

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.

SVEUČILIŠTE U SPLITU
FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE

Idejni projekt lokalne ceste

Završni rad

Split, 2019.

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 elemeti 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 RAZVRSTAVANJE		PROJEKTNNA BRZINA V_p (km/h) / NAGIB s_{max} (%)							
KAT.	Razina 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** 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

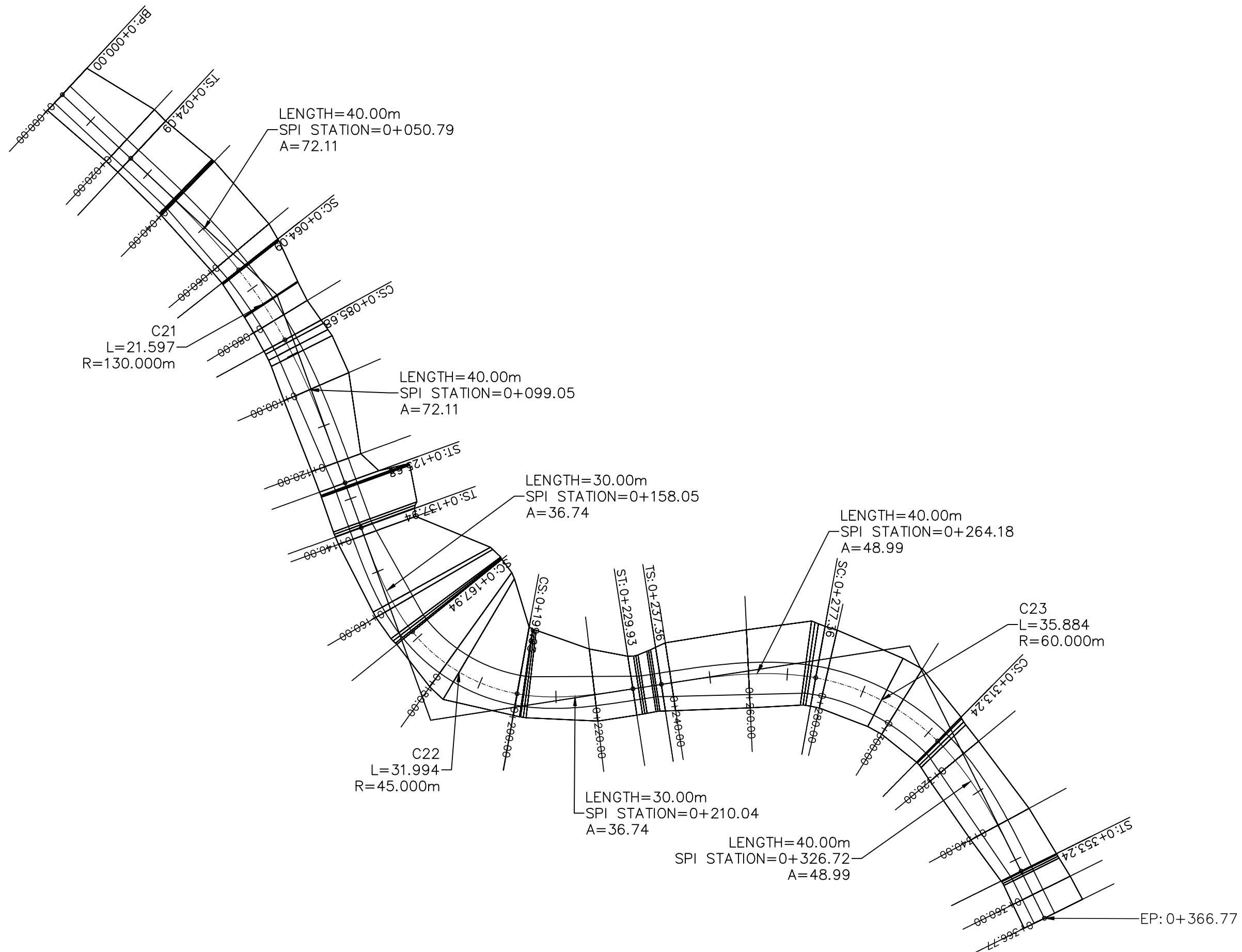
Odvodnja prometnice predviđa izvedbu otvorenog sustava odvodnje kojim se vrši prihvat voda s kolnika i pribrežnih voda izvedbom betonskih rigola. Uzdužnim i poprečnim nagibima kolnika vode se usmjeravaju u betonske rigole u koje se vrši i prihvat pribrežnih voda u usjecima i ispuštaju u teren. Dio kolničkih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

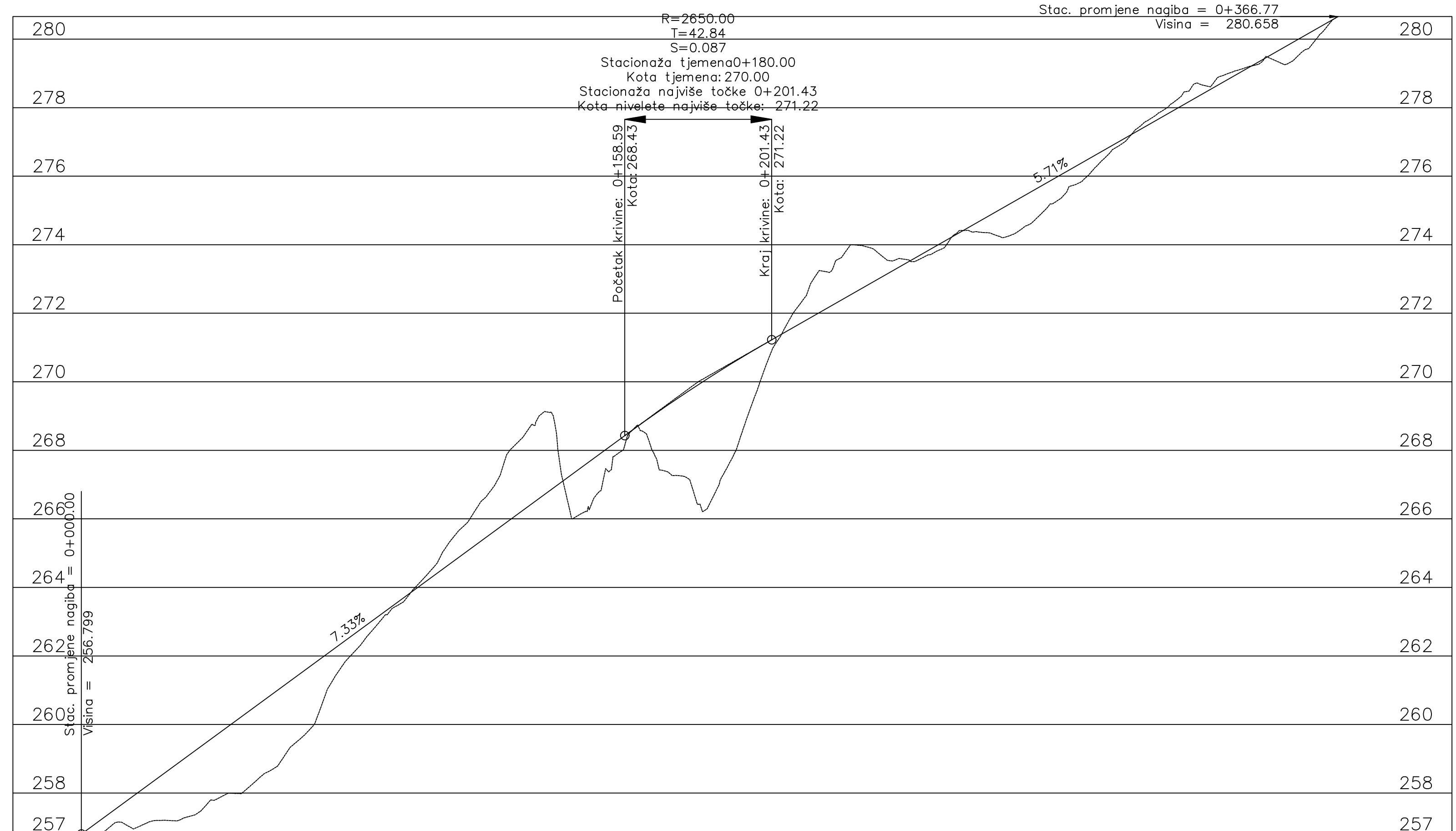
3.1. Situacija M 1:1000



 SVEUČILIŠTE U SPLITU FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE 21000 SPLIT, MATICE HRVATSKE 15	Završni rad		
	TEMA		
	Idejni projekt ceste		
	STUDENTI		
	Radić Tomislav		
SADRŽAJ	Građevinska situacija	MJERILO	1:1000
DATUM	lipanj 2019.	BROJ PRILOGA	1

3.2. Uzdužni presjek 1:1000/100

os ceste PROFILE

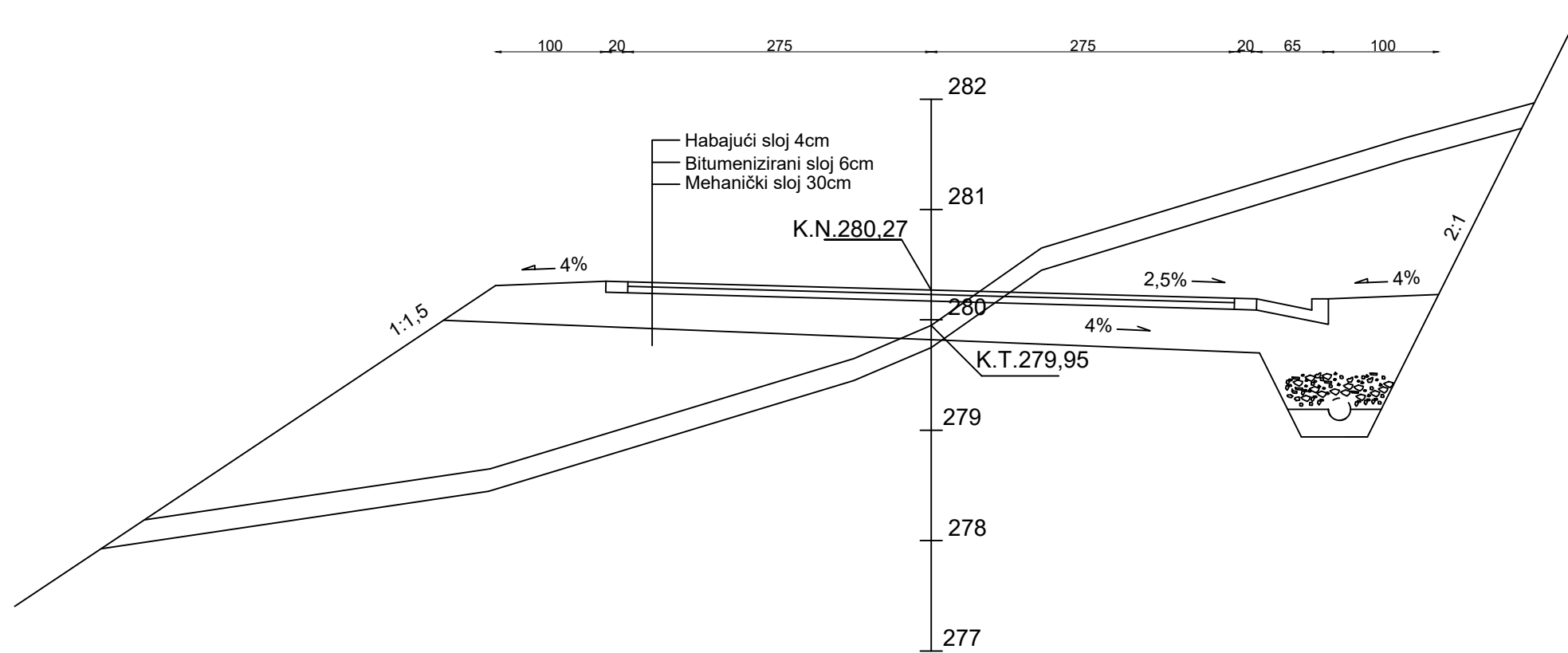



Stacionaža	0+026.00, 0+010.00, 0+000.00, 0+010.00, 0+010.00, 0+020.00, 0+030.00, 0+040.00, 0+050.00, 0+060.00, 0+070.00, 0+080.00, 0+090.00, 0+100.00, 0+110.00, 0+120.00, 0+130.00, 0+140.00, 0+150.00, 0+160.00, 0+170.00, 0+180.00, 0+190.00, 0+200.00, 0+210.00, 0+220.00, 0+230.00, 0+240.00, 0+250.00, 0+260.00, 0+270.00, 0+280.00, 0+290.00, 0+300.00, 0+310.00, 0+320.00, 0+330.00, 0+340.00, 0+350.00, 0+360.00, 0+370.00, 0+380.00, 0+390.00, 0+400.00
Kote nivelete	256.80, 257.53, 258.27, 259.00, 259.73, 260.47, 261.20, 261.93, 262.67, 263.40, 264.13, 264.87, 265.64, 266.90, 268.55, 267.07, 267.80, 268.53, 269.24, 269.91, 270.55, 271.14, 271.71, 272.28, 272.85, 273.42, 273.99, 274.57, 275.14, 275.71, 276.28, 276.85, 277.42, 277.99, 278.56, 279.13, 279.70, 280.27, 280.84, 281.41, 281.98, 282.55, 283.12, 283.69, 284.26, 284.83, 285.40, 285.97, 286.54, 287.11, 287.68, 288.25, 288.82, 289.39, 289.96, 290.53, 291.10, 291.67, 292.24, 292.81, 293.38, 293.95, 294.52, 295.09, 295.66, 296.23, 296.80, 297.37, 297.94, 298.51, 299.08, 299.65, 300.22, 300.79, 301.36, 301.93, 302.50, 303.07, 303.64, 304.21, 304.78, 305.35, 305.92, 306.49, 307.06, 307.63, 308.20, 308.77, 309.34, 309.91, 310.48, 311.05, 311.62, 312.19, 312.76, 313.33, 313.90, 314.47, 315.04, 315.61, 316.18, 316.75, 317.32, 317.89, 318.46, 319.03, 319.60, 320.17, 320.74, 321.31, 321.88, 322.45, 323.02, 323.59, 324.16, 324.73, 325.30, 325.87, 326.44, 327.01, 327.58, 328.15, 328.72, 329.29, 329.86, 330.43, 331.00, 331.57, 332.14, 332.71, 333.28, 333.85, 334.42, 334.99, 335.56, 336.13, 336.70, 337.27, 337.84, 338.41, 338.98, 339.55, 340.12, 340.69, 341.26, 341.83, 342.40, 342.97, 343.54, 344.11, 344.68, 345.25, 345.82, 346.39, 346.96, 347.53, 348.10, 348.67, 349.24, 349.81, 350.38, 350.95, 351.52, 352.09, 352.66, 353.23, 353.80, 354.37, 354.94, 355.51, 356.08, 356.65, 357.22, 357.79, 358.36, 358.93, 359.50, 360.07, 360.64, 361.21, 361.78, 362.35, 362.92, 363.49, 364.06, 364.63, 365.20, 365.77, 366.34, 366.91, 367.48, 368.05, 368.62, 369.19, 369.76, 370.33, 370.90, 371.47, 372.04, 372.61, 373.18, 373.75, 374.32, 374.89, 375.46, 376.03, 376.60, 377.17, 377.74, 378.31, 378.88, 379.45, 380.02, 380.59, 381.16, 381.73, 382.30, 382.87, 383.44, 384.01, 384.58, 385.15, 385.72, 386.29, 386.86, 387.43, 388.00, 388.57, 389.14, 389.71, 390.28, 390.85, 391.42, 391.99, 392.56, 393.13, 393.70, 394.27, 394.84, 395.41, 395.98, 396.55, 397.12, 397.69, 398.26, 398.83, 399.40, 399.97, 400.54, 401.11, 401.68, 402.25, 402.82, 403.39, 403.96, 404.53, 405.10, 405.67, 406.24, 406.81, 407.38, 407.95, 408.52, 409.09, 409.66, 410.23, 410.80, 411.37, 411.94, 412.51, 413.08, 413.65, 414.22, 414.79, 415.36, 415.93, 416.50, 417.07, 417.64, 418.21, 418.78, 419.35, 419.92, 420.49, 421.06, 421.63, 422.20, 422.77, 423.34, 423.91, 424.48, 425.05, 425.62, 426.19, 426.76, 427.33, 427.90, 428.47, 429.04, 429.61, 430.18, 430.75, 431.32, 431.89, 432.46, 433.03, 433.60, 434.17, 434.74, 435.31, 435.88, 436.45, 437.02, 437.59, 438.16, 438.73, 439.30, 439.87, 440.44, 441.01, 441.58, 442.15, 442.72, 443.29, 443.86, 444.43, 445.00, 445.57, 446.14, 446.71, 447.28, 447.85, 448.42, 448.99, 449.56, 450.13, 450.70, 451.27, 451.84, 452.41, 452.98, 453.55, 454.12, 454.69, 455.26, 455.83, 456.40, 456.97, 457.54, 458.11, 458.68, 459.25, 459.82, 460.39, 460.96, 461.53, 462.10, 462.67, 463.24, 463.81, 464.38, 464.95, 465.52, 466.09, 466.66, 467.23, 467.80, 468.37, 468.94, 469.51, 470.08, 470.65, 471.22, 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3.3. Normalni poprečni presjek 1:50

NORMALNI POPREČNI PRESJEK

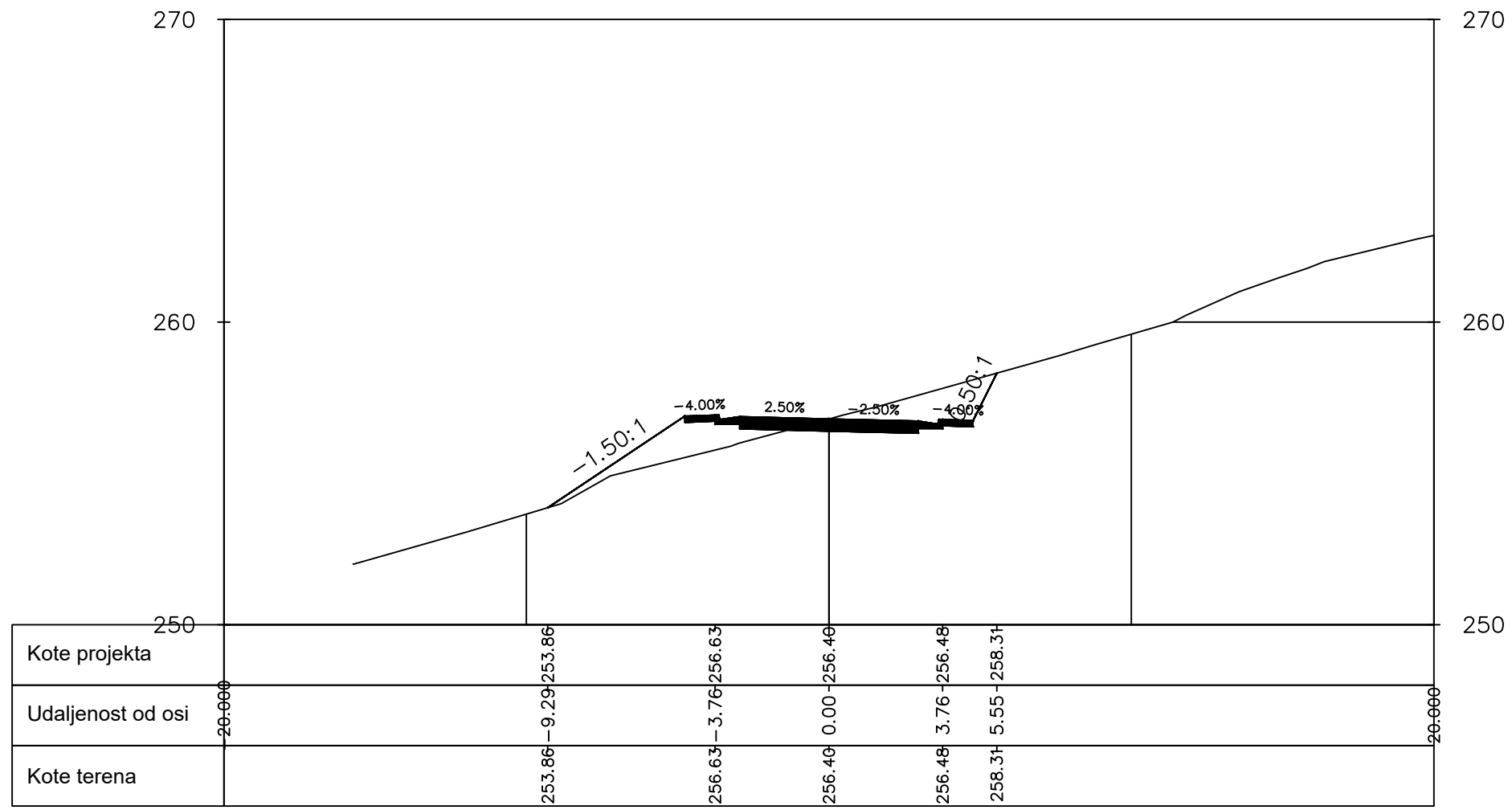
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KOTA NIVELETE: 280,27



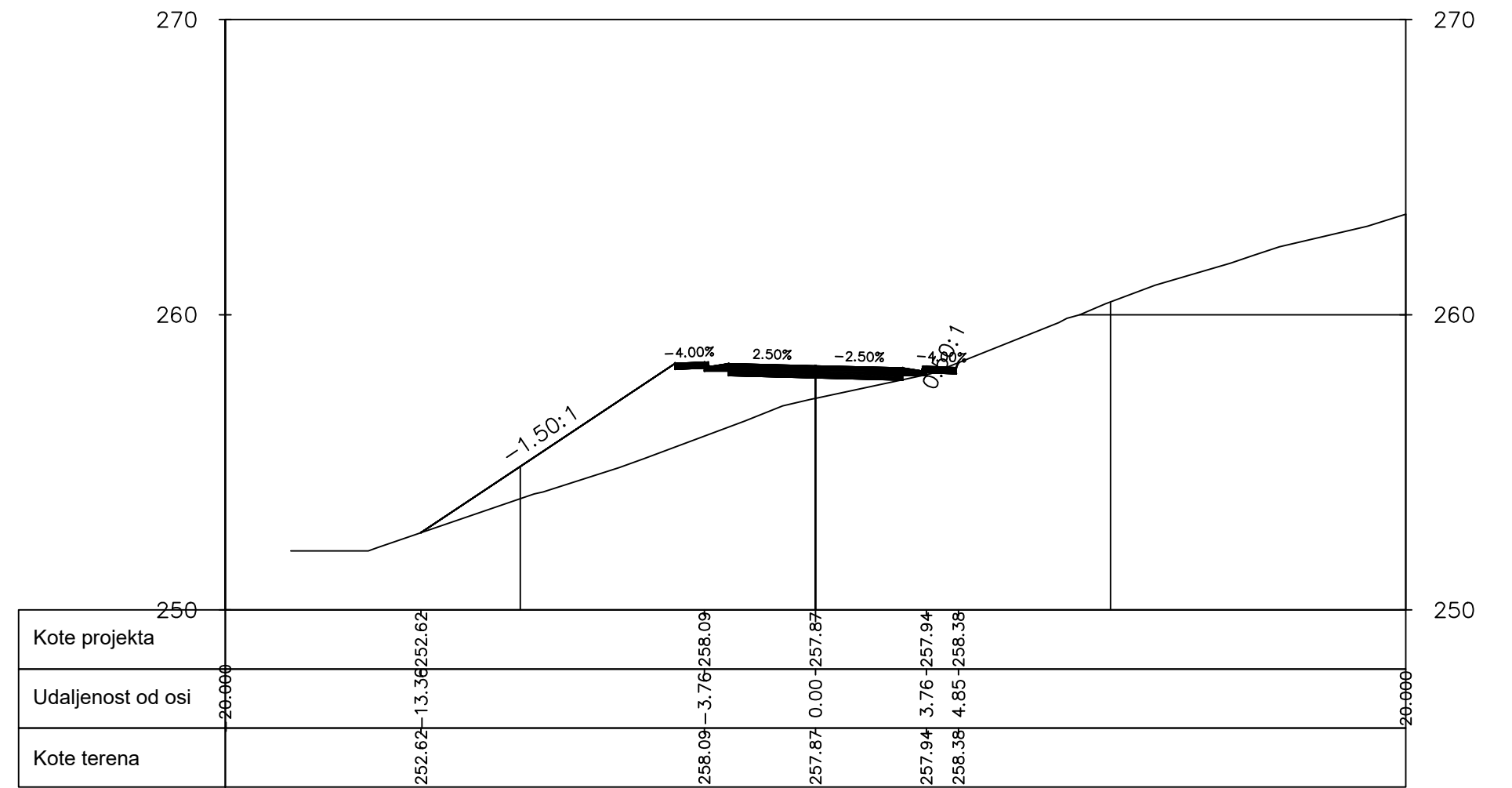
 SVEUČILIŠTE U SPLITU FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE 21000 SPLIT, MATICE HRVATSKE 15	Završni rad	
	TEMA	Idejni projekt ceste
	STUDENTI	Radić Tomislav
	SADRŽAJ	Normalni poprečni presjek
DATUM	lipanj 2019.	MJERILO 1:50 BROJ PRILOGA 3

3.4. Karakteristični poprečni presjeci M 1:200

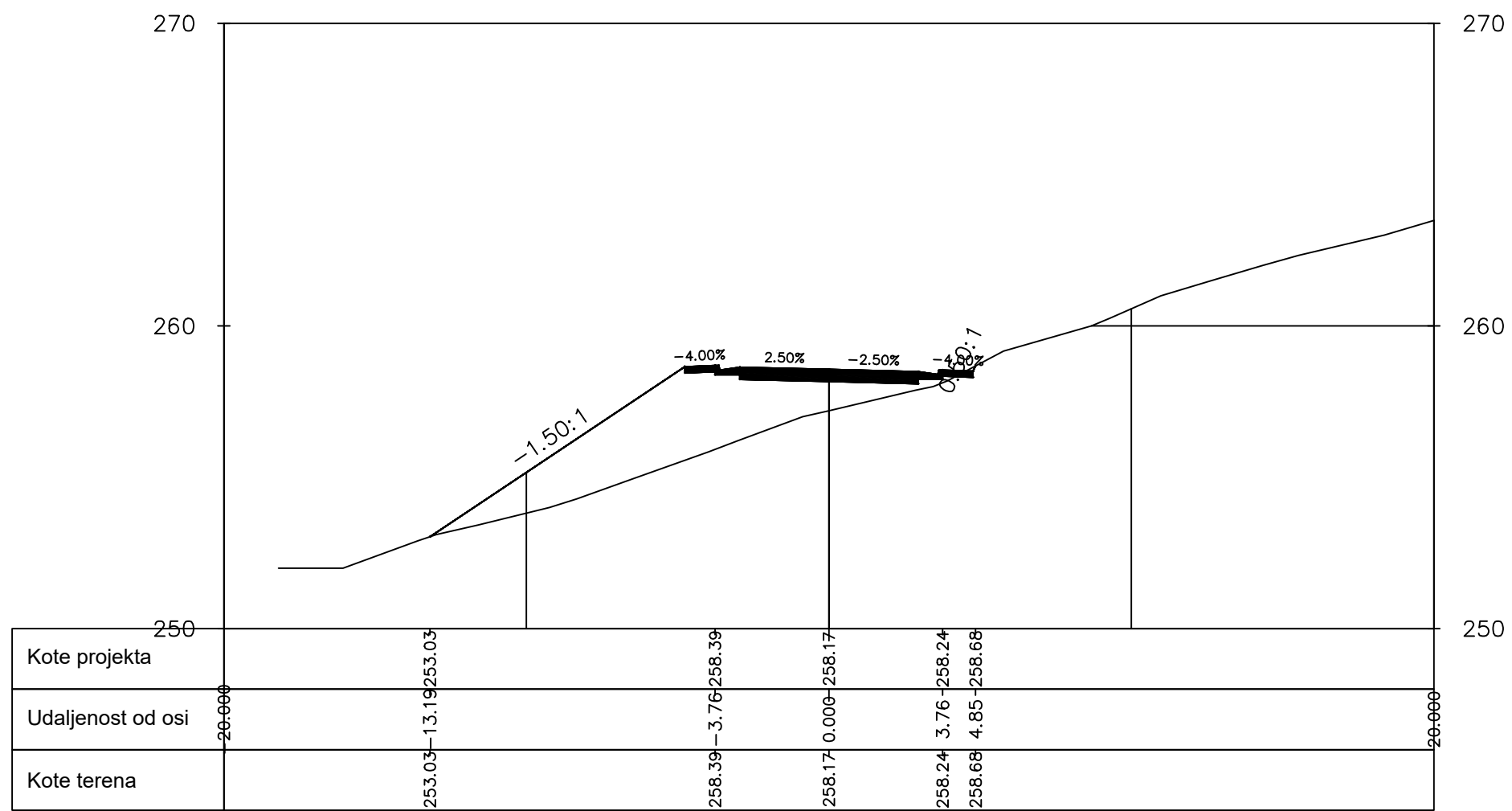
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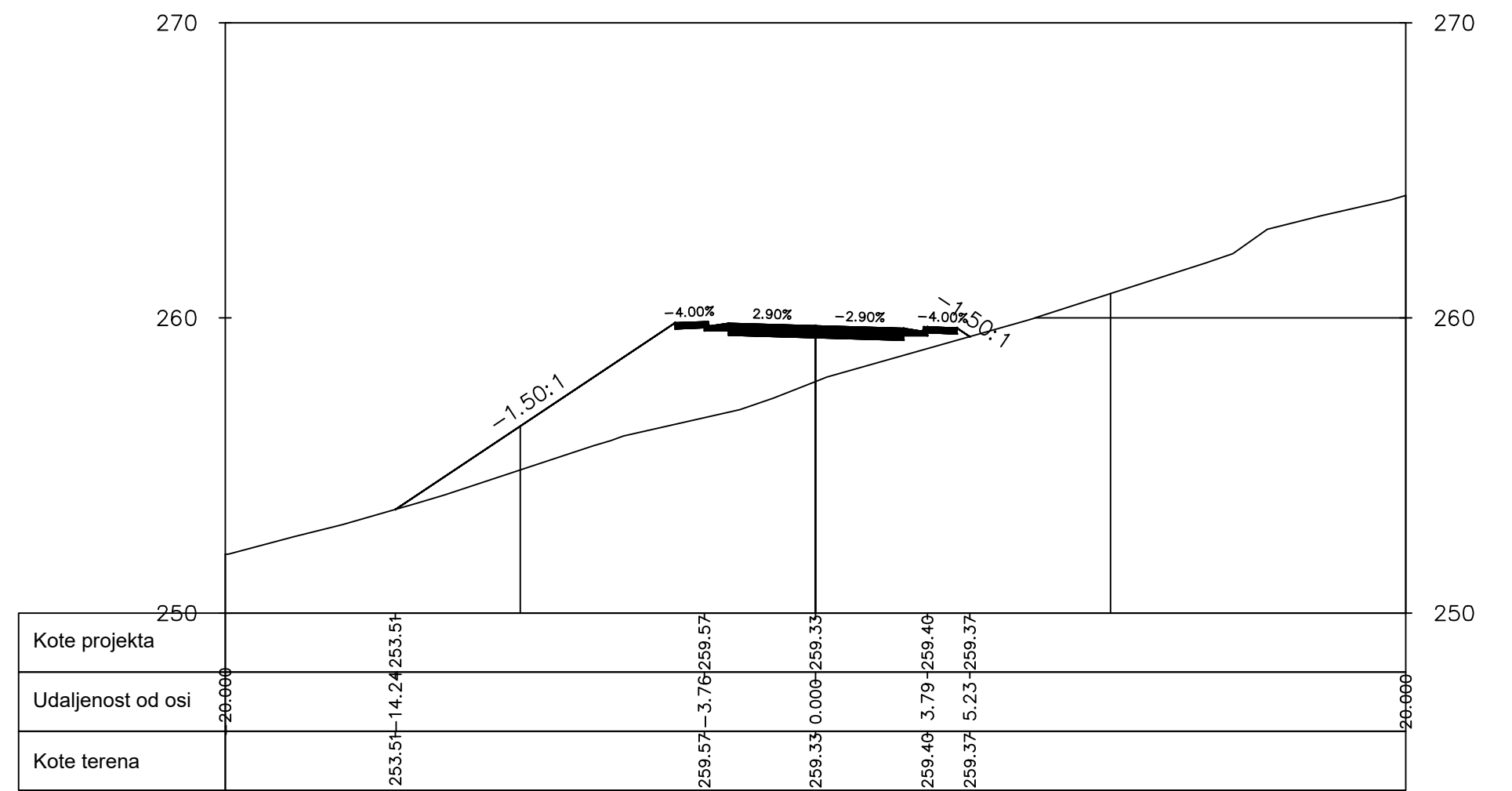
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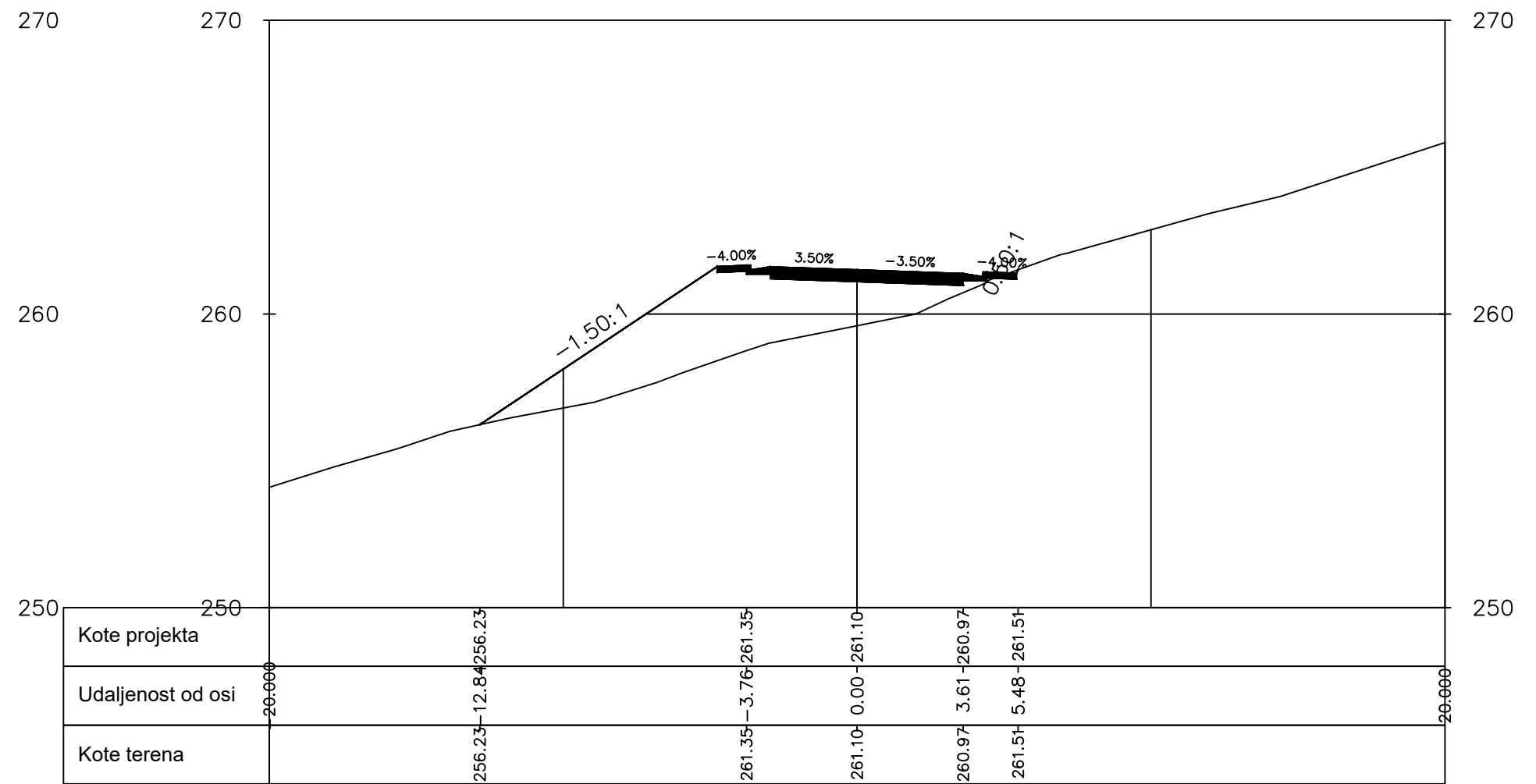
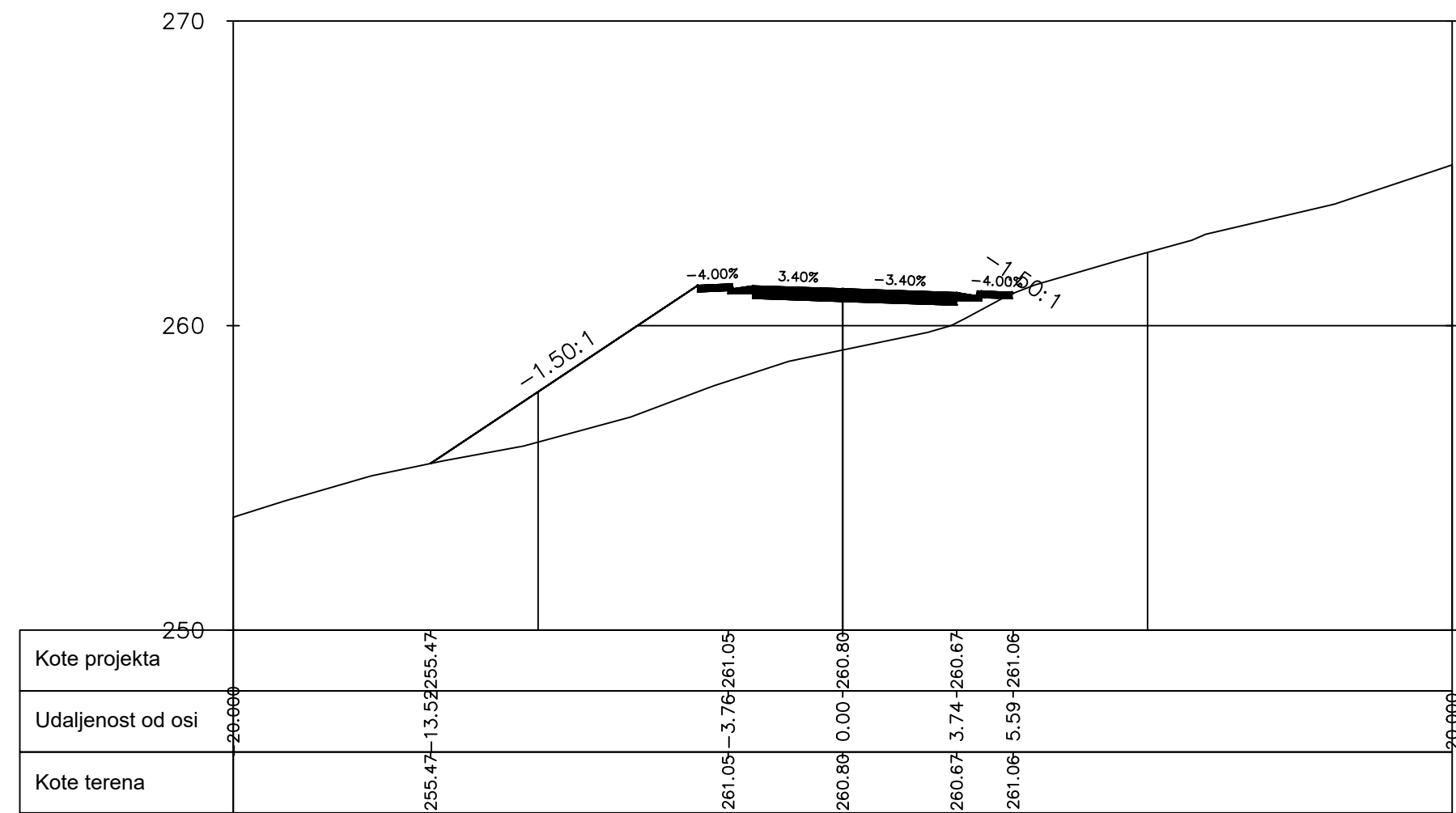


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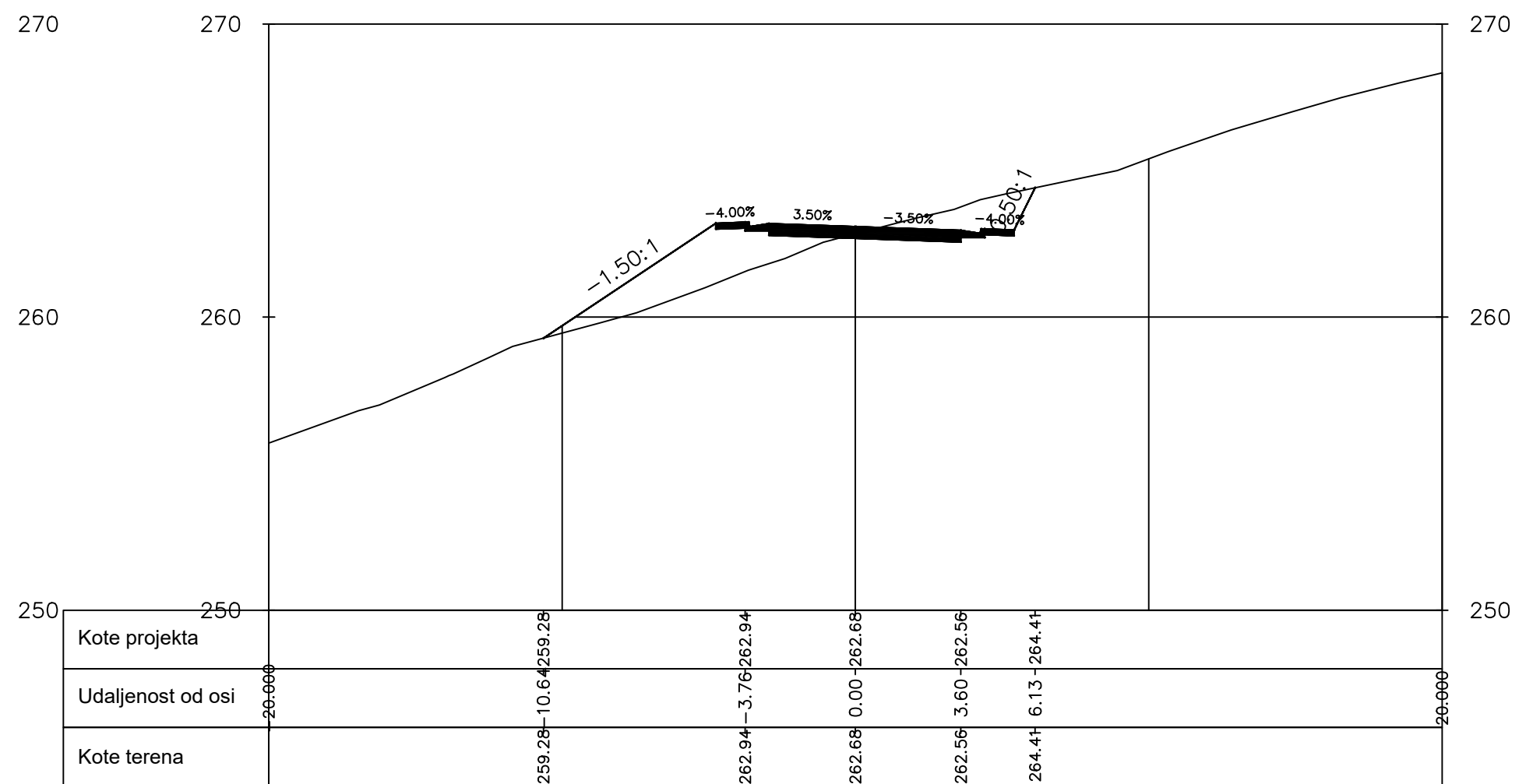
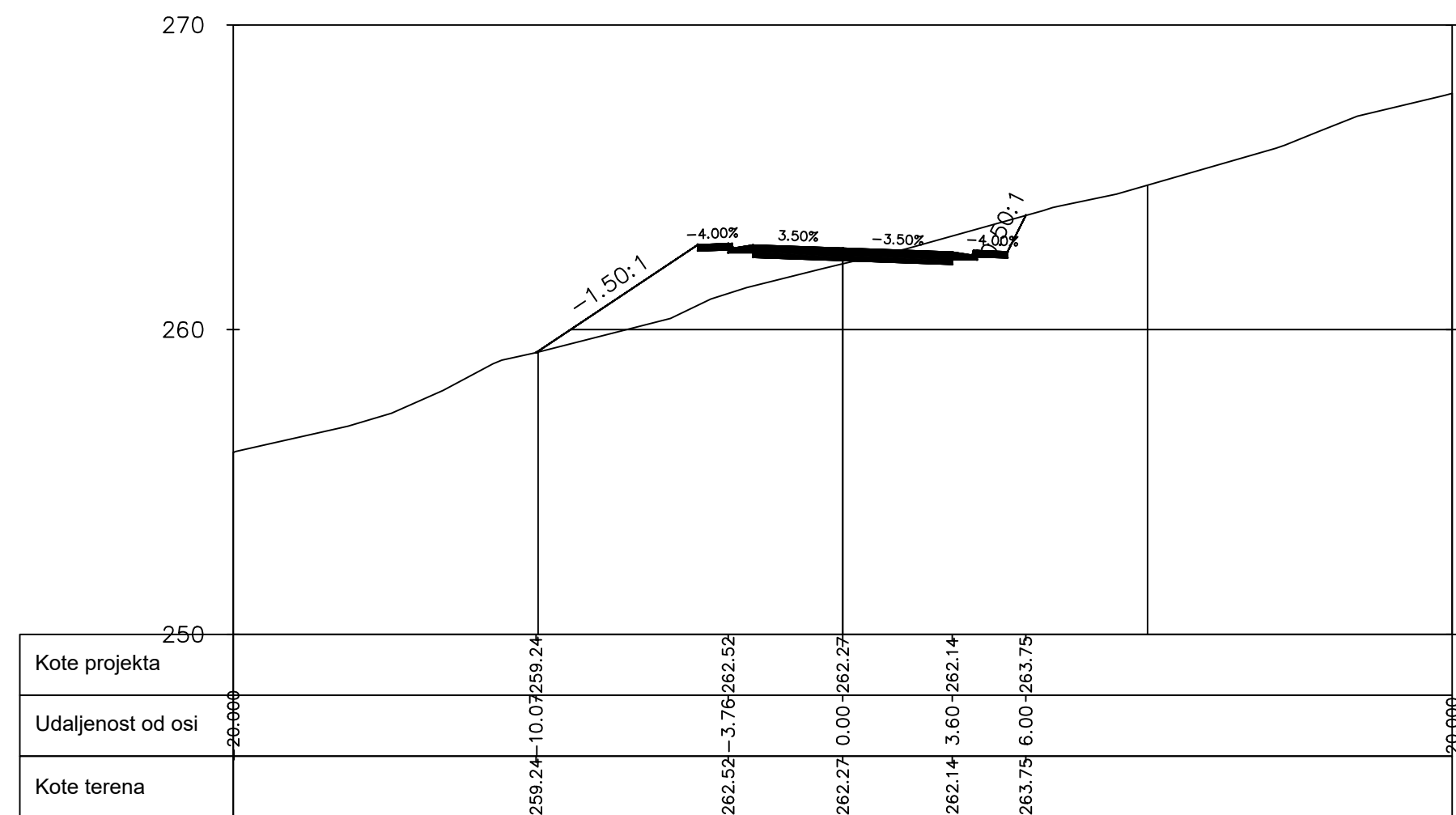
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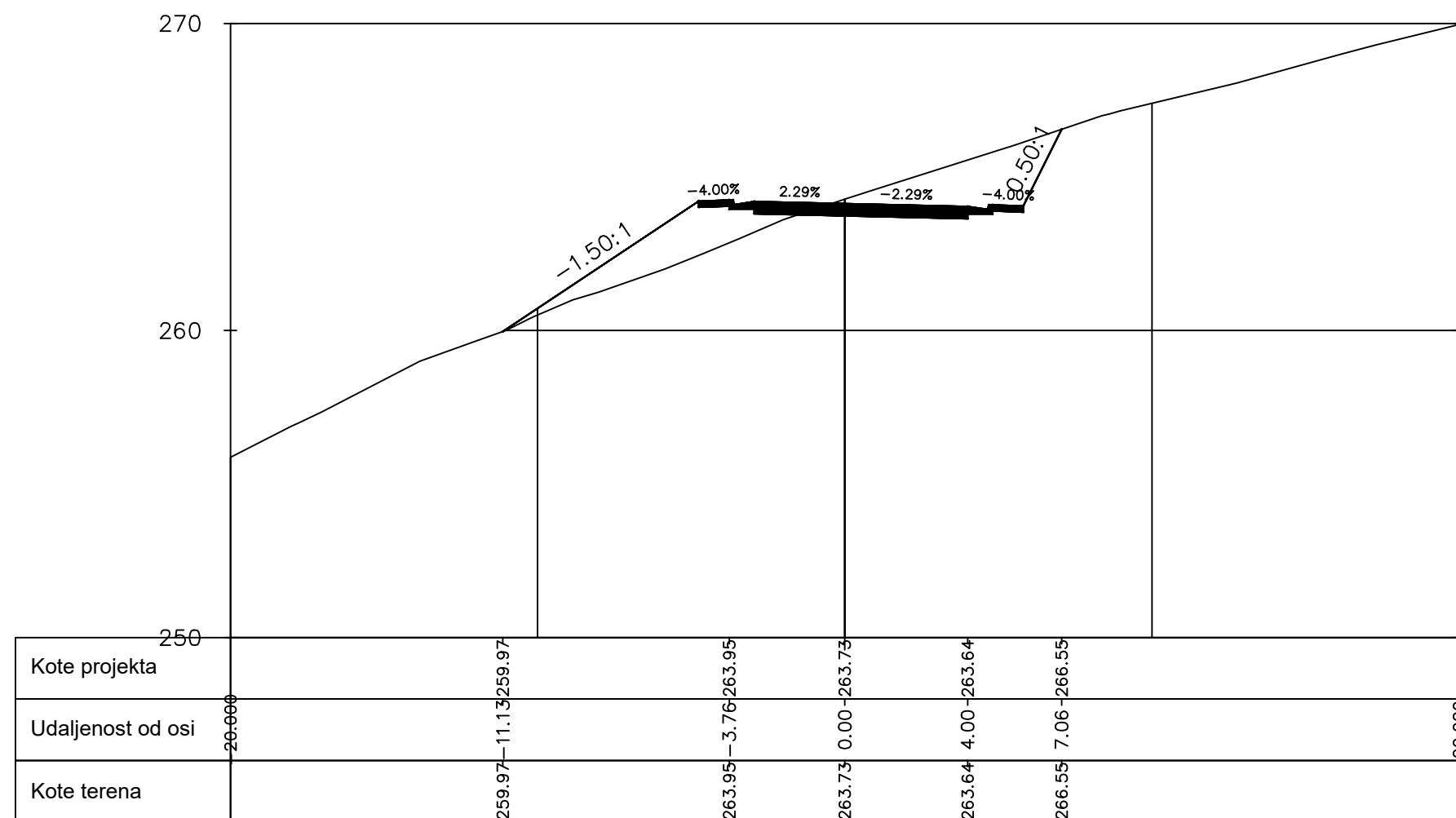


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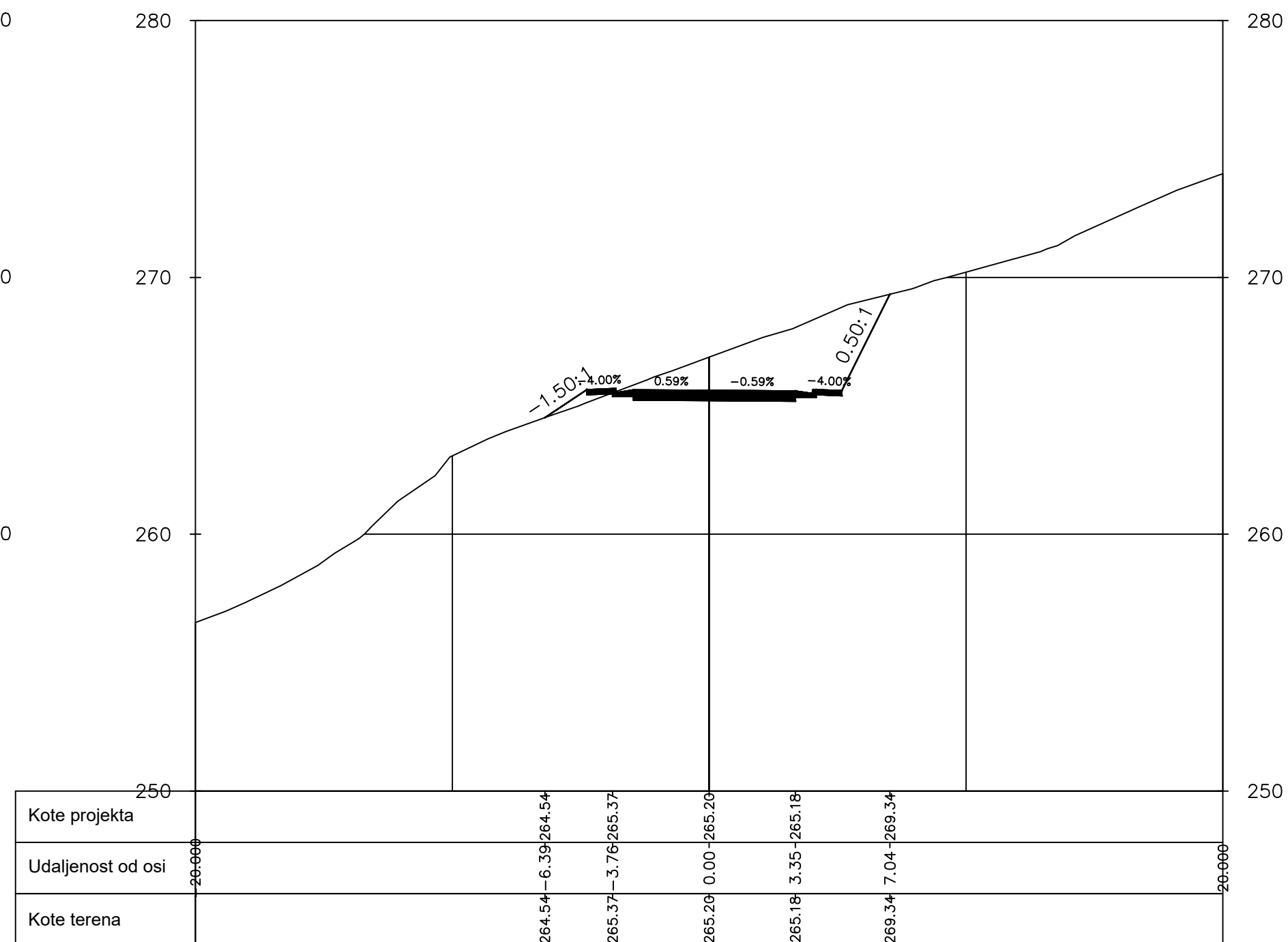
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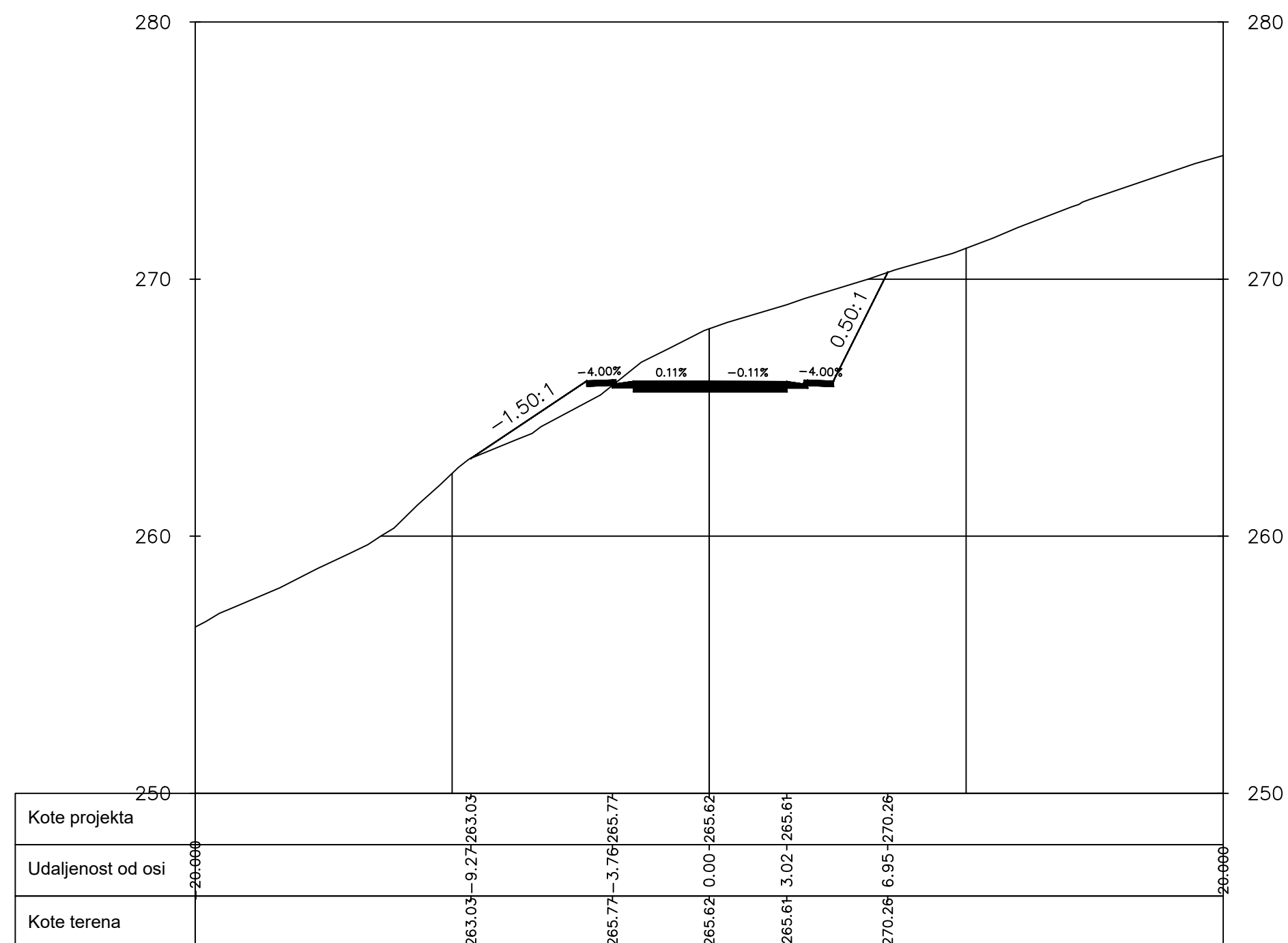
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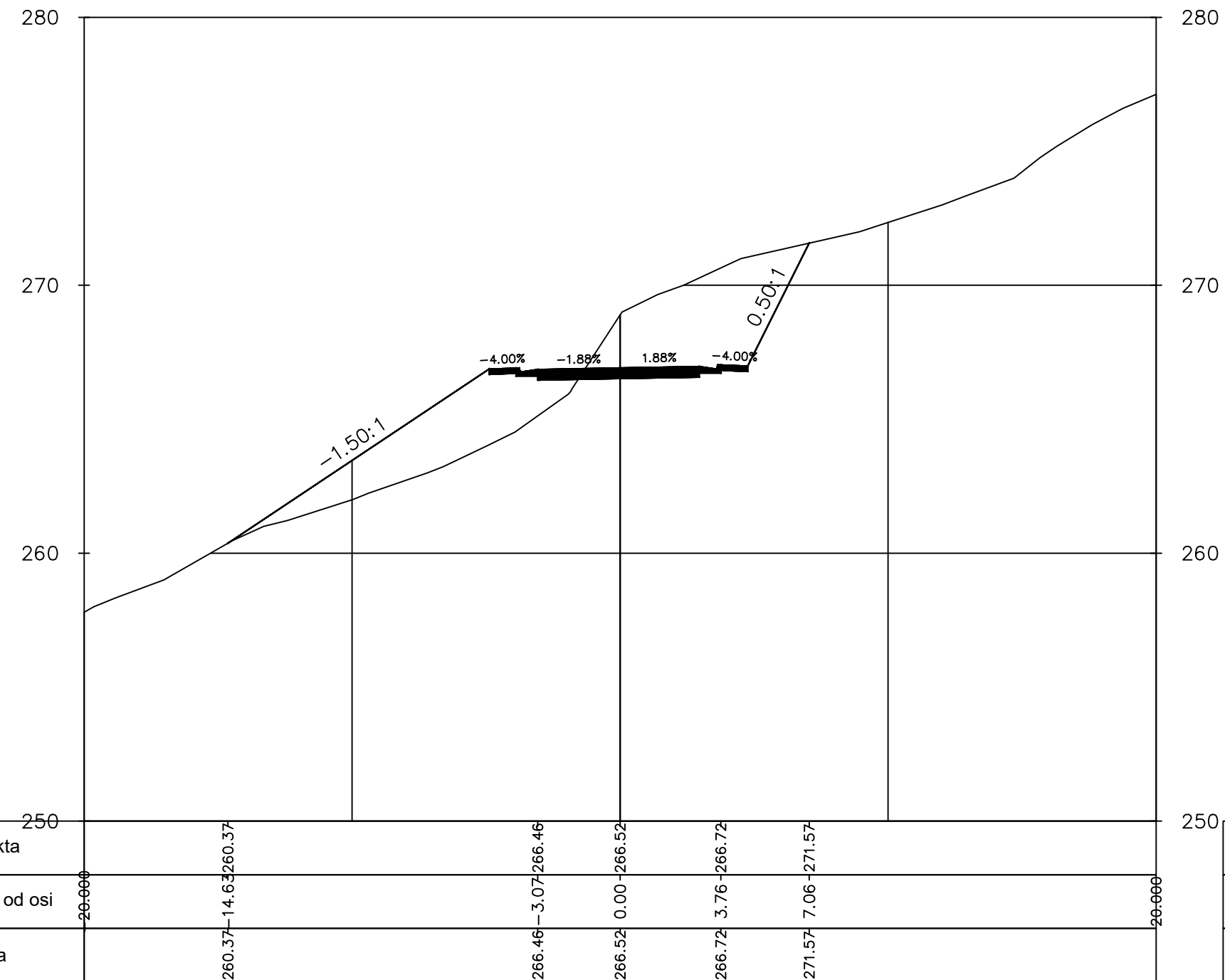
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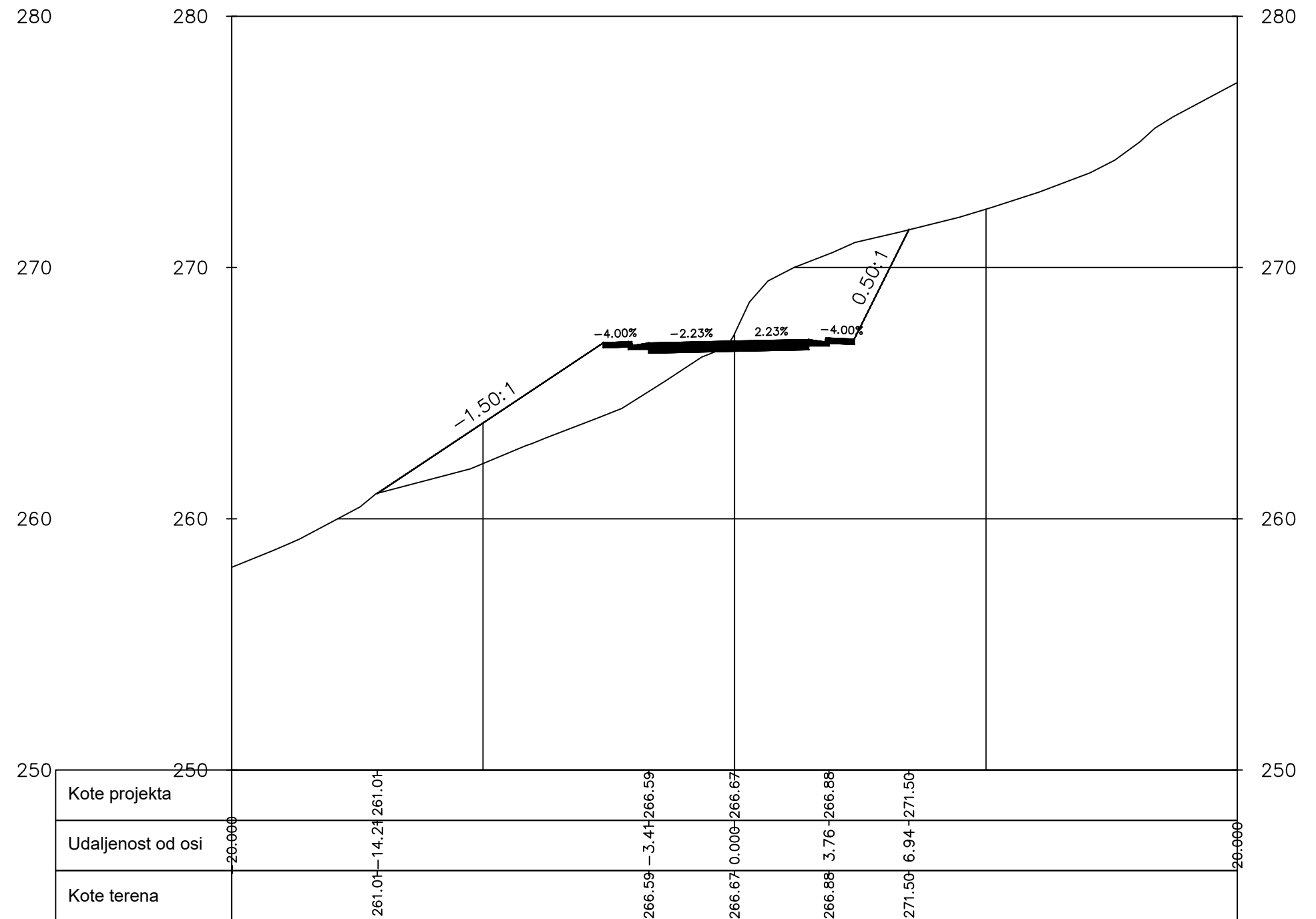
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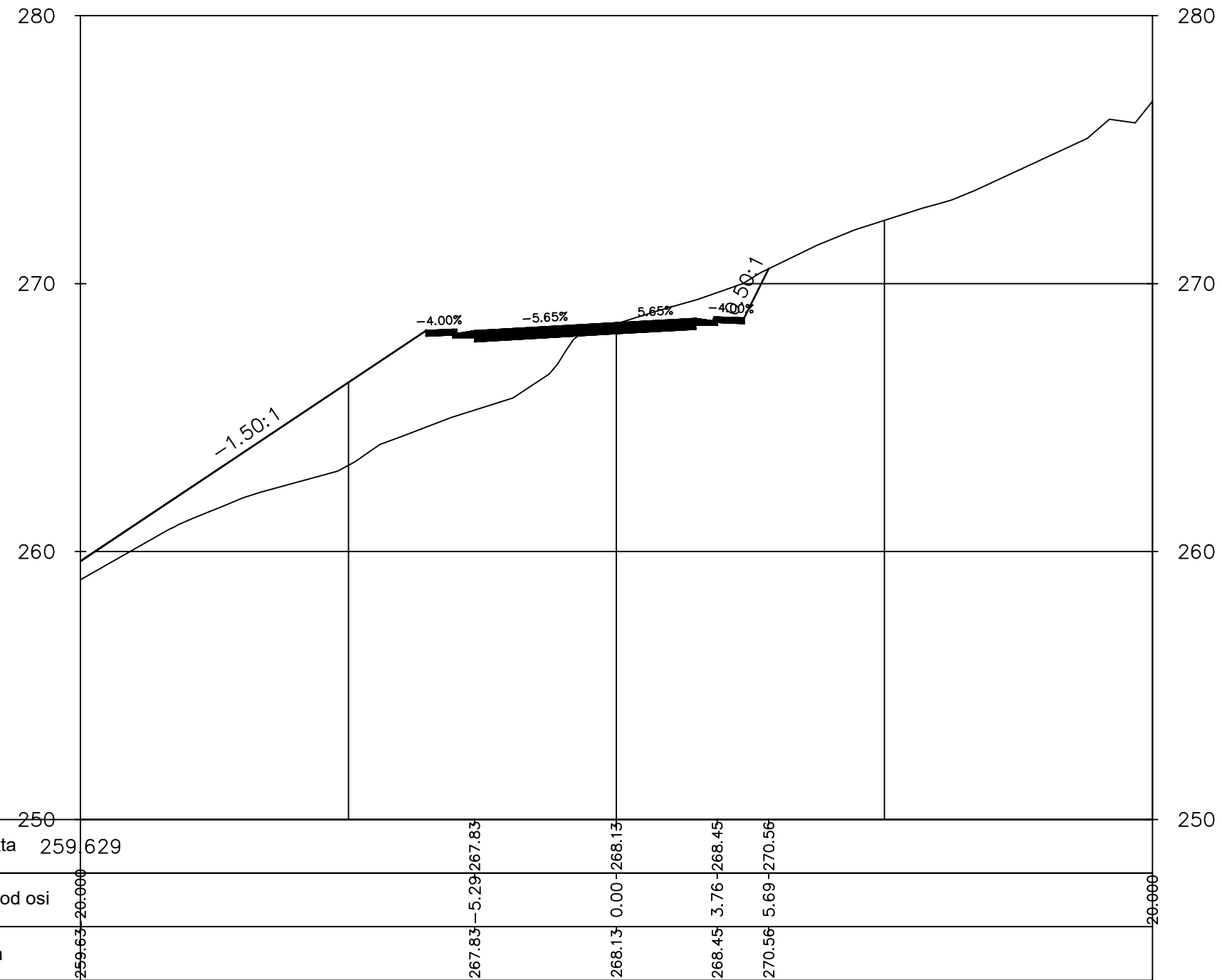
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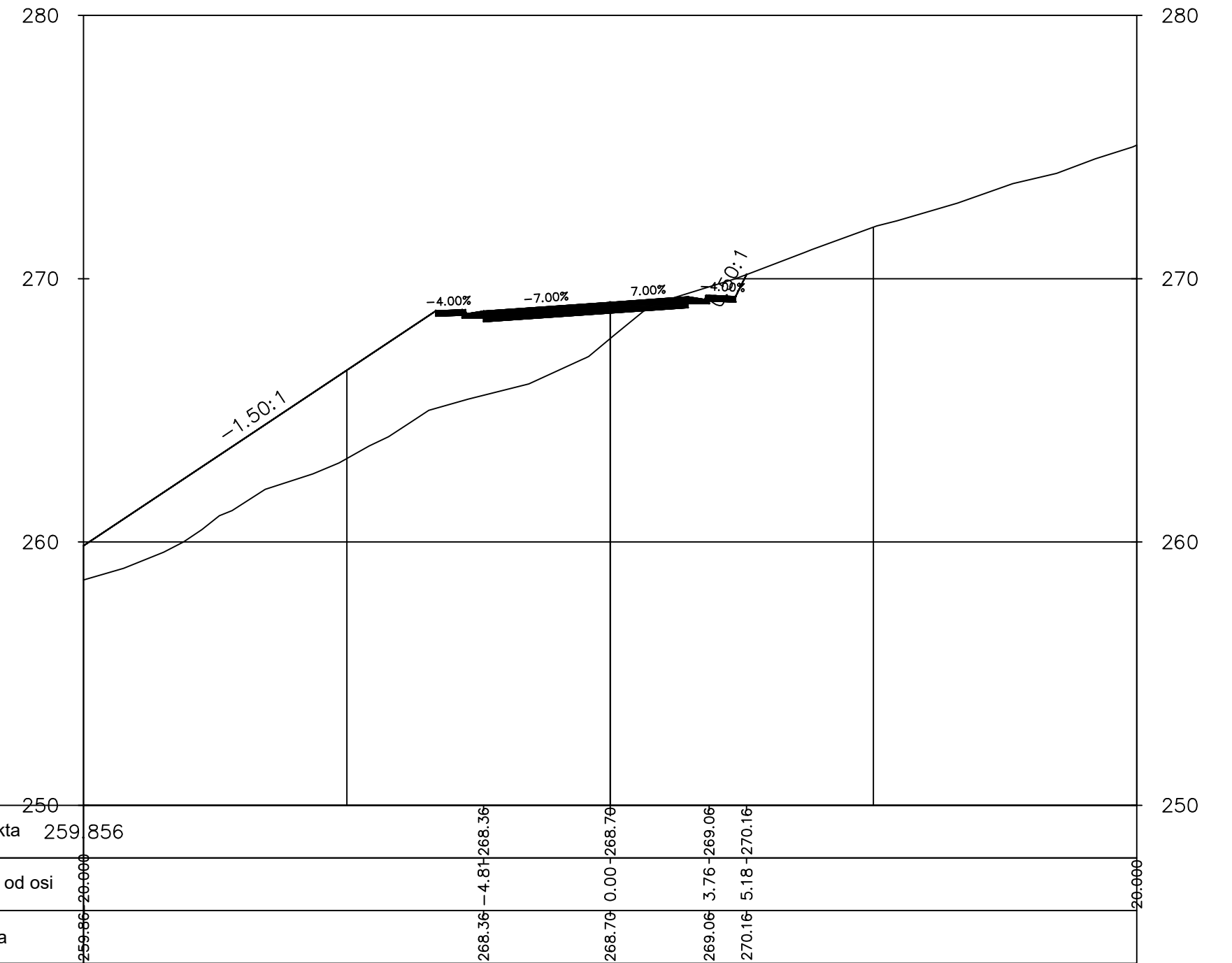
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SVEUČILIŠTE U SPLITU
 FAKULTET GRAĐEVINARSTVA,
 ARHITEKTURE I GEODEZIJE
 21000 SPLIT, MATICE HRVATSKE 15

Završni rad

TEMA Idejni projekt ceste

STUDENTI Radić Tomislav

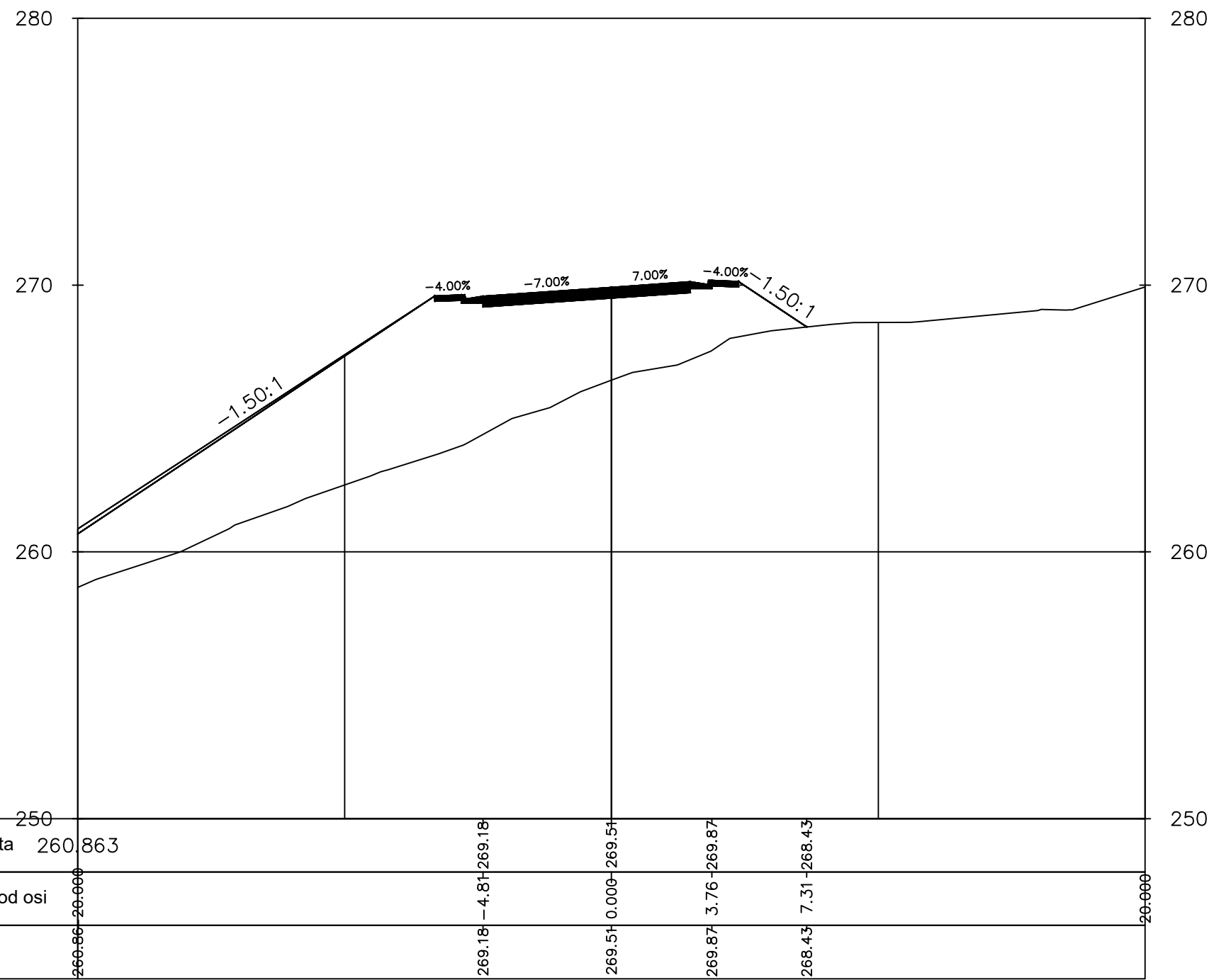
SADRŽAJ Karakteristični poprečni presjeci

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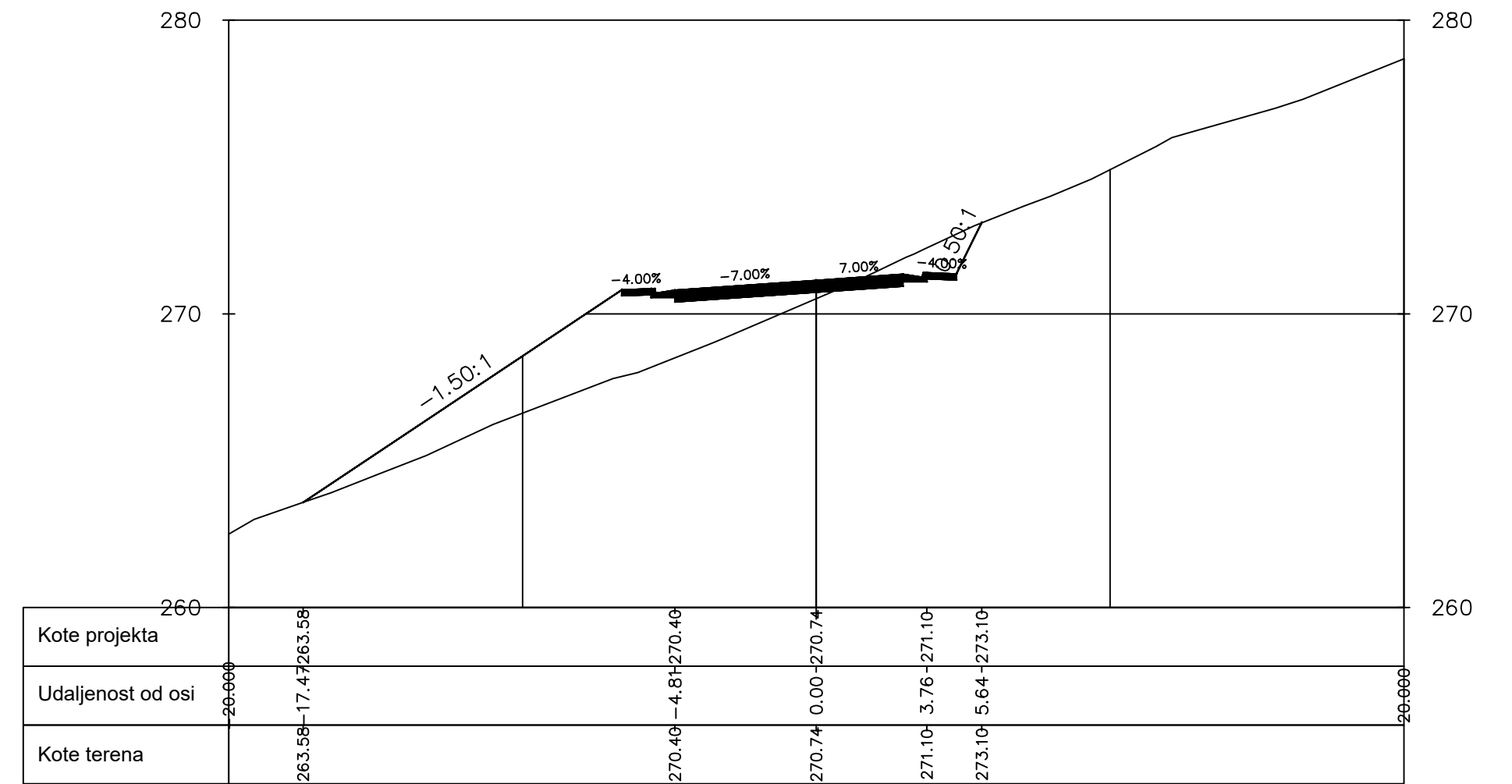
BROJ PRILOGA 4

DATUM lipanj 2019.

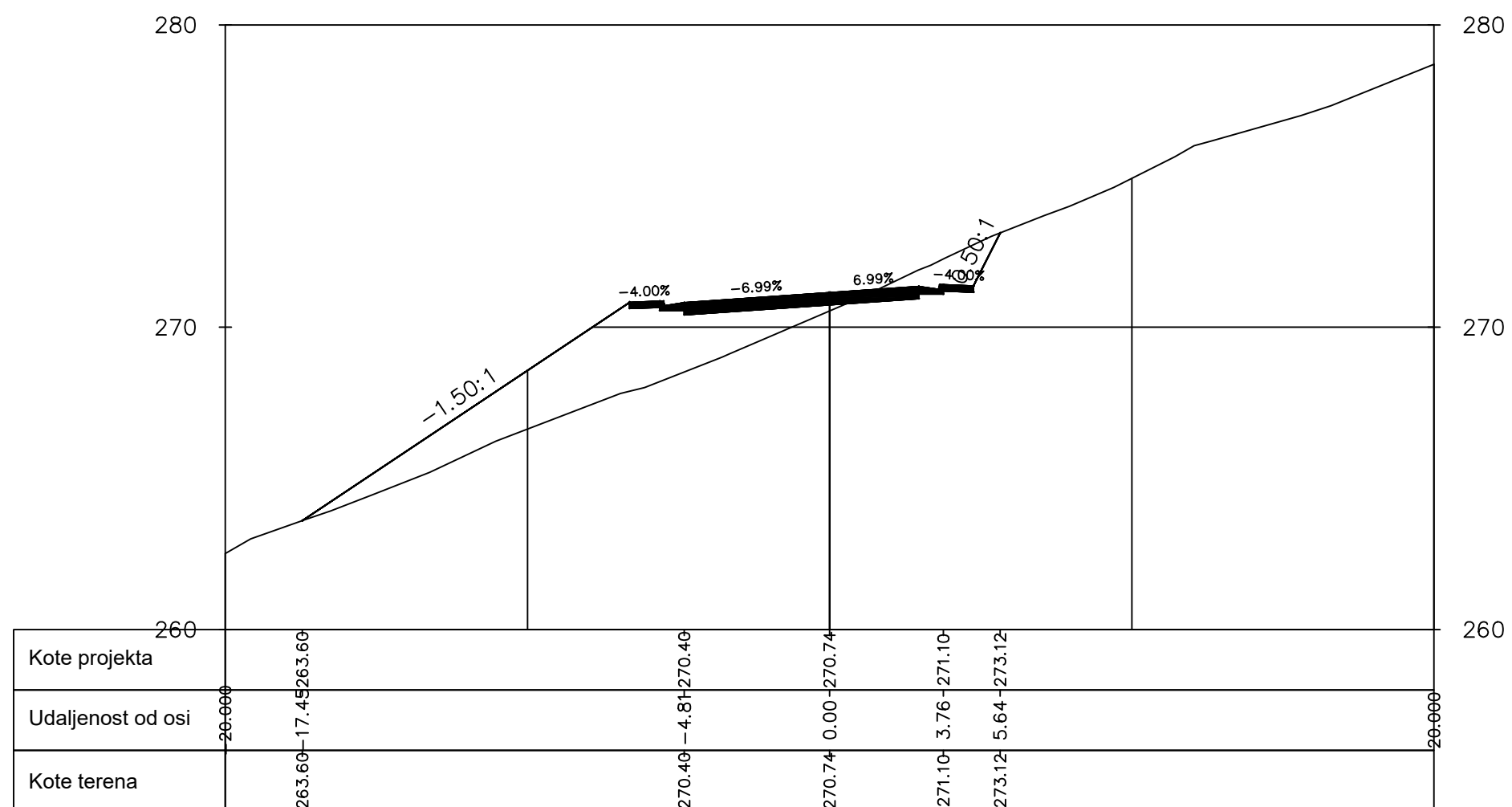
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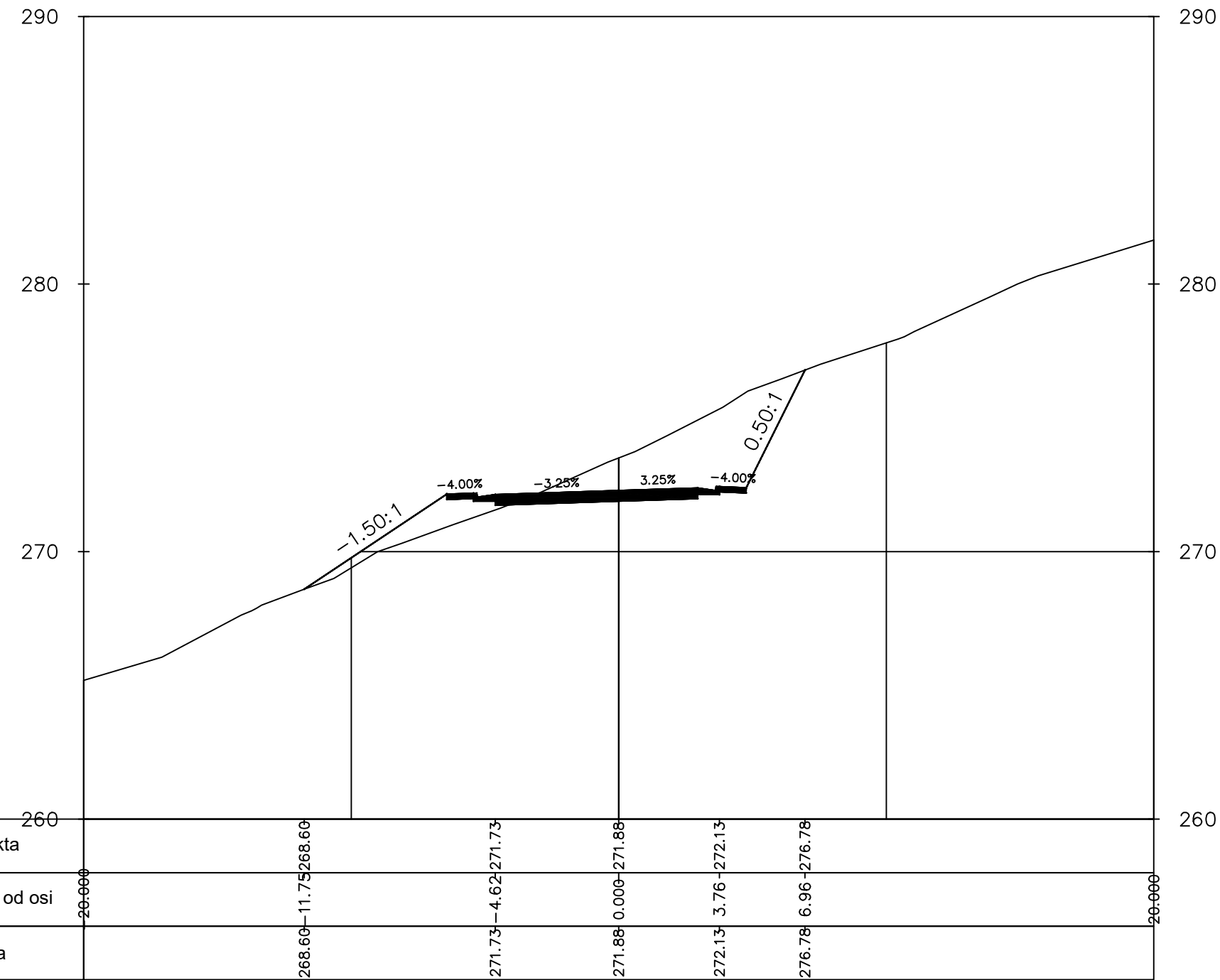
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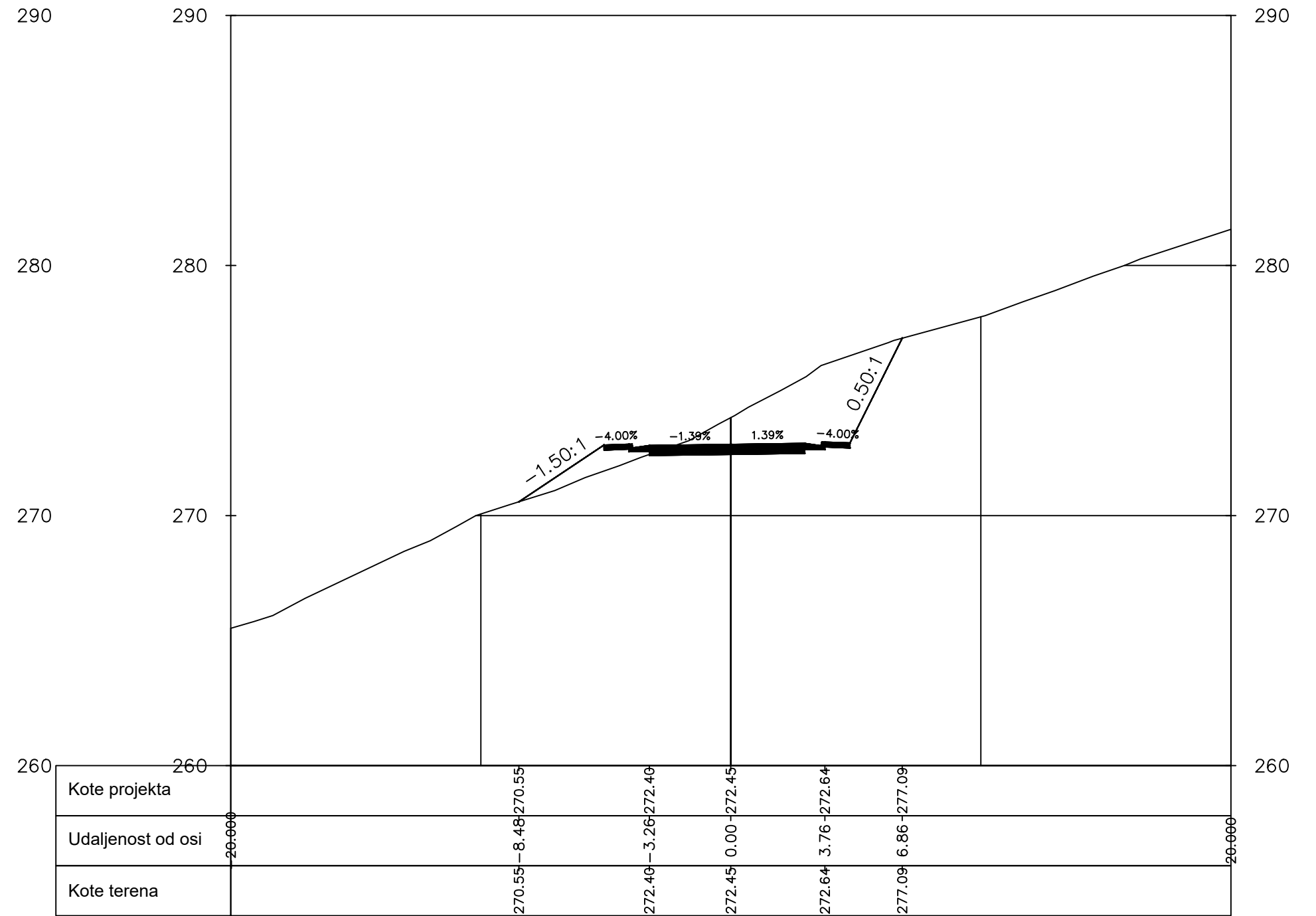
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SVEUČILIŠTE U SPLITU
 FAKULTET GRAĐEVINARSTVA,
 ARHITEKTURE I GEODEZIJE
 21000 SPLIT, MATICE HRVATSKE 15

Završni rad

TEMA
 Idejni projekt ceste

STUDENTI
 Radić Tomislav

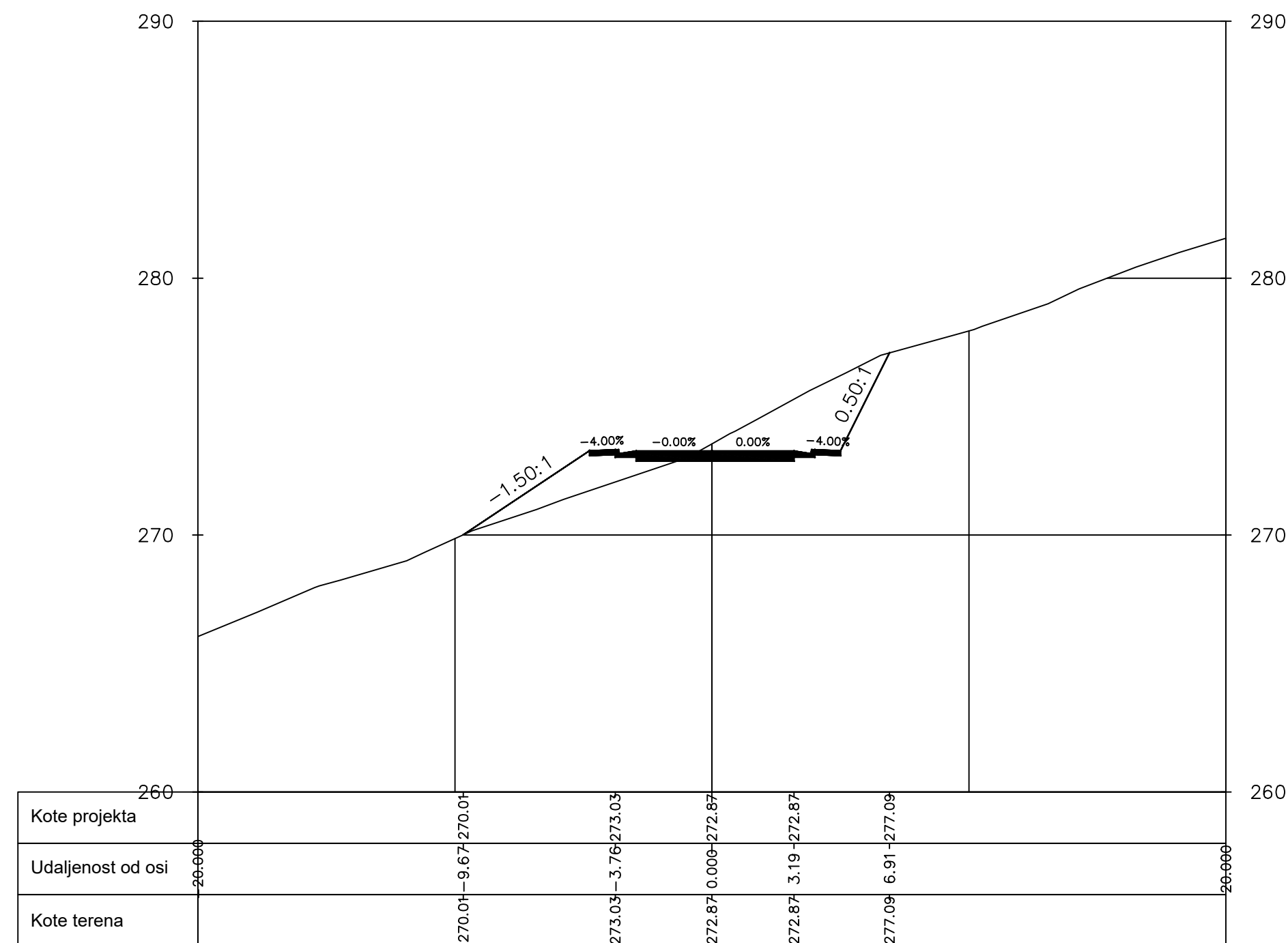
SADRŽAJ
 Karakteristični poprečni presjeci

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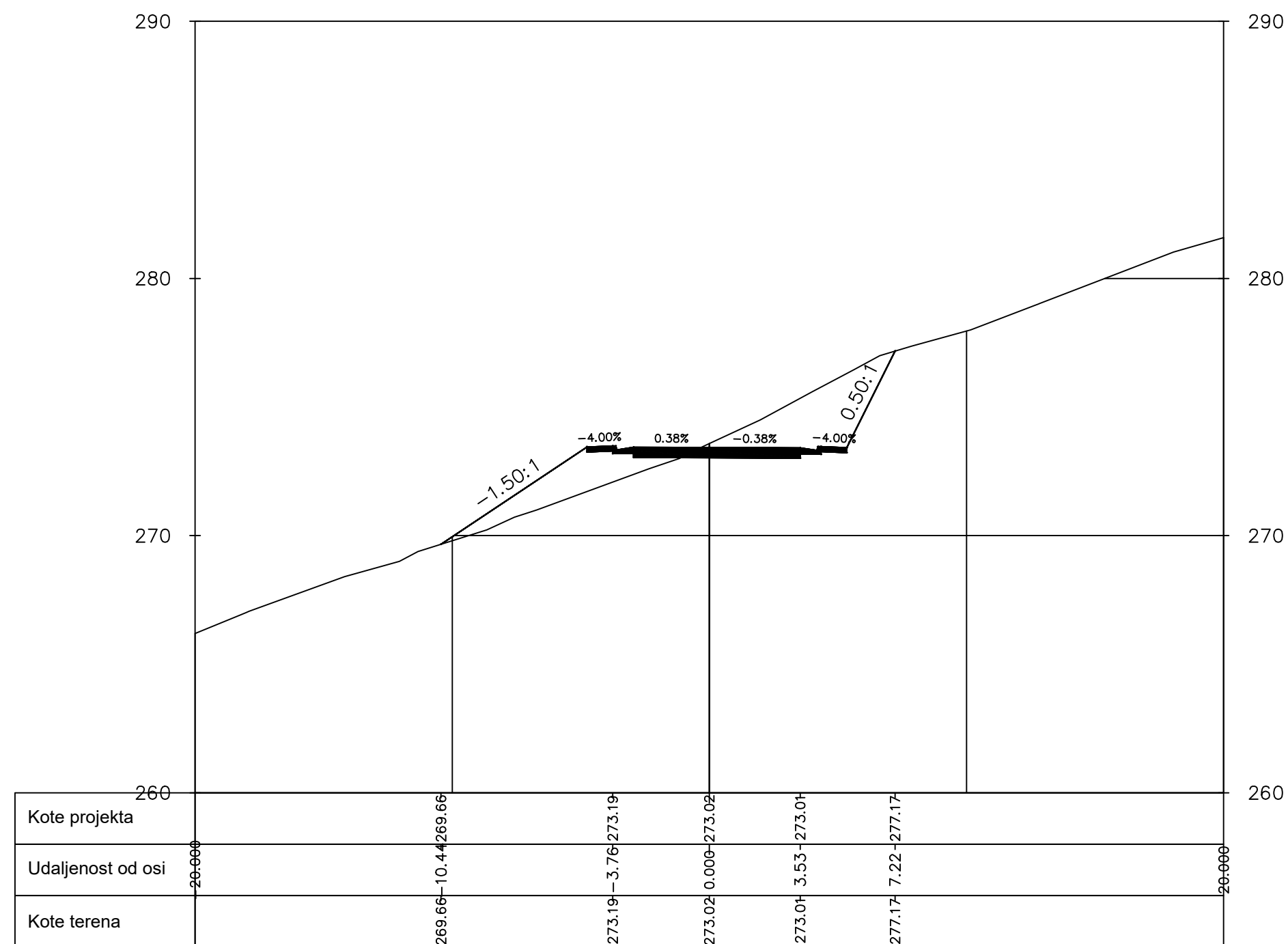
DATUM
 lipanj 2019.

BROJ PRILOGA
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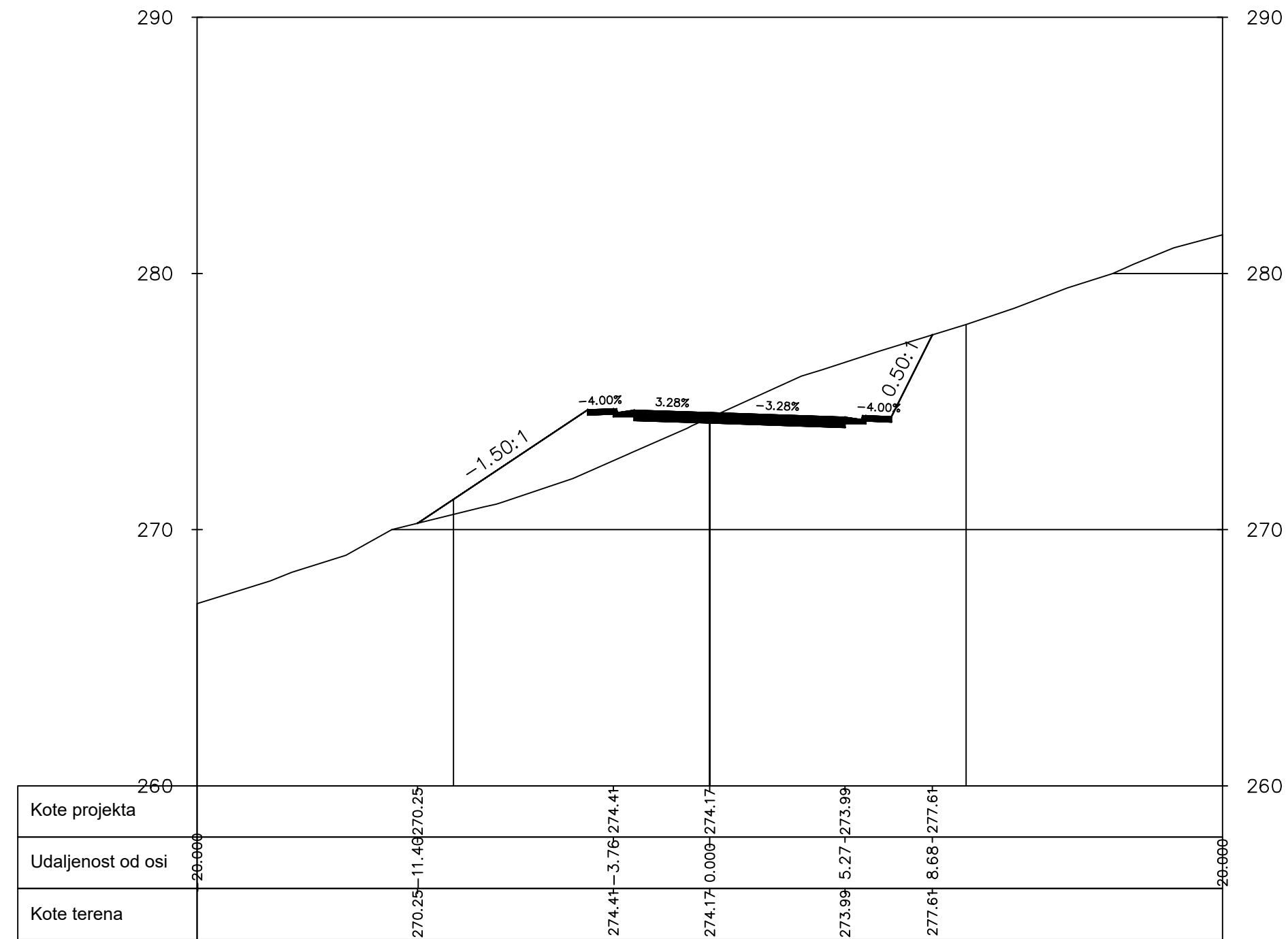
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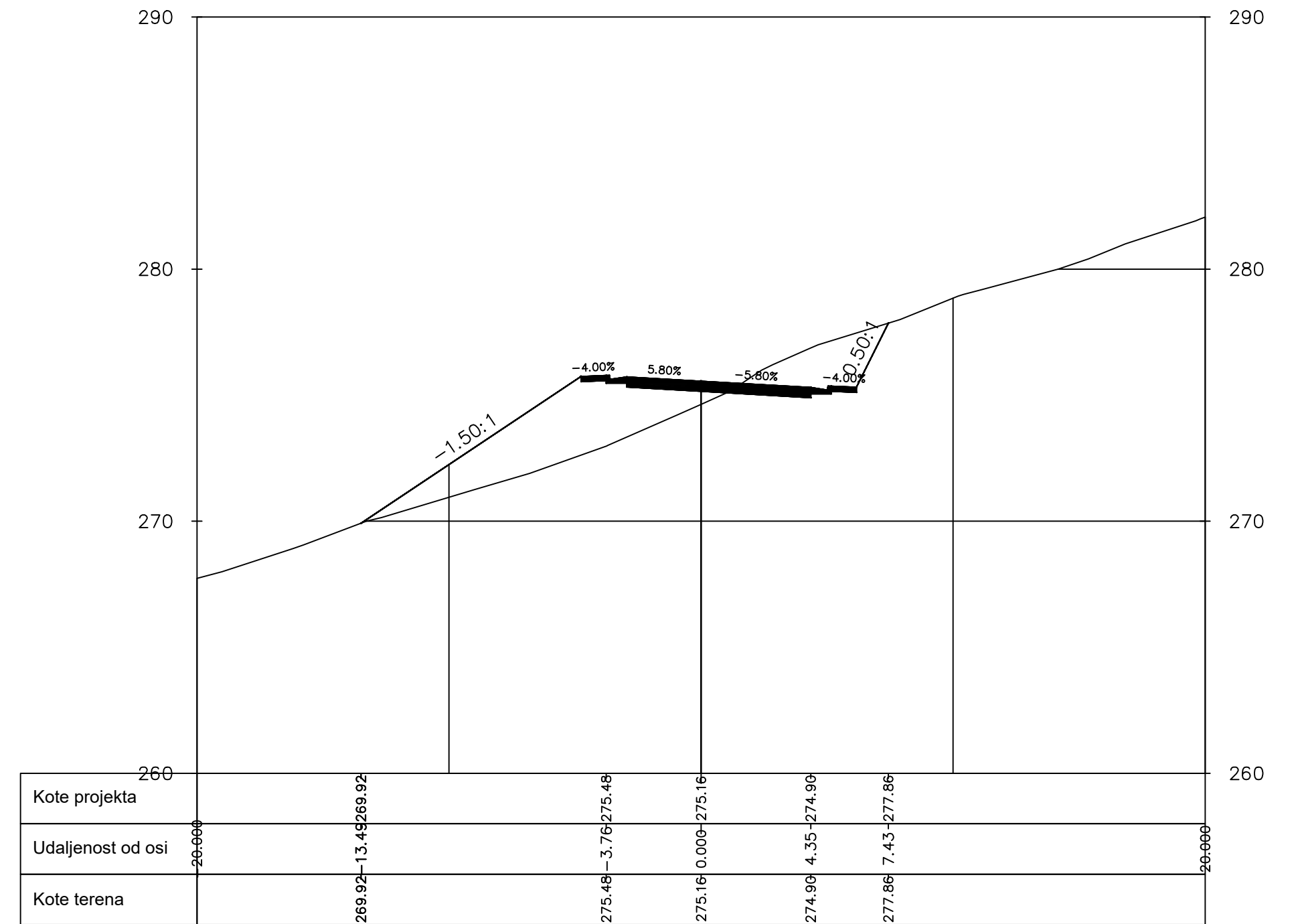
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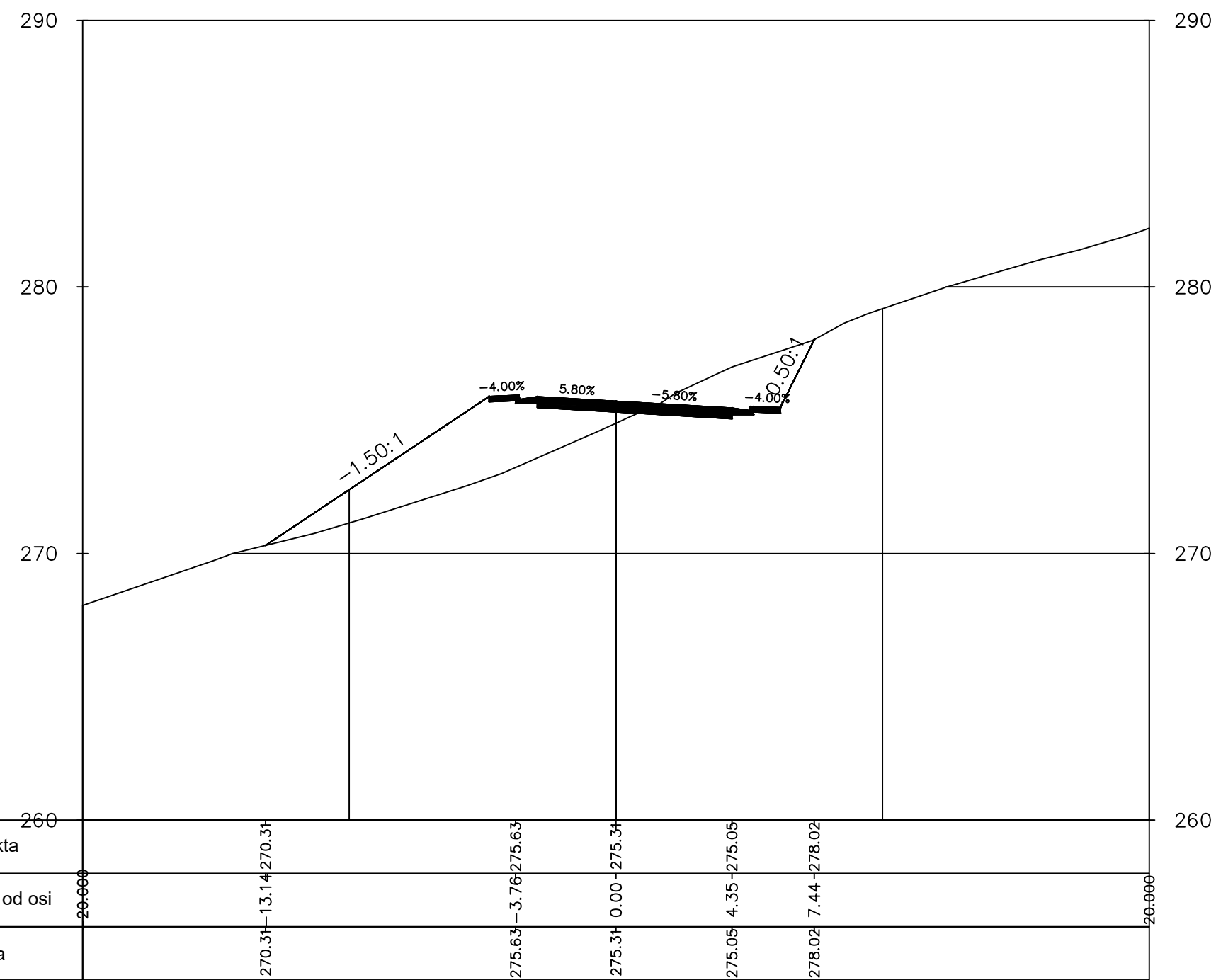
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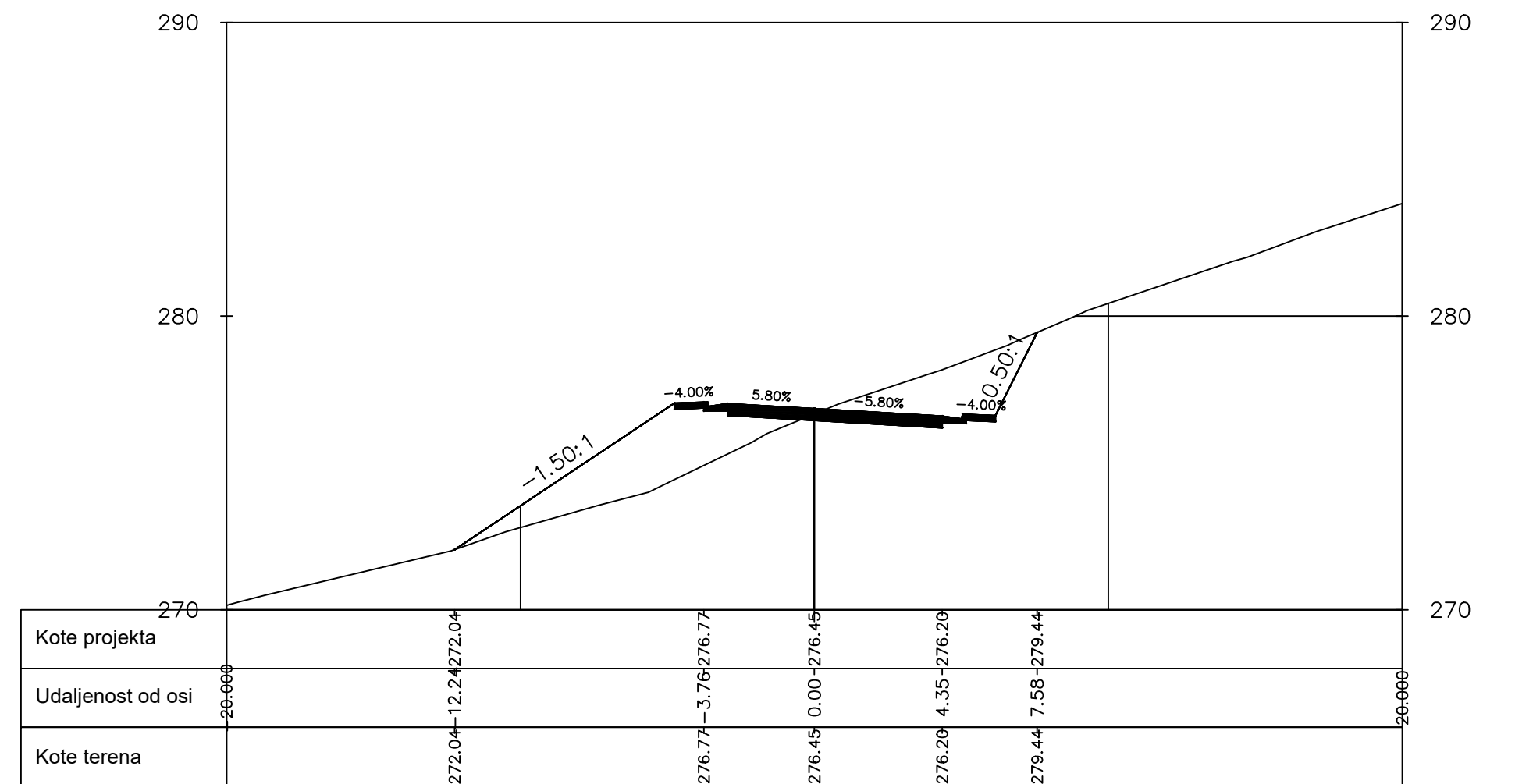
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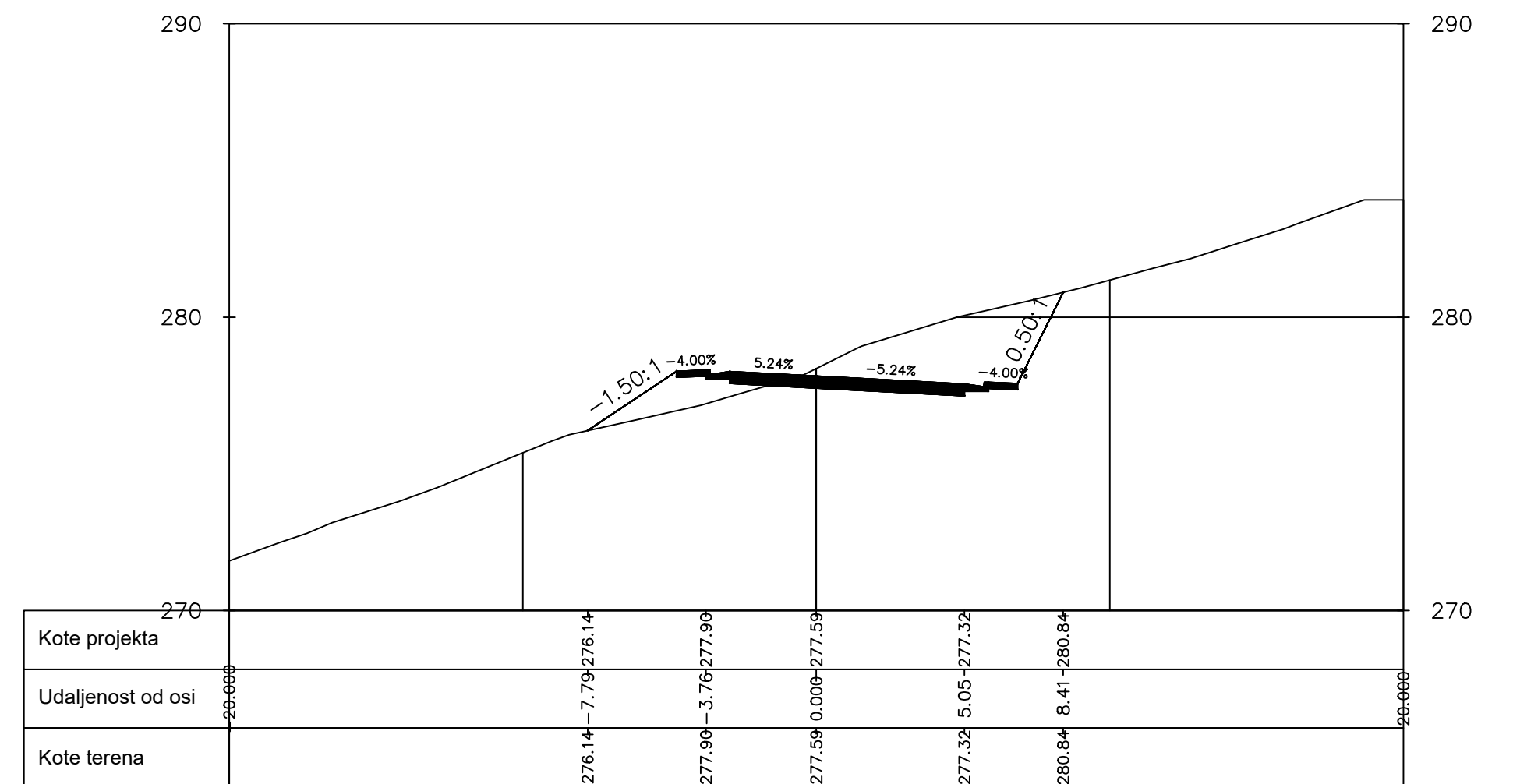
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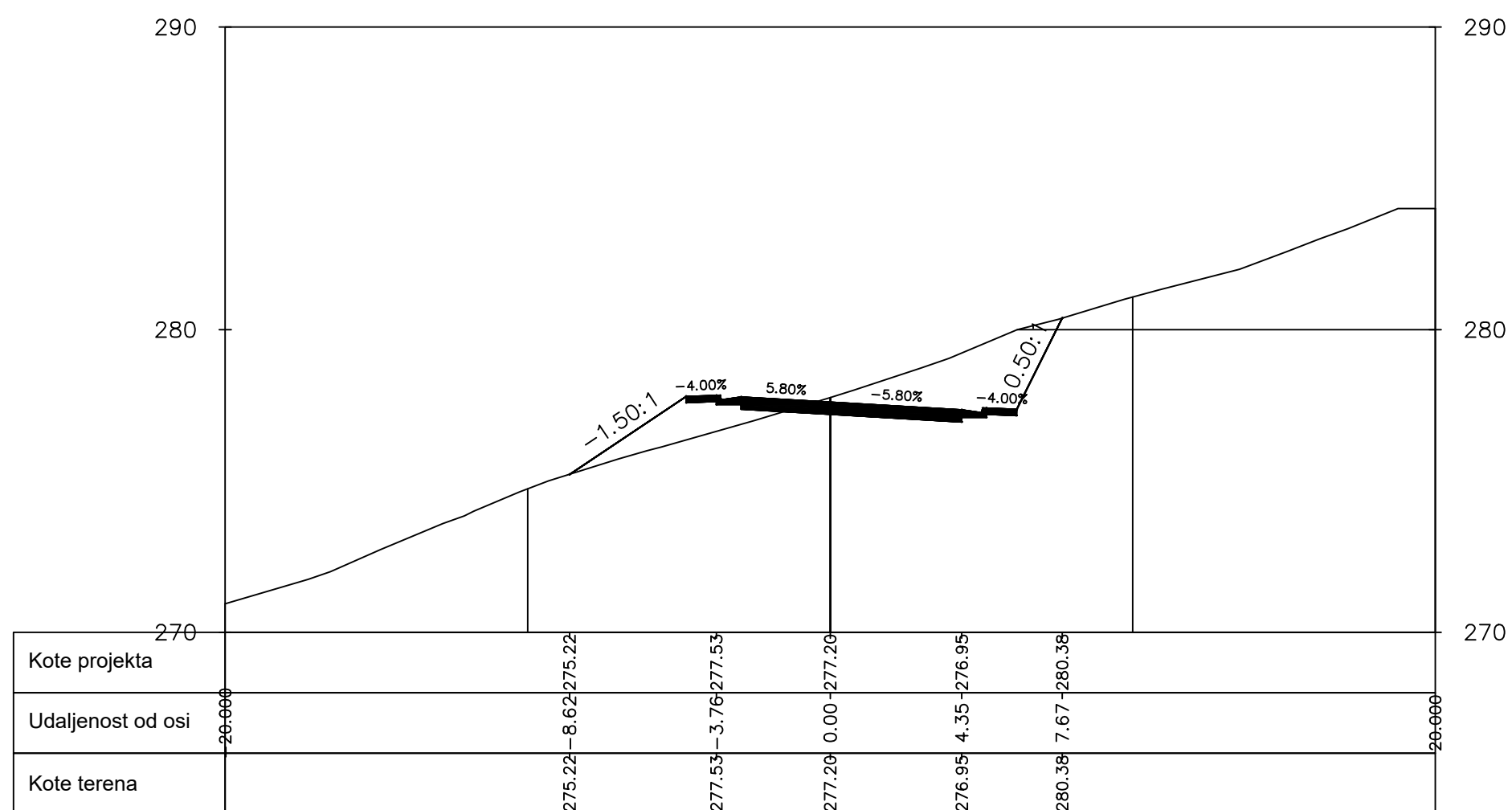
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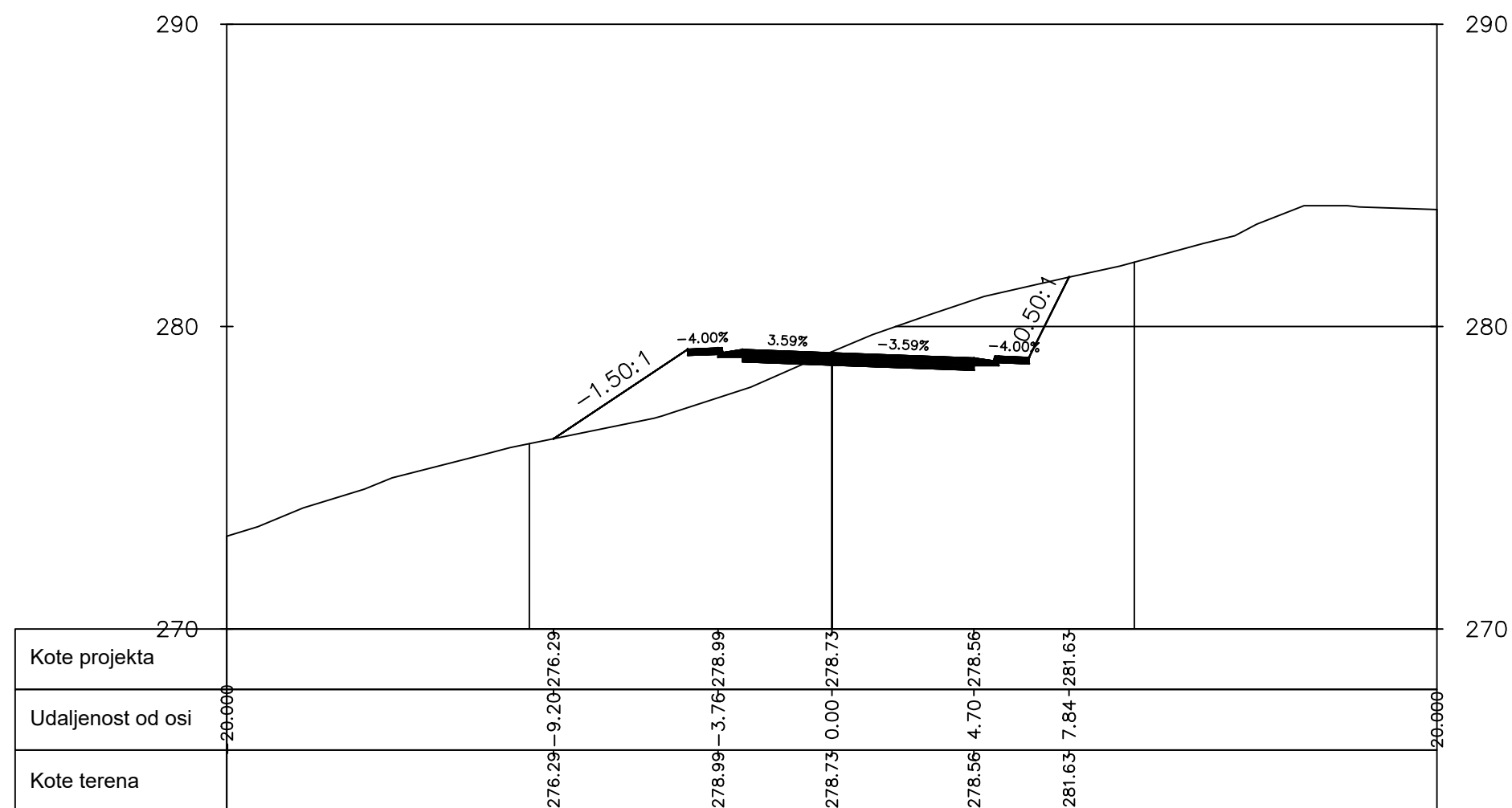
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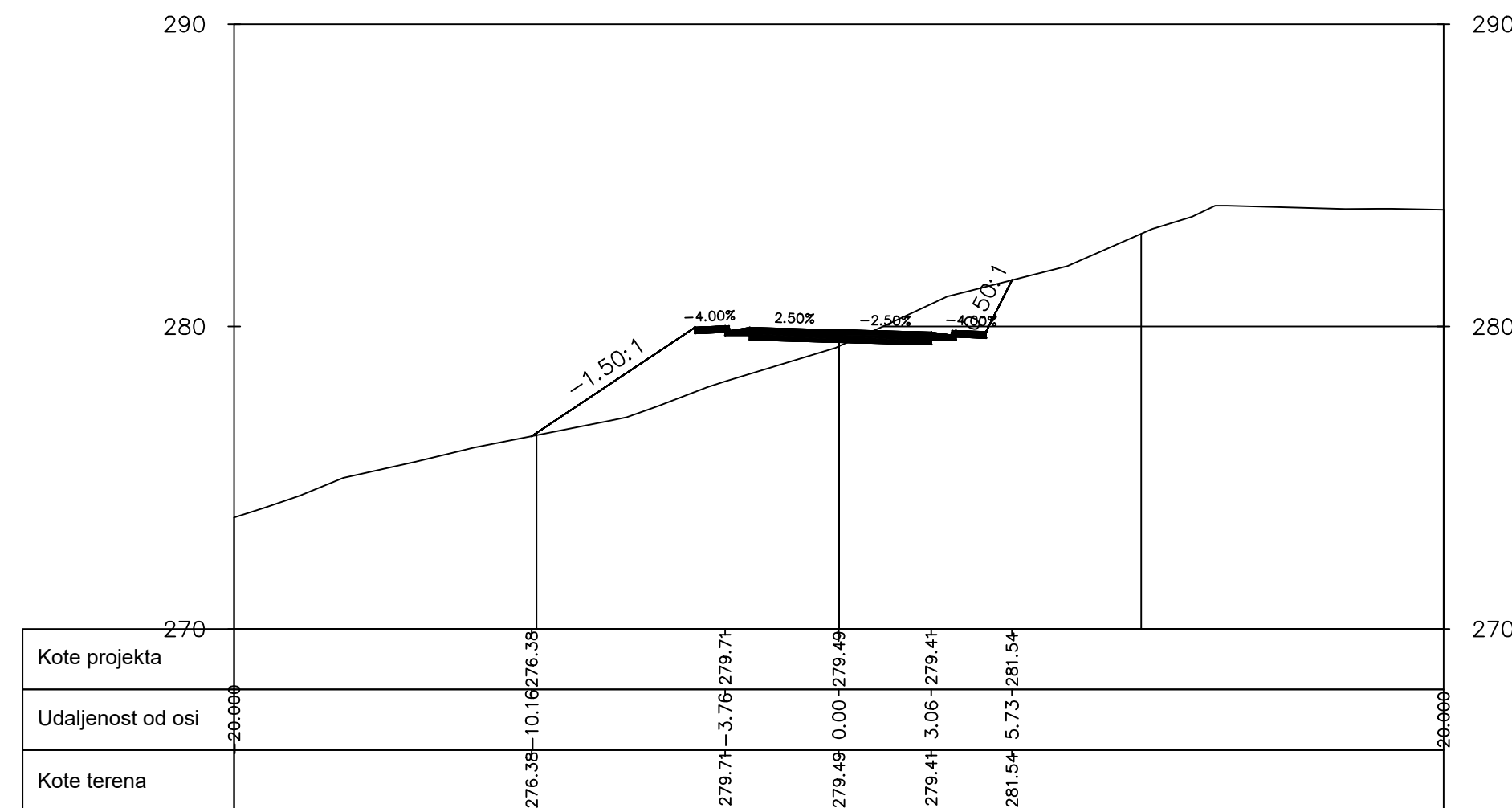
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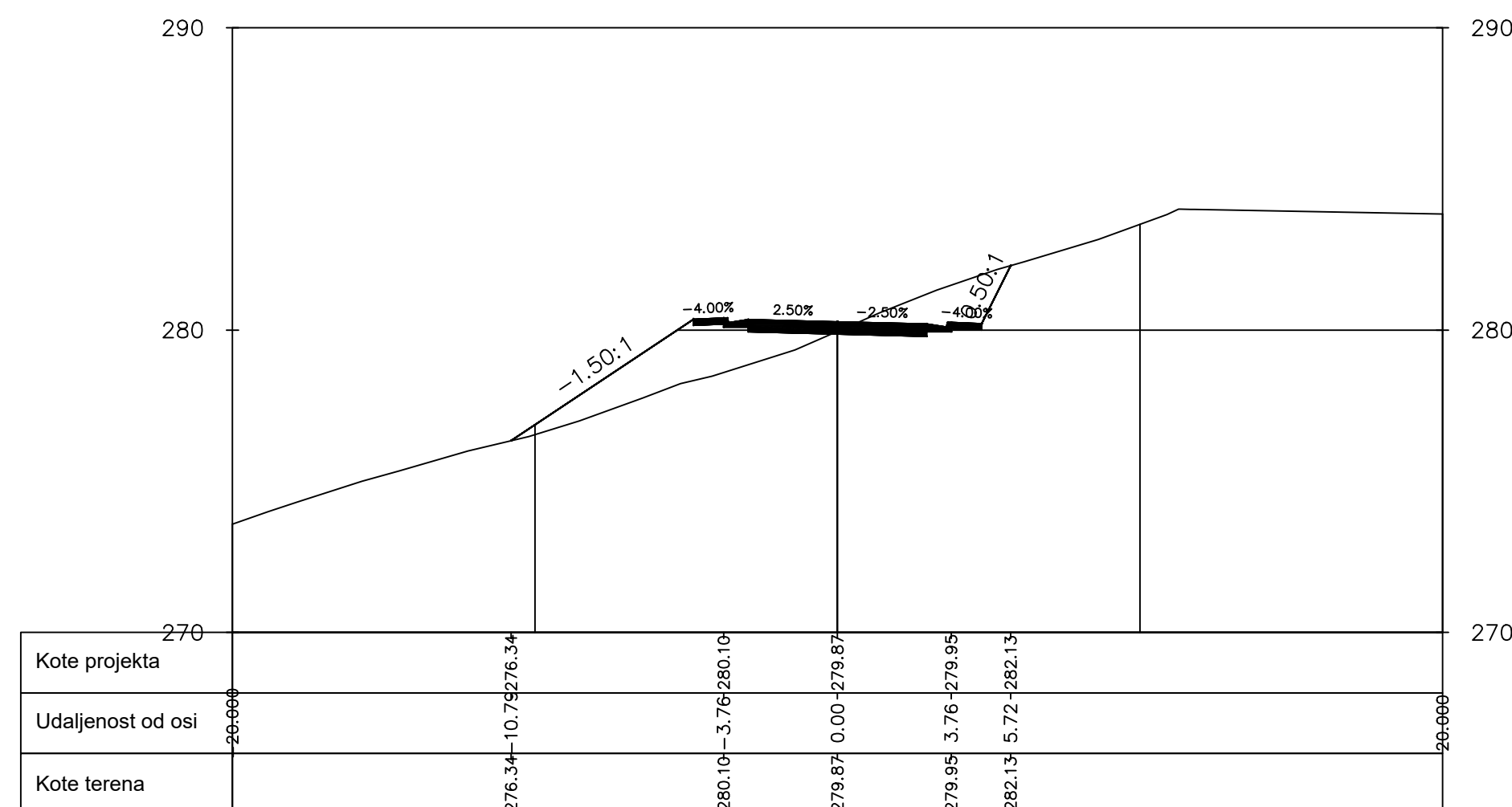
0+340.00



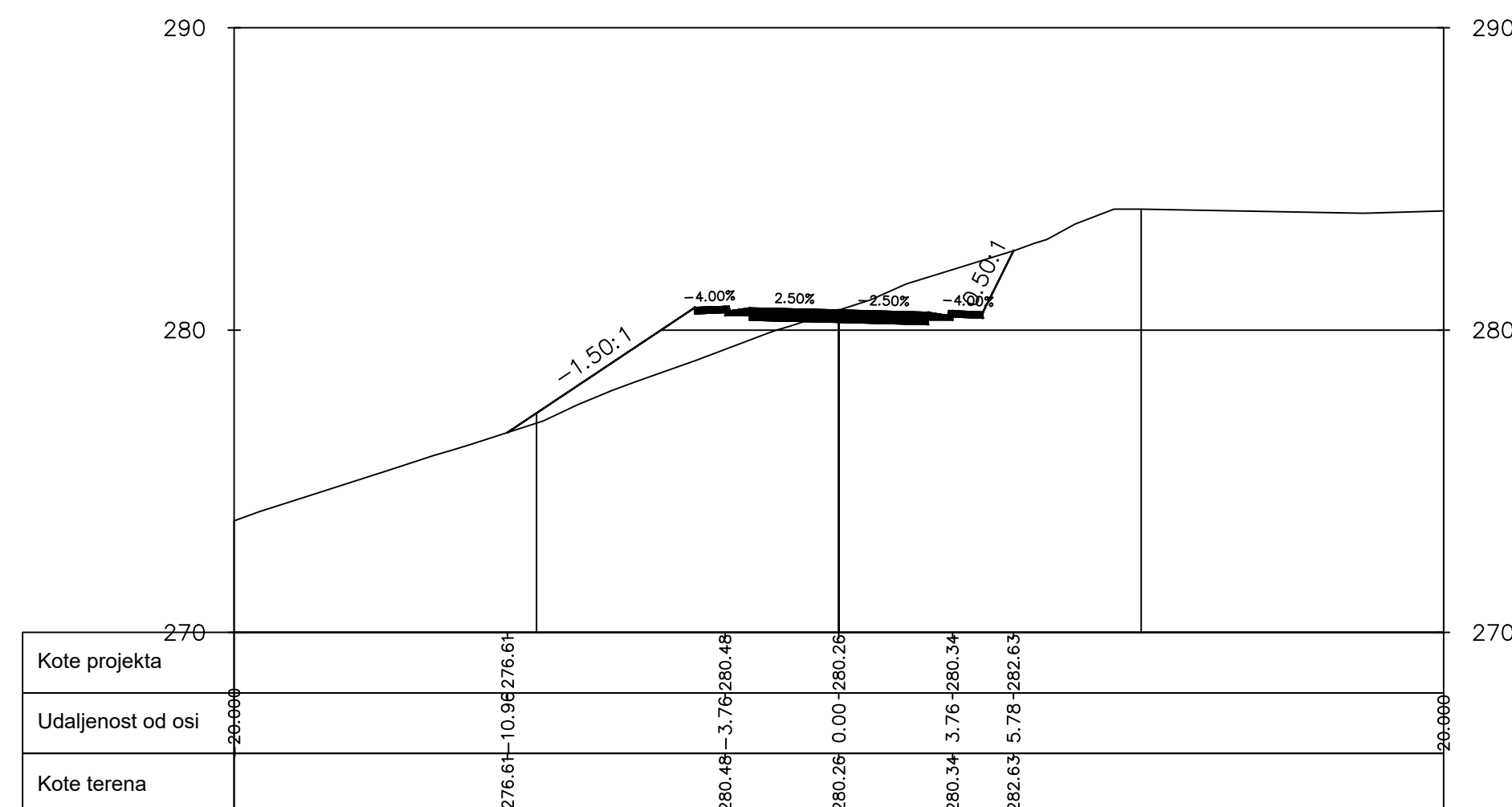
0+353.24



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
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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
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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

POINT	X	Y	Z	OFFSET	STRING CUT
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

POINT	X	Y	Z	OFFSET	STRING CUT
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 PVI Station: 0+180.00 Elevation: 270.000m PVT Station: 0+201.43 Elevation: 271.223m High Point: 0+201.43 Elevation: 271.223m Grade in: 7.33% Grade out: 5.71% Change: 1.63% K: Curve Length: 42.842m Passing Distance: Stopping Distance:			
2.00	0+366.77		

6. PRORAČUN KOLIČINE RADOVA

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

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

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