

# Idejni projekt lokalne ceste

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UNIVERSITY OF SPLIT





**SVEUČILIŠTE U SPLITU**

**FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE**

**ZAVRŠNI RAD**

**TOMISLAV RADIĆ**

**Split, 2019.**

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**SVEUČILIŠTE U SPLITU**  
**FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE**

Split, Matice hrvatske 15

**STUDIJ: PREDDIPLOMSKI SVEUČILIŠNI STUDIJ GRAĐEVINARSTVA**

**KANDIDAT: TOMISLAV RADIĆ**

**BROJ INDEKSA: 4495**

**KATEDRA: Katedra za prometnice i geodeziju**

**PREDMET: Ceste**

**ZADATAK ZA ZAVRŠNI RAD**

Tema: IDEJNI PROJEKT LOKALNE CESTE

Opis zadatka: Uz pomoć programa za projektiranje cesta Autodesk AutoCAD Civil 3D potrebno je izraditi idejni projekt ceste na geodetskoj podlozi koja je korištena za izradu programa u okviru kolegija Ceste. Trasu treba položiti od točke A do točke B prema svim podacima iz programskog zadatka.

Zadatak treba sadržavati:

1. Kopiju programskog zadatka
2. Tehnički opis
3. Građevinsku situaciju u M 1:1000

4. Uzdužni presjek u M 1:1000/100
5. Karakteristične poprečne presjeke u M 1:200
6. Računalne ispise koordinatnih točaka osi
7. Proračun količina zemljanih radova
8. Proračun količine radova po presjecima

U Splitu, travanj 2019.

Voditelj Završnog rada:

Prof. dr.sc. Dražen Cvitanić

## **Idejni projekt lokalne ceste**

*Sažetak:* Idejni projekt lokalne ceste izrađeno je na geodetskoj podlozi, prema zadatku iz kolegija Ceste, koristeći se programom Autodesk AutoCAD Civil 3D. Cesta je projektirana za godišnji dnevni promet (PGDP) od 950 vozila na dan, na brdovitom terenu. Projektna brzina ceste iznosi 40 km/h. Idejno rješenje izrađeno je prema Pravilniku o osnovnim uvjetima za projektiranje ceste s elementima koji zadovoljavaju važeće propise, kao i sigurnosne i estetske kriterije.

Ključne riječi:

Idejni projekt, lokalna cesta, projektna brzina, os ceste, niveleta, poprečni presjek

## **Conceptual project of local road**

*Abstract:* A conceptual project of local road, on a geodetic ground according to the task from course „Roads“, is made using software Autodesk AutoCAD Civil 3D. The road is designed for the annual average daily traffic (AADT) of 950 vehicles per day, on the hilly terrain. Design speed for the road is 40 km/h. Preliminary design of local road was created according to the Regulations on the basic conditions for the design of public roads with the elements that meet the applicable rules, as well as safety and aesthetic criteria.

Keywords:

Conceptual project, local road, design speed, the road axis, profile, cross-section

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## **1. PROGRAMSKI ZADATAK**



Katedra za prometnice

Studij: Preddiplomski

Nastavni predmet: CESTE

Student/ica: ..... Tomislav Badić .....

## ZADATAK

Treba izraditi idejni projekt dionice ceste između točaka A i B naznačenih na priloženoj geodetskoj podlozi u mjerilu 1:1000.

Zadano je:

- PGDP - prosječni godišnji dnevni promet: **950 voz/dan**
- vrsta terena: **brdoviti**.

Idejni projekt treba sadržavati:

1. Tehnički opis
2. Proračun horizontalne geometrije
3. Proračun proširenja kolnika u krivini
4. Proračun vertikalne geometrije i kota nivelete
5. Proračun vitoperenja kolnika
6. Građevinska situacija MJ. 1:1000
7. Uzdužni presjek MJ. 1:1000/100
8. Normalni poprečni presjek MJ. 1:50
9. Karakteristični poprečni presjeci MJ. 1:100
10. Predmjer radova
11. Aproksimativni troškovnik

Predmetna nastavnica:



izv.prof.dr.sc. Deana Breški, dipl.ing.grad.

## 2. TEHNIČKI OPIS

### 2.1. Opći podaci

Ovim idejnim projektom obuhvaćeno je projektiranje lokalne cesta na dionici od točke A (257 m.n.m ) do točke B (280,26 m.n.m ) u dužini od 366,37 m koja se proteže u smjeru zapad-istok na brdovitom terenu.

Za izradu idejnog rješenja korištena je katastarsko-topografska podloga u mjerilu 1:1000, prilog iz programa kolegija Ceste. Situacija je priložena u mjerilu 1:1000.

### 2.2. Tehnički elementi izgradnje

Opis trase: Početak prometnice je u točki A(257 m.n.m ) na stacionaži 0+000,00, a završava u točki B (280,658 m.n.m ) na stacionaži 0+366,77. Na prostorno vođenje prometnice utječu topografske karakteristike terena. Prometnica se nalazi na brdovitom krškom terenu. Temeljem «Pravilnika o osnovnim uvjetima kojima javne ceste izvan naselja i njihovi elementi moraju udovoljavati sa stajališta sigurnosti prometa», definirani su projektni elementi trase i elementi poprečnog profila. U tablici 1.2, koja je sastavni dio Pravilnika, dani su elementi za definiciju kategorije prometnice.

Tabl. 1.2

| Kategorija ceste | Društ. gospod. značenje (1.1.1.) | Vrsta prometa (1.1.2.)        | Veličina prometa (1.1.3.) | Zadaća povezivanja (1.1.4.)      | Srednja duljina putovanja (km) |
|------------------|----------------------------------|-------------------------------|---------------------------|----------------------------------|--------------------------------|
| AC               | Državna                          | Prom. mot. vozila             | >14000                    | Međudržavno i državno            | >100                           |
| 1. kat.          | Državna                          | Prom. mot. vozila             | >12000                    | Međudržavno i državno-regionalno | 50-100                         |
| 2. kat.          | Državna                          | Prom. mot. v. mješoviti prom. | 7000-12000                | Državno i županijsko             | 20-50                          |
| 3. kat.          | Državna; županijska              | Mješoviti promet              | 3000-7000                 | Meduopćinsko                     | 5-50                           |
| 4. kat.          | Županijska; lokalna              | Mješoviti promet              | 1000-3000                 | Općinsko                         | 5-20                           |
| 5. kat.          | Lokalna                          | Mješoviti promet              | <1000                     | Općinsko-lokalno                 | <5                             |

Predmetna cesta je lokalnog značaja s PGDP-om od 950 voz/dan što je svrstava u 5. kategoriju.

Prema tablici 1.3.1 iz Pravilnika, ceste 5. kategorije projektiraju se za projektne brzine 40-60 km/h ovisno o terenskim ograničenjima.

Tabl. 1.3.1. Projektne brzine i najveći nagibi nivelete

| PROMETNO -TEHNIČKO<br>RAZVRSTAVANJE |                  | PROJEKTNNA BRZINA $V_p$ (km/h) / NAGIB $s_{max}$ (%) |          |          |         |         |         |         |                         |
|-------------------------------------|------------------|--|----------|----------|---------|---------|---------|---------|-------------------------|
| KAT.                                | Razina<br>usluge | 120  | 100      | 90       | 80      | 70      | 60      | 50      | 40                      |
|                                     |                  | a.   | b.       | c.       | d.      | e.      | f.      | g.      | h.                      |
| AC                                  | C/D              | $\geq 120/4^*$                                       | 100/5*   | 90/5.5** | 80/6*** |         |         |         |                         |
| 1. kat.                             | D                |  | 100/5.5° | 90/5.5*  | 80/6**  | 70/7*** |         |         |                         |
| 2. kat.                             | D                |  | 100/5.5° | 90/5.5*  | 80/6*   | 70/7**  | 60/8*** |         |                         |
| 3. kat.                             | E                |  |          |          | 80/7*   | 70/7*   | 60/8**  | 50/9*** |                         |
| 4. kat.                             | E                |  |          |          |         | 70/8°   | 60/9*   | 50/10** | 40/11***                |
| 5. kat.                             | E                |  |          |          |         |         | 60/10°  | 50/11*  | 40/12**<br>40(30)/12*** |

OZNAKE: ° BEZ OGRANIČENJA BO  
 \* UMJERENA OGRANIČENJA UO  
 \*\* ZNATNA OGRANIČENJA ZO  
 \*\*\* VELIKA OGRANIČENJA VO

Vrijednost u zagradi primjenjuje se iznimno

Za predmetnu prometnicu, obzirom da se radi o brdovitom terenu sa znatnim ograničenjima, prema navedenoj tablici, projektna brzina je 40 km/h i max. uzdužni nagib je 12%.

Iz odabrane projektne brzine proizlaze i projektni elementi horizontalne i vertikalne geometrije trase:

- minimalni radijus horizontalne krivine  $R=45$  m
- minimalna duljina klotoidne prelazne krivine  $L=30$  m
- maksimalni uzdužni nagib  $i=12$  %
- minimalni polumjer konkavnog zaobljenja nivelete (za 0%)  $R=200$  m
- minimalni polumjer konveksnog zaobljenja nivelete (za 0%)  $R=300$  m .

### 2.3. Tlocrtni elementi trase

Trasa ceste ima duljinu od 366,77 m, sastoji se od četiri pravca i tri krivine. Prva krivina ima radijus  $R=130$  m i duljinu prijelazne krivine  $L=40$  m, druga ima radijus  $R=45$  m i duljinu prijelazne krivine  $L=30$  m, treća ima radijus  $R=60$  m i duljinu prijelazne krivine  $L=40$  m. Duljina prvog pravca je 24,09 m, duljina drugog pravca je 12,25 m, duljina trećeg pravca je 7,43 m, a duljina četvrtog pravca je 13,53 m. Krivine su konstruirane pomoću prijelazne krivine oblika klotoide i kružnog luka. Također, u krivinama su izvršena proširenja kružnog luka za promet teretnih vozila s priključkom, a proširenja iznose: za prvu krivinu: 0,646 m, za drugu krivinu: 1,86 m, za treću krivinu: 1,40 m.

### 2.4. Vertikalni elementi trase

Maksimalni nagib nivelete je 12%, a minimalni radijus krivine 300 m. U programu se tok sastoji od dva pravca i jedne krivine. Nagib prvog pravca je 7,33% , a drugog 5,71%. Tangenta krivine je dužine 42,84 m , a radijus konveksne krivine 2650 m.

### 2.5. Elementi poprečnog profila

Planirana prometnica predviđena je za dvosmjerni promet s po jednim voznim trakom za svaki smjer. Širina voznog traka poprečnog presjeka iznosi 2,75 m, širina rubnog traka 0,20 m. U nasipu se izvodi bankina širine 1,0 m i nagiba 4%, a u usjeku berma širine 0,5 m, nagiba 4%. U usjecima se izvode i rigoli za odvodnju vode širine 0,65 m i drenaža koja je postavljena u glinenu posteljicu. Cesta se u većem dijelu nalazi u nasipu. Poprečni nagib ceste u pravcu iznosi 2.5%, a u krivinama je u ovisnosti od polumjera kružnog luka i usvojene računске brzine,  $V_r = 40$  km/h. Poprečni nagib prve krivine je  $q_1=3,50\%$ , druge krivine  $q_2=7,0\%$ , a treće krivine  $q_3= 5,80\%$ .

Nagibi usjeka su 2:1, dok su nagibi nasipa 1:1.5.

## **2.6. Kolnička konstrukcija**

Projektom je predviđena slijedeća kolnička konstrukcija:

|                                |       |
|--------------------------------|-------|
| -asfalt-beton habajući sloj    | 4 cm  |
| -bitumenizirani nosivi sloj    | 6 cm  |
| -mehanički zbijeni nosivi sloj | 30 cm |

## **2.7. Odvodnja**

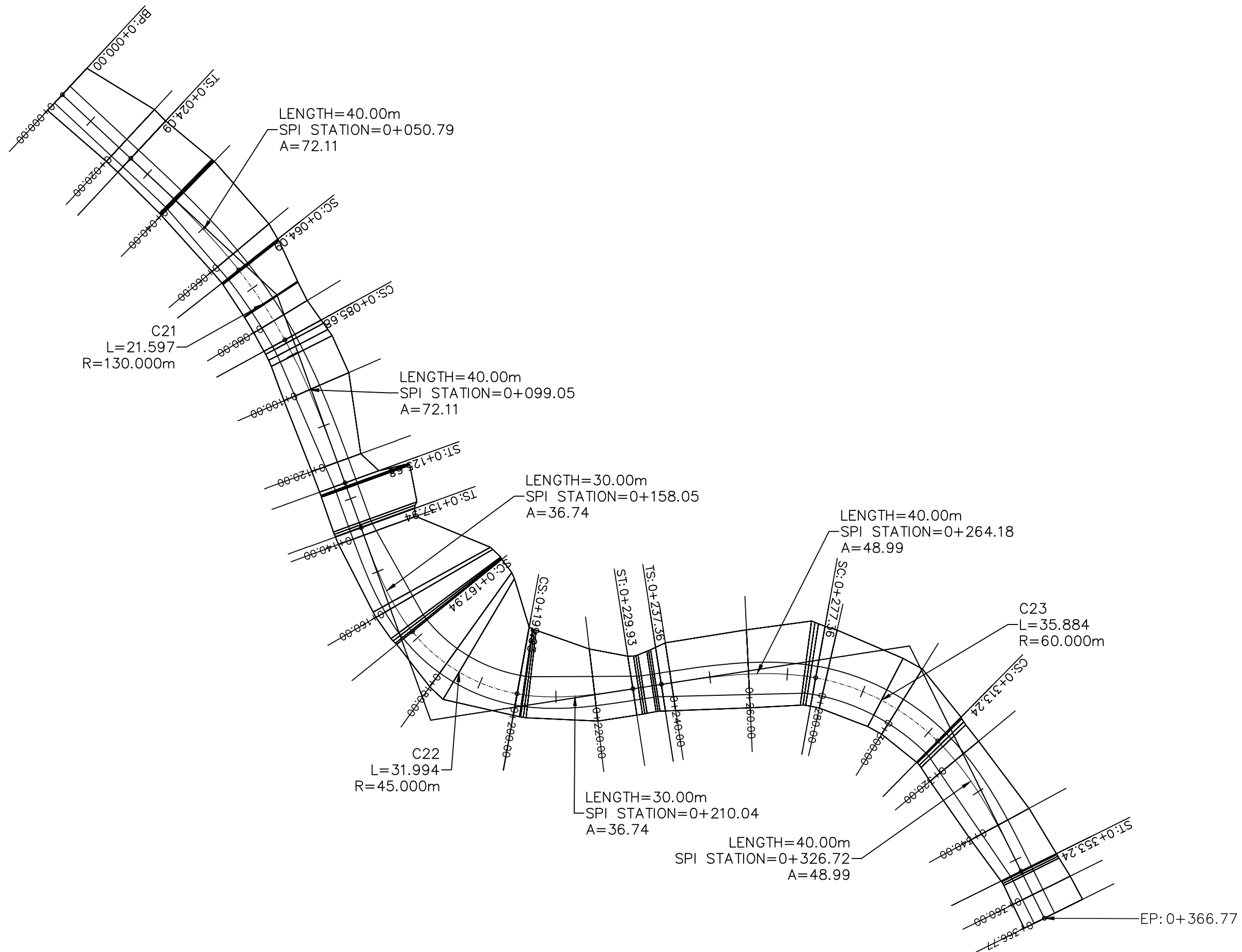
Odvodnja prometnice predviđa izvedbu otvorenog sustava odvodnje kojim se vrši prihvat voda s kolnika i pribrežnih voda izvedbom betonskih rigola. Uzdužnim i poprečnim nagibima kolnika vode se usmjeravaju u betonske rigole u koje se vrši i prihvat pribrežnih voda u usjecima i ispuštaju u teren. Dio kolničkih voda preljeva se preko bankine niz pokose nasipa.

## **2.8. Oprema ceste**

Idejnim rješenjem predviđena je horizontalna signalizacija koja se sastoji od jedne pune razdjelne crte širine 10 cm koja se postavlja u osi prometnice i punih rubnih crta širine 10 cm koje se postavljaju na svaki od rubnih trakova. Na nasip se postavlja jednostrana zaštitna čelična ograda.

### **3. GRAFIČKI PRILOZI**

#### **3.1. Situacija M 1:1000**



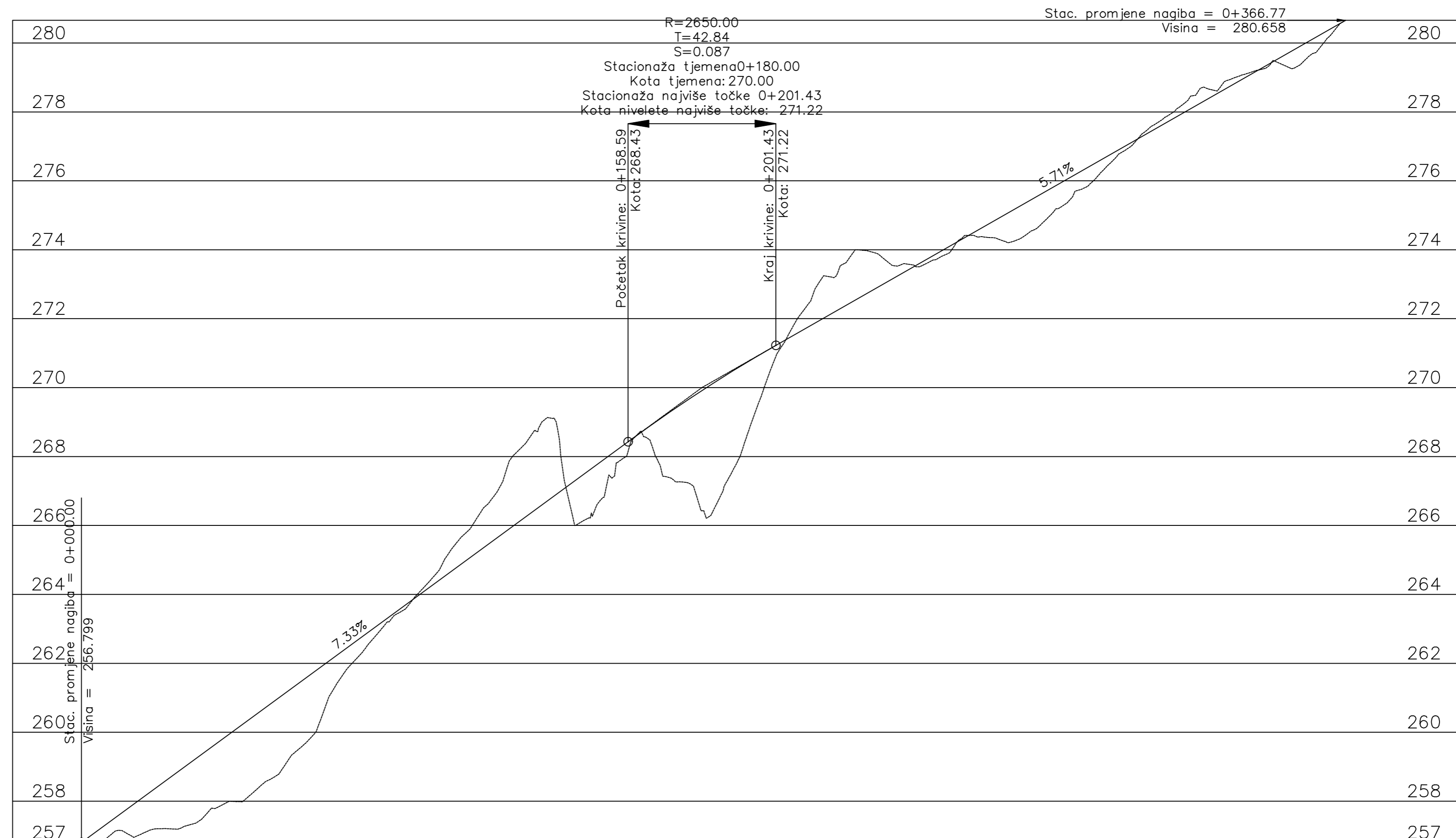
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ARHITEKTURE I GEODEZIJE  
21000 SPLIT, MATICE HRVATSKE 15

|                    |                       |
|--------------------|-----------------------|
| <b>Završni rad</b> |                       |
| TEMA               | Idejni projekt ceste  |
| STUDENTI           | Radić Tomislav        |
| SADRŽAJ            | Građevinska situacija |
| DATUM              | lipanj 2019.          |
| MJERILO            | 1:1000                |
| BROJ PRILOGA       | 1                     |

### **3.2. Uzdužni presjek 1:1000/100**



# os ceste PROFILE

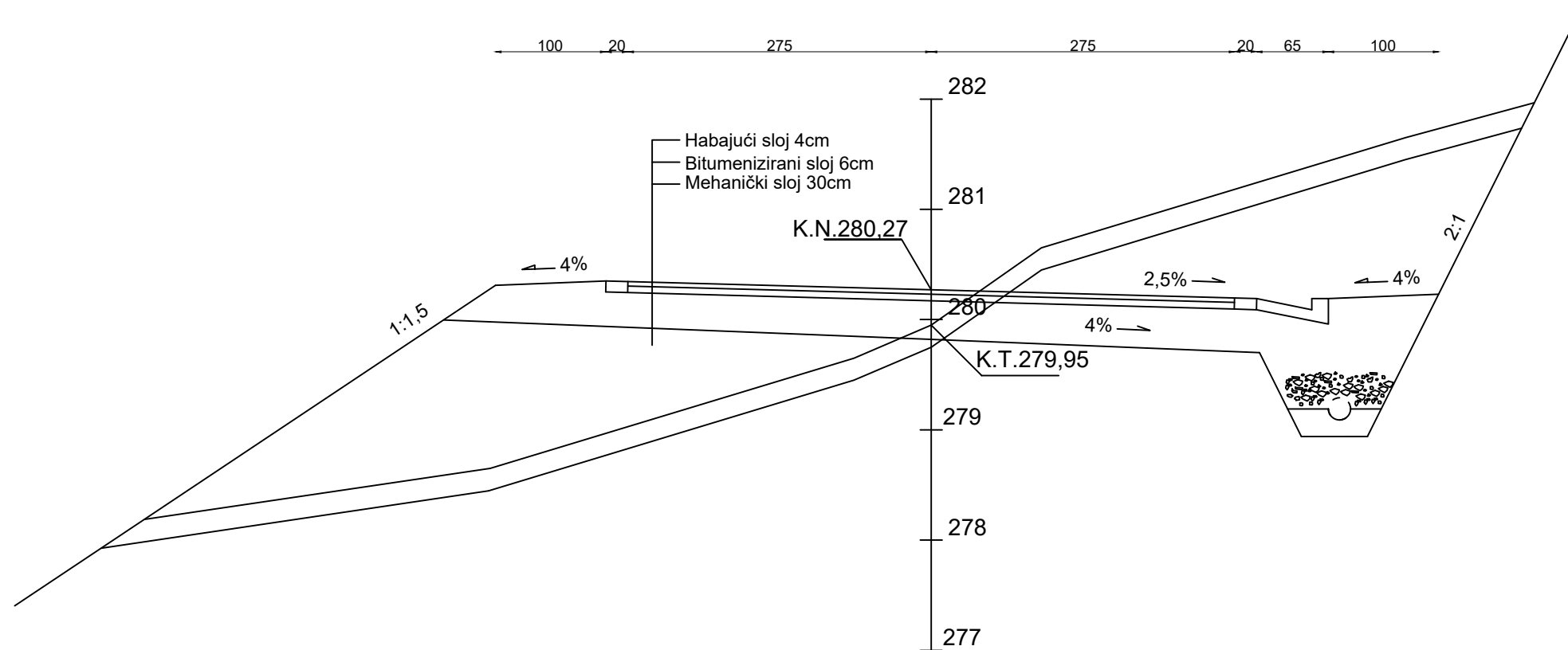



|               |  |
|---------------|--|
| Stacionaža    | 0+026.00<br>0+010.00<br>0+000.00<br>0+010.00<br>0+020.00<br>0+030.00<br>0+040.00<br>0+050.00<br>0+060.00<br>0+070.00<br>0+080.00<br>0+090.00<br>0+100.00<br>0+110.00<br>0+120.00<br>0+130.00<br>0+140.00<br>0+150.00<br>0+160.00<br>0+170.00<br>0+180.00<br>0+190.00<br>0+200.00<br>0+210.00<br>0+220.00<br>0+230.00<br>0+240.00<br>0+250.00<br>0+260.00<br>0+270.00<br>0+280.00<br>0+290.00<br>0+300.00<br>0+310.00<br>0+320.00<br>0+330.00<br>0+340.00<br>0+350.00<br>0+360.00<br>0+370.00<br>0+380.00<br>0+390.00<br>0+400.00   |
| Kote nivelete | 256.80<br>257.53<br>258.27<br>259.00<br>259.73<br>260.47<br>261.20<br>261.93<br>262.67<br>263.40<br>264.13<br>264.87<br>265.60<br>266.33<br>267.07<br>267.80<br>268.53<br>269.24<br>269.91<br>270.55<br>271.14<br>271.71<br>272.28<br>272.85<br>273.42<br>273.99<br>274.57<br>275.14<br>275.71<br>276.28<br>276.85<br>277.42<br>277.99<br>278.56<br>279.13<br>279.70<br>280.27<br>280.84<br>281.41<br>281.98<br>282.55<br>283.12<br>283.69<br>284.26<br>284.83<br>285.40<br>285.97<br>286.54<br>287.11<br>287.68<br>288.25<br>288.82<br>289.39<br>289.96<br>290.53<br>291.10<br>291.67<br>292.24<br>292.81<br>293.38<br>293.95<br>294.52<br>295.09<br>295.66<br>296.23<br>296.80<br>297.37<br>297.94<br>298.51<br>299.08<br>299.65<br>300.22<br>300.79<br>301.36<br>301.93<br>302.50<br>303.07<br>303.64<br>304.21<br>304.78<br>305.35<br>305.92<br>306.49<br>307.06<br>307.63<br>308.20<br>308.77<br>309.34<br>309.91<br>310.48<br>311.05<br>311.62<br>312.19<br>312.76<br>313.33<br>313.90<br>314.47<br>315.04<br>315.61<br>316.18<br>316.75<br>317.32<br>317.89<br>318.46<br>319.03<br>319.60<br>320.17<br>320.74<br>321.31<br>321.88<br>322.45<br>323.02<br>323.59<br>324.16<br>324.73<br>325.30<br>325.87<br>326.44<br>327.01<br>327.58<br>328.15<br>328.72<br>329.29<br>329.86<br>330.43<br>331.00<br>331.57<br>332.14<br>332.71<br>333.28<br>333.85<br>334.42<br>334.99<br>335.56<br>336.13<br>336.70<br>337.27<br>337.84<br>338.41<br>338.98<br>339.55<br>340.12<br>340.69<br>341.26<br>341.83<br>342.40<br>342.97<br>343.54<br>344.11<br>344.68<br>345.25<br>345.82<br>346.39<br>346.96<br>347.53<br>348.10<br>348.67<br>349.24<br>349.81<br>350.38<br>350.95<br>351.52<br>352.09<br>352.66<br>353.23<br>353.80<br>354.37<br>354.94<br>355.51<br>356.08<br>356.65<br>357.22<br>357.79<br>358.36<br>358.93<br>359.50<br>360.07<br>360.64<br>361.21<br>361.78<br>362.35<br>362.92<br>363.49<br>364.06<br>364.63<br>365.20<br>365.77<br>366.34<br>366.91<br>367.48<br>368.05<br>368.62<br>369.19<br>369.76<br>370.33<br>370.90<br>371.47<br>372.04<br>372.61<br>373.18<br>373.75<br>374.32<br>374.89<br>375.46<br>376.03<br>376.60<br>377.17<br>377.74<br>378.31<br>378.88<br>379.45<br>380.02<br>380.59<br>381.16<br>381.73<br>382.30<br>382.87<br>383.44<br>384.01<br>384.58<br>385.15<br>385.72<br>386.29<br>386.86<br>387.43<br>388.00<br>388.57<br>389.14<br>389.71<br>390.28<br>390.85<br>391.42<br>391.99<br>392.56<br>393.13<br>393.70<br>394.27<br>394.84<br>395.41<br>395.98<br>396.55<br>397.12<br>397.69<br>398.26<br>398.83<br>399.40<br>399.97<br>400.54<br>401.11<br>401.68<br>402.25<br>402.82<br>403.39<br>403.96<br>404.53<br>405.10<br>405.67<br>406.24<br>406.81<br>407.38<br>407.95<br>408.52<br>409.09<br>409.66<br>410.23<br>410.80<br>411.37<br>411.94<br>412.51<br>413.08<br>413.65<br>414.22<br>414.79<br>415.36<br>415.93<br>416.50<br>417.07<br>417.64<br>418.21<br>418.78<br>419.35<br>419.92<br>420.49<br>421.06<br>421.63<br>422.20<br>422.77<br>423.34<br>423.91<br>424.48<br>425.05<br>425.62<br>426.19<br>426.76<br>427.33<br>427.90<br>428.47<br>429.04<br>429.61<br>430.18<br>430.75<br>431.32<br>431.89<br>432.46<br>433.03<br>433.60<br>434.17<br>434.74<br>435.31<br>435.88<br>436.45<br>437.02<br>437.59<br>438.16<br>438.73<br>439.30<br>439.87<br>440.44<br>441.01<br>441.58<br>442.15<br>442.72<br>443.29<br>443.86<br>444.43<br>445.00<br>445.57<br>446.14<br>446.71<br>447.28<br>447.85<br>448.42<br>448.99<br>449.56<br>450.13<br>450.70<br>451.27<br>451.84<br>452.41<br>452.98<br>453.55<br>454.12<br>454.69<br>455.26<br>455.83<br>456.40<br>456.97<br>457.54<br>458.11<br>458.68<br>459.25<br>459.82<br>460.39<br>460.96<br>461.53<br>462.10<br>462.67<br>463.24<br>463.81<br>464.38<br>464.95<br>465.52<br>466.09<br>466.66<br>467.23<br>467.80<br>468.37<br>468.94<br>469.51<br>470.08<br>470.65<br>471.22<br>471.79<br>472.36<br>472.93<br>473.50<br>474.07<br>474.64<br>475.21<br>475.78<br>476.35<br>476.92<br>477.49<br>478.06<br>478.63<br>479.20<br>479.77<br>480.34<br>480.91<br>481.48<br>482.05<br>482.62<br>483.19<br>483.76<br>484.33<br>484.90<br>485.47<br>486.04<br>486.61<br>487.18<br>487.75<br>488.32<br>488.89<br>489.46<br>490.03<br>490.60<br>491.17<br>491.74<br>492.31<br>492.88<br>493.45<br>494.02<br>494.59<br>495.16<br>495.73<br>496.30<br>496.87<br>497.44<br>498.01<br>498.58<br>499.15<br>499.72<br>500.29<br>500.86<br>501.43<br>502.00<br>502.57<br>503.14<br>503.71<br>504.28<br>504.85<br>505.42<br>505.99<br>506.56<br>507.13<br>507.70<br>508.27<br>508.84<br>509.41<br>509.98<br>510.55<br>511.12<br>511.69<br>512.26<br>512.83<br>513.40<br>513.97<br>514.54<br>515.11<br>515.68<br>516.25<br>516.82<br>517.39<br>517.96<br>518.53<br>519.10<br>519.67<br>520.24<br>520.81<br>521.38<br>521.95<br>522.52<br>523.09<br>523.66<br>524.23<br>524.80<br>525.37<br>525.94<br>526.51<br>527.08<br>527.65<br>528.22<br>528.79<br>529.36<br>529.93<br>530.50<br>531.07<br>531.64<br>532.21<br>532.78<br>533.35<br>533.92<br>534.49<br>535.06<br>535.63<br>536.20<br>536.77<br>537.34<br>537.91<br>538.48<br>539.05<br>539.62<br>540.19<br>540.76<br>541.33<br>541.90<br>542.47<br>543.04<br>543.61<br>544.18<br>544.75<br>545.32<br>545.89<br>546.46<br>547.03<br>547.60<br>548.17<br>548.74<br>549.31<br>549.88<br>550.45<br>551.02<br>551.59<br>552.16<br>552.73<br>553.30<br>553.87<br>554.44<br>555.01<br>555.58<br>556.15<br>556.72<br>557.29<br>557.86<br>558.43<br>559.00<br>559.57<br>560.14<br>560.71<br>561.28<br>561.85<br>562.42<br>562.99<br>563.56<br>564.13<br>564.70<br>565.27<br>565.84<br>566.41<br>566.98<br>567.55<br>568.12<br>568.69<br>569.26<br>569.83<br>570.40<br>570.97<br>571.54<br>572.11<br>572.68<br>573.25<br>573.82<br>574.39<br>574.96<br>575.53<br>576.10<br>576.67<br>577.24<br>577.81<br>578.38<br>578.95<br>579.52<br>580.09<br>580.66<br>581.23<br>581.80<br>582.37<br>582.94<br>583.51<br>584.08<br>584.65<br>585.22<br>585.79<br>586.36<br>586.93<br>587.50<br>588.07<br>588.64<br>589.21<br>589.78<br>590.35<br>590.92<br>591.49<br>592.06<br>592.63<br>593.20<br>593.77<br>594.34<br>594.91<br>595.48<br>596.05<br>596.62<br>597.19<br>597.76<br>598.33<br>598.90<br>599.47<br>600.04<br>600.61<br>601.18<br>601.75<br>602.32<br>602.89<br>603.46<br>604.03<br>604.60<br>605.17<br>605.74<br>606.31<br>606.88<br>607.45<br>608.02<br>608.59<br>609.16<br>609.73<br>610.30<br>610.87<br>611.44<br>612.01<br>612.58<br>613.15<br>613.72<br>614.29<br>614.86<br>615.43<br>616.00<br>616.57<br>617.14<br>617.71<br>618.28<br>618.85<br>619.42<br>620.00<br>620.57<br>621.14<br>621.71<br>622.28<br>622.85<br>623.42<br>623.99<br>624.56<br>625.13<br>625.70<br>626.27<br>626.84<br>627.41<br>627.98<br>628.55<br>629.12<br>629.69<br>630.26<br>630.83<br>631.40<br>631.97<br>632.54<br>633.11<br>633.68<br>634.25<br>634.82<br>635.39<br>635.96<br>636.53<br>637.10<br>637.67<br>638.24<br>638.81<br>639.38<br>639.95<br>640.52<br>641.09<br>641.66<br>642.23<br>642.80<br>643.37<br>643.94<br>644.51<br>645.08<br>645.65<br>646.22<br>646.79<br>647.36<br>647.93<br>648.50<br>649.07<br>649.64<br>650.21<br>650.78<br>651.35<br>651.92<br>652.49<br>653.06<br>653.63<br>654.20<br>654.77<br>655.34<br>655.91<br>656.48<br>657.05<br>657.62<br>658.19<br>658.76<br>659.33<br>659.90<br>660.47<br>661.04<br>661.61<br>662.18<br>662.75<br>663.32<br>663.89<br>664.46<br>665.03<br>665.60<br>666.17<br>666.74<br>667.31<br>667.88<br>668.45<br>669.02<br>669.59<br>670.16<br>670.73<br>671.30<br>671.87<br>672.44<br>673.01<br>673.58<br>674.15<br>674.72<br>675.29<br>675.86<br>676.43<br>677.00<br>677.57<br>678.14<br>678.71<br>679.28<br>679.85<br>680.42<br>680.99<br>681.56<br>682.13<br>682.70<br>683.27<br>683.84<br>684.41<br>684.98<br>685.55<br>686.12<br>686.69<br>687.26<br>687.83<br>688.40<br>688.97<br>689.54<br>690.11<br>690.68<br>691.25<br>691.82<br>692.39<br>692.96<br>693.53<br>694.10<br>694.67<br>695.24<br>695.81<br>696.38<br>696.95<br>697.52<br>698.09<br>698.66<br>699.23<br>699.80<br>700.37<br>700.94<br>701.51<br>702.08<br>702.65<br>703.22<br>703.79<br>704.36<br>704.93<br>705.50<br>706.07<br>706.64<br>707.21<br>707.78<br>708.35<br>708.92<br>709.49<br>710.06<br>710.63<br>711.20<br>711.77<br>712.34<br>712.91<br>713.48<br>714.05<br>714.62<br>715.19<br>715.76<br>716.33<br>716.90<br>717.47<br>718.04<br>718.61<br>719.18<br>719.75<br>720.32<br>720.89<br>721.46<br>722.03<br>722.60<br>723.17<br>723.74<br>724.31<br>724.88<br>725.45<br>726.02<br>726.59<br>727.16<br>727.73<br>728.30<br>728.87<br>729.44<br>730.01<br>730.58<br>731.15<br>731.72<br>732.29<br>732.86<br>733.43<br>734.00<br>734.57<br>735.14<br>735.71<br>736.28<br>736.85<br>737.42<br>737.99<br>738.56<br>739.13<br>739.70<br>740.27<br>740.84<br>741.41<br>741.98<br>742.55<br>743.12<br>743.69<br>744.26<br>744.83<br>745.40<br>745.97<br>746.54<br>747.11<br>747.68<br>748.25<br>748.82<br>749.39<br>749.96<br>750.53<br>751.10<br>751.67<br>752.24<br>752.81<br>753.38<br>753.95<br>754.52<br>755.09<br>755.66<br>756.23<br>756.80<br>757.37<br>757.94<br>758.51<br>759.08<br>759.65<br>760.22<br>760.79<br>761.36<br>761.93<br>762.50<br>763.07<br>763.64<br>764.21<br>764.78<br>765.35<br>765.92<br>766.49<br>767.06<br>767.63<br>768.20<br>768.77<br>769.34<br>769.91<br>770.48<br>771.05<br>771.62<br>772.19<br>772.76<br>773.33<br>773.90<br>774.47<br>775.04<br>775.61<br>776.18<br>776.75<br>777.32<br>777.89<br>778.46<br>779.03<br>779.60<br>780.17<br>780.74<br>781.31<br>781.88<br>782.45<br>783.02<br>783.59<br>784.16<br>784.73<br>785.30<br>785.87<br>786.44<br>787.01<br>787.58<br>788.15<br>788.72<br>789.29<br>789.86<br>790.43<br>791.00<br>791.57<br>792.14<br>792.71<br>793.28<br>793.85<br>794.42<br>794.99<br>795.56<br>796.13<br>796.70<br>797.27<br>797.84<br>798.41<br>798.98<br>799.55<br>800.12<br>800.69<br>801.26<br>801.83<br>802.40<br>802.97<br>803.54<br>804.11<br>804.68<br>805.25<br>805.82<br>806.39<br>806.96<br>807.53<br>808.10<br>808.67<br>809.24<br>809.81<br>810.38<br>810.95<br>811.52<br>812.09<br>812.66<br>813.23<br>813.80<br>814.37<br>814.94<br>815.51<br>816.08<br>816.65<br>817.22<br>817.79<br>818.36<br>818.93<br>819.50<br>820.07<br>820.64<br>821.21<br>821.78<br>822.35<br>822.92<br>823.49<br>824.06<br>824.63<br>825.20<br>825.77<br>826.34<br>826.91<br>827.48<br>828.05<br>828.62<br>829.19<br>829.76<br>830.33<br>830.90<br>831.47<br>832.04<br>832.61<br>833.18<br>833.75<br>834.32<br>834.89<br>835.46<br>836.03<br>836.60<br>837.17<br>837.74<br>838.31<br>838.88<br>839.45<br>840.02<br>840.59<br>841.16<br>841.73<br>842.30<br>842.87<br>843.44<br>844.01<br>844.58<br>845.15<br>845.72<br>846.29<br>846.86<br>847.43<br>848.00<br>848.57<br>849.14<br>849.71<br>850.28<br>850.85<br>851.42<br>851.99<br>852.56<br>853.13<br>853.70<br>854.27<br>854.84<br>855.41<br>855.98<br>856.55<br>857.12<br>857.69<br>858.26<br>858.83<br>859.40<br>859.97<br>860.54<br>861.11<br>861.68<br>862.25<br>862.82<br>863.39<br>863.96<br>864.53<br>865.10<br>865.67<br>866.24<br>866.81<br>867.38<br>867.95<br>868.52<br>869.09<br>869.66<br>870.23<br>870.80<br>871.37<br>871.94<br>872.51<br>873.08<br>873.65<br>874.22<br>874.79<br>875.36<br>875.93<br>876.50<br>877.07<br>877.64<br>878.21<br>878.78<br>879.35<br>879.92<br>880.49<br>881.06<br>881.63<br>882.20<br>882.77<br>883.34<br>883.91<br>884.48<br>885.05<br>885.62<br>886.19<br>886.76<br>887.33<br>887.90<br>888.47<br>889.04<br>889.61<br>890.18<br>890.75<br>891.32<br>891.89<br>892.46<br>893.03<br>893.60<br>894.17<br>894.74<br>895.31<br>895.88<br>896.45<br>897.02<br>897.59<br>898.16<br>898.73<br>899.30<br>899.87<br>900.44<br>901.01<br>901.58<br>902.15<br>902.72<br>903.29<br>903.86<br>904.43<br>905.00<br>905.57<br>906.14<br>906.71<br>907.28<br>907.85<br>908.42<br>908.99<br>909.56<br>910.13<br>910.70<br>911.27<br>911.84<br>912.41<br>912.98<br>913.55<br>914.12<br>914.69<br>915.26<br>915.83<br>916.40<br>916.97<br>917.54<br>918.11<br>918.68<br>919.25<br>919.82<br>920.39<br>920.96<br>921.53<br>922.10<br>922.67<br>923.24<br>923.81<br>924.38<br>924.95<br>925.52<br>926.09<br>926.66<br>927.23<br>927.80<br>928.37<br>928.94<br>929.51<br>930.08<br>930.65<br>931.22<br>931.79<br>932.36<br>932.93<br>933.50<br>934.07<br>934.64<br>935.21<br>935.78<br>936.35<br>936.92<br>937.49<br>938.06<br>938.63<br>939.20<br>939.77<br>940.34<br>940.91<br>941.48<br>942.05<br>942.62<br>943.19<br>943.76<br>944.33<br>944.90<br>945.47<br>946.04<br>946.61<br>947.18<br>947.75<br>948.32<br>948.89<br>949.46<br>950.03<br>950.60<br>951.17<br>951.74<br>952.31<br>952.88<br>953.45<br>954.02<br>954.59<br>955.16<br>955.73<br>956.30<br>956.87<br>957.44<br>958.01<br>958.58<br>959.15<br>959.72<br>960.29<br>960.86<br>961.43<br>962.00<br>962.57<br>963.14<br>963.71<br>964.28<br>964.85<br>965.42<br>965.99<br>966.56<br>967.13<br>967.70<br>968.27<br>968.84<br>969.41<br>969.98<br>970.55<br>971.12<br>971.69<br>972.26<br>972.83<br>973.40<br>973.97<br>974.54<br>975.11<br>975.68<br>976.25<br>976.82<br>977.39<br>977.96<br>978.53<br>979.10<br>979.67<br>980.24<br>980.81<br>981.38<br>981.95<br>982.52<br>983.09<br>983.66<br>984.23<br>984.80<br>985.37<br>985.94<br>986.51<br>987.08<br>987.65<br>988.22<br>988.79<br>989.36<br>989.93<br>990.50<br>991.07<br>991.64<br>992.21<br>992.78<br>993.35<br>993.92<br>994.49<br>995.06<br>995.63<br>996.20<br>996.77<br>997.34<br>997.91<br>998.48<br>999.05<br>999.62<br>1000.19<br>1000.76<br>1001.33<br>1001.90<br>1002.47<br>1003.04<br>1003.61<br>1004.18<br>1004.75<br>1005.32<br>1005.89<br>1006.46<br>1007.03<br>1007.60<br>1008.17<br>1008.74<br>1009.31<br>1009.88<br>1010.45<br>1011.02<br>1011.59<br>1012.16<br>1012.73<br>1013.30<br>1013.87<br>1014.44<br>1015.01<br>1015.58<br>1016.15<br>1016.72<br>1017.29<br>1017.86<br>1018.43<br>1019.00<br>1019.57<br>1020.14<br>1020.71<br>1021.28<br>1021.85<br>1022.42<br>1022.99<br>1023.56<br>1024.13<br>1024.70<br>1025.27<br>1025.84<br>1026.41<br>1026.98<br>1027.55<br>1028.12<br>1028.69<br>1029.26<br>1029.83<br>1030.40<br>1030.97<br>1031.54<br>1032.11<br>1032.68<br>1033.25<br>1033.82<br>1034.39<br>1034.96<br>1035.53<br>1036.10<br>1036.67<br>1037.24<br>1037.81<br>1038.38<br>1038.95<br>1039.52<br>1040.09<br>1040.66<br>1041.23<br>1041.80<br>1042.37<br>1042.94<br>1043.51<br>1044.08<br>1044.65<br>1045.22<br>1045.79<br>1046.36<br>1046.93<br>1047.50<br>1048.07<br>1048.64<br>1049.21<br>1049.78<br>1050.35<br>1050.92<br>1051.49<br>1052.06<br>1052.63<br>1053.20<br>1053.77<br>1054.34<br>1054.91<br>1055.48<br>1056.05<br>1056.62<br>1057.19<br>1057.76<br>1058.33<br>1058.90<br>1059 |

### **3.3. Normalni poprečni presjek 1:50**

# NORMALNI POPREČNI PRESJEK

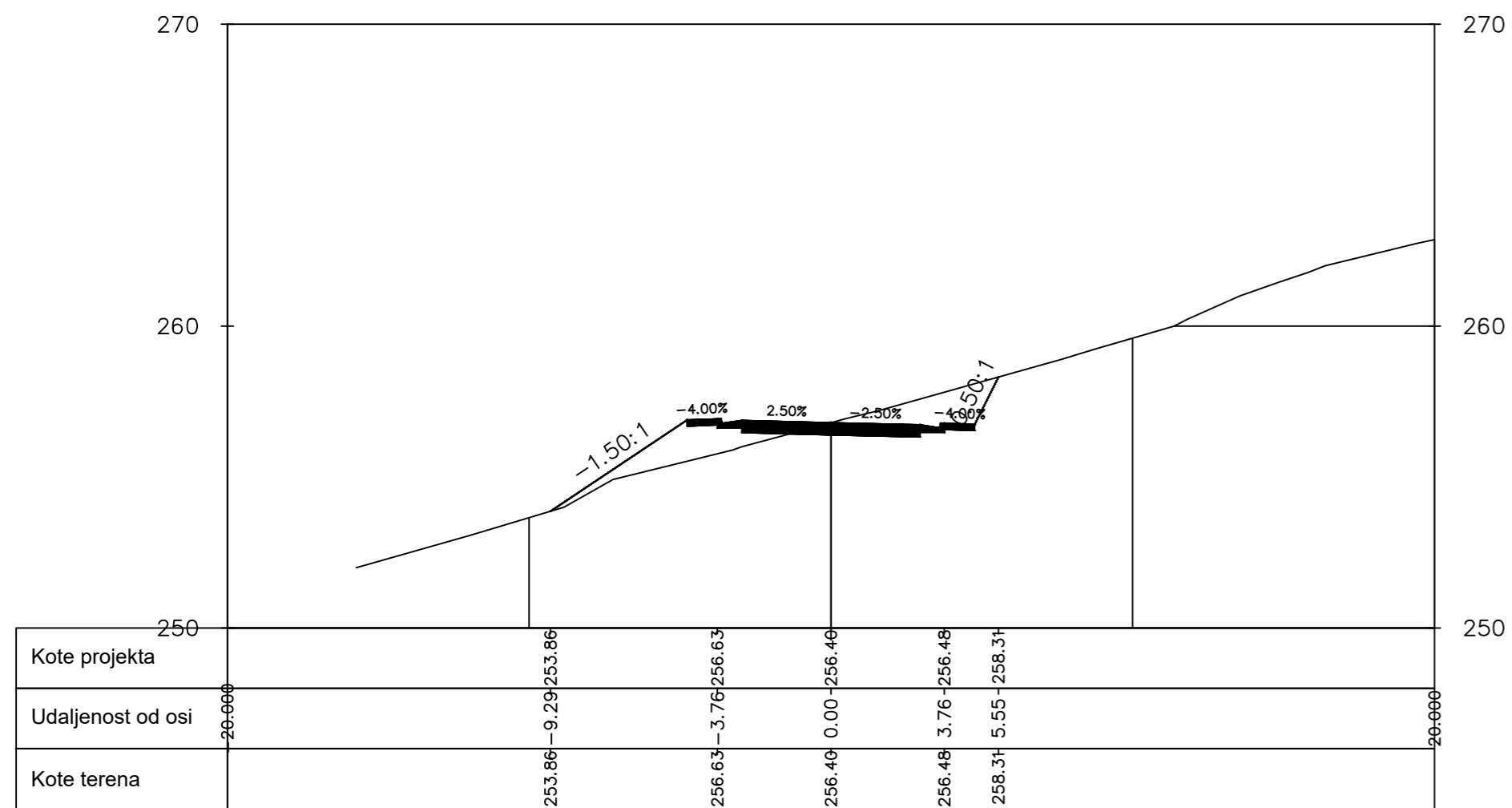
STACIONAŽA: 360  
KOTA TERENA: 279,95  
KOTA NIVELETE: 280,27



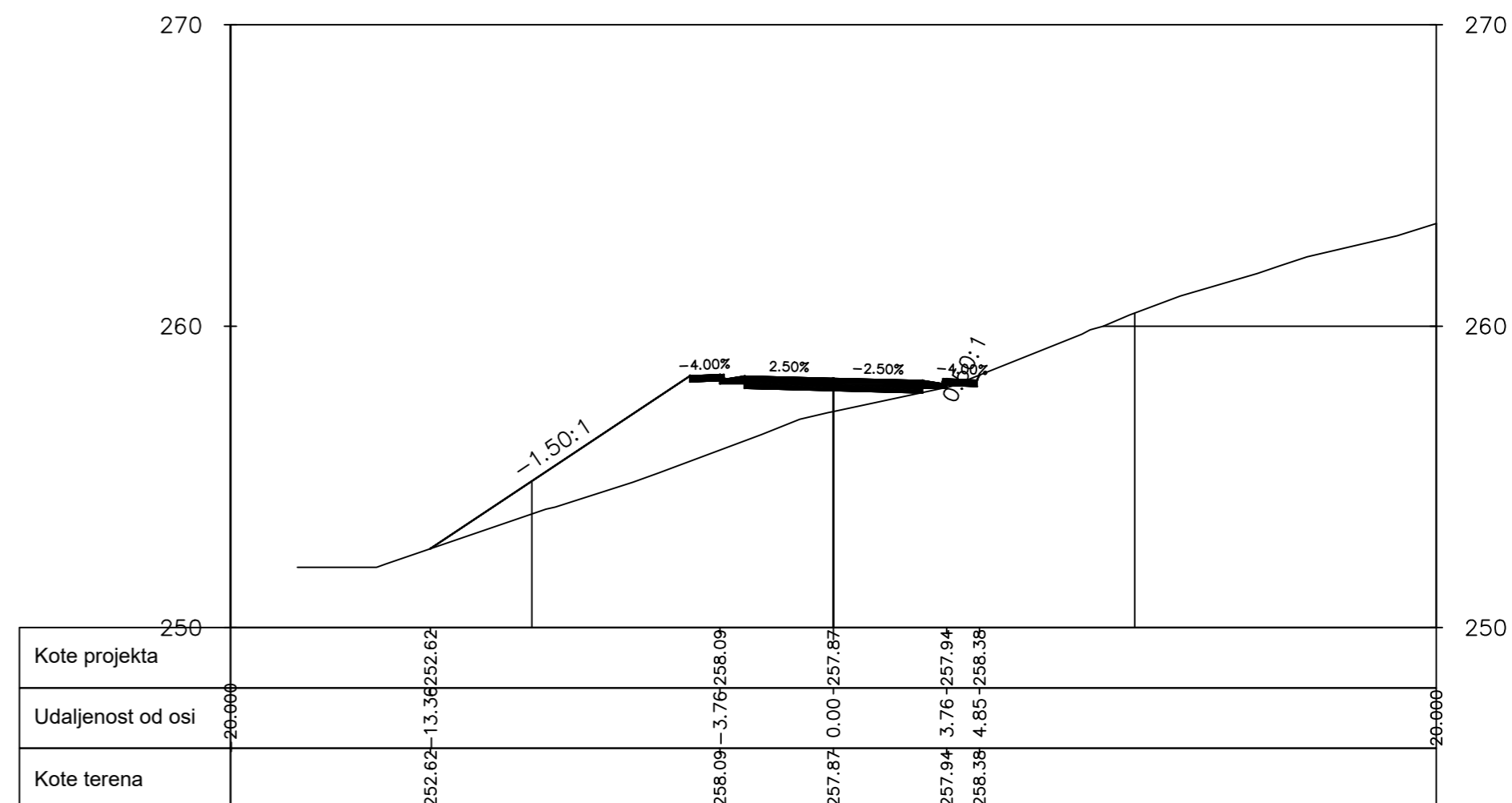
|   |                    |                                |
|---|--------------------|--------------------------------|
| <br>SVEUČILIŠTE U SPLITU<br>FAKULTET GRAĐEVINARSTVA, ARHITEKTURE<br>I GEODEZIJE<br>21000 SPLIT, MATICE HRVATSKE 15 | <b>Završni rad</b> |                                |
|   | TEMA               | Idejni projekt ceste           |
|   | STUDENTI           | Radić Tomislav                 |
|   | SADRŽAJ            | Normalni poprečni presjek      |
| DATUM   | lipanj 2019.       | MJERILO 1:50<br>BROJ PRILOGA 3 |

### **3.4. Karakteristični poprečni presjeci M 1:200**

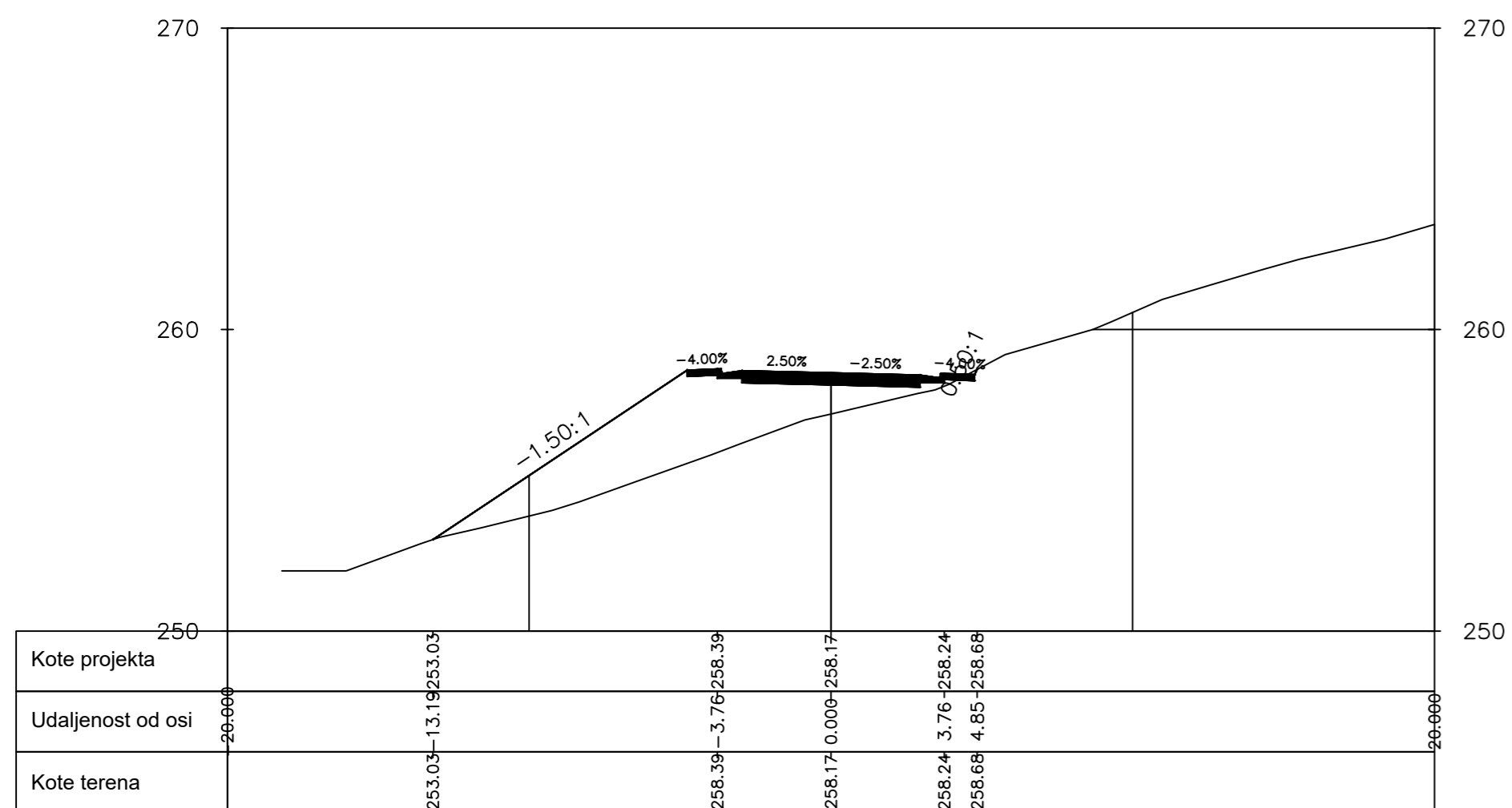
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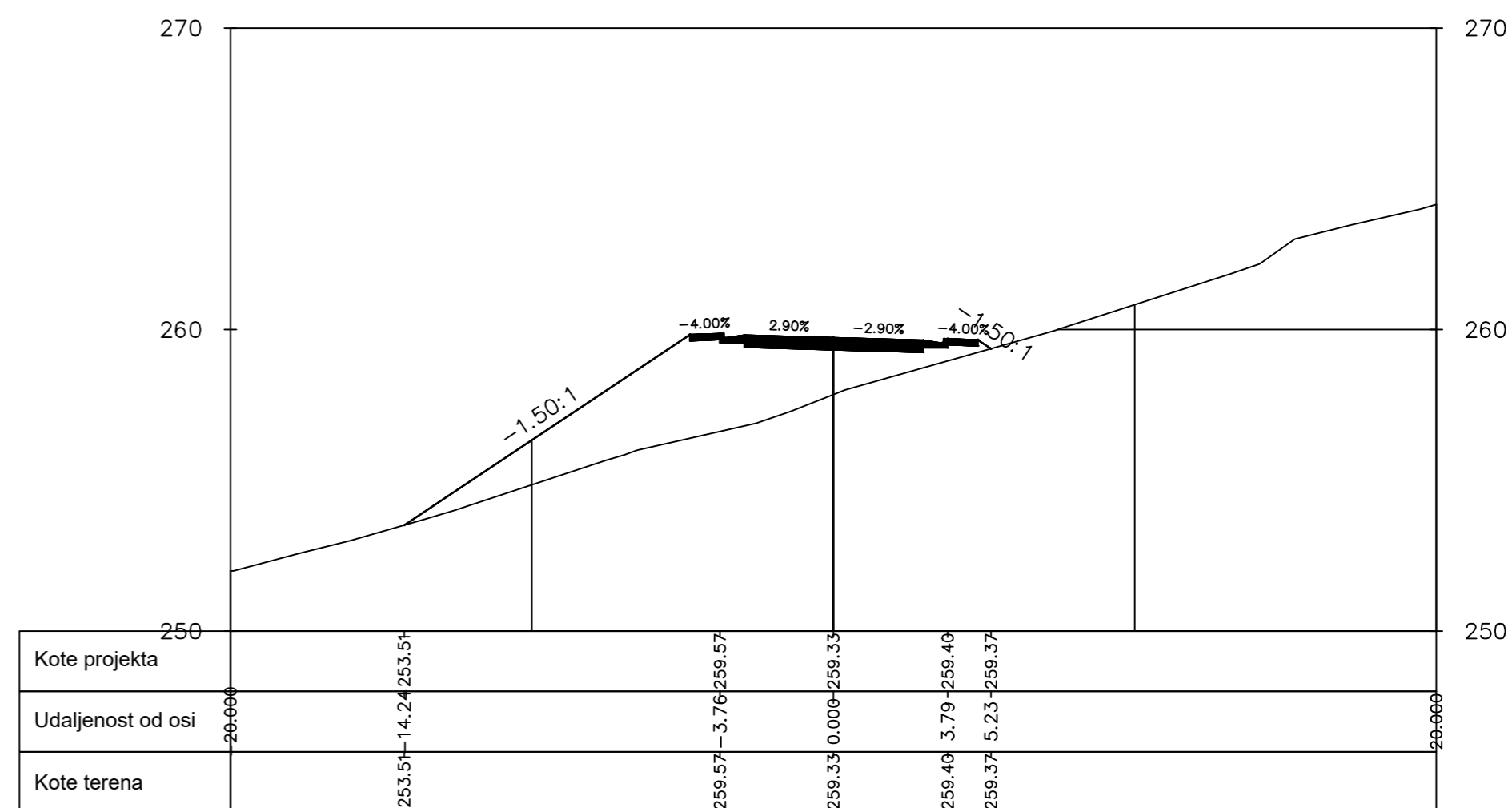
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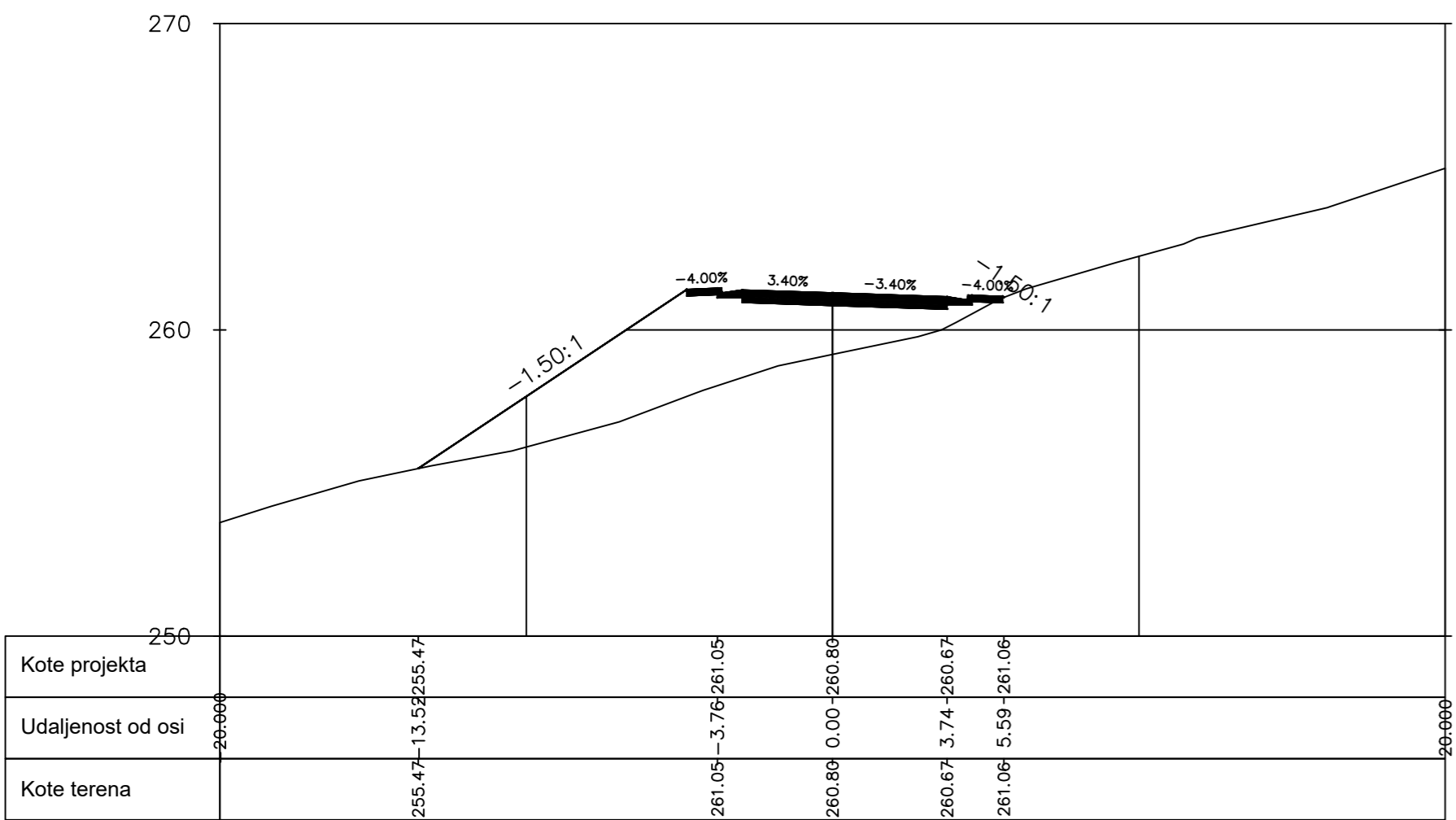
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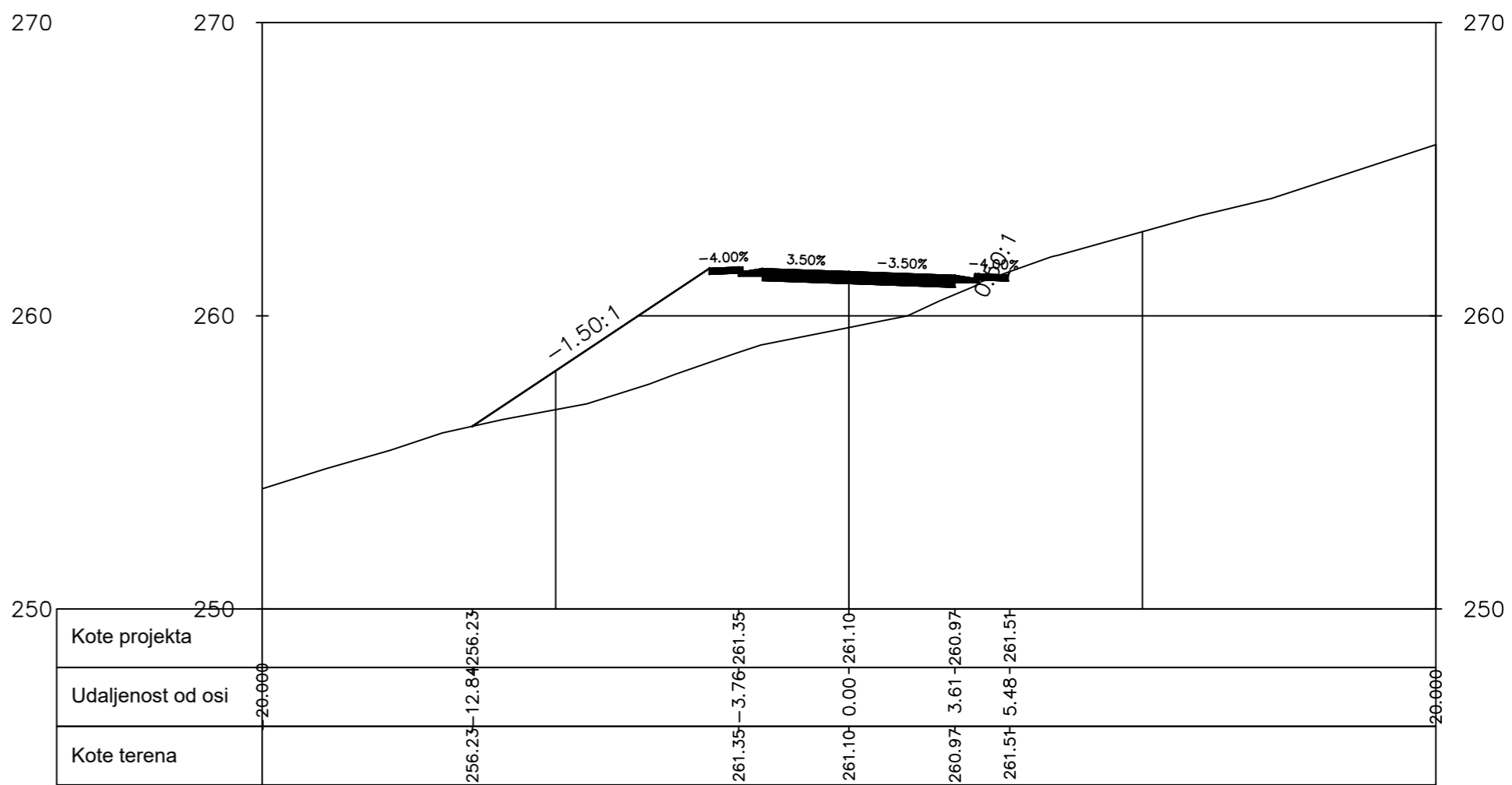
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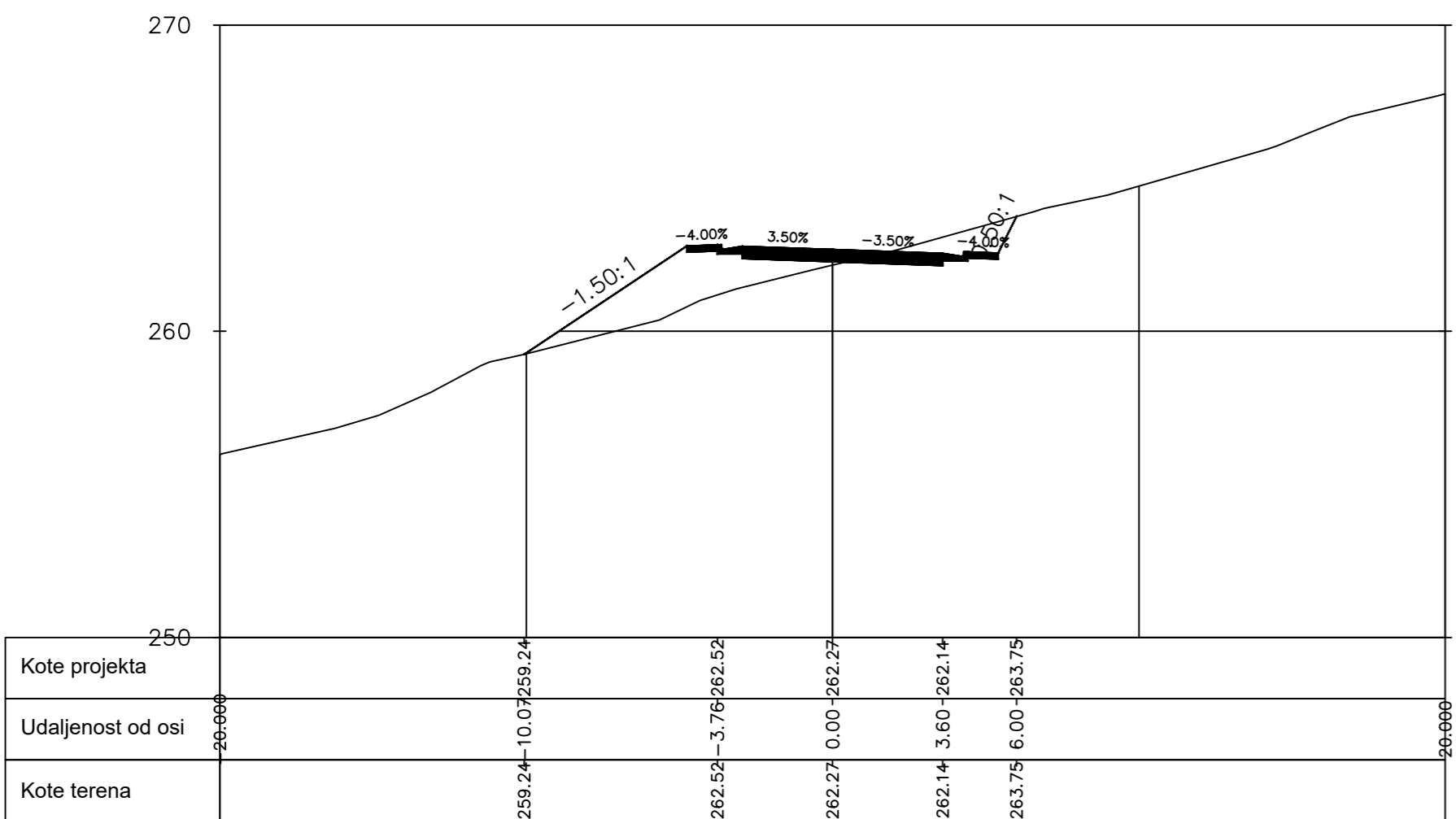
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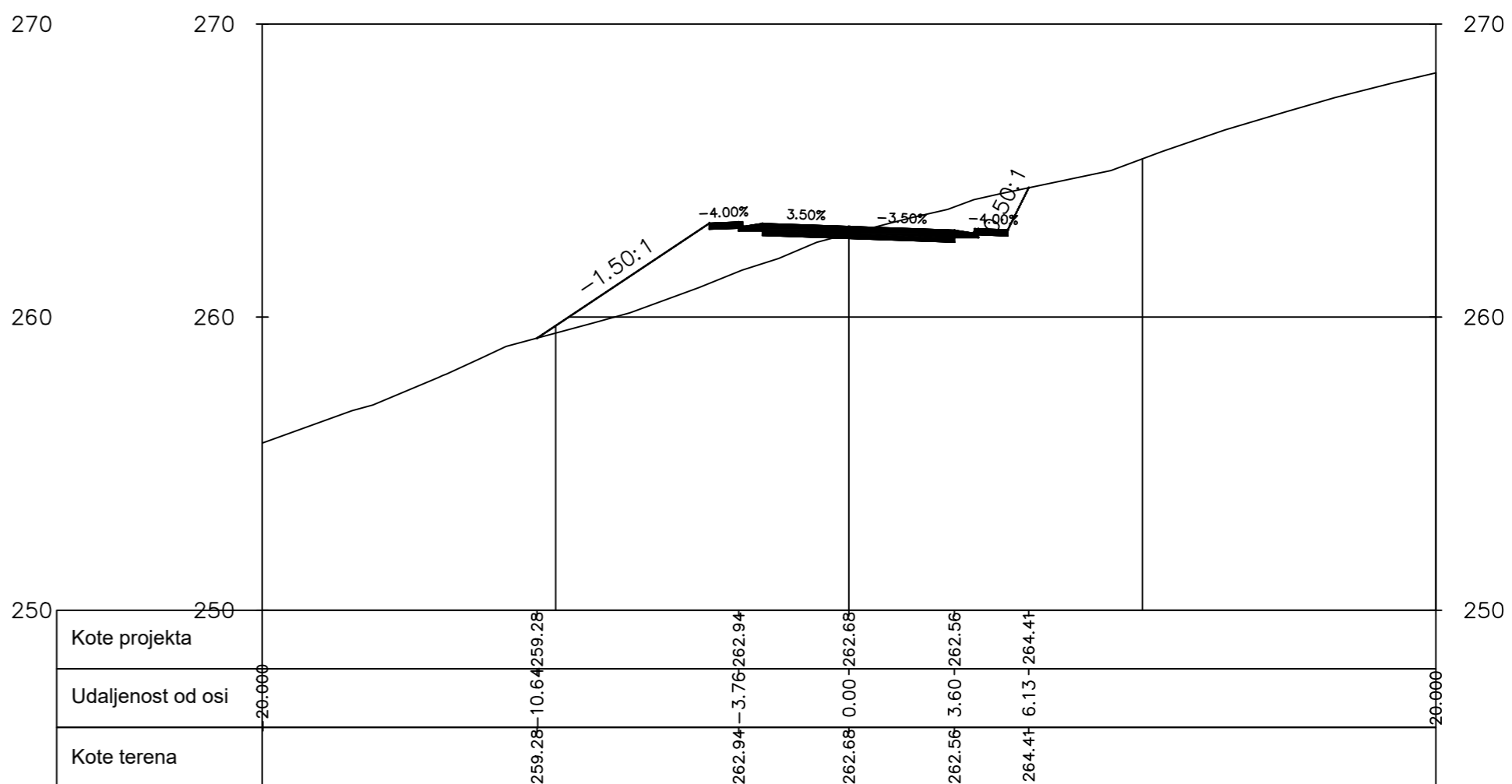
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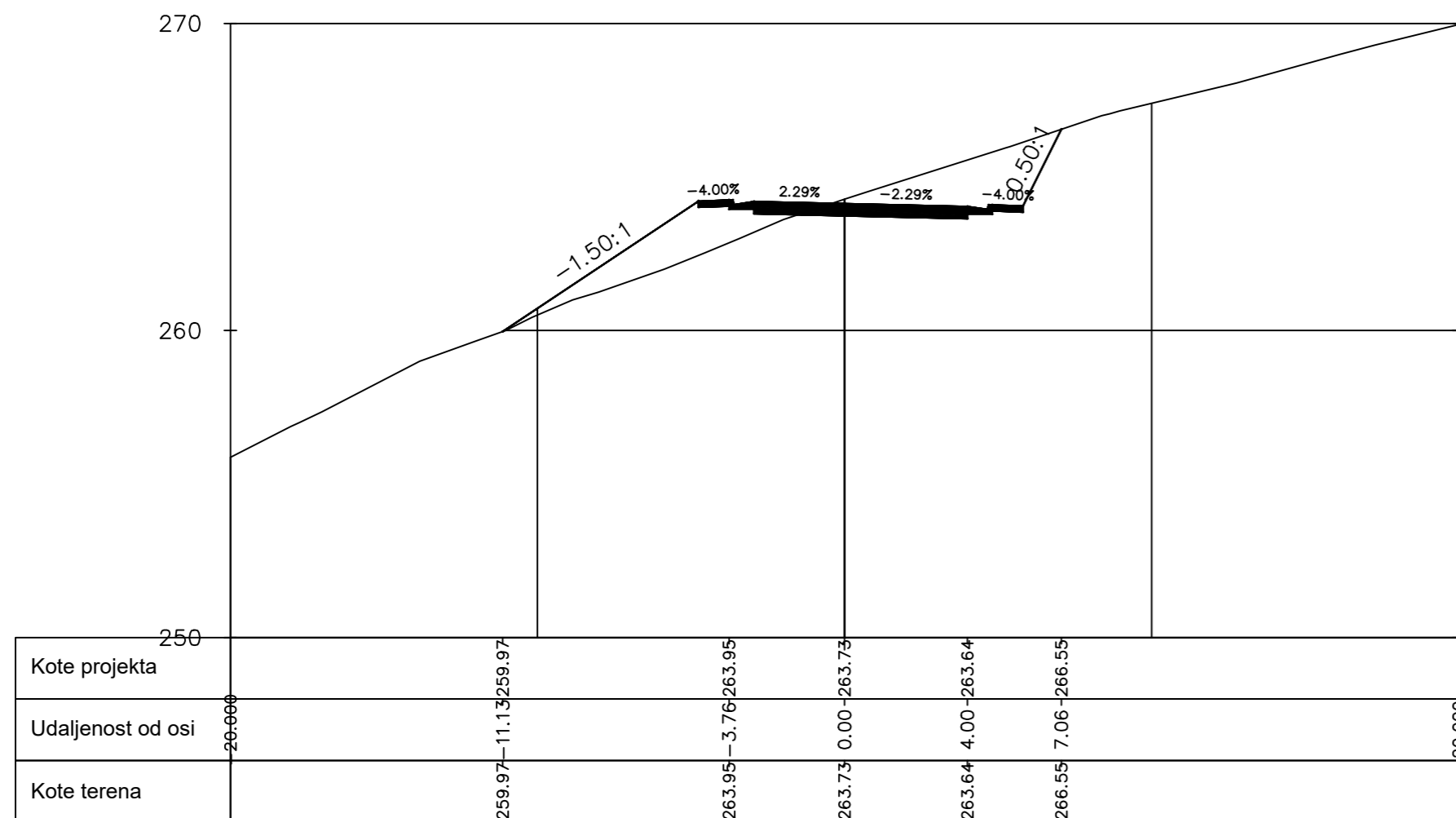
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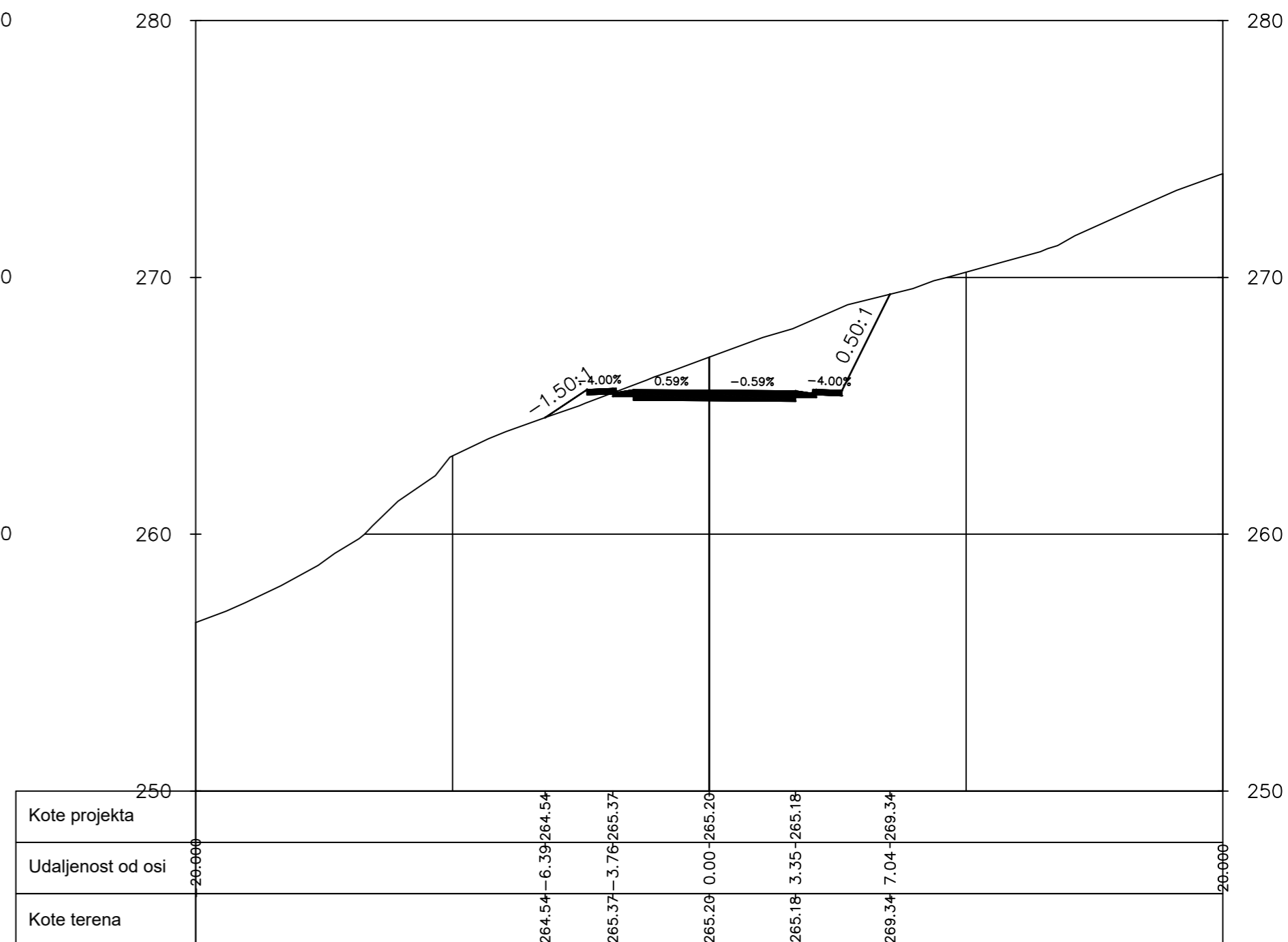
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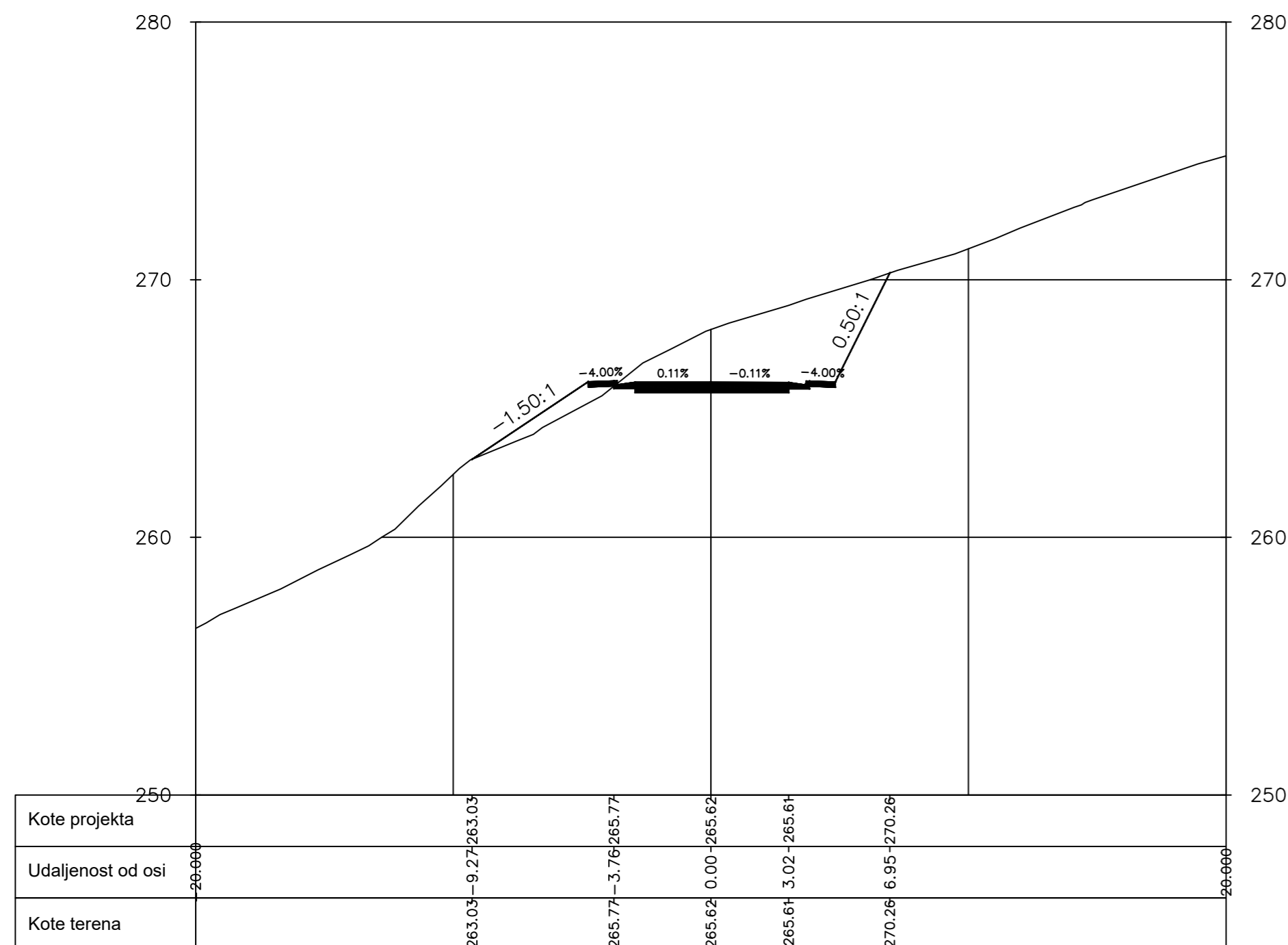
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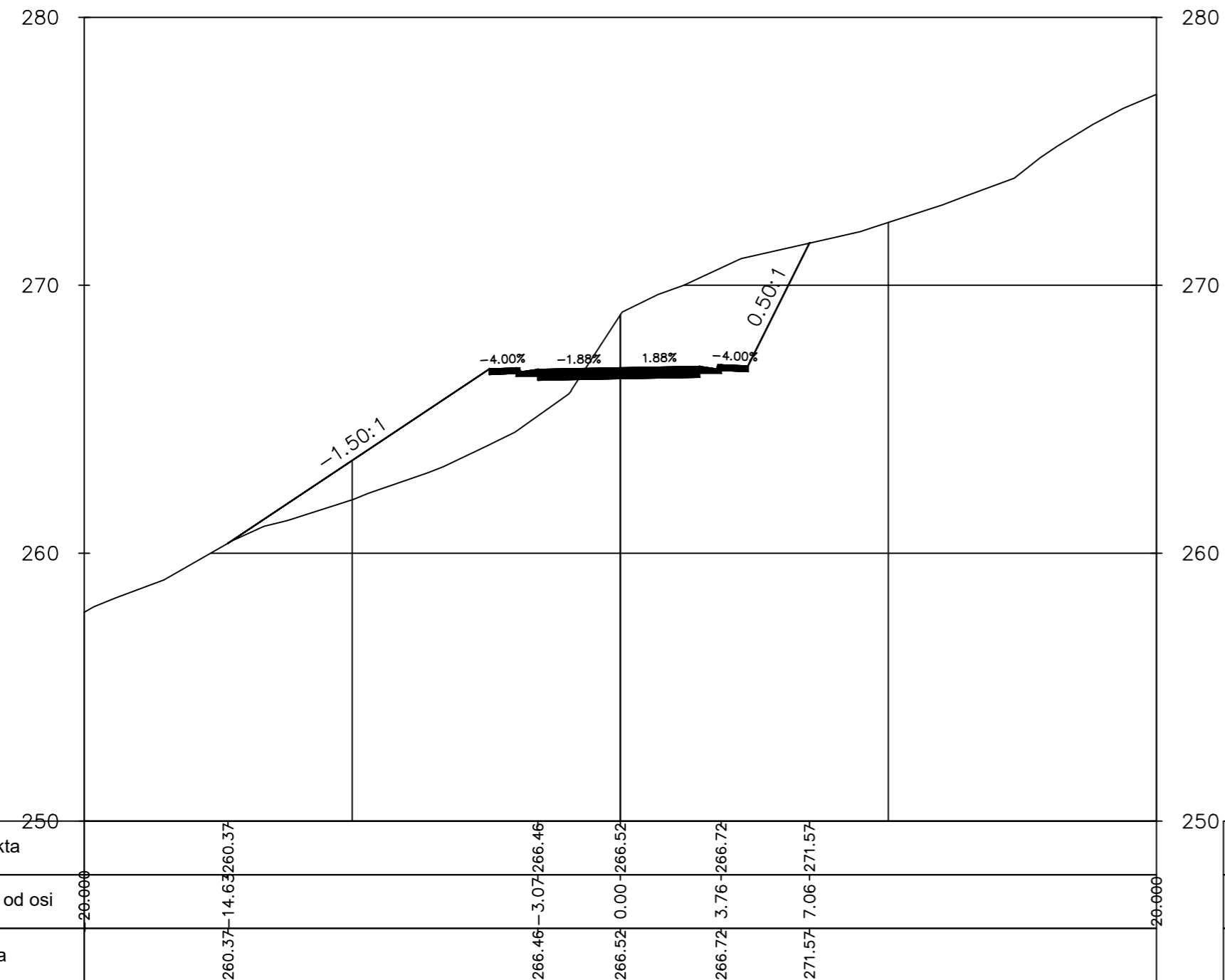
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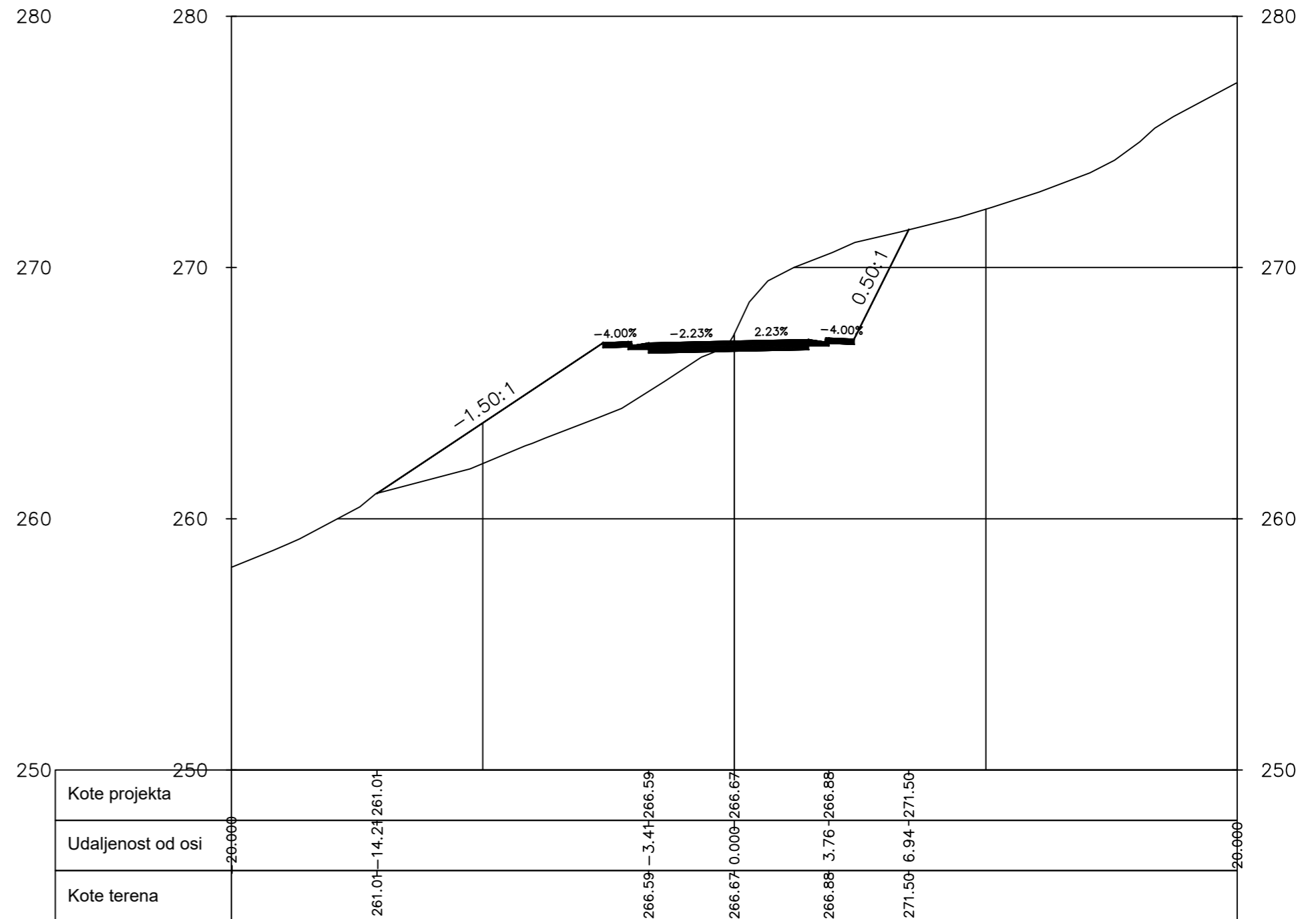
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0+137.94

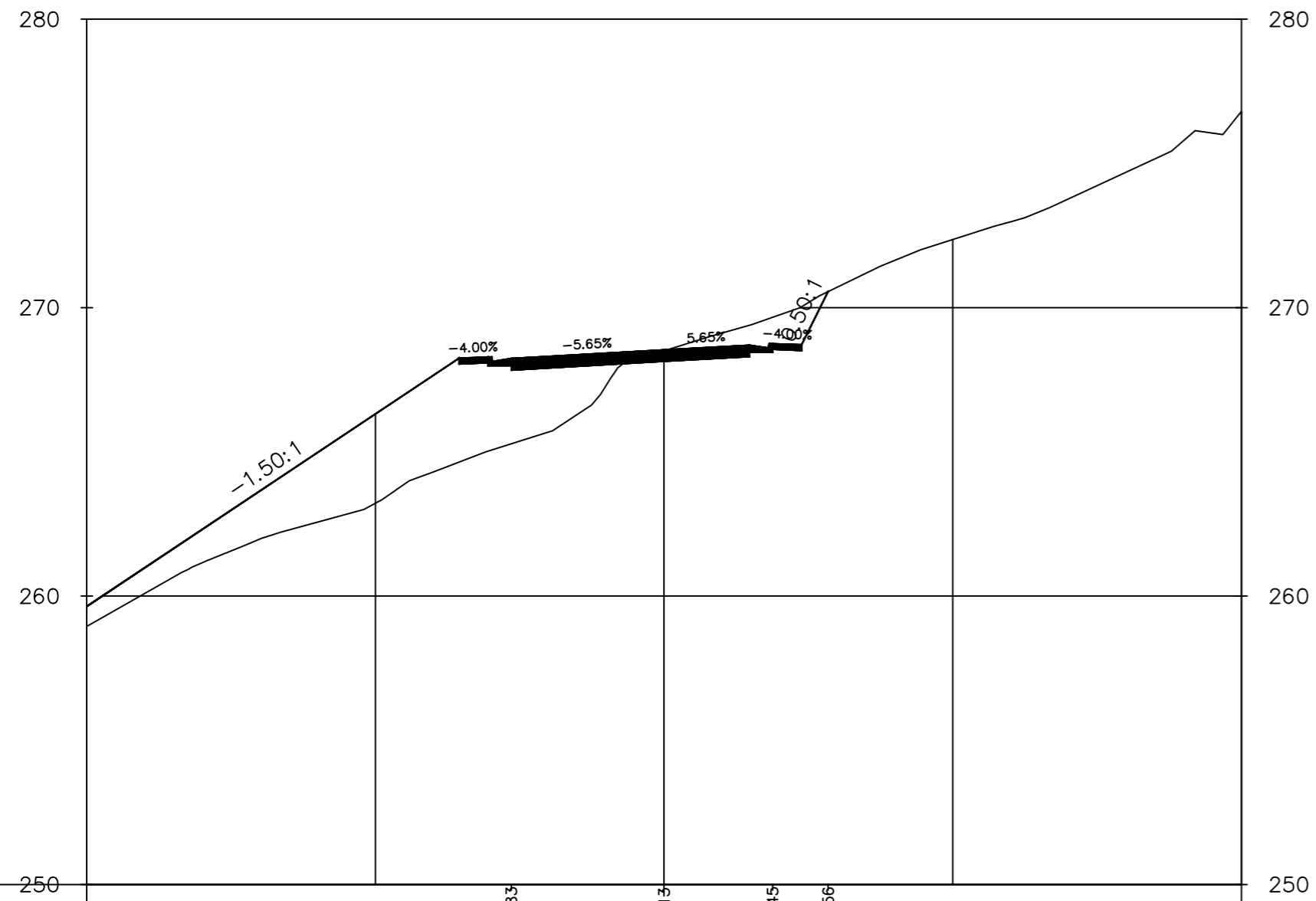


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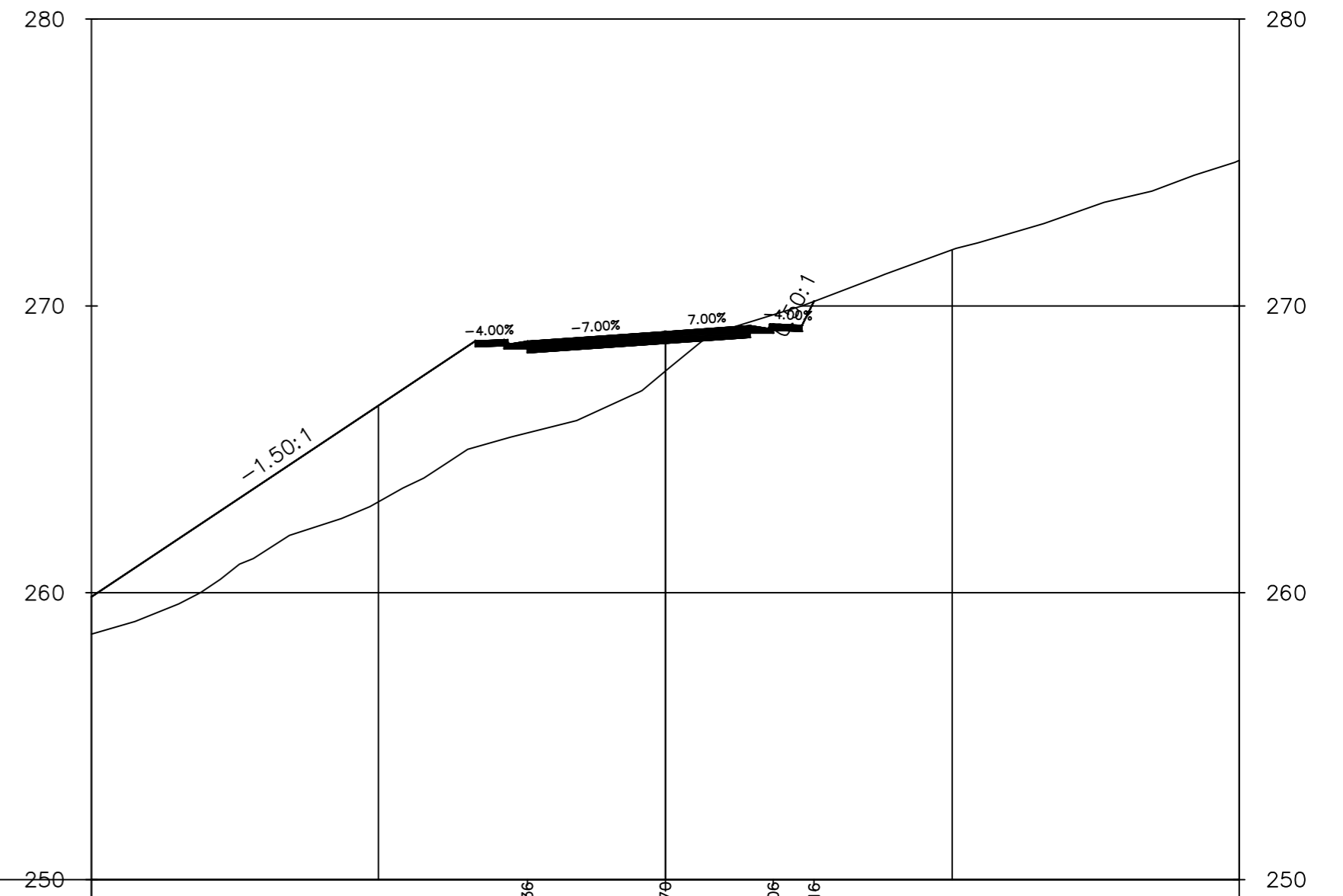


0+160.00



|                   |         |        |        |        |        |        |
|-------------------|---------|--------|--------|--------|--------|--------|
| Kote projekta     | 259.629 |        |        |        |        |        |
| Udaljenost od osi | 0.00    | 5.29   | 0.00   | 3.76   | 5.69   | 20.00  |
| Kote terena       | 259.62  | 267.83 | 268.13 | 268.45 | 270.56 | 266.66 |

0+167.94



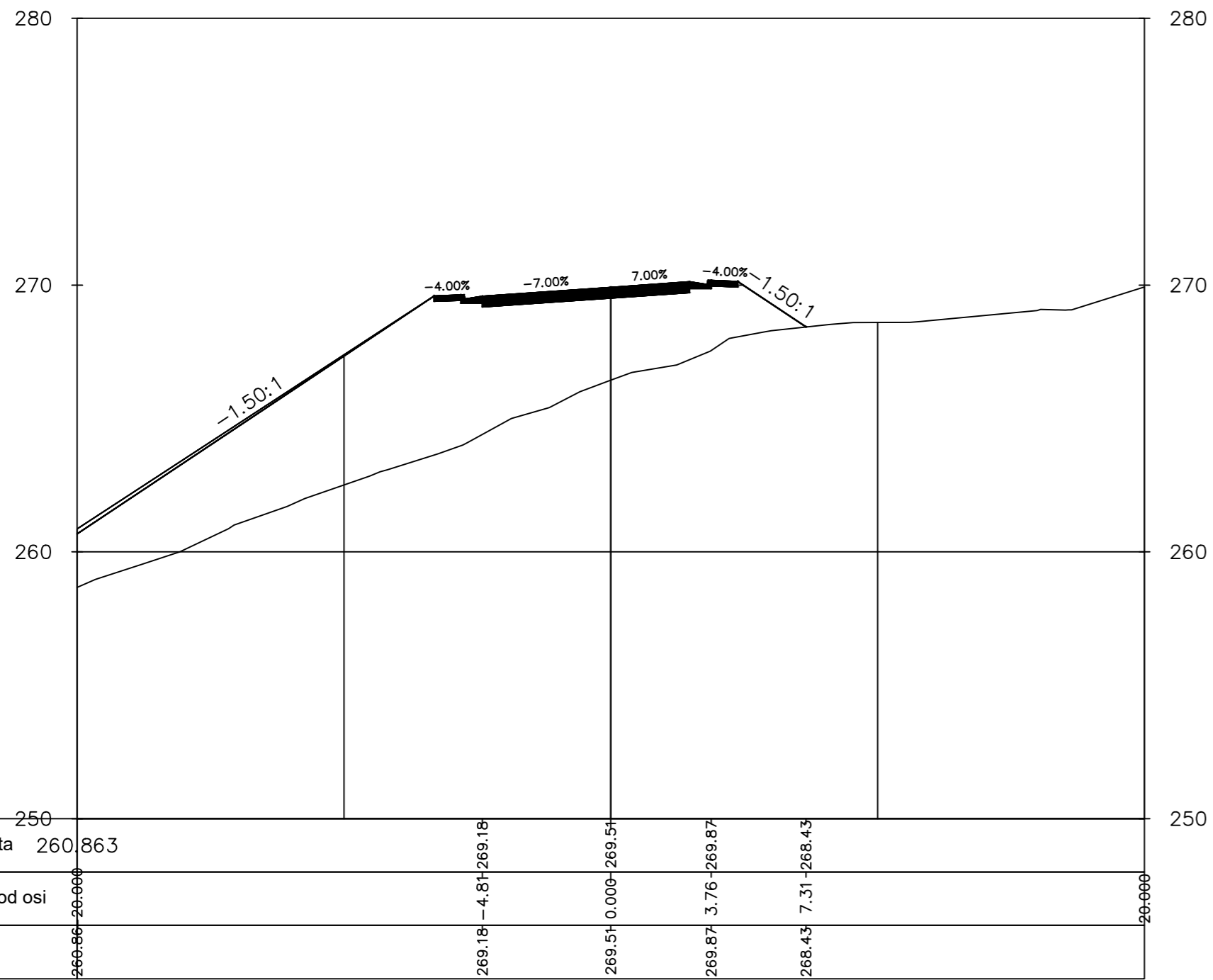
|                   |         |        |        |        |        |        |
|-------------------|---------|--------|--------|--------|--------|--------|
| Kote projekta     | 259.856 |        |        |        |        |        |
| Udaljenost od osi | 0.00    | 4.81   | 0.00   | 3.76   | 5.18   | 20.00  |
| Kote terena       | 259.66  | 268.36 | 268.70 | 269.06 | 270.16 | 266.66 |



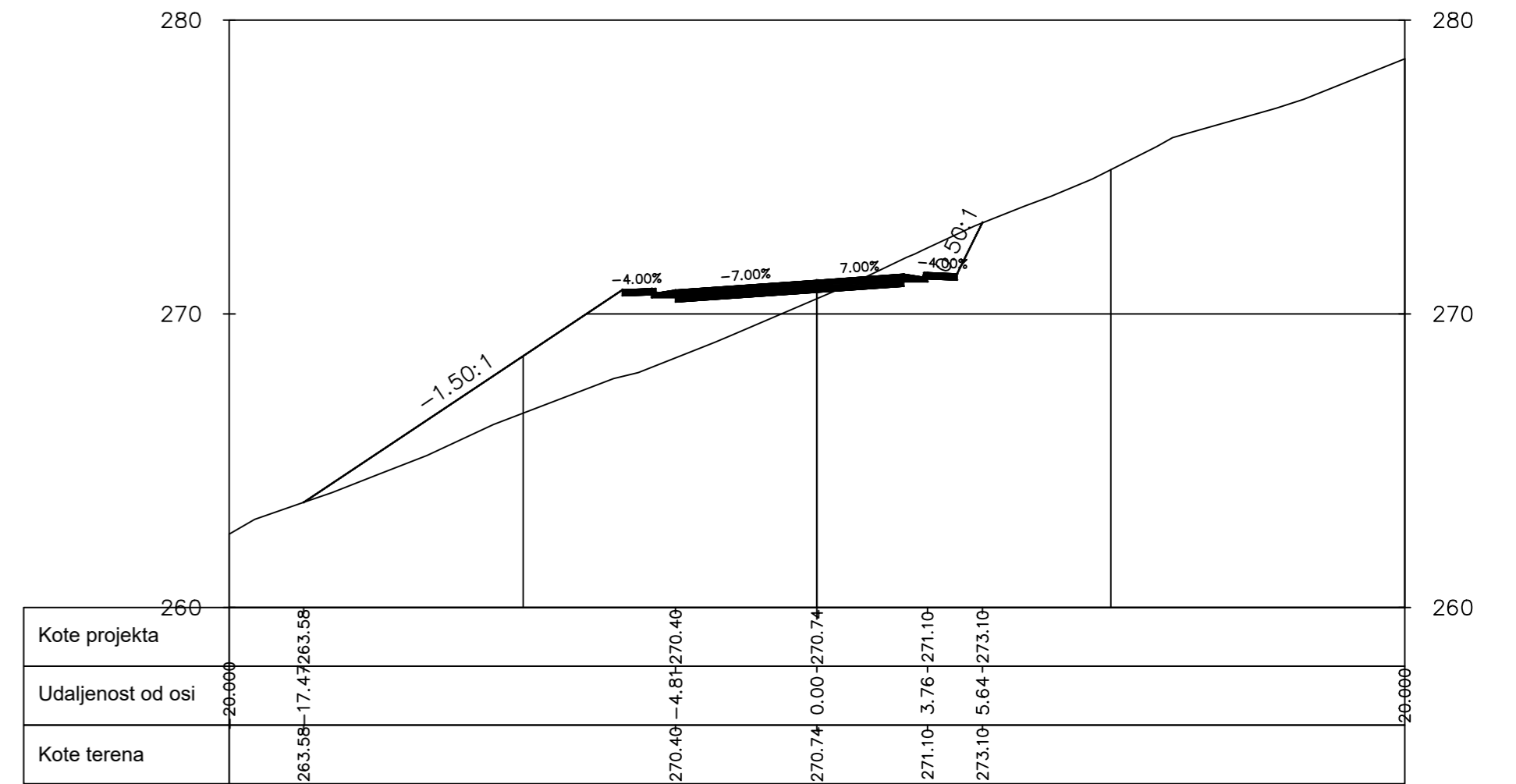
SVEUČILIŠTE U SPLITU  
 FAKULTET GRAĐEVINARSTVA,  
 ARHITEKTURE I GEODEZIJE  
 21000 SPLIT, MATICE HRVATSKE 15

|                    |                                   |
|--------------------|-----------------------------------|
| <b>Završni rad</b> |                                   |
| TEMA               | Idejni projekt ceste              |
| STUDENTI           | Radić Tomislav                    |
| SADRŽAJ            | Karakteristični poprečni presjeci |
| DATUM              | lipanj 2019.                      |
| MJERILO            | 1:200                             |
| BROJ PRILOGA       | 4                                 |

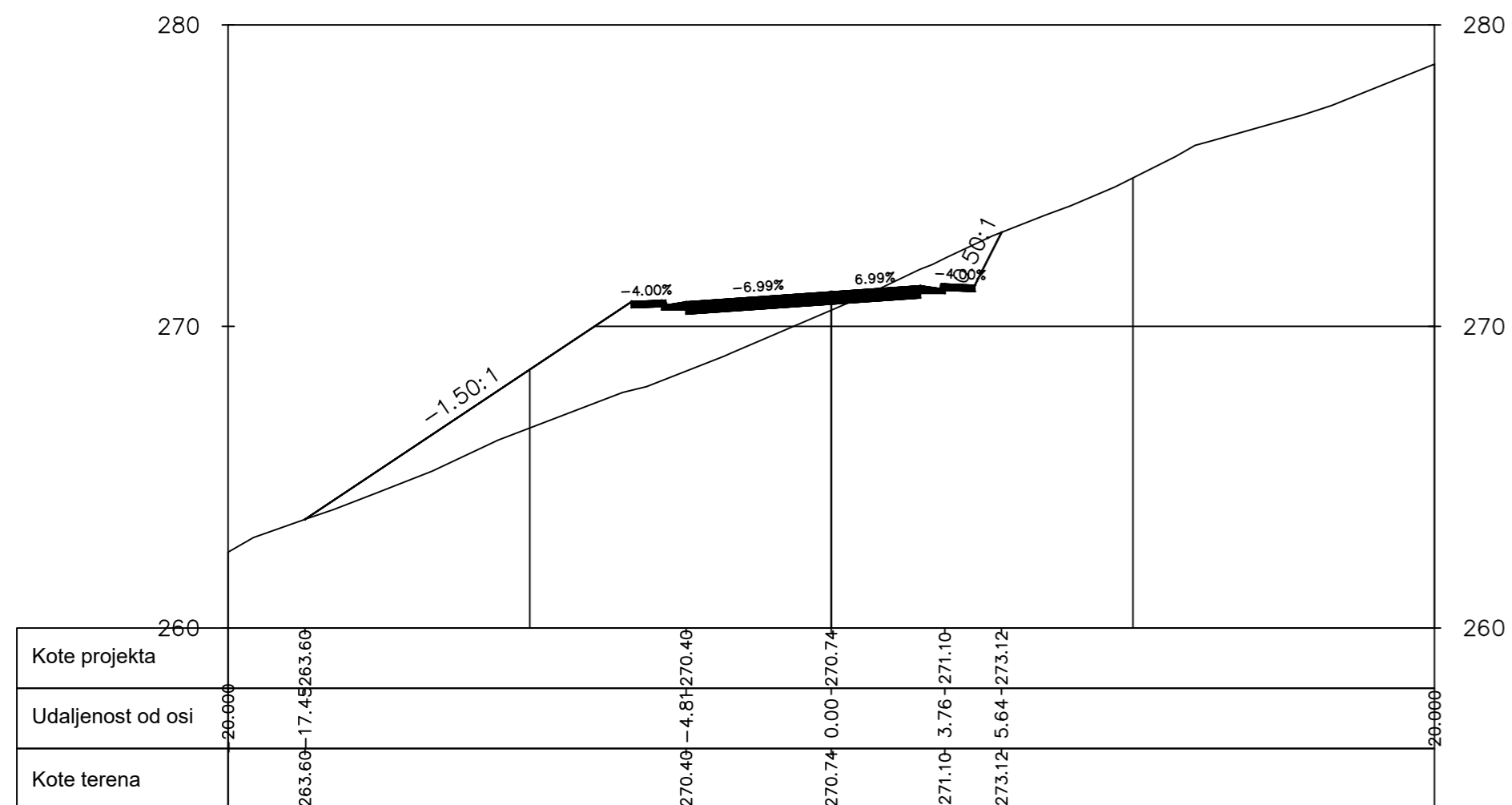
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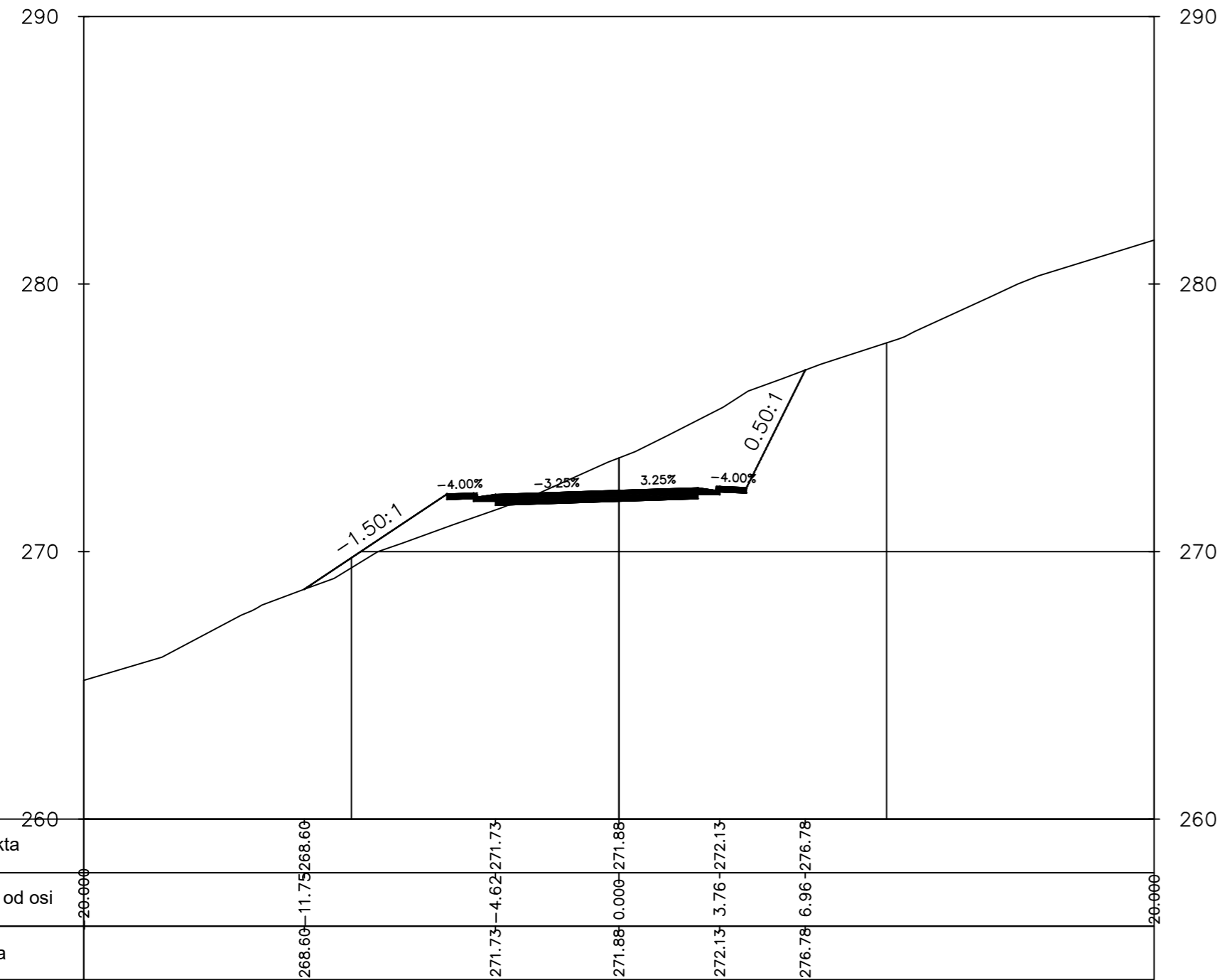
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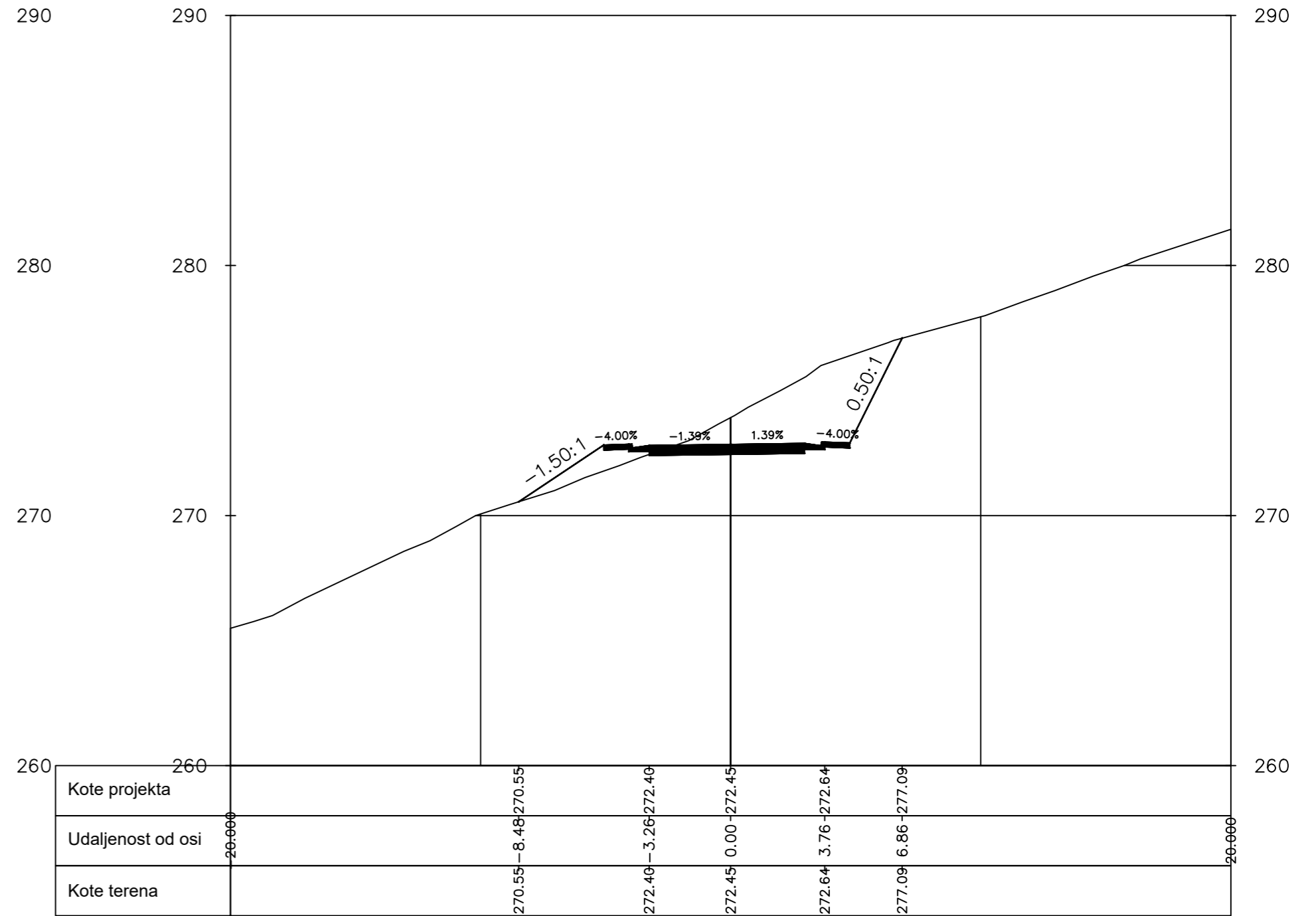
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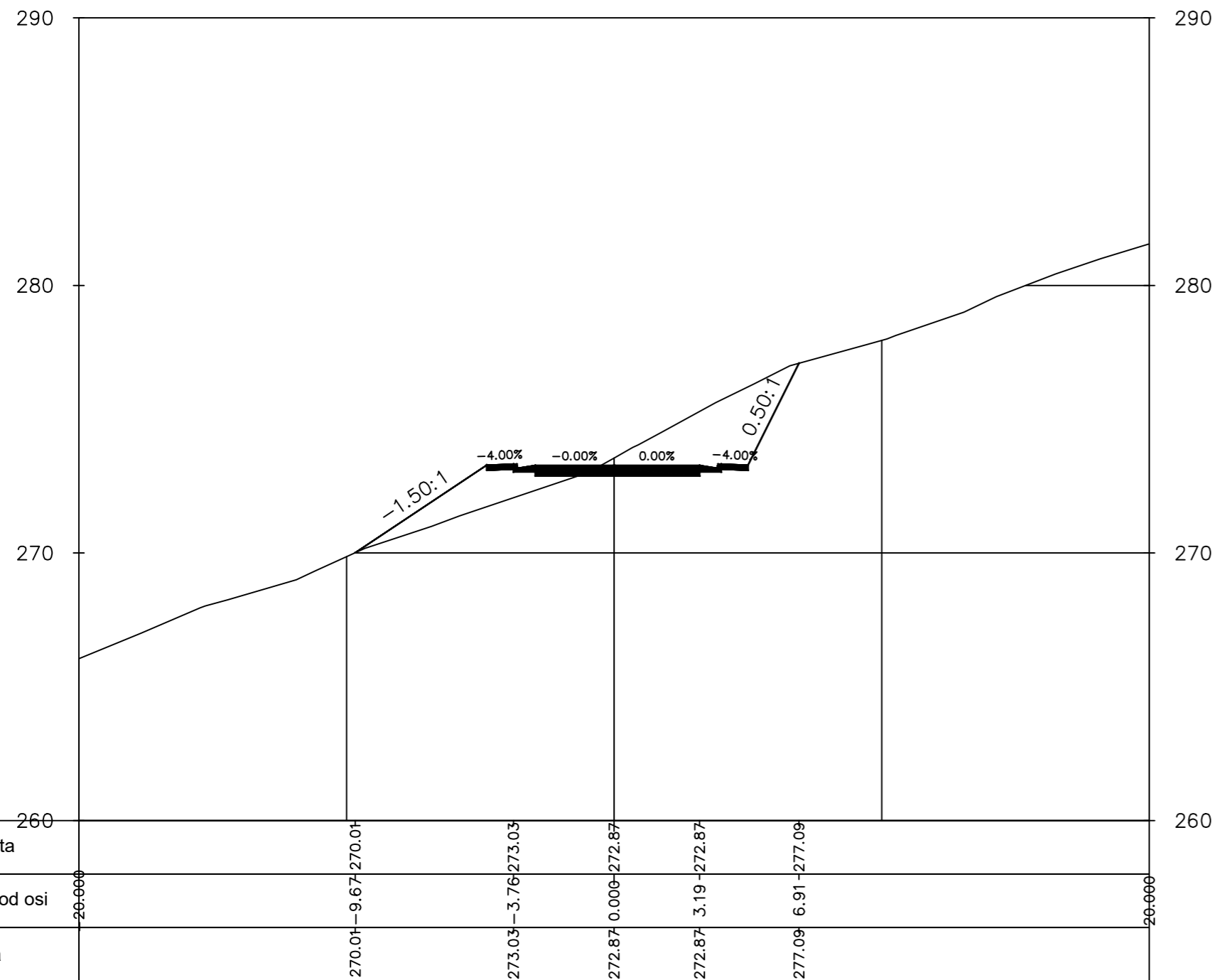
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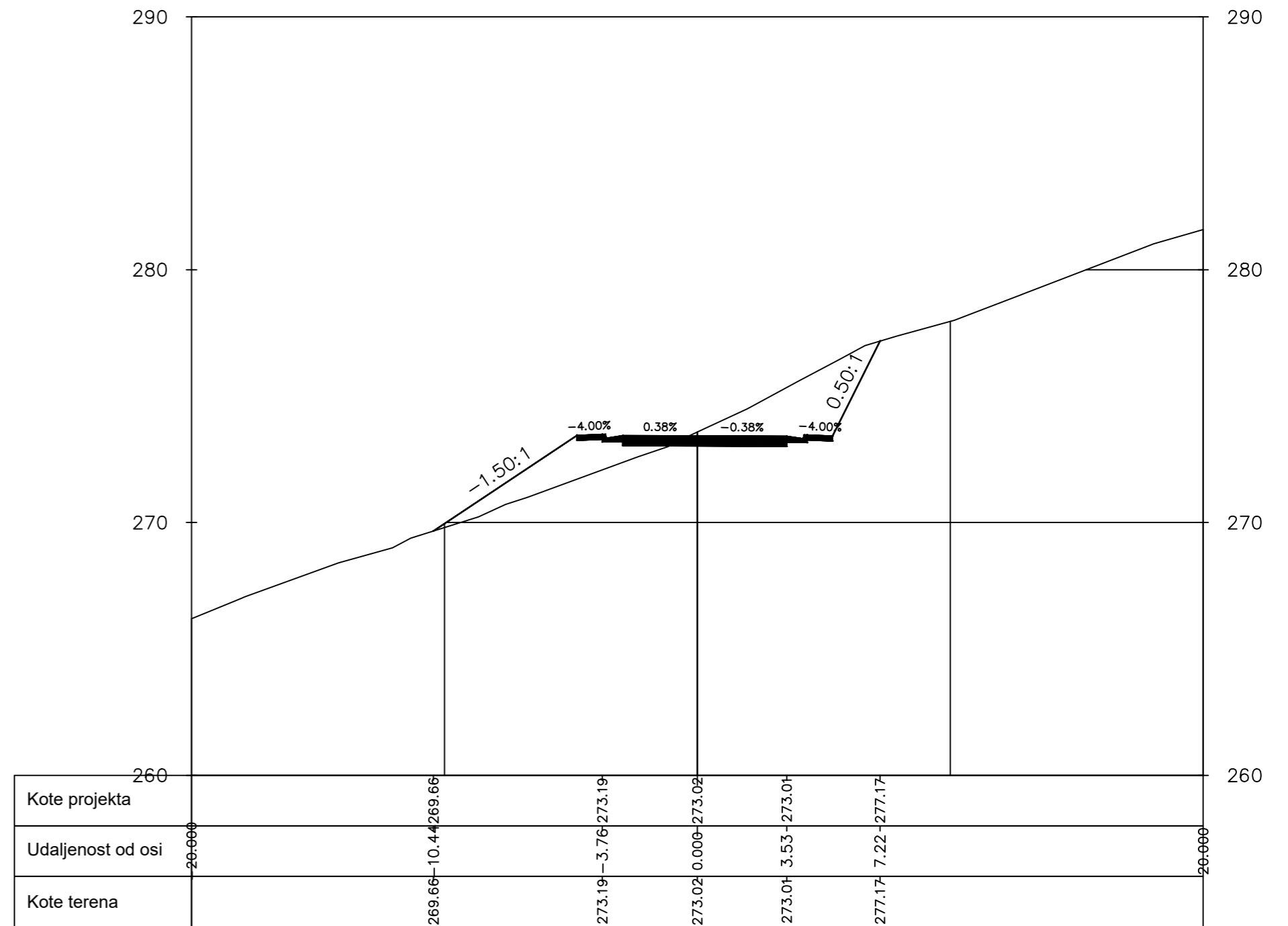
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0+237.36



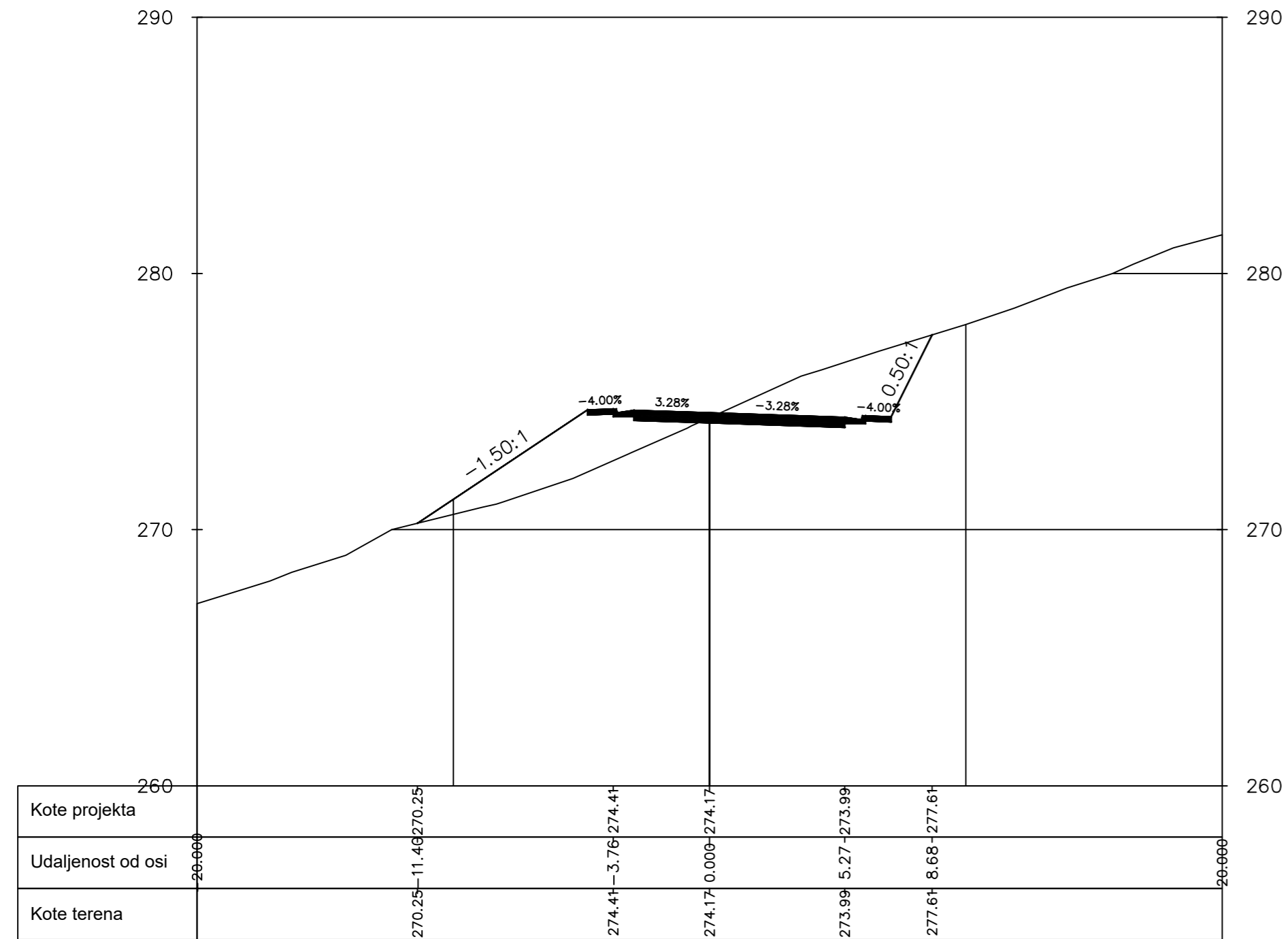
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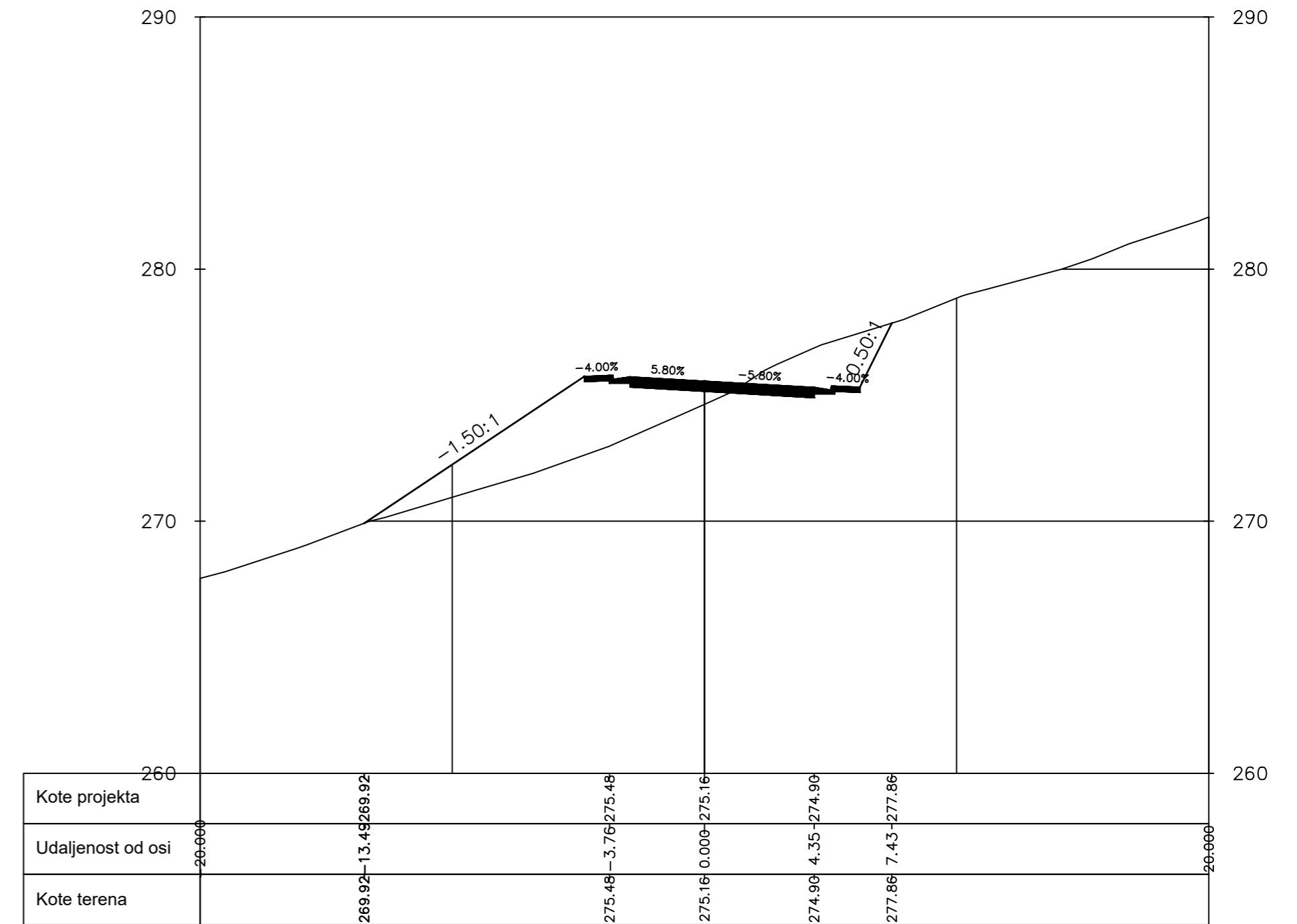
SVEUČILIŠTE U SPLITU  
FAKULTET GRAĐEVINARSTVA,  
ARHITEKTURE I GEODEZIJE  
21000 SPLIT, MATICE HRVATSKE 15

|                    |                                   |
|--------------------|-----------------------------------|
| <b>Završni rad</b> |                                   |
| TEMA               | Idejni projekt ceste              |
| STUDENTI           | Radić Tomislav                    |
| SADRŽAJ            | Karakteristični poprečni presjeci |
| DATUM              | lipanj 2019.                      |
| MJERILO            | 1:200                             |
| BROJ PRILOGA       | 4                                 |

0+260.00



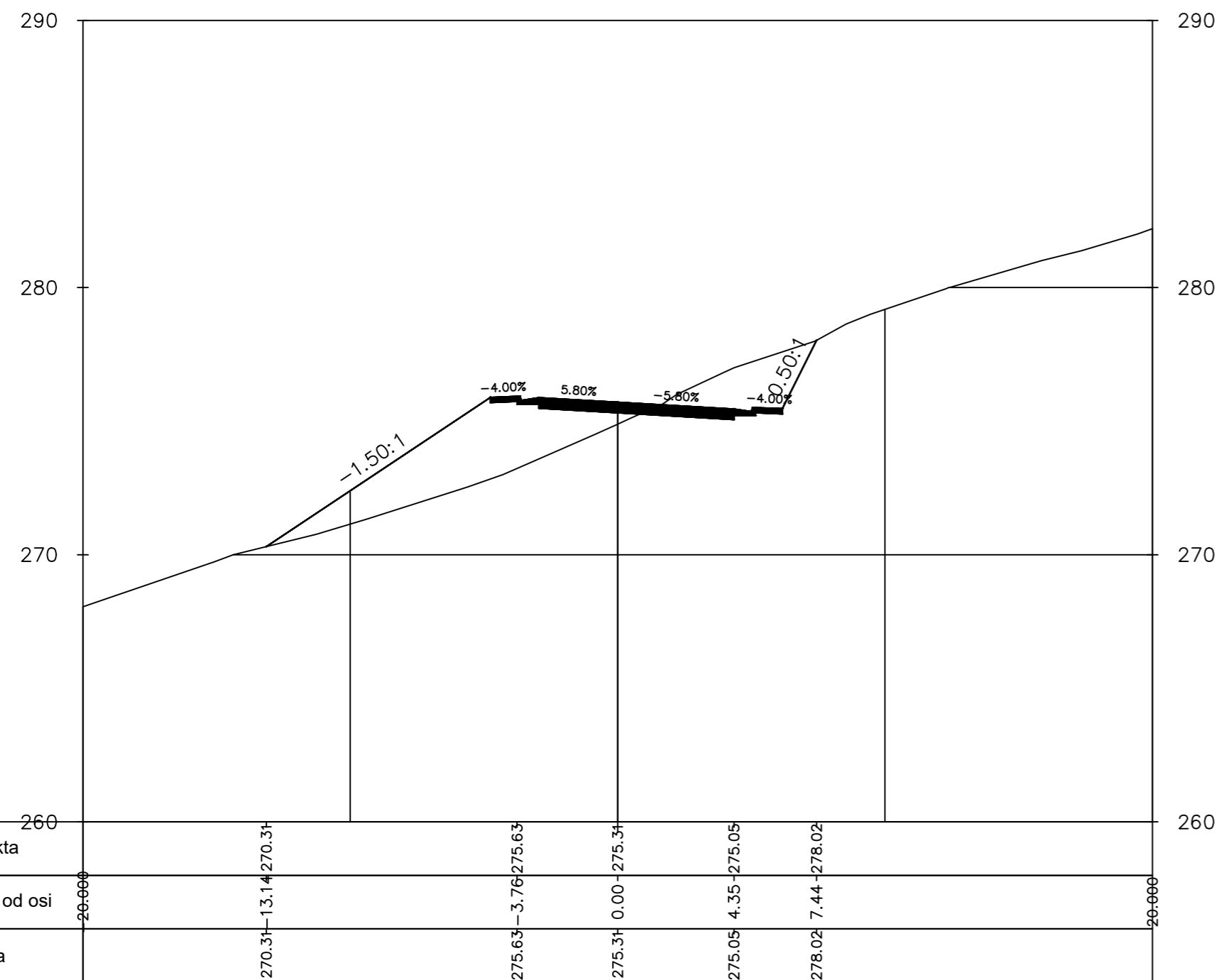
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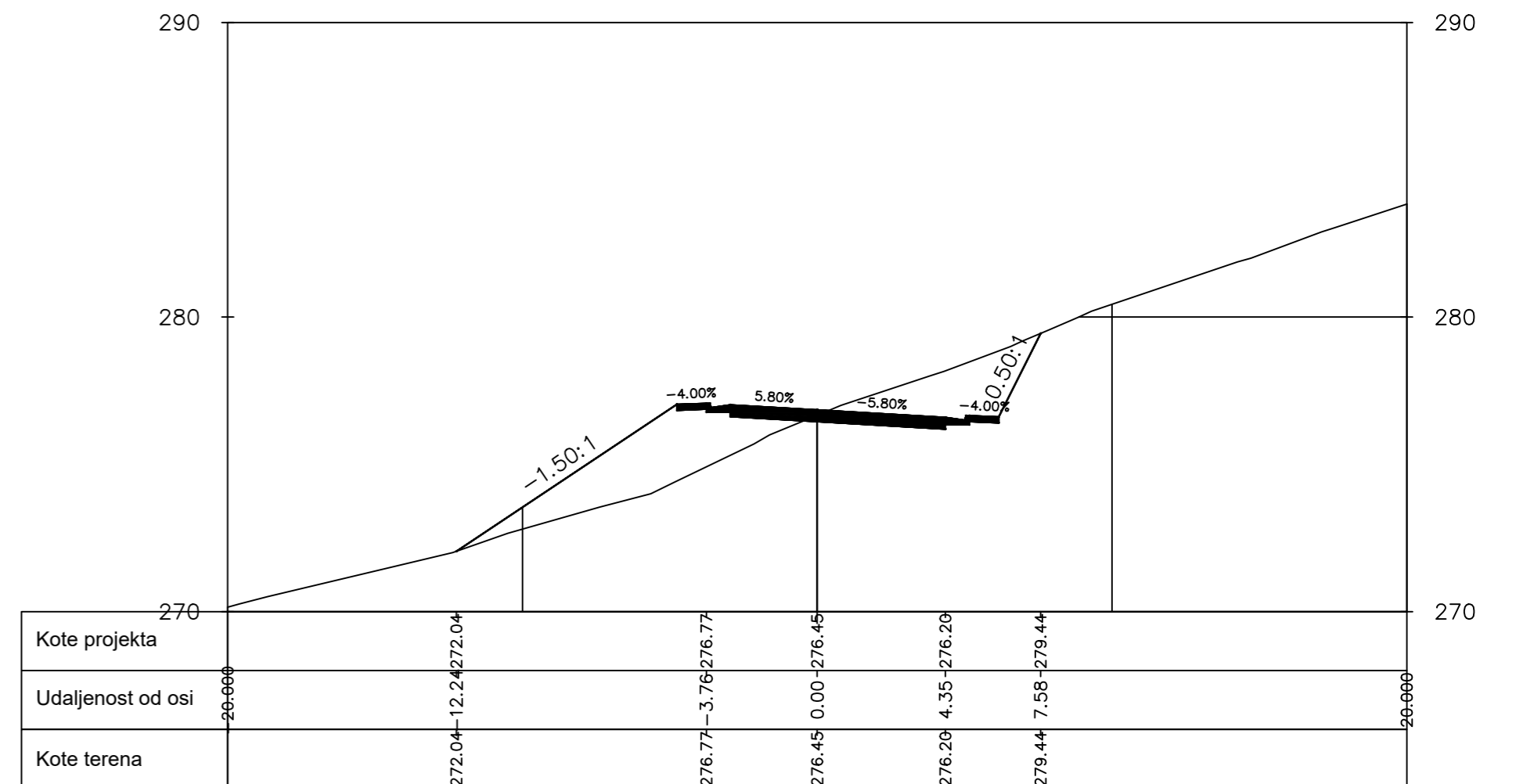
SVEUČILIŠTE U SPLITU  
 FAKULTET GRAĐEVINARSTVA,  
 ARHITEKTURE I GEODEZIJE  
 21000 SPLIT, MATICE HRVATSKE 15

|                    |                                   |
|--------------------|-----------------------------------|
| <b>Završni rad</b> |                                   |
| TEMA               | Idejni projekt ceste              |
| STUDENTI           | Radić Tomislav                    |
| SADRŽAJ            | Karakteristični poprečni presjeci |
| DATUM              | lipanj 2019.                      |
| MJERILO            | 1:200                             |
| BROJ PRILOGA       | 4                                 |

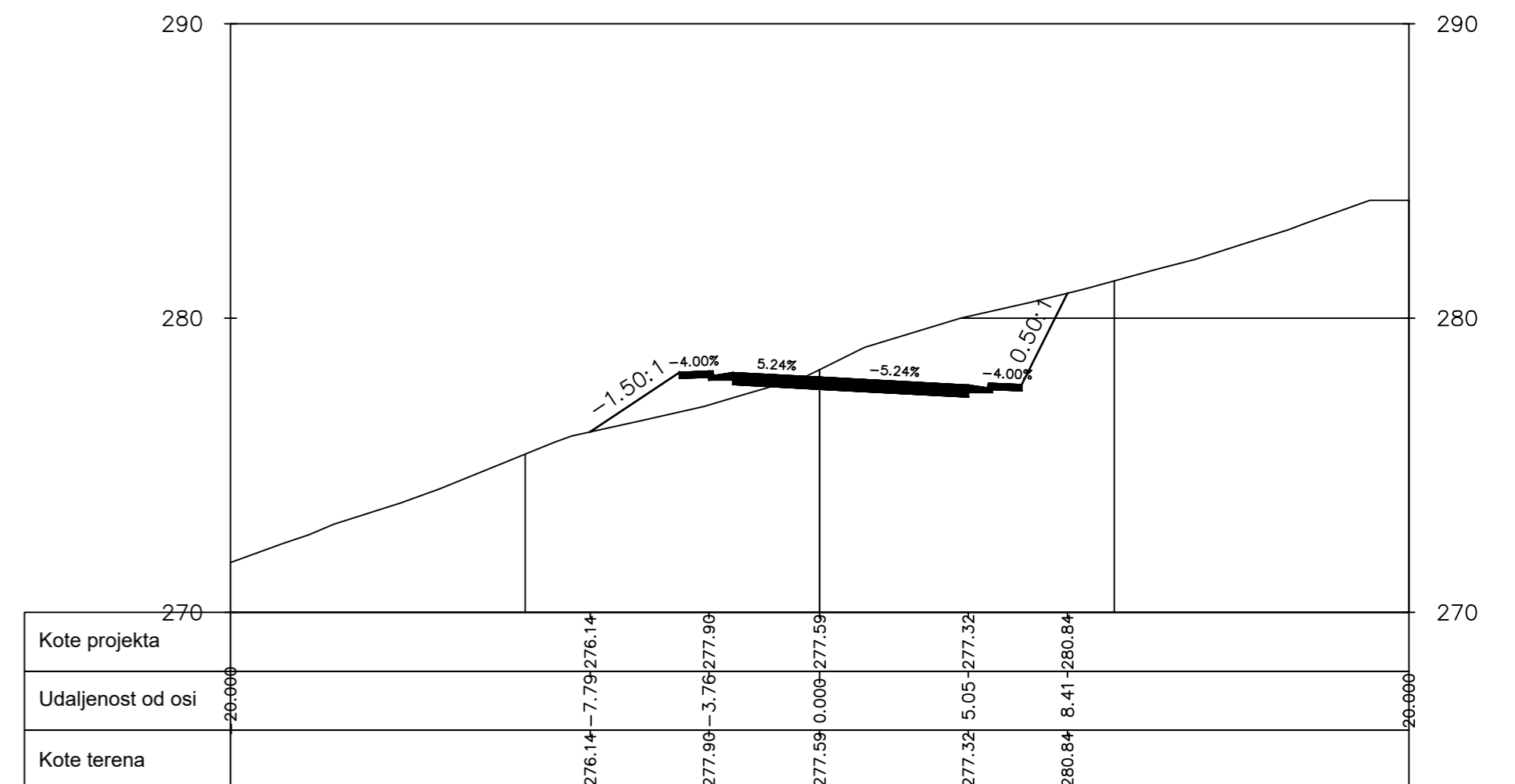
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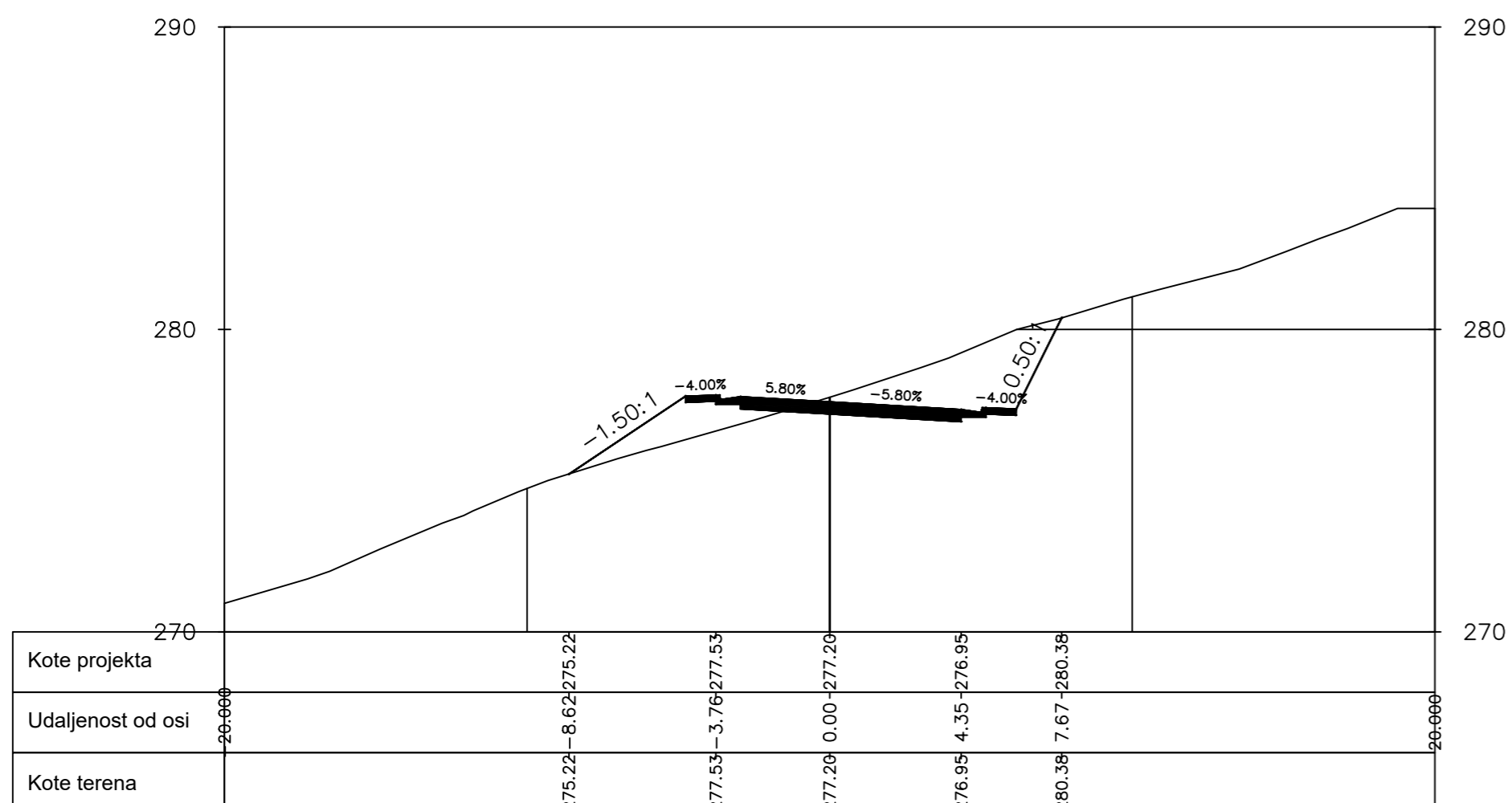
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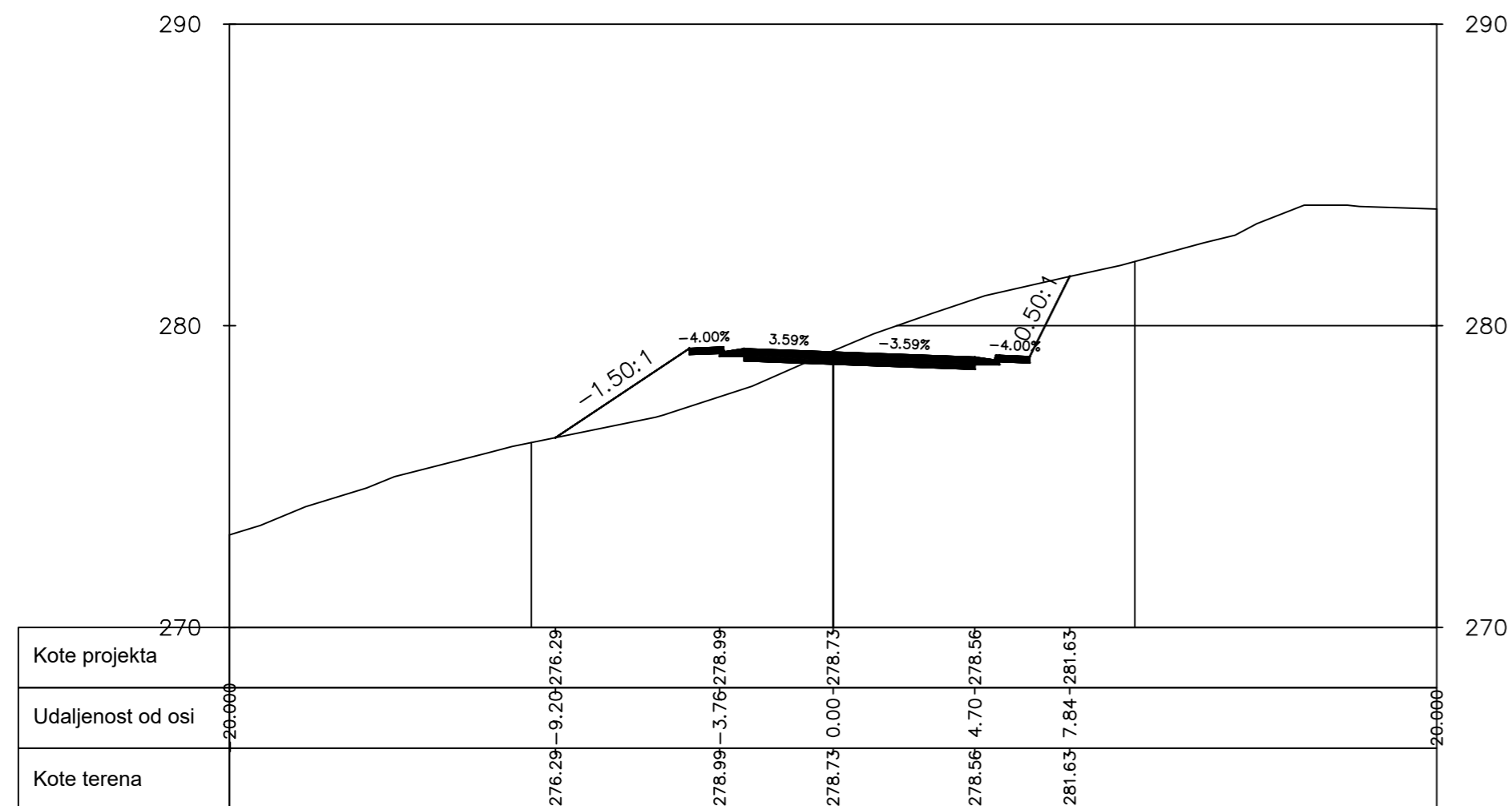
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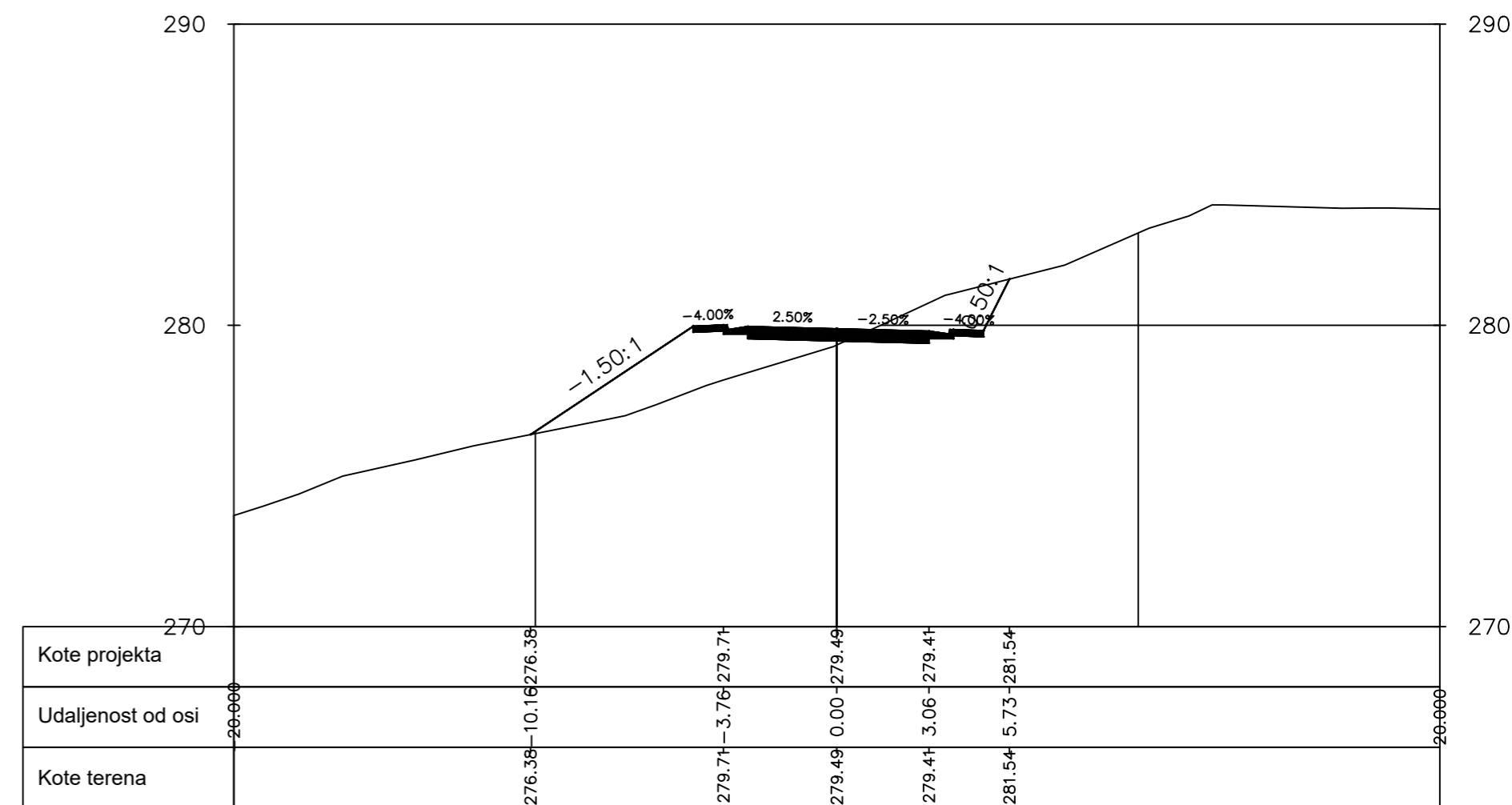
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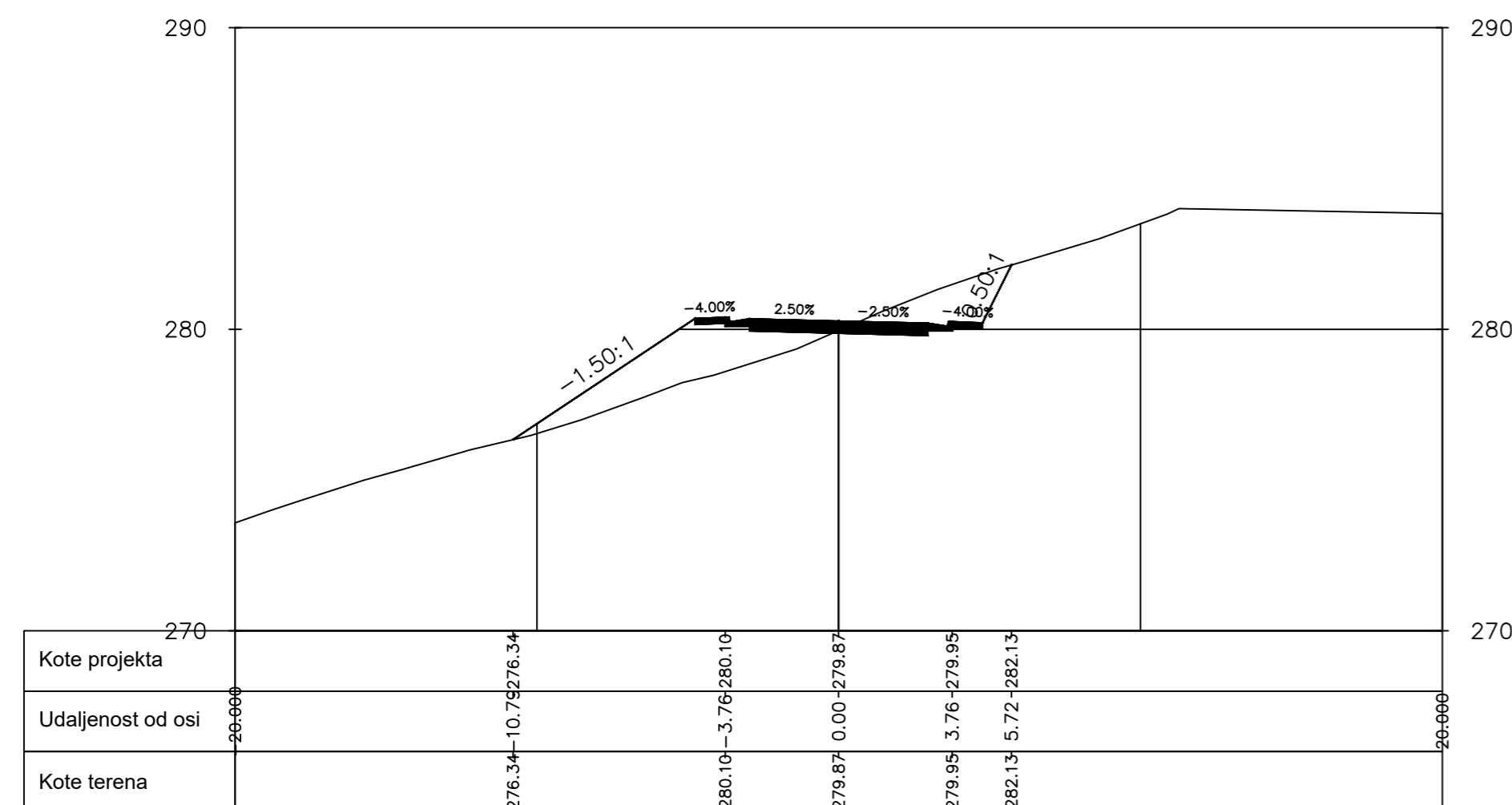
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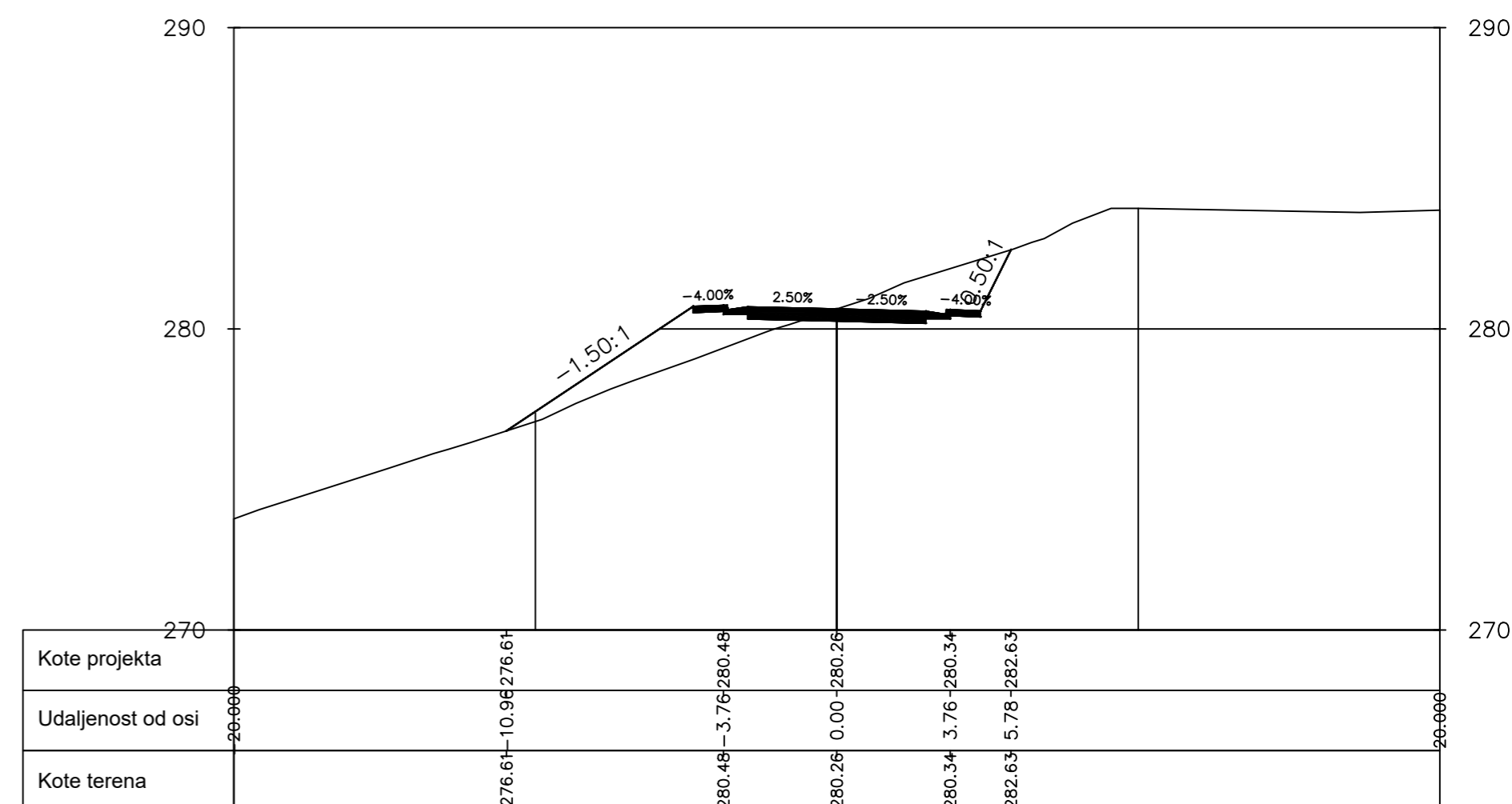
0+353.24



0+360.00



0+366.77



## 4. OBRADA NA RAČUNALU

Prilikom izrade predmetnog zadatka korišteno je računalo uz odgovarajući softver Autodesk AutoCAD Civil 3D. Postupak projektiranja trase na računalu sličan je ručnoj izradi rješenja ali mnogo brži. Radu na računalu prethodi definiranje problema, uočavanje nedostataka te određivanje načina na koje bi se idejno rješenje kvalitetno izradilo.

Prvi korak pri izradi idejnog rješenja na računalu je digitaliziranje terena na temelju zadanih slojnica. Unošenjem slojnica u obliku 3D polilinja sa zadanim nadmorskim visinama pomoću kojih definiramo površinu odnosno trodimenzionalni model terena postojećeg stanja na području obuhvaćenim predmetnim zadatkom.

Nakon toga se unose koordinate točaka tangenti (po dvije za svaku tangentu) koje ih definiraju na terenu. Sjecišta tangenti definiramo ubacivanjem odgovarajućih kružnih lukova i prijelaznih krivina čime se dobija horizontalni tok ceste.

Sljedeći korak je izrada uzdužnog presjeka ceste. Linija terena se automatski generira iz zadane horizontalne osi ceste. Potrebno je definirati niveletu. Niveleta se postavlja tako da se u konačnici riješe geometrijski i sigurnosni elementi i odvodnja. Između tangenti se umeće kružna krivina radijusa prema potrebi.

Potrebno je definirati i poprečni profil prometnice. Poprečnim presjekom definirani su: poprečni nagib i širina kolnika te pokosi usjeka i nasipa.

Iz definirane osi trase, nivelete i poprečnog presjeka definiramo koridor. Ovime smo dobili poprečne presjeke u svim karakterističnim i zadanim točkama osi ceste a time i točke spajanja pokosa usjeka i nasipa sa terenom. Ovime smo definirali čitavu dionicu ceste u prostoru.

Kao izlazni podaci dobiju se računalni ispisi koordinatnih točaka osi, točaka svakog poprečnog presjeka te količina zemljanih radova po presjeku.



## 5. IZLAZNI PODACI IZ PROGRAMA

### 5.1. Koordinatni račun glavnih točaka osi

**Alignment Station and Curve Report**

**Client:** Client Company

**Project Name:** Idejni projekt

**Project Description:**

**Report Date:** 28.5.2019. 12:54:47

**Prepared by:** Preparer

Alignment: os\_cesta

Description:

#### Tangent Data

| Description | PT Station | Northing  | Easting    |
|-------------|------------|-----------|------------|
| Start:      | 0+00.000   | 32048.539 | -17174.941 |
| End:        | 0+24.087   | 32032.119 | -17157.318 |

#### Tangent Data

| Parameter | Value  | Parameter | Value                |
|-----------|--------|-----------|----------------------|
| Length:   | 24.087 | Course:   | S 47° 01' 24.2603" E |

#### Spiral Point Data

| Description | Station  | Northing  | Easting    |
|-------------|----------|-----------|------------|
| TS:         | 0+24.087 | 32032.119 | -17157.318 |
| SPI:        |          | 32013.918 | -17137.784 |
| SC:         | 0+64.087 | 32003.417 | -17129.518 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 40.000           | L Tan:    | 26.700               |
| Radius:   | 130.000          | S Tan:    | 13.363               |
| Theta:    | 08° 48' 53.0471" | P:        | 0.512                |
| X:        | 39.905           | K:        | 19.984               |
| Y:        | 2.048            | A:        | 72.111               |
| Chord:    | 39.958           | Course:   | S 44° 05' 08.6986" E |

#### Curve Point Data

| Description | Station  | Northing  | Easting    |
|-------------|----------|-----------|------------|
| SC:         | 0+64.087 | 32003.417 | -17129.518 |
| RP:         |          | 31923.009 | -17231.668 |
| CS:         | 0+85.684 | 31985.418 | -17117.628 |

#### Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 09° 31' 07.0465" | Type:     | RIGHT                |
| Radius:   | 130.000          |           |                      |
| Length:   | 21.597           | Tangent:  | 10.823               |
| Mid-Ord:  | 0.448            | External: | 0.450                |
| Chord:    | 21.572           | Course:   | S 33° 26' 57.6899" E |

#### Spiral Point Data

| Description | Station  | Northing  | Easting    |
|-------------|----------|-----------|------------|
| CS:         | 0+85.684 | 31985.418 | -17117.628 |

|      |          |           |            |
|------|----------|-----------|------------|
| SPI: |          | 31973.695 | -17111.212 |
| ST:  | 1+25.684 | 31948.586 | -17102.135 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 40.000           | L Tan:    | 26.700               |
| Radius:   | 130.000          | S Tan:    | 13.363               |
| Theta:    | 08° 48' 53.0471" | P:        | 0.512                |
| X:        | 39.905           | K:        | 19.984               |
| Y:        | 2.048            | A:        | 72.111               |
| Chord:    | 39.958           | Course:   | S 22° 48' 46.6813" E |

Tangent Data

| Description | PT Station | Northing  | Easting    |
|-------------|------------|-----------|------------|
| Start:      | 1+25.684   | 31948.586 | -17102.135 |
| End:        | 1+37.936   | 31937.063 | -17097.970 |

Tangent Data

| Parameter | Value  | Parameter | Value                |
|-----------|--------|-----------|----------------------|
| Length:   | 12.252 | Course:   | S 19° 52' 31.1196" E |

Spiral Point Data

| Description | Station  | Northing  | Easting    |
|-------------|----------|-----------|------------|
| TS:         | 1+37.936 | 31937.063 | -17097.970 |
| SPI:        |          | 31918.144 | -17091.130 |
| SC:         | 1+67.936 | 31910.286 | -17084.773 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 30.000           | L Tan:    | 20.118               |
| Radius:   | 45.000           | S Tan:    | 10.107               |
| Theta:    | 19° 05' 54.9354" | P:        | 0.830                |
| X:        | 29.668           | K:        | 14.945               |
| Y:        | 3.307            | A:        | 36.742               |
| Chord:    | 29.852           | Course:   | S 26° 14' 07.8157" E |

Curve Point Data

| Description | Station  | Northing  | Easting    |
|-------------|----------|-----------|------------|
| SC:         | 1+67.936 | 31910.286 | -17084.773 |
| RP:         |          | 31938.590 | -17049.789 |
| CS:         | 1+99.930 | 31894.314 | -17057.827 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 40° 44' 08.3466" | Type:     | LEFT                 |
| Radius:   | 45.000           |           |                      |
| Length:   | 31.994           | Tangent:  | 16.707               |
| Mid-Ord:  | 2.814            | External: | 3.001                |
| Chord:    | 31.324           | Course:   | S 59° 20' 30.2283" E |

Spiral Point Data

| Description | Station | Northing | Easting |
|-------------|---------|----------|---------|
|-------------|---------|----------|---------|

|      |          |           |            |
|------|----------|-----------|------------|
| CS:  | 1+99.930 | 31894.314 | -17057.827 |
| SPI: |          | 31892.508 | -17047.883 |
| ST:  | 2+29.930 | 31895.589 | -17028.002 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 30.000           | L Tan:    | 20.118               |
| Radius:   | 45.000           | S Tan:    | 10.107               |
| Theta:    | 19° 05' 54.9354" | P:        | 0.830                |
| X:        | 29.668           | K:        | 14.945               |
| Y:        | 3.307            | A:        | 36.742               |
| Chord:    | 29.852           | Course:   | N 87° 33' 07.3591" E |

Tangent Data

| Description | PT Station | Northing  | Easting    |
|-------------|------------|-----------|------------|
| Start:      | 2+29.930   | 31895.589 | -17028.002 |
| End:        | 2+37.356   | 31896.726 | -17020.664 |

Tangent Data

| Parameter | Value | Parameter | Value                |
|-----------|-------|-----------|----------------------|
| Length:   | 7.426 | Course:   | N 81° 11' 30.6630" E |

Spiral Point Data

| Description | Station  | Northing  | Easting    |
|-------------|----------|-----------|------------|
| TS:         | 2+37.356 | 31896.726 | -17020.664 |
| SPI:        |          | 31900.833 | -16994.157 |

SC: 2+77.356 31898.426 -16980.898

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 40.000           | L Tan:    | 26.824               |
| Radius:   | 60.000           | S Tan:    | 13.476               |
| Theta:    | 19° 05' 54.9354" | P:        | 1.107                |
| X:        | 39.558           | K:        | 19.926               |
| Y:        | 4.409            | A:        | 48.990               |
| Chord:    | 39.803           | Course:   | N 87° 33' 07.3591" E |

Curve Point Data

| Description | Station  | Northing  | Easting    |
|-------------|----------|-----------|------------|
| SC:         | 2+77.356 | 31898.426 | -16980.898 |
| RP:         |          | 31839.391 | -16991.616 |
| CS:         | 3+13.240 | 31882.144 | -16949.518 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 34° 16' 01.6964" | Type:     | RIGHT                |
| Radius:   | 60.000           |           |                      |
| Length:   | 35.884           | Tangent:  | 18.497               |
| Mid-Ord:  | 2.663            | External: | 2.786                |
| Chord:    | 35.352           | Course:   | S 62° 34' 33.5534" E |

Spiral Point Data

| Description | Station  | Northing  | Easting    |
|-------------|----------|-----------|------------|
| CS:         | 3+13.240 | 31882.144 | -16949.518 |
| SPI:        |          | 31872.688 | -16939.916 |
| ST:         | 3+53.240 | 31848.651 | -16928.013 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 40.000           | L Tan:    | 26.824               |
| Radius:   | 60.000           | S Tan:    | 13.476               |
| Theta:    | 19° 05' 54.9354" | P:        | 1.107                |
| X:        | 39.558           | K:        | 19.926               |
| Y:        | 4.409            | A:        | 48.990               |
| Chord:    | 39.803           | Course:   | S 32° 42' 14.4659" E |

Tangent Data

| Description | PT Station | Northing  | Easting    |
|-------------|------------|-----------|------------|
| Start:      | 3+53.240   | 31848.651 | -16928.013 |
| End:        | 3+66.766   | 31836.530 | -16922.011 |

Tangent Data

| Parameter | Value  | Parameter | Value                |
|-----------|--------|-----------|----------------------|
| Length:   | 13.526 | Course:   | S 26° 20' 37.7698" E |

## 5.2. Koordinatni račun detaljnih točaka osi

Alignment Name: os ceste

Description:

Station Range: Start: 0+000.00, End: 36+677.00

Station Increment: 20.00

| Station  | Northing     | Easting       | Tangential Direction |
|----------|--------------|---------------|----------------------|
| 0+000.00 | 32,048.5389m | -17,174.9411m | S47° 01' 24"E        |
| 0+020.00 | 32,034.9049m | -17,160.3084m | S47° 01' 24"E        |
| 0+040.00 | 32,021.1771m | -17,145.7645m | S45° 37' 42"E        |
| 0+060.00 | 32,006.5896m | -17,132.0945m | S39° 55' 04"E        |
| 0+080.00 | 31,990.3427m | -17,120.4645m | S31° 11' 42"E        |
| 0+100.00 | 31,972.5454m | -17,111.3739m | S23° 30' 34"E        |
| 0+120.00 | 31,953.9290m | -17,104.0729m | S20° 03' 12"E        |
| 0+140.00 | 31,935.1226m | -17,097.2669m | S19° 57' 57"E        |
| 0+160.00 | 31,916.8307m | -17,089.2486m | S30° 12' 21"E        |
| 0+180.00 | 31,902.0304m | -17,076.0263m | S54° 20' 03"E        |
| 0+200.00 | 31,894.3011m | -17,057.7583m | S79° 47' 55"E        |
| 0+220.00 | 31,894.1878m | -17,037.8324m | N83° 17' 03"E        |
| 0+240.00 | 31,897.1294m | -17,018.0509m | N81° 16' 31"E        |
| 0+260.00 | 31,899.3930m | -16,998.1891m | N87° 18' 45"E        |
| 0+280.00 | 31,897.8962m | -16,978.3072m | S77° 11' 04"E        |
| 0+300.00 | 31,890.3214m | -16,959.8971m | S58° 05' 09"E        |
| 0+320.00 | 31,877.1537m | -16,944.9626m | S39° 31' 58"E        |
| 0+340.00 | 31,860.4427m | -16,934.0321m | S28° 26' 11"E        |



|          |              |               |               |
|----------|--------------|---------------|---------------|
| 0+360.00 | 31,842.5928m | -16,925.0133m | S26° 20' 38"E |
|----------|--------------|---------------|---------------|

### 5.3. Račun kota kolnika

Corridor Name: corridorCESTE\_ZADNJI

Description:

Base Alignment Name: os ceste

Station Range: Start: 0+000.00, End: 0+366.77

CHAINAGE 0+000.00

| POINT | X            | Y           | Z        | OFFSET  | STRING CUT      |
|-------|--------------|-------------|----------|---------|-----------------|
| 1     | -17,168.6062 | 32,055.3378 | 253.8649 | -9.293m | Daylight        |
| 2     | -17,171.6950 | 32,052.0227 | 256.8855 | -4.762m | Hinge           |
| 3     | -17,171.6957 | 32,052.0220 | 256.6855 | -4.761m | EPS_Sub         |
| 4     | -17,172.3767 | 32,051.2911 | 256.9255 | -3.762m | Back_Curb       |
| 5     | -17,172.4585 | 32,051.2033 | 256.9255 | -3.642m | Top_Curb        |
| 6     | -17,172.4870 | 32,051.1728 | 256.7755 | -3.600m | Flowline_Gutter |
| 7     | -17,172.9301 | 32,050.6972 | 256.8330 | -2.950m | ETW_Pave1       |
| 8     | -17,172.9301 | 32,050.6972 | 256.8730 | -2.950m | ETW             |
| 9     | -17,172.9301 | 32,050.6972 | 256.4730 | -2.950m | ETW_Sub         |
| 10    | -17,172.9301 | 32,050.6972 | 256.7730 | -2.950m | ETW_Pave2       |
| 11    | -17,174.9411 | 32,048.5389 | 256.7993 | 0.000m  | Crown           |
| 12    | -17,174.9411 | 32,048.5389 | 256.3993 | 0.000m  | Crown_Sub       |
| 13    | -17,174.9411 | 32,048.5389 | 256.6993 | 0.000m  | Crown_Pave2     |
| 14    | -17,174.9411 | 32,048.5389 | 256.7593 | 0.000m  | Crown_Pave1     |
| 15    | -17,176.9521 | 32,046.3806 | 256.3255 | 2.950m  | ETW_Sub         |

|    |              |             |          |        |                 |
|----|--------------|-------------|----------|--------|-----------------|
| 16 | -17,176.9521 | 32,046.3806 | 256.6255 | 2.950m | ETW_Pave2       |
| 17 | -17,176.9521 | 32,046.3806 | 256.7255 | 2.950m | ETW             |
| 18 | -17,176.9521 | 32,046.3806 | 256.6855 | 2.950m | ETW_Pave1       |
| 19 | -17,177.3952 | 32,045.9051 | 256.6280 | 3.600m | Flowline_Gutter |
| 20 | -17,177.4236 | 32,045.8745 | 256.7780 | 3.642m | Top_Curb        |
| 21 | -17,177.5054 | 32,045.7867 | 256.7780 | 3.762m | Back_Curb       |
| 22 | -17,178.1864 | 32,045.0558 | 256.5380 | 4.761m | EPS_Sub         |
| 23 | -17,178.1871 | 32,045.0551 | 256.7380 | 4.762m | Hinge_Cut       |
| 24 | -17,178.7236 | 32,044.4793 | 258.3120 | 5.549m | Daylight        |

CHAINAGE 0+025.00

CHAINAGE 0+050.00

CHAINAGE 0+075.00

CHAINAGE 0+100.00

| <b>POINT</b> | <b>X</b>     | <b>Y</b>    | <b>Z</b> | <b>OFFSET</b> | <b>STRING CUT</b> |
|--------------|--------------|-------------|----------|---------------|-------------------|
| 1            | -17,101.1658 | 31,976.9860 | 259.9658 | -11.132m      | Daylight          |
| 2            | -17,107.0077 | 31,974.4447 | 264.2129 | -4.761m       | Hinge             |
| 3            | -17,107.0086 | 31,974.4443 | 264.0129 | -4.760m       | EPS_Sub           |
| 4            | -17,107.9247 | 31,974.0458 | 264.2529 | -3.761m       | Back_Curb         |
| 5            | -17,108.0347 | 31,973.9980 | 264.2529 | -3.641m       | Top_Curb          |
| 6            | -17,108.0730 | 31,973.9813 | 264.1029 | -3.600m       | Flowline_Gutter   |
| 7            | -17,108.6690 | 31,973.7220 | 264.1604 | -2.950m       | ETW_Pave1         |
| 8            | -17,108.6690 | 31,973.7220 | 264.2004 | -2.950m       | ETW               |

|    |              |             |          |         |                 |
|----|--------------|-------------|----------|---------|-----------------|
| 9  | -17,108.6690 | 31,973.7220 | 263.8004 | -2.950m | ETW_Sub         |
| 10 | -17,108.6690 | 31,973.7220 | 264.1004 | -2.950m | ETW_Pave2       |
| 11 | -17,111.3739 | 31,972.5454 | 264.1330 | 0.000m  | Crown           |
| 12 | -17,111.3739 | 31,972.5454 | 263.7330 | 0.000m  | Crown_Sub       |
| 13 | -17,111.3739 | 31,972.5454 | 264.0330 | 0.000m  | Crown_Pave2     |
| 14 | -17,111.3739 | 31,972.5454 | 264.0930 | 0.000m  | Crown_Pave1     |
| 15 | -17,115.0418 | 31,970.9498 | 263.6416 | 4.000m  | ETW_Sub         |
| 16 | -17,115.0418 | 31,970.9498 | 263.9416 | 4.000m  | ETW_Pave2       |
| 17 | -17,115.0418 | 31,970.9498 | 264.0416 | 4.000m  | ETW             |
| 18 | -17,115.0418 | 31,970.9498 | 264.0016 | 4.000m  | ETW_Pave1       |
| 19 | -17,115.6379 | 31,970.6905 | 263.9441 | 4.650m  | Flowline_Gutter |
| 20 | -17,115.6761 | 31,970.6739 | 264.0941 | 4.692m  | Top_Curb        |
| 21 | -17,115.7862 | 31,970.6260 | 264.0941 | 4.812m  | Back_Curb       |
| 22 | -17,116.7022 | 31,970.2275 | 263.8541 | 5.811m  | EPS_Sub         |
| 23 | -17,116.7032 | 31,970.2271 | 264.0541 | 5.812m  | Hinge_Cut       |
| 24 | -17,117.8496 | 31,969.7284 | 266.5546 | 7.062m  | Daylight        |

CHAINAGE 0+125.00

CHAINAGE 0+150.00

CHAINAGE 0+175.00

CHAINAGE 0+200.00

| <b>POINT</b> | <b>X</b>     | <b>Y</b>    | <b>Z</b> | <b>OFFSET</b> | <b>STRING CUT</b> |
|--------------|--------------|-------------|----------|---------------|-------------------|
| 1            | -17,054.6674 | 31,911.4776 | 263.5969 | -17.452m      | Daylight          |
| 2            | -17,056.5856 | 31,900.8181 | 270.8174 | -6.622m       | Hinge             |
| 3            | -17,056.5858 | 31,900.8172 | 270.6174 | -6.621m       | EPS_Sub           |
| 4            | -17,056.7627 | 31,899.8340 | 270.8574 | -5.622m       | Back_Curb         |
| 5            | -17,056.7839 | 31,899.7159 | 270.8574 | -5.502m       | Top_Curb          |
| 6            | -17,056.7913 | 31,899.6748 | 270.7074 | -5.460m       | Flowline_Gutter   |
| 7            | -17,056.9065 | 31,899.0351 | 270.7649 | -4.810m       | ETW_Pave1         |
| 8            | -17,056.9065 | 31,899.0351 | 270.8049 | -4.810m       | ETW               |
| 9            | -17,056.9065 | 31,899.0351 | 270.4049 | -4.810m       | ETW_Sub           |
| 10           | -17,056.9065 | 31,899.0351 | 270.7049 | -4.810m       | ETW_Pave2         |
| 11           | -17,057.7583 | 31,894.3011 | 271.1409 | 0.000m        | Crown             |
| 12           | -17,057.7583 | 31,894.3011 | 270.7409 | 0.000m        | Crown_Sub         |
| 13           | -17,057.7583 | 31,894.3011 | 271.0409 | 0.000m        | Crown_Pave2       |
| 14           | -17,057.7583 | 31,894.3011 | 271.1009 | 0.000m        | Crown_Pave1       |
| 15           | -17,058.2808 | 31,891.3978 | 270.9471 | 2.950m        | ETW_Sub           |
| 16           | -17,058.2808 | 31,891.3978 | 271.2471 | 2.950m        | ETW_Pave2         |
| 17           | -17,058.2808 | 31,891.3978 | 271.3471 | 2.950m        | ETW               |
| 18           | -17,058.2808 | 31,891.3978 | 271.3071 | 2.950m        | ETW_Pave1         |
| 19           | -17,058.3959 | 31,890.7580 | 271.2496 | 3.600m        | Flowline_Gutter   |
| 20           | -17,058.4033 | 31,890.7170 | 271.3996 | 3.642m        | Top_Curb          |
| 21           | -17,058.4246 | 31,890.5989 | 271.3996 | 3.762m        | Back_Curb         |
| 22           | -17,058.6015 | 31,889.6157 | 271.1596 | 4.761m        | EPS_Sub           |

|    |              |             |          |        |           |
|----|--------------|-------------|----------|--------|-----------|
| 23 | -17,058.6017 | 31,889.6147 | 271.3596 | 4.762m | Hinge_Cut |
| 24 | -17,058.7572 | 31,888.7503 | 273.1161 | 5.640m | Daylight  |

CHAINAGE 0+225.00

CHAINAGE 0+250.00

CHAINAGE 0+275.00

CHAINAGE 0+300.00

| POINT | X            | Y           | Z        | OFFSET   | STRING CUT      |
|-------|--------------|-------------|----------|----------|-----------------|
| 1     | -16,953.4251 | 31,900.7134 | 272.0443 | -12.243m | Daylight        |
| 2     | -16,957.3799 | 31,894.3633 | 277.0316 | -4.762m  | Hinge           |
| 3     | -16,957.3804 | 31,894.3624 | 276.8316 | -4.761m  | EPS_Sub         |
| 4     | -16,957.9085 | 31,893.5144 | 277.0716 | -3.762m  | Back_Curb       |
| 5     | -16,957.9720 | 31,893.4126 | 277.0716 | -3.642m  | Top_Curb        |
| 6     | -16,957.9940 | 31,893.3772 | 276.9216 | -3.600m  | Flowline_Gutter |
| 7     | -16,958.3376 | 31,892.8254 | 276.9791 | -2.950m  | ETW_Pave1       |
| 8     | -16,958.3376 | 31,892.8254 | 277.0191 | -2.950m  | ETW             |
| 9     | -16,958.3376 | 31,892.8254 | 276.6191 | -2.950m  | ETW_Sub         |
| 10    | -16,958.3376 | 31,892.8254 | 276.9191 | -2.950m  | ETW_Pave2       |
| 11    | -16,959.8971 | 31,890.3214 | 276.8480 | 0.000m   | Crown           |
| 12    | -16,959.8971 | 31,890.3214 | 276.4480 | 0.000m   | Crown_Sub       |
| 13    | -16,959.8971 | 31,890.3214 | 276.7480 | 0.000m   | Crown_Pave2     |
| 14    | -16,959.8971 | 31,890.3214 | 276.8080 | 0.000m   | Crown_Pave1     |

|    |              |             |          |        |                 |
|----|--------------|-------------|----------|--------|-----------------|
| 15 | -16,962.1967 | 31,886.6289 | 276.1957 | 4.350m | ETW_Sub         |
| 16 | -16,962.1967 | 31,886.6289 | 276.4957 | 4.350m | ETW_Pave2       |
| 17 | -16,962.1967 | 31,886.6289 | 276.5957 | 4.350m | ETW             |
| 18 | -16,962.1967 | 31,886.6289 | 276.5557 | 4.350m | ETW_Pave1       |
| 19 | -16,962.5404 | 31,886.0772 | 276.4982 | 5.000m | Flowline_Gutter |
| 20 | -16,962.5624 | 31,886.0418 | 276.6482 | 5.042m | Top_Curb        |
| 21 | -16,962.6259 | 31,885.9399 | 276.6482 | 5.162m | Back_Curb       |
| 22 | -16,963.1540 | 31,885.0919 | 276.4082 | 6.161m | EPS_Sub         |
| 23 | -16,963.1545 | 31,885.0911 | 276.6082 | 6.162m | Hinge_Cut       |
| 24 | -16,963.9041 | 31,883.8875 | 279.4441 | 7.580m | Daylight        |

CHAINAGE 0+325.00

CHAINAGE 0+350.00

## 5.4. Vertikalni tok trase

Vertical Alignment: NIVELETA

Description:

Station Range: Start: 0+000.00, End: 36+677.00

| PVI   | Station  | Grade Out | Curve Length |
|---|----------|-----------|--------------|
| 0.00  | 0+000.00 | 7.33%     |              |
| 1.00  | 0+180.00 | 5.71%     | 42.842m      |
| Vertical Curve Information:(crest curve) <hr/> PVC Station: 0+158.59 Elevation: 268.430m<br>PVI Station: 0+180.00 Elevation: 270.000m<br>PVT Station: 0+201.43 Elevation: 271.223m<br>High Point: 0+201.43 Elevation: 271.223m<br>Grade in: 7.33% Grade out: 5.71%<br>Change: 1.63% K:<br>Curve Length: 42.842m<br>Passing Distance: Stopping Distance: |          |           |              |
| 2.00  | 0+366.77 |           |              |

## 6. PRORAČUN KOLIČINE RADOVA

| <b>Station</b> | <b>Cut Area (Sq. m.)</b> | <b>Cut Volume (Cu. m.)</b> | <b>Reusable Volume (Cu. m.)</b> | <b>Fill Area (Sq. m.)</b> | <b>Fill Volume (Cu. m.)</b> | <b>Cum. Cut Vol. (Cu. m.)</b> | <b>Cum. Reusable Vol. (Cu. m.)</b> | <b>Cum. Fill Vol. (Cu. m.)</b> | <b>Cum. Net Vol. (Cu. m.)</b> |
|----------------|--------------------------|----------------------------|---------------------------------|---------------------------|-----------------------------|-------------------------------|------------------------------------|--------------------------------|-------------------------------|
| 0+000.000      | 5.60                     | 0.00                       | 0.00                            | 4.55                      | 0.00                        | 0.00                          | 0.00                               | 0.00                           | 0.00                          |
| 0+020.000      | 0.14                     | 57.42                      | 57.42                           | 20.98                     | 255.26                      | 57.42                         | 57.42                              | 255.26                         | 197.84                        |
| 0+024.087      | 0.10                     | 0.49                       | 0.49                            | 24.81                     | 93.56                       | 57.91                         | 57.91                              | 348.81                         | 290.90                        |
| 0+024.090      | 0.10                     | 0.00                       | 0.00                            | 24.81                     | 0.08                        | 57.91                         | 57.91                              | 348.90                         | 290.98                        |
| 0+040.000      | 0.00                     | 0.81                       | 0.81                            | 31.27                     | 449.48                      | 58.72                         | 58.72                              | 798.38                         | 739.66                        |
| 0+060.000      | 0.02                     | 0.24                       | 0.24                            | 32.80                     | 655.63                      | 58.96                         | 58.96                              | 1454.01                        | 1395.05                       |
| 0+064.086      | 0.12                     | 0.28                       | 0.28                            | 28.17                     | 128.73                      | 59.24                         | 59.24                              | 1582.75                        | 1523.51                       |
| 0+064.087      | 0.12                     | 0.00                       | 0.00                            | 28.17                     | 0.02                        | 59.24                         | 59.24                              | 1582.77                        | 1523.54                       |
| 0+080.000      | 3.53                     | 28.15                      | 28.15                           | 9.85                      | 313.50                      | 87.39                         | 87.39                              | 1896.27                        | 1808.88                       |
| 0+085.684      | 5.25                     | 24.25                      | 24.25                           | 10.31                     | 59.64                       | 111.64                        | 111.64                             | 1955.91                        | 1844.27                       |
| 0+085.685      | 5.25                     | 0.00                       | 0.00                            | 10.31                     | 0.00                        | 111.64                        | 111.64                             | 1955.92                        | 1844.27                       |
| 0+100.000      | 10.27                    | 108.55                     | 108.55                          | 7.83                      | 134.44                      | 220.19                        | 220.19                             | 2090.36                        | 1870.16                       |



|               |       |            |        |       |             |             |             |             |             |
|---------------|-------|------------|--------|-------|-------------|-------------|-------------|-------------|-------------|
| 0+120.<br>000 | 19.96 | 299.6<br>3 | 299.63 | 0.56  | 85.33       | 519.8<br>2  | 519.82      | 2175.<br>68 | 1655.<br>86 |
| 0+125.<br>684 | 24.38 | 125.9<br>9 | 125.99 | 2.54  | 8.79        | 645.8<br>2  | 645.82      | 2184.<br>47 | 1538.<br>66 |
| 0+137.<br>936 | 22.78 | 288.9<br>1 | 288.91 | 19.38 | 134.2<br>8  | 934.7<br>3  | 934.73      | 2318.<br>75 | 1384.<br>02 |
| 0+140.<br>000 | 18.61 | 42.72      | 42.72  | 20.27 | 40.92       | 977.4<br>4  | 977.44      | 2359.<br>67 | 1382.<br>22 |
| 0+160.<br>000 | 5.25  | 245.5<br>3 | 245.53 | 37.45 | 532.4<br>2  | 1222.<br>97 | 1222.9<br>7 | 2892.<br>09 | 1669.<br>11 |
| 0+180.<br>000 | 0.00  | 55.74      | 55.74  | 97.19 | 1118.<br>58 | 1278.<br>71 | 1278.7<br>1 | 4010.<br>66 | 2731.<br>95 |
| 0+199.<br>930 | 3.75  | 40.35      | 40.35  | 25.48 | 1016.<br>89 | 1319.<br>06 | 1319.0<br>6 | 5027.<br>55 | 3708.<br>49 |
| 0+200.<br>000 | 3.81  | 0.26       | 0.26   | 25.36 | 1.78        | 1319.<br>33 | 1319.3<br>3 | 5029.<br>33 | 3710.<br>00 |
| 0+220.<br>000 | 19.71 | 244.7<br>0 | 244.70 | 4.25  | 261.3<br>1  | 1564.<br>03 | 1564.0<br>3 | 5290.<br>64 | 3726.<br>61 |
| 0+229.<br>930 | 18.62 | 192.1<br>9 | 192.19 | 2.73  | 33.76       | 1756.<br>22 | 1756.2<br>2 | 5324.<br>40 | 3568.<br>18 |
| 0+237.<br>356 | 13.07 | 117.6<br>8 | 117.68 | 6.09  | 32.75       | 1873.<br>90 | 1873.9<br>0 | 5357.<br>15 | 3483.<br>25 |
| 0+237.<br>360 | 13.07 | 0.06       | 0.06   | 6.10  | 0.03        | 1873.<br>96 | 1873.9<br>6 | 5357.<br>18 | 3483.<br>22 |
| 0+240.<br>000 | 12.84 | 34.20      | 34.20  | 7.77  | 18.31       | 1908.<br>16 | 1908.1<br>6 | 5375.<br>49 | 3467.<br>33 |
| 0+260.<br>000 | 14.64 | 268.4<br>9 | 268.49 | 13.55 | 219.6<br>3  | 2176.<br>65 | 2176.6<br>5 | 5595.<br>11 | 3418.<br>46 |
| 0+277.<br>355 | 8.69  | 189.7<br>7 | 189.77 | 22.62 | 337.6<br>1  | 2366.<br>42 | 2366.4<br>2 | 5932.<br>72 | 3566.<br>31 |

|               |       |            |        |       |            |             |             |             |                  |
|---------------|-------|------------|--------|-------|------------|-------------|-------------|-------------|------------------|
| 0+277.<br>356 | 8.69  | 0.00       | 0.00   | 22.62 | 0.01       | 2366.<br>42 | 2366.4<br>2 | 5932.<br>73 | -<br>3566.<br>31 |
| 0+280.<br>000 | 8.53  | 21.01      | 21.01  | 21.50 | 64.02      | 2387.<br>43 | 2387.4<br>3 | 5996.<br>75 | -<br>3609.<br>32 |
| 0+300.<br>000 | 10.36 | 174.9<br>9 | 174.99 | 14.99 | 400.5<br>6 | 2562.<br>42 | 2562.4<br>2 | 6397.<br>32 | -<br>3834.<br>89 |
| 0+313.<br>240 | 12.90 | 143.3<br>4 | 143.34 | 4.80  | 143.3<br>6 | 2705.<br>77 | 2705.7<br>7 | 6540.<br>67 | -<br>3834.<br>91 |
| 0+313.<br>241 | 12.90 | 0.00       | 0.00   | 4.80  | 0.00       | 2705.<br>77 | 2705.7<br>7 | 6540.<br>68 | -<br>3834.<br>90 |
| 0+320.<br>000 | 16.69 | 93.58      | 93.58  | 3.99  | 31.92      | 2799.<br>36 | 2799.3<br>6 | 6572.<br>59 | -<br>3773.<br>24 |
| 0+340.<br>000 | 12.75 | 282.2<br>2 | 282.22 | 8.02  | 125.8<br>3 | 3081.<br>58 | 3081.5<br>8 | 6698.<br>42 | -<br>3616.<br>85 |
| 0+353.<br>240 | 5.13  | 117.0<br>8 | 117.08 | 11.20 | 128.9<br>8 | 3198.<br>66 | 3198.6<br>6 | 6827.<br>40 | -<br>3628.<br>74 |
| 0+353.<br>240 | 5.13  | 0.00       | 0.00   | 11.20 | 0.00       | 3198.<br>66 | 3198.6<br>6 | 6827.<br>40 | -<br>3628.<br>74 |
| 0+360.<br>000 | 5.78  | 36.87      | 36.87  | 10.81 | 74.38      | 3235.<br>52 | 3235.5<br>2 | 6901.<br>78 | -<br>3666.<br>26 |
| 0+366.<br>766 | 6.97  | 43.11      | 43.11  | 8.11  | 63.99      | 3278.<br>64 | 3278.6<br>4 | 6965.<br>77 | -<br>3687.<br>13 |

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