Idejni projekt lokalne ceste

Raić, Ana

SVEUČILIŠTE U SPLITU

FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE

ZAVRŠNI RAD

ANA RAIĆ

Split, 2022.

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FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE

IDEJNI PROJEKT LOKALNE CESTE

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FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE

Split, Matice hrvatske 15

STUDIJ: **PREDDIPLOMSKI SVEUČILIŠNI STUDIJ GRAĐEVINARSTVA**

KANDIDAT: **Ana Raić**

MATIČNI BROJ (JMBG): 0083226032

KATEDRA: **Katedra za prometnice**

PREDMET: **Ceste**

ZADATAK ZA ZAVRŠNI RAD

Tema: Idejni projekt lokalne ceste

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

Zadatak treba sadržavati:

1. Kopiju programskog zadatka
2. Tehnički opis s prikazom korištenja programa Civil 3D
3. Građevinsku situaciju u mjerilu 1:1000
4. Uzdužni presjek u mjerilu 1:1000/100
5. Karakteristične poprečne presjeke u mjerilu 1:200
6. Obradu na računalu
7. Računalne ispise koordinatnih točaka osi
8. Proračun količina zemljanih radova
9. Proračun količine radova po presjecima

U Splitu, rujan 2022.

Voditelj završnog rada:

Prof. dr. sc. Dražen Cvitanić

Idejni projekt lokalne ceste

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

Ključne riječi:

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

Conceptual project of local road

Abstract:

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

Keywords:

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

SADRŽAJ

1. PROGRAMSKI ZADATAK

SVEUČILIŠTE U SPLITU
FAKULTET GRAĐEVINARSTVA, ARHITEKTURE
I GEODEZIJE

Split, ak.god. 2021/2022.

Katedra za prometnice

Studij: Preddiplomski

Nastavni predmet: CESTE

Student/ica: .....

ZADATAK

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

Zadano je:

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

Idejni projekt treba sadržavati:

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

Predmetna nastavnica:

izv.prof.dr.sc. Deana Breški

2. TEHNIČKI OPIS

2.1. Općenito

Na priloženoj geodetskoj podlozi u mjerilu 1:1000 izrađen je idejni projekt ceste na dionici od točke A koja se nalazi na 234 metara nadmorske visine, do točke B koja se nalazi na 216 metara nadmorske visine. Cesta je projektirana za prosječni godišnji dnevni promet od 950 vozila na dan i to na brdovitom terenu (cesta je V. kategorije). Predviđena projektna brzina je 40 km/h.

2.2. Horizontalni elementi

Za navedenu kategoriju prema pravilniku, minimalni radijus horizontalne krivine je 45 m, a prijelaznice 30 m. Trasa kontinuirane ceste ima dužinu od 345 m, a sastoji se od četiri pravca i tri krivine. Prva krivina ima radijus 30 m i duljinu prijelaznice 30 m, a druga krivina ima radijus 80 m i duljinu prijelaznice 30 m. Svaka krivina je konstruirana pomoću dvije prijelaznice oblika klotoide i jednog kružnog luka. Proširenje kružnog luka za promet teretnih vozila s priključkom u prvoj krivini iznosi 2.80 m, a udrugoj 1.05 m.

2.3. Vertikalni elementi

Na temelju kategorije ceste najveći dopušteni nagib nivelete iznosi 12%, a najmanji dopušteni radijus vertikalne krivine 300 m. Tok trase se sastoji od dva pravca i jedne krivine. Nagib prvog pravca iznosi 5.31 %, a drugog 4.05 %. Tangenta krivine je dužine 6.30 m, a radijus konkavne krivine 500 m.

2.4. Poprečni presjek

Projektirana cesta ima dva kolnička traka širine svakog po 3.00 m, betonski rubni trak širine 0.20 m i bankinu širine 1 m i nagiba 4%. Cesta se dijelom nalazi u zasjeku, a dijelom u usjeku i nasipu. Nagib pokosa nasipa iznosi 1:1.5, a usjeka 2:1. Na usjecima se izvode rigoli za odvodnju vode širine 0.65 m i drenaža koja je postavljena u glinenu posteljicu, a u nasipu se izvode potporni zidovi zbog konfiguracije terena.

2.5. Kolnička konstrukcija

Projektom je predviđena kolnička konstrukcija sa sljedećim slojevima:

- Habajući sloj AC 11 surf (BIT50/70) AG4 M4 u debljini 4 cm
- Nosivi sloj AC 22 base (BIT50/70) AG6 M2 u debljini 6 cm
- Mehanički zbijeni nosivi sloj debljine 30 cm

2.6. Odvodnja

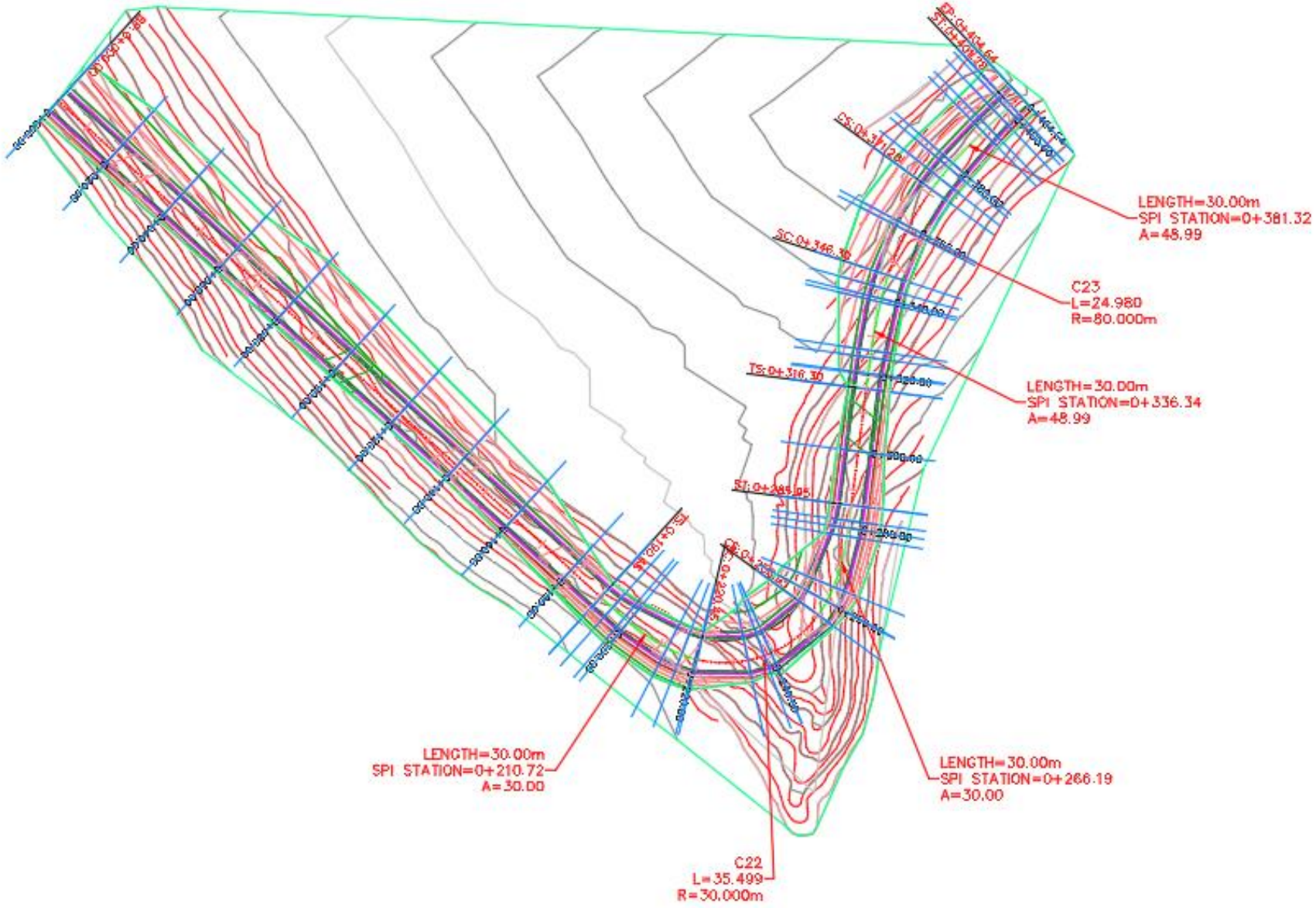
Odvodnja kolnika predviđa se otvorenim sustavom odvodnje prihvaćanjem kolničkih pribrežnih voda u zasjeku i usjeku u betonske rigole te kontroliranim ispuštanjem u teren direktno ili betonskim cijevnim propustima kroz trup kolnika.

2.7. Oprema ceste

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

3 GRAFIČKI PRILOZI

3.1. Situacija M 1:1000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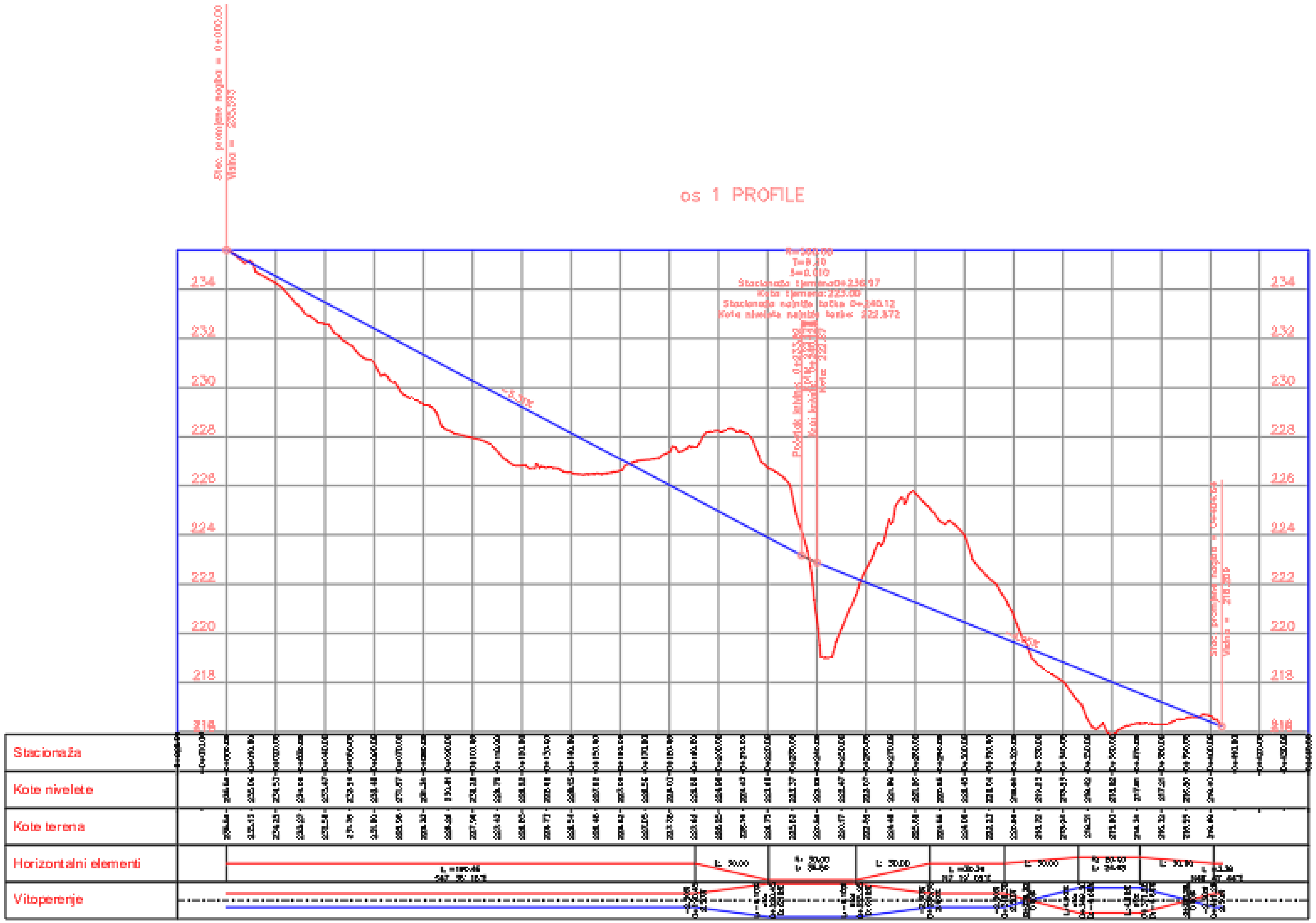
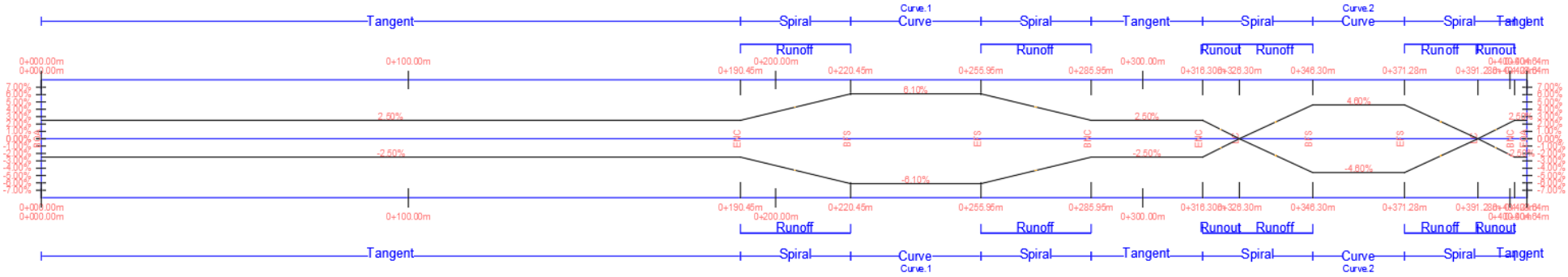
C23
L=24.980
R=80.000m
LENGTH=30.00m
SPI STATION=0+336.34
A=48.99
LENGTH=30.00m
SPI STATION=0+210.72
A=30.00
LENGTH=30.00m
SPI STATION=0+266.19
A=30.00
C22
L=35.499
R=30.000m

3.2. Uzdužni presjek M 1:1000/100

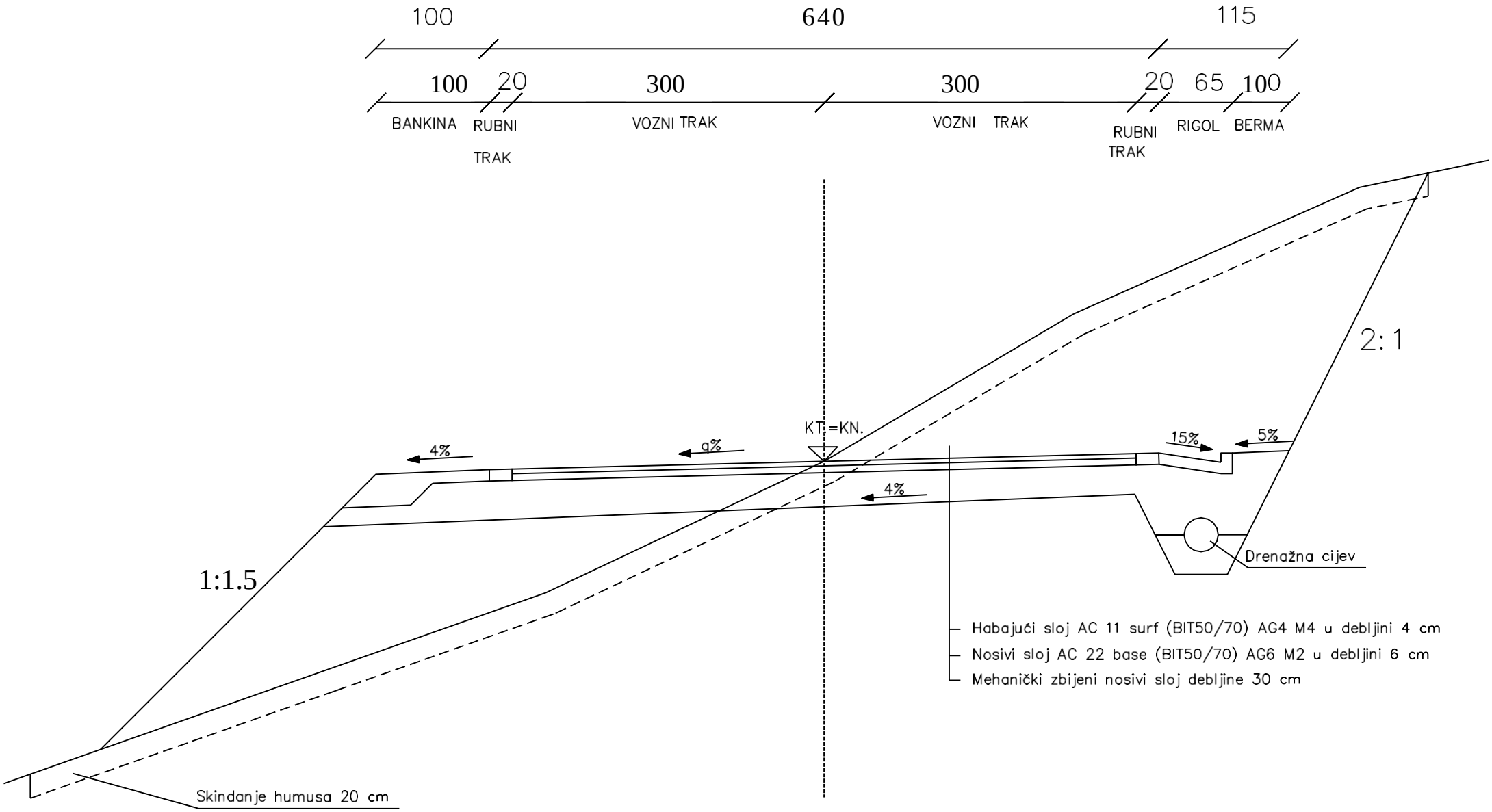


os 1 PROFILE
234
232
230
228
226
224
222
220
218
216
Stacionaža
Kote nivelete
Kote terena
Horizontalni elementi
Vitoperenje

Superelevation

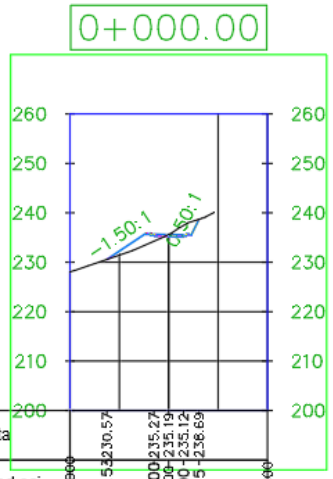


3.3. Normalni poprečni presjek M 1:50


100
640
115
100
20
300
300
20
65
100
BANKINA
RUBNI TRAK
VOZNI TRAK
VOZNI TRAK
RUBNI TRAK
RIGOL
BERMA
2:1
KT.=KN.
4%
q%
4%
15%
5%
1:1.5
Drenažna cijev
Habajući sloj AC 11 surf (BIT50/70) AG4 M4 u debljini 4 cm
Nosivi sloj AC 22 base (BIT50/70) AG6 M2 u debljini 6 cm
Mehanički zbijeni nosivi sloj debljine 30 cm
Skindanje humusa 20 cm

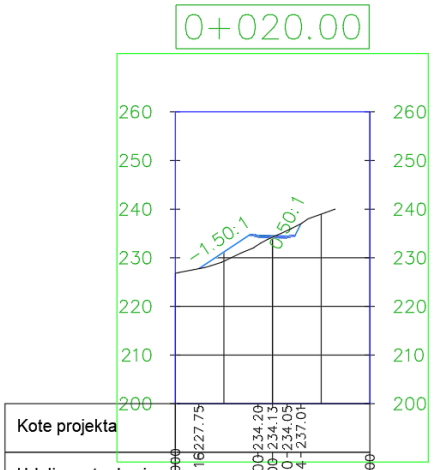
3.4. Karakteristični poprečni presjeci M 1:200

0+000.00



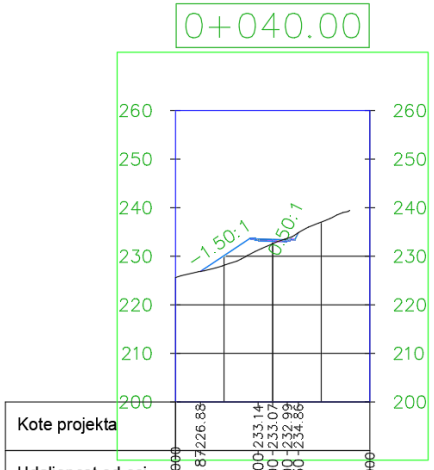
Kote projekta			230.57		235.27	235.19	235.12	238.69	
Udaljenost od osi	20.000	12.53	3.00	0.000	3.00	6.15			20.000
Kote terena		230.57	235.27	235.19	235.12	238.69			

0+020.00



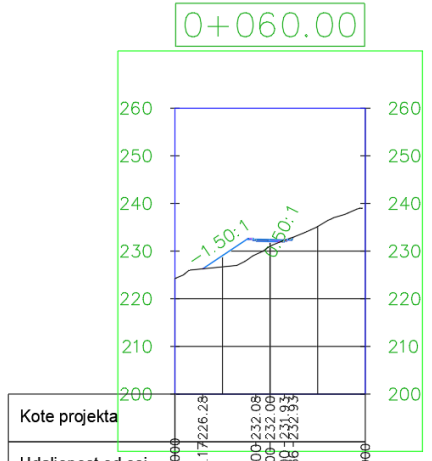
Kote projekta			227.75		234.20	234.13	234.05	237.01	
Udaljenost od osi	20.000	15.16	3.00	0.000	3.00	3.84			20.000
Kote terena		227.75	234.20	234.13	234.05	237.01			

0+040.00



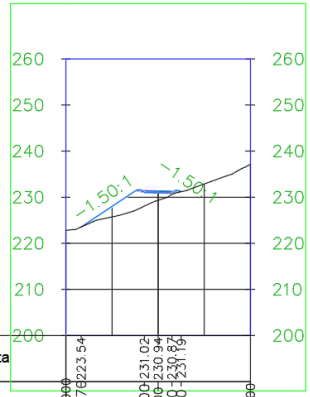
Kote projekta			226.88		233.14	233.07	232.99	234.86	
Udaljenost od osi	20.000	14.87	3.00	0.000	3.00	5.30			20.000
Kote terena		226.88	233.14	233.07	232.99	234.86			

0+060.00



Kote projekta			226.28		232.08	232.00	231.93	232.93	
Udaljenost od osi	20.000	14.17	3.00	0.000	3.00	4.88			20.000
Kote terena		226.28	232.08	232.00	231.93	232.93			

0+080.00

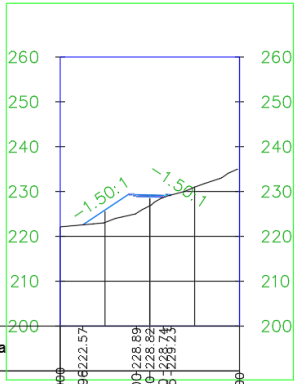


Kote projekta			223.54		231.02	230.94	230.87	231.19	
Udaljenost od osi	20.000	16.76	3.00	0.000	3.00	3.07			20.000
Kote terena		223.54	231.02	230.94	230.87	231.19			

0+100.00

Kote projekta			222.73		229.95	229.88	229.80	230.08	
Udaljenost od osi	20.000	16.34	3.00	0.000	3.00	3.07			20.000
Kote terena		222.73	229.95	229.88	229.80	230.08			

0+120.00



Kote projekta			222.57		228.89	228.82	228.74	229.23	
Udaljenost od osi	20.000	14.96	3.00	0.000	3.00	4.75			20.000
Kote terena		222.57	228.89	228.82	228.74	229.23			

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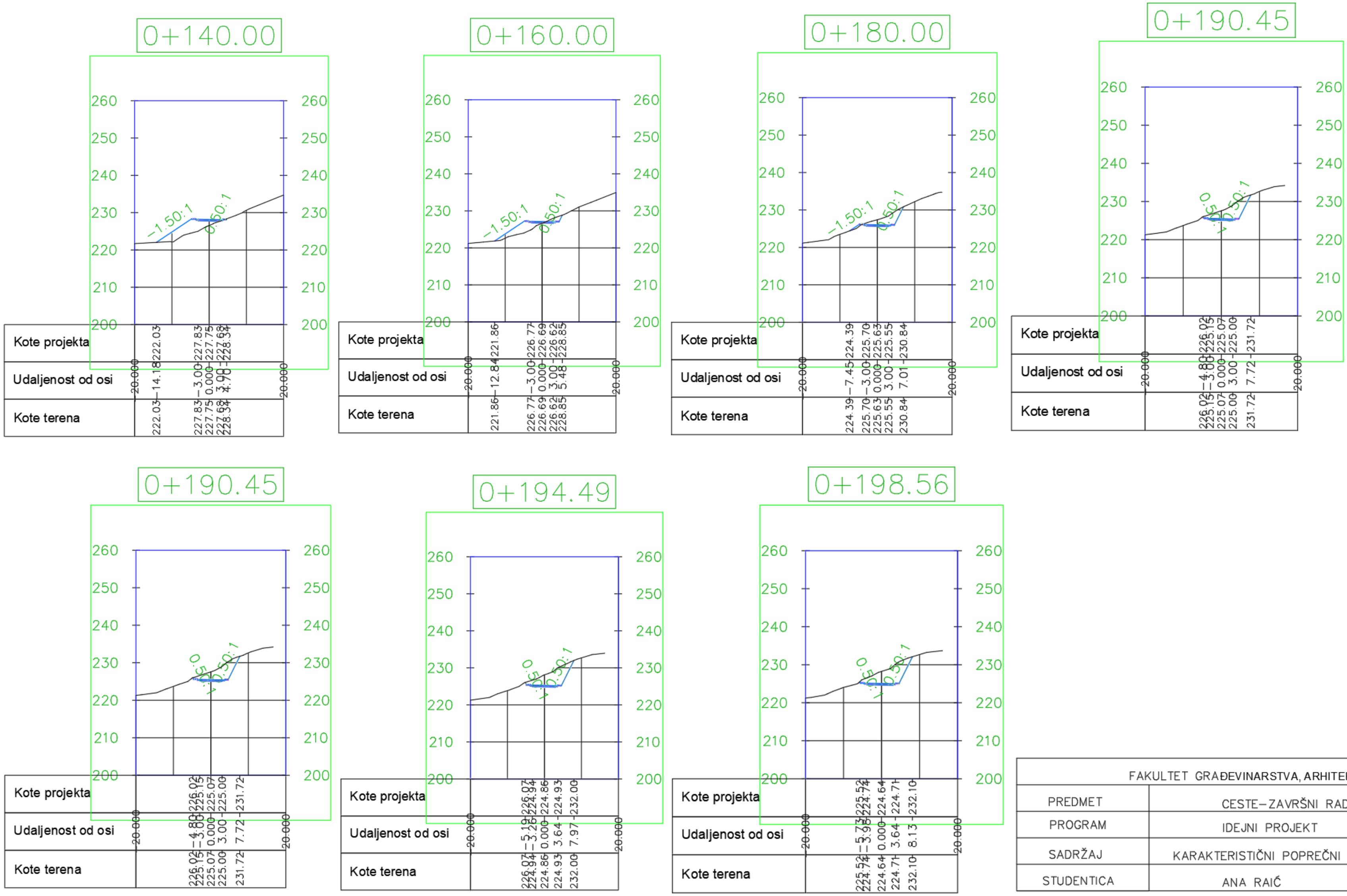
PREDMET	CESTE – ZAVRŠNI RAD	2021./2022.
PROGRAM	IDEJNI PROJEKT	
SADRŽAJ	KARAKTERISTIČNI POPREČNI PRESJECI	M 1:200
STUDENTICA	ANA RAIČ	



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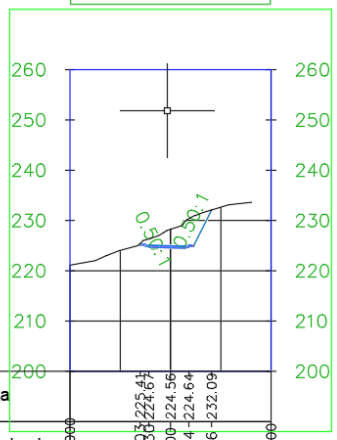
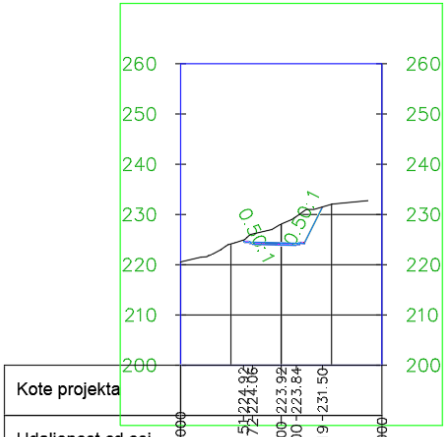
PREDMET	CESTE–ZAVRŠNI RAD	2021./2022.
PROGRAM	IDEJNI PROJEKT	
SADRŽAJ	KARAKTERISTIČNI POPREČNI PRESJECI	M 1:200
STUDENTICA	ANA RAIĆ	

0+200.00



Kote projekta											
Udaljenost od osi	20.000	-6.03	-4.30	0.00	3.64	8.16	20.000				
Kote terena	225.41	224.67	224.56	224.64	232.09						

0+212.13



Kote projekta											
Udaljenost od osi	20.000	-7.51	-5.77	0.000	3.00	8.19	20.000				
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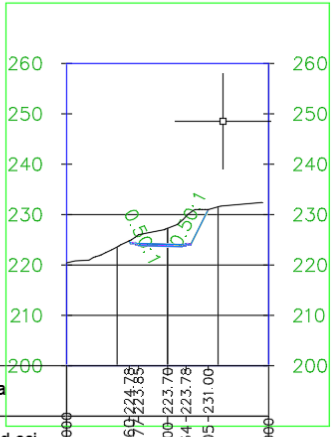
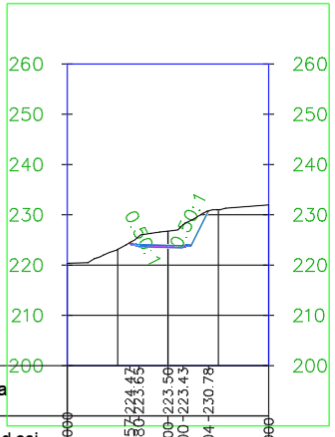
0+216.22



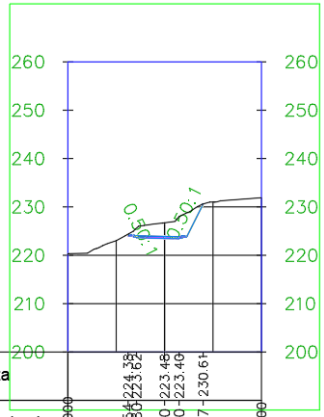
Kote projekta											
Udaljenost od osi	20.000	-7.60	-5.77	0.000	3.64	8.05	20.000				
Kote terena	224.78	223.85	223.70	223.78	231.00						

0+220.00



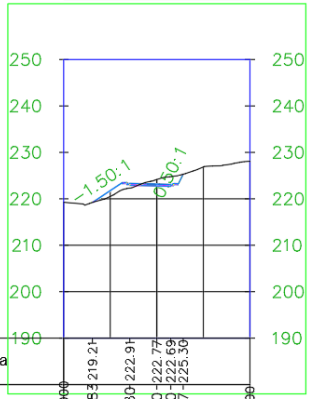
Kote projekta											
Udaljenost od osi	20.000	-7.57	-5.80	0.000	3.00	8.04	20.000				
Kote terena	224.43	223.65	223.50	223.43	230.78						

0+220.45



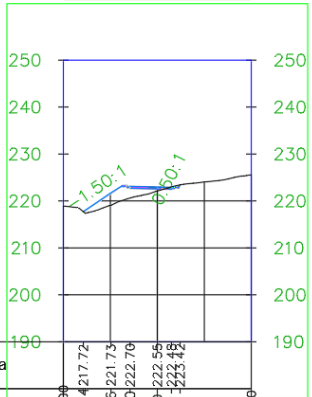
Kote projekta											
Udaljenost od osi	20.000	-7.54	-5.80	0.00	3.00	7.97	20.000				
Kote terena	224.38	223.62	223.48	223.40	230.61						

0+233.82



Kote projekta											
Udaljenost od osi	20.000	-13.83	-5.80	0.00	3.00	5.67	20.000				
Kote terena	219.21	222.91	222.77	222.69	225.30						

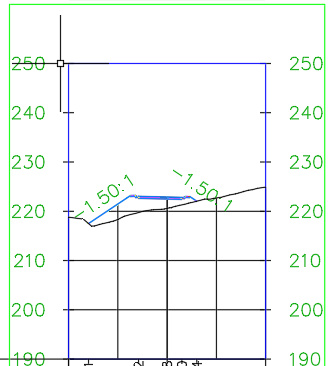
0+238.20



Kote projekta											
Udaljenost od osi	20.000	-15.74	-9.86	-5.80	0.000	3.00	4.84	20.000			
Kote terena	217.72	217.72	221.73	222.70	222.55	223.48	223.42				

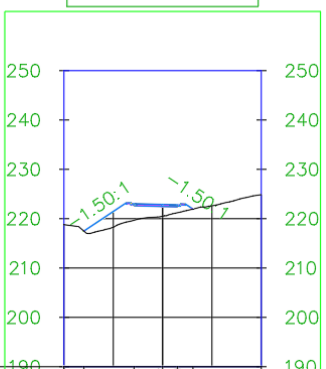
FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE		
PREDMET	CESTE – ZAVRŠNI RAD	2021./2022.
PROGRAM	IDEJNI PROJEKT	
SADRŽAJ	KARAKTERISTIČNI POPREČNI PRESJECI	M 1:200
STUDENTICA	ANA RAIČ	

0+240.00



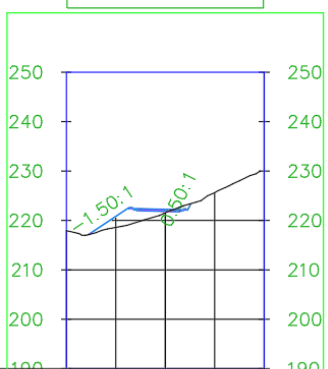
Kote projekta	217.51	222.62	222.48	222.40	222.04	
Udaljenost od osi	20.000	−15.95	−5.80	0.00	3.00	6.03	20.000
Kote terena	217.51	222.62	222.48	222.40	222.04	

0+240.12



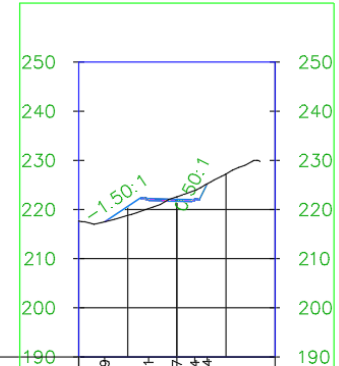
Kote projekta	217.49	222.62	222.47	222.40	221.95	
Udaljenost od osi	20.000	−15.97	−5.80	0.00	3.00	6.15	20.000
Kote terena	217.49	222.62	222.47	222.40	221.95	

0+255.95



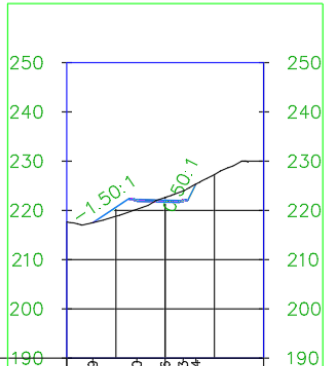
Kote projekta	217.10	221.98	221.83	221.76	223.41	
Udaljenost od osi	20.000	−15.53	−5.80	0.00	3.00	5.19	20.000
Kote terena	217.10	221.98	221.83	221.76	223.41	

0+260.00



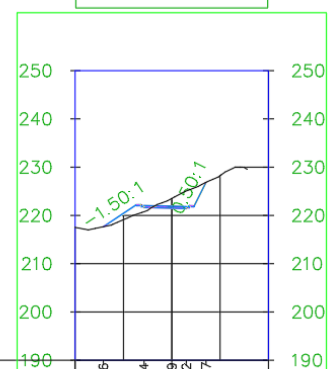
Kote projekta	217.49	221.81	221.67	221.74	225.24	
Udaljenost od osi	20.000	−14.73	−5.77	0.00	3.64	6.19	20.000
Kote terena	217.49	221.81	221.67	221.74	225.24	

0+260.18



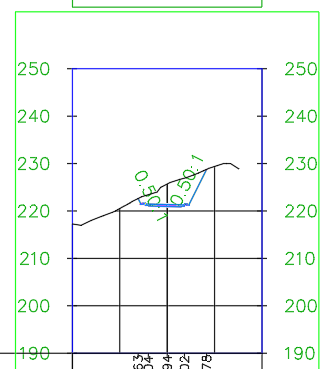
Kote projekta	217.49	221.80	221.66	221.73	225.34	
Udaljenost od osi	20.000	−14.74	−5.77	0.00	3.64	6.24	20.000
Kote terena	217.49	221.80	221.66	221.73	225.34	

0+264.27



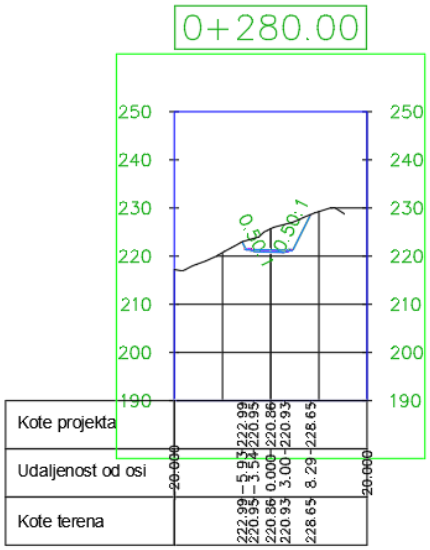
Kote projekta	217.66	221.64	221.49	221.42	226.87	
Udaljenost od osi	20.000	−14.16	−5.72	0.00	3.00	7.09	20.000
Kote terena	217.66	221.64	221.49	221.42	226.87	

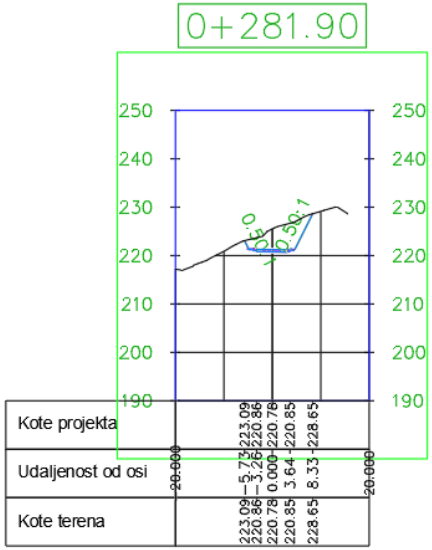
0+277.84

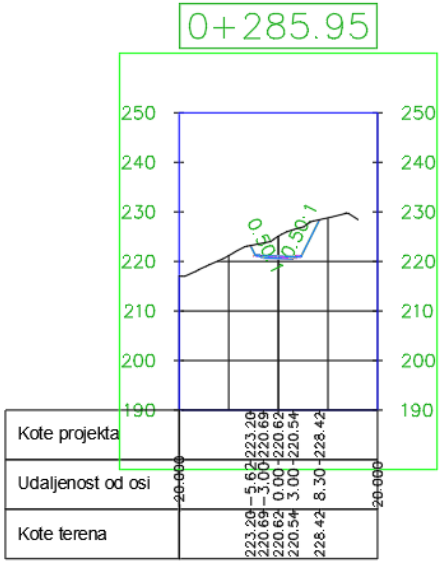


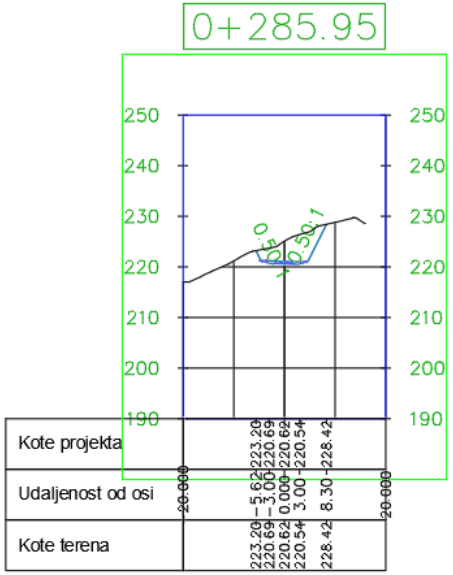
Kote projekta	222.63	221.04	220.94	221.02	228.78	
Udaljenost od osi	20.000	−6.13	−3.98	0.00	3.64	8.32	20.000
Kote terena	222.63	221.04	220.94	221.02	228.78	

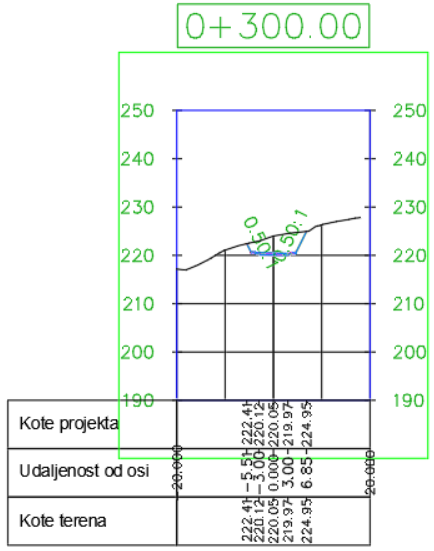
FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE		
PREDMET	CESTE – ZAVRŠNI RAD	2021./2022.
PROGRAM	IDEJNI PROJEKT	
SADRŽAJ	KARAKTERISTIČNI POPREČNI PRESJECI	M 1:200
STUDENTICA	ANA RAIĆ	

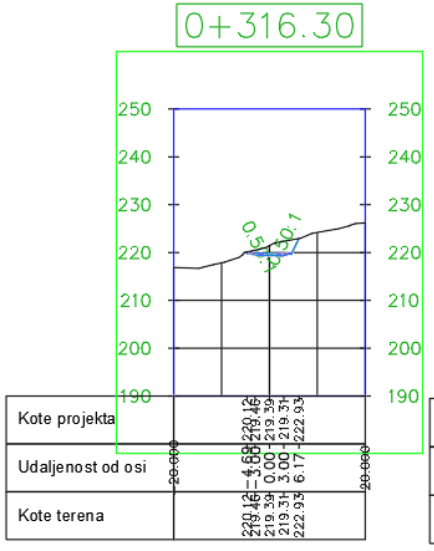


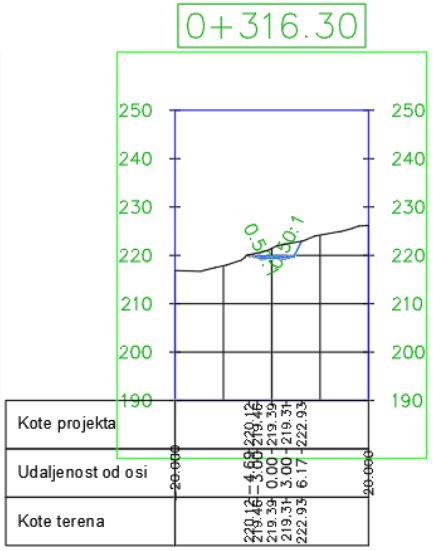




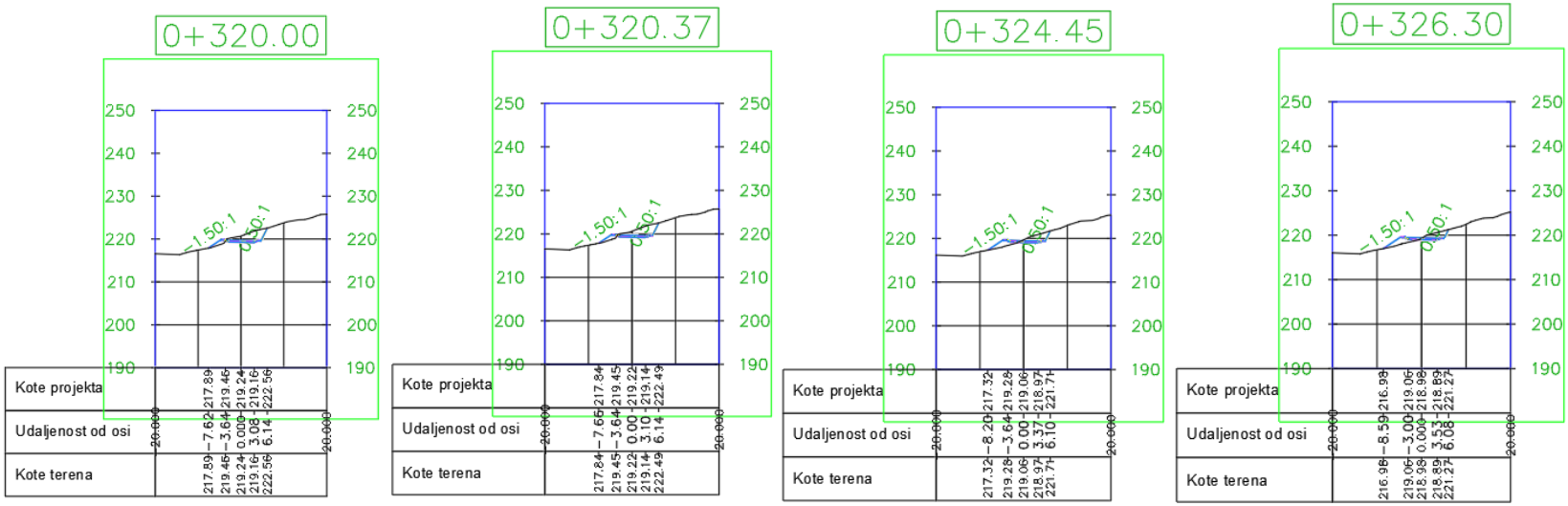


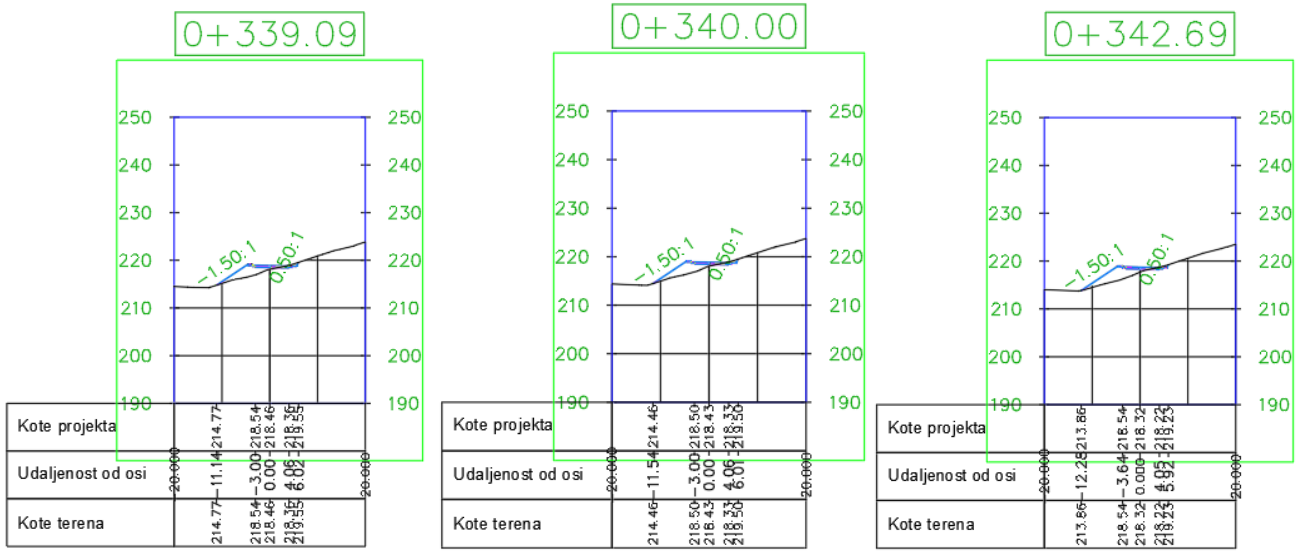




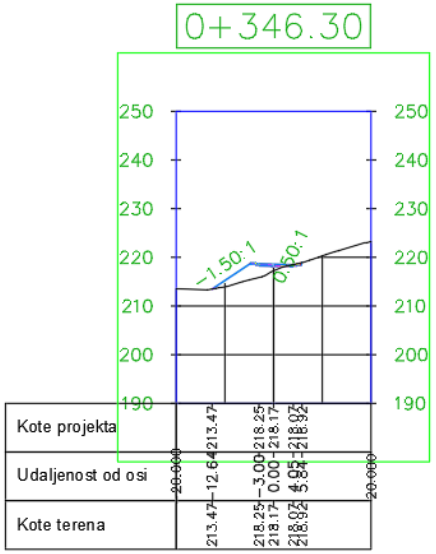


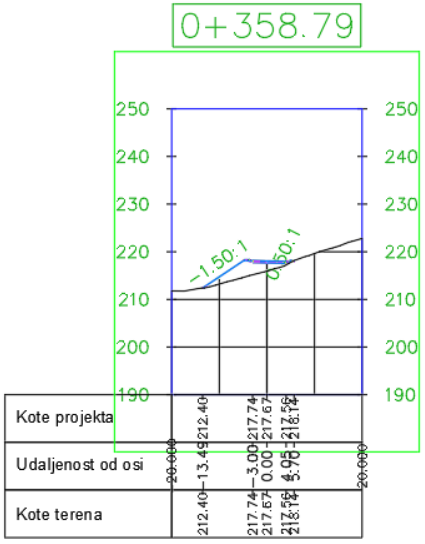
FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE		
PREDMET	CESTE – ZAVRŠNI RAD	2021./2022.
PROGRAM	IDEJNI PROJEKT	
SADRŽAJ	KARAKTERISTIČNI POPREČNI PRESJECI	M 1:200
STUDENTICA	ANA RAIČ	

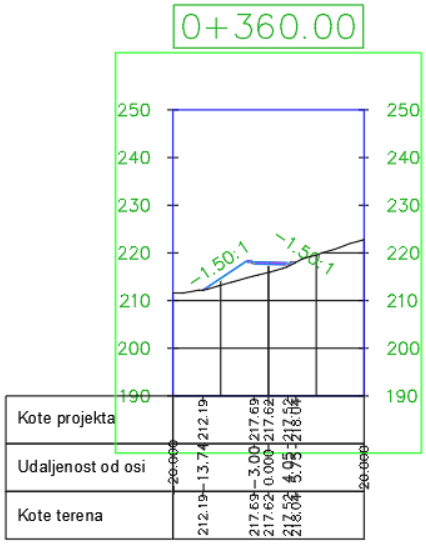


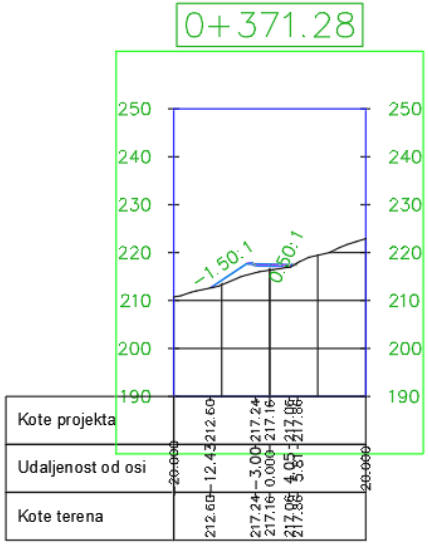


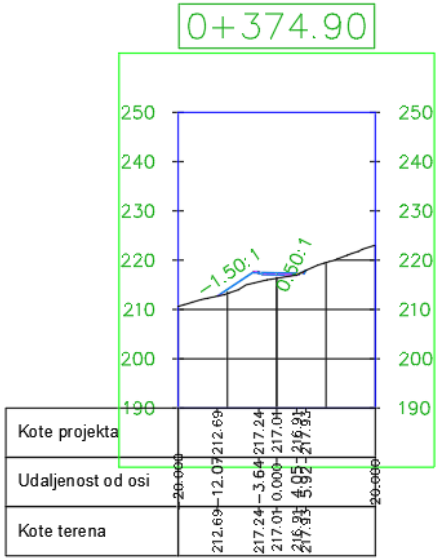
FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE		
PREDMET	CESTE – ZAVRŠNI RAD	2021./2022.
PROGRAM	IDEJNI PROJEKT	
SADRŽAJ	KARAKTERISTIČNI POPREČNI PRESJECI	M 1:200
STUDENTICA	ANA RAIĆ	

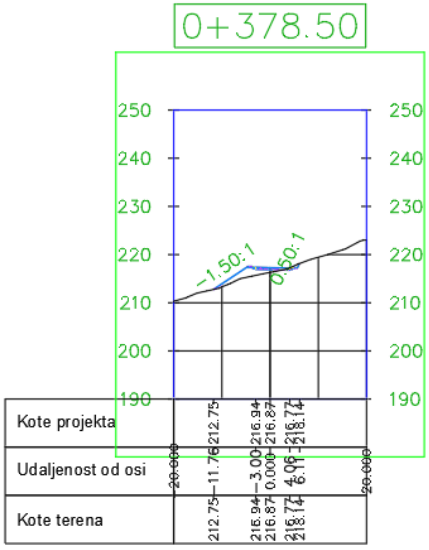


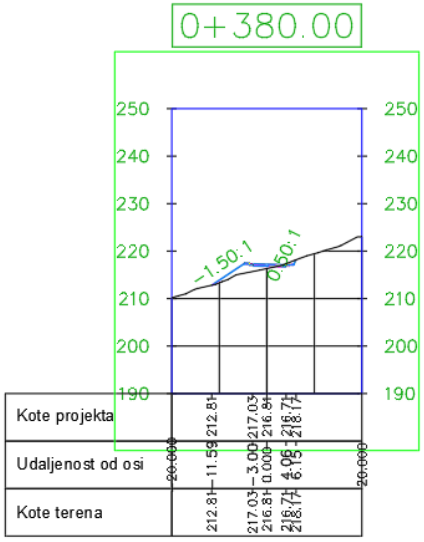












FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE		
PREDMET	CESTE – ZAVRŠNI RAD	2021./2022.
PROGRAM	IDEJNI PROJEKT	
SADRŽAJ	KARAKTERISTIČNI POPREČNI PRESJECI	M 1:200
STUDENTICA	ANA RAIĆ	

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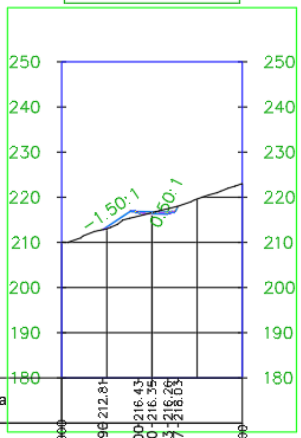

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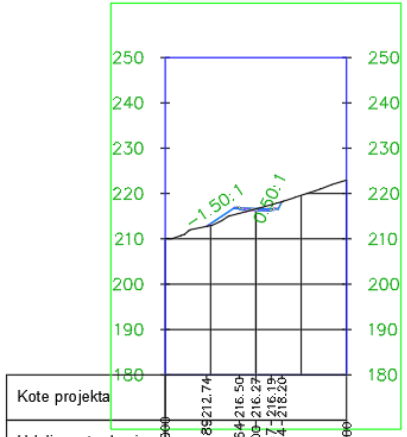

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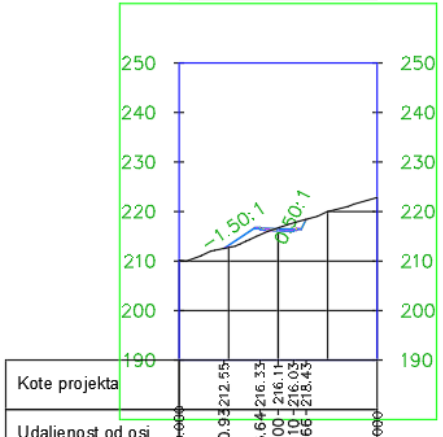

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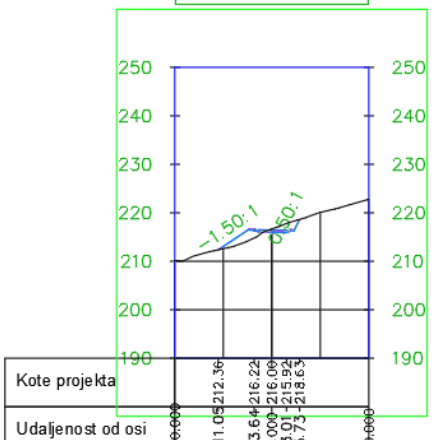

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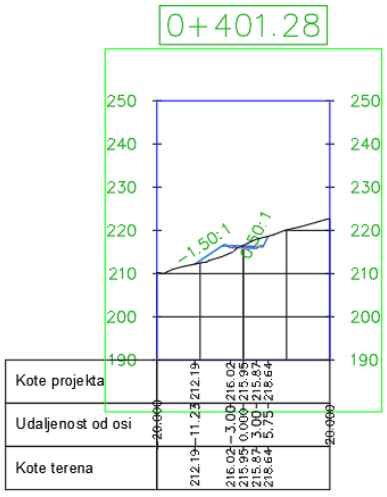

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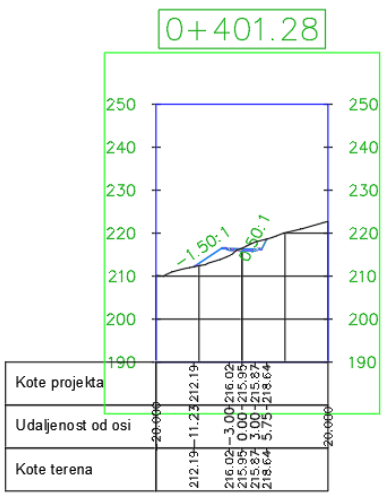

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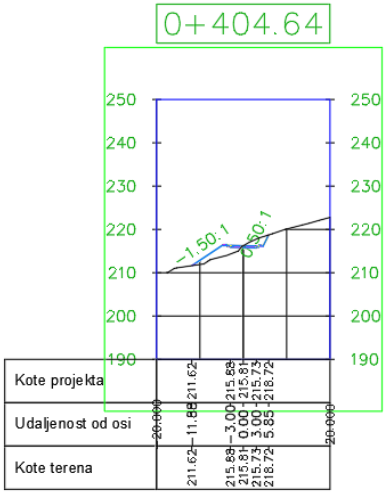

FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE		
PREDMET	CESTE – ZAVRŠNI RAD	2021./2022.
PROGRAM	IDEJNI PROJEKT	
SADRŽAJ	KARAKTERISTIČNI POPREČNI PRESJECI	M 1:200
STUDENTICA	ANA RAIČ	

4. TABLICA UKUPNOG VOLUMENA ZEMLJANIH RADOVA

Station	Cut Area (Sq.m.)	Cut Volume (Cu.m.)	Reusable Volume (Cu.m.)	Fill Area (Sq.m.)	Fill Volume (Cu.m.)	Cum. Cut Vol. (Cu.m.)	Cum. Reusable Vol. (Cu.m.)	Cum. Fill Vol. (Cu.m.)	Cum. Net Vol. (Cu.m.)
0+000.000	10.22	0.00	0.00	13.59	0.00	0.00	0.00	0.00	0.00
0+020.000	6.25	164.72	164.72	24.24	378.30	164.72	164.72	378.30	-213.58
0+040.000	2.12	83.72	83.72	27.97	522.02	248.44	248.44	900.32	-651.88
0+060.000	0.74	28.61	28.61	37.30	652.62	277.05	277.05	1552.94	-1275.89
0+080.000	0.00	7.38	7.38	40.68	779.76	284.43	284.43	2332.69	-2048.27
0+100.000	0.00	0.00	0.00	49.83	905.13	284.43	284.43	3237.82	-2953.39
0+120.000	0.02	0.18	0.18	45.17	950.00	284.61	284.61	4187.82	-3903.21
0+140.000	0.13	1.49	1.49	34.94	801.11	286.10	286.10	4988.93	-4702.83
0+160.000	4.75	48.86	48.86	19.94	548.86	334.96	334.96	5537.79	-5202.83
0+180.000	20.40	251.57	251.57	1.08	210.18	586.53	586.53	5747.97	-5161.44
0+190.448	31.83	272.86	272.86	0.00	5.62	859.39	859.39	5753.59	-4894.20
0+190.450	31.83	0.05	0.05	0.00	0.00	859.44	859.44	5753.59	-4894.15
0+194.495	38.47	142.16	142.16	0.00	0.00	1001.61	1001.61	5753.59	-4751.99
0+198.555	43.86	169.41	169.41	0.00	0.00	1171.02	1171.02	5753.59	-4582.58
0+200.000	45.59	64.61	64.61	0.00	0.00	1235.63	1235.63	5753.59	-4517.97
0+212.129	54.48	623.48	623.48	0.00	0.00	1859.10	1859.10	5753.59	-3894.49
0+216.219	52.29	225.78	225.78	0.00	0.00	2084.88	2084.88	5753.59	-3668.71
0+220.000	45.42	191.01	191.01	0.00	0.00	2275.89	2275.89	5753.59	-3477.70
0+220.448	44.55	20.17	20.17	0.00	0.00	2296.06	2296.06	5753.59	-3457.53
0+233.819	12.54	394.80	394.80	8.47	39.88	2690.87	2690.87	5793.47	-3102.61
0+238.198	1.14	31.72	31.72	28.52	58.80	2722.59	2722.59	5852.27	-3129.68
0+240.000	0.00	1.14	1.14	46.68	52.52	2723.73	2723.73	5904.79	-3181.06
0+240.118	0.00	0.00	0.00	47.90	5.60	2723.73	2723.73	5910.39	-3186.66
0+255.947	2.96	26.02	26.02	26.02	460.06	2749.75	2749.75	6370.45	-3620.70

0+260.000	10.69	30.08	30.08	17.31	66.71	2779.83	2779.83	6437.16	-3657.33
0+260.177	11.24	1.94	1.94	17.01	3.03	2781.77	2781.77	6440.19	-3658.42
0+264.267	23.37	75.40	75.40	10.58	43.84	2857.17	2857.17	6484.03	-3626.87
0+277.840	53.25	535.60	535.60	0.00	61.34	3392.77	3392.77	6545.37	-3152.60
0+280.000	53.62	115.43	115.43	0.00	0.00	3508.20	3508.20	6545.37	-3037.17
0+281.901	52.77	101.12	101.12	0.00	0.00	3609.32	3609.32	6545.37	-2936.05
0+285.947	52.29	212.55	212.55	0.00	0.00	3821.86	3821.86	6545.37	-2723.51
0+285.950	52.28	0.16	0.16	0.00	0.00	3822.02	3822.02	6545.37	-2723.35
0+300.000	39.43	644.28	644.28	0.00	0.00	4466.30	4466.30	6545.37	-2079.07
0+316.300	20.16	485.61	485.61	0.00	0.00	4951.91	4951.91	6545.37	-1593.46
0+316.304	20.15	0.07	0.07	0.00	0.00	4951.99	4951.99	6545.37	-1593.38
0+320.000	16.26	67.29	67.29	2.36	4.36	5019.28	5019.28	6549.73	-1530.46
0+320.367	15.35	5.80	5.80	2.60	0.91	5025.08	5025.08	6550.64	-1525.56
0+324.446	9.05	49.75	49.75	5.22	15.93	5074.83	5074.83	6566.57	-1491.74
0+326.304	7.50	15.37	15.37	6.14	10.55	5090.20	5090.20	6577.12	-1486.92
0+339.092	1.69	57.38	57.38	14.31	135.13	5147.58	5147.58	6712.25	-1564.67
0+340.000	1.68	1.53	1.53	15.59	13.58	5149.11	5149.11	6725.83	-1576.72
0+342.686	1.31	3.84	3.84	19.74	50.01	5152.95	5152.95	6775.84	-1622.89
0+346.304	0.95	3.88	3.88	25.14	86.17	5156.82	5156.82	6862.01	-1705.18
0+358.794	0.04	5.86	5.86	32.75	383.45	5162.68	5162.68	7245.46	-2082.77
0+360.000	0.02	0.03	0.03	32.39	39.29	5162.72	5162.72	7284.75	-2122.03
0+371.284	0.12	0.69	0.69	18.52	303.68	5163.41	5163.41	7588.42	-2425.02
0+374.901	0.38	0.84	0.84	16.33	66.63	5164.24	5164.24	7655.06	-2490.82
0+378.495	1.35	2.96	2.96	13.88	57.07	5167.20	5167.20	7712.13	-2544.93
0+380.000	1.85	2.41	2.41	12.64	19.95	5169.61	5169.61	7732.08	-2562.47
0+391.284	4.82	36.76	36.76	7.56	117.93	5206.37	5206.37	7850.00	-2643.64
0+393.141	5.49	9.58	9.58	7.50	14.00	5215.94	5215.94	7864.00	-2648.05
0+397.220	7.42	26.31	26.31	9.55	34.78	5242.26	5242.26	7898.78	-2656.52

0+400.000	8.30	21.85	21.85	11.63	29.44	5264.10	5264.10	7928.22	-2664.11
0+401.280	8.71	10.89	10.89	13.29	15.95	5274.99	5274.99	7944.17	-2669.18
0+401.284	8.71	0.03	0.03	13.30	0.05	5275.02	5275.02	7944.22	-2669.20
0+404.642	8.50	28.91	28.91	16.36	49.80	5303.93	5303.93	7994.02	-2690.08

5. OBRADA NA RAČUNALU

Za izradu idejnog projekta lokalne ceste korišten je AutoCAD Civil 3D koji znatno olakšava izradu programskog zadatka. U odnosu na ručno rješavanje, postupak na računalu je znatno brži i jednostavniji.

Prvi korak pri izradi idejnog rješenja je skeniranje geodetske podloge te slijedi iscrtavanje slojnica. Slojnice se iscrtavaju pomoću 3D poligonalnih linija te se postupkom triangulacije na tim linijama dobije trodimenzionalni model terena. Zatim definiramo koordinate točaka tangenti (dvije točke ta svaku tangentu) te ih definiramo na terenu. Na sjecištima tangenti definiramo kružne lukove i prijelazne krivine te na taj način definiramo horizontalni tok ceste.

Slijedi izrada uzdužnog presjeka ceste kojeg definira niveleta. Niveleta se postavlja tako da se zadovolje geometrijski i sigurnosni elementi te odvodnja. Između tangenti se ubacuje kružna krivina određenog radijusa.

Sljedeći korak je definiranje poprečnog profila prometnice. Poprečnim presjekom su definirani: poprečni nagib i širina kolnika te pokosi usjeka i nasipa.

Na temelju definiranih horizontalnih i vertikalnih elemenata te osi ceste, izrađujemo koridor. On omogućuje uvid u poprečne presjeke u svim karakterističnim i zadanim točkama osi ceste. Time smo definirali cijelu dionicu ceste.

Izlazni podaci su računalni ispisi koordinatnih točaka osi, točaka svakog poprečnog

presjeka te količina zemljanih radova po presjeku.

6. IZLAZNI PODACI IZ PROGRAMA

6.1. Koordinatni račun glavnih točaka

Alignment: os_1

Description:

Tangent Data

Description	PT Station	Northing	Easting
Start:	0+00.000	162.437	-127.797
End:	1+90.448	33.987	12.813

Tangent Data

Parameter	Value	Parameter	Value
Length:	190.448	Course:	S 47° 35' 16.4960" E

Spiral Point Data

Description	Station	Northing	Easting
TS:	1+90.448	33.987	12.813
SPI:		20.317	27.778
SC:	2+20.448	17.880	37.728

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 57° 07' 00.7637" E

Curve Point Data

Description	Station	Northing	Easting
SC:	2+20.448	17.880	37.728
RP:		47.018	44.866
CS:	2+55.947	29.398	69.146

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	67° 47' 49.8245"	Type:	LEFT
Radius:	30.000		
Length:	35.499	Tangent:	20.158
Mid-Ord:	5.099	External:	6.143
Chord:	33.463	Course:	N 69° 51' 56.1886" E

Spiral Point Data

Description	Station	Northing	Easting
CS:	2+55.947	29.398	69.146
SPI:		37.690	75.163

ST:	2+85.947	57.793	77.745

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 16° 50' 53.1409" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	2+85.947	57.793	77.745
End:	3+16.304	87.902	81.613

Tangent Data

Parameter	Value	Parameter	Value
Length:	30.357	Course:	N 07° 19' 08.8732" E

Spiral Point Data

Description	Station	Northing	Easting
TS:	3+16.304	87.902	81.613
SPI:		107.776	84.165
SC:	3+46.304	117.315	87.276

Spiral Curve Data: clothoid

Parameter	Value	Parameter	Value
Length:	30.000	L Tan:	20.037
Radius:	80.000	S Tan:	10.034
Theta:	10° 44' 34.6512"	P:	0.468
X:	29.895	K:	14.982
Y:	1.870	A:	48.990
Chord:	29.953	Course:	N 10° 53' 56.5836" E

Curve Point Data

Description	Station	Northing	Easting
SC:	3+46.304	117.315	87.276
RP:		92.511	163.334
CS:	3+71.284	139.481	98.574

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	17° 53' 25.8435"	Type:	RIGHT
Radius:	80.000		
Length:	24.980	Tangent:	12.592
Mid-Ord:	0.973	External:	0.985
Chord:	24.879	Course:	N 27° 00' 26.4461" E

Spiral Point Data

Description	Station	Northing	Easting
CS:	3+71.284	139.481	98.574
SPI:		147.603	104.464
ST:	4+01.284	161.346	119.046

Spiral Curve Data: clothoid

Parameter	Value	Parameter	Value
Length:	30.000	L Tan:	20.037
Radius:	80.000	S Tan:	10.034
Theta:	10° 44' 34.6512"	P:	0.468
X:	29.895	K:	14.982
Y:	1.870	A:	48.990
Chord:	29.953	Course:	N 43° 06' 56.3087" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	4+01.284	161.346	119.046
End:	4+04.642	163.649	121.490

Tangent Data

Parameter	Value	Parameter	Value
Length:	3.359	Course:	N 46° 41' 44.0190" E

Alignment: os 1-Left-3.000

Description:

Tangent Data

Description	PT Station	Northing	Easting
Start:	0+00.000	164.652	-125.774
End:	1+90.448	36.202	14.837

Tangent Data

Parameter	Value	Parameter	Value
Length:	190.448	Course:	S 47° 35' 16.4960" E

Curve Point Data

Description	Station	Northing	Easting
PC:	1+90.448	36.202	14.837
RP:		58.351	35.071
PT:	1+98.506	31.627	21.440

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	15° 23' 17.2796"	Type:	LEFT
Radius:	30.000		
Length:	8.057	Tangent:	4.053

Mid-Ord:	0.270	External:	0.273
Chord:	8.033	Course:	S 55° 16' 55.1358" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	1+98.506	31.627	21.440
End:	2+11.051	25.927	32.615

Tangent Data

Parameter	Value	Parameter	Value
Length:	12.545	Course:	S 62° 58' 33.7756" E

Curve Point Data

Description	Station	Northing	Easting
PC:	2+11.051	25.927	32.615
RP:		52.652	46.246
PCC:	2+17.993	23.513	39.108

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	13° 15' 35.1236"	Type:	LEFT
Radius:	30.000		
Length:	6.943	Tangent:	3.487
Mid-Ord:	0.201	External:	0.202
Chord:	6.927	Course:	S 69° 36' 21.3373" E

Curve Point Data

Description	Station	Northing	Easting
PCC:	2+17.993	23.513	39.108
RP:		47.018	44.866
PCC:	2+46.629	32.805	64.452

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	67° 47' 49.8245"	Type:	LEFT
Radius:	24.200		
Length:	28.635	Tangent:	16.261
Mid-Ord:	4.113	External:	4.956
Chord:	26.994	Course:	N 69° 51' 56.1886" E

Curve Point Data

Description	Station	Northing	Easting
PCC:	2+46.629	32.805	64.452
RP:		50.425	40.172
PT:	2+53.572	38.844	67.846

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	13° 15' 35.1236"	Type:	LEFT

Radius:	30.000		
Length:	6.943	Tangent:	3.487
Mid-Ord:	0.201	External:	0.202
Chord:	6.927	Course:	N 29° 20' 13.7146" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	2+53.572	38.844	67.846
End:	2+66.117	50.416	72.689

Tangent Data

Parameter	Value	Parameter	Value
Length:	12.545	Course:	N 22° 42' 26.1528" E

Curve Point Data

Description	Station	Northing	Easting
PC:	2+66.117	50.416	72.689
RP:		61.997	45.014
PT:	2+74.174	58.175	74.770

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	15° 23' 17.2796"	Type:	LEFT
Radius:	30.000		
Length:	8.057	Tangent:	4.053
Mid-Ord:	0.270	External:	0.273
Chord:	8.033	Course:	N 15° 00' 47.5130" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	2+74.174	58.175	74.770
End:	3+04.531	88.285	78.637

Tangent Data

Parameter	Value	Parameter	Value
Length:	30.357	Course:	N 07° 19' 08.8732" E

Spiral Point Data

Description	Station	Northing	Easting
TS:	3+04.531	88.285	78.637
SPI:		108.438	81.226
SC:	3+35.093	118.245	84.424

Spiral Curve Data: clothoid

Parameter	Value	Parameter	Value
Length:	30.563	L Tan:	20.411
Radius:	83.000	S Tan:	10.221
Theta:	10° 32' 55.7117"	P:	0.468
X:	30.459	K:	15.264

Y:	1.871	A:	50.366
Chord:	30.515	Course:	N 10° 55' 55.2812" E

Curve Point Data

Description	Station	Northing	Easting
SC:	3+35.093	118.245	84.424
RP:		92.511	163.334
CS:	3+61.010	141.242	96.145

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	17° 53' 25.8435"	Type:	RIGHT
Radius:	83.000		
Length:	25.917	Tangent:	13.065
Mid-Ord:	1.009	External:	1.022
Chord:	25.811	Course:	N 27° 00' 26.4461" E

Spiral Point Data

Description	Station	Northing	Easting
CS:	3+61.010	141.242	96.145
SPI:		149.593	102.202
ST:	3+91.572	163.529	116.988

Spiral Curve Data: clothoid

Parameter	Value	Parameter	Value
Length:	30.563	L Tan:	20.411
Radius:	83.000	S Tan:	10.221
Theta:	10° 32' 55.7117"	P:	0.468
X:	30.459	K:	15.264
Y:	1.871	A:	50.366
Chord:	30.515	Course:	N 43° 04' 57.6110" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	3+91.572	163.529	116.988
End:	3+94.931	165.833	119.432

Tangent Data

Parameter	Value	Parameter	Value
Length:	3.359	Course:	N 46° 41' 44.0190" E

Alignment: os 1-Right-3.000

Description:

Tangent Data

Description	PT Station	Northing	Easting

Start:	0+00.000	160.222	-129.821
End:	1+90.448	31.772	10.790

Tangent Data

Parameter	Value	Parameter	Value
Length:	190.448	Course:	S 47° 35' 16.4960" E

Spiral Point Data

Description	Station	Northing	Easting
TS:	1+90.448	31.772	10.790
SPI:		17.585	26.320
SC:	2+21.948	14.966	37.014

Spiral Curve Data: clothoid

Parameter	Value	Parameter	Value
Length:	31.500	L Tan:	21.256
Radius:	33.000	S Tan:	10.733
Theta:	27° 20' 44.5666"	P:	1.243
X:	30.790	K:	15.631
Y:	4.930	A:	32.241
Chord:	31.147	Course:	S 57° 20' 42.4740" E

Curve Point Data

Description	Station	Northing	Easting
SC:	2+21.948	14.966	37.014
RP:		47.018	44.866
CS:	2+60.997	27.637	71.575

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	67° 47' 49.8245"	Type:	LEFT
Radius:	33.000		
Length:	39.048	Tangent:	22.174
Mid-Ord:	5.609	External:	6.758
Chord:	36.810	Course:	N 69° 51' 56.1886" E

Spiral Point Data

Description	Station	Northing	Easting
CS:	2+60.997	27.637	71.575
SPI:		36.548	78.041
ST:	2+92.497	57.411	80.721

Spiral Curve Data: clothoid

Parameter	Value	Parameter	Value
Length:	31.500	L Tan:	21.256
Radius:	33.000	S Tan:	10.733
Theta:	27° 20' 44.5666"	P:	1.243
X:	30.790	K:	15.631
Y:	4.930	A:	32.241

Chord:	31.147	Course:	N 17° 04' 34.8513" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	2+92.497	57.411	80.721
End:	3+22.854	87.520	84.588

Tangent Data

Parameter	Value	Parameter	Value
Length:	30.357	Course:	N 07° 19' 08.8732" E

Curve Point Data

Description	Station	Northing	Easting
PC:	3+22.854	87.520	84.588
RP:		77.329	163.936
PT:	3+30.963	95.498	86.027

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	05° 48' 28.7199"	Type:	RIGHT
Radius:	80.000		
Length:	8.109	Tangent:	4.058
Mid-Ord:	0.103	External:	0.103
Chord:	8.106	Course:	N 10° 13' 23.2332" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	3+30.963	95.498	86.027
End:	3+45.264	109.425	89.275

Tangent Data

Parameter	Value	Parameter	Value
Length:	14.301	Course:	N 13° 07' 37.5931" E

Curve Point Data

Description	Station	Northing	Easting
PC:	3+45.264	109.425	89.275
RP:		91.256	167.184
PCC:	3+52.154	116.060	91.127

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	04° 56' 05.9313"	Type:	RIGHT
Radius:	80.000		
Length:	6.891	Tangent:	3.447
Mid-Ord:	0.074	External:	0.074
Chord:	6.888	Course:	N 15° 35' 40.5588" E

Curve Point Data

Description	Station	Northing	Easting
PCC:	3+52.154	116.060	91.127
RP:		92.511	163.334
PCC:	3+75.870	137.103	101.852

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	17° 53' 25.8435"	Type:	RIGHT
Radius:	75.950		
Length:	23.715	Tangent:	11.955
Mid-Ord:	0.924	External:	0.935
Chord:	23.619	Course:	N 27° 00' 26.4461" E

Curve Point Data

Description	Station	Northing	Easting
PCC:	3+75.870	137.103	101.852
RP:		90.134	166.612
PT:	3+82.760	142.500	106.133

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	04° 56' 05.9313"	Type:	RIGHT
Radius:	80.000		
Length:	6.891	Tangent:	3.447
Mid-Ord:	0.074	External:	0.074
Chord:	6.888	Course:	N 38° 25' 12.3335" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	3+82.760	142.500	106.133
End:	3+97.061	153.311	115.494

Tangent Data

Parameter	Value	Parameter	Value
Length:	14.301	Course:	N 40° 53' 15.2991" E

Curve Point Data

Description	Station	Northing	Easting
PC:	3+97.061	153.311	115.494
RP:		100.945	175.973
PT:	4+05.171	159.163	121.103

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	05° 48' 28.7199"	Type:	RIGHT
Radius:	80.000		
Length:	8.109	Tangent:	4.058
Mid-Ord:	0.103	External:	0.103
Chord:	8.106	Course:	N 43° 47' 29.6591" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	4+05.171	159.163	121.103
End:	4+08.529	161.466	123.547

Tangent Data

Parameter	Value	Parameter	Value
Length:	3.359	Course:	N 46° 41' 44.0190" E

6.2. Koordinatni račun detaljnih točaka osi

Alignment Name: os 1
Description:
Station Range: Start: 0+000.00, End: 40+464.00
Station Increment: 20.00

Station	Northing	Easting	Tangential Direction
0+000.00	162.4366m	-127.7972m	S47° 35' 16"E
0+020.00	148.9475m	-113.0309m	S47° 35' 16"E
0+040.00	135.4583m	-98.2646m	S47° 35' 16"E
0+060.00	121.9691m	-83.4984m	S47° 35' 16"E
0+080.00	108.4800m	-68.7321m	S47° 35' 16"E
0+100.00	94.9908m	-53.9659m	S47° 35' 16"E
0+120.00	81.5016m	-39.1996m	S47° 35' 16"E
0+140.00	68.0125m	-24.4333m	S47° 35' 16"E
0+160.00	54.5233m	-9.6671m	S47° 35' 16"E
0+180.00	41.0342m	5.0992m	S47° 35' 16"E
0+200.00	27.6658m	19.9725m	S50° 29' 31"E
0+220.00	17.9895m	37.2932m	S75° 23' 09"E
0+240.00	19.5223m	56.8650m	N66° 25' 24"E
0+260.00	32.8232m	71.3090m	N28° 44' 57"E
0+280.00	51.8997m	76.9490m	N8° 26' 42"E
0+300.00	71.7316m	79.5356m	N7° 19' 09"E
0+320.00	91.5682m	82.0870m	N7° 28' 56"E
0+340.00	111.2559m	85.5429m	N14° 01' 18"E
0+360.00	129.9105m	92.6138m	N27° 52' 17"E
0+380.00	146.2740m	104.0300m	N41° 17' 18"E
0+400.00	160.4654m	118.1118m	N46° 40' 33"E

6.3. Račun kota kolnika

Corridor Name: Koridor
Description:
Base Alignment Name: os 1
Station Range: Start: 0+000.00, End: 0+404.64

CHAINAGE 0+000.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	-119.3472	171.6866	230.5676	-12.529m	Daylight
2	-124.6665	165.8636	235.8255	-4.642m	Hinge
3	-124.6672	165.8629	235.6255	-4.641m	EPS_Sub
4	-125.3410	165.1253	235.8655	-3.642m	Back_Curb
5	-125.4422	165.0146	235.8655	-3.492m	Top_Curb
6	-125.4703	164.9838	235.6405	-3.450m	Flowline_Gutter
7	-125.7738	164.6516	235.6675	-3.000m	ETW
8	-125.7738	164.6516	235.2675	-3.000m	ETW_SubBase
9	-129.8205	160.2217	235.5175	3.000m	Flange
10	-129.8205	160.2217	235.1175	3.000m	ETW_SubBase
11	-130.1240	159.8894	235.4905	3.450m	Flowline_Gutter
12	-130.1522	159.8587	235.7155	3.492m	Top_Curb
13	-130.2533	159.7479	235.7155	3.642m	Back_Curb
14	-130.9271	159.0103	235.4755	4.641m	EPS_Sub
15	-130.9278	159.0096	235.6755	4.642m	Hinge_Cut
16	-131.9449	157.8961	238.6918	6.150m	Daylight

CHAINAGE 0+020.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	-102.8089	160.1372	227.7533	-15.156m	Daylight
2	-109.9003	152.3745	234.7627	-4.642m	Hinge
3	-109.9009	152.3737	234.5627	-4.641m	EPS_Sub
4	-110.5747	151.6362	234.8027	-3.642m	Back_Curb
5	-110.6759	151.5254	234.8027	-3.492m	Top_Curb
6	-110.7040	151.4946	234.5777	-3.450m	Flowline_Gutter
7	-111.0075	151.1624	234.6047	-3.000m	ETW
8	-111.0075	151.1624	234.2047	-3.000m	ETW_SubBase
9	-115.0543	146.7325	234.4547	3.000m	Flange
10	-115.0543	146.7325	234.0547	3.000m	ETW_SubBase
11	-115.3578	146.4003	234.4277	3.450m	Flowline_Gutter
12	-115.3859	146.3695	234.6527	3.492m	Top_Curb
13	-115.4871	146.2587	234.6527	3.642m	Back_Curb
14	-116.1609	145.5212	234.4127	4.641m	EPS_Sub

15	-116.1615	145.5204	234.6127	4.642m	Hinge_Cut
16	-116.9694	144.6361	237.0084	5.840m	Daylight

CHAINAGE 0+040.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	-88.2352	146.4373	226.8808	-14.870m	Daylight
2	-95.1340	138.8853	233.6999	-4.642m	Hinge
3	-95.1347	138.8846	233.4999	-4.641m	EPS_Sub
4	-95.8085	138.1470	233.7399	-3.642m	Back_Curb
5	-95.9096	138.0363	233.7399	-3.492m	Top_Curb
6	-95.9378	138.0055	233.5149	-3.450m	Flowline_Gutter
7	-96.2413	137.6732	233.5419	-3.000m	ETW
8	-96.2413	137.6732	233.1419	-3.000m	ETW_SubBase
9	-100.2880	133.2434	233.3919	3.000m	Flange
10	-100.2880	133.2434	232.9919	3.000m	ETW_SubBase
11	-100.5915	132.9111	233.3649	3.450m	Flowline_Gutter
12	-100.6196	132.8803	233.5899	3.492m	Top_Curb
13	-100.7208	132.7696	233.5899	3.642m	Back_Curb
14	-101.3946	132.0320	233.3499	4.641m	EPS_Sub
15	-101.3953	132.0313	233.5499	4.642m	Hinge_Cut
16	-101.8386	131.5459	234.8647	5.299m	Daylight

CHAINAGE 0+060.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	-73.9404	132.4321	226.2840	-14.171m	Daylight
2	-80.3677	125.3962	232.6371	-4.642m	Hinge
3	-80.3684	125.3954	232.4371	-4.641m	EPS_Sub
4	-81.0422	124.6578	232.6771	-3.642m	Back_Curb
5	-81.1434	124.5471	232.6771	-3.492m	Top_Curb
6	-81.1715	124.5163	232.4521	-3.450m	Flowline_Gutter
7	-81.4750	124.1841	232.4791	-3.000m	ETW
8	-81.4750	124.1841	232.0791	-3.000m	ETW_SubBase
9	-85.5217	119.7542	232.3291	3.000m	Flange
10	-85.5217	119.7542	231.9291	3.000m	ETW_SubBase
11	-85.8253	119.4220	232.3021	3.450m	Flowline_Gutter
12	-85.8534	119.3912	232.5271	3.492m	Top_Curb
13	-85.9545	119.2804	232.5271	3.642m	Back_Curb
14	-86.6283	118.5428	232.2871	4.641m	EPS_Sub
15	-86.6290	118.5421	232.4871	4.642m	Hinge_Cut
16	-86.7795	118.3773	232.9334	4.865m	Daylight

CHAINAGE 0+080.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	-57.4714	120.8068	223.5381	-16.696m	Daylight
2	-65.6015	111.9070	231.5743	-4.642m	EPS
3	-65.6022	111.9063	231.3743	-4.641m	EPS_Sub
4	-66.2759	111.1687	231.6143	-3.642m	Back_Curb
5	-66.3771	111.0579	231.6143	-3.492m	Top_Curb
6	-66.4052	111.0272	231.3893	-3.450m	Flowline_Gutter
7	-66.7087	110.6949	231.0163	-3.000m	ETW_SubBase
8	-66.7087	110.6949	231.4163	-3.000m	Flange
9	-70.7555	106.2650	231.2663	3.000m	Flange
10	-70.7555	106.2650	230.8663	3.000m	ETW_SubBase
11	-71.0590	105.9328	231.2393	3.450m	Flowline_Gutter
12	-71.0871	105.9020	231.4643	3.492m	Top_Curb
13	-71.1883	105.7913	231.4643	3.642m	Back_Curb
14	-71.8621	105.0537	231.2243	4.641m	EPS_Sub
15	-71.8627	105.0529	231.4243	4.642m	Hinge
16	-72.1021	104.7909	231.1877	4.997m	Daylight

CHAINAGE 0+100.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	-42.9650	107.0332	222.7322	-16.311m	Daylight
2	-50.8352	98.4178	230.5115	-4.642m	EPS
3	-50.8359	98.4171	230.3115	-4.641m	EPS_Sub
4	-51.5097	97.6795	230.5515	-3.642m	Back_Curb
5	-51.6108	97.5688	230.5515	-3.492m	Top_Curb
6	-51.6390	97.5380	230.3265	-3.450m	Flowline_Gutter
7	-51.9425	97.2057	229.9535	-3.000m	ETW_SubBase
8	-51.9425	97.2057	230.3535	-3.000m	Flange
9	-55.9892	92.7759	230.2035	3.000m	Flange
10	-55.9892	92.7759	229.8035	3.000m	ETW_SubBase
11	-56.2927	92.4436	230.1765	3.450m	Flowline_Gutter
12	-56.3209	92.4128	230.4015	3.492m	Top_Curb
13	-56.4220	92.3021	230.4015	3.642m	Back_Curb
14	-57.0958	91.5645	230.1615	4.641m	EPS_Sub
15	-57.0965	91.5638	230.3615	4.642m	Hinge
16	-57.3848	91.2481	230.0765	5.069m	Daylight

CHAINAGE 0+120.00

POINT	X	Y	Z	OFFSET	STRING CUT

1	-29.1068	92.5500	222.5670	-14.964m	Daylight
2	-36.0690	84.9287	229.4487	-4.642m	EPS
3	-36.0696	84.9279	229.2487	-4.641m	EPS_Sub
4	-36.7434	84.1904	229.4887	-3.642m	Back_Curb
5	-36.8446	84.0796	229.4887	-3.492m	Top_Curb
6	-36.8727	84.0488	229.2637	-3.450m	Flowline_Gutter
7	-37.1762	83.7166	228.8907	-3.000m	ETW_SubBase
8	-37.1762	83.7166	229.2907	-3.000m	Flange
9	-41.2230	79.2867	229.1407	3.000m	Flange
10	-41.2230	79.2867	228.7407	3.000m	ETW_SubBase
11	-41.5265	78.9545	229.1137	3.450m	Flowline_Gutter
12	-41.5546	78.9237	229.3387	3.492m	Top_Curb
13	-41.6558	78.8129	229.3387	3.642m	Back_Curb
14	-42.3295	78.0754	229.0987	4.641m	EPS_Sub
15	-42.3302	78.0746	229.2987	4.642m	Hinge
16	-42.4013	77.9968	229.2284	4.747m	Daylight

CHAINAGE 0+140.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	-14.8705	78.4807	222.0280	-14.179m	Daylight
2	-21.3027	71.4395	228.3859	-4.642m	Hinge
3	-21.3034	71.4388	228.1859	-4.641m	EPS_Sub
4	-21.9772	70.7012	228.4259	-3.642m	Back_Curb
5	-22.0783	70.5905	228.4259	-3.492m	Top_Curb
6	-22.1064	70.5597	228.2009	-3.450m	Flowline_Gutter
7	-22.4100	70.2274	228.2279	-3.000m	ETW
8	-22.4100	70.2274	227.8279	-3.000m	ETW_SubBase
9	-26.4567	65.7975	228.0779	3.000m	Flange
10	-26.4567	65.7975	227.6779	3.000m	ETW_SubBase
11	-26.7602	65.4653	228.0509	3.450m	Flowline_Gutter
12	-26.7883	65.4345	228.2759	3.492m	Top_Curb
13	-26.8895	65.3238	228.2759	3.642m	Back_Curb
14	-27.5633	64.5862	228.0359	4.641m	EPS_Sub
15	-27.5640	64.5855	228.2359	4.642m	Hinge_Cut
16	-27.6003	64.5457	228.3435	4.696m	Daylight

CHAINAGE 0+160.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	-1.0076	64.0026	221.8582	-12.839m	Daylight
2	-6.5364	57.9504	227.3231	-4.642m	Hinge
3	-6.5371	57.9496	227.1231	-4.641m	EPS_Sub

4	-7.2109	57.2120	227.3631	-3.642m	Back_Curb
5	-7.3121	57.1013	227.3631	-3.492m	Top_Curb
6	-7.3402	57.0705	227.1381	-3.450m	Flowline_Gutter
7	-7.6437	56.7383	227.1651	-3.000m	ETW
8	-7.6437	56.7383	226.7651	-3.000m	ETW_SubBase
9	-11.6904	52.3084	227.0151	3.000m	Flange
10	-11.6904	52.3084	226.6151	3.000m	ETW_SubBase
11	-11.9939	51.9761	226.9881	3.450m	Flowline_Gutter
12	-12.0221	51.9454	227.2131	3.492m	Top_Curb
13	-12.1232	51.8346	227.2131	3.642m	Back_Curb
14	-12.7970	51.0970	226.9731	4.641m	EPS_Sub
15	-12.7977	51.0963	227.1731	4.642m	Hinge_Cut
16	-13.3639	50.4764	228.8522	5.481m	Daylight

CHAINAGE 0+180.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	10.1215	46.5320	224.3905	-7.446m	Daylight
2	8.2298	44.4612	226.2603	-4.642m	Hinge
3	8.2292	44.4604	226.0603	-4.641m	EPS_Sub
4	7.5554	43.7229	226.3003	-3.642m	Back_Curb
5	7.4542	43.6121	226.3003	-3.492m	Top_Curb
6	7.4261	43.5813	226.0753	-3.450m	Flowline_Gutter
7	7.1226	43.2491	226.1023	-3.000m	ETW
8	7.1226	43.2491	225.7023	-3.000m	ETW_SubBase
9	3.0758	38.8192	225.9523	3.000m	Flange
10	3.0758	38.8192	225.5523	3.000m	ETW_SubBase
11	2.7723	38.4870	225.9253	3.450m	Flowline_Gutter
12	2.7442	38.4562	226.1503	3.492m	Top_Curb
13	2.6430	38.3454	226.1503	3.642m	Back_Curb
14	1.9692	37.6079	225.9103	4.641m	EPS_Sub
15	1.9686	37.6071	226.1103	4.642m	Hinge_Cut
16	0.3731	35.8606	230.8415	7.007m	Daylight

CHAINAGE 0+200.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	23.8069	32.3159	225.4070	-6.027m	Daylight
2	23.7505	32.2476	225.2299	-5.939m	Ditch_In
3	23.7499	32.2469	225.0299	-5.938m	EPS_Sub
4	23.1144	31.4761	225.2699	-4.939m	Back_Curb
5	23.0189	31.3604	225.2699	-4.789m	Top_Curb
6	22.9924	31.3282	225.0449	-4.747m	Flowline_Gutter

7	22.7061	30.9810	225.0719	-4.297m	ETW
8	22.7061	30.9810	224.6719	-4.297m	ETW_SubBase
9	18.0641	25.3514	224.8895	3.000m	Flange
10	18.0641	25.3514	224.4895	3.000m	ETW_SubBase
11	17.7778	25.0042	224.8625	3.450m	Flowline_Gutter
12	17.7513	24.9720	225.0875	3.491m	Top_Curb
13	17.6558	24.8563	225.0875	3.641m	Back_Curb
14	17.0203	24.0855	224.8475	4.640m	EPS_Sub
15	17.0196	24.0847	225.0475	4.641m	Ditch_In
16	14.7781	21.3663	232.0942	8.165m	Daylight

CHAINAGE 0+220.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	39.2037	25.3165	224.4663	-7.572m	Daylight
2	39.1707	25.1900	224.2047	-7.441m	Ditch_In
3	39.1705	25.1890	224.0047	-7.440m	EPS_Sub
4	38.9184	24.2223	224.2447	-6.441m	Back_Curb
5	38.8806	24.0772	224.2447	-6.291m	Top_Curb
6	38.8701	24.0368	224.0197	-6.249m	Flowline_Gutter
7	38.7565	23.6014	224.0467	-5.799m	ETW
8	38.7565	23.6014	223.6467	-5.799m	ETW_SubBase
9	36.5363	15.0865	223.8267	3.000m	Flange
10	36.5363	15.0865	223.4267	3.000m	ETW_SubBase
11	36.4228	14.6510	223.7997	3.450m	Flowline_Gutter
12	36.4122	14.6107	224.0247	3.492m	Top_Curb
13	36.3744	14.4655	224.0247	3.642m	Back_Curb
14	36.1223	13.4989	223.7847	4.641m	EPS_Sub
15	36.1221	13.4979	223.9847	4.642m	Ditch_In
16	35.2647	10.2098	230.7807	8.040m	Daylight

CHAINAGE 0+240.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	50.4843	34.1435	217.5061	-15.953m	Daylight
2	53.8885	26.3428	223.1802	-7.442m	EPS
3	53.8889	26.3419	222.9802	-7.441m	EPS_Sub
4	54.2885	25.4263	223.2202	-6.442m	Back_Curb
5	54.3485	25.2888	223.2202	-6.292m	Top_Curb
6	54.3652	25.2506	222.9952	-6.250m	Flowline_Gutter
7	54.5452	24.8381	222.6222	-5.800m	ETW_SubBase
8	54.5452	24.8381	223.0222	-5.800m	Flange
9	58.0649	16.7727	222.8022	3.000m	Flange

10	58.0649	16.7727	222.4022	3.000m	ETW_SubBase
11	58.2449	16.3603	222.7752	3.450m	Flowline_Gutter
12	58.2616	16.3221	223.0002	3.492m	Top_Curb
13	58.3216	16.1846	223.0002	3.642m	Back_Curb
14	58.7212	15.2690	222.7602	4.641m	EPS_Sub
15	58.7216	15.2680	222.9602	4.642m	Hinge
16	59.2759	13.9979	222.0363	6.028m	Daylight

CHAINAGE 0+260.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	58.3988	39.9058	217.4927	-14.725m	Daylight
2	64.8122	36.3874	222.3694	-7.410m	Hinge
3	64.8131	36.3869	222.1694	-7.409m	EPS_Sub
4	65.6889	35.9064	222.4094	-6.410m	Back_Curb
5	65.8204	35.8343	222.4094	-6.260m	Top_Curb
6	65.8570	35.8142	222.1844	-6.219m	Flowline_Gutter
7	66.2515	35.5978	222.2114	-5.769m	ETW
8	66.2515	35.5978	221.8114	-5.769m	ETW_SubBase
9	73.9384	31.3807	221.9922	2.999m	Flange
10	73.9384	31.3807	221.5922	2.999m	ETW_SubBase
11	74.3330	31.1643	221.9652	3.449m	Flowline_Gutter
12	74.3695	31.1442	222.1902	3.491m	Top_Curb
13	74.5010	31.0721	222.1902	3.641m	Back_Curb
14	75.3769	30.5916	221.9502	4.640m	EPS_Sub
15	75.3778	30.5911	222.1502	4.641m	Hinge_Cut
16	76.7344	29.8469	225.2449	6.188m	Daylight

CHAINAGE 0+280.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	71.0861	52.7702	222.9888	-5.927m	Daylight
2	71.8205	52.6612	221.5038	-5.185m	Ditch_In
3	71.8215	52.6610	221.3038	-5.184m	EPS_Sub
4	72.8097	52.5143	221.5438	-4.185m	Back_Curb
5	72.9581	52.4923	221.5438	-4.035m	Top_Curb
6	72.9993	52.4861	221.3188	-3.993m	Flowline_Gutter
7	73.4444	52.4201	221.3458	-3.543m	ETW
8	73.4444	52.4201	220.9458	-3.543m	ETW_SubBase
9	79.9165	51.4592	221.1822	3.000m	Flange
10	79.9165	51.4592	220.7822	3.000m	ETW_SubBase
11	80.3616	51.3931	221.1552	3.450m	Flowline_Gutter
12	80.4029	51.3870	221.3802	3.492m	Top_Curb

13	80.5513	51.3649	221.3802	3.642m	Back_Curb
14	81.5394	51.2182	221.1402	4.641m	EPS_Sub
15	81.5404	51.2181	221.3402	4.642m	Ditch_In
16	85.1532	50.6817	228.6450	8.294m	Daylight

CHAINAGE 0+300.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	74.0718	72.4334	222.4142	-5.509m	Daylight
2	74.9317	72.3229	220.6802	-4.642m	Ditch_In
3	74.9327	72.3228	220.4802	-4.641m	EPS_Sub
4	75.9235	72.1955	220.7202	-3.642m	Back_Curb
5	76.0723	72.1764	220.7202	-3.492m	Top_Curb
6	76.1137	72.1711	220.4952	-3.450m	Flowline_Gutter
7	76.5600	72.1138	220.5222	-3.000m	ETW
8	76.5600	72.1138	220.1222	-3.000m	ETW_SubBase
9	82.5111	71.3494	220.3722	3.000m	Flange
10	82.5111	71.3494	219.9722	3.000m	ETW_SubBase
11	82.9575	71.2921	220.3452	3.450m	Flowline_Gutter
12	82.9988	71.2868	220.5702	3.492m	Top_Curb
13	83.1476	71.2676	220.5702	3.642m	Back_Curb
14	84.1385	71.1404	220.3302	4.641m	EPS_Sub
15	84.1394	71.1403	220.5302	4.642m	Ditch_In
16	86.3323	70.8586	224.9519	6.853m	Daylight

CHAINAGE 0+320.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	74.5340	92.5602	217.8856	-7.618m	Daylight
2	77.4855	92.1725	219.8702	-4.641m	Hinge
3	77.4865	92.1724	219.6702	-4.640m	EPS_Sub
4	78.4770	92.0423	219.9102	-3.641m	Back_Curb
5	78.6257	92.0228	219.9102	-3.491m	Top_Curb
6	78.6671	92.0173	219.6852	-3.449m	Flowline_Gutter
7	79.1133	91.9587	219.7122	-2.999m	ETW
8	79.1133	91.9587	219.3122	-2.999m	ETW_SubBase
9	85.1423	91.1669	219.5601	3.082m	Flange
10	85.1423	91.1669	219.1601	3.082m	ETW_SubBase
11	85.5884	91.1083	219.5331	3.532m	Flowline_Gutter
12	85.6298	91.1029	219.7581	3.573m	Top_Curb
13	85.7785	91.0833	219.7581	3.723m	Back_Curb
14	86.7690	90.9533	219.5181	4.722m	EPS_Sub
15	86.7700	90.9531	219.7181	4.723m	Hinge_Cut

16	88.1786	90.7681	222.5595	6.144m	Daylight

CHAINAGE 0+340.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	74.3435	114.0528	214.4591	-11.543m	Daylight
2	81.0394	112.3806	219.0602	-4.642m	Hinge
3	81.0404	112.3803	218.8602	-4.641m	EPS_Sub
4	82.0097	112.1383	219.1002	-3.642m	Back_Curb
5	82.1552	112.1019	219.1002	-3.492m	Top_Curb
6	82.1956	112.0918	218.8752	-3.450m	Flowline_Gutter
7	82.6322	111.9828	218.9022	-3.000m	ETW
8	82.6322	111.9828	218.5022	-3.000m	ETW_SubBase
9	89.4775	110.2733	218.7258	4.055m	Flange
10	89.4775	110.2733	218.3258	4.055m	ETW_SubBase
11	89.9141	110.1643	218.6988	4.505m	Flowline_Gutter
12	89.9545	110.1542	218.9238	4.547m	Top_Curb
13	90.1001	110.1178	218.9238	4.697m	Back_Curb
14	91.0693	109.8758	218.6838	5.696m	EPS_Sub
15	91.0703	109.8756	218.8838	5.697m	Hinge_Cut
16	91.3703	109.8006	219.5022	6.006m	Daylight

CHAINAGE 0+360.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	80.4719	136.3316	212.1878	-13.735m	Daylight
2	88.5106	132.0805	218.2502	-4.642m	EPS
3	88.5115	132.0800	218.0502	-4.641m	EPS_Sub
4	89.3946	131.6130	218.2902	-3.642m	Back_Curb
5	89.5272	131.5428	218.2902	-3.492m	Top_Curb
6	89.5640	131.5233	218.0652	-3.450m	Flowline_Gutter
7	89.9618	131.3130	217.6922	-3.000m	ETW_SubBase
8	89.9618	131.3130	218.0922	-3.000m	Flange
9	96.1940	128.0172	217.9159	4.050m	Flange
10	96.1940	128.0172	217.5159	4.050m	ETW_SubBase
11	96.5918	127.8068	217.8889	4.500m	Flowline_Gutter
12	96.6287	127.7873	218.1139	4.542m	Top_Curb
13	96.7613	127.7172	218.1139	4.692m	Back_Curb
14	97.6444	127.2502	217.8739	5.691m	EPS_Sub
15	97.6453	127.2497	218.0739	5.692m	Hinge
16	97.6941	127.2239	218.0371	5.747m	Daylight

CHAINAGE 0+380.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	95.3214	153.9216	212.8080	-11.590m	Daylight
2	100.5422	149.3369	217.4402	-4.642m	Hinge
3	100.5430	149.3362	217.2402	-4.641m	EPS_Sub
4	101.2936	148.6770	217.4802	-3.642m	Back_Curb
5	101.4063	148.5780	217.4802	-3.492m	Top_Curb
6	101.4377	148.5505	217.2552	-3.450m	Flowline_Gutter
7	101.7758	148.2536	217.2822	-3.000m	ETW
8	101.7758	148.2536	216.8822	-3.000m	ETW_SubBase
9	107.0808	143.5949	217.1057	4.060m	Flange
10	107.0808	143.5949	216.7057	4.060m	ETW_SubBase
11	107.4189	143.2980	217.0787	4.510m	Flowline_Gutter
12	107.4503	143.2705	217.3037	4.552m	Top_Curb
13	107.5630	143.1715	217.3037	4.702m	Back_Curb
14	108.3136	142.5123	217.0637	5.701m	EPS_Sub
15	108.3144	142.5116	217.2637	5.702m	Hinge_Cut
16	108.6547	142.2128	218.1694	6.155m	Daylight

CHAINAGE 0+400.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	110.5300	168.5041	212.3577	-11.050m	Daylight
2	114.9272	163.8419	216.6302	-4.641m	Hinge
3	114.9279	163.8411	216.4302	-4.640m	EPS_Sub
4	115.6133	163.1144	216.6702	-3.641m	Back_Curb
5	115.7163	163.0052	216.6702	-3.491m	Top_Curb
6	115.7449	162.9749	216.4452	-3.450m	Flowline_Gutter
7	116.0536	162.6475	216.4722	-3.000m	ETW
8	116.0536	162.6475	216.0722	-3.000m	ETW_SubBase
9	120.1771	158.2755	216.3219	3.010m	Flange
10	120.1771	158.2755	215.9219	3.010m	ETW_SubBase
11	120.4858	157.9482	216.2949	3.460m	Flowline_Gutter
12	120.5144	157.9178	216.5199	3.502m	Top_Curb
13	120.6174	157.8087	216.5199	3.652m	Back_Curb
14	121.3028	157.0820	216.2799	4.651m	EPS_Sub
15	121.3035	157.0812	216.4799	4.652m	Hinge_Cut
16	122.0414	156.2988	218.6309	5.727m	Daylight

6.4. Vertikalni tok trase

Vertical Alignment: Niveleta
Description:
Station Range: Start: 0+000.00, End: 40+464.00

PVI	Station	Grade Out	Curve Length
0.00	0+000.00	-5.31%	
1.00	0+236.97	-4.05%	6.299m
	Vertical Curve Information:(sag curve) PVC Station: 0+233.82 Elevation: 223.167m PVI Station: 0+236.97 Elevation: 223.000m PVT Station: 0+240.12 Elevation: 222.872m Low Point: 0+240.12 Elevation: 222.872m Grade in: -5.31% Grade out: -4.05% Change: 1.26% K: Curve Length: 6.299m Headlight Distance:		
2.00	0+404.64		

7. LITERATURA

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