

elektronski potpis projektanta	elektronski potpis revidenta
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INVESTITOR¹

Opština Bar

OBJEKAT²

Rekonstrukcija objekta infrastrukture-saobraćajnice i parkinga, sa pratećom infrastrukturom, u zahvatu Izmjena i dopuna DUP-a "Topolica-Bjeliši", saobraćajnice označene u planu kao "Borska ulica" i parkinga označenih osovinama O64-O67 i O68-O73, u zoni A

LOKACIJA³

Katastarske parcele 5700/1, 5701/1, 5702, 5704, 5699, 5698/1, 5695/1, 5693/3, 5691/2, 5690, 5694, djelova kat.parcela br. 5006, 5004/1, 5005, 5700/1,5692/4, 5691/2, i 5693/3 K.O Novi Bar

DIO TEHNIČKE
DOKUMENTACIJE⁴

Knjiga 2.2-Konstrukcija

PROJEKTANT⁵

“URBI PRO” d.o.o. Podgorica

ODGOVORNO LICE⁶ /

Dušan Džudović,dipl.inž.arh.

ODGOVORNI INŽENJER⁷ / Jovana Perović, spec.sci.grad.

SARADNICI NA
PROJEKTU⁸

¹ Naziv/ime investitora

² Naziv projektovanog objekta

³ Mjesto građenja, planski dokument, urbanistička parcela, katastarska parcela

⁴ Arhitektonski projekat, građevinski projekat, elektrotehnički projekat odnosno mašinski projekat (ako je u pitanju naslovna strana dijela tehnički dokumentacije)

⁵ Naziv privrednog društva, pravnog lica odnosno preduzetnika koji je izradio dio tehničke dokumentacije

⁶ Ime odgovornog lica u privrednom društvu, pravnom licu odnosno ime i prezime preduzetnika

⁷ Ime i prezime odgovornog inženjera

⁸ Ime i prezime saradnika na izradi dijela tehnički dokumentacije

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- Predračun radova

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- 1-01 Plan pozicija potpornih zidova
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TEKSTUALNA DOKUMENTACIJA

TEHNIČKI IZVJEŠTAJ

Lokacija: Novi Bar - Katastarske parcele 5700/1, 5701/1, 5702, 5704, 5699, 5698/1, 5695/1, 5693/3, 5691/2, 5690, 5694, djelova kat.parcela br. 5006, 5004/1, 5005, 5700/1, 5692/4, 5691/2, i 5693/3 K.O

Objekat: Rekonstrukcija objekta infrastrukture-saobraćajnice i parkinga, sa pratećom infrastrukturom, u zahvatu Izmjena i dopuna DUP-a "Topolica-Bjeliši", saobraćajnice označene u planu kao "Borska ulica" i parkinga označenih osovina O64-O67 i O68-O73, u zoni A.

Investitor: Opština Bar

1. UVOD

Glavni projekat konstrukcije potpornih zidova urađen je na osnovu: projekta saobraćaja, geodetskih podloga, geotehničkog elaborata, hidrotehnike i drugih instalacija koji su povezani glavnim projektom.

Takođe, projekat konstrukcije urađen je poštujući projektni zadatak, kao i odgovarajuće tehničke propise i standarde, a s obzirom na namjenu, lokaciju i položaj objekta. Dokazana je statička sigurnost konstrukcije svih objekata, kao i prostorna stabilnost.

2. OPŠTI PODACI

Lokacija na kojoj je planirana izgradnja potpornih zidova je u Baru. Morfološki posmatrano teren je ravničarskog karaktera.

Za potrebe saobraćajnice nije rađen Geotehnički elaborat. Na osnovu elaborata koji je urađen u neposrednoj blizini, može se zaključiti da su registrovane sljedeće geotehničke sredine:

Sredina 1 – crvenica sa sitnom i krupnom krečnjačkom drobinom (tr) – izgrađuje gornje djelove terena, debljine do 2,0m. Predstavlja slabovezanu, heterogenu, slabo zbijenu sredinu (na inženjerskogeološkom profilu terena je označena sa 1, prilog br.4.0). F

Sredina 2 – prašinsta i pjeskovita drobina i sitni komadi sa laporovitom glinom flišnog porijekla, komadima pješčara i krečnjaka (dl) – pripada inženjerskogeološkoj grupi slabo vezanih stijena. U genetskom smislu pripadaju deluvijalnim sedimentima. Pojavljuje se u slojevima debljine do 3.0m.

Sredina 3 – Eluvijalna prašinsta i laporovita glina sa uklopcima laporaca i pješčara (el) – Čine ih sivomaslinaste i tamnosive laporovite gline i glinoviti lapori sa očuvanom primarnom teksturom i sa jasno uočljivom primarnom teksturom, a sama drobina je u različitim međusobnim razmjerama. Nalaze u gornjoj zoni flišnog

kompleksa debljine 1,0m do 2,0m. U suvom stanju, ova sredina je dobrih fizičkomehaničkih karakteristika, dok pod uticajem vode i vlage, dolazi do pogoršanja otporno-deformabilnih svojstava, te prelazi u stanje mekih, stišljivih, slabo nosivih glina.

Sredina 4 – Flišni sediment srednje eocenske starosti (fliš) – Predstavljaju vezane, slabookamenjene do okamenjene stijene sastavljene od glinaca, laporaca i pješčara, listastih, tankoslojevitih do slojevitih, sive do sivoplavičaste boje. Granica između svježeg fliša i eluvijuma je postupna i nepravilna. Kompleks je ubran i ispucao, u površinskoj zoni fizičko-hemijski izmijenjen i pretvoren u gline sa drobinom, smeđe do braon boje. Pri opterećenju se ponašaja kao kruta elastična sredina. Stijena je suva, kompaktna, svjetlosive boje, bušenjem usitnjena u komade, sa vrlo kratkim intervalima bušenja.

Zbog racionalnosti, izvršeno je fundiranje na dubini od 0.8 do 1,0 m u odnosu na kotu terena. Kako na ovoj dubini se nalazi geotehnička sredina 2, koja nije pogodna za gradnju, potporni zidovi moraju se izvoditi uz potpunu zamjenu tla, sa minimalnom debljinom zamjene od 1,0 m, u četiri sloja po 0.25m. Zamjenu podtla izvršiti dobro granuliranim, čistim drobljenim krečnjačkim ili prirodnim šljunkovito-pjeskovitim materijalom granulacije 0-50 mm uz maksimalno učešće glinovite komponente do 3%. Tampon je neophodno uvaljati (zbiti) do modula $M_s = 50.000 \text{ kN/m}^2$ u slojevima od po 25 cm;

- Zbijenost tampona provjeravati opitom kružnom pločom na dovoljnom broju mjernih mjesta i uraditi Izvještaj o izvedenim ispitivanjima;
- Iskope izvoditi po mogućnosti u sušnom periodu zbog priliva voda i planirati mjere zaštite iskopa po potrebi;
- Tokom izvođenja zemljanih radova može se očekivati da će doći do prodora podzemne vode zbog njenog visokog nivoa, tj. vodozasićenje iskopa odmah nakon zasijecanja tla pa je potrebno u dijelu terena iskopati drenažni šaht iz koga bi se muljnom pumpom voda izbacala do najbližeg vodosabirnika ili kanala;
- Kosine iskopa prilikom zasijecanja raditi i nagibu 2:1;
- OBAVEZNO je prisustvo inženjera geotehnike pri izvođenju iskopa kako bi se precizno definisale inženjerskogeološke sredine na otvorenom profilu zasjeka i pravovremeno riješili eventualni problema.

3. DISPOZICIONO RJEŠENJE I USVOJENI KONSTRUKTIVNI SISTEM

Dispoziciono rješenje i upotreba osnovnih materijala za konstrukciju usvojeni su u skladu sa projektnim zadatkom, funkcijom, lokalnim uslovima, projektom saobraćaja.

Projektovani su potporni zidovi kao konzole. Kota krune zida definisana je projektom saobraćajnice. Potporni zidovi su konstantne visine krune zida i konstantne kote donje ivice temelja. Usvojen je jedan tip poprečnog presjeka potpornih zidova, visine $H=2.0\text{m}$ i širine temeljne stope $B=1.5\text{m}$.

Usvojeni tip konstrukcije zadovoljava sve uslove tražene seizmičkim propisima.

4. OPIS MODELIRANJA I PRORAČUNA

- Proračunski model je urađen kao 2D model pomoću u programskom paketu GEO 5 (Geo Structural Analysis – Cantilever wall).

-Projektant konstrukcije je vrijednost dozvoljenog centričnog napona u tlu usvojio od 200 kN/m^2 i sljedeće parametre zasipa i temeljnog tla:

- $\gamma=20.0 \text{ kN/m}^3$
- $\varphi=30^\circ$
- $c_1=0 \text{ kN/m}^2, c_2=5 \text{ kN/m}^2$
- $M_s=10\,000 \text{ kN/m}^2$
- Zaštitni sloj za $a_o=4 \text{ cm}$
- $\delta=(1/3-2/3) \varphi_{ef}=20^\circ$

Po ovim parametrima izvršen je proračun zidova u programskom paketu GEO 5, po važećim evropskim propisima i standardu EC7, pri čemu je korišten projektni pristup 2.

Kontrola naprezanja u kontaktnoj površini sprovedena je za najnepovoljniju kombinaciju eksploatacionih opterećenja, a cilj je obezbijediti da maksimalna **naprezanja ne prevazilaze dopuštene napone u tlu, a da pri tome budu zadovoljeni propisima faktori sigurnosti na preturanje i klizanje**. Pri tome, u prenosu opterećenja na tlo može učestvovati samo onaj dio kontaktne površine koji je pritisnut (na spoju temelj – tlo se ne prenose naponi zatezanja). Izuzetno, za pojedine kombinacije (seizmička), dopušta se prekoračenje dopuštenih napona u ograničenom procentu (20%) na ivicama kontaktne površine.

Obavezno je izvesti predviđene drenaže i barbakane potpornih zidova.

Svi zidovi projektovani su uzimajući u obzir zemlju sa obje strane zida, odnosno cijelu visinu dubine fundiranja sa jedne strane (80-100cm) i cijelo opterećenje zemljom sa druge kritičnije strane.

U proračunskom modelu konstrukcije su unešena sledeća opterećenja:

Stalno – sopstvena težina elemenata konstruktivnog sistema i sva ostala opterećenja stalnog karaktera, uključujući i tlo (aktivni i pasivni pritisak)

Saobraćajno opterećenje - usvojeno $33,3 \text{ kN/m}^2$

Seizmičko opterećenje

Seizmičko opterećenje je odrađeno po formuli:

$$F_y = \Sigma G * k_h$$

$$K_h = a_{\max} * S/r$$

$$K_v = 0,33 \text{ za slučaj } K_h \leq 0,6$$

Usvojeni povratni period referentnog zemljotresa od 475 godina usvojeno je horizontalno ubrzanje tla za zadatu lokaciju je $a_{gr} = 0,371 \text{ g}$ i temeljno tlo tipa B ($S=1.2$)

Faktor r usvaja se zavisno od tipa potporne konstrukcije. Za zidove koji nisu visociji od 10 m usvaja se da je seizmički koeficijent konstantan po visini. Usvojen je $r=2$, za slobodne masivne zidove, gdje je prihvatljivo pomjeranje do $d_r = 300 a \cdot S$ (mm), prema EN 1998-5 (7.3.2.2.)

$$K_h = 0.371 \cdot 1.2 / 2$$

$$K_h = 0,223$$

Prilikom dimenzionisanja elemenata konstrukcije koje je vršeno po teoriji graničnih stanja korišćeni su adekvatni parcijalni koeficijenti sigurnosti.

Kao opšti zaključak se navodi da usvojene dimenzije potpornih zidova, kao i usvojena armatura obezbjeđuju potrebnu sigurnost, stabilnost i duktilnost projektovanih potpornih zidova.

5. KVALITET MATERIJALA ZA KONSTRUKCIJU OBJEKTA

- Za cjelokupnu konstrukciju: C25/30 $f_{ck}=25.00$ MPa
- Za armaturu: B500B i MAR 500/560 $f_{yk}=500.00$ MPa

6. PRIMJENJENI PROPISI

- EN 1991-1-1, EN 1991-1-3
- EN 1992-1-1
- EN 1998-1, EN 1998-5
- MEST EN 1990
- MEST EN 1997-1

7. OPŠTE SMJERNICE ZA IZVOĐENJE

- **Postojeće zidove treba uklopiti sa novoprojektovanim potpornim zidovima na licu mjesta.**
- Zidove treba izvoditi u kampadama uz potpun završetak kampade (zida, drenažnog sloja i nasipa) prije otpočinjanja radova na sljedećoj kampadi. Iskop za izradu potporne konstrukcije se ne smije ostaviti da stoji dugo otvoren. Preporuka je da se od izvođenja iskopa u roku od 7- 10 dana izvede potporna konstrukcija i izvrši zatrpavanje preostalog profila do projektom predviđenih kota. Napredovanje iskopa u podužnom pravcu ograničiti na dužinu jednaku dužini 1 -1.5 kampade. U suprotnom preduzeti dodatne mjere u cilju obezbjeđivanja stabilnosti iskopa, odobrene od strane nadzora. Na izvođenju se u svemu/pridržavati važećeg Zakona o zaštiti na radu.
- **Zidovi u usijeku** - U svim zidovima izvesti barbakane prečnika $\varnothing 100$ mm. Barbakane izvesti u jednom redu, na međusobnom horizontalnom razmaku od 200cm. Sve barbakane izvesti sa padom od 2% prema vanjskoj strani zida.

- **Zidovi u nasipu** - Vertikalni i horizontalni razmak između barbakana je 200cm (horizontalni razmak) i 100cm (vertikalni razmak). Iza prvog reda barbakana u drenažnom materijalu iza zida položiti perforiranu drenažnu cijev PP-ID100-SNB (otvor perforacija da nije manji od 100cm²/m) sa izvodima u barbakane od cijevi PVC-DN100. Sve barbakane izvesti sa padom od 2% prema vanjskoj strani zida. Ukoliko je visina zida veća od 4.0 m barbakane izvesti u tri reda. Ukoliko je visina zida od 2.5 do 4.0 m barbakane izvesti u dva reda. Ukoliko je visina zida 2.0m barbakane izvesti u jednom redu.
- Zemljane radove vršiti kontrolisano, kako se ne bi poremetila stabilnost zidova iskopa i time ugrozila stabilnost terena i objekata u blizini.
- Za objekte predvidjeti adekvatne drenaže.

U toku izvođenja radova na temeljnom iskopu obavezan je geotehnički nadzor radi eventualnih nepredviđenih okolnosti koja diktiraju složena svojstva geološke sredine.

U Podgorici,
April, 2024. godine

Odgovorni inženjer:
Jovana Perović, spec.sci.građ.

2.2. OPŠTI TEHNIČKI I TEHNOLOŠKI USLOVI ZA IZRADU KONSTRUKCIJE OBJEKTA

Da bi se postigla potpuna sigurnost rada i stabilnost konstrukcije, moraju se sagledati sledeći problemi i opasnosti, analizirati uslove za njihovo otklanjanje i sprovesti odgovarajuće mere.

OPŠTI USLOVI ZA IZVOĐENJE RADOVA

Izvođenje svih radova mora biti stručno i precizno, prema planovima, opisima i detaljima projekta, po tehničkim propisima, primjenom Eurocode (MEST EN) i po potrebnim uputstvima projektanta.

Radove mogu izvoditi samo stručna lica sa potrebnom spremom i atestima, kao i preduzeća registrovana za te vrste radova i sa odgovarajućim licencama.

Svi materijali, polufabrikati i gotovi proizvodi, moraju odgovarati propisima MEST-a.

Svi materijali za koje po MEST-u mora da se garantuje kvalitet, moraju biti atestirani ili ispitani, da bi se dokazao potreban kvalitet. Ukoliko je izvođač ugradio materijal koji nema odgovarajući atest, ili se ispitivanjem dokaže kvalitet niži od potrebnog, izvođač je dužan da ga ukloni i zamijeni odgovarajućim, na svoju štetu.

Svu odgovornost za kvalitet materijala, u skladištima, na objektu i u toku ugradnje, pa sve do predaje objekta na korišćenje investitoru, snosi izvođač.

U izvođenju radova izvođač je dužan da sprovodi higijensko tehničke mjere zaštite u skladu sa važećim propisima. Ove mjere moraju biti obuhvaćene cijenom radova.

Nakon izvršenih radova izvođač je dužan da ukloni sve otpadne materijale i viškove materijala. Uklanjanje i odvoženje otpadnog materijala mora biti obuhvaćeno ponudom i ugovorom.

Obračun izvršenih i primljenih radova obavlja se prema ugovoru uz odobrenje nadzornog organa. Ukoliko izvođač odstupa od ugovorenih radova bez saglasnosti projektanta, sam snosi sve posledice koje iz toga proizilaze.

Opšti uslovi važe za sve radove koji su navedeni u predmjeru radova, kao i za radove koji se urade na predlog i uz saglasnost nadzornog organa i projektanta.

U konkretnom objektu su korišćeni sljedeći kvaliteti materijala:

- AB konstrukcija C25/30
- B 500B; MAR 500/560;
- Čelična konstrukcija S 235
- Kalitet elektroda za elekto lučko zavarivanje prema MEST-u.

USLOVI ZA IZVOĐENJE BETONSKIH I ARMIRANO BETONSKIH RADOVA

Betonski radovi se izvode prema projektu konstrukcije i projektu betona. U sastavu projekta betona se nalaze sl. uputstva, potvrde i dokaznice:

- Sastav betonskih mješavina, količine i tehničke uslove za projektovanje klase betona
- Plan betoniranja, organizacije i opreme
- Način transporta i ugrađivanja betonske mješavine
- Način njegovanja građenog betona
- Program kontrolnih ispitivanja sastojaka betona
- Program kontrole betona, uzimanja uzoraka i ispitivanje betonske mješavine po partijama
- Plan montaže elemenata, projekat skele i projekat oplata (kod složene oplata).

Sa betoniranjem se može otpočeti tek kada je izvršen pregled preduzetih mjera iz projekta betona, kada su pregledane i primljene podloge, skele, oplata i armature.

Skele i oplata

Skele i oplata moraju biti izvedene tako da preuzmu opterećenje i uticaje u toku izvođenja radova, bez štetnih slijeganja i deformacija, sa obezbjeđenjem tačnosti predviđene projektom konstrukcije.

Oplata mora biti takva da ne dozvoljava gubitak sastojaka betona za vrijeme betoniranja i sazrijevanja betona. Ona mora biti lako demontažna. Unutrašnje stranice moraju biti čiste i ravne, premazane sredstvima za onemogućavanje prijanjanja betona. Premaz za oplatu ne smije biti štetan za beton, armaturu i vezu betona sa armaturom, kao i za materijale koji se naknadno nanose na beton. Ne smije da mijenja boju površine betona koja je vidna.

Oplata se skida bez potresa i udara, kada je beton dovoljno očvrstnuo. Čvrstoća betona prilikom skidanja oplata mora biti:

- 30 % klase betona za stubove, zidove i vertikalne ivice greda
- 70 % klase betona kod ploča i donjih dijelova oplata greda
- 100 % klase betona ukoliko je betonski element opterećen u trenutku skidanja oplata.

Za nosive elemente, kod kojih je noseća dužina veća od 6.0 m, oplata se postavlja sa nadvišenjem od 1/1000 noseće dužine.

Armatura

Transport, skladištenje i ugradnja armature mora biti takva, da ne dolazi do oštećenja, zamašćenja, zaprljavanja i dodatne korozije armaturnih profila. Takođe, se moraju sačuvati oznake za način ugradnje.

Armatura se savija u hladnom stanju a nastavlja na način predviđen projektom. Ukoliko je nastavljanje zavarivanjem, ono se sprovodi u svemu prema MEST-u. Zavarivanje gorionikom i kovanjem je zabranjeno. Provjera zavarljivosti se sprovodi na epruvetama.

Radi osiguranja projektovanog položaja, armatura se fiksira potrebnim brojem podmetača i graničnika odgovarajućeg tipa.

- Naknadni proračun konstrukcije sa postignutim kvalitetom betona
- Smanjenje dopuštenog opterećenja, ako je moguće
- Sanacija konstrukcije

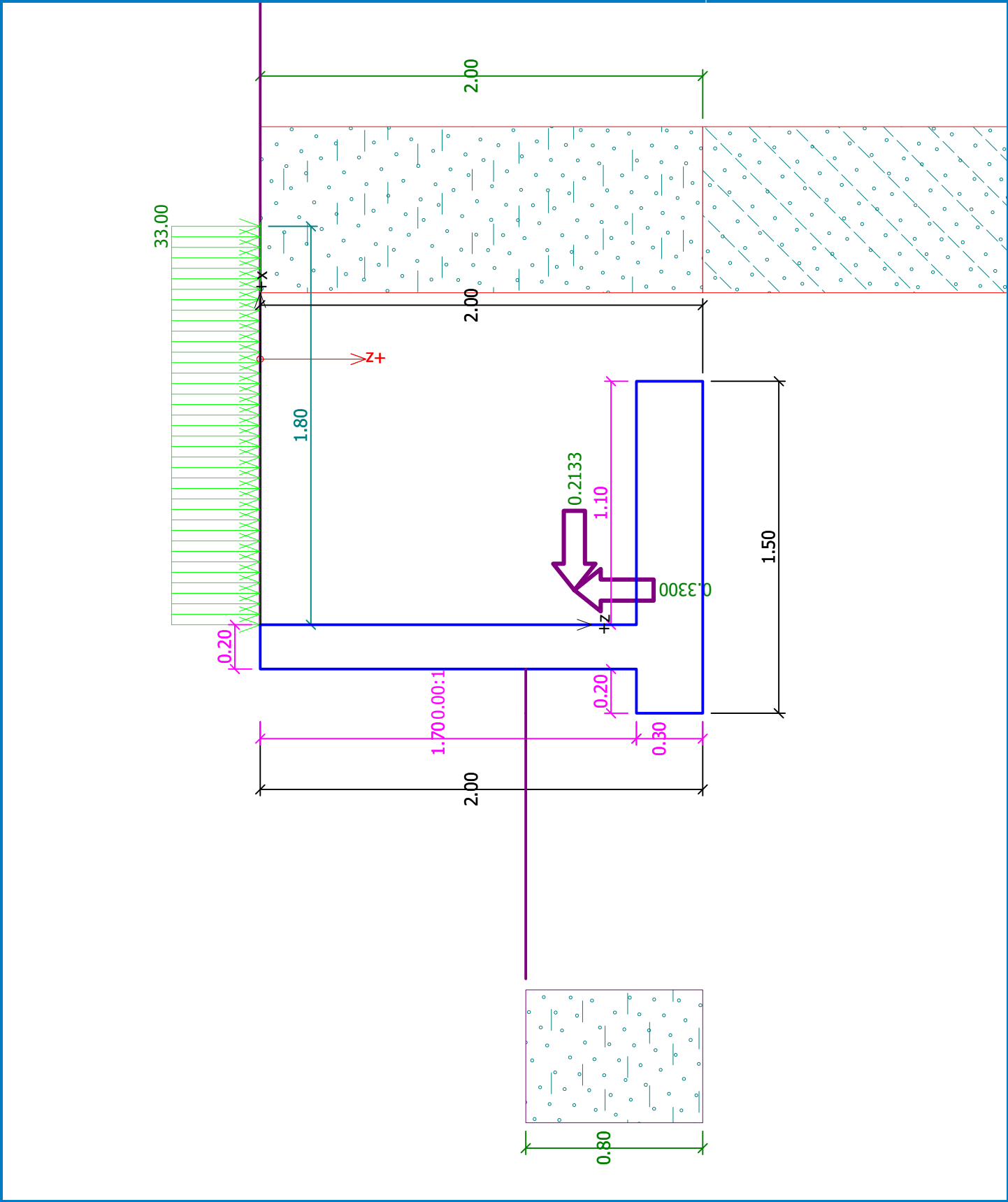
NUMERIČKA DOKUMENTACIJA

Proračun potpornih zidova
- Borska ulica -



Name : Project

Stage : 1

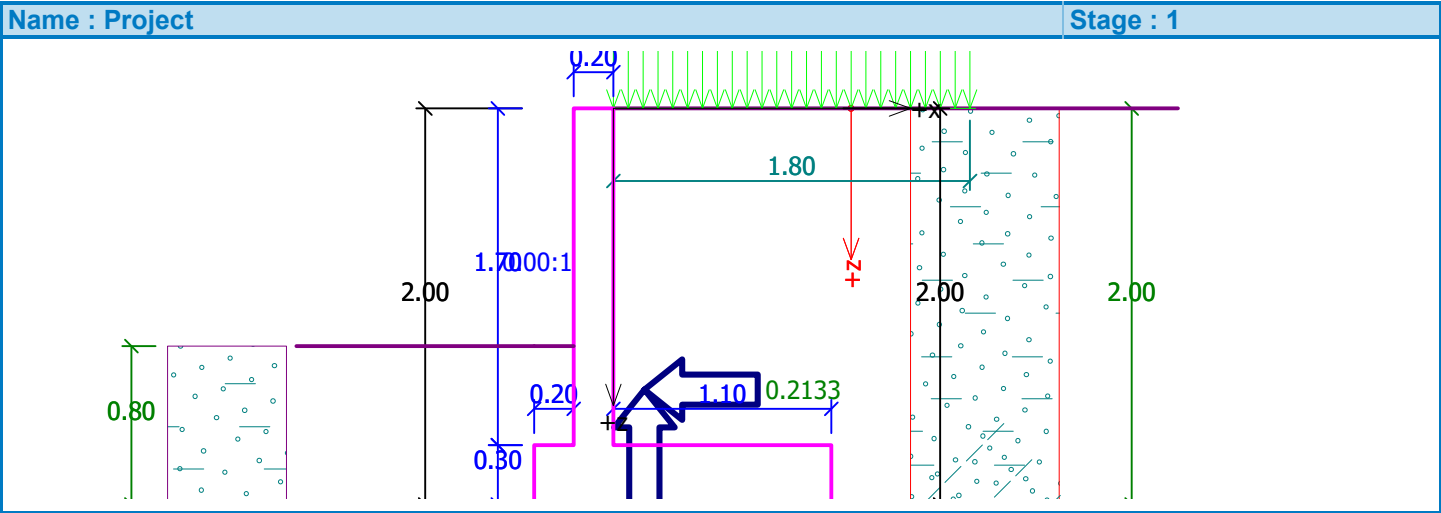


Cantilever wall analysis

Input data

Project

Task : Potporni zid-TIP 1
Date : 4/26/2024



Settings

Standard - EN 1997 - DA2

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)
Coefficients EN 1992-1-1 : standard

Wall analysis

Active earth pressure calculation : Coulomb
Passive earth pressure calculation : Caquot-Kerisel
Earthquake analysis : Mononobe-Okabe
Shape of earth wedge : Calculate as skew
Base key : The base key is considered as inclined footing bottom
Verification methodology : according to EN 1997
Design approach : 2 - reduction of actions and resistances

Partial factors on actions (A)			
Permanent design situation			
		Unfavourable	Favourable
Permanent actions :	$\gamma_G =$	1.35 [-]	1.00 [-]
Variable actions :	$\gamma_Q =$	1.50 [-]	0.00 [-]
Water load :	$\gamma_w =$	1.35 [-]	

Partial factors for resistances (R)			
Permanent design situation			
Partial factor on overturning :	$\gamma_{Re} =$	1.40 [-]	
Partial factor on sliding resistance :	$\gamma_{Rh} =$	1.10 [-]	
Partial factor on bearing capacity :	$\gamma_{Rv} =$	1.40 [-]	

Partial factors for variable actions

Permanent design situation

Factor for combination value :	$\psi_0 =$	0.70	[-]
Factor for frequent value :	$\psi_1 =$	0.50	[-]
Factor for quasi-permanent value :	$\psi_2 =$	0.30	[-]

Material of structure

Unit weight $\gamma = 25.00 \text{ kN/m}^3$

Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete : C 25/30

Cylinder compressive strength

 $f_{ck} = 25.00 \text{ MPa}$

Tensile strength

 $f_{ct} = 2.60 \text{ MPa}$

Longitudinal steel : B500

Yield strength

 $f_{yk} = 500.00 \text{ MPa}$

Geometry of structure

No.	Coordinate X [m]	Depth Z [m]
1	0.00	0.00
2	0.00	1.70
3	1.10	1.70
4	1.10	2.00
5	-0.40	2.00
6	-0.40	1.70
7	-0.20	1.70
8	-0.20	0.00

The origin [0,0] is located at the most upper right point of the wall.

Wall section area = 0.79 m^2 .

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]	γ_{su} [kN/m ³]	δ [°]
1	tlo 1		30.00	0.00	20.00	10.00	20.00
2	temeljno tlo		30.00	0.00	20.00	10.00	20.00

All soils are considered as cohesionless for at rest pressure analysis.

Soil parameters

tlo 1

Unit weight : $\gamma = 20.00 \text{ kN/m}^3$

Stress-state : effective

Angle of internal friction : $\varphi_{ef} = 30.00^\circ$ Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$ Angle of friction struc.-soil : $\delta = 20.00^\circ$

Soil : cohesionless

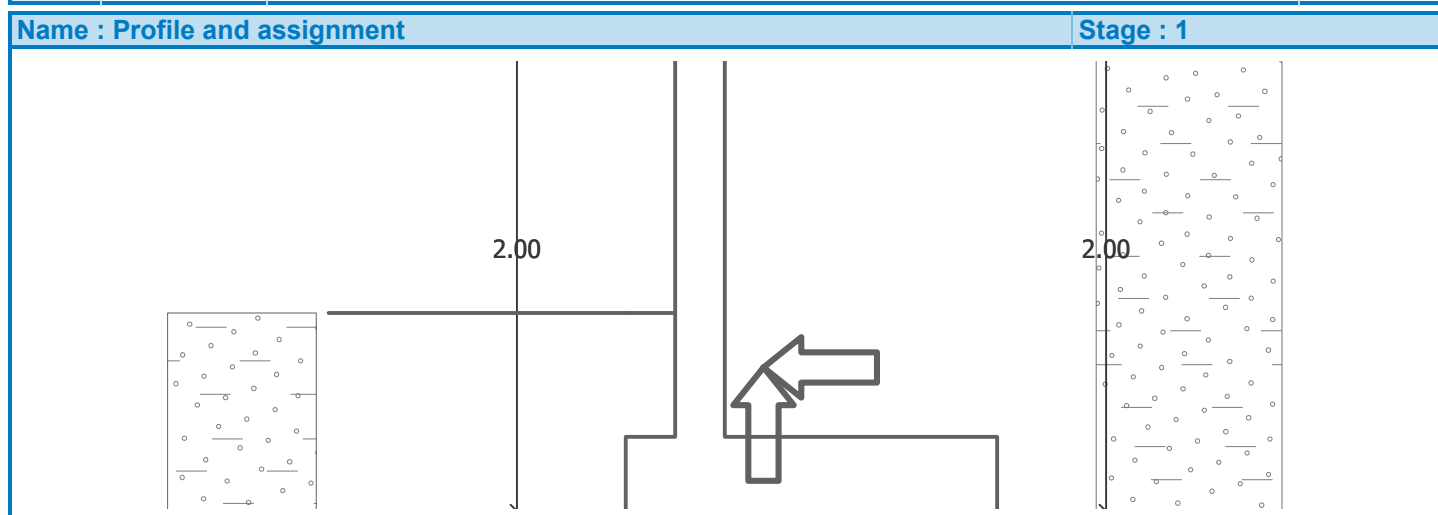
Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

temeljno tlo

Unit weight : $\gamma = 20.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{\text{ef}} = 30.00^\circ$
 Cohesion of soil : $c_{\text{ef}} = 0.00 \text{ kPa}$
 Angle of friction struc.-soil : $\delta = 20.00^\circ$
 Soil : cohesionless
 Saturated unit weight : $\gamma_{\text{sat}} = 20.00 \text{ kN/m}^3$

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	2.00	tlo 1	
2	-	temeljno tlo	

**Terrain profile**

Terrain behind the structure is flat.

Water influence

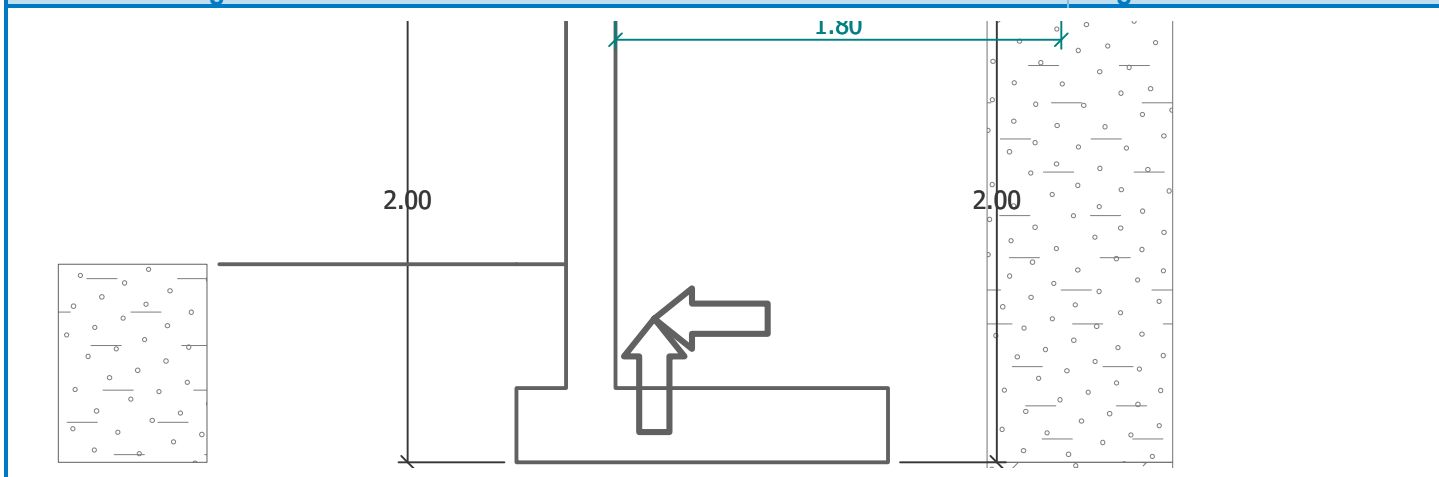
Ground water table is located below the structure.

Input surface surcharges

No.	Surcharge		Action	Mag.1 [kN/m ²]	Mag.2 [kN/m ²]	Ord.x x [m]	Length l [m]	Depth z [m]
	new	change						
1	YES		accidental	33.00		0.00	1.80	on terrain
No.	Name							
1	saobraćajno opterećenje							

Name : Surcharge

Stage : 1



Resistance on front face of the structure

Resistance on front face of the structure: at rest

Soil on front face of the structure - tlo 1

Soil thickness in front of structure $h = 0.80$ m

Terrain in front of structure is flat.

Earthquake

Horizontal seismic coefficient $k_h = 0.2133$

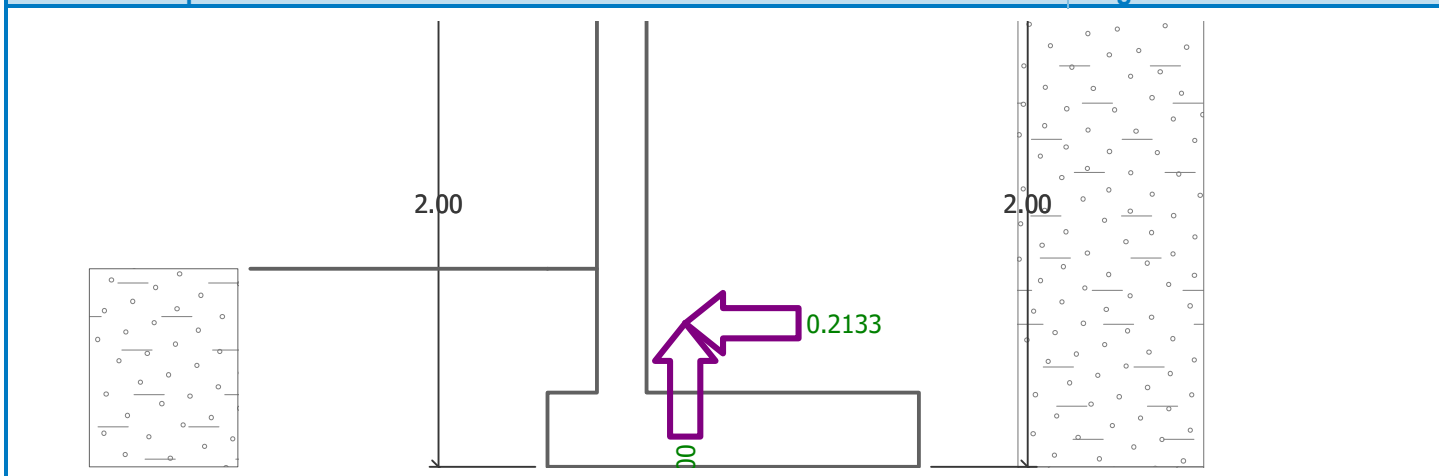
Vertical seismic coefficient $k_v = 0.3300$

Coeff. to compute point of application $k.H = 0.66$

Water below the GWT is restricted.

Name : Earthquake

Stage : 1



Settings of the stage of construction

Design situation : permanent

The wall is free to move. Active earth pressure is therefore assumed.

Verification No. 1 (Stage of construction 1)**Pressure at rest on front face of the structure - partial results**

Layer No.	Thickness [m]	α [°]	φ_d [°]	c_d [kPa]	γ [kN/m ³]	K_r	Comment
1	0.50	0.00	30.00	0.00	20.00	0.500	
2	0.00	89.61(80.00)	30.00	0.00	20.00	0.500	MODIFIED
3	0.30	0.00	30.00	0.00	20.00	0.500	

Pressure at rest distribution on front face of the structure

Layer No.	Start [m] End [m]	σ_z [kPa]	σ_w [kPa]	Pressure [kPa]	Hor. comp. [kPa]	Vert. comp. [kPa]
1	0.00	0.00	0.00	0.00	0.00	0.00
	0.50	10.00	0.00	5.00	5.00	0.00
2	0.50	10.00	0.00	9.89	0.87	9.85
	0.50	10.03	0.00	9.91	0.87	9.87
3	0.50	10.03	0.00	5.01	5.01	0.00
	0.80	16.00	0.00	8.00	8.00	0.00

Active pressure behind the structure - partial results

Layer No.	Thickness [m]	α [°]	φ_d [°]	c_d [kPa]	γ [kN/m ³]	δ_d [°]	K_a	Comment
1	1.70	30.00	30.00	0.00	20.00	30.00	0.667	
2	0.30	0.00	30.00	0.00	20.00	20.00	0.297	

Active pressure distribution behind the structure (without surcharge)

Layer No.	Start [m] End [m]	σ_z [kPa]	σ_w [kPa]	Pressure [kPa]	Hor. comp. [kPa]	Vert. comp. [kPa]
1	0.00	0.00	0.00	0.00	0.00	0.00
	1.70	34.00	0.00	22.67	11.33	19.63
2	1.70	34.00	0.00	10.11	9.50	3.46
	2.00	40.00	0.00	11.89	11.18	4.07

Earthquake effects (active earth pressure) - partial results

Layer No.	Thickness [m]	φ_d [°]	β [°]	ψ [°]	K_a	K_{ae}	$K_{ae}-K_a$	Comment
1	1.70	30.00	0.00	17.66	0.667	1.486	0.819	
2	0.30	30.00	0.00	17.66	0.297	0.598	0.300	

Earthquake effects (active earth pressure)

Layer No.	Start [m] End [m]	σ_z [kPa]	σ_D [kPa]	Pressure [kPa]	Hor. comp. [kPa]	Vertical comp. [kPa]
1	0.00	0.00	26.80	21.96	10.98	19.01
	1.70	22.78	4.02	3.29	1.65	2.85
2	1.70	22.78	4.02	1.21	1.14	0.41
	2.00	26.80	0.00	0.00	0.00	0.00

Pressure profile due to surcharge - saobraćajno opterećenje

Point No.	Depth [m]	Hor. comp. [kPa]	Vert. comp. [kPa]
1	0.00	0.00	0.00
2	0.00	0.00	0.00
3	0.03	0.00	0.00
4	0.03	4.94	8.56
5	1.70	4.80	8.31
6	1.70	9.28	3.38
7	2.00	9.23	3.36

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. overturn.	Coeff. sliding	Coeff. stress
Weight - wall	0.00	-0.58	19.75	0.56	1.000	1.000	1.350
Earthq.- constr.	4.21	-0.58	-6.52	0.56	1.000	1.000	1.000
FF resistance	-3.19	-0.27	0.01	0.10	1.000	1.000	1.350
Weight - earth wedge	0.00	-0.92	20.71	0.77	1.000	1.000	1.350
Earthquake - soil wedge	4.42	-0.92	-6.84	0.77	1.000	1.000	1.000
Active pressure	12.73	-0.69	17.81	1.19	1.350	1.350	1.350
Earthq.- act.pressure	10.90	-1.32	18.65	0.91	1.000	1.000	1.000
saobraćajno opterećenje	10.91	-0.89	15.10	1.05	1.000	1.000	1.000
saobraćajno opterećenje	0.00	-2.00	3.91	0.46	0.000	0.000	1.000

Verification of complete wall

Check for overturning stability

Resisting moment $M_{res} = 56.84$ kNm/mOverturning moment $M_{ovr} = 41.63$ kNm/mWall for overturning is **SATISFACTORY**

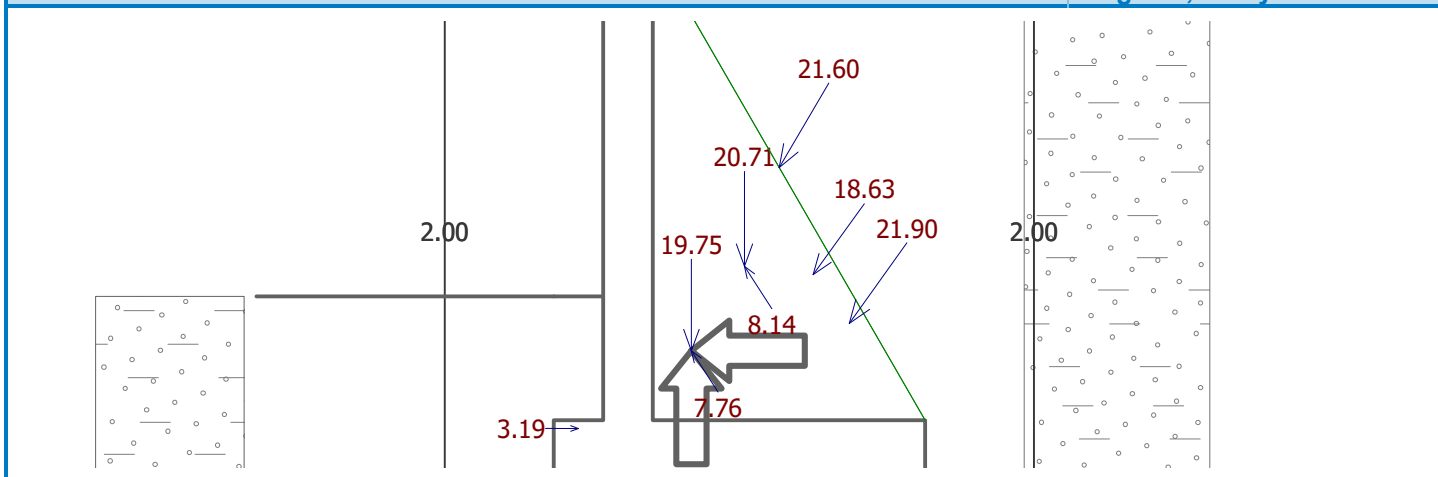
Check for slip

Resisting horizontal force $H_{res} = 44.57$ kN/mActive horizontal force $H_{act} = 44.44$ kN/mWall for slip is **SATISFACTORY**Overall check - WALL is **SATISFACTORY**

Maximum stress in footing bottom : 107.22 kPa

Name : Verification

Stage : 1; Analysis : 1



Bearing capacity of foundation soil (Stage of construction 1)

Forces acting at the centre of the footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]	Eccentricity [m]	Stress [kPa]
1	27.78	103.00	43.32	0.27	107.22
2	25.75	84.93	44.44	0.30	95.03

Spread footing verification

Input data

Settings

Standard - EN 1997 - DA2

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)

Coefficients EN 1992-1-1 : standard

Settlement

Analysis method : Analysis using oedometric modulus

Restriction of influence zone : by percentage of Sigma, Or

Coeff. of restriction of influence zone : 10.0 [%]

Spread Footing

Analysis for drained conditions : EC 7-1 (EN 1997-1:2003)

Verification methodology : according to EN 1997

Design approach : 2 - reduction of actions and resistances

Partial factors on actions (A)			
Permanent design situation			
		Unfavourable	Favourable
Permanent actions :	$\gamma_G =$	1.35 [-]	1.00 [-]
Partial factors for resistances (R)			
Permanent design situation			
Partial factor on vertical bearing capacity :	$\gamma_{Rvs} =$	1.40	[-]
Partial factor on sliding resistance :	$\gamma_{Rhs} =$	1.10	[-]

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]	γ_{su} [kN/m ³]	δ [°]
1	tlo 1		30.00	0.00	20.00	10.00	20.00
2	temeljno tlo		30.00	0.00	20.00	10.00	20.00

All soils are considered as cohesionless for at rest pressure analysis.

Soil parameters**tlo 1**

Unit weight : $\gamma = 20.00 \text{ kN/m}^3$
 Angle of internal friction : $\varphi_{ef} = 30.00^\circ$
 Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
 Deformation modulus : $E_{def} = 1.37 \text{ MPa}$
 Poisson's ratio : $\nu = 0.33$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

temeljno tlo

Unit weight : $\gamma = 20.00 \text{ kN/m}^3$
 Angle of internal friction : $\varphi_{ef} = 30.00^\circ$
 Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
 Deformation modulus : $E_{def} = 3.37 \text{ MPa}$
 Poisson's ratio : $\nu = 0.33$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

Foundation**Foundation type: strip footing**

Depth from original ground surface $h_z = 2.00 \text{ m}$
 Depth of footing bottom $d = 0.80 \text{ m}$
 Foundation thickness $t = 0.30 \text{ m}$
 Incl. of finished grade $s_1 = 0.00^\circ$
 Incl. of footing bottom $s_2 = 0.00^\circ$

Unit weight of soil above foundation = 20.00 kN/m^3

Material of structure

Unit weight $\gamma = 25.00 \text{ kN/m}^3$

Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete : C 25/30

Cylinder compressive strength $f_{ck} = 25.00 \text{ MPa}$

Tensile strength $f_{ct} = 2.60 \text{ MPa}$

Elasticity modulus $E_{cm} = 31000.00 \text{ MPa}$

Longitudinal steel : B500

Yield strength $f_{yk} = 500.00 \text{ MPa}$

Transverse steel: B500

Yield strength $f_{yk} = 500.00 \text{ MPa}$

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	2.00	tlo 1	
2	-	temeljno tlo	

Load

No.	Load new	Load change	Name	Type	N [kN/m]	M _y [kNm/m]	H _x [kN/m]
1	YES		LC 1	Service	77.75	14.78	-43.32
2	YES		LC 2	Design	77.75	14.78	-43.32
3	YES		LC 3	Service	59.68	12.41	-44.44
4	YES		LC 4	Design	59.68	12.41	-44.44

Global settings

Analysis type : analysis for drained conditions

Settings of the stage of construction

Design situation : permanent

Verification No. 1

Load case verification

Name	Self w. in favor	e _x [m]	e _y [m]	σ [kPa]	R _d [kPa]	Utilization [%]	Is satisfied
LC 2	Yes	-0.27	0.00	107.22	138.49	77.42	Yes
LC 2	No	-0.25	0.00	111.48	155.61	71.64	Yes
LC 4	Yes	-0.30	0.00	95.03	95.70	99.30	Yes
LC 4	No	-0.27	0.00	98.61	116.61	84.56	Yes

Analysis of bearing capacity - partial results

$\varphi_d = 30.000^\circ$
 $c_d = 0.000 \text{ kPa}$
 $\gamma_{1prum} = 20.000 \text{ kN/m}^3$
 $\gamma_{2prum} = 20.000 \text{ kN/m}^3$
 $b_{ef} = 0.894 \text{ m}$
 $N_d = 18.401$
 $N_c = 30.140$
 $N_b = 20.093$
 $s_d = 1.147$
 $s_c = 1.155$
 $s_b = 0.912$
 $d_d = 1.000$
 $d_c = 1.000$
 $d_b = 1.000$
 $i_d = 0.322$
 $i_c = 0.309$

$i_b = 0.154$
 $b_d = 1.000$
 $b_c = 1.000$
 $b_b = 1.000$
 $g_d = 1.000$
 $g_c = 1.000$
 $g_b = 1.000$
 $R_d = 133.979 \text{ kPa}$

Analysis carried out with automatic selection of the most unfavourable load cases.

Computed self weight of strip foundation $G = 11.25 \text{ kN/m}$

Computed weight of overburden $Z = 14.00 \text{ kN/m}$

Vertical bearing capacity check

Shape of contact stress : rectangle

Most severe load case No. 4. (LC 4)

Parameters of slip surface below foundation:

Depth of slip surface $z_{sp} = 2.38 \text{ m}$

Length of slip surface $l_{sp} = 7.19 \text{ m}$

Design bearing capacity of found.soil $R_d = 95.70 \text{ kPa}$

Extreme contact stress $\sigma = 95.03 \text{ kPa}$

Bearing capacity in the vertical direction is SATISFACTORY

Horizontal bearing capacity check

Most severe load case No. 4. (LC 4)

Earth resistance: not considered

Friction angle foundation-footing bottom $\psi = 30.00^\circ$

Cohesion foundation-footing bottom $a = 0.00 \text{ kPa}$

Horizontal bearing capacity $R_{dh} = 44.57 \text{ kN}$

Extreme horizontal force $H = 44.44 \text{ kN}$

Bearing capacity in the horizontal direction is SATISFACTORY

Bearing capacity of foundation is SATISFACTORY

Verification No. 1

Settlement and rotation of foundation - input data

Analysis carried out with automatic selection of the most unfavourable load cases.

Analysis carried out with accounting for coefficient κ_1 (influence of foundation depth).

Stress at the footing bottom considered from the finished grade.

Computed self weight of strip foundation $G = 11.25 \text{ kN/m}$

Computed weight of overburden $Z = 14.00 \text{ kN/m}$

Settlement and rotation of foundation - partial results

Layer No.	Origin [m]	End [m]	Thickness [m]	E_{def} [MPa]	σ_{or} [kPa]	$\Delta\sigma_z$ [kPa]	Settlement [mm]
1	2.00	2.05	0.05	3.37	40.50	54.83	0.55
2	2.05	2.10	0.05	3.37	41.50	51.92	0.52
3	2.10	2.15	0.05	3.37	42.50	47.14	0.47

Layer No.	Origin [m]	End [m]	Thickness [m]	E_{def} [MPa]	σ_{or} [kPa]	$\Delta\sigma_z$ [kPa]	Settlement [mm]
4	2.15	2.20	0.05	3.37	43.50	42.45	0.43
5	2.20	2.25	0.05	3.37	44.50	38.51	0.39
6	2.25	2.30	0.05	3.37	45.50	35.29	0.35
7	2.30	2.40	0.10	3.37	47.00	31.67	0.63
8	2.40	2.50	0.10	3.37	49.00	27.92	0.56
9	2.50	2.60	0.10	3.37	51.00	25.13	0.50
10	2.60	2.70	0.10	3.37	53.00	22.94	0.46
11	2.70	2.80	0.10	3.37	55.00	21.14	0.42
12	2.80	2.90	0.10	3.37	57.00	19.62	0.39
13	2.90	3.15	0.25	3.37	60.50	17.50	0.88
14	3.15	3.40	0.25	3.37	65.50	15.00	0.75
15	3.40	3.65	0.25	3.37	70.50	13.03	0.65
16	3.65	3.90	0.25	3.37	75.50	11.42	0.57
17	3.90	4.15	0.25	3.37	80.50	10.09	0.51
18	4.15	4.34	0.19	3.37	84.94	9.09	0.27

Settlement of mid point of longitudinal edge = 7.0 mm

Settlement of mid point of transverse edge 1 = 14.8 mm

Settlement of mid point of transverse edge 2 = -0.6 mm

(1-max.compressed edge; 2-min.compressed edge)

Settlement and rotation of foundation - results

Foundation stiffness:

Computed weighted average modulus of deformation $E_{def} = 3.37$ MPa

Foundation in the longitudinal direction is rigid ($k=73.59$)

Foundation in the direction of width is rigid ($k=248.37$)

Overall settlement and rotation of foundation:

Foundation settlement = 9.3 mm

Depth of influence zone = 2.34 m

Rotation in direction of width = 10.239 ($\tan \cdot 1000$)

Dimensioning No. 1

Analysis carried out with automatic selection of the most unfavourable load cases.

Verification of longitudinal reinforcement of foundation in the direction of x

Bar diameter = 10.0 mm

Number of bars = 6

Reinforcement cover = 40.0 mm

Cross-section width = 1.00 m

Cross-section depth = 0.30 m

Reinforcement ratio $\rho = 0.18 \% > 0.14 \% = \rho_{min}$

Position of neutral axis $x = 0.02 \text{ m} < 0.16 \text{ m} = x_{max}$

Ultimate moment $M_{Rd} = 50.99 \text{ kNm} > 27.17 \text{ kNm} = M_{Ed}$

Cross-section is SATISFACTORY.

Spread footing for punching shear failure check

Column normal force = 77.75 kN

Compression chord adjacent to the column

Force transmitted into found. soil	=	5.18 kN
Force transmitted by shear strength of SRC	=	72.57 kN
Considered column perimeter	u_0	= 0.76 m
Shear resistance at the column perimeter	$v_{Ed,max}$	= 1.07 MPa
Resist. of the compr. chord adjacent to the column	$v_{Rd,max}$	= 4.50 MPa

Critical section without shear reinforcement

Force transmitted into found. soil	=	44.60 kN
Force transmitted by shear strength of SRC	=	33.15 kN
Distance of section from the column	=	0.38 m
Section perimeter	u_{cr}	= 2.00 m
Shear stress at section	v_{Ed}	= 0.10 MPa
Shear resistance of section without shear reinforcement	$v_{Rd,c}$	= 0.61 MPa

 $v_{Ed} < v_{Rd,c} \Rightarrow$ Reinforcement is not required**Spread footing for punching shear is SATISFACTORY****Dimensioning No. 1 (Stage of construction 1)****Pressure at rest on front face of the structure - partial results**

Layer No.	Thickness [m]	α [°]	φ_d [°]	c_d [kPa]	γ [kN/m³]	K_r	Comment
1	0.50	0.00	30.00	0.00	20.00	0.500	
2	0.00	89.61(80.00)	30.00	0.00	20.00	0.500	MODIFIED
3	0.30	0.00	30.00	0.00	20.00	0.500	

Pressure at rest distribution on front face of the structure

Layer No.	Start [m] End [m]	σ_z [kPa]	σ_w [kPa]	Pressure [kPa]	Hor. comp. [kPa]	Vert. comp. [kPa]
1	0.00	0.00	0.00	0.00	0.00	0.00
	0.50	10.00	0.00	5.00	5.00	0.00
2	0.50	10.00	0.00	9.89	0.87	9.85
	0.50	10.03	0.00	9.91	0.87	9.87
3	0.50	10.03	0.00	5.01	5.01	0.00
	0.80	16.00	0.00	8.00	8.00	0.00

Active pressure behind the structure - partial results

Layer No.	Thickness [m]	α [°]	φ_d [°]	c_d [kPa]	γ [kN/m³]	δ_d [°]	K_a	Comment
1	1.70	30.00	30.00	0.00	20.00	30.00	0.667	
2	0.30	0.00	30.00	0.00	20.00	20.00	0.297	

Active pressure distribution behind the structure (without surcharge)

Layer No.	Start [m] End [m]	σ_z [kPa]	σ_w [kPa]	Pressure [kPa]	Hor. comp. [kPa]	Vert. comp. [kPa]
1	0.00	0.00	0.00	0.00	0.00	0.00
	1.70	34.00	0.00	22.67	11.33	19.63
2	1.70	34.00	0.00	10.11	9.50	3.46
	2.00	40.00	0.00	11.89	11.18	4.07

Earthquake effects (active earth pressure) - partial results

Layer No.	Thickness [m]	φ_d [°]	β [°]	ψ [°]	K_a	K_{ae}	$K_{ae}-K_a$	Comment
1	1.70	30.00	0.00	17.66	0.667	1.486	0.819	
2	0.30	30.00	0.00	17.66	0.297	0.598	0.300	

Earthquake effects (active earth pressure)

Layer No.	Start [m] End [m]	σ_z [kPa]	σ_D [kPa]	Pressure [kPa]	Hor. comp. [kPa]	Vertical comp. [kPa]
1	0.00	0.00	26.80	21.96	10.98	19.01
	1.70	22.78	4.02	3.29	1.65	2.85
2	1.70	22.78	4.02	1.21	1.14	0.41
	2.00	26.80	0.00	0.00	0.00	0.00

Pressure profile due to surcharge - saobraćajno opterećenje

Point No.	Depth [m]	Hor. comp. [kPa]	Vert. comp. [kPa]
1	0.00	0.00	0.00
2	0.00	0.00	0.00
3	0.03	0.00	0.00
4	0.03	4.94	8.56
5	1.70	4.80	8.31
6	1.70	9.28	3.38
7	2.00	9.23	3.36

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Weight - wall	0.00	-0.15	8.25	0.95	1.350
Weight - earth wedge	0.00	-0.92	20.71	0.77	1.350
Active pressure	12.73	-0.69	17.81	1.19	1.350
saobraćajno opterećenje	10.91	-0.89	15.10	1.05	1.000
Contact tractions	0.00	0.00	-53.75	0.75	1.000
Gravity surch. 1	0.00	-2.00	4.07	0.46	1.000

Back wall jump check

Reinforcement and dimensions of the cross-section

Bar diameter = 8.0 mm

Number of bars = 7

Reinforcement cover = 40.0 mm

Cross-section width = 1.00 m

Cross-section depth = 0.30 m

Reinforcement ratio $\rho = 0.14 \% > 0.14 \% = \rho_{\min}$

Position of neutral axis $x = 0.01 \text{ m} < 0.16 \text{ m} = x_{\max}$

Ultimate shear force $V_{Rd} = 115.84 \text{ kN} > 28.58 \text{ kN} = V_{Ed}$

Ultimate moment $M_{Rd} = 38.46 \text{ kNm} > 26.95 \text{ kNm} = M_{Ed}$

Cross-section is SATISFACTORY.

Slope stability analysis

Input data

Project

Settings

Standard - EN 1997 - DA2

Stability analysis

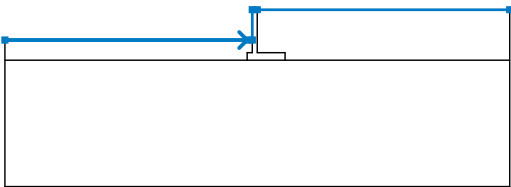
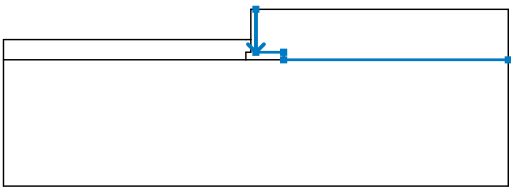
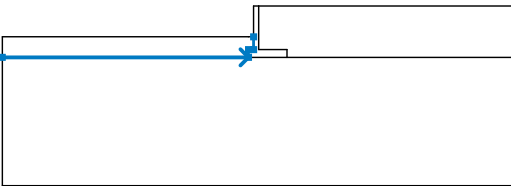
Verification methodology : according to EN 1997

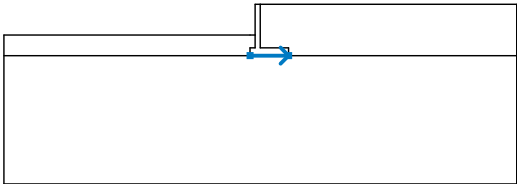
Design approach : 2 - reduction of actions and resistances

Partial factors on actions (A)				
Permanent design situation				
		Unfavourable	Favourable	
Permanent actions :	$\gamma_G =$	1.35 [-]	1.00 [-]	
Variable actions :	$\gamma_Q =$	1.50 [-]	0.00 [-]	
Water load :	$\gamma_w =$	1.35 [-]		

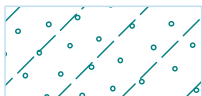
Partial factors for resistances (R)				
Permanent design situation				
Partial factor on sliding resistance (on slip surface) :		$\gamma_{Rs} =$	1.10 [-]	

Interface

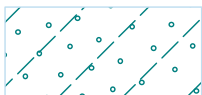
No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
1		-10.00	-1.20	-0.40	-1.20	-0.20	-1.20
		-0.20	0.00	0.00	0.00	10.00	0.00
2		0.00	0.00	0.00	-1.70	1.10	-1.70
		1.10	-2.00	10.00	-2.00		
3		-10.00	-2.00	-0.40	-2.00	-0.40	-1.70
		-0.20	-1.70	-0.20	-1.20		

No.	Interface location	Coordinates of interface points [m]					
		x	z	x	z	x	z
4		-0.40	-2.00	1.10	-2.00		

Soil parameters - effective stress state

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]
1	tlo 1		30.00	0.00	20.00
2	temeljno tlo		30.00	0.00	20.00

Soil parameters - uplift

No.	Name	Pattern	γ_{sat} [kN/m ³]	γ_s [kN/m ³]	n [-]
1	tlo 1		20.00		
2	temeljno tlo		20.00		

Soil parameters

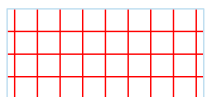
tlo 1

Unit weight : $\gamma = 20.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 30.00^\circ$
 Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

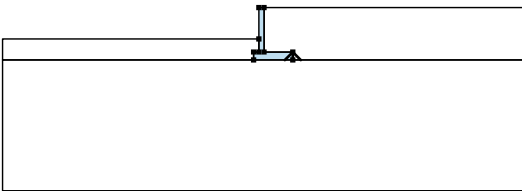
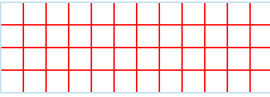
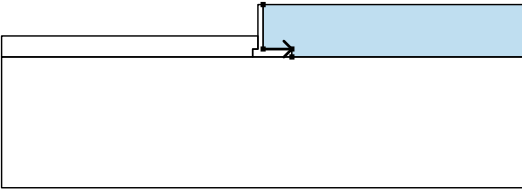
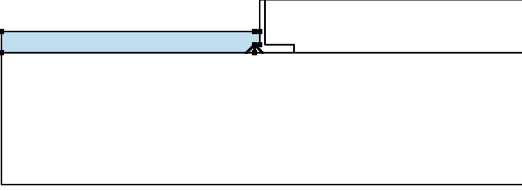
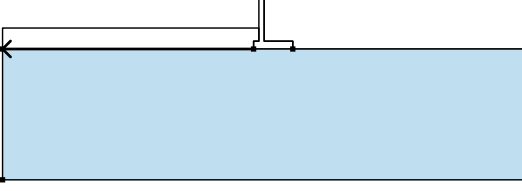
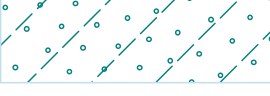
temeljno tlo

Unit weight : $\gamma = 20.00 \text{ kN/m}^3$
 Stress-state : effective
 Angle of internal friction : $\varphi_{ef} = 30.00^\circ$
 Cohesion of soil : $c_{ef} = 0.00 \text{ kPa}$
 Saturated unit weight : $\gamma_{sat} = 20.00 \text{ kN/m}^3$

Rigid bodies

No.	Name	Sample	γ [kN/m ³]
1	Wall material		25.00

Assigning and surfaces

No.	Surface position	Coordinates of surface points [m]				Assigned soil
		x	z	x	z	
1		1.10	-2.00	1.10	-1.70	Wall material 
		0.00	-1.70	0.00	0.00	
		-0.20	0.00	-0.20	-1.20	
		-0.20	-1.70	-0.40	-1.70	
		-0.40	-2.00			
2		0.00	-1.70	1.10	-1.70	tlo 1 
		1.10	-2.00	10.00	-2.00	
		10.00	0.00	0.00	0.00	
3		-0.40	-2.00	-0.40	-1.70	tlo 1 
		-0.20	-1.70	-0.20	-1.20	
		-0.40	-1.20	-10.00	-1.20	
		-10.00	-2.00			
4		-0.40	-2.00	-10.00	-2.00	temeljno tlo 
		-10.00	-7.00	10.00	-7.00	
		10.00	-2.00	1.10	-2.00	

Surcharge

No.	Type	Type of action	Location z [m]	Origin x [m]	Length l [m]	Width b [m]	Slope α [°]	Magnitude		
								q, q ₁ , f, F	q ₂	unit
1	strip	accidental	on terrain	x = 0.00	l = 1.80		0.00	33.00		kN/m ²

Surcharges

No.	Name
1	saobraćajno opterećenje

Water

Water type : No water

Tensile crack

Tensile crack not inputted.

Earthquake

Horizontal seismic coefficient : $K_h = 0.21$

Vertical seismic coefficient : $K_v = 0.33$

Settings of the stage of construction

Design situation : permanent

Results (Stage of construction 1)

Analysis 1

Circular slip surface

Slip surface parameters					
Center :	x =	-0.51 [m]	Angles :	α_1 =	-31.23 [°]
	z =	4.70 [m]		α_2 =	47.07 [°]
Radius :	R =	6.90 [m]			
The slip surface after optimization.					

Slope stability verification (Bishop)

Sum of active forces : $F_a = 61.89$ kN/m

Sum of passive forces : $F_p = 77.70$ kN/m

Sliding moment : $M_a = 427.05$ kNm/m

Resisting moment : $M_p = 487.36$ kNm/m

Utilization : 87.6 %

Slope stability ACCEPTABLE

Optimization of circular slip surface (Bishop)

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
1	-1.82	29.07	31.30	75.9 %	ACCEPTABLE
2	1.13	10.29	13.46	69.4 %	ACCEPTABLE
3	-1.80	28.77	31.02	75.8 %	ACCEPTABLE
4	1.77	1.98	8.27	-	Solution not found
5	-1.32	21.01	23.78	73.2 %	ACCEPTABLE
6	0.74	15.44	17.91	74.0 %	ACCEPTABLE
7	-0.37	5.42	11.52	55.4 %	ACCEPTABLE
8	-0.73	6.58	9.32	77.2 %	ACCEPTABLE
9	-0.99	15.63	18.98	70.0 %	ACCEPTABLE
10	3.19	6.58	9.32	62.6 %	ACCEPTABLE
11	-0.30	4.35	10.99	51.7 %	ACCEPTABLE
12	-4.65	6.58	9.32	3.2 %	ACCEPTABLE
13	-4.22	2.38	6.61	4.1 %	ACCEPTABLE
14	-1.33	21.11	23.86	73.3 %	ACCEPTABLE
15	3.48	3.77	7.35	55.2 %	ACCEPTABLE
16	-25.91	316.37	317.97	0.5 %	ACCEPTABLE
17	-12.83	209.20	210.42	1.3 %	ACCEPTABLE
18	-21.02	300.93	302.51	1.3 %	ACCEPTABLE
19	-0.73	6.58	9.32	77.2 %	ACCEPTABLE
20	2.52	0.35	5.97	-	Solution not found
21	-1.12	15.23	18.00	74.3 %	ACCEPTABLE
22	2.55	0.03	5.93	-	Solution not found
23	-0.94	12.68	15.79	72.4 %	ACCEPTABLE
24	1.88	6.58	9.32	69.0 %	ACCEPTABLE
25	-0.37	4.69	10.02	57.6 %	ACCEPTABLE
26	-3.34	6.58	9.32	1.1 %	ACCEPTABLE
27	-3.11	4.34	7.71	68.6 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
28	-0.28	0.94	3.66	71.0 %	ACCEPTABLE
29	-1.13	15.46	18.21	74.5 %	ACCEPTABLE
30	1.97	5.77	8.70	67.8 %	ACCEPTABLE
31	-15.21	105.09	106.70	0.3 %	ACCEPTABLE
32	-20.35	258.39	259.99	1.0 %	ACCEPTABLE
33	-12.60	105.09	106.70	0.8 %	ACCEPTABLE
34	-0.73	6.58	9.32	77.2 %	ACCEPTABLE
35	1.22	4.58	7.87	66.6 %	ACCEPTABLE
36	-6.21	78.18	79.40	1.3 %	ACCEPTABLE
37	-3.06	46.36	47.57	1.6 %	ACCEPTABLE
38	-1.01	12.26	14.99	75.1 %	ACCEPTABLE
39	1.51	1.70	6.33	50.8 %	ACCEPTABLE
40	-0.89	10.69	13.65	73.7 %	ACCEPTABLE
41	1.01	6.58	9.32	72.6 %	ACCEPTABLE
42	-0.44	5.03	9.50	61.4 %	ACCEPTABLE
43	-0.38	2.06	4.96	72.8 %	ACCEPTABLE
44	-4.69	28.28	29.63	0.9 %	ACCEPTABLE
45	-3.39	22.76	23.97	0.9 %	ACCEPTABLE
46	-2.47	6.58	9.32	77.6 %	ACCEPTABLE
47	-0.52	4.58	7.87	70.7 %	ACCEPTABLE
48	-7.95	78.18	79.40	0.9 %	ACCEPTABLE
49	-4.80	46.36	47.57	1.0 %	ACCEPTABLE
50	-2.75	12.26	14.99	75.5 %	ACCEPTABLE
51	-0.23	1.70	6.33	53.8 %	ACCEPTABLE
52	-2.63	10.69	13.65	74.1 %	ACCEPTABLE
53	-0.73	6.58	9.32	77.2 %	ACCEPTABLE
54	-2.18	5.03	9.50	61.8 %	ACCEPTABLE
55	-2.12	2.06	4.96	1.3 %	ACCEPTABLE
56	-6.43	28.28	29.63	0.4 %	ACCEPTABLE
57	-5.13	22.76	23.97	0.4 %	ACCEPTABLE
58	-4.21	6.58	9.32	1.9 %	ACCEPTABLE
59	-2.75	0.63	5.18	-	Solution not found
60	-3.85	3.08	6.96	3.8 %	ACCEPTABLE
61	-2.04	1.49	4.67	7.6 %	ACCEPTABLE
62	-3.69	1.49	6.26	-	Solution not found
63	-4.09	5.36	8.40	2.0 %	ACCEPTABLE
64	-2.18	2.46	5.19	1.1 %	ACCEPTABLE
65	-2.74	12.14	14.89	76.0 %	ACCEPTABLE
66	-0.72	6.46	9.22	77.0 %	ACCEPTABLE
67	-16.06	125.90	127.51	0.4 %	ACCEPTABLE
68	-19.49	228.10	229.70	1.0 %	ACCEPTABLE
69	-14.32	125.90	127.51	0.8 %	ACCEPTABLE
70	-2.47	6.58	9.32	77.6 %	ACCEPTABLE
71	-1.25	6.05	8.91	77.4 %	ACCEPTABLE
72	-3.93	25.12	26.76	2.1 %	ACCEPTABLE
73	-2.40	17.23	18.87	2.0 %	ACCEPTABLE
74	-2.67	10.32	13.03	76.7 %	ACCEPTABLE
75	-0.94	3.00	6.92	63.8 %	ACCEPTABLE
76	-2.58	9.34	12.22	76.0 %	ACCEPTABLE
77	-1.31	6.58	9.32	77.8 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
78	-0.09	6.05	8.91	75.6 %	ACCEPTABLE
79	-2.77	25.12	26.76	2.5 %	ACCEPTABLE
80	-1.24	17.23	18.87	3.0 %	ACCEPTABLE
81	-1.51	10.32	13.03	76.7 %	ACCEPTABLE
82	0.22	3.00	6.92	62.5 %	ACCEPTABLE
83	-1.42	9.34	12.22	76.0 %	ACCEPTABLE
84	-0.15	6.58	9.32	76.1 %	ACCEPTABLE
85	-1.08	5.36	9.25	66.4 %	ACCEPTABLE
86	-1.12	3.65	6.39	78.3 %	ACCEPTABLE
87	0.14	2.86	5.89	71.1 %	ACCEPTABLE
88	-2.39	17.11	18.75	2.0 %	ACCEPTABLE
89	-0.86	10.68	12.32	2.2 %	ACCEPTABLE
90	-1.32	6.64	9.36	78.1 %	ACCEPTABLE
91	0.37	1.06	5.03	-	Solution not found
92	-1.24	5.87	8.78	76.7 %	ACCEPTABLE
93	0.04	3.65	6.39	75.2 %	ACCEPTABLE
94	-0.95	3.06	6.95	64.2 %	ACCEPTABLE
95	-0.89	1.24	4.05	73.0 %	ACCEPTABLE
96	-2.91	8.56	10.38	1.9 %	ACCEPTABLE
97	-1.64	5.67	7.31	1.7 %	ACCEPTABLE
98	-2.28	3.65	6.39	1.8 %	ACCEPTABLE
99	-1.29	0.33	4.27	-	Solution not found
100	-2.07	2.01	5.42	73.5 %	ACCEPTABLE
101	-0.84	0.93	3.91	68.1 %	ACCEPTABLE
102	-1.93	0.91	4.98	-	Solution not found
103	-2.21	3.07	6.02	14.5 %	ACCEPTABLE
104	-0.91	1.39	4.12	75.3 %	ACCEPTABLE
105	-1.31	6.55	9.29	77.8 %	ACCEPTABLE
106	0.04	3.63	6.37	75.2 %	ACCEPTABLE
107	-18.37	140.82	142.43	0.2 %	ACCEPTABLE
108	-20.66	208.96	210.56	0.5 %	ACCEPTABLE
109	-17.21	140.82	142.43	0.4 %	ACCEPTABLE
110	-1.12	3.65	6.39	78.3 %	ACCEPTABLE
111	-0.32	3.46	6.26	75.5 %	ACCEPTABLE
112	-1.74	10.03	12.03	0.4 %	ACCEPTABLE
113	-0.79	7.10	9.09	0.4 %	ACCEPTABLE
114	-1.26	5.62	8.34	79.4 %	ACCEPTABLE
115	-0.48	5.54	8.28	77.9 %	ACCEPTABLE
116	-1.95	13.72	15.70	0.5 %	ACCEPTABLE
117	-1.00	10.28	12.25	0.4 %	ACCEPTABLE
118	-1.40	7.95	10.64	78.4 %	ACCEPTABLE
119	-0.23	3.28	6.76	67.9 %	ACCEPTABLE
120	-1.34	7.37	10.17	77.1 %	ACCEPTABLE
121	-0.49	5.62	8.34	78.2 %	ACCEPTABLE
122	-1.10	4.86	8.34	69.6 %	ACCEPTABLE
123	-1.14	3.80	6.49	79.3 %	ACCEPTABLE
124	-2.45	9.41	11.48	0.7 %	ACCEPTABLE
125	-1.58	7.28	9.26	0.5 %	ACCEPTABLE
126	-2.03	5.62	8.34	79.6 %	ACCEPTABLE
127	-1.25	5.54	8.28	79.1 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
128	-2.72	13.72	15.70	1.0 %	ACCEPTABLE
129	-1.77	10.28	12.25	0.5 %	ACCEPTABLE
130	-2.17	7.95	10.64	78.6 %	ACCEPTABLE
131	-1.00	3.28	6.76	68.8 %	ACCEPTABLE
132	-2.11	7.37	10.17	77.2 %	ACCEPTABLE
133	-1.26	5.62	8.34	79.4 %	ACCEPTABLE
134	-1.87	4.86	8.34	69.7 %	ACCEPTABLE
135	-1.91	3.80	6.49	7.7 %	ACCEPTABLE
136	-3.22	9.41	11.48	2.0 %	ACCEPTABLE
137	-2.35	7.28	9.26	1.1 %	ACCEPTABLE
138	-2.80	5.62	8.34	1.4 %	ACCEPTABLE
139	-2.10	2.48	5.99	71.9 %	ACCEPTABLE
140	-1.67	1.89	5.37	65.3 %	ACCEPTABLE
141	-2.70	4.62	7.62	13.5 %	ACCEPTABLE
142	-1.86	3.40	6.23	76.5 %	ACCEPTABLE
143	-2.52	3.06	6.63	72.2 %	ACCEPTABLE
144	-2.76	5.24	8.06	2.5 %	ACCEPTABLE
145	-1.90	3.73	6.45	13.2 %	ACCEPTABLE
146	-2.15	7.79	10.51	78.2 %	ACCEPTABLE
147	-1.27	5.73	8.43	79.7 %	ACCEPTABLE
148	-0.49	5.66	8.38	78.2 %	ACCEPTABLE
149	-1.98	14.02	15.98	0.5 %	ACCEPTABLE
150	-1.02	10.51	12.47	0.4 %	ACCEPTABLE
151	-1.41	8.09	10.77	78.6 %	ACCEPTABLE
152	-0.24	3.35	6.81	68.2 %	ACCEPTABLE
153	-1.35	7.49	10.28	77.2 %	ACCEPTABLE
154	-0.50	5.73	8.43	78.5 %	ACCEPTABLE
155	-1.11	4.94	8.40	69.9 %	ACCEPTABLE
156	-1.15	3.89	6.57	79.5 %	ACCEPTABLE
157	-2.47	9.62	11.67	0.7 %	ACCEPTABLE
158	-1.60	7.47	9.42	0.5 %	ACCEPTABLE
159	-2.04	5.73	8.43	79.9 %	ACCEPTABLE
160	-1.26	5.66	8.38	79.4 %	ACCEPTABLE
161	-2.75	14.02	15.98	1.1 %	ACCEPTABLE
162	-1.79	10.51	12.47	0.5 %	ACCEPTABLE
163	-2.18	8.09	10.77	78.7 %	ACCEPTABLE
164	-1.01	3.35	6.81	69.2 %	ACCEPTABLE
165	-2.12	7.49	10.28	77.3 %	ACCEPTABLE
166	-1.27	5.73	8.43	79.7 %	ACCEPTABLE
167	-1.88	4.94	8.40	70.0 %	ACCEPTABLE
168	-1.92	3.89	6.57	4.8 %	ACCEPTABLE
169	-3.24	9.62	11.67	1.6 %	ACCEPTABLE
170	-2.37	7.47	9.42	1.1 %	ACCEPTABLE
171	-2.81	5.73	8.43	1.3 %	ACCEPTABLE
172	-2.10	2.54	6.03	72.0 %	ACCEPTABLE
173	-1.67	1.95	5.41	65.8 %	ACCEPTABLE
174	-2.70	4.72	7.69	7.3 %	ACCEPTABLE
175	-1.87	3.48	6.29	76.9 %	ACCEPTABLE
176	-2.53	3.12	6.67	72.5 %	ACCEPTABLE
177	-2.77	5.34	8.14	2.1 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
178	-1.91	3.82	6.52	7.1 %	ACCEPTABLE
179	-2.16	7.93	10.63	78.5 %	ACCEPTABLE
180	-1.28	5.85	8.52	80.2 %	ACCEPTABLE
181	-0.50	5.79	8.48	78.7 %	ACCEPTABLE
182	-2.01	14.40	16.33	0.6 %	ACCEPTABLE
183	-1.05	10.80	12.73	0.4 %	ACCEPTABLE
184	-1.42	8.25	10.90	78.9 %	ACCEPTABLE
185	-0.24	3.42	6.85	68.7 %	ACCEPTABLE
186	-1.36	7.63	10.39	77.6 %	ACCEPTABLE
187	-0.51	5.85	8.52	79.0 %	ACCEPTABLE
188	-1.11	5.02	8.46	70.1 %	ACCEPTABLE
189	-1.16	3.99	6.63	80.3 %	ACCEPTABLE
190	-0.37	3.83	6.52	77.7 %	ACCEPTABLE
191	-1.85	11.06	12.96	0.7 %	ACCEPTABLE
192	-0.88	7.87	9.77	0.4 %	ACCEPTABLE
193	-1.31	6.08	8.70	79.6 %	ACCEPTABLE
194	-0.14	2.03	5.44	65.3 %	ACCEPTABLE
195	-1.25	5.54	8.28	79.1 %	ACCEPTABLE
196	-0.39	3.99	6.63	78.7 %	ACCEPTABLE
197	-1.02	3.46	6.87	69.9 %	ACCEPTABLE
198	-1.03	2.35	4.98	80.3 %	ACCEPTABLE
199	-2.32	7.02	9.03	1.0 %	ACCEPTABLE
200	-1.46	5.17	7.07	0.7 %	ACCEPTABLE
201	-1.93	3.99	6.63	3.6 %	ACCEPTABLE
202	-1.23	1.36	4.79	63.9 %	ACCEPTABLE
203	-0.80	0.85	4.24	-	Solution not found
204	-1.81	3.04	6.00	75.3 %	ACCEPTABLE
205	-0.98	2.03	4.79	76.8 %	ACCEPTABLE
206	-1.66	1.85	5.35	65.0 %	ACCEPTABLE
207	-1.89	3.63	6.38	78.1 %	ACCEPTABLE
208	-1.02	2.33	4.96	80.1 %	ACCEPTABLE
209	-1.29	5.95	8.59	79.3 %	ACCEPTABLE
210	-0.40	4.07	6.69	79.1 %	ACCEPTABLE
211	-14.15	94.27	95.88	0.4 %	ACCEPTABLE
212	-15.67	130.68	132.29	0.6 %	ACCEPTABLE
213	-13.38	94.27	95.88	0.5 %	ACCEPTABLE
214	-1.16	3.99	6.63	80.3 %	ACCEPTABLE
215	-0.65	4.03	6.66	79.5 %	ACCEPTABLE
216	-1.55	7.89	10.03	0.6 %	ACCEPTABLE
217	-0.92	6.18	8.32	1.1 %	ACCEPTABLE
218	-1.26	5.37	7.99	80.9 %	ACCEPTABLE
219	-0.75	5.46	8.06	80.4 %	ACCEPTABLE
220	-1.68	9.99	12.11	0.6 %	ACCEPTABLE
221	-1.05	8.07	10.19	1.1 %	ACCEPTABLE
222	-1.36	6.93	9.52	80.0 %	ACCEPTABLE
223	-0.56	3.73	6.83	72.1 %	ACCEPTABLE
224	-1.32	6.53	9.21	78.7 %	ACCEPTABLE
225	-0.74	5.37	7.99	80.1 %	ACCEPTABLE
226	-1.14	4.81	7.93	73.6 %	ACCEPTABLE
227	-1.18	4.17	6.76	81.3 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
228	-0.67	4.22	6.80	80.5 %	ACCEPTABLE
229	-1.59	8.25	10.35	0.5 %	ACCEPTABLE
230	-0.96	6.48	8.57	0.7 %	ACCEPTABLE
231	-1.28	5.60	8.16	81.9 %	ACCEPTABLE
232	-0.78	5.71	8.25	81.4 %	ACCEPTABLE
233	-1.73	10.48	12.55	0.5 %	ACCEPTABLE
234	-1.09	8.48	10.54	0.6 %	ACCEPTABLE
235	-1.38	7.22	9.75	80.8 %	ACCEPTABLE
236	-0.57	3.88	6.93	72.9 %	ACCEPTABLE
237	-1.34	6.79	9.41	79.5 %	ACCEPTABLE
238	-0.76	5.60	8.16	81.1 %	ACCEPTABLE
239	-1.15	4.99	8.05	74.4 %	ACCEPTABLE
240	-1.20	4.37	6.90	82.5 %	ACCEPTABLE
241	-0.69	4.44	6.95	81.8 %	ACCEPTABLE
242	-1.63	8.69	10.72	0.4 %	ACCEPTABLE
243	-1.00	6.84	8.87	0.4 %	ACCEPTABLE
244	-1.31	5.85	8.35	81.6 %	ACCEPTABLE
245	-0.49	2.89	5.90	73.4 %	ACCEPTABLE
246	-1.26	5.46	8.05	81.5 %	ACCEPTABLE
247	-0.68	4.37	6.90	81.4 %	ACCEPTABLE
248	-1.08	3.91	6.94	73.9 %	ACCEPTABLE
249	-1.12	3.24	5.74	82.7 %	ACCEPTABLE
250	-0.61	3.26	5.75	81.7 %	ACCEPTABLE
251	-1.54	7.01	9.02	0.5 %	ACCEPTABLE
252	-0.90	5.31	7.32	0.4 %	ACCEPTABLE
253	-1.23	4.58	7.05	83.7 %	ACCEPTABLE
254	-0.73	4.67	7.12	83.1 %	ACCEPTABLE
255	-1.69	9.15	11.13	0.5 %	ACCEPTABLE
256	-1.05	7.22	9.20	0.4 %	ACCEPTABLE
257	-1.34	6.12	8.56	82.7 %	ACCEPTABLE
258	-0.52	3.03	5.99	74.4 %	ACCEPTABLE
259	-1.29	5.70	8.23	82.5 %	ACCEPTABLE
260	-0.71	4.58	7.05	82.5 %	ACCEPTABLE
261	-1.11	4.07	7.05	74.8 %	ACCEPTABLE
262	-1.15	3.42	5.86	13.5 %	ACCEPTABLE
263	-2.02	6.75	8.80	0.6 %	ACCEPTABLE
264	-1.44	5.49	7.46	0.5 %	ACCEPTABLE
265	-1.75	4.58	7.05	1.8 %	ACCEPTABLE
266	-1.24	2.43	5.42	73.8 %	ACCEPTABLE
267	-0.94	2.01	4.98	72.9 %	ACCEPTABLE
268	-1.67	3.96	6.60	80.5 %	ACCEPTABLE
269	-1.10	3.11	5.65	83.1 %	ACCEPTABLE
270	-1.52	2.83	5.87	73.9 %	ACCEPTABLE
271	-1.71	4.33	6.87	4.8 %	ACCEPTABLE
272	-1.13	3.33	5.80	83.4 %	ACCEPTABLE
273	-1.32	5.97	8.44	82.2 %	ACCEPTABLE
274	-0.73	4.70	7.14	83.2 %	ACCEPTABLE
275	-14.43	100.26	101.87	0.4 %	ACCEPTABLE
276	-15.43	124.58	126.18	0.5 %	ACCEPTABLE
277	-13.91	100.26	101.87	0.5 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
278	-1.23	4.58	7.05	83.7 %	ACCEPTABLE
279	-0.90	4.70	7.14	83.7 %	ACCEPTABLE
280	-1.51	7.28	9.42	0.6 %	ACCEPTABLE
281	-1.09	6.16	8.30	0.9 %	ACCEPTABLE
282	-1.31	5.60	8.05	82.6 %	ACCEPTABLE
283	-0.75	3.50	6.29	76.8 %	ACCEPTABLE
284	-1.27	5.33	7.84	82.8 %	ACCEPTABLE
285	-0.89	4.58	7.05	83.2 %	ACCEPTABLE
286	-1.14	4.21	7.02	77.5 %	ACCEPTABLE
287	-1.18	3.81	6.26	84.1 %	ACCEPTABLE
288	-0.85	3.91	6.34	83.9 %	ACCEPTABLE
289	-1.45	6.28	8.40	0.5 %	ACCEPTABLE
290	-1.03	5.22	7.34	0.7 %	ACCEPTABLE
291	-1.26	4.76	7.19	84.5 %	ACCEPTABLE
292	-0.93	4.90	7.29	84.7 %	ACCEPTABLE
293	-0.60	5.05	7.40	84.4 %	ACCEPTABLE
294	-1.23	7.81	9.88	0.5 %	ACCEPTABLE
295	-0.81	6.63	8.69	0.7 %	ACCEPTABLE
296	-1.01	5.97	8.34	83.6 %	ACCEPTABLE
297	-0.44	3.75	6.45	77.6 %	ACCEPTABLE
298	-0.97	5.67	8.10	82.5 %	ACCEPTABLE
299	-0.59	4.90	7.29	83.6 %	ACCEPTABLE
300	-0.83	4.48	7.21	78.5 %	ACCEPTABLE
301	-0.88	4.11	6.47	85.4 %	ACCEPTABLE
302	-0.55	4.24	6.57	84.9 %	ACCEPTABLE
303	-1.18	6.79	8.83	0.4 %	ACCEPTABLE
304	-0.75	5.67	7.70	0.5 %	ACCEPTABLE
305	-0.96	5.12	7.46	85.7 %	ACCEPTABLE
306	-0.64	5.28	7.59	85.1 %	ACCEPTABLE
307	-1.28	8.19	10.20	0.4 %	ACCEPTABLE
308	-0.85	6.96	8.97	0.4 %	ACCEPTABLE
309	-1.04	6.23	8.55	84.5 %	ACCEPTABLE
310	-0.46	3.91	6.56	78.5 %	ACCEPTABLE
311	-1.00	5.91	8.29	83.4 %	ACCEPTABLE
312	-0.62	5.12	7.46	84.5 %	ACCEPTABLE
313	-0.86	4.66	7.34	79.4 %	ACCEPTABLE
314	-0.91	4.31	6.62	13.2 %	ACCEPTABLE
315	-1.50	6.68	8.73	0.4 %	ACCEPTABLE
316	-1.11	5.81	7.82	0.4 %	ACCEPTABLE
317	-1.30	5.12	7.46	3.9 %	ACCEPTABLE
318	-0.93	3.40	6.09	78.6 %	ACCEPTABLE
319	-0.74	3.08	5.75	79.8 %	ACCEPTABLE
320	-1.25	4.71	7.14	84.5 %	ACCEPTABLE
321	-0.87	4.04	6.42	85.0 %	ACCEPTABLE
322	-1.13	3.72	6.43	78.8 %	ACCEPTABLE
323	-1.28	4.94	7.32	7.1 %	ACCEPTABLE
324	-0.89	4.21	6.54	86.1 %	ACCEPTABLE
325	-0.56	4.35	6.64	85.6 %	ACCEPTABLE
326	-1.19	6.97	8.98	0.4 %	ACCEPTABLE
327	-0.77	5.82	7.82	0.4 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
328	-0.97	5.24	7.55	86.2 %	ACCEPTABLE
329	-0.65	5.42	7.69	84.6 %	ACCEPTABLE
330	-1.30	8.40	10.38	0.4 %	ACCEPTABLE
331	-0.87	7.14	9.12	0.4 %	ACCEPTABLE
332	-1.05	6.38	8.66	85.1 %	ACCEPTABLE
333	-0.47	4.00	6.62	79.1 %	ACCEPTABLE
334	-1.01	6.04	8.39	83.9 %	ACCEPTABLE
335	-0.63	5.24	7.55	85.1 %	ACCEPTABLE
336	-0.86	4.76	7.40	80.1 %	ACCEPTABLE
337	-0.92	4.42	6.70	5.0 %	ACCEPTABLE
338	-1.52	6.85	8.87	0.5 %	ACCEPTABLE
339	-1.13	5.97	7.95	0.4 %	ACCEPTABLE
340	-1.31	5.24	7.55	2.1 %	ACCEPTABLE
341	-0.94	3.48	6.14	79.2 %	ACCEPTABLE
342	-0.74	3.16	5.80	80.4 %	ACCEPTABLE
343	-1.26	4.81	7.22	84.9 %	ACCEPTABLE
344	-0.88	4.14	6.49	85.6 %	ACCEPTABLE
345	-1.13	3.80	6.48	79.4 %	ACCEPTABLE
346	-1.29	5.06	7.41	3.6 %	ACCEPTABLE
347	-0.90	4.31	6.62	13.2 %	ACCEPTABLE
348	-1.04	6.24	8.55	84.6 %	ACCEPTABLE
349	-0.64	5.36	7.65	84.2 %	ACCEPTABLE
350	-14.55	103.58	105.19	0.4 %	ACCEPTABLE
351	-15.22	119.74	121.35	0.5 %	ACCEPTABLE
352	-14.21	103.58	105.19	0.5 %	ACCEPTABLE
353	-0.97	5.24	7.55	86.2 %	ACCEPTABLE
354	-0.76	5.39	7.67	84.9 %	ACCEPTABLE
355	-1.17	7.18	9.27	0.6 %	ACCEPTABLE
356	-0.89	6.42	8.51	0.8 %	ACCEPTABLE
357	-1.03	5.99	8.29	84.9 %	ACCEPTABLE
358	-0.63	4.38	6.90	81.5 %	ACCEPTABLE
359	-1.00	5.78	8.11	84.4 %	ACCEPTABLE
360	-0.74	5.24	7.55	85.5 %	ACCEPTABLE
361	-0.89	4.90	7.43	82.0 %	ACCEPTABLE
362	-0.94	4.69	6.98	7.8 %	ACCEPTABLE
363	-1.33	6.26	8.38	0.6 %	ACCEPTABLE
364	-1.07	5.69	7.78	0.6 %	ACCEPTABLE
365	-1.20	5.24	7.55	3.6 %	ACCEPTABLE
366	-0.94	4.00	6.54	81.8 %	ACCEPTABLE
367	-0.81	3.77	6.30	81.7 %	ACCEPTABLE
368	-1.17	4.98	7.35	85.4 %	ACCEPTABLE
369	-0.91	4.50	6.84	85.8 %	ACCEPTABLE
370	-1.07	4.23	6.79	81.6 %	ACCEPTABLE
371	-1.18	5.12	7.46	14.1 %	ACCEPTABLE
372	-0.92	4.61	6.92	86.4 %	ACCEPTABLE
373	-0.71	4.74	7.02	86.2 %	ACCEPTABLE
374	-1.12	6.41	8.50	0.6 %	ACCEPTABLE
375	-0.84	5.68	7.78	0.8 %	ACCEPTABLE
376	-0.98	5.32	7.62	86.5 %	ACCEPTABLE
377	-0.77	5.47	7.74	85.1 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
378	-1.18	7.29	9.37	0.6 %	ACCEPTABLE
379	-0.90	6.52	8.60	0.7 %	ACCEPTABLE
380	-1.04	6.08	8.36	12.6 %	ACCEPTABLE
381	-0.64	4.45	6.96	81.7 %	ACCEPTABLE
382	-1.01	5.86	8.19	84.4 %	ACCEPTABLE
383	-0.75	5.32	7.62	85.7 %	ACCEPTABLE
384	-0.90	4.97	7.49	82.2 %	ACCEPTABLE
385	-0.95	4.77	7.05	4.8 %	ACCEPTABLE
386	-1.34	6.36	8.46	0.5 %	ACCEPTABLE
387	-1.08	5.78	7.86	0.5 %	ACCEPTABLE
388	-1.21	5.32	7.62	2.9 %	ACCEPTABLE
389	-0.95	4.06	6.60	81.8 %	ACCEPTABLE
390	-0.82	3.83	6.35	82.0 %	ACCEPTABLE
391	-1.18	5.06	7.41	13.1 %	ACCEPTABLE
392	-0.92	4.58	6.90	86.3 %	ACCEPTABLE
393	-1.08	4.30	6.84	82.0 %	ACCEPTABLE
394	-1.19	5.20	7.53	7.6 %	ACCEPTABLE
395	-0.93	4.69	6.99	14.3 %	ACCEPTABLE
396	-1.03	5.98	8.29	84.8 %	ACCEPTABLE
397	-0.76	5.41	7.69	84.9 %	ACCEPTABLE
398	-14.29	105.73	107.34	0.5 %	ACCEPTABLE
399	-14.73	116.48	118.09	0.6 %	ACCEPTABLE
400	-14.06	105.73	107.34	0.6 %	ACCEPTABLE
401	-0.98	5.32	7.62	86.5 %	ACCEPTABLE
402	-0.84	5.43	7.71	85.0 %	ACCEPTABLE
403	-1.11	6.56	8.72	1.1 %	ACCEPTABLE
404	-0.92	6.08	8.23	1.3 %	ACCEPTABLE
405	-1.02	5.83	8.11	13.7 %	ACCEPTABLE
406	-0.75	4.73	7.16	83.4 %	ACCEPTABLE
407	-1.00	5.68	8.00	84.7 %	ACCEPTABLE
408	-0.83	5.32	7.62	85.9 %	ACCEPTABLE
409	-0.93	5.08	7.53	83.5 %	ACCEPTABLE
410	-0.96	4.96	7.24	7.1 %	ACCEPTABLE
411	-1.22	5.99	8.16	0.8 %	ACCEPTABLE
412	-1.04	5.61	7.76	0.9 %	ACCEPTABLE
413	-1.13	5.32	7.62	3.8 %	ACCEPTABLE
414	-0.96	4.45	6.90	83.6 %	ACCEPTABLE
415	-0.87	4.29	6.73	83.7 %	ACCEPTABLE
416	-1.11	5.16	7.49	13.0 %	ACCEPTABLE
417	-0.94	4.82	7.14	86.2 %	ACCEPTABLE
418	-1.04	4.61	7.08	83.4 %	ACCEPTABLE
419	-1.12	5.24	7.56	12.9 %	ACCEPTABLE
420	-0.95	4.89	7.19	86.6 %	ACCEPTABLE
421	-0.81	5.00	7.27	86.6 %	ACCEPTABLE
422	-0.67	5.11	7.36	86.5 %	ACCEPTABLE
423	-0.94	6.22	8.34	1.0 %	ACCEPTABLE
424	-0.75	5.74	7.86	1.3 %	ACCEPTABLE
425	-0.85	5.50	7.76	85.4 %	ACCEPTABLE
426	-0.58	4.42	6.83	83.4 %	ACCEPTABLE
427	-0.83	5.35	7.64	84.8 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
428	-0.66	5.00	7.27	86.1 %	ACCEPTABLE
429	-0.76	4.77	7.19	83.6 %	ACCEPTABLE
430	-0.79	4.64	6.90	13.2 %	ACCEPTABLE
431	-1.05	5.65	7.79	0.9 %	ACCEPTABLE
432	-0.87	5.28	7.40	0.9 %	ACCEPTABLE
433	-0.96	5.00	7.27	4.8 %	ACCEPTABLE
434	-0.79	4.15	6.58	83.7 %	ACCEPTABLE
435	-0.70	3.99	6.41	83.6 %	ACCEPTABLE
436	-0.94	4.84	7.14	86.5 %	ACCEPTABLE
437	-0.77	4.51	6.80	86.3 %	ACCEPTABLE
438	-0.87	4.31	6.74	83.9 %	ACCEPTABLE
439	-0.95	4.92	7.21	13.2 %	ACCEPTABLE
440	-0.78	4.58	6.85	86.8 %	ACCEPTABLE
441	-0.64	4.69	6.93	86.8 %	ACCEPTABLE
442	-0.50	4.80	7.02	86.7 %	ACCEPTABLE
443	-0.77	5.88	7.97	0.9 %	ACCEPTABLE
444	-0.59	5.41	7.50	1.0 %	ACCEPTABLE
445	-0.68	5.18	7.41	87.0 %	ACCEPTABLE
446	-0.54	5.30	7.51	85.5 %	ACCEPTABLE
447	-0.82	6.45	8.53	0.8 %	ACCEPTABLE
448	-0.63	5.96	8.04	0.9 %	ACCEPTABLE
449	-0.72	5.69	7.91	85.8 %	ACCEPTABLE
450	-0.45	4.58	6.94	83.8 %	ACCEPTABLE
451	-0.70	5.54	7.79	85.2 %	ACCEPTABLE
452	-0.53	5.18	7.41	86.4 %	ACCEPTABLE
453	-0.62	4.93	7.31	83.9 %	ACCEPTABLE
454	-0.66	4.82	7.03	7.0 %	ACCEPTABLE
455	-0.92	5.86	7.96	0.8 %	ACCEPTABLE
456	-0.75	5.48	7.57	0.8 %	ACCEPTABLE
457	-0.83	5.18	7.41	4.8 %	ACCEPTABLE
458	-0.65	4.30	6.68	84.1 %	ACCEPTABLE
459	-0.56	4.14	6.51	84.0 %	ACCEPTABLE
460	-0.81	5.01	7.27	13.1 %	ACCEPTABLE
461	-0.64	4.67	6.92	86.7 %	ACCEPTABLE
462	-0.74	4.46	6.85	84.2 %	ACCEPTABLE
463	-0.82	5.10	7.35	13.1 %	ACCEPTABLE
464	-0.65	4.75	6.98	87.1 %	ACCEPTABLE
465	-0.51	4.86	7.07	87.3 %	ACCEPTABLE
466	-0.37	4.98	7.16	86.7 %	ACCEPTABLE
467	-0.65	6.09	8.16	0.9 %	ACCEPTABLE
468	-0.46	5.61	7.67	0.9 %	ACCEPTABLE
469	-0.55	5.36	7.56	85.7 %	ACCEPTABLE
470	-0.28	4.28	6.63	83.2 %	ACCEPTABLE
471	-0.53	5.21	7.44	86.4 %	ACCEPTABLE
472	-0.36	4.86	7.07	86.2 %	ACCEPTABLE
473	-0.45	4.63	6.98	84.0 %	ACCEPTABLE
474	-0.49	4.50	6.70	87.3 %	ACCEPTABLE
475	-0.75	5.51	7.59	0.8 %	ACCEPTABLE
476	-0.58	5.15	7.21	0.7 %	ACCEPTABLE
477	-0.66	4.86	7.07	7.0 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
478	-0.48	4.01	6.37	84.0 %	ACCEPTABLE
479	-0.39	3.85	6.20	83.9 %	ACCEPTABLE
480	-0.64	4.69	6.94	86.6 %	ACCEPTABLE
481	-0.47	4.36	6.59	86.6 %	ACCEPTABLE
482	-0.57	4.16	6.54	83.9 %	ACCEPTABLE
483	-0.65	4.78	7.01	87.1 %	ACCEPTABLE
484	-0.48	4.44	6.65	87.1 %	ACCEPTABLE
485	-0.54	5.29	7.51	85.3 %	ACCEPTABLE
486	-0.37	4.93	7.12	86.7 %	ACCEPTABLE
487	-14.40	108.02	109.63	0.5 %	ACCEPTABLE
488	-14.70	115.21	116.82	0.6 %	ACCEPTABLE
489	-14.24	108.02	109.63	0.5 %	ACCEPTABLE
490	-0.51	4.86	7.07	87.3 %	ACCEPTABLE
491	-0.42	4.95	7.14	86.9 %	ACCEPTABLE
492	-0.60	5.65	7.77	1.8 %	ACCEPTABLE
493	-0.47	5.34	7.46	2.2 %	ACCEPTABLE
494	-0.54	5.20	7.40	85.8 %	ACCEPTABLE
495	-0.35	4.47	6.77	84.6 %	ACCEPTABLE
496	-0.52	5.10	7.32	86.6 %	ACCEPTABLE
497	-0.41	4.86	7.07	86.5 %	ACCEPTABLE
498	-0.47	4.70	7.01	84.8 %	ACCEPTABLE
499	-0.49	4.62	6.82	87.3 %	ACCEPTABLE
500	-0.67	5.29	7.41	1.3 %	ACCEPTABLE
501	-0.55	5.04	7.16	1.6 %	ACCEPTABLE
502	-0.61	4.86	7.07	13.1 %	ACCEPTABLE
503	-0.49	4.27	6.59	84.8 %	ACCEPTABLE
504	-0.43	4.16	6.47	84.8 %	ACCEPTABLE
505	-0.60	4.75	6.99	86.8 %	ACCEPTABLE
506	-0.48	4.53	6.75	86.8 %	ACCEPTABLE
507	-0.55	4.38	6.70	84.9 %	ACCEPTABLE
508	-0.60	4.81	7.03	87.0 %	ACCEPTABLE
509	-0.49	4.58	6.79	87.0 %	ACCEPTABLE
510	-0.53	5.15	7.36	86.8 %	ACCEPTABLE
511	-0.41	4.91	7.11	86.7 %	ACCEPTABLE
512	-13.07	95.21	96.82	0.6 %	ACCEPTABLE
513	-13.27	99.68	101.29	0.6 %	ACCEPTABLE
514	-12.97	95.21	96.82	0.6 %	ACCEPTABLE
515	-0.51	4.86	7.07	87.3 %	ACCEPTABLE
516	-0.45	4.92	7.12	86.9 %	ACCEPTABLE
517	-0.57	5.38	7.52	2.0 %	ACCEPTABLE
518	-0.49	5.18	7.32	2.8 %	ACCEPTABLE
519	-0.53	5.08	7.29	86.8 %	ACCEPTABLE
520	-0.41	4.59	6.86	85.5 %	ACCEPTABLE
521	-0.52	5.02	7.23	86.9 %	ACCEPTABLE
522	-0.44	4.86	7.07	86.5 %	ACCEPTABLE
523	-0.48	4.75	7.03	85.4 %	ACCEPTABLE
524	-0.50	4.70	6.90	87.2 %	ACCEPTABLE
525	-0.62	5.14	7.29	2.4 %	ACCEPTABLE
526	-0.54	4.98	7.12	2.5 %	ACCEPTABLE
527	-0.58	4.86	7.07	87.3 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
528	-0.49	4.46	6.74	85.7 %	ACCEPTABLE
529	-0.46	4.39	6.66	85.7 %	ACCEPTABLE
530	-0.57	4.79	7.02	86.8 %	ACCEPTABLE
531	-0.49	4.64	6.86	86.8 %	ACCEPTABLE
532	-0.53	4.54	6.82	85.6 %	ACCEPTABLE
533	-0.57	4.83	7.04	87.1 %	ACCEPTABLE
534	-0.50	4.67	6.88	87.4 %	ACCEPTABLE
535	-0.44	4.73	6.93	86.7 %	ACCEPTABLE
536	-0.56	5.17	7.32	2.8 %	ACCEPTABLE
537	-0.47	4.98	7.12	2.9 %	ACCEPTABLE
538	-0.52	4.89	7.09	87.1 %	ACCEPTABLE
539	-0.40	4.41	6.68	85.5 %	ACCEPTABLE
540	-0.51	4.82	7.04	86.7 %	ACCEPTABLE
541	-0.43	4.67	6.88	86.6 %	ACCEPTABLE
542	-0.47	4.57	6.84	86.1 %	ACCEPTABLE
543	-0.49	4.51	6.72	87.0 %	ACCEPTABLE
544	-0.61	4.94	7.09	2.1 %	ACCEPTABLE
545	-0.53	4.78	6.93	2.5 %	ACCEPTABLE
546	-0.57	4.67	6.88	87.3 %	ACCEPTABLE
547	-0.49	4.28	6.56	85.6 %	ACCEPTABLE
548	-0.45	4.21	6.48	85.7 %	ACCEPTABLE
549	-0.56	4.60	6.83	86.9 %	ACCEPTABLE
550	-0.48	4.45	6.67	86.8 %	ACCEPTABLE
551	-0.52	4.35	6.64	85.6 %	ACCEPTABLE
552	-0.56	4.64	6.85	13.2 %	ACCEPTABLE
553	-0.49	4.48	6.69	87.1 %	ACCEPTABLE
554	-0.51	4.86	7.07	87.3 %	ACCEPTABLE
555	-0.44	4.70	6.90	86.7 %	ACCEPTABLE
556	-13.10	95.94	97.56	0.6 %	ACCEPTABLE
557	-13.23	98.93	100.54	0.7 %	ACCEPTABLE
558	-13.03	95.94	97.56	0.7 %	ACCEPTABLE
559	-0.50	4.67	6.88	87.4 %	ACCEPTABLE
560	-0.46	4.71	6.91	87.0 %	ACCEPTABLE
561	-0.54	5.00	7.17	4.8 %	ACCEPTABLE
562	-0.48	4.87	7.04	7.7 %	ACCEPTABLE
563	-0.51	4.82	7.02	87.2 %	ACCEPTABLE
564	-0.43	4.50	6.75	85.9 %	ACCEPTABLE
565	-0.51	4.77	6.99	86.8 %	ACCEPTABLE
566	-0.45	4.67	6.88	86.7 %	ACCEPTABLE
567	-0.48	4.60	6.85	86.5 %	ACCEPTABLE
568	-0.49	4.57	6.77	87.2 %	ACCEPTABLE
569	-0.57	4.85	7.02	4.0 %	ACCEPTABLE
570	-0.52	4.74	6.91	4.9 %	ACCEPTABLE
571	-0.55	4.67	6.88	87.2 %	ACCEPTABLE
572	-0.49	4.41	6.66	86.2 %	ACCEPTABLE
573	-0.46	4.36	6.61	86.2 %	ACCEPTABLE
574	-0.54	4.63	6.85	86.9 %	ACCEPTABLE
575	-0.49	4.52	6.74	87.2 %	ACCEPTABLE
576	-0.52	4.46	6.72	86.1 %	ACCEPTABLE
577	-0.54	4.65	6.86	87.1 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
578	-0.49	4.55	6.76	87.0 %	ACCEPTABLE
579	-0.51	4.80	7.01	87.4 %	ACCEPTABLE
580	-0.46	4.69	6.90	86.7 %	ACCEPTABLE
581	-12.93	93.50	95.11	0.6 %	ACCEPTABLE
582	-13.02	95.46	97.07	0.6 %	ACCEPTABLE
583	-12.88	93.50	95.11	0.6 %	ACCEPTABLE
584	-0.50	4.67	6.88	87.4 %	ACCEPTABLE
585	-0.47	4.70	6.90	87.0 %	ACCEPTABLE
586	-0.53	4.89	7.07	7.1 %	ACCEPTABLE
587	-0.49	4.80	6.99	87.2 %	ACCEPTABLE
588	-0.51	4.77	6.97	87.6 %	ACCEPTABLE
589	-0.48	4.80	6.99	87.1 %	ACCEPTABLE
590	-0.54	4.99	7.16	4.8 %	ACCEPTABLE
591	-0.50	4.91	7.08	7.1 %	ACCEPTABLE
592	-0.52	4.87	7.07	87.1 %	ACCEPTABLE
593	-0.46	4.65	6.88	86.3 %	ACCEPTABLE
594	-0.51	4.84	7.04	87.2 %	ACCEPTABLE
595	-0.48	4.77	6.97	86.9 %	ACCEPTABLE
596	-0.50	4.72	6.95	86.5 %	ACCEPTABLE
597	-0.51	4.70	6.90	87.6 %	ACCEPTABLE
598	-0.48	4.73	6.92	87.2 %	ACCEPTABLE
599	-0.54	4.92	7.09	4.8 %	ACCEPTABLE
600	-0.50	4.84	7.01	4.9 %	ACCEPTABLE
601	-0.52	4.80	7.00	87.2 %	ACCEPTABLE
602	-0.46	4.58	6.81	86.3 %	ACCEPTABLE
603	-0.51	4.77	6.97	87.6 %	ACCEPTABLE
604	-0.48	4.70	6.90	87.0 %	ACCEPTABLE
605	-0.50	4.65	6.88	86.5 %	ACCEPTABLE
606	-0.51	4.63	6.83	87.2 %	ACCEPTABLE
607	-0.56	4.82	6.99	3.7 %	ACCEPTABLE
608	-0.52	4.75	6.92	4.9 %	ACCEPTABLE
609	-0.54	4.70	6.90	87.4 %	ACCEPTABLE
610	-0.50	4.52	6.75	86.6 %	ACCEPTABLE
611	-0.49	4.49	6.72	86.6 %	ACCEPTABLE
612	-0.54	4.67	6.88	87.1 %	ACCEPTABLE
613	-0.50	4.60	6.81	87.4 %	ACCEPTABLE
614	-0.52	4.56	6.79	86.7 %	ACCEPTABLE
615	-0.54	4.69	6.89	87.4 %	ACCEPTABLE
616	-0.50	4.62	6.82	87.2 %	ACCEPTABLE
617	-0.52	4.78	6.98	87.2 %	ACCEPTABLE
618	-0.48	4.71	6.91	87.0 %	ACCEPTABLE
619	-12.94	93.83	95.44	0.6 %	ACCEPTABLE
620	-13.00	95.13	96.74	0.6 %	ACCEPTABLE
621	-12.91	93.83	95.44	0.6 %	ACCEPTABLE
622	-0.51	4.70	6.90	87.6 %	ACCEPTABLE
623	-0.49	4.72	6.91	87.5 %	ACCEPTABLE
624	-0.53	4.85	7.03	7.7 %	ACCEPTABLE
625	-0.50	4.79	6.97	7.8 %	ACCEPTABLE
626	-0.52	4.77	6.96	87.4 %	ACCEPTABLE
627	-0.48	4.62	6.84	86.8 %	ACCEPTABLE

No.	Center		Radius R [m]	Utilization	Verification
	x [m]	z [m]			
628	-0.51	4.75	6.95	87.6 %	ACCEPTABLE
629	-0.49	4.70	6.90	87.2 %	ACCEPTABLE
630	-0.50	4.67	6.89	87.2 %	ACCEPTABLE
631	-0.51	4.65	6.85	87.2 %	ACCEPTABLE
632	-0.54	4.78	6.96	4.8 %	ACCEPTABLE
633	-0.52	4.73	6.91	4.8 %	ACCEPTABLE
634	-0.53	4.70	6.90	87.4 %	ACCEPTABLE
635	-0.51	4.58	6.80	86.8 %	ACCEPTABLE
636	-0.49	4.56	6.78	86.8 %	ACCEPTABLE
637	-0.53	4.68	6.88	87.4 %	ACCEPTABLE
638	-0.50	4.63	6.84	87.4 %	ACCEPTABLE
639	-0.52	4.60	6.82	86.9 %	ACCEPTABLE
640	-0.53	4.69	6.89	87.4 %	ACCEPTABLE
641	-0.51	4.64	6.84	87.3 %	ACCEPTABLE
642	-0.51	4.76	6.96	87.6 %	ACCEPTABLE
643	-0.49	4.71	6.91	87.2 %	ACCEPTABLE
644	-12.94	93.80	95.41	0.6 %	ACCEPTABLE
645	-12.98	94.67	96.28	0.6 %	ACCEPTABLE
646	-12.92	93.80	95.41	0.6 %	ACCEPTABLE
647	-0.51	4.70	6.90	87.6 %	ACCEPTABLE
648	-0.50	4.71	6.91	87.2 %	ACCEPTABLE
649	-0.52	4.80	6.98	7.0 %	ACCEPTABLE
650	-0.50	4.76	6.95	87.4 %	ACCEPTABLE
651	-0.51	4.74	6.94	87.6 %	ACCEPTABLE
652	-0.49	4.65	6.86	87.0 %	ACCEPTABLE
653	-0.51	4.73	6.93	87.6 %	ACCEPTABLE
654	-0.50	4.70	6.90	87.2 %	ACCEPTABLE
655	-0.50	4.68	6.89	87.0 %	ACCEPTABLE
656	-0.51	4.67	6.87	87.2 %	ACCEPTABLE
657	-0.53	4.75	6.94	14.2 %	ACCEPTABLE
658	-0.52	4.72	6.91	13.1 %	ACCEPTABLE
659	-0.52	4.70	6.90	87.2 %	ACCEPTABLE
660	-0.51	4.62	6.83	87.0 %	ACCEPTABLE
661	-0.50	4.60	6.82	86.8 %	ACCEPTABLE
662	-0.52	4.69	6.89	87.2 %	ACCEPTABLE
663	-0.51	4.66	6.86	87.2 %	ACCEPTABLE
664	-0.51	4.64	6.85	87.0 %	ACCEPTABLE
665	-0.52	4.69	6.89	87.2 %	ACCEPTABLE
666	-0.51	4.66	6.86	87.2 %	ACCEPTABLE
667	-0.51	4.74	6.94	87.6 %	ACCEPTABLE
668	-0.50	4.71	6.90	87.4 %	ACCEPTABLE
669	-12.95	93.94	95.56	0.6 %	ACCEPTABLE
670	-12.97	94.52	96.14	0.6 %	ACCEPTABLE
671	-12.93	93.94	95.56	0.6 %	ACCEPTABLE
672	-0.51	4.70	6.90	87.6 %	ACCEPTABLE

Input data (Stage of construction 2)

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	2.00	tlo 1	
2	-	temeljno tlo	

Terrain profile

Terrain behind the structure is flat.

Water influence

Ground water table is located below the structure.

Input surface surcharges

No.	Surcharge new	change	Action	Mag.1 [kN/m ²]	Mag.2 [kN/m ²]	Ord.x x [m]	Length l [m]	Depth z [m]
1	NO	NO	accidental	33.00		0.00	1.80	on terrain

No.	Name
1	saobraćajno opterećenje

Resistance on front face of the structure

Resistance on front face of the structure is not considered.

Settings of the stage of construction

Design situation : permanent

The wall is free to move. Active earth pressure is therefore assumed.

Verification No. 1 (Stage of construction 2)

Active pressure behind the structure - partial results

Layer No.	Thickness [m]	α [°]	φ_d [°]	c_d [kPa]	γ [kN/m ³]	δ_d [°]	K_a	Comment
1	1.70	30.00	30.00	0.00	20.00	30.00	0.667	
2	0.30	0.00	30.00	0.00	20.00	20.00	0.297	

Active pressure distribution behind the structure (without surcharge)

Layer No.	Start [m] End [m]	σ_z [kPa]	σ_w [kPa]	Pressure [kPa]	Hor. comp. [kPa]	Vert. comp. [kPa]
1	0.00	0.00	0.00	0.00	0.00	0.00
	1.70	34.00	0.00	22.67	11.33	19.63
2	1.70	34.00	0.00	10.11	9.50	3.46
	2.00	40.00	0.00	11.89	11.18	4.07

Pressure profile due to surcharge - saobraćajno opterećenje

Point No.	Depth [m]	Hor. comp. [kPa]	Vert. comp. [kPa]
1	0.00	0.00	0.00

Point No.	Depth [m]	Hor. comp. [kPa]	Vert. comp. [kPa]
2	0.00	0.00	0.00
3	0.03	0.00	0.00
4	0.03	4.94	8.56
5	1.70	4.80	8.31
6	1.70	9.28	3.38
7	2.00	9.23	3.36

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. overturn.	Coeff. sliding	Coeff. stress
Weight - wall	0.00	-0.58	19.75	0.56	1.000	1.000	1.350
Weight - earth wedge	0.00	-0.92	20.71	0.77	1.000	1.000	1.350
Active pressure	12.73	-0.69	17.81	1.19	1.350	1.350	1.350
saobraćajno opterećenje	10.91	-0.89	15.10	1.05	1.000	1.000	1.000
saobraćajno opterećenje	0.00	-2.00	3.91	0.46	0.000	0.000	1.000

Verification of complete wall

Check for overturning stability

Resisting moment $M_{res} = 51.05$ kNm/m

Overturning moment $M_{ovr} = 21.57$ kNm/m

Wall for overturning is SATISFACTORY

Check for slip

Resisting horizontal force $H_{res} = 41.79$ kN/m

Active horizontal force $H_{act} = 28.10$ kN/m

Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 78.05 kPa

Bearing capacity of foundation soil (Stage of construction 2)

Forces acting at the centre of the footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]	Eccentricity [m]	Stress [kPa]
1	12.14	97.69	28.10	0.12	78.05
2	9.81	79.62	28.10	0.12	63.51

Dimensioning No. 1 (Stage of construction 2)

Active pressure behind the structure - partial results

Layer No.	Thickness [m]	α [°]	φ_d [°]	c_d [kPa]	γ [kN/m ³]	δ_d [°]	K_a	Comment
1	1.70	30.00	30.00	0.00	20.00	30.00	0.667	
2	0.30	0.00	30.00	0.00	20.00	20.00	0.297	

Active pressure distribution behind the structure (without surcharge)

Layer No.	Start [m] End [m]	σ_z [kPa]	σ_w [kPa]	Pressure [kPa]	Hor. comp. [kPa]	Vert. comp. [kPa]
1	0.00	0.00	0.00	0.00	0.00	0.00
	1.70	34.00	0.00	22.67	11.33	19.63
2	1.70	34.00	0.00	10.11	9.50	3.46
	2.00	40.00	0.00	11.89	11.18	4.07

Pressure profile due to surcharge - saobraćajno opterećenje

Point No.	Depth [m]	Hor. comp. [kPa]	Vert. comp. [kPa]
1	0.00	0.00	0.00
2	0.00	0.00	0.00
3	0.03	0.00	0.00
4	0.03	4.94	8.56
5	1.70	4.80	8.31
6	1.70	9.28	3.38
7	2.00	9.23	3.36

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Weight - wall	0.00	-0.15	8.25	0.95	1.350
Weight - earth wedge	0.00	-0.92	20.71	0.77	1.350
Active pressure	12.73	-0.69	17.81	1.19	1.350
saobraćajno opterećenje	10.91	-0.89	15.10	1.05	1.000
Contact tractions	0.00	0.00	-62.15	0.87	1.000
Gravity surch. 1	0.00	-2.00	4.07	0.46	1.000

Back wall jump check

Reinforcement and dimensions of the cross-section

Bar diameter = 8.0 mm

Number of bars = 7

Reinforcement cover = 40.0 mm

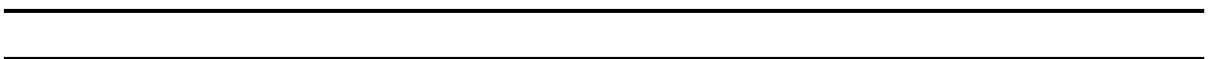
Cross-section width = 1.00 m

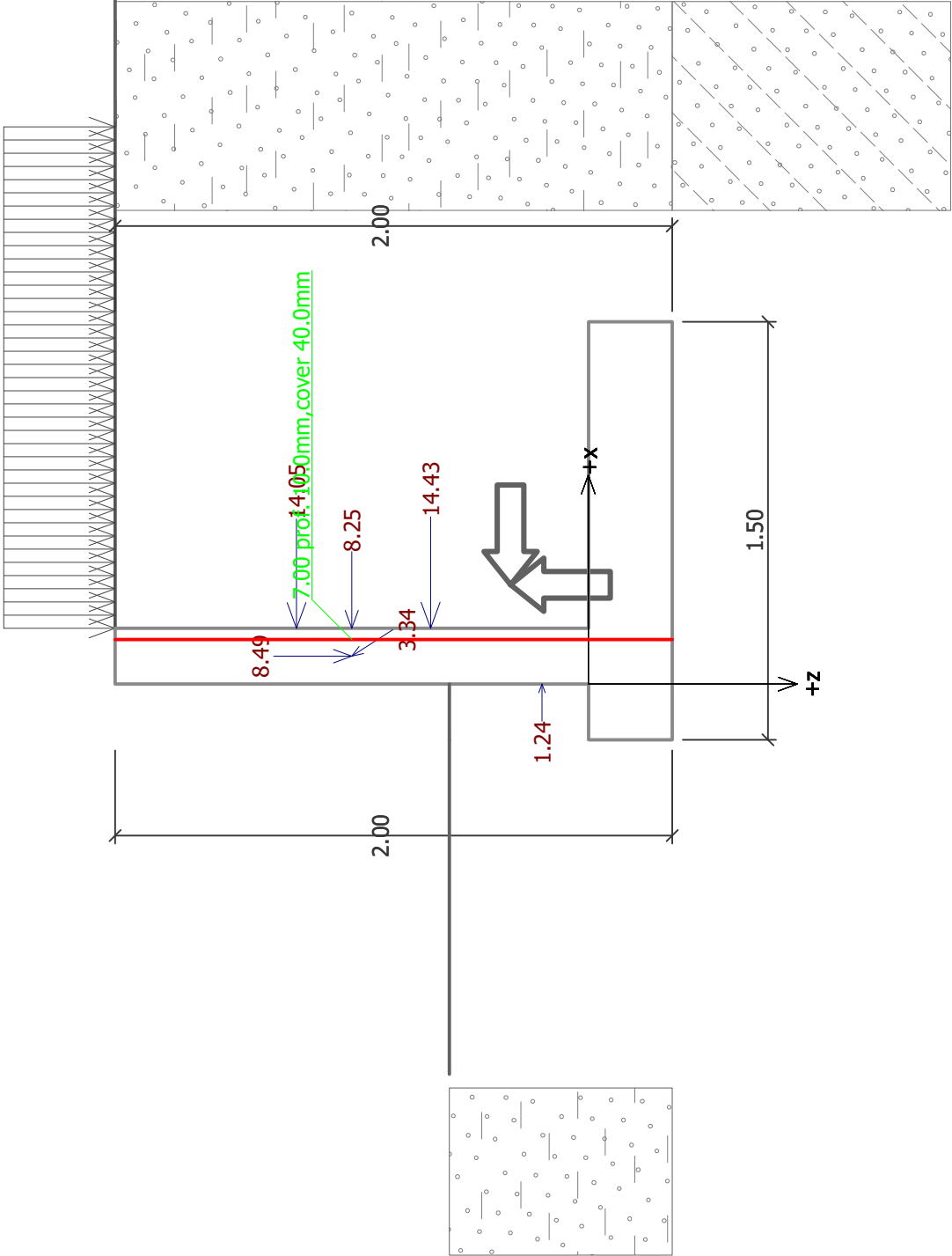
Cross-section depth = 0.30 m

Reinforcement ratio $\rho = 0.14 \% > 0.14 \% = \rho_{min}$ Position of neutral axis $x = 0.01 \text{ m} < 0.16 \text{ m} = x_{max}$ Ultimate shear force $V_{Rd} = 115.84 \text{ kN} > 20.18 \text{ kN} = V_{Ed}$ Ultimate moment $M_{Rd} = 38.46 \text{ kNm} > 16.21 \text{ kNm} = M_{Ed}$ **Cross-section is SATISFACTORY.**

Dimenzionisanje

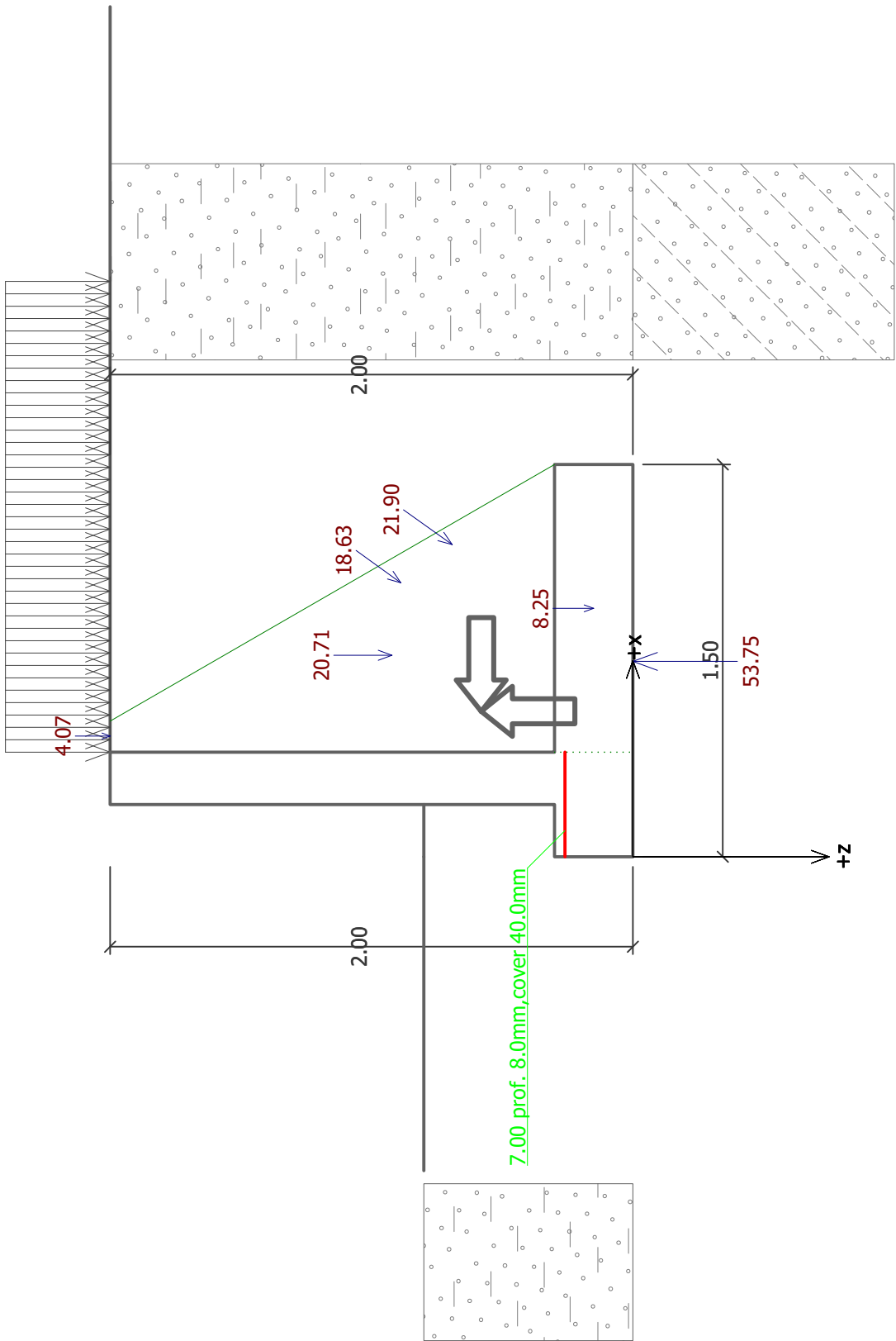
- Borska ulica -



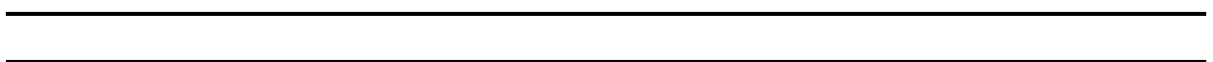


Name : Dimensioning

Stage - analysis : 1 - 1



Proračun potpornih zidova - otpornost tla -



Spread footing verification

Input data

Settings

Standard - EN 1997 - DA2

Materials and standards

Concrete structures : EN 1992-1-1 (EC2)

Coefficients EN 1992-1-1 : standard

Settlement

Analysis method : Analysis using oedometric modulus

Restriction of influence zone : by percentage of Sigma, Or

Coeff. of restriction of influence zone : 10.0 [%]

Spread Footing

Analysis for drained conditions : EC 7-1 (EN 1997-1:2003)

Verification methodology : according to EN 1997

Design approach : 2 - reduction of actions and resistances

Partial factors on actions (A)			
Permanent design situation			
		Unfavourable	Favourable
Permanent actions :	$\gamma_G =$	1.35 [-]	1.00 [-]

Partial factors for resistances (R)			
Permanent design situation			
Partial factor on vertical bearing capacity :	$\gamma_{Rvs} =$	1.40 [-]	
Partial factor on sliding resistance :	$\gamma_{Rhs} =$	1.10 [-]	

Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]	γ_{su} [kN/m ³]	δ [°]
1	tlo 1		30.00	0.00	20.00	10.00	20.00
2	temeljno tlo		30.00	0.00	20.00	10.00	20.00

All soils are considered as cohesionless for at rest pressure analysis.

Soil parameters

tlo 1

Unit weight : $\gamma = 20.00$ kN/m³

Angle of internal friction : $\varphi_{ef} = 30.00^\circ$

Cohesion of soil : $c_{ef} = 0.00$ kPa

Deformation modulus : $E_{def} = 1.37$ MPa

Poisson's ratio : $\nu = 0.33$

Saturated unit weight : $\gamma_{sat} = 20.00$ kN/m³

temeljno tlo

Unit weight : $\gamma = 20.00$ kN/m³

Angle of internal friction : $\varphi_{ef} = 30.00^\circ$

Cohesion of soil : $c_{ef} = 0.00$ kPa

Deformation modulus : $E_{\text{def}} = 3.37 \text{ MPa}$
 Poisson's ratio : $\nu = 0.33$
 Saturated unit weight : $\gamma_{\text{sat}} = 20.00 \text{ kN/m}^3$

Foundation

Foundation type: strip footing

Depth from original ground surface $h_z = 2.00 \text{ m}$
 Depth of footing bottom $d = 0.80 \text{ m}$
 Foundation thickness $t = 0.30 \text{ m}$
 Incl. of finished grade $s_1 = 0.00^\circ$
 Incl. of footing bottom $s_2 = 0.00^\circ$

Unit weight of soil above foundation = 20.00 kN/m^3

Material of structure

Unit weight $\gamma = 25.00 \text{ kN/m}^3$

Analysis of concrete structures carried out according to the standard EN 1992-1-1 (EC2).

Concrete : C 25/30
 Cylinder compressive strength $f_{\text{ck}} = 25.00 \text{ MPa}$
 Tensile strength $f_{\text{ct}} = 2.60 \text{ MPa}$
 Elasticity modulus $E_{\text{cm}} = 31000.00 \text{ MPa}$

Longitudinal steel : B500
 Yield strength $f_{\text{yk}} = 500.00 \text{ MPa}$

Transverse steel: B500
 Yield strength $f_{\text{yk}} = 500.00 \text{ MPa}$

Geological profile and assigned soils

No.	Layer [m]	Assigned soil	Pattern
1	2.00	tlo 1	
2	-	temeljno tlo	

Load

No.	Load		Name	Type	N [kN/m]	M_y [kNm/m]	H_x [kN/m]
	new	change					
1	YES		LC 1	Service	77.75	14.78	-43.32
2	YES		LC 2	Design	77.75	14.78	-43.32
3	YES		LC 3	Service	59.68	12.41	-44.44
4	YES		LC 4	Design	59.68	12.41	-44.44

Global settings

Analysis type : analysis for drained conditions

Settings of the stage of construction

Design situation : permanent

Verification No. 1

Load case verification

Name	Self w. in favor	e_x [m]	e_y [m]	σ [kPa]	R_d [kPa]	Utilization [%]	Is satisfied
LC 2	Yes	-0.27	0.00	107.22	138.49	77.42	Yes
LC 2	No	-0.25	0.00	111.48	155.61	71.64	Yes
LC 4	Yes	-0.30	0.00	95.03	95.70	99.30	Yes
LC 4	No	-0.27	0.00	98.61	116.61	84.56	Yes

Analysis carried out with automatic selection of the most unfavourable load cases.

Computed self weight of strip foundation $G = 11.25$ kN/m

Computed weight of overburden $Z = 14.00$ kN/m

Vertical bearing capacity check

Shape of contact stress : rectangle

Most severe load case No. 4. (LC 4)

Parameters of slip surface below foundation:

Depth of slip surface $z_{sp} = 2.38$ m

Length of slip surface $l_{sp} = 7.19$ m

Design bearing capacity of found.soil $R_d = 95.70$ kPa

Extreme contact stress $\sigma = 95.03$ kPa

Bearing capacity in the vertical direction is SATISFACTORY

Horizontal bearing capacity check

Most severe load case No. 4. (LC 4)

Earth resistance: not considered

Friction angle foundation-footing bottom $\psi = 30.00^\circ$

Cohesion foundation-footing bottom $a = 0.00$ kPa

Horizontal bearing capacity $R_{dh} = 44.57$ kN

Extreme horizontal force $H = 44.44$ kN

Bearing capacity in the horizontal direction is SATISFACTORY

Bearing capacity of foundation is SATISFACTORY

Verification No. 1

Settlement and rotation of foundation - input data

Analysis carried out with automatic selection of the most unfavourable load cases.

Analysis carried out with accounting for coefficient κ_1 (influence of foundation depth).

Stress at the footing bottom considered from the finished grade.

Computed self weight of strip foundation $G = 11.25$ kN/m

Computed weight of overburden $Z = 14.00$ kN/m

Settlement of mid point of longitudinal edge = 7.0 mm

Settlement of mid point of transverse edge 1 = 14.8 mm

Settlement of mid point of transverse edge 2 = -0.6 mm

(1-max.compressed edge; 2-min.compressed edge)

Settlement and rotation of foundation - results

Foundation stiffness:

Computed weighted average modulus of deformation $E_{\text{def}} = 3.37 \text{ MPa}$

Foundation in the longitudinal direction is rigid ($k=73.59$)

Foundation in the direction of width is rigid ($k=248.37$)

Overall settlement and rotation of foundation:

Foundation settlement = 9.3 mm

Depth of influence zone = 2.34 m

Rotation in direction of width = 10.239 ($\text{tan} \cdot 1000$)

Dimensioning No. 1

Analysis carried out with automatic selection of the most unfavourable load cases.

Verification of longitudinal reinforcement of foundation in the direction of x

Bar diameter = 10.0 mm

Number of bars = 6

Reinforcement cover = 40.0 mm

Cross-section width = 1.00 m

Cross-section depth = 0.30 m

Reinforcement ratio $\rho = 0.18 \% > 0.14 \% = \rho_{\text{min}}$

Position of neutral axis $x = 0.02 \text{ m} < 0.16 \text{ m} = x_{\text{max}}$

Ultimate moment $M_{\text{Rd}} = 50.99 \text{ kNm} > 27.17 \text{ kNm} = M_{\text{Ed}}$

Cross-section is SATISFACTORY.

Spread footing for punching shear failure check

Column normal force = 77.75 kN

Compression chord adjacent to the column

Force transmitted into found. soil = 5.18 kN

Force transmitted by shear strength of SRC = 72.57 kN

Considered column perimeter $u_0 = 0.76 \text{ m}$

Shear resistance at the column perimeter $v_{\text{Ed,max}} = 1.07 \text{ MPa}$

Resist. of the compr. chord adjacent to the column $v_{\text{Rd,max}} = 4.50 \text{ MPa}$

Critical section without shear reinforcement

Force transmitted into found. soil = 44.60 kN

Force transmitted by shear strength of SRC = 33.15 kN

Distance of section from the column = 0.38 m

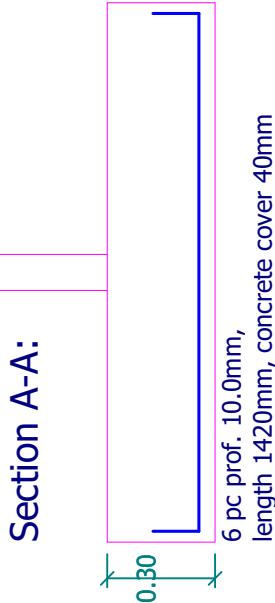
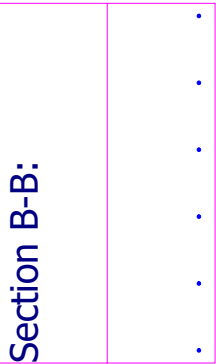
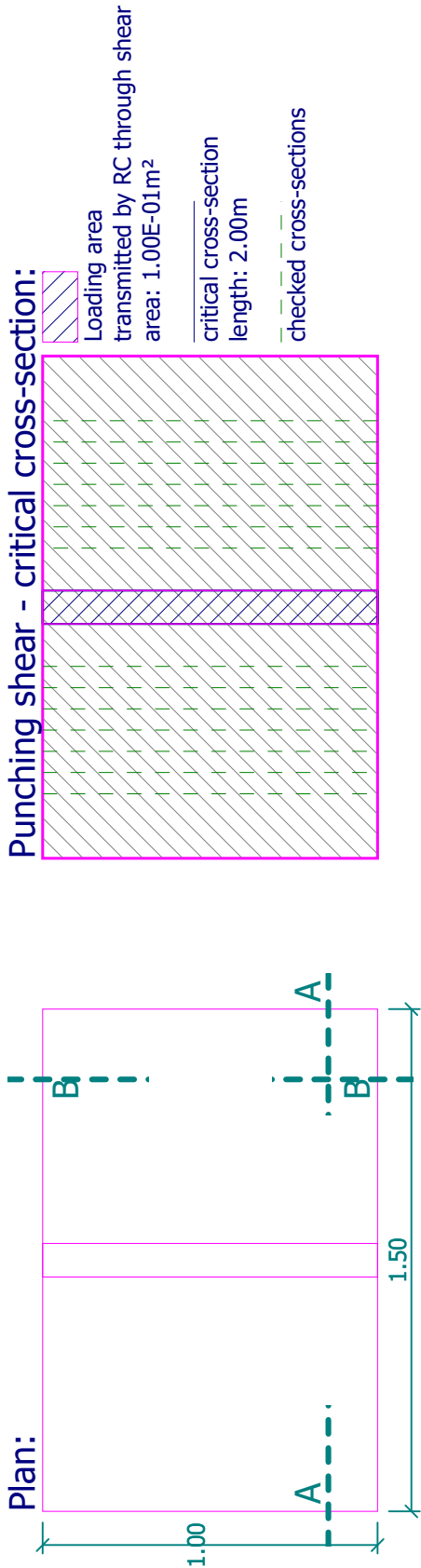
Section perimeter $u_{\text{cr}} = 2.00 \text{ m}$

Shear stress at section $v_{\text{Ed}} = 0.10 \text{ MPa}$

Shear resistance of section without shear reinforcement $v_{\text{Rd,c}} = 0.61 \text{ MPa}$

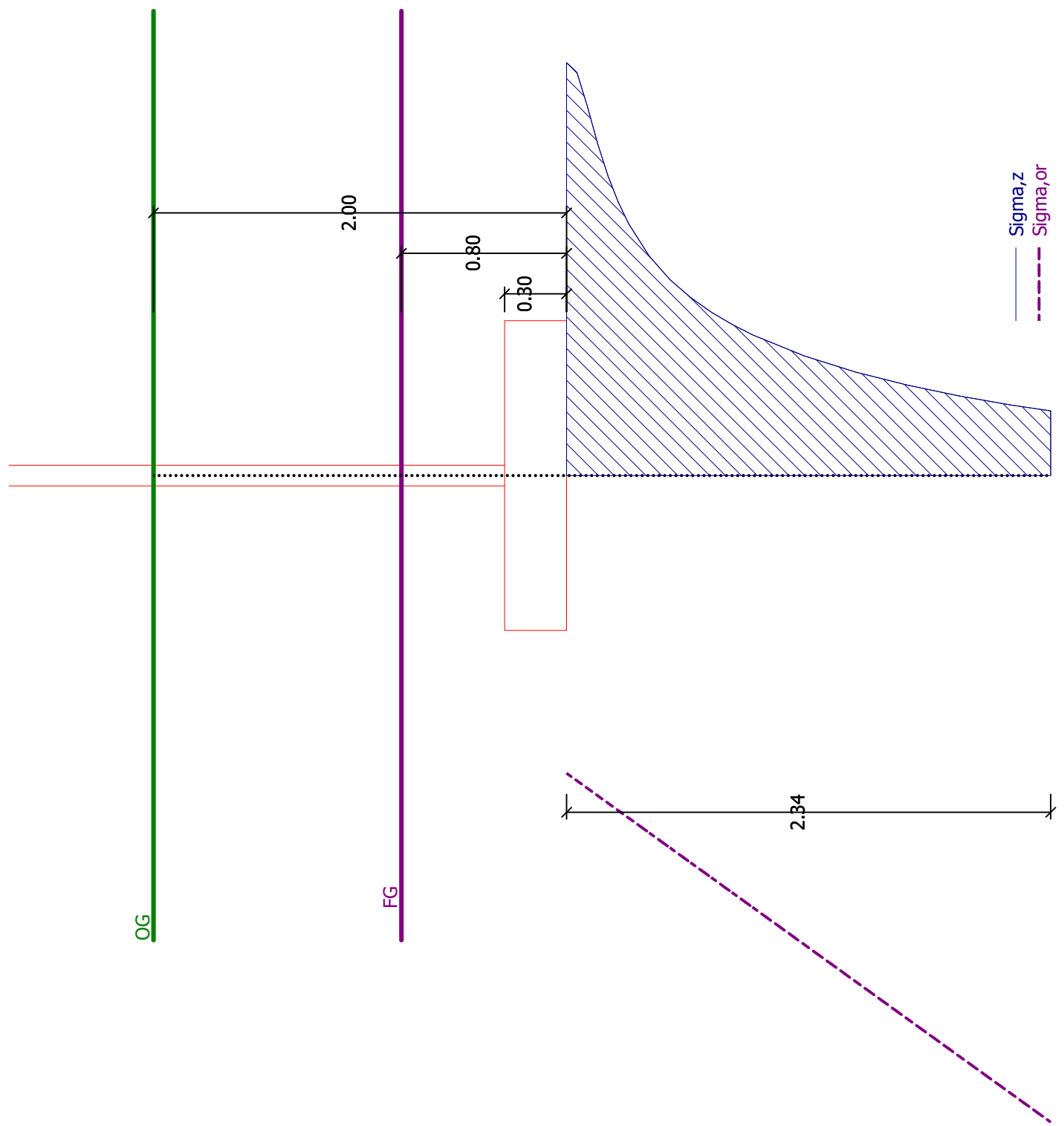
$v_{\text{Ed}} < v_{\text{Rd,c}} \Rightarrow$ Reinforcement is not required

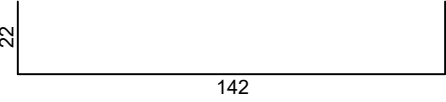
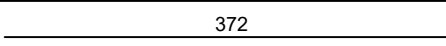
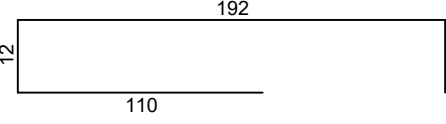
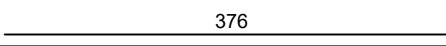
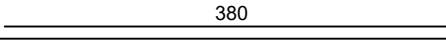
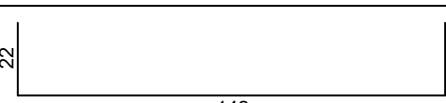
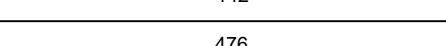
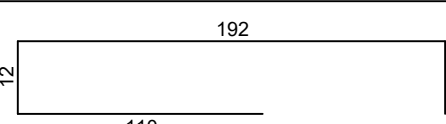
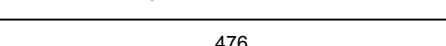
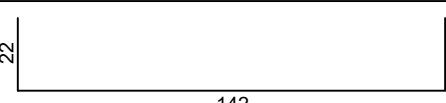
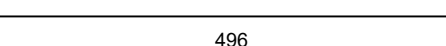
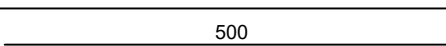
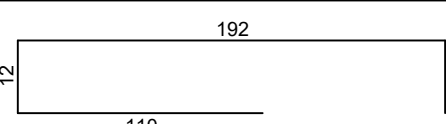
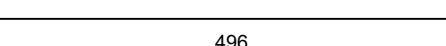
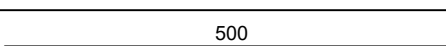
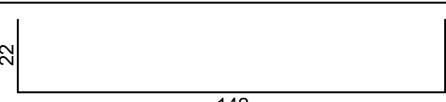
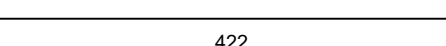
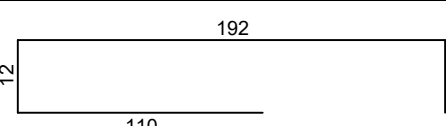
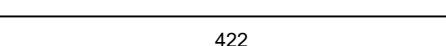
Spread footing for punching shear is SATISFACTORY

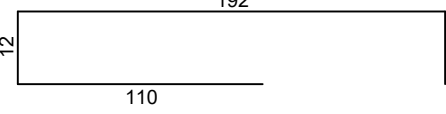
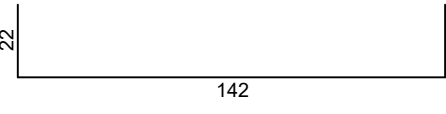
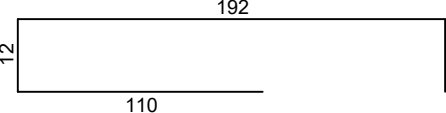
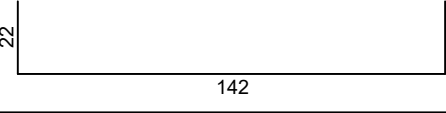
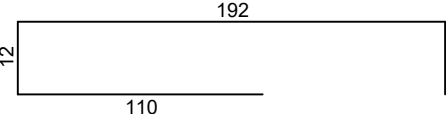
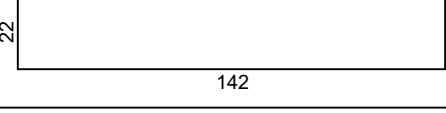
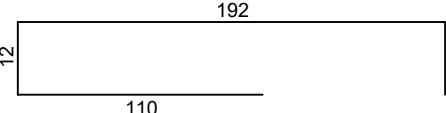


Name : Settlement

Stage - analysis : 1 - 1



Bars - specification						
mark	shape and measures [cm]	Ø	lg [m]	n [pcs.]	lg _n [m]	Remark
Crtež 02-01: Plan armature potpornog zida PZ1 (1 pcs.)						
1		8	1.86	156	290.16	
2		8	3.72	36	133.92	
3		10	3.26	78	254.28	
4		10	3.76	40	150.40	
5		10	3.80	20	76.00	
Crtež 02-01: Plan armature potpornog zida PZ2 (1 pcs.)						
1		8	1.86	132	245.52	
2		8	4.76	24	114.24	
3		10	3.26	66	215.16	
4		10	4.76	40	190.40	
Crtež 02-01: Plan armature potpornog zida PZ3 (1 pcs.)						
1		8	1.86	204	379.44	
2		8	4.96	24	119.04	
3		8	5.00	12	60.00	
4		10	3.26	102	332.52	
5		10	4.96	40	198.40	
6		10	5.00	20	100.00	
Crtež 02-01: Plan armature potpornog zida PZ4 (1 pcs.)						
1		8	1.86	58	107.88	
2		8	4.22	12	50.64	
3		10	3.26	29	94.54	
4		10	4.22	20	84.40	
Crtež 02-01: Plan armature potpornog zida PZ5 (1 pcs.)						
1		8	1.86	210	390.60	

Bars - specification						
mark	shape and measures [cm]	Ø	lg [m]	n [pcs.]	lg _n [m]	Remark
2	496	8	4.96	12	59.52	
3	500	8	5.00	12	60.00	
4	536	8	5.36	12	64.32	
5		10	3.26	105	342.30	
6	496	10	4.96	20	99.20	
7	500	10	5.00	20	100.00	
8	536	10	5.36	20	107.20	
Crtež 02-01: Plan armature potpornog zida PZ6 (1 pcs.)						
1		8	1.86	266	494.76	
2	476	8	4.76	24	114.24	
3	480	8	4.80	12	57.60	
4	496	8	4.96	12	59.52	
5		10	3.26	133	433.58	
6	476	10	4.76	20	95.20	
7	480	10	4.80	40	192.00	
8	496	10	4.96	20	99.20	
Crtež 02-01: Plan armature potpornog zida PZ7 (1 pcs.)						
1		8	1.86	108	200.88	
2	386	8	3.86	24	92.64	
3		10	3.26	54	176.04	
4	386	10	3.86	40	154.40	
Crtež 02-01: Plan armature potpornog zida PZ8 (1 pcs.)						
1		8	1.86	212	394.32	
2	496	8	4.96	12	59.52	
3	500	8	5.00	12	60.00	
4	546	8	5.46	12	65.52	
5		10	3.26	106	345.56	
6	496	10	4.96	20	99.20	

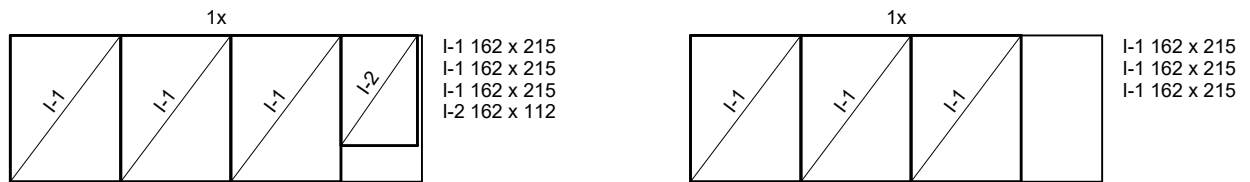
Bars - specification						
mark	shape and measures [cm]	Ø	lg [m]	n [pcs.]	lgn [m]	Remark
7	500	10	5.00	20	100.00	
8	546	10	5.46	20	109.20	

Bars - recapitulation			
Ø [mm]	lgn [m]	Unit weight [kg/m']	Weight [kg]
B500B			
8	3674.28	0.41	1488.08
10	4149.18	0.63	2626.43
Total (B500B)			4114.51
Total			4114.51

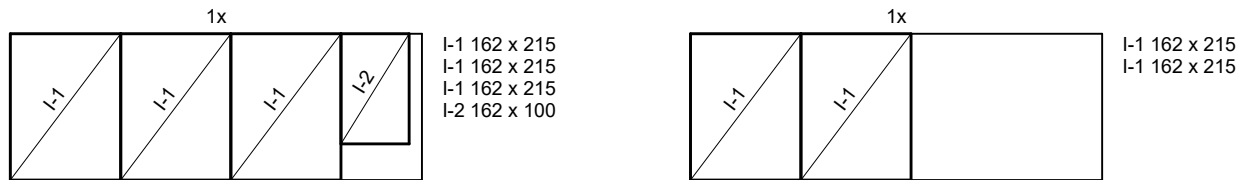
Meshes - specification							
Item	Mesh type	B [cm]	L [cm]	n	Unit weight [kg/m2]	Total weight [kg]	Remark
Crtež 02-01: Plan armature potpornog zida PZ1 (1 pcs.)							
I-1	Q-257	215	162	6	4.02	84.01	
I-2	Q-257	112	162	1	4.02	7.30	
Total						91.31	
Crtež 02-01: Plan armature potpornog zida PZ2 (1 pcs.)							
I-1	Q-257	215	162	5	4.02	70.01	
I-2	Q-257	100	162	1	4.02	6.53	
Total						76.54	
Crtež 02-01: Plan armature potpornog zida PZ3 (1 pcs.)							
I-1	Q-257	215	162	8	4.02	112.01	
I-3	Q-257	132	162	1	4.02	8.62	
Total						120.64	
Crtež 02-01: Plan armature potpornog zida PZ4 (1 pcs.)							
I-1	Q-257	215	162	2	4.02	28.00	
I-4	Q-257	84	162	1	4.02	5.47	
Total						33.47	
Crtež 02-01: Plan armature potpornog zida PZ5 (1 pcs.)							
I-1	Q-257	215	162	8	4.02	112.01	
I-5	Q-257	174	162	1	4.02	11.36	
Total						123.37	
Crtež 02-01: Plan armature potpornog zida PZ6 (1 pcs.)							
I-1	Q-257	215	162	11	4.02	154.02	
I-6	Q-257	64	162	1	4.02	4.18	
Total						158.20	
Crtež 02-01: Plan armature potpornog zida PZ7 (1 pcs.)							
I-1	Q-257	215	162	4	4.02	56.01	
I-7	Q-257	91	162	1	4.02	5.93	
Total						61.93	
Crtež 02-01: Plan armature potpornog zida PZ8 (1 pcs.)							
I-1	Q-257	215	162	8	4.02	112.01	
I-8	Q-257	185	162	1	4.02	12.06	
Total						124.07	

Meshes - recapitulation						
Mesh type	B [cm]	L [cm]	n	Unit weight [kg/m2]	Total weight [kg]	Net installed weight [kg]
Q-257	215	605	20	4.02	1045.80	789.53
Total					1045.80	789.53

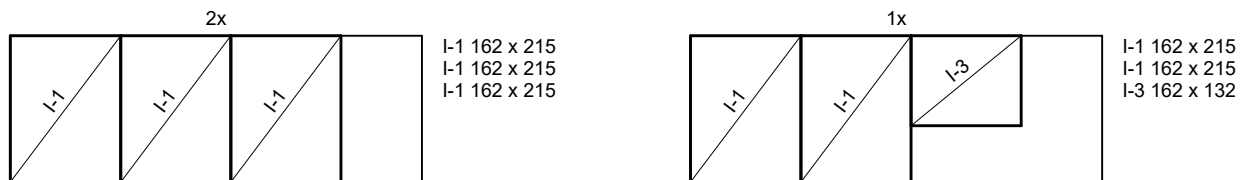
Meshes - cutting design
Crtež 02-01: Plan armature potpornog zida PZ1
Q-257 (605 cm x 215 cm)



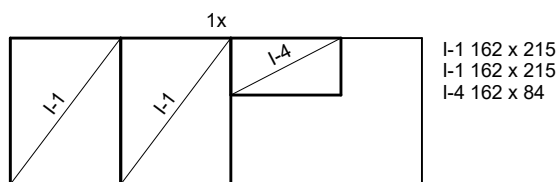
Crtež 02-01: Plan armature potpornog zida PZ2
Q-257 (605 cm x 215 cm)



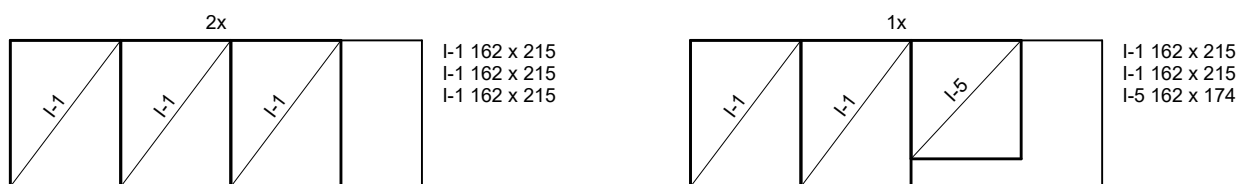
Crtež 02-01: Plan armature potpornog zida PZ3
Q-257 (605 cm x 215 cm)



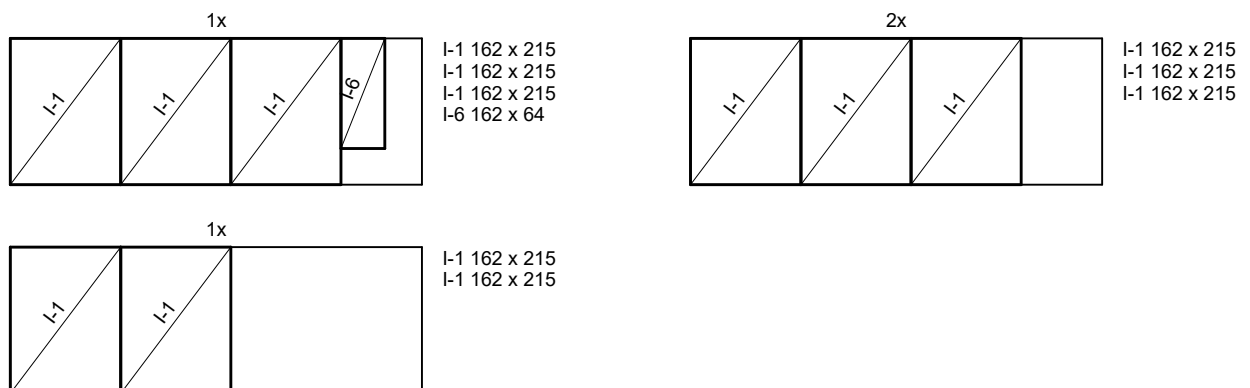
Crtež 02-01: Plan armature potpornog zida PZ4
Q-257 (605 cm x 215 cm)



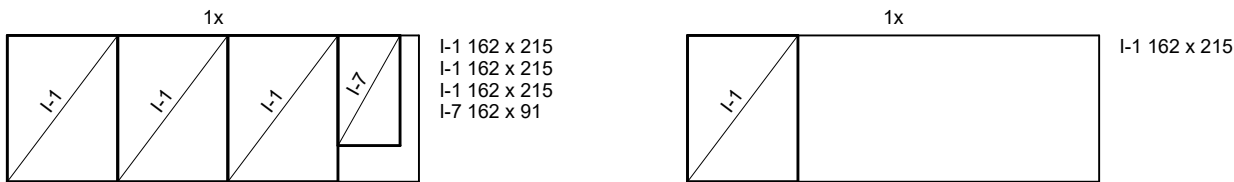
Crtež 02-01: Plan armature potpornog zida PZ5
Q-257 (605 cm x 215 cm)



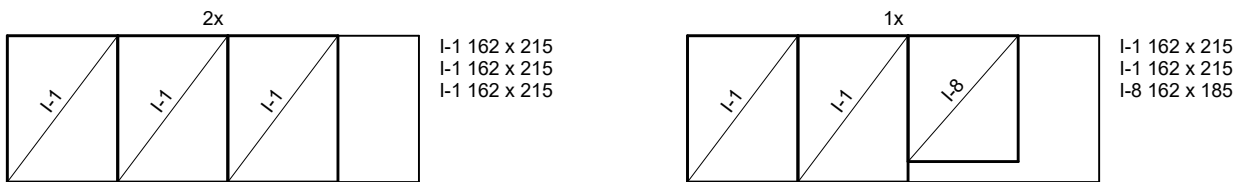
Crtež 02-01: Plan armature potpornog zida PZ6
Q-257 (605 cm x 215 cm)



Meshes - cutting design
Crtež 02-01: Plan armature potpornog zida PZ7
Q-257 (605 cm x 215 cm)



Crtež 02-01: Plan armature potpornog zida PZ8
Q-257 (605 cm x 215 cm)



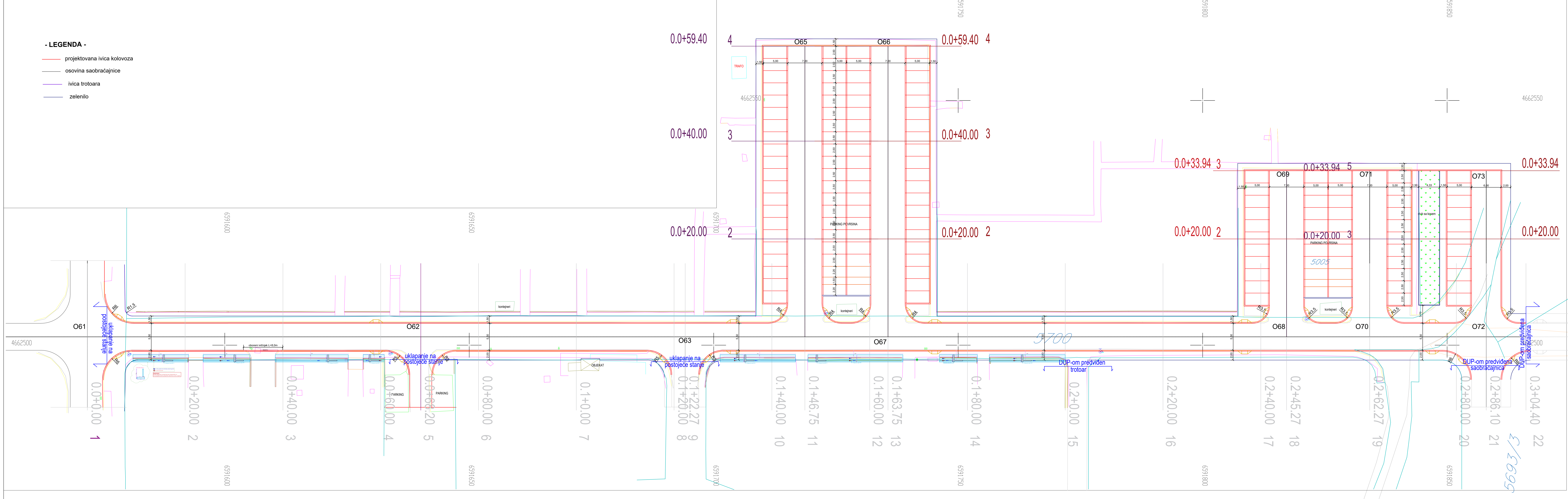
Predračun radova
- Borska ulica -



GRAFIČKA DOKUMENTACIJA

- LEGENDA -

- projektovana ivica kolovoza
— osovina saobraćajnice
— ivica trotoara
— zelenilo



TAČKE OPERATIVNOG POLIGONA			
oznaka	X	Y	Z
p1	6591821.19	4662505.25	14.85
p2	6591722.85	4662506.46	12.89
p3	6591633.78	4662498.25	11.00
p4	6591666.96	4662523.04	12.17
p5	6591580.35	4662498.05	9.77
p6	6591779.07	4662498.66	13.97

PROJEKTANT:

“URBI.PRO” d.o.o., Podgorica,
ul. Radosava Burica bb, telefon 067/006-012,
e-mail: office@urbipro.me
PDV: 30/31-14987-7, PIB: 03059847

INVESTITOR:

OPŠTINA BAR
Bulevar revolucije 1, 85000 Bar
www.bar.me

Objekat: Rekonstrukcija objekta infrastrukture-saobraćajnice i parkinga, sa pratećom infrastrukturom, u okviru zemljišta i dopuna dijela “Ispoljica-Bajali” - saobraćajnice označene u planu kao “Borska ulica” i parkinga označenih osovina O64-O67 i O68-O73, u zoni A.

Glavni inženjer:

Dušan Džudović d.i.a.

Odgovorni inženjer:

Jovana Perović, spec. scj. grad.

Sarađnici:

Datum izrade i M.P.:

Legenda: Katastarske parcele 5700/1, 5701/1, 5702, 5704, 5699, 5698/1, 5695/1, 5693/3, 5691/2, 5690, 5694, dijelova kat.parcela br. 5006, 5004/1, 5005, 5700/1, 5692/4, 5691/2, 1 5693/3 K.O Novi Bar

Vrsta tehničke dokumentacije:

GLAVNI PROJEKAT

Dio tehničke dokumentacije:

KONSTRUKCIJA

Prilog:

PLAN POZICIJA

Datum revizije i M.P.:

KAZNICA:

R=1:250

Broj stranice:

01

April, 2024.

4/695

DUP-om predviđen trotoar

DUP-om predviđena saobraćajnica

DUP-om predviđena saobraćajnica

DUP-om predviđena saobraćajnica

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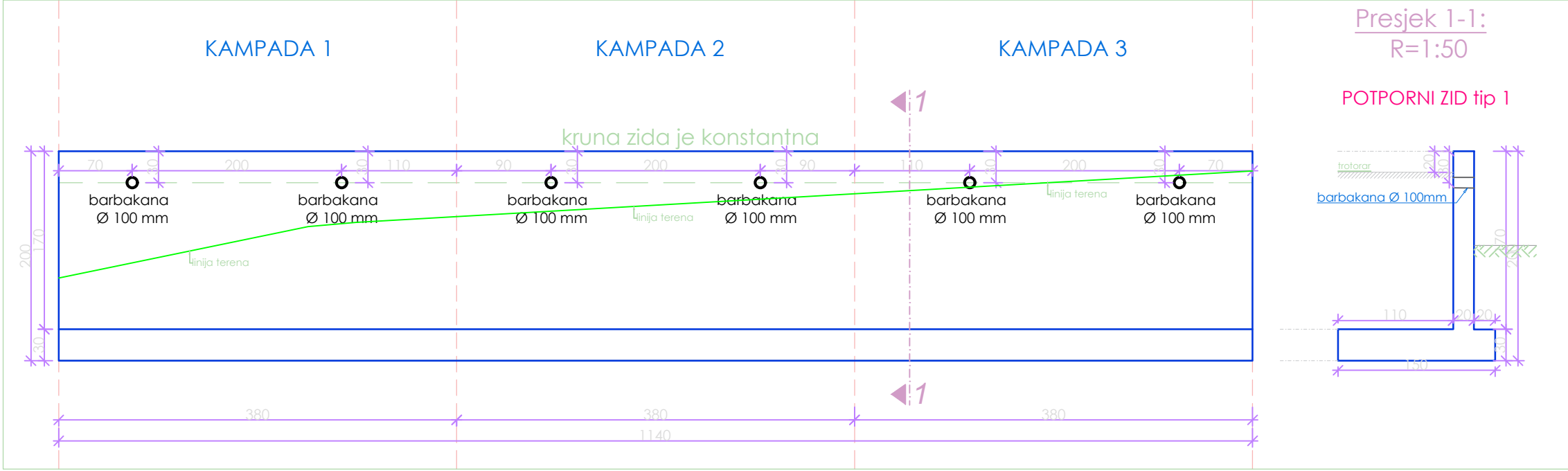
DUP-om predviđena saobraćajnica

DUP-om predviđena saobraćajnica

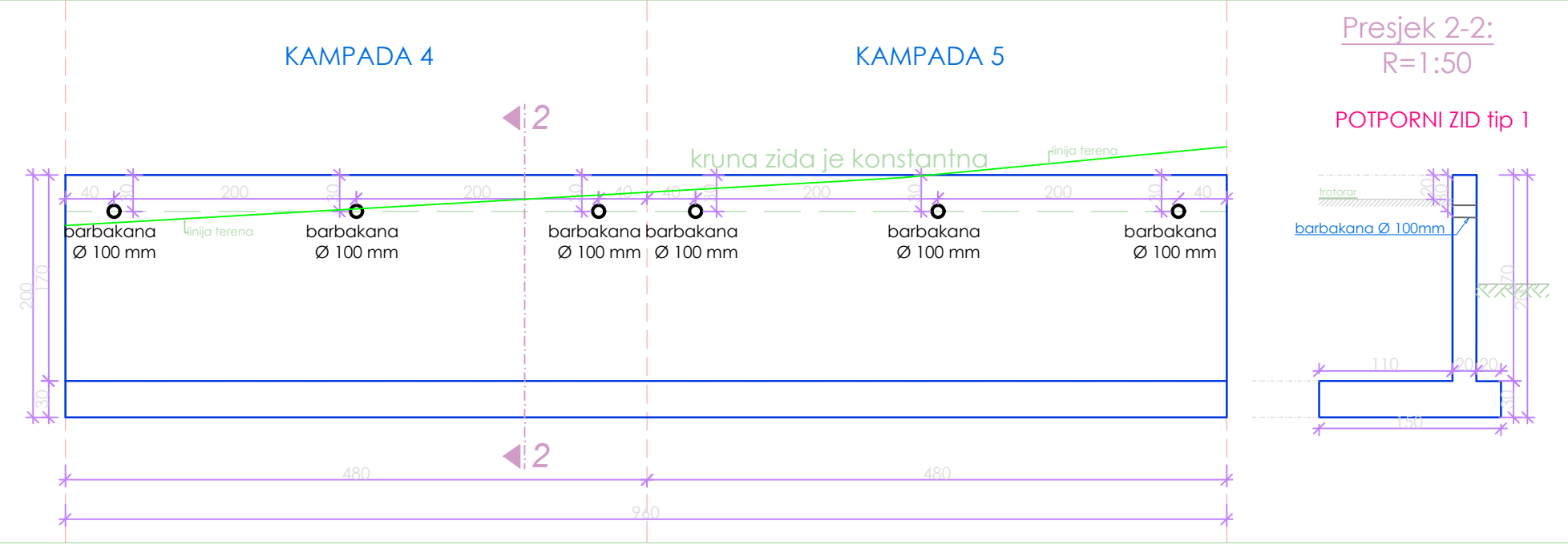
DUP-om predviđena saobraćajnica

Plan oplate potpornih zidova

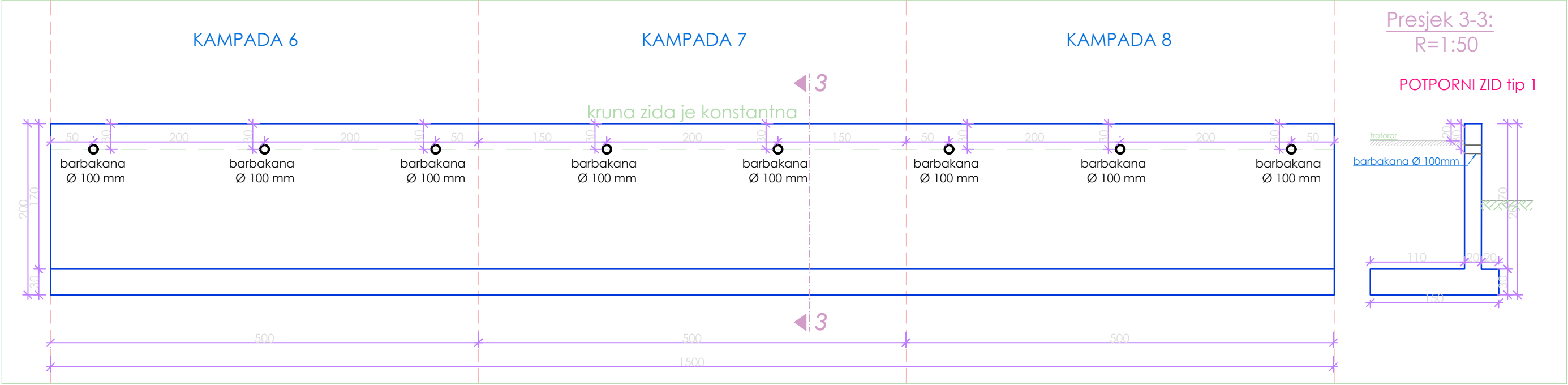
POTPORNI ZID 1



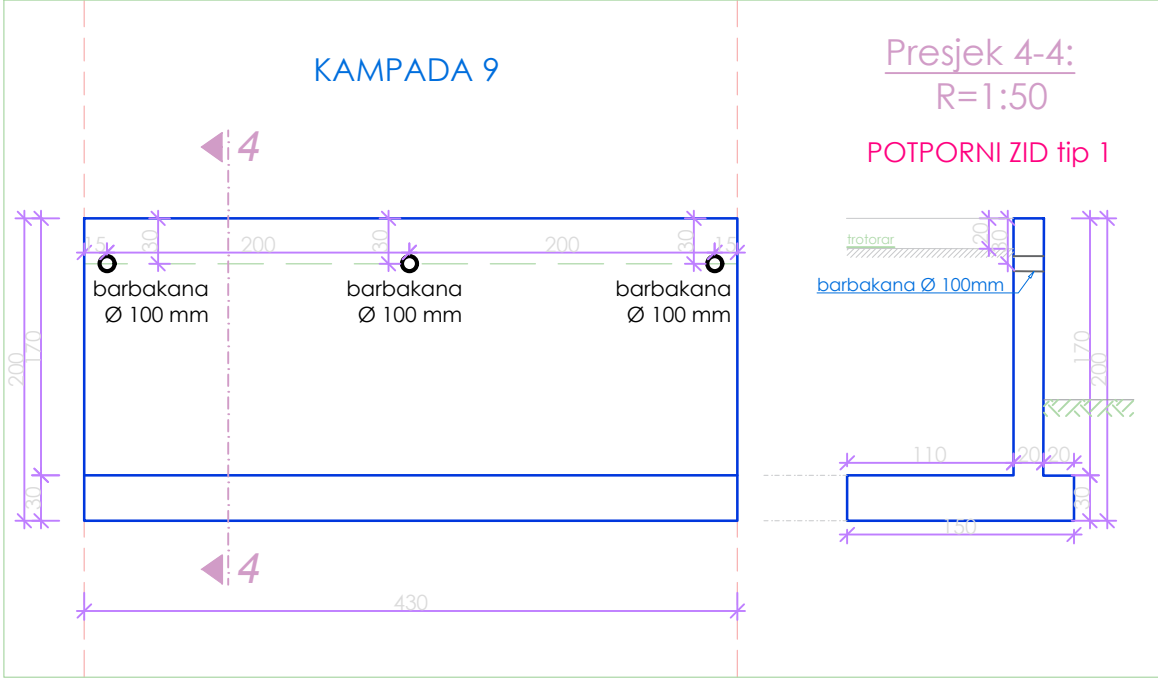
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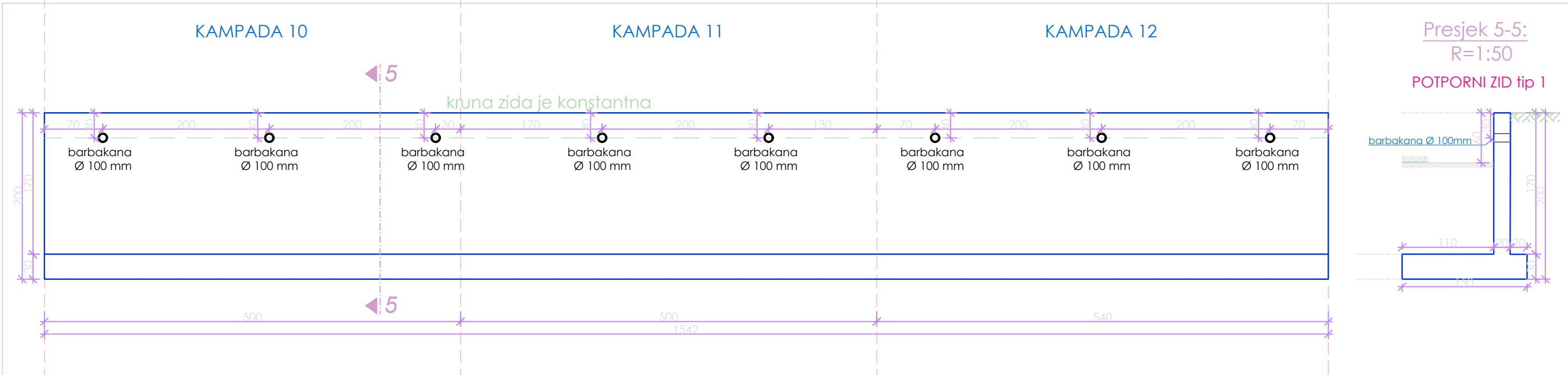
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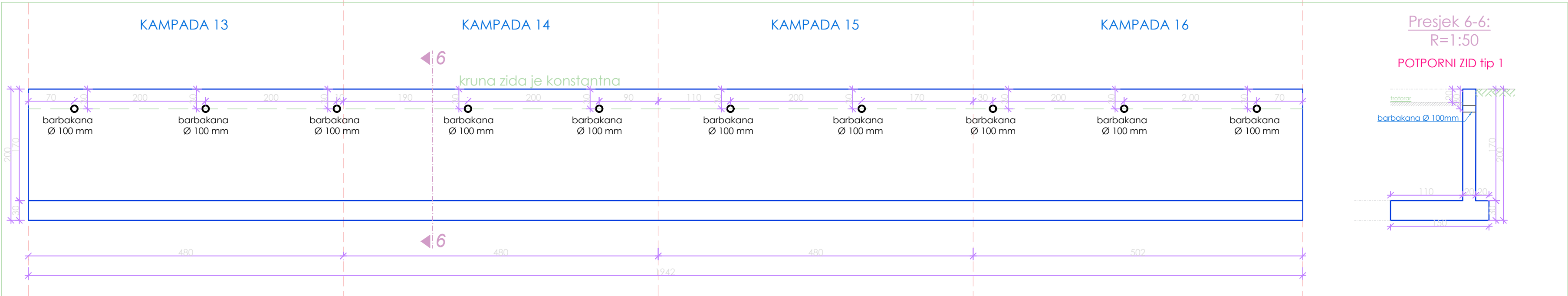
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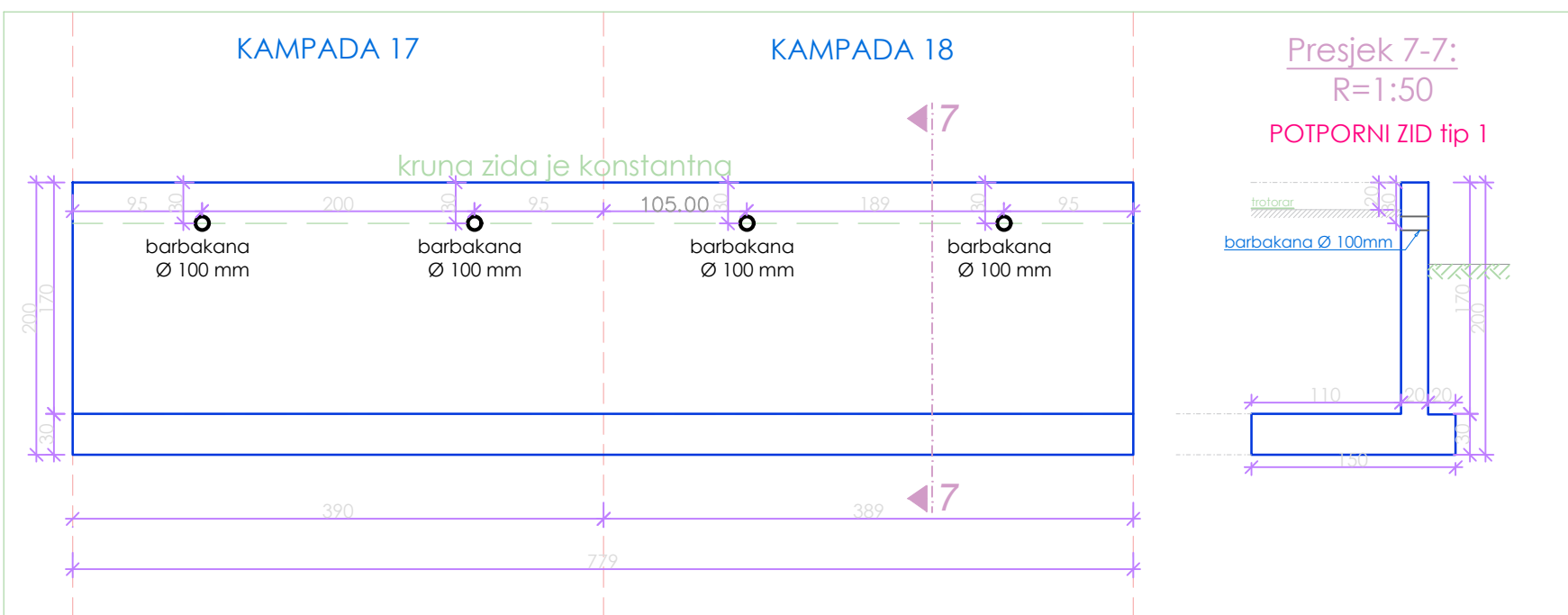
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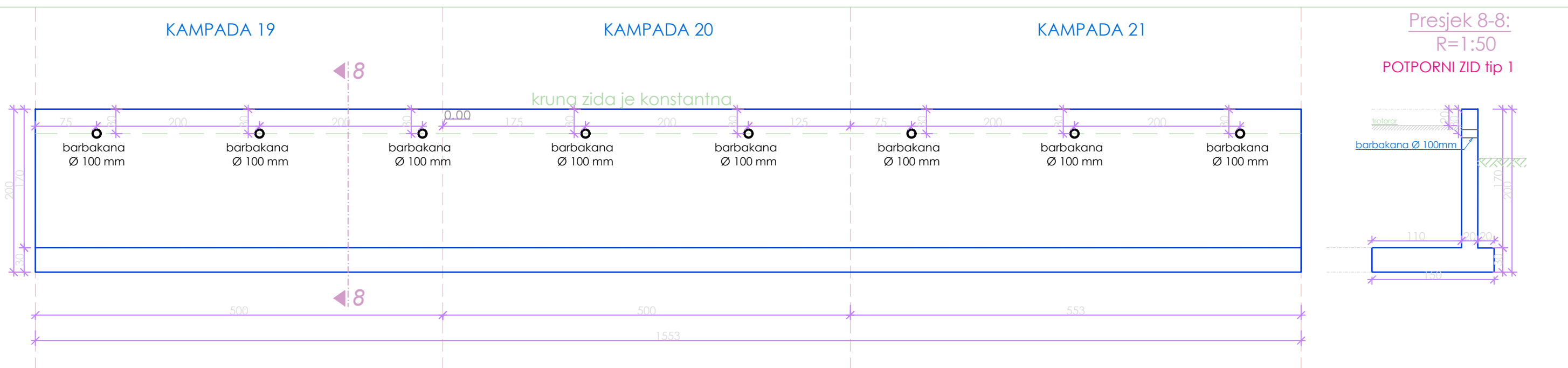
POTPORNI ZID 6



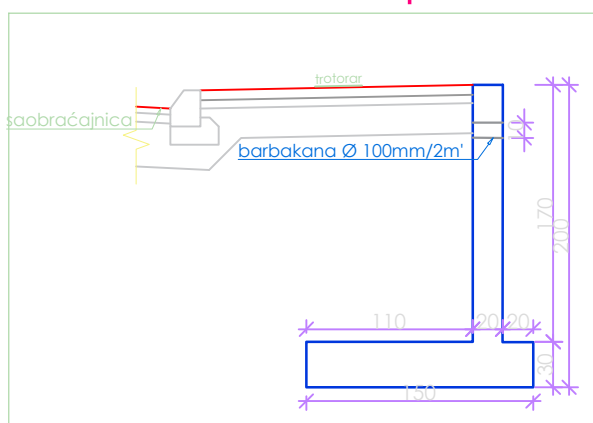
POTPORNI ZID 7



POTPORNI ZID 8



POTPORNI ZID tip 1



Napomena:
Izvršiti uklanjanje postojećeg zida (stepeništa) sa novoprojektovanim potpornim zidovima na licu mjesta.

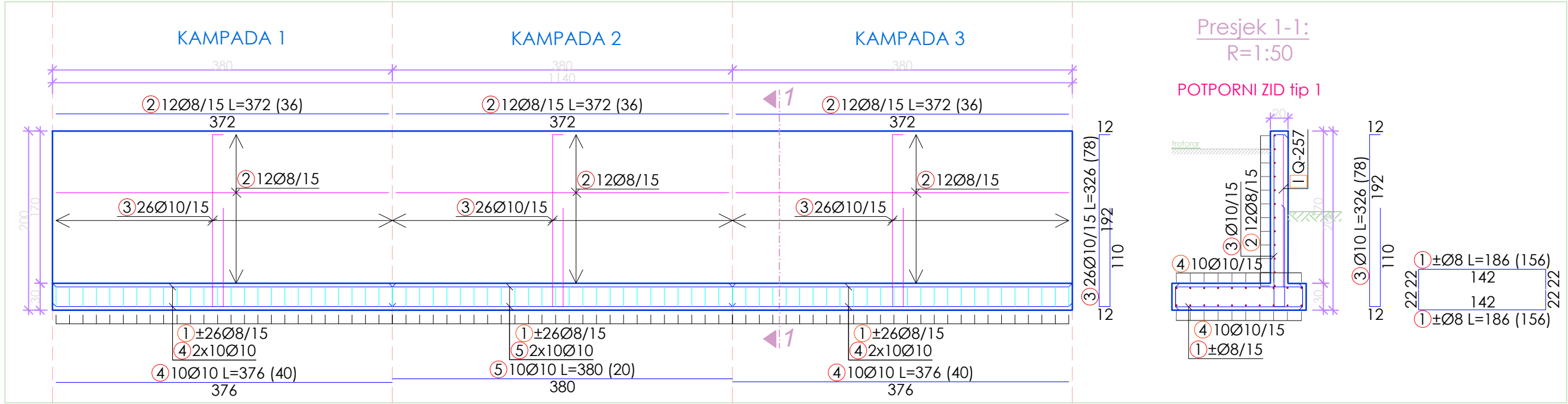
Napomena:
Barbakane postavljati 30cm iznad površine terena.

Napomena:
Kampade izvoditi naizmjениčno, parne pa neparne.

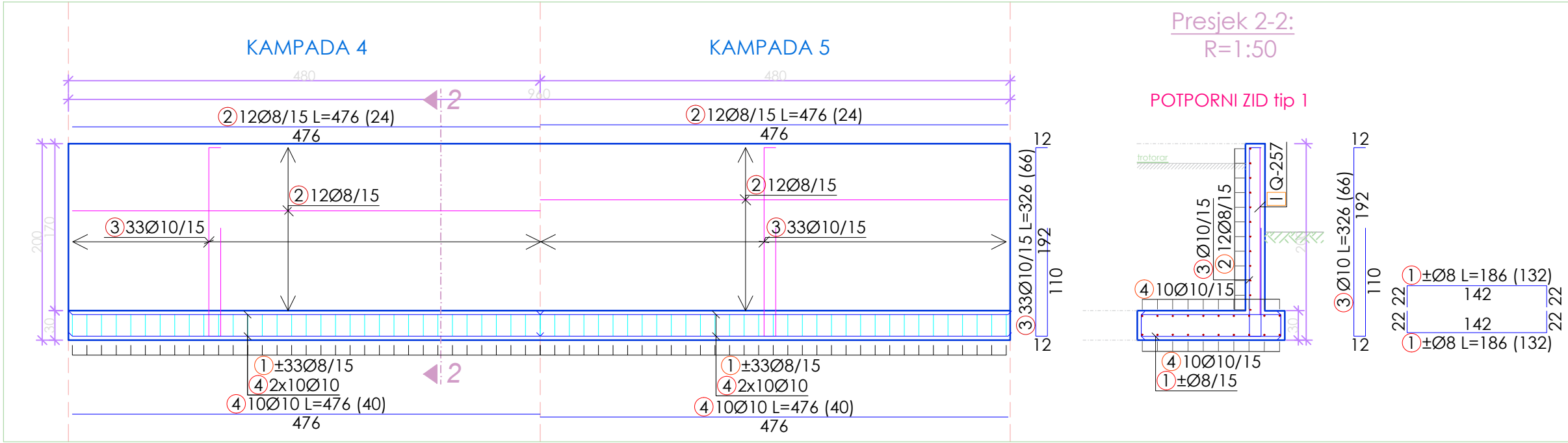
PROJEKTANT: URBI.PRO www.urbi.pro Objekat: Rekonstrukcija objekta infrastrukture saobraćajnice i parkinga, sa pratećom infrastrukturom, u zahvatu Izmjena i dopuna DOP-a "Trgovište Bjeleš", saobraćajnice označene u planu kao "Borska ulica" i parkinga označenih oznakama O64-O67 i O68-O73, u zoni A. Glavni inženjer: Dušan Džudović d.i.a. Odgovorni inženjer: Jovana Perović, spec.sci.građ. Saradnici: Datum izrade i M.P. April, 2024.godine	INVESTITOR: OPŠTINA BAR Bulevar revolucije 1, 85000 Bar www.bar.me Lokacija: Katastarske parcele 5700/1, 5701/1, 5702, 5704, 5699, 5698/1, 5695/1, 5693/3, 5691/2, 5690, 5694, dijelova kat.parcela br. 5006, 5004/1, 5005, 5700/1,5692/4, 5691/2, i 5690/3 K.O Novi Bar. Vrsta tehničke dokumentacije: GLAVNI PROJEKAT Dio tehničke dokumentacije: KONSTRUKCIJA Prilog: Plan oplate Potporni zid PZ /1-8/ Broj priloga: 01 Broj strane: 01 Datum revizije i M.P.

Plan oplate potpornih zidova

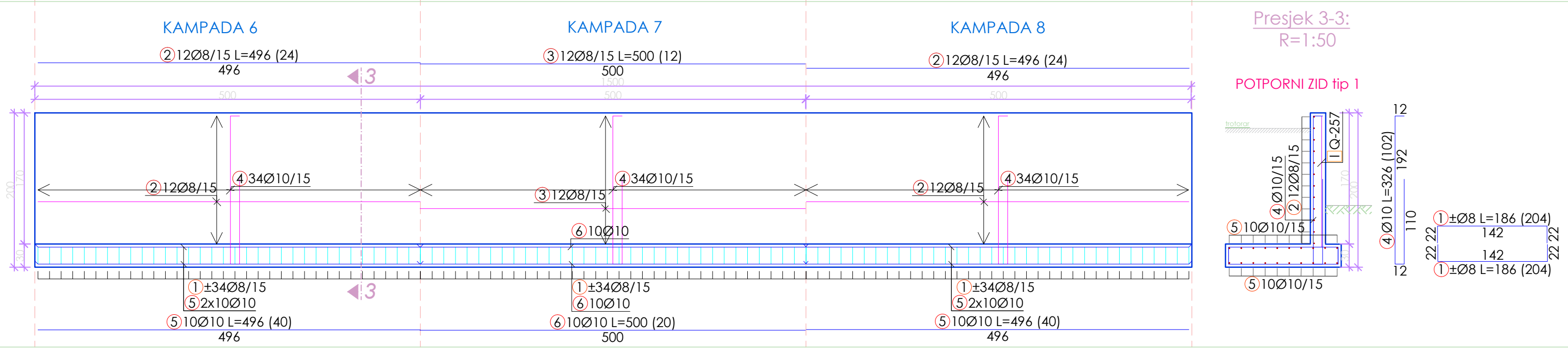
POTPORNI ZID 1



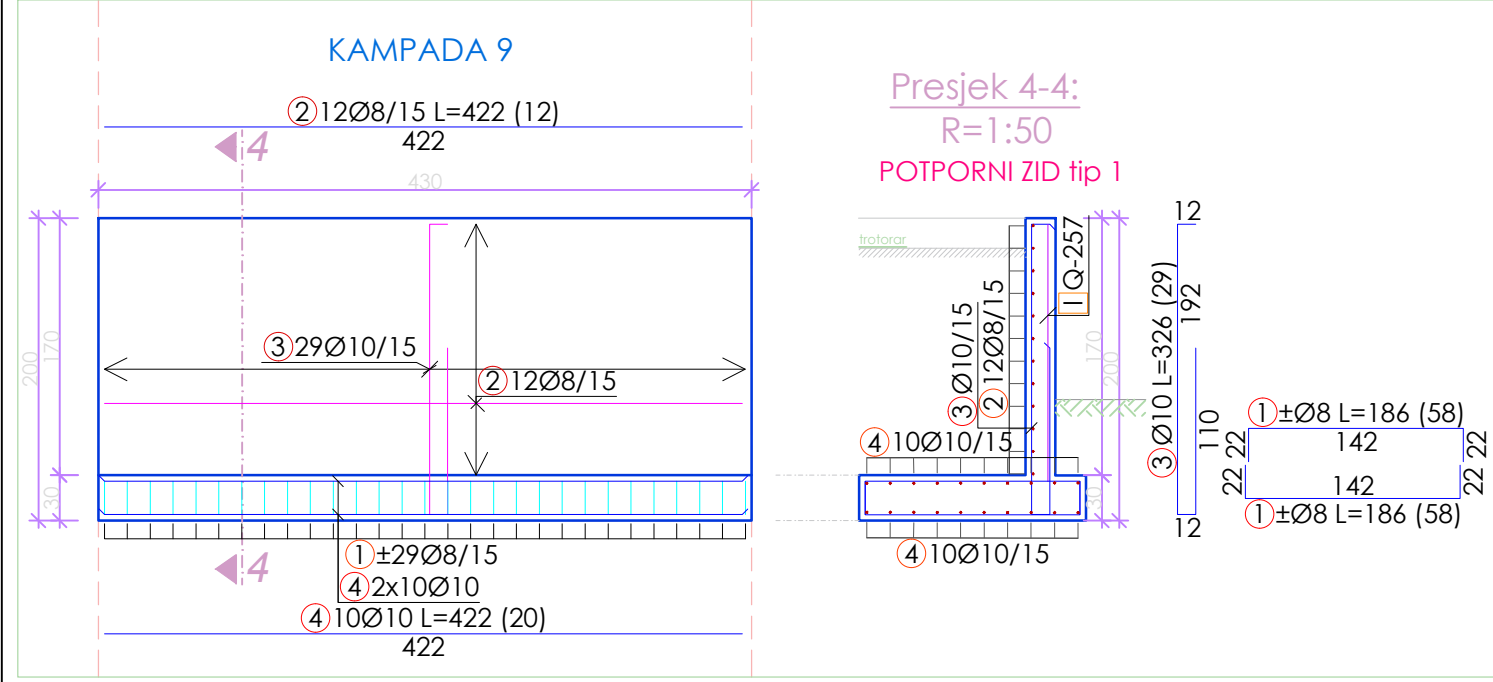
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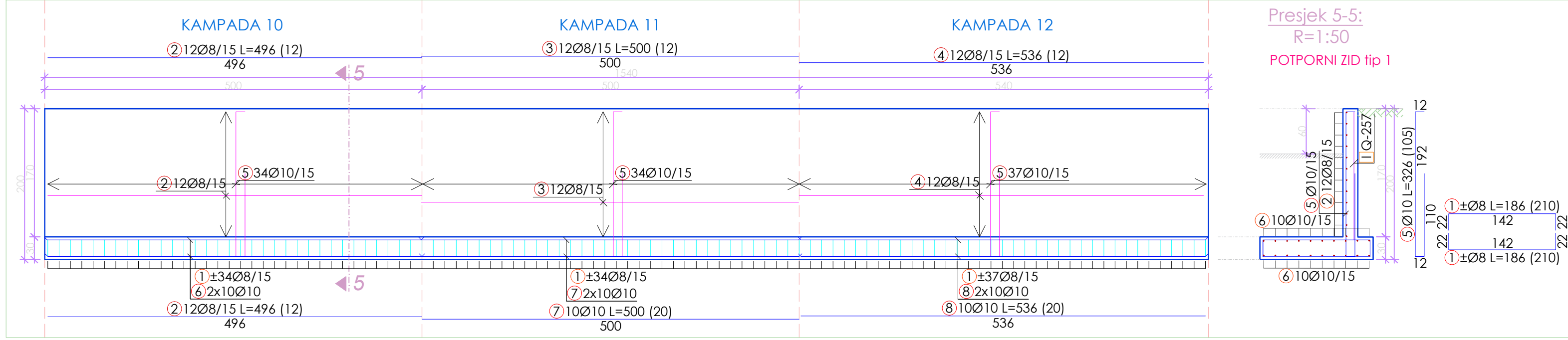
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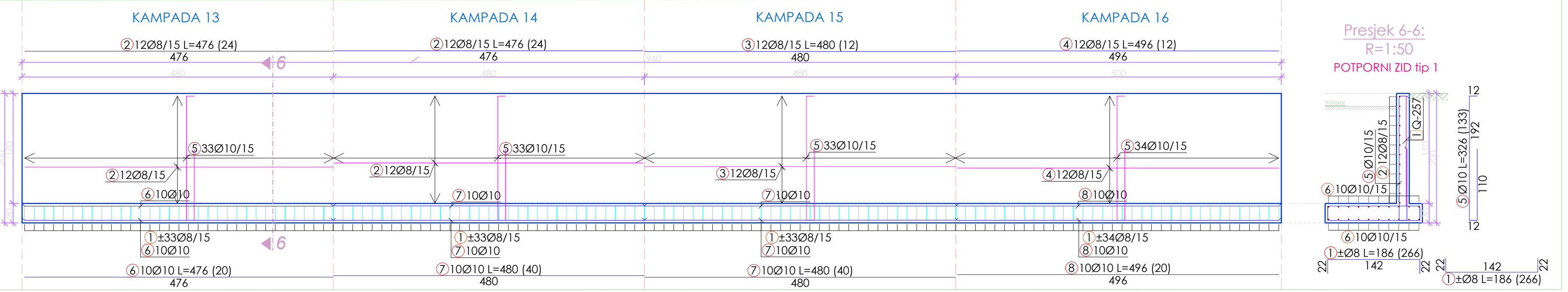
POTPORNI ZID 4



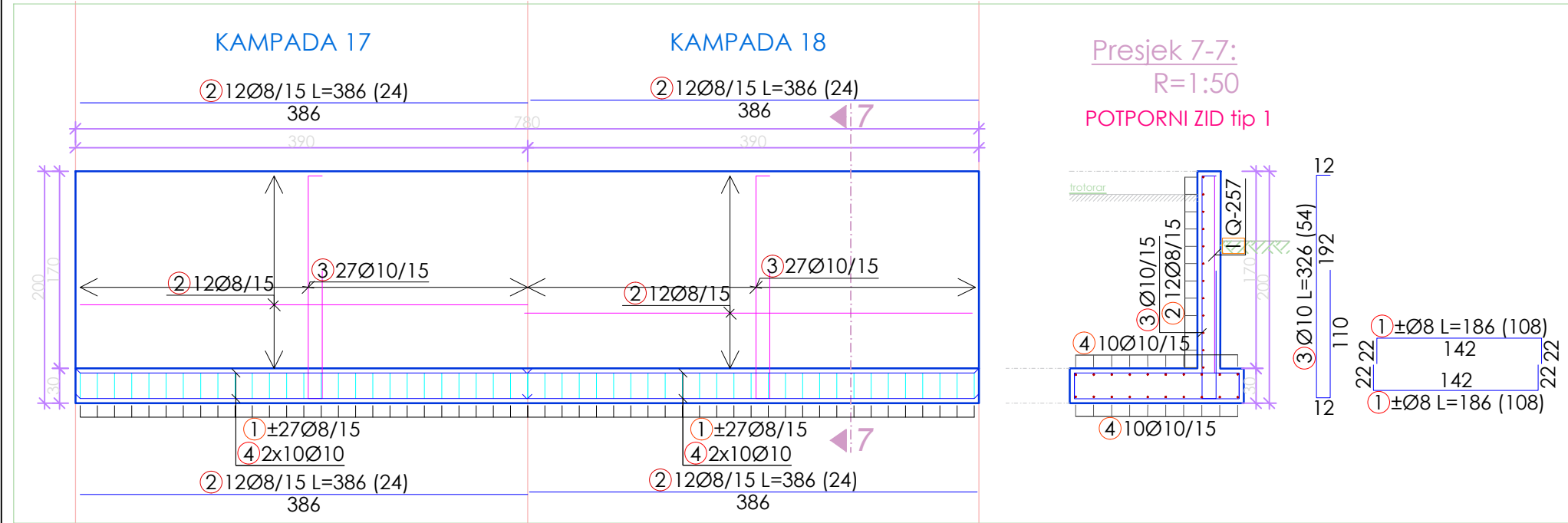
POTPORNI ZID 5



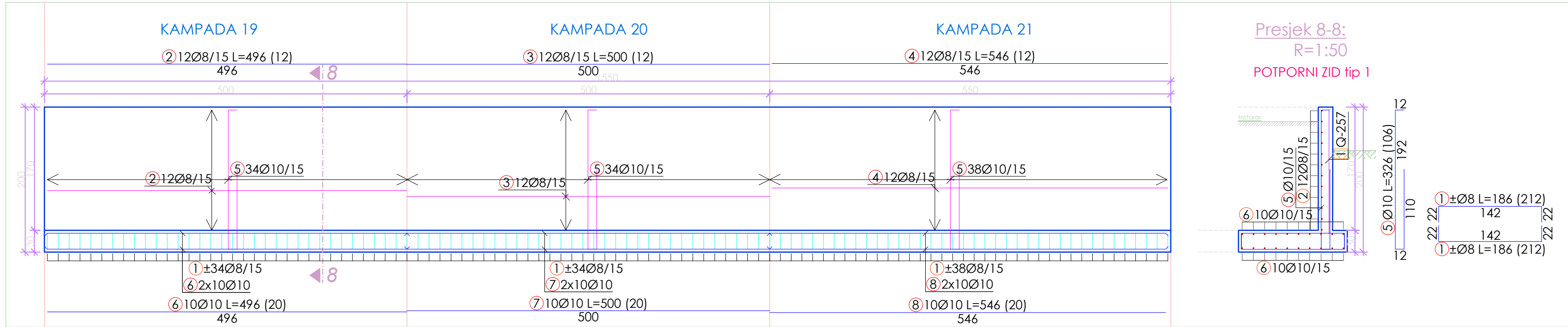
POTPORNI ZID 6



POTPORNI ZID 7



POTPORNI ZID 8



Napomena:
Izvršiti uklopavanje postojećeg zida (stepeništa) sa novoprojektovanim potpornim zidovima na licu mjesta.

Napomena:
Barbakane postavljati 30cm iznad površine terena.

Napomena:
Kampade izvoditi naizmjenično, parne pa neparne.

PROJEKTANT: "URBI.PRO" d.o.o., Podgorica, ul. Radosava Burica bb, telefon 067/006-012, e-mail office@urbipro.me PDV: 30/31-14987-7, PIB: 03059847		INVESTITOR:  OPŠTINA BAR Bulevar revolucije 1, 85000 Bar www.bar.me	
Objekat: Rekonstrukcija objekta infrastrukture saobraćajnice i parkinga, sa pratećom infrastrukturom, u zahvatu [Imena i dopuna DUPI "Trgovišta Brijuni", saobraćajnice omeđene u planu kao "Borska ulica" i parkinga označenih oznakama 064-067 i 068-073, u zoni A.		Lokacija: Katastarske parcele 5700/1, 5701/1, 5702, 5704, 5699, 5698/1, 5695/1, 5693/3, 5691/2, 5690, 5694, dijelova kat.parcela br. 5006, 5004/1, 5005, 5700/1, 5692/4, 5691/2, 5693/3, K.O Novi Bar	
Glavni inženjer: Dušan Džudović d.i.a.		Vrsta tehničke dokumentacije: GLAVNI PROJEKAT	
Odgovorni inženjer: Jovana Perović, spec.sci.građ.		Dio tehničke dokumentacije: KONSTRUKCIJA	RAZMJERA: 1:50
Saradnici:		Prilog: Plan armature Potporni zid PZ /1-8/	Broj priloga: 02 Broj strana: 01
Datum izrade i M.P.		Datum revizije i M.P.	
April, 2024.godine			

The diagram illustrates a retaining wall (POTPORNI ZID) with the following components and dimensions:

- Top Slope:** A 2.50% downward slope on the left side.
- Wall Top:** A 1.50% downward slope on the right side.
- Wall Structure:** The wall is labeled "POTPORNI ZID". It features a vertical face on the right and a sloped face on the left with a 5:1 ratio.
- Drainage System:**
 - Top Drainage:** "drenažni zasip od sitnozrnog šljunka - zasip 2" (fine-grained gravel fill - fill 2) is located behind the wall face.
 - Bottom Drainage:** "drenažni zasip od krupnozrnog šljunka - zasip 1" (coarse-grained gravel fill - fill 1) is located at the base of the wall.
 - Barbicanes:** "BARBAKANE-PVC barbakane Ø100mm / 2m" are installed horizontally through the drainage layers.
- Foundation:** The wall sits on a "podložni beton d=10cm" (base concrete d=10cm).
- Dimensions and Lines:**
 - širina zida:** Width of the wall.
 - H:** Height of the retaining wall.
 - širina stope:** Width of the base.
 - linija iskopa:** Excavation line.
 - stope:** The base of the wall.
- Other Labels:** "materijal iz iskopa - zasip 3" (material from excavation - fill 3) points to the area above the wall, and "visina potpornog zida" (height of retaining wall) indicates the total height.

Napomena: Dimenzije potpornog zida prilagoditi dimenzijama potpornih zidova iz projekta. Crtež je prikazan kao primjer sistema drenaže potpornih zidova.