Idejno rješenje lokalne ceste

Đurečić, Matea

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SVEUČILIŠTE U SPLITU

FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE

ZAVRŠNI RAD

Matea Đurečič

Split, 2019.

SVEUČILIŠTE U SPLIT

FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE

IDEJNO RJEŠENJE LOKALNE CESTE

Završni rad

Split, 2019.

SVEUČILIŠTE U SPLITU FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE

Split, Matice hrvatske 15
STUDIJ: PREDDIPLOMSKI SVEUČILIŠNI STUDIJ GRAĐEVINARSTVA
KANDIDAT: Matea Đurečić
BROJ INDEKSA: 4385
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, travanj 2019.
Voditelj Završnog rada: Dr.sc. Dražen Cvitanić

Idejni projekt lokalne ceste

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 40km/h. Idejno rješenje izrađeno je prema Pravilniku o osnovnim uvjetima za projektiranje ceste.

Ključne riječi:

idejno rješenje, projektna brzina, os ceste, duljina prijelazne krivine, radijus 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 40 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

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1.0 PROGRAMSKI ZADATAK

SVEUČILIŠTE U SPLITU
FAKULTET GRAĐEVINARSTVA, ARHITEKTURE
I GEODEZIJE

Split, ak.god. 2017/2018.

Katedra za prometnice

Studij: Preddiplomski

Nastavni predmet: CESTE

Student/ica: Đurečić Matea

ZADATAK

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

Zadano je:

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

Idejni projekt treba sadržavati:

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

Predmetni nastavnik:

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

2. TEHNIČKI OPIS

OPĆENITO

Na priloženoj geodetskoj podlozi u mjerilu 1:1000 izrađen je idejni projekt ceste na dionici od točke A koja se nalazi na 175m nadmorske visine, do točke B koja se nalazi na 155m nadmorske visine.
Cesta je projektirana za prosječni godišnji dnevni promet od 950 voz/dan i to na brdovitom terenu.
Predviđena projektna brzina za ovu kategoriju ceste je vp=40 km/h. Duljina trase je 318,66 m.

HORIZONTALNI ELEMENTI

Za određenu kategoriju prema pravilniku, minimalni radijus krivine je 45 m, a prijelaznice 30m.
Trasa konstruirane ceste ima dužinu od 318,66 m, a sastoji se od tri pravca i dvije krivine. Prva krivina ima radijus R=50 m i duljinu prijelaznice L=40 m. Druga krivina ima radijus R=90 m i duljinu prijelaznice L=40 m. Svaka krivina je konstruirana pomoću dvije prijelazne krivine oblika klotoide i jednog kružnog luka. Proširenje kružnog luka za promet teretnih vozila s priključkom u prvoj krivini iznosi 1,68m, a u drugoj 0,93 m.

VERTIKALNI ELEMENTI

Maksimalni nagib nivelete je 12%, a minimalni radijus krivine 300 m.
U programu se tok sastoji od dva pravca i jedne krivine.
Nagib prvog pravca je 7,08% , a drugog 5,57%.
Tangenta krivine je dužine 134,69m , a radijus konveksne krivine 9000 m.

POPREČNI PRESJEK

Cesta ove kategorije ima dva kolnička traka širine svakog po 2,95 m, betonski rubni trak širine 0,20 m te bankine širine 1,0 m i nagiba 4% . Cesta se dijelom nalazi u zasjeku, usjeku i nasipu. Na usjecima se izvode rigoli za odvodnju vode i drenaža koja je postavljena u glinenu posteljicu. Nagibi usjeka su 2:1 , a nasipa 1:1,5.

KOLNIČKA KONSTRUKCIJA

Projektom je predviđena kolnička konstrukcija sa sljedećim slojevima:
- Asfalt- beton habajući sloj- AB11 u debljini od 4 cm
-Bitumenizirani nosivi sloj- BNS22 u debljini od 6 cm
-Mehanički zbijeni nosivi sloj-MZNS u debljini 30 cm.

ODVODNJA

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

3.0 GRAFIČKI PRILOZI

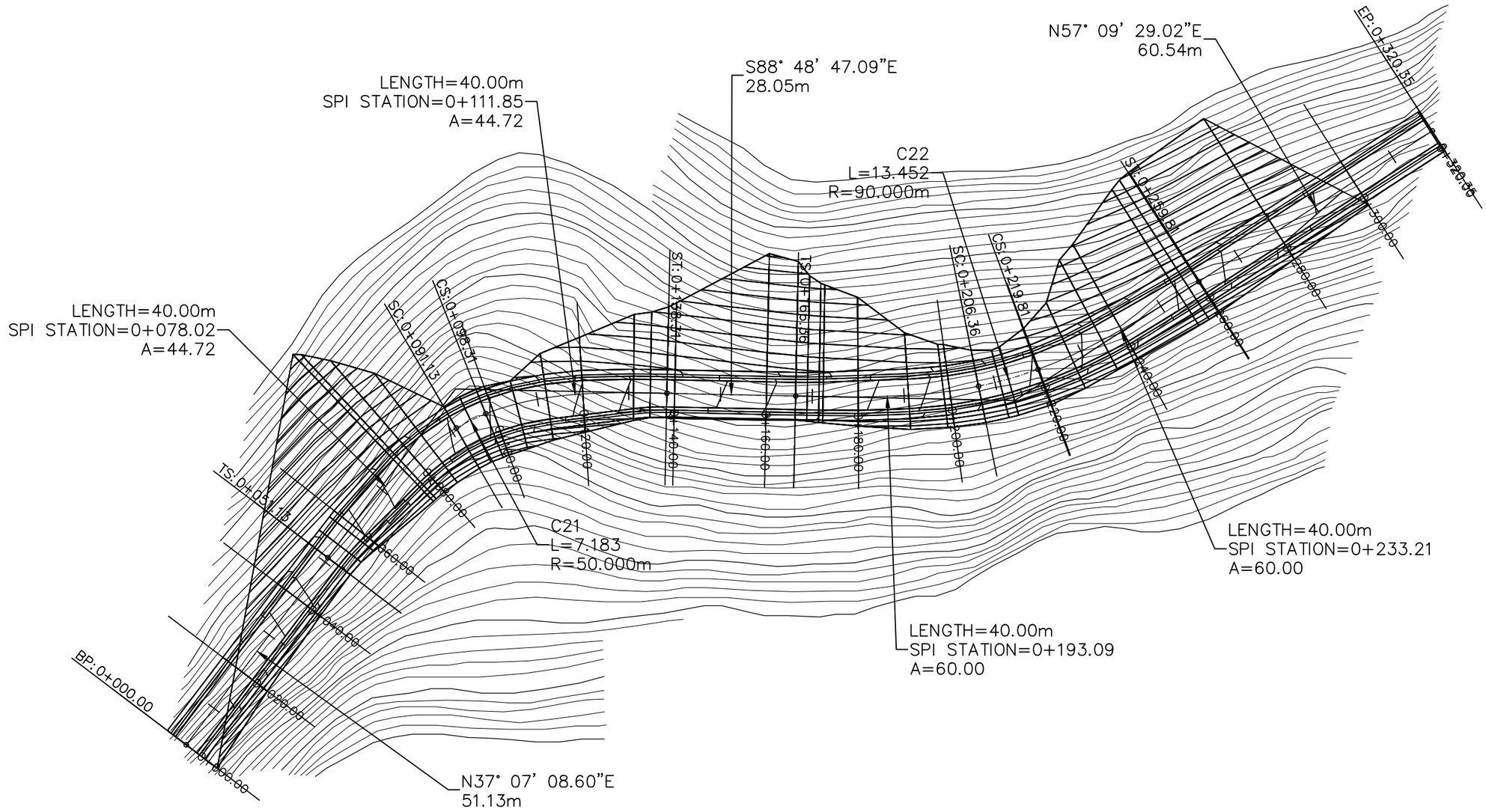
3.1 SITUACIJA M 1:1000

3.2 UZDUŽNI PRESJEK M 1.1000/100

3.3 NORMALNI POPREČNI PRESJEK M 1:50

3.4 KARAKTERISTIČNI POPREČNI PRESJECI M 1:200

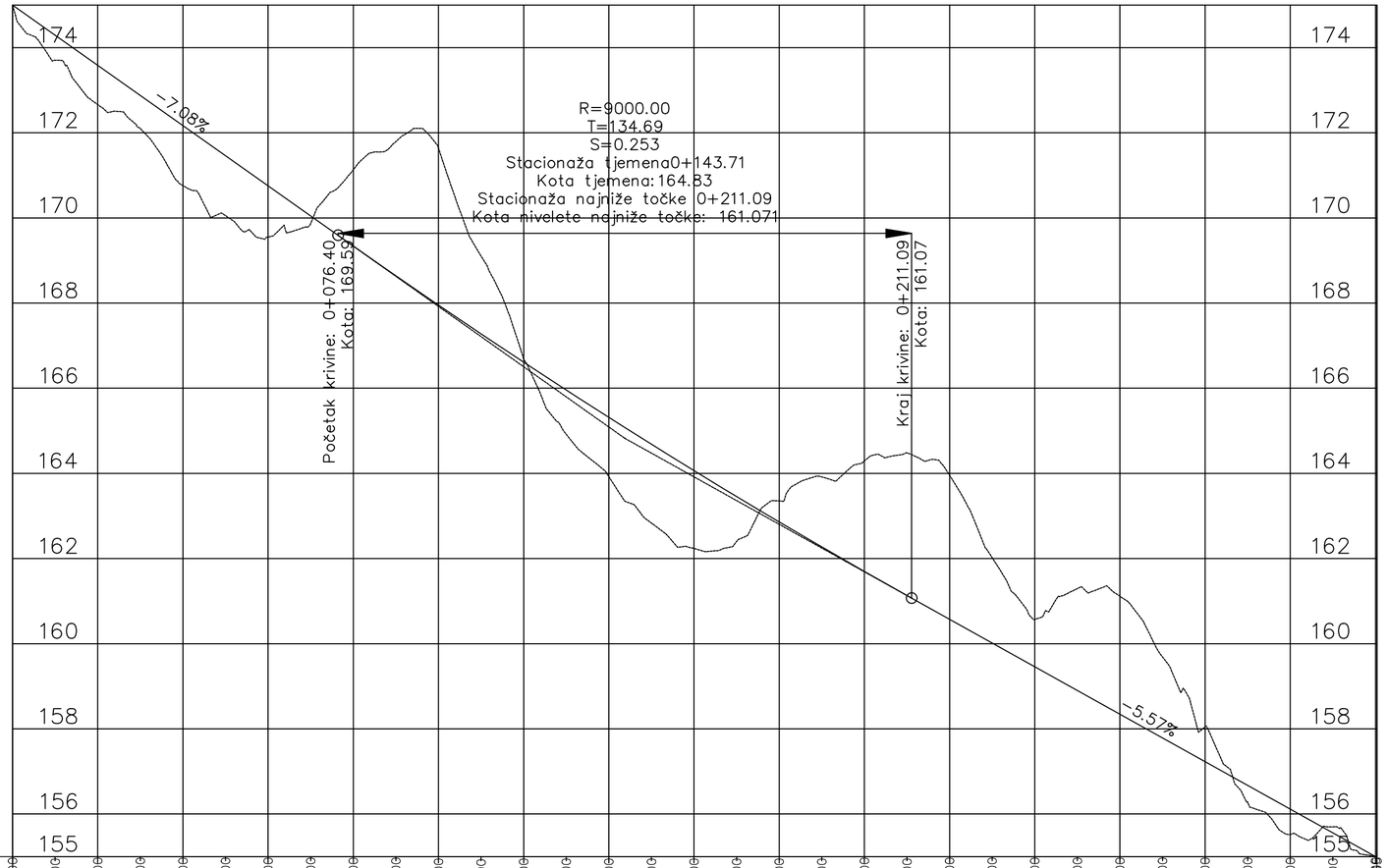
SITUACIJA
M 1:1000



SVEUČILIŠTE U SPLITU, FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE					ZAVRŠNI RAD
Faza	IDEJNO RJEŠENJE LOKALNE CESTE				CESTE
Sadržaj	SITUACIJA				
Mentor:	DRAŽEN CVITANIĆ				
STUDENTICA:	MATEA ĐURIČIĆ				
Godina:	2018./2019.	Mjerilo:	1:1000	br. nacrta	3.1

UZDUŽNI PRESJEK
M 1:1000/100

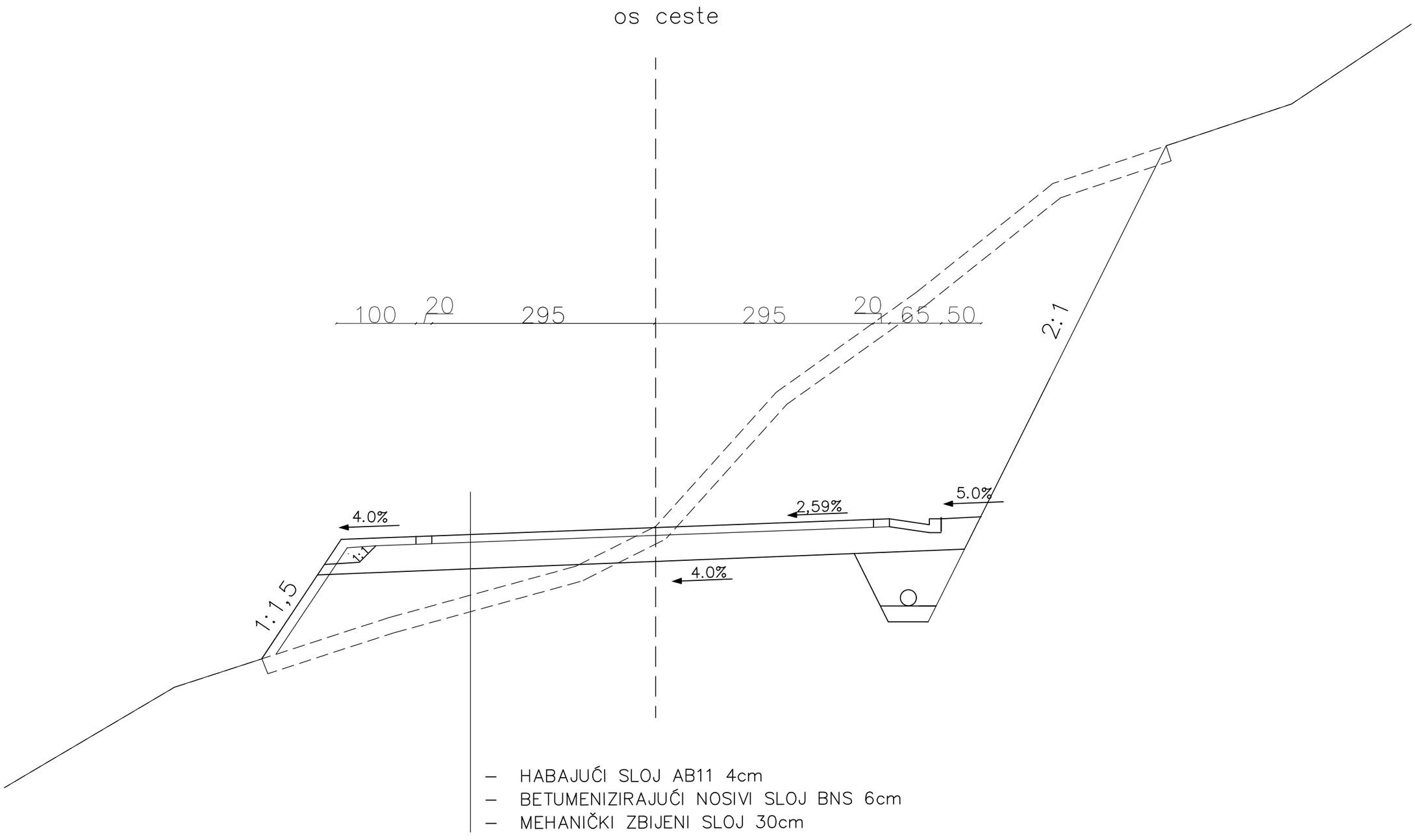
OS1 PROFILE



| | | |

NORMALNI POPREČNI PRESJEK

M 1:50



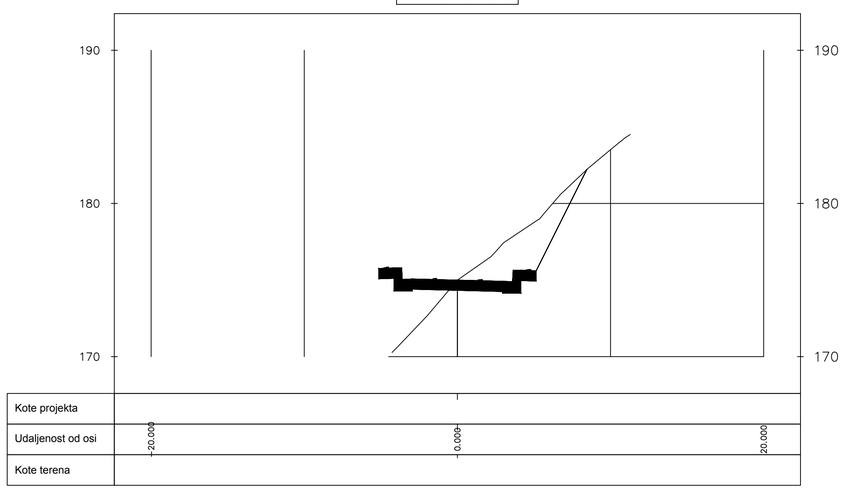
- HABAJUĆI SLOJ AB11 4cm
- BETUMENIZIRAJUĆI NOSIVI SLOJ BNS 6cm
- MEHANIČKI ZBIJENI SLOJ 30cm

	SVEUČILIŠTE U SPLITU, FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE				ZAVRŠNI RAD
Faza	IDEJNO RJEŠENJE LOKALNE CESTE				CESTE
Sadržaj	NORMALNI POPREČNI PRESJEK				
Mentor:	DRAŽEN CVITANIĆ				
STUDENTICA:	MATEA ĐURIČIĆ				
Godina:	2018./2019.	Mjerilo:	1:50	br. nacrta	3.3

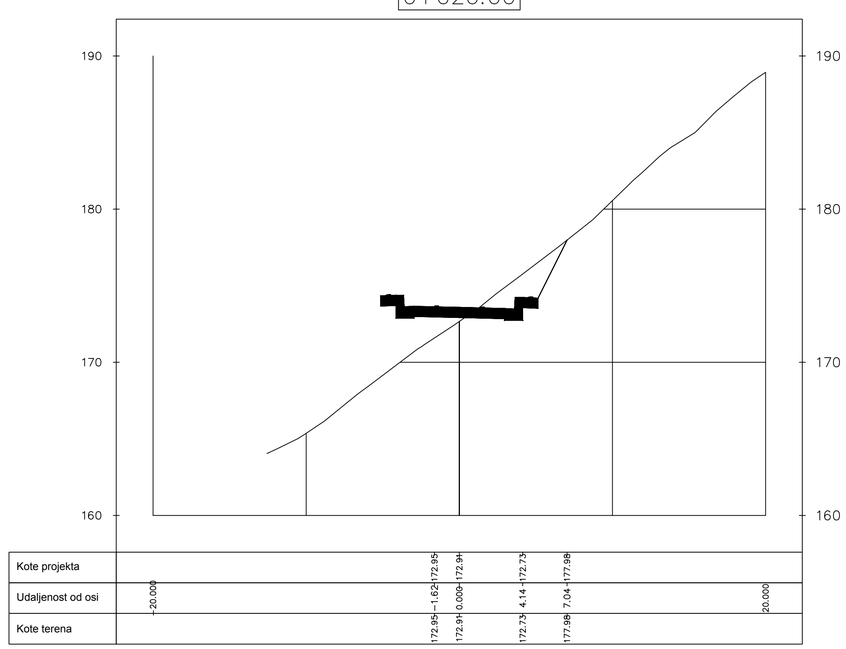
KARAKTERISTIČNI POPREČNI PRESJECI

M 1:200

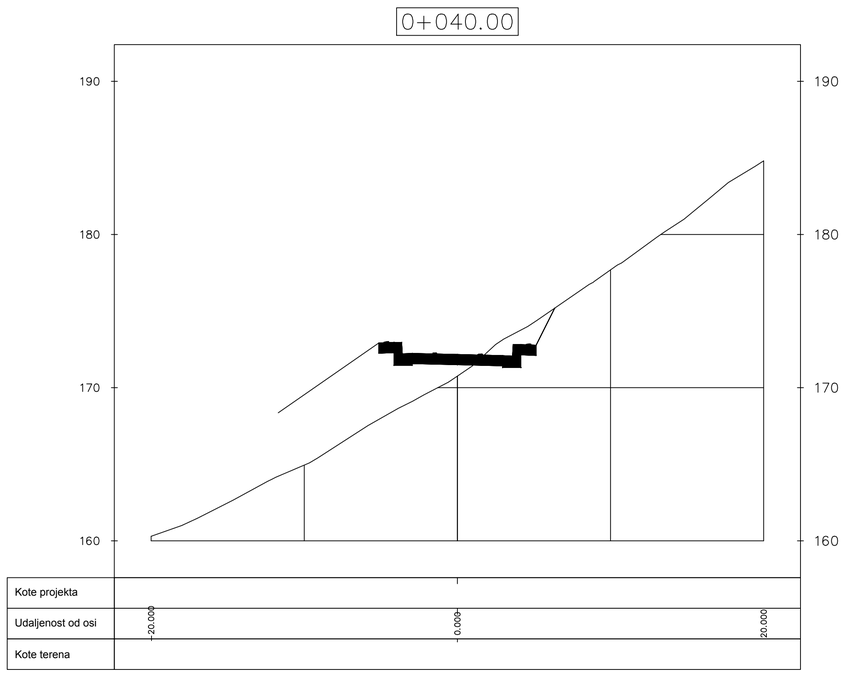
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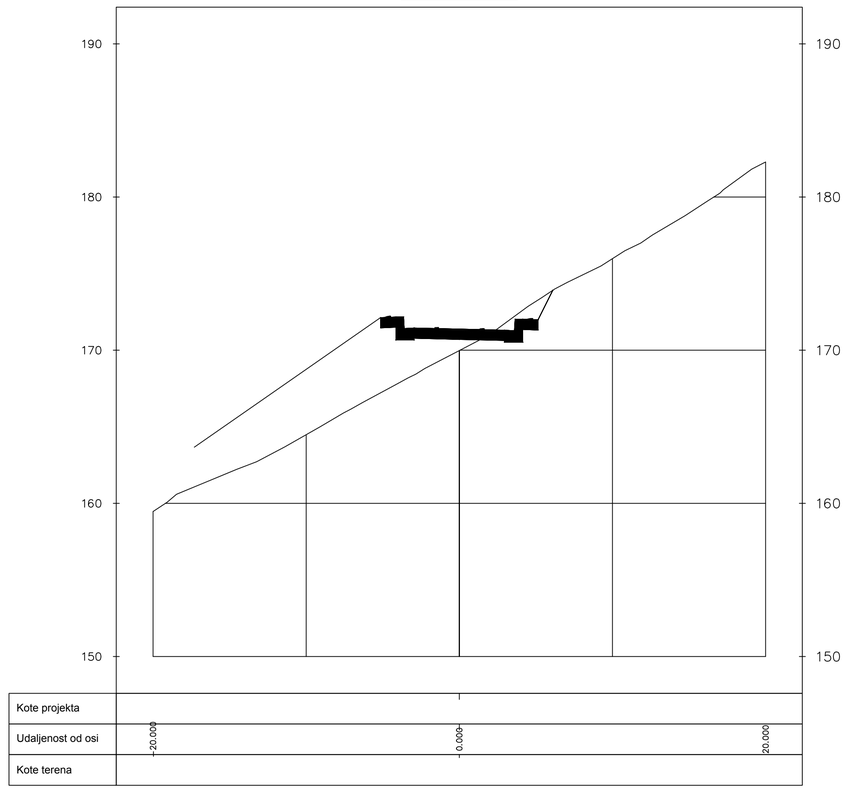
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0+040.00



0+051.13

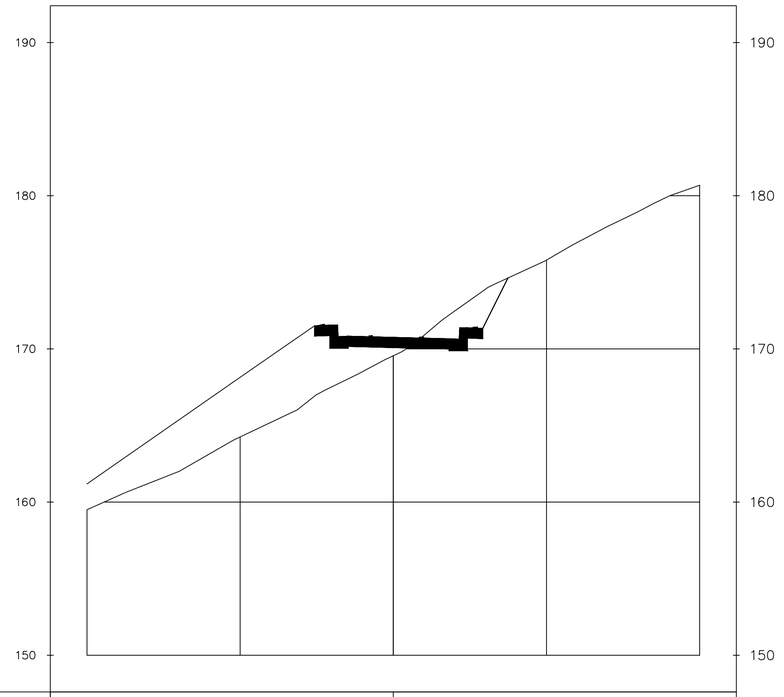


	SVEUČILIŠTE U SPLITU, FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE				ZAVRŠNI RAD
Faza	IDEJNO RJEŠENJE LOKALNE CESTE				CESTE
Sadržaj	KARAKTERISTIČNI POPREČNI PRESJECI				
Mentor:	DRAŽEN CVITANIĆ				
STUDENTICA:	MATEA ĐUREČIĆ				
Godina:	2018./2019.	Mjerilo:	1:200	br. nacrta	3.4

KARAKTERISTIČNI POPREČNI PRESJECI

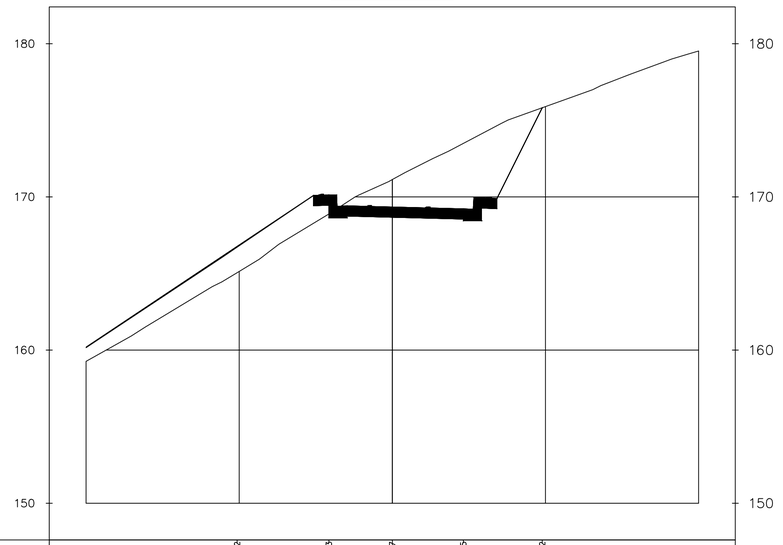
M 1:200

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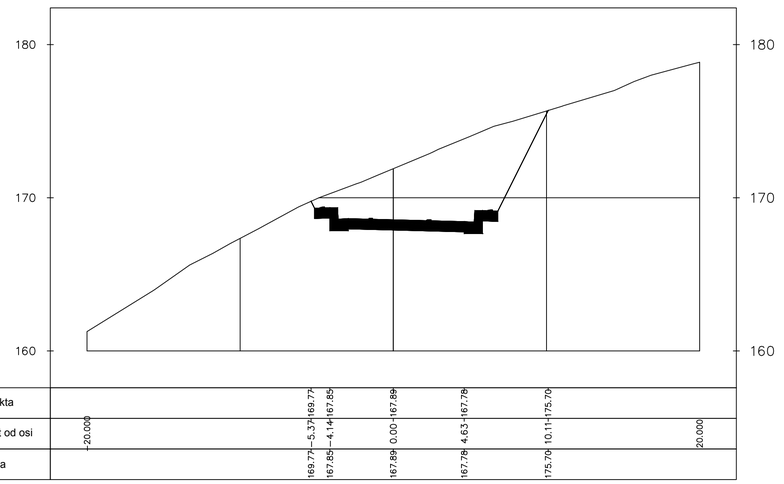
Kote projekta			
Udaljenost od osi	-20.000	0.000	20.000
Kote terena			

0+080.00



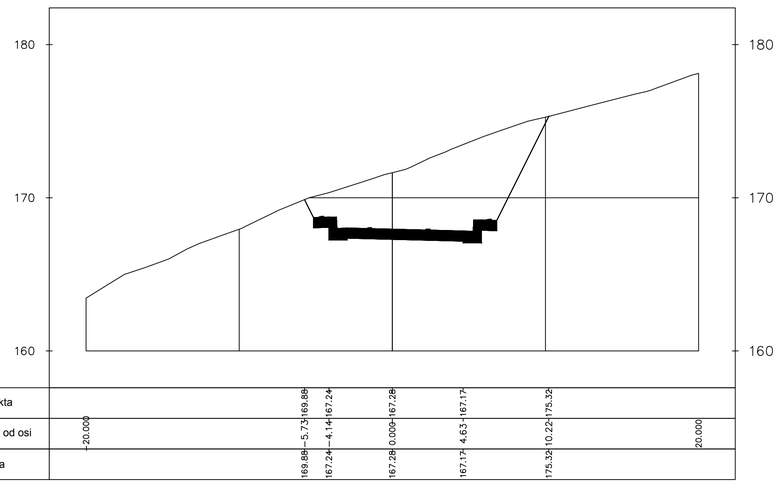
Kote projekta	160.156						
Udaljenost od osi	-20.000	-10.134	-4.14	0.000	4.64	9.79	20.000
Kote terena	160.16	166.72	168.63	168.67	168.55	175.82	

0+091.13



Kote projekta						
Udaljenost od osi	-20.000	-5.371	-4.14	0.00	4.63	10.11	20.000
Kote terena		169.77	167.85	167.89	167.78	175.70	

0+100.00



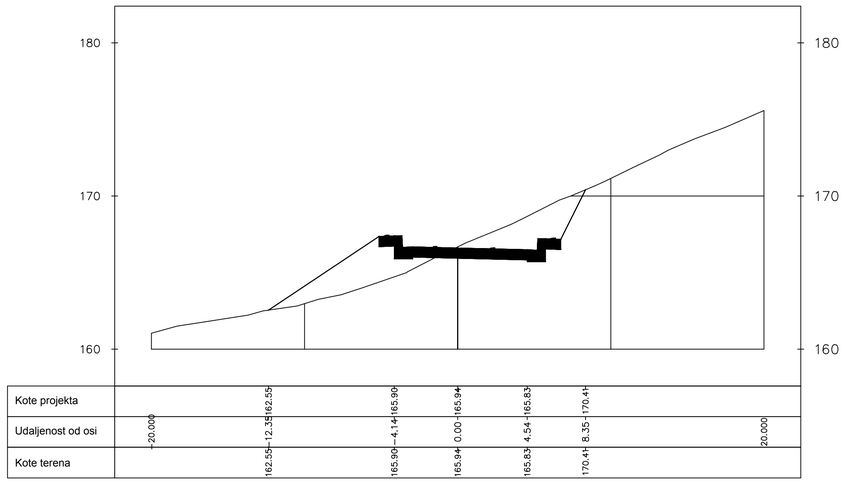
Kote projekta						
Udaljenost od osi	-20.000	-5.73	-4.14	0.000	4.63	10.22	20.000
Kote terena		169.88	167.24	167.28	167.17	175.32	

	SVEUČILIŠTE U SPLITU, FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE		ZAVRŠNI RAD
Faza	IDEJNO RJEŠENJE LOKALNE CESTE		CESTE
Sadržaj	KARAKTERISTIČNI POPREČNI PRESJECI		
Mentor	DRAŽEN CVITANIĆ		
STUDENTICA	MATEA ĐURAČIĆ		
Godina	2018./2019.	Mjerilo 1:200	br. nacrta 3.4

KARAKTERISTIČNI POPREČNI PRESJECI

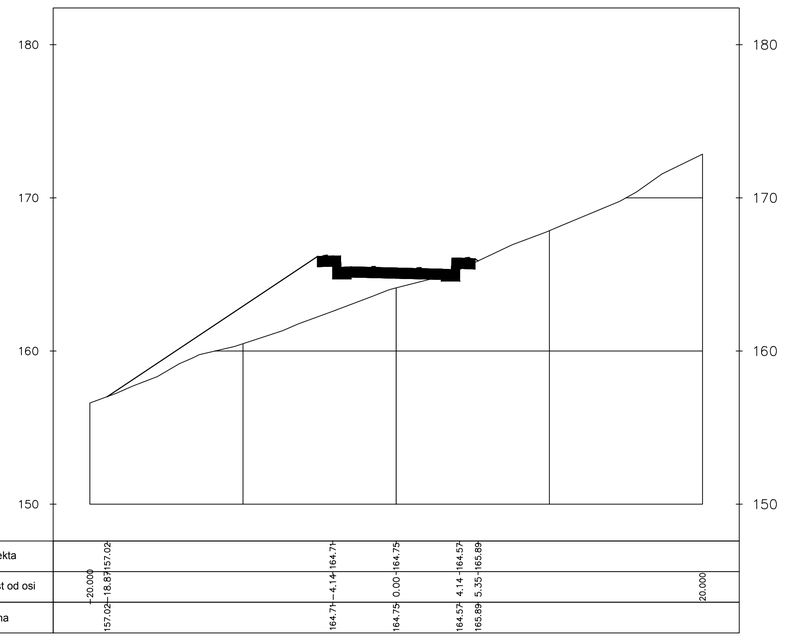
M 1:200

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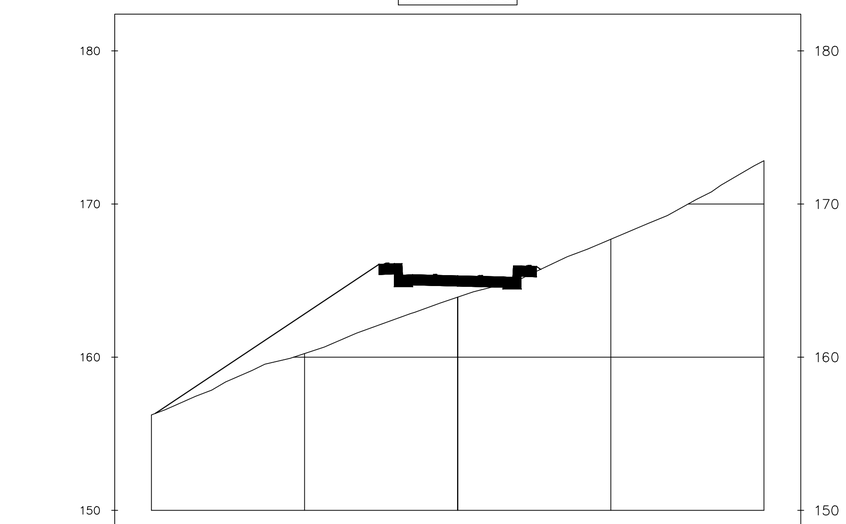
Kote projekta							
Udaljenost od osi	-20.000	-12.35	-4.14	0.00	4.54	8.35	20.000
Kote terena	162.55	162.55	165.90	165.94	165.83	170.41	

0+138.31



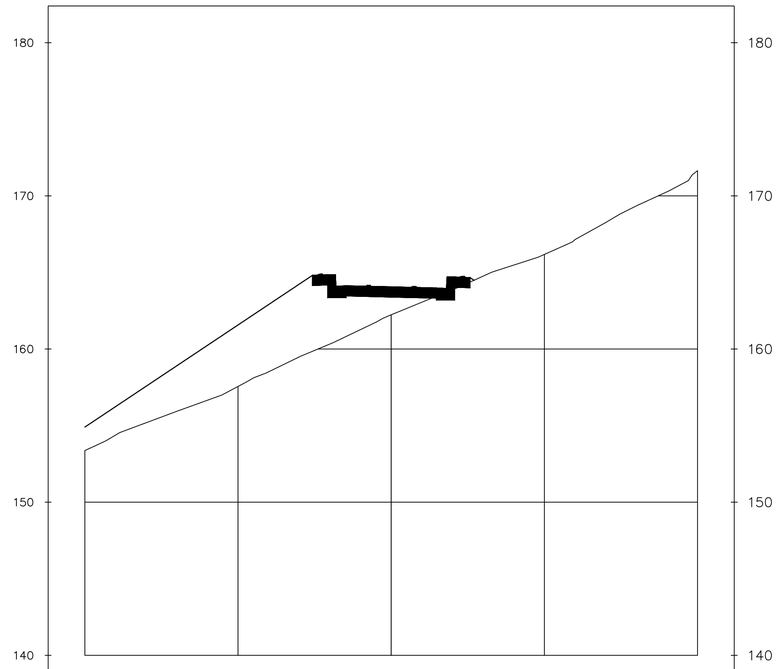
Kote projekta							
Udaljenost od osi	-20.000	-18.87	-4.14	0.00	4.14	5.35	20.000
Kote terena	157.02	157.02	164.71	164.75	164.57	165.89	

0+140.00



Kote projekta							
Udaljenost od osi	-20.000	-20.00	-4.14	0.00	4.14	5.41	20.000
Kote terena	156.34	156.34	164.61	164.65	164.46	165.74	

0+160.00



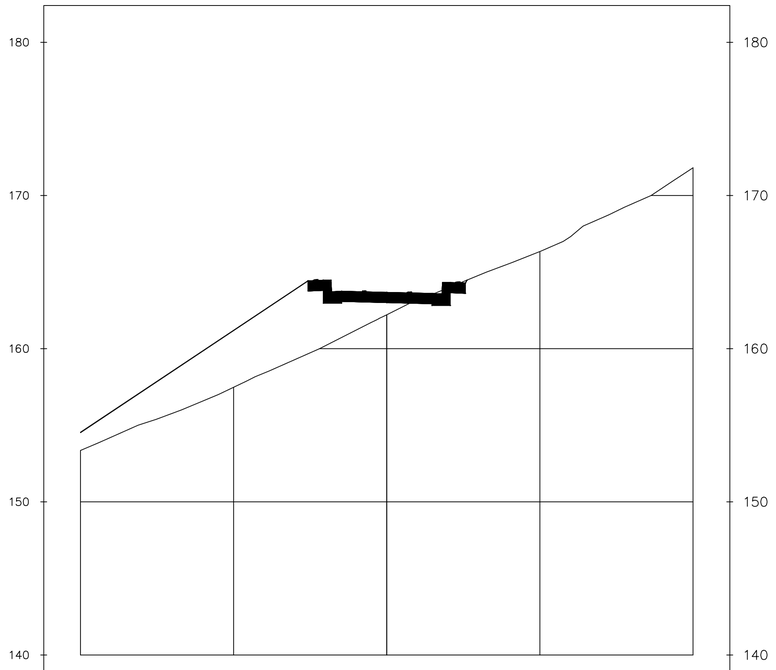
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Udaljenost od osi	-20.000		-4.14	0.00	4.14	5.40	20.000
Kote terena	154.91		163.36	163.39	163.21	164.49	

SVEUČILIŠTE U SPLITU, FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE		ZAVRŠNI RAD
Faza	IDEJNO RJEŠENJE LOKALNE CESTE	CESTE
Sadržaj	KARAKTERISTIČNI POPREČNI PRESJECI	
Mentor:	DRAŽEN CVITANIĆ	
STUDENTICA:	MATEA ĐURIČIĆ	
Godina	2018./2019.	Mjerilo: 1:200 Br. nacrta: 3.4

KARAKTERISTIČNI POPREČNI PRESJECI

M 1:200

0+166.36

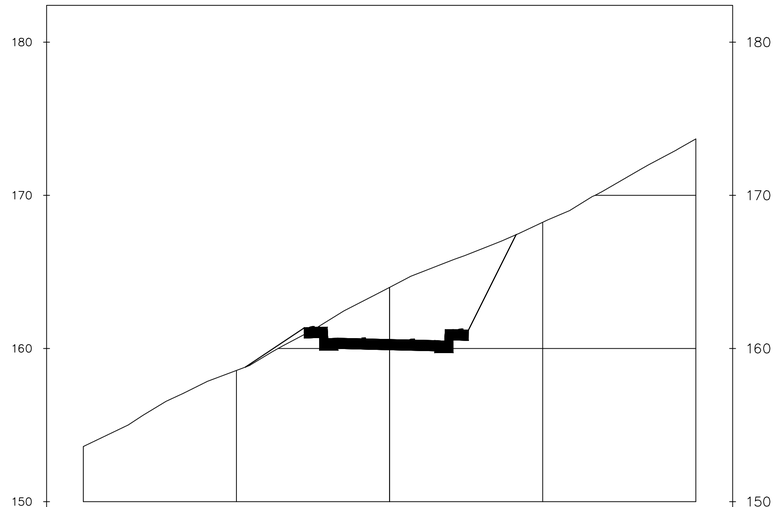


| | | |

KARAKTERISTIČNI POPREČNI PRESJECI

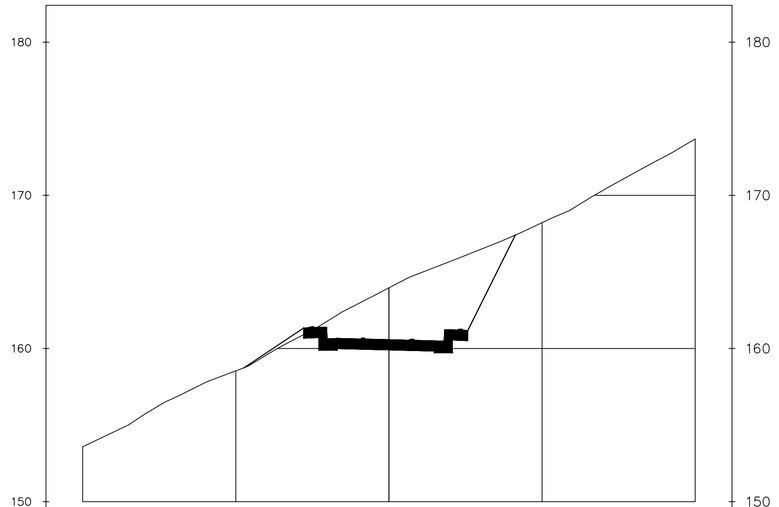
M 1:200

0+219.81



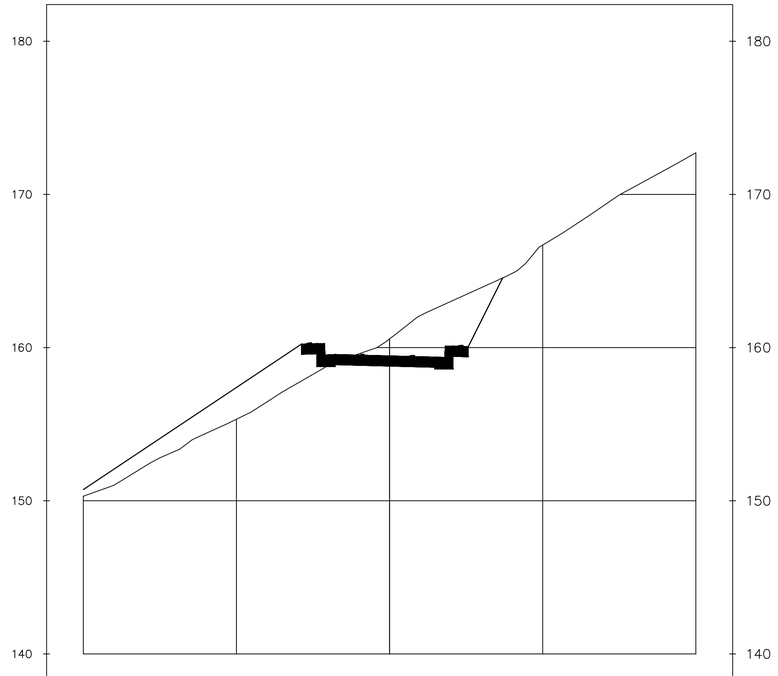
Kote projekta			158.79	160.00	159.91	159.73	167.43
Udaljenost od osi	-20.000		-9.41	-3.38	0.000	4.14	8.26	20.000
Kote terena			158.79	160.00	159.91	159.73	167.43	

0+220.00



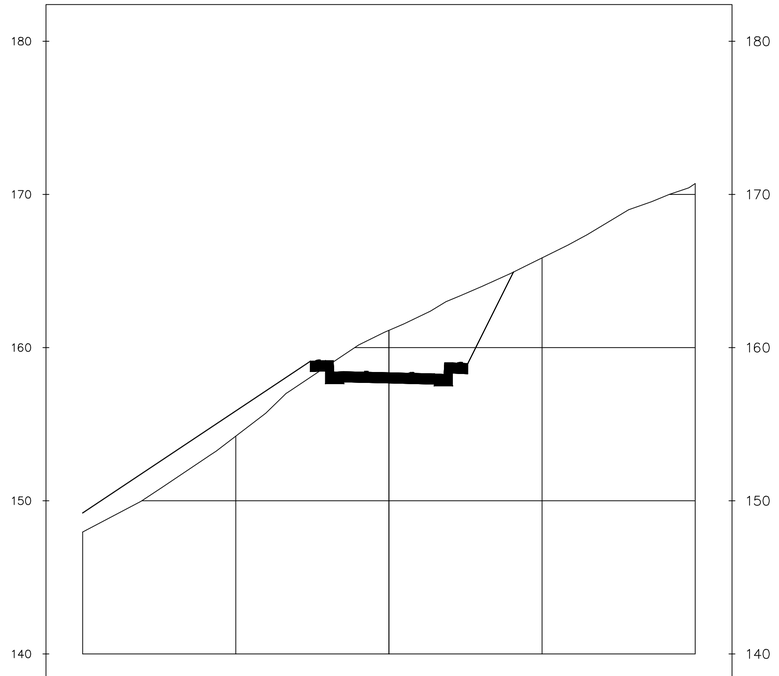
Kote projekta			158.74	159.99	159.90	159.72	167.41
Udaljenost od osi	-20.000		-9.47	-3.38	0.00	4.14	8.26	20.000
Kote terena			158.74	159.99	159.90	159.72	167.41	

0+240.00



Kote projekta	150.727			158.88	158.79	158.60	164.55
Udaljenost od osi	-20.000			-3.56	0.000	4.14	7.38	20.000
Kote terena	150.73			158.88	158.79	158.60	164.55	

0+259.81



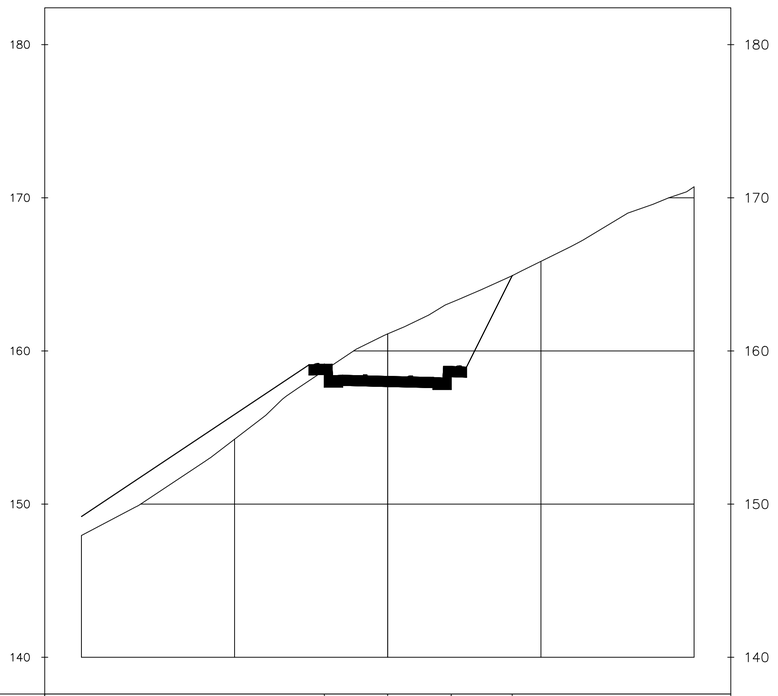
Kote projekta	149.201			157.65	157.68	157.50	164.93
Udaljenost od osi	-20.000			-4.14	0.000	4.14	8.13	20.000
Kote terena	149.20			157.65	157.68	157.50	164.93	

SVEUČILIŠTE U SPLITU, FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE		ZAVRŠNI RAD
Faza	IDEJNO RJEŠENJE LOKALNE CESTE	CESTE
Sadržaj	KARAKTERISTIČNI POPREČNI PRESJECI	
Mentor:	DRAŽEN CVITANIĆ	
STUDENTICA:	MATEA ĐURČIĆ	
Godina:	2018./2019.	Mjerilo: 1:200 Br. nacrta: 3.4

KARAKTERISTIČNI POPREČNI PRESJECI

M 1:200

0+260.00



| | | |

4.0 OBRADA NA RAČUNALU

Prilikom izrade predmetnog zadatka korišteno je računalo uz odgovarajući softver Autodesk AutoCAD Civil 3D. Postupak projektiranja trase na računalu sličan je ručnoj izradi rješenja ali mnogo brži. Radu na računalu prethodi definiranje problema, uočavanje nedostataka te određivanje načina na koje bi se idejno rješenje kvalitetno izradilo.

Prvi korak pri izradi idejnog rješenja na računalu je digitaliziranje terena na temelju zadanih slojnica. Unošenjem slojnica u obliku 3D polilinija sa zadanim nadmorskim visinama pomoću kojih definiramo površinu odnosno trodimenzionalni model terena postojećeg stanja na području obuhvaćenim predmetnim zadatkom.

Nakon toga se unose koordinate točaka tangenti (po dvije za svaku tangentu) koje ih definiraju na terenu. Sjecišta tangenti definiramo ubacivanjem odgovarajućih kružnih lukova i prijelaznih krivina čime se dobiva horizontalni tok ceste.

Sljedeći korak je izrada uzdužnog presjeka ceste. Linija terena se automatski generira iz zadane horizontalne osi ceste. Potrebno je definirati niveletu. Niveleta se postavlja tako da se u konačnici riješe geometrijski i sigurnosni elementi i odvodnja. Između tangenti se umeće kružna krivina radijusa prema potrebi.

Potrebno je definirati i poprečni profil prometnice. Poprečnim presjekom definirani su: poprečni nagib i širina kolnika te pokosi usjeka i nasipa.

Iz definirane osi trase, nivelete i poprečnog presjeka definiramo koridor. Ovime smo dobili poprečne presjeke u svim karakterističnim i zadanim točkama osi ceste, a time i točke spajanja pokosa usjeka i nasipa sa terenom. Ovime smo definirali čitavu dionicu ceste u prostoru.

Kao izlazni podaci dobivaju se računalni ispisi koordinatnih točaka osi, točaka svakog poprečnog presjeka te količina zemljanih radova po presjeku.

5.0 IZLAZNI PODACI PROGRAMA

5.1 KOORDINATNI RAČUN GLAVNIH TOČAKA OSI

Alignment: OS1
Description:

Tangent Data			
Description	**PT Station**	**Northing**	**Easting**
Start:	0+00.000	-9652.146	-52010.336
End:	0+51.128	-9611.377	-51979.482
Tangent Data			
Parameter	**Value**	**Parameter**	**Value**
Length:	51.128	Course:	N 37° 07' 08.5969" E
Spiral Point Data			
Description	**Station**	**Northing**	**Easting**
TS:	0+51.128	-9611.377	-51979.482
SPI:		-9589.933	-51963.252
SC:	0+91.128	-9583.171	-51951.522
Spiral Curve Data: clothoid			
Parameter	**Value**	**Parameter**	**Value**
Length:	40.000	L Tan:	26.894
Radius:	50.000	S Tan:	13.540
Theta:	22° 55' 05.9225"	P:	1.326
X:	39.365	K:	19.894
Y:	5.273	A:	44.721
Chord:	39.716	Course:	N 44° 44' 53.1747" E
Curve Point Data			
Description	**Station**	**Northing**	**Easting**
SC:	0+91.128	-9583.171	-51951.522
RP:		-9626.488	-51926.550
CS:	0+98.311	-9580.042	-51945.063
Circular Curve Data			
Parameter	**Value**	**Parameter**	**Value**
Delta:	08° 13' 52.4653"	Type:	RIGHT
Radius:	50.000		
Length:	7.183	Tangent:	3.598
Mid-Ord:	0.129	External:	0.129
Chord:	7.177	Course:	N 64° 09' 10.7521" E
Spiral Point Data			
Description	**Station**	**Northing**	**Easting**
CS:	0+98.311	-9580.042	-51945.063
SPI:		-9575.028	-51932.485
ST:	1+38.311	-9575.585	-51905.597
Spiral Curve Data: clothoid			
Parameter	**Value**	**Parameter**	**Value**
Length:	40.000	L Tan:	26.894
Radius:	50.000	S Tan:	13.540
Theta:	22° 55' 05.9225"	P:	1.326
X:	39.365	K:	19.894
Y:	5.273	A:	44.721
Chord:	39.716	Course:	N 83° 33' 28.3294" E

Tangent Data			
Description	**PT Station**	**Northing**	**Easting**
Start:	1+38.311	-9575.585	-51905.597
End:	1+66.357	-9576.166	-51877.558
Tangent Data			
Parameter	**Value**	**Parameter**	**Value**
Length:	28.046	Course:	S 88° 48' 47.0928" E
Spiral Point Data			
Description	**Station**	**Northing**	**Easting**
TS:	1+66.357	-9576.166	-51877.558
SPI:		-9576.720	-51850.828
SC:	2+06.357	-9574.039	-51837.702
Spiral Curve Data: clothoid			
Parameter	**Value**	**Parameter**	**Value**
Length:	40.000	L Tan:	26.736
Radius:	90.000	S Tan:	13.396
Theta:	12° 43' 56.6236"	P:	0.739
X:	39.803	K:	19.967
Y:	2.953	A:	60.000
Chord:	39.912	Course:	N 86° 56' 40.4278" E
Curve Point Data			
Description	**Station**	**Northing**	**Easting**
SC:	2+06.357	-9574.039	-51837.702
RP:		-9485.860	-51855.715
CS:	2+19.810	-9570.373	-51824.772
Circular Curve Data			
Parameter	**Value**	**Parameter**	**Value**
Delta:	08° 33' 50.6363"	Type:	LEFT
Radius:	90.000		
Length:	13.452	Tangent:	6.739
Mid-Ord:	0.251	External:	0.252
Chord:	13.440	Course:	N 74° 10' 20.9655" E
Spiral Point Data			
Description	**Station**	**Northing**	**Easting**
CS:	2+19.810	-9570.373	-51824.772
SPI:		-9565.767	-51812.192
ST:	2+59.810	-9551.268	-51789.729
Spiral Curve Data: clothoid			
Parameter	**Value**	**Parameter**	**Value**
Length:	40.000	L Tan:	26.736
Radius:	90.000	S Tan:	13.396
Theta:	12° 43' 56.6236"	P:	0.739
X:	39.803	K:	19.967
Y:	2.953	A:	60.000
Chord:	39.912	Course:	N 61° 24' 01.5032" E
Tangent Data			
Description	**PT Station**	**Northing**	**Easting**
Start:	2+59.810	-9551.268	-51789.729
End:	3+20.353	-9518.434	-51738.863
Tangent Data			
Parameter	**Value**	**Parameter**	**Value**
Length:	60.543	Course:	N 57° 09' 29.0238" E

Alignment: OS1-Left-2.950

Description:

Tangent Data			
Description	**PT Station**	**Northing**	**Easting**
Start:	0+00.000	-9650.366	-52012.689
End:	0+51.128	-9609.597	-51981.834
Tangent Data			
Parameter	**Value**	**Parameter**	**Value**
Length:	51.128	Course:	N 37° 07' 08.5969" E
Spiral Point Data			
Description	**Station**	**Northing**	**Easting**
TS:	0+51.128	-9609.597	-51981.834
SPI:		-9587.676	-51965.244
SC:	0+92.308	-9580.615	-51952.995
Spiral Curve Data: clothoid			
Parameter	**Value**	**Parameter**	**Value**
Length:	41.180	L Tan:	27.674
Radius:	52.950	S Tan:	13.927
Theta:	22° 16' 47.5989"	P:	1.327
X:	40.562	K:	20.487
Y:	5.280	A:	46.696
Chord:	40.886	Course:	N 44° 51' 28.1770" E
Curve Point Data			
Description	**Station**	**Northing**	**Easting**
SC:	0+92.308	-9580.615	-51952.995
RP:		-9626.488	-51926.550
CS:	0+99.915	-9577.301	-51946.155
Circular Curve Data			
Parameter	**Value**	**Parameter**	**Value**
Delta:	08° 13' 52.4653"	Type:	RIGHT
Radius:	52.950		
Length:	7.607	Tangent:	3.810
Mid-Ord:	0.137	External:	0.137
Chord:	7.600	Course:	N 64° 09' 10.7521" E
Spiral Point Data			
Description	**Station**	**Northing**	**Easting**
CS:	0+99.915	-9577.301	-51946.155
SPI:		-9572.067	-51933.022
ST:	1+41.095	-9572.636	-51905.536
Spiral Curve Data: clothoid			
Parameter	**Value**	**Parameter**	**Value**
Length:	41.180	L Tan:	27.674
Radius:	52.950	S Tan:	13.927
Theta:	22° 16' 47.5989"	P:	1.327
X:	40.562	K:	20.487
Y:	5.280	A:	46.696
Chord:	40.886	Course:	N 83° 26' 53.3272" E
Tangent Data			
Description	**PT Station**	**Northing**	**Easting**
Start:	1+41.095	-9572.636	-51905.536
End:	1+69.141	-9573.217	-51877.497
Tangent Data			
Parameter	**Value**	**Parameter**	**Value**
Length:	28.046	Course:	S 88° 48' 47.0928" E

Curve Point Data			
Description	**Station**	**Northing**	**Easting**
PC:	1+69.141	-9573.217	-51877.497
RP:		-9483.236	-51875.632
PT:	1+74.222	-9573.179	-51872.417
Circular Curve Data			
Parameter	**Value**	**Parameter**	**Value**
Delta:	03° 14' 04.4438"	Type:	LEFT
Radius:	90.000		
Length:	5.081	Tangent:	2.541
Mid-Ord:	0.036	External:	0.036
Chord:	5.080	Course:	N 89° 34' 10.6854" E
Tangent Data			
Description	**PT Station**	**Northing**	**Easting**
Start:	1+74.222	-9573.179	-51872.417
End:	1+93.475	-9572.491	-51853.176
Tangent Data			
Parameter	**Value**	**Parameter**	**Value**
Length:	19.253	Course:	N 87° 57' 08.4635" E
Curve Point Data			
Description	**Station**	**Northing**	**Easting**
PC:	1+93.475	-9572.491	-51853.176
RP:		-9482.548	-51856.392
PCC:	2+08.394	-9570.727	-51838.379
Circular Curve Data			
Parameter	**Value**	**Parameter**	**Value**
Delta:	09° 29' 52.1798"	Type:	LEFT
Radius:	90.000		
Length:	14.919	Tangent:	7.477
Mid-Ord:	0.309	External:	0.310
Chord:	14.902	Course:	N 83° 12' 12.3735" E
Curve Point Data			
Description	**Station**	**Northing**	**Easting**
PCC:	2+08.394	-9570.727	-51838.379
RP:		-9485.860	-51855.715
PCC:	2+21.341	-9567.199	-51825.934
Circular Curve Data			
Parameter	**Value**	**Parameter**	**Value**
Delta:	08° 33' 50.6363"	Type:	LEFT
Radius:	86.620		
Length:	12.947	Tangent:	6.486
Mid-Ord:	0.242	External:	0.242
Chord:	12.935	Course:	N 74° 10' 20.9655" E
Curve Point Data			
Description	**Station**	**Northing**	**Easting**
PCC:	2+21.341	-9567.199	-51825.934
RP:		-9482.686	-51856.877
PT:	2+36.260	-9560.935	-51812.413
Circular Curve Data			
Parameter	**Value**	**Parameter**	**Value**
Delta:	09° 29' 52.1654"	Type:	LEFT
Radius:	90.000		
Length:	14.919	Tangent:	7.477
Mid-Ord:	0.309	External:	0.310

Chord:	14.902	Course:	N 65° 08' 29.5647" E
Tangent Data			
Description	**PT Station**	**Northing**	**Easting**
Start:	2+36.260	-9560.935	-51812.413
End:	2+55.513	-9551.423	-51795.674
Tangent Data			
Parameter	**Value**	**Parameter**	**Value**
Length:	19.253	Course:	N 60° 23' 33.4820" E
Curve Point Data			
Description	**Station**	**Northing**	**Easting**
PC:	2+55.513	-9551.423	-51795.674
RP:		-9473.174	-51840.138
PT:	2+60.594	-9548.789	-51791.329
Circular Curve Data			
Parameter	**Value**	**Parameter**	**Value**
Delta:	03° 14' 04.4582"	Type:	LEFT
Radius:	90.000		
Length:	5.081	Tangent:	2.541
Mid-Ord:	0.036	External:	0.036
Chord:	5.080	Course:	N 58° 46' 31.2529" E
Tangent Data			
Description	**PT Station**	**Northing**	**Easting**
Start:	2+60.594	-9548.789	-51791.329
End:	3+21.137	-9515.956	-51740.463
Tangent Data			
Parameter	**Value**	**Parameter**	**Value**
Length:	60.543	Course:	N 57° 09' 29.0238" E

Alignment: OS1-Right-2.950
Description:

Tangent Data			
Description	**PT Station**	**Northing**	**Easting**
Start:	0+00.000	-9653.926	-52007.984
End:	0+51.128	-9613.158	-51977.130
Tangent Data			
Parameter	**Value**	**Parameter**	**Value**
Length:	51.128	Course:	N 37° 07' 08.5969" E
Curve Point Data			
Description	**Station**	**Northing**	**Easting**
PC:	0+51.128	-9613.158	-51977.130
RP:		-9643.331	-51937.260
PT:	0+58.374	-9607.716	-51972.354
Circular Curve Data			
Parameter	**Value**	**Parameter**	**Value**
Delta:	08° 18' 12.1721"	Type:	RIGHT
Radius:	50.000		
Length:	7.246	Tangent:	3.629
Mid-Ord:	0.131	External:	0.132
Chord:	7.240	Course:	N 41° 16' 14.6830" E
Tangent Data			
Description	**PT Station**	**Northing**	**Easting**
Start:	0+58.374	-9607.716	-51972.354

End:	0+76.657	-9594.884	-51959.332
Tangent Data			
Parameter	**Value**	**Parameter**	**Value**
Length:	18.282	Course:	N 45° 25' 20.7690" E
Curve Point Data			
Description	**Station**	**Northing**	**Easting**
PC:	0+76.657	-9594.884	-51959.332
RP:		-9630.499	-51924.238
PCC:	0+89.411	-9587.182	-51949.210
Circular Curve Data			
Parameter	**Value**	**Parameter**	**Value**
Delta:	14° 36' 53.7504"	Type:	RIGHT
Radius:	50.000		
Length:	12.754	Tangent:	6.412
Mid-Ord:	0.406	External:	0.409
Chord:	12.719	Course:	N 52° 43' 47.6442" E
Curve Point Data			
Description	**Station**	**Northing**	**Easting**
PCC:	0+89.411	-9587.182	-51949.210
RP:		-9626.488	-51926.550
PCC:	0+95.929	-9584.343	-51943.349
Circular Curve Data			
Parameter	**Value**	**Parameter**	**Value**
Delta:	08° 13' 52.4653"	Type:	RIGHT
Radius:	45.370		
Length:	6.518	Tangent:	3.265
Mid-Ord:	0.117	External:	0.117
Chord:	6.512	Course:	N 64° 09' 10.7521" E
Curve Point Data			
Description	**Station**	**Northing**	**Easting**
PCC:	0+95.929	-9584.343	-51943.349
RP:		-9630.789	-51924.836
PT:	1+08.683	-9581.174	-51931.030
Circular Curve Data			
Parameter	**Value**	**Parameter**	**Value**
Delta:	14° 36' 53.7504"	Type:	RIGHT
Radius:	50.000		
Length:	12.754	Tangent:	6.412
Mid-Ord:	0.406	External:	0.409
Chord:	12.719	Course:	N 75° 34' 33.8600" E
Tangent Data			
Description	**PT Station**	**Northing**	**Easting**
Start:	1+08.683	-9581.174	-51931.030
End:	1+26.965	-9578.909	-51912.889
Tangent Data			
Parameter	**Value**	**Parameter**	**Value**
Length:	18.282	Course:	N 82° 53' 00.7352" E
Curve Point Data			
Description	**Station**	**Northing**	**Easting**
PC:	1+26.965	-9578.909	-51912.889
RP:		-9628.524	-51906.694
PT:	1+34.211	-9578.535	-51905.659
Circular Curve Data			
Parameter	**Value**	**Parameter**	**Value**

Delta:	08° 18' 12.1721"	Type:	RIGHT
Radius:	50.000		
Length:	7.246	Tangent:	3.629
Mid-Ord:	0.131	External:	0.132
Chord:	7.240	Course:	N 87° 02' 06.8212" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	1+34.211	-9578.535	-51905.659
End:	1+62.257	-9579.116	-51877.619

Tangent Data

Parameter	Value	Parameter	Value
Length:	28.046	Course:	S 88° 48' 47.0928" E

Spiral Point Data

Description	Station	Northing	Easting
TS:	1+62.257	-9579.116	-51877.619
SPI:		-9579.676	-51850.560
SC:	2+02.912	-9576.929	-51837.112

Spiral Curve Data: clothoid

Parameter	Value	Parameter	Value
Length:	40.656	L Tan:	27.172
Radius:	92.950	S Tan:	13.614
Theta:	12° 31' 49.2538"	P:	0.740
X:	40.462	K:	20.295
Y:	2.954	A:	61.473
Chord:	40.566	Course:	N 86° 54' 37.1519" E

Curve Point Data

Description	Station	Northing	Easting
SC:	2+02.912	-9576.929	-51837.112
RP:		-9485.860	-51855.715
CS:	2+16.806	-9573.144	-51823.758

Circular Curve Data

Parameter	Value	Parameter	Value
Delta:	08° 33' 50.6363"	Type:	LEFT
Radius:	92.950		
Length:	13.893	Tangent:	6.960
Mid-Ord:	0.259	External:	0.260
Chord:	13.880	Course:	N 74° 10' 20.9655" E

Spiral Point Data

Description	Station	Northing	Easting
CS:	2+16.806	-9573.144	-51823.758
SPI:		-9568.424	-51810.869
ST:	2+57.461	-9553.746	-51788.130

Spiral Curve Data: clothoid

Parameter	Value	Parameter	Value
Length:	40.656	L Tan:	27.172
Radius:	92.950	S Tan:	13.614
Theta:	12° 31' 49.2538"	P:	0.740
X:	40.462	K:	20.295
Y:	2.954	A:	61.473
Chord:	40.566	Course:	N 61° 26' 04.7792" E

Tangent Data

Description	PT Station	Northing	Easting
Start:	2+57.461	-9553.746	-51788.130
End:	3+18.004	-9520.913	-51737.263

Tangent Data			
Parameter	**Value**	**Parameter**	**Value**
Length:	60.543	Course:	N 57° 09' 29.0238" E

5.2 KOORDINATNI RAČUN DETALJNIH TOČAKA OSI

Alignment Name: OS1
Description:
Station Range: Start: 0+000.00, End: 0+320.35
Station Increment: 20.00

Station	Northing	Easting	Tangential Direction
0+000.00	-9,652.1462m	-52,010.3364m	N37° 07' 09"E
0+020.00	-9,636.1986m	-51,998.2669m	N37° 07' 09"E
0+040.00	-9,620.2509m	-51,986.1975m	N37° 07' 09"E
0+060.00	-9,604.3386m	-51,974.0818m	N38° 14' 47"E
0+080.00	-9,589.6619m	-51,960.5398m	N49° 03' 33"E
0+100.00	-9,579.4426m	-51,943.4843m	N70° 09' 46"E
0+120.00	-9,575.7177m	-51,923.9027m	N86° 23' 02"E
0+140.00	-9,575.6204m	-51,903.9093m	S88° 48' 47"E
0+160.00	-9,576.0347m	-51,883.9135m	S88° 48' 47"E
0+180.00	-9,576.3315m	-51,863.9163m	N89° 42' 21"E
0+200.00	-9,575.1022m	-51,843.9687m	N82° 10' 48"E
0+220.00	-9,570.3077m	-51,824.5931m	N69° 46' 10"E
0+240.00	-9,561.7056m	-51,806.5630m	N60° 16' 51"E
0+260.00	-9,551.1646m	-51,789.5694m	N57° 09' 29"E
0+280.00	-9,540.3182m	-51,772.7660m	N57° 09' 29"E
0+300.00	-9,529.4717m	-51,755.9626m	N57° 09' 29"E
0+320.00	-9,518.6253m	-51,739.1592m	N57° 09' 29"E
0+320.35	-9,518.4354m	-51,738.8652m	N57° 09' 29"E

Alignment Name: OS1-Left-2.950
Description:
Station Range: Start: 0+000.00, End: 0+321.14
Station Increment: 20.00

Station	Northing	Easting	Tangential Direction
0+000.00	-9,650.3660m	-52,012.6887m	N37° 07' 09"E
0+020.00	-9,634.4183m	-52,000.6192m	N37° 07' 09"E
0+040.00	-9,618.4707m	-51,988.5498m	N37° 07' 09"E
0+060.00	-9,602.7148m	-51,976.5579m	N38° 10' 58"E
0+080.00	-9,588.0022m	-51,963.1207m	N48° 23' 05"E
0+100.00	-9,577.2690m	-51,946.0742m	N68° 21' 46"E
0+120.00	-9,572.9382m	-51,926.3243m	N85° 10' 22"E
0+140.00	-9,572.6141m	-51,906.6008m	S88° 49' 45"E
0+160.00	-9,573.0277m	-51,886.6356m	S88° 48' 47"E
0+180.00	-9,572.9724m	-51,866.6421m	N87° 57' 08"E
0+200.00	-9,572.0217m	-51,846.6690m	N83° 47' 53"E
0+220.00	-9,567.6507m	-51,827.1967m	N70° 46' 39"E
0+240.00	-9,559.0872m	-51,809.1610m	N60° 23' 33"E
0+260.00	-9,549.1098m	-51,791.8293m	N57° 32' 10"E
0+280.00	-9,538.2650m	-51,775.0248m	N57° 09' 29"E
0+300.00	-9,527.4186m	-51,758.2214m	N57° 09' 29"E
0+320.00	-9,516.5721m	-51,741.4180m	N57° 09' 29"E
0+321.14	-9,515.9555m	-51,740.4628m	N57° 09' 29"E

Alignment Name: OS1-Right-2.950
Description:
Station Range: Start: 0+000.00, End: 0+318.00
Station Increment: 20.00

Station	Northing	Easting	Tangential Direction
0+000.00	-9,653.9265m	-52,007.9841m	N37° 07' 09"E
0+020.00	-9,637.9788m	-51,995.9147m	N37° 07' 09"E
0+040.00	-9,622.0311m	-51,983.8452m	N37° 07' 09"E
0+060.00	-9,606.5753m	-51,971.1962m	N45° 25' 21"E
0+080.00	-9,592.6191m	-51,956.8735m	N49° 15' 12"E
0+100.00	-9,582.9907m	-51,939.5096m	N72° 56' 02"E
0+120.00	-9,579.7722m	-51,919.8001m	N82° 53' 01"E
0+140.00	-9,578.6547m	-51,899.8710m	S88° 48' 47"E
0+160.00	-9,579.0690m	-51,879.8753m	S88° 48' 47"E
0+180.00	-9,579.2311m	-51,860.0388m	N88° 45' 43"E
0+200.00	-9,577.4759m	-51,840.0167m	N80° 12' 48"E
0+220.00	-9,571.9775m	-51,820.7331m	N67° 58' 06"E
0+240.00	-9,562.9281m	-51,802.7913m	N59° 30' 24"E
0+260.00	-9,552.3697m	-51,785.9967m	N57° 09' 29"E
0+280.00	-9,541.5232m	-51,769.1933m	N57° 09' 29"E
0+300.00	-9,530.6767m	-51,752.3899m	N57° 09' 29"E
0+318.00	-9,520.9149m	-51,737.2668m	N57° 09' 29"E

5.3 RAČUN KOTA KOLNIKA

Corridor Name: KORIDOR
Description:
Base Alignment Name: OS1
Station Range: Start: 0+000.00, End: 0+320.35

CHAINAGE 0+000.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	-52,014.4363	-9,649.0434	175.7512	-5.142m	Hinge_Cut
2	-52,014.4355	-9,649.0440	175.0812	-5.141m	EPS_Sub
3	-52,013.6389	-9,649.6468	175.7912	-4.142m	Back_Curb
4	-52,013.2402	-9,649.9486	175.7912	-3.642m	Top_Curb
5	-52,013.2070	-9,649.9737	175.0412	-3.600m	Flowline_Gutter
6	-52,012.6887	-9,650.3660	175.0737	-2.950m	ETW
7	-52,012.6887	-9,650.3660	174.4037	-2.950m	ETW_SubBase
8	-52,007.9841	-9,653.9265	174.2563	2.950m	ETW_SubBase
9	-52,007.9841	-9,653.9265	174.9263	2.950m	Flange
10	-52,007.4658	-9,654.3187	174.8938	3.600m	Flowline_Gutter
11	-52,007.4326	-9,654.3439	175.6438	3.642m	Top_Curb
12	-52,007.0339	-9,654.6456	175.6438	4.142m	Back_Curb
13	-52,006.2373	-9,655.2485	174.9338	5.141m	EPS_Sub
14	-52,006.2365	-9,655.2491	175.6038	5.142m	EPS
15	-52,003.5978	-9,657.2461	182.2222	8.451m	Daylight

CHAINAGE 0+025.00

CHAINAGE 0+050.00

CHAINAGE 0+075.00

CHAINAGE 0+100.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	-51,945.4286	-9,574.0532	169.8776	-5.729m	Daylight
2	-51,945.2293	-9,574.6056	168.7030	-5.142m	EPS
3	-51,945.2289	-9,574.6065	168.0330	-5.141m	EPS_Sub
4	-51,944.8899	-9,575.5463	168.7430	-4.142m	Back_Curb
5	-51,944.7202	-9,576.0166	168.7430	-3.642m	Top_Curb
6	-51,944.7061	-9,576.0558	167.9930	-3.600m	Flowline_Gutter
7	-51,944.4855	-9,576.6672	168.0255	-2.950m	ETW
8	-51,944.4855	-9,576.6672	167.3555	-2.950m	ETW_SubBase
9	-51,941.9138	-9,583.7960	167.1660	4.628m	ETW_SubBase
10	-51,941.9138	-9,583.7960	167.8360	4.628m	ETW
11	-51,941.6932	-9,584.4074	167.8035	5.278m	Flowline_Gutter
12	-51,941.6790	-9,584.4467	168.5535	5.320m	Top_Curb
13	-51,941.5094	-9,584.9170	168.5535	5.820m	Back_Curb
14	-51,941.1704	-9,585.8567	167.8435	6.819m	EPS_Sub
15	-51,941.1700	-9,585.8576	168.5135	6.820m	Hinge_Cut
16	-51,940.0157	-9,589.0573	175.3165	10.221m	Daylight

CHAINAGE 0+125.00

CHAINAGE 0+150.00

CHAINAGE 0+175.00

CHAINAGE 0+200.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	-51,845.3620	-9,564.9570	159.3477	-10.240m	Daylight
2	-51,844.7273	-9,569.5785	162.4576	-5.575m	Hinge
3	-51,844.7272	-9,569.5795	161.7876	-5.574m	EPS_Sub
4	-51,844.5912	-9,570.5692	162.4976	-4.575m	Back_Curb
5	-51,844.5232	-9,571.0646	162.4976	-4.075m	Top_Curb
6	-51,844.5175	-9,571.1059	161.7476	-4.034m	Flowline_Gutter
7	-51,844.4291	-9,571.7499	161.7801	-3.384m	ETW
8	-51,844.4291	-9,571.7499	161.1101	-3.384m	ETW_SubBase
9	-51,843.5674	-9,578.0244	161.6217	2.950m	Flange
10	-51,843.5674	-9,578.0244	160.9517	2.950m	ETW_SubBase
11	-51,843.4789	-9,578.6684	161.5892	3.600m	Flowline_Gutter
12	-51,843.4732	-9,578.7097	162.3392	3.641m	Top_Curb
13	-51,843.4052	-9,579.2050	162.3392	4.141m	Back_Curb
14	-51,843.2693	-9,580.1947	161.6292	5.140m	EPS_Sub
15	-51,843.2692	-9,580.1957	162.2992	5.141m	Hinge_Cut
16	-51,842.8994	-9,582.8880	167.7343	7.859m	Daylight

CHAINAGE 0+225.00

CHAINAGE 0+250.00

CHAINAGE 0+275.00

CHAINAGE 0+300.00

POINT	X	Y	Z	OFFSET	STRING CUT
1	-51,758.7511	-9,525.1518	156.8660	-5.142m	EPS
2	-51,758.7506	-9,525.1527	156.1960	-5.141m	EPS_Sub
3	-51,758.2088	-9,525.9920	156.9060	-4.142m	Back_Curb
4	-51,757.9376	-9,526.4121	156.9060	-3.642m	Top_Curb
5	-51,757.9150	-9,526.4471	156.1560	-3.600m	Flowline_Gutter
6	-51,757.5625	-9,526.9932	156.1885	-2.950m	ETW
7	-51,757.5625	-9,526.9932	155.5185	-2.950m	ETW_SubBase
8	-51,754.3628	-9,531.9502	156.0410	2.950m	Flange
9	-51,754.3628	-9,531.9502	155.3710	2.950m	ETW_SubBase
10	-51,754.0103	-9,532.4963	156.0085	3.600m	Flowline_Gutter
11	-51,753.9877	-9,532.5314	156.7585	3.642m	Top_Curb
12	-51,753.7165	-9,532.9514	156.7585	4.142m	Back_Curb
13	-51,753.1747	-9,533.7908	156.0485	5.141m	EPS_Sub
14	-51,753.1742	-9,533.7916	156.7185	5.142m	EPS
15	-51,752.6883	-9,534.5444	158.5105	6.038m	Daylight

5.4 PRORAČUN KOLIČINA ZEMLJANIH RADOVA

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	7075.50	6614.83	7414.47	799.64<Fill>

Totals

	2d Area (sq.m)	**Cut** (Cu. M.)	**Fill** (Cu. M.)	**Net** (Cu. M.)
Total	7075.50	6614.83	7414.47	799.64<Fill>

5.5 PRORAČUN KOLIČINA RADOVA

Alignment: OS1
Sample Line Group: PRESJECI
Start Sta: 0+000.000
End Sta: 0+320.353

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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0+020.000	10.48	104.82	104.82	1.37	13.72	104.82	104.82	13.72	91.11
0+040.000	0.00	104.82	104.82	0.00	13.72	209.65	209.65	27.44	182.21
0+051.128	0.00	0.00	0.00	0.00	0.00	209.65	209.65	27.44	182.21
0+051.130	0.00	0.00	0.00	0.00	0.00	209.65	209.65	27.44	182.21
0+060.000	0.00	0.00	0.00	0.00	0.00	209.65	209.65	27.44	182.21
0+080.000	41.76	402.77	402.77	22.16	245.68	612.42	612.42	273.12	339.30
0+091.128	60.84	538.81	538.81	0.00	147.76	1151.24	1151.24	420.88	730.36
0+100.000	66.56	533.60	533.60	0.00	0.00	1684.84	1684.84	420.88	1263.96
0+120.000	17.59	805.41	805.41	15.54	170.26	2490.25	2490.25	591.14	1899.11
0+138.310	0.85	165.48	165.48	34.89	477.32	2655.73	2655.73	1068.46	1587.27
0+140.000	0.74	1.34	1.34	37.32	61.01	2657.07	2657.07	1129.47	1527.60
0+160.000	0.73	14.69	14.69	63.55	1008.66	2671.76	2671.76	2138.13	533.63
0+166.357	2.18	9.26	9.26	57.22	383.88	2681.02	2681.02	2522.01	159.01
0+166.360	0.00	0.00	0.00	0.00	0.08	2681.02	2681.02	2522.10	158.93
0+180.000	13.57	93.03	93.03	31.14	208.24	2774.06	2774.06	2730.34	43.72
0+200.000	37.76	520.89	520.89	2.44	313.74	3294.94	3294.94	3044.08	250.86
0+206.357	43.76	264.36	264.36	0.41	8.41	3559.30	3559.30	3052.49	506.81
0+219.810	47.77	628.80	628.80	0.81	7.63	4188.10	4188.10	3060.13	1127.98
0+220.000	47.55	9.08	9.08	0.81	0.15	4197.18	4197.18	3060.28	1136.90
0+240.000	24.51	733.88	733.88	24.30	228.38	4931.06	4931.06	3288.66	1642.40
0+259.810	40.29	646.23	646.23	23.16	454.69	5577.28	5577.28	3743.34	1833.94
0+259.810	0.00	0.01	0.01	0.00	0.00	5577.29	5577.29	3743.35	1833.95
0+260.000	40.30	3.83	3.83	22.98	2.18	5581.12	5581.12	3745.53	1835.59
0+280.000	17.70	579.94	579.94	31.26	542.47	6161.06	6161.06	4288.00	1873.06
0+300.000	0.00	176.96	176.96	0.00	312.63	6338.03	6338.03	4600.64	1737.39
0+320.353	0.00	0.00	0.00	0.00	0.00	6338.03	6338.03	4600.64	1737.39

6.0 LITERATURA

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