

# Idejno rješenje lokalne ceste

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**Strunje, Ante**

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UNIVERSITY OF SPLIT



DIGITALNI AKADEMSKI ARHIVI I REPOZITORIJ

**SVEUČILIŠTE U SPLITU**  
**FAKULTET GRAĐEVINE ARHITEKTURE I GEODEZIJE**

# **ZAVRŠNI RAD**

**Ante Strunje**

**Split, 2016.**

**SVEUČILIŠTE U SPLITU**  
**FAKULTET GRAĐEVINE ARHITEKTURE I GEODEZIJE**

**Ante Strunje**

**I d e j n o r j e š e n j e l o k a l n e c e s t e**

**Završni rad**

**Split, 2016**

**SVEUČILIŠTE U SPLITU  
FAKULTEG GRAĐEVINE ARHITEKTURE I GEODEZIJE**

Split, Matice hrvatske 15

STUDIJ: **PREDDIPLOMSKI STUDIJ GRAĐEVINARSTVA**  
KANDIDAT: **Ante Strunje**  
BROJ INDEKSA: **4086**  
KATEDRA: **Katedra za prometnice i geodeziju**  
PREDMET: **Ceste**

**ZADATAK ZA ZAVRŠNI RAD**

Tema: IDEJNO RJEŠENJE LOKALNE CESTE

Opis zadatka: Uz pomoć programa Autodesk AutoCAD Civil 3D potrebno je uraditi projekt ceste na geodetskoj podlozi koja je korištena za izradu programa u okviru predmeta 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 s prikazom korištenja programa Civil 3D
3. Građevinsku situaciju u M 1:1000
4. Uzdužni presjek u M 1:1000/100
5. Karakteristične poprečne presjeke u M 1:100
7. Računalne ispise koordinatnih tocaka osi
8. Proracun kolicina zemljanih radova
9. Proracun kolicine radova po presjecima

U Splitu, travanj 2016.

Voditelj Završnog rada:

Prof. dr.sc. Dražen Cvitanić



## Idejno rješenje lokalne ceste

### **Sažetak:**

Idejno rješenje 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:**

idejno rješenje, lokalna cesta, projektna brzina, os ceste, niveleta, poprečni presjek

## Preliminary design of local road

### **Abstract:**

A preliminary design 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:**

preliminary design, local road, design speed, the road axis, niveleta, cross-section

Zahvaljujem se mentoru prof. dr. sc. Draženu Cvitaniću  
dipl. ing. građ. te asistentici doc. dr. sc. Deani Breški  
dipl. ing. građ. na pomoći i vodstvu prilikom izrade  
završnog rada.

Hvala svim kolegama i prijateljima s kojima su  
godine studiranja prošle ugodnije.

Najveća hvala mojim roditeljima na pruženoj  
podršci i razumijevanju tijekom studiranja.

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## **1. KOPIJA PROGRAMSKOG ZADATKA**

SVEUČILIŠTE U SPLITU  
GRAĐEVINSKO-ARHITEKTONSKI FAKULTET

Split, ak.god. 2008/2009.

Katedra za prometnice i geodeziju

Studij: Stručni

Nastavni predmet: CESTE

Student: .....

## 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: **brdovit**.

Idejni projekt treba sadržavati:

1. Tehnički opis
2. Proračun horizontalne geometrije
3. Proračun proširenja kolnika u krivini
4. Proračun vertikalne geometrije
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

Predmetni asistent:

  
dr.sc. Deana Breški, dipl.ing.građ.

## **2. TEHNIČKI OPIS**

## TEHNIČKI OPIS

### OPĆI PODACI:

Ovim idejnim rješenjem obuhvaćena je lokalna cesta na dionici od točke A (295 m.n.m ) do točke B (277 m.n.m ) u dužini od 413.86 m koja se proteže u smjeru zapad-istok na brdovitom terenu.

#### **Geodetska podloga:**

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

Situacija je priložena u mjerilu 1:1000.

### TEHNIČKI ELEMENTI IZGRADNJE :

#### **Opis trase:**

Početak prometnice je u točki A(295 m.n.m ) na stacionaži 0+000,00, a završava u točki B (277 m.n.m ) na stacionaži 0+413.86. Na prostorno vođenje prometnice utječu topografske karakteristike terena. Prometnica se nalazi na brdskom 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                 | Međuopćinsko                     | 5-50                           |
| 4. kat.          | Županijska; lokalna              | Mješoviti promet              | 1000-3000                 | Općinsko                         | 5-20                           |
| 5. kat.          | Lokalna                          | Mješoviti promet              | <1000                     | Općinsko-lokalno                 | <5                             |

U pravilu se usvaja najviša kategorija ceste koja se dobije primjenom kriterija iz tablice 1.2.

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              | $\geq 120/4^\circ$                                   | 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

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

Iz odabrane projektne brzine proizlaze i projektne 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

#### Tlocrtni elementi trase:

Trasa ceste ima duljinu od 413.86m, sastoji se od tri pravca i tri krivine. Prva krivina ima radijus R=80 m i duljinu prijelazne krivine L=40 m, druga ima radijus R=120.00 m i duljinu prijelazne krivine L=40 m a treća ima radijus R=100.00 m i duljinu prijelazne krivine L=40 m. Duljina prvog pravca je 65.86 m, duljina drugog pravca je 13.93 m, duljina trećeg pravca je 4 m.

Krivine su konstruirane pomoću dvije prijelazne krivine oblika klotoide i kružnog luka.

**Vertikalni elementi trase:**

Vertikalni tok trase sastoji se od dva pravca i jedne konkavne krivine, radijus krivine je  $R=2500$  m i pripadajuća tangenta je duljine 48 m . Uzdužni nagibi nivelete iznose 4.95% i 2.76 %.

**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. Bankine se izvode s nagibom 4% prema pokosu nasipa i širinom 1.00 m, širina rigola je 0.65 m.

Poprečni nagib ceste u pravcu iznosi **2.5%**, a u zavojima u ovisnosti od polumjera kružnog luka i usvojene računske brzine,  **$V_r = 40$  km/h** .

**Odvodnja:**

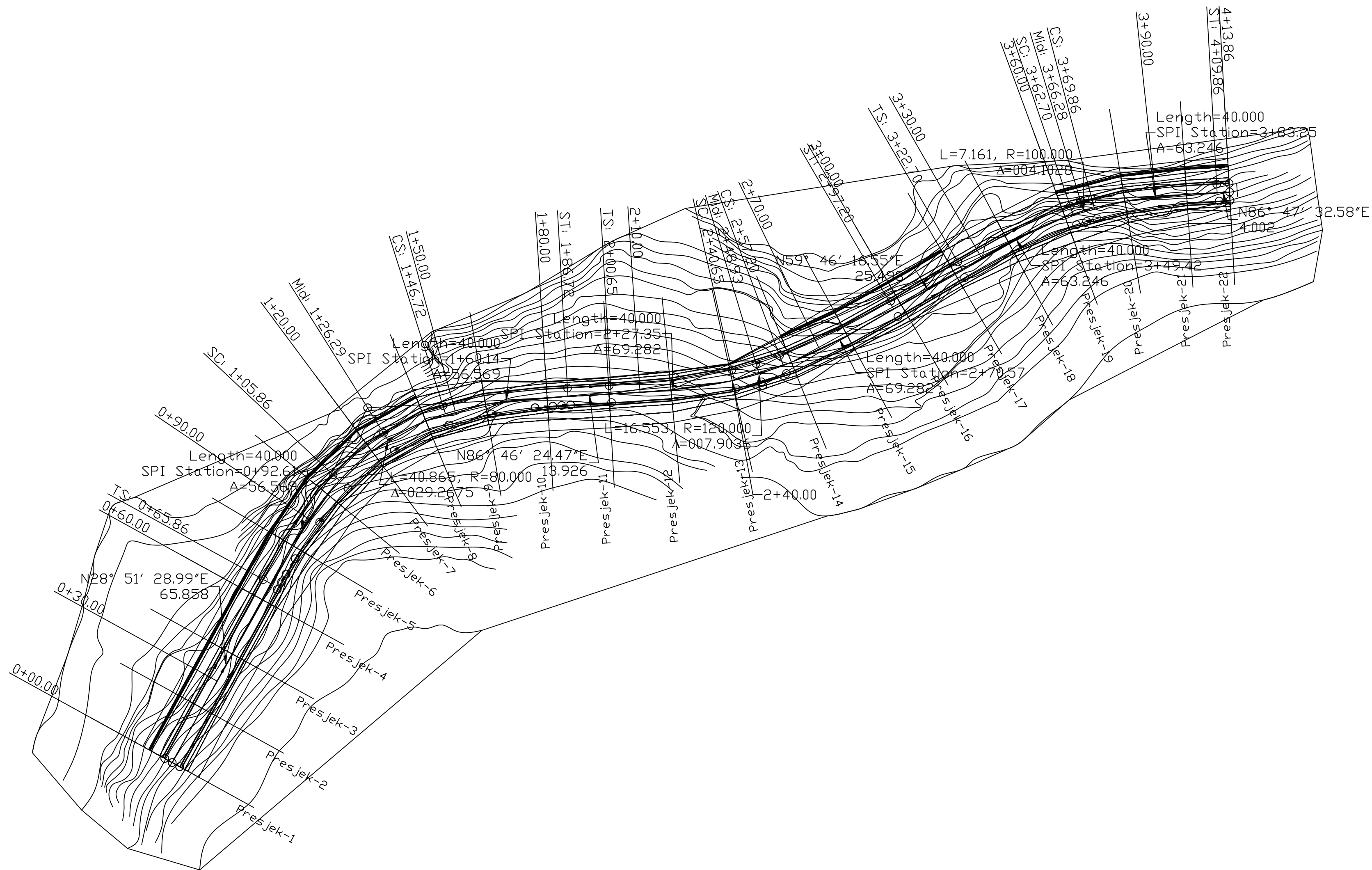
Odvodnja prometnice predviđa izvedbu otvorenog sustava odvodnje kojim se vrši prihvata voda s kolnika i pribrežnih voda izvedbom betonskih rigola. Uzdužnim i poprečnim nagibima kolnika vode se usmjeravaju u betonske rigole u koje se vrši i prihvat pribrežnih voda u usjecima i ispuštaju u teren.

Dio kolničkih voda preljeva se preko bankine niz pokose nasipa.

**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. GRAĐEVINSKA SITUACIJA M 1:1000**

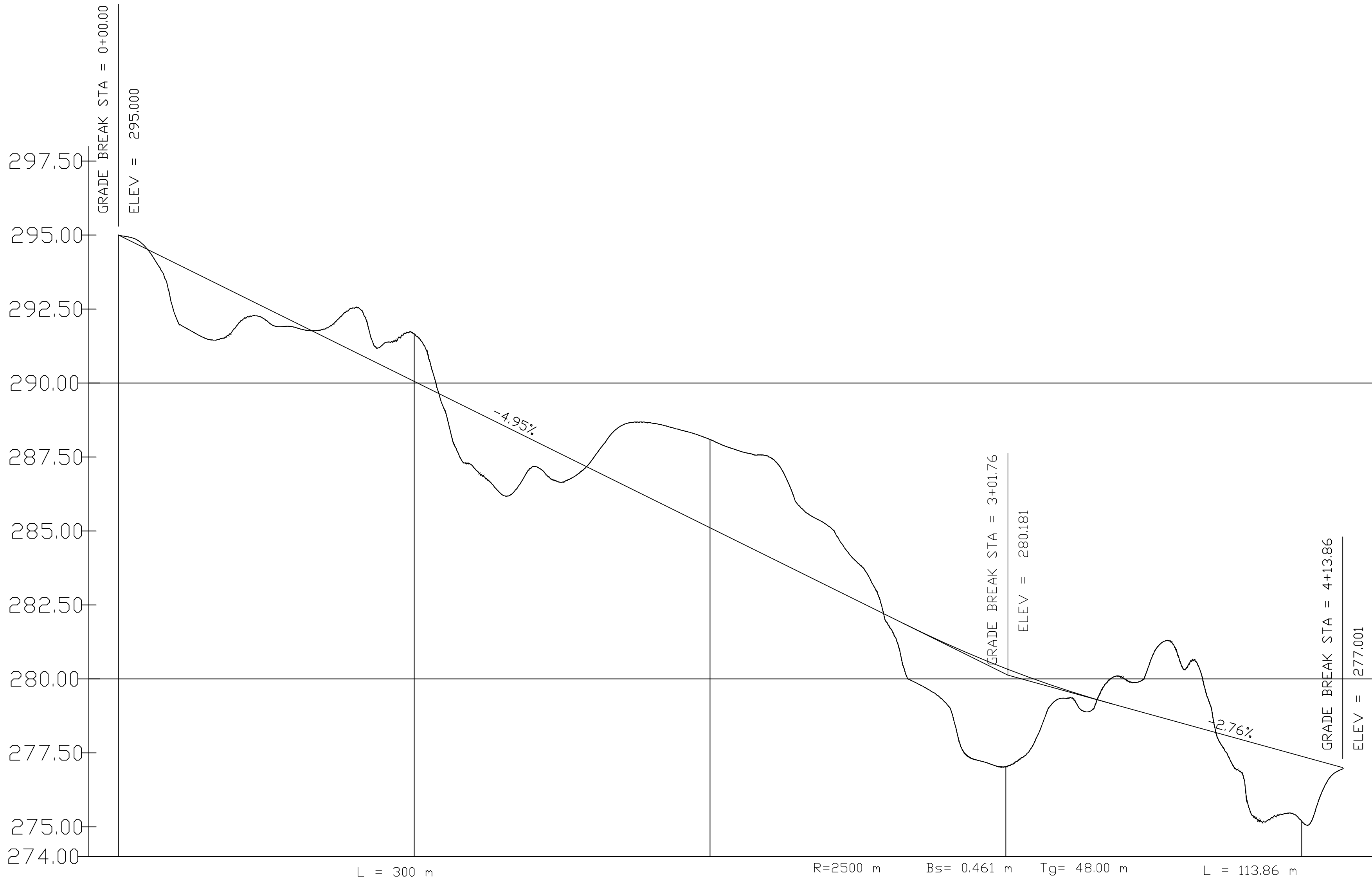


## **4. UZDUŽNI PRESJEK**

### **M 1:1000/100**

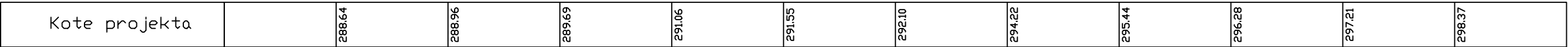
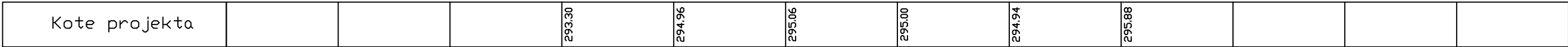


Uzdužni presjek  
MJ 1:1000/100



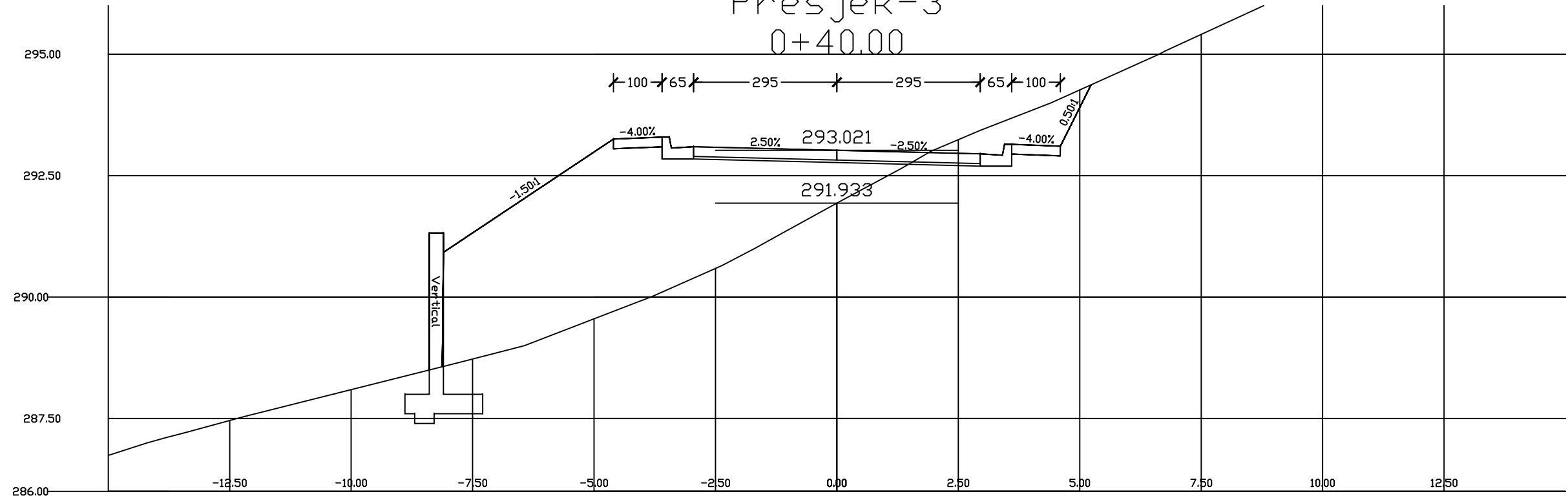
| Broj presjeka                       | Presjek 1<br>0+00.00<br>20.00                                                                                                                                                                                                                                                             | Presjek 2<br>0+20.00<br>20.00 | Presjek 3<br>0+40.00<br>20.00 | Presjek 4<br>0+60.00<br>20.00 | Presjek 5<br>0+80.00<br>20.00 | Presjek 6<br>1+00.00<br>20.00 | Presjek 7<br>1+20.00<br>20.00 | Presjek 8<br>1+40.00<br>20.00 | Presjek 9<br>1+60.00<br>20.00 | Presjek 10<br>1+80.00<br>20.00 | Presjek 11<br>2+00.00<br>20.00 | Presjek 12<br>2+20.00<br>20.00 | Presjek 13<br>2+40.00<br>20.00 | Presjek 14<br>2+60.00<br>20.00 | Presjek 15<br>2+80.00<br>20.00 | Presjek 16<br>3+00.00<br>20.00 | Presjek 17<br>3+20.00<br>20.00 | Presjek 18<br>3+40.00<br>20.00 | Presjek 19<br>3+60.00<br>20.00 | Presjek 20<br>3+80.00<br>20.00 | Presjek 21<br>4+00.00<br>20.00 | Presjek 22<br>4+13.86<br>0.00 |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|-------------------------------|
| Kota terena                         | 295.00                                                                                                                                                                                                                                                                                    | 292.10                        | 291.93                        | 291.87                        | 292.54                        | 291.66                        | 287.16                        | 287.17                        | 287.39                        | 288.65                         | 288.09                         | 287.50                         | 285.16                         | 281.87                         | 279.15                         | 277.03                         | 279.34                         | 280.01                         | 280.33                         | 276.78                         | 275.19                         | 276.96                        |
| Kota nivele                         | 295.00                                                                                                                                                                                                                                                                                    | 294.01                        | 293.02                        | 292.03                        | 291.04                        | 290.05                        | 289.06                        | 288.08                        | 287.09                        | 286.10                         | 285.11                         | 284.12                         | 283.13                         | 282.14                         | 281.18                         | 280.35                         | 279.63                         | 279.04                         | 278.49                         | 277.94                         | 277.38                         | 277.00                        |
| Horizontalna geometrija             | <div><div>L=65.86</div><div>L=40.00</div><div>L=40.87<br/>R=80.00</div><div>L=40.00</div><div>L=13.93</div><div>L=40.00</div><div>L=16.55<br/>R=120.00</div><div>L=40.00</div><div>L=25.50</div><div>L=40.00</div><div>L=7.16<br/>R=100.00</div><div>L=40.00</div><div>L=4.00</div></div> |                               |                               |                               |                               |                               |                               |                               |                               |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                                |                               |
| Stacionazna horizontalne geometrije | 0+00.00                                                                                                                                                                                                                                                                                   |                               |                               | 0+65.86                       |                               | 1+05.86                       |                               | 1+46.72                       |                               | 1+86.72                        | 2+00.65                        |                                | 2+40.65                        | 2+57.20                        |                                | 2+97.20                        | 3+22.70                        |                                | 3+62.70                        | 3+69.86                        |                                | 4+09.86<br>4+13.86            |
| Vitoperenje                         |                                                                                                                                                                                                                                                                                           |                               | 2.50%                         | -2.50%                        | 4.70%                         | -4.70%                        | 4.70%                         | -4.70%                        | 2.50%                         | -2.50%                         | 2.50%                          | -2.50%                         | 3.60%                          | -3.60%                         | 2.50%                          | -2.50%                         | 2.50%                          | -2.50%                         | 4.10%                          | -4.10%                         | 2.50%                          | -2.50%                        |

## **5. KARAKTERISTIČNI POPREČNI PRESJECI M 1:100**



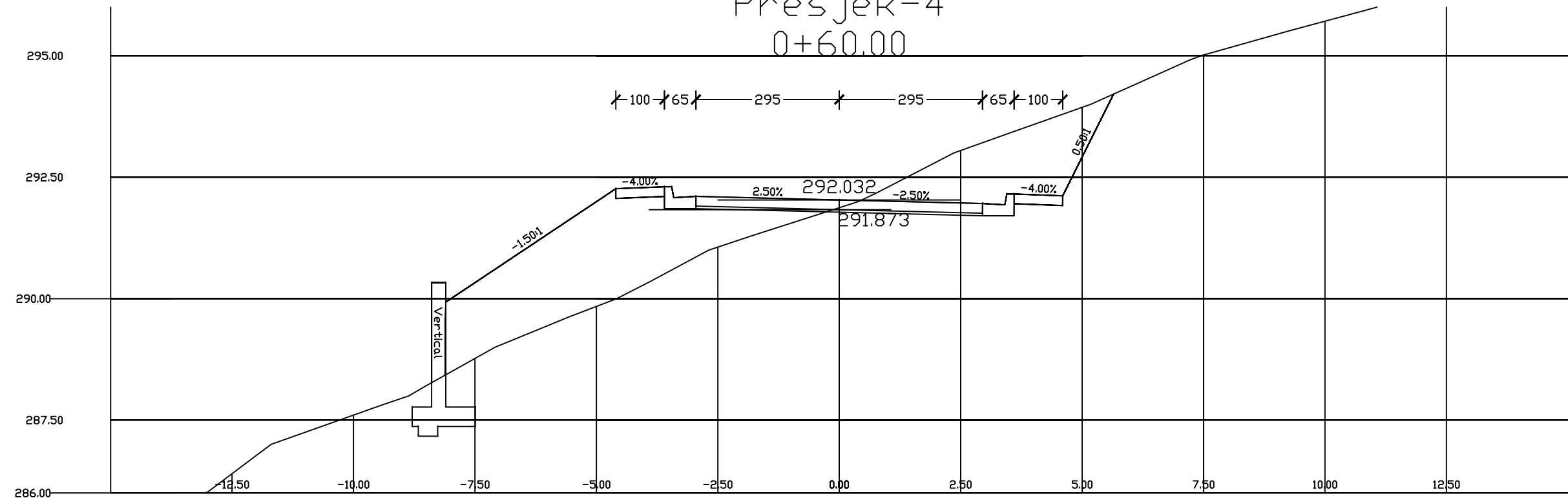


# Presjek-3 0+40.00



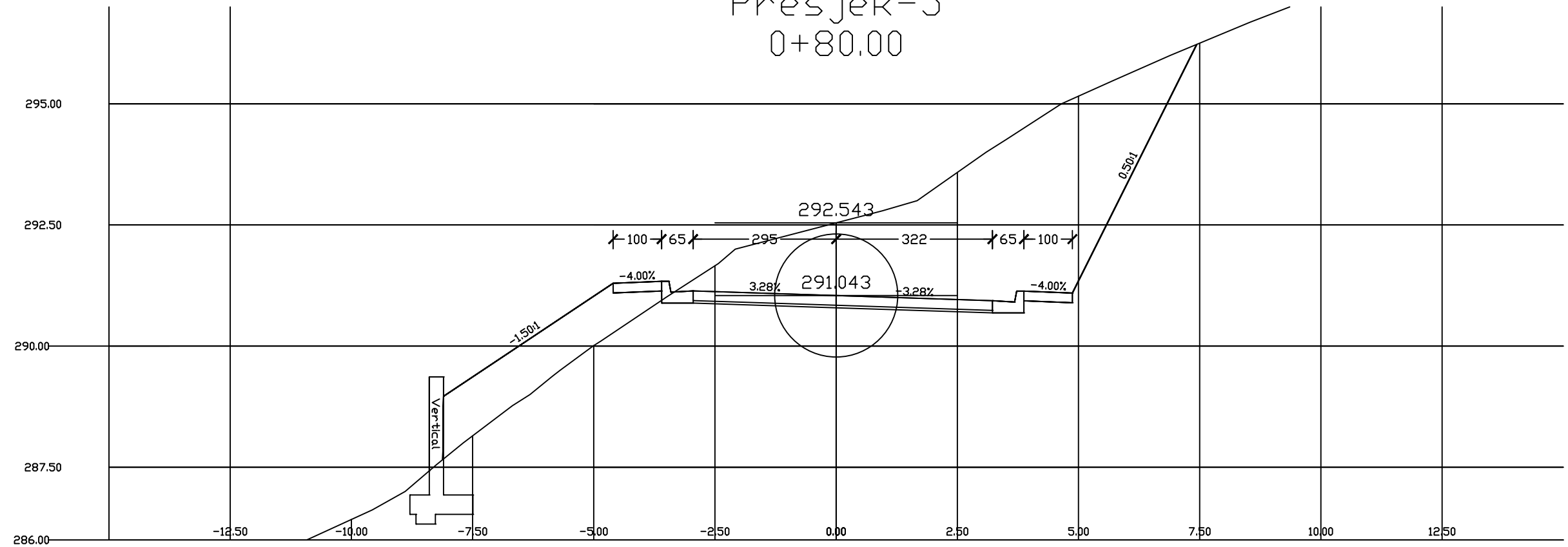
|               |        |        |        |        |        |        |        |        |        |        |        |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Kote projekta | 287.46 | 288.09 | 288.72 | 289.55 | 290.59 | 291.93 | 293.24 | 294.26 | 295.41 | 296.27 | 296.89 |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|

# Presjek-4 0+60.00



|               |        |        |        |        |        |        |        |        |        |        |        |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Kote projekta | 286.40 | 287.60 | 288.77 | 289.84 | 291.06 | 291.87 | 293.05 | 293.94 | 295.02 | 295.71 | 296.57 |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|

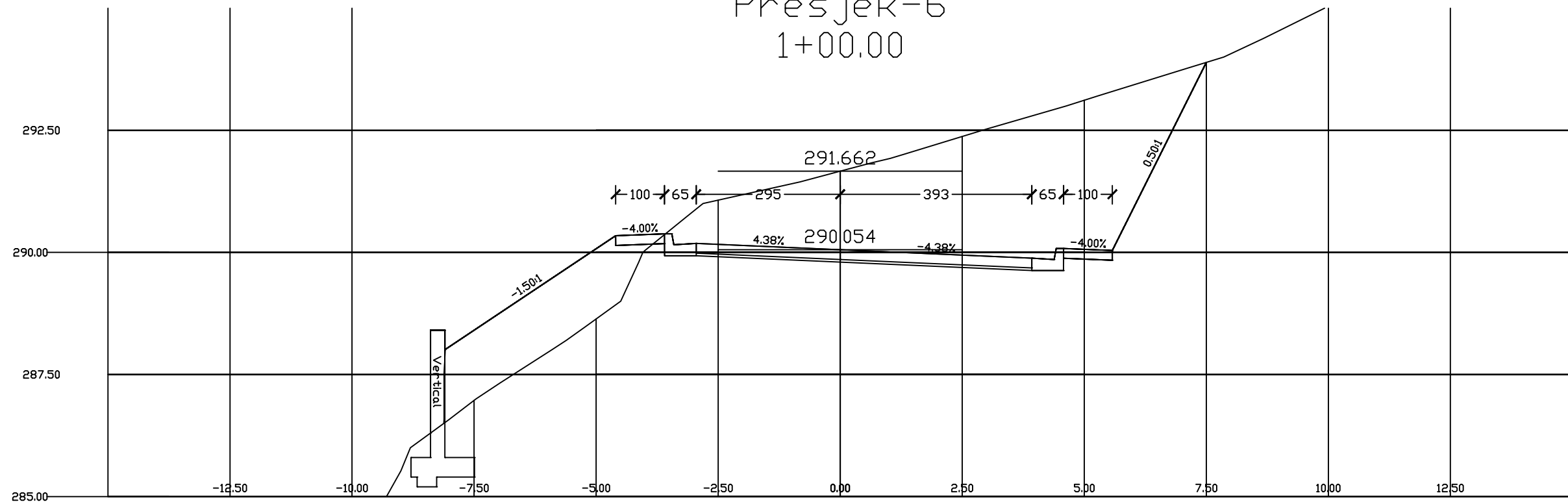
# Presjek-5 0+80.00



Kote projekta

|        |        |        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 284.91 | 286.42 | 288.15 | 290.01 | 291.66 | 292.54 | 293.58 | 295.16 | 296.25 | 297.35 | 298.55 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|

# Presjek-6 1+00.00

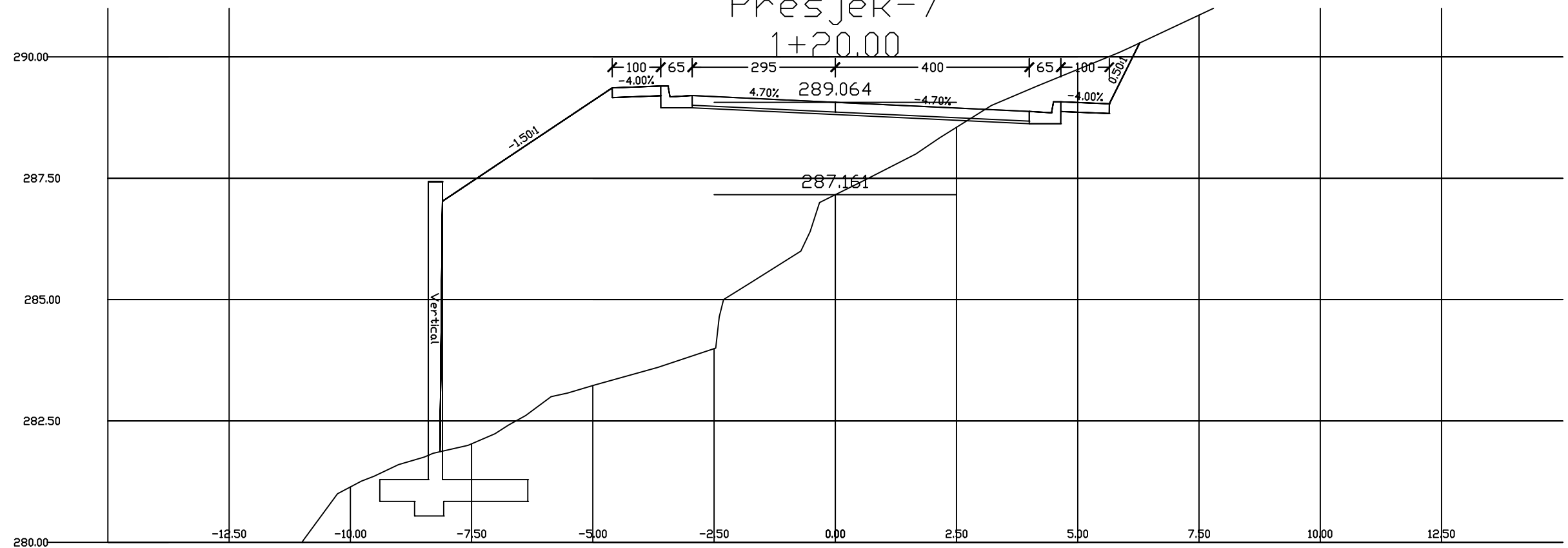


Kote projekta

|        |        |        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 281.31 | 284.54 | 286.97 | 288.64 | 291.07 | 291.66 | 292.37 | 293.12 | 293.89 | 295.03 | 295.75 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|

# Presjek-7

1+20.00

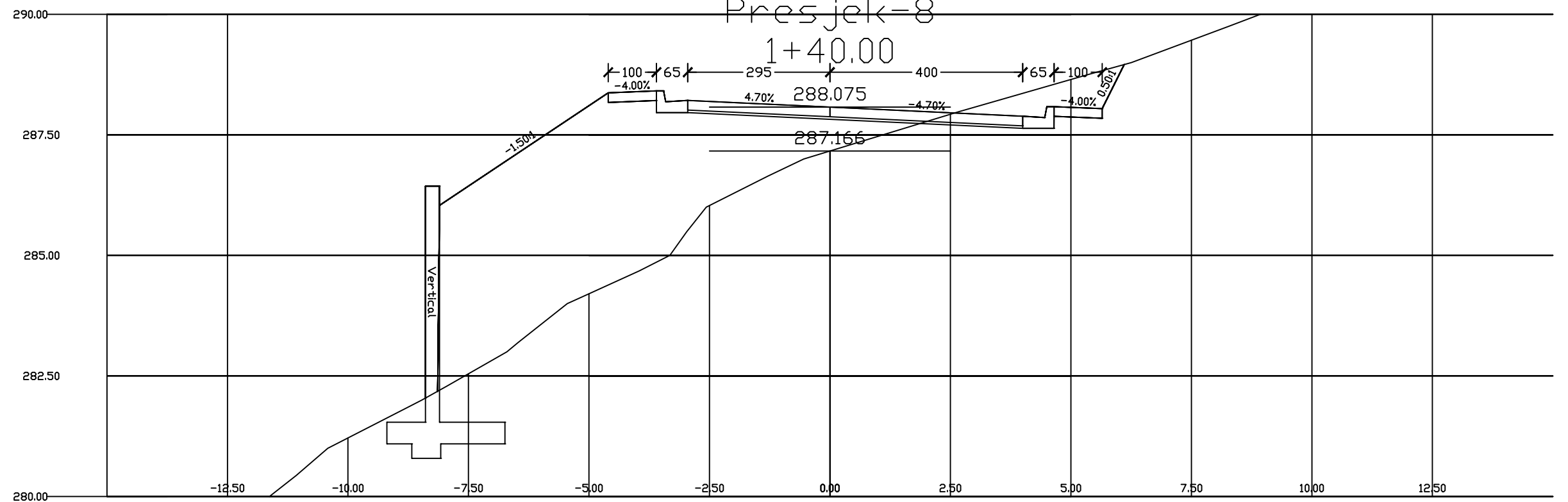


Kote projekta

|        |        |        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 278.75 | 281.14 | 282.03 | 283.23 | 283.99 | 287.16 | 288.55 | 289.74 | 290.86 | 291.81 | 293.02 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|

# Presjek-8

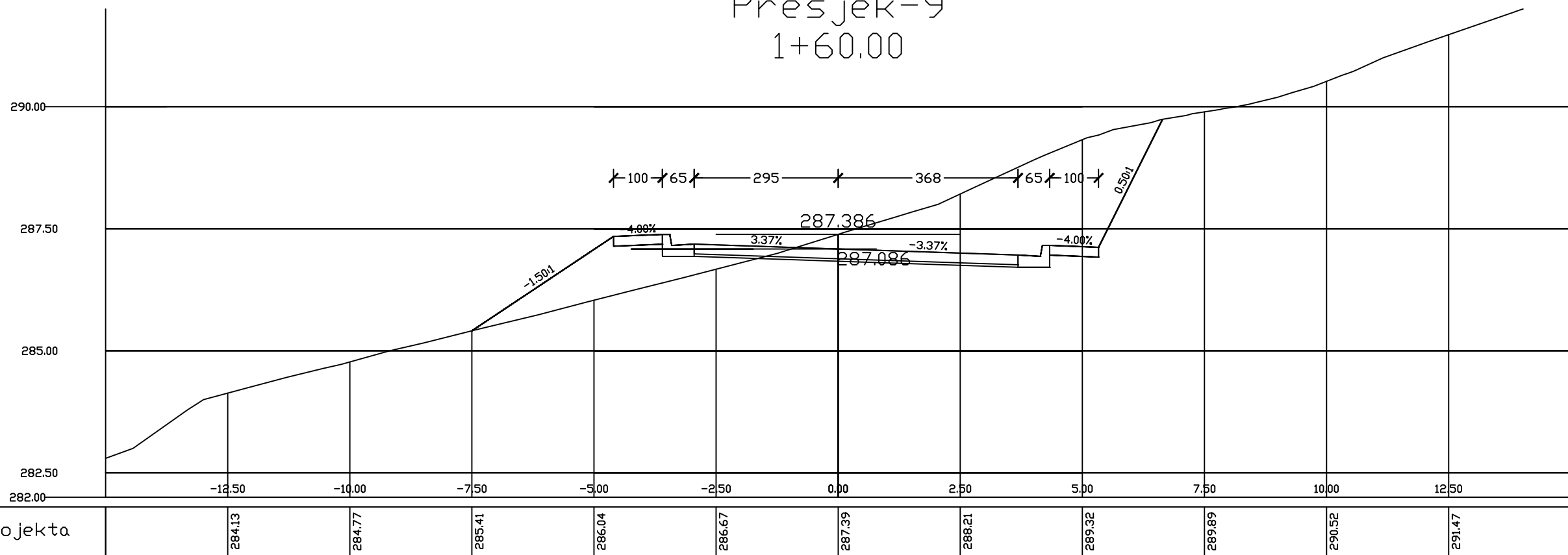
1+40.00



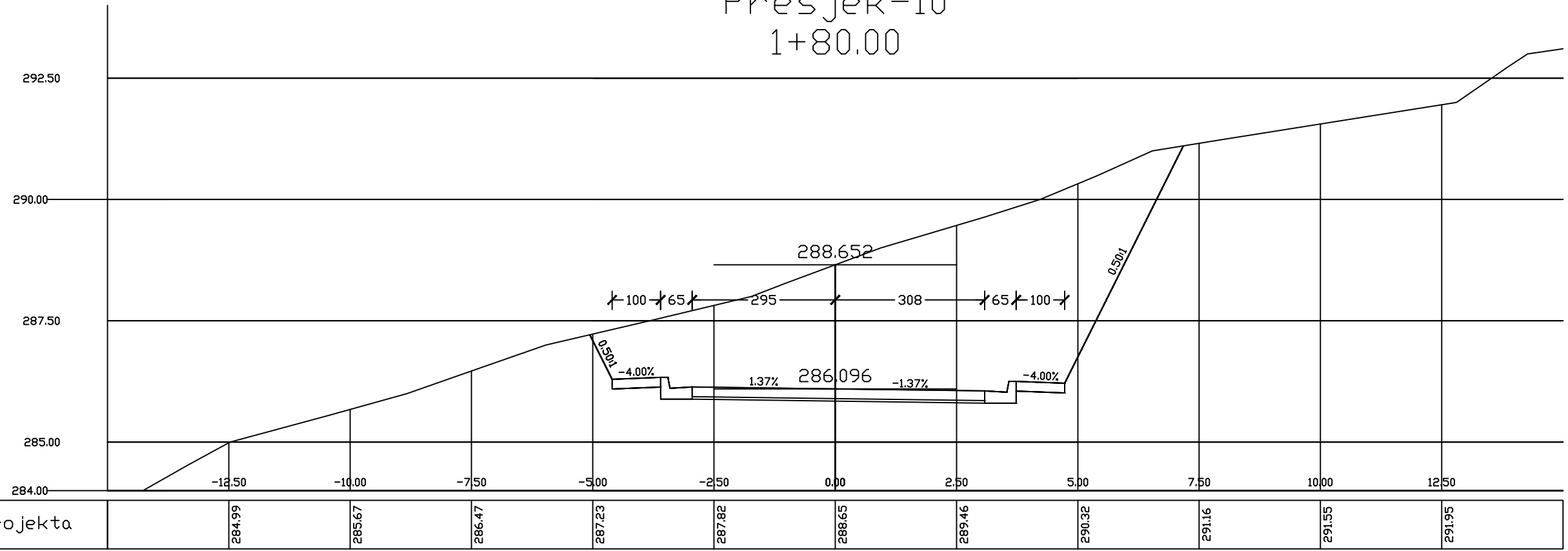
Kote projekta

|        |        |        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 279.14 | 281.21 | 282.54 | 284.20 | 286.03 | 287.17 | 287.93 | 288.65 | 289.46 | 290.50 | 291.32 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|

Presjek-9  
1+60.00



Presjek-10  
1+80.00



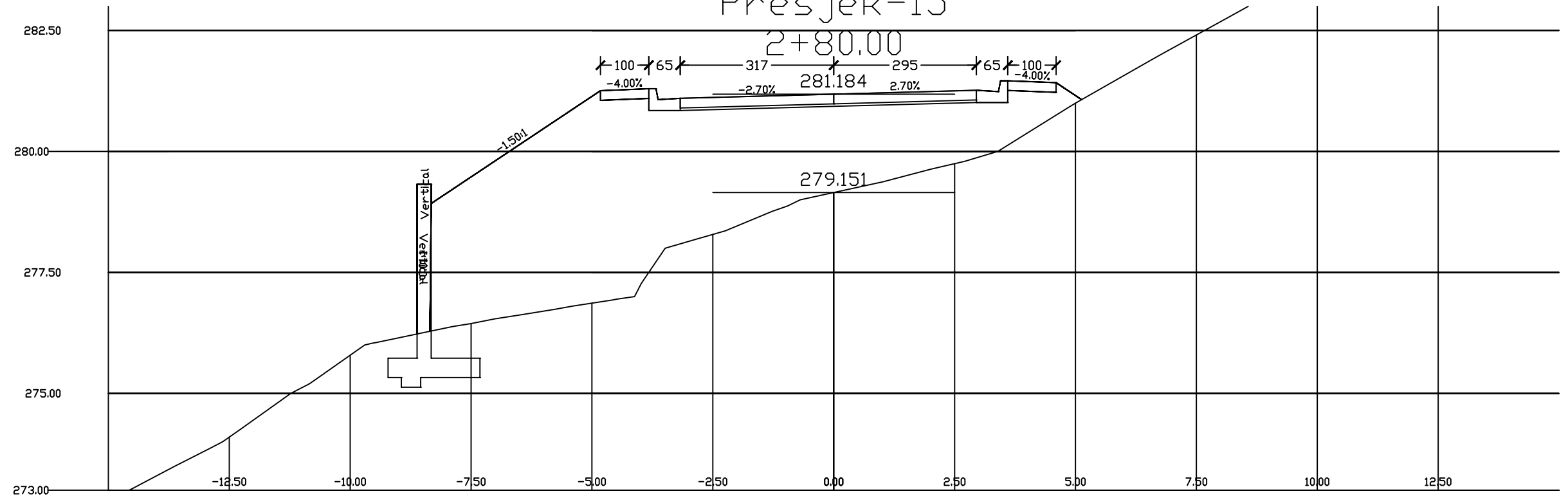






# Presjek-15

2+80.00



Kote projekta

274.10

275.79

276.44

276.87

278.29

279.15

279.75

281.00

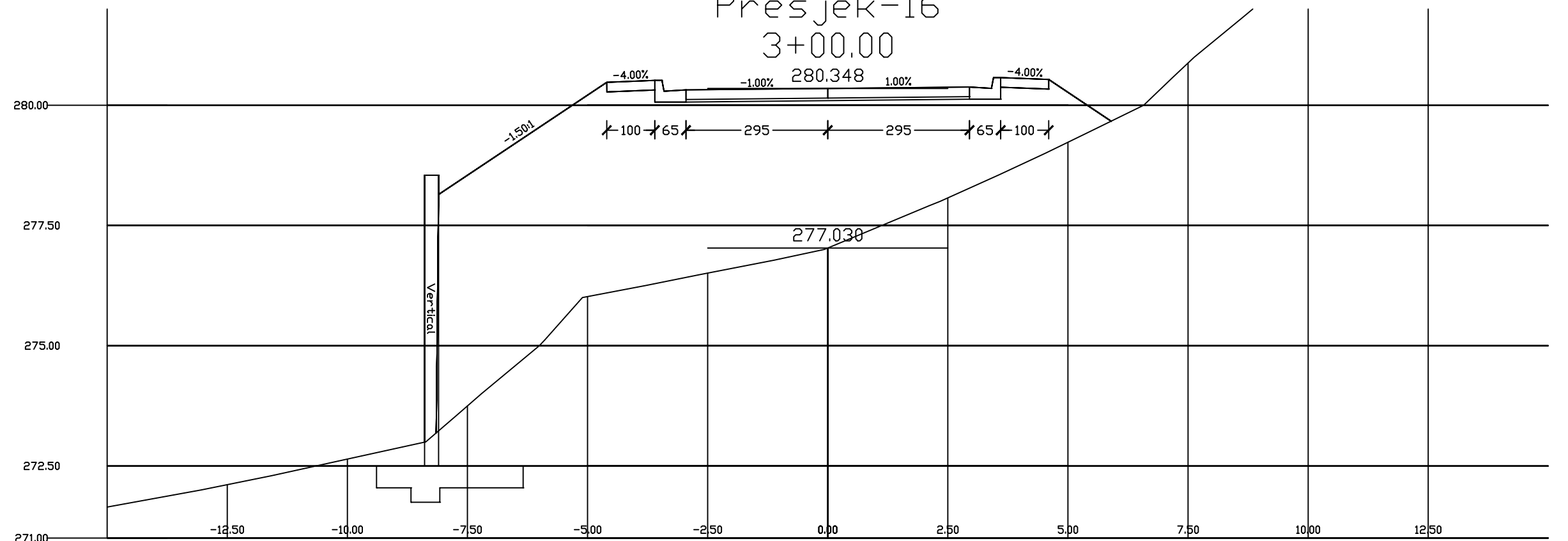
282.41

283.30

283.80

# Presjek-16

3+00.00



Kote projekta

272.11

272.64

273.75

276.02

276.51

277.03

278.07

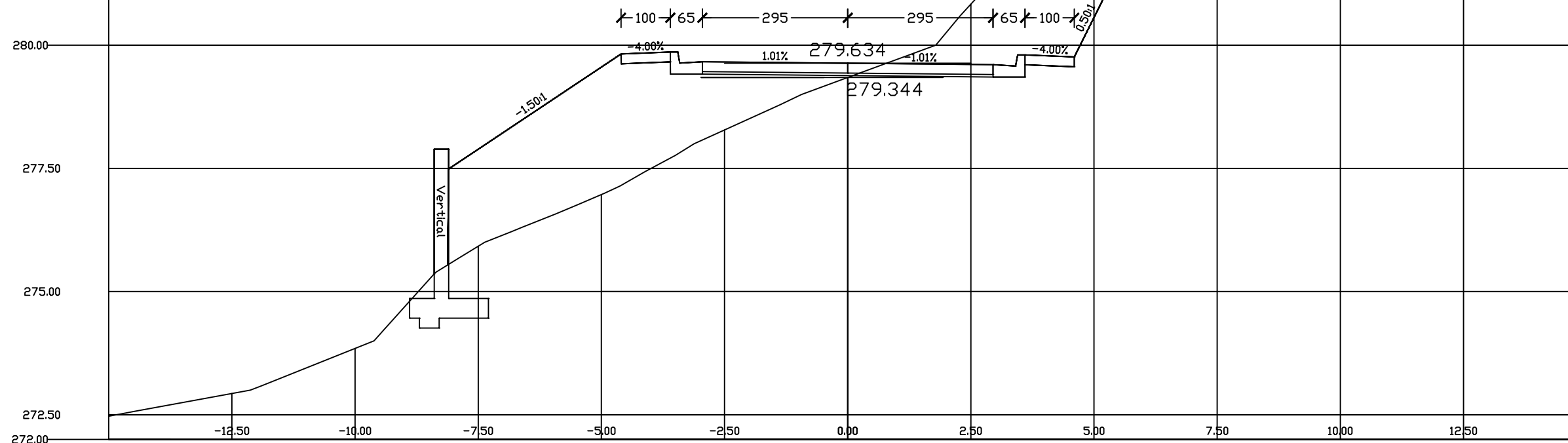
279.23

280.88

282.22

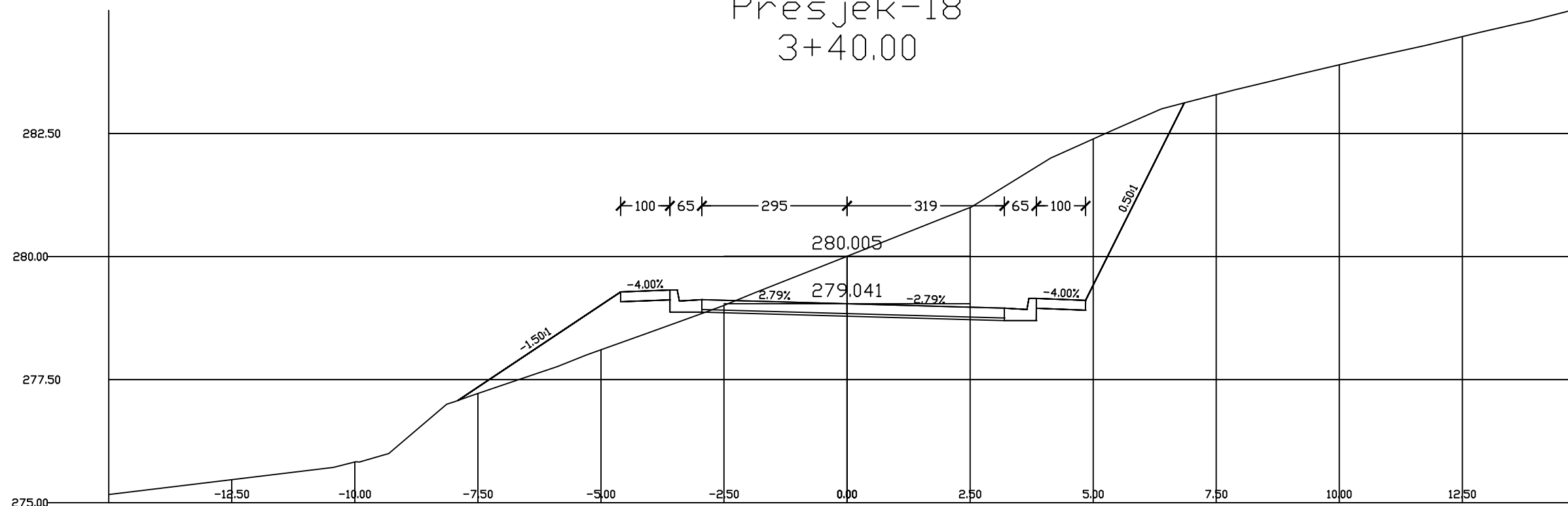
282.67

# Presjek-17 3+20.00



|               |        |        |        |        |        |        |        |        |        |        |        |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Kote projekta |        |        |        |        |        |        |        |        |        |        |        |
|               | 272.93 | 273.85 | 275.92 | 276.97 | 278.28 | 279.34 | 280.83 | 281.18 | 281.43 | 281.66 | 281.91 |

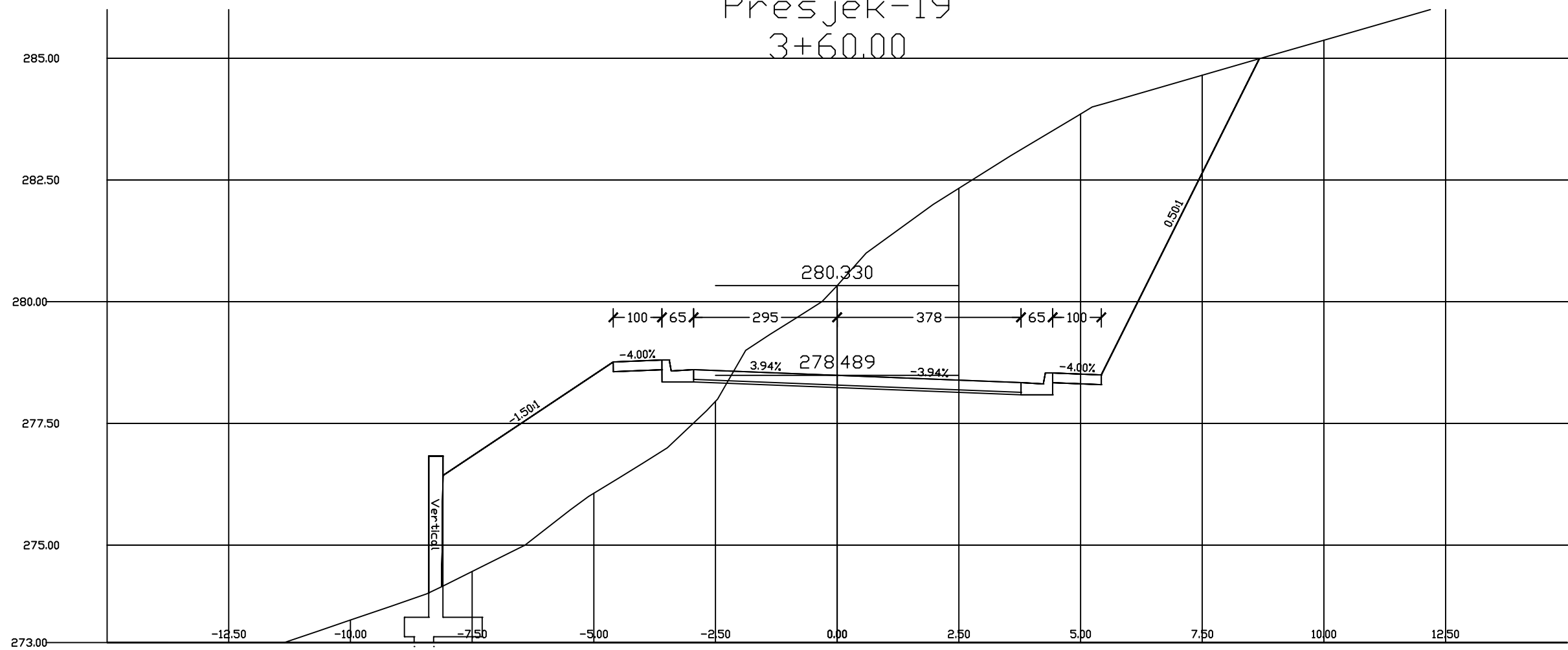
# Presjek-18 3+40.00



|               |        |        |        |        |        |        |        |        |        |        |        |
|---------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Kote projekta |        |        |        |        |        |        |        |        |        |        |        |
|               | 275.47 | 275.83 | 277.22 | 278.11 | 279.01 | 280.01 | 281.00 | 282.39 | 283.29 | 283.90 | 284.47 |



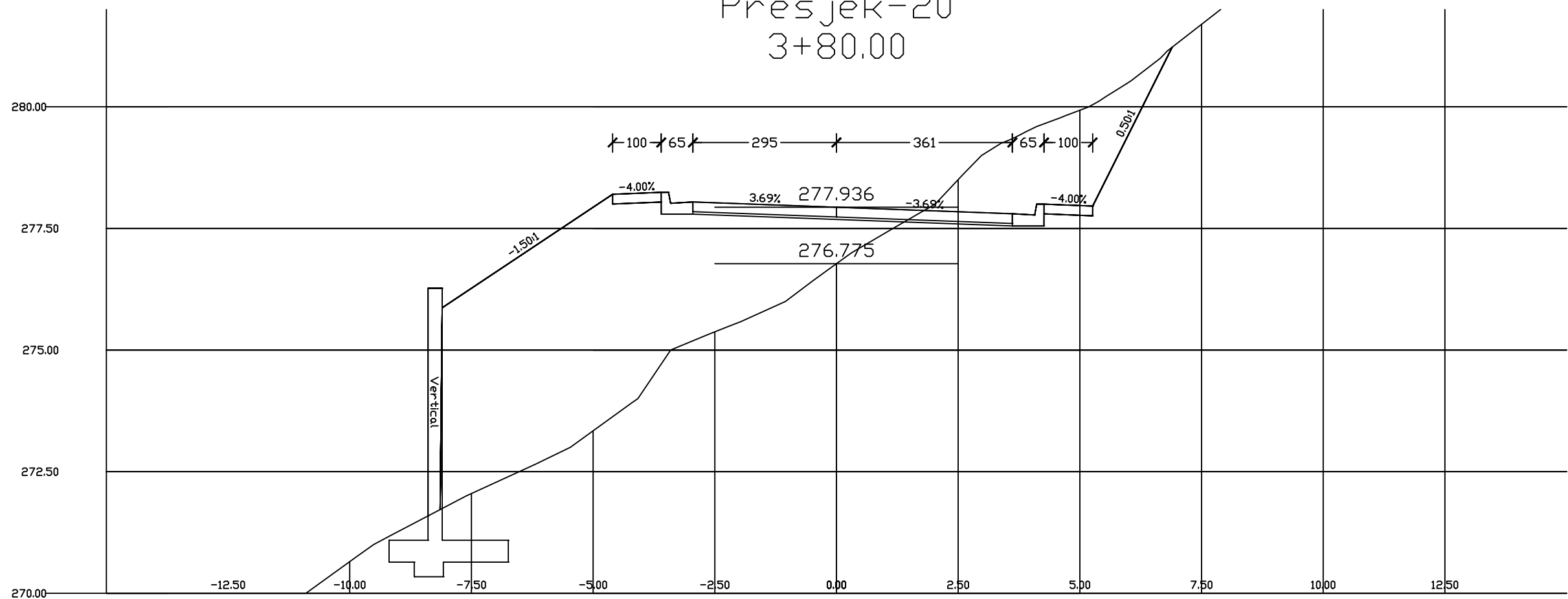
# Presjek-19 3+60.00



Kote projekta

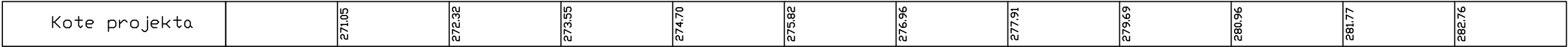
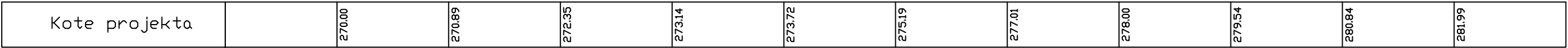
|        |        |        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 272.78 | 273.46 | 274.46 | 276.07 | 277.95 | 280.33 | 282.33 | 283.86 | 284.65 | 285.37 | 286.09 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|

# Presjek-20 3+80.00



Kote projekta

|        |        |        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 270.00 | 270.65 | 272.05 | 273.34 | 275.37 | 276.78 | 278.50 | 279.93 | 281.69 | 283.20 | 285.00 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|



## **6. OBRADA NA RAČUNALU**

## 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. 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 polilinja te izrada točaka na tim polilinjama dobije se model terena, tj. 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, ubacuju se odgovarajući kružni lukovi i prijelazne krivine čime se dobiju horizontalni elementi ceste. Sljedeći korak je izrada uzdužnog presjeka ceste. Niveleta se postavlja tako da se u konačnici riješe geometrijski i sigurnosni elementi i odvodnja. Između tangenti interpolira se odgovarajuća kružna krivina.

Poprečnim presjekom definirani su: poprečni nagib i širina kolnika. Kao izlazni podaci dobiju se računalni ispisi koordinatnih točaka osi i količina zemljanih radova po presjeku

## **7. RAČUNALNI ISPIS TOČKA OSI**

## **7.1. KOORDINATNI RAČUN GLAVIH TOČAKA OSI**

**Alignment Station and Curve Report****Project Name:**

C:\Users\Strunje\Desktop\zavrsni\zavrsni2\_recoverplot.dwg

**Report Date:** 11.9.2016. 18:04:33**Client:** Client  
Company**Project  
Description:****Prepared by:**  
Preparer**Alignment: Os****Description:**Tangent Data

| Description | PT Station | Northing | Easting |
|-------------|------------|----------|---------|
| Start:      | 0+00.000   | 215.155  | 211.915 |
| End:        | 0+65.858   | 272.835  | 243.701 |

Tangent Data

| Parameter | Value  | Parameter | Value                |
|-----------|--------|-----------|----------------------|
| Length:   | 65.858 | Course:   | N 28° 51' 28.9873" E |

Spiral Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| TS:         | 0+65.858 | 272.835  | 243.701 |
| SPI:        |          | 296.267  | 256.614 |
| SC:         | 1+05.858 | 306.047  | 265.793 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 40.000           | L Tan:    | 26.754               |
| Radius:   | 80.000           | S Tan:    | 13.413               |
| Theta:    | 14° 19' 26.2016" | P:        | 0.831                |
| X:        | 39.751           | K:        | 19.958               |
| Y:        | 3.318            | A:        | 56.569               |
| Chord:    | 39.889           | Course:   | N 33° 37' 48.6127" E |

Curve Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| SC:         | 1+05.858 | 306.047  | 265.793 |
| RP:         |          | 251.302  | 324.127 |
| CS:         | 1+46.723 | 327.578  | 300.004 |

Circular Curve Data

| Parameter | Value            | Parameter | Value  |
|-----------|------------------|-----------|--------|
| Delta:    | 29° 16' 03.0757" | Type:     | RIGHT  |
| Radius:   | 80.000           |           |        |
| Length:   | 40.865           | Tangent:  | 20.889 |

Mid-Ord: 2.595 External: 2.682  
 Chord: 40.422 Course: N 57° 48' 56.7266" E

Spiral Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| CS:         | 1+46.723 | 327.578  | 300.004 |
| SPI:        |          | 331.623  | 312.793 |
| ST:         | 1+86.723 | 333.129  | 339.505 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 40.000           | L Tan:    | 26.754               |
| Radius:   | 80.000           | S Tan:    | 13.413               |
| Theta:    | 14° 19' 26.2016" | P:        | 0.831                |
| X:        | 39.751           | K:        | 19.958               |
| Y:        | 3.318            | A:        | 56.569               |
| Chord:    | 39.889           | Course:   | N 82° 00' 04.8406" E |

Tangent Data

| Description | PT Station | Northing | Easting |
|-------------|------------|----------|---------|
| Start:      | 1+86.723   | 333.129  | 339.505 |
| End:        | 2+00.649   | 333.912  | 353.408 |

Tangent Data

| Parameter | Value  | Parameter | Value                |
|-----------|--------|-----------|----------------------|
| Length:   | 13.926 | Course:   | N 86° 46' 24.4660" E |

Spiral Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| TS:         | 2+00.649 | 333.912  | 353.408 |
| SPI:        |          | 335.415  | 380.072 |
| SC:         | 2+40.649 | 338.372  | 393.109 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 40.000           | L Tan:    | 26.706               |
| Radius:   | 120.000          | S Tan:    | 13.369               |
| Theta:    | 09° 32' 57.4677" | P:        | 0.555                |
| X:        | 39.889           | K:        | 19.981               |
| Y:        | 2.218            | A:        | 69.282               |
| Chord:    | 39.951           | Course:   | N 83° 35' 28.0066" E |

Curve Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| SC:         | 2+40.649 | 338.372  | 393.109 |
| RP:         |          | 455.401  | 366.573 |
| CS:         | 2+57.202 | 343.132  | 408.950 |

Circular Curve Data



| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 07° 54' 12.9763" | Type:     | LEFT                 |
| Radius:   | 120.000          |           |                      |
| Length:   | 16.553           | Tangent:  | 8.290                |
| Mid-Ord:  | 0.285            | External: | 0.286                |
| Chord:    | 16.540           | Course:   | N 73° 16' 20.5102" E |

Spiral Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| CS:         | 2+57.202 | 343.132  | 408.950 |
| SPI:        |          | 347.853  | 421.457 |
| ST:         | 2+97.202 | 361.298  | 444.531 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 40.000           | L Tan:    | 26.706               |
| Radius:   | 120.000          | S Tan:    | 13.369               |
| Theta:    | 09° 32' 57.4677" | P:        | 0.555                |
| X:        | 39.889           | K:        | 19.981               |
| Y:        | 2.218            | A:        | 69.282               |
| Chord:    | 39.951           | Course:   | N 62° 57' 13.0137" E |

Tangent Data

| Description | PT Station | Northing | Easting |
|-------------|------------|----------|---------|
| Start:      | 2+97.202   | 361.298  | 444.531 |
| End:        | 3+22.700   | 374.135  | 466.562 |

Tangent Data

| Parameter | Value  | Parameter | Value                |
|-----------|--------|-----------|----------------------|
| Length:   | 25.498 | Course:   | N 59° 46' 16.5543" E |

Spiral Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| TS:         | 3+22.700 | 374.135  | 466.562 |
| SPI:        |          | 387.589  | 489.651 |
| SC:         | 3+62.700 | 391.896  | 502.324 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 40.000           | L Tan:    | 26.723               |
| Radius:   | 100.000          | S Tan:    | 13.384               |
| Theta:    | 11° 27' 32.9612" | P:        | 0.666                |
| X:        | 39.840           | K:        | 19.973               |
| Y:        | 2.659            | A:        | 63.246               |
| Chord:    | 39.929           | Course:   | N 63° 35' 22.8805" E |

Curve Point Data

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

|     |          |         |         |
|-----|----------|---------|---------|
| SC: | 3+62.700 | 391.896 | 502.324 |
| RP: |          | 297.214 | 534.500 |
| CS: | 3+69.861 | 393.955 | 509.180 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 04° 06' 10.1064" | Type:     | RIGHT                |
| Radius:   | 100.000          |           |                      |
| Length:   | 7.161            | Tangent:  | 3.582                |
| Mid-Ord:  | 0.064            | External: | 0.064                |
| Chord:    | 7.159            | Course:   | N 73° 16' 54.5688" E |

Spiral Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| CS:         | 3+69.861 | 393.955  | 509.180 |
| SPI:        |          | 397.344  | 522.128 |
| ST:         | 4+09.861 | 398.839  | 548.809 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 40.000           | L Tan:    | 26.723               |
| Radius:   | 100.000          | S Tan:    | 13.384               |
| Theta:    | 11° 27' 32.9612" | P:        | 0.666                |
| X:        | 39.840           | K:        | 19.973               |
| Y:        | 2.659            | A:        | 63.246               |
| Chord:    | 39.929           | Course:   | N 82° 58' 26.2571" E |

Tangent Data

| Description | PT Station | Northing | Easting |
|-------------|------------|----------|---------|
| Start:      | 4+09.861   | 398.839  | 548.809 |
| End:        | 4+13.863   | 399.063  | 552.805 |

Tangent Data

| Parameter | Value | Parameter | Value                |
|-----------|-------|-----------|----------------------|
| Length:   | 4.002 | Course:   | N 86° 47' 32.5833" E |

**Alignment: Os-Left-2.750-Left-0.000**

**Description:**

Tangent Data

| Description | PT Station | Northing | Easting |
|-------------|------------|----------|---------|
| Start:      | 0+00.000   | 216.482  | 209.507 |
| End:        | 0+65.858   | 274.162  | 241.292 |

Tangent Data

| Parameter | Value | Parameter | Value |
|-----------|-------|-----------|-------|
|-----------|-------|-----------|-------|

Length: 65.858 Course: N 28° 51' 28.9873" E

Spiral Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| TS:         | 0+65.858 | 274.162  | 241.292 |
| SPI:        |          | 297.896  | 254.372 |
| SC:         | 1+06.546 | 307.929  | 263.787 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 40.688           | L Tan:    | 27.211               |
| Radius:   | 82.750           | S Tan:    | 13.641               |
| Theta:    | 14° 05' 09.3614" | P:        | 0.832                |
| X:        | 40.442           | K:        | 20.303               |
| Y:        | 3.320            | A:        | 58.025               |
| Chord:    | 40.574           | Course:   | N 33° 40' 13.9711" E |

Curve Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| SC:         | 1+06.546 | 307.929  | 263.787 |
| RP:         |          | 251.302  | 324.127 |
| CS:         | 1+48.816 | 330.200  | 299.174 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 29° 16' 03.0757" | Type:     | RIGHT                |
| Radius:   | 82.750           |           |                      |
| Length:   | 42.270           | Tangent:  | 21.607               |
| Mid-Ord:  | 2.684            | External: | 2.774                |
| Chord:    | 41.812           | Course:   | N 57° 48' 56.7266" E |

Spiral Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| CS:         | 1+48.816 | 330.200  | 299.174 |
| SPI:        |          | 334.349  | 312.293 |
| ST:         | 1+89.503 | 335.874  | 339.350 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 40.688           | L Tan:    | 27.211               |
| Radius:   | 82.750           | S Tan:    | 13.641               |
| Theta:    | 14° 05' 09.3614" | P:        | 0.832                |
| X:        | 40.442           | K:        | 20.303               |
| Y:        | 3.320            | A:        | 58.025               |
| Chord:    | 40.574           | Course:   | N 81° 57' 39.4822" E |

Tangent Data

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

Start: 1+89.503 335.874 339.350  
 End: 2+02.970 336.632 352.795

Tangent Data

| Parameter | Value  | Parameter | Value                |
|-----------|--------|-----------|----------------------|
| Length:   | 13.467 | Course:   | N 86° 46' 24.4660" E |

Curve Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| PC:         | 2+02.970 | 336.632  | 352.795 |
| RP:         |          | 606.204  | 337.599 |
| PT:         | 2+07.395 | 336.917  | 357.211 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 00° 56' 20.2543" | Type:     | LEFT                 |
| Radius:   | 270.000          |           |                      |
| Length:   | 4.425            | Tangent:  | 2.212                |
| Mid-Ord:  | 0.009            | External: | 0.009                |
| Chord:    | 4.425            | Course:   | N 86° 18' 14.3389" E |

Tangent Data

| Description | PT Station | Northing | Easting |
|-------------|------------|----------|---------|
| Start:      | 2+07.395   | 336.917  | 357.211 |
| End:        | 2+12.845   | 337.313  | 362.647 |

Tangent Data

| Parameter | Value | Parameter | Value                |
|-----------|-------|-----------|----------------------|
| Length:   | 5.450 | Course:   | N 85° 50' 04.2117" E |

Curve Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| PC:         | 2+12.845 | 337.313  | 362.647 |
| RP:         |          | 536.785  | 348.119 |
| CS:         | 2+42.900 | 341.736  | 392.346 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 08° 36' 36.3737" | Type:     | LEFT                 |
| Radius:   | 200.000          |           |                      |
| Length:   | 30.055           | Tangent:  | 15.056               |
| Mid-Ord:  | 0.564            | External: | 0.566                |
| Chord:    | 30.027           | Course:   | N 81° 31' 46.0249" E |

Spiral Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| CS:         | 2+42.900 | 341.736  | 392.346 |
| SPI:        |          | 341.736  | 392.346 |
| SC:         | 2+42.900 | 341.736  | 392.346 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 0.000            | L Tan:    | 0.000                |
| Radius:   | 116.550          | S Tan:    | 0.000                |
| Theta:    | 00° 00' 00.8397" | P:        | 0.000                |
| X:        | 0.000            | K:        | 0.000                |
| Y:        | 0.000            | A:        | 66.316               |
| Chord:    | 0.000            | Course:   | N 77° 13' 27.4185" E |

Curve Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| SC:         | 2+42.900 | 341.736  | 392.346 |
| RP:         |          | 455.401  | 366.573 |
| PCC:        | 2+58.978 | 346.360  | 407.731 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 07° 54' 12.9763" | Type:     | LEFT                 |
| Radius:   | 116.550          |           |                      |
| Length:   | 16.077           | Tangent:  | 8.051                |
| Mid-Ord:  | 0.277            | External: | 0.278                |
| Chord:    | 16.065           | Course:   | N 73° 16' 20.5102" E |

Curve Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| PCC:        | 2+58.978 | 346.360  | 407.731 |
| RP:         |          | 533.474  | 337.103 |
| PT:         | 2+89.035 | 359.044  | 434.950 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 08° 36' 38.8390" | Type:     | LEFT                 |
| Radius:   | 200.000          |           |                      |
| Length:   | 30.057           | Tangent:  | 15.057               |
| Mid-Ord:  | 0.564            | External: | 0.566                |
| Chord:    | 30.029           | Course:   | N 65° 00' 54.6025" E |

Tangent Data

| Description | PT Station | Northing | Easting |
|-------------|------------|----------|---------|
| Start:      | 2+89.035   | 359.044  | 434.950 |
| End:        | 2+94.485   | 361.710  | 439.703 |

Tangent Data

| Parameter | Value | Parameter | Value                |
|-----------|-------|-----------|----------------------|
| Length:   | 5.450 | Course:   | N 60° 42' 35.1831" E |

Curve Point Data

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

|     |          |         |         |
|-----|----------|---------|---------|
| PC: | 2+94.485 | 361.710 | 439.703 |
| RP: |          | 597.191 | 307.610 |
| PT: | 2+98.908 | 363.905 | 443.543 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 00° 56' 18.6287" | Type:     | LEFT                 |
| Radius:   | 270.000          |           |                      |
| Length:   | 4.423            | Tangent:  | 2.211                |
| Mid-Ord:  | 0.009            | External: | 0.009                |
| Chord:    | 4.423            | Course:   | N 60° 14' 25.8687" E |

Tangent Data

| Description | PT Station | Northing | Easting |
|-------------|------------|----------|---------|
| Start:      | 2+98.908   | 363.905  | 443.543 |
| End:        | 3+23.947   | 376.511  | 465.177 |

Tangent Data

| Parameter | Value  | Parameter | Value                |
|-----------|--------|-----------|----------------------|
| Length:   | 25.040 | Course:   | N 59° 46' 16.5543" E |

Spiral Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| TS:         | 3+23.947 | 376.511  | 465.177 |
| SPI:        |          | 390.104  | 488.505 |
| SC:         | 3+64.497 | 394.499  | 501.439 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 40.550           | L Tan:    | 27.089               |
| Radius:   | 102.750          | S Tan:    | 13.567               |
| Theta:    | 11° 18' 20.9143" | P:        | 0.666                |
| X:        | 40.392           | K:        | 20.249               |
| Y:        | 2.660            | A:        | 64.549               |
| Chord:    | 40.478           | Course:   | N 63° 36' 56.1931" E |

Curve Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| SC:         | 3+64.497 | 394.499  | 501.439 |
| RP:         |          | 297.214  | 534.500 |
| CS:         | 3+71.855 | 396.615  | 508.484 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 04° 06' 10.1064" | Type:     | RIGHT                |
| Radius:   | 102.750          |           |                      |
| Length:   | 7.358            | Tangent:  | 3.680                |
| Mid-Ord:  | 0.066            | External: | 0.066                |
| Chord:    | 7.356            | Course:   | N 73° 16' 54.5688" E |

| <u>Spiral Point Data</u>           |                  |           |                      |
|------------------------------------|------------------|-----------|----------------------|
| Description                        | Station          | Northing  | Easting              |
| CS:                                | 3+71.855         | 396.615   | 508.484              |
| SPI:                               |                  | 400.074   | 521.699              |
| ST:                                | 4+12.405         | 401.585   | 548.655              |
| <u>Spiral Curve Data: clothoid</u> |                  |           |                      |
| Parameter                          | Value            | Parameter | Value                |
| Length:                            | 40.550           | L Tan:    | 27.089               |
| Radius:                            | 102.750          | S Tan:    | 13.567               |
| Theta:                             | 11° 18' 20.9143" | P:        | 0.666                |
| X:                                 | 40.392           | K:        | 20.249               |
| Y:                                 | 2.660            | A:        | 64.549               |
| Chord:                             | 40.478           | Course:   | N 82° 56' 52.9445" E |
| <u>Tangent Data</u>                |                  |           |                      |
| Description                        | PT Station       | Northing  | Easting              |
| Start:                             | 4+12.405         | 401.585   | 548.655              |
| End:                               | 4+16.407         | 401.809   | 552.651              |
| <u>Tangent Data</u>                |                  |           |                      |
| Parameter                          | Value            | Parameter | Value                |
| Length:                            | 4.002            | Course:   | N 86° 47' 32.5833" E |

**Alignment: Os-Right-2.750-Left-0.000-Left-0.000**

**Description:**

| <u>Tangent Data</u>        |                  |           |                      |
|----------------------------|------------------|-----------|----------------------|
| Description                | PT Station       | Northing  | Easting              |
| Start:                     | 0+00.000         | 213.827   | 214.324              |
| End:                       | 0+65.170         | 270.905   | 245.777              |
| <u>Tangent Data</u>        |                  |           |                      |
| Parameter                  | Value            | Parameter | Value                |
| Length:                    | 65.170           | Course:   | N 28° 51' 28.9873" E |
| <u>Curve Point Data</u>    |                  |           |                      |
| Description                | Station          | Northing  | Easting              |
| PC:                        | 0+65.170         | 270.905   | 245.777              |
| RP:                        |                  | 184.029   | 403.425              |
| PT:                        | 0+70.925         | 275.899   | 248.635              |
| <u>Circular Curve Data</u> |                  |           |                      |
| Parameter                  | Value            | Parameter | Value                |
| Delta:                     | 01° 49' 54.4964" | Type:     | RIGHT                |

|          |         |           |                      |
|----------|---------|-----------|----------------------|
| Radius:  | 180.000 |           |                      |
| Length:  | 5.755   | Tangent:  | 2.878                |
| Mid-Ord: | 0.023   | External: | 0.023                |
| Chord:   | 5.755   | Course:   | N 29° 46' 26.2355" E |

Tangent Data

| Description | PT Station | Northing | Easting |
|-------------|------------|----------|---------|
| Start:      | 0+70.925   | 275.899  | 248.635 |
| End:        | 0+76.666   | 280.837  | 251.565 |

Tangent Data

| Parameter | Value | Parameter | Value                |
|-----------|-------|-----------|----------------------|
| Length:   | 5.741 | Course:   | N 30° 41' 23.4837" E |

Curve Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| PC:         | 0+76.666 | 280.837  | 251.565 |
| RP:         |          | 214.486  | 363.358 |
| CS:         | 1+05.009 | 303.446  | 268.563 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 12° 29' 29.9613" | Type:     | RIGHT                |
| Radius:   | 130.000          |           |                      |
| Length:   | 28.343           | Tangent:  | 14.228               |
| Mid-Ord:  | 0.772            | External: | 0.776                |
| Chord:    | 28.287           | Course:   | N 36° 56' 08.4643" E |

Spiral Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| CS:         | 1+05.009 | 303.446  | 268.563 |
| SPI:        |          | 303.447  | 268.563 |
| SC:         | 1+05.009 | 303.447  | 268.564 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 0.001            | L Tan:    | 0.000                |
| Radius:   | 76.200           | S Tan:    | 0.000                |
| Theta:    | 00° 00' 01.7439" | P:        | 0.000                |
| X:        | 0.001            | K:        | 0.000                |
| Y:        | 0.000            | A:        | 52.586               |
| Chord:    | 0.001            | Course:   | N 43° 10' 54.3169" E |

Curve Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| SC:         | 1+05.009 | 303.447  | 268.564 |
| RP:         |          | 251.302  | 324.127 |
| PCC:        | 1+43.934 | 323.955  | 301.150 |



Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 29° 16' 03.0757" | Type:     | RIGHT                |
| Radius:   | 76.200           |           |                      |
| Length:   | 38.924           | Tangent:  | 19.897               |
| Mid-Ord:  | 2.472            | External: | 2.555                |
| Chord:    | 38.502           | Course:   | N 57° 48' 56.7266" E |

Curve Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| PCC:        | 1+43.934 | 323.955  | 301.150 |
| RP:         |          | 200.006  | 340.351 |
| PT:         | 1+72.279 | 329.500  | 328.890 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 12° 29' 34.4767" | Type:     | RIGHT                |
| Radius:   | 130.000          |           |                      |
| Length:   | 28.346           | Tangent:  | 14.229               |
| Mid-Ord:  | 0.772            | External: | 0.776                |
| Chord:    | 28.289           | Course:   | N 78° 41' 45.5028" E |

Tangent Data

| Description | PT Station | Northing | Easting |
|-------------|------------|----------|---------|
| Start:      | 1+72.279   | 329.500  | 328.890 |
| End:        | 1+78.020   | 330.006  | 334.609 |

Tangent Data

| Parameter | Value | Parameter | Value                |
|-----------|-------|-----------|----------------------|
| Length:   | 5.741 | Course:   | N 84° 56' 32.7412" E |

Curve Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| PC:         | 1+78.020 | 330.006  | 334.609 |
| RP:         |          | 150.707  | 350.477 |
| PT:         | 1+83.772 | 330.422  | 340.346 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 01° 49' 51.7249" | Type:     | RIGHT                |
| Radius:   | 180.000          |           |                      |
| Length:   | 5.752            | Tangent:  | 2.876                |
| Mid-Ord:  | 0.023            | External: | 0.023                |
| Chord:    | 5.752            | Course:   | N 85° 51' 28.6036" E |

Tangent Data

| Description | PT Station | Northing | Easting |
|-------------|------------|----------|---------|
| Start:      | 1+83.772   | 330.422  | 340.346 |

End: 1+97.011 331.167 353.563

Tangent Data

| Parameter | Value  | Parameter | Value                |
|-----------|--------|-----------|----------------------|
| Length:   | 13.238 | Course:   | N 86° 46' 24.4660" E |

Spiral Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| TS:         | 1+97.011 | 331.167  | 353.563 |
| SPI:        |          | 332.683  | 380.456 |
| SC:         | 2+37.469 | 335.690  | 393.717 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 40.458           | L Tan:    | 27.011               |
| Radius:   | 122.750          | S Tan:    | 13.521               |
| Theta:    | 09° 26' 32.3841" | P:        | 0.555                |
| X:        | 40.349           | K:        | 20.211               |
| Y:        | 2.218            | A:        | 70.472               |
| Chord:    | 40.408           | Course:   | N 83° 34' 23.0715" E |

Curve Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| SC:         | 2+37.469 | 335.690  | 393.717 |
| RP:         |          | 455.401  | 366.573 |
| CS:         | 2+54.401 | 340.560  | 409.921 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 07° 54' 12.9763" | Type:     | LEFT                 |
| Radius:   | 122.750          |           |                      |
| Length:   | 16.933           | Tangent:  | 8.480                |
| Mid-Ord:  | 0.292            | External: | 0.293                |
| Chord:    | 16.919           | Course:   | N 73° 16' 20.5102" E |

Spiral Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| CS:         | 2+54.401 | 340.560  | 409.921 |
| SPI:        |          | 345.362  | 422.643 |
| ST:         | 2+94.860 | 358.922  | 445.916 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 40.458           | L Tan:    | 27.011               |
| Radius:   | 122.750          | S Tan:    | 13.521               |
| Theta:    | 09° 26' 32.3841" | P:        | 0.555                |
| X:        | 40.349           | K:        | 20.211               |
| Y:        | 2.218            | A:        | 70.472               |
| Chord:    | 40.408           | Course:   | N 62° 58' 17.9488" E |

Tangent Data

| Description | PT Station | Northing | Easting |
|-------------|------------|----------|---------|
| Start:      | 2+94.860   | 358.922  | 445.916 |
| End:        | 3+19.730   | 371.443  | 467.404 |

Tangent Data

| Parameter | Value  | Parameter | Value                |
|-----------|--------|-----------|----------------------|
| Length:   | 24.870 | Course:   | N 59° 46' 16.5543" E |

Curve Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| PC:         | 3+19.730 | 371.443  | 467.404 |
| RP:         |          | 181.358  | 578.164 |
| PT:         | 3+21.630 | 372.393  | 469.050 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 00° 29' 41.8434" | Type:     | RIGHT                |
| Radius:   | 220.000          |           |                      |
| Length:   | 1.900            | Tangent:  | 0.950                |
| Mid-Ord:  | 0.002            | External: | 0.002                |
| Chord:    | 1.900            | Course:   | N 60° 01' 07.4760" E |

Tangent Data

| Description | PT Station | Northing | Easting |
|-------------|------------|----------|---------|
| Start:      | 3+21.630   | 372.393  | 469.050 |
| End:        | 3+27.237   | 375.173  | 473.918 |

Tangent Data

| Parameter | Value | Parameter | Value                |
|-----------|-------|-----------|----------------------|
| Length:   | 5.606 | Course:   | N 60° 15' 58.3977" E |

Curve Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| PC:         | 3+27.237 | 375.173  | 473.918 |
| RP:         |          | 227.556  | 558.233 |
| CS:         | 3+59.634 | 388.472  | 503.407 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 10° 55' 08.6310" | Type:     | RIGHT                |
| Radius:   | 170.000          |           |                      |
| Length:   | 32.398           | Tangent:  | 16.248               |
| Mid-Ord:  | 0.771            | External: | 0.775                |
| Chord:    | 32.349           | Course:   | N 65° 43' 32.7133" E |

Spiral Point Data

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

|      |          |         |         |
|------|----------|---------|---------|
| CS:  | 3+59.634 | 388.472 | 503.407 |
| SPI: |          | 388.484 | 503.443 |
| SC:  | 3+59.710 | 388.497 | 503.479 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 0.076            | L Tan:    | 0.038                |
| Radius:   | 96.410           | S Tan:    | 0.038                |
| Theta:    | 00° 02' 42.4868" | P:        | 0.000                |
| X:        | 0.076            | K:        | 0.000                |
| Y:        | 0.000            | A:        | 59.874               |
| Chord:    | 0.076            | Course:   | N 71° 12' 28.2445" E |

Curve Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| SC:         | 3+59.710 | 388.497  | 503.479 |
| RP:         |          | 297.214  | 534.500 |
| PCC:        | 3+66.533 | 390.462  | 510.011 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 04° 03' 17.0384" | Type:     | RIGHT                |
| Radius:   | 96.410           |           |                      |
| Length:   | 6.823            | Tangent:  | 3.413                |
| Mid-Ord:  | 0.060            | External: | 0.060                |
| Chord:    | 6.821            | Course:   | N 73° 15' 28.0348" E |

Curve Point Data

| Description | Station  | Northing | Easting |
|-------------|----------|----------|---------|
| PCC:        | 3+66.533 | 390.462  | 510.011 |
| RP:         |          | 226.037  | 553.192 |
| PT:         | 3+99.877 | 395.724  | 542.883 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 11° 14' 16.7116" | Type:     | RIGHT                |
| Radius:   | 170.000          |           |                      |
| Length:   | 33.344           | Tangent:  | 16.726               |
| Mid-Ord:  | 0.817            | External: | 0.821                |
| Chord:    | 33.290           | Course:   | N 80° 54' 14.9097" E |

Tangent Data

| Description | PT Station | Northing | Easting |
|-------------|------------|----------|---------|
| Start:      | 3+99.877   | 395.724  | 542.883 |
| End:        | 4+05.403   | 396.059  | 548.399 |

Tangent Data

| Parameter | Value | Parameter | Value                |
|-----------|-------|-----------|----------------------|
| Length:   | 5.526 | Course:   | N 86° 31' 23.2655" E |

| <u>Curve Point Data</u>    |                  |           |                      |
|----------------------------|------------------|-----------|----------------------|
| Description                | Station          | Northing  | Easting              |
| PC:                        | 4+05.403         | 396.059   | 548.399              |
| RP:                        |                  | 176.464   | 561.741              |
| PT:                        | 4+06.437         | 396.120   | 549.431              |
| <u>Circular Curve Data</u> |                  |           |                      |
| Parameter                  | Value            | Parameter | Value                |
| Delta:                     | 00° 16' 09.3177" | Type:     | RIGHT                |
| Radius:                    | 220.000          |           |                      |
| Length:                    | 1.034            | Tangent:  | 0.517                |
| Mid-Ord:                   | 0.001            | External: | 0.001                |
| Chord:                     | 1.034            | Course:   | N 86° 39' 27.9244" E |
| <u>Tangent Data</u>        |                  |           |                      |
| Description                | PT Station       | Northing  | Easting              |
| Start:                     | 4+06.437         | 396.120   | 549.431              |
| End:                       | 4+09.971         | 396.317   | 552.959              |
| <u>Tangent Data</u>        |                  |           |                      |
| Parameter                  | Value            | Parameter | Value                |
| Length:                    | 3.534            | Course:   | N 86° 47' 32.5833" E |

## **7.2. KOORDINATNI RAČUN DETALJNIH TOČAKA OSI**

**Client:**

Client

Client Company

Address 1

Date: 11.9.2016. 18:05:45

**Prepared by:**

Preparer

Your Company Name

123 Main Street

Alignment Name: Os

Description:

Station Range: Start: 0+00.00, End: 413+86.00

Station Increment: 20.00

| Station | Northing  | Easting   | Tangential Direction |
|---------|-----------|-----------|----------------------|
| 0+00.00 | 215.1547m | 211.9151m | N28° 51' 28.99"E     |
| 0+20.00 | 232.6711m | 221.5679m | N28° 51' 28.99"E     |
| 0+40.00 | 250.1875m | 231.2208m | N28° 51' 28.99"E     |
| 0+60.00 | 267.7038m | 240.8736m | N28° 51' 28.99"E     |
| 0+80.00 | 285.1479m | 250.6547m | N30° 38' 54.49"E     |
| 1+00.00 | 301.6394m | 261.9358m | N39° 17' 37.06"E     |
| 1+20.00 | 315.4525m | 276.3290m | N53° 18' 37.23"E     |
| 1+40.00 | 325.2837m | 293.6860m | N67° 38' 03.43"E     |
| 1+60.00 | 330.6348m | 312.9128m | N80° 22' 48.65"E     |
| 1+80.00 | 332.7343m | 332.7929m | N86° 22' 07.62"E     |
| 2+00.00 | 333.8758m | 352.7603m | N86° 46' 24.47"E     |
| 2+20.00 | 335.2525m | 372.7115m | N84° 32' 18.89"E     |
| 2+40.00 | 338.2299m | 392.4759m | N77° 31' 53.63"E     |
| 2+60.00 | 344.1500m | 411.5555m | N68° 01' 53.38"E     |
| 2+80.00 | 352.7913m | 429.5803m | N61° 32' 14.68"E     |
| 3+00.00 | 362.7069m | 446.9483m | N59° 46' 16.55"E     |
| 3+20.00 | 372.7759m | 464.2288m | N59° 46' 16.55"E     |
| 3+40.00 | 382.6574m | 481.6157m | N61° 54' 52.90"E     |
| 3+60.00 | 390.9931m | 499.7786m | N69° 44' 07.73"E     |
| 3+80.00 | 396.0637m | 519.0940m | N80° 24' 22.23"E     |
| 4+00.00 | 398.2476m | 538.9660m | N86° 05' 45.42"E     |

Alignment Name: Os-Left-2.750-Left-0.000

Description:

Station Range: Start: 0+00.00, End: 416+41.00

Station Increment: 20.00

| Station | Northing | Easting | Tangential Direction |
|---------|----------|---------|----------------------|
|---------|----------|---------|----------------------|

|         |           |           |                  |
|---------|-----------|-----------|------------------|
| 0+00.00 | 216.4820m | 209.5066m | N28° 51' 28.99"E |
| 0+20.00 | 233.9984m | 219.1594m | N28° 51' 28.99"E |
| 0+40.00 | 251.5147m | 228.8123m | N28° 51' 28.99"E |
| 0+60.00 | 269.0311m | 238.4651m | N28° 51' 28.99"E |
| 0+80.00 | 286.3416m | 248.1657m | N30° 35' 18.51"E |
| 1+00.00 | 302.9204m | 259.4329m | N38° 56' 38.20"E |
| 1+20.00 | 316.9498m | 273.7498m | N52° 29' 51.82"E |
| 1+40.00 | 327.0994m | 290.9266m | N66° 20' 44.34"E |
| 1+60.00 | 332.9332m | 310.1542m | N79° 14' 31.46"E |
| 1+80.00 | 335.3036m | 329.9873m | N85° 59' 31.46"E |
| 2+00.00 | 336.4650m | 349.8302m | N86° 46' 24.47"E |
| 2+20.00 | 337.9605m | 369.7721m | N83° 47' 05.07"E |
| 2+40.00 | 341.1155m | 389.5132m | N78° 03' 18.59"E |
| 2+60.00 | 346.7235m | 408.6866m | N69° 01' 39.76"E |
| 2+80.00 | 354.8029m | 426.9730m | N63° 17' 53.28"E |
| 3+00.00 | 364.4551m | 444.4864m | N59° 46' 16.55"E |
| 3+20.00 | 374.5242m | 461.7669m | N59° 46' 16.55"E |
| 3+40.00 | 384.3821m | 479.0163m | N61° 34' 01.57"E |
| 3+60.00 | 392.9433m | 497.1618m | N68° 49' 46.42"E |
| 3+80.00 | 398.4001m | 516.5196m | N79° 28' 27.68"E |
| 4+00.00 | 400.8207m | 536.3912m | N85° 43' 11.89"E |

Alignment Name: Os-Right-2.750-Left-0.000-Left-0.000

Description:

Station Range: Start: 0+00.00, End: 409+97.00

Station Increment: 20.00

| Station | Northing  | Easting   | Tangential Direction |
|---------|-----------|-----------|----------------------|
| 0+00.00 | 213.8275m | 214.3236m | N28° 51' 28.99"E     |
| 0+20.00 | 231.3438m | 223.9764m | N28° 51' 28.99"E     |
| 0+40.00 | 248.8602m | 233.6293m | N28° 51' 28.99"E     |
| 0+60.00 | 266.3766m | 243.2821m | N28° 51' 28.99"E     |
| 0+80.00 | 283.6815m | 253.3034m | N32° 09' 33.20"E     |
| 1+00.00 | 299.7289m | 265.2068m | N40° 58' 26.24"E     |
| 1+20.00 | 313.3016m | 279.8276m | N54° 27' 12.97"E     |
| 1+40.00 | 322.6725m | 297.4315m | N69° 29' 30.72"E     |
| 1+60.00 | 327.8419m | 316.7283m | N79° 31' 50.21"E     |
| 1+80.00 | 330.1698m | 336.5820m | N85° 34' 21.75"E     |
| 2+00.00 | 331.3341m | 356.5165m | N86° 43' 16.77"E     |
| 2+20.00 | 332.8649m | 376.3741m | N83° 41' 24.64"E     |
| 2+40.00 | 336.2749m | 396.1800m | N76° 02' 33.75"E     |



|         |           |           |                  |
|---------|-----------|-----------|------------------|
| 2+60.00 | 342.6715m | 415.1640m | N66° 51' 38.15"E |
| 2+80.00 | 351.5908m | 433.1133m | N61° 03' 34.06"E |
| 3+00.00 | 361.5102m | 450.3568m | N59° 46' 16.55"E |
| 3+20.00 | 371.5791m | 467.6374m | N59° 50' 29.70"E |
| 3+40.00 | 381.0819m | 485.2283m | N64° 34' 04.54"E |
| 3+60.00 | 388.5894m | 503.7533m | N71° 24' 09.70"E |
| 3+80.00 | 393.3631m | 523.1581m | N79° 49' 26.48"E |
| 4+00.00 | 395.7318m | 543.0057m | N86° 31' 23.27"E |

### **7.3. RAČUN KOTA KOLNIKA**

**Client:**

Client

Client Company

Address 1

Date: 11.9.2016. 18:06:44

**Prepared by:**

Preparer

Your Company Name

123 Main Street

Corridor Name: koridor ceste

Description:

Base Alignment Name: Os

Station Range: Start: 0+00.00, End: 4+13.86

## CHAINAGE 0+00.00

| POINT | X        | Y        | Z        | OFFSET  | STRING CUT      |
|-------|----------|----------|----------|---------|-----------------|
| 1     | 204.3025 | 219.3498 | 291.1750 | -8.692m | RW_Outside      |
| 2     | 204.3025 | 219.3498 | 290.7750 | -8.692m | RWall_B1        |
| 3     | 204.3463 | 219.3257 | 290.5750 | -8.642m | RWall_K1        |
| 4     | 204.3463 | 219.3257 | 290.7750 | -8.642m | RWall_B2        |
| 5     | 204.5652 | 219.2051 | 293.2979 | -8.392m | RW_Back         |
| 6     | 204.5652 | 219.2051 | 291.6750 | -8.392m | RW_Hinge        |
| 7     | 204.6966 | 219.1327 | 290.5750 | -8.242m | RWall_K2        |
| 8     | 204.6966 | 219.1327 | 290.7750 | -8.242m | RWall_B3        |
| 9     | 204.8112 | 219.0695 | 291.7761 | -8.111m | Daylight        |
| 10    | 204.8210 | 219.0641 | 292.8979 | -8.100m | Hinge           |
| 11    | 204.8210 | 219.0641 | 293.2979 | -8.100m | RW_Top          |
| 12    | 205.1783 | 218.8672 | 291.1750 | -7.692m | RW_Inside       |
| 13    | 205.1783 | 218.8672 | 290.7750 | -7.692m | RWall_B4        |
| 14    | 207.8863 | 217.3749 | 295.2313 | -4.600m | Hinge           |
| 15    | 207.8872 | 217.3744 | 295.0313 | -4.599m | EPS_Sub         |
| 16    | 208.7622 | 216.8922 | 295.2713 | -3.600m | Back_Curb       |
| 17    | 208.8935 | 216.8198 | 295.2713 | -3.450m | Top_Curb        |
| 18    | 208.9301 | 216.7997 | 295.0463 | -3.408m | Flowline_Gutter |
| 19    | 209.3314 | 216.5785 | 295.0738 | -2.950m | Flange          |
| 20    | 211.9151 | 215.1547 | 295.0000 | 0.000m  | t               |
| 21    | 214.4988 | 213.7309 | 294.9263 | 2.950m  | t               |
| 22    | 214.4988 | 213.7309 | 294.9263 | 2.950m  | Flange          |
| 23    | 214.9002 | 213.5097 | 294.8988 | 3.408m  | Flowline_Gutter |
| 24    | 214.9367 | 213.4896 | 295.1238 | 3.450m  | Top_Curb        |
| 25    | 215.0680 | 213.4172 | 295.1238 | 3.600m  | Back_Curb       |
| 26    | 215.9430 | 212.9351 | 294.8838 | 4.599m  | EPS_Sub         |
| 27    | 215.9439 | 212.9346 | 295.0838 | 4.600m  | Ditch_In        |
| 28    | 216.9730 | 212.3674 | 297.4339 | 5.775m  | Daylight        |

## CHAINAGE 0+25.00

CHAINAGE 0+50.00

CHAINAGE 0+75.00

CHAINAGE 1+00.00

| POINT | X        | Y        | Z        | OFFSET  | STRING CUT      |
|-------|----------|----------|----------|---------|-----------------|
| 1     | 255.1319 | 307.2070 | 285.8006 | -8.791m | RW_Outside      |
| 2     | 255.1319 | 307.2070 | 285.4006 | -8.791m | RWall_B1        |
| 3     | 255.2287 | 307.1279 | 285.2006 | -8.666m | RWall_K1        |
| 4     | 255.2287 | 307.1279 | 285.4006 | -8.666m | RWall_B2        |
| 5     | 255.4415 | 306.9537 | 288.4069 | -8.391m | RW_Back         |
| 6     | 255.4415 | 306.9537 | 286.3006 | -8.391m | RW_Hinge        |
| 7     | 255.5382 | 306.8746 | 285.2006 | -8.266m | RWall_K2        |
| 8     | 255.5382 | 306.8746 | 285.4006 | -8.266m | RWall_B3        |
| 9     | 255.6558 | 306.7783 | 286.5021 | -8.115m | Daylight        |
| 10    | 255.6675 | 306.7688 | 288.0069 | -8.099m | Hinge           |
| 11    | 255.6675 | 306.7688 | 288.4069 | -8.099m | RW_Top          |
| 12    | 256.1380 | 306.3838 | 285.8006 | -7.491m | RW_Inside       |
| 13    | 256.1380 | 306.3838 | 285.4006 | -7.491m | RWall_B4        |
| 14    | 258.3762 | 304.5523 | 290.3402 | -4.599m | Hinge           |
| 15    | 258.3769 | 304.5516 | 290.1402 | -4.598m | EPS_Sub         |
| 16    | 259.1501 | 303.9190 | 290.3802 | -3.599m | Back_Curb       |
| 17    | 259.2662 | 303.8240 | 290.3802 | -3.449m | Top_Curb        |
| 18    | 259.2984 | 303.7976 | 290.1552 | -3.408m | Flowline_Gutter |
| 19    | 259.6531 | 303.5073 | 290.1827 | -2.949m | Flange          |
| 20    | 261.9358 | 301.6394 | 290.0536 | 0.000m  | t               |
| 21    | 264.9736 | 299.1535 | 289.8817 | 3.925m  | t               |
| 22    | 265.3283 | 298.8633 | 289.8542 | 4.384m  | Flowline_Gutter |
| 23    | 265.3606 | 298.8369 | 290.0792 | 4.425m  | Top_Curb        |
| 24    | 265.4767 | 298.7419 | 290.0792 | 4.575m  | Back_Curb       |
| 25    | 266.2498 | 298.1092 | 289.8392 | 5.574m  | EPS_Sub         |
| 26    | 266.2506 | 298.1086 | 290.0392 | 5.575m  | Ditch_In        |
| 27    | 267.7409 | 296.8891 | 293.8906 | 7.501m  | Daylight        |

CHAINAGE 1+25.00

CHAINAGE 1+50.00

CHAINAGE 1+75.00

CHAINAGE 2+00.00

| POINT | X        | Y        | Z        | OFFSET  | STRING CUT |
|-------|----------|----------|----------|---------|------------|
| 1     | 352.4610 | 339.1850 | 286.6813 | -5.318m | Daylight   |
| 2     | 352.5014 | 338.4685 | 285.2460 | -4.600m | Hinge      |

|    |          |          |          |         |                 |
|----|----------|----------|----------|---------|-----------------|
| 3  | 352.5014 | 338.4675 | 285.0460 | -4.599m | EPS_Sub         |
| 4  | 352.5576 | 337.4701 | 285.2860 | -3.600m | Back_Curb       |
| 5  | 352.5661 | 337.3203 | 285.2860 | -3.450m | Top_Curb        |
| 6  | 352.5684 | 337.2787 | 285.0610 | -3.408m | Flowline_Gutter |
| 7  | 352.5942 | 336.8211 | 285.0885 | -2.950m | Flange          |
| 8  | 352.7603 | 333.8758 | 285.1072 | 0.000m  | t               |
| 9  | 352.9263 | 330.9304 | 285.1258 | 2.950m  | Flange          |
| 10 | 352.9521 | 330.4729 | 285.0983 | 3.408m  | Flowline_Gutter |
| 11 | 352.9544 | 330.4312 | 285.3233 | 3.450m  | Top_Curb        |
| 12 | 352.9629 | 330.2815 | 285.3233 | 3.600m  | Back_Curb       |
| 13 | 353.0191 | 329.2841 | 285.0833 | 4.599m  | EPS_Sub         |
| 14 | 353.0192 | 329.2831 | 285.2833 | 4.600m  | EPS             |
| 15 | 353.1689 | 326.6280 | 290.6019 | 7.259m  | Daylight        |

CHAINAGE 2+25.00

CHAINAGE 2+50.00

CHAINAGE 2+75.00

CHAINAGE 3+00.00

| POINT | X        | Y        | Z        | OFFSET  | STRING CUT      |
|-------|----------|----------|----------|---------|-----------------|
| 1     | 442.2199 | 370.8218 | 272.0443 | -9.392m | RWall_B1        |
| 2     | 442.2199 | 370.8218 | 272.4943 | -9.392m | RW_Outside      |
| 3     | 442.5807 | 370.2025 | 271.7443 | -8.675m | RWall_K1        |
| 4     | 442.5807 | 370.2025 | 272.0443 | -8.675m | RWall_B2        |
| 5     | 442.7234 | 369.9577 | 272.9943 | -8.392m | RW_Hinge        |
| 6     | 442.7234 | 369.9577 | 278.5428 | -8.392m | RW_Back         |
| 7     | 442.8454 | 369.7483 | 273.1865 | -8.150m | Daylight        |
| 8     | 442.8704 | 369.7054 | 278.1428 | -8.100m | Hinge           |
| 9     | 442.8704 | 369.7054 | 278.5428 | -8.100m | RW_Top          |
| 10    | 442.8828 | 369.6841 | 272.0443 | -8.075m | RWall_B3        |
| 11    | 442.8828 | 369.6841 | 271.7443 | -8.075m | RWall_K2        |
| 12    | 443.7554 | 368.1865 | 272.0443 | -6.342m | RWall_B4        |
| 13    | 443.7554 | 368.1865 | 272.4943 | -6.342m | RW_Inside       |
| 14    | 444.6325 | 366.6814 | 280.4761 | -4.600m | EPS             |
| 15    | 444.6330 | 366.6805 | 280.2761 | -4.599m | EPS_Sub         |
| 16    | 445.1359 | 365.8173 | 280.5161 | -3.600m | Back_Curb       |
| 17    | 445.2114 | 365.6877 | 280.5161 | -3.450m | Top_Curb        |
| 18    | 445.2324 | 365.6517 | 280.2911 | -3.408m | Flowline_Gutter |
| 19    | 445.4632 | 365.2557 | 280.3186 | -2.950m | Flange          |
| 20    | 446.9483 | 362.7069 | 280.3480 | 0.000m  | t               |
| 21    | 448.4335 | 360.1580 | 280.3773 | 2.950m  | t               |

|    |          |          |          |        |                 |
|----|----------|----------|----------|--------|-----------------|
| 22 | 448.6643 | 359.7620 | 280.3498 | 3.408m | Flowline_Gutter |
| 23 | 448.6853 | 359.7260 | 280.5748 | 3.450m | Top_Curb        |
| 24 | 448.7608 | 359.5964 | 280.5748 | 3.600m | Back_Curb       |
| 25 | 449.2637 | 358.7332 | 280.3348 | 4.599m | EPS_Sub         |
| 26 | 449.2642 | 358.7324 | 280.5348 | 4.600m | Hinge           |
| 27 | 449.9186 | 357.6093 | 279.6683 | 5.900m | Daylight        |

CHAINAGE 3+25.00

CHAINAGE 3+50.00

CHAINAGE 3+75.00

CHAINAGE 4+00.00

| POINT | X        | Y        | Z        | OFFSET  | STRING CUT      |
|-------|----------|----------|----------|---------|-----------------|
| 1     | 538.3470 | 407.3181 | 271.5536 | -9.092m | RW_Outside      |
| 2     | 538.3470 | 407.3181 | 271.1536 | -9.092m | RWall_B1        |
| 3     | 538.3765 | 406.8857 | 270.8536 | -8.658m | RWall_K1        |
| 4     | 538.3765 | 406.8857 | 271.1536 | -8.658m | RWall_B2        |
| 5     | 538.3947 | 406.6197 | 275.6934 | -8.392m | RW_Back         |
| 6     | 538.3947 | 406.6197 | 272.0536 | -8.392m | RW_Hinge        |
| 7     | 538.4124 | 406.3598 | 272.1408 | -8.131m | Daylight        |
| 8     | 538.4145 | 406.3284 | 275.2934 | -8.100m | Hinge           |
| 9     | 538.4145 | 406.3284 | 275.6934 | -8.100m | RW_Top          |
| 10    | 538.4174 | 406.2871 | 271.1536 | -8.058m | RWall_B3        |
| 11    | 538.4174 | 406.2871 | 270.8536 | -8.058m | RWall_K2        |
| 12    | 538.4968 | 405.1232 | 271.5536 | -6.892m | RW_Inside       |
| 13    | 538.4968 | 405.1232 | 271.1536 | -6.892m | RWall_B4        |
| 14    | 538.6528 | 402.8365 | 277.6268 | -4.600m | Hinge           |
| 15    | 538.6529 | 402.8355 | 277.4268 | -4.599m | EPS_Sub         |
| 16    | 538.7209 | 401.8388 | 277.6668 | -3.600m | Back_Curb       |
| 17    | 538.7311 | 401.6891 | 277.6668 | -3.450m | Top_Curb        |
| 18    | 538.7340 | 401.6475 | 277.4418 | -3.408m | Flowline_Gutter |
| 19    | 538.7652 | 401.1903 | 277.4693 | -2.950m | Flange          |
| 20    | 538.9660 | 398.2476 | 277.3839 | 0.000m  | t               |
| 21    | 539.1701 | 395.2573 | 277.2972 | 2.997m  | t               |
| 22    | 539.2013 | 394.8000 | 277.2697 | 3.456m  | Flowline_Gutter |
| 23    | 539.2041 | 394.7584 | 277.4947 | 3.497m  | Top_Curb        |
| 24    | 539.2143 | 394.6088 | 277.4947 | 3.647m  | Back_Curb       |
| 25    | 539.2824 | 393.6121 | 277.2547 | 4.646m  | EPS_Sub         |
| 26    | 539.2824 | 393.6111 | 277.4547 | 4.647m  | Ditch_In        |
| 27    | 539.2996 | 393.3597 | 277.9587 | 4.899m  | Daylight        |

## **7.4. VERTIKALNI TOK TRASE**

**Client:**

Client

Client Company

Address 1

Date: 11.9.2016. 18:07:31

**Prepared by:**

Preparer

Your Company Name

123 Main Street

Vertical Alignment: Niveleta (1)

Description:

Station Range: Start: 0+00.00, End: 413+86.00

| PVI                                                                                                                                                                                                                                                                                                                                 | Station | Grade Out | Curve Length |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----------|--------------|
| 0.00                                                                                                                                                                                                                                                                                                                                | 0+00.00 | -4.95%    |              |
| 1.00                                                                                                                                                                                                                                                                                                                                | 3+00.68 | -2.76%    | 71.255m      |
| Vertical Curve Information:(sag_curve)-----<br>PVC Station: 2+65.06 Elevation: 281.889m<br>PVI Station: 3+00.68 Elevation: 280.127m<br>PVT Station: 3+36.32 Elevation: 279.143m<br>Low Point: 3+36.32 Elevation: 279.143m<br>Grade in: -4.95% Grade out: -2.76%<br>Change: 2.18% K:<br>Curve Length: 71.255m<br>Headlight Distance: |         |           |              |
| 2.00                                                                                                                                                                                                                                                                                                                                | 4+13.86 |           |              |



## 8.PRORACUN KOLICINA ZEMLJANIH RADOVA ZA TROŠKOVNIK

### Cut/Fill Report

**Generated:** 2016-09-12 06:26:15  
**By user:** Strunje  
**Drawing:** C:\Users\Strunje\Desktop\ZAVRSNII\C:\Users\Strunje\Desktop\ZAVRSNII\zavrsni2\_recoverplot.dwg

\* Rectangular Prism

#### Volume Summary

| Name     | Type | Cut Factor | Fill Factor | 2d Area (sq.m) | Cut (Cu. M.) | Fill (Cu. M.) | Net (Cu. M.) |
|----------|------|------------|-------------|----------------|--------------|---------------|--------------|
| Surface8 | full | 1.000      | 1.000       | 5754.03        | 5426.08      | 6255.87       | 829.79<Fill> |

#### Totals

|       | 2d Area (sq.m) | Cut (Cu. M.) | Fill (Cu. M.) | Net (Cu. M.) |
|-------|----------------|--------------|---------------|--------------|
| Total | 5754.03        | 5426.08      | 6255.87       | 829.79<Fill> |

\* Value adjusted by cut or fill factor other than 1.0

## 9.PRORAČUN KOLIČINE RADOVA PO PRESJECIMA

## Volume Report

Project: C:\Users\Strunje\appdata\local\temp\zavrsni2\_recoverplot\_1\_1\_2844.sv\$

Alignment: Os

Sample Line Group: Presjek-2

Start Sta: 0+00.000

End Sta: 4+13.863

| Station  | Cut Area<br>(Sq.m.) | Cut Volume<br>(Cu.m.) | Reusable Volume<br>(Cu.m.) | Fill Area<br>(Sq.m.) | Fill Volume<br>(Cu.m.) | Cum. Cut Vol.<br>(Cu.m.) | Cum. Reusable Vol.<br>(Cu.m.) | Cum. Fill Vol.<br>(Cu.m.) | Cum. Net Vol.<br>(Cu.m.) |
|----------|---------------------|-----------------------|----------------------------|----------------------|------------------------|--------------------------|-------------------------------|---------------------------|--------------------------|
| 0+00.000 | 7.40                | 0.00                  | 0.00                       | 9.93                 | 0.00                   | 0.00                     | 0.00                          | 0.00                      | 0.00                     |
| 0+20.000 | 2.82                | 102.21                | 102.21                     | 22.23                | 321.67                 | 102.21                   | 102.21                        | 321.67                    | -219.46                  |
| 0+40.000 | 2.40                | 52.23                 | 52.23                      | 20.96                | 431.91                 | 154.44                   | 154.44                        | 753.59                    | -599.15                  |
| 0+60.000 | 5.97                | 83.77                 | 83.77                      | 10.23                | 311.90                 | 238.21                   | 238.21                        | 1065.49                   | -827.27                  |
| 0+80.000 | 23.03               | 288.74                | 288.74                     | 4.47                 | 148.31                 | 526.96                   | 526.96                        | 1213.80                   | -686.84                  |
| 1+00.000 | 23.05               | 451.59                | 451.59                     | 5.52                 | 104.61                 | 978.55                   | 978.55                        | 1318.41                   | -339.86                  |
| 1+20.000 | 2.29                | 244.93                | 244.93                     | 41.08                | 491.46                 | 1223.48                  | 1223.48                       | 1809.86                   | -586.38                  |
| 1+40.000 | 2.32                | 43.53                 | 43.53                      | 23.80                | 684.88                 | 1267.01                  | 1267.01                       | 2494.74                   | -1227.72                 |
| 1+60.000 | 10.22               | 120.40                | 120.40                     | 3.21                 | 284.51                 | 1387.41                  | 1387.41                       | 2779.25                   | -1391.84                 |
| 1+80.000 | 31.26               | 410.34                | 410.34                     | 0.00                 | 32.85                  | 1797.76                  | 1797.76                       | 2812.10                   | -1014.34                 |
| 2+00.000 | 35.99               | 672.48                | 672.48                     | 0.00                 | 0.00                   | 2470.24                  | 2470.24                       | 2812.10                   | -341.86                  |
| 2+20.000 | 42.29               | 784.57                | 784.57                     | 0.00                 | 0.00                   | 3254.81                  | 3254.81                       | 2812.10                   | 442.71                   |
| 2+40.000 | 21.27               | 639.36                | 639.36                     | 0.00                 | 0.00                   | 3894.17                  | 3894.17                       | 2812.10                   | 1082.07                  |
| 2+60.000 | 4.82                | 263.41                | 263.41                     | 9.21                 | 88.35                  | 4157.58                  | 4157.58                       | 2900.45                   | 1257.13                  |
| 2+80.000 | 0.00                | 48.97                 | 48.97                      | 31.36                | 397.30                 | 4206.55                  | 4206.55                       | 3297.74                   | 908.80                   |
| 3+00.000 | 0.00                | 0.00                  | 0.00                       | 43.43                | 744.47                 | 4206.55                  | 4206.55                       | 4042.22                   | 164.33                   |
| 3+20.000 | 5.12                | 51.24                 | 51.24                      | 13.06                | 564.84                 | 4257.79                  | 4257.79                       | 4607.05                   | -349.27                  |
| 3+40.000 | 16.19               | 211.98                | 211.98                     | 2.51                 | 157.13                 | 4469.77                  | 4469.77                       | 4764.18                   | -294.42                  |
| 3+60.000 | 34.59               | 495.89                | 495.89                     | 11.61                | 146.59                 | 4965.66                  | 4965.66                       | 4910.77                   | 54.88                    |
| 3+80.000 | 6.98                | 401.01                | 401.01                     | 27.44                | 408.75                 | 5366.67                  | 5366.67                       | 5319.52                   | 47.15                    |
| 4+00.000 | 0.65                | 74.62                 | 74.62                      | 31.08                | 597.62                 | 5441.28                  | 5441.28                       | 5917.14                   | -475.86                  |
| 4+13.863 | 7.97                | 59.72                 | 59.72                      | 11.26                | 293.54                 | 5501.00                  | 5501.00                       | 6210.68                   | -709.68                  |

## 10. LITERATURA

### Literatura

- 1) Prof. dr. sc. Željko Korlaet, “Uvod u projektiranje i građenje cesta“, Građevinski Fakultet Sveučilišta u Zagrebu, Zagreb, 1995.
- 2) Ministarstvo pomorstva, prometa i veza, “Pravilnik o osnovnim uvjetima kojima javne ceste izvan naselja i njihovi elementi moraju udovoljavati sa stajališta sigurnosti prometa“, Narodne novine, Zagreb, 30. studenoga 2001.
- 3) Hrvatske ceste – Hrvatske autoceste, „Opći tehnički uvjeti za radove na cestama“, Institut građevinarstva Hrvatske, Zagreb, prosinac 2001.
- 4) Ministarstvo mora, turizma, prometa i razvitka, “Pravilnik o prometnim znakovima, signalizaciji i opremi na cestama“, Narodne novine, Zagreb, 03. ožujka 2005