

# Idejni projekt dionice ceste

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**Kekez, Josipa**

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UNIVERSITY OF SPLIT



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

# **ZAVRŠNI RAD**

**Josipa Kekez**

**Split, 2017.**

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

**Idejni projekt dionice ceste**

**Završni rad**

**Split, 2017.**

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

Split, Matice hrvatske 15

STUDIJ: **PREDDIPLOMSKI SVEUČILIŠNI STUDIJ GRAĐEVINARSTVA**  
KANDIDAT: **Josipa Kekez**  
BROJ INDEKSA: **4172**  
KATEDRA: **Katedra za prometnice**  
PREDMET: **Ceste**

**ZADATAK ZA ZAVRŠNI RAD**

Tema: Idejni projekt dionice 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 1:500
7. Računalne ispise koordinatnih točaka osi
8. Proračun količina zemljanih radova
9. Proračun količine radova po presjecima

U Splitu, ožujak 2017.

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 Danieli Dumanić  
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





## 2. Tehnički opis

## Tehnički opis

### a) OPĆENITO

Na priloženoj geodetskoj podlozi u mjerilu 1:1000 izrađen je idejni projekt ceste na dionici od točke A koja se nalazi na 303 metara nadmorske visine, do točke B koja se nalazi na 283 metara nadmorske visine.

Cesta je projektirana za prosječni godišnji dnevni promet od 950 vozila na dan i to na brdovitom terenu.

Predviđena projektna brzina za ovu kategoriju ceste je  $v_p = 40$  km/h.

### b) HORIZONTALNI ELEMENTI

Za određenu kategoriju prema pravilniku min radijus krivine je 45m, a prijelaznice 30m. Trasa konstruirane ceste ima dužinu od 416.57 m, a sastoji se od tri pravca i tri krivine.

Prva krivina ima radijus  $R=60$  m, duljinu prijelaznice  $L=40$  m, druga krivina ima radijus  $R=100$  m, duljinu prijelaznice  $L=40$  m, treća krivina ima radijus  $R=70$  m, duljinu prijelaznice  $L=30$  m.

Krivine su konstruirane uz pomoć dvije prijelazne krivine oblika klotoide i jednog kružnog luka. Proširenje kružnih lukova za promet teretnih vozila sa priključkom u prvoj krivini iznosi 1,40 m, u drugoj 0.84 m, a u trećoj 1,20 m.

### c) VERTIKALNI ELEMENTI

Max. nagib nivelete je 12%, a min radijus krivine 555m.

U programu se tok sastoji od dva pravca i krivine.

Nagib prvog pravca je  $S_1=5.90\%$ , a drugog  $S_2=3.80\%$ .

Tangenta je dužine 35.10 m, a radijus konkavne krivine je 5000 m.

### d) POPREČNI PRESJEK

Cesta ove kategorije ima dva kolnička traka širine svakog po 2,75 m, betonski rubni trak širine 0.2m, bankine dužine 1 m i nagiba 4%, te berme dužine 1m i nagiba 5%.

Cesta se većim dijelom nalazi u zasjeku. Na usjecima se izvode rigoli za odvodnju vode i drenaža koja je postavljena u glinenu posteljicu.

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

### e) KOLNIČKA KONSTRUKCIJA

Projektom je predviđena kolnička konstrukcija sa sljedećim slojevima:

- asfaltbeton habajući sloj AB11 u debljini 4cm
- bitumenizirani nosivi sloj BNS22 u debljini 6cm
- nevezani nosivi sloj debljine 25cm

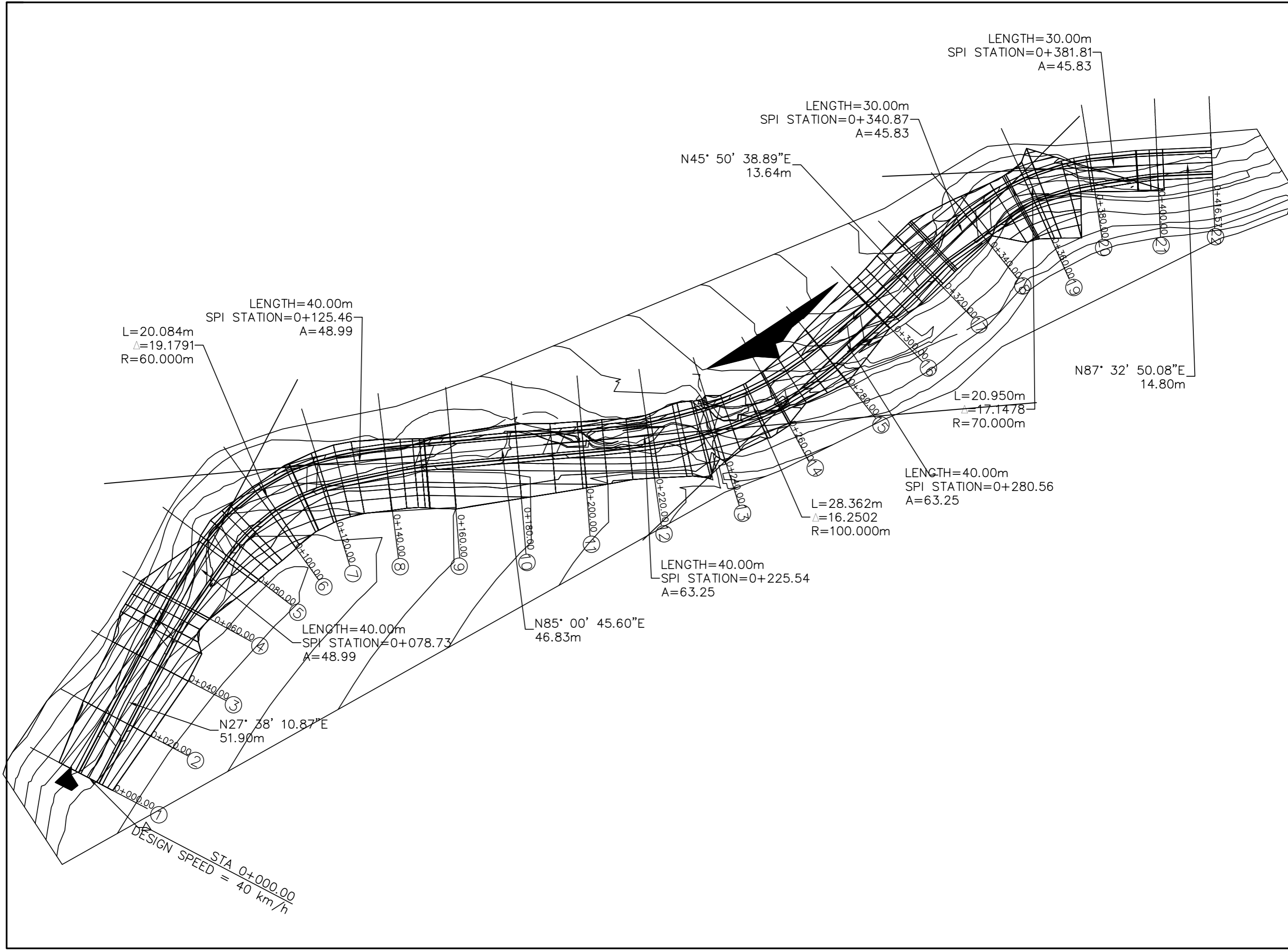
### f) ODVODNJA

Odvodnja kolnika predviđa se otvorenim sustavom odvodnje prihvaćanjem kolničkih pribrežnih voda u zasjeku i usjeku u betonske rigole, te kontroliranim ispuštanjem u teren direktno ili betonskim cijevnim propustima kroz trup kolnika.

### g) 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



LENGTH=30.00m  
SPI STATION=0+381.81  
A=45.83

LENGTH=30.00m  
SPI STATION=0+340.87  
A=45.83

N45° 50' 38.89"E  
13.64m

LENGTH=40.00m  
SPI STATION=0+125.46  
A=48.99

L=20.084m  
Δ=19.1791  
R=60.000m

N87° 32' 50.08"E  
14.80m

L=20.950m  
Δ=17.1478  
R=70.000m

LENGTH=40.00m  
SPI STATION=0+280.56  
A=63.25

L=28.362m  
Δ=16.2502  
R=100.000m

LENGTH=40.00m  
SPI STATION=0+225.54  
A=63.25

N85° 00' 45.60"E  
46.83m

LENGTH=40.00m  
SPI STATION=0+078.73  
A=48.99

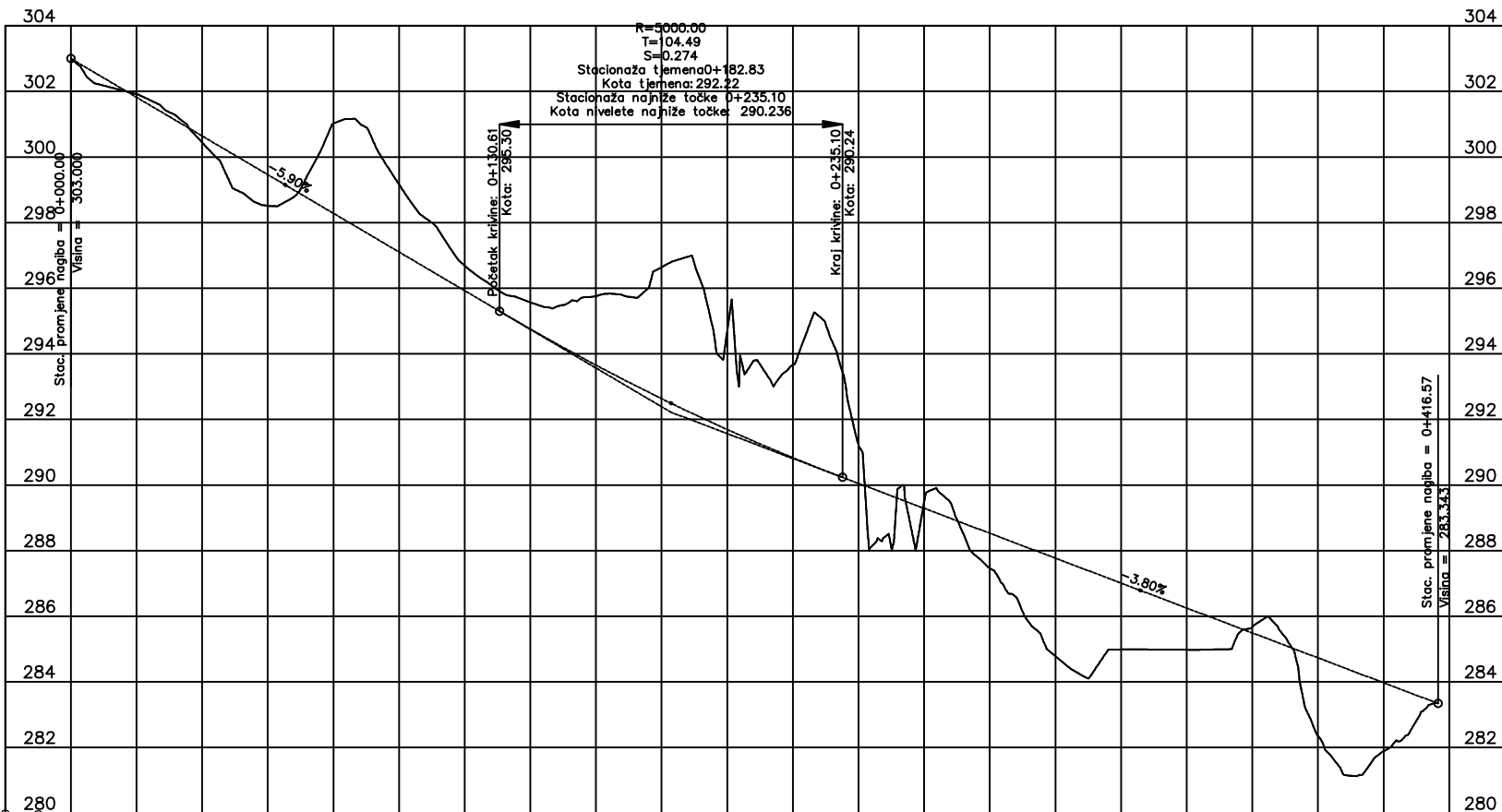
N27° 38' 10.87"E  
51.90m

STA 0+000.00  
DESIGN SPEED = 40 km/h

## 4. Uzdužni presjek M1:1000/ 1:100

# UZDUŽNI PRESJEK M 1:1000/100

## OSI PROFILE



|                       |  |
|-----------------------|--|
| Stacionaža            | 0+000.00<br>0+010.00<br>0+020.00<br>0+030.00<br>0+040.00<br>0+050.00<br>0+060.00<br>0+070.00<br>0+080.00<br>0+090.00<br>0+100.00<br>0+110.00<br>0+120.00<br>0+130.00<br>0+140.00<br>0+150.00<br>0+160.00<br>0+170.00<br>0+180.00<br>0+190.00<br>0+200.00<br>0+210.00<br>0+220.00<br>0+230.00<br>0+240.00<br>0+250.00<br>0+260.00<br>0+270.00<br>0+280.00<br>0+290.00<br>0+300.00<br>0+310.00<br>0+320.00<br>0+330.00<br>0+340.00<br>0+350.00<br>0+360.00<br>0+370.00<br>0+380.00<br>0+390.00<br>0+400.00<br>0+410.00<br>0+420.00<br>0+430.00<br>0+440.00<br>0+450.00<br>0+460.00 |
| Kote nivelete         | 303.00<br>302.18<br>301.92<br>301.37<br>300.44<br>299.01<br>298.51<br>299.02<br>301.03<br>300.90<br>299.16<br>298.00<br>296.69<br>295.95<br>295.57<br>295.49<br>295.76<br>295.74<br>296.64<br>296.75<br>294.70<br>293.67<br>293.66<br>294.90<br>291.23<br>288.07<br>289.49<br>288.95<br>287.46<br>286.14<br>284.78<br>284.10<br>284.99<br>284.98<br>284.98<br>284.99<br>285.68<br>285.37<br>282.35<br>281.14<br>281.69<br>282.82<br>282.82<br>282.82   |
| Kote terena           | 303.00<br>302.18<br>301.92<br>301.37<br>300.44<br>299.01<br>298.51<br>299.02<br>301.03<br>300.90<br>299.16<br>298.00<br>296.69<br>295.95<br>295.57<br>295.49<br>295.76<br>295.74<br>296.64<br>296.75<br>294.70<br>293.67<br>293.66<br>294.90<br>291.23<br>288.07<br>289.49<br>288.95<br>287.46<br>286.14<br>284.78<br>284.10<br>284.99<br>284.98<br>284.98<br>284.99<br>285.68<br>285.37<br>282.35<br>281.14<br>281.69<br>282.82<br>282.82<br>282.82   |
| Horizontalni elementi | L = 51.90<br>N27° 38' 11"E<br>L: 40.00<br>R: 60.00<br>L: 20.08<br>L: 40.00<br>L = 46.83<br>N85° 00' 46"E<br>L: 40.00<br>R: 100.00<br>L: 28.36<br>L: 40.00<br>L: 30.00<br>R: 70.00<br>L: 20.95<br>L: 30.00<br>L = 14.80<br>N87° 32' 50"E  |
| Vitoperenje           | 4.50‰<br>0+000.00<br>0+010.00<br>L: 5.75‰<br>0+089.23<br>R: -5.75‰<br>L: 5.75‰<br>0+100.00<br>R: -5.75‰<br>1.50‰<br>0+130.61<br>R: -2.50‰<br>4.50‰<br>0+190.52<br>R: -1.50‰<br>0.00‰<br>0+206.31<br>L: 4.10‰<br>0+230.12<br>R: 4.10‰<br>L: 4.10‰<br>0+250.00<br>R: 4.10‰<br>L: 5.10‰<br>0+260.00<br>R: 5.10‰<br>L: 5.10‰<br>0+300.00<br>R: 5.10‰<br>L: 5.10‰<br>0+330.00<br>R: 5.10‰<br>L: 5.10‰<br>0+360.00<br>R: 5.10‰<br>L: 5.10‰<br>0+390.00<br>R: 5.10‰<br>L: 5.10‰<br>0+420.00<br>R: 5.10‰<br>L: 5.10‰<br>0+430.00<br>R: 5.10‰<br>L: 5.10‰<br>0+460.00                     |

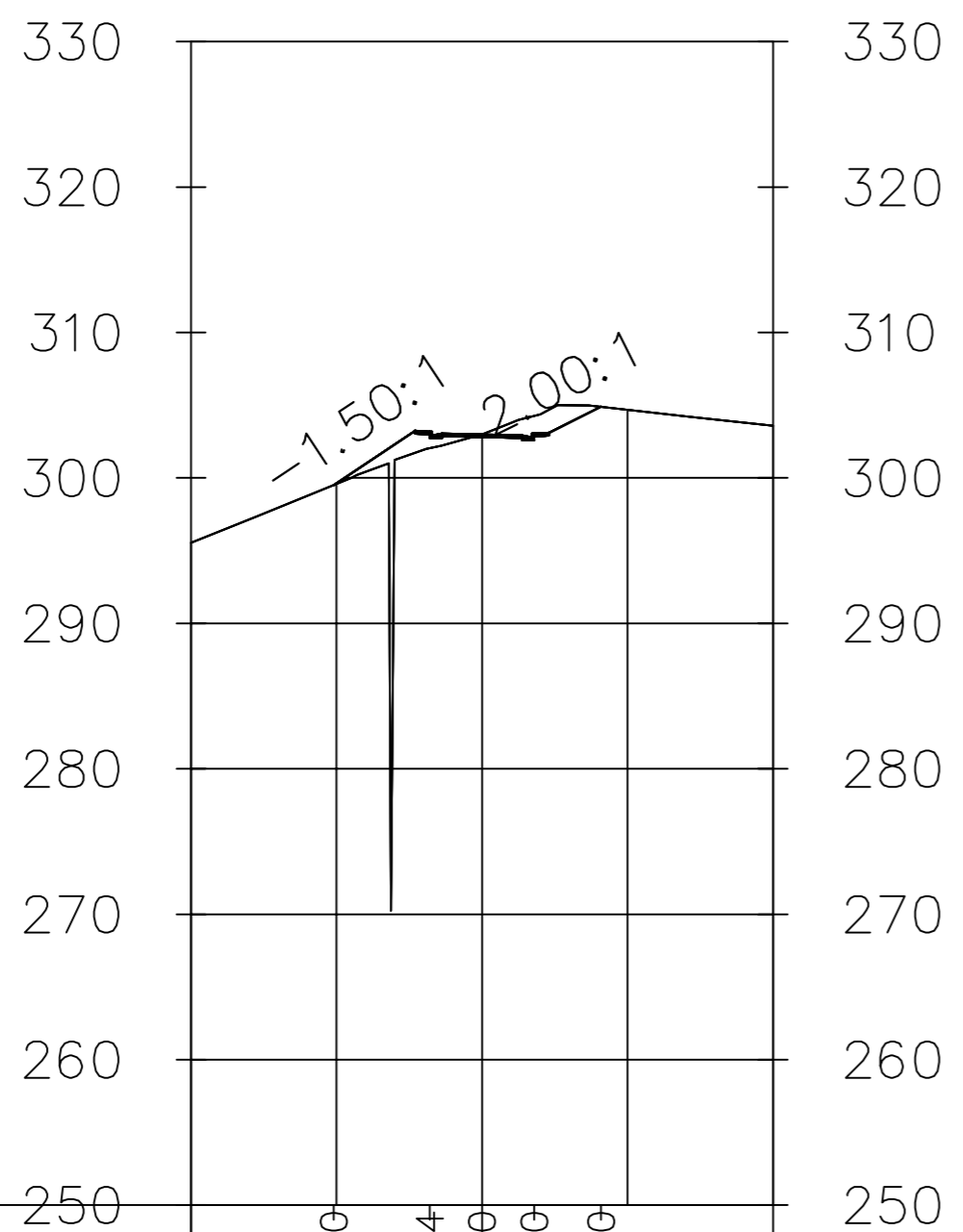


| FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE<br>SVEUČILIŠTE U SPLITU |                              |                        |
|--|------------------------------|------------------------|
| PREDMET  | ZAVRŠNI RAD                  | Datum:<br>lipanj 2017. |
| ZADATAK  | IDEJNI PROJEKT DIONICE CESTE | M 1:1000<br>1:100      |
| SADRŽAJ LISTA  | UZDUŽNI PRESJEK              |                        |
| STUDENT  | Josipa Kekez                 |                        |



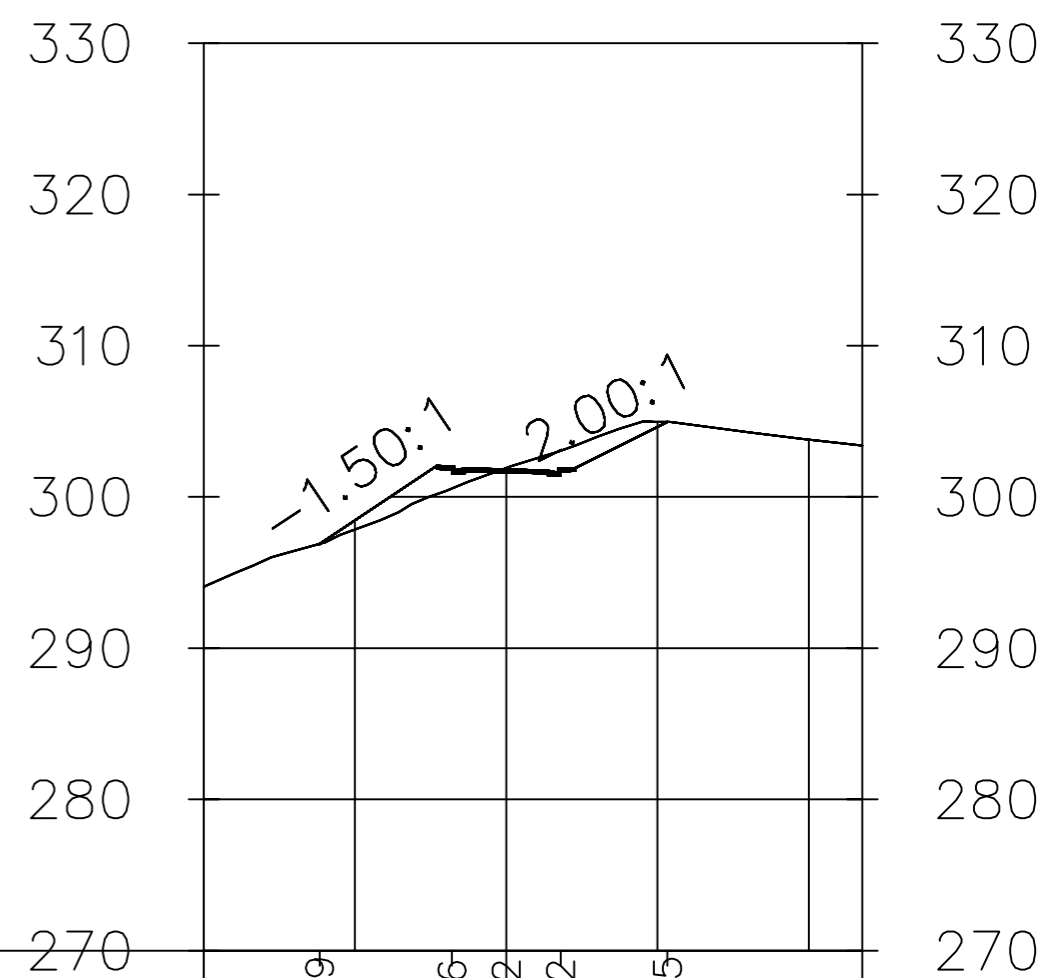
## 5. Karakteristični poprečni presjeci M1:500

0+000.00

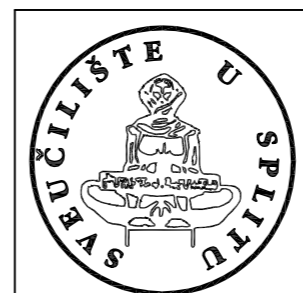


|                   |        |        |        |        |        |
|-------------------|--------|--------|--------|--------|--------|
| Kote projekta     | 299.50 | 302.74 | 302.80 | 302.60 | 304.90 |
| Udaljenost od osi | 10.20  | 3.59   | 0.00   | 3.59   | 8.18   |
| Kote terena       | 299.50 | 302.74 | 302.80 | 302.60 | 304.90 |

0+020.00

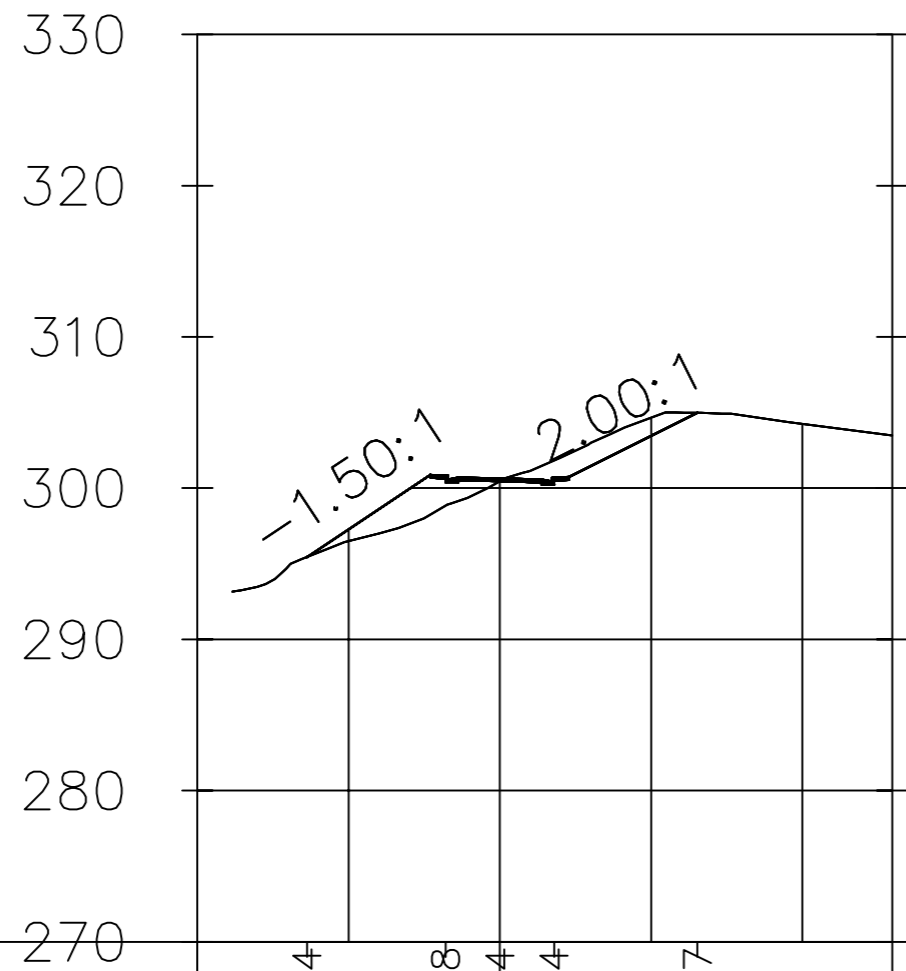


|                   |        |        |        |        |        |
|-------------------|--------|--------|--------|--------|--------|
| Kote projekta     | 296.89 | 301.56 | 301.62 | 301.42 | 304.95 |
| Udaljenost od osi | 12.34  | 3.59   | 0.00   | 3.59   | 10.65  |
| Kote terena       | 296.89 | 301.56 | 301.62 | 301.42 | 304.95 |



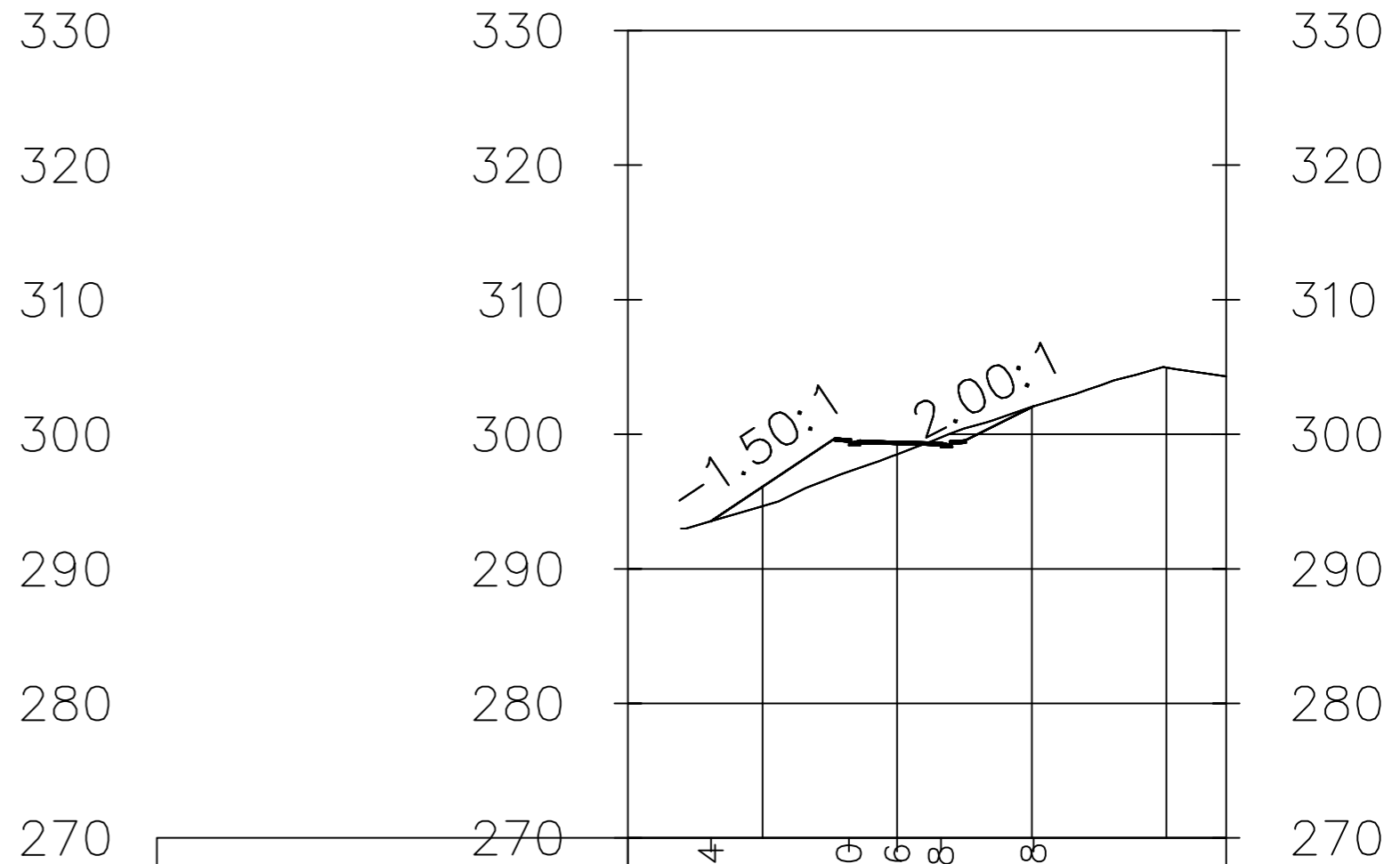
|  |                              |              |
|--|------------------------------|--------------|
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| PREDMET  | ZAVRŠNI RAD                  | Datum:       |
| ZADATAK  | IDEJNI PROJEKT DIONICE CESTE | lipanj 2017. |
| SADRŽAJ LISTA  | KARAKTERISTIČNI PRESJECI 1,2 | M 1:500      |
| STUDENT  | Josipa Kekez                 |              |

0+040.00



|                   |        |        |        |        |        |
|-------------------|--------|--------|--------|--------|--------|
| Kote projekta     |        |        |        |        |        |
| Udaljenost od osi | 20.000 | 12.76  | 3.59   | 0.00   | 3.59   |
| Kote terena       | 295.44 | 300.38 | 300.44 | 300.24 | 304.97 |

0+060.00

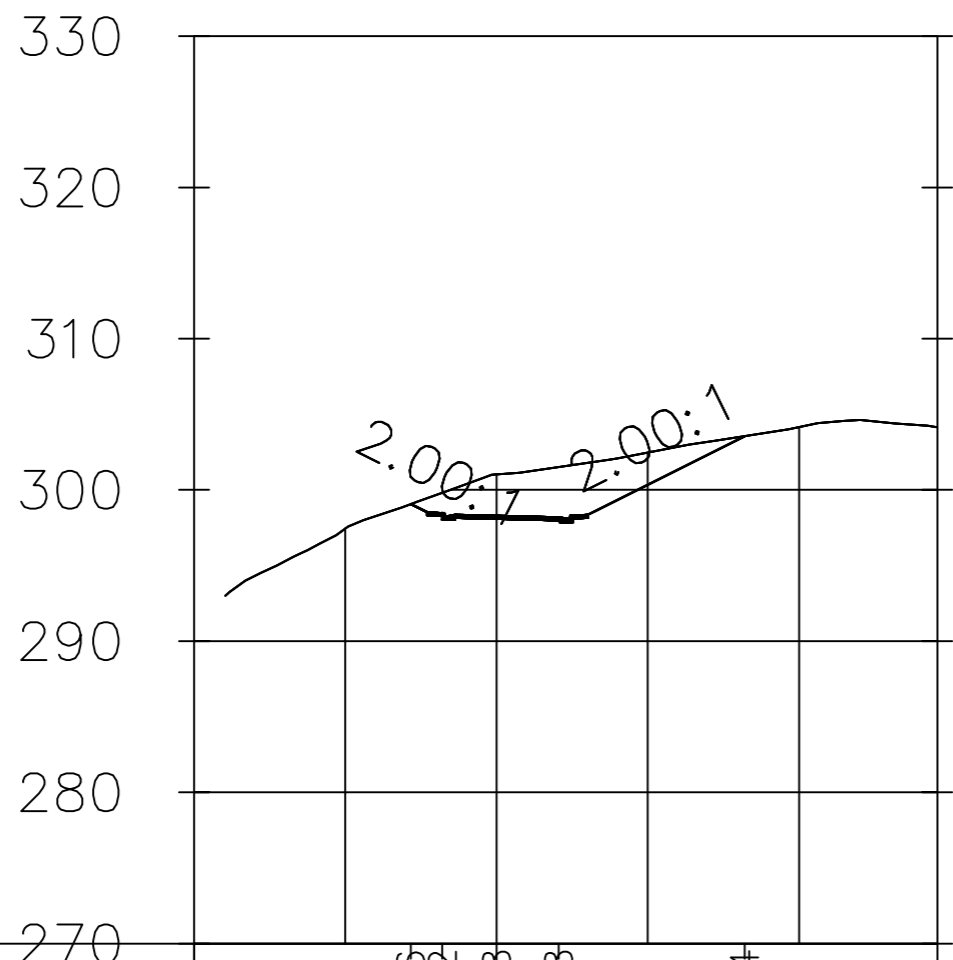


|                   |        |        |        |        |
|-------------------|--------|--------|--------|--------|
| Kote projekta     |        |        |        |        |
| Udaljenost od osi | 20.000 | 13.83  | 3.59   | 0.00   |
| Kote terena       | 293.54 | 299.20 | 299.26 | 299.18 |



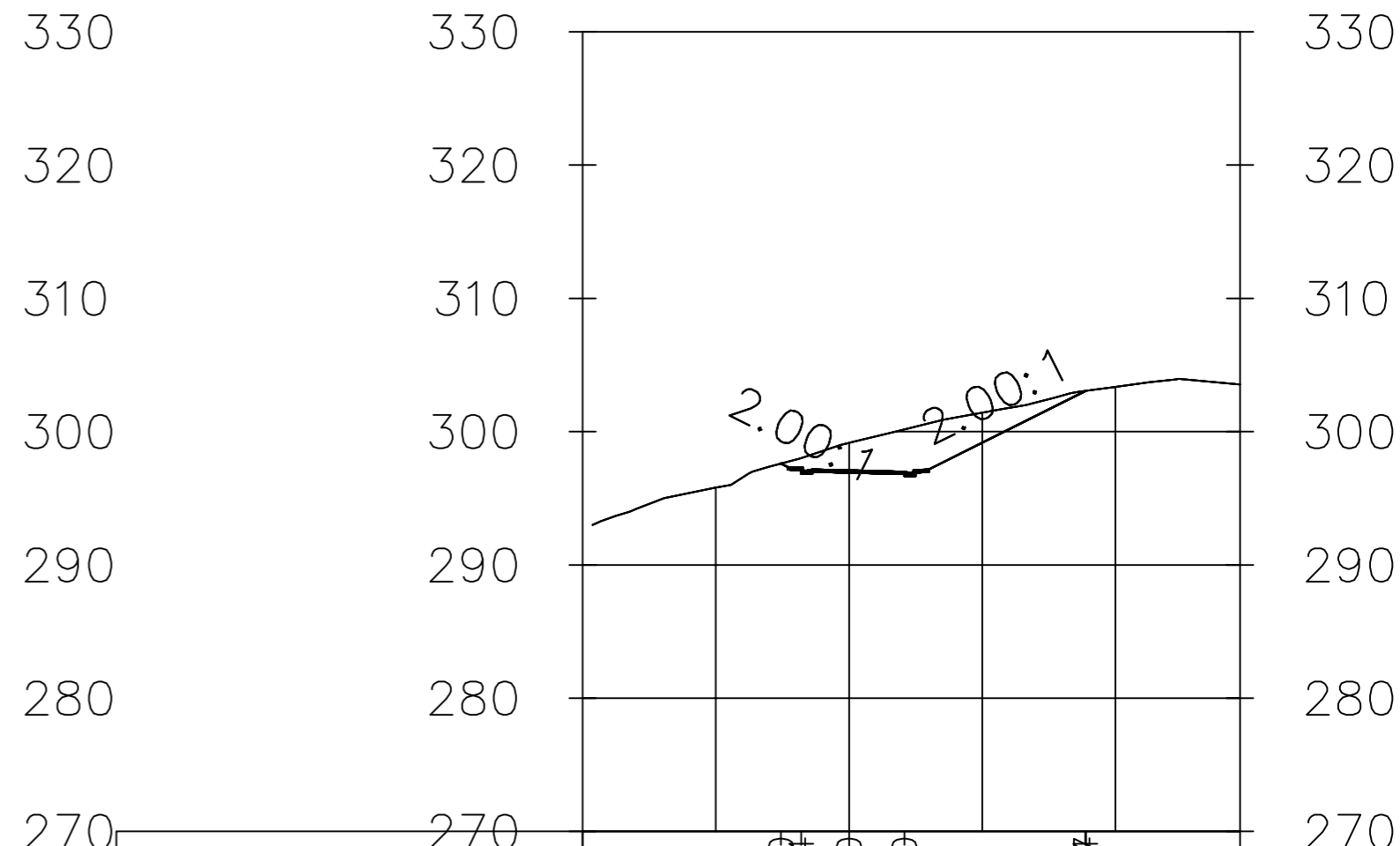
|  |                              |              |
|--|------------------------------|--------------|
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| PREDMET  | ZAVRŠNI RAD                  | Datum:       |
| ZADATAK  | IDEJNI PROJEKT DIONICE CESTE | lipanj 2017. |
| SADRŽAJ LISTA  | KARAKTERISTIČNI PRESJECI 3,4 | M 1:500      |
| STUDENT  | Josipa Kekez                 |              |

0+080.00



|                          |        |        |        |        |        |        |
|--------------------------|--------|--------|--------|--------|--------|--------|
| <b>Kote projekta</b>     |        |        |        |        |        |        |
| <b>Udaljenost od osi</b> | 20.000 |        |        |        |        | 29.158 |
| <b>Kote terena</b>       |        | 299.06 | 298.02 | 298.08 | 297.98 | 303.54 |

0+100.00



|                          |        |        |        |        |        |        |
|--------------------------|--------|--------|--------|--------|--------|--------|
| <b>Kote projekta</b>     |        |        |        |        |        |        |
| <b>Udaljenost od osi</b> | 20.000 |        |        |        |        | 29.344 |
| <b>Kote terena</b>       |        | 297.60 | 296.84 | 296.90 | 296.80 | 303.07 |

|   |  |                              |              |
|---|--|------------------------------|--------------|
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|   | PREDMET  | ZAVRŠNI RAD                  | Datum:       |
|   | ZADATAK  | IDEJNI PROJEKT DIONICE CESTE | lipanj 2017. |
|   | SADRŽAJ LISTA  | KARAKTERISTIČNI PRESJECI 5,6 | M 1:500      |
| STUDENT   | Josipa Kekez   |                              |              |

## 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 3D poliliniija te postupkom triangulacije na tim poliliniijama 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, sigurnosni elementi i odvodnja. Između tangenti interpolira se odgovarajuća kružna krivina.

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

## 7. Računalni ispis točaka osi

### 7.1. Koordinatni račun glavnih točaka osi

**Alignment Station and Curve Report**Client: Client  
CompanyProject Name: C:\Users\Korisnik\Documents\završni NOVO  
03.05.2017.dwg

Project Description:

Report Date: 5.5.2017. 9:24:25

Prepared by:  
PreparerAlignment: OS1  
Description:Tangent Data

| Description | PT Station | Northing | Easting  |
|-------------|------------|----------|----------|
| Start:      | 0+00.000   | 4035.238 | 5919.385 |
| End:        | 0+51.904   | 4081.220 | 5943.461 |

Tangent Data

| Parameter | Value  | Parameter | Value                |
|-----------|--------|-----------|----------------------|
| Length:   | 51.904 | Course:   | N 27° 38' 10.8688" E |

Spiral Point Data

| Description | Station  | Northing | Easting  |
|-------------|----------|----------|----------|
| TS:         | 0+51.904 | 4081.220 | 5943.461 |
| SPI:        |          | 4104.984 | 5955.903 |
| SC:         | 0+91.904 | 4114.220 | 5965.717 |

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 33° 59' 47.5649" E |

Curve Point Data

| Description | Station  | Northing | Easting  |
|-------------|----------|----------|----------|
| SC:         | 0+91.904 | 4114.220 | 5965.717 |
| RP:         |          | 4070.528 | 6006.839 |
| CS:         | 1+11.988 | 4125.304 | 5982.353 |

Circular Curve Data

| Parameter | Value            | Parameter | Value  |
|-----------|------------------|-----------|--------|
| Delta:    | 19° 10' 44.8600" | Type:     | RIGHT  |
| Radius:   | 60.000           |           |        |
| Length:   | 20.084           | Tangent:  | 10.137 |



|          |        |           |                      |
|----------|--------|-----------|----------------------|
| Mid-Ord: | 0.838  | External: | 0.850                |
| Chord:   | 19.991 | Course:   | N 56° 19' 28.2342" E |

Spiral Point Data

| Description | Station  | Northing | Easting  |
|-------------|----------|----------|----------|
| CS:         | 1+11.988 | 4125.304 | 5982.353 |
| SPI:        |          | 4130.804 | 5994.655 |
| ST:         | 1+51.988 | 4133.136 | 6021.377 |

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 78° 39' 08.9035" E |

Tangent Data

| Description | PT Station | Northing | Easting  |
|-------------|------------|----------|----------|
| Start:      | 1+51.988   | 4133.136 | 6021.377 |
| End:        | 1+98.817   | 4137.207 | 6068.029 |

Tangent Data

| Parameter | Value  | Parameter | Value                |
|-----------|--------|-----------|----------------------|
| Length:   | 46.829 | Course:   | N 85° 00' 45.5996" E |

Spiral Point Data

| Description | Station  | Northing | Easting  |
|-------------|----------|----------|----------|
| TS:         | 1+98.817 | 4137.207 | 6068.029 |
| SPI:        |          | 4139.530 | 6094.650 |
| SC:         | 2+38.817 | 4143.320 | 6107.487 |

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 81° 11' 39.2735" E |

Curve Point Data

| Description | Station  | Northing | Easting  |
|-------------|----------|----------|----------|
| SC:         | 2+38.817 | 4143.320 | 6107.487 |

RP: 4239.228 6079.175  
 CS: 2+67.179 4155.074 6133.194

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 16° 15' 00.7906" | Type:     | LEFT                 |
| Radius:   | 100.000          |           |                      |
| Length:   | 28.362           | Tangent:  | 14.277               |
| Mid-Ord:  | 1.004            | External: | 1.014                |
| Chord:    | 28.267           | Course:   | N 65° 25' 42.2430" E |

Spiral Point Data

| Description | Station  | Northing | Easting  |
|-------------|----------|----------|----------|
| CS:         | 2+67.179 | 4155.074 | 6133.194 |
| SPI:        |          | 4162.304 | 6144.458 |
| ST:         | 3+07.179 | 4180.919 | 6163.630 |

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 49° 39' 45.2126" E |

Tangent Data

| Description | PT Station | Northing | Easting  |
|-------------|------------|----------|----------|
| Start:      | 3+07.179   | 4180.919 | 6163.630 |
| End:        | 3+20.819   | 4190.421 | 6173.416 |

Tangent Data

| Parameter | Value  | Parameter | Value                |
|-----------|--------|-----------|----------------------|
| Length:   | 13.640 | Course:   | N 45° 50' 38.8865" E |

Spiral Point Data

| Description | Station  | Northing | Easting  |
|-------------|----------|----------|----------|
| TS:         | 3+20.819 | 4190.421 | 6173.416 |
| SPI:        |          | 4204.387 | 6187.799 |
| SC:         | 3+50.819 | 4209.691 | 6196.328 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value  |
|-----------|------------------|-----------|--------|
| Length:   | 30.000           | L Tan:    | 20.048 |
| Radius:   | 70.000           | S Tan:    | 10.044 |
| Theta:    | 12° 16' 39.6013" | P:        | 0.535  |

|        |        |         |                      |
|--------|--------|---------|----------------------|
| X:     | 29.863 | K:      | 14.977               |
| Y:     | 2.136  | A:      | 45.826               |
| Chord: | 29.939 | Course: | N 49° 56' 06.3533" E |

Curve Point Data

| Description | Station  | Northing | Easting  |
|-------------|----------|----------|----------|
| SC:         | 3+50.819 | 4209.691 | 6196.328 |
| RP:         |          | 4150.249 | 6233.296 |
| CS:         | 3+71.769 | 4217.948 | 6215.497 |

Circular Curve Data

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Delta:    | 17° 08' 51.9930" | Type:     | RIGHT                |
| Radius:   | 70.000           |           |                      |
| Length:   | 20.950           | Tangent:  | 10.554               |
| Mid-Ord:  | 0.782            | External: | 0.791                |
| Chord:    | 20.872           | Course:   | N 66° 41' 44.4843" E |

Spiral Point Data

| Description | Station  | Northing | Easting  |
|-------------|----------|----------|----------|
| CS:         | 3+71.769 | 4217.948 | 6215.497 |
| SPI:        |          | 4220.502 | 6225.211 |
| ST:         | 4+01.769 | 4221.360 | 6245.241 |

Spiral Curve Data: clothoid

| Parameter | Value            | Parameter | Value                |
|-----------|------------------|-----------|----------------------|
| Length:   | 30.000           | L Tan:    | 20.048               |
| Radius:   | 70.000           | S Tan:    | 10.044               |
| Theta:    | 12° 16' 39.6013" | P:        | 0.535                |
| X:        | 29.863           | K:        | 14.977               |
| Y:        | 2.136            | A:        | 45.826               |
| Chord:    | 29.939           | Course:   | N 83° 27' 22.6152" E |

Tangent Data

| Description | PT Station | Northing | Easting  |
|-------------|------------|----------|----------|
| Start:      | 4+01.769   | 4221.360 | 6245.241 |
| End:        | 4+16.571   | 4221.994 | 6260.030 |

Tangent Data

| Parameter | Value  | Parameter | Value                |
|-----------|--------|-----------|----------------------|
| Length:   | 14.802 | Course:   | N 87° 32' 50.0821" E |

## 7.2. Koordinatni račun detaljnih točaka osi

**Client:**

Client

Client Company

Address 1

Date: 5.5.2017. 9:30:35

**Prepared by:**

Preparer

Your Company Name

123 Main Street

Alignment Name: OS1

Description:

Station Range: Start: 0+000.00, End: 41+657.00

Station Increment: 20.00

| <b>Station</b> | <b>Northing</b> | <b>Easting</b> | <b>Tangential Direction</b> |
|----------------|-----------------|----------------|-----------------------------|
| 0+000.00       | 4,035.2381m     | 5,919.3849m    | N27° 38' 11"E               |
| 0+020.00       | 4,052.9563m     | 5,928.6621m    | N27° 38' 11"E               |
| 0+040.00       | 4,070.6745m     | 5,937.9393m    | N27° 38' 11"E               |
| 0+060.00       | 4,088.3754m     | 5,947.2490m    | N28° 25' 07"E               |
| 0+080.00       | 4,105.3306m     | 5,957.8202m    | N37° 03' 32"E               |
| 0+100.00       | 4,119.3546m     | 5,971.9678m    | N54° 27' 57"E               |
| 0+120.00       | 4,128.1105m     | 5,989.8515m    | N72° 47' 54"E               |
| 0+140.00       | 4,131.9747m     | 6,009.4458m    | N83° 17' 50"E               |
| 0+160.00       | 4,133.8325m     | 6,029.3586m    | N85° 00' 46"E               |
| 0+180.00       | 4,135.5712m     | 6,049.2829m    | N85° 00' 46"E               |
| 0+200.00       | 4,137.3100m     | 6,069.2071m    | N85° 00' 10"E               |
| 0+220.00       | 4,139.4425m     | 6,089.0904m    | N81° 47' 56"E               |
| 0+240.00       | 4,143.6612m     | 6,108.6195m    | N72° 52' 33"E               |
| 0+260.00       | 4,151.4158m     | 6,127.0188m    | N61° 25' 00"E               |
| 0+280.00       | 4,162.6020m     | 6,143.5646m    | N51° 08' 05"E               |
| 0+300.00       | 4,175.9294m     | 6,158.4686m    | N46° 12' 48"E               |
| 0+320.00       | 4,189.8505m     | 6,172.8283m    | N45° 50' 39"E               |
| 0+340.00       | 4,203.3709m     | 6,187.5566m    | N50° 51' 48"E               |
| 0+360.00       | 4,214.0155m     | 6,204.4200m    | N65° 38' 12"E               |
| 0+380.00       | 4,219.6126m     | 6,223.5551m    | N81° 04' 58"E               |
| 0+400.00       | 4,221.2841m     | 6,243.4741m    | N87° 30' 16"E               |

## 7.3. Račun kota kolnika

**Client:**

Client

Client Company

Address 1

Date: 5.5.2017. 9:31:38

**Prepared by:**

Preparer

Your Company Name

123 Main Street

Corridor Name: CORRIDOR

Description:

Base Alignment Name: OS1

Station Range: Start: 0+000.00, End: 0+416.57

## CHAINAGE 0+000.00

| <b>POINT</b> | <b>X</b>   | <b>Y</b>   | <b>Z</b> | <b>OFFSET</b> | <b>STRING CUT</b> |
|--------------|------------|------------|----------|---------------|-------------------|
| 1            | 5,910.3525 | 4,039.9674 | 299.5028 | -10.196m      | Daylight          |
| 2            | 5,915.3171 | 4,037.3680 | 303.2388 | -4.592m       | Hinge             |
| 3            | 5,915.3180 | 4,037.3675 | 303.0388 | -4.591m       | EPS_Sub           |
| 4            | 5,916.2030 | 4,036.9041 | 303.1888 | -3.592m       | Back_Curb         |
| 5            | 5,916.3359 | 4,036.8345 | 303.1888 | -3.442m       | Top_Curb          |
| 6            | 5,916.3728 | 4,036.8152 | 302.9388 | -3.400m       | Flowline_Gutter   |
| 7            | 5,916.9487 | 4,036.5137 | 303.0688 | -2.750m       | ETW               |
| 8            | 5,916.9487 | 4,036.5137 | 302.8688 | -2.750m       | ETW_SubBase       |
| 9            | 5,921.8212 | 4,033.9625 | 302.9313 | 2.750m        | Flange            |
| 10           | 5,921.8212 | 4,033.9625 | 302.7313 | 2.750m        | ETW_SubBase       |
| 11           | 5,922.3970 | 4,033.6610 | 302.8013 | 3.400m        | Flowline_Gutter   |
| 12           | 5,922.4340 | 4,033.6416 | 303.0513 | 3.442m        | Top_Curb          |
| 13           | 5,922.5669 | 4,033.5720 | 303.0513 | 3.592m        | Back_Curb         |
| 14           | 5,923.4519 | 4,033.1087 | 302.9013 | 4.591m        | EPS_Sub           |
| 15           | 5,923.4528 | 4,033.1082 | 303.1013 | 4.592m        | Hinge_Cut         |
| 16           | 5,926.6318 | 4,031.4437 | 304.8955 | 8.180m        | Daylight          |

## CHAINAGE 0+025.00

## CHAINAGE 0+050.00

## CHAINAGE 0+075.00

## CHAINAGE 0+100.00

| <b>POINT</b> | <b>X</b>   | <b>Y</b>   | <b>Z</b> | <b>OFFSET</b> | <b>STRING CUT</b> |
|--------------|------------|------------|----------|---------------|-------------------|
| 1            | 5,968.9966 | 4,123.5148 | 297.6034 | -5.112m       | Daylight          |
| 2            | 5,969.2992 | 4,123.0912 | 297.3431 | -4.592m       | EPS               |
| 3            | 5,969.2998 | 4,123.0903 | 297.1431 | -4.591m       | EPS_Sub           |
| 4            | 5,969.8804 | 4,122.2774 | 297.2931 | -3.592m       | Back_Curb         |
| 5            | 5,969.9675 | 4,122.1553 | 297.2931 | -3.442m       | Top_Curb          |

|    |            |            |          |         |                 |
|----|------------|------------|----------|---------|-----------------|
| 6  | 5,969.9918 | 4,122.1214 | 297.0431 | -3.400m | Flowline_Gutter |
| 7  | 5,970.3695 | 4,121.5924 | 297.1731 | -2.750m | ETW             |
| 8  | 5,970.3695 | 4,121.5924 | 296.9731 | -2.750m | ETW_SubBase     |
| 9  | 5,974.3797 | 4,115.9774 | 296.8006 | 4.150m  | ETW_SubBase     |
| 10 | 5,974.3797 | 4,115.9774 | 297.0006 | 4.150m  | ETW             |
| 11 | 5,974.7575 | 4,115.4485 | 296.8706 | 4.800m  | Flowline_Gutter |
| 12 | 5,974.7817 | 4,115.4145 | 297.1206 | 4.842m  | Top_Curb        |
| 13 | 5,974.8689 | 4,115.2925 | 297.1206 | 4.992m  | Back_Curb       |
| 14 | 5,975.4495 | 4,114.4795 | 296.9706 | 5.991m  | EPS_Sub         |
| 15 | 5,975.4501 | 4,114.4787 | 297.1706 | 5.992m  | Hinge_Cut       |
| 16 | 5,982.2993 | 4,104.8885 | 303.0631 | 17.777m | Daylight        |

CHAINAGE 0+125.00

CHAINAGE 0+150.00

CHAINAGE 0+175.00

CHAINAGE 0+200.00

| <b>POINT</b> | <b>X</b>   | <b>Y</b>   | <b>Z</b> | <b>OFFSET</b> | <b>STRING CUT</b> |
|--------------|------------|------------|----------|---------------|-------------------|
| 1            | 6,068.6822 | 4,143.3133 | 292.6483 | -6.026m       | Daylight          |
| 2            | 6,068.8072 | 4,141.8843 | 291.9311 | -4.592m       | EPS               |
| 3            | 6,068.8072 | 4,141.8833 | 291.7311 | -4.591m       | EPS_Sub           |
| 4            | 6,068.8943 | 4,140.8881 | 291.8811 | -3.592m       | Back_Curb         |
| 5            | 6,068.9073 | 4,140.7386 | 291.8811 | -3.442m       | Top_Curb          |
| 6            | 6,068.9110 | 4,140.6971 | 291.6311 | -3.400m       | Flowline_Gutter   |
| 7            | 6,068.9676 | 4,140.0496 | 291.7611 | -2.750m       | ETW               |
| 8            | 6,068.9676 | 4,140.0496 | 291.5611 | -2.750m       | ETW_SubBase       |
| 9            | 6,069.4467 | 4,134.5707 | 291.4236 | 2.750m        | ETW_SubBase       |
| 10           | 6,069.4467 | 4,134.5707 | 291.6236 | 2.750m        | ETW               |
| 11           | 6,069.5033 | 4,133.9232 | 291.4936 | 3.400m        | Flowline_Gutter   |
| 12           | 6,069.5069 | 4,133.8816 | 291.7436 | 3.441m        | Top_Curb          |
| 13           | 6,069.5200 | 4,133.7322 | 291.7436 | 3.591m        | Back_Curb         |
| 14           | 6,069.6070 | 4,132.7370 | 291.5936 | 4.590m        | EPS_Sub           |
| 15           | 6,069.6071 | 4,132.7360 | 291.7936 | 4.591m        | Hinge_Cut         |
| 16           | 6,070.4352 | 4,123.2661 | 296.5466 | 14.097m       | Daylight          |

CHAINAGE 0+225.00

CHAINAGE 0+250.00



CHAINAGE 0+275.00

CHAINAGE 0+300.00

| <b>POINT</b> | <b>X</b>   | <b>Y</b>   | <b>Z</b> | <b>OFFSET</b> | <b>STRING CUT</b> |
|--------------|------------|------------|----------|---------------|-------------------|
| 1            | 6,150.0245 | 4,184.7389 | 283.1021 | -12.203m      | Daylight          |
| 2            | 6,155.1243 | 4,179.4184 | 288.0153 | -4.833m       | Hinge             |
| 3            | 6,155.1250 | 4,179.4177 | 287.8153 | -4.832m       | EPS_Sub           |
| 4            | 6,155.8163 | 4,178.6965 | 287.9653 | -3.833m       | Back_Curb         |
| 5            | 6,155.9201 | 4,178.5882 | 287.9653 | -3.683m       | Top_Curb          |
| 6            | 6,155.9489 | 4,178.5581 | 287.7153 | -3.641m       | Flowline_Gutter   |
| 7            | 6,156.3987 | 4,178.0888 | 287.6453 | -2.991m       | ETW_SubBase       |
| 8            | 6,156.3987 | 4,178.0888 | 287.8453 | -2.991m       | Flange            |
| 9            | 6,160.3715 | 4,173.9441 | 287.7018 | 2.750m        | Flange            |
| 10           | 6,160.3715 | 4,173.9441 | 287.5018 | 2.750m        | ETW_SubBase       |
| 11           | 6,160.8213 | 4,173.4749 | 287.5718 | 3.400m        | Flowline_Gutter   |
| 12           | 6,160.8502 | 4,173.4447 | 287.8218 | 3.442m        | Top_Curb          |
| 13           | 6,160.9539 | 4,173.3365 | 287.8218 | 3.592m        | Back_Curb         |
| 14           | 6,161.6452 | 4,172.6153 | 287.6718 | 4.591m        | EPS_Sub           |
| 15           | 6,161.6459 | 4,172.6145 | 287.8718 | 4.592m        | EPS               |
| 16           | 6,162.5009 | 4,171.7225 | 287.0480 | 5.827m        | Daylight          |

CHAINAGE 0+325.00

CHAINAGE 0+350.00

CHAINAGE 0+375.00

CHAINAGE 0+400.00

| <b>POINT</b> | <b>X</b>   | <b>Y</b>   | <b>Z</b> | <b>OFFSET</b> | <b>STRING CUT</b> |
|--------------|------------|------------|----------|---------------|-------------------|
| 1            | 6,243.2742 | 4,225.8707 | 284.2109 | -4.591m       | EPS               |
| 2            | 6,243.2743 | 4,225.8697 | 284.0109 | -4.590m       | EPS_Sub           |
| 3            | 6,243.3178 | 4,224.8717 | 284.1609 | -3.591m       | Back_Curb         |
| 4            | 6,243.3243 | 4,224.7218 | 284.1609 | -3.441m       | Top_Curb          |
| 5            | 6,243.3261 | 4,224.6802 | 283.9109 | -3.399m       | Flowline_Gutter   |
| 6            | 6,243.3544 | 4,224.0308 | 284.0409 | -2.749m       | ETW               |
| 7            | 6,243.3544 | 4,224.0308 | 283.8409 | -2.749m       | ETW_SubBase       |
| 8            | 6,243.5948 | 4,218.5145 | 283.9029 | 2.772m        | Flange            |
| 9            | 6,243.5948 | 4,218.5145 | 283.7029 | 2.772m        | ETW_SubBase       |
| 10           | 6,243.6231 | 4,217.8651 | 283.7729 | 3.422m        | Flowline_Gutter   |
| 11           | 6,243.6249 | 4,217.8235 | 284.0229 | 3.464m        | Top_Curb          |

|    |            |            |          |        |           |
|----|------------|------------|----------|--------|-----------|
| 12 | 6,243.6315 | 4,217.6736 | 284.0229 | 3.614m | Back_Curb |
| 13 | 6,243.6749 | 4,216.6756 | 283.8729 | 4.613m | EPS_Sub   |
| 14 | 6,243.6750 | 4,216.6746 | 284.0729 | 4.614m | EPS       |
| 15 | 6,243.8181 | 4,213.3919 | 285.7158 | 7.900m | Daylight  |

## 7.4. Vertikalni tok trase

**Client:**

Client

Client Company

Address 1

Date: 5.5.2017. 9:32:35

**Prepared by:**

Preparer

Your Company Name

123 Main Street

Vertical Alignment: NIVELETA

Description:

Station Range: Start: 0+000.00, End: 41+657.00

| PVI  | Station  | Grade Out | Curve Length |
|--|----------|-----------|--------------|
| 0.00   | 0+000.00 | -5.90%    |              |
| 1.00   | 0+182.83 | -3.80%    | 104.492m     |
| Vertical Curve Information:(sag curve)-----<br>PVC Station:        0+130.61    Elevation: 295.300m<br>PVI Station:        0+182.83    Elevation: 292.221m<br>PVT Station:        0+235.10    Elevation: 290.236m<br>Low Point:           0+235.10    Elevation: 290.236m<br>Grade in:            -5.90%    Grade out:    -3.80%<br>Change:              2.10%    K:<br>Curve Length:       104.492m<br>Headlight Distance: |          |           |              |
| 2.00   | 0+416.57 |           |              |

## 8. Proračun količina zemljanih radova za troškovnik

# Cut/Fill Report

**Generated:** 2017-05-11 22:14:15  
**By user:** Korisnik  
**Drawing:** C:\Users\Korisnik\Documents\C:\Users\Korisnik\Documents\zavrzni NOVO  
 03.05.2017.dwg

## Volume Summary

| Name          | Type | Cut Factor | Fill Factor | 2d Area | Cut     | Fill    | Net          |
|---------------|------|------------|-------------|---------|---------|---------|--------------|
| Surface1      | full | 1.000      | 1.000       | 7974.75 | 9600.03 | 3958.14 | 5641.89<Cut> |
| <b>Totals</b> |      |            |             |         |         |         |              |
|               |      |            |             | 2d Area | Cut     | Fill    | Net          |
| Total         |      |            |             | 7974.75 | 9600.03 | 3958.14 | 5641.89<Cut> |

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

## 9. Proračun količine radova po presjecima

# Volume Report

**Project:** C:\Users\Korisnik\appdata\local\temp\završni NOVO

**03.05.2017\_1\_13126\_0180.sv\$**

Alignment: OS1

Sample Line Group: poprečni presjeci

Start Sta: 0+000.000

End Sta: 0+416.571

| <u>Station</u> | <u>Cut Area</u><br>(Sq.m.) | <u>Cut Volume</u><br>(Cu.m.) | <u>Reusable Volume</u><br>(Cu.m.) | <u>Fill Area</u><br>(Sq.m.) | <u>Fill Volume</u><br>(Cu.m.) | <u>Cum. Cut Vol.</u><br>(Cu.m.) | <u>Cum. Reusable Vol.</u><br>(Cu.m.) | <u>Cum. Fill Vol.</u><br>(Cu.m.) | <u>Cum. Net Vol.</u><br>(Cu.m.) |
|----------------|----------------------------|------------------------------|-----------------------------------|-----------------------------|-------------------------------|---------------------------------|--------------------------------------|----------------------------------|---------------------------------|
| 0+000.000      | 8.52                       | 0.00                         | 0.00                              | 12.81                       | 0.00                          | 0.00                            | 0.00                                 | 0.00                             | 0.00                            |
| 0+020.000      | 11.06                      | 195.85                       | 195.85                            | 10.56                       | 233.71                        | 195.85                          | 195.85                               | 233.71                           | -37.87                          |
| 0+040.000      | 14.27                      | 253.33                       | 253.33                            | 16.20                       | 267.60                        | 449.17                          | 449.17                               | 501.31                           | -52.14                          |
| 0+049.230      | 6.51                       | 95.88                        | 95.88                             | 22.42                       | 178.23                        | 545.06                          | 545.06                               | 679.54                           | -134.49                         |
| 0+051.890      | 3.70                       | 13.58                        | 13.58                             | 24.83                       | 62.84                         | 558.63                          | 558.63                               | 742.38                           | -183.75                         |
| 0+051.904      | 3.69                       | 0.05                         | 0.05                              | 24.83                       | 0.35                          | 558.69                          | 558.69                               | 742.73                           | -184.05                         |
| 0+055.556      | 3.16                       | 12.51                        | 12.51                             | 25.24                       | 91.42                         | 571.20                          | 571.20                               | 834.15                           | -262.96                         |
| 0+059.228      | 3.93                       | 13.02                        | 13.02                             | 23.39                       | 89.28                         | 584.22                          | 584.22                               | 923.43                           | -339.22                         |
| 0+060.000      | 4.24                       | 3.16                         | 3.16                              | 22.64                       | 17.77                         | 587.37                          | 587.37                               | 941.20                           | -353.83                         |
| 0+078.450      | 43.54                      | 425.58                       | 425.58                            | 0.00                        | 217.72                        | 1012.95                         | 1012.95                              | 1158.93                          | -145.97                         |
| 0+080.000      | 48.51                      | 67.61                        | 67.61                             | 0.00                        | 0.00                          | 1080.57                         | 1080.57                              | 1158.93                          | -78.36                          |
| 0+085.130      | 58.67                      | 259.74                       | 259.74                            | 0.00                        | 0.00                          | 1340.31                         | 1340.31                              | 1158.93                          | 181.38                          |
| 0+089.230      | 61.19                      | 229.48                       | 229.48                            | 0.00                        | 0.00                          | 1569.79                         | 1569.79                              | 1158.93                          | 410.86                          |
| 0+091.890      | 59.25                      | 147.37                       | 147.37                            | 0.00                        | 0.00                          | 1717.17                         | 1717.17                              | 1158.93                          | 558.24                          |
| 0+091.904      | 59.22                      | 0.84                         | 0.84                              | 0.00                        | 0.00                          | 1718.01                         | 1718.01                              | 1158.93                          | 559.08                          |



|           |       |         |         |      |       |         |         |         |         |
|-----------|-------|---------|---------|------|-------|---------|---------|---------|---------|
| 0+100.000 | 45.13 | 385.36  | 385.36  | 0.00 | 0.00  | 2103.37 | 2103.37 | 1158.93 | 944.44  |
| 0+101.946 | 41.71 | 76.95   | 76.95   | 0.00 | 0.00  | 2180.32 | 2180.32 | 1158.93 | 1021.39 |
| 0+110.670 | 31.85 | 292.34  | 292.34  | 0.33 | 1.57  | 2472.66 | 2472.66 | 1160.50 | 1312.16 |
| 0+111.988 | 30.72 | 37.57   | 37.57   | 0.43 | 0.54  | 2510.23 | 2510.23 | 1161.04 | 1349.19 |
| 0+112.169 | 30.56 | 5.53    | 5.53    | 0.44 | 0.08  | 2515.76 | 2515.76 | 1161.12 | 1354.64 |
| 0+118.870 | 25.92 | 172.88  | 172.88  | 1.06 | 5.39  | 2688.64 | 2688.64 | 1166.51 | 1522.13 |
| 0+120.000 | 25.36 | 28.98   | 28.98   | 1.15 | 1.25  | 2717.63 | 2717.63 | 1167.76 | 1549.87 |
| 0+125.490 | 23.96 | 125.38  | 125.38  | 1.56 | 7.87  | 2843.01 | 2843.01 | 1175.63 | 1667.37 |
| 0+130.610 | 24.94 | 117.48  | 117.48  | 3.00 | 12.23 | 2960.48 | 2960.48 | 1187.86 | 1772.62 |
| 0+140.000 | 29.64 | 245.19  | 245.19  | 1.74 | 22.98 | 3205.67 | 3205.67 | 1210.84 | 1994.83 |
| 0+144.890 | 30.92 | 144.50  | 144.50  | 0.94 | 6.66  | 3350.17 | 3350.17 | 1217.50 | 2132.67 |
| 0+148.532 | 33.41 | 117.16  | 117.16  | 0.45 | 2.52  | 3467.33 | 3467.33 | 1220.03 | 2247.30 |
| 0+150.670 | 35.92 | 74.11   | 74.11   | 0.23 | 0.73  | 3541.44 | 3541.44 | 1220.75 | 2320.69 |
| 0+151.988 | 37.66 | 48.51   | 48.51   | 0.12 | 0.23  | 3589.95 | 3589.95 | 1220.98 | 2368.97 |
| 0+152.169 | 37.91 | 6.82    | 6.82    | 0.10 | 0.02  | 3596.77 | 3596.77 | 1221.00 | 2375.77 |
| 0+160.000 | 47.62 | 334.89  | 334.89  | 0.00 | 0.41  | 3931.65 | 3931.65 | 1221.41 | 2710.24 |
| 0+180.000 | 68.43 | 1160.53 | 1160.53 | 0.00 | 0.00  | 5092.18 | 5092.18 | 1221.41 | 3870.77 |
| 0+190.520 | 62.58 | 689.12  | 689.12  | 0.00 | 0.00  | 5781.31 | 5781.31 | 1221.41 | 4559.90 |
| 0+198.817 | 56.64 | 494.59  | 494.59  | 0.00 | 0.00  | 6275.89 | 6275.89 | 1221.41 | 5054.48 |
| 0+200.000 | 56.86 | 67.12   | 67.12   | 0.00 | 0.00  | 6343.02 | 6343.02 | 1221.41 | 5121.61 |
| 0+206.310 | 56.38 | 357.26  | 357.26  | 0.00 | 0.00  | 6700.28 | 6700.28 | 1221.41 | 5478.87 |
| 0+213.799 | 58.45 | 434.43  | 434.43  | 0.00 | 0.00  | 7134.70 | 7134.70 | 1221.41 | 5913.29 |
| 0+220.000 | 61.11 | 377.20  | 377.20  | 0.00 | 0.00  | 7511.90 | 7511.90 | 1221.41 | 6290.49 |

|           |       |        |        |       |        |         |         |         |         |
|-----------|-------|--------|--------|-------|--------|---------|---------|---------|---------|
| 0+221.343 | 61.70 | 82.50  | 82.50  | 0.00  | 0.00   | 7594.40 | 7594.40 | 1221.41 | 6372.99 |
| 0+228.935 | 76.82 | 539.04 | 539.04 | 0.00  | 0.00   | 8133.43 | 8133.43 | 1221.41 | 6912.02 |
| 0+230.520 | 75.24 | 120.50 | 120.50 | 0.00  | 0.00   | 8253.94 | 8253.94 | 1221.41 | 7032.53 |
| 0+235.103 | 65.05 | 331.96 | 331.96 | 0.00  | 0.00   | 8585.90 | 8585.90 | 1221.41 | 7364.49 |
| 0+235.882 | 58.14 | 47.99  | 47.99  | 0.00  | 0.00   | 8633.88 | 8633.88 | 1221.41 | 7412.47 |
| 0+238.817 | 27.12 | 129.53 | 129.53 | 3.27  | 4.54   | 8763.42 | 8763.42 | 1225.95 | 7537.47 |
| 0+240.000 | 21.92 | 29.00  | 29.00  | 2.34  | 3.32   | 8792.41 | 8792.41 | 1229.27 | 7563.15 |
| 0+244.837 | 8.62  | 77.27  | 77.27  | 3.64  | 14.10  | 8869.69 | 8869.69 | 1243.36 | 7626.32 |
| 0+252.998 | 9.83  | 78.53  | 78.53  | 2.98  | 26.46  | 8948.22 | 8948.22 | 1269.82 | 7678.40 |
| 0+253.799 | 9.68  | 7.81   | 7.81   | 4.58  | 3.02   | 8956.03 | 8956.03 | 1272.85 | 7683.19 |
| 0+259.920 | 6.17  | 50.68  | 50.68  | 3.53  | 23.95  | 9006.71 | 9006.71 | 1296.79 | 7709.92 |
| 0+260.000 | 6.29  | 0.50   | 0.50   | 3.47  | 0.28   | 9007.21 | 9007.21 | 1297.07 | 7710.14 |
| 0+260.489 | 6.26  | 3.07   | 3.07   | 2.96  | 1.57   | 9010.28 | 9010.28 | 1298.65 | 7711.63 |
| 0+267.179 | 12.94 | 66.56  | 66.56  | 5.07  | 25.61  | 9076.84 | 9076.84 | 1324.26 | 7752.58 |
| 0+273.677 | 8.52  | 72.37  | 72.37  | 10.55 | 48.48  | 9149.20 | 9149.20 | 1372.74 | 7776.47 |
| 0+280.000 | 4.82  | 43.97  | 43.97  | 18.19 | 87.60  | 9193.18 | 9193.18 | 1460.33 | 7732.85 |
| 0+280.137 | 4.86  | 0.66   | 0.66   | 18.36 | 2.51   | 9193.84 | 9193.84 | 1462.84 | 7731.00 |
| 0+299.733 | 0.00  | 49.01  | 49.01  | 40.73 | 569.81 | 9242.85 | 9242.85 | 2032.65 | 7210.20 |
| 0+299.920 | 0.00  | 0.00   | 0.00   | 40.93 | 7.65   | 9242.85 | 9242.85 | 2040.30 | 7202.54 |
| 0+300.000 | 0.00  | 0.00   | 0.00   | 41.02 | 3.28   | 9242.85 | 9242.85 | 2043.58 | 7199.27 |
| 0+303.459 | 0.00  | 0.00   | 0.00   | 44.39 | 147.71 | 9242.85 | 9242.85 | 2191.30 | 7051.55 |
| 0+307.179 | 0.00  | 0.00   | 0.00   | 47.11 | 170.21 | 9242.85 | 9242.85 | 2361.51 | 6881.34 |
| 0+312.340 | 0.00  | 0.00   | 0.00   | 49.06 | 248.17 | 9242.85 | 9242.85 | 2609.68 | 6633.17 |

|           |       |        |        |       |        |         |         |         |         |
|-----------|-------|--------|--------|-------|--------|---------|---------|---------|---------|
| 0+320.000 | 0.00  | 0.00   | 0.00   | 45.73 | 363.04 | 9242.85 | 9242.85 | 2972.72 | 6270.13 |
| 0+320.819 | 0.00  | 0.00   | 0.00   | 45.32 | 37.27  | 9242.85 | 9242.85 | 3009.99 | 6232.85 |
| 0+325.891 | 0.00  | 0.00   | 0.00   | 43.92 | 226.34 | 9242.85 | 9242.85 | 3236.33 | 6006.52 |
| 0+326.486 | 0.00  | 0.00   | 0.00   | 43.44 | 25.99  | 9242.85 | 9242.85 | 3262.32 | 5980.53 |
| 0+327.079 | 0.00  | 0.00   | 0.00   | 42.89 | 25.57  | 9242.85 | 9242.85 | 3287.89 | 5954.96 |
| 0+340.000 | 0.00  | 0.00   | 0.00   | 16.86 | 392.90 | 9242.85 | 9242.85 | 3680.79 | 5562.06 |
| 0+342.340 | 0.00  | 0.00   | 0.00   | 13.48 | 35.91  | 9242.85 | 9242.85 | 3716.70 | 5526.15 |
| 0+350.819 | 13.91 | 53.68  | 53.68  | 6.11  | 84.59  | 9296.53 | 9296.53 | 3801.29 | 5495.24 |
| 0+354.767 | 15.88 | 52.66  | 52.66  | 3.06  | 18.69  | 9349.19 | 9349.19 | 3819.98 | 5529.20 |
| 0+355.328 | 16.11 | 8.97   | 8.97   | 2.11  | 1.45   | 9358.16 | 9358.16 | 3821.43 | 5536.73 |
| 0+355.891 | 16.72 | 9.24   | 9.24   | 1.52  | 1.02   | 9367.40 | 9367.40 | 3822.45 | 5544.94 |
| 0+360.000 | 20.71 | 69.01  | 69.01  | 2.04  | 7.73   | 9436.41 | 9436.41 | 3830.18 | 5606.23 |
| 0+361.294 | 21.18 | 24.30  | 24.30  | 2.70  | 3.28   | 9460.71 | 9460.71 | 3833.46 | 5627.25 |
| 0+363.830 | 22.34 | 49.20  | 49.20  | 7.14  | 13.56  | 9509.92 | 9509.92 | 3847.03 | 5662.89 |
| 0+363.890 | 22.38 | 1.34   | 1.34   | 7.27  | 0.43   | 9511.26 | 9511.26 | 3847.46 | 5663.80 |
| 0+371.769 | 24.53 | 162.28 | 162.28 | 6.36  | 57.65  | 9673.54 | 9673.54 | 3905.10 | 5768.43 |
| 0+371.782 | 24.53 | 0.33   | 0.33   | 6.36  | 0.09   | 9673.87 | 9673.87 | 3905.19 | 5768.68 |
| 0+375.418 | 3.57  | 45.30  | 45.30  | 7.36  | 25.77  | 9719.17 | 9719.17 | 3930.96 | 5788.21 |
| 0+379.029 | 3.33  | 11.86  | 11.86  | 5.61  | 23.62  | 9731.03 | 9731.03 | 3954.59 | 5776.44 |
| 0+380.000 | 3.40  | 3.26   | 3.26   | 4.81  | 5.06   | 9734.29 | 9734.29 | 3959.65 | 5774.64 |
| 0+393.651 | 0.42  | 25.17  | 25.17  | 0.00  | 32.70  | 9759.46 | 9759.46 | 3992.34 | 5767.11 |
| 0+393.890 | 0.43  | 0.10   | 0.10   | 0.00  | 0.00   | 9759.56 | 9759.56 | 3992.34 | 5767.22 |
| 0+397.724 | 0.33  | 1.45   | 1.45   | 0.00  | 0.00   | 9761.01 | 9761.01 | 3992.34 | 5768.67 |

|           |      |      |      |      |      |         |         |         |         |
|-----------|------|------|------|------|------|---------|---------|---------|---------|
| 0+400.000 | 0.26 | 0.67 | 0.67 | 0.00 | 0.00 | 9761.68 | 9761.68 | 3992.34 | 5769.34 |
| 0+401.769 | 0.00 | 0.23 | 0.23 | 0.00 | 0.00 | 9761.91 | 9761.91 | 3992.34 | 5769.57 |
| 0+401.782 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 9761.91 | 9761.91 | 3992.34 | 5769.57 |
| 0+416.571 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 9761.91 | 9761.91 | 3992.34 | 5769.57 |

## 10. Literatura

### Literatura

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