

Idejno rješenje lokalne ceste

Budanko, Tihana

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

ZAVRŠNI RAD

Tihana Budanko

Split, 2017.

**SVEUČILIŠTE U SPLITU
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IDEJNO RJEŠENJE LOKALNE CESTE

Završni rad

Split, 2017.

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

Split, Matice hrvatske 15

STUDIJ: **PREDDIPLOMSKI SVEUČILIŠNI
STUDIJ GRAĐEVINARSTVA**

KANDIDAT: **Tihana Budanko**

BROJ INDEKSA: **4262**

KATEDRA: **Katedra za prometnice**

PREDMET: **Ceste**

ZADATAK ZA ZAVRŠNI RAD

Tema: Idejno rješenje lokalne ceste

Opis zadatka: Uz pomoć programa za projektiranje cesta Autocad Civil 3D potrebno je izraditi idejno rješenje lokalne ceste između zadanih točaka A i B na situaciji koja je preuzeta iz programa iz kolegija Ceste.

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 1:200
7. Računalne ispise koordinatnih točaka osi
8. Proračun količina zemljanih radova
9. Proračun količine radova po presjecima

U Splitu, srpanj 2017.

Voditelj Završnog rada: Dr.sc. Dražen Cvitanić

Sažetak:

Uz pomoć programa za projektiranje cesta AUTOCAD CIVIL 3D izrađeno je idejno rješenje lokalne ceste na posebnoj geodetskoj podlozi prema zadatku iz kolegija Ceste. Cesta je projektirana za godišnji dnevni promet (PGDP) od 950 vozila na dan, na brdovitom terenu. Projektna brzina ceste iznosi 30km/h. Idejno rješenje izrađeno je prema Pravilniku o osnovnim uvjetima za projektiranje ceste.

Ključne riječi:

idejno rješenje, projektna brzina, os ceste, duljina prijelazne krivine, radius krivine, niveleta, poprečni presjek, uzdužni presjek

Preliminary design of the road section

Abstract:

With the help of the road design software AUTOCAD CIVIL 3D, the conceptual solution of the local road was developed on a special geodetic basis according to the task from course Roads. The road is designed for annual average daily traffic (AADT) of 950 vehicles per day, on hilly terrain. The design speed of the road is 30 km / h. The conceptual solution has been developed according to the Regulations on the basic conditions for the design of public roads.

Keywords:

preliminary design, project speed, road axis, length of transition curve, curve radius, roadway, cross section, longitudinal section

Zahvaljujem se svom mentoru prof. dr. sc. Draženu Cvitaniću te asistentici Danieli Dumanić koji su svojim znanjem i savjetima pomogli pri izradi ovog završnog rada. Također, hvala svim kolegama i profesorima koji su mi kroz zajednički rad olakšali protekle godine studiranja te hvala prijateljima i obitelji na podršci.

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Katedra za prometnice

Studij: Preddiplomski

Nastavni predmet: CESTE

Student: *Tihana Budauko*

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 i kota nivelete
5. Proračun vitoperenja kolnika
6. Građevinska situacija MJ. 1:1000
7. Uzdužni presjek MJ. 1:1000/100
8. Normalni poprečni presjek MJ. 1:50
9. Karakteristični poprečni presjeci MJ. 1:100
10. Predmjer radova
11. Aproksimativni troškovnik

Predmetni nastavnik:

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

2. TEHNIČKI OPIS

OPĆENITO

Predmet projekta je dionica ceste od točke A(235) do točke B(215) (naznačenih na geodetskoj podlozi, u mjerilu 1:000). Teren na kojem se gradi cesta je brdovit. Prosječni godišnji dnevni promet ceste je 950 voz/dan, cesta je 5. kategorije. Zbog većih razlika u konfiguraciji terena predviđena projektna brzina iznosi $v_p = 30 \text{ km/h}$, a duljina trase je 312,50 m.

HORIZONTALNI ELEMENTI.

Za projektnu brzinu $v_p = 30 \text{ km/h}$ prema pravilniku minimalni radijus horizontalne krivine iznosi 25 m. Na projektnoj dionici predviđene su dvije dvije krivine, dvije prijelazice i tri pravca.

Primjenjeni radijusi i prijelaznice su:

1. krivina $R = 65 \text{ m}$, $L = 40 \text{ m}$.
2. krivina $R = 30 \text{ m}$, $L = 30 \text{ m}$

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 1,3 m a u drugoj krivini 2,8m.

VERTIKALNI ELEMENTI

Prema pravilniku maksimalni nagib nivelete za ceste 5. kategorije iznosi 12 %. Tok se sastoji od dva pravca i jedne konveksne krivine. Primjenjeni nagibi pravaca su 5,15 % i 8,05 %. Tangenta je dužine 40,60 m, a radijus konveksne krivine iznosi 2800 m.

POPREČNI PRESJEK

Cesta se sastoji od 2 prometna traka širine 2,75 m, s obje strane kolnika je rubni trak koji je izведен kao proširenje kolničke konstrukcije uz označavanje rubnom crtom širine 0,2 m istog poprečnog nagiba kao i kolnik. Strani ceste koja je u nasipu rubni trak nastavlja bankina širine 1 m i minimalnog poprečnog nagiba 4%. Strana cesta koja je u usjeku na rubni trak se nastavlja rigol koji služi za prikupljanje i odvodnju oborinske vode, također u usjeku izvedene su drenaže radi odvodnje podzemne vode. Predviđeni pokos nasipa 1:1,5, a pokos usjeka je 2:1. Cesta je svojim većim dijeom u zasječku. Poprečni nagib ceste u pravcu iznosi 2,5 %, u 1. krivini 3,6% a u 2. krivini 6,2%.

KOLNIČKA KONSTRUKCIJA

Projektom je predviđena kolnička konstrukcija sa sljedećim slojevima:

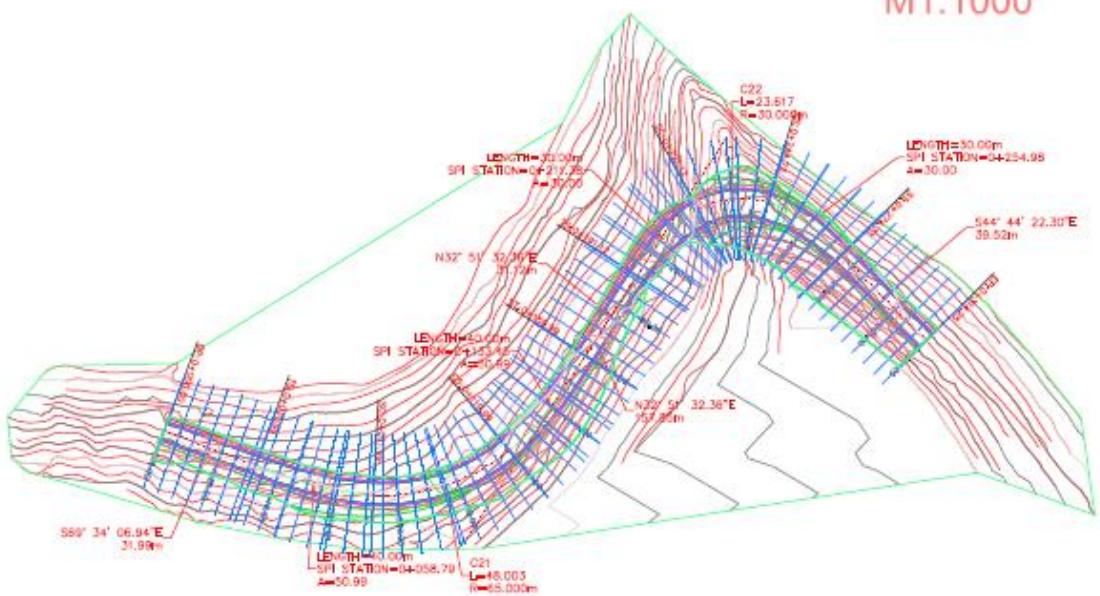
- Asfalt- beton habajući sloj- AB11 u debljini od 4cm
- Bitumenizirani nosivi sloj- BNS22 u debljini od 6cm
- Mehanički zbijeni nosivi sloj debljine 30cm.

ODVODNJA

Odvodnja kolnika u zasječku i usjeku predviđa se betonskim rigolima, na nasipu voda otječe preko bankine u okolni teren. Odvodnja podzemnih voda rješava se drenažom.

**3. Građevinska situacija
M 1:1000**

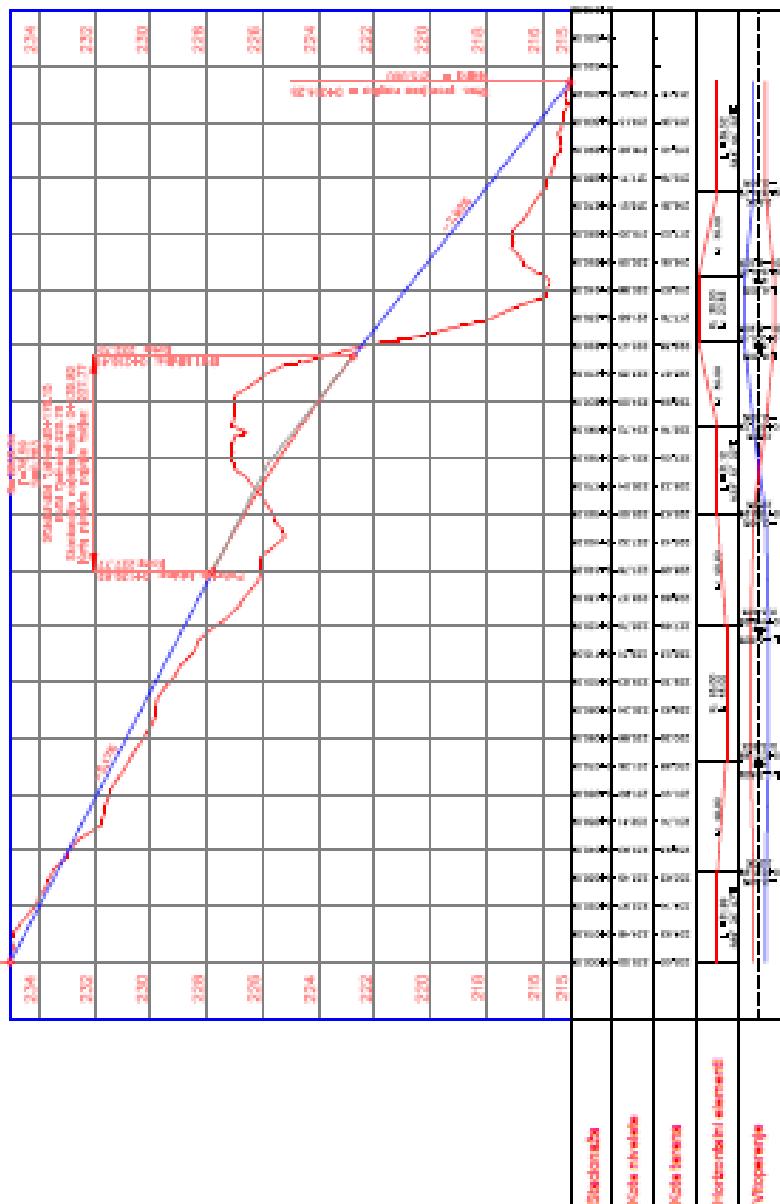
GRAĐEVINSKA
SITUACIJA
M1:1000



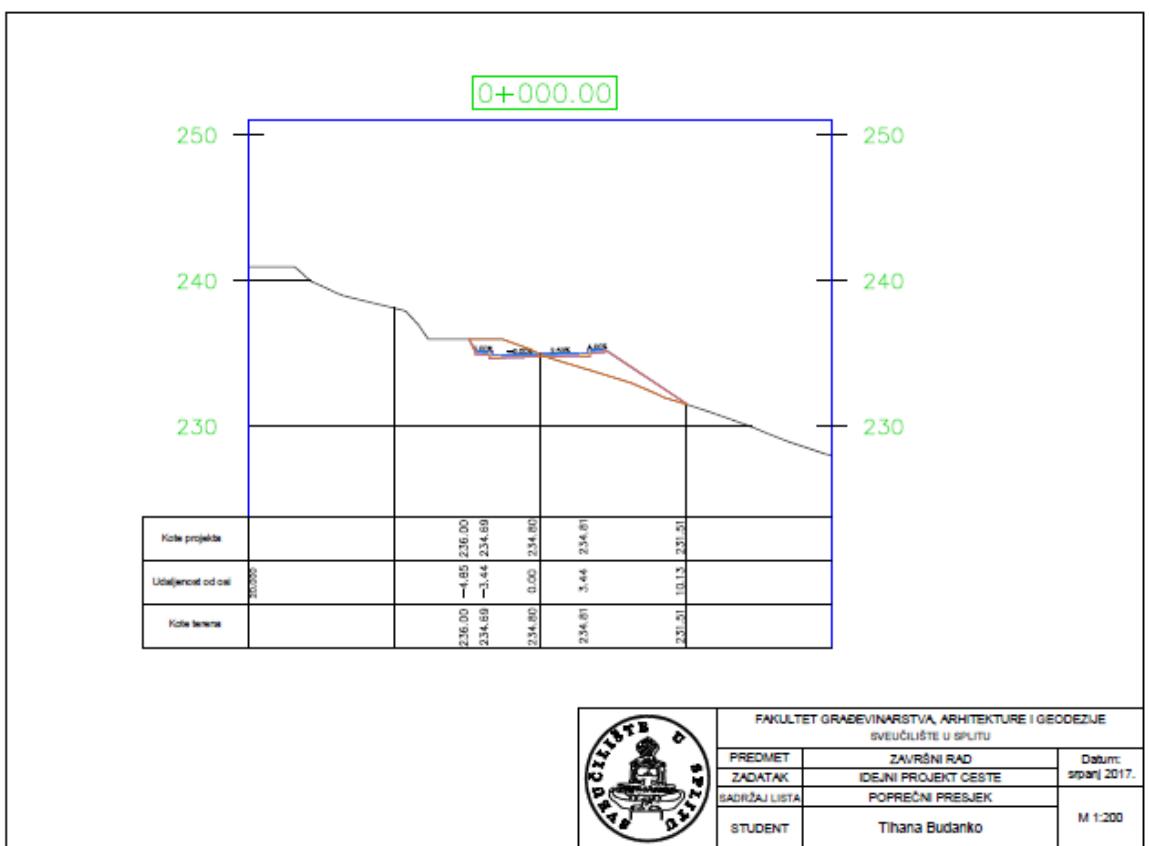
**4. Uzdužni presjek
M1:1000/ 1:100**

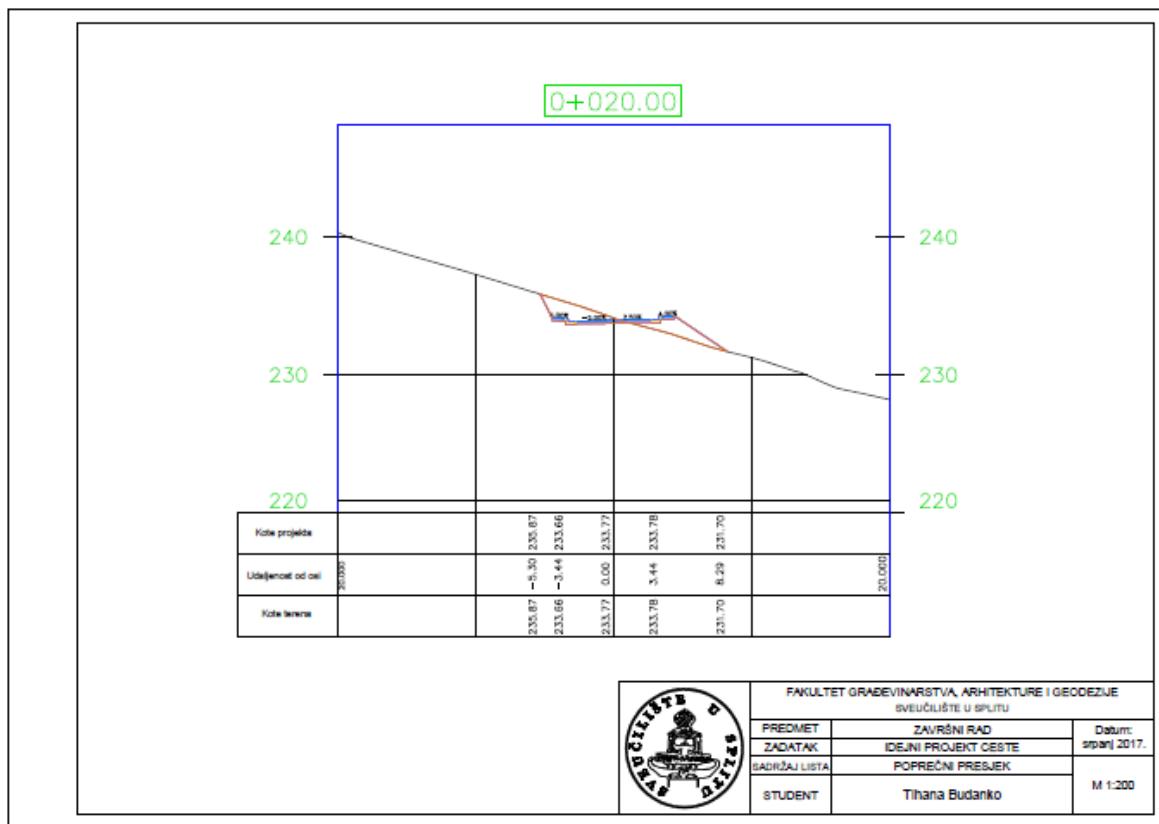
OSI PROFILE

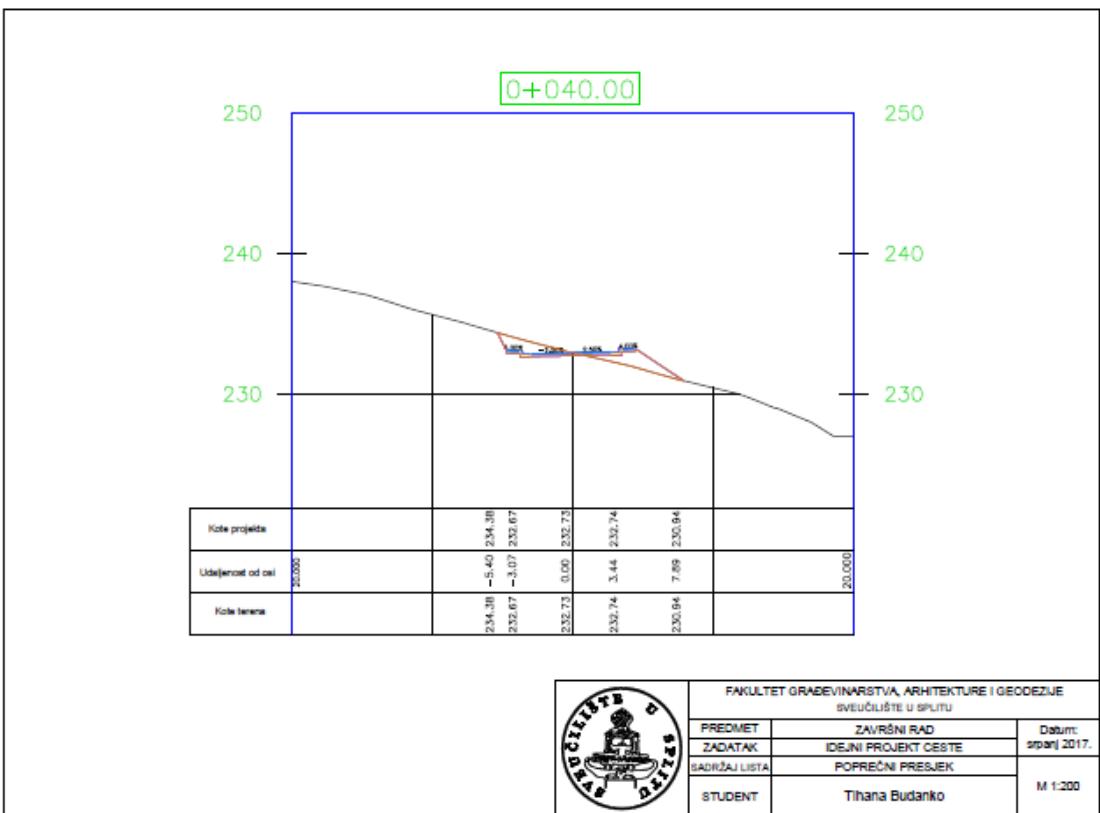
**MAX. PLATEAU LENGTH = 2000m
THICKNESS = 1000m**

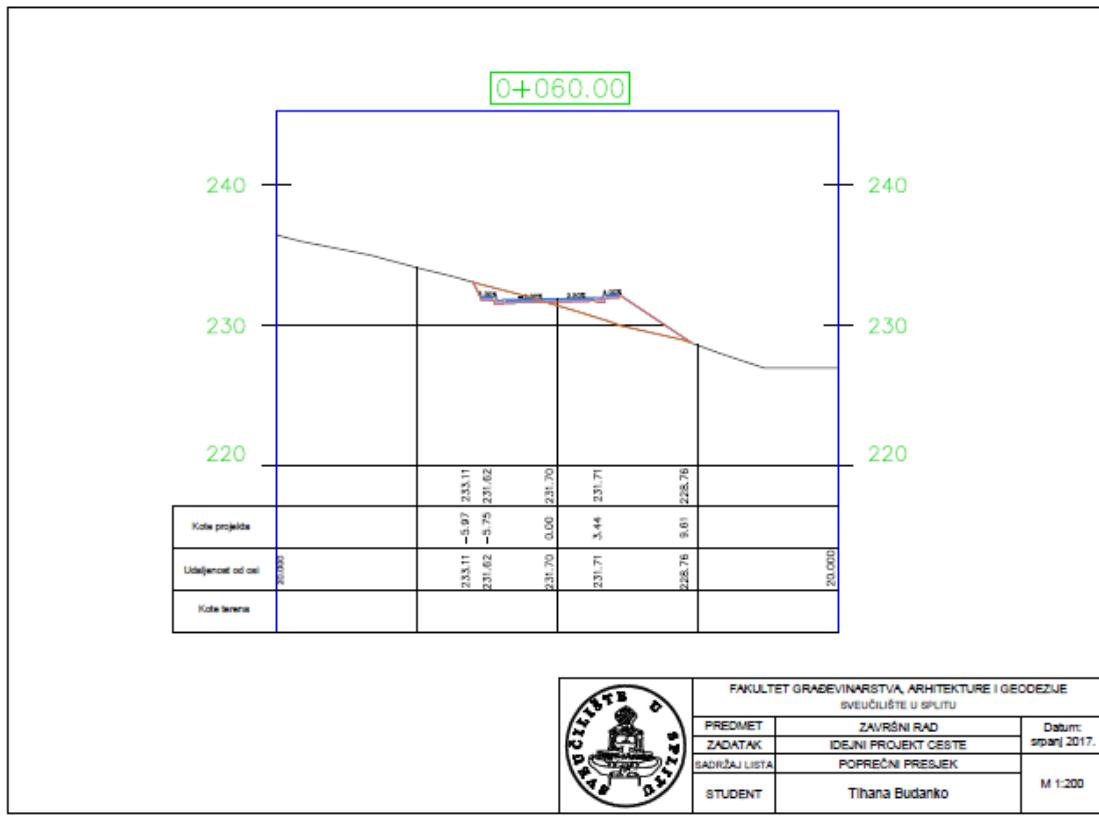


**5. Karakteristični poprečni presjeci
M1:200**









6. Obrada na računalu

OBRADA NA RAČUNALU

Prilikom izrade idejnog rješenja lokalne ceste korišten je softver za projektiranje cesta Autodesk AutoCAD Civil 3D. Postupak projektiranja trase u softveru sličan je ručnoj izradi rješenja, s prednošću što je cijeli postupak značajno brži i jednostavniji.

Prvi korak pri izradi idejnog rješenja na računalu je ubacivanje terena sa skenirane podloge na temelju zadanih slojnice. Unošenjem slojnice u obliku 3D polilinija te postupkom triangulacije na tim polilinijama dobije se model terena, tj. trodimenzionalni model postojećeg terena.

Nakon toga se definira os ceste tako da se postave tangente i 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 riješe geometrijski, sigurnosni elementi i odvodnja. Između tangent interpolira se odgovarajuća vertikalna kružna krivina.

Poprečnim presjekom definirani su poprečni nagibi, širina kolnika i elementi kolnika. Izlazni podaci su računalni ispisi horizontalnog toka trase, vertikalnog toka trase, kote kolnika te volumeni iskopa, nasipa i skidanje humusa (količina zemljanih radova po presjeku).

7. Računalni ispis točaka osi

7.1. Koordinatni račun glavnih točaka osi

Alignment Station and Curve Report**Client:** Client Company**Project Name:** D:\Tihana (C)\Dokumenti\ZAVRŠNI
RAD\Tihana_završni rad8.dwg**Project Description:****Report Date:** 19.5.2017. 9:39:16**Prepared by:**
Preparer

Alignment: OS1

Description:

Tangent Data

| Description | PT Station | Northing | Easting |
|-------------|------------|----------|------------|
| Start: | 0+00.000 | 7316.374 | -16796.967 |
| End: | 0+31.990 | 7305.207 | -16766.989 |

Tangent Data

| Parameter | Value | Parameter | Value |
|-----------|--------|-----------|----------------------|
| Length: | 31.990 | Course: | S 69° 34' 06.9354" E |

Spiral Point Data

| Description | Station | Northing | Easting |
|-------------|----------|----------|------------|
| TS: | 0+31.990 | 7305.207 | -16766.989 |
| SPI: | | 7295.851 | -16741.875 |
| SC: | 0+71.990 | 7295.194 | -16728.437 |

Spiral Curve Data: clothoid

| Parameter | Value | Parameter | Value |
|-----------|------------------|-----------|----------------------|
| Length: | 40.000 | L Tan: | 26.800 |
| Radius: | 65.000 | S Tan: | 13.455 |
| Theta: | 17° 37' 46.0942" | P: | 1.022 |
| X: | 39.623 | K: | 19.937 |
| Y: | 4.075 | A: | 50.990 |
| Chord: | 39.832 | Course: | S 75° 26' 25.3056" E |

Curve Point Data

| Description | Station | Northing | Easting |
|-------------|----------|----------|------------|
| SC: | 0+71.990 | 7295.194 | -16728.437 |
| RP: | | 7360.116 | -16725.259 |
| CS: | 1+19.993 | 7309.969 | -16683.904 |

Circular Curve Data

| Parameter | Value | Parameter | Value |
|------------------|------------------|------------------|----------------------|
| Delta: | 42° 18' 48.5131" | Type: | LEFT |
| Radius: | 65.000 | | |
| Length: | 48.003 | Tangent: | 25.155 |
| Mid-Ord: | 4.381 | External: | 4.698 |
| Chord: | 46.920 | Course: | N 71° 38' 42.7139" E |

Spiral Point Data

| Description | Station | Northing | Easting |
|--------------------|----------------|-----------------|----------------|
| CS: | 1+19.993 | 7309.969 | -16683.904 |
| SPI: | | 7318.529 | -16673.524 |
| ST: | 1+59.993 | 7341.041 | -16658.983 |

Spiral Curve Data: clothoid

| Parameter | Value | Parameter | Value |
|------------------|------------------|------------------|----------------------|
| Length: | 40.000 | L Tan: | 26.800 |
| Radius: | 65.000 | S Tan: | 13.455 |
| Theta: | 17° 37' 46.0942" | P: | 1.022 |
| X: | 39.623 | K: | 19.937 |
| Y: | 4.075 | A: | 50.990 |
| Chord: | 39.832 | Course: | N 38° 43' 50.7333" E |

Tangent Data

| Description | PT Station | Northing | Easting |
|--------------------|-------------------|-----------------|----------------|
| Start: | 1+59.993 | 7341.041 | -16658.983 |
| End: | 1+91.115 | 7367.184 | -16642.097 |

Tangent Data

| Parameter | Value | Parameter | Value |
|------------------|--------------|------------------|----------------------|
| Length: | 31.122 | Course: | N 32° 51' 32.3631" E |

Spiral Point Data

| Description | Station | Northing | Easting |
|--------------------|----------------|-----------------|----------------|
| TS: | 1+91.115 | 7367.184 | -16642.097 |
| SPI: | | 7384.210 | -16631.100 |
| SC: | 2+21.115 | 7389.097 | -16622.096 |

Spiral Curve Data: clothoid

| Parameter | Value | Parameter | Value |
|------------------|------------------|------------------|----------------------|
| Length: | 30.000 | L Tan: | 20.268 |
| Radius: | 30.000 | S Tan: | 10.244 |
| Theta: | 28° 38' 52.4031" | P: | 1.239 |
| X: | 29.259 | K: | 14.876 |
| Y: | 4.911 | A: | 30.000 |
| Chord: | 29.668 | Course: | N 42° 23' 16.6308" E |

Curve Point Data

| Description | Station | Northing | Easting |
|--------------------|----------------|-----------------|----------------|
| SC: | 2+21.115 | 7389.097 | -16622.096 |
| RP: | | 7362.731 | -16607.784 |
| CS: | 2+44.732 | 7391.479 | -16599.207 |

Circular Curve Data

| Parameter | Value | Parameter | Value |
|------------------|------------------|------------------|----------------------|
| Delta: | 45° 06' 20.5275" | Type: | RIGHT |
| Radius: | 30.000 | | |
| Length: | 23.617 | Tangent: | 12.459 |
| Mid-Ord: | 2.294 | External: | 2.484 |
| Chord: | 23.012 | Course: | N 84° 03' 35.0300" E |

Spiral Point Data

| Description | Station | Northing | Easting |
|--------------------|----------------|-----------------|----------------|
| CS: | 2+44.732 | 7391.479 | -16599.207 |
| SPI: | | 7388.550 | -16589.391 |
| ST: | 2+74.732 | 7374.153 | -16575.124 |

Spiral Curve Data: clothoid

| Parameter | Value | Parameter | Value |
|------------------|------------------|------------------|----------------------|
| Length: | 30.000 | L Tan: | 20.268 |
| Radius: | 30.000 | S Tan: | 10.244 |
| Theta: | 28° 38' 52.4031" | P: | 1.239 |
| X: | 29.259 | K: | 14.876 |
| Y: | 4.911 | A: | 30.000 |
| Chord: | 29.668 | Course: | S 54° 16' 06.5709" E |

Tangent Data

| Description | PT Station | Northing | Easting |
|---------------------|-------------------|------------------|----------------------|
| Start: | 2+74.732 | 7374.153 | -16575.124 |
| End: | 3+14.251 | 7346.082 | -16547.308 |
| <u>Tangent Data</u> | | | |
| Parameter | Value | Parameter | Value |
| Length: | 39.518 | Course: | S 44° 44' 22.3031" E |

7.2. Koordinatni račun detaljnih točaka osi

Client:
Client
Client Company
Address 1
Date: 19.5.2017. 9:43:35

Prepared by:
Preparer
Your Company Name
123 Main Street

Alignment Name: OS1

Description:

Station Range: Start: 0+000.00, End: 31+425.00

Station Increment: 20.00

| Station | Northing | Easting | Tangential Direction |
|----------|-------------|---------------|----------------------|
| 0+000.00 | 7,316.3740m | -16,796.9666m | S69° 34' 07"E |
| 0+020.00 | 7,309.3922m | -16,778.2248m | S69° 34' 07"E |
| 0+040.00 | 7,302.4415m | -16,759.4716m | S70° 16' 32"E |
| 0+060.00 | 7,296.7690m | -16,740.3099m | S78° 12' 48"E |
| 0+080.00 | 7,295.2954m | -16,720.4320m | N85° 44' 27"E |
| 0+100.00 | 7,299.8017m | -16,701.0271m | N68° 06' 41"E |
| 0+120.00 | 7,309.9733m | -16,683.8984m | N50° 28' 55"E |
| 0+140.00 | 7,324.5350m | -16,670.2540m | N37° 15' 47"E |
| 0+160.00 | 7,341.0413m | -16,658.9827m | N32° 51' 32"E |
| 0+180.00 | 7,357.8476m | -16,648.1273m | N32° 51' 32"E |
| 0+200.00 | 7,374.5759m | -16,637.1677m | N35° 22' 19"E |
| 0+220.00 | 7,388.5472m | -16,623.0660m | N59° 25' 01"E |
| 0+240.00 | 7,392.4690m | -16,603.8299m | S82° 25' 32"E |
| 0+260.00 | 7,384.1859m | -16,585.8990m | S51° 38' 53"E |
| 0+280.00 | 7,370.4112m | -16,571.4162m | S44° 44' 22"E |
| 0+300.00 | 7,356.2049m | -16,557.3385m | S44° 44' 22"E |

7.3. Račun kota kolnika

Client:
 Client
 Client Company
 Address 1
 Date: 19.5.2017. 9:46:42

Prepared by:
 Preparer
 Your Company Name
 123 Main Street

Corridor Name: corridorNOVI
 Description:
 Base Alignment Name: OS1
 Station Range: Start: 0+000.00, End: 0+314.25

CHAINAGE 0+000.00

| POINT | X | Y | Z | OFFSET | STRING CUT |
|-------|--------------|------------|----------|---------|-----------------|
| 1 | -16,795.2729 | 7,320.9204 | 236.0000 | -4.852m | Daylight |
| 2 | -16,795.4161 | 7,320.5362 | 235.1800 | -4.442m | Ditch_In |
| 3 | -16,795.4164 | 7,320.5353 | 234.9800 | -4.441m | EPS_Sub |
| 4 | -16,795.7652 | 7,319.5991 | 235.1400 | -3.442m | Back_Curb |
| 5 | -16,795.8175 | 7,319.4586 | 235.1400 | -3.292m | Top_Curb |
| 6 | -16,795.8321 | 7,319.4195 | 234.9150 | -3.250m | Flowline_Gutter |
| 7 | -16,796.0066 | 7,318.9510 | 234.9450 | -2.750m | Flange |
| 8 | -16,796.0066 | 7,318.9510 | 234.7450 | -2.750m | ETW_SubBase |
| 9 | -16,797.9266 | 7,313.7970 | 234.8687 | 2.750m | ETW_SubBase |
| 10 | -16,797.9266 | 7,313.7970 | 235.0687 | 2.750m | Flange |
| 11 | -16,798.1011 | 7,313.3284 | 235.0387 | 3.250m | Flowline_Gutter |
| 12 | -16,798.1157 | 7,313.2893 | 235.2637 | 3.292m | Top_Curb |
| 13 | -16,798.1681 | 7,313.1488 | 235.2637 | 3.442m | Back_Curb |
| 14 | -16,798.5168 | 7,312.2126 | 235.1037 | 4.441m | EPS_Sub |
| 15 | -16,798.5171 | 7,312.2117 | 235.3037 | 4.442m | Hinge |
| 16 | -16,800.5036 | 7,306.8793 | 231.5102 | 10.132m | Daylight |

CHAINAGE 0+025.00

| POINT | X | Y | Z | OFFSET | STRING CUT |
|-------|--------------|------------|----------|---------|-----------------|
| 1 | -16,771.7156 | 7,312.5425 | 235.4519 | -5.224m | Daylight |
| 2 | -16,771.9888 | 7,311.8091 | 233.8867 | -4.442m | Ditch_In |
| 3 | -16,771.9891 | 7,311.8082 | 233.6867 | -4.441m | EPS_Sub |
| 4 | -16,772.3379 | 7,310.8720 | 233.8467 | -3.442m | Back_Curb |
| 5 | -16,772.3902 | 7,310.7314 | 233.8467 | -3.292m | Top_Curb |
| 6 | -16,772.4048 | 7,310.6924 | 233.6217 | -3.250m | Flowline_Gutter |
| 7 | -16,772.5793 | 7,310.2238 | 233.6517 | -2.750m | Flange |
| 8 | -16,772.5793 | 7,310.2238 | 233.4517 | -2.750m | ETW_SubBase |
| 9 | -16,774.4993 | 7,305.0698 | 233.5754 | 2.750m | ETW_SubBase |

| | | | | | |
|----|--------------|------------|----------|--------|-----------------|
| 10 | -16,774.4993 | 7,305.0698 | 233.7754 | 2.750m | Flange |
| 11 | -16,774.6739 | 7,304.6013 | 233.7454 | 3.250m | Flowline_Gutter |
| 12 | -16,774.6884 | 7,304.5622 | 233.9704 | 3.292m | Top_Curb |
| 13 | -16,774.7408 | 7,304.4216 | 233.9704 | 3.442m | Back_Curb |
| 14 | -16,775.0895 | 7,303.4855 | 233.8104 | 4.441m | EPS_Sub |
| 15 | -16,775.0899 | 7,303.4845 | 234.0104 | 4.442m | Hinge |
| 16 | -16,776.2412 | 7,300.3938 | 231.8116 | 7.740m | Daylight |

CHAINAGE 0+050.00

| POINT | X | Y | Z | OFFSET | STRING CUT |
|-------|--------------|------------|----------|---------|-----------------|
| 1 | -16,748.3784 | 7,304.5849 | 233.3292 | -5.550m | Daylight |
| 2 | -16,748.4872 | 7,304.2257 | 232.5786 | -5.175m | Ditch_In |
| 3 | -16,748.4875 | 7,304.2248 | 232.3786 | -5.174m | EPS_Sub |
| 4 | -16,748.7772 | 7,303.2687 | 232.5386 | -4.175m | Back_Curb |
| 5 | -16,748.8207 | 7,303.1251 | 232.5386 | -4.025m | Top_Curb |
| 6 | -16,748.8328 | 7,303.0852 | 232.3136 | -3.983m | Flowline_Gutter |
| 7 | -16,748.9778 | 7,302.6067 | 232.3436 | -3.483m | Flange |
| 8 | -16,748.9778 | 7,302.6067 | 232.1436 | -3.483m | ETW_SubBase |
| 9 | -16,750.7852 | 7,296.6417 | 232.2820 | 2.749m | ETW_SubBase |
| 10 | -16,750.7852 | 7,296.6417 | 232.4820 | 2.749m | Flange |
| 11 | -16,750.9302 | 7,296.1632 | 232.4520 | 3.249m | Flowline_Gutter |
| 12 | -16,750.9423 | 7,296.1233 | 232.6770 | 3.291m | Top_Curb |
| 13 | -16,750.9858 | 7,295.9798 | 232.6770 | 3.441m | Back_Curb |
| 14 | -16,751.2755 | 7,295.0237 | 232.5170 | 4.440m | EPS_Sub |
| 15 | -16,751.2758 | 7,295.0227 | 232.7170 | 4.441m | Hinge |
| 16 | -16,752.7277 | 7,290.2310 | 229.3791 | 9.448m | Daylight |

CHAINAGE 0+075.00

| POINT | X | Y | Z | OFFSET | STRING CUT |
|-------|--------------|------------|----------|---------|-----------------|
| 1 | -16,725.4118 | 7,301.1973 | 231.9531 | -6.081m | Daylight |
| 2 | -16,725.4126 | 7,300.8578 | 231.2740 | -5.742m | Ditch_In |
| 3 | -16,725.4126 | 7,300.8568 | 231.0740 | -5.741m | EPS_Sub |
| 4 | -16,725.4152 | 7,299.8578 | 231.2340 | -4.742m | Back_Curb |
| 5 | -16,725.4156 | 7,299.7078 | 231.2340 | -4.592m | Top_Curb |
| 6 | -16,725.4157 | 7,299.6661 | 231.0090 | -4.550m | Flowline_Gutter |
| 7 | -16,725.4170 | 7,299.1661 | 231.0390 | -4.050m | Flange |
| 8 | -16,725.4170 | 7,299.1661 | 230.8390 | -4.050m | ETW_SubBase |
| 9 | -16,725.4346 | 7,292.3661 | 230.9887 | 2.750m | ETW_SubBase |
| 10 | -16,725.4346 | 7,292.3661 | 231.1887 | 2.750m | Flange |
| 11 | -16,725.4359 | 7,291.8661 | 231.1587 | 3.250m | Flowline_Gutter |
| 12 | -16,725.4360 | 7,291.8244 | 231.3837 | 3.292m | Top_Curb |

| | | | | | |
|----|--------------|------------|----------|--------|-----------|
| 13 | -16,725.4364 | 7,291.6744 | 231.3837 | 3.442m | Back_Curb |
| 14 | -16,725.4390 | 7,290.6754 | 231.2237 | 4.441m | EPS_Sub |
| 15 | -16,725.4390 | 7,290.6744 | 231.4237 | 4.442m | Hinge |
| 16 | -16,725.4504 | 7,286.2902 | 228.5009 | 8.826m | Daylight |

CHAINAGE 0+100.00

| POINT | X | Y | Z | OFFSET | STRING CUT |
|-------|--------------|------------|----------|---------|-----------------|
| 1 | -16,703.2535 | 7,305.3431 | 230.4410 | -5.972m | Daylight |
| 2 | -16,703.1676 | 7,305.1295 | 229.9806 | -5.742m | Ditch_In |
| 3 | -16,703.1673 | 7,305.1285 | 229.7806 | -5.741m | EPS_Sub |
| 4 | -16,702.7948 | 7,304.2016 | 229.9406 | -4.742m | Back_Curb |
| 5 | -16,702.7389 | 7,304.0624 | 229.9406 | -4.592m | Top_Curb |
| 6 | -16,702.7234 | 7,304.0237 | 229.7156 | -4.550m | Flowline_Gutter |
| 7 | -16,702.5370 | 7,303.5597 | 229.7456 | -4.050m | Flange |
| 8 | -16,702.5370 | 7,303.5597 | 229.5456 | -4.050m | ETW_SubBase |
| 9 | -16,700.0019 | 7,297.2499 | 229.6954 | 2.750m | ETW_SubBase |
| 10 | -16,700.0019 | 7,297.2499 | 229.8954 | 2.750m | Flange |
| 11 | -16,699.8155 | 7,296.7860 | 229.8654 | 3.250m | Flowline_Gutter |
| 12 | -16,699.8000 | 7,296.7473 | 230.0904 | 3.292m | Top_Curb |
| 13 | -16,699.7441 | 7,296.6081 | 230.0904 | 3.442m | Back_Curb |
| 14 | -16,699.3716 | 7,295.6811 | 229.9304 | 4.441m | EPS_Sub |
| 15 | -16,699.3713 | 7,295.6802 | 230.1304 | 4.442m | Hinge |
| 16 | -16,697.5910 | 7,291.2491 | 226.9468 | 9.217m | Daylight |

CHAINAGE 0+125.00

| POINT | X | Y | Z | OFFSET | STRING CUT |
|-------|--------------|------------|----------|---------|-----------------|
| 1 | -16,684.2504 | 7,317.5801 | 228.8560 | -5.923m | Daylight |
| 2 | -16,684.1915 | 7,317.5183 | 228.6854 | -5.838m | Ditch_In |
| 3 | -16,684.1908 | 7,317.5176 | 228.4854 | -5.837m | EPS_Sub |
| 4 | -16,683.5013 | 7,316.7947 | 228.6454 | -4.838m | Back_Curb |
| 5 | -16,683.3977 | 7,316.6862 | 228.6454 | -4.688m | Top_Curb |
| 6 | -16,683.3690 | 7,316.6560 | 228.4204 | -4.646m | Flowline_Gutter |
| 7 | -16,683.0238 | 7,316.2942 | 228.4504 | -4.146m | Flange |
| 8 | -16,683.0238 | 7,316.2942 | 228.2504 | -4.146m | ETW_SubBase |
| 9 | -16,678.2643 | 7,311.3048 | 228.4020 | 2.749m | ETW_SubBase |
| 10 | -16,678.2643 | 7,311.3048 | 228.6020 | 2.749m | Flange |
| 11 | -16,677.9192 | 7,310.9430 | 228.5720 | 3.249m | Flowline_Gutter |
| 12 | -16,677.8904 | 7,310.9128 | 228.7970 | 3.291m | Top_Curb |
| 13 | -16,677.7869 | 7,310.8043 | 228.7970 | 3.441m | Back_Curb |
| 14 | -16,677.0973 | 7,310.0814 | 228.6370 | 4.440m | EPS_Sub |
| 15 | -16,677.0966 | 7,310.0807 | 228.8370 | 4.441m | Hinge |

| | | | | | |
|----|--------------|------------|----------|---------|----------|
| 16 | -16,672.0154 | 7,304.7540 | 223.9293 | 11.803m | Daylight |
|----|--------------|------------|----------|---------|----------|

CHAINAGE 0+150.00

| POINT | X | Y | Z | OFFSET | STRING CUT |
|-------|--------------|------------|----------|---------|-----------------|
| 1 | -16,668.6633 | 7,335.5145 | 227.9009 | -5.070m | Daylight |
| 2 | -16,668.4530 | 7,335.3729 | 227.3939 | -4.817m | Ditch_In |
| 3 | -16,668.4522 | 7,335.3723 | 227.1939 | -4.816m | EPS_Sub |
| 4 | -16,667.6236 | 7,334.8143 | 227.3539 | -3.817m | Back_Curb |
| 5 | -16,667.4992 | 7,334.7305 | 227.3539 | -3.667m | Top_Curb |
| 6 | -16,667.4646 | 7,334.7072 | 227.1289 | -3.625m | Flowline_Gutter |
| 7 | -16,667.0499 | 7,334.4279 | 227.1589 | -3.125m | Flange |
| 8 | -16,667.0499 | 7,334.4279 | 226.9589 | -3.125m | ETW_SubBase |
| 9 | -16,662.1777 | 7,331.1466 | 227.0901 | 2.749m | ETW_SubBase |
| 10 | -16,662.1777 | 7,331.1466 | 227.2901 | 2.749m | Flange |
| 11 | -16,661.7630 | 7,330.8673 | 227.2601 | 3.249m | Flowline_Gutter |
| 12 | -16,661.7284 | 7,330.8440 | 227.4851 | 3.291m | Top_Curb |
| 13 | -16,661.6040 | 7,330.7602 | 227.4851 | 3.441m | Back_Curb |
| 14 | -16,660.7754 | 7,330.2022 | 227.3251 | 4.440m | EPS_Sub |
| 15 | -16,660.7745 | 7,330.2016 | 227.5251 | 4.441m | Hinge |
| 16 | -16,654.5176 | 7,325.9877 | 222.4960 | 11.985m | Daylight |

CHAINAGE 0+175.00

| POINT | X | Y | Z | OFFSET | STRING CUT |
|-------|--------------|------------|----------|---------|-----------------|
| 1 | -16,655.4983 | 7,356.6563 | 228.1120 | -5.545m | Daylight |
| 2 | -16,654.5712 | 7,356.0575 | 225.9048 | -4.442m | Ditch_In |
| 3 | -16,654.5704 | 7,356.0570 | 225.7048 | -4.441m | EPS_Sub |
| 4 | -16,653.7312 | 7,355.5150 | 225.8648 | -3.442m | Back_Curb |
| 5 | -16,653.6052 | 7,355.4336 | 225.8648 | -3.292m | Top_Curb |
| 6 | -16,653.5702 | 7,355.4109 | 225.6398 | -3.250m | Flowline_Gutter |
| 7 | -16,653.1502 | 7,355.1397 | 225.6698 | -2.750m | Flange |
| 8 | -16,653.1502 | 7,355.1397 | 225.4698 | -2.750m | ETW_SubBase |
| 9 | -16,648.5301 | 7,352.1555 | 225.5936 | 2.750m | ETW_SubBase |
| 10 | -16,648.5301 | 7,352.1555 | 225.7936 | 2.750m | Flange |
| 11 | -16,648.1101 | 7,351.8842 | 225.7636 | 3.250m | Flowline_Gutter |
| 12 | -16,648.0751 | 7,351.8616 | 225.9886 | 3.292m | Top_Curb |
| 13 | -16,647.9491 | 7,351.7802 | 225.9886 | 3.442m | Back_Curb |
| 14 | -16,647.1099 | 7,351.2382 | 225.8286 | 4.441m | EPS_Sub |
| 15 | -16,647.1091 | 7,351.2376 | 226.0286 | 4.442m | Hinge |
| 16 | -16,645.0994 | 7,349.9395 | 224.4336 | 6.834m | Daylight |

CHAINAGE 0+200.00

| POINT | X | Y | Z | OFFSET | STRING CUT |
|--------------|--------------|------------|----------|---------------|-------------------|
| 1 | -16,642.9070 | 7,378.6503 | 229.3798 | -7.039m | Daylight |
| 2 | -16,640.7886 | 7,377.1464 | 224.1839 | -4.441m | Hinge_Cut |
| 3 | -16,640.7878 | 7,377.1459 | 223.9839 | -4.440m | EPS_Sub |
| 4 | -16,639.9732 | 7,376.5676 | 224.1439 | -3.441m | Back_Curb |
| 5 | -16,639.8509 | 7,376.4807 | 224.1439 | -3.291m | Top_Curb |
| 6 | -16,639.8168 | 7,376.4566 | 223.9189 | -3.249m | Flowline_Gutter |
| 7 | -16,639.4091 | 7,376.1672 | 223.9489 | -2.749m | ETW |
| 8 | -16,639.4091 | 7,376.1672 | 223.7489 | -2.749m | ETW_SubBase |
| 9 | -16,634.2199 | 7,372.4832 | 224.0943 | 3.615m | ETW |
| 10 | -16,634.2199 | 7,372.4832 | 223.8943 | 3.615m | ETW_SubBase |
| 11 | -16,633.8122 | 7,372.1938 | 224.0643 | 4.115m | Flowline_Gutter |
| 12 | -16,633.7782 | 7,372.1696 | 224.2893 | 4.157m | Top_Curb |
| 13 | -16,633.6559 | 7,372.0828 | 224.2893 | 4.307m | Back_Curb |
| 14 | -16,632.8413 | 7,371.5045 | 224.1293 | 5.306m | EPS_Sub |
| 15 | -16,632.8405 | 7,371.5039 | 224.3293 | 5.307m | Hinge_Cut |
| 16 | -16,632.6004 | 7,371.3334 | 224.9182 | 5.601m | Daylight |

CHAINAGE 0+225.00

| POINT | X | Y | Z | OFFSET | STRING CUT |
|--------------|--------------|------------|----------|---------------|-------------------|
| 1 | -16,621.0029 | 7,397.0348 | 220.7043 | -6.763m | Daylight |
| 2 | -16,620.1684 | 7,394.8691 | 222.2516 | -4.442m | Hinge |
| 3 | -16,620.1680 | 7,394.8681 | 222.0516 | -4.441m | EPS_Sub |
| 4 | -16,619.8088 | 7,393.9359 | 222.2116 | -3.442m | Back_Curb |
| 5 | -16,619.7549 | 7,393.7960 | 222.2116 | -3.292m | Top_Curb |
| 6 | -16,619.7399 | 7,393.7571 | 221.9866 | -3.250m | Flowline_Gutter |
| 7 | -16,619.5601 | 7,393.2905 | 221.8166 | -2.750m | ETW_SubBase |
| 8 | -16,619.5601 | 7,393.2905 | 222.0166 | -2.750m | ETW |
| 9 | -16,616.5757 | 7,385.5456 | 222.2103 | 5.550m | Flange |
| 10 | -16,616.5757 | 7,385.5456 | 222.0103 | 5.550m | ETW_SubBase |
| 11 | -16,616.3959 | 7,385.0790 | 222.1803 | 6.050m | Flowline_Gutter |
| 12 | -16,616.3809 | 7,385.0401 | 222.4053 | 6.092m | Top_Curb |
| 13 | -16,616.3270 | 7,384.9002 | 222.4053 | 6.242m | Back_Curb |
| 14 | -16,615.9678 | 7,383.9680 | 222.2453 | 7.241m | EPS_Sub |
| 15 | -16,615.9674 | 7,383.9670 | 222.4453 | 7.242m | Hinge |
| 16 | -16,613.1952 | 7,376.7726 | 217.3053 | 14.952m | Daylight |

CHAINAGE 0+250.00

| POINT | X | Y | Z | OFFSET | STRING CUT |
|--------------|--------------|------------|----------|---------------|-------------------|
| 1 | -16,591.4156 | 7,395.5458 | 218.8020 | -6.645m | Daylight |
| 2 | -16,592.3741 | 7,393.5621 | 220.2708 | -4.441m | Hinge |

| | | | | | |
|----|--------------|------------|----------|---------|-----------------|
| 3 | -16,592.3745 | 7,393.5612 | 220.0708 | -4.440m | EPS_Sub |
| 4 | -16,592.8092 | 7,392.6617 | 220.2308 | -3.441m | Back_Curb |
| 5 | -16,592.8744 | 7,392.5266 | 220.2308 | -3.291m | Top_Curb |
| 6 | -16,592.8926 | 7,392.4891 | 220.0058 | -3.250m | Flowline_Gutter |
| 7 | -16,593.1101 | 7,392.0389 | 219.8358 | -2.750m | ETW_SubBase |
| 8 | -16,593.1101 | 7,392.0389 | 220.0358 | -2.750m | ETW |
| 9 | -16,596.6422 | 7,384.7291 | 220.2250 | 5.369m | Flange |
| 10 | -16,596.6422 | 7,384.7291 | 220.0250 | 5.369m | ETW_SubBase |
| 11 | -16,596.8598 | 7,384.2789 | 220.1950 | 5.869m | Flowline_Gutter |
| 12 | -16,596.8779 | 7,384.2413 | 220.4200 | 5.910m | Top_Curb |
| 13 | -16,596.9432 | 7,384.1063 | 220.4200 | 6.060m | Back_Curb |
| 14 | -16,597.3778 | 7,383.2068 | 220.2600 | 7.059m | EPS_Sub |
| 15 | -16,597.3782 | 7,383.2059 | 220.4600 | 7.060m | Hinge |
| 16 | -16,602.1331 | 7,373.3655 | 213.1740 | 17.989m | Daylight |

CHAINAGE 0+275.00

| POINT | X | Y | Z | OFFSET | STRING CUT |
|-------|--------------|------------|----------|---------|-----------------|
| 1 | -16,571.4585 | 7,377.4084 | 217.9876 | -4.895m | Daylight |
| 2 | -16,571.7807 | 7,377.0892 | 218.2899 | -4.442m | Hinge |
| 3 | -16,571.7814 | 7,377.0885 | 218.0899 | -4.441m | EPS_Sub |
| 4 | -16,572.4910 | 7,376.3853 | 218.2499 | -3.442m | Back_Curb |
| 5 | -16,572.5975 | 7,376.2797 | 218.2499 | -3.292m | Top_Curb |
| 6 | -16,572.6271 | 7,376.2503 | 218.0249 | -3.250m | Flowline_Gutter |
| 7 | -16,572.9823 | 7,375.8984 | 217.8549 | -2.750m | ETW_SubBase |
| 8 | -16,572.9823 | 7,375.8984 | 218.0549 | -2.750m | ETW |
| 9 | -16,576.8890 | 7,372.0270 | 218.1787 | 2.750m | Flange |
| 10 | -16,576.8890 | 7,372.0270 | 217.9787 | 2.750m | ETW_SubBase |
| 11 | -16,577.2442 | 7,371.6751 | 218.1487 | 3.250m | Flowline_Gutter |
| 12 | -16,577.2738 | 7,371.6457 | 218.3737 | 3.292m | Top_Curb |
| 13 | -16,577.3803 | 7,371.5402 | 218.3737 | 3.442m | Back_Curb |
| 14 | -16,578.0900 | 7,370.8370 | 218.2137 | 4.441m | EPS_Sub |
| 15 | -16,578.0907 | 7,370.8363 | 218.4137 | 4.442m | Hinge |
| 16 | -16,587.0552 | 7,361.9529 | 210.0000 | 17.062m | Daylight |

CHAINAGE 0+300.00

| POINT | X | Y | Z | OFFSET | STRING CUT |
|-------|--------------|------------|----------|---------|------------|
| 1 | -16,553.9753 | 7,359.5377 | 216.8954 | -4.735m | Daylight |
| 2 | -16,554.1835 | 7,359.3313 | 216.3091 | -4.442m | Ditch_In |
| 3 | -16,554.1842 | 7,359.3306 | 216.1091 | -4.441m | EPS_Sub |
| 4 | -16,554.8939 | 7,358.6274 | 216.2691 | -3.442m | Back_Curb |
| 5 | -16,555.0004 | 7,358.5218 | 216.2691 | -3.292m | Top_Curb |

| | | | | | |
|----|--------------|------------|----------|---------|-----------------|
| 6 | -16,555.0300 | 7,358.4925 | 216.0441 | -3.250m | Flowline_Gutter |
| 7 | -16,555.3852 | 7,358.1406 | 216.0741 | -2.750m | Flange |
| 8 | -16,555.3852 | 7,358.1406 | 215.8741 | -2.750m | ETW_SubBase |
| 9 | -16,559.2919 | 7,354.2692 | 215.9979 | 2.750m | ETW_SubBase |
| 10 | -16,559.2919 | 7,354.2692 | 216.1979 | 2.750m | Flange |
| 11 | -16,559.6471 | 7,353.9172 | 216.1679 | 3.250m | Flowline_Gutter |
| 12 | -16,559.6767 | 7,353.8879 | 216.3929 | 3.292m | Top_Curb |
| 13 | -16,559.7832 | 7,353.7823 | 216.3929 | 3.442m | Back_Curb |
| 14 | -16,560.4928 | 7,353.0791 | 216.2329 | 4.441m | EPS_Sub |
| 15 | -16,560.4935 | 7,353.0784 | 216.4329 | 4.442m | Hinge |
| 16 | -16,567.3216 | 7,346.3122 | 210.0244 | 14.054m | Daylight |

7.4. Vertikalni tok trase

Client:
 Client
 Client Company
 Address 1
 Date: 19.5.2017. 9:47:32

Prepared by:
 Preparer
 Your Company Name
 123 Main Street

Vertical Alignment: NIVELETA

Description:

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

| PVI | Station | Grade Out | Curve Length |
|-----|---------|-----------|--------------|
|-----|---------|-----------|--------------|

Vertical Alignment: NIVELETA (1)

Description:

Station Range: Start: 0+000.00, End: 31+425.00

| PVI | Station | Grade Out | Curve Length |
|--|----------|--------------------|--------------|
| 0.00 | 0+000.00 | -5.17% | |
| 1.00 | 0+178.15 | -7.92% | 76.594m |
| Vertical Curve Information:(crest curve) | | | |
| PVC Station: | 0+139.82 | Elevation: | 227.767m |
| PVI Station: | 0+178.15 | Elevation: | 225.784m |
| PVT Station: | 0+216.41 | Elevation: | 222.752m |
| High Point: | 0+139.82 | Elevation: | 227.767m |
| Grade in: | -5.17% | Grade out: | -7.92% |
| Change: | 2.75% | K: | |
| Curve Length: | 76.594m | | |
| Passing Distance: | | Stopping Distance: | |
| 2.00 | 0+314.25 | | |

8. Proračun količina zemljanih radova za troškovnik

Cut/Fill Report

Generated: 2017-05-19 09:55:27

By user: Tihana

Drawing: D:\Tihana (C)\Dokumenti\ZAVRŠNI RAD\D:\Tihana (C)\Dokumenti\ZAVRŠNI RAD\Tihana_završni rad8.dwg

Volume Summary

| Name | Type | Cut Factor | Fill Factor | 2d Area (sq.m) | Cut (Cu. M.) | Fill (Cu. M.) | Net (Cu. M.) |
|----------|------|------------|-------------|-------------------|-----------------|------------------|-----------------|
| Surface3 | full | 1.000 | 1.000 | 5227.75 | 1613.01 | 6527.32 | 4914.31<Fill> |

Totals

| | 2d Area (sq.m) | Cut (Cu. M.) | Fill (Cu. M.) | Net (Cu. M.) |
|-------|-------------------|-----------------|------------------|-----------------|
| Total | 5227.75 | 1613.01 | 6527.32 | 4914.31<Fill> |

* Value adjusted by cut or fill factor other than 1.0

9. Proračun količine radova po presjecima

Project: C:\Users\Tihana\appdata\local\temp\Tihana_završni rad8_1_1_4742.sv\$
Alignment: OS1
Sample Line Group: Presjeci
Start Sta: 0+000.000
End Sta: 0+314.251

| Station | Cut Area (Sq.m.) | Cut Volume (Cu.m.) | Reusable Volume (Cu.m.) | Fill Area (Sq.m.) | Fill Volume (Cu.m.) | Cum. Cut Vol. (Cu.m.) | Cum. Reusable Vol. (Cu.m.) | Cum. Fill Vol. (Cu.m.) | Cum. Net Vol. (Cu.m.) |
|----------------|---------------------------------|-----------------------------------|--|----------------------------------|------------------------------------|--|---|---------------------------------------|--|
| 0+000.000 | 4.30 | 0.00 | 0.00 | 7.78 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0+005.000 | 6.17 | 26.17 | 26.17 | 7.16 | 37.35 | 26.17 | 26.17 | 37.35 | -11.18 |
| 0+010.000 | 7.63 | 34.48 | 34.48 | 2.91 | 25.17 | 60.65 | 60.65 | 62.52 | -1.87 |
| 0+015.000 | 7.04 | 36.66 | 36.66 | 3.36 | 15.65 | 97.31 | 97.31 | 78.17 | 19.14 |
| 0+020.000 | 5.88 | 32.30 | 32.30 | 4.49 | 19.61 | 129.61 | 129.61 | 97.78 | 31.83 |
| 0+025.000 | 5.20 | 27.71 | 27.71 | 3.90 | 20.98 | 157.32 | 157.32 | 118.77 | 38.56 |
| 0+030.000 | 5.25 | 26.14 | 26.14 | 4.32 | 20.56 | 183.46 | 183.46 | 139.33 | 44.13 |
| 0+031.990 | 5.33 | 10.53 | 10.53 | 4.20 | 8.48 | 193.99 | 193.99 | 147.81 | 46.18 |
| 0+031.990 | 5.33 | 0.00 | 0.00 | 4.20 | 0.00 | 193.99 | 193.99 | 147.81 | 46.18 |
| 0+035.000 | 5.40 | 16.15 | 16.15 | 4.26 | 12.74 | 210.14 | 210.14 | 160.55 | 49.59 |
| 0+040.000 | 4.32 | 24.31 | 24.31 | 4.20 | 21.16 | 234.45 | 234.45 | 181.72 | 52.73 |
| 0+045.000 | 2.03 | 15.67 | 15.67 | 7.04 | 28.61 | 250.12 | 250.12 | 210.33 | 39.79 |
| 0+045.323 | 1.96 | 0.64 | 0.64 | 7.42 | 2.34 | 250.76 | 250.76 | 212.66 | 38.10 |
| 0+050.000 | 2.10 | 9.27 | 9.27 | 11.08 | 44.39 | 260.03 | 260.03 | 257.06 | 2.97 |
| 0+055.000 | 2.93 | 12.18 | 12.18 | 11.13 | 57.43 | 272.21 | 272.21 | 314.49 | -42.28 |
| 0+058.656 | 3.10 | 10.62 | 10.62 | 10.60 | 41.44 | 282.83 | 282.83 | 355.93 | -73.10 |
| 0+060.000 | 3.34 | 4.32 | 4.32 | 10.02 | 13.85 | 287.16 | 287.16 | 369.78 | -82.63 |
| 0+065.000 | 3.50 | 16.28 | 16.28 | 7.43 | 45.89 | 303.43 | 303.43 | 415.68 | -112.24 |
| 0+070.000 | 2.88 | 15.03 | 15.03 | 7.84 | 40.38 | 318.46 | 318.46 | 456.06 | -137.60 |
| 0+071.989 | 2.90 | 5.38 | 5.38 | 8.70 | 17.50 | 323.85 | 323.85 | 473.56 | -149.72 |
| 0+071.990 | 2.90 | 0.00 | 0.00 | 8.70 | 0.00 | 323.85 | 323.85 | 473.57 | -149.72 |
| 0+075.000 | 2.30 | 7.32 | 7.32 | 9.10 | 28.57 | 331.17 | 331.17 | 502.15 | -170.97 |
| 0+080.000 | 1.67 | 9.28 | 9.28 | 9.46 | 49.41 | 340.45 | 340.45 | 551.55 | -211.11 |
| 0+085.000 | 1.45 | 7.29 | 7.29 | 9.08 | 49.23 | 347.73 | 347.73 | 600.78 | -253.05 |
| 0+090.000 | 1.50 | 6.90 | 6.90 | 7.33 | 43.51 | 354.63 | 354.63 | 644.30 | -289.66 |
| 0+095.000 | 2.16 | 8.58 | 8.58 | 7.95 | 40.73 | 363.21 | 363.21 | 685.03 | -321.81 |
| 0+095.991 | 2.13 | 2.12 | 2.12 | 8.21 | 8.01 | 365.34 | 365.34 | 693.04 | -327.70 |
| 0+100.000 | 1.69 | 7.17 | 7.17 | 8.91 | 36.69 | 372.51 | 372.51 | 729.73 | -357.23 |
| 0+105.000 | 0.83 | 5.89 | 5.89 | 10.05 | 50.62 | 378.40 | 378.40 | 780.35 | -401.95 |
| 0+110.000 | 1.57 | 5.60 | 5.60 | 13.38 | 62.76 | 384.00 | 384.00 | 843.11 | -459.11 |
| 0+115.000 | 1.74 | 7.68 | 7.68 | 12.78 | 70.05 | 391.68 | 391.68 | 913.16 | -521.48 |
| 0+119.993 | 0.99 | 6.31 | 6.31 | 16.13 | 76.91 | 397.99 | 397.99 | 990.07 | -592.08 |
| 0+119.993 | 0.99 | 0.00 | 0.00 | 16.13 | 0.01 | 397.99 | 397.99 | 990.08 | -592.09 |
| 0+120.000 | 0.99 | 0.00 | 0.00 | 16.13 | 0.11 | 398.00 | 398.00 | 990.19 | -592.19 |
| 0+125.000 | 0.26 | 2.89 | 2.89 | 22.80 | 103.16 | 400.89 | 400.89 | 1093.35 | -692.46 |
| 0+130.000 | 0.03 | 0.66 | 0.66 | 28.66 | 135.71 | 401.55 | 401.55 | 1229.06 | -827.51 |
| 0+133.326 | 0.02 | 0.07 | 0.07 | 30.19 | 102.77 | 401.62 | 401.62 | 1331.83 | -930.21 |
| 0+135.000 | 0.07 | 0.08 | 0.08 | 30.40 | 50.71 | 401.70 | 401.70 | 1382.54 | -980.84 |
| 0+139.819 | 0.31 | 0.89 | 0.89 | 29.07 | 149.07 | 402.58 | 402.58 | 1531.62 | -1129.03 |
| 0+140.000 | 0.33 | 0.06 | 0.06 | 28.98 | 5.27 | 402.64 | 402.64 | 1536.88 | - |

| | | | | | | | | | |
|-----------|-------|--------|--------|-------|--------|---------|---------|---------|----------|
| | | | | | | | | | 1134.24 |
| 0+145.000 | 0.52 | 2.04 | 2.04 | 26.80 | 143.85 | 404.69 | 404.69 | 1680.73 | -1276.04 |
| 0+146.659 | 0.51 | 0.85 | 0.85 | 26.50 | 44.22 | 405.53 | 405.53 | 1724.95 | -1319.41 |
| 0+150.000 | 0.70 | 2.01 | 2.01 | 26.09 | 87.83 | 407.54 | 407.54 | 1812.78 | -1405.24 |
| 0+155.000 | 0.11 | 2.02 | 2.02 | 23.18 | 123.16 | 409.56 | 409.56 | 1935.94 | -1526.38 |
| 0+159.990 | 0.49 | 1.50 | 1.50 | 15.49 | 96.47 | 411.06 | 411.06 | 2032.42 | -1621.35 |
| 0+159.993 | 0.49 | 0.00 | 0.00 | 15.48 | 0.04 | 411.06 | 411.06 | 2032.46 | -1621.40 |
| 0+160.000 | 0.50 | 0.00 | 0.00 | 15.47 | 0.11 | 411.07 | 411.07 | 2032.57 | -1621.50 |
| 0+165.000 | 3.31 | 9.52 | 9.52 | 8.57 | 60.10 | 420.59 | 420.59 | 2092.67 | -1672.09 |
| 0+170.000 | 6.70 | 25.02 | 25.02 | 5.51 | 35.19 | 445.61 | 445.61 | 2127.86 | -1682.25 |
| 0+175.000 | 10.80 | 43.75 | 43.75 | 1.84 | 18.36 | 489.36 | 489.36 | 2146.22 | -1656.86 |
| 0+180.000 | 14.57 | 63.45 | 63.45 | 1.73 | 8.92 | 552.80 | 552.80 | 2155.14 | -1602.33 |
| 0+185.000 | 18.31 | 82.21 | 82.21 | 0.96 | 6.72 | 635.01 | 635.01 | 2161.85 | -1526.84 |
| 0+190.000 | 23.15 | 103.65 | 103.65 | 0.02 | 2.46 | 738.66 | 738.66 | 2164.31 | -1425.65 |
| 0+191.115 | 25.65 | 27.20 | 27.20 | 0.00 | 0.01 | 765.86 | 765.86 | 2164.32 | -1398.46 |
| 0+191.120 | 25.65 | 0.13 | 0.13 | 0.00 | 0.00 | 765.99 | 765.99 | 2164.32 | -1398.33 |
| 0+195.000 | 29.46 | 106.91 | 106.91 | 0.00 | 0.00 | 872.90 | 872.90 | 2164.32 | -1291.42 |
| 0+200.000 | 35.92 | 165.06 | 165.06 | 0.00 | 0.00 | 1037.96 | 1037.96 | 2164.32 | -1126.36 |
| 0+201.115 | 36.86 | 40.58 | 40.58 | 0.00 | 0.00 | 1078.54 | 1078.54 | 2164.32 | -1085.78 |
| 0+205.000 | 34.75 | 141.67 | 141.67 | 0.00 | 0.00 | 1220.21 | 1220.21 | 2164.32 | -944.11 |
| 0+210.000 | 28.98 | 163.10 | 163.10 | 0.00 | 0.00 | 1383.31 | 1383.31 | 2164.32 | -781.01 |
| 0+211.115 | 28.00 | 32.60 | 32.60 | 0.01 | 0.00 | 1415.91 | 1415.91 | 2164.33 | -748.42 |
| 0+215.000 | 17.12 | 90.72 | 90.72 | 1.87 | 2.98 | 1506.63 | 1506.63 | 2167.31 | -660.68 |
| 0+216.413 | 12.00 | 21.61 | 21.61 | 4.77 | 3.71 | 1528.24 | 1528.24 | 2171.02 | -642.78 |
| 0+220.000 | 2.28 | 27.25 | 27.25 | 14.77 | 27.51 | 1555.49 | 1555.49 | 2198.53 | -643.03 |
| 0+221.115 | 0.36 | 1.61 | 1.61 | 19.33 | 14.82 | 1557.10 | 1557.10 | 2213.35 | -656.25 |
| 0+221.115 | 0.36 | 0.00 | 0.00 | 19.33 | 0.00 | 1557.10 | 1557.10 | 2213.35 | -656.26 |
| 0+225.000 | 0.00 | 0.78 | 0.78 | 41.44 | 98.71 | 1557.88 | 1557.88 | 2312.07 | -754.18 |
| 0+230.000 | 0.00 | 0.00 | 0.00 | 71.59 | 249.55 | 1557.88 | 1557.88 | 2561.62 | -1003.74 |
| 0+232.924 | 0.00 | 0.00 | 0.00 | 86.49 | 205.83 | 1557.88 | 1557.88 | 2767.45 | -1209.56 |
| 0+235.000 | 0.00 | 0.00 | 0.00 | 97.83 | 171.31 | 1557.88 | 1557.88 | 2938.76 | -1380.87 |

| | | | | | | | | | |
|-----------|------|-------|-------|--------|--------|---------|---------|---------|--------------|
| 0+240.000 | 0.00 | 0.00 | 0.00 | 108.84 | 459.76 | 1557.88 | 1557.88 | 3398.52 | - 1840.64 |
| 0+244.732 | 0.00 | 0.00 | 0.00 | 98.15 | 419.42 | 1557.88 | 1557.88 | 3817.94 | - 2260.06 |
| 0+244.733 | 0.00 | 0.00 | 0.00 | 98.15 | 0.05 | 1557.88 | 1557.88 | 3817.98 | - 2260.10 |
| 0+245.000 | 0.00 | 0.00 | 0.00 | 96.96 | 26.07 | 1557.88 | 1557.88 | 3844.05 | - 2286.17 |
| 0+250.000 | 0.00 | 0.00 | 0.00 | 79.39 | 367.19 | 1557.88 | 1557.88 | 4211.24 | - 2653.36 |
| 0+254.732 | 0.00 | 0.00 | 0.00 | 65.69 | 290.54 | 1557.88 | 1557.88 | 4501.78 | - 2943.90 |
| 0+255.000 | 0.00 | 0.00 | 0.00 | 65.43 | 17.54 | 1557.88 | 1557.88 | 4519.33 | - 2961.45 |
| 0+260.000 | 0.00 | 0.00 | 0.00 | 58.13 | 271.36 | 1557.88 | 1557.88 | 4790.69 | - 3232.80 |
| 0+264.732 | 0.00 | 0.00 | 0.00 | 54.87 | 244.83 | 1557.88 | 1557.88 | 5035.52 | - 3477.64 |
| 0+265.000 | 0.00 | 0.00 | 0.00 | 54.93 | 14.70 | 1557.88 | 1557.88 | 5050.22 | - 3492.34 |
| 0+270.000 | 0.00 | 0.00 | 0.00 | 51.74 | 253.54 | 1557.88 | 1557.88 | 5303.76 | - 3745.87 |
| 0+274.730 | 0.00 | 0.00 | 0.00 | 42.47 | 222.79 | 1557.88 | 1557.88 | 5526.54 | - 3968.66 |
| 0+274.732 | 0.00 | 0.00 | 0.00 | 42.47 | 0.10 | 1557.88 | 1557.88 | 5526.64 | - 3968.76 |
| 0+275.000 | 0.00 | 0.00 | 0.00 | 42.59 | 11.38 | 1557.88 | 1557.88 | 5538.03 | - 3980.14 |
| 0+280.000 | 0.00 | 0.00 | 0.00 | 40.88 | 208.69 | 1557.88 | 1557.88 | 5746.71 | - 4188.83 |
| 0+285.000 | 0.00 | 0.00 | 0.00 | 35.10 | 189.96 | 1557.88 | 1557.88 | 5936.67 | - 4378.79 |
| 0+290.000 | 0.00 | 0.01 | 0.01 | 30.24 | 163.36 | 1557.90 | 1557.90 | 6100.03 | - 4542.13 |
| 0+295.000 | 0.00 | 0.02 | 0.02 | 23.55 | 134.49 | 1557.92 | 1557.92 | 6234.52 | - 4676.60 |
| 0+300.000 | 1.01 | 2.53 | 2.53 | 19.83 | 108.45 | 1560.45 | 1560.45 | 6342.96 | - 4782.52 |
| 0+305.000 | 2.60 | 9.03 | 9.03 | 14.09 | 84.80 | 1569.48 | 1569.48 | 6427.77 | - 4858.29 |
| 0+310.000 | 3.97 | 16.44 | 16.44 | 10.32 | 61.03 | 1585.91 | 1585.91 | 6488.80 | - 4902.89 |
| 0+314.251 | 5.72 | 20.60 | 20.60 | 6.77 | 36.31 | 1606.52 | 1606.52 | 6525.11 | - 4918.60 |

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