Kidričeva ulica 9a, 5000 Nova Gorica, Slovenija
tel.: +386 (0)5 338 0000 fax: +386 (0)5 302 4493
e-mail: info@projekt.si

PROJEKT
podjetje za inženiring , geodezijo, urbanizem in projektiranje

2/1 NASLOVNA STRAN NAČRTA

OSNOVNI PODATKI O GRADNJI

Naziv gradnje	**Umestitev podhoda na železniški postaji Rače**
Kratek opis gradnje	Gradnja dveh bočnih peronov, podhoda z dvigalom in parkirišča
Vrsta gradnje	VZDRŽEVALNA DELA V JAVNO KORIST

DOKUMENTACIJA

Vrsta dokumentacije:	IZVEDBENI NAČRT
Številka projekta:	**8516**

PODATKI O NAČRTU

Strokovno področje načrta	**2/1 Podhod**
Številka načrta	**15299_1_2_1**
Datum izdelave	**Januar 2021**

PODATKI O IZDELOVALCU NAČRTA

Ime in priimek pooblaščenega arhitekta, pooblaščenega inženirja	Sandi Stanič, univ.dipl.inž.grad.
Identifikacijska številka	G-4173
Podpis pooblaščenega arhitekta, pooblaščenega inženirja	SANDI STANIČ univ.dipl.inž.grad. IZS G-4173

PODATKI O PROJEKTANTU

Projektant (naziv družbe) Naslov	Projekt d.d. Nova Gorica. Kidričeva 9a, 5000 Nova Gorica
Odgovorna oseba projektanta	Vladimir Durcik, univ.dipl.inž.grad.
Podpis Odgovorne osebe projektanta	PROJEKT d.d. NOVA GORICA
Vodja projekta	Luka Šošo, mag.inž.prom., dipl.inž.grad.
Identifikacijska številka	G-4643
Podpis vodje projekta	

ZG 3000	0256.00	007.2164	S.1	

SODELAVCI

dr. Peter Kante, univ.dipl.inž.grad.,

Matej Jan, univ.dipl.inž.grad.,

Vilko Šuligoj, univ.dipl.inž.grad.,

Matteo Humar, dott.mag.ing.

2/1.2 KAZALO VSEBINE NAČRTA ŠT. 15299_1_2_1

2/1.1	NASLOVNA STRAN S KLJUČNIMI PODATKI O NAČRTU
	SODELAVCI
2/1.2	KAZALO VSEBINE NAČRTA ŠT. 15299_1_2_1
2/1.3.1	IZJAVA POOBLAŠČENEGA INŽENIRJA
2/1.3.2	IZJAVA REVIDENTA O DOPOLNITVI PROJEKTNE DOKUMENTACIJE
2/1.3.3	DOKUMENTACIJA O REVIZIJI PROJEKTA
2/1.4.1	TEHNIČNO POROČILO
2/1.4.2	STATIČNI IZRAČUN
2/1.4.3.1	PROJEKTANTSKI POPIS S PREDIZMERAMI
2/1.4.3.2	PREDRAČUN Z REKAPITULACIJO STROŠKOV
2/1.5	RISBE

2/1.3.1 IZJAVA POOBLAŠČENEGA INŽENIRJA

Pooblaščeni inženir

Sandi Stanič, univ.dipl.inž.grad.

V skladu s 7. Točko 27. člena Pravilnika o pogojih in postopku za začetek, izvajanje in dokončanje tekočega in investicijskega vzdrževanja ter vzdrževalnih del v javno korist na področju železniške infrastrukture (Ur. l. RS, št. 82/2006)

I Z J A V L J A M,

1. da je načrt **2/1 Podhod** skladen z veljavnimi prostorskimi akti in projektno nalogo,

2. da predmetni izvedbeni načrt izpolnjuje vse pogoje interoperabilnosti podane v tehnični specifikaciji za interoperabilnost vseevropskega železniškega sistema za konvencionalne hitrosti v zvezi
   - s podsistemom infrastruktura »TSI – EU/1299/2014« z dne 18.11. 2014
   - s funkcionalno oviranimi osebami »TSI – EU/1300/2014« z dne 18.11.2014

Sandi Stanič, univ.dipl.inž.grad.

G-4173

Št. načrta: **15299_1_2_1**

Trzin, januar 2021

2/1.3.3 DOKUMENTACIJA O REVIZIJI PROJEKTA AVT

POROČILO REVIDENTA

ZABELEŽKA REVIZIJSKE RAZPRAVE

ODGOVORI NA POROČILO REVIDENTA

2/1.4.2 TEHNIČNO POROČILO

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SPLOŠNI PODATKI

Predmet obdelave je izgradnja AB podhoda na postaji Rače znotraj projekta »Umestitev podhoda na železniški postaji Rače«.

Obravnavani načrt vsebuje gradbene konstrukcije za AB podhoda. Arhitektura in nadstreški niso predmet tega načrta in so obdelani ločeno v načrtu 1/1 Podhod in nadstreški, št.: 15299_1_1 in 2/2 Jeklene konstrukcije nadstreškov, št.: 15299_1_2_2 (Projekt d.d. Nova Gorica). Načrt pa je potrebno gledati skupaj z ostalim načrti, ki sestavljajo skupen projekt.

Splošni podatki	
Objekt:	Podhod na postajališču Rače
Dolžina:	22,32 m
Prečni prerez:	4,60 x 3,55 m (3,50 x 2,80 m – svetla odprtina)
Dostop:	Stopnišče in dvigalo na bočnem in otočnem peronu
Kot križanja s tiri:	90°

Trenutno na je na predvideni lokaciji AB podhoda z nadstreškom nepozidan prostor, kar je prikazano na spodnjih fotografijah.

Slika 2: Pogled na mesto izvedbe podhoda iz druge strani.

1.1. Opis premostitvenega objekta

Objekt podhoda je zasnovan kot armiranobetonska škatlasta konstrukcija, sestavljen iz prekladne konstrukcije (plošče s konstantno debelino 35 cm) preko enega polja 3,85m (osni razpon), ki se naslanja na stene enake debeline. Temeljenje je zasnovano na temeljni plošči debeline 35 cm. Dostop v podhod je možen preko kesnoskih stoponišč ali dvigalnih jaškov na bočnem/postajnem peronu in bočnem peronu. Skupna dolžina podhoda znaša **22,32m** (zunanji gabariti), zunanji presek podhoda znaša **4,6 x 3,55 m**.

1.1.1. Ocenjena investicijska vrednost objekta

Ocenjena investicijska vrednost objekta brez DDV znaša 789.738,21 €. V to ceno je všteta celotna izvedba podhoda z jeklenim nadstreškom. Projektantski predračun je del načrta 1/1 Podhod in nadstreški (št.: 15299_1_1, januar 2021, Projekt d.d. Nova Gorica).

1.2. Podloge za projektiranje

[1] 1/1 podhod in nadstreški (št.: 15299_1_1, januar 2021, Projekt d.d. Nova Gorica)

[2] 0/2 Tirne naprave (št.: 8516T, januar 2021, Tiring d.o.o. Trzin)

[3] 2/1 Podhod (št.: 15299_1_2_1, januar 2021, Projekt d.d. Nova Gorica)

[4] 7/1 Geološko-geomehansko poročilo (št.:255.6, december 2020, Lamela d.o.o. Maribor)

1.3. Predpisi in standardi

[5] Gradbeni zakon GZ

[6] Tehnične specifikacije TSI.

[7] Tehnični standardi za gradbene konstrukcije SIST EN (Eurocode).

[8] Vsi ostali v Republiki Sloveniji veljavni zakoni, tehnični predpisi, standardi in smernice, ki obravnavajo projektiranje in izgradnjo inženirskih objektov.

1.4. Geološko-geotehnični pogoji

Za fazo IzN smo prejeli geološko geomehanskega elaborata o pogojih temeljenja, ki ga je izdelalo podjetje lamela d.o.o. (št.: 255.6, december 2020, Maribor). V nadaljevanju podajamo povzetek poročila.

Naselje Rače se nahaja na zahodnem delu Dravskega polja ob vznožju Pohorja, ob železniški progi med Mariborom in Pragerskim, kje se progi priključi krak iz smeri Ptuja in se nadaljuje v smer Celja in Zidanega mosta. Vzporedno progi v smeri sever – jug poteka avtocesta A1 Šentilj – Koper. Teren je raven. Prevladujejo kmetijske obdelovalne površine, manjša naselja so gručasta, vendar se zaradi bližine prometne infrastrukture hitro širijo. Raven teren je prepreden s številnimi manjšimi vodotoki iz Pohorja in umetnimi melioracijskimi kanali. Veliko je stoječe vode kot so ribniki in akumulacije. Ca. 100 m južno od železniške postaje se nahaja nivojski prehod s cesto R3 Fram-Rače. Višina postaje Rače je na 270 m n.m.v.

Celotno območje postaje in zaledje gradijo kvartarni sedimenti, ki so zastopani kot peščena glina z lečami proda (g). Najdemo jo na jugozahodnem delu Dravskega polja med Mariborom in Pragerskim in dalje proti jugovzhodu do obrobja Dravinjskih goric. Glina leži na peščeno prodnati podlagi. Barva gline je siva do sivo rjava in ima kroglasto krojitev. Ponekod vsebuje leče peščenega proda, ki so večinoma tanjše in se hitro izklinijo. Glina doseže debelino 12 m in več. Za območje so značilni opuščeni glinokopi, na vzhodnem delu pa so večja nahajališča proda in

gradbenega materiala (prodne jame). Proga poteka v nizkem nasipu. Na trasi in postaji ni inženirsko geoloških posebnosti.

Obravnavano območje je sestavni del vodnega telesa Dravska kotlina. Podtalnica se pojavi na večjih globinah v prodno peščenem zasipu Drave - aluvialni vodonosnik. Vodonosnik je medzrnski, obširen, srednje do visoko izdaten. Po podatkih ARSO je za merilno mesto Rače (1250) globina podtalnice ca. 8 m na višini 253 – 254 m n.m.v. Lokacija se nahaja na vodovarstvenem območju 3. kategorije z režimom 3, vodnega zajetja Dobrovci.

Umetno nasute zemljine in zemljine raščenih tal so razvrščene v 3. izkopno kategorijo.

V obeh vrtinah se je voda pojavila na dveh nivojih. Najprej na višini 2,90 m (267,40 m n.m.v.) in 2,80 m (267,80 m n.m.v.) in na globini 9,60 m (260,70 m n.m.v.) in 8,60 m (a.k. 262,00 m n.m.v.). V sklopu raziskav leta 1976 (vir1) je bila podtalnica zabeležena na a.k. 268,60 m n.m.v.

Pod umetnim nasutjem (Mg/UN) debeline do 2,0 m se nahajajo vezane zemljine visoko in srednje plastične gline (CIH/CH, CIM/CI) in visokoplastična glina do visokoplastični melj (CIH/CH-SiH/MH). Zemljine so srednje do težko gnetne konsistence, do globine ca. 3,0 m sivo rjave barve, glavnina pa je oker rjave barve, ki na globini desetih metrov preide v sivo zeleno barvo. Na globini 9,40 do 9,80 m (vrtina R-1) so prisotne organske primesi. Meljast drobni do srednji pesek (m/fSa /SU-SM) je prisoten na levi strani proge (R-2) na globini 7,80 do 9,80 m. V prepustnejših peščenih in meljnih slojih se pojavi voda. Izmerjena je bila na dveh nivojih. Prvič na globini 2,80 do 2,90 m na srednji absolutni koti 267.60 m n.m.v. in drugič na globini 8,60 do 9,60 m na sredni absolutni koti 261,35 m. Prodni sedimenti se nagajajo na globini večji od 12,00 m, kar je globina izvedenih raziskav. Glede na lokacijo obstaja velika verjetnost, da so glinaste in meljne zemljine odložene direktno na lapornato podlago. Pri projektiranju se naj upošteva nivo podtalnice na absolutni koti 269,00 m n.m.v.

Zap. št.	Karakteristični sloj	Globina (m)	Gostota γ (kN/m^3)	Enoosna tlačna trdnost q_u (kN/m^2)	Kohezija c (kN/m^2)	Strižni kot φ (°)	Modul stisljivosti E_{oed} (kN/m^2)	Prep. k (m/s)
1.	NA (nasip)	0,00 – 2,00	20,0	-	0	28	3 600	5×0^{-5}
2.a	GLINA 1	2,00 – 9,50	18,5	150	15	24	5 500	$1,5\times10^{-10}$
2.b	GLINA 2	9,50-12,00	19,0	130	25	20	4 400	$3,5\times10^{-11}$

Nov podhod, v km proge 581+617,00, je načrtovan kot zaprt okvir dolžine L = 22,00 m in širine Š = 4,40 m usmerjen pravokotno na progo. Stopnišča potekajo izven objekta vzporedno s progo. Višina krovne plošče objekta je na 267,33 m, tlak v podhodu je na 267,33 m, dno temeljne plošče pa na 266,68 m n.m.v. Po zasnovi projektanta je pod temeljno ploščo debeline 0,35 m predvidena sanacijska blazina v debelini 0,25 m. Priporoča se, da se blazino ne izvede oziroma, da se sabo nosilne in razmočene zemljine odstrani in nadomesti s podbetonom.

Temelj objekta je temeljna plošča, ki nalega temeljna tla težko gnetne gline pod nivojem podtalnice. Pri načrtovanju se naj upošteva projektni odpor tal določen na osnovi podatkov za drenirane pogoje tal: Rd = 16 700 kN (Rd/A' = 240 kN/m2).

Na mestu objekta bo teren predhodno razbremenjen z izkopom, zato bodo posedki objekta zaradi dodatne obremenitve temeljnih tal minimalni. Zaradi glinastih in slabo prepustnih temeljnih tal je čas konsolidacije do 3 leta od tega ca. 60 % pa v 18 mesecih.

Pri analizi temeljne plošče se naj upošteva koeficient reakcije tal za vertikalno smer: ks,v = 3 050 kN/m3 in razmerje ks,v = 0,75 ks,v.

Gradnja podhoda se po izvajala v odprti gradbeni jami pod provizorijem. Stabilnost za fazo gradnje je preverjena za naklon brežine n = 1 : 2. Za zagotavljanje stabilnosti izkopa pod strmejšim naklonom bo potrebno dodatno varovanje. Primerne so vse konstrukcije z zabijanjem. Predlagamo, da se uporabi zagatnice.

Dno objekta je pod nivojem podtalnice. Pri projektiranju se naj upošteva vzgon do kote 269,00 m n.m.v.

Zasip za objektom se naj izvede z izkopanim glinastim materialom z vgradnjo pri optimalnih pogojih in zgoščenostjo 95 – 98 % SPP.

V predmetnem poročilu so podani podatki in rezultati geotehničnih raziskav izvedenih za potrebe ureditve izven nivojskega dostopa, v km 581+617,33, na postaji Rače v kvantitativnem in kvalitativnem obsegu, za določitev načina in pogojev načrtovanja in gradnje objekta.
Sestav temeljnih tal in skladnost dejanskih razmer na terenu s pogoji geotehničnega poročila določi in potrdi projektant v času gradnje, na mestu samem, v sklopu geotehničnega nadzora.

2. KONSTRUKCIJSKA ZASNOVA OBJEKTA

2.1. Podhod

Podhod je zasnovan kot monolitna AB škatlasta konstrukcija, katere sestavljajo temeljna plošča, stene in prekladna/stropna plošča. Vsi omenjeni elementi imajo enotno debelino 35 cm, pri čemer je zgornji rob stropne plošče zaradi ovodnjavanja izveden v blagem naklonu. Skupna dolžina podhoda znaša 22,32m (zunanji gabariti), zunanji presek podhoda znaša 4,6 x 3,55 m.

2.2. Dvigalni jaški

V območju bočnega/postajnega perona in bočnega perona se na stene podhoda pritrjujeta AB dvigalna jaška. Dvigalni jašek ima svetlo odprtino 2,5 x 1,65 m. Stene jaška so debeline 35 cm in se v območju perona stanjšajo na 25 cm. Temeljenje je izvedeno na AB temeljni plošči debeline 30 cm, ki je za 75 globlje postavljena od temeljne plošče podhoda. Stik dvigalni jašek – podhod je monoliten. Dvigalni jašek je nad terenom jeklene izvedbe.

2.3. Stopnišča

Dostop v podhod je možen tudi preko kesonskih stopnišč na bočnem/postajnem in bočnem peronu. Stopnišča so dvoramna z vmesnim podestom. Gabariti in zasnova obeh stopnišč so zelo podobni, razlika nastane le zaradi višinske razlike med otočnim in bočnim peronom, kar se odraža v večjem številu stopnic in posledično dolžini kesona. Konstrukcijsko so zasnovane iz AB temeljne plošče debeline 40 cm, ki je izvedena kontaktno v naklonu na utrjenem nasutju. Na temeljno ploščo so pritrjene konzolne stene debeline 40 cm, ki se v območju perona stanjšajo na 30 cm. Na stiku s podhodom je na vrhu stene prečni nosilec/zaporni element, ki preprečuje premike sten v območju dilatacije.
Stopnice so dilatirane od pohoda, pri čemer se na stiku sten zagotavlja le vodotesnost, na stiku temeljev pa se izvede mozničen in vodotesen stik.

2.4. Temeljenje

Temeljenje objekta se izvede v sloju vezanih zemljin visoko in srednje plastičnih glin ter visokoplastičnih glina do visokoplastični meljev. Pod temelji je potrebno zagotoviti dobra temeljna tla (kontrola zbitosti), ki se izvede iz plasti pustega betona.

2.5. Nasipi ob objektu

Prehod iz deformabilne tirne grede na togo betonsko konstrukcijo se izvede preko ustrezno izvedenega in zbitega umetnega nasutja ob objektu. Nasipe se izvaja simetrično v tanjših plasteh s sprotnim utrjevanjem. Izvedeni nasip mora zadostiti vsem zahtevam tirne grede. Nasip ob samem objektu se izvede z enakim materialom kot okolice (glina), saj bi tamponsko nasutje povzročilo efekt drenaže in nabiranje vode ob podhodu. Izvedbo zasutja potrdi geomehanik.

2.6. Hidroizolacija

Hidroizolacija prekladne konstrukcije se izvede z enojnim bitumenskim trakom na osnovni premaza z epoksidno smolo. Lepljenje trakov poteka na predhodno pripravljeno površino. Podlaga mora biti oprana in obdelana tako, da se prepreči poškodbe trakov in omogoči kvalitetno sprijemnost.

Sestava horizontalne hidroizolacije:

- Osnovni premaz z epoksidno smolo in posipom s kremenčevim peskom
- Zalivni premaz z epoksidno smolo ali izravnava z lopatico z epoksidno malto
- Lepilna zmes na bitumenski osnovi
- Tesnilna plast iz enega bitumenskega traku s preklopi
- Zaščitna plast hidroizolacije iz armiranega betona (10cm) z armaturno mrežo Q-139

Vsi detajli, ki se nanašajo na izvedbo horizontalne hidroizolacije se izvajajo v skladu s proizvajalcem in TSC 07.104.

2.7. Tiri

Preko objekta potekajo dve med seboj vzporedne proge (tir 1 in tir 2), ki so skupaj s tirno gredo obravnavani v drugem načrtu.

2.8. Rege

Delavni stik oz. rega se izvede za lažjo in kvalitetnejšo izvedbo konstrukcije. Z njimi razdelimo celotno konstrukcijo objekta na manjše delavne enote, ki se jih opaži in betonira v različnih fazah.

Stiki, ki so narejeni z delavno rego:

- Vsi stiki med fazami gradnje in glede na izbrano tehnologijo gradnje (DELAVNA REGA PRI IZVEDBI »BELIH KADI«)

Postopek izvedbe delavnih reg:

Na predhodno otrdelo betonsko površino, na katero se betonira naslednja faza, je potrebno očistiti z izpiranjem pod visokim pritiskom tako, da se s površine odstrani drobnozrnata mešanica agregata in cementnega kamna. Izprana površina mora biti ustrezno nahrapavljena (vidna groba zrna). V očiščeni in navlaženi ravnini se nato izvede delavno rego oz. stik. Delavni stiki na obravnavani konstrukciji morajo biti v skladu z zahtevami konstrukcijskih reg (TSC 07.116).

2.9. Dilatacije

Stik kesonskih stopnišč in podhoda se izvede dilatirano. Stik talnih plošč se izvede »mozničeno«. Dilatacije se izvedejo na stiku dveh različnih konstrukcijskih elementov, pri čemer se omogoča določene pomike in zasuke ter ohrani vodotesnost. Dilatacije na obravnavani konstrukciji morajo biti v skladu z zahtevami konstrukcijskih reg (TSC 07.116).

2.10. Opaži, obdelave in obloge vidnih betonskih elementov

Vse vidne betonske površine morajo ustrezati visokim oblikovnim razmeram. Predpisan je razred vidnih betonov VB 4 za sledeče elemente: spodnja ploskev plošče, notranje stene podhoda, notranje stene stopnišča in nadzemni parapetni zidovi. Za vse ostale elemente je predpisan osnovni razred vidnih betonov VB 0. Vsi detajli in postopki, ki se nanašajo na izvedbo se izvajajo v skladu s TSC 07.111.

3. OPREMA OBJEKTA

3.1. Odvodnjavanje in kanaliziranje

Objekt je zaprta škatlasta konstrukcija s pokritimi stopnišči. Voda v podhod v večjih količinah ne bo prihajala, saj je edini možen dotok preko stopnišča in preko samih uporabnikov (pešcev). Voda iz peronov se lovi s talno rešetko na vrhu stopnišča, medtem ko sta v podhodu predvideni vzdolžni rešetki ob robu, ki se navezujeta na poglobljeni AB jašek v temeljni plošči.

Odvodnjavanje je potrebno gledati skupaj z nadstreški in peroni ter je podrobneje prikazana v načrtu Nadstrešek nad stopniščem podhoda in peronski nadstrešek (št.: 15299_1_1, januar 2021, Projekt d.d. Nova Gorica).

3.2. Proti vibracijska zaščita

Preko betonske zaščite hidroizolacije podhoda se položi mehanska zaščita vibracij v obliki tanke blazine iz umetnih mas (npr.: Damtec Kraiburg SBM 20mm).

3.3. Napeljave preko objekta

Preko podhoda potekajo komunalni vodi (SVTK,…), ki pa se konstrukcije ne dotikajo in niso predmet tega načrta.

3.4. Ograje

Na stene stopnišča so pritrjena držala za pešce, ki so obdelana v načrtu arhitekture. Na stene stopnišča se pritrjuje jekleni nadstrešek s stekleno fasado, ki preprečuje padec.

4. OBTEŽBA IN STATIČNI IZRAČUN

Pri projektiranju so bili upoštevani vplivi na konstrukcije kot jih določajo standardi SIST EN 1991, SIST EN 1992, SIST EN 1997 in SIST EN 1998 ob upoštevanju delnih faktorjev obtežbe v skladu s standardom SIST EN 1990. Analiza zunanjih vplivov in statična analiza objekta sta priložena za tehničnem poročilom.

5. MATERIALI

Izbrani materiali v objektu zagotavljajo uporabnost, nosilnost in trajnost za projektirano življenjsko dobo.

Tabela vgrajenih materialov za nosilne betonske elemente na objektih:

Element	Kvalitet a betona	Razred izpostavljenosti	Dmax [mm]	Krovni sloj [mm]	Kvaliteta armature	Kvaliteta kablov za prednap.	Razred vidnega betona
Podložni beton	C 25/30	XC0	/	/	/	/	VB 0
Talne plošče	C 30/37	XC2, PV-II	32	50	B 500B	/	VB 0
Stene podhoda in dvigala - notranje	C 30/37	XC3, XF1, PV-II	22	50/30	B 500B	/	VB 4
Stene stopnišča in nadzemni deli sten	C 30/37	XC3, XF4, PV-II	22	50/30	B 500B	/	VB 4
Prekladna konstrukcija	C 30/37	XC3, XF1, PV-II	22	30/30	B 500B	/	VB 4

Pri stenah in ploščah se razred vidnega betona VB4 zagotavlja na vseh končnih vidnih površinah.

6. TEHNOLOGIJA GRADNJE IN UREDITEV GRADBIŠČA

Gradnja objekta in okolice mora potekati v smislu ohranjanja kulturne dediščine, ohranjanja narave, varstva okolja in naravnih dobrin ter varstva pred naravnimi in drugimi nesrečami.

6.1. Tehnologija gradnje

Pred pričetkom del mora izbrani izvajalec temeljito preučiti elaborat izvedbe (9/1 Elaborat za izvedbo del (št.:8516IZ)) in na podlagi tega izdelati terminski plan in faznost gradnje. Gradnja poteka pod dvema tiroma (tir 1 tir 2).

V zgoraj navedenem terminskem roku mora izbrani izvajalec izvesti vsa potrebna dela, da se promet na tirih ponovno povrne. Tako mora tehtno pripraviti in pred pripraviti vse potrebno, da bodo dela potekala nemoteno in čim hitreje. Konstrukcija tehnično ni zelo zahtevna je pa čas gradnje omejen.

V prvi fazi se izvede zaščita gradbene jame (zagatnice) in provizorji na tiru 2 (24h zapora). Sledi še izvedba zaščite gradbene jame (zagatnice) in provizorji na tiru 1 (24h zapora). Izvajalec lahko opravlja dela na izkopih na postajnem in bočnem peronu, medtem ko v samih tirih gradnja zaradi železniškega prometa verjetno ne bo mogoča. V naslednji fazi je potrebno izvesti vsa gradbena dela v območju tirov, da se v časovnem okviru povrne promet. Dela obsegajo izkope, izvedbo AB podhoda, izvedba zaščite betona in zasipanje skupaj s tirno gredo in tiri. V tretji fazi je potrebno izvesti betonska dela na postajnem in bočnem peronu. V zadnji fazi se odstrani provizorije in povrne promet na tirih v končno stanje.

Vsa ostala notranja in nadzemna dela se lahko izvajajo s časovnim zamikom, saj se jih lahko izvaja ob železniškem prometu. Jeklena konstrukcija nadstreška se lahko izvede šele po končanih betonskih delih podhoda in izvedenih točkovnih temeljih na peronu.

Predvideni provizorji zagotavlja, da se gradbena dela izvedejo brez zapore tirov, ki bi še podaljšale čas gradnje samega podhoda. Izbrani izvajalec izdela elaborat montaže in demontaže provizorija.

Izvedba betonskih elementov podhoda se izvaja na klasičen način podpiranja z nepomičnim odrom. Pred izvedbo prekladne plošče se izvedejo temeljne plošče in stene. Šele po zaključenih vseh betonskih delih in dosežene ustrezni trdnosti vgrajenih betonov, se lahko začnejo izvajati zasipi krajnih opornikov. S pomočjo iglastih previbratorjev je potrebno zagotoviti kvalitetno vgradno sveže betonske mešanice. Po končanem betoniranju je potrebno beton ustrezno negovati. Pred in med vgradnjo svežega betona je potrebno kontrolirati in zagotavljati ustrezno krovno oz. zaščitno plast betona.

Promet se lahko spusti na objekt šele ko ima beton zadostno nosilnost, pri čemer je potrebno šteti tudi zaščitni beton hidroizolacije.

Za potrebe izvedbe podhoda bo potreben izkop večji od 5,5m pod obstoječim terenom. Izkope se izvaja prosto v naklonu 1:2. Zaradi slabših temeljnih tal bo treba vse izkope varovati z zagatnicami. Zagatnice se postavi le na mestih, kjer ni moč doseči potrebnega naklona prostega izkopa. Glede na predvideno časovnico gradnje bo večina zagatnic po opravljenih delih ostala v zemljini. V gradbeno jamo je možen dotok vode, zato je predvideno črpanje le te. Dotok vode je odvisen na letni čas in trenutne vremenske razmere. Izvedbo temeljenja provizorija mora nadzirati geomehanik.

Za vse postopke, opremo, materiale in detajle, ki niso posebej navedeni, veljajo splošni in posebni pogoji investitorja ter ostale priznane tehnične norme, predpisi in standardi. Za pomoč in dodatna navodila se kontaktira projektanta.

6.2. Ureditev gradbišča

Gradbišče mora v celoti potekati znotraj meje obdelave. Morebitne začasno skladiščenje gradbenega materiala se izvede tako, da ne ovira odtok zalednih voda in da ne prihaja do erozije le teh. Med izvajanjem del je potrebno preprečiti morebitno onesnaževanje okolja zaradi transporta, skladiščenja ali uporabe tekočih goriv in drugih nevarnih snovi.

Po končani gradnji je potrebno vse površine prizadete med gradnjo ustrezno urediti oz. povrniti v obstoječe stanje. Pri morebitni ozelenitvi zunanjih površin se lahko uporabi le prečiščen humus in lokalno avtohtono rastlinje.

7. POGOJI ZA IZVEDBO KONSTRUKCIJE

7.1. Zagotavljanje in kontrola kvalitete

Zahteva se stalen strokovni nadzor. Izvajalec je pred pričetkom del dolžan pripraviti program tekoče kontrole izdelave, ki mora predpisati vrsto in pogostost preiskav. Program potrdi tehnična služba investitorja ali nadzora.

7.2. Armiranobetonski elementi konstrukcije

1) Armiranobetonska konstrukcija se mora izvajati v skladu s standardom SIST EN 13670, medtem ko mora biti betonska mešanica v skladu s SIST EN 206-1 in SIST 1026.
2) Pred pričetkom del na objektu je treba pripraviti projekt betona, ki mora upoštevati veljavne standarde in tehnične normative. Vsebovati mora vsaj naslednje:
   - sestavo betonskih mešanic, vključno s količinami in tehničnimi zahtevami za projektirane kakovostne razrede betona,
   - podatke o dodatkih k betonom, če so potrebni,
   - posebne zahteve (za vidne betonske površine, glede vodotesnosti ipd.),
   - načrt betoniranja in organizacije gradbišča ter podatke o potrebni opremi,
   - podatke o načinu transporta in vgrajevanja betonske mešanice,
   - navodila glede negovanja vgrajenega betona,
   - program kontrolnih preiskav sestavin betona,
   - program kontrole kvalitete betona, odvzemanja vzorcev in preiskav betonske mešanice ter betona po partijah,
   - načrt montaže elementov ter projekt odrov in podpornih stolpov.

8. ZAKLJUČNE OPOMBE

V primeru kakršnih koli odstopanj, ki so navedene v tem projektu, se je potrebno predhodno posvetovati z odgovornim projektantom gradbenih konstrukcij. Pred začetkom izvedbe temeljev mora na gradbišču biti prisoten geomehanik, da potrdi ustreznost predpostavk glede temeljnih tal in samega temeljenja.

Ker gre za objekt katerega gradnja je odvisna od ostalih gradbenih in prometnih dejavnosti, je potrebno izdelati terminski plan glede na tehnologijo in znanje, ki ga ima izbrani izvajalec. Izbrani izvajalec mora tako glede na predvideno faznost zapor in gradnje (9/1 Elaborat za izvedbo del

(št.:8516IZ)) izdelati podroben terminski plan. Izvajalec mora na gradbišču zagotoviti ustrezno pripravo in predpripravo dela z materialom, število delavcev in primerno gradbeno mehanizacijo, da se predvidenih časovnih zapor prometa ne prekorači.

2/1.4.2 STATIČNI IZRAČUN

STATIČNI IZRAČUN

Izvennivojski podhod Rače

Kazalo

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2	KOMBINACIJE VPLIVOV IN VARNOSTNI FAKTORJI	14
3	STATIČNA ANALIZA	16

1 ANALIZA ZUNANJIH VPLIVOV

Pozicija in vrednost posameznega zunanjega vpliva (obtežbe), ki je bila upoštevana v izračunu je razvidna v nadaljevanju tega poglavja in v kasnejših izpisih iz računalniškega programa SOFiSTiK v.2020.

1.1 Vpliv lastne teže konstrukcije

Lastno težo konstrukcije izračuna računalniški program. Izračun temelji na podlagi geometrije elementa in predpisanega materiala. Specifične teže materialov, uporabljenih pri gradnji, so navedene v standardu SIST EN 1991-1-1. Lastna teža konstrukcije je določena ob upoštevanju specifične teže, navedenih spodaj (Preglednica 1).

Preglednica 1: Specifične teže materialov, uporabljenih za izračun lastne teže konstrukcije

material	γ [kN/m^3]
nearmirani strnjen beton	24,0
nearmirani mokri beton v času sušenja	25,0
armirani strnjen beton	25,0
armirani mokri beton v času sušenja	26,0
konstrukcijsko jeklo	78,6

1.2 Vpliv stalne teže

Kot dodatno obtežbo upoštevamo vso preostalo stalno obtežbo, ki se jo vgradi na prepust. To predstavlja sestava perona, tirne grede, dvigala ter nadstreška. Za dodatna pojasnila glej tehnično poročilo, kjer so predstavljeni vsi ti elementi.

Preglednica 2: Stalna obtežba na podhod – območje tirov

sloj	$_kd$ [cm]	$_k\gamma$ [kN/m^3]	g_k [kN/m^2]
Tirna greda	60,00	21,0	12,60
Izolacija proti vibracijam	/	/	0,10
Zaščitni beton HI	10,00	25,0	2,50
Hidroizolacija	/	/	0,10
skupaj			***g_c = 15,30***

Preglednica 3: Stalna obtežba na podhoda – območje peronov

sloj	$_kd$ [cm]	$_k\gamma$ [kN/m^3]	g_k [kN/m^2]
Končni betonski tlak	8,00	25,0	2,00
Nasutje	140,00	21,0	29,40
Izolacija proti vibracijam	/	/	0,10
Zaščitni beton HI	10,00	25,0	2,50
Hidroizolacija	/	/	0,10
skupaj			***g_c = 34,10***

** Opomba: Obtežba robnih AB montažnih zidov je všteta znotraj nasipa.*

Preglednica 4: Stalna obtežba na podhoda – notranji tlaki

sloj	$_kd$ [cm]	$_k\gamma$ [kN/m^3]	g_k [kN/m^2]
Končni kamniti tlak	2,00	30,0	0,60
Podbeton	27,00	25,0	6,75
skupaj			***g_c = 7,35***

Preglednica 5: Stalna obtežba na podhoda – na stopnice

sloj	$_kd$ [cm]	$_k\gamma$ [kN/m^3]	g_k [kN/m^2]
Končni kamniti tlak	2,00	30,0	0,60
Betonske stopnice	8,00	25,0	2,00
skupaj			***g_c = 2,60***

1.3 Vpliv prometa

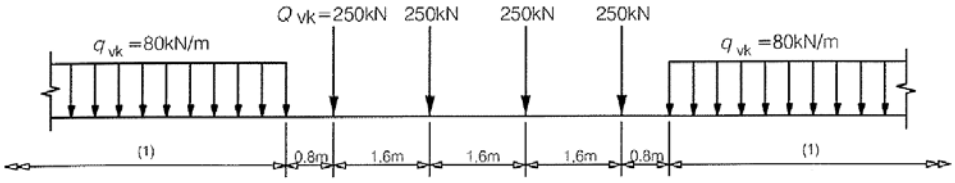
Prometna obtežba je določena v skladu s standardom SIST EN 1991-2 poglavje 6, v katerem se obravnava obtežbo za železniške mostove. Predstavljene idealizirane obtežne sheme ne predstavljajo dejanskega železniškega prometa, ampak so izbrane in umerjene tako, da predstavljajo vpliv prometa skupaj z dinamičnimi vplivi. Dinamična analiza konstrukcije ni potrebna.

1.3.1 Vertikalna prometna obtežba

Obravnavamo dva standardna primera obtežbe, ki se določijo v skladu s SIST EN 1991-2, tč. 6.3 in predstavlja karakteristično obtežbo. Le to se lahko v primeru, da gre za težji ali lažji promet od predpostavljenega, pomnoži s faktorjem α, ki ima razpon 0,75 ≤ α ≤ 1,46. V našem primeru znaša α = 1,1.

Obtežni primer 71 (UIC 71)

Obtežba predstavlja statičen vpliv zaradi vertikalne obtežbe običajnega železniškega prometa. Njena razporeditev je predstavljena na sliki 1.



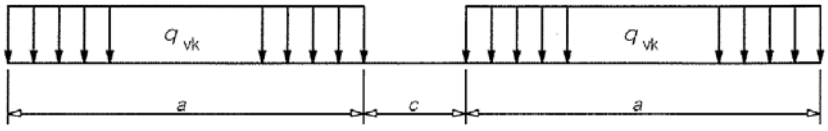
Slika 1: Obtežni primer 71 in njegove karakteristične vrednosti vertikalne obtežbe

Obtežni primer SW/0 in SW/2

Obtežni primer SW/0 predstavlja statični vpliv zaradi vertikalne obtežbe običajnega železniškega prometa v primeru kontinuiranih nosilcev in ga v tem primeru ne upoštevamo.

Obtežni primer SW/2 pa predstavlja statični vpliv zaradi vertikalne obtežbe težkega železniškega prometa.

Razporeditev obeh vertikalnih obtežb je prikazana na sliki 4, njune karakteristične vrednosti pa v preglednici 4.



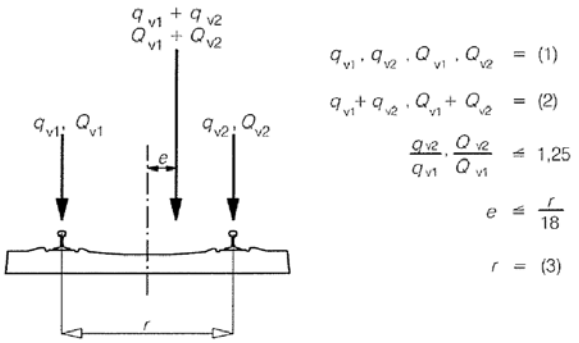
Slika 2: Obtežna primera SW/0 in SW/2

Preglednica 6: Karakteristične vrednosti za obtežna primera SW/0 in SW/2

Obtežni primer	q_{vk} *[kN/m]*	*a [m]*	*c [m]*
SW/0	133	15	5,3
SW/2	150	25	7,0

Ekscentričnost vertikalne obtežbe

Vpliv prečnega pomika vertikalne obtežbe (samo obtežnega primera 71) zajamemo z upoštevanjem njene ekscentričnosti e. To določimo preko razmerja obremenitev koles v osi 1:1,25 kot kaže slika 3.



Slika 3: Ekscentričnost vertikalne obtežbe obtežnega primera 71

Na podlagi zgornjih enačb lahko izpeljemo enačbo obtežbe na prvo tirnico

$\rightarrow\ Q_{vk,1} = \frac{Q_{vk}}{2{,}25}$ in $q_{vk,1} = \frac{q_{vk}}{2{,}25}$

$\rightarrow\ Q_{vk,2} = Q_{vk} - Q_{vk,1}$ in $q_{vk,2} = q_{vk} - q_{vk,1}$

Preglednica 7: Ekscentričnost obremenitve obtežnega primera 71

Obtežni primer r = 1500 mm in $e = r/18$	Tirnica 1		Tirnica 2	
	$Q_{vk,1}$ *[kN]*	$q_{vk,1}$ *[kN/m]*	$Q_{vk,2}$ *[kN]*	$q_{vk,2}$ *[kN/m]*
UIC 71	111,11	35,56	138,89	44,44

Zgornjo tabelo množimo s predpisanim faktorjem α = 1,1 in dobimo:

Preglednica 8: Obremenitve obtežnega primera 71

Obtežni primer r = 1500 mm in $e = r/18$	Tirnica 1		Tirnica 2	
	$Q_{vk,1}$ *[kN]*	$q_{vk,1}$ *[kN/m]*	$Q_{vk,2}$ *[kN]*	$q_{vk,2}$ *[kN/m]*
UIC 71	122,22	39,12	152,78	48,88

1.3.2 Določitev dinamičnega faktorja.

Faktor se določi v skladu s SIST EN 1991-2, tč. 6.4.5 in upošteva dinamično povečanje napetosti in vibracij brez vpliva resonance. Z njim povečamo vertikalno obtežbo obtežnih primerov UIC 71 in SW/2. Za predvideno standardno vzdrževanje proge se dinamični faktor določi z enačbo:

$$\Phi_3 = \frac{2{,}16}{\sqrt{L_\Phi} - 0{,}2} + 0{,}73 = 1{,}46$$

$$1{,}0 \leq \Phi_3 \leq 2{,}0$$

kjer je L_Φ deterministična dolžina, določena v nadaljevanju.

$$L_{\Phi} = 3 \cdot L_m = 3 \cdot 3{,}35 = 10{,}05 \text{ m}$$

$L_1 = 3{,}35$ m

Če upoštevamo še dinamični faktor dobimo naslednje vrednosti:

Preglednica 9: Obremenitve obtežnega primera LM7 in SW/2

Obtežni primer	Tirnica 1		Tirnica 2	
	$Q_{vk,1}$ [kN]	$q_{vk,1}$ [kN/m]	$Q_{vk,2}$ [kN]	$q_{vk,2}$ [kN/m]
UIC 71	200,75	64,24	200,75	64,24
UIC 71- ekscentricna	178,44	57,12	223,05	71,36
SW/2	/	120,45	/	120,45

1.3.3 Horizontalna prometna obtežba

Bočna sila (Nosing force)

Obtežba se določi v skladu s SIST EN 1991-2, tč. 6.5.2 in deluje v središču proge na višini zgornjega roba tirnice in ima smer prečno na os proge. Bočna sila ima vrednost 100 kN in deluje vedno z vertikalno obtežbo. Obtežba se ne poveča z dinamičnim faktorjem.

Pospeševalna in zaviralna sila

Obtežba se določi v skladu s SIST EN 1991-2, tč. 6.5.3 in deluje na zgornjem robu tirnice in ima smer vzdolž proge. Upošteva se kot enakomerno porazdeljena obtežba na dolžini $L_{a,b}$ in se ne poveča z dinamičnim faktorjem.

Preglednica 10: Vrednosti pospeševalnih in zaviralnih sil

Obtežni primer	Q_{lak} [kN/m]	Q_{lbk} [kN/m]	$L_{a,b}$ [m]
UIC 71	33	20	3,35
SW/2	33	35	3,35

1.4 Vpliv spremembe temperature

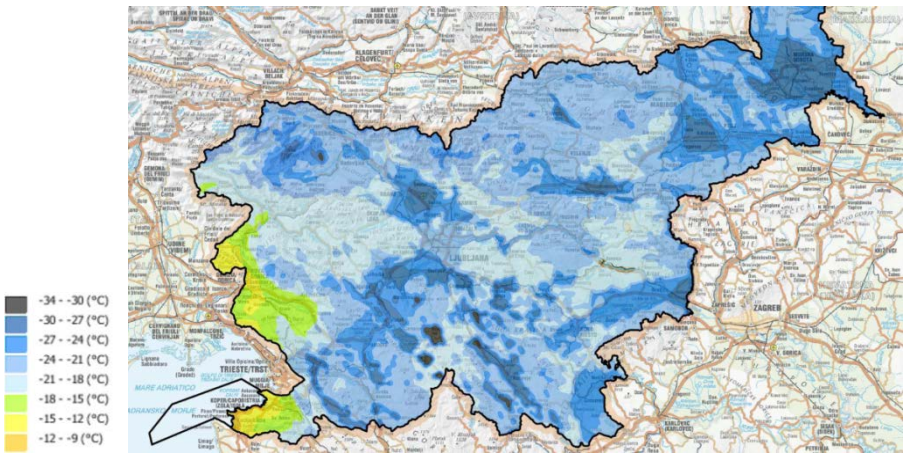
Vplive sprememb temperature določimo s pomočjo standarda SIST EN 1991-1-5, z upoštevanjem nacionalnega dodatka SIST EN 1991-1-5:2004/A101:2009.

Osnovne predpostavke toplotne obtežbe na objekt:

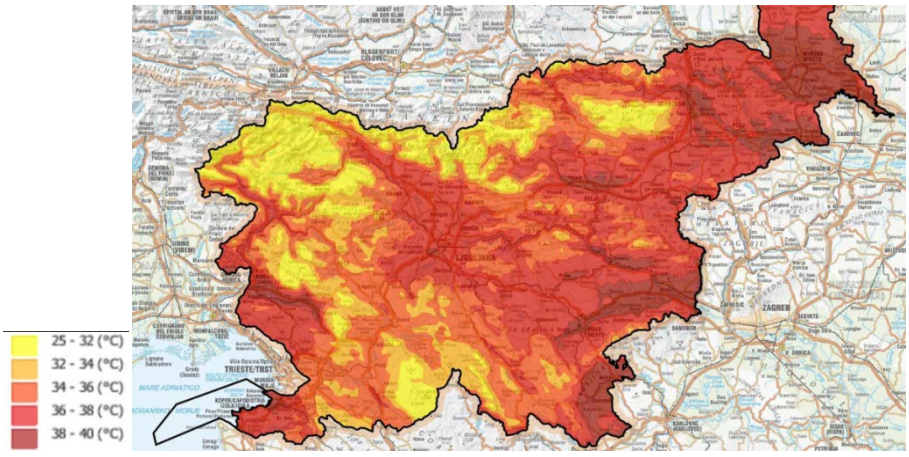
- toplotna obtežba na mostove se šteje kot *spremenljiva* obtežba *Q*, za katero veljajo delni kombinacijski varnostni faktorji ψ_0=0,6 (za MSU) oz. ψ_0=0,0 (za MSN), ψ_1=0,6 in ψ_2=0,5,
- upošteva se ohlajevanje objekta pozimi in segrevanje nosilnih elementov objekta poleti,
- temperaturni vpliv v prekladni konstrukciji predstavimo z vsoto enakomerne spremembe temperature ter neenakomerne spremembe temperature oziroma linearnega temperaturnega gradienta.
- razlikujemo tri tipe konstrukcije mostu glede na vrsto gradiva voziščne konstrukcije:

  tip 1 – jeklena voziščna konstrukcija (škatlasti prerezi, paličje)
  tip 2 – sovprežna voziščna konstrukcija,
  tip 3 – betonska voziščna konstrukcija (škatlasti prerezi, nosilci, plošče).

Iz karte ARSO lahko razberemo vrednosti najvišjih oz. najnižjih temperatur s povratno dobo 50 let (glej sliki spodaj).



Slika 4: Karta najnižjih temperatur - ARSO.



Slika 5: Karta najvišjih temperatur - ARSO.

Podatki za najnižjo in najvišjo temperaturo, merjeno v senci, s povratno dobo 50 let, za obravnavano območje (Rače) znašajo:

$$T_{min} = -26{,}4\ °C$$

$$T_{max} = +38{,}7\ °C$$

Ker gre za popolnoma vkopani objekt spremembe temperature ne upoštevamo.

1.5 Vplivi snega

Po standardu SIST EN 1991-1-3 se objekt nahaja v coni A2 (Rače), in sicer na ca. 275m nadmorske višine. Karakteristična obtežba snega na ravnih tleh tako znaša

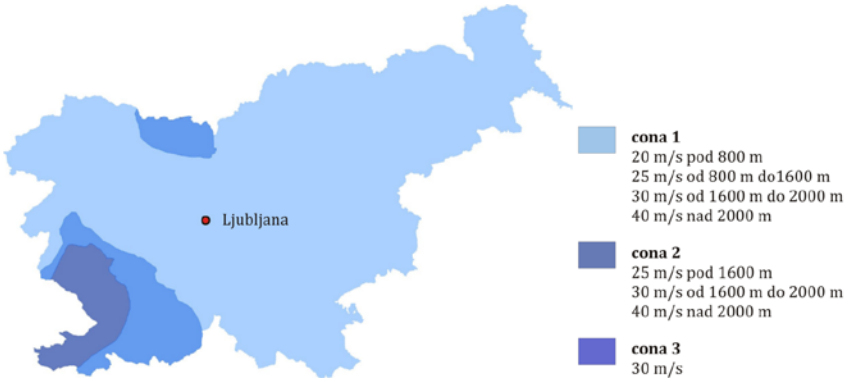
$$s_k = 1{,}293\left[1+\left(\frac{A}{728}\right)^2\right] = 1{,}293\left[1+\left(\frac{275}{728}\right)^2\right] = 1{,}47\ \mathrm{kN/m^2}.$$

Slika 6: Regije za določitev obtežbe zaradi snega

V skladu s standardom se ugotovi, da obtežba snega ne predstavlja pomembnih vplivov, saj je bistveno manjša od vpliva prometa. Zato se le ta pri izračunu zanemari.

1.6 Vplivi vetra

Po standardu SIST EN 1991-1-4 se stavba nahaja v coni 1 (Rače), in sicer na 275m nadmorske višine. Referenčna hitrost vetra tako znaša $v_{\mathrm{b},0} = 20\ \mathrm{m/s}$.



Veter na vkopani podhod nima vpliva, zato ga zanemarimo.

1.7 Vpliv relativnega pomika podpor

Ker pri gradnji pride do razbremenitve terena in so temeljna dobra, pomikov podpor ne upoštevamo.

1.8 Vpliv zemeljskih pritiskov

Na stene podhoda, dvigala in zidove stopnišča je potrebno upoštevati vpliv zemeljskih pritiskov. Pri izračunu bomo upoštevali zasip z nekoherentno zemljino (umetni nasip – mešan material) s strižnim kotom $\varphi' = 30°$, kohezijo $c = 0\ \mathrm{kN/m^2}$ in specifično težo zasipa $\gamma = 20\ \mathrm{kN/m^3}$. Horizontalno obtežbo izračunamo z upoštevanjem mirnih zemeljskih pritiskov.

Najprej določimo koeficient mirnega zemeljskega pritiska:

$$k_0 = 1 - \sin\varphi' = 1 - \sin 30° = 0{,}50$$

s pomočjo katerega lahko izračunamo vrednost pritiska zasipa sten podhoda na vrhu (h_1 = 0,60 m) in na dnu podhoda (h_2 = 4,3 m) oziroma dnu dvigala (h_2 = 5,8 m), ki je zasut le z ene strani:

$$p_{G,zg}=k_0\cdot\gamma\cdot h_1=0{,}50\cdot 20{,}0\cdot 0{,}60 = 6{,}0\ \mathrm{kN/m^2}$$

$$p_{G,sp}=k_0\cdot\gamma\cdot h_2=0{,}50\cdot 20{,}0\cdot 4{,}30 = 43{,}0\ \mathrm{kN/m^2}$$

$$p_{G,sp}=k_0\cdot\gamma\cdot h_2=0{,}50\cdot 20{,}0\cdot 5{,}80 = 58{,}0\ \mathrm{kN/m^2}$$

Pri izračunu se upošteva povečanje pritiskov zemljine zaradi vpliva prometa. Pri tem pa naredimo poenostavitev in promet upoštevamo kot brezkrajno obtežbo. Dodatno obtežbo prometa na zasipu se upošteva samo, če povzroča neugoden vpliv na konstrukcijo. Obtežbo LM71 in SW/2 se enakomerno razdeli na širino 3,0 m, kar je groba predpostavka.

Za obtežni primer LM71

$$p_{P,zg} = p_{P,sp} = k_0 \cdot q_{LM71} = 0{,}50 \cdot 42{,}7 = 21{,}3\ \mathrm{kN/m^2}$$

Za obtežni primer SW/2

$$p_{P,zg} = p_{P,sp} = k_0 \cdot q_{SW/2} = 0{,}50 \cdot 109{,}5 = 54{,}8\ \mathrm{kN/m^2}$$

Pri zidovih stopnic se vpliv prometne obtežbe upošteva samo na spodnjih 3,0 m višine, pri čemer se je raznos obtežbe upošteval pod kotom 45°.

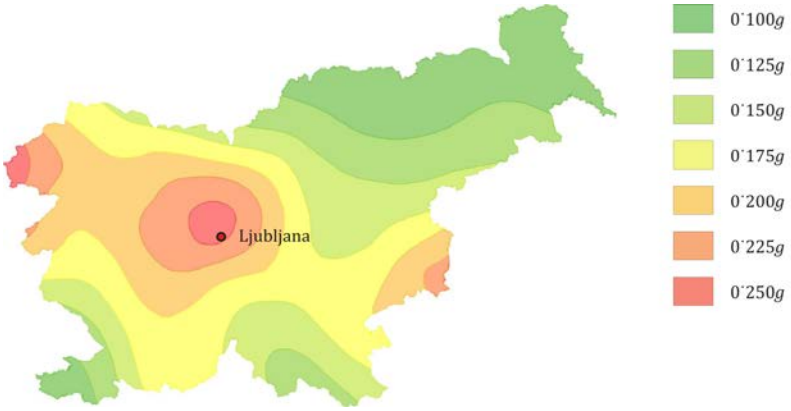
1.9 Vpliv reologije

Reoloških vplivov lezenja in krčenja ne upoštevamo.

1.10 Potresni vplivi

Objekt se nahaja v Račah. Skladno z geomehanskim poročilom so temeljna tla takšna, da jih glede na SIST EN 1998-1 lahko razvrstimo v kategorijo E (glej geološko-geotehnični pogoji). Projektni pospešek temeljnih tal ob upoštevanju običajne pomembnosti objekta (II. kategorija, $\gamma_{\mathrm{I}} = 1{,}0$) in faktorja tal $S = 1{,}0$ tako znaša

$$a_{\mathrm{g}} = \gamma_{\mathrm{I}} a_I S = 1{,}0 \times 0{,}100g \times 1{,}0 = \mathbf{0{,}100}\boldsymbol{g}.$$



Slika 7: Karta projektnih pospeškov temeljnih tal za povratno dobo 475 let

Ker gre za vkopan objekt izračun potresa ni potreben.

2 KOMBINACIJE VPLIVOV IN VARNOSTNI FAKTORJI

Kombinacije in varnostni faktorji se določijo v skladu s standardom SIST EN 1990, poglavje 6.4 za analizo MSN in po poglavju 6.5 za analizo MSU.

- vpliv krčenja in lezenja se za MSN upošteva samo, če deluje neugodno
- vpliv krčenja in lezenja se za MSU upošteva samo, če deluje neugodno

Kombiniranje vseh vplivov je izvedeno v programu SOFiSTiK, modul MAXIMA, ki upošteva, glavne in spremljajoče koristne ter stalne vplive na konstrukcijo. Zaradi obsežnega zapisa avtomatično generiranih kombinacij (za vsak končni elementi posebej) le teh v nadaljevanju ne prikazujemo. Za nedvoumnost in jasnost generiranih kombinacij v nadaljevanju tabelarično prikazujemo parcialne in kombinacijske faktorje varnosti, ter osnovne kombinacijske enačbe, po katerih se generirajo vplivi v SOFiSTiK-u.

V nadaljevanju so $G_{k,j}$ in $Q_{k,i}$ karakteristične vrednosti stalne in spremenljive obtežbe, *P* je vpliv prednapetja, A_d predstavlja nezgodni vpliv, A_{Ed} pa potresno obtežbo.

2.1 Mejno stanje nosilnosti

Stalna in začasna projektna stanja:

$$\sum_{j\geq 1}\gamma_{G,j}G_{k,j}+\gamma_P P+\gamma_{Q,1}Q_{k,1}+\sum_{i>1}\gamma_{Q,i}\psi_{0,i}Q_{k,i}$$

Nezgodna projektna stanja:

$$\sum_{j\geq 1}G_{k,j}+P+A_d+\left(\psi_{1,1}\text{ ali }\psi_{2,1}\right)Q_{k,1}+\sum_{i>1}\gamma_{Q,i}\psi_{2,i}Q_{k,i}$$

Potresna projektna stanja:

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

2.2 Mejno stanje uporabnosti

Karakteristična kombinacija:

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

Pogosta kombinacija:

$$\sum_{j\geq 1}G_{k,j}+P+\psi_{1,1}Q_{k,1}+\sum_{i>1}\psi_{2,i}Q_{k,i}$$

Navidezno stalna kombinacija:

$$\sum_{j\geq 1}G_{k,j}+P+\sum_{i\geq 1}\psi_{2,i}Q_{k,i}$$

2.3 Parcialni varnostni faktorji za mostove

Parcialni varnostni faktorji so določeni iz SIST EN 1990, dodatek A.

Preglednica 11: Parcialni faktorji varnosti za strukturne elemente

	Vplivi	Narava vpliva	Simbol	Stalna in začasna projektna stanja	Nezgodna in potresna projektna stanja
EQU	Stalni vplivi	neugodna	$\gamma_{G,sup}$	1,05	/
		ugodna	$\gamma_{G,inf}$	0,95	/
	Reologija	neugodna	$\gamma_{SH,sup}$	1,00	/
		ugodna	$\gamma_{SH,inf}$	0,00	/
	Spremenljivi vplivi - promet UIC 71	neugodna	γ_Q	1,45	/
		ugodna	γ_Q	0,00	/
	Spremenljivi vplivi - ostalo	neugodna	γ_Q	1,50	/
		ugodna	γ_Q	0,00	/
UPL	Stalni vplivi	neugodna	$\gamma_{G,sup}$	1,10	/
		ugodna	$\gamma_{G,inf}$	0,90	/
	Reologija	neugodna	$\gamma_{SH,sup}$	1,00	/
		ugodna	$\gamma_{SH,inf}$	0,00	/
	Spremenljivi vplivi – promet – vse grupe	neugodna	γ_Q	1,45	/
		ugodna	γ_Q	0,00	/
	Spremenljivi vplivi - promet grupe 16 in 17	neugodna	γ_Q	1,00	
		ugodna	γ_Q		
	Spremenljivi vplivi - ostalo	neugodna	γ_Q	1,50	/
		ugodna	γ_Q	0,00	/
STR/GEO	Stalni vplivi	neugodna	$\gamma_{G,sup}$	1,35	1,00
		ugodna	$\gamma_{G,inf}$	1,00	1,00
	Reologija	neugodna	$\gamma_{SH,sup}$	1,00	1,00
		ugodna	$\gamma_{SH,inf}$	0,00	0,00
	Spremenljivi vplivi - promet : vse grupe 11-31 brez grup 16, 17, 26 in 27	neugodna	γ_Q	1,45	1,00
		ugodna	γ_Q	0,00	0,00
	Spremenljivi vplivi - promet grupe 16 in 17	neugodna	γ_Q	1,20	/
		ugodna	γ_Q	0,00	/
	Spremenljivi vplivi - promet grupe 26 in 27[(1)]	neugodna	γ_Q	1,20-1,45	/
		ugodna	γ_Q	0,00	/
	Spremenljivi vplivi - ostalo	neugodna	γ_Q	1,50	1,00
		ugodna	γ_Q	0,00	0,00

3 *Prometni grupi 26 in 27 predstavljata težki promet na mostu. Upošteva se istočasnost UIC 71 na eni progi ter SW/2 na drugi progi. Uporabi se faktor varnosti γ_Q = 1,45 za UIC 71 ter γ_Q = 1,20 za SW/2.*

3.1 Kombinacijski faktorji varnosti za železniške mostove

Kombinacijski faktorji varnosti so določeni iz SIST EN 1990, dodatek A, tabela A2.3.

Preglednica 12: Kombinacijski faktorji obtežbe grup in ostalih spremenljivih vplivov za železniške mostove

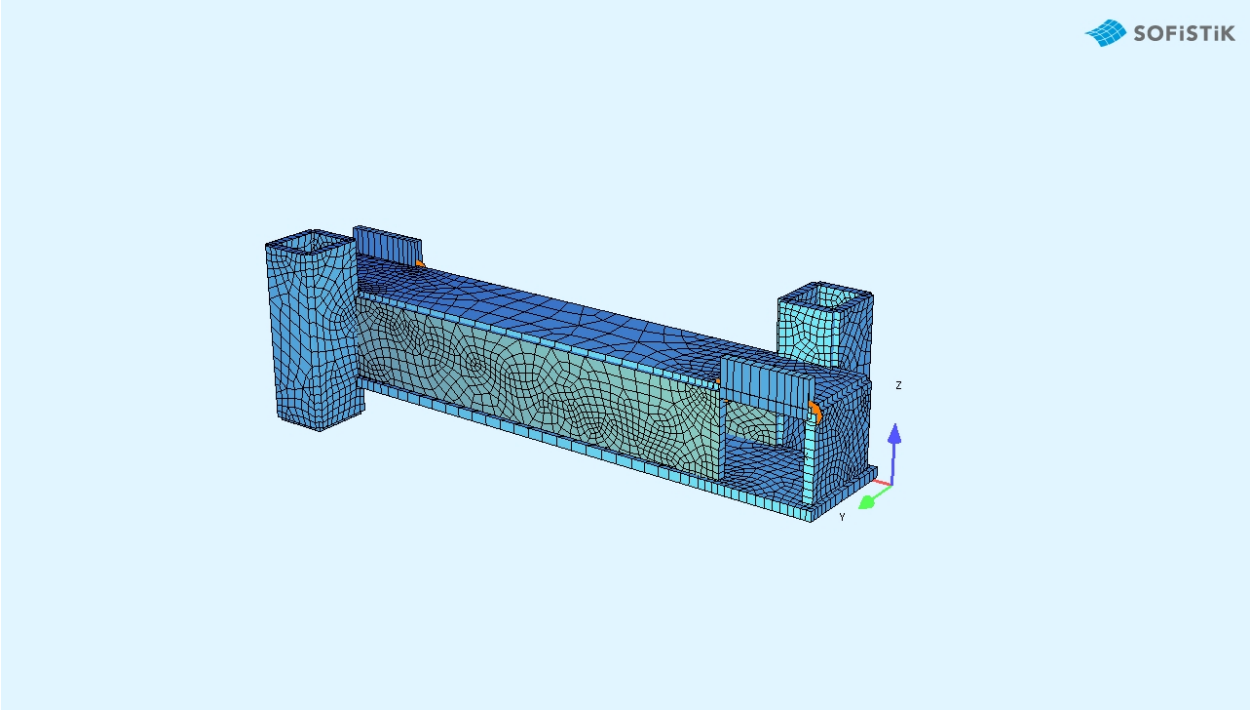
Vplivi	Simboli		ψ_0	ψ_1	ψ_2
Glavne prometne akcije(obtežne grupe)	gr11 (LM71)	Max. vertikalna 1 + max. vzdolžna	0,8	0,8	0,0
	gr12 (LM71)	Max. vertikalna 2 + max. prečna			
	gr13 (Pospeš./zaviranje)	Max. vzdolžna			
	gr14 (Centrif./bočna sila)	Max. prečna			
	gr15 (Prazen vlak)	Prečna stabilnost konstrukcije			
	gr16 (SW/2)	SW/2 z max. vzdolžno			
	gr17 (SW/2)	SW/2 z max. prečno			
	gr21 (LM71+SW/0)	Max. vertikalna 1 z max. vzdolžna	0,8	0,7	0,0
	gr22 (LM71+SW/0)	Max. vertikalna 2 z max. prečna			
	gr23 (Pospeš./zaviranje)	Max. vzdolžna			
	gr24 (Centrif./bočna sila)	Max. prečna			
	gr26 (SW/2)	SW/2 z max. vzdolžno			
	gr27 (SW/2)	SW/2 z max. prečno			
	gr31 (LM71+SW/0)	Dodatni obtežni primeri	0,8	0,6	0,0
Druge operacijske akcije	Aerodinamični efekti		0,8	0,5	0,0
	Splošna vzdrževalna obtežba za ne javno pot		0,8	0,5	0,0
Obtežba vetra (2)	F_{wk}		0,8	0,5	0,0
	F_w^{**}		1,0	0,0	0,0
Temperaturna obtežba	T_k		0,6	0,6	0,5
Obtežba snega	$Q_{sn,k}$ (med gradnjo)		0,8	/	0,0
Obtežba med gradnjo	Q_c		1,0	/	1,0

Opomba: za pomen simbolov (1)-(5) glej standard SIST EN 1990 AMD 1:2005(E), 15 str.

4 STATIČNA ANALIZA

4.1 Predpostavke globalnega računskega modela

Statična analiza konstrukcije podhoda je bila izvedena s pomočjo prostorskega računskega modela iz linijskih in lupinastih končnih elementov v programu *SOFiSTiK FEM ver. 2020*. Opravljena je bila analiza po teoriji prvega reda.



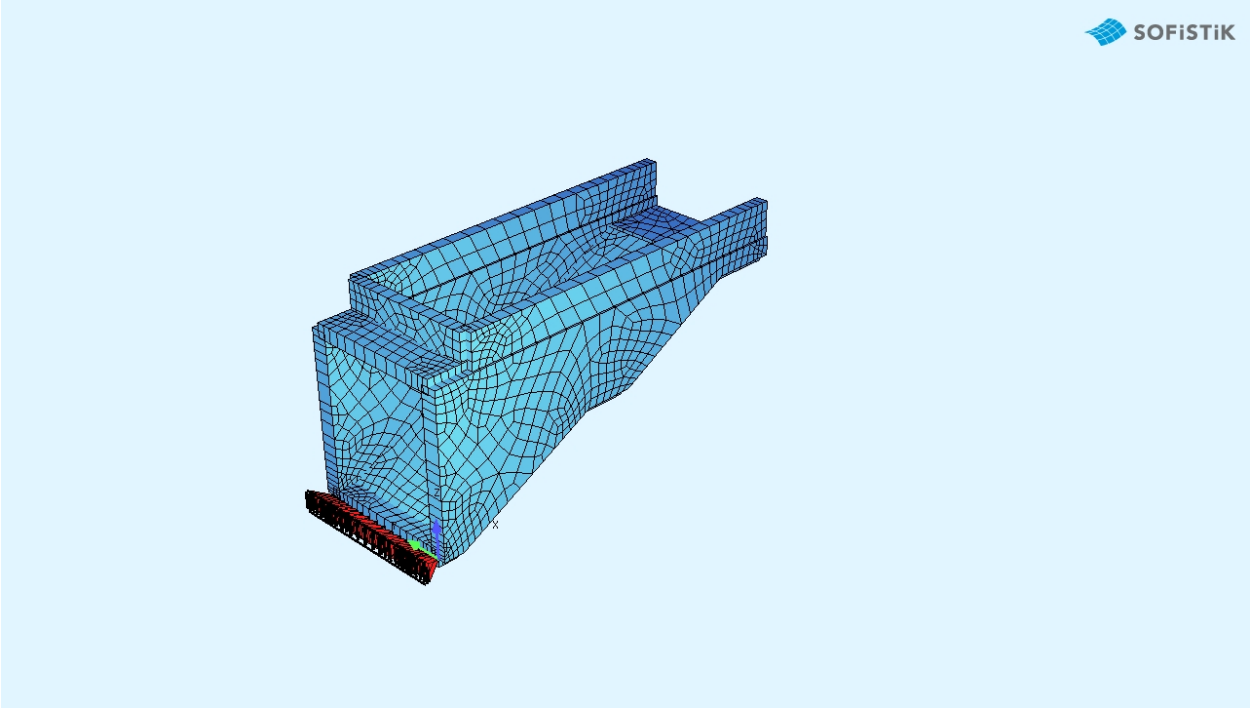
Slika 8: Globalni računski model v SOFiSTiKu

Za potrebe računske analize so razponi, višine in dolžine elementov določeni po osi elementa.

V globalnem računskem modelu smo robne pogoje temeljenja predpostavili s pomočjo elastičnih vzmeti: ena vertikalna in dve horizontalni. Predpostavili smo temeljenje na temeljni plošči. Pri izračunu togosti vzmeti za globalni model smo upoštevali modul reakcije tal v vertikalni smeri $K_{tal,Z} = 3000$ kN/m^3, ki je določen v geološko-geomehanskem poročilu glede na obremenitve objekta ter njegove posedke. V horizontalni smeri pa smo upoštevali 75% vertikalnega modula reakcije tal $K_{tal,XY} = 2250$ kN/m^3

Kontrola dovoljene širine razpok $w_{dop} = 0{,}2$ mm za temeljno ploščo in stene ter $w_{dop} = 0{,}3$ mm za prekladno ploščo je narejena po tabelah iz standarda SIST EN 1992-1, poglavje 7.

Stopnišča so bili analizirani s pomočjo ločenega modela, v katerem so bili upoštevani vsi zunanji vplivi iz globalnega modela, ki vplivajo na krilne zidove. Upoštevana je bila dejanska geometrija stopnic. Izpisi notranjih statičnih količin in armature za krilne zidove so priloženi na koncu izpisov iz računalniškega programa Sofistik.



Slika 9: Računski model stopnic v SOFiSTiKu.

4.2 Osnovni obtežni slučaji v globalnem računskem modelu

Preglednica 13: Osnovni obtežni slučaji v globalnem računskem modelu

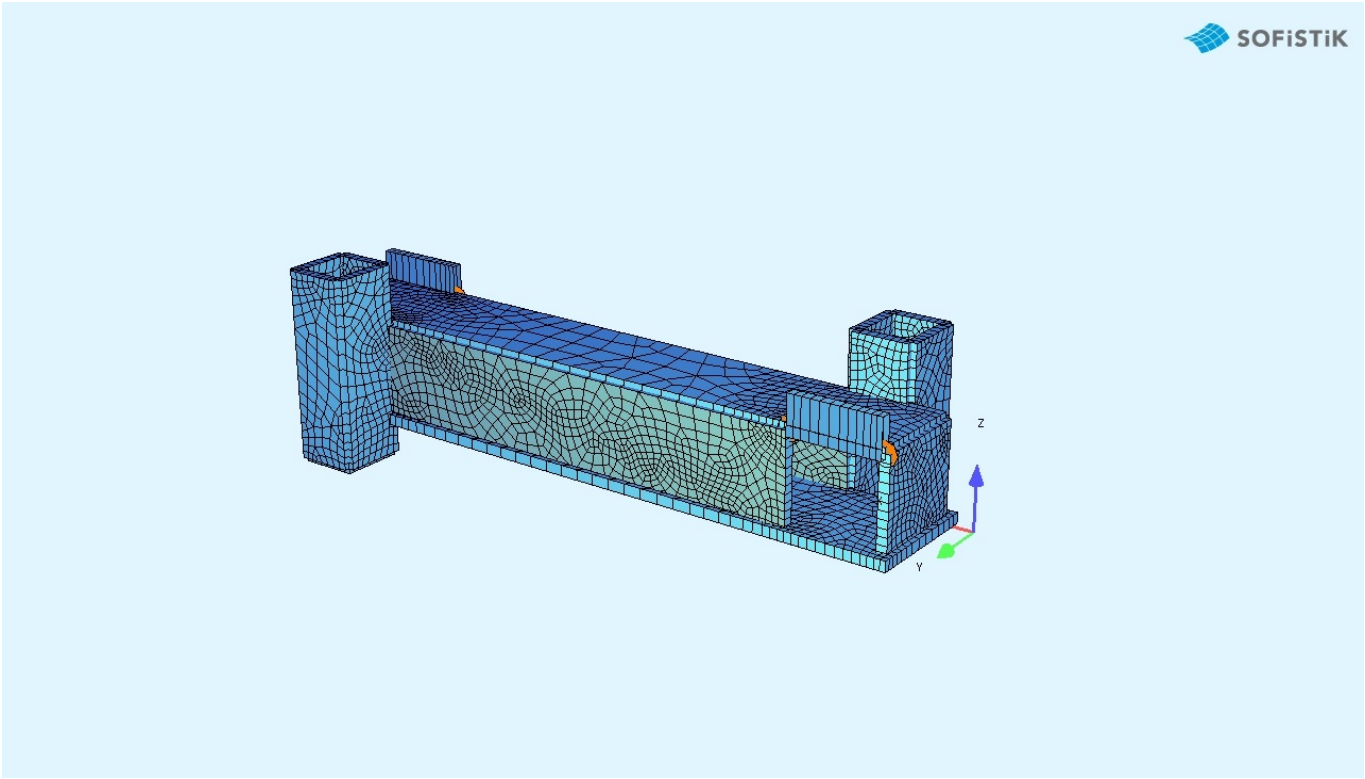
	Obtežni slučaj	OPIS
G	1	Lastna teža konstrukcije
	2,3	Stalna teža na preklado in v podhodu
Q	5,6	Koristna na peronu in podhodu
L	401,402,403,404,405,406	UIC 71 – tir 1, 2
	411,412,413,414,415,416	SW/2 – tir 1, 2
	421,422,423,424	UIC 71- ekscentričnost – tir 1, 2
	431,432,433,434	Bočna sila – tir 1, 2
	441,442,443,444	Pospeševalna in zaviralna sila UIC 71 – tir 1, 2
	451,452,453,454	Pospeševalna in zaviralna sila SW/2 – tir 1, 2
R	701	Zemeljski pritiski

PRILOGA:

- Izpis statične analize iz računalniškega programa SOFiSTiK ter Tower
- Skica izbrane armature

Zelezniski podhod
Materials

Default design code is EuroNorm EN 1992-2:2005 Concrete Structures (Slowenija) V 2020
Structure and Tab.7.1N: D (Railroad bridges)
Snow load zone : 1



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National Defined Parameters

Reference of parameter in design code	Value
long term reduction concrete compressive strength α-cc EN 1992-2 3.1.6	0.850¹
long term reduction concrete tensile strength α-ct EN 1992-1-1 3.1.6 (2)	1.000¹
safety coefficient γ-c for concrete EN 1992-1-1 2.4.2.4	1.500¹
safety coefficient γ-CE for concrete elasticity EN 1992-1-1 5.8.6 (3)	1.200¹
safety coefficient γ-s for reinforcing steel EN 1992-1-1 2.4.2.4	1.150¹

¹ national defined parameter taken from the INI-files

Materials

Mat	Classification
1	C 30/37 (EN 1992)
2	B 500 B (EN 1992)

Mat 1 C 30/37 (EN 1992)

Young's modulus	E	32837 [N/mm2]	Safetyfactor		1.50 [-]
Poisson's ratio	μ	0.20 [-]	Strength	fc	25.50 [MPa]
Shear modulus	G	13682 [N/mm2]	Nominal strength	fck	30.00 [MPa]
Compression modulus	K	18243 [N/mm2]	Tensile strength	fctm	2.90 [MPa]
Nominal Weight	γ	25.0 [kN/m3]	Tensile strength	fctk,05	2.03 [MPa]
Mean density	ρ	2400.0 [kg/m3]	Tensile strength	fctk,95	3.77 [MPa]
Elongation coefficient	α	1.00E-05 [1/K]	Bond strength	fbd	3.04 [MPa]
			Service strength	fcm	38.00 [MPa]
			Fatigue strength	fcd,fat	14.96 [MPa]
			Tensile strength	fctd	1.35 [MPa]
			Tensile failure energy	Gf	0.14 [N/mm]

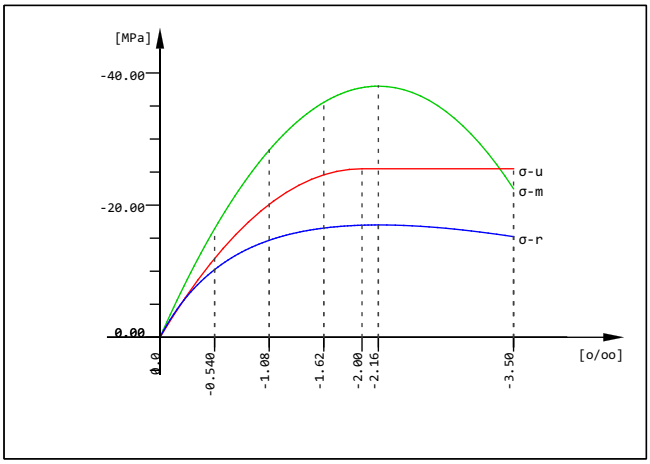
Stress-Strain for serviceability	ε[o/oo]	σ-m[MPa]	E-t[N/mm2]
Is only valid within the defined	0.000	0.00	34478
stress range	-0.540	-16.42	26234
	-1.081	-28.31	17746

Zelezniski podhod
Materials

Stress-Strain for serviceability	ε[o/oo]	σ-m[MPa]	E-t[N/mm2]
	-1.621	-35.55	9005
	-2.162	-38.00	0
	-3.500	-22.47	-23499
	Safetyfactor		1.50

Stress-Strain for ultimate load	ε[o/oo]	σ-u[MPa]	E-t[N/mm2]
Is only valid within the defined	0.000	0.00	25500
stress range	-2.000	-25.50	0
	-3.500	-25.50	0
	Safetyfactor		1.50

Stress-Strain of calc. mean values	ε[o/oo]	σ-r[MPa]	E-t[N/mm2]
Is only valid within the defined	0.000	0.00	28732
stress range	-0.540	-10.23	12007
	-1.081	-14.67	5278
	-1.621	-16.53	1917
	-2.162	-17.00	0
	-3.500	-15.23	-2279
	Safetyfactor		(1.50)



C 30/37 (EN 1992)

Mat 2 B 500 B (EN 1992)

Young's modulus	E	200000 [N/mm2]	Safetyfactor		1.15 [-]
Poisson's ratio	μ	0.30 [-]	Yield stress	fy	500.00 [MPa]
Shear modulus	G	76923 [N/mm2]	Compressive yield	fyc	500.00 [MPa]
Compression modulus	K	166667 [N/mm2]	Tensile strength	ft	540.00 [MPa]
Nominal Weight	γ	78.5 [kN/m3]	Compressive strength	fc	540.00 [MPa]
Mean density	ρ	7850.0 [kg/m3]	Ultimate strain		50.00 [o/oo]
Elongation coefficient	α	1.20E-05 [1/K]	relative bond coeff.		1.00 [-]
max. thickness	t-max	32.00 [mm]	EN 1992 bond coeff.	k1	0.80 [-]
			Hardening modulus	Eh	0.00 [MPa]
			Proportional limit	fp	500.00 [MPa]
			Dynamic allowance	σ-dyn	152.17 [MPa]

Stress-Strain for serviceability	ε[o/oo]	σ-m[MPa]	E-t[N/mm2]
Is also extended beyond the	1000.000	540.00	0
defined stress range	50.000	540.00	0
	2.500	500.00	842
	0.000	0.00	200000
	-2.500	-500.00	842
	-50.000	-540.00	0
	-1000.000	-540.00	0
	Safetyfactor		1.15

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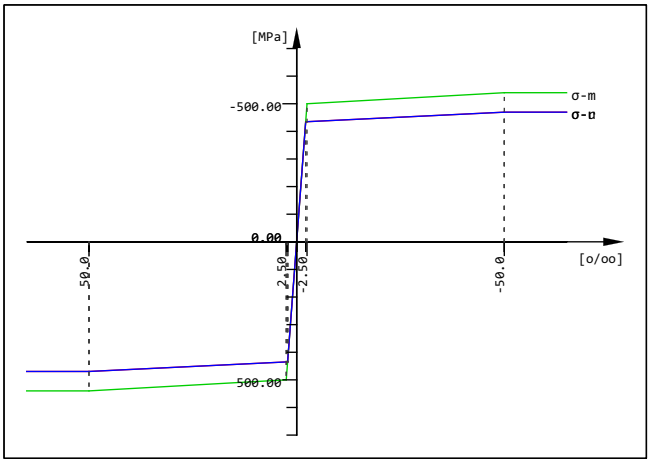
Zelezniski podhod
Materials

Stress-Strain for ultimate load	**ε[o/oo]**	**σ-u[MPa]**	**E-t[N/mm2]**
Is also extended beyond the	1000.000	469.57	0
defined stress range	50.000	469.57	0
	2.174	434.78	727
	0.000	0.00	200000
	-2.174	-434.78	727
	-50.000	-469.57	0
	-1000.000	-469.57	0
	Safetyfactor		(1.15)

Stress-Strain of calc. mean values	**ε[o/oo]**	**σ-r[MPa]**	**E-t[N/mm2]**
Is also extended beyond the	1000.000	469.57	0
defined stress range	50.000	469.57	0
	2.174	434.78	727
	0.000	0.00	200000
	-2.174	-434.78	727
	-50.000	-469.57	0
	-1000.000	-469.57	0
	Safetyfactor		(1.15)



B 500 B (EN 1992)

Thermal material constants

Mat	**T[°C]**	**S[kJ/K/m3]**	**Kxx[W/K/m]**	**Kyy[W/K/m]**	**Kzz[W/K/m]**	
1	AUTO	2.16E+03	1.951E+00			C 30/37 (EN 1992)
2	AUTO	3.45E+03	5.333E+01			B 500 B (EN 1992)

Mat material number S[kJ/K/m3] Heat capacity
T[°C] Temperature Kxx[W/K/m],Kyy[W/K/m],Kzz[W/K/m] Heat conductivity

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Zelezniski podhod
Sections

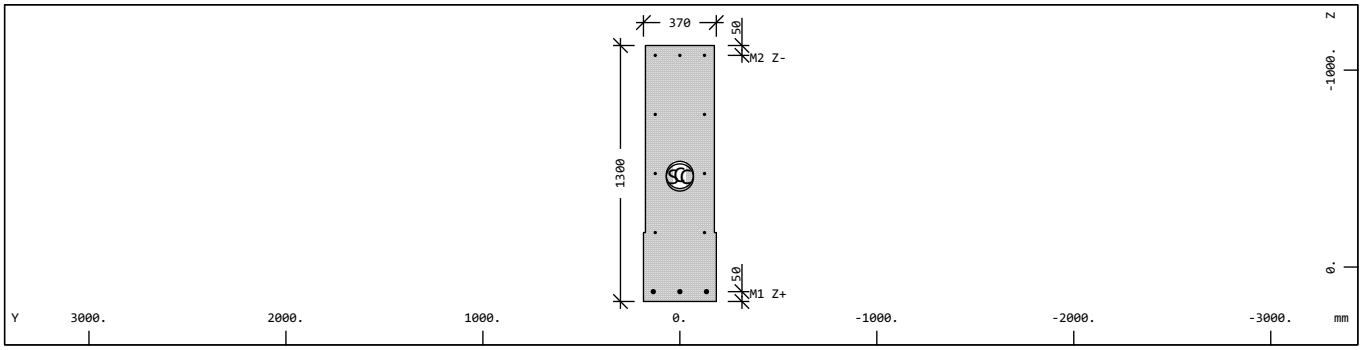
Cross-sections static properties

SNo	Mat	A[m2]	Ay[m2]	Iy[m4]	yc[mm]	ysc[mm]	E[N/mm2]	g[kg/m]	I-1[m4]
	MRf	It[m4]	Az[m2]	Iz[m4]	zc[mm]	zsc[mm]	G[N/mm2]		I-2[m4]
			Ayz[m2]	Iyz[m4]					α[°]
1	1	4.6200E-01	1.079E-01	6.571E-02	0.0	0.0	32837	1155.0	
	2¹	1.778E-02	3.792E-01	4.872E-03	-467.8	-454.9	13682	(BEAM)	
	=	B/H/Bw/Hf 370/1300/350/350(inv)							
	=	B/H/Bw/Hf 370/1300/350/350(inv)							

¹ Reinforcements are not considered in the sectional values

SNo	section number	yc[mm],zc[mm]	ordinate of elastic centroid
Mat	material number	ysc[mm],zsc[mm]	ordinate of shear centre
A[m2]	sectional area	E[N/mm2]	Young's modulus
Ay[m2],Az[m2],Ayz[m2]	transverse shear deformation area	g[kg/m]	weight per length
Iy[m4],Iz[m4],Iyz[m4]	bending moment of inertia		
I-1[m4],I-2[m4],α[°]	principal moments of inertia and angle of the principal axes		
MRf	reinforcement material number		
It[m4]	torsional moment of inertia		
G[N/mm2]	Shear modulus		

Cross section No. 1 - B/H/Bw/Hf 370/1300/350/350(inv)



Cross section No. 1 - B/H/Bw/Hf 370/1300/350/350(inv)

Static properties of cross section

Mat	A[m2]	Ay[m2]	Iy[m4]	yc[mm]	ysc[mm]	E[N/mm2]	g[kg/m]	I-1[m4]
MRf	It[m4]	Az[m2]	Iz[m4]	zc[mm]	zsc[mm]	G[N/mm2]		I-2[m4]
		Ayz[m2]	Iyz[m4]					α[°]
1	4.6200E-01	1.079E-01	6.571E-02	0.0	0.0	32837	1155.0	
2¹	1.778E-02	3.792E-01	4.872E-03	-467.8	-454.9	13682	(BEAM)	

¹ Reinforcements are not considered in the sectional values

Mat	material number	yc[mm],zc[mm]	ordinate of elastic centroid
A[m2]	sectional area	ysc[mm],zsc[mm]	ordinate of shear centre
Ay[m2],Az[m2],Ayz[m2]	transverse shear deformation area	E[N/mm2]	Young's modulus
Iy[m4],Iz[m4],Iyz[m4]	bending moment of inertia	g[kg/m]	weight per length
I-1[m4],I-2[m4],α[°]	principal moments of inertia and angle of the principal axes		
MRf	reinforcement material number		
It[m4]	torsional moment of inertia		
G[N/mm2]	Shear modulus		

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Zelezniski podhod
Actions

Actions

type	part	sup	Designation		γ-u	γ-f	γ-a	ψ_0	ψ_1	ψ_2	$\psi_1$inf
G_1	G	perm	dead load g1		1.35	1.00	1.00	1.00	1.00	1.00	1.00
R	G	perm	earth pressure		1.35	1.00	1.00	1.00	1.00	1.00	1.00
F	Q	cond	settlement		1.00	0.00	1.00	1.00	1.00	1.00	1.00
L	Q	excl	live loading		1.50	0.00	1.00	0.75	0.75	0.75	0.80
L_C	Q	excl	Traffic load UIC of EC/DIN-FB		1.45	0.00	1.00	0.80	0.80	0.00	1.00
L_E	Q	excl	Traffic load SW/2 of EC/DIN-FB		1.20	0.00	1.00	0.00	1.00	0.00	1.00
S	Q	cond	snow loading		1.50	0.00	1.00	0.50	0.20	0.00	0.20
SL	Q	excl	special live load		1.45	0.00	1.00	0.80	0.80	0.00	1.00
			Reliability factor	Kfi	1.000						
			Reduction factor	xsi	0.850						

type	action	γ-u,γ-f,γ-a	partial safety factors for unfavourable/favourable/accidental
part	partition of the action	ψ_0,ψ_1,ψ_2,$\psi_1$inf	combination coefficients
sup	superposition type		

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Mesh Generation

Default design code is EuroNorm EN 1992-2:2005 Concrete Structures (Slowenija) V 2020
Structure and Tab.7.1N: D (Railroad bridges)
Snow load zone : 1

National Defined Parameters

Reference of parameter in design code	Value
long term reduction concrete compressive strength α-cc EN 1992-2 3.1.6	0.850[1]
long term reduction concrete tensile strength α-ct EN 1992-1-1 3.1.6 (2)	1.000[1]
safety coefficient γ-c for concrete EN 1992-1-1 2.4.2.4	1.500[1]
safety coefficient γ-CE for concrete elasticity EN 1992-1-1 5.8.6 (3)	1.200[1]
safety coefficient γ-s for reinforcing steel EN 1992-1-1 2.4.2.4	1.150[1]

[1] national defined parameter taken from the INI-files

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Zelezniski podhod
Generation of Node and Element Loads

Actions

type	part	sup	Designation	γ-u	γ-f	γ-a	ψ_o	ψ_1	ψ_2	$\psi_1$inf
G_1	G	perm	dead load g1	1.35	1.00	1.00	1.00	1.00	1.00	1.00
		1	lastna							
		2	stalna na peronu in plosci							
		3	stalna v podhodu							
		5	koristna na peronu							
		6	koristna v podhodu							
R	G	perm	earth pressure	1.35	1.00	1.00	1.00	1.00	1.00	1.00
		701	zemeljski pritiski							
F	Q	cond	settlement	1.00	0.00	1.00	1.00	1.00	1.00	1.00
L	Q	excl	live loading	1.50	0.00	1.00	0.75	0.75	0.75	0.80
L_C	Q	excl	Traffic load UIC of EC/DIN-FB	1.45	0.00	1.00	0.80	0.80	0.00	1.00
		401	LM71_tir 1_1							
		402	LM71_tir 1_2							
		403	LM71_tir 1_3							
		404	LM71_tir 2_1							
		405	LM71_tir 2_2							
		406	LM71_tir 2_3							
		421	LM71_eksc_1_1							
		422	LM71_eksc_1_2							
		423	LM71_eksc_2_1							
		424	LM71_eksc_2_2							
		431	LM71_boc_1_1							
		432	LM71_boc_1_2							
		433	LM71_boc_2_1							
		434	LM71_boc_2_2							
		441	LM71_zavi_posp_1_1							
		442	LM71_zavi_posp_1_2							
		443	LM71_zavi_posp_2_1							
		444	LM71_zavi_posp_2_2							
L_E	Q	excl	Traffic load SW/2 of EC/DIN-FB	1.20	0.00	1.00	0.00	1.00	0.00	1.00
		411	SW/2_tir 1_1							
		412	SW/2_tir 1_2							
		413	SW/2_tir 1_3							
		414	SW/2_tir 2_1							
		415	SW/2_tir 2_2							
		416	SW/2_tir 2_3							
		451	SW/2_zavi_posp_1_1							
		452	SW/2_zavi_posp_1_2							
		453	SW/2_zavi_posp_2_1							
		454	SW/2_zavi_posp_2_2							
S	Q	cond	snow loading	1.50	0.00	1.00	0.50	0.20	0.00	0.20
SL	Q	excl	special live load	1.45	0.00	1.00	0.80	0.80	0.00	1.00
			Reliability factor Kfi	1.000						
			Reduction factor xsi	0.850						

type action — γ-u,γ-f,γ-a partial safety factors for unfavourable/favourable/accidental
part partition of the action — $\psi_o,\psi_1,\psi_2,\psi_1$inf combination coefficients
sup superposition type

Load Case 1 (G_1) lastna

Factor forces and moments		1.000
Factor dead weight	DL-ZZ	-1.000
unfavourable partial safety factor		1.350
favourable partial safety factor		1.000
Combination coefficient	ψ_o	1.000 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	1.000 (frequent)
Combination coefficient	ψ_2	1.000 (permanent)

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Zelezniski podhod
Generation of Node and Element Loads

Load Case 2 (G_1) stalna na peronu in plosci

Factor forces and moments		1.000
unfavourable partial safety factor		1.350
favourable partial safety factor		1.000
Combination coefficient	ψ_0	1.000 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	1.000 (frequent)
Combination coefficient	ψ_2	1.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Area	sar 3			0.000	2.100	4.350	PG	34.10 [kN/m2]
				7.050	2.100	4.350		34.10 [kN/m2]
				7.050	5.450	4.350		34.10 [kN/m2]
				0.000	5.450	4.350		34.10 [kN/m2]
						activated		100.00 percent
Area	sar 3			15.065	2.100	4.350	PG	34.10 [kN/m2]
				21.700	2.100	4.350		34.10 [kN/m2]
				21.700	5.450	4.350		34.10 [kN/m2]
				15.065	5.450	4.350		34.10 [kN/m2]
						activated		100.00 percent
Area	sar 3			7.050	2.100	4.350	PG	15.30 [kN/m2]
				15.065	2.100	4.350		15.30 [kN/m2]
				15.065	5.450	4.350		15.30 [kN/m2]
				7.050	5.450	4.350		15.30 [kN/m2]
						activated		100.00 percent

Load Case 3 (G_1) stalna v podhodu

Factor forces and moments		1.000
unfavourable partial safety factor		1.350
favourable partial safety factor		1.000
Combination coefficient	ψ_0	1.000 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	1.000 (frequent)
Combination coefficient	ψ_2	1.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Area	sar 2			0.000	5.450	1.200	PG	7.35 [kN/m2]
				21.700	5.450	1.200		7.35 [kN/m2]
				21.700	2.100	1.200		7.35 [kN/m2]
				0.000	2.100	1.200		7.35 [kN/m2]
						activated		100.00 percent

Load Case 5 (G_1) koristna na peronu

Factor forces and moments		1.000
unfavourable partial safety factor		1.350
favourable partial safety factor		1.000
Combination coefficient	ψ_0	1.000 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	1.000 (frequent)
Combination coefficient	ψ_2	1.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Area	sar 3			0.000	2.100	4.350	PG	5.00 [kN/m2]
				7.050	2.100	4.350		5.00 [kN/m2]

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Zelezniski podhod
Generation of Node and Element Loads

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
				7.050	5.450	4.350		5.00 [kN/m2]
				0.000	5.450	4.350		5.00 [kN/m2]
						activated		100.00 percent
Area	sar 3			15.065	2.100	4.350	PG	5.00 [kN/m2]
				21.700	2.100	4.350		5.00 [kN/m2]
				21.700	5.450	4.350		5.00 [kN/m2]
				15.065	5.450	4.350		5.00 [kN/m2]
						activated		100.00 percent

Load Case 6 (G_1) koristna v podhodu

Factor forces and moments		1.000
unfavourable partial safety factor		1.350
favourable partial safety factor		1.000
Combination coefficient	ψ_0	1.000 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	1.000 (frequent)
Combination coefficient	ψ_2	1.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Area	sar 2			0.000	5.450	1.200	PG	5.00 [kN/m2]
				21.700	5.450	1.200		5.00 [kN/m2]
				21.700	2.100	1.200		5.00 [kN/m2]
				0.000	2.100	1.200		5.00 [kN/m2]
						activated		100.00 percent

Load Case 401 (L_C) LM71_tir 1_1

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Point	sar 3			7.950	4.650	4.350	PG	200.8 [kN]
						activated		100.00 percent
Point	sar 3			9.450	4.650	4.350	PG	200.8 [kN]
						activated		100.00 percent
Point	sar 3			7.950	3.050	4.350	PG	200.8 [kN]
						activated		100.00 percent
Point	sar 3			9.450	3.050	4.350	PG	200.8 [kN]
						activated		100.00 percent
Area	sar 12			7.200	5.450	4.350	PYY	-21.30 [kN/m2]
				7.200	5.450	1.200		-21.30 [kN/m2]
				10.200	5.450	1.200		-21.30 [kN/m2]
				10.200	5.450	4.350		-21.30 [kN/m2]
						activated		100.00 percent

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Zelezniski podhod
Generation of Node and Element Loads

Load Case 402 (L_C) LM71_tir 1_2

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Area	sar 11			6.750	2.100	4.350	PYY	21.30 [kN/m2]
				6.750	2.100	1.200		21.30 [kN/m2]
				9.750	2.100	1.200		21.30 [kN/m2]
				9.750	2.100	4.350		21.30 [kN/m2]
						activated		100.00 percent
Point	sar 3			7.950	5.450	4.350	PG	200.8 [kN]
						activated		100.00 percent
Point	sar 3			9.450	5.450	4.350	PG	200.8 [kN]
						activated		100.00 percent
Point	sar 3			7.950	3.850	4.350	PG	200.8 [kN]
						activated		100.00 percent
Point	sar 3			9.450	3.850	4.350	PG	200.8 [kN]
						activated		100.00 percent
Line	qgrp 201			7.950	3.050	4.350	PG	64.24 [kN/m]
				7.950	2.100	4.350		64.24 [kN/m]
						activated		100.00 percent
Line	qgrp 201			9.450	3.050	4.350	PG	64.24 [kN/m]
				9.450	2.100	4.350		64.24 [kN/m]
						activated		100.00 percent

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Load Case 403 (L_C) LM71_tir 1_3

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			7.950	5.450	4.350	PG	64.24 [kN/m]
				7.950	2.100	4.350		64.24 [kN/m]
						activated		100.00 percent
Line	qgrp 201			9.450	5.450	4.350	PG	64.24 [kN/m]
				9.450	2.100	4.350		64.24 [kN/m]
						activated		100.00 percent
Area	sar 11			6.750	2.100	4.350	PYY	21.30 [kN/m2]
				6.750	2.100	1.200		21.30 [kN/m2]
				9.750	2.100	1.200		21.30 [kN/m2]
				9.750	2.100	4.350		21.30 [kN/m2]
						activated		100.00 percent
Area	sar 12			7.200	5.450	4.350	PYY	-21.30 [kN/m2]
				7.200	5.450	1.200		-21.30 [kN/m2]
				10.200	5.450	1.200		-21.30 [kN/m2]
				10.200	5.450	4.350		-21.30 [kN/m2]
						activated		100.00 percent

Zelezniski podhod
Generation of Node and Element Loads

Load Case 404 (L_C) LM71_tir 2_1

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Point	sar 3			12.665	4.650	4.350	PG	200.8 [kN]
						activated		100.00 percent
Point	sar 3			14.165	4.650	4.350	PG	200.8 [kN]
						activated		100.00 percent
Point	sar 3			12.665	3.050	4.350	PG	200.8 [kN]
						activated		100.00 percent
Point	sar 3			14.165	3.050	4.350	PG	200.8 [kN]
						activated		100.00 percent
Area	sar 12			11.915	5.450	4.350	PYY	-21.30 [kN/m2]
				11.915	5.450	1.200		-21.30 [kN/m2]
				14.915	5.450	1.200		-21.30 [kN/m2]
				14.915	5.450	4.350		-21.30 [kN/m2]
						activated		100.00 percent

Load Case 405 (L_C) LM71_tir 2_2

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Point	sar 3			12.665	5.450	4.350	PG	200.8 [kN]
						activated		100.00 percent
Point	sar 3			14.165	5.450	4.350	PG	200.8 [kN]
						activated		100.00 percent
Point	sar 3			12.665	3.850	4.350	PG	200.8 [kN]
						activated		100.00 percent
Point	sar 3			14.165	3.850	4.350	PG	200.8 [kN]
						activated		100.00 percent
Line	qgrp 201			12.665	3.050	4.350	PG	64.24 [kN/m]
				12.665	2.100	4.350		64.24 [kN/m]
						activated		100.00 percent
Line	qgrp 201			14.165	3.050	4.350	PG	64.24 [kN/m]
				14.165	2.100	4.350		64.24 [kN/m]
						activated		100.00 percent
Area	sar 11			11.915	2.100	4.350	PYY	21.30 [kN/m2]
				11.915	2.100	1.200		21.30 [kN/m2]
				14.915	2.100	1.200		21.30 [kN/m2]
				14.915	2.100	4.350		21.30 [kN/m2]
						activated		100.00 percent

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Zelezniski podhod
Generation of Node and Element Loads

Load Case 406 (L_C) LM71_tir 2_3

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			12.665	5.450	4.350	PG	64.24 [kN/m]
				12.665	2.100	4.350		64.24 [kN/m]
						activated		100.00 percent
Line	qgrp 201			14.165	5.450	4.350	PG	64.24 [kN/m]
				14.165	2.100	4.350		64.24 [kN/m]
						activated		100.00 percent
Area	sar 11			11.915	2.100	4.350	PYY	21.30 [kN/m2]
				11.915	2.100	1.200		21.30 [kN/m2]
				14.915	2.100	1.200		21.30 [kN/m2]
				14.915	2.100	4.350		21.30 [kN/m2]
						activated		100.00 percent
Area	sar 12			11.915	5.450	4.350	PYY	-21.30 [kN/m2]
				11.915	5.450	1.200		-21.30 [kN/m2]
				14.915	5.450	1.200		-21.30 [kN/m2]
				14.915	5.450	4.350		-21.30 [kN/m2]
						activated		100.00 percent

Load Case 411 (L_E) SW/2_tir 1_1

Factor forces and moments		1.000
unfavourable partial safety factor		1.200
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.000 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	1.000 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			7.950	5.450	4.350	PG	120.45 [kN/m]
				7.950	2.100	4.350		120.45 [kN/m]
						activated		100.00 percent
Line	qgrp 201			9.450	5.450	4.350	PG	120.45 [kN/m]
				9.450	2.100	4.350		120.45 [kN/m]
						activated		100.00 percent
Area	sar 11			7.200	2.100	4.350	PYY	54.80 [kN/m2]
				7.200	2.100	1.200		54.80 [kN/m2]
				10.200	2.100	1.200		54.80 [kN/m2]
				10.200	2.100	4.350		54.80 [kN/m2]
						activated		100.00 percent

Load Case 412 (L_E) SW/2_tir 1_2

Factor forces and moments		1.000
unfavourable partial safety factor		1.200
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.000 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	1.000 (frequent)

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Load Case 412 (L_E) SW/2_tir 1_2

Combination coefficient ψ_2 0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			7.950	5.450	4.350	PG	120.45 [kN/m]
				7.950	2.100	4.350		120.45 [kN/m]
						activated		100.00 percent
Line	qgrp 201			9.450	5.450	4.350	PG	120.45 [kN/m]
				9.450	2.100	4.350		120.45 [kN/m]
						activated		100.00 percent
Area	sar 12			7.200	5.450	4.350	PYY	-54.80 [kN/m2]
				7.200	5.450	1.200		-54.80 [kN/m2]
				10.200	5.450	1.200		-54.80 [kN/m2]
				10.200	5.450	4.350		-54.80 [kN/m2]
						activated		100.00 percent

Load Case 413 (L_E) SW/2_tir 1_3

Factor forces and moments 1.000
unfavourable partial safety factor 1.200
favourable partial safety factor 0.000
Combination coefficient ψ_0 0.000 (rare)
Combination coefficient $\psi_1$inf 1.000 (infrequent)
Combination coefficient ψ_1 1.000 (frequent)
Combination coefficient ψ_2 0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			7.950	5.450	4.350	PG	120.45 [kN/m]
				7.950	2.100	4.350		120.45 [kN/m]
						activated		100.00 percent
Line	qgrp 201			9.450	5.450	4.350	PG	120.45 [kN/m]
				9.450	2.100	4.350		120.45 [kN/m]
						activated		100.00 percent
Area	sar 11			7.200	2.100	4.350	PYY	54.80 [kN/m2]
				7.200	2.100	1.200		54.80 [kN/m2]
				10.200	2.100	1.200		54.80 [kN/m2]
				10.200	2.100	4.350		54.80 [kN/m2]
						activated		100.00 percent
Area	sar 12			7.200	5.450	4.350	PYY	-54.80 [kN/m2]
				7.200	5.450	1.200		-54.80 [kN/m2]
				10.200	5.450	1.200		-54.80 [kN/m2]
				10.200	5.450	4.350		-54.80 [kN/m2]
						activated		100.00 percent

Load Case 414 (L_E) SW/2_tir 2_1

Factor forces and moments 1.000
unfavourable partial safety factor 1.200
favourable partial safety factor 0.000
Combination coefficient ψ_0 0.000 (rare)
Combination coefficient $\psi_1$inf 1.000 (infrequent)
Combination coefficient ψ_1 1.000 (frequent)
Combination coefficient ψ_2 0.000 (permanent)

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Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			12.665	5.450	4.350	PG	120.45 [kN/m]
				12.665	2.100	4.350		120.45 [kN/m]
						activated		100.00 percent
Line	qgrp 201			14.165	5.450	4.350	PG	120.45 [kN/m]
				14.165	2.100	4.350		120.45 [kN/m]
						activated		100.00 percent
Area	sar 11			11.915	2.100	4.350	PYY	54.80 [kN/m2]
				11.915	2.100	1.200		54.80 [kN/m2]
				14.915	2.100	1.200		54.80 [kN/m2]
				14.915	2.100	4.350		54.80 [kN/m2]
						activated		100.00 percent

Load Case 415 (L_E) SW/2_tir 2_2

Factor forces and moments		1.000
unfavourable partial safety factor		1.200
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.000 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	1.000 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			12.665	5.450	4.350	PG	120.45 [kN/m]
				12.665	2.100	4.350		120.45 [kN/m]
						activated		100.00 percent
Line	qgrp 201			14.165	5.450	4.350	PG	120.45 [kN/m]
				14.165	2.100	4.350		120.45 [kN/m]
						activated		100.00 percent
Area	sar 12			11.915	5.450	4.350	PYY	-54.80 [kN/m2]
				11.915	5.450	1.200		-54.80 [kN/m2]
				14.915	5.450	1.200		-54.80 [kN/m2]
				14.915	5.450	4.350		-54.80 [kN/m2]
						activated		100.00 percent

Load Case 416 (L_E) SW/2_tir 2_3

Factor forces and moments		1.000
unfavourable partial safety factor		1.200
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.000 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	1.000 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			12.665	5.450	4.350	PG	120.45 [kN/m]
				12.665	2.100	4.350		120.45 [kN/m]
						activated		100.00 percent
Line	qgrp 201			14.165	5.450	4.350	PG	120.45 [kN/m]
				14.165	2.100	4.350		120.45 [kN/m]
						activated		100.00 percent
Area	sar 11			11.915	2.100	4.350	PYY	54.80 [kN/m2]
				11.915	2.100	1.200		54.80 [kN/m2]
				14.915	2.100	1.200		54.80 [kN/m2]

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Generation of Node and Element Loads

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
				14.915	2.100	4.350		54.80 [kN/m2]
						activated		100.00 percent
Area	sar 12			11.915	5.450	4.350	PYY	-54.80 [kN/m2]
				11.915	5.450	1.200		-54.80 [kN/m2]
				14.915	5.450	1.200		-54.80 [kN/m2]
				14.915	5.450	4.350		-54.80 [kN/m2]
						activated		100.00 percent

Load Case 421 (L_C) LM71_eksc_1_1

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			7.950	5.450	4.350	PG	57.12 [kN/m]
				7.950	2.100	4.350		57.12 [kN/m]
						activated		100.00 percent
Line	qgrp 201			9.450	5.450	4.350	PG	71.36 [kN/m]
				9.450	2.100	4.350		71.36 [kN/m]
						activated		100.00 percent
Area	sar 12			7.200	5.450	4.350	PYY	-21.30 [kN/m2]
				7.200	5.450	1.200		-21.30 [kN/m2]
				10.200	5.450	1.200		-21.30 [kN/m2]
				10.200	5.450	4.350		-21.30 [kN/m2]
						activated		100.00 percent

Load Case 422 (L_C) LM71_eksc_1_2

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			7.950	5.450	4.350	PG	57.12 [kN/m]
				7.950	2.100	4.350		57.12 [kN/m]
						activated		100.00 percent
Line	qgrp 201			9.450	5.450	4.350	PG	71.36 [kN/m]
				9.450	2.100	4.350		71.36 [kN/m]
						activated		100.00 percent
Area	sar 11			7.200	2.100	4.350	PYY	21.30 [kN/m2]
				7.200	2.100	1.200		21.30 [kN/m2]
				10.200	2.100	1.200		21.30 [kN/m2]
				10.200	2.100	4.350		21.30 [kN/m2]
						activated		100.00 percent

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Load Case 423 (L_C) LM71_eksc_2_1

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			12.665	5.450	4.350	PG	57.12 [kN/m]
				12.665	2.100	4.350		57.12 [kN/m]
						activated		100.00 percent
Line	qgrp 201			14.165	5.450	4.350	PG	71.36 [kN/m]
				14.165	2.100	4.350		71.36 [kN/m]
						activated		100.00 percent
Area	sar 12			11.915	5.450	4.350	PYY	-21.30 [kN/m2]
				11.915	5.450	1.200		-21.30 [kN/m2]
				14.915	5.450	1.200		-21.30 [kN/m2]
				14.915	5.450	4.350		-21.30 [kN/m2]
						activated		100.00 percent

Load Case 424 (L_C) LM71_eksc_2_2

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			12.665	5.450	4.350	PG	57.12 [kN/m]
				12.665	2.100	4.350		57.12 [kN/m]
						activated		100.00 percent
Line	qgrp 201			14.165	5.450	4.350	PG	71.36 [kN/m]
				14.165	2.100	4.350		71.36 [kN/m]
						activated		100.00 percent
Area	sar 11			11.915	2.100	4.350	PYY	21.30 [kN/m2]
				11.915	2.100	1.200		21.30 [kN/m2]
				14.915	2.100	1.200		21.30 [kN/m2]
				14.915	2.100	4.350		21.30 [kN/m2]
						activated		100.00 percent

Load Case 431 (L_C) LM71_boc_1_1

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

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Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Point	sar 3			8.700	3.775	4.350	PXX	100.0 [kN]
						activated		100.00 percent

Load Case 432 (L_C) LM71_boc_1_2

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Point	sar 3			8.700	3.775	4.350	PXX	-100.0 [kN]
						activated		100.00 percent

Load Case 433 (L_C) LM71_boc_2_1

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Point	sar 3			13.415	3.775	4.350	PXX	100.0 [kN]
						activated		100.00 percent

Load Case 434 (L_C) LM71_boc_2_2

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Point	sar 3			13.415	3.775	4.350	PXX	-100.0 [kN]
						activated		100.00 percent

Load Case 441 (L_C) LM71_zavi_posp_1_1

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

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Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			8.700	5.450	4.350	PYY	33.00 [kN/m]
				8.700	2.100	4.350		33.00 [kN/m]
						activated		100.00 percent

Load Case 442 (L_C) LM71_zavi_posp_1_2

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			8.700	5.450	4.350	PYY	-33.00 [kN/m]
				8.700	2.100	4.350		-33.00 [kN/m]
						activated		100.00 percent

Load Case 443 (L_C) LM71_zavi_posp_2_1

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

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Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			13.000	5.450	4.350	PYY	33.00 [kN/m]
				13.000	2.100	4.350		33.00 [kN/m]
						activated		100.00 percent

Load Case 444 (L_C) LM71_zavi_posp_2_2

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			13.415	5.450	4.350	PYY	-33.00 [kN/m]
				13.415	2.100	4.350		-33.00 [kN/m]
						activated		100.00 percent

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Generation of Node and Element Loads

Load Case 451 (L_E) SW/2_zavi_posp_1_1

Factor forces and moments		1.000
unfavourable partial safety factor		1.200
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.000 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	1.000 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			8.700	5.450	4.350	PYY	33.00 [kN/m]
				8.700	2.100	4.350		33.00 [kN/m]
						activated		100.00 percent

Load Case 452 (L_E) SW/2_zavi_posp_1_2

Factor forces and moments		1.000
unfavourable partial safety factor		1.200
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.000 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	1.000 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			8.700	5.450	4.350	PYY	-33.00 [kN/m]
				8.700	2.100	4.350		-33.00 [kN/m]
						activated		100.00 percent

Load Case 453 (L_E) SW/2_zavi_posp_2_1

Factor forces and moments		1.000
unfavourable partial safety factor		1.200
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.000 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	1.000 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			13.415	5.450	4.350	PYY	33.00 [kN/m]
				13.415	2.100	4.350		33.00 [kN/m]
						activated		100.00 percent

Load Case 454 (L_E) SW/2_zavi_posp_2_2

Factor forces and moments		1.000
unfavourable partial safety factor		1.200
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.000 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	1.000 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

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Generation of Node and Element Loads

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Line	qgrp 201			13.415	5.450	4.350	PYY	-33.00 [kN/m]
				13.415	2.100	4.350		-33.00 [kN/m]
						activated		100.00 percent

Load Case 701 (R) zemeljski pritiski

Factor forces and moments		1.000
unfavourable partial safety factor		1.350
favourable partial safety factor		1.000
Combination coefficient	ψ_0	1.000 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	1.000 (frequent)
Combination coefficient	ψ_2	1.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Area	sar 11			6.600	2.100	1.200	PYY	43.00 [kN/m2]
				6.600	2.100	4.350		6.00 [kN/m2]
				18.600	2.100	4.350		6.00 [kN/m2]
				18.600	2.100	1.200		43.00 [kN/m2]
						activated		100.00 percent
Area	sar 20			20.500	5.450	1.200	PYY	-43.00 [kN/m2]
				20.500	5.450	4.350		-6.00 [kN/m2]
				21.700	5.450	4.350		-6.00 [kN/m2]
				21.700	5.450	1.200		-43.00 [kN/m2]
						activated		100.00 percent
Area	sar 10			0.000	2.100	1.200	PYY	43.00 [kN/m2]
				0.000	2.100	4.350		6.00 [kN/m2]
				1.200	2.100	4.350		6.00 [kN/m2]
				1.200	2.100	1.200		43.00 [kN/m2]
						activated		100.00 percent
Area	sar 12			6.600	5.450	1.200	PYY	-43.00 [kN/m2]
				6.600	5.450	4.350		-6.00 [kN/m2]
				15.065	5.450	4.350		-6.00 [kN/m2]
				15.065	5.450	1.200		-43.00 [kN/m2]
						activated		100.00 percent
Area	sar 9			0.000	5.450	1.200	PXX	43.00 [kN/m2]
				0.000	5.450	4.350		6.00 [kN/m2]
				0.000	2.100	4.350		6.00 [kN/m2]
				0.000	2.100	1.200		43.00 [kN/m2]
						activated		100.00 percent
Area	sar 13			21.700	5.450	1.200	PXX	-43.00 [kN/m2]
				21.700	5.450	4.350		-6.00 [kN/m2]
				21.700	2.100	4.350		-6.00 [kN/m2]
				21.700	2.100	1.200		-43.00 [kN/m2]
						activated		100.00 percent
Area	sar 11			3.100	2.100	1.200	PYY	53.00 [kN/m2]
				3.100	2.100	4.350		16.00 [kN/m2]
				6.600	2.100	4.350		16.00 [kN/m2]
				6.600	2.100	1.200		53.00 [kN/m2]
						activated		100.00 percent
Area	sar 12			3.100	5.450	1.200	PYY	-53.00 [kN/m2]
				3.100	5.450	4.350		-16.00 [kN/m2]
				6.600	5.450	4.350		-16.00 [kN/m2]
				6.600	5.450	1.200		-53.00 [kN/m2]
						activated		100.00 percent
Area	sar 17			18.600	7.550	0.400	PYY	-58.00 [kN/m2]

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Zelezniski podhod
Generation of Node and Element Loads

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
				18.600	7.550	6.350		0.00 [kN/m2]
				20.500	7.550	6.350		0.00 [kN/m2]
				20.500	7.550	0.400		-58.00 [kN/m2]
						activated		100.00 percent
Area	sar 15			18.600	7.550	0.400	PXX	58.00 [kN/m2]
				18.600	7.550	6.350		0.00 [kN/m2]
				18.600	5.450	6.350		0.00 [kN/m2]
				18.600	5.450	0.400		58.00 [kN/m2]
						activated		100.00 percent
Area	sar 18			18.600	5.450	4.350	PYY	16.00 [kN/m2]
				18.600	5.450	6.350		0.00 [kN/m2]
				20.500	5.450	6.350		0.00 [kN/m2]
				20.500	5.450	4.350		16.00 [kN/m2]
						activated		100.00 percent
Area	sar 14			20.500	7.550	0.400	PXX	-58.00 [kN/m2]
				20.500	7.550	6.350		0.00 [kN/m2]
				20.500	5.450	6.350		0.00 [kN/m2]
				20.500	5.450	0.400		-58.00 [kN/m2]
						activated		100.00 percent
Area	sar 7			1.200	0.000	0.000	PYY	58.00 [kN/m2]
				1.200	0.000	5.950		0.00 [kN/m2]
				3.100	0.000	5.950		0.00 [kN/m2]
				3.100	0.000	0.000		58.00 [kN/m2]
						activated		100.00 percent
Area	sar 5			1.200	2.100	0.000	PXX	58.00 [kN/m2]
				1.200	2.100	5.950		0.00 [kN/m2]
				1.200	0.000	5.950		0.00 [kN/m2]
				1.200	0.000	0.000		58.00 [kN/m2]
						activated		100.00 percent
Area	sar 8			1.200	2.100	4.350	PYY	-16.00 [kN/m2]
				1.200	2.100	5.950		0.00 [kN/m2]
				3.100	2.100	5.950		0.00 [kN/m2]
				3.100	2.100	4.350		-16.00 [kN/m2]
						activated		100.00 percent
Area	sar 4			3.100	2.100	0.000	PXX	-58.00 [kN/m2]
				3.100	2.100	5.950		0.00 [kN/m2]
				3.100	0.000	5.950		0.00 [kN/m2]
				3.100	0.000	0.000		-58.00 [kN/m2]
						activated		100.00 percent
Area	sar 12			15.065	5.450	1.200	PYY	-53.00 [kN/m2]
				15.065	5.450	4.350		-16.00 [kN/m2]
				18.600	5.450	4.350		-16.00 [kN/m2]
				18.600	5.450	1.200		-53.00 [kN/m2]
						activated		100.00 percent

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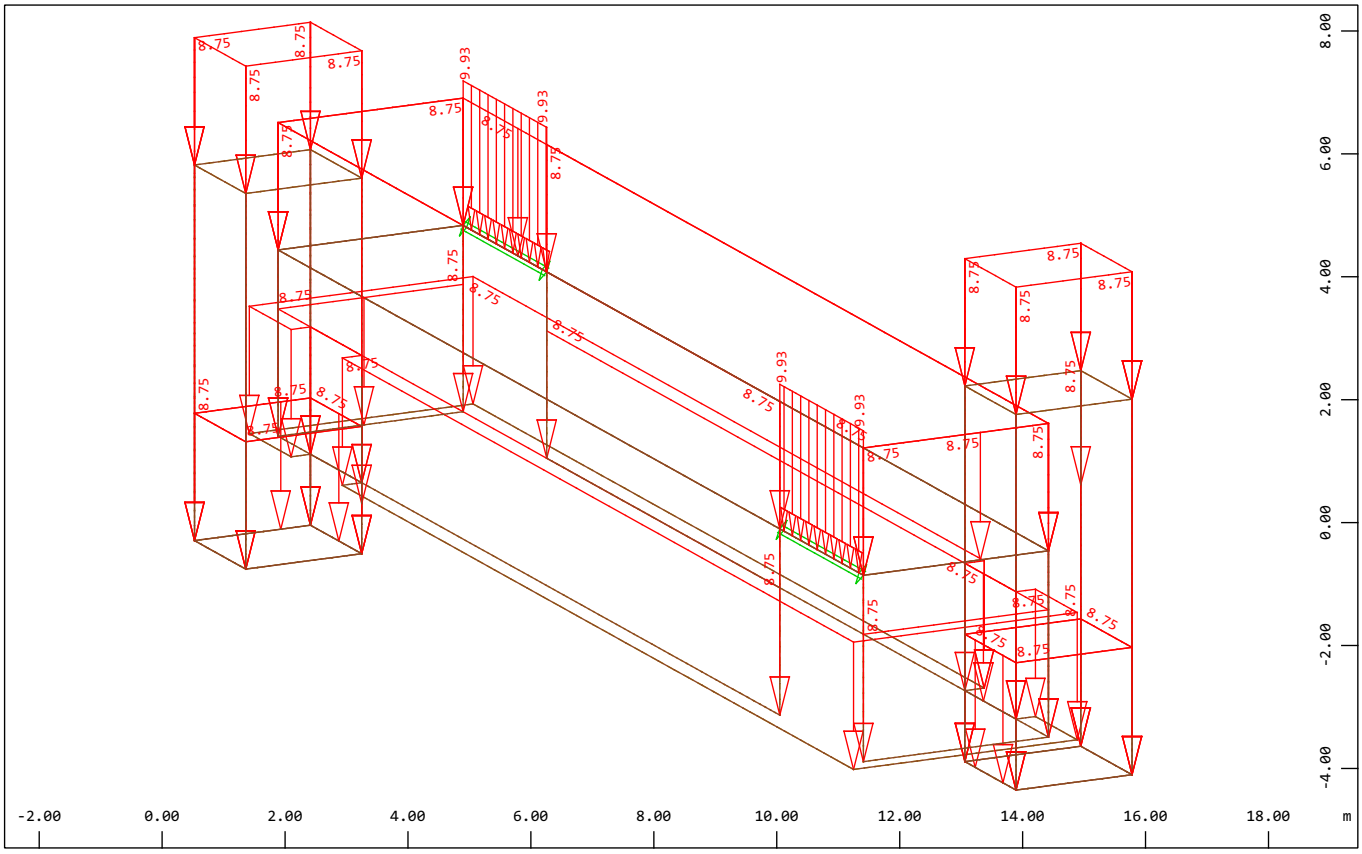
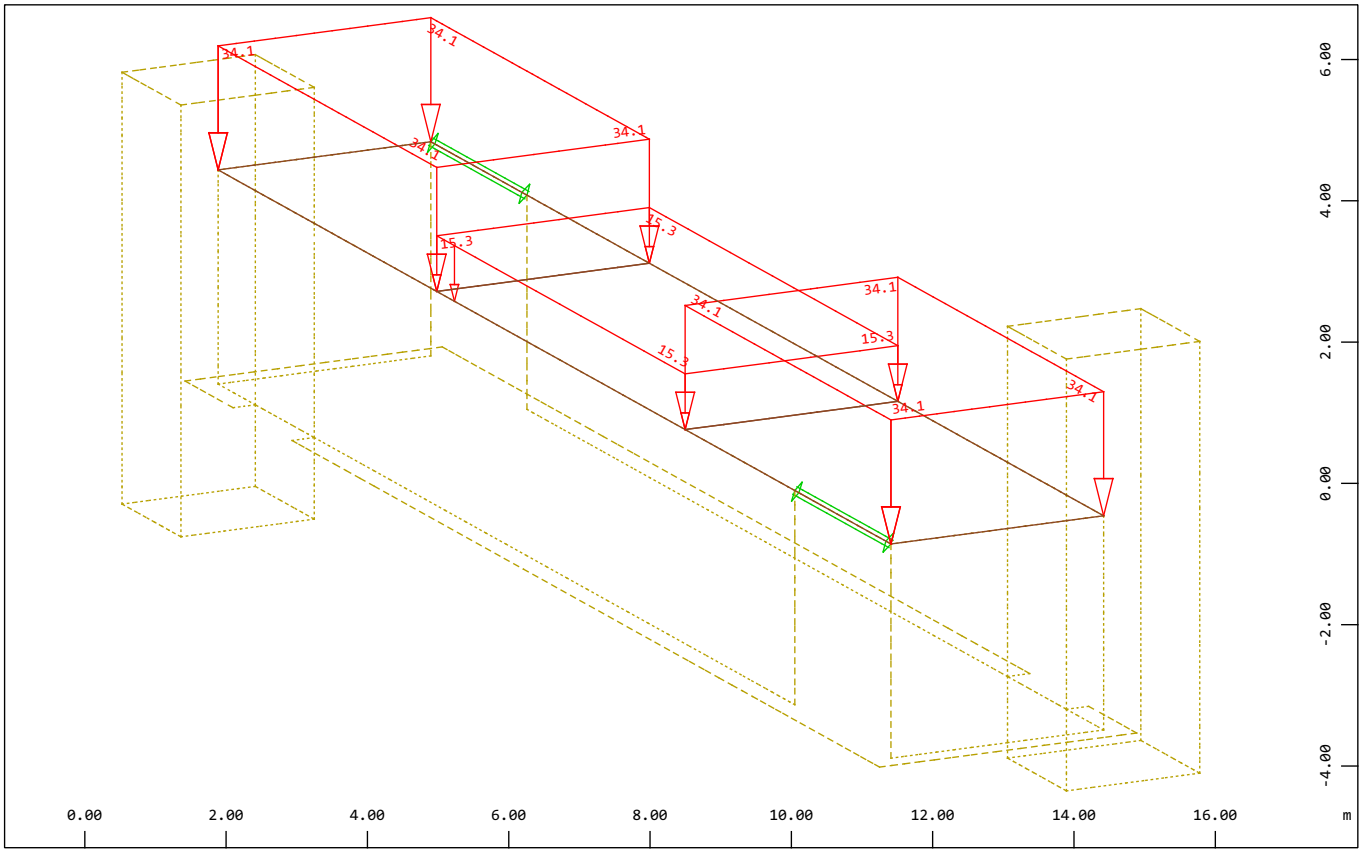
Zelezniski podhod
Graphical Output



Z
Y
X
All loads (in components), Loadcase 1 lastna , (1 cm 3D = unit) QUAD-Area dead load in global Z in Element (Unit=5.00 kN/m2,Min=-8.75 Max=-8.75), Beam dead load in global Z (Unit=5.00 kN/m,Min=-9.93 Max=-9.93)

M 1 : 123
X * 0.502
Y * 0.906
Z * 0.962



Z
Y
X
All loads (in components), Loadcase 2 stalna na peronu in plosci , (1 cm 3D = unit)
Free area load (force) in global Z (Unit=20.0 kN/m2) (Min=-34.1) (Max=-15.3)

M 1 : 107
X * 0.502
Y * 0.906
Z * 0.962

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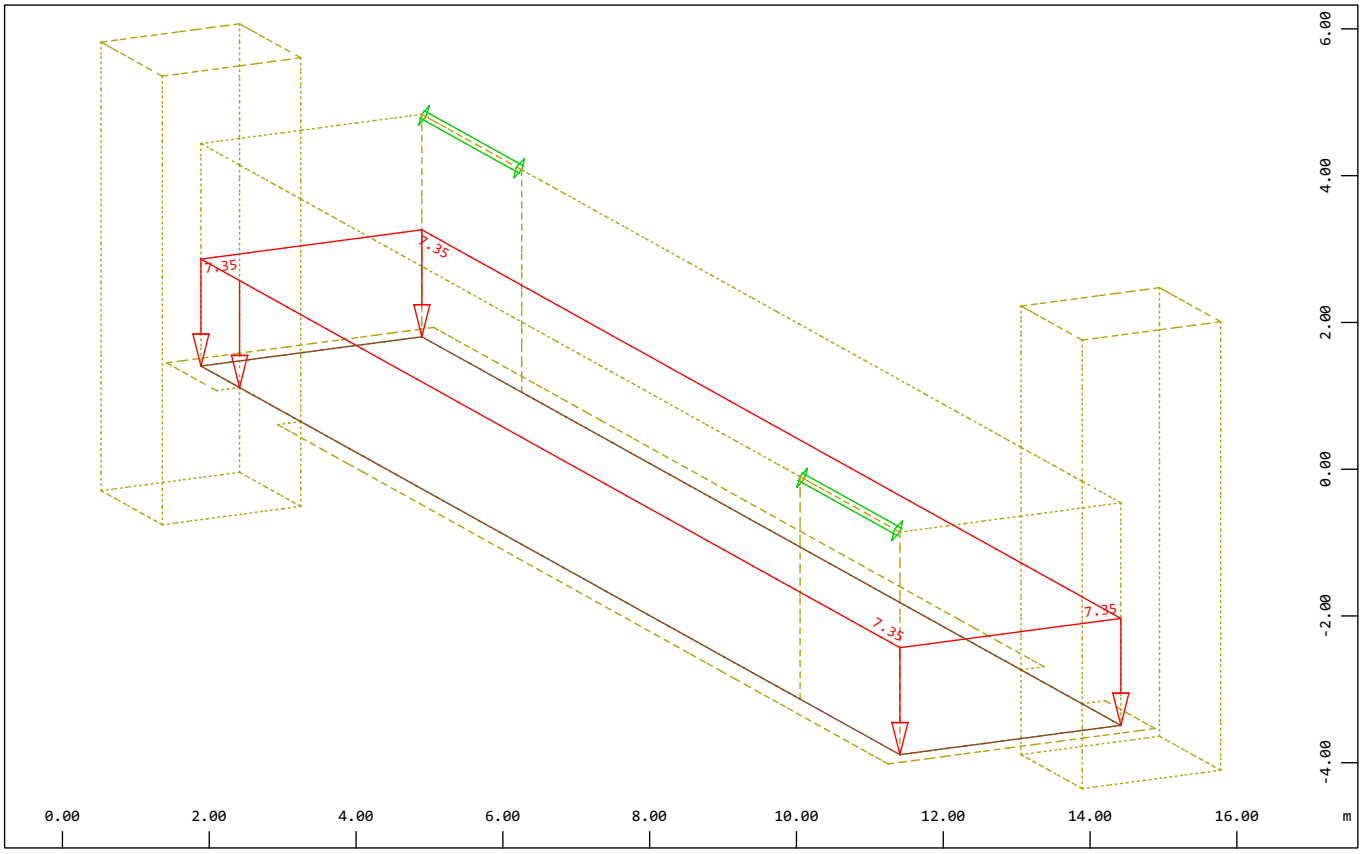
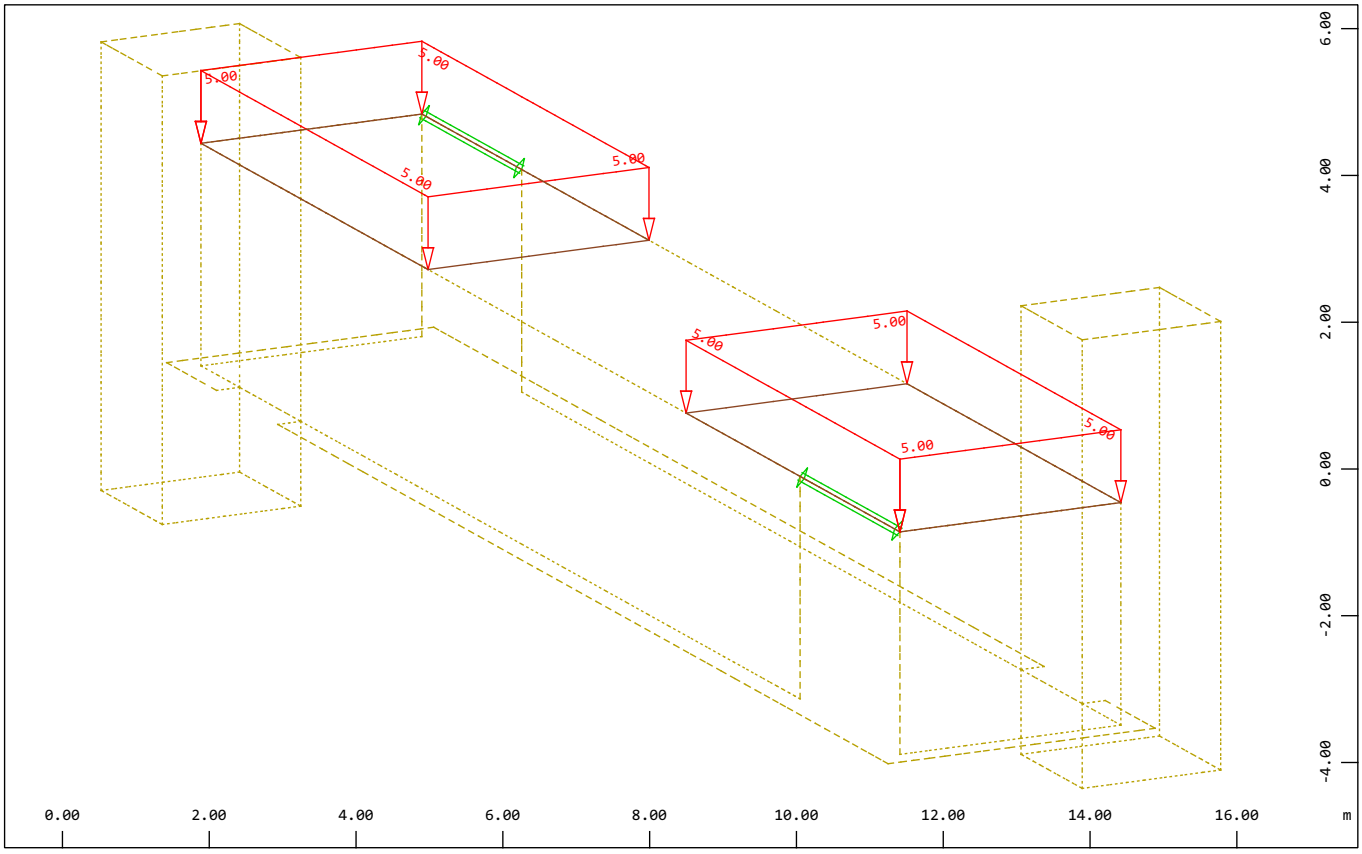
Zelezniski podhod
Graphical Output



Z
Y X
All loads (in components), Loadcase 3 stalna v podhodu , (1 cm 3D = unit) Free area
load (force) in global Z (Unit=5.00 kN/m2) (Min=-7.35) (Max=-7.35)
M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962



Z
Y X
All loads (in components), Loadcase 5 koristna na peronu , (1 cm 3D = unit) Free area
load (force) in global Z (Unit=5.00 kN/m2) (Min=-5.00) (Max=-5.00)
M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962

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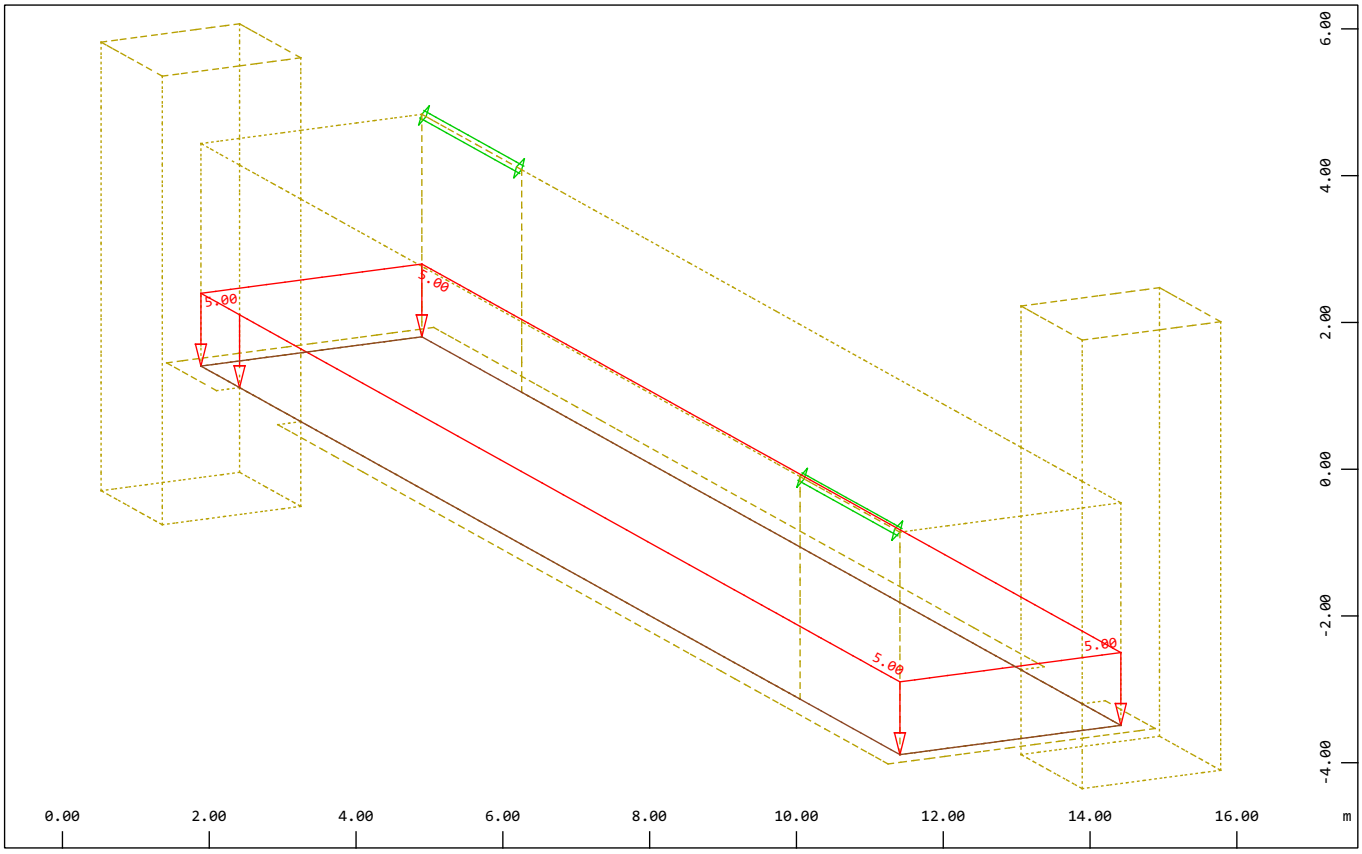
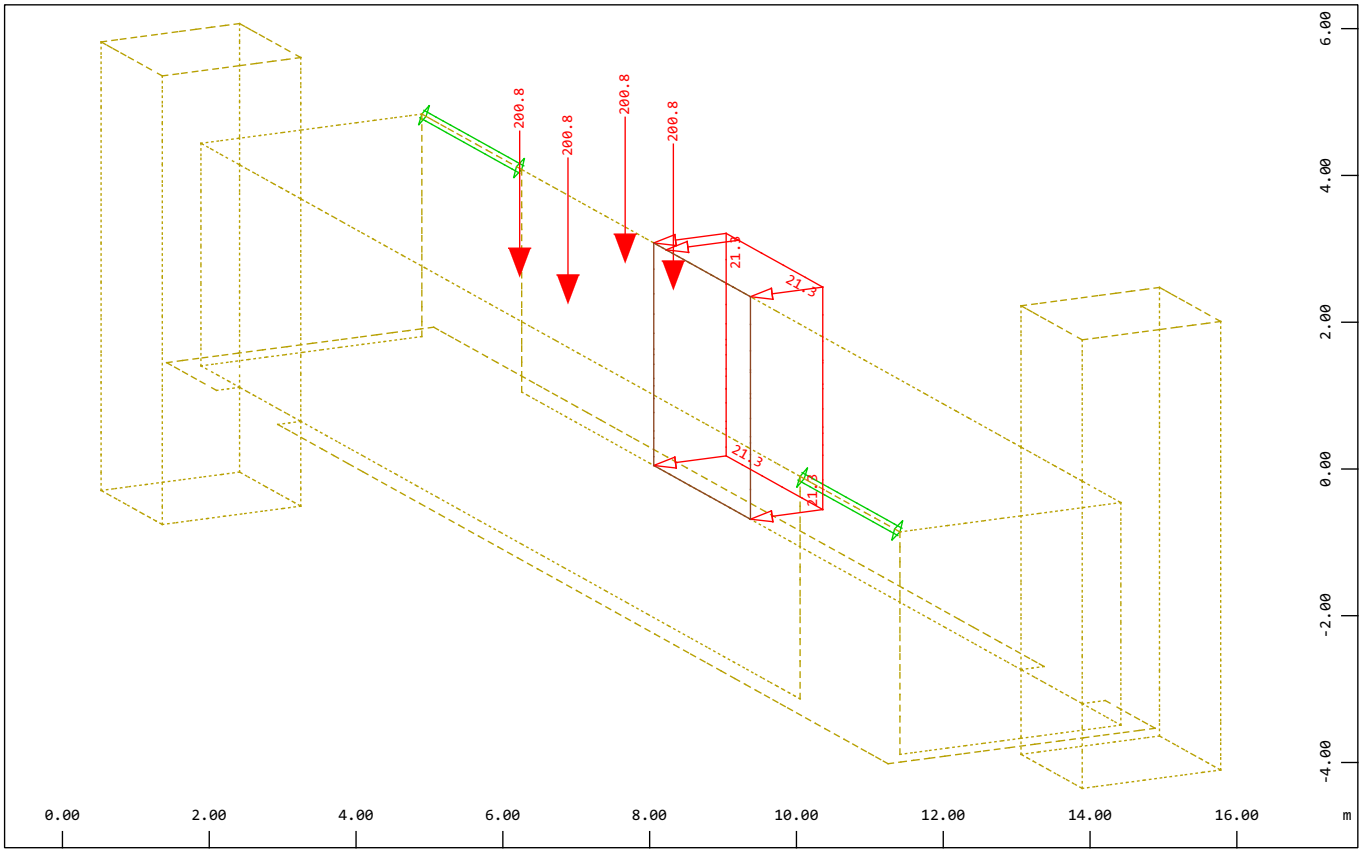
Zelezniski podhod
Graphical Output



Z
Y
X
All loads (in components), Loadcase 6 koristna v podhodu , (1 cm 3D = unit) Free area load (force) in global Z (Unit=5.00 kN/m2) (Min=-5.00) (Max=-5.00)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962



Z
Y
X
All loads (in components), Loadcase 401 LM71_tir 1_1 , (1 cm 3D = unit) Free single load (force) in global Z (Unit=100.0 kN,Min=-200.8 Max=-200.8), Free area load (force) in global Y (Unit=20.0 kN/m2,Min=-21.3 Max=-21.3)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962

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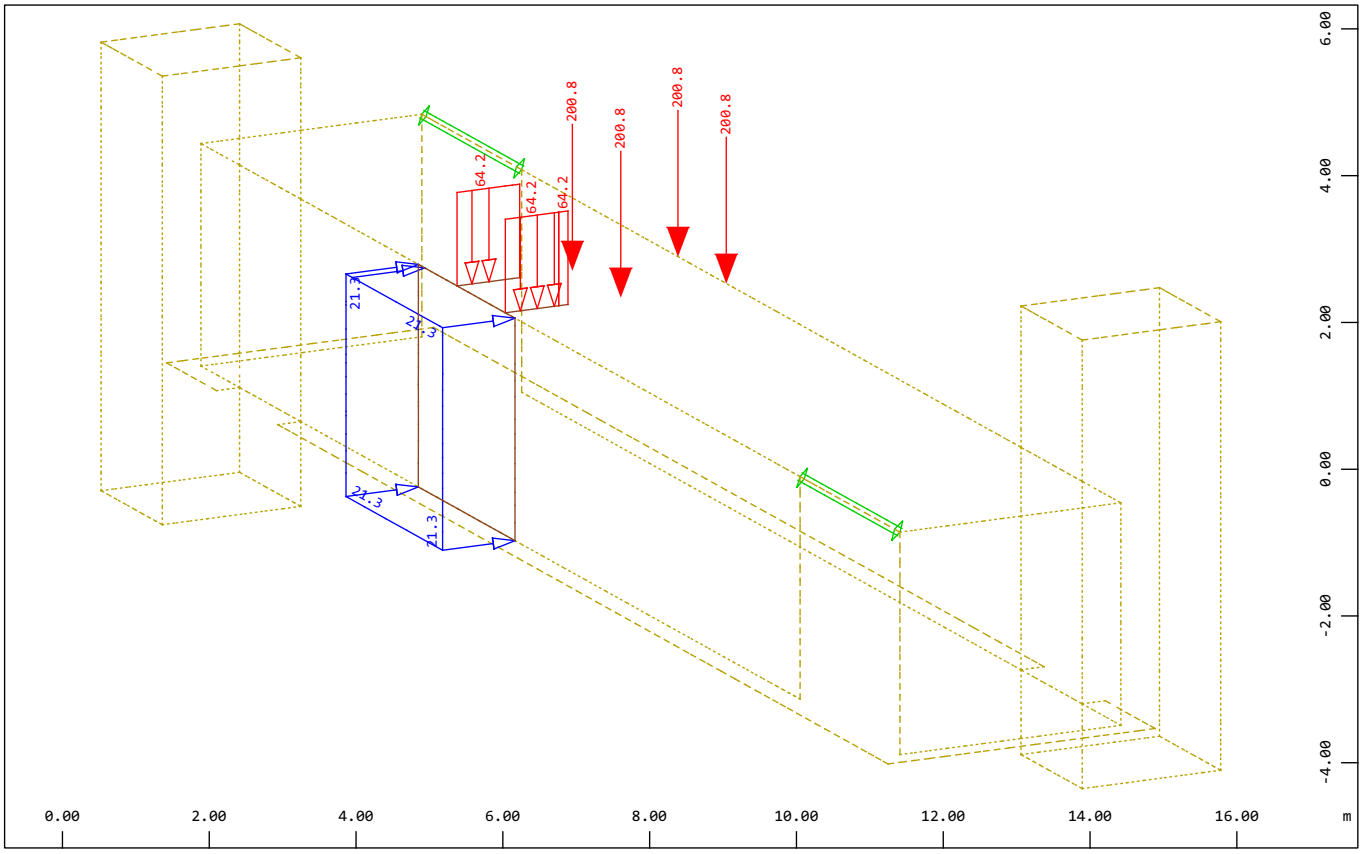
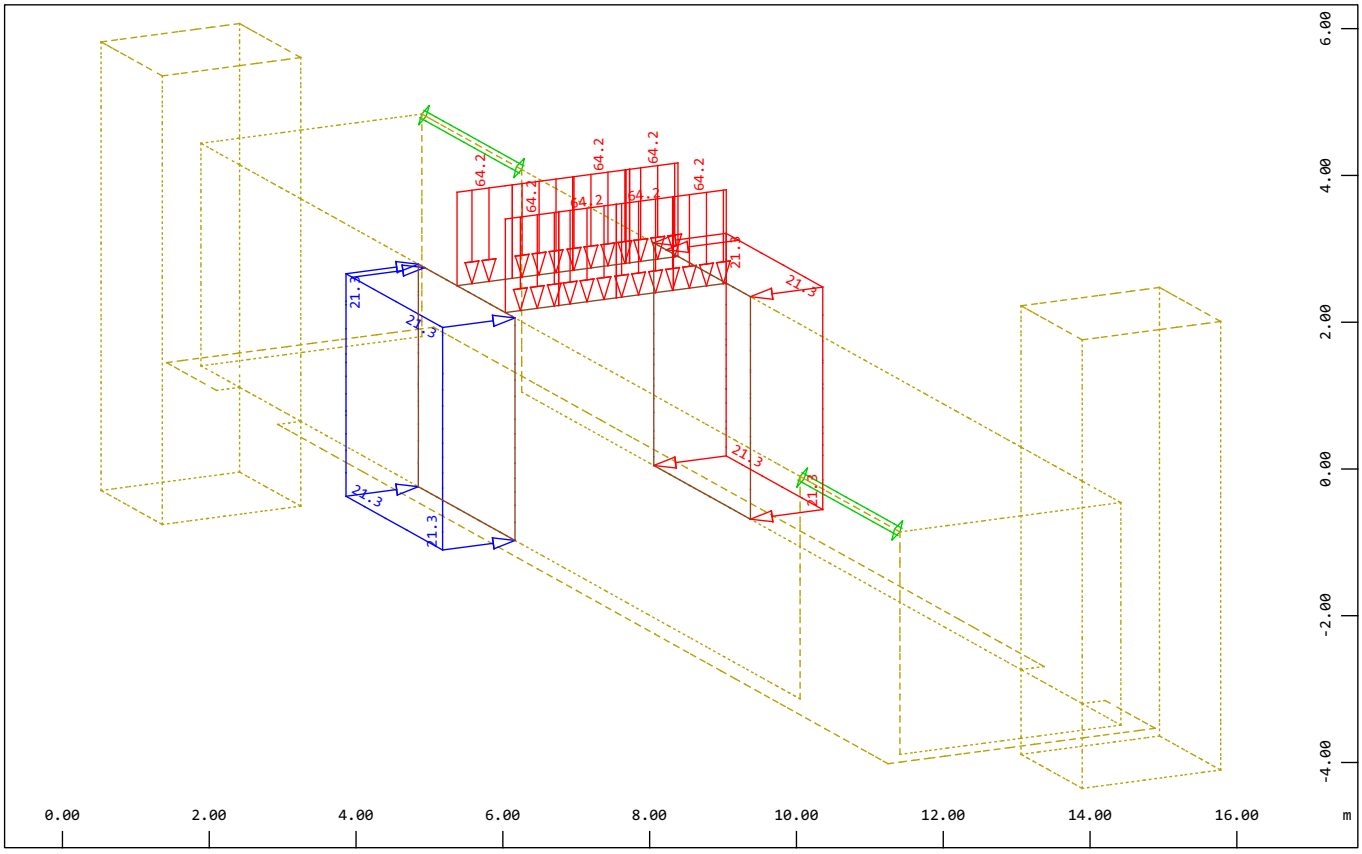
Zelezniski podhod
Graphical Output



Z
Y
X
All loads (in components), Loadcase 402 LM71_tir 1_2 , (1 cm 3D = unit) Free single load (force) in global Z (Unit=100.0 kN,Min=-200.8 Max=-200.8), Free line load (force) in global Z (Unit=50.0 kN/m,Min=-64.2 Max=-64.2), Free area load (force) in

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962



Z
Y
X
All loads (in components), Loadcase 403 LM71_tir 1_3 , (1 cm 3D = unit) Free line load (force) in global Z (Unit=50.0 kN/m,Min=-64.2 Max=-64.2), Free area load (force) in global Y (Unit=20.0 kN/m2,Min=-21.3 Max=21.3)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962

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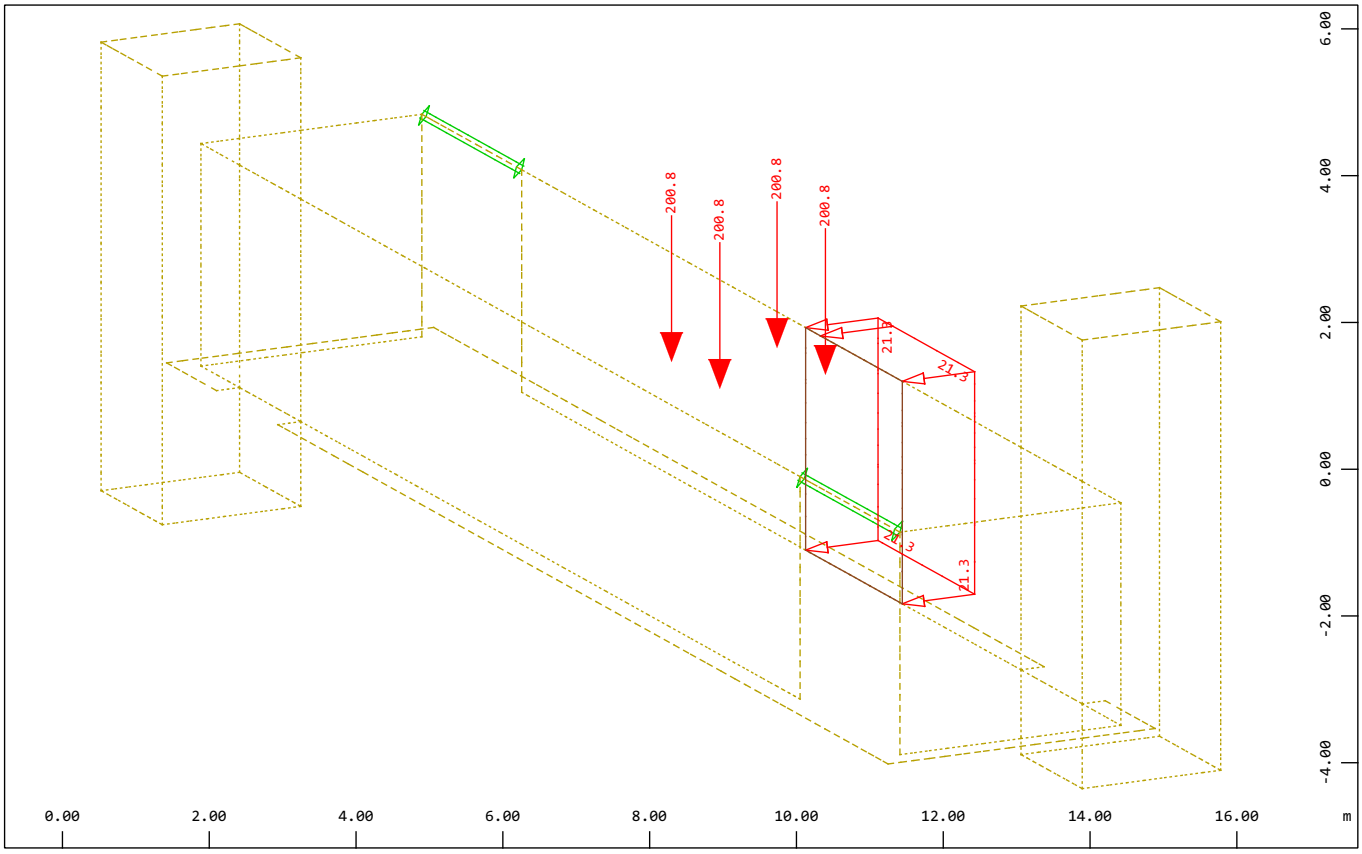
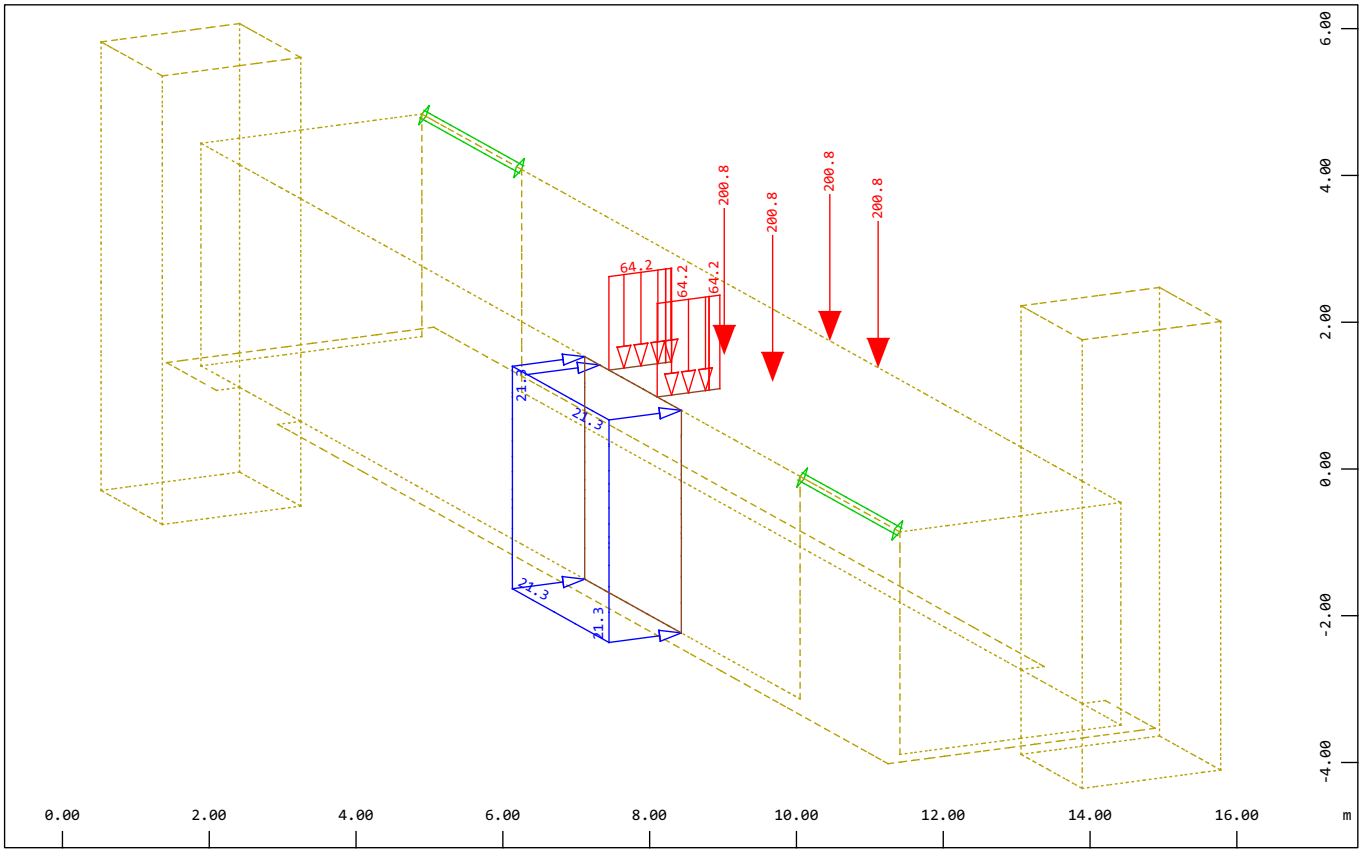
Zelezniski podhod
Graphical Output



Z
Y
X

All loads (in components), Loadcase 404 LM71_tir 2_1 , (1 cm 3D = unit) Free single load (force) in global Z (Unit=100.0 kN,Min=-200.8 Max=-200.8), Free area load (force) in global Y (Unit=20.0 kN/m2,Min=-21.3 Max=-21.3)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962



Z
Y
X

All loads (in components), Loadcase 405 LM71_tir 2_2 , (1 cm 3D = unit) Free single load (force) in global Z (Unit=100.0 kN,Min=-200.8 Max=-200.8), Free line load (force) in global Z (Unit=50.0 kN/m,Min=-64.2 Max=-64.2), Free area load (force) in

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962

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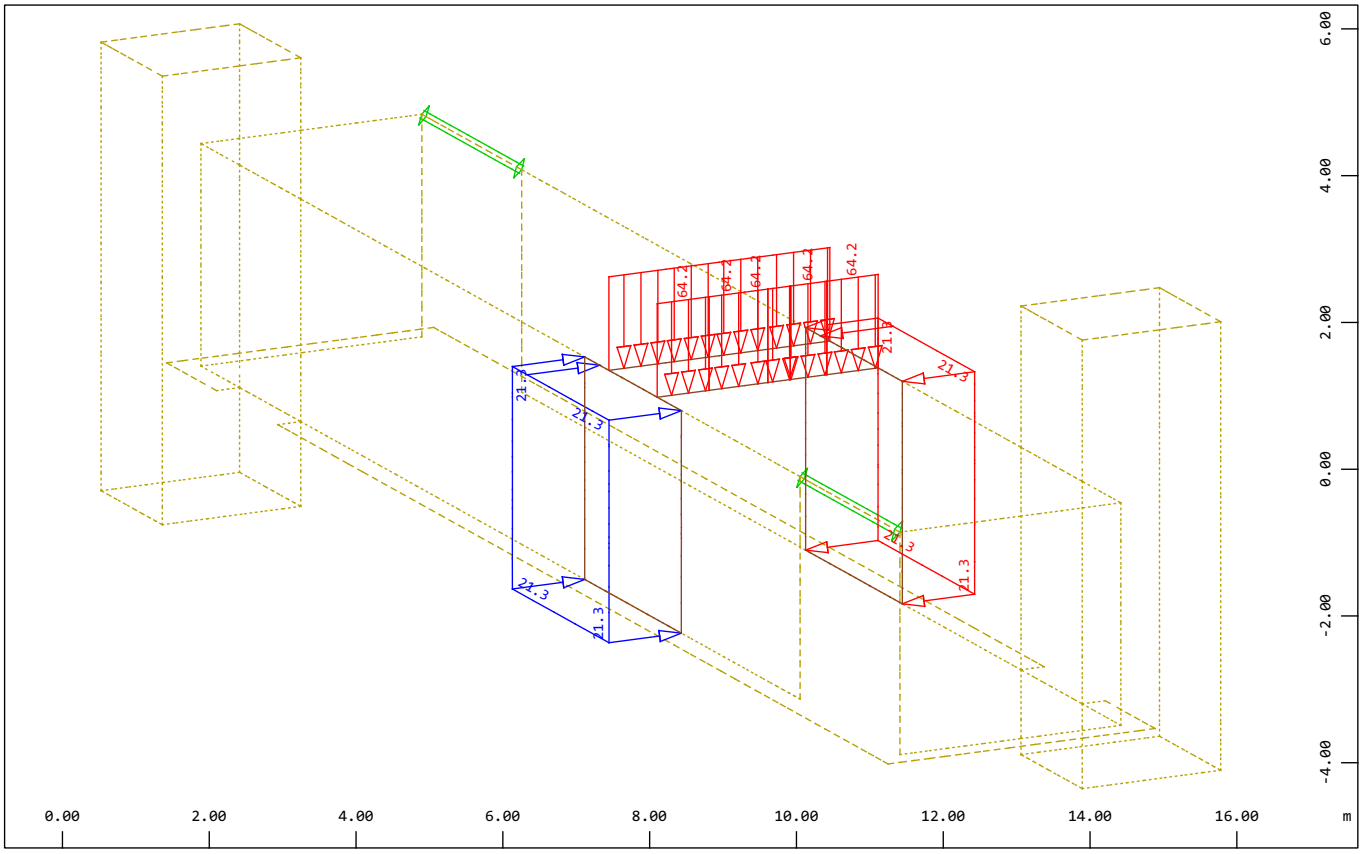
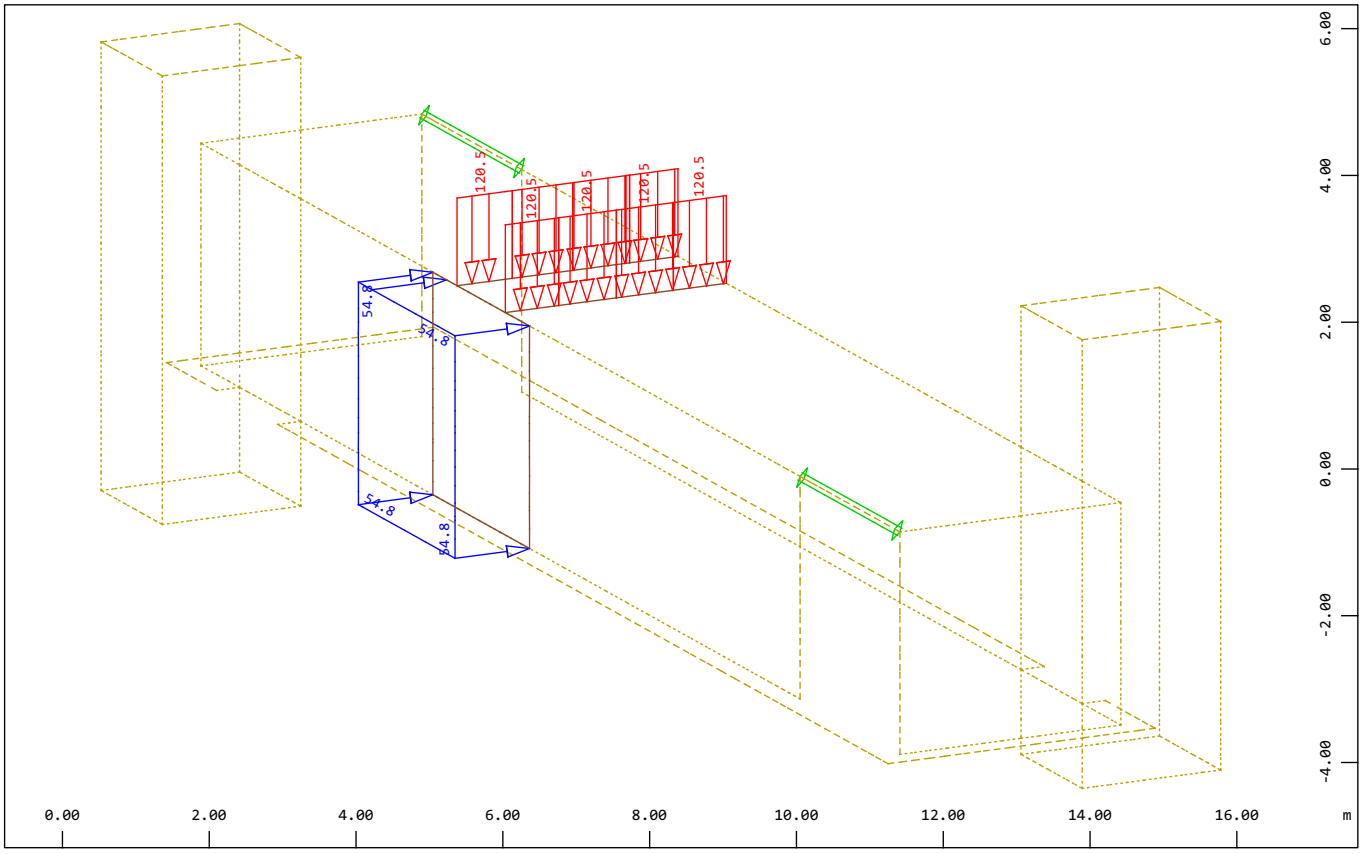
Zelezniski podhod
Graphical Output



Z
Y
X

All loads (in components), Loadcase 406 LM71_tir 2_3 , (1 cm 3D = unit) Free line load (force) in global Z (Unit=50.0 kN/m,Min=-64.2 Max=-64.2), Free area load (force) in global Y (Unit=20.0 kN/m2,Min=-21.3 Max=21.3)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962



Z
Y
X

All loads (in components), Loadcase 411 SW/2_tir 1_1 , (1 cm 3D = unit) Free line load (force) in global Z (Unit=100.0 kN/m,Min=-120.4 Max=-120.4), Free area load (force) in global Y (Unit=50.0 kN/m2,Max=54.8)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962

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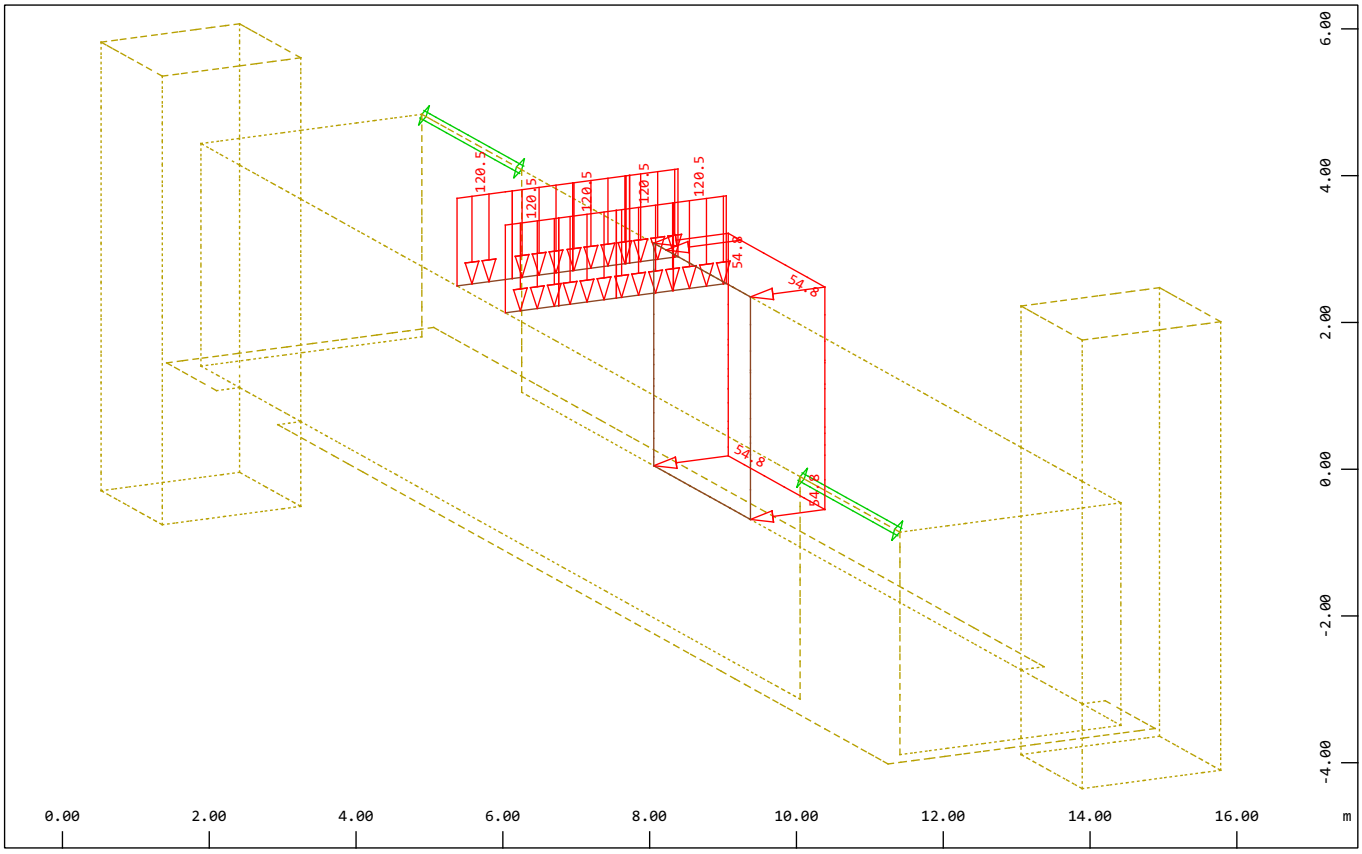
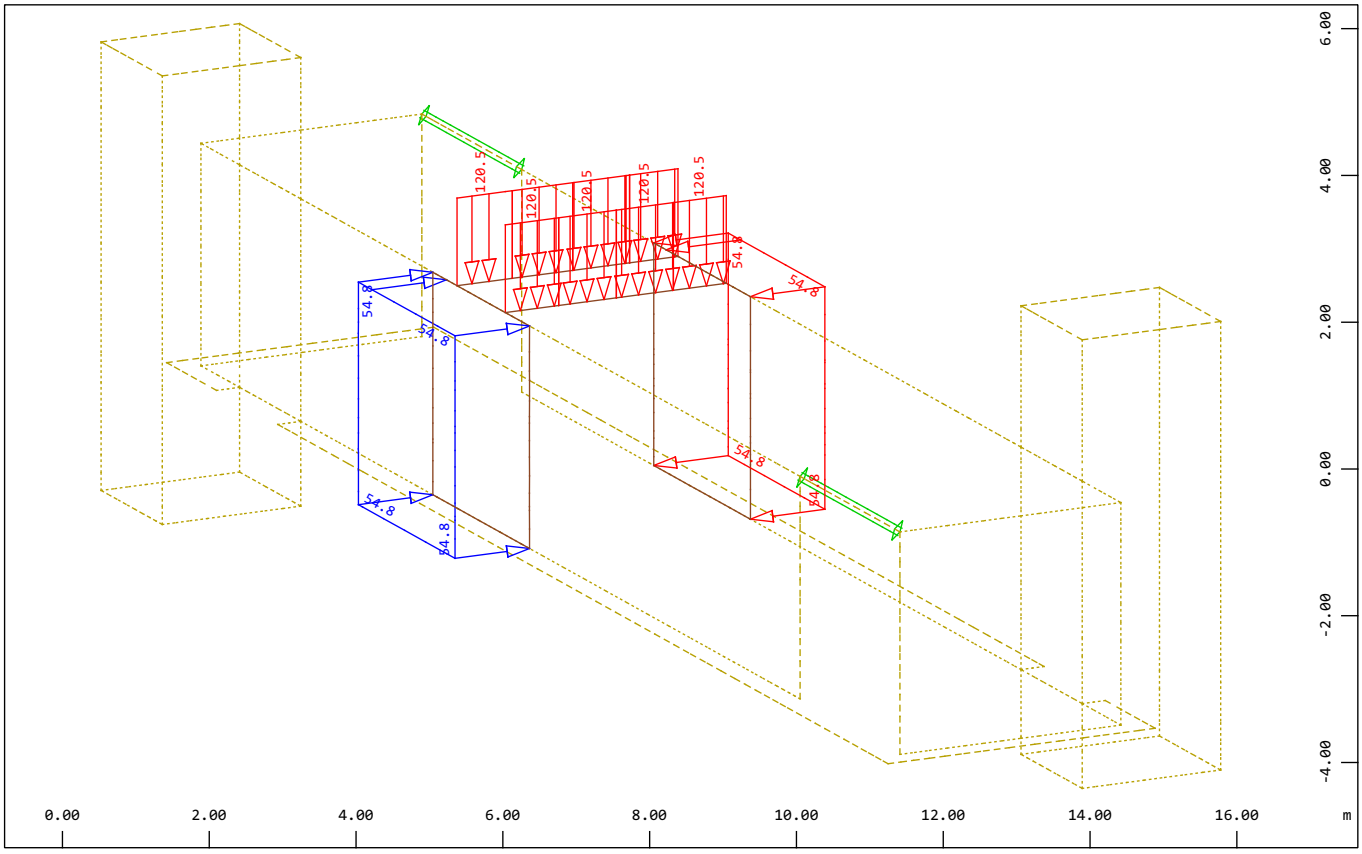
Zelezniski podhod
Graphical Output



Z
Y
X

All loads (in components), Loadcase 412 SW/2_tir 1_2 , (1 cm 3D = unit) Free line load
(force) in global Z (Unit=100.0 kN/m,Min=-120.4 Max=-120.4), Free area load (force)
in global Y (Unit=50.0 kN/m2,Min=-54.8 Max=-54.8)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962



Z
Y
X

All loads (in components), Loadcase 413 SW/2_tir 1_3 , (1 cm 3D = unit) Free line load
(force) in global Z (Unit=100.0 kN/m,Min=-120.4 Max=-120.4), Free area load (force)
in global Y (Unit=50.0 kN/m2,Min=-54.8 Max=54.8)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962

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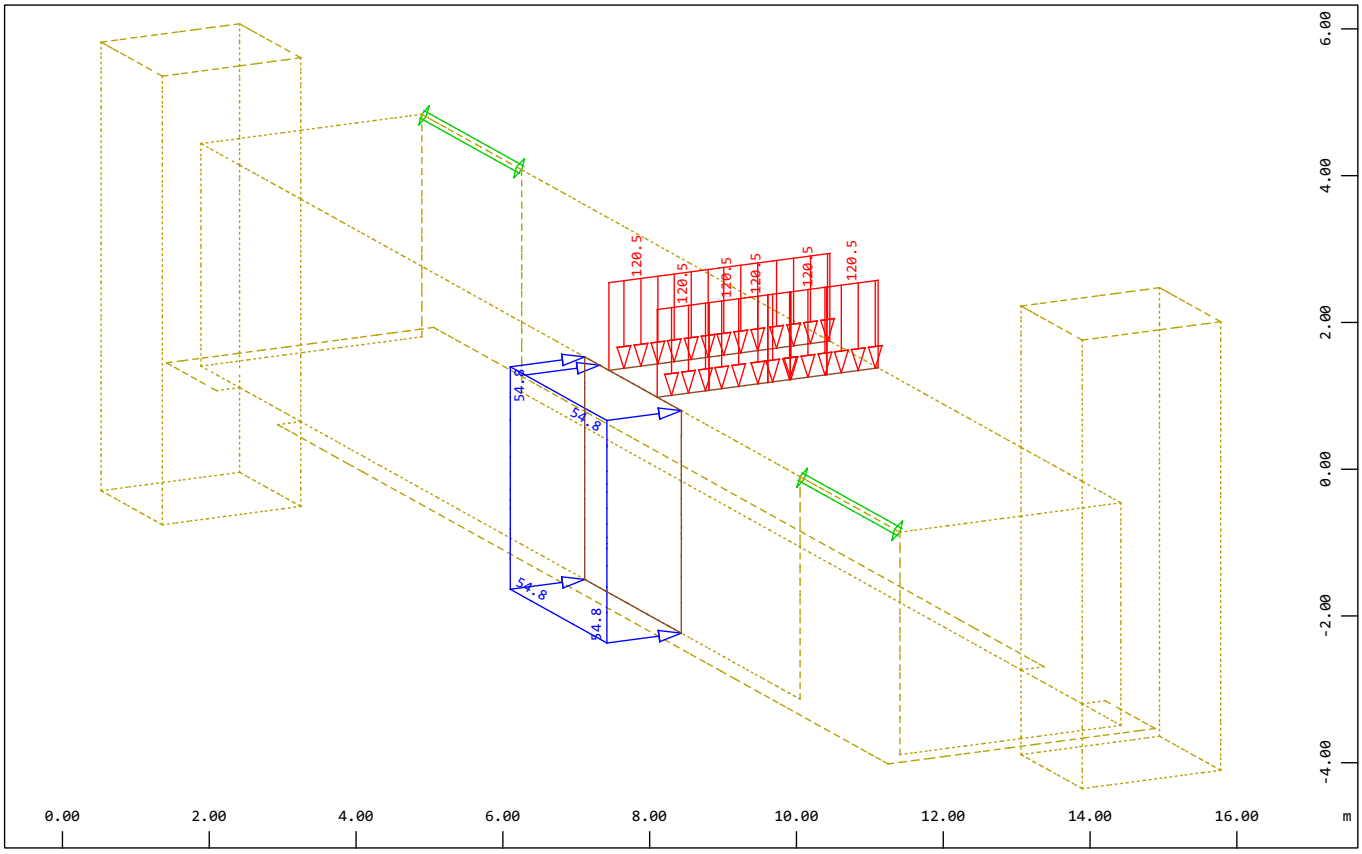
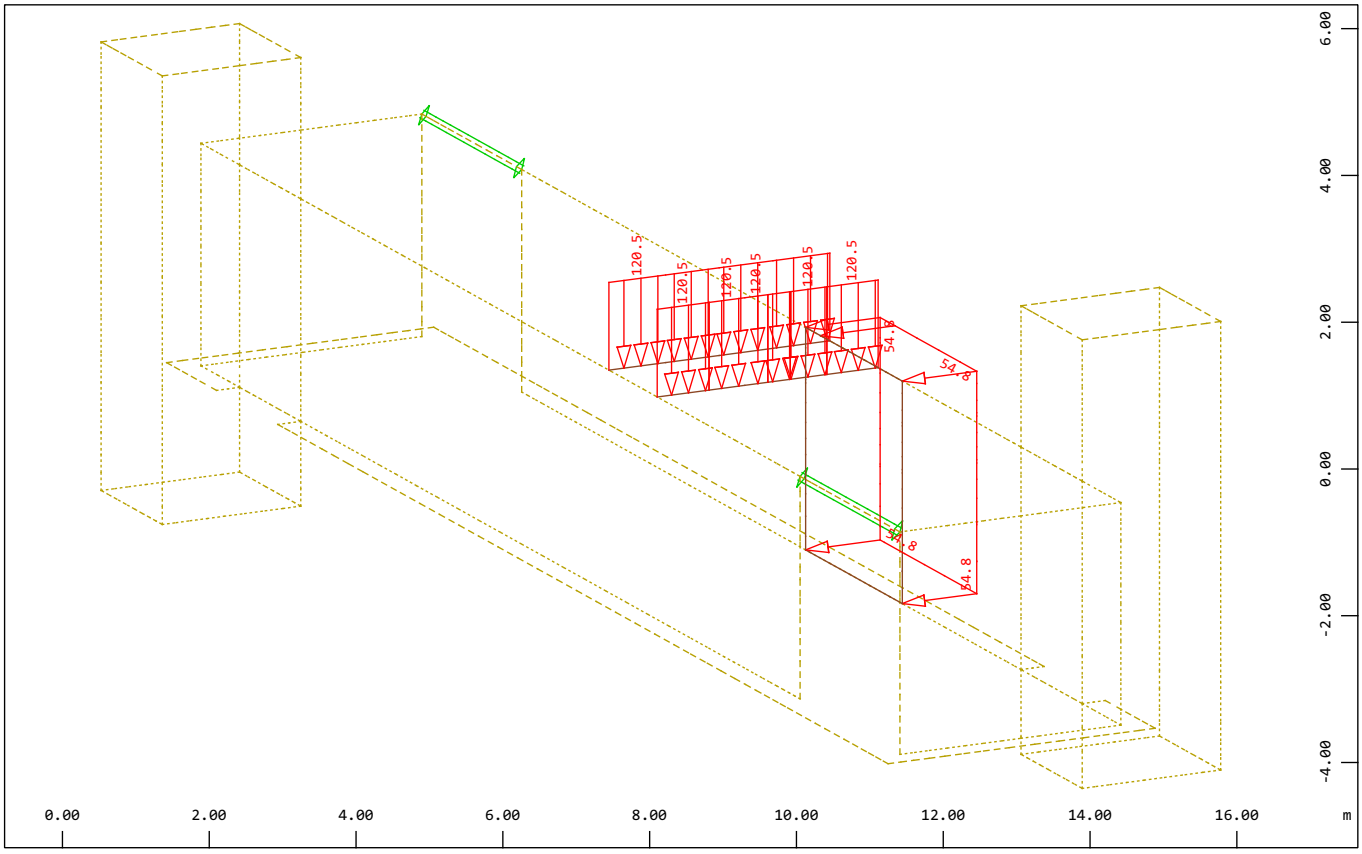
Zelezniski podhod
Graphical Output



Z
Y
X
All loads (in components), Loadcase 414 SW/2_tir 2_1 , (1 cm 3D = unit) Free line load
(force) in global Z (Unit=100.0 kN/m,Min=-120.4 Max=-120.4), Free area load (force)
in global Y (Unit=50.0 kN/m2,Max=54.8)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962



Z
Y
X
All loads (in components), Loadcase 415 SW/2_tir 2_2 , (1 cm 3D = unit) Free line load
(force) in global Z (Unit=100.0 kN/m,Min=-120.4 Max=-120.4), Free area load (force)
in global Y (Unit=50.0 kN/m2,Min=-54.8 Max=-54.8)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962

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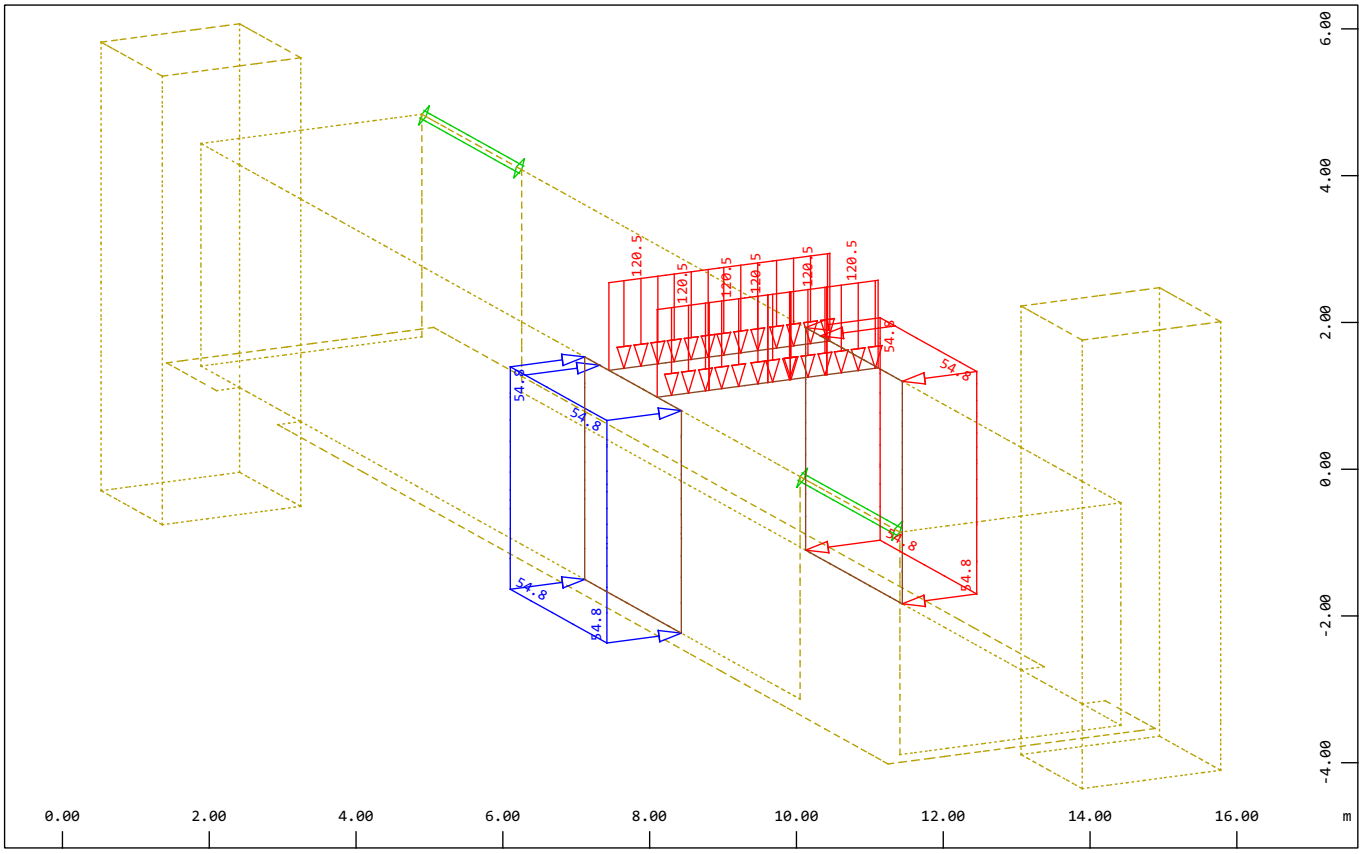
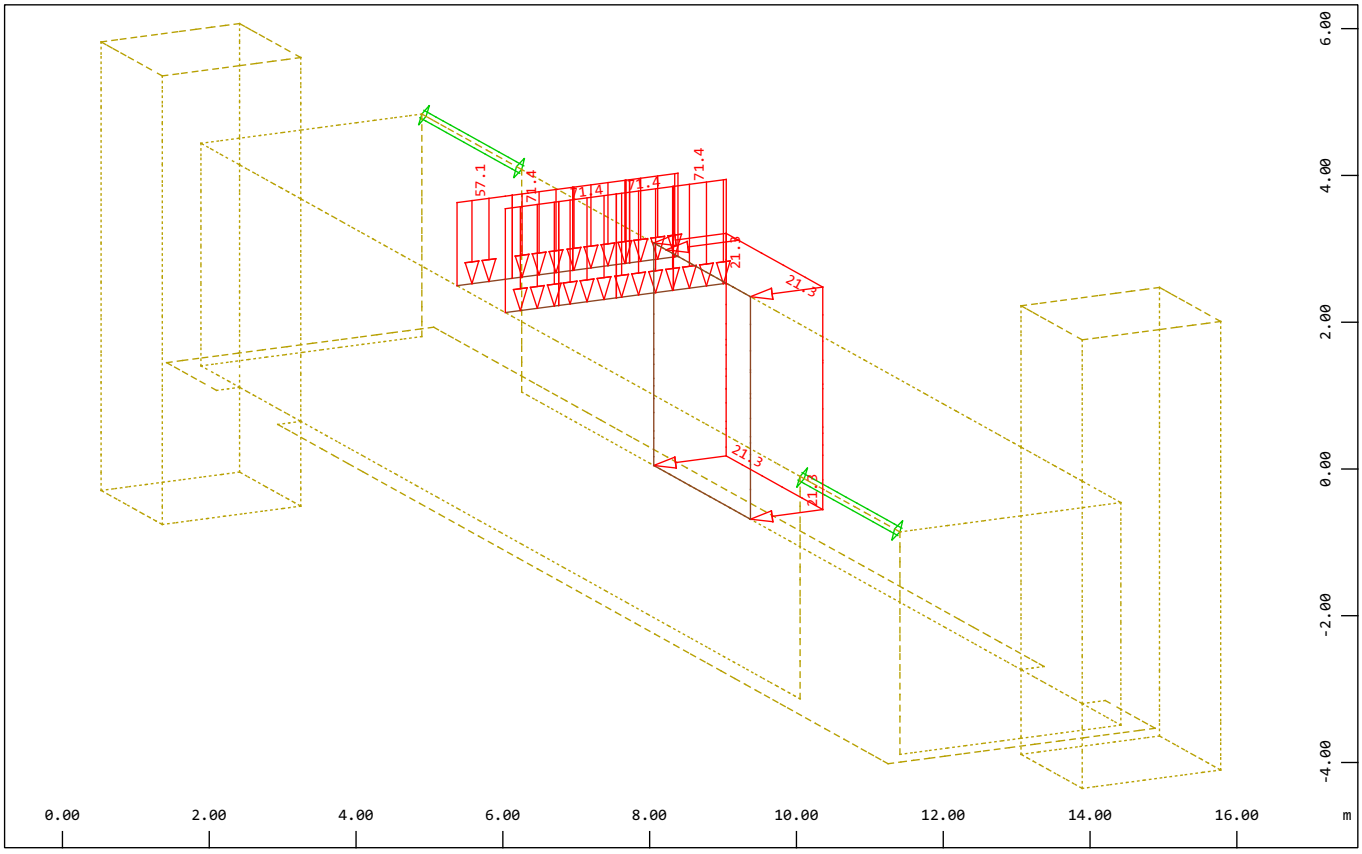
Zelezniski podhod
Graphical Output



Z
Y
X

All loads (in components), Loadcase 416 SW/2_tir 2_3 , (1 cm 3D = unit) Free line load
(force) in global Z (Unit=100.0 kN/m,Min=-120.4 Max=-120.4), Free area load (force)
in global Y (Unit=50.0 kN/m2,Min=-54.8 Max=54.8)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962



Z
Y
X

All loads (in components), Loadcase 421 LM71_eksc_1_1 , (1 cm 3D = unit) Free line load
(force) in global Z (Unit=50.0 kN/m,Min=-71.4 Max=-57.1), Free area load (force) in
global Y (Unit=20.0 kN/m2,Min=-21.3 Max=-21.3)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962

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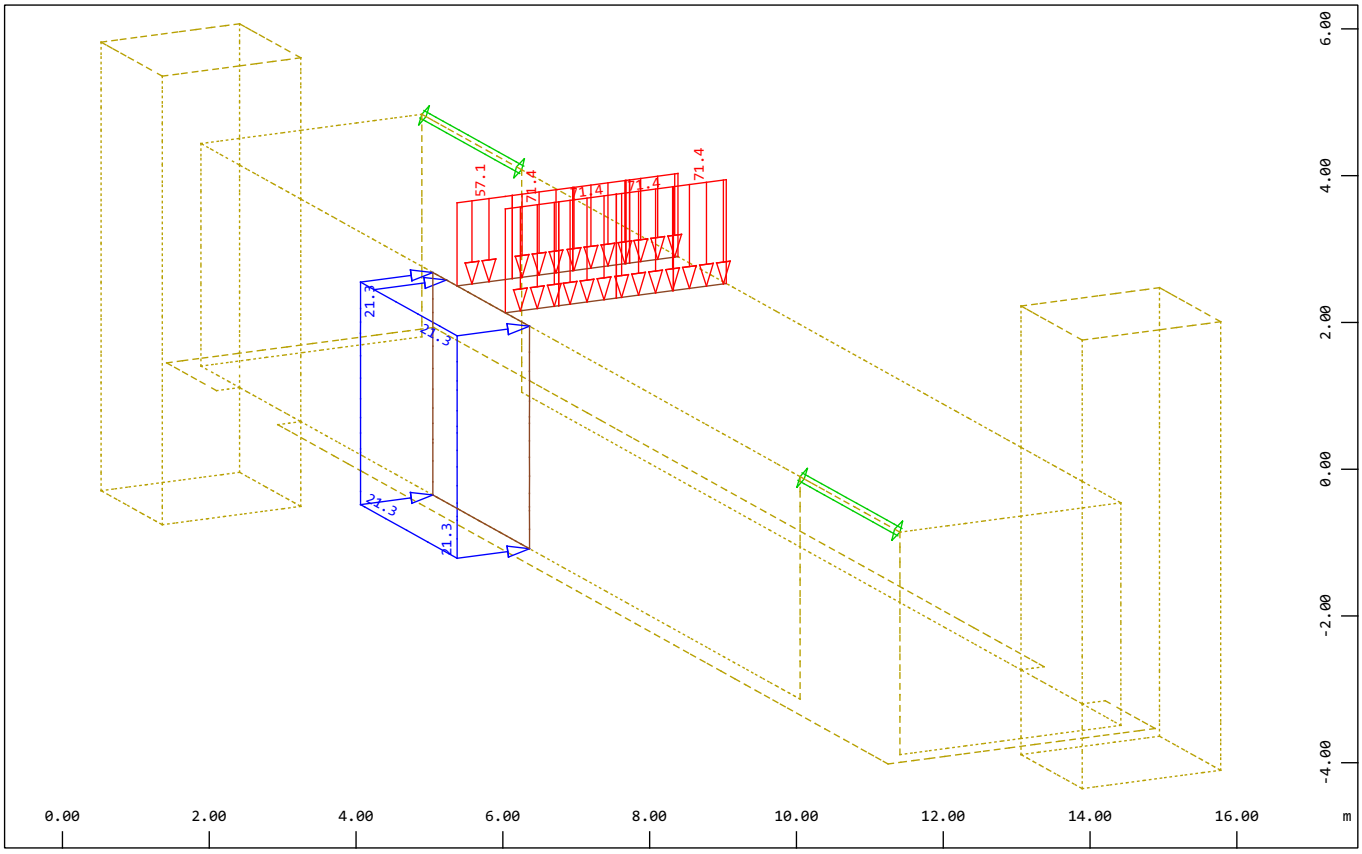
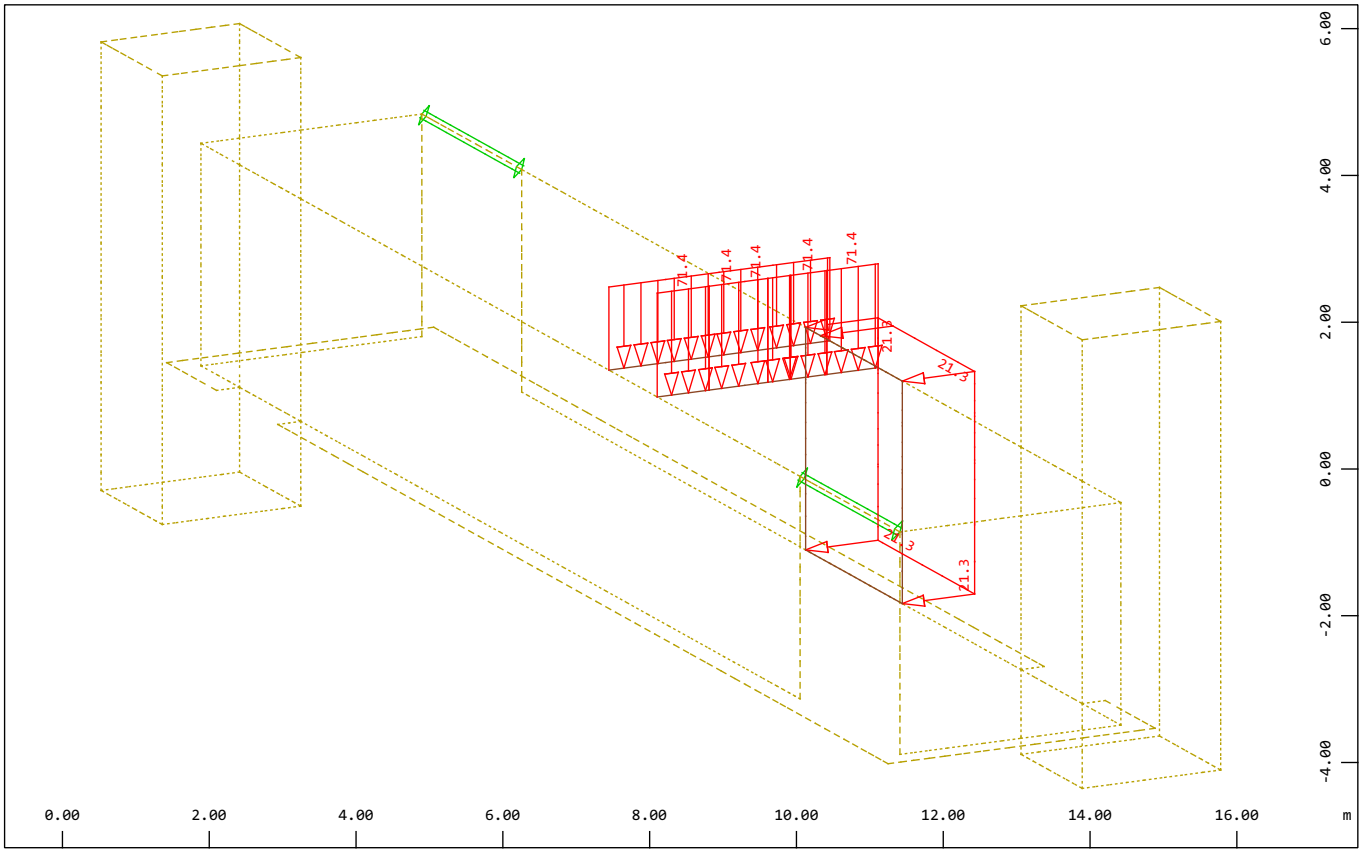
Zelezniski podhod
Graphical Output



Z
Y
X
All loads (in components), Loadcase 422 LM71_eksc_1_2 , (1 cm 3D = unit) Free line load (force) in global Z (Unit=50.0 kN/m,Min=-71.4 Max=-57.1), Free area load (force) in global Y (Unit=20.0 kN/m2,Max=21.3)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962



Z
Y
X
All loads (in components), Loadcase 423 LM71_eksc_2_1 , (1 cm 3D = unit) Free line load (force) in global Z (Unit=50.0 kN/m,Min=-71.4 Max=-57.1), Free area load (force) in global Y (Unit=20.0 kN/m2,Min=-21.3 Max=-21.3)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962

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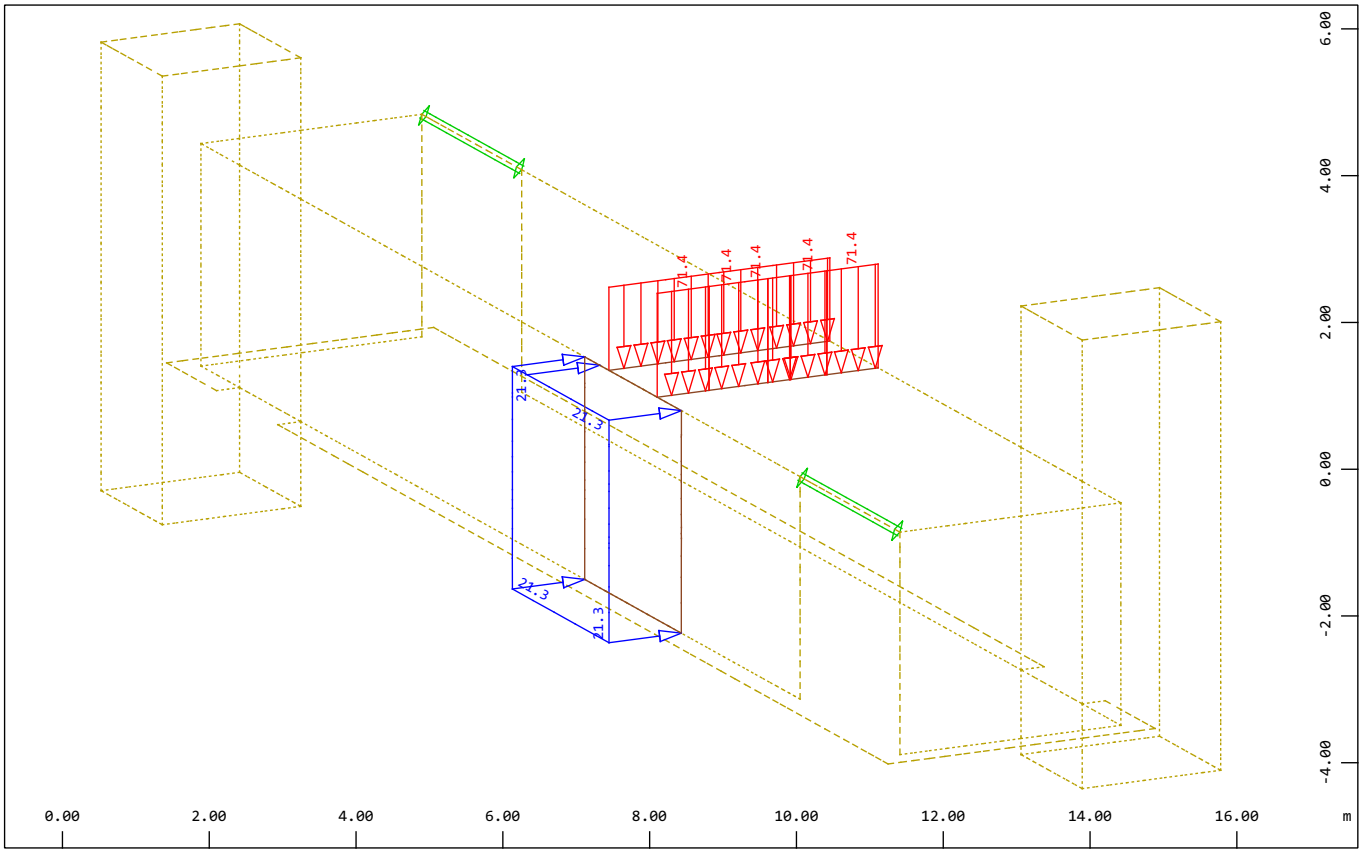
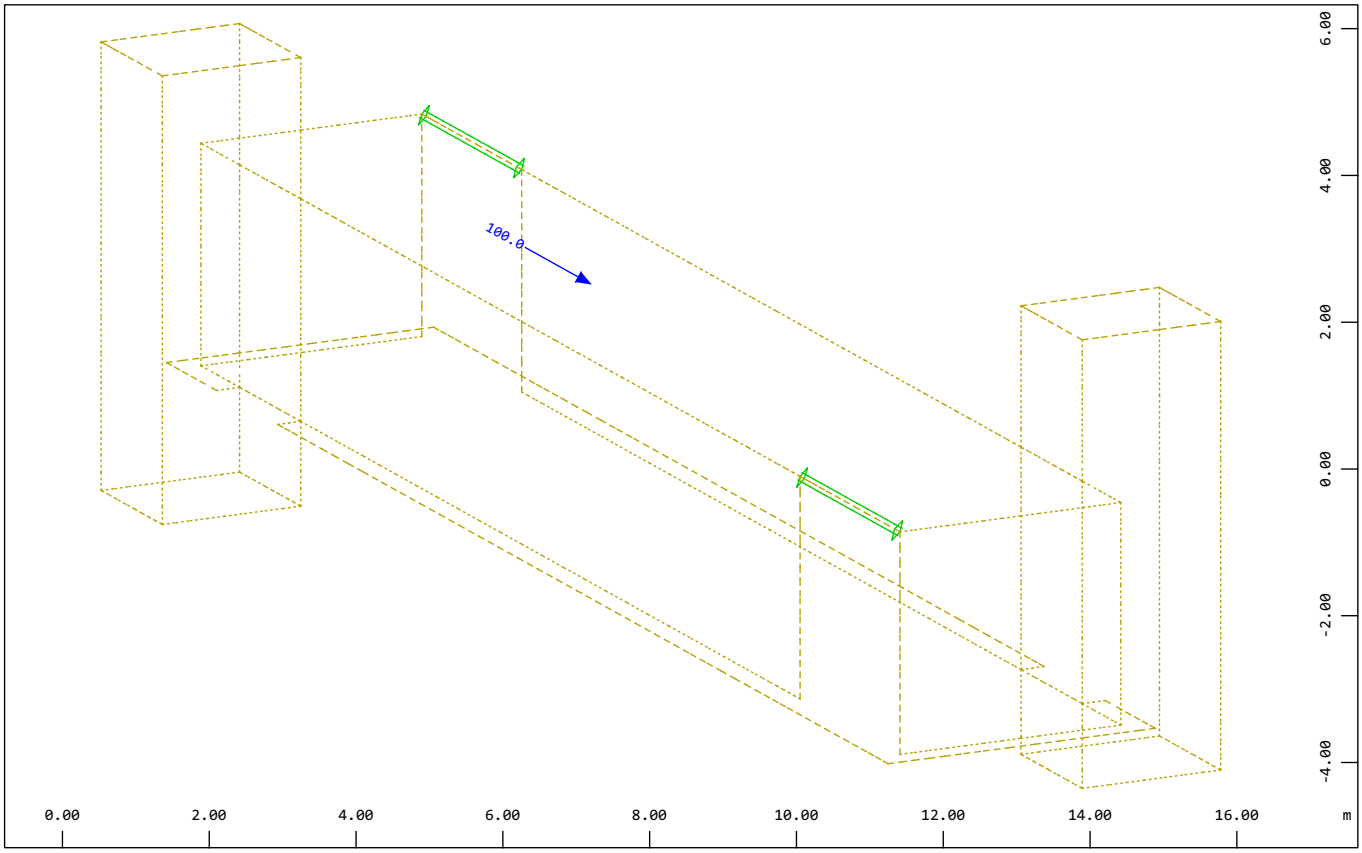
Zelezniski podhod
Graphical Output



Z
Y
X

All loads (in components), Loadcase 424 LM71_eksc_2_2 , (1 cm 3D = unit) Free line load (force) in global Z (Unit=50.0 kN/m,Min=-71.4 Max=-57.1), Free area load (force) in global Y (Unit=20.0 kN/m2,Max=21.3)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962



Z
Y
X

All loads (in components), Loadcase 431 LM71_boc_1_1 , (1 cm 3D = unit) Free single load (force) in global X (Unit=50.0 kN) (Max=100.0)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962

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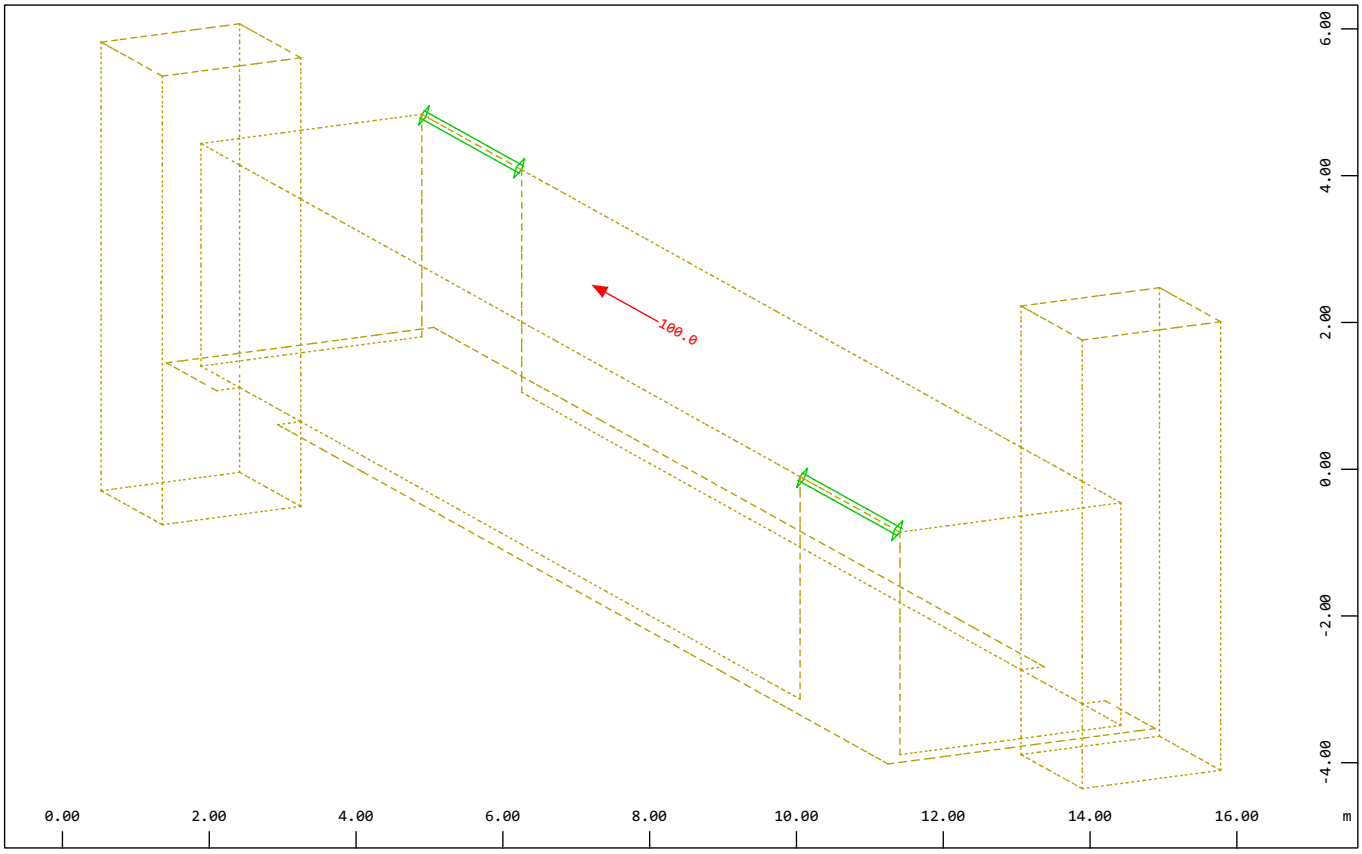
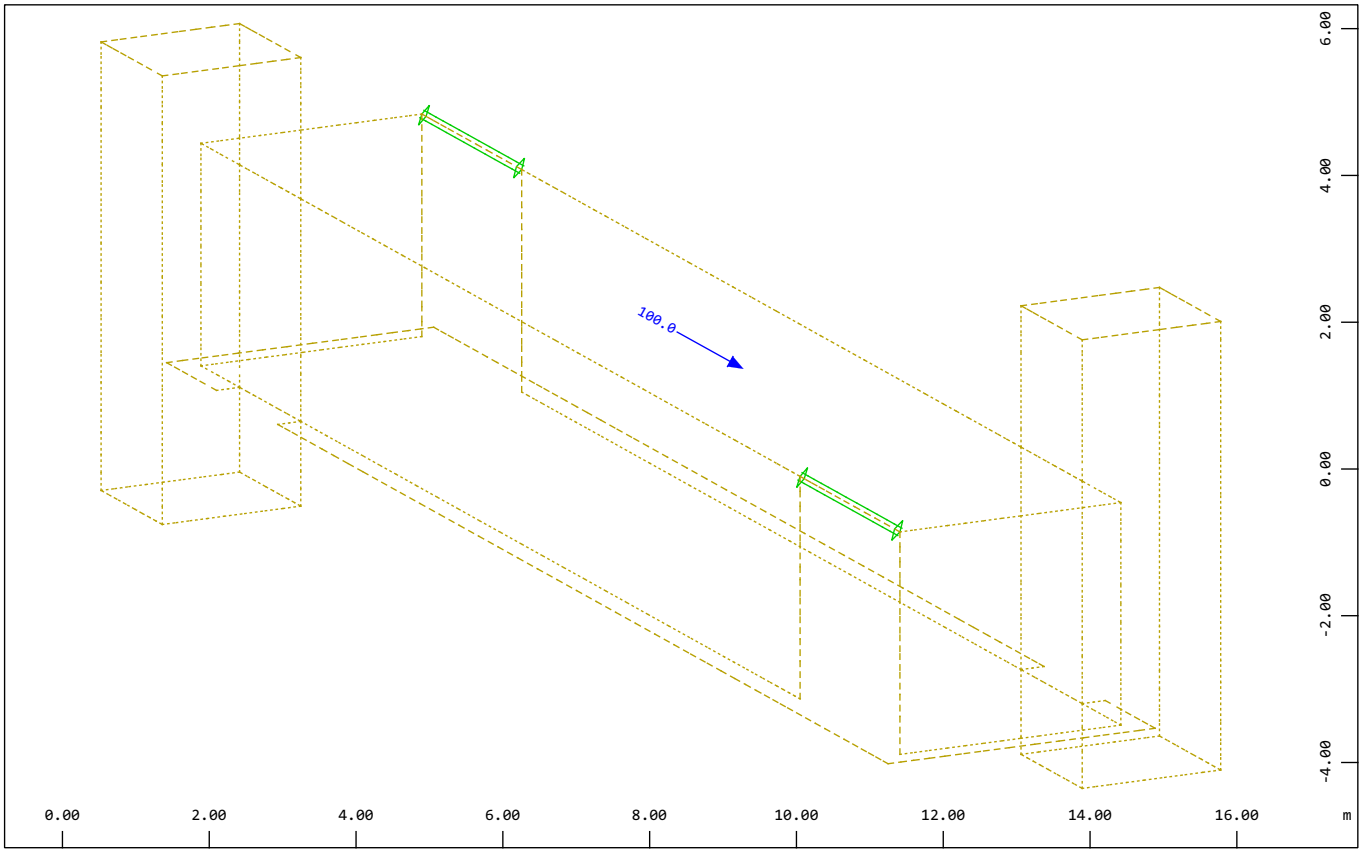
Zelezniski podhod
Graphical Output



All loads (in components), Loadcase 432 LM71_boc_1_2 , (1 cm 3D = unit) Free single load (force) in global X (Unit=50.0 kN) (Min=-100.0) (Max=-100.0)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962



All loads (in components), Loadcase 433 LM71_boc_2_1 , (1 cm 3D = unit) Free single load (force) in global X (Unit=50.0 kN) (Max=100.0)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962

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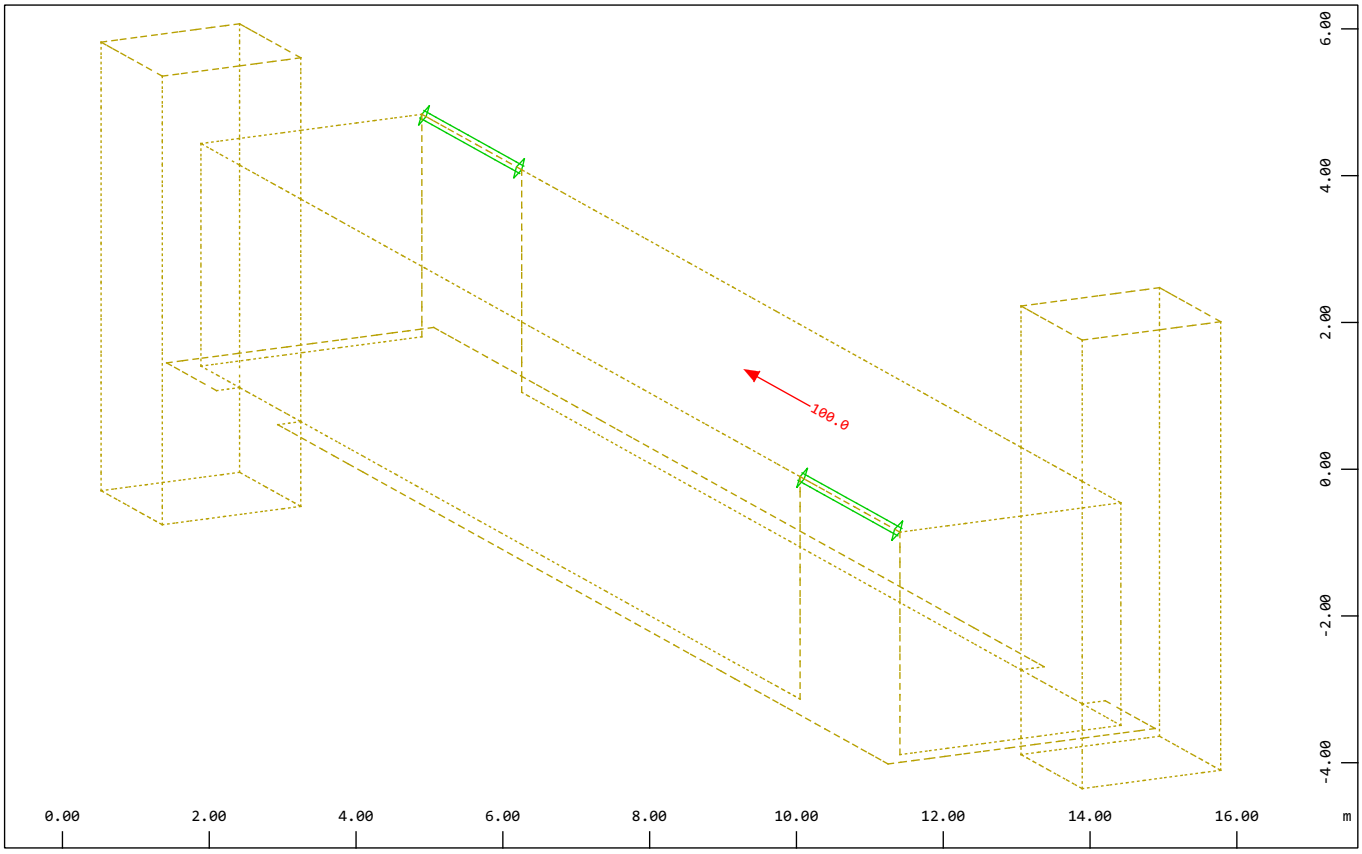
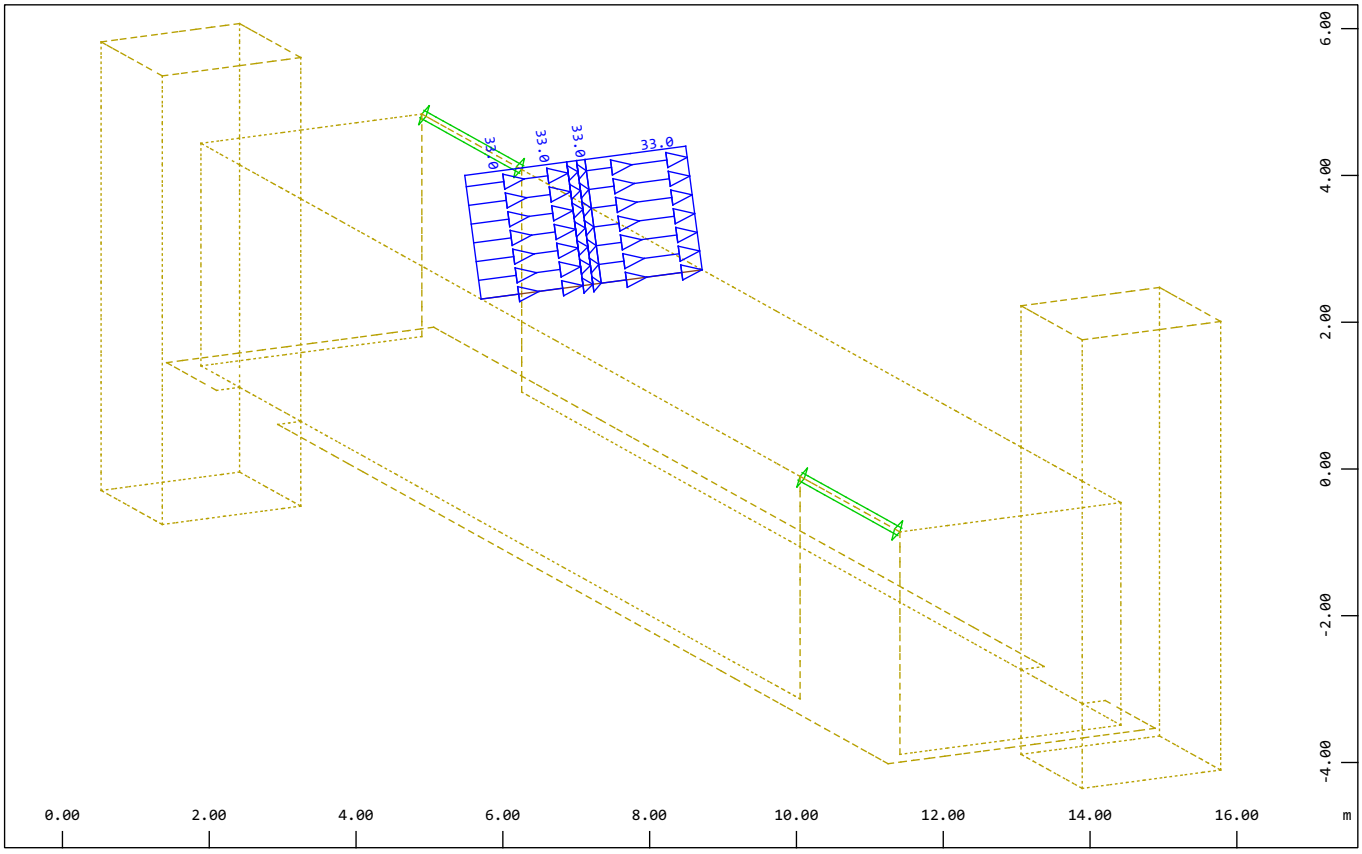
Zelezniski podhod
Graphical Output



Z
Y X
All loads (in components), Loadcase 434 LM71_boc_2_2 , (1 cm 3D = unit) Free single
load (force) in global X (Unit=50.0 kN) (Min=-100.0) (Max=-100.0)
M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962



Z
Y X
All loads (in components), Loadcase 441 LM71_zavi_posp_1_1 , (1 cm 3D = unit) Free line
load (force) in global Y (Unit=20.0 kN/m) (Max=33.0)
M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962

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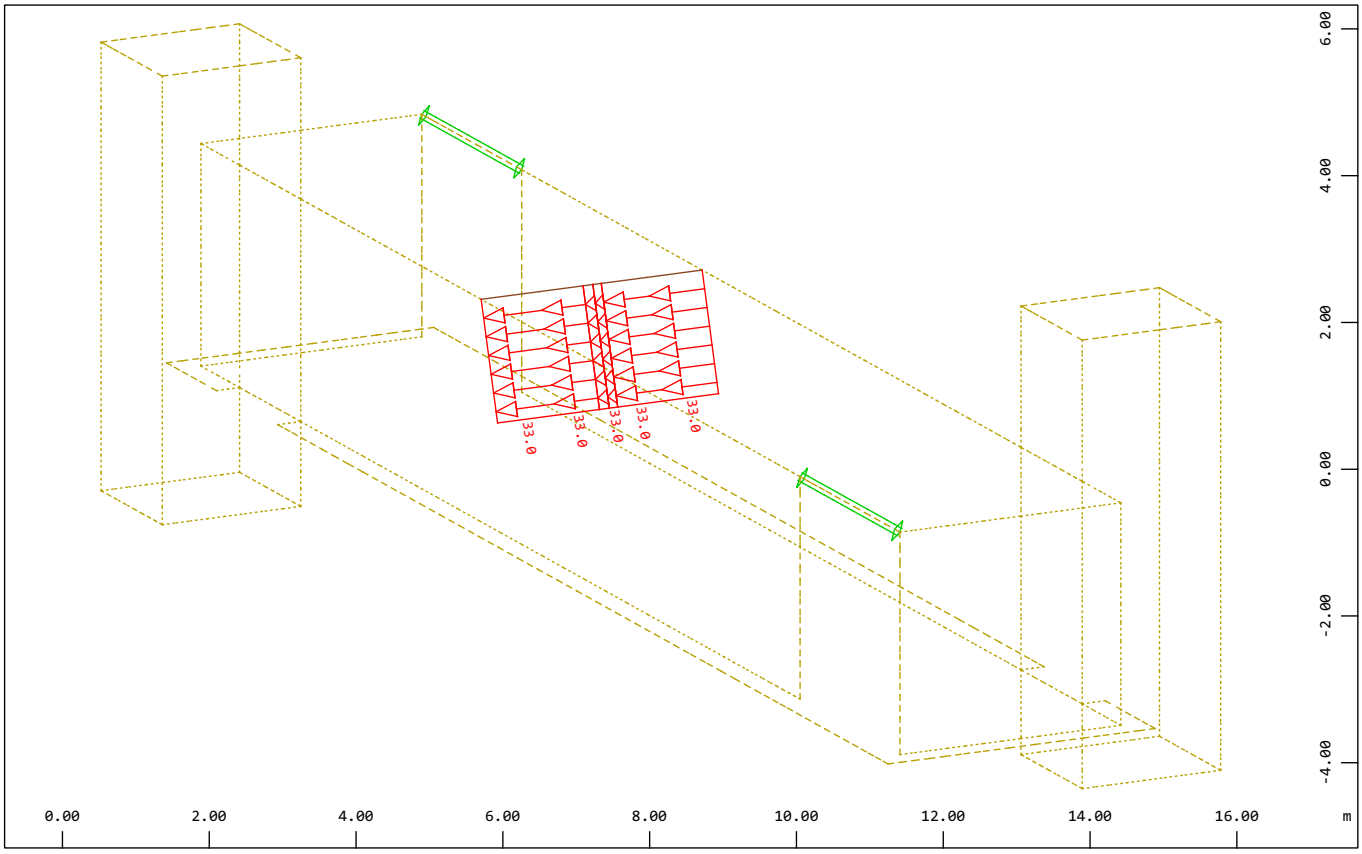
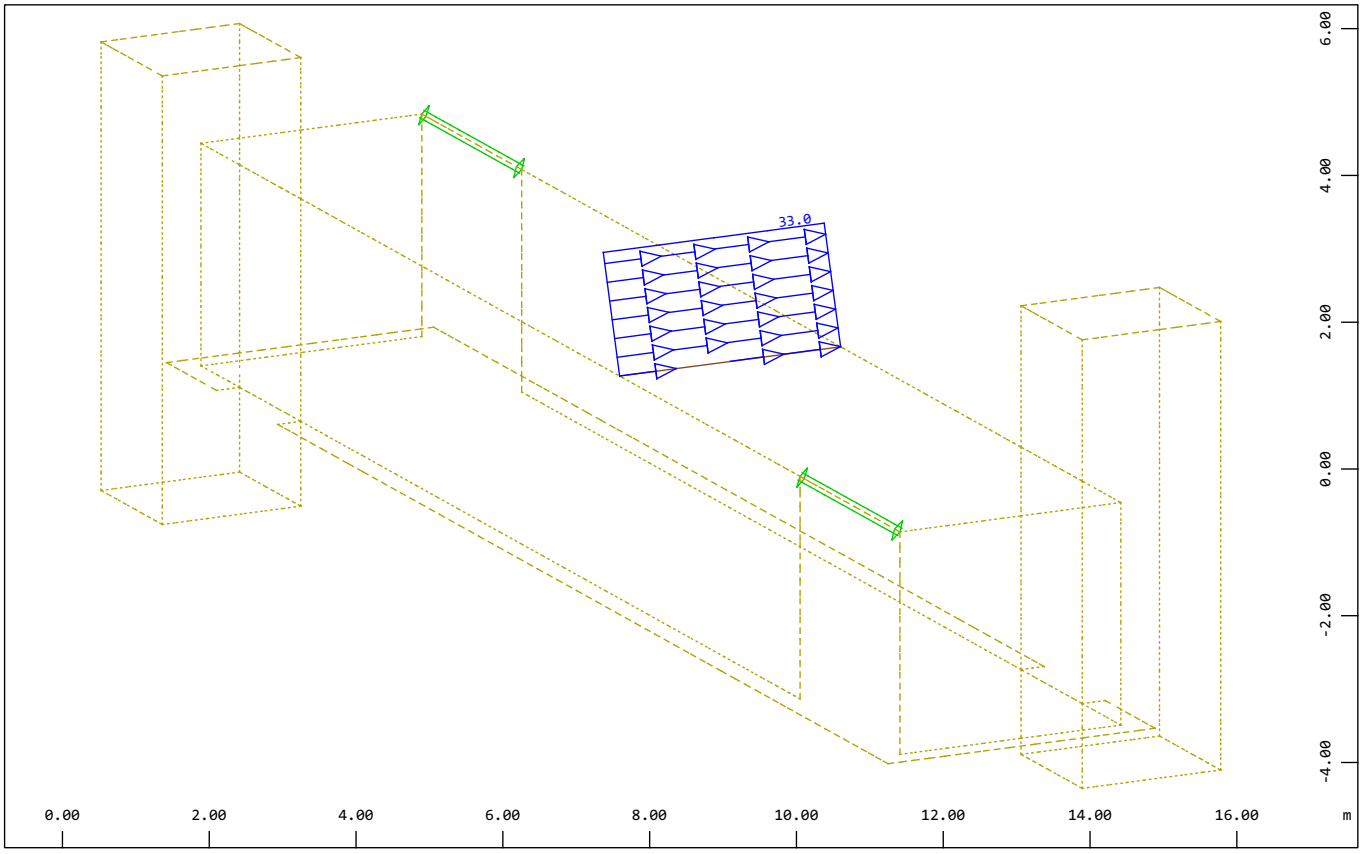
Zelezniski podhod
Graphical Output



Z
Y X
All loads (in components), Loadcase 442 LM71_zavi_posp_1_2 , (1 cm 3D = unit) Free line
load (force) in global Y (Unit=20.0 kN/m) (Min=-33.0) (Max=-33.0)
M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962



Z
Y X
All loads (in components), Loadcase 443 LM71_zavi_posp_2_1 , (1 cm 3D = unit) Free line
load (force) in global Y (Unit=20.0 kN/m) (Max=33.0)
M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962

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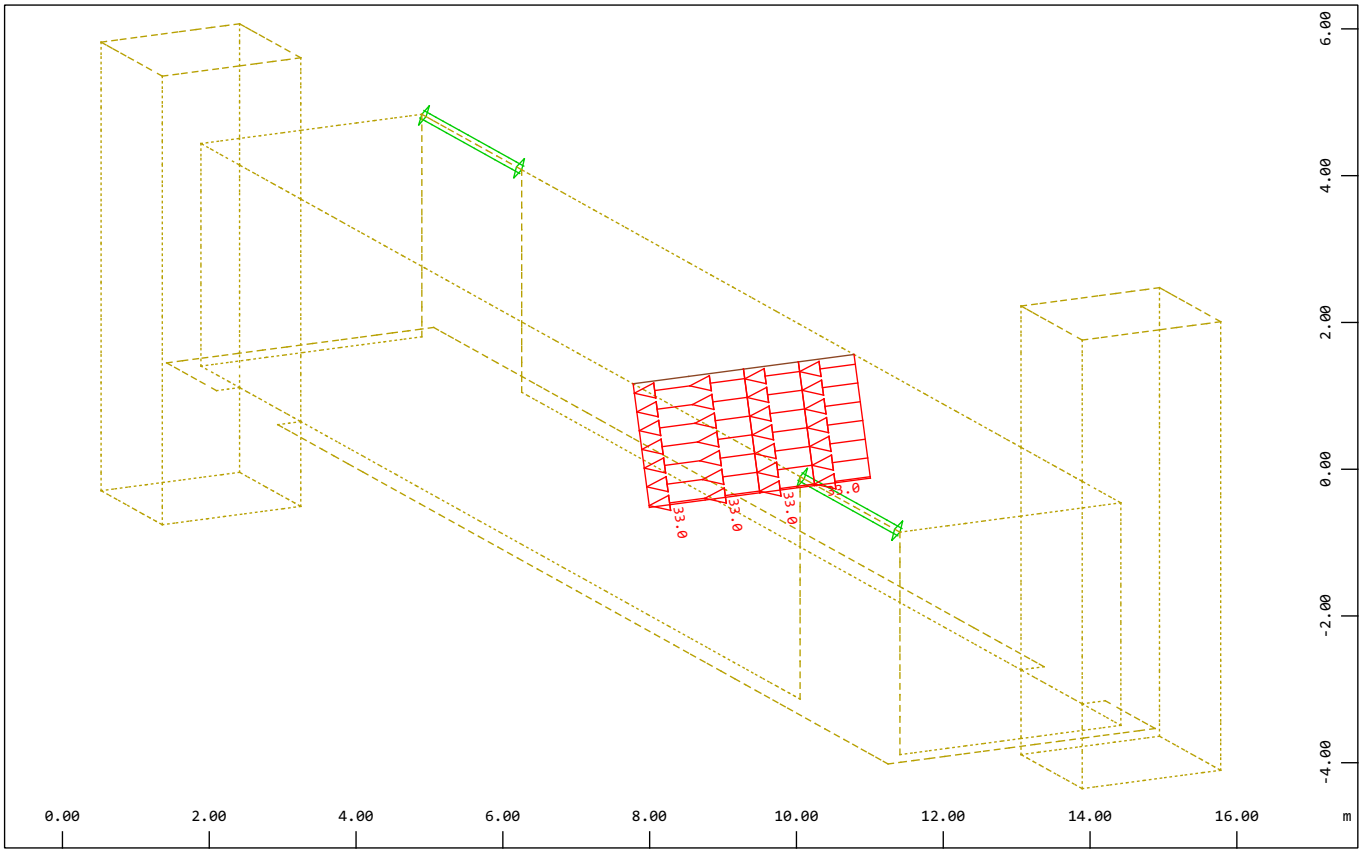
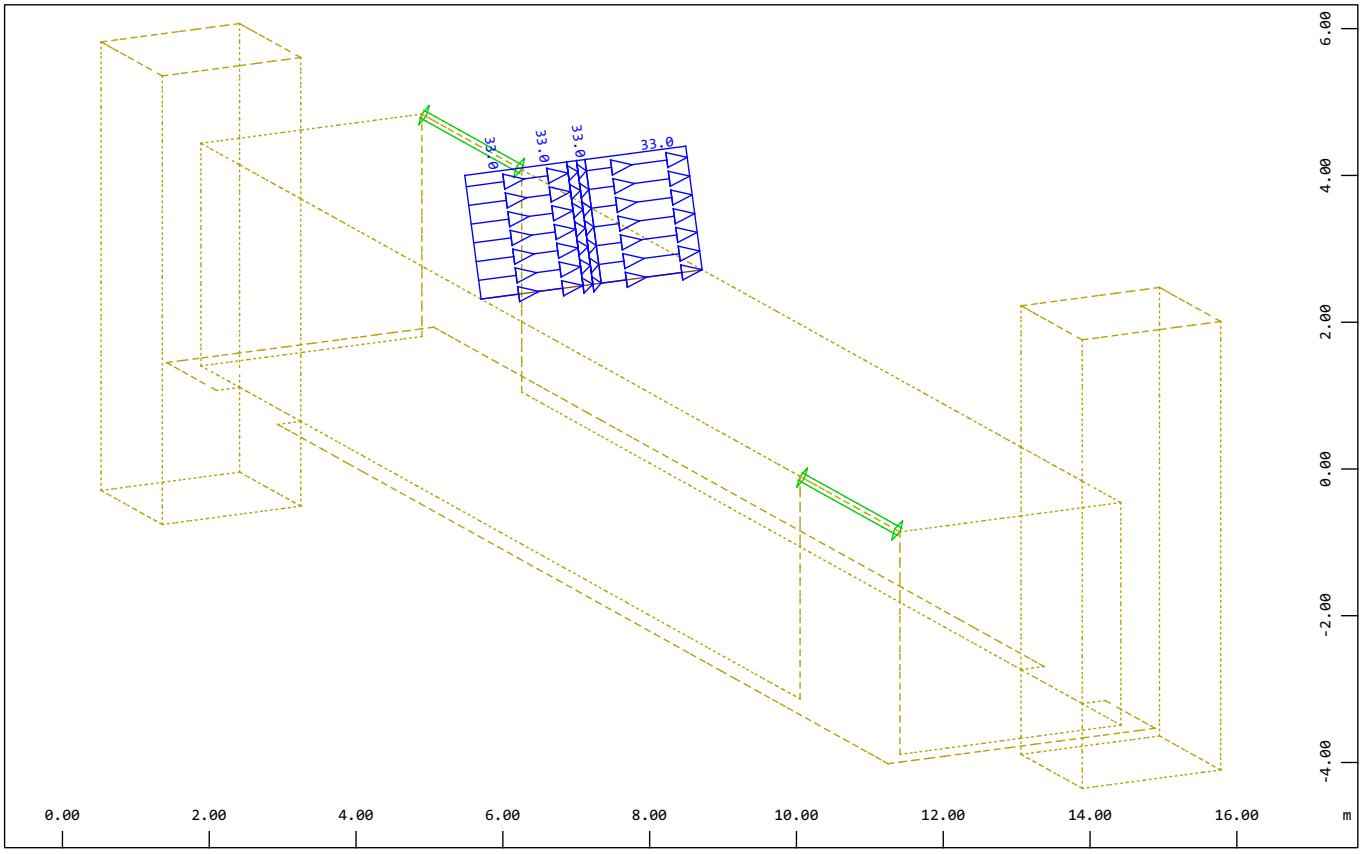
Zelezniski podhod
Graphical Output



Z
Y X
All loads (in components), Loadcase 444 LM71_zavi_posp_2_2 , (1 cm 3D = unit) Free line
load (force) in global Y (Unit=20.0 kN/m) (Min=-33.0) (Max=-33.0)
M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962



Z
Y X
All loads (in components), Loadcase 451 SW/2_zavi_posp_1_1 , (1 cm 3D = unit) Free line
load (force) in global Y (Unit=20.0 kN/m) (Max=33.0)
M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962

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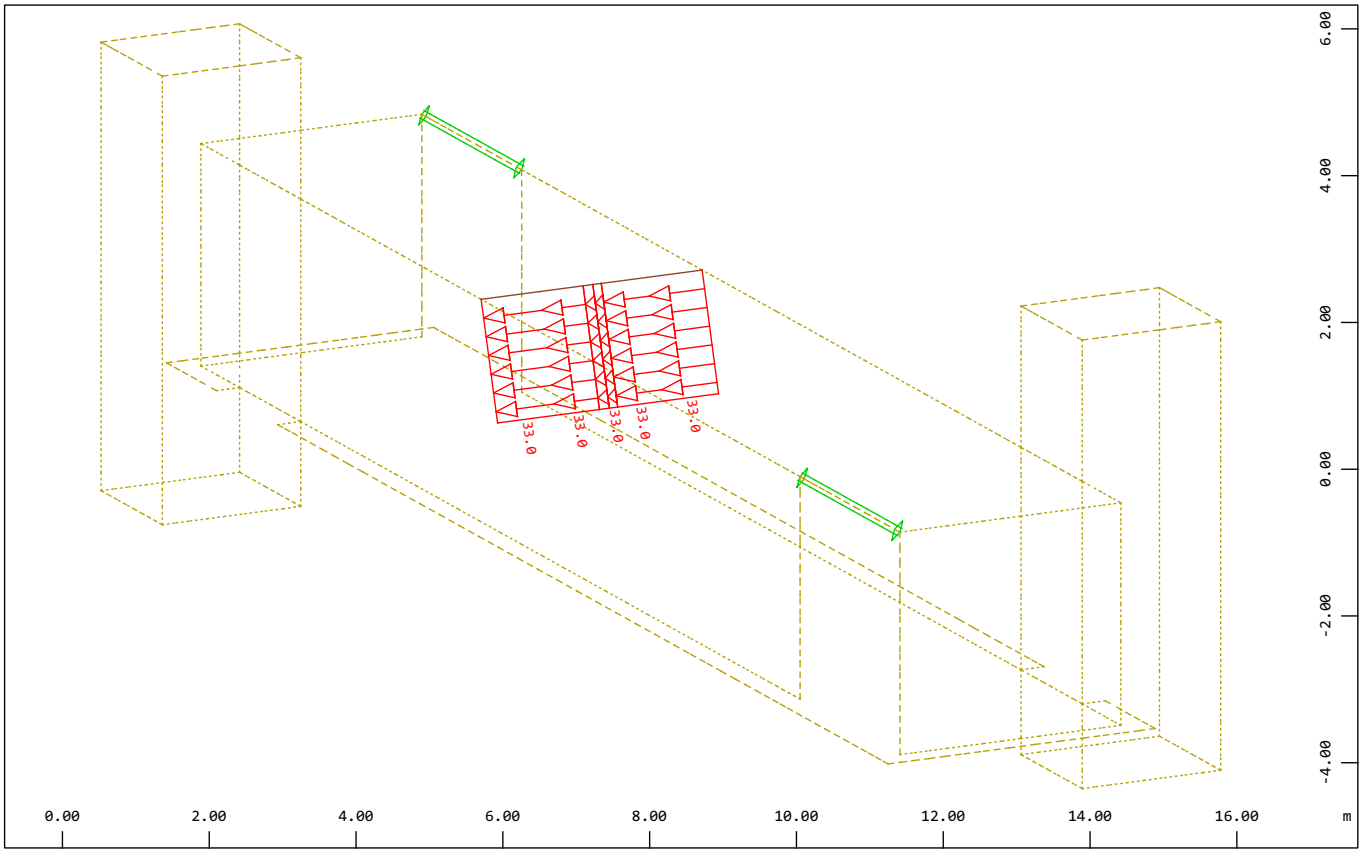
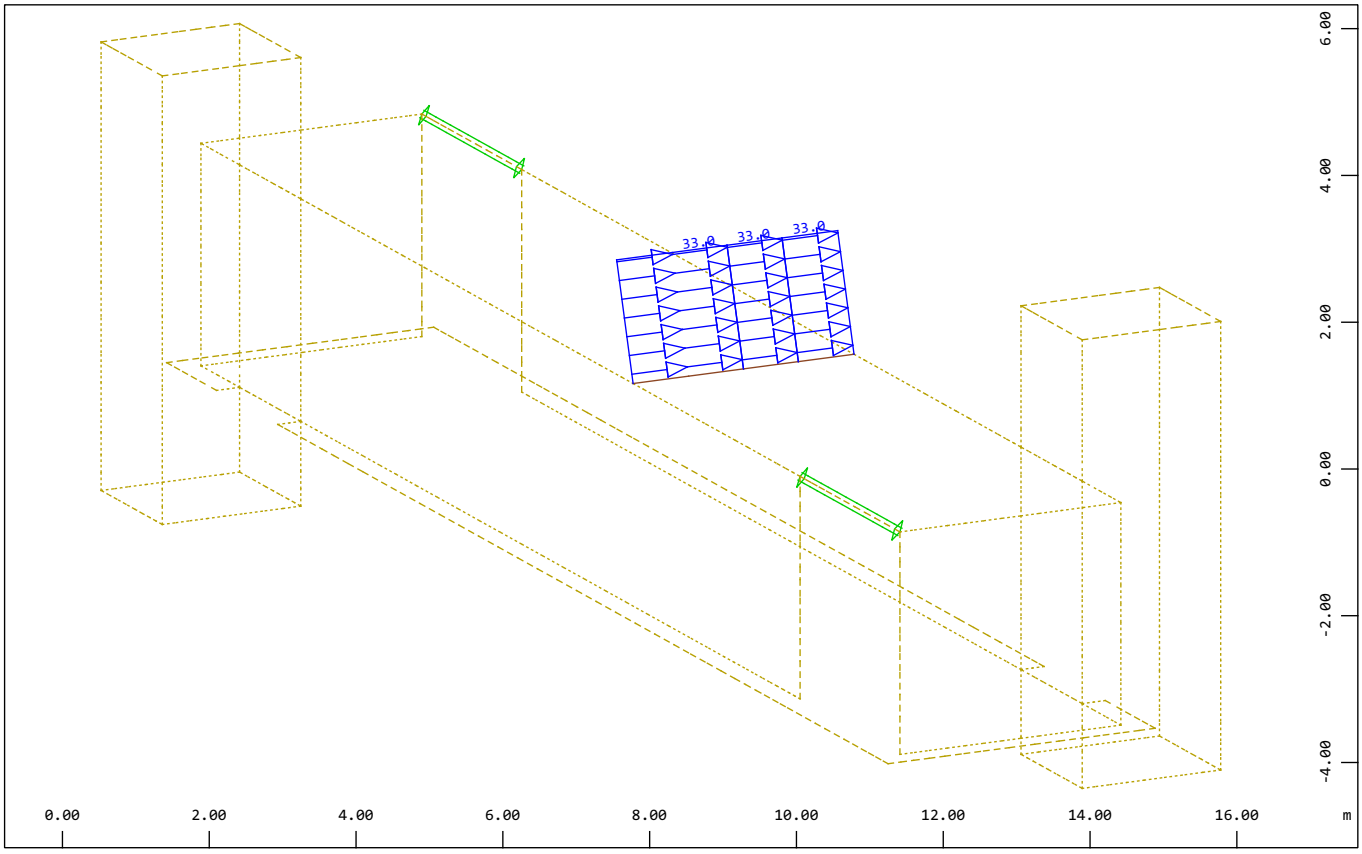
Zelezniski podhod
Graphical Output



Z
Y X
All loads (in components), Loadcase 452 SW/2_zavi_posp_1_2 , (1 cm 3D = unit) Free line
load (force) in global Y (Unit=20.0 kN/m) (Min=-33.0) (Max=-33.0)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962



Z
Y X
All loads (in components), Loadcase 453 SW/2_zavi_posp_2_1 , (1 cm 3D = unit) Free line
load (force) in global Y (Unit=20.0 kN/m) (Max=33.0)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962

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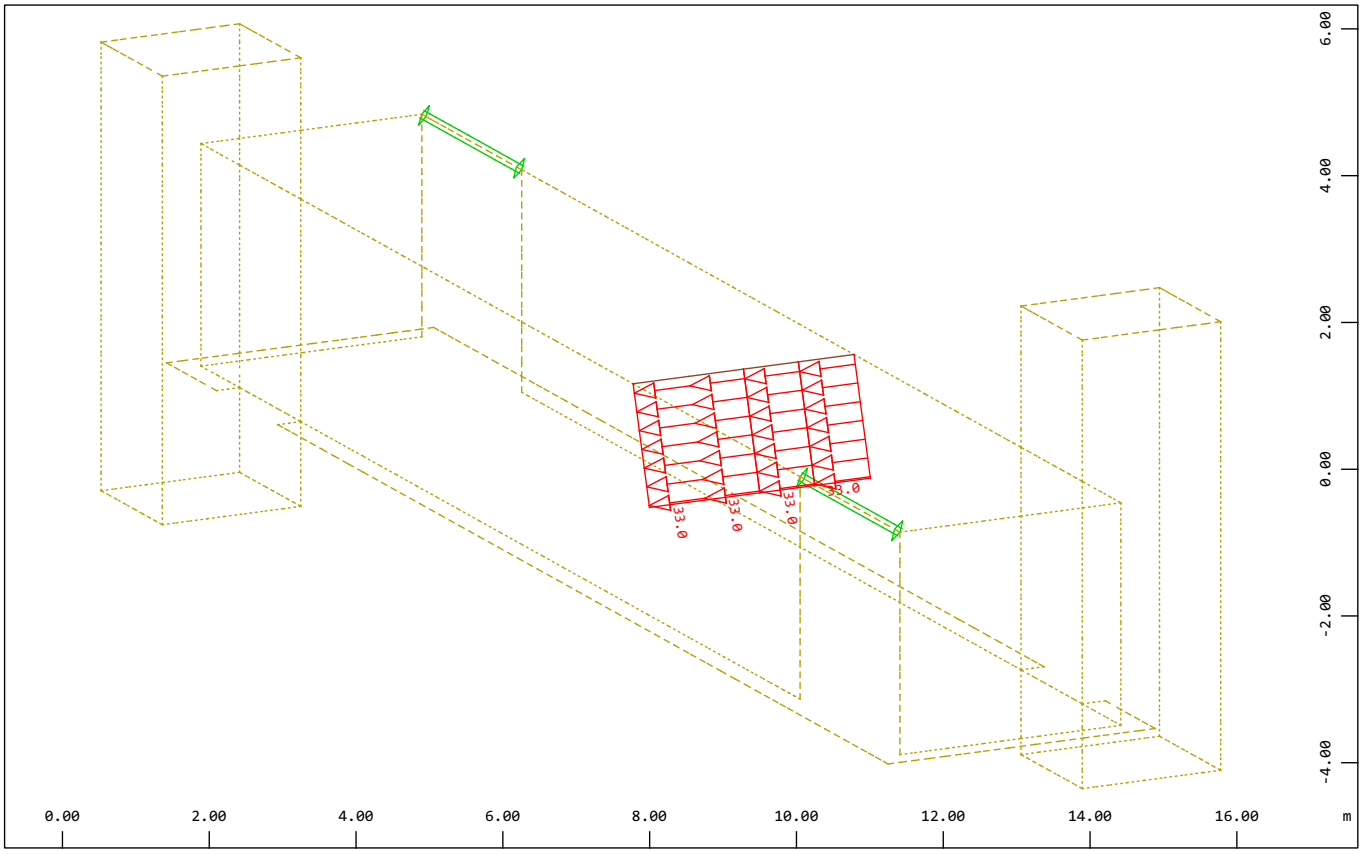
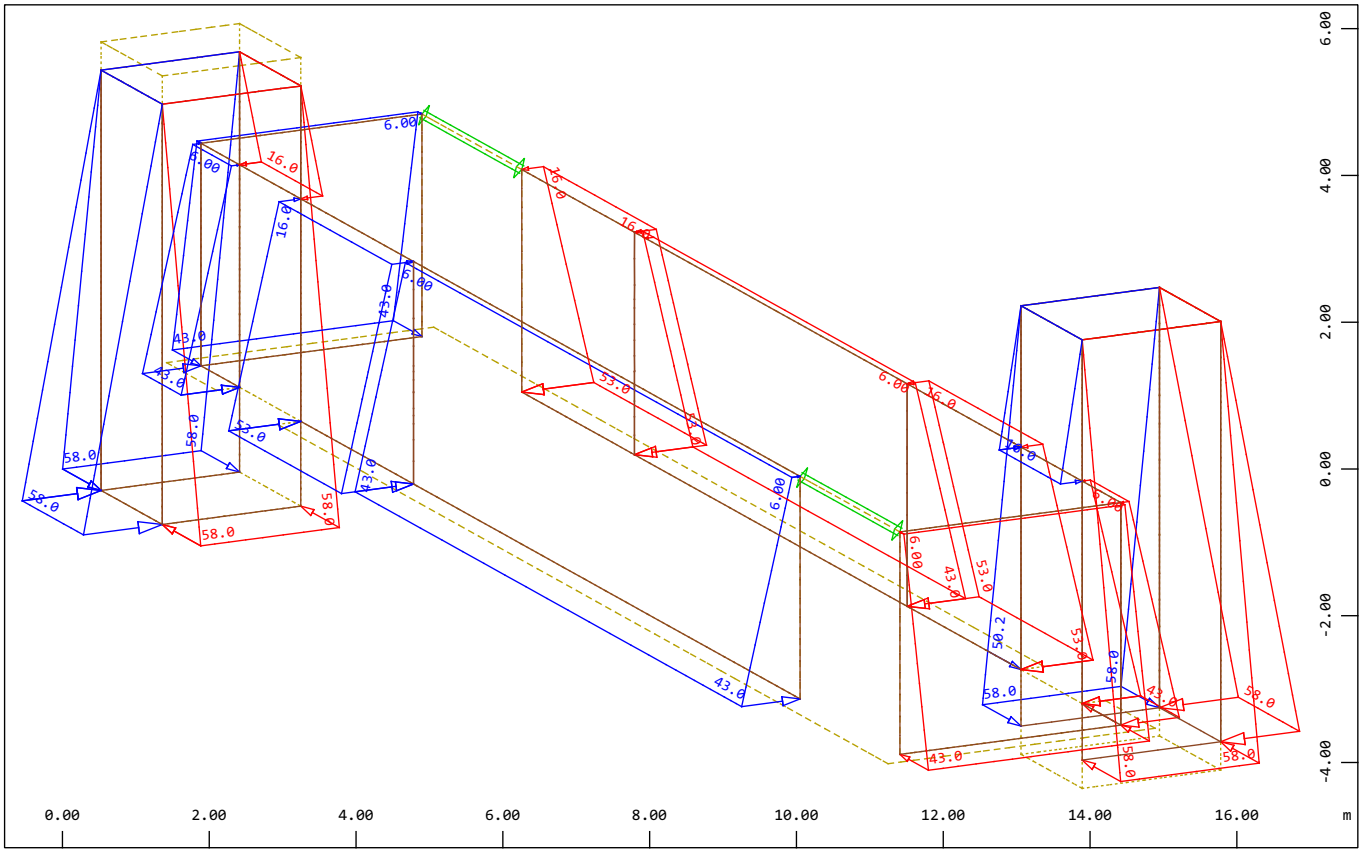
Zelezniski podhod
Graphical Output



All loads (in components), Loadcase 454 SW/2_zavi_posp_2_2 , (1 cm 3D = unit) Free line
load (force) in global Y (Unit=20.0 kN/m) (Min=-33.0) (Max=-33.0)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962



All loads (in components), Loadcase 701 zemeljski pritiski , (1 cm 3D = unit) Free area
load (force) in global X (Unit=50.0 kN/m2,Min=-58.0 Max=58.0), Free area load (force)
in global Y (Unit=50.0 kN/m2,Min=-58.0 Max=58.0)

M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962

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Zelezniski podhod
design parameter list

Reinforcementparameter two layer reinforcement

Selection Grp no.	elem no.	distance d1-u d1-l [mm]	2.lay [mm]	bar-diameter ds-u ds-l [mm]	2.lay [mm]	crackwidth wk-u wk-l [mm]	2.lay [mm]	steelstress sigsu sigsl [MPa]	2.lay [MPa]	min.reinf. asu asl [cm2/m]	2.lay [cm2/m]
default		-	-	-	-	-	-	-	-	-	-
101		35.0	49.0	16	16	0.20	0.20	-	-	-	-
		50.0	64.0	16	16	0.20	0.20	-	-	-	-
102		35.0	49.0	16	16	0.20	0.20	-	-	-	-
		50.0	64.0	16	16	0.20	0.20	-	-	-	-
201		35.0	51.0	16	16	0.20	0.20	400.00	400.00	-	-
		35.0	51.0	16	16	0.20	0.20	400.00	400.00	-	-
301		35.0	49.0	16	16	0.20	0.20	-	-	-	-
		35.0	49.0	16	16	0.20	0.20	-	-	-	-
302		35.0	49.0	16	16	0.20	0.20	-	-	-	-
		35.0	49.0	16	16	0.20	0.20	-	-	-	-
311		35.0	49.0	14	14	0.30	0.30	400.00	400.00	-	-
		35.0	49.0	14	14	0.30	0.30	400.00	400.00	-	-
312		35.0	49.0	14	14	0.30	0.30	400.00	400.00	-	-
		35.0	49.0	14	14	0.30	0.30	400.00	400.00	-	-

distance	upper / lower distance center of bar to surface
bar-diameter	upper / lower bar diameter
crackwidth	upper / lower required crack width
steelstress	upper / lower maximum steel stress in SLS check
min.reinf.	upper / lower minimum reinforcement

The reinforcement directions relate to the local coordinate system of
the elements and have to be plotted graphically.
With the input of a steel stress sigsu... the 'crack design according tables'
uses this given stress sigsu for the corresponding layer. With this input, the check can
be done for bar distances instead of bar diameters, see legend SLS control parameters.

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Zelezniski podhod
ULS design

Default design code is EuroNorm EN 1992-2:2005 Concrete Structures (Slowenija) V 2020
Loadcases have been calculated in the Ultimate Limit State
The design uses the Baumann method.

Load Cases for the Design

Loadcase	factor	Designation	
7001	1.000	MAX-MXX QUAD	
7002	1.000	MIN-MXX QUAD	
7003	1.000	MAX-MYY QUAD	
7004	1.000	MIN-MYY QUAD	
7005	1.000	MAX-MXY QUAD	
7006	1.000	MIN-MXY QUAD	
7007	1.000	MAX-VX QUAD	
7008	1.000	MIN-VX QUAD	
7009	1.000	MAX-VY QUAD	
7010	1.000	MIN-VY QUAD	
7011	1.000	MAX-NXX QUAD	
7012	1.000	MIN-NXX QUAD	
7013	1.000	MAX-NYY QUAD	
7014	1.000	MIN-NYY QUAD	
7015	1.000	MAX-NXY QUAD	
7016	1.000	MIN-NXY QUAD	
7017	1.000	MAX-P QUAD	Bedding stresses for punching design
7018	1.000	MIN-P QUAD	Bedding stresses for punching design
7051	1.000	MAX-PX NODE	Nodal reaction punching design
7052	1.000	MIN-PX NODE	Nodal reaction punching design
7053	1.000	MAX-PY NODE	Nodal reaction punching design
7054	1.000	MIN-PY NODE	Nodal reaction punching design
7055	1.000	MAX-PZ NODE	Nodal reaction punching design
7056	1.000	MIN-PZ NODE	Nodal reaction punching design
7057	1.000	MAX-MX NODE	Nodal reaction punching design
7058	1.000	MIN-MX NODE	Nodal reaction punching design
7059	1.000	MAX-MY NODE	Nodal reaction punching design
7060	1.000	MIN-MY NODE	Nodal reaction punching design
7061	1.000	MAX-MZ NODE	Nodal reaction punching design
7062	1.000	MIN-MZ NODE	Nodal reaction punching design

Material (EN 1992-1-1:2004)

MAT	fck [MPa]	fc [MPa]	fctm [MPa]	fy [MPa]	ft [MPa]	minT	Type
1	30.00	25.50	2.90			0.20	
2				500.00	535.43		

MAT material number
fck nominal strength of the concrete
fc strength of the concrete
fctm tensile strength of the concrete
fy yield stress reinforcing steel
ft tensile stress reinforcing steel
minT minimum transverse reinforcement
Type character of the loading

Reduction of FC in case of transvers tension = 25.0 [o/o]

Material-safety-factors:

MAT	concr SC1	SC2	steel SS1	SS2
1	1.50	1.50		
2			1.15	1.15

MAT material number
concr material safety SC1/SC2 = bending/compression
steel material safety steel bending/compression

At direct supports the shear force is linear reduced from 1.0*d up to the face of the support to 70%.
The maximum shear capacity is checked at the face of the support without reduction.
For punching design, the longitudinal reinforcement will be increased up to 1.50%
to avoid shear reinforcement [input PUNC...RO_V].
Outside the punching area, the normal slab shear design may increase the

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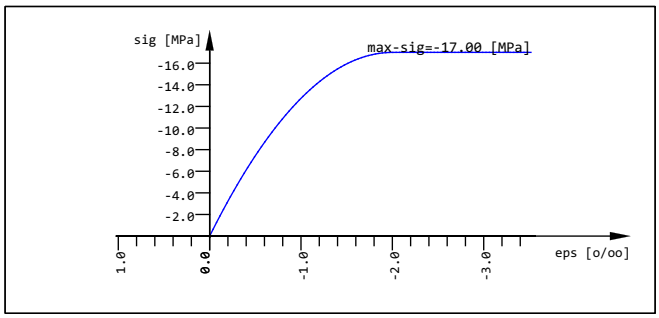
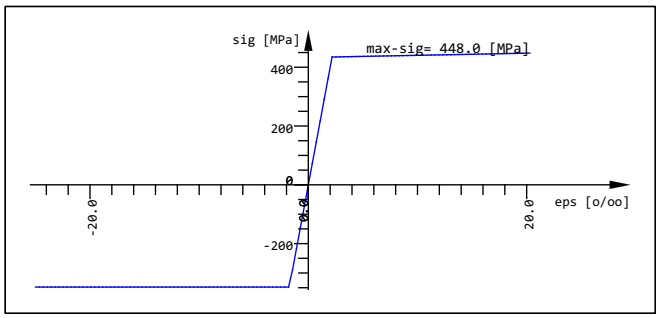
Zelezniski podhod
ULS design

longitudinal reinforcement up to 0.20% [input CTRL...RO_V].



Used work law Mno: 1 (first concrete)



Used work law Mno: 2 (first steel)

Reinforcementparameter two layer reinforcement

Selection Grp no.	elem no.	distance d1-u d1-l [mm]	2.lay 2.lay [mm]	bar-diameter ds-u ds-l [mm]	2.lay 2.lay [mm]	crackwidth wk-u wk-l [mm]	2.lay 2.lay [mm]	steelstress sigsu sigsl [MPa]	2.lay 2.lay [MPa]	min.reinf. asu asl [cm2/m]	2.lay 2.lay [cm2/m]
default		-	-	-	-	-	-	-	-	-	-
101		35.0	49.0	16	16	-	-	-	-	-	-
		50.0	64.0	16	16	-	-	-	-	-	-
102		35.0	49.0	16	16	-	-	-	-	-	-
		50.0	64.0	16	16	-	-	-	-	-	-
201		35.0	51.0	16	16	-	-	-	-	-	-
		35.0	51.0	16	16	-	-	-	-	-	-
301		35.0	49.0	16	16	-	-	-	-	-	-
		35.0	49.0	16	16	-	-	-	-	-	-
302		35.0	49.0	16	16	-	-	-	-	-	-
		35.0	49.0	16	16	-	-	-	-	-	-
311		35.0	49.0	14	14	-	-	-	-	-	-
		35.0	49.0	14	14	-	-	-	-	-	-
312		35.0	49.0	14	14	-	-	-	-	-	-
		35.0	49.0	14	14	-	-	-	-	-	-

distance upper / lower distance center of bar to surface
bar-diameter upper / lower bar diameter
crackwidth upper / lower required crack width
steelstress upper / lower maximum steel stress in SLS check
min.reinf. upper / lower minimum reinforcement

The reinforcement directions relate to the local coordinate system of
the elements and have to be plotted graphically.
The design takes a uniform element thickness of 0.350 [m].
Over columns a greater element height is taken into account
The reinforcement is saved in the data base as reinforcement distribution number 1

Punching Design (EN 1992-1-1:2004):

Node number = 1012 X= 20.50 [m] Y= 5.800 [m]
Z= 1.200 [m]
Max. shear force V-ULS= 7.0 [kN] LC= 7002 from slab shear forces
End of wall thick b= 0.350 [m]
Plate thickness h-slab= 0.350 [m] d= 0.308 [m]
Perimeter iterated a= 0.179 [m] u1= 0.532 [m]
(side piece s= 0.350 [m] ucrit = s + d + quarter circle with r= 0.179)
reduced perimeter distance due to bedded foundation!
Tension reinfor. as >= 0.00 [cm2/m] ro= 0.00 [o/o] vrdc= 0.47 [MPa]
The minimum punching shear resistance vmin + k1·sigmacp was controlling.
v-Ed = 1.40·V/u/d = 0.06 [MPa] <= 0.47 [MPa] =vrdc <= 0.70 =VRd,max(u1)
1.40=flat eccentricity factor beta
At the column face: v-ED(u0) = 0.20 [MPa] < v-RD,max = 3.59 [MPa]

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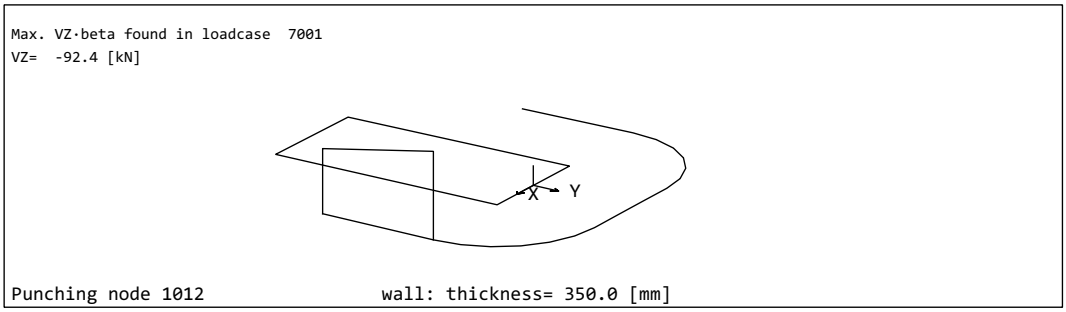
Zelezniski podhod
ULS design

Node number = 1012 X= 20.50 [m] Y= 5.800 [m]
No punching shear reinforcement necessary.

Design for tension force:
Max. shear force V-ULS= -92.4 [kN] LC= 7001 from slab shear forces
reduced by foundation pressure 136.1 [kN/m2] (90% of loadcase with maximum pressure)
(due to near boundary, bedding stress substracted on sectorarea of 53%)
Max. shear force V-ULS= -50.4 [kN] = -92.4 + 42.0 [kN]
Plate thickness h-slab= 0.350 [m] d= 0.308 [m]
Perimeter iterated a= 0.179 [m] u1= 0.325 [m]
(side piece s= 0.350 [m] ucrit = s + d + quarter circle with r= 0.179)
reduced perimeter distance due to bedded foundation!
Tension reinfor. as >= 0.00 [cm2/m] ro= 0.00 [o/o] vrdc= 1.60 [MPa]
The minimum punching shear resistance vmin + k1·sigmacp was controlling.
v-Ed = 1.40·V/u/d = 0.70 [MPa] <= 1.60 [MPa] =vrdc <= 2.41 =VRd,max(u1)
1.40=flat eccentricity factor beta
At the column face: v-ED(u0) = 2.66 [MPa] < v-RD,max = 3.59 [MPa]
No punching shear reinforcement necessary.
Both pressure and tension results are taken into account.



Node number = 1015 X= 18.60 [m] Y= 5.800 [m]
Z= 1.200 [m]
Max. shear force V-ULS= 6.4 [kN] LC= 7012 from slab shear forces
End of wall thick b= 0.350 [m]
Plate thickness h-slab= 0.350 [m] d= 0.308 [m]
Perimeter iterated a= 0.172 [m] u1= 0.532 [m]
(side piece s= 0.350 [m] ucrit = s + d + quarter circle with r= 0.172)
reduced perimeter distance due to bedded foundation!
Tension reinfor. as >= 0.00 [cm2/m] ro= 0.00 [o/o] vrdc= 0.47 [MPa]
The minimum punching shear resistance vmin + k1·sigmacp was controlling.
v-Ed = 1.40·V/u/d = 0.06 [MPa] <= 0.47 [MPa] =vrdc <= 0.70 =VRd,max(u1)
1.40=flat eccentricity factor beta
At the column face: v-ED(u0) = 0.19 [MPa] < v-RD,max = 3.59 [MPa]
No punching shear reinforcement necessary.

Design for tension force:
Max. shear force V-ULS= -92.4 [kN] LC= 7003 from slab shear forces
reduced by foundation pressure 138.1 [kN/m2] (90% of loadcase with maximum pressure)
(due to near boundary, bedding stress substracted on sectorarea of 53%)
Max. shear force V-ULS= -50.9 [kN] = -92.4 + 41.5 [kN]
Plate thickness h-slab= 0.350 [m] d= 0.308 [m]
Perimeter iterated a= 0.172 [m] u1= 0.323 [m]
(side piece s= 0.350 [m] ucrit = s + d + quarter circle with r= 0.172)
reduced perimeter distance due to bedded foundation!
Tension reinfor. as >= 0.00 [cm2/m] ro= 0.00 [o/o] vrdc= 1.66 [MPa]
The minimum punching shear resistance vmin + k1·sigmacp was controlling.
v-Ed = 1.40·V/u/d = 0.72 [MPa] <= 1.66 [MPa] =vrdc <= 2.49 =VRd,max(u1)
1.40=flat eccentricity factor beta
At the column face: v-ED(u0) = 2.66 [MPa] < v-RD,max = 3.59 [MPa]
No punching shear reinforcement necessary.

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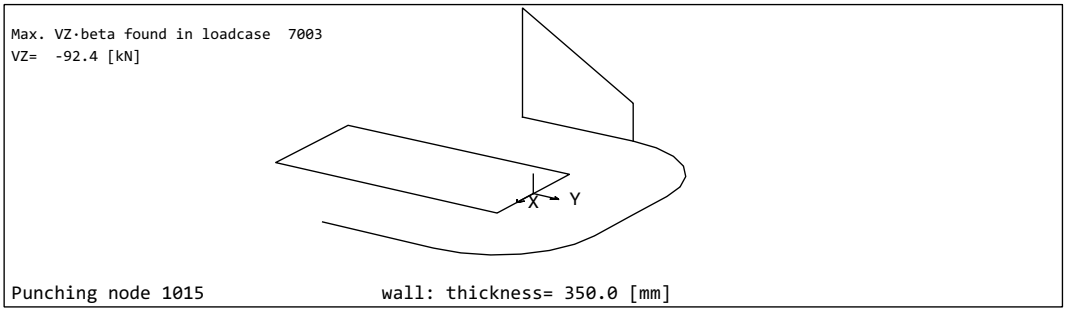
Zelezniski podhod
ULS design

Node number = 1015 X= 18.60 [m] Y= 5.800 [m]
Both pressure and tension results are taken into account.



Node number = 1041 X= 0.000 [m] Y= 5.450 [m]
Z= 1.200 [m]
Max. shear force V-ULS= -195. [kN] LC= 7008 from slab shear forces
reduced by foundation pressure 147.5 [kN/m2] (90% of loadcase with maximum pressure)
(due to near boundary, bedding stress substracted on sectorarea of 46%)
Max. shear force V-ULS= -129. [kN] = -195. + 65.4 [kN]
End of wall thick b= 0.350 [m]
Plate thickness h-slab= 0.350 [m] d= 0.308 [m]
Perimeter iterated a= 0.308 [m] u1= 0.712 [m]
(side piece s= 0.350 [m] ucrit = s + d + quarter circle with r= 0.308)
reduced perimeter distance due to bedded foundation!
Tension reinfor. as >= 0.00 [cm2/m] ro= 0.00 [o/o] vrdc= 0.93 [MPa]
The minimum punching shear resistance vmin + k1·sigmacp was controlling.
v-Ed = 1.40·V/u/d = 0.82 [MPa] <= 0.93 [MPa] =vrdc <= 1.40 =VRd,max(u1)
1.40=flat eccentricity factor beta
At the column face: v-ED(u0) = 2.80 [MPa] < v-RD,max = 3.59 [MPa]
No punching shear reinforcement necessary.

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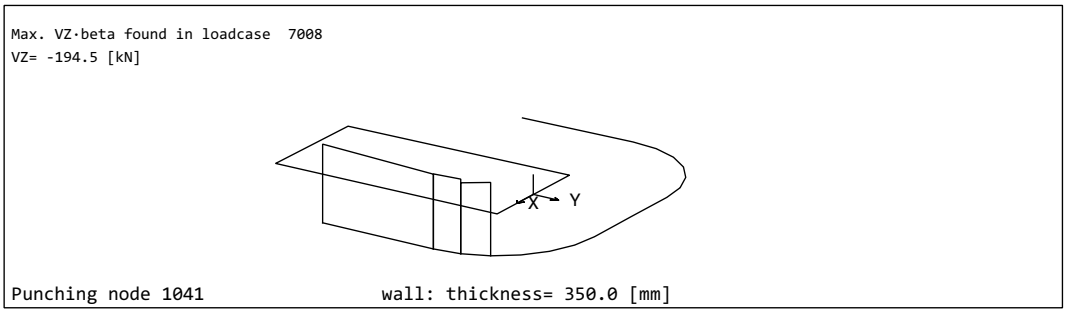
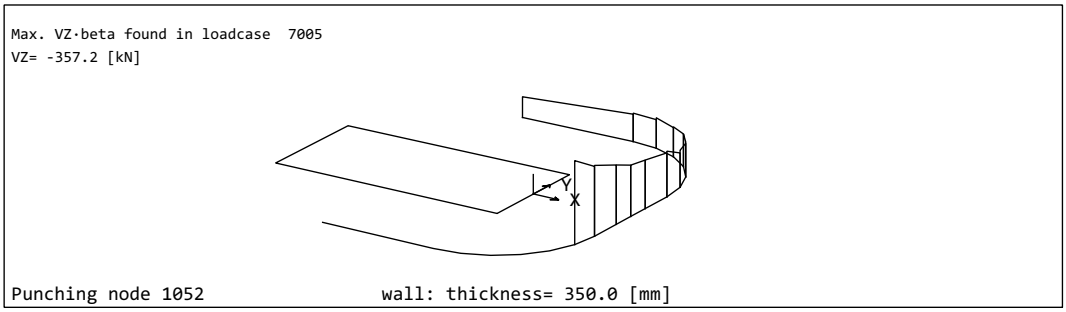
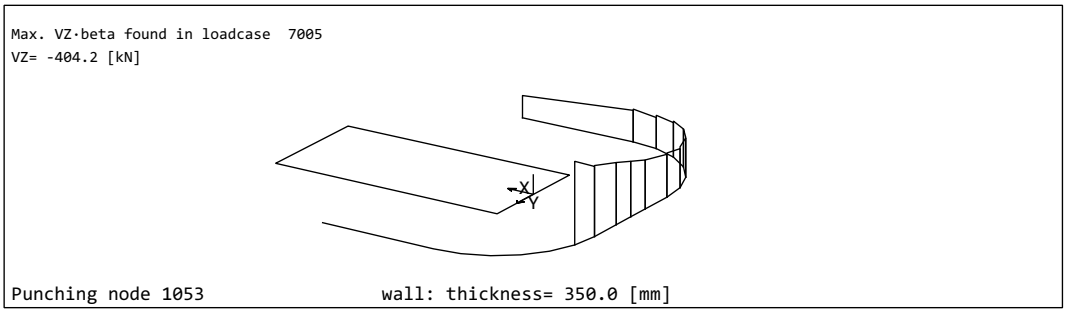


Node number = 1052 X= 18.60 [m] Y= 2.100 [m]
Z= 1.200 [m]
Max. shear force V-ULS= -357. [kN] LC= 7005 from slab shear forces
reduced by foundation pressure 143.3 [kN/m2] (90% of loadcase with maximum pressure)
(due to near boundary, bedding stress substracted on sectorarea of 64%)
Max. shear force V-ULS= -261. [kN] = -357. + 96.5 [kN]
End of wall thick b= 0.350 [m]
Plate thickness h-slab= 0.350 [m] d= 0.308 [m]
Perimeter iterated a= 0.345 [m] u1= 1.609 [m]
(side piece s= 0.350 [m] ucrit = s + d + quarter circle with r= 0.345)
reduced perimeter distance due to bedded foundation!
Tension reinfor. as >= 0.00 [cm2/m] ro= 0.00 [o/o] vrdc= 0.83 [MPa]
The minimum punching shear resistance vmin + k1·sigmacp was controlling.
v-Ed = 1.40·V/u/d = 0.74 [MPa] <= 0.83 [MPa] =vrdc <= 1.25 =VRd,max(u1)
1.40=flat eccentricity factor beta
At the column face: v-ED(u0) = 2.47 [MPa] < v-RD,max = 3.59 [MPa]
No punching shear reinforcement necessary.

Zelezniski podhod
ULS design



Node number = 1053 X= 3.100 [m] Y= 5.450 [m]
Z= 1.200 [m]
Max. shear force V-ULS= -404. [kN] LC= 7005 from slab shear forces
reduced by foundation pressure 146.8 [kN/m2] (90% of loadcase with maximum pressure)
(due to near boundary, bedding stress substracted on sectorarea of 64%)
Max. shear force V-ULS= -300. [kN] = -404. + 104.5 [kN]
End of wall thick b= 0.350 [m]
Plate thickness h-slab= 0.350 [m] d= 0.308 [m]
Perimeter iterated a= 0.363 [m] u1= 1.646 [m]
(side piece s= 0.350 [m] ucrit = s + d + quarter circle with r= 0.363)
reduced perimeter distance due to bedded foundation!
Tension reinfor. as >= 11.76 [cm2/m] ro= 0.38 [o/o] vrdc= 0.83 [MPa]
v-Ed = 1.40·V/u/d = 0.83 [MPa] <= 0.83 [MPa] =vrdc <= 1.24 =VRd,max(u1)
1.40=flat eccentricity factor beta
At the column face: v-ED(u0) = 2.79 [MPa] < v-RD,max = 3.59 [MPa]
No punching shear reinforcement necessary.



Node number = 1060 X= 21.70 [m] Y= 2.100 [m]
Z= 1.200 [m]
Max. shear force V-ULS= -206. [kN] LC= 7007 from slab shear forces
reduced by foundation pressure 147.1 [kN/m2] (90% of loadcase with maximum pressure)
(due to near boundary, bedding stress substracted on sectorarea of 46%)
Max. shear force V-ULS= -137. [kN] = -206. + 69.1 [kN]
End of wall thick b= 0.350 [m]
Plate thickness h-slab= 0.350 [m] d= 0.308 [m]
Perimeter iterated a= 0.320 [m] u1= 0.723 [m]
(side piece s= 0.350 [m] ucrit = s + d + quarter circle with r= 0.320)
reduced perimeter distance due to bedded foundation!
Tension reinfor. as >= 0.00 [cm2/m] ro= 0.00 [o/o] vrdc= 0.89 [MPa]
The minimum punching shear resistance vmin + k1·sigmacp was controlling.
v-Ed = 1.40·V/u/d = 0.86 [MPa] <= 0.89 [MPa] =vrdc <= 1.34 =VRd,max(u1)
1.40=flat eccentricity factor beta
At the column face: v-ED(u0) = 2.96 [MPa] < v-RD,max = 3.59 [MPa]
No punching shear reinforcement necessary.

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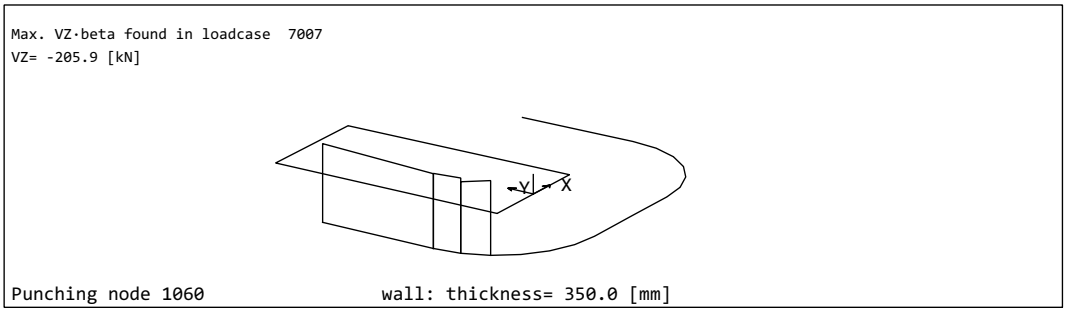
Zelezniski podhod
ULS design



Summary Punching Design (EN 1992-1-1:2004)

Node No	Typ	X [m]	Y [m]	V-ULS [kN]	column [mm]	ucrit [m]	%u0 [o/o]	beta [-]	v-max [MPa]	AssSum [cm2]	ast [cm2/m]	nperi
1012	W	20.500	5.800	7.0	350/-	0.628	35	1.40	0.06	-	0.00	-
1012	WF	20.500	5.800	-50.4	350/-	0.387	35	1.40	0.70	-	0.00	-
1015	W	18.600	5.800	6.4	350/-	0.628	35	1.40	0.06	-	0.00	-
1015	WF	18.600	5.800	-50.9	350/-	0.384	35	1.40	0.72	-	0.00	-
1041	WF	0.000	5.450	-129.2	350/-	0.712	28	1.40	0.82	-	0.00	-
1052	WF	18.600	2.100	-260.7	350/-	1.716	41	1.40	0.74	-	0.00	-
1053	WF	3.100	5.450	-299.7	350/-	1.752	41	1.40	0.83	-	11.76	-
1060	WF	21.700	2.100	-136.8	350/-	0.723	28	1.40	0.86	-	0.00	-

Typ I=inner column, E=edge column, C=corner column, F=foundation, W=end of wall, L=wall corner, G=end_of_girder
V-ULS design shear force (reduced by bedding pressure)
column dimension of column or wall thickness at end of walls
ucrit effective length of 1. perimeter, reduced due to openings and edges
%u0 ucrit = ... % of a full circle (ucrit/u0-tot)
beta excentricity factor
v-max shear stress at reduced critical 1. perimeter
AssSum shear reinforcemend - total sum of all nperi perimeters
ast min. required tension reinforcement in the punching zone
nperi up to this perimeter, shear reinforcement is required

The eccentricity factors beta must be checked.
Both pressure and tension results are taken into account.

Required Reinforcements acc. to EN 1992-1-1:2004

Grp	Element	t [m]	asu [cm2/m]	asu2 [cm2/m]	asu3 [cm2/m]	asl [cm2/m]	asl2 [cm2/m]	asl3 [cm2/m]	supp [-]	shear [-]	ass [cm2/m2]
102	1020184	0.350	0.73	3.67		11.76	11.76			1d	
	1020405	0.350	6.33	1.79		0.09	0.47			1	
201	2010243	0.350	3.52	3.92		1.71	2.69		0.95	2	7.57
311	3110424	0.350	3.51	6.71		1.65	0.43		0.73	1	

Grp primary group number
Element element number
t plate thickness
asu Principal reinforcements (1st layer) Top
asu2 Cross reinforcements (2nd layer) Top
asu3 Third reinforcements Top
asl Principal reinforcements (1st layer) Bottom
asl2 Cross reinforcements (2nd layer) Bottom
asl3 Third reinforcements Bottom
supp reduction factor for the shear force near supports, punc=point in punching zone -> punching shear design
shear shear zone: 1=Ok, punc=punching area, 1s=asu/l increased for shear, 1d=for punching, 2=required ass, 2m=minimum shear reinf.
ass Shear reinforcement
Elements with maximum values are printed

Required Reinforcements acc. to EN 1992-1-1:2004 at nodes

Grp	Node	t [m]	asu [cm2/m]	asu2 [cm2/m]	asu3 [cm2/m]	asl [cm2/m]	asl2 [cm2/m]	asl3 [cm2/m]	supp [-]	shear [-]	ass [cm2/m2]
102	1015	0.350	9.80	2.54		7.27	3.25		punc	punc	
	1053	0.350				11.76	11.76		punc	punc	
	1224	0.350	4.19	1.40		11.76	11.76			2	8.10
	1614	0.350				12.71	11.76		punc	punc	
201	1550	0.350	4.34	10.15		1.15	0.85		0.00	1	

Grp primary group number
Node Number
t plate thickness
asu Principal reinforcements (1st layer) Top
asu2 Cross reinforcements (2nd layer) Top
asu3 Third reinforcements Top
asl Principal reinforcements (1st layer) Bottom
asl2 Cross reinforcements (2nd layer) Bottom
asl3 Third reinforcements Bottom
supp reduction factor for the shear force near supports, punc=point in punching zone -> punching shear design

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Zelezniski podhod
ULS design

```
shear shear zone: 1=Ok, punc=punching area, 1s=asu/l increased for shear, 1d=for punching, 2=required ass, 2m=minimum shear
      reinf.
ass   Shear reinforcement
       Elements with maximum values are printed
```

At 18 punching-nodes the bending moments have been reduced (rounded)

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Zelezniski podhod
SLS design

Maximum of reinforcement-distributions

The maximum reinforcement is build of the actual design and the previous distribution 1
and stored as new reinforcement-distribution 2 .
For the SLS stress results only the result of the actual desing is stored, not the maximum.
For a maximum of SLS stresses please use a pure superposition run without design.

Default design code is EuroNorm EN 1992-2:2005 Concrete Structures (Slowenija) V 2020
Loadcases have been calculated in the Serviceability State
The design uses the Baumann method.

Load Cases for the Design

Loadcase	factor	Designation
8201	1.000	MAXP-MXX QUAD
8202	1.000	MINP-MXX QUAD
8203	1.000	MAXP-MYY QUAD
8204	1.000	MINP-MYY QUAD
8205	1.000	MAXP-MXY QUAD
8206	1.000	MINP-MXY QUAD
8207	1.000	MAXP-VX QUAD
8208	1.000	MINP-VX QUAD
8209	1.000	MAXP-VY QUAD
8210	1.000	MINP-VY QUAD
8211	1.000	MAXP-NXX QUAD
8212	1.000	MINP-NXX QUAD
8213	1.000	MAXP-NYY QUAD
8214	1.000	MINP-NYY QUAD
8215	1.000	MAXP-NXY QUAD
8216	1.000	MINP-NXY QUAD
8217	1.000	MAXP-P QUAD
8218	1.000	MINP-P QUAD
8251	1.000	MAXP-PX NODE
8252	1.000	MINP-PX NODE
8253	1.000	MAXP-PY NODE
8254	1.000	MINP-PY NODE
8255	1.000	MAXP-PZ NODE
8256	1.000	MINP-PZ NODE
8257	1.000	MAXP-MX NODE
8258	1.000	MINP-MX NODE
8259	1.000	MAXP-MY NODE
8260	1.000	MINP-MY NODE
8261	1.000	MAXP-MZ NODE
8262	1.000	MINP-MZ NODE
8271	1.000	MAXP-UX NODE
8272	1.000	MINP-UX NODE
8273	1.000	MAXP-UY NODE
8274	1.000	MINP-UY NODE
8275	1.000	MAXP-UZ NODE
8276	1.000	MINP-UZ NODE

Material (EN 1992-1-1:2004)

MAT	fck [MPa]	fc [MPa]	fctm [MPa]	fy [MPa]	ft [MPa]	minT	Type
1	30.00	25.50	2.90			0.20	
2				500.00	535.43		

MAT	material number	fy	yield stress reinforcing steel
fck	nominal strength of the concrete	ft	tensile stress reinforcing steel
fc	strength of the concrete	minT	minimum transverse reinforcement
fctm	tensile strength of the concrete	Type	character of the loading

A robustness minimum reinforcement has not been requested and
has to be checked separately.

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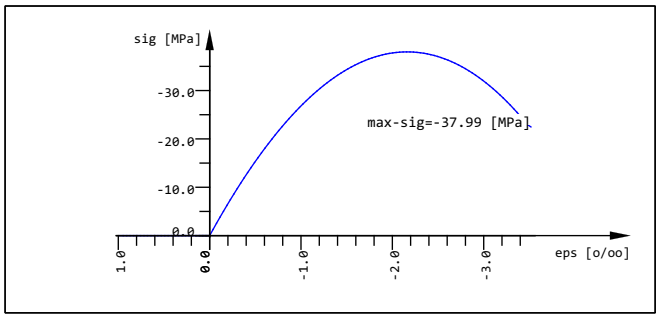
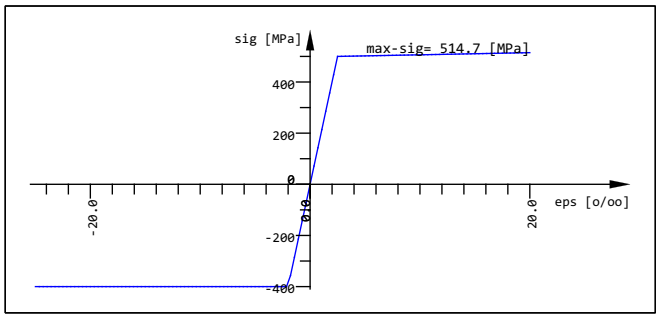
Zelezniski podhod
SLS design

A minimum reinforcement has not been requested and
has to be checked separately.



Used work law Mno: 1 (first concrete)



Used work law Mno: 2 (first steel)

Reinforcementparameter two layer reinforcement

Selection Grp no.	elem no.	distance d1-u d1-l [mm]	2.lay 2.lay [mm]	bar-diameter ds-u ds-l [mm]	2.lay 2.lay [mm]	crackwidth wk-u wk-l [mm]	2.lay 2.lay [mm]	steelstress sigsu sigsl [MPa]	2.lay 2.lay [MPa]	min.reinf. asu asl [cm2/m]	2.lay 2.lay [cm2/m]
default		-	-	-	-	-	-	-	-	-	-
101		35.0	49.0	16	16	0.20	0.20	-	-	-	-
		50.0	64.0	16	16	0.20	0.20	-	-	-	-
102		35.0	49.0	16	16	0.20	0.20	-	-	-	-
		50.0	64.0	16	16	0.20	0.20	-	-	-	-
201		35.0	51.0	16	16	0.20	0.20	400.00	400.00	-	-
		35.0	51.0	16	16	0.20	0.20	400.00	400.00	-	-
301		35.0	49.0	16	16	0.20	0.20	-	-	-	-
		35.0	49.0	16	16	0.20	0.20	-	-	-	-
302		35.0	49.0	16	16	0.20	0.20	-	-	-	-
		35.0	49.0	16	16	0.20	0.20	-	-	-	-
311		35.0	49.0	14	14	0.30	0.30	400.00	400.00	-	-
		35.0	49.0	14	14	0.30	0.30	400.00	400.00	-	-
312		35.0	49.0	14	14	0.30	0.30	400.00	400.00	-	-
		35.0	49.0	14	14	0.30	0.30	400.00	400.00	-	-

distance upper / lower distance center of bar to surface
bar-diameter upper / lower bar diameter
crackwidth upper / lower required crack width
steelstress upper / lower maximum steel stress in SLS check
min.reinf. upper / lower minimum reinforcement

The reinforcement directions relate to the local coordinate system of
the elements and have to be plotted graphically.
With the input of a steel stress sigsu... the 'crack design according tables'
uses this given stress sigsu for the corresponding layer. With this input, the check can
be done for bar distances instead of bar diameters, see legend SLS control parameters.
The design takes a uniform element thickness of 0.350 [m].
Over columns a greater element height is taken into account

Serviceability limit state control parameters

No	Code	wk [mm]
1	EN-1992	->para Calculation of crack-width acc. EN 1992 7.3.4

Reinforcement has been increased by SLS design -> WINGRAF: Decisive design check✓

wk Required crack width: ->para = values from design parameter definition
7301 elements/nodes were designed with direct calculation of crack width EN 1992-1-1 7.3.4

Required Reinforcements acc. to EN 1992-1-1:2004

Grp	Element	t [m]	asu [cm2/m]	asu2 [cm2/m]	asu3 [cm2/m]	asl [cm2/m]	asl2 [cm2/m]	asl3 [cm2/m]	supp [-]	shear [-]	ass [cm2/m2]
0	1020184	0.350	0.73	3.67		11.76	11.76				
	1020405	0.350	6.33	1.79		0.09	0.47				
	2010243	0.350	3.52	3.92		1.71	2.69				
	3110424	0.350	3.51	6.71		1.65	0.43				

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Zelezniski podhod
SLS design

Grp primary group number
Element element number
t plate thickness
asu Principal reinforcements (1st layer) Top
asu2 Cross reinforcements (2nd layer) Top
asu3 Third reinforcements Top
asl Principal reinforcements (1st layer) Bottom
asl2 Cross reinforcements (2nd layer) Bottom
asl3 Third reinforcements Bottom
supp reduction factor for the shear force near supports, punc=point in punching zone -> punching shear design
shear shear zone: 1=Ok, punc=punching area, 1s=asu/l increased for shear, 1d=for punching, 2=required ass, 2m=minimum shear reinf.
ass in a SLS design no shear design is done
Elements with maximum values are printed

Required Reinforcements acc. to EN 1992-1-1:2004 at nodes

Grp	Node	t	asu	asu2	asu3	asl	asl2	asl3	supp	shear	ass
		[m]	[cm2/m]	[cm2/m]	[cm2/m]	[cm2/m]	[cm2/m]	[cm2/m]	[-]	[-]	[cm2/m2]
102	1015	0.350	9.80	2.54		7.27	3.25				
	1053	0.350				11.76	11.76				
	1224	0.350	4.19	1.40		11.76	11.76				
	1614	0.350				12.71	11.76				
201	1550	0.350	4.34	10.15		1.15	0.85				

Grp primary group number
Node Number
t plate thickness
asu Principal reinforcements (1st layer) Top
asu2 Cross reinforcements (2nd layer) Top
asu3 Third reinforcements Top
asl Principal reinforcements (1st layer) Bottom
asl2 Cross reinforcements (2nd layer) Bottom
asl3 Third reinforcements Bottom
supp reduction factor for the shear force near supports, punc=point in punching zone -> punching shear design
shear shear zone: 1=Ok, punc=punching area, 1s=asu/l increased for shear, 1d=for punching, 2=required ass, 2m=minimum shear reinf.
ass in a SLS design no shear design is done
Elements with maximum values are printed

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At 18 punching-nodes the bending moments have been reduced (rounded)

Serviceability load results according to EN 1992-1-1

ELEM No	LC No	x [m]	wk [mm]	as1	as2	as3	d1 [mm]	d2 [mm]	d3 [mm]	wk+ [mm]	as1+	as2+	as3+
******	8201	L	0.39	4.36	2.53		16	16		0.20	9.13	4.44	
******		L	0.35	2.54	6.24		16	16		0.20	2.54	8.72	
******		U	0.50	0.32	0.52		16	16		0.20	0.63	1.28	
******		U	0.51	0.47	0.88		16	16		0.20	0.86	2.24	
******		U	0.26	5.14	1.40		16	16		0.20	6.59	1.40	
******		U	0.23	5.56	1.22		16	16		0.20	6.33	1.27	
******		U	0.20	5.71	1.91		16	16		0.20	5.77	1.91	
******		U	0.24	5.74	2.42		16	16		0.20	6.66	2.42	
******		L	0.25	1.28	6.40		16	16		0.20	1.46	7.28	
******		L	0.23	8.42	6.57		16	16		0.20	8.42	7.18	
******		U	0.52	0.44	0.81		16	16		0.20	0.74	2.10	
******		L	0.25	1.44	7.21		16	16		0.20	1.64	8.21	
******		L	0.38	3.99	4.70		16	16		0.20	6.11	9.44	
******		L	0.30	2.13	6.60		16	16		0.20	2.13	9.70	
******		L	0.30	2.22	6.55		16	16		0.20	2.22	9.80	
******		L	0.32	2.03	6.96		16	16		0.20	2.03	9.83	
******		U	0.53	0.50	0.39		16	16		0.20	0.83	1.01	
******		U	0.53	0.18	0.23		14	14		0.30	0.31	0.23	
******		U	0.54	0.21	0.21		14	14		0.30	0.38	0.21	

x height of compression zone
wk crack width before increase of reinforcement
as1 reinforcement 1. layer before increase of reinforcement
as2 reinforcement 2. layer before increase of reinforcement
as3 reinforcement 3. layer before increase of reinforcement
d1 reinforcement diameter layer 1-3
wk+ crack width after increase of reinforcement
as1+ reinforcement after increase of reinforcement layer 1-3
Calculation of crack width according to EN 1992-1-1 7.3.4 (first element):
kt= 0.40 k1= 0.80 k2= 0.50 k3= 3.40 k4= 0.43
Elements with maximum values are printed

Zelezniski podhod
SLS design

Serviceability load results according to EN 1992-1-1 at nodes Group 102

NODE No	LC No	x [m]	wk [mm]	as1	as2	as3	d1 [mm]	d2 [mm]	d3 [mm]	wk+ [mm]	as1+	as2+	as3+
1179	8201	L	0.41	4.47	0.89		16	16		0.20	12.77	2.55	
1183		L	0.33	2.33	7.12		16	16		0.20	2.33	9.48	
1185		L	0.37	2.36	6.90		16	16		0.20	2.36	9.94	
1186		L	0.22	2.23	7.59		16	16		0.20	2.23	8.06	
1424		L	0.37	6.01	3.09		16	16		0.20	10.84	4.88	
1494		L	0.26	9.17	5.60		16	16		0.20	9.17	7.39	
1511		L	0.20	2.68	7.87		16	16		0.20	2.68	7.95	
1516		L	0.21	2.94	7.92		16	16		0.20	2.94	8.16	
1517		L	0.23	2.83	7.97		16	16		0.20	2.83	8.72	
1523		L	0.42	2.64	6.55		16	16		0.20	2.64	10.18	
1524		L	0.42	2.89	6.75		16	16		0.20	2.89	10.51	
1525		L	0.34	3.12	8.03		16	16		0.20	3.12	11.12	
1526		L	0.23	2.94	9.01		16	16		0.20	2.94	9.75	
1582		L	0.22	1.99	9.50		16	16		0.20	2.04	10.19	
2223		U	0.53	0.72	0.81		16	16		0.20	1.17	2.15	

x height of compression zone
wk crack width before increase of reinforcement
as1 reinforcement 1. layer before increase of reinforcement
as2 reinforcement 2. layer before increase of reinforcement
as3 reinforcement 3. layer before increase of reinforcement
d1 reinforcement diameter layer 1-3
wk+ crack width after increase of reinforcement
as1+ reinforcement after increase of reinforcement layer 1-3
Calculation of crack width according to EN 1992-1-1 7.3.4 (first element):
kt= 0.40 k1= 0.80 k2= 0.50 k3= 3.40 k4= 0.43
Elements with maximum values are printed

Serviceability load results according to EN 1992-1-1 at nodes Group 201

NODE No	LC No	x [m]	wk [mm]	as1	as2	as3	d1 [mm]	d2 [mm]	d3 [mm]	wk+ [mm]	as1+	as2+	as3+
1020	8201	L	0.46	5.47	6.92		16	16		0.20	8.20	12.10	
1550		U	0.21	4.34	10.2		16	16		0.20	4.43	10.15	

x height of compression zone
wk crack width before increase of reinforcement
as1 reinforcement 1. layer before increase of reinforcement
as2 reinforcement 2. layer before increase of reinforcement
as3 reinforcement 3. layer before increase of reinforcement
d1 reinforcement diameter layer 1-3
wk+ crack width after increase of reinforcement
as1+ reinforcement after increase of reinforcement layer 1-3
Calculation of crack width according to EN 1992-1-1 7.3.4 (first element):
kt= 0.40 k1= 0.80 k2= 0.50 k3= 3.40 k4= 0.43
Elements with maximum values are printed

Serviceability load results according to EN 1992-1-1 at nodes Group 312

NODE No	LC No	x [m]	wk [mm]	as1	as2	as3	d1 [mm]	d2 [mm]	d3 [mm]	wk+ [mm]	as1+	as2+	as3+
3200	8201	U	0.67	0.16	0.24		14	14		0.30	0.36	0.24	

x height of compression zone
wk crack width before increase of reinforcement
as1 reinforcement 1. layer before increase of reinforcement
as2 reinforcement 2. layer before increase of reinforcement
as3 reinforcement 3. layer before increase of reinforcement
d1 reinforcement diameter layer 1-3
wk+ crack width after increase of reinforcement
as1+ reinforcement after increase of reinforcement layer 1-3
Calculation of crack width according to EN 1992-1-1 7.3.4 (first element):
kt= 0.40 k1= 0.80 k2= 0.50 k3= 3.40 k4= 0.43
Elements with maximum values are printed

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Zelezniski podhod
ULS design beams

Default design code is EuroNorm EN 1992-2:2005 Concrete Structures (Slowenija) V 2020
Structure and Tab.7.1N: D (Railroad bridges)

Materials

Mat	Classification
1	C 30/37 (EN 1992)
2	B 500 B (EN 1992)

Selected Beam Elements

Selection	NoA	NoE	x[m]	Type
BEAM	all elements			

NoA,NoE range of element numbers
x[m] x-ordinate of beam section or station on axis
Type element type

Reinforcement will be accounted for sectional values as defined in AQUA
Reinforcements saved as Design case No. 1

Considered Load Cases

LC	ACT	REF	CS	Designation
7021	(D)			MAX-N BEAM
7022	(D)			MIN-N BEAM
7023	(D)			MAX-VY BEAM
7024	(D)			MIN-VY BEAM
7025	(D)			MAX-VZ BEAM
7026	(D)			MIN-VZ BEAM
7027	(D)			MAX-MT BEAM
7028	(D)			MIN-MT BEAM
7029	(D)			MAX-MY BEAM
7030	(D)			MIN-MY BEAM
7031	(D)			MAX-MZ BEAM
7032	(D)			MIN-MZ BEAM

LC load case REF reference point for forces and moments
ACT action CS section the load case is acting on

Design for Ultimate Loads - EuroNorm EN 1992-2:2005 Concrete Structures

Safety factors	γ-c,t	γ-c,c	γ-c,s	γ-s,s	γ-s,p	γ-s	Biaxial bending
Strain limits	**ε-c1**	**ε-c2**	**ε-s1**	**ε-s2**	**ε-z1**	**ε-z2**	**CTRL-options**
	1.50	1.50	1.50	1.15	1.15	1.00	
	-3.50	-2.00¹	δ= 1.00²	20.00	20.00		PIIA = 7

¹ Strain limits will be adopted to active stress strain definitions of material
² Value is obtained from maximum height of compression zone based on the redistribution grade δ (EN 1992-1-1, 5.5)
γ-c,t global safety factor for concrete in bending
γ-c,c global safety factor for concrete in compression
γ-c,s global safety factor for concrete in shear
γ-s,s global safety factor for passive reinforcements
γ-s,p global safety factor for active reinforcements
γ-s global safety factor for structural steel
ε-c1 strain limit for compression of concrete
ε-c2 strain limit for centric compression of concrete
ε-s1 strain limit for a selected x/d ratio triggering symmetric reinforcements
ε-s2 strain limit for tension respective hardening of reinforcements
ε-z1 total strain limit for tendons
ε-z2 incremental strain limit for tendons

Parameters for reinforcements

Minimum reinforcement for beams	Minimum reinforcement for columns	Compressive Member Limits e/h	Compressive Member Limits N/Npl	Minimum reinforcement of the required section		Maximum reinforcements	
0.13 [o/o]	0.20 [o/o]	3.50¹	0.0010¹	0.00 [o/o]	0.10*Ned/fyd	8.00	[o/o]

¹ A beam is taken as compressive member if the eccentricity e/h is less and the compressive force is larger than these limits

Tensile forces in the longitudinal reinforcements due to shear are NOT accounted for.
Material of sections uses Ultimate Limit strain-stress law with individual safety factors
Material of reinforcements uses Ultimate Limit strain-stress law with individual safety factors

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Zelezniski podhod
ULS design beams

Applied material properties

Mat	Temp Lev.	Safety factor [-]	Max.compr stress [MPa]	at strain [o/oo]	Max.tens stress [MPa]	at strain [o/oo]	Tension-stiffening [MPa]	Bond factor [-]
1	0	1.500	-17.00	-2.00	0.00	0.00	fc,t = 0.00	
2	0	1.150	-469.57	-50.00	469.57	50.00		

Maximum Utilisation Level

	N	Vy	Vz	My	Mz	Mtp	Mts	Mb	Ncr	SCL	Total
	σ-x	σ+x	τ	σ-v	σ-s	σ-dyn	As-l	As-v	crack	c/t	
Section 1	0.000	0.000	0.267	0.000	0.000	0.118	0.000	0.000	-	-	1.000
B/H/Bw/Hf 370/1300/350	0.000	0.000	0.000	0.282	-	-	1.000	-	-	-	

N	normal force	τ	shear stress
Vy,Vz	shear force	σ-v	principal or von Mises stress
My,Mz	bending	σ-s	stress in reinforcements
Mtp,Mts	torsion (p)rimary and (s)econdary	σ-dyn	stress range
Mb	warping moment	As-l	longitudinal reinforcements
Ncr	flexural buckling	As-v	transverse reinforcements
SCL	cross-section class	crack	crack width
σ-x	longitud. compressive stress	c/t	stress dependant utilisation level (see AQB Manual 2.3.2)
σ+x	longitud. tensile stress	Total	most unfavorable utilisation for all checks

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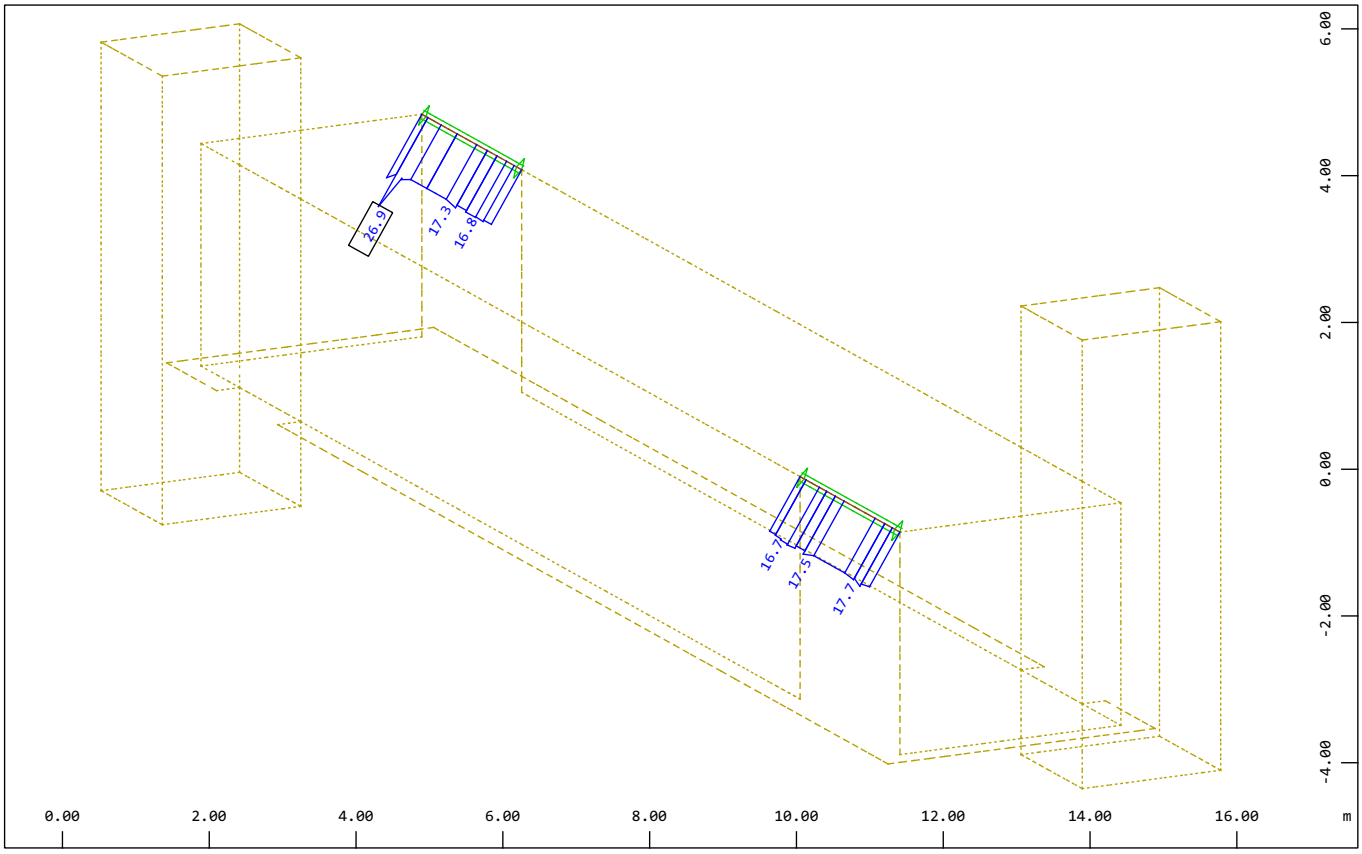
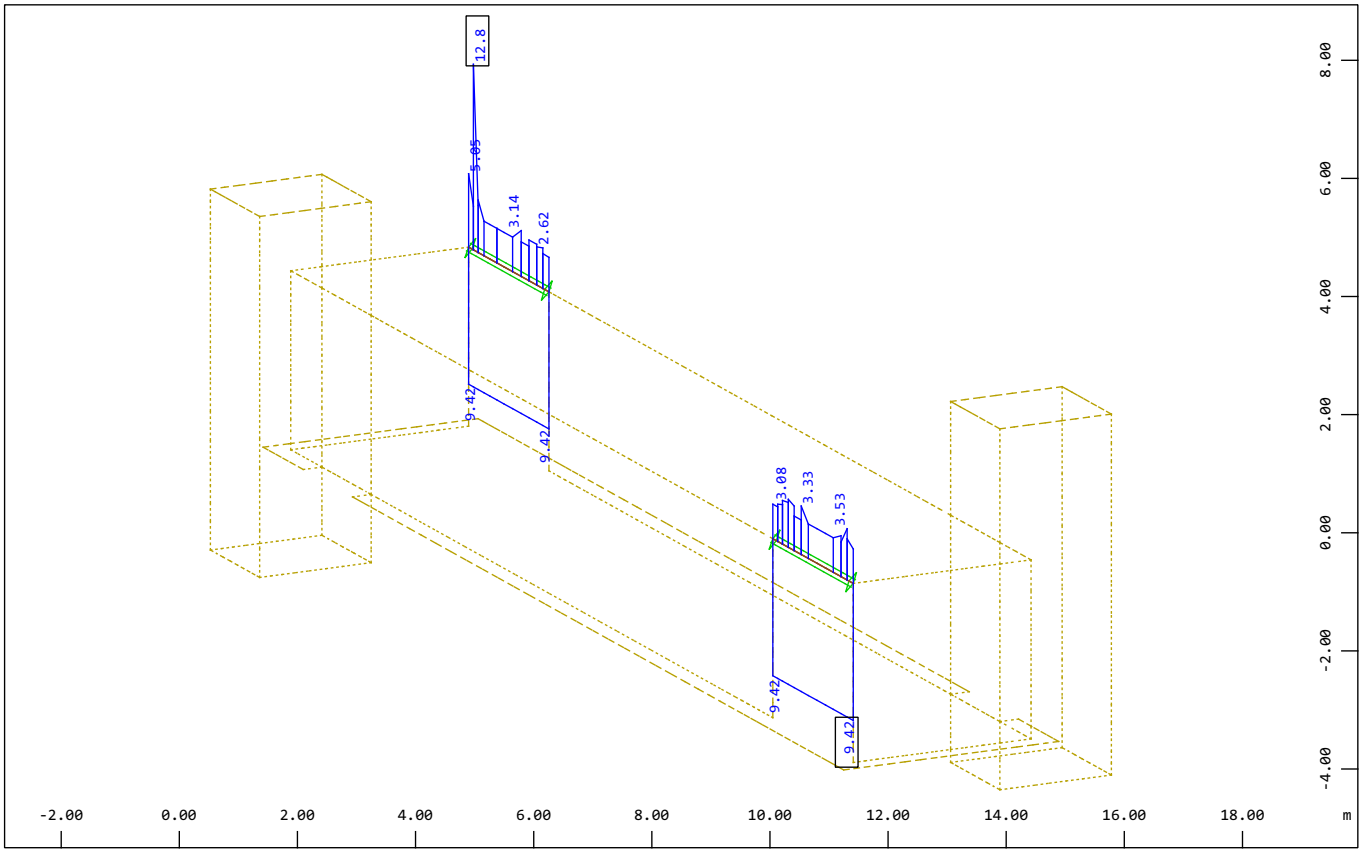
Zelezniski podhod
Graphical Output



Z
Y X
Beam Elements , Longitudinal reinforcements (total), Design Case 1 , 1 cm 3D = 20.0
cm2 (Max=26.9)
M 1 : 103
X * 0.502
Y * 0.906
Z * 0.962



Z
Y X
Beam Elements , Longitudinal Reinforcements Lay. M1, Design Case 1 , 1 cm 3D = 5.00
cm2 (Max=9.42)
Beam Elements , Longitudinal Reinforcements Lay. M2, Design Case 1 , 1 cm 3D = 5.00
M 1 : 128
X * 0.502
Y * 0.906
Z * 0.962

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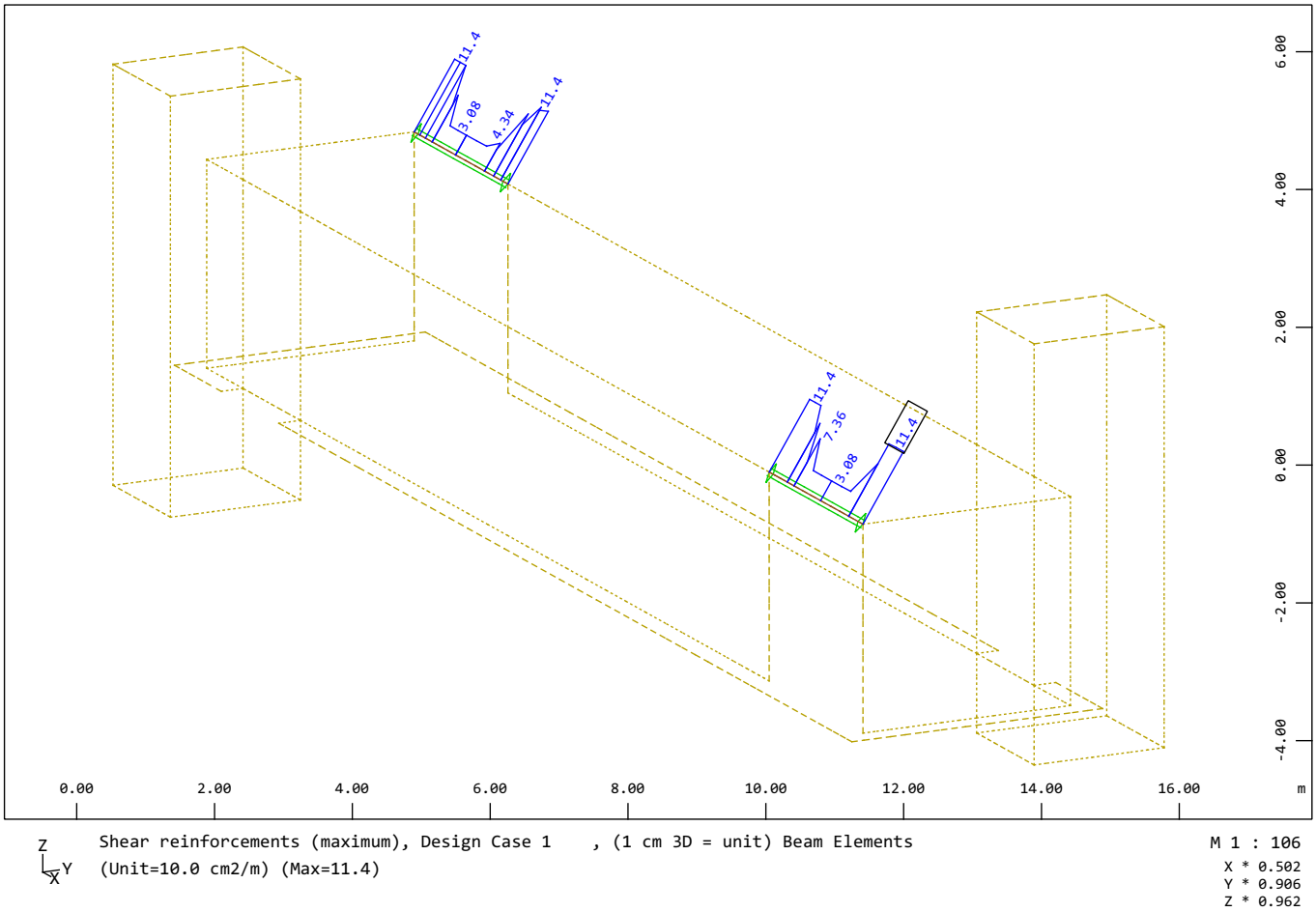
Zelezniski podhod
Graphical Output



Z
Y
X

Shear reinforcements (maximum), Design Case 1 , (1 cm 3D = unit) Beam Elements
(Unit=10.0 cm2/m) (Max=11.4)

M 1 : 106
X * 0.502
Y * 0.906
Z * 0.962

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Zelezniski podhod
SLS design beams

Default design code is EuroNorm EN 1992-2:2005 Concrete Structures (Slowenija) V 2020
Structure and Tab.7.1N: D (Railroad bridges)

Materials

Mat	Classification
1	C 30/37 (EN 1992)
2	B 500 B (EN 1992)

Selected Beam Elements

Selection	NoA	NoE	x[m]	Type
BEAM	all elements			

NoA,NoE range of element numbers
x[m] x-ordinate of beam section or station on axis
Type element type

Reinforcement will be accounted for sectional values as defined in AQUA
Reinforcements saved as Design case No. 2
Reinforcements superposed with existing Design case No. 1

Considered Load Cases

LC	ACT	REF	CS	Designation
8221	(P)			MAXP-N BEAM
8222	(P)			MINP-N BEAM
8223	(P)			MAXP-VY BEAM
8224	(P)			MINP-VY BEAM
8225	(P)			MAXP-VZ BEAM
8226	(P)			MINP-VZ BEAM
8227	(P)			MAXP-MT BEAM
8228	(P)			MINP-MT BEAM
8229	(P)			MAXP-MY BEAM
8230	(P)			MINP-MY BEAM
8231	(P)			MAXP-MZ BEAM
8232	(P)			MINP-MZ BEAM

LC load case
ACT action
REF reference point for forces and moments
CS section the load case is acting on

Nonlinear Stresses
Maximum Utilisation Level

	N	Vy	Vz	My	Mz	Mtp	Mts	Mb	Ncr	SCL	Total
	σ-x	σ+x	τ	σ-v	σ-s	σ-dyn	As-l	As-v	crack	c/t	
Section 1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-	-	0.469
B/H/Bw/Hf 370/1300/350	0.000	0.000	0.000	0.000	-	-	-	-	0.469	-	

N normal force
Vy,Vz shear force
My,Mz bending
Mtp,Mts torsion (p)rimary and (s)econdary
Mb warping moment
Ncr flexural buckling
SCL cross-section class
σ-x longitud. compressive stress
σ+x longitud. tensile stress
τ shear stress
σ-v principal or von Mises stress
σ-s stress in reinforcements
σ-dyn stress range
As-l longitudinal reinforcements
As-v transverse reinforcements
crack crack width
c/t stress dependant utilisation level (see AQB Manual 2.3.2)
Total most unfavorable utilisation for all checks

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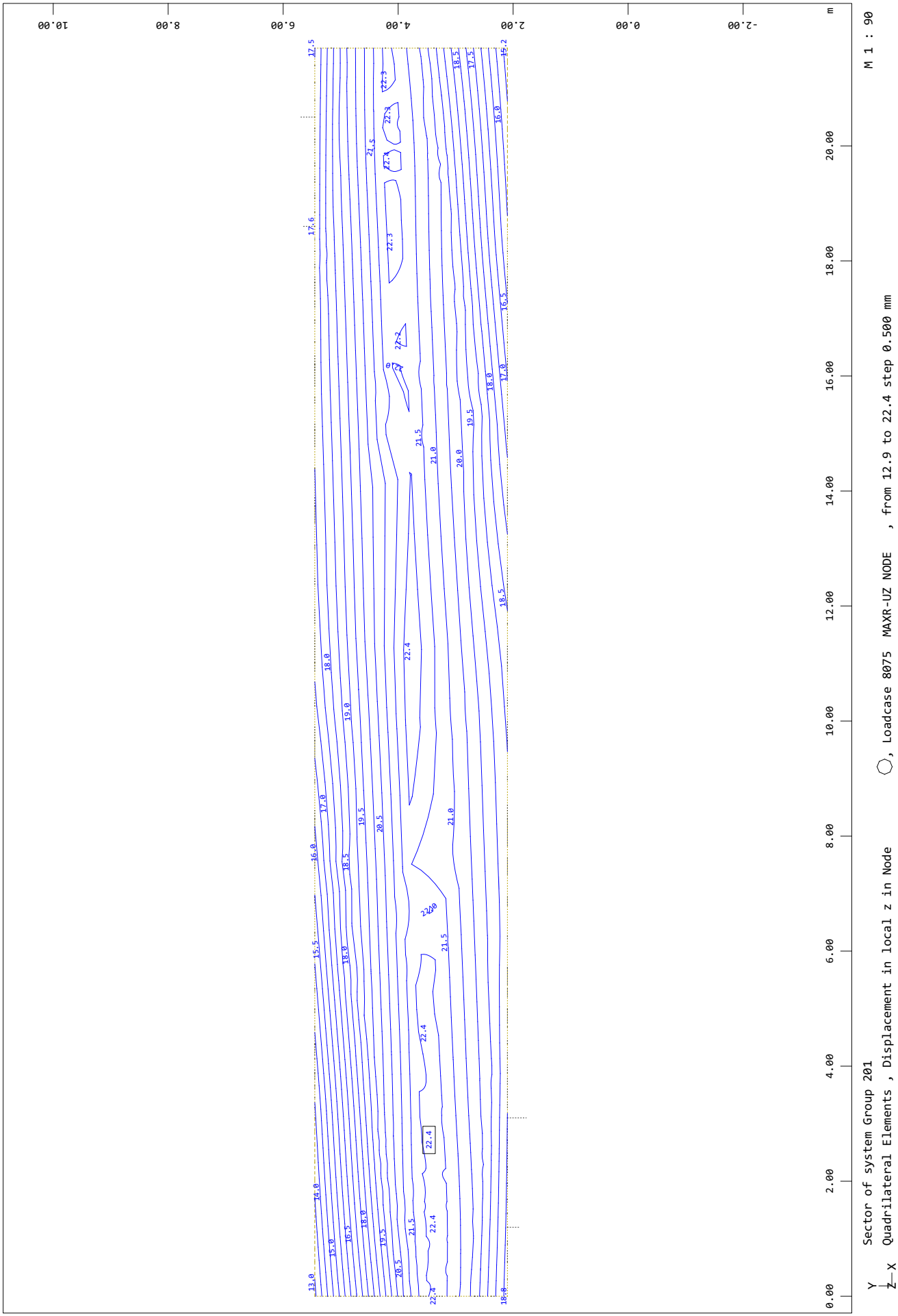
Zelezniski podhod
Zgornja plošča - Kontrola povesov



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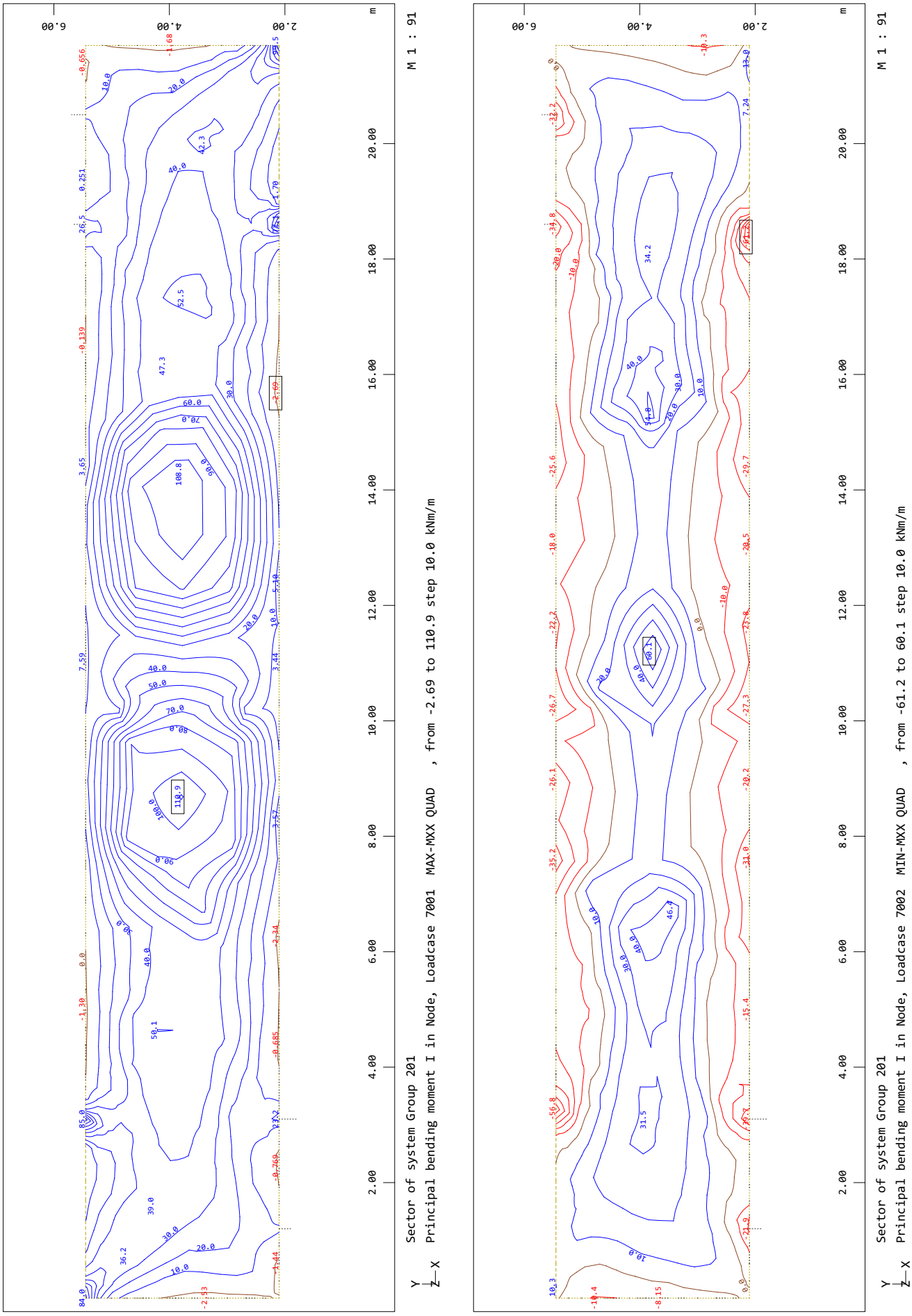
Zelezniski podhod
Notranje statične količine - MSN
Zgornja plošča



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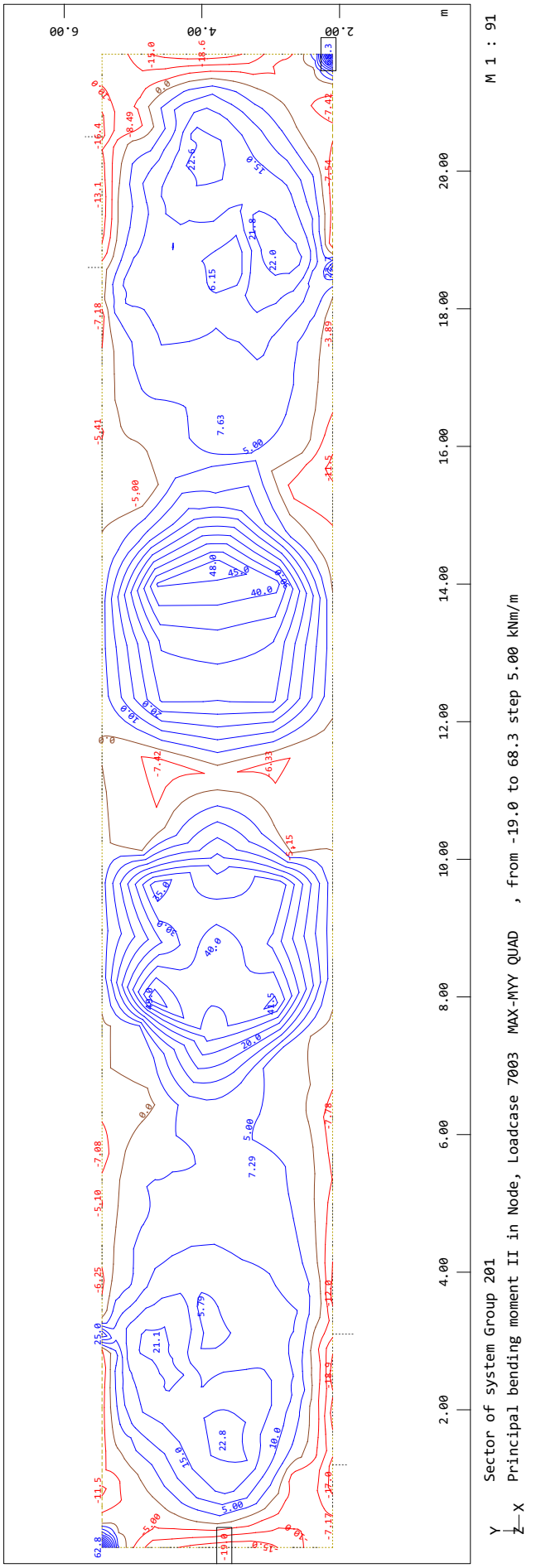
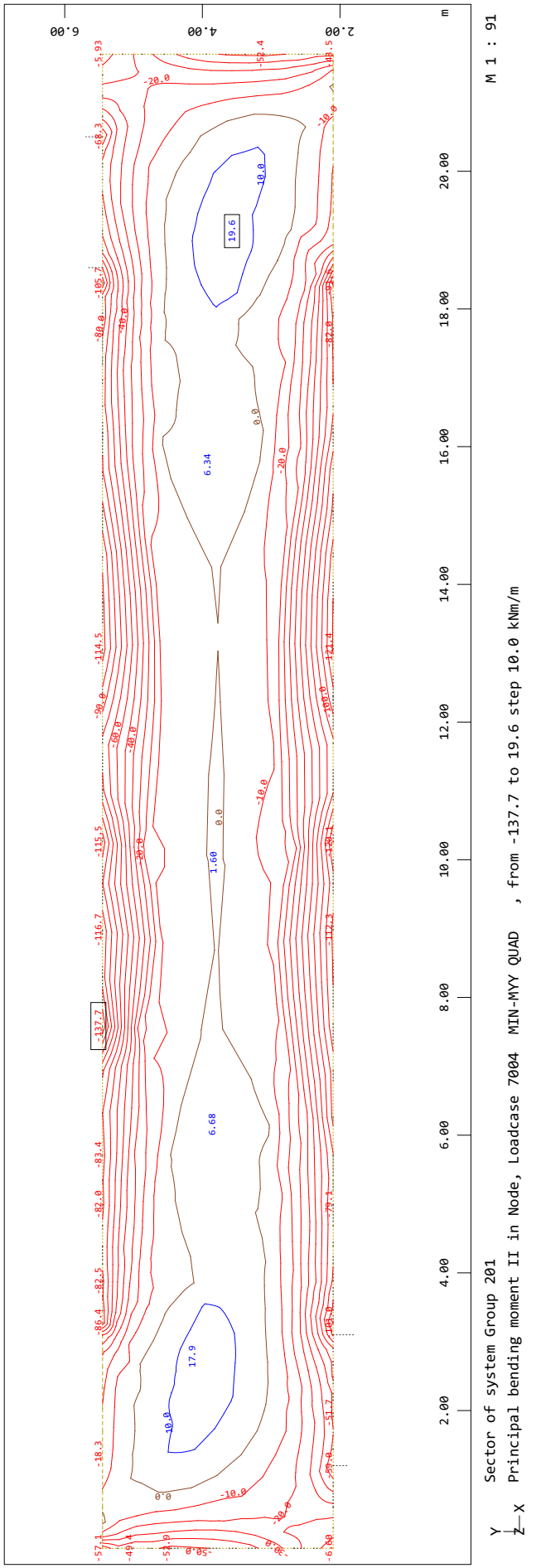
Zelezniski podhod
Notranje statične količine - MSN
Zgornja plošča





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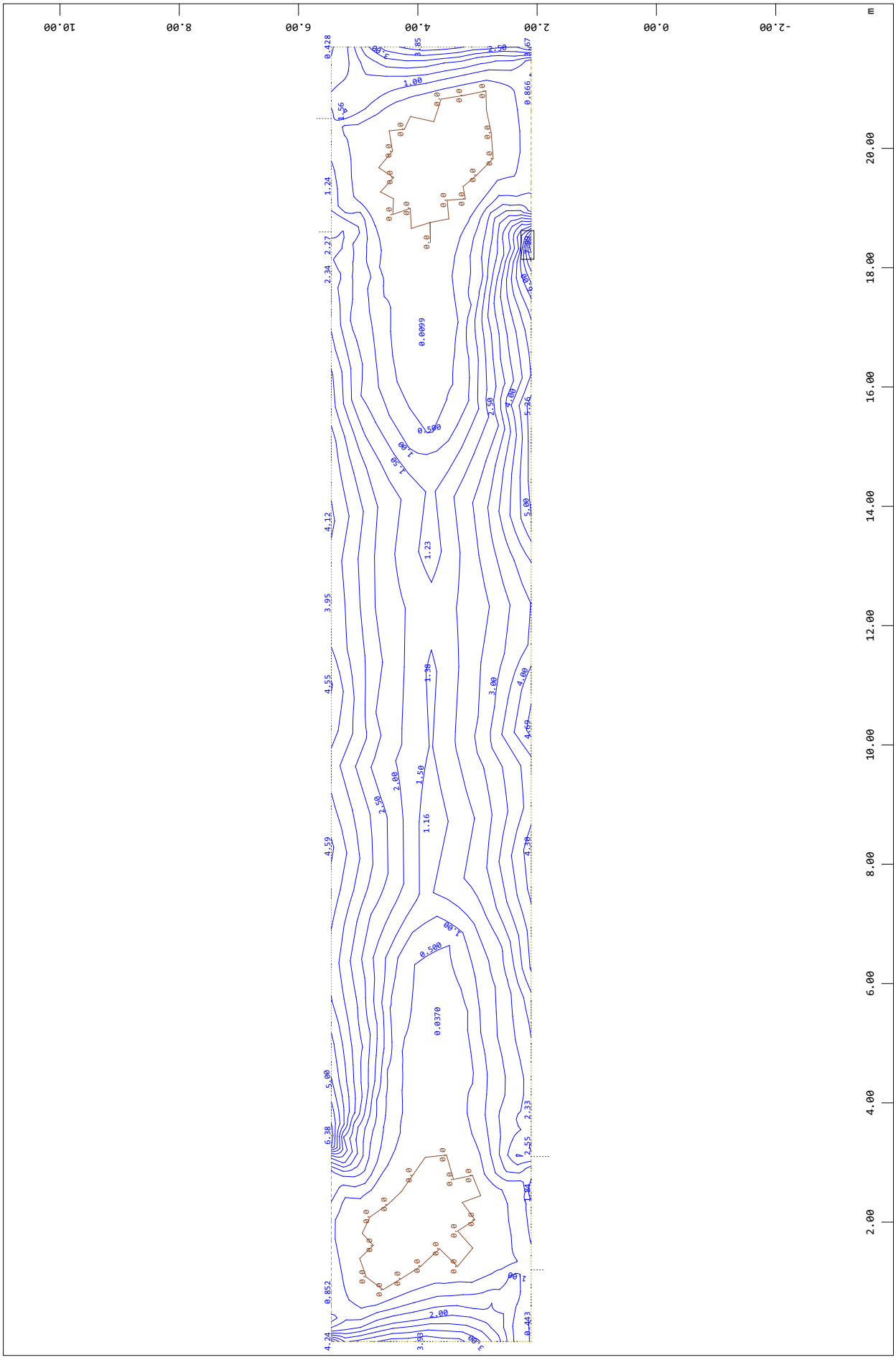
Zelezniski podhod
Računska armatura - plošča podhoda
Armatura zgoraj - smer 1



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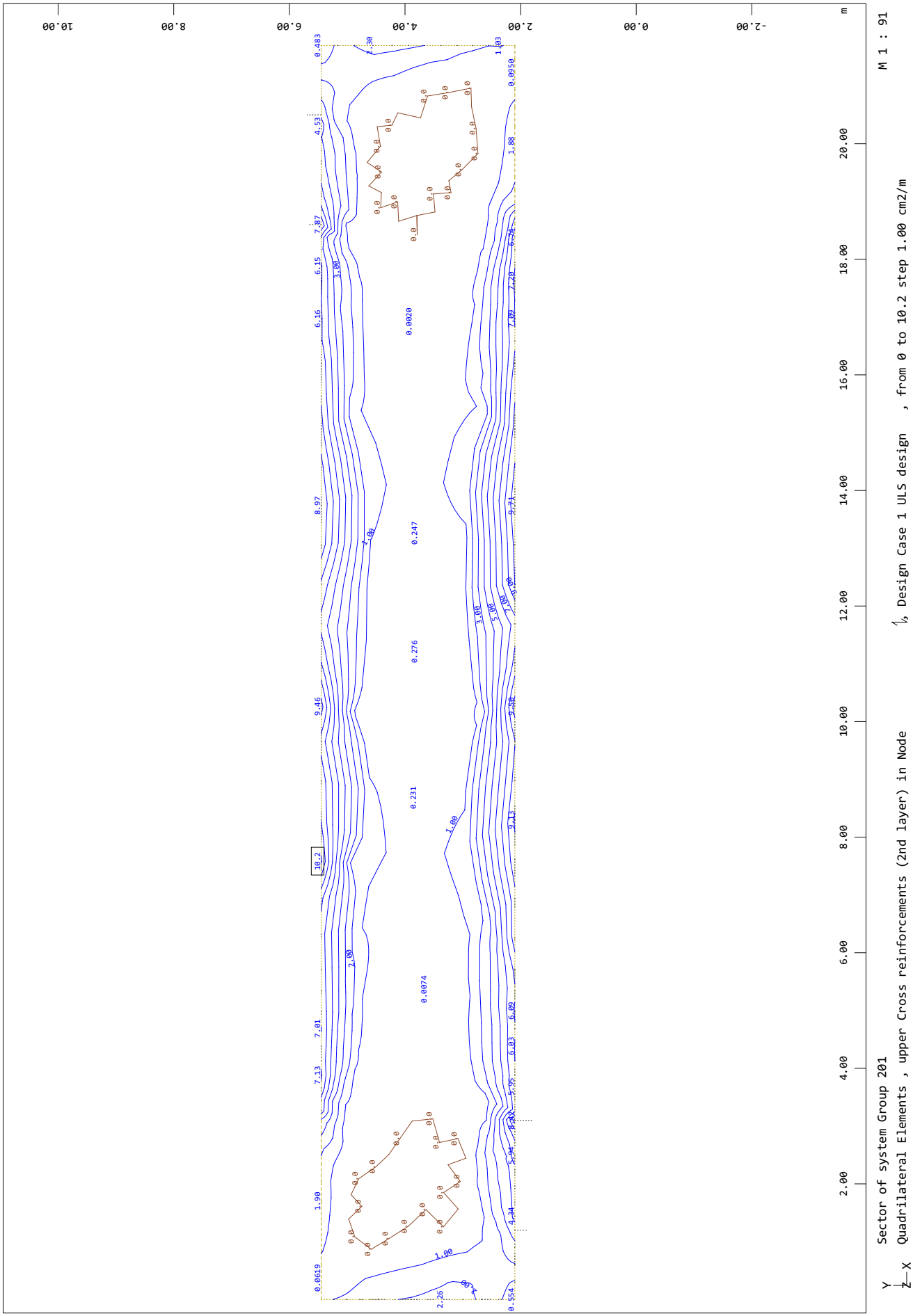
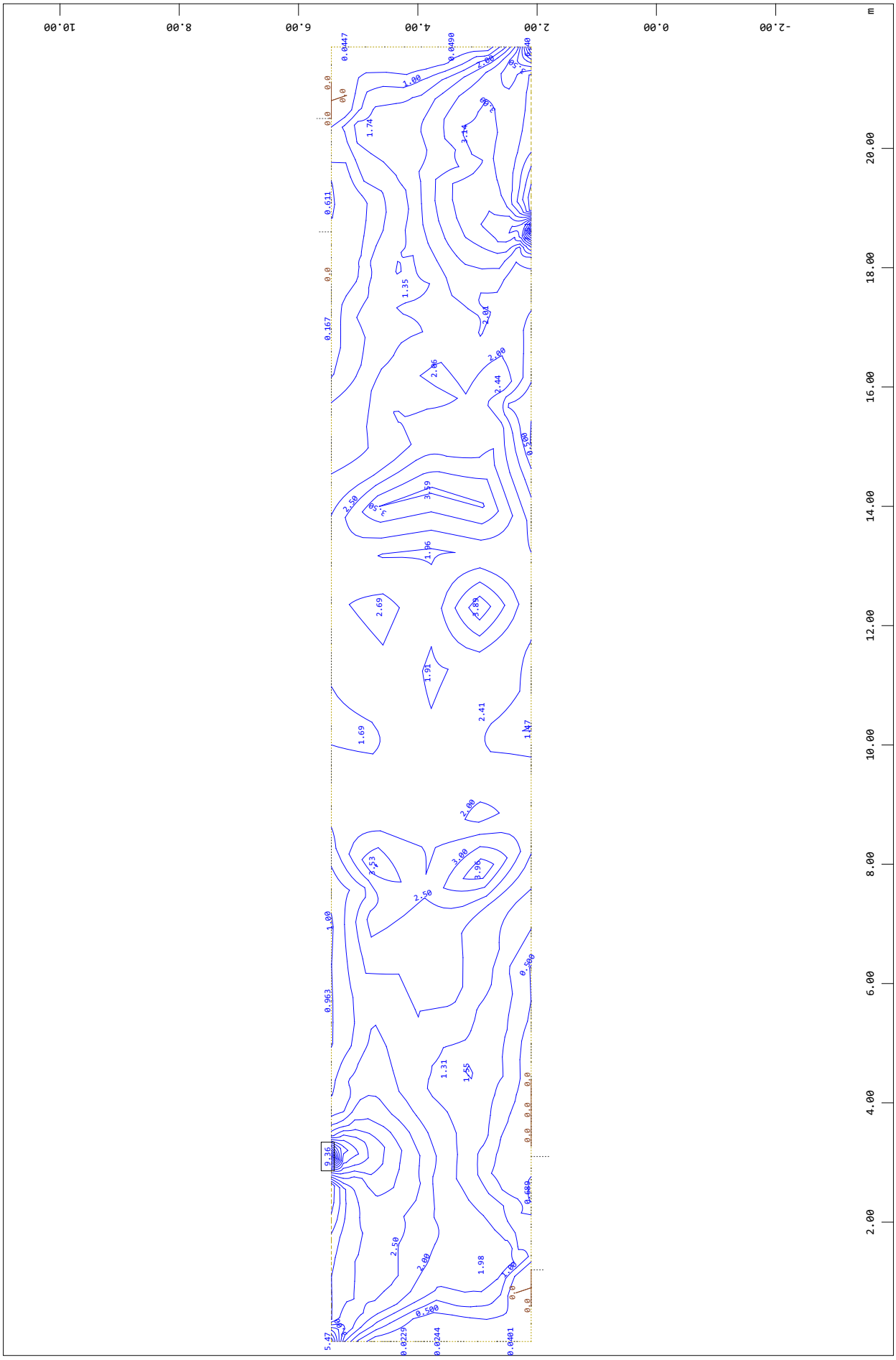
Zelezniski podhod
Računska armatura - plošča podhoda
Armatura zgoraj - smer 2



Zelezniski podhod
Računska armatura - plošča podhoda
Armatura spodaj - smer 1



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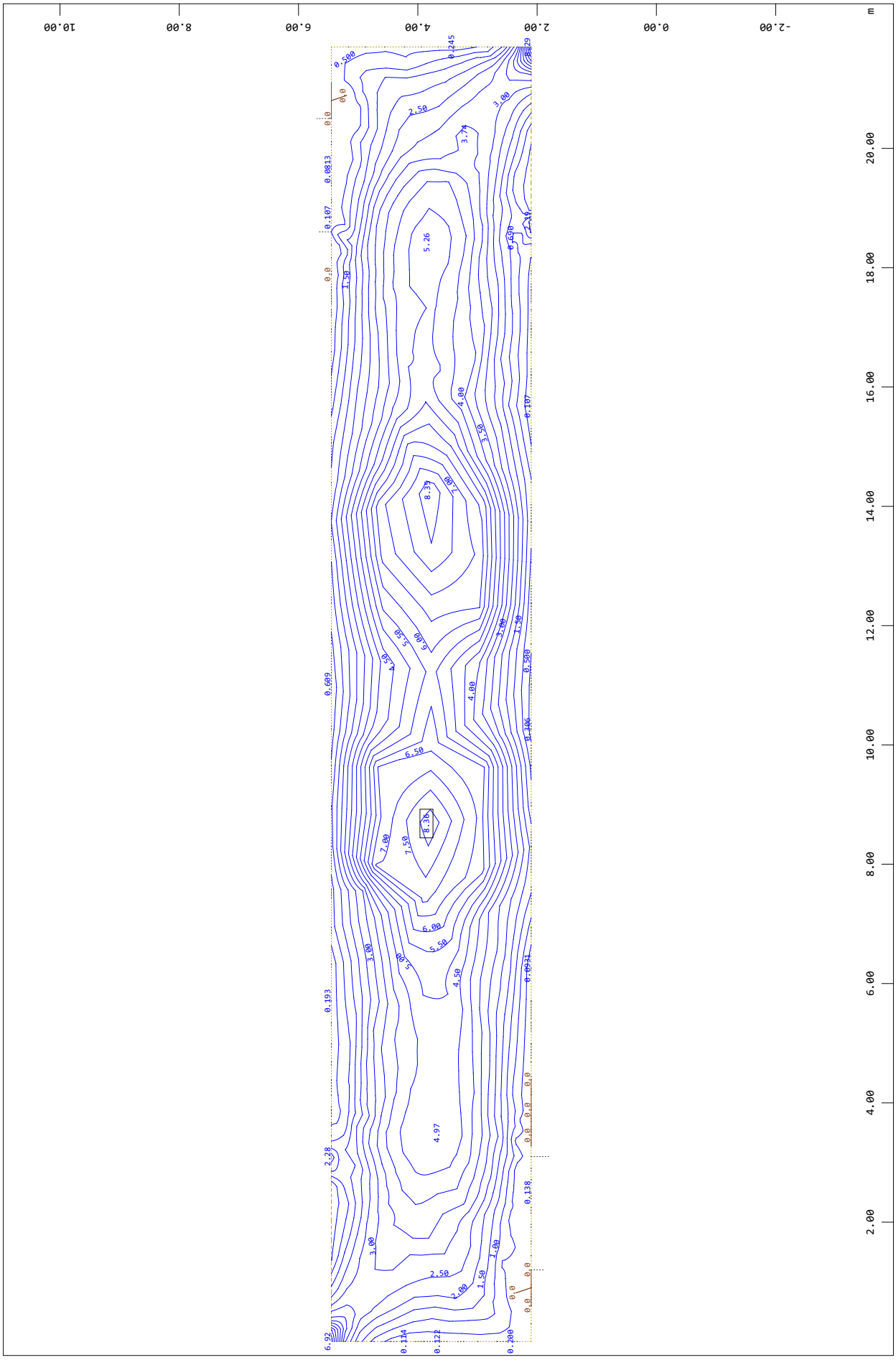
Zelezniski podhod
Računska armatura - plošča podhoda
Armatura spodaj - smer 2



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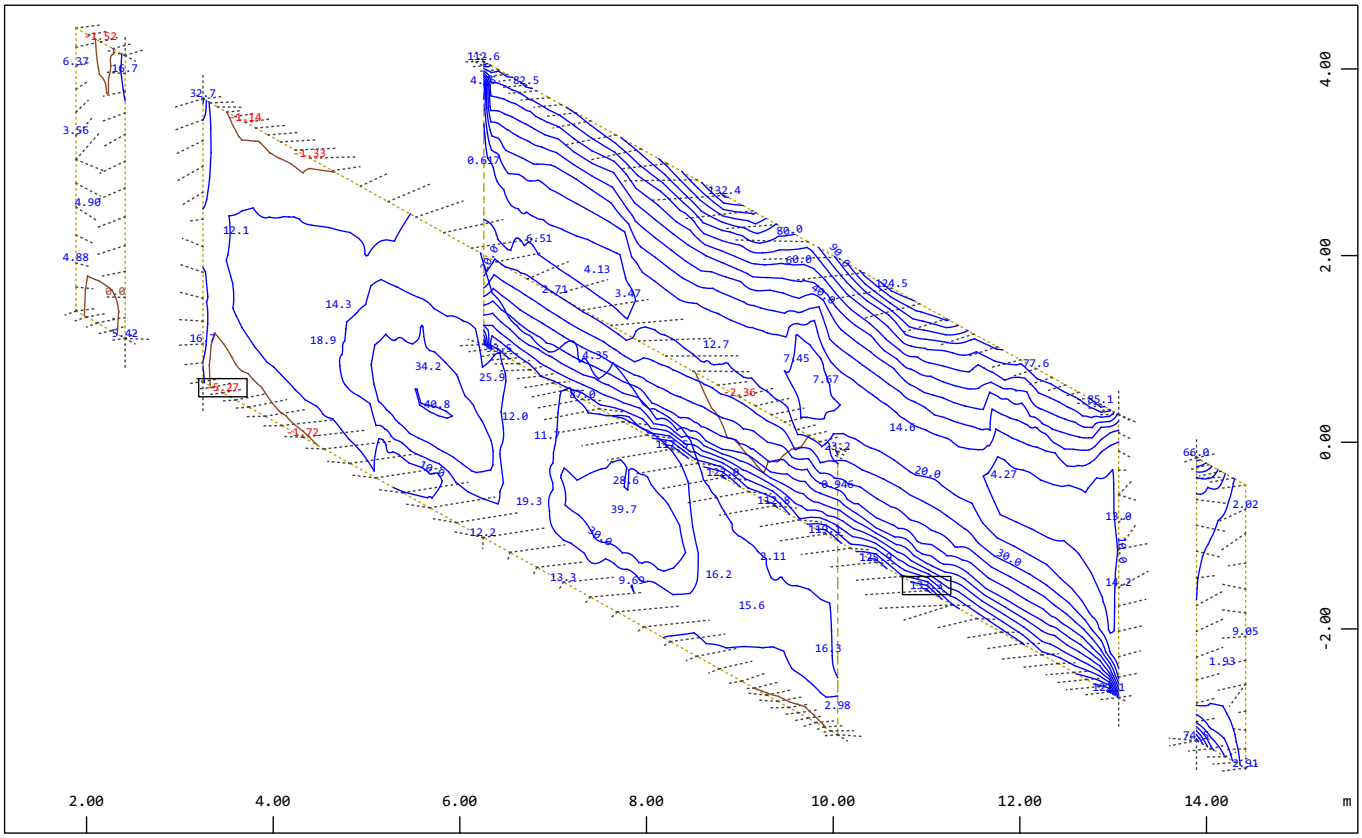
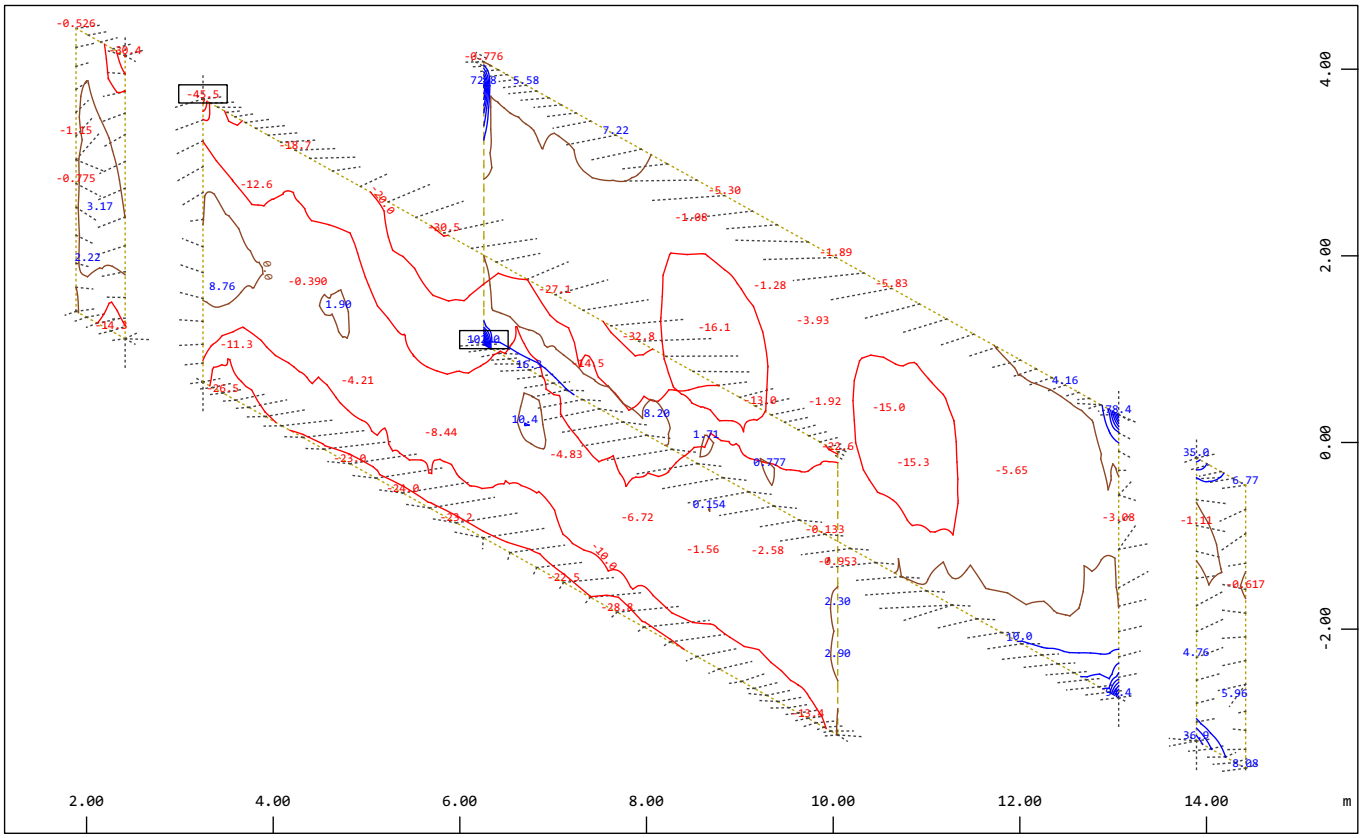
Zelezniski podhod
Notranje statične količine - MSN
Stranske stene



Sector of system Group 311
Principal bending moment I in Node, Loadcase 7001 MAX-MXX QUAD , from -5.27 to 133.3
step 10.0 kNm/m

M 1 : 81
X * 0.502
Y * 0.906
Z * 0.962



Sector of system Group 311
Principal bending moment I in Node, Loadcase 7002 MIN-MXX QUAD , from -45.5 to 102.0
step 10.0 kNm/m

M 1 : 81
X * 0.502
Y * 0.906
Z * 0.962

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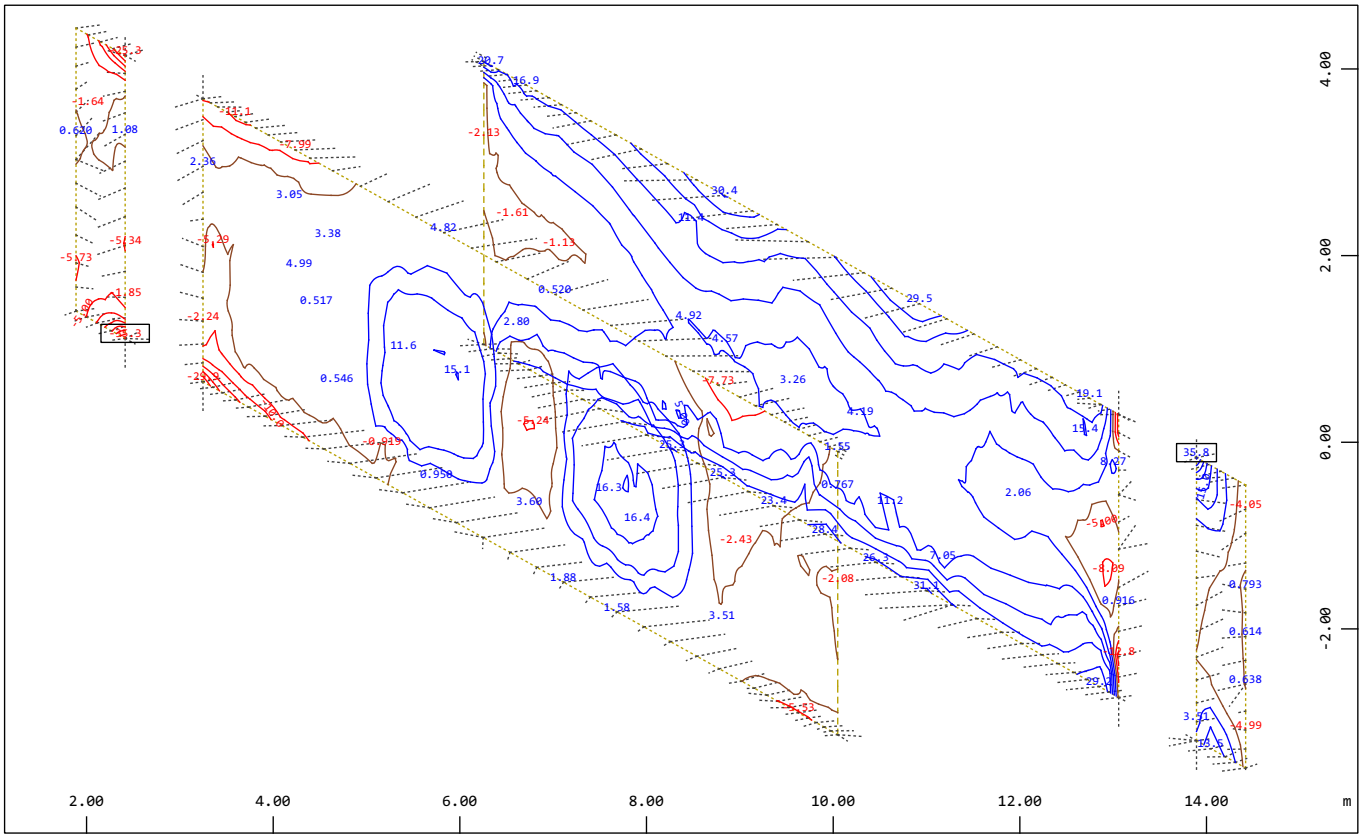
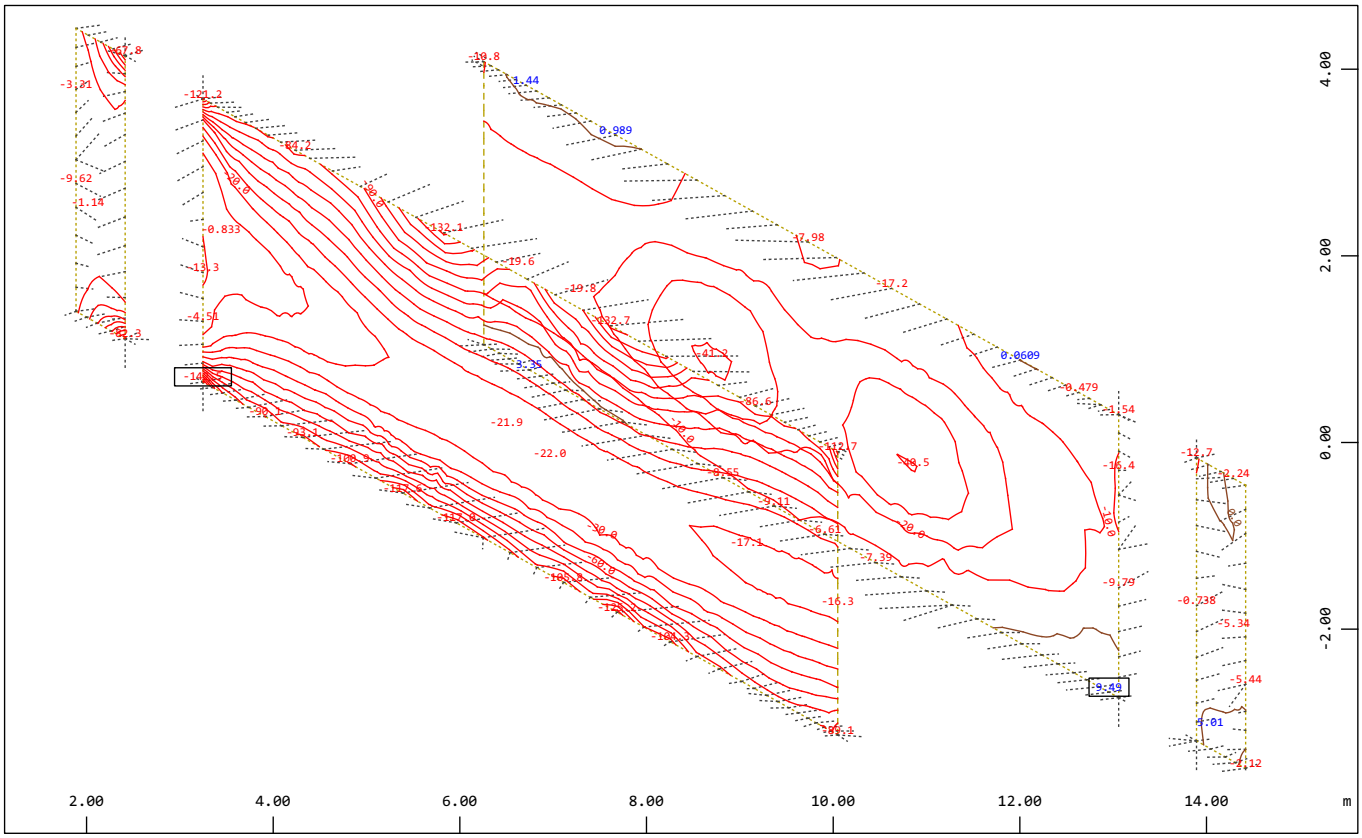
Zelezniski podhod
Notranje statične količine - MSN
Stranske stene



Z
Y
X

Sector of system Group 311
Principal bending moment II in Node, Loadcase 7003 MAX-MYY QUAD , from -35.3 to 35.8
step 5.00 kNm/m

M 1 : 81
X * 0.502
Y * 0.906
Z * 0.962



Z
Y
X

Sector of system Group 311
Principal bending moment II in Node, Loadcase 7004 MIN-MYY QUAD , from -142.5 to 9.49
step 10.0 kNm/m

M 1 : 81
X * 0.502
Y * 0.906
Z * 0.962

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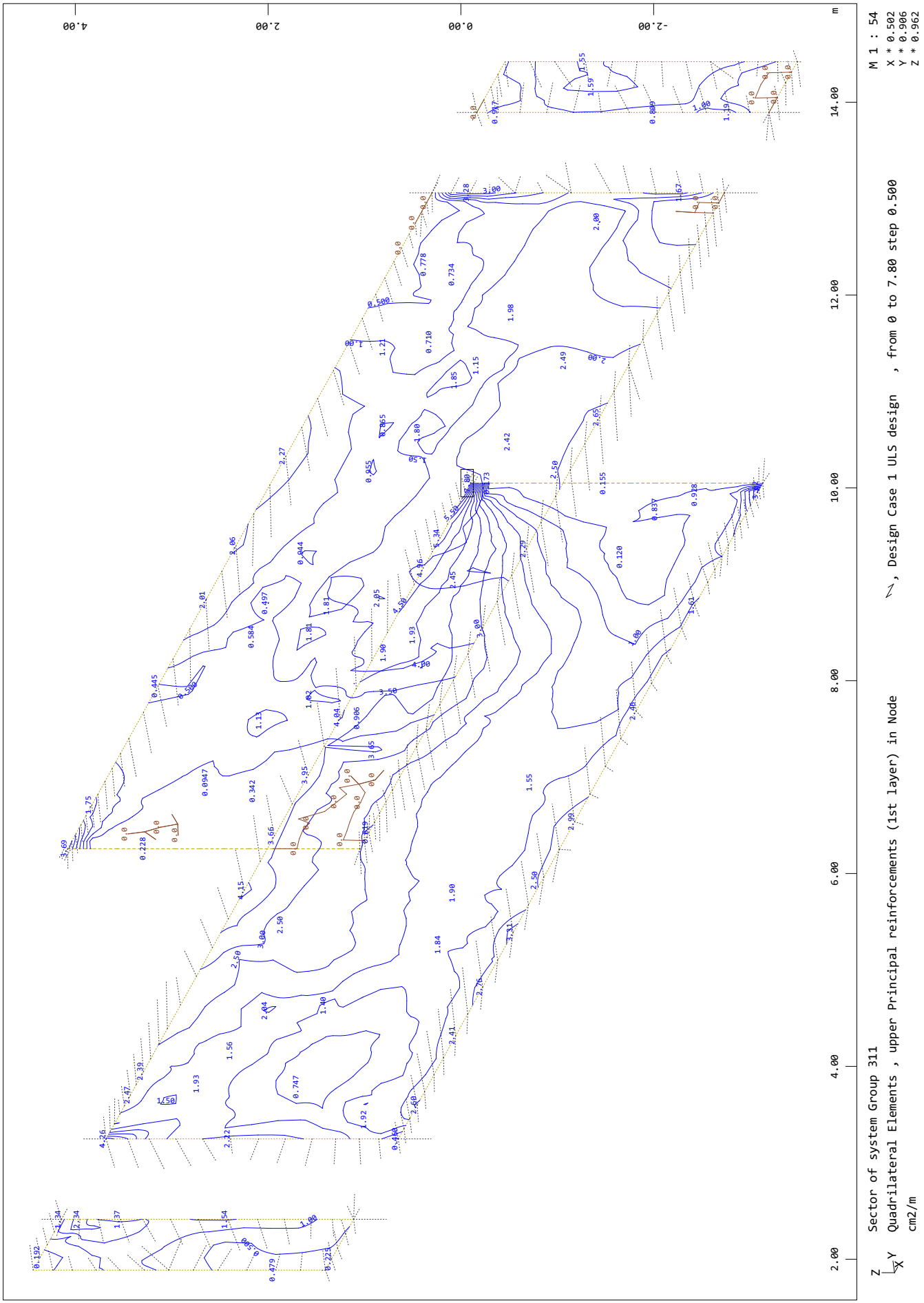
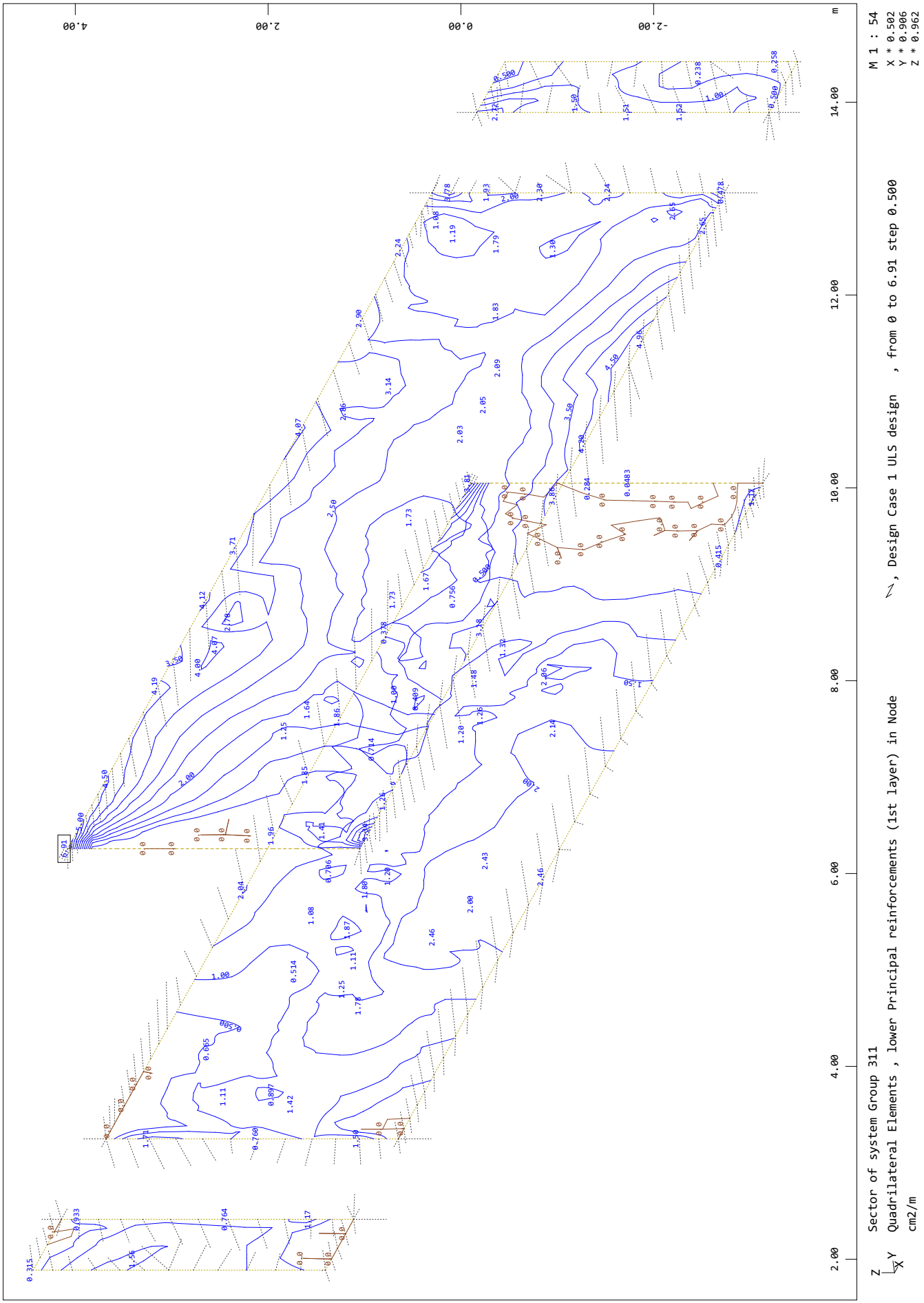
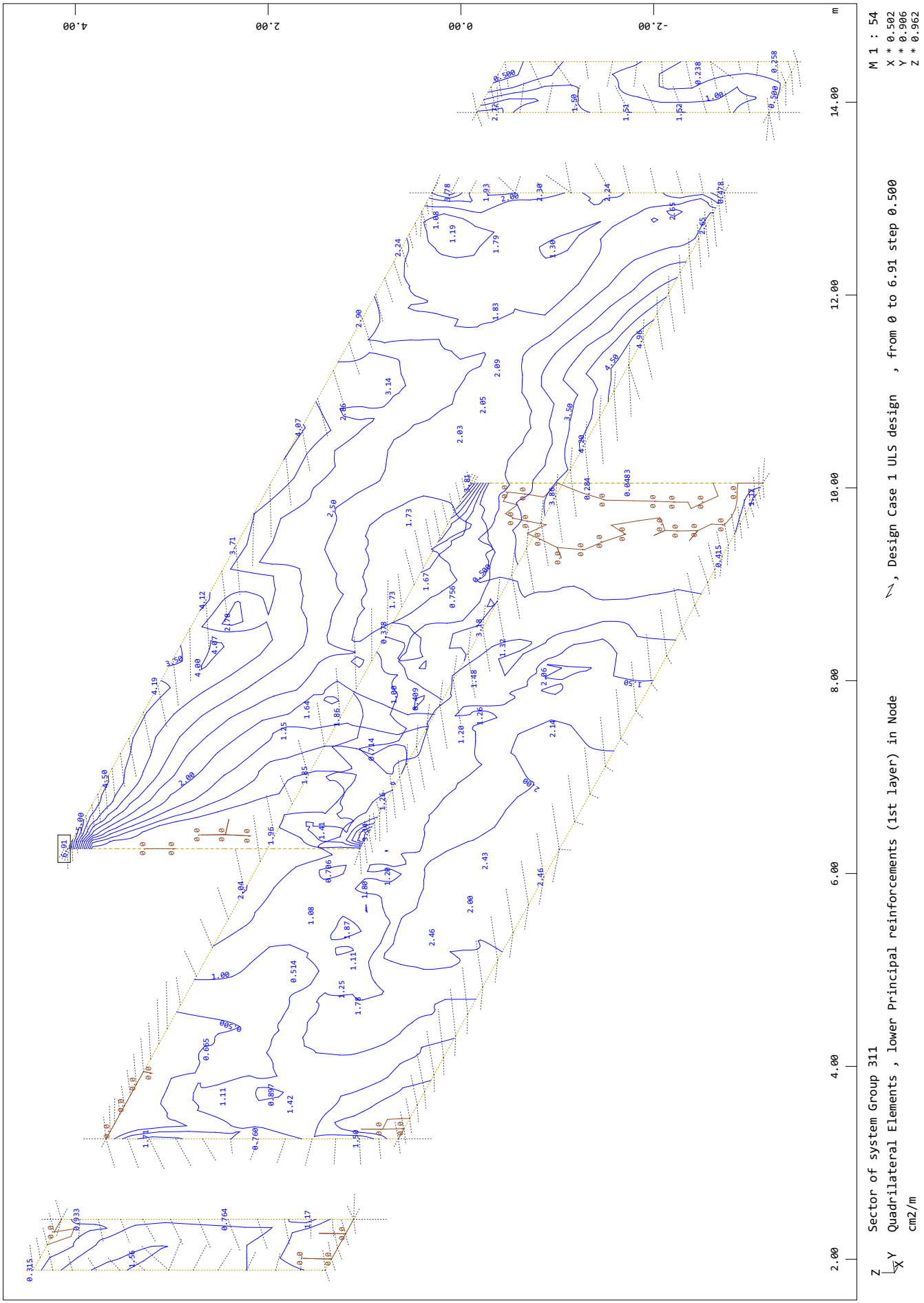
Zelezniski podhod
Računska armatura - stranske stene podhoda
Armatura zgoraj - smer 1



Zelezniski podhod
Računska armatura - stranske stene podhoda
Armatura zgoraj - smer 2



Zelezniski podhod
Računska armatura - stranske stene podhoda
Armatura spodaj - smer 1



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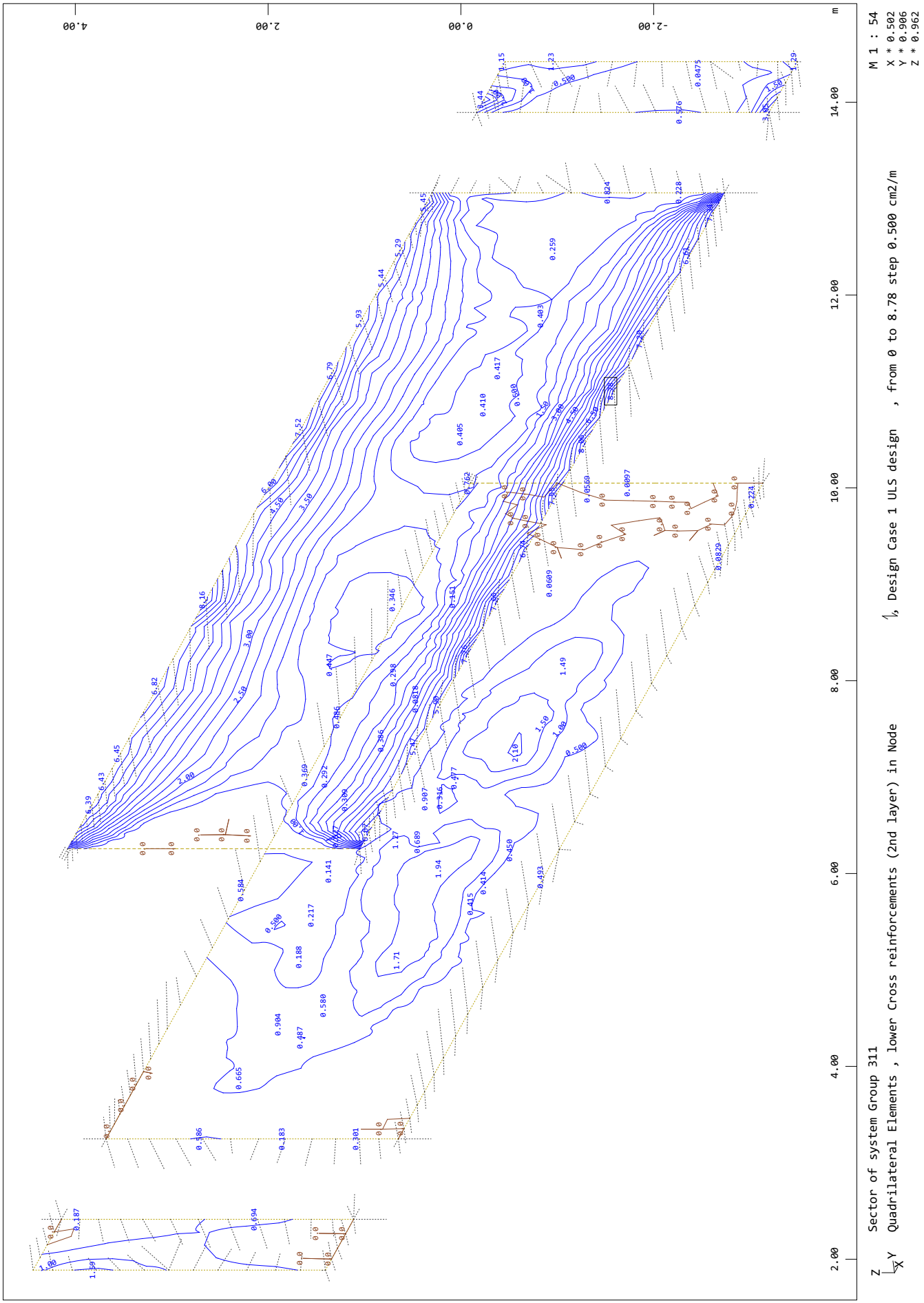
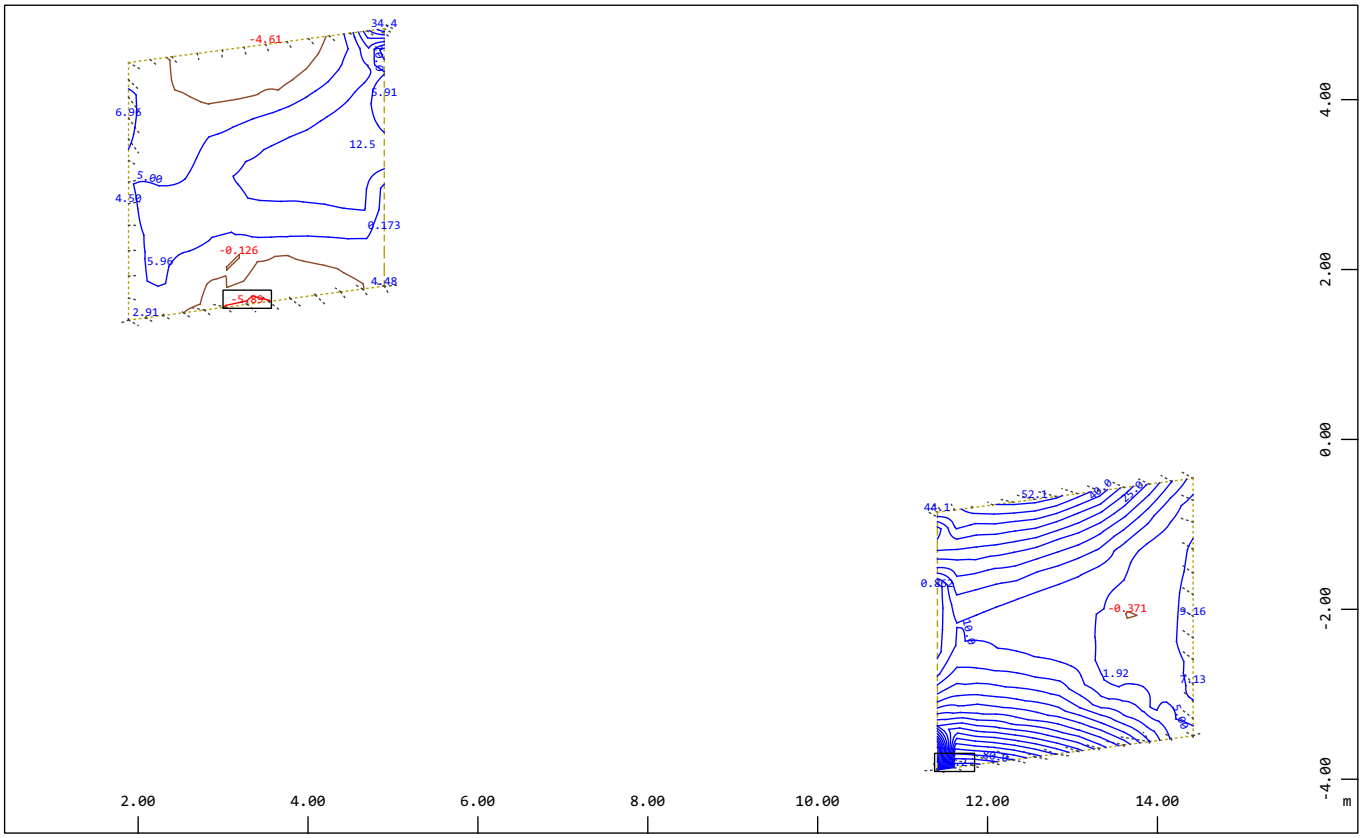
Zelezniski podhod
Računska armatura - stranske stene podhoda
Armatura spodaj - smer 2



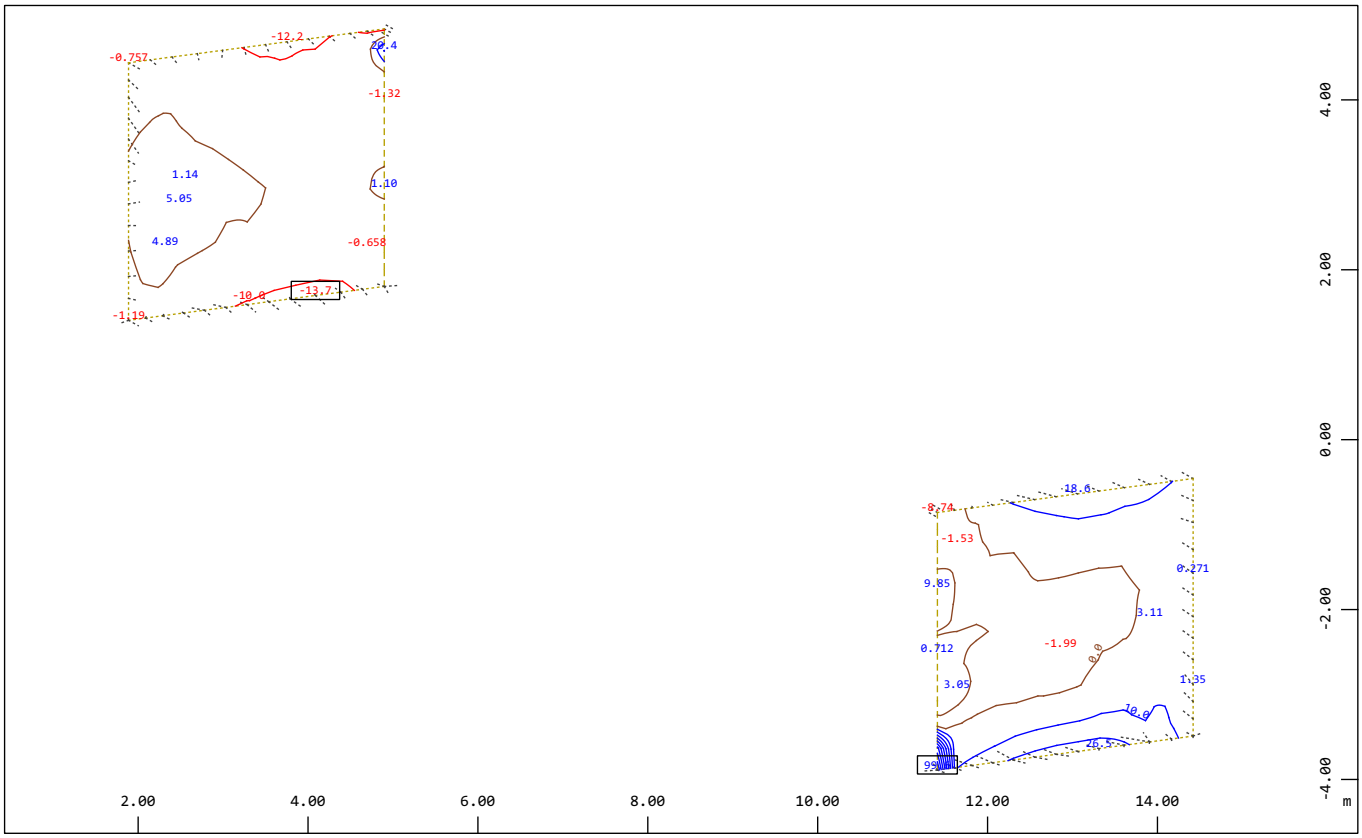
Zelezniski podhod
Notranje statične količine - MSN
Bocne stene



Z
Y
X

Sector of system Group 312
Principal bending moment I in Node, Loadcase 7001 MAX-MXX QUAD , from -5.89 to 89.2 step
5.00 kNm/m

M 1 : 89
X * 0.502
Y * 0.906
Z * 0.962



Z
Y
X

Sector of system Group 312
Principal bending moment I in Node, Loadcase 7002 MIN-MXX QUAD , from -13.7 to 99.6 step
10.0 kNm/m

M 1 : 89
X * 0.502
Y * 0.906
Z * 0.962

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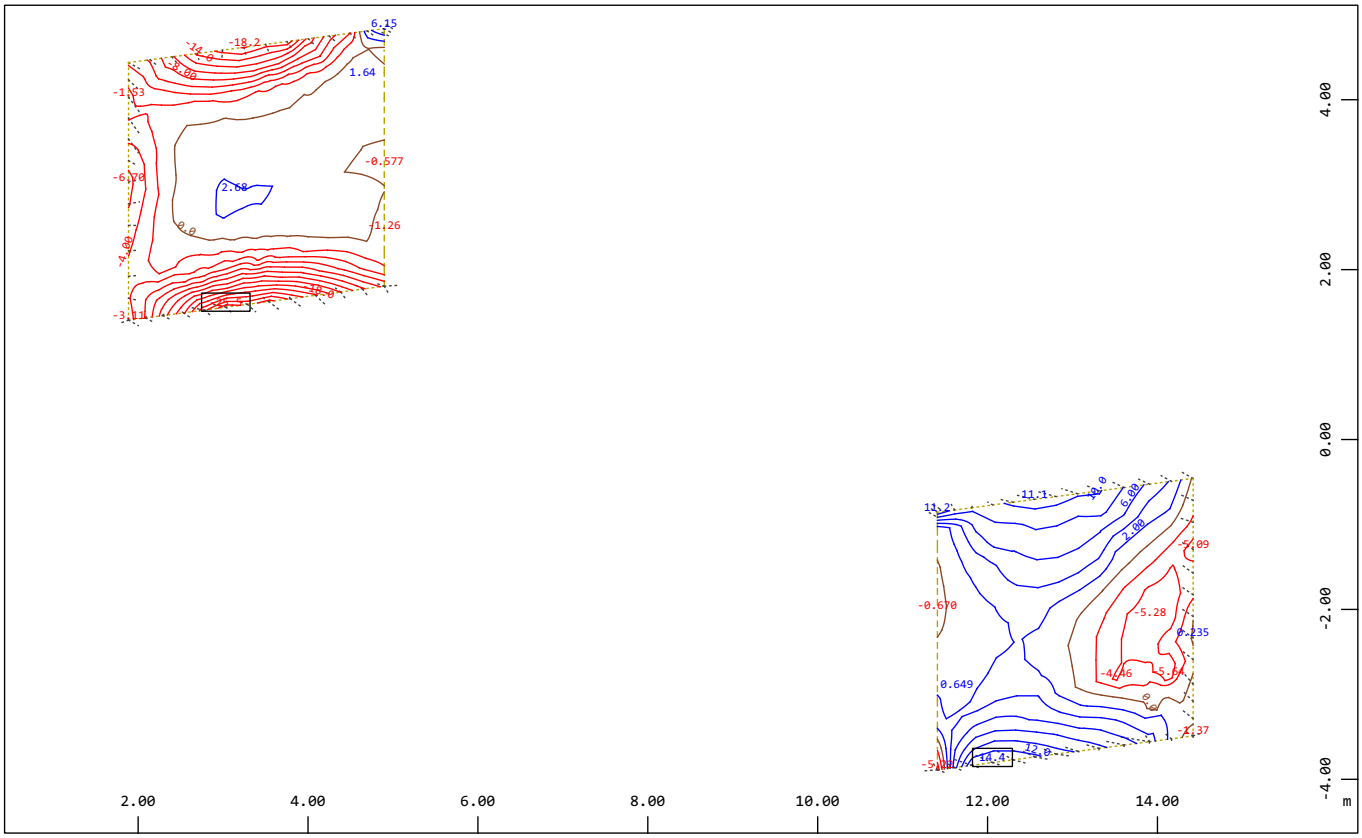
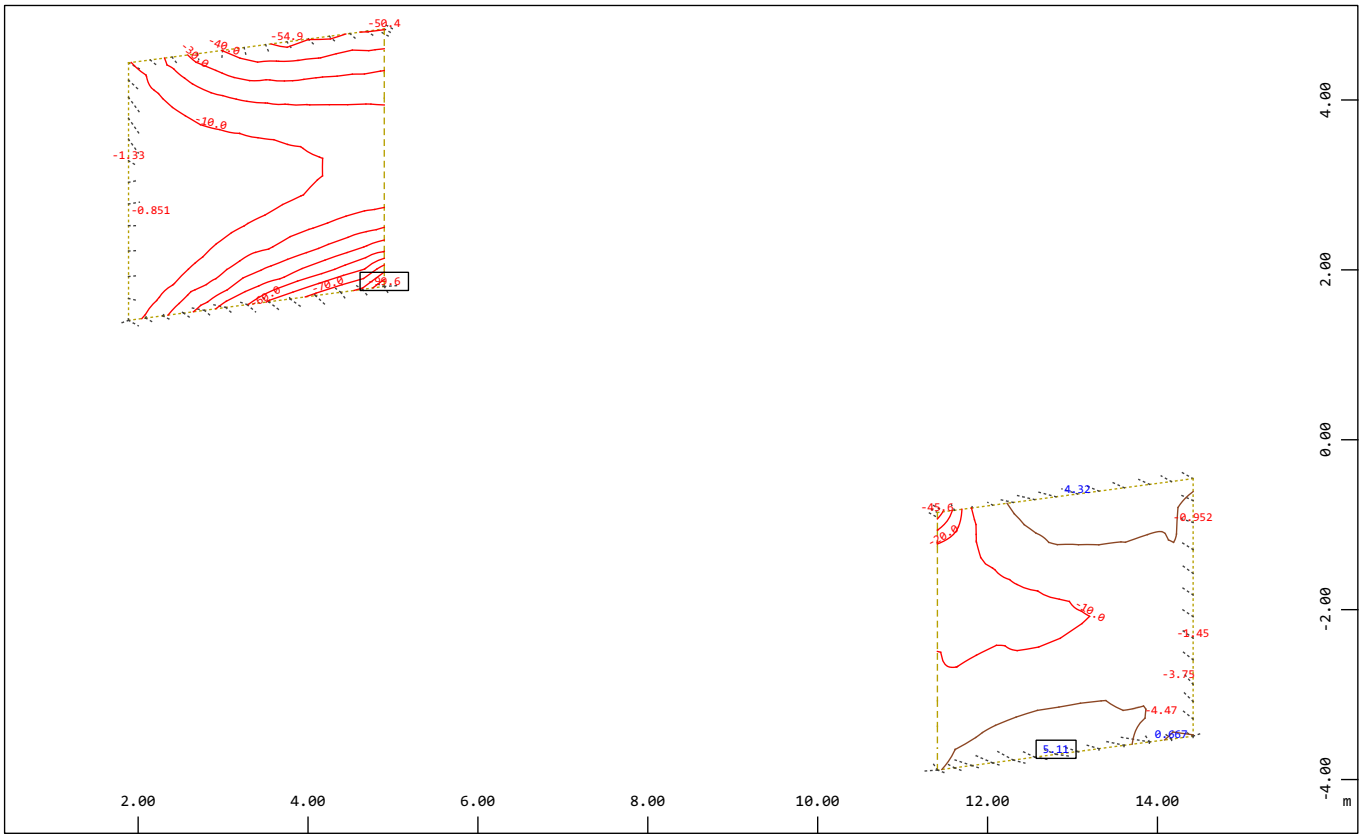
Zelezniski podhod
Notranje statične količine - MSN
Bocne stene



Sector of system Group 312
Principal bending moment II in Node, Loadcase 7003 MAX-MYY QUAD , from -25.5 to 14.4
step 2.00 kNm/m

M 1 : 89
X * 0.502
Y * 0.906
Z * 0.962



Sector of system Group 312
Principal bending moment II in Node, Loadcase 7004 MIN-MYY QUAD , from -99.6 to 5.11
step 10.0 kNm/m

M 1 : 89
X * 0.502
Y * 0.906
Z * 0.962

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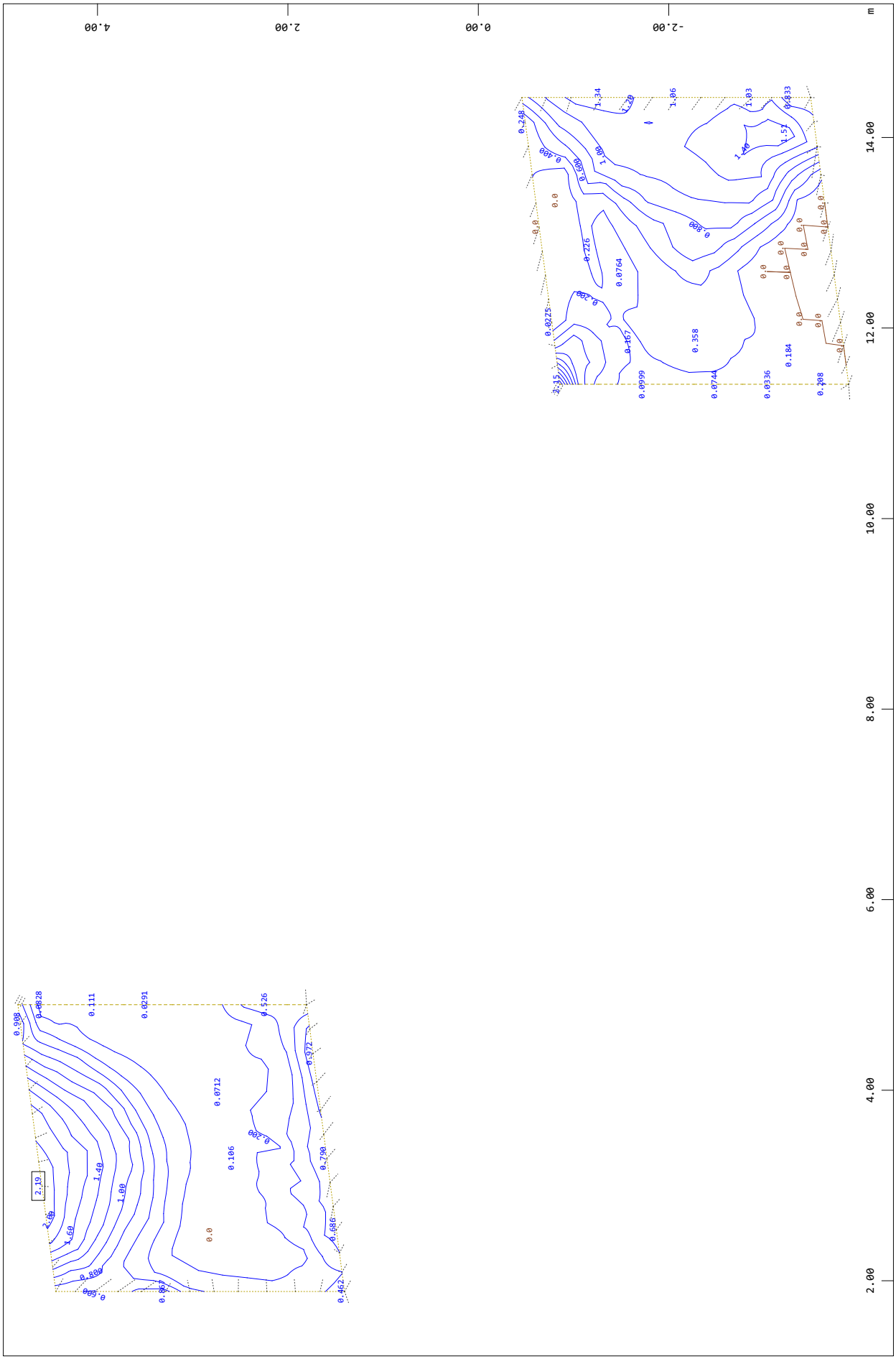
Zelezniski podhod
Računska armatura - bocne stene
Armatura zgoraj - smer 1



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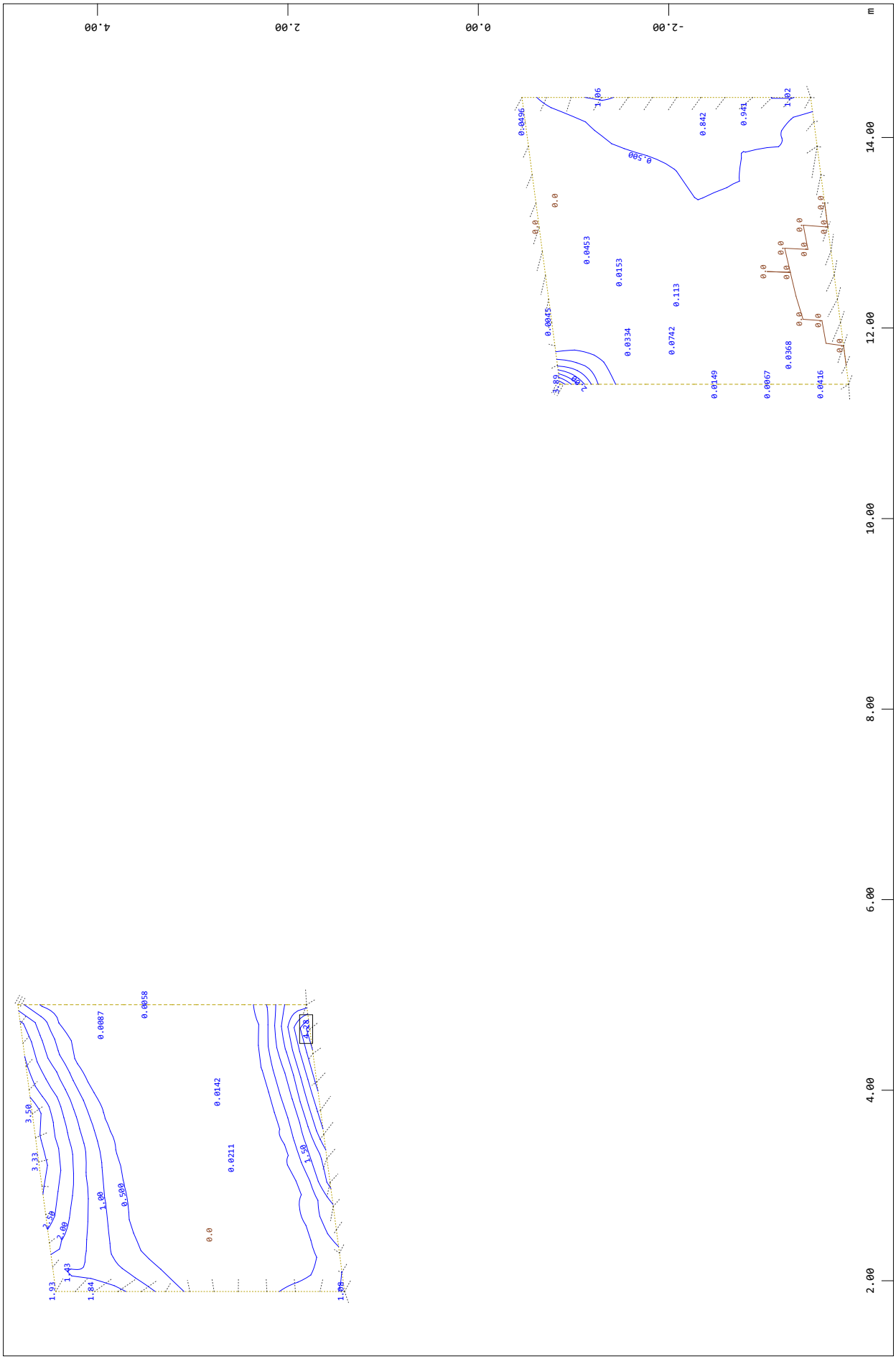
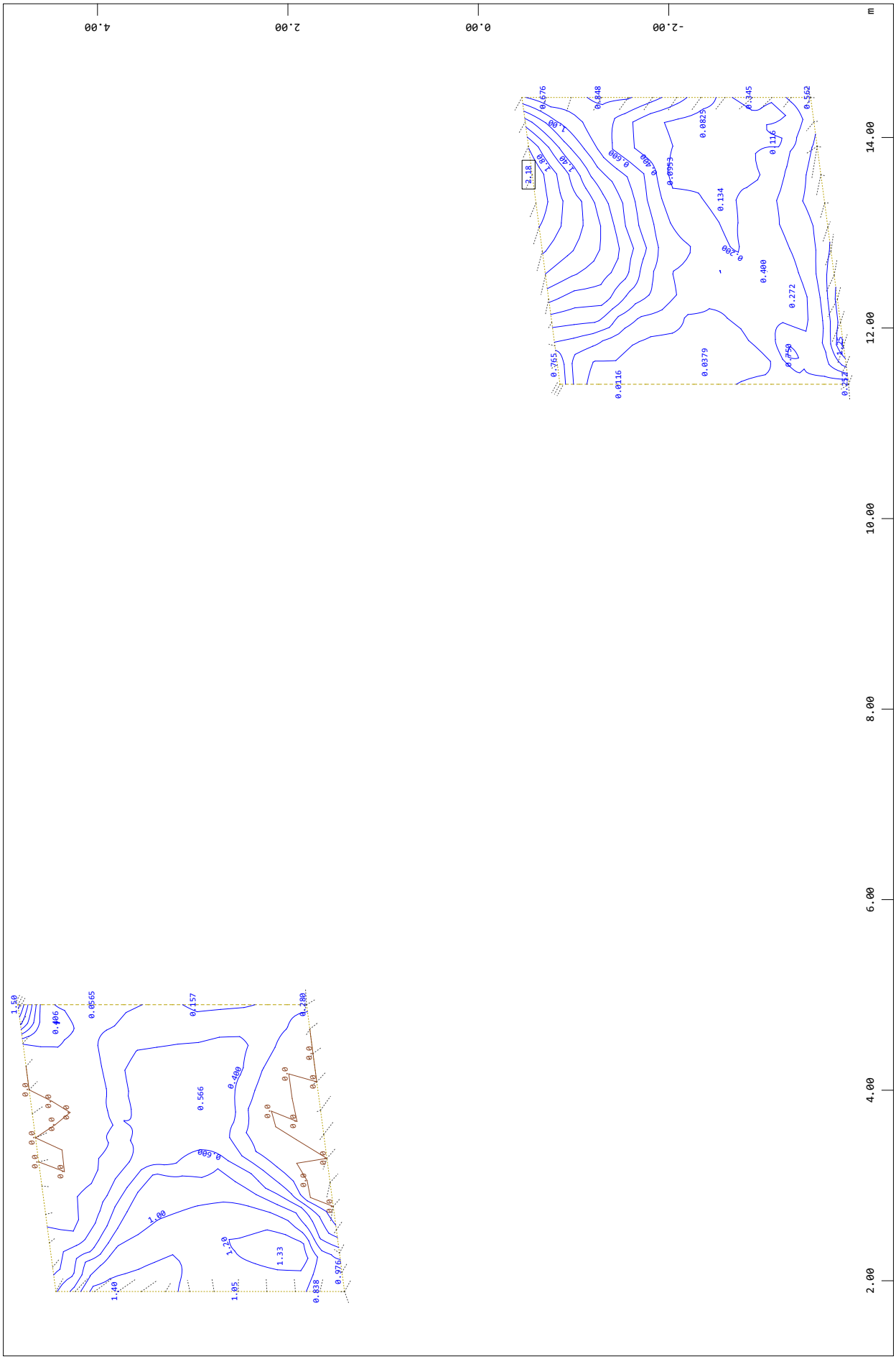
Zelezniski podhod
Računska armatura - bocne stene
Armatura zgoraj - smer 2



Zelezniski podhod
Računska armatura - bocne stene
Armatura spodaj - smer 1



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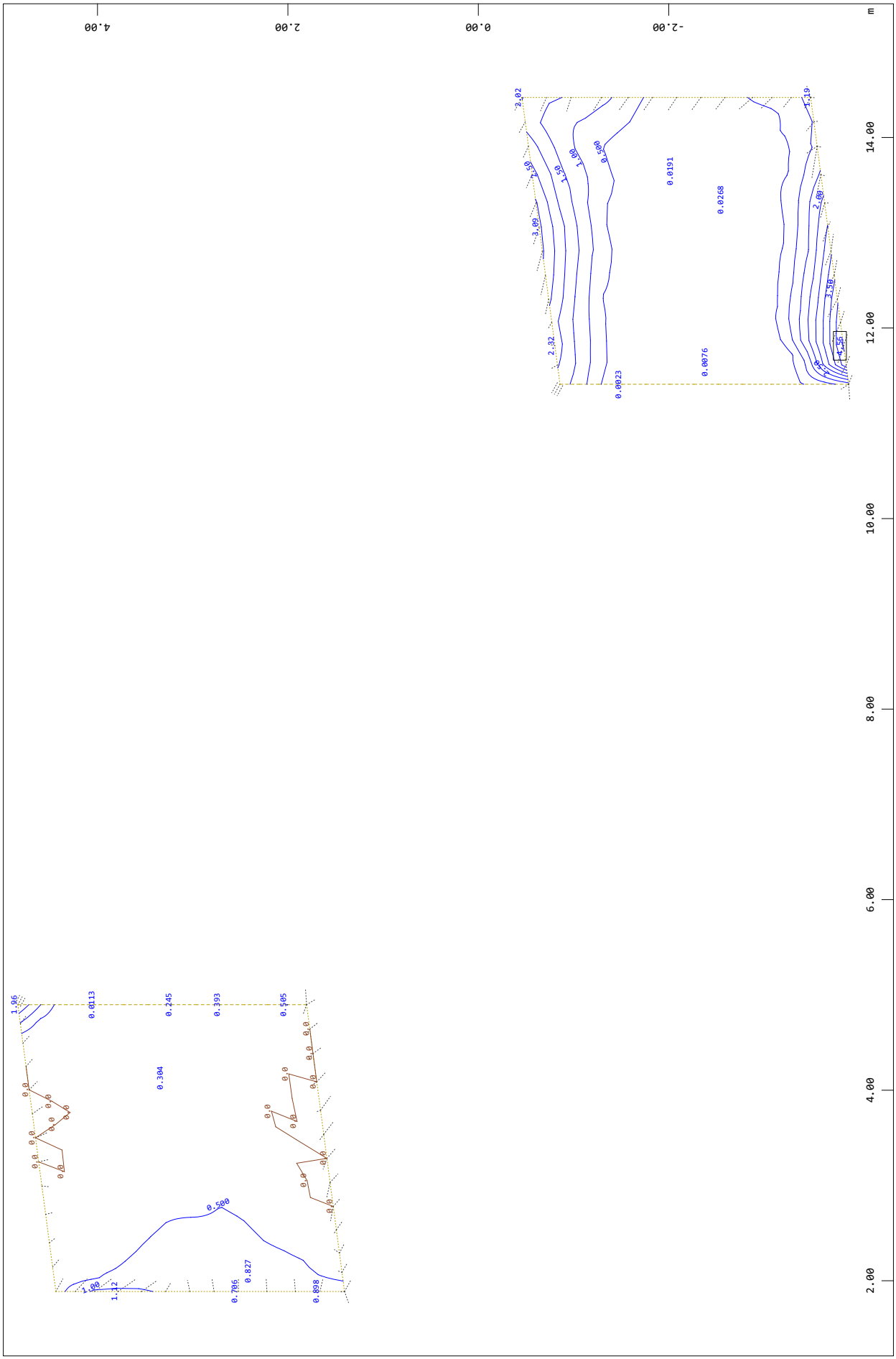
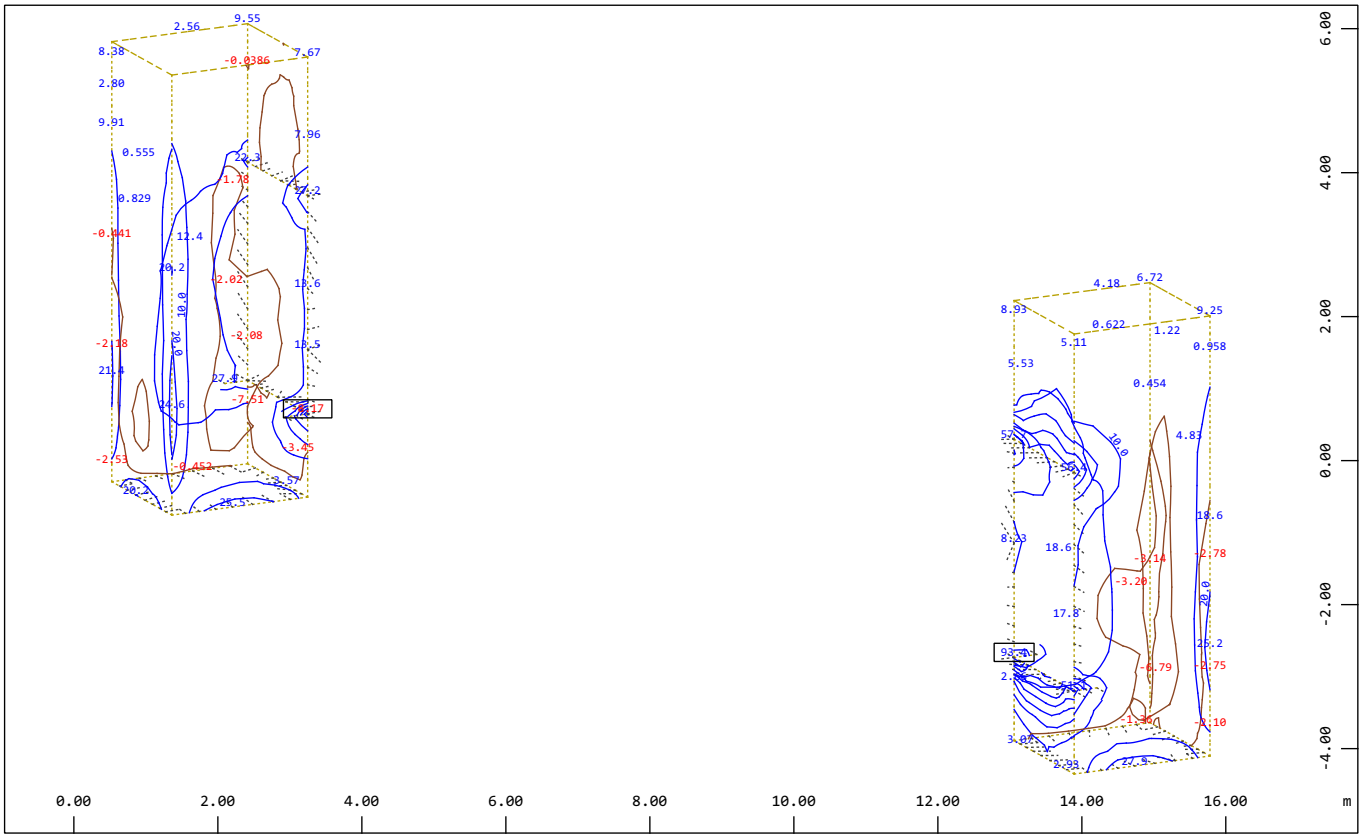
Zelezniski podhod
Računska armatura - bocne stene
Armatura spodaj - smer 2



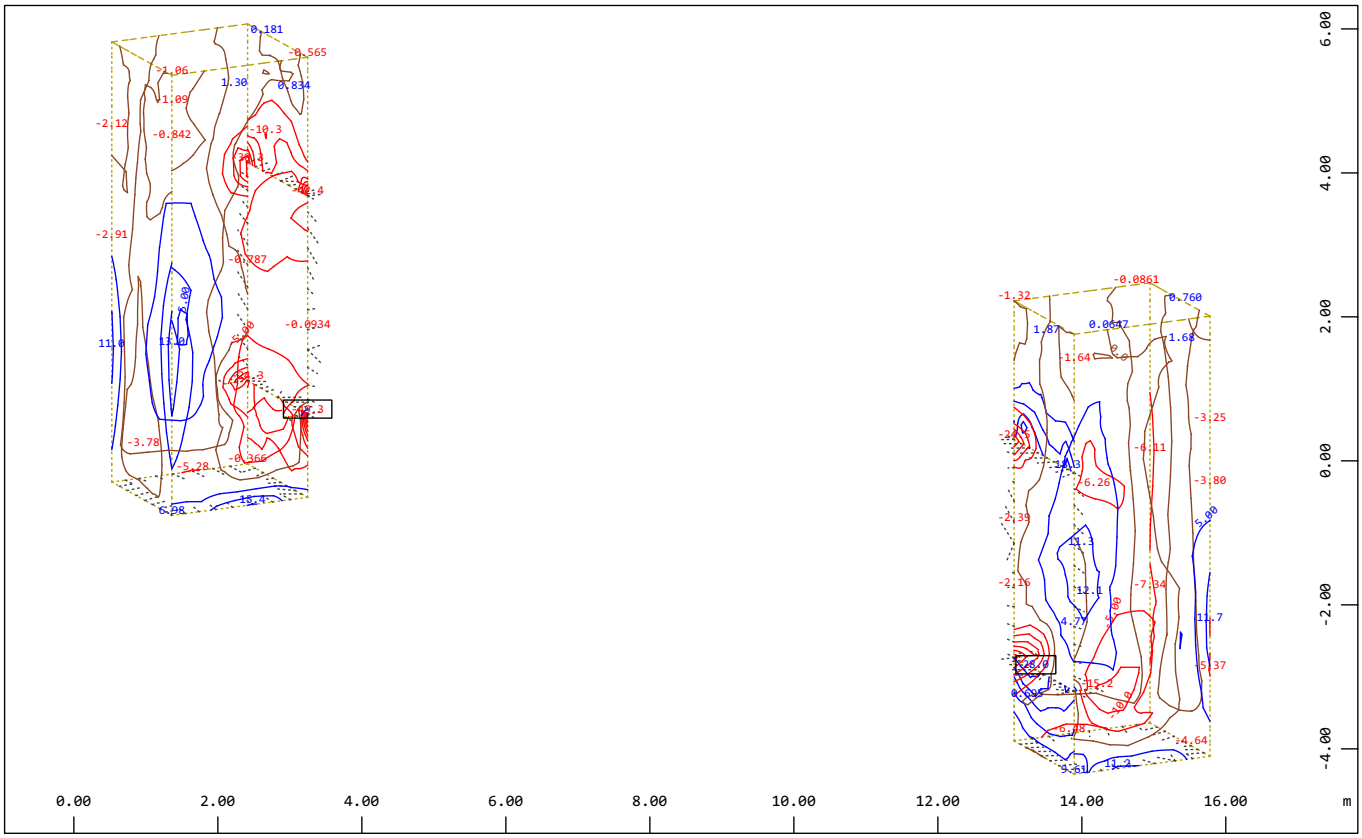
Zelezniski podhod
Notranje statične količine - MSN
Stene dvigala



Z
Y
X

Sector of system Quadrilateral Elements Group 301 302
Principal bending moment I in Node, Loadcase 7001 MAX-MXX QUAD , from -8.17 to 93.4
step 10.0 kNm/m

M 1 : 105
X * 0.502
Y * 0.906
Z * 0.962



Z
Y
X

Sector of system Quadrilateral Elements Group 301 302
Principal bending moment I in Node, Loadcase 7002 MIN-MXX QUAD , from -49.3 to 28.0
step 5.00 kNm/m

M 1 : 105
X * 0.502
Y * 0.906
Z * 0.962

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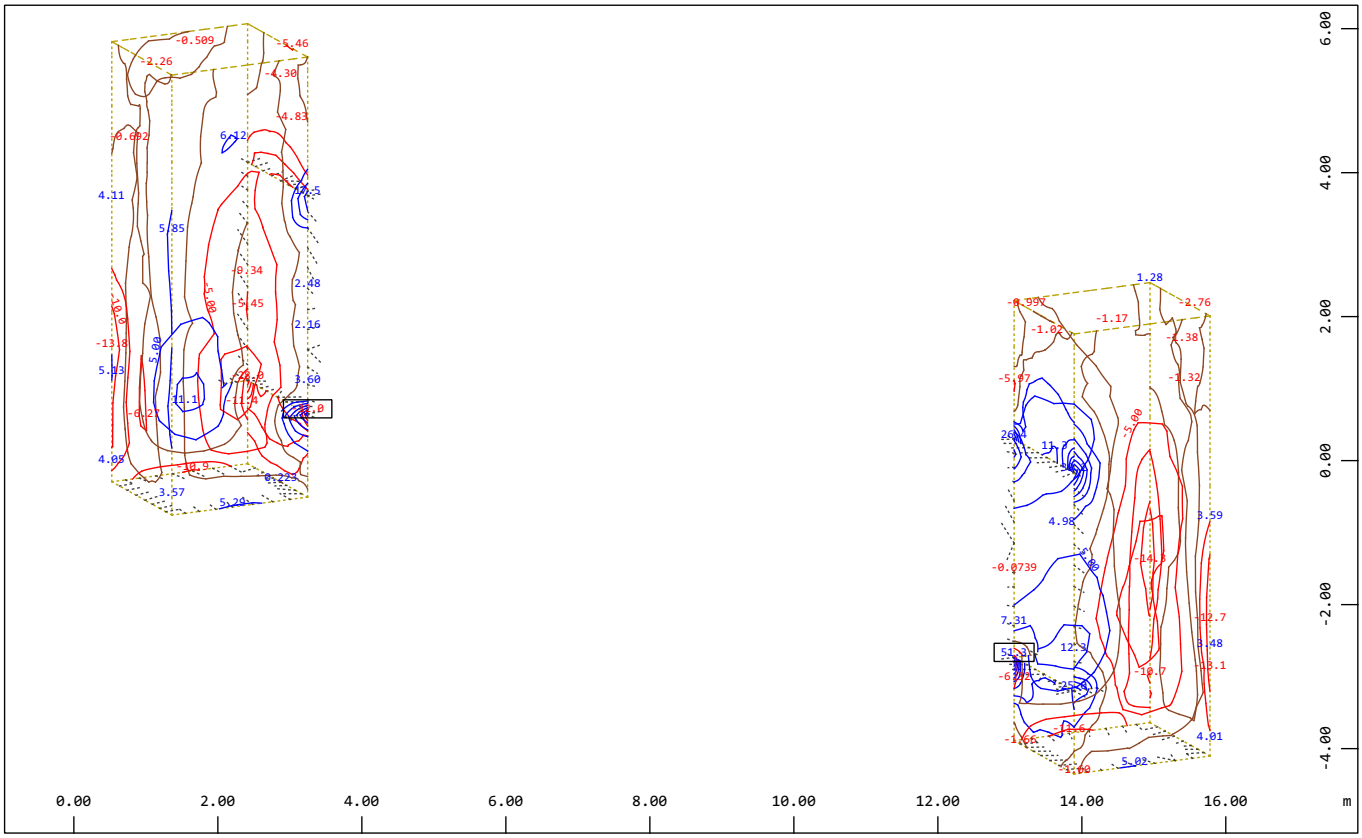
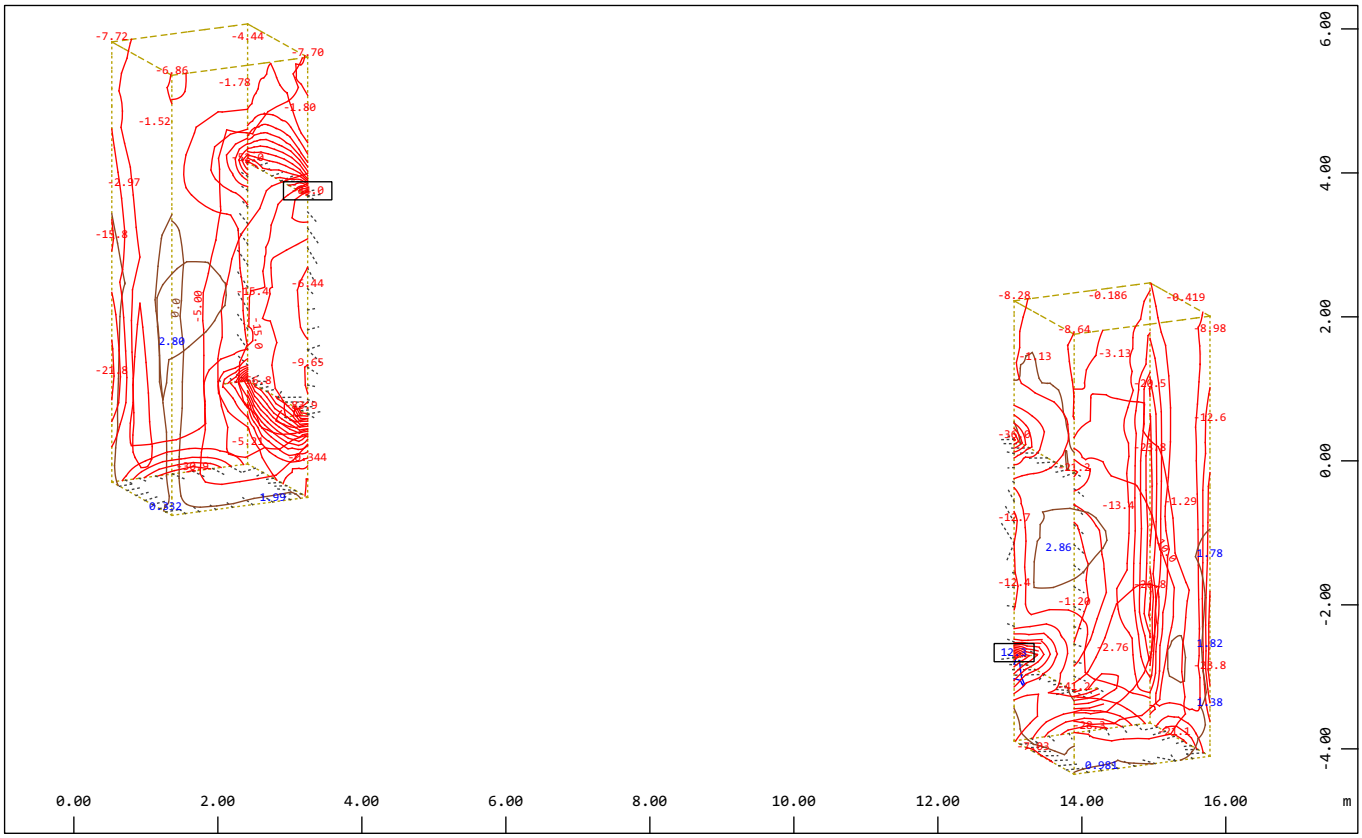
Zelezniski podhod
Notranje statične količine - MSN
Stene dvigala



Z
Y
X

Sector of system Quadrilateral Elements Group 301 302
Principal bending moment II in Node, Loadcase 7003 MAX-MYY QUAD , from -32.0 to 51.3
step 5.00 kNm/m

M 1 : 105
X * 0.502
Y * 0.906
Z * 0.962



Z
Y
X

Sector of system Quadrilateral Elements Group 301 302
Principal bending moment II in Node, Loadcase 7004 MIN-MYY QUAD , from -84.0 to 12.3
step 5.00 kNm/m

M 1 : 105
X * 0.502
Y * 0.906
Z * 0.962

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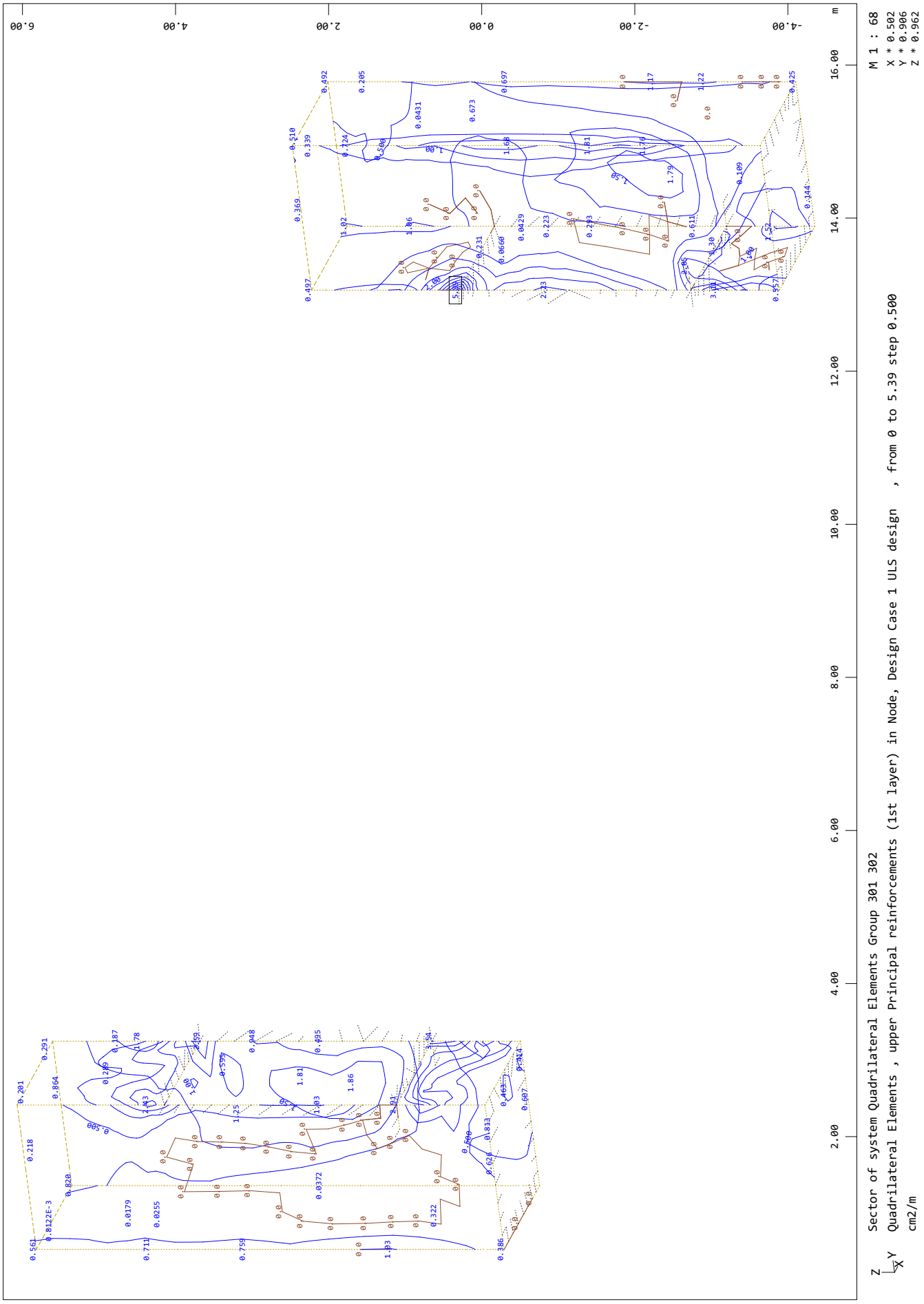
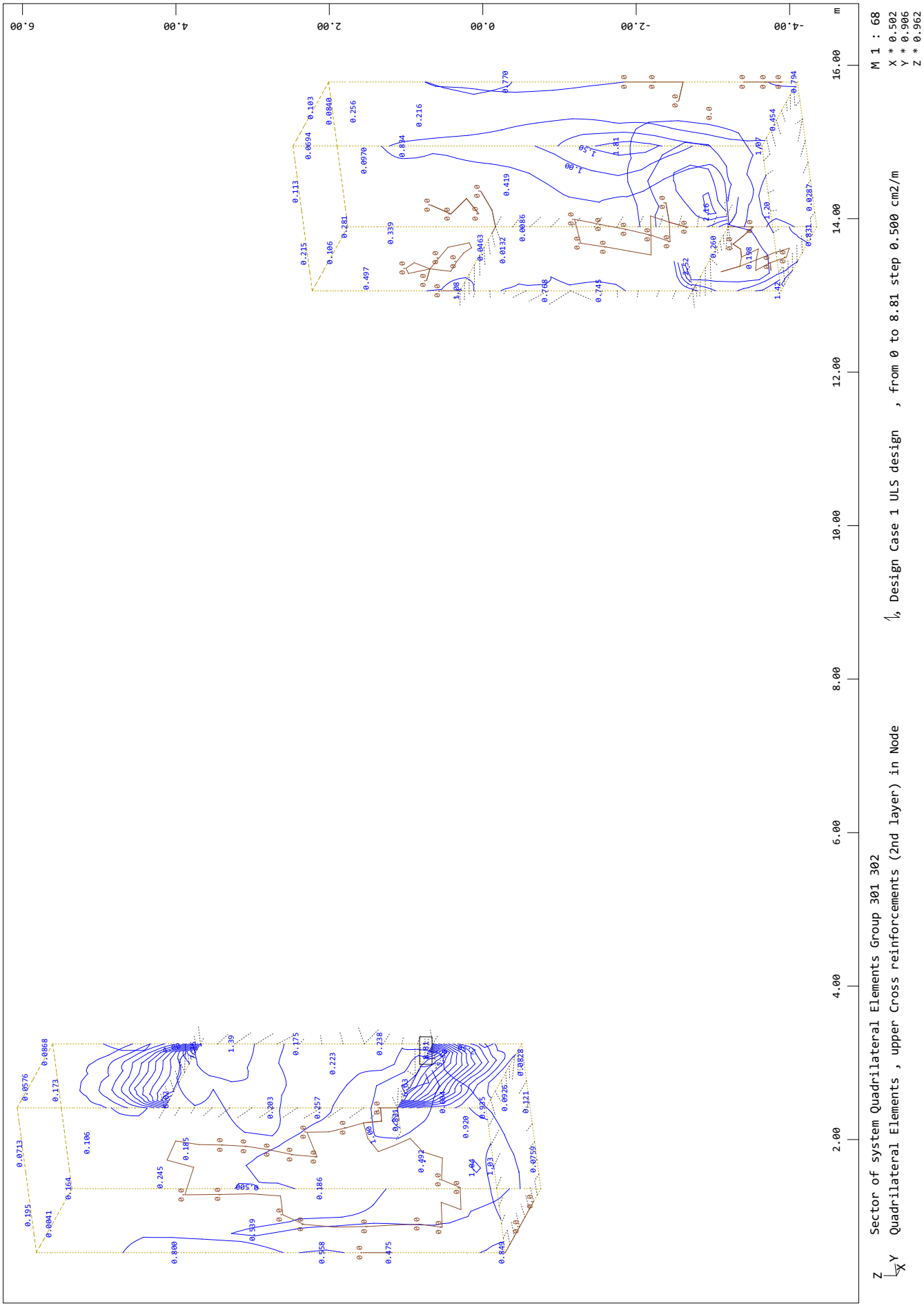
Zelezniski podhod
Računska armatura - stene dvigalnega jaska
Armatura zgoraj - smer 1



Zelezniski podhod
Računska armatura - stene dvigalnega jaska
Armatura zgoraj - smer 2



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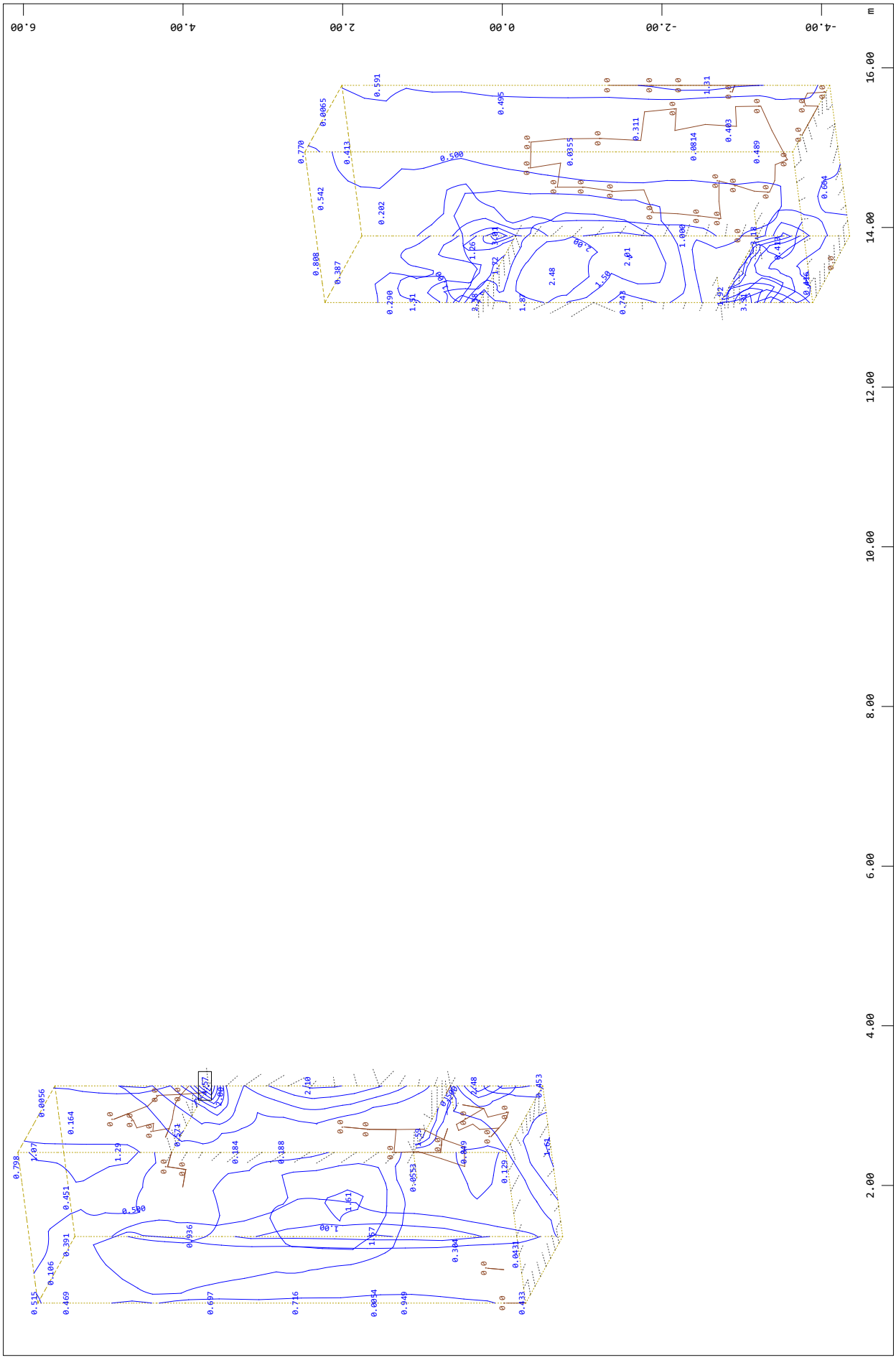
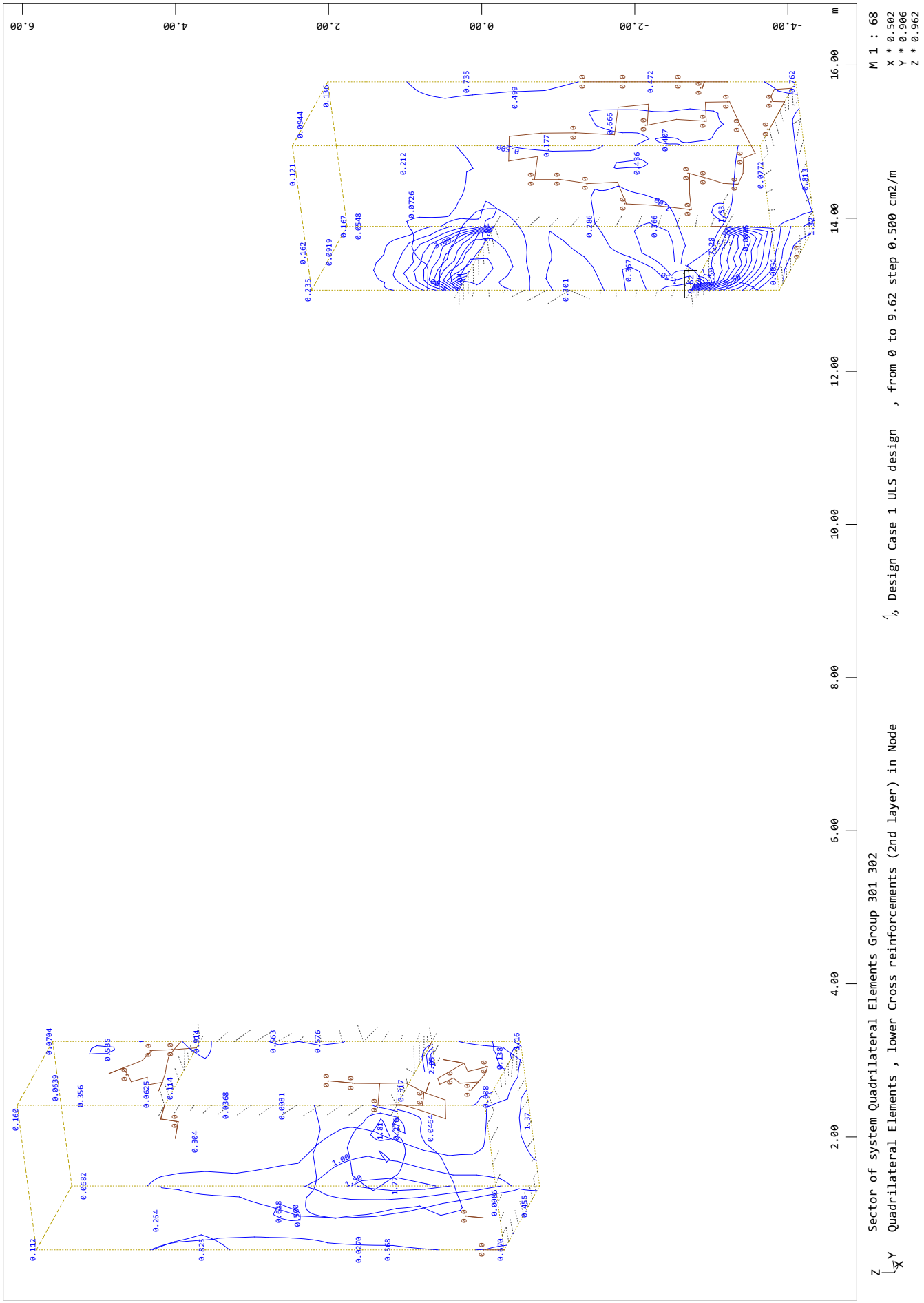
Zelezniski podhod
Računska armatura - stene dvigalnega jaska
Armatura spodaj - smer 1



Zelezniski podhod
Računska armatura - stene dvigalnega jaska
Armatura spodaj - smer 2



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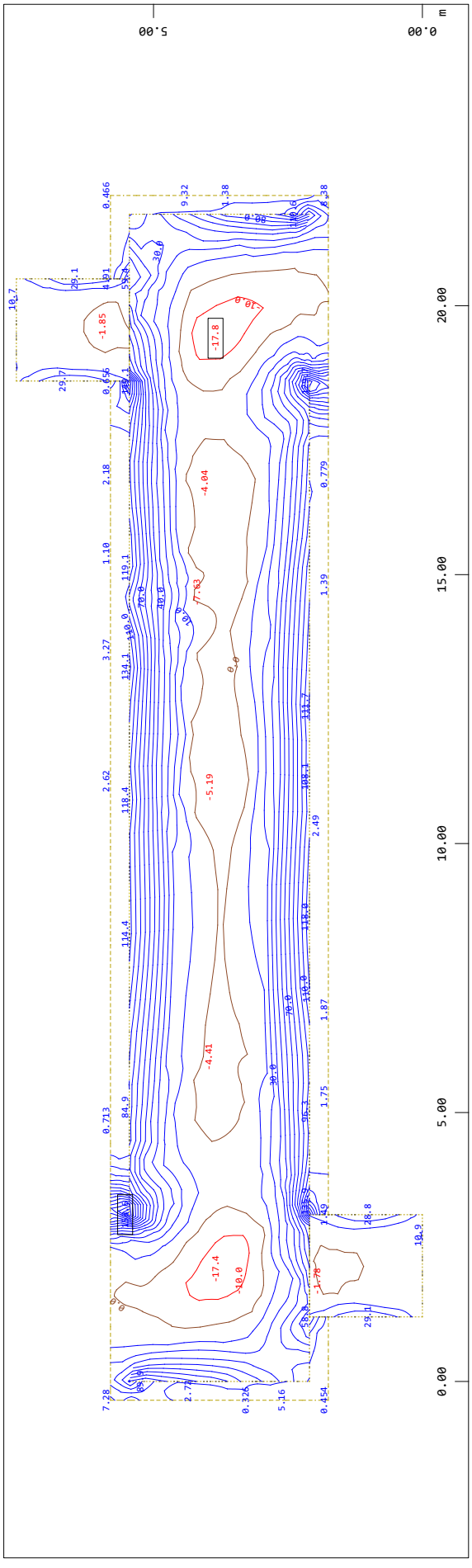
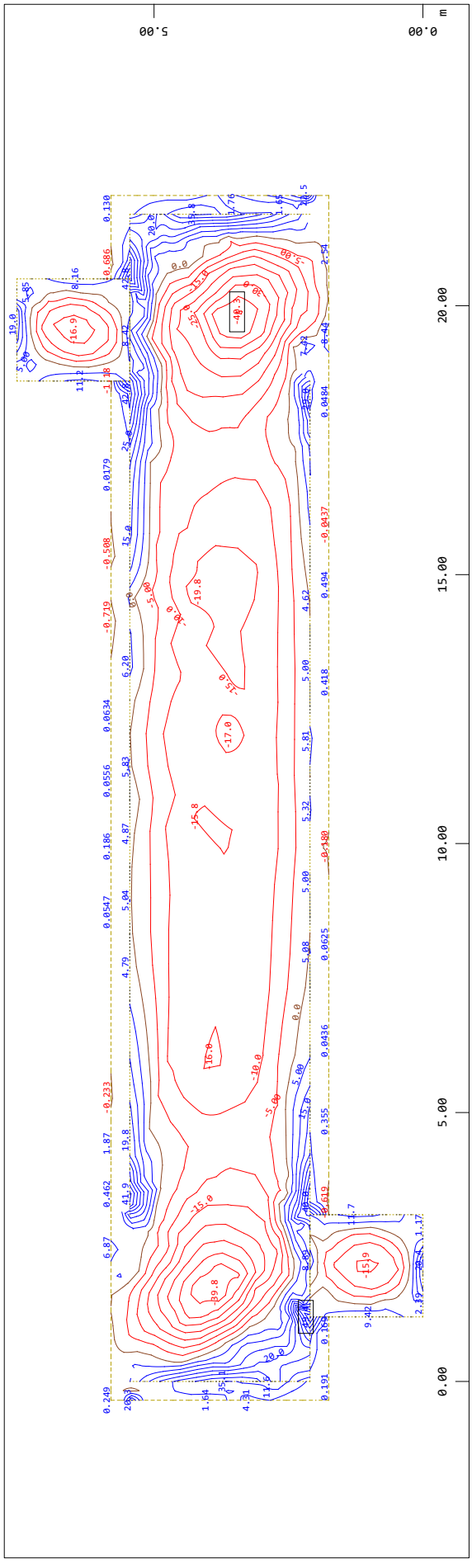
Zelezniski podhod
Notranje statične količine - MSN
Talna plošča



Sector of system Quadrilateral Elements Group 101 102
Principal bending moment I in Node, Loadcase 7001 MAX-MXX QUAD , from -17.8 to 158.6 step 10.0 kNm/m



Sector of system Quadrilateral Elements Group 101 102
Principal bending moment I in Node, Loadcase 7002 MIN-MXX QUAD , from -40.3 to 49.4 step 5.00 kNm/m

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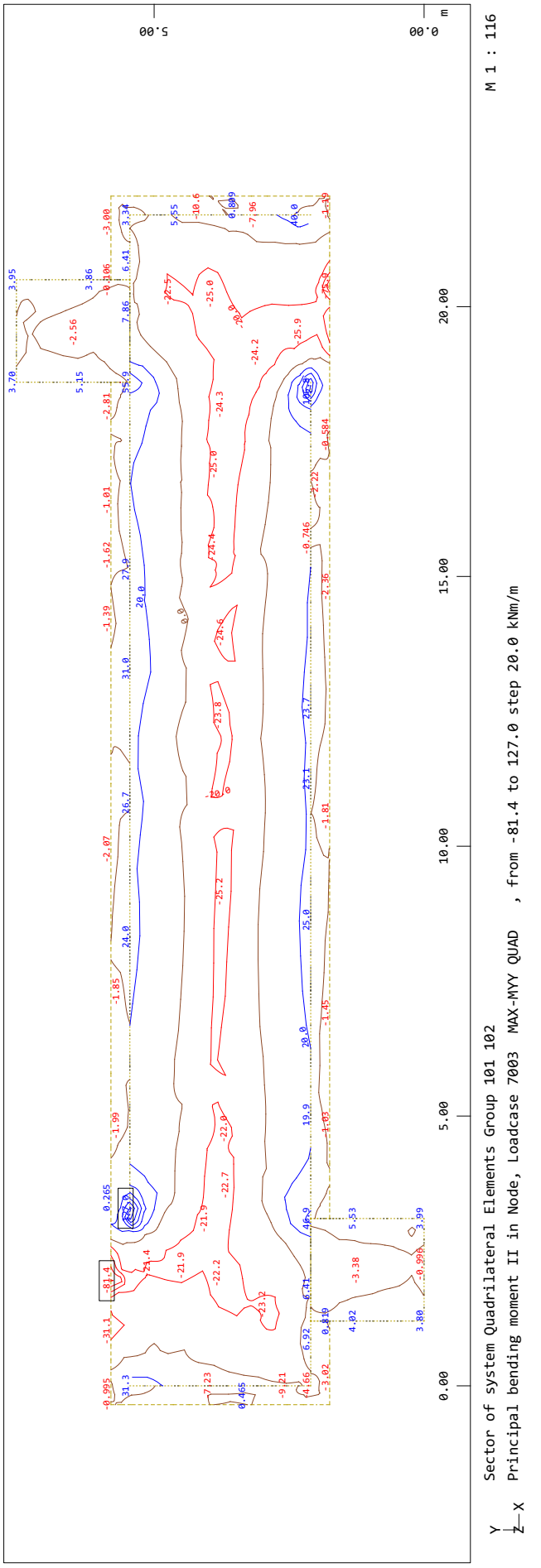
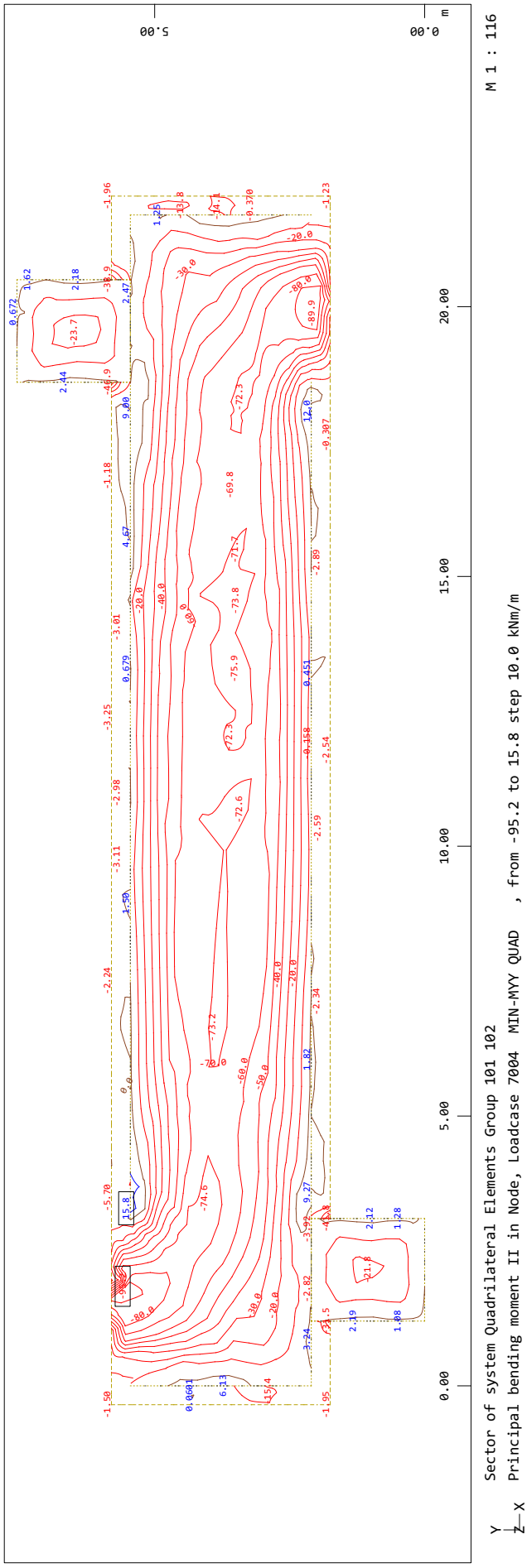
Zelezniski podhod
Notranje statične količine - MSN
Talna plošča





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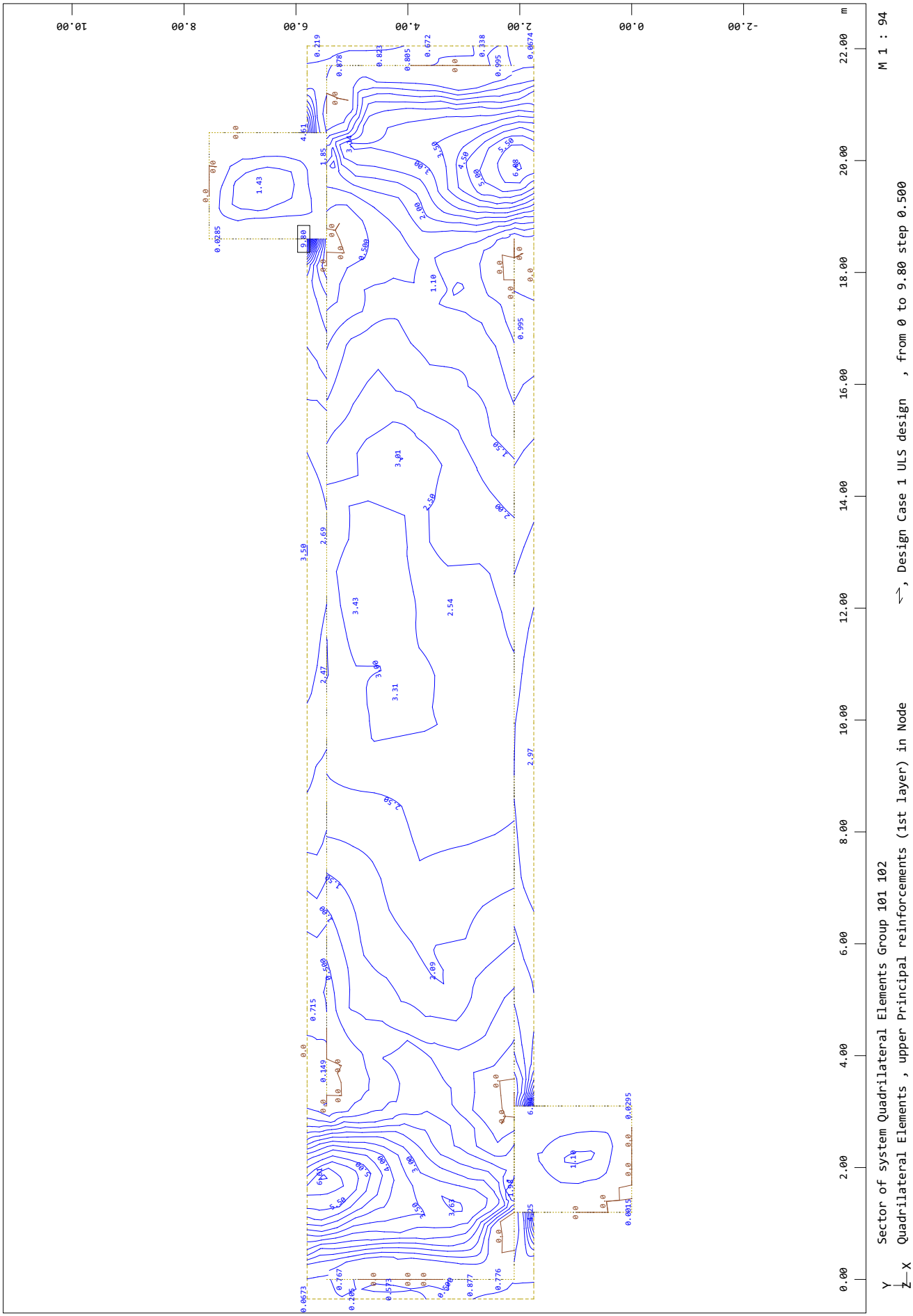
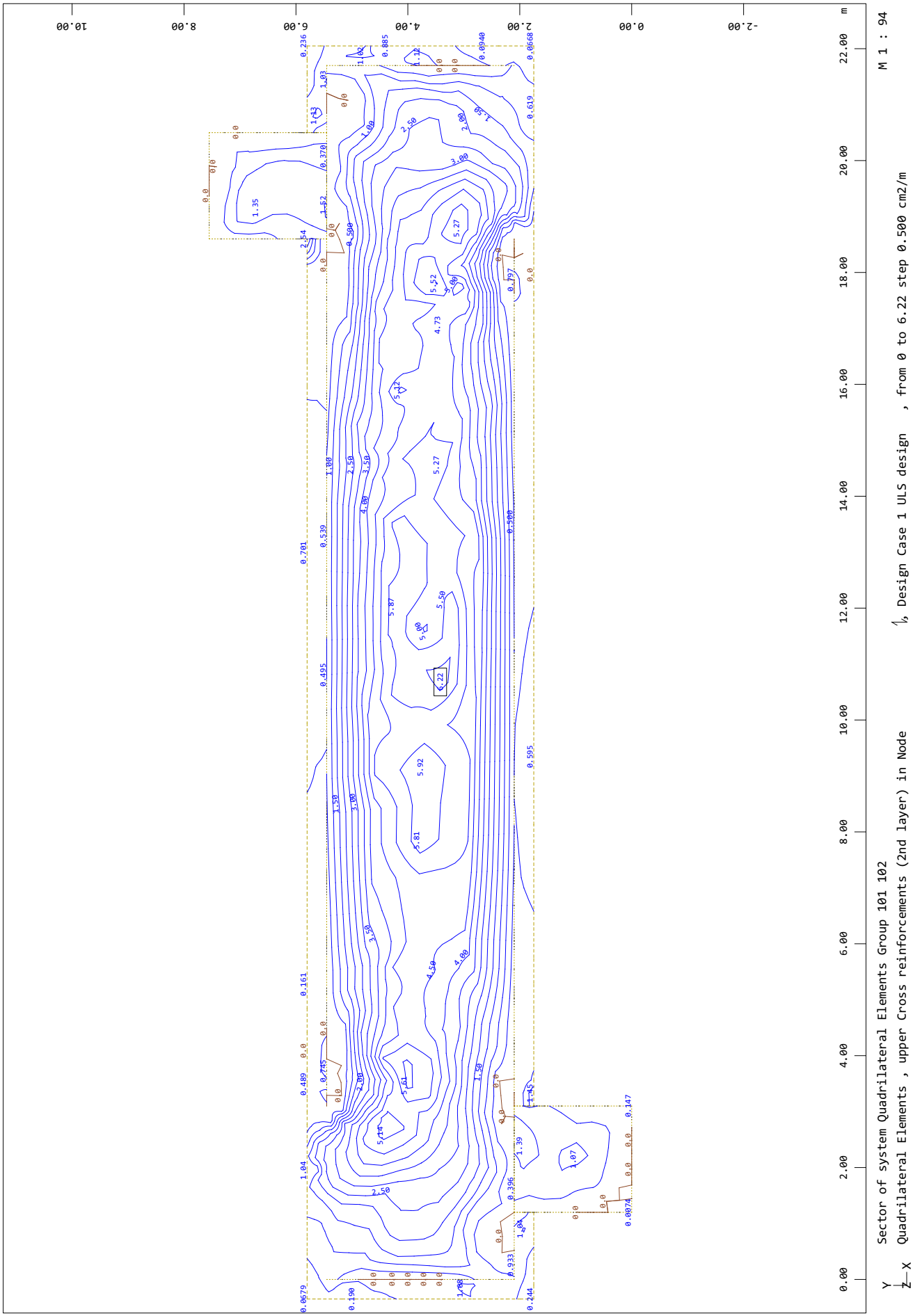
Zelezniski podhod
Računska armatura - talna plošča podhoda
Armatura zgoraj - smer 1



Zelezniski podhod
Računska armatura - talna plošča podhoda
Armatura zgoraj - smer 2



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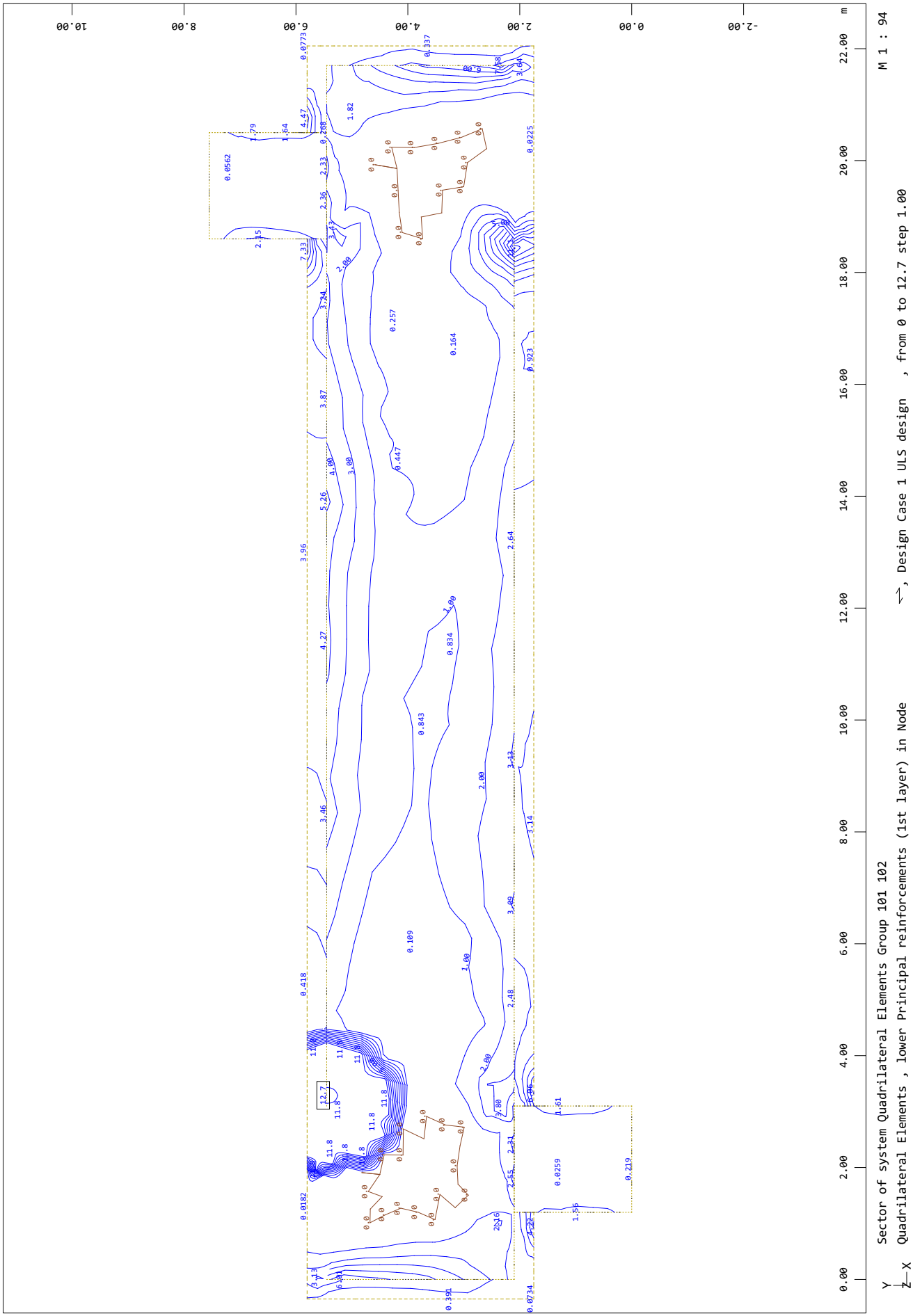
Zelezniski podhod
Računska armatura - talna plošča podhoda
Armatura spodaj - smer 1



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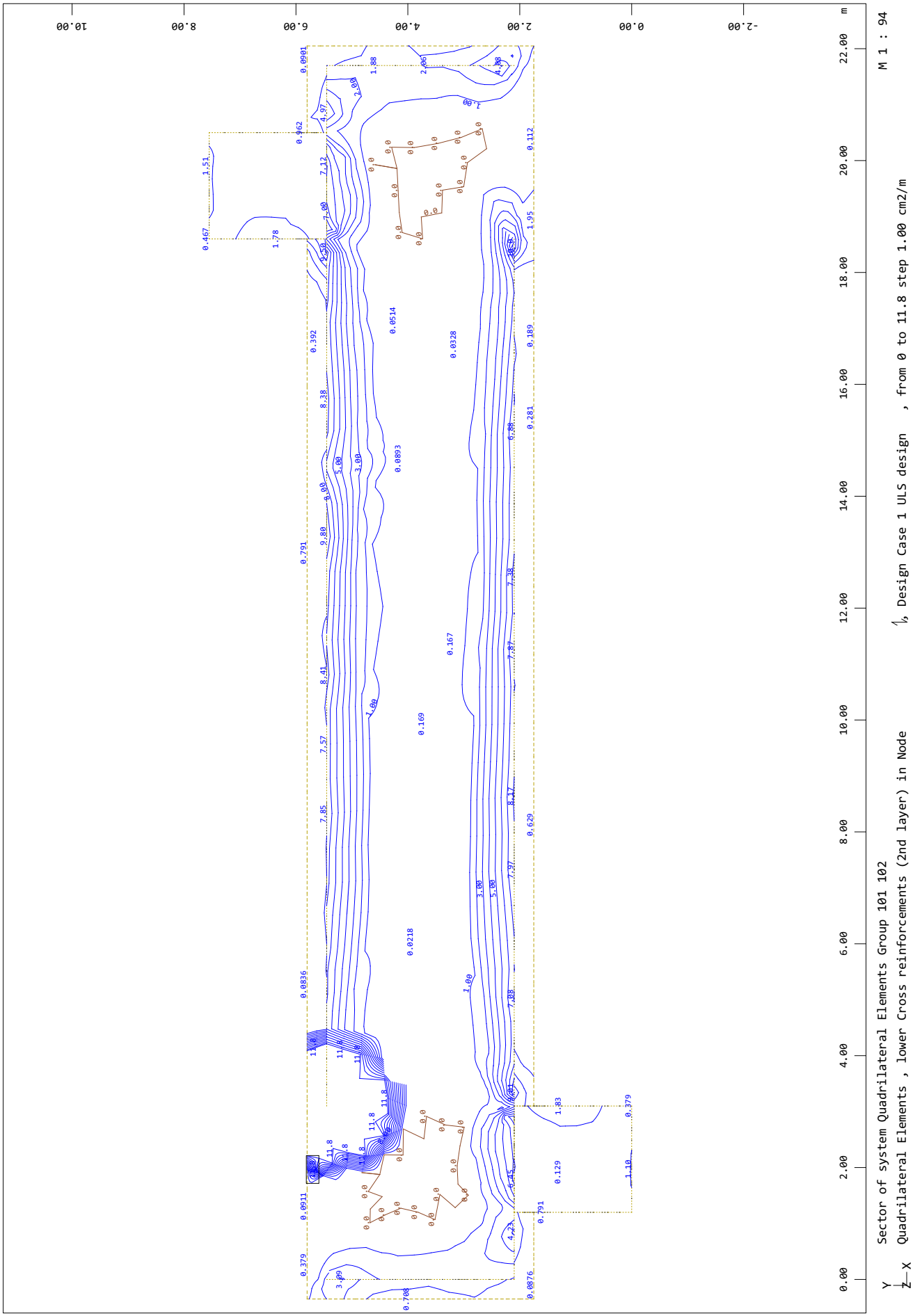
Zelezniski podhod
Računska armatura - talna plošča podhoda
Armatura spodaj - smer 2



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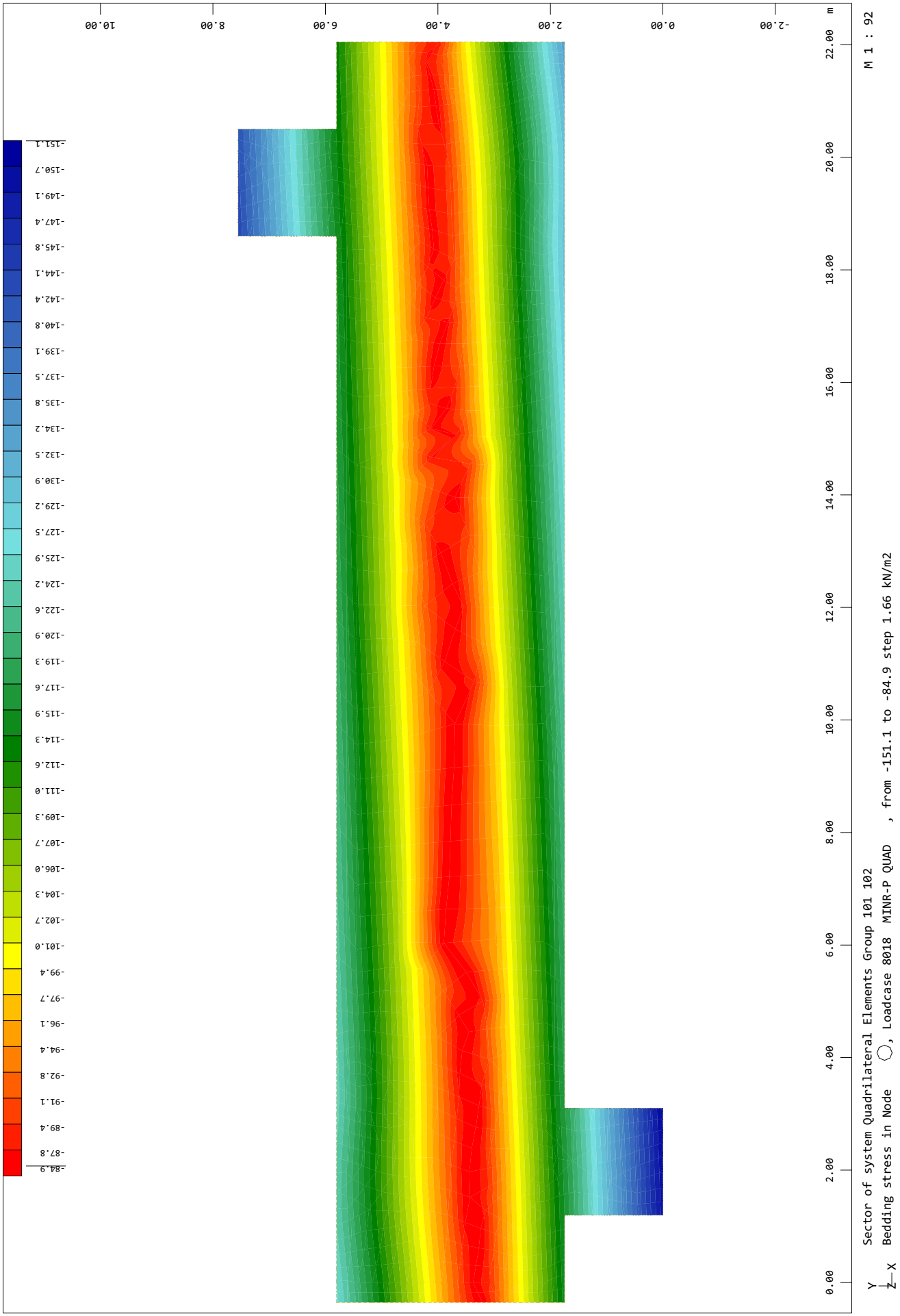
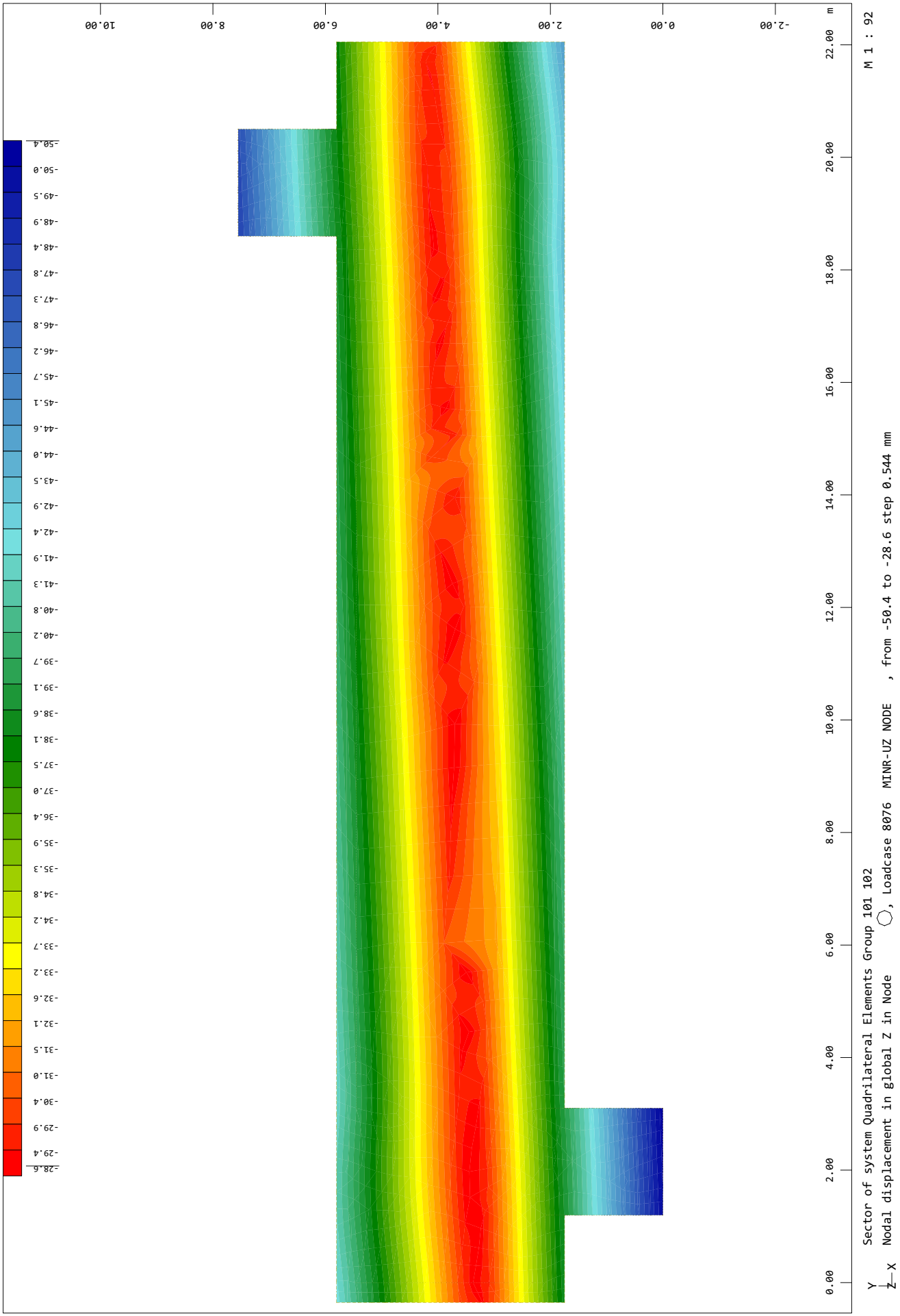
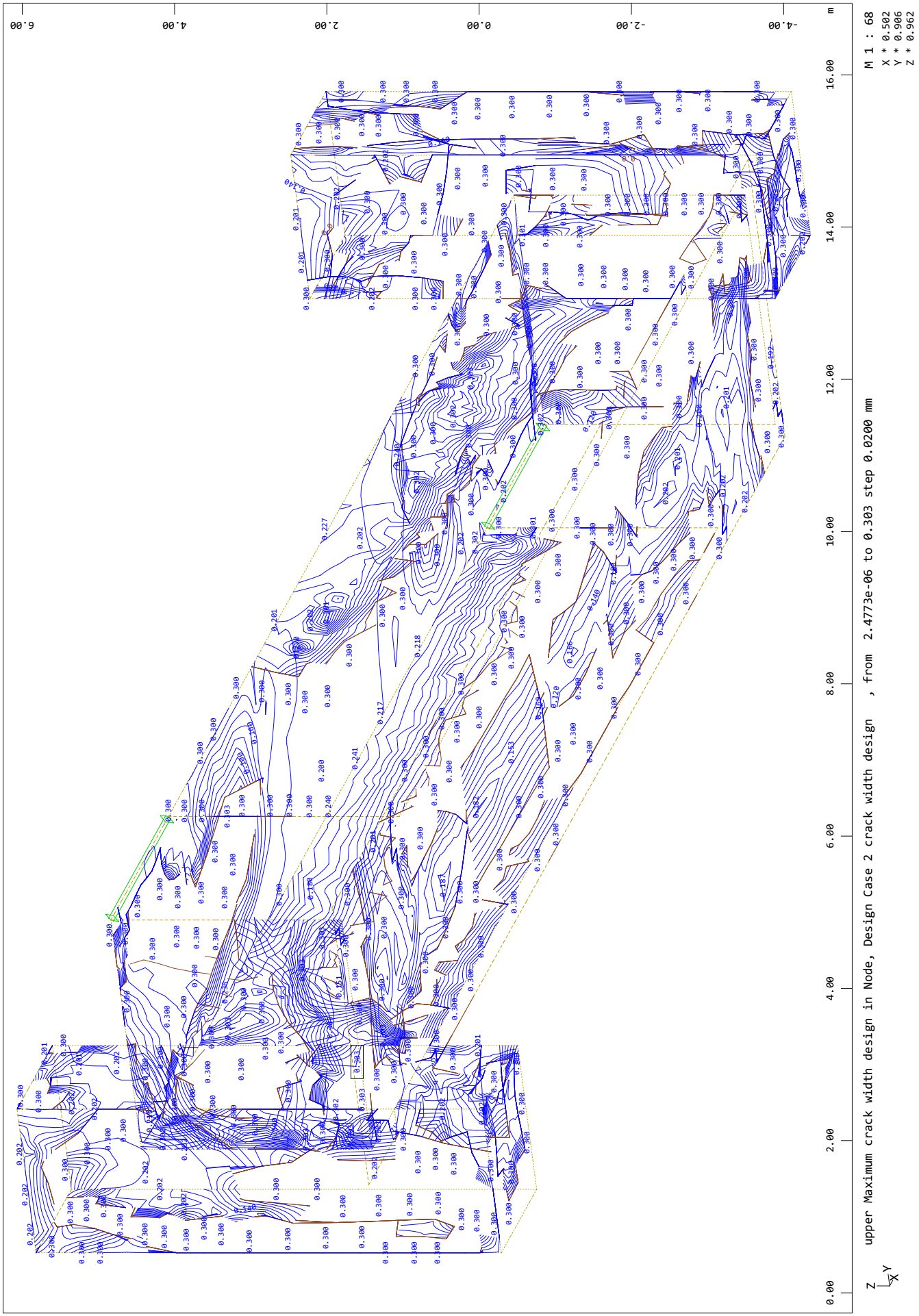
Zelezniski podhod
Napetosti pod talno ploščo - MSU



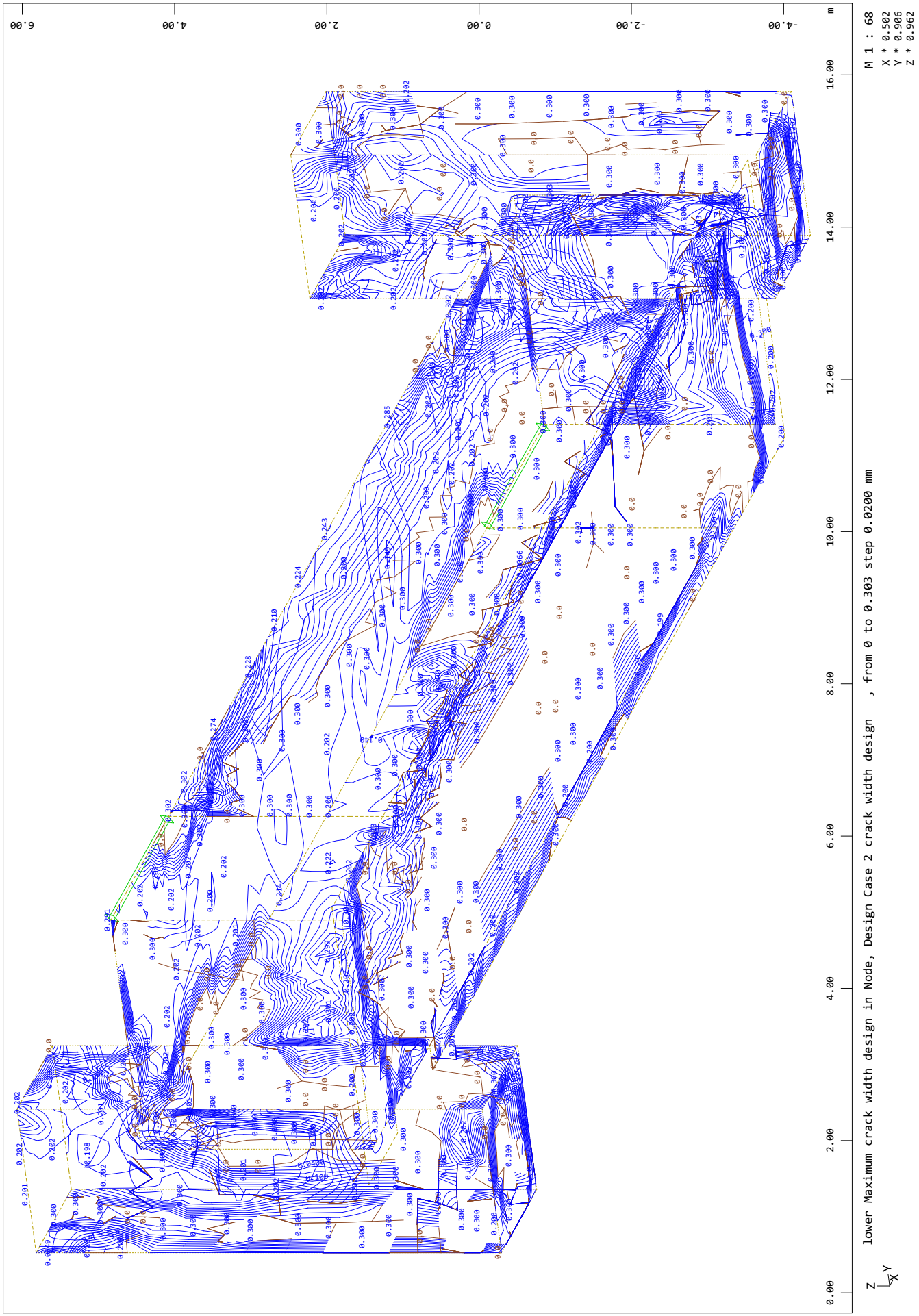
Zelezniski podhod
Računski posedki pod talno ploščo - MSU



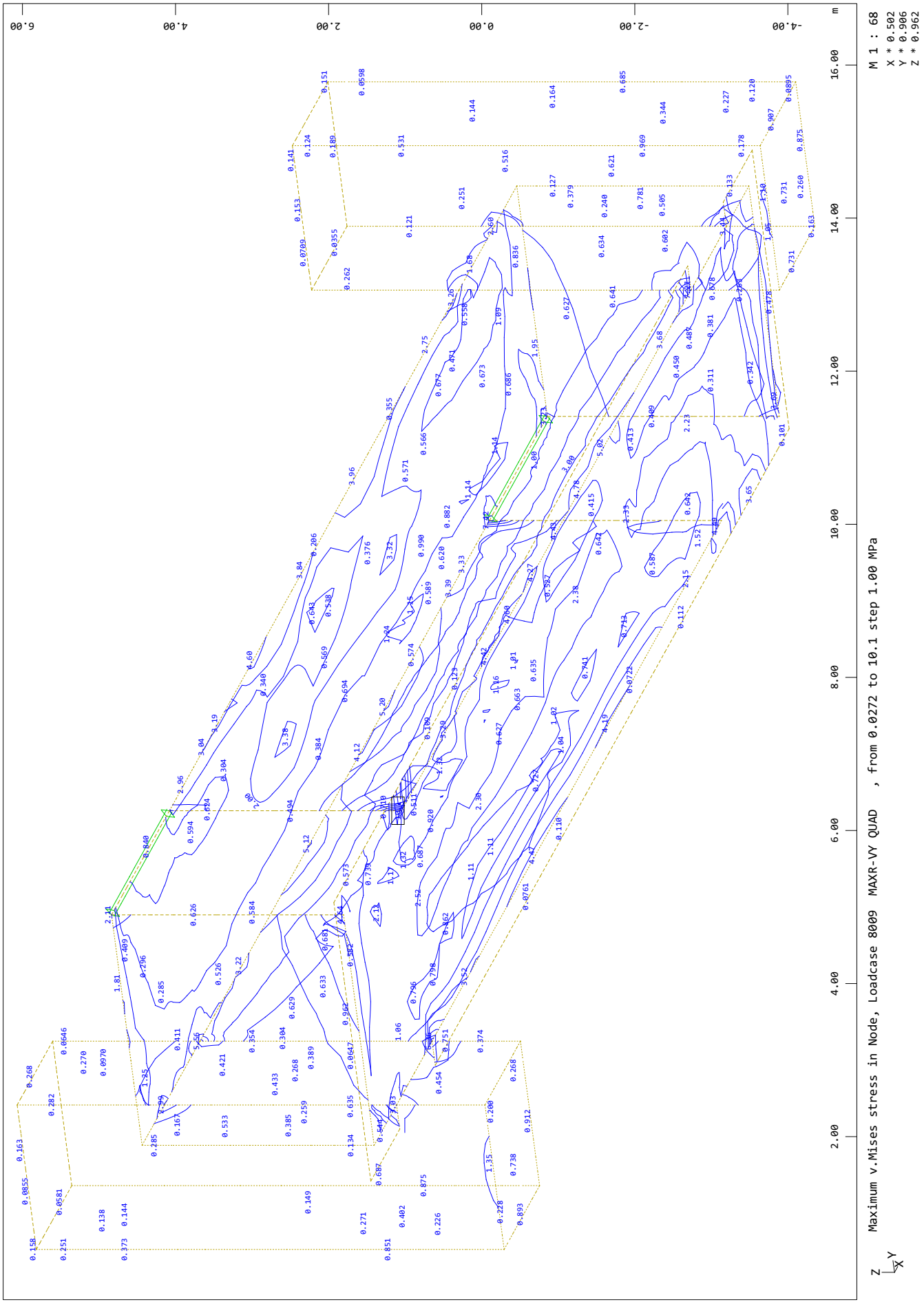
Zelezniski podhod
Razpoke



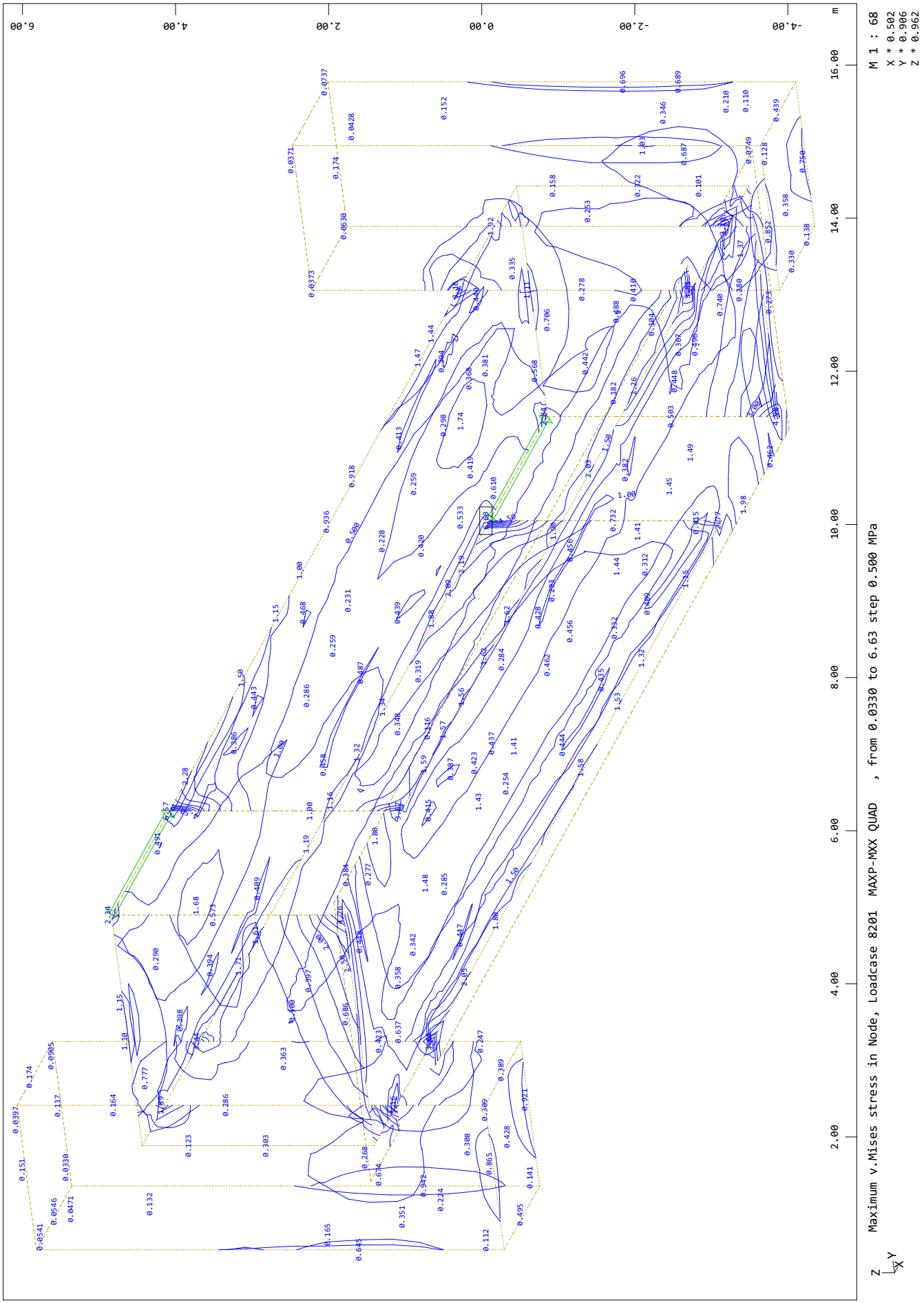
Zelezniski podhod
Razpoke



Zelezniski podhod
Kontrola napetosti - Karakteristična obtežba
Omejitev 60% - 18MPa



Zelezniski podhod
Kontrola napetosti - Navidezno stalna obtežba
Omejitev 45% - 13.5MPa



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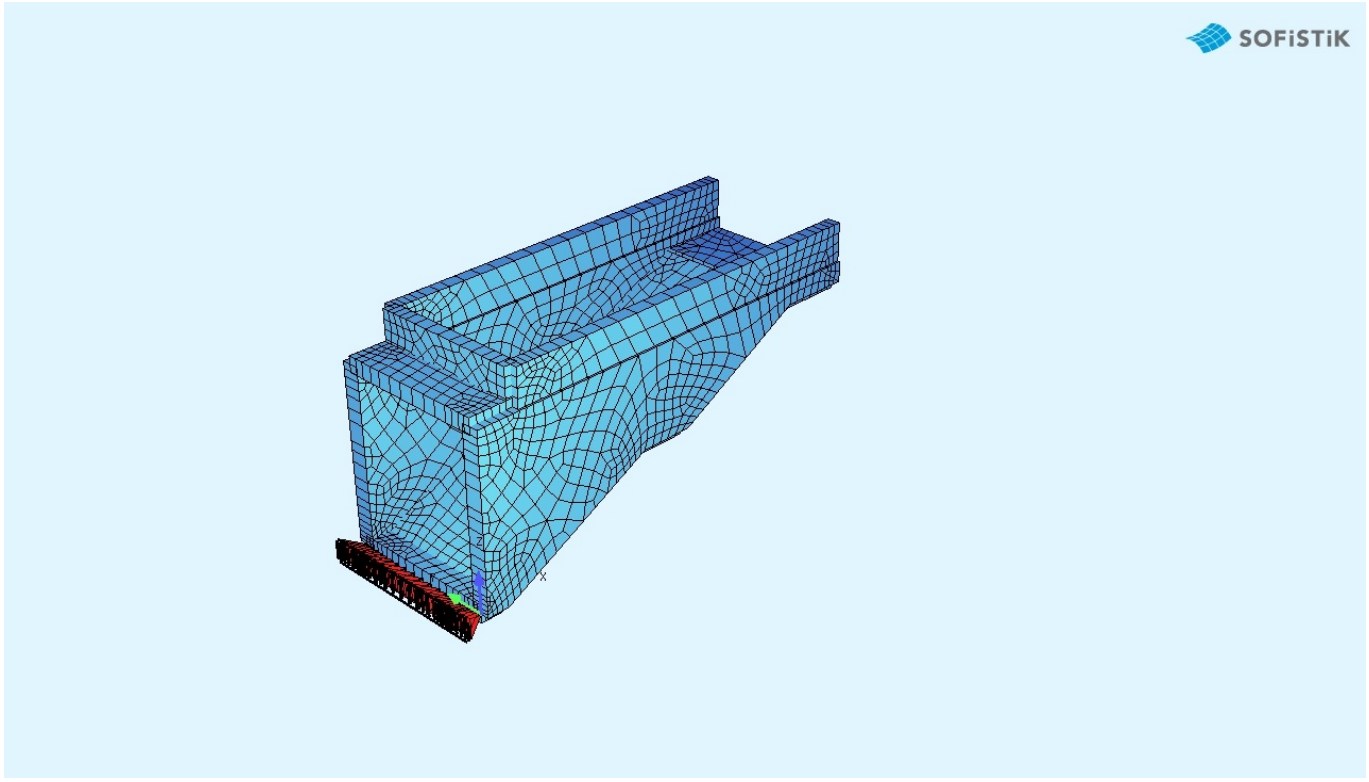
Materials

Default design code is EuroNorm EN 1992-2:2005 Concrete Structures (Slowenija) V 2020
Structure and Tab.7.1N: D (Railroad bridges)
Snow load zone : 1



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National Defined Parameters

Reference of parameter in design code	Value
long term reduction concrete compressive strength α-cc EN 1992-2 3.1.6	0.850¹
long term reduction concrete tensile strength α-ct EN 1992-1-1 3.1.6 (2)	1.000¹
safety coefficient γ-c for concrete EN 1992-1-1 2.4.2.4	1.500¹
safety coefficient γ-CE for concrete elasticity EN 1992-1-1 5.8.6 (3)	1.200¹
safety coefficient γ-s for reinforcing steel EN 1992-1-1 2.4.2.4	1.150¹

¹ national defined parameter taken from the INI-files

Materials

Mat	Classification
1	C 30/37 (EN 1992)
2	B 500 B (EN 1992)

Mat 1 C 30/37 (EN 1992)

Young's modulus	E	32837 [N/mm2]	Safetyfactor		1.50 [-]
Poisson's ratio	μ	0.20 [-]	Strength	fc	25.50 [MPa]
Shear modulus	G	13682 [N/mm2]	Nominal strength	fck	30.00 [MPa]
Compression modulus	K	18243 [N/mm2]	Tensile strength	fctm	2.90 [MPa]
Nominal Weight	γ	25.0 [kN/m3]	Tensile strength	fctk,05	2.03 [MPa]
Mean density	ρ	2400.0 [kg/m3]	Tensile strength	fctk,95	3.77 [MPa]
Elongation coefficient	α	1.00E-05 [1/K]	Bond strength	fbd	3.04 [MPa]
			Service strength	fcm	38.00 [MPa]
			Fatigue strength	fcd,fat	14.96 [MPa]
			Tensile strength	fctd	1.35 [MPa]
			Tensile failure energy	Gf	0.14 [N/mm]

Stress-Strain for serviceability	ε[o/oo]	σ-m[MPa]	E-t[N/mm2]
Is only valid within the defined	0.000	0.00	34478
stress range	-0.540	-16.42	26234
	-1.081	-28.31	17746

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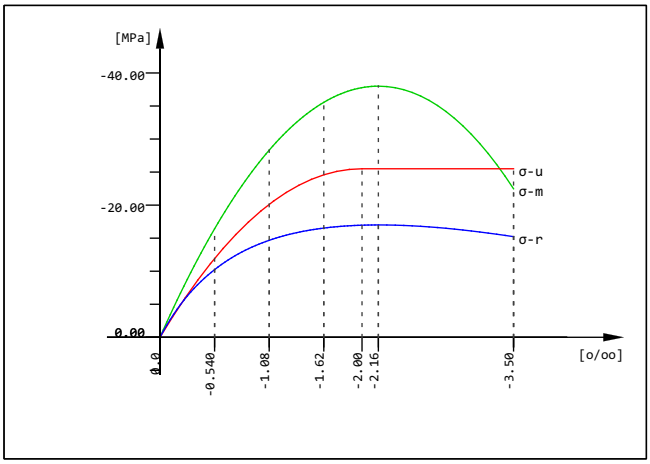
Materials

Stress-Strain for serviceability	ε[o/oo]	σ-m[MPa]	E-t[N/mm2]
	-1.621	-35.55	9005
	-2.162	-38.00	0
	-3.500	-22.47	-23499
	Safetyfactor		1.50

Stress-Strain for ultimate load	ε[o/oo]	σ-u[MPa]	E-t[N/mm2]
Is only valid within the defined	0.000	0.00	25500
stress range	-2.000	-25.50	0
	-3.500	-25.50	0
	Safetyfactor		1.50

Stress-Strain of calc. mean values	ε[o/oo]	σ-r[MPa]	E-t[N/mm2]
Is only valid within the defined	0.000	0.00	28732
stress range	-0.540	-10.23	12007
	-1.081	-14.67	5278
	-1.621	-16.53	1917
	-2.162	-17.00	0
	-3.500	-15.23	-2279
	Safetyfactor		(1.50)



C 30/37 (EN 1992)

Mat 2 B 500 B (EN 1992)

Young's modulus	E	200000 [N/mm2]	Safetyfactor		1.15 [-]
Poisson's ratio	μ	0.30 [-]	Yield stress	fy	500.00 [MPa]
Shear modulus	G	76923 [N/mm2]	Compressive yield	fyc	500.00 [MPa]
Compression modulus	K	166667 [N/mm2]	Tensile strength	ft	540.00 [MPa]
Nominal Weight	γ	78.5 [kN/m3]	Compressive strength	fc	540.00 [MPa]
Mean density	ρ	7850.0 [kg/m3]	Ultimate strain		50.00 [o/oo]
Elongation coefficient	α	1.20E-05 [1/K]	relative bond coeff.		1.00 [-]
max. thickness	t-max	32.00 [mm]	EN 1992 bond coeff.	k1	0.80 [-]
			Hardening modulus	Eh	0.00 [MPa]
			Proportional limit	fp	500.00 [MPa]
			Dynamic allowance	σ-dyn	152.17 [MPa]

Stress-Strain for serviceability	ε[o/oo]	σ-m[MPa]	E-t[N/mm2]
Is also extended beyond the	1000.000	540.00	0
defined stress range	50.000	540.00	0
	2.500	500.00	842
	0.000	0.00	200000
	-2.500	-500.00	842
	-50.000	-540.00	0
	-1000.000	-540.00	0
	Safetyfactor		1.15

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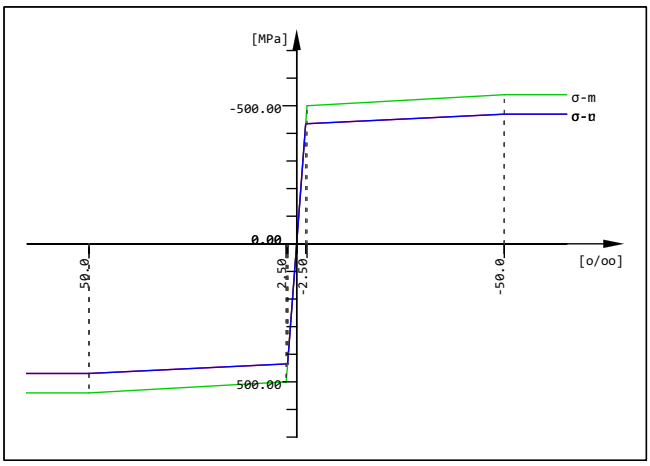
Materials

Stress-Strain for ultimate load	**ε[o/oo]**	**σ-u[MPa]**	**E-t[N/mm2]**
Is also extended beyond the	1000.000	469.57	0
defined stress range	50.000	469.57	0
	2.174	434.78	727
	0.000	0.00	200000
	-2.174	-434.78	727
	-50.000	-469.57	0
	-1000.000	-469.57	0
	Safetyfactor		(1.15)

Stress-Strain of calc. mean values	**ε[o/oo]**	**σ-r[MPa]**	**E-t[N/mm2]**
Is also extended beyond the	1000.000	469.57	0
defined stress range	50.000	469.57	0
	2.174	434.78	727
	0.000	0.00	200000
	-2.174	-434.78	727
	-50.000	-469.57	0
	-1000.000	-469.57	0
	Safetyfactor		(1.15)



B 500 B (EN 1992)

Thermal material constants

Mat	**T[°C]**	**S[kJ/K/m3]**	**Kxx[W/K/m]**	**Kyy[W/K/m]**	**Kzz[W/K/m]**	
1	AUTO	2.16E+03	1.951E+00			C 30/37 (EN 1992)
2	AUTO	3.45E+03	5.333E+01			B 500 B (EN 1992)

Mat material number S[kJ/K/m3] Heat capacity
T[°C] Temperature Kxx[W/K/m],Kyy[W/K/m],Kzz[W/K/m] Heat conductivity

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Actions

Actions

type	part	sup	Designation	γ-u	γ-f	γ-a	ψ_0	ψ_1	ψ_2	$\psi_1$inf
G_1	G	perm	dead load g1	1.35	1.00	1.00	1.00	1.00	1.00	1.00
G_2	G	perm	dead load g2	1.35	1.00	1.00	1.00	1.00	1.00	1.00
R	G	perm	earth pressure	1.35	1.00	1.00	1.00	1.00	1.00	1.00
L	Q	cond	live loading	1.50	0.00	1.00	0.75	0.75	0.75	0.80
L_C	Q	excl	Traffic load UIC of EC/DIN-FB	1.45	0.00	1.00	0.80	0.80	0.00	1.00
L_E	Q	excl	Traffic load SW/2 of EC/DIN-FB	1.20	0.00	1.00	0.00	1.00	0.00	1.00
			Reliability factor Kfi	1.000						
			Reduction factor xsi	0.850						

type action — γ-u,γ-f,γ-a partial safety factors for unfavourable/favourable/accidental
part partition of the action — $\psi_0,\psi_1,\psi_2,\psi_1$inf combination coefficients
sup superposition type

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Generation of Node and Element Loads

Actions

type	part	sup	Designation	γ-u	γ-f	γ-a	ψ_o	ψ_1	ψ_2	$\psi_1$inf
G_1	G	perm	dead load g1	1.35	1.00	1.00	1.00	1.00	1.00	1.00
		1	lastna							
G_2	G	perm	dead load g2	1.35	1.00	1.00	1.00	1.00	1.00	1.00
		2	stalna							
R	G	perm	earth pressure	1.35	1.00	1.00	1.00	1.00	1.00	1.00
		30	zemeljski pritiski							
L	Q	cond	live loading	1.50	0.00	1.00	0.75	0.75	0.75	0.80
		10	koristna							
L_C	Q	excl	Traffic load UIC of EC/DIN-FB	1.45	0.00	1.00	0.80	0.80	0.00	1.00
		20	LM71							
L_E	Q	excl	Traffic load SW/2 of EC/DIN-FB	1.20	0.00	1.00	0.00	1.00	0.00	1.00
		21	SW2							
			Reliability factor Kfi	1.000						
			Reduction factor xsi	0.850						

type action γ-u,γ-f,γ-a partial safety factors for unfavourable/favourable/accidental
part partition of the action ψ_o,ψ_1,ψ_2,$\psi_1$inf combination coefficients
sup superposition type

Load Case 1 (G_1) lastna

Factor forces and moments		1.000	
Factor dead weight	DL-ZZ	-1.000	
unfavourable partial safety factor		1.350	
favourable partial safety factor		1.000	
Combination coefficient	ψ_o	1.000	(rare)
Combination coefficient	$\psi_1$inf	1.000	(infrequent)
Combination coefficient	ψ_1	1.000	(frequent)
Combination coefficient	ψ_2	1.000	(permanent)

Load Case 2 (G_2) stalna

Factor forces and moments		1.000	
unfavourable partial safety factor		1.350	
favourable partial safety factor		1.000	
Combination coefficient	ψ_o	1.000	(rare)
Combination coefficient	$\psi_1$inf	1.000	(infrequent)
Combination coefficient	ψ_1	1.000	(frequent)
Combination coefficient	ψ_2	1.000	(permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Area	SAR 4						PG	2.60 [kN/m2]
						activated		100.00 percent
Area	SAR 3						PG	2.60 [kN/m2]
						activated		100.00 percent
Area	SAR 2						PG	2.60 [kN/m2]
						activated		100.00 percent
Area	SAR 1						PG	2.60 [kN/m2]
						activated		100.00 percent
Area	SAR 8						PG	2.60 [kN/m2]
						activated		100.00 percent
Area	SAR 7						PG	16.50 [kN/m2]
						activated		100.00 percent

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Generation of Node and Element Loads

Load Case 10 (L) koristna

Factor forces and moments		1.000
unfavourable partial safety factor		1.500
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.750 (rare)
Combination coefficient	$\psi_1$inf	0.800 (infrequent)
Combination coefficient	ψ_1	0.750 (frequent)
Combination coefficient	ψ_2	0.750 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Area	SAR 8						PG	5.00 [kN/m2]
						activated		100.00 percent
Area	SAR 1						PG	5.00 [kN/m2]
						activated		100.00 percent
Area	SAR 2						PG	5.00 [kN/m2]
						activated		100.00 percent
Area	SAR 3						PG	5.00 [kN/m2]
						activated		100.00 percent
Area	SAR 4						PG	5.00 [kN/m2]
						activated		100.00 percent
Area	SAR 7						PG	5.00 [kN/m2]
						activated		100.00 percent

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Load Case 20 (L_C) LM71

Factor forces and moments		1.000
unfavourable partial safety factor		1.450
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.800 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	0.800 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Area	sar 9			0.000	0.000	0.000	PYP	21.30 [kN/m2]
				0.000	0.000	2.000		21.30 [kN/m2]
				5.573	0.000	2.000		21.30 [kN/m2]
				5.300	0.000	1.850		21.30 [kN/m2]
				4.100	0.000	1.850		21.30 [kN/m2]
				0.500	0.000	0.000		21.30 [kN/m2]
						activated		100.00 percent

Load Case 21 (L_E) SW2

Factor forces and moments		1.000
unfavourable partial safety factor		1.200
favourable partial safety factor		0.000
Combination coefficient	ψ_0	0.000 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	1.000 (frequent)
Combination coefficient	ψ_2	0.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Area	sar 9			0.000	0.000	0.000	PYP	54.80 [kN/m2]
				0.000	0.000	2.000		54.80 [kN/m2]
				5.573	0.000	2.000		54.80 [kN/m2]

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Generation of Node and Element Loads

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
				5.300	0.000	1.850		54.80 [kN/m2]
				4.100	0.000	1.850		54.80 [kN/m2]
				0.500	0.000	0.000		54.80 [kN/m2]
						activated		100.00 percent

Load Case 30 (R) zemeljski pritiski

Factor forces and moments		1.000
unfavourable partial safety factor		1.350
favourable partial safety factor		1.000
Combination coefficient	ψ_0	1.000 (rare)
Combination coefficient	$\psi_1$inf	1.000 (infrequent)
Combination coefficient	ψ_1	1.000 (frequent)
Combination coefficient	ψ_2	1.000 (permanent)

Loads

Kind	Reference to	Projection Designation	W[m]	Coordinates X[m]	Y[m]	Z[m]	Type	Load value
Area	sar -mult-			0.000	0.000	0.000	PYY	48.00 [kN/m2]
				0.000	0.000	3.950		8.50 [kN/m2]
				1.000	0.000	3.950		8.50 [kN/m2]
				1.000	0.000	4.800		0.00 [kN/m2]
				9.850	0.000	4.800		0.00 [kN/m2]
				9.850	0.000	3.500		13.00 [kN/m2]
				8.300	0.000	3.500		13.00 [kN/m2]
				5.300	0.000	1.850		29.50 [kN/m2]
				4.100	0.000	1.850		29.50 [kN/m2]
				0.500	0.000	0.000		48.00 [kN/m2]
						activated		100.00 percent
Area	sar -mult-			0.000	3.400	0.000	PYY	-48.00 [kN/m2]
				0.000	3.400	3.950		-8.50 [kN/m2]
				1.000	3.400	3.950		-8.50 [kN/m2]
				1.000	3.400	4.800		0.00 [kN/m2]
				9.850	3.400	4.800		0.00 [kN/m2]
				9.850	3.400	3.500		-13.00 [kN/m2]
				8.300	3.400	3.500		-13.00 [kN/m2]
				5.300	3.400	1.850		-29.50 [kN/m2]
				4.100	3.400	1.850		-29.50 [kN/m2]
				0.500	3.400	0.000		-48.00 [kN/m2]
						activated		100.00 percent

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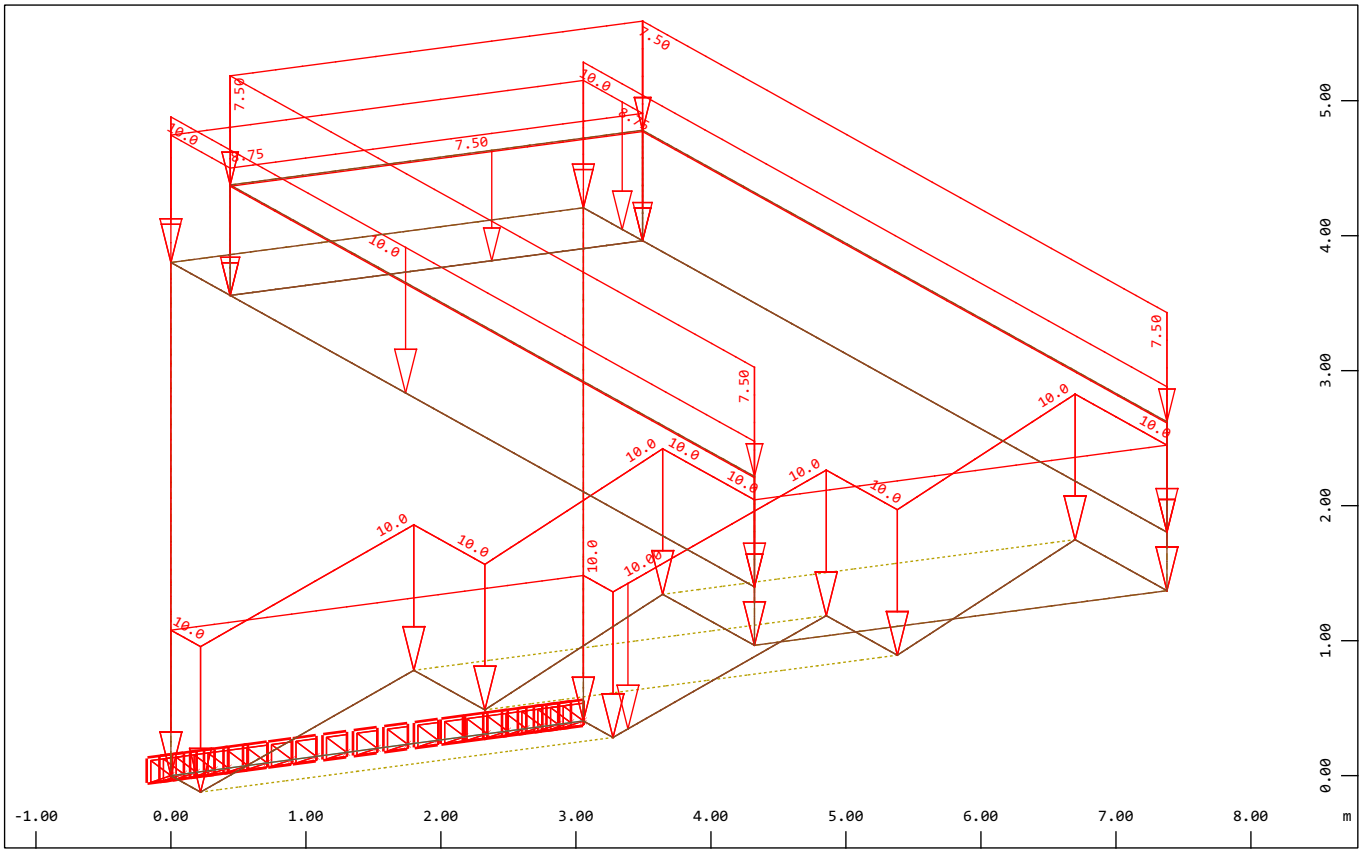
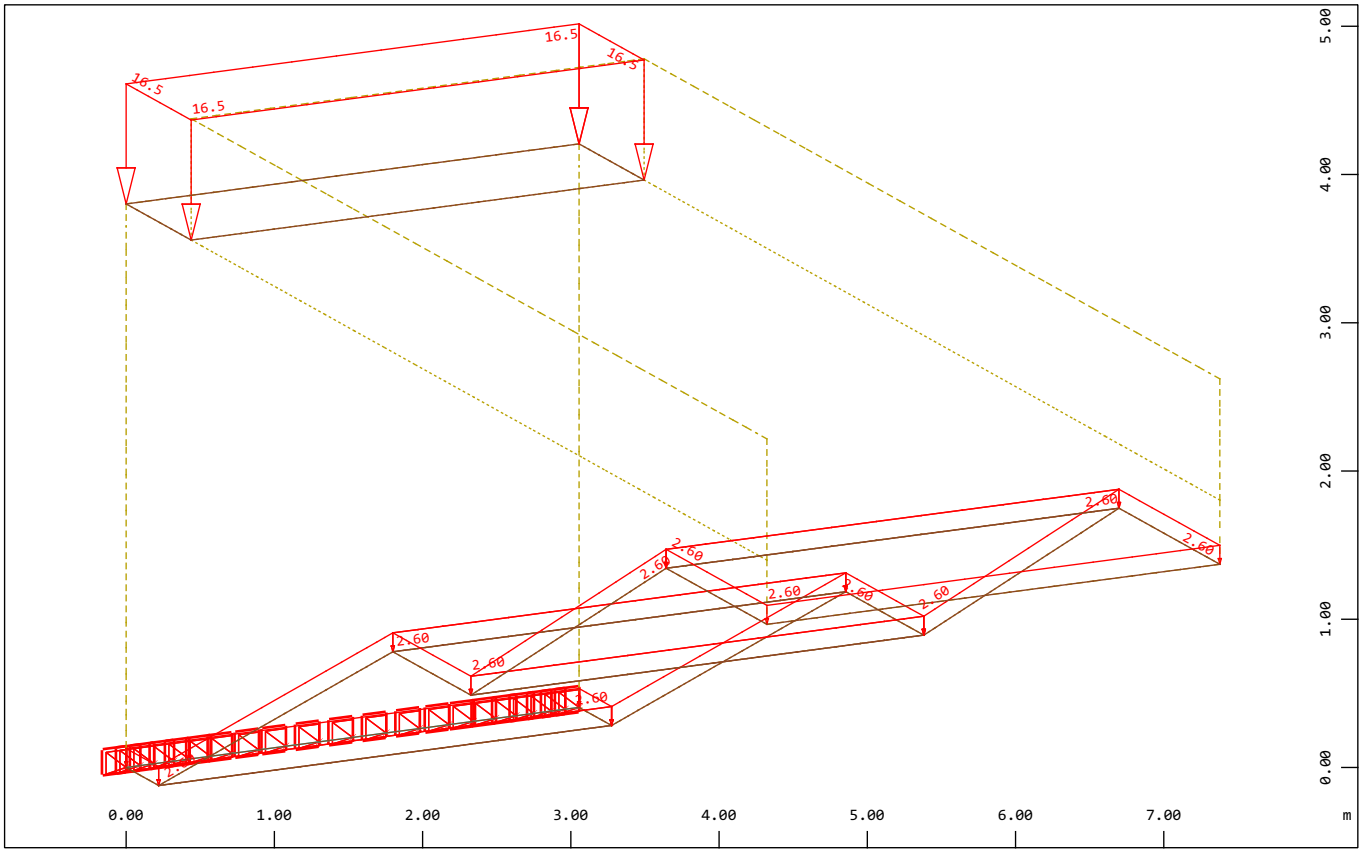
3D model_stopnice
Graphical Output



Z
Y X
All loads (in components), Loadcase 1 lastna , (1 cm 3D = unit) QUAD-Area dead load in
global Z in Element (Unit=5.00 kN/m2) (Min=-10.0) (Max=-7.50)

M 1 : 56
X * 0.502
Y * 0.906
Z * 0.962



Z
Y X
All loads (in components), Loadcase 2 stalna , (1 cm 3D = unit) Area element load
(force) in global Z (Unit=10.0 kN/m2) (Min=-16.5) (Max=-2.60)

M 1 : 51
X * 0.502
Y * 0.906
Z * 0.962

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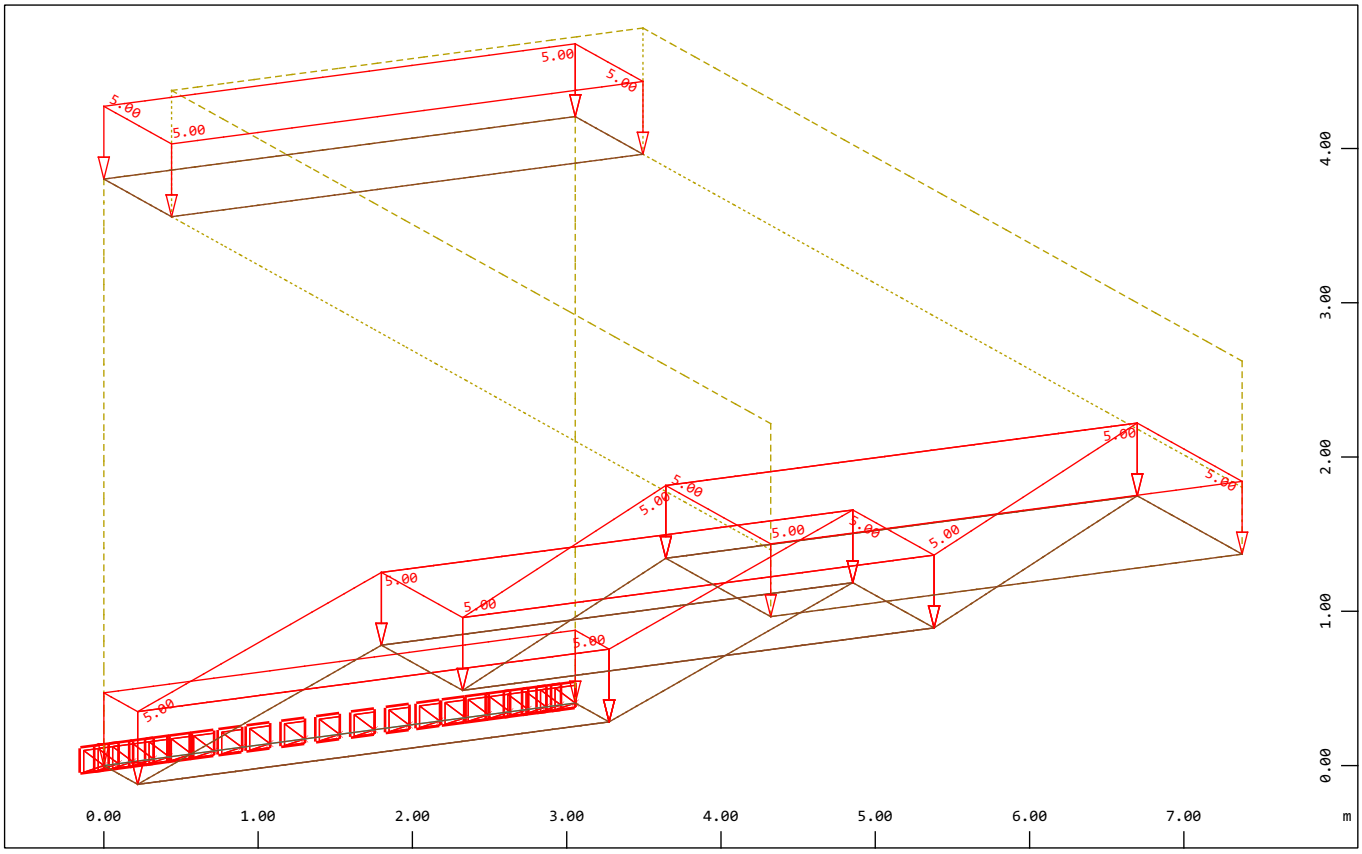
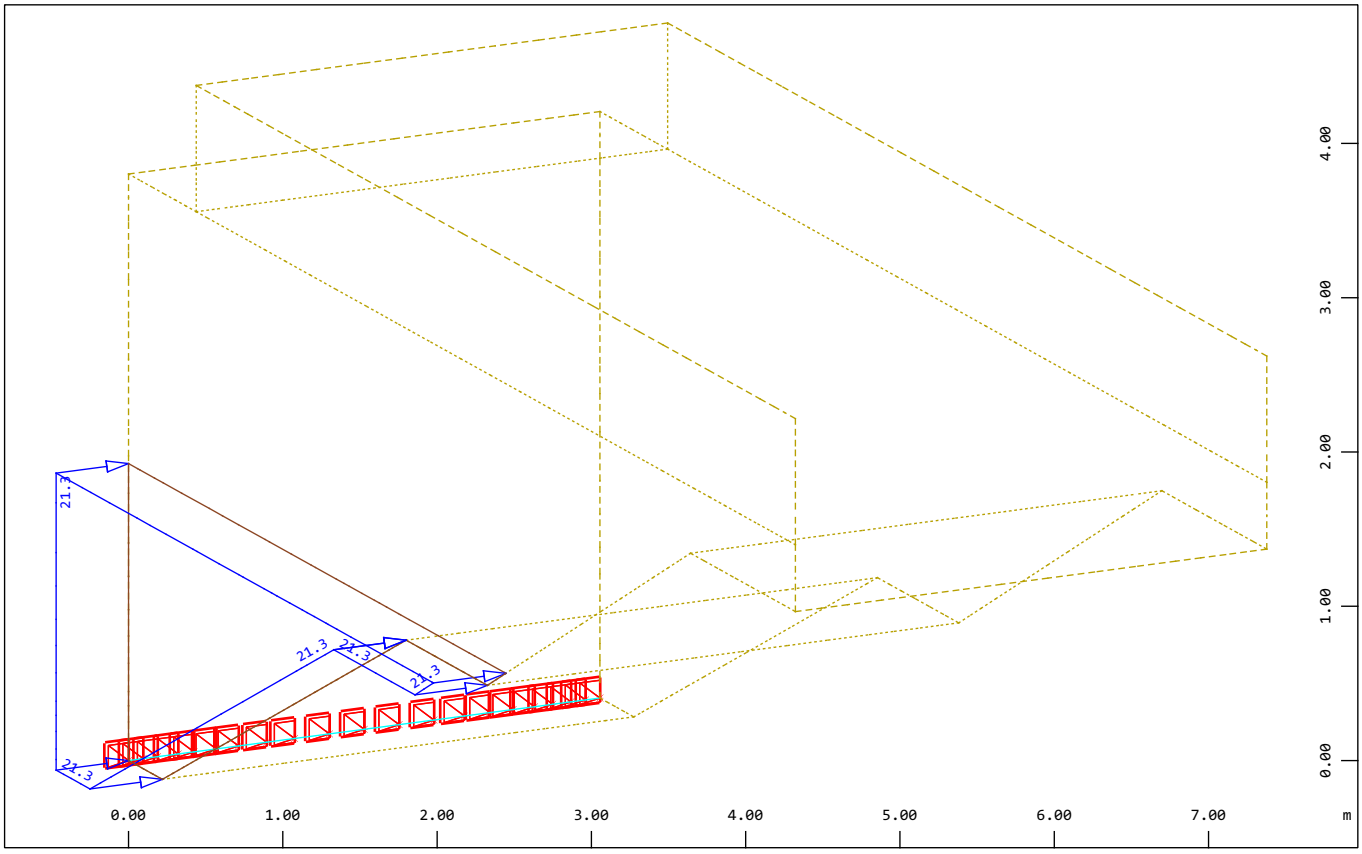
3D model_stopnice
Graphical Output



Z
Y X All loads (in components), Loadcase 10 koristna , (1 cm 3D = unit) Area element load
(force) in global Z (Unit=5.00 kN/m2) (Min=-5.00) (Max=-5.00)

M 1 : 49
X * 0.502
Y * 0.906
Z * 0.962



Z
Y X All loads (in components), Loadcase 20 LM71 , (1 cm 3D = unit) Free area load (force) on
projection in global Y (Unit=20.0 kN/m2) (Max=21.3)

M 1 : 49
X * 0.502
Y * 0.906
Z * 0.962

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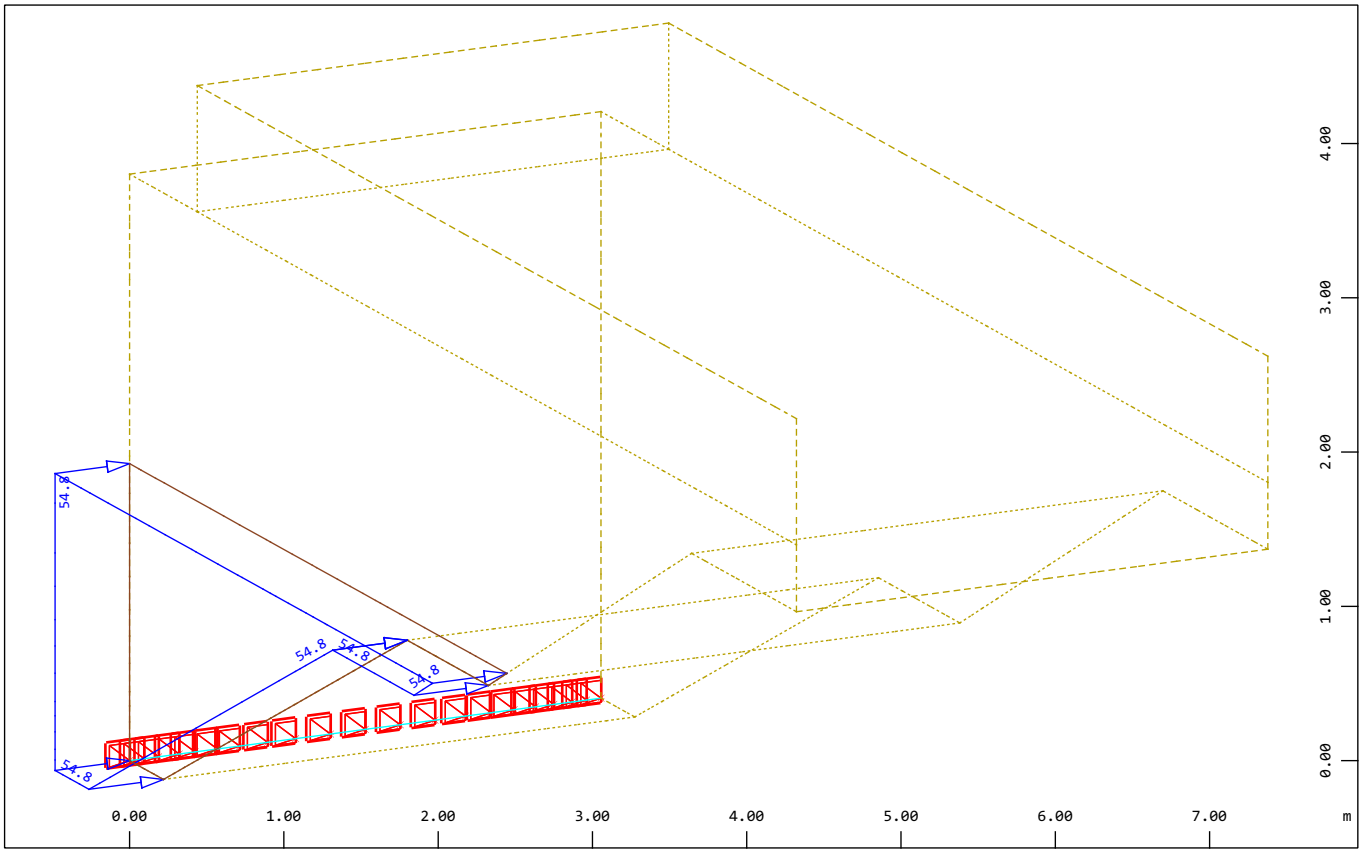
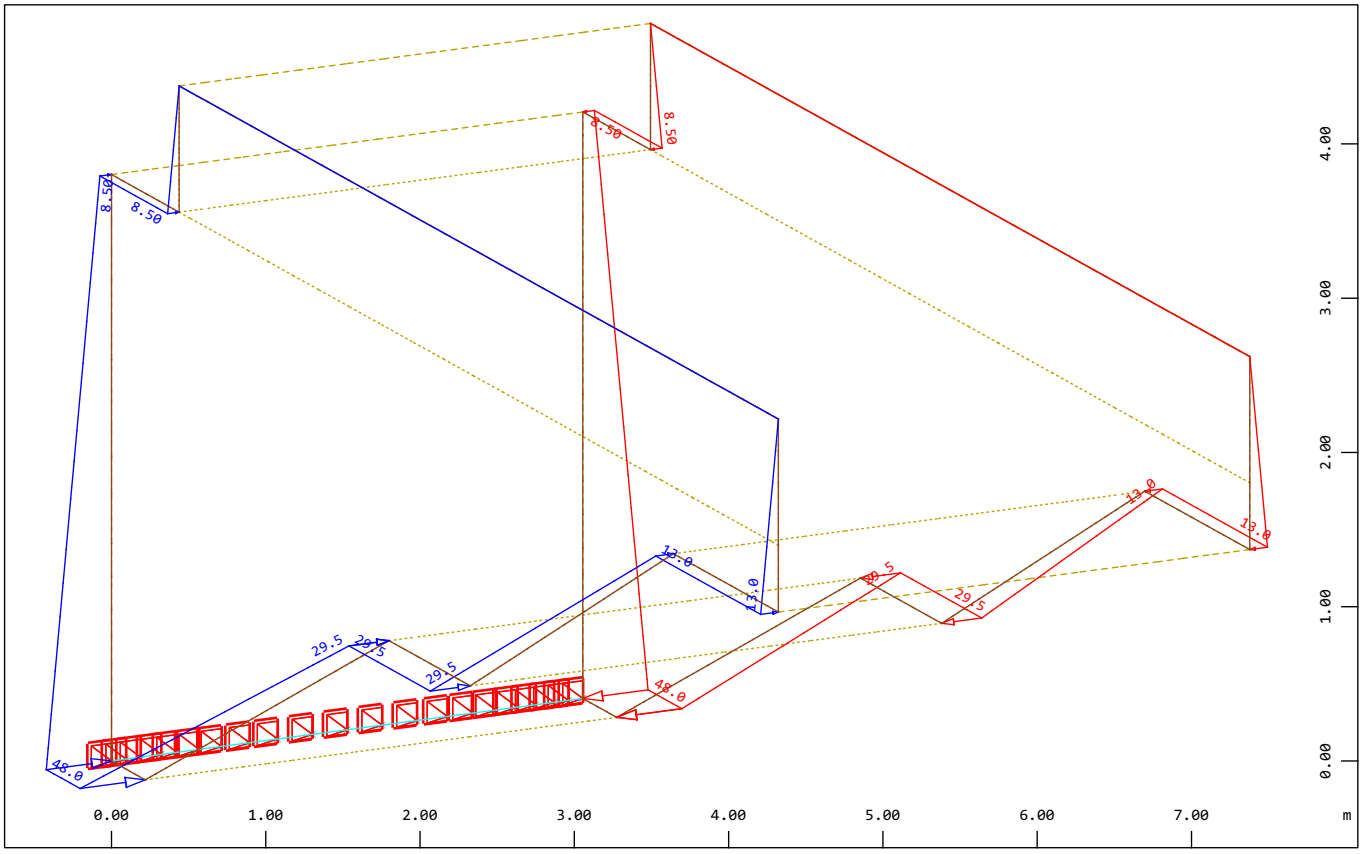
3D model_stopnice
Graphical Output



Z
Y X
All loads (in components), Loadcase 21 SW2 , (1 cm 3D = unit) Free area load (force) on projection in global Y (Unit=50.0 kN/m2) (Max=54.8)

M 1 : 49
X * 0.502
Y * 0.906
Z * 0.962



Z
Y X
All loads (in components), Loadcase 30 zemeljski pritiski , (1 cm 3D = unit) Free area load (force) in global Y (Unit=50.0 kN/m2) (Min=-48.0) (Max=48.0)

M 1 : 49
X * 0.502
Y * 0.906
Z * 0.962

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3D model_stopnice
design parameter list

Reinforcementparameter two layer reinforcement

Selection Grp no.	elem no.	distance d1-u d1-l [mm]	2.lay 2.lay [mm]	bar-diameter ds-u ds-l [mm]	2.lay 2.lay [mm]	crackwidth wk-u wk-l [mm]	2.lay 2.lay [mm]	steelstress sigsu sigsl [MPa]	2.lay 2.lay [MPa]	min.reinf. asu asl [cm2/m]	2.lay 2.lay [cm2/m]
default		-	-	-	-	-	-	-	-	-	-
201		50.0	66.0	16	14	0.30	0.30	-	-	-	-
		50.0	66.0	16	14	0.30	0.30	-	-	-	-
202		50.0	66.0	16	14	0.30	0.30	-	-	-	-
		50.0	66.0	16	14	0.30	0.30	-	-	-	-
203		50.0	66.0	16	14	0.30	0.30	-	-	-	-
		50.0	66.0	16	14	0.30	0.30	-	-	-	-
101		35.0	49.0	16	12	0.30	0.30	-	-	-	-
		50.0	64.0	16	12	0.30	0.30	-	-	-	-
301		50.0	62.0	12	12	0.30	0.30	-	-	-	-
		50.0	62.0	12	12	0.30	0.30	-	-	-	-

distance	upper / lower distance center of bar to surface
bar-diameter	upper / lower bar diameter
crackwidth	upper / lower required crack width
steelstress	upper / lower maximum steel stress in SLS check
min.reinf.	upper / lower minimum reinforcement

The reinforcement directions relate to the local coordinate system of
the elements and have to be plotted graphically.
With the input of a steel stress sigsu... the 'crack design according tables'
uses this given stress sigsu for the corresponding layer. With this input, the check can
be done for bar distances instead of bar diameters, see legend SLS control parameters.

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3D model_stopnice
ULS design

Default design code is EuroNorm EN 1992-2:2005 Concrete Structures (Slowenija) V 2020
Loadcases have been calculated in the Ultimate Limit State
The design uses the Baumann method.

Load Cases for the Design

Loadcase	factor	Designation	
7001	1.000	MAX-MXX QUAD	
7002	1.000	MIN-MXX QUAD	
7003	1.000	MAX-MYY QUAD	
7004	1.000	MIN-MYY QUAD	
7005	1.000	MAX-MXY QUAD	
7006	1.000	MIN-MXY QUAD	
7007	1.000	MAX-VX QUAD	
7008	1.000	MIN-VX QUAD	
7009	1.000	MAX-VY QUAD	
7010	1.000	MIN-VY QUAD	
7011	1.000	MAX-NXX QUAD	
7012	1.000	MIN-NXX QUAD	
7013	1.000	MAX-NYY QUAD	
7014	1.000	MIN-NYY QUAD	
7015	1.000	MAX-NXY QUAD	
7016	1.000	MIN-NXY QUAD	
7017	1.000	MAX-P QUAD	Bedding stresses for punching design
7018	1.000	MIN-P QUAD	Bedding stresses for punching design
7051	1.000	MAX-PX NODE	Nodal reaction punching design
7052	1.000	MIN-PX NODE	Nodal reaction punching design
7053	1.000	MAX-PY NODE	Nodal reaction punching design
7054	1.000	MIN-PY NODE	Nodal reaction punching design
7055	1.000	MAX-PZ NODE	Nodal reaction punching design
7056	1.000	MIN-PZ NODE	Nodal reaction punching design
7057	1.000	MAX-MX NODE	Nodal reaction punching design
7058	1.000	MIN-MX NODE	Nodal reaction punching design
7059	1.000	MAX-MY NODE	Nodal reaction punching design
7060	1.000	MIN-MY NODE	Nodal reaction punching design
7061	1.000	MAX-MZ NODE	Nodal reaction punching design
7062	1.000	MIN-MZ NODE	Nodal reaction punching design

Material (EN 1992-1-1:2004)

MAT	fck [MPa]	fc [MPa]	fctm [MPa]	fy [MPa]	ft [MPa]	minT	Type
1	30.00	25.50	2.90			0.20	
2				500.00	535.43		

MAT material number
fck nominal strength of the concrete
fc strength of the concrete
fctm tensile strength of the concrete
fy yield stress reinforcing steel
ft tensile stress reinforcing steel
minT minimum transverse reinforcement
Type character of the loading

Reduction of FC in case of transvers tension = 25.0 [o/o]

Material-safety-factors:

MAT	concr SC1	SC2	steel SS1	SS2
1	1.50	1.50		
2			1.15	1.15

MAT material number
concr material safety SC1/SC2 = bending/compression
steel material safety steel bending/compression

At direct supports the shear force is linear reduced from 1.0*d up to the face of the support to 70%.
The maximum shear capacity is checked at the face of the support without reduction.
For punching design, the longitudinal reinforcement will be increased up to 1.50%
to avoid shear reinforcement [input PUNC...RO_V].
Outside the punching area, the normal slab shear design may increase the

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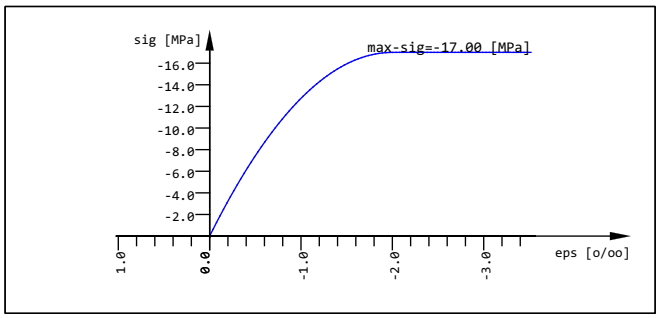
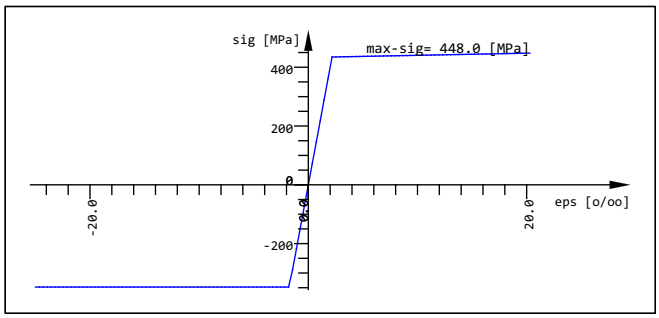
ULS design

longitudinal reinforcement up to 0.20% [input CTRL...RO_V].



Used work law Mno: 1 (first concrete)



Used work law Mno: 2 (first steel)

Reinforcementparameter two layer reinforcement

Selection Grp no.	elem no.	distance d1-u d1-l [mm]	2.lay 2.lay [mm]	bar-diameter ds-u ds-l [mm]	2.lay 2.lay [mm]	crackwidth wk-u wk-l [mm]	2.lay 2.lay [mm]	steelstress sigsu sigsl [MPa]	2.lay 2.lay [MPa]	min.reinf. asu asl [cm2/m]	2.lay 2.lay [cm2/m]
default		-	-	-	-	-	-	-	-	-	-
201		50.0	66.0	16	14	-	-	-	-	-	-
		50.0	66.0	16	14	-	-	-	-	-	-
202		50.0	66.0	16	14	-	-	-	-	-	-
		50.0	66.0	16	14	-	-	-	-	-	-
203		50.0	66.0	16	14	-	-	-	-	-	-
		50.0	66.0	16	14	-	-	-	-	-	-
101		35.0	49.0	16	12	-	-	-	-	-	-
		50.0	64.0	16	12	-	-	-	-	-	-
301		50.0	62.0	12	12	-	-	-	-	-	-
		50.0	62.0	12	12	-	-	-	-	-	-

distance upper / lower distance center of bar to surface
bar-diameter upper / lower bar diameter
crackwidth upper / lower required crack width
steelstress upper / lower maximum steel stress in SLS check
min.reinf. upper / lower minimum reinforcement

The reinforcement directions relate to the local coordinate system of
the elements and have to be plotted graphically.
The reinforcement is saved in the data base as reinforcement distribution number 1

Required Reinforcements acc. to EN 1992-1-1:2004

Grp	Element	t [m]	asu [cm2/m]	asu2 [cm2/m]	asu3 [cm2/m]	asl [cm2/m]	asl2 [cm2/m]	asl3 [cm2/m]	supp [-]	shear [-]	ass [cm2/m2]
101	1010474	0.400	13.45	3.43		13.46	2.69		0.00	1	
	1010523	0.400	0.99	0.20		1.38	6.88		0.88	1	
201	2010250	0.400	2.13	10.63		0.10	0.02		0.72	2	8.03
	2010253	0.400	1.72	8.58		0.71	1.45		0.89	2	8.40

Grp primary group number
Element element number
t plate thickness
asu Principal reinforcements (1st layer) Top
asu2 Cross reinforcements (2nd layer) Top
asu3 Third reinforcements Top
asl Principal reinforcements (1st layer) Bottom
asl2 Cross reinforcements (2nd layer) Bottom
asl3 Third reinforcements Bottom
supp reduction factor for the shear force near supports, punc=point in punching zone -> punching shear design
shear shear zone: 1=Ok, punc=punching area, 1s=asu/l increased for shear, 1d=for punching, 2=required ass, 2m=minimum shear reinf.
ass Shear reinforcement
Elements with maximum values are printed

Required Reinforcements acc. to EN 1992-1-1:2004 at nodes

Grp	Node	t [m]	asu [cm2/m]	asu2 [cm2/m]	asu3 [cm2/m]	asl [cm2/m]	asl2 [cm2/m]	asl3 [cm2/m]	supp [-]	shear [-]	ass [cm2/m2]
101	1025	0.400	18.08	4.20		17.76	3.55		0.00	1s	
	1113	0.400	1.14	0.23		1.63	8.15		0.80	1	
201	1038	0.400	2.52	12.60		0.02			0.00	1	
	1340	0.400	1.94	9.68		1.13	2.18		0.85	2	8.41

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ULS design

Required Reinforcements acc. to EN 1992-1-1:2004 at nodes

Grp	Node	t [m]	asu [cm2/m]	asu2 [cm2/m]	asu3 [cm2/m]	asl [cm2/m]	asl2 [cm2/m]	asl3 [cm2/m]	supp [-]	shear [-]	ass [cm2/m2]
203	1025	0.400	24.15	8.67		24.05	5.72		0.00	1	

Grp	primary group number		asu3	Third reinforcements	Top
Node	Number		asl	Principal reinforcements (1st layer)	Bottom
t	plate thickness		asl2	Cross reinforcements (2nd layer)	Bottom
asu	Principal reinforcements (1st layer)	Top	asl3	Third reinforcements	Bottom
asu2	Cross reinforcements (2nd layer)	Top			

supp reduction factor for the shear force near supports, punc=point in punching zone -> punching shear design
shear shear zone: 1=Ok, punc=punching area, 1s=asu/l increased for shear, 1d=for punching, 2=required ass, 2m=minimum shear reinf.
ass Shear reinforcement
Elements with maximum values are printed

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SLS design

Maximum of reinforcement-distributions

The maximum reinforcement is build of the actual design and the previous distribution 1
and stored as new reinforcement-distribution 2 .
For the SLS stress results only the result of the actual desing is stored, not the maximum.
For a maximum of SLS stresses please use a pure superposition run without design.

Default design code is EuroNorm EN 1992-2:2005 Concrete Structures (Slowenija) V 2020
Loadcases have been calculated in the Serviceability State
The design uses the Baumann method.

Load Cases for the Design

Loadcase	factor	Designation
8201	1.000	MAXP-MXX QUAD
8202	1.000	MINP-MXX QUAD
8203	1.000	MAXP-MYY QUAD
8204	1.000	MINP-MYY QUAD
8205	1.000	MAXP-MXY QUAD
8206	1.000	MINP-MXY QUAD
8207	1.000	MAXP-VX QUAD
8208	1.000	MINP-VX QUAD
8209	1.000	MAXP-VY QUAD
8210	1.000	MINP-VY QUAD
8211	1.000	MAXP-NXX QUAD
8212	1.000	MINP-NXX QUAD
8213	1.000	MAXP-NYY QUAD
8214	1.000	MINP-NYY QUAD
8215	1.000	MAXP-NXY QUAD
8216	1.000	MINP-NXY QUAD
8217	1.000	MAXP-P QUAD
8218	1.000	MINP-P QUAD
8251	1.000	MAXP-PX NODE
8252	1.000	MINP-PX NODE
8253	1.000	MAXP-PY NODE
8254	1.000	MINP-PY NODE
8255	1.000	MAXP-PZ NODE
8256	1.000	MINP-PZ NODE
8257	1.000	MAXP-MX NODE
8258	1.000	MINP-MX NODE
8259	1.000	MAXP-MY NODE
8260	1.000	MINP-MY NODE
8261	1.000	MAXP-MZ NODE
8262	1.000	MINP-MZ NODE
8271	1.000	MAXP-UX NODE
8272	1.000	MINP-UX NODE
8273	1.000	MAXP-UY NODE
8274	1.000	MINP-UY NODE
8275	1.000	MAXP-UZ NODE
8276	1.000	MINP-UZ NODE

Reinforcementparameter two layer reinforcement

Selection Grp no.	elem no.	distance d1-u d1-l [mm]	2.lay 2.lay [mm]	bar-diameter ds-u ds-l [mm]	2.lay 2.lay [mm]	crackwidth wk-u wk-l [mm]	2.lay 2.lay [mm]	steelstress sigsu sigsl [MPa]	2.lay 2.lay [MPa]	min.reinf. asu asl [cm2/m]	2.lay 2.lay [cm2/m]
default		-	-	-	-	-	-	-	-	-	-
201		50.0	66.0	16	14	0.30	0.30	-	-	-	-
		50.0	66.0	16	14	0.30	0.30	-	-	-	-
202		50.0	66.0	16	14	0.30	0.30	-	-	-	-
		50.0	66.0	16	14	0.30	0.30	-	-	-	-
203		50.0	66.0	16	14	0.30	0.30	-	-	-	-

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SLS design

Reinforcementparameter two layer reinforcement

Selection Grp no.	elem no.	distance d1-u 2.lay d1-l 2.lay [mm]	[mm]	bar-diameter ds-u 2.lay ds-l 2.lay [mm]	[mm]	crackwidth wk-u 2.lay wk-l 2.lay [mm]	[mm]	steelstress sigsu 2.lay sigsl 2.lay [MPa]	[MPa]	min.reinf. asu 2.lay asl 2.lay [cm2/m]	[cm2/m]
		50.0	66.0	16	14	0.30	0.30	-	-	-	-
101		35.0	49.0	16	12	0.30	0.30	-	-	-	-
		50.0	64.0	16	12	0.30	0.30	-	-	-	-
301		50.0	62.0	12	12	0.30	0.30	-	-	-	-
		50.0	62.0	12	12	0.30	0.30	-	-	-	-

distance upper / lower distance center of bar to surface
bar-diameter upper / lower bar diameter
crackwidth upper / lower required crack width
steelstress upper / lower maximum steel stress in SLS check
min.reinf. upper / lower minimum reinforcement

The reinforcement directions relate to the local coordinate system of
the elements and have to be plotted graphically.
With the input of a steel stress sigsu... the 'crack design according tables'
uses this given stress sigsu for the corresponding layer. With this input, the check can
be done for bar distances instead of bar diameters, see legend SLS control parameters.

Serviceability limit state control parameters

No	Code	dNW [mm]
1	EN-1992	->para diameter check acc. EN 1992 7.3.3¹

Reinforcement has been increased by SLS design -> WINGRAF: Decisive design check✓

¹ with national annex
dNW Check diameter in crack width design: ->para = values from design parameter definition
3241 elements/nodes were designed with the bar diameter in the crack check (table EN 1992-1-1 7.2N)

Design via bar spacing/steel stress for elements with defined steel stress!
(In this case the maximum bar distance has to keep the condition of
table bar diameter according to the choosen steel stress).
Crack design via bar diameter for elements without defined steel stress!

Required Reinforcements acc. to EN 1992-1-1:2004

Grp	Element	t [m]	asu [cm2/m]	asu2 [cm2/m]	asu3 [cm2/m]	asl [cm2/m]	asl2 [cm2/m]	asl3 [cm2/m]	supp [-]	shear [-]	ass [cm2/m2]
0	1010474	0.400	13.45	3.43		13.46	2.69				
	1010523	0.400	0.99	0.20		1.38	6.88				
	2010250	0.400	2.13	10.63		0.10	0.02				
	2010253	0.400	1.72	8.58		0.71	1.45				

Grp primary group number
Element element number
t plate thickness
asu Principal reinforcements (1st layer) Top
asu2 Cross reinforcements (2nd layer) Top
asu3 Third reinforcements Top
asl Principal reinforcements (1st layer) Bottom
asl2 Cross reinforcements (2nd layer) Bottom
asl3 Third reinforcements Bottom
supp reduction factor for the shear force near supports, punc=point in punching zone -> punching shear design
shear shear zone: 1=Ok, punc=punching area, 1s=asu/l increased for shear, 1d=for punching, 2=required ass, 2m=minimum shear reinf.
ass in a SLS design no shear design is done
Elements with maximum values are printed

Required Reinforcements acc. to EN 1992-1-1:2004 at nodes

Grp	Node	t [m]	asu [cm2/m]	asu2 [cm2/m]	asu3 [cm2/m]	asl [cm2/m]	asl2 [cm2/m]	asl3 [cm2/m]	supp [-]	shear [-]	ass [cm2/m2]
101	1025	0.400	18.08	4.20		17.76	3.55				
	1113	0.400	1.14	0.23		1.63	8.15				
201	1038	0.400	2.52	12.60		0.02					
	1340	0.400	1.94	9.68		1.13	2.18				
203	1025	0.400	24.15	8.67		24.05	5.72				

Grp primary group number
Node Number
t plate thickness
asu Principal reinforcements (1st layer) Top
asu2 Cross reinforcements (2nd layer) Top
asu3 Third reinforcements Top
asl Principal reinforcements (1st layer) Bottom
asl2 Cross reinforcements (2nd layer) Bottom
asl3 Third reinforcements Bottom
supp reduction factor for the shear force near supports, punc=point in punching zone -> punching shear design

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SLS design

shear shear zone: 1=Ok, punc=punching area, 1s=asu/l increased for shear, 1d=for punching, 2=required ass, 2m=minimum shear reinf.
ass in a SLS design no shear design is done
Elements with maximum values are printed

At 8 punching-nodes the bending moments have been reduced (rounded)

Serviceability load results according to EN 1992-1-1

ELEM No	LC No	x [m]	wk [mm]	as1	as2	as3	d1 [mm]	d2 [mm]	d3 [mm]	wk+ [mm]	as1+	as2+	as3+
******	8201	U	>0.30	1.61	8.04		16	14		0.30	1.73	8.04	
******		L	>0.30	13.1	3.93		16	14		0.30	13.06	4.54	

x height of compression zone
wk crack width before increase of reinforcement
as1 reinforcement 1. layer before increase of reinforcement
as2 reinforcement 2. layer before increase of reinforcement
as3 reinforcement 3. layer before increase of reinforcement
d1 reinforcement diameter layer 1-3
wk+ crack width after increase of reinforcement
as1+ reinforcement after increase of reinforcement layer 1-3
Elements with maximum values are printed

Serviceability load results according to EN 1992-1-1 at nodes Group 101

NODE No	LC No	x [m]	wk [mm]	as1	as2	as3	d1 [mm]	d2 [mm]	d3 [mm]	wk+ [mm]	as1+	as2+	as3+
1241	8201	L	>0.30	14.5	2.90		16	12		0.30	14.50	3.04	

x height of compression zone
wk crack width before increase of reinforcement
as1 reinforcement 1. layer before increase of reinforcement
as2 reinforcement 2. layer before increase of reinforcement
as3 reinforcement 3. layer before increase of reinforcement
d1 reinforcement diameter layer 1-3
wk+ crack width after increase of reinforcement
as1+ reinforcement after increase of reinforcement layer 1-3
Elements with maximum values are printed

Serviceability load results according to EN 1992-1-1 at nodes Group 201

NODE No	LC No	x [m]	wk [mm]	as1	as2	as3	d1 [mm]	d2 [mm]	d3 [mm]	wk+ [mm]	as1+	as2+	as3+
1338	8202	U	>0.30	3.64	10.7		16	14		0.30	3.65	10.74	

x height of compression zone
wk crack width before increase of reinforcement
as1 reinforcement 1. layer before increase of reinforcement
as2 reinforcement 2. layer before increase of reinforcement
as3 reinforcement 3. layer before increase of reinforcement
d1 reinforcement diameter layer 1-3
wk+ crack width after increase of reinforcement
as1+ reinforcement after increase of reinforcement layer 1-3
Elements with maximum values are printed

Serviceability load results according to EN 1992-1-1 at nodes Group 203

NODE No	LC No	x [m]	wk [mm]	as1	as2	as3	d1 [mm]	d2 [mm]	d3 [mm]	wk+ [mm]	as1+	as2+	as3+
1241	8201	L	>0.30	17.8	3.57		16	14		0.30	17.84	4.58	

x height of compression zone
wk crack width before increase of reinforcement
as1 reinforcement 1. layer before increase of reinforcement
as2 reinforcement 2. layer before increase of reinforcement
as3 reinforcement 3. layer before increase of reinforcement
d1 reinforcement diameter layer 1-3
wk+ crack width after increase of reinforcement
as1+ reinforcement after increase of reinforcement layer 1-3
Elements with maximum values are printed

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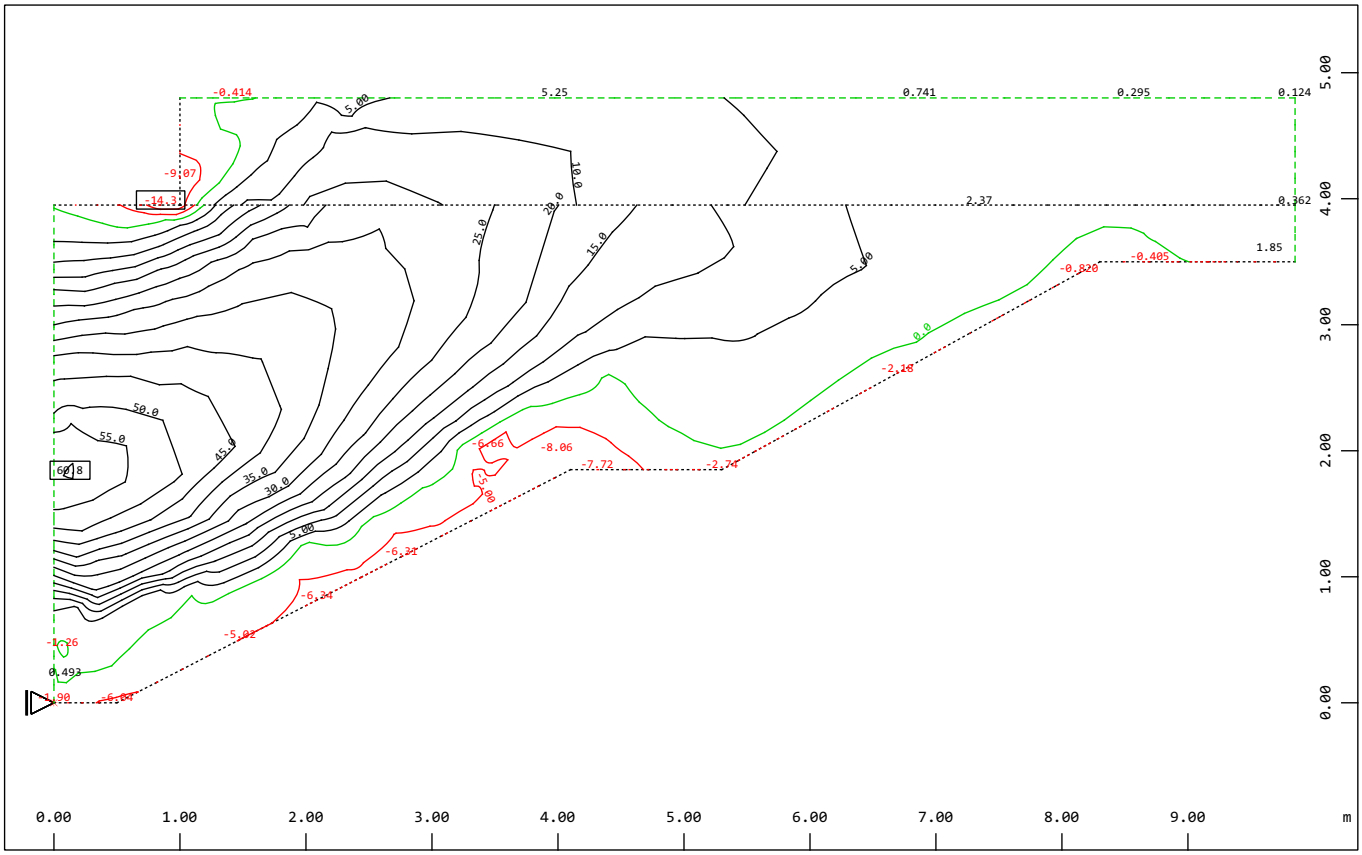
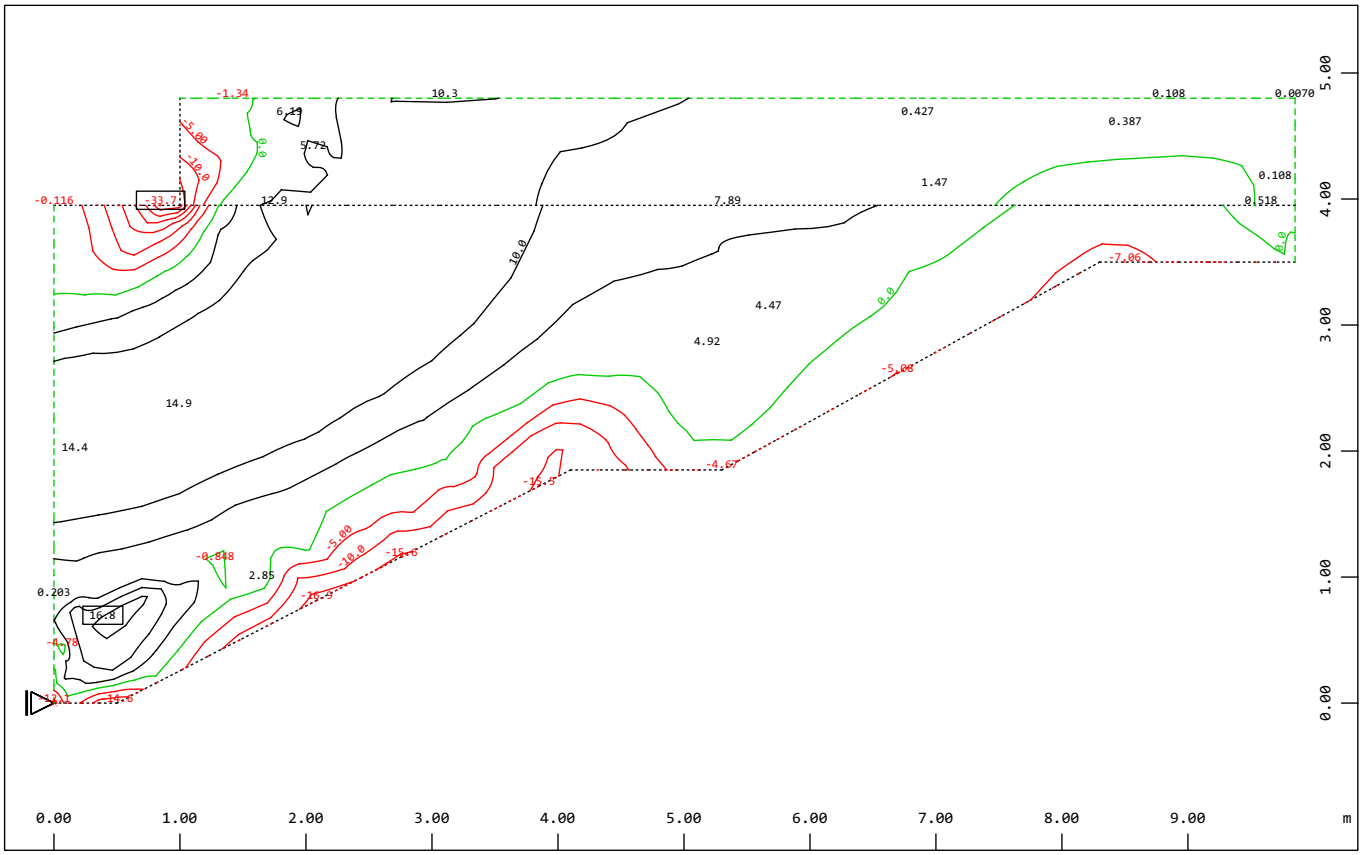
3D model_stopnice
Stene



Z
X

Sector of system Group 201
Principal bending moment I in Node, Loadcase 7003 MAX-MYY QUAD , from -14.3 to 60.8 step
5.00 kNm/m

M 1 : 60



Z
X

Sector of system Group 201
Principal bending moment I in Node, Loadcase 7004 MIN-MYY QUAD , from -33.7 to 16.8 step
5.00 kNm/m

M 1 : 60

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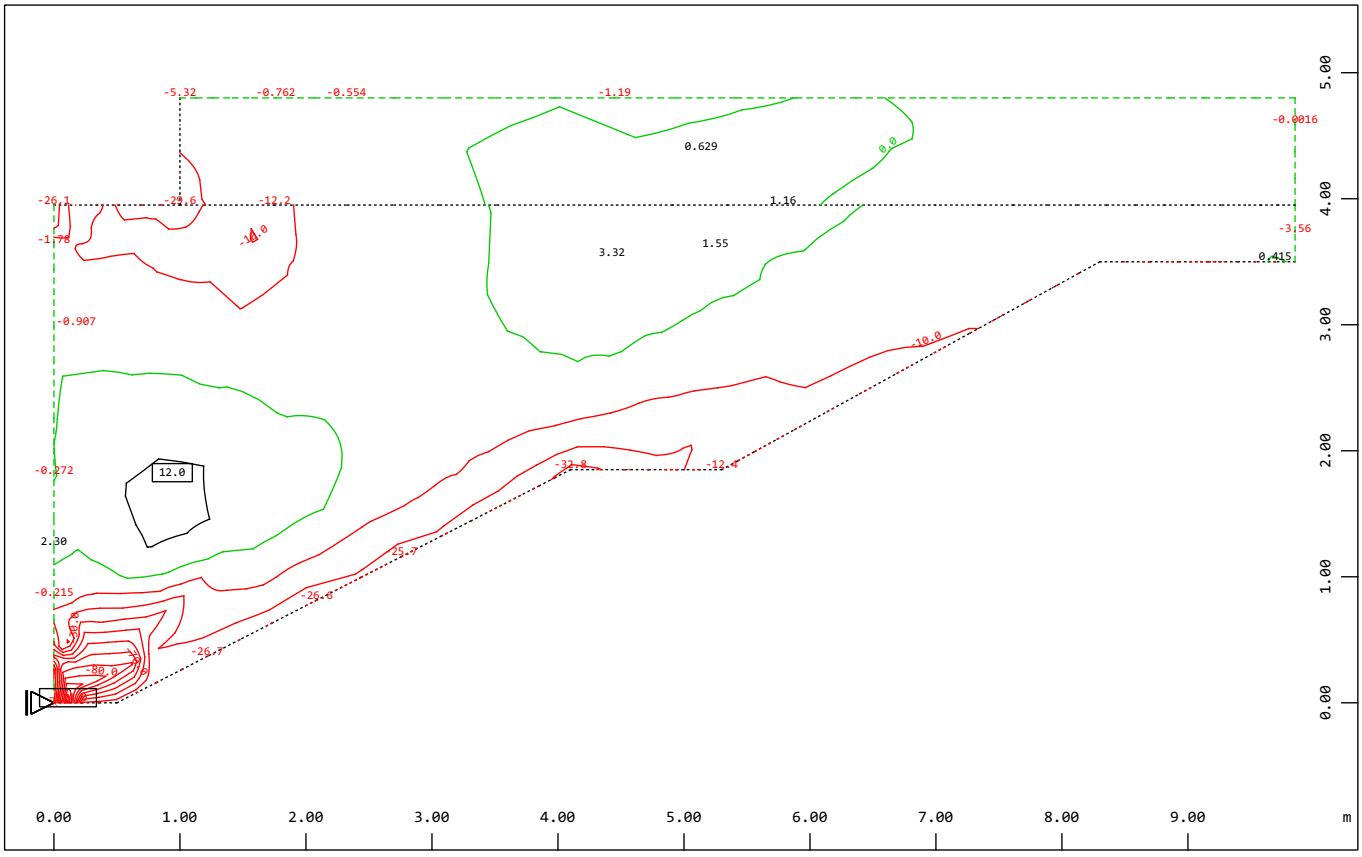
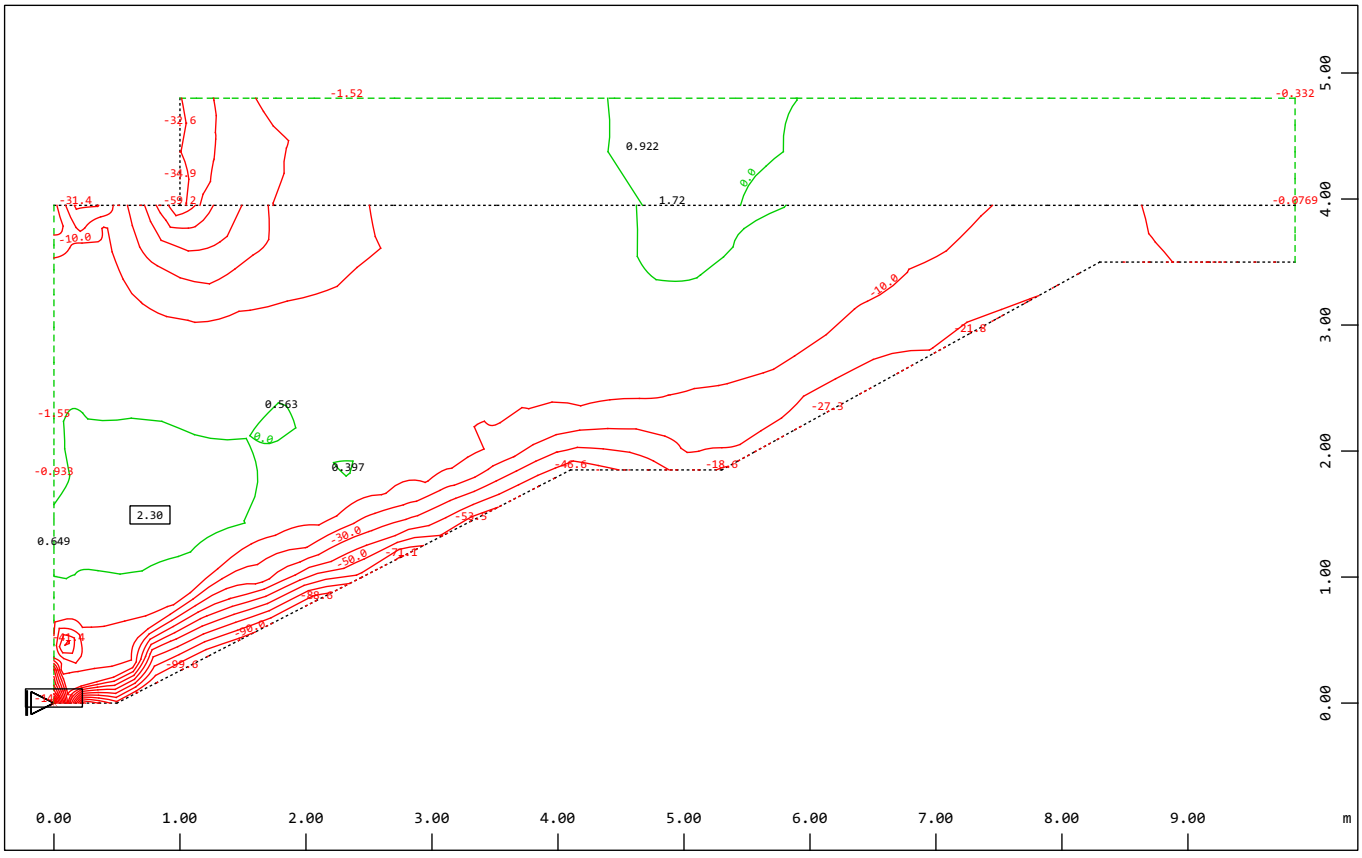
3D model_stopnice
Stene



Z
X

Sector of system Group 201
Principal bending moment II in Node, Loadcase 7001 MAX-MXX QUAD , from -124.0 to 12.0
step 10.0 kNm/m

M 1 : 60



Z
X

Sector of system Group 201
Principal bending moment II in Node, Loadcase 7002 MIN-MXX QUAD , from -140.7 to 2.30
step 10.0 kNm/m

M 1 : 60

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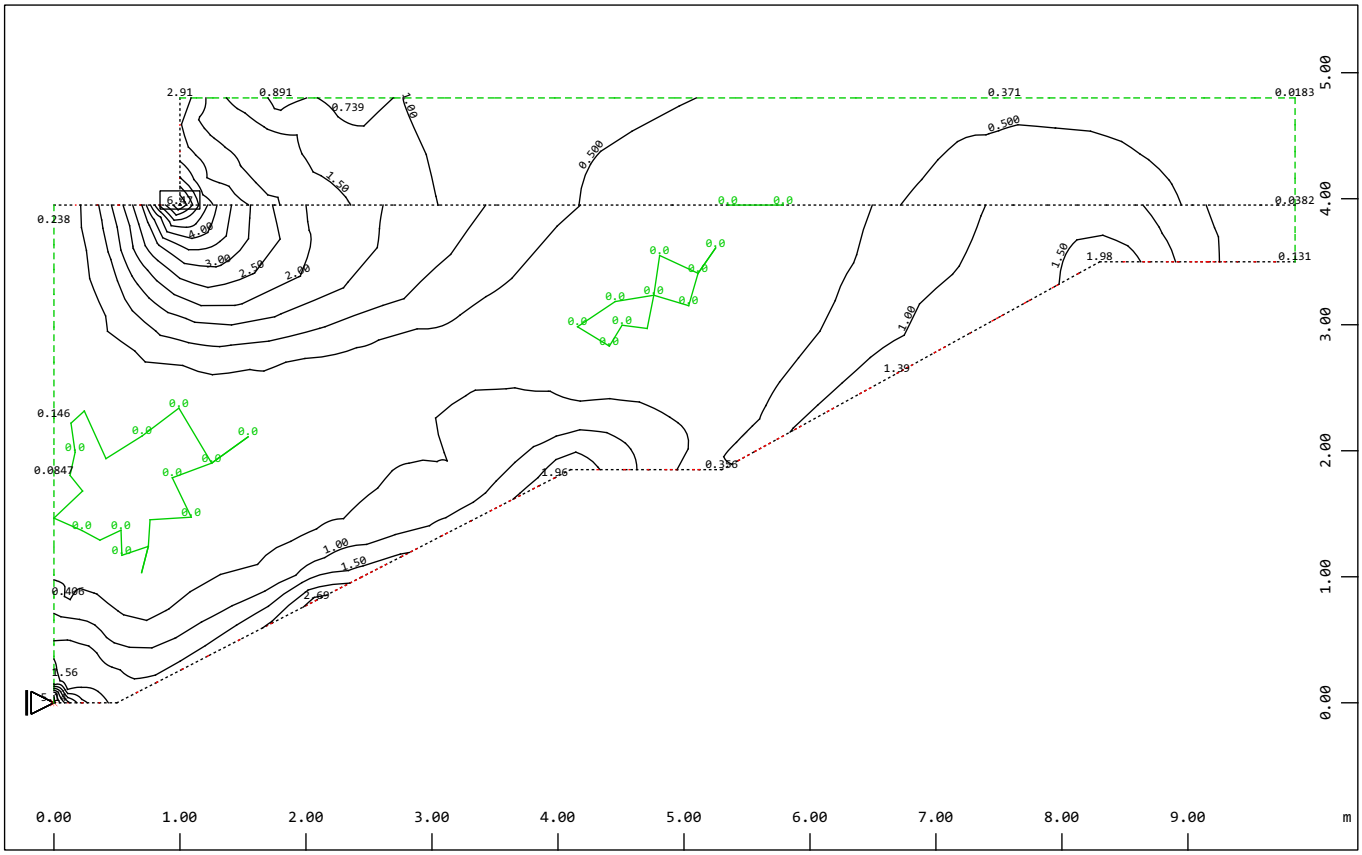
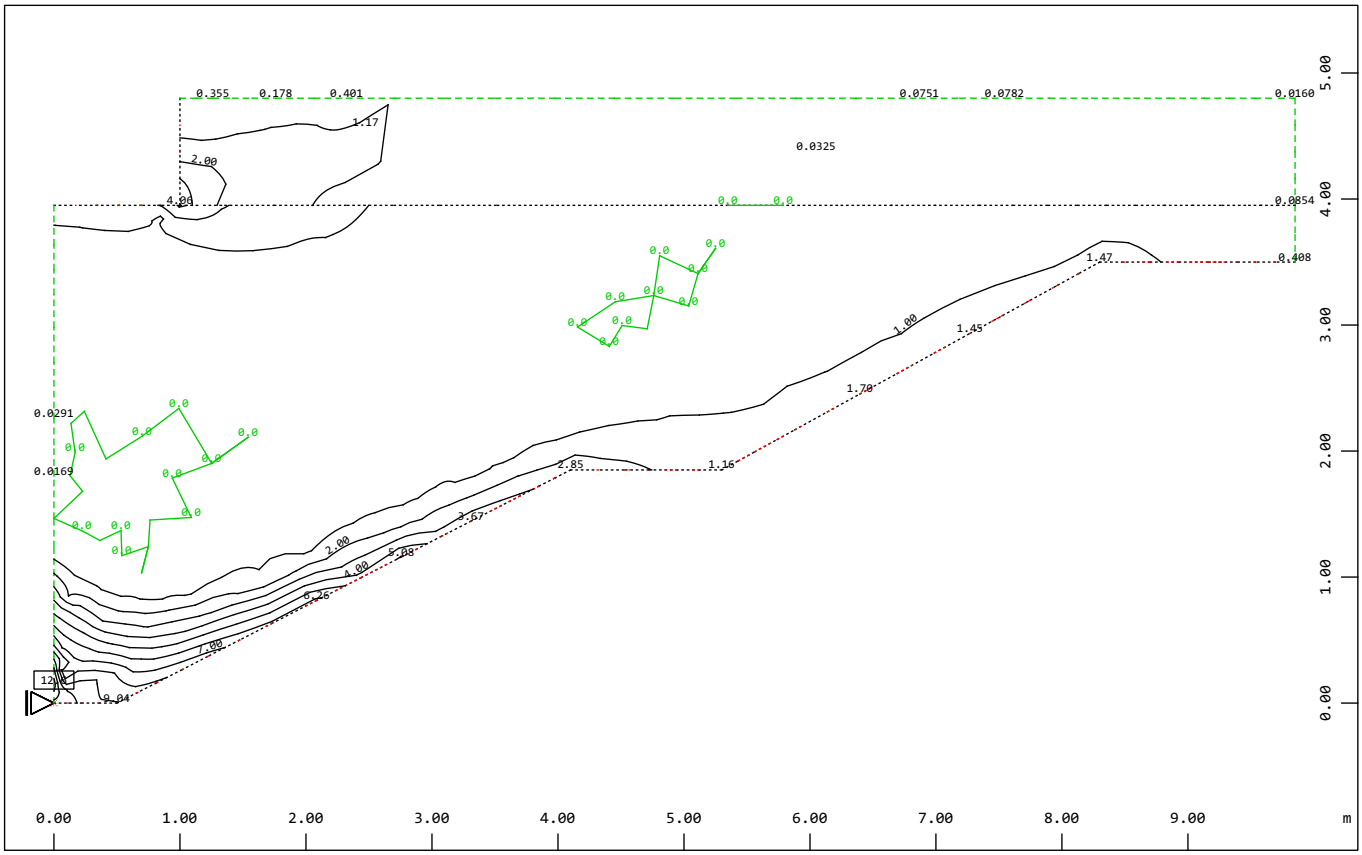
3D model_stopnice
Stene



Z
X
Sector of system Group 201
Quadrilateral Elements , upper Principal reinforcements (1st layer) in Node
1 ULS design , from 0 to 6.47 step 0.500 cm2/m
, Design Case
M 1 : 60



Z
X
Sector of system Group 201
Quadrilateral Elements , upper Cross reinforcements (2nd layer) in Node
ULS design , from 0 to 12.6 step 1.00 cm2/m
, Design Case 1
M 1 : 60

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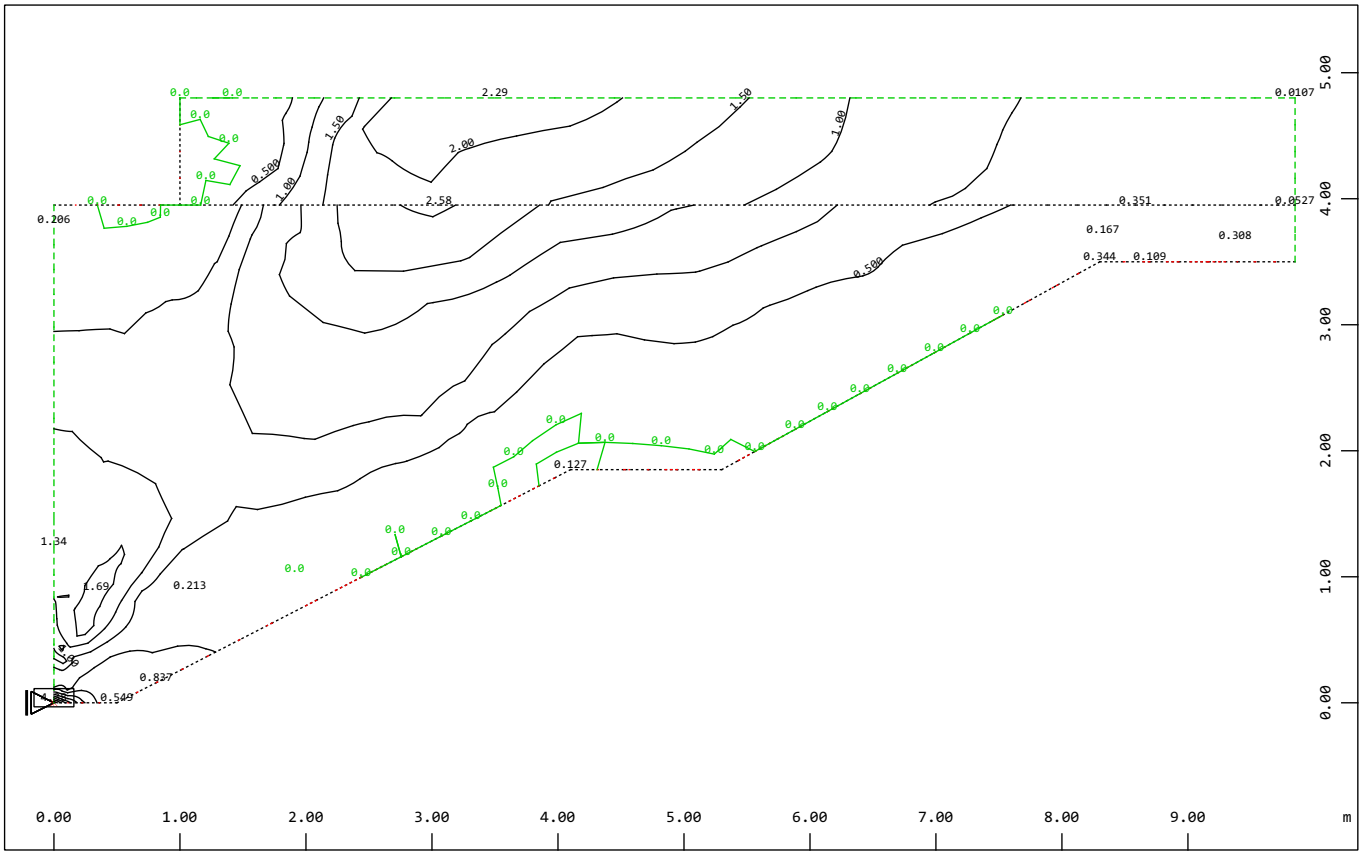
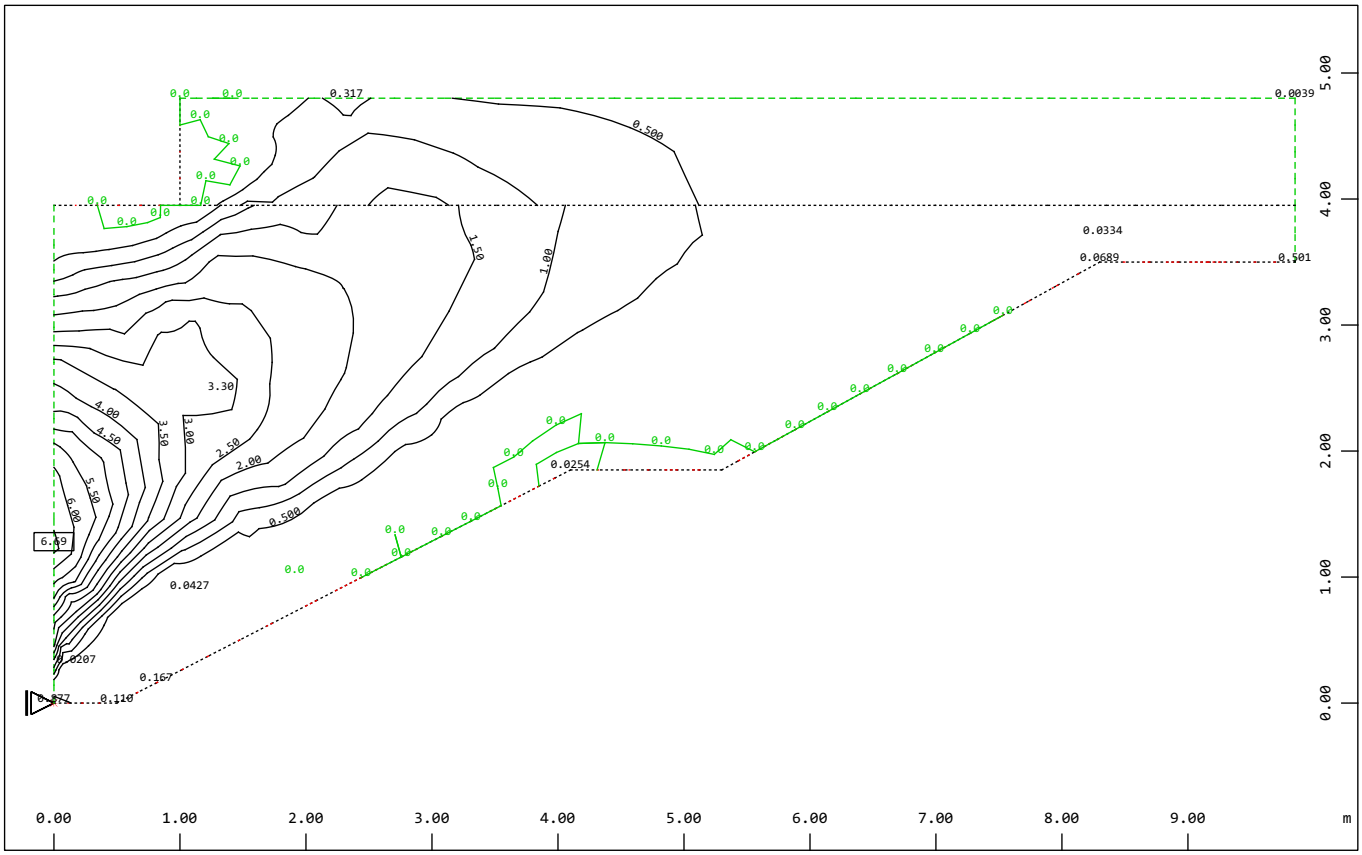
3D model_stopnice
Stene



Sector of system Group 201 M 1 : 60
Quadrilateral Elements , lower Principal reinforcements (1st layer) in Node , Design Case
1 ULS design , from 0 to 4.38 step 0.500 cm2/m



Sector of system Group 201 M 1 : 60
Quadrilateral Elements , lower Cross reinforcements (2nd layer) in Node , Design Case 1
ULS design , from 0 to 6.69 step 0.500 cm2/m

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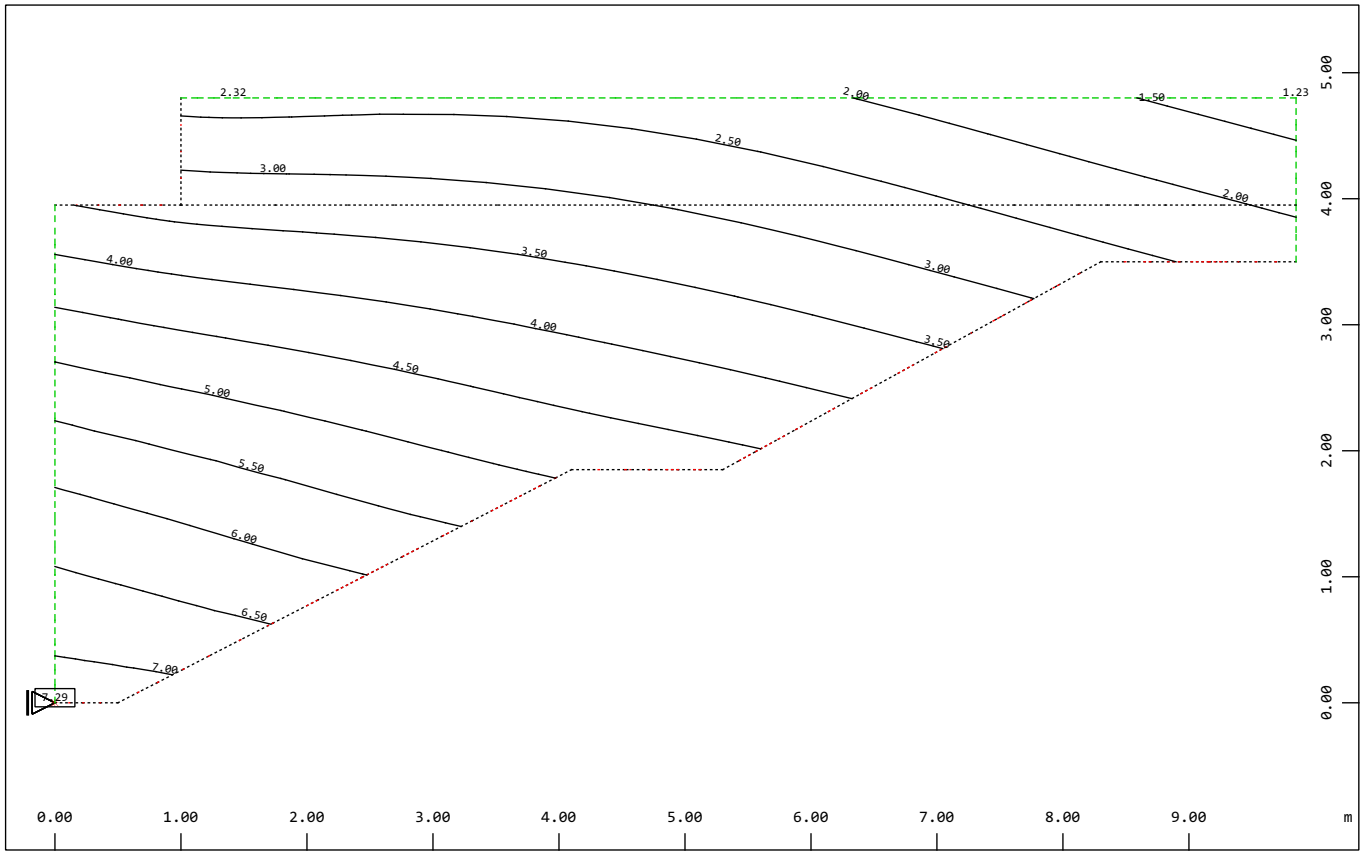
3D model_stopnice
Stene



Sector of system Group 201 M 1 : 60
Z
Y X
Nodal displacement in global Y in Node , Loadcase 8073 MAXR-UY NODE , from 1.23 to 7.29
step 0.500 mm

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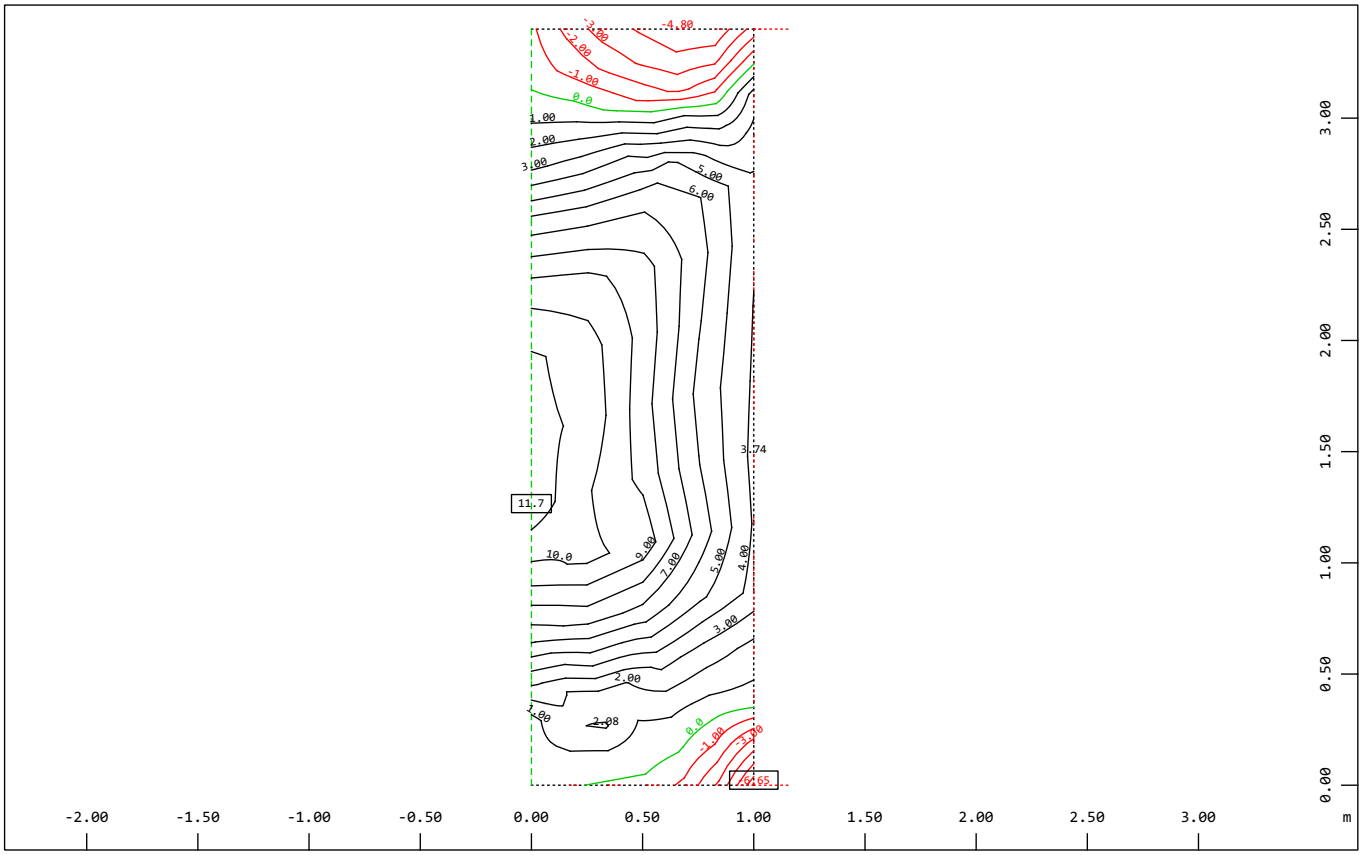
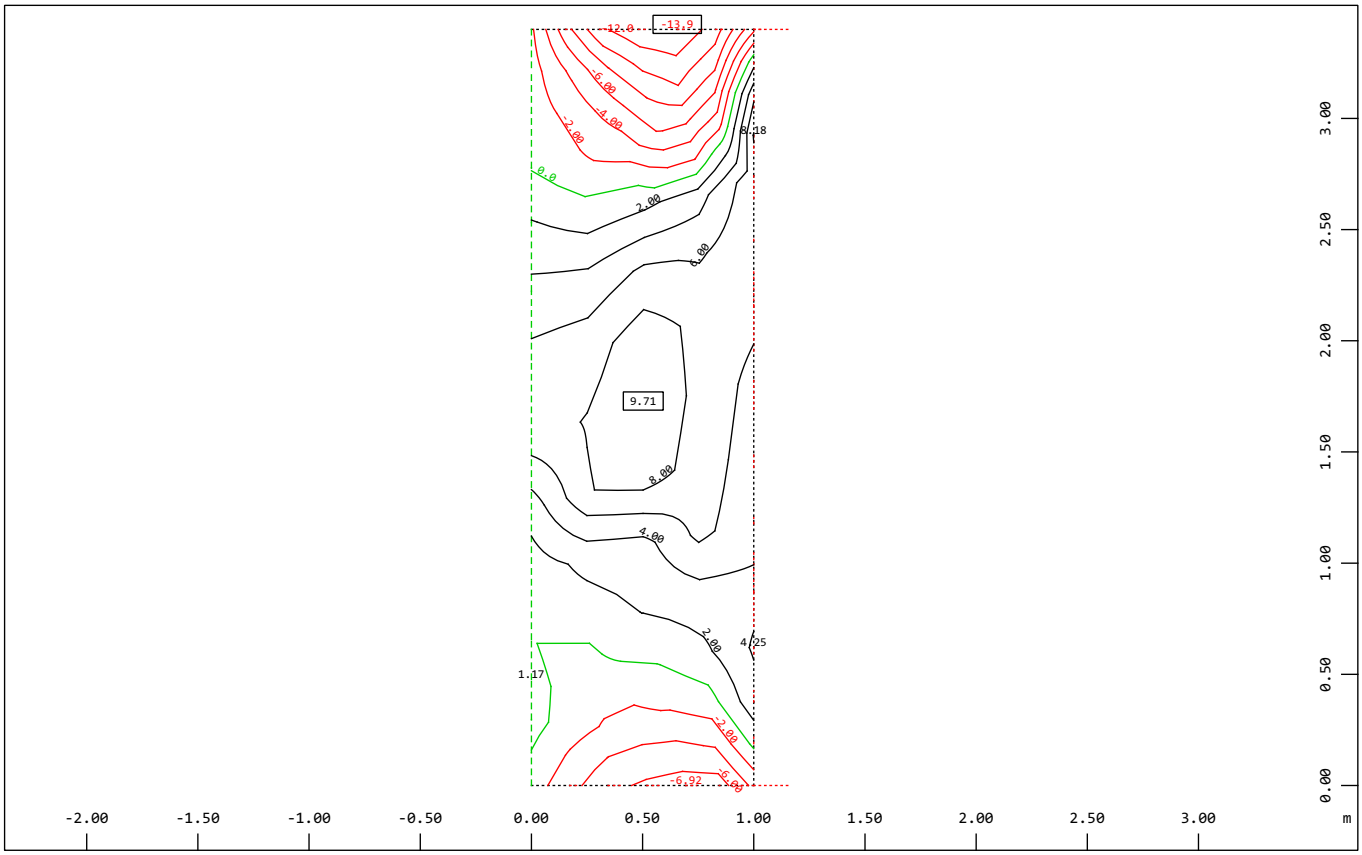
3D model_stopnice
Zg plosca



Y
Z—X

Sector of system Group 301 M 1 : 34
Principal bending moment I in Node, Loadcase 7003 MAX-MYY QUAD , from -6.65 to 11.7 step
1.00 kNm/m



Y
Z—X

Sector of system Group 301 M 1 : 34
Principal bending moment I in Node, Loadcase 7004 MIN-MYY QUAD , from -13.9 to 9.71 step
2.00 kNm/m

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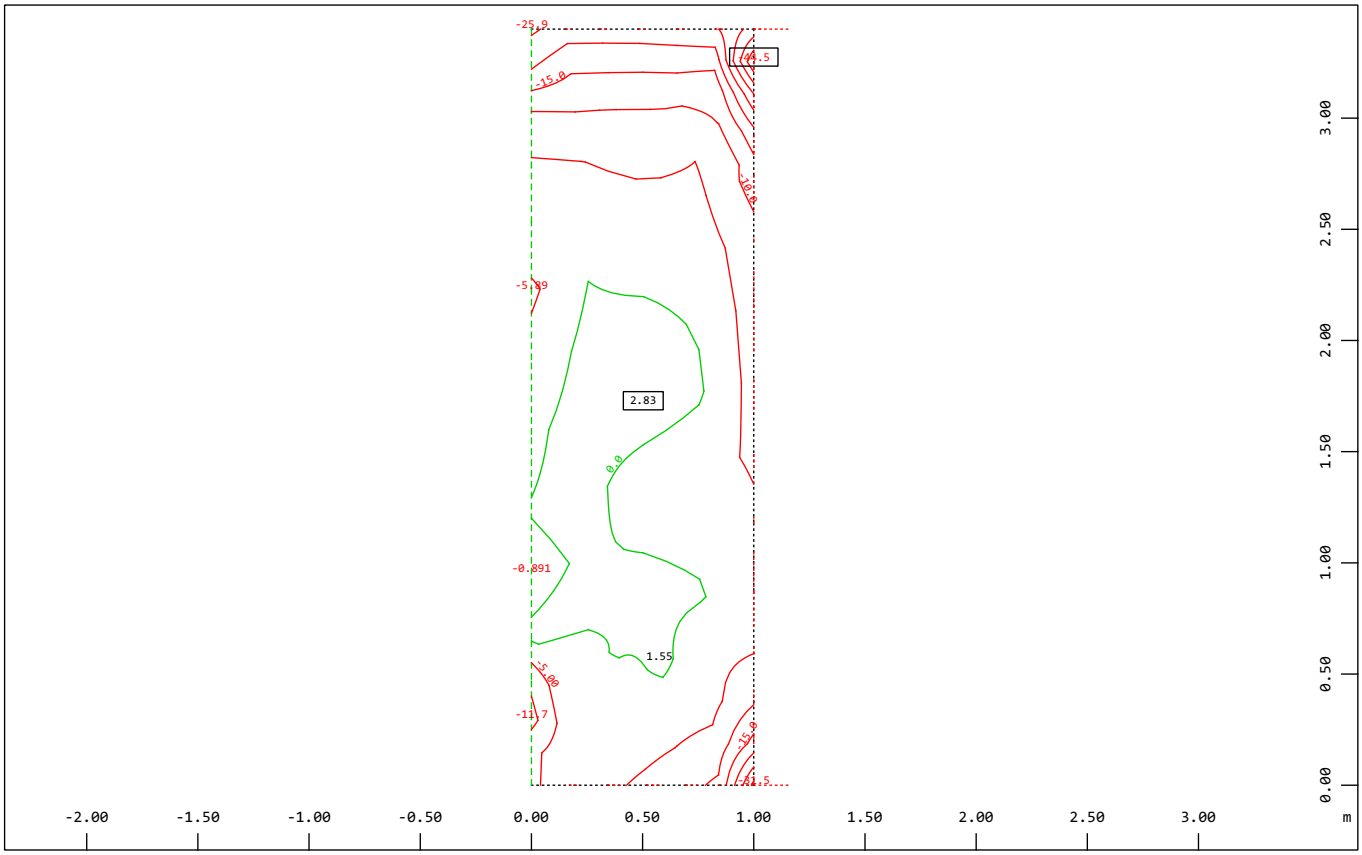
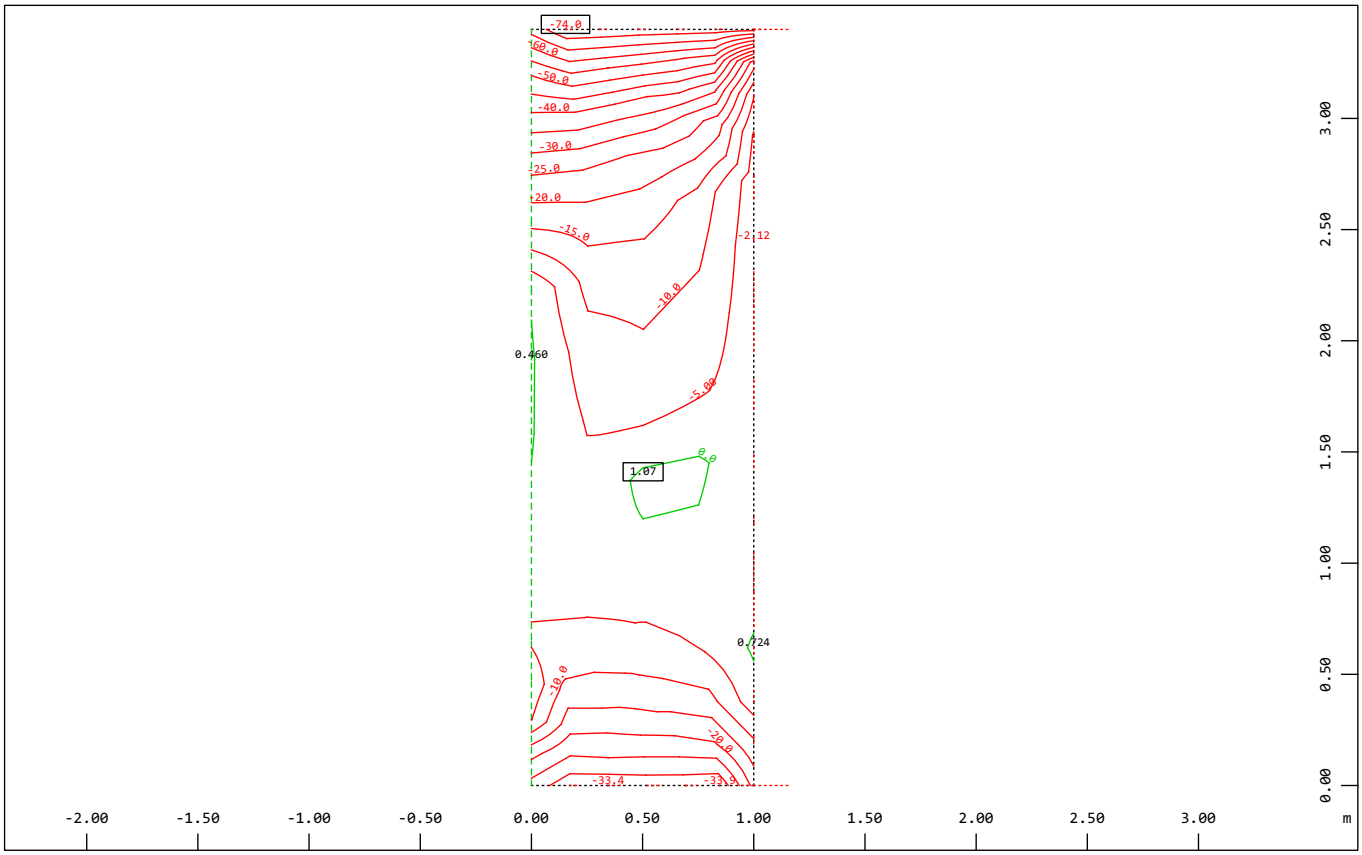
3D model_stopnice
Zg plosca



Y
Z—X
Sector of system Group 301
M 1 : 34
Principal bending moment II in Node, Loadcase 7001 MAX-MXX QUAD , from -44.5 to 2.83
step 5.00 kNm/m



Y
Z—X
Sector of system Group 301
M 1 : 34
Principal bending moment II in Node, Loadcase 7002 MIN-MXX QUAD , from -74.0 to 1.07
step 5.00 kNm/m

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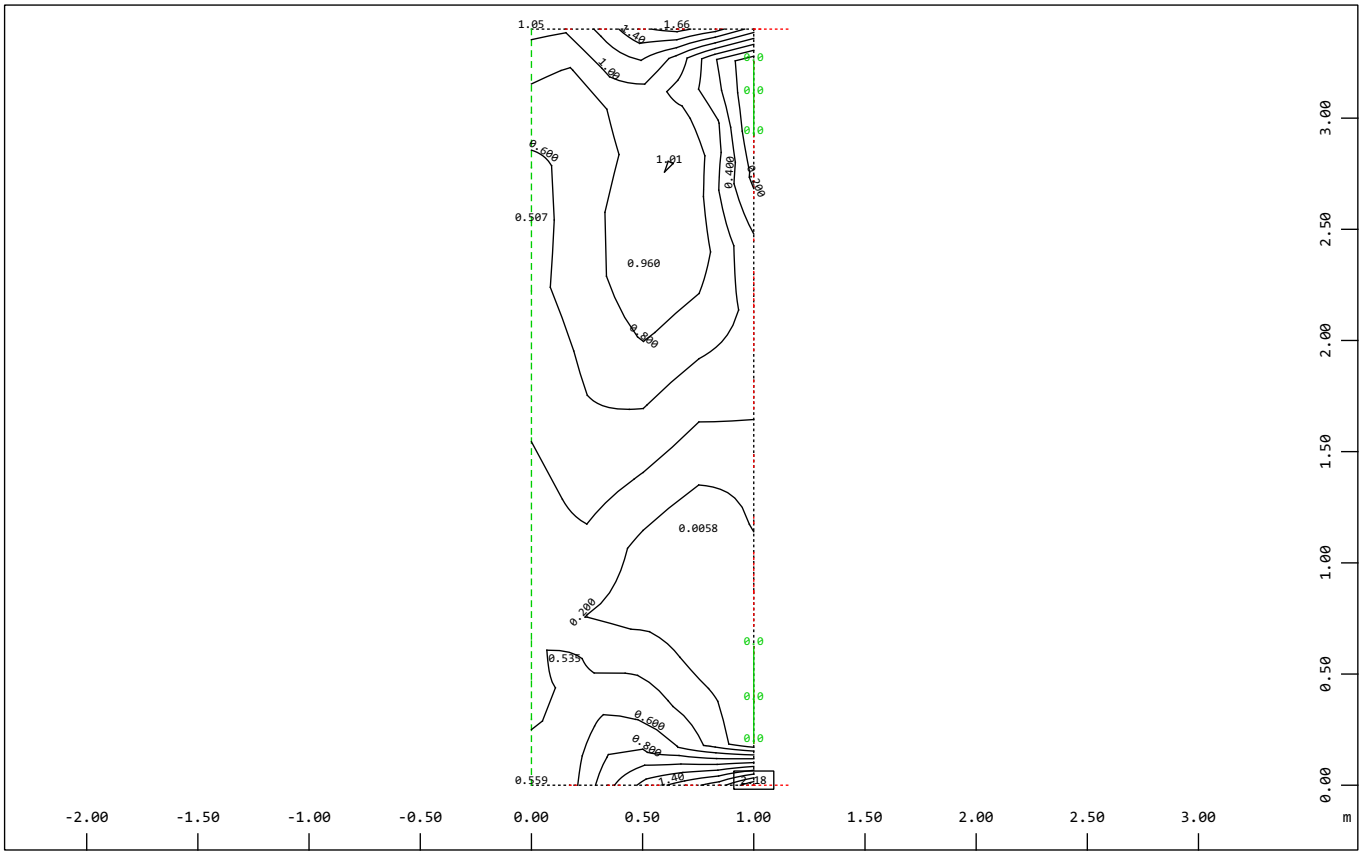
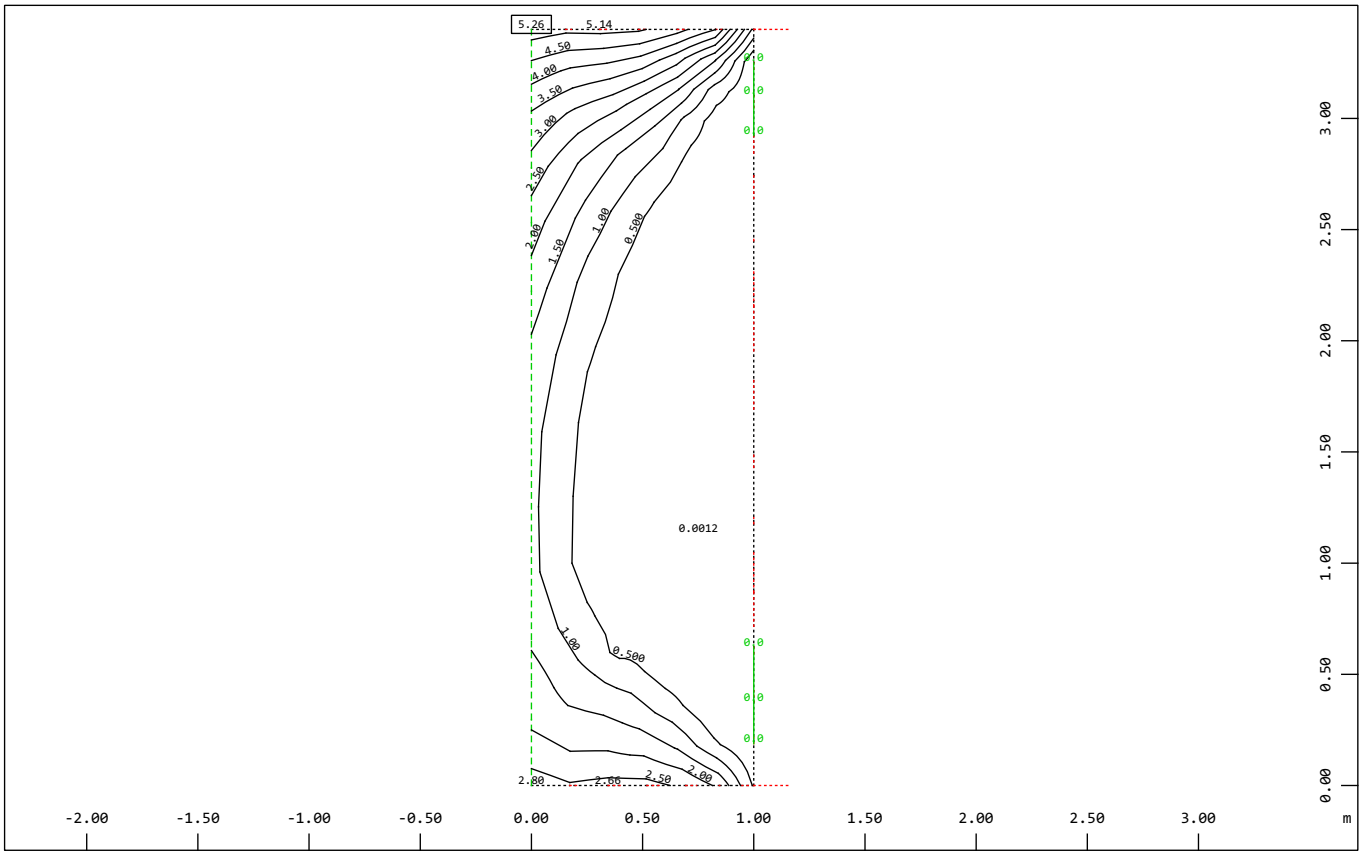
3D model_stopnice
Zg plosca



Y
Z—X
Sector of system Group 301
Quadrilateral Elements , upper Principal reinforcements (1st layer) in Node
1 ULS design , from 0 to 2.18 step 0.200 cm2/m
M 1 : 34
, Design Case



Y
Z—X
Sector of system Group 301
Quadrilateral Elements , upper Cross reinforcements (2nd layer) in Node
ULS design , from 0 to 5.26 step 0.500 cm2/m
M 1 : 34
, Design Case 1

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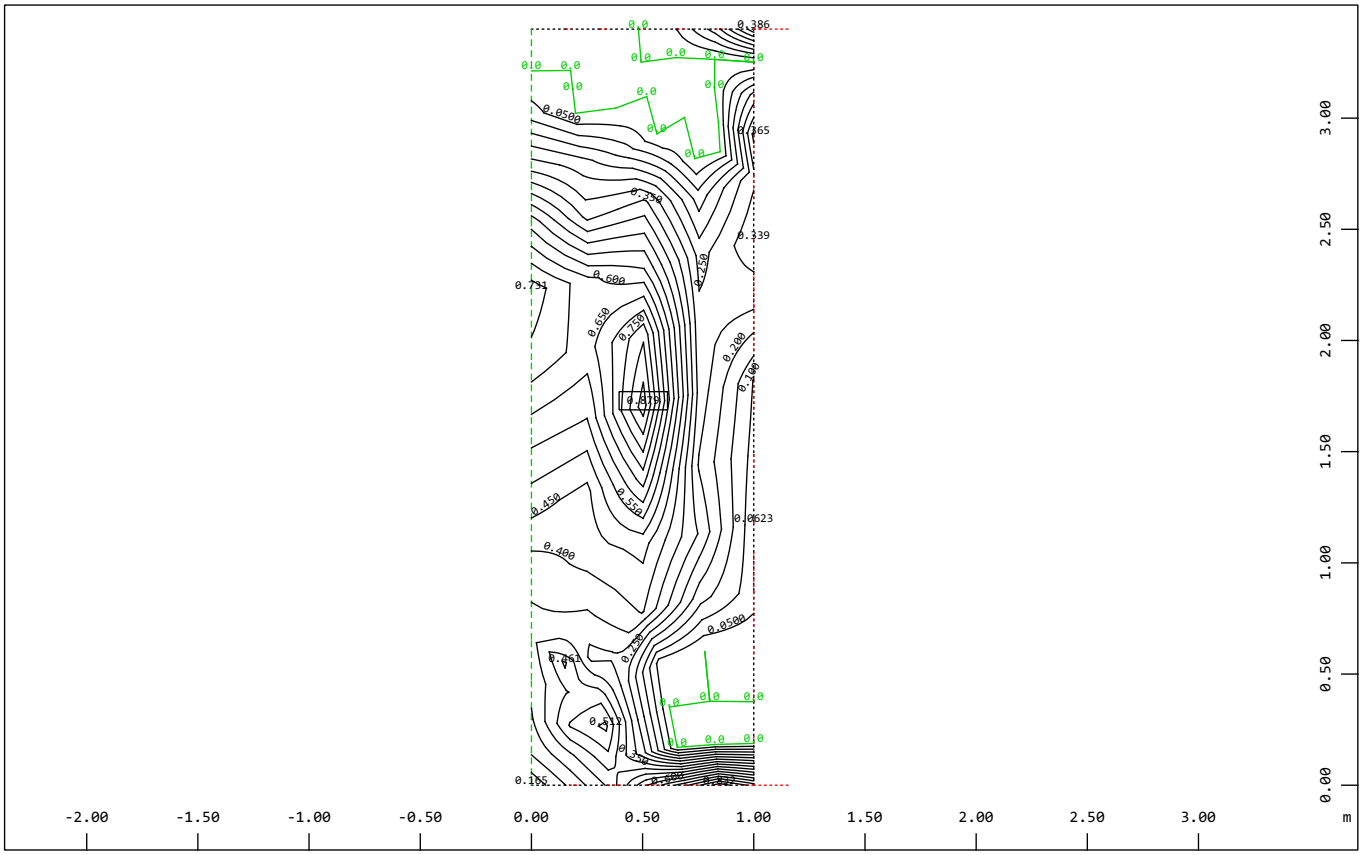
3D model_stopnice
Zg plosca

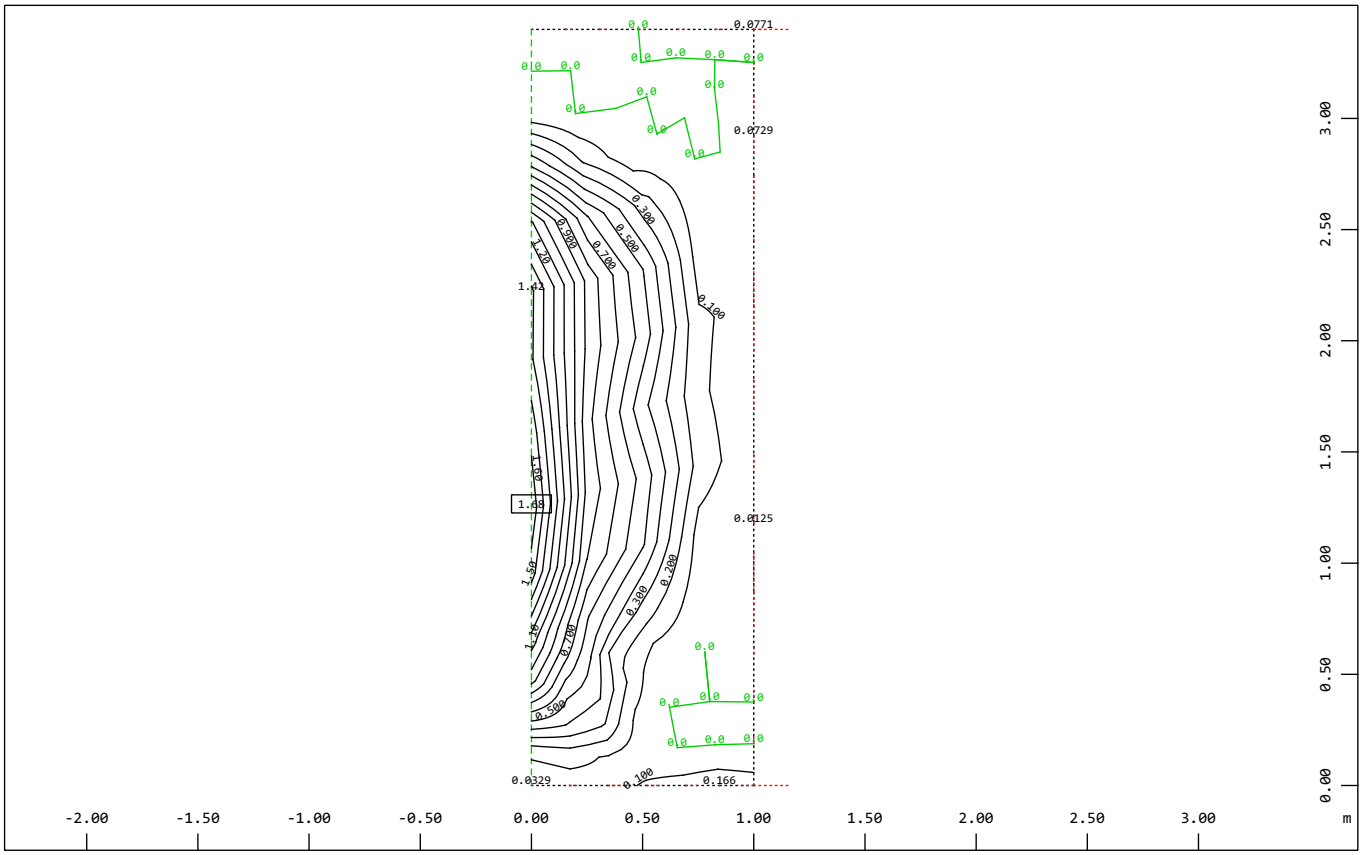


Y
Z—X

Sector of system Group 301
Quadrilateral Elements , lower Principal reinforcements (1st layer) in Node
1 ULS design , from 0 to 0.879 step 0.0500 cm2/m

M 1 : 34

, Design Case



Y
Z—X

Sector of system Group 301
Quadrilateral Elements , lower Cross reinforcements (2nd layer) in Node
ULS design , from 0 to 1.68 step 0.100 cm2/m

M 1 : 34

, Design Case 1

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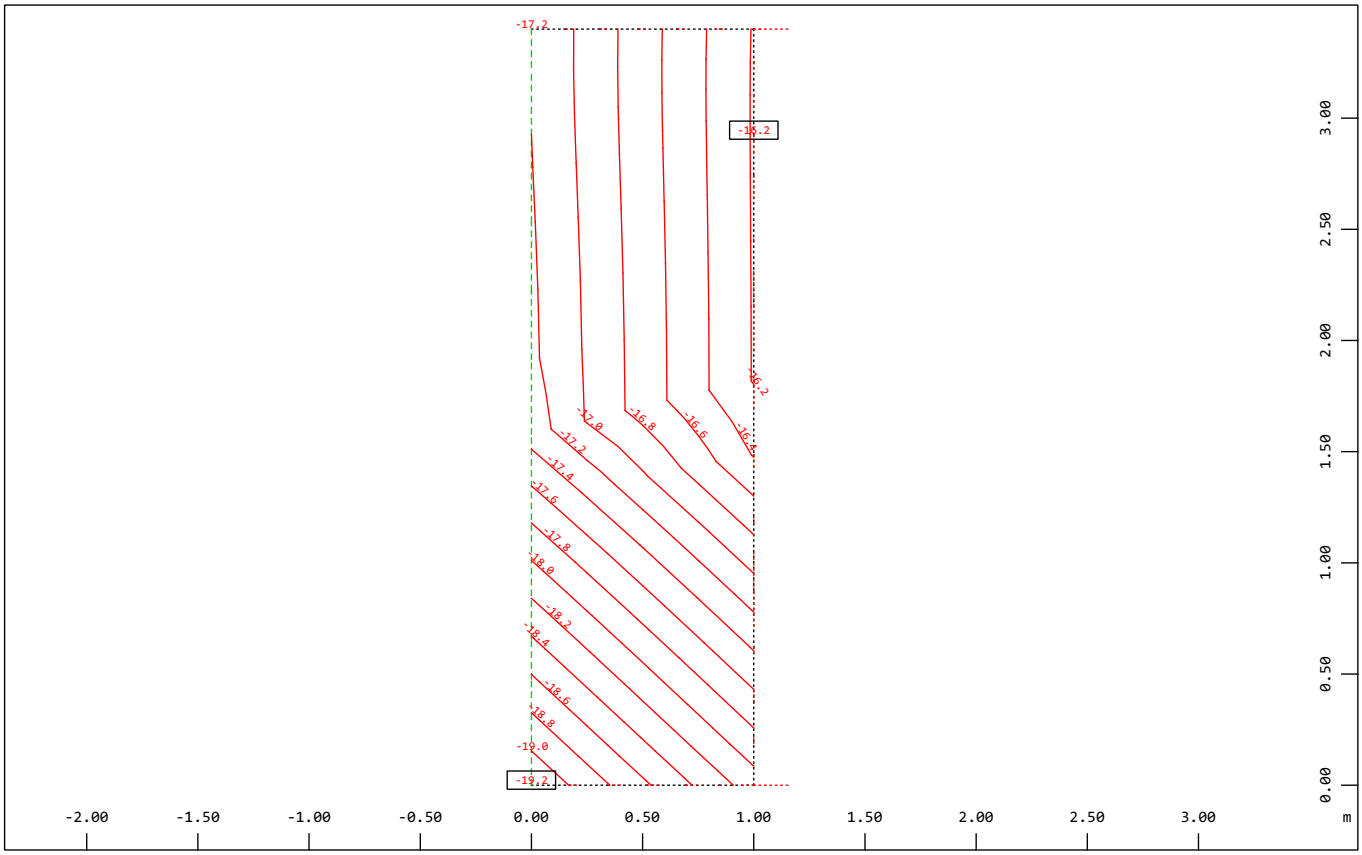
3D model_stopnice
Zg plosca



Y
Z X

Sector of system Group 301
Nodal displacement in global Z in Node , Loadcase 8076 MINR-UZ NODE , from -19.2 to -16.2 step 0.200 mm

M 1 : 34

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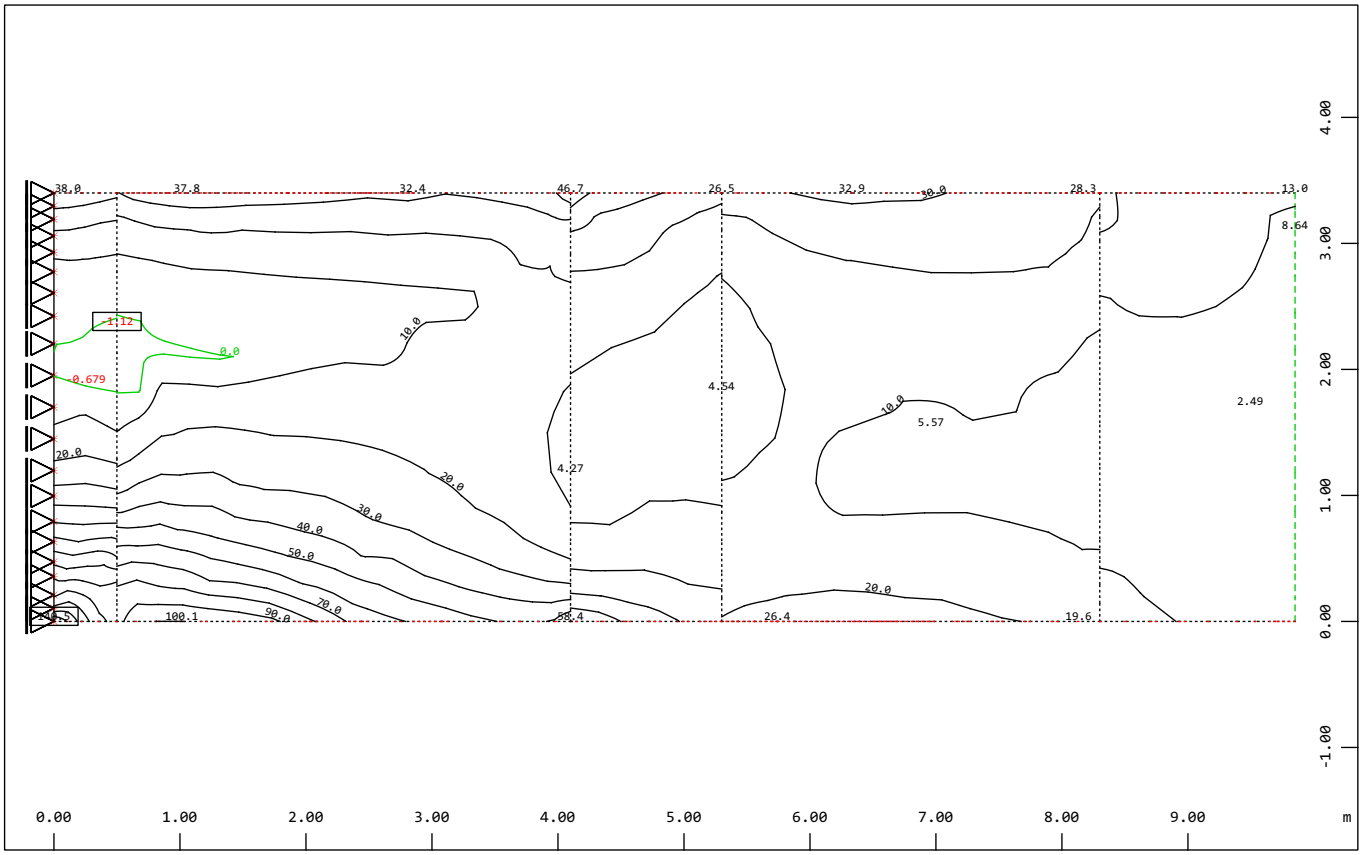
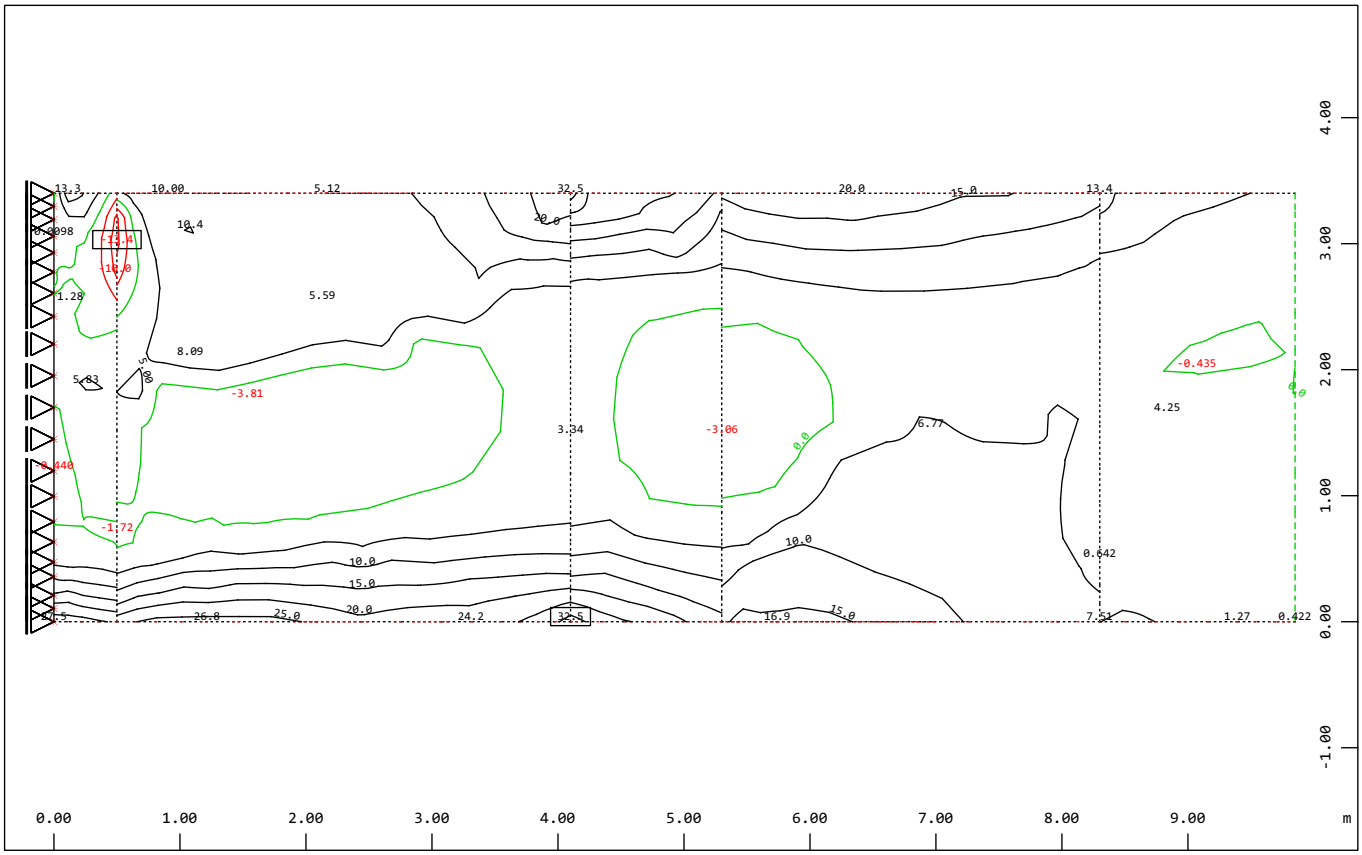
3D model_stopnice
Tem plosca



Y
Z—X

Sector of system Group 101
Principal bending moment I in Node, Loadcase 7003 MAX-MYY QUAD , from -1.12 to 140.5
step 10.0 kNm/m

M 1 : 60



Y
Z—X

Sector of system Group 101
Principal bending moment I in Node, Loadcase 7004 MIN-MYY QUAD , from -13.4 to 32.5 step
5.00 kNm/m

M 1 : 60

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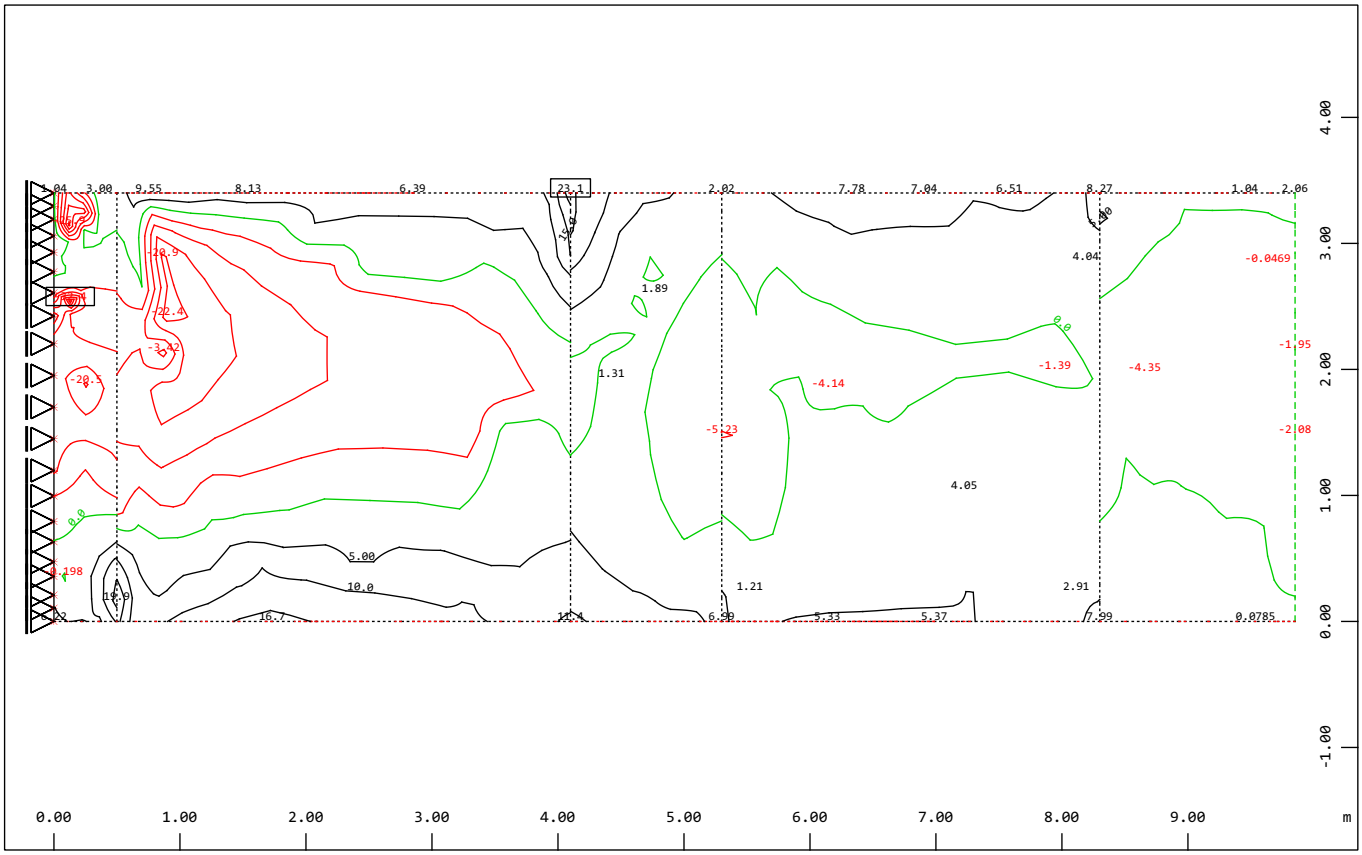
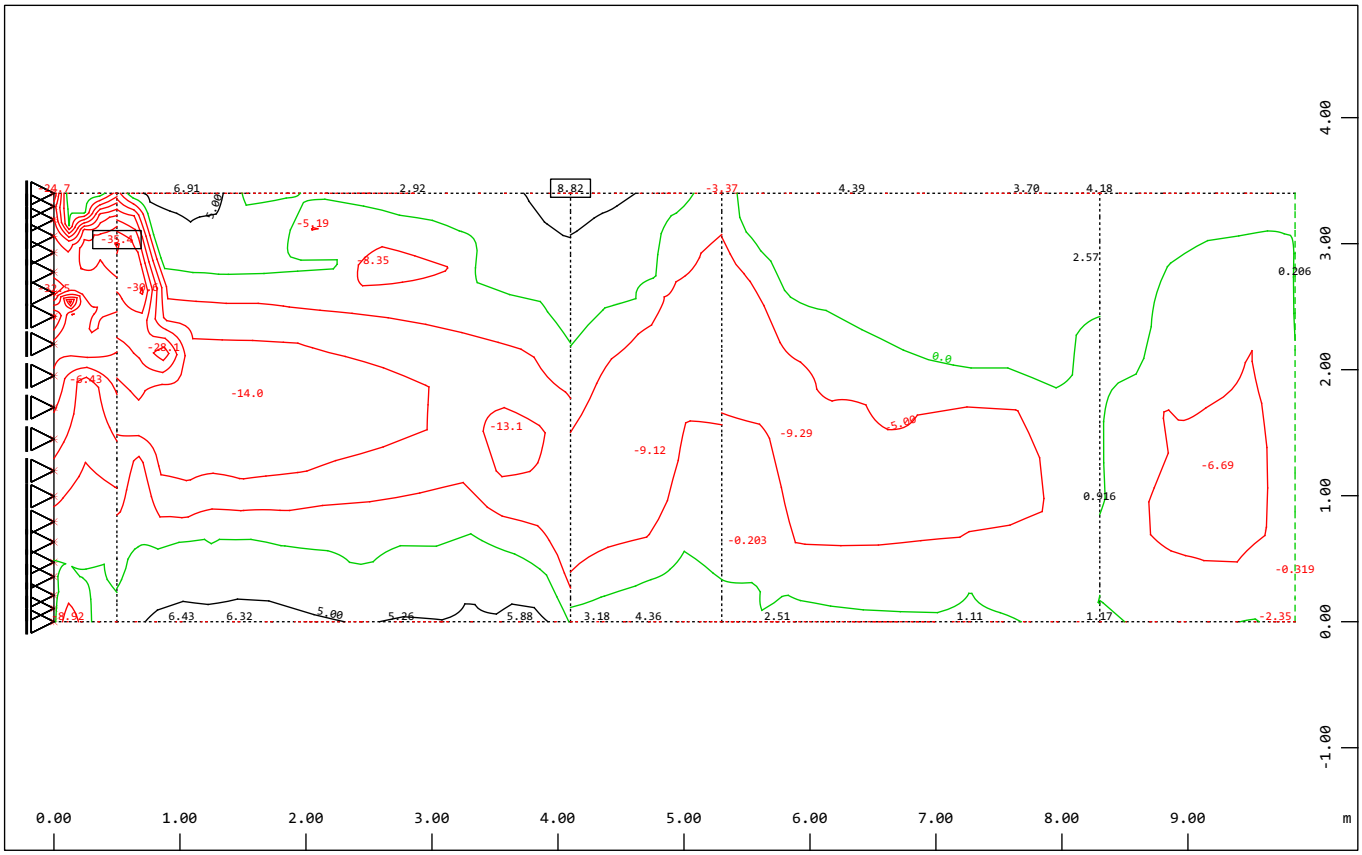
3D model_stopnice
Tem plosca



Y
Z—X

Sector of system Group 101
Principal bending moment II in Node, Loadcase 7001 MAX-MXX QUAD , from -32.4 to 23.1
step 5.00 kNm/m

M 1 : 60



Y
Z—X

Sector of system Group 101
Principal bending moment II in Node, Loadcase 7002 MIN-MXX QUAD , from -35.4 to 8.82
step 5.00 kNm/m

M 1 : 60

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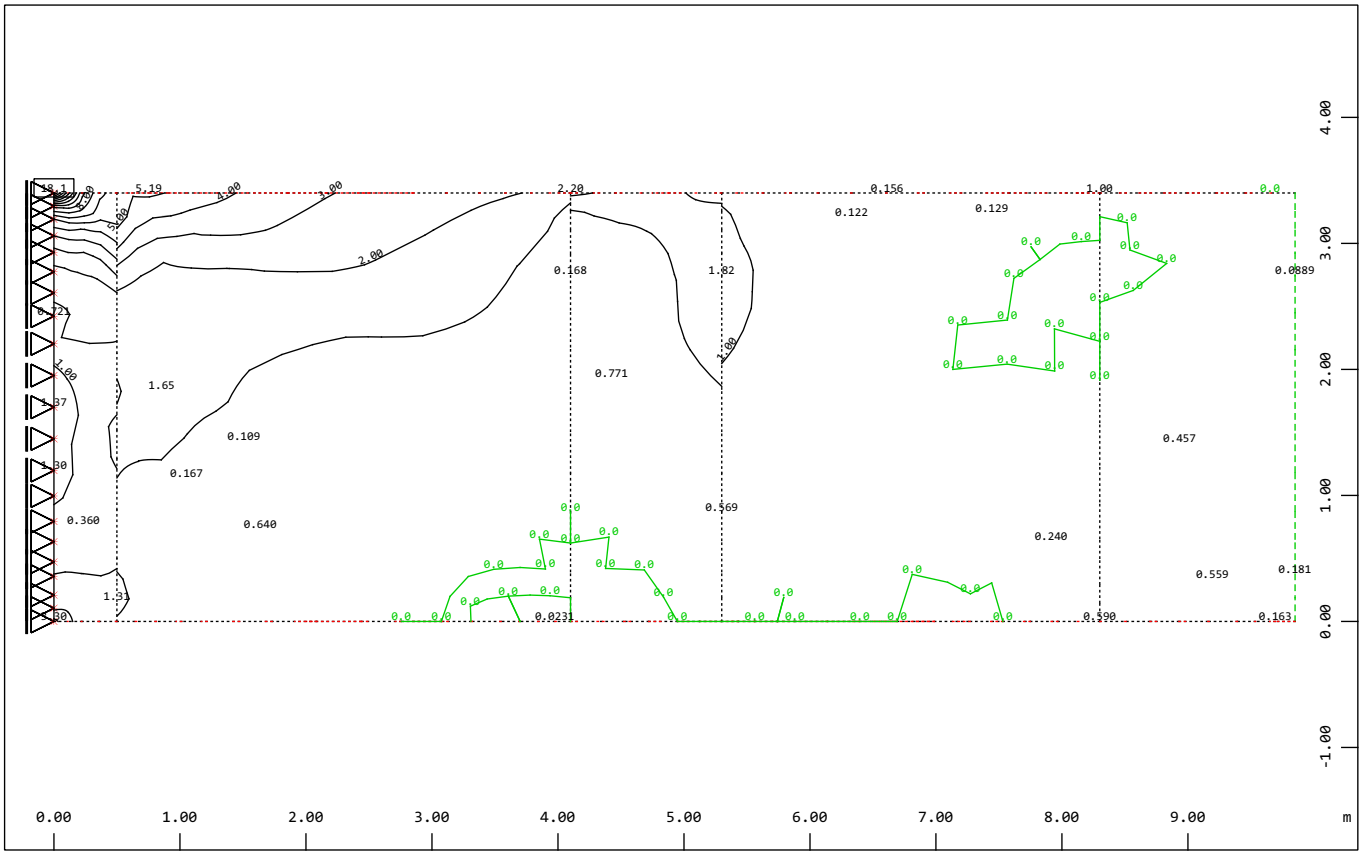
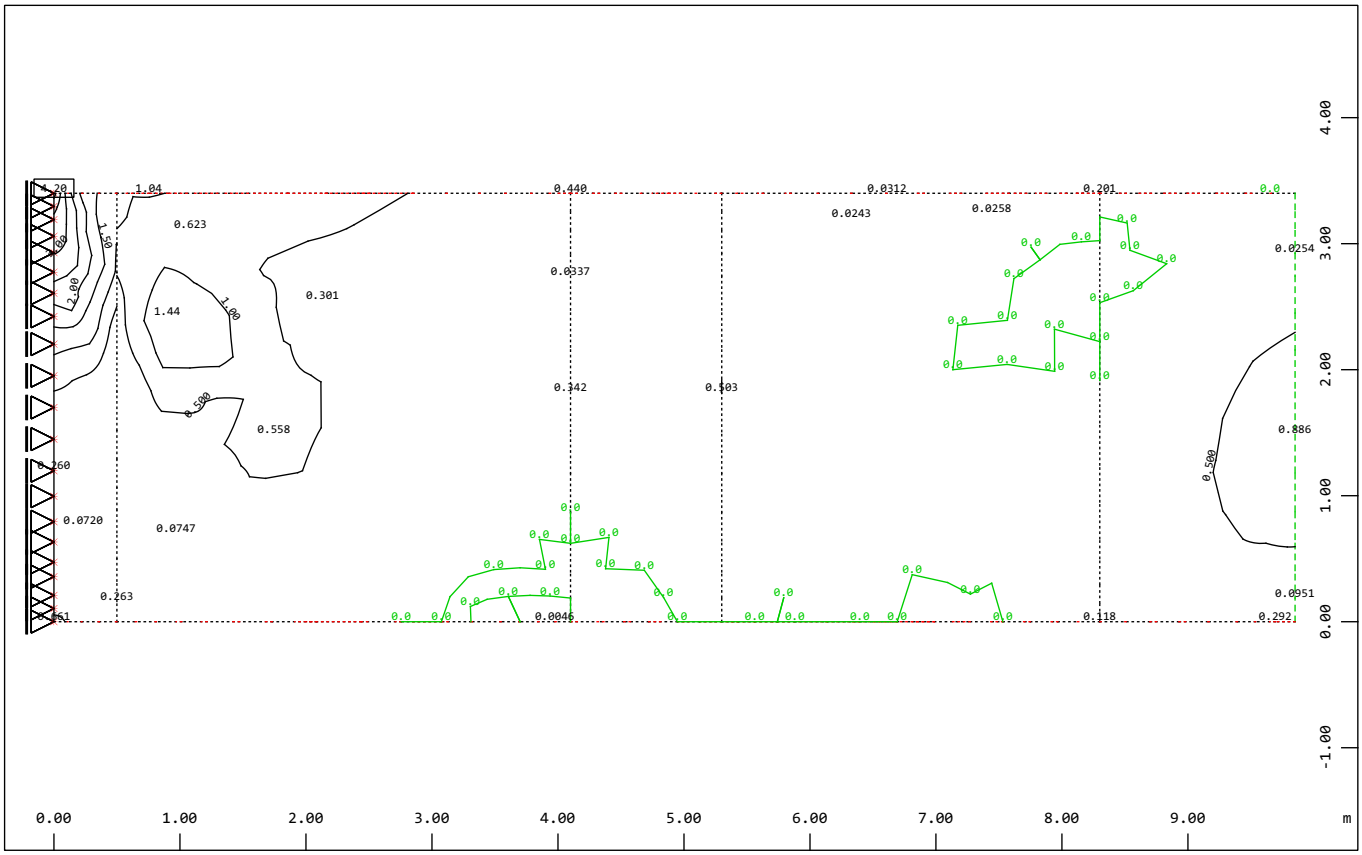
3D model_stopnice
Tem plosca



Y
Z—X

Sector of system Group 101
Quadrilateral Elements , upper Principal reinforcements (1st layer) in Node, Design Case 1
ULS design , from 0 to 18.1 step 1.00 cm2/m

M 1 : 60



Y
Z—X

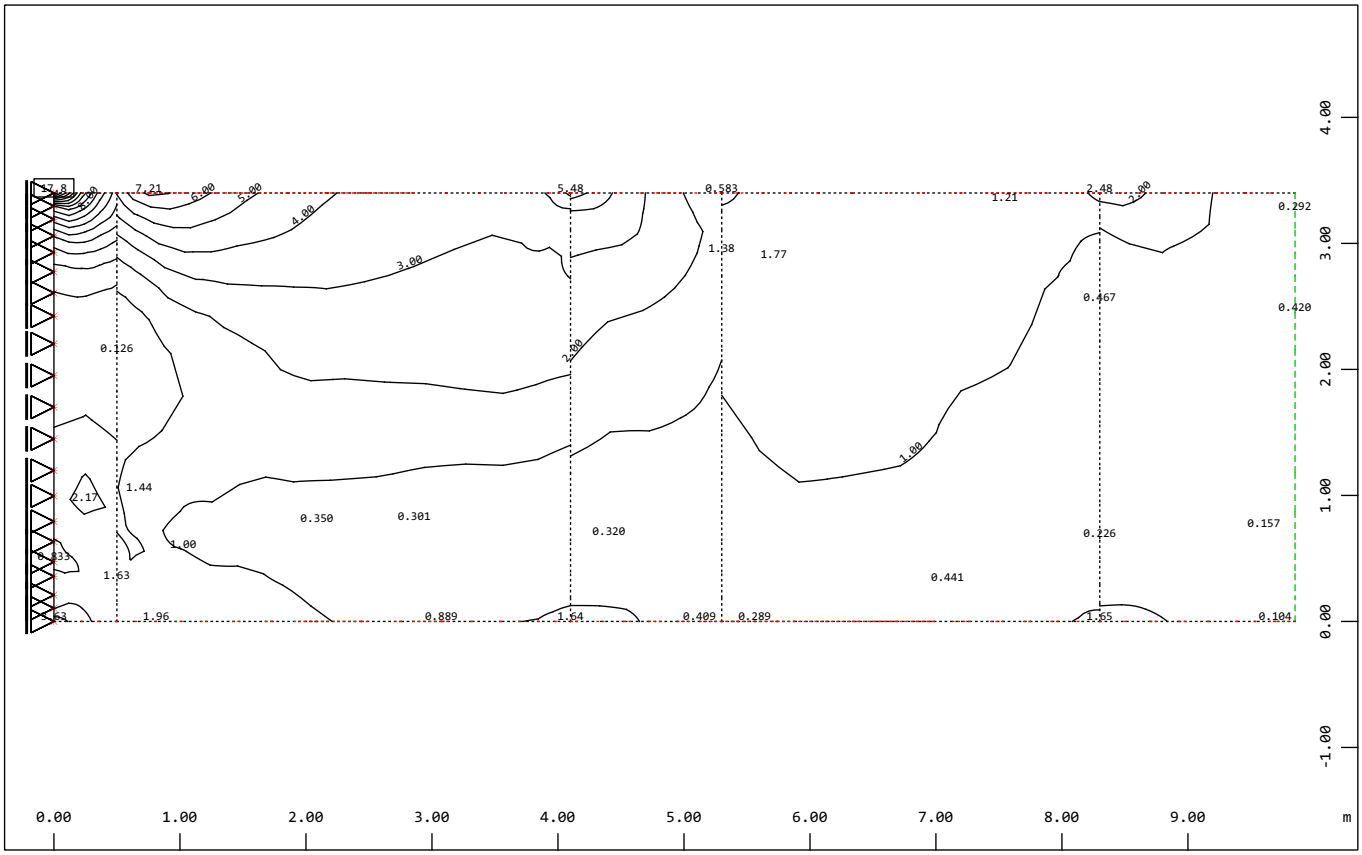
Sector of system Group 101
Quadrilateral Elements , upper Cross reinforcements (2nd layer) in Node
ULS design , from 0 to 4.20 step 0.500 cm2/m

M 1 : 60

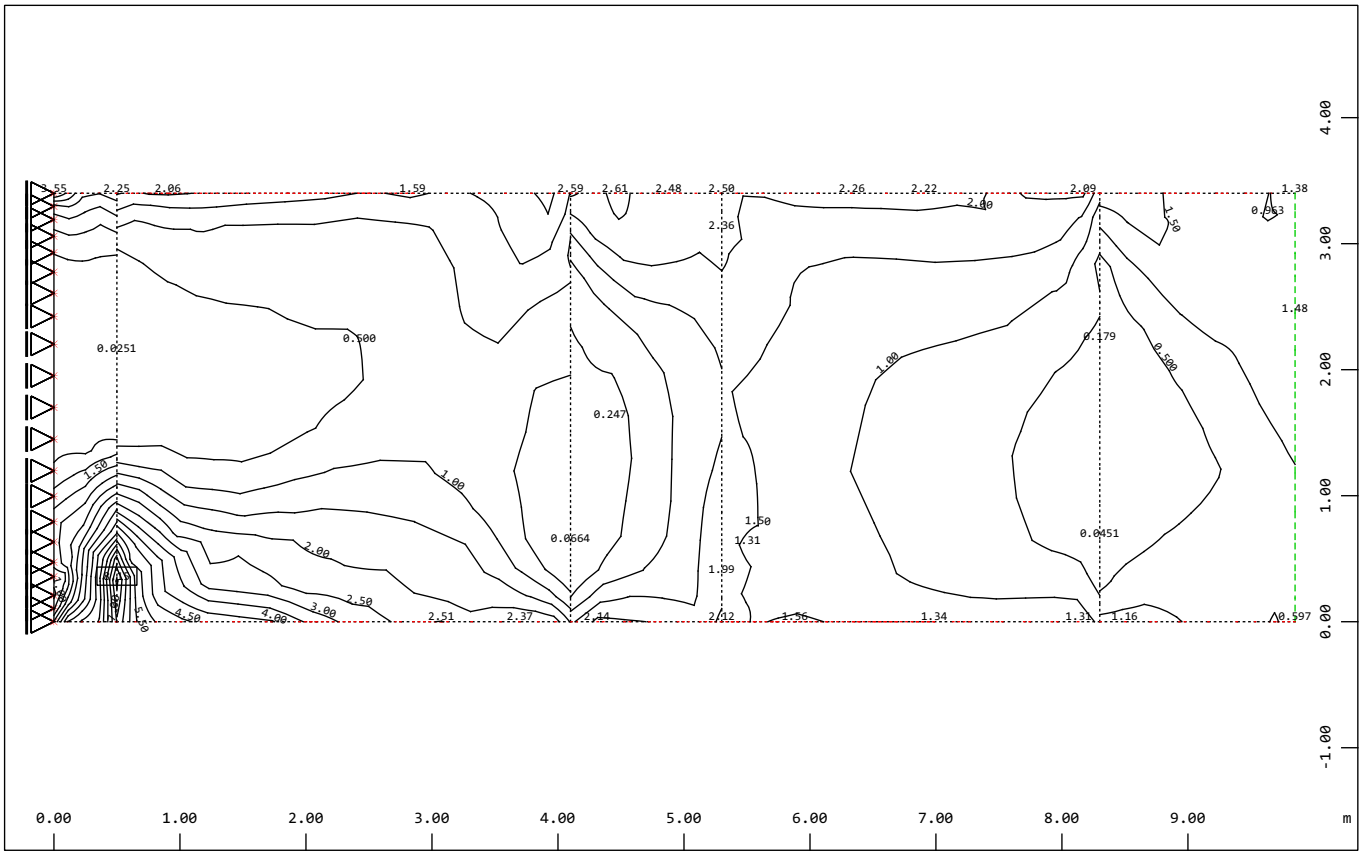
Design Case 1

SOFiSTiK AG - www.sofistik.de

3D model_stopnice
Tem plosca



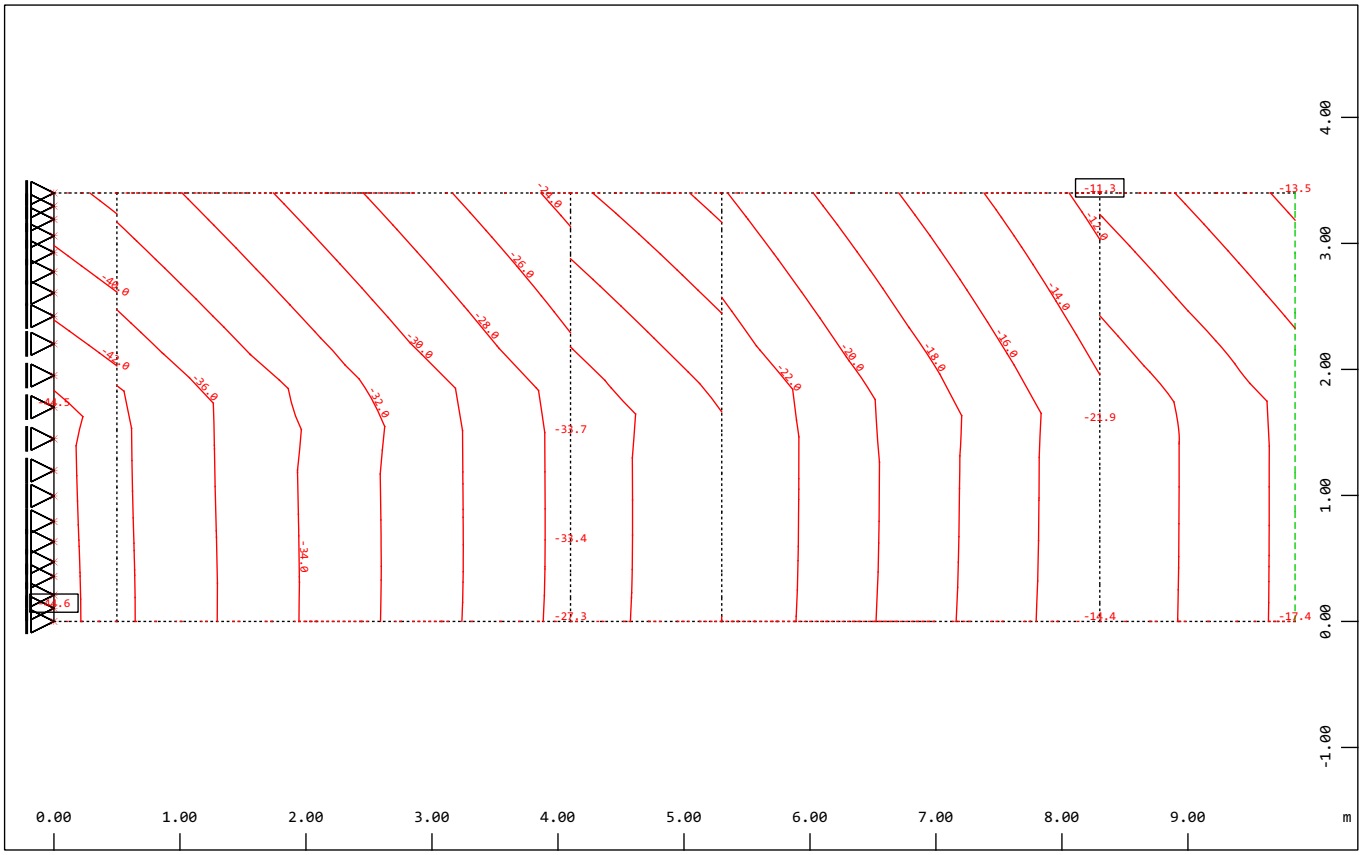
Y
Z—X
Sector of system Group 101
Quadrilateral Elements , lower Principal reinforcements (1st layer) in Node, Design Case 1
ULS design , from 0.104 to 17.8 step 1.00 cm2/m
M 1 : 60



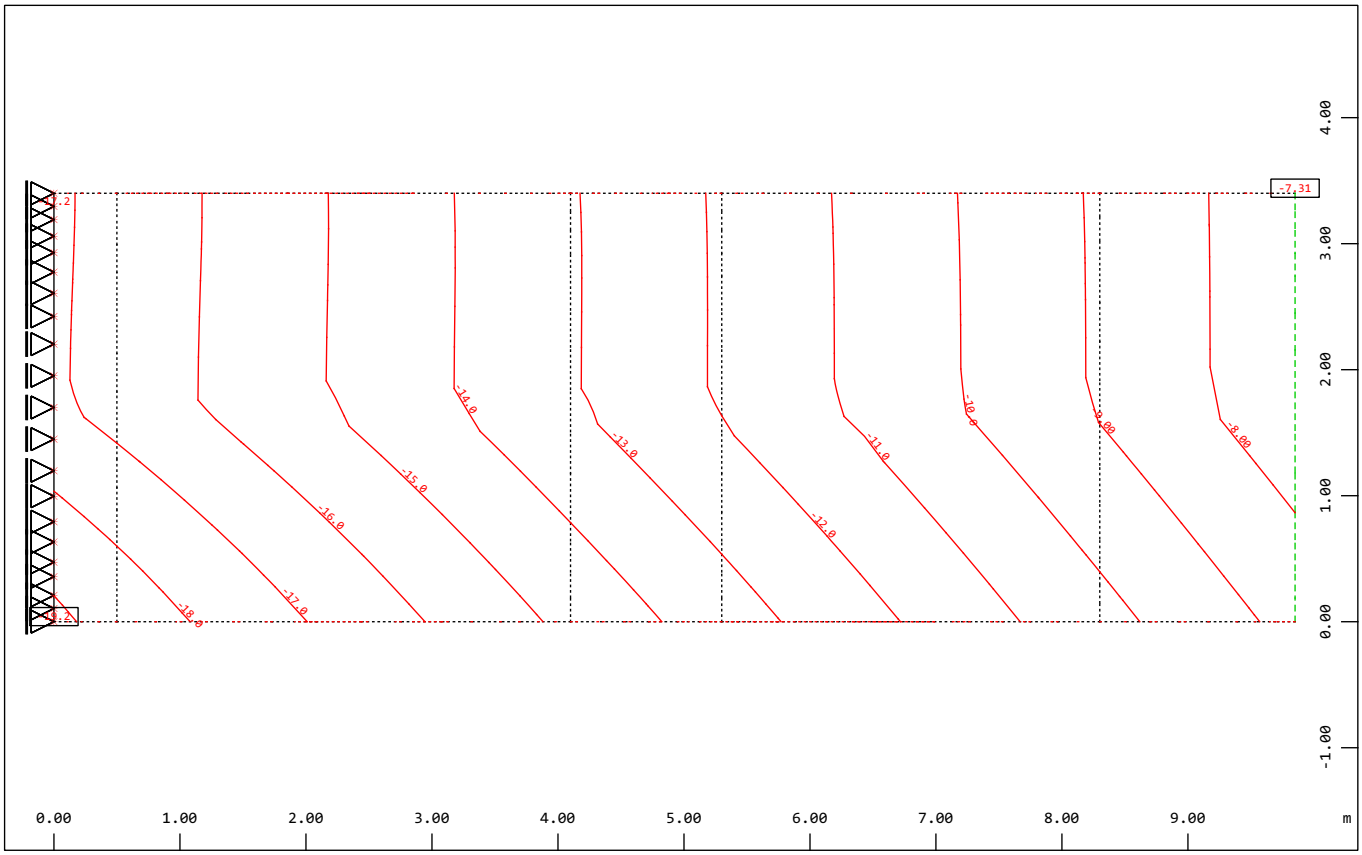
Y
Z—X
Sector of system Group 101
Quadrilateral Elements , lower Cross reinforcements (2nd layer) in Node
ULS design , from 0.0251 to 8.15 step 0.500 cm2/m
Design Case 1
M 1 : 60

SOFiSTiK AG - www.sofistik.de

3D model_stopnice
Napetosti in posedki



Sector of system Group 101
Bedding stress in Node, Loadcase 8117 MAXF-P QUAD , from -44.6 to -11.3 step 2.00 kN/m2
M 1 : 60



Sector of system Group 101
Nodal displacement in global Z in Node , Loadcase 8076 MINR-UZ NODE , from -19.2 to -7.31 step 1.00 mm
M 1 : 60

SOFiSTiK AG - www.sofistik.de

2/1.4.3.1 PROJEKTANTSKI POPIS S PREDIZMERAMI

Popis za gradbene konstrukcije je v celoti zajet v načrtu arhitekture **1/1 podhod in nadstreški (št.nač.: 15299_1_1, Projekt d.d., Nova Gorica).**

2/1.4.3.2 PREDRAČUN Z REKAPITULACIJO STROŠKOV

Popis za gradbene konstrukcije je v celoti zajet v načrtu arhitekture **1/1 podhod in nadstreški (št.nač.: 15299_1_1, Projekt d.d., Nova Gorica).**

2/1.5 RISBE

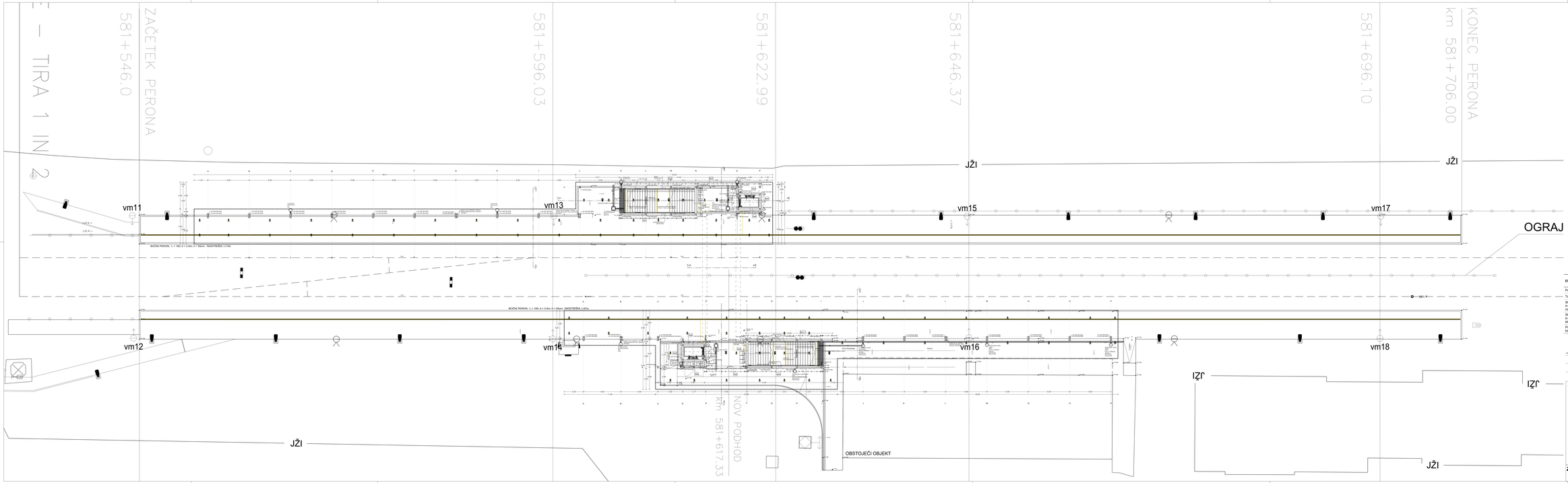
List	Opis	Merilo
2/1.5.0	GRADBENA SITUACIJA	1:100
2/1.5.1	TLORIS PODHODA	1:100
2/1.5.2	TLORIS PERONA	1:100
2/1.5.3	TLORIS STREHE	1:50
2/1.5.4	PREREZI	1:50

OPAŽNI NAČRT

List	Opis	Merilo
2/1.5.5	PLOŠČE IN STENE	1:50
2/1.5.6	SHEMA PROVIZORIJA IN ZAGATNIC	1:50

ARMATURNI NAČRT

List	Opis	Merilo
2/1.5.7	PLOŠČE IN PREREZI	1:50
2/1.5.8	STENE	1:50



GRADBENA SITUACIJA

M 1:100

OPOMBE:
NAČRT GLEJ SKUPAJ Z OSTALIMI NAČRTI !
MERE PREVERITI NA LICU MESTA!

Element	Kvaliteta betona	Razred izpostavljenosti	Dmax [mm]	Krivulja slej [mm]	Kvaliteta armature	Kvaliteta tal/dov za zmrzlja	Razred vdelega betona
Podložni beton	C 25/30	XC0	/	/	/	/	VB 0
Talne plošče	C 30/37	XC2, PV-II	32	50	B 500B	/	VB 0
Stene podhoda in dvigala - notranje	C 30/37	XC3, XF1, PV-II	22	50/30	B 500B	/	VB 4
Stene stopnišča in nadzemni del sten	C 30/37	XC3, XF4, PV-II	22	50/30	B 500B	/	VB 4
Prekladna konstrukcija	C 30/37	XC3, XF1, PV-II	22	30/50	B 500B	/	VB 4

Datum:	Izris ureditvenih:		Projekt:

Projektant:
TIRING
Tiring d.o.o.
Mirnska cesta 7a
8000 Novo mesto
Slovenija

Projektant načrta:
PROJEKT NOVA GRADNJA
IZVEDBENI NAČRT

Naročnik:
RS Ministrstvo za infrastrukturo
Direkcija RS za infrastrukturo
Tržaška cesta 19, 1000 Ljubljana

Številka projekta: 15296
Številka načrta: 15296_1_2_1

Odg. vodja projekta: Luka Šolo m.i.p / d.i.g. G-4643
Odg. projektant: S. STANIČ, u.d.i.g. G-4173
Odg. vodja del: F. FRANC m.i.g
Datum izdelave: januar 2021

Naziv: **Umestitev podhoda na železniški postaji Rače**

Faza: **2/1 Načrt podhoda**

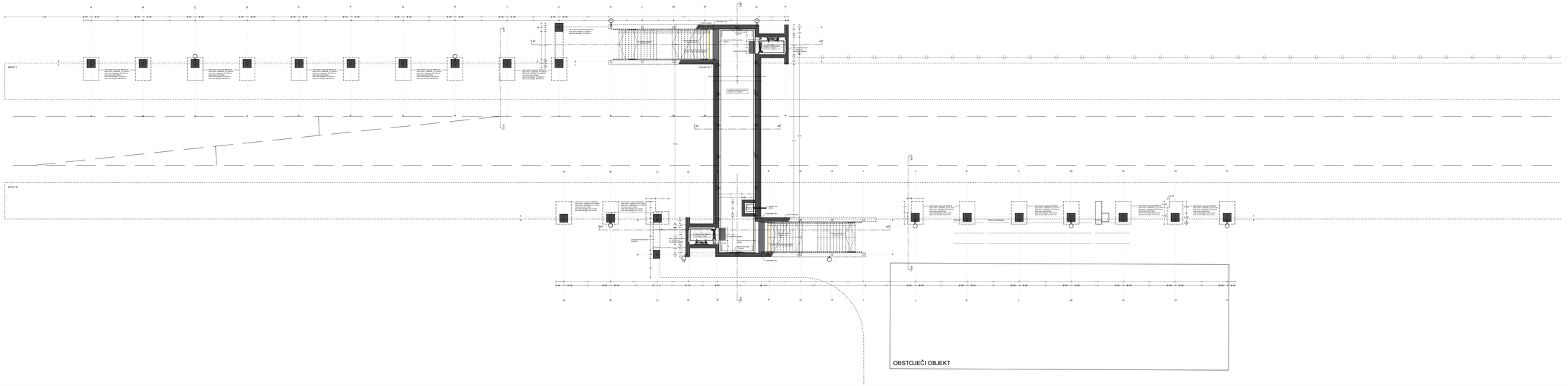
Vsebina: Gradbena situacija

Merilo: 1:100

Številka načrta: **2/1.5.0**

ZG3000 0256.00 007.2164 G

AutoCAD Civil 3D
A 3.73 SP
15299_1_2_Acad Podhoda Rača_arhitektura 15.12.dwg



TLORIS PODHODA

M 1:100

OPOMBE:
NAČRT GLEJ SKUPAJ Z OSTALIMI NAČRTI !
MERE PREVERITI NA LICU MESTA!

Element	Kvaliteta betona	Razred izpostavljenosti	Dmax [mm]	Krovni sloj [mm]	Kvaliteta armature	Kvaliteta kablov za predmap.	Razred vdelanega betona
Podložni beton	C 25/30	XC0	/	/	/	/	VB 0
Talne plošče	C 30/37	XC2, PV-II	32	50	B 500B	/	VB 0
Stene podhoda in dvigala - notranje	C 30/37	XC3, XF1, PV-II	22	50/30	B 500B	/	VB 4
Stene stopnišča in nadzemni deli sten	C 30/37	XC3, XF4, PV-II	22	50/30	B 500B	/	VB 4
Prekladna konstrukcija	C 30/37	XC3, XF1, PV-II	22	30/30	B 500B	/	VB 4

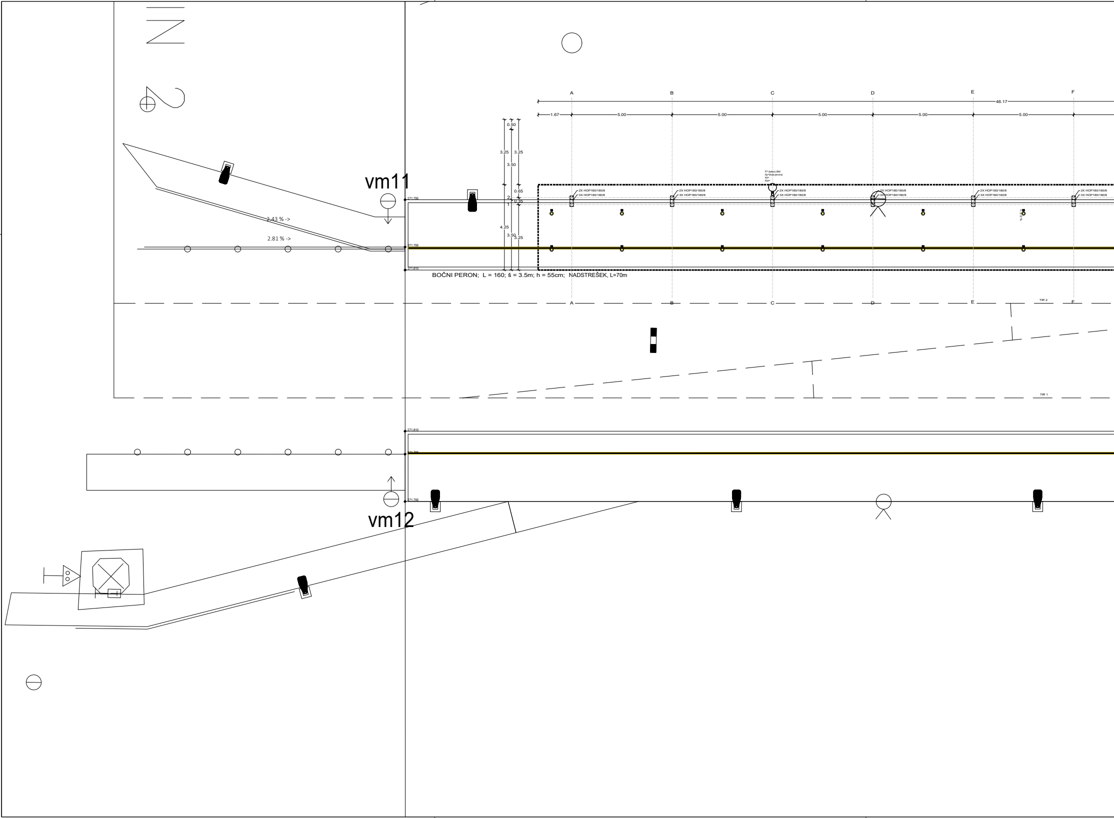
Ge-tac	Ging arhitektonski	Projekt

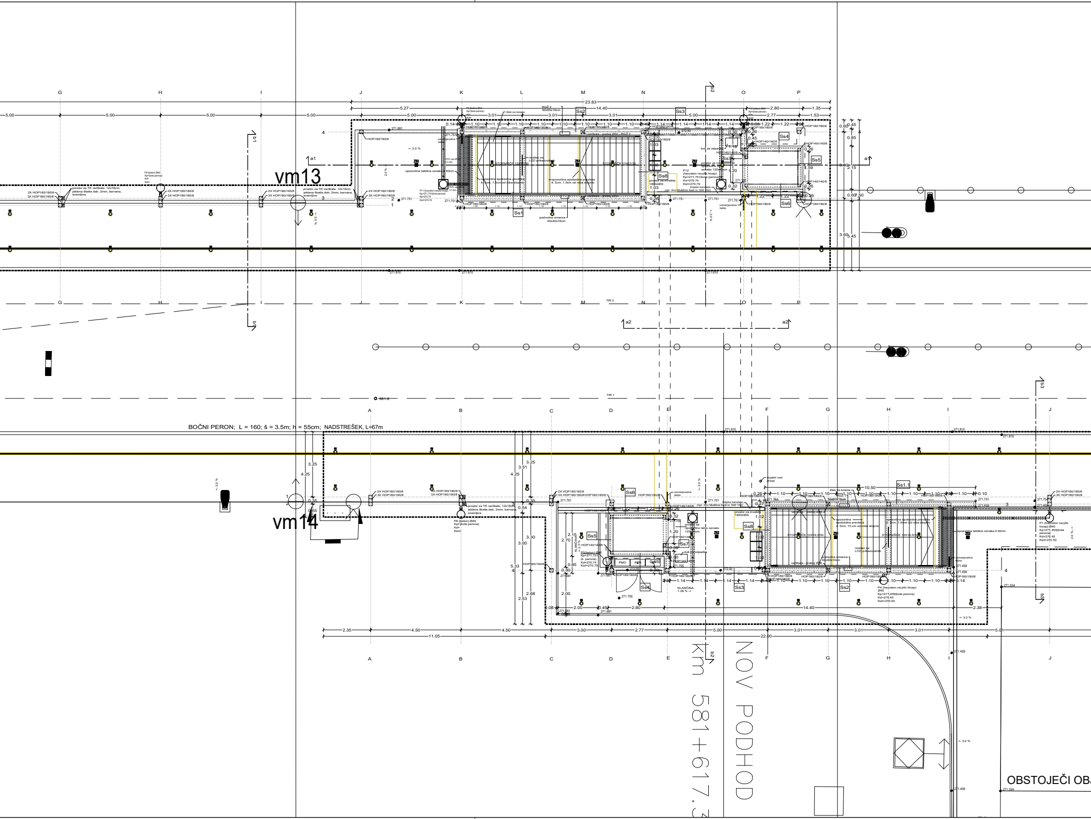
INVESTITOR	TIRING d.o.o.
NAROČNIK	RS Ministrstvo za infrastrukturo Direkcija RS za infrastrukturo Tržaška cesta 19, 1000 Ljubljana
OBJEKT	**Umestitev podhoda na železniški postaji Rače**
NAZIV	**2/1 Načrt podhoda**
Priloga	Tloris podhoda
PROJEKTANT	PROJEKT NOVA GORICA d.d. Delpinova 2, p.p.13 5001 Nova Gorica TOM TVRDI tel./fax: (0)5/ 3 335 00 00
PROJEKTANTSKA NAZIVA	PROJEKT NOVA GORICA d.d.
VRSTA PROJEKTNE DOKUMENTACIJE	IZVEDBENI NAČRT
ŠIFRA PROJ.	8516
ŠIFRA PROJEKTA	15299_1_2_1
Odg. vodja projekta	Luka Šoško mi.p / d.i.g.
ŠIFRA	G-4643
Odg. projektant	B. STANIČ, u.d.i.g.
ŠIFRA	G-4173
Datum iz.	F. FRANIC m.i.g.
Datum	januar 2021
Merilo	1:100
Številka	2/1.5.1

ZG3000	**0256.00**	**007.2164**	**G**		

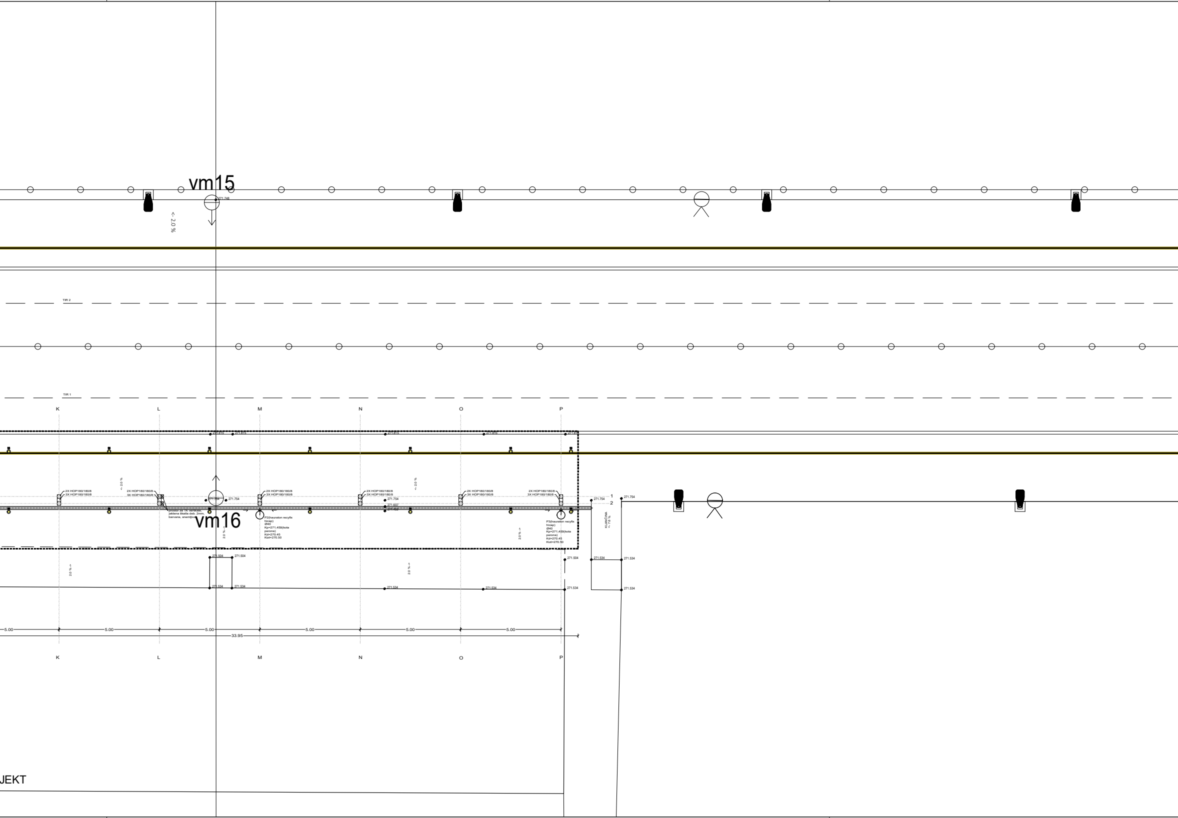
A3x7: 420x2080
A: 0.84 m²

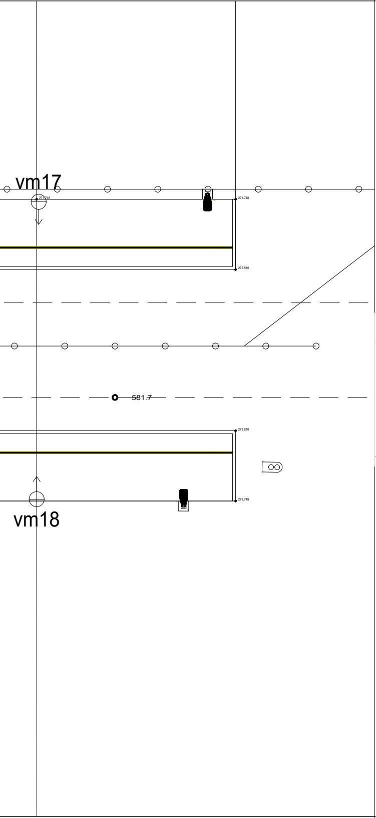
16.12.2020
15299_1_2_2_Nacrt Podhoda Rače_arhitektura.26.03.dwg


vm11
vm12
2.43 % ->
2.81 % ->
A
B
C
D
E
F
46.17
1.67
5.00
5.00
5.00
5.00
5.00
0.50
3.25
3.25
3.50
0.65
2
0.35
1
4.25
3.50
3.25
271.795
271.795
271.810
P7 (beton) Ø40
Kp=(kota perona)
Ko=
Kzt=
2X HOP180/180/8
3X HOP180/180/8
BOČNI PERON; L = 160; š = 3.5m; h = 55cm; NADSTREŠEK, L=70m
TIR 2
TIR 1
271.810
271.795
271.795



vm13
vm14
BOČNI PERON; L = 160; š = 3.5m; h = 55cm; NADSTREŠEK, L=67m
NOV PODHOD
km 581+617.3
OBSTOJEČI OB
TIR 2
TIR 1
G
H
I
J
K
L
M
N
O
P
A
B
C
D
E
F
a1
a2
b1
b2
b3
23.83
14.40
5.27
5.00
3.01
2.80
2.77
1.35
1.53
10.50
11.05
22.00
14.40
4.50
2.35
3.00
2.77
2.80
2.00
2.38
Ss1
Ss1.1
Ss2
Ss3
Ss4
Ss5
Ss6
Ss7
Ss8
STOPNIŠČE 12X16,5/30
prehodna omarica 40x40x16cm
opozorilna taktilna oznaka š 60cm
prostor za TK vertikale, 12x18cm, jeklena škatla deb. 2mm, barvana, snemljiva
2X HOP180/180/8
3X HOP180/180/8
HOP180/180/8
HOP140/140/6
usmerjevalna tabla
prostor za invalida 1400x900
P1 (hauraton recyfix hicap) Ø40
P4 (hauraton recyfix hicap) Ø40
P6 (beton) Ø40
P12 (hauraton recyfix hicap)
KLANČINA 1.38 %
~ 2.0 %
~ 3.0 %
271.810
271.751
271.681
271.459
271.534
581.6
PMO
RDF
koš za odpadke


vm15
271.748
<- 2.0 %
TIR 2
TIR 1
K
L
M
N
O
P
2X HOP180/180/8
3X HOP180/180/8
<- 2.0 %
prostor za TK vertikale,
jeklena škatla deb. 2mm,
barvana, snemljiva
271.754
271.754
vm16
2.0 % ->
P2(hauraton recyfix
hicap)
Ø40
Kp=271,459(kota
perona)
Kd=270.45
Kizt=270.50
271.754
271.607
P3(hauraton recyfix
hicap)
Ø40
Kp=271,459(kota
perona)
Kd=270.45
Kizt=270.50
1
2
271.754
271.754
KLANČINA
<- 7.6 %
271.504
271.504
271.534
271.534
271.534
271.534
271.504
271.534
271.534
271.534
271.534
2.0 % ->
2.0 % ->
5.00
5.00
5.00
5.00
5.00
5.00
33.95
JEKT


vm17
271.748
271.748
271.810
581.7
271.810
271.748
vm18

TLORIS PERONA

M 1:100

OPOMBE:
NAČRT GLEJ SKUPAJ Z OSTALIMI NAČRTI !
MERE PREVERITI NA LICU MESTA!

Element	Kvalitet a betona	Razred izpostavljenosti	Dmax [mm]	Krovni sloj [mm]	Kvaliteta armature	Kvaliteta kablov za prednap.	Razred vidnega betona
Podložni beton	C 25/30	XC0	/	/	/	/	VB 0
Talne plošče	C 30/37	XC2, PV-II	32	50	B 500B	/	VB 0
Stene podhoda in dvigala - notranje	C 30/37	XC3, XF1, PV-II	22	50/30	B 500B	/	VB 4
Stene stopnišča in nadzemni deli sten	C 30/37	XC3, XF4, PV-II	22	50/30	B 500B	/	VB 4
Prekladna konstrukcija	C 30/37	XC3, XF1, PV-II	22	30/30	B 500B	/	VB 4

Datum	Opis spremembe	Podpis

Projektant
TIRING
Podjetje za železniški
inženiring, d.o.o.
Motnica 11
1236 Trzin
TEL/FAX 01/562 35 55

Projektant načrta
PROJEKT d.d.
NOVA GORICA

Investitor
RS Ministrstvo za infrastrukturo
Direkcija RS za infrastrukturo
Tržaška cesta 19, 1000 Ljubljana

Faza
IZVEDBENI NAČRT

Projekt št.
8516

Načrt št.
15299_1_2_1

Objekt
Umestitev podhoda na železniški postaji Rače

Odg. vodja projekta
Luka Šošo m.i.p / d.i.g

Id. št.
G-4643

Odg. projektant
S. STANIČ, u.d.i.g.

Id. št.
G-4173

Obdelal
F. FRANC m.i.g

Načrt
2/1 Načrt podhoda

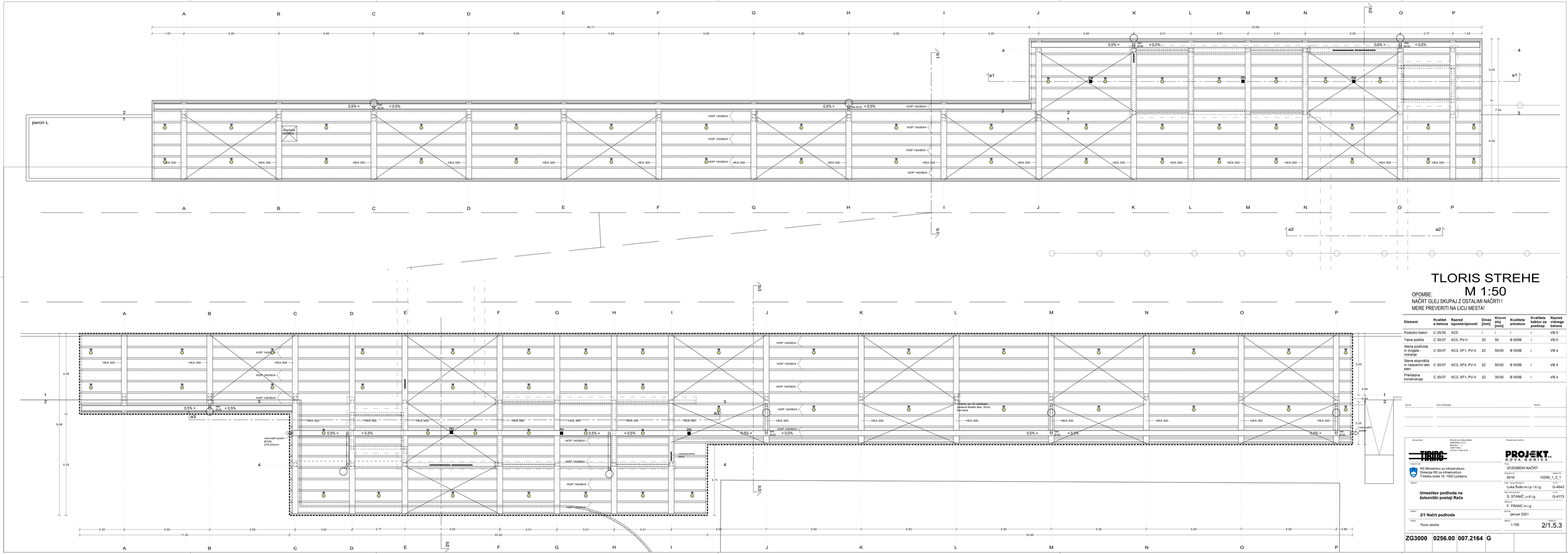
Datum
januar 2021

Risba
Tloris perona

Merilo
1:100

Risba št.
2/1.5.2

ZG3000	**0256.00**	**007.2164**	**G**	



TLORIS STREHE
M 1:50

OPOMBE:
NAČRT GLEJ SKUPAJ Z OSTALIMI NAČRTI !
MERE PREVERITI NA LICU MESTA!

Element	Kvaliteta betona	Razred izpostavljenosti	Dmax [mm]	Krovni sloj [mm]	Kvaliteta armature	Kvaliteta kablov za prednap.	Razred vlivnega betona
Podložni beton	C 25/30	XC0	/	/	/	/	VB 0
Talne plošče	C 30/37	XC2, PV-II	32	50	B 500B	/	VB 0
Stene podhoda in čuvajska - notranje	C 30/37	XC3, XF1, PV-II	22	50/30	B 500B	/	VB 4
Stene stopnišča in nadzemni deli sten	C 30/37	XC3, XF4, PV-II	22	50/30	B 500B	/	VB 4
Prekladna konstrukcija	C 30/37	XC3, XF1, PV-II	22	30/30	B 500B	/	VB 4

Gerüste	Ograditev gradbišča
	Projekt

PROJEKTANT: TIRING
PODJETJE ZA SLUŽENJE PROMETA IN ZVEZ, d.o.o.
SEDEŽ: Ulica 15. maja 13
1236 Trzin
ŠIFRA VLOGE IN ID

PROJEKTANT NAČRTA: PROJEKT d.o.o. NOVA GORICA

Naročnik: RS Ministrstvo za infrastrukturo, Direkcija RS za infrastrukturo, Tržaška cesta 19, 1000 Ljubljana

Vrsta: IZVEDBENI NAČRT

Številka: 8516

Projekt št.: 15299_1_2_1

Odg. vodja projekta: Luka Šolo m.i.p / d.i.g.

Št.: G-4643

Odg. projektant: S. STANIČ, u.d.i.g.

Št.: G-4173

Pregledal: F. FRANC m.i.g

Datum: januar 2021

Objekt: Umestitev podhoda na železniški postaji Rače

Načrt: 2/1 Načrt podhoda

Risba: Tloris strehe

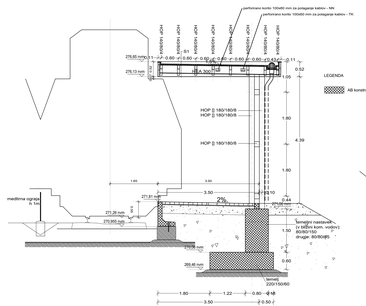
Merilo: 1:100

Številka risbe: 2/1.5.3

ZG3000 | 0256.00 | 007.2164 | G

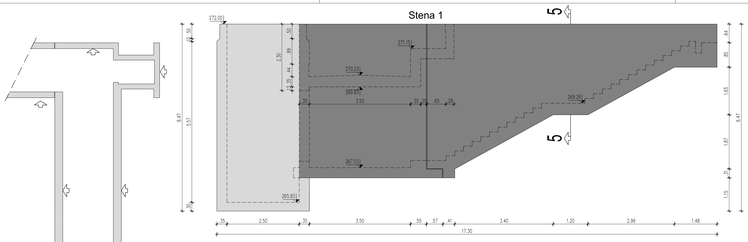
A2oz 594/1682
A1 1:50 /2
100% / 2,2 /Nerf Pathway Ruby_arhitektura_2020.plt
25.3.2021

karakterističen prerez

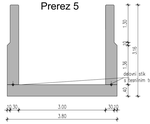

LEGENDA
AB konstrukcija
HOP 180/180/8
HOP 140/140/6
HOP 180/180/8
HOP 180/180/8
HOP 180/180/8

A1x0, 84 x 1189
A1, 1:50 mm
15299_1_2_1_Nacrt-Podhoda_Race_20201209.dwg

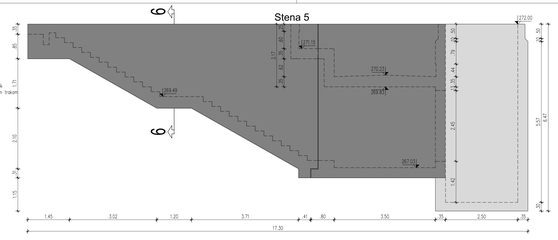
Stena 1



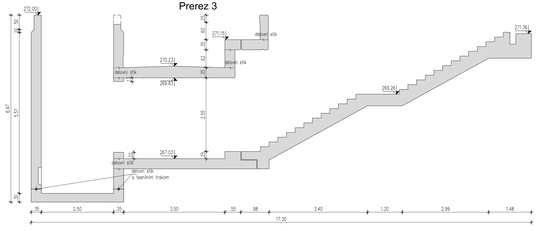
Prerez 5



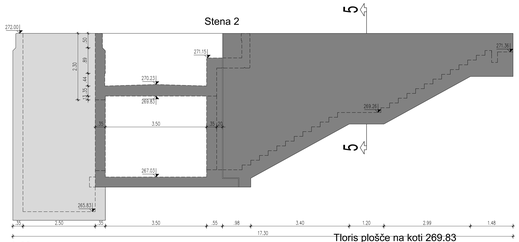
Stena 5



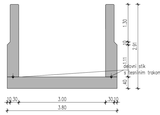
Prerez 3



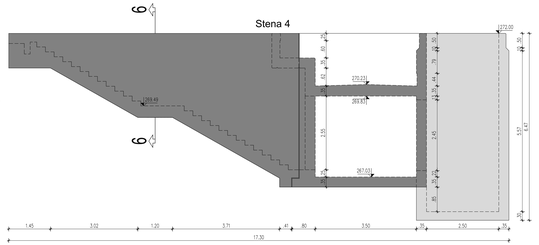
Stena 2



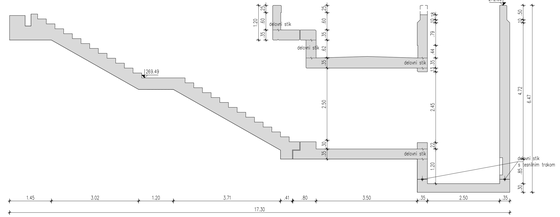
Prerez 6



Stena 4

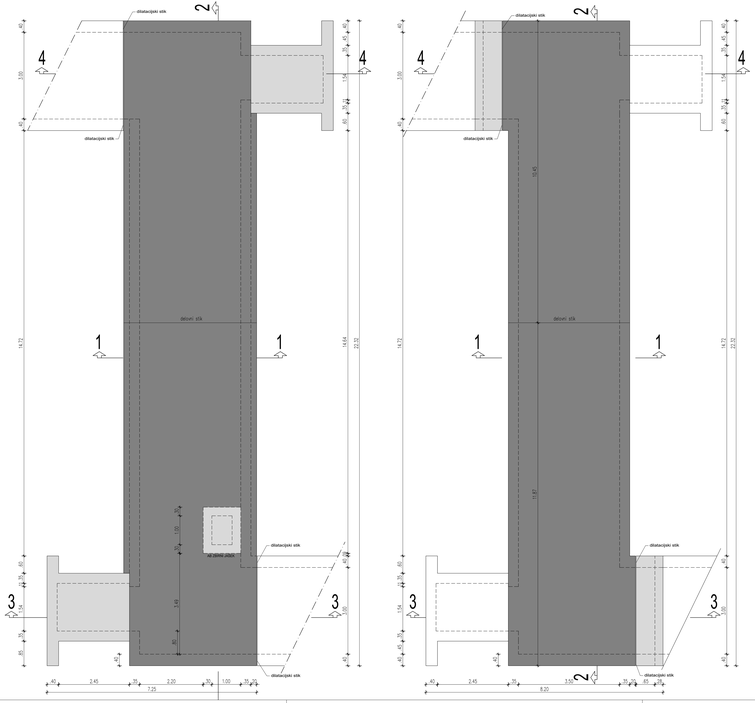


Prerez 4

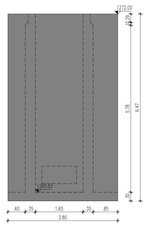


Tloris plošče na koti 269.83

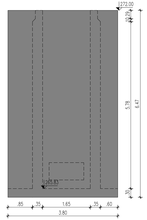
Tloris talne plošče



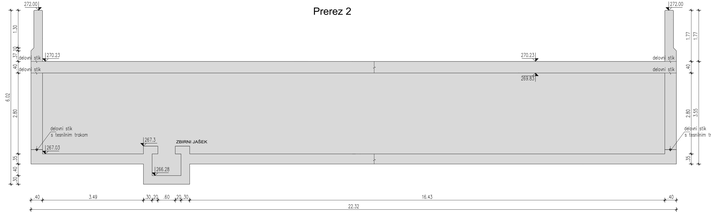
Stena 3



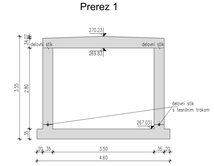
Stena 6



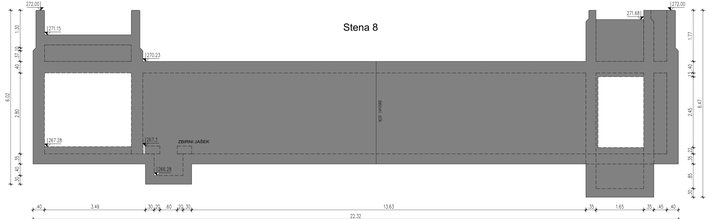
Prerez 2



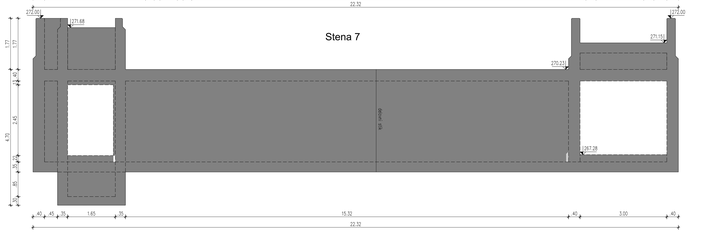
Prerez 1



Stena 8

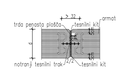


Stena 7

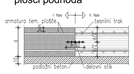


Detajl del. stika v steni

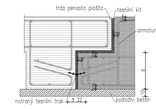
Detajl dilatacije v steni



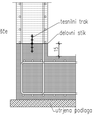
Detajl del. stika teměljni plošči podhoda



Detajl dilatacije v temeljni plošči



Detajl del. stika v steni



OPOMBE:
NAČRT GLEJ SKUPAJ Z OSTALIMI NAČRTI !
MERE PREVERITI NA LICU MESTA!

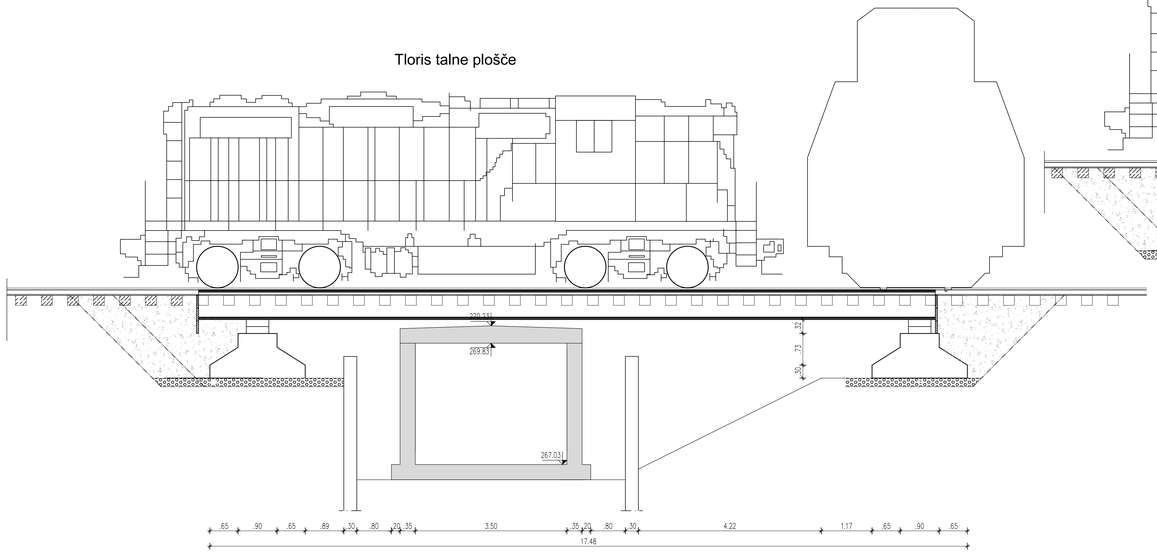
Element	Kvaliteta betona	Razred izpostavljenosti	Dmax [mm]	Krovni sloj [mm]	Kvaliteta armature	Kvaliteta kablov za predmag.	Razred vidnega betona
Podložni beton	C 25/30	XC0	/	/	/	/	VB 0
Talne plošče	C 30/37	XC2, PV-II	32	50	B 500B	/	VB 0
Stene podhoda in čvrgala - notranje	C 30/37	XC3, XF1, PV-II	22	50/30	B 500B	/	VB 4
Stene stopnišča in nadzemni deli sten	C 30/37	XC3, XF4, PV-II	22	50/30	B 500B	/	VB 4
Preklada konstrukcija	C 30/37	XC3, XF1, PV-II	22	30/30	B 500B	/	VB 4

Številka	Vrsta sprememb	Datum

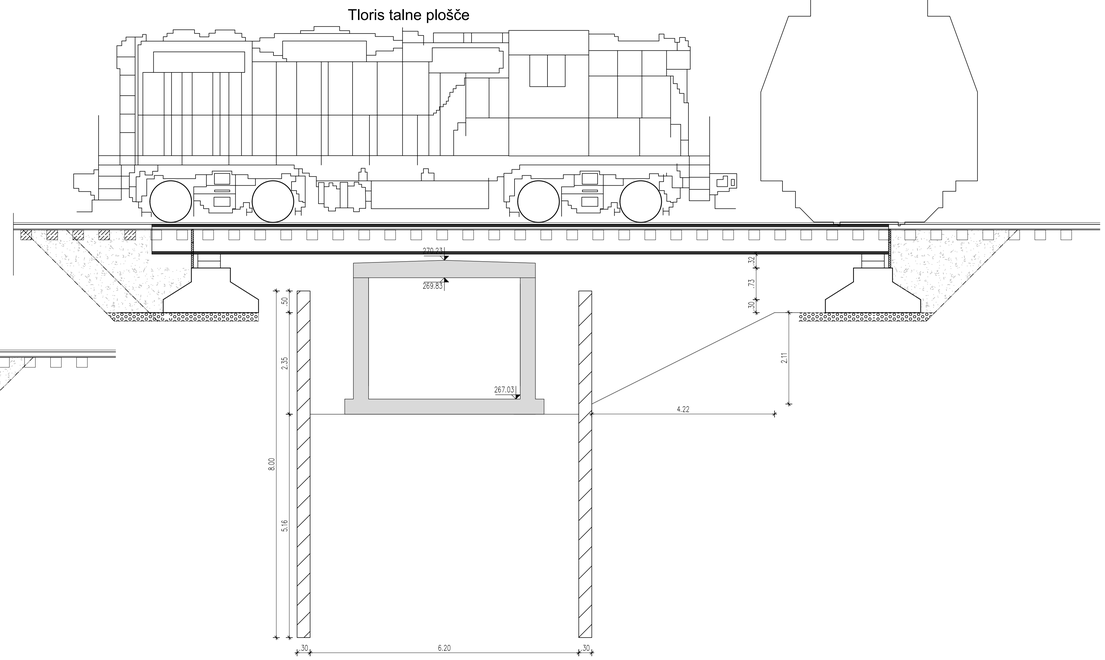
NAROČNIK:	PRIPRAVIL IN SKLADNO: MONARING, d.o.o. Ul. Mirka Vadnova 3a 1236 Trzin Tel.: 01 241 00 00 www.monaring.si	PROJEKTANT NAČRTA: PROJEKT NOVA GORICA
RS Ministrstvo za infrastrukturo Direkcija RS za infrastrukturo Tržaška cesta 19, 1000 Ljubljana		IZVEDBENI NAČRT
OBJEKT:		PROJEKT ID: 8516 / ŠIFRA PROJ.: 15299_1_2_1
Umestitev podhoda na železniški postaji Rače		VODJA PROJEKTA: Luka Šoško m.i.p. / d.i.g. G-4643
		ODG. PROJEKTANT: S. STANIČ, u.d.i.g. G-4173
NAČRT: **2/1 Načrt podhoda**		ODG. VODJA DEL: F. FRANC m.i.g.
		DATUM: Januar 2021
Risba: Opažni načrt - stene in plošče		MERILO: 1:50 ŠIFRA: 2/1.5.5

ZG3000	0256.00	007.2164	G	

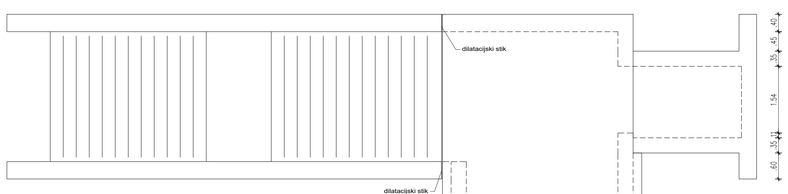
Tloris talne plošče



Tloris talne plošče



Tloris talne plošče



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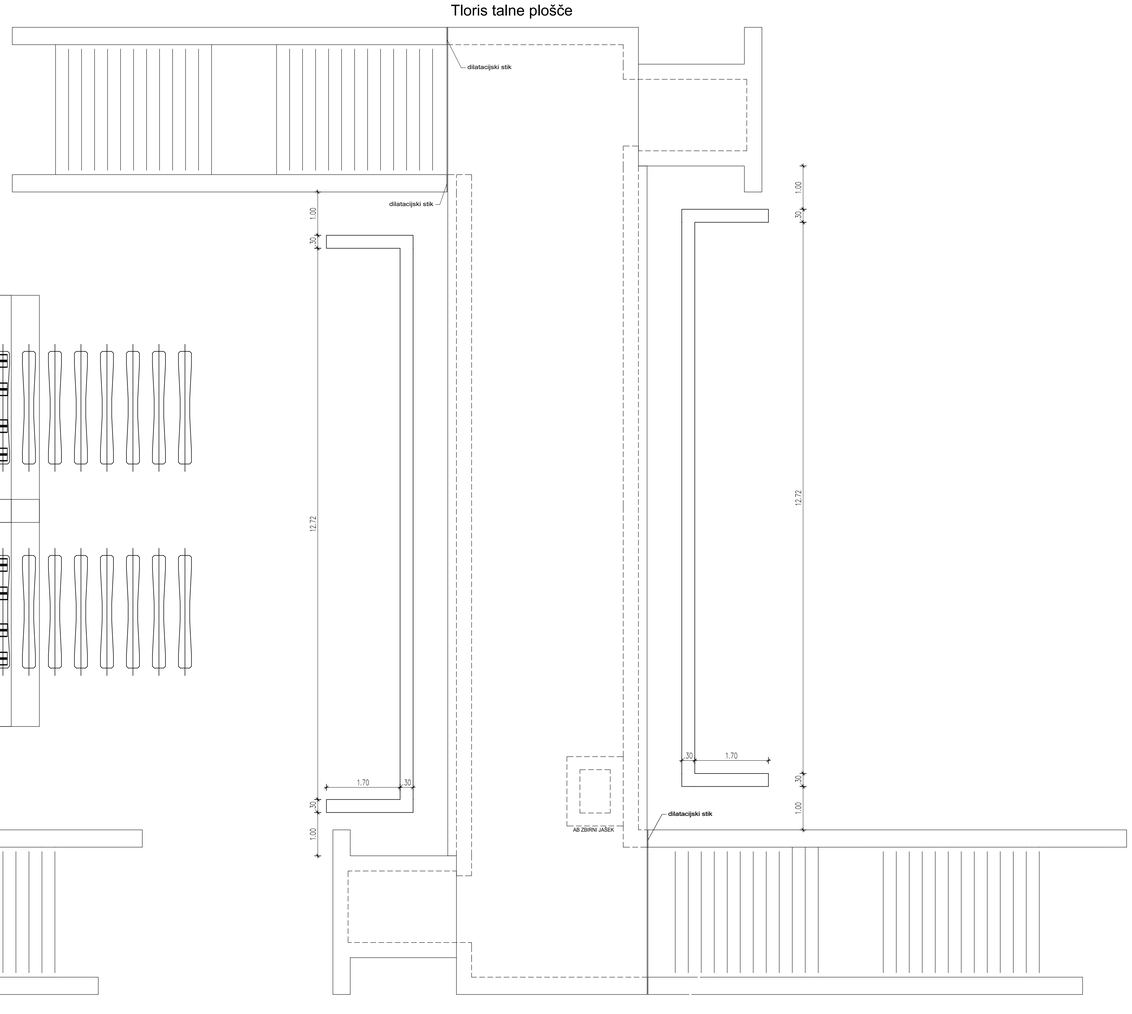


OPOMBE:
NAČRT GLEJ SKUPAJ Z OSTALIMI NAČRTI !
MERE PREVERITI NA LICU MESTA!

Element	Kvalitet a betona	Razred izpostavljenosti	Dmax [mm]	Krovni sloj [mm]	Kvaliteta armature	Kvaliteta kablov za prednap.	Razred vidnega betona
Podložni beton	C 25/30	XC0	/	/	/	/	VB 0
Talne plošče	C 30/37	XC2, PV-II	32	50	B 500B	/	VB 0
Stene podhoda in dvigala - notranje	C 30/37	XC3, XF1, PV-II	22	50/30	B 500B	/	VB 4
Stene stopnišča in nadzemni deli sten	C 30/37	XC3, XF4, PV-II	22	50/30	B 500B	/	VB 4
Prekladna konstrukcija	C 30/37	XC3, XF1, PV-II	22	30/30	B 500B	/	VB 4

DATUM	OPIS SPREMEMBE	PODPIS

PROJEKTANT
TIRING
INŠTITUT ZA ŽELEZNIŠKO INŽENIRING, D.O.O.
MOSTNCA 11
1236 TRZIN
TELEFAX: 01/562 35 55

PROJEKTANT NAČRTA
PROJEKT d.d. NOVA GORICA

INVESTITOR
RS Ministrstvo za infrastrukturo
Direkcija RS za infrastrukturo
Tržaška cesta 19, 1000 Ljubljana

FAZA
IZVEDBENI NAČRT

PROJEKT ŠT.: 8516
NAČRT ŠT.: 15299_1_2_1

OBJEKT
Umestitev podhoda na železniški postaji Rače

ODG. VODJA PROJEKTA: Luka Šoša m.i.p / d.i.g. — ID. ŠT.: G-4643
ODG. PROJEKTANT: S. STANIČ, u.d.i.g. — ID. ŠT.: G-4173
ODGOVAJA: F. FRANC m.i.g
DATUM: januar 2021

NAČRT
2/1 Načrt podhoda

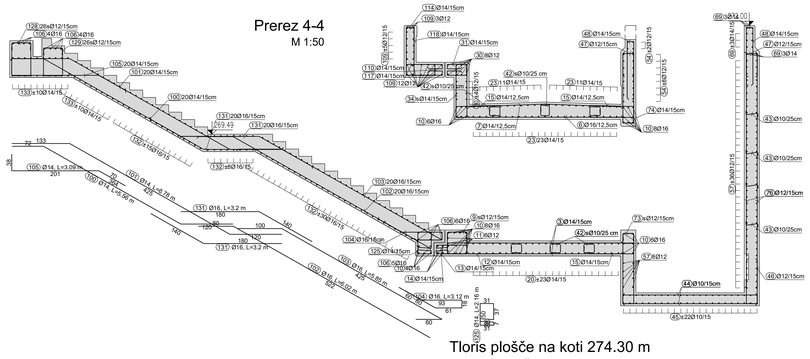
RISBA
Shema provizorja in zagatnic

MERILO: 1:50
RISBA ŠT.: 2/1.5.6

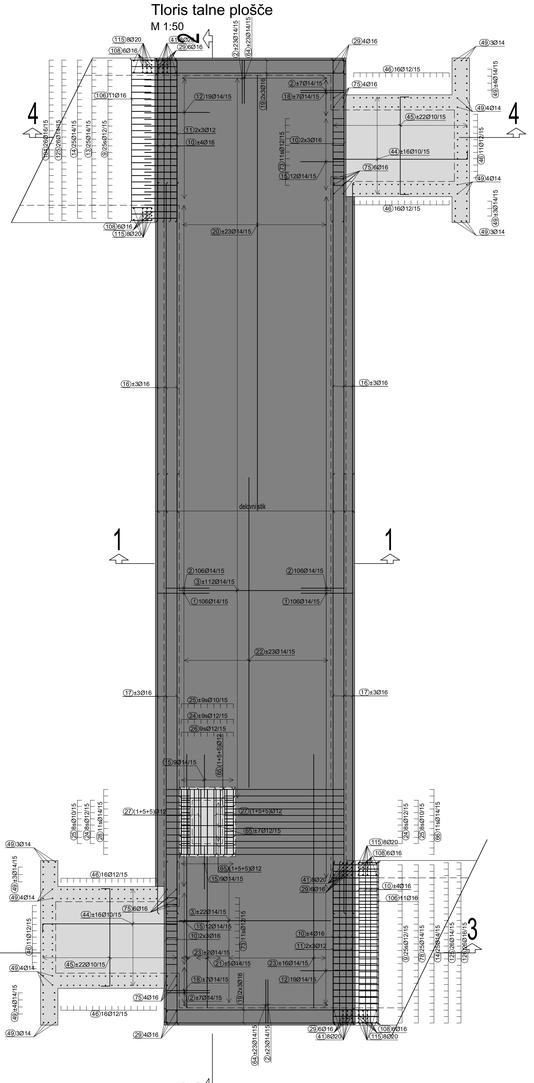
ZG3000	0256.00	007.2164	G		

A0: 841x1189
A1: 1:0 m²
15299_1_2_1_Nacrt Podhoda Rače_signUP.dwg

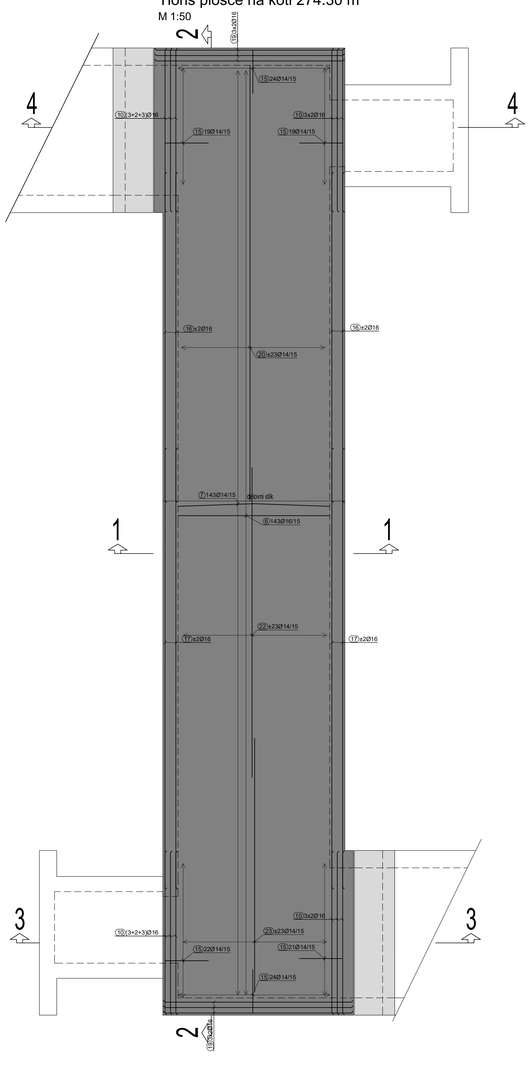
Prerez 4-4
M 1:50



Tloris talne plošče
M 1:50



Tloris plošče na koti 274.30 m
M 1:50



Prerez 2-2
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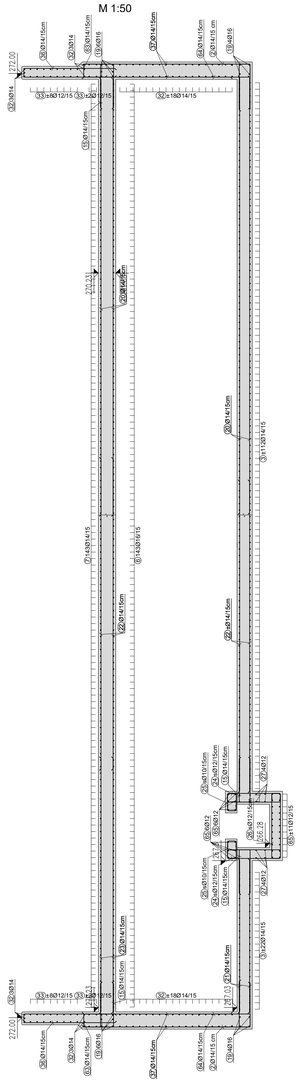
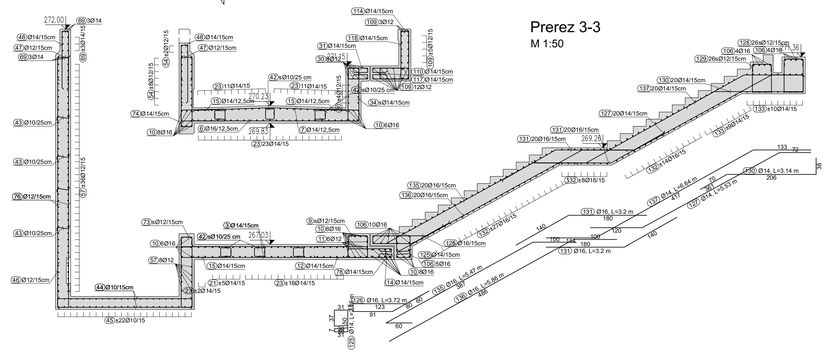
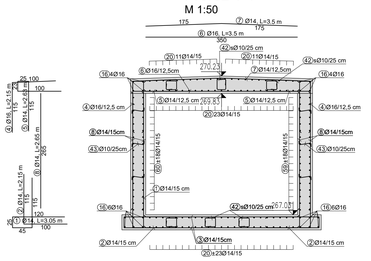


Prerez 3-3
M 1:50



Prerez 1-1
M 1:50



Palice - specifikacija

Ozn.	Oblika in mere [cm]	Ø	L [m]	kd [kos]	Teža palice [kg]	Teža pozicije [kg]
Podhod (1 kos)						
1	120, 25, 115, 45	14	3.05	212	3.79	803.08
2	115, 100	14	2.15	332	2.67	886.54
3	350	14	3.50	268	4.35	1165.00
4	115, 100, 4, 100	16	2.15	107	3.49	372.91
5	115, 100, 25, 23	14	2.63	321	3.27	1048.53
6	350	16	3.50	143	5.67	811.31
7	175, 175, 175, 12	14	3.50	143	4.35	621.62
8	265	14	2.65	412	3.29	1356.02
9	50, 45, 13, 45, 50	12	2.61	50	2.40	120.06
10	370	16	3.70	64	6.00	383.85
11	370	12	3.70	12	3.40	40.85
12	25, 120, 120	14	2.65	38	3.29	125.07
13	70, 25, 25, 25, 25, 7, 7, 20, 70	14	2.24	25	2.78	69.55
14	20, 30, 30	14	0.80	50	0.99	49.68
15	25, 100, 100	14	2.25	295	2.79	824.38
16	755	16	7.55	20	12.24	244.77
17	1010	16	10.10	20	16.37	327.44
18	115, 100, 25, 25	14	2.65	28	3.29	92.16
19	430	16	4.30	24	6.97	167.29
20	1005	14	10.05	92	12.48	1148.35
21	350	14	3.50	10	4.35	43.47
22	715	14	7.15	92	8.88	816.99
23	585	14	5.85	82	7.27	595.79
24	20, 13, 122, 122, 20	12	3.30	34	3.04	103.22
25	20, 40, 11, 40, 20	10	1.62	34	1.03	35.14
26	30, 13, 150, 150, 20	12	3.86	9	3.55	31.96
27	150	12	1.50	22	1.38	30.36
28	25, 55, 15, 55, 25	14	2.15	11	2.67	29.37
29	125, 16	16	1.50	26	2.43	63.22
30	350	12	3.50	32	3.22	103.04
31	45, 10, 30, 30, 10, 25, 45	14	1.95	92	2.42	222.81
32	430	14	4.30	84	5.34	448.61
33	340	12	3.40	40	3.13	125.12
34	20, 122, 15, 122, 15	14	3.49	46	4.33	199.39
35	412	16	4.12	40	6.68	267.14
36	20, 210, 210	14	4.40	48	5.46	262.31
37	339	14	3.39	92	4.21	387.35
38	25, 97, 15, 97, 25	14	2.99	56	3.71	207.96
39	45, 30, 30, 30, 20, 45	14	1.86	26	2.31	60.06
40	15, 70, 70	14	1.55	72	1.93	138.61
41	145, 15	20	1.70	24	4.20	100.78
42	20, 24, 20, 24	10	1.10	498	0.70	349.50
43	6, 27, 6	10	0.39	492	0.25	122.42
44	20, 310, 20	10	3.50	64	2.23	142.91
45	20, 225, 20	10	2.65	88	1.69	148.78
46	25, 100, 100	12	2.25	86	2.07	178.02
47	25, 50, 50	12	1.25	200	1.15	230.00
48	15, 130, 130	14	2.75	174	3.42	594.30
49	15, 125, 15	14	1.50	56	1.86	104.33
50	25, 85, 85	12	1.95	460	1.79	825.24
51	310	14	3.10	12	3.85	46.20
52	250	12	2.50	320	2.30	736.00
53	288	14	2.88	12	3.58	42.92
54	300	12	3.00	48	2.76	132.48
55	85, 20, 13, 89, 20	12	2.86	74	2.63	194.71
56	110, 30, 13, 110, 30	12	3.36	74	3.09	228.75
57	165	12	1.65	140	1.52	212.52
58	885	14	8.85	72	10.99	791.40
59	790	14	7.90	36	9.81	353.22
60	725	14	7.25	36	9.00	324.16
61	45, 15, 30, 15, 30, 45	14	2.06	46	2.56	117.69
62	238	16	2.38	28	3.86	108.02
63	30, 50, 50	14	1.30	48	1.61	77.50
64	115, 30, 25, 30	14	2.75	92	3.42	314.23
65	120	12	1.20	36	1.10	39.74
66	15, 275, 275, 25	14	6.55	11	8.14	89.49
67	130	16	1.30	28	2.11	59.00
68	70, 20, 70	14	1.60	40	1.99	79.49
69	370	14	3.70	24	4.60	110.29
70	412	14	4.12	12	5.12	61.40
71	328	16	3.28	24	5.32	127.61
72	328	20	3.28	32	8.10	259.25
73	35, 13, 162, 162, 25	12	4.25	22	3.91	86.02
74	20, 160, 160	14	3.45	23	4.28	98.55
75	240, 25	16	2.65	20	4.30	85.91
76	537	12	5.37	176	4.94	869.51
77	539	14	5.39	96	6.69	642.66
78	7, 10, 25, 20, 25, 7, 100, 100	14	2.84	25	3.53	88.18
Stopnišče (1 kos)						
100	120, 284, 25, 317, 72	14	5.56	26	6.91	179.54
101	120, 370, 210, 133	14	6.78	26	8.42	218.94
102	60, 70, 522	16	6.02	26	9.76	253.72
103	60, 100, 52, 425, 87	16	5.85	26	9.48	246.55
104	52, 25, 60, 93, 70, 61	16	3.12	26	5.06	131.50
105	30, 201, 70, 35, 61	14	3.09	26	3.84	99.78
106	370	16	3.70	38	6.00	227.91
107	30, 100, 100	14	2.30	84	2.86	239.95
108	125, 20	16	1.50	24	2.43	58.36
109	370	12	3.70	50	3.40	170.20
110	25, 50, 50	14	1.25	52	1.55	80.73
111	45, 13, 30, 30, 13, 45	14	2.06	92	2.56	235.38
112	328	16	3.28	24	5.32	127.61
113	40, 45, 30, 30, 40, 45	14	1.86	36	2.31	83.16
114	18, 70, 70	14	1.58	108	1.96	211.93
115	145, 20	20	1.70	32	4.20	134.37
116	328	20	3.28	32	8.10	259.25
117	10, 83, 30, 30, 10, 25, 83	14	2.71	52	3.37	175.02
118	50, 110, 110	14	2.38	52	2.96	153.71
119	20, 24, 20, 24	10	1.10	166	0.70	116.50
120	6, 32, 6	10	0.44	164	0.28	46.04
121	30, 50, 50	12	1.30	188	1.20	224.85
122	20, 210, 210	14	4.40	196	5.46	1071.10
123	20, 110, 110	14	2.40	36	2.98	107.31
124	238	16	2.38	56	3.86	216.05
125	7, 2, 37, 31, 2, 30, 2, 31, 50	14	2.16	52	2.68	139.50
126	52, 25, 60, 123, 70, 91	16	3.72	26	6.03	156.78
127	120, 284, 21, 317, 72	14	5.53	26	6.87	178.57
128	76, 13, 44, 44, 76	12	3.10	52	2.85	148.30
129	64, 13, 44, 44, 64	12	2.86	52	2.63	136.82
130	38, 206, 70, 35, 61	14	3.14	26	3.90	101.40
131	180, 122, 50, 50	16	3.20	104	5.19	539.47
132	50, 370, 50	16	4.30	204	6.97	1421.94
133	50, 350, 50	14	4.10	78	5.09	397.19
134	60, 125	16	2.05	184	3.32	611.44
135	53, 20, 60, 387, 100, 88, 48	16	5.47	26	8.87	230.54
136	100, 88, 486, 48	16	5.86	26	9.50	246.98
137	114, 364, 172, 203, 133	14	6.64	26	8.25	214.42
138	995	14	9.95	18	12.36	222.44
139	995	12	9.95	64	9.15	585.86
140	80, 145	16	2.25	48	3.65	175.07
141	a; 4 x : a = 128, 137, 145, 153, 162, 170, 179, 187, 196, 204, 212, 221, 229, 238, 246, 254, 263, 271, 280, 288, 297, 305, 313	16	*2.21	4 x 23	*3.58	329.26
142	a, 80; 4 x : a = 64, 73, 81, 90, 98, 106, 115, 123, 132, 140	14	*1.82	4 x 10	*2.26	90.52
143	650	14	6.50	24	8.07	193.75
144	a; 4 x : a = 427, 400, 374, 347, 321, 295, 268, 242, 216, 189, 163, 137, 110	16	*2.68	4 x 13	*4.35	226.23
145	805	14	8.05	6	10.00	59.99
146	80, 170	16	2.50	72	4.05	291.78
147	20, 140, 140	14	3.00	36	3.73	134.14
148	700	14	7.00	32	8.69	278.21
149	a, 50; 4 x : a = 89, 98, 106, 115, 123, 131, 140, 148, 157, 165	14	*2.07	4 x 10	*2.57	102.94
150	a; 4 x : a = 148, 156, 165, 173, 181, 190, 198, 206, 214, 223, 231, 239, 247, 256, 264, 272, 280, 289, 297, 305, 313	16	*2.31	4 x 21	*3.74	314.28
151	a; 4 x : a = 427, 398, 369, 340, 312, 283, 254, 225, 196, 168, 139, 110	16	*2.68	4 x 12	*4.35	208.85

OPOMBE:
NAČRT GLEJ SKUPAJ Z OSTALIMI NAČRTI !
MERE PREVERITI NA LICU MESTA!

Element	Kvaliteta betona	Razred izpostavljenosti	Dmax [mm]	Krovni sloj [mm]	Kvaliteta armature	Kvaliteta kablov za prednap.	Razred vidnega betona
Podložni beton	C 25/30	XC0	/	/	/	/	VB 0
Talne plošče	C 30/37	XC2, PV-II	32	50	B 500B	/	VB 0
Stene podhoda in dvigala - notranje	C 30/37	XC3, XF1, PV-II	22	50/30	B 500B	/	VB 4
Stene stopnišča in nadzemni deli sten	C 30/37	XC3, XF4, PV-II	22	50/30	B 500B	/	VB 4
Prekladna konstrukcija	C 30/37	XC3, XF1, PV-II	22	30/30	B 500B	/	VB 4

DATUM	OPIS SPREMEMBE	PODPIS

PROJEKTANT: TIRING

PODJETJE ZA ZGLAJEVŠKO IN TRANSPORT, D.O.O. MOTNIKA 1, 1236 TRZIN, TELEFAX: 01/562 35 50

PROJEKTANT NAČRTA: PROJEKT d.d. NOVA GORICA

INVESTITOR: RS Ministrstvo za infrastrukturo, Direkcija RS za infrastrukturo, Tržaška cesta 19, 1000 Ljubljana

PROJEKT: IZVEDBENI NAČRT

PROJEKT ŠT.: 8516 — NAČRT ŠT.: 15299_1_2_1

OBJEKT: **Umestitev podhoda na železniški postaji Rače**

ODG. VODJA PROJEKTA: Luka Soško m.i.p / d.i.g — G-4643

ODG. PROJEKTANT: S. STANIČ, u.d.i.g. — G-4173

ODGOVOR.: M. HUMAR, dott.mag.ing.

NAČRT: **2/1 Načrt podhoda**

DATUM: januar 2021

RISBA: Armaturni načrt - Plošče in prerezi

MERILO: 1:50 — RISBA ŠT.: 2/1.5.7

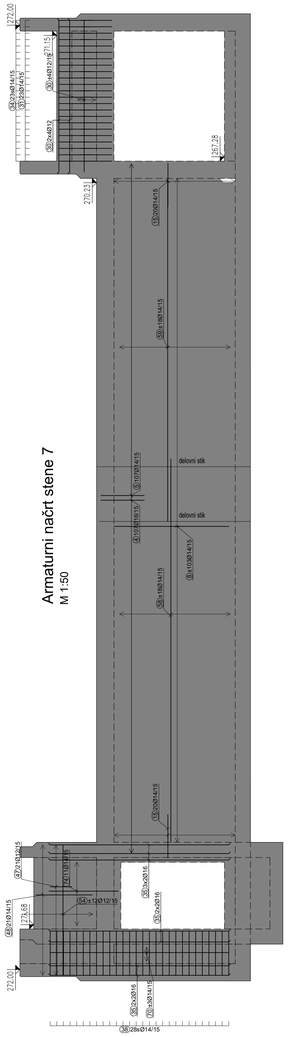
ZG3000	0256.00	007.2164	G		

Ab: 841x1189
A: 1,0 m²
15299_2_2_1_Načrt Podhoda Rače_A3M.dwg
Datum: 2021

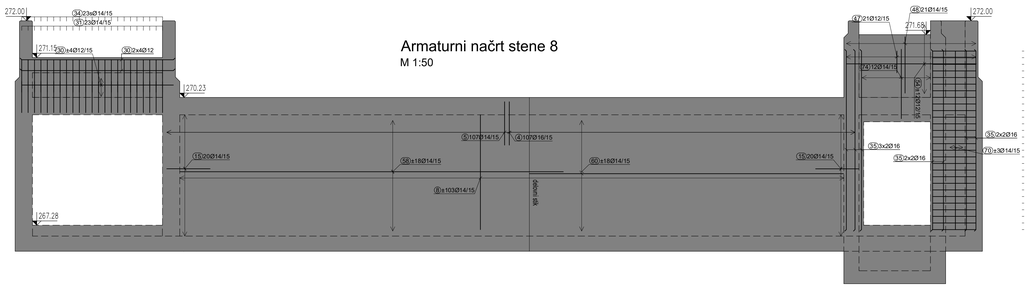
A0: 841x1189
A: 1.0 m²

1539_2_2_1_Nacrt Podhoda Race_A3&A4.dwg

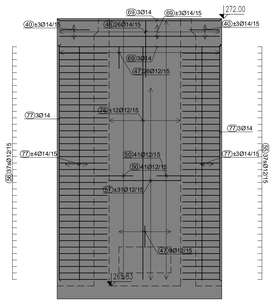
Armaturni načrt stene 7
M 1:50

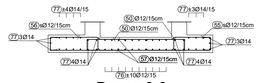


Armaturni načrt stene 8
M 1:50

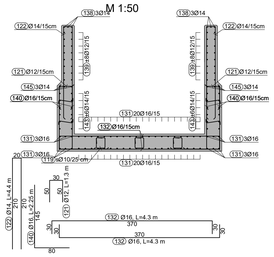


Armaturni načrt stene 6
M 1:50

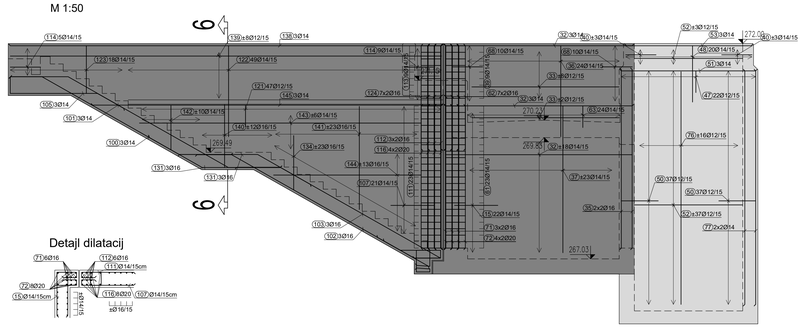




Prerez 6-6
M 1:50

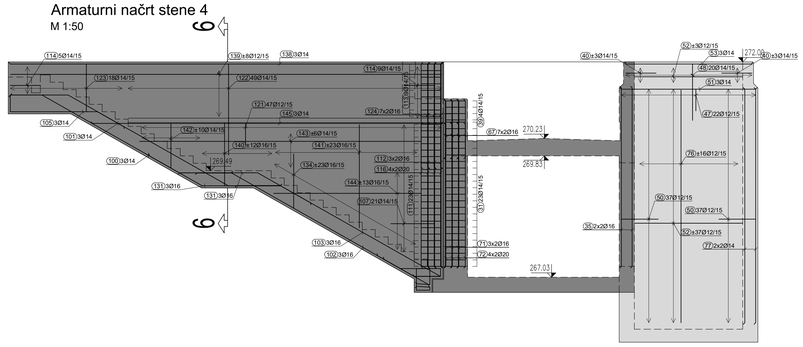


Armaturni načrt stene 5
M 1:50

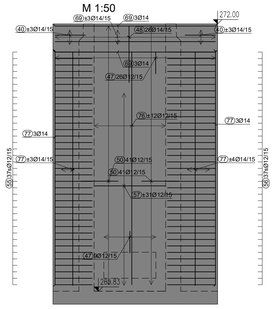


Detajl dilatacij

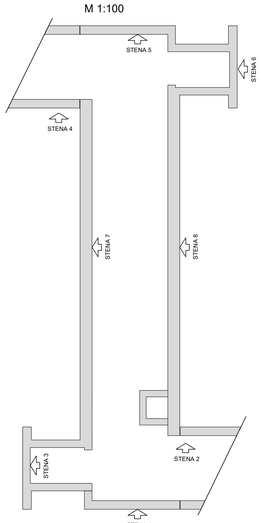
Armaturni načrt stene 4
M 1:50

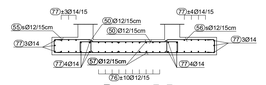


Armaturni načrt stene 3
M 1:50

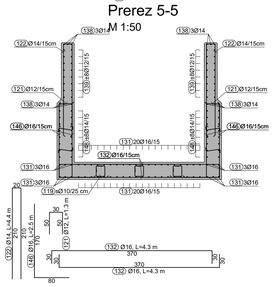


Shema sten
M 1:100

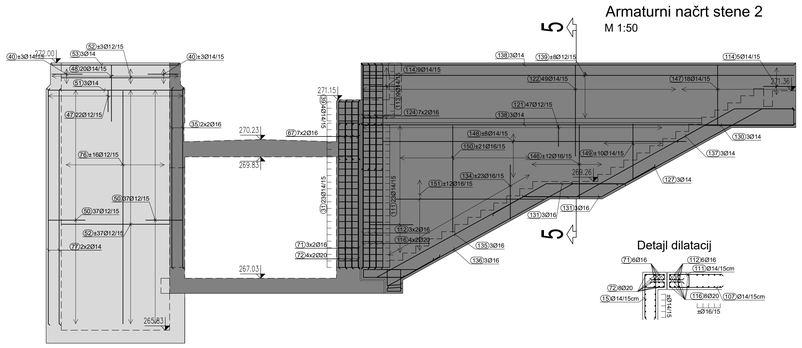




Prerez 5-5
M 1:50

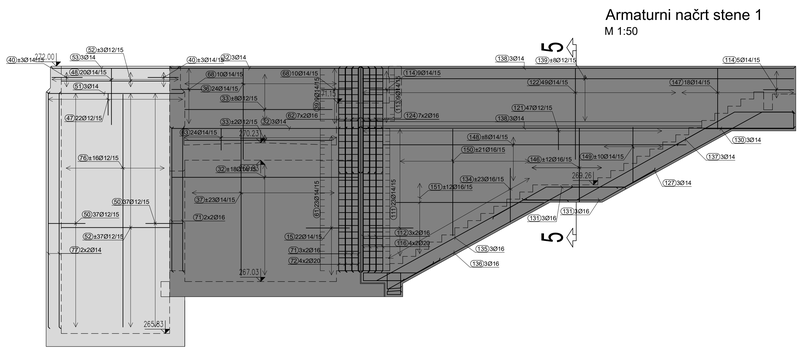


Armaturni načrt stene 2
M 1:50



Detajl dilatacij

Armaturni načrt stene 1
M 1:50



Palice - specifikacija

Ozn.	Oblika in mere [cm]	Ø	L [m]	kd [kos]	Teža palice [kg]	Teža pozicije [kg]
	Podhod (1 kos)					
1	120, 115, 25, 45	14	3.05	212	3.79	803.08
2	115, 100	14	2.15	332	2.67	886.54
3	350	14	3.50	268	4.35	1165.00
4	115, 100, 4, 100	16	2.15	107	3.49	372.91
5	115, 100, 25, 23	14	2.63	321	3.27	1048.53
6	350	16	3.50	143	5.67	811.31
7	175, 175, 12	14	3.50	143	4.35	621.62
8	265	14	2.65	412	3.29	1356.02
9	50, 13, 50	12	2.61	50	2.40	120.06
10	370	16	3.70	64	6.00	383.85
11	370	12	3.70	12	3.40	40.85
12	25, 120, 120	14	2.65	38	3.29	125.07
13	70, 25, 25, 7, 7, 20, 70	14	2.24	25	2.78	69.55
14	20, 30, 30	14	0.80	50	0.99	49.68
15	25, 100, 100	14	2.25	295	2.79	824.38
16	755	16	7.55	20	12.24	244.77
17	1010	16	10.10	20	16.37	327.44
18	115, 100, 25	14	2.65	28	3.29	92.16
19	430	16	4.30	24	6.97	167.29
20	1005	14	10.05	92	12.48	1148.35
21	350	14	3.50	10	4.35	43.47
22	715	14	7.15	92	8.88	816.99
23	585	14	5.85	82	7.27	595.79
24	20, 13, 122, 122	12	3.30	34	3.04	103.22
25	20, 11, 40, 40	10	1.62	34	1.03	35.14
26	20, 13, 150, 150	12	3.86	9	3.55	31.96
27	150	12	1.50	22	1.38	30.36
28	25, 15, 55, 55	14	2.15	11	2.67	29.37
29	25, 125	16	1.50	26	2.43	63.22
30	350	12	3.50	32	3.22	103.04
31	10, 45, 10, 30, 30, 25, 45	14	1.95	92	2.42	222.81
32	430	14	4.30	84	5.34	448.61
33	340	12	3.40	40	3.13	125.12
34	25, 15, 122, 122, 15	14	3.49	46	4.33	199.39
35	412	16	4.12	40	6.68	267.14
36	20, 210, 210	14	4.40	48	5.46	262.31
37	339	14	3.39	92	4.21	387.35
38	25, 15, 97, 97, 25	14	2.99	56	3.71	207.96
39	45, 30, 30, 45, 20	14	1.86	26	2.31	60.06
40	45, 70, 70	14	1.55	72	1.93	138.61
41	145, 25	20	1.70	24	4.20	100.78
42	20, 24, 20, 24	10	1.10	498	0.70	349.50
43	45, 27, 5	10	0.39	492	0.25	122.42
44	20, 310, 20	10	3.50	64	2.23	142.91
45	20, 225, 20	10	2.65	88	1.69	148.78
46	25, 100, 100	12	2.25	86	2.07	178.02
47	25, 50, 50	12	1.25	200	1.15	230.00
48	15, 130, 130	14	2.75	174	3.42	594.30
49	25, 125	14	1.50	56	1.86	104.33
50	25, 85, 85	12	1.95	460	1.79	825.24
51	310	14	3.10	12	3.85	46.20
52	250	12	2.50	320	2.30	736.00
53	288	14	2.88	12	3.58	42.92
54	300	12	3.00	48	2.76	132.48
55	30, 13, 85, 85	12	2.86	74	2.63	194.71
56	30, 110, 13, 110	12	3.36	74	3.09	228.75
57	165	12	1.65	140	1.52	212.52
58	885	14	8.85	72	10.99	791.40
59	790	14	7.90	36	9.81	353.22
60	725	14	7.25	36	9.00	324.16
61	45, 15, 30, 30, 15, 45	14	2.06	46	2.56	117.69
62	238	16	2.38	28	3.86	108.02
63	30, 50, 50	14	1.30	48	1.61	77.50
64	115, 30, 30, 25	14	2.75	92	3.42	314.23
65	120	12	1.20	36	1.10	39.74
66	35, 15, 275, 275, 35	14	6.55	11	8.14	89.49
67	130	16	1.30	28	2.11	59.00
68	20, 70, 70	14	1.60	40	1.99	79.49
69	370	14	3.70	24	4.60	110.29
70	412	14	4.12	12	5.12	61.40
71	328	16	3.28	24	5.32	127.61
72	328	20	3.28	32	8.10	259.25
73	35, 13, 162, 162, 35	12	4.25	22	3.91	86.02
74	25, 160, 160	14	3.45	23	4.28	98.55
75	25, 240	16	2.65	20	4.30	85.91
76	537	12	5.37	176	4.94	869.51
77	539	14	5.39	96	6.69	642.66
78	7, 7, 25, 25, 25, 7, 7, 20, 100	14	2.84	25	3.53	88.18
	Stopnišče (1 kos)					
100	120, 317, 72, 317	14	5.56	26	6.91	179.54
101	120, 370, 210, 133	14	6.78	26	8.42	218.94
102	522, 60, 70, 35	16	6.02	26	9.76	253.72
103	52, 425, 60, 87, 35	16	5.85	26	9.48	246.55
104	70, 52, 35, 60, 93, 61, 35	16	3.12	26	5.06	131.50
105	38, 201, 35, 61, 12	14	3.09	26	3.84	99.78
106	370	16	3.70	38	6.00	227.91
107	100, 30, 100	14	2.30	84	2.86	239.95
108	125, 25	16	1.50	24	2.43	58.36
109	370	12	3.70	50	3.40	170.20
110	50, 25, 50	14	1.25	52	1.55	80.73
111	45, 15, 30, 30, 15, 45	14	2.06	92	2.56	235.38
112	328	16	3.28	24	5.32	127.61
113	45, 40, 30, 30, 20, 45	14	1.86	36	2.31	83.16
114	70, 18, 70	14	1.58	108	1.96	211.93
115	145, 25	20	1.70	32	4.20	134.37
116	328	20	3.28	32	8.10	259.25
117	10, 83, 30, 30, 10, 25	14	2.71	52	3.37	175.02
118	55, 110, 110	14	2.38	52	2.96	153.71
119	20, 24, 20, 24	10	1.10	166	0.70	116.50
120	5, 32, 5	10	0.44	164	0.28	46.04
121	30, 50, 50	12	1.30	188	1.20	224.85
122	20, 210, 210	14	4.40	196	5.46	1071.10
123	20, 110, 110	14	2.40	36	2.98	107.31
124	238	16	2.38	56	3.86	216.05
125	7, 7, 2, 50, 25, 35, 2, 35, 37, 50	14	2.16	52	2.68	139.50
126	52, 25, 40, 70, 123, 25, 91, 15	16	3.72	26	6.03	156.78
127	120, 317, 267, 72, 317	14	5.53	26	6.87	178.57
128	44, 76, 13, 76, 44	12	3.10	52	2.85	148.30
129	44, 64, 13, 64, 44	12	2.86	52	2.63	136.82
130	38, 206, 35, 61, 12	14	3.14	26	3.90	101.40
131	180, 160, 122, 60	16	3.20	104	5.19	539.47
132	30, 370, 30	16	4.30	204	6.97	1421.94
133	30, 350, 30	14	4.10	78	5.09	397.19
134	65, 125	16	2.05	184	3.32	611.44
135	53, 25, 65, 387, 150, 68, 48	16	5.47	26	8.87	230.54
136	150, 68, 48, 486	16	5.86	26	9.50	246.98
137	114, 364, 472, 203, 133	14	6.64	26	8.25	214.42
138	995	14	9.95	18	12.36	222.44
139	995	12	9.95	64	9.15	585.86
140	80, 145	16	2.25	48	3.65	175.07
141	a; 4 x : a = 128, 137, 145, 153, 162, 170, 179, 187, 196, 204, 212, 221, 229, 238, 246, 254, 263, 271, 280, 288, 297, 305, 313	16	*2.21	4 x 23	*3.58	329.26
142	a, 80; 4 x : a = 64, 73, 81, 90, 98, 106, 115, 123, 132, 140	14	*1.82	4 x 10	*2.26	90.52
143	650	14	6.50	24	8.07	193.75
144	a; 4 x : a = 427, 400, 374, 347, 321, 295, 268, 242, 216, 189, 163, 137, 110	16	*2.68	4 x 13	*4.35	226.23
145	805	14	8.05	6	10.00	59.99
146	80, 170	16	2.50	72	4.05	291.78
147	20, 140, 140	14	3.00	36	3.73	134.14
148	700	14	7.00	32	8.69	278.21
149	a, 80; 4 x : a = 89, 98, 106, 115, 123, 131, 140, 148, 157, 165	14	*2.07	4 x 10	*2.57	102.94
150	a; 4 x : a = 148, 156, 165, 173, 181, 190, 198, 206, 214, 223, 231, 239, 247, 256, 264, 272, 280, 289, 297, 305, 313	16	*2.31	4 x 21	*3.74	314.28
151	a; 4 x : a = 427, 398, 369, 340, 312, 283, 254, 225, 196, 168, 139, 110	16	*2.68	4 x 12	*4.35	208.85

OPOMBE:
NAČRT GLEJ SKUPAJ Z OSTALIMI NAČRTI !
MERE PREVERITI NA LICU MESTA!

Element	Kvalitet a betona	Razred izpostavljenosti	Dmax [mm]	Krovni sloj [mm]	Kvaliteta armature	Kvaliteta kablov za prednap.	Razred vidnega betona
Podložni beton	C 25/30	XC0	/	/	/	/	VB 0
Talne plošče	C 30/37	XC2, PV-II	32	50	B 500B	/	VB 0
Stene podhoda in dvigala - notranje	C 30/37	XC3, XF1, PV-II	22	50/30	B 500B	/	VB 4
Stene stopnišča in nadzemni deli sten	C 30/37	XC3, XF4, PV-II	22	50/30	B 500B	/	VB 4
Prekladna konstrukcija	C 30/37	XC3, XF1, PV-II	22	30/30	B 500B	/	VB 4

DATUM	OPIS SPREMEMBE	PODPIS

PROJEKTANT
TIRING PRIMO
PODJETJE ZA ŽELEZNIŠKI NIŽVIRING, D.O.O.
MOTNIKA 11
1236 TRZIN
TELEFAX: 01/562 39 55

PROJEKTANT NAČRTA
PROJEKT d.d. NOVA GORICA

INVESTITOR
RS Ministrstvo za infrastrukturo
Direkcija RS za infrastrukturo
Tržaška cesta 19, 1000 Ljubljana

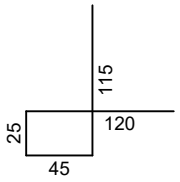
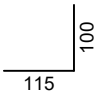
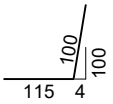
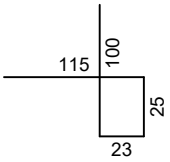
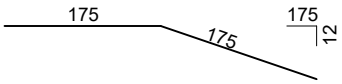
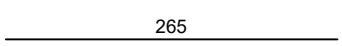
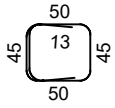
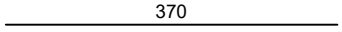
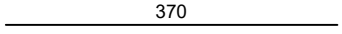
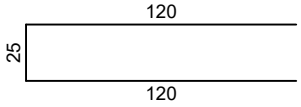
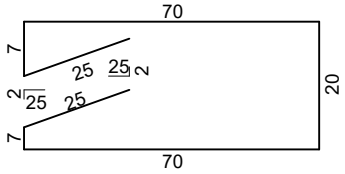
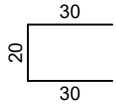
OBJEKT
Umestitev podhoda na železniški postaji Rače

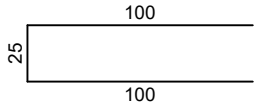
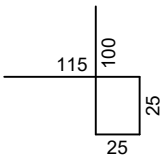
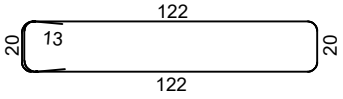
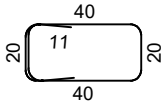
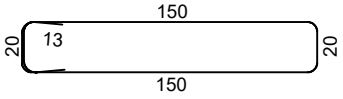
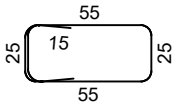
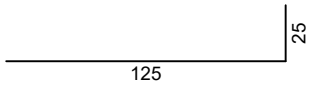
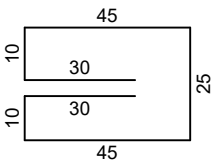
NAČRT
2/1 Načrt podhoda

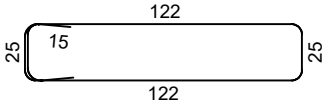
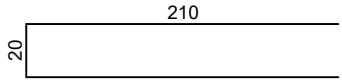
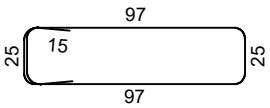
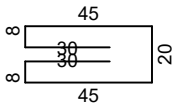
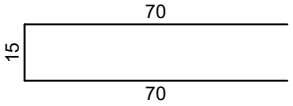
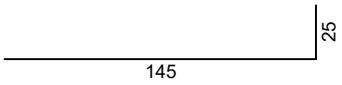
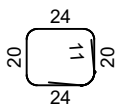
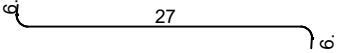
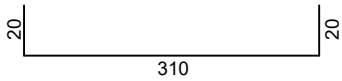
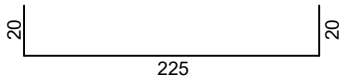
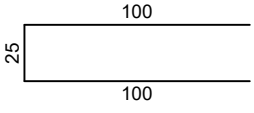
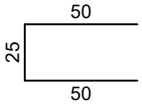
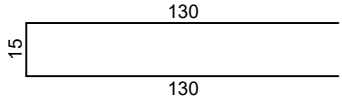
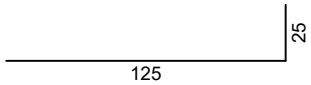
RISBA
Armaturni načrt - Stene

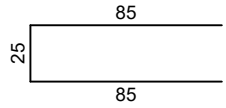
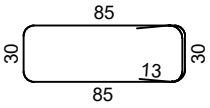
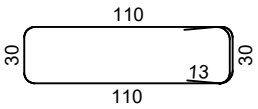
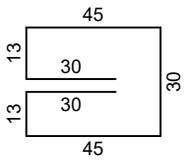
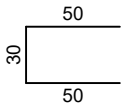
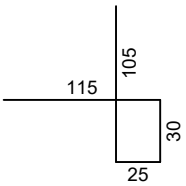
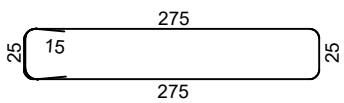
FAZA: IZVEDBENI NAČRT
PROJEKT ŠT.: 8516
NAČRT ŠT.: 15299_1_2_1
ODG. VODJA PROJEKTA: Luka Šoško m.i.p / d.i.g
ŠT. ŠT.: G-4643
ODG. PROJEKTANT: S. STANIČ, u.d.i.g.
ŠT. ŠT.: G-4173
IZDELAL: M. HUMAR, dott.mag.ing.
DATUM: januar 2021
MERILO: 1:50
PRILOGA: 2/1.5.8

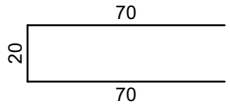
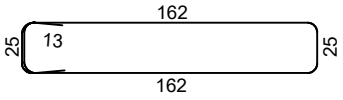
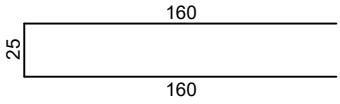
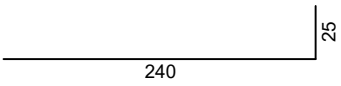
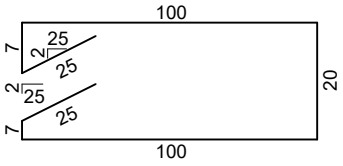
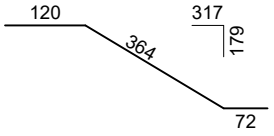
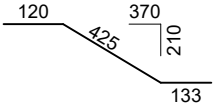
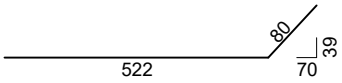
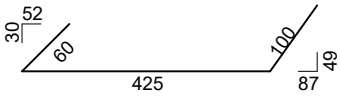
ZG3000	0256.00	007.2164	G		

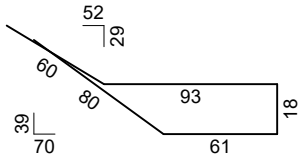
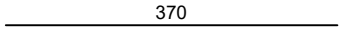
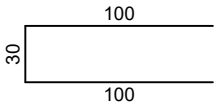
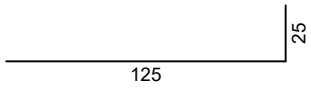
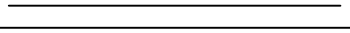
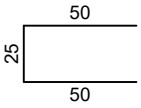
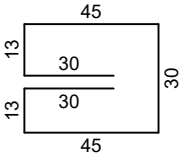
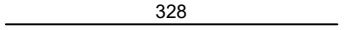
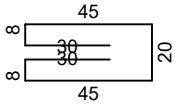
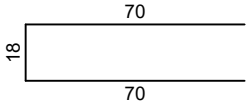
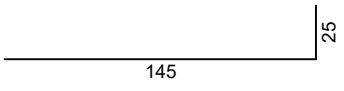
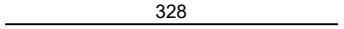
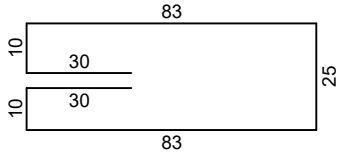
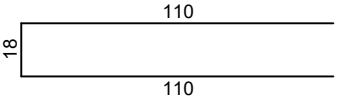
Palice - specifikacija						
Ozn.	Oblika in mere [cm]	Ø	L [m]	kd [kos]	Teža palice [kg]	Teža pozicije [kg]
Podhod (1 kos)						
1		14	3.05	212	3.79	803.08
2		14	2.15	332	2.67	886.54
3		14	3.50	268	4.35	1165.00
4		16	2.15	107	3.49	372.91
5		14	2.63	321	3.27	1048.53
6		16	3.50	143	5.67	811.31
7		14	3.50	143	4.35	621.62
8		14	2.65	412	3.29	1356.02
9		12	2.61	50	2.40	120.06
10		16	3.70	64	6.00	383.85
11		12	3.70	12	3.40	40.85
12		14	2.65	38	3.29	125.07
13		14	2.24	25	2.78	69.55
14		14	0.80	50	0.99	49.68

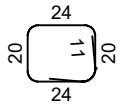
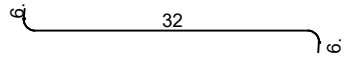
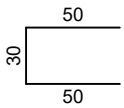
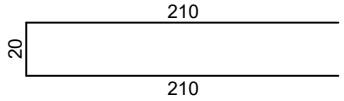
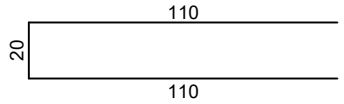
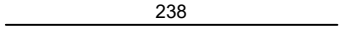
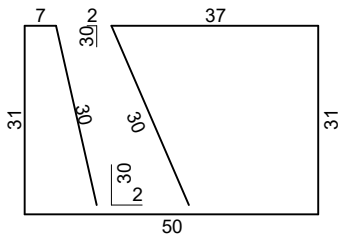
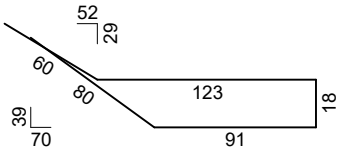
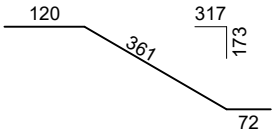
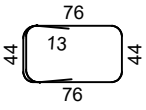
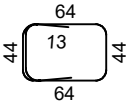
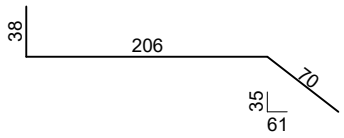
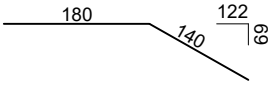
Palice - specifikacija						
Ozn.	Oblika in mere [cm]	Ø	L [m]	kd [kos]	Teža palice [kg]	Teža pozicije [kg]
15		14	2.25	295	2.79	824.38
16		16	7.55	20	12.24	244.77
17		16	10.10	20	16.37	327.44
18		14	2.65	28	3.29	92.16
19		16	4.30	24	6.97	167.29
20		14	10.05	92	12.48	1148.35
21		14	3.50	10	4.35	43.47
22		14	7.15	92	8.88	816.99
23		14	5.85	82	7.27	595.79
24		12	3.30	34	3.04	103.22
25		10	1.62	34	1.03	35.14
26		12	3.86	9	3.55	31.96
27		12	1.50	22	1.38	30.36
28		14	2.15	11	2.67	29.37
29		16	1.50	26	2.43	63.22
30		12	3.50	32	3.22	103.04
31		14	1.95	92	2.42	222.81
32		14	4.30	84	5.34	448.61

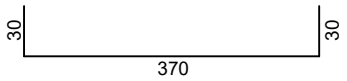
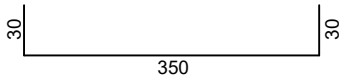
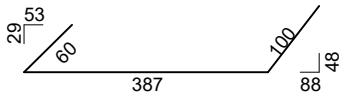
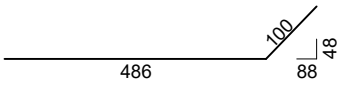
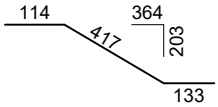
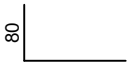
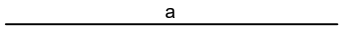
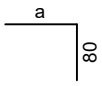
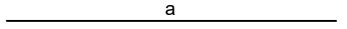
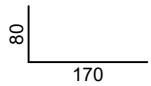
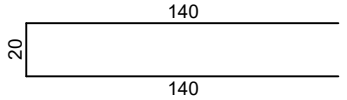
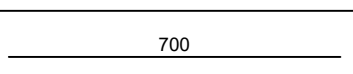
Palice - specifikacija						
Ozn.	Oblika in mere [cm]	Ø	L [m]	kd [kos]	Teža palice [kg]	Teža pozicije [kg]
33		12	3.40	40	3.13	125.12
34		14	3.49	46	4.33	199.39
35		16	4.12	40	6.68	267.14
36		14	4.40	48	5.46	262.31
37		14	3.39	92	4.21	387.35
38		14	2.99	56	3.71	207.96
39		14	1.86	26	2.31	60.06
40		14	1.55	72	1.93	138.61
41		20	1.70	24	4.20	100.78
42		10	1.10	498	0.70	349.50
43		10	0.39	492	0.25	122.42
44		10	3.50	64	2.23	142.91
45		10	2.65	88	1.69	148.78
46		12	2.25	86	2.07	178.02
47		12	1.25	200	1.15	230.00
48		14	2.75	174	3.42	594.30
49		14	1.50	56	1.86	104.33

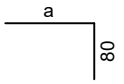
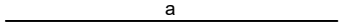
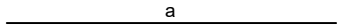
Palice - specifikacija						
Ozn.	Oblika in mere [cm]	Ø	L [m]	kd [kos]	Teža palice [kg]	Teža pozicije [kg]
50		12	1.95	460	1.79	825.24
51		14	3.10	12	3.85	46.20
52		12	2.50	320	2.30	736.00
53		14	2.88	12	3.58	42.92
54		12	3.00	48	2.76	132.48
55		12	2.86	74	2.63	194.71
56		12	3.36	74	3.09	228.75
57		12	1.65	140	1.52	212.52
58		14	8.85	72	10.99	791.40
59		14	7.90	36	9.81	353.22
60		14	7.25	36	9.00	324.16
61		14	2.06	46	2.56	117.69
62		16	2.38	28	3.86	108.02
63		14	1.30	48	1.61	77.50
64		14	2.75	92	3.42	314.23
65		12	1.20	36	1.10	39.74
66		14	6.55	11	8.14	89.49
67		16	1.30	28	2.11	59.00

Palice - specifikacija						
Ozn.	Oblika in mere [cm]	Ø	L [m]	kd [kos]	Teža palice [kg]	Teža pozicije [kg]
68		14	1.60	40	1.99	79.49
69		14	3.70	24	4.60	110.29
70		14	4.12	12	5.12	61.40
71		16	3.28	24	5.32	127.61
72		20	3.28	32	8.10	259.25
73		12	4.25	22	3.91	86.02
74		14	3.45	23	4.28	98.55
75		16	2.65	20	4.30	85.91
76		12	5.37	176	4.94	869.51
77		14	5.39	96	6.69	642.66
78		14	2.84	25	3.53	88.18
Stopnišče (1 kos)						
100		14	5.56	26	6.91	179.54
101		14	6.78	26	8.42	218.94
102		16	6.02	26	9.76	253.72
103		16	5.85	26	9.48	246.55

Palice - specifikacija						
Ozn.	Oblika in mere [cm]	Ø	L [m]	kd [kos]	Teža palice [kg]	Teža pozicije [kg]
104		16	3.12	26	5.06	131.50
105		14	3.09	26	3.84	99.78
106		16	3.70	38	6.00	227.91
107		14	2.30	84	2.86	239.95
108		16	1.50	24	2.43	58.36
109		12	3.70	50	3.40	170.20
110		14	1.25	52	1.55	80.73
111		14	2.06	92	2.56	235.38
112		16	3.28	24	5.32	127.61
113		14	1.86	36	2.31	83.16
114		14	1.58	108	1.96	211.93
115		20	1.70	32	4.20	134.37
116		20	3.28	32	8.10	259.25
117		14	2.71	52	3.37	175.02
118		14	2.38	52	2.96	153.71

Palice - specifikacija						
Ozn.	Oblika in mere [cm]	Ø	L [m]	kd [kos]	Teža palice [kg]	Teža pozicije [kg]
119		10	1.10	166	0.70	116.50
120		10	0.44	164	0.28	46.04
121		12	1.30	188	1.20	224.85
122		14	4.40	196	5.46	1071.10
123		14	2.40	36	2.98	107.31
124		16	2.38	56	3.86	216.05
125		14	2.16	52	2.68	139.50
126		16	3.72	26	6.03	156.78
127		14	5.53	26	6.87	178.57
128		12	3.10	52	2.85	148.30
129		12	2.86	52	2.63	136.82
130		14	3.14	26	3.90	101.40
131		16	3.20	104	5.19	539.47

Palice - specifikacija						
Ozn.	Oblika in mere [cm]	Ø	L [m]	kd [kos]	Teža palice [kg]	Teža pozicije [kg]
132		16	4.30	204	6.97	1421.94
133		14	4.10	78	5.09	397.19
134		16	2.05	184	3.32	611.44
135		16	5.47	26	8.87	230.54
136		16	5.86	26	9.50	246.98
137		14	6.64	26	8.25	214.42
138		14	9.95	18	12.36	222.44
139		12	9.95	64	9.15	585.86
140		16	2.25	48	3.65	175.07
141	 4 x : a = 128, 137, 145, 153, 162, 170, 179, 187, 196, 204, 212, 221, 229, 238, 246, 254, 263, 271, 280, 288, 297, 305, 313	16	*2.21	4 x 23	*3.58	329.26
142	 4 x : a = 64, 73, 81, 90, 98, 106, 115, 123, 132, 140	14	*1.82	4 x 10	*2.26	90.52
143		14	6.50	24	8.07	193.75
144	 4 x : a = 427, 400, 374, 347, 321, 295, 268, 242, 216, 189, 163, 137, 110	16	*2.68	4 x 13	*4.35	226.23
145		14	8.05	6	10.00	59.99
146		16	2.50	72	4.05	291.78
147		14	3.00	36	3.73	134.14
148		14	7.00	32	8.69	278.21

Palice - specifikacija						
Ozn.	Oblika in mere [cm]	Ø	L [m]	kd [kos]	Teža palice [kg]	Teža pozicije [kg]
149	 4 x : a = 89, 98, 106, 115, 123, 131, 140, 148, 157, 165	14	*2.07	4 x 10	*2.57	102.94
150	 4 x : a = 148, 156, 165, 173, 181, 190, 198, 206, 214, 223, 231, 239, 247, 256, 264, 272, 280, 289, 297, 305, 313	16	*2.31	4 x 21	*3.74	314.28
151	 4 x : a = 427, 398, 369, 340, 312, 283, 254, 225, 196, 168, 139, 110	16	*2.68	4 x 12	*4.35	208.85

Palice - izvleček			
Ø [mm]	L x kd [m]	Teža enote [kg/m']	Teža enote [kg/m']
B500 B, Ø <= 12 mm			
10	1506.72	0.64	961.29
12	6036.56	0.92	5553.64
Skupaj (B500 B, Ø <= 12 mm)			6514.92
B500 B, Ø > 12 mm			
14	16512.37	1.24	20508.36
16	5572.35	1.62	9032.78
20	305.12	2.47	753.65
Skupaj (B500 B, Ø > 12 mm)			30294.79
Skupaj			36809.71