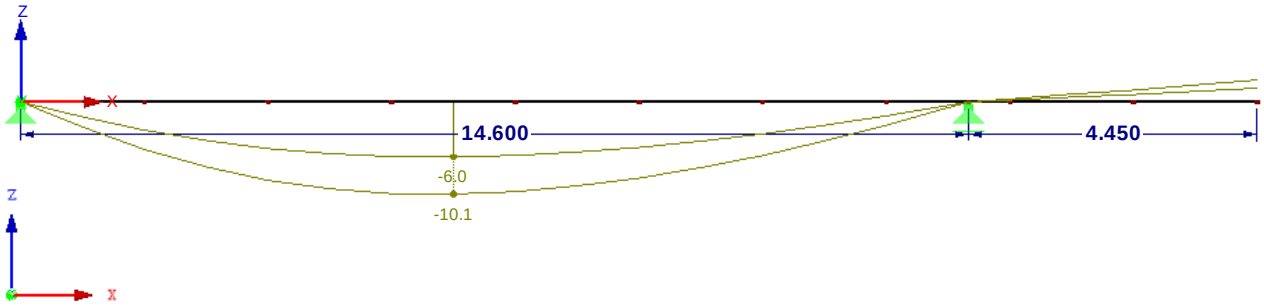
Max P-Z': -10.91, Min P-Z': -20.49 kN
Max P-X': 0.00, Min P-X': 0.00 kN
Max u-Z: 0.2, Min u-Z: -0.7 mm
Factor of deformations: 2200.00

2.332 m

GLOBAL DEFORMATIONS u_Z

RC2: SLS - Characteristic
Global Deformations u-Z
Result Combinations: Max and Min Values

In Y-direction



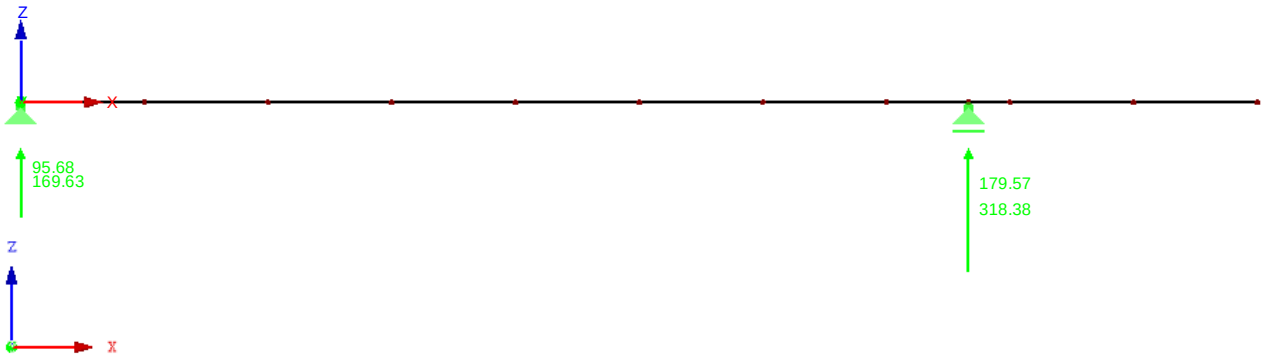
Max u-Z: 2.4, Min u-Z: -10.1 mm
Factor of deformations: 140.00

2.332 m

SUPPORT REACTIONS

RC1: ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Support Reactions[kN]
Result Combinations: Max and Min Values

In Y-direction



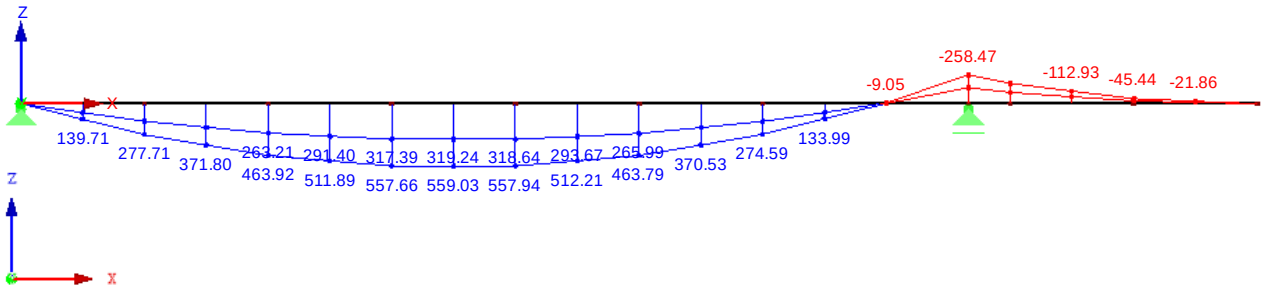
Max P-Z': -95.68, Min P-Z': -318.38 kN
Max P-X': 0.00, Min P-X': 0.00 kN

2.332 m

INTERNAL FORCES M_y

RC1: ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces M-y
Result Combinations: Max and Min Values

In Y-direction



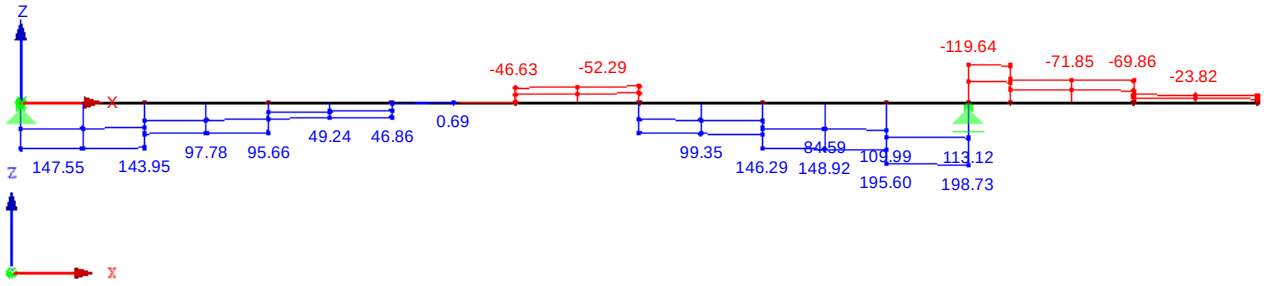
Max M-y: 559.03, Min M-y: -258.47 kNm

2.332 m

INTERNAL FORCES V_z

RC1: ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces V-z
Result Combinations: Max and Min Values

In Y-direction



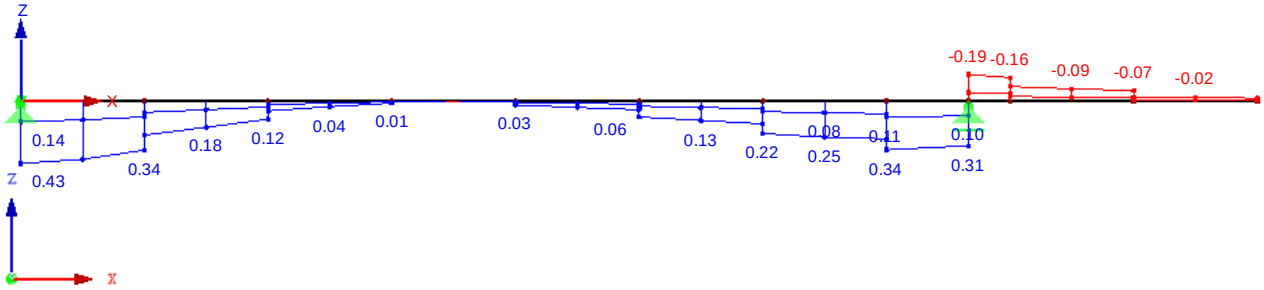
Max V-z: 198.73, Min V-z: -119.64 kN

2.332 m

INTERNAL FORCES N

RC1: ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces N
Result Combinations: Max and Min Values

In Y-direction



Max N: 0.43, Min N: -0.19 kN

2.332 m

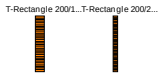
1.1.1 GENERAL DATA

Members to design:		1,2
Design according to Standard:		SIST EN 1995-1-1/A101:2006-03
Ultimate Limit State Design Load combinations to design:	CO1	1.35*LC1
	CO2	1.35*LC1 + 1.5*LC2
	CO3	1.35*LC1 + 1.5*LC2 + 0.9*LC3
	CO4	1.35*LC1 + 1.5*LC3
	CO5	1.35*LC1 + 0.75*LC2 + 1.5*LC3

1.2 MATERIALS

Matl. No.	Description	Factor Category	Comment
1	Glulam Timber GL28c | DIN 1052 - 08	Glued Laminated Timber	

1.3.1 CROSS-SECTIONS



Sect. No.	Matl. No.	Cross-section Description [mm]	Max Design Ratio	Comment
1	1	T-Rectangle 200/1300		
	The cross-section cannot be optimized, when it is combined with another cross-section on any other member.			
2	1	T-Rectangle 200/2300		
	The cross-section cannot be optimized, when it is combined with another cross-section on any other member.			

1.4 LOAD DURATION AND SERVICE CLASS

LC/CO/ RC	LC, CO or RC Description	Load Case Type	Classification of Load Duration
LC1	Lastna, stalna	Permanent	Permanent
LC2	Sneg	Snow (H ≤ 1000 m a.s.l.)	Medium-term
LC3	Veter	Wind	Short-term
CO1	1.35*LC1	-	Permanent
CO2	1.35*LC1 + 1.5*LC2	-	Medium-term
CO3	1.35*LC1 + 1.5*LC2 + 0.9*LC3	-	Short-term
CO4	1.35*LC1 + 1.5*LC3	-	Short-term
CO5	1.35*LC1 + 0.75*LC2 + 1.5*LC3	-	Short-term

Service Class SECL
Service Class 1: Identical for All Members/Sets of Members

1.5 EFFECTIVE LENGTHS - MEMBERS

Member	Buckling	Buckling About Axis y			Buckling About Axis z			Lateral-Torsional Buckling		
No.	Possible	Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Possible	Define L_{cr}	L_{cr} [m]
1	☒	☒	1.533	14.600	☒	0.200	1.905	☒	As member length	9.525
2	☒	☒	1.533	14.600	☒	0.200	1.905	☒	As member length	9.525

1.7 TAPERED MEMBERS

Member No.	Cross-section Member Start	Member End	Length L [m]	Cut-to-Grain Angle α [°]	Grain Parallel to the edge	With Ridge	Notes
1	T-Rectangle 200/1300	T-Rectangle 200/2300	9.525	5.99	+z-Axis	☐	
2	T-Rectangle 200/1300	T-Rectangle 200/2300	9.525	5.99	+z-Axis	☐	

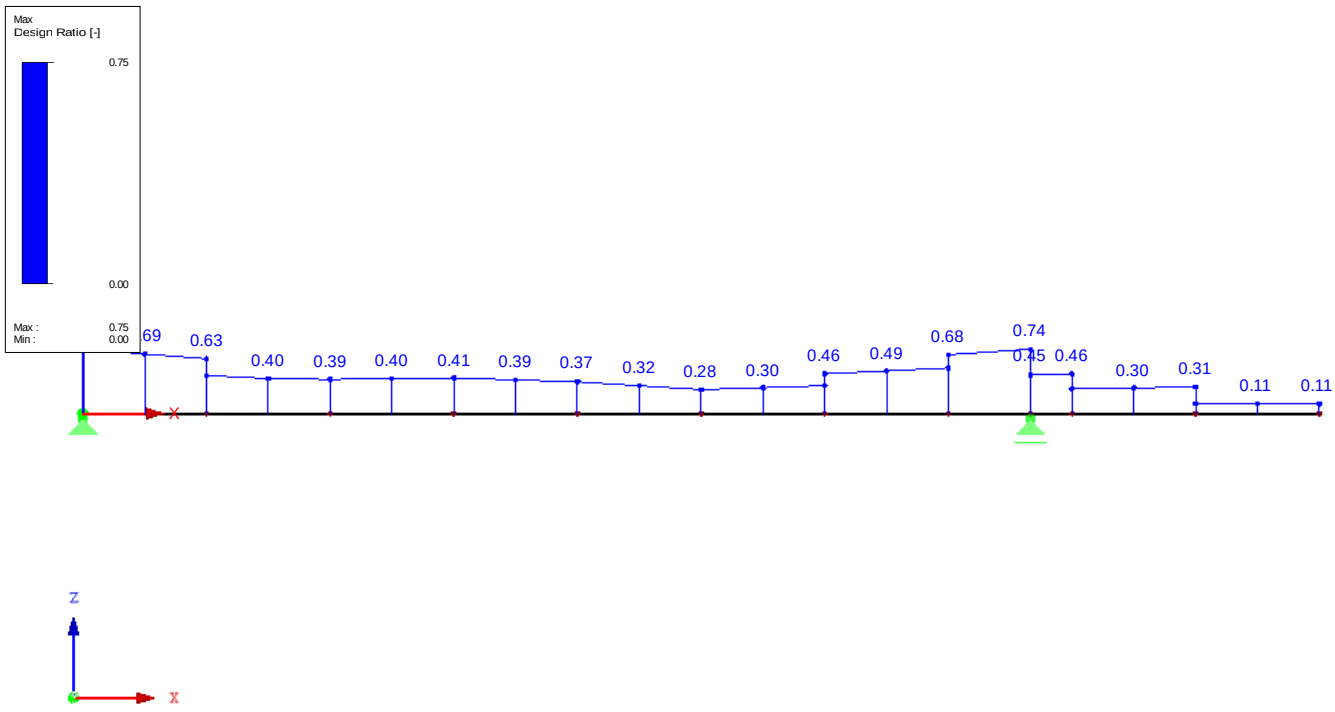
2.4 DESIGN BY MEMBER

Member No.	Location x [m]	LC/CO/ RC	Design		Design No.	Description
1	**Cross-section No. 1 - T-Rectangle 200/1300 ... 2 - T-Rectangle 200/2300**					
	0.000	CO2	0.75	≤ 1	111)	Cross-section resistance - Shear due to shear force Vz acc. to 6.1.7
	3.810	CO2	0.25	≤ 1	181)	Cross-section resistance - Uniaxial bending about y-axis on edge parallel to grain acc. to 6.4.2 and 6.1.6
	3.810	CO2	0.32	≤ 1	201)	Cross-section resistance - Uniaxial bending about y-axis (compression edge) on cut edge acc. 6.4.2
	5.715	CO2	0.41	≤ 1	311)	Flexural member without compression force acc. to 6.3.3 - Bending about y-axis
2	**Cross-section No. 1 - T-Rectangle 200/1300 ... 2 - T-Rectangle 200/2300**					
	4.450	CO2	0.74	≤ 1	111)	Cross-section resistance - Shear due to shear force Vz acc. to 6.1.7
	9.525	CO2	0.14	≤ 1	181)	Cross-section resistance - Uniaxial bending about y-axis on edge parallel to grain acc. to 6.4.2 and 6.1.6
	4.450	CO2	0.26	≤ 1	191)	Cross-section resistance - Uniaxial bending about y-axis (tension edge) on cut edge acc. to 6.4.2
	9.525	CO2	0.18	≤ 1	201)	Cross-section resistance - Uniaxial bending about y-axis (compression edge) on cut edge acc. 6.4.2
	9.525	CO2	0.28	≤ 1	311)	Flexural member without compression force acc. to 6.3.3 - Bending about y-axis

DESIGN: ULTIMATE LIMIT STATE - CROSS-SECTION DESIGN

RF-TIMBER Pro CA2
Ultimate Limit State - Cross-Section Design

In Y-direction



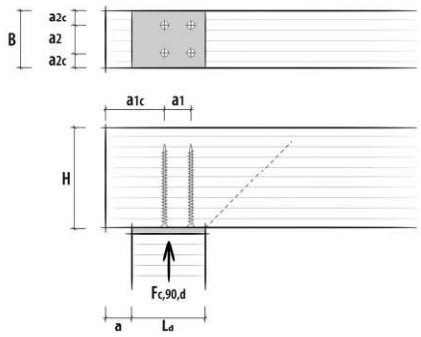
2.332 m

Max Design Ratio: 0.75

PROJECT INFORMATION

Date	:	12/05/2025
Project	:	
Client	:	
Project address	:	
Edited by	:	
Joint	:	
Notes	:	
Code of calculation	:	EN1995:2014 (EU)

Reinforcements withs fully-threaded VGS and VGZ screws - Reinforcement to compression perpendicular



VGS - Full thread countersunk head fastener 13x500 mm (cod. VGS13500)
- Number of screws: = 4 pcs



CE marking according to ETA 11/0030

CALCULATION DATA

Connections with crossed fully-threaded VGS and VGZ screws

Service class	cl	=	2
Main load duration	tq	=	medium
kmod factor	kmod	=	0,80
Connection safety factor	γM	=	1,30
Design action on support	Fc,90,d	=	318,00 kN
Beam width	B	=	200 mm
Beam height	H	=	1800 mm
Type of wood:		=	Glulam GL24h (homogeneous)
Length of support	La	=	300 mm
Type of support		=	0 mm
Number of screws perp. to grain		=	2
Number of screws parall. to grain		=	2
SCREW DATA			
Nominal diameter/thread screw	d1	=	13,0 mm
Shank diameter	ds	=	9,0 mm
Inner core diameter	d2	=	8,0 mm
Head diameter	dk	=	22,0 mm
Screw length	Lv	=	500 mm
Thread length	Lf	=	480 mm

NOTES

Before the construction, all calculation must be verified and approved by the responsible designer
Mechanical resistance values and geometry refer to product certification
Verification of timber elements resistance must be realized apart.

CALCULATION RESULTS

INPUT DATA:		=	
Service class	cl	=	2
Duration of main load	tq	=	media
kmod factor	kmod	=	0,8
Design action on support	Fc,90,d	=	318,00 kN
Beam width	B	=	200 mm
Beam height	H	=	1800 mm
Type of wood:		=	GL24h
Angle (grain - support)	α	=	90,00 °
Safety factor of the material (timber)	YM1	=	1,25
Safety factor of timber connection	YM2	=	1,3
Length of support	La	=	300 mm
Type of support		=	Intermediate support
VERIFICATION OF COMPRESSION RESISTANCE WITHOUT REINFORCEMENT		=	
Effective length of the support	Lef	=	360 mm
Compression characteristic resistance (timber)	fc,90,k	=	2,50 N/mm²
Compression design resistance (timber)	fc,90,d	=	1,60 N/mm²
Compression factor	kc,90	=	1,75
Compression design resistance (support)	Fc,90,Rd	=	201,60 kN
Verification of compression resistance without reinforcement		=	1,58 NOT VERIFIED
		=	
Type of fastening:	screw VGS Rinforzi		13x500
Thread diameter	df	=	13 mm
Shank diameter	dg	=	9 mm
Inner core diameter	dn	=	8 mm
Head diameter	dh	=	22 mm
Length of screw	lv	=	500 mm
Thread length	lf	=	480 mm
Minimum suggested support plate thickness	sa	=	6 mm
GEOMETRY OF CONNECTION:		=	
Number of screws perp. to grain		=	2
Number of screws parall. to grain		=	2
Minimum distance of screws parall. to grain	a1	=	100 mm
Insertion angle	α	=	90,00 °
Minimum distance of screws parall. to grain	a1	=	65 mm
Minimum distance of screws perp. to grain	a2	=	65 mm
Minimum distance screws - end (parall. to grain)	a1c	=	130 mm
Minimum distance screws - edge (perp. to grain)	a2c	=	52 mm
SCREWS RESISTANCE:		=	
Withdrawal characteristic resistance of single screw	Fax,Rk	=	78,79 kN
Characteristic buckling resistance of the screw in timber	Fki,Rk	=	32,69 kN
VERIFICATION OF COMPRESSION RESISTANCE WITH REINFORCEMENT		=	
Eff. length of the contact area	Lef1	=	360 mm
Eff. length in the plane of the screw tips	Lef2	=	1100 mm
Compression design resistance (timber)	fc,90,d	=	1,60 N/mm²
Resistance on the plane 1	F1c,90,Rd	=	326,15 kN
Resistance on the plane 2	F2c,90,Rd	=	352,00 kN
Final design resistance with reinforcement	Fc,90,Rd	=	326,15 kN
Verification of compression resistance with reinforcement		=	0,98 VERIFIED
Verification of compression resistance without reinforcement		**=**	**1,58 NOT VERIFIED**
Final design resistance with reinforcement	**Fc,90,Rd**	**=**	**326,15 kN**
Verification of compression resistance with reinforcement		**=**	**0,98 VERIFIED**

SPINA Novo mesto, d.o.o.

POZ X03 – PRIMARCI b/h = **20** / **48** cm

MATERIAL	**GL28c**	fm,k =	**2,80**	kN/cm2	fv,k =	**0,35**	kN/cm2
	- lepljen:	γm=	**1,25**		Eo,mean =	**1200**	kN/cm2
	- srednje trajanje o		**M**		kmod =	**0,80**	
	- razred vlažnosti		**2 (12% do 20%)**		fc,90,k=	**0,25**	kN/cm2
GEOMETRIJA		emax =	4,90	m	Wy =	7680,00	cm3
		L =	5,60	m	Iy =	184320	cm4
OBTEŽBA	lastna teža				b*h*5 =	0,48	kN/m
Sekundar	stalna		8,48	kN	* 2 =	16,96	kN
	sneg		6,15	kN	* 2 =	12,3	kN
			robni		*1,5 =	9,225	kN
					*1,33 =	16,359	kN
					*1,16 =	14,268	kN
	veter - tlak		1,57	kN	* 2 =	3,14	kN
	veter - srk		0,00	kN	* 2 =	0,00	kN

PRERAČUN Glej izpiske iz programa!

KONTROLE

TLAK - PRAVOKOTNO Ved = 77,7 kN

Dimenzije ležišča a = 20,00 cm

b = 30,00 cm

fc,90,d = Ved /a*b = 0,13 kN/cm2 < fc,90d = 0,15 kN/cm^2

Ojačitev ni potrebna!

POMIKI L = 560 cm

Trenutni upogib	winst(g) =	0,54	cm		kdef,g =	0,80	
	winst(q) =	0,46	cm		kdef,q =	0,25	
winst = winst(g)+	winst(q) =	1,00	cm	<	L/300 =	1,87	cm

Končni upogib wfin = winst(g)*(1+kdef,g) + winst(q)*(1+Ψ_2*kdef,q)

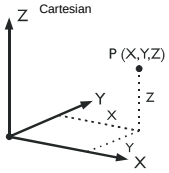
wfin = 1,55 cm < L/200 = 2,80 cm

MODEL - GENERAL DATA

General	Model name		:	Primarci-l=5,6m
	Project name		:	DARS-DOB
	Type of model		:	2D-XZ (ux/uz/φy)
	Positive direction of global axis Z		:	Upward
	Classification of load cases and combinations		:	According to Standard: EN 1990 National Annex: CEN - EU
	☒ Automatically create combinations		:	☒ Load Combinations

FE MESH SETTINGS

General	Target length of finite elements	l_{FE}	:	0.5 m
	Maximum distance between a node and a line to integrate it into the line	ε	:	0.0 m
	Maximum number of mesh nodes (in thousands)		:	500
Members	Number of divisions of members with cable, elastic foundation, taper, or plastic characteristic		:	10
	☒ Activate member divisions for large deformation or post-critical analysis			
	☒ Use division for members with node lying on them			
Surfaces	Maximum ratio of FE rectangle diagonals	Δ_D	:	1.800
	Maximum out-of-plane inclination of two finite elements	α	:	0.50 °
	Shape direction of finite elements		:	Triangles and quadrangles ☒ Same squares where possible



1.1 NODES

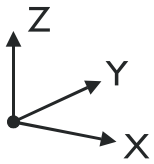
Node No.	Node Type	Reference Node	Coordinate System	Node Coordinates X [m]	Z [m]	Comment
1	Standard	-	Cartesian	0.000	0.000	
2	Standard	-	Cartesian	5.600	0.000	
3	Standard	-	Cartesian	1.850	0.000	
4	Standard	-	Cartesian	3.750	0.000	

1.2 LINES

Line No.	Line Type	Nodes No.	Line Length L [m]		Comment
1	Polyline	1,2	5.600	X	

1.3 MATERIALS

Matl. No.	Modulus E [kN/cm²]	Modulus G [kN/cm²]	Poisson's Ratio ν [-]	Spec. Weight γ [kN/m³]	Coeff. of Th. Exp. α [1/℃]	Partial Factor γ_M [-]	Material Model
1	Glulam Timber GL28c | DIN 1052:2008-12						
	1260.00	72.00	7.750	5.00	5.00E-06	1.30	Isotropic Linear Elastic



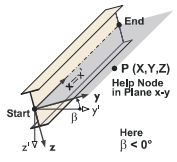
1.7 NODAL SUPPORTS

Support No.	Nodes No.	Rotation [°] about Y	Support or Spring [kN/m] [kNm/rad] $u_{X'}$	$u_{Z'}$	$\varphi_{Y'}$	Comment
1	1	0.00	☒	☒	☐	
2	2	0.00	☐	☒	☐	



1.13 CROSS-SECTIONS

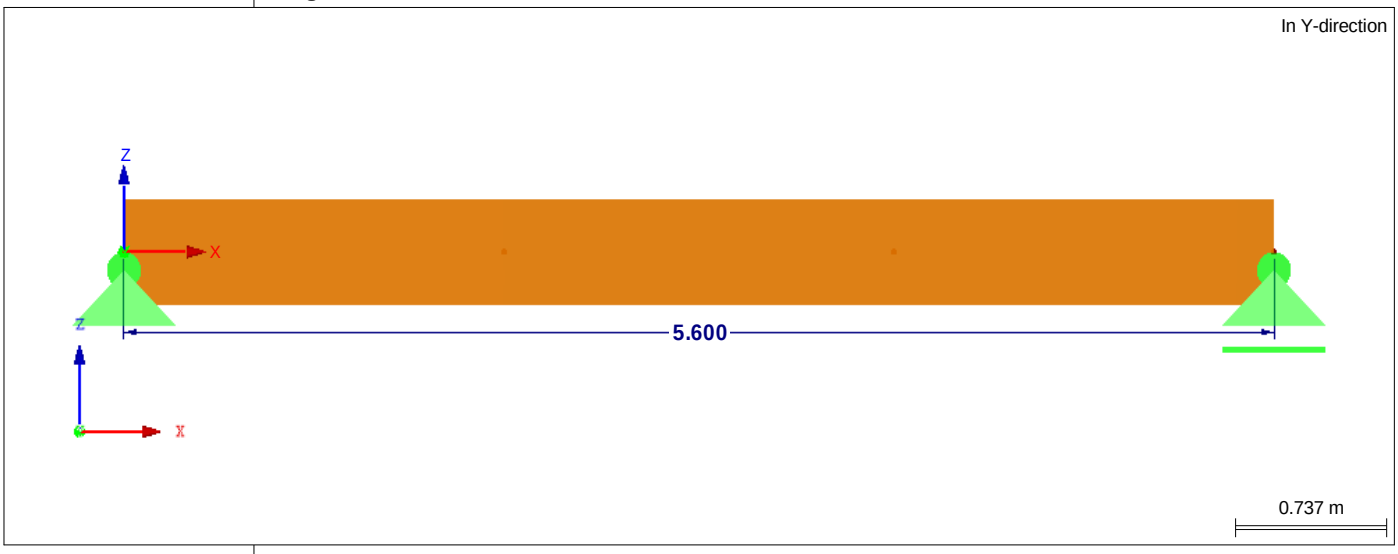
Section No.	Matl. No.	J [cm⁴] A [cm²]	I_y [cm⁴] A_y [cm²]	I_z [cm⁴] A_z [cm²]	Principal Axes α [°]	Rotation α' [°]	Overall Dimensions [mm] Width b	Height h
1	T-Rectangle 200/480							
	1	960.00	184320.02	800.00	0.00	0.00	200.0	480.0



1.17 MEMBERS

Mbr. No.	Line No.	Member	Rotation Type	Rotation β[¡¿½]	Cross-Section Start	Cross-Section End	Hinge No. Start	Hinge No. End	Ecc. No.	Div. No.	Length L [m]	
1	1	Beam	Angle	0.00	1	1	-	-	-	-	5.600	X

MODEL



2.1 LOAD CASES

Load Case	Load Case Description	EN 1990 | CEN Action Category	Self-Weight - Factor in Direction Active	X	Y	Z
LC1	Lastna, stalna	Permanent	☒	0.000		-1.000
LC2	Sneg	Snow (H ≤ 1000 m a.s.l.)	☐			
LC3	Veter	Wind	☐			

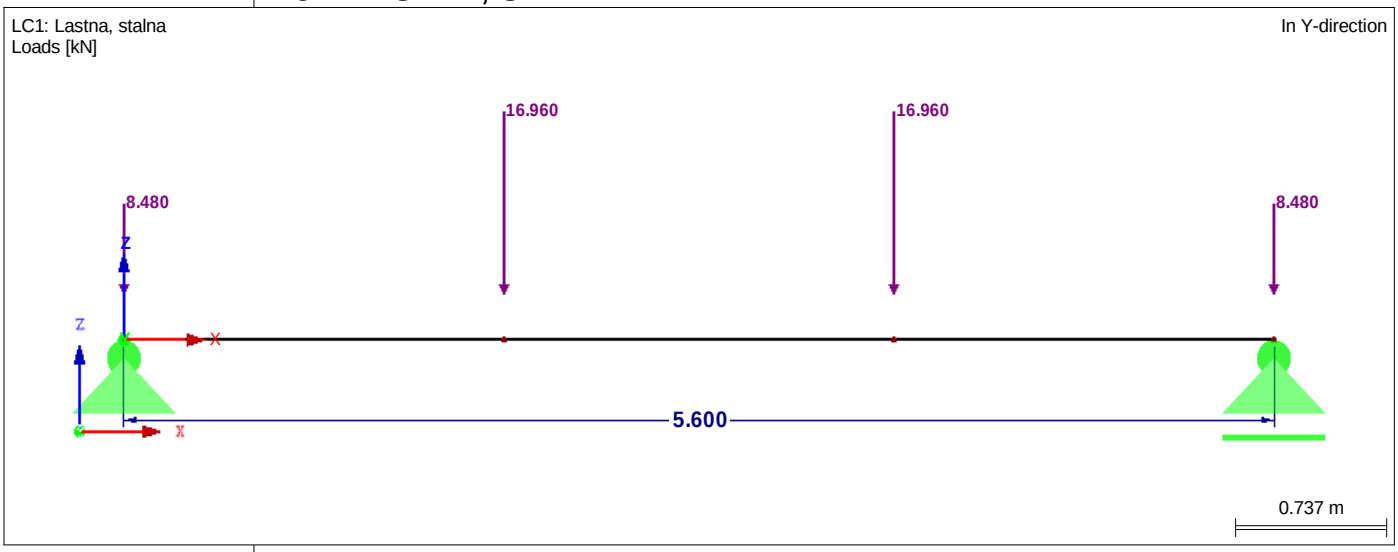
2.5 LOAD COMBINATIONS

Load Combin.	Load Combination DS	Description	No.	Factor	Load Case	
CO1	ULS	1.35*LC1	1	1.35	LC1	Lastna, stalna
CO2	ULS	1.35*LC1 + 1.5*LC2	1	1.35	LC1	Lastna, stalna
			2	1.50	LC2	Sneg
CO3	ULS	1.35*LC1 + 1.5*LC2 + 0.9*LC3	1	1.35	LC1	Lastna, stalna
			2	1.50	LC2	Sneg
			3	0.90	LC3	Veter
CO4	ULS	1.35*LC1 + 1.5*LC3	1	1.35	LC1	Lastna, stalna
			2	1.50	LC3	Veter
CO5	ULS	1.35*LC1 + 0.75*LC2 + 1.5*LC3	1	1.35	LC1	Lastna, stalna
			2	0.75	LC2	Sneg
			3	1.50	LC3	Veter
CO6	S Ch	LC1	1	1.00	LC1	Lastna, stalna
CO7	S Ch	LC1 + LC2	1	1.00	LC1	Lastna, stalna
			2	1.00	LC2	Sneg
CO8	S Ch	LC1 + LC2 + 0.6*LC3	1	1.00	LC1	Lastna, stalna
			2	1.00	LC2	Sneg
			3	0.60	LC3	Veter
CO9	S Ch	LC1 + LC3	1	1.00	LC1	Lastna, stalna
			2	1.00	LC3	Veter
CO10	S Ch	LC1 + 0.5*LC2 + LC3	1	1.00	LC1	Lastna, stalna
			2	0.50	LC2	Sneg
			3	1.00	LC3	Veter

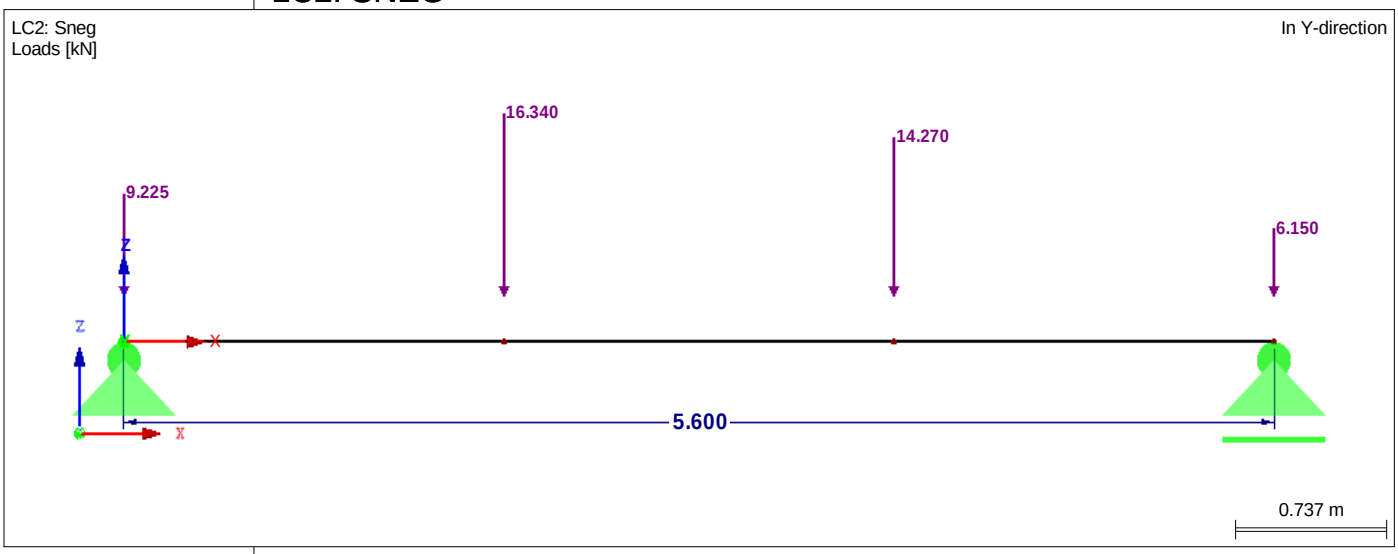
2.7 RESULT COMBINATIONS

Result Combin.	Description	Loading
RC1	ULS (STR/GEO) - Permanent / transient - Eq. 6.10	CO1/p to CO5/p
RC2	SLS - Characteristic	CO6/p to CO10/p

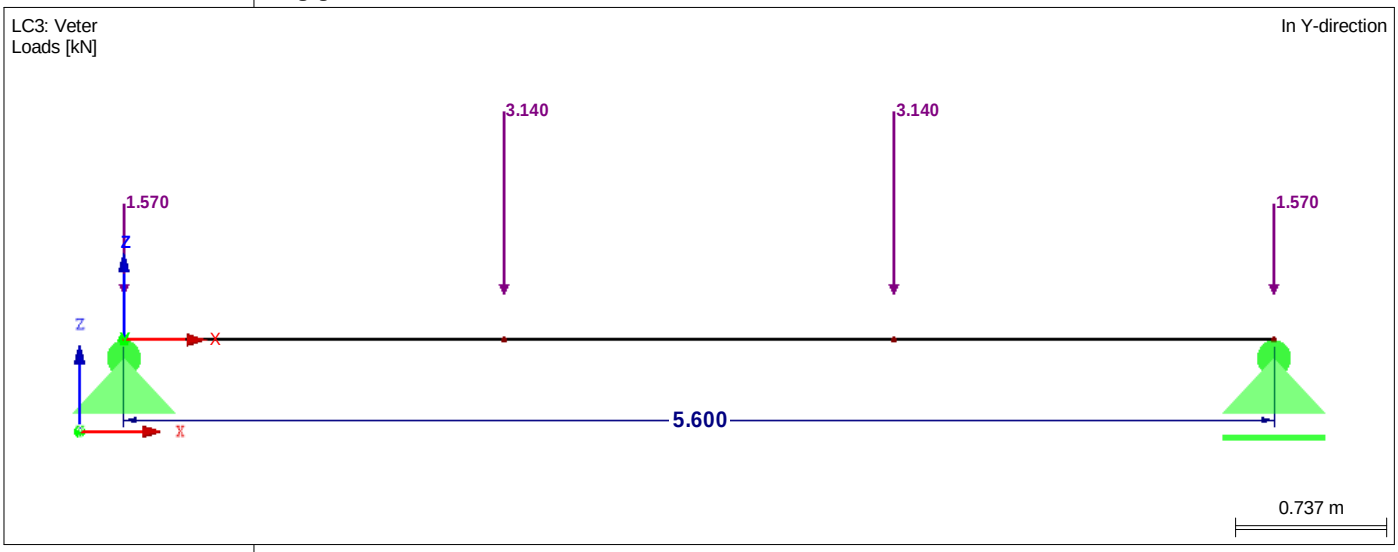
LC1: LASTNA, STALNA



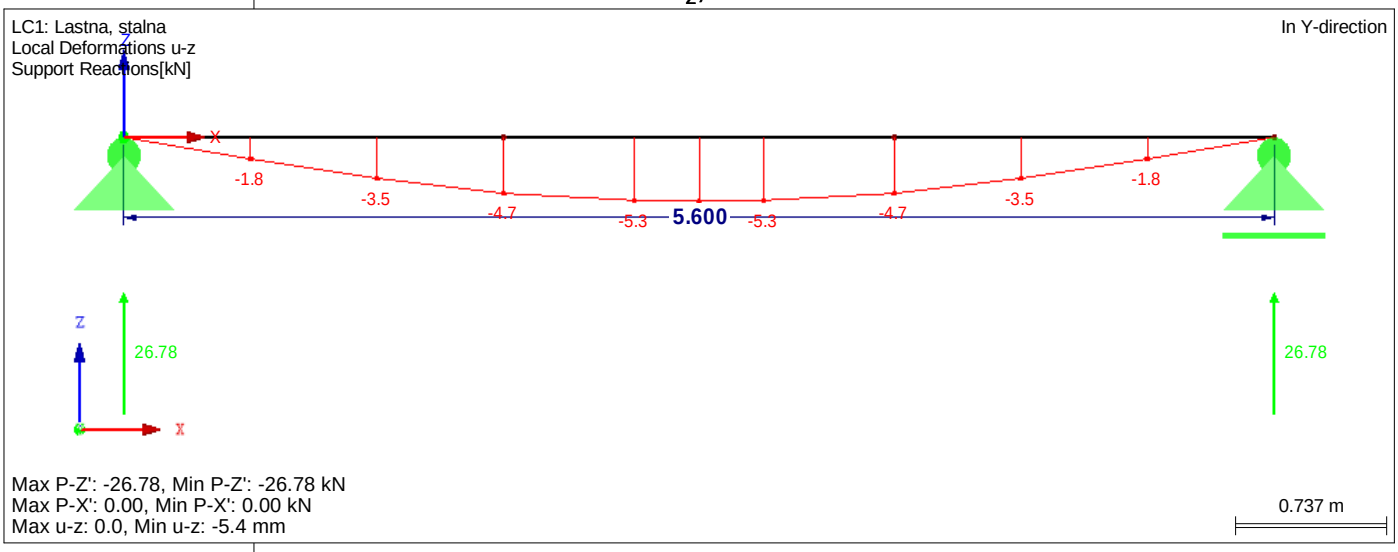
LC2: SNEG



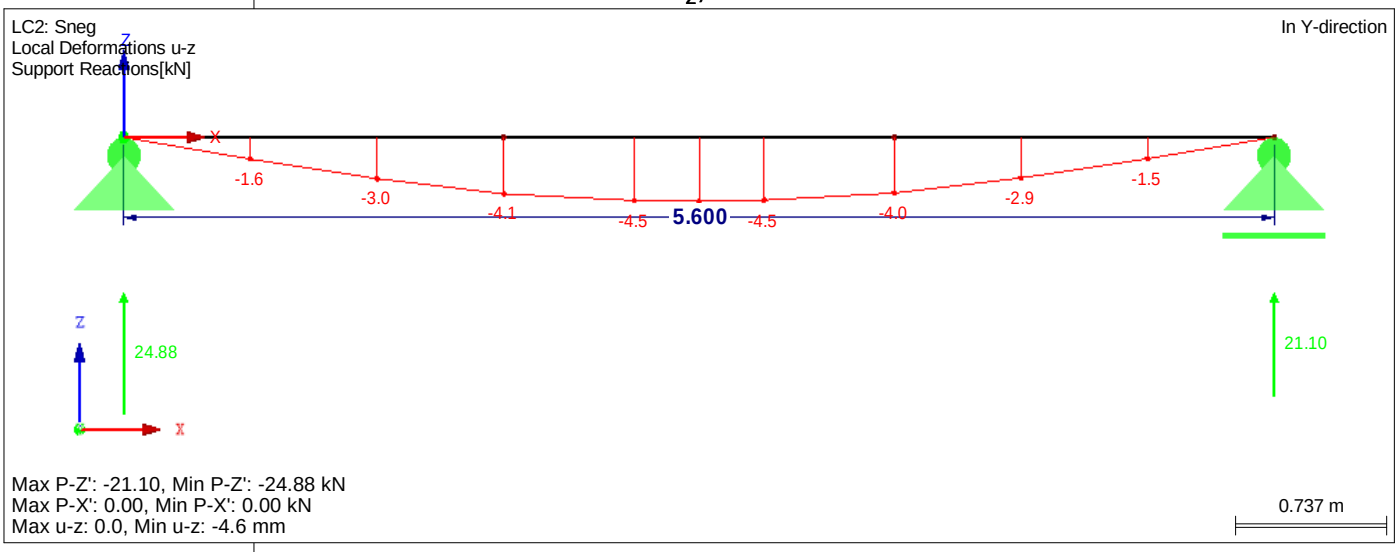
LC3: VETER



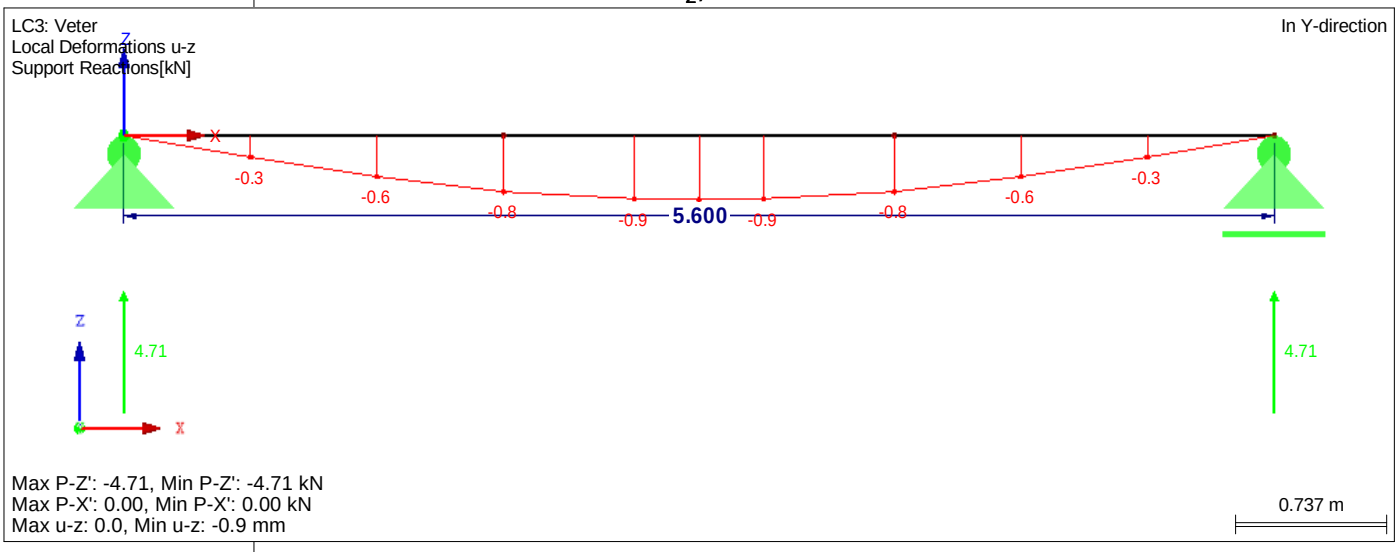
LOCAL DEFORMATIONS u_z, SUPPORT REACTIONS



LOCAL DEFORMATIONS u_z, SUPPORT REACTIONS



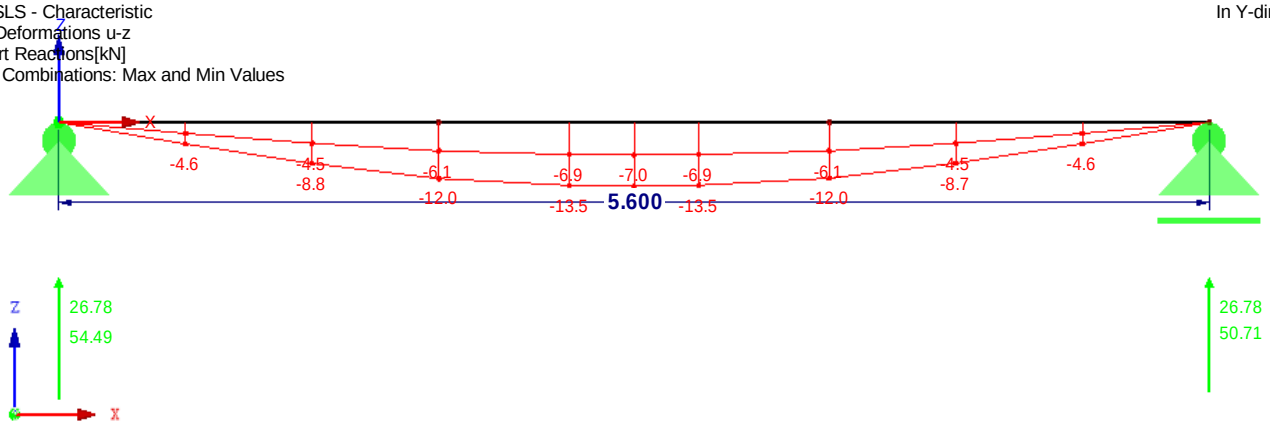
LOCAL DEFORMATIONS u_z, SUPPORT REACTIONS



■ LOCAL DEFORMATIONS u_z, SUPPORT REACTIONS

RC2: SLS - Characteristic
Local Deformations u-z
Support Reactions[kN]
Result Combinations: Max and Min Values

In Y-direction

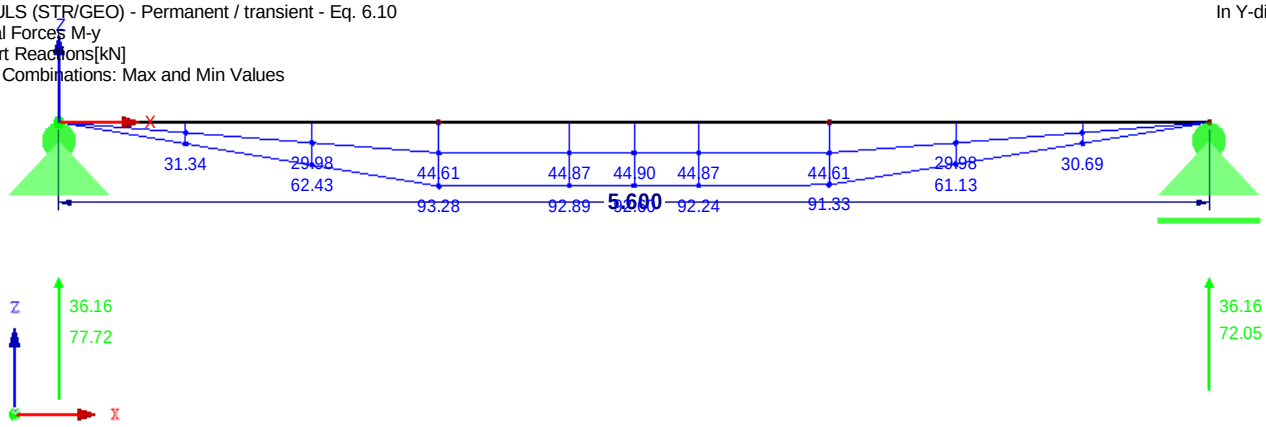


Max P-Z': -26.78, Min P-Z': -54.49 kN
Max P-X': 0.00, Min P-X': 0.00 kN
Max u-z: 0.0, Min u-z: -13.7 mm

0.737 m

INTERNAL FORCES M_y, SUPPORT REACTIONS

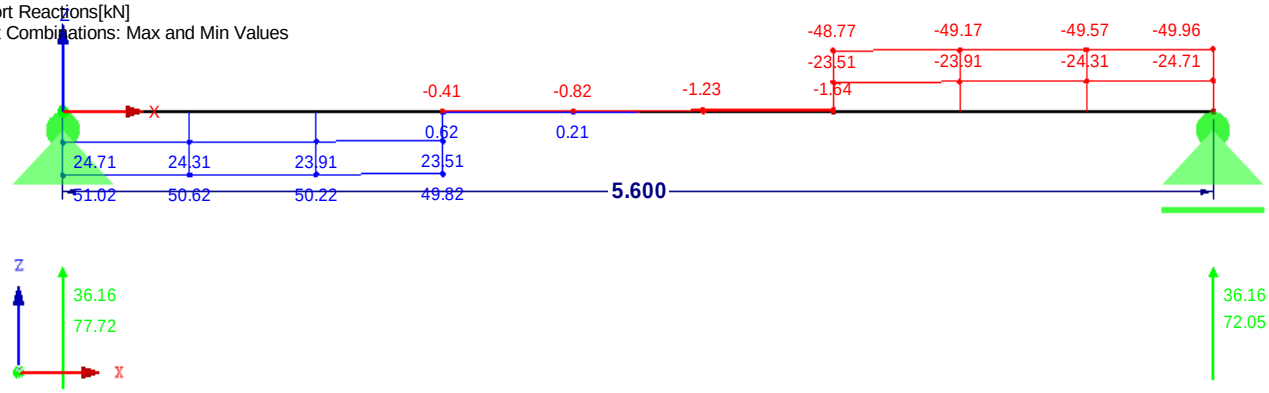
RC1: ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces M-y
Support Reactions[kN]
Result Combinations: Max and Min Values
In Y-direction



Max P-Z': -36.16, Min P-Z': -77.72 kN
Max P-X': 0.00, Min P-X': 0.00 kN
Max M-y: 93.28, Min M-y: 0.00 kNm
0.737 m

INTERNAL FORCES V_z, SUPPORT REACTIONS

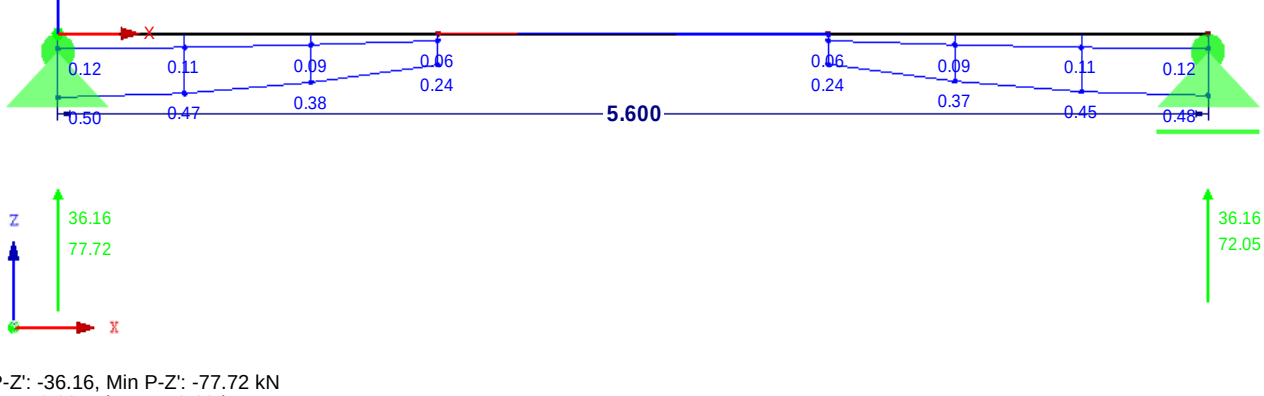
RC1: ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces V-z
Support Reactions[kN]
Result Combinations: Max and Min Values
In Y-direction



Max P-Z': -36.16, Min P-Z': -77.72 kN
Max P-X': 0.00, Min P-X': 0.00 kN
Max V-z: 51.02, Min V-z: -49.96 kN
0.737 m

INTERNAL FORCES N, SUPPORT REACTIONS

RC1: ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces N
Support Reactions[kN]
Result Combinations: Max and Min Values
In Y-direction



Max P-Z': -36.16, Min P-Z': -77.72 kN
Max P-X': 0.00, Min P-X': 0.00 kN
Max N: 0.50, Min N: 0.00 kN
0.737 m

1.1.1 GENERAL DATA

Members to design:		1
Design according to Standard:		SIST EN 1995-1-1/A101:2006-03
Ultimate Limit State Design Load combinations to design:	CO1	1.35*LC1
	CO2	1.35*LC1 + 1.5*LC2
	CO3	1.35*LC1 + 1.5*LC2 + 0.9*LC3
	CO4	1.35*LC1 + 1.5*LC3
	CO5	1.35*LC1 + 0.75*LC2 + 1.5*LC3

1.2 MATERIALS

Matl. No.	Description	Factor Category	Comment
1	Glulam Timber GL28c | DIN 1052 - 08	Glued Laminated Timber	

1.3.1 CROSS-SECTIONS



Sect. No.	Matl. No.	Cross-section Description [mm]	Max Design Ratio	Comment
1	1	T-Rectangle 200/480	0.00	

1.4 LOAD DURATION AND SERVICE CLASS

LC/CO/RC	LC, CO or RC Description	Load Case Type	Classification of Load Duration
LC1	Lastna, stalna	Permanent	Permanent
LC2	Sneg	Snow (H ≤ 1000 m a.s.l.)	Medium-term
LC3	Veter	Wind	Short-term
CO1	1.35*LC1	-	Permanent
CO2	1.35*LC1 + 1.5*LC2	-	Medium-term
CO3	1.35*LC1 + 1.5*LC2 + 0.9*LC3	-	Short-term
CO4	1.35*LC1 + 1.5*LC3	-	Short-term
CO5	1.35*LC1 + 0.75*LC2 + 1.5*LC3	-	Short-term

Service Class SECL
Service Class 1: Identical for All Members/Sets of Members

1.5 EFFECTIVE LENGTHS - MEMBERS

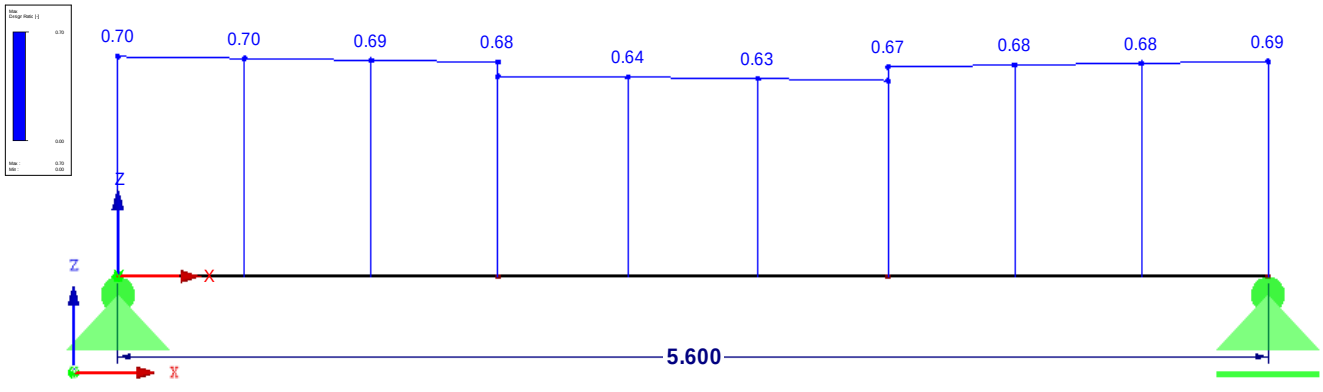
Member No.	Buckling Possible	Buckling About Axis y Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Buckling About Axis z Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Lateral-Torsional Buckling Possible	Define L_{cr}	L_{cr} [m]
1	☒	☒	1.000	5.600	☒	0.330	1.850	☒	As member length	5.600

2.4 DESIGN BY MEMBER

Member No.	Location x [m]	LC/CO/RC	Design		Design No.	Description
1	**Cross-section No. 1 - T-Rectangle 200/480**					
	0.000	CO2	0.70	≤ 1	111)	Cross-section resistance - Shear due to shear force Vz acc. to 6.1.7
	1.850	CO2	0.64	≤ 1	151)	Cross-section resistance - Uniaxial bending acc. to 6.1.6
	1.850	CO2	0.64	≤ 1	311)	Flexural member without compression force acc. to 6.3.3 - Bending about y-axis

DESIGN: ULTIMATE LIMIT STATE - CROSS-SECTION DESIGN

RF-TIMBER Pro CA2
Ultimate Limit State - Cross-Section Design
In Y-direction



Max Design Ratio: 0.70

0.737 m

SPINA Novo mesto, d.o.o.

POZ X04 – PRIMARCI b/h = **20** / **100** cm

MATERIAL	**GL28c**	fm,k =	**2,80**	kN/cm2	fv,k =	**0,35**	kN/cm2
	- lepljen:	γm=	**1,25**		Eo,mean =	**1200**	kN/cm2
	- srednje trajanje o		**M**		kmod =	**0,80**	
	- razred vlažnosti		**2 (12% do 20%)**		fc,90,k=	**0,25**	kN/cm2
GEOMETRIJA		emax =	4,90	m	Wy =	33333,33	cm3
		L =	8,20	m	Iy =	1666666,67	cm4
OBTEŽBA	lastna teža				b*h*5 =	1,00	kN/m
Sekundar	stalna		8,48	kN	* 2 =	16,96	kN
	sneg		6,15	kN	* 2 =	12,3	kN
		kopičenje	robni		*1,5 =	9,225	kN
		kopičenje	2.		*1,33 =	16,359	kN
		kopičenje	3.		*1,16 =	14,268	kN
	veter - tlak		1,57	kN	* 2 =	3,14	kN
	veter - srk		0,00	kN	* 2 =	0,00	kN
ROBNI	bočni veter					1,287	kNm

PRERAČUN Glej izpiske iz programa!

KONTROLE

TLAK - PRAVOKOTNO Ved = 283,7 kN

Dimenzije ležišča a = 20,00 cm

b = 30,00 cm

fc,90,d = Ved /a*b = 0,47 kN/cm2 < fc,90d = 0,15 kN/cm^2

Potrebna ojačitev z vijaki!!

POMIKI POLJE L = 820 cm

Trenutni upogib	winst(g) =	0,58	cm	kdef,g =	0,80		
	winst(q) =	0,40	cm	kdef,q =	0,25		
winst = winst(g)+	winst(q) =	0,98	cm	< L/300 =	2,73	cm	

Končni upogib wfin = winst(g)*(1+kdef,g) + winst(q)*(1+Ψ_2*kdef,q)

wfin = 1,54 cm < L/200 = 4,10 cm

POMIKI KONZOLA L = 550 cm

Trenutni upogib	winst(g) =	1,37	cm	kdef,g =	0,80		
	winst(q) =	0,91	cm	kdef,q =	0,25		
winst = winst(g)+	winst(q) =	2,28	cm	< 2*L/300 =	3,67	cm	

Končni upogib wfin = winst(g)*(1+kdef,g) + winst(q)*(1+Ψ_2*kdef,q)

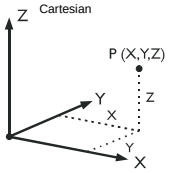
wfin = 3,60 cm < 2*L/200 = 5,50 cm

MODEL - GENERAL DATA

General	Model name		:	Primarci-l=8.2m
	Project name		:	DARS-DOB
	Type of model		:	2D-XZ (ux/uz/φy)
	Positive direction of global axis Z		:	Upward
	Classification of load cases and combinations		:	According to Standard: EN 1990 National Annex: CEN - EU
	☒ Automatically create combinations		:	☒ Load Combinations

FE MESH SETTINGS

General	Target length of finite elements	l_{FE}	:	0.5 m
	Maximum distance between a node and a line to integrate it into the line	ε	:	0.0 m
	Maximum number of mesh nodes (in thousands)		:	500
Members	Number of divisions of members with cable, elastic foundation, taper, or plastic characteristic		:	10
	☒ Activate member divisions for large deformation or post-critical analysis			
	☒ Use division for members with node lying on them			
Surfaces	Maximum ratio of FE rectangle diagonals	Δ_D	:	1.800
	Maximum out-of-plane inclination of two finite elements	α	:	0.50 °
	Shape direction of finite elements		:	Triangles and quadrangles ☒ Same squares where possible



1.1 NODES

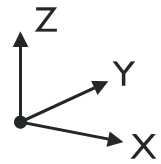
Node No.	Node Type	Reference Node	Coordinate System	Node Coordinates X [m]	Z [m]	Comment
1	Standard	-	Cartesian	0.000	0.000	
2	Standard	-	Cartesian	8.200	0.000	
3	Standard	-	Cartesian	13.700	0.000	
4	Standard	-	Cartesian	2.050	0.000	
5	Standard	-	Cartesian	4.100	0.000	
6	Standard	-	Cartesian	6.150	0.000	
7	Standard	-	Cartesian	10.030	0.000	
8	Standard	-	Cartesian	11.860	0.000	

1.2 LINES

Line No.	Line Type	Nodes No.	Line Length L [m]		Comment
1	Polyline	1,3	13.700	X	

1.3 MATERIALS

Matl. No.	Modulus E [kN/cm²]	Modulus G [kN/cm²]	Poisson's Ratio ν [-]	Spec. Weight γ [kN/m³]	Coeff. of Th. Exp. α [1/℃]	Partial Factor γ_M [-]	Material Model
1	Glulam Timber GL28c | DIN 1052:2008-12						
	1260.00	72.00	7.750	5.00	5.00E-06	1.30	Isotropic Linear Elastic



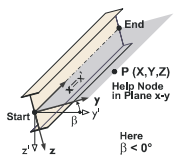
1.7 NODAL SUPPORTS

Support No.	Nodes No.	Rotation [°] about Y	Support or Spring [kN/m] [kNm/rad] $u_{X'}$	$u_{Z'}$	$\varphi_{Y'}$	Comment
1	1	0.00	☒	☒	☐	
2	2	0.00	☐	☒	☐	



1.13 CROSS-SECTIONS

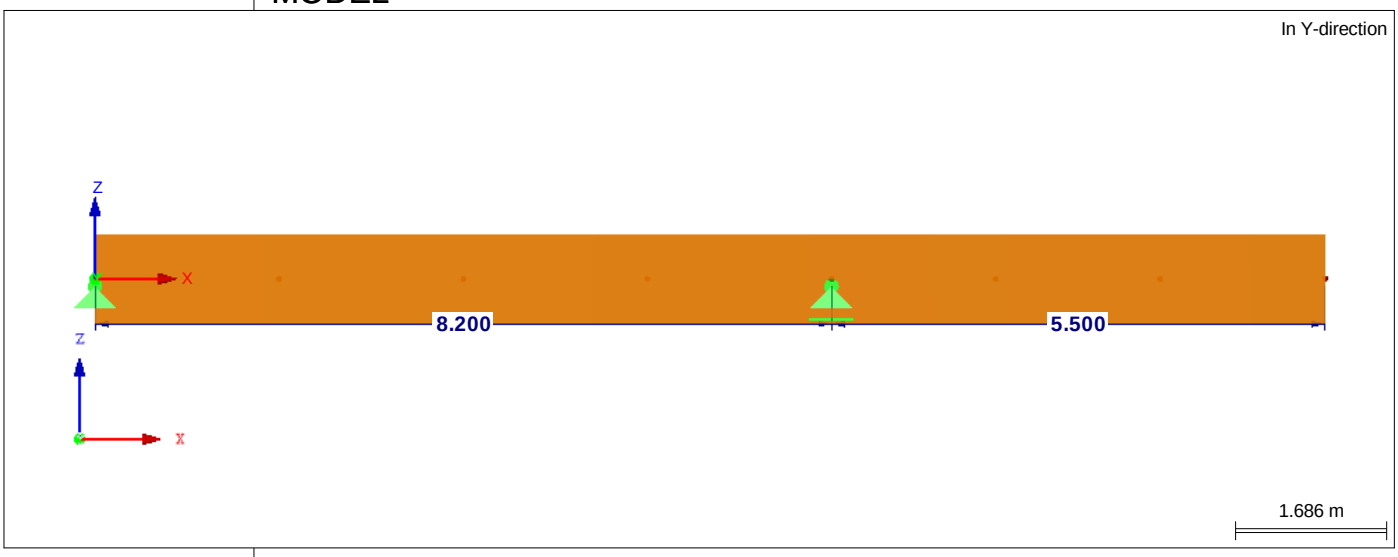
Section No.	Matl. No.	J [cm⁴] A [cm²]	I_y [cm⁴] A_y [cm²]	I_z [cm⁴] A_z [cm²]	Principal Axes α [°]	Rotation α' [°]	Overall Dimensions [mm] Width b	Height h
1	T-Rectangle 200/1000							
	1	2000.00	1666666.75	1666.67	0.00	0.00	200.0	1000.0



1.17 MEMBERS

Mbr. No.	Line No.	Member	Rotation Type	Rotation β[ï¿½]	Cross-Section Start	Cross-Section End	Hinge No. Start	Hinge No. End	Ecc. No.	Div. No.	Length L [m]	
1	1	Beam	Angle	0.00	1	1	-	-	-	-	13.700	X

MODEL



2.1 LOAD CASES

Load Case	Load Case Description	EN 1990 | CEN Action Category	Self-Weight - Factor in Direction Active	X	Y	Z
LC1	Lastna, stalna	Permanent	☒	0.000		-1.000
LC2	Sneg	Snow (H ≤ 1000 m a.s.l.)	☐			
LC3	Veter	Wind	☐			

2.5 LOAD COMBINATIONS

Load Combin.	DS	Load Combination Description	No.	Factor	Load Case	
CO1	ULS	1.35*LC1	1	1.35	LC1	Lastna, stalna
CO2	ULS	1.35*LC1 + 1.5*LC2	1	1.35	LC1	Lastna, stalna
			2	1.50	LC2	Sneg
CO3	ULS	1.35*LC1 + 1.5*LC2 + 0.9*LC3	1	1.35	LC1	Lastna, stalna
			2	1.50	LC2	Sneg
			3	0.90	LC3	Veter
CO4	ULS	1.35*LC1 + 1.5*LC3	1	1.35	LC1	Lastna, stalna
			2	1.50	LC3	Veter
CO5	ULS	1.35*LC1 + 0.75*LC2 + 1.5*LC3	1	1.35	LC1	Lastna, stalna
			2	0.75	LC2	Sneg
			3	1.50	LC3	Veter
CO6	S Ch	LC1	1	1.00	LC1	Lastna, stalna
CO7	S Ch	LC1 + LC2	1	1.00	LC1	Lastna, stalna
			2	1.00	LC2	Sneg
CO8	S Ch	LC1 + LC2 + 0.6*LC3	1	1.00	LC1	Lastna, stalna
			2	1.00	LC2	Sneg
			3	0.60	LC3	Veter
CO9	S Ch	LC1 + LC3	1	1.00	LC1	Lastna, stalna
			2	1.00	LC3	Veter
CO10	S Ch	LC1 + 0.5*LC2 + LC3	1	1.00	LC1	Lastna, stalna
			2	0.50	LC2	Sneg
			3	1.00	LC3	Veter

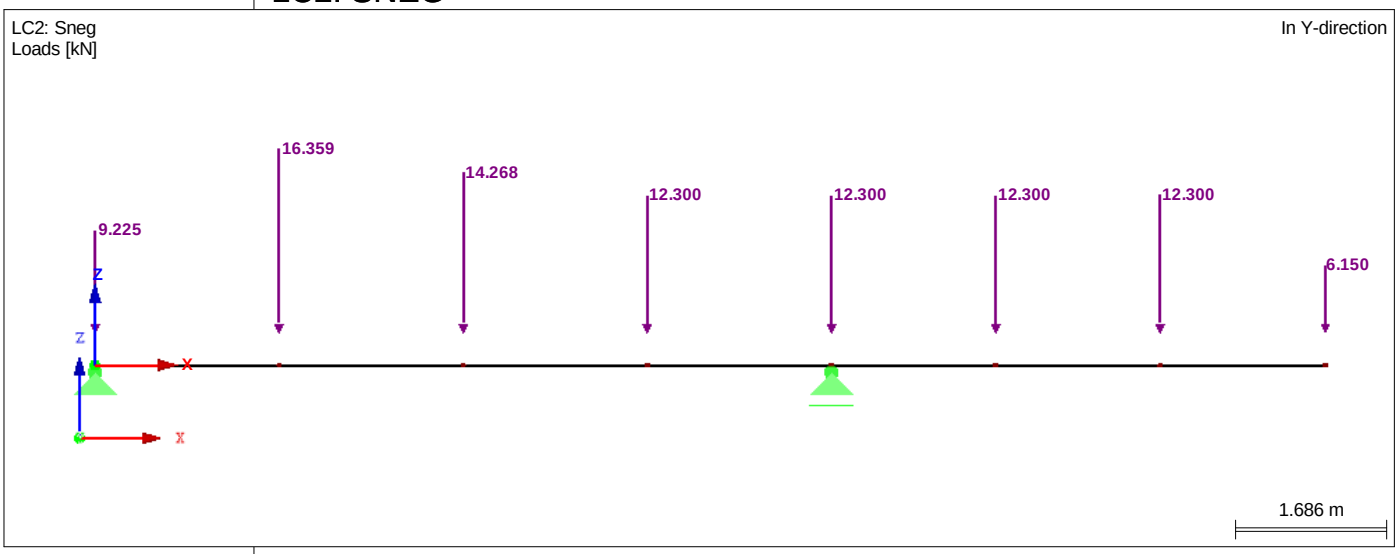
2.7 RESULT COMBINATIONS

Result Combin.	Description	Loading
RC1	ULS (STR/GEO) - Permanent / transient - Eq. 6.10	CO1/p to CO5/p
RC2	SLS - Characteristic	CO6/p to CO10/p

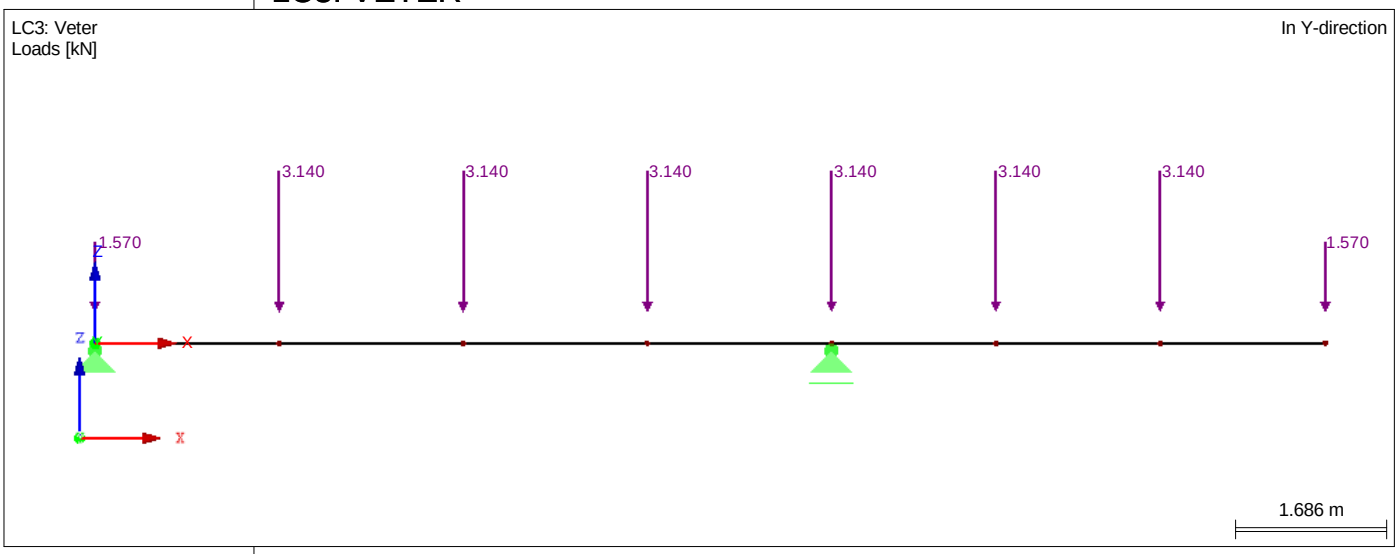
LC1: LASTNA, STALNA



LC2: SNEG



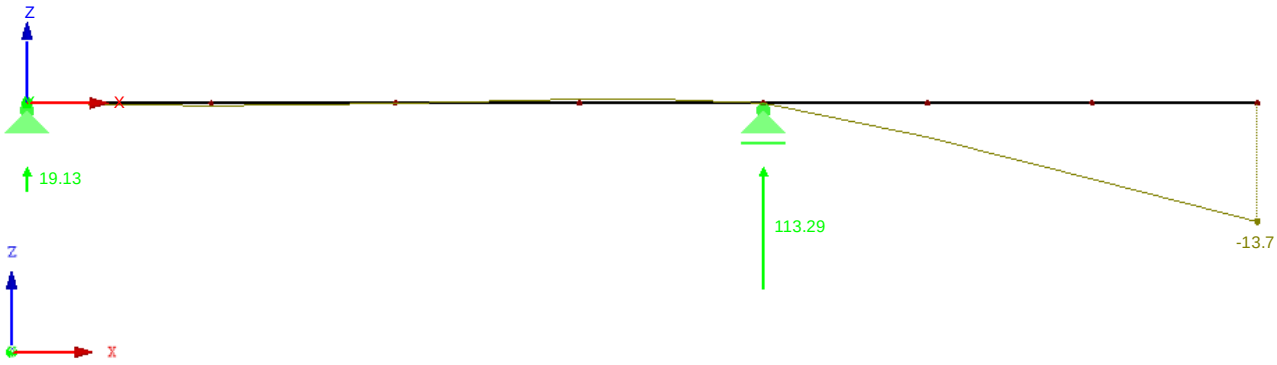
LC3: VETER



GLOBAL DEFORMATIONS u_Z, SUPPORT REACTIONS

LC1: Lastna, stalna
Global Deformations u-Z
Support Reactions[kN]

In Y-direction



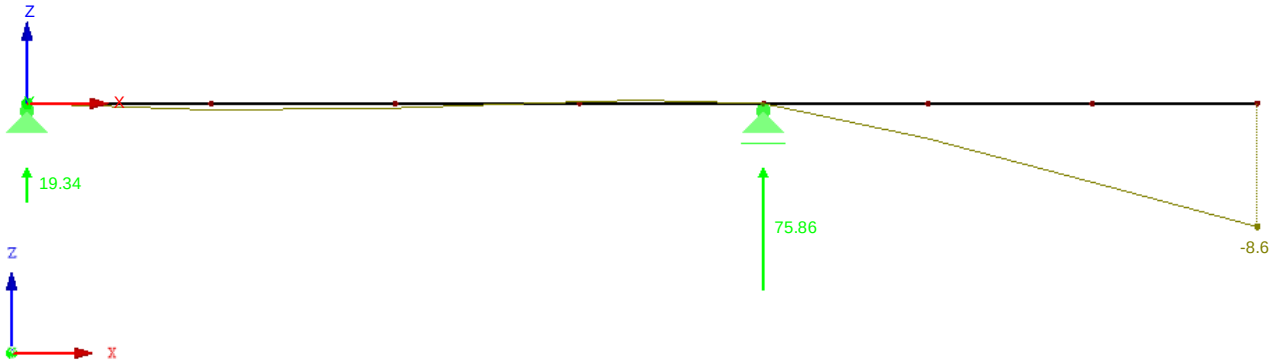
Max P-Z': -19.13, Min P-Z': -113.29 kN
Max P-X': 0.00, Min P-X': 0.00 kN
Max u-Z: 0.5, Min u-Z: -13.7 mm
Factor of deformations: 96.00

1.686 m

GLOBAL DEFORMATIONS u_Z, SUPPORT REACTIONS

LC2: Sneg
Global Deformations u-Z
Support Reactions[kN]

In Y-direction



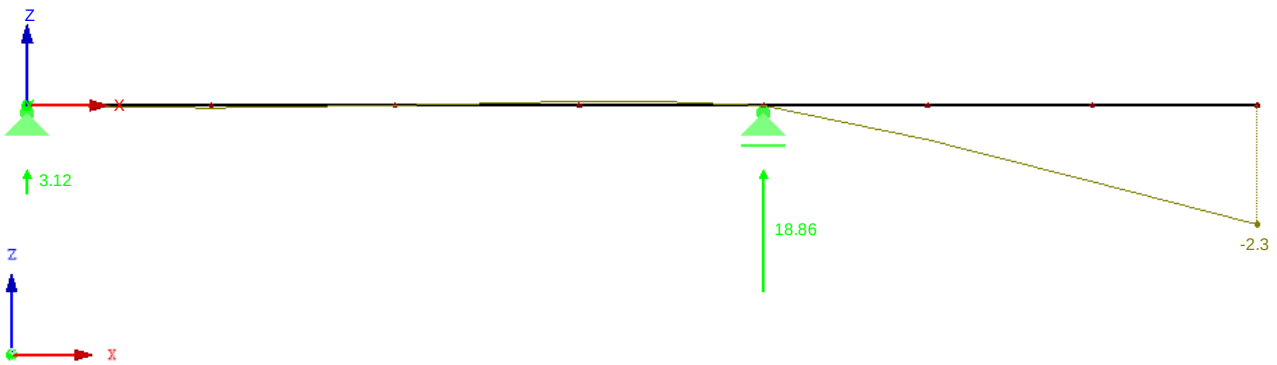
Max P-Z': -19.34, Min P-Z': -75.86 kN
Max P-X': 0.00, Min P-X': 0.00 kN
Max u-Z: 0.2, Min u-Z: -8.6 mm
Factor of deformations: 160.00

1.686 m

GLOBAL DEFORMATIONS u_Z, SUPPORT REACTIONS

LC3: Veter
Global Deformations u-Z
Support Reactions[kN]

In Y-direction



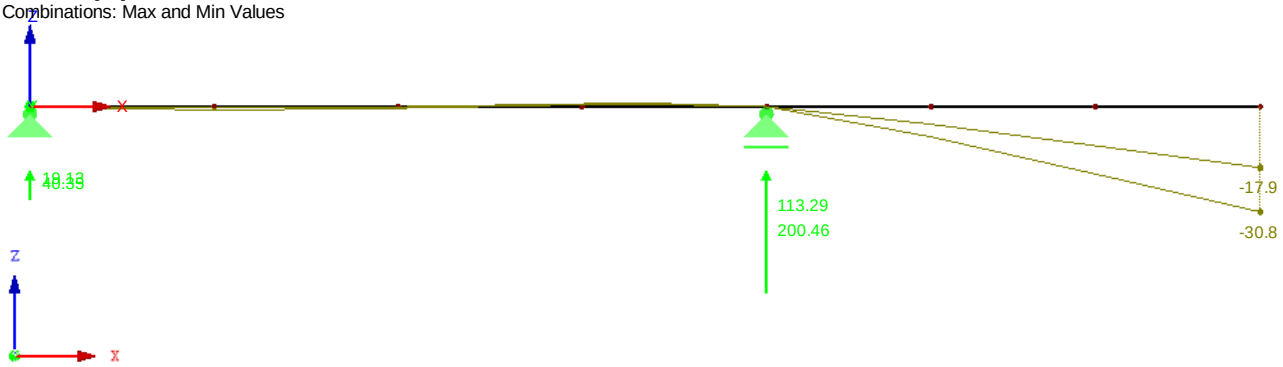
Max P-Z': -3.12, Min P-Z': -18.86 kN
Max P-X': 0.00, Min P-X': 0.00 kN
Max u-Z: 0.1, Min u-Z: -2.3 mm
Factor of deformations: 570.00

1.686 m

GLOBAL DEFORMATIONS u_Z, SUPPORT REACTIONS

RC2: SLS - Characteristic
Global Deformations u-Z
Support Reactions[kN]
Result Combinations: Max and Min Values

In Y-direction



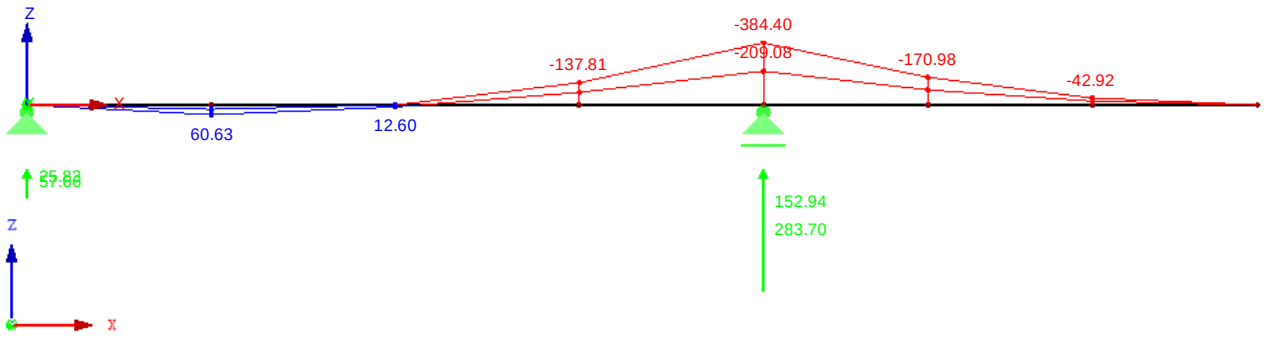
Max P-Z': -19.13, Min P-Z': -200.46 kN
Max P-X': 0.00, Min P-X': 0.00 kN
Max u-Z: 1.0, Min u-Z: -30.8 mm
Factor of deformations: 38.00

1.686 m

INTERNAL FORCES M_y, SUPPORT REACTIONS

RC1: ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces M-y
Support Reactions[kN]
Result Combinations: Max and Min Values

In Y-direction



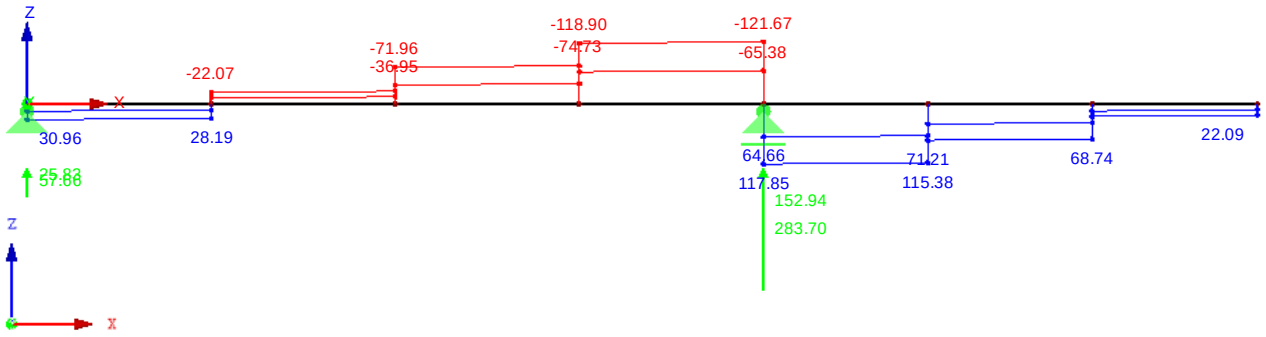
Max P-Z': -25.83, Min P-Z': -283.70 kN
Max P-X': 0.00, Min P-X': 0.00 kN
Max M-y: 60.63, Min M-y: -384.40 kNm

1.686 m

INTERNAL FORCES V_z, SUPPORT REACTIONS

RC1: ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces V-z
Support Reactions[kN]
Result Combinations: Max and Min Values

In Y-direction



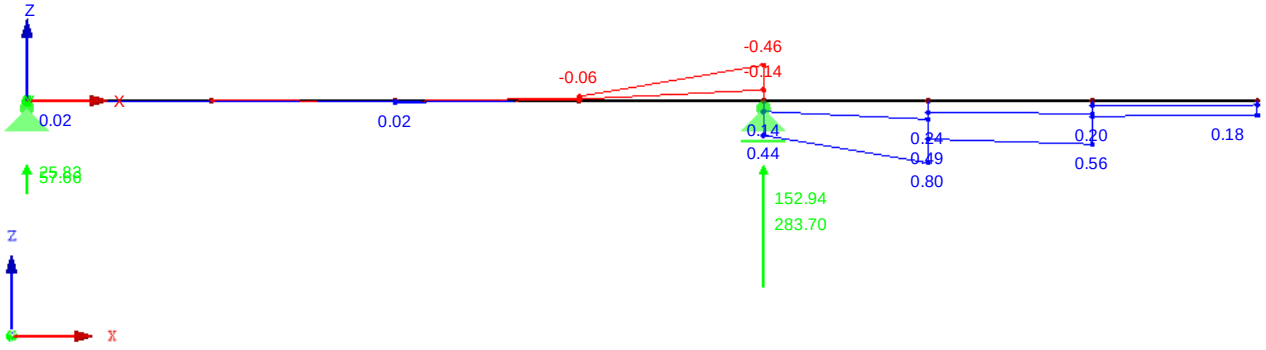
Max P-Z': -25.83, Min P-Z': -283.70 kN
Max P-X': 0.00, Min P-X': 0.00 kN
Max V-z: 117.85, Min V-z: -121.67 kN

1.686 m

INTERNAL FORCES N, SUPPORT REACTIONS

RC1: ULS (STR/GEO) - Permanent / transient - Eq. 6.10
Internal Forces N
Support Reactions[kN]
Result Combinations: Max and Min Values

In Y-direction



Max P-Z': -25.83, Min P-Z': -283.70 kN
Max P-X': 0.00, Min P-X': 0.00 kN
Max N: 0.80, Min N: -0.46 kN

1.686 m

1.1.1 GENERAL DATA

Members to design:		1
Design according to Standard:		SIST EN 1995-1-1/A101:2006-03
Ultimate Limit State Design Load combinations to design:	CO1	1.35*LC1
	CO2	1.35*LC1 + 1.5*LC2
	CO3	1.35*LC1 + 1.5*LC2 + 0.9*LC3
	CO4	1.35*LC1 + 1.5*LC3
	CO5	1.35*LC1 + 0.75*LC2 + 1.5*LC3

1.2 MATERIALS

Matl. No.	Description	Factor Category	Comment
1	Glulam Timber GL28c | DIN 1052 - 08	Glued Laminated Timber	

1.3.1 CROSS-SECTIONS



Sect. No.	Matl. No.	Cross-section Description [mm]	Max Design Ratio	Comment
1	1	T-Rectangle 200/1000	0.00	

1.4 LOAD DURATION AND SERVICE CLASS

LC/CO/RC	LC, CO or RC Description	Load Case Type	Classification of Load Duration
LC1	Lastna, stalna	Permanent	Permanent
LC2	Sneg	Snow (H ≤ 1000 m a.s.l.)	Medium-term
LC3	Veter	Wind	Short-term
CO1	1.35*LC1	-	Permanent
CO2	1.35*LC1 + 1.5*LC2	-	Medium-term
CO3	1.35*LC1 + 1.5*LC2 + 0.9*LC3	-	Short-term
CO4	1.35*LC1 + 1.5*LC3	-	Short-term
CO5	1.35*LC1 + 0.75*LC2 + 1.5*LC3	-	Short-term

Service Class SECL
Service Class 1: Identical for All Members/Sets of Members

1.5 EFFECTIVE LENGTHS - MEMBERS

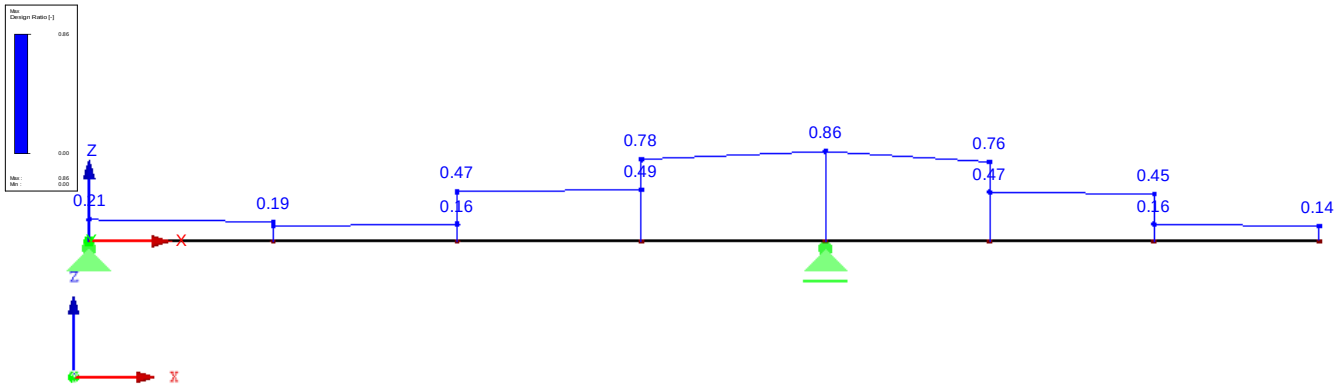
Member No.	Buckling Possible	Buckling About Axis y Possible	$k_{cr,y}$	$L_{cr,y}$ [m]	Buckling About Axis z Possible	$k_{cr,z}$	$L_{cr,z}$ [m]	Lateral-Torsional Buckling Possible	Define L_{cr}	L_{cr} [m]
1	☒	☒	0.599	8.200	☒	0.150	2.050	☒	As member length	13.700

2.4 DESIGN BY MEMBER

Member No.	Location x [m]	LC/CO/RC	Design		Design No.	Description
1	**Cross-section No. 1 - T-Rectangle 200/1000**					
	8.200	CO2	0.80	≤ 1	111)	Cross-section resistance - Shear due to shear force Vz acc. to 6.1.7
	8.200	CO2	0.60	≤ 1	151)	Cross-section resistance - Uniaxial bending acc. to 6.1.6
	8.200	CO2	0.86	≤ 1	311)	Flexural member without compression force acc. to 6.3.3 - Bending about y-axis

DESIGN: ULTIMATE LIMIT STATE - CROSS-SECTION DESIGN

RF-TIMBER Pro CA2
Ultimate Limit State - Cross-Section Design
In Y-direction



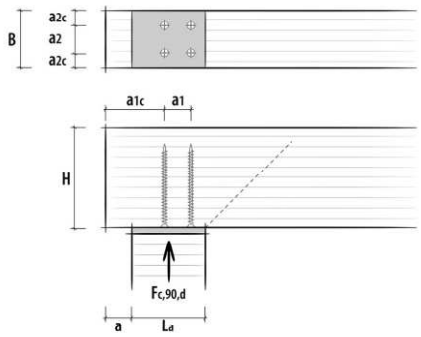
Max Design Ratio: 0.86

1.686 m

PROJECT INFORMATION

Date	:	12/05/2025
Project	:	
Client	:	
Project address	:	
Edited by	:	
Joint	:	
Notes	:	
Code of calculation	:	EN1995:2014 (EU)

Reinforcements withs fully-threaded VGS and VGZ screws - Reinforcement to compression perpendicular



VGS - Full thread countersunk head fastener 13x450 mm (cod. VGS13450)
- Number of screws: = 4 pcs



CE marking according to ETA 11/0030

CALCULATION DATA

Connections with crossed fully-threaded VGS and VGZ screws

Service class	cl	=	2
Main load duration	tq	=	medium
kmod factor	kmod	=	0,80
Connection safety factor	γM	=	1,30
Design action on support	Fc,90,d	=	283,00 kN
Beam width	B	=	200 mm
Beam height	H	=	900 mm
Type of wood:		=	Glulam GL28c (composite)
Length of support	La	=	300 mm
Type of support		=	0 mm
Number of screws perp. to grain		=	2
Number of screws parall. to grain		=	2
SCREW DATA			
Nominal diameter/thread screw	d1	=	13,0 mm
Shank diameter	ds	=	9,0 mm
Inner core diameter	d2	=	8,0 mm
Head diameter	dk	=	22,0 mm
Screw length	Lv	=	450 mm
Thread length	Lf	=	430 mm

NOTES

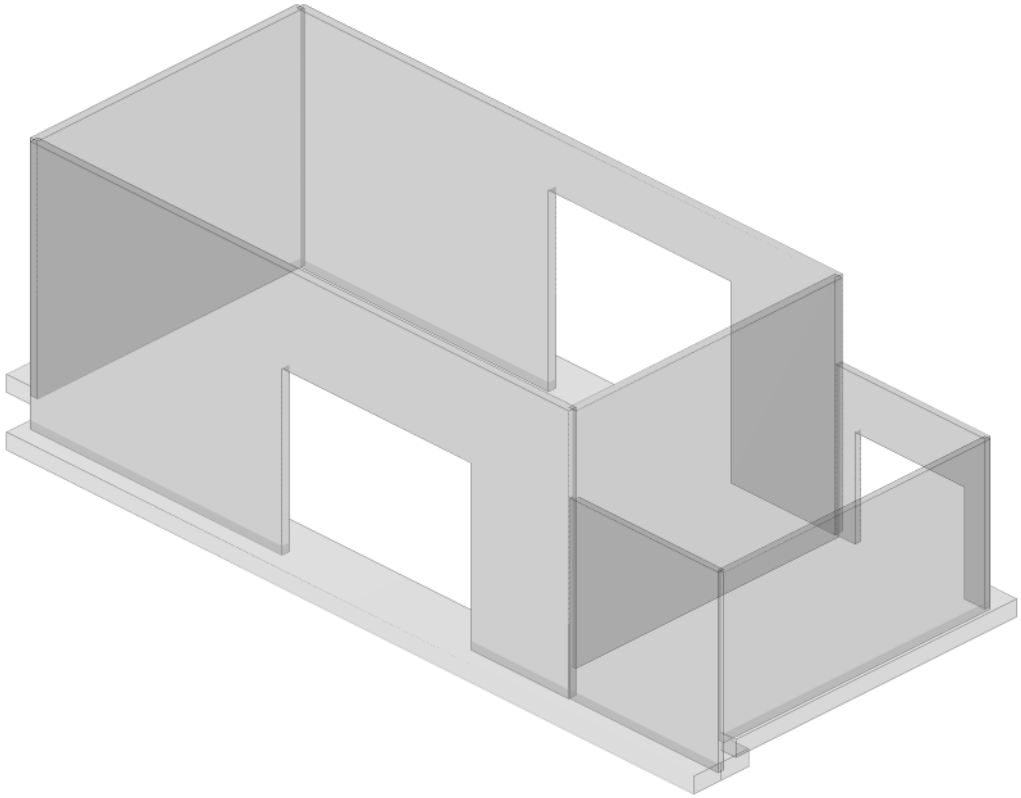
Before the construction, all calculation must be verified and approved by the responsible designer
Mechanical resistance values and geometry refer to product certification
Verification of timber elements resistance must be realized apart.

CALCULATION RESULTS

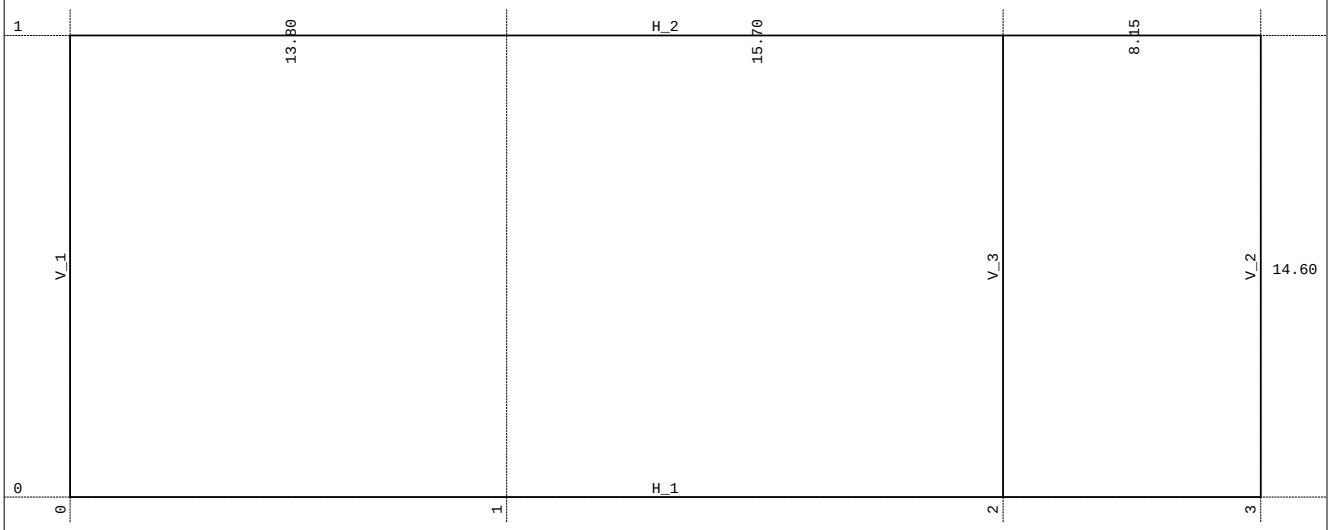
INPUT DATA:		=	
Service class	cl	=	2
Duration of main load	tq	=	media
kmod factor	kmod	=	0,8
Design action on support	Fc,90,d	=	283,00 kN
Beam width	B	=	200 mm
Beam height	H	=	900 mm
Type of wood:		=	GL28c
Angle (grain - support)	α	=	90,00 °
Safety factor of the material (timber)	YM1	=	1,25
Safety factor of timber connection	YM2	=	1,3
Length of support	La	=	300 mm
Type of support		=	Intermediate support
VERIFICATION OF COMPRESSION RESISTANCE WITHOUT REINFORCEMENT		=	
Effective length of the support	Lef	=	360 mm
Compression characteristic resistance (timber)	fc,90,k	=	2,50 N/mm²
Compression design resistance (timber)	fc,90,d	=	1,60 N/mm²
Compression factor	kc,90	=	1,75
Compression design resistance (support)	Fc,90,Rd	=	201,60 kN
Verification of compression resistance without reinforcement		=	1,40 NOT VERIFIED
		=	
Type of fastening:	screw VGS Rinforzi		13x450
Thread diameter	df	=	13 mm
Shank diameter	dg	=	9 mm
Inner core diameter	dn	=	8 mm
Head diameter	dh	=	22 mm
Length of screw	lv	=	450 mm
Thread length	lf	=	430 mm
Minimum suggested support plate thickness	sa	=	6 mm
GEOMETRY OF CONNECTION:		=	
Number of screws perp. to grain		=	2
Number of screws parall. to grain		=	2
Minimum distance of screws parall. to grain	a1	=	100 mm
Insertion angle	α	=	90,00 °
Minimum distance of screws parall. to grain	a1	=	65 mm
Minimum distance of screws perp. to grain	a2	=	65 mm
Minimum distance screws - end (parall. to grain)	a1c	=	130 mm
Minimum distance screws - edge (perp. to grain)	a2c	=	52 mm
SCREWS RESISTANCE:		=	
Withdrawal characteristic resistance of single screw	Fax,Rk	=	71,32 kN
Characteristic buckling resistance of the screw in timber	Fki,Rk	=	32,78 kN
VERIFICATION OF COMPRESSION RESISTANCE WITH REINFORCEMENT		=	
Eff. length of the contact area	Lef1	=	360 mm
Eff. length in the plane of the screw tips	Lef2	=	1000 mm
Compression design resistance (timber)	fc,90,d	=	1,60 N/mm²
Resistance on the plane 1	F1c,90,Rd	=	326,47 kN
Resistance on the plane 2	F2c,90,Rd	=	320,00 kN
Final design resistance with reinforcement	Fc,90,Rd	=	320,00 kN
Verification of compression resistance with reinforcement		=	0,88 VERIFIED
Verification of compression resistance without reinforcement		**=**	**1,40 NOT VERIFIED**
Final design resistance with reinforcement	**Fc,90,Rd**	**=**	**320,00 kN**
Verification of compression resistance with reinforcement		**=**	**0,88 VERIFIED**

AB KONSTRUKCIJA

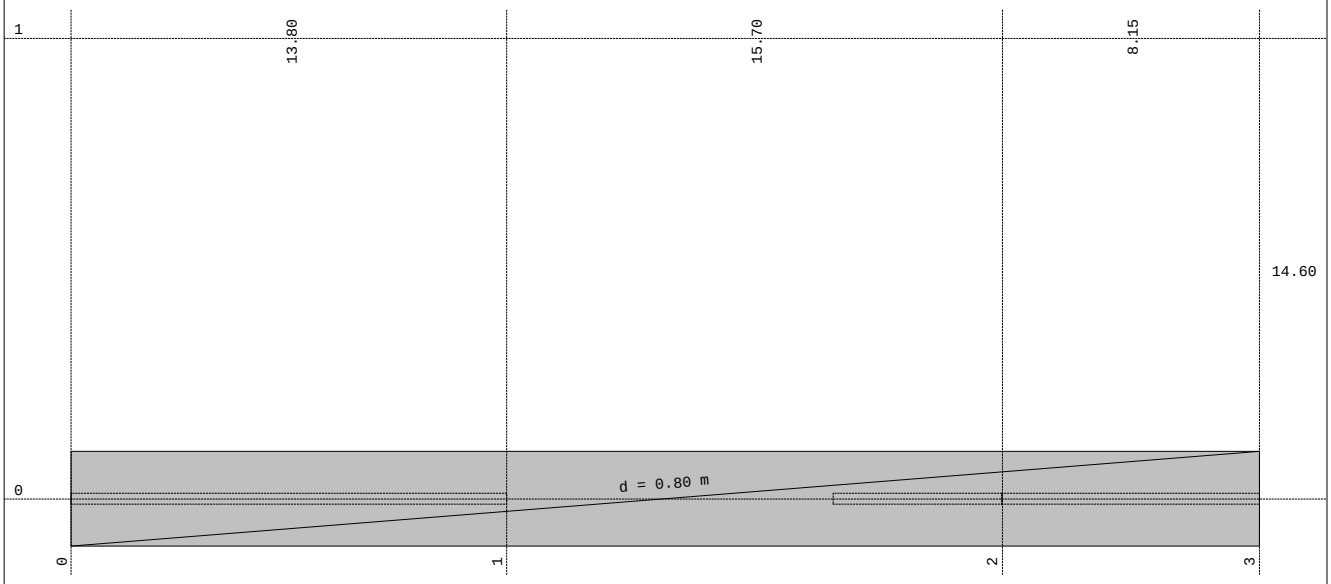
Vhodni podatki - Konstrukcija



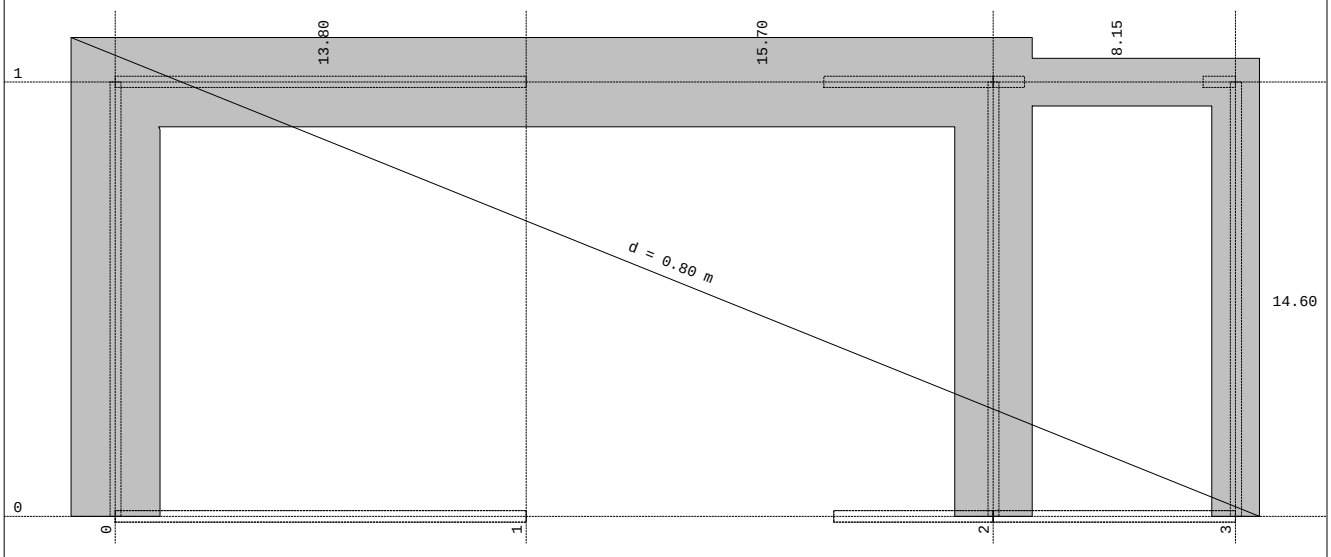
Izometrija



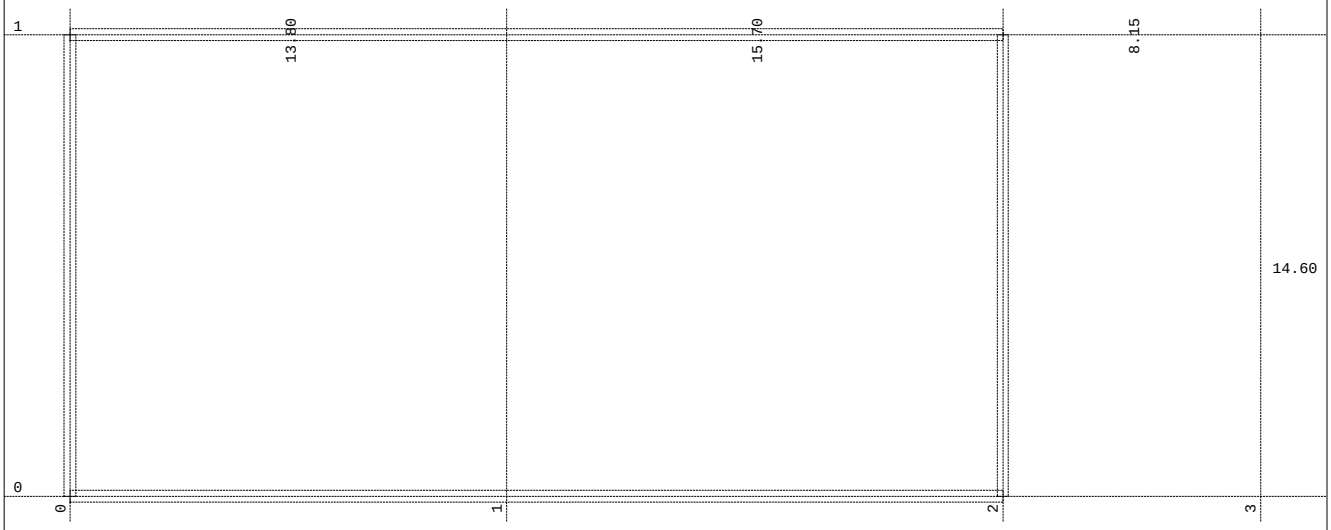
Dispozicija okvirjev



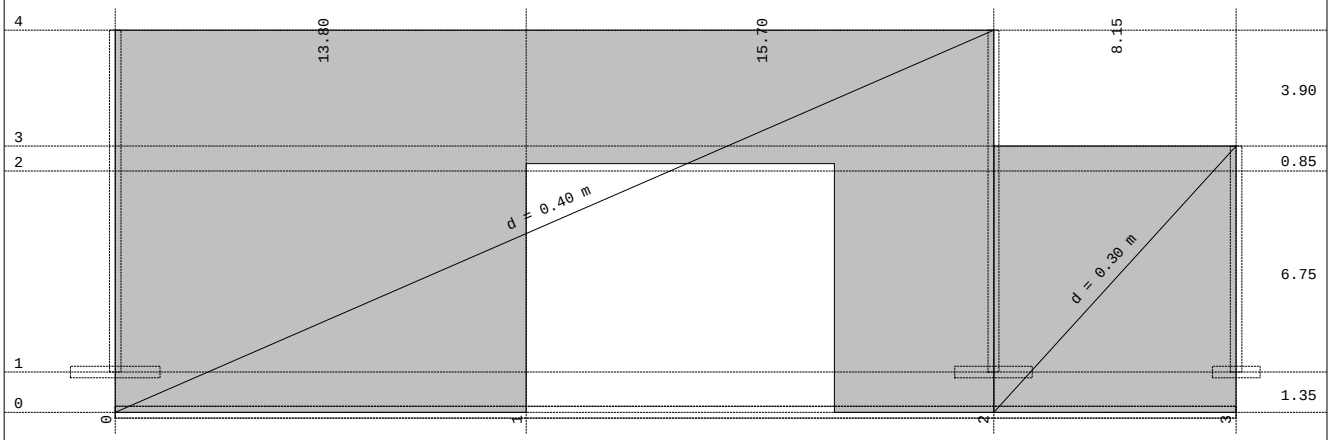
Nivo: [-1.35 m]



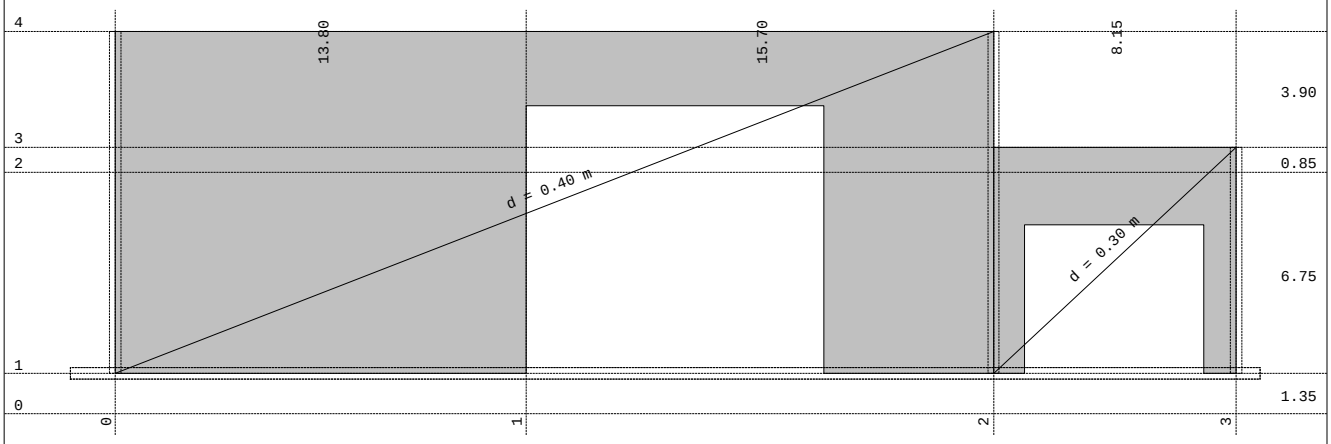
Nivo: [0.00 m]



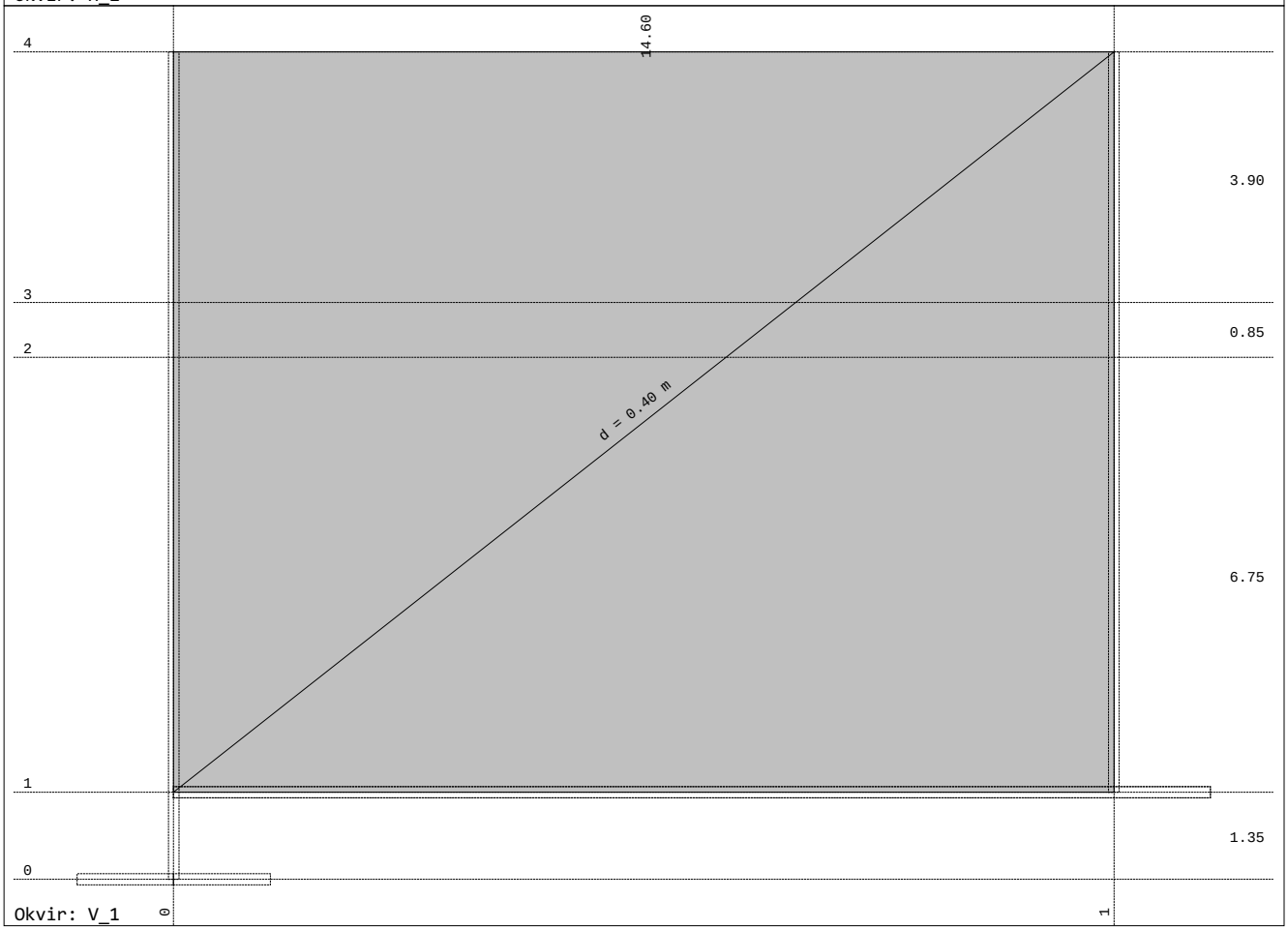
Nivo: [11.50 m]



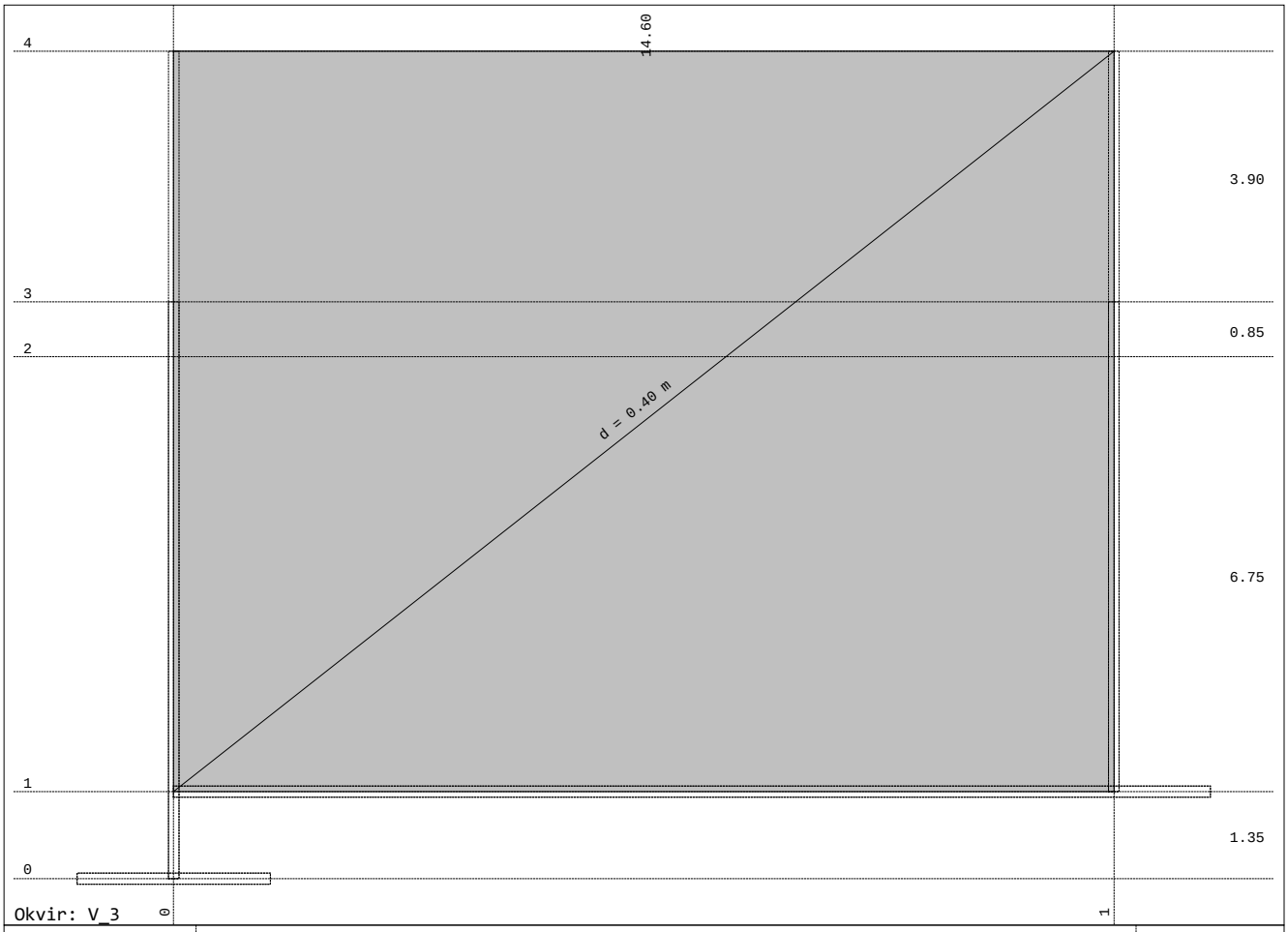
Okvir: H_1

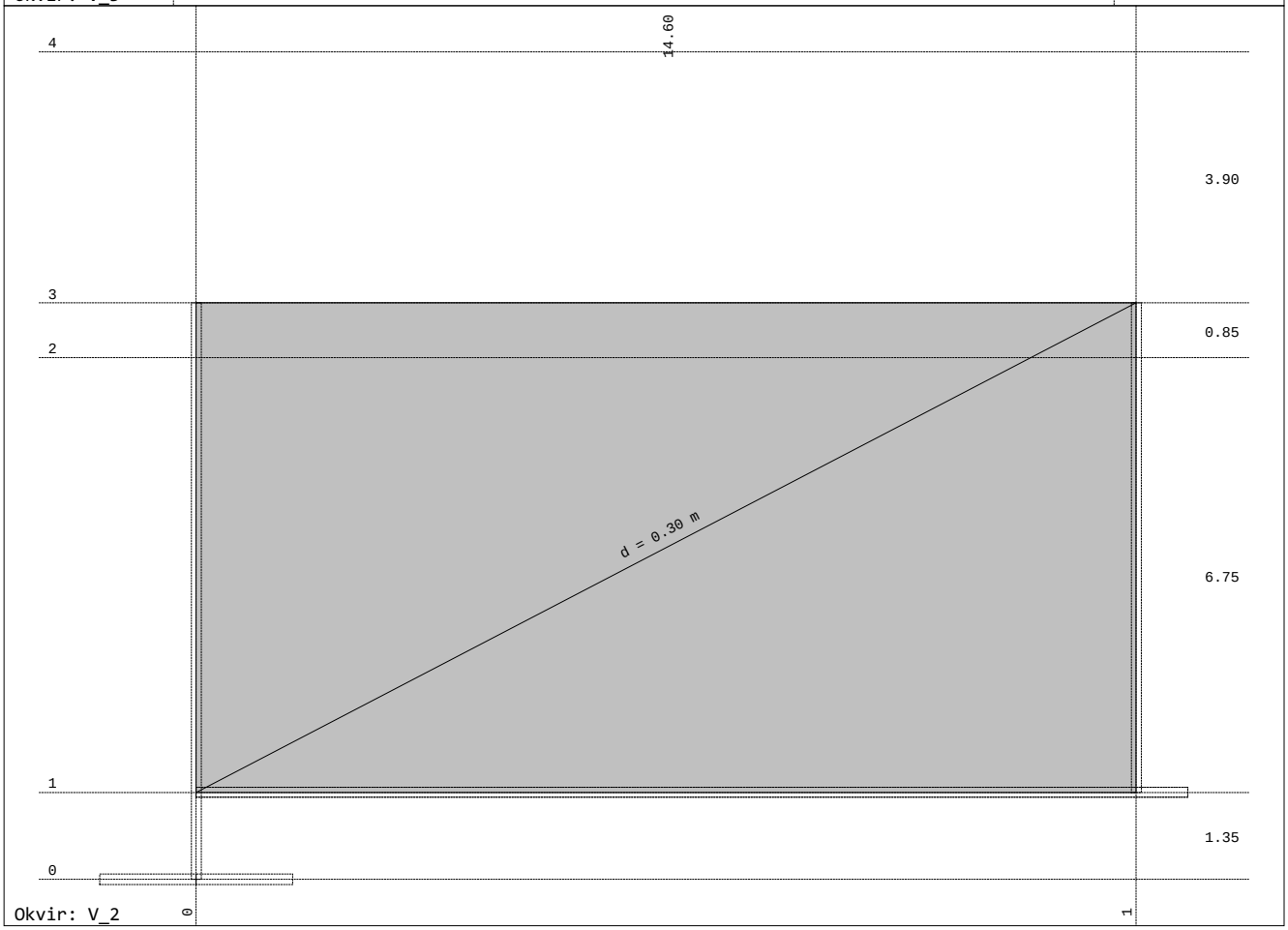


Okvir: H_2



Okvir: V_1


14.60
4
3
2
1
0
3.90
0.85
6.75
1.35
d = 0.40 m
0
1
Okvir: V_3

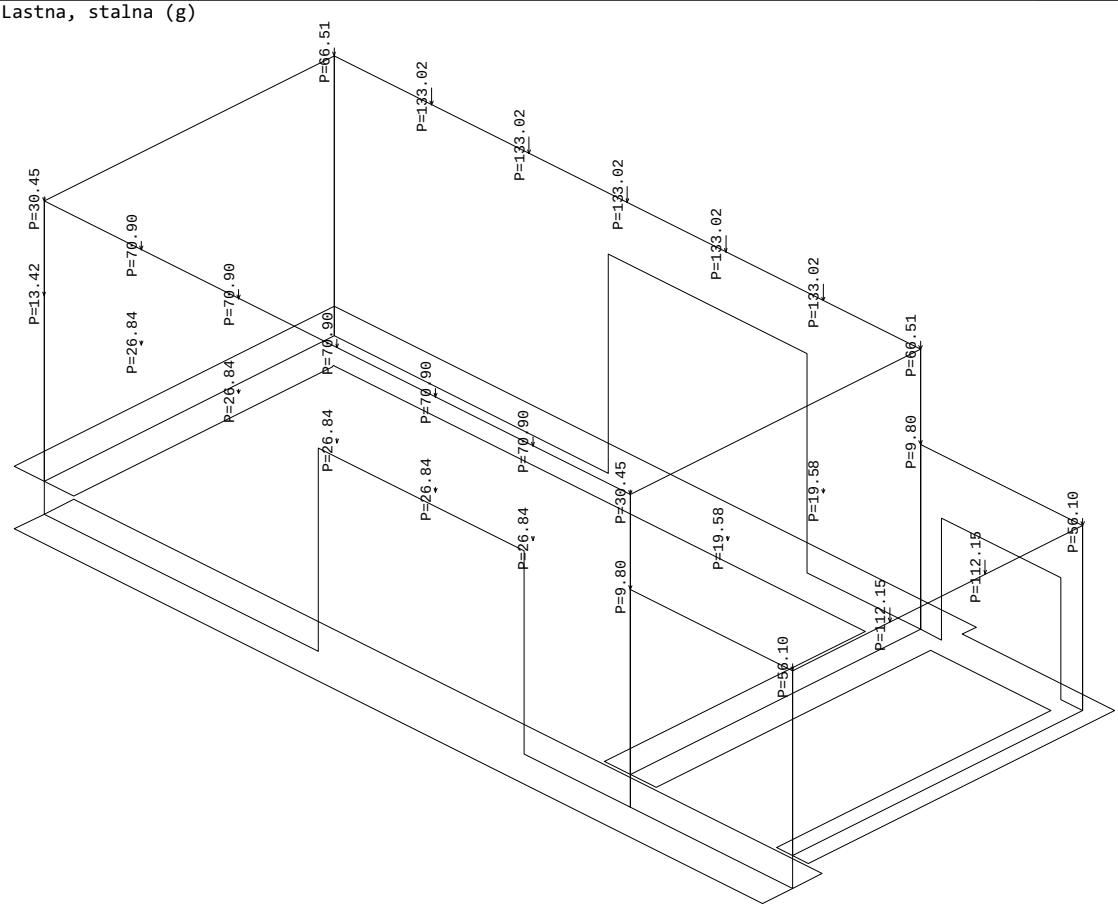

14.60
4
3
2
1
0
3.90
0.85
6.75
1.35
d = 0.30 m
0
1
Okvir: V_2

Tabele materialov							
No	Naziv materiala	E[kN/m2]	μ	γ[kN/m3]	αt[1/C]	Em[kN/m2]	μm
1	C 30/37	3.300e+7	0.20	25.00	1.000e-5	3.300e+7	0.20

Seti površinskih podpor			
Set	K,R1	K,R2	K,R3
1	1.000e+4	1.000e+4	1.000e+4

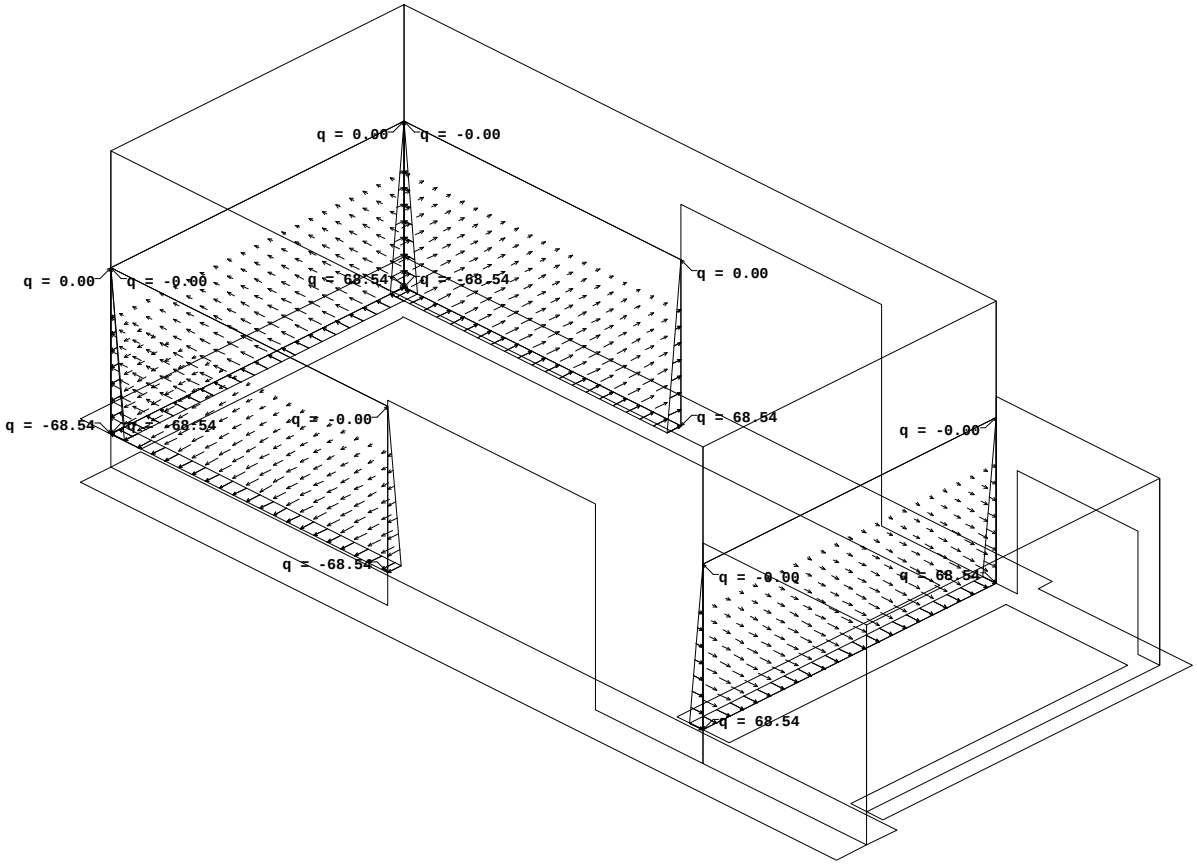
Vhodni podatki - Obtežba

Obt. 1: Lastna, stalna (g)



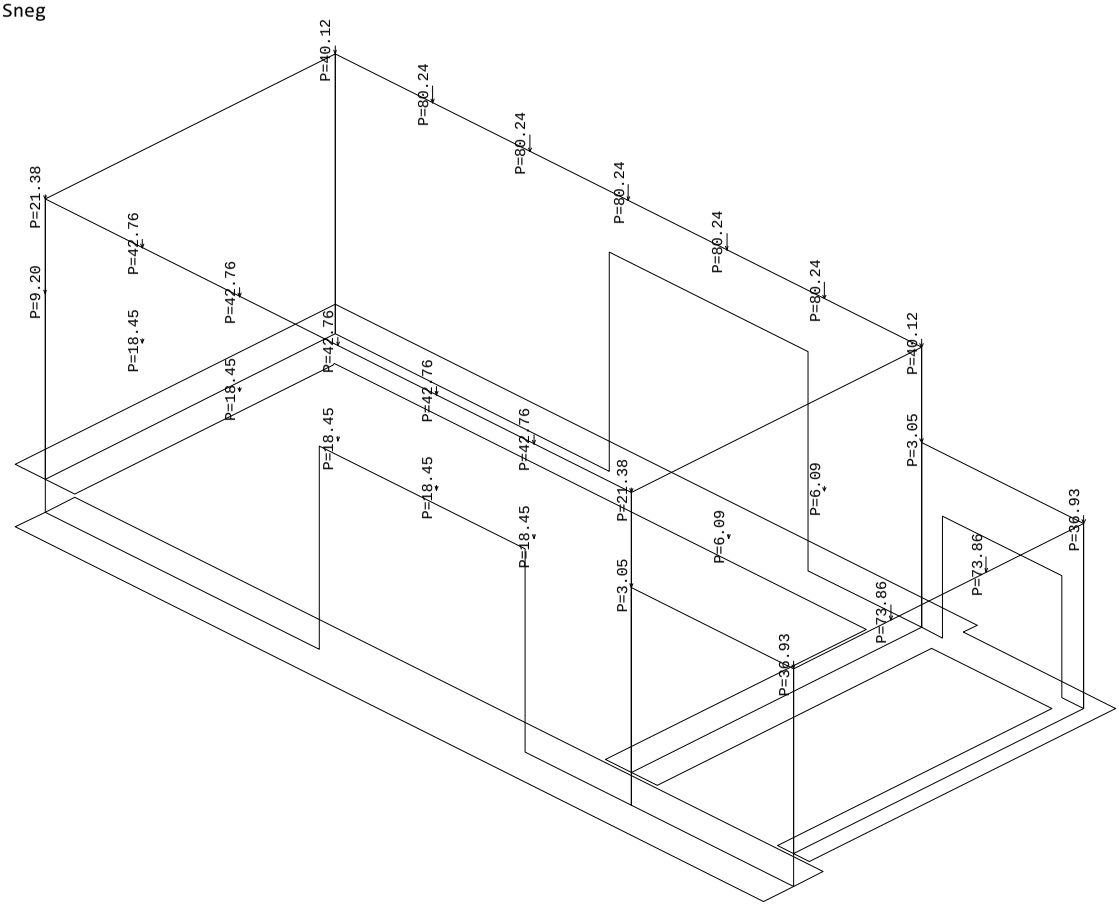
Izometrija

Obt. 2: Nasutje



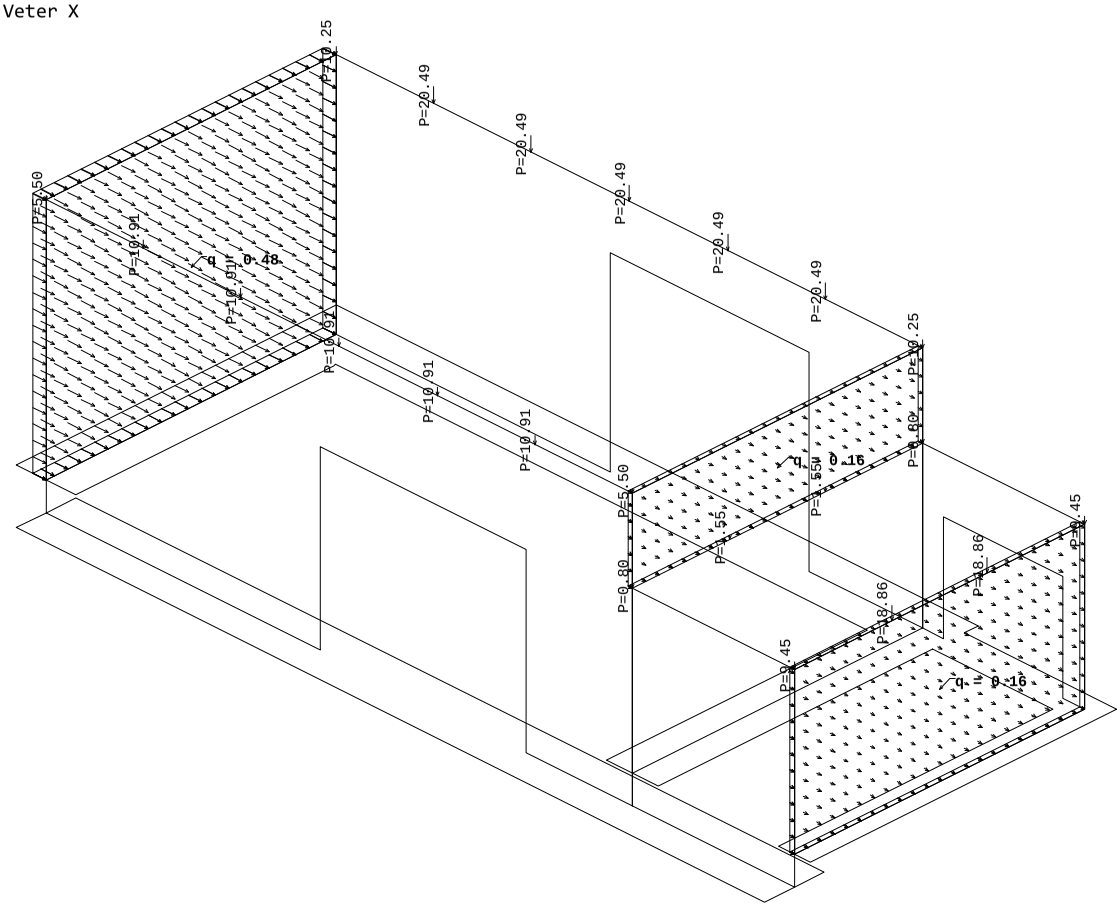
Izometrija

Obt. 3: Sneg



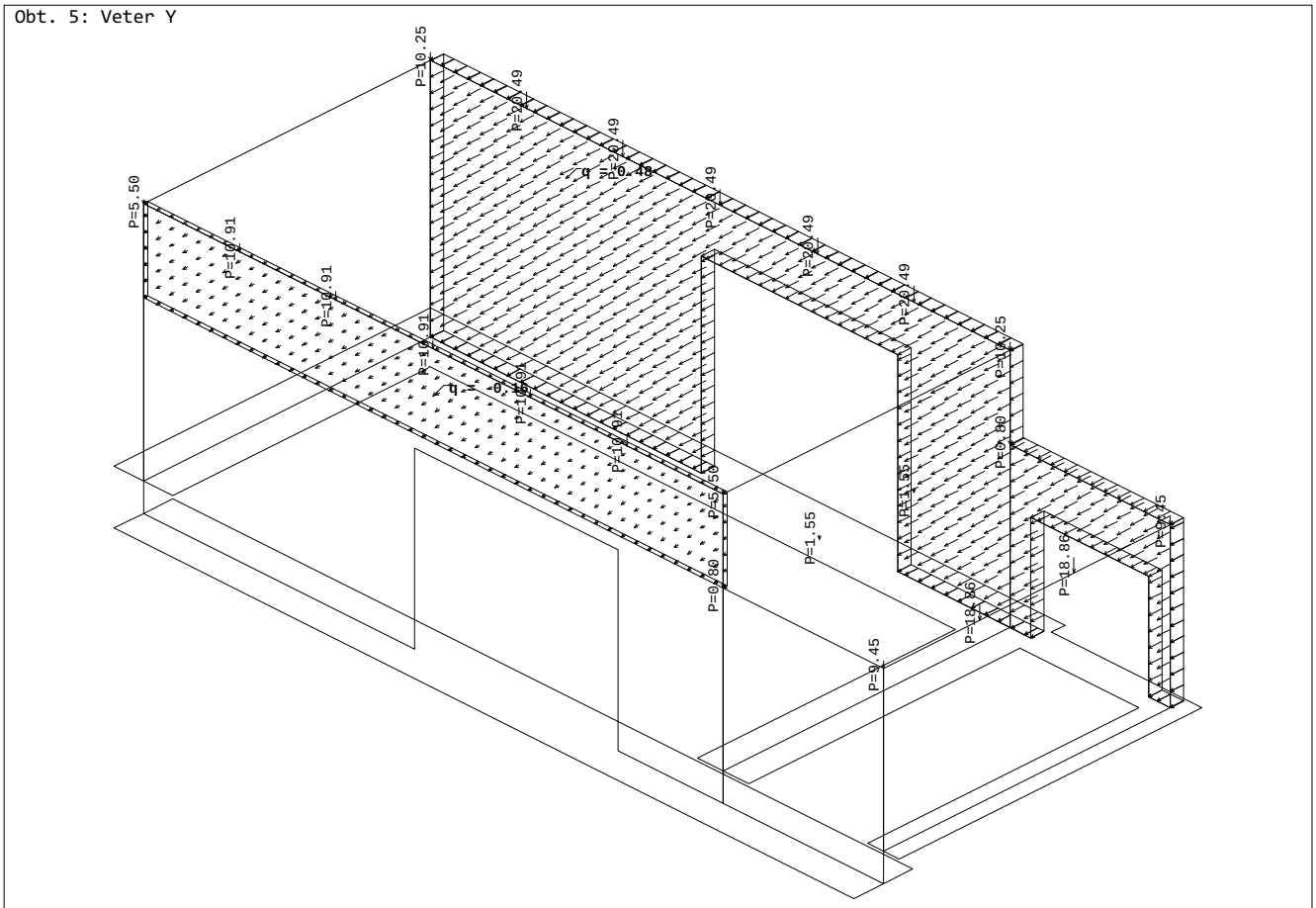
Izometrija

Obt. 4: Veter X



Izometrija

Obt. 5: Veter Y



Izometrija

Lista obtežnih primerov

LC	Naziv	pX [kN]	pY [kN]	pZ [kN]
1	Lastna, stalna (g)	0.00	0.00	-18502.8
2	Nasutje	0.01	5.02	0.00
3	Sneg	0.00	0.00	-1079.31
4	Veter X	107.46	0.00	-249.82
5	Veter Y	0.00	-153.38	-249.82
6	Px			
7	Py			
8	Komb.: 1.35xI+1.5xII+0.75xIII+0.9xV	0.02	-130.51	-26013.1
9	Komb.: 1.35xI+1.5xII+0.75xIII+0.9xIV	96.73	7.53	-26013.1
10	Komb.: I+1.5xII+0.75xIII+0.9xV	0.02	-130.51	-19537.1
11	Komb.: I+1.5xII+0.75xIII+0.9xIV	96.73	7.53	-19537.1
12	Komb.: 1.35xI+1.5xIII+0.9xV	0.00	-138.04	-26822.6
13	Komb.: 1.35xI+1.5xIII+0.9xIV	96.71	0.00	-26822.6
14	Komb.: 1.35xI+1.5xII+0.9xV	0.02	-130.51	-25203.6
15	Komb.: 1.35xI+1.5xII+0.9xIV	96.73	7.53	-25203.6
16	Komb.: 1.35xI+0.75xIII+1.5xV	0.00	-230.07	-26163.0
17	Komb.: 1.35xI+0.75xIII+1.5xIV	161.18	0.00	-26163.0
18	Komb.: 1.35xI+1.5xII+0.75xIII	0.02	7.53	-25788.3
19	Komb.: I+1.5xIII+0.9xV	0.00	-138.04	-20346.6
20	Komb.: I+1.5xIII+0.9xIV	96.71	0.00	-20346.6
21	Komb.: I+1.5xII+0.9xV	0.02	-130.51	-18727.6
22	Komb.: I+1.5xII+0.9xIV	96.73	7.53	-18727.6
23	Komb.: I+0.75xIII+1.5xV	0.00	-230.07	-19687.0
24	Komb.: I+0.75xIII+1.5xIV	161.18	0.00	-19687.0
25	Komb.: I+1.5xII+0.75xIII	0.02	7.53	-19312.3
26	Komb.: 1.35xI+1.5xV	0.00	-230.07	-25353.5
27	Komb.: 1.35xI+1.5xIV	161.18	0.00	-25353.5
28	Komb.: 1.35xI+1.5xIII	0.00	0.00	-26597.7
29	Komb.: 1.35xI+1.5xII	0.02	7.53	-24978.8
30	Komb.: I+1.5xV	0.00	-230.07	-18877.5
31	Komb.: I+1.5xIV	161.18	0.00	-18877.5
32	Komb.: I+1.5xIII	0.00	0.00	-20121.8
33	Komb.: I+1.5xII	0.02	7.53	-18502.8
34	Komb.: I-1xVI			
35	Komb.: I-1xVII			
36	Komb.: I+VII			
37	Komb.: I+VI			
38	Komb.: 1.35xI	0.00	0.00	-24978.8
39	Komb.: I	0.00	0.00	-18502.8
40	Komb.: I+II+III+0.6xV	0.01	-87.01	-19732.0
41	Komb.: I+II+III+0.6xIV	64.49	5.02	-19732.0
42	Komb.: I+II+0.5xIII+V	0.01	-148.36	-19292.3
43	Komb.: I+II+0.5xIII+IV	107.47	5.02	-19292.3

Lista obtežnih primerov

LC	Naziv	pX [kN]	pY [kN]	pZ [kN]
44	Komb.: I+II+0.5xIII+0.6xV	0.01	-87.01	-19192.3
45	Komb.: I+II+0.5xIII+0.6xIV	64.49	5.02	-19192.3
46	Komb.: I+II+V	0.01	-148.36	-18752.6
47	Komb.: I+II+IV	107.47	5.02	-18752.6
48	Komb.: I+II+III	0.01	5.02	-19582.1
49	Komb.: I+III+0.6xV	0.00	-92.03	-19732.0
50	Komb.: I+III+0.6xIV	64.47	0.00	-19732.0
51	Komb.: I+II+0.6xV	0.01	-87.01	-18652.7
52	Komb.: I+II+0.6xIV	64.49	5.02	-18652.7
53	Komb.: I+0.5xIII+V	0.00	-153.38	-19292.3
54	Komb.: I+0.5xIII+IV	107.46	0.00	-19292.3
55	Komb.: I+II+0.5xIII	0.01	5.02	-19042.5
56	Komb.: I+V	0.00	-153.38	-18752.6
57	Komb.: I+IV	107.46	0.00	-18752.6
58	Komb.: I+III	0.00	0.00	-19582.1
59	Komb.: I+II	0.01	5.02	-18502.8
60	Komb.: I	0.00	0.00	-18502.8

Modalna analiza

Napredne opcije seizmičnega preračuna:

Multiplikator togosti podpor: 100.000
Preprečeno nihanje v Z smeri

Faktorji obtežb za preračun mas		
No	Naziv	Koeficient
1	Lastna, stalna (g)	1.00
2	Nasutje	0.00
3	Sneg	0.00
4	Veter X	0.00
5	Veter Y	0.00

Razporeditev mas po višini objekta					
Nivo	Z [m]	X [m]	Y [m]	Masa [T]	T/m²
	11.50	14.87	8.06	316.78	
	7.60	19.33	6.79	227.55	
	6.75	18.48	6.79	361.49	
	0.00	18.12	9.07	733.19	3.58
	-1.35	18.74	0.00	247.74	2.19
Skupno:	3.96	17.87	7.00	1886.76	

Položaj centra togosti po višini objekta (približna m...			
Nivo	Z [m]	X [m]	Y [m]
	11.50	14.75	7.30
	7.60	18.36	1.53
	6.75	20.99	7.34
	0.00	20.99	4.47
	-1.35	15.68	0.00

Ekscentriciteta po višini objekta (približna metoda)			
Nivo	Z [m]	eox [m]	eoy [m]
	11.50	0.12	0.76
	7.60	0.97	5.27
	6.75	2.52	0.55
	0.00	2.87	4.59
	-1.35	3.06	0.00

Nihajne dobe konstrukcije								
No	T [s]	f [Hz]	No	T [s]	f [Hz]	No	T [s]	f [Hz]
1	0.5801	1.7237	51	0.0289	34.6204	101	0.0150	66.5546
2	0.5558	1.7994	52	0.0284	35.2229	102	0.0148	67.4620
3	0.2923	3.4209	53	0.0276	36.1856	103	0.0147	68.1268
4	0.2640	3.7875	54	0.0274	36.4696	104	0.0145	68.8452
5	0.2601	3.8440	55	0.0270	37.0450	105	0.0145	68.9293
6	0.1859	5.3806	56	0.0267	37.4879	106	0.0144	69.2797
7	0.1578	6.3360	57	0.0261	38.2535	107	0.0142	70.4099
8	0.1530	6.5372	58	0.0255	39.1890	108	0.0141	71.1626
9	0.1325	7.5462	59	0.0253	39.5936	109	0.0139	71.9202
10	0.1266	7.8998	60	0.0244	40.9935	110	0.0139	72.0631
11	0.1238	8.0765	61	0.0237	42.1304	111	0.0138	72.2159
12	0.1070	9.3432	62	0.0234	42.6932	112	0.0137	73.1862
13	0.1004	9.9581	63	0.0232	43.0302	113	0.0136	73.6932
14	0.0926	10.8016	64	0.0229	43.7384	114	0.0135	74.0140
15	0.0872	11.4651	65	0.0226	44.3161	115	0.0134	74.8193
16	0.0792	12.6292	66	0.0223	44.7666	116	0.0131	76.2467
17	0.0766	13.0485	67	0.0221	45.2245	117	0.0131	76.5315
18	0.0710	14.0885	68	0.0219	45.6697	118	0.0130	76.7748
19	0.0684	14.6154	69	0.0217	46.1173	119	0.0130	77.0168
20	0.0672	14.8907	70	0.0215	46.5278	120	0.0128	78.2763
21	0.0652	15.3462	71	0.0210	47.6547	121	0.0127	78.8892
22	0.0640	15.6189	72	0.0208	48.0788	122	0.0125	79.8996
23	0.0632	15.8182	73	0.0207	48.3435	123	0.0124	80.8710
24	0.0618	16.1733	74	0.0204	49.0143	124	0.0123	81.1122
25	0.0612	16.3509	75	0.0201	49.7382	125	0.0122	81.7452
26	0.0596	16.7884	76	0.0200	50.0532	126	0.0122	81.7659
27	0.0567	17.6328	77	0.0199	50.2379	127	0.0122	82.0939
28	0.0541	18.4950	78	0.0196	50.9001	128	0.0121	82.6055
29	0.0491	20.3521	79	0.0195	51.1835	129	0.0120	83.3195
30	0.0477	20.9580	80	0.0192	52.1963	130	0.0119	83.9835
31	0.0441	22.6649	81	0.0190	52.5125	131	0.0119	84.2165
32	0.0434	23.0521	82	0.0186	53.6473	132	0.0118	84.6486
33	0.0427	23.3974	83	0.0186	53.7027	133	0.0117	85.2343
34	0.0405	24.7066	84	0.0181	55.1326	134	0.0117	85.6614
35	0.0391	25.5946	85	0.0179	55.9340	135	0.0116	86.0176
36	0.0381	26.2556	86	0.0174	57.3711	136	0.0116	86.0583
37	0.0378	26.4396	87	0.0172	58.1248	137	0.0115	87.0752
38	0.0374	26.7499	88	0.0171	58.4494	138	0.0115	87.1226
39	0.0371	26.9842	89	0.0169	59.0764	139	0.0113	88.1110
40	0.0362	27.6169	90	0.0166	60.1407	140	0.0112	89.2264
41	0.0361	27.7019	91	0.0165	60.4701	141	0.0112	89.5542
42	0.0346	28.8991	92	0.0163	61.2990	142	0.0111	89.8978
43	0.0345	28.9581	93	0.0161	61.9748	143	0.0111	90.2080
44	0.0340	29.3825	94	0.0161	62.2544	144	0.0111	90.3705
45	0.0329	30.4149	95	0.0159	62.7396	145	0.0110	90.9946
46	0.0321	31.1644	96	0.0159	63.0716	146	0.0109	91.6571
47	0.0311	32.1652	97	0.0158	63.3486	147	0.0109	91.7271
48	0.0303	32.9742	98	0.0155	64.4269	148	0.0108	92.4340
49	0.0299	33.4701	99	0.0154	64.7893	149	0.0108	92.9136
50	0.0293	34.1207	100	0.0153	65.3671	150	0.0107	93.2027

Nihajne dobe konstrukcije

No	T [s]	f [Hz]
151	0.0107	93.8173
152	0.0106	94.1994
153	0.0105	94.9136
154	0.0105	95.2058
155	0.0104	95.9601
156	0.0104	96.4724
157	0.0103	96.7921
158	0.0103	97.3376
159	0.0102	97.6750
160	0.0102	98.0168
161	0.0102	98.3392
162	0.0101	99.2786
163	0.0100	100.1319
164	0.0099	100.5332
165	0.0099	100.7408
166	0.0098	101.5491
167	0.0098	101.8062
168	0.0098	102.4044
169	0.0097	102.7255
170	0.0097	103.0777
171	0.0096	103.8855
172	0.0096	104.6115
173	0.0095	104.7161
174	0.0095	105.2193
175	0.0095	105.7881
176	0.0094	106.4032
177	0.0093	107.3129
178	0.0093	107.9616
179	0.0092	108.1596
180	0.0092	108.3632

Seizmični preračun

Seizmični preračun: EC8 (EN 1998) SLO	
Kategorija tal:	A
Kategorija pomena:	II (γ=1.0)
Razmerje agR/g:	0.250
Koeficient dušenja:	0.05

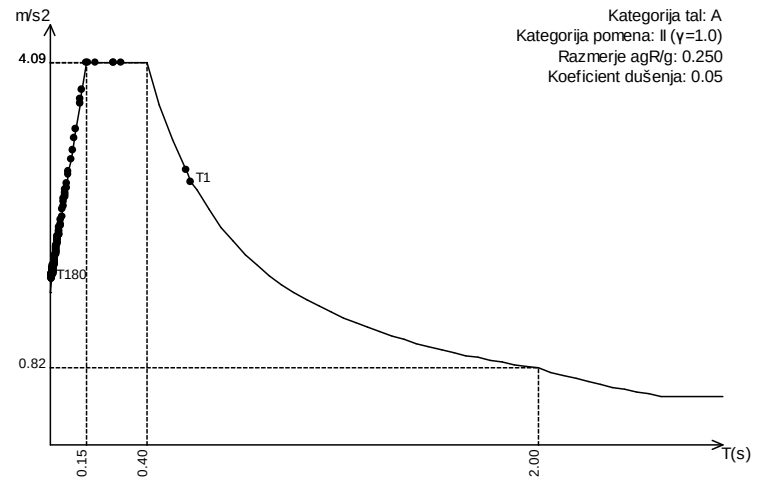
Faktorji smeri potresa:

Obtežni primer	Kot α[°]	k,α	k,α+90°	kz	Faktor O.
Px	0	1.000	0.300	0.000	1.500
Py	90	1.000	0.300	0.000	1.500

Tip spektra

Obtežni primer	S	Tb	Tc	Td	avg/ag
Px	1.000	0.150	0.400	2.000	1.000
Py	1.000	0.150	0.400	2.000	1.000

Projektni spekter



S=1.00, Tb=0.15, Tc=0.40, Td=2.00

Razporeditev potresnih sil po višini objekta - Px

Nivo	Z [m]	Ton 1 Px [kN]	Ton 1 Py [kN]	Ton 1 Pz [kN]	Ton 2 Px [kN]	Ton 2 Py [kN]	Ton 2 Pz [kN]	Ton 3 Px [kN]	Ton 3 Py [kN]	Ton 3 Pz [kN]
	11.50	-0.08	14.79	-0.01	0.21	178.39	-0.01	19.36	-6.63	0.03
	7.60	0.04	-0.50	-0.00	0.00	58.80	0.00	7.80	8.63	0.01
	6.75	0.16	-0.56	-0.00	-0.18	40.66	0.00	10.13	5.50	0.01
	0.00	0.02	-0.11	-0.00	-0.02	6.99	-0.02	1.55	0.22	0.01
	-1.35	0.00	-0.00	0.00	-0.00	0.02	0.03	-0.00	-0.01	-0.01
	Σ=	0.13	13.62	-0.01	0.02	284.87	0.00	38.84	7.71	0.04

Nivo	Z [m]	Ton 4 Px [kN]	Ton 4 Py [kN]	Ton 4 Pz [kN]	Ton 5 Px [kN]	Ton 5 Py [kN]	Ton 5 Pz [kN]	Ton 6 Px [kN]	Ton 6 Py [kN]	Ton 6 Pz [kN]
	11.50	-6.16	-3.14	-0.02	18.67	4.08	-0.06	0.04	-0.20	0.00
	7.60	105.94	2.52	-0.07	42.22	-0.04	-0.03	0.07	-0.11	0.00
	6.75	67.78	14.50	0.02	32.95	-22.96	-0.05	0.01	-0.07	-0.00
	0.00	11.26	4.59	-0.02	5.45	-5.95	-0.03	0.00	-0.01	-0.00
	-1.35	0.07	0.02	0.01	-0.03	-0.02	0.02	0.00	-0.00	0.00
	Σ=	178.89	18.49	-0.08	99.26	-24.89	-0.15	0.13	-0.40	0.00

Nivo	Z [m]	Ton 7 Px [kN]	Ton 7 Py [kN]	Ton 7 Pz [kN]	Ton 8 Px [kN]	Ton 8 Py [kN]	Ton 8 Pz [kN]	Ton 9 Px [kN]	Ton 9 Py [kN]	Ton 9 Pz [kN]
	11.50	282.49	29.39	0.15	-1.89	20.67	-0.02	-0.37	-7.72	0.01
	7.60	190.36	-9.16	0.00	-0.90	5.86	0.01	-0.06	3.97	0.01
	6.75	205.02	10.42	-0.16	-1.69	5.09	0.01	-0.32	7.18	-0.00
	0.00	35.64	4.00	0.04	-0.25	1.02	-0.05	-0.04	2.46	0.00
	-1.35	0.67	0.06	-0.11	-0.01	0.00	0.06	-0.00	0.03	-0.00
	Σ=	714.18	34.71	-0.07	-4.74	32.64	0.02	-0.78	5.92	0.01

Nivo	Z [m]	Ton 10 Px [kN]	Ton 10 Py [kN]	Ton 10 Pz [kN]	Ton 11 Px [kN]	Ton 11 Py [kN]	Ton 11 Pz [kN]	Ton 12 Px [kN]	Ton 12 Py [kN]	Ton 12 Pz [kN]
	11.50	0.21	-7.91	-0.02	-0.20	-0.19	0.01	9.65	-25.57	-0.04
	7.60	-0.27	12.19	0.01	0.02	1.48	0.00	6.50	22.04	-0.01
	6.75	0.98	19.75	0.03	-0.07	3.73	0.01	8.38	39.68	-0.06
	0.00	0.13	6.48	-0.01	-0.05	0.88	-0.01	1.81	11.41	-0.02
	-1.35	-0.01	0.07	0.02	0.02	0.01	0.01	0.07	0.00	0.01
	Σ=	1.05	30.57	0.03	-0.28	5.91	0.03	26.42	47.56	-0.12

Nivo	Z [m]	Ton 13 Px [kN]	Ton 13 Py [kN]	Ton 13 Pz [kN]	Ton 14 Px [kN]	Ton 14 Py [kN]	Ton 14 Pz [kN]	Ton 15 Px [kN]	Ton 15 Py [kN]	Ton 15 Pz [kN]
	11.50	1.41	4.27	-0.01	-0.19	-0.06	0.00	10.72	0.77	0.01
	7.60	0.92	-3.51	-0.00	0.22	0.88	0.00	6.12	0.03	-0.01
	6.75	1.07	-6.51	-0.01	0.67	-1.70	0.00	7.18	3.53	-0.00
	0.00	0.22	-1.87	-0.00	0.20	-1.20	0.00	1.60	1.67	0.01

	-1.35	0.01	0.00	-0.00	-0.01	-0.02	-0.00	0.10	0.02	-0.00
	Σ=	3.64	-7.62	-0.02	0.90	-2.10	0.00	25.72	6.02	0.00

		Ton 16			Ton 17			Ton 18		
Nivo	Z [m]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.42	0.22	0.00	-1.17	1.87	-0.02	1.50	2.32	-0.02
	7.60	-0.04	0.44	0.00	0.14	-0.21	-0.00	-1.17	1.01	-0.01
	6.75	-0.36	-0.06	0.00	0.73	0.86	0.00	-0.09	0.83	-0.03
	0.00	-0.11	0.06	-0.00	0.24	0.23	-0.01	0.21	-0.34	-0.04
	-1.35	0.00	0.00	0.00	-0.01	0.00	0.02	-0.02	-0.02	0.04
	Σ=	-0.09	0.66	0.01	-0.08	2.74	-0.02	0.43	3.81	-0.06

		Ton 19			Ton 20			Ton 21		
Nivo	Z [m]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	1.23	0.62	-0.10	0.61	-0.52	0.00	-1.59	-8.84	-0.26
	7.60	0.64	1.61	-0.04	-0.37	0.14	0.00	2.54	16.51	-0.02
	6.75	-1.65	3.35	-0.04	-0.45	0.94	0.00	11.67	50.41	-0.14
	0.00	-0.62	0.19	-0.03	-0.05	0.56	-0.00	3.71	15.22	-0.32
	-1.35	-0.03	0.01	0.04	-0.00	0.00	0.00	-0.32	0.12	0.44
	Σ=	-0.43	5.78	-0.17	-0.26	1.13	0.01	16.00	73.42	-0.31

		Ton 22			Ton 23			Ton 24		
Nivo	Z [m]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-56.60	-5.78	-0.65	-3.85	7.18	-0.23	-2.38	1.92	0.15
	7.60	10.91	-2.48	-0.21	-0.50	1.14	-0.04	-0.50	-0.52	0.06
	6.75	111.26	2.72	-0.08	12.26	2.23	-0.00	2.96	0.23	0.07
	0.00	38.88	6.26	0.02	5.44	1.05	-0.13	1.00	0.58	-0.00
	-1.35	0.25	0.11	-0.09	-0.04	0.02	0.18	0.10	0.02	0.01
	Σ=	104.71	0.84	-1.00	13.31	11.61	-0.23	1.18	2.23	0.29

		Ton 25			Ton 26			Ton 27		
Nivo	Z [m]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	9.27	0.24	-0.41	4.95	-0.15	-0.08	4.36	7.66	-0.26
	7.60	0.41	-4.14	-0.11	-18.18	0.57	-0.06	1.45	2.19	-0.10
	6.75	6.46	-14.85	-0.31	27.45	1.22	-0.22	-1.14	9.50	-0.08
	0.00	3.31	-4.17	-0.03	19.02	-0.56	-0.03	-0.61	6.33	-0.13
	-1.35	-0.57	-0.01	-0.03	0.17	0.02	-0.02	0.03	0.10	0.16
	Σ=	18.87	-22.93	-0.89	33.41	1.10	-0.40	4.10	25.77	-0.41

		Ton 28			Ton 29			Ton 30		
Nivo	Z [m]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.64	0.07	-0.00	202.31	-11.13	-4.50	144.50	-1.25	-1.88
	7.60	0.10	1.23	-0.00	74.80	-15.27	-1.77	53.28	24.76	-0.94
	6.75	0.77	-0.84	0.01	89.57	34.16	-3.46	56.79	-39.81	-1.82
	0.00	0.25	-1.32	0.00	38.45	12.07	-0.49	24.98	-24.71	-0.01
	-1.35	0.03	-0.03	0.00	0.98	-0.14	-0.02	2.12	-0.03	-0.35
	Σ=	0.52	-0.89	0.00	406.11	19.68	-10.24	281.67	-41.04	-4.99

		Ton 31			Ton 32			Ton 33		
Nivo	Z [m]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.62	2.05	-0.00	168.39	17.05	1.85	143.12	48.30	1.32
	7.60	0.55	-4.41	-0.01	88.20	-16.64	-0.51	96.19	20.94	-0.46
	6.75	0.46	-0.90	-0.01	107.32	-12.94	0.92	121.64	69.82	0.93
	0.00	0.06	6.49	0.03	43.71	11.09	1.37	47.96	29.76	-0.02
	-1.35	0.07	0.26	-0.04	11.92	0.23	-1.56	15.37	0.23	0.20
	Σ=	1.76	3.47	-0.03	419.53	-1.20	2.06	424.28	169.05	1.97

		Ton 34			Ton 35			Ton 36		
Nivo	Z [m]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	7.13	-4.77	0.15	28.71	5.00	0.22	8.97	-3.25	0.55
	7.60	4.95	3.99	-0.05	8.19	3.40	0.33	4.95	-1.64	0.18
	6.75	5.08	-8.86	0.01	-3.02	9.82	0.30	5.05	-9.08	0.16
	0.00	1.96	-14.54	0.28	-0.47	9.12	0.10	2.03	-4.26	0.35
	-1.35	0.95	-0.39	-0.41	0.94	0.08	0.06	1.36	0.09	-0.43
	Σ=	20.08	-24.57	-0.01	34.34	27.41	1.00	22.36	-18.15	0.81

		Ton 37			Ton 38			Ton 39		
Nivo	Z [m]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.10	-0.15	-0.01	0.09	-0.08	0.00	0.28	-0.13	-0.01
	7.60	0.06	0.10	0.01	0.01	0.12	-0.00	0.02	-0.21	0.02
	6.75	-0.01	0.18	0.01	0.02	-0.08	-0.00	0.16	-0.21	0.01
	0.00	0.01	0.46	-0.00	0.01	-0.36	0.00	0.10	-0.76	0.01
	-1.35	-0.01	-0.00	0.01	0.00	-0.01	-0.00	-0.00	-0.02	-0.02
	Σ=	-0.06	0.58	0.00	0.13	-0.41	-0.00	0.56	-1.33	0.01

		Ton 40			Ton 41			Ton 42		
Nivo	Z [m]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	2.54	-1.98	0.38	1.38	-2.44	0.18	-1.38	4.81	-0.25
	7.60	1.52	-9.53	0.01	1.43	-0.94	0.02	-0.09	1.90	-0.01
	6.75	1.71	-1.48	0.01	1.50	-4.94	0.02	0.50	3.04	-0.03
	0.00	0.92	4.63	0.30	0.56	-3.19	0.18	0.20	1.74	-0.27
	-1.35	0.48	0.00	-0.39	0.38	0.00	-0.24	0.26	0.03	0.34
	Σ=	7.16	-8.35	0.29	5.24	-11.51	0.16	-0.50	11.52	-0.23

		Ton 43			Ton 44			Ton 45		
Nivo	Z [m]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-1.35	6.99	-0.40	5.88	-4.16	0.12	-0.48	10.78	-0.78
	7.60	0.14	2.90	-0.02	1.69	-8.75	-0.08	-1.65	10.86	-0.10
	6.75	-0.37	6.40	-0.02	2.17	-3.17	0.01	-0.19	4.29	-0.02
	0.00	-0.75	3.88	-0.41	2.28	5.06	0.51	0.84	1.40	-0.71
	-1.35	0.16	0.03	0.54	0.25	0.12	-0.64	-0.24	0.17	0.96
	Σ=	-2.16	20.20	-0.31	12.27	-10.89	-0.07	-1.72	27.51	-0.64

Nivo	Z [m]	Ton 46			Ton 47			Ton 48		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.59	3.13	-0.02	0.38	0.73	-0.10	-0.31	4.72	-0.22
	7.60	-0.54	0.90	-0.01	-0.24	-2.21	0.00	0.18	6.03	-0.14
	6.75	-0.49	2.42	-0.02	0.28	1.47	0.01	-1.16	5.57	0.02
	0.00	-0.17	2.48	-0.23	0.58	2.44	0.01	-0.94	3.82	-0.31
	-1.35	-0.24	0.04	0.29	0.09	0.01	-0.01	-0.59	0.04	0.48
	Σ=	-2.04	8.98	0.01	1.09	2.44	-0.09	-2.80	20.18	-0.17

Nivo	Z [m]	Ton 49			Ton 50			Ton 51		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	8.07	-1.74	0.33	8.33	-9.54	0.82	5.06	1.82	-0.16
	7.60	-16.57	1.18	0.02	1.78	7.09	-0.41	-11.25	-1.36	0.09
	6.75	9.06	1.48	-0.01	2.65	-1.36	-0.50	3.56	-0.96	0.17
	0.00	19.03	0.14	0.04	3.93	-5.06	0.37	13.83	-0.31	-0.01
	-1.35	0.08	-0.03	-0.05	1.22	-0.09	-0.55	-0.34	0.00	0.02
	Σ=	19.68	1.03	0.34	17.91	-8.96	-0.28	10.86	-0.80	0.11

Nivo	Z [m]	Ton 52			Ton 53			Ton 54		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-2.55	0.04	0.21	-0.20	-1.44	0.04	8.02	7.10	-1.02
	7.60	-0.03	12.71	-0.26	0.55	1.13	-0.07	1.06	10.57	-0.25
	6.75	1.19	11.32	-0.56	0.34	2.13	-0.13	-1.19	8.56	0.04
	0.00	0.22	10.47	-0.70	0.17	0.72	0.00	2.44	11.51	-0.50
	-1.35	0.97	0.22	0.89	0.25	0.02	-0.04	0.80	0.21	0.92
	Σ=	-0.19	34.76	-0.42	1.11	2.57	-0.20	11.13	37.94	-0.81

Nivo	Z [m]	Ton 55			Ton 56			Ton 57		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.28	0.25	-0.12	2.96	2.83	-0.10	0.94	-0.40	-0.05
	7.60	0.36	-0.07	0.04	0.10	-1.72	-0.06	0.08	-0.38	0.06
	6.75	-0.02	1.32	0.08	-1.42	6.52	-0.01	-0.52	0.22	0.14
	0.00	-0.28	0.23	0.02	-0.19	6.50	-0.24	0.30	-0.42	0.11
	-1.35	-0.02	0.02	0.01	0.24	0.02	0.37	-0.04	-0.04	-0.08
	Σ=	0.31	1.74	0.03	1.70	14.14	-0.04	0.76	-1.02	0.18

Nivo	Z [m]	Ton 58			Ton 59			Ton 60		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.95	1.53	-0.13	0.05	0.38	-0.53	9.40	7.15	-2.28
	7.60	-0.42	0.25	0.02	-1.38	-0.09	-0.07	2.42	11.12	0.30
	6.75	0.62	2.36	0.07	3.72	1.02	-0.01	-5.06	8.79	1.37
	0.00	-0.09	2.65	-0.13	-1.03	0.34	-0.02	3.60	12.31	-0.57
	-1.35	-0.22	0.05	0.21	0.16	-0.02	0.04	-0.30	0.39	1.43
	Σ=	-1.07	6.84	0.04	1.52	1.62	-0.59	10.05	39.76	0.24

Nivo	Z [m]	Ton 61			Ton 62			Ton 63		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	3.38	2.34	-0.11	-3.73	0.51	-0.86	-1.68	-0.17	0.42
	7.60	-0.94	3.29	0.32	3.55	-4.07	-0.11	-0.20	-0.06	0.17
	6.75	-2.69	3.69	0.09	-2.98	-0.69	-0.30	4.06	-1.25	0.14
	0.00	2.02	3.62	-0.35	17.76	-1.21	-0.01	0.84	0.85	0.01
	-1.35	-0.21	0.19	0.59	0.23	-0.06	-0.14	0.28	0.09	0.00
	Σ=	1.56	13.13	0.55	14.84	-5.52	-1.42	3.29	-0.55	0.74

Nivo	Z [m]	Ton 64			Ton 65			Ton 66		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-1.43	-0.72	-0.09	-0.24	-0.09	-0.01	-3.50	-0.48	-0.71
	7.60	0.15	0.84	-0.15	0.04	-0.32	-0.02	0.24	5.39	-0.53
	6.75	2.05	2.03	-0.13	0.32	1.03	-0.01	7.46	-4.11	-0.10
	0.00	2.40	-2.52	-0.03	0.02	-0.82	-0.03	-0.79	9.90	-0.34
	-1.35	0.36	-0.20	0.04	0.03	-0.12	0.03	0.57	0.89	0.43
	Σ=	3.53	-0.57	-0.37	0.17	-0.31	-0.04	3.99	11.59	-1.26

Nivo	Z [m]	Ton 67			Ton 68			Ton 69		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.05	-0.00	0.02	-0.81	0.61	-0.46	0.02	0.20	-0.07
	7.60	0.01	0.12	0.00	-0.28	-0.16	-0.09	-0.06	-0.08	-0.02
	6.75	-0.17	-0.18	-0.01	2.37	1.15	0.10	0.18	0.24	0.01
	0.00	0.12	0.04	0.00	-0.12	-0.57	-0.01	0.04	-0.53	0.00
	-1.35	0.01	0.01	-0.01	0.02	-0.10	0.06	-0.03	-0.05	0.01
	Σ=	0.01	-0.01	0.01	1.18	0.93	-0.40	0.15	-0.22	-0.07

Nivo	Z [m]	Ton 70			Ton 71			Ton 72		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.14	0.05	-0.00	-1.02	2.49	-0.30	-0.14	0.18	-0.04
	7.60	-0.03	0.07	0.01	0.61	1.46	-0.20	0.02	0.06	-0.02
	6.75	0.14	-0.22	0.01	1.26	-5.50	-0.01	0.28	-0.29	0.01
	0.00	0.01	0.19	0.00	1.83	4.46	-0.17	-0.04	-0.16	-0.02
	-1.35	-0.01	0.02	-0.00	0.02	0.30	0.19	0.03	0.04	0.02
	Σ=	-0.02	0.10	0.02	2.70	3.21	-0.49	0.15	-0.17	-0.04

Nivo	Z [m]	Ton 73			Ton 74			Ton 75		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-1.83	2.83	2.49	-0.55	-1.96	0.59	-0.59	-1.04	0.44
	7.60	4.13	3.45	0.09	0.64	-0.15	0.12	0.08	0.55	0.12
	6.75	0.74	3.47	0.15	0.18	2.54	0.00	1.06	2.28	0.10
	0.00	4.93	2.97	-1.81	1.12	1.54	-0.14	0.89	0.52	-0.09
	-1.35	0.89	-0.08	2.07	0.14	0.01	0.13	0.15	-0.16	0.13
	Σ=	8.85	12.65	3.00	1.53	1.97	0.71	1.59	2.15	0.70

Nivo	Z [m]	Ton 76			Ton 77			Ton 78		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-1.21	-0.73	-0.88	-0.82	-0.72	-0.44	0.05	0.08	0.02
	7.60	0.53	1.85	-0.07	0.51	-0.33	-0.09	0.08	0.29	-0.00
	6.75	1.53	-4.14	-0.00	0.83	1.76	-0.01	-0.18	-0.84	-0.01
	0.00	2.10	6.14	0.07	1.18	-2.23	0.05	-0.08	1.21	-0.01
	-1.35	-0.10	0.55	-0.10	-0.06	-0.11	-0.08	-0.02	0.04	0.01
	∑=	2.85	3.68	-0.98	1.63	-1.63	-0.58	-0.14	0.78	0.01

Nivo	Z [m]	Ton 79			Ton 80			Ton 81		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-1.14	-0.99	-1.95	0.03	-0.85	0.03	-1.67	-1.44	-0.77
	7.60	0.66	-0.35	-0.54	-0.02	0.31	-0.07	1.21	0.39	-0.31
	6.75	1.61	3.40	-0.13	-0.01	-0.07	-0.01	2.02	4.83	0.11
	0.00	1.79	0.74	0.08	0.16	0.60	0.09	2.85	-2.75	-0.24
	-1.35	0.09	-0.21	-0.13	0.05	0.04	-0.11	0.18	0.06	0.29
	∑=	3.00	2.59	-2.68	0.21	0.04	-0.07	4.59	1.09	-0.92

Nivo	Z [m]	Ton 82			Ton 83			Ton 84		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-5.42	0.92	-3.11	0.02	0.43	0.08	-7.02	0.43	-5.82
	7.60	2.49	-1.38	-0.84	-0.14	-0.07	0.07	5.68	1.20	-1.45
	6.75	5.06	0.11	0.06	0.21	-1.46	0.02	4.22	-0.20	0.52
	0.00	5.24	-0.95	0.01	0.21	1.36	0.07	11.38	1.49	0.12
	-1.35	0.52	0.11	-0.05	0.04	-0.03	-0.08	-0.00	-0.15	-0.16
	∑=	7.90	-1.19	-3.93	0.34	0.24	0.15	14.25	2.77	-6.78

Nivo	Z [m]	Ton 85			Ton 86			Ton 87		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-2.87	0.26	-2.01	-2.00	0.62	-2.31	-1.72	-0.17	-1.43
	7.60	2.40	-0.77	-0.52	1.44	2.25	-0.84	1.25	0.61	-0.00
	6.75	2.24	1.21	0.27	2.31	-3.20	-0.07	2.49	-0.39	0.33
	0.00	3.06	-0.47	0.05	2.57	5.08	-0.18	0.11	1.98	-0.02
	-1.35	-0.58	-0.08	-0.07	0.68	0.37	0.22	-0.16	0.01	0.00
	∑=	4.26	0.16	-2.28	5.00	5.12	-3.17	1.97	2.04	-1.12

Nivo	Z [m]	Ton 88			Ton 89			Ton 90		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.31	-0.33	-0.16	-0.17	0.12	-0.26	-0.14	-1.22	-0.32
	7.60	0.24	0.02	0.03	0.02	-0.02	-0.06	0.14	0.66	-0.68
	6.75	0.39	0.76	0.09	0.24	-0.21	0.03	-0.16	-0.23	-0.23
	0.00	0.11	-0.82	-0.02	0.03	0.02	0.01	2.46	1.11	0.02
	-1.35	-0.03	-0.02	0.02	0.03	-0.02	-0.01	0.46	0.44	-0.08
	∑=	0.40	-0.38	-0.04	0.13	-0.11	-0.30	2.76	0.76	-1.29

Nivo	Z [m]	Ton 91			Ton 92			Ton 93		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.81	-0.43	0.09	0.04	-0.19	-0.08	0.15	-0.08	0.09
	7.60	0.60	0.18	-0.49	0.05	0.09	0.14	-0.14	-0.02	0.06
	6.75	0.94	-1.44	-0.08	0.00	0.11	0.07	-0.13	0.03	0.03
	0.00	-0.23	5.12	0.04	-0.12	0.63	-0.02	0.11	0.21	0.01
	-1.35	0.68	0.04	-0.01	-0.15	0.05	0.03	-0.03	0.04	-0.01
	∑=	1.18	3.48	-0.46	-0.17	0.70	0.14	-0.03	0.17	0.18

Nivo	Z [m]	Ton 94			Ton 95			Ton 96		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.07	0.08	-0.05	0.23	0.10	-0.37	-0.82	1.03	-0.58
	7.60	-0.69	-0.02	-0.06	3.78	-1.16	-0.54	13.24	0.28	0.08
	6.75	0.92	-0.03	-0.01	-7.54	0.34	-0.18	-23.05	-0.90	0.06
	0.00	-0.26	-0.06	-0.01	15.89	1.62	0.02	40.49	-2.95	-0.05
	-1.35	0.16	-0.08	0.01	1.07	-0.09	-0.03	0.64	-0.60	0.02
	∑=	0.20	-0.11	-0.12	13.44	0.81	-1.11	30.50	-3.14	-0.48

Nivo	Z [m]	Ton 97			Ton 98			Ton 99		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.73	-0.16	-0.04	-4.10	-0.03	-3.55	-7.67	-0.77	-4.92
	7.60	1.03	-0.51	-0.18	2.17	-0.89	-2.53	2.18	1.98	-5.22
	6.75	-0.24	0.20	-0.06	5.38	0.60	-0.84	9.23	-2.36	-1.59
	0.00	0.71	1.55	0.03	-0.02	-3.34	0.17	12.39	2.46	0.34
	-1.35	0.13	0.13	-0.04	1.89	0.17	-0.34	4.16	-0.12	-0.66
	∑=	0.90	1.21	-0.28	5.32	-3.48	-7.09	20.28	1.19	-12.04

Nivo	Z [m]	Ton 100			Ton 101			Ton 102		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.01	0.05	0.17	-0.15	-1.01	0.64	-0.27	0.11	0.29
	7.60	-0.11	-0.06	0.01	-0.12	0.45	0.06	-0.03	-0.07	0.04
	6.75	-0.10	0.31	0.01	-0.00	0.73	0.01	0.29	-0.18	-0.01
	0.00	0.13	-0.17	-0.01	1.11	0.84	-0.01	-0.02	1.83	-0.05
	-1.35	0.22	-0.10	0.02	0.61	0.85	0.02	0.20	0.27	0.05
	∑=	0.13	0.03	0.20	1.44	1.85	0.72	0.17	1.95	0.32

Nivo	Z [m]	Ton 103			Ton 104			Ton 105		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.34	-0.08	-0.00	-0.85	-0.60	-1.11	-1.38	-0.15	-0.84
	7.60	-0.31	0.35	-0.04	-1.51	-0.36	0.69	0.23	1.26	0.42
	6.75	-0.19	-0.54	-0.03	3.06	1.45	-0.34	1.94	-1.25	0.05
	0.00	0.75	-0.06	-0.00	3.53	1.50	-0.55	1.69	-0.72	-0.30
	-1.35	-0.15	0.18	-0.00	1.59	-0.23	0.40	0.74	0.20	0.23
	∑=	0.45	-0.15	-0.08	5.82	1.75	-0.90	3.21	-0.66	-0.44

Nivo	Z [m]	Ton 106			Ton 107			Ton 108		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.05	-0.24	-0.01	0.16	0.70	-1.94	-6.49	-1.78	-4.31
	7.60	0.01	0.03	-0.03	-0.15	-0.87	-0.24	0.34	-1.63	-1.20
	6.75	-0.07	0.17	-0.02	0.33	0.19	-0.01	11.60	2.91	-0.70
	0.00	-0.14	0.55	0.03	0.72	-1.30	-0.01	6.16	10.01	-0.67
	-1.35	0.02	0.08	-0.02	0.02	-0.31	-0.01	4.28	0.46	0.37
	∑=	-0.14	0.58	-0.06	1.09	-1.59	-2.21	15.90	9.97	-6.52

Nivo	Z [m]	Ton 109			Ton 110			Ton 111		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.09	0.43	1.67	-0.29	1.46	-3.18	0.06	-2.77	-3.47
	7.60	0.19	-1.12	0.06	0.42	-0.06	-0.51	-0.46	1.00	0.02
	6.75	-2.40	0.34	-0.15	0.35	-1.70	0.04	-0.08	2.30	0.30
	0.00	5.40	1.12	-0.06	1.51	-2.75	-0.07	1.51	2.09	-0.02
	-1.35	0.03	0.01	-0.01	-0.03	0.02	0.09	1.62	0.40	0.05
	∑=	3.31	0.79	1.50	1.96	-3.03	-3.63	2.66	3.01	-3.12

Nivo	Z [m]	Ton 112			Ton 113			Ton 114		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.43	0.95	-0.16	-0.03	0.05	0.00	0.00	-0.00	0.00
	7.60	-0.08	-0.82	0.04	0.01	-0.00	-0.01	-0.00	0.00	0.00
	6.75	0.83	-0.56	0.01	0.04	-0.06	0.01	-0.00	0.00	-0.00
	0.00	0.69	-0.64	0.03	0.02	-0.16	-0.00	0.00	0.00	0.00
	-1.35	-0.00	0.12	-0.01	0.03	-0.01	0.00	-0.00	-0.00	-0.00
	∑=	1.01	-0.95	-0.10	0.07	-0.18	0.00	-0.00	0.00	0.00

Nivo	Z [m]	Ton 115			Ton 116			Ton 117		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.86	0.76	3.40	-0.39	-1.69	-0.47	-0.52	1.76	-1.49
	7.60	0.43	-0.28	0.36	0.62	2.44	-0.63	0.25	-0.75	-0.57
	6.75	0.86	-0.34	0.01	0.33	-1.43	0.31	0.81	-0.48	0.21
	0.00	1.53	-2.15	-0.03	0.01	5.53	-0.14	1.24	-5.41	-0.11
	-1.35	-0.58	-0.26	0.02	1.52	-0.33	0.15	1.25	-0.31	0.12
	∑=	1.39	-2.26	3.76	2.10	4.52	-0.79	3.04	-5.20	-1.85

Nivo	Z [m]	Ton 118			Ton 119			Ton 120		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-2.34	2.46	0.37	0.17	-0.42	0.19	0.08	-0.38	0.39
	7.60	1.05	-2.77	-0.15	0.01	0.40	-0.05	0.23	0.05	0.02
	6.75	2.43	1.09	0.44	-0.21	-0.02	0.07	-0.20	0.26	0.17
	0.00	3.03	-5.82	-0.04	-0.20	1.04	-0.01	-0.03	0.58	0.01
	-1.35	2.80	-0.24	0.04	0.02	0.09	0.02	-0.20	0.43	-0.01
	∑=	6.97	-5.30	0.66	-0.21	1.08	0.22	-0.13	0.94	0.58

Nivo	Z [m]	Ton 121			Ton 122			Ton 123		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.09	-0.23	-0.25	-9.29	0.79	5.05	-29.19	-6.04	41.38
	7.60	-0.17	0.17	-0.11	1.41	2.58	1.78	6.12	5.54	8.69
	6.75	0.02	-0.14	-0.19	11.22	-5.10	0.58	29.10	-4.53	4.49
	0.00	-0.13	1.02	0.01	22.05	-5.35	-0.09	58.28	30.70	-0.01
	-1.35	-0.02	0.35	-0.03	2.35	-0.01	0.11	27.57	-0.67	1.04
	∑=	-0.22	1.17	-0.58	27.75	-7.09	7.43	91.88	25.00	55.58

Nivo	Z [m]	Ton 124			Ton 125			Ton 126		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-2.61	0.70	-0.34	-0.37	-1.81	-1.87	-2.81	-0.83	-9.94
	7.60	0.09	0.08	0.61	-0.71	0.60	0.34	-5.73	-1.32	-0.27
	6.75	3.09	-2.10	-0.24	0.71	1.69	0.01	7.08	1.67	-2.08
	0.00	3.30	3.70	0.07	1.62	4.52	0.07	14.68	1.61	0.29
	-1.35	1.58	0.29	0.03	1.32	-1.27	-0.10	4.54	0.50	-0.70
	∑=	5.45	2.67	0.13	2.57	3.73	-1.55	17.76	1.63	-12.69

Nivo	Z [m]	Ton 127			Ton 128			Ton 129		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-1.78	1.69	-5.61	-10.86	-4.64	19.99	-3.32	1.14	4.53
	7.60	-0.33	0.35	-0.05	-2.66	-5.25	3.22	-0.10	-0.72	0.75
	6.75	1.79	-2.77	0.05	14.17	10.75	-1.60	3.83	1.29	-0.12
	0.00	3.19	-2.85	-0.07	34.97	11.56	0.40	12.20	-4.23	-0.36
	-1.35	2.15	-0.12	0.07	7.77	3.64	-0.55	1.03	4.49	0.36
	∑=	5.03	-3.70	-5.61	43.40	16.05	21.45	13.63	1.97	5.17

Nivo	Z [m]	Ton 130			Ton 131			Ton 132		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.03	-0.14	-0.61	-5.38	-4.51	9.49	-0.08	0.07	-0.06
	7.60	0.17	-0.60	0.10	-2.11	1.11	5.55	0.04	-0.10	0.07
	6.75	-0.12	0.76	0.08	5.08	5.41	1.74	0.05	0.06	0.06
	0.00	0.15	2.24	0.02	2.03	12.79	-0.25	-0.08	-0.02	-0.01
	-1.35	-0.77	0.27	-0.02	17.95	2.05	0.64	0.05	0.07	0.03
	∑=	-0.54	2.54	-0.43	17.56	16.85	17.17	-0.01	0.08	0.08

Nivo	Z [m]	Ton 133			Ton 134			Ton 135		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-4.46	-2.62	2.09	-0.25	-0.37	0.97	-5.11	-1.64	10.52
	7.60	-1.13	0.51	-0.52	0.09	0.28	0.80	-0.92	0.34	2.55
	6.75	5.29	3.13	-0.65	0.24	0.14	0.35	5.33	4.25	0.79
	0.00	19.52	2.47	-0.10	0.44	0.90	0.00	14.53	-2.80	-0.53
	-1.35	5.80	-3.00	0.08	-0.27	-0.38	-0.00	7.95	0.60	0.79
	∑=	25.02	0.49	0.90	0.26	0.57	2.12	21.78	0.74	14.12

Nivo	Z [m]	Ton 136			Ton 137			Ton 138		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.48	-1.19	-0.18	-1.60	-0.26	-1.76	-8.20	4.99	4.38
	7.60	-0.42	-1.82	0.50	0.17	1.32	-0.17	-3.39	6.03	2.07
	6.75	0.35	3.24	0.78	2.71	-2.14	0.41	9.64	-5.94	0.35
	0.00	-1.75	3.03	0.32	5.39	-0.41	0.27	38.10	-23.98	-1.26
	-1.35	4.96	1.61	-0.26	-2.54	0.10	-0.20	9.77	-1.35	1.88
	∑=	2.66	4.87	1.16	4.12	-1.40	-1.45	45.93	-20.24	7.42

Nivo	Z [m]	Ton 139			Ton 140			Ton 141		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.02	0.01	0.15	0.08	0.90	-3.33	-1.62	1.02	-6.85
	7.60	0.01	-0.05	0.02	-0.80	-0.27	0.04	0.18	1.14	-0.88
	6.75	0.01	0.01	0.00	-0.27	-1.43	-0.11	0.49	-2.25	-0.95
	0.00	0.04	0.02	-0.00	1.45	0.80	-0.20	6.68	-4.47	-0.08
	-1.35	-0.05	0.02	0.01	1.15	0.87	0.18	1.41	-1.47	0.04
	∑=	-0.00	0.02	0.17	1.61	0.88	-3.42	7.14	-6.04	-8.72

Nivo	Z [m]	Ton 142			Ton 143			Ton 144		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-9.57	-5.99	-8.03	-3.67	0.29	-10.74	0.18	-0.31	4.26
	7.60	0.64	-2.27	-3.39	-0.12	-0.69	-1.23	-0.34	-0.40	1.10
	6.75	6.13	6.24	-0.03	2.22	0.63	-0.94	-1.50	1.78	0.47
	0.00	60.05	11.02	1.26	11.50	-4.26	-0.02	6.04	-5.11	-0.02
	-1.35	-2.28	-2.05	-1.35	1.46	0.11	0.03	3.12	-0.02	0.06
	∑=	54.97	6.95	-11.54	11.39	-3.91	-12.90	7.50	-4.05	5.88

Nivo	Z [m]	Ton 145			Ton 146			Ton 147		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-8.90	2.26	-8.87	-0.21	-0.34	-0.91	-1.67	-1.34	1.96
	7.60	-7.58	-2.51	1.70	0.19	0.29	-0.16	-0.31	1.70	1.23
	6.75	18.41	3.79	0.24	0.21	0.21	0.06	1.25	0.77	-0.03
	0.00	33.18	-20.35	-0.24	0.20	0.19	0.00	3.19	-2.80	-0.13
	-1.35	9.33	1.08	0.43	-0.36	0.12	0.00	2.16	-1.32	0.12
	∑=	44.43	-15.72	-6.74	0.02	0.47	-1.00	4.61	-2.99	3.16

Nivo	Z [m]	Ton 148			Ton 149			Ton 150		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.14	2.29	4.83	-1.94	4.74	0.85	0.63	-1.38	0.06
	7.60	-2.80	1.41	2.58	0.04	-0.32	2.67	2.95	-4.03	2.20
	6.75	1.53	-3.38	-0.19	1.78	-3.71	1.70	-9.94	1.13	1.15
	0.00	6.88	-9.66	-0.32	15.26	-10.44	-0.86	24.10	24.06	1.17
	-1.35	4.73	-1.31	0.21	2.35	-0.39	1.21	5.69	8.94	-1.51
	∑=	10.49	-10.64	7.11	17.49	-10.13	5.58	23.44	28.73	3.07

Nivo	Z [m]	Ton 151			Ton 152			Ton 153		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-3.76	-11.77	-7.94	-1.27	-0.00	2.69	-0.17	-1.44	1.54
	7.60	-7.48	-1.13	-6.42	0.54	1.21	1.03	0.14	2.43	-0.12
	6.75	10.62	-2.85	-3.28	0.12	-0.23	0.29	-0.25	-0.80	-0.95
	0.00	30.13	89.44	3.41	3.74	-2.40	-0.50	4.65	-0.69	-0.04
	-1.35	14.87	5.49	-4.36	0.12	-1.38	0.69	-1.41	-1.11	-0.09
	∑=	44.38	79.17	-18.57	3.25	-2.80	4.19	2.96	-1.62	0.34

Nivo	Z [m]	Ton 154			Ton 155			Ton 156		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.97	-2.35	0.30	-0.08	0.20	0.18	-0.05	-0.39	-0.08
	7.60	2.10	-2.63	-1.42	0.01	0.15	0.16	0.24	-0.04	0.09
	6.75	-3.27	5.42	-0.29	0.03	-0.36	0.15	0.13	-0.11	-0.03
	0.00	12.97	6.61	0.74	0.32	-0.61	-0.05	0.84	1.76	0.14
	-1.35	-2.93	0.53	-1.01	0.04	-0.32	0.08	-1.12	0.69	-0.26
	∑=	7.90	7.59	-1.67	0.31	-0.95	0.51	0.04	1.91	-0.14

Nivo	Z [m]	Ton 157			Ton 158			Ton 159		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.02	1.40	-0.79	1.07	-0.88	-17.36	-3.78	-0.83	7.53
	7.60	-0.38	0.37	-0.27	0.54	0.05	-5.42	-2.85	-7.77	2.88
	6.75	-0.76	-1.39	0.12	-6.31	3.03	-2.07	0.02	3.89	0.32
	0.00	1.88	-6.25	-0.24	34.76	-4.32	-0.31	28.97	28.73	1.80
	-1.35	2.29	-0.75	0.42	0.76	0.90	0.10	8.72	4.16	-2.09
	∑=	3.05	-6.62	-0.76	30.82	-1.22	-25.07	31.08	28.18	10.43

Nivo	Z [m]	Ton 160			Ton 161			Ton 162		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-1.29	-0.17	-2.01	-0.00	0.00	-0.18	-0.00	-0.07	-0.46
	7.60	0.06	-0.26	-0.00	-0.12	-0.10	-0.00	-0.13	-0.16	-0.03
	6.75	0.68	-0.28	0.05	0.18	0.14	-0.02	0.04	0.14	-0.09
	0.00	0.92	-0.14	0.04	-0.38	-0.09	0.02	-0.40	0.74	0.09
	-1.35	5.77	0.62	0.08	0.30	0.15	-0.03	0.54	-0.35	-0.14
	∑=	6.13	-0.23	-1.85	-0.01	0.09	-0.21	0.05	0.30	-0.64

Nivo	Z [m]	Ton 163			Ton 164			Ton 165		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-1.65	1.14	1.60	-0.11	0.72	4.12	0.12	-0.11	-0.20
	7.60	0.26	2.69	-1.29	0.10	-1.78	0.70	-0.09	0.45	-0.11
	6.75	0.08	-2.18	-0.58	0.20	-0.02	0.11	-0.11	0.17	-0.08
	0.00	4.13	-9.56	-1.11	4.22	7.70	0.06	0.13	-1.83	-0.04
	-1.35	11.83	-3.29	1.78	-0.54	-0.34	-0.09	0.49	-0.14	0.03
	∑=	14.65	-11.19	0.40	3.87	6.27	4.91	0.54	-1.46	-0.39

Nivo	Z [m]	Ton 166			Ton 167			Ton 168		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.11	-0.26	0.27	0.06	-0.01	0.10	-1.67	4.16	-0.59
	7.60	0.04	-0.12	0.01	0.05	0.21	0.03	0.31	-3.50	-0.61
	6.75	-0.00	0.90	-0.04	-0.13	-0.04	-0.01	1.34	0.81	-0.05
	0.00	0.69	-1.94	0.11	0.53	-0.80	-0.06	7.57	0.74	-0.33
	-1.35	-0.33	1.42	-0.15	-0.20	-0.23	0.06	2.50	17.81	0.50
	Σ=	0.30	-0.01	0.20	0.30	-0.87	0.13	10.07	20.01	-1.07

Nivo	Z [m]	Ton 169			Ton 170			Ton 171		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.71	-1.77	-3.01	-0.83	-0.51	0.34	1.40	2.45	3.83
	7.60	-0.96	-2.99	0.47	-0.85	0.79	0.02	-1.18	-2.40	0.77
	6.75	0.02	1.46	0.83	0.86	-0.96	-0.39	-4.05	-1.51	-0.11
	0.00	2.33	14.24	1.08	6.90	-1.81	0.26	7.62	10.32	-0.23
	-1.35	2.19	-3.39	-1.34	0.70	-3.88	-0.38	3.40	11.37	0.12
	Σ=	4.29	7.55	-1.96	6.78	-6.38	-0.15	7.19	20.22	4.37

Nivo	Z [m]	Ton 172			Ton 173			Ton 174		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.09	-0.33	0.15	-0.14	0.03	-0.40	0.01	-0.68	2.95
	7.60	0.07	-0.05	-0.23	0.07	-0.20	-0.03	-0.99	1.65	-0.09
	6.75	-0.09	0.33	-0.15	0.36	0.39	0.05	-0.30	0.84	-0.55
	0.00	0.60	0.99	0.03	-1.00	4.07	0.01	7.80	-9.97	-0.43
	-1.35	0.33	-2.32	-0.04	-0.52	1.81	-0.01	5.36	1.74	0.49
	Σ=	0.82	-1.37	-0.24	-1.23	6.10	-0.37	11.88	-6.42	2.37

Nivo	Z [m]	Ton 175			Ton 176			Ton 177		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.02	-0.00	0.02	0.05	-0.11	0.74	-0.03	-0.11	0.24
	7.60	-0.01	-0.01	-0.01	-0.36	1.02	-0.15	0.04	0.01	-0.04
	6.75	-0.05	0.01	0.00	0.70	0.20	-0.13	-0.00	0.10	-0.02
	0.00	0.01	0.06	0.00	3.52	-4.26	0.04	0.37	1.31	0.01
	-1.35	-0.00	0.05	-0.01	0.38	1.24	0.06	-0.25	-0.88	-0.01
	Σ=	-0.03	0.10	0.01	4.29	-1.91	0.56	0.14	0.42	0.17

Nivo	Z [m]	Ton 178			Ton 179			Ton 180		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.48	0.63	2.50	-0.01	0.03	-0.00	0.88	-0.01	3.23
	7.60	-1.26	1.35	1.81	0.00	-0.03	0.02	-1.32	-2.25	0.61
	6.75	1.42	-1.02	1.67	0.01	-0.04	0.01	-0.46	2.10	0.86
	0.00	10.31	-2.01	0.43	0.04	0.08	-0.00	10.96	6.65	0.46
	-1.35	-2.37	47.24	-0.18	-0.02	-0.10	0.00	1.17	-2.97	-0.57
	Σ=	8.57	46.20	6.22	0.02	-0.06	0.03	11.22	3.52	4.60

Razporeditev potresnih sil po višini objekta - Py

Nivo	Z [m]	Ton 1			Ton 2			Ton 3		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.25	47.59	-0.02	0.71	594.50	-0.04	-1.85	0.64	-0.00
	7.60	0.12	-1.60	-0.00	0.00	195.97	0.01	-0.75	-0.83	-0.00
	6.75	0.50	-1.79	-0.00	-0.59	135.51	0.01	-0.97	-0.53	-0.00
	0.00	0.06	-0.36	-0.00	-0.06	23.29	-0.07	-0.15	-0.02	-0.00
	-1.35	0.00	-0.01	0.00	-0.00	0.07	0.10	0.00	0.00	0.00
	Σ=	0.43	43.83	-0.02	0.06	949.34	0.01	-3.72	-0.74	-0.00

Nivo	Z [m]	Ton 4			Ton 5			Ton 6		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	1.17	0.60	0.00	-11.12	-2.43	0.04	-2.09	9.72	-0.10
	7.60	-20.21	-0.48	0.01	-25.14	0.02	0.02	-3.55	5.44	-0.02
	6.75	-12.93	-2.77	-0.00	-19.62	13.68	0.03	-0.32	3.16	0.01
	0.00	-2.15	-0.88	0.00	-3.25	3.54	0.02	-0.18	0.68	0.01
	-1.35	-0.01	-0.00	-0.00	0.02	0.01	-0.01	-0.00	0.00	-0.01
	Σ=	-34.12	-3.53	0.02	-59.12	14.83	0.09	-6.14	19.01	-0.12

Nivo	Z [m]	Ton 7			Ton 8			Ton 9		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-70.00	-7.28	-0.04	-12.74	139.42	-0.12	-2.30	-47.94	0.04
	7.60	-47.17	2.27	-0.00	-6.07	39.51	0.05	-0.36	24.66	0.03
	6.75	-50.80	-2.58	0.04	-11.43	34.35	0.06	-1.96	44.58	-0.00
	0.00	-8.83	-0.99	-0.01	-1.70	6.87	-0.31	-0.24	15.27	0.01
	-1.35	-0.17	-0.02	0.03	-0.04	0.01	0.43	-0.02	0.19	-0.01
	Σ=	-176.97	-8.60	0.02	-31.99	220.17	0.12	-4.87	36.77	0.06

Nivo	Z [m]	Ton 10			Ton 11			Ton 12		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.62	-23.43	-0.06	-0.79	-0.75	0.06	9.40	-24.91	-0.04
	7.60	-0.80	36.09	0.02	0.09	5.91	0.00	6.34	21.47	-0.01
	6.75	2.90	58.48	0.09	-0.28	14.94	0.02	8.16	38.65	-0.06
	0.00	0.39	19.17	-0.02	-0.20	3.53	-0.02	1.77	11.11	-0.02
	-1.35	-0.02	0.19	0.06	0.06	0.03	0.05	0.06	0.00	0.01
	Σ=	3.10	90.51	0.09	-1.11	23.66	0.10	25.74	46.33	-0.12

Nivo	Z [m]	Ton 13			Ton 14			Ton 15		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-9.08	-27.44	0.06	1.71	0.58	-0.01	-0.66	-0.05	-0.00
	7.60	-5.93	22.58	0.00	-2.01	-7.90	-0.01	-0.38	-0.00	0.00
	6.75	-6.88	41.84	0.05	-6.03	15.26	-0.00	-0.44	-0.22	0.00
	0.00	-1.43	11.99	0.00	-1.76	10.80	-0.01	-0.10	-0.10	-0.00
	-1.35	-0.08	-0.01	0.01	0.05	0.17	0.02	-0.01	-0.00	0.00
	Σ=	-23.40	48.97	0.12	-8.05	18.92	-0.02	-1.58	-0.37	-0.00

Nivo	Z [m]	Ton 16			Ton 17			Ton 18		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	2.59	1.39	0.01	-4.36	6.95	-0.08	3.52	5.43	-0.05
	7.60	-0.27	2.72	0.02	0.50	-0.78	-0.01	-2.73	2.37	-0.01
	6.75	-2.21	-0.36	0.02	2.73	3.20	0.00	-0.22	1.95	-0.07
	0.00	-0.68	0.36	-0.01	0.88	0.85	-0.05	0.49	-0.80	-0.09
	-1.35	0.03	0.00	0.02	-0.04	0.01	0.07	-0.05	-0.04	0.10
	Σ=	-0.55	4.11	0.06	-0.30	10.22	-0.07	1.01	8.92	-0.13

Nivo	Z [m]	Ton 19			Ton 20			Ton 21		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	5.59	2.82	-0.45	9.10	-7.77	0.02	-2.86	-15.95	-0.48
	7.60	2.90	7.28	-0.17	-5.53	2.14	0.06	4.58	29.78	-0.03
	6.75	-7.50	15.18	-0.20	-6.68	14.02	0.02	21.05	90.96	-0.25
	0.00	-2.81	0.87	-0.15	-0.67	8.29	-0.05	6.69	27.47	-0.58
	-1.35	-0.14	0.05	0.19	-0.03	0.07	0.07	-0.58	0.22	0.79
	Σ=	-1.95	26.19	-0.77	-3.82	16.75	0.12	28.88	132.48	-0.56

Nivo	Z [m]	Ton 22			Ton 23			Ton 24		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	16.49	1.68	0.19	-1.75	3.25	-0.10	-2.41	1.94	0.15
	7.60	-3.18	0.72	0.06	-0.23	0.52	-0.02	-0.51	-0.53	0.06
	6.75	-32.41	-0.79	0.02	5.56	1.01	-0.00	3.01	0.24	0.07
	0.00	-11.33	-1.82	-0.01	2.47	0.47	-0.06	1.02	0.59	-0.00
	-1.35	-0.07	-0.03	0.03	-0.02	0.01	0.08	0.10	0.02	0.01
	Σ=	-30.50	-0.24	0.29	6.04	5.27	-0.10	1.20	2.26	0.29

Nivo	Z [m]	Ton 25			Ton 26			Ton 27		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-22.10	-0.58	0.97	-1.31	0.04	0.02	9.05	15.89	-0.53
	7.60	-0.97	9.87	0.26	4.81	-0.15	0.01	3.01	4.54	-0.20
	6.75	-15.40	35.40	0.75	-7.26	-0.32	0.06	-2.36	19.70	-0.18
	0.00	-7.89	9.94	0.07	-5.03	0.15	0.01	-1.26	13.13	-0.27
	-1.35	1.37	0.03	0.08	-0.05	-0.00	0.00	0.07	0.21	0.33
	Σ=	-44.99	54.66	2.12	-8.84	-0.29	0.11	8.51	53.46	-0.85

Nivo	Z [m]	Ton 28			Ton 29			Ton 30		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	2.61	-0.30	0.02	-50.16	2.76	1.12	-67.35	0.58	0.88
	7.60	-0.43	-5.05	0.02	-18.54	3.79	0.44	-24.83	-11.54	0.44
	6.75	-3.16	3.42	-0.03	-22.21	-8.47	0.86	-26.47	18.55	0.85
	0.00	-1.02	5.42	-0.00	-9.53	-2.99	0.12	-11.64	11.52	0.01
	-1.35	-0.13	0.14	-0.01	-0.24	0.03	0.01	-0.99	0.01	0.16
	Σ=	-2.13	3.63	-0.01	-100.69	-4.88	2.54	-131.28	19.13	2.33

Nivo	Z [m]	Ton 31			Ton 32			Ton 33		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.65	2.15	-0.00	-51.04	-5.17	-0.56	12.59	4.25	0.12
	7.60	0.58	-4.64	-0.01	-26.74	5.04	0.16	8.46	1.84	-0.04
	6.75	0.48	-0.95	-0.01	-32.53	3.92	-0.28	10.70	6.14	0.08
	0.00	0.07	6.82	0.03	-13.25	-3.36	-0.41	4.22	2.62	-0.00
	-1.35	0.08	0.27	-0.04	-3.61	-0.07	0.47	1.35	0.02	0.02
	Σ=	1.85	3.65	-0.03	-127.17	0.36	-0.63	37.31	14.87	0.17

Nivo	Z [m]	Ton 34			Ton 35			Ton 36		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-17.17	11.48	-0.36	11.54	2.01	0.09	-13.18	4.78	-0.81
	7.60	-11.92	-9.60	0.11	3.29	1.37	0.13	-7.28	2.41	-0.26
	6.75	-12.24	21.33	-0.03	-1.21	3.94	0.12	-7.43	13.35	-0.24
	0.00	-4.72	35.01	-0.68	-0.19	3.66	0.04	-2.98	6.27	-0.51
	-1.35	-2.29	0.95	0.98	0.38	0.03	0.02	-2.00	-0.13	0.63
	Σ=	-48.34	59.16	0.02	13.80	11.02	0.40	-32.86	26.68	-1.19

Nivo	Z [m]	Ton 37			Ton 38			Ton 39		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.51	-0.76	-0.05	-6.88	6.41	-0.31	-2.67	1.23	0.10
	7.60	0.29	0.49	0.03	-0.94	-9.52	0.16	-0.16	2.01	-0.18
	6.75	-0.08	0.90	0.04	-1.27	6.59	0.19	-1.55	1.96	-0.08
	0.00	0.07	2.33	-0.03	-0.79	27.68	-0.14	-0.93	7.26	-0.14
	-1.35	-0.06	-0.02	0.04	-0.12	0.72	0.23	0.04	0.16	0.20
	Σ=	-0.29	2.94	0.02	-10.01	31.87	0.12	-5.28	12.61	-0.10

Nivo	Z [m]	Ton 40			Ton 41			Ton 42		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-5.72	4.45	-0.85	-10.06	17.86	-1.34	-5.46	19.03	-0.99
	7.60	-3.42	21.48	-0.02	-10.46	6.86	-0.12	-0.35	7.53	-0.04
	6.75	-3.85	3.33	-0.01	-10.96	36.07	-0.11	1.97	12.02	-0.13
	0.00	-2.07	-10.44	-0.67	-4.08	23.33	-1.29	0.79	6.87	-1.08
	-1.35	-1.09	-0.00	0.89	-2.76	-0.00	1.73	1.05	0.12	1.35
	Σ=	-16.15	18.83	-0.66	-38.32	84.11	-1.13	-2.00	45.57	-0.89

Nivo	Z [m]	Ton 43			Ton 44			Ton 45		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-7.24	37.34	-2.16	-9.52	6.72	-0.20	-2.04	46.23	-3.33
	7.60	0.77	15.52	-0.12	-2.74	14.15	0.12	-7.06	46.56	-0.43
	6.75	-1.95	34.18	-0.10	-3.51	5.13	-0.01	-0.83	18.41	-0.08
	0.00	-3.98	20.75	-2.17	-3.69	-8.19	-0.83	3.61	6.01	-3.04
	-1.35	0.86	0.18	2.90	-0.40	-0.19	1.04	-1.04	0.71	4.13
	Σ=	-11.54	107.97	-1.65	-19.86	17.62	0.12	-7.36	117.92	-2.75

Nivo	Z [m]	Ton 46			Ton 47			Ton 48		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-8.56	45.66	-0.23	0.44	0.85	-0.12	-1.97	30.52	-1.45
	7.60	-7.94	13.09	-0.10	-0.28	-2.56	0.00	1.16	39.00	-0.93
	6.75	-7.16	35.33	-0.33	0.33	1.70	0.01	-7.48	36.02	0.14
	0.00	-2.53	36.21	-3.40	0.68	2.83	0.01	-6.05	24.68	-1.97
	-1.35	-3.49	0.64	4.24	0.10	0.01	-0.01	-3.78	0.25	3.08
	∑=	-29.68	130.93	0.19	1.26	2.83	-0.10	-18.12	130.47	-1.13

Nivo	Z [m]	Ton 49			Ton 50			Ton 51		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-1.97	0.42	-0.08	-7.84	8.98	-0.77	-1.93	-0.70	0.06
	7.60	4.04	-0.29	-0.01	-1.68	-6.68	0.39	4.30	0.52	-0.04
	6.75	-2.21	-0.36	0.00	-2.49	1.28	0.47	-1.36	0.37	-0.06
	0.00	-4.64	-0.03	-0.01	-3.70	4.76	-0.35	-5.29	0.12	0.00
	-1.35	-0.02	0.01	0.01	-1.15	0.09	0.52	0.13	-0.00	-0.01
	∑=	-4.79	-0.25	-0.08	-16.86	8.43	0.26	-4.16	0.31	-0.04

Nivo	Z [m]	Ton 52			Ton 53			Ton 54		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-8.66	0.14	0.71	-0.24	-1.70	0.04	12.33	10.91	-1.57
	7.60	-0.10	43.23	-0.89	0.66	1.34	-0.08	1.63	16.25	-0.38
	6.75	4.06	38.49	-1.90	0.40	2.53	-0.16	-1.83	13.16	0.06
	0.00	0.76	35.59	-2.38	0.20	0.86	0.00	3.75	17.69	-0.77
	-1.35	3.30	0.76	3.03	0.30	0.02	-0.05	1.23	0.32	1.41
	∑=	-0.64	118.21	-1.43	1.32	3.05	-0.23	17.11	58.32	-1.25

Nivo	Z [m]	Ton 55			Ton 56			Ton 57		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.54	0.49	-0.23	6.79	6.50	-0.24	-2.58	1.11	0.14
	7.60	0.70	-0.15	0.07	0.24	-3.95	-0.14	-0.21	1.04	-0.17
	6.75	-0.04	2.61	0.16	-3.24	14.94	-0.03	1.42	-0.62	-0.37
	0.00	-0.55	0.45	0.05	-0.44	14.89	-0.55	-0.82	1.16	-0.31
	-1.35	-0.04	0.03	0.03	0.56	0.05	0.85	0.10	0.11	0.23
	∑=	0.61	3.44	0.07	3.91	32.42	-0.10	-2.09	2.81	-0.49

Nivo	Z [m]	Ton 58			Ton 59			Ton 60		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-6.99	11.22	-0.94	0.03	0.22	-0.31	15.71	11.95	-3.81
	7.60	-3.09	1.82	0.15	-0.81	-0.05	-0.04	4.04	18.59	0.50
	6.75	4.54	17.26	0.53	2.17	0.60	-0.01	-8.46	14.69	2.29
	0.00	-0.69	19.41	-0.94	-0.60	0.20	-0.01	6.02	20.58	-0.96
	-1.35	-1.64	0.36	1.51	0.09	-0.01	0.02	-0.50	0.65	2.39
	∑=	-7.86	50.06	0.31	0.88	0.95	-0.34	16.80	66.46	0.41

Nivo	Z [m]	Ton 61			Ton 62			Ton 63		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	7.78	5.39	-0.26	2.82	-0.38	0.65	0.82	0.08	-0.20
	7.60	-2.17	7.57	0.73	-2.68	3.08	0.08	0.10	0.03	-0.08
	6.75	-6.19	8.49	0.21	2.25	0.52	0.22	-1.99	0.61	-0.07
	0.00	4.65	8.33	-0.80	-13.43	0.91	0.01	-0.41	-0.42	-0.01
	-1.35	-0.48	0.43	1.37	-0.17	0.04	0.11	-0.13	-0.04	-0.00
	∑=	3.59	30.21	1.25	-11.22	4.17	1.08	-1.61	0.27	-0.36

Nivo	Z [m]	Ton 64			Ton 65			Ton 66		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.69	0.35	0.04	1.15	0.42	0.04	-4.87	-0.66	-0.99
	7.60	-0.07	-0.41	0.07	-0.21	1.49	0.09	0.34	7.50	-0.73
	6.75	-0.99	-0.98	0.06	-1.49	-4.86	0.07	10.40	-5.73	-0.14
	0.00	-1.16	1.22	0.02	-0.12	3.89	0.13	-1.10	13.79	-0.48
	-1.35	-0.18	0.10	-0.02	-0.14	0.55	-0.13	0.79	1.25	0.60
	∑=	-1.71	0.28	0.18	-0.81	1.48	0.19	5.55	16.14	-1.75

Nivo	Z [m]	Ton 67			Ton 68			Ton 69		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.10	0.01	-0.05	-0.32	0.24	-0.18	-0.07	-0.63	0.20
	7.60	-0.02	-0.25	-0.00	-0.11	-0.06	-0.04	0.19	0.26	0.06
	6.75	0.36	0.38	0.03	0.94	0.46	0.04	-0.57	-0.74	-0.02
	0.00	-0.26	-0.08	-0.01	-0.05	-0.23	-0.01	-0.12	1.65	-0.00
	-1.35	-0.01	-0.03	0.02	0.01	-0.04	0.03	0.09	0.16	-0.02
	∑=	-0.03	0.03	-0.01	0.47	0.37	-0.16	-0.47	0.69	0.22

Nivo	Z [m]	Ton 70			Ton 71			Ton 72		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-1.08	0.38	-0.01	-0.67	1.63	-0.20	0.32	-0.41	0.09
	7.60	-0.21	0.51	0.07	0.40	0.96	-0.13	-0.04	-0.14	0.04
	6.75	1.13	-1.73	0.08	0.83	-3.60	-0.00	-0.62	0.66	-0.03
	0.00	0.08	1.50	0.03	1.20	2.92	-0.11	0.10	0.37	0.04
	-1.35	-0.04	0.13	-0.02	0.01	0.20	0.12	-0.08	-0.10	-0.05
	∑=	-0.13	0.79	0.15	1.77	2.11	-0.32	-0.33	0.38	0.09

Nivo	Z [m]	Ton 73			Ton 74			Ton 75		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-1.45	2.24	1.97	-0.39	-1.40	0.42	-0.44	-0.78	0.33
	7.60	3.26	2.73	0.08	0.45	-0.11	0.08	0.06	0.41	0.09
	6.75	0.58	2.74	0.12	0.13	1.81	0.00	0.80	1.71	0.08
	0.00	3.89	2.35	-1.43	0.80	1.10	-0.10	0.67	0.39	-0.07
	-1.35	0.70	-0.06	1.64	0.10	0.01	0.09	0.11	-0.12	0.10
	∑=	6.99	9.99	2.37	1.09	1.41	0.50	1.19	1.61	0.53

Nivo	Z [m]	Ton 76			Ton 77			Ton 78		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.87	-0.52	-0.63	1.53	1.34	0.82	0.44	0.68	0.20
	7.60	0.38	1.32	-0.05	-0.95	0.61	0.16	0.72	2.48	-0.01
	6.75	1.09	-2.96	-0.00	-1.54	-3.27	0.02	-1.50	-7.19	-0.08
	0.00	1.50	4.39	0.05	-2.19	4.15	-0.08	-0.69	10.39	-0.08
	-1.35	-0.07	0.40	-0.07	0.12	0.20	0.16	-0.15	0.35	0.05
	∑=	2.03	2.63	-0.70	-3.03	3.04	1.07	-1.19	6.71	0.08

Nivo	Z [m]	Ton 79			Ton 80			Ton 81		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.51	-0.44	-0.87	-0.00	0.08	-0.00	0.10	0.08	0.04
	7.60	0.29	-0.16	-0.24	0.00	-0.03	0.01	-0.07	-0.02	0.02
	6.75	0.72	1.52	-0.06	0.00	0.01	0.00	-0.12	-0.28	-0.01
	0.00	0.80	0.33	0.03	-0.01	-0.05	-0.01	-0.16	0.16	0.01
	-1.35	0.04	-0.10	-0.06	-0.00	-0.00	0.01	-0.01	-0.00	-0.02
	∑=	1.34	1.16	-1.20	-0.02	-0.00	0.01	-0.26	-0.06	0.05

Nivo	Z [m]	Ton 82			Ton 83			Ton 84		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	2.56	-0.44	1.47	0.01	0.14	0.02	0.70	-0.04	0.58
	7.60	-1.18	0.65	0.40	-0.05	-0.02	0.02	-0.57	-0.12	0.14
	6.75	-2.39	-0.05	-0.03	0.07	-0.48	0.01	-0.42	0.02	-0.05
	0.00	-2.47	0.45	-0.00	0.07	0.45	0.02	-1.13	-0.15	-0.01
	-1.35	-0.25	-0.05	0.02	0.01	-0.01	-0.03	0.00	0.01	0.02
	∑=	-3.73	0.56	1.85	0.11	0.08	0.05	-1.42	-0.28	0.68

Nivo	Z [m]	Ton 85			Ton 86			Ton 87		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.75	-0.07	0.52	-1.11	0.34	-1.28	-0.96	-0.10	-0.80
	7.60	-0.63	0.20	0.14	0.80	1.24	-0.46	0.70	0.34	-0.00
	6.75	-0.59	-0.32	-0.07	1.28	-1.77	-0.04	1.39	-0.22	0.19
	0.00	-0.80	0.12	-0.01	1.42	2.81	-0.10	0.06	1.11	-0.01
	-1.35	0.15	0.02	0.02	0.37	0.21	0.12	-0.09	0.00	0.00
	∑=	-1.11	-0.04	0.59	2.77	2.83	-1.76	1.10	1.14	-0.63

Nivo	Z [m]	Ton 88			Ton 89			Ton 90		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.55	0.58	0.28	0.25	-0.18	0.39	0.00	0.03	0.01
	7.60	-0.43	-0.04	-0.05	-0.02	0.04	0.09	-0.00	-0.01	0.01
	6.75	-0.68	-1.34	-0.15	-0.35	0.32	-0.04	0.00	0.00	0.01
	0.00	-0.19	1.45	0.04	-0.04	-0.04	-0.01	-0.05	-0.02	-0.00
	-1.35	0.05	0.04	-0.04	-0.04	0.02	0.02	-0.01	-0.01	0.00
	∑=	-0.71	0.68	0.07	-0.20	0.16	0.44	-0.06	-0.02	0.03

Nivo	Z [m]	Ton 91			Ton 92			Ton 93		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-1.14	-0.60	0.12	0.77	-3.81	-1.70	1.58	-0.80	0.94
	7.60	0.84	0.26	-0.69	1.10	1.91	2.91	-1.44	-0.26	0.58
	6.75	1.32	-2.02	-0.12	0.09	2.18	1.52	-1.35	0.27	0.29
	0.00	-0.32	7.20	0.05	-2.51	12.92	-0.43	1.14	2.21	0.11
	-1.35	0.96	0.06	-0.02	-3.00	1.13	0.60	-0.29	0.40	-0.06
	∑=	1.66	4.89	-0.64	-3.55	14.32	2.89	-0.36	1.82	1.85

Nivo	Z [m]	Ton 94			Ton 95			Ton 96		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.07	-0.08	0.05	-0.05	-0.02	0.09	0.34	-0.43	0.24
	7.60	0.71	0.02	0.06	-0.89	0.27	0.13	-5.50	-0.12	-0.03
	6.75	-0.94	0.03	0.01	1.78	-0.08	0.04	9.59	0.37	-0.03
	0.00	0.26	0.06	0.01	-3.75	-0.38	-0.00	-16.84	1.23	0.02
	-1.35	-0.17	0.08	-0.01	-0.25	0.02	0.01	-0.27	0.25	-0.01
	∑=	-0.20	0.11	0.12	-3.17	-0.19	0.26	-12.68	1.31	0.20

Nivo	Z [m]	Ton 97			Ton 98			Ton 99		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.55	-0.12	-0.03	4.87	0.03	4.21	1.82	0.18	1.17
	7.60	0.77	-0.38	-0.13	-2.58	1.06	3.00	-0.52	-0.47	1.24
	6.75	-0.18	0.15	-0.04	-6.38	-0.72	1.00	-2.19	0.56	0.38
	0.00	0.53	1.16	0.02	0.03	3.96	-0.20	-2.94	-0.58	-0.08
	-1.35	0.10	0.10	-0.03	-2.25	-0.21	0.40	-0.99	0.03	0.16
	∑=	0.67	0.91	-0.21	-6.31	4.13	8.41	-4.81	-0.28	2.85

Nivo	Z [m]	Ton 100			Ton 101			Ton 102		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.00	-0.00	-0.01	-0.11	-0.72	0.45	-0.69	0.28	0.72
	7.60	0.00	0.00	-0.00	-0.09	0.32	0.04	-0.07	-0.17	0.10
	6.75	0.00	-0.01	-0.00	-0.00	0.52	0.01	0.73	-0.46	-0.02
	0.00	-0.01	0.01	0.00	0.79	0.60	-0.01	-0.05	4.59	-0.12
	-1.35	-0.01	0.00	-0.00	0.43	0.60	0.02	0.51	0.67	0.12
	∑=	-0.01	-0.00	-0.01	1.03	1.32	0.51	0.43	4.90	0.80

Nivo	Z [m]	Ton 103			Ton 104			Ton 105		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.24	0.05	0.00	-0.00	-0.00	-0.00	0.74	0.08	0.45
	7.60	0.22	-0.24	0.03	-0.00	-0.00	0.00	-0.12	-0.68	-0.23
	6.75	0.13	0.38	0.02	0.00	0.00	-0.00	-1.04	0.67	-0.03
	0.00	-0.53	0.04	0.00	0.00	0.00	-0.00	-0.91	0.39	0.16
	-1.35	0.11	-0.12	0.00	0.00	-0.00	0.00	-0.40	-0.11	-0.12
	∑=	-0.31	0.10	0.05	0.01	0.00	-0.00	-1.73	0.35	0.24

Nivo	Z [m]	Ton 106			Ton 107			Ton 108		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.84	-4.14	-0.15	-0.50	-2.19	6.07	-1.79	-0.49	-1.19
	7.60	0.11	0.57	-0.56	0.46	2.72	0.74	0.09	-0.45	-0.33
	6.75	-1.22	2.81	-0.30	-1.02	-0.60	0.03	3.20	0.80	-0.19
	0.00	-2.37	9.36	0.42	-2.27	4.06	0.04	1.70	2.76	-0.19
	-1.35	0.30	1.28	-0.38	-0.08	0.98	0.04	1.18	0.13	0.10
	∑=	-2.34	9.87	-0.96	-3.40	4.97	6.93	4.38	2.75	-1.80

Nivo	Z [m]	Ton 109			Ton 110			Ton 111		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.01	-0.02	-0.10	1.00	-5.02	10.92	0.04	-1.72	-2.16
	7.60	-0.01	0.06	-0.00	-1.45	0.21	1.73	-0.28	0.62	0.01
	6.75	0.14	-0.02	0.01	-1.21	5.83	-0.15	-0.05	1.43	0.19
	0.00	-0.31	-0.06	0.00	-5.19	9.45	0.26	0.94	1.30	-0.01
	-1.35	-0.00	-0.00	0.00	0.11	-0.07	-0.29	1.01	0.25	0.03
	∑=	-0.19	-0.05	-0.09	-6.74	10.39	12.47	1.65	1.87	-1.94

Nivo	Z [m]	Ton 112			Ton 113			Ton 114		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.74	-1.64	0.28	0.42	-0.61	-0.02	0.01	-0.22	0.25
	7.60	0.13	1.42	-0.07	-0.17	0.04	0.07	-0.01	0.11	0.02
	6.75	-1.43	0.97	-0.01	-0.44	0.74	-0.10	-0.02	0.13	-0.01
	0.00	-1.19	1.09	-0.05	-0.25	1.98	0.02	0.10	0.16	0.00
	-1.35	0.01	-0.21	0.03	-0.42	0.07	-0.03	-0.11	-0.02	-0.01
	∑=	-1.74	1.63	0.18	-0.86	2.22	-0.06	-0.05	0.16	0.26

Nivo	Z [m]	Ton 115			Ton 116			Ton 117		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	3.23	-2.87	-12.79	-0.44	-1.90	-0.53	2.14	-7.26	6.17
	7.60	-1.64	1.05	-1.35	0.70	2.75	-0.71	-1.05	3.10	2.37
	6.75	-3.26	1.29	-0.04	0.37	-1.61	0.35	-3.34	1.97	-0.87
	0.00	-5.76	8.09	0.10	0.02	6.23	-0.16	-5.12	22.35	0.47
	-1.35	2.18	0.97	-0.08	1.71	-0.37	0.17	-5.18	1.30	-0.50
	∑=	-5.24	8.53	-14.16	2.36	5.09	-0.89	-12.55	21.46	7.64

Nivo	Z [m]	Ton 118			Ton 119			Ton 120		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	3.22	-3.38	-0.51	1.70	-4.24	1.90	0.53	-2.43	2.51
	7.60	-1.45	3.81	0.20	0.13	4.04	-0.54	1.46	0.33	0.13
	6.75	-3.33	-1.49	-0.60	-2.17	-0.24	0.74	-1.31	1.65	1.05
	0.00	-4.16	8.00	0.05	-2.01	10.58	-0.13	-0.20	3.69	0.06
	-1.35	-3.84	0.34	-0.05	0.18	0.89	0.22	-1.31	2.77	-0.04
	∑=	-9.57	7.27	-0.91	-2.16	11.03	2.19	-0.82	6.01	3.72

Nivo	Z [m]	Ton 121			Ton 122			Ton 123		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.81	-2.13	-2.32	5.59	-0.48	-3.04	0.75	0.16	-1.07
	7.60	-1.54	1.58	-1.04	-0.85	-1.55	-1.07	-0.16	-0.14	-0.22
	6.75	0.18	-1.32	-1.72	-6.75	3.07	-0.35	-0.75	0.12	-0.12
	0.00	-1.20	9.30	0.05	-13.27	3.22	0.06	-1.50	-0.79	0.00
	-1.35	-0.22	3.24	-0.29	-1.41	0.01	-0.07	-0.71	0.02	-0.03
	∑=	-1.97	10.68	-5.32	-16.69	4.26	-4.47	-2.37	-0.65	-1.43

Nivo	Z [m]	Ton 124			Ton 125			Ton 126		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.43	0.12	-0.06	-0.30	-1.45	-1.50	0.57	0.17	2.01
	7.60	0.02	0.01	0.10	-0.57	0.48	0.27	1.16	0.27	0.06
	6.75	0.51	-0.35	-0.04	0.57	1.35	0.00	-1.43	-0.34	0.42
	0.00	0.55	0.61	0.01	1.30	3.62	0.06	-2.97	-0.33	-0.06
	-1.35	0.26	0.05	0.01	1.06	-1.02	-0.08	-0.92	-0.10	0.14
	∑=	0.90	0.44	0.02	2.06	2.99	-1.24	-3.59	-0.33	2.57

Nivo	Z [m]	Ton 127			Ton 128			Ton 129		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	2.36	-2.25	7.44	-0.68	-0.29	1.26	0.50	-0.17	-0.68
	7.60	0.44	-0.46	0.06	-0.17	-0.33	0.20	0.01	0.11	-0.11
	6.75	-2.38	3.68	-0.07	0.89	0.68	-0.10	-0.57	-0.19	0.02
	0.00	-4.24	3.78	0.09	2.20	0.73	0.03	-1.82	0.63	0.05
	-1.35	-2.86	0.15	-0.09	0.49	0.23	-0.03	-0.15	-0.67	-0.05
	∑=	-6.68	4.91	7.44	2.73	1.01	1.35	-2.03	-0.29	-0.77

Nivo	Z [m]	Ton 130			Ton 131			Ton 132		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.32	-1.73	-7.52	-2.75	-2.31	4.86	-0.56	0.52	-0.48
	7.60	2.08	-7.34	1.28	-1.08	0.57	2.84	0.30	-0.73	0.52
	6.75	-1.44	9.36	0.95	2.60	2.77	0.89	0.36	0.45	0.45
	0.00	1.87	27.53	0.25	1.04	6.55	-0.13	-0.60	-0.17	-0.08
	-1.35	-9.49	3.36	-0.25	9.19	1.05	0.33	0.41	0.49	0.19
	∑=	-6.66	31.19	-5.29	8.99	8.62	8.79	-0.09	0.57	0.60

Nivo	Z [m]	Ton 133			Ton 134			Ton 135		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	1.24	0.73	-0.58	-0.28	-0.42	1.11	1.35	0.43	-2.77
	7.60	0.31	-0.14	0.14	0.10	0.32	0.91	0.24	-0.09	-0.67
	6.75	-1.47	-0.87	0.18	0.27	0.16	0.40	-1.40	-1.12	-0.21
	0.00	-5.44	-0.69	0.03	0.50	1.02	0.00	-3.83	0.74	0.14
	-1.35	-1.62	0.84	-0.02	-0.30	-0.43	-0.00	-2.09	-0.16	-0.21
	∑=	-6.97	-0.14	-0.25	0.30	0.65	2.41	-5.74	-0.19	-3.72

Nivo	Z [m]	Ton 136			Ton 137			Ton 138		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.48	-1.18	-0.18	1.14	0.18	1.25	7.00	-4.26	-3.74
	7.60	-0.41	-1.80	0.50	-0.12	-0.94	0.12	2.89	-5.15	-1.76
	6.75	0.34	3.21	0.78	-1.93	1.53	-0.29	-8.23	5.07	-0.30
	0.00	-1.73	3.00	0.31	-3.83	0.30	-0.19	-32.52	20.47	1.07
	-1.35	4.91	1.59	-0.26	1.81	-0.07	0.14	-8.34	1.15	-1.61
	∑=	2.63	4.82	1.15	-2.94	1.00	1.03	-39.21	17.28	-6.34

Nivo	Z [m]	Ton 139			Ton 140			Ton 141		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.33	0.23	2.50	0.02	0.19	-0.70	2.48	-1.57	10.51
	7.60	0.24	-0.78	0.33	-0.17	-0.06	0.01	-0.27	-1.75	1.36
	6.75	0.16	0.16	0.03	-0.06	-0.30	-0.02	-0.76	3.46	1.45
	0.00	0.63	0.31	-0.07	0.31	0.17	-0.04	-10.25	6.86	0.13
	-1.35	-0.78	0.41	0.09	0.24	0.18	0.04	-2.16	2.26	-0.06
	∑=	-0.08	0.33	2.88	0.34	0.18	-0.72	-10.96	9.26	13.39

Nivo	Z [m]	Ton 142			Ton 143			Ton 144		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	1.60	1.00	1.34	2.64	-0.21	7.71	-0.18	0.31	-4.27
	7.60	-0.11	0.38	0.57	0.09	0.50	0.88	0.34	0.40	-1.10
	6.75	-1.02	-1.04	0.01	-1.60	-0.46	0.67	1.51	-1.79	-0.47
	0.00	-10.04	-1.84	-0.21	-8.25	3.06	0.02	-6.06	5.13	0.02
	-1.35	0.38	0.34	0.23	-1.05	-0.08	-0.02	-3.13	0.02	-0.06
	∑=	-9.19	-1.16	1.93	-8.17	2.81	9.26	-7.52	4.07	-5.90

Nivo	Z [m]	Ton 145			Ton 146			Ton 147		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	6.51	-1.65	6.49	-0.59	-0.95	-2.55	1.97	1.58	-2.31
	7.60	5.54	1.84	-1.24	0.53	0.80	-0.45	0.37	-2.00	-1.45
	6.75	-13.46	-2.78	-0.18	0.58	0.59	0.17	-1.47	-0.91	0.03
	0.00	-24.27	14.88	0.17	0.57	0.53	0.01	-3.76	3.30	0.16
	-1.35	-6.82	-0.79	-0.31	-1.02	0.34	0.01	-2.54	1.55	-0.15
	∑=	-32.50	11.50	4.93	0.07	1.31	-2.81	-5.43	3.53	-3.72

Nivo	Z [m]	Ton 148			Ton 149			Ton 150		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.26	-4.33	-9.13	2.06	-5.04	-0.91	0.43	-0.94	0.04
	7.60	5.29	-2.66	-4.87	-0.05	0.34	-2.84	2.00	-2.73	1.49
	6.75	-2.89	6.38	0.36	-1.89	3.95	-1.81	-6.72	0.77	0.78
	0.00	-13.01	18.26	0.60	-16.24	11.11	0.91	16.31	16.29	0.80
	-1.35	-8.94	2.47	-0.40	-2.50	0.42	-1.28	3.85	6.05	-1.02
	∑=	-19.82	20.11	-13.44	-18.61	10.78	-5.94	15.86	19.44	2.08

Nivo	Z [m]	Ton 151			Ton 152			Ton 153		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-3.63	-11.38	-7.67	1.99	0.01	-4.20	0.17	1.46	-1.56
	7.60	-7.24	-1.10	-6.21	-0.85	-1.90	-1.61	-0.14	-2.46	0.12
	6.75	10.27	-2.76	-3.17	-0.19	0.36	-0.46	0.26	0.82	0.96
	0.00	29.13	86.46	3.30	-5.86	3.76	0.79	-4.71	0.70	0.05
	-1.35	14.37	5.31	-4.21	-0.18	2.15	-1.08	1.42	1.13	0.09
	∑=	42.90	76.54	-17.96	-5.09	4.38	-6.55	-3.00	1.64	-0.34

Nivo	Z [m]	Ton 154			Ton 155			Ton 156		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.50	-1.20	0.15	3.06	-7.42	-6.69	-0.15	-1.22	-0.24
	7.60	1.08	-1.35	-0.73	-0.29	-5.59	-5.86	0.74	-0.14	0.28
	6.75	-1.68	2.78	-0.15	-0.98	13.49	-5.54	0.40	-0.34	-0.11
	0.00	6.66	3.39	0.38	-12.10	23.11	1.74	2.58	5.44	0.42
	-1.35	-1.50	0.27	-0.52	-1.46	12.18	-2.85	-3.45	2.14	-0.79
	∑=	4.05	3.90	-0.86	-11.78	35.78	-19.20	0.13	5.89	-0.43

Nivo	Z [m]	Ton 157			Ton 158			Ton 159		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	-0.15	-9.96	5.62	-0.37	0.30	5.97	-1.80	-0.40	3.59
	7.60	2.73	-2.63	1.95	-0.19	-0.02	1.86	-1.36	-3.71	1.37
	6.75	5.39	9.89	-0.84	2.17	-1.04	0.71	0.01	1.85	0.15
	0.00	-13.37	44.40	1.67	-11.94	1.49	0.11	13.82	13.71	0.86
	-1.35	-16.26	5.36	-3.02	-0.26	-0.31	-0.03	4.16	1.99	-1.00
	∑=	-21.66	47.05	5.38	-10.59	0.42	8.61	14.83	13.44	4.98

Nivo	Z [m]	Ton 160			Ton 161			Ton 162		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.44	0.06	0.69	-0.00	0.02	-1.04	-0.01	-0.15	-0.92
	7.60	-0.02	0.09	0.00	-0.68	-0.60	-0.02	-0.26	-0.31	-0.05
	6.75	-0.23	0.09	-0.02	1.08	0.79	-0.13	0.08	0.28	-0.19
	0.00	-0.31	0.05	-0.01	-2.23	-0.55	0.11	-0.79	1.47	0.17
	-1.35	-1.97	-0.21	-0.03	1.77	0.88	-0.16	1.08	-0.69	-0.28
	∑=	-2.10	0.08	0.63	-0.07	0.54	-1.23	0.10	0.59	-1.27

Nivo	Z [m]	Ton 163			Ton 164			Ton 165		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	2.27	-1.58	-2.21	-0.10	0.64	3.67	-1.89	1.74	3.11
	7.60	-0.37	-3.71	1.78	0.09	-1.58	0.62	1.41	-7.10	1.66
	6.75	-0.11	3.01	0.80	0.18	-0.02	0.10	1.73	-2.68	1.32
	0.00	-5.69	13.18	1.53	3.75	6.85	0.05	-2.10	28.64	0.62
	-1.35	-16.32	4.53	-2.45	-0.48	-0.31	-0.08	-7.60	2.14	-0.54
	∑=	-20.21	15.43	-0.55	3.44	5.58	4.36	-8.44	22.75	6.16

Nivo	Z [m]	Ton 166			Ton 167			Ton 168		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.04	0.09	-0.09	-1.52	0.33	-2.64	-1.76	4.40	-0.62
	7.60	-0.01	0.04	-0.00	-1.21	-5.59	-0.92	0.33	-3.71	-0.65
	6.75	0.00	-0.30	0.01	3.41	0.97	0.17	1.42	0.85	-0.05
	0.00	-0.23	0.65	-0.04	-14.00	21.35	1.50	8.01	0.78	-0.34
	-1.35	0.11	-0.47	0.05	5.42	6.09	-1.60	2.65	18.83	0.53
	Σ=	-0.10	0.00	-0.07	-7.90	23.16	-3.49	10.64	21.15	-1.14

Nivo	Z [m]	Ton 169			Ton 170			Ton 171		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.67	-1.70	-2.88	1.43	0.87	-0.59	1.91	3.34	5.21
	7.60	-0.91	-2.86	0.45	1.47	-1.36	-0.03	-1.60	-3.27	1.04
	6.75	0.02	1.40	0.80	-1.49	1.67	0.67	-5.51	-2.06	-0.15
	0.00	2.23	13.62	1.03	-11.93	3.13	-0.44	10.38	14.05	-0.32
	-1.35	2.09	-3.24	-1.28	-1.20	6.71	0.65	4.63	15.48	0.16
	Σ=	4.10	7.22	-1.88	-11.72	11.02	0.27	9.80	27.54	5.95

Nivo	Z [m]	Ton 172			Ton 173			Ton 174		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.37	1.30	-0.59	-1.48	0.28	-4.32	-0.01	0.68	-2.96
	7.60	-0.26	0.18	0.91	0.73	-2.14	-0.27	1.00	-1.65	0.09
	6.75	0.36	-1.33	0.58	3.92	4.24	0.58	0.30	-0.85	0.55
	0.00	-2.40	-3.94	-0.10	-10.79	43.88	0.11	-7.82	10.00	0.43
	-1.35	-1.33	9.26	0.17	-5.63	19.44	-0.13	-5.38	-1.74	-0.49
	Σ=	-3.26	5.48	0.97	-13.24	65.71	-4.04	-11.92	6.44	-2.38

Nivo	Z [m]	Ton 175			Ton 176			Ton 177		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.87	-0.12	1.08	-0.04	0.10	-0.64	-0.04	-0.16	0.34
	7.60	-0.43	-0.50	-0.61	0.31	-0.88	0.13	0.06	0.01	-0.05
	6.75	-2.37	0.69	0.21	-0.60	-0.18	0.11	-0.00	0.14	-0.03
	0.00	0.71	2.72	0.18	-3.03	3.68	-0.04	0.54	1.90	0.01
	-1.35	-0.17	2.22	-0.39	-0.33	-1.07	-0.05	-0.36	-1.27	-0.02
	Σ=	-1.39	5.01	0.47	-3.70	1.65	-0.48	0.20	0.61	0.25

Nivo	Z [m]	Ton 178			Ton 179			Ton 180		
		Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]	Px [kN]	Py [kN]	Pz [kN]
	11.50	0.93	1.22	4.86	0.18	-0.57	0.06	0.01	-0.00	0.04
	7.60	-2.44	2.63	3.52	-0.08	0.58	-0.26	-0.02	-0.03	0.01
	6.75	2.75	-1.99	3.24	-0.18	0.70	-0.17	-0.01	0.03	0.01
	0.00	20.04	-3.90	0.84	-0.68	-1.37	0.01	0.14	0.08	0.01
	-1.35	-4.62	91.88	-0.36	0.40	1.66	-0.06	0.01	-0.04	-0.01
	Σ=	16.67	89.84	12.10	-0.37	1.00	-0.43	0.14	0.05	0.06

Faktorji participacije - relativno sodelov		
Ton \ Naziv	1. Px	2. Py
1	0.001	0.010
2	0.020	0.224
3	0.010	0.000
4	0.043	0.002
5	0.022	0.008
6	0.000	0.005
7	0.170	0.011
8	0.001	0.054
9	0.000	0.009
10	0.002	0.021
11	0.000	0.006
12	0.010	0.009
13	0.000	0.013
14	0.000	0.005
15	0.006	0.000
16	0.000	0.001
17	0.000	0.002
18	0.000	0.002
19	0.000	0.006
20	0.000	0.004
21	0.009	0.029
22	0.025	0.002
23	0.004	0.001
24	0.000	0.000
25	0.003	0.016
26	0.008	0.001
27	0.003	0.012
28	0.000	0.001
29	0.097	0.006
30	0.063	0.014
31	0.001	0.001
32	0.098	0.009
33	0.112	0.001
34	0.003	0.017
35	0.010	0.002
36	0.004	0.009
37	0.000	0.001
38	0.000	0.008
39	0.000	0.003
40	0.001	0.006
41	0.000	0.023
42	0.001	0.011
43	0.001	0.026
44	0.002	0.006

Faktorji participacije - relativno sodelov		
Ton \ Naziv	1. Px	2. Py
45	0.002	0.028
46	0.000	0.033
47	0.000	0.001
48	0.001	0.032
49	0.005	0.000
50	0.004	0.003
51	0.002	0.000
52	0.002	0.028
53	0.000	0.001
54	0.005	0.013
55	0.000	0.001
56	0.001	0.007
57	0.000	0.001
58	0.000	0.012
59	0.000	0.000
60	0.005	0.015
61	0.001	0.007
62	0.003	0.002
63	0.001	0.000
64	0.001	0.000
65	0.000	0.000
66	0.002	0.003
67	0.000	0.000
68	0.000	0.000
69	0.000	0.000
70	0.000	0.000
71	0.001	0.000
72	0.000	0.000
73	0.003	0.002
74	0.000	0.000
75	0.001	0.000
76	0.001	0.000
77	0.000	0.001
78	0.000	0.002
79	0.001	0.000
80	0.000	0.000
81	0.001	0.000
82	0.002	0.000
83	0.000	0.000
84	0.004	0.000
85	0.001	0.000
86	0.002	0.000
87	0.001	0.000
88	0.000	0.000
89	0.000	0.000
90	0.001	0.000
91	0.001	0.001
92	0.000	0.004
93	0.000	0.000
94	0.000	0.000
95	0.003	0.000
96	0.007	0.001
97	0.000	0.000
98	0.001	0.001
99	0.005	0.000
100	0.000	0.000
101	0.000	0.000
102	0.000	0.001
103	0.000	0.000
104	0.001	0.000
105	0.001	0.000
106	0.000	0.002
107	0.000	0.001
108	0.004	0.000
109	0.001	0.000
110	0.000	0.003
111	0.001	0.000
112	0.000	0.001
113	0.000	0.001
114	0.000	0.000
115	0.000	0.002
116	0.001	0.001
117	0.000	0.006
118	0.001	0.002
119	0.000	0.003
120	0.000	0.001
121	0.000	0.003
122	0.006	0.002
123	0.023	0.000
124	0.001	0.000
125	0.001	0.001
126	0.004	0.000
127	0.001	0.002
128	0.011	0.000
129	0.003	0.000
130	0.000	0.008
131	0.005	0.001
132	0.000	0.000
133	0.006	0.000

Faktorji participacije - relativno sodelov		
Ton \ Naziv	1. Px	2. Py
134	0.000	0.000
135	0.005	0.000
136	0.001	0.001
137	0.001	0.000
138	0.009	0.007
139	0.000	0.000
140	0.000	0.000
141	0.001	0.003
142	0.013	0.000
143	0.002	0.001
144	0.001	0.001
145	0.009	0.005
146	0.000	0.000
147	0.001	0.001
148	0.002	0.006
149	0.003	0.004
150	0.008	0.003
151	0.016	0.015
152	0.001	0.001
153	0.001	0.001
154	0.002	0.001
155	0.000	0.009
156	0.000	0.001
157	0.000	0.013
158	0.007	0.001
159	0.009	0.002
160	0.001	0.000
161	0.000	0.000
162	0.000	0.000
163	0.003	0.005
164	0.001	0.001
165	0.000	0.006
166	0.000	0.000
167	0.000	0.006
168	0.004	0.004
169	0.002	0.001
170	0.001	0.003
171	0.003	0.006
172	0.000	0.002
173	0.000	0.016
174	0.002	0.002
175	0.000	0.001
176	0.001	0.001
177	0.000	0.000
178	0.005	0.020
179	0.000	0.000
180	0.003	0.000

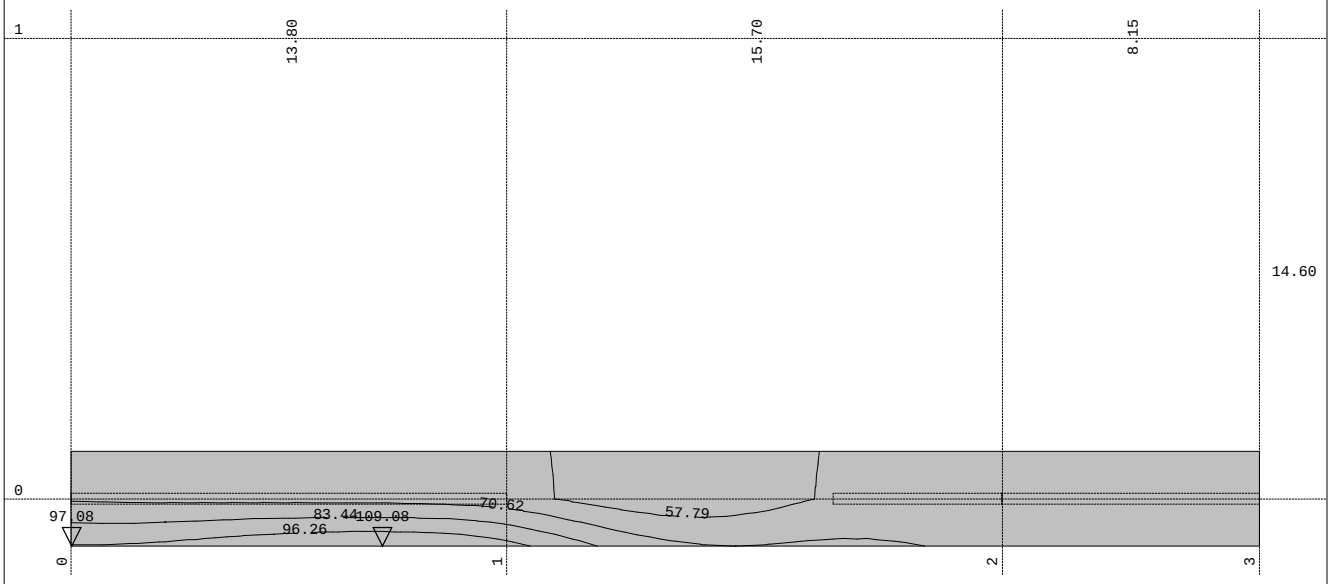
Faktorji participacije - angažiranje mase		
Ton	U [α=0°]	U [α=90°]
1	0.00	0.83
2	0.00	17.11
3	0.48	0.02
4	2.25	0.02
5	1.39	0.09
6	0.02	0.22
7	9.13	0.02
8	0.06	2.74
9	0.01	0.49
10	0.00	1.31
11	0.00	0.34
12	0.27	0.87
13	0.16	0.69
14	0.05	0.28
15	0.42	0.02
16	0.00	0.07
17	0.00	0.19
18	0.00	0.18
19	0.00	0.49
20	0.02	0.30
21	0.13	2.79
22	2.07	0.00
23	0.21	0.16
24	0.02	0.05
25	0.60	0.89
26	0.67	0.00
27	0.03	1.16
28	0.02	0.07
29	9.05	0.02
30	6.59	0.14
31	0.02	0.10
32	9.70	0.00
33	8.96	1.42
34	0.73	1.10
35	0.65	0.41
36	0.70	0.46
37	0.00	0.07

Ton	U [α=0°]	U [α=90°]
38	0.07	0.69
39	0.05	0.27
40	0.26	0.36
41	0.37	1.77
42	0.00	1.10
43	0.03	2.56
44	0.41	0.32
45	0.01	2.88
46	0.16	3.08
47	0.02	0.08
48	0.06	3.26
49	0.49	0.00
50	0.54	0.13
51	0.28	0.00
52	0.00	3.17
53	0.02	0.09
54	0.14	1.66
55	0.00	0.09
56	0.01	0.86
57	0.03	0.06
58	0.03	1.25
59	0.03	0.03
60	0.12	1.92
61	0.01	0.83
62	0.44	0.06
63	0.09	0.00
64	0.10	0.00
65	0.01	0.03
66	0.06	0.48
67	0.00	0.00
68	0.03	0.02
69	0.01	0.02
70	0.00	0.02
71	0.05	0.08
72	0.01	0.01
73	0.17	0.36
74	0.03	0.05

Faktorji participacije - angažiranje mase		
Ton	U [α=0°]	U [α=90°]
75	0.03	0.06
76	0.06	0.09
77	0.06	0.06
78	0.01	0.17
79	0.07	0.05
80	0.01	0.00
81	0.12	0.01
82	0.23	0.01
83	0.01	0.00
84	0.39	0.01
85	0.12	0.00
86	0.11	0.11
87	0.04	0.05
88	0.02	0.01
89	0.00	0.00
90	0.07	0.01
91	0.02	0.15
92	0.03	0.41
93	0.00	0.05
94	0.01	0.00
95	0.37	0.00
96	0.89	0.01
97	0.02	0.03
98	0.20	0.09
99	0.60	0.00
100	0.00	0.00
101	0.03	0.05
102	0.00	0.14
103	0.01	0.00
104	0.16	0.01
105	0.10	0.00
106	0.01	0.27
107	0.06	0.13
108	0.42	0.17
109	0.09	0.01
110	0.12	0.28
111	0.06	0.08
112	0.04	0.04
113	0.01	0.06
114	0.00	0.00
115	0.10	0.27
116	0.04	0.18
117	0.19	0.55
118	0.27	0.15
119	0.01	0.31
120	0.00	0.17
121	0.01	0.30
122	0.92	0.06
123	3.19	0.24
124	0.14	0.03
125	0.05	0.11
126	0.53	0.00
127	0.21	0.12
128	1.30	0.18
129	0.39	0.01
130	0.04	0.98
131	0.48	0.44
132	0.00	0.02
133	0.74	0.00
134	0.01	0.03
135	0.68	0.00
136	0.05	0.18
137	0.14	0.02
138	1.68	0.33
139	0.00	0.01
140	0.05	0.01
141	0.31	0.22
142	1.66	0.03
143	0.43	0.05
144	0.27	0.08
145	1.55	0.19
146	0.00	0.04
147	0.19	0.08
148	0.50	0.51
149	0.70	0.24
150	0.53	0.79
151	0.99	3.14
152	0.14	0.11
153	0.11	0.03
154	0.19	0.18
155	0.12	1.09
156	0.00	0.18
157	0.28	1.33
158	1.09	0.00
159	0.77	0.63
160	0.20	0.00
161	0.00	0.02
162	0.00	0.02
163	0.66	0.38
164	0.08	0.21
165	0.09	0.67
166	0.01	0.00
167	0.08	0.65
168	0.19	0.76
169	0.09	0.29
170	0.30	0.27
171	0.12	0.94
172	0.05	0.14
173	0.08	1.86
174	0.44	0.13
175	0.01	0.14
176	0.15	0.03
177	0.00	0.02
178	0.10	2.88
179	0.00	0.03
180	0.32	0.03
ΣU (%)	87.16	88.44

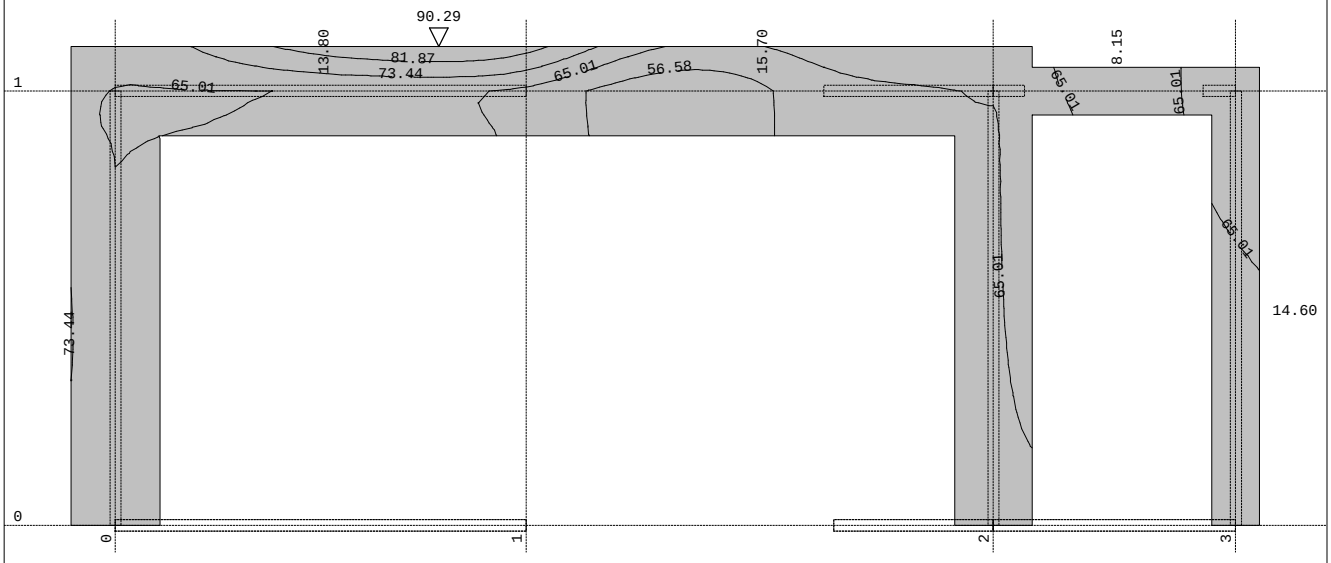
Statični preračun

Obt. 62: [MSU] 40-60

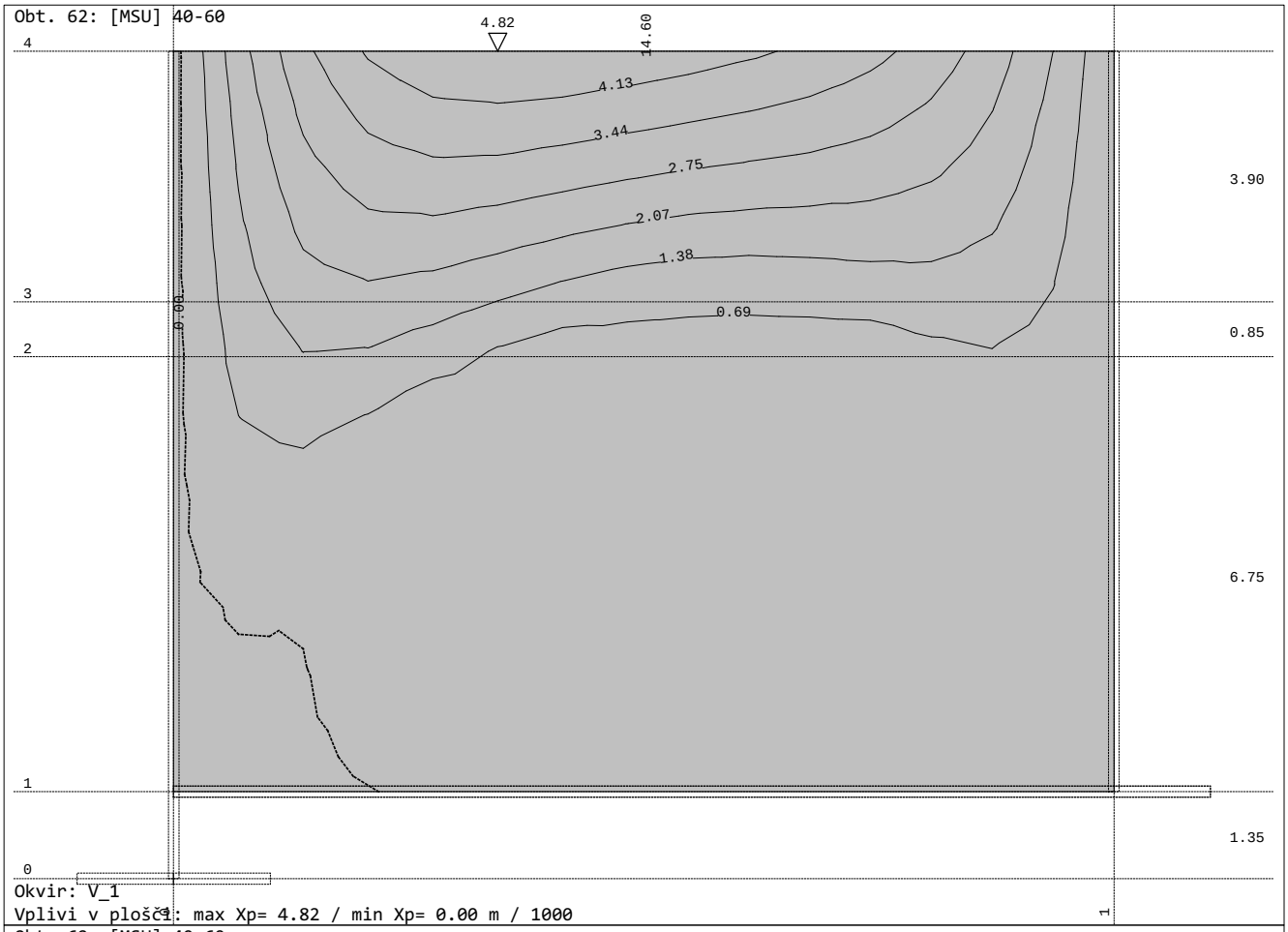


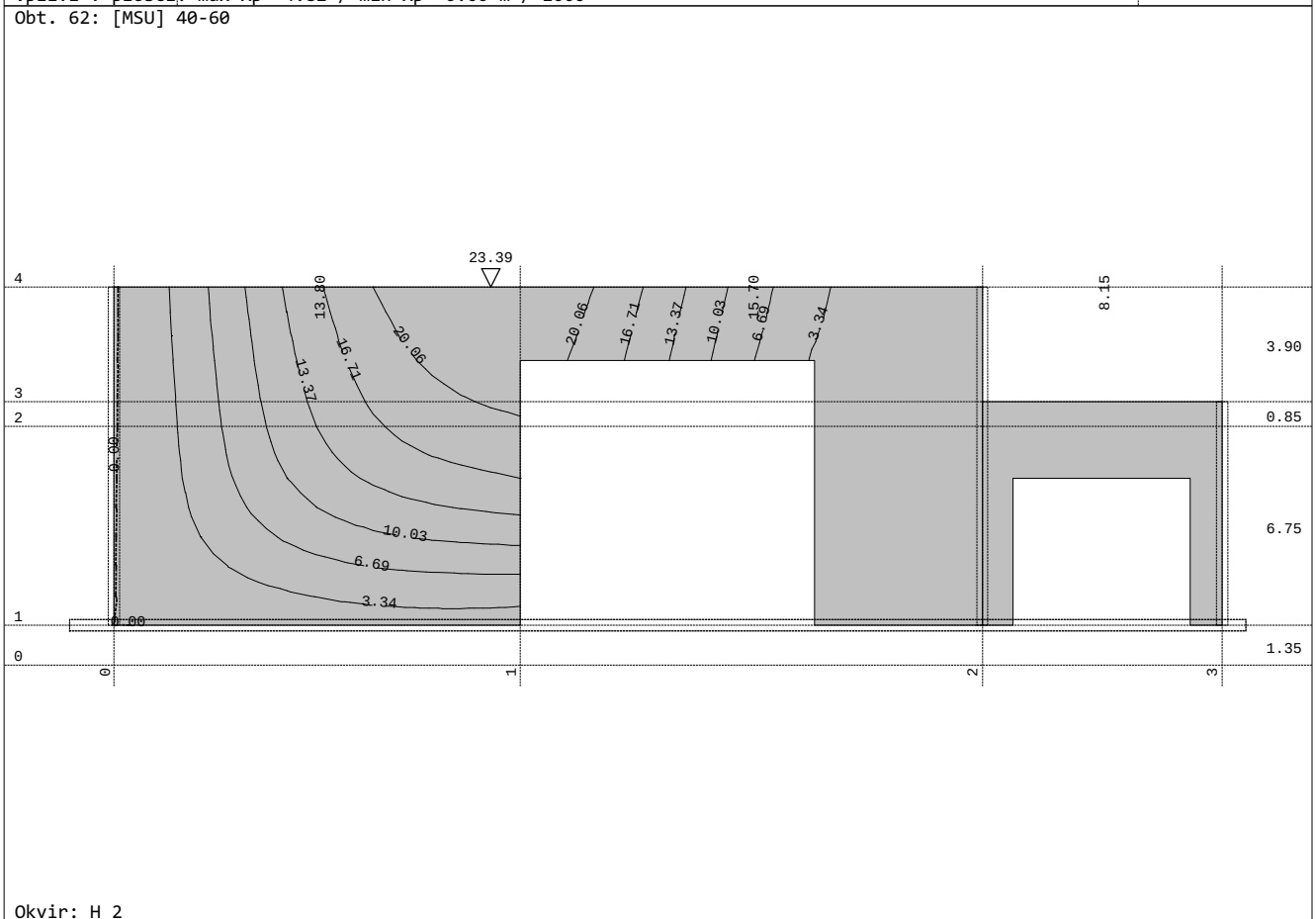
Nivo: [-1.35 m]
Vplivi v pov.podpori: max σ,tal= 109.08 / min σ,tal= 19.34 kN/m²

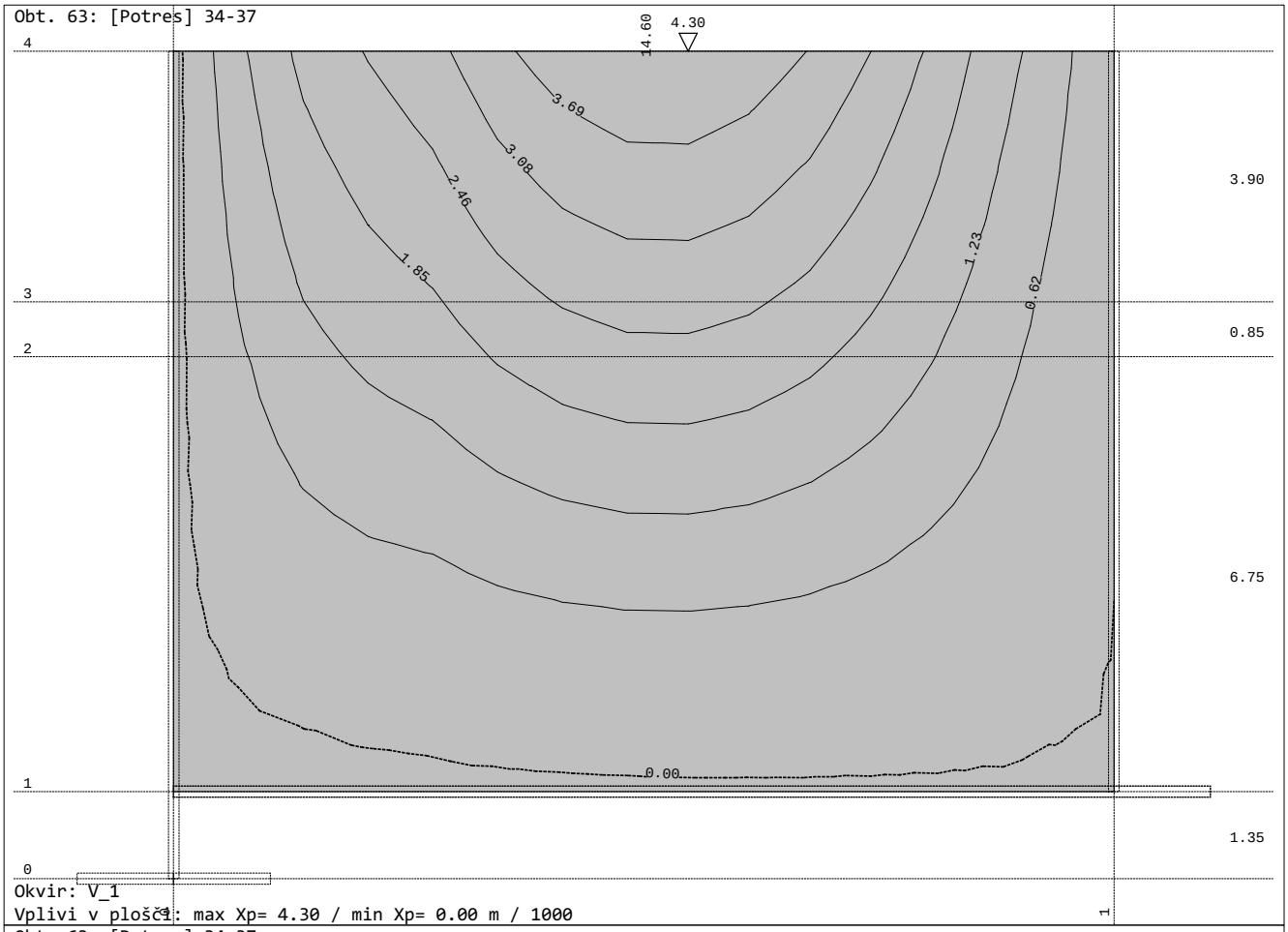
Obt. 62: [MSU] 40-60



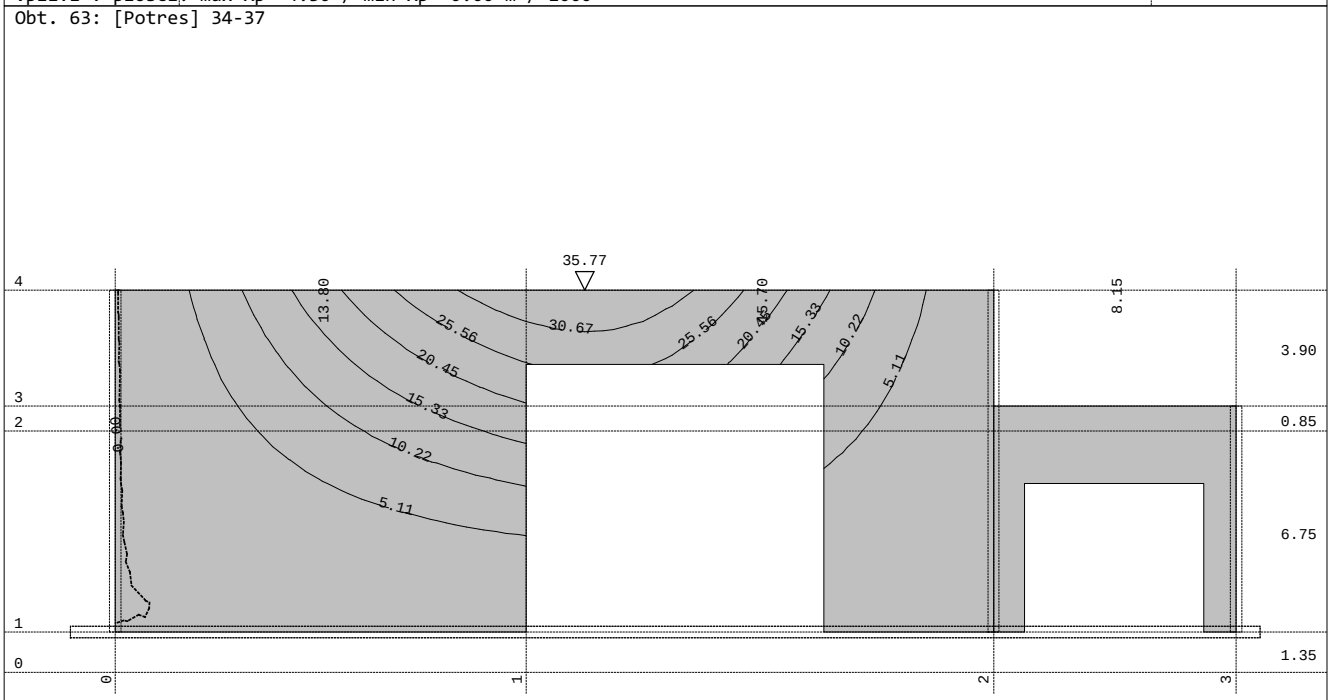
Nivo: [0.00 m]
Vplivi v pov.podpori: max σ,tal= 90.29 / min σ,tal= 31.30 kN/m²


Obt. 62: [MSU] 40-60
4.82
14.60
4.13
3.44
2.75
2.07
1.38
0.69
0.00
3.90
0.85
6.75
1.35
Okvir: V_1
Vplivi v plošči: max Xp= 4.82 / min Xp= 0.00 m / 1000


Obt. 62: [MSU] 40-60
23.39
13.80
16.71
20.06
13.37
10.03
6.69
3.34
15.70
8.15
0.00
3.90
0.85
6.75
1.35
Okvir: H_2
Vplivi v plošči: max Yp= 23.39 / min Yp= 0.00 m / 1000



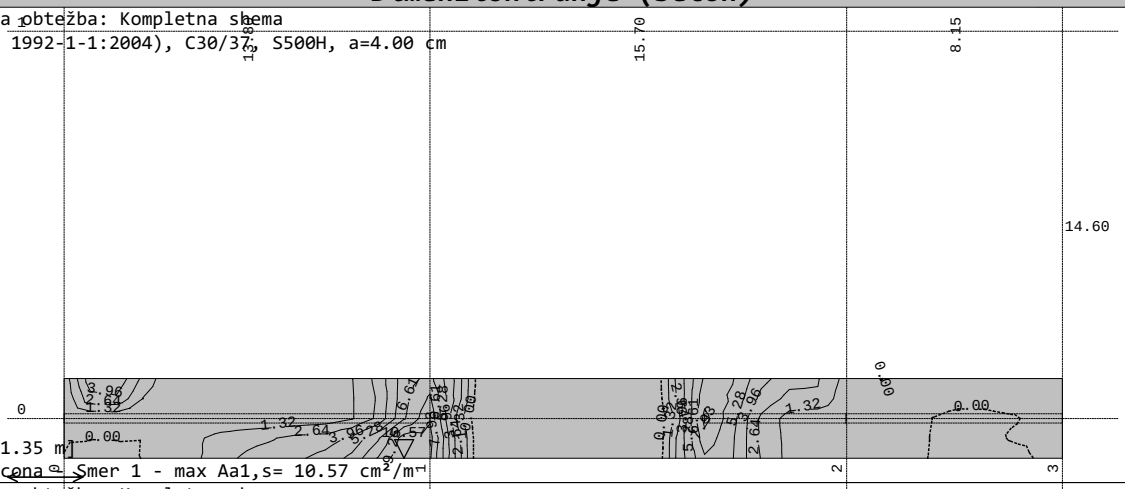
Okvir: V_1
Vplivi v plošči: max Xp= 4.30 / min Xp= 0.00 m / 1000



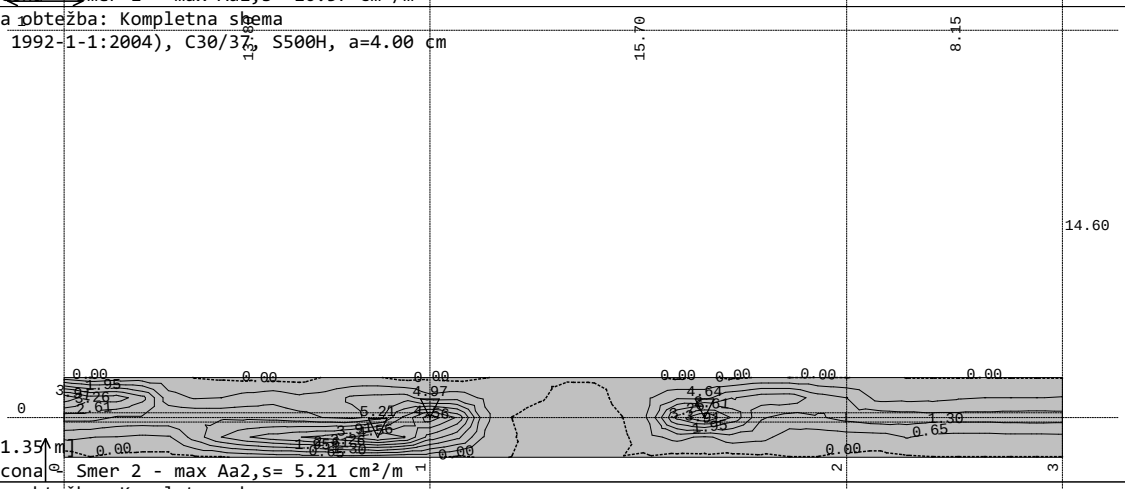
Okvir: H_2
Vplivi v plošči: max Yp= 35.77 / min Yp= 0.00 m / 1000

Dimenzioniranje (beton)

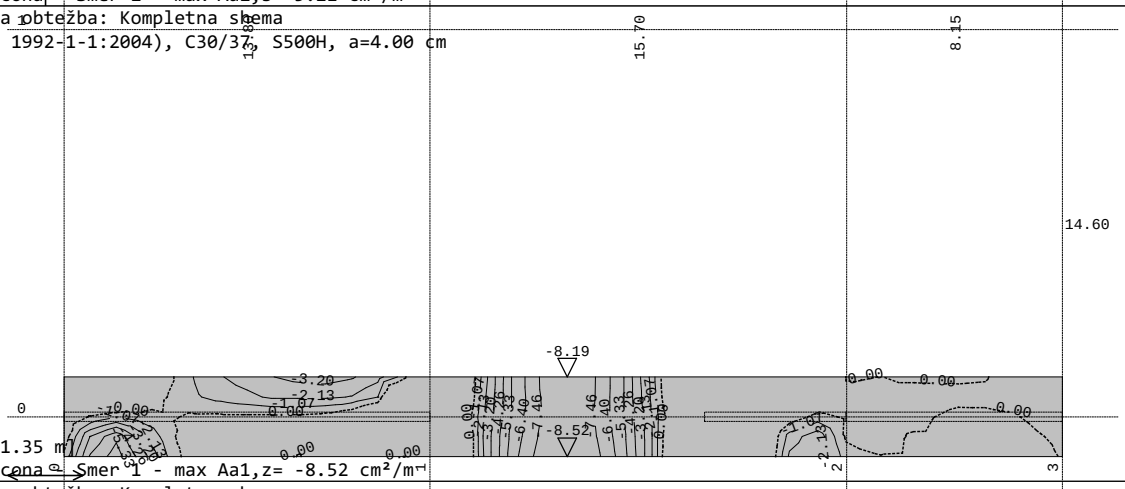
Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm



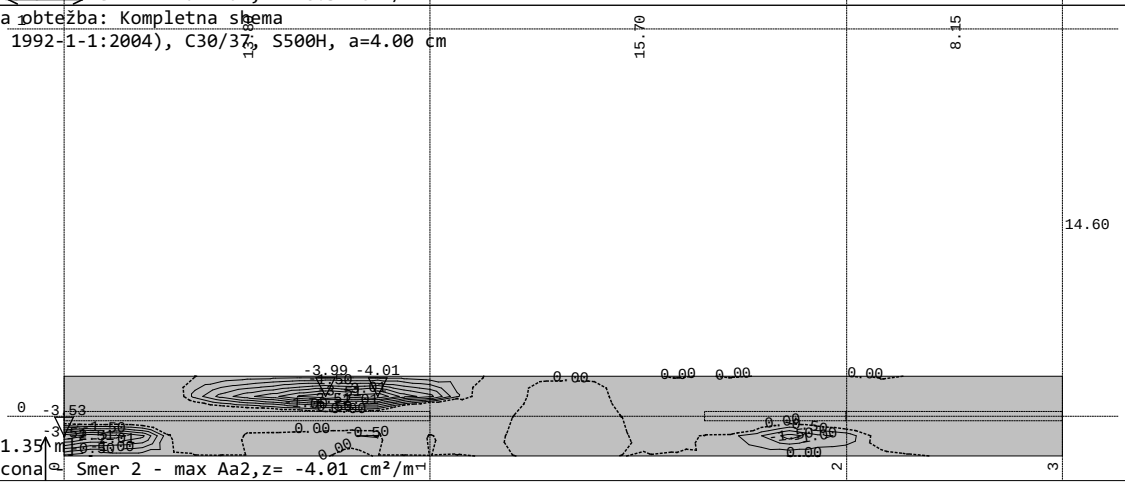
Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm



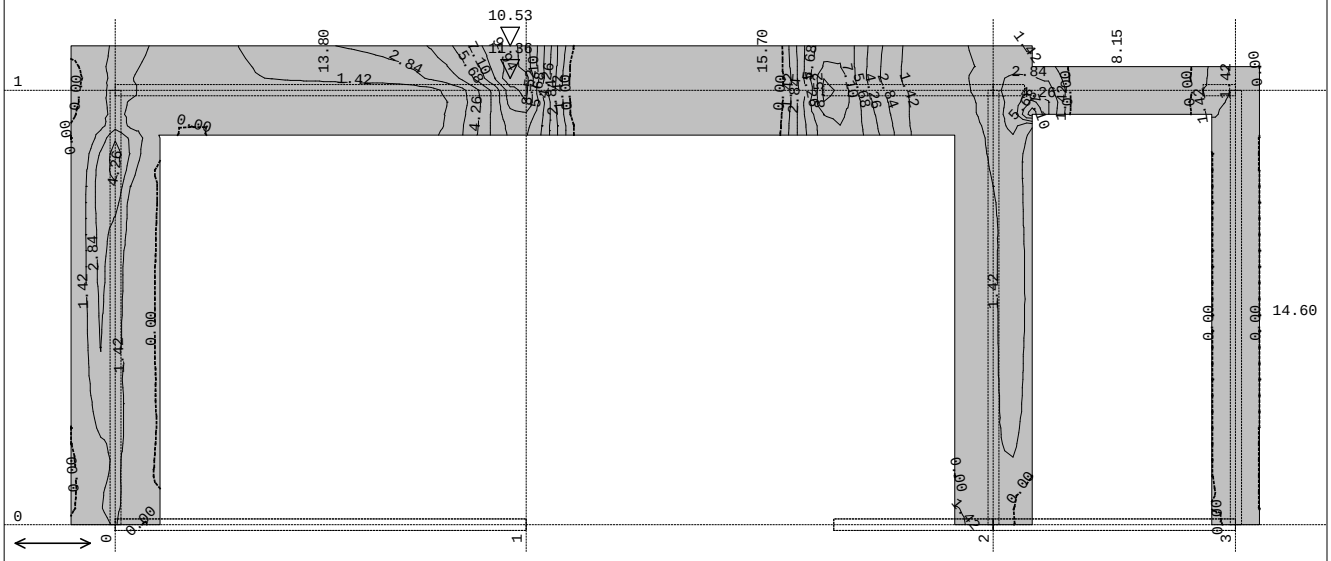
Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm



Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm

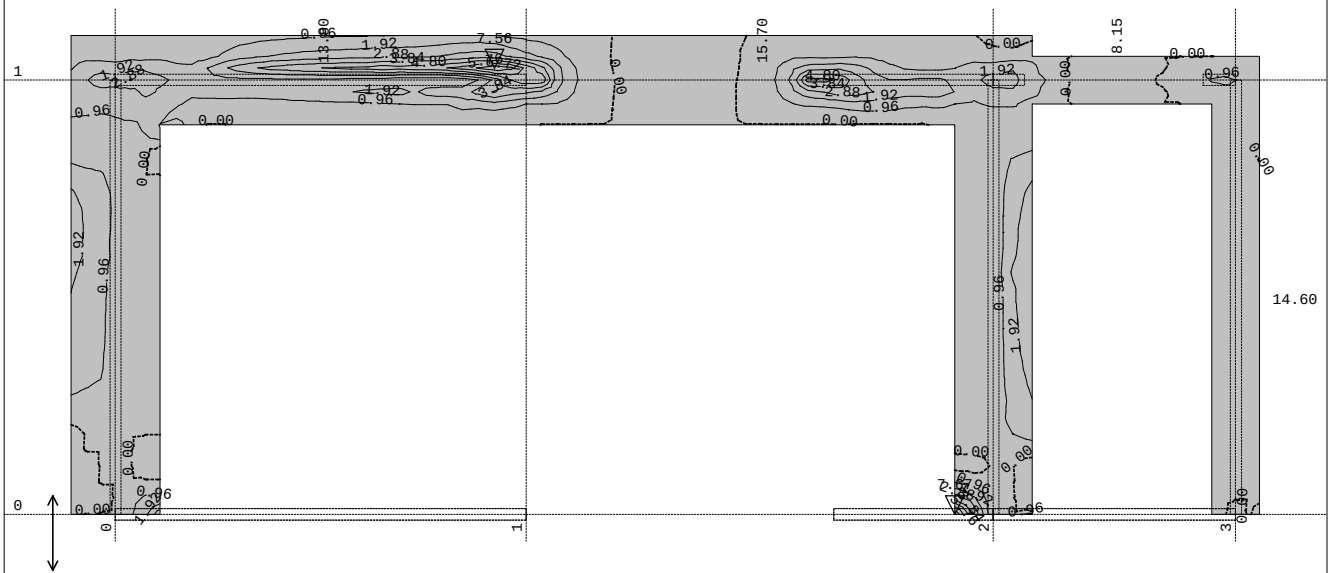


Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm



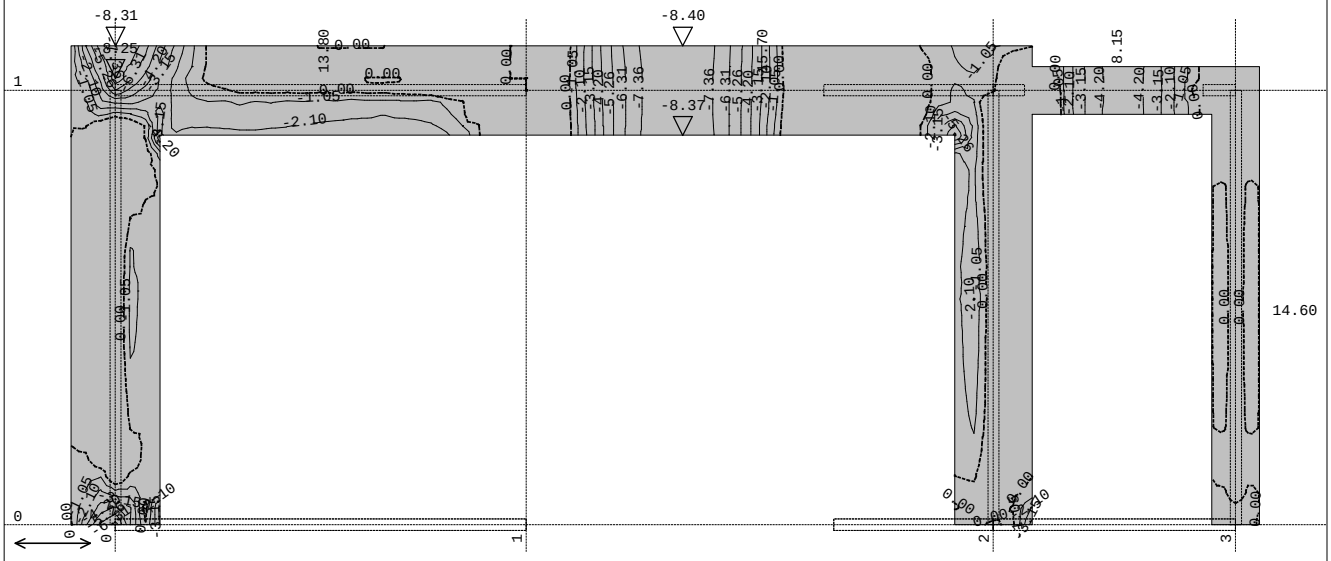
Nivo: [0.00 m]
Aa - sp.cona - Smer 1 - max Aa1,s= 11.36 cm²/m

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm



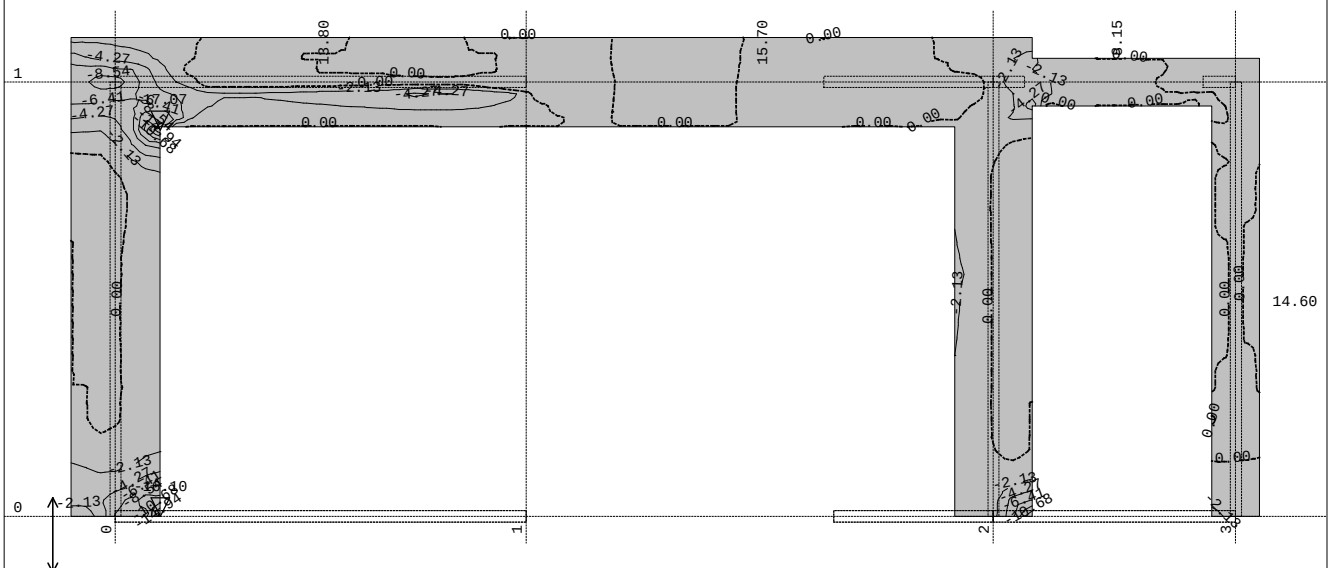
Nivo: [0.00 m]
Aa - sp.cona - Smer 2 - max Aa2,s= 7.67 cm²/m

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm

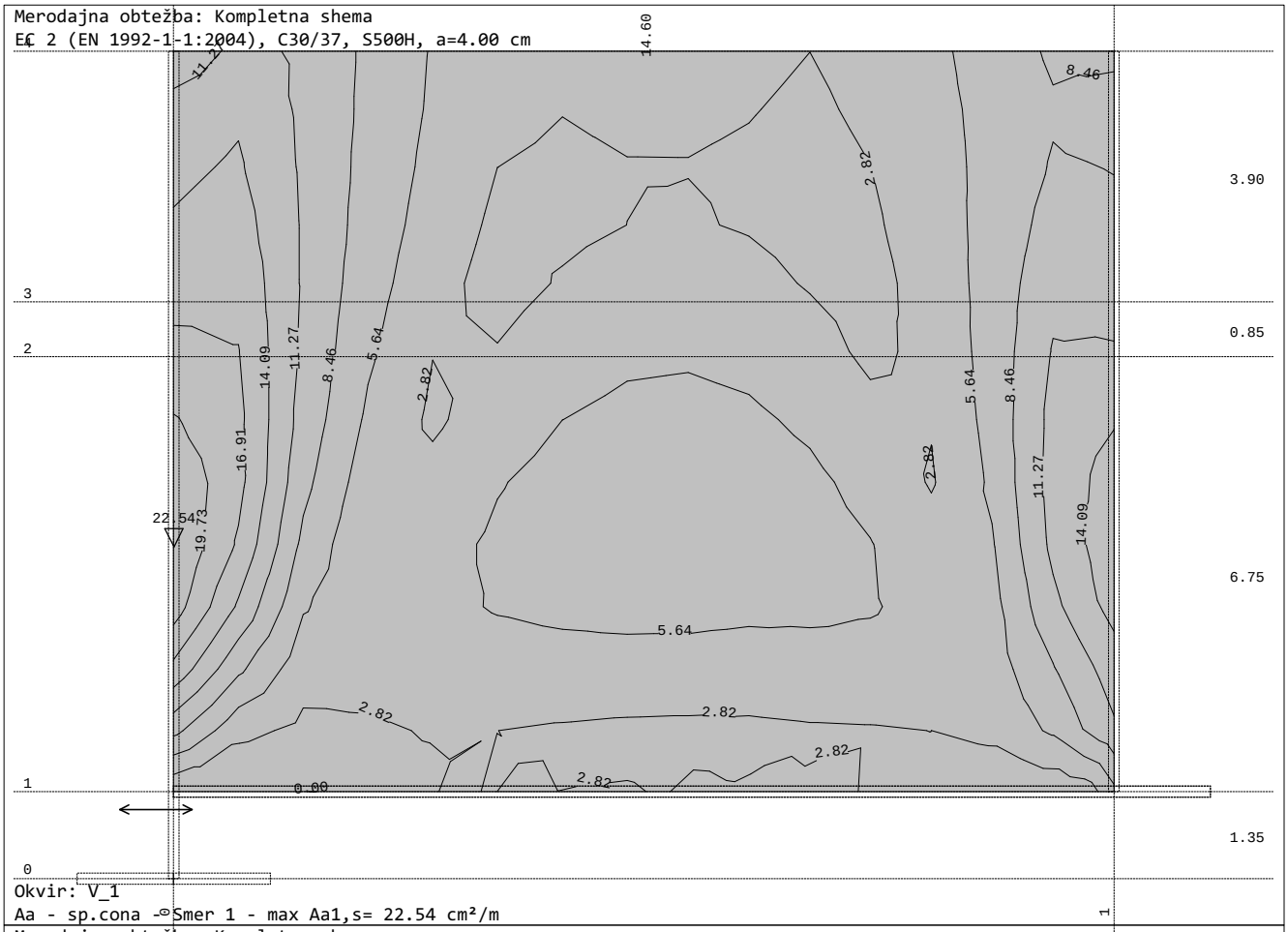


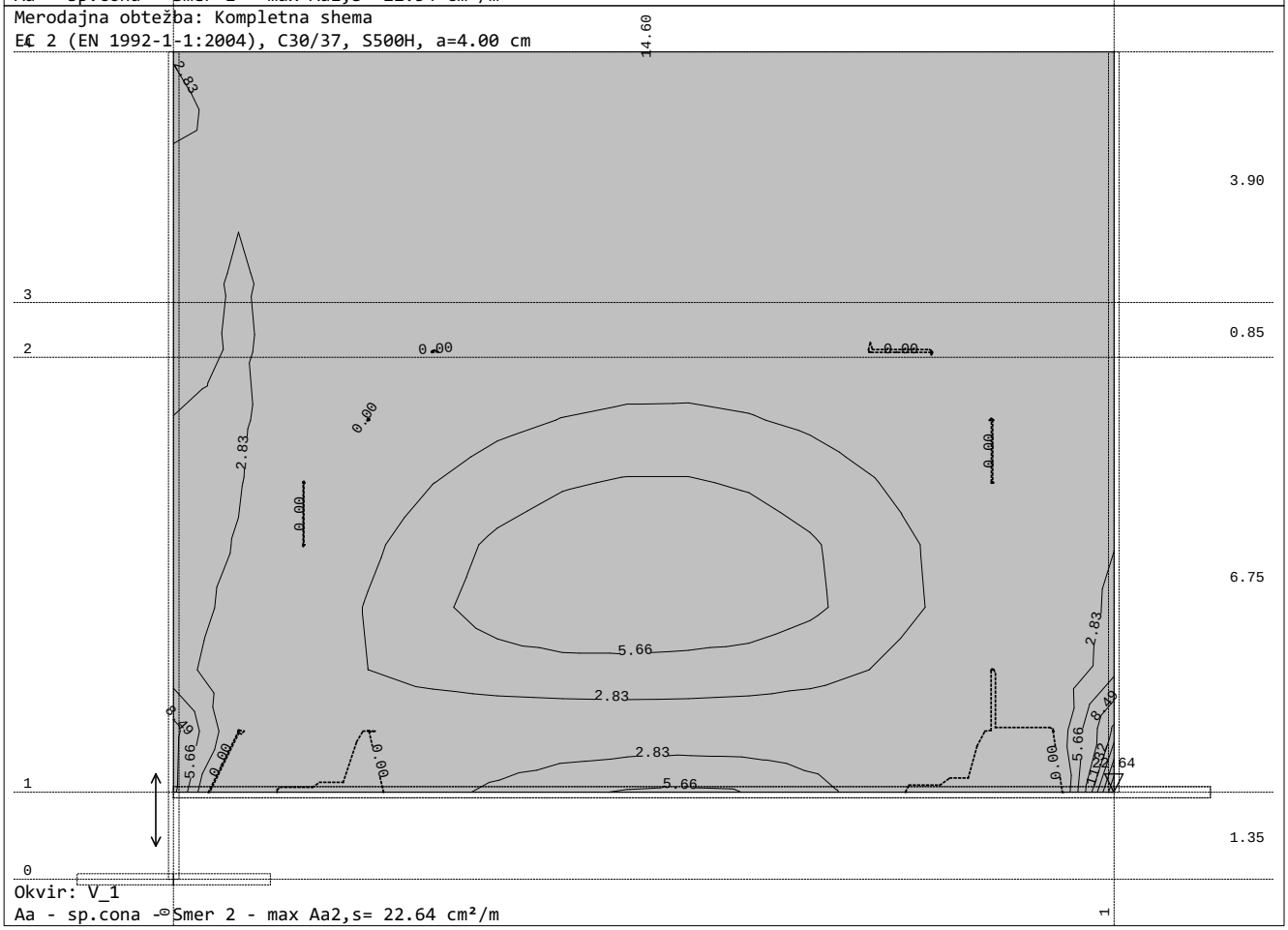
Nivo: [0.00 m]
Aa - zg.cona - Smer 1 - max Aa1,z= -8.40 cm²/m

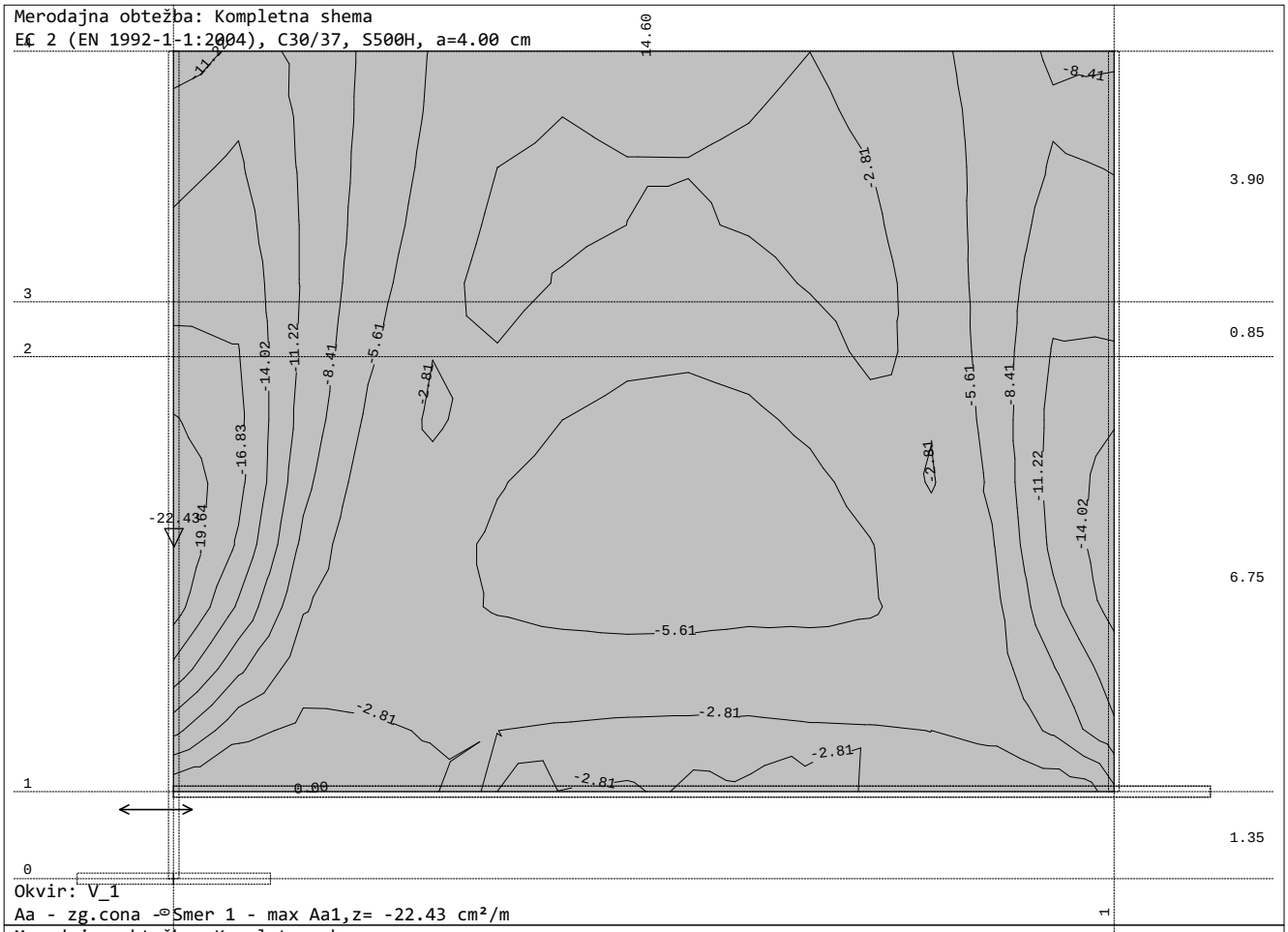
Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm

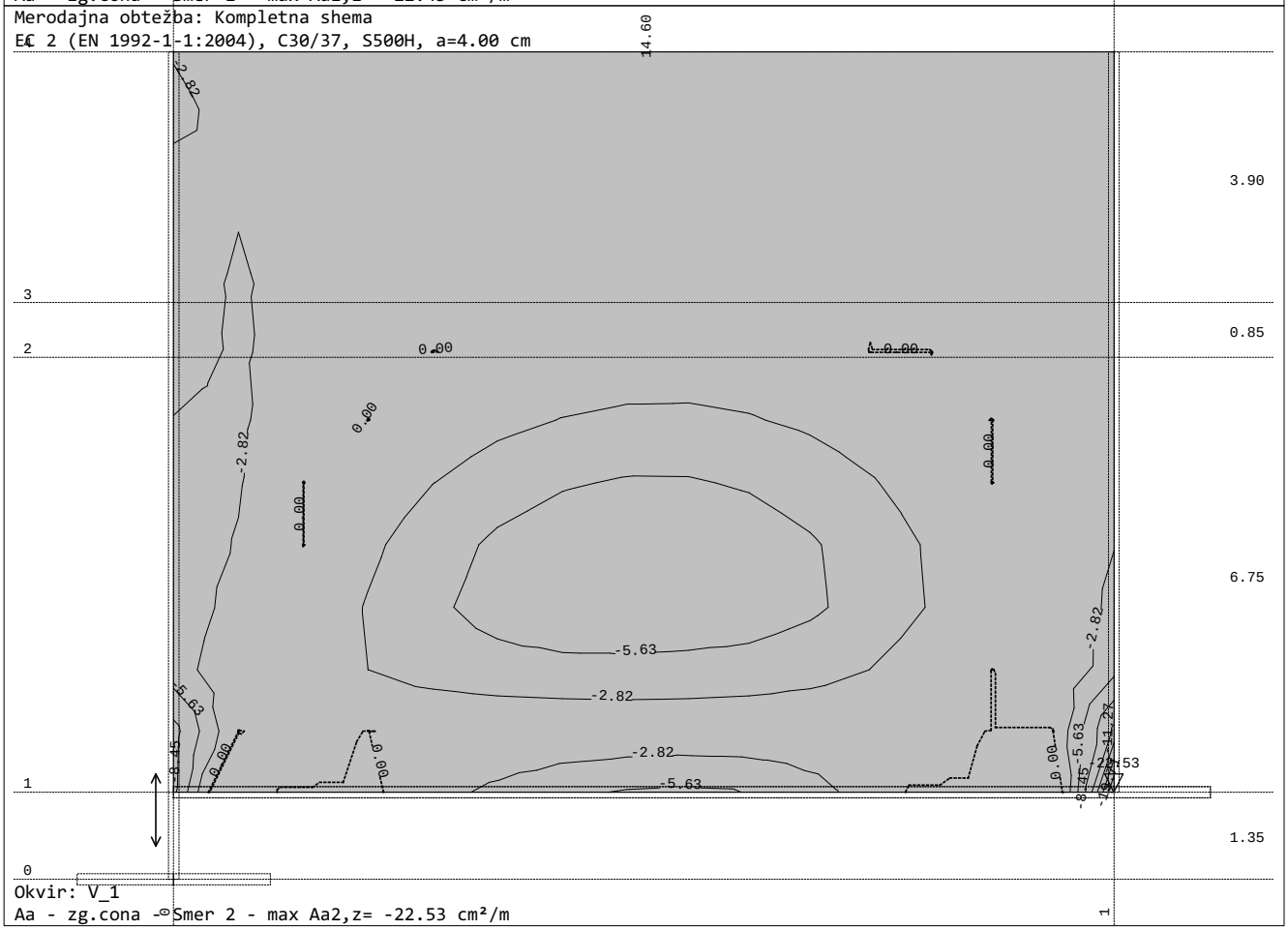


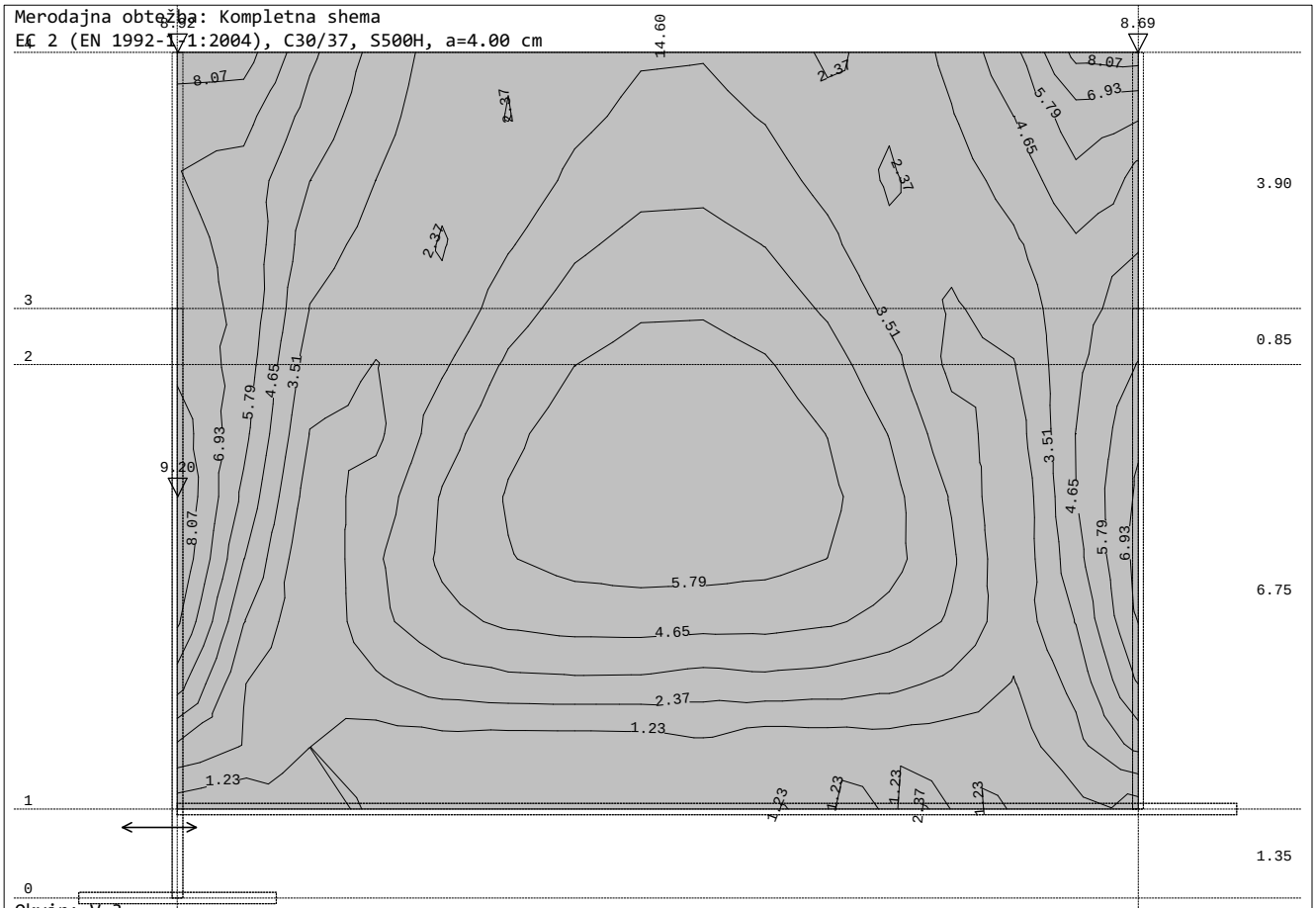
Nivo: [0.00 m]
Aa - zg.cona - Smer 2 - max Aa2,z= -17.07 cm²/m

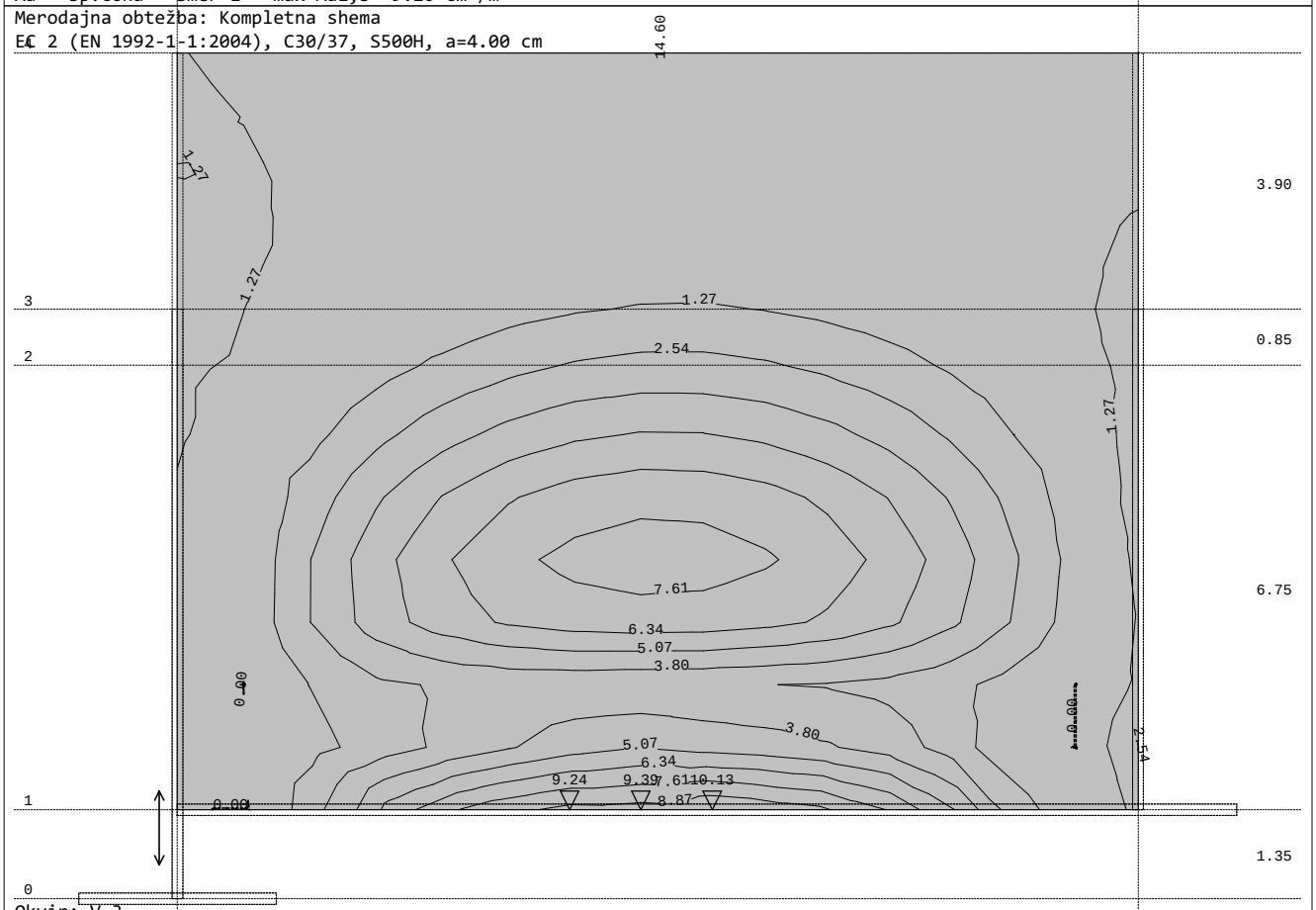

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm
14.60
3.90
0.85
6.75
1.35
3
2
1
0
22.54
19.73
16.91
14.09
11.27
8.46
5.64
2.82
0.00
Okvir: V_1
Aa - sp.cona - Smer 1 - max Aa1,s= 22.54 cm²/m

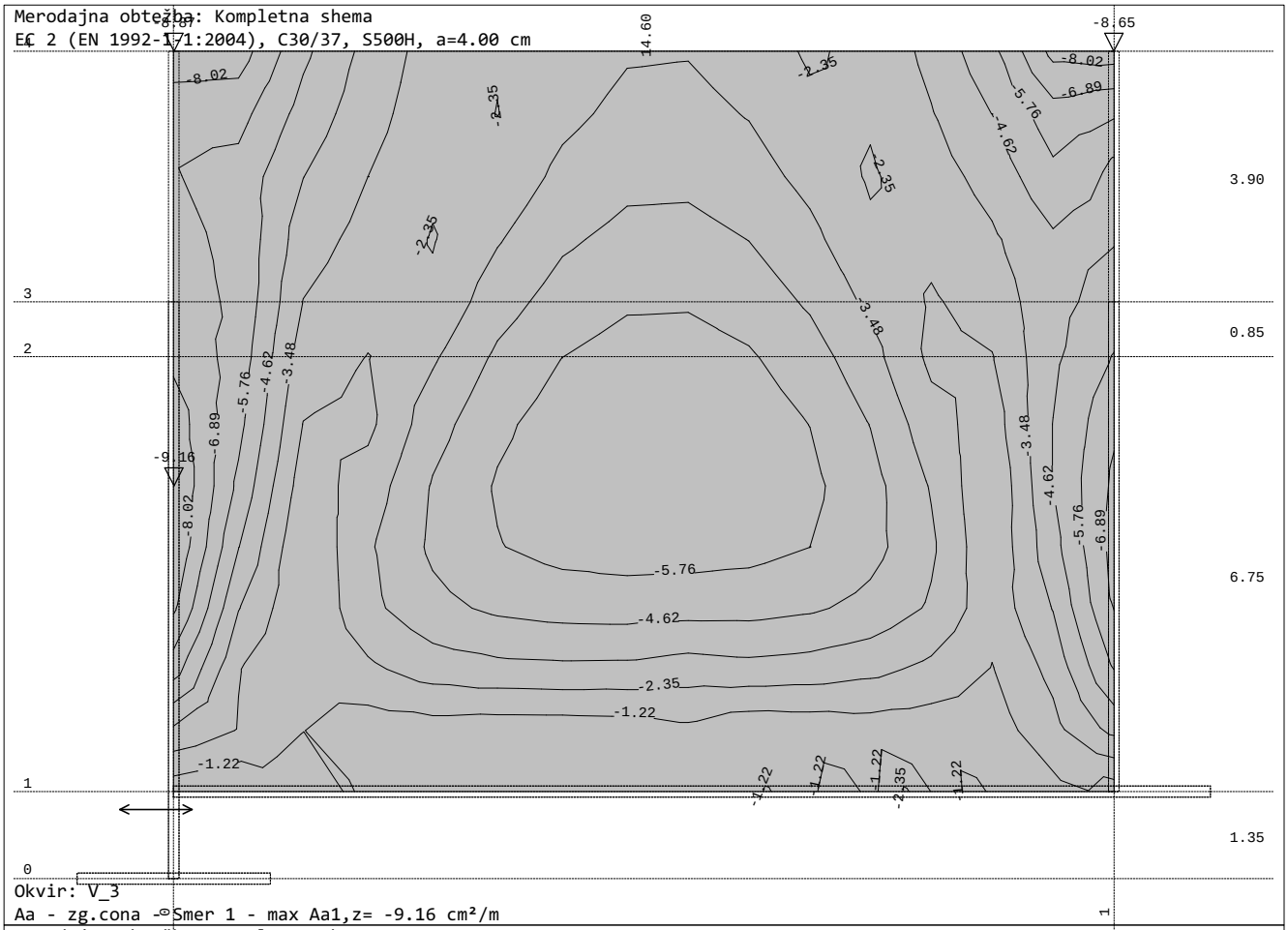

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm
14.60
3.90
0.85
6.75
1.35
3
2
1
0
22.64
5.66
2.83
0.00
Okvir: V_1
Aa - sp.cona - Smer 2 - max Aa2,s= 22.64 cm²/m

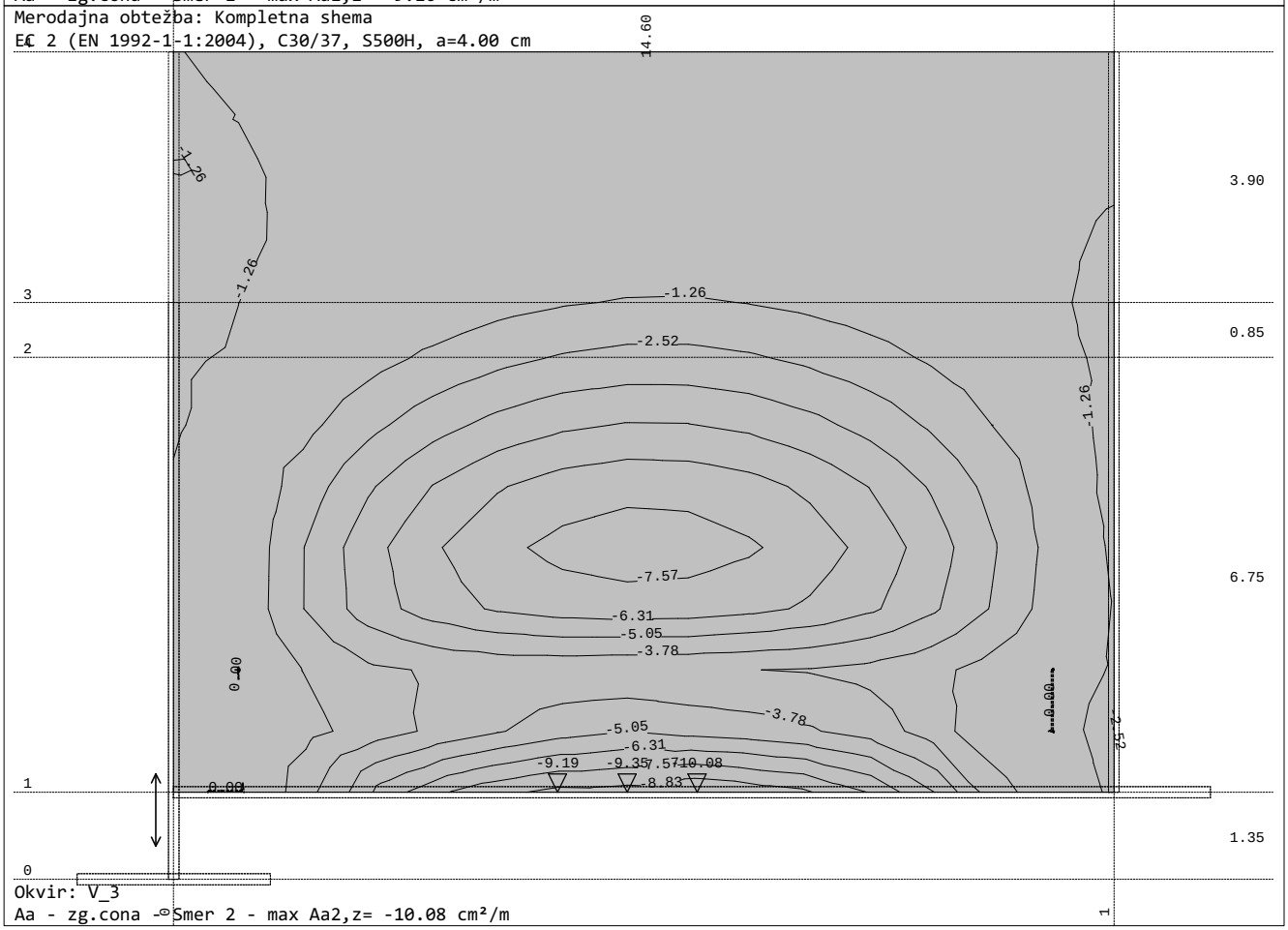

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm
14.60
3.90
0.85
6.75
1.35
-22.43
-5.61
-2.81
0.00
Okvir: V_1
Aa - zg.cona - Smer 1 - max Aa1,z= -22.43 cm²/m


Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm
14.60
3.90
0.85
6.75
1.35
-22.53
-5.63
-2.82
0.00
Okvir: V_1
Aa - zg.cona - Smer 2 - max Aa2,z= -22.53 cm²/m

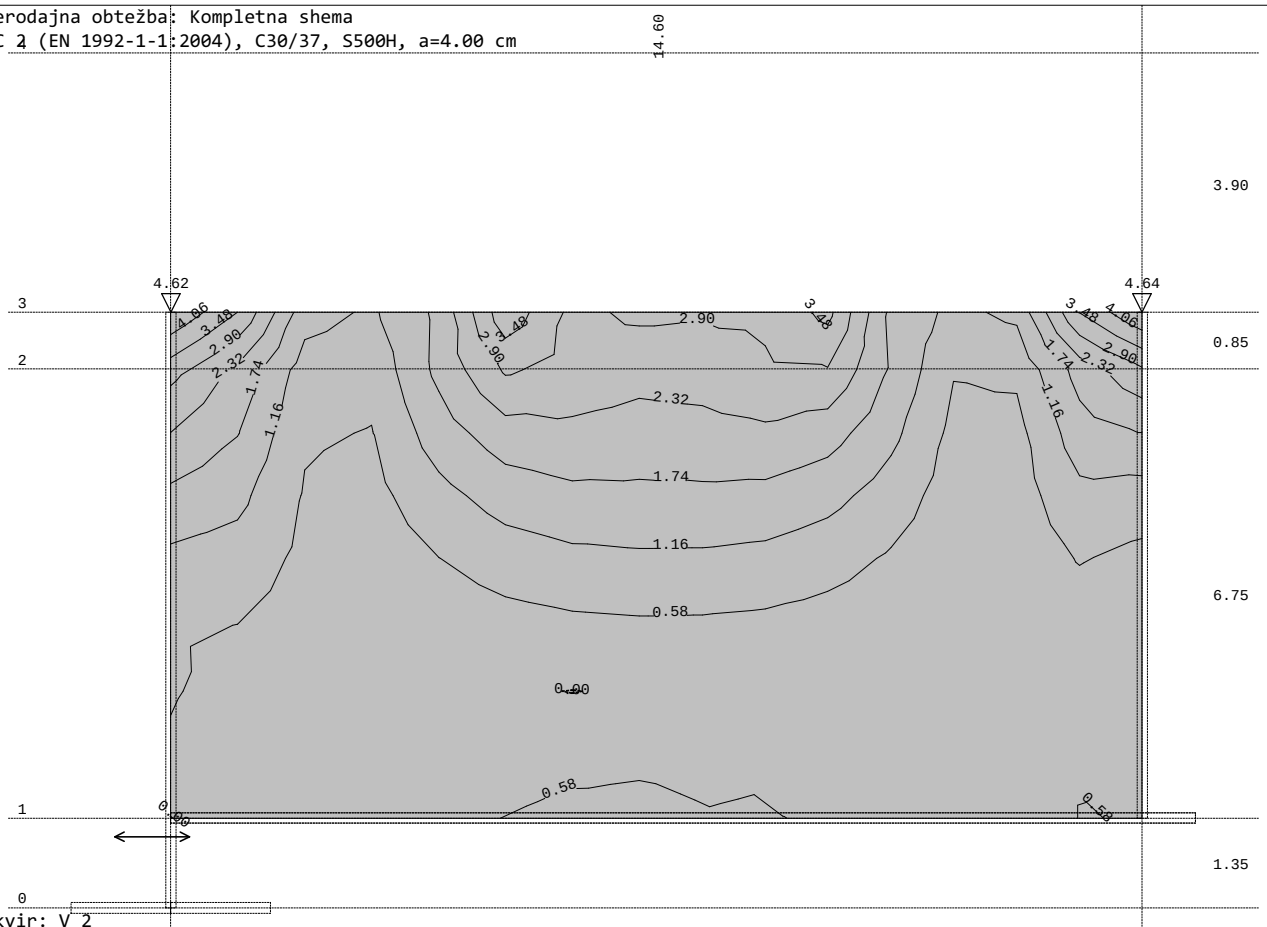

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm
14.60
8.69
9.20
3.90
0.85
6.75
1.35
Okvir: V_3
Aa - sp.cona - Smer 1 - max Aa1,s= 9.20 cm²/m


Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm
14.60
3.90
0.85
6.75
1.35
Okvir: V_3
Aa - sp.cona - Smer 2 - max Aa2,s= 10.13 cm²/m


Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm
14.60
-8.65
-8.02
-6.89
-5.76
-4.62
-3.48
-2.35
-1.22
-9.16
3.90
0.85
6.75
1.35
Okvir: V_3
Aa - zg.cona - Smer 1 - max Aa1,z= -9.16 cm²/m

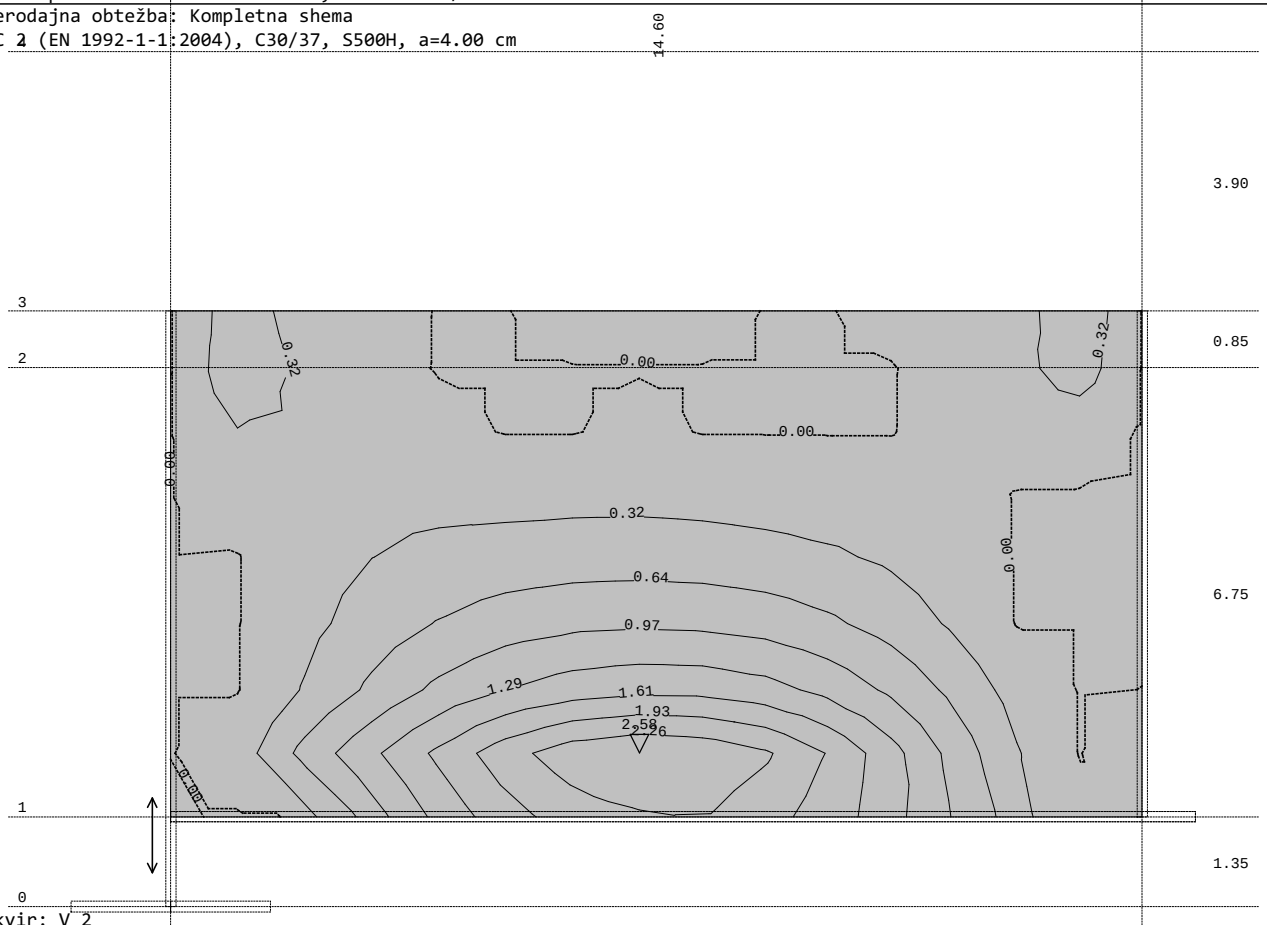

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm
14.60
-1.26
-2.52
-3.78
-5.05
-6.31
-7.57
-9.19
-9.35
-10.08
-8.83
3.90
0.85
6.75
1.35
Okvir: V_3
Aa - zg.cona - Smer 2 - max Aa2,z= -10.08 cm²/m

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm



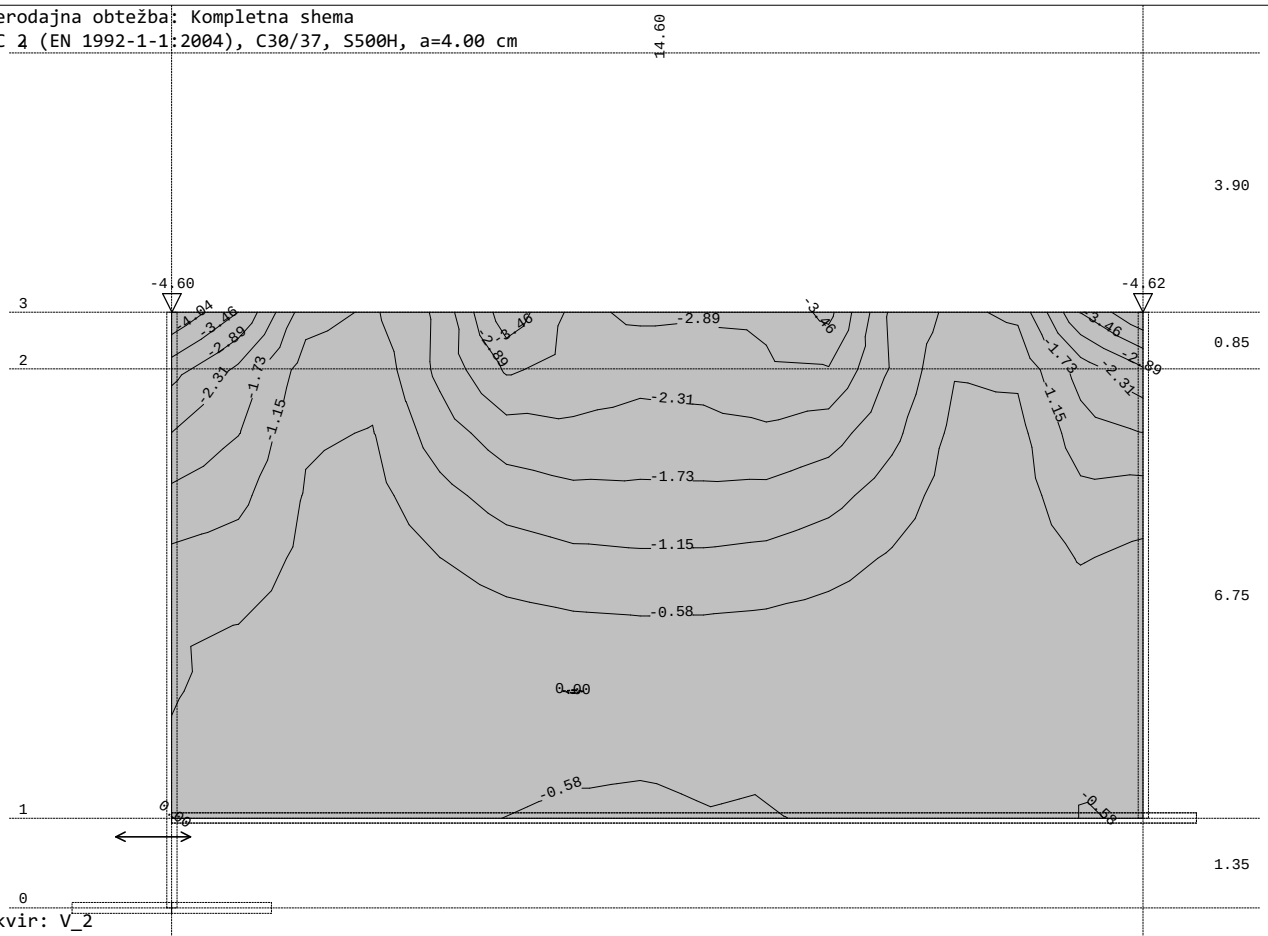
Okvir: V_2
Aa - sp.cona - Smer 1 - max Aa1,s= 4.64 cm²/m

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm



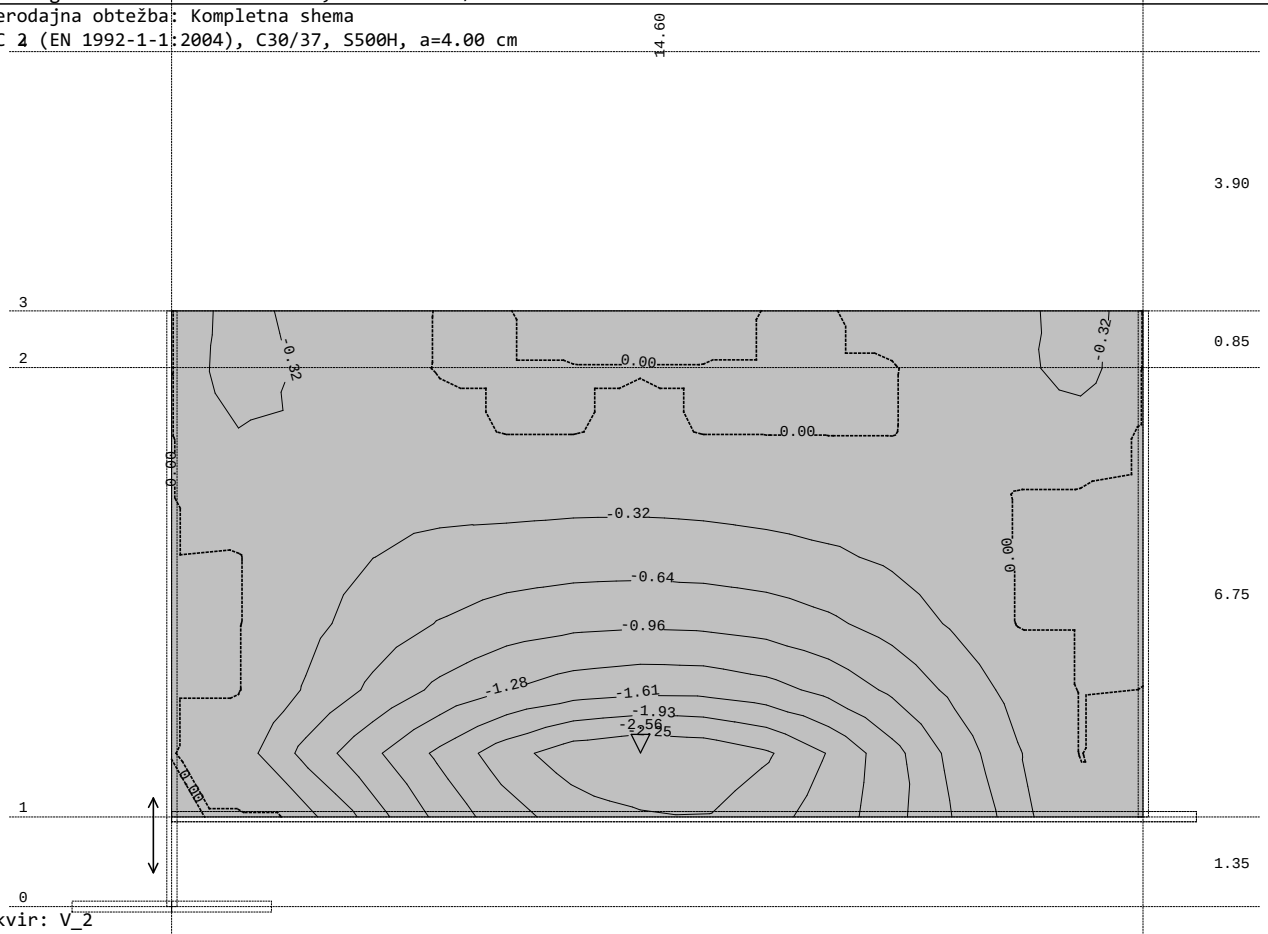
Okvir: V_2
Aa - sp.cona - Smer 2 - max Aa2,s= 2.58 cm²/m

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm



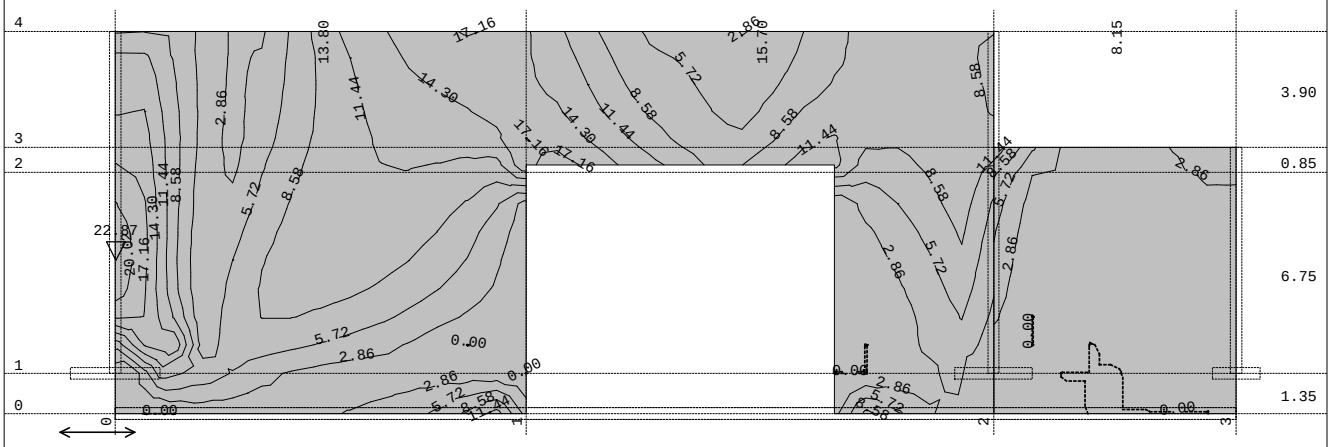
Okvir: V_2
Aa - zg.cona - Smer 1 - max Aa1,z= -4.62 cm²/m

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm



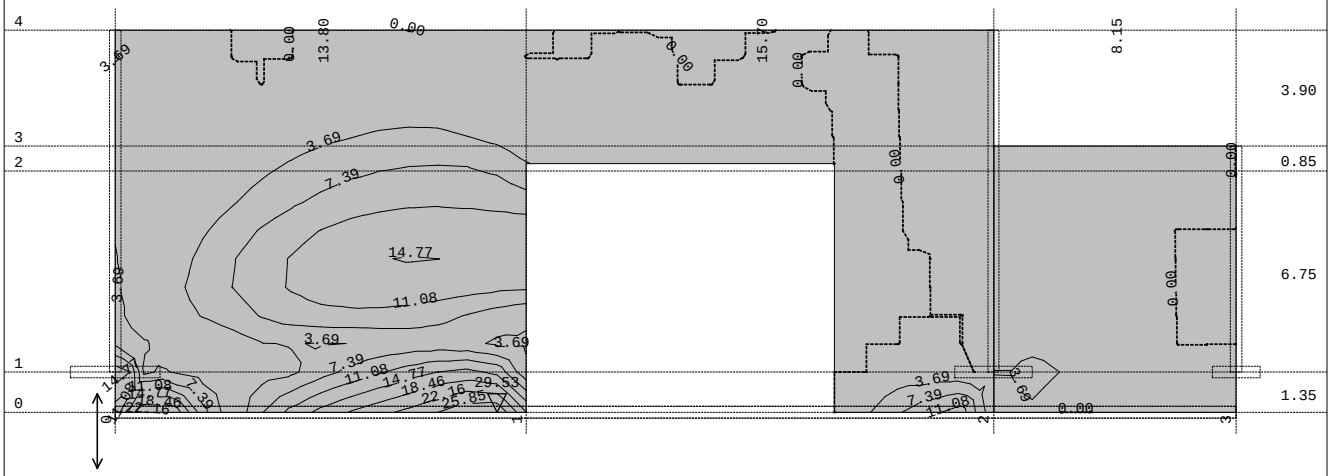
Okvir: V_2
Aa - zg.cona - Smer 2 - max Aa2,z= -2.56 cm²/m

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm



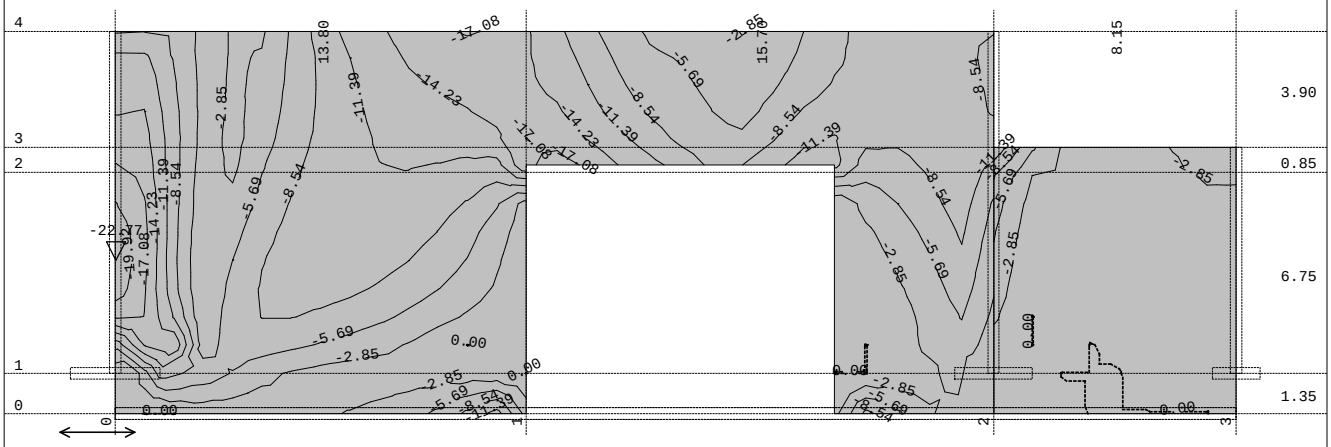
Okvir: H_1
Aa - sp.cona - Smer 1 - max Aa1,s= 22.87 cm²/m

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm



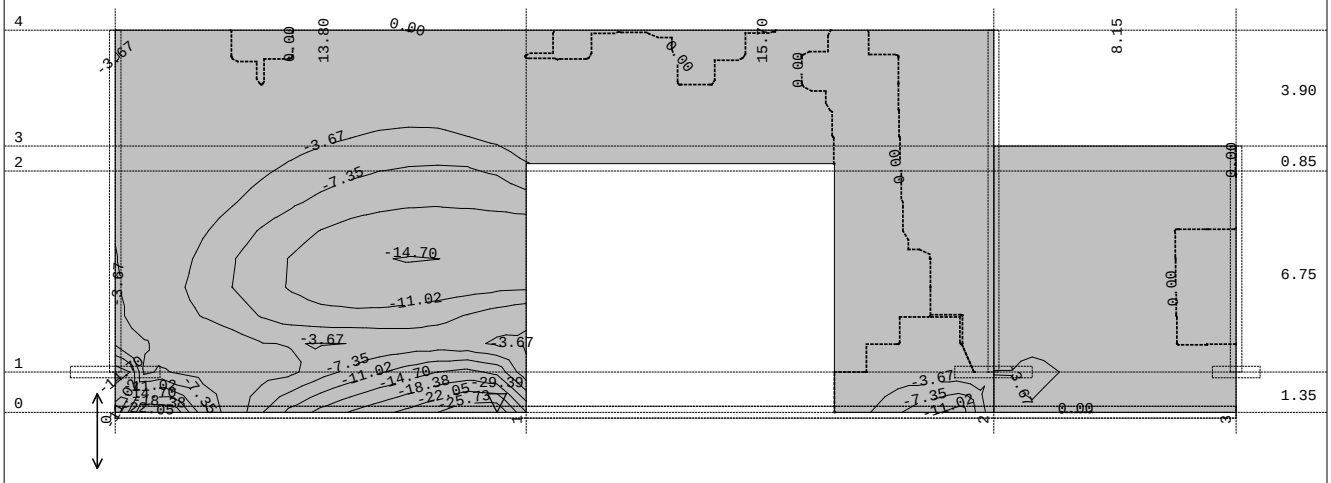
Okvir: H_1
Aa - sp.cona - Smer 2 - max Aa2,s= 29.53 cm²/m

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm



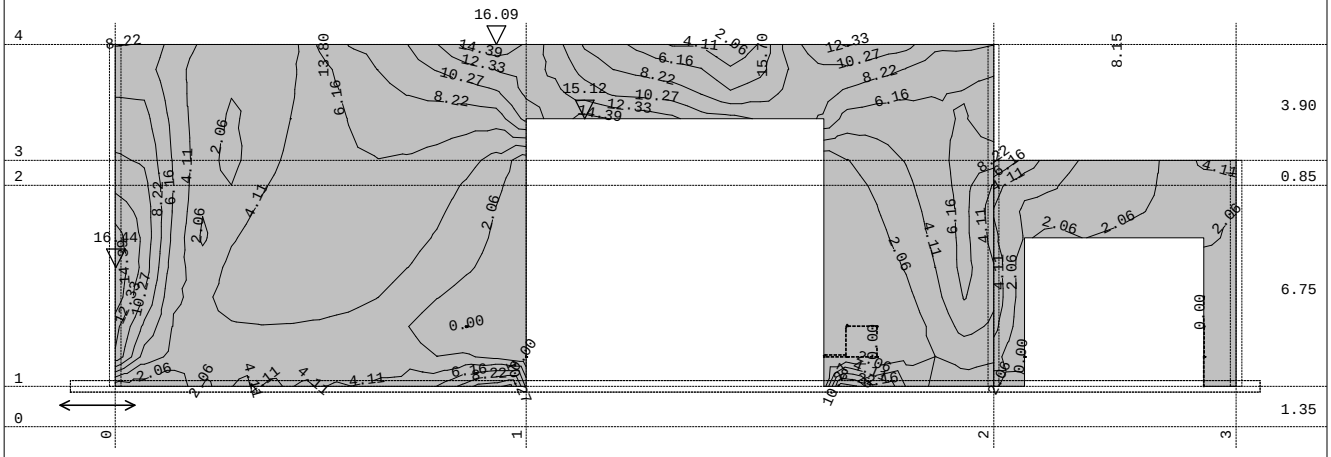
Okvir: H_1
Aa - zg.cona - Smer 1 - max Aa1,z= -22.77 cm²/m

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm



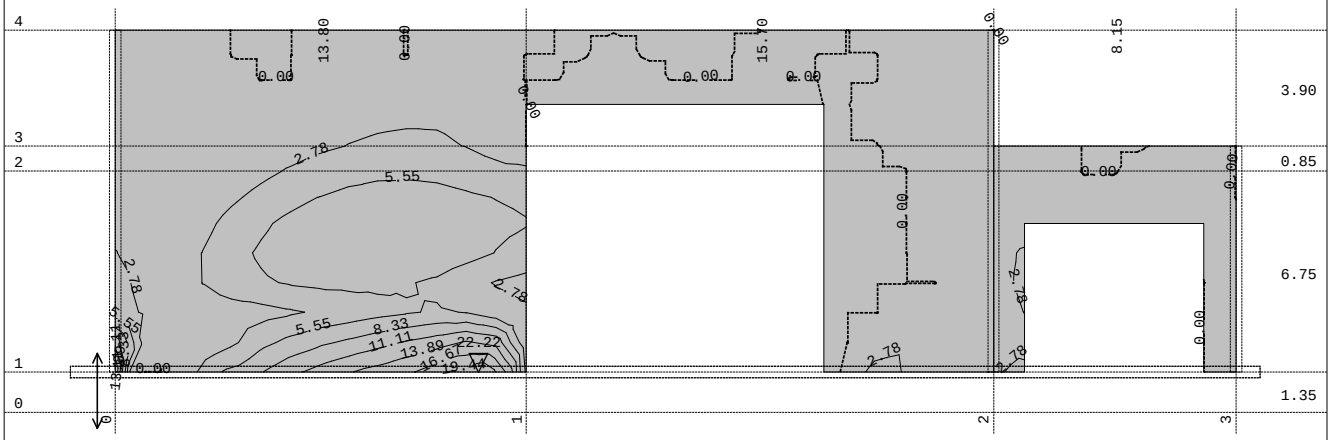
Okvir: H_1
Aa - zg.cona - Smer 2 - max Aa2,z= -29.39 cm²/m

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm



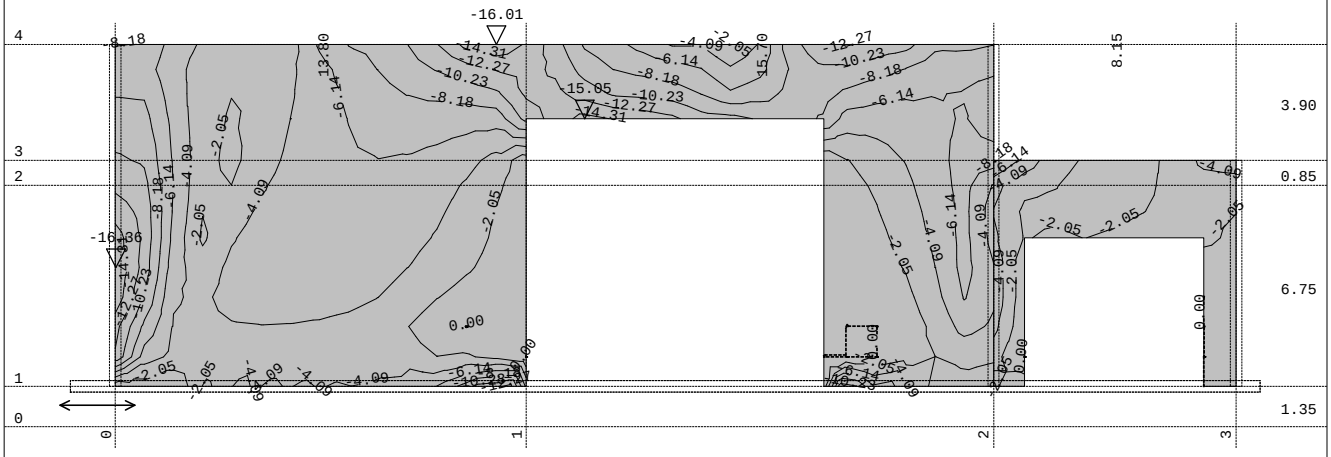
Okvir: H_2
Aa - sp.cona - Smer 1 - max Aa1,s= 16.44 cm²/m

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm



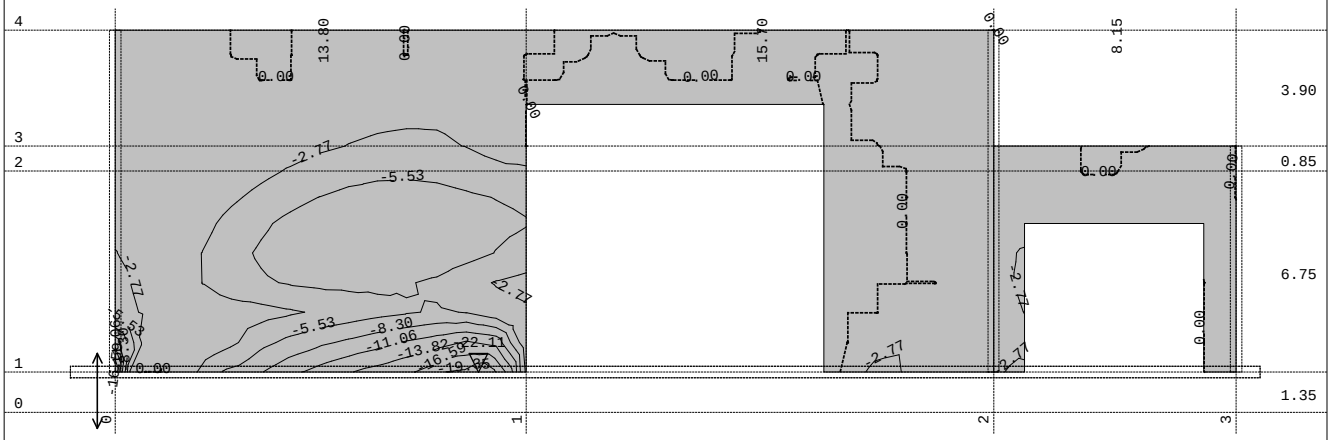
Okvir: H_2
Aa - sp.cona - Smer 2 - max Aa2,s= 22.22 cm²/m

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm



Okvir: H_2
Aa - zg.cona - Smer 1 - max Aa1,z= -16.36 cm²/m

Merodajna obtežba: Kompletna shema
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=4.00 cm



Okvir: H_2
Aa - zg.cona - Smer 2 - max Aa2,z= -22.11 cm²/m

SPINA Novo mesto, d.o.o.

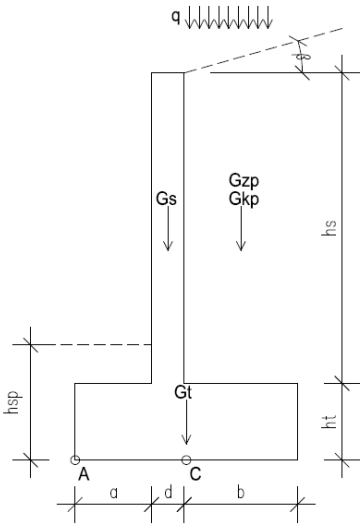
STENA - VIŠJA EC 2 - PROJEKTNI PRISTOP 2 - PP2

MATERIAL:

BETON:	**C 35/45**	fck =	2,33	kN/cm2
JEKLO:	**S 500**	fsk =	43,48	kN/cm2

KARAKTERISTIKE NASUTJA

	γz =	21,60	kN/m3
kot notranjega trenja	ϕtr =	32,00	°
kot notranjega trenja podlage	ϕtr =	35,00	°
nagnjenost zaledja	β =	0,00	°
	hnasutja =	6,5	m
‹tivni zem.pr.(nagnjeno zaledje)	ka =	0,31	
	ko =	0,47	
pasivni zemeljski pritisk	kp =	3,25	
	Nγ =	45,23	
	Nq =	33,30	



GEOMETRIJA:

širina spredaj	a =	1,30	m
širina stene	d =	0,40	m
širina zadaj	b =	1,30	m
naklon dna temelja	α =	0,00	°
višina pete	ht =	0,80	m
višina stene	hs =	8,00	m
skupna višina zemljine zadaj	htot =	8,00	m
višina zemljine spredaj	hsp =	1,20	m
upoštevana višina pasivnih pr.	hps =	0,40	m

OBTEŽBA:

	q =	0,00	kN/m2 obtežba na zaledju
	h bagra =	0,00	m

VERTIKALNA

Gs =	80,00	kN
Gt =	60,00	kN
Gzp =	224,64	kN
Gkp =	0,00	kN
ΣG =	364,64	kN
rezultanta sil		
ga =	2,02	m
lega glede na težišče		
gc =	-0,52	m

HORIZONTALNA OBTEŽBA:

Ea,z =	140,20	kN
ea,z =	2,67	m
Ea,kor =	0,00	kN
ea,kor =	0,00	m
Ep,z =	5,62	kN
ep,z =	0,20	m

KONTROLE:

- KONTROLA ZDRSA

ΣH =	189,27	kN
ΣN =	236,13	kN
Z = N/H =	**1,25 > 1**	

- LEGA REZULTANTE NA DNU TEMELJA

Gd =	492,26	kN
Mc =	245,43	kNm
e = Mc/Gd =	0,50	m
j =	0,50	m

SMO V JEDRU PREREZA

ekr = B/3 =	1,00	m
e < ekr - temelj je stabilen		
x =	1,00	m
σr = 2*Gd/3*x =	491,57	kPa

- NOSILNOST TEMELJNIH TAL

B* = 2,00 m
pf = 1553,66 kPa
pd = pf/1,4 **1109,76** **>** **245,78** kPa

- KONTROLA PREVRNITVE ČE REZULTANTA V JEDRU, BREZ UPOŠTEVANJA PREVRNITVE

Mprev = 504,73 kNm
Modp = 739,03 kNm
Fp = Modp/Mprev = **1,46**

DIMENZIONIRANJE:

- ARMATURA STENE:

hnasutja = 6,5 m
hbager = 0 m
Med = 410,09 kNm

$k_d = M_{Ed} / (f_{cd}*b*d^2)$ = 0,136 → ks = 1,10

As = ks*Med / (d*fyd) = 28,82 cm²/m => Ø 22/12,5cm
30,41 cm2

h nasutja= 6,00 m As = **22,67 cm²/m** **Ø 22/15cm**

h nasutja= 5,00 m As = **13,12 cm²/m** **Ø 16/12,5cm**

- ARMATURA TEMELJA:

Med = 410,09 kNm

$k_d = M_{Ed} / (f_{cd}*b*d^2)$ = 0,03 → ks = 1,10

As = ks*Med / (d*fyd) = 13,65 cm²/m => Ø 16/12,5cm
16,08 cm2

SPINA Novo mesto, d.o.o.

STENA - NIŽJA

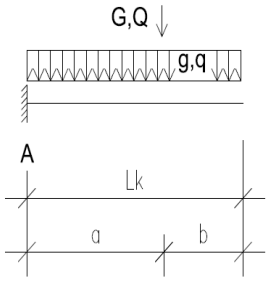
h = 30,00 cm

MATERIAL BETON: **C 25/30** **XC1** JEKLO: **S 500 B**

fcd = 1,67 kN/cm2 fyd = 43,48 kN/cm2

GEOMETRIJA

cmin = 2,00 cm
d = 27,00 cm
Lk = 6,50 m
a = 0,00 m
b = 6,50 m



OBTEŽBA lastna, stalna teža gpl = 0,00 kN/m
veter qpl = 0,75 kN/m
qed = 1,13 kN/m

točkovna Ad = 0,00 kN
Qd = 0,00 kN

zemljina h = 0,00 m qmax,z = 0,00 kN/m2

DIMENZIONIRANJE Med = qed*L^2/2 + Qd*a +qmax,z*h2/6= 23,77 kNm

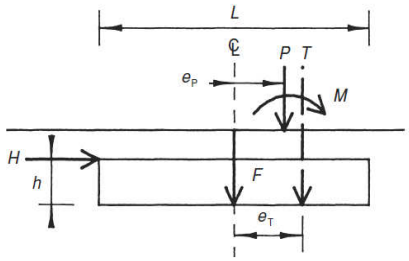
Upogib $k_d = M_{Ed} / (f_{cd}*b*d^2)$ = 0,020 → ks = 1,05 (1.25/10‰)
As = ks*Med / (d*fyd) = 2,12 cm^2/m => Q524
As,min = 3,51 cm^2/m As,max = 108 cm^2/m
As,zgoraj = 5,24 cm^2/m
As, spodaj = 0,00 cm^2/m

Strig Aed = qed*L + Qd = 7,31 kN
bw [mm]= 1000,00 Crd,d = 0,12 r1 = 0,00 < 0,02
d [mm]= 270,00 ck [Mpa] = 25,00 k = 1,86 < 2
'd,c=[Crd,c*k*(100*ρ1*fck)^1/3+k1*Scp]*b*d= 102,06 kN > Ved = 7,31 kN

TEMELJ - EKSCENTRIČEN

GEOMETRI

B = 1,00 m
L = 1,60 m
H = 0,80 m
d = 0,75 m



MATERIAL BETON: **C 25/30** **XC1** JEKLO: **S 500 B**
fcd = 1,67 kN/cm2 fyd = 43,48 kN/cm2

OBTEŽBA Lastna teža Gt = 32,00 kN

Osna sila N = 48,75 kN
Moment M = 23,77 kNm
položaj obtežbe - od začetka temelja xp = 0,80 m
ep = 0,00 m

Horizontalna sila na vrhu temelja H = 0,00 kN

PRERAČUN

T = Gt + N = 80,75 kN
et = 0,29 m
Mt = T*et = 6,99 kNm

IZBERI SPODNJO

et < L/6 = 0,27 m

OBREMENITEV JE IZVEN JEDRA PREREZA

et > L/6 = 0,27 m

POGOJ: Lb = 3*(L/2-et) = 1,52 m > 2*L/3 = 1,07 m OK

tmax = 2*T/B*Lb = 106,46 kPa

DIMENZIONIRANJE

tc = tmax*L/2/Lb = 56,14 kPa

Med = tc*L/2^2 + Δt*L^2/3 = 28,70 kNm

$k_d = M_{Ed} / (f_{cd}*b*d^2)$ = 0,003 → ks = 1,06 (1.75/10‰)

As = ks*Med / (d*fyd) = 0,93 cm²/m => Φ10 / 15 cm

As,min = 0 cm²/m
As,max = 0 cm²/m
As,dej = 5,00 cm²/m

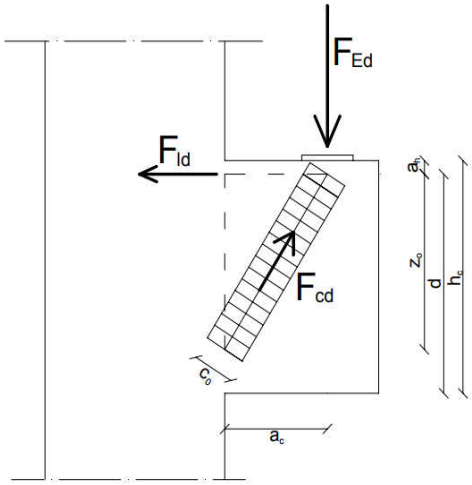
KRATKA KONZOLA **b/h =** 50 / 50 **cm**

MATERIAL BETON: **C 30/37** **XC1** JEKLO: **S 500 B**

fcd = 2 kN/cm2 fyd = 43,48 kN/cm2

GEOMETRI

	širina stebra [cm] =		50
	višina stebra [cm] =		50
Konzola	širina	B [cm] =	50
	dolžina	lc [cm] =	50,00
	odmik sile	ac [cm] =	40,00
	višina	hc [cm] =	50,00
		dc [cm] =	45,00
	neopren	dh [cm] =	0,00
	težišče armature	ah [cm] =	5,00
		d [cm] =	45,00
		z0 [cm]=	36
		š [cm] =	9
		z =	40
		α =	48,01



POGOJ ac/hc = **0,800 < 1,00 < 0,5 => hc/ac =** 2

0,5 < hc/ac < 1 => hc/ac = 21

OBTEŽBA iz towerja

Ag = 28,65 kN

Aq = 18,45 kN

Fed = 66,35 kN

DIMENZIONIRANJE

NATEG Fid [kN] = 73,73 ->As[cm2]= 1,70 n Φ [mm]

As,dej [cm2] = 4,52 **zgoraj** **4** **12**

TLAK Fcd [kN] = 99,1868433 -> σc = 0,22 < fcd = 2 kN/cm2

STRIG POGOJ **0,5*d = 22,5 < ac = 40,00 < 2*d = 90**

=> REDUKCIIJA β = 0,444 Ved,red = 29,49 kN

Crd,d = 0,12 k = 1,67 < 2 r1 = 0,00 < 0,02

: = [Crd,c*k*(100*ρ1*fck)^1/3+k1*Scp]*b*d = 59,06 kN > Ved = 29,49 kN

Dodatna strižna armatura ni potrebna Asw = 0,68 cm2

strižno Φ [mm] razmak [cm] n [kom]

zaprta horizontalna stremena po višini **2** **10** **10,0** **3,00**

Vrd,s = 204,9 kN

Maksimalna strižna sila Ved < Vrd,max = 1188 kN

KONSTRUKTIVNA ARMATURA

As,lnk =

ac/hc < 0,5 horizontalna armatura po celotnem volumnu konzole

0,25*As,main SUM As,lnk = As,main

ac/hc > 0,5 + Fed > Vrdc -> vertikalna strižna ar As,vert[cm: 0,76305375

ac/hc = 0,80 < 0,5

As,lnk = 1,13 cm2

SPINA Novo mesto, d.o.o.

AB STENA - SAMOSTOJNA

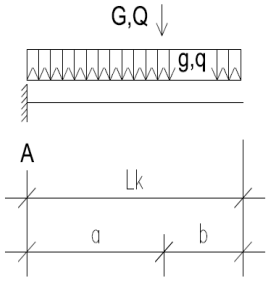
h = **25,00** **cm**

MATERIAL BETON: **C 25/30** **XC1** JEKLO: **S 500 B**

fcd = 1,67 kN/cm2 fyd = 43,48 kN/cm2

GEOMETRIJA

cmin = 2,00 cm
d = 22,00 cm
Lk = 7,85 m
a = 0,00 m
b = 7,85 m



OBTEŽBA lastna, stalna teža gpl = 0,00 kN/m
veter qpl = 0,50 kN/m
qed = 0,75 kN/m

točkovna Ad = 0,00 kN
Qd = 0,00 kN

zemljina h = 1,35 m qmax,z = 25,00 kN/m2

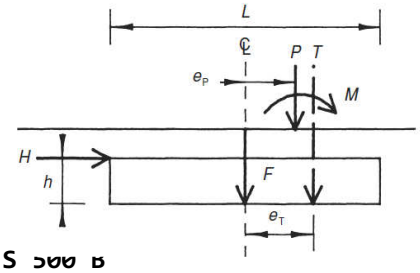
DIMENZIONIRANJE Med = qed*L^2/2 + Qd*a +qmax,z*h2/6= 33,36 kNm

Upogib $k_d = M_{Ed} / (f_{cd}*b*d^2)$ = 0,041 → ks = 1,05 (1.25/10‰)
As = ks*Med / (d*fyd) = **3,64** **cm^2/m =>** **Q636**
As,min = 2,86 cm^2/m As,max = 88 cm^2/m
As,zgoraj = 6,36 cm^2/m
As, spodaj = 0,00 cm^2/m

Strig Aed = qed*L + Qd = 5,89 kN
bw [mm]= 1000,00 Crd,d = 0,12 r1 = 0,00 < 0,02
d [mm]= 220,00 fck [Mpa] = 25,00 k = 1,95 < 2
Vrd,c=[Crd,c*k*(100*ρ1*fck)^1/3+k1*Scp]*b*d= 99,71 kN > Ved = 18,39 kN

TEMELJ - EKSCENTRIČEN

GEOMETRI
B = **1,00** **m**
L = **1,60** **m**
H = **0,80** **m**
d = 0,75 m



MATERIAL BETON: **C 25/30** **XC1** JEKLO: **S 500 B**
fcd = 1,67 kN/cm2 fyd = 43,48 kN/cm2

OBTEŽBA Lastna teža Gt = 32,00 kN

Osna sila N = 74,66 kN
Moment M = 33,36 kNm
položaj obtežbe - od začetka temelja xp = 0,80 m
ep = 0,00 m

Horizontalna sila na vrhu temelja H = 0,00 kN

PRERAČUN

T = Gt + N = 106,66 kN
et = 0,31 m
Mt = T*et = 10,43 kNm

IZBERI SPODNJO

et < L/6 = 0,27 m

OBREMENITEV JE IZVEN JEDRA PREREZA

et > L/6 = 0,27 m

POGOJ: Lb = 3*(L/2-et) = 1,46 m > 2*L/3 = 1,07 m OK

tmax = 2*T/B*Lb = 145,94 kPa

DIMENZIONIRANJE

tc = tmax*L/2/Lb = 79,87 kPa

Med = tc*L/2^2 + Δt*L^2/3 = 39,65 kNm

$k_d = M_{Ed} / (f_{cd}*b*d^2)$ = 0,004 → ks = 1,06 (1.75/10‰)

As = ks*Med / (d*fyd) = 1,29 cm²/m => R 524 + U Φ10 / 15 cm

As,min = 0 cm²/m As,max = 0 cm²/m

As,dej = 5,24 cm²/m

AB STEBRI **b/h = 30 / 30 cm**

MATERIAL BETON: **C 25/30** **XC1** JEKLO: **S 500 B**

fcd = 1,67 kN/cm2 fyd = 43,48 kN/cm2

GEOMETRIJA

L = 530 cm
A = 900 cm2
Iy = 67500 cm4 iy = 8,66 cm
Iz = 67500 cm4 iz = 8,66 cm

OBTEŽBA

Potresna analiza vezi

ag = **0,250** g
q = 1,50 …konzolni betonski nosilec
S = 1,00

T1 = Ct*H^(3/4) = 0,02 s…ocenjen nihajni čas
Ct = 0,005
H = 5,30 m

Tb < T < T(Sd(T) = 0,42

Preračun mas
- nosilec Ag = 7,50 kN
- streha Ag = 28,64 kN
- masa strehe F = 36,14 kN

- base shear Fb = 12,80 kN

Etaža	hetaže	zi	G	zi*mi	Fe,i, x
e2	5,30	5,30	36,14	191,54	12,80
0,00	0,00	0,00	0,00	0,00	0,00

SUM Fg = 36,14 kN 12,80 kN
SUM zi*mi : 191,54

NOTRANJE SILE

Vertikalne sile Azg= 36,14 kN
Ned = 36,14 kN
Momenti Med,yzg = 67,84 kNm
Med,ysum = 67,84 kNm

KONTROLA UKLONA

n = 0,02 Uklonska dolžina
A = 0,7 Lo = 1 xL
B = 1,1 Lo = 530 cm
C = 0,7 λy = 61,20 < λlim - OK
λlim = 69,52 λz = 61,20 < λlim - OK

KONTROLA NAPETOSTI V PREREZU

v = 0,02 < 0,65 DCM

DIMENZIONIRANJE: Med = Med,ysum = 67,84 kNm

$k_d = M_{Ed}*10^{-4} / (f_{cd}*b*d^2)$ = 0,217 → ks = 1,10

As = ks*Med / (d*fyd) = 6,87 zgoraj - 3 Φ20
spodaj + 3 Φ20

ARMATURA As, min = max (0,1*Ned/fyd; 0,002Ac; 0,01Ac) = 9,00 cm2
8 20 As,dej = 25,13 cm^2

Prečna armatura razmik med stremeni

s = min (bo/2;175;8*dbl) = 17,5 cm Stremena **ϕ8 / 10 / 20 cm**

AB STENA OB KLANČINI

AB STEBRI **b/h =** **30** / **30** **cm**

MATERIAL BETON: **C 30/37** **XC4** JEKLO: **S 500 B**

fcd = 1,67 kN/cm2 fyd = 43,48 kN/cm2

GEOMETRIJA

L = 490 cm
A = 0 cm2
Iy = 0 cm4
Iz = 0 cm4

OBTEŽBA Potresna analiza vezi

ag = **0,250** g
q = 1,50 …konzolni betonski nosilec

S = 1,00

T1 = Ct*H^(3/4) = 0,02 s…ocenjen nihajni čas
Ct = 0,005
H = 5,30 m

Tb < T < T(Sd(T) = 0,42

Preračun mas
- nosilec Ag = 7,50 kN
- streha Ag = 28,64 kN
- masa strehe F = 36,14 kN
- base shear Fb = 12,80 kN

Etaža	**hetaže**	**zi**	**G**	**zi*mi**	**Fe,i, x**
e2	5,30	5,30	36,14	191,54	12,80
0,00	0,00	0,00	0,00	0,00	0,00
		SUM Fg =	36,14 kN		12,80 kN
		SUM zi*mi =	191,54		

NOTRANJE SILE

Vertikalne sile Azg= 36,14 kN
Ned = 36,14 kN
Momenti Med,yzg = 67,84 kNm
Med,ysum = 67,84 kNm

DIMENZIONIRANJE: Med = Med,ysum = 67,84 kNm

$k_d = M_{Ed}*10^{-4} / (f_{cd}*b*d^2)$ = 0,217 → ks = 1,10

As = ks*Med / (d*fyd) = **6,87** **zgoraj - 3 Ø20**
spodaj + 3 Ø20

ARMATURA As, min = max (0,1*Ned/fyd; 0,002Ac; 0,01Ac) = 0,08 cm2
8 **20** As,dej = 25,13 cm^2

Prečna armatura razmik med stremeni

s = min (bo/2;175;8*dbl) = 17,5 cm Stremena **ϕ8 / 10 / 20 cm**

POZ - AB STENA **b = 30,00 cm**

MATERIAL BETON: **C 30/37** **XC4** JEKLO: **S 500 B**

fcd = 2,00 kN/cm2 fyd = 43,48 kN/cm2

DIMENZIONIRANJE:

Ast,min = 0,003*Ast = 9,00 cm2/m

Ast,min/ na eno lice stene = 4,50 cm2/m MREŽE **± Q524**

PASOVNI TEMELJI **b/h= 160 / 50 cm**

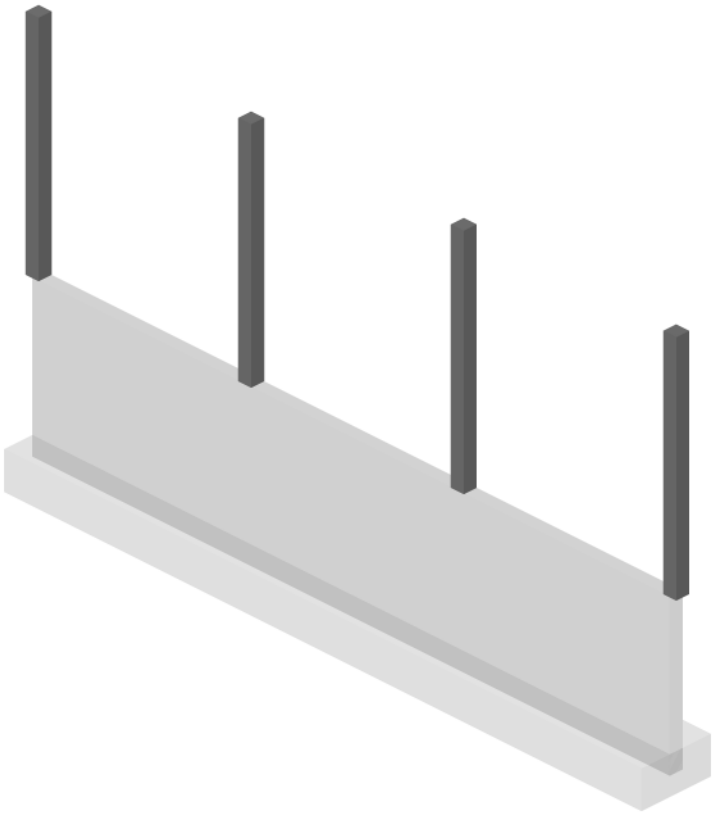
NAPETOSTI V TEMELJNIH TLEH - nefaktorirane

σd = 65,00 kPa < σdovoljeno = 200,00 kPa

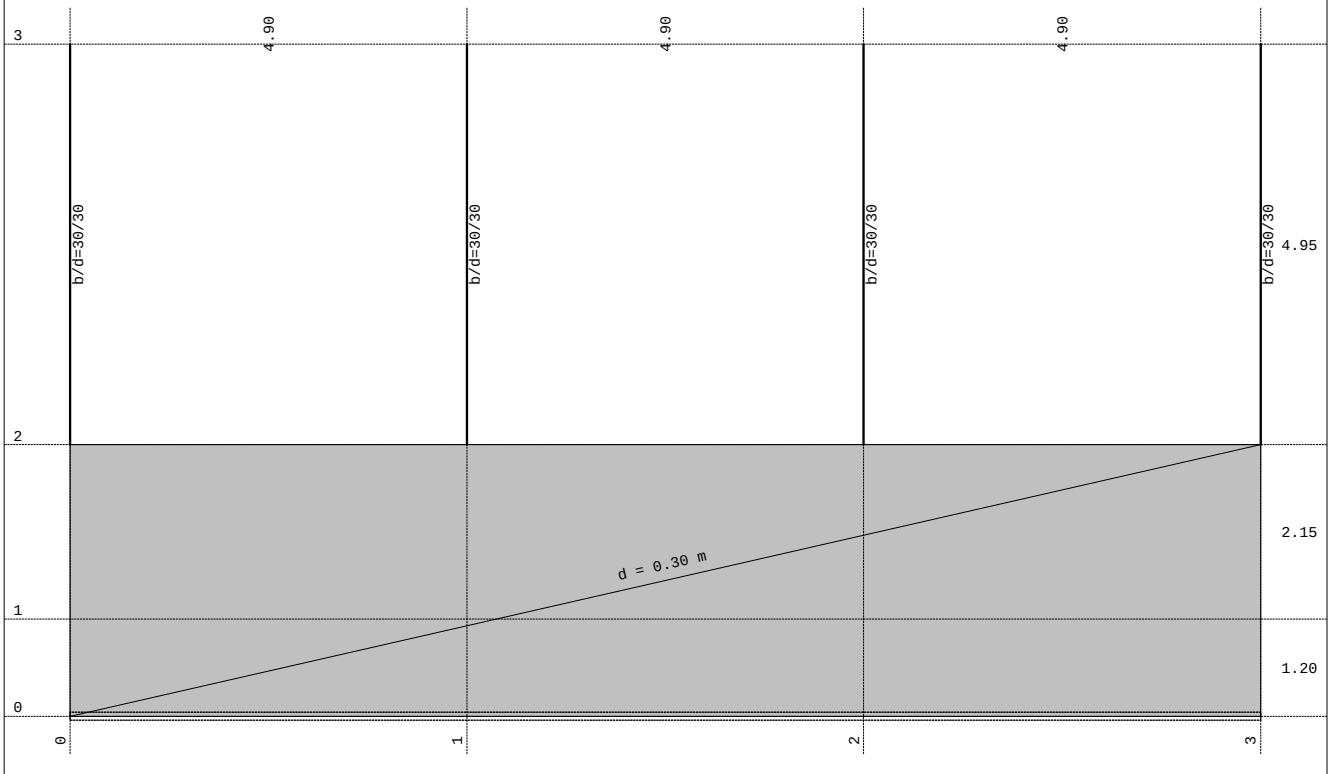
DIMENZIONIRANJE: As,min = 9,10 cm^2

As => ± U Φ 14/15cm; v obe smeri

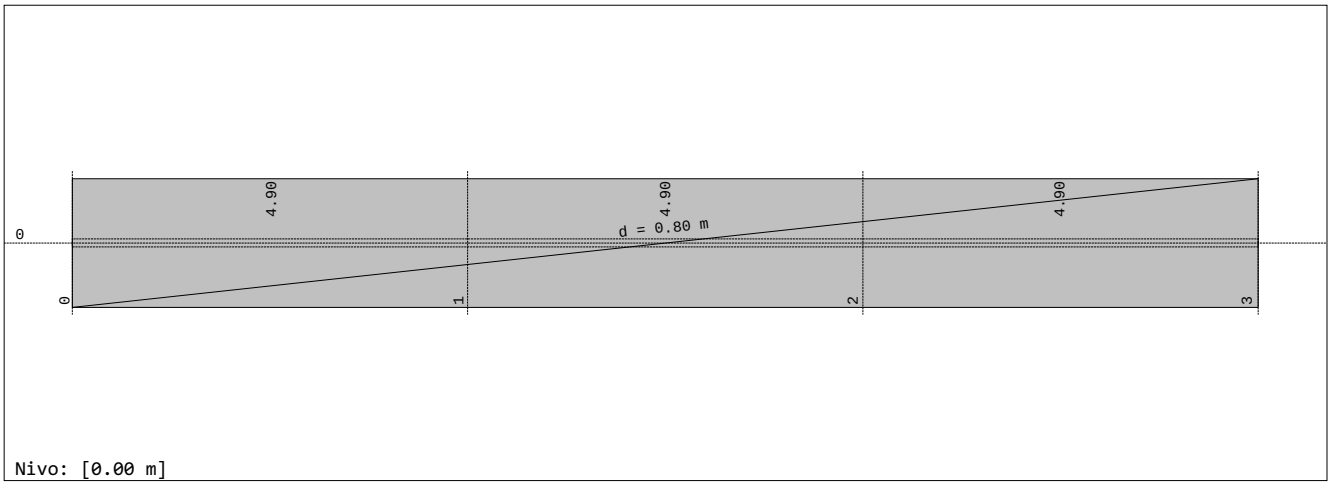
Vhodni podatki - Konstrukcija



Izometrija



Okvir: H_1



Nivo: [0.00 m]

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

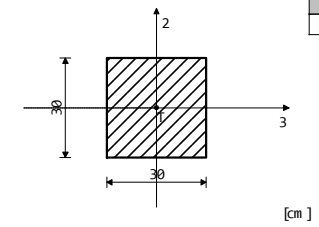
Seti plošč

No	d[m]	e[m]	Material	Tip preračuna	Ortotropija	E2[kN/m2]	G[kN/m2]	α
<1>	0.300	0.150	1	Tanka plošča	Izotropna			
<2>	0.800	0.400	1	Tanka plošča	Izotropna			

Seti gred

Set: 1 Prerez: b/d=30/30, Fiktivna ekscentričnost

Mat.	A1	A2	A3	I1	I2	I3
1 - C 25/30	9.000e-2	7.500e-2	7.500e-2	1.141e-3	6.750e-4	6.750e-4

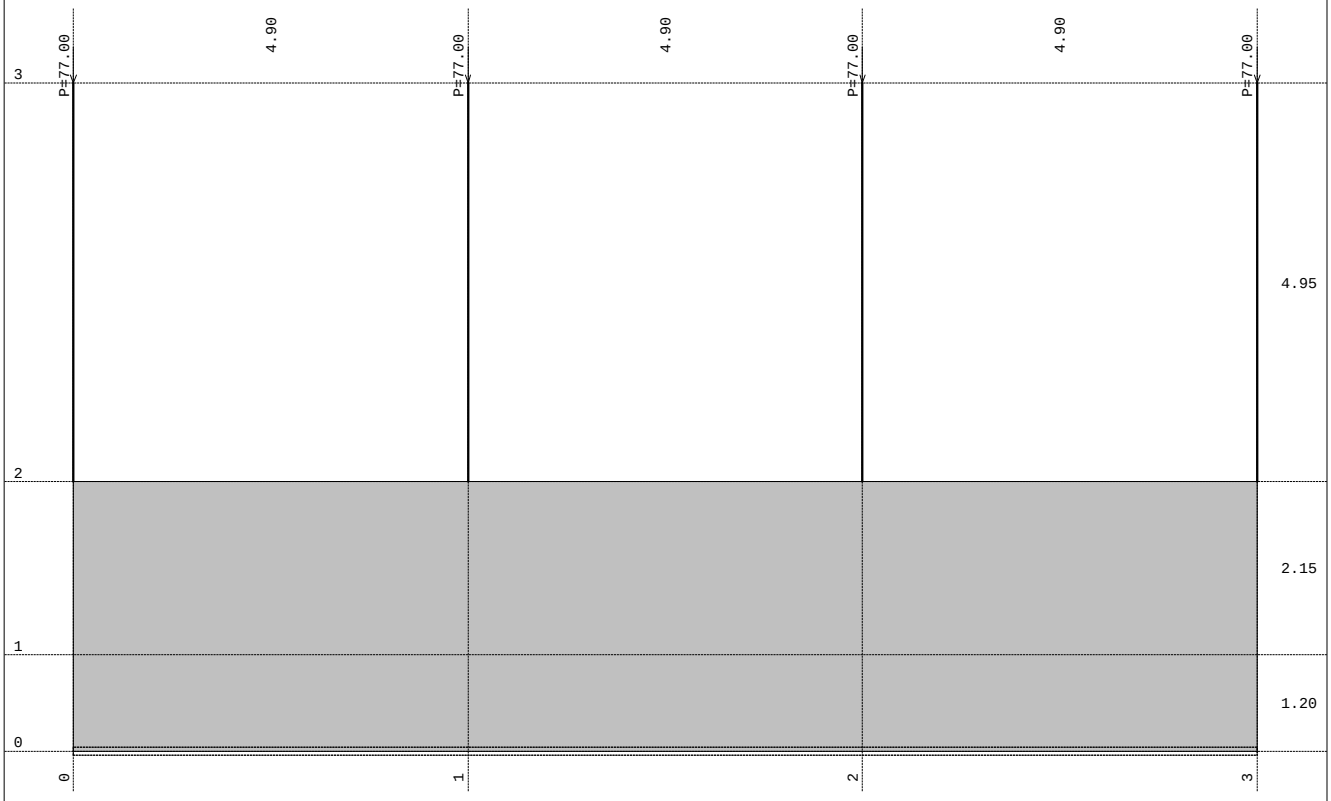


Seti površinskih podpor

Set	K,R1	K,R2	K,R3
1	1.000e+4	1.000e+4	1.000e+4

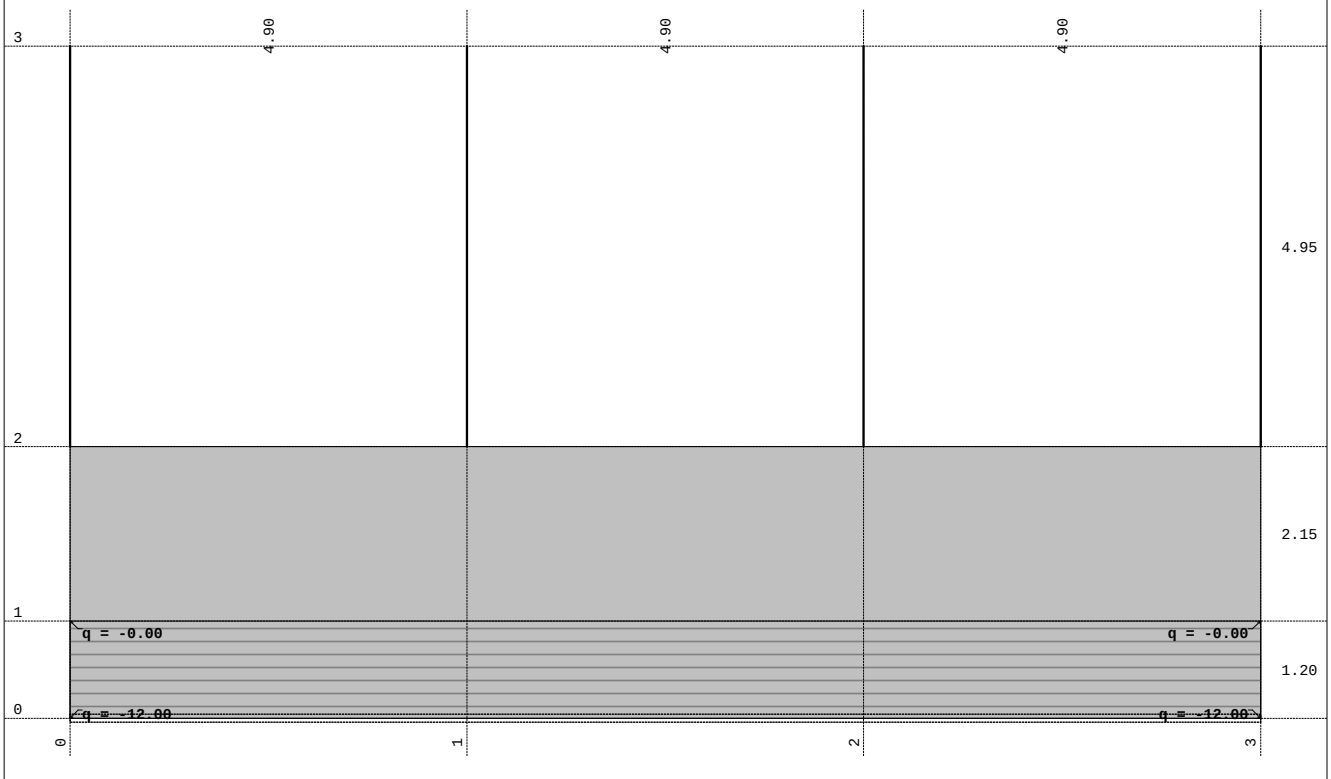
Vhodni podatki - Obtežba

Obt. 1: Lastna, stalna (g)



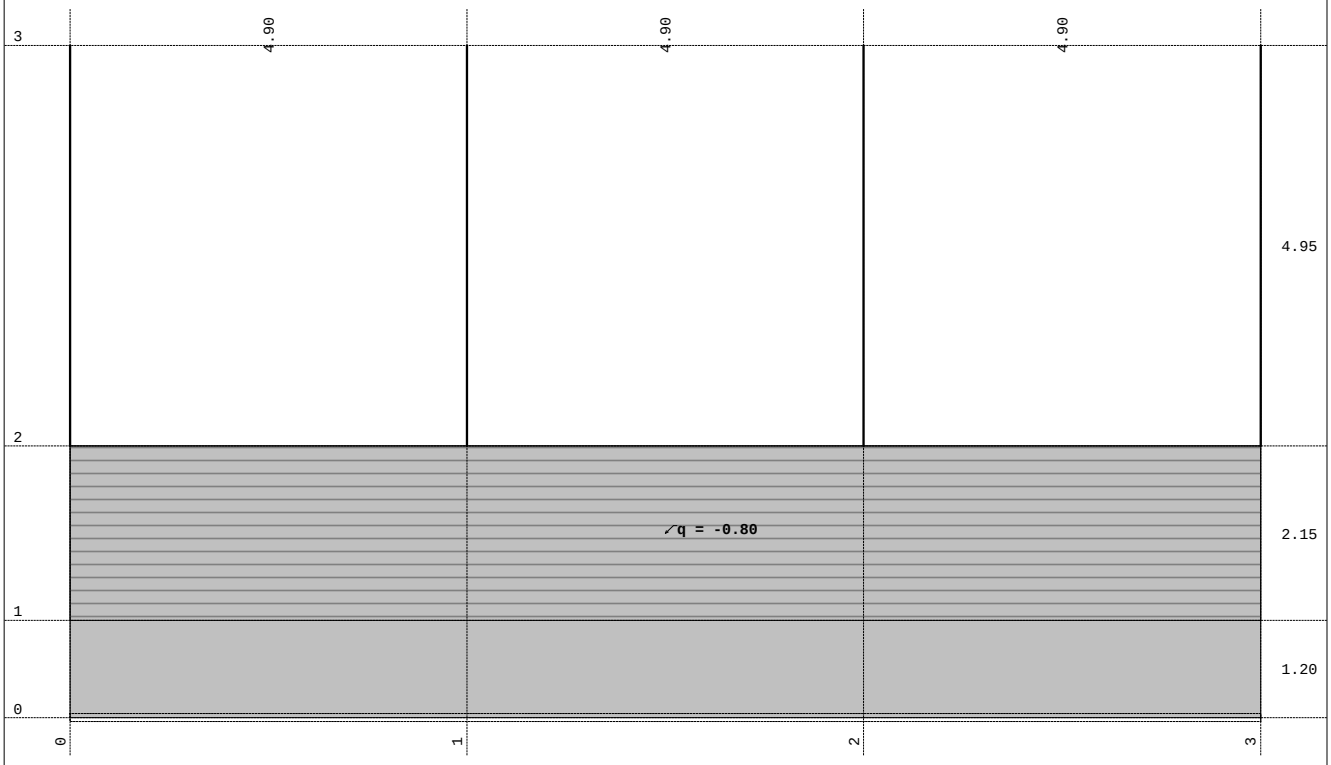
Okvir: H_1

Obt. 2: Zemljina



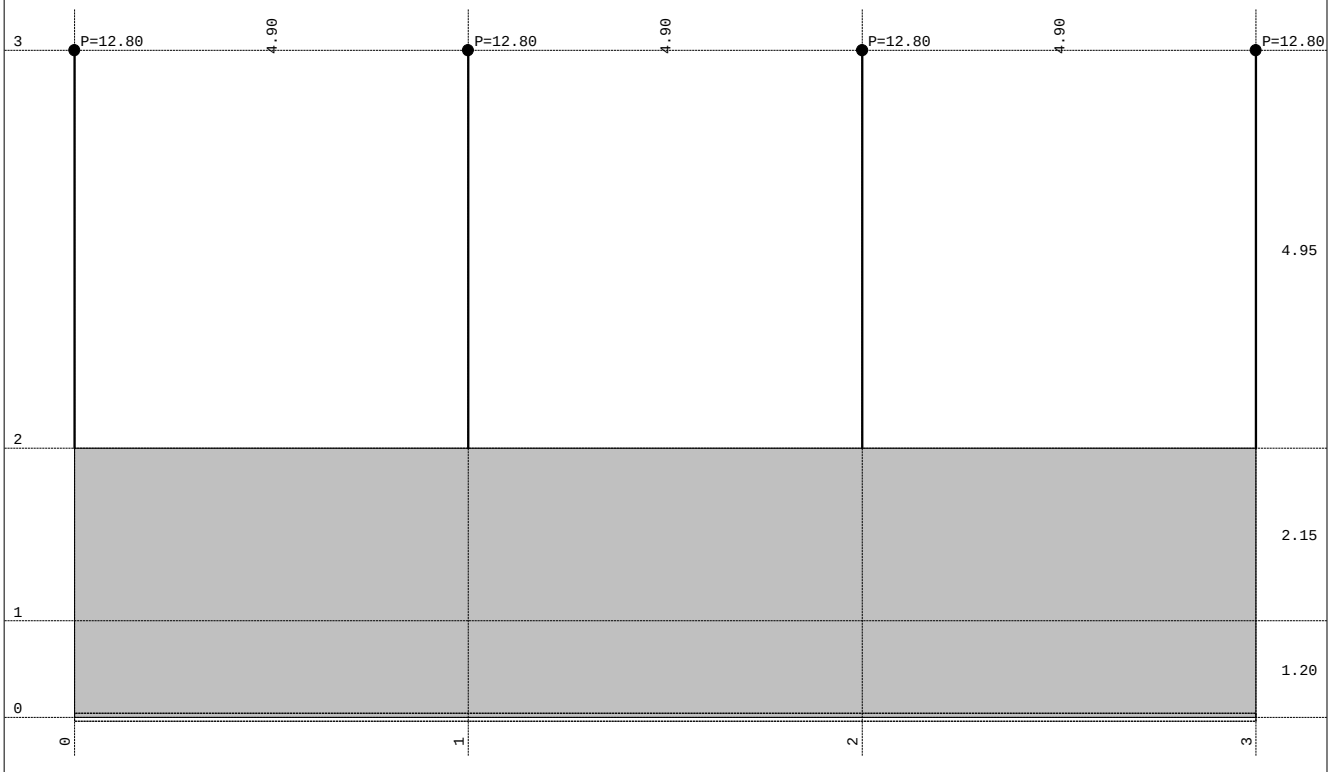
Okvir: H_1

Obt. 3: Veter



Okvir: H_1

Obt. 4: Py



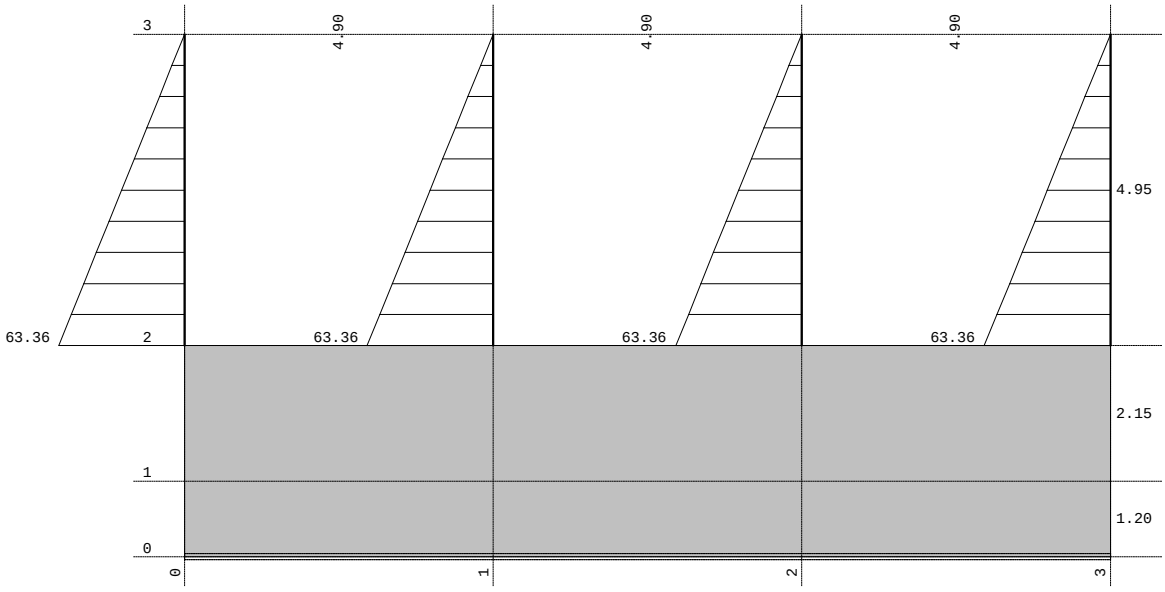
Okvir: H_1

Lista obtežnih primerov

LC	Naziv	pX [kN]	pY [kN]	pZ [kN]
1	Lastna, stalna (g)	0.00	0.00	-1192.29
2	Zemljina	0.00	105.84	0.00
3	Veter	0.00	25.28	0.00
4	Py	0.00	51.20	0.00
5	Komb.: 1.35xI+1.35xII+1.5xIII	0.00	180.81	-1609.59
6	Komb.: I+1.35xII+1.5xIII	0.00	180.81	-1192.29
7	Komb.: 1.35xI+II+1.5xIII	0.00	143.77	-1609.59
8	Komb.: I+II+1.5xIII	0.00	143.77	-1192.29
9	Komb.: 1.35xI+1.35xII	0.00	142.88	-1609.59
10	Komb.: I+1.35xII	0.00	142.88	-1192.29
11	Komb.: 1.35xI+II	0.00	105.84	-1609.59
12	Komb.: I+II	0.00	105.84	-1192.29
13	Komb.: I+II+III	0.00	131.12	-1192.29
14	Komb.: I+II	0.00	105.84	-1192.29
15	Komb.: I+IV	0.00	51.20	-1192.29

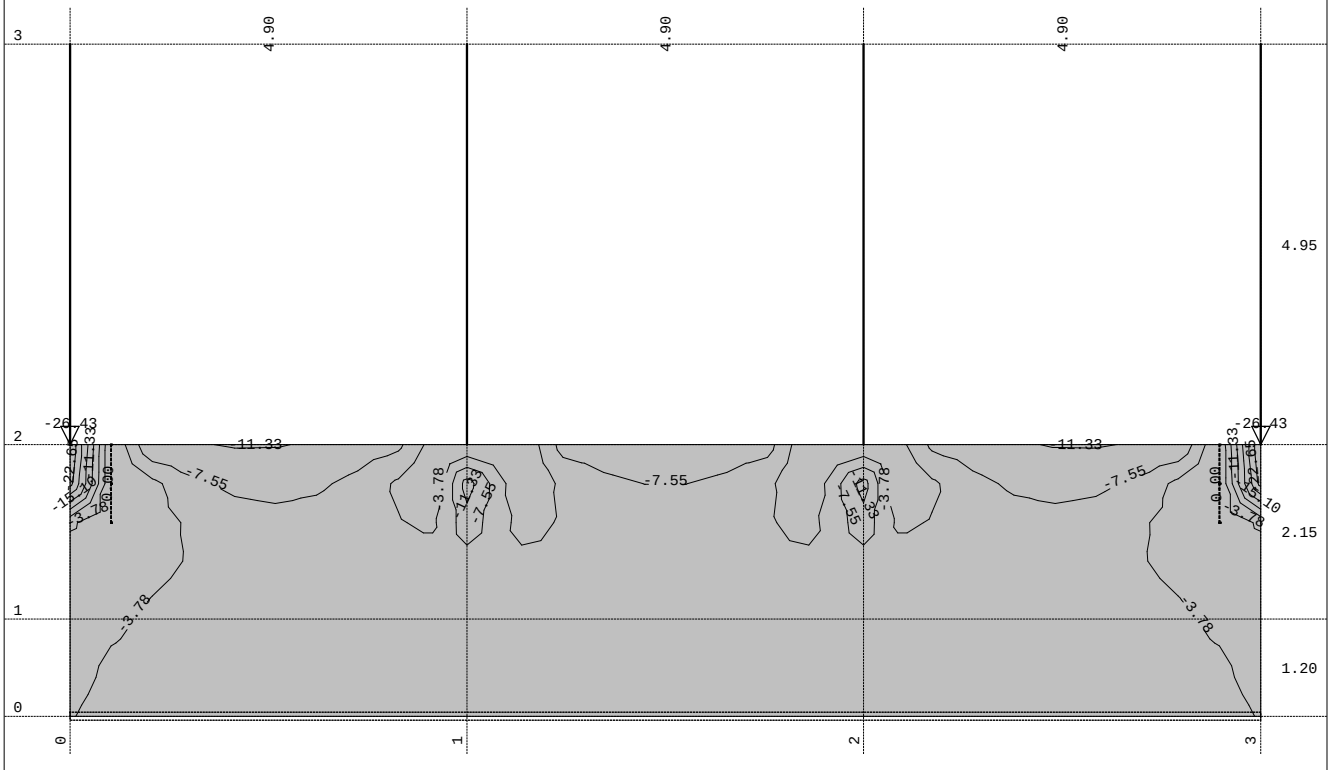
Statični preračun

Obt. 16: [Ovojnica] 5-15



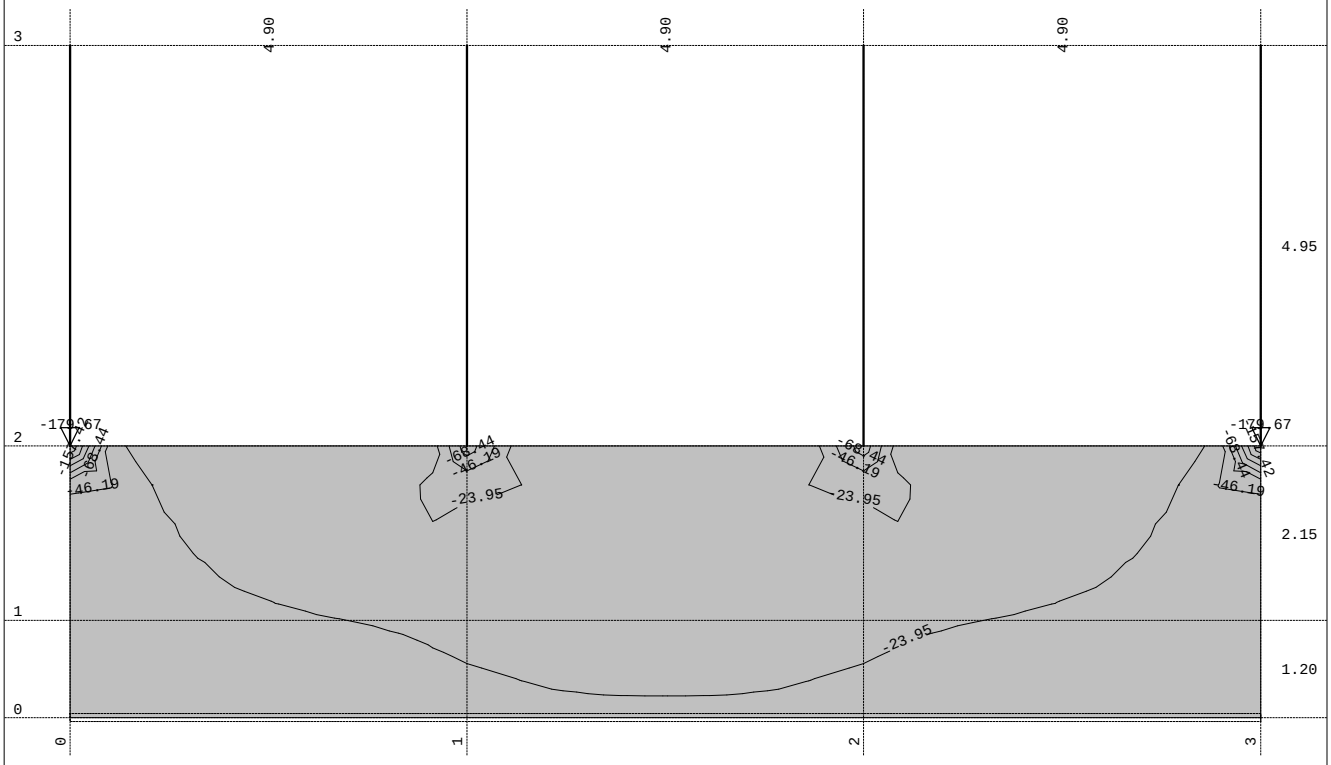
Okvir: H_1
Vplivi v gredi: max M2= 63.36 / min M2= -0.00 kNm

Obt. 16: [Ovojnica] 5-15



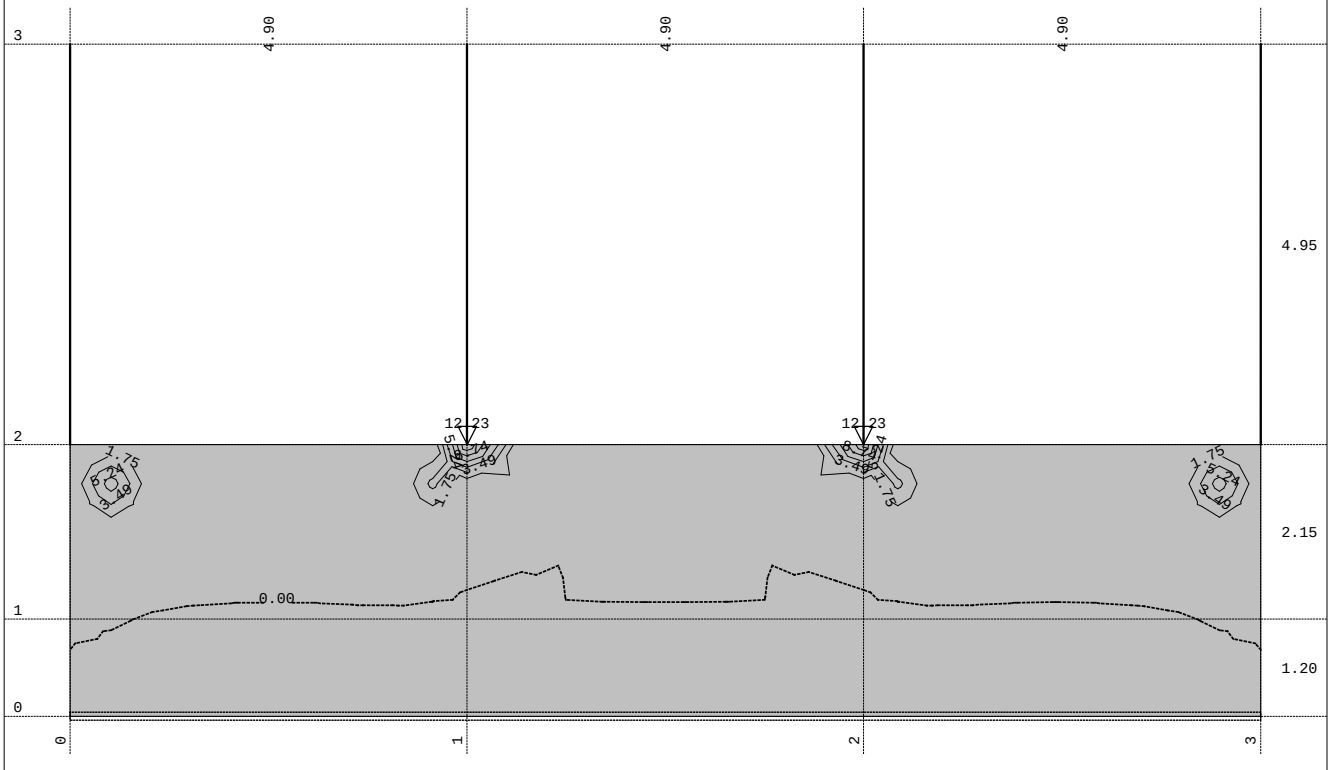
Okvir: H_1
Vplivi v plošči: max Mx= 0.00 / min Mx= -26.43 kNm/m

Obt. 16: [Ovojnica] 5-15



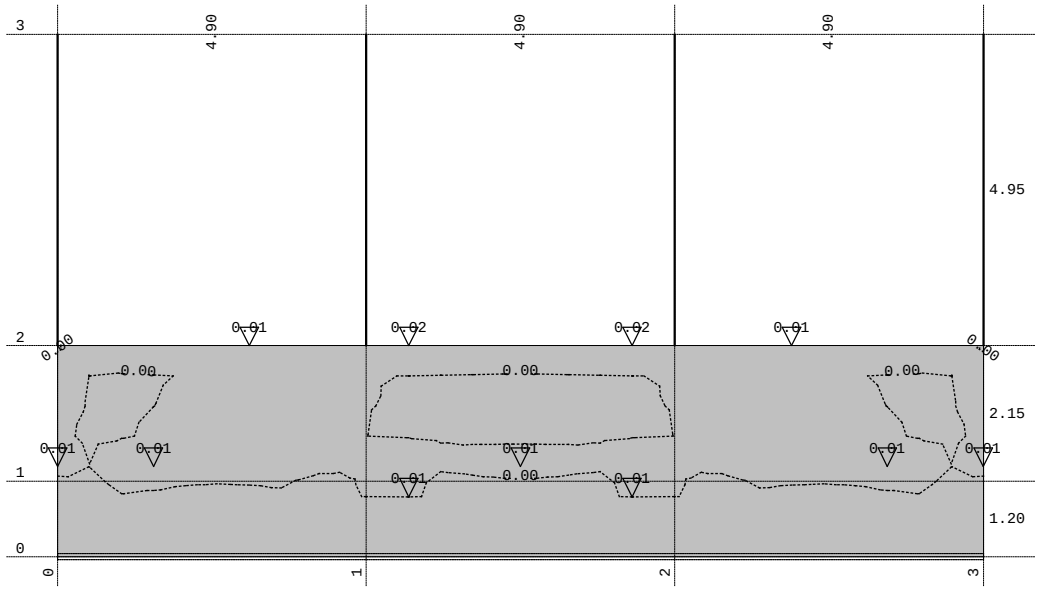
Okvir: H_1
Vplivi v plošči: max My= -1.71 / min My= -179.67 kNm/m

Obt. 16: [Ovojnica] 5-15



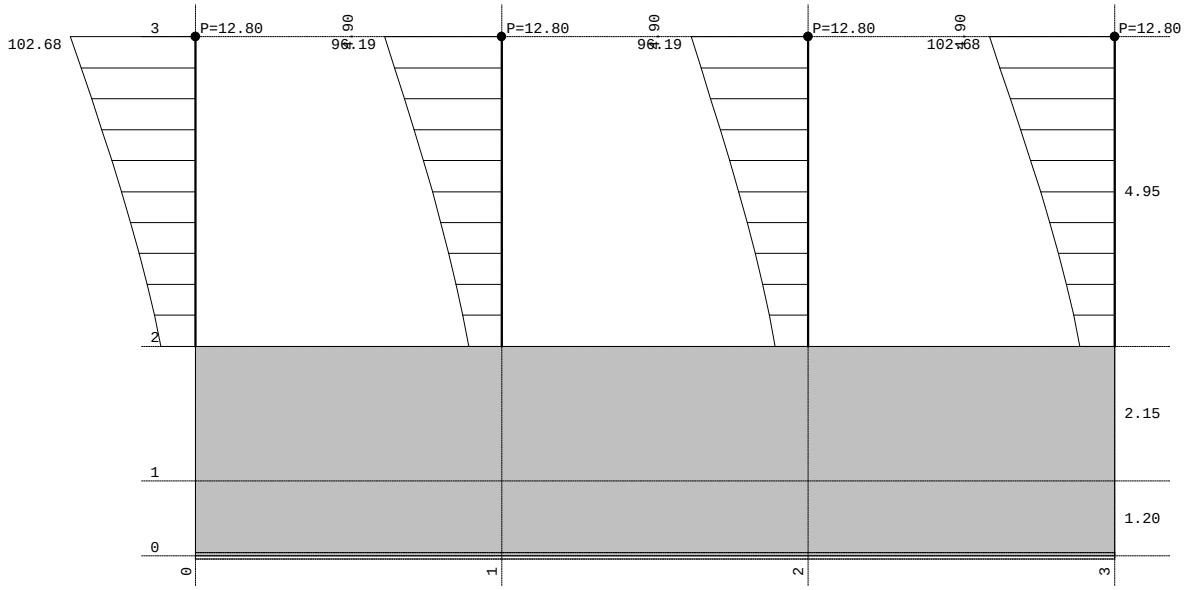
Okvir: H_1
Vplivi v plošči: max Mx= 12.23 / min Mx= 0.00 kNm/m

Obt. 16: [Ovojnica] 5-15



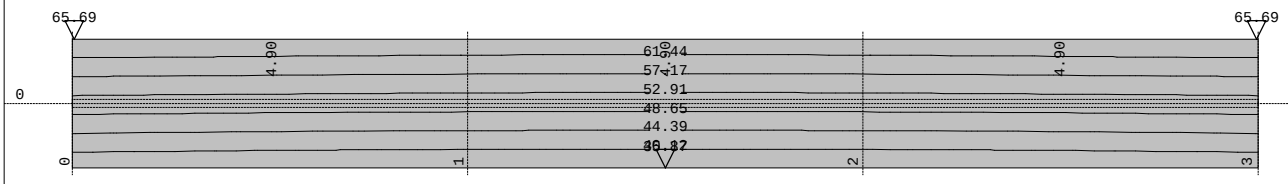
Okvir: H_1
Vplivi v plošči: max My= 0.02 / min My= 0.00 kNm/m

Obt. 4: Py



Okvir: H_1
Vplivi v gredi: max Yp= 102.68 / min Yp= 27.29 m / 1000

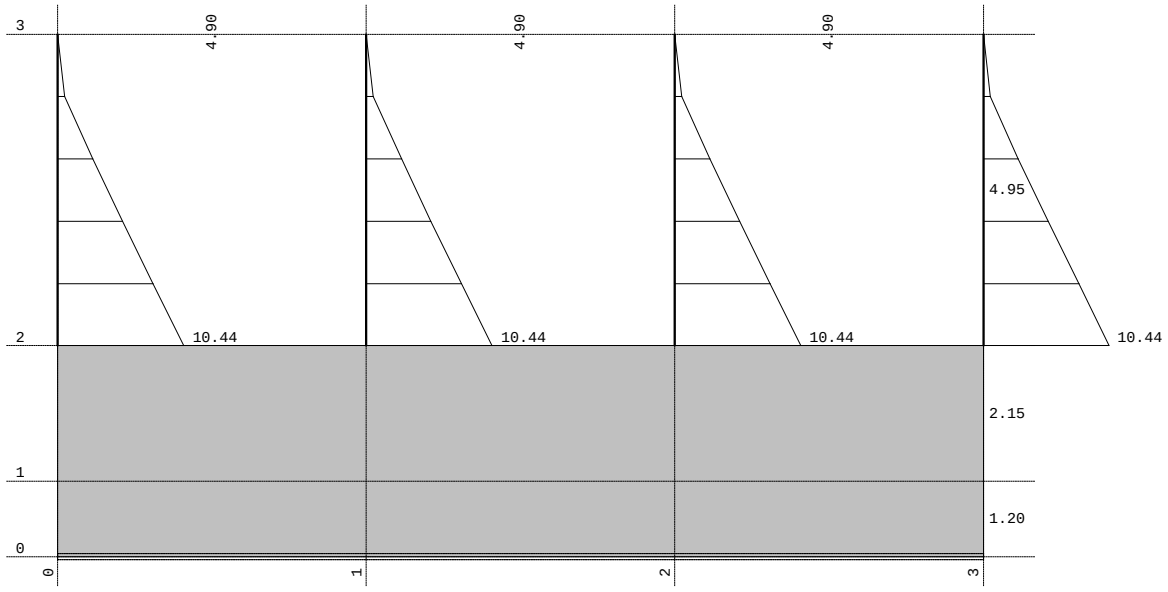
Obt. 13: I+II+III



Nivo: [0.00 m]
Vplivi v pov.podpori: max σ,tal= 65.69 / min σ,tal= 35.87 kN/m²

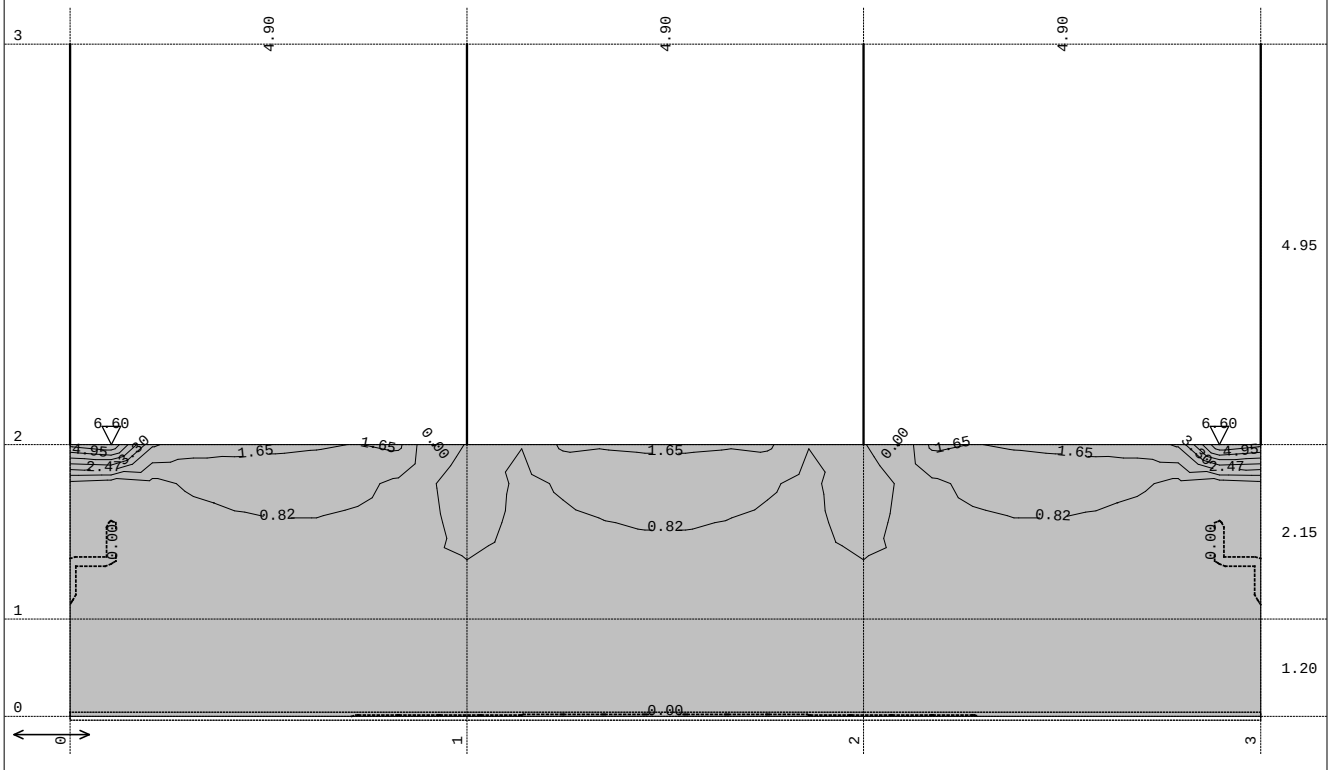
Dimenzioniranje (beton)

Merodajna obtežba: 5-13,15
EC 2 (EN 1992-1-1:2004), C30/37, S500H



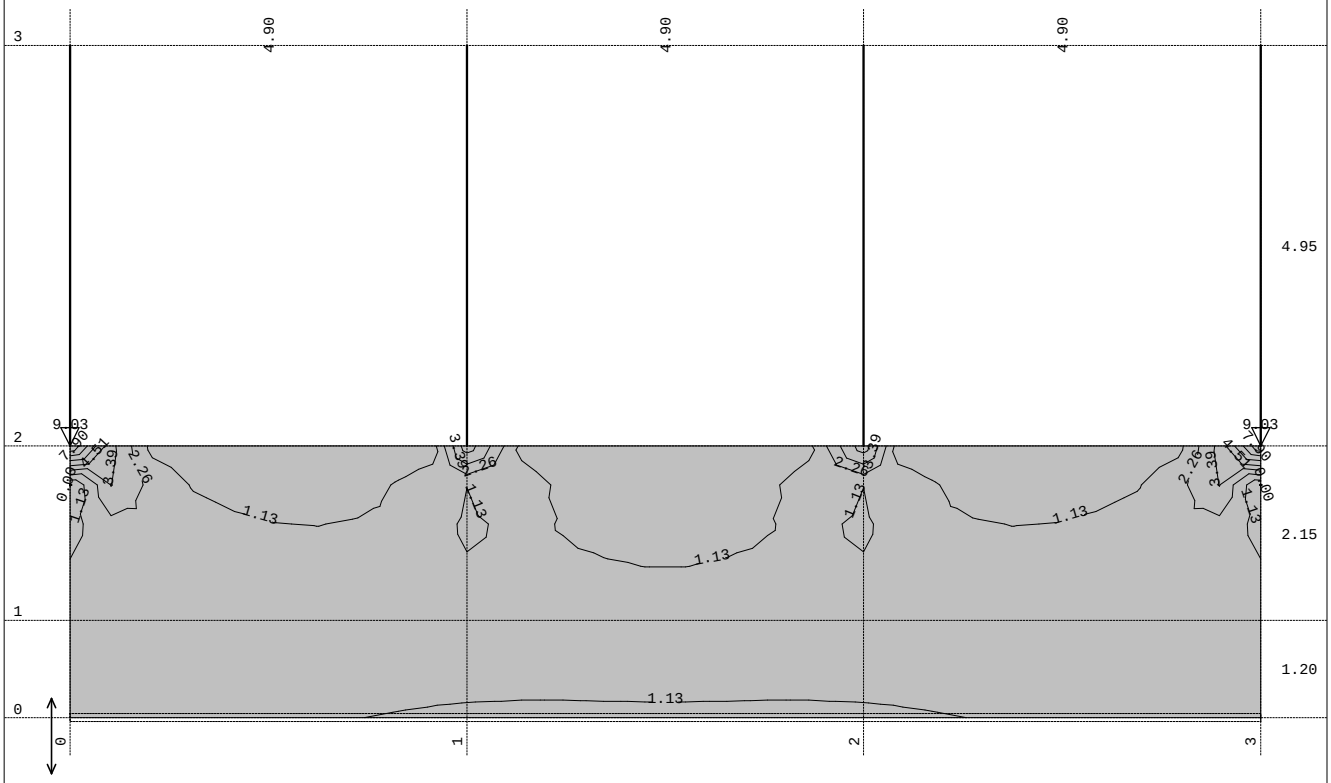
Okvir: H_1
Armatura v gredah: max ΣAa= 10.44 cm²

Merodajna obtežba: 5-13,15
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=3.00 cm



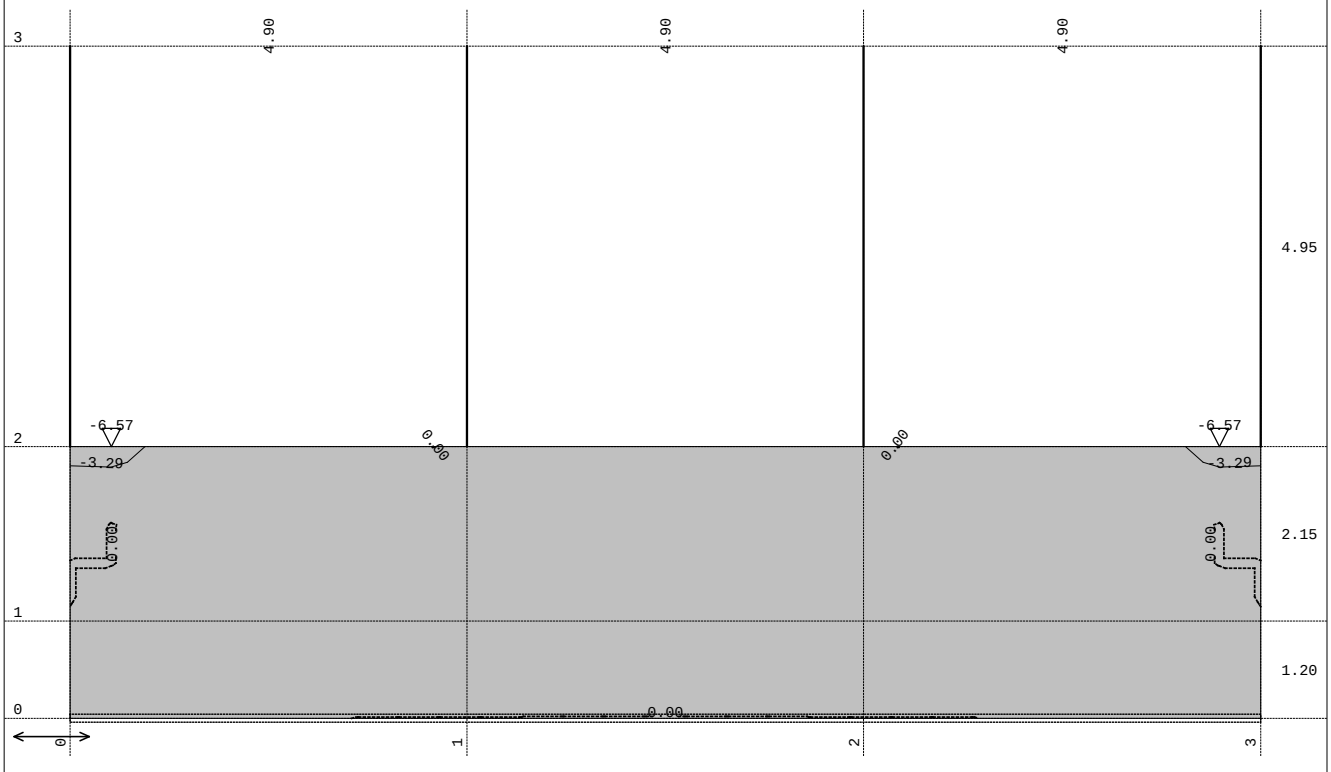
Okvir: H_1
Aa - sp.cona - Smer 1 - max Aa1,s= 6.60 cm²/m

Merodajna obtežba: 5-13,15
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=3.00 cm



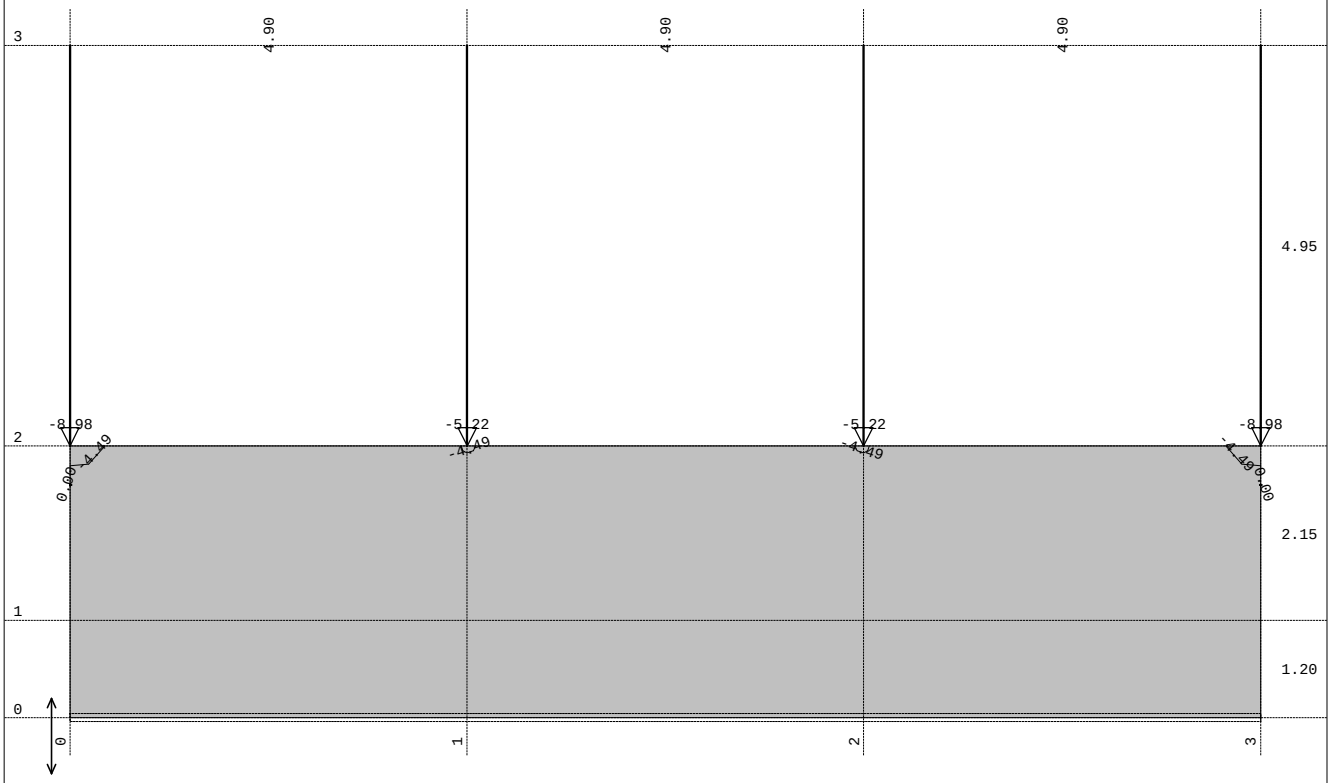
Okvir: H_1
Aa - sp.cona - Smer 2 - max Aa2,s= 9.03 cm²/m

Merodajna obtežba: 5-13,15
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=3.00 cm



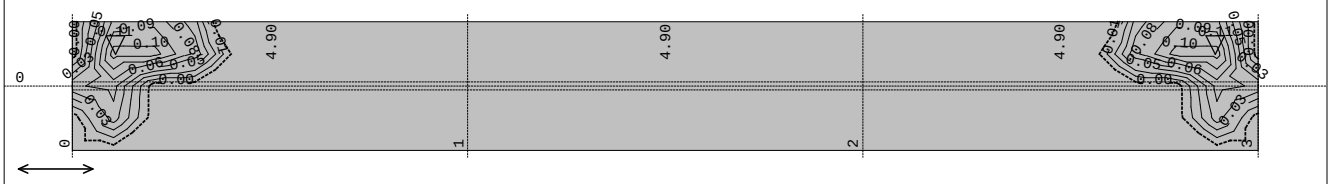
Okvir: H_1
Aa - zg.cona - Smer 1 - max Aa1,z= -6.57 cm²/m

Merodajna obtežba: 5-13,15
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=3.00 cm



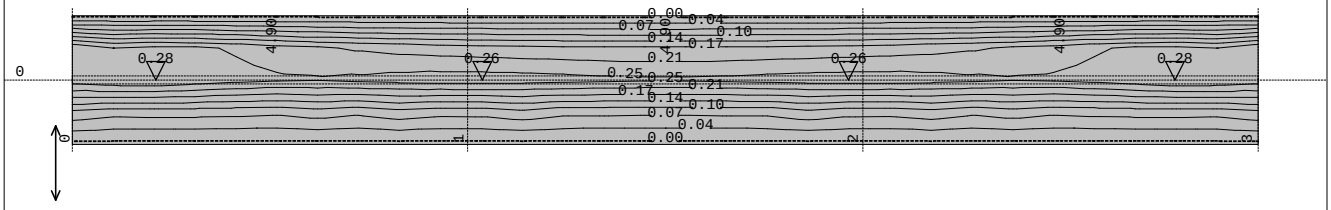
Okvir: H_1
Aa - zg.cona - Smer 2 - max Aa2,z= -8.98 cm²/m

Merodajna obtežba: 5-13,15
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=3.00 cm



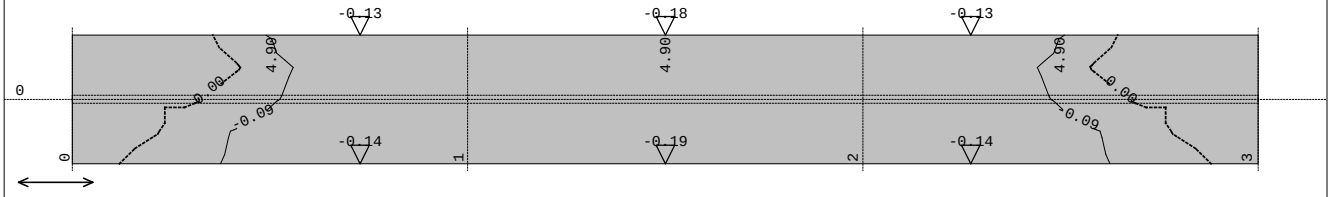
Nivo: [0.00 m]
Aa - sp.cona - Smer 1 - max Aa1,s= 0.11 cm²/m

Merodajna obtežba: 5-13,15
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=3.00 cm



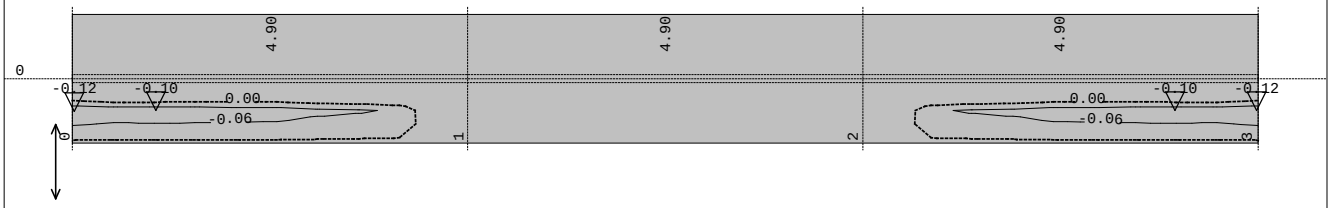
Nivo: [0.00 m]
Aa - sp.cona - Smer 2 - max Aa2,s= 0.28 cm²/m

Merodajna obtežba: 5-13,15
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=3.00 cm



Nivo: [0.00 m]
Aa - zg.cona - Smer 1 - max Aa1,z= -0.19 cm²/m

Merodajna obtežba: 5-13,15
EC 2 (EN 1992-1-1:2004), C30/37, S500H, a=3.00 cm



Nivo: [0.00 m]
Aa - zg.cona - Smer 2 - max Aa2,z= -0.12 cm²/m