

OBRAZAC 1

elektronski potpis projektanta	elektronski potpis revidenta
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INVESTITOR¹**OPŠTINA BAR**OBJEKAT²**SAOBRAĆAJNICA 1 – II FAZA I PRIKLJUČNE
SAOBRAĆAJNICE U ZAHVATU DUP-a „ČANJ II“ I DSL-
A „ČANJ SEKTOR 51“**LOKACIJA³**ČANJ - ZAHVAT DUP-a „ČANJ II“ I DSL-a „ČANJ II
SEKTOR 51“**VRSTA TEHNIČKE
DOKUMENTACIJE⁴**GLAVNI PROJEKAT**PROJEKTANT⁵**„ČELEBIĆ" DOO PODGORICA**ODGOVORNO LICE⁶**Andrija Radusinović, dipl.ecc.**GLAVNI INŽENJER⁷**Zorica Perišić, dipl.inž.građ.**

¹ Naziv/ime investitora

² Naziv projektovanog objekta

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

⁴ Idejno rješenje, idejni projekat, glavni projekat odnosno projekat izvedenog objekta projekat (ako je u pitanju naslovna strana cjelokupne tehničke dokumentacije)

⁵ Naziv privrednog društva, pravnog lica odnosno preduzetnika koji je izradio tehničku dokumentaciju

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

⁷ Ime i prezime glavnog inženjera.

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INVESTITOR⁸

OPŠTINA BAR

OBJEKAT⁹

**SAOBRAĆAJNICA 1 – II FAZA I PRIKLJUČNE
SAOBRAĆAJNICE U ZAHVATU DUP-a „ČANJ II“ I DSL-
A „ČANJ SEKTOR 51“**

LOKACIJA¹⁰

**ČANJ - ZAHVAT DUP-a „ČANJ“ I DSL-a „ČANJ II
SEKTOR 51“**

DIO TEHNIČKE
DOKUMENTACIJE¹¹

KNJIGA 4 - GLAVNI PROJEKAT KONSTRUKCIJE

PROJEKTANT¹²

„ČELEBIĆ“ DOO PODGORICA

ODGOVORNO LICE¹³

Andrija Radusinović, dipl.ecc.

ODGOVORNI
INŽENJER¹⁴

MSc Nikola Popović, spec.sci.građ.

SARADNICI
PROJEKTU¹⁵

Nikola Mijatović, spec.sci.građ.

⁸ 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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1. TEKSTUALNA DOKUMENTACIJA

1.1 TEHNIČKI IZVJEŠTAJ – DIO KONSTRUKCIJA

1.1.1 UVOD

Glavni projekat potpornih zidova uz lokalnu saobraćajnicu 1 – II FAZA i priključne saobraćajnice u zahvatu DUP-a „ČANJ II“ i DSL „ČANJ“, izrađen je na osnovu:

- Elaborata detaljnih geotehničkih istraživanja terena za definisanje geotehničkih uslova za potrebe projektovanja konstrukcije zidova uz saobraćajnicu 1, FAZA II, u Čanju, katastarska opština Mišići, opština Bar;
- Saobraćajnih podloga formiranih za potrebe izrade glavnog projekta potpornih zidova objekata u sklopu saobraćajnice.

1.1.2 OSVRT NA PODLOGE ZA PROJEKTOVANJE

a) Saobraćajne podloge

Geodetske podloge sadrže poprečne profile na svakih 5m. Prije izvođenja radova treba obilježiti teren, prenijeti položaj potpornih zidovana teren i po potrebi izvršiti manje ispravke u cilju boljeg uklapanja u postojeće stanje.

b) Geotehničke-geološke podloge

Geološke podloge su dale dovoljno informacija za definisanje karakteristika tla u kome se vrši iskop i podgrađivanje. Na mjestima potpornih zidova u toku izvođenja iskopa treba vršiti geološko kartiranje i geološki nadzor nad izvođenjem radova. Izvod iz geološkog elaborata dat je u prilogu 1.3.

Na osnovu terenskih istražnih radova, laboratorijskih ispitivanja i dostupnih literaturnih podataka za ovaj teren izdvojene su sledeće geotehničke sredine:

Litološka jedinica 1 – DELUVIJUM

Ovi sedimenti se najčešće javljaju na djelovima terena gdje su padine srednjeg do velikog nagiba i najčešće su promjenljive debljine. Nastali su kao produkt fizičko-mehaničkog raspadanja osnovne stijene i njenim deponovanjem na blažim padinama. Deluvijalni materijali na predmetnoj lokaciji su slabo do srednje vezani, pjeskovito-prašnasti, djelimično zaglinjeni, sa uklopcima rožnaca (predstavljaju koru raspadanja rožnaca). Fragmenti su uglasti, boja je tamno siva do braon. U takvoj masi nerijetko se pojavljuju veći blokovi rožnaca, koji štrče iznad terena. Heterogenog su granulometrijskog sastava. Sredina je konstatovana istražnom bušotinom B1 na dubini 0,00-2,80m. Prema građevinskoj kategorizaciji GN-200 sredina 1 pripada III kategoriji iskopa.

Vrijednosti fizičko-mehaničkih parametara sredine 1, određene na osnovu laboratorijskih ispitivanja uzoraka tla i podataka iz fondovske dokumentacije i literature, date su u Tabeli ispod.

Fizičkomehaničke karakteristike	Raspon vrijednosti	Usvojene vrijednosti
Zapreminska težina γ [kN/m ³]	19 – 21	20
Kohezija c [kN/m ²]	5 – 9	7
Ugao unutrašnjeg trenja ϕ [°]	30 – 35	33
Modul stišljivosti M_s [kN/m ²]	5000 – 6000	5500

Litološka jedinica 1' – PROLUVIJUM

Ovi sedimenti se najčešće javljaju na ravnijim dijelovima terena. Predstavljani su glinovito-prašinastim materijalom, sa manjim udjelom pjeskovite komponente. Tamno do svijetlo braon su boje. Proluvijalni materijali na predmetnoj lokaciji su srednje do dobro vezani i srednje do dobro konsolidovani. Konstatovani su na dubini: 0,00-2,30m (u zoni bušotine B2), 0,00-3,00m (u zoni bušotine B3), 0,00-0,50m (u zoni bušotine B4) i 0,00-0,40m (u zoni bušotine B5). Prema građevinskoj kategorizaciji GN- 200 sredina 1' pripada II-III kategoriji iskopa.

Vrijednosti fizičko-mehaničkih parametara sredine 1', određene na osnovu laboratorijskih ispitivanja uzoraka tla i podataka iz fondovske dokumentacije i literature, date su u Tabeli ispod.

Fizičkomehaničke karakteristike	Raspon vrijednosti	Usvojene vrijednosti
Zapreminska težina γ [kN/m ³]	18 - 20	19
Kohezija c [kN/m ²]	22 - 27	25
Ugao unutrašnjeg trenja ϕ [°]	30 – 35	21
Modul stišljivosti M_s [kN/m ²]	6000 – 7000	6500

Litološka jedinica 2 – ŠLJUNAK I PIJESAK

Litološku jedinicu 2 predstavlja šljunak i pijesak, djelimično muljevit, tamnosive boje, sa različitim sadržaj komponenti. Pripada inženjerskogeološkoj grupi poluvezanih stijena, intergranularne poroznosti, sa koeficijentom filtracije po USBR-u $1 \times 10^{-4} \geq K_f \geq 1 \times 10^{-1}$ cm/s. Granulat je solidno sortirani, što mu daje dobru zbijenost, osim u bušotini B2 gdje su parametri znatno slabiji zbog velikog priliva vode. Prema građevinskoj GN- 200 sredina 2 pripada II-III kategoriji iskopa. Sredina je konstatovana: 2,80-4,00m (B1), 2,30-3,00m (B2), 0,50-3,00m (B4) i 0,40-3,00m (B5).

Vrijednosti fizičko-mehaničkih parametara sredine 2, određene na osnovu laboratorijskih ispitivanja uzoraka tla i podataka iz fondovske dokumentacije i literature, date su u Tabeli ispod.

Fizičkomehaničke karakteristike	Raspon vrijednosti	Usvojene vrijednosti
Zapreminska težina γ [kN/m ³]	16 – 18	17
Kohezija c [kN/m ²]	22 - 27	25
Ugao unutrašnjeg trenja ϕ [°]	0	0
Modul stišljivosti M_s [kN/m ²]	6500 – 8000	7300

c) Seizmogeološke odlike terena

Prema karti seizmičke mikrorejoneizacije ovog područja, ovaj dio terena pripada zoni IX MCS skale, sa maksimalnim horizontalni ubrzanje od 0.36g za zemljotresa sa povratnim periodom od 475 godina.

1.1.3 POTPORNİ ZIDOVI

Zidovi uz lokalne saobraćajnice su projektovani kao AB zidovi "L" poprečnog presjeka i fundirani su na nasipu od 40cm, ispod temeljnih traka. Zidovi su vertikalni sa spoljašnje strane i pod nagibom sa unutrašnje strane (prema otvorenom. U okviru zidova definisane su kampade za izvođenje i geometrija pojedinih tipova, koje zavise od visine zida u pojedinim kampadama.

Potporni zidove su fundirani na litološkoj sredini 1', za čije parametre iz geomehantičkog elaborata su uzete vrijednosti prilikom provjere nosivosti tla. Ispod temeljnih stopa je potrebno zamijeniti tlo u

sloju od 40cm, od drobljenog agregata 0-60mm. Nasip je potrebno formirati nasipanjem u dva sloja od po 20cm, i zbijanjem do modula stišljivosti 60 MPa. Sloj tla ispod nasipa za zamjenu tla je potrebno da isplanira i zbije do modula stišljivosti od 20 MPa. Projektovana visina zidova (od gornje ivice temelja do krune) se kreće od 2.0m do 3.35m. Na tipu 4 potpornog zida potrebno je predvijeti bubreću hidroizolacionu traku na spojevima kampada.

Karakteristike materijala: Za zidove projektovana je klasa betona C25/30. Maksimalna veličina zrna agregata je 32mm. Zidovi su armirani rebrastom armaturom B500B. Zaštitini sloj do armature je $a=5.0\text{cm}$.

Barbarkane se postavljaju na rastojanju cca 2.0m, kružnog su oblika $\varnothing 110\text{mm}$. Za svaki zid posebno je definisan položaj barbarkana na planu oplata.

Izvođenje: Temelji i tijelo potporne konstrukcije – zida izvode se u obostranoj oplati, u kampadama dužine cca 5.00m. Nakon iskopa u temeljnoj jami potpornog zida) treba izvesti podložni sloj betona (ne manje od MB20) debljine 5-10cm, koji je podloga za formiranje armaturnih koševa.

Potporne zidove treba izvesti sa jednim prekidom u betoniranju po vertikali u okviru jedne kampade na kontaktu temelja i zida, a naviše izvesti što manje prekida betoniranja (minimalno na rastojanju 3m). Oplata treba da bude glatka (blažujka ili sl.) i bez uočljivih spojeva i teksture.

Na krajevima zidova se po potrebi formiraju kegle koje treba izvesti nasipanjem uz formiranje prirodnog nagiba stabilnosti, ali ne većeg nagiba od 1:2.

Nasip uz potporni zid se izvode od dobro građiranog šljunkovitog materijala (maksimalna veličina zrna 60mm odnosno 100mm) u slojevima maksimalne debljine 40cm uz nabijanje do predviđenog modula stišljivosti $M_s=60\text{MPa}$.

Proračun potpornih konstrukcija je izvršen prema konceptu aktivnog zemljanog pritiska i dozvoljenog opterećenja na temeljno tlo, uz provjeru faktora sigurnosti na prevrtanje i klizanje. Zidovi su kontrolisani za dvije kombinacije opterećenja:

1. sopstvena težina + pritisci tla + korisno opterećenje, i
2. sopstvena težina + pritisci tla + korisno opterećenje + seizmičko opterećenje.

Detalji proračuna su dati u dijelu 2.1 *Statički proračun*.

Predmjerom i predračunom radova su obuhvaćeni: iskopi za zidove, nasipi, beton i armatura. Ostale količine iskopa i nasipa su obuhvaćene kroz predmjer saobraćajnice i objekata.

1.1.4 TEHNOLOGIJA IZVOĐENJA RADOVA

Izvođenje visokih iskopa za temeljne jame potpornih zidova zahtjeva oprez pri izvođenju svih radova, a posebno u redosledu izvođenja pojedinih kampada iskopa i podgradne konstrukcije. Radovi mogu biti paralelizovani, ali tako da se ne ugrozi stabilnost iskopa. Po potrebi na odgovarajući način podgraditi temeljnu jamu potpornih zidova (razupore, kosnici, talpe i sl).

Vremenski i prostorni raspored izvođenja radova potpornih zidova

Rad na izvođenju AB zida je kampadan. U grafičkim prilogima svaka kampada je definisana svojim dimenzijama i označena brojem. Generalno svi zidovi (kampade) su autostabilni pa se mogu izvoditi odvojeno ili na čitavom potezu zavisno od organizacije radova na gradilištu.

Vrijeme izvođenja radova

Najpogodnije je radove na iskopu i podgrađivanju izvoditi u vrijeme sušnog perioda, tj. u vrijeme malih atmosferskih padavina. U vrijeme eventualnih padavina prekinuti radove da ne bi došlo do raskvašavanja temeljnog tla (osim u krečnjaku) u toku kretanja mašina.

Drenaža i odvođenje podzemnih i atmosferskih voda

U toku izvođenja radova treba očekivati manji priliv podzmene vode i eventualno vodu usljed atmosferskih padavina. U cilju odvođenja vode iz temeljne jame u svakoj fazi iskopa izvesti kanal za odvođenje vode do sabirne jame i odvođenje do prirodnog recepijenta. Ako se ne može obezbijediti prirodno oticanje treba koristiti pumpe.

1.1.5 OSMATRANJE TLA I OBJEKATA

Rad u geološkoj sredini uvijek sa sobom »donosi« izvjestan stepen neproučnosti i varijabilnosti prirodne stijenske sredine i/ili tla, podzemne vode i sl. U cilju predupređivanja nepredviđenih situacija neophodno je vršiti osmatranje potpornih zidova u toku građenja. Osmatranje se sastoji od: vizuelnog osmatranja i mjerenja pomjeranja potpornih konstrukcija

Vizuelno osmatranje i fotografisanje

Vizuelno osmatranje se vrši svakodnevno. Ovim osmatranjem treba da se uoče sve pojave podzemne vode, obrušavanja, pukotina i prslina kako na kosinama temeljne jame, tako i na podgradnoj konstrukciji i eventualno susjednim objektima. O pregledu se vrši zapisnik. Sve pojave treba fotografisati i sačiniti fotodokumentaciju sa tačnim opisom fotografisanog dijela i prikazanim položajem fotografskog aparata. Prije početka radova treba napraviti detaljnu fotografsku dokumentaciju lokacije, a posebno dijelova uz temeljnu jamu.

Mjerenje pomjeranja podgradne konstrukcije

Geodetska mjerenje pomjeranja podgradne konstrukcije se vrše u kruni i na nižoj tački zida. Mjere se horizontalna pomjeranja na taj način što se postave reperi za mjerenja. Granična deformacija konstrukcije koja je dopuštena zavisi od visine potporne konstrukcije. Kada je u pitanju translatorno pomjeranje potporne konstrukcije ona iznosi $\max X = 0.01 \times H$.

Program mjerenja

Početno mjerenje (nulto mjerenje) se obavlja nakon završetka radova na betoniranju, a prvo sljedeće 7 dana pa na 15 dana. Ukoliko su maksimalna pomjeranja manja od 50% od dozvoljenih za vrijeme izvođenja radova mjerenja se organizuju nadalje jedan put mjesečno. U slučaju da su mjerena pomjeranja dostigla 50% od maksimalnih pomjeranja potrebno je o tome obavijestiti nadležna lica na gradilištu, Investitora i organizovati mjerenje pomjeranja na svakih 15 dana

Mjere i postupci uslovljeni mjerenjem pomjeranja potpornih konstrukcija

U slučaju pojave prekomjernih pomjeranja i prslina u konstrukciji provjeriti ulazne mehaničke parametre geotehničke sredine koji su korišćeni u statičkoj analizi i po potrebi izvršiti korekcije dimenzija i/ili armature potpornih zidova i sl.

1.1.6 PRILAGOĐAVANJE PROJEKTA I IZVOĐENJA USLOVIMA NA TERENU

Projekat potpornih zidova je sačinjen na osnovu parametara definisanih u geološkom elaboratu, prosječnih vrijednosti parametara smičuće otpornosti tla za opisane slojeve na predmetnoj lokaciji i drugih uslova opisanih u elaboratu ili osmotrenih na licu mjesta. U toku izvođenja radova mogu se desiti situacije u kojima stvarno stanje na terenu odstupa od projektovanih. Imajući ovo u vidu neophodno je pri izvođenju zidova vršiti stalni stručni nadzor i gore opisana osmatranja.

Stručni nadzor u saradnji sa Izvođačem radova treba dnevno da kontrolišu kvalitet izvedenih radova, stanje u tlu i donose adekvatne odluke uključujući i izmjene projektovanih mjera i preporuka, kao što su: visina i širina kampada za iskop, vrijeme potrebno za završetak pojedinih kampada i sl. Generalno u toku izvođenja potpornih zidova neophodno je dnevno sagledavati stanje na gradilištu i davati uputstva za dalje radove. U slučaju da dođe do većih odstupanja treba konsultovati Projektanta.

Na gradilištu ili u blizini uvijek mora imati dovolno pomoćnog materijala, koji može biti iskorišćen za ojačanje projektovane konstrukcije, kao što su: drvene talpe, drvene grede, čelični profili, koje Izvođač treba da upotrebi kao razupore u slučaju potrebe. U zavisnosti od tehnologije kojom raspolaže i mašina koje će koristiti Izvođač je dužan da izradi projekta zaštite na radu.

1.1.7 NAČIN MJERENJA I PLAĆANJE

Mjerenje izvedenih količina vrši Izvođač o svom trošku uz kontrolu Nadzora. Nadzor po potrebi vrši kontrolna mjerenja. Izvođač može vršiti češća ili "gušća" mjerenja od predviđenih ukoliko smatra da će dobiti tačnije ili veće količine ugrađenog ili otkopanog materijala. Sva mjerenja količina se obavljaju u skladu sa načinom mjerenja opisanom u narednom poglavlju.

Plaćanje se vrši po ugovorenim jediničnim cijenama i stvarno izvedenim količinama. Radovi se smatraju izvedenim nakon mjerenja i prihvatanja količina i kvaliteta od strane Nadzora. U jedinične cijene je uključen sav potreban rad, materijal (zajedno sa transportom), rastur materijala (pod rasturom materijala se smatra materijal koji Izvođač proizvede, ali u toku transporta i ugradnje izgubi i ne ugradi), transport iskopanog materijala iz temeljne jame do deponije, svi troškovi osvjetljenja, energije, pogonskih goriva i maziva, privremene odvodnje, privremenih podgrađivanja, skela i oplata, njegovanje betona, otežani uslovi zbog rada u raskvašenom i mokrom materijalu i dr. Prema tome, ugovorene jedinične cijene predstavljaju punu kompenzaciju za sve radove i materijale koje Izvođač mora da izvrši.

Mjerenje količina vrši Izvođač o svom trošku uz kontrolu Nadzora.

Podgorica,

Sastavio

Februar 2024.god.

MSc Nikola Popović, spec.sci.građ.

Spisak osnovnih propisa, pravilnika uz nacionalne anekse i standarda koji su korišćeni pri projektovanju:

- MEST EN 1990;
- MEST EN 1991-1-1;
- MEST EN 1992-1-1;
- MEST EN 1997-1;
- MEST EN 1998-1;
- MEST EN 1998-5.

1.2 POSEBNI TEHNIČKI USLOVI ZA IZVOĐENJE RADOVA

1.2.1 Opšte napomene

Svi radovi na obezbijedenju temeljne jame se izvode u skladu sa važećim propisima i standardima ukoliko ovim uslovima nije predviđen strožiji kriterijum. U ovom odjeljku posebnih tehničkih uslova se bliže definišu neki bitni zahtjevi vezani za izvođenje radova i tehnologije izvođenja konstrukcija.

1.2.2 Koordinate osnovnih tačaka za pozicioniranje iskopa

Investitor će u preko nadzornog organa na licu mjesta upoznati Izvođača sa obilježenom i utvrđenom osovinom i koordinatama pozicija za iskop, zajedno sa stalnim tačkama i triangulacijom, ukoliko je rađena, kao i sa osiguranjima za pravce i visine, s potrebnim podacima. Upoznavanje sa osovinom i stalnim tačkama vrši se zapisnički, poslije zajedničkog provjeravanja pravca i visina na terenu. Stalne tačke i osiguranja za visinu moraju biti adekvatno fiksirane. Sva kasnija obilježavanja i nivelisanja padaju u dužnost i na teret izvođača

Za vrijeme gradjenja Nadzor je obavezan da povremeno kontroliše vođenje linije iskopa i nivelmana i o rezultatima obavještava Izvođača. Ova kontrola ne skida odgovornost Izvođača za sve eventualne greške pri obilježavanju i nivelisanju i ne daje mu pravo na naknadu štete.

Dopuštena greška pri iskopu po visini i po širini je 5cm. Sve povećane količine radova koje budu prouzrokovane prekopom (van ovih propisanih granica) padaju na teret izvođača.

1.2.3 Način testiranja uzoraka

Uzorci se testiraju po MEST standardima i MEST kriterijumu, osim ukoliko su ovim posebnim tehničkim uslovima postavljeni strožiji kriterijumi koji se odnose na kvalitet. Na zahtjev Izvođača i saglasnost Nadzora, mogu se koristiti i komparativne metode testiranja ukoliko je uspostavljen jasan odnos komparativnih i MEST standarda.

Izvođač je dužan priložiti nadzornom organu ateste za upotrijebljene materijale, a Nadzor će vršiti kontrolna ispitivanja prema ovim tehničkim uslovima za pojedine vrste radova i materijale.

1.2.4 Aditivi za betonske mješavine

Aditivi za betonske mješavine moraju biti atestirani i probnim mješavinama mora biti dokazano da ne djeluju štetno na armaturu i da ne dolazi do naknadnog smanjenja čvrstoće betona. Količina i način primjene moraju biti propisani kroz pretodna ispitivanja. "recepture" i projekat betona.

Pored atesta o kvalitetu aditiva Izvođač radova mora pribaviti atest od lokalne ovlaštene institucije kojim se potvrđuje da primjenjeni materijal nije štetan po okolinu.

1.2.5 Izrada projekta izvedenog stanja

Nema posebnih zahtjeva.

1.2.6 Kontrolna testiranja uzoraka materijala

Izvođač radova je dužan da o svom trošku vrši prethodna i tekuća testiranja ugrađenih materijala, u skladu sa JUS standardima ili ekvivalentnim MEST standardima, propisima i pravilnicima (po vrsti i količini).

Kontrolna ispitivanja uzoraka materijala može zatražiti Nadzor (uz konsultacije sa Projektantom) ukoliko posumnja u kvalitet ugrađenog materijala i/ili konstrukcija ili uoči potrebu za dodatnim geološkim istraživanjima. Kontrolisana ispitivanja se vrše u nezavisnoj laboratoriji u kojoj se ne vrše prethodna i tekuća ispitivanja materijala. Ovu laboratoriju određuje Nadzor uz saglasnost Investitora.

Izvođač je dužan da obezbijedi svu potrebnu pomoć za uzimanje uzoraka: skelu, šinski prevoz, električnu energiju, tehničku vodu i osvjjetljenje.

Podgorica,

Sastavio

Februar 2024.god.

MSc Nikola Popović, spec.sci.građ.

1.3 IZVOD IZ GEOMEHANIČKOG ELABORATA

4. REZULTATI ISTRAŽIVANJA

4.1. Morfološka svojstva terena

U morfološkom pogledu šire područje istraživanja je teren u nagibu, dok sama lokacija predstavlja subhorizontalan teren. Na samoj lokaciji apsolutne kote terena se kreću od oko 3,40 do oko 5,20 m.n.v. Ovaj prirodni plato predstavlja udolinu između znatno strmijih terena koji okružuju ovaj prostor sa istočne, zapadne i sjeverne strane.

Današnji izgled lokacije formiran je procesom deponovanja kvartarnih sedimenata, površinskim spiranjem istih i antropogenim djelovanjem, odnosno radovima na izgradnji postojećih objekata i lokalnih saobraćajnica, te uređenjem terena na širem području istraživanja.

Morfologija lokacije prikazana je na topografskoj karti i na inženjersko-geološkoj karti sa položajem izvedenih istražnih radova (prilozi broj 1 i 3).

4.2. Hidrografske odlike područja

Na predmetnom području gravitiraju dva povremena vodotoka. Vodotoci su regulisani samo na mjestima prolaza ispod postojeće saobraćajnice. Navedeni vodotoci predstavljaju bujične tokove u periodu intenzivnih padavina, pa je samim tim ove tokove neophodno regulisati i kanalisano sprovesti u more.

4.3. Klima područja

Klimu područja čine padavine, temperatura i vlažnost vazduha, te karakteristike vjetrova. Na istražnom području vlada mediteranski klimatski režim. Suma godišnjih padavina za period 1961-1990. je 1402,9 mm. Srednja godišnja temperatura vazduha za isti period je 15,6°. Karakteristični vjetrovi su bura i jugo. Bura duva iz pravca sjevera i sjeveroistoka. Ovaj vjetar snižava temperaturu, smanjuje oblačnost i vlažnost vazduha. Jugo je topao vjetar iz južnog pravca koji donosi obilne padavine, dok je maestral jugozapadni i zapadni vjetar.

4.4. Saobraćajne veze

U pogledu saobraćajne infrastrukture, karakteriše je slaba izgrađenost. Postojeće saobraćajnice su u dosta lošem stanju. Sva saobraćajna mreža oslonjena je na postojeću saobraćajnicu uz plažu, a saobraćajna mreža Čanja vezana je za magistralni put M-2.4 (E-752) Petrovac-Bar samo jednom saobraćajnicom koja tehnički ne zadovoljava sve zahtjeve koje uslovljava njena funkcija.

4.5. Geološka građa i tektonski sklop terena

4.5.1. Geološka građa terena

U geološkoj građi šireg područja učestvuju sedimenti trijaske, jurske, kredne, paleogene i kvartarne starosti (Osnovna geološka karta lista „Bar“ 1:100000 sa Tumačem, Zavod za geološka istraživanja SRCG, Titograd, 1962-1968. godina). Istražno područje je vrlo složene građe, kako po geološkom sastavu tako i po tektonskom sklopu. U geološkoj građi šireg područja istraživanja učestvuju:

- **Masivni i bankoviti krečnjaci (T_2^1)** - Ove stijene predstavljaju najmlađi dio aniziskog fliša i leže ispod ladinskih krečnjaka i rožnaca.
- **Srednji gornji trijas ($T_{2,3}$)** - predstavljen je slojevitim, bankovitim i masivnim krečnjacima, dolomitičnim krečnjacima i dolomitima.
- **Jura (J)** - jurski sedimenti na širem istražnom prostoru javljaju se u obliku uskih isprekidanih pojaseva. Najzastupljenija je neraščlanjena serija sedimenata, koju predstavljaju raznobojni, pretežno laporoviti, slojeviti i pločasti krečnjaci sa proslojcima rožnaca.
- **Kreda (K)** - kreda je na kartiranom terenu zastupljena sedimentima donjo i gornjo kredne starosti. To su stijene pretežno karbonatnog sastava.
- **Donjo kredni sedimenti (K_1)** - predstavljeni su paketima slojevitih i pločastih rožnaca sa proslojcima krečnjaka. Na terenu je vizuelno

nemoguće izdvojiti ove stijene od susjednih jurskih ili gornjo krednih sedimenata sa kojima su u kontaktu.

- **Senonski sedimenti (K_2^3)** - predstavljeni su slojevitim krečnjacima, dolomitičnim krečnjacima i dolomitima koji se međusobno smenjuju.
- **Gornjo kredni (senonski) sedimenti (${}_4K_2^3$)** - ovi sedimenti predstavljeni su rumenkastim tankoslojevitim i pločastim laporovitim krečnjacima sa rožnacima, preko kojih leže sivozeleni laporoviti krečnjaci.
- **Paleocen i donji eocen (Pc; E)** - predstavljen je flišnom serijom tankoslojevitih, sivih i zelenkastih laporaca i glinaca, pločastih liskunovitih pjesčara i laporovitih pjeskovitih krečnjaka.
- **Aluvijalne tvorevine (al)** - Specifičan položaj između kopna i mora utiče na složen litološki sastav aluvijalnih sedimenata koje izgrađuju šljunkovi, pjeskovi, prasina i u manjoj mjeri sitna drobina. Ove frakcije se međusobno često nepravilno smjenjuju, zbog čega postoji veliki broj varijeteta ovih naslaga. Debljina ovih naslaga prema fondovskim podacima iznosi i do 15m.
- **Deluvijalni nanos (dl)** - Deluvijalna drobina locirana je u zapadnom dijelu ispitivane lokacije. Procijenjena debljina ovih naslaga je do 5m. U osnovi je to glinovito-drobinska raspadina. Učešće drobine je promjenljivo, tako da se u granulometrijskom smislu može tretirati kao zaglinjena drobina.

4.5.2. Tektonski sklop terena

Izučavanjem geološke građe duž Crnogorskog primorja, a time i područja Bara, utvrđene su i izdvojene tri velike geotektonske jedinice, i to:

- Paraautohton,
- Budvansko-barska zona i
- Zona Visokog krša.

Istraživani prostor pripada Budvansko–barskoj zoni u kojoj paleogeni sedimenti zauzimaju najveći dio terena. Budvansko–barska zona predstavlja područje intenzivnog tektonskog suženja na koju je navučena velika geotektonska jedinica Visoki krš.

Sklop Budvansko–barske zone je veoma složen, s obzirom da je amplituda navlačenja veća od 1,5 km. Zbog znatnih pritisaka usled navlačenja zone Visokog krša sa sjeveroistoka, flišni sedimenti su pretrpjeli mjestimično velike deformacije i došlo je do stvaranja lokalnih antiklinalnih i sinklinalnih struktura u kojima je prvobitan položaj slojeva znatno izmijenjen, jako je ubran i razlomljen. Usled toga i usled postojanja velikog broja longitudinalnih i transverzalnih ruptura, obrazovala se mjestimično debela zona degradacije, naročito u hipsometrijski nižim djelovima terena.

Geološka karta šire okoline lokacije data je u prilogu broj 2, a karta tektonske rejonizacije predstavljena je prilogom broj 4.

4.6. Hidrogeološka svojstva terena

Hidrogeološke karakteristike terena su u direktnoj zavisnosti od geološke građe terena, strukturnih svojstava stijenske mase i tipa poroznosti. Na osnovu hidrogeoloških svojstava i funkcija stijenskih masa, strukture poroznosti i prostornog položaja hidrogeoloških pojava, na izučavanom dijelu terena mogu se izdvojiti:

- srednje do dobro propusne stijene intergranularne poroznosti, predstavljene aluvijalnim sedimentima;
- slabo propusne stijene intergranularne poroznosti, predstavljene deluvijalno-proluvijalnim sedimentima;
- stijene pukotinsko-kavernozne poroznosti, predstavljene masivnim i bankovitim krečnjacima srednjotrijaske starosti;
- pretežno nepropusne stijene, predstavljene eocenskim kompleksom pješčara i laporaca.

Aluvijalni pjeskovito–šljunkoviti sedimenti od kojih je pretežno izgrađen teren odlikuju se intergranularnom poroznošću, i u njima je

formirana zbijena izdan. Prema hidrodinamičkim karakteristikama izdvojena zbijena izdan karakteriše se slobodnim nivoom. Generalno, propusnost ovih sedimenata je dobra. Radi se o veoma heterogenom nanosu, međuzrnske poroznosti.

Pjeskoviti šljunak predstavlja dobropropusnu sredinu sa koficijentom filtracije koji se kreće u granicama $1 \times 10^{-4} \geq K_f \geq 1 \times 10^{-1}$ cm/s. Aluvijalna izdan prihranjuje se najvećim dijelom na račun infiltracije voda rječnih tokova i infiltracijom voda atmosferskih taloga. Takođe, vode ove izdani su pod direktnim uticajem nivoa morske vode.

Prilikom izvođenja terenskih radova konstatovana je pojava vode i nivo podzemne vode. Dubine na kojima je konstatovana pojava i nivo podzemne vode date su u narednoj tabeli (Tabela broj 5).

Oznaka bušotine	PPV (pojava podzemne vode)	NPV (nivo podzemne vode)
B1		2,80 m
B2	1,00 m	0,60 m
B3	1,20 m	0,70 m
B4	1,80 m	1,20 m
B5		

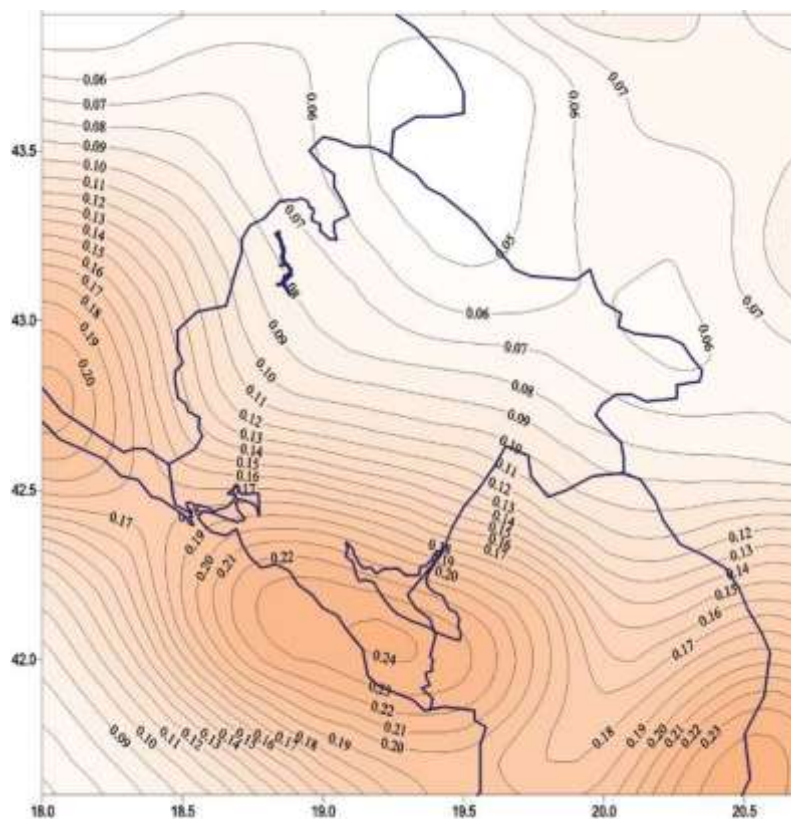
Tabela broj 5: Dubine na kojima je registrovana pojava i nivo podzemne vode

4.7. Seizmičnost terena

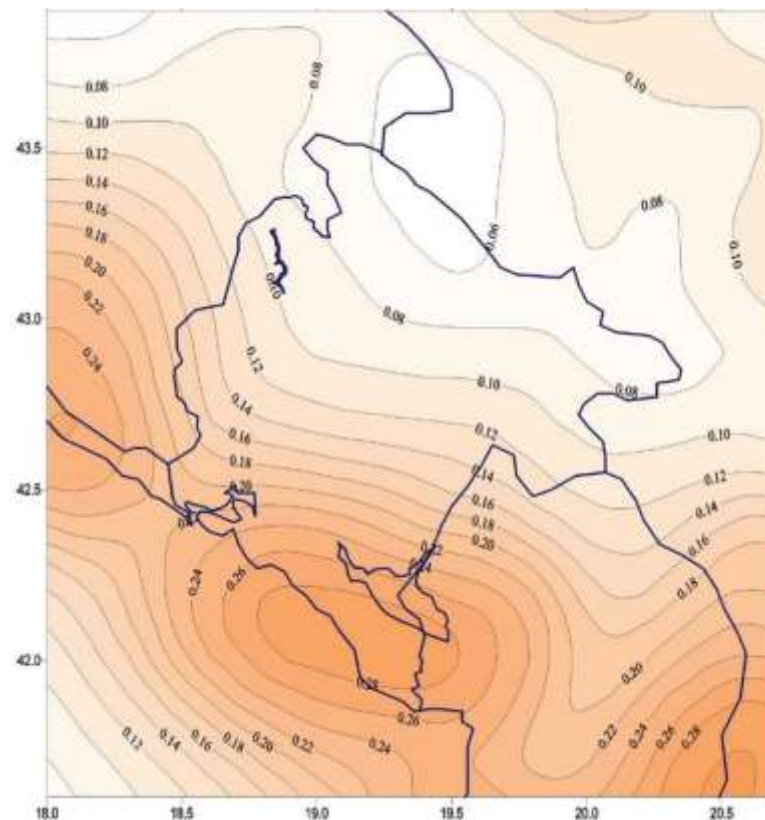
Kvantifikaciju efekata istorijske seizmičnosti na području istraživanja moguće je izraziti kroz proračun maksimalnih vrijednosti intenziteta zemljotresa i maksimalnih vrijednosti horizontalnog ubrzanja tla, pri dejstvu najsnažnijih zemljotresa generisanih tokom prethodnih nekoliko stotina godina na širem prostoru istraživanja.

Litološke jedinice u kojima će se fundirati budući potporni zidovi, saglasno svim standardima za klasifikaciju tipova tla (uključujući i Eurokod 8), pripadaju kategoriji tipa tla C prema EC-8.

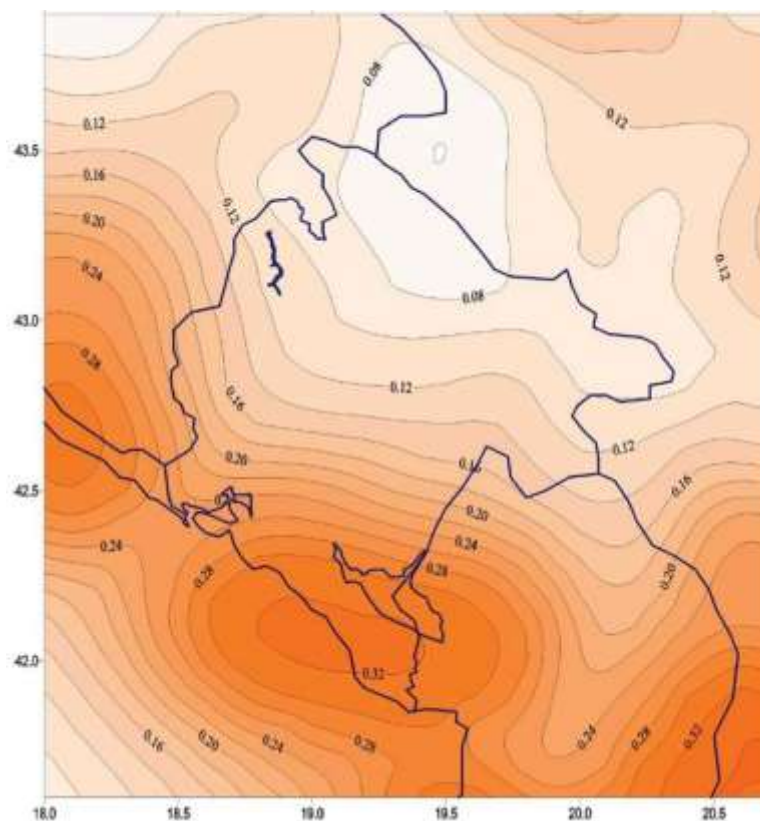
Osnovni parametar sa kojim se opisuje seizmički hazard je „referentno“ maksimalno horizontalno ubrzanje tla (a_{\max}) na osnovnoj stijeni (Slike broj 3, 4, 5 i 6).



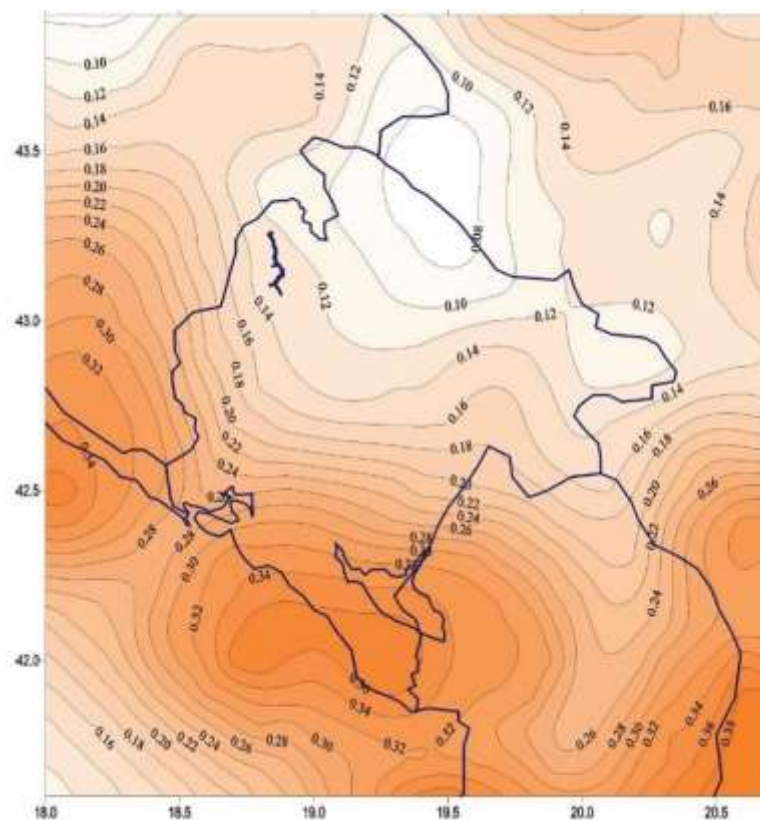
Slika broj 3: Seizmički hazard u vidu očekivanih maksimalnih horizontalnih ubrzanja tla, u okviru povr. perioda od 50 god, sa vjerovatnoćom realizacije 70%



Slika broj 4: Seizmički hazard u vidu očekivanih maksimalnih horizontalnih ubrzanja tla, u okviru povr. perioda od 100 god, sa vjerovatnoćom realizacije 70%



Slika broj 5: Seizmički hazard u vidu očekivanih maksimalnih horizontalnih ubrzanja tla, u okviru povr. perioda od 200 god, sa vjerovatnoćom realizacije 70%



Slika broj 6: Seizmički hazard u vidu očekivanih maksimalnih horizontalnih ubrzanja tla, u okviru povr. perioda od 475 god, sa vjerovatnoćom realizacije 70%

U narednoj tabeli (Tabela broj 6) dati su podaci o seizmičnosti terena, tačnije maksimalno horizontalno ubrzanje tla (a_{\max}) na osnovnoj stijeni, za povratne periode vremena od 50, 100, 200 i 475 godina.

Povratni period vremena T (god)	Maksimalno horizontalno ubrzanje tla a_{\max} (%g)
50	0,23
100	0,28
200	0,32
475	0,36

Tabela broj 6: Podaci o seizmičnosti terena

Naponsko stanje pri nastupu potresa simulirano je kao dodatna sila koja djeluje na zidove. Dodatna sila je podijeljena na horizontalnu i vertikalnu komponentu, koje su definisane sledećim izrazima:

- Horizontalna komponenta: $F_h = 0,5 \cdot \alpha \cdot S \cdot W$
- Vertikalna komponenta: $F_v = \pm 0,5 \cdot F_h$

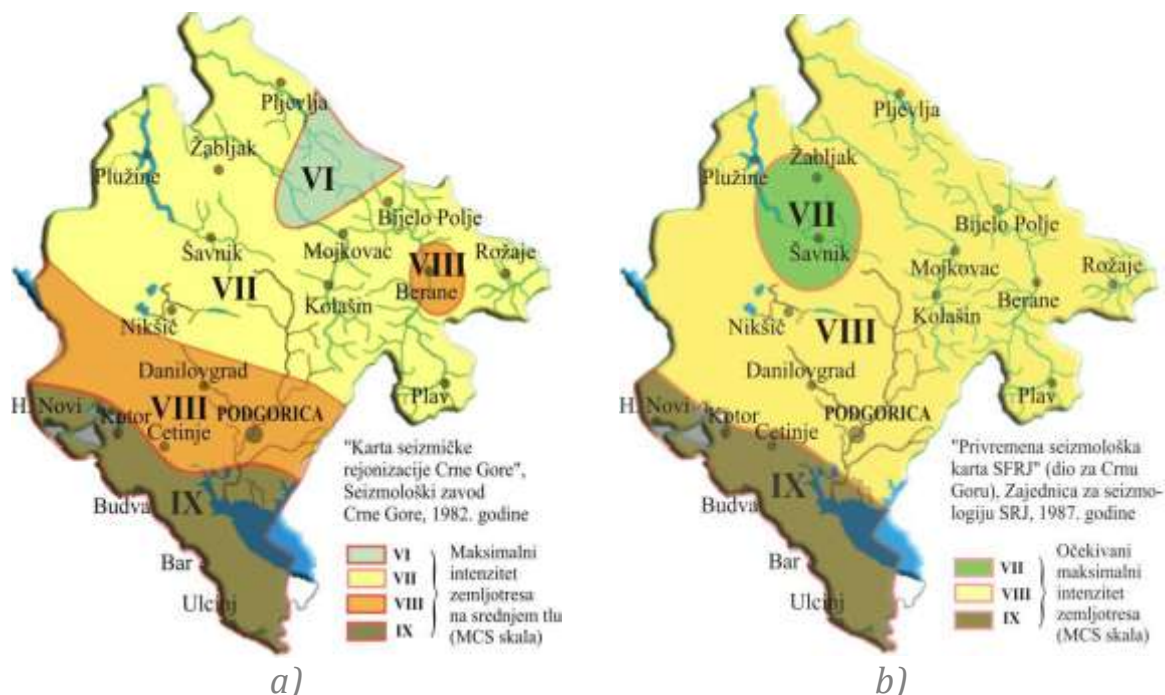
gdje je:

- α - ubrzanje tla u % gravitacije; za $T_p = 475 \rightarrow \alpha = 0,36 \cdot g$
- S - parametar tla prema tipu iz EN; za tip C $\rightarrow S = 1,5$
- W - težina kliznog tijela; za potrebe proračuna uzima se $W = 1$

Prema tome, za povratni period vremena $T_p=475$ god, vrijednosti horizontalne i vertikalne komponente dodatne sile iznose:

- Horizontalna komponenta:
$$F_h = 0,5 \cdot \alpha \cdot S \cdot W = 0,5 \cdot 0,36 \cdot g \cdot 1,5 \cdot 1 = 0,27 \cdot g$$
- Vertikalna komponenta:
$$F_v = \pm 0,5 \cdot F_h = 0,5 \cdot 0,27 \cdot g = 0,135 \cdot g$$

Osnovni stepen seizmičkog inteziteta prikazan je na karti seizmičke rejonizacije teritorije Crne Gore (Slika broj 7a) i na privremenoj seizmološkoj karti SFRJ - dio za Crnu Goru (Slika broj 7b) koje predstavljaju finalni rezultat kompleksnih seizmogeoloških proučavanja nivoa seizmičnosti terena i stepena seizmičke opasnosti na području cijele Crne Gore. Prema pomenutim kartama istražno područje nalazi se u zoni IX stepena MCS.



Slika broj 7: Karte očekivanih maksimalnih intenziteta zemljotresa: a) Karta seizmičke rejonizacije teritorije Crne Gore, 1982; b) Privremena seizmološka karta SFRJ (dio za Crnu Goru), 1987.

4.8. Savremeni geološki procesi i pojave

Od savremenih geoloških procesa i pojava u široj okolini područja istraživanja prisutan je proces planarne erozije i denudacije.

Na samoj lokaciji objekta nema pojava nestabilnosti.

4.9. Inženjersko-geološka svojstva izdvojenih sredina

Inženjersko-geološke odlike istraživanog terena sa okolinom su složene i sagledane su kroz inženjersko-geološke odlike zastupljenih litoloških jedinica i inženjersko-geološke procese koji su na terenu razvijeni. Na osnovu analize postojeće dokumentacije, rekognosciranja i inženjersko-geološkog kartiranja terena, izvedenih istražnih bušotina, izvedenih terenskih opita i laboratorijskih geomehaničkih ispitivanja uzoraka tla, na istražnom području su izdvojene različite litološke jedinice (litotipovi).

S obzirom da se sve građevinske aktivnosti odvijaju od površine terena, tako će biti prikazane i izdvojene sredine (od mlađih ka starijim):

Litološka jedinica 1 – DELUVIJUM

Ovi sedimenti se najčešće javljaju na djelovima terena gdje su padine srednjeg do velikog nagiba i najčešće su promjenljive debljine. Nastali su kao produkt fizičko-mehaničkog raspadanja osnovne stijene i njenim deponovanjem na blažim padinama. Deluvijalni materijali na predmetnoj lokaciji su slabo do srednje vezani, pjeskovito-prašinasti, dijelimično zaglinjeni, sa uklopcima rožnaca (predstavljaju koru raspadanja rožnaca). Fragmenti su uglasti, boja je tamno siva do braon. U takvoj masi nerijetko se pojavljuju veći blokovi rožnaca, koji štrče iznad terena. Heterogenog su granulometrijskog sastava. Sredina je konstatovana istražnom bušotinom B1 na dubini 0,00-2,80m. Prema građevinskoj kategorizaciji GN-200 sredina 1 pripada III kategoriji iskopa.

Vrijednosti fizičko-mehaničkih parametara sredine 1, određene na osnovu laboratorijskih ispitivanja uzoraka tla i podataka iz fondovske dokumentacije i literature, date su u Tabeli broj 7.

Fizičkomehaničke karakteristike	Raspon vrijednosti	Usvojene vrijednosti
Zapreminska težina γ [kN/m ³]	19 – 21	20
Kohezija c [kN/m ²]	5 – 9	7
Ugao unutrašnjeg trenja ϕ [°]	30 – 35	33
Modul stišljivosti M_s [kN/m ²]	5000 – 6000	5500

Tabela broj 7: Vrijednosti fizičko-mehaničkih parametara sredine 1

Litološka jedinica 1' – PROLUVIJUM

Ovi sedimenti se najčešće javljaju na ravnijim dijelovima terena. Predstavljeni su glinovito-prašinastim materijalom, sa manjim udjelom pjeskovite komponente. Tamno do svijetlo braon su boje. Proluvijalni materijali na predmetnoj lokaciji su srednje do dobro vezani i srednje do dobro konsolidovani. Konstatovani su na dubini: 0,00-2,30m (u zoni bušotine B2), 0,00-3,00m (u zoni bušotine B3), 0,00-0,50m (u zoni bušotine B4) i 0,00-0,40m (u zoni bušotine B5). Prema građevinskoj kategorizaciji GN-200 sredina 1' pripada II-III kategoriji iskopa.

Vrijednosti fizičko-mehaničkih parametara sredine 1', određene na osnovu laboratorijskih ispitivanja uzoraka tla i podataka iz fondovske dokumentacije i literature, date su u Tabeli broj 8.

Fizičkomehaničke karakteristike	Raspon vrijednosti	Usvojene vrijednosti
Zapreminska težina γ [kN/m ³]	18 – 20	19
Kohezija c [kN/m ²]	22 – 27	25
Ugao unutrašnjeg trenja ϕ [°]	20 – 23	21
Modul stišljivosti M_s [kN/m ²]	6000 – 7000	6500

Tabela broj 8: Vrijednosti fizičko-mehaničkih parametara sredine 1'

Litološka jedinica 2 – ŠLJUNAK I PIJESAK

Litološku jedinicu 2 predstavlja šljunak i pijesak, djelimično muljevit, tamnosive boje, sa različitim sadržaj komponenti. Pripada inženjersko-geološkoj grupi poluvezanih stijena, intergranularne poroznosti, sa koeficijentom filtracije po USBR-u $1 \times 10^{-4} \geq K_f \geq 1 \times 10^{-1}$ cm/s. Granulat je solidno sortirano, što mu daje dobru zbijenost, osim u bušotini B2 gdje su parametri znatno slabiji zbog velikog priliva vode. Prema građevinskoj GN-200 sredina 2 pripada II-III kategoriji iskopa. Sredina je konstatovana: 2,80-4,00m (B1), 2,30-3,00m (B2), 0,50-3,00m (B4) i 0,40-3,00m (B5).

Vrijednosti fizičko-mehaničkih parametara sredine 2, određene na osnovu laboratorijskih ispitivanja uzoraka tla i podataka iz fondovske dokumentacije i literature, date su u Tabeli broj 9.

Fizičkomehaničke karakteristike	Raspon vrijednosti	Usvojene vrijednosti
Zapreminska težina γ [kN/m ³]	16 – 18	17
Kohezija c [kN/m ²]	22 – 27	25
Ugao unutrašnjeg trenja ϕ [°]	0	0
Modul stišljivosti M_s [kN/m ²]	6500 – 8000	7300

Tabela broj 9: Vrijednosti fizičko-mehaničkih parametara sredine 2

5. GEOSTATIČKI PRORAČUNI

5.1. *Dozvoljena nosivost tla po Brinch Hansen-u*

Proračun dozvoljenog opterećenja koje će se prenositi na tlo izveden je po Brinch-Hansen-u, za litološku jedinicu 1 (deluvijum) i za litološku jedinicu 1' (proluvijum). Proračun nije rađen za litološku jedinicu 2 (šljunak i pijesak) jer se fundiranjem u ovoj litološkoj jedinici povećava mogućnost za pojavom podzemne vode, što može otežati izvođenje samih potpornih zidova i ugroziti stabilnost terena.

U narednoj tabeli (Tabela broj 10) dat je pregled veličina dozvoljenog opterećenja po Brinch-Hansenu (q_a), dok je detaljni tok proračuna predstavljen prilogom broj 9 (9.1 i 9.2 za sredinu 1 i 9.3 i 9.4 za sredinu 1').

Litološka jedinica	Dubina fundiranja D_f [m]	Oblik temelja	Dimenzije temelja	Dozvoljeno opterećenje q_a [kN/m ²]
Sredina 1	0,50	Traka	B=0,60m	209,20
	0,50	Traka	B=0,80m	216,80
Sredina 1'	0,50	Traka	B=0,60m	175,80
	0,50	Traka	B=0,80m	174,00

Tabela broj 10: Pregled veličina dozvoljenog opterećenja tla

Kako pretpostavljeno dopunsko opterećenje od zidova iznosi maksimalno $\sigma=120$ kN/m², budući temelji su bezbjedni od proloma tla, jer su veličine ukupnog kontaktnog opterećenja manje od dozvoljene nosivosti tla.

5.2. *Slijeganje terena pod uticajem zidova*

Preliminarnom procjenom o trenutnom stanju terena došlo se do zaključka da treba izvršiti proračun slijeganja za predmetne zidove. Proračun je vršen po metodi proračuna teorije konsolidacije.

U narednoj tabeli (Tabela broj 11) dat je pregled veličina ukupnog slijeganja, dok je detaljni tok proračuna predstavljen prilogom broj 10 (10.1 i 10.2 za sredinu 1 i 10.3 i 10.4 za sredinu 1').

Litološka jedinica	Dubina fundiranja D_f [m]	Oblik temelja	Dimenzije temelja	Ukupno slijeganje $S=S_c+S_i$ [cm]
Sredina 1	0,50	Traka	$B=0,60\text{m}$	3,13
	0,50	Traka	$B=0,80\text{m}$	4,21
Sredina 1'	0,50	Traka	$B=0,60\text{m}$	2,80
	0,50	Traka	$B=0,80\text{m}$	3,73

Tabela broj 11: Pregled veličina slijeganja po Evrocod-u 7

Dobijene vrijednosti predstavljaju ukupno slijeganje ($S=S_i+S_c$). Važno je napomenuti da je ukupno slijeganje za sva četiri razmatrana scenarija u dozvoljenim granicama i da će se odvijati ravnomjerno.

Kako bi se tlo homogenizovalo i kako bi se spriječila nejednaka slijeganja, obavezno izvršiti nasipanje slojem šljunkovito-pjeskovitog ili drobinskog kamenog tampona, granulacije 0-60mm, debljine 0,30m (dva sloja po 15cm), uz zbijanje do minimalnog modula stišljivosti od $M_s=40\text{MPa}$. Obavezno izvršiti provjeru zbijenosti metodom kružne ploče sa padajućim tegom i o tome sačiniti adekvatni Izvještaj.

6. PREPORUKE PROJEKTANTU I IZVOĐAČU RADOVA

Na osnovu analize postojeće geološke dokumentacije, inženjersko-geološkog kartiranja terena, izvedenih istražnih bušotina, izvedenih terenskih opita i laboratorijskih geomehaničkih ispitivanja uzoraka tla, ukazujemo na sledeće:

- U morfološkom pogledu šire područje istraživanja je teren u nagibu, dok sama lokacija predstavlja subhorizontalan teren. Na samoj lokaciji apsolutne kote terena se kreću od oko 3,40 do oko 5,20 m.n.v;
- U geološkoj građi šireg područja učestvuju sedimenti trijaskе, jurske, kredne, paleogene i kvartarne starosti. Istražno područje je vrlo složene građe, kako po geološkom sastavu tako i po tektonskom sklopu;
- Aluvijalni pjeskovito-šljunkoviti sedimenti od kojih je pretežno izgrađen teren odlikuju se intergranularnom poroznošću, i u njima je formirana zbijena izdan. Prema hidrodinamičkim karakteristikama izdvojena zbijena izdan karakteriše se slobodnim nivoom. Generalno, propusnost ovih sedimenata je dobra. Aluvijalna izdan prihranjuje se najvećim dijelom na račun infiltracije voda rječnih tokova i infiltracijom voda atmosferskih taloga. Takođe, vode ove izdani su pod direktnim uticajem nivoa morske vode;
- Prilikom izvođenja terenskih radova konstatovana je pojava vode na dubini: 1,00m (B2); 1,20m (B3) i 1,80 (B4), kao i nivo podzemne vode na dubini: 2,80m (B1); 0,60m (B2); 0,70m (B3) i 1,20m (B4);
- Na predmetnom području gravitiraju dva povremena vodotoka. Vodotoci su regulisani samo na mjestima prolaza ispod postojeće saobraćajnice. Navedeni vodotoci predstavljaju bujične tokove u periodu intezivnih padavina, pa je samim tim ove tokove neophodno regulisati i kanalisano sprovesti u more;
- Prema karti seizmičke regionalizacije Crne Gore, razmatrano područje u Čanju nalazi se u zoni IX stepena MCS;
- Konstrukciju terena izučavane lokacije izgrađuju deluvijum (sredina 1) i proluvijum (sredina 1') na površini terena, a ispod njih je

konstatovan šljunak i pijesak (sredina 2). Podaci o fizičko-mehaničkim karakteristikama tla usvojeni su na osnovu laboratorijskih opita i fondovskih podataka za iste i slične sredine;

- Proračunom je utvrđeno da dozvoljeno opterećenje tla prema Brinch Hansen-u iznosi:
 - $q_a > 200 \text{ kN/m}^2$ za litološku jedinicu 1,
 - $q_a > 170 \text{ kN/m}^2$ za litološku jedinicu 1';
- Kako pretpostavljeno dopunsko opterećenje od zidova iznosi maksimalno $\sigma = 120 \text{ kN/m}^2$, budući temelji su bezbjedni od proloma tla, jer su veličine ukupnog kontaktnog opterećenja manje od dozvoljene nosivosti tla;
- Preliminarnom procjenom o trenutnom stanju terena i izvršenom analizom slijeganja došlo se do zaključka da će ukupno slijeganje biti u dozvoljenim granicama za sva četiri razmatrana scenarija;
- Kako bi se spriječilo eventualno zadržavanje vode na terenu, predlažemo projektovanje drenažnih kanala;
- Kako bi se tlo homogenizovalo i kako bi se spriječila nejednaka slijeganja, obavezno izvršiti nasipanje slojem šljunkovito-pjeskovitog ili drobinskog kamenog tampona, granulacije 0-60mm, debljine 0,30m (dva sloja po 15cm), uz zbijanje do minimalnog modula stišljivosti od $M_s = 40 \text{ MPa}$. Obavezno izvršiti provjeru zbijenosti metodom kružne ploče sa padajućim tegom i o tome sačiniti adekvatni Izvještaj;
- Radove obavezno izvoditi u hidrološkom minimumu, odnosno u sušnom periodu godine, a temeljenje objekta obaviti iznad nivoa vode;
- Prilikom izvođenja iskopa voditi računa o stabilnosti zidova iskopa. Iskop materijala je u najvećem dijelu moguće izvesti mašinskim putem. Prema građevinskoj GN-200 sredine u kojima će se vršiti iskop pripadaju II-III kategoriji iskopa;
- Prilikom izvođenja radova strogo voditi računa da se ne ugrozi stabilnost susjednih objekata i saobraćajnica u neposrednoj blizini;
- Teren je u prirodnim uslovima stabilan.

7. ZAKLJUČAK

Na osnovu rezultata izvedenih geotehničkih istraživanja i geotehničke analize može se zaključiti da se projektovanje i izgradnja zidova uz saobraćajnicu 1, faza II, u Čanju, Opština Bar, na lokaciji: KP 1002, 1010/1, 3543/1, 2730, 1341, 1321, 3539/1, 1013/2, 3535, 3539/4, 1011, 1014/1, 1271/1, 3541/2, 1270, 2722/1, 1261/1, 1261/2, 1265, 1259, 1260, 1255/1, 1251/1, 1255/2, 1255/5, 1252, 1253/1, 1253/2, 1253/3, 1254/1, 1254/2, 1250/4, 1250/5, 1250/6, 1245/2, 1245/3, 1246, 1247/1, 1247/2, 1247/3, 1237/4, 1236, 1206/3, 1206/7, 1206/9, 1235/1, 1235/2, 1234/1, 1211, 1222/1, 1222/2, 1221/1, 1278/53, 1225, 1226, 1228/1, 1228/2, 1228/3, 1230, 2722/3, 1255/1 i 1237/1 KO Mišići, Opština Bar može izvesti, uz obavezno pridržavanje svih preporuka koje su iznijete u ovom Elaboratu.

U toku izvođenja radova preporučujemo povremeni geotehnički nadzor, radi sprovođenja predloženog načina iskopa i sanacionih mjera, kao i radi eventualnih nepredviđenih okolnosti koje diktiraju složena svojstva geološke sredine.

Zaključci i preporuke u ovom Elaboratu važe isključivo za predmetnu lokaciju i ne mogu se, bez konsultacija i pisane saglasnosti autora ovog Elaborata, primijeniti na drugu lokaciju.

Rukovodilac radova:

Šućur Milovan, dipl.inž.geot.

8. LITERATURA I FONDOVSKA DOKUMENTACIJA

- Bešić Z. (1959): Geološki vodič kroz NR Crnu Gore, Posebna izdanja Geološkog društva NR Crne Gore, Titograd;
- Cvijić J. (1926): Geomorfologija, knj. II, Izdanje državne štamparije, Beograd;
- M.Mirković, M.Kalezić, M.Pajović: Osnovna geološka karta list “Bar” 1:100000 sa Tumačem, Zavod za geološka istraživanja Crne Gore, Podgorica;
- Radulović M., (2000): Hidrogeologija karsta crne Gore, Posebno izdanje Geološkog glasnika, knjiga XVIII, Podgorica;
- R. Najdanović, N. Obradović: Mehanika tla u inženjerskoj praksi, Rudarski institut, Bgd 1999;
- Pravilnik o tehničkim normama za projektovanje i izvođenje radova na temeljenju građevinskih objekata, 1974;
- Seizmička mikroneonizacija područja opštine Bar;
- Fondovski materijal: „GEOTEHNIKA“ d.o.o. Bijelo Polje – R.J. Nikšić.

2. NUMERIČKA DOKUMENTACIJA

Potporni zid B=1.2m

Input data

Project

Date : 28.11.2023.

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

Allowable eccentricity : 0,333

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 :	$\gamma_{Rv} =$	1,40	[-]
Partial factor on sliding resistance :	$\gamma_{Rh} =$	1,10	[-]
Partial factor on bearing capacity :	$\gamma_{Re} =$	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	[-]

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Partial factors for variable actions			
Permanent design situation			
Factor for quasi-permanent value :	$\psi_2 =$	0,30	[-]

Partial factors on actions (A)			
Seismic design situation			
		Unfavourable	Favourable
Permanent actions :	$\gamma_G =$	1,00 [-]	1,00 [-]
Variable actions :	$\gamma_Q =$	1,00 [-]	0,00 [-]
Water load :	$\gamma_w =$	1,00 [-]	

Partial factors for resistances (R)			
Seismic design situation			
Partial factor on overturning :	$\gamma_{Rv} =$	1,00	[-]
Partial factor on sliding resistance :	$\gamma_{Rh} =$	1,00	[-]
Partial factor on bearing capacity :	$\gamma_{Re} =$	1,00	[-]

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).

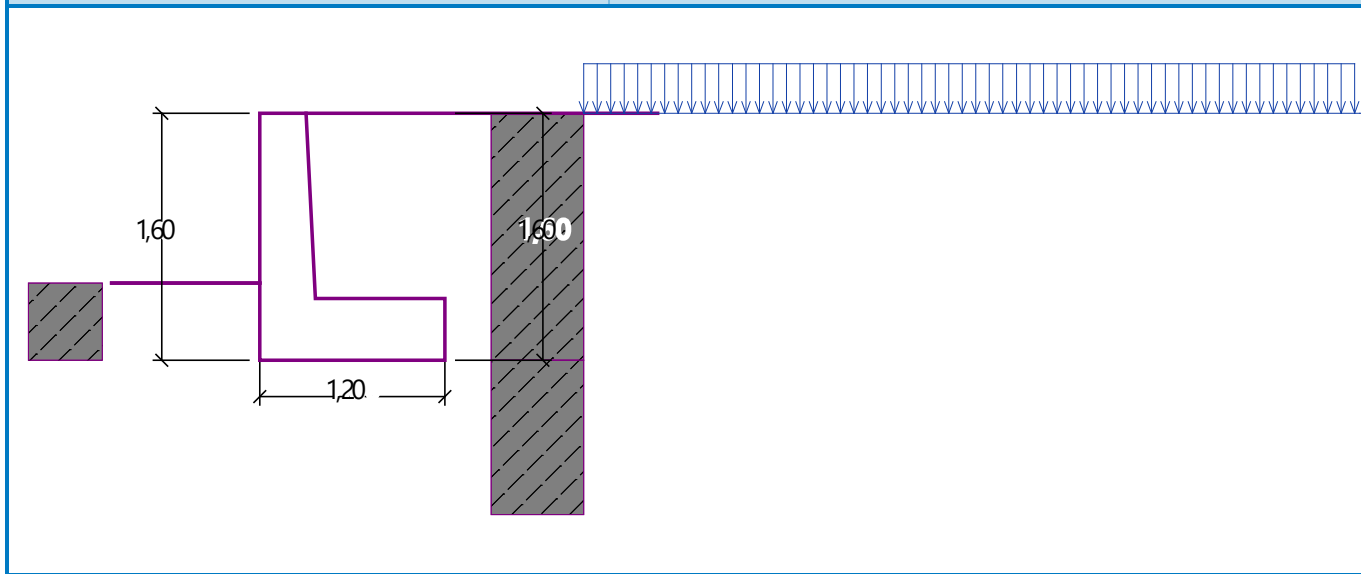
Concrete : C 25/30

Cylinder compressive strength $f_{ck} = 25,00 \text{ MPa}$

Tensile strength $f_{ctm} = 2,60 \text{ MPa}$

Longitudinal steel : B500

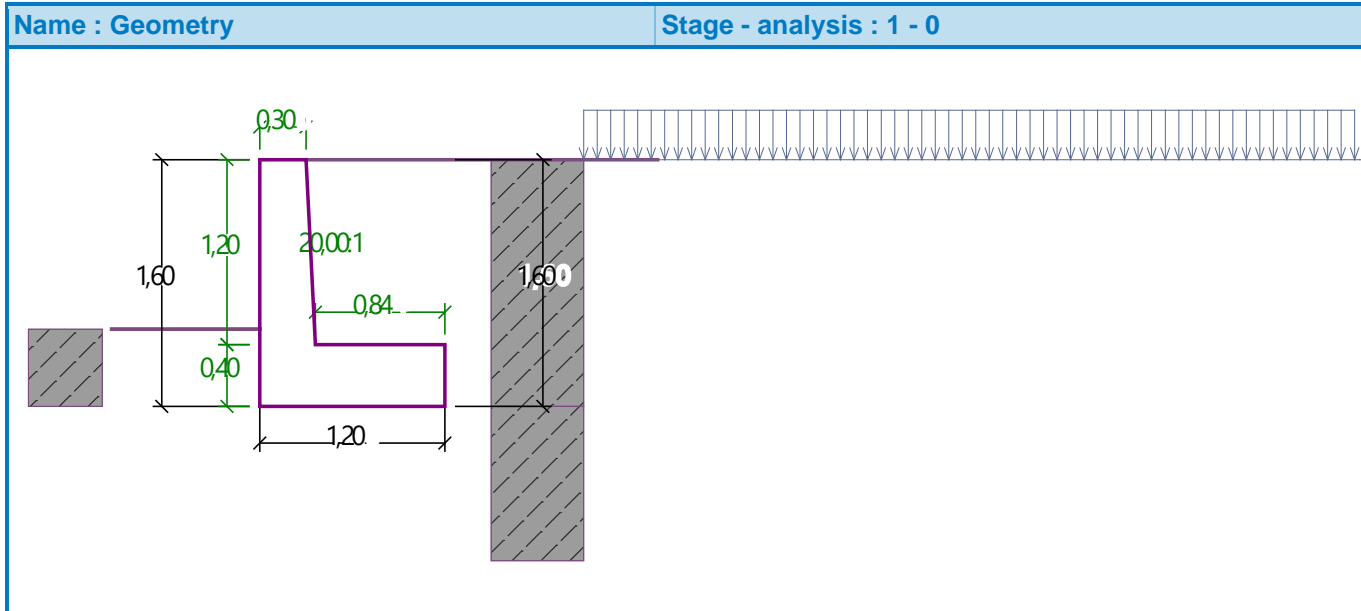
Yield strength $f_{yk} = 500,00 \text{ MPa}$



Geometry of structure

No.	Coordinate X [m]	Depth Z [m]
1	0,00	0,00
2	0,06	1,20
3	0,90	1,20
4	0,90	1,60
5	-0,30	1,60
6	-0,30	1,20
7	-0,30	0,00

The origin [0,0] is located at the most upper right point of the wall.
Wall section area = 0,88 m².



Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]	γ_{su} [kN/m ³]	δ [°]
1	zasip		30,00	0,00	19,00	9,00	0,00
2	temeljno tlo		21,00	25,00	9,00	9,00	0,00

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

Soil parameters

zasip



Unit weight : $\gamma = 19,00 \text{ kN/m}^3$
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 : $\delta = 0,00^\circ$
Soil : cohesionless
Saturated unit weight : $\gamma_{sat} = 19,00 \text{ kN/m}^3$

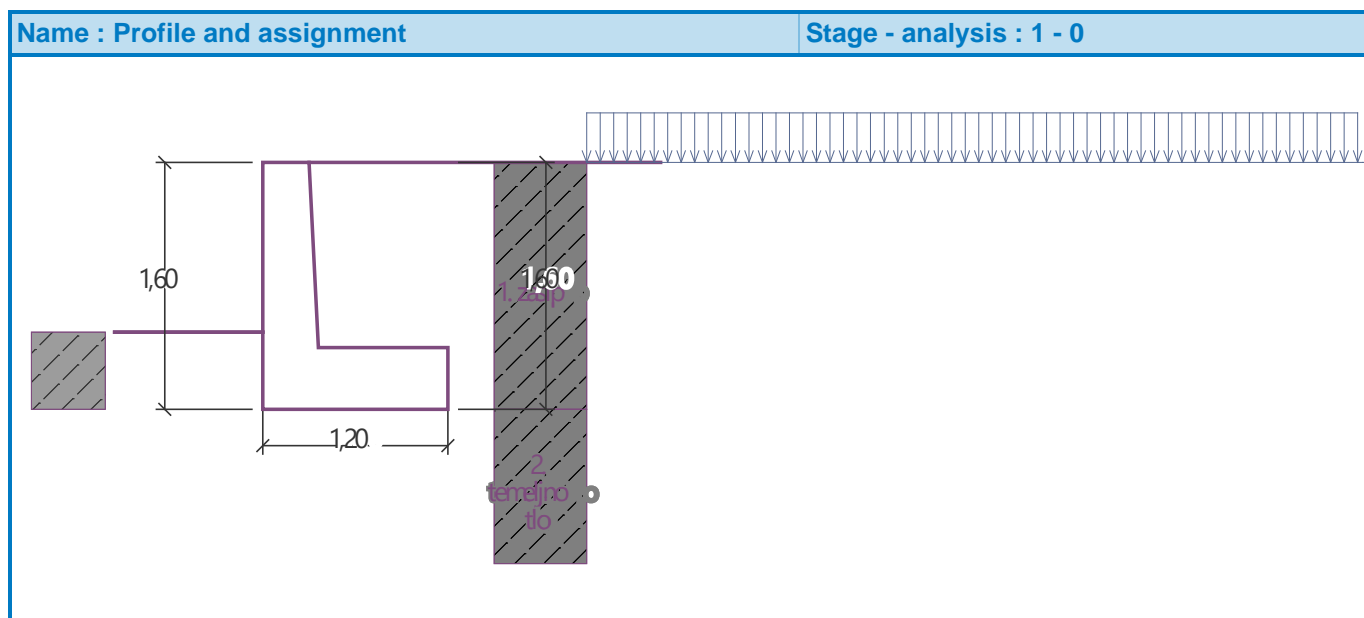
temeljno tlo

Unit weight : $\gamma = 9,00 \text{ kN/m}^3$
Stress-state : effective
Angle of internal friction : $\varphi_{ef} = 21,00^\circ$
Cohesion of soil : $c_{ef} = 25,00 \text{ kPa}$

Angle of friction struc.-soil : $\delta = 0,00^\circ$
 Soil : cohesionless
 Saturated unit weight : $\gamma_{\text{sat}} = 19,00 \text{ kN/m}^3$

Geological profile and assigned soils

No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	1,60	0,00 .. 1,60	zasip	
2	-	1,60 .. ∞	temeljno tlo	



Foundation

Type of foundation : soil from geological profile

Terrain profile

Terrain behind the structure is flat.

Water influence

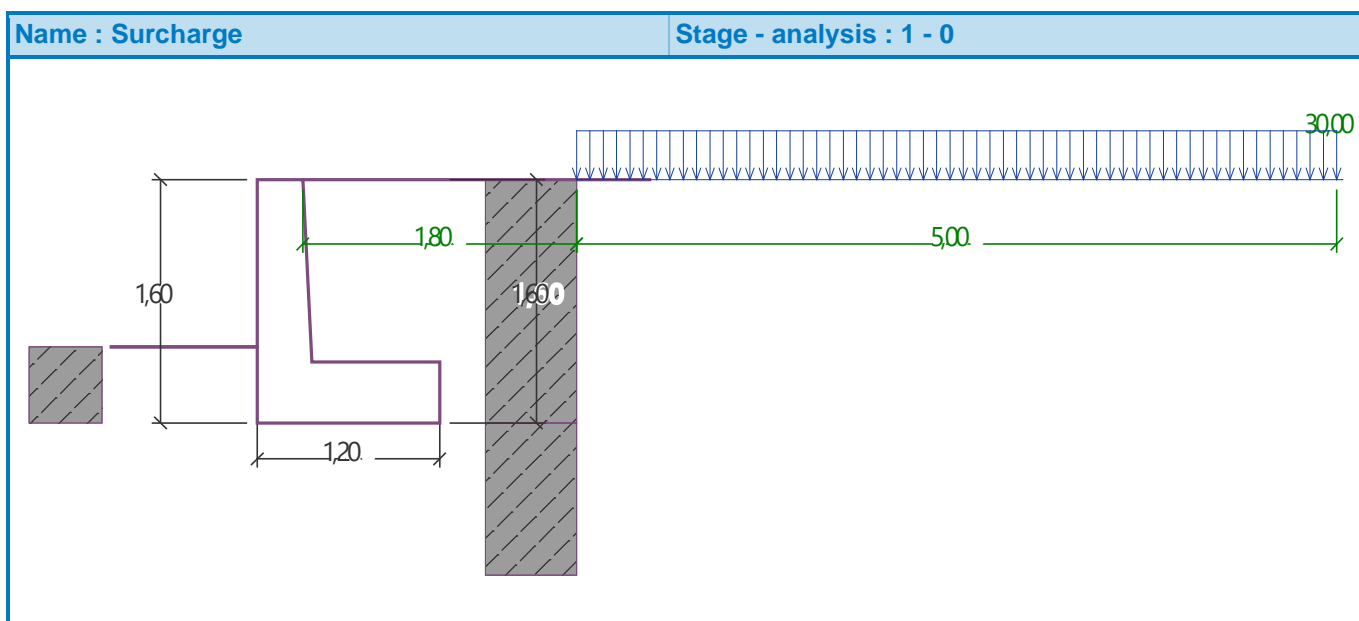
Ground water table is located below the structure.

Input surface surcharges

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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		variable	30,00		1,80	5,00	on terrain

No.	Name
1	Korisno opterecenje



Resistance on front face of the structure

Resistance on front face of the structure: at rest
 Soil on front face of the structure - zasip
 Soil thickness in front of structure $h = 0,50$ m

Terrain in front of structure is flat.

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)

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. overtur.	Coeff. sliding	Coeff. stress
Weight - wall	0,00	-0,55	21,90	0,40	1,000	1,000	1,350
FF resistance	-1,19	-0,17	0,00	0,00	1,000	1,000	1,350

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. overtur.	Coeff. sliding	Coeff. stress
Weight - earth wedge	0,00	-0,88	11,94	0,63	1,000	1,000	1,350
Active pressure	8,11	-0,53	7,90	0,97	1,350	1,350	1,350
Korisno opterecenje	5,26	-0,28	2,14	1,12	1,500	1,500	1,500

Verification of complete wall

Check for overturning stability

Resisting moment $M_{res} = 21,63 \text{ kNm/m}$

Overturning moment $M_{ovr} = 7,85 \text{ kNm/m}$

Wall for overturning is SATISFACTORY

Check for slip

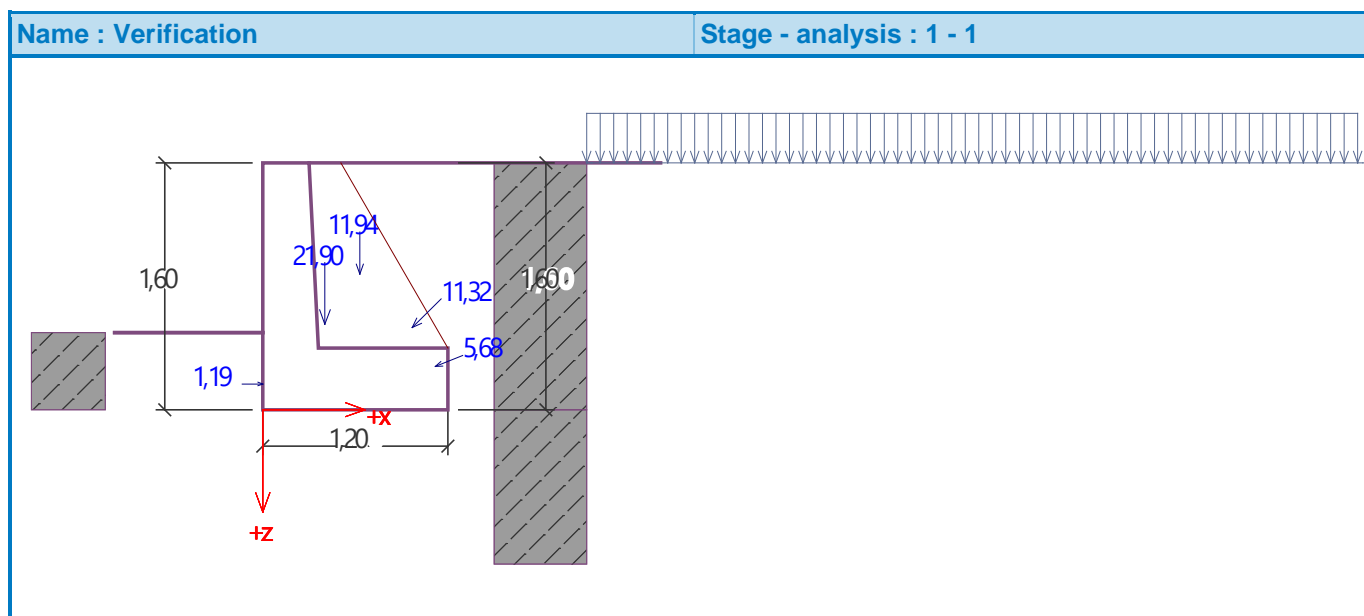
Resisting horizontal force $H_{res} = 25,04 \text{ kN/m}$

Active horizontal force $H_{act} = 17,65 \text{ kN/m}$

Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 62,83 kPa



Bearing capacity of foundation soil (Stage of construction 1)

Design load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]	Eccentricity [-]	Stress [kPa]
1	7,51	59,56	17,23	0,105	62,83

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]	Eccentricity [-]	Stress [kPa]
2	6,20	47,71	17,65	0,108	50,74

Service load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	5,52	43,88	12,18

Verification of foundation soil

Stress in the footing bottom : trapezoid

Eccentricity verification

Max. eccentricity of normal force $e = 0,108$

Maximum allowable eccentricity $e_{alw} = 0,333$

Eccentricity of the normal force is SATISFACTORY

Verification of bearing capacity

Bearing capacity of foundation soil $R = 215,00 \text{ kPa}$

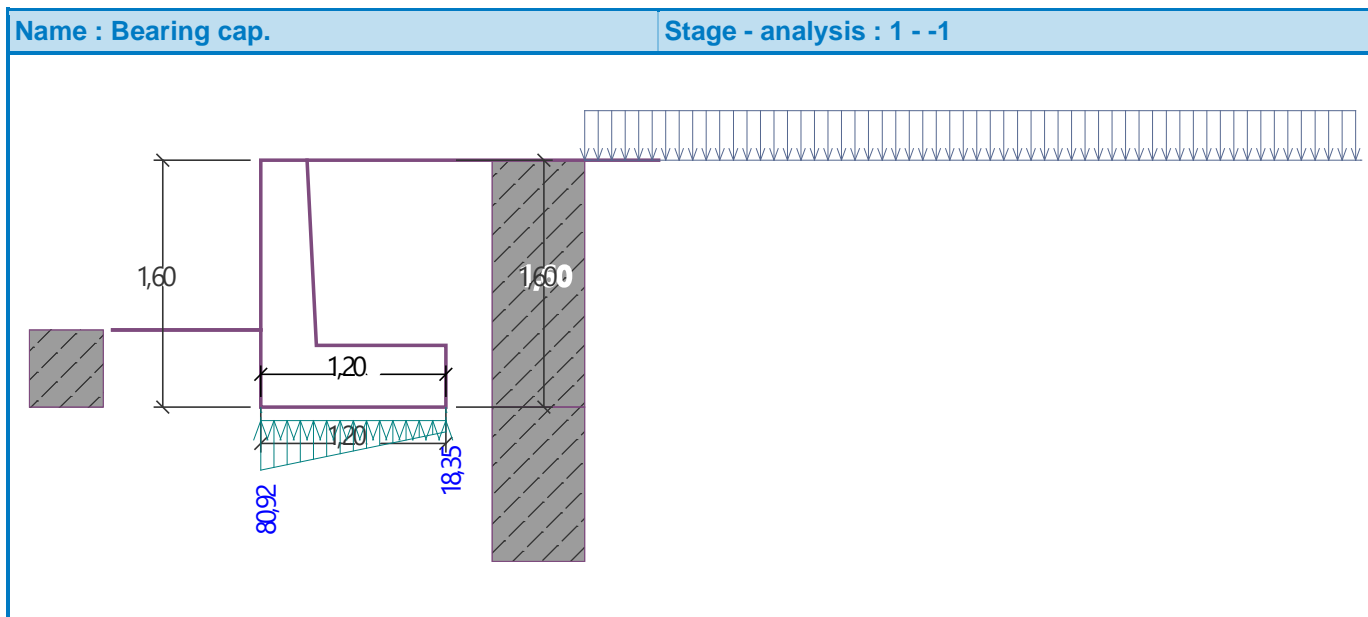
Partial factor on bearing capacity $\gamma_{Rv} = 1,40$

Max. stress at footing bottom $\sigma = 80,92 \text{ kPa}$

Bearing capacity of foundation soil $R_d = 153,57 \text{ kPa}$

Bearing capacity of foundation soil is SATISFACTORY

Overall verification - bearing capacity of found. soil is SATISFACTORY



Dimensioning No. 1 (Stage of construction 1)

Wall stem check - front reinf.

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,58	9,89	0,17	1,350	1,350	1,000
FF resistance	-0,05	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	6,82	-0,40	0,68	0,34	1,350	1,350	1,350
Korisno opterecenje	9,41	-0,43	0,94	0,34	1,500	1,500	1,500

Wall stem check - front reinf.

Front reinforcement is not required.

Wall stem check - back reinf.

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,58	9,89	0,17	1,350	1,350	1,000
FF resistance	-0,05	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	6,82	-0,40	0,68	0,34	1,350	1,350	1,350
Korisno opterecenje	9,41	-0,43	0,94	0,34	1,500	1,500	1,500

Wall stem check - back reinf.

Wall check at the construction joint 1,20 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 438,0 mm²

Cross-section width = 1,00 m

Cross-section height = 0,36 m

Reinforcement ratio ρ = 0,24 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,03 m < 0,20 m = x_{max}

Ultimate shear force V_{Rd} = 135,28 kN > 23,27 kN = V_{Ed}

Ultimate moment M_{Rd} = 108,95 kNm > 9,52 kNm = M_{Ed}

Cross-section is SATISFACTORY.

Wall heel check

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	-0,20	8,40	0,78	1,350
Weight - earth wedge	0,00	-0,88	11,94	0,63	1,350
Active pressure	8,11	-0,53	7,90	0,97	1,350
Korisno opterecenje	5,26	-0,28	2,14	1,12	1,500
Contact stress	0,00	0,00	-33,81	0,70	1,000

Wall heel check

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 492,1 mm²

Cross-section width = 1,00 m

Cross-section height = 0,40 m

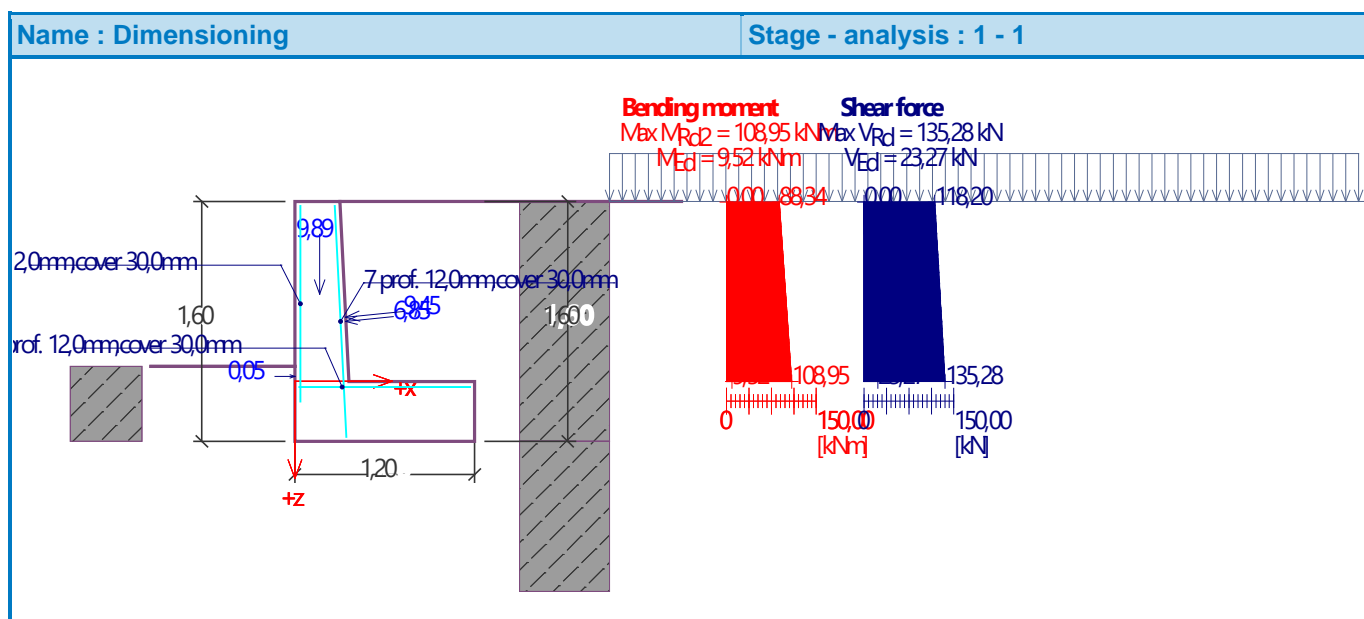
Reinforcement ratio ρ = 0,22 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,03 m < 0,22 m = x_{max}

Ultimate shear force V_{Rd} = 146,36 kN > 7,53 kN = V_{Ed}

Ultimate moment M_{Rd} = 121,74 kNm > 9,52 kNm = M_{Ed}

Cross-section is SATISFACTORY.



Dimensioning No. 2 (Stage of construction 1)

Wall stem check - front reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,58	9,89	0,17	1,350	1,350	1,000
FF resistance	-0,05	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	6,82	-0,40	0,68	0,34	1,350	1,350	1,350
Korisno opterecenje	9,41	-0,43	0,94	0,34	1,500	1,500	1,500

Wall stem check - front reinf.

Front reinforcement is not required.

Wall stem check - back reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,58	9,89	0,17	1,350	1,350	1,000
FF resistance	-0,05	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	6,82	-0,40	0,68	0,34	1,350	1,350	1,350
Korisno opterecenje	9,41	-0,43	0,94	0,34	1,500	1,500	1,500

Wall stem check - back reinf.

Wall check at the construction joint 1,20 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 438,0 mm²

Cross-section width = 1,00 m

Cross-section height = 0,36 m

Reinforcement ratio ρ = 0,24 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,03 m < 0,20 m = x_{max}

Ultimate shear force V_{Rd} = 135,28 kN > 23,27 kN = V_{Ed}

Ultimate moment M_{Rd} = 108,95 kNm > 9,52 kNm = M_{Ed}

Cross-section is SATISFACTORY.

Wall heel check

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	-0,20	8,40	0,78	1,350
Weight - earth wedge	0,00	-0,88	11,94	0,63	1,350

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	8,11	-0,53	7,90	0,97	1,350
Korisno opterecenje	5,26	-0,28	2,14	1,12	1,500
Contact stress	0,00	0,00	-33,81	0,70	1,000

Wall heel check

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 492,1 mm²

Cross-section width = 1,00 m

Cross-section height = 0,40 m

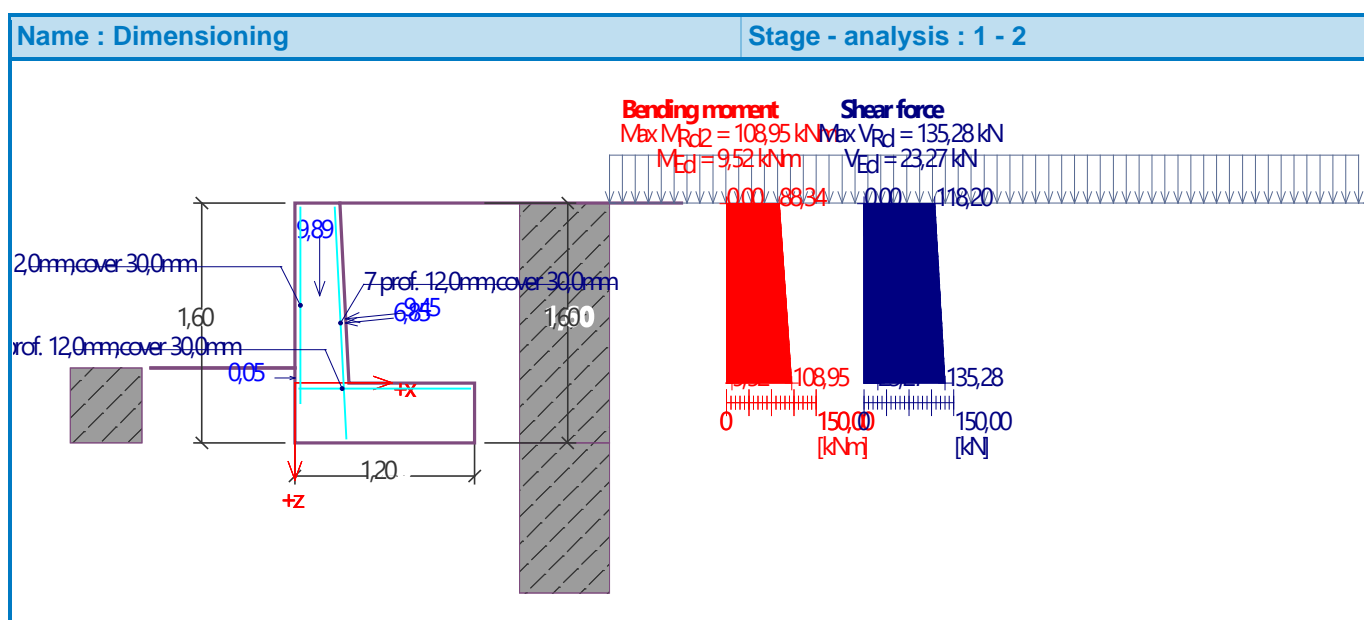
Reinforcement ratio $\rho = 0,22 \% > 0,14 \% = \rho_{min}$

Position of neutral axis $x = 0,03 \text{ m} < 0,22 \text{ m} = x_{max}$

Ultimate shear force $V_{Rd} = 146,36 \text{ kN} > 7,53 \text{ kN} = V_{Ed}$

Ultimate moment $M_{Rd} = 121,74 \text{ kNm} > 9,52 \text{ kNm} = M_{Ed}$

Cross-section is **SATISFACTORY**.



Dimensioning No. 3 (Stage of construction 1)

Wall stem check - front reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,58	9,89	0,17	1,350	1,350	1,000
FF resistance	-0,05	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	6,82	-0,40	0,68	0,34	1,350	1,350	1,350
Korisno opterecenje	9,41	-0,43	0,94	0,34	1,500	1,500	1,500

Wall stem check - front reinf.

Front reinforcement is not required.

Wall stem check - back reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,58	9,89	0,17	1,350	1,350	1,000
FF resistance	-0,05	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	6,82	-0,40	0,68	0,34	1,350	1,350	1,350
Korisno opterecenje	9,41	-0,43	0,94	0,34	1,500	1,500	1,500

Wall stem check - back reinf.

Wall check at the construction joint 1,20 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 438,0 mm²

Cross-section width = 1,00 m

Cross-section height = 0,36 m

Reinforcement ratio ρ = 0,24 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,03 m < 0,20 m = x_{max}

Ultimate shear force V_{Rd} = 135,28 kN > 23,27 kN = V_{Ed}

Ultimate moment M_{Rd} = 108,95 kNm > 9,52 kNm = M_{Ed}

Cross-section is SATISFACTORY.

Wall heel check

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	-0,20	8,40	0,78	1,350
Weight - earth wedge	0,00	-0,88	11,94	0,63	1,350
Active pressure	8,11	-0,53	7,90	0,97	1,350

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Korisno opterecenje	5,26	-0,28	2,14	1,12	1,500
Contact stress	0,00	0,00	-33,81	0,70	1,000

Wall heel check

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 492,1 mm²

Cross-section width = 1,00 m

Cross-section height = 0,40 m

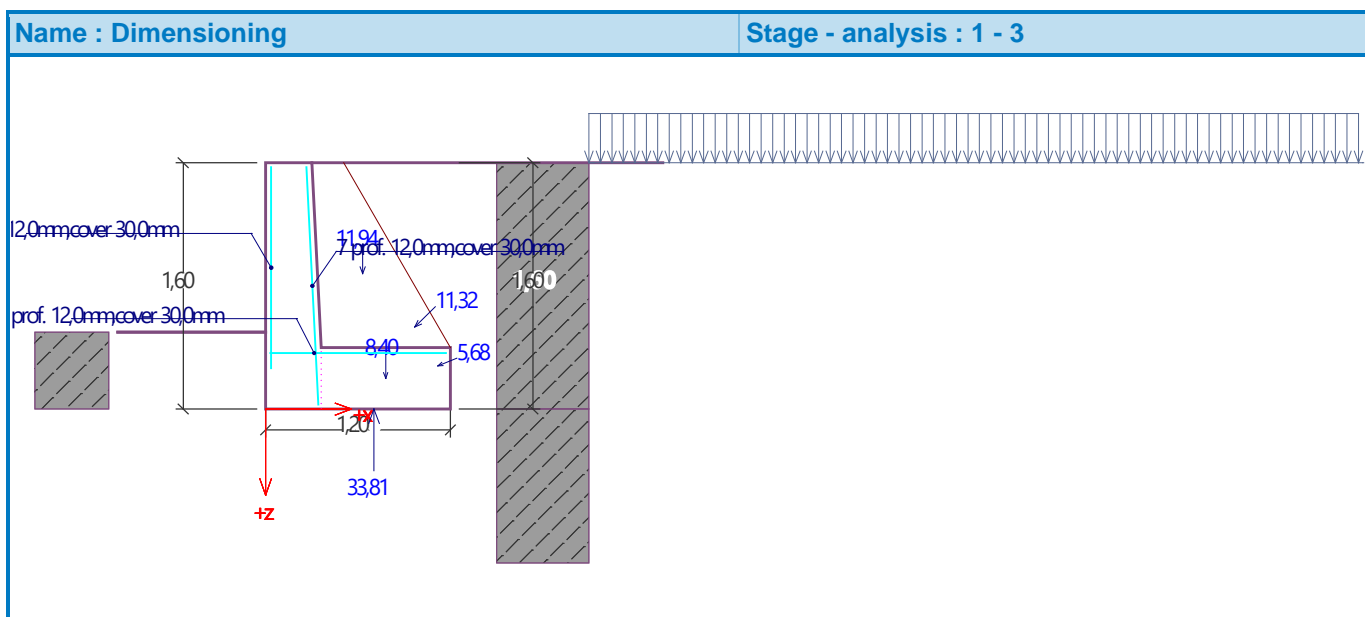
Reinforcement ratio ρ = 0,22 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,03 m < 0,22 m = x_{max}

Ultimate shear force V_{Rd} = 146,36 kN > 7,53 kN = V_{Ed}

Ultimate moment M_{Rd} = 121,74 kNm > 9,52 kNm = M_{Ed}



Cross-section is SATISFACTORY.



Input data (Stage of construction 2)

Geological profile and assigned soils

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No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	1,60	0,00 .. 1,60	zasip	
2	-	1,60 .. ∞	temeljno tlo	

Foundation

Type of foundation : soil from geological profile

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	No	No	variable	30,00		1,80	5,00	on terrain

No.	Name
1	Korisno opterecenje

Resistance on front face of the structure

Resistance on front face of the structure: at rest

Soil on front face of the structure - zasip

Soil thickness in front of structure $h = 0,50$ m

Terrain in front of structure is flat.

Earthquake

Factor of horizontal acceleration $K_h = 0,2760$

Factor of vertical acceleration $K_v = 0,0000$

Water below the GWT is restricted.

Settings of the stage of construction

Design situation : seismic

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

Verification No. 1 (Stage of construction 2)

15

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. overtur.	Coeff. sliding	Coeff. stress
Weight - wall	0,00	-0,55	21,90	0,40	1,000	1,000	1,000
Earthq.- constr.	6,04	-0,55	0,00	0,40	1,000	1,000	1,000
FF resistance	-1,19	-0,17	0,00	0,00	1,000	1,000	1,000
Weight - earth wedge	0,00	-0,88	11,94	0,63	1,000	1,000	1,000
Earthquake - soil wedge	3,29	-0,88	0,00	0,63	1,000	1,000	1,000
Active pressure	8,11	-0,53	7,90	0,97	1,000	1,000	1,000
Earthq.- act.pressure	7,28	-1,08	12,05	0,78	1,000	1,000	1,000
Korisno opterecenje	5,26	-0,28	2,14	1,12	0,700	0,700	0,700

Verification of complete wall

Check for overturning stability

Resisting moment $M_{res} = 35,14$ kNm/m

Overturning moment $M_{ovr} = 19,28$ kNm/m

Wall for overturning is SATISFACTORY

Check for slip

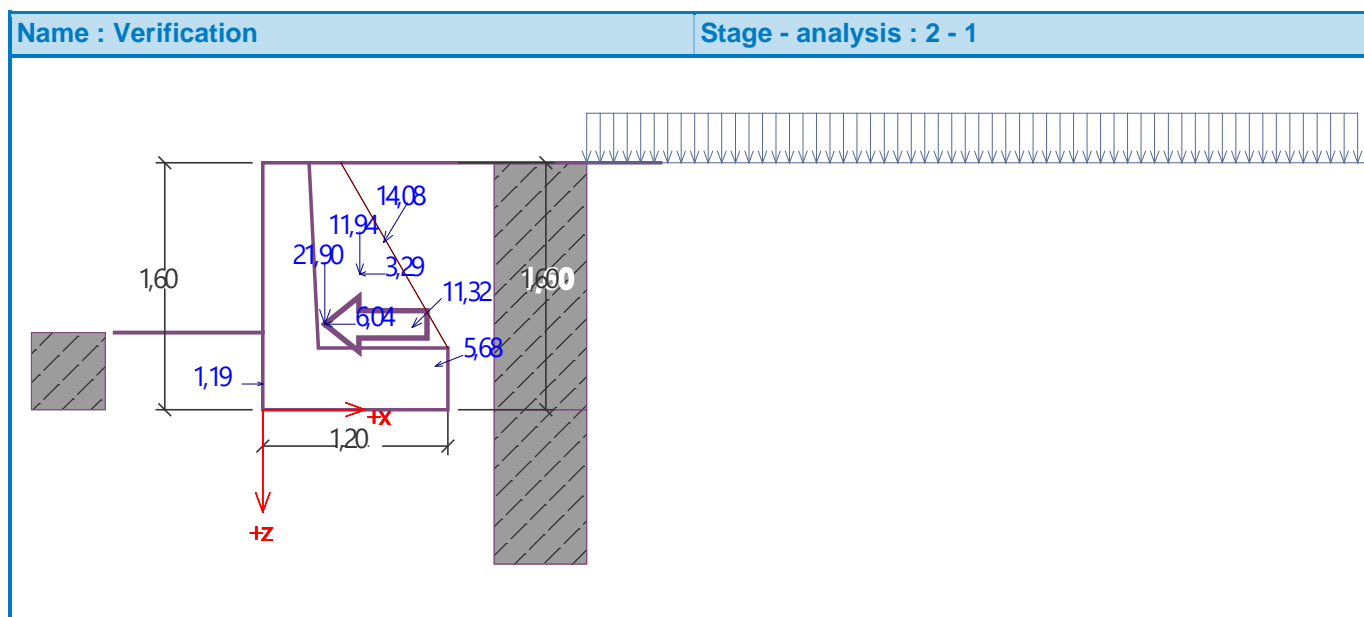
Resisting horizontal force $H_{res} = 31,92$ kN/m

Active horizontal force $H_{act} = 27,22$ kN/m

Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 96,36 kPa



Bearing capacity of foundation soil (Stage of construction 2)

Design load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]	Eccentricity [-]	Stress [kPa]
1	17,31	55,29	27,22	0,261	96,36

Service load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	17,42	55,93	28,80

Verification of foundation soil

Stress in the footing bottom : trapezoid

Eccentricity verification

Max. eccentricity of normal force $e = 0,261$

Maximum allowable eccentricity $e_{alw} = 0,333$

Eccentricity of the normal force is SATISFACTORY

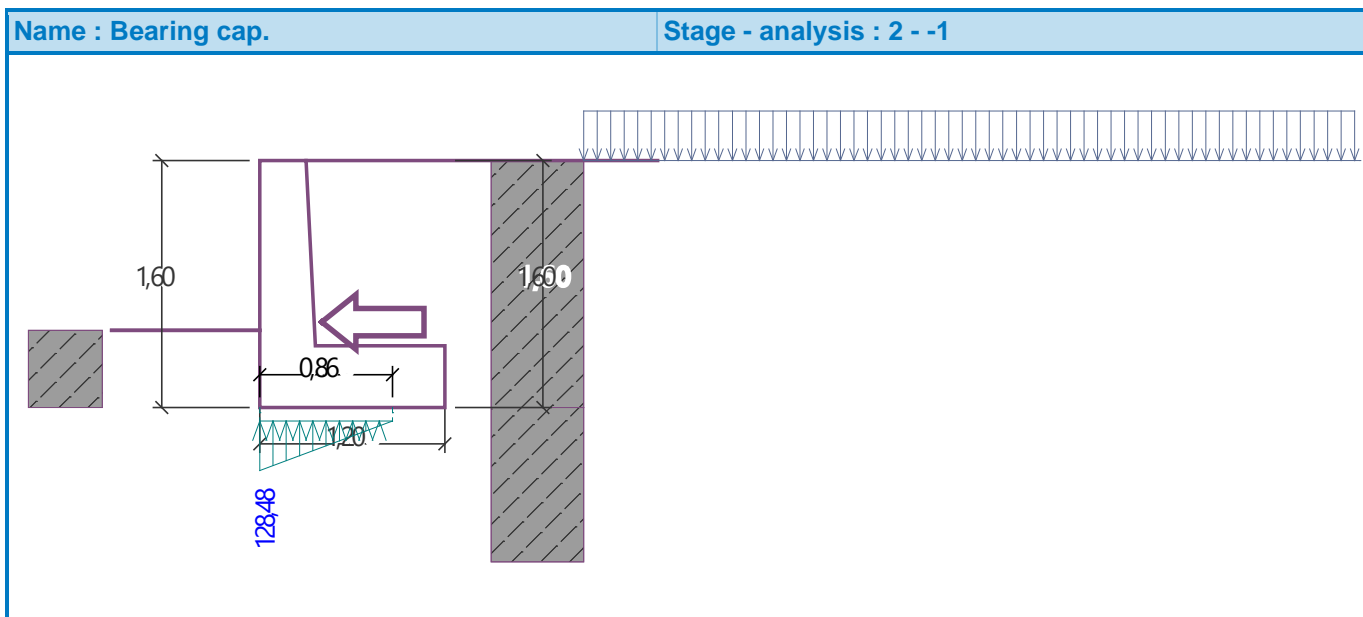
Verification of bearing capacity

Max. stress at footing bottom $\sigma = 128,48 \text{ kPa}$

Bearing capacity of foundation soil $R_d = 215,00 \text{ kPa}$

Bearing capacity of foundation soil is SATISFACTORY

Overall verification - bearing capacity of found. soil is SATISFACTORY



Dimensioning No. 1 (Stage of construction 2)

Wall stem check - front reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,58	9,89	0,17	1,000	1,000	1,000
Earthq.- constr.	2,73	-0,58	0,00	0,17	1,000	1,000	1,000
FF resistance	-0,05	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	6,82	-0,40	0,68	0,34	1,000	1,000	1,000
Earthquake - pressure at rest	7,54	-0,60	0,00	0,30	1,000	1,000	1,000
Korisno opterecenje	9,41	-0,43	0,94	0,34	0,700	0,700	0,700

Wall stem check - front reinf.

Front reinforcement is not required.

Wall stem check - back reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,58	9,89	0,17	1,000	1,000	1,000
Earthq.- constr.	2,73	-0,58	0,00	0,17	1,000	1,000	1,000
FF resistance	-0,05	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	6,82	-0,40	0,68	0,34	1,000	1,000	1,000
Earthquake - pressure at rest	7,54	-0,60	0,00	0,30	1,000	1,000	1,000
Korisno opterecenje	9,41	-0,43	0,94	0,34	0,700	0,700	0,700

Wall stem check - back reinf.

Wall check at the construction joint 1,20 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 438,0 mm²

Cross-section width = 1,00 m

Cross-section height = 0,36 m

Reinforcement ratio ρ = 0,24 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,03 m < 0,20 m = x_{max}

Ultimate shear force V_{Rd} = 135,28 kN > 23,62 kN = V_{Ed}

Ultimate moment M_{Rd} = 108,95 kNm > 11,56 kNm = M_{Ed}

Cross-section is SATISFACTORY.

Wall heel check

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	-0,20	8,40	0,78	1,000
Weight - earth wedge	0,00	-0,88	11,94	0,63	1,000
Active pressure	8,11	-0,53	7,90	0,97	1,000
Korisno opterecenje	5,26	-0,28	2,14	1,12	0,700
Contact stress	0,00	0,00	-18,71	0,53	1,000

Wall heel check

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 492,1 mm²

Cross-section width = 1,00 m

Cross-section height = 0,40 m

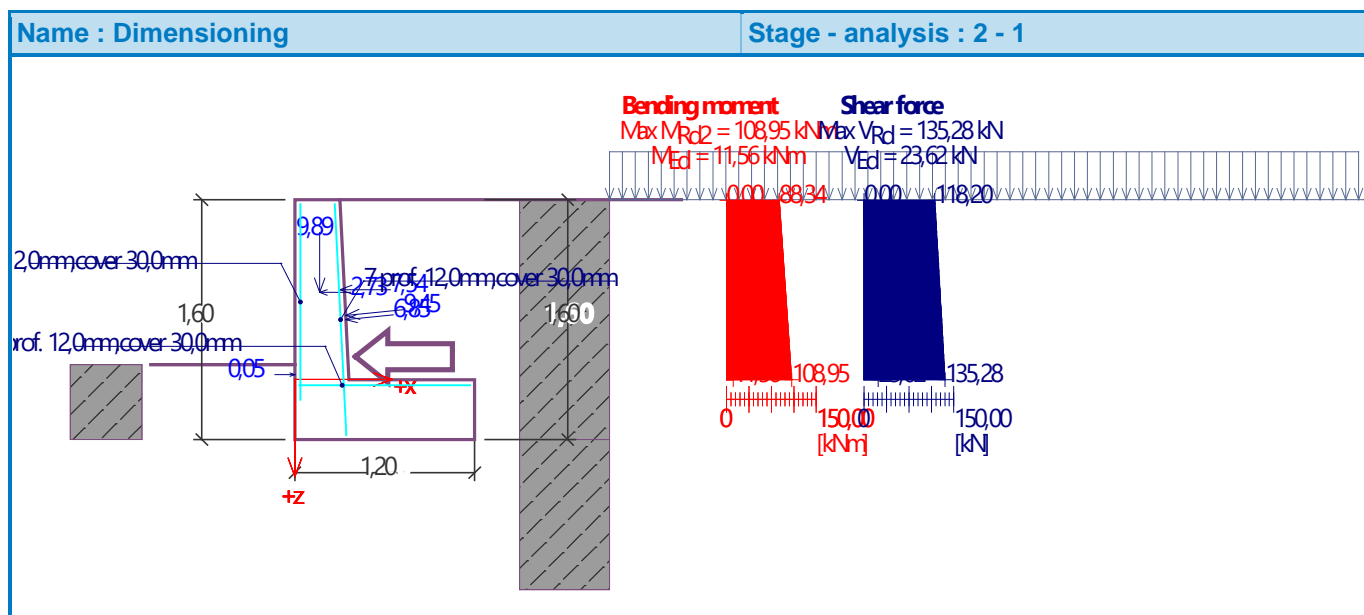
Reinforcement ratio $\rho = 0,22 \% > 0,14 \% = \rho_{min}$

Position of neutral axis $x = 0,03 \text{ m} < 0,22 \text{ m} = x_{max}$

Ultimate shear force $V_{Rd} = 146,36 \text{ kN} > 11,03 \text{ kN} = V_{Ed}$

Ultimate moment $M_{Rd} = 121,74 \text{ kNm} > 11,56 \text{ kNm} = M_{Ed}$

Cross-section is **SATISFACTORY**.



Dimensioning No. 2 (Stage of construction 2)

Wall stem check - front reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,58	9,89	0,17	1,000	1,000	1,000
Earthq.- constr.	2,73	-0,58	0,00	0,17	1,000	1,000	1,000
FF resistance	-0,05	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	6,82	-0,40	0,68	0,34	1,000	1,000	1,000
Earthquake - pressure at rest	7,54	-0,60	0,00	0,30	1,000	1,000	1,000
Korisno opterecenje	9,41	-0,43	0,94	0,34	0,700	0,700	0,700

Wall stem check - front reinf.

Front reinforcement is not required.

Wall stem check - back reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,58	9,89	0,17	1,000	1,000	1,000
Earthq.- constr.	2,73	-0,58	0,00	0,17	1,000	1,000	1,000
FF resistance	-0,05	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	6,82	-0,40	0,68	0,34	1,000	1,000	1,000
Earthquake - pressure at rest	7,54	-0,60	0,00	0,30	1,000	1,000	1,000
Korisno opterecenje	9,41	-0,43	0,94	0,34	0,700	0,700	0,700

Wall stem check - back reinf.

Wall check at the construction joint 1,20 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 438,0 mm²

Cross-section width = 1,00 m

Cross-section height = 0,36 m

Reinforcement ratio ρ = 0,24 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,03 m < 0,20 m = x_{max}

Ultimate shear force V_{Rd} = 135,28 kN > 23,62 kN = V_{Ed}

Ultimate moment M_{Rd} = 108,95 kNm > 11,56 kNm = M_{Ed}

Cross-section is SATISFACTORY.

Wall heel check

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	-0,20	8,40	0,78	1,000
Weight - earth wedge	0,00	-0,88	11,94	0,63	1,000
Active pressure	8,11	-0,53	7,90	0,97	1,000
Korisno opterećenje	5,26	-0,28	2,14	1,12	0,700
Contact stress	0,00	0,00	-18,71	0,53	1,000

Wall heel check

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 492,1 mm²

Cross-section width = 1,00 m

Cross-section height = 0,40 m

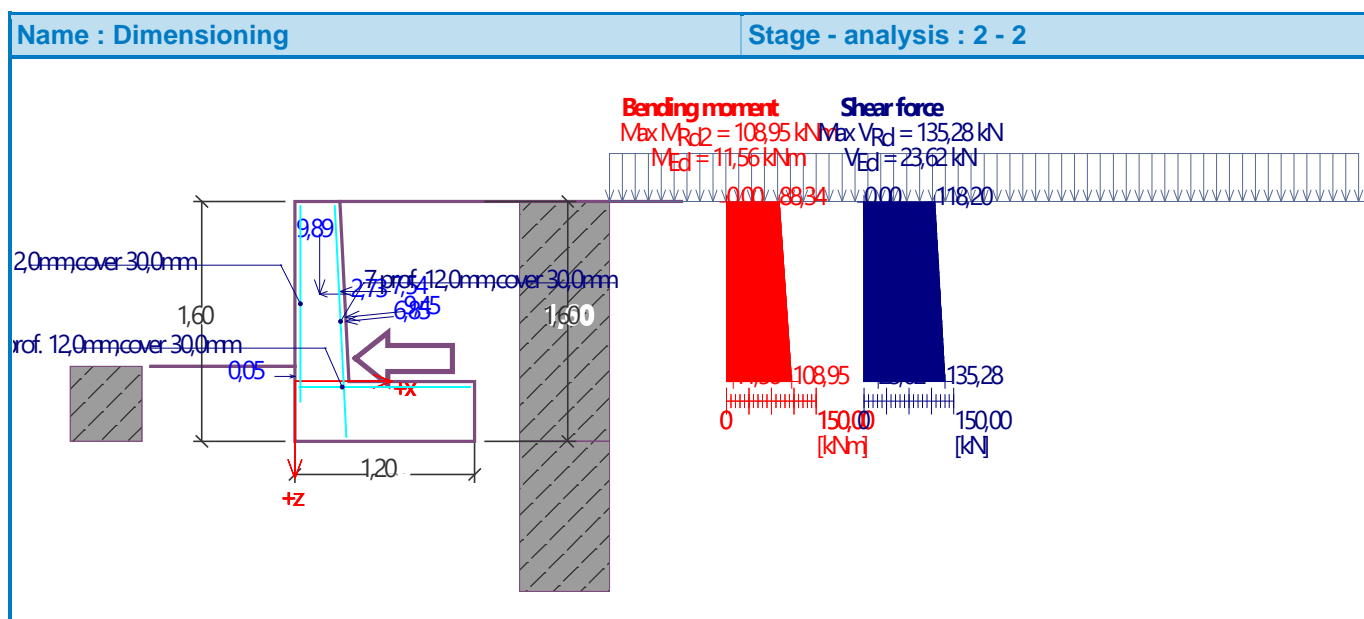
Reinforcement ratio $\rho = 0,22 \% > 0,14 \% = \rho_{min}$

Position of neutral axis $x = 0,03 \text{ m} < 0,22 \text{ m} = x_{max}$

Ultimate shear force $V_{Rd} = 146,36 \text{ kN} > 11,03 \text{ kN} = V_{Ed}$

Ultimate moment $M_{Rd} = 121,74 \text{ kNm} > 11,56 \text{ kNm} = M_{Ed}$

Cross-section is SATISFACTORY.



Dimensioning No. 3 (Stage of construction 2)

Wall stem check - front reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,58	9,89	0,17	1,000	1,000	1,000
Earthq.- constr.	2,73	-0,58	0,00	0,17	1,000	1,000	1,000
FF resistance	-0,05	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	6,82	-0,40	0,68	0,34	1,000	1,000	1,000
Earthquake - pressure at rest	7,54	-0,60	0,00	0,30	1,000	1,000	1,000
Korisno opterecenje	9,41	-0,43	0,94	0,34	0,700	0,700	0,700

Wall stem check - front reinf.

Front reinforcement is not required.

Wall stem check - back reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,58	9,89	0,17	1,000	1,000	1,000
Earthq.- constr.	2,73	-0,58	0,00	0,17	1,000	1,000	1,000
FF resistance	-0,05	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	6,82	-0,40	0,68	0,34	1,000	1,000	1,000
Earthquake - pressure at rest	7,54	-0,60	0,00	0,30	1,000	1,000	1,000
Korisno opterecenje	9,41	-0,43	0,94	0,34	0,700	0,700	0,700

Wall stem check - back reinf.

Wall check at the construction joint 1,20 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 438,0 mm²

Cross-section width = 1,00 m

Cross-section height = 0,36 m

Reinforcement ratio ρ = 0,24 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,03 m < 0,20 m = x_{max}

Ultimate shear force V_{Rd} = 135,28 kN > 23,62 kN = V_{Ed}

Ultimate moment M_{Rd} = 108,95 kNm > 11,56 kNm = M_{Ed}

Cross-section is SATISFACTORY.

Wall heel check

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	-0,20	8,40	0,78	1,000
Weight - earth wedge	0,00	-0,88	11,94	0,63	1,000
Active pressure	8,11	-0,53	7,90	0,97	1,000
Korisno opterecenje	5,26	-0,28	2,14	1,12	0,700
Contact stress	0,00	0,00	-18,71	0,53	1,000

Wall heel check

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 492,1 mm²

Cross-section width = 1,00 m

Cross-section height = 0,40 m

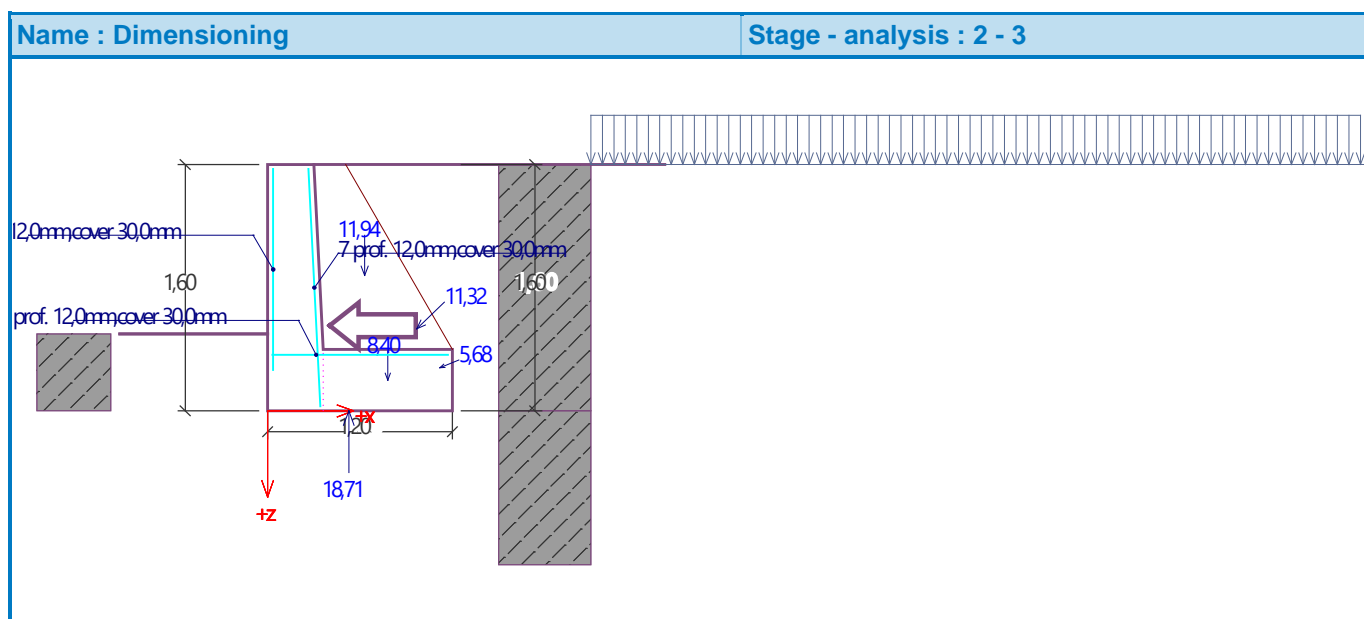
Reinforcement ratio $\rho = 0,22 \% > 0,14 \% = \rho_{min}$

Position of neutral axis $x = 0,03 \text{ m} < 0,22 \text{ m} = x_{max}$

Ultimate shear force $V_{Rd} = 146,36 \text{ kN} > 11,03 \text{ kN} = V_{Ed}$

Ultimate moment $M_{Rd} = 121,74 \text{ kNm} > 11,56 \text{ kNm} = M_{Ed}$

Cross-section is SATISFACTORY.



Karakteristike temelja i temeljnog tla

$c=$	25,00	$\gamma cM2=$	1,00		
$\rho=$	21,00	$\gamma \rho M2=$	1,00		
$\gamma t=$	19,00	$\gamma tM2=$	1,00		
		$H=$	17,23	kN	horizontalna sila u temelju
		$\vartheta=$	0,00		ugao dejstva horizontalne sile (0 u B pravcu, 90 u L pravcu)
$c'=$	25,00	$V=$	59,56	kN	vertikalna sila u temelju
$\rho'=$	21,00	$Df=$	0,50	[m]	dubina fundiranja
$\gamma' t=$	9,00	$\alpha=$	0,00		nagib temeljne površi
$tg(\rho)/\gamma \rho M2=$	0,38	$B=$	1,20	[m]	širina temelja
$ctg(\rho')=$	2,61	$L=$	5,00	[m]	dužina temelja
$\sin(\rho')=$	0,36	$eB=$	0,41	[m]	ekscentricitet L
$\cos(\rho')=$	0,93	$eL=$	0,00	[m]	ekscentricitet B
			B		pravac dejstva horizontalne sile
		$mB=$	1,93		
		$mL=$	0,00		
		$m=$	0,00		

Koeficijenti za nosivost po Vesiću

				$L' =$	5,00
$c' =$	25,00	$q' =$	4,50	$B' =$	0,38
$Nc =$	15,81	$Nq =$	7,07	$Ny =$	4,66
$bc =$	1,00	$bq =$	1,00	$by =$	1,00
$sc =$	1,03	$sq =$	1,03	$sy =$	0,98
$ic =$	0,47	$iq =$	0,55	$iy =$	0,40

Nosivost tla

$qf=$	$c' \cdot Nc \cdot bc \cdot sc \cdot ic + q' \cdot Nq \cdot bq \cdot sq \cdot iq + 0.5 \cdot \gamma t \cdot B' \cdot Ny \cdot by \cdot sy \cdot iy$				
$qf=$	214,76	kN/m ²			
Slijeganje iz Tower-a					
$s=$	0,006	m			
Koeficijent posteljice					
$ks=$	35792,77	kN/m ³			

Potporni zid B=1.40m

Input data

Project

Date : 28.11.2023.

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

Allowable eccentricity : 0,333

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 :	$\gamma_{Rv} =$	1,40	[-]
Partial factor on sliding resistance :	$\gamma_{Rh} =$	1,10	[-]
Partial factor on bearing capacity :	$\gamma_{Re} =$	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	[-]

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Partial factors for variable actions			
Permanent design situation			
Factor for quasi-permanent value :	$\psi_2 =$	0,30	[-]

Partial factors on actions (A)			
Seismic design situation			
		Unfavourable	Favourable
Permanent actions :	$\gamma_G =$	1,00 [-]	1,00 [-]
Variable actions :	$\gamma_Q =$	1,00 [-]	0,00 [-]
Water load :	$\gamma_w =$	1,00 [-]	

Partial factors for resistances (R)			
Seismic design situation			
Partial factor on overturning :	$\gamma_{Rv} =$	1,00	[-]
Partial factor on sliding resistance :	$\gamma_{Rh} =$	1,00	[-]
Partial factor on bearing capacity :	$\gamma_{Re} =$	1,00	[-]

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).

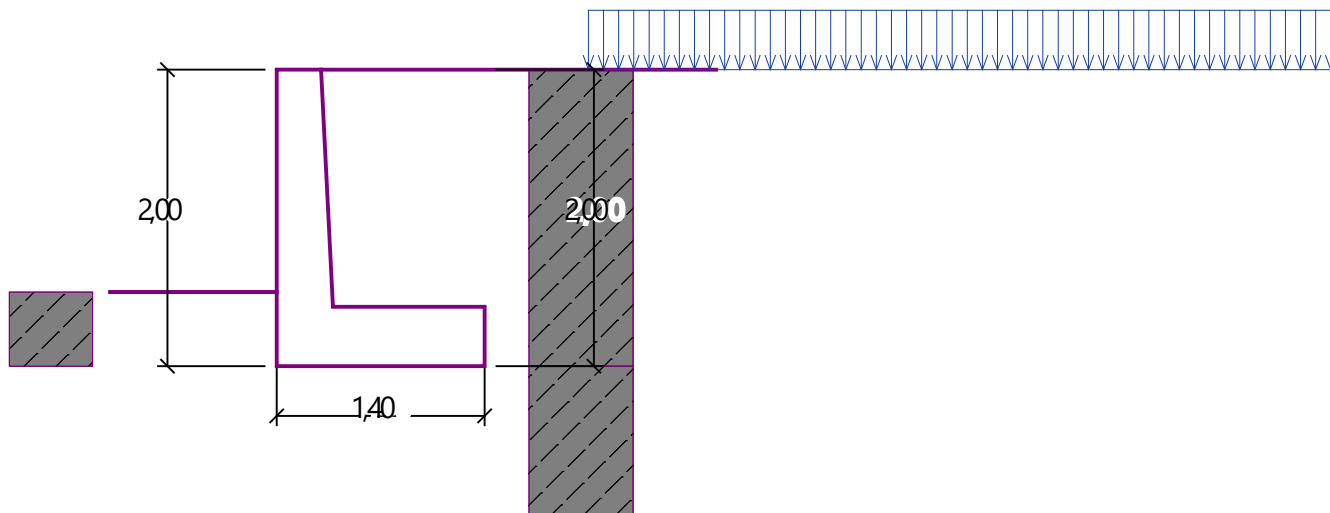
Concrete : C 20/25

Cylinder compressive strength $f_{ck} = 20,00 \text{ MPa}$

Tensile strength $f_{ctm} = 2,20 \text{ MPa}$

Longitudinal steel : B500

Yield strength $f_{yk} = 500,00 \text{ MPa}$



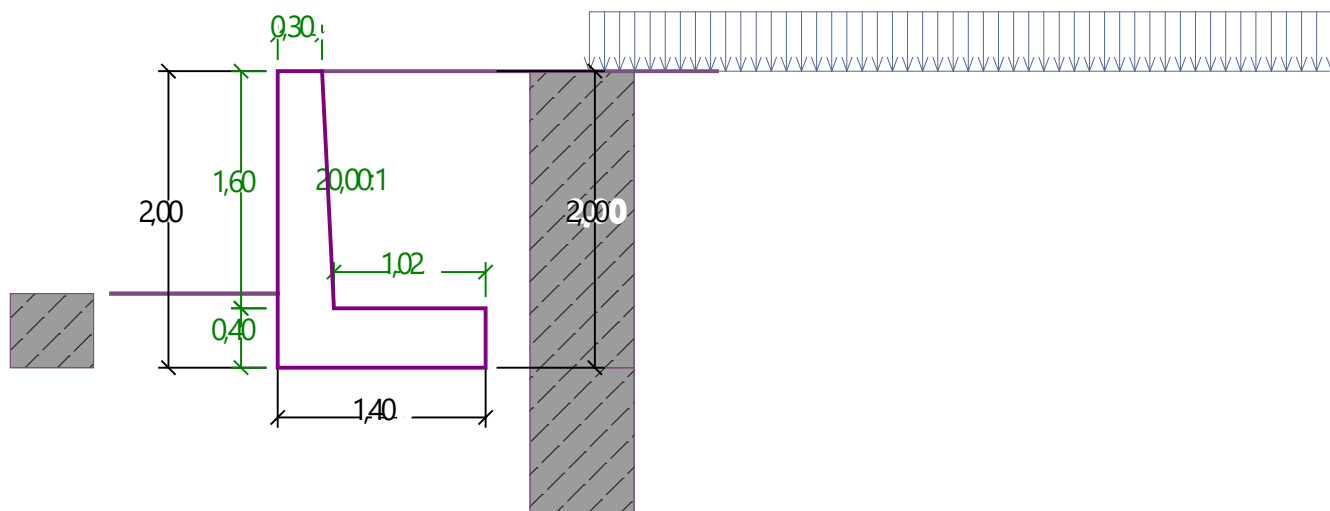
Geometry of structure

No.	Coordinate X [m]	Depth Z [m]
1	0,00	0,00
2	0,08	1,60
3	1,10	1,60
4	1,10	2,00
5	-0,30	2,00
6	-0,30	1,60
7	-0,30	0,00

The origin [0,0] is located at the most upper right point of the wall.
Wall section area = 1,10 m².

Name : Geometry

Stage - analysis : 1 - 0



Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]	γ_{su} [kN/m ³]	δ [°]
1	zasip		30,00	0,00	19,00	9,00	0,00
2	temeljno tlo		21,00	25,00	9,00	9,00	0,00

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

Soil parameters

zasip

Unit weight : $\gamma = 19,00 \text{ kN/m}^3$

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 : $\delta = 0,00^\circ$

Soil : cohesionless

Saturated unit weight : $\gamma_{sat} = 19,00 \text{ kN/m}^3$

temeljno tlo



Unit weight : $\gamma = 9,00 \text{ kN/m}^3$

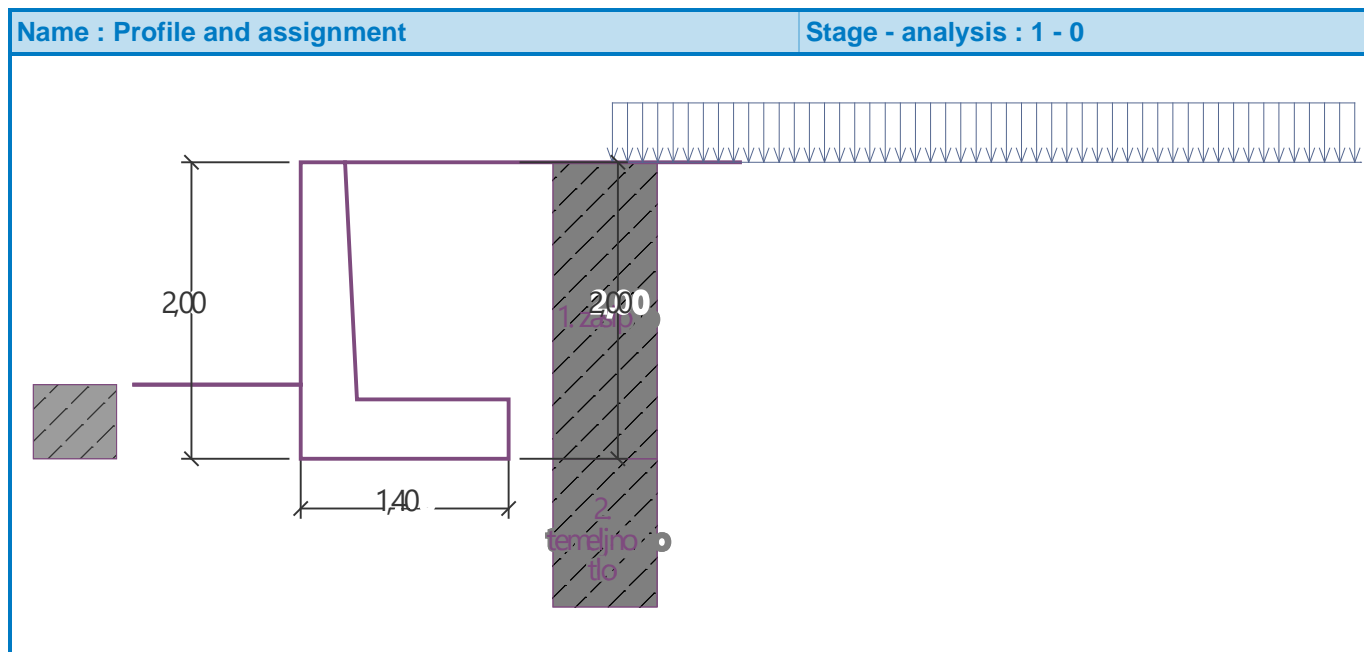
Stress-state : effective

Angle of internal friction : $\varphi_{ef} = 21,00^\circ$

Cohesion of soil : $c_{ef} = 25,00 \text{ kPa}$
 Angle of friction struc.-soil : $\delta = 0,00^\circ$
 Soil : cohesionless
 Saturated unit weight : $\gamma_{sat} = 19,00 \text{ kN/m}^3$

Geological profile and assigned soils

No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	2,00	0,00 .. 2,00	zasip	
2	-	2,00 .. ∞	temeljno tlo	



Foundation

Type of foundation : soil from geological profile

Terrain profile

Terrain behind the structure is flat.

Water influence

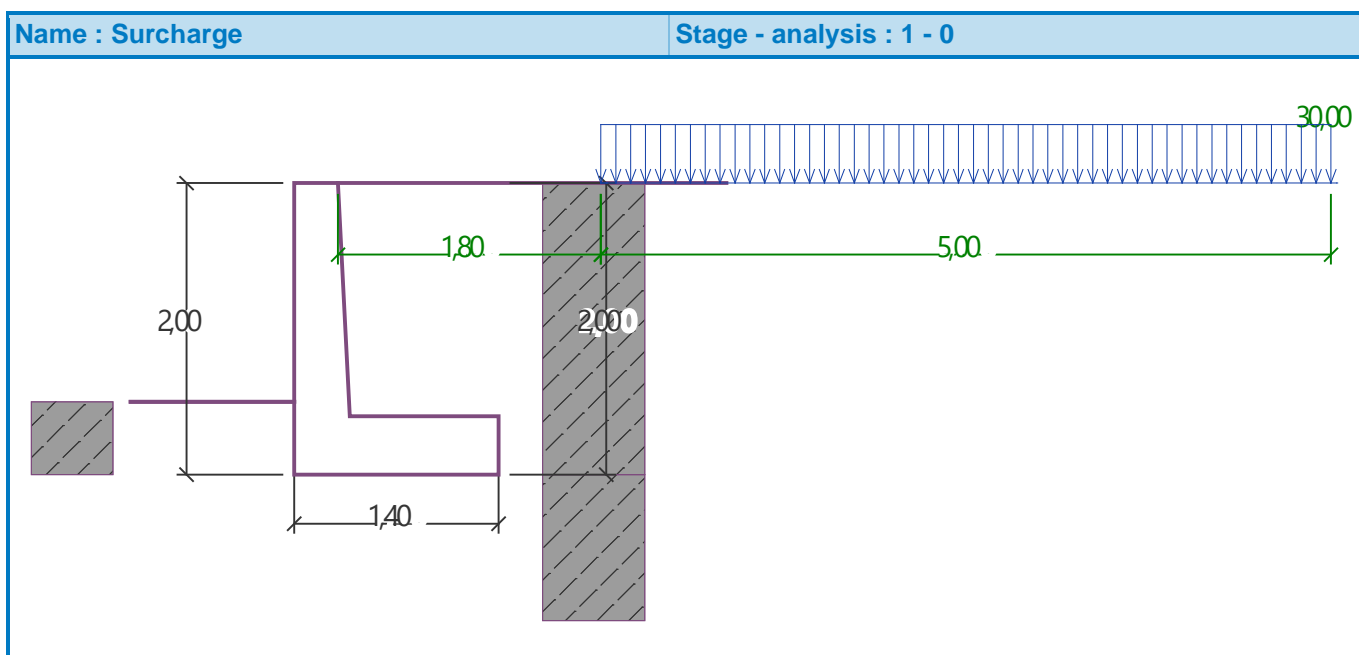
Ground water table is located below the structure.

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		variable	30,00		1,80	5,00	on terrain

No.	Name
1	korisno opterecenje



Resistance on front face of the structure

Resistance on front face of the structure: passive

Soil on front face of the structure - zasip

Angle of friction struc.-soil $\delta = 0,00^\circ$

Soil thickness in front of structure $h = 0,50$ m

Terrain in front of structure is flat.

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)

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. overtur.	Coeff. sliding	Coeff. stress
Weight - wall	0,00	-0,68	27,60	0,44	1,000	1,000	1,350
FF resistance	-7,12	-0,17	0,00	0,00	1,000	1,000	1,350
Weight - earth wedge	0,00	-1,01	18,18	0,70	1,000	1,000	1,350
Active pressure	12,67	-0,67	14,04	1,09	1,350	1,350	1,350
korisno opterecenje	6,86	-0,43	5,02	1,21	1,500	1,500	1,500

Verification of complete wall

Check for overturning stability

Resisting moment $M_{res} = 39,01 \text{ kNm/m}$

Overturning moment $M_{ovr} = 14,59 \text{ kNm/m}$

Wall for overturning is SATISFACTORY

Check for slip

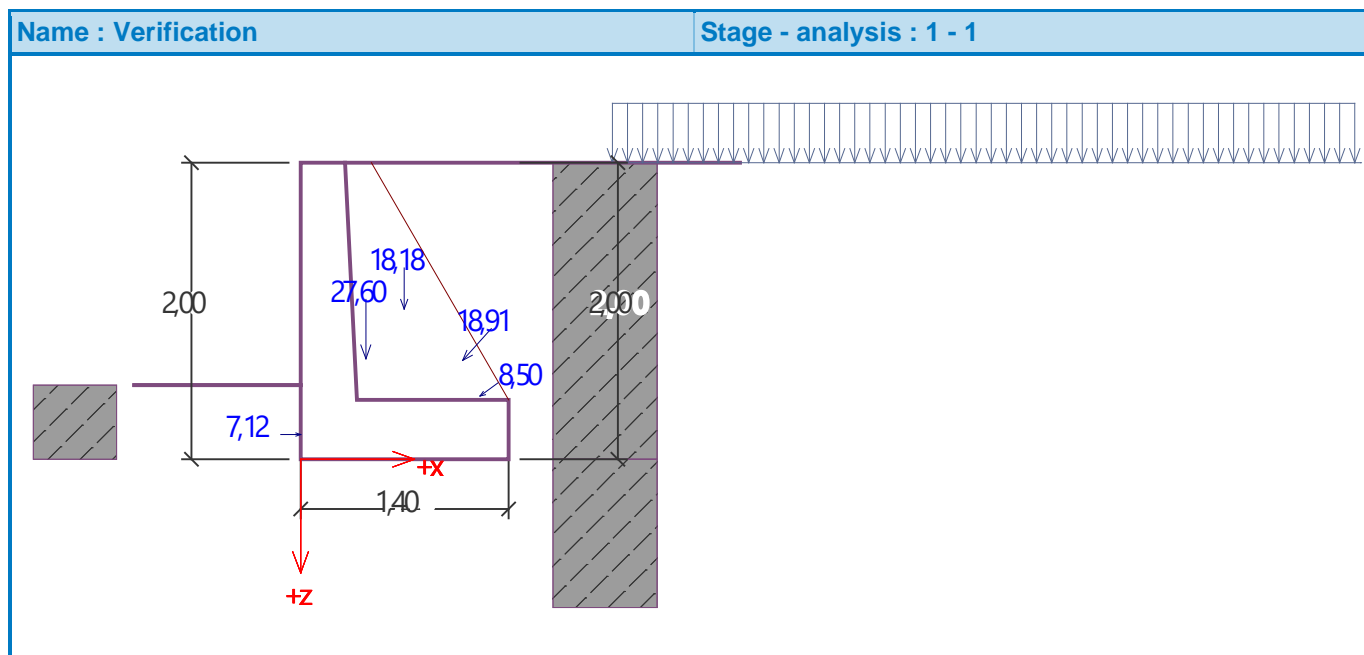
Resisting horizontal force $H_{res} = 37,93 \text{ kN/m}$

Active horizontal force $H_{act} = 20,27 \text{ kN/m}$

Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 79,35 kPa



Bearing capacity of foundation soil (Stage of construction 1)

Design load acting at the center of footing bottom

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No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]	Eccentricity [-]	Stress [kPa]
1	12,68	88,30	17,78	0,103	79,35
2	10,56	72,27	20,27	0,104	65,25

Service load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	9,35	64,85	12,41

Verification of foundation soil

Stress in the footing bottom : trapezoid

Eccentricity verification

Max. eccentricity of normal force $e = 0,104$

Maximum allowable eccentricity $e_{alw} = 0,333$

Eccentricity of the normal force is SATISFACTORY

Verification of bearing capacity

Bearing capacity of foundation soil $R = 308,00 \text{ kPa}$

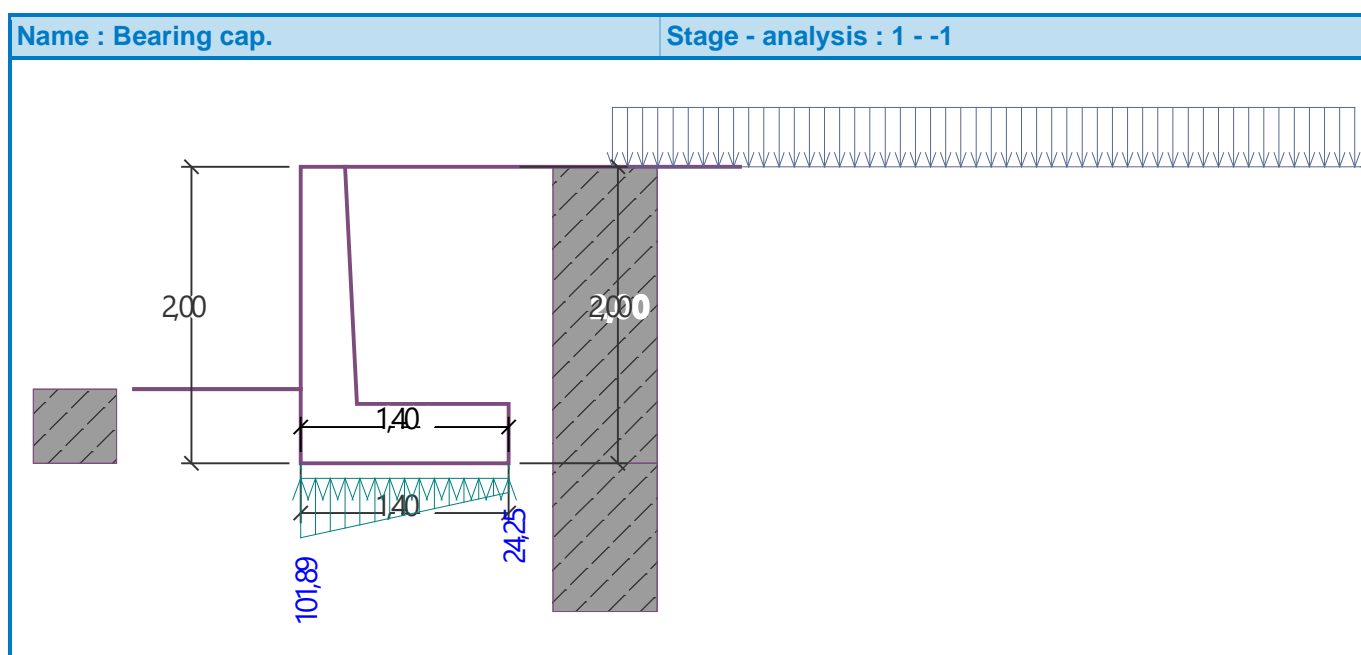
Partial factor on bearing capacity $\gamma_{Rv} = 1,40$

Max. stress at footing bottom $\sigma = 101,89 \text{ kPa}$

Bearing capacity of foundation soil $R_d = 220,00 \text{ kPa}$

Bearing capacity of foundation soil is SATISFACTORY

Overall verification - bearing capacity of found. soil is SATISFACTORY



Dimensioning No. 1 (Stage of construction 1)

Wall stem check - front reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,77	13,59	0,17	1,350	1,350	1,000
FF resistance	-0,28	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	12,13	-0,53	1,21	0,35	1,350	1,350	1,350
korisno opterecenje	15,05	-0,59	1,50	0,35	1,500	1,500	1,500

Wall stem check - front reinf.

Front reinforcement is not required.

Wall stem check - back reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,77	13,59	0,17	1,350	1,350	1,000
FF resistance	-0,28	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	12,13	-0,53	1,21	0,35	1,350	1,350	1,350
korisno opterecenje	15,05	-0,59	1,50	0,35	1,500	1,500	1,500

Wall stem check - back reinf.

Wall check at the construction joint 1,60 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 447,1 mm²

Cross-section width = 1,00 m

Cross-section height = 0,38 m

Reinforcement ratio ρ = 0,23 % > 0,13 % = ρ_{min}

Position of neutral axis x = 0,03 m < 0,21 m = x_{max}

Ultimate shear force V_{Rd} = 125,97 kN > 38,66 kN = V_{Ed}

Ultimate moment M_{Rd} = 114,17 kNm > 21,77 kNm = M_{Ed}

Cross-section is SATISFACTORY.

Wall heel check

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	-0,20	10,20	0,89	1,350
Weight - earth wedge	0,00	-1,01	18,18	0,70	1,350
Active pressure	12,67	-0,67	14,04	1,09	1,350
korisno opterećenje	6,86	-0,43	5,02	1,21	1,500
Contact stress	0,00	0,00	-53,58	0,80	1,000

Wall heel check

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 473,2 mm²

Cross-section width = 1,00 m

Cross-section height = 0,40 m

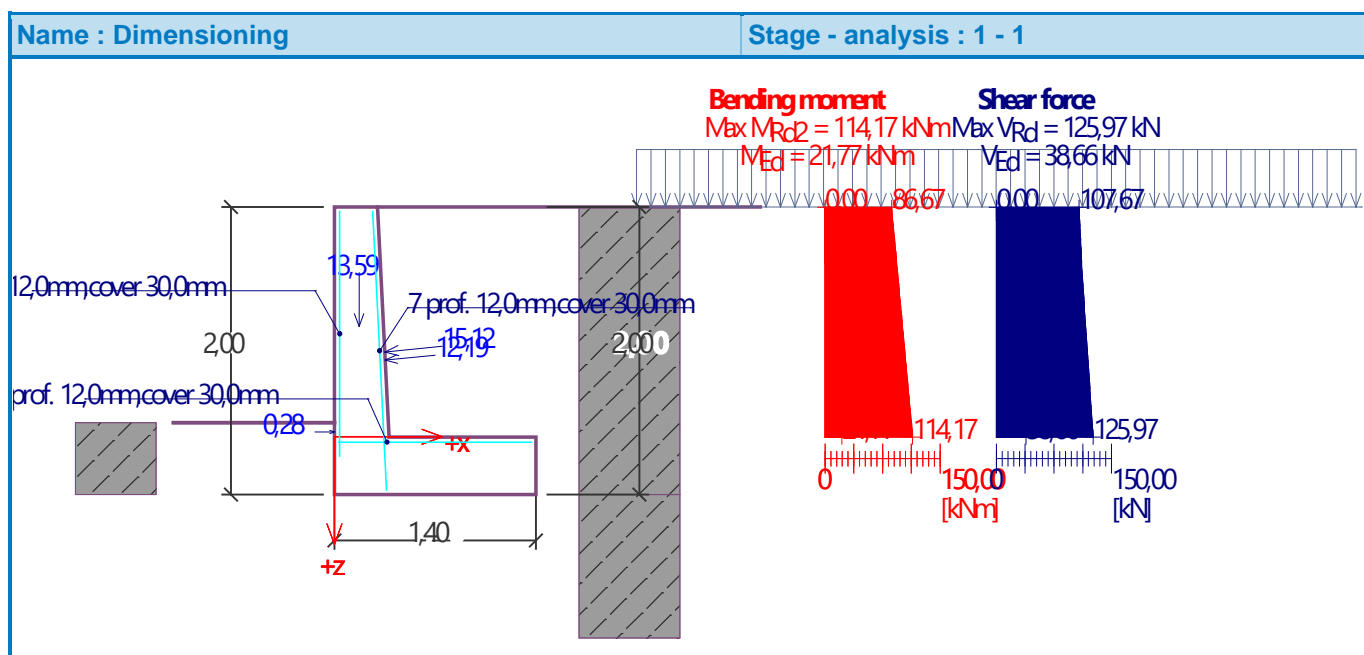
Reinforcement ratio ρ = 0,22 % > 0,13 % = ρ_{min}

Position of neutral axis x = 0,03 m < 0,22 m = x_{max}

Ultimate shear force V_{Rd} = 130,91 kN > 11,22 kN = V_{Ed}

Ultimate moment M_{Rd} = 120,85 kNm > 21,77 kNm = M_{Ed}

Cross-section is **SATISFACTORY**.



Dimensioning No. 2 (Stage of construction 1)

Wall stem check - front reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,77	13,59	0,17	1,350	1,350	1,000
FF resistance	-0,28	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	12,13	-0,53	1,21	0,35	1,350	1,350	1,350
korisno opterecenje	15,05	-0,59	1,50	0,35	1,500	1,500	1,500

Wall stem check - front reinf.

Front reinforcement is not required.

Wall stem check - back reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,77	13,59	0,17	1,350	1,350	1,000
FF resistance	-0,28	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	12,13	-0,53	1,21	0,35	1,350	1,350	1,350
korisno opterecenje	15,05	-0,59	1,50	0,35	1,500	1,500	1,500

Wall stem check - back reinf.

Wall check at the construction joint 1,60 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 447,1 mm²

Cross-section width = 1,00 m

Cross-section height = 0,38 m

Reinforcement ratio ρ = 0,23 % > 0,13 % = ρ_{min}

Position of neutral axis x = 0,03 m < 0,21 m = x_{max}

Ultimate shear force V_{Rd} = 125,97 kN > 38,66 kN = V_{Ed}

Ultimate moment M_{Rd} = 114,17 kNm > 21,77 kNm = M_{Ed}

Cross-section is SATISFACTORY.

Wall heel check

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	-0,20	10,20	0,89	1,350
Weight - earth wedge	0,00	-1,01	18,18	0,70	1,350

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
Active pressure	12,67	-0,67	14,04	1,09	1,350
korisno opterecenje	6,86	-0,43	5,02	1,21	1,500
Contact stress	0,00	0,00	-53,58	0,80	1,000

Wall heel check

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 473,2 mm²

Cross-section width = 1,00 m

Cross-section height = 0,40 m

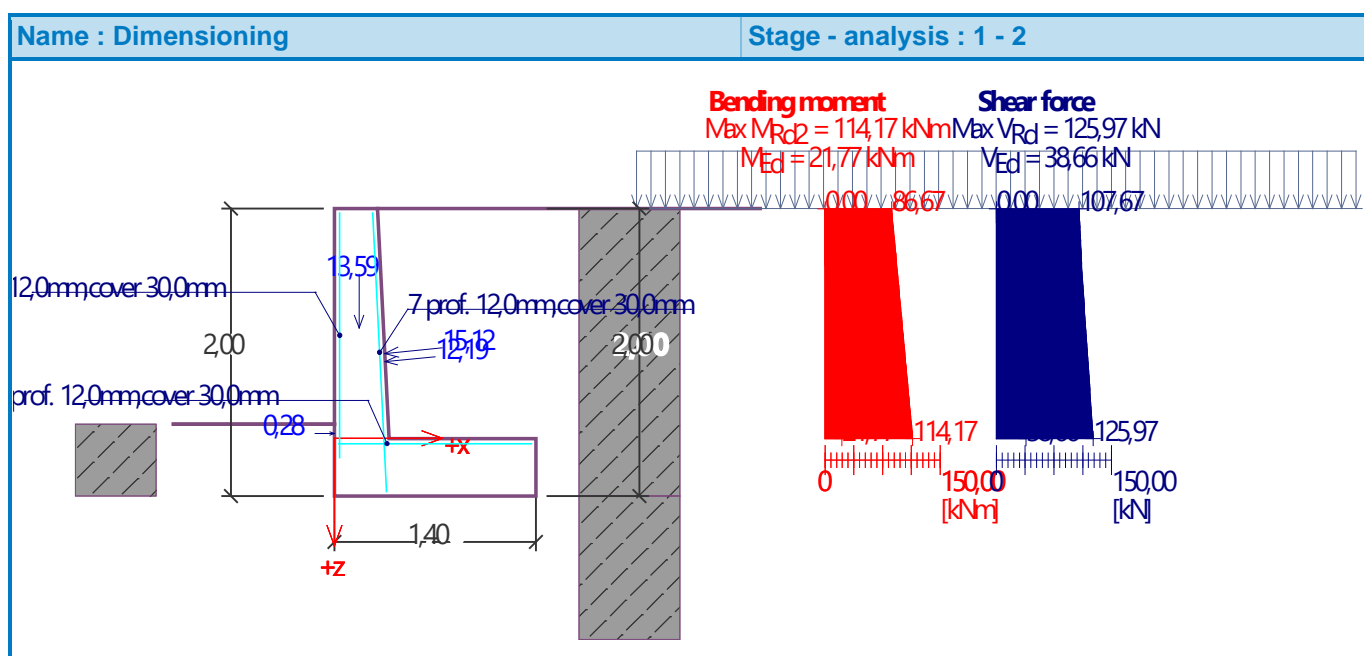
Reinforcement ratio $\rho = 0,22 \% > 0,13 \% = \rho_{min}$

Position of neutral axis $x = 0,03 \text{ m} < 0,22 \text{ m} = x_{max}$

Ultimate shear force $V_{Rd} = 130,91 \text{ kN} > 11,22 \text{ kN} = V_{Ed}$

Ultimate moment $M_{Rd} = 120,85 \text{ kNm} > 21,77 \text{ kNm} = M_{Ed}$

Cross-section is **SATISFACTORY**.



Dimensioning No. 3 (Stage of construction 1)

Wall stem check - front reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,77	13,59	0,17	1,350	1,350	1,000
FF resistance	-0,28	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	12,13	-0,53	1,21	0,35	1,350	1,350	1,350
korisno opterecenje	15,05	-0,59	1,50	0,35	1,500	1,500	1,500

Wall stem check - front reinf.

Front reinforcement is not required.

Wall stem check - back reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,77	13,59	0,17	1,350	1,350	1,000
FF resistance	-0,28	-0,03	0,00	0,00	1,000	1,000	1,000
Pressure at rest	12,13	-0,53	1,21	0,35	1,350	1,350	1,350
korisno opterecenje	15,05	-0,59	1,50	0,35	1,500	1,500	1,500

Wall stem check - back reinf.

Wall check at the construction joint 1,60 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 447,1 mm²

Cross-section width = 1,00 m

Cross-section height = 0,38 m

Reinforcement ratio ρ = 0,23 % > 0,13 % = ρ_{min}

Position of neutral axis x = 0,03 m < 0,21 m = x_{max}

Ultimate shear force V_{Rd} = 125,97 kN > 38,66 kN = V_{Ed}

Ultimate moment M_{Rd} = 114,17 kNm > 21,77 kNm = M_{Ed}

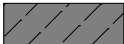
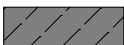
Cross-section is SATISFACTORY.

Wall heel check

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	-0,20	10,20	0,89	1,350
Weight - earth wedge	0,00	-1,01	18,18	0,70	1,350
Active pressure	12,67	-0,67	14,04	1,09	1,350

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No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	2,00	0,00 .. 2,00	zasip	
2	-	2,00 .. ∞	temeljno tlo	

Foundation

Type of foundation : soil from geological profile

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	No	No	variable	30,00		1,80	5,00	on terrain

No.	Name
1	korisno opterecenje

Resistance on front face of the structure

Resistance on front face of the structure: passive

Soil on front face of the structure - zasip

Angle of friction struc.-soil $\delta = 0,00^\circ$

Soil thickness in front of structure $h = 0,50$ m

Terrain in front of structure is flat.

Earthquake

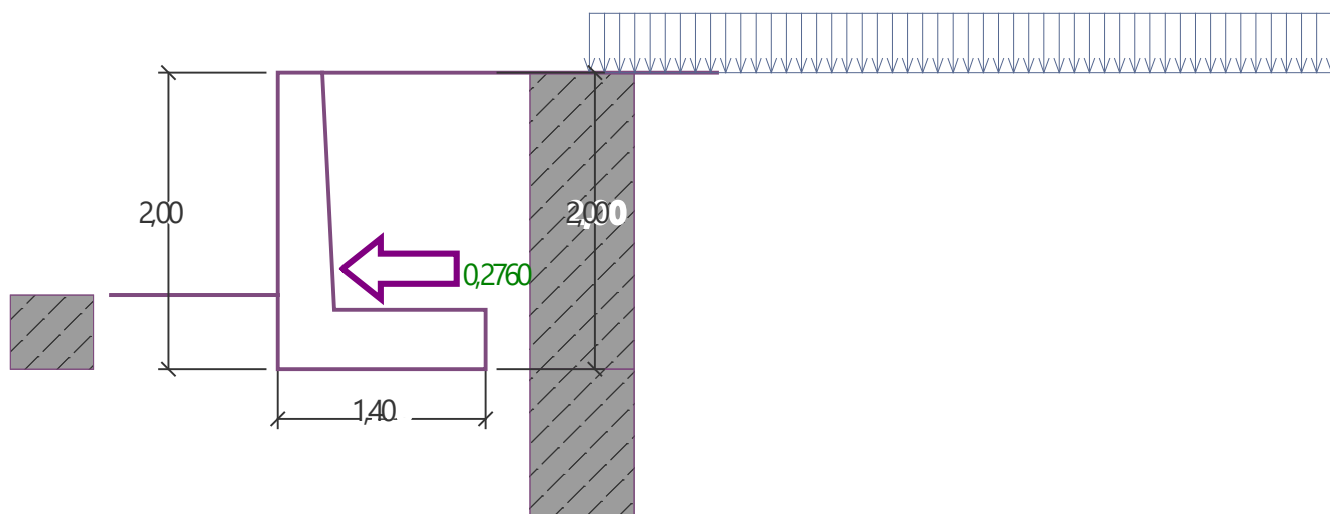
Factor of horizontal acceleration $K_h = 0,2760$

Factor of vertical acceleration $K_v = 0,0000$

Water below the GWT is restricted.

Name : Earthquake

Stage - analysis : 2 - 0



Settings of the stage of construction

Design situation : seismic

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

Verification No. 1 (Stage of construction 2)

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. overtur.	Coeff. sliding	Coeff. stress
Weight - wall	0,00	-0,68	27,60	0,44	1,000	1,000	1,000
Earthq.- constr.	7,62	-0,68	0,00	0,44	1,000	1,000	1,000
FF resistance	-7,12	-0,17	0,00	0,00	1,000	1,000	1,000
Earthq.- face	1,26	-0,33	0,00	0,00	1,000	1,000	1,000
Weight - earth wedge	0,00	-1,01	18,18	0,70	1,000	1,000	1,000
Earthquake - soil wedge	5,02	-1,01	0,00	0,70	1,000	1,000	1,000
Active pressure	12,67	-0,67	14,04	1,09	1,000	1,000	1,000
Earthq.- act.pressure	11,45	-1,35	19,29	0,84	1,000	1,000	1,000
korisno opterecenje	6,86	-0,43	5,02	1,21	0,700	0,700	0,700

Verification of complete wall

Check for overturning stability

Resisting moment $M_{res} = 60,51$ kNm/m

Overturning moment $M_{ovr} = 35,38$ kNm/m

Wall for overturning is **SATISFACTORY**

Check for slip

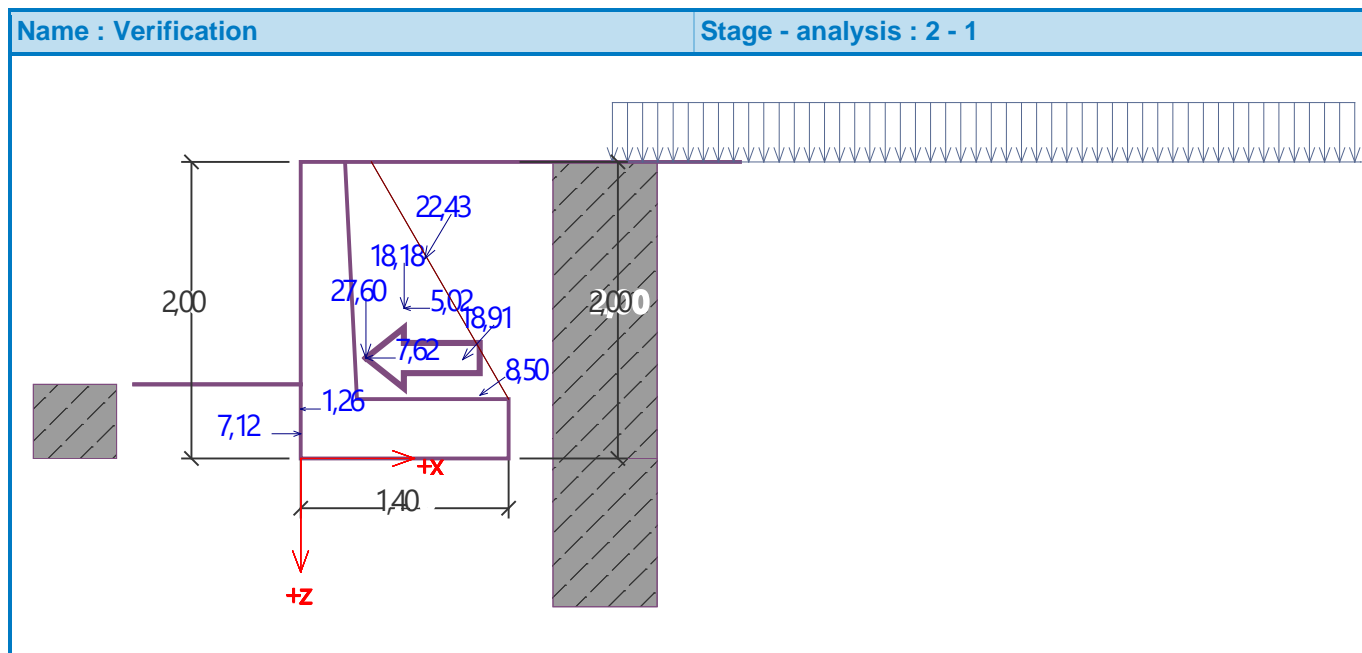
Resisting horizontal force $H_{res} = 47,70 \text{ kN/m}$

Active horizontal force $H_{act} = 35,70 \text{ kN/m}$

Wall for slip is **SATISFACTORY**

Overall check - **WALL is SATISFACTORY**

Maximum stress in footing bottom : 135,86 kPa



Bearing capacity of foundation soil (Stage of construction 2)

Design load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]	Eccentricity [-]	Stress [kPa]
1	32,71	82,62	35,70	0,283	135,86

Service load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	32,82	84,13	37,76

Verification of foundation soil

Stress in the footing bottom : trapezoid

Eccentricity verification

Max. eccentricity of normal force $e = 0,283$

Maximum allowable eccentricity $e_{alw} = 0,333$

Eccentricity of the normal force is SATISFACTORY

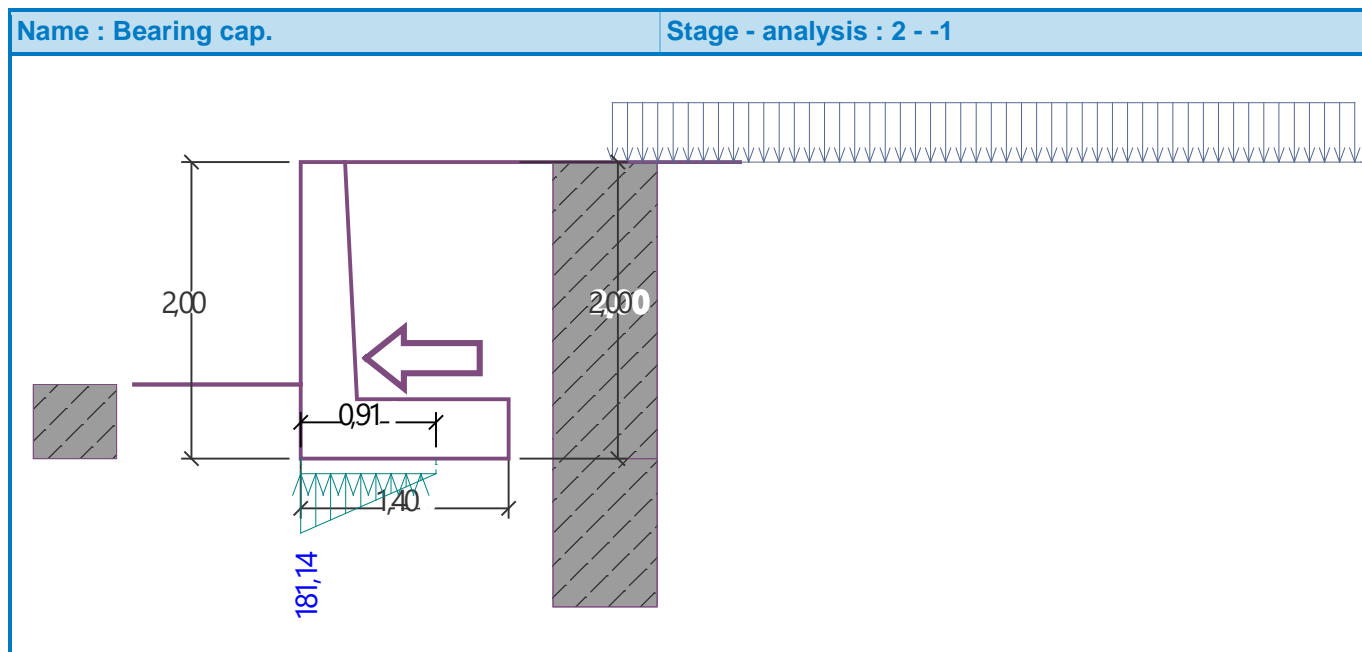
Verification of bearing capacity

Max. stress at footing bottom $\sigma = 181,14 \text{ kPa}$

Bearing capacity of foundation soil $R_d = 308,00 \text{ kPa}$

Bearing capacity of foundation soil is SATISFACTORY

Overall verification - bearing capacity of found. soil is SATISFACTORY



Dimensioning No. 1 (Stage of construction 2)

Wall stem check - front reinf.

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,77	13,59	0,17	1,000	1,000	1,000
Earthq.- constr.	3,75	-0,77	0,00	0,17	1,000	1,000	1,000
FF resistance	-0,28	-0,03	0,00	0,00	1,000	1,000	1,000
Earthq.- face	0,05	-0,07	0,00	0,00	1,000	1,000	1,000
Pressure at rest	12,13	-0,53	1,21	0,35	1,000	1,000	1,000
Earthquake - pressure at rest	13,40	-0,80	0,00	0,30	1,000	1,000	1,000
korisno opterecenje	15,05	-0,59	1,50	0,35	0,700	0,700	0,700

Wall stem check - front reinf.

Front reinforcement is not required.

Wall stem check - back reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,77	13,59	0,17	1,000	1,000	1,000
Earthq.- constr.	3,75	-0,77	0,00	0,17	1,000	1,000	1,000
FF resistance	-0,28	-0,03	0,00	0,00	1,000	1,000	1,000
Earthq.- face	0,05	-0,07	0,00	0,00	1,000	1,000	1,000
Pressure at rest	12,13	-0,53	1,21	0,35	1,000	1,000	1,000
Earthquake - pressure at rest	13,40	-0,80	0,00	0,30	1,000	1,000	1,000
korisno opterecenje	15,05	-0,59	1,50	0,35	0,700	0,700	0,700

Wall stem check - back reinf.

Wall check at the construction joint 1,60 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 447,1 mm²

Cross-section width = 1,00 m

Cross-section height = 0,38 m

Reinforcement ratio ρ = 0,23 % > 0,13 % = ρ_{min}

Position of neutral axis x = 0,03 m < 0,21 m = x_{max}

Ultimate shear force V_{Rd} = 125,97 kN > 39,58 kN = V_{Ed}

Ultimate moment M_{Rd} = 114,17 kNm > 26,17 kNm = M_{Ed}

Cross-section is SATISFACTORY.

Wall heel check

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	-0,20	10,20	0,89	1,000
Weight - earth wedge	0,00	-1,01	18,18	0,70	1,000
Active pressure	12,67	-0,67	14,04	1,09	1,000
korisno opterecenje	6,86	-0,43	5,02	1,21	0,700
Contact stress	0,00	0,00	-28,13	0,56	1,000

Wall heel check

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

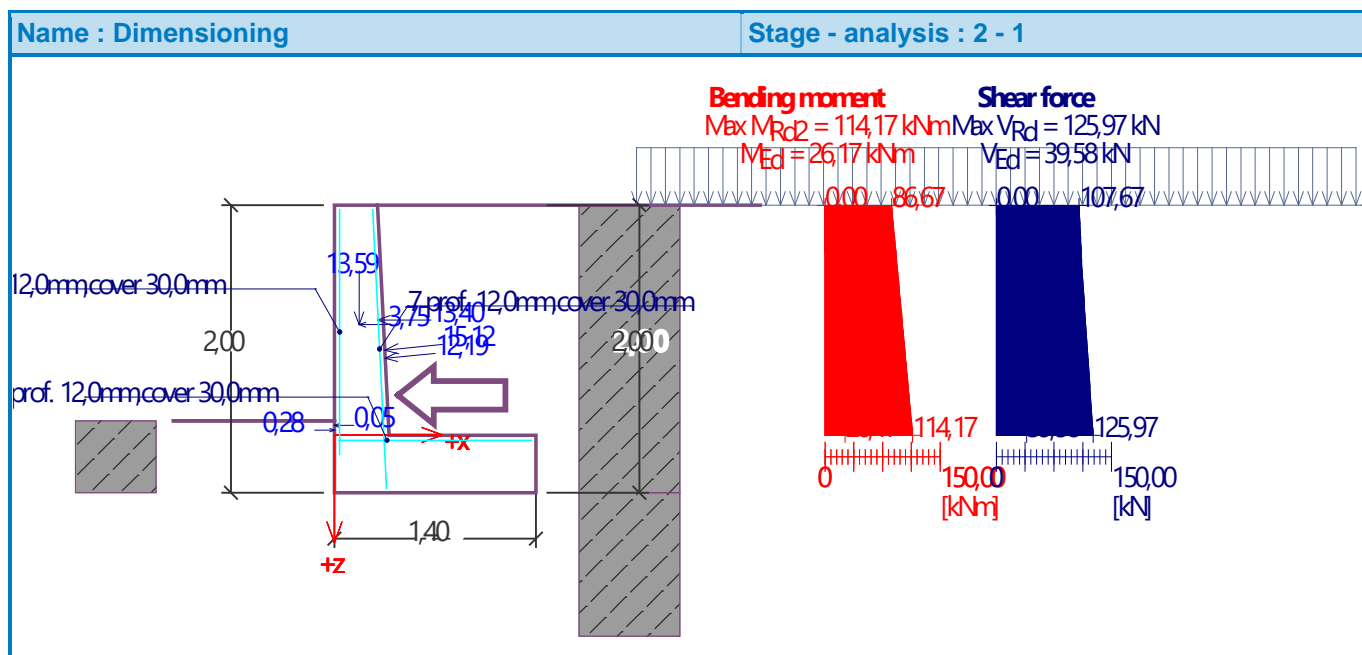
Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 473,2 mm²

Cross-section width = 1,00 m
Cross-section height = 0,40 m

Reinforcement ratio $\rho = 0,22 \% > 0,13 \% = \rho_{min}$
Position of neutral axis $x = 0,03 \text{ m} < 0,22 \text{ m} = x_{max}$
Ultimate shear force $V_{Rd} = 130,91 \text{ kN} > 17,81 \text{ kN} = V_{Ed}$
Ultimate moment $M_{Rd} = 120,85 \text{ kNm} > 26,17 \text{ kNm} = M_{Ed}$

Cross-section is **SATISFACTORY**.



Dimensioning No. 2 (Stage of construction 2)

Wall stem check - front reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,77	13,59	0,17	1,000	1,000	1,000
Earthq.- constr.	3,75	-0,77	0,00	0,17	1,000	1,000	1,000
FF resistance	-0,28	-0,03	0,00	0,00	1,000	1,000	1,000
Earthq.- face	0,05	-0,07	0,00	0,00	1,000	1,000	1,000
Pressure at rest	12,13	-0,53	1,21	0,35	1,000	1,000	1,000
Earthquake - pressure at rest	13,40	-0,80	0,00	0,30	1,000	1,000	1,000
korisno opterecenje	15,05	-0,59	1,50	0,35	0,700	0,700	0,700

Wall stem check - front reinf.

Front reinforcement is not required.

Wall stem check - back reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,77	13,59	0,17	1,000	1,000	1,000
Earthq.- constr.	3,75	-0,77	0,00	0,17	1,000	1,000	1,000
FF resistance	-0,28	-0,03	0,00	0,00	1,000	1,000	1,000
Earthq.- face	0,05	-0,07	0,00	0,00	1,000	1,000	1,000
Pressure at rest	12,13	-0,53	1,21	0,35	1,000	1,000	1,000
Earthquake - pressure at rest	13,40	-0,80	0,00	0,30	1,000	1,000	1,000
korisno opterecenje	15,05	-0,59	1,50	0,35	0,700	0,700	0,700

Wall stem check - back reinf.

Wall check at the construction joint 1,60 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 447,1 mm²

Cross-section width = 1,00 m

Cross-section height = 0,38 m

Reinforcement ratio $\rho = 0,23 \% > 0,13 \% = \rho_{min}$

Position of neutral axis $x = 0,03 \text{ m} < 0,21 \text{ m} = x_{max}$

Ultimate shear force $V_{Rd} = 125,97 \text{ kN} > 39,58 \text{ kN} = V_{Ed}$

Ultimate moment $M_{Rd} = 114,17 \text{ kNm} > 26,17 \text{ kNm} = M_{Ed}$

Cross-section is SATISFACTORY.

Wall heel check

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	-0,20	10,20	0,89	1,000
Weight - earth wedge	0,00	-1,01	18,18	0,70	1,000
Active pressure	12,67	-0,67	14,04	1,09	1,000
korisno opterecenje	6,86	-0,43	5,02	1,21	0,700
Contact stress	0,00	0,00	-28,13	0,56	1,000

Wall heel check

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 473,2 mm²

Cross-section width = 1,00 m

Cross-section height = 0,40 m

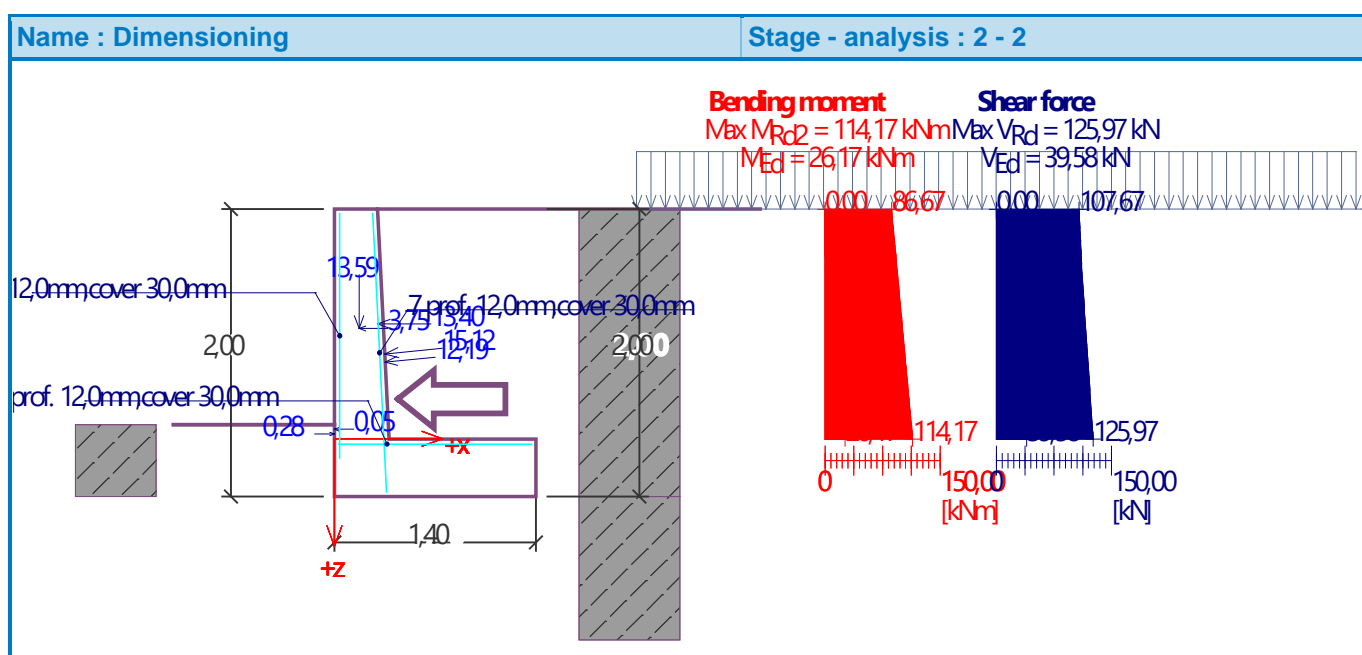
Reinforcement ratio ρ = 0,22 % > 0,13 % = ρ_{min}

Position of neutral axis x = 0,03 m < 0,22 m = x_{max}

Ultimate shear force V_{Rd} = 130,91 kN > 17,81 kN = V_{Ed}

Ultimate moment M_{Rd} = 120,85 kNm > 26,17 kNm = M_{Ed}

Cross-section is SATISFACTORY.



Dimensioning No. 3 (Stage of construction 2)

Wall stem check - front reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,77	13,59	0,17	1,000	1,000	1,000
Earthq.- constr.	3,75	-0,77	0,00	0,17	1,000	1,000	1,000
FF resistance	-0,28	-0,03	0,00	0,00	1,000	1,000	1,000
Earthq.- face	0,05	-0,07	0,00	0,00	1,000	1,000	1,000
Pressure at rest	12,13	-0,53	1,21	0,35	1,000	1,000	1,000
Earthquake - pressure at rest	13,40	-0,80	0,00	0,30	1,000	1,000	1,000

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
korisno opterecenje	15,05	-0,59	1,50	0,35	0,700	0,700	0,700

Wall stem check - front reinf.

Front reinforcement is not required.

Wall stem check - back reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-0,77	13,59	0,17	1,000	1,000	1,000
Earthq.- constr.	3,75	-0,77	0,00	0,17	1,000	1,000	1,000
FF resistance	-0,28	-0,03	0,00	0,00	1,000	1,000	1,000
Earthq.- face	0,05	-0,07	0,00	0,00	1,000	1,000	1,000
Pressure at rest	12,13	-0,53	1,21	0,35	1,000	1,000	1,000
Earthquake - pressure at rest	13,40	-0,80	0,00	0,30	1,000	1,000	1,000
korisno opterecenje	15,05	-0,59	1,50	0,35	0,700	0,700	0,700

Wall stem check - back reinf.

Wall check at the construction joint 1,60 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 447,1 mm²

Cross-section width = 1,00 m

Cross-section height = 0,38 m

Reinforcement ratio ρ = 0,23 % > 0,13 % = ρ_{min}

Position of neutral axis x = 0,03 m < 0,21 m = x_{max}

Ultimate shear force V_{Rd} = 125,97 kN > 39,58 kN = V_{Ed}

Ultimate moment M_{Rd} = 114,17 kNm > 26,17 kNm = M_{Ed}

Cross-section is SATISFACTORY.

Wall heel check

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	-0,20	10,20	0,89	1,000
Weight - earth wedge	0,00	-1,01	18,18	0,70	1,000
Active pressure	12,67	-0,67	14,04	1,09	1,000

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Design coefficient
korisno opterecenje	6,86	-0,43	5,02	1,21	0,700
Contact stress	0,00	0,00	-28,13	0,56	1,000

Wall heel check

Reinforcement and dimensions of the cross-section

7 prof. 12,0 mm, cover 30,0 mm

Inputted reinforcement area = 791,7 mm²

Required reinforcement area = 473,2 mm²

Cross-section width = 1,00 m

Cross-section height = 0,40 m

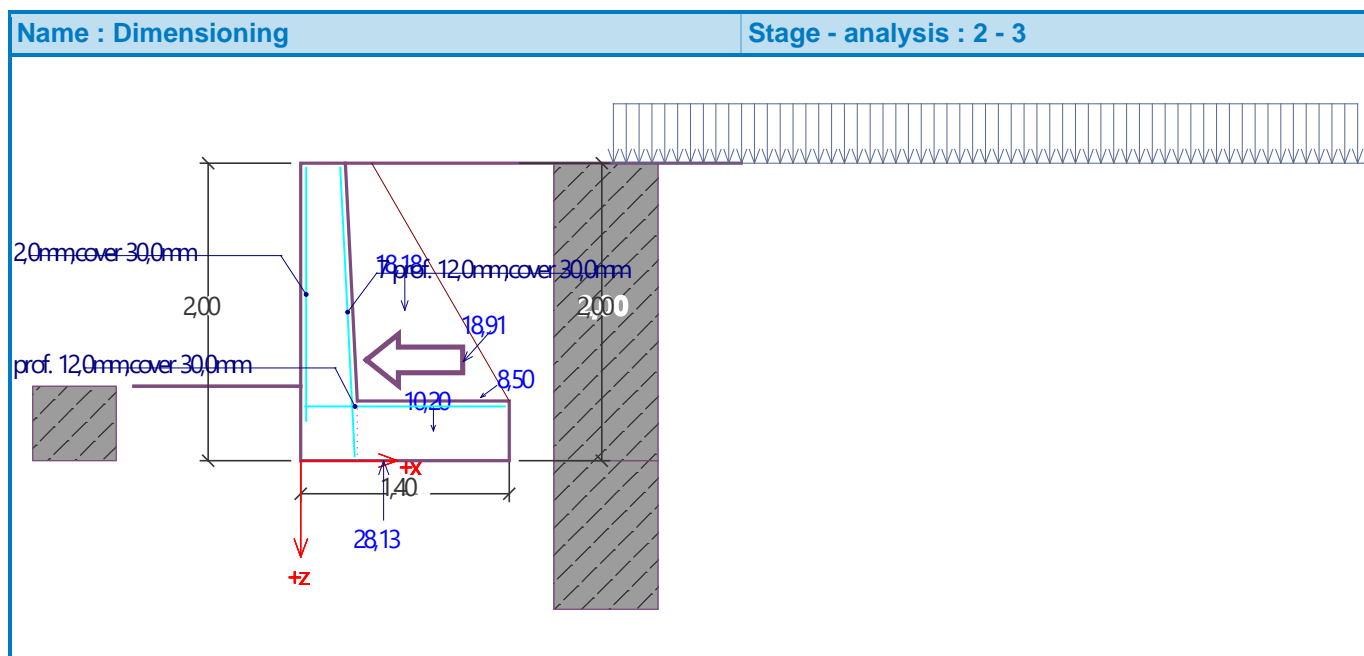
Reinforcement ratio ρ = 0,22 % > 0,13 % = ρ_{min}

Position of neutral axis x = 0,03 m < 0,22 m = x_{max}

Ultimate shear force V_{Rd} = 130,91 kN > 17,81 kN = V_{Ed}

Ultimate moment M_{Rd} = 120,85 kNm > 26,17 kNm = M_{Ed}

Cross-section is SATISFACTORY.



Karakteristike temelja i temeljnog tla

$c=$	25,00	$\gamma_{cM2}=$	1,00		
$\rho=$	21,00	$\gamma_{\rho M2}=$	1,00		
$\gamma_t=$	19,00	$\gamma_{tM2}=$	1,00		
		$H=$	17,80	kN	horizontalna sila u temelju
		$\vartheta=$	0,00		ugao dejstva horizontalne sile (0 u B pravcu, 90 u L pravcu)
$c'=$	25,00	$V=$	88,28	kN	vertikalna sila u temelju
$\rho'=$	21,00	$D_f=$	0,50	[m]	dubina fundiranja
$\gamma'_t=$	9,00	$\alpha=$	0,00		nagib temeljne površi
$tg(\rho)/\gamma_{\rho M2}=$	0,38	$B=$	1,40	[m]	širina temelja
$ctg(\rho')=$	2,61	$L=$	5,00	[m]	dužina temelja
$sin(\rho')=$	0,36	$e_B=$	0,25	[m]	ekscentricitet L
$cos(\rho')=$	0,93	$e_L=$	0,00	[m]	ekscentricitet B
		B			pravac dejstva horizontalne sile
		$m_B=$	1,85		
		$m_L=$	0,00		
		$m=$	0,00		

Koeficijenti za nosivost po Vesiću

			$L' =$	5,00	
$c' =$	25,00	$q' =$	4,50	$B' =$	0,90
$Nc =$	15,81	$Nq =$	7,07	$Ny =$	4,66
$bc =$	1,00	$bq =$	1,00	$by =$	1,00
$sc =$	1,08	$sq =$	1,06	$sy =$	0,95
$ic =$	0,65	$iq =$	0,70	$iy =$	0,57

Nosivost tla

$q_f=$	$c' \cdot N_c \cdot b_c \cdot s_c \cdot i_c + q' \cdot N_q \cdot b_q \cdot s_q \cdot i_q + 0.5 \cdot \gamma_t \cdot B' \cdot N_y \cdot b_y \cdot s_y \cdot i_y$				
$q_f=$	308,72	kN/m ²			
Slijeganje iz Tower-a					
$s=$	0,006	m			
Koeficijent posteljice					
$k_s=$	51453,96	kN/m ³			

Potporni zid B=1.80m

Input data

Project

Date : 28.11.2023.

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

Allowable eccentricity : 0,333

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 :	$\gamma_{Rv} =$	1,40	[-]
Partial factor on sliding resistance :	$\gamma_{Rh} =$	1,10	[-]
Partial factor on bearing capacity :	$\gamma_{Re} =$	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	[-]

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Partial factors for variable actions			
Permanent design situation			
Factor for quasi-permanent value :	$\psi_2 =$	0,30	[-]

Partial factors on actions (A)			
Seismic design situation			
		Unfavourable	Favourable
Permanent actions :	$\gamma_G =$	1,00 [-]	1,00 [-]
Variable actions :	$\gamma_Q =$	1,00 [-]	0,00 [-]
Water load :	$\gamma_w =$	1,00 [-]	

Partial factors for resistances (R)			
Seismic design situation			
Partial factor on overturning :	$\gamma_{Rv} =$	1,00	[-]
Partial factor on sliding resistance :	$\gamma_{Rh} =$	1,00	[-]
Partial factor on bearing capacity :	$\gamma_{Re} =$	1,00	[-]

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).

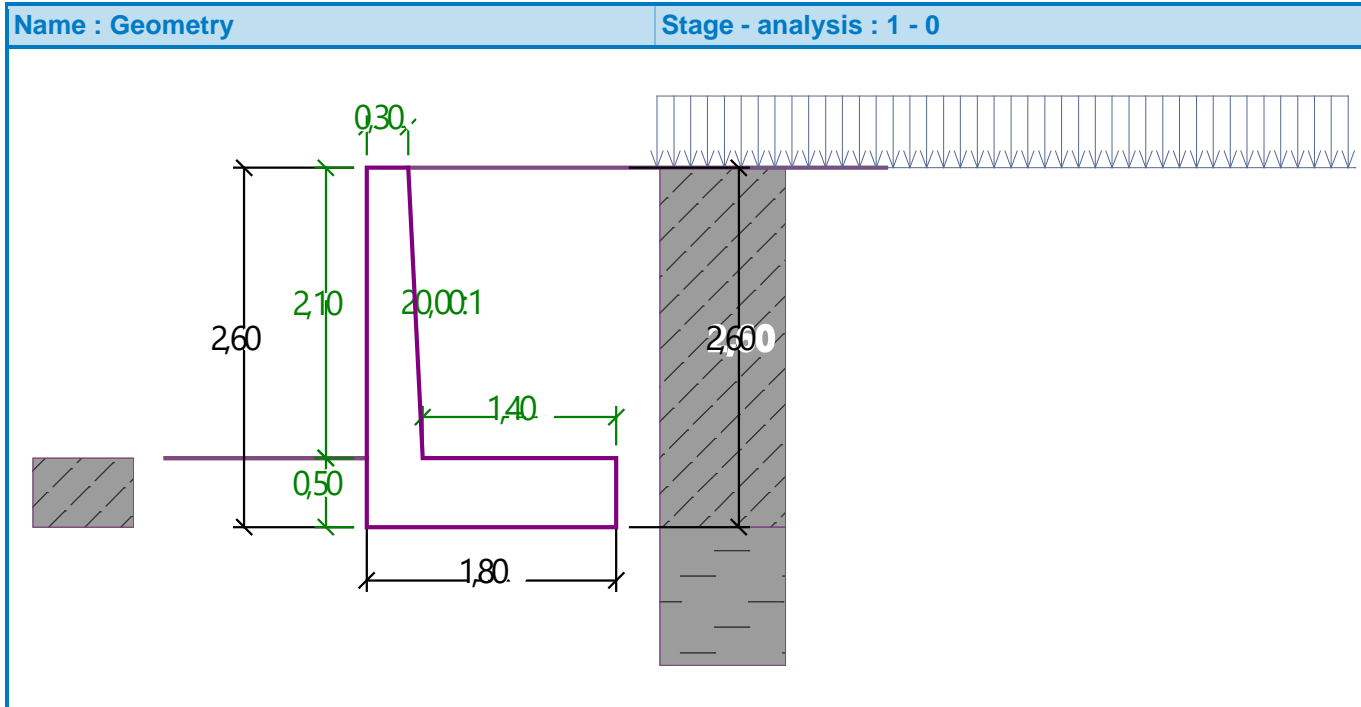
Concrete : C 25/30

Cylinder compressive strength $f_{ck} = 25,00 \text{ MPa}$

Tensile strength $f_{ctm} = 2,60 \text{ MPa}$

Longitudinal steel : B500

Yield strength $f_{yk} = 500,00 \text{ MPa}$



Basic soil parameters

No.	Name	Pattern	φ_{ef} [°]	c_{ef} [kPa]	γ [kN/m ³]	γ_{su} [kN/m ³]	δ [°]
1	zasip		30,00	0,00	19,00	9,00	0,00
2	temeljno tlo		21,00	25,00	9,00	9,00	0,00

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

Soil parameters

zasip



Unit weight : $\gamma = 19,00 \text{ kN/m}^3$
 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 : $\delta = 0,00^\circ$
 Soil : cohesionless
 Saturated unit weight : $\gamma_{sat} = 19,00 \text{ kN/m}^3$

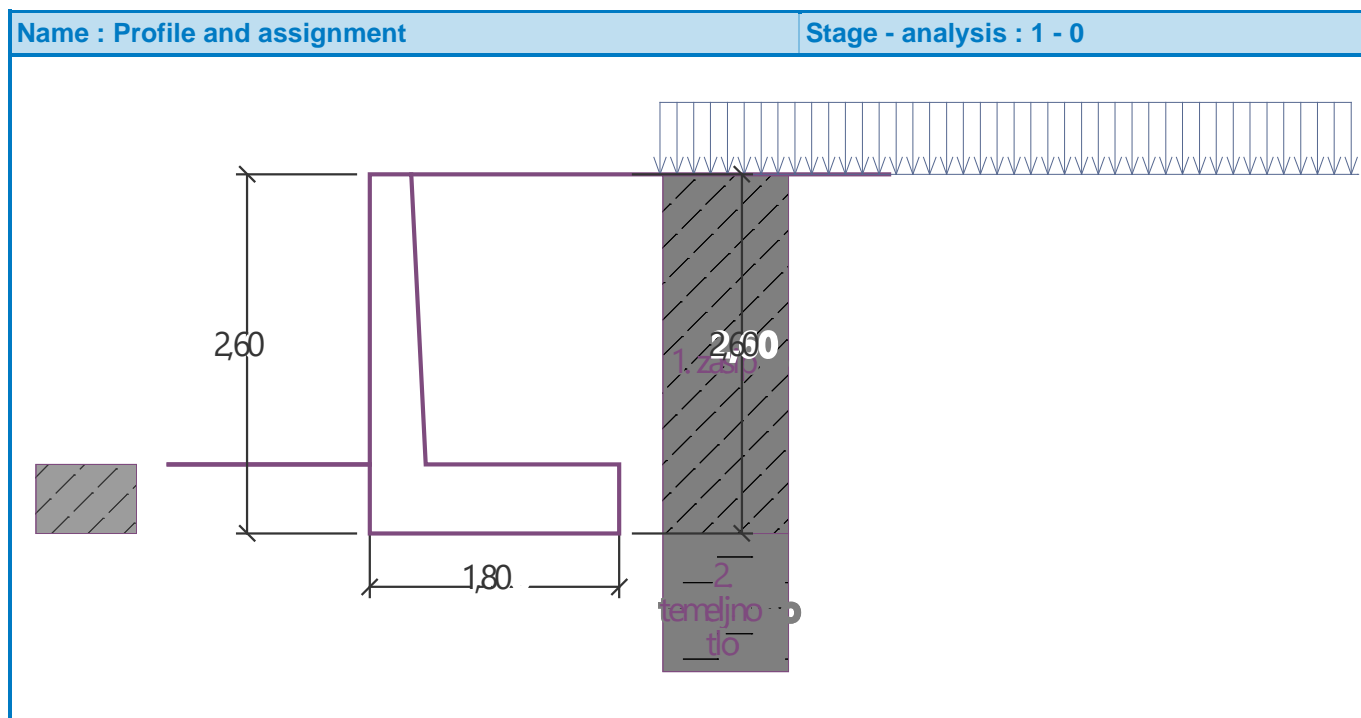
temeljno tlo

Unit weight : $\gamma = 9,00 \text{ kN/m}^3$
 Stress-state : effective

Angle of internal friction : $\varphi_{ef} = 21,00^\circ$
 Cohesion of soil : $c_{ef} = 25,00 \text{ kPa}$
 Angle of friction struc.-soil : $\delta = 0,00^\circ$
 Soil : cohesionless
 Saturated unit weight : $\gamma_{sat} = 19,00 \text{ kN/m}^3$

Geological profile and assigned soils

No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	2,60	0,00 .. 2,60	zasip	
2	-	2,60 .. ∞	temeljno tlo	



Foundation

Type of foundation : soil from geological profile

Terrain profile

Terrain behind the structure is flat.

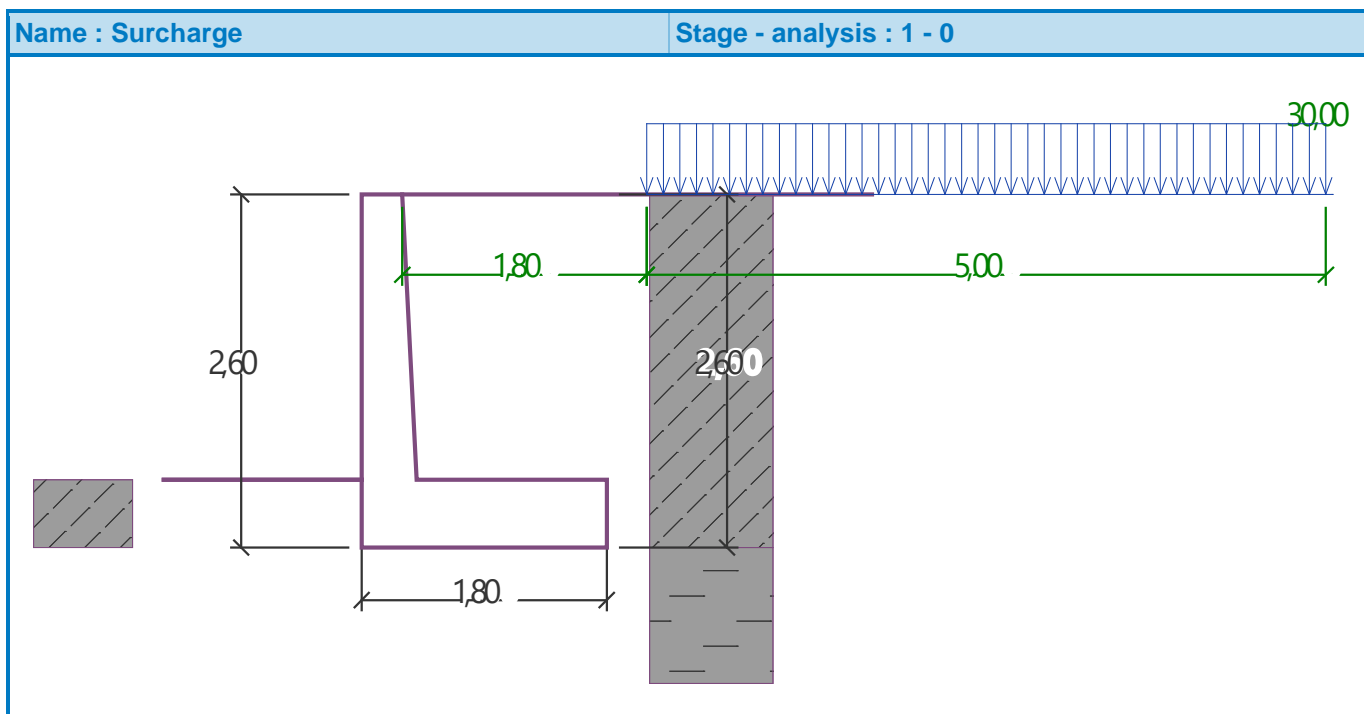
Water influence

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	Yes		variable	30,00		1,80	5,00	on terrain

No.	Name
1	Korisno opterećenje



Resistance on front face of the structure

Resistance on front face of the structure: at rest

Soil on front face of the structure - zasip

Soil thickness in front of structure $h = 0,50$ m

Terrain in front of structure is flat.

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)

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. overtur.	Coeff. sliding	Coeff. stress
Weight - wall	0,00	-0,81	41,07	0,58	1,000	1,000	1,350
FF resistance	-1,19	-0,17	0,00	0,00	1,000	1,000	1,350
Weight - earth wedge	0,00	-1,32	33,77	0,85	1,000	1,000	1,350
Active pressure	21,41	-0,87	24,19	1,40	1,350	1,350	1,350
Korisno opterećenje	10,19	-0,71	9,25	1,45	1,500	1,500	1,500

Verification of complete wall

Check for overturning stability

Resisting moment $M_{res} = 84,34 \text{ kNm/m}$

Overturning moment $M_{ovr} = 35,64 \text{ kNm/m}$

Wall for overturning is SATISFACTORY

Check for slip

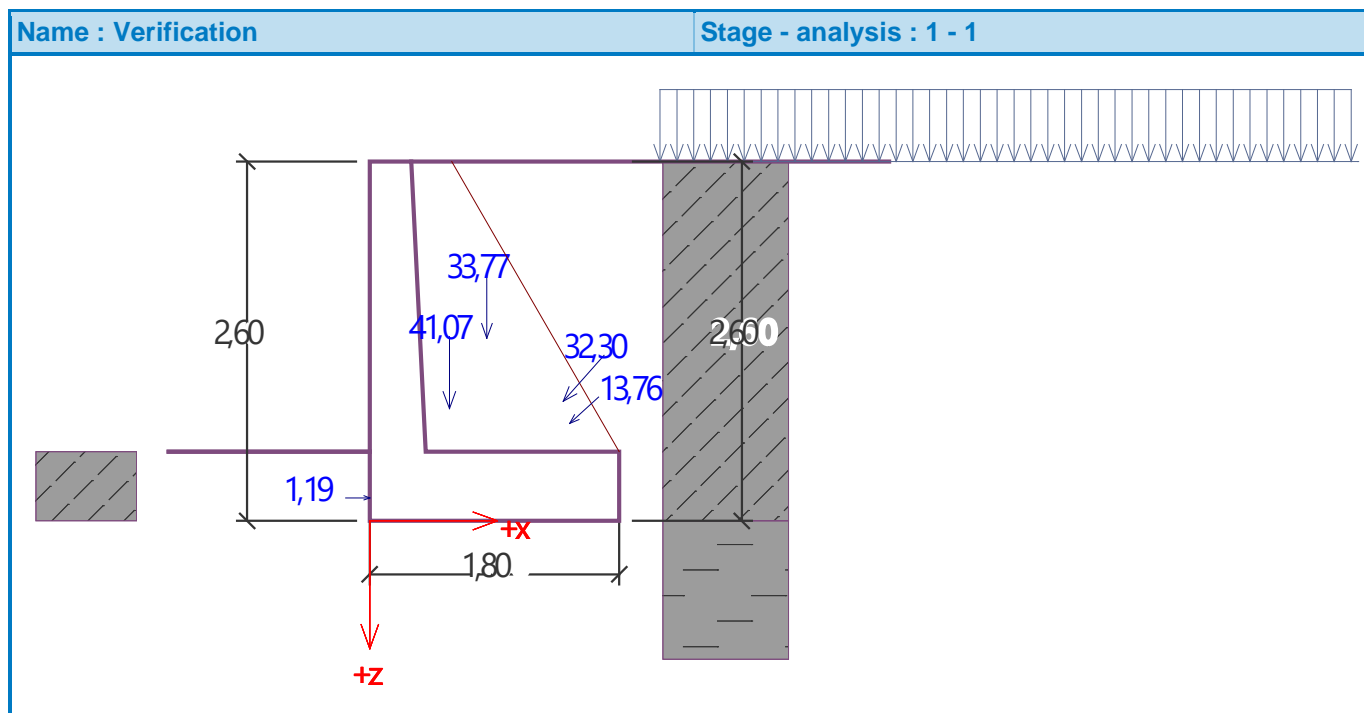
Resisting horizontal force $H_{res} = 63,70 \text{ kN/m}$

Active horizontal force $H_{act} = 43,00 \text{ kN/m}$

Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 107,99 kPa



Bearing capacity of foundation soil (Stage of construction 1)

Design load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]	Eccentricity [-]	Stress [kPa]
1	32,36	147,55	42,58	0,121	107,99
2	27,08	121,36	43,00	0,124	89,32

Service load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	23,73	108,27	30,41

Verification of foundation soil

Stress in the footing bottom : trapezoid

Eccentricity verification

Max. eccentricity of normal force $e = 0,124$

Maximum allowable eccentricity $e_{alw} = 0,333$

Eccentricity of the normal force is SATISFACTORY

Verification of bearing capacity

Bearing capacity of foundation soil $R = 343,00 \text{ kPa}$

Partial factor on bearing capacity $\gamma_{Rv} = 1,40$

Max. stress at footing bottom $\sigma = 141,34 \text{ kPa}$

Bearing capacity of foundation soil $R_d = 245,00 \text{ kPa}$

Bearing capacity of foundation soil is SATISFACTORY

Overall verification - bearing capacity of found. soil is SATISFACTORY

Wall check at the construction joint 2,10 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 14,0 mm, cover 30,0 mm

Inputted reinforcement area = 1077,6 mm²

Required reinforcement area = 497,5 mm²

Cross-section width = 1,00 m

Cross-section height = 0,40 m

Reinforcement ratio ρ = 0,29 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,04 m < 0,23 m = x_{max}

Ultimate shear force V_{Rd} = 148,95 kN > 61,85 kN = V_{Ed}

Ultimate moment M_{Rd} = 165,92 kNm > 46,72 kNm = M_{Ed}

Cross-section is SATISFACTORY.

Wall heel check

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	-0,25	17,50	1,10	1,350
Weight - earth wedge	0,00	-1,32	33,77	0,85	1,350
Active pressure	21,41	-0,87	24,19	1,40	1,350
Korisno opterećenje	10,19	-0,71	9,25	1,45	1,500
Contact stress	0,00	0,00	-95,72	0,95	1,000

Wall heel check

Reinforcement and dimensions of the cross-section

7 prof. 14,0 mm, cover 30,0 mm

Inputted reinforcement area = 1077,6 mm²

Required reinforcement area = 626,0 mm²

Cross-section width = 1,00 m

Cross-section height = 0,50 m

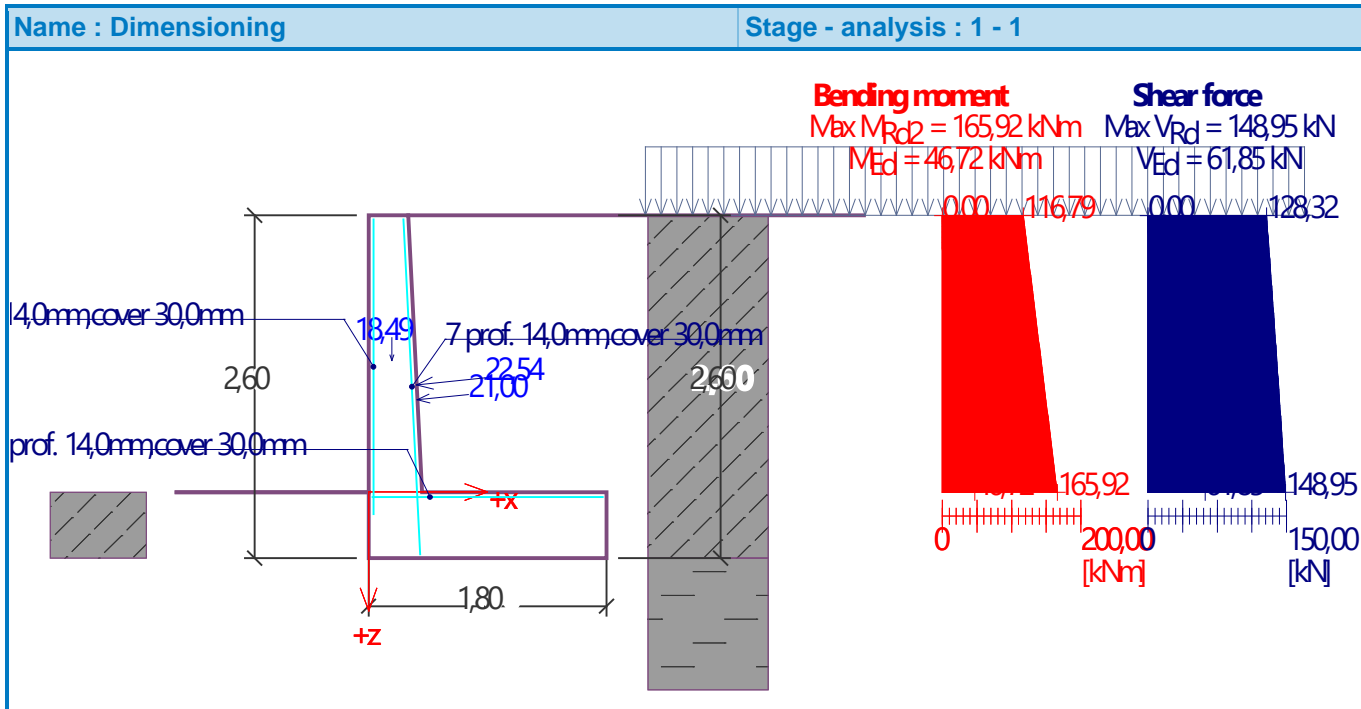
Reinforcement ratio ρ = 0,23 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,04 m < 0,29 m = x_{max}

Ultimate shear force V_{Rd} = 172,86 kN > 20,01 kN = V_{Ed}

Ultimate moment M_{Rd} = 210,33 kNm > 46,72 kNm = M_{Ed}

Cross-section is SATISFACTORY.



Dimensioning No. 2 (Stage of construction 1)

Wall stem check - front reinf.

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-1,00	18,49	0,18	1,350	1,350	1,000
Pressure at rest	20,90	-0,70	2,09	0,37	1,350	1,350	1,350
Korisno opterećenje	22,43	-0,81	2,24	0,36	1,500	1,500	1,500

Wall stem check - front reinf.

Front reinforcement is not required.

Wall stem check - back reinf.

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-1,00	18,49	0,18	1,350	1,350	1,000
Pressure at rest	20,90	-0,70	2,09	0,37	1,350	1,350	1,350
Korisno opterećenje	22,43	-0,81	2,24	0,36	1,500	1,500	1,500

Wall stem check - back reinf.

Wall check at the construction joint 2,10 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 14,0 mm, cover 30,0 mm

Inputted reinforcement area = 1077,6 mm²

Required reinforcement area = 497,5 mm²

Cross-section width = 1,00 m

Cross-section height = 0,40 m

Reinforcement ratio ρ = 0,29 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,04 m < 0,23 m = x_{max}

Ultimate shear force V_{Rd} = 148,95 kN > 61,85 kN = V_{Ed}

Ultimate moment M_{Rd} = 165,92 kNm > 46,72 kNm = M_{Ed}

Cross-section is SATISFACTORY.

Wall heel check

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	-0,25	17,50	1,10	1,350
Weight - earth wedge	0,00	-1,32	33,77	0,85	1,350
Active pressure	21,41	-0,87	24,19	1,40	1,350
Korisno opterećenje	10,19	-0,71	9,25	1,45	1,500
Contact stress	0,00	0,00	-95,72	0,95	1,000

Wall heel check

Reinforcement and dimensions of the cross-section

7 prof. 14,0 mm, cover 30,0 mm

Inputted reinforcement area = 1077,6 mm²

Required reinforcement area = 626,0 mm²

Cross-section width = 1,00 m

Cross-section height = 0,50 m

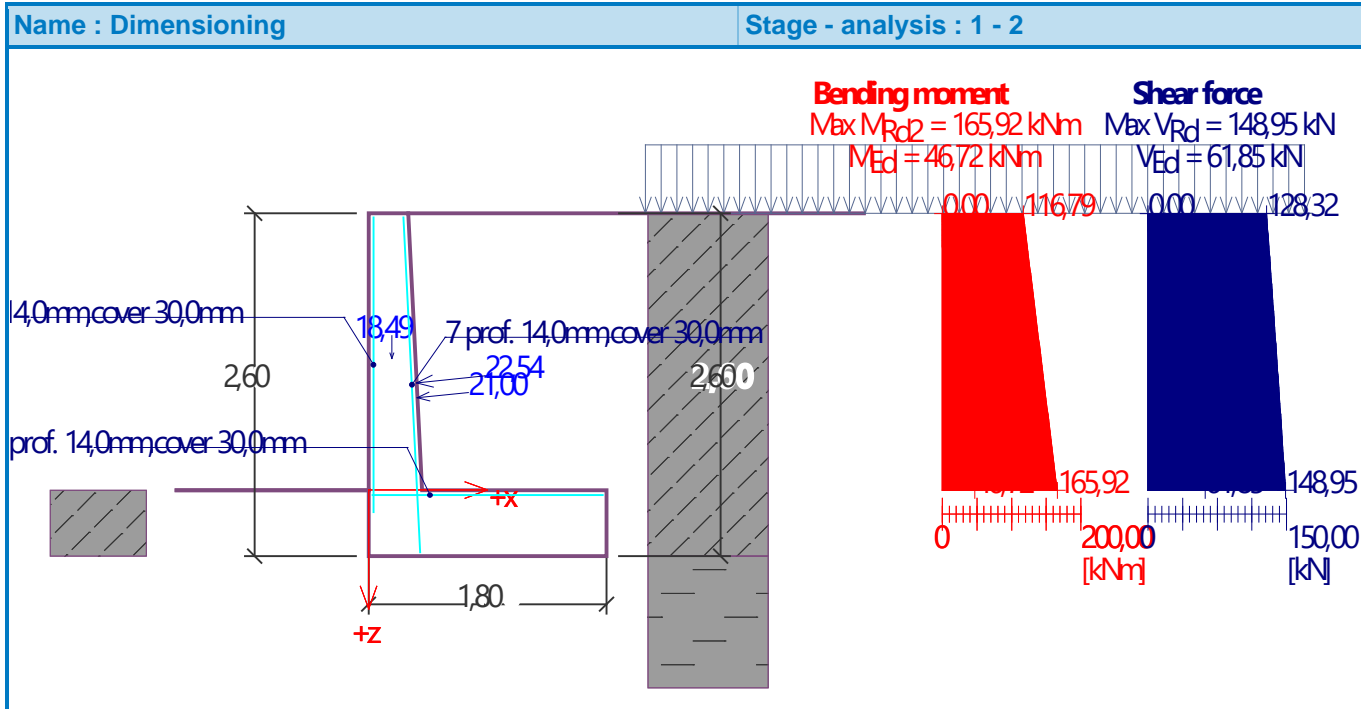
Reinforcement ratio ρ = 0,23 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,04 m < 0,29 m = x_{max}

Ultimate shear force V_{Rd} = 172,86 kN > 20,01 kN = V_{Ed}

Ultimate moment M_{Rd} = 210,33 kNm > 46,72 kNm = M_{Ed}

Cross-section is SATISFACTORY.



Dimensioning No. 3 (Stage of construction 1)

Wall stem check - front reinf.

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-1,00	18,49	0,18	1,350	1,350	1,000
Pressure at rest	20,90	-0,70	2,09	0,37	1,350	1,350	1,350
Korisno opterećenje	22,43	-0,81	2,24	0,36	1,500	1,500	1,500

Wall stem check - front reinf.

Front reinforcement is not required.

Wall stem check - back reinf.

Forces acting on construction

Name	F_{hor} [kN/m]	App.Pt. z [m]	F_{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-1,00	18,49	0,18	1,350	1,350	1,000
Pressure at rest	20,90	-0,70	2,09	0,37	1,350	1,350	1,350
Korisno opterećenje	22,43	-0,81	2,24	0,36	1,500	1,500	1,500

Wall stem check - back reinf.

Wall check at the construction joint 2,10 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 14,0 mm, cover 30,0 mm

Inputted reinforcement area = 1077,6 mm²

Required reinforcement area = 497,5 mm²

Cross-section width = 1,00 m

Cross-section height = 0,40 m

Reinforcement ratio ρ = 0,29 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,04 m < 0,23 m = x_{max}

Ultimate shear force V_{Rd} = 148,95 kN > 61,85 kN = V_{Ed}

Ultimate moment M_{Rd} = 165,92 kNm > 46,72 kNm = M_{Ed}

Cross-section is SATISFACTORY.

Wall heel check

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	-0,25	17,50	1,10	1,350
Weight - earth wedge	0,00	-1,32	33,77	0,85	1,350
Active pressure	21,41	-0,87	24,19	1,40	1,350
Korisno opterećenje	10,19	-0,71	9,25	1,45	1,500
Contact stress	0,00	0,00	-95,72	0,95	1,000

Wall heel check

Reinforcement and dimensions of the cross-section

7 prof. 14,0 mm, cover 30,0 mm

Inputted reinforcement area = 1077,6 mm²

Required reinforcement area = 626,0 mm²

Cross-section width = 1,00 m

Cross-section height = 0,50 m

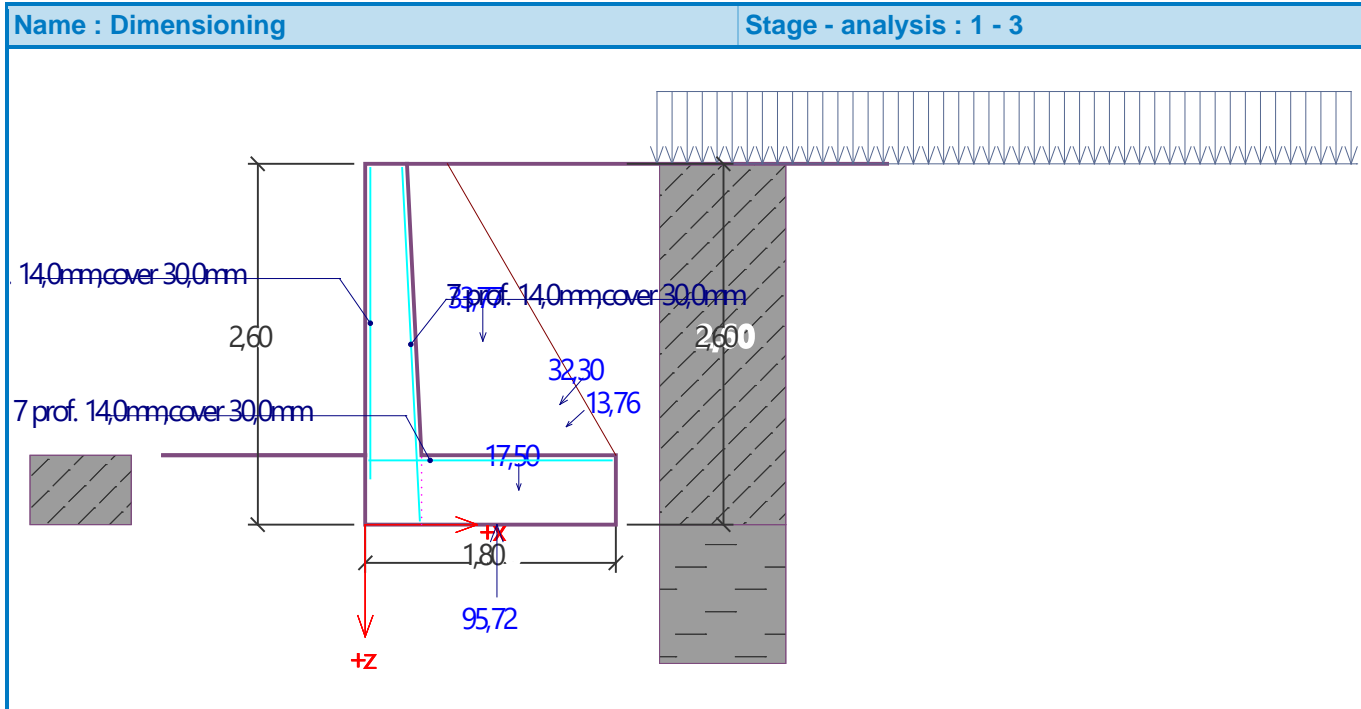
Reinforcement ratio ρ = 0,23 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,04 m < 0,29 m = x_{max}

Ultimate shear force V_{Rd} = 172,86 kN > 20,01 kN = V_{Ed}

Ultimate moment M_{Rd} = 210,33 kNm > 46,72 kNm = M_{Ed}

Cross-section is SATISFACTORY.



Input data (Stage of construction 2)

Geological profile and assigned soils

No.	Thickness of layer t [m]	Depth z [m]	Assigned soil	Pattern
1	2,60	0,00 .. 2,60	zasip	
2	-	2,60 .. ∞	temeljno tlo	

Foundation

Type of foundation : soil from geological profile

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	No	No	variable	30,00		1,80	5,00	on terrain

No.	Name
1	Korisno opterećenje

Resistance on front face of the structure

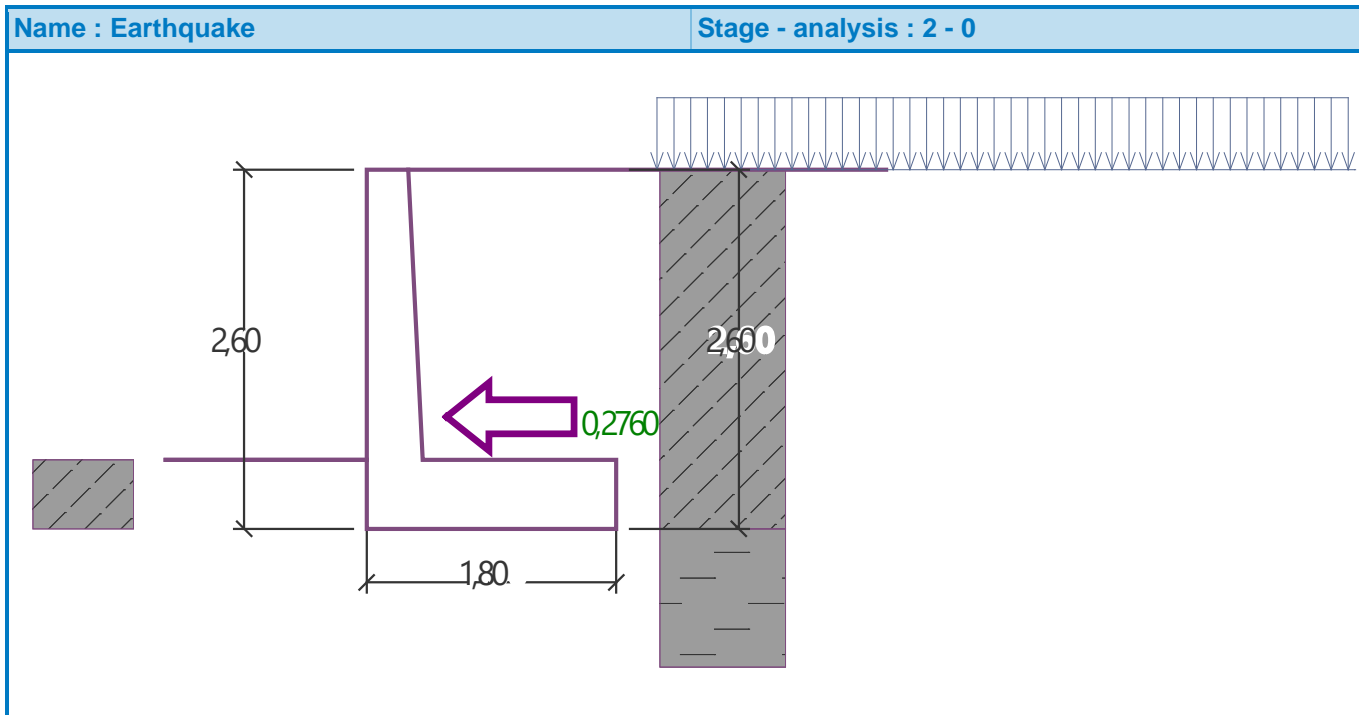
Resistance on front face of the structure: at rest
 Soil on front face of the structure - zasip
 Soil thickness in front of structure $h = 0,50\text{ m}$

Terrain in front of structure is flat.

Earthquake

Factor of horizontal acceleration $K_h = 0,2760$
 Factor of vertical acceleration $K_v = 0,0000$

Water below the GWT is restricted.



Settings of the stage of construction

Design situation : seismic
 The wall is free to move. Active earth pressure is therefore assumed.

Verification No. 1 (Stage of construction 2)

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. overtur.	Coeff. sliding	Coeff. stress
Weight - wall	0,00	-0,81	41,07	0,58	1,000	1,000	1,000
Earthq.- constr.	11,33	-0,81	0,00	0,58	1,000	1,000	1,000
FF resistance	-1,19	-0,17	0,00	0,00	1,000	1,000	1,000
Weight - earth wedge	0,00	-1,32	33,77	0,85	1,000	1,000	1,000
Earthquake - soil wedge	9,32	-1,32	0,00	0,85	1,000	1,000	1,000
Active pressure	21,41	-0,87	24,19	1,40	1,000	1,000	1,000
Earthq.- act.pressure	19,38	-1,75	32,70	1,06	1,000	1,000	1,000
Korisno opterećenje	10,19	-0,71	9,25	1,45	0,700	0,700	0,700

Verification of complete wall

Check for overturning stability

Resisting moment $M_{res} = 130,23 \text{ kNm/m}$

Overturning moment $M_{ovr} = 78,81 \text{ kNm/m}$

Wall for overturning is SATISFACTORY

Check for slip

Resisting horizontal force $H_{res} = 79,78 \text{ kN/m}$

Active horizontal force $H_{act} = 67,38 \text{ kN/m}$

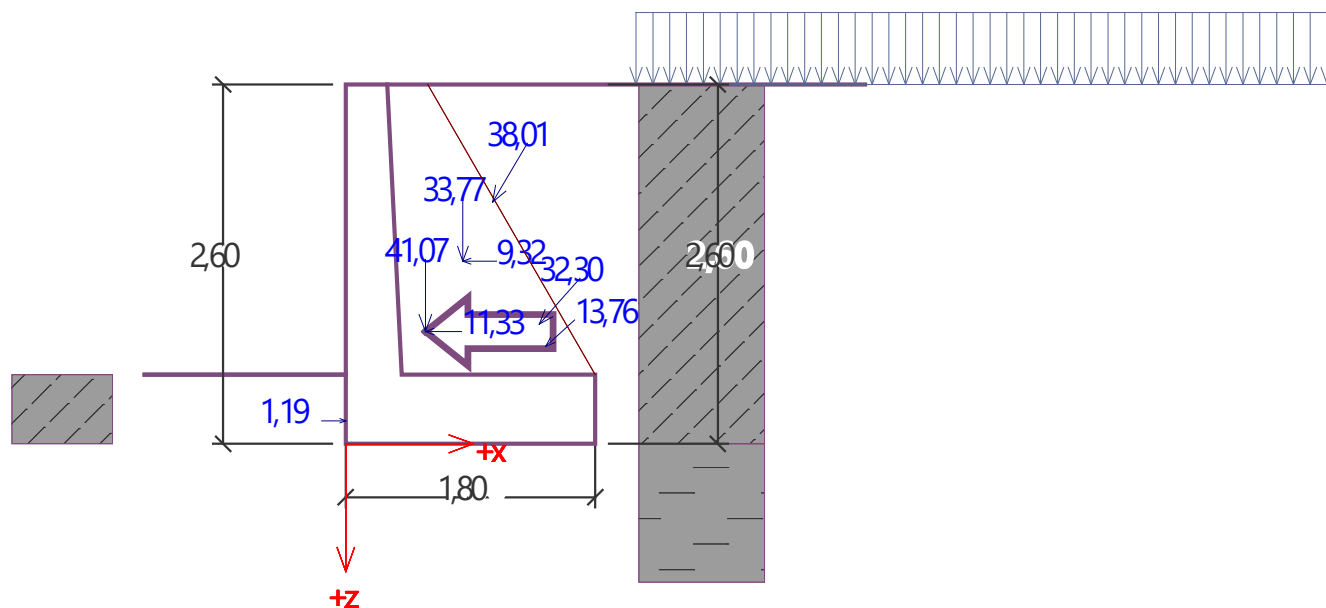
Wall for slip is SATISFACTORY

Overall check - WALL is SATISFACTORY

Maximum stress in footing bottom : 185,67 kPa

Name : Verification

Stage - analysis : 2 - 1



Bearing capacity of foundation soil (Stage of construction 2)

Design load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]	Eccentricity [-]	Stress [kPa]
1	73,29	138,19	67,38	0,294	185,67

Service load acting at the center of footing bottom

No.	Moment [kNm/m]	Norm. force [kN/m]	Shear Force [kN/m]
1	73,94	140,96	70,44

Verification of foundation soil

Stress in the footing bottom : trapezoid

Eccentricity verification

Max. eccentricity of normal force $e = 0,294$

Maximum allowable eccentricity $e_{alw} = 0,333$

Eccentricity of the normal force is SATISFACTORY

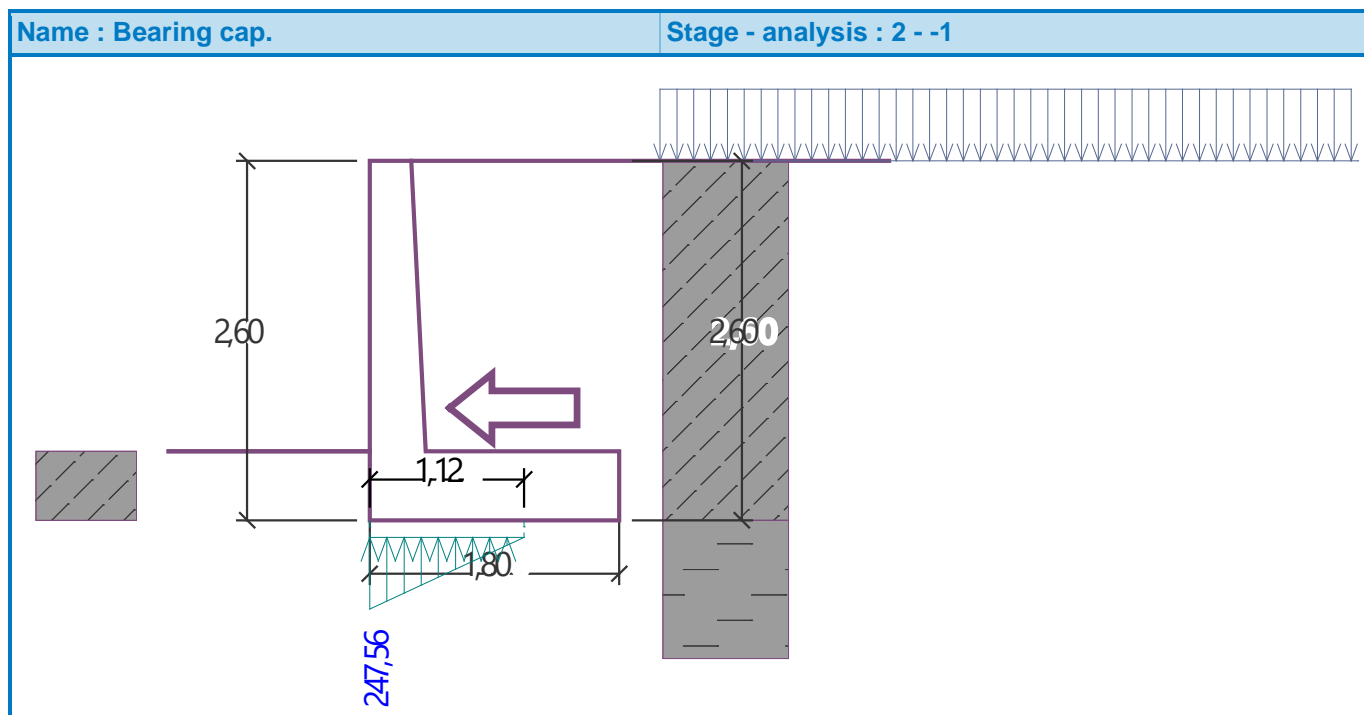
Verification of bearing capacity

Max. stress at footing bottom $\sigma = 247,56 \text{ kPa}$

Bearing capacity of foundation soil $R_d = 343,00 \text{ kPa}$

Bearing capacity of foundation soil is SATISFACTORY

Overall verification - bearing capacity of found. soil is SATISFACTORY



Dimensioning No. 1 (Stage of construction 2)

Wall stem check - front reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-1,00	18,49	0,18	1,000	1,000	1,000
Earthq.- constr.	5,10	-1,00	0,00	0,18	1,000	1,000	1,000
Pressure at rest	20,90	-0,70	2,09	0,37	1,000	1,000	1,000
Earthquake - pressure at rest	23,10	-1,05	0,00	0,30	1,000	1,000	1,000
Korisno opterećenje	22,43	-0,81	2,24	0,36	0,700	0,700	0,700

Wall stem check - front reinf.

Front reinforcement is not required.

Wall stem check - back reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-1,00	18,49	0,18	1,000	1,000	1,000
Earthq.- constr.	5,10	-1,00	0,00	0,18	1,000	1,000	1,000

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Pressure at rest	20,90	-0,70	2,09	0,37	1,000	1,000	1,000
Earthquake - pressure at rest	23,10	-1,05	0,00	0,30	1,000	1,000	1,000
Korisno opterećenje	22,43	-0,81	2,24	0,36	0,700	0,700	0,700

Wall stem check - back reinf.

Wall check at the construction joint 2,10 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 14,0 mm, cover 30,0 mm

Inputted reinforcement area = 1077,6 mm²

Required reinforcement area = 497,5 mm²

Cross-section width = 1,00 m

Cross-section height = 0,40 m

Reinforcement ratio ρ = 0,29 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,04 m < 0,23 m = x_{max}

Ultimate shear force V_{Rd} = 148,95 kN > 64,80 kN = V_{Ed}

Ultimate moment M_{Rd} = 165,92 kNm > 56,58 kNm = M_{Ed}

Cross-section is SATISFACTORY.

Wall heel check

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	-0,25	17,50	1,10	1,000
Weight - earth wedge	0,00	-1,32	33,77	0,85	1,000
Active pressure	21,41	-0,87	24,19	1,40	1,000
Korisno opterećenje	10,19	-0,71	9,25	1,45	0,700
Contact stress	0,00	0,00	-56,12	0,64	1,000

Wall heel check

Reinforcement and dimensions of the cross-section

7 prof. 14,0 mm, cover 30,0 mm

Inputted reinforcement area = 1077,6 mm²

Required reinforcement area = 626,0 mm²

Cross-section width = 1,00 m

Cross-section height = 0,50 m

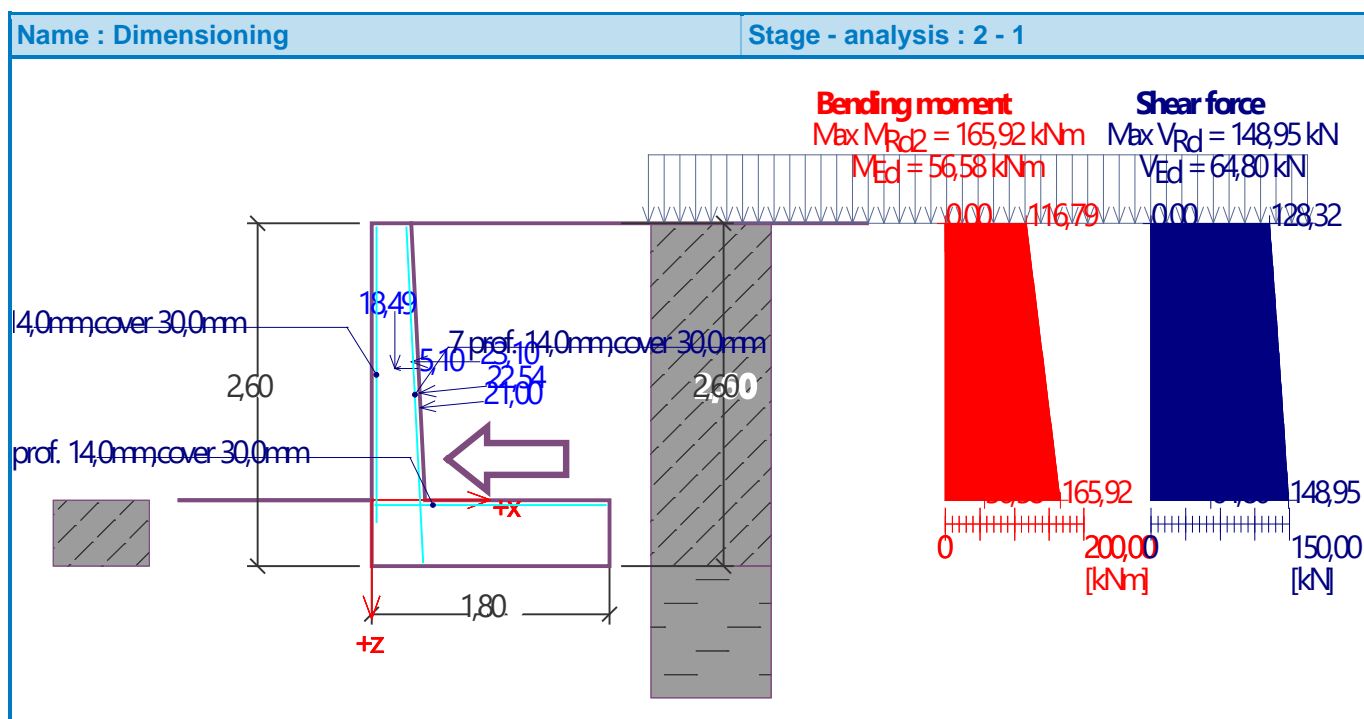
Reinforcement ratio ρ = 0,23 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,04 m < 0,29 m = x_{max}

Ultimate shear force V_{Rd} = 172,86 kN > 25,81 kN = V_{Ed}

Ultimate moment $M_{Rd} = 210,33 \text{ kNm} > 56,58 \text{ kNm} = M_{Ed}$

Cross-section is **SATISFACTORY**.



Dimensioning No. 2 (Stage of construction 2)

Wall stem check - front reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-1,00	18,49	0,18	1,000	1,000	1,000
Earthq.- constr.	5,10	-1,00	0,00	0,18	1,000	1,000	1,000
Pressure at rest	20,90	-0,70	2,09	0,37	1,000	1,000	1,000
Earthquake - pressure at rest	23,10	-1,05	0,00	0,30	1,000	1,000	1,000
Korisno opterećenje	22,43	-0,81	2,24	0,36	0,700	0,700	0,700

Wall stem check - front reinf.

Front reinforcement is not required.

Wall stem check - back reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-1,00	18,49	0,18	1,000	1,000	1,000
Earthq.- constr.	5,10	-1,00	0,00	0,18	1,000	1,000	1,000
Pressure at rest	20,90	-0,70	2,09	0,37	1,000	1,000	1,000
Earthquake - pressure at rest	23,10	-1,05	0,00	0,30	1,000	1,000	1,000
Korisno opterećenje	22,43	-0,81	2,24	0,36	0,700	0,700	0,700

Wall stem check - back reinf.

Wall check at the construction joint 2,10 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 14,0 mm, cover 30,0 mm

Inputted reinforcement area = 1077,6 mm²

Required reinforcement area = 497,5 mm²

Cross-section width = 1,00 m

Cross-section height = 0,40 m

Reinforcement ratio ρ = 0,29 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,04 m < 0,23 m = x_{max}

Ultimate shear force V_{Rd} = 148,95 kN > 64,80 kN = V_{Ed}

Ultimate moment M_{Rd} = 165,92 kNm > 56,58 kNm = M_{Ed}

Cross-section is SATISFACTORY.

Wall heel check

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	-0,25	17,50	1,10	1,000
Weight - earth wedge	0,00	-1,32	33,77	0,85	1,000
Active pressure	21,41	-0,87	24,19	1,40	1,000
Korisno opterećenje	10,19	-0,71	9,25	1,45	0,700
Contact stress	0,00	0,00	-56,12	0,64	1,000

Wall heel check

Reinforcement and dimensions of the cross-section

7 prof. 14,0 mm, cover 30,0 mm

Inputted reinforcement area = 1077,6 mm²

Required reinforcement area = 626,0 mm²

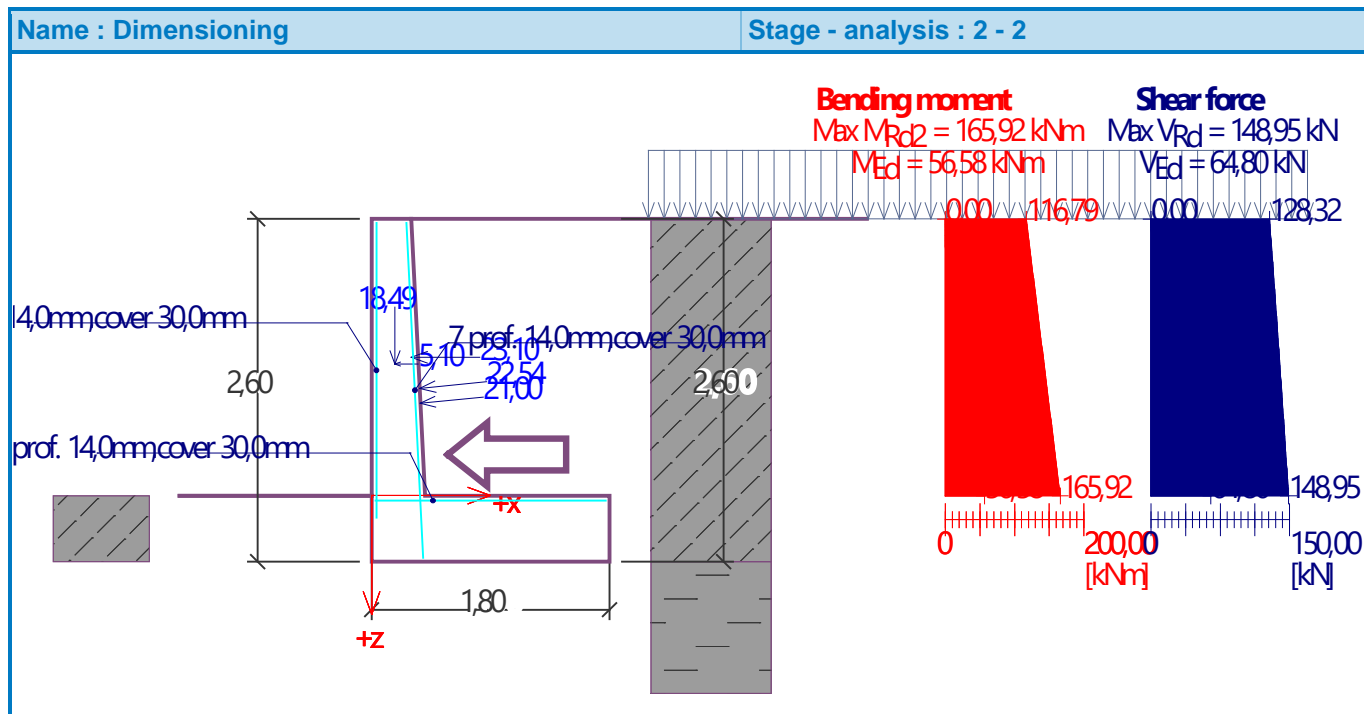
Cross-section width = 1,00 m

Cross-section height = 0,50 m

Reinforcement ratio ρ = 0,23 % > 0,14 % = ρ_{min}

Position of neutral axis $x = 0,04 \text{ m} < 0,29 \text{ m} = x_{\max}$
 Ultimate shear force $V_{Rd} = 172,86 \text{ kN} > 25,81 \text{ kN} = V_{Ed}$
 Ultimate moment $M_{Rd} = 210,33 \text{ kNm} > 56,58 \text{ kNm} = M_{Ed}$

Cross-section is **SATISFACTORY**.



Dimensioning No. 3 (Stage of construction 2)

Wall stem check - front reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-1,00	18,49	0,18	1,000	1,000	1,000
Earthq.- constr.	5,10	-1,00	0,00	0,18	1,000	1,000	1,000
Pressure at rest	20,90	-0,70	2,09	0,37	1,000	1,000	1,000
Earthquake - pressure at rest	23,10	-1,05	0,00	0,30	1,000	1,000	1,000
Korisno opterećenje	22,43	-0,81	2,24	0,36	0,700	0,700	0,700

Wall stem check - front reinf.

Front reinforcement is not required.

Wall stem check - back reinf.

Forces acting on construction

Name	F _{hor} [kN/m]	App.Pt. z [m]	F _{vert} [kN/m]	App.Pt. x [m]	Coeff. moment	Coeff. norm.force	Coeff. shear for.
Weight - wall	0,00	-1,00	18,49	0,18	1,000	1,000	1,000
Earthq.- constr.	5,10	-1,00	0,00	0,18	1,000	1,000	1,000
Pressure at rest	20,90	-0,70	2,09	0,37	1,000	1,000	1,000
Earthquake - pressure at rest	23,10	-1,05	0,00	0,30	1,000	1,000	1,000
Korisno opterećenje	22,43	-0,81	2,24	0,36	0,700	0,700	0,700

Wall stem check - back reinf.

Wall check at the construction joint 2,10 m from the wall crest

Reinforcement and dimensions of the cross-section

7 prof. 14,0 mm, cover 30,0 mm

Inputted reinforcement area = 1077,6 mm²

Required reinforcement area = 497,5 mm²

Cross-section width = 1,00 m

Cross-section height = 0,40 m

Reinforcement ratio ρ = 0,29 % > 0,14 % = ρ_{min}

Position of neutral axis x = 0,04 m < 0,23 m = x_{max}

Ultimate shear force V_{Rd} = 148,95 kN > 64,80 kN = V_{Ed}

Ultimate moment M_{Rd} = 165,92 kNm > 56,58 kNm = M_{Ed}

Cross-section is SATISFACTORY.

Wall heel check

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	-0,25	17,50	1,10	1,000
Weight - earth wedge	0,00	-1,32	33,77	0,85	1,000
Active pressure	21,41	-0,87	24,19	1,40	1,000
Korisno opterećenje	10,19	-0,71	9,25	1,45	0,700
Contact stress	0,00	0,00	-56,12	0,64	1,000

Wall heel check

Reinforcement and dimensions of the cross-section

7 prof. 14,0 mm, cover 30,0 mm

Inputted reinforcement area = 1077,6 mm²

Required reinforcement area = 626,0 mm²

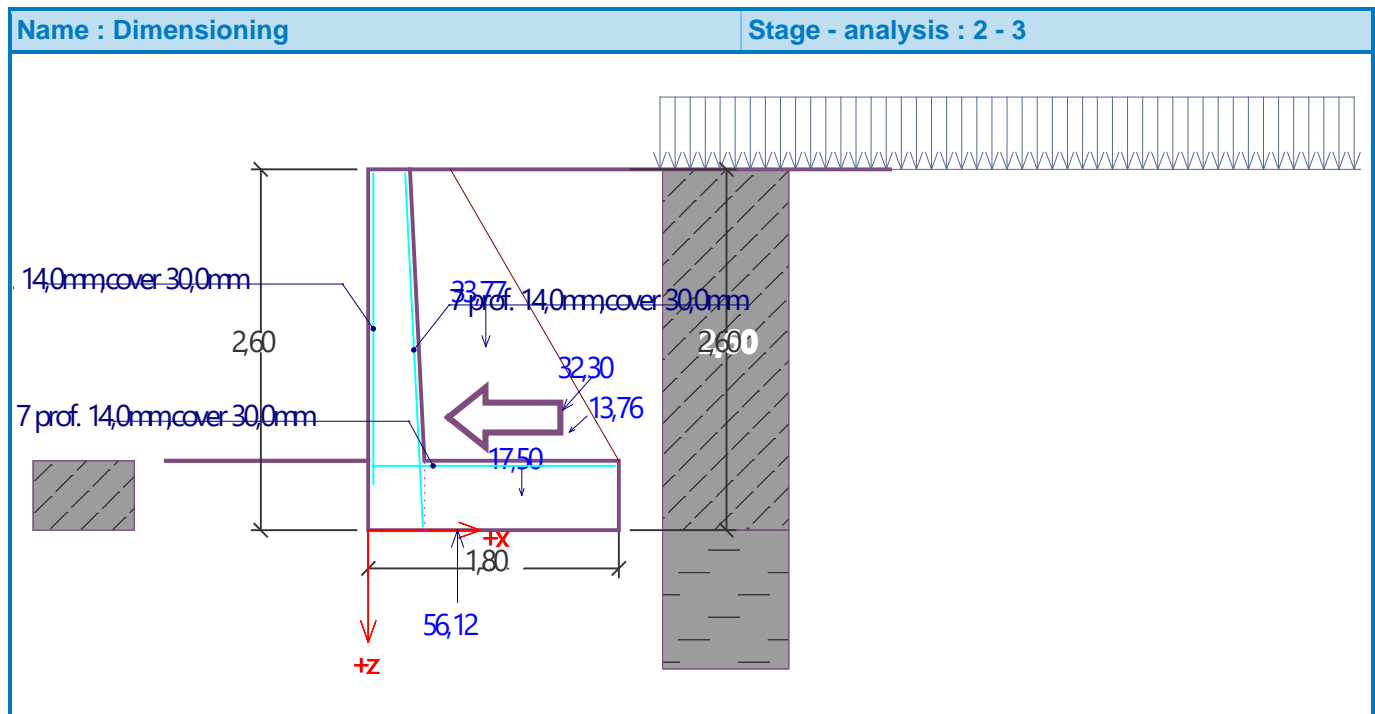
Cross-section width = 1,00 m

Cross-section height = 0,50 m

Reinforcement ratio ρ = 0,23 % > 0,14 % = ρ_{min}

Position of neutral axis $x = 0,04 \text{ m} < 0,29 \text{ m} = x_{\max}$
 Ultimate shear force $V_{Rd} = 172,86 \text{ kN} > 25,81 \text{ kN} = V_{Ed}$
 Ultimate moment $M_{Rd} = 210,33 \text{ kNm} > 56,58 \text{ kNm} = M_{Ed}$

Cross-section is SATISFACTORY.



Karakteristike temelja i temeljnog tla

$c=$	25,00	$\gamma cM2=$	1,00		
$\rho=$	21,00	$\gamma \rho M2=$	1,00		
$\gamma t=$	19,00	$\gamma tM2=$	1,00		
		$H=$	30,41	kN	horizontalna sila u temelju
		$\vartheta=$	0,00		ugao dejstva horizontalne sile (0 u B pravcu, 90 u L pravcu)
$c'=$	25,00	$V=$	147,56	kN	vertikalna sila u temelju
$\rho'=$	21,00	$Df=$	0,50	[m]	dubina fundiranja
$\gamma' t=$	9,00	$\alpha=$	0,00		nagib temeljne površi
$tg(\rho)/\gamma \rho M2=$	0,38	$B=$	1,80	[m]	širina temelja
$ctg(\rho')=$	2,61	$L=$	5,00	[m]	dužina temelja
$sin(\rho')=$	0,36	$eB=$	0,04	[m]	ekscentricitet L
$cos(\rho')=$	0,93	$eL=$	0,00	[m]	ekscentricitet B
		B			pravac dejstva horizontalne sile
		$mB=$	1,74		
		$mL=$	0,00		
		$m=$	0,00		

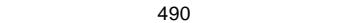

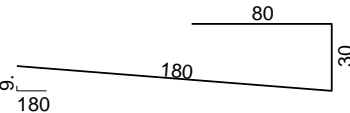
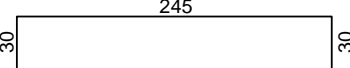
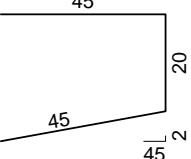
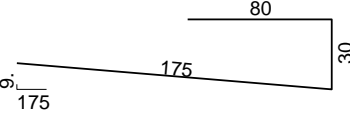
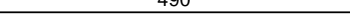
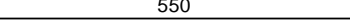
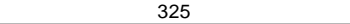
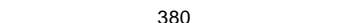
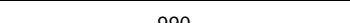
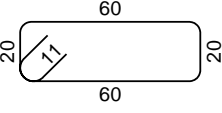
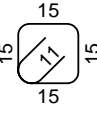
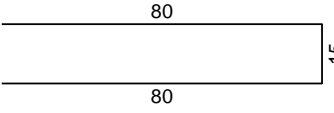
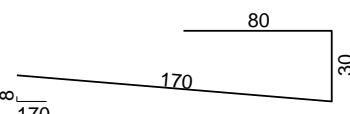

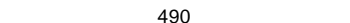
Koeficijenti za nosivost po Vesiću

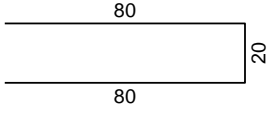
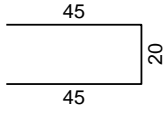
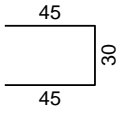
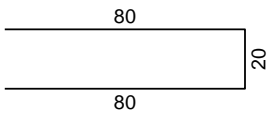
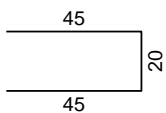
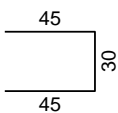
			$L'=$	5,00	
$c'=$	25,00	$q'=$	4,50	$B'=$	1,72
$Nc=$	15,81	$Nq=$	7,07	$Ny=$	4,66
$bc=$	1,00	$bq=$	1,00	$by=$	1,00
$sc=$	1,14	$sq=$	1,12	$sy=$	0,90
$ic=$	0,66	$iq=$	0,71	$iy=$	0,58

Nosivost tla

$qf=$	$c' \cdot Nc \cdot bc \cdot sc \cdot ic + q' \cdot Nq \cdot bq \cdot sq \cdot iq + 0.5 \cdot \gamma t \cdot B' \cdot Ny \cdot by \cdot sy \cdot iy$				
$qf=$	343,10	kN/m ²			
Slijeganje iz Tower-a					
$s=$	0,006	m			
Koeficijent posteljice					
$ks=$	57184,11	kN/m ³			

Šipke - specifikacija						
ozn.	oblik i mere [cm]	Ø	lg [m]	n [kom]	lgn [m]	Napomena
TIP 1 (1 kom)						
1		14	4.17	272	1134.24	
2		14	2.50	544	1360.00	
3		12	4.90	29	142.10	
4		12	4.90	203	994.70	
5		12	5.60	22	123.20	
TIP 2 (1 kom)						
1		12	3.45	1546	5333.70	
2		12	1.90	3066	5825.40	
3		12	4.90	662	3243.80	
4		12	4.90	22	107.80	
5		12	4.90	22	107.80	
6		12	4.90	66	323.40	
7		12	9.90	18	178.20	
8		12	4.90	67	328.30	
9		12	4.90	22	107.80	
10		12	4.90	22	107.80	
11		12	4.90	44	215.60	
12		12	3.50	8	28.00	
13		12	3.75	8	30.00	
14		10	1.52	20	30.40	
TIP 3 (1 kom)						
1		12	3.03	107	324.21	
2		12	1.70	204	346.80	

Šipke - specifikacija						
ozn.	oblik i mere [cm]	Ø	lg [m]	n [kom]	lg _n [m]	Napomena
3		12	4.90	60	294.00	
5		10	0.60	6	3.60	
TIP 4 (1 kom)						
1		12	2.90	125	362.50	
2		12	3.05	738	2250.90	
3		12	1.10	354	389.40	
4		12	2.85	102	290.70	
5		12	4.90	307	1504.30	
6		12	5.50	26	143.00	
7		12	3.25	6	19.50	
8		12	3.80	32	121.60	
9		12	9.90	4	39.60	
10		10	1.82	19	34.58	
11		10	0.82	327	268.14	
12		10	1.75	327	572.25	
13		12	2.80	102	285.60	
14		10	3.00	4	12.00	
15		10	4.90	36	176.40	

Šipke - specifikacija						
ozn.	oblik i mere [cm]	Ø	lg [m]	n [kom]	lg _n [m]	Napomena
Propust 1 (1 kom)						
1		10	1.80	224	403.20	
2		10	1.10	484	532.40	
3		10	1.20	260	312.00	
Propust 2 (1 kom)						
1		10	1.80	309	556.20	
2		10	1.10	681	749.10	
3		10	1.20	372	446.40	

Šipke - rekapitulacija			
Ø [mm]	lgn [m]	Jedinična težina [kg/m]	Težina [kg]
B500B			
10	4096.67	0.62	2527.65
12	23569.71	0.89	20929.90
14	2494.24	1.21	3018.03
Ukupno (B500B)			26475.58
Ukupno			26475.58

Mreže - specifikacija							
Pozicija	Oznaka mreže	B [cm]	L [cm]	n	Jedinična težina [kg/m2]	Ukupna težina [kg]	Napomena
TIP 1 (1 kom)							
I-1	Q-257	168	206	1	4.02	13.84	
I-2	Q-257	215	206	1	4.02	17.78	
I-3	Q-257	202	206	1	4.02	16.74	
I-4	Q-257	168	209	1	4.02	14.09	
I-5	Q-257	215	211	1	4.02	18.19	
I-6	Q-257	202	210	1	4.02	17.11	
I-7	Q-257	168	209	1	4.02	14.10	
I-8	Q-257	215	211	1	4.02	18.21	
I-9	Q-257	203	210	1	4.02	17.13	
I-10	Q-257	167	210	1	4.02	14.15	
I-11	Q-257	215	212	1	4.02	18.29	
I-12	Q-257	203	211	1	4.02	17.20	
I-13	Q-257	168	209	1	4.02	14.04	
I-14	Q-257	215	210	1	4.02	18.12	
I-15	Q-257	202	209	1	4.02	17.04	
I-16	Q-257	168	208	1	4.02	14.03	
I-17	Q-257	215	209	1	4.02	18.09	
I-18	Q-257	203	209	1	4.02	17.02	
I-19	Q-257	168	208	1	4.02	14.02	
I-20	Q-257	215	209	1	4.02	18.07	
I-21	Q-257	202	209	1	4.02	17.00	
I-22	Q-257	167	208	1	4.02	14.01	
I-23	Q-257	215	209	1	4.02	18.05	
I-24	Q-257	203	209	1	4.02	16.98	
Ukupno						393.30	
TIP 2 (1 kom)							
I-1	Q-257	167	159	1	4.02	10.73	
I-2	Q-257	215	161	1	4.02	13.88	
I-3	Q-257	203	160	1	4.02	13.05	
I-4	Q-257	167	160	1	4.02	10.80	
I-5	Q-257	215	162	1	4.02	14.00	
I-6	Q-257	203	162	1	4.02	13.15	
I-7	Q-257	168	162	1	4.02	10.92	
I-8	Q-257	215	164	1	4.02	14.19	
I-9	Q-257	202	164	1	4.02	13.32	
I-10	Q-257	168	158	1	4.02	10.64	
I-11	Q-257	215	159	1	4.02	13.73	

Mreže - specifikacija							
Pozicija	Oznaka mreže	B [cm]	L [cm]	n	Jedinična težina [kg/m ²]	Ukupna težina [kg]	Napom ena
I-12	Q-257	203	159	1	4.02	12.91	
I-13	Q-257	167	155	1	4.02	10.47	
I-14	Q-257	215	156	1	4.02	13.45	
I-15	Q-257	203	156	1	4.02	12.67	
I-16	Q-257	167	158	2	4.02	21.26	
I-17	Q-257	215	159	2	4.02	27.44	
I-18	Q-257	203	159	2	4.02	25.81	
I-19	Q-257	168	157	1	4.02	10.60	
I-20	Q-257	215	158	1	4.02	13.67	
I-21	Q-257	202	158	1	4.02	12.86	
I-22	Q-257	168	157	1	4.02	10.59	
I-23	Q-257	215	158	1	4.02	13.65	
I-24	Q-257	203	158	1	4.02	12.84	
I-25	Q-257	167	157	1	4.02	10.58	
I-26	Q-257	215	158	1	4.02	13.63	
I-27	Q-257	203	158	1	4.02	12.83	
I-28	Q-257	168	157	1	4.02	10.57	
I-29	Q-257	215	158	1	4.02	13.61	
I-30	Q-257	203	157	1	4.02	12.81	
I-31	Q-257	167	157	1	4.02	10.56	
I-32	Q-257	215	157	1	4.02	13.59	
I-33	Q-257	203	157	1	4.02	12.79	
I-34	Q-257	168	157	1	4.02	10.54	
I-35	Q-257	215	157	1	4.02	13.57	
I-36	Q-257	202	157	1	4.02	12.77	
I-37	Q-257	168	156	1	4.02	10.54	
I-38	Q-257	215	157	1	4.02	13.56	
I-39	Q-257	202	157	1	4.02	12.76	
I-40	Q-257	168	160	1	4.02	10.74	
I-41	Q-257	215	161	1	4.02	13.90	
I-42	Q-257	202	160	1	4.02	13.06	
I-43	Q-257	168	161	1	4.02	10.87	
I-44	Q-257	215	163	1	4.02	14.10	
I-45	Q-257	203	163	1	4.02	13.25	
I-46	Q-257	168	159	1	4.02	10.70	
I-47	Q-257	215	160	1	4.02	13.83	
I-48	Q-257	203	160	1	4.02	13.00	
I-49	Q-257	168	159	1	4.02	10.69	

Mreže - specifikacija							
Pozicija	Oznaka mreže	B [cm]	L [cm]	n	Jedinična težina [kg/m ²]	Ukupna težina [kg]	Napom ena
I-50	Q-257	215	160	1	4.02	13.81	
I-51	Q-257	203	159	1	4.02	12.98	
I-52	Q-257	168	159	1	4.02	10.67	
I-53	Q-257	215	160	1	4.02	13.79	
I-54	Q-257	202	159	1	4.02	12.97	
I-55	Q-257	168	158	1	4.02	10.66	
I-56	Q-257	215	159	1	4.02	13.77	
I-57	Q-257	202	159	1	4.02	12.95	
I-58	Q-257	168	158	1	4.02	10.65	
I-59	Q-257	215	159	1	4.02	13.75	
I-60	Q-257	203	159	1	4.02	12.93	
I-61	Q-257	168	158	1	4.02	10.64	
I-62	Q-257	215	159	1	4.02	13.73	
I-63	Q-257	203	159	1	4.02	12.92	
I-64	Q-257	168	158	1	4.02	10.62	
I-65	Q-257	215	159	1	4.02	13.70	
I-66	Q-257	203	158	1	4.02	12.89	
I-67	Q-257	168	158	1	4.02	10.61	
I-68	Q-257	215	158	1	4.02	13.68	
I-69	Q-257	202	158	1	4.02	12.87	
I-70	Q-257	168	158	1	4.02	10.61	
I-71	Q-257	215	158	1	4.02	13.67	
I-72	Q-257	203	158	1	4.02	12.86	
I-73	Q-257	168	157	1	4.02	10.60	
I-74	Q-257	215	158	1	4.02	13.66	
I-75	Q-257	203	158	1	4.02	12.85	
I-76	Q-257	168	157	1	4.02	10.59	
I-77	Q-257	215	158	1	4.02	13.64	
I-78	Q-257	202	158	1	4.02	12.84	
I-79	Q-257	168	157	1	4.02	10.57	
I-80	Q-257	215	158	1	4.02	13.62	
I-81	Q-257	203	157	1	4.02	12.82	
I-82	Q-257	167	157	1	4.02	10.56	
I-83	Q-257	215	157	1	4.02	13.60	
I-84	Q-257	203	157	1	4.02	12.80	
I-85	Q-257	168	157	1	4.02	10.55	
I-86	Q-257	215	157	1	4.02	13.59	
I-87	Q-257	203	157	1	4.02	12.79	

Mreže - specifikacija							
Pozicija	Oznaka mreže	B [cm]	L [cm]	n	Jedinična težina [kg/m ²]	Ukupna težina [kg]	Napom ena
I-88	Q-257	168	157	1	4.02	10.54	
I-89	Q-257	215	157	1	4.02	13.57	
I-90	Q-257	203	157	1	4.02	12.77	
I-91	Q-257	121	156	1	4.02	7.54	
I-92	Q-257	215	157	1	4.02	13.56	
I-93	Q-257	89	156	1	4.02	5.59	
I-94	Q-257	162	157	1	4.02	10.17	
I-95	Q-257	215	157	1	4.02	13.58	
I-96	Q-257	71	156	1	4.02	4.43	
I-97	Q-257	215	156	1	4.02	13.51	
I-98	Q-257	47	155	1	4.02	2.96	
I-99	Q-257	215	156	1	4.02	13.51	
I-100	Q-257	153	156	1	4.02	9.56	
I-101	Q-257	168	156	1	4.02	10.49	
I-102	Q-257	215	156	1	4.02	13.49	
I-103	Q-257	203	156	1	4.02	12.70	
I-104	Q-257	168	156	1	4.02	10.48	
I-105	Q-257	215	156	1	4.02	13.47	
I-106	Q-257	202	156	1	4.02	12.69	
I-107	Q-257	168	156	1	4.02	10.47	
I-108	Q-257	215	156	1	4.02	13.46	
I-109	Q-257	203	156	1	4.02	12.67	
I-110	Q-257	168	155	1	4.02	10.46	
I-111	Q-257	215	155	1	4.02	13.44	
I-112	Q-257	202	155	1	4.02	12.65	
I-113	Q-257	168	155	1	4.02	10.45	
I-114	Q-257	215	155	1	4.02	13.42	
I-115	Q-257	202	155	1	4.02	12.64	
I-116	Q-257	168	155	1	4.02	10.44	
I-117	Q-257	215	155	1	4.02	13.40	
I-118	Q-257	202	155	1	4.02	12.62	
I-119	Q-257	168	155	1	4.02	10.45	
I-120	Q-257	215	155	1	4.02	13.41	
I-121	Q-257	203	155	1	4.02	12.63	
I-122	Q-257	168	155	1	4.02	10.45	
I-123	Q-257	215	155	1	4.02	13.43	
I-124	Q-257	203	155	1	4.02	12.64	
I-125	Q-257	168	155	1	4.02	10.46	

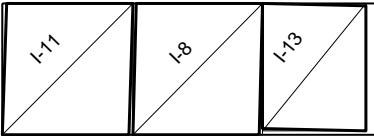
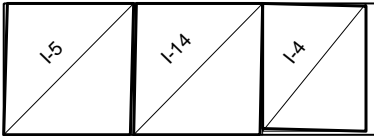
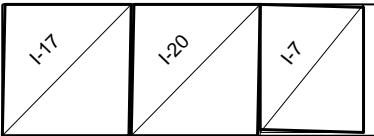
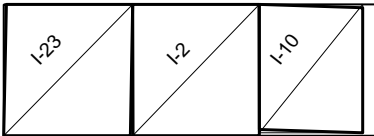
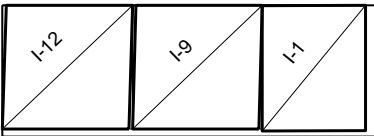
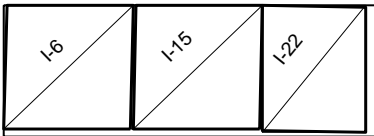
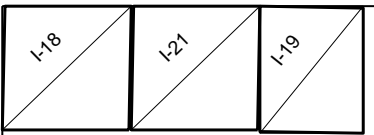
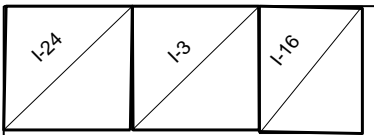
Mreže - specifikacija							
Pozicija	Oznaka mreže	B [cm]	L [cm]	n	Jedinična težina [kg/m2]	Ukupna težina [kg]	Napomena
I-126	Q-257	215	155	1	4.02	13.43	
I-127	Q-257	202	155	1	4.02	12.65	
I-128	Q-257	168	155	1	4.02	10.45	
I-129	Q-257	215	156	1	4.02	13.44	
I-130	Q-257	203	156	1	4.02	12.68	
I-131	Q-257	168	156	1	4.02	10.49	
I-132	Q-257	215	156	2	4.02	26.96	
I-133	Q-257	103	155	1	4.02	6.42	
Ukupno						1659.03	
TIP 3 (1 kom)							
I-1	Q-257	167	116	1	4.02	7.78	
I-2	Q-257	215	116	1	4.02	10.00	
I-3	Q-257	202	116	1	4.02	9.42	
I-4	Q-257	167	119	1	4.02	8.02	
I-5	Q-257	215	120	1	4.02	10.39	
I-6	Q-257	203	120	1	4.02	9.77	
I-7	Q-257	167	116	1	4.02	7.80	
I-8	Q-257	215	116	1	4.02	10.03	
I-9	Q-257	203	116	1	4.02	9.44	
Ukupno						82.64	
TIP 4 (1 kom)							
I-1	Q-257	168	155	1	4.02	10.46	
I-2	Q-257	215	156	1	4.02	13.51	
I-3	Q-257	140	156	1	4.02	8.80	
I-4	Q-257	167	157	1	4.02	10.55	
I-5	Q-257	185	157	1	4.02	11.67	
I-6	Q-257	167	153	1	4.02	10.32	
I-7	Q-257	215	155	1	4.02	13.38	
I-8	Q-257	203	156	1	4.02	12.71	
I-9	Q-257	167	149	1	4.02	10.05	
I-10	Q-257	215	151	1	4.02	13.02	
I-11	Q-257	203	152	1	4.02	12.36	
I-12	Q-257	167	146	1	4.02	9.81	
I-13	Q-257	215	147	1	4.02	12.70	
I-14	Q-257	203	148	1	4.02	12.05	
I-15	Q-257	167	143	1	4.02	9.65	
I-16	Q-257	215	144	1	4.02	12.45	

Mreže - specifikacija							
Pozicija	Oznaka mreže	B [cm]	L [cm]	n	Jedinična težina [kg/m2]	Ukupna težina [kg]	Napomena
I-17	Q-257	203	145	1	4.02	11.77	
I-18	Q-257	167	142	1	4.02	9.53	
I-19	Q-257	215	142	1	4.02	12.29	
I-20	Q-257	203	143	1	4.02	11.62	
I-21	Q-257	167	140	1	4.02	9.40	
I-22	Q-257	215	140	1	4.02	12.13	
I-23	Q-257	203	141	1	4.02	11.47	
I-24	Q-257	167	138	1	4.02	9.28	
I-25	Q-257	215	138	1	4.02	11.97	
I-26	Q-257	203	139	1	4.02	11.32	
I-27	Q-257	167	136	1	4.02	9.16	
I-28	Q-257	215	137	1	4.02	11.81	
I-29	Q-257	203	137	1	4.02	11.17	
I-30	Q-257	167	135	1	4.02	9.12	
I-31	Q-257	215	136	1	4.02	11.73	
I-32	Q-257	202	136	1	4.02	11.05	
II-1	Q-335	210	115	2	5.26	25.50	
II-2	Q-335	137	115	2	5.26	16.64	
II-3	Q-335	210	115	18	5.26	229.46	
II-4	Q-335	215	115	18	5.26	234.97	
II-5	Q-335	155	115	18	5.26	168.98	
III-1	Q-524	215	245	38	8.22	1645.36	
III-2	Q-524	132	245	1	8.22	26.65	
III-3	Q-524	132	245	1	8.22	26.65	
III-4	Q-524	149	245	9	8.22	270.86	
III-5	Q-524	149	245	9	8.22	270.93	
Ukupno						3274.28	
Propust 1 (1 kom)							
I	Q-335	215	605	1	5.26	68.42	
I-1	Q-335	210	104	4	5.26	46.14	
I-2	Q-335	215	105	32	5.26	378.32	
I-3	Q-335	147	103	4	5.26	32.00	
I-4	Q-335	215	290	18	5.26	590.33	
I-5	Q-335	199	290	2	5.26	60.57	
II	Q-524	215	605	2	8.22	213.84	
II-1	Q-524	215	290	18	8.22	922.53	
II-2	Q-524	199	290	2	8.22	94.65	
II-3	Q-524	215	605	1	8.22	106.92	

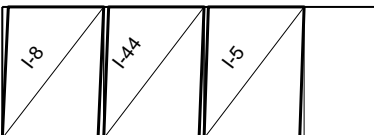
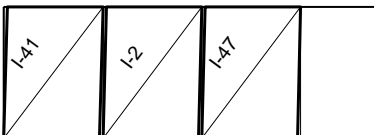

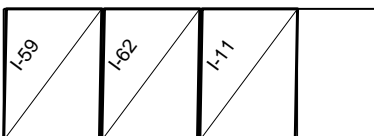
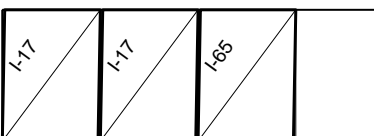
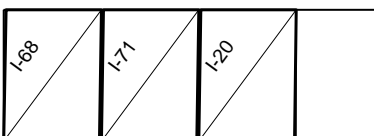
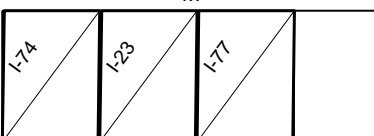
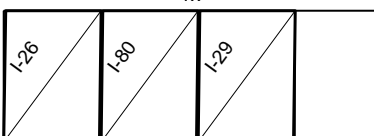
Mreže - specifikacija							
Pozicija	Oznaka mreže	B [cm]	L [cm]	n	Jedinična težina [kg/m2]	Ukupna težina [kg]	Napomena
II-4	Q-524	215	594	1	8.22	104.98	
II-5	Q-524	120	605	2	8.22	119.35	
II-6	Q-524	120	576	1	8.22	56.77	
Ukupno						2794.83	
Propust 2 (1 kom)							
I-1	Q-335	215	246	20	5.26	556.40	
I-2	Q-335	209	246	2	5.26	54.08	
I-3	Q-335	215	92	2	5.26	20.77	
I-4	Q-335	215	92	2	5.26	20.76	
I-5	Q-335	215	92	2	5.26	20.76	
I-6	Q-335	215	92	2	5.26	20.76	
I-7	Q-335	215	92	2	5.26	20.76	
I-8	Q-335	215	92	2	5.26	20.76	
I-9	Q-335	215	92	2	5.26	20.76	
I-10	Q-335	215	92	2	5.26	20.76	
I-11	Q-335	215	92	22	5.26	228.31	
I-12	Q-335	49	90	2	5.26	4.68	
I-13	Q-335	215	92	2	5.26	20.76	
I-14	Q-335	188	92	2	5.26	18.11	
I-15	Q-335	215	240	2	5.26	54.39	
I-16	Q-335	215	240	2	5.26	54.39	
I-17	Q-335	180	240	2	5.26	45.52	
II	Q-524	215	605	2	8.22	213.84	
II-1	Q-524	215	246	20	8.22	869.51	
II-2	Q-524	209	246	2	8.22	84.51	
II-3	Q-524	215	605	1	8.22	106.92	
II-4	Q-524	215	229	1	8.22	40.47	
II-5	Q-524	76	605	3	8.22	113.39	
II-6	Q-524	76	99	1	8.22	6.20	
II-7	Q-524	215	240	2	8.22	84.99	
II-8	Q-524	215	240	2	8.22	84.99	
II-9	Q-524	180	240	2	8.22	71.14	
II-10	Q-524	215	520	1	8.22	91.81	
II-11	Q-524	46	520	1	8.22	19.72	
II-12	Q-524	70	443	1	8.22	25.51	
Ukupno						3015.74	

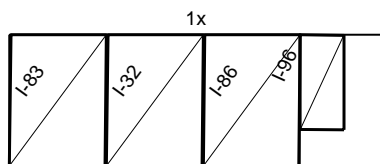
Mreže - rekapitulacija						
Oznaka mreže	B [cm]	L [cm]	n	Jedinična težina [kg/m ²]	Ukupna težina celih tabli [kg]	Neto ugrađena težina [kg]
Q-257	215	605	62	4.02	3241.99	2454.90
Q-335	215	605	50	5.26	3420.97	2967.32
Q-524	215	605	67	8.22	7163.75	5549.79
Ukupno					13826.71	10972.01

Mreže - plan sečenja
TIP 1
Q-257 (605 cm x 215 cm)

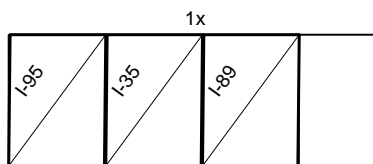
1x 	I-11 212 x 215 I-8 211 x 215 I-13 209 x 168	1x 	I-5 211 x 215 I-14 210 x 215 I-4 209 x 168
1x 	I-17 209 x 215 I-20 209 x 215 I-7 209 x 168	1x 	I-23 209 x 215 I-2 206 x 215 I-10 210 x 167
1x 	I-12 211 x 203 I-9 210 x 203 I-1 206 x 168	1x 	I-6 210 x 202 I-15 209 x 202 I-22 208 x 167
1x 	I-18 209 x 203 I-21 209 x 202 I-19 208 x 168	1x 	I-24 209 x 203 I-3 206 x 202 I-16 208 x 168

TIP 2
Q-257 (605 cm x 215 cm)

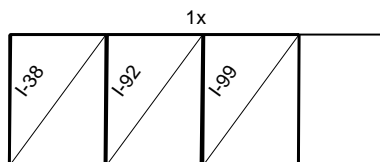
1x 	I-8 164 x 215 I-44 163 x 215 I-5 162 x 215	1x 	I-41 161 x 215 I-2 161 x 215 I-47 160 x 215
1x 	I-50 160 x 215 I-53 160 x 215 I-56 159 x 215	1x 	I-59 159 x 215 I-62 159 x 215 I-11 159 x 215
1x 	I-17 159 x 215 I-17 159 x 215 I-65 159 x 215	1x 	I-68 158 x 215 I-71 158 x 215 I-20 158 x 215
1x 	I-74 158 x 215 I-23 158 x 215 I-77 158 x 215	1x 	I-26 158 x 215 I-80 158 x 215 I-29 158 x 215



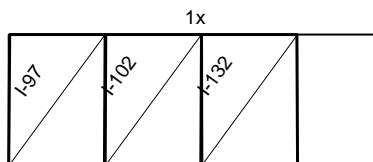
I-83 157 x 215
I-32 157 x 215
I-86 157 x 215
I-96 156 x 71



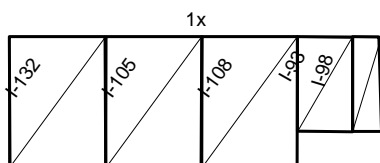
I-95 157 x 215
I-35 157 x 215
I-89 157 x 215



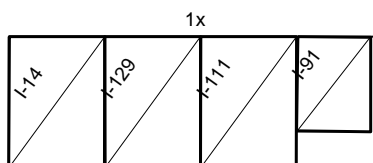
I-38 157 x 215
I-92 157 x 215
I-99 156 x 215



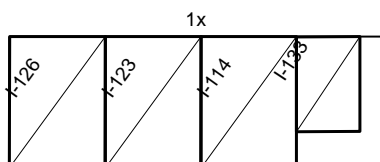
I-97 156 x 215
I-102 156 x 215
I-132 156 x 215



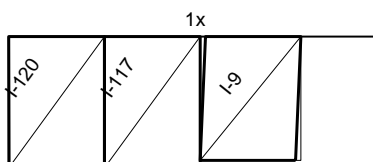
I-132 156 x 215
I-105 156 x 215
I-108 156 x 215
I-93 156 x 89
I-98 155 x 47



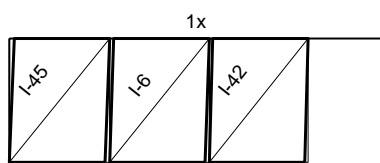
I-14 156 x 215
I-129 156 x 215
I-111 155 x 215
I-91 156 x 121



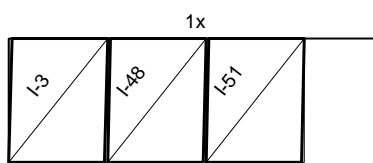
I-126 155 x 215
I-123 155 x 215
I-114 155 x 215
I-133 155 x 103



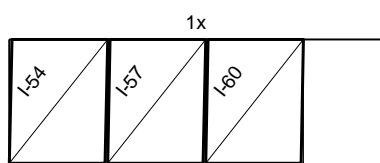
I-120 155 x 215
I-117 155 x 215
I-9 164 x 202



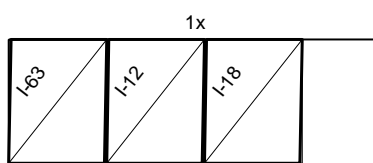
I-45 163 x 203
I-6 162 x 203
I-42 160 x 202



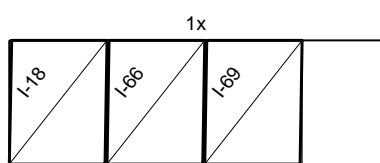
I-3 160 x 203
I-48 160 x 203
I-51 159 x 203



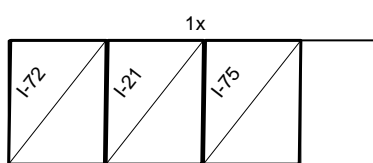
I-54 159 x 202
I-57 159 x 202
I-60 159 x 203



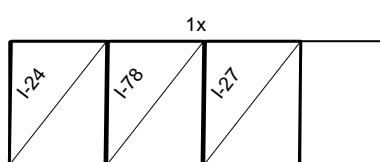
I-63 159 x 203
I-12 159 x 203
I-18 159 x 203



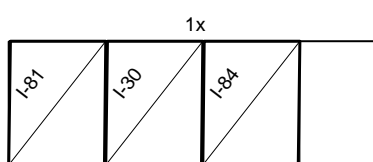
I-18 159 x 202
I-66 158 x 203
I-69 158 x 202



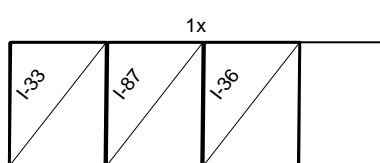
I-72 158 x 203
I-21 158 x 202
I-75 158 x 203



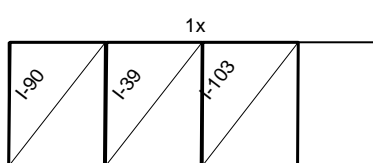
I-24 158 x 203
I-78 158 x 202
I-27 158 x 203



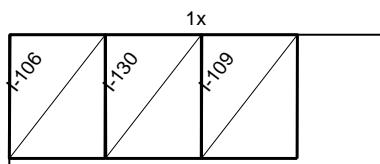
I-81 157 x 203
I-30 157 x 203
I-84 157 x 203



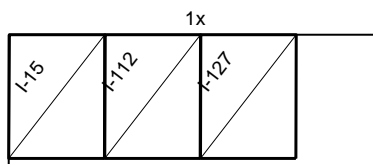
I-33 157 x 203
I-87 157 x 203
I-36 157 x 202



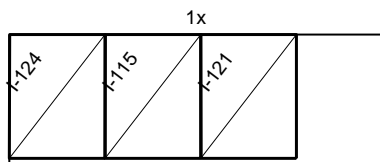
I-90 157 x 203
I-39 157 x 202
I-103 156 x 203



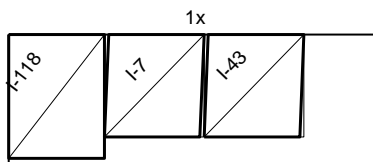
I-106 156 x 202
I-130 156 x 203
I-109 156 x 203



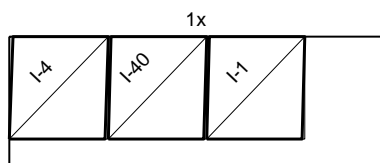
I-15 156 x 203
I-112 155 x 202
I-127 155 x 202



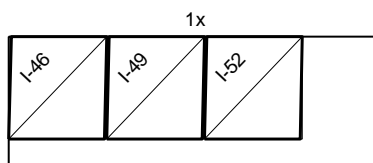
I-124 155 x 203
I-115 155 x 202
I-121 155 x 203



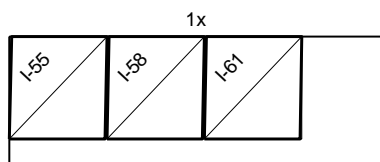
I-118 155 x 202
I-7 162 x 168
I-43 161 x 168



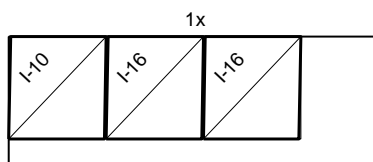
I-4 160 x 167
I-40 160 x 168
I-1 159 x 167



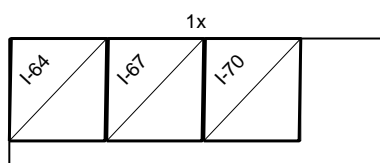
I-46 159 x 168
I-49 159 x 168
I-52 159 x 168



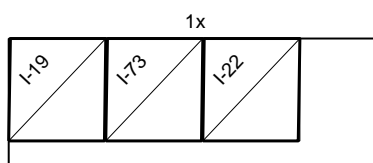
I-55 158 x 168
I-58 158 x 168
I-61 158 x 168



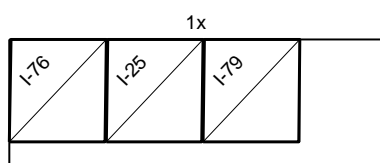
I-10 158 x 168
I-16 158 x 168
I-16 158 x 167



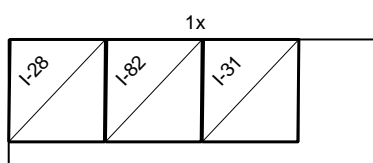
I-64 158 x 168
I-67 158 x 168
I-70 158 x 168



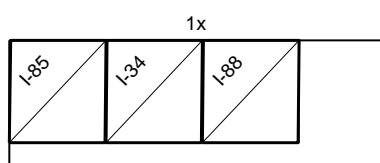
I-19 157 x 168
I-73 157 x 168
I-22 157 x 168



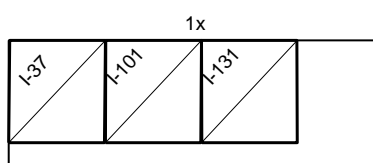
I-76 157 x 168
I-25 157 x 167
I-79 157 x 168



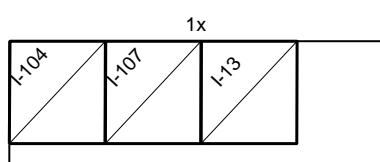
I-28 157 x 168
I-82 157 x 167
I-31 157 x 167



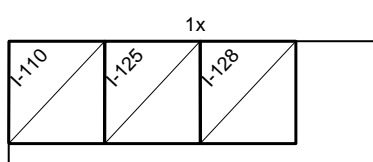
I-85 157 x 168
I-34 157 x 168
I-88 157 x 168



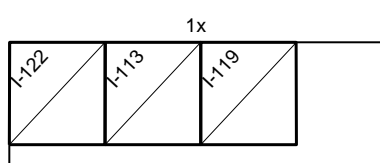
I-37 156 x 168
I-101 156 x 168
I-131 156 x 168



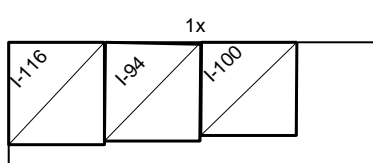
I-104 156 x 168
I-107 156 x 168
I-13 155 x 167



I-110 155 x 168
I-125 155 x 168
I-128 155 x 168

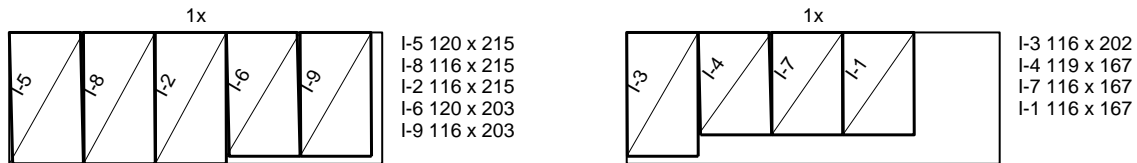


I-122 155 x 168
I-113 155 x 168
I-119 155 x 168

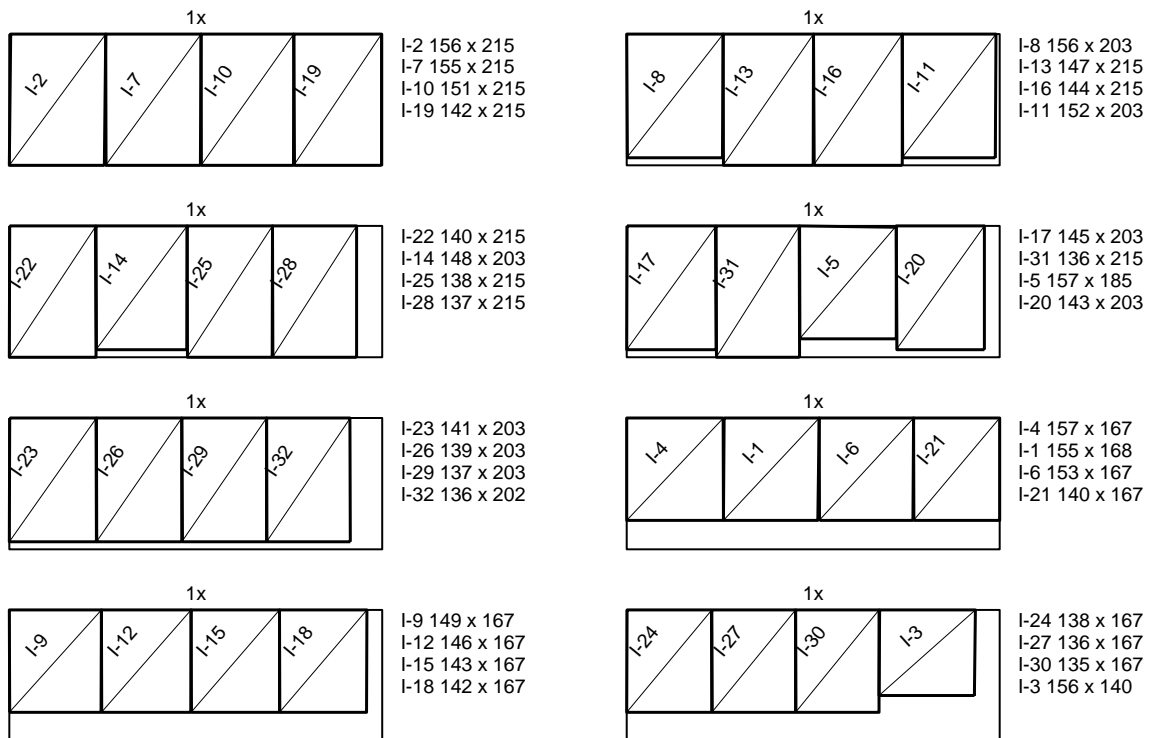


I-116 155 x 168
I-94 157 x 162
I-100 156 x 153

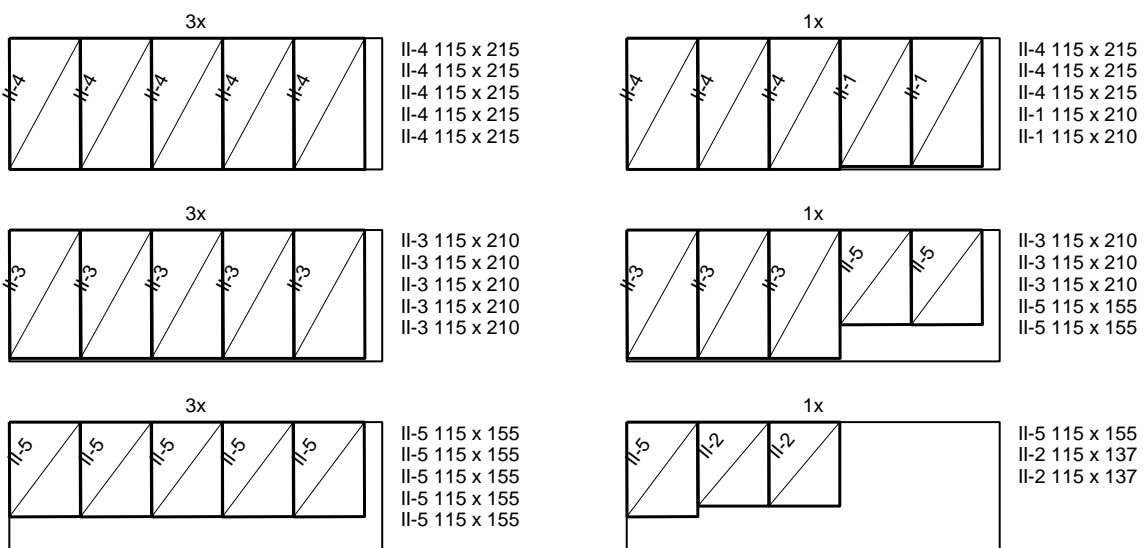
Mreže - plan sečenja
TIP 3
Q-257 (605 cm x 215 cm)



TIP 4
Q-257 (605 cm x 215 cm)

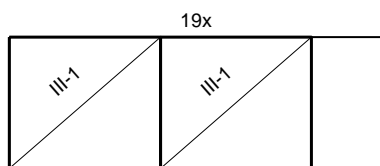


Q-335 (605 cm x 215 cm)

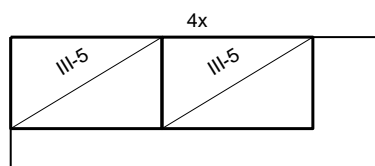


Mreže - plan sečenja

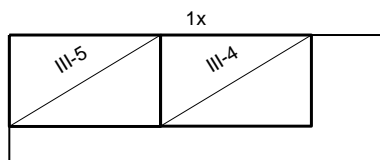
Q-524 (605 cm x 215 cm)



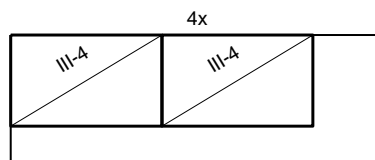
III-1 245 x 215
III-1 245 x 215



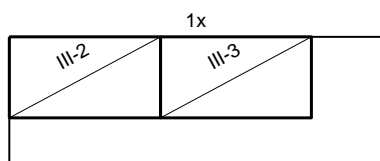
III-5 245 x 149
III-5 245 x 149



III-5 245 x 149
III-4 245 x 149



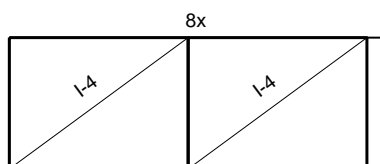
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III-4 245 x 149



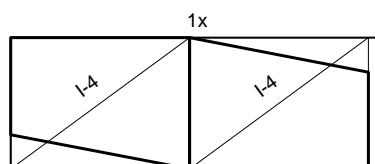
III-2 245 x 132
III-3 245 x 132

Propust 1

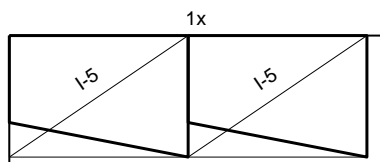
Q-335 (605 cm x 215 cm)



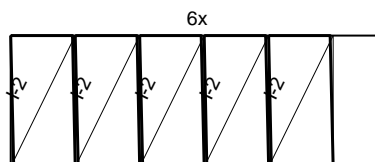
I-4 290 x 215
I-4 290 x 215



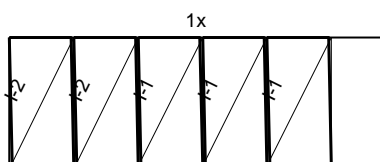
I-4 290 x 215
I-4 290 x 215



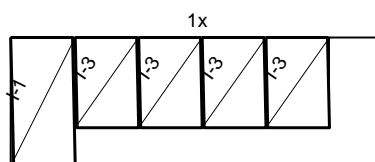
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I-5 290 x 199



I-2 105 x 215
I-2 105 x 215
I-2 105 x 215
I-2 105 x 215
I-2 105 x 215

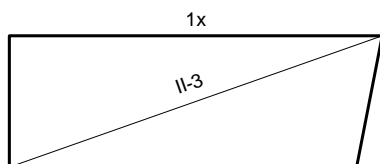


I-2 105 x 215
I-2 105 x 215
I-1 104 x 210
I-1 104 x 210
I-1 104 x 210

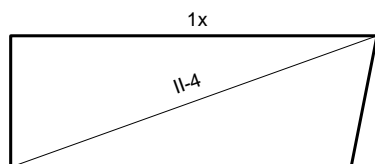


I-1 104 x 210
I-3 103 x 147
I-3 103 x 147
I-3 103 x 147
I-3 103 x 147

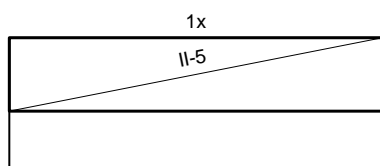
Q-524 (605 cm x 215 cm)



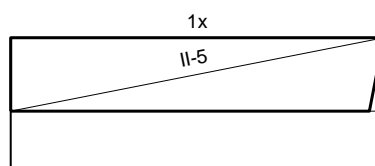
II-3 605 x 215



II-4 594 x 215

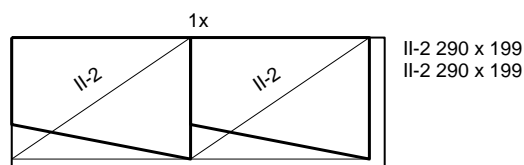
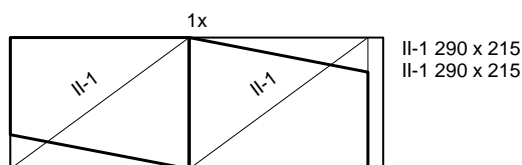
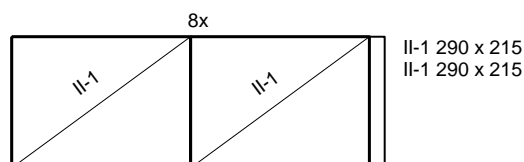
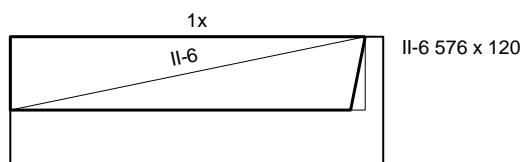


II-5 605 x 120



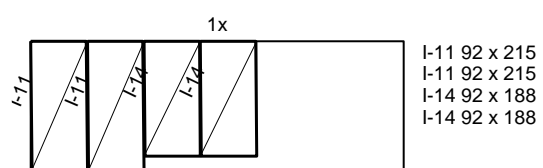
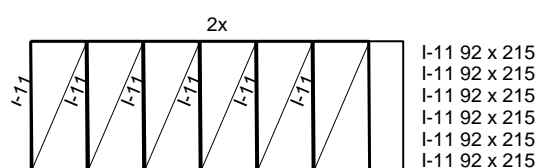
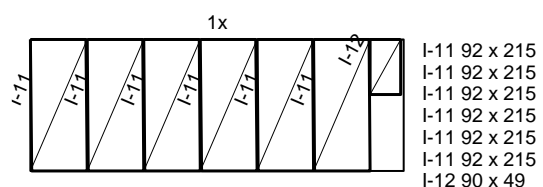
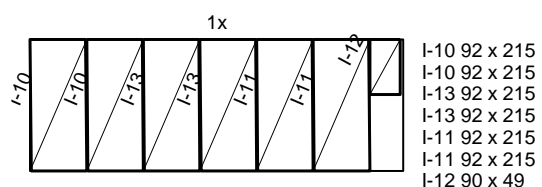
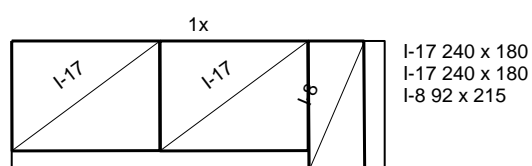
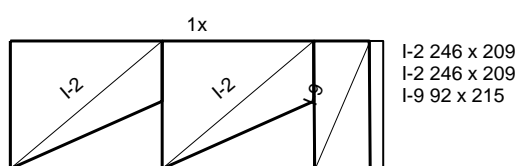
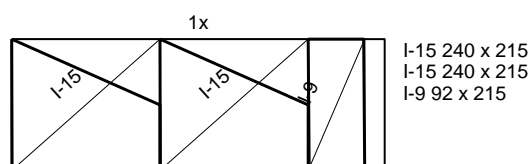
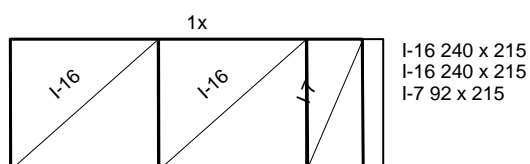
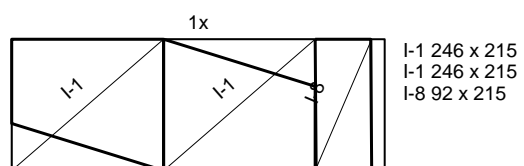
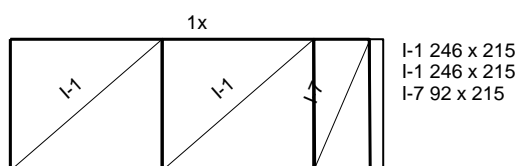
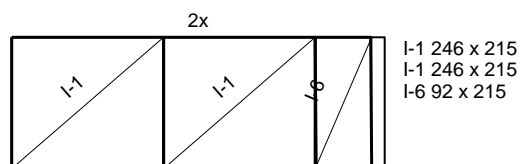
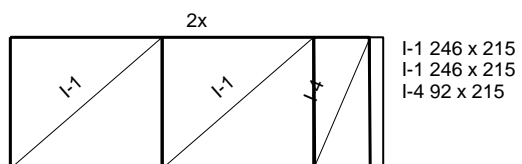
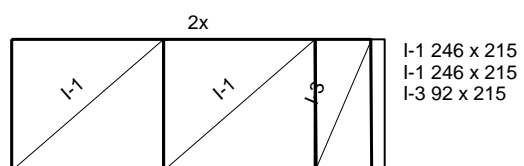
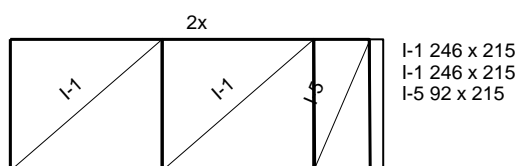
II-5 605 x 120

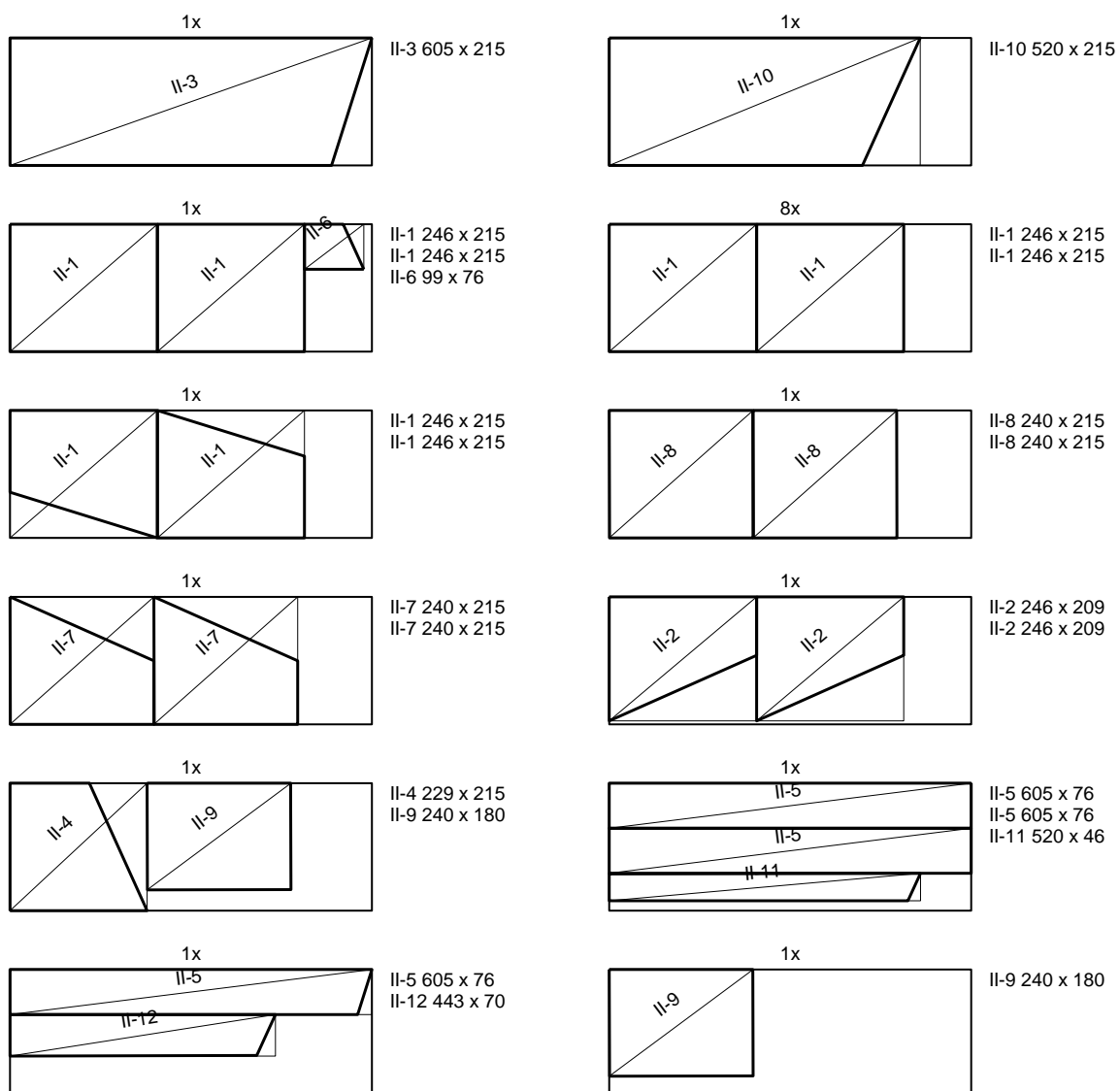
Mreže - plan sečenja



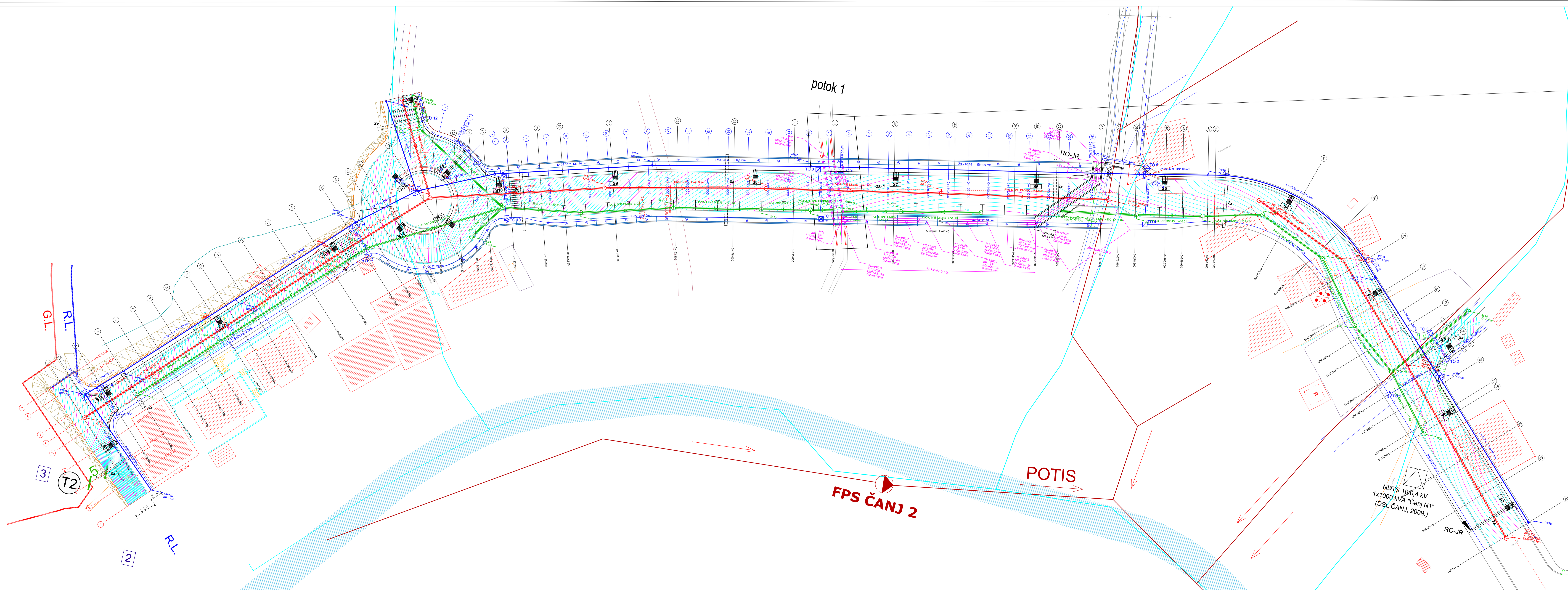
Propust 2

Q-335 (605 cm x 215 cm)





3. GRAFIČKA DOKUMENTACIJA

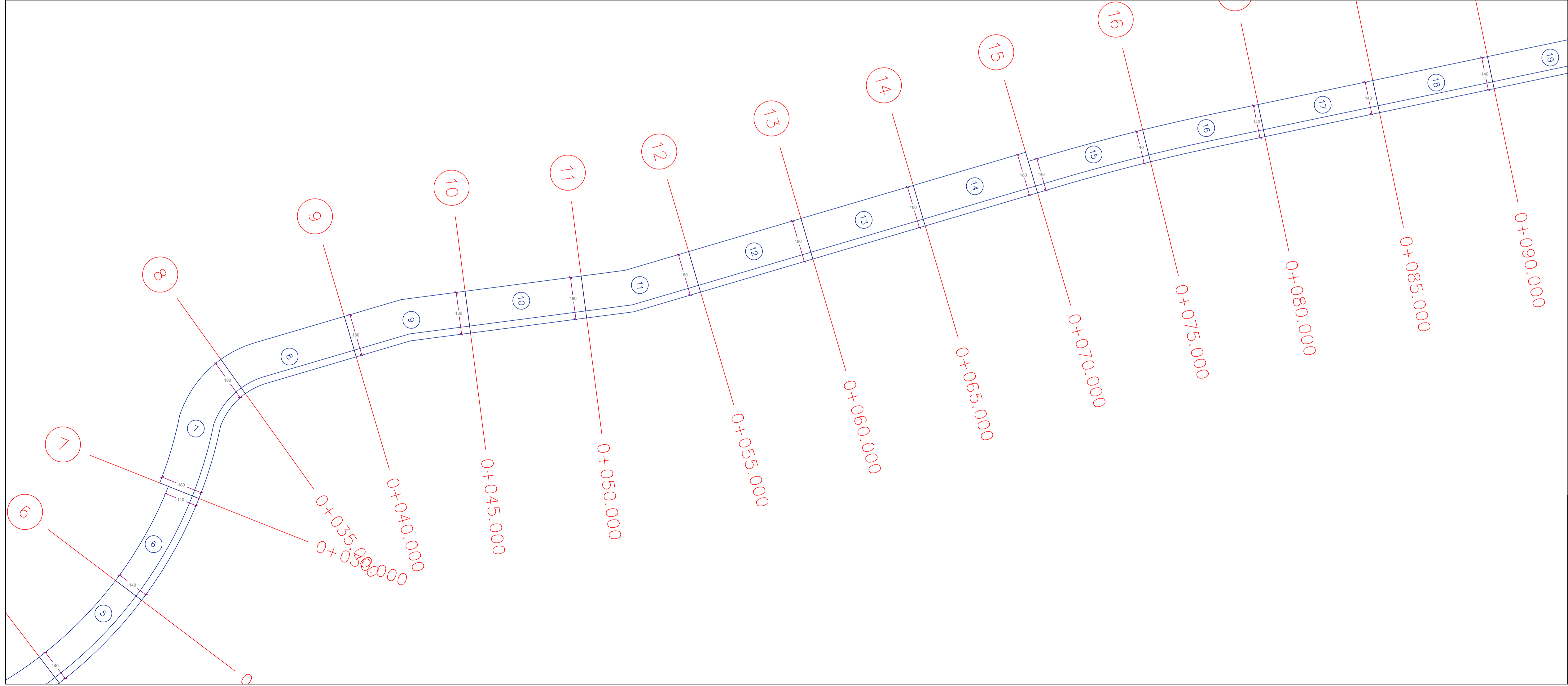
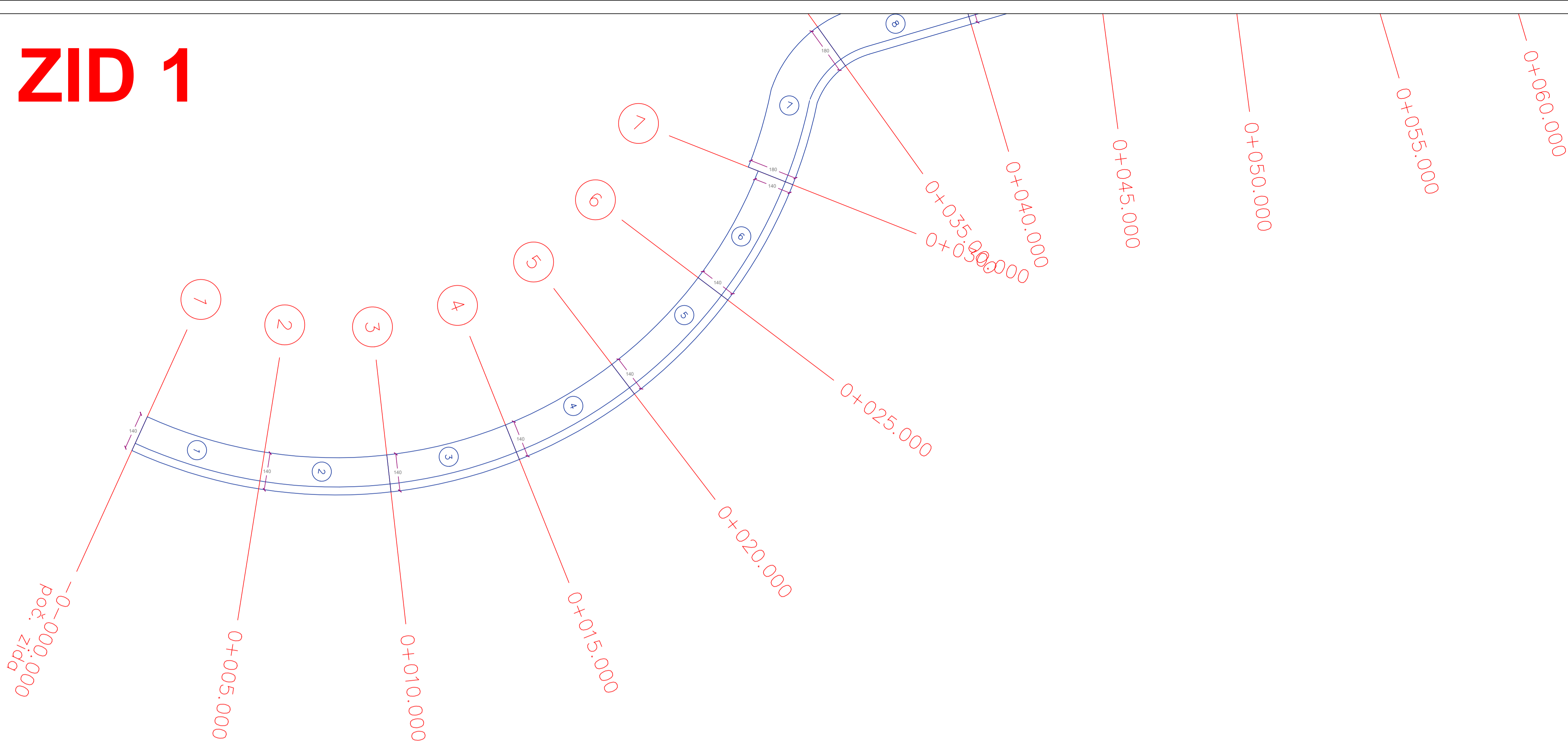


- Legenda:
- | | |
|------------------------------|--------------------|
| Zakaznik stanovanja 11. jana | Stambeni objekat |
| Uzdužna linija | Objekat (rasveta) |
| Brusna stena | Stupnja |
| Brus | Trasa odlozavanja |
| Mokradlo | Trasa odlozavanja |
| Ograda | Zid |
| Kanal | Zidna ograda |
| | Soba |
| | Brusna drvena stak |
| | Zimolovna drva |

GEODETSKA SITUACIJA
POSTOJEĆEG STANJA
R 1:250

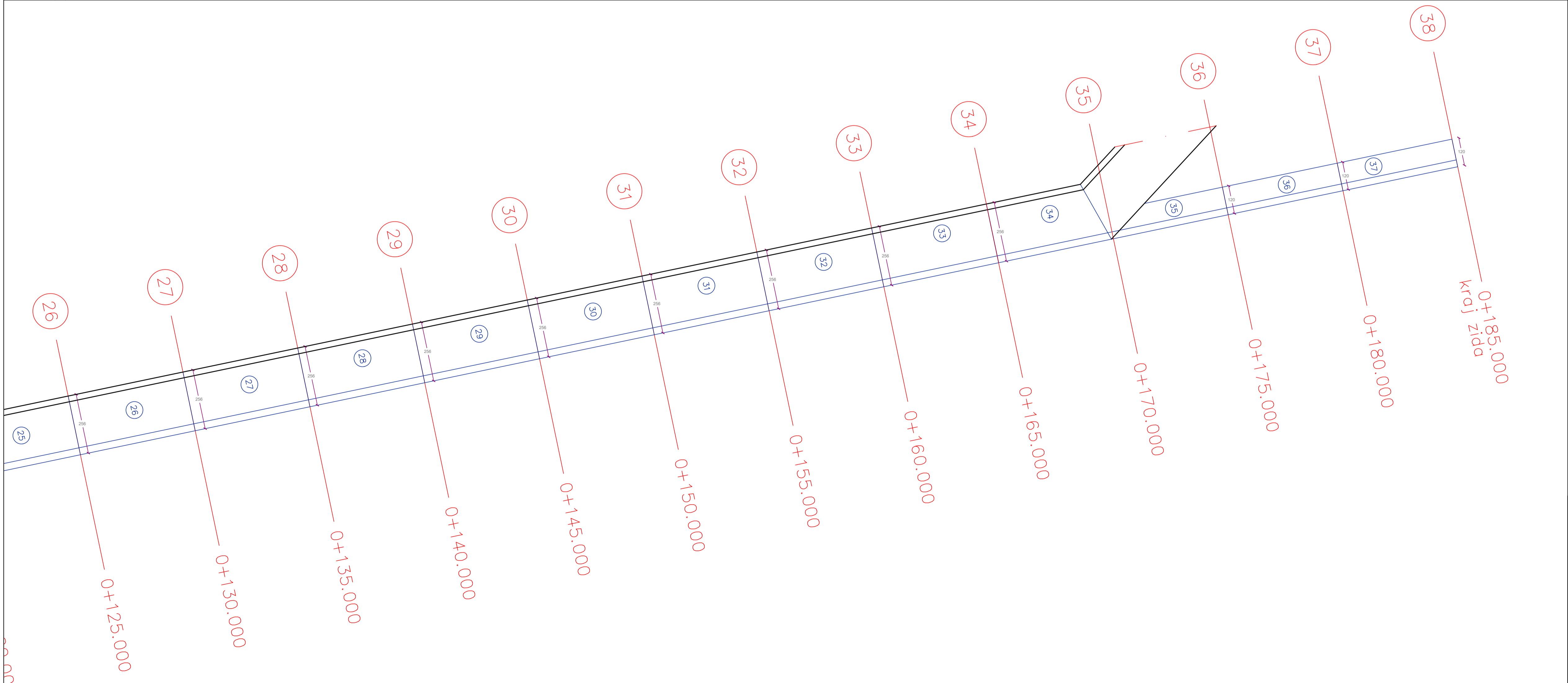
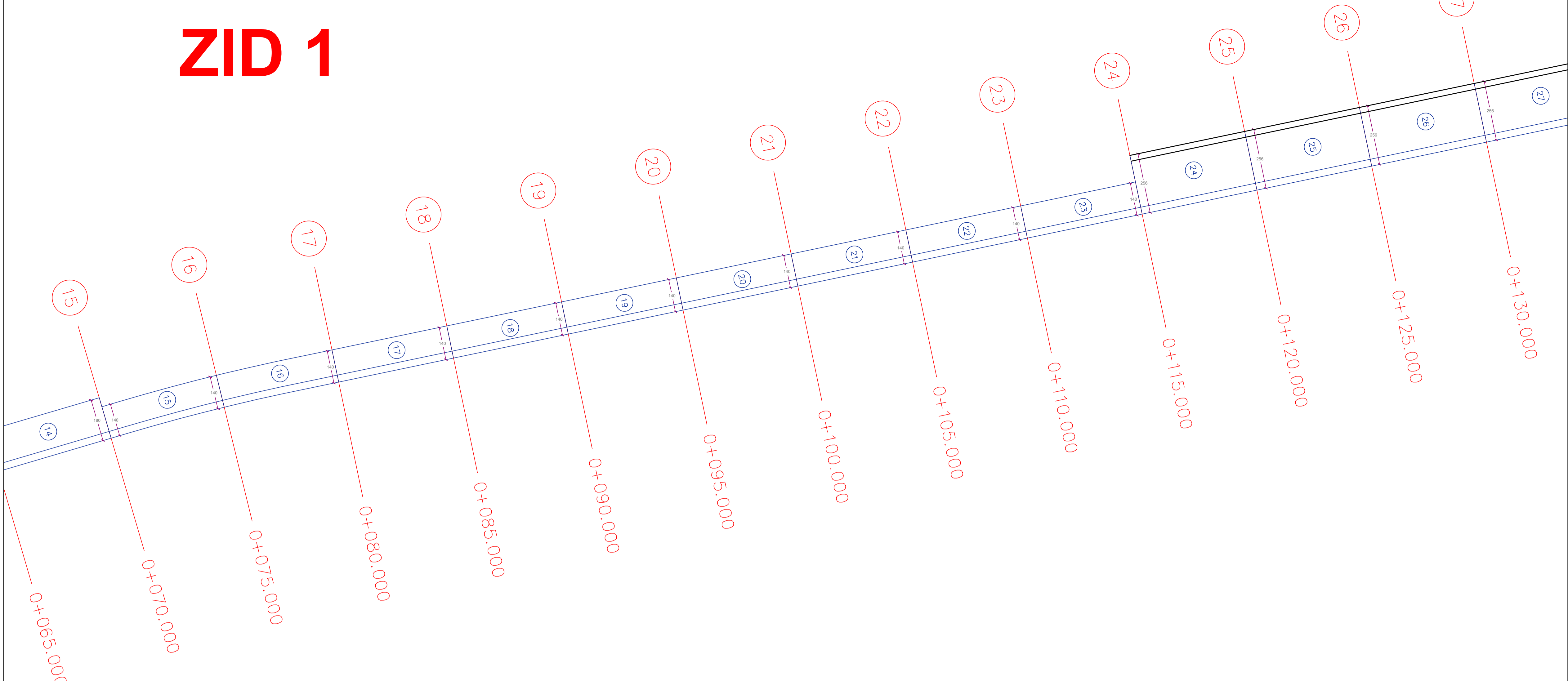
PROJEKTANT: ČELEBIĆ ul. Oktobra 2, Donja Gorica	INVESTITOR: OPŠTINA BAR
Objekat: IZMENA I PROMENA IZ OBLASTI GRAĐEVINARSTVA U ZAKUPATU DUPA, "ČANJ" I I. DIO "ČANJ SEKTOR 51"	Lokacija: ČANJ - ZAHVAT DUPA "ČANJ" I I. DIO "ČANJ SEKTOR 51"
Glavni inženjer: Zorica Perić, dipl. inž. građ.	Vrsta tehničke dokumentacije: Glavni projekat
Odgovorni inženjer: Miro Nikola Popović, spec. sci. građ.	Dio tehničke dokumentacije: KURSA 4 - Glavni projekat konstrukcije
Saradnik: Nikola Mijatović, spec. sci. građ.	Dr. priloga: 1
Datum izrade 1 MP:	Datum revizije 1 MP:
Februar, 2024.	

ZID 1



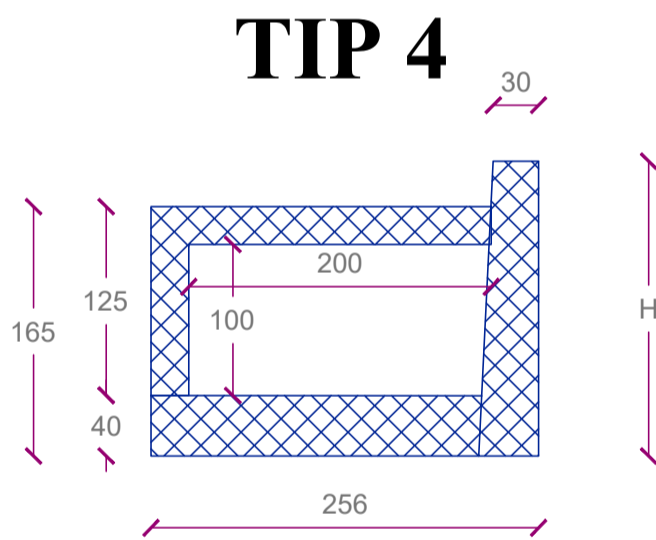
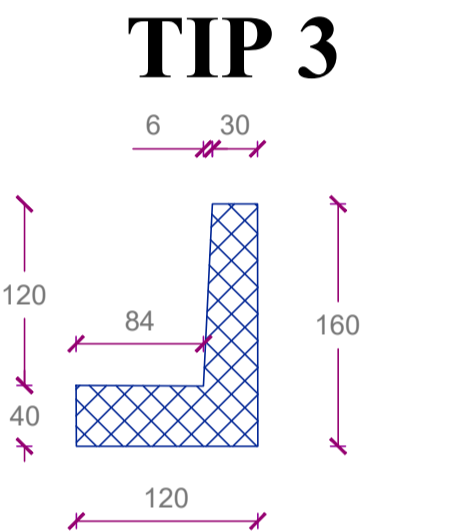
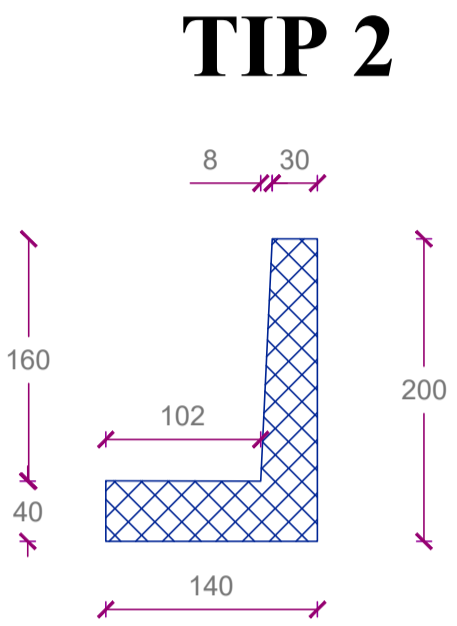
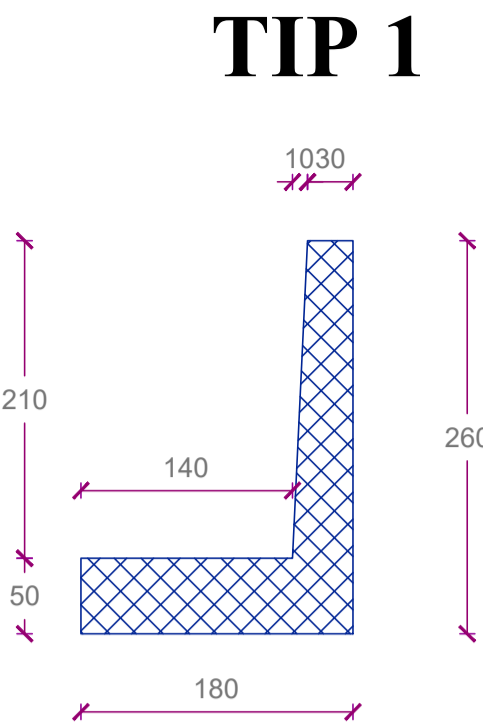
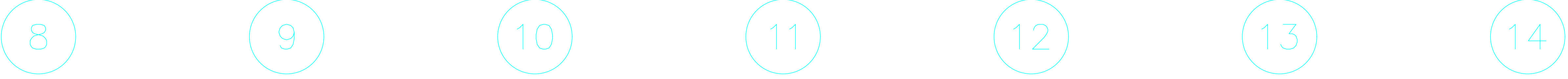
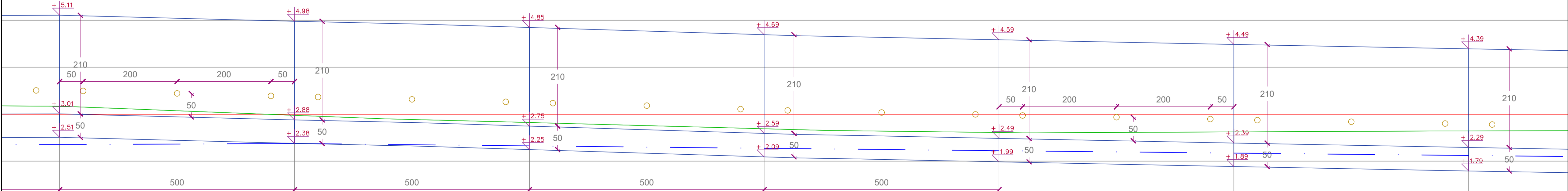
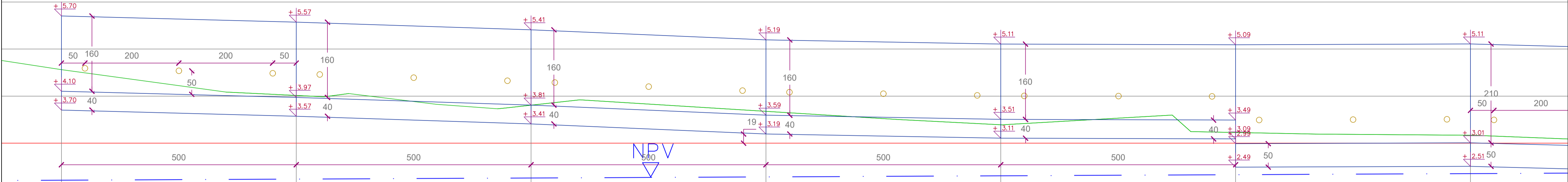
PROJEKTANT: ČELEBIĆ Ul. Oktobra 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Objekat: SAGRAĐAVALICA 1 - II FAZA I PRILJUČNE SAGRAĐAVALICE U ZAHVATU DUP-a "ČANJU" I I DSL "ČANJU SEKTOR 51"		Lokacija: ČANJU - ZAHVAT DUP-a "ČANJU II" I DSL "Čanji SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJIGA 4 - Glavni projekat konstrukcije	
Saradnik: Nikola Mijatović, spec.sci.grad.		Prilog: Čenova zida 1 - od profila 1 do profila 16	
Datum izrade i MP:		Datum revizije i MP:	
Februar, 2024.			

ZID 1



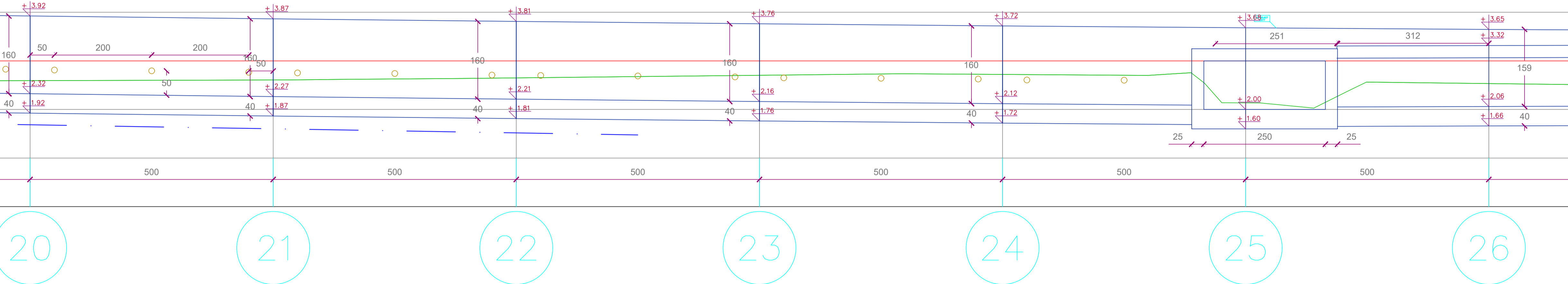
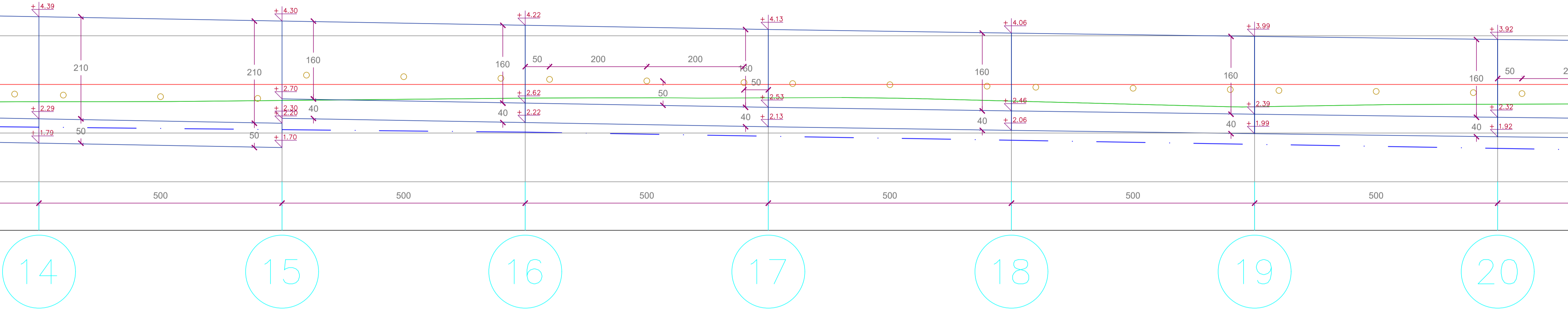
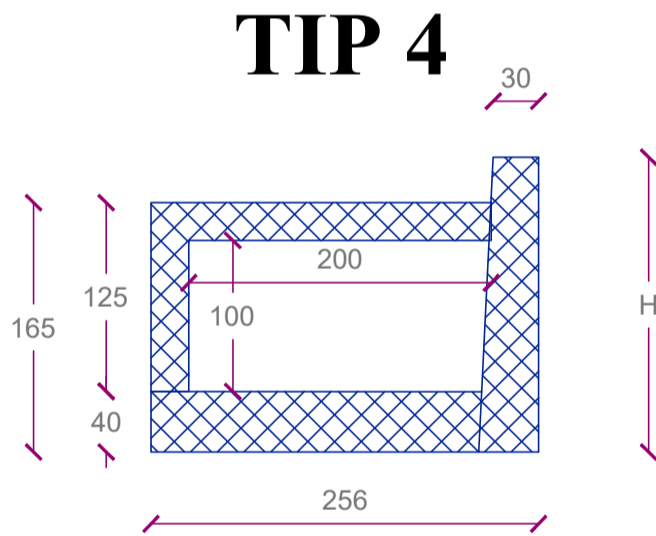
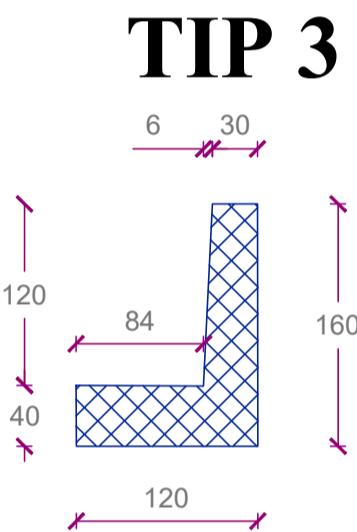
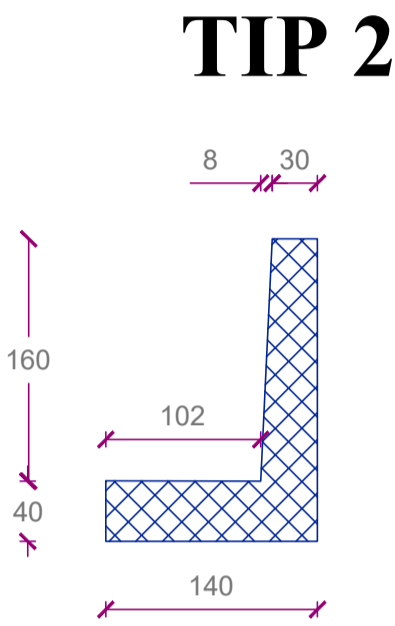
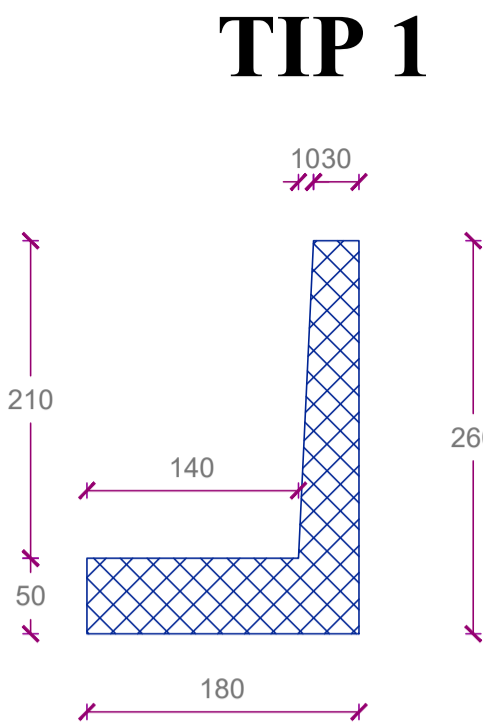
PROJEKTANT: ČELEBIĆ Ul.Oktobr 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Objekat: SAGRAĐANICA 1 - II FAZA I PRILJUČNE SAGRAĐANICE U ZAHVATU RUP-a "ČANJ II" I DSL "ČANJ SEKTOR 51"		Lokacija: ČANJ - ZAHVAT DUP-a "ČANJ II" I DSL "ČANJ SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJ/GA 4 - Glavni projekat konstrukcije	
Saradnik: Nikola Mijatović, spec.sci.grad.		Prilog: Čenova zida 1 - od profila 16 do profila 38	
Datum izrade i MP:		Datum revizije i MP:	
Februar, 2024.		3 129	
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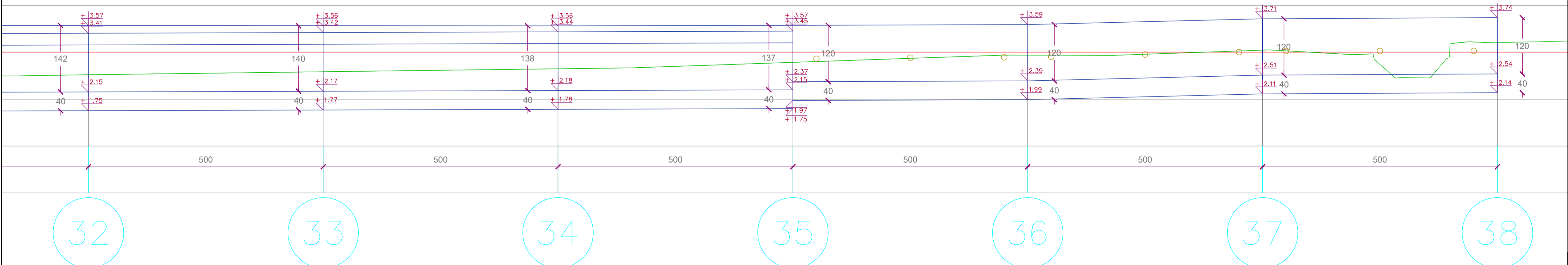
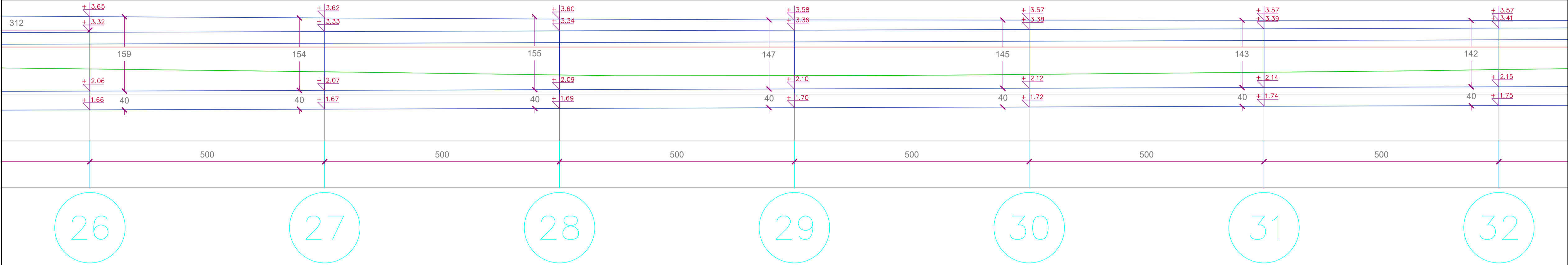
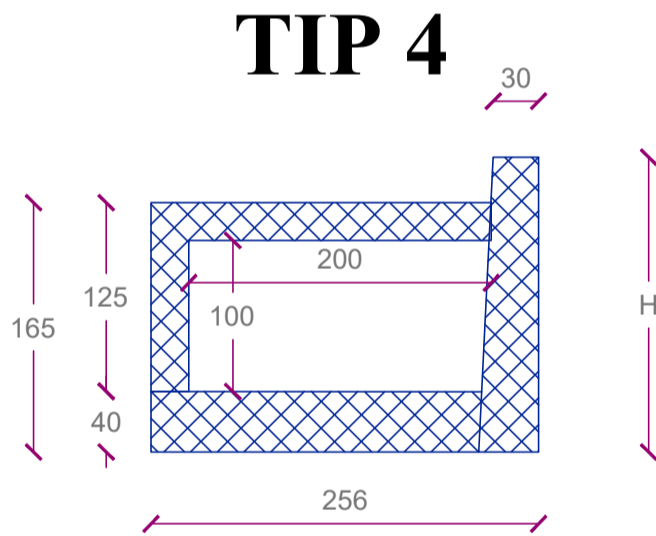
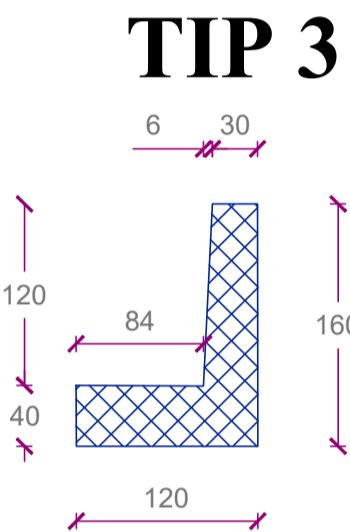
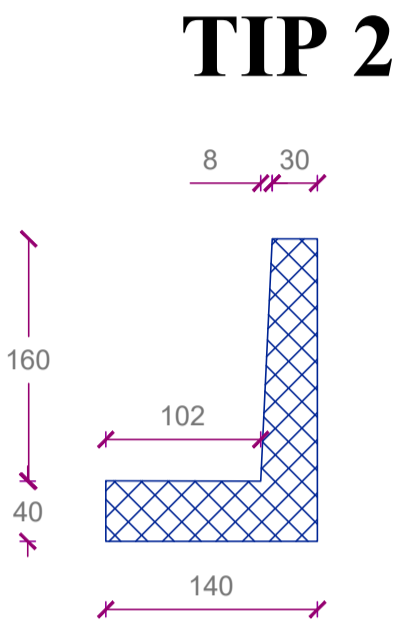
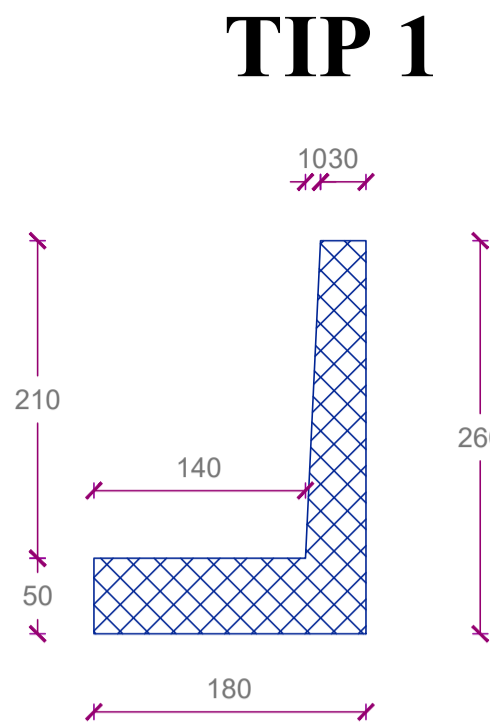
PROJEKTANT: ČELEBIĆ ul.Oktolih 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Objekat: SAGRAĐAVALICA 1 - II FAZA I PRILJUČNE SAGRAĐAVALICE U ZAHVATU DUP-a "ČANJU" I DSL "ČANJU SEKTOR 51"		Lokacija: ČANJU - ZAHVAT DUP-a "ČANJU II" I DSL "Čanji SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJ/GA 4 - Glavni projekat konstrukcije	
Saradnik: Nikola Mijatović, spec.sci.grad.		Prilog: Prodolni presjek zida 1 - od profila 1 do profila 13	
Datum izrade I MP:		Datum revizije I MP:	
Februar, 2024.		1:50 br. priloga 4 130	

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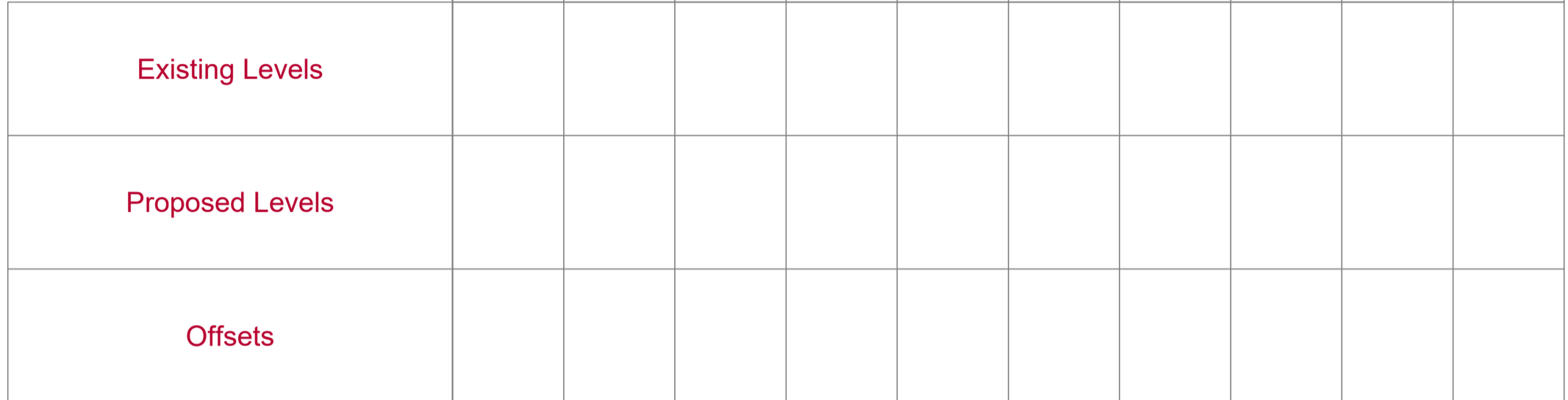
PROJEKTANT: ČELEBIĆ ul. Oktob 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Objekat: SAGRAĐANICA 1 - II FAZA I PRILJUČNE SAGRAĐANICE U ZAHVATU RUP-a "ČANJ" I I DSL "ČANJ SEKTOR 51"		Lokacija: ČANJ - ZAHVAT DUP-a "ČANJ II" I DSL "Čanj SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJIGA 4 - Glavni projekat konstrukcije	
Saradnik: Nikola Mijatović, spec.sci.grad.		Prilog: Prodolni presjek zida 1 - od profila 14 do profila 26	
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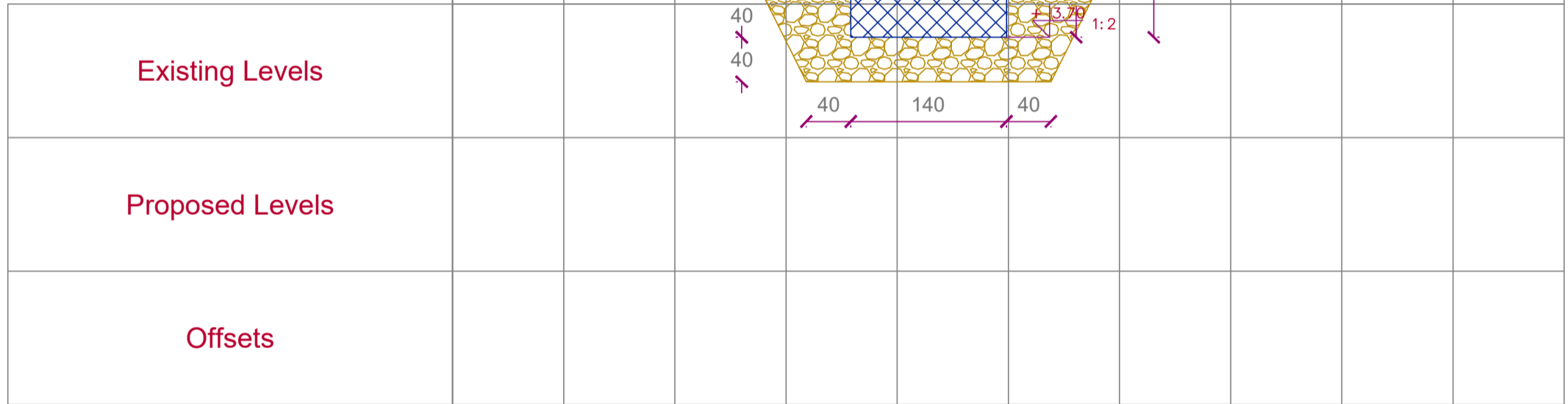


PROJEKTANT: ČELEBIĆ Uj.Oktoli 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Objekat: SAGRAĐAVALICA 1 - II FAZA I PRILJUČNE SAGRAĐAVALICE U ZAHVATU RUP-a "ČANJU" I DSL "ČANJU SEKTOR 51"		Lokacija: ČANJU - ZAHVAT DUP-a "ČANJU II" I DSL "Čanj SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJIGA 4 - Glavni projekat konstrukcije	
Saradnik: Nikola Mijatović, spec.sci.grad.		Prilog: Prodolni presjek zida - od profila 28 do profila 38	
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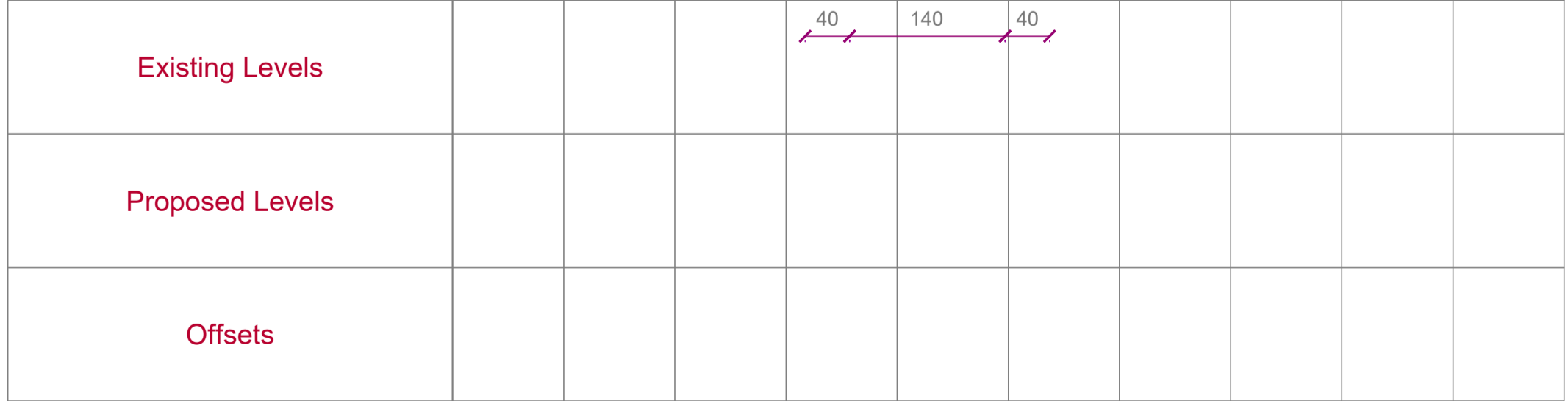
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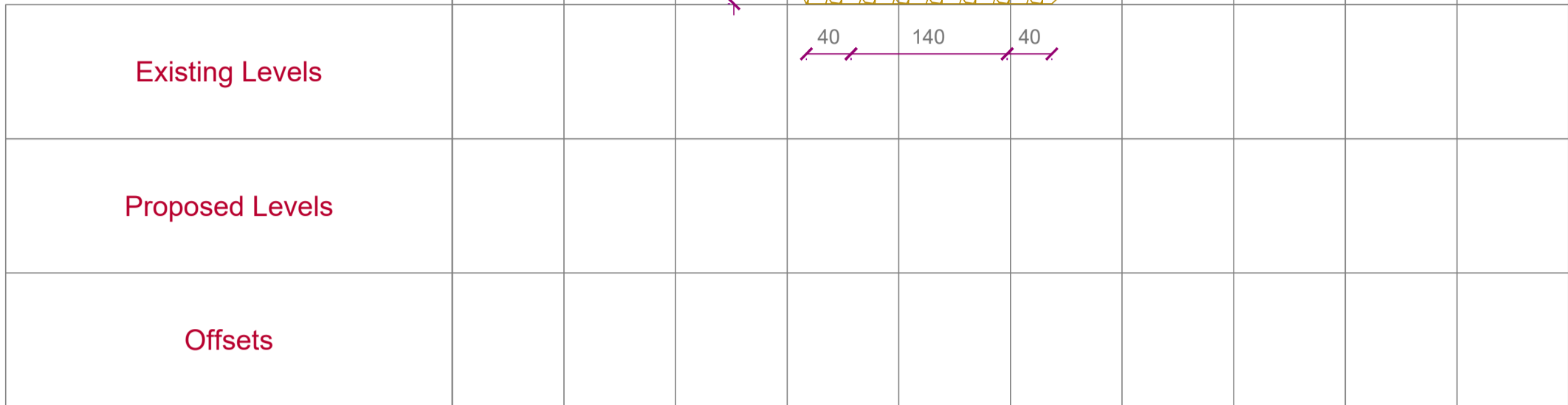
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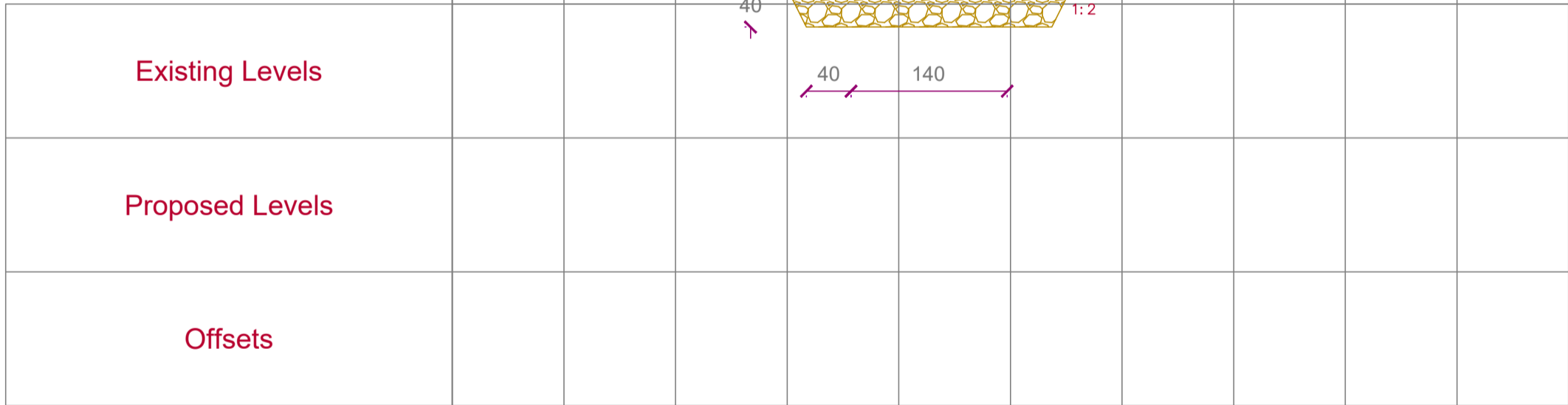
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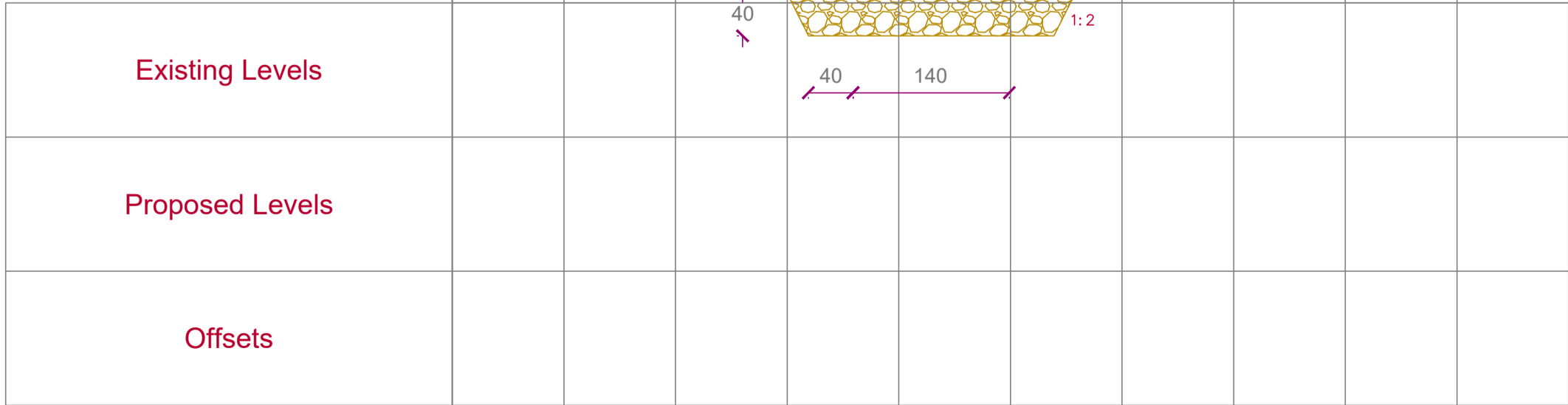
0+015.00



0+020.00



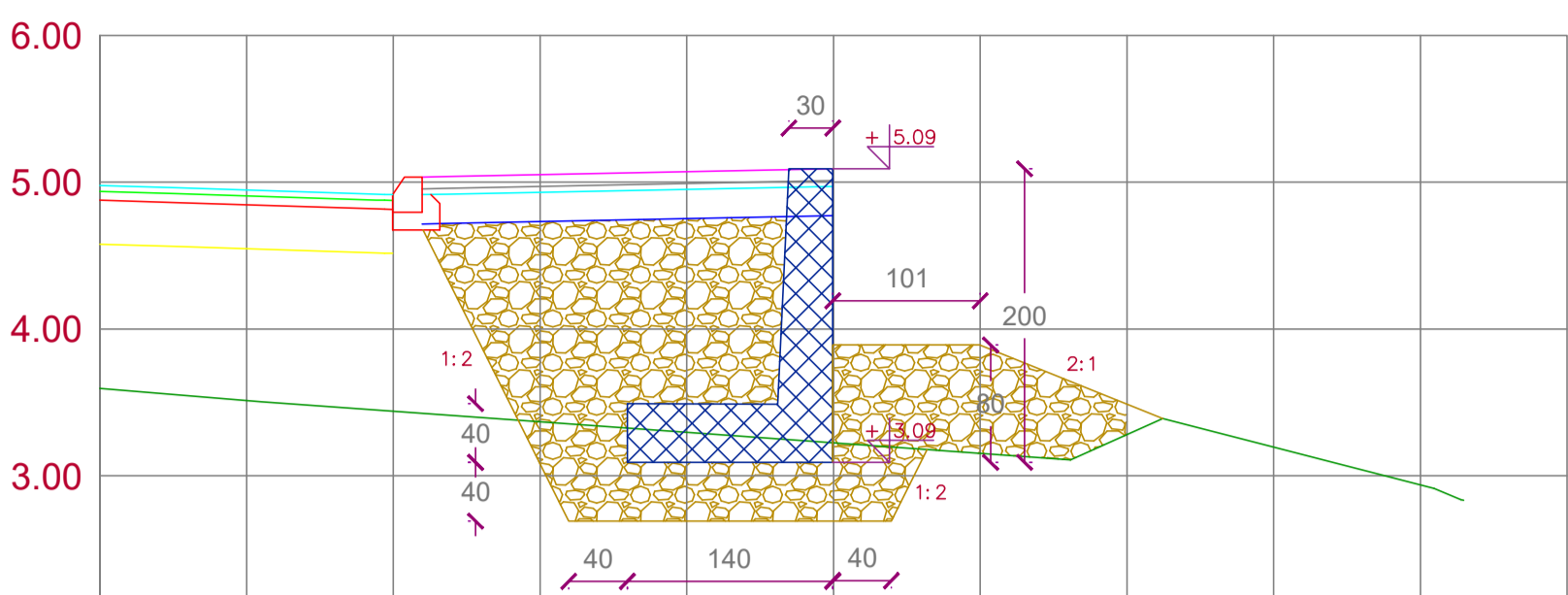
0+025.00



Februar, 2024

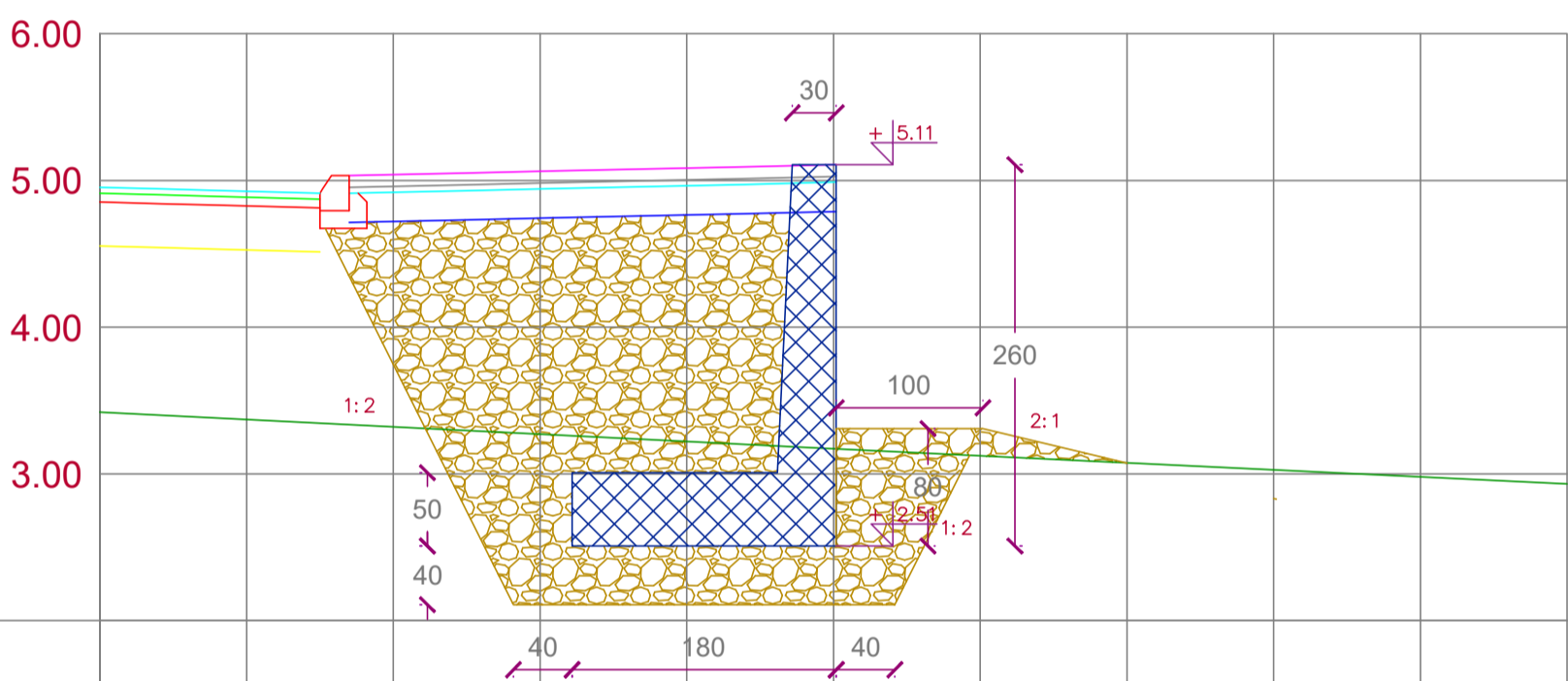
7

0+030.00

[illegible][illegible][illegible]

8

0+035.00

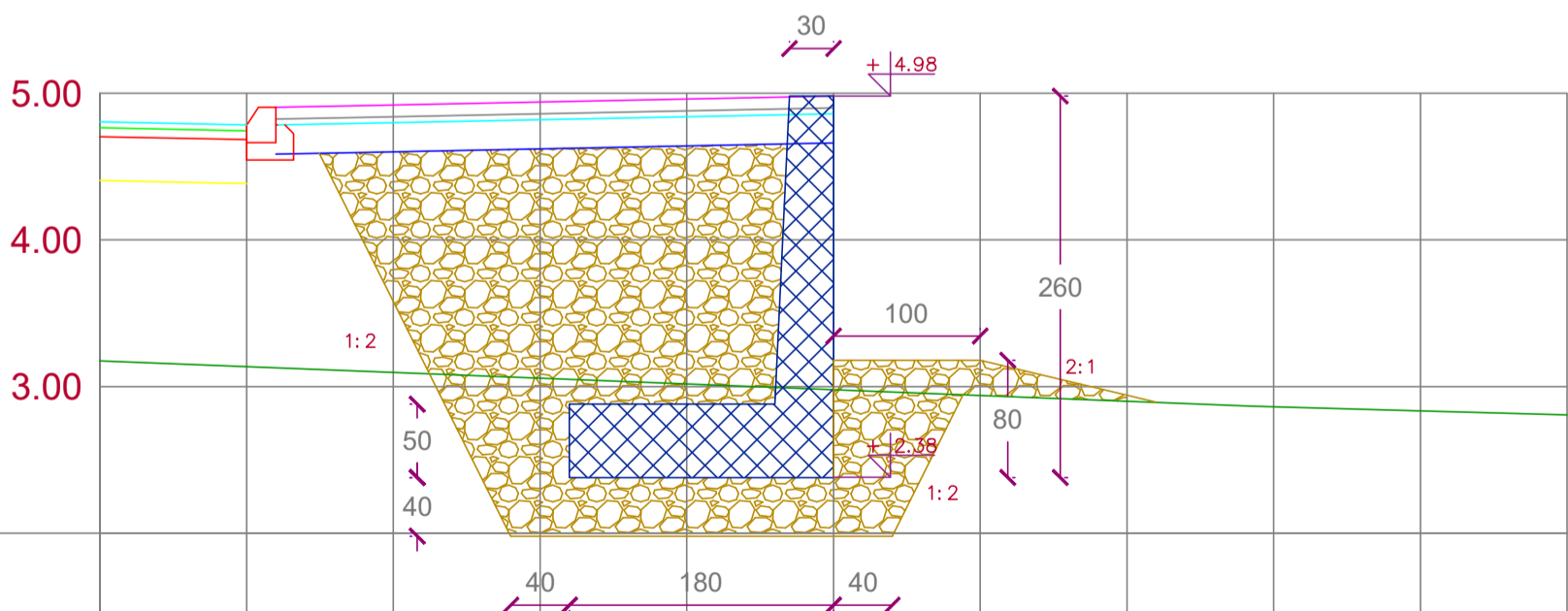


Existing Levels				40	180	40			
Proposed Levels									
Offsets									

[illegible][illegible]

9

0+040.00

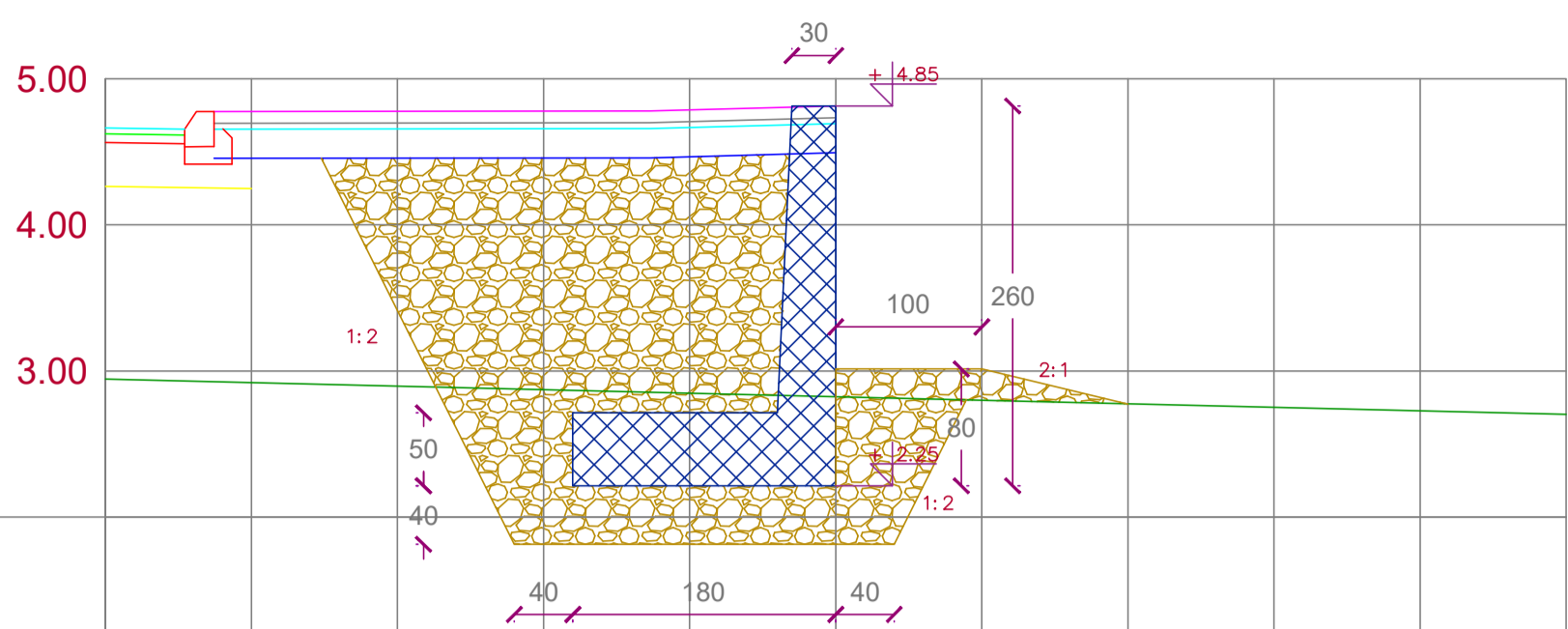


Existing Levels								
Proposed Levels								
Offsets								

[illegible][illegible]

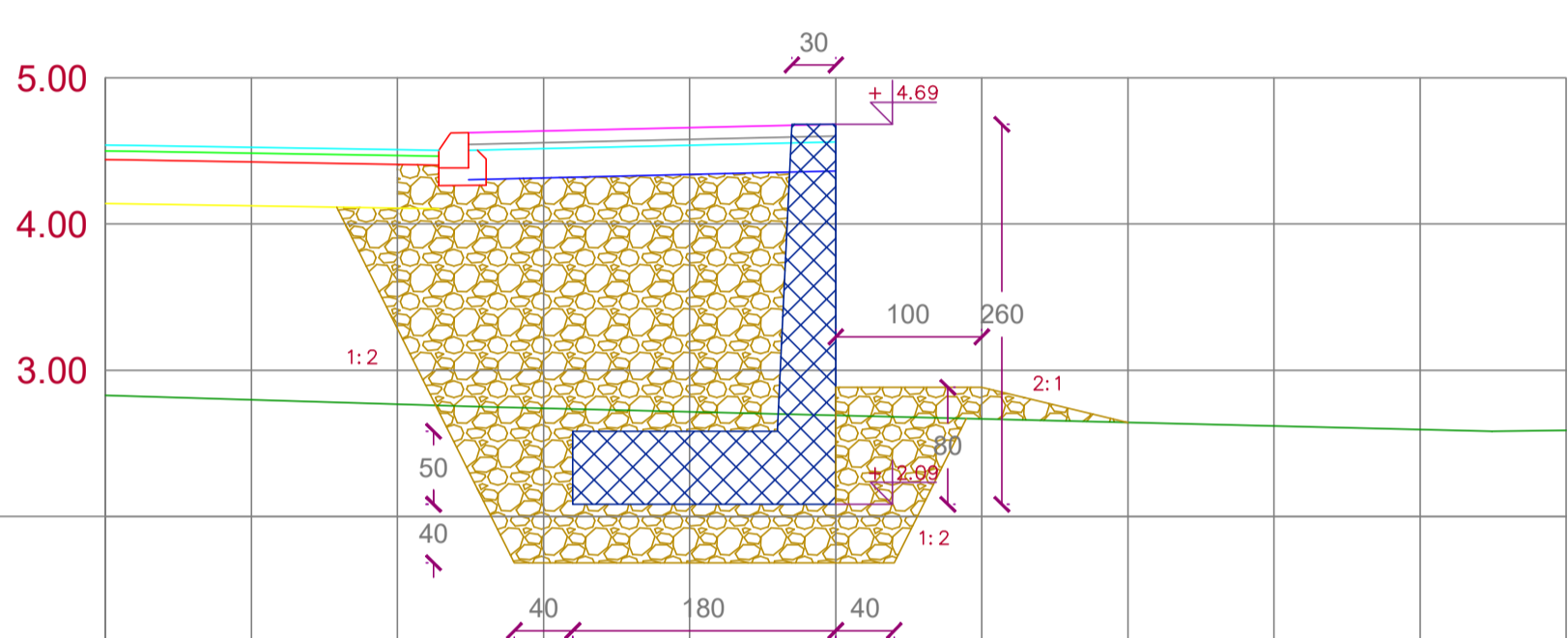
10

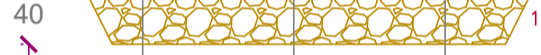
0+045.00

[illegible][illegible][illegible]

11

0+050.00

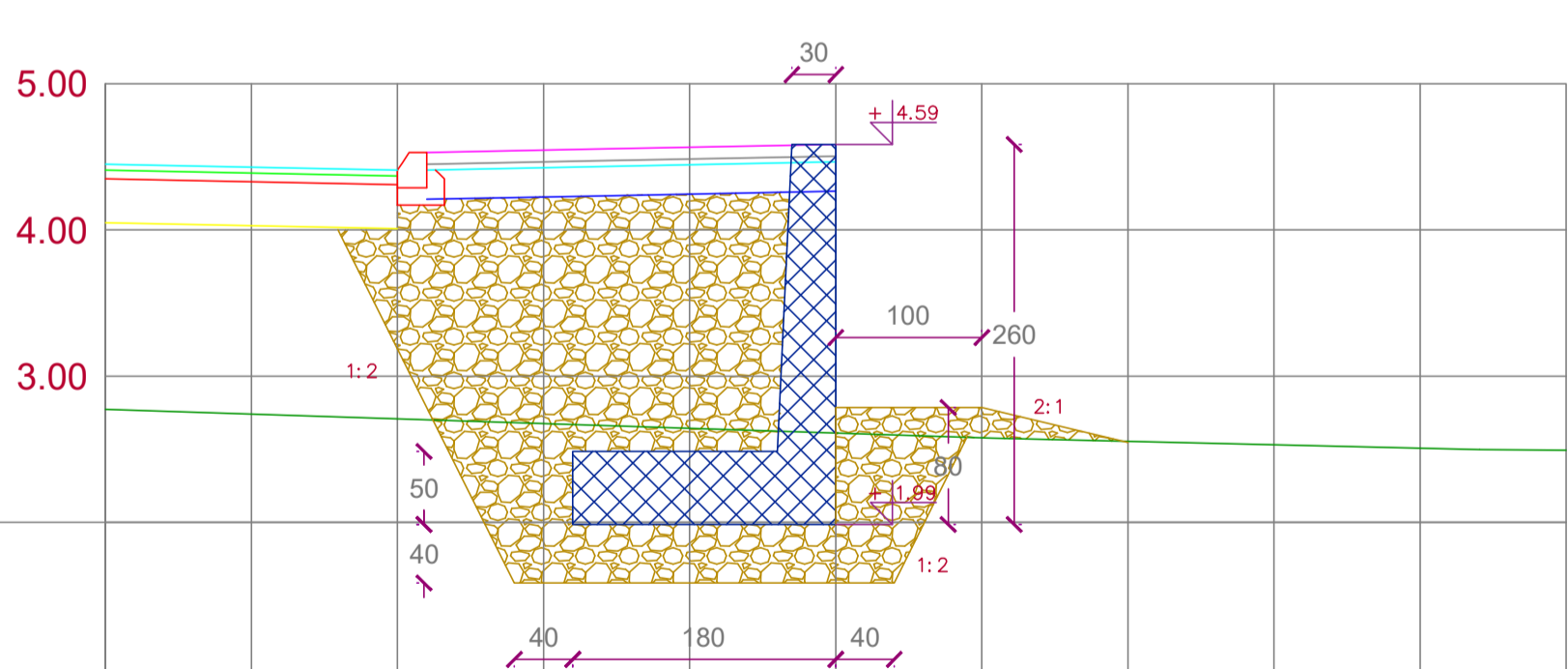



Existing Levels									
Proposed Levels									
Offsets									

[illegible][illegible]

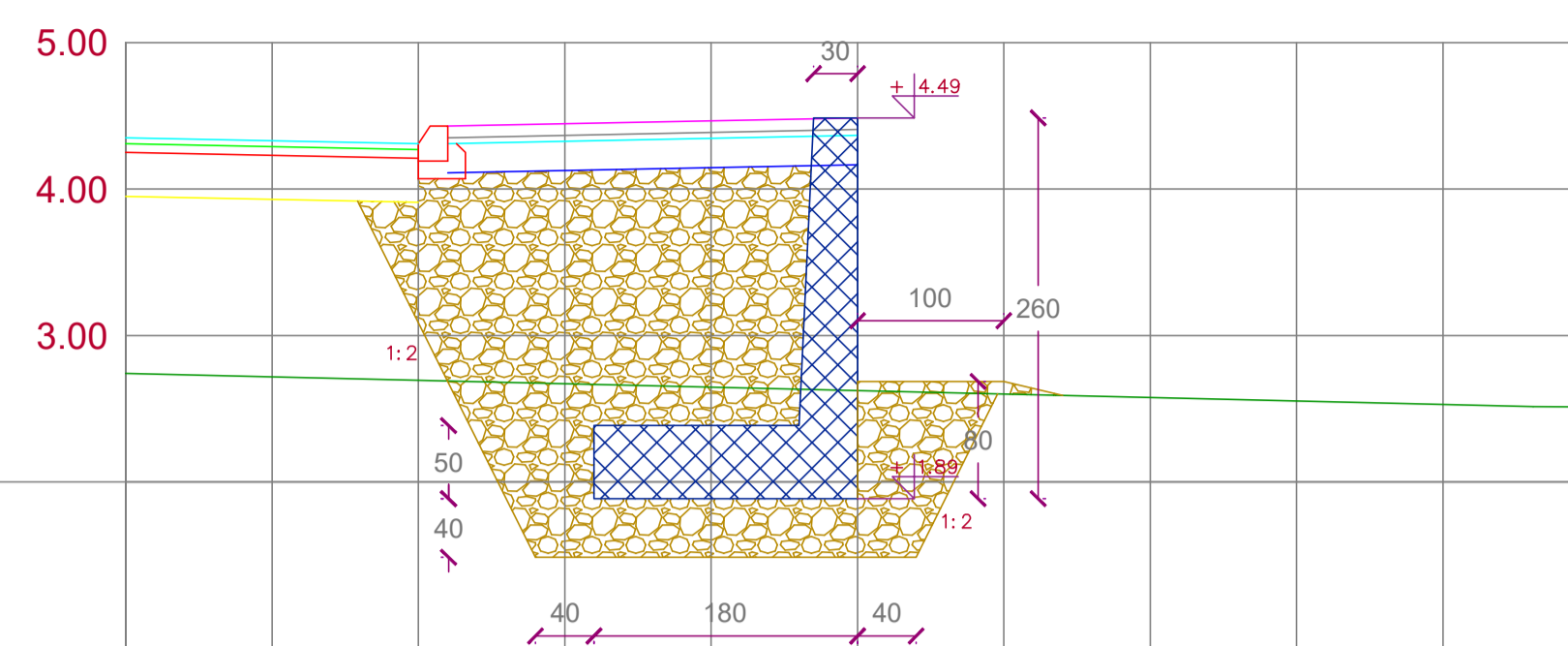
12

0+055.00

[illegible][illegible][illegible]

PROJEKTANT:  ČELEBIĆ ul. Oktoih 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Objekt: PRILIKOVNA IZMJENA 1. - 8. FAZA I PRILIKOVNA SAGRAĐAJNICE U ZAVRŠTU DUP-a "ČANJU I" I DSL "ČANJU SEKTOR 51"		Lokacija: ČANJU - ZAHVAT DUP-a "ČANJU I" I DSL "Čanji Sektor 51"	
Glavni inženjer: <div style="border: 1px solid black; padding: 5px; display: inline-block;"> Zorica Perišić, dipl.inž.grad. </div>		Vrsta tehničke dokumentacije: Glavni projekt	
Odgovorni inženjer: MSc. Nikola Popović, spec.sci.grad.		Dio tehničkog dokumentacije: KNJIGA 4 - Glavni projekt konstrukcije	
Saradnici: Nikola Mijatović, spec.sci.grad.		RAZMJERA: 1:50	
		Prilog: Poprečni presjeci zida 1	br. priloga 8
		br. listane 134	
Datum izrade i MP:		Datum revizije i MP:	
Februar, 2024.			

13 0+060.00

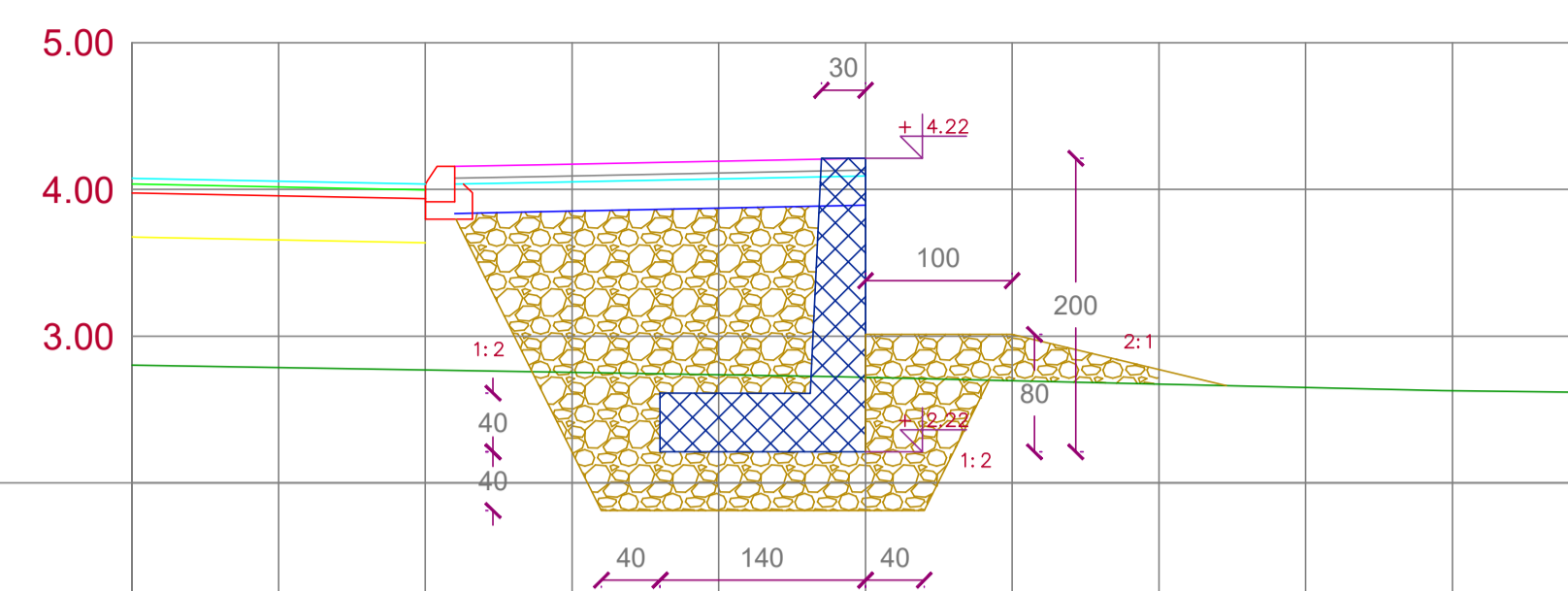


Existing Levels

Proposed Levels

Offsets

16 0+075.00

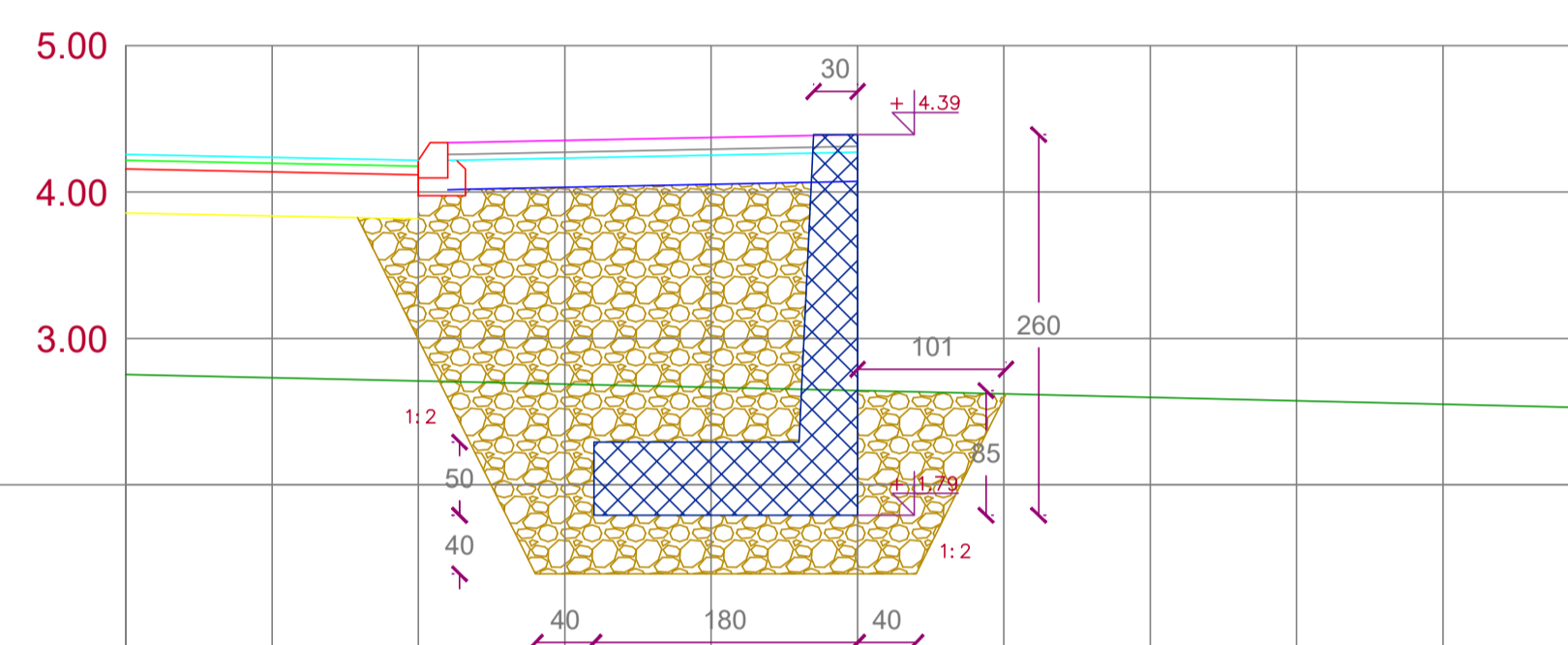


Existing Levels

Proposed Levels

Offsets

14 0+065.00

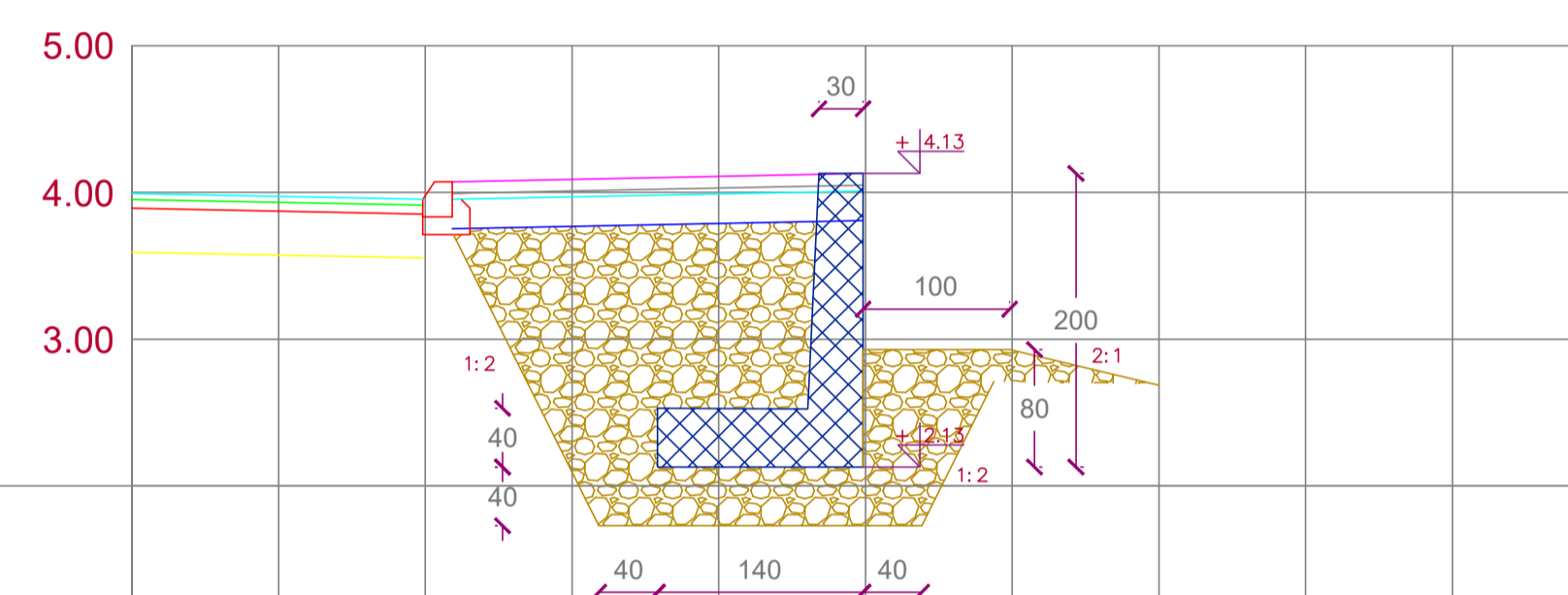


Existing Levels

Proposed Levels

Offsets

17 0+080.00

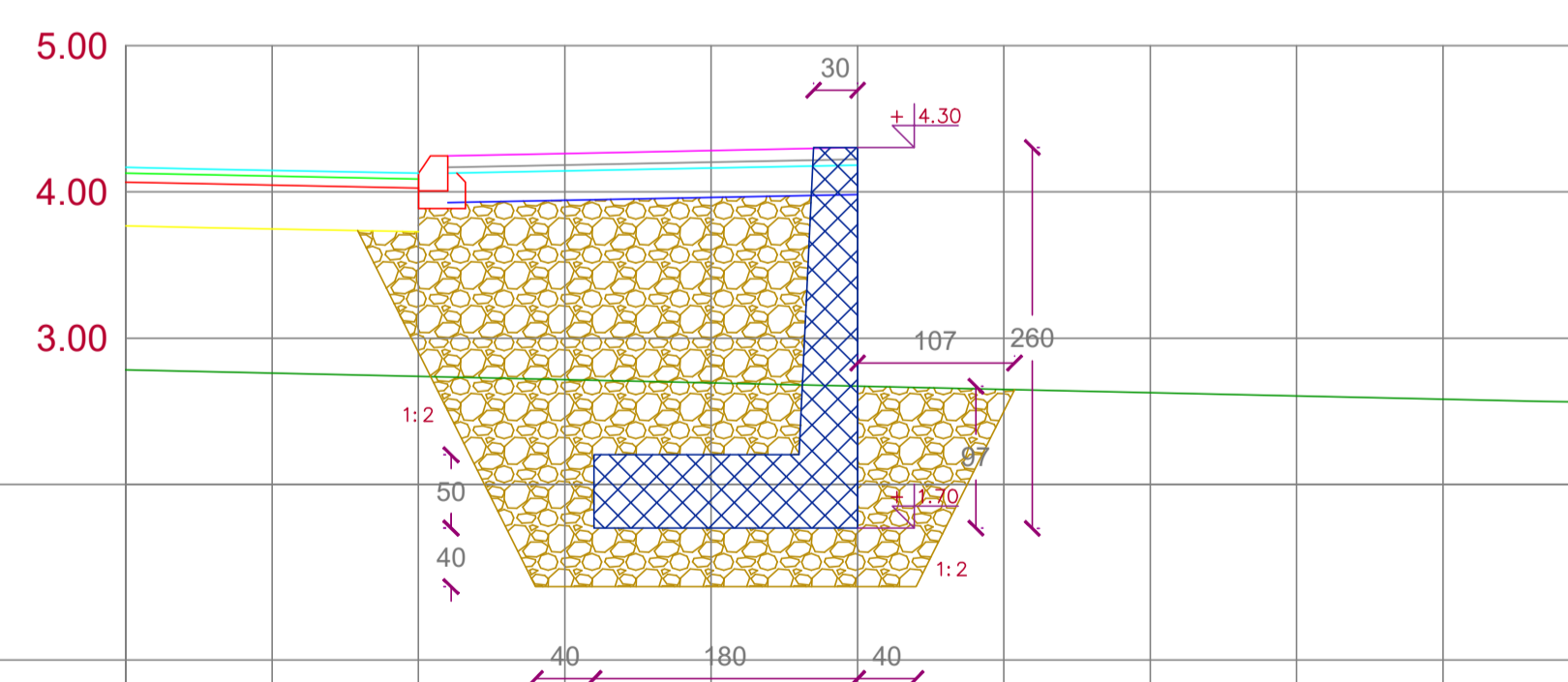


Existing Levels

Proposed Levels

Offsets

15 0+070.00

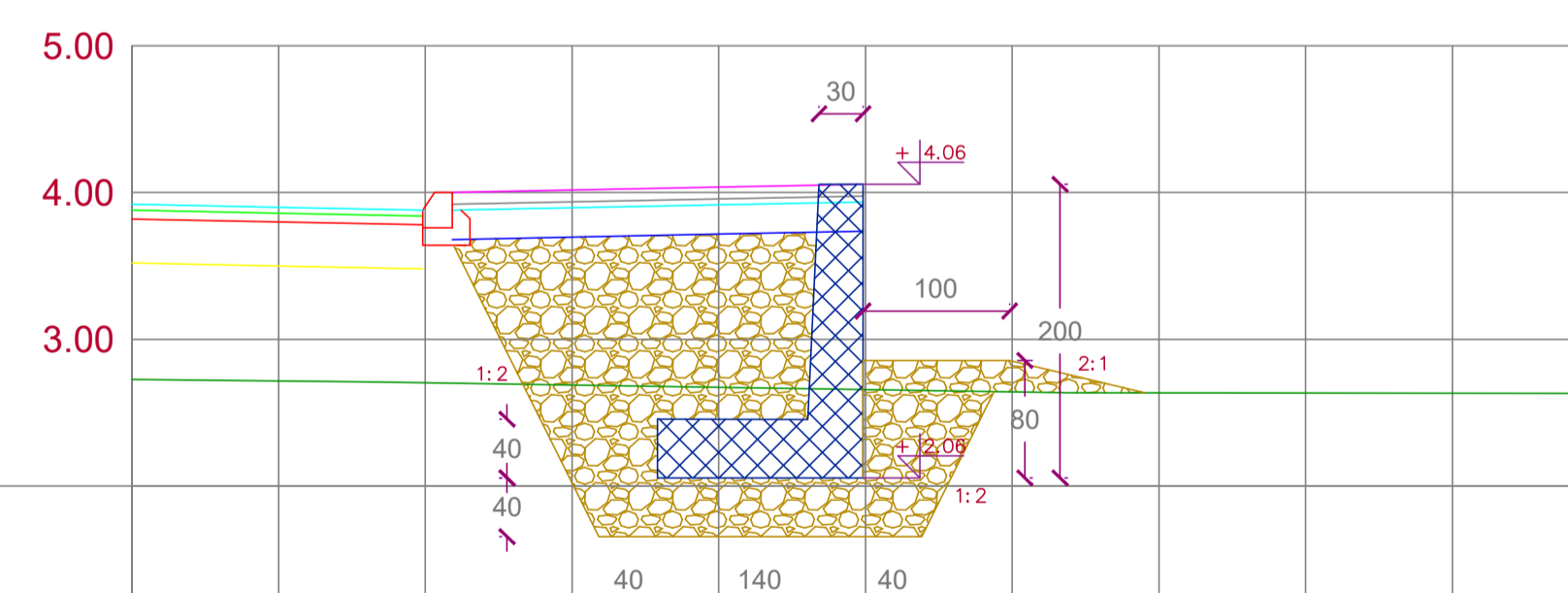


Existing Levels

Proposed Levels

Offsets


18 0+085.00



Existing Levels

Proposed Levels

Offsets

PROJEKTANT:  ČELEBIĆ ul.Oktolih 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Ogibek: SADRBAČANICA 1. I FAZA I PRILIKUJE SADRBAČANICA U ZAHVATU DUP-a „ČANJ I I DSL „ČANJ SEKTOR I I“		Lokacija: ČANJ - ZAHVAT DUP-a „ČANJ I I“ I DSL „ČanJ SEKTOR I I“	
Glavni inženjer: Zorica Penišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekt	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: NIJUGA 4 - Glavni projekt konstrukcije	
Saradnik: Nikola Mijatović, spec.sci.grad.		Prilog: Popračni presjek zida 1	br. priloga 9
Datum izrade i MP:		Datum revizije i MP:	
Februar, 2024.			

[illegible]

23

0+110.00

Existing Levels

Proposed Levels

Offsets

The diagram illustrates a cross-section of a road embankment. The vertical axis shows elevations from 3.00 to 4.00. The horizontal axis shows offsets from 40 to 140. The existing ground level is shown as a solid green line, while the proposed embankment profile is indicated by dashed yellow lines. A blue hatched area represents the proposed embankment structure. Key dimensions include a top width of 100, a base width of 140, and a height of 80. Slopes are specified as 1:2 on both sides. A vertical offset of 3.92 is noted at the top right corner.

	Station	Offset	Elevation
Existing Levels	20+095.00	40	3.92
	20+095.00	140	3.92
	20+095.00	140	3.00
	20+095.00	40	3.00
Proposed Levels	20+095.00	40	3.92
	20+095.00	140	3.92
	20+095.00	140	3.00
	20+095.00	40	3.00
Offsets	20+095.00	40	3.92
	20+095.00	140	3.92
	20+095.00	140	3.00
	20+095.00	40	3.00

(24) 0+115.00

The diagram illustrates a cross-section of a road at station 0+115.00. The vertical axis shows elevations from 3.00 to 4.00. The horizontal axis shows offsets from the centerline. The existing ground profile is shown as a solid line, while the proposed road grade is indicated by dashed lines. The road width is defined by offsets of 40 units on each side of the centerline. The proposed road has a top width of 140 units and a base width of 140 units. The height of the embankment is 100 units. The slope ratio is 1:2. A vertical curve length of 200 units is indicated. A horizontal offset of 3.72 units is shown between the existing and proposed profiles.

Station	Existing Levels	Proposed Levels	Offsets
0+115.00	3.00 - 4.00	3.00 - 4.00	40 - 140 - 40

[illegible][illegible]

22

0+105.00

Existing Levels

Proposed Levels

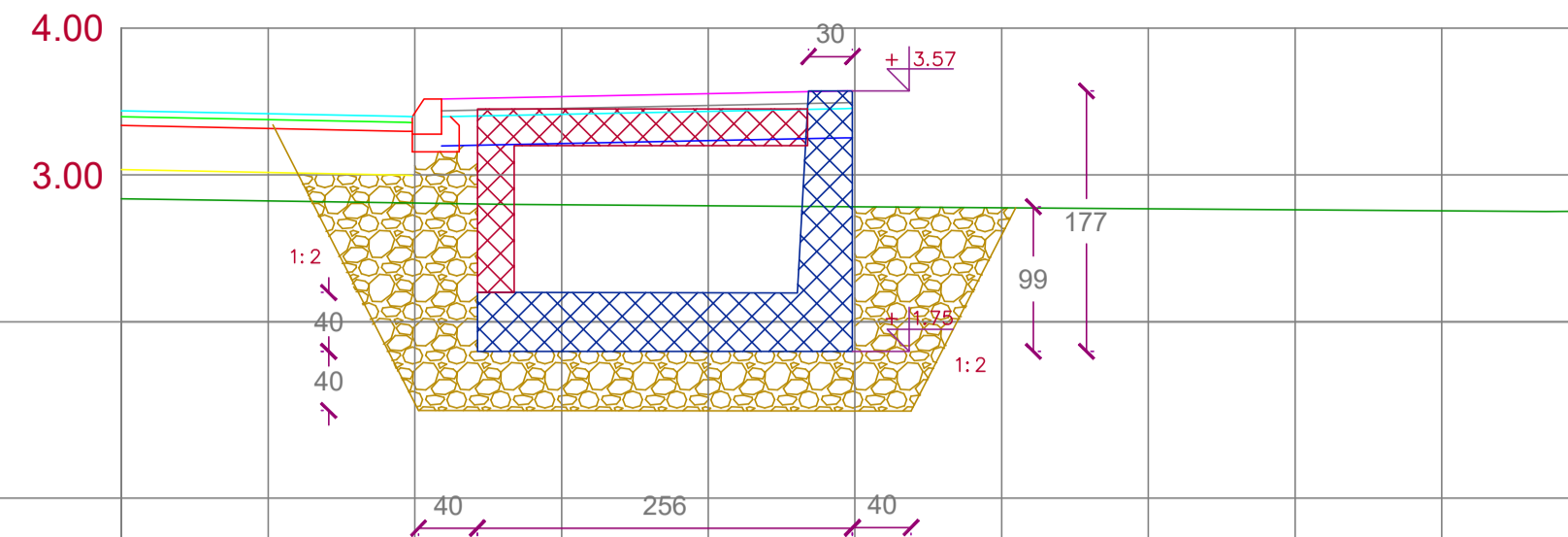
Offsets

26 0+125.00

Category	Value
Existing Levels	3.00, 4.00
Proposed Levels	3.65, 3.706
Offsets	40, 257, 40

(35)

0+170.00



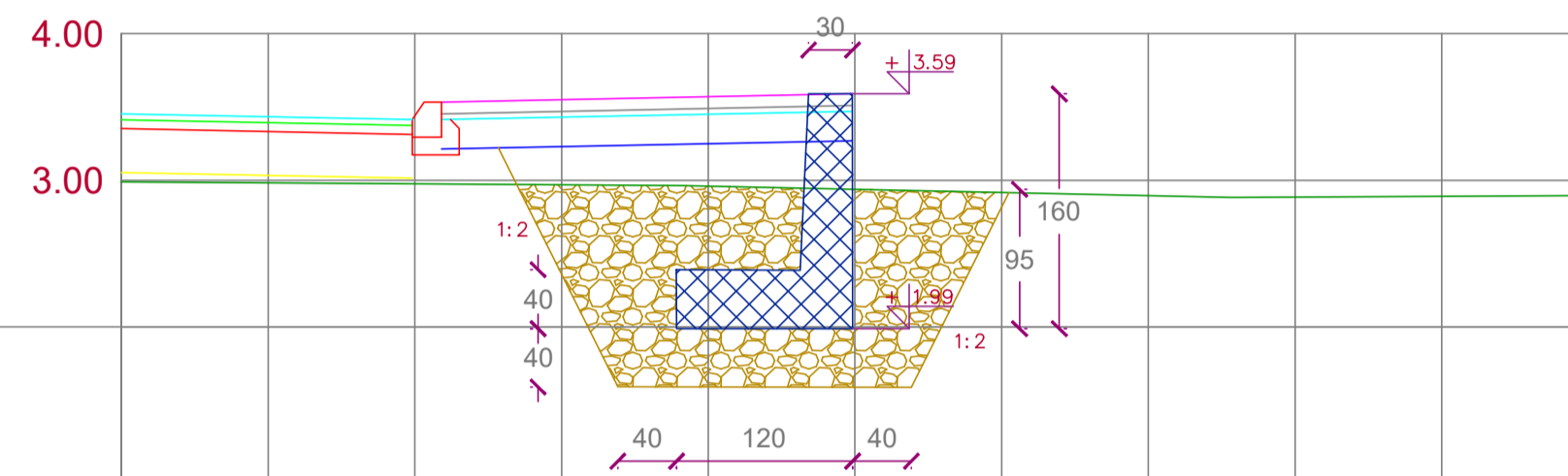
Existing Levels

Proposed Levels

Offsets

36

0+175.00



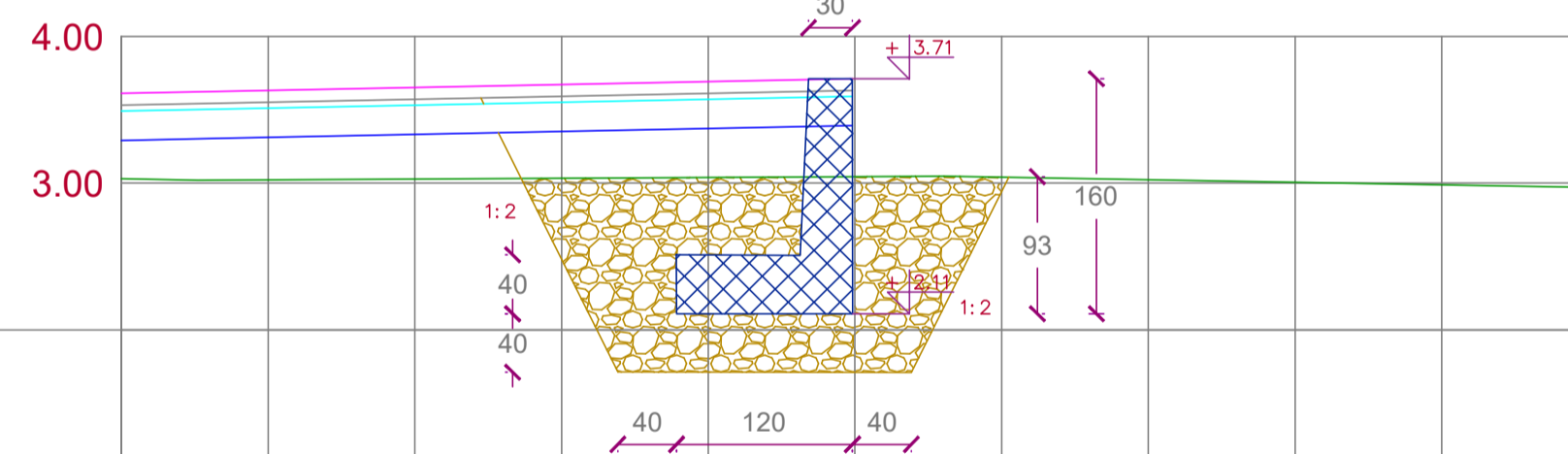
Existing Levels

Proposed Levels

Offsets

(37)

0+180.00



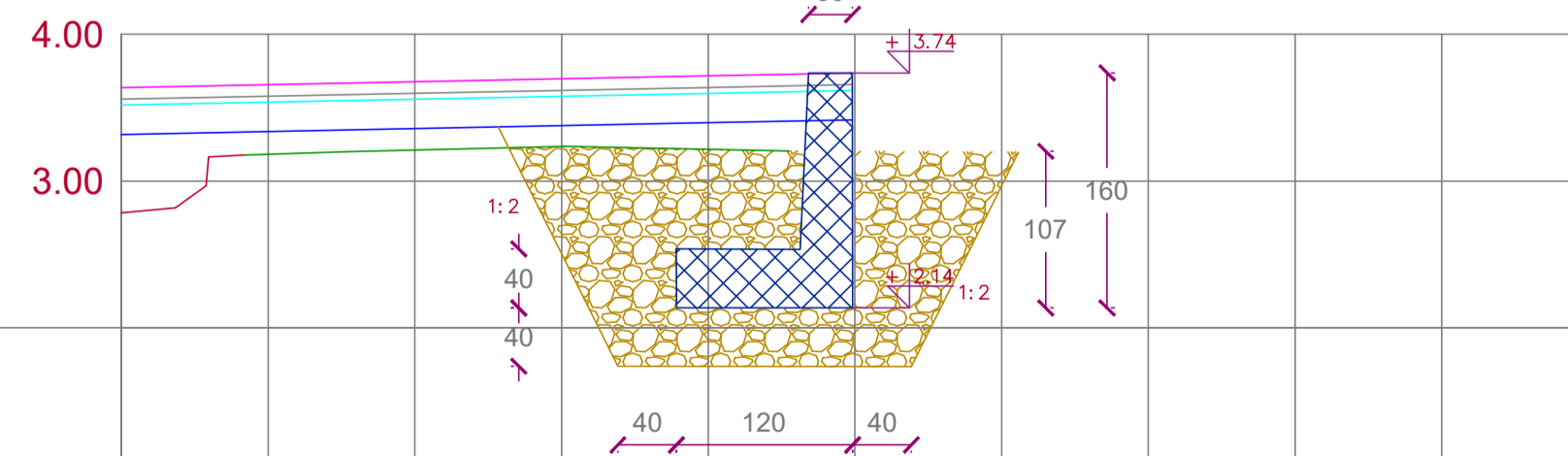
Existing Levels

Proposed Levels

Offsets

38


0+185.00



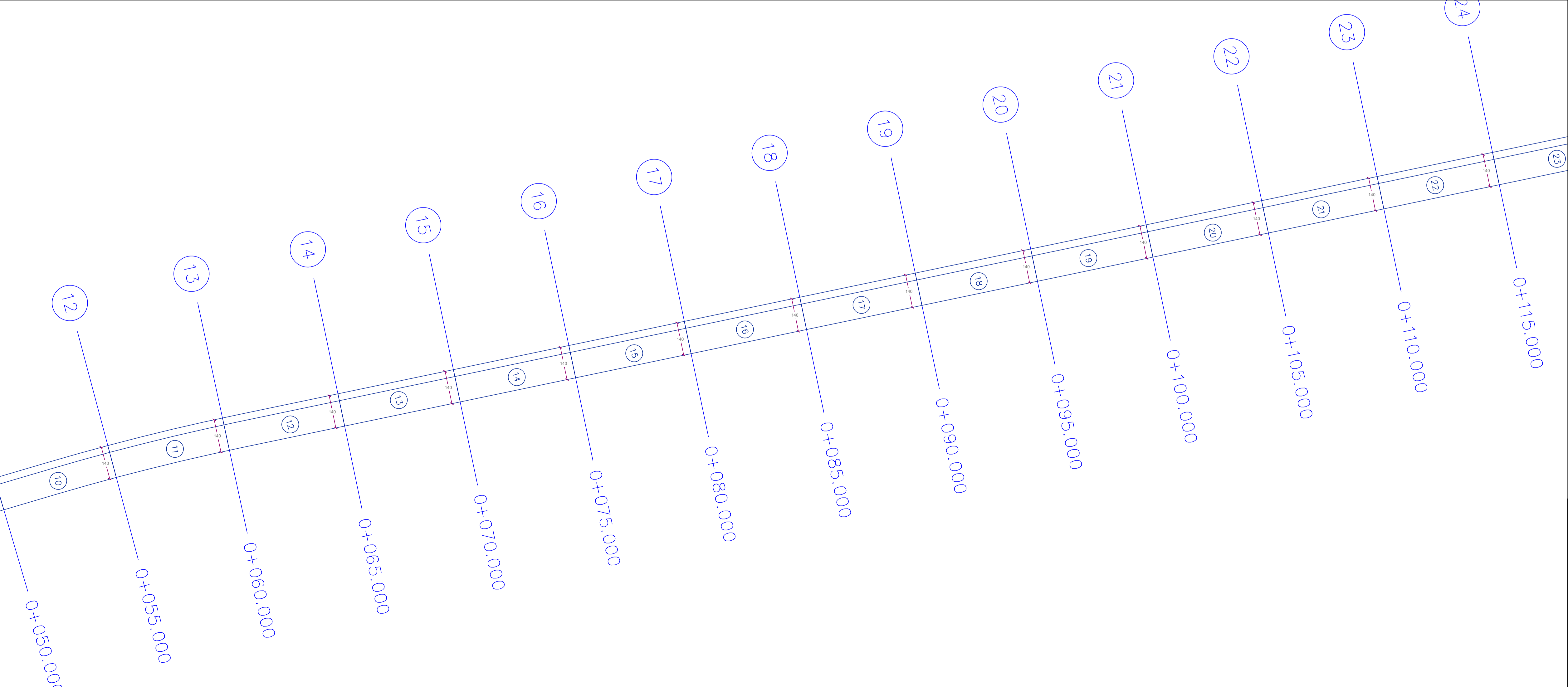
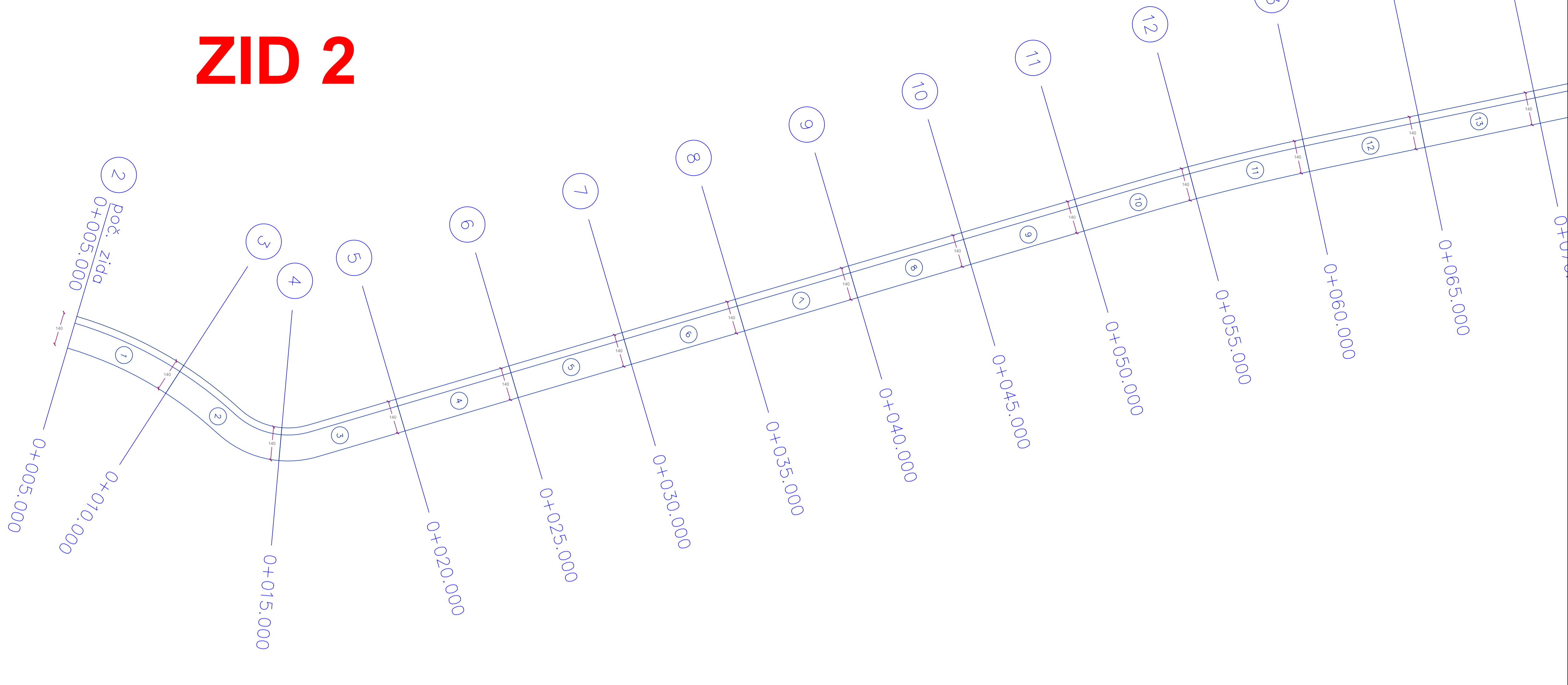
Existing Levels


Proposed Levels

Offsets

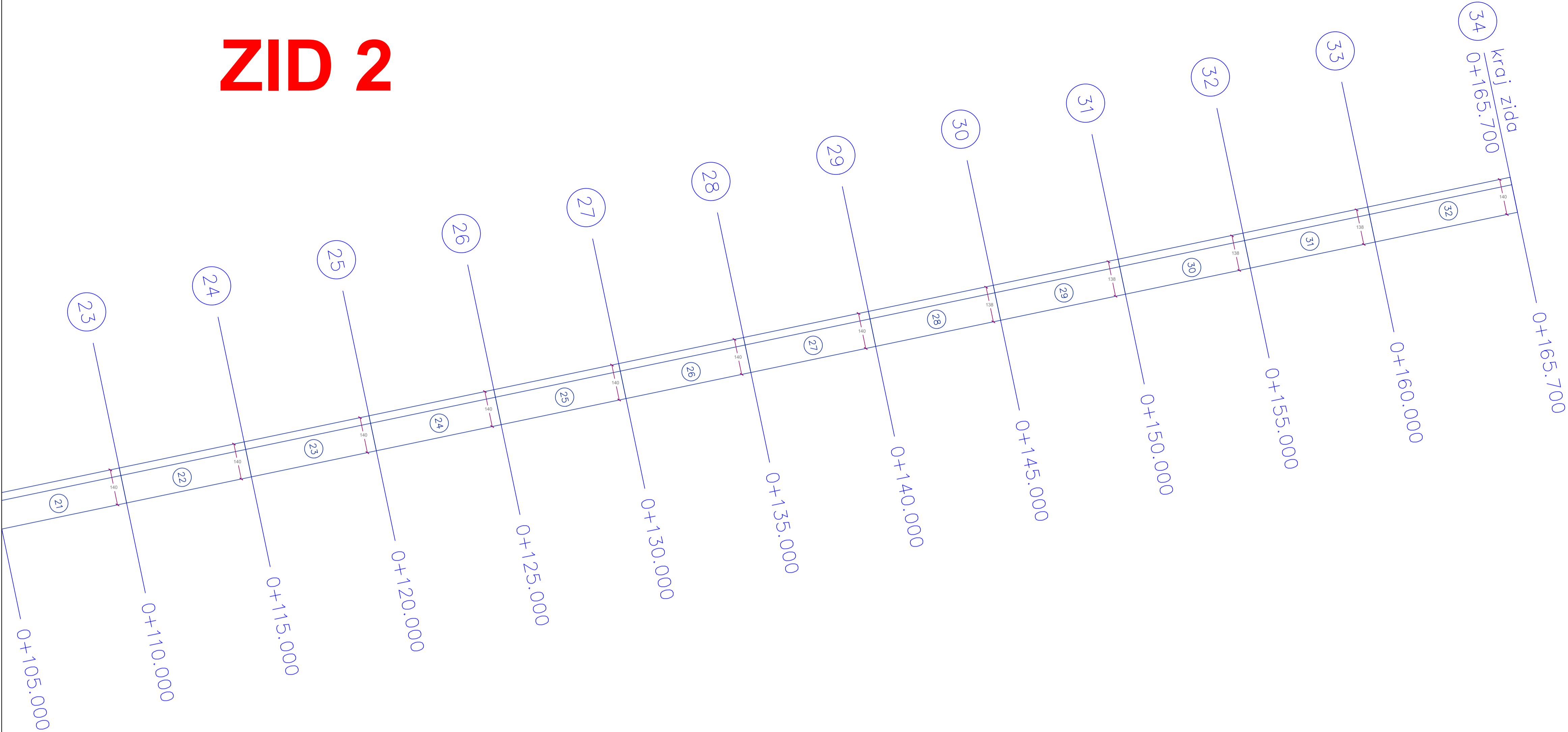
PROJEKTANT:  ČEBEČIĆ ul.Oktolih 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Objekat: PROMENJANICA I - B.FAZA I PROMENJALICE SAMORAZUJNE U ZAHVATU ZUPA - "ČANJ II" I DEL "ČANJ SEKTOR II"		Lokacija: ČANJ - ZAHVAT DUP-a "ČANJ II" I DSL "ČanJ Sektora 51"	
Glavni inženjer: <div> <div>Zorica Perišić, dipl.inž.grad.</div> </div>		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MŠo Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJIGA 4 - Glavni projekat konstrukcije	
Saradnik/i: Nikola Mijatović, spec.sci.grad.		Priloga: Popisni presjeci zida 1	br. priloga 12
Datum izrade I MP:		Datum revizije I MP:	
Februar, 2024.			


ZID 2



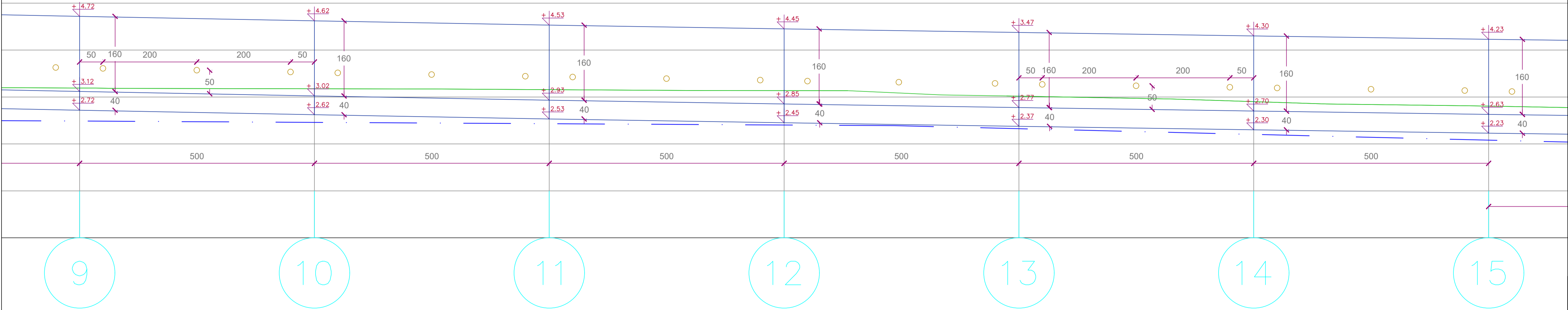
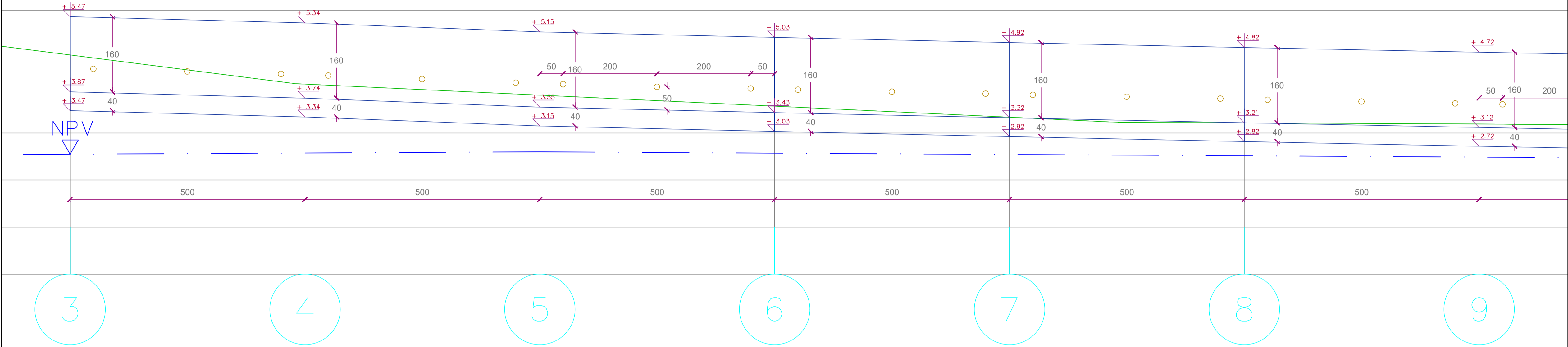
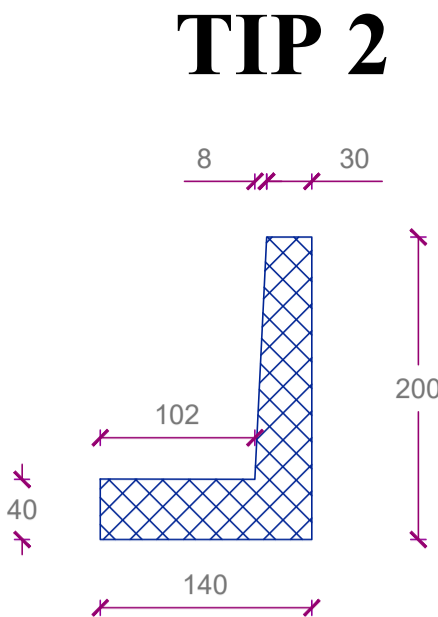
PROJEKTANT: <div> ČELEBIĆ</div> ul.Oktolih 2, Donja Gorica		INVESTITOR: OPŠTINA BAR		
Objekat: SAGRAĐAVALICA 1 - II FAZA I PRILJUČNE SAGRAĐAVALICE U ZAHVATU DUP-a "ČANJU" I DSL "ČANJU SEKTOR 51"		Lokacija: ČANJU - ZAHVAT DUP-a "ČANJU II" I DSL "Čanji SEKTOR 51"		
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekat		
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJIGA 4 - Glavni projekat konstrukcije		
Saradnik: Nikola Mijatović, spec.sci.grad.		Prilog: Čenova zida 2 - do profila 2 do profila 24	RAZMJERA: 1:50	
			br. strane 139	
Datum izrade I MP:		Datum revizije I MP:		
Februar, 2024.				

ZID 2



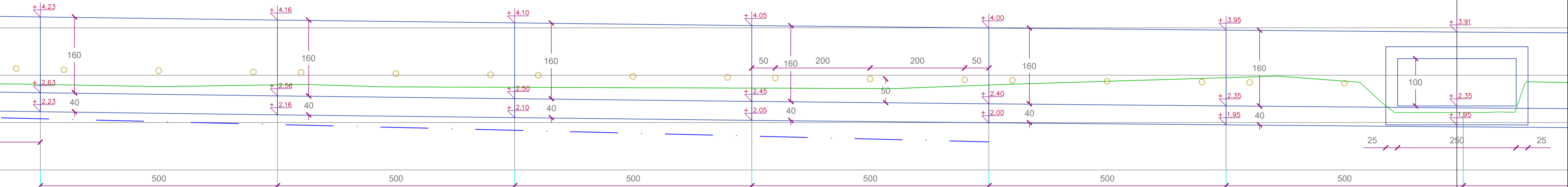
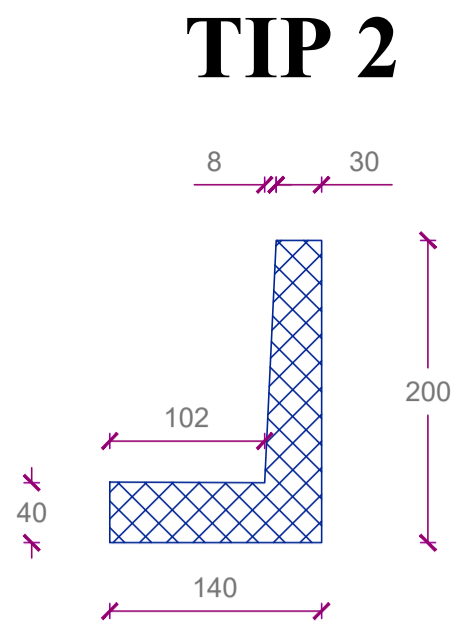
PROJEKTANT: <div> ČELEBIĆ Ul. Oktob 2, Donja Gorica</div>	INVESTITOR: OPŠTINA BAR
Objekat: SAGRAĐAČANICA 1 - II FAZA I PRILJUČNE SAGRAĐAČANICE U ZAHVATU DUP-a "ČANJU I" I DSL "ČANJU SEKTOR 51"	Lokacija: ČANJU - ZAHVAT DUP-a "ČANJU II" I DSL "Čanji SEKTOR 51"
Glavni inženjer: Zorica Perišić, dipl.inž.grad.	Vrsta tehničke dokumentacije: Glavni projekat
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.	Dio tehničke dokumentacije: KNJIGA 4 - Glavni projekat konstrukcije
Saradnik: Nikola Mijatović, spec.sci.grad.	Prilog: Čenova zida 2 - od profila 24 do profila 34
Datum izrade i MP:	Datum revizije i MP:

ZID 2

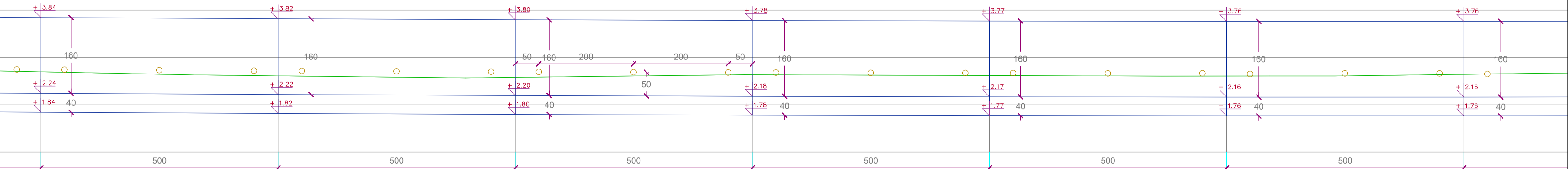


PROJEKTANT: ČELEBIĆ Ul.Oktolih 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Objekat: SAGRAĐAVALICA 1 - II FAZA I PRILJUČNE SAGRAĐAVALICE U ZAHVATU DUP-a "ČANJU I" I DSL "ČANJU SEKTOR 51"		Lokacija: ČANJU - ZAHVAT DUP-a "ČANJU II" I DSL "Čanji SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJIGA 4 - Glavni projekat konstrukcije	
Saradnik: Nikola Mijatović, spec.sci.grad.		Prilog: Prodolni presjek zida 2 - od profila 3 do profila 15	
Datum izrade I MP:		Datum revizije I MP:	
Februar, 2024.		15	

ZID 2



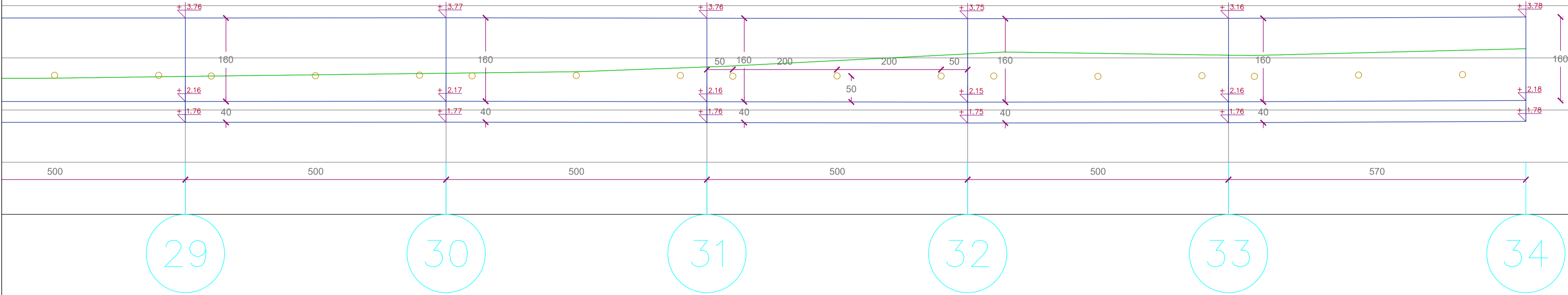
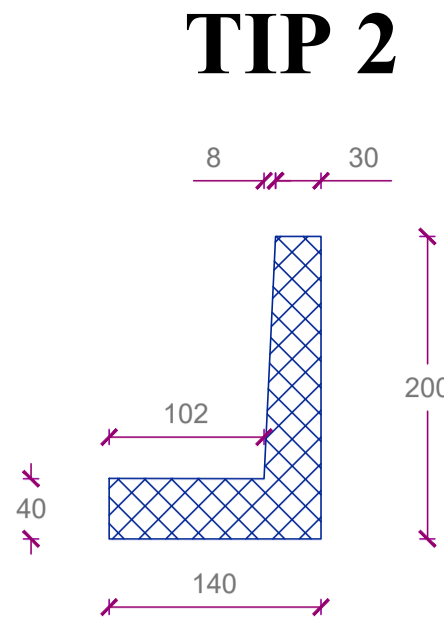
15 16 17 18 19 20 21



23 24 25 26 27 28 29

PROJEKTANT: ČELEBIĆ ul. Oktolih 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Objekat: SAGRAĐAVALICA 1 - II FAZA I PRILJUČNE SAGRAĐAVALICE U ZAHVATU DUP-a "ČANJU" I I DSL "ČANJU SEKTOR 51"		Lokacija: ČANJU - ZAHVAT DUP-a "ČANJU II" I DSL "Čanji SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJIGA 4 - Glavni projekat konstrukcije	
Saradnik: Nikola Mijatović, spec.sci.grad.		Prilog: Prodolni presjek zida 2 - od profila 15 do profila 29	
Datum izrade i MP:		Datum revizije i MP:	
Februar, 2024.		16 142	
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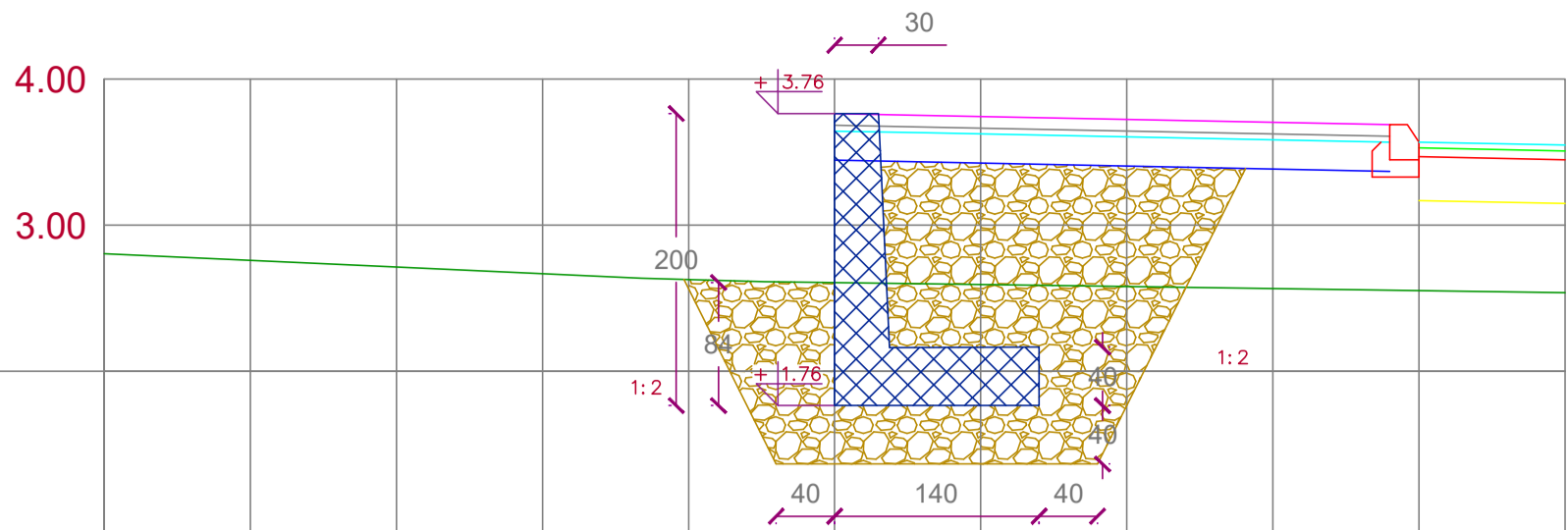
ZID 2



PROJEKTANT: <div><div></div><div>ČELEBIĆ</div><div>Uj.Oktoli 2, Donja Gorica</div></div>		INVESTITOR: OPŠTINA BAR	
Objekat: SAGRAĐANICA 1 - II FAZA I PRILJUČNE SAGRAĐANICE U ZAHVATU DUP-a "ČANJU" I DSL "ČANJ SEKTOR 51"		Lokacija: ČANJ - ZAHVAT DUP-a "ČANJU II" I DSL "Čanj SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJ/GA 4 - Glavni projekat konstrukcije	
Saradnik: Nikola Mijatović, spec.sci.grad.		Prilog: Prostorni presjek zida 2 - od profila 29 do 34	
Datum izrade i MP:		Datum revizije i MP:	
Februar, 2024.		17143	
		RAZMJERA: 1:50	

28

0+135.00



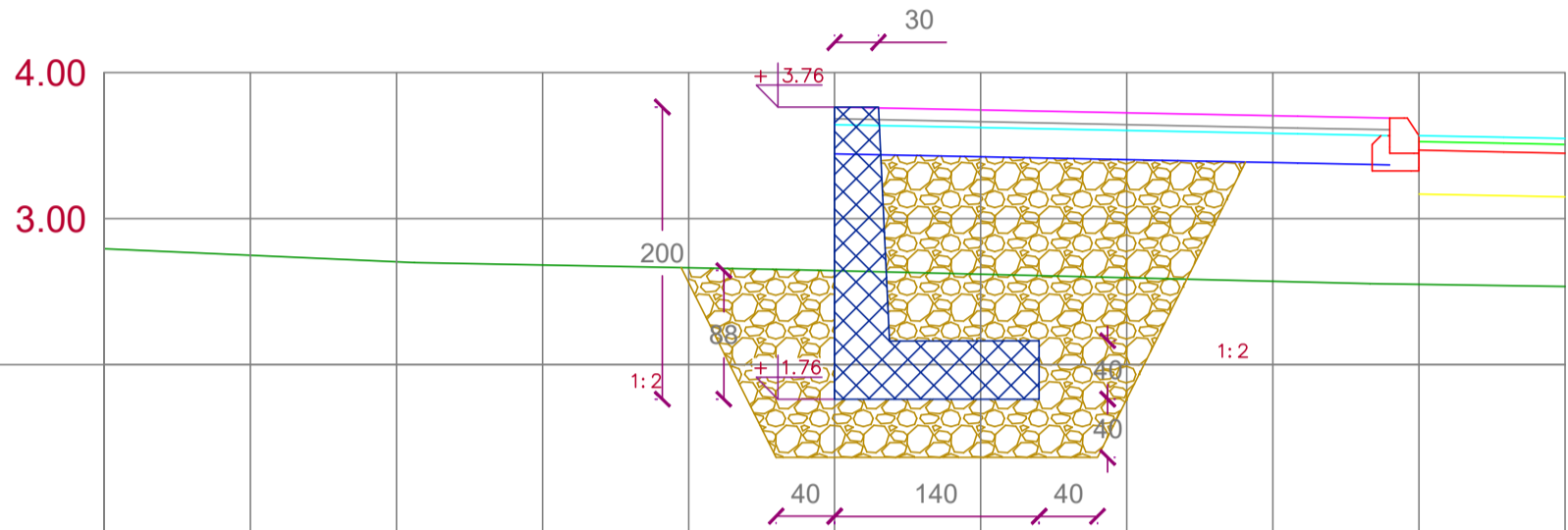
Existing Levels

Proposed Levels

Offsets

29

0+140.00



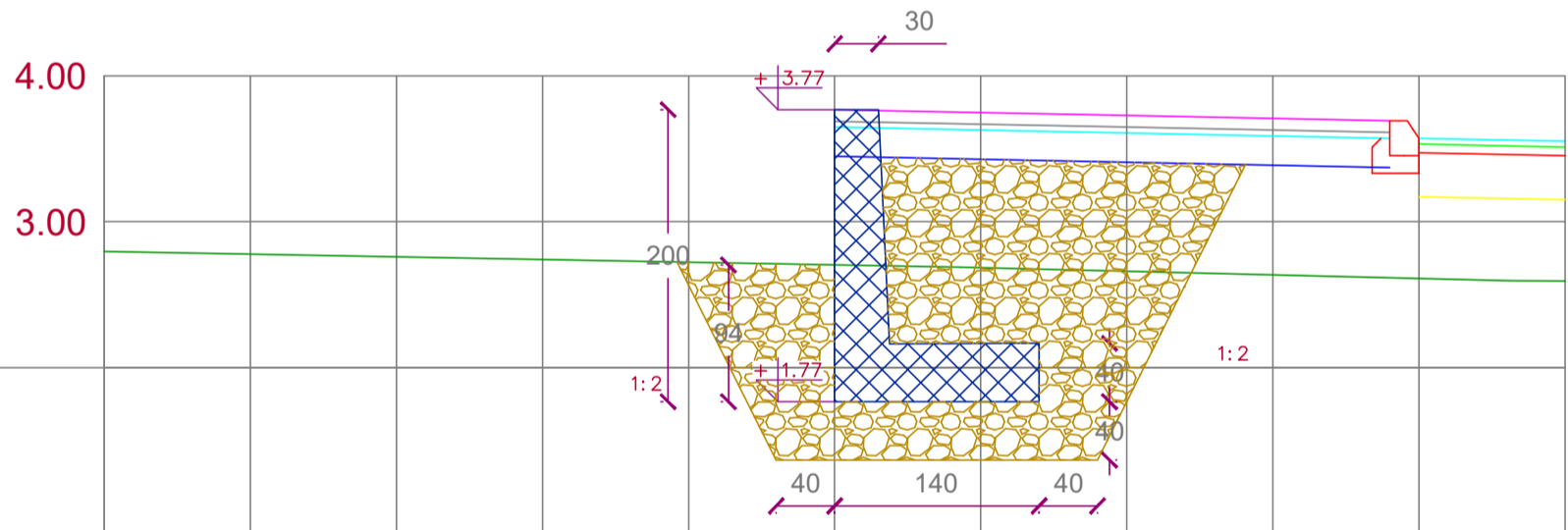
Existing Levels

Proposed Levels

Offsets

30

0+145.00



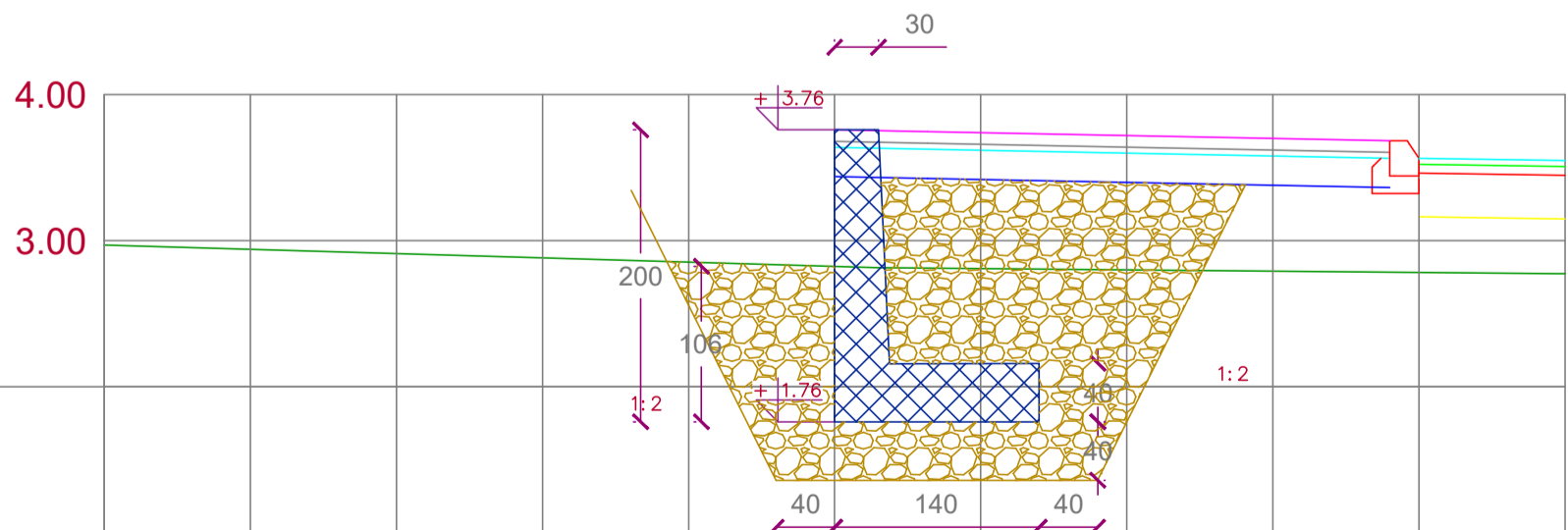
Existing Levels

Proposed Levels

Offsets

31

0+150.00



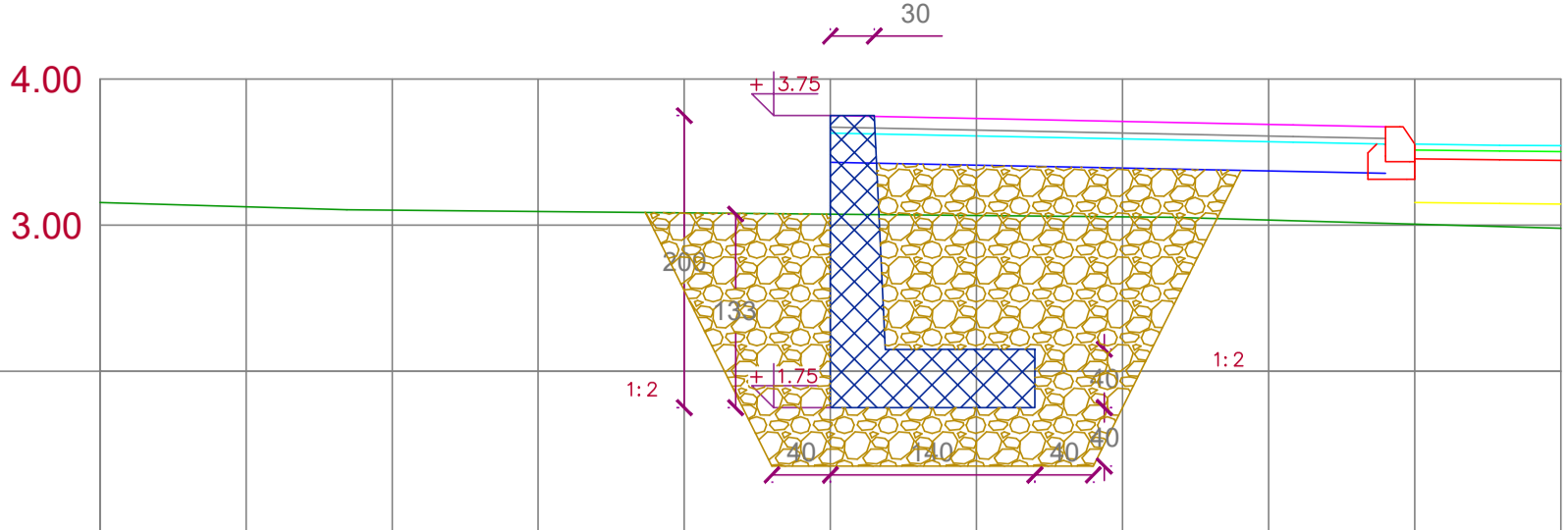
Existing Levels

Proposed Levels

Offsets

32

0+155.00



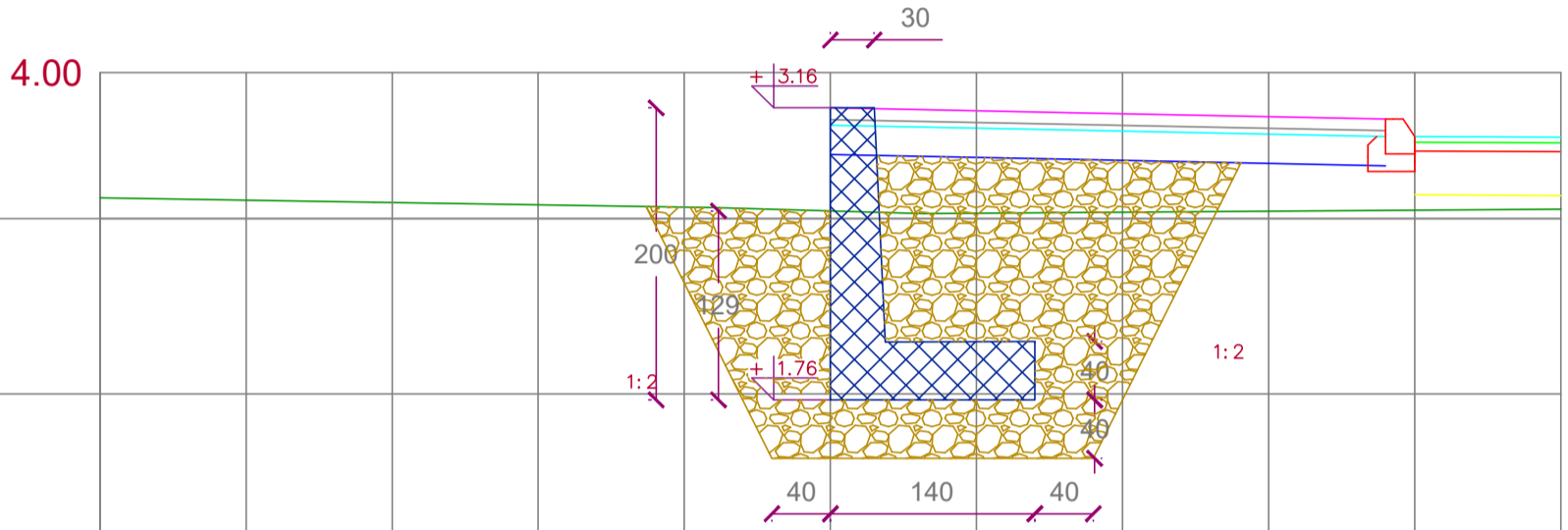
Existing Levels

Proposed Levels

Offsets

33

0+160.00



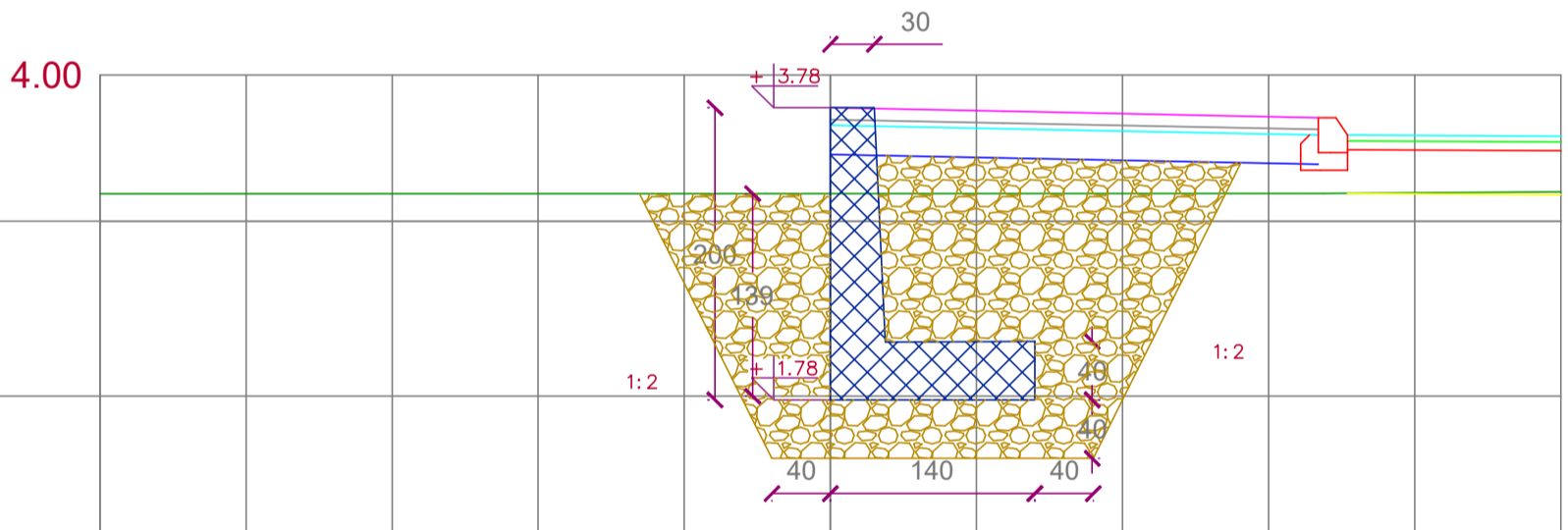
Existing Levels

Proposed Levels

Offsets

34

0+165.70



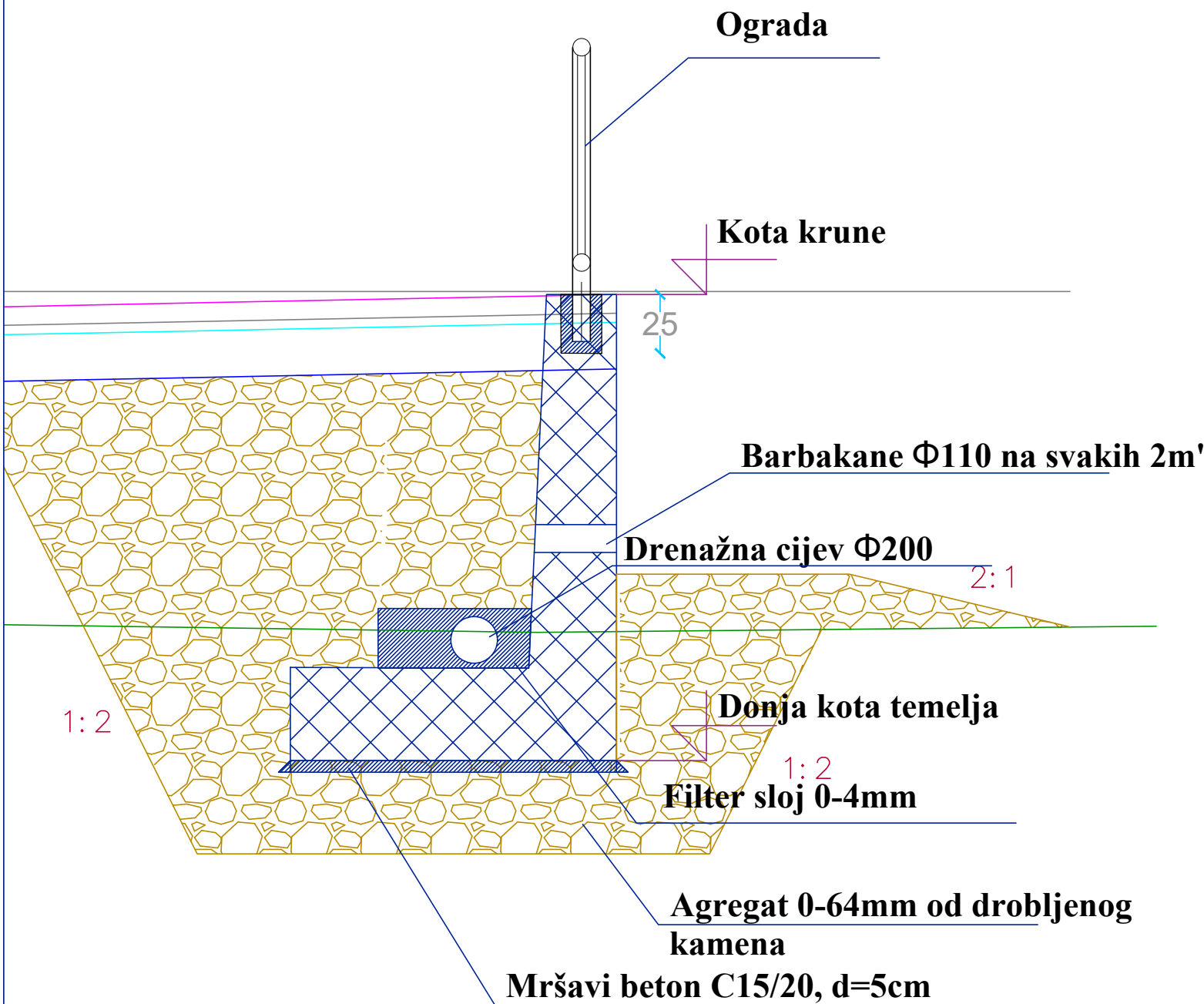
Existing Levels

Proposed Levels

Offsets

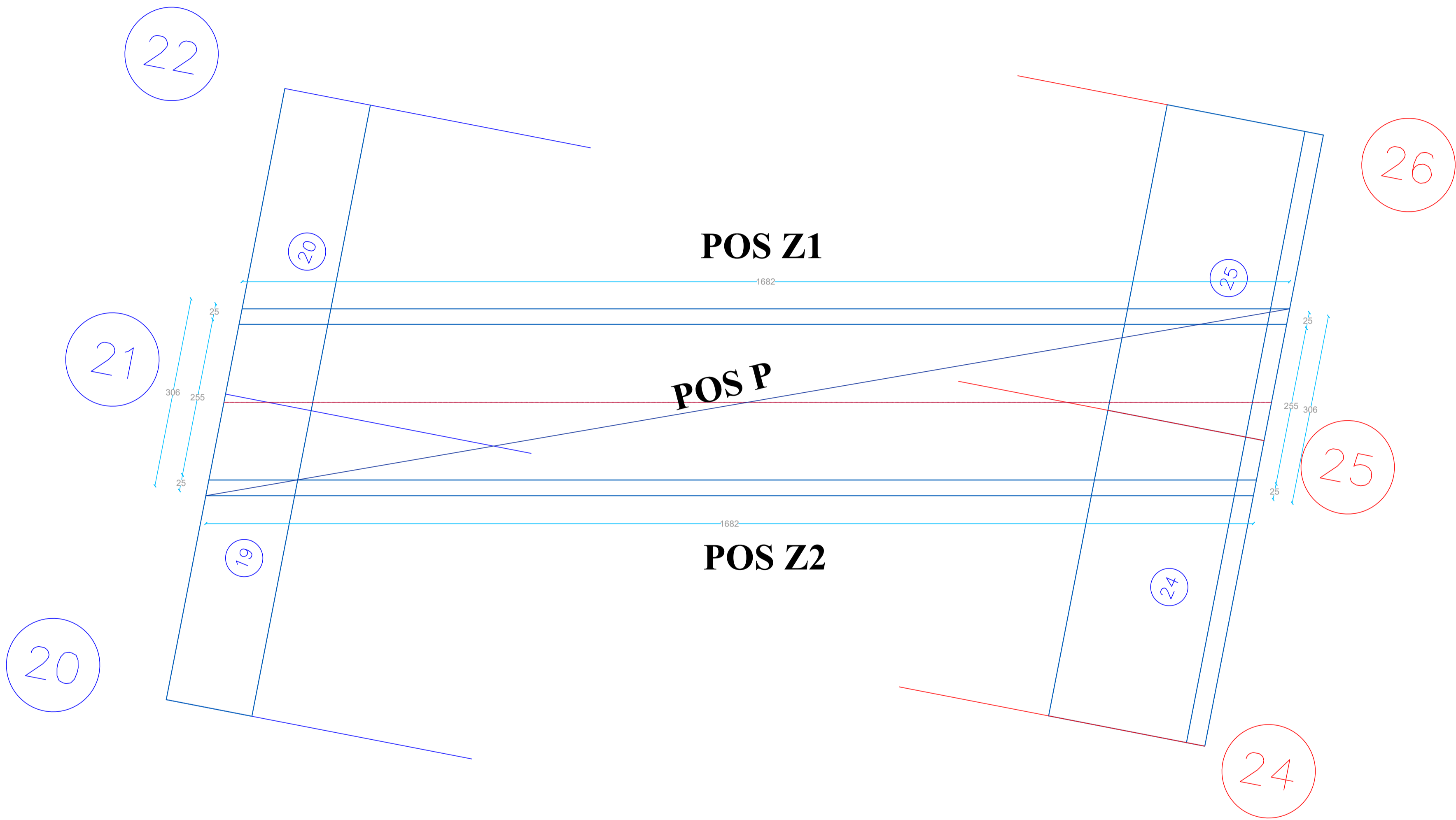
PROJEKTANT: ČELEBIĆ Ul. Oktobra 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Objekat: SAGRAĐAVALICA 1 - II FAZA I PRILUČNE SAGRAĐAVALICE U ZAHVATU DUP-a "ČANJ" I I DSL "ČANJ SEKTOR 51"		Lokacija: ČANJ - ZAHVAT DUP-a "ČANJ II" I DSL "Čanj SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJIGA 4 - Glavni projekat konstrukcije	
Saradnik: Nikola Mijatović, spec.sci.grad.		Prilog: Popisni presjeci zida 2	
Datum izrade I MP:		Datum revizije I MP:	
Februar, 2024.		22	
		148	
		1:50	
		br. priloga	
		RAZMJERA:	

KARAKTERISTIČNI DETALJ
POPREČNOG PRESJEKA ZIDA
R=1:25



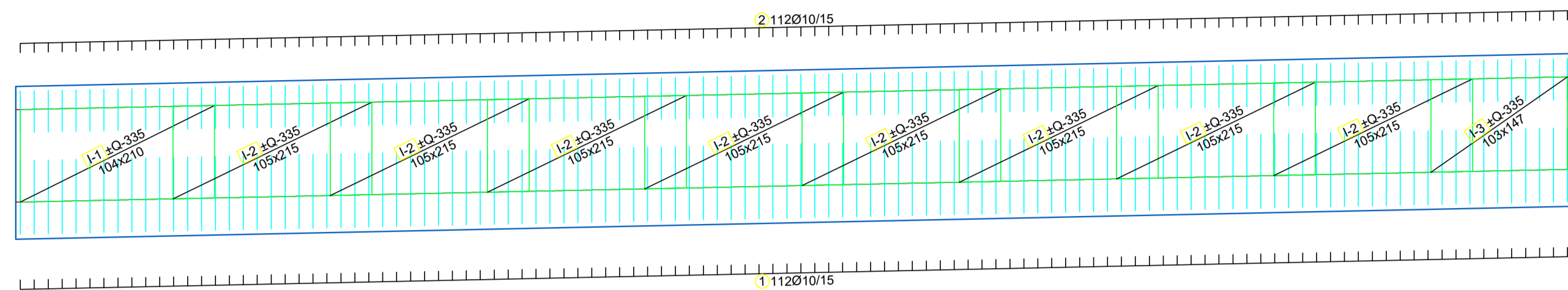
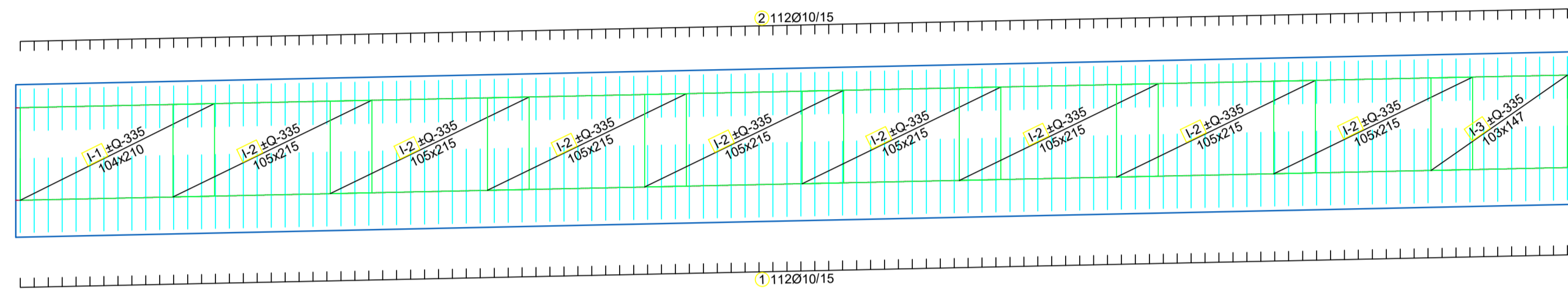
PROJEKTANT: <div> ČELEBIĆ ul.Oktoih 2, Donja Gorica</div>		INVESTITOR: OPŠTINA BAR	
Objekat: SAOBRAĆAJNICA 1 - II FAZA I PRIKLJUČNE SAOBRAĆAJNICE U ZAHVATU DUP-a "ČANJ II" I DSL "ČANJ SEKTOR 51"		Lokacija: ČANJ - ZAHVAT DUP-a "ČANJ II" I DSL "Čanj SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.građ.		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.građ.		Dio tehničke dokumentacije: KNJIGA 4 - Građevinski projekat konstrukcije	RAZMJERA: 1:50
Saradnik/ci: Nikola Mijatović, spec.sci.građ.		Prilog: Karakteristični poprečni presjek potpornog zida	br. priloga 23 br. strane 149
Datum izrade i MP: Februar, 2024.		Datum revizije i MP:	

PLAN ARMIRANJA PROPUSTA 1, R=1:50

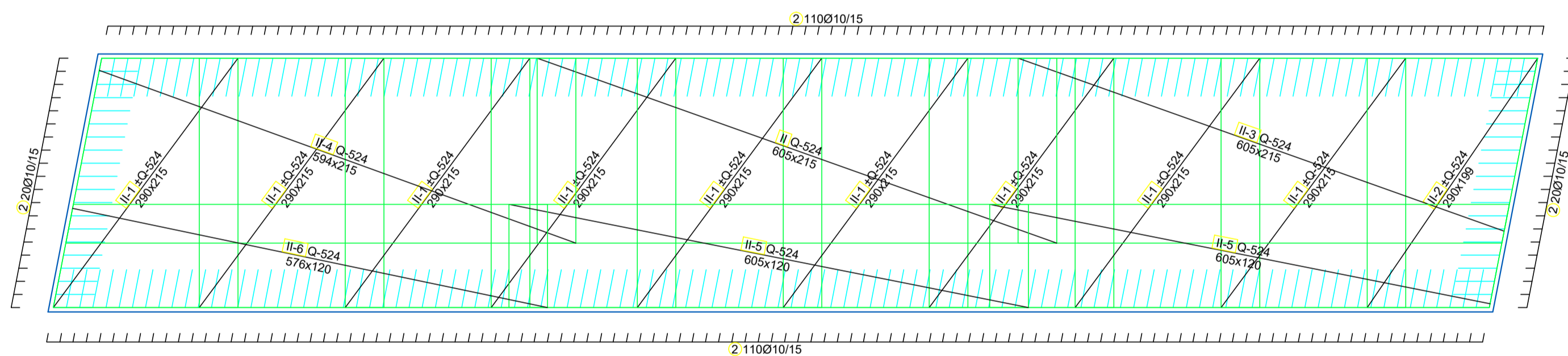


PROJEKTANT:  ČELEBIĆ ul. Oktolih 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Objekat: SAOBRAĆAČNICA 1 - II FAZA I PRIKLJUČNE SAOBRAĆAČNICE U ZAHVATU DUP-a "ČANJ II" I DSL "ČANJ SEKTOR 51"		Lokacija: ČANJ - ZAHVAT DUP-a "ČANJ II" I DSL "Čanj SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJIGA 4 - Građevinski projekat konstrukcije	
Saradnik/ici: Nikola Mijatović, spec.sci.grad.		Prilog: Plan pozicija propusta 1	RAZMJERA: 1:50 br. priloga 24 br. strane 150
Datum izrade i MP:		Datum revizije i MP:	
Februar, 2024.			

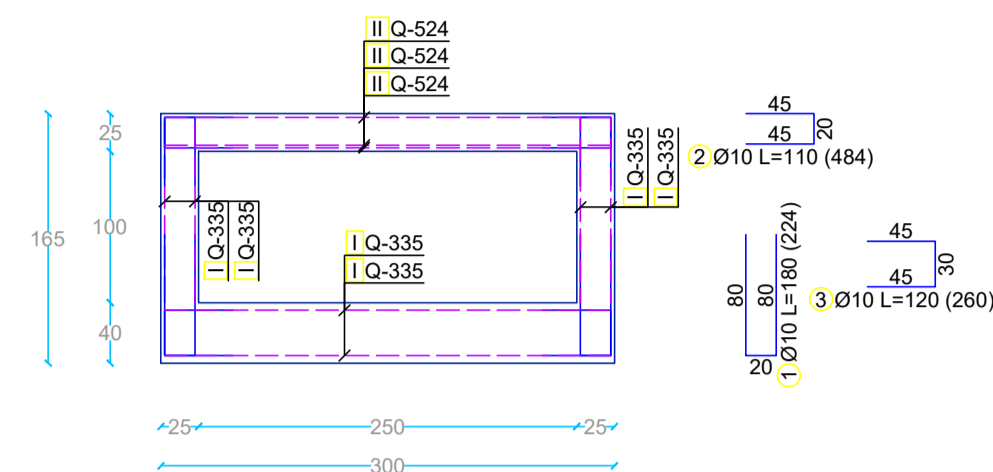
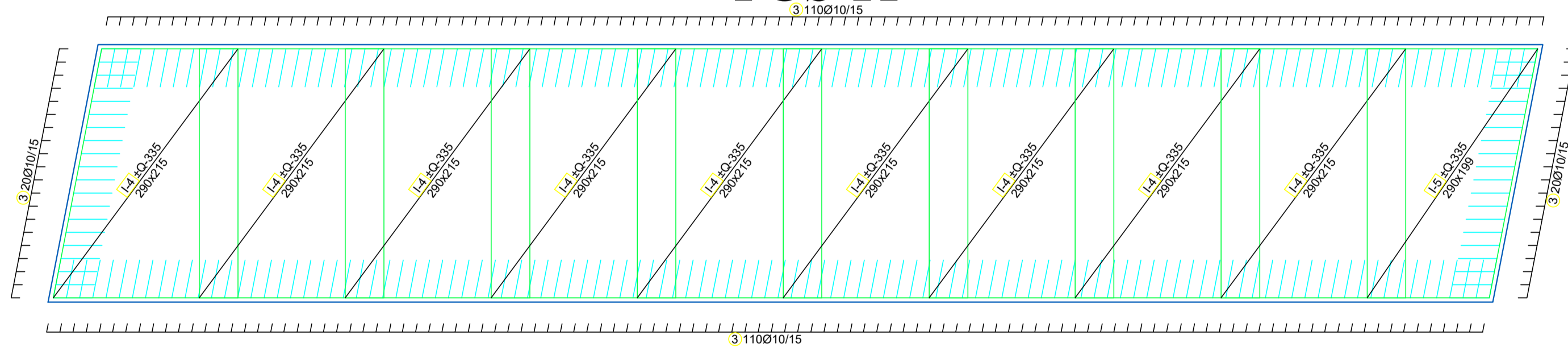
POS Z1

**POS Z2**

POS P

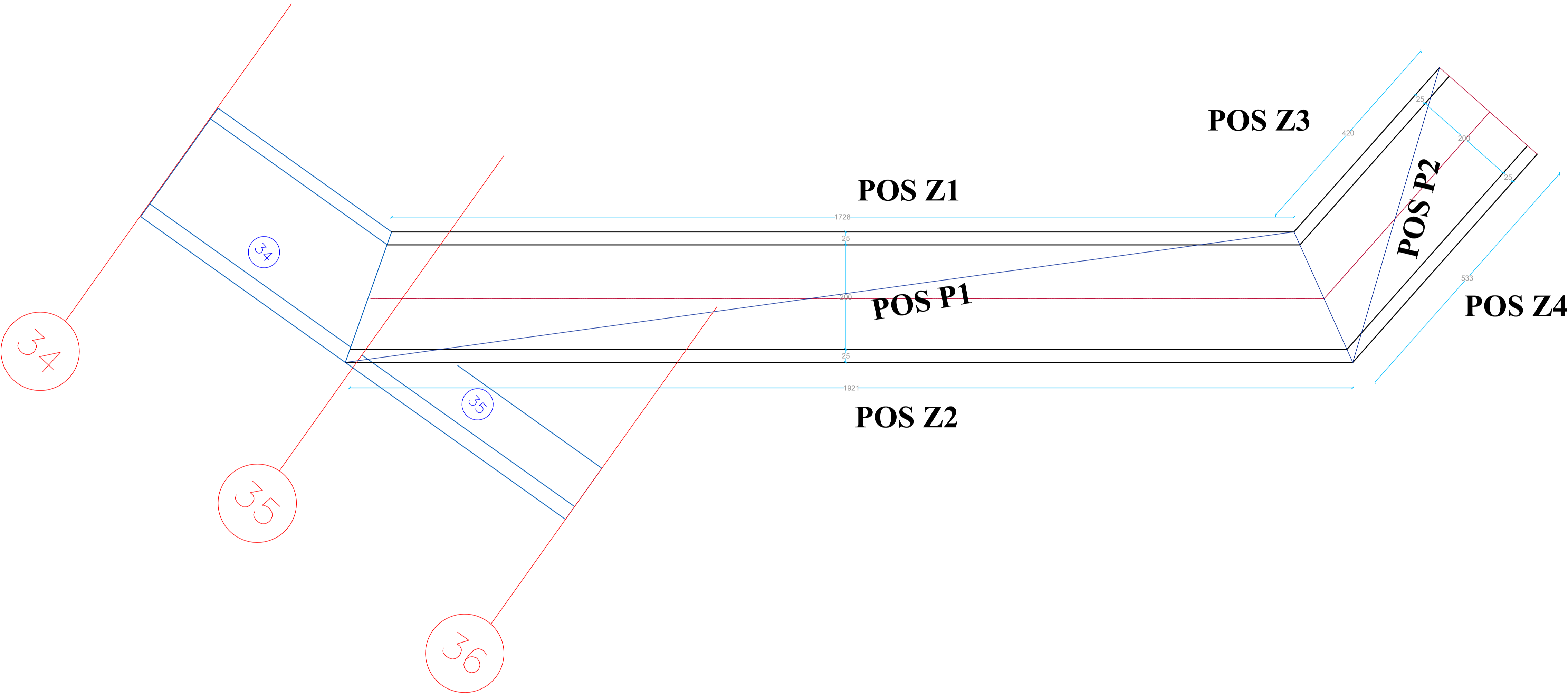


POS TP

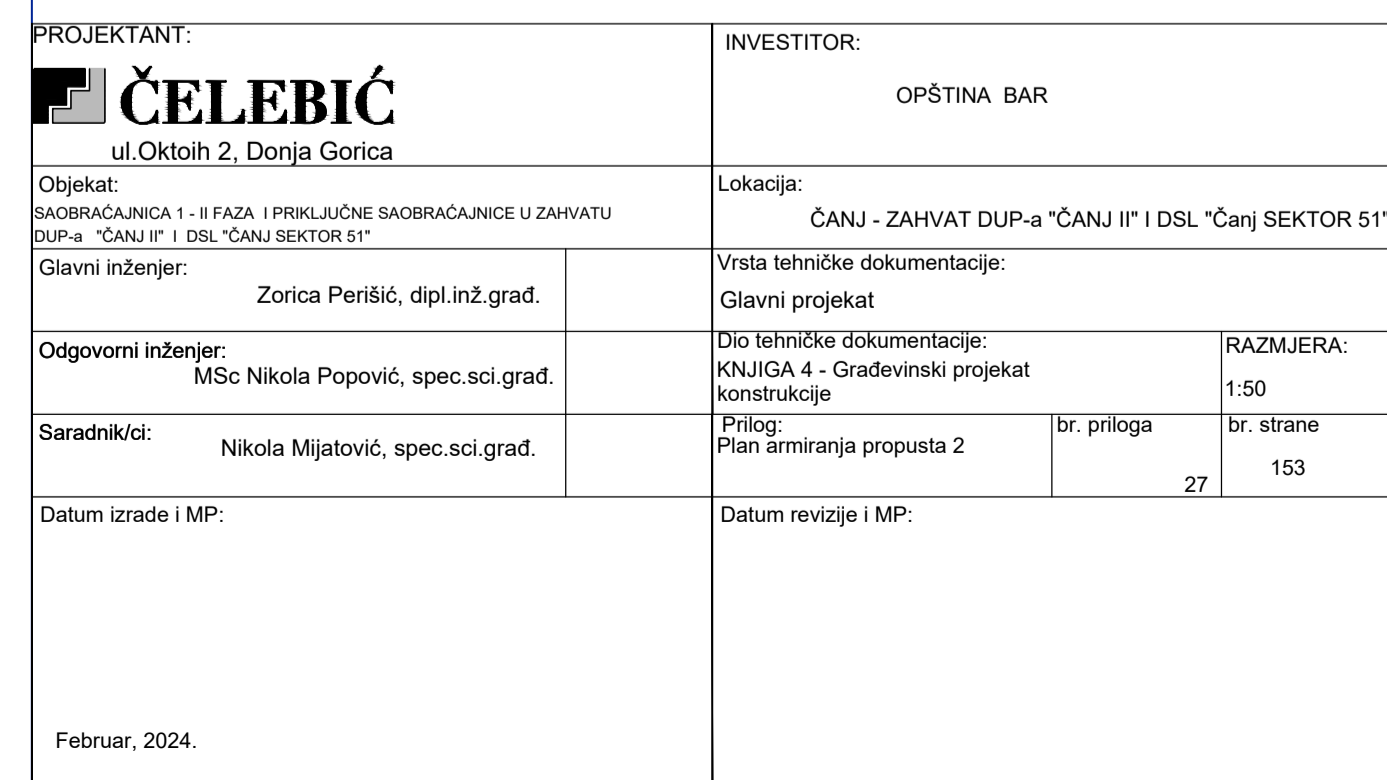


PROJEKTANT:  ČEBELIĆ ul.Oktolih 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Objekt: SAOBRAĆAJNIČNA 1 - II FAZA I PRILJUČNE SAOBRAĆAJNICE U ZAHVATU DUP-a "ČANJU II" I DSL "ČANJU SEKTOR 51"		Lokacija: ČANJU - ZAHVAT DUP-a "ČANJU II" I DSL "Čanju SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJIGA 4 - Građevinski projekat Konstrukcija:	RAZMJERA: 1:50
Saradnik(i): Nikola Mijatović, spec.sci.grad.		Prilog: Plan armiranja propusta 1	br. priloga br. strane 25 151
Datum izrade i MP:		Datum revizije i MP:	
Februar, 2024.			

PLAN POZICIJA PROPUSTA 2, R=1:50

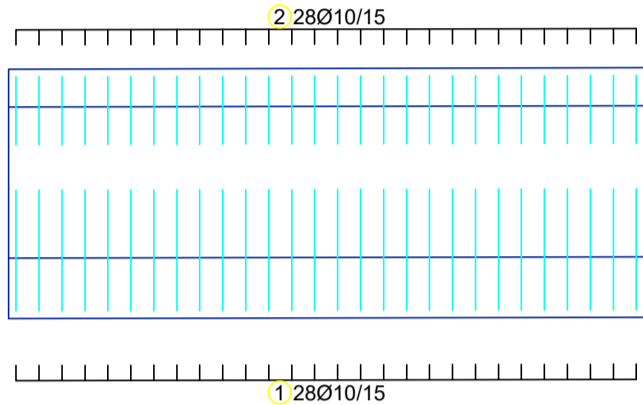


PROJEKTANT: <div> ČELEBIĆ ul.Oktoli 2, Donja Gorica</div>		INVESTITOR: OPŠTINA BAR		
Objekat: SAGRAĐAČANICA 1 - II FAZA I PRIKLJUČNE SAOBRAČAČNICE U ZAHVATU DUP-a "ČANJ II" I DSL "ČANJ SEKTOR 51"		Lokacija: ČANJ - ZAHVAT DUP-a "ČANJ II" I DSL "ČanJ SEKTOR 51"		
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekat		
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJIGA 4 - Građevinski projekat konstrukcije		RAZMJERA: 1:50
Saradnik/ici: Nikola Mijatović, spec.sci.grad.		Prilog: Plan pozicija propusta 2		br. priloga 26 br. strane 152
Datum izrade i MP:		Datum revizije i MP:		
Februar, 2024.				

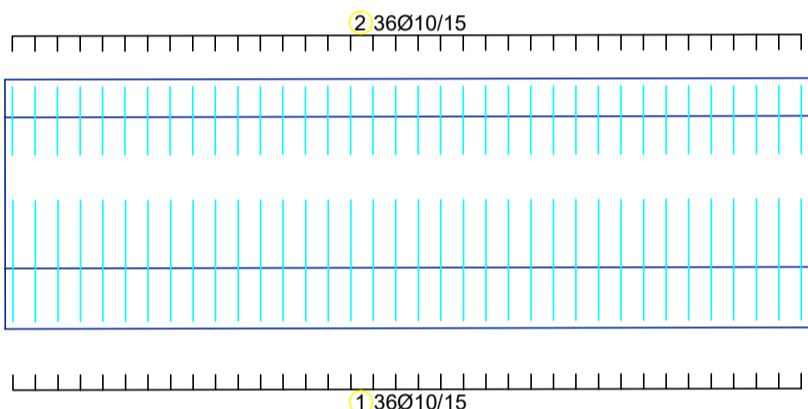
POS Z1

PLAN ARMIRANJA PROPUSTA 2, R=1:50

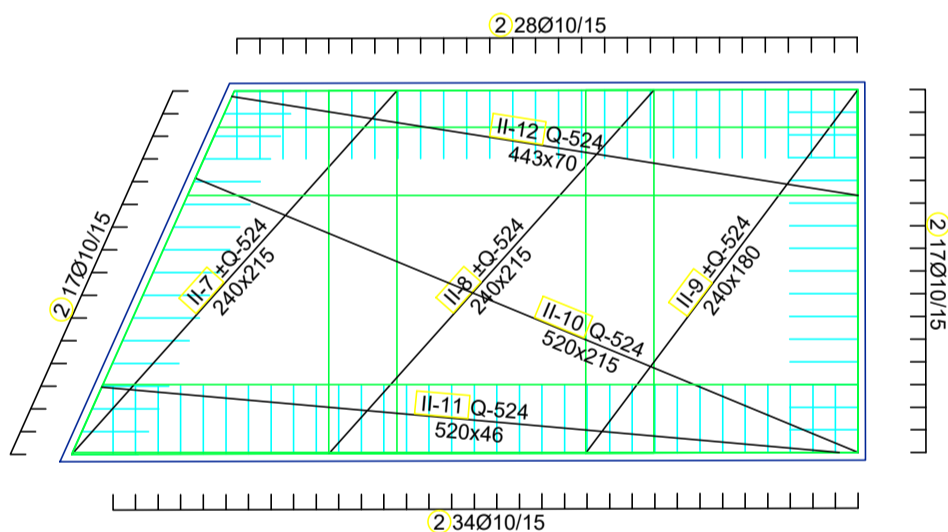
POS Z3



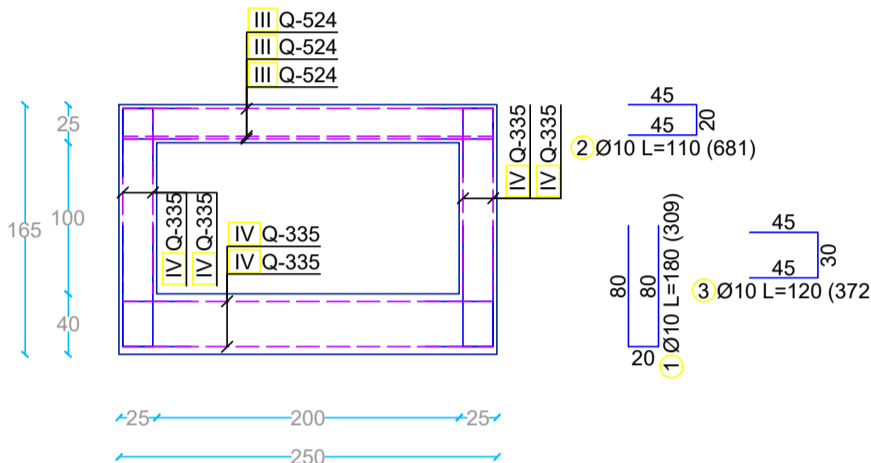
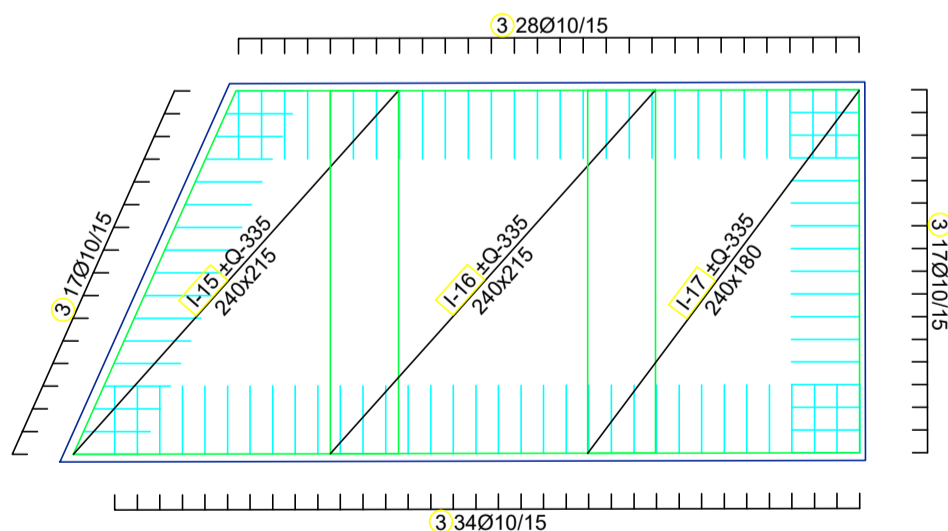
POS Z4



POS P2



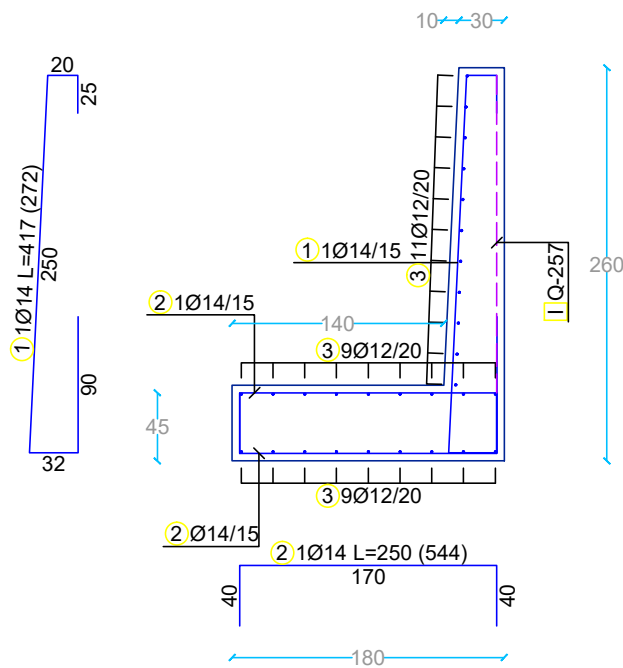
POS TP2



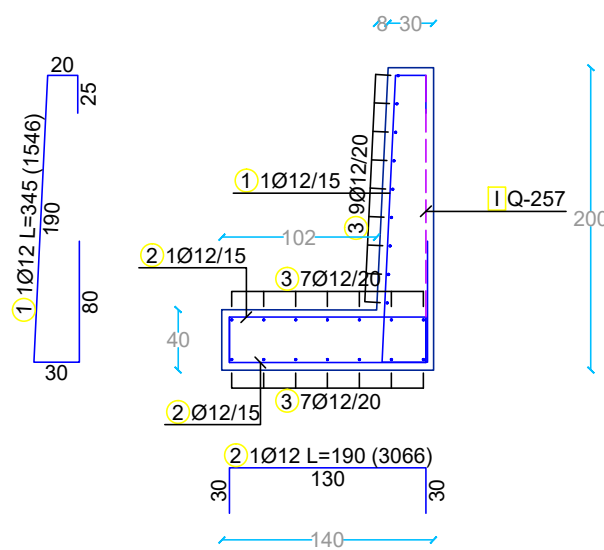
PROJEKTANT:		INVESTITOR:	
 ČELEBIĆ ul. Oktoih 2, Donja Gorica		OPŠTINA BAR	
Objekat: SAGRAĐAČANICA 1 - II FAZA I PRIKLJUČNE SAOBRAĆAČNICE U ZAHVATU DUP-a "ČANJ II" I DSL "ČANJ SEKTOR 51"		Lokacija: ČANJ - ZAHVAT DUP-a "ČANJ II" I DSL "ČanJ SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJIGA 4 - Građevinski projekat konstrukcije	
Saradnik/ici: Nikola Mijatović, spec.sci.grad.		Prilog: Plan armiranja propusta 2	
Datum izrade i MP:		Datum revizije i MP:	
Februar, 2024.			

DETALJI ARMIRANJA POPREČNIH
PRESJEKA TIPOVA ZIDOVA
R=1:50

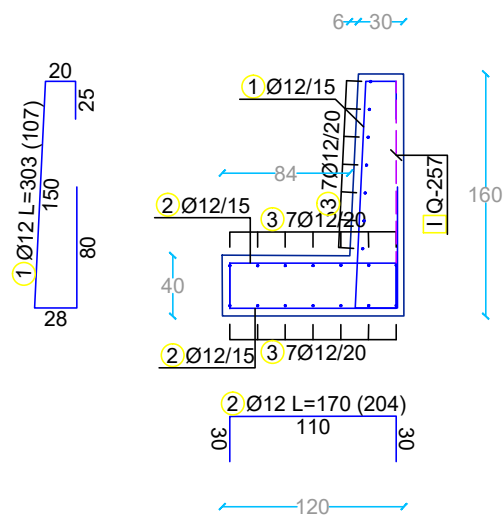
TIP 1



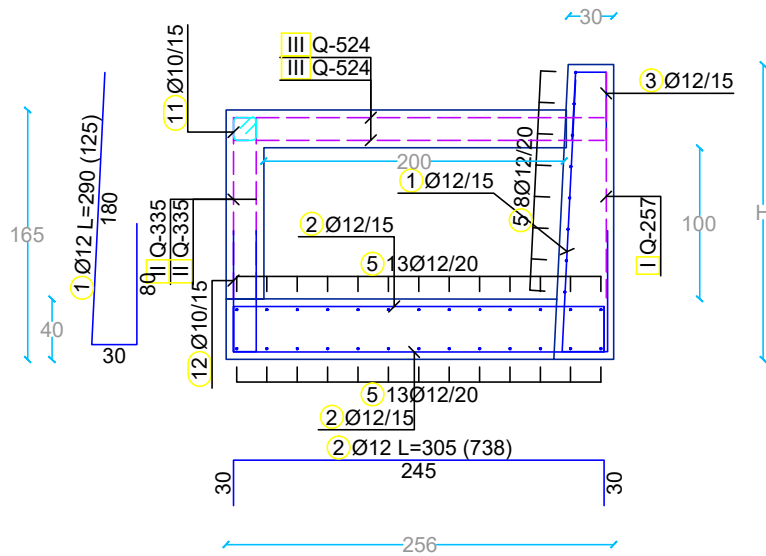
TIP 2



TIP 3

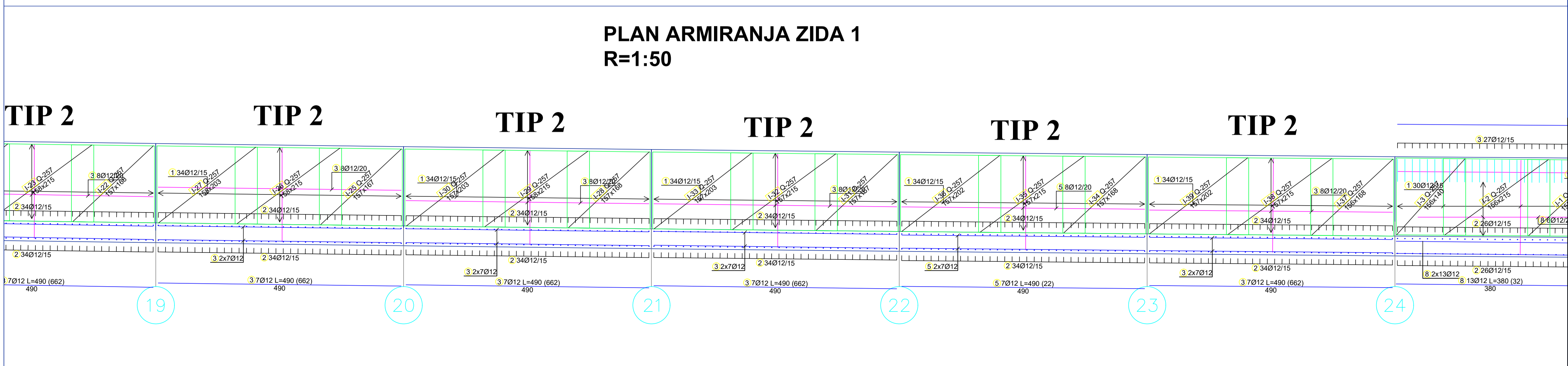
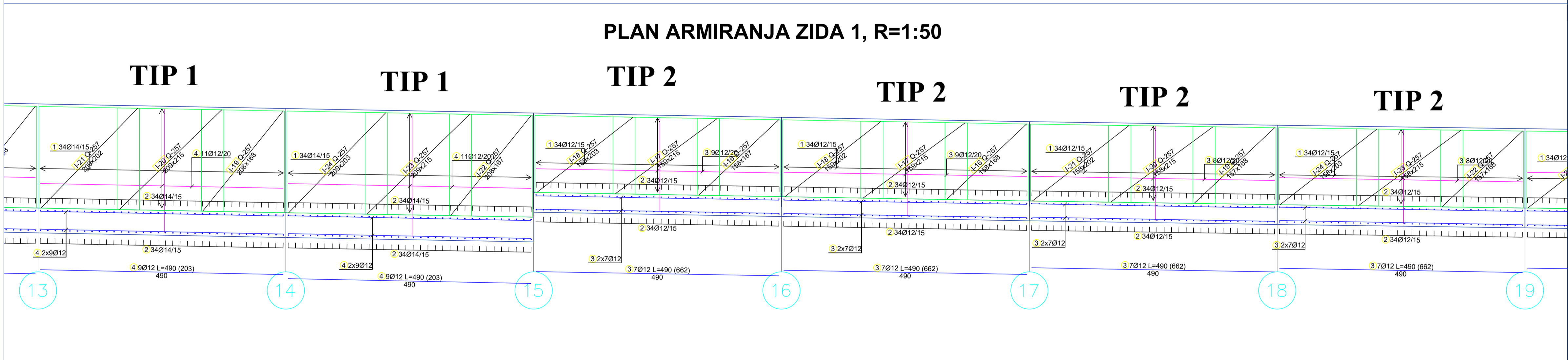
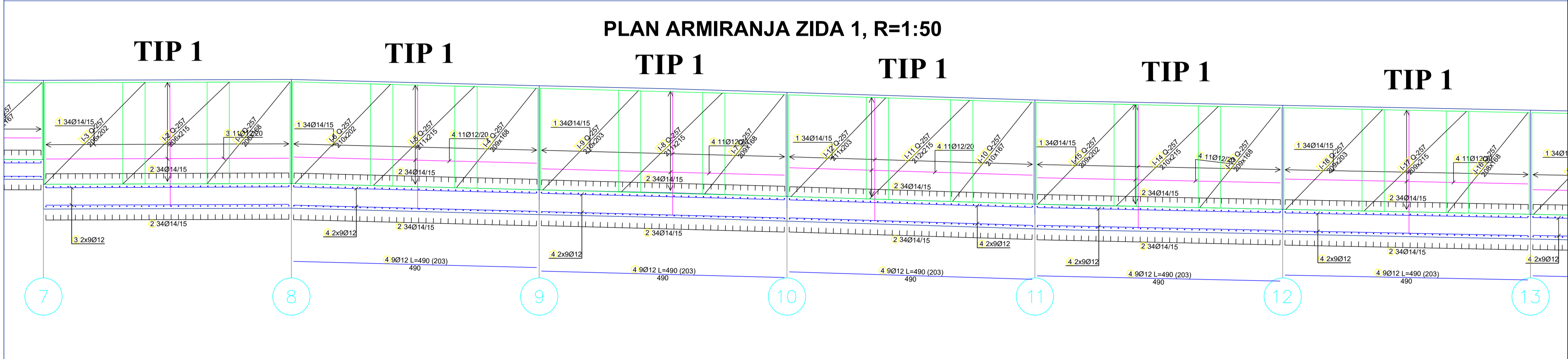
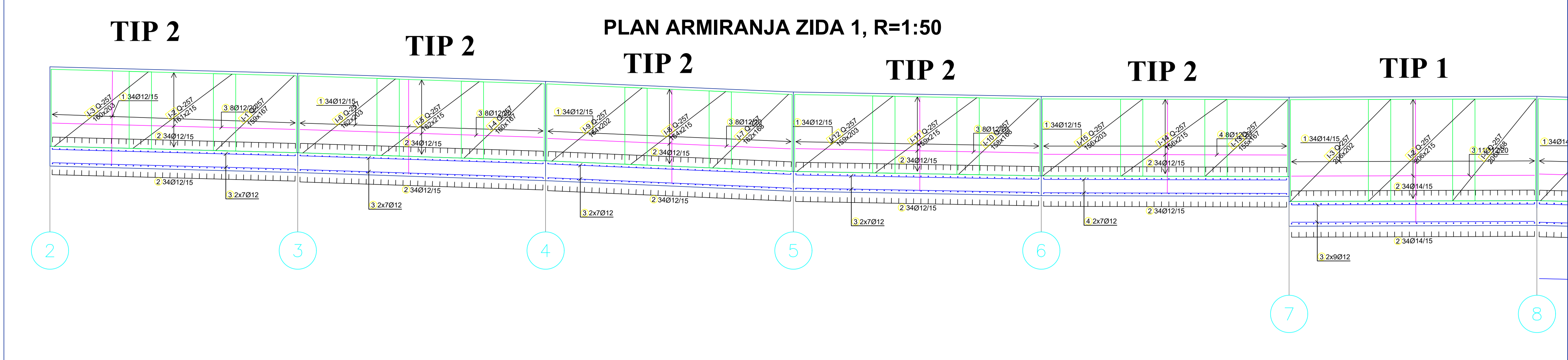


TIP 4



Spojeve kanala (tip 4, propust 1 i propust 2) je potrebno obraditi hidroizolacionog bubrečom trakom.

PROJEKTANT: ČELEBIĆ ul.Oktoih 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Objekat: SAOBRAĆAJNICA 1 - II FAZA I PRIKLJUČNE SAOBRAĆAJNICE U ZAHVATU DUP-a "ČANJ II" I DSL "ČANJ SEKTOR 51"		Lokacija: ČANJ - ZAHVAT DUP-a "ČANJ II" I DSL "Čanj SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.građ.		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.građ.		Dio tehničke dokumentacije: KNJIGA 4 - Građevinski projekat konstrukcije	RAZMJERA: 1:50
Saradnik/ci: Nikola Mijatović, spec.sci.građ.		Prilog: Plan armiranja zidova	br. priloga 29 br. strane 155
Datum izrade i MP:		Datum revizije i MP:	
Februar, 2024.			



PODUŽNU ARMATURU ZIDA 1,
POZICIJU, OD KAMPADE 1 DO
KAMPADE 8 PRILAGODITI NA LICU
MJESTA

PROJEKTANT: ČELEBIĆ ul.Otkoih 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Objekat: SAGRAĐAČANICA 1 - 8 FAZA I PRILAGODNE SAGRAĐAČANICE U ZAHVATU DUP-a "ČANJ II" I DSL "ČANJ SEKTOR 51"		Lokacija: ČANJ - ZAHVAT DUP-a "ČANJ II" I DSL "ČANJ SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJIGA 4 - Građevinski projekat konstrukcije	
Saradnik/ici: Nikola Mijatović, spec.sci.grad.		Prilog: Plan armiranja zidova	
Datum izrade i MP:		Datum revizije i MP:	
Februar, 2024.		br. priloga 30	
		RAZMJERA: 1:50 br. strane 156	

PLAN ARMIRANJA ZIDA 1 R=1:50

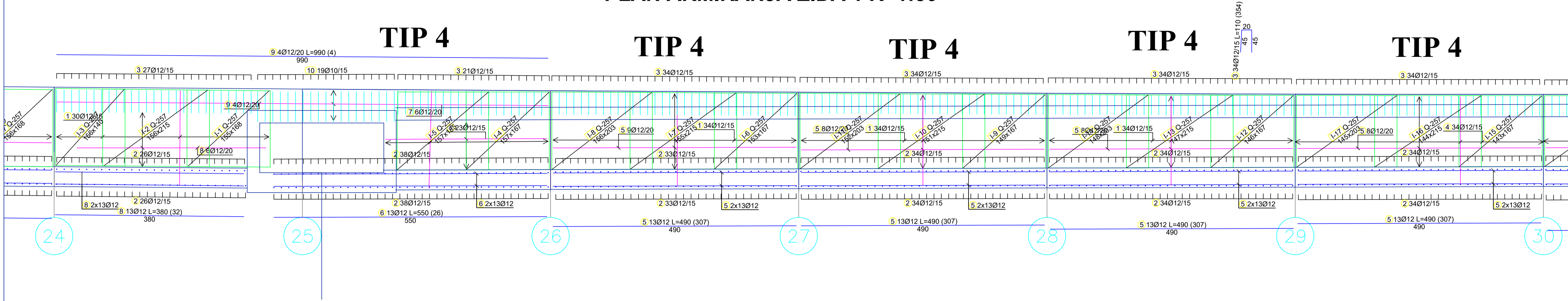
TIP 4

TIP 4

TIP 4

TIP 4

TIP 4



PLAN ARMIRANJA ZIDA 1 R=1:50

TIP 4

TIP 4

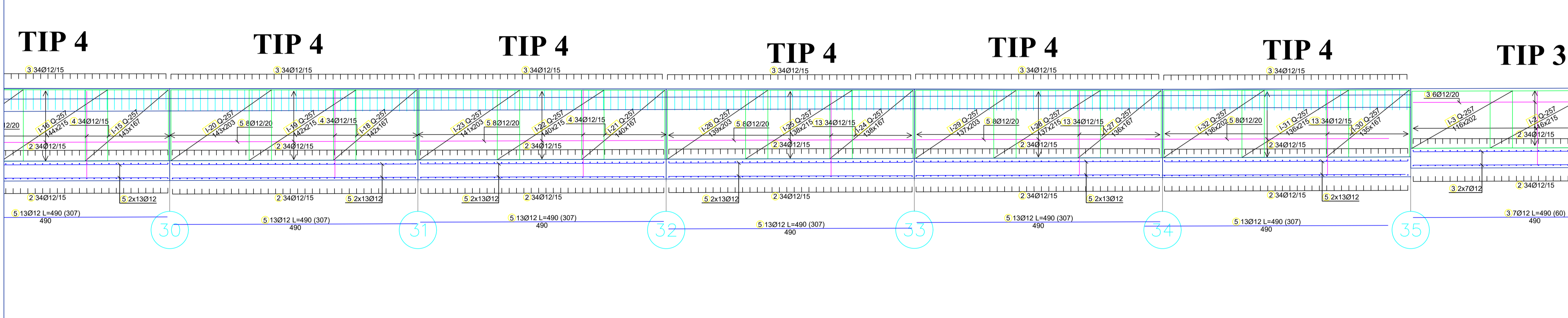
TIP 4

TIP 4

TIP 4

TIP 4

TIP 3



PLAN ARMIRANJA ZIDA 1 R=1:50

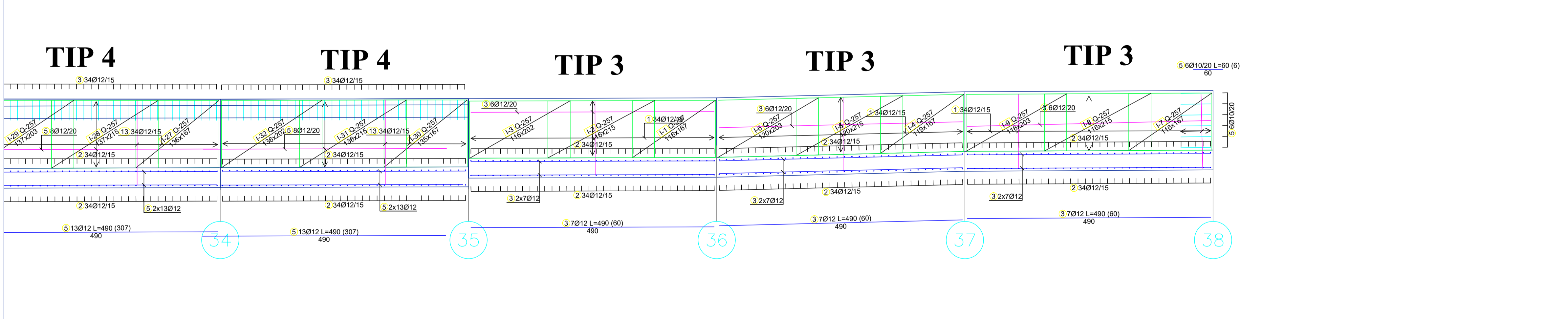
TIP 4

TIP 4

TIP 3

TIP 3

TIP 3



PLAN ZIDA I PLOČE KANALA R=1:50

TIP 4

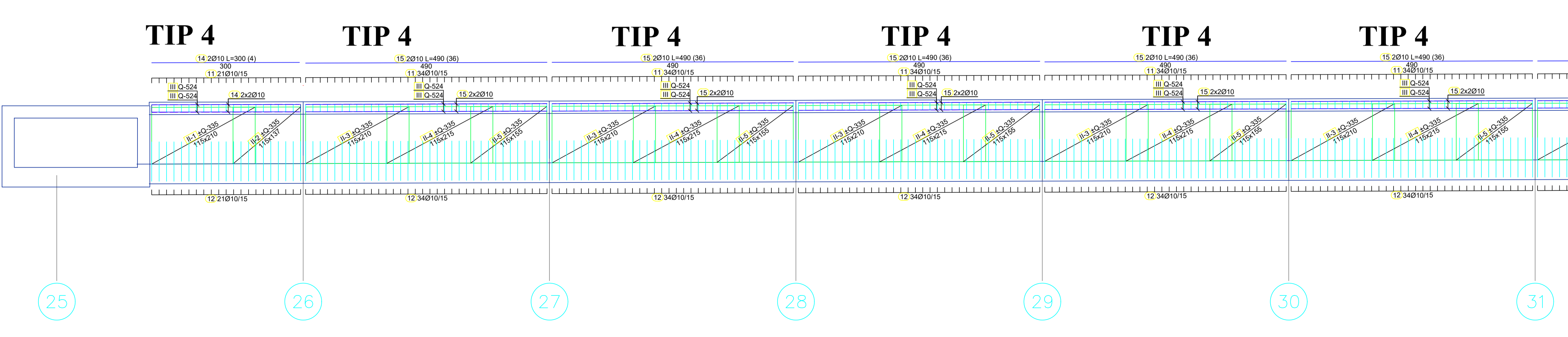
TIP 4

TIP 4

TIP 4

TIP 4

TIP 4



TIP 4 SE NE IZVODI U KAMPADAMA, VEĆ KAO CJELINA, SA ADEKVATNIM PREKIDIMA BETONAŽE.

PROJEKTANT: ČELEBIĆ ul. Oktoih 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Objekat: SABIRAČANICA 1 - 8 FAZA I PRIKLJUČNE SABIRAČANICE U ZAHVATU DUP-a "ČANJ II" I DSL "ČANJ SEKTOR 51"		Lokacija: ČANJ - ZAHVAT DUP-a "ČANJ II" I DSL "ČANJ SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJIGA 4 - Građevinski projekat konstrukcije	
Saradnik/ici: Nikola Mijatović, spec.sci.grad.		Prilog: Plan armiranja zidova	
Datum izrade i MP:		Datum revizije i MP:	
Februar, 2024.		br. priloga 31	
		br. strane 157	

The figure consists of six diagrams, each representing a 166.67' segment of a 1000' long embankment. Each diagram is labeled 'TIP 2' at the top. The diagrams show the layout of the embankment with a 1:1 slope. Key features include:

- Diagram 3:** Shows a 1:1 slope with a 12' high embankment. It includes a 3' wide top width and a 3' wide base width. The slope is 1:1, and the embankment is 12' high. The diagram is labeled 'TIP 2' and '3' in a circle at the bottom.
- Diagram 4:** Shows a 1:1 slope with a 12' high embankment. It includes a 3' wide top width and a 3' wide base width. The slope is 1:1, and the embankment is 12' high. The diagram is labeled 'TIP 2' and '4' in a circle at the bottom.
- Diagram 5:** Shows a 1:1 slope with a 12' high embankment. It includes a 3' wide top width and a 3' wide base width. The slope is 1:1, and the embankment is 12' high. The diagram is labeled 'TIP 2' and '5' in a circle at the bottom.
- Diagram 6:** Shows a 1:1 slope with a 12' high embankment. It includes a 3' wide top width and a 3' wide base width. The slope is 1:1, and the embankment is 12' high. The diagram is labeled 'TIP 2' and '6' in a circle at the bottom.
- Diagram 7:** Shows a 1:1 slope with a 12' high embankment. It includes a 3' wide top width and a 3' wide base width. The slope is 1:1, and the embankment is 12' high. The diagram is labeled 'TIP 2' and '7' in a circle at the bottom.
- Diagram 8:** Shows a 1:1 slope with a 12' high embankment. It includes a 3' wide top width and a 3' wide base width. The slope is 1:1, and the embankment is 12' high. The diagram is labeled 'TIP 2' and '8' in a circle at the bottom.

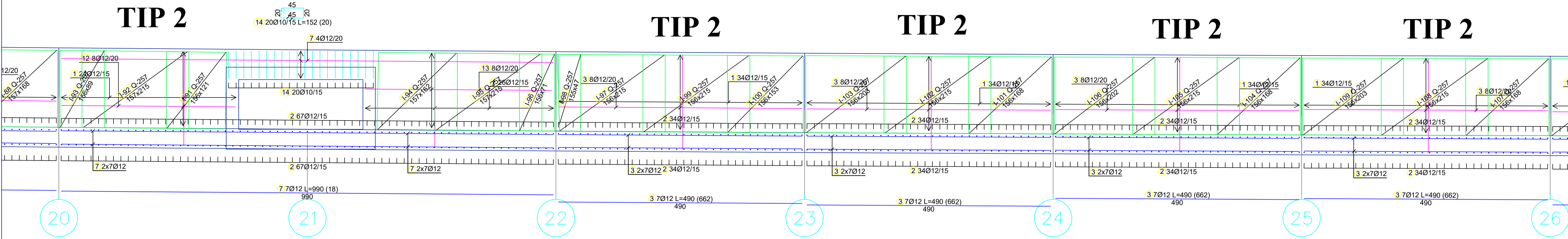
The figure shows a timeline from slot 8 to 13. Each slot contains multiple horizontal bars representing different tasks. Key tasks include:

- Task 1:** 34012/15, duration 150, starting at 0:257.
- Task 2:** 34012/15, duration 150, starting at 0:257.
- Task 3:** 8012/20-257, duration 150, starting at 0:257.
- Task 4:** 2x7012, duration 490, starting at 0:257.
- Task 5:** 7012 L=490 (662), duration 490, starting at 0:257.

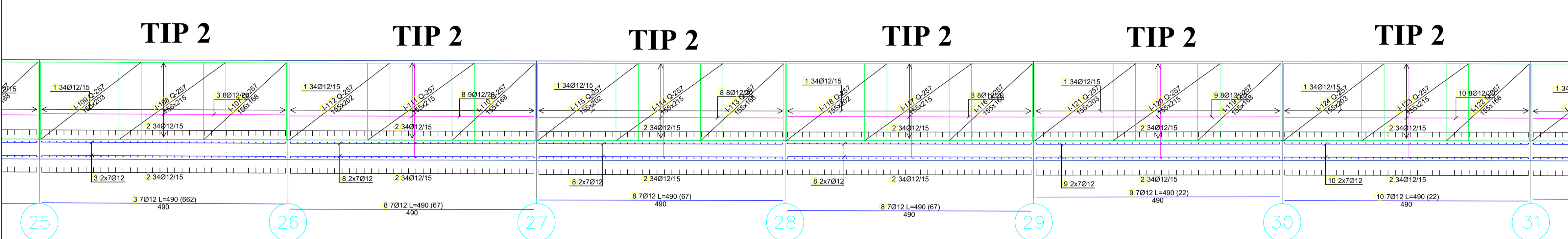
The timeline is divided into segments by vertical dashed lines, with each segment labeled 'TIP 2'.

PROJEKTANT:  ČELEBIĆ ul. Oktoih 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Objekt: SAGROBNAJICA 1 - II FAZA I PRILIKUĆNE SAGBRAČANICE U ZAHVATU DUP-a "ČANJ II" I DSL "ČANJ SEKTOR 51"		Lokacija: ČANJ - ZAHVAT DUP-a "ČANJ II" I DSL "Čanj SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekt	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJIGA 4 - Građevinski projekt konstrukcije	
Saradnik/i: Nikola Mijatović, spec.sci.grad.		Prilog: Plan amiranja zidova	RAZMJERA: 1:50 br. strane 158
Datum izrade i MP:		Datum revizije i MP:	
Februar, 2024.			

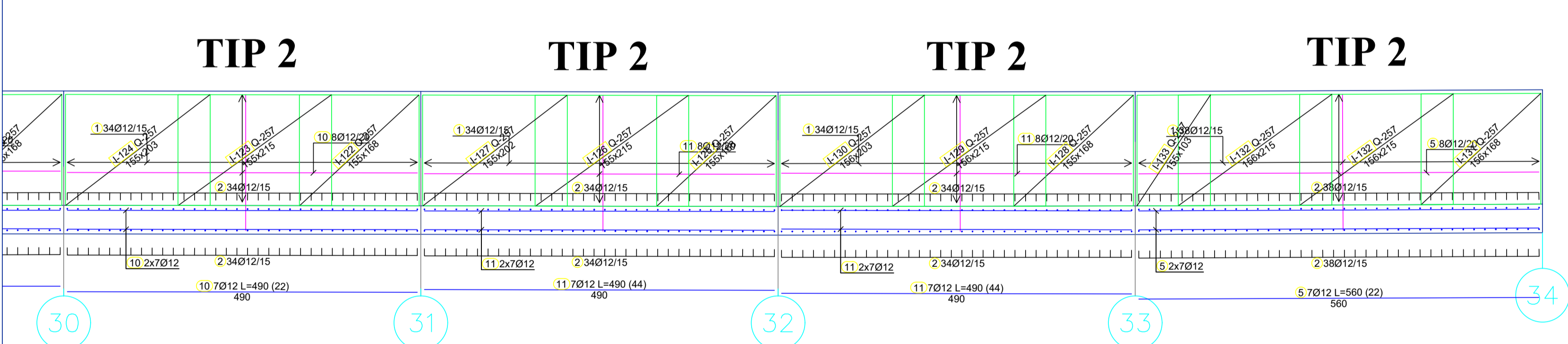
PLAN ARMIRANJA ZIDA 2 R=1:50



PLAN ARMIRANJA ZIDA 2 R=1:50



PLAN ARMIRANJA ZIDA 2 R=1:50



PROJEKTANT: ČELEBIĆ ul.Oktolih 2, Donja Gorica		INVESTITOR: OPŠTINA BAR	
Objekat: SAGRAĐAČANICA 1 - II FAZA I PRILUČNE SAGRAĐAČANICE U ZAHVATU DUP-a "ČANJ II" I DSL "ČANJ SEKTOR 51"		Lokacija: ČANJ - ZAHVAT DUP-a "ČANJ II" I DSL "ČanJ SEKTOR 51"	
Glavni inženjer: Zorica Perišić, dipl.inž.grad.		Vrsta tehničke dokumentacije: Glavni projekat	
Odgovorni inženjer: MSc Nikola Popović, spec.sci.grad.		Dio tehničke dokumentacije: KNJIGA 4 - Građevinski projekat konstrukcije	
Saradnik/ici: Nikola Mijatović, spec.sci.grad.		Prilog: Plan armiranja zidova	RAZMJERA: 1:50 br. strana 159
Datum izrade i MP:		Datum revizije i MP:	
Februar, 2024.			