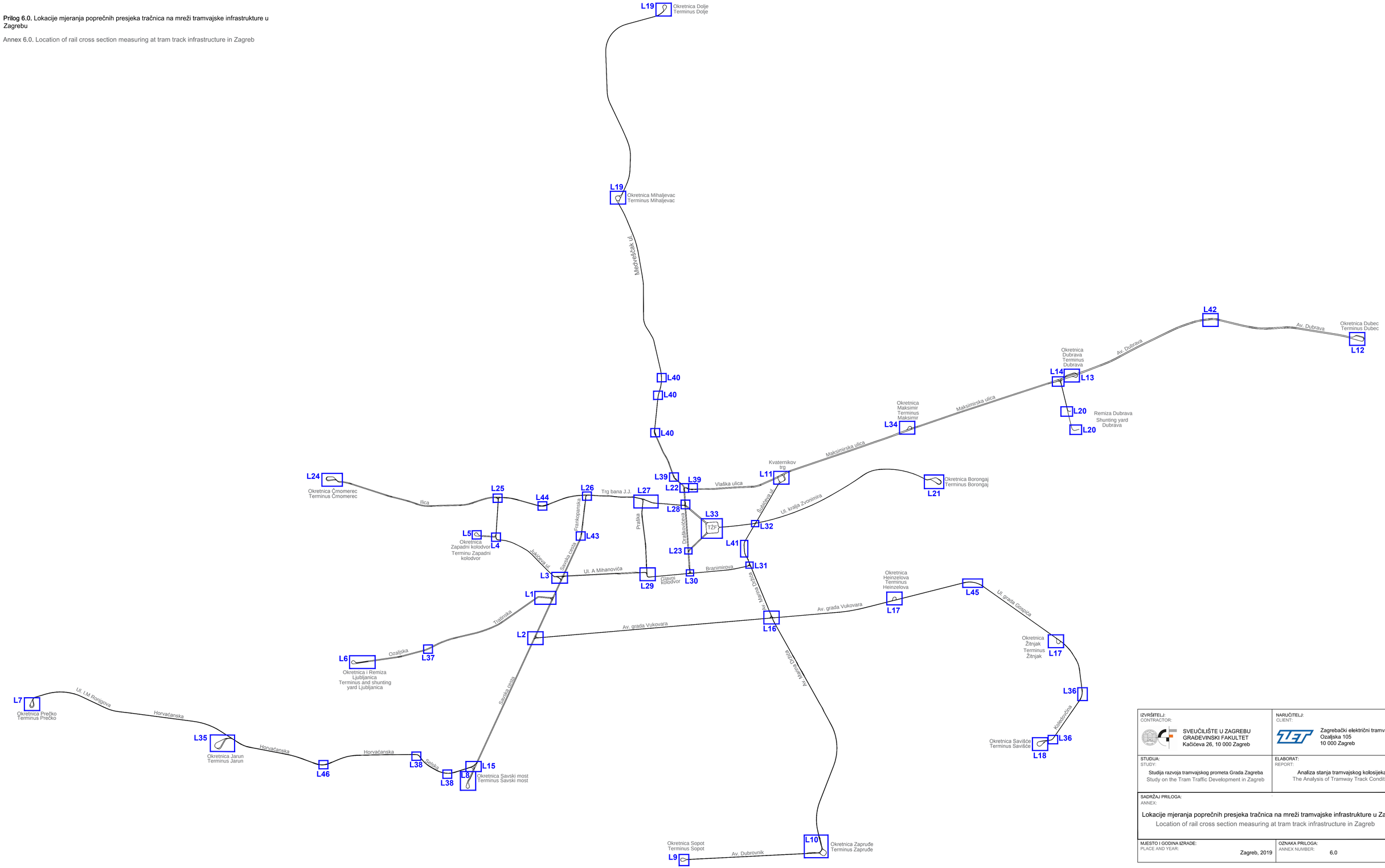
Prilog 6.0. Lokacije mjeranja poprečnih presjeka tračnica na mreži tramvajske infrastrukture u Zagrebu

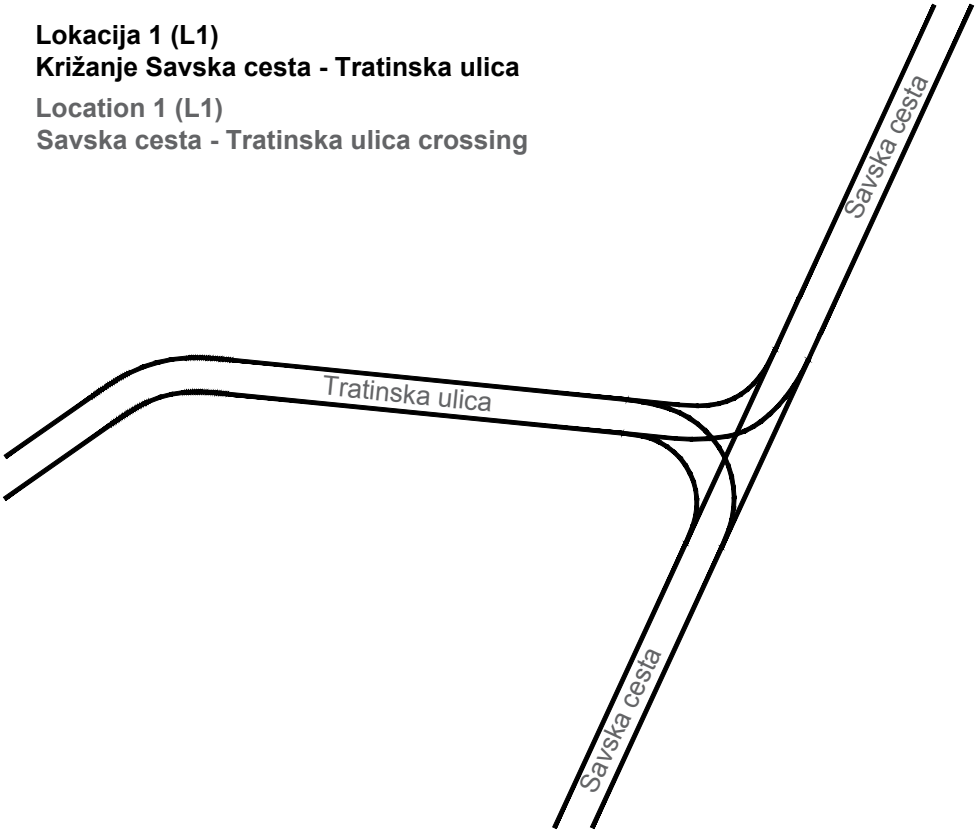
Annex 6.0. Location of rail cross section measuring at tram track infrastructure in Zagreb



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija razvoja tramvajskog prometa Grada Zagreba Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition
SADRŽAJ PRILOGA: ANNEX: Lokacije mjeranja poprečnih presjeka tračnica na mreži tramvajske infrastrukture u Zagrebu Location of rail cross section measuring at tram track infrastructure in Zagreb	
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.0

Lokacija 1 (L1)
Križanje Savska cesta - Tratinska ulica

Location 1 (L1)
Savska cesta - Tratinska ulica crossing



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija razvoja tramvajskog prometa □rada □agre□a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition

SADRŽAJ PRILOGA:
ANNEX:

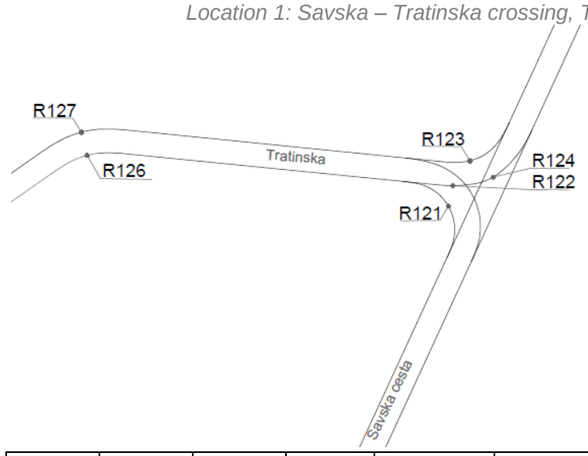
Istrošenje poprečnih presjeka tračnica u krivinama, skretnicama i križalištima na Lokaciji 1

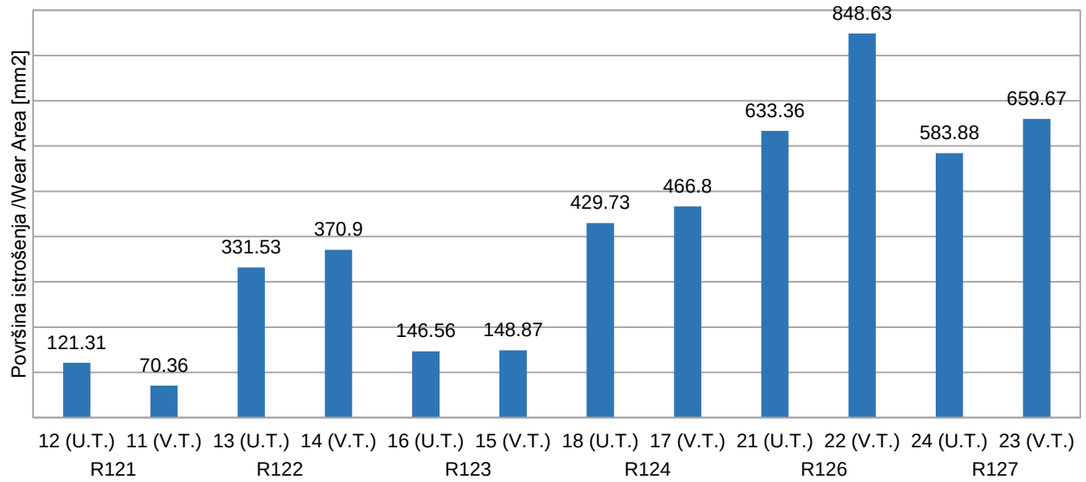
Rail cross section wear in curves, turnouts and crossings at Location 1

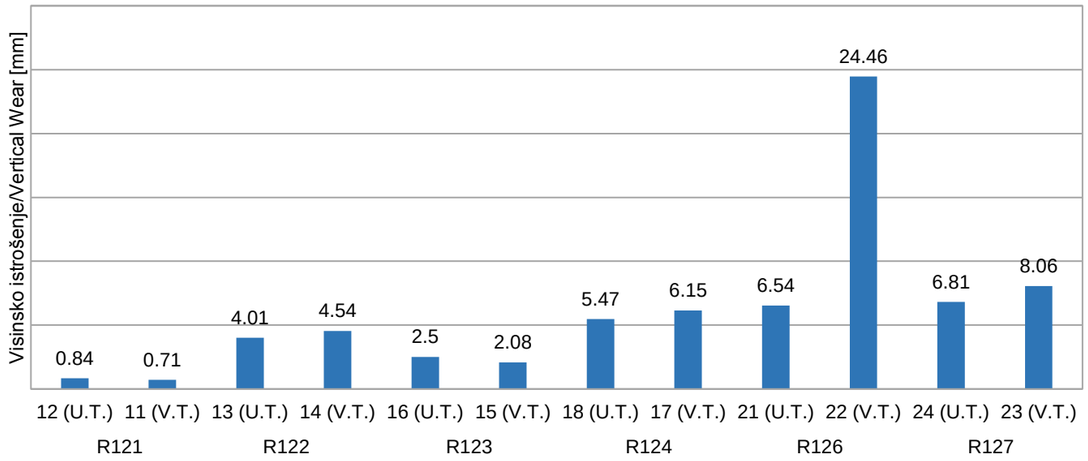
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.1

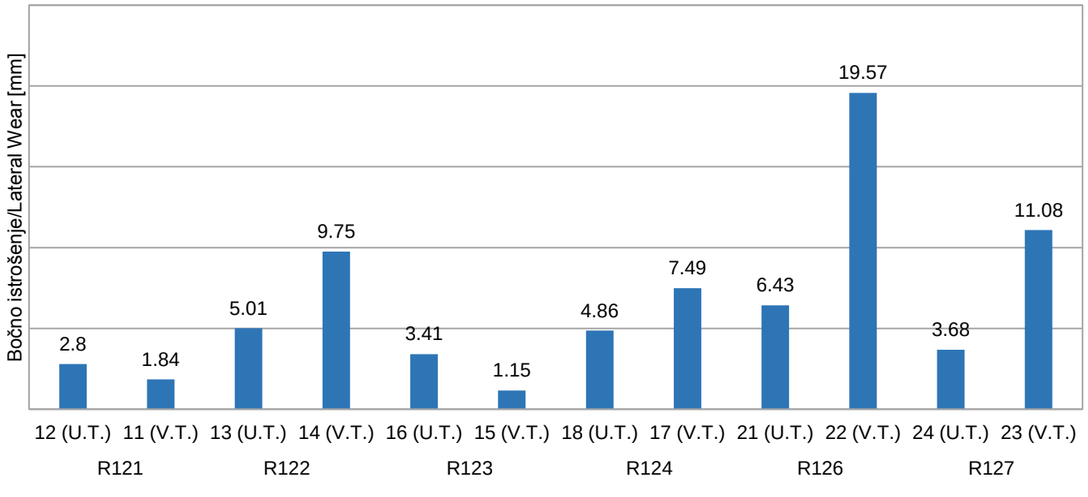
Prilog 6.1.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 1**
Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska- Kranjčevićeva

Annex 6.1.1. **Results of cross section wear in curves at Location 1**
Location 1: Savska – Tratinska crossing, Tratinska- Kranjčevićeva crossing









Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [˚]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
D-05-02	R121	desna right	11	lijeva/left	70.36	0.71	1.84	74.26	18	10
			12	desna/right	121.31	0.84	2.8	75.56		
D-05-01	R122	lijeva left	13	lijeva/left	331.53	4.01	5.01	79.01	25	10
			14	desna/right	370.9	4.54	9.75	73.33		
K-04-04	R123	desna right	15	lijeva/left	148.87	2.08	1.15	80.25	18	10
			16	desna/right	146.56	2.5	3.41	72.66		
K-04-03	R124	lijeva left	18	lijeva/left	429.73	5.47	4.86	77.74	21	10
			17	desna/right	466.8	6.15	7.49	72.45		
K-04-01	R126	desna right	22	lijeva/left	848.63	24.46	19.57	71.52	30	18
			21	desna/right	633.36	6.54	6.43	82.14		
K-04-02	R127	lijeva left	24	lijeva/left	583.88	6.81	3.68	79.43	39	18
			23	desna/right	659.67	8.06	11.08	74.73		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
D-05-02	R121	desna right	11	lijeva/left	70.36	0.71	1.84
			12	desna/right	121.31	0.84	2.8
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-50.95	-0.13	-0.96
D-05-01	R122	lijeva left	13	lijeva/left	331.53	4.01	5.01
			14	desna/right	370.9	4.54	9.75
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					39.37	0.53	4.74
K-04-04	R123	desna right	15	lijeva/left	148.87	2.08	1.15
			16	desna/right	146.56	2.5	3.41
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					2.31	-0.42	-2.26
K-04-03	R124	lijeva left	18	lijeva/left	429.73	5.47	4.86
			17	desna/right	466.8	6.15	7.49
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					37.07	0.68	2.63
K-04-01	R126	desna right	22	lijeva/left	848.63	24.46	19.57
			21	desna/right	633.36	6.54	6.43
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					215.27	17.92	13.14
K-04-02	R127	lijeva left	24	lijeva/left	583.88	6.81	3.68
			23	desna/right	659.67	8.06	11.08
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					75.79	1.25	7.4

U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve

Prilog 6.1.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 1

Istrošenje poprečnog presjeka tračnica u krivini R121

Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska- Kranjčevićeva

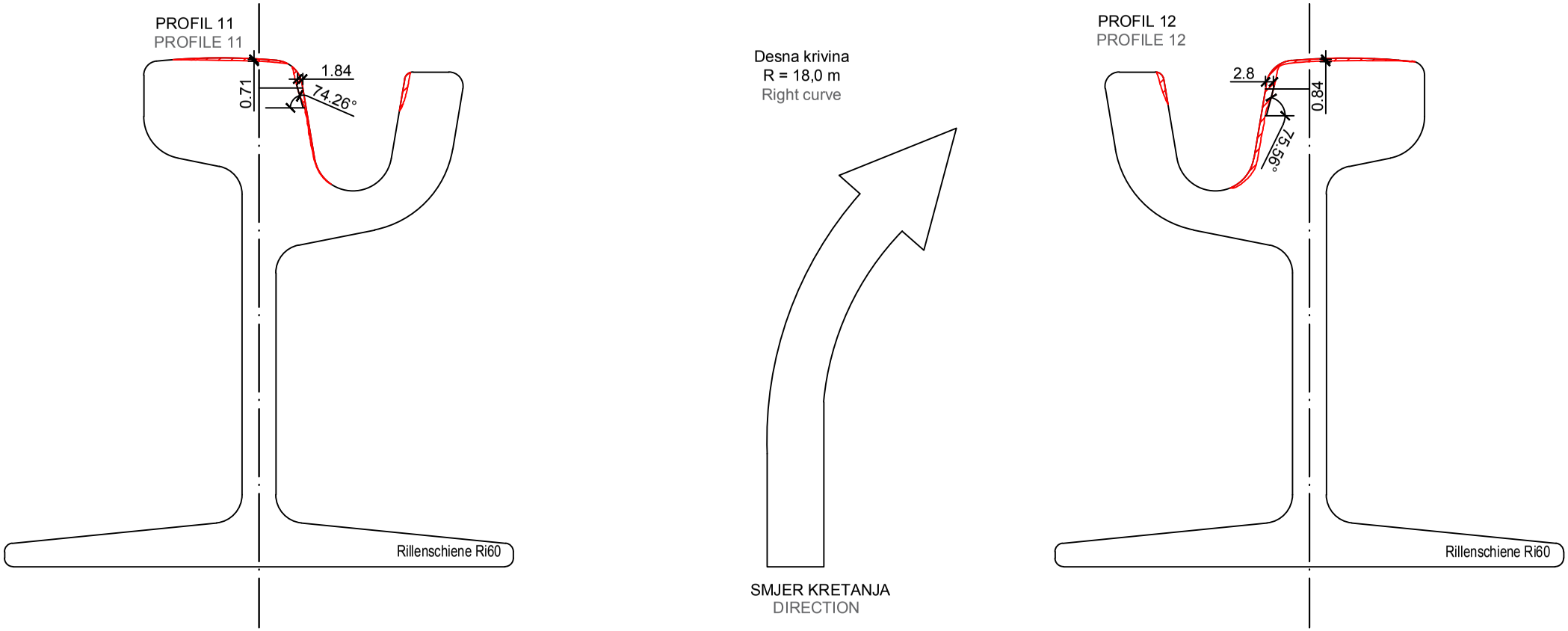
MJ: 1:2

Annex 6.1.1.1. Cross section wear in curves at Location 1

Cross section wear in curve R121

Location 1: Savska - Tratinska crossing, Tratinska - Kranjčevićeva crossing

Scale: 1:2



Prilog 6.1.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 1

Istrošenje poprečnog presjeka tračnica u krivini R122

Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska- Kranjčevićeva

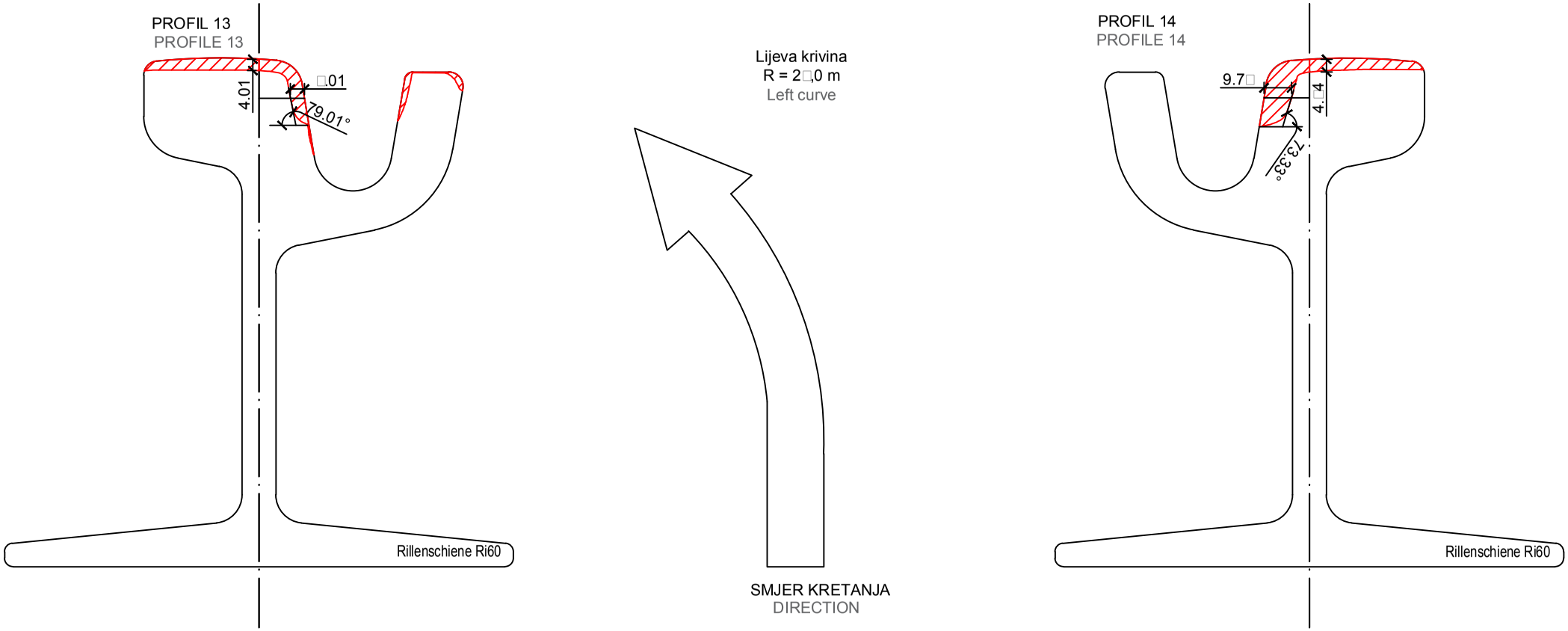
MJ: 1:2

Annex 6.1.1.1. Cross section wear in curves at Location 1

Cross section wear in curve R122

Location 1: Savska - Tratinska crossing, Tratinska - Kranjčevićeva crossing

Scale: 1:2



Prilog 6.1.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 1

Istrošenje poprečnog presjeka tračnica u krivini R123

Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska- Kranjčevićeva

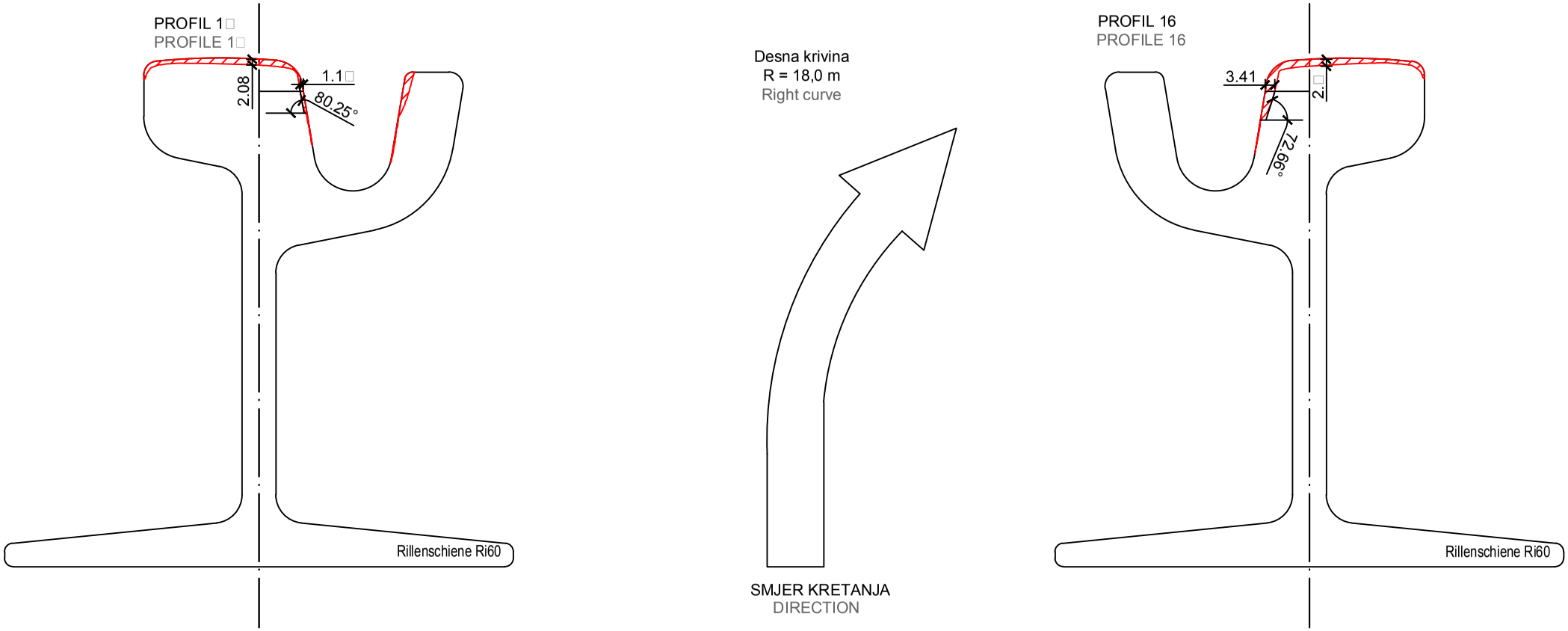
MJ: 1:2

Annex 6.1.1.1. Cross section wear in curves at Location 1

Cross section wear in curve R123

Location 1: Savska - Tratinska crossing, Tratinska - Kranjčevićeva crossing

Scale: 1:2



Prilog 6.1.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 1

Istrošenje poprečnog presjeka tračnica u krivini R124

Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska- Kranjčevićeva

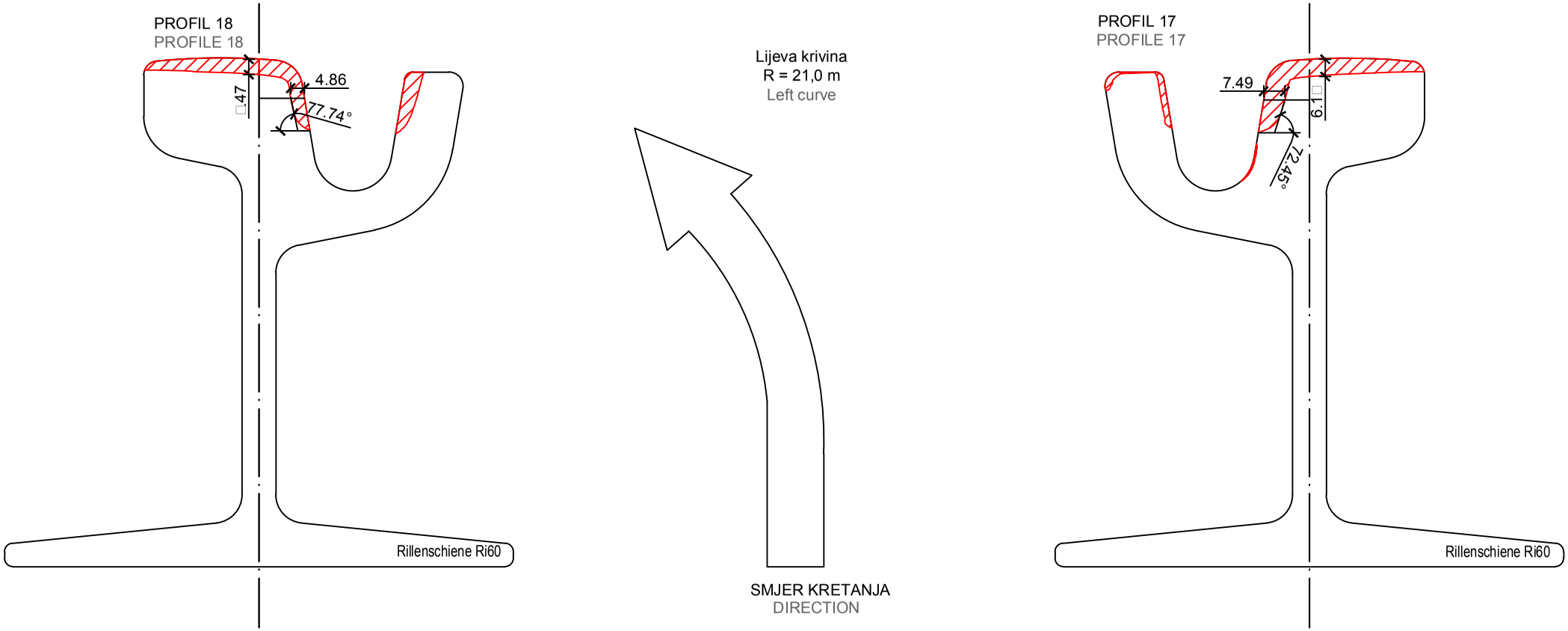
MJ: 1:2

Annex 6.1.1.1. Cross section wear in curves at Location 1

Cross section wear in curve R124

Location 1: Savska - Tratinska crossing, Tratinska - Kranjčevićeva crossing

Scale: 1:2



Prilog 6.1.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 1

Istrošenje poprečnog presjeka tračnica u krivini R126

Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska- Kranjčevićeva

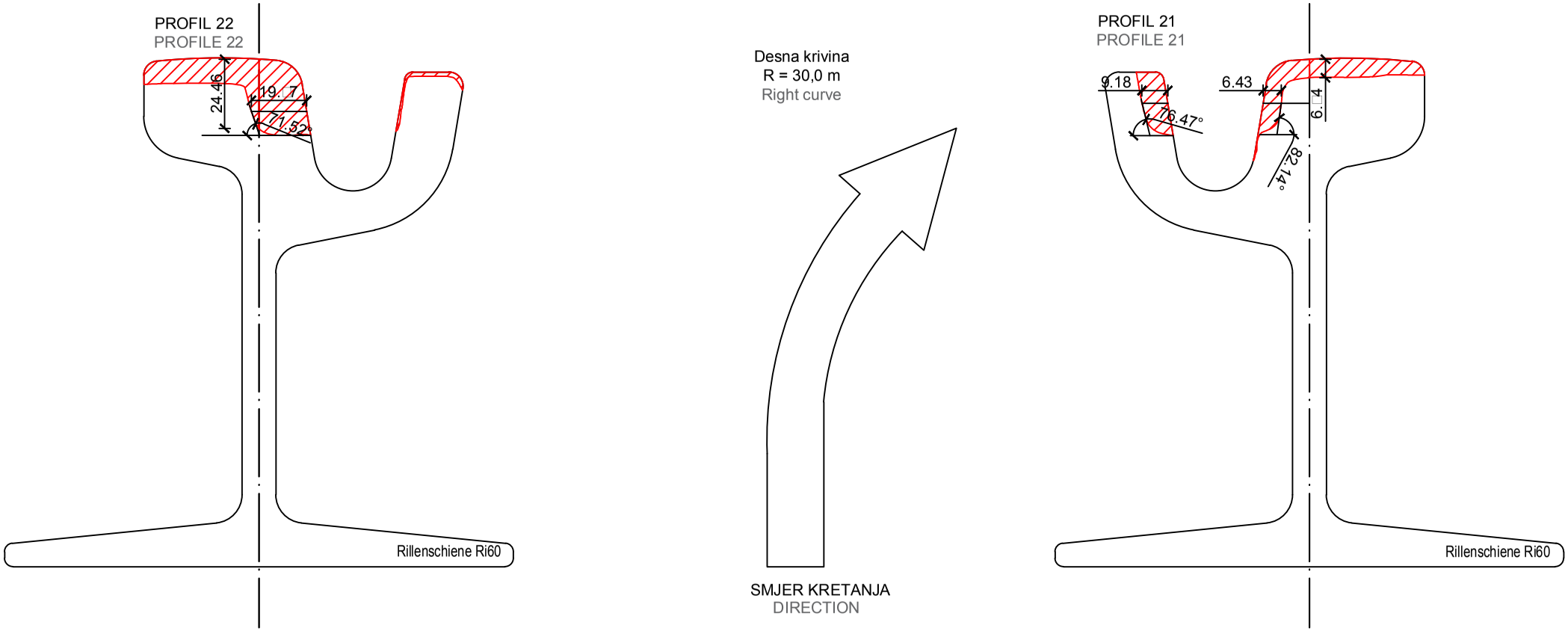
MJ: 1:2

Annex 6.1.1.1. Cross section wear in curves at Location 1

Cross section wear in curve R126

Location 1: Savska - Tratinska crossing, Tratinska - Kranjčevićeva crossing

Scale: 1:2



Prilog 6.1.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 1

Istrošenje poprečnog presjeka tračnica u krivini R127

Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska- Kranjčevićeva

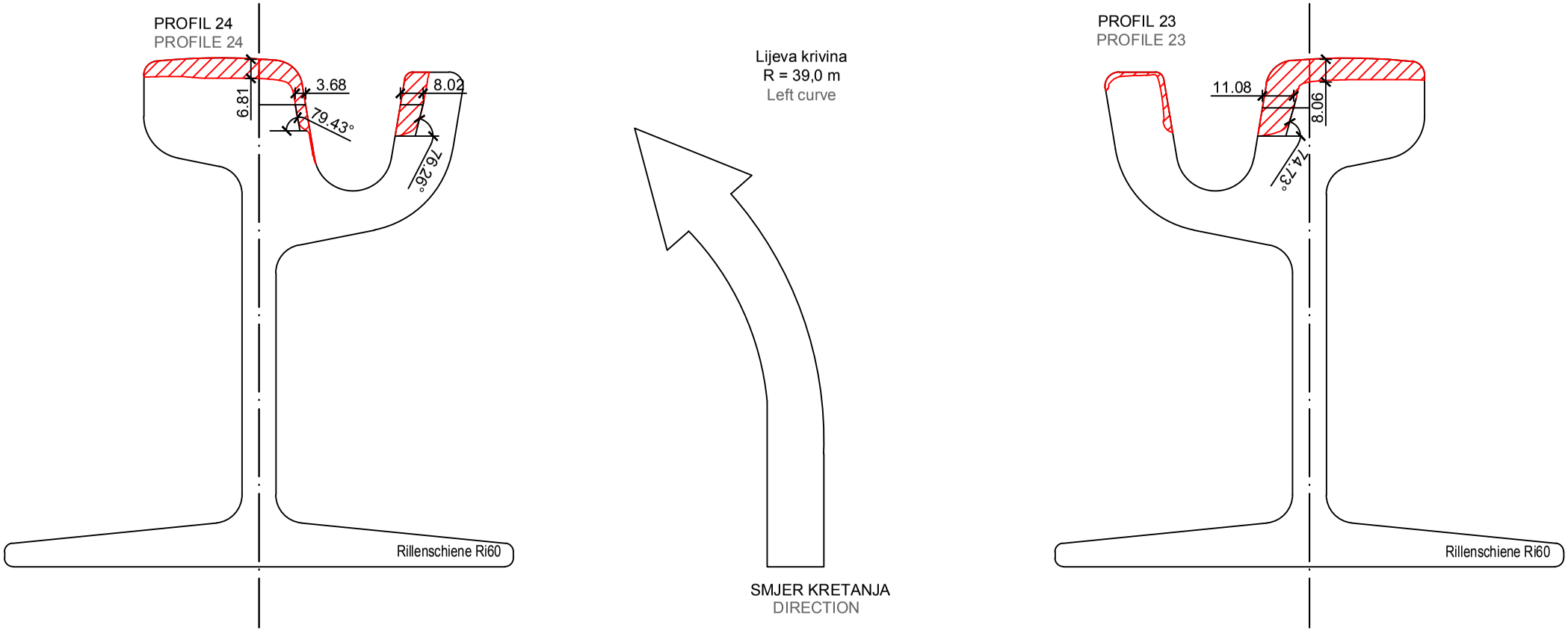
MJ: 1:2

Annex 6.1.1.1. Cross section wear in curves at Location 1

Cross section wear in curve R127

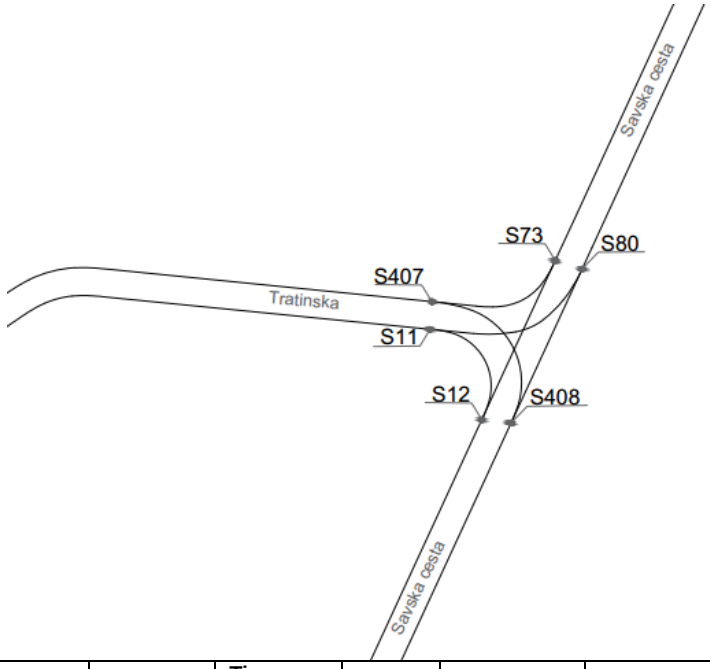
Location 1: Savska - Tratinska crossing, Tratinska - Kranjčevićeva crossing

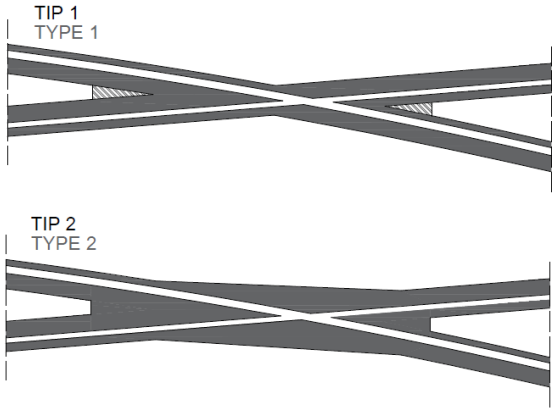
Scale: 1:2



Prilog 6.1.2. Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 1
Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska- Kranjčevićeva

Annex 6.1.2. Results of cross section wear in turnouts at Location 1
Location 1: Savska – Tratinska crossing, Tratinska- Kranjčevićeva crossing





Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (1 ili 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-04-03 K-04-01	S407	2	28L	13	15.71	2.71	12.00	21.08	-2.92	10
			28D	13	14.82	1.82	30.63	32.82	2.19	
			29	12	16.16	4.16		37.12		
			30L	13	16.27	3.27	30.63	33.50	2.87	
			30D	13	15.81	2.81	12.00	21.28	-2.72	
K-04-04 K-04-02	S11	2	31L	13	15.64	2.64	35.67	39.19	3.52	10
			31D	13	20.27	7.27	24.00	26.48	2.48	
			32	12	20.74	8.74		44.06		
			33L	13	20.22	7.22	24.00	26.41	2.41	
			33D	13	15.81	2.81	35.67	39.67	4.00	
K-04-01 K-04-05	S73	2	48L	13	19.41	6.41	24.00	26.23	2.23	10
			48D	13	20.60	7.60	35.25	42.78	7.53	
			49	12	21.26	9.26		52.13		
			50L	13	21.58	8.58	35.24	39.69	4.45	
			50D	13	20.64	7.64	24.00	28.42	4.42	
K-04-02 K-04-06	S80	2	51L	13	21.80	8.80	24.00	25.11	1.11	10
			51D	13	20.44	7.44	30.62	31.79	1.17	
			52	12	22.56	10.56		43.12		
			54L	13	21.16	8.16	30.62	32.92	2.30	
			54D	13	22.15	9.15	24.00	24.11	0.11	
K-04-03 K-04-06	S408	2	55L	13	15.09	2.09	35.25	40.39	5.14	10
			55D	13	18.00	5.00	23.57	28.74	5.17	
			56	12	16.10	4.10		51.04		
			57L	13	15.38	2.38	24.00	26.58	2.58	
			57D	13	12.38	-0.62	35.25	40.44	5.19	
K-04-04 K-04-05	S12	1	58L	13	15.70	2.70	24.00	25.62	1.62	10
			58D	13	11.32	-1.68	35.67	36.55	0.88	
			59	12	12.07	0.07		38.31		
			60L	13	13.49	0.49	35.67	36.74	1.07	
			60D	13	15.84	2.84	24.00	26.13	2.13	

Prilog 6.1.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 1

Istrošenje poprečnog presjeka srcišta skretnice S12

Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska - Kranjčevićeva

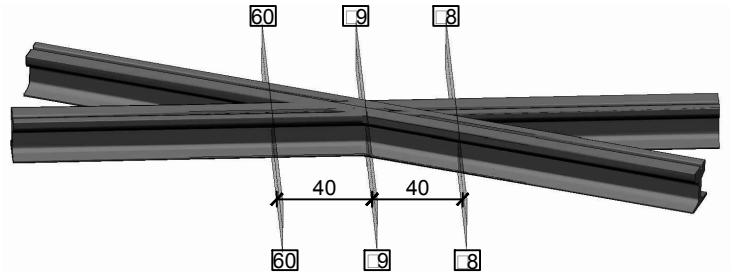
MJ: 1:2

Annex 6.1.2.1. Cross section wear in turnouts at Location 1

Cross section wear in turnout S12

Location 1: Savska - Tratinska crossing, Tratinska - Kranjčevićeva crossing

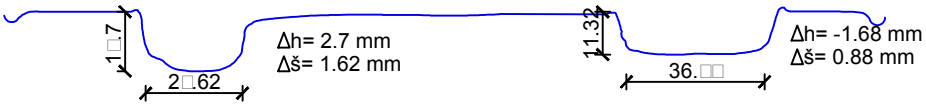
Scale: 1:2



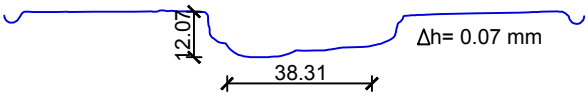
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savska sjever → Savska jug
Direction: Savska North → Savska South

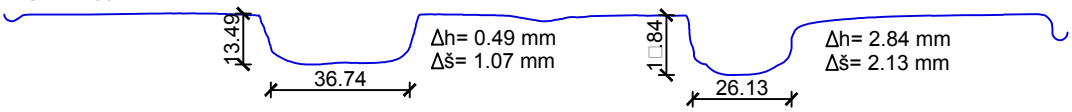
PROFIL □8
PROFILE □8



PROFIL □9
PROFILE □9



PROFIL 60
PROFILE 60

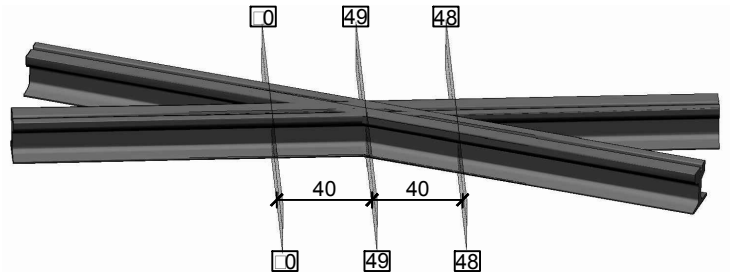


Prilog 6.1.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 1

Istrošenje poprečnog presjeka srcišta skretnice S73
Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska - Kranjčevićeva
MJ: 1:2

Annex 6.1.2.1. Cross section wear in turnouts at Location 1

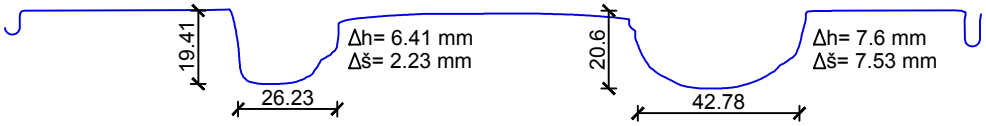
Cross section wear in turnout S73
Location 1: Savska - Tratinska crossing, Tratinska - Kranjčevićeva crossing
Scale: 1:2



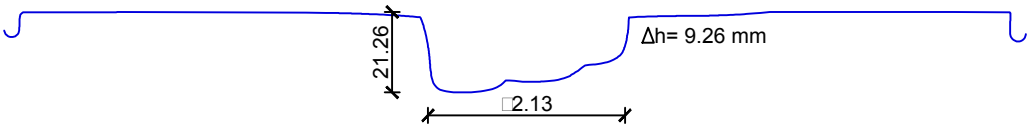
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savska sjever → Savska jug
Direction: Savska North → Savska South

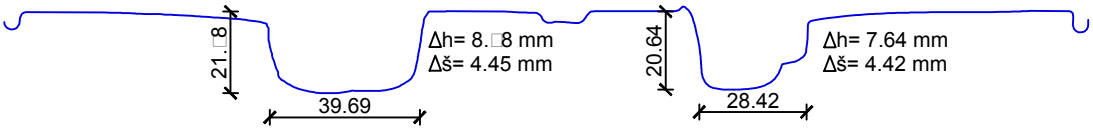
PROFIL 48
PROFILE 48



PROFIL 49
PROFILE 49



PROFIL □0
PROFILE □0

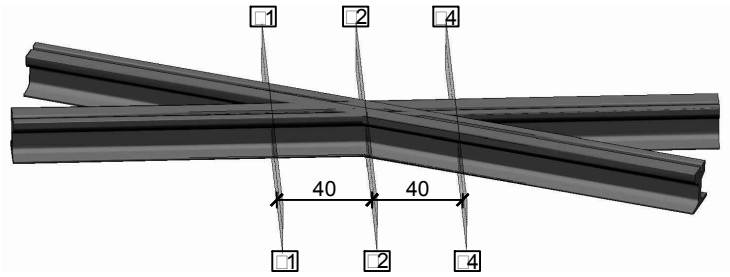


Prilog 6.1.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 1

Istrošenje poprečnog presjeka srcišta skretnice S80
Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska - Kranjčevićeva
MJ: 1:2

Annex 6.1.2.1. Cross section wear in turnouts at Location 1

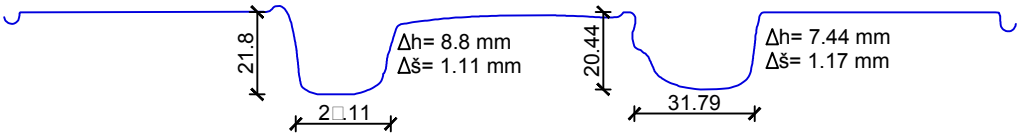
Cross section wear in turnout S80
Location 1: Savska - Tratinska crossing, Tratinska - Kranjčevićeva crossing
Scale: 1:2



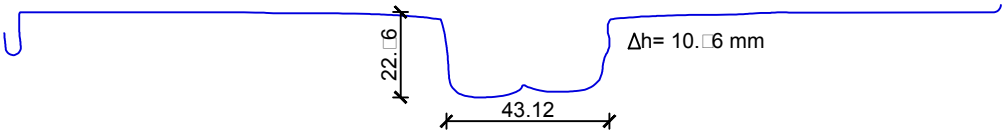
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savska jug → Savska sjever
Direction: Savska South → Savska north

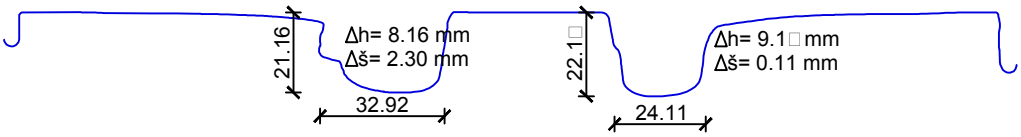
PROFIL □1
PROFILE □1



PROFIL □2
PROFILE □2



PROFIL □4
PROFILE □4

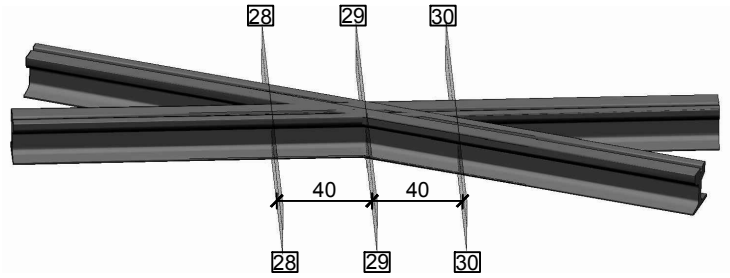


Prilog 6.1.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 1

Istrošenje poprečnog presjeka srcišta skretnice S407
Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska - Kranjčevićeva
MJ: 1:2

Annex 6.1.2.1. Cross section wear in turnouts at Location 1

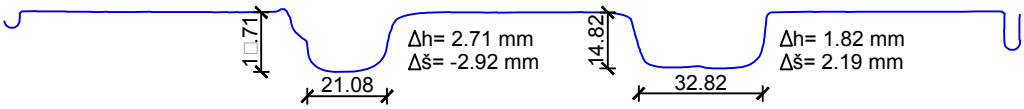
Cross section wear in turnouts S407
Location 1: Savska - Tratinska crossing, Tratinska - Kranjčevićeva crossing
Scale: 1:2



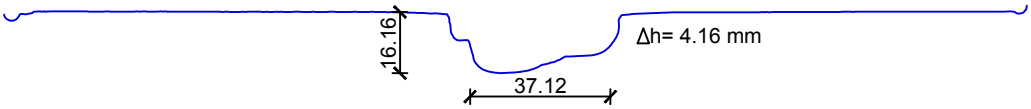
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savska cesta ⟶ Tratinska
Direction: Savska cesta ⟶ Tratinska

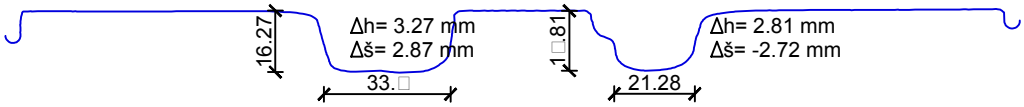
PROFIL 28
PROFILE 28



PROFIL 29
PROFILE 29



PROFIL 30
PROFILE 30

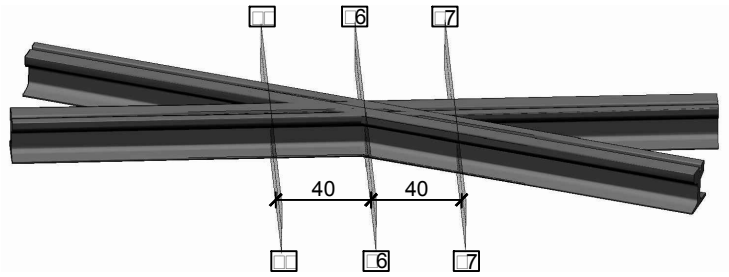


Prilog 6.1.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 1

Istrošenje poprečnog presjeka srcišta skretnice S408
Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska - Kranjčevićeva
MJ: 1:2

Annex 6.1.2.1. Cross section wear in turnouts at Location 1

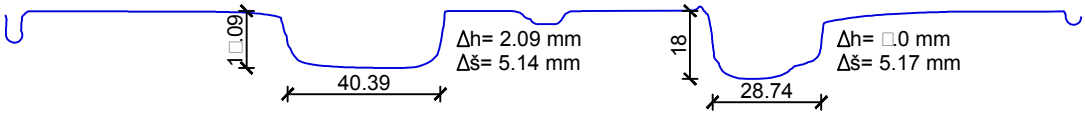
Cross section wear in turnout S408
Location 1: Savska - Tratinska crossing, Tratinska - Kranjčevićeva crossing
Scale: 1:2



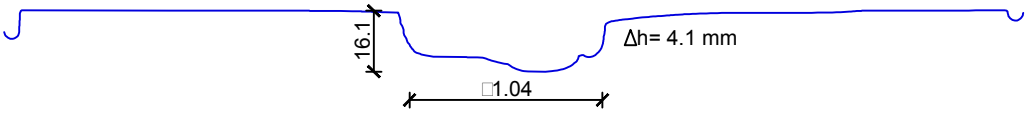
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savska jug → Savska sjever
Direction: Savska South → Savska north

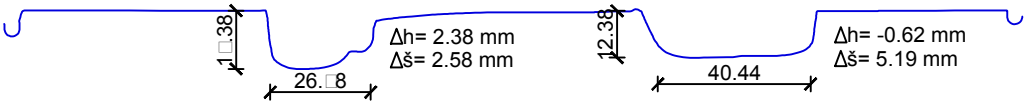
PROFIL □□
PROFILE □□



PROFIL □6
PROFILE □6

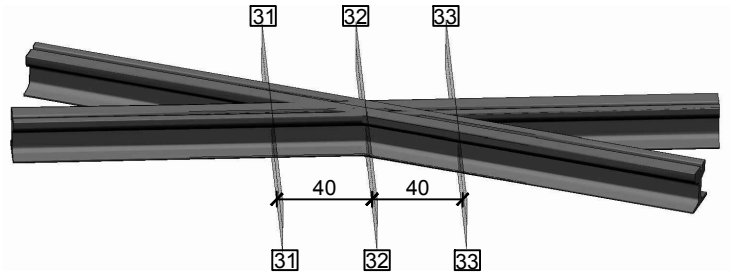


PROFIL □7
PROFILE □7



Prilog 6.1.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 1
Istrošenje poprečnog presjeka srcišta skretnice S411
Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska - Kranjčevićeva
MJ: 1:2

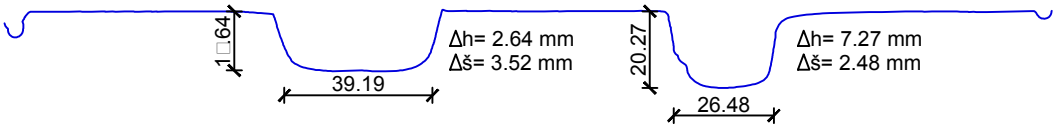
Annex 6.1.2.1. Cross section wear in turnouts at Location 1
Cross section wear in turnout S411
Location 1: Savska - Tratinska crossing, Tratinska - Kranjčevićeva crossing
Scale: 1:2



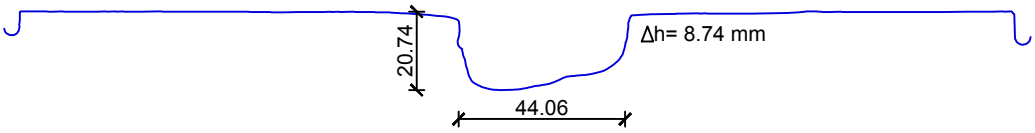
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Tratinska → Savska cesta
Direction: Tratinska → Savska cesta

PROFIL 31
PROFILE 31



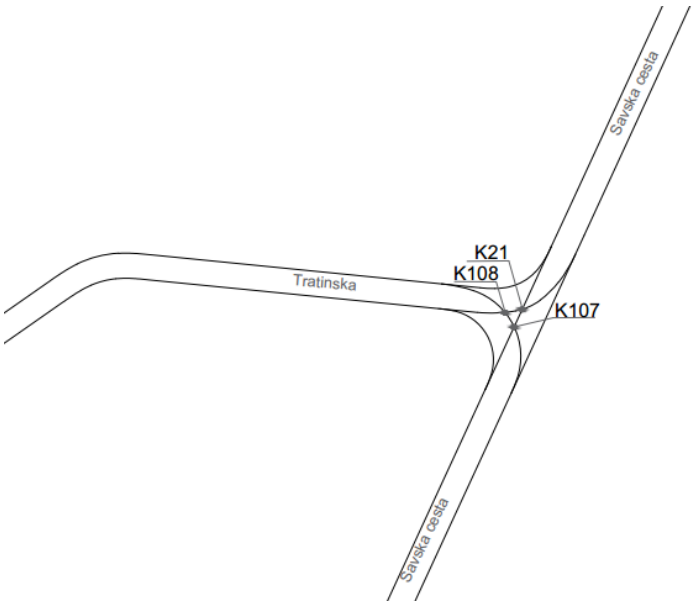
PROFIL 32
PROFILE 32



PROFIL 33
PROFILE 33

Prilog 6.1.3. Rezultati istrošenja profila tračnica u križalištima na Lokaciji 1
Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska- Kranjčevićeva

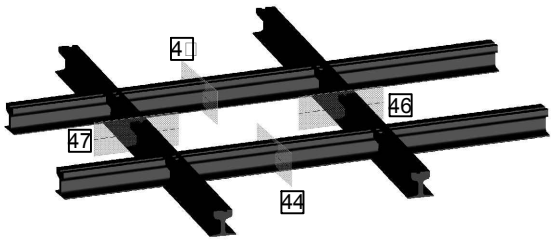
Annex 6.1.3. Results of cross section wear in track crossing at Location 1
Location 1: Savska – Tratinska crossing, Tratinska- Kranjčevićeva crossing



Dionice Sections	**Oznaka križališta** Track crossing mark	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-04-02 K-04-03	K108	35	12	22,61	10.61	30.00	31.27	1.27	10
		36	12	21,84	9.84	30.00	31.48	1.48	
		37	12	17,51	5.51	34.00	34.71	0.71	
		38	12	16,73	4.73	34.00	33.66	-0.34	
K-04-03 K-04-05	K107	40	12	21,36	9.36	24.00	23.25	-0.75	10
		41	12	21,28	9.28	24.00	23.26	-0.74	
		42	12	17,89	5.89	34.00	33.57	-0.43	
		43	12	17,75	5.75	34.00	34.84	0.84	
K-04-02 K-04-05	K21	44	12	21,13	9.13	24.00	22.86	-1.14	10
		45	12	21,62	9.62	24.00	24.15	0.15	
		46	12	21,06	9.06	34.00	37.54	3.54	
		47	12	22,62	10.62	34.00	37.16	3.16	

Prilog 6.1.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 1
Istrošenje poprečnog presjeka tračnica u križalištu K21
Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska - Kranjčevićeva
MJ: 1:2

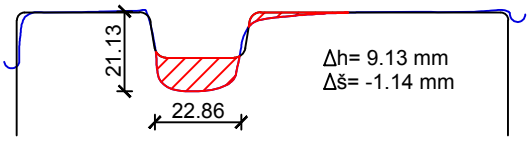
Annex 6.1.3.1. Cross section wear in track crossings at Location 1
Cross section wear in track crossing K21
Location 1: Savska - Tratinska crossing, Tratinska - Kranjčevićeva crossing
Scale: 1:2



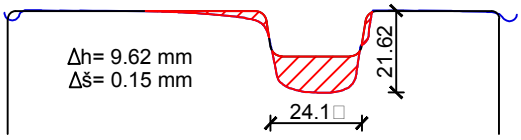
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savska Sjever ⟶ Savska Jug
Direction: Savska North ⟶ Savska South

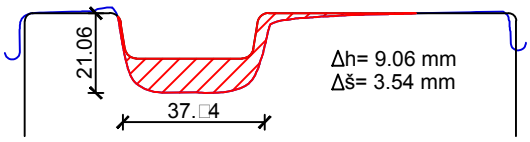
PROFIL 44
PROFILE 44



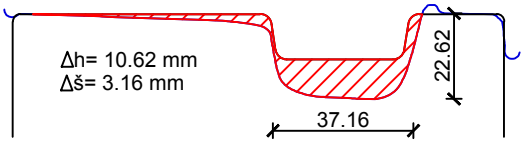
PROFIL 4□
PROFILE 4□



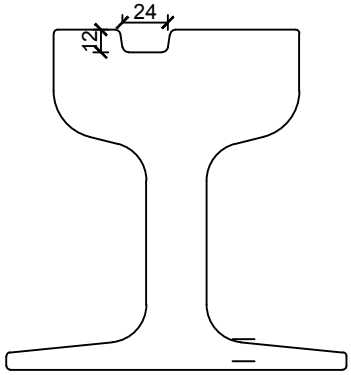
PROFIL 46
PROFILE 46



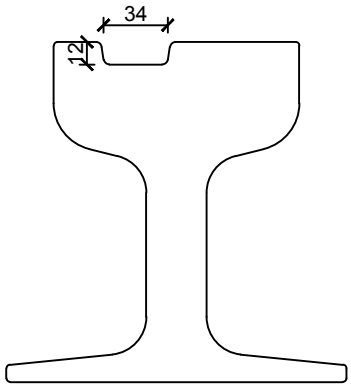
PROFIL 47
PROFILE 47



PROFIL 44, 4□ □PROFILE 44, 4□
R = 0 m

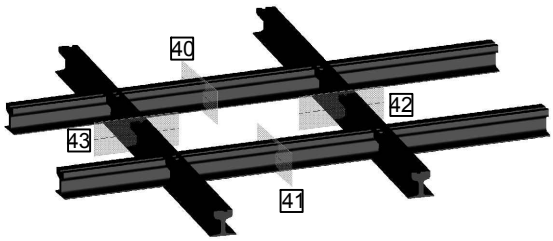


PROFIL 46, 47 □PROFIL 46, 47
R = 21 m



Prilog 6.1.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 1
Istrošenje poprečnog presjeka tračnica u križalištu K107
Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska - Kranjčevićeva
MJ: 1:2

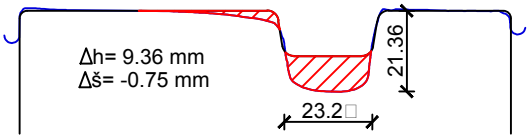
Annex 6.1.3.1. Cross section wear in track crossings at Location 1
Cross section wear in track crossing K107
Location 1: Savska - Tratinska crossing, Tratinska - Kranjčevićeva crossing
Scale: 1:2



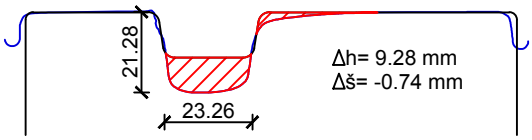
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savska Sjever → Savska Jug
Direction: Savska North → Savska South

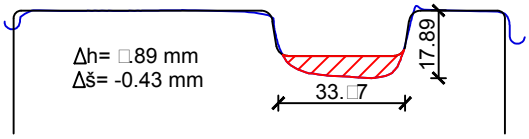
PROFIL 40
PROFILE 40



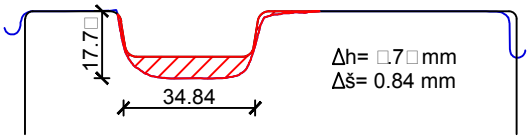
PROFIL 41
PROFILE 41



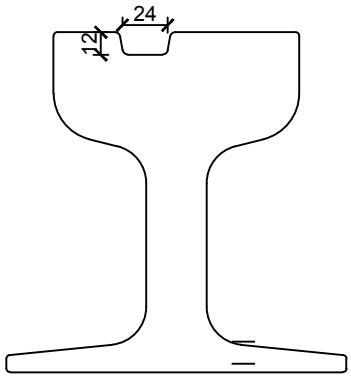
PROFIL 42
PROFILE 42



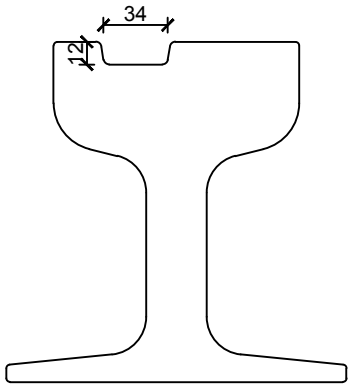
PROFIL 43
PROFILE 43



PROFIL 40, 41 PROFILE 40, 41
R = 0 m

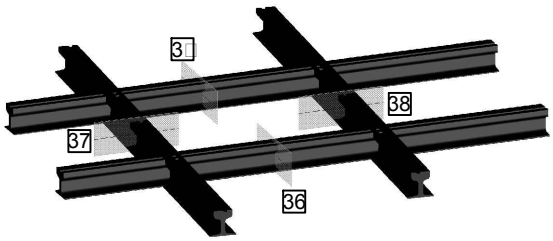


PROFIL 42, 43 PROFILE 42, 43
R = 2 m



Prilog 6.1.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 1
Istrošenje poprečnog presjeka tračnica u križalištu K108
Lokacija 1: Križanje Savska - Tratinska, križanje Tratinska - Kranjčevićeva
MJ: 1:2

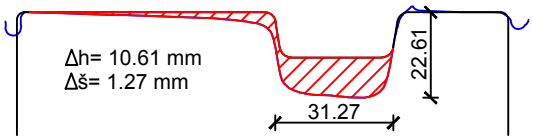
Annex 6.1.3.1. Cross section wear in track crossings at Location 1
Cross section wear in track crossing K108
Location 1: Savska - Tratinska crossing, Tratinska - Kranjčevićeva crossing
Scale: 1:2



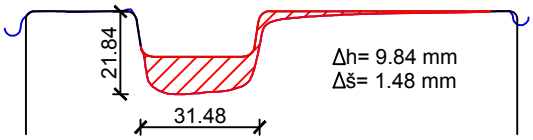
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Tratinska ⟶ Savska cesta
Direction: Tratinska ⟶ Savska cesta

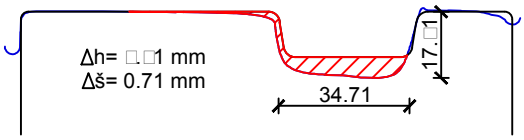
PROFIL 3□
PROFILE 3□



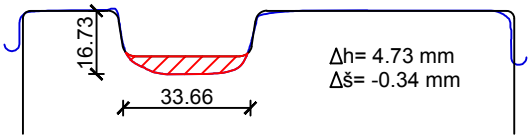
PROFIL 36
PROFILE 36



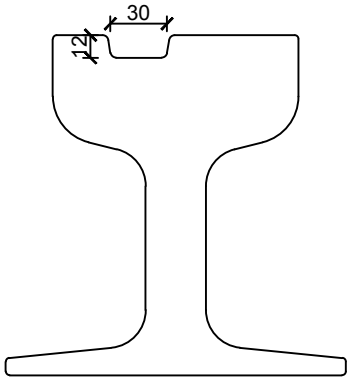
PROFIL 37
PROFILE 37



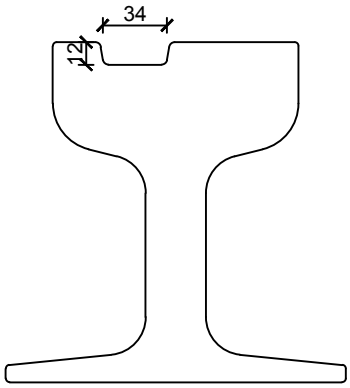
PROFIL 38
PROFILE 38



PROFIL 3□, 36 □PROFILE 3□, 36
R = □0 m

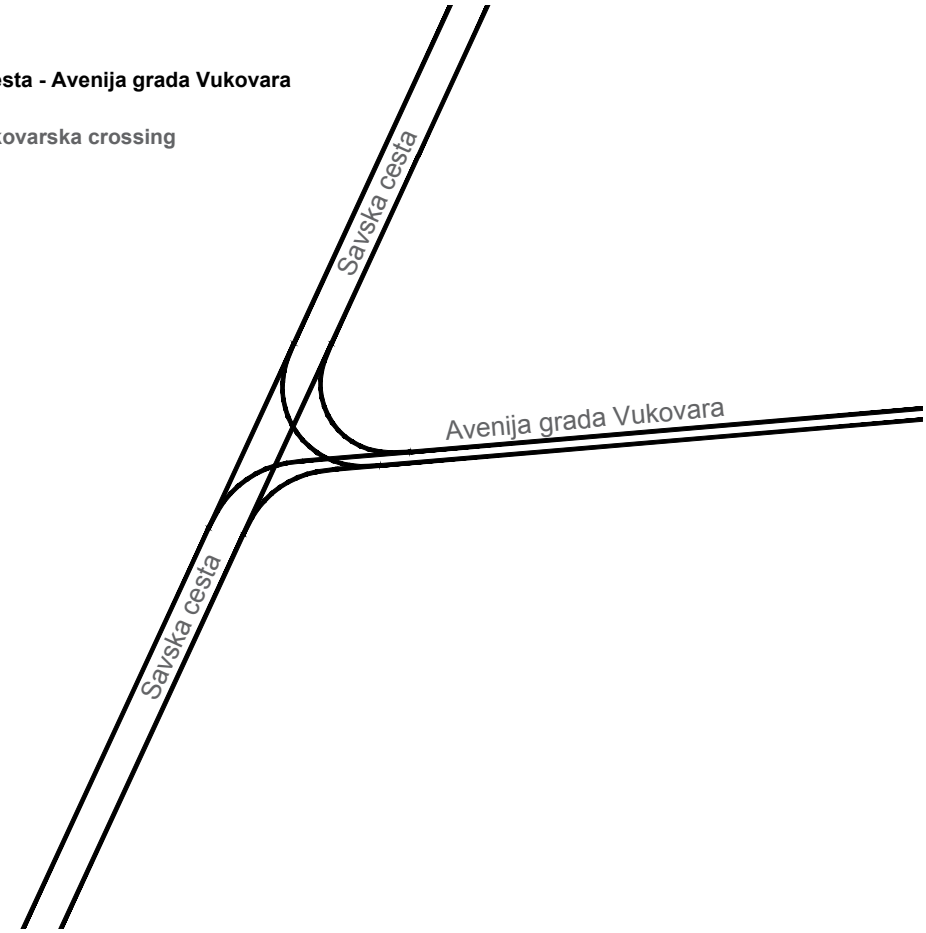


PROFIL 37, 38 □PROFILE 37, 38
R = 2□m



Lokacija 2 (L2)
Križanje Savska cesta - Avenija grada Vukovara

Location 2 (L2)
Savska cesta - Vukovarska crossing



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija razvoja tramvajskog prometa □rada □agre□a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition

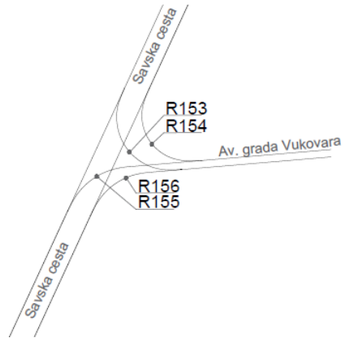
SADRŽAJ PRILOGA:
ANNEX:

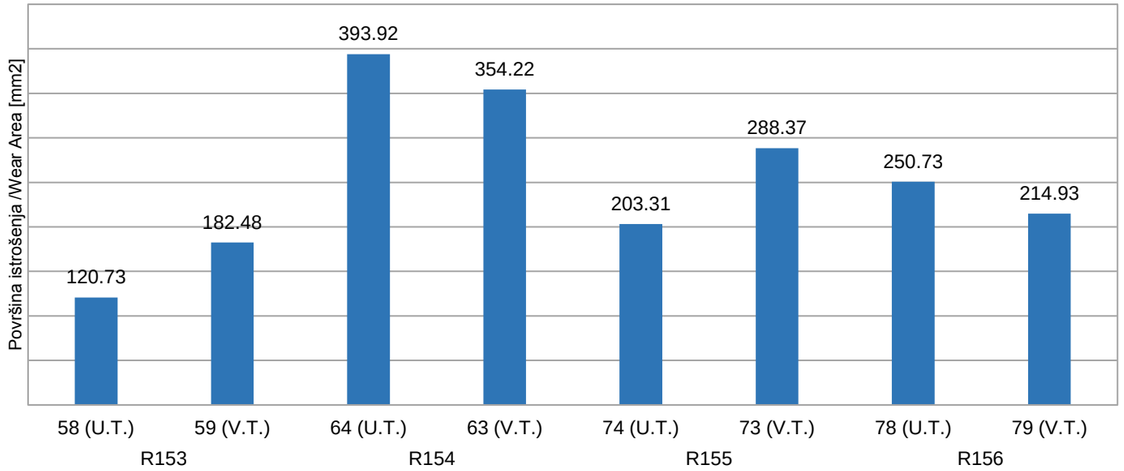
Istrošenje poprečnih presjeka tračnica u krivinama, skretnicama i križalištima na Lokaciji 2

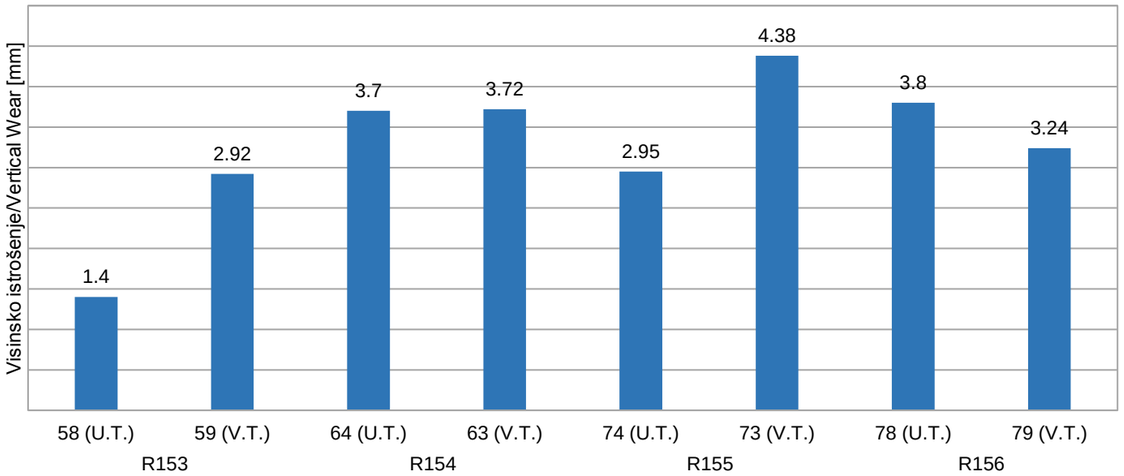
Rail cross section wear in curves, turnouts and crossings at Location 2

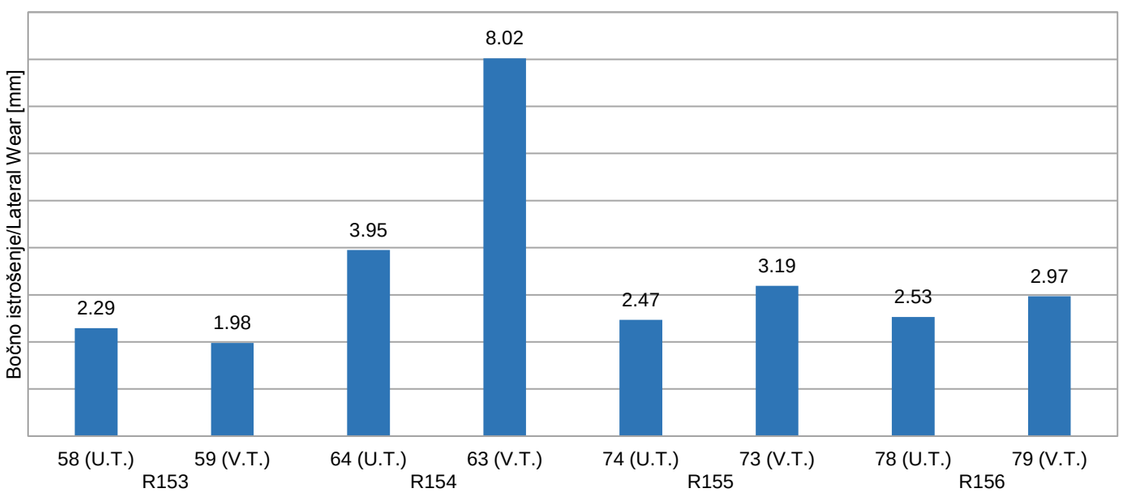
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.2

Prilog 6.2.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 2**
Lokacija 2: Križanje Savska cesta - Ulica grada Vukovara
Annex 6.2.1. **Results of cross section wear in curves at Location 2**
Location 2: Savska - Vukovarska crossing









Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear				Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
					Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [ ]		
K-03-04	R153	lijeva left	58	lijeva/left	120.73	1.4	2.29	74.93	21	8
			59	desna/right	182.48	2.92	1.98	77.41		
K-03-03	R154	desna right	63	lijeva/left	354.22	3.72	8.02	73.03	18	8
			64	desna/right	393.92	3.7	3.95	77.86		
K-03-05	R155	lijeva left	74	lijeva/left	203.31	2.95	2.47	73.15	26.4	8
			73	desna/right	288.37	4.38	3.19	75.31		
K-03-06	R156	desna right	79	lijeva/left	214.93	3.24	2.97	75.24	25	8
			78	desna/right	250.73	3.8	2.53	80.23		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear		
					Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
K-03-04	R153	lijeva left	58	lijeva/left	120.73	1.4	2.29
			59	desna/right	182.48	2.92	1.98
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					61.75	1.52	-0.31
K-03-03	R154	desna right	63	lijeva/left	354.22	3.72	8.02
			64	desna/right	393.92	3.7	3.95
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-39.7	0.02	4.07
K-03-05	R155	lijeva left	74	lijeva/left	203.31	2.95	2.47
			73	desna/right	288.37	4.38	3.19
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					85.06	1.43	0.72
K-03-06	R156	desna right	79	lijeva/left	214.93	3.24	2.97
			78	desna/right	250.73	3.8	2.53
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-35.8	-0.56	0.44

U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve

Prilog 6.2.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 2

Istrošenje poprečnog presjeka tračnica u krivini R153

Lokacija 2: Križanje Savska cesta - Avenija grada Vukovara

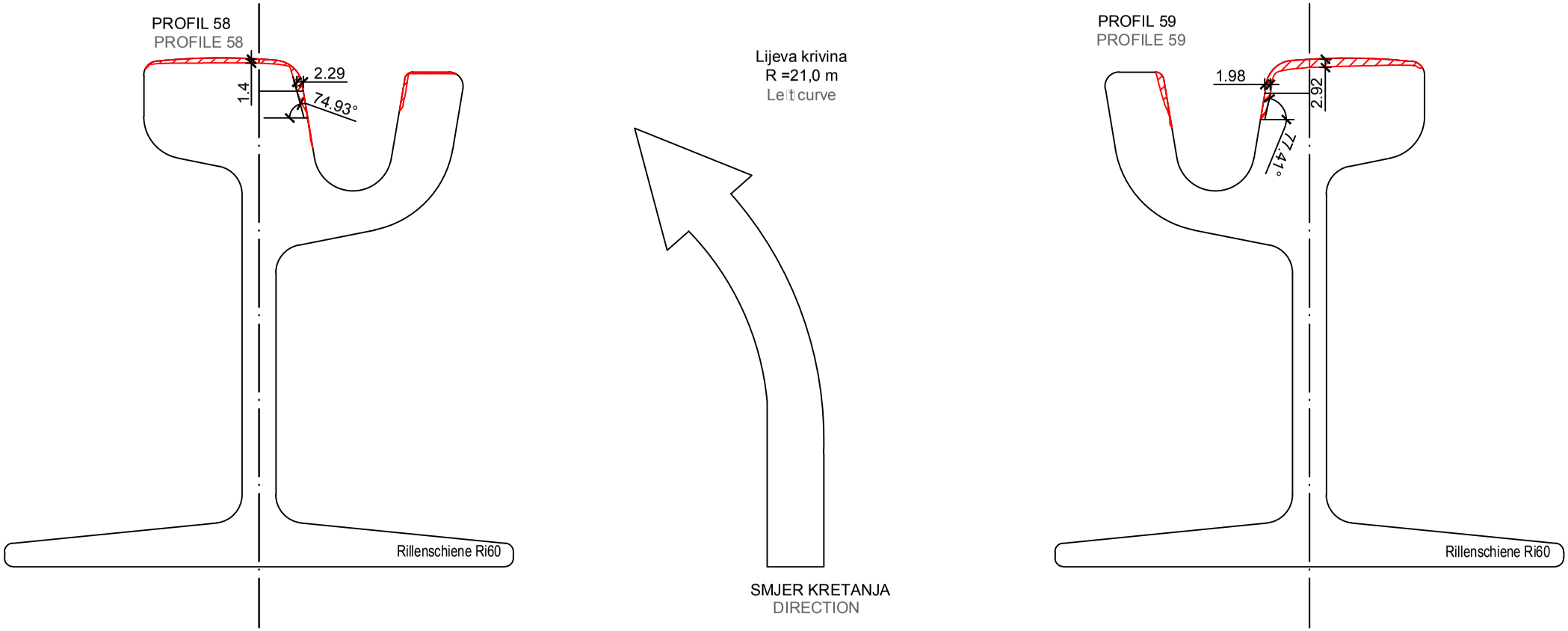
MJ: 1:2

Annex 6.2.1.1. Cross section wear in curves at Location 2

Cross section wear in curve R153

Location 2: Savska - Vukovarska crossing

Scale: 1:2



Prilog 6.2.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 2

Istrošenje poprečnog presjeka tračnica u krivini R154

Lokacija 2: Križanje Savska cesta - Avenija grada Vukovara

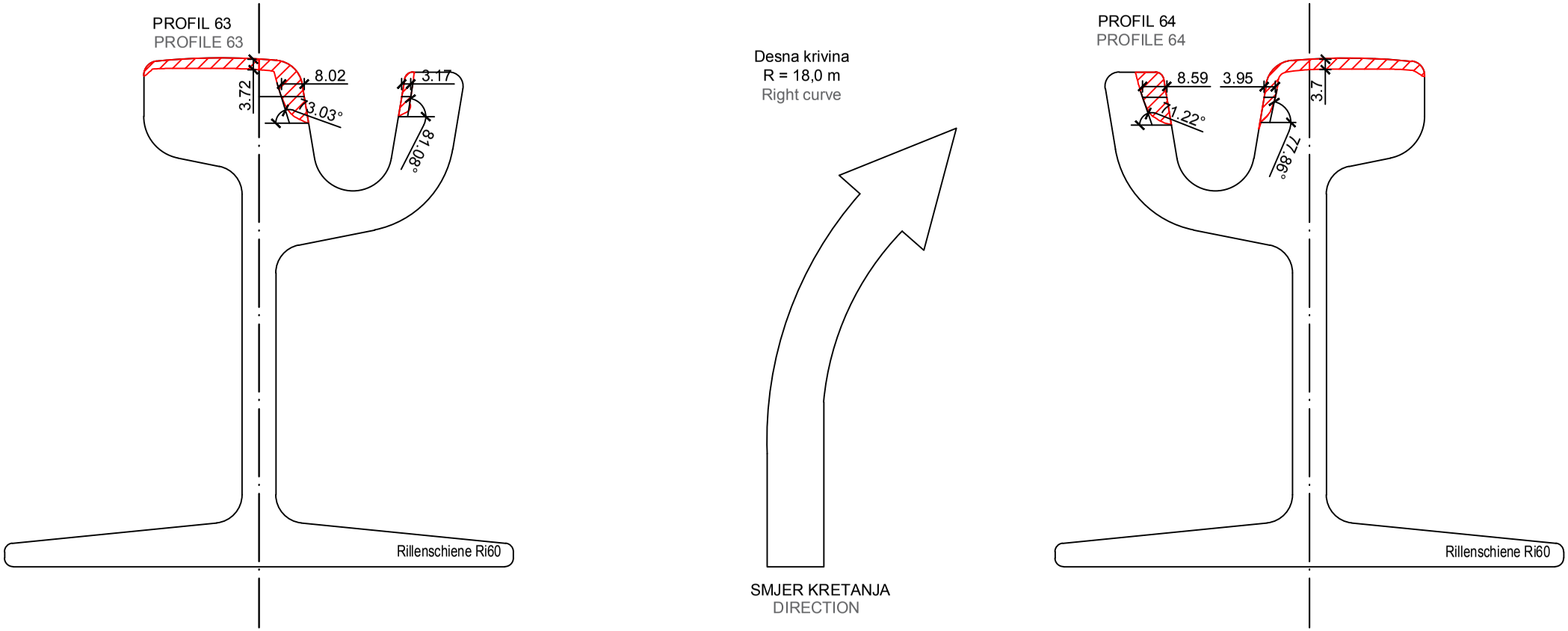
MJ: 1:2

Annex 6.2.1.1. Cross section wear in curves at Location 2

Cross section wear in curve R154

Location 2: Savska - Vukovarska crossing

Scale: 1:2



Prilog 6.2.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 2

Istrošenje poprečnog presjeka tračnica u krivini R155

Lokacija 2: Križanje Savska cesta - Avenija grada Vukovara

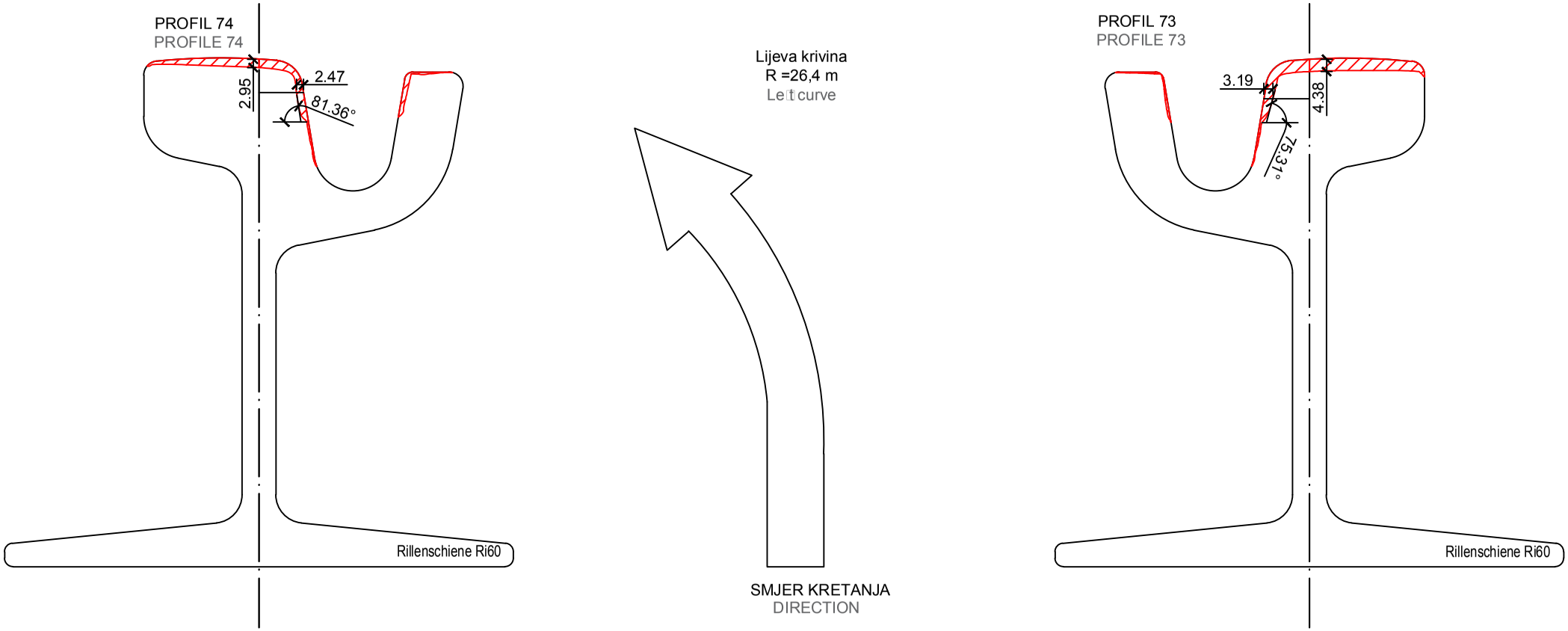
MJ: 1:2

Annex 6.2.1.1. Cross section wear in curves at Location 2

Cross section wear in curve R155

Location 2: Savska - Vukovarska crossing

Scale: 1:2



Prilog 6.2.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 2

Istrošenje poprečnog presjeka tračnica u krivini R156

Lokacija 2: Križanje Savska cesta - Avenija grada Vukovara

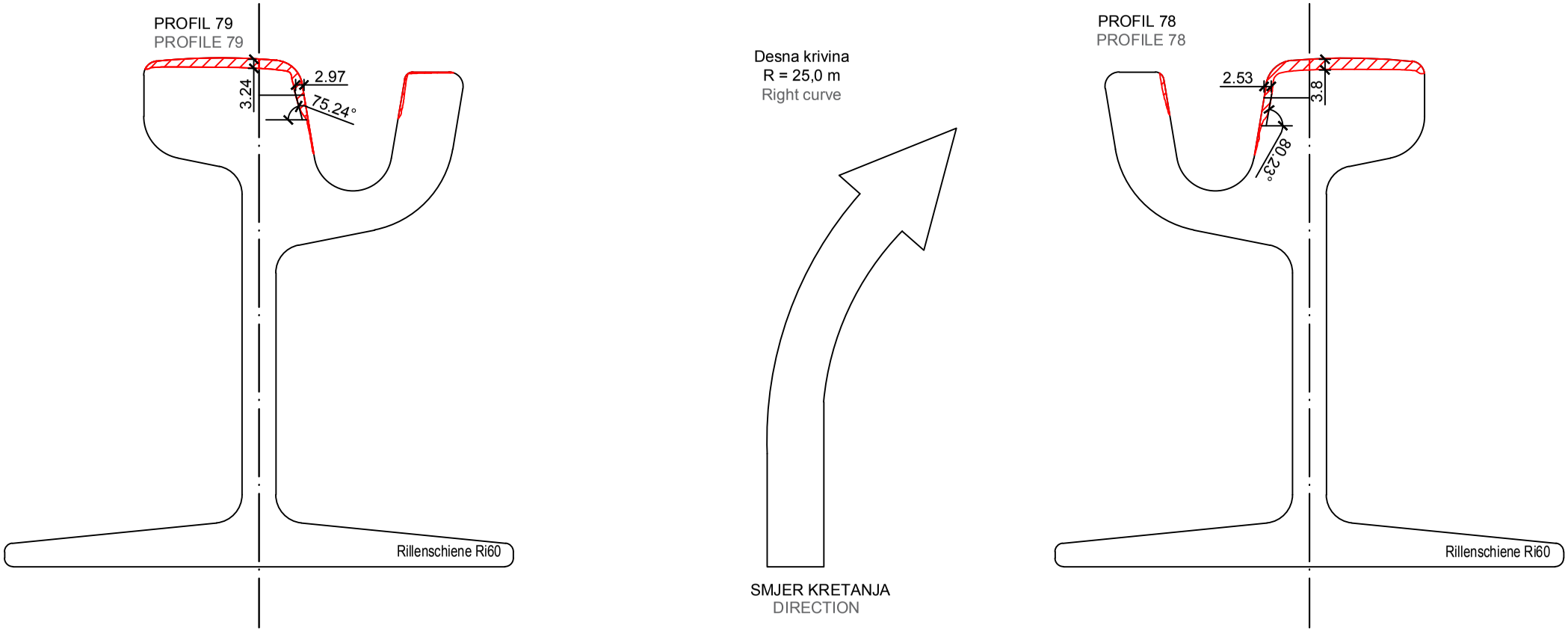
MJ: 1:2

Annex 6.2.1.1. Cross section wear in curves at Location 2

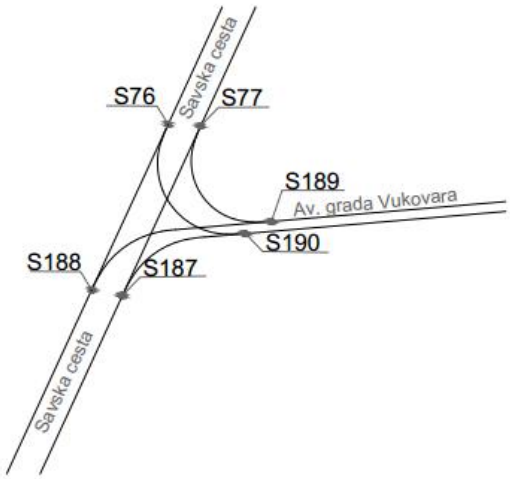
Cross section wear in curve R156

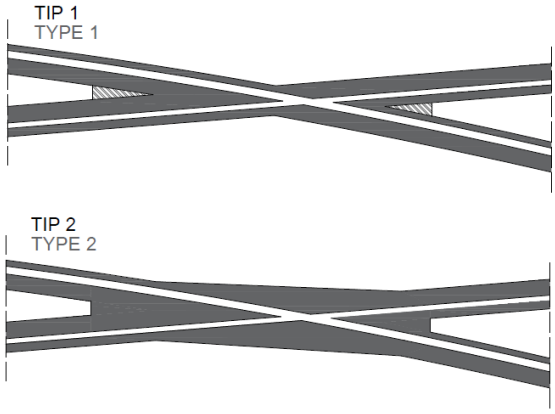
Location 2: Savska - Vukovarska crossing

Scale: 1:2



Prilog 6.2.2. Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 2
Lokacija 2: Križanje Savska cesta - Ulica grada Vukovara
Annex 6.2.2. Results of cross section wear in turnouts at Location 2
Location 2: Savska - Vukovarska crossing

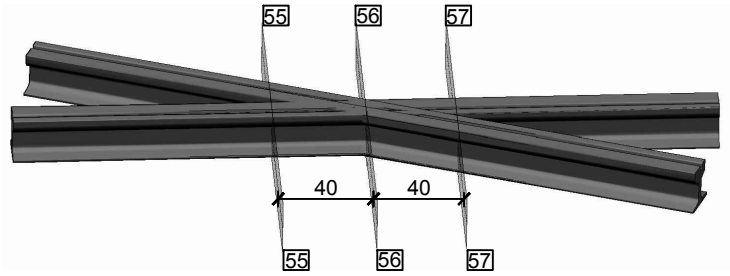




Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-03-04 K-03-01	S76	1	55L	13	20.71	7.71	25.04	24.86	-0.18	8
			55D	13	16.73	3.73	34.00	34.65	0.65	
			56	12	21.05	9.05		36.78		
			57L	13	18.21	5.21	34.00	32.46	-1.54	
			57D	13	21.53	8.53	25.04	24.63	-0.41	
K-03-03 K-03-02	S77	2	60L	13	13.98	0.98	24.00	21.96	-2.04	8
			60D	13	12.84	-0.16	35.69	36.94	1.25	
			61	12	13.94	1.94		58.42		
			62L	13	12.77	-0.23	35.69	36.77	1.08	
			62D	13	13.87	0.87	24.00	21.92	-2.08	
K-03-02 K-03-06	S187	1	75L	13	20.10	7.10	35.15	36.72	1.57	8
			75D	13	22.19	9.19	24.00	26.45	2.45	
			76	12	21.78	9.78		35.10		
			77L	13	22.70	9.70	24.00	24.03	0.03	
			77D	13	21.88	8.88	35.15	35.36	0.21	
K-03-01 K-03-05	S188	1	80L	13	19.76	6.76	34.00	34.33	0.33	8
			80D	13	22.07	9.07	24.78	25.98	1.20	
			81	12	21.19	9.19		31.57		
			82L	13	21.26	8.26	24.78	24.38	-0.40	
			82D	13	19.02	6.02	34.00	33.67	-0.33	
K-03-04 K-03-06	S190	1	87L	13	17.75	4.75	34.00	37.37	3.37	8
			87D	13	20.34	7.34	25.04	22.84	-2.20	
			88	12	20.49	8.49		37.52		
			89L	13	20.73	7.73	25.04	23.77	-1.27	
			89D	13	16.98	3.98	34.00	41.01	7.01	
K-03-03 K-03-05	S189	1	90L	13	19.23	6.23	35.47	40.09	4.62	8
			90D	13	20.64	7.64	24.00	22.90	-1.10	
			91	12	21.13	9.13		54.11		
			92L	13	20.87	7.87	24.00	22.55	-1.45	
			92D	13	20.45	7.45	35.47	37.08	1.61	

Prilog 6.2.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 2
Istrošenje poprečnog presjeka srcišta skretnice S76
Lokacija 2: Križanje Savska cesta - Ulica grada Vukovara
MJ: 1:2

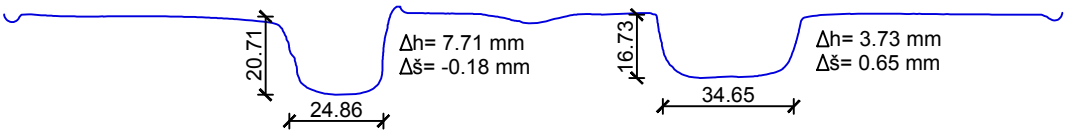
Annex 6.2.2.1. Cross section wear in turnouts at Location 2
Cross section wear in turnout S76
Location 2: Savska - Vukovarska crossing
Scale: 1:2



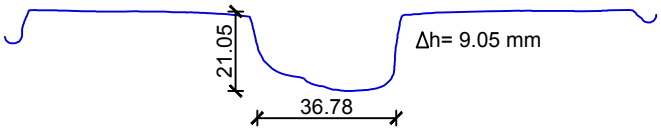
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Ilica ⟶ Savski most
Direction: Ilica ⟶ Savski most

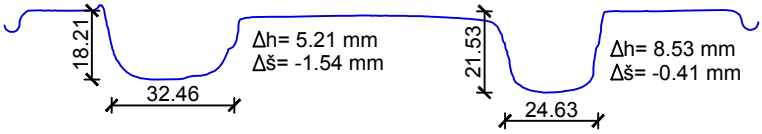
PROFIL 55
PROFILE 55



PROFIL 56
PROFILE 56

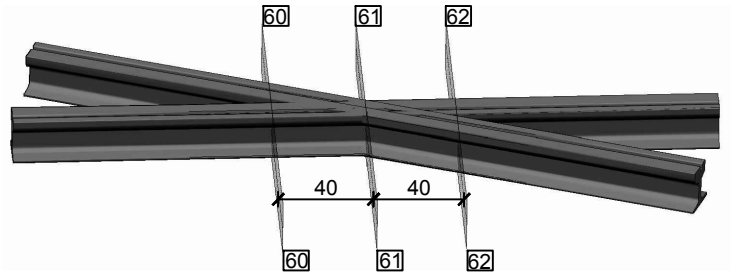


PROFIL 57
PROFILE 57



Prilog 6.2.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 2
Istrošenje poprečnog presjeka srcišta skretnice S77
Lokacija 2: Križanje Savska cesta - Ulica grada Vukovara
MJ: 1:2

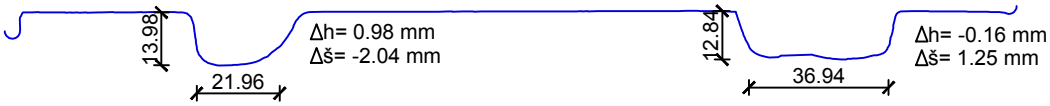
Annex 6.2.2.1. Cross section wear in turnouts at Location 2
Cross section wear in turnout S77
Location 2: Savska - Vukovarska crossing
Scale: 1:2



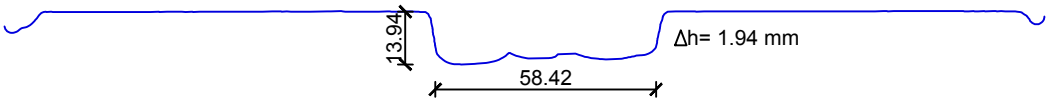
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savski most ⟶ Ilica
Direction: Savski most ⟶ Ilica

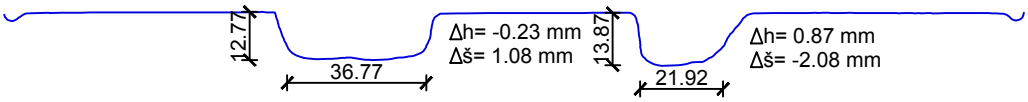
PROFIL 60
PROFILE 60



PROFIL 61
PROFILE 61

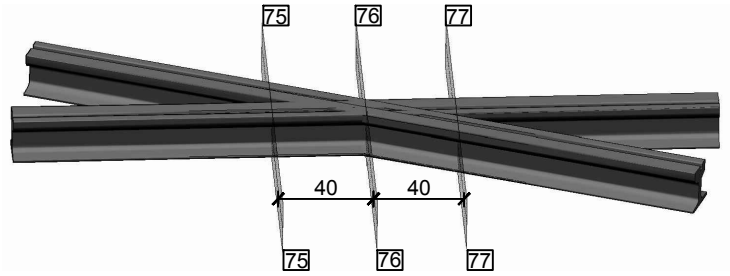


PROFIL 62
PROFILE 62



Prilog 6.2.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 2
Istrošenje poprečnog presjeka srcišta skretnice S187
Lokacija 2: Križanje Savska cesta - Ulica grada Vukovara
MJ: 1:2

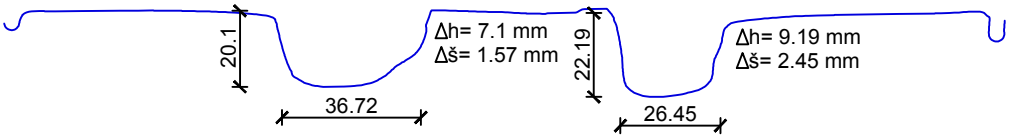
Annex 6.2.2.1. Cross section wear in turnouts at Location 2
Cross section wear in turnout S187
Location 2: Savska - Vukovarska crossing
Scale: 1:2



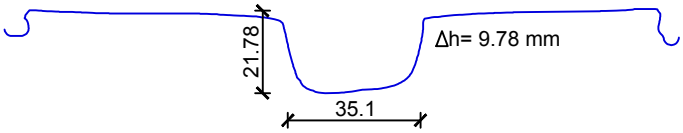
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savski most ⟶ Ilica
Direction: Savski most ⟶ Ilica

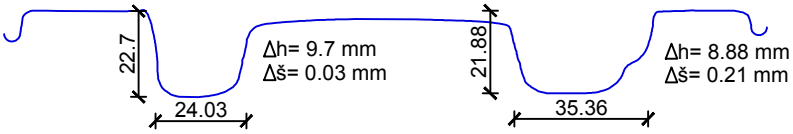
PROFIL 75
PROFILE 75



PROFIL 76
PROFILE 76

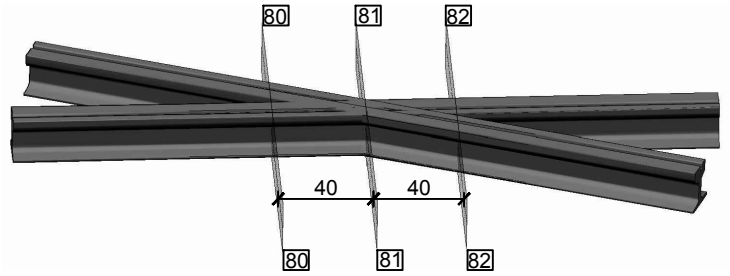


PROFIL 77
PROFILE 77



Prilog 6.2.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 2
Istrošenje poprečnog presjeka srcišta skretnice S188
Lokacija 2: Križanje Savska cesta - Ulica grada Vukovara
MJ: 1:2

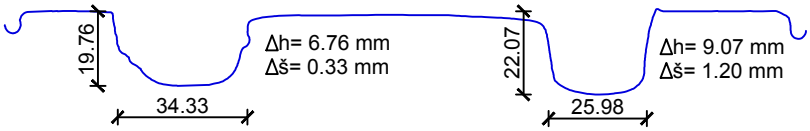
Annex 6.2.2.1. Cross section wear in turnouts at Location 2
Cross section wear in turnout S188
Location 2: Savska - Vukovarska crossing
Scale: 1:2



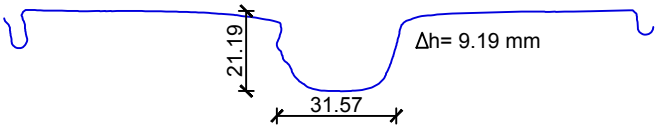
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Ilica ⟶ Savski most
Direction: Ilica ⟶ Savski most

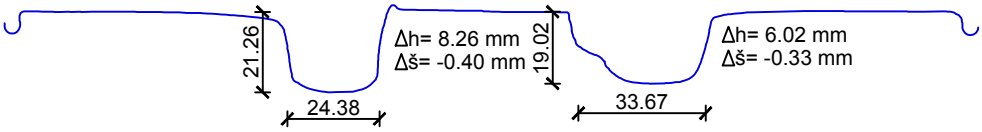
PROFIL 80
PROFILE 80



PROFIL 81
PROFILE 81

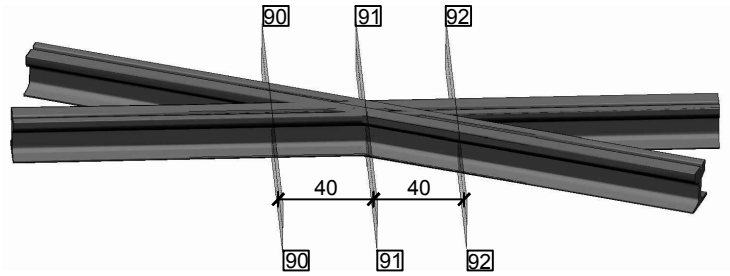


PROFIL 82
PROFILE 82



Prilog 6.2.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 2
Istrošenje poprečnog presjeka srcišta skretnice S189
Lokacija 2: Križanje Savska cesta - Ulica grada Vukovara
MJ: 1:2

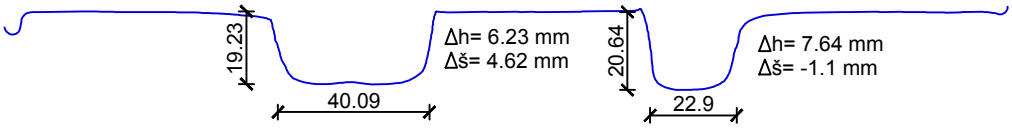
Annex 6.2.2.1. Cross section wear in turnouts at Location 2
Cross section wear in turnout S189
Location 2: Savska - Vukovarska crossing
Scale: 1:2



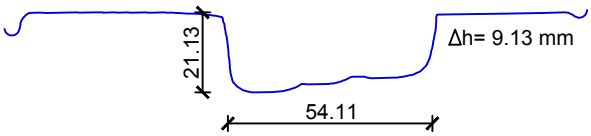
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Vukovarska → Savska
Direction: Vukovarska → Savska

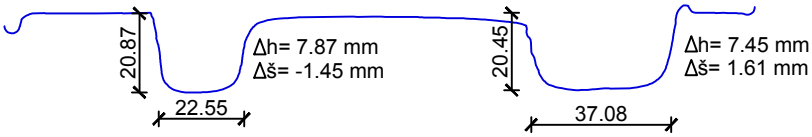
PROFIL 90
PROFILE 90



PROFIL 91
PROFILE 91

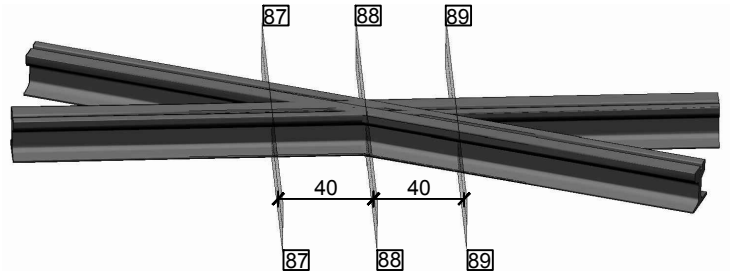


PROFIL 92
PROFILE 92



Prilog 6.2.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 2
Istrošenje poprečnog presjeka srcišta skretnice S190
Lokacija 2: Križanje Savska cesta - Ulica grada Vukovara
MJ: 1:2

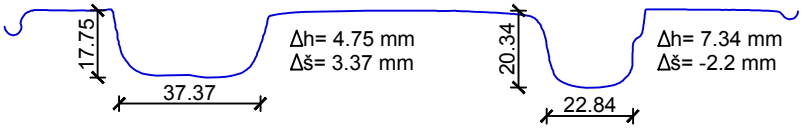
Annex 6.2.2.1. Cross section wear in turnouts at Location 2
Cross section wear in turnout S190
Location 2: Savska - Vukovarska crossing
Scale: 1:2



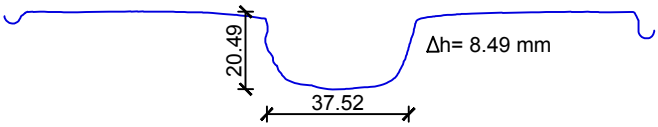
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savska ⟶ Vukovarska
Direction: Savska ⟶ Vukovarska

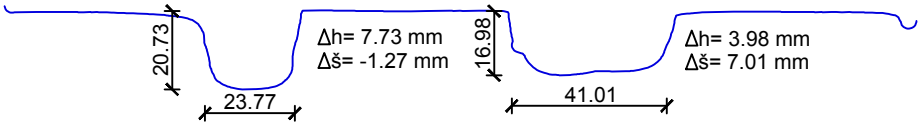
PROFIL 87
PROFILE 87



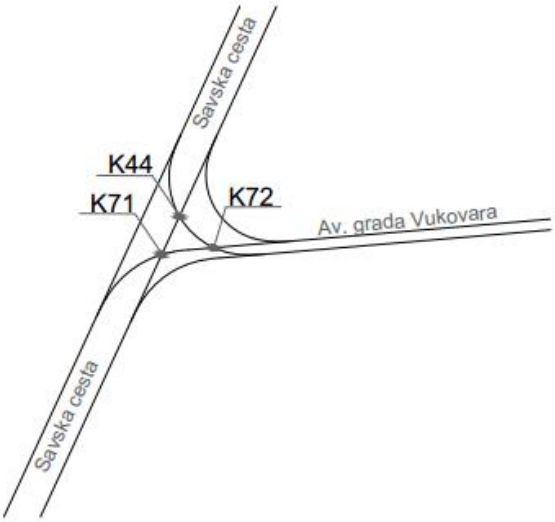
PROFIL 88
PROFILE 88



PROFIL 89
PROFILE 89



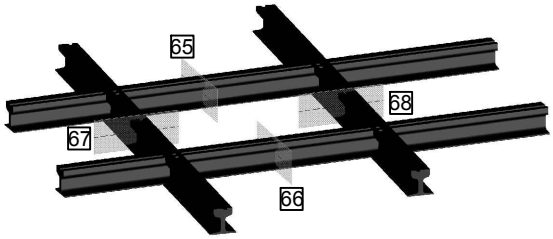
Prilog 6.2.3. Rezultati istrošenja profila tračnica u križalištima na Lokaciji 2
Lokacija 2: Križanje Savska cesta - Ulica grada Vukovara
Annex 6.2.3. Results of cross section wear in track crossing at Location 2
Location 2: Savska - Vukovarska crossing



Dionice Sections	**Oznaka križališta** Track crossing mark	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-03-04 K-03-02	K44	65	12	20,62	8.62	24.00	22.76	-1.24	8
		66	12	21,09	9.09	24.00	22.84	-1.16	
		67	12	16,13	4.13	34.00	37.26	3.26	
		68	12	16,93	4.93	34.00	36.24	2.24	
K-03-05 K-03-02	K71	69	12	18,07	6.07	34.00	33.87	-0.13	8
		70	12	17,10	5.10	34.00	35.06	1.06	
		71	12	20,37	8.37	24.00	22.82	-1.18	
		72	12	21,16	9.16	24.00	23.07	-0.93	
K-03-05 K-03-04	K72	83	12	15,90	3.90	34.00	36.55	2.55	8
		84	12	16,11	4.11	34.00	37.27	3.27	
		85	12	14,91	2.91	24.00	24.36	0.36	
		86	12	15,04	3.04	24.00	24.50	0.50	

Prilog 6.2.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 2
Istrošenje poprečnog presjeka tračnica u križalištu K44
Lokacija 2: Križanje Savska cesta - Ulica grada Vukovara
MJ: 1:2

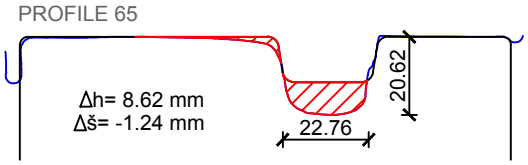
Annex 6.2.3.1. Cross section wear in track crossings at Location 2
Cross section wear in track crossing K44
Location 2: Savska - Vukovarska crossing
Scale: 1:2



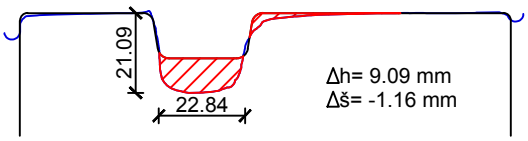
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savski most ⟶ Ilica
Direction: Savski most Ilica

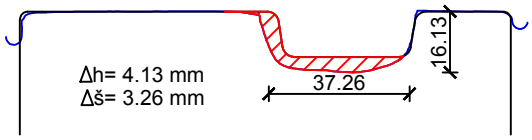
PROFIL 65
PROFILE 65



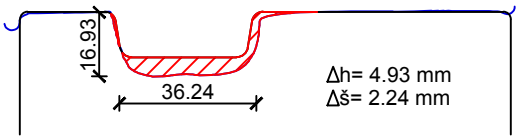
PROFIL 66
PROFILE 66



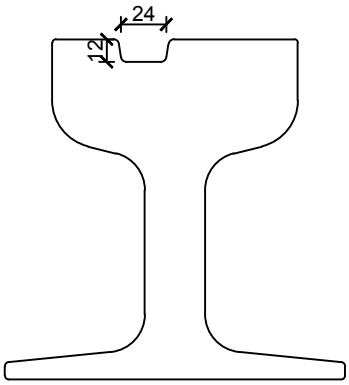
PROFIL 67
PROFILE 67



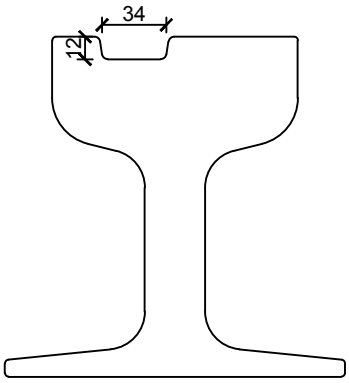
PROFIL 68
PROFILE 68



PROFIL 65, 66 PROFIL 65, 66
R = 0 m

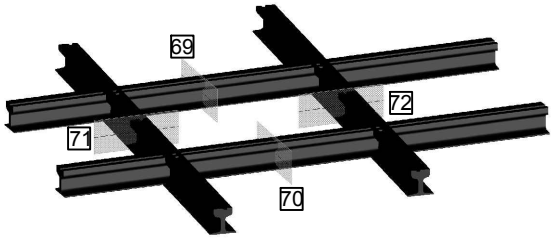


PROFIL 67, 68 PROFIL 67, 68
R = 21 m



Prilog 6.2.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 2
Istrošenje poprečnog presjeka tračnica u križalištu K71
Lokacija 2: Križanje Savska cesta - Ulica grada Vukovara
MJ: 1:2

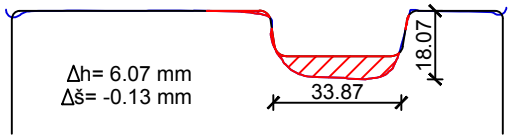
Annex 6.2.3.1. Cross section wear in track crossings at Location 2
Cross section wear in track crossing K71
Location 2: Savska - Vukovarska crossing
Scale: 1:2



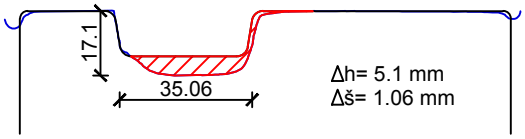
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Vukovarska ⟶ Savska
Direction: Vukovarska ⟶ Savska

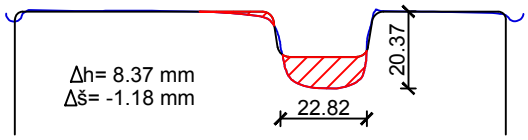
PROFIL 69
PROFILE 69



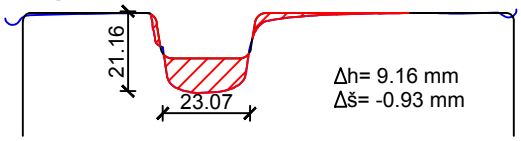
PROFIL 70
PROFILE 70



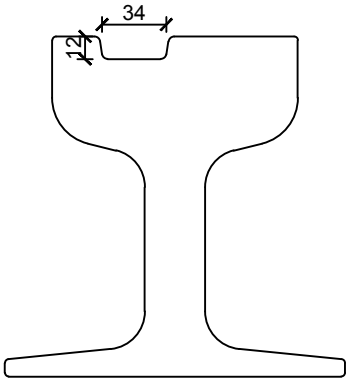
PROFIL 71
PROFILE 71



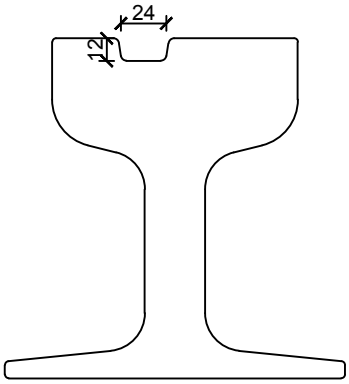
PROFIL 72
PROFILE 72



PROFIL 69, 70 PROFIL 69, 70
R = 26.4 m

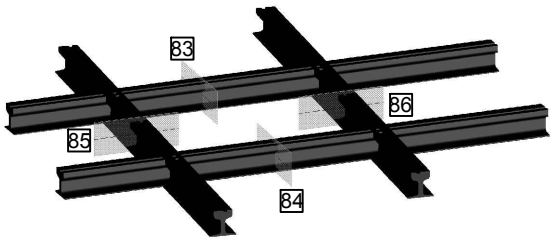


PROFIL 71, 72 PROFIL 71, 72
R = 0 m



Prilog 6.2.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 2
Istrošenje poprečnog presjeka tračnica u križalištu K72
Lokacija 2: Križanje Savska cesta - Ulica grada Vukovara
MJ: 1:2

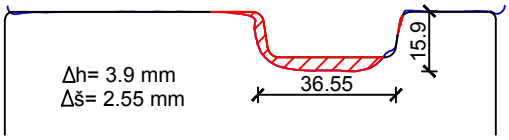
Annex 6.2.3.1. Cross section wear in track crossings at Location 2
Cross section wear in track crossing K72
Location 2: Savska - Vukovarska crossing
Scale: 1:2



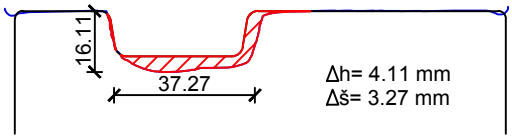
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savska ⟶ Vukovarska
Direction: Savska ⟶ Vukovarska

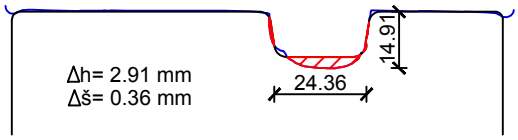
PROFIL 83
PROFILE 83



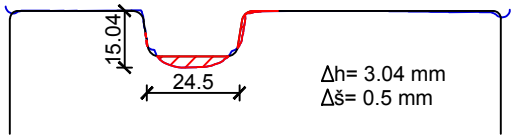
PROFIL 84
PROFILE 84



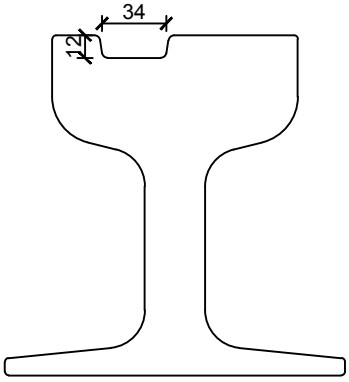
PROFIL 85
PROFILE 85



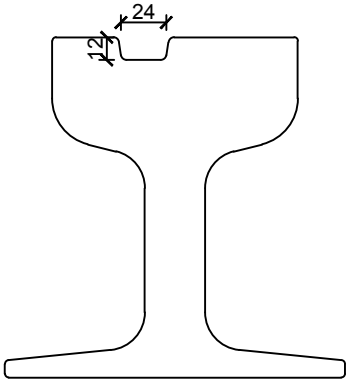
PROFIL 86
PROFILE 86

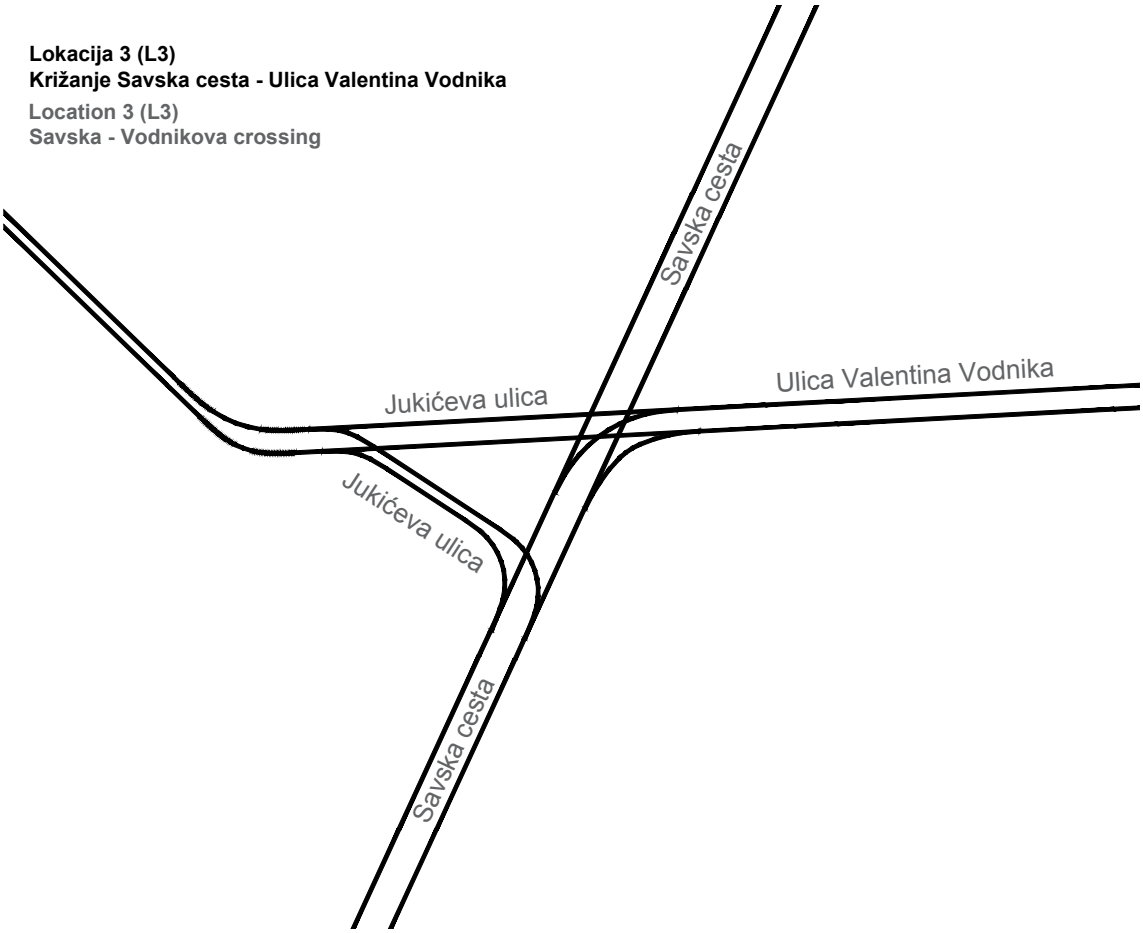


PROFIL 83, 84 PROFILE 83, 84
R = 21.0 m



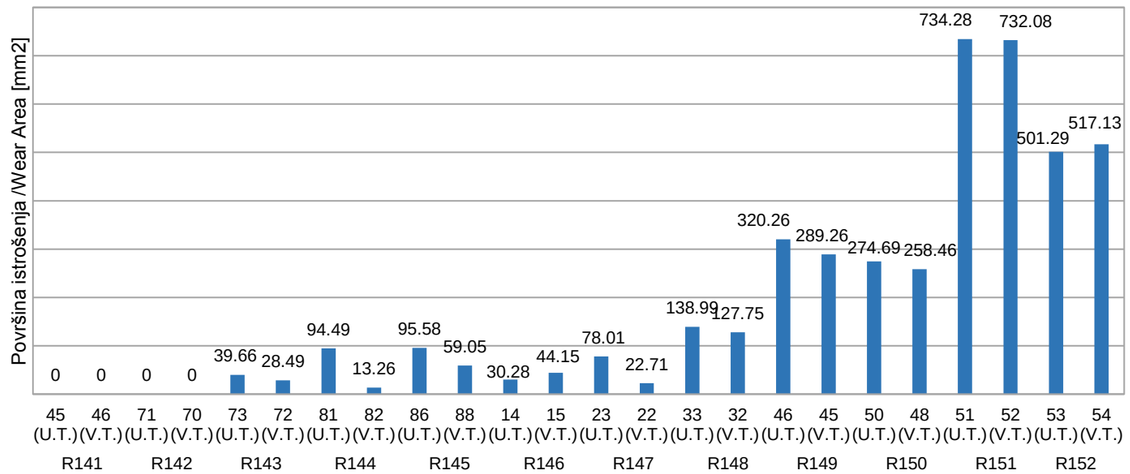
PROFIL 85, 86 PROFILE 85, 86
R = 0 m

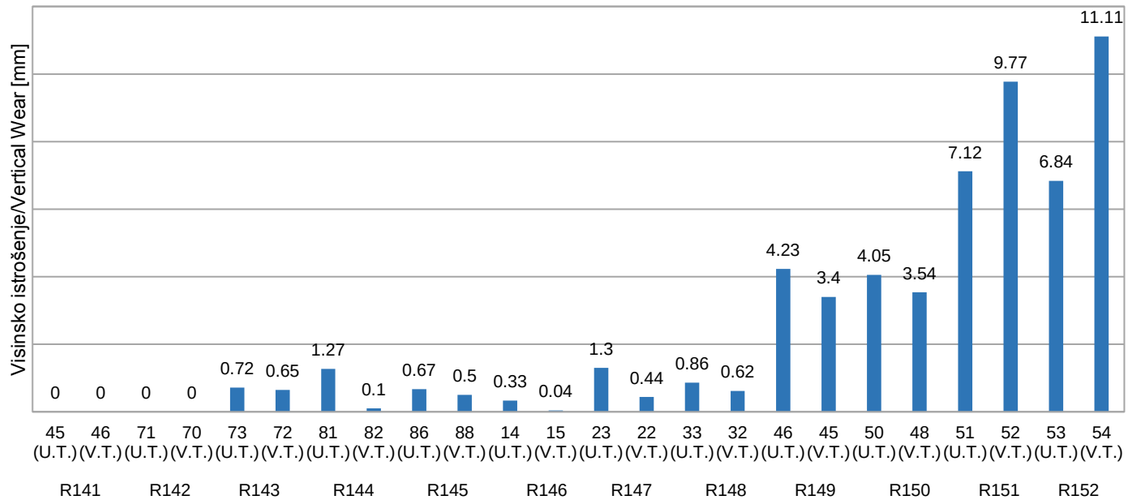


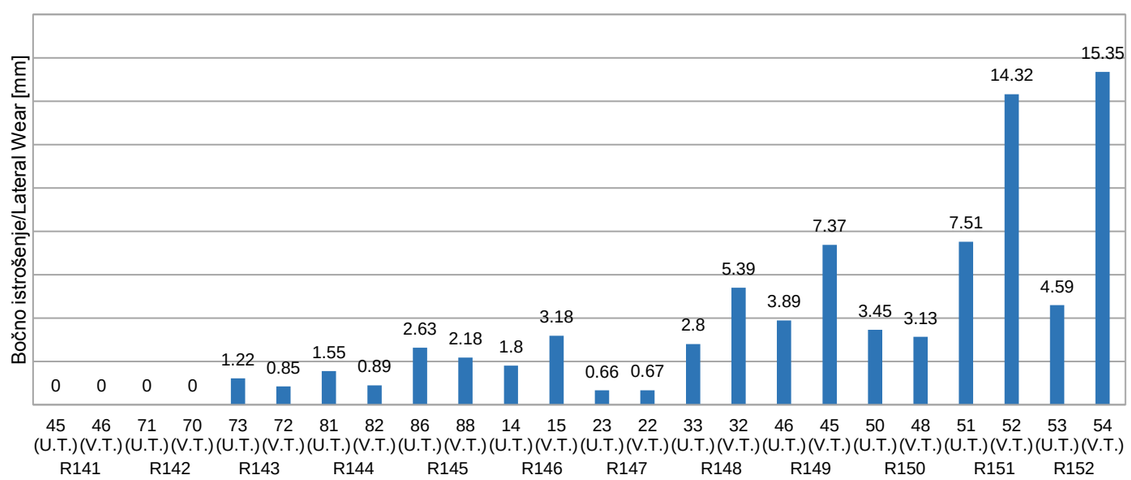


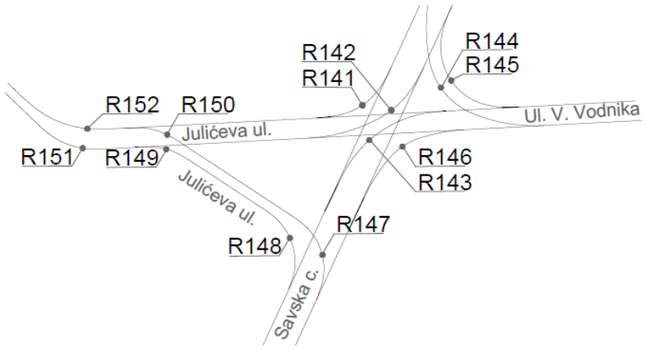
IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija razvoja tramvajskog prometa □rada □agre□a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition
SADRŽAJ PRILOGA: ANNEX: **Istrošenje poprečnih presjeka tračnica u krivinama, skretnicama i križalištima na Lokaciji 3** Rail cross section wear in curves, turnouts and crossings at Location 3	
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.3

Prilog 6.3.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 3**
Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova
Annex 6.3.1. **Results of cross section wear in curves at Location 3**
Location 3: Savska - Vodnikova crossing









Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [˚]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
-	R141	lijeva left	45	lijeva/left	0	0	0	0	18	1
			46	desna/right	0	0	0	0		
-	R142	lijeva left	71	lijeva/left	0	0	0	0	30	1
			70	desna/right	0	0	0	0		
K-05-06	R143	lijeva left	73	lijeva/left	39.66	0.72	1.22	81.13	35	1
			72	desna/right	28.49	0.65	0.85	78.08		
-	R144	lijeva left	81	lijeva/left	94.49	1.27	1.55	82.39	21.8	1
			82	desna/right	13.26	0.1	0.89	77.77		
-	R145	desna right	88	lijeva/left	59.05	0.5	2.18	74.07	18	1
			86	desna/right	95.58	0.67	2.63	69.83		
K-05-10	R146	desna right	15	lijeva/left	44.15	0.04	3.18	71.15	18	1
			14	desna/right	30.28	0.33	1.8	80.02		
K-05-08	R147	lijeva left	23	lijeva/left	78.01	1.3	0.66	77.03	18	21
			22	desna/right	22.71	0.44	0.67	74.34		
K-05-02	R148	desna right	32	lijeva/left	127.75	0.62	5.39	70.85	18	21
			33	desna/right	138.99	0.86	2.8	74.26		
K-05-02	R149	desna right	45	lijeva/left	289.26	3.4	7.37	72.01	18	21
			46	desna/right	320.26	4.23	3.89	81.52		
K-05-01	R150	lijeva left	50	lijeva/left	274.69	4.05	3.45	77.38	18	21
			48	desna/right	258.46	3.54	3.13	74.31		
D-07-04	R151	lijeva left	51	lijeva/left	734.28	7.12	7.51	77.12	20	23
			52	desna/right	732.08	9.77	14.32	69.96		
D-07-03	R152	desna right	54	lijeva/left	517.13	11.11	15.35	75.34	20	23
			53	desna/right	501.29	6.84	4.59	83.91		

U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve

Prilog 6.3.1. Rezultati istrošenja profila tračnica u krivinama na Lokaciji 3
Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova
Annex 6.3.1. Results of cross section wear in curves at Location 3
Location 3: Savska - Vodnikova crossing

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear		
					Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
-	R141	lijeva left	45	lijeva/left	0	0	0
			46	desna/right	0	0	0
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					0	0	0
-	R142	lijeva left	71	lijeva/left	0	0	0
			70	desna/right	0	0	0
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					0	0	0
K-05-06	R143	lijeva left	73	lijeva/left	39.66	0.72	1.22
			72	desna/right	28.49	0.65	0.85
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-11.17	-0.07	-0.37
-	R144	lijeva left	81	lijeva/left	94.49	1.27	1.55
			82	desna/right	13.26	0.1	0.89
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-81.23	-1.17	-0.66
-	R145	desna right	88	lijeva/left	59.05	0.5	2.18
			86	desna/right	95.58	0.67	2.63
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-36.53	-0.17	-0.45
K-05-10	R146	desna right	15	lijeva/left	44.15	0.04	3.18
			14	desna/right	30.28	0.33	1.8
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					13.87	-0.29	1.38
K-05-08	R147	lijeva left	23	lijeva/left	78.01	1.3	0.66
			22	desna/right	22.71	0.44	0.67
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-55.3	-0.86	0.01
K-05-02	R148	desna right	32	lijeva/left	127.75	0.62	5.39
			33	desna/right	138.99	0.86	2.8
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-11.24	-0.24	2.59
K-05-02	R149	desna right	45	lijeva/left	289.26	3.4	7.37
			46	desna/right	320.26	4.23	3.89
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-31	-0.83	3.48
K-05-01	R150	lijeva left	50	lijeva/left	274.69	4.05	3.45
			48	desna/right	258.46	3.54	3.13
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-16.23	-0.51	-0.32
D-07-04	R151	lijeva left	51	lijeva/left	734.28	7.12	7.51
			52	desna/right	732.08	9.77	14.32
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-2.2	2.65	6.81
D-07-03	R152	desna right	54	lijeva/left	517.13	11.11	15.35
			53	desna/right	501.29	6.84	4.59
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					15.84	4.27	10.76

Prilog 6.3.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 3

Istrošenje poprečnog presjeka tračnica u krivini R141

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

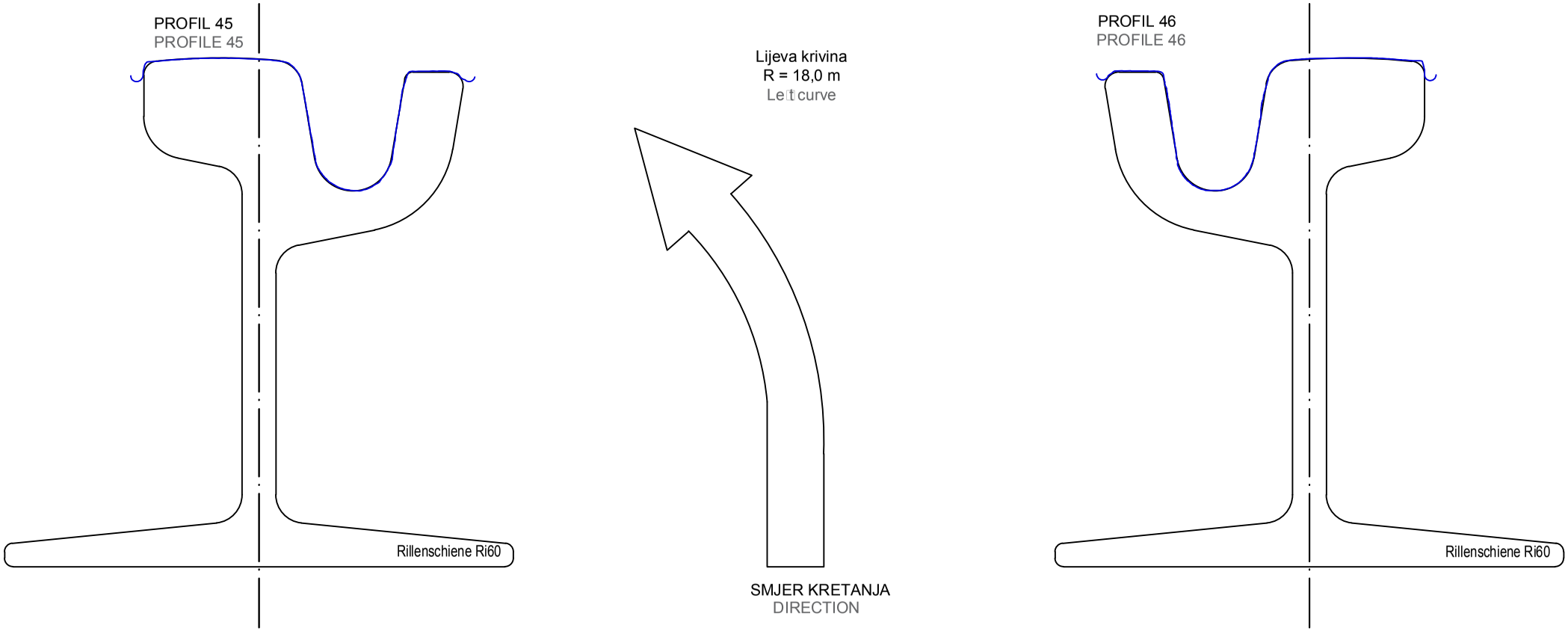
MJ: 1:2

Annex 6.3.1.1. Cross section wear in curves at Location 3

Cross section wear in curve R141

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Prilog 6.3.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 3

Istrošenje poprečnog presjeka tračnica u krivini R142

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

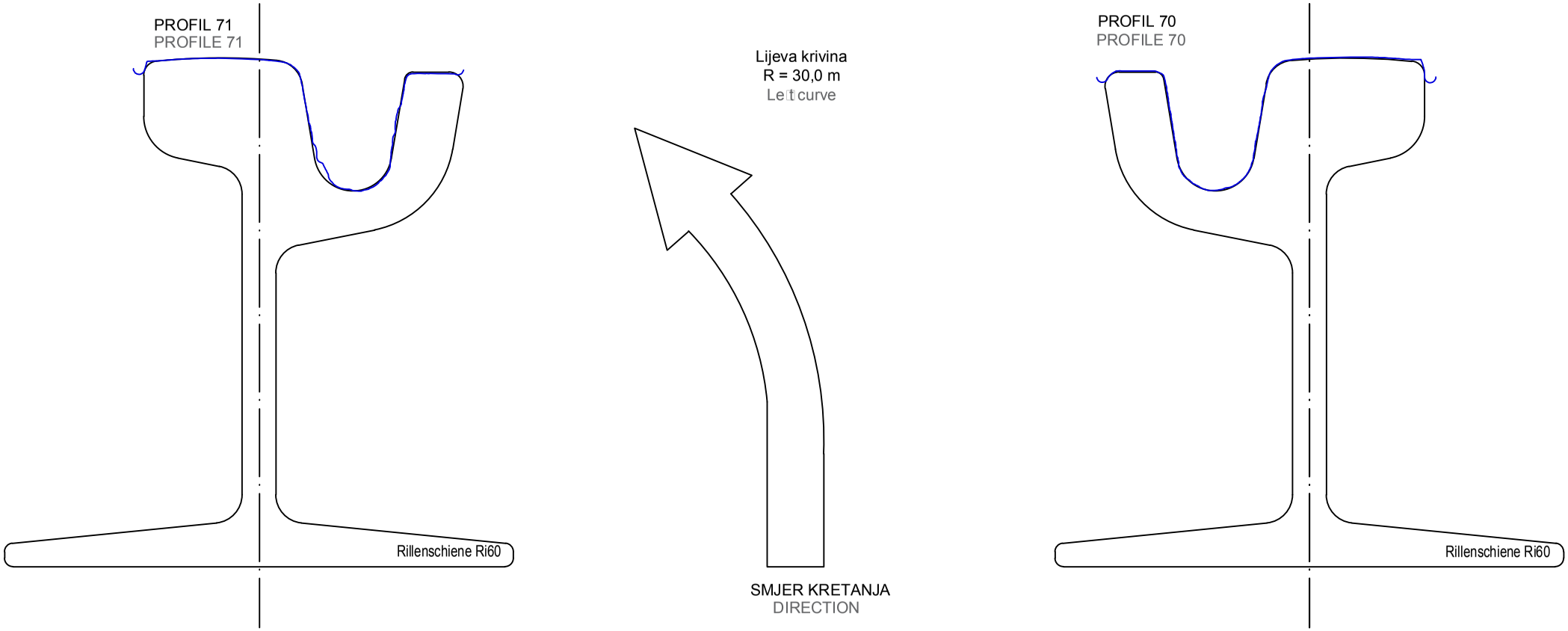
MJ: 1:2

Annex 6.3.1.1. Cross section wear in curves at Location 3

Cross section wear in curve R142

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Prilog 6.3.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 3

Istrošenje poprečnog presjeka tračnica u krivini R143

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

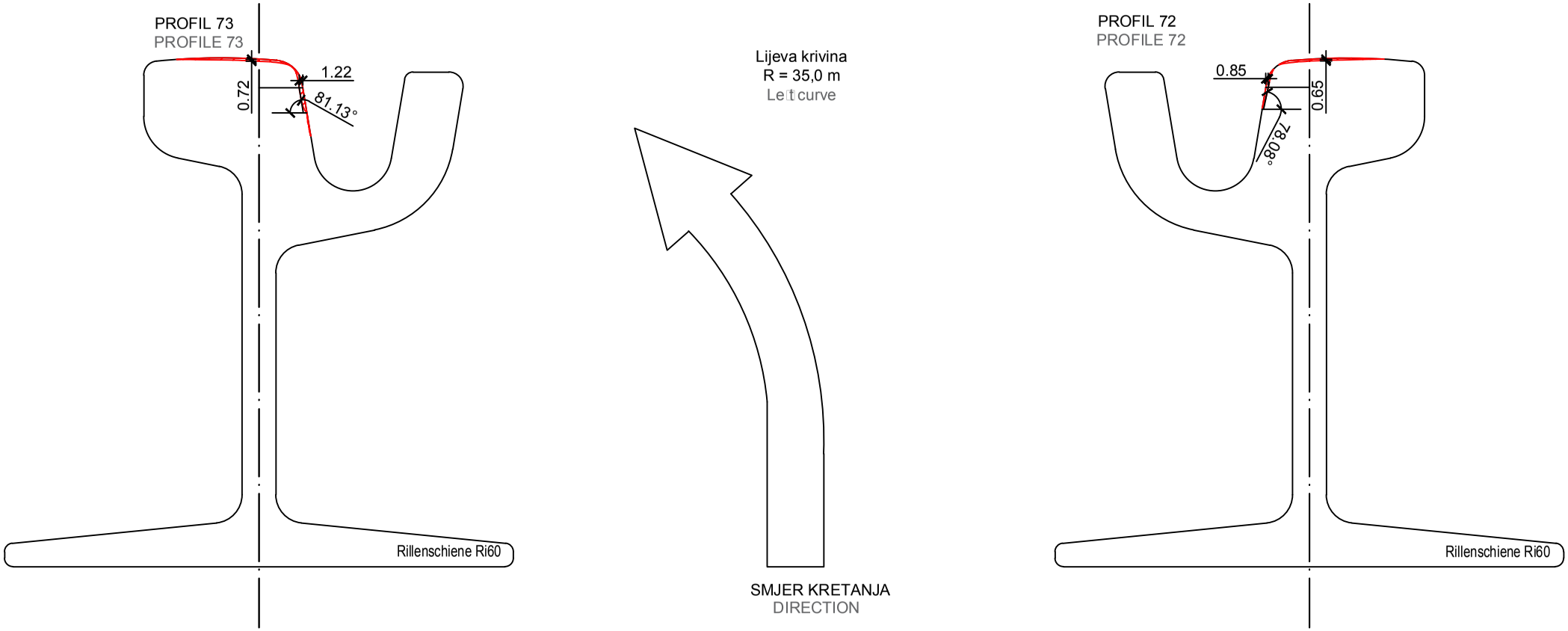
MJ: 1:2

Annex 6.3.1.1. Cross section wear in curves at Location 3

Cross section wear in curve R143

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Prilog 6.3.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 3

Istrošenje poprečnog presjeka tračnica u krivini R144

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

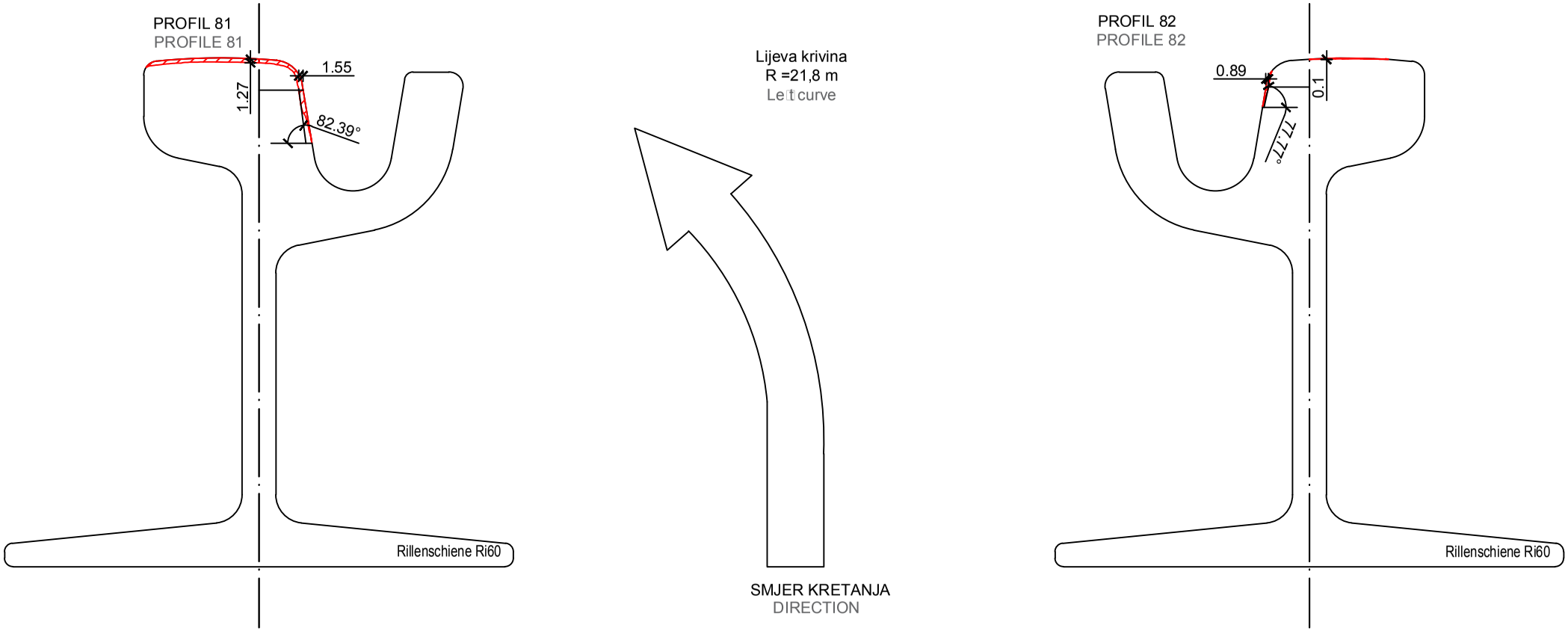
MJ: 1:2

Annex 6.3.1.1. Cross section wear in curves at Location 3

Cross section wear in curve R144

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Prilog 6.3.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 3

Istrošenje poprečnog presjeka tračnica u krivini R145

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

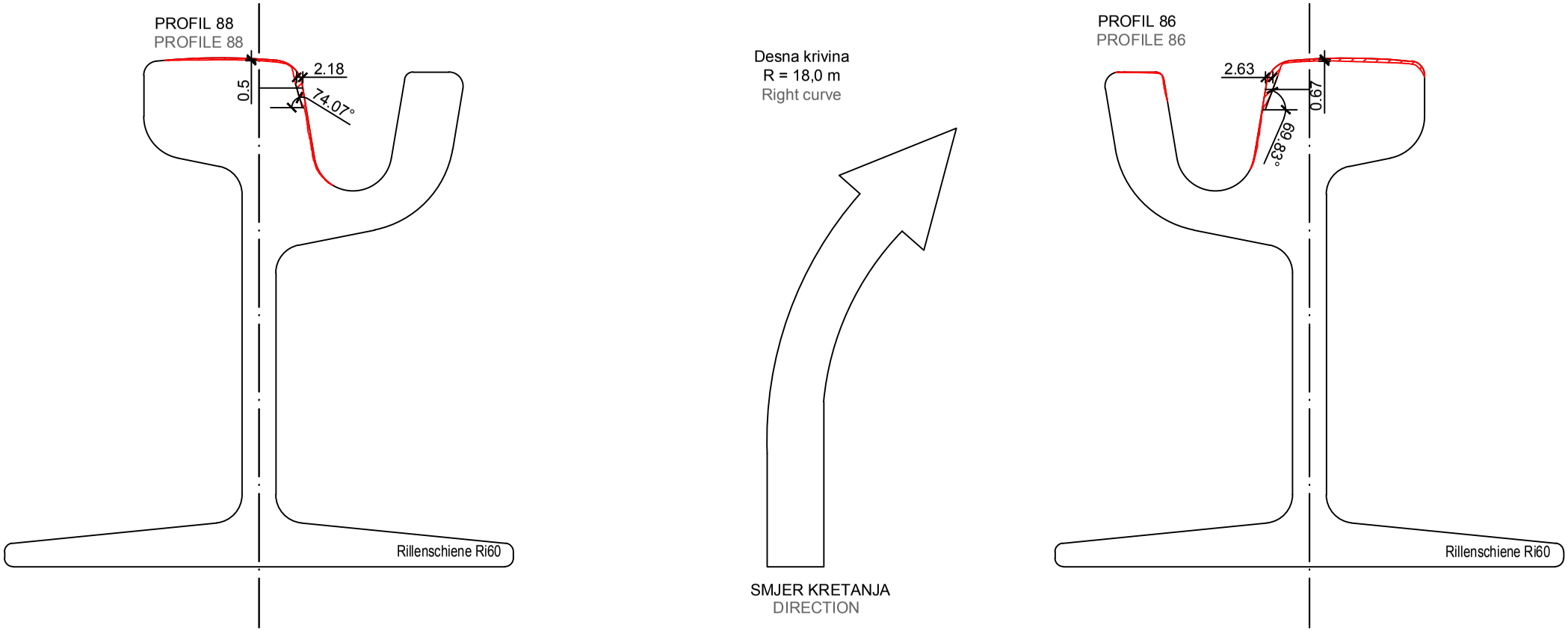
MJ: 1:2

Annex 6.3.1.1. Cross section wear in curves at Location 3

Cross section wear in curve R145

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Prilog 6.3.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 3

Istrošenje poprečnog presjeka tračnica u krivini R146

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

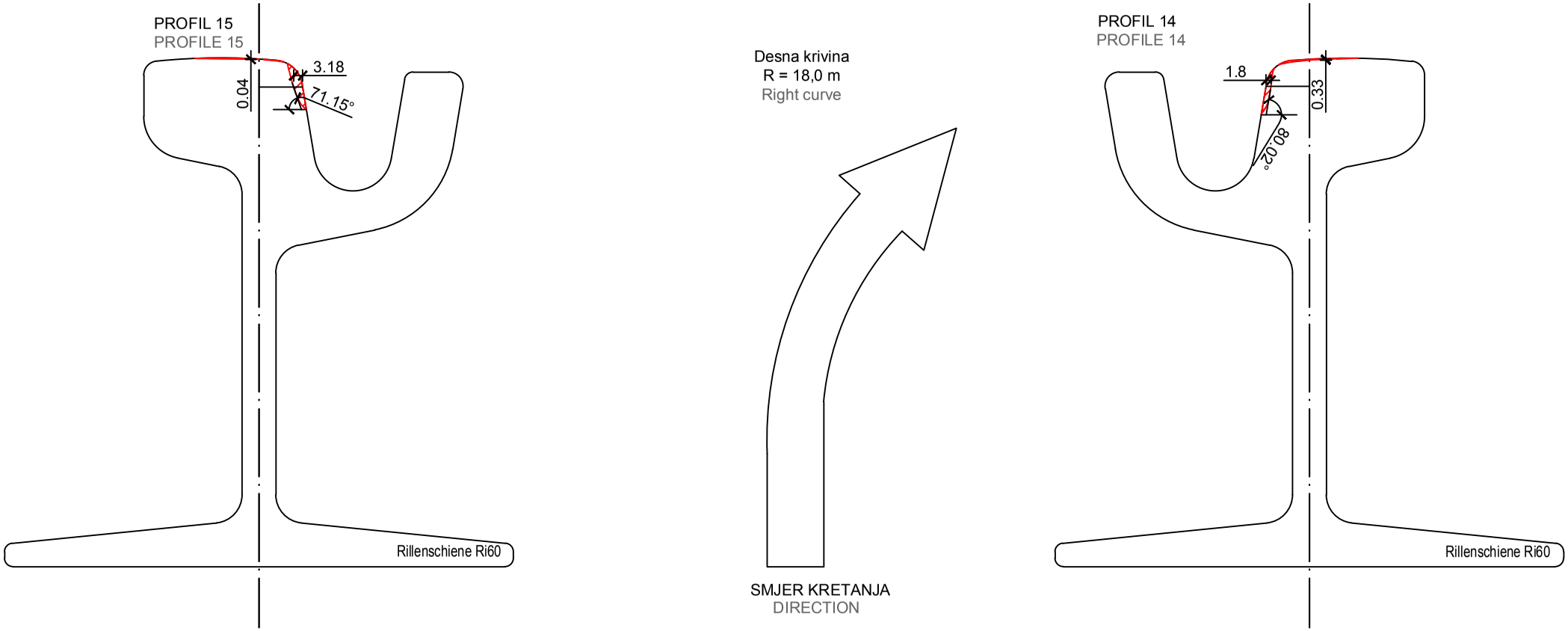
MJ: 1:2

Annex 6.3.1.1. Cross section wear in curves at Location 3

Cross section wear in curve R146

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Prilog 6.3.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 3

Istrošenje poprečnog presjeka tračnica u krivini R147

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

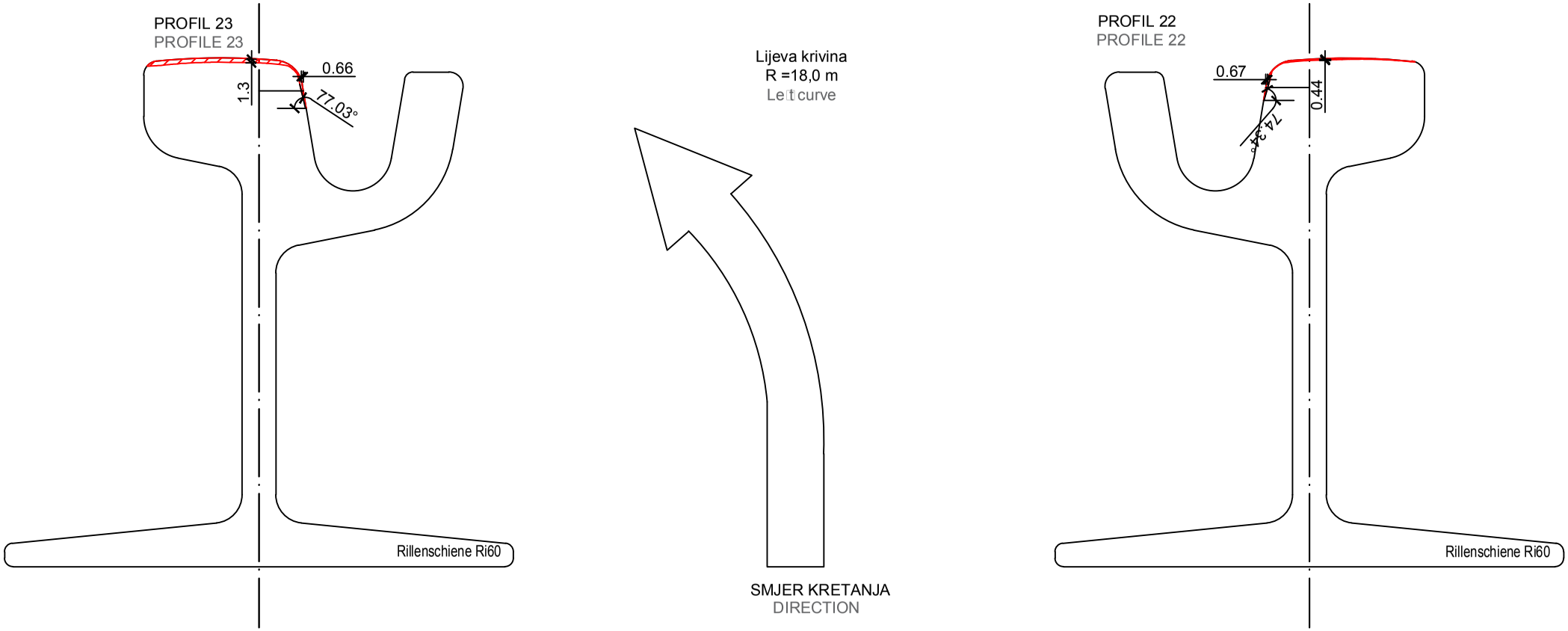
MJ: 1:2

Annex 6.3.1.1. Cross section wear in curves at Location 3

Cross section wear in curve R147

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Prilog 6.3.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 3

Istrošenje poprečnog presjeka tračnica u krivini R148

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

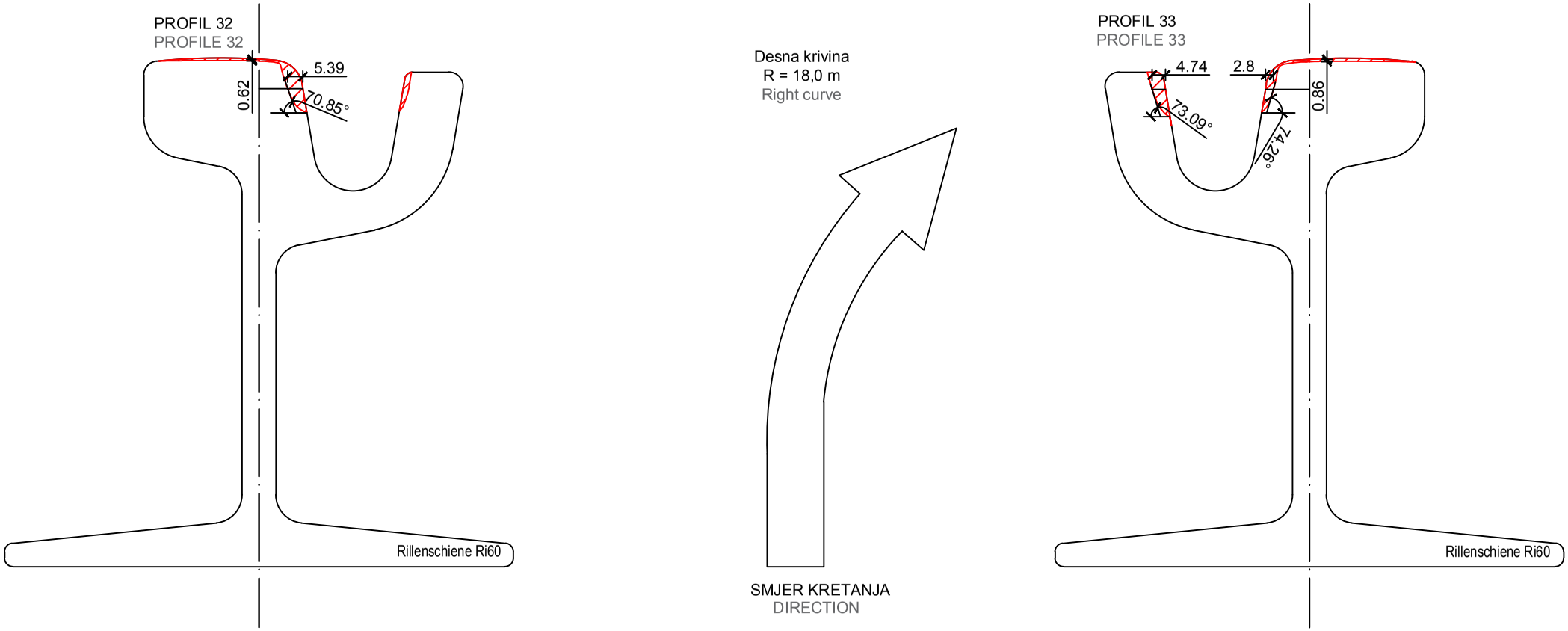
MJ: 1:2

Annex 6.3.1.1. Cross section wear in curves at Location 3

Cross section wear in curve R148

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Prilog 6.3.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 3

Istrošenje poprečnog presjeka tračnica u krivini R149

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

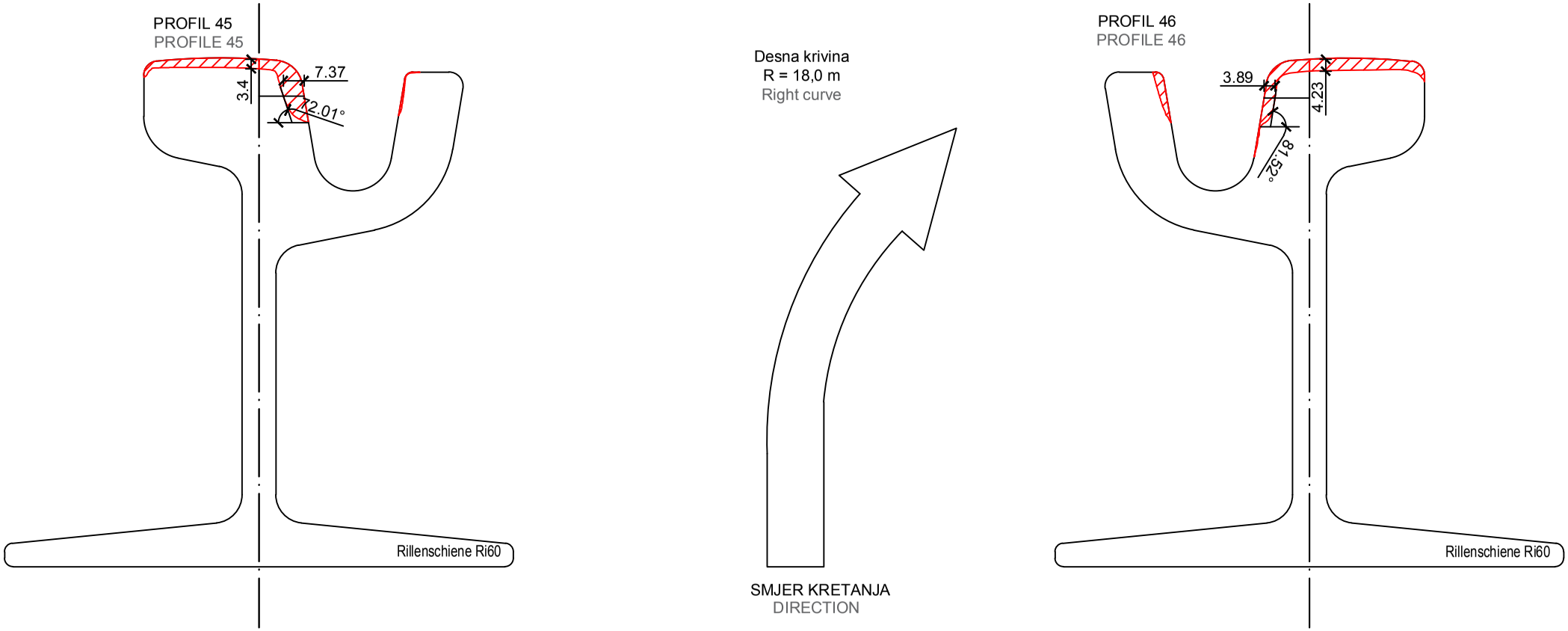
MJ: 1:2

Annex 6.3.1.1. Cross section wear in curves at Location 3

Cross section wear in curve R149

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Prilog 6.3.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 3

Istrošenje poprečnog presjeka tračnica u krivini R150

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

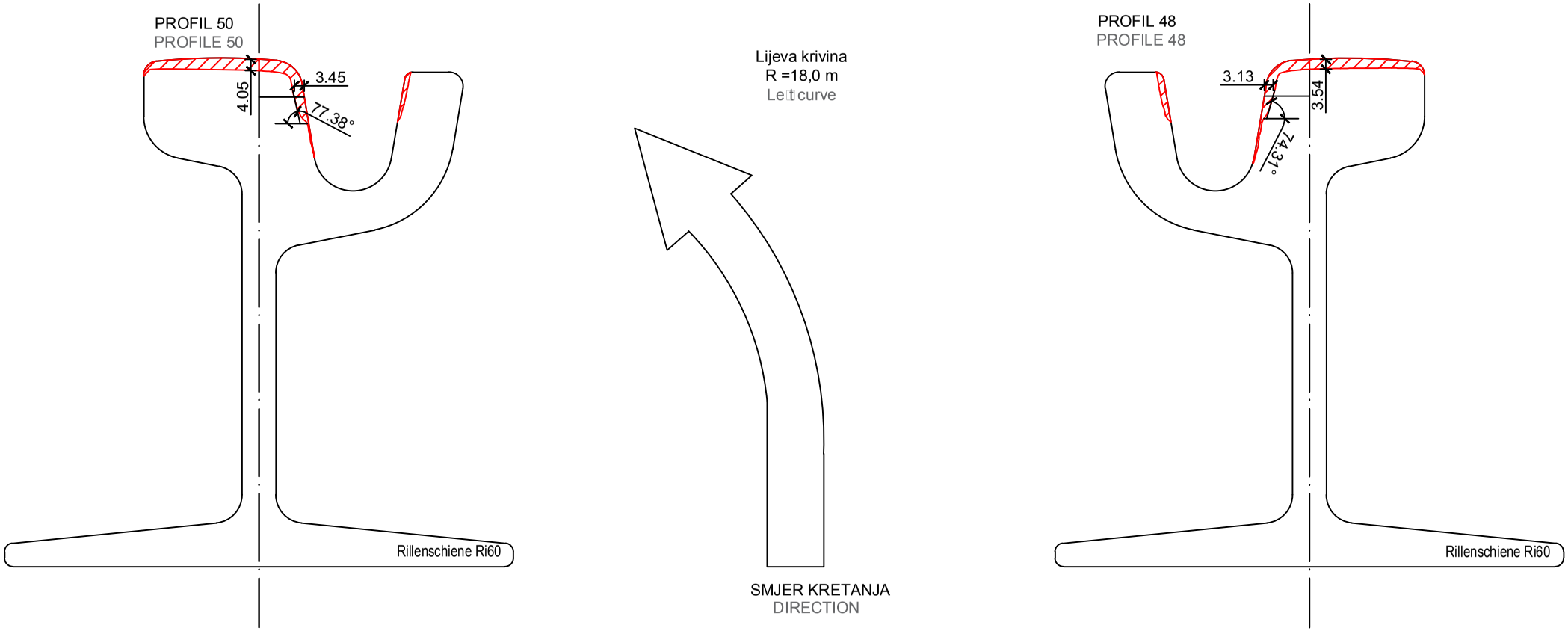
MJ: 1:2

Annex 6.3.1.1. Cross section wear in curves at Location 3

Cross section wear in curve R150

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Prilog 6.3.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 3

Istrošenje poprečnog presjeka tračnica u krivini R151

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

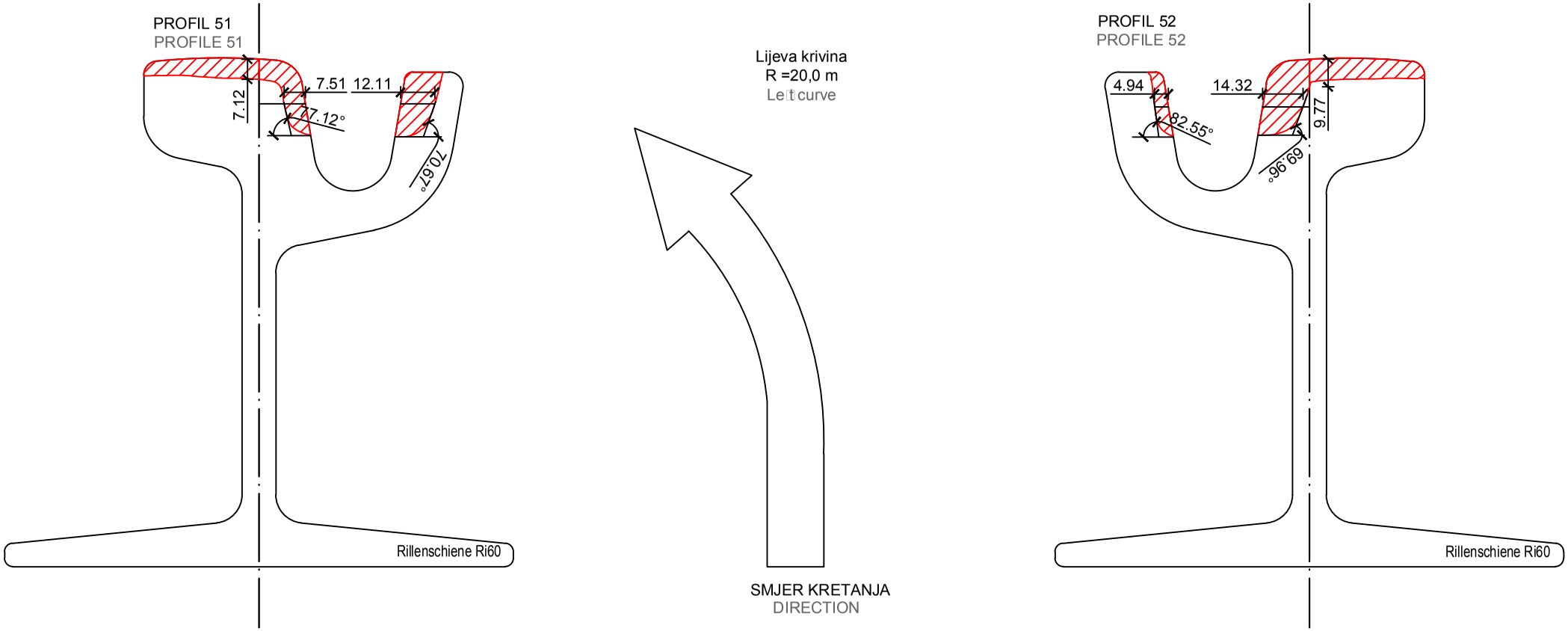
MJ: 1:2

Annex 6.3.1.1. Cross section wear in curves at Location 3

Cross section wear in curve R151

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Prilog 6.3.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 3

Istrošenje poprečnog presjeka tračnica u krivini R152

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

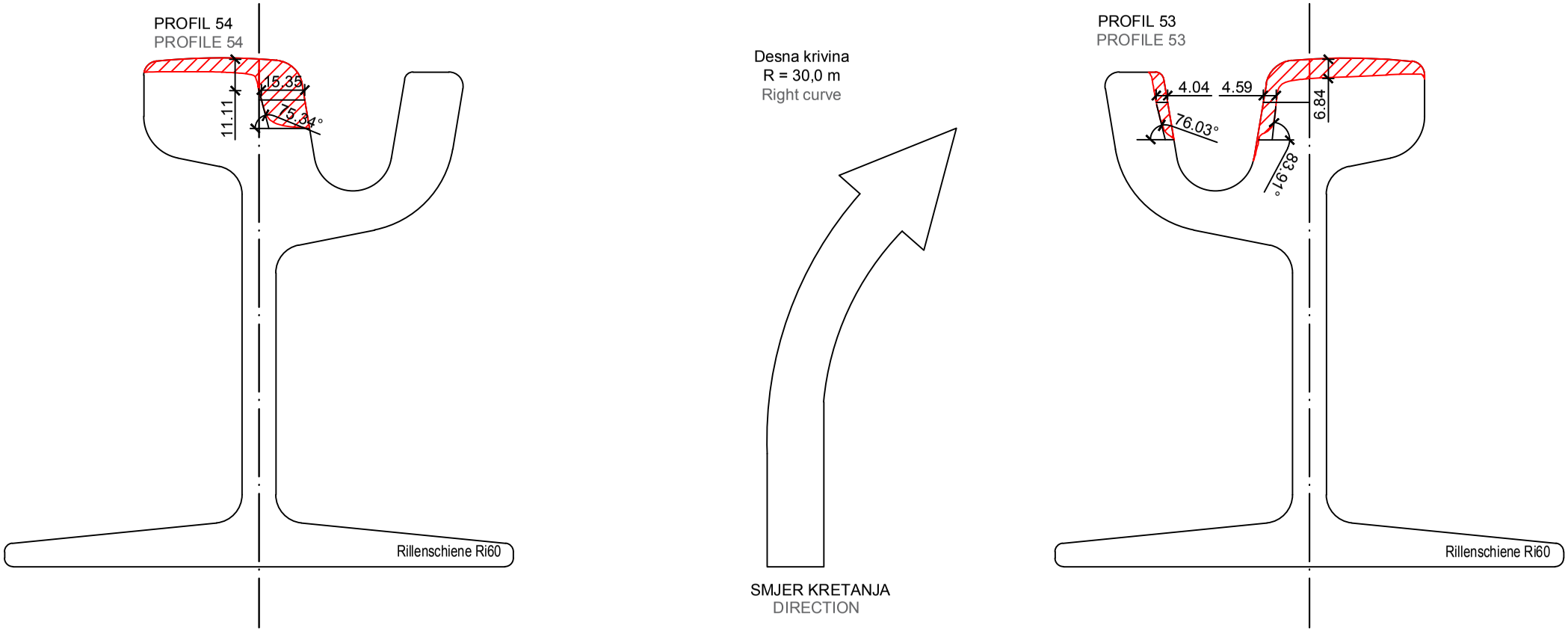
MJ: 1:2

Annex 6.3.1.1. Cross section wear in curves at Location 3

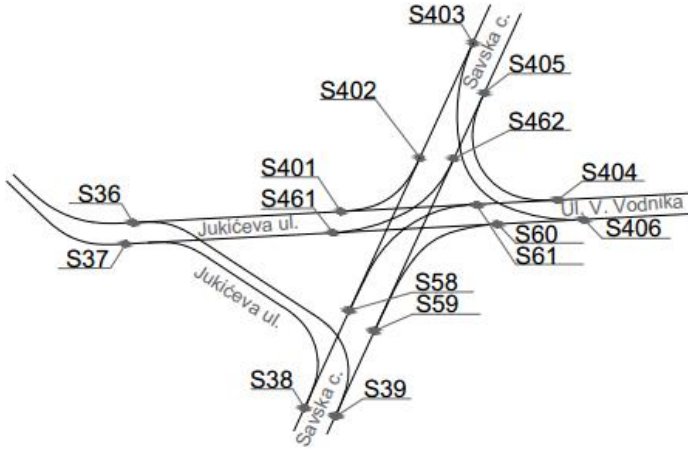
Cross section wear in curve R152

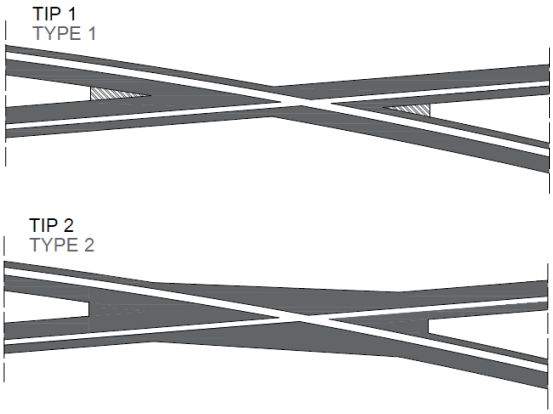
Location 3: Savska - Vodnikova crossing

Scale: 1:2



Prilog 6.3.2. Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 3
Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova
Annex 6.3.2. Results of cross section wear in turnouts at Location 3
Location 3: Savska - Vodnikova crossing





Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-05-04	S461	2	20L	13	14.57	1.57	24.47	24.50	0.03	1
			20D	13	12.54	-0.46	30.00	30.45	0.45	
			21	12	14.48	2.48		43.77		
			22L	13	12.61	-0.39	30.00	30.59	0.59	
			22D	13	14.67	1.67	24.47	24.79	0.32	
K-05-05 K-05-09	S58	2	27L	13	13.98	0.98	30.00	32.27	2.27	1
			27D	13	17.47	4.47	24.27	22.08	-2.19	
			28	12	17.67	5.67		48.34		
			29L	13	16.94	3.94	24.27	22.73	1.54	
			29D	13	13.81	0.81	30.00	32.03	-2.03	
K-05-05	S402	2	38L	13	12.63	-0.37	35.26	35.70	0.44	1
			38D	13	17.83	4.83	24.00	23.40	-0.60	
			39	12	17.95	5.95		38.57		
			41L	13	17.52	4.52	24.00	22.76	-1.24	
			41D	13	12.37	-0.63	35.26	35.57	0.31	
K-05-03	S401	2	42L	13	13.58	0.58	24.00	24.46	0.46	1
			42D	13	12.24	-0.76	35.18	35.49	0.31	
			43	12	13.69	1.69		53.49		
			44L	13	13.08	0.08	35.15	35.18	0.03	
			44D	13	14.88	1.88	24.00	25.17	1.17	
K-05-06	S462	2	55L	13	12.38	-0.62	30.00	30.45	0.45	1
			55D	13	17.98	4.98	19.42	22.09	2.67	
			56	12	17.99	5.99		48.26		
			57L	13	18.14	5.14	24.76	25.69	0.93	
			57D	13	13.47	0.47	30.00	30.68	0.68	
K-05-06	S405	2	78L	13	17.15	4.15	24.00	22.03	-1.97	1
			78D	13	12.05	-0.95	35.26	36.09	0.83	
			79	12	16.78	4.78		48.90		
			80L	13	12.24	-0.76	35.26	35.64	0.38	
			80D	13	16.96	3.96	24.00	22.81	-1.19	
K-05-05	S403	2	83L	13	18.44	5.44	24.50	22.25	-2.25	1
			83D	13	12.06	-0.94	30.00	30.43	0.43	
			84	12	19.16	7.16		38.01		
			85L	13	12.06	-0.94	30.00	30.31	0.31	
			85D	13	18.72	5.72	24.50	22.28	-2.22	
K-05-03	S404	2	89L	13	12.73	-0.27	35.25	35.72	0.47	1

			89D	13	15.64	2.64	24.00	24.79	0.79	
			90	12	15.92	3.92		38.31		
			91L	13	15.85	2.85	24.00	22.13	-1.87	
			91D	13	11.67	-1.33	35.25	35.17	-0.08	
K-05-04	S406	2	96L	13	12.18	-0.82	30.00	30.36	0.36	1
			96D	13	16.52	3.52	24.50	22.47	-2.03	
			97	12	16.63	4.63		37.86		
			98L	13	16.64	3.64	24.50	22.53	-1.97	
			98D	13	12.39	-0.61	30.00	30.72	0.72	
K-05-03 K-05-09	S61	2	6L	13	13.01	0.01	24.67	25.17	0.50	1
			6D	13	14.70	1.70	30.00	31.46	1.46	
			7	12	14.53	2.53		37.12		
			8L	13	14.40	1.40	30.00	31.14	1.14	
			8D	13	12.94	-0.06	24.67	25.18	0.51	
K-05-10 K-05-04	S60	2	9L	13	14.20	1.20	24.00	24.40	0.40	1
			9D	13	13.96	0.96	30.64	31.94	1.30	
			10	12	14.13	2.13		63.19		
			12L	13	13.85	0.85	30.63	32.38	1.75	
			12D	13	14.20	1.20	24.00	24.69	0.69	
K-05-06 K-05-10	S59	2	16L	13	14.54	1.54	30.59	31.38	0.79	1
			16D	13	18.52	5.52	24.00	23.15	-0.85	
			17	12	18.65	6.65		33.76		
			18L	13	18.51	5.51	24.00	22.51	-1.49	
			18D	13	14.23	1.23	30.59	31.71	1.12	
K-05-06 K-05-08	S39	2	19L	13	19.97	6.97	29.29	27.12	-2.17	1
			19D	13	13.62	0.62	34.00	33.92	-0.08	
			20	12	20.42	8.42		41.47		
			21L	13	13.52	0.52	34.00	35.22	1.22	
			21D	13	19.86	6.86	24.95	23.74	-1.21	
K-05-05 K-05-07	S38	2	29L	13	18.58	5.58	24.00	22.13	-1.87	1
			29D	13	12.50	-0.50	35.34	36.03	0.69	
			30	12	19.07	7.07		42.47		
			31L	13	13.17	0.17	35.34	35.05	-0.29	
			31D	13	19.98	6.98	24.00	23.68	-0.32	
K-05-02 K-05-04	S37	1	34L	13	18.28	5.28	35.54	43.58	8.04	21
			34D	13	22.68	9.68	24.00	24.04	0.04	
			35	12	23.09	11.09		43.64		
			37L	13	22.67	9.67	24.00	22.91	-1.09	
			37D	13	18.54	5.54	35.54	41.09	5.55	
K-05-01 K-05-03	S36	1	38L	13	18.12	5.12	34.00	35.13	1.13	21
			38D	13	22.14	9.14	25.08	25.21	0.13	
			39	12	21.56	9.56		45.64		
			40L	13	21.79	8.79	25.07	24.34	-0.73	
			40D	13	16.89	3.89	34.00	34.60	0.60	

Prilog 6.3.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 3

Istrošenje poprečnog presjeka srcišta skretnice S36

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

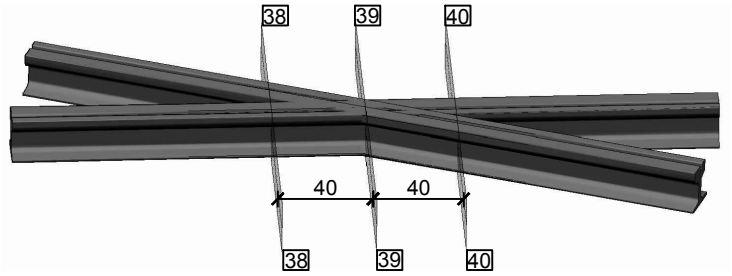
MJ: 1:2

Annex 6.3.2.1. Cross section wear in turnouts at Location 3

Cross section wear in turnout S36

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

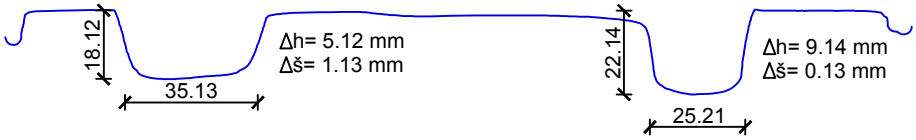
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Glavni kolodvor → Jukićeva

Direction: Main station → Jukićeva

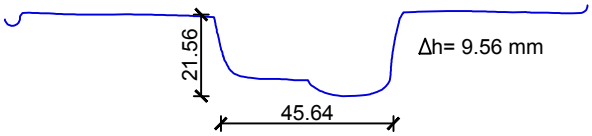
PROFIL 38

PROFILE 38



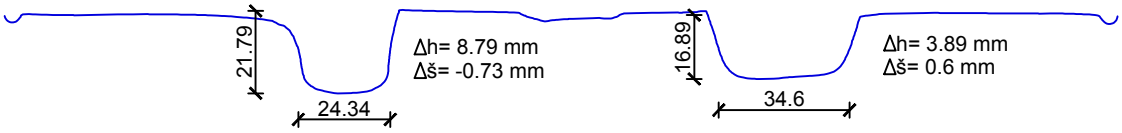
PROFIL 39

PROFILE 39



PROFIL 40

PROFILE 40



Prilog 6.3.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 3

Istrošenje poprečnog presjeka srcišta skretnice S37

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

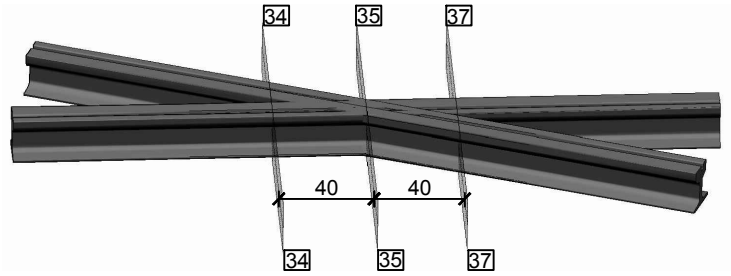
MJ: 1:2

Annex 6.3.2.1. Cross section wear in turnouts at Location 3

Cross section wear in turnout S37

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

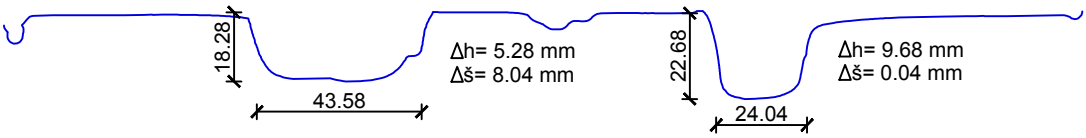
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Jukićeva ⟶ Glavni kolodvor

Direction: Jukićeva ⟶ Main station

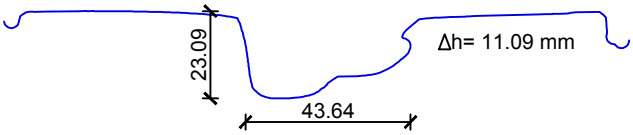
PROFIL 34

PROFILE 34



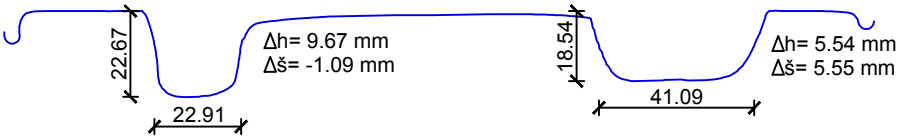
PROFIL 35

PROFILE 35



PROFIL 37

PROFILE 37



Prilog 6.3.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 3

Istrošenje poprečnog presjeka srcišta skretnice S38

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

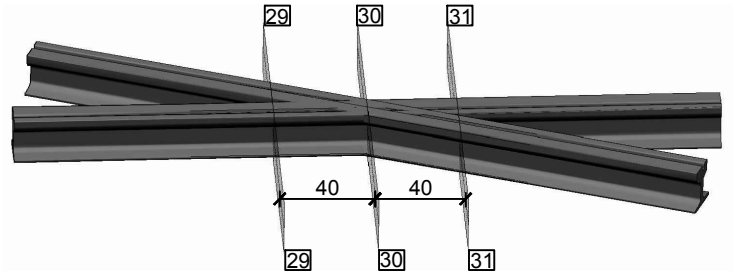
MJ: 1:2

Annex 6.3.2.1. Cross section wear in turnouts at Location 3

Cross section wear in turnout S38

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

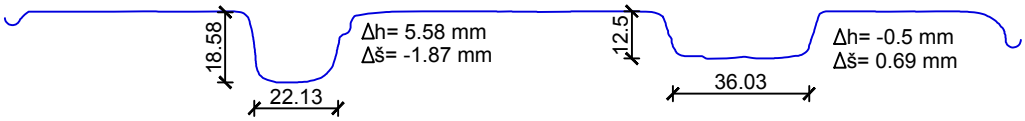
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Ilica → Savski most

Direction: Ilica → Savski most

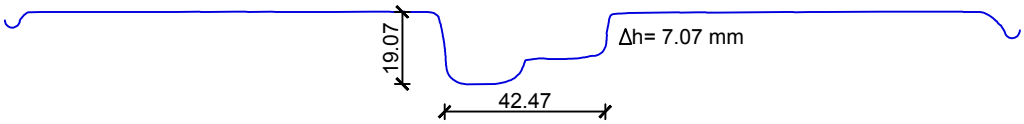
PROFIL 29

PROFILE 29



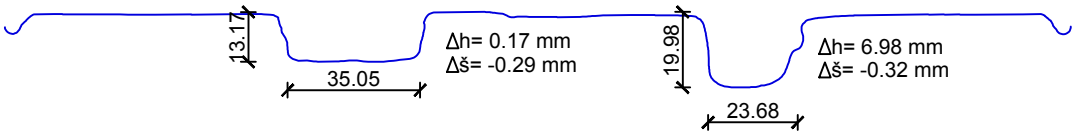
PROFIL 30

PROFILE 30



PROFIL 31

PROFILE 31



Prilog 6.3.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 3

Istrošenje poprečnog presjeka srcišta skretnice S39

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

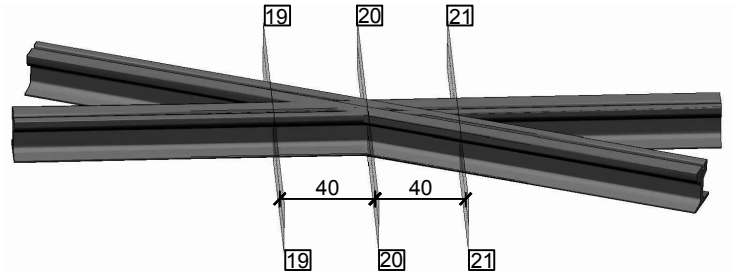
MJ: 1:2

Annex 6.3.2.1. Cross section wear in turnouts at Location 3

Cross section wear in turnout S39

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

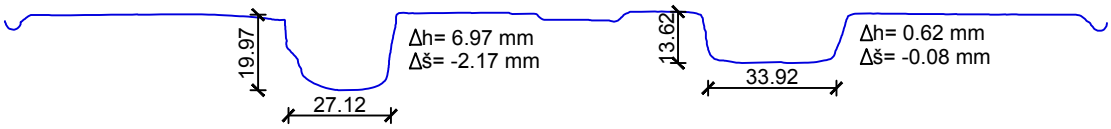
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savski most ⟶ Ilica

Direction: Savski most ⟶ Ilica

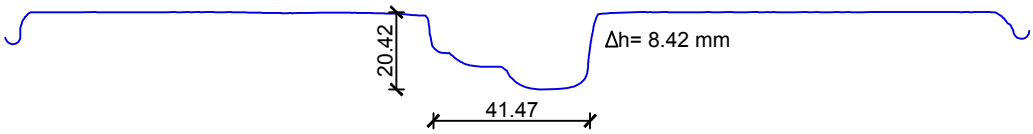
PROFIL 19

PROFILE 19



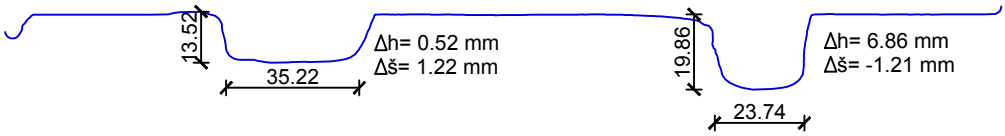
PROFIL 20

PROFILE 20



PROFIL 21

PROFILE 21



Prilog 6.3.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 3

Istrošenje poprečnog presjeka srcišta skretnice S58

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

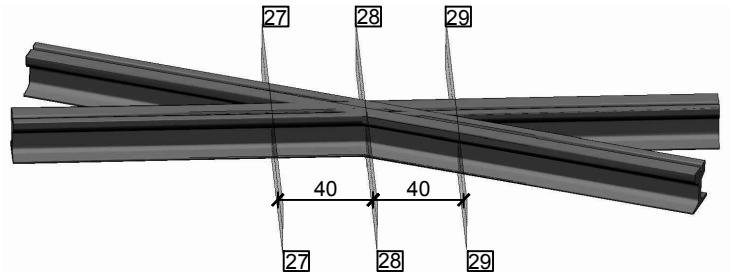
MJ: 1:2

Annex 6.3.2.1. Cross section wear in turnouts at Location 3

Cross section wear in turnout S58

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

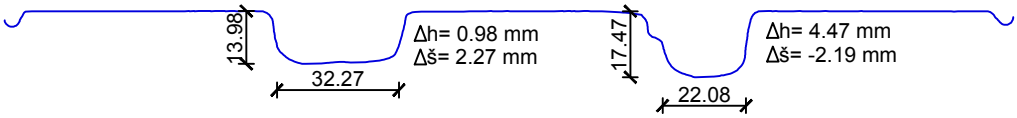
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Jukićeva ⟶ Glavni kolodvor

Direction: Jukićeva ⟶ Main station

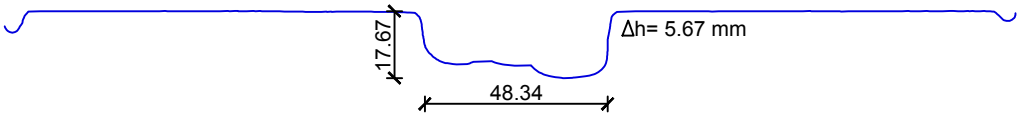
PROFIL 27

PROFILE 27



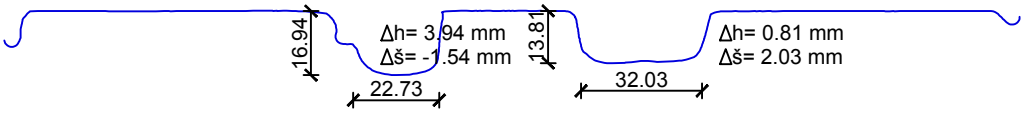
PROFIL 28

PROFILE 28



PROFIL 29

PROFILE 29



Prilog 6.3.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 3

Istrošenje poprečnog presjeka srcišta skretnice S59

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

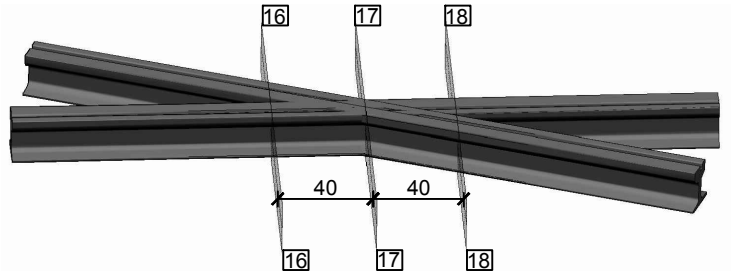
MJ: 1:2

Annex 6.3.2.1. Cross section wear in turnouts at Location 3

Cross section wear in turnout S59

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

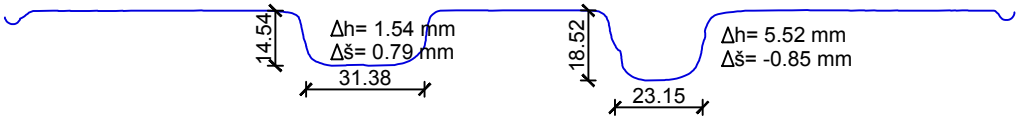
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savski most ⟶ Ilica

Direction: Savski most ⟶ Ilica

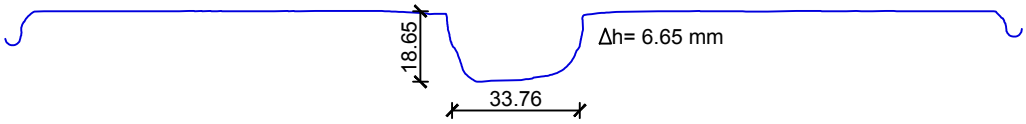
PROFIL 16

PROFILE 16



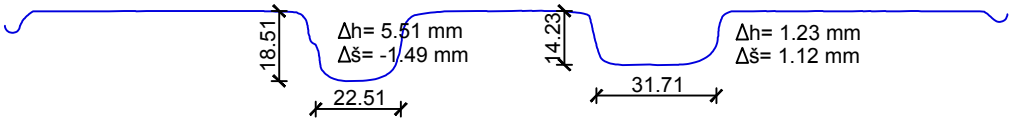
PROFIL 17

PROFILE 17



PROFIL 18

PROFILE 18



Prilog 6.3.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 3

Istrošenje poprečnog presjeka srcišta skretnice S60

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

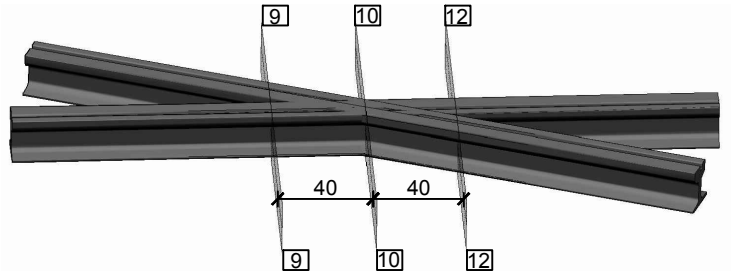
MJ: 1:2

Annex 6.3.2.1. Cross section wear in turnouts at Location 3

Cross section wear in turnout S60

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

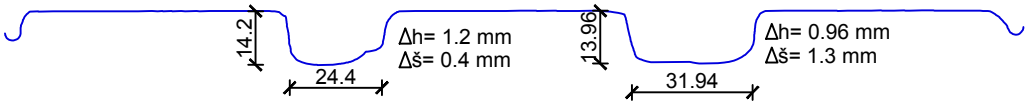
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Jukićeva ⟶ lavni kolodvor

Direction: Jukićeva ⟶ Main station

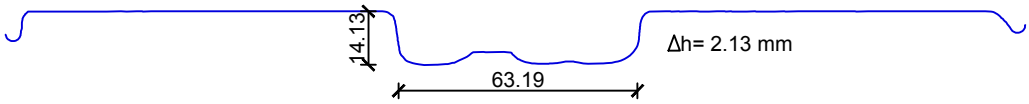
PROFIL 9

PROFILE 9



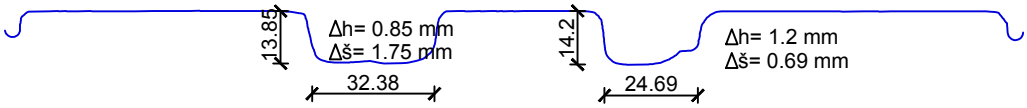
PROFIL 10

PROFILE 10



PROFIL 12

PROFILE 12



Prilog 6.3.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 3

Istrošenje poprečnog presjeka srcišta skretnice S61

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

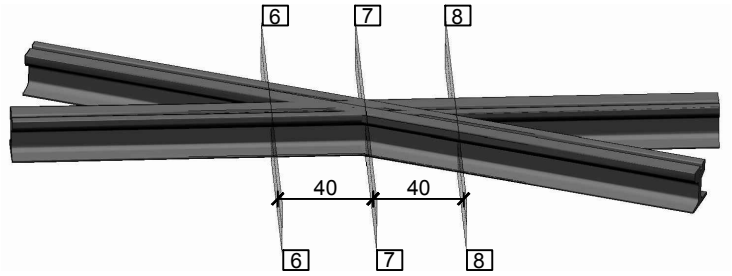
MJ: 1:2

Annex 6.3.2.1. Cross section wear in turnouts at Location 3

Cross section wear in turnout S61

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

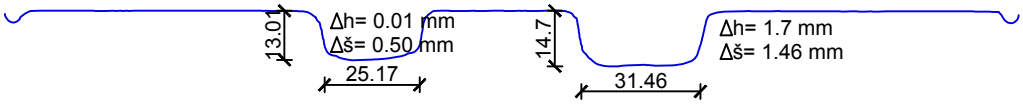
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Glavni kolodvor ⟶ Jukićeva

Direction: Main station ⟶ Jukićeva

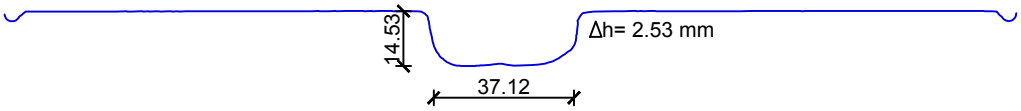
PROFIL 6

PROFILE 6



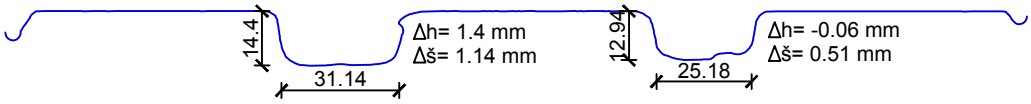
PROFIL 7

PROFILE 7



PROFIL 8

PROFILE 8



Prilog 6.3.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 3

Istrošenje poprečnog presjeka srcišta skretnice S401

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

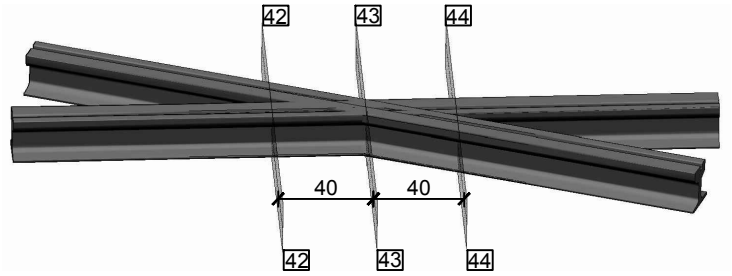
MJ: 1:2

Annex 6.3.2.1. Cross section wear in turnoutd at Location 3

Cross section wear in turnout S401

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

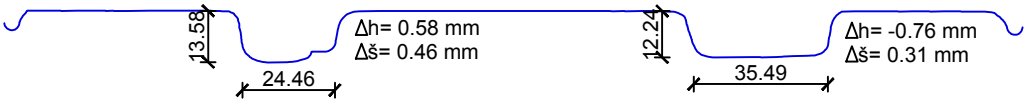
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Glavni kolodvor ⟶ Jukićeva

Direction: Main station ⟶ Jukićeva

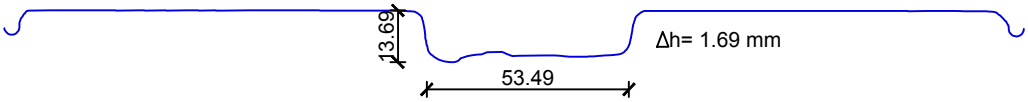
PROFIL 42

PROFILE 42



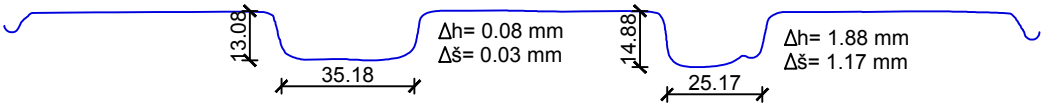
PROFIL 43

PROFILE 43



PROFIL 44

PROFILE 44



Prilog 6.3.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 3

Istrošenje poprečnog presjeka srcišta skretnice S402

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

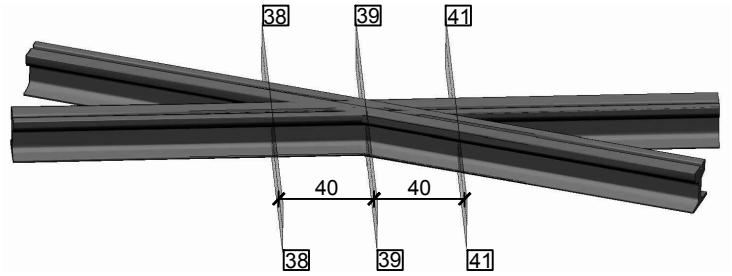
MJ: 1:2

Annex 6.3.2.1. Cross section wear in turnouts at Location 3

Cross section wear in turnout S402

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

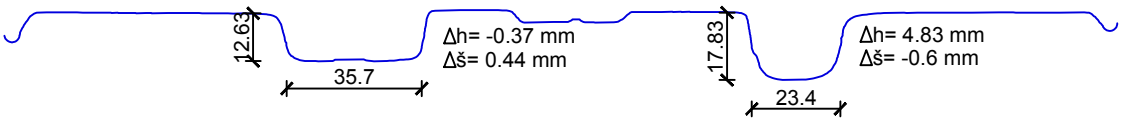
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Ilica → Savski most

Direction: Ilica → Savski most

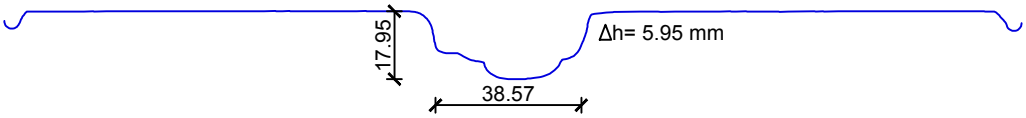
PROFIL 38

PROFILE 38



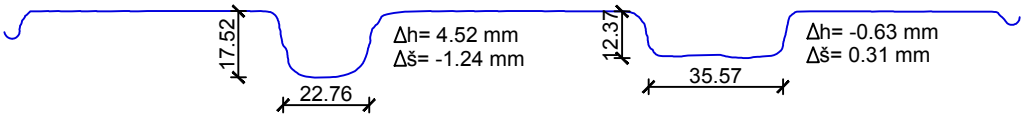
PROFIL 39

PROFILE 39



PROFIL 41

PROFILE 41



Prilog 6.3.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 3

Istrošenje poprečnog presjeka srcišta skretnice S403

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

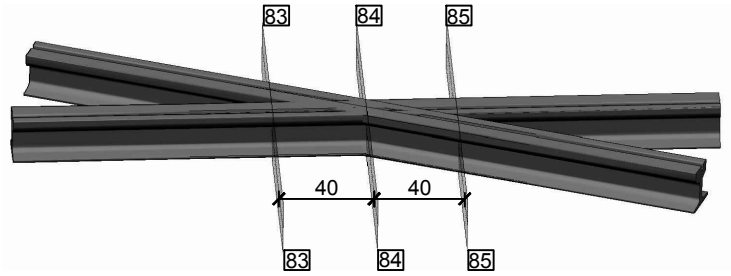
MJ: 1:2

Annex 6.3.2.1. Cross section wear in turnouts at Location 3

Cross section wear in turnout S403

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

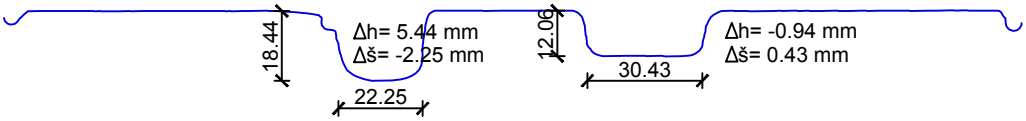
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Ilica ⟶ Savski most

Direction: Ilica ⟶ Savski most

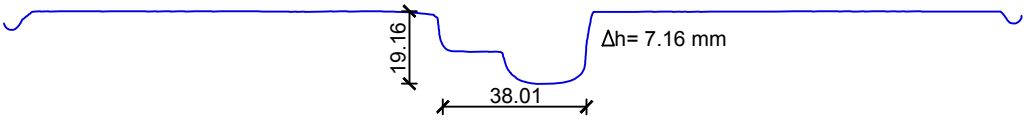
PROFIL 83

PROFILE 83



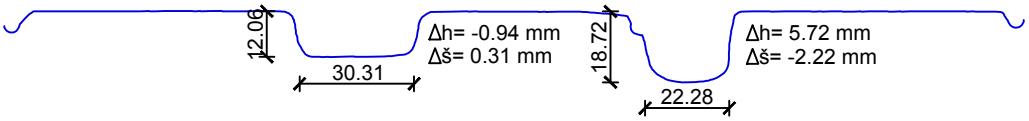
PROFIL 84

PROFILE 84



PROFIL 85

PROFILE 85



Prilog 6.3.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 3

Istrošenje poprečnog presjeka srcišta skretnice S404

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

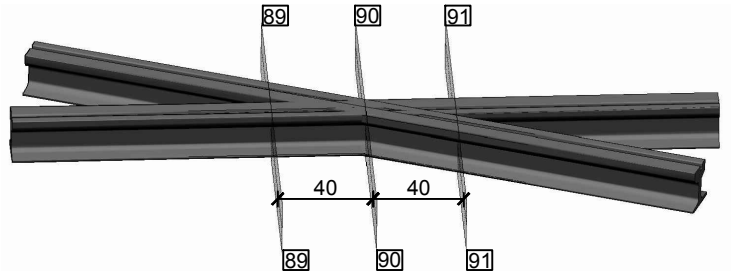
MJ: 1:2

Annex 6.3.2.1. Cross section wear in turnouts at Location 3

Cross section wear in turnout S404

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

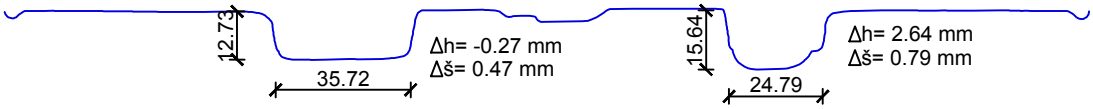
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Glavni kolodvor ⟶ Jukićeva

Direction: Main station ⟶ Jukićeva

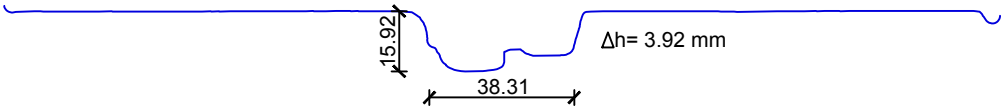
PROFIL 89

PROFILE 89



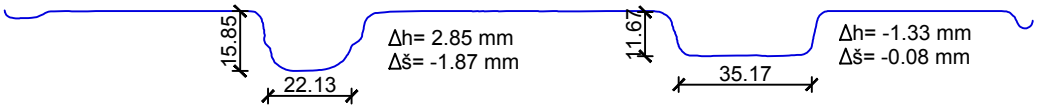
PROFIL 90

PROFILE 90



PROFIL 91

PROFILE 91



Prilog 6.3.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 3

Istrošenje poprečnog presjeka srcišta skretnice S405

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

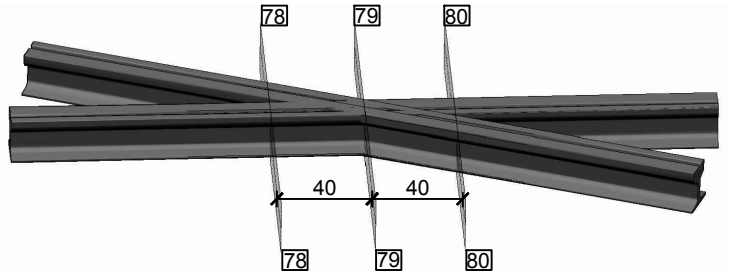
MJ: 1:2

Annex 6.3.2.1. Cross section wear in turnouts at Location 3

Cross section wear in turnout S405

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Δh - visinsko istrošenje

Δš - bočno istrošenje

Δh - vertical wear

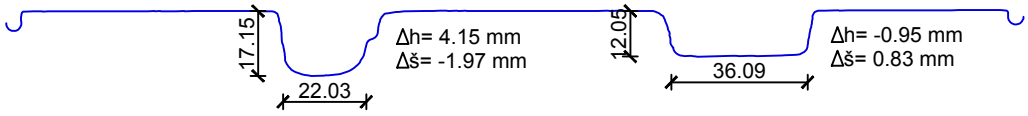
Δš - lateral wear

Smjer vožnje: Savski most ⟶ Ilica

Direction: Savski most ⟶ Ilica

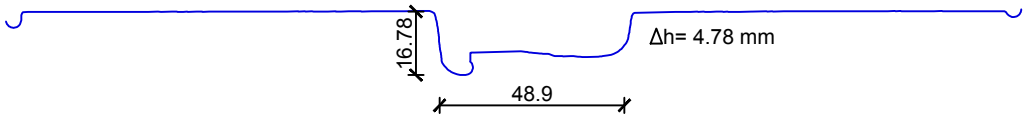
PROFIL 78

PROFILE 78



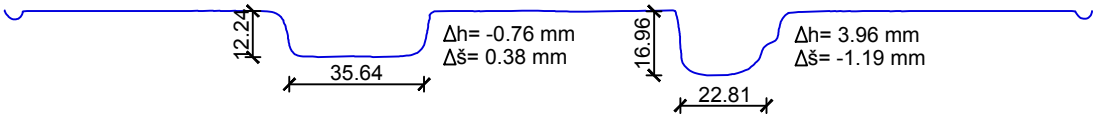
PROFIL 79

PROFILE 79



PROFIL 80

PROFILE 80



Prilog 6.3.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 3

Istrošenje poprečnog presjeka srcišta skretnice S406

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

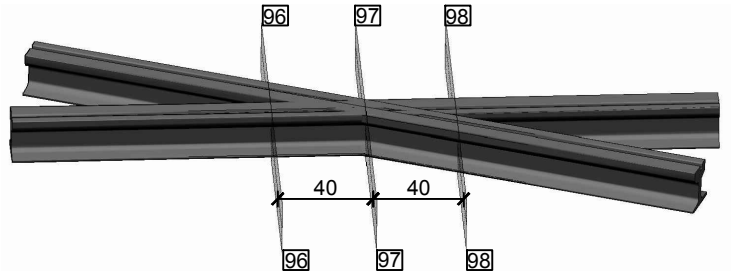
MJ: 1:2

Annex 6.3.2.1. Cross section wear in turnouts at Location 3

Cross section wear in turnout S406

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

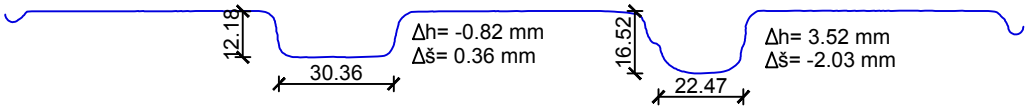
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Jukićeva ⟶ Glavni kolodvor

Direction: Jukićeva ⟶ Main station

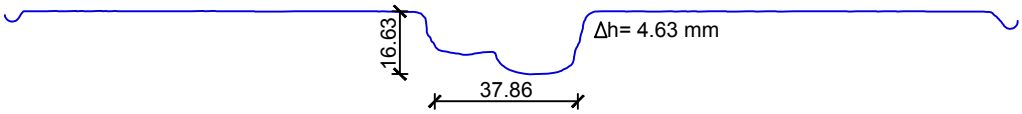
PROFIL 96

PROFILE 96



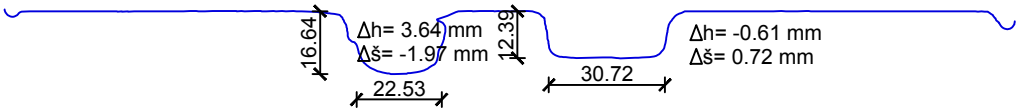
PROFIL 97

PROFILE 97



PROFIL 98

PROFILE 98



Prilog 6.3.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 3

Istrošenje poprečnog presjeka srcišta skretnice S461

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

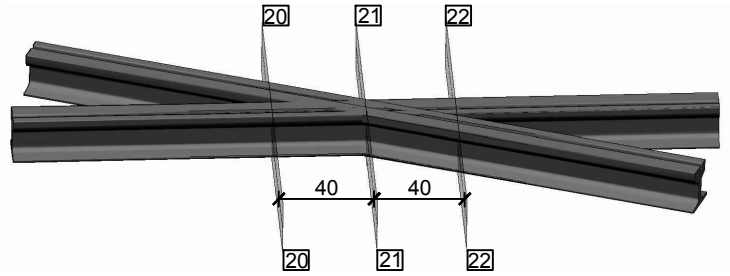
MJ: 1:2

Annex 6.3.2.1. Cross section wear in turnouts at Location 3

Cross section wear in turnout S461

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

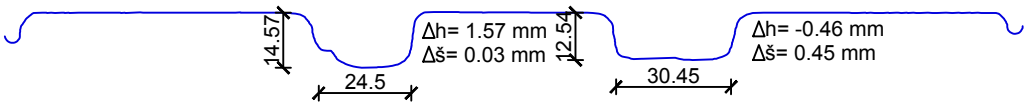
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Jukićeva ⟶ Glavni kolodvor

Direction: Jukićeva ⟶ Main station

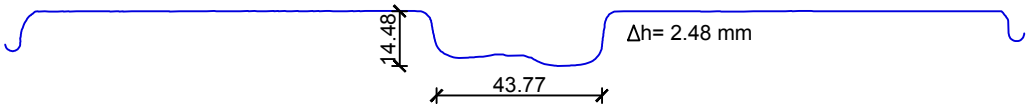
PROFIL 20

PROFILE 20



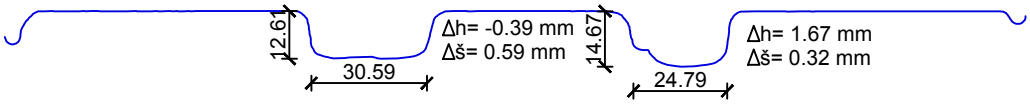
PROFIL 21

PROFILE 21



PROFIL 22

PROFILE 22



Prilog 6.3.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 3

Istrošenje poprečnog presjeka srcišta skretnice S462

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

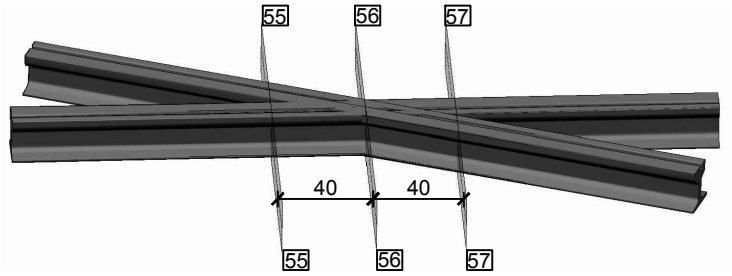
MJ: 1:2

Annex 6.3.2.1. Cross section wear in turnouts at Location 3

Cross section wear in turnout S462

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

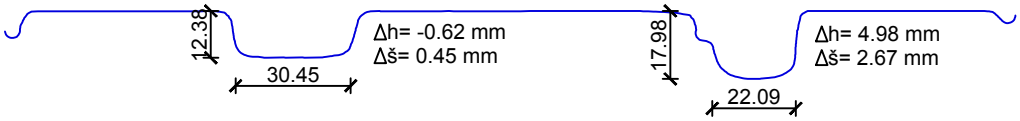
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savski most ⟶ Ilica

Direction: Savski most ⟶ Ilica

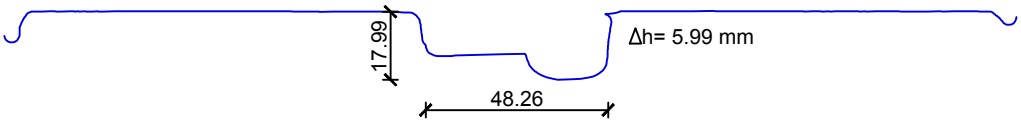
PROFIL 55

PROFILE 55



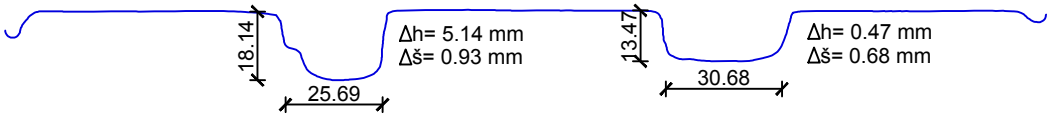
PROFIL 56

PROFILE 56



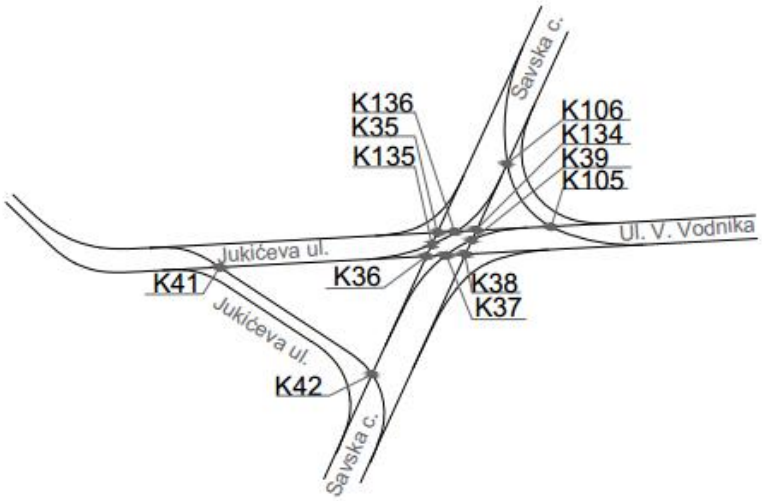
PROFIL 57

PROFILE 57



Prilog 6.3.3. Rezultati istrošenja profila tračnica u križalištima na Lokaciji 3
Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

Annex 6.3.3. Results of cross section wear in track crossing at Location 3
Location 3: Savska - Vodnikova crossing

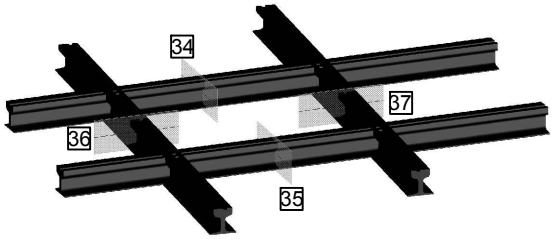


Dionice Sections	Oznaka križališta Track crossing mark	Profil Profile	Referentna dubina žlijeba Reference groove depth [mm]	Izmjerena dubina žlijeba Measured groove depth [mm]	Visinsko istrošenje žlijeba Vertical wear [mm]	Referentna širina žlijeba [mm] Reference groove width [mm]	Izmjerena širina žlijeba Measured groove width [mm]	Bočno istrošenje žlijeba Lateral wear [mm]	Period eksploatacije [god] Exploitation Period [years]
K-05-03 K-05-05	K35	34	12	12,64	0.64	24.00	24.06	0.06	1
		35	12	13,01	1.01	24.00	26.19	2.19	
		36	12	14,49	2.49	24.00	25.08	1.08	
		37	12	13,38	1.38	24.00	25.77	1.77	
K-05-03	K136	47	12	12,94	0.94	24.00	24.66	0.66	1
		48	12	12,57	0.57	24.00	24.54	0.54	
		49	12	12,27	0.27	30.00	30.26	0.26	
		50	12	11,75	-0.25	30.00	30.00	0.00	
K-05-04 K-05-06	K38	58	12	12,68	0.68	24.00	24.32	0.32	1
		59	12	12,57	0.57	24.00	24.24	0.24	
		60	12	13,68	1.68	24.00	24.08	0.08	
		61	12	13,09	1.09	24.00	23.78	-0.22	
K-05-09 K-05-06	K39	62	12	13,22	1.22	24.00	25.07	1.07	1
		63	12	13,06	1.06	24.00	24.58	0.58	
		64	12	14,13	2.13	30.00	30.70	0.70	
		65	12	13,01	1.01	30.00	30.75	0.75	
K-05-09 K-05-04	K37	51	12	12,62	0.62	24.00	24.99	0.99	1
		52	12	12,52	0.52	24.00	24.34	0.34	
		53	12	13,19	1.19	30.00	30.70	0.70	
		54	12	13,12	1.12	30.00	31.31	1.31	
K-05-05 K-05-08	K42	24	12	14,54	2.54	24.00	24.77	0.77	1
		25	12	14,00	2.00	24.00	21.70	-2.30	
		27	12	12,50	0.50	34.00	34.32	0.32	
		28	12	12,66	0.66	34.00	34.13	0.13	
K-05-01 K-05-04	K41	41	12	18,75	6.75	24.00	24.04	0.04	1
		42	12	18,78	6.78	24.00	26.64	2.64	
		43	12	16,30	4.30	24.00	27.92	3.92	
		44	12	16,19	4.19	24.00	27.99	3.99	
K-05-05 K-05-04	K36	23	12	12,49	0.49	24.00	24.50	0.50	1
		24	12	12,86	0.86	24.00	24.61	0.61	
		25	12	13,09	1.09	24.00	24.39	0.39	
		26	12	13,55	1.55	24.00	24.43	0.43	
K-05-05	K135	30	12	13,27	1.27	24.00	24.43	0.43	1
		31	12	12,87	0.87	24.00	24.55	0.55	
		32	12	12,58	0.58	30.00	30.05	0.05	
		33	12	12,09	0.09	30.00	30.00	0.00	
K-05-03	K106	74	12	13,57	1.57	24.00	24.87	0.87	1
		75	12	13,65	1.65	24.00	25.09	1.09	
		76	12	12,07	0.07	30.00	30.18	0.18	

		77	12	12,09	0.09	30.00	30.57	0.57	
K-05-03	K105	92	12	14,92	2.92	24.00	24.22	0.22	1
		93	12	14,70	2.70	24.00	24.07	0.07	
		94	12	12,19	0.19	34.00	34.00	0.00	
		95	12	12,40	0.40	34.00	34.37	0.37	
K-05-03 K-05-06	K134	66	12	13,25	1.25	24.00	24.41	0.41	1
		67	12	13,45	1.45	24.00	24.86	0.86	
		68	12	12,99	0.99	24.00	24.99	0.99	
		69	12	13,19	1.19	24.00	24.26	0.26	

Prilog 6.3.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 3
Istrošenje poprečnog presjeka tračnica u križalištu K35
Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova
MJ: 1:2

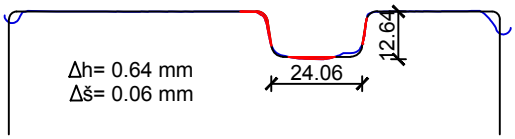
Annex 6.3.3.1. Cross section wear in track crossings at Location 3
Cross section wear in track crossing K35
Location 3: Savska - Vodnikova crossing
Scale: 1:2



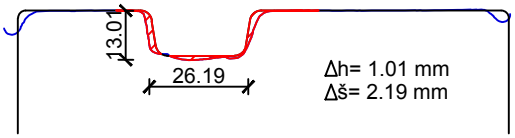
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Glavni kolodvor ⟶ Jukićeva
Direction: Main station ⟶ Jukićeva

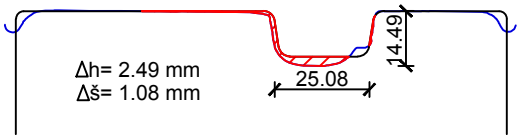
PROFIL 34
PROFILE 34



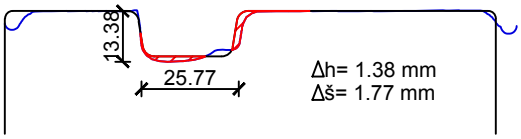
PROFIL 35
PROFILE 35



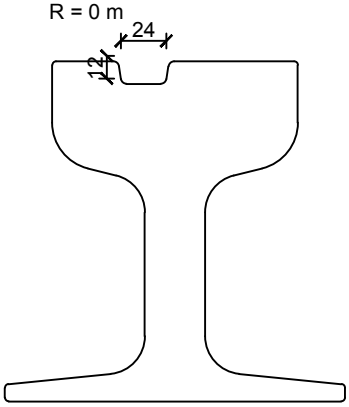
PROFIL 36
PROFILE 36



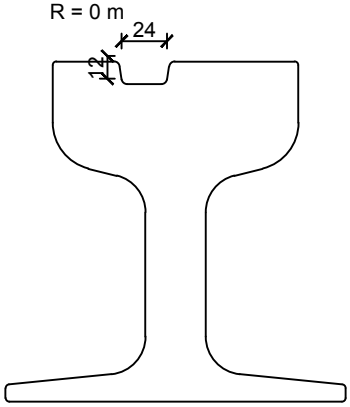
PROFIL 37
PROFILE 37



PROFIL 34, 35 PROFILE 34, 35
R = 0 m

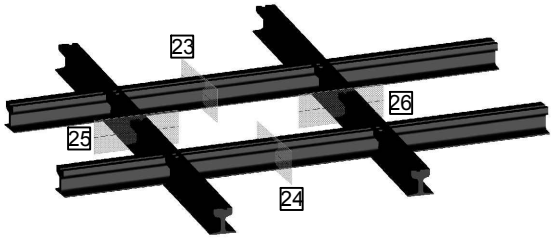


PROFIL 36, 37 PROFILE 36, 37
R = 0 m



Prilog 6.3.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 3
Istrošenje poprečnog presjeka tračnica u križalištu K36
Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova
MJ: 1:2

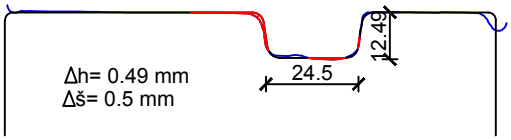
Annex 6.3.3.1. Cross section wear in track crossings at Location 3
Cross section wear in track crossing K36
Location 3: Savska - Vodnikova crossing
Scale: 1:2



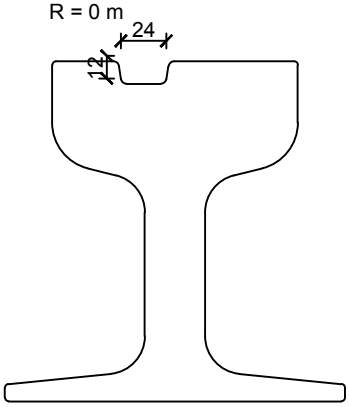
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Jukićeva ⟶ Glavni kolodvor
Direction: Jukićeva ⟶ Main station

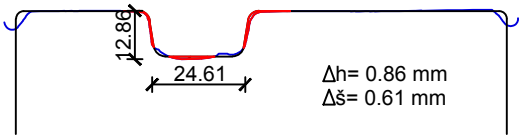
PROFIL 23
PROFILE 23



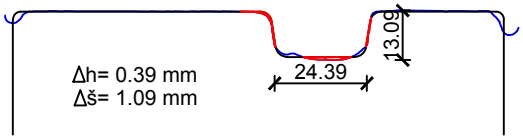
PROFIL 23, PROFIL 24
R = 0 m



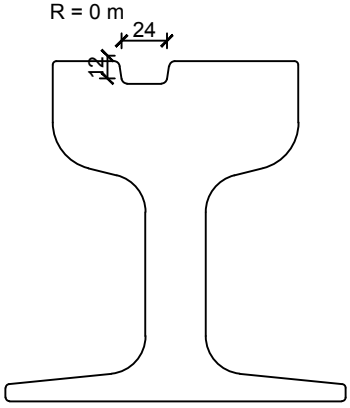
PROFIL 24
PROFILE 24



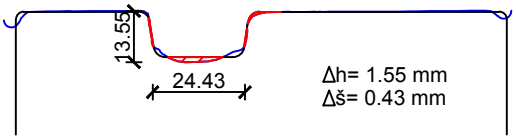
PROFIL 25
PROFILE 25



PROFIL 25, PROFIL 26
R = 0 m



PROFIL 26
PROFILE 26



Prilog 6.3.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 3

Istrošenje poprečnog presjeka tračnica u križalištu K37

Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova

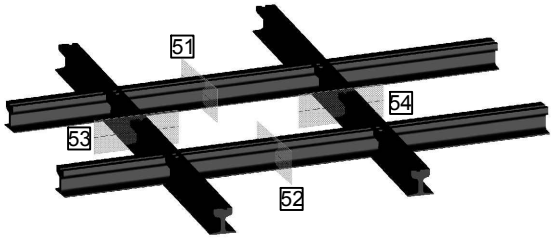
MJ: 1:2

Annex 6.3.3.1. Cross section wear in track crossings at Location 3

Cross section wear in track crossing K37

Location 3: Savska - Vodnikova crossing

Scale: 1:2



Δh - visinsko istrošenje

Δš - bočno istrošenje

Δh - vertical wear

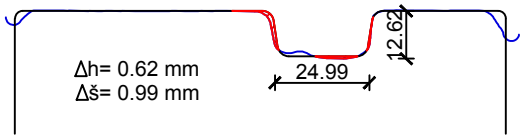
Δš - lateral wear

Smjer vožnje: Jukićeva ⟶ Glavni kolodvor

Direction: Jukićeva ⟶ Main station

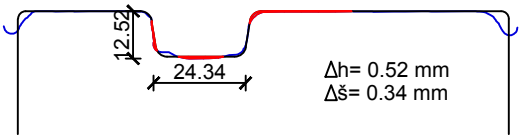
PROFIL 51

PROFILE 51



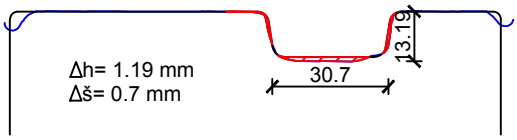
PROFIL 52

PROFILE 52



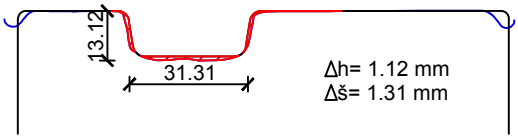
PROFIL 53

PROFILE 53



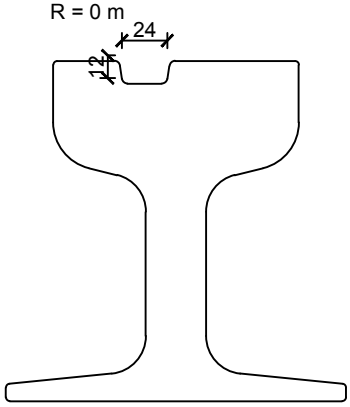
PROFIL 54

PROFILE 54



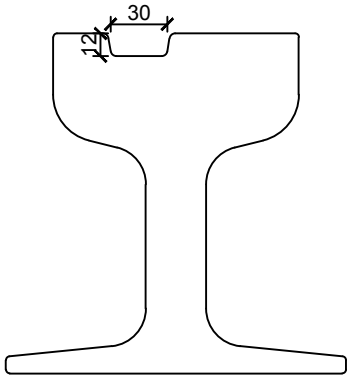
PROFIL 51, 52 PROFILE 51, 52

R = 0 m



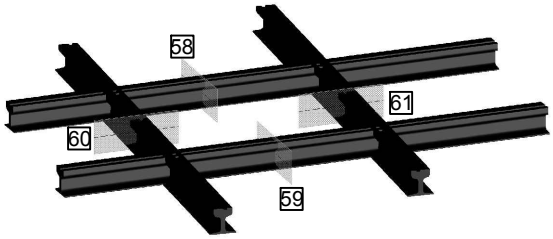
PROFIL 53, 54 PROFILE 53, 54

R = 35 m



Prilog 6.3.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 3
Istrošenje poprečnog presjeka tračnica u križalištu K38
Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova
MJ: 1:2

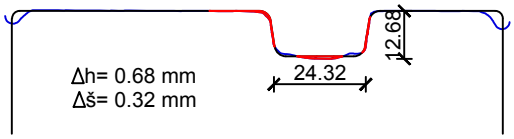
Annex 6.3.3.1. Cross section wear in track crossings at Location 3
Cross section wear in track crossing K38
Location 3: Savska - Vodnikova crossing
Scale: 1:2



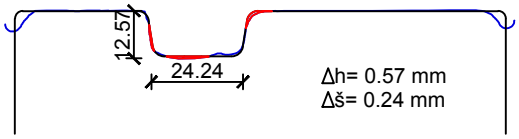
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Jukićeva ⟶ Glavni kolodvor
Direction: Jukićeva ⟶ Main station

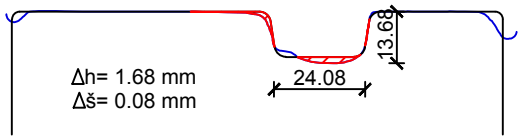
PROFIL 58
PROFILE 58



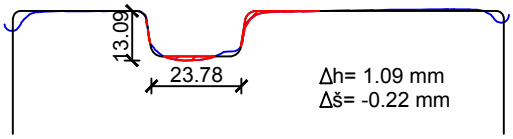
PROFIL 59
PROFILE 59



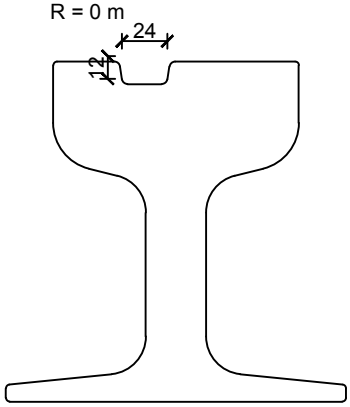
PROFIL 60
PROFILE 60



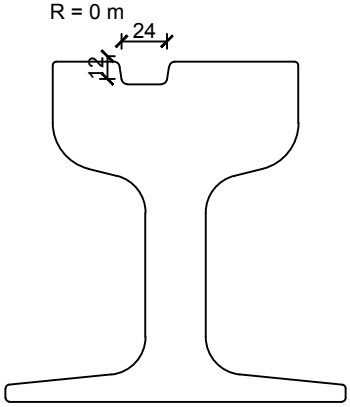
PROFIL 61
PROFILE 61



PROFIL 58, 59 PROFILE 58, 59
R = 0 m

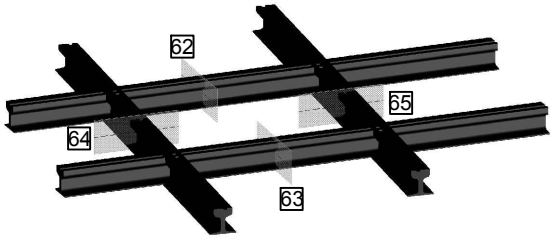


PROFIL 60, 61 PROFILE 60, 61
R = 0 m



Prilog 6.3.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 3
Istrošenje poprečnog presjeka tračnica u križalištu K39
Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova
MJ: 1:2

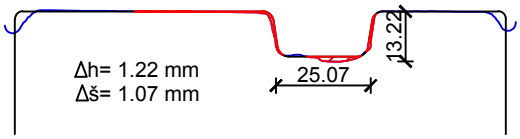
Annex 6.3.3.1. Cross section wear in track crossings at Location 3
Cross section wear in track crossing K39
Location 3: Savska - Vodnikova crossing
Scale: 1:2



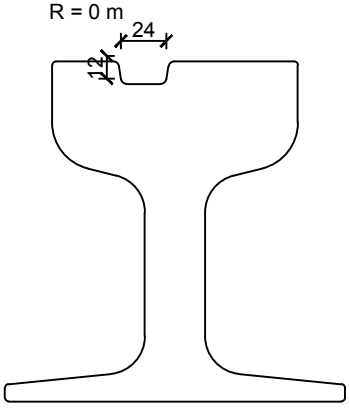
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savski most ⟶ Ilica
Direction: Savski most ⟶ Ilica

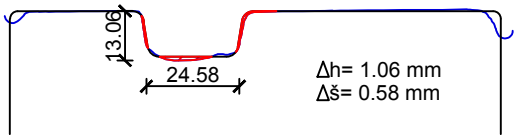
PROFIL 62
PROFILE 62



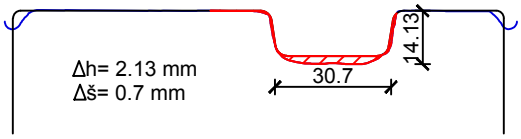
PROFIL 62, 63 PROFILE 62, 63
R = 0 m



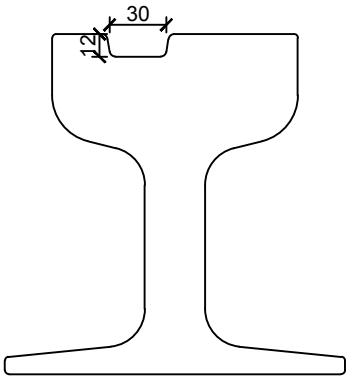
PROFIL 63
PROFILE 63



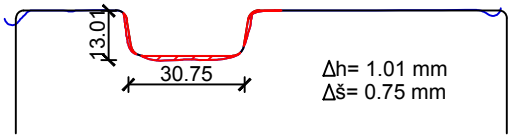
PROFIL 64
PROFILE 64



PROFIL 64, 65 PROFILE 64, 65
R = 35 m

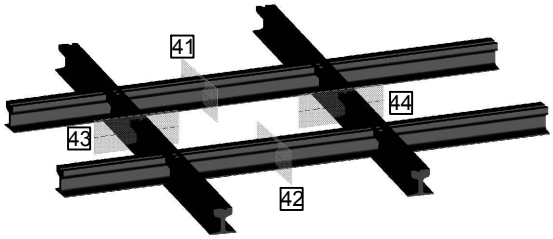


PROFIL 65
PROFILE 65



Prilog 6.3.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 3
Istrošenje poprečnog presjeka tračnica u križalištu K41
Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova
MJ: 1:2

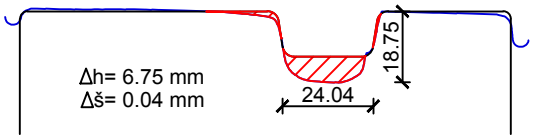
Annex 6.3.3.1. Cross section wear in track crossings at Location 3
Cross section wear in track crossing K41
Location 3: Savska - Vodnikova crossing
Scale: 1:2



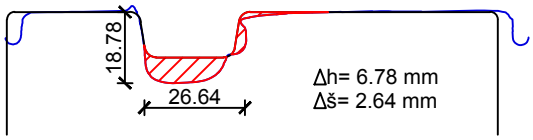
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Jukićeva ⟶ lavni kolodvor
Direction: Jukićeva ⟶ Main station

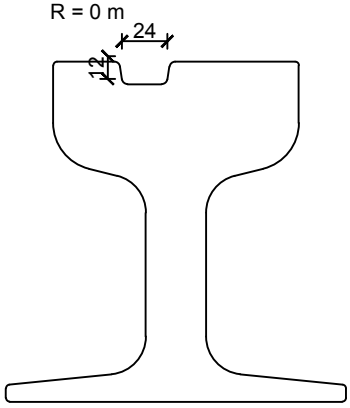
PROFIL 41
PROFILE 41



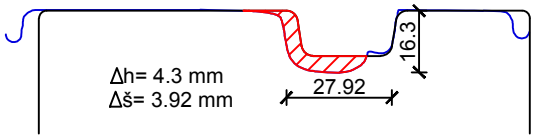
PROFIL 42
PROFILE 42



PROFIL 41, 42 PROFILE 41, 42
R = 0 m

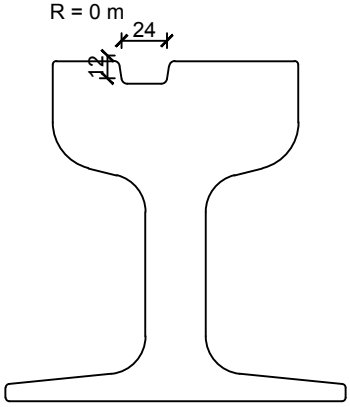


PROFIL 43
PROFILE 43



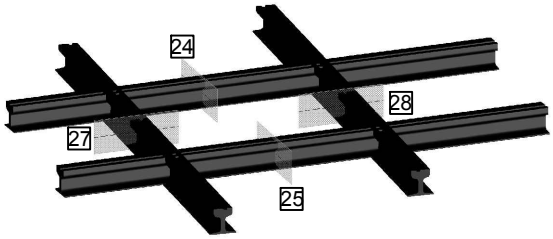
PROFIL 44
PROFILE 44

PROFIL 43, 44 PROFILE 43, 44
R = 0 m



Prilog 6.3.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 3
Istrošenje poprečnog presjeka tračnica u križalištu K42
Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova
MJ: 1:2

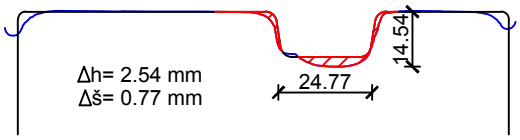
Annex 6.3.3.1. Cross section wear in track crossings at Location 3
Cross section wear in track crossing K42
Location 3: Savska - Vodnikova crossing
Scale: 1:2



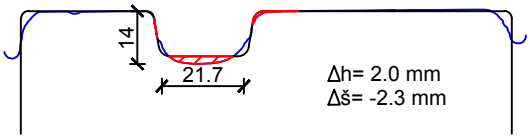
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Ilica ⟶ Savski most
Direction: Ilica ⟶ Savski most

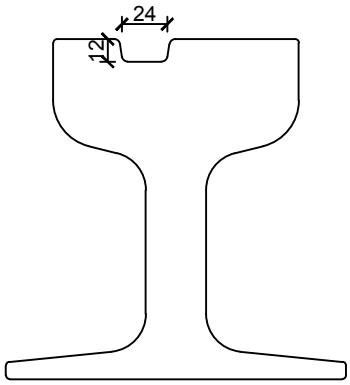
PROFIL 24
PROFILE 24



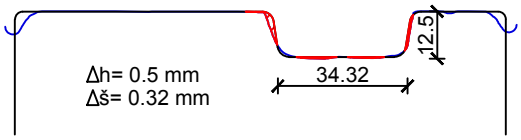
PROFIL 25
PROFILE 25



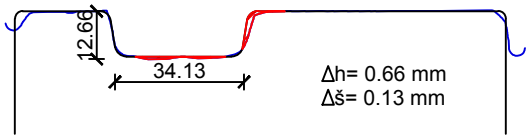
PROFIL 24, 25 PROFILE 24, 25
R = 0 m



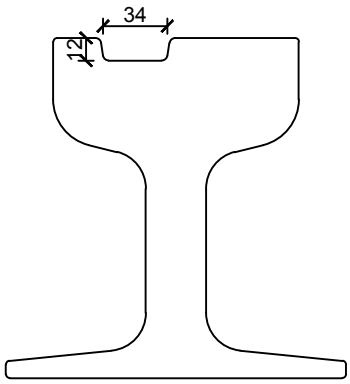
PROFIL 27
PROFILE 27



PROFIL 28
PROFILE 28

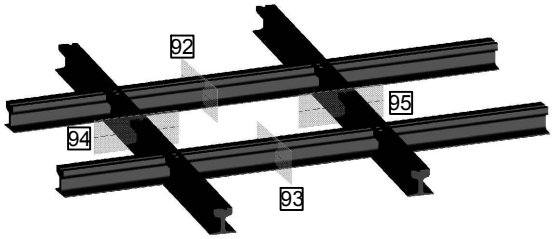


PROFIL 27, 28 PROFILE 27, 28
R = 18 m



Prilog 6.3.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 3
Istrošenje poprečnog presjeka tračnica u križalištu K105
Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova
MJ: 1:2

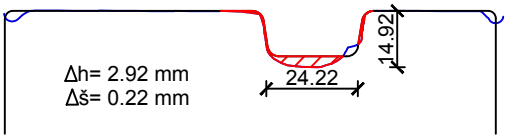
Annex 6.3.3.1. Cross section wear in track crossings at Location 3
Cross section wear in track crossing K105
Location 3: Savska - Vodnikova crossing
Scale: 1:2



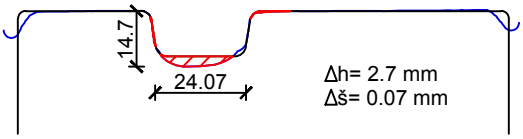
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Glavni kolodvor ⟶ Jukićeva
Direction: Main station ⟶ Jukićeva

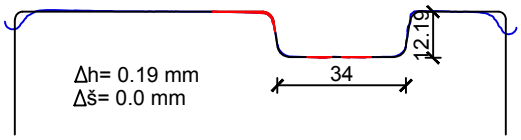
PROFIL 92
PROFILE 92



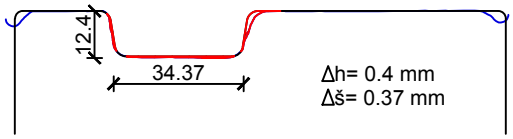
PROFIL 93
PROFILE 93



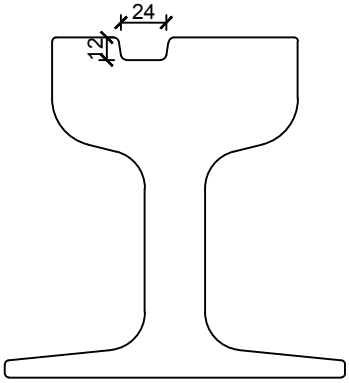
PROFIL 94
PROFILE 94



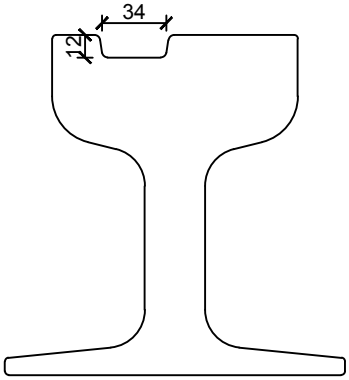
PROFIL 95
PROFILE 95



PROFIL 92, 96 PROFILE 92, 93
R = 0 m

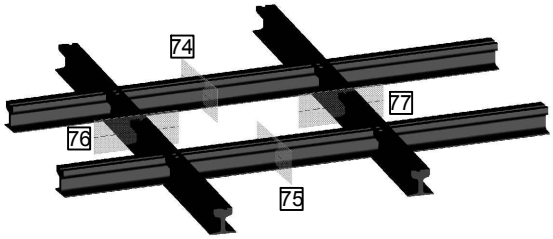


PROFIL 94, 95 PROFILE 94, 95
R = 21.8 m



Prilog 6.3.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 3
Istrošenje poprečnog presjeka tračnica u križalištu K106
Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova
MJ: 1:2

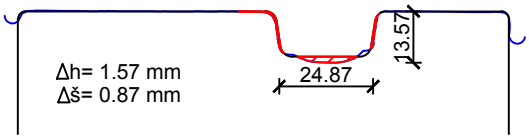
Annex 6.3.3.1. Cross section wear in track crossings at Location 3
Cross section wear in track crossing K106
Location 3: Savska - Vodnikova crossing
Scale: 1:2



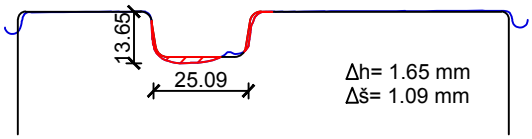
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savski most ⟶ Ilica
Direction: Savski most ⟶ Ilica

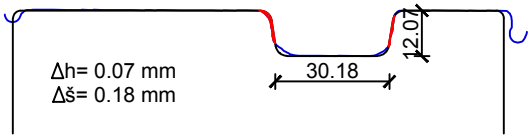
PROFIL 74
PROFILE 74



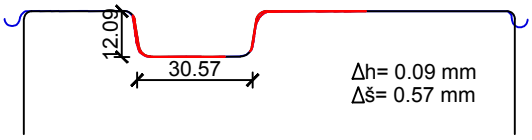
PROFIL 75
PROFILE 75



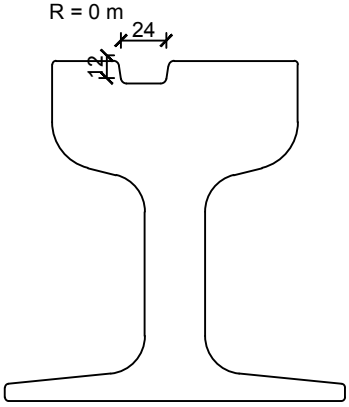
PROFIL 76
PROFILE 76



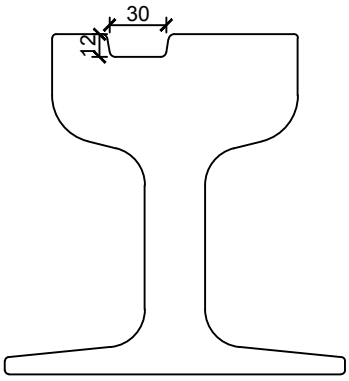
PROFIL 77
PROFILE 77



PROFIL 74, 75 PROFILE 74, 75
R = 0 m

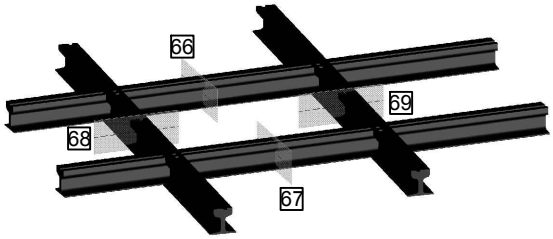


PROFIL 76, 77 PROFILE 76, 77
R = 50 m



Prilog 6.3.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 3
Istrošenje poprečnog presjeka tračnica u križalištu K134
Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova
MJ: 1:2

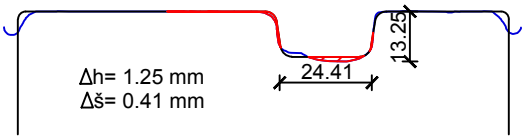
Annex 6.3.3.1. Cross section wear in track crossings at Location 3
Cross section wear in track crossing K134
Location 3: Savska - Vodnikova crossing
Scale: 1:2



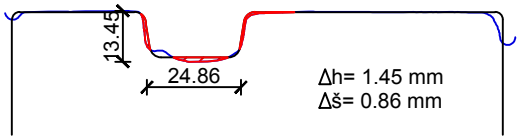
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savski most ⟶ Ilica
Direction: Savski most ⟶ Ilica

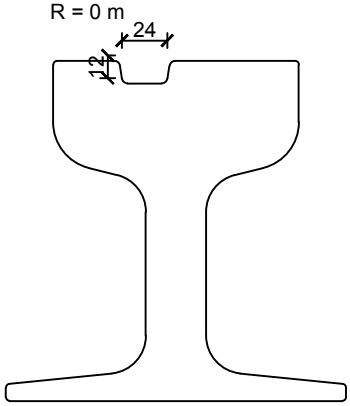
PROFIL 66
PROFILE 66



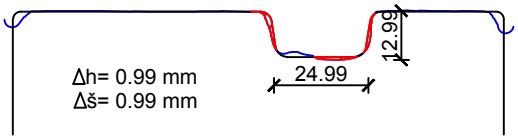
PROFIL 67
PROFILE 67



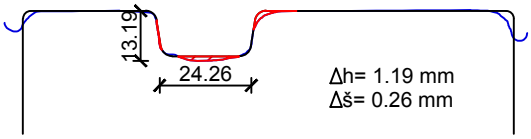
PROFIL 66, 67 PROFILE 66, 67
R = 0 m



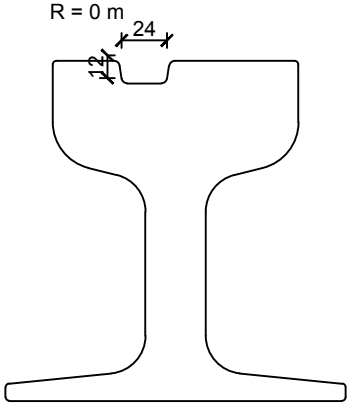
PROFIL 68
PROFILE 68



PROFIL 69
PROFILE 69

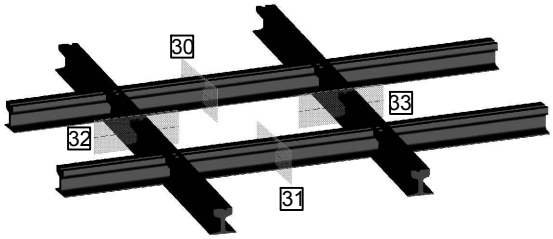


PROFIL 68, 69 PROFILE 68, 69
R = 0 m



Prilog 6.3.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 3
Istrošenje poprečnog presjeka tračnica u križalištu K135
Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova
MJ: 1:2

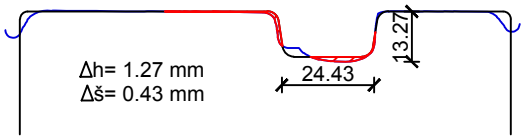
Annex 6.3.3.1. Cross section wear in track crossings at Location 3
Cross section wear in track crossing K135
Location 3: Savska - Vodnikova crossing
Scale: 1:2



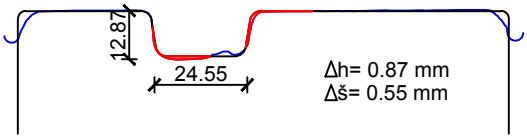
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Ilica → Savski most
Direction: Ilica → Savski most

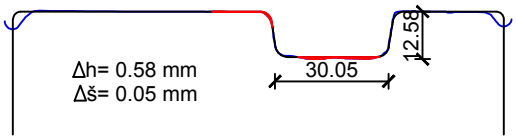
PROFIL 30
PROFILE 30



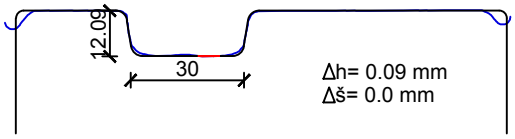
PROFIL 31
PROFILE 31



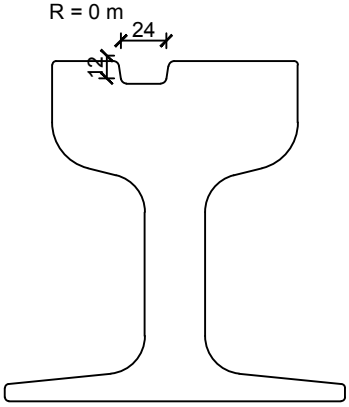
PROFIL 32
PROFILE 32



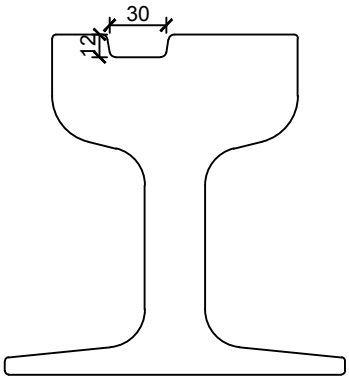
PROFIL 33
PROFILE 33



PROFIL 30, 31 PROFILE 30, 31
R = 0 m

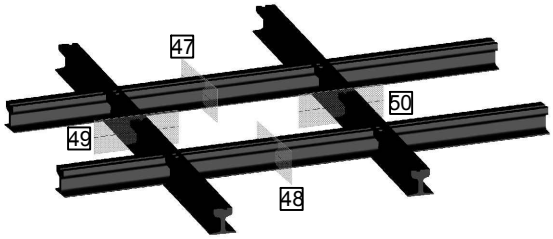


PROFIL 32, 33 PROFILE 32, 33
R = 50 m



Prilog 6.3.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 3
Istrošenje poprečnog presjeka tračnica u križalištu K136
Lokacija 3: Križanje Savska cesta - Ulica Valentina Vodnikova
MJ: 1:2

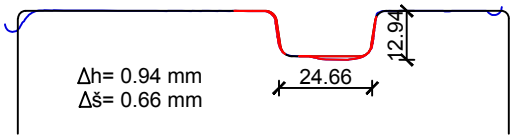
Annex 6.3.3.1. Cross section wear in track crossings at Location 3
Cross section wear in track crossing K136
Location 3: Savska - Vodnikova crossing
Scale: 1:2



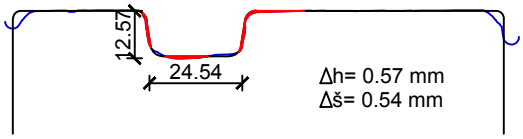
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Glavni kolodvor ⟶ Jukićeva
Direction: Main station ⟶ Jukićeva

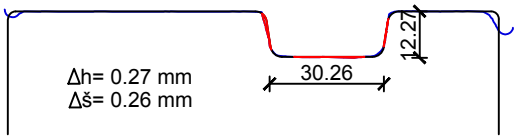
PROFIL 47
PROFILE 47



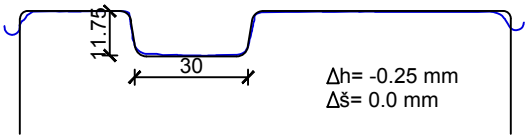
PROFIL 48
PROFILE 48



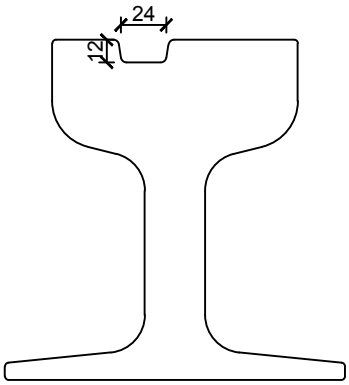
PROFIL 49
PROFILE 49



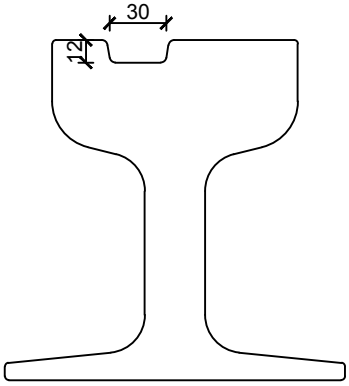
PROFIL 50
PROFILE 50



PROFIL 47, 48 PROFILE 47, 48
R = 0 m

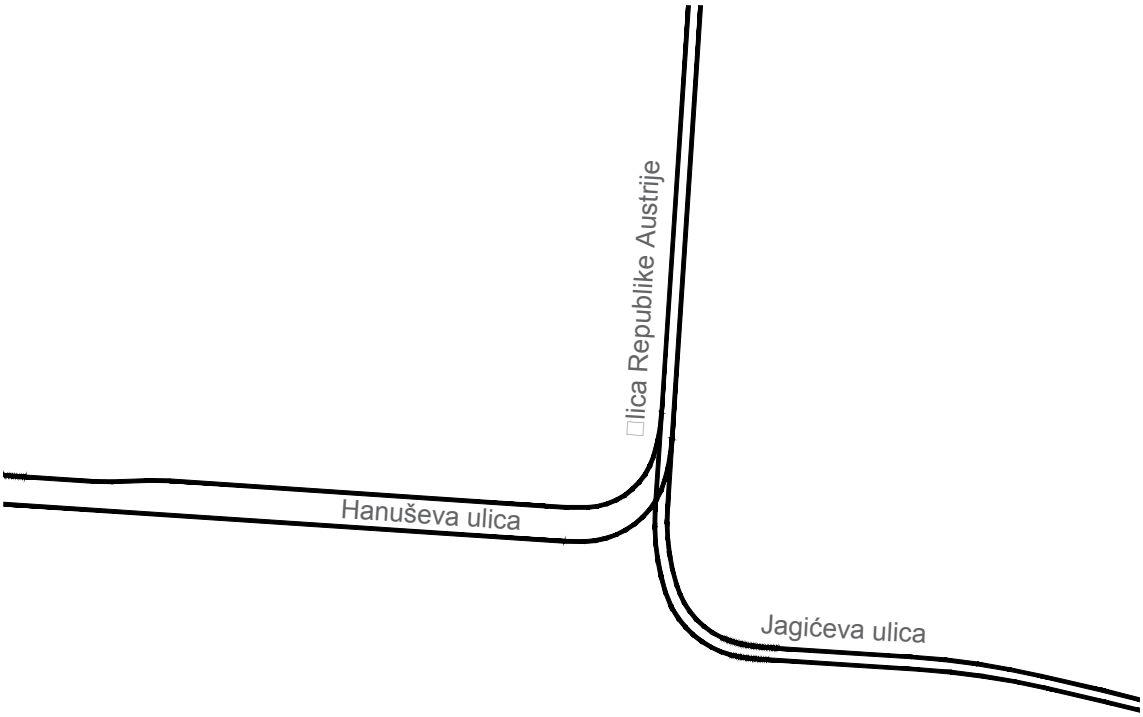


PROFIL 49, 50 PROFILE 49, 50
R = 30 m



Lokacija 4 (L4)
Križanje Ul. Republike Austrije - Jagićeva ul. - Hanuševa ul.

Location 4 (L4)
Republike Austrije - Jagićeva - Hanuševa crossing



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija razvoja tramvajskog prometa rada agreba Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition

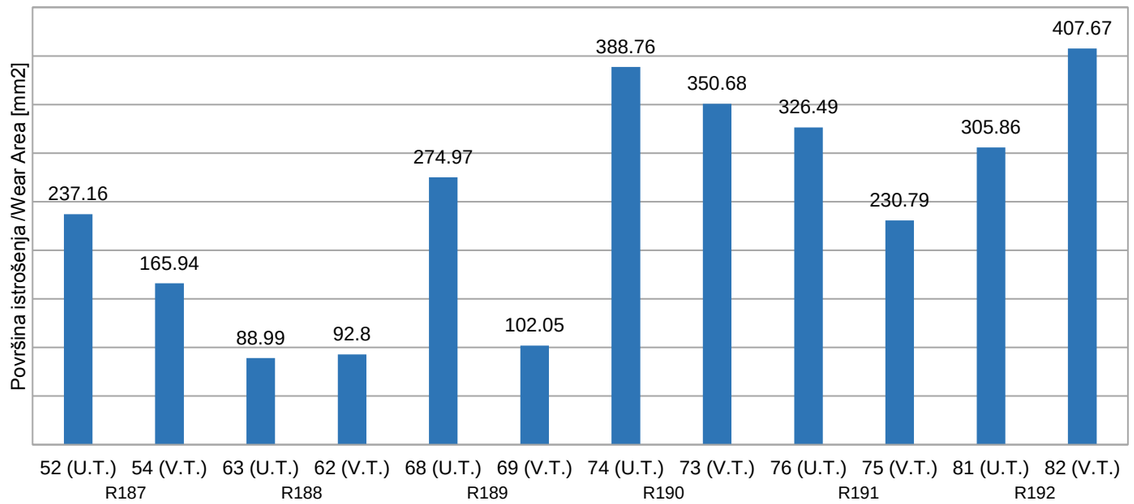
SADRŽAJ PRILOGA:
ANNEX:

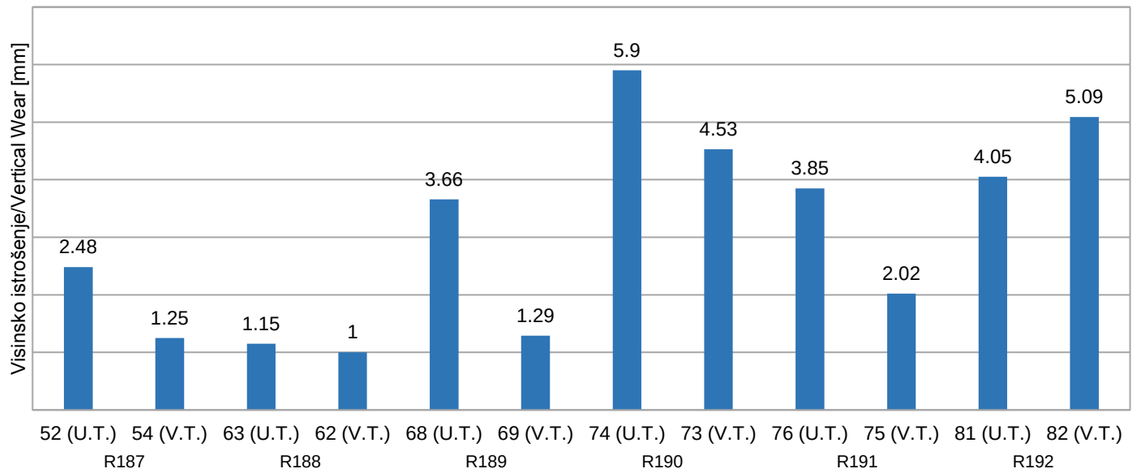
Istrošenje poprečnih presjeka tračnica u krivinama, skretnicama i križalištima na Lokaciji 4

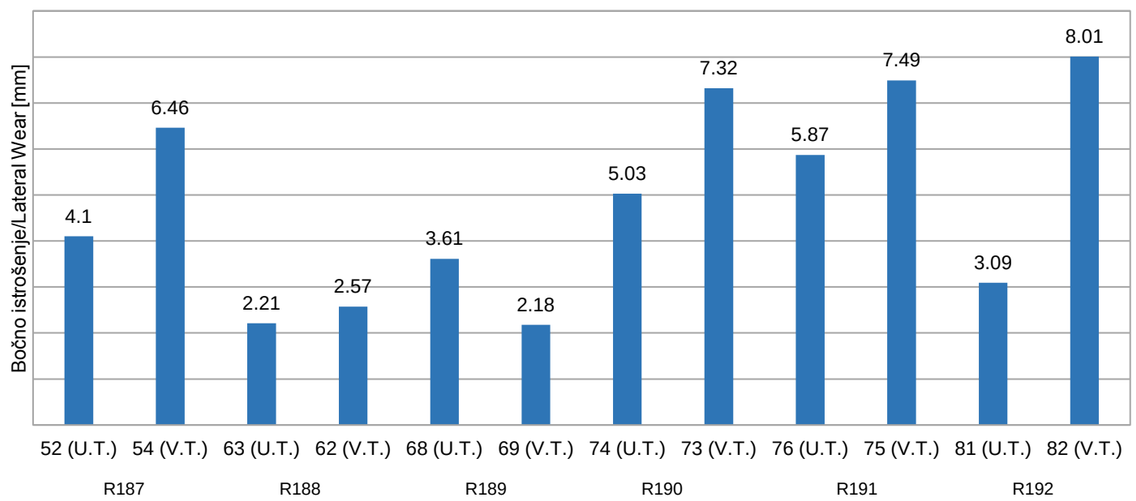
Rail cross section wear in curves, turnouts and crossings at Location 4

MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.4

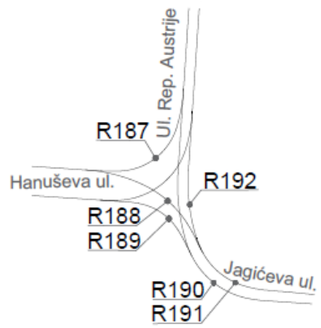
Prilog 6.4.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 4**
Lokacija 4: Križanje Ul. Republike Austrije-Jagićeva ul.-Hanuševa ul.
Annex 6.4.1. **Results of cross section wear in curves at Location 4**
Location 4: Republike Austrije-Jagićeva-Hanuševa crossing







U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve



Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [ ]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]]
K-06-01	R187	desna right	54	lijeva/left	165.94	1.25	6.46	70.84	25	15
			52	desna/right	237.16	2.48	4.1	75.52		
-	R188	lijeva left	63	lijeva/left	88.99	1.15	2.21	82.86	33	15
			62	desna/right	92.8	1	2.57	76.13		
-	R189	desna right	69	lijeva/left	102.05	1.29	2.18	71.6	18	15
			68	desna/right	274.97	3.66	3.61	75.74		
D-07-02	R190	lijeva left	74	lijeva/left	388.76	5.9	5.03	79.58	25	15
			73	desna/right	350.68	4.53	7.32	71.03		
D-07-01	R191	desna right	75	lijeva/left	230.79	2.02	7.49	74.24	21.5	15
			76	desna/right	326.49	3.85	5.87	77.64		
D-06-04	R192	desna right	82	lijeva/left	407.67	5.09	8.01	78.66	56	15
			81	desna/right	305.86	4.05	3.09	83.37		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
K-06-01	R187	desna right	54	lijeva/left	165.94	1.25	6.46
			52	desna/right	237.16	2.48	4.1
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-71.22	-1.23	2.36
-	R188	lijeva left	63	lijeva/left	88.99	1.15	2.21
			62	desna/right	92.8	1	2.57
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					3.81	-0.15	0.36
-	R189	desna right	69	lijeva/left	102.05	1.29	2.18
			68	desna/right	274.97	3.66	3.61
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-172.92	-2.37	-1.43
D-07-02	R190	lijeva left	74	lijeva/left	388.76	5.9	5.03
			73	desna/right	350.68	4.53	7.32
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-38.08	-1.37	2.29
D-07-01	R191	desna right	75	lijeva/left	230.79	2.02	7.49
			76	desna/right	326.49	3.85	5.87
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-95.7	-1.83	1.62
D-06-04	R192	desna right	82	lijeva/left	407.67	5.09	8.01
			81	desna/right	305.86	4.05	3.09
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					101.81	1.04	4.92

Prilog 6.4.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 4

Istrošenje poprečnog presjeka tračnica u krivini R187

Lokacija 4: Križanje Ul. Republike Austrije-Jagićeva ul.-Hanuševa ul.

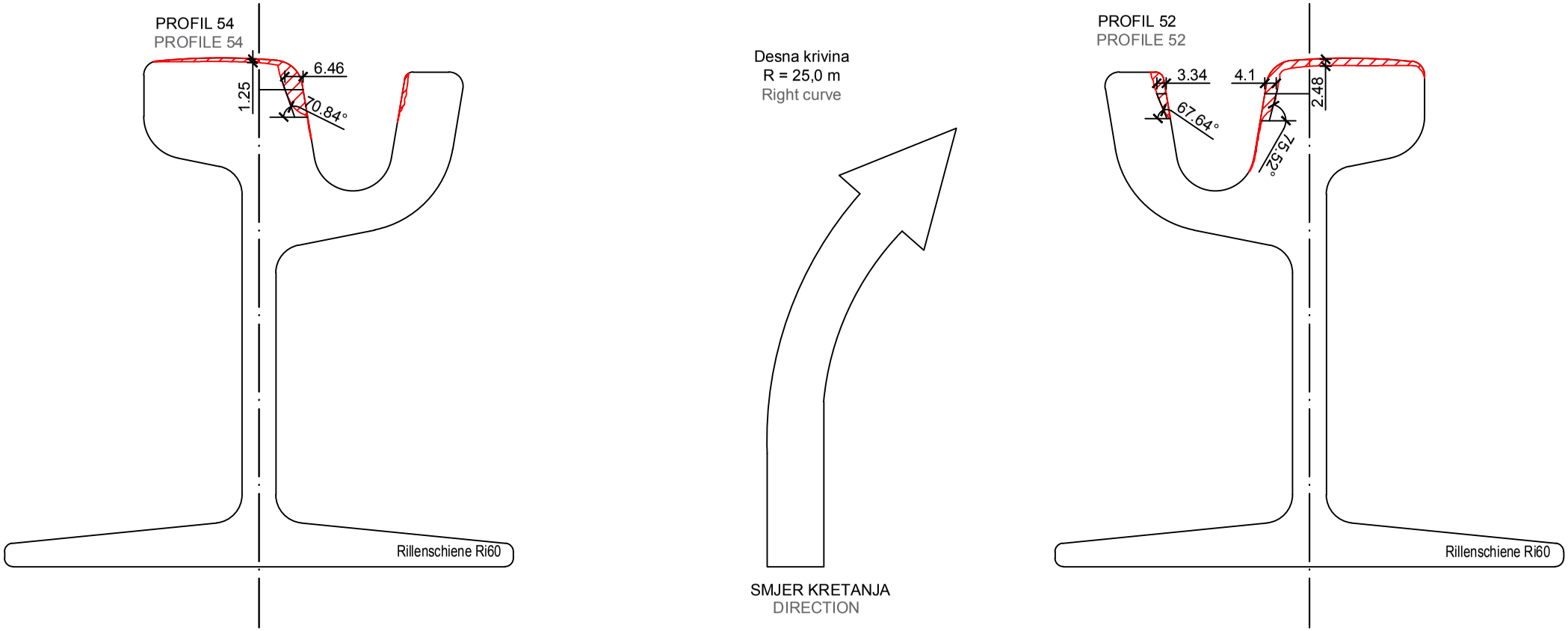
MJ: 1:2

Annex 6.4.1.1. Cross section wear in curves at Location 4

Cross section wear in curve R187

Location 4: Republike Austrije-Jagićeva-Hanuševa crossing

Scale: 1:2



Prilog 6.4.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 4

Istrošenje poprečnog presjeka tračnica u krivini R188

Lokacija 4: Križanje Ul. Republike Austrije-Jagićeva ul.-Hanuševa ul.

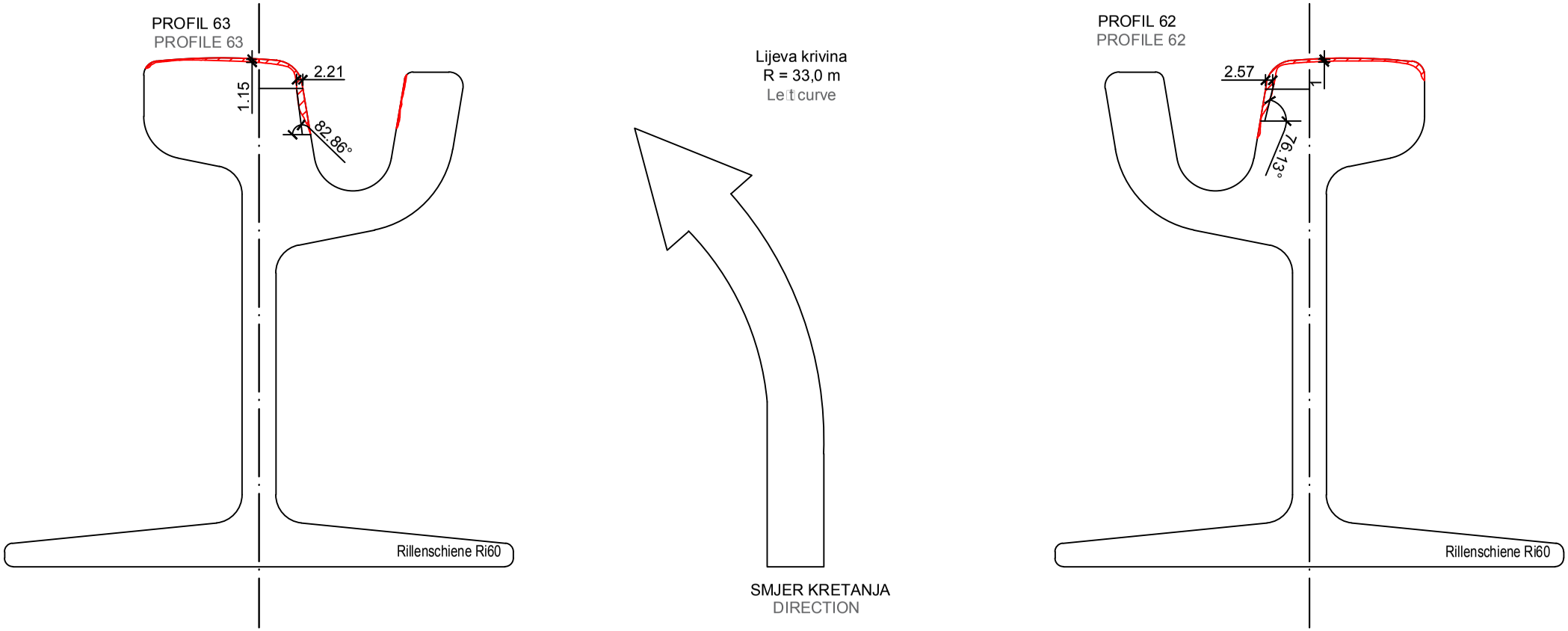
MJ: 1:2

Annex 6.4.1.1. Cross section wear in curves at Location 4

Cross section wear in curve R188

Location 4: Republike Austrije-Jagićeva-Hanuševa crossing

Scale: 1:2



Prilog 6.4.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 4

Istrošenje poprečnog presjeka tračnica u krivini R189

Lokacija 4: Križanje Ul. Republike Austrije-Jagićeva ul.-Hanuševa ul.

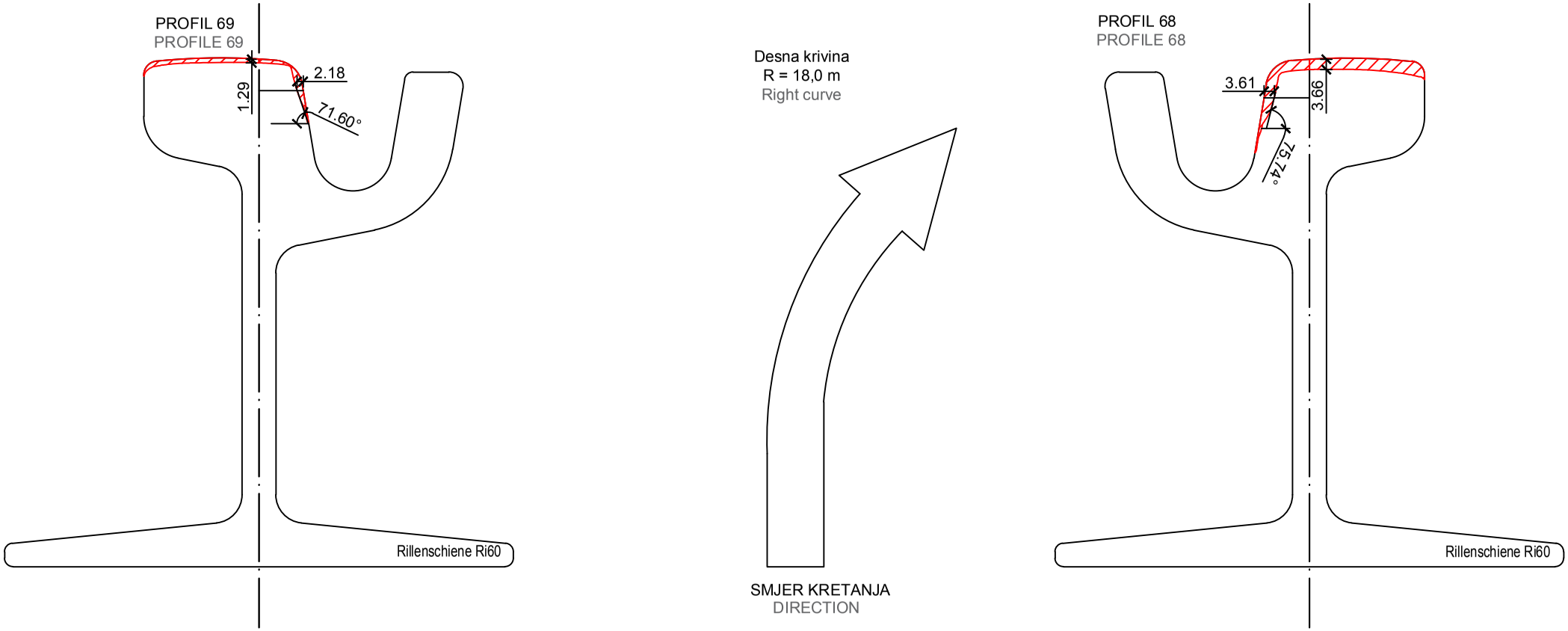
MJ: 1:2

Annex 6.4.1.1. Cross section wear in curves at Location 4

Cross section wear in curve R189

Location 4: Republike Austrije-Jagićeva-Hanuševa crossing

Scale: 1:2



Prilog 6.4.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 4

Istrošenje poprečnog presjeka tračnica u krivini R190

Lokacija 4: Križanje Ul. Republike Austrije-Jagićeva ul.-Hanuševa ul.

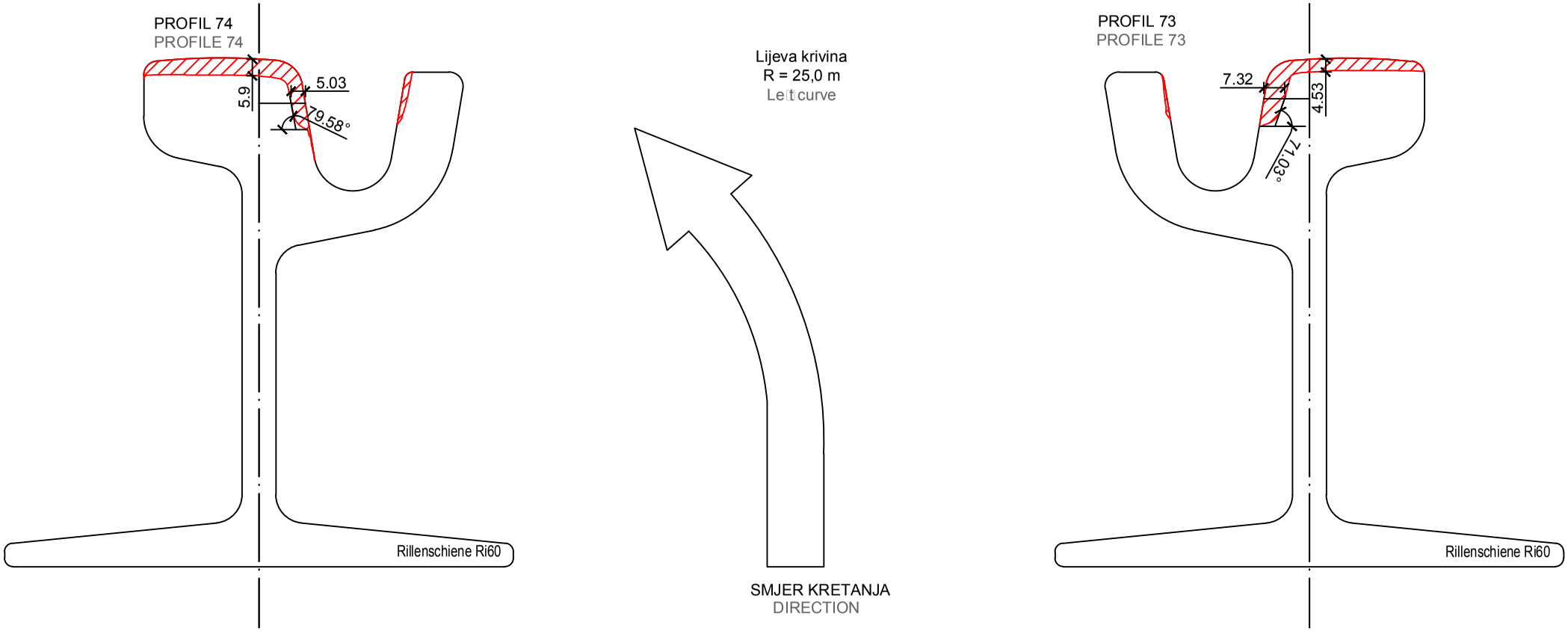
MJ: 1:2

Annex 6.4.1.1. Cross section wear in curves at Location 4

Cross section wear in curve R190

Location 4: Republike Austrije-Jagićeva-Hanuševa crossing

Scale: 1:2



Prilog 6.4.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 4

Istrošenje poprečnog presjeka tračnica u krivini R191

Lokacija 4: Križanje Ul. Republike Austrije-Jagićeva ul.-Hanuševa ul.

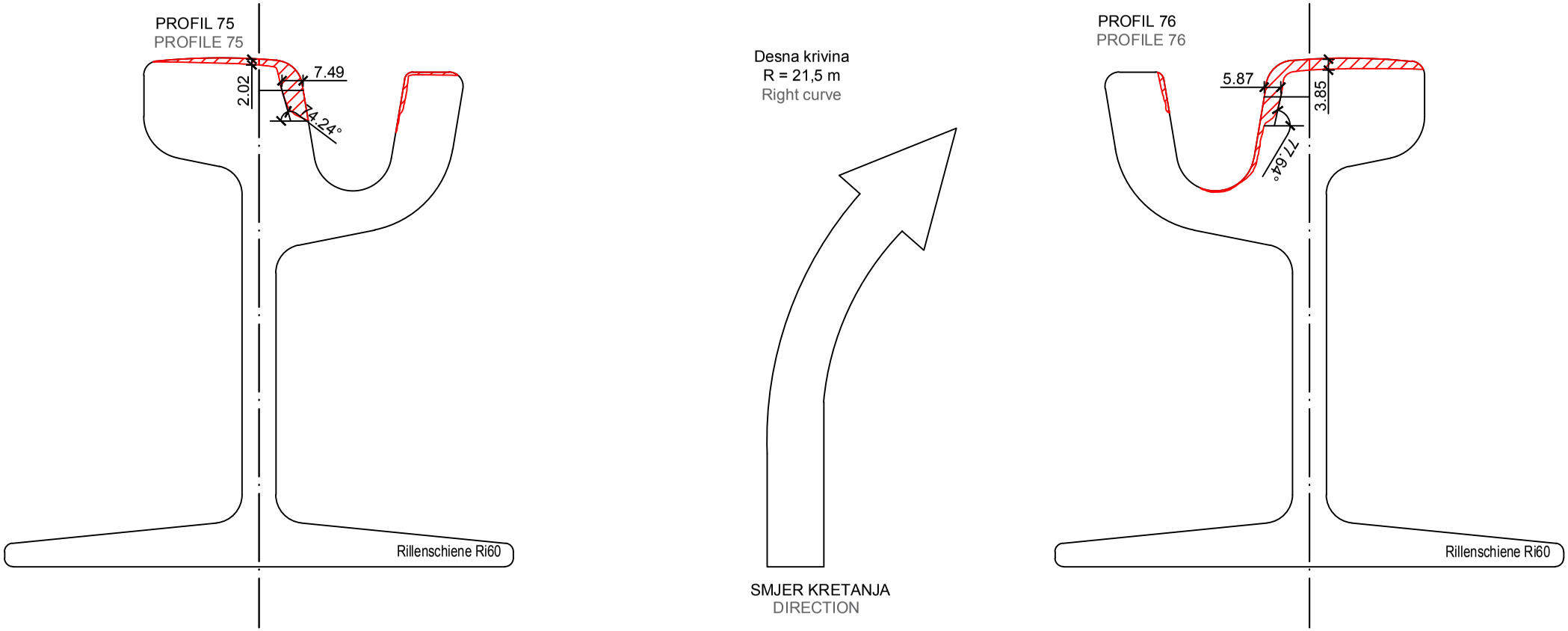
MJ: 1:2

Annex 6.4.1.1. Cross section wear in curves at Location 4

Cross section wear in curve R191

Location 4: Republike Austrije-Jagićeva-Hanuševa crossing

Scale: 1:2



Prilog 6.4.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 4

Istrošenje poprečnog presjeka tračnica u krivini R192

Lokacija: križanje Republike Austrije, Hanuševe i Jagićeve

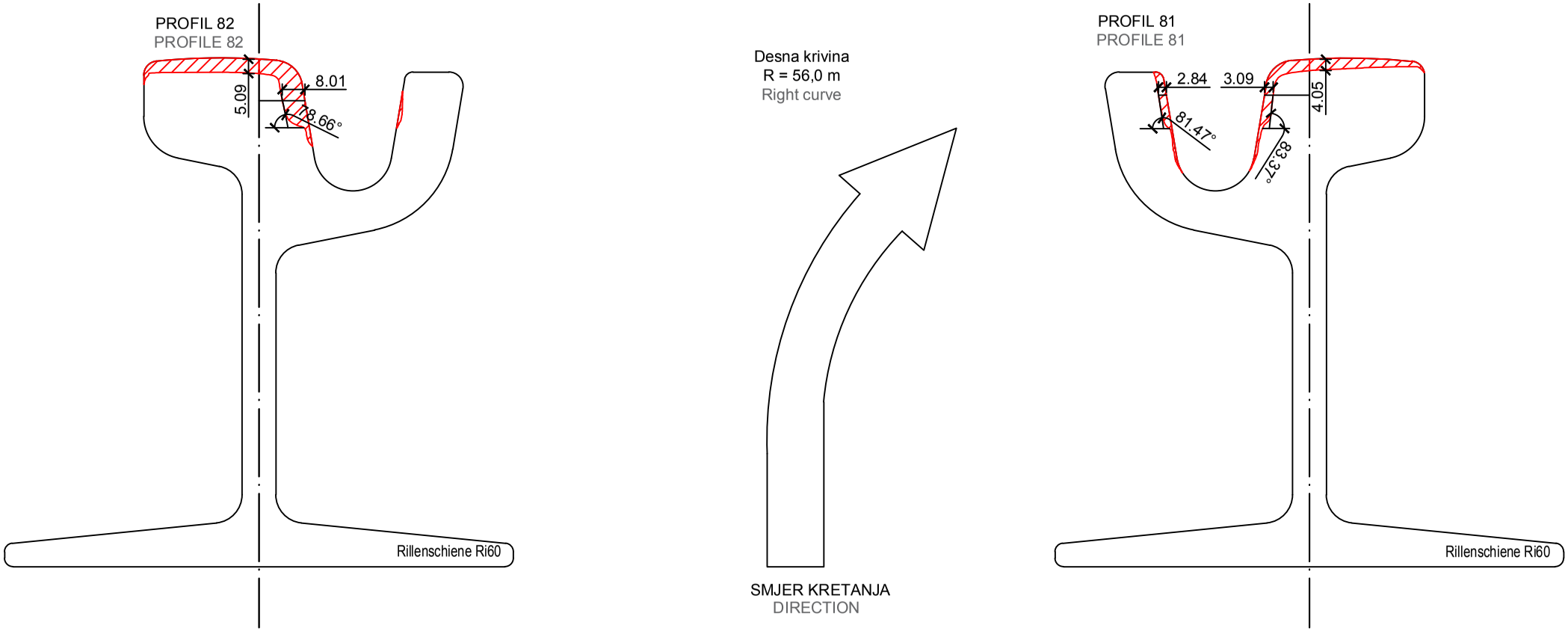
MJ: 1:2

Annex 6.4.1.1. Cross section wear in curves at Location 4

Cross section wear in curve R192

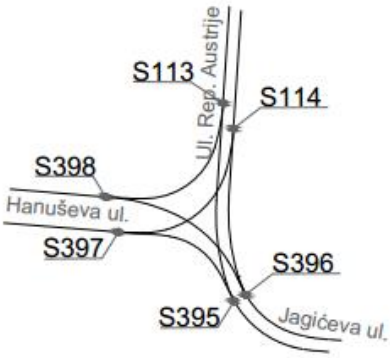
Location 4: Republike Austrije-Jagićeva-Hanuševa crossing

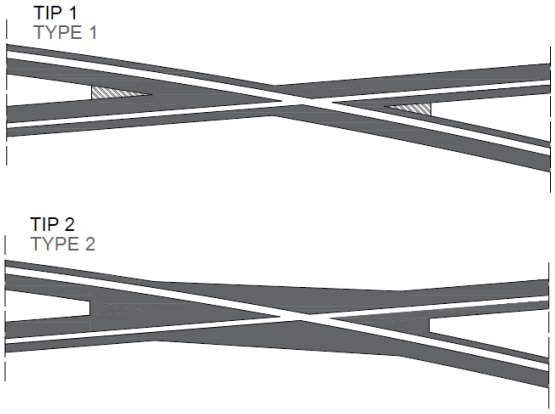
Scale: 1:2



Prilog 6.4.2. Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 4
Lokacija 4: Križanje Ul. Republike Austrije-Jagićeva ul.-Hanuševa ul.

Annex 6.4.2. Results of cross section wear in turnouts at Location 4
Location 4: Republike Austrije-Jagićeva-Hanuševa crossing





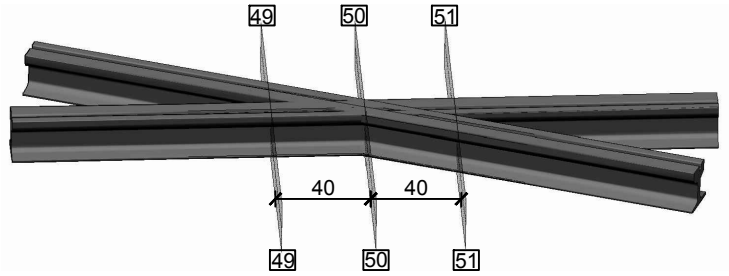
Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-06-01 K-06-03	S113	1	49L	13	19.72	6.72	30.58	32.23	1.65	15
			49D	13	22.61	9.61	24.00	25.25	1.25	
			50	12	22.28	10.28		30.34		
			51L	13	22.56	9.56	24.00	23.70	-0.30	
			51D	13	17.69	4.69	30.58	27.01	-3.57	
K-06-01	S398	1	55L	13	13.85	0.85	30.00	27.93	-2.07	15
			55D	13	19.53	6.53	31.12	30.87	-0.25	
			56	12	18.72	6.72		29.32		
			57L	13	19.01	6.01	31.12	32.43	1.31	
			57D	13	13.30	0.30	30.00	28.30	-1.70	
K-06-02	S397	1	64L	13	13.46	0.46	31.29	29.09	-2.20	15
			64D	13	18.24	5.24	34.00	43.47	9.47	
			65	12	17.29	5.29		37.50		
			67L	13	19.34	6.34	34.00	37.78	3.78	
			67D	13	13.20	0.20	31.33	29.59	-1.74	
K-06-03	S395	1	70L	13	17.81	4.81	30.00	27.97	-2.03	15
			70D	13	12.75	-0.25	31.23	29.88	-1.35	
			71	12	18.43	6.43		32.26		
			72L	13	13.46	0.46	31.23	31.09	-0.14	
			72D	13	18.34	5.34	30.00	30.50	0.50	
K-06-04	S396	1	78L	13	19.39	6.39	31.14	29.63	-1.51	15
			78D	13	12.65	-0.35	30.00	28.62	-1.38	
			79	12	19.45	7.45		37.15		
			80L	13	12.38	-0.62	30.00	26.72	-3.28	
			80D	13	19.59	6.59	31.14	29.24	-1.90	
K-06-02 K-06-04	S114	1	93L	13	18.95	5.95	30.00	36.07	6.07	15
			93D	13	22.38	9.38	24.51	25.29	0.78	
			94	12	22.74	10.74		43.17		
			96L	13	23.10	10.10	24.50	25.69	1.19	
			96D	13	20.20	7.20	30.00	34.88	4.88	

Prilog 6.4.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 4

Istrošenje poprečnog presjeka srcišta skretnice S113
Lokacija 4: Križanje Ul. Republike Austrije-Jagićeva ul.-Hanuševa ul.
MJ: 1:2

Annex 6.4.2.1. Cross section wear in turnouts at Location 4

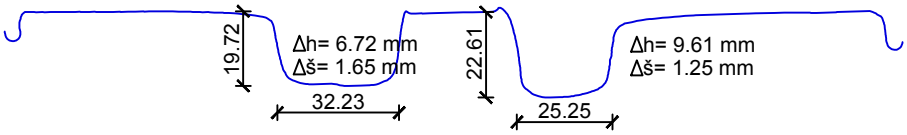
Cross section wear in turnout S113
Location 4: Republike Austrije-Jagićeva-Hanuševa crossing
Scale: 1:2



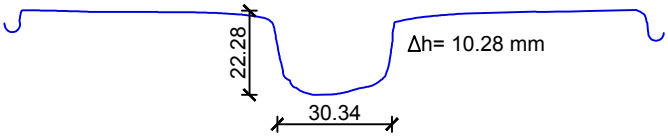
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Republike Austrije → Jagićeva
Direction: Republike Austrije → Jagićeva

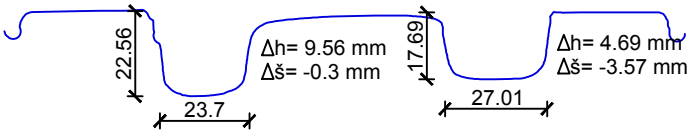
PROFIL 49
PROFILE 49



PROFIL 50
PROFILE 50

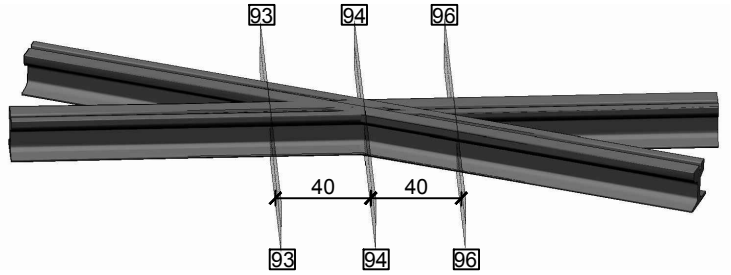


PROFIL 51
PROFILE 51



Prilog 6.4.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 4
Istrošenje poprečnog presjeka srcišta skretnice S114
Lokacija 4: Križanje Ul. Republike Austrije-Jagićeva ul.-Hanuševa ul.
MJ: 1:2

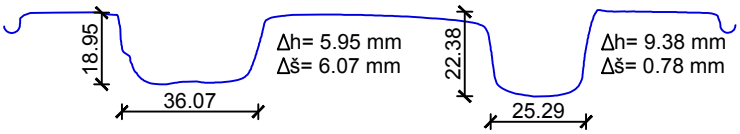
Annex 6.4.2.1. Cross section wear in turnouts at Location 4
Cross section wear in turnout S114
Location 4: Republike Austrije-Jagićeva-Hanuševa crossing
Scale: 1:2



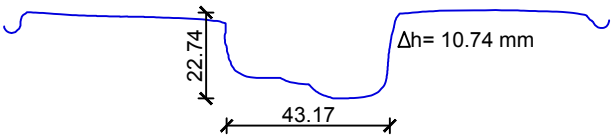
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Jagićeva ⟶ Ilica
Direction: Jagićeva ⟶ Ilica

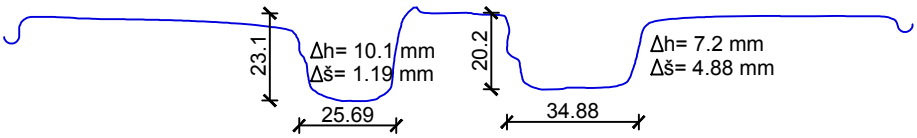
PROFIL 93
PROFILE 93



PROFIL 94
PROFILE 94

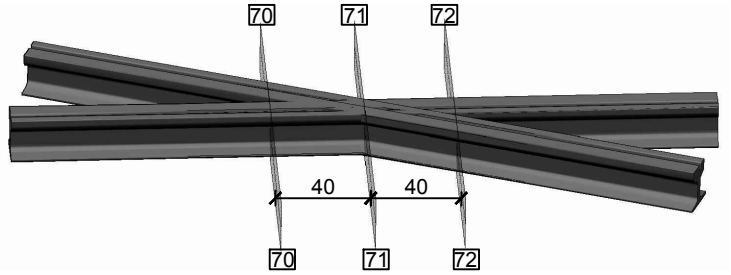


PROFIL 96
PROFILE 96



Prilog 6.4.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 4
Istrošenje poprečnog presjeka srcišta skretnice S395
Lokacija 4: Križanje Ul. Republike Austrije-Jagićeva ul.-Hanuševa ul.
MJ: 1:2

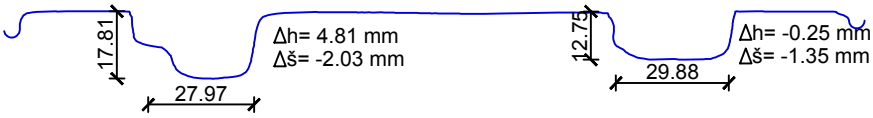
Annex 6.4.2.1. Cross section wear in turnouts at Location 4
Cross section wear in turnout S395
Location 4: Republike Austrije-Jagićeva-Hanuševa crossing
Scale: 1:2



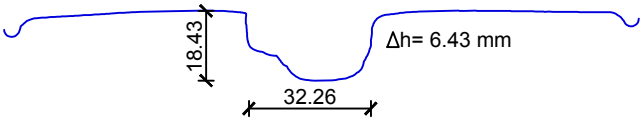
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Zapadni kolodvor → Jagićeva
Direction: Zapadni kolodvor → Jagićeva

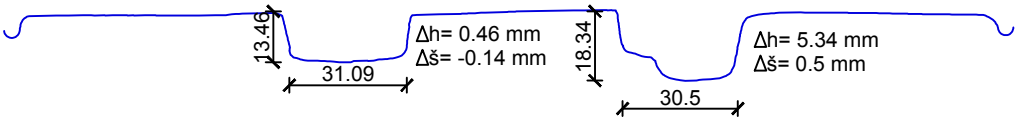
PROFIL 70
PROFILE 70



PROFIL 71
PROFILE 71

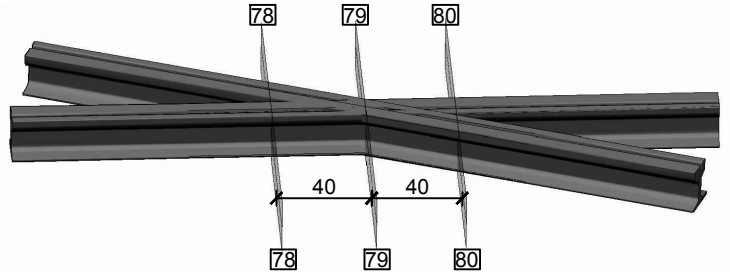


PROFIL 72
PROFILE 72



Prilog 6.4.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 4
Istrošenje poprečnog presjeka srcišta skretnice S396
Lokacija 4: Križanje Ul. Republike Austrije-Jagićeva ul.-Hanuševa ul.
MJ: 1:2

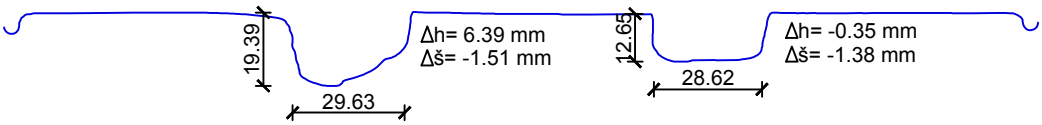
Annex 6.4.2.1. Cross section wear in turnouts at Location 4
Cross section wear in turnout S396
Location 4: Republike Austrije-Jagićeva-Hanuševa crossing
Scale: 1:2



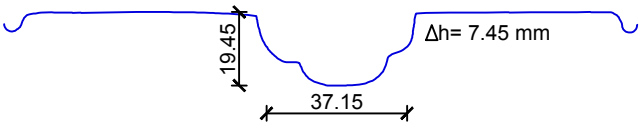
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Jagićeva ⟶ Ilica
Direction: Jagićeva ⟶ Ilica

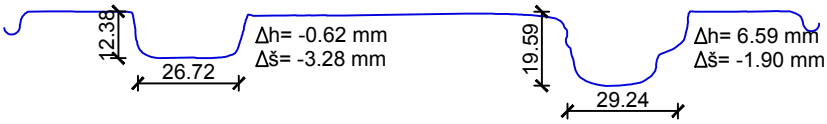
PROFIL 78
PROFILE 78



PROFIL 79
PROFILE 79



PROFIL 80
PROFILE 80



Prilog 6.4.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 4

Istrošenje poprečnog presjeka srcišta skretnice S397

Lokacija 4: Križanje Ul. Republike Austrije-Jagićeva ul.-Hanuševa ul.

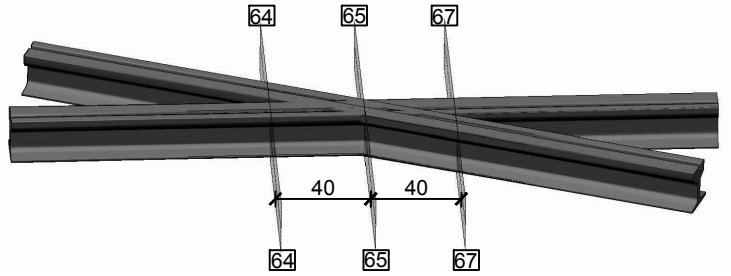
MJ: 1:2

Annex 6.4.2.1. Cross section wear in turnouts at Location 4

Cross section wear in turnout S397

Location 4: Republike Austrije-Jagićeva-Hanuševa crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

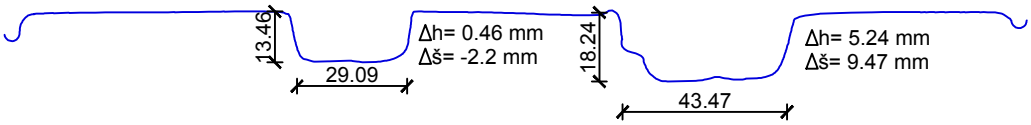
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Zapadni kolodvor → Ilica

Direction: Zapadni kolodvor → Ilica

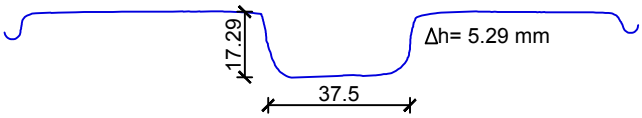
PROFIL 64

PROFILE 64



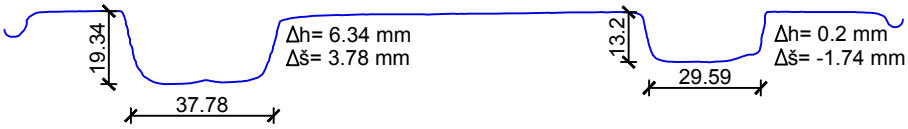
PROFIL 65

PROFILE 65



PROFIL 67

PROFILE 67



Prilog 6.4.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 4

Istrošenje poprečnog presjeka srcišta skretnice S398

Lokacija 4: Križanje Ul. Republike Austrije-Jagićeva ul.-Hanuševa ul.

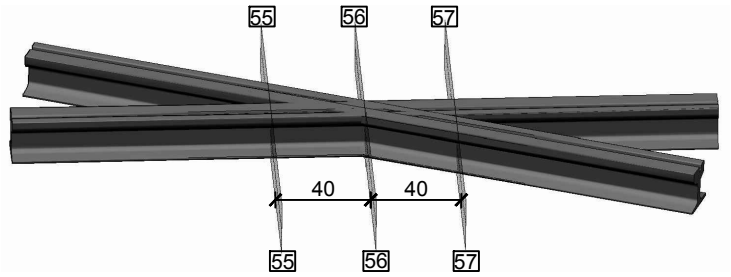
MJ: 1:2

Annex 6.4.2.1. Cross section wear in turnouts at Location 4

Cross section wear in turnout S398

Location 4: Republike Austrije-Jagićeva-Hanuševa crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

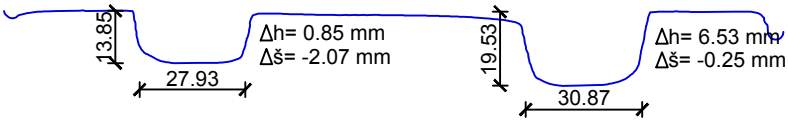
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Ilica → □apadni kolodvor

Direction: Ilica → □apadni kolodvor

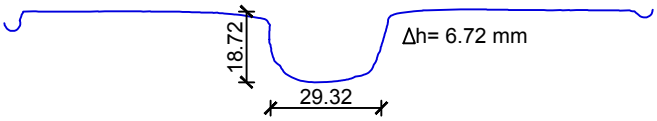
PROFIL 55

PROFILE 55



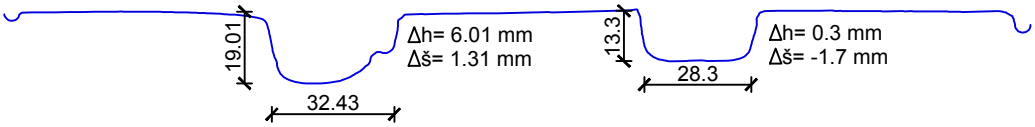
PROFIL 56

PROFILE 56



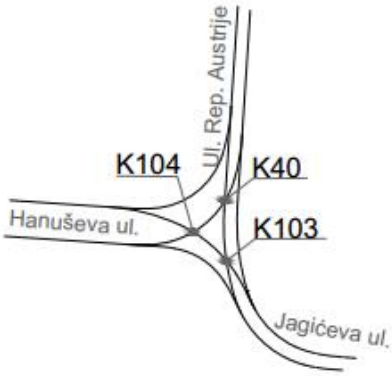
PROFIL 57

PROFILE 57



Prilog 6.4.3. Rezultati istrošenja profila tračnica u križalištima na Lokaciji 4
Lokacija 4: Križanje Ul. Republike Austrije-Jagićeva ul.-Hanuševa ul.

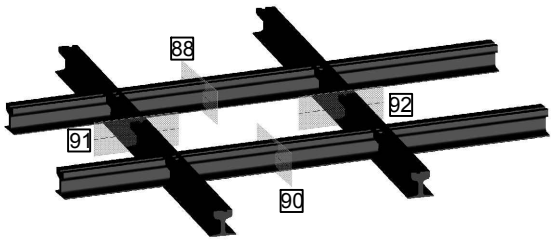
Annex 6.4.3. Results of cross section wear in track crossing at Location 4
Location 4: Republike Austrije-Jagićeva-Hanuševa crossing



Dionice Sections	**Oznaka križališta** Track crossing mark	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-06-02	K104	58	12	13,73	1.73	30.00	28.08	-1.92	15
		59	12	12,53	0.53	30.00	28.17	-1.83	
		60	12	16,58	4.58	34.00	35.80	1.80	
		61	12	18,40	6.40	34.00	38.08	4.08	
K-06-03	K103	83	12	12,76	0.76	30.00	27.55	-2.45	15
		84	12	13,53	1.53	30.00	27.85	-2.15	
		85	12	23,31	11.31	30.00	31.24	1.24	
		86	12	22,54	10.54	30.00	30.57	0.57	
K-06-03 K-06-02	K40	88	12	16,03	4.03	24.00	27.70	3.70	15
		90	12	17,83	5.83	24.00	27.64	3.64	
		91	12	16,01	4.01	34.00	37.94	3.94	
		92	12	16,13	4.13	34.00	38.75	4.75	

Prilog 6.4.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 4
Istrošenje poprečnog presjeka tračnica u križalištu K40
Lokacija 4: Križanje Ul. Republike Austrije-Jagićeva ul.-Hanuševa ul.
MJ: 1:2

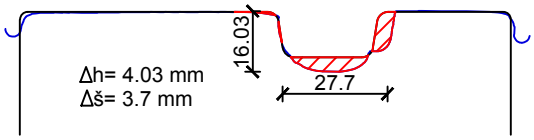
Annex 6.4.3.1. Cross section wear in track crossings at Location 4
Cross section wear in track crossing K40
Location 4: Republike Austrije-Jagićeva-Hanuševa crossing
Scale: 1:2



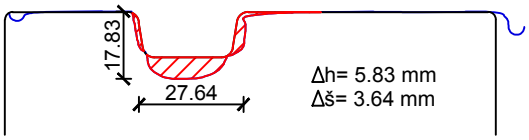
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Republike Austrije ⟶ Jagićeva
Direction: Republike Austrije ⟶ Jagićeva

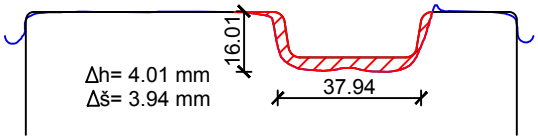
PROFIL 88
PROFILE 88



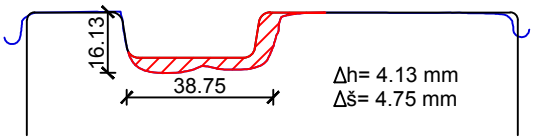
PROFIL 90
PROFILE 90



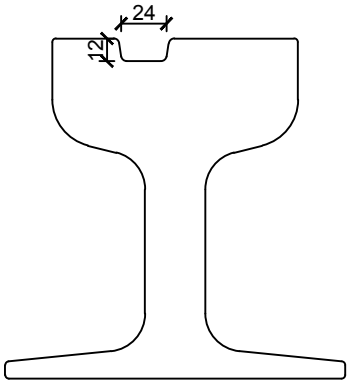
PROFIL 91
PROFILE 91



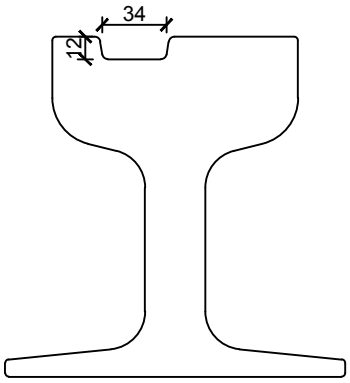
PROFIL 92
PROFILE 92



PROFIL 33, 34 PROFILE 33, 34
R = 0 m



PROFIL 51, 52 PROFILE 51, 52
R = 25 m



Prilog 6.4.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 4

Istrošenje poprečnog presjeka tračnica u križalištu K103

Lokacija 4: Križanje Ul. Republike Austrije-Jagićeva ul.-Hanuševa ul.

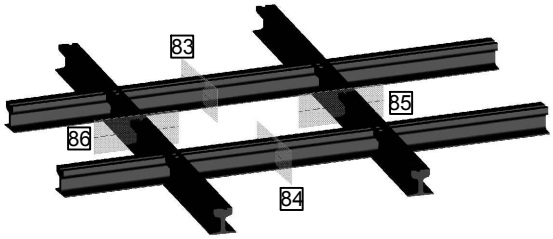
MJ: 1:2

Annex 6.4.3.1. Cross section wear in track crossings at Location 4

Cross section wear in track crossing K103

Location 4: Republike Austrije-Jagićeva-Hanuševa crossing

Scale: 1:2

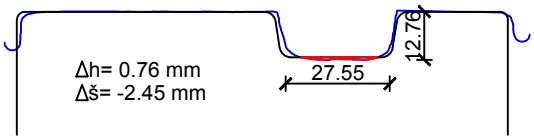


Δh - visinsko istrošenje
Δš - bočno istrošenje

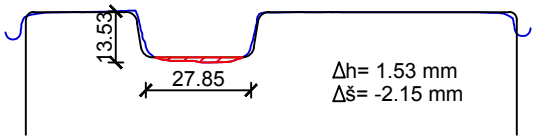
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Jagićeva → □apadni kolodvor
Direction: Jagićeva → □apadni kolodvor

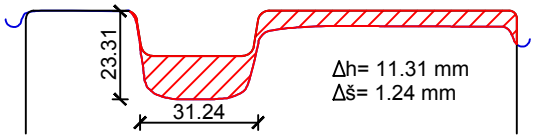
PROFIL 83
PROFILE 83



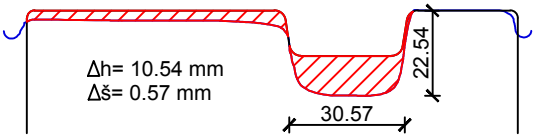
PROFIL 84
PROFILE 84



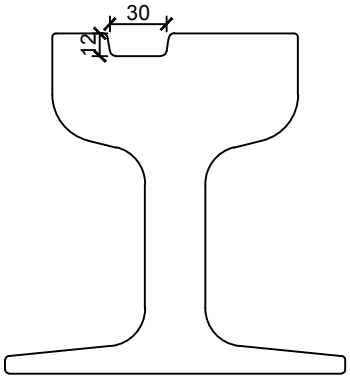
PROFIL 85
PROFILE 85



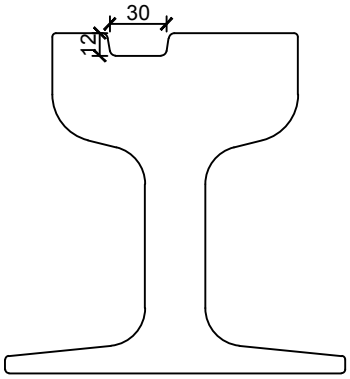
PROFIL 86
PROFILE 86



PROFIL 83, 84 □PROFILE 83, 84
R = 33 m



PROFIL 85, 86 □PROFILE 85, 86
R = 61 m



Prilog 6.4.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 4

Istrošenje poprečnog presjeka tračnica u križalištu K104

Lokacija 4: Križanje Ul. Republike Austrije-Jagićeva ul.-Hanuševa ul.

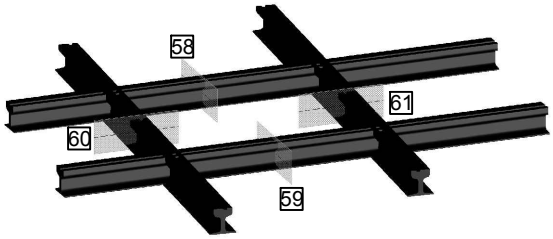
MJ: 1:2

Annex 6.4.3.1. Cross section wear in track crossings at Location 4

Cross section wear in track crossing K104

Location 4: Republike Austrije-Jagićeva-Hanuševa crossing

Scale: 1:2

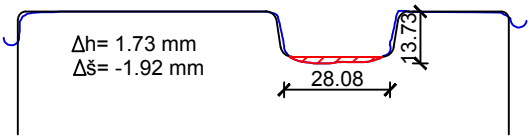


Δh - visinsko istrošenje
Δš - bočno istrošenje

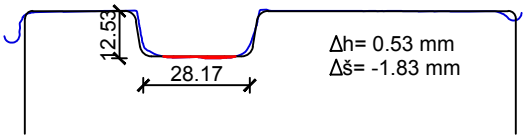
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Jagićeva → apadni kolodvor
Direction: Jagićeva → apadni kolodvor

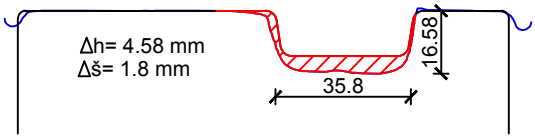
PROFIL 58
PROFILE 58



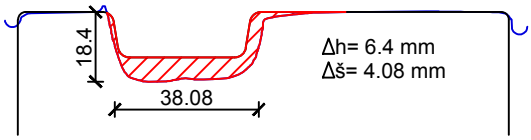
PROFIL 59
PROFILE 59



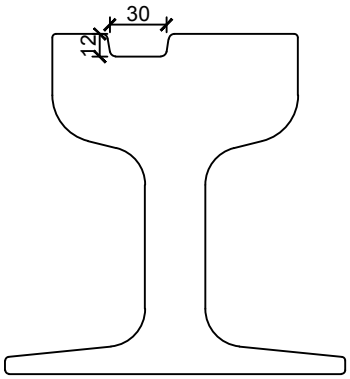
PROFIL 60
PROFILE 60



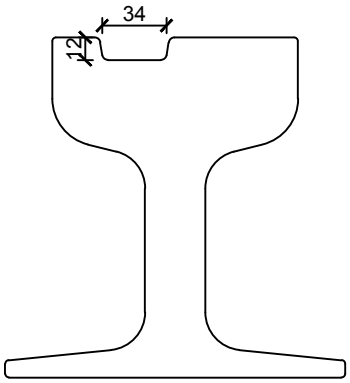
PROFIL 61
PROFILE 61



PROFILE 58, 59 PROFILE 58, 59
R = 33 m

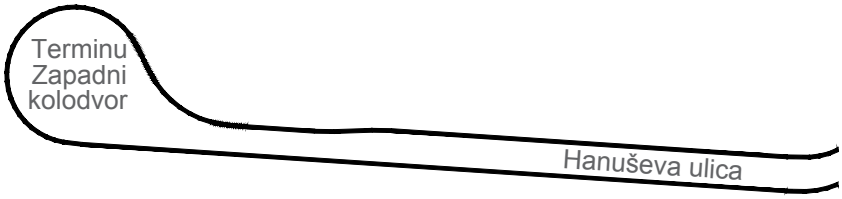


PROFIL 60, 61 PROFILE 60, 61
R = 25 m



Lokacija 5 (L5)
Okretnica Zapadni kolodvor

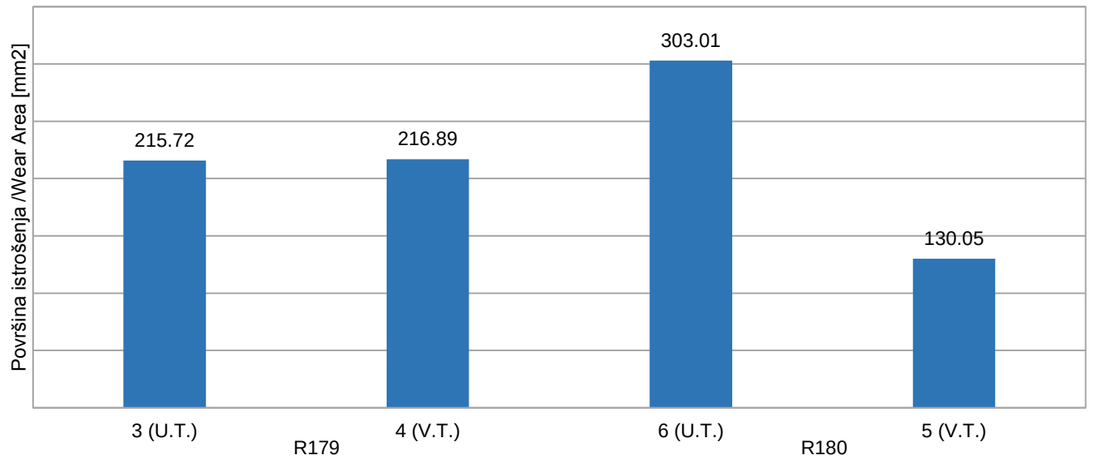
Location 5 (L5)
Terminus Zapadni kolodvor

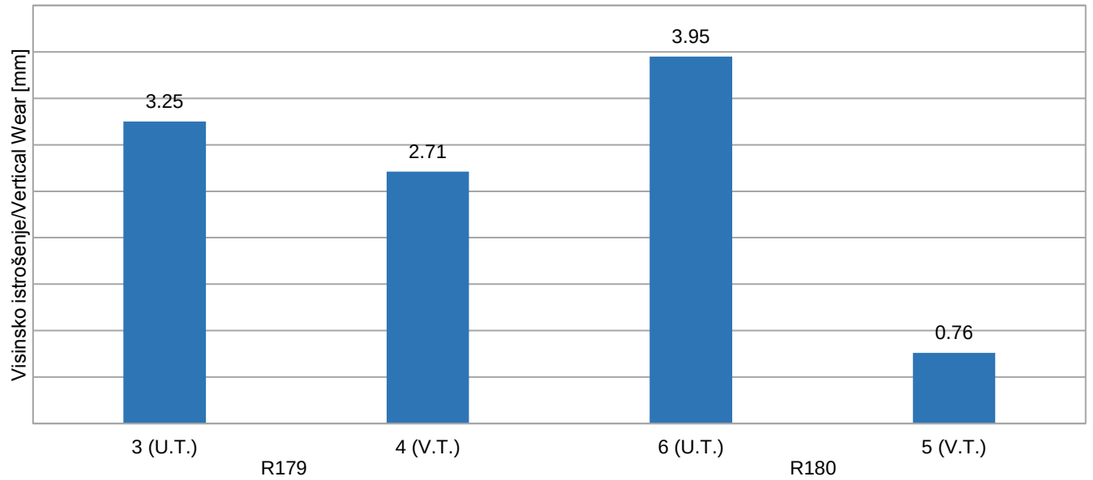


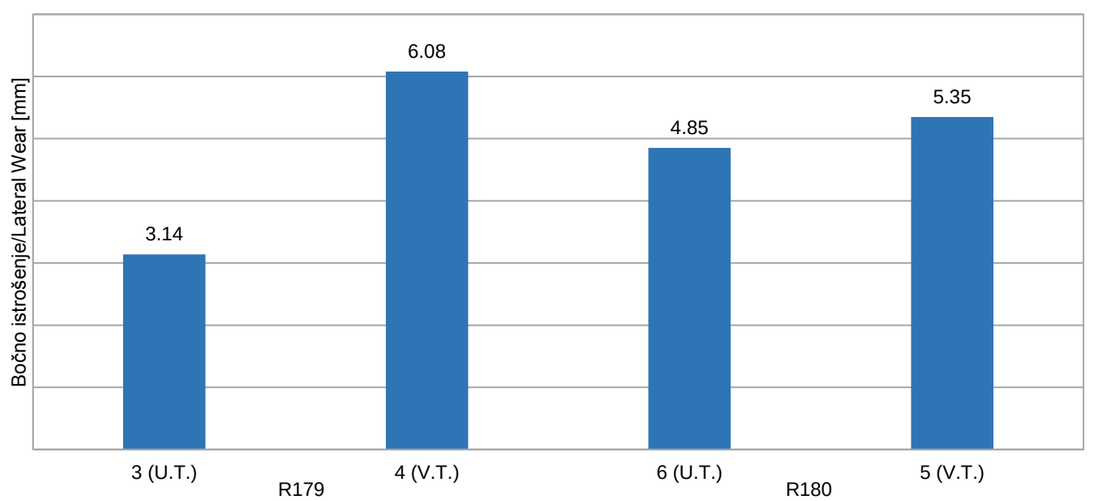
IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija ra□voja tramvajskog prometa □rada Zagre□a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition
SADRŽAJ PRILOGA: ANNEX: Istrošenje poprečnih presjeka tračnica u krivinama na Lokaciji 5 Rail cross section wear in curves at Location 5	
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.5

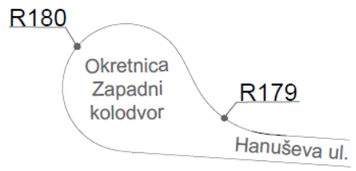
Prilog 6.5.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 5**
Lokacija 5: Okretnica Zapadni kolodvor

Annex 6.5.1. **Results of cross section wear in curves at Location 5**
Location 5: Terminus Zapadni kolodvor









Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [˚]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
Z-05-01	R179	desna right	4	lijeva/left	216.89	2.71	6.08	76.01	25	15
			3	desna/right	215.72	3.25	3.14	82.82		
Z-05-01	R180	lijeva left	6	lijeva/left	303.01	3.95	4.85	76.99	18	15
			5	desna/right	130.05	0.76	5.35	68.12		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
Z-05-01	R179	desna right	4	lijeva/left	216.89	2.71	6.08
			3	desna/right	215.72	3.25	3.14
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					1.17	-0.54	2.94
Z-05-01	R180	lijeva left	6	lijeva/left	303.01	3.95	4.85
			5	desna/right	130.05	0.76	5.35
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-172.96	-3.19	0.5

U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve

Prilog 6.5.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 5

Istrošenje poprečnog presjeka tračnica u krivini R179

Lokacija 5: Okretnica Zapadni kolodvor

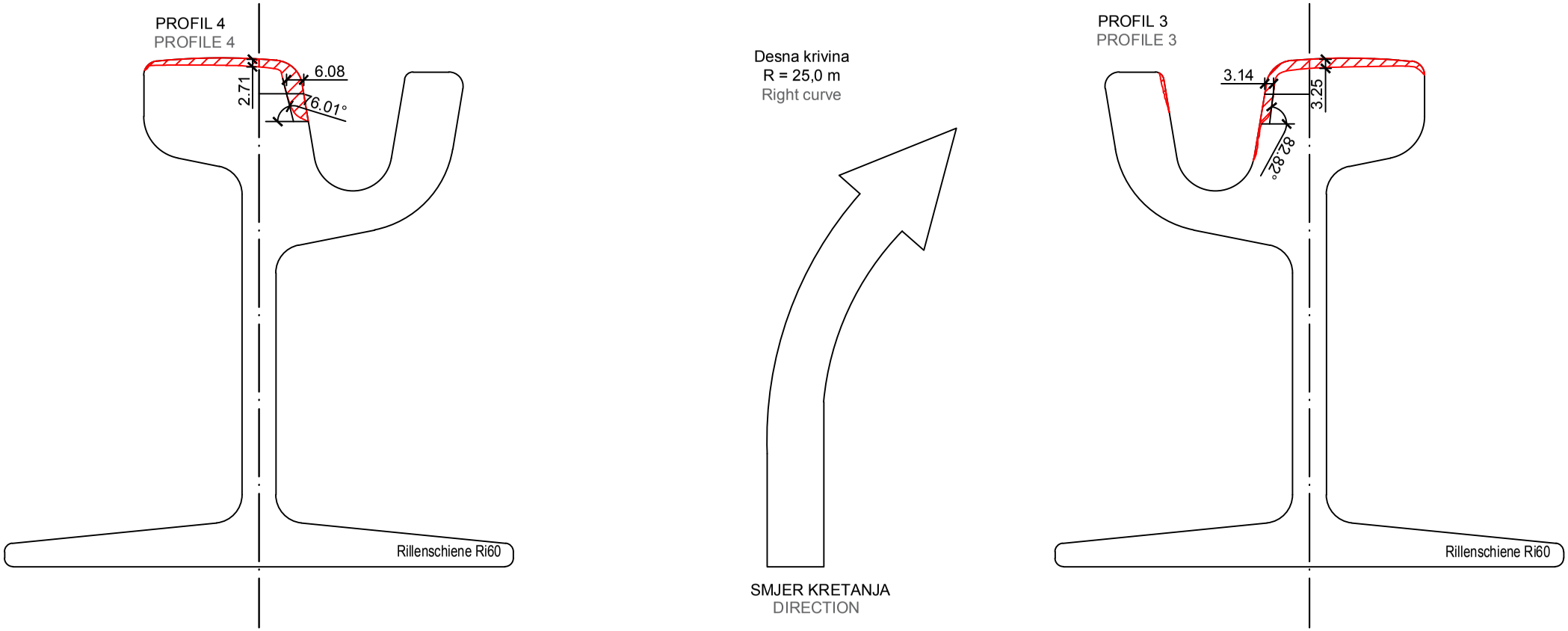
MJ: 1:2

Annex 6.5.1.1. Cross section wear in curves at Location 5

Cross section wear in curve R179

Location 5: Terminus Zapadni kolodvor

Scale: 1:2



Prilog 6.5.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 5

Istrošenje poprečnog presjeka tračnica u krivini R180

Lokacija 5: Okretnica Zapadni kolodvor

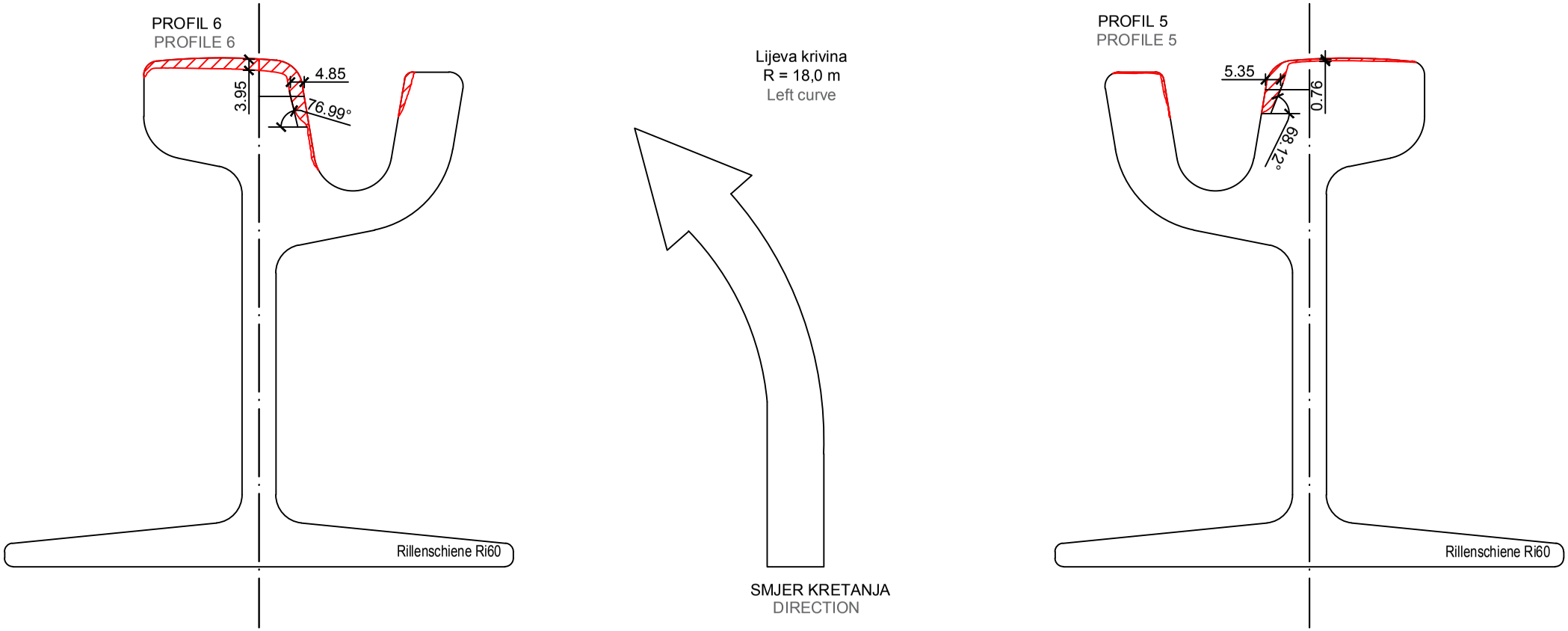
MJ: 1:2

Annex 6.5.1.1. Cross section wear in curves at Location 5

Cross section wear in curve R180

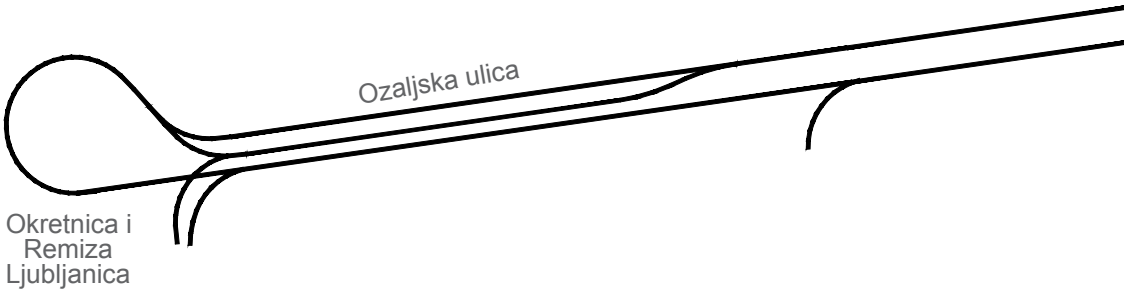
Location 5: Terminus Zapadni kolodvor

Scale: 1:2



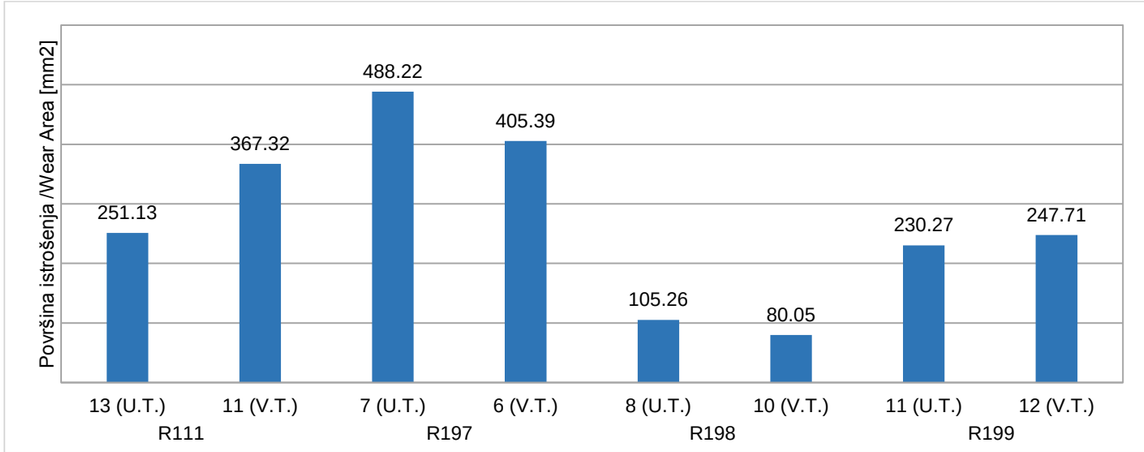
Lokacija 6 (L6)
Okretnica Ljubljanica, remiza Ljubljanica (ulaz i izlaz u remizu)

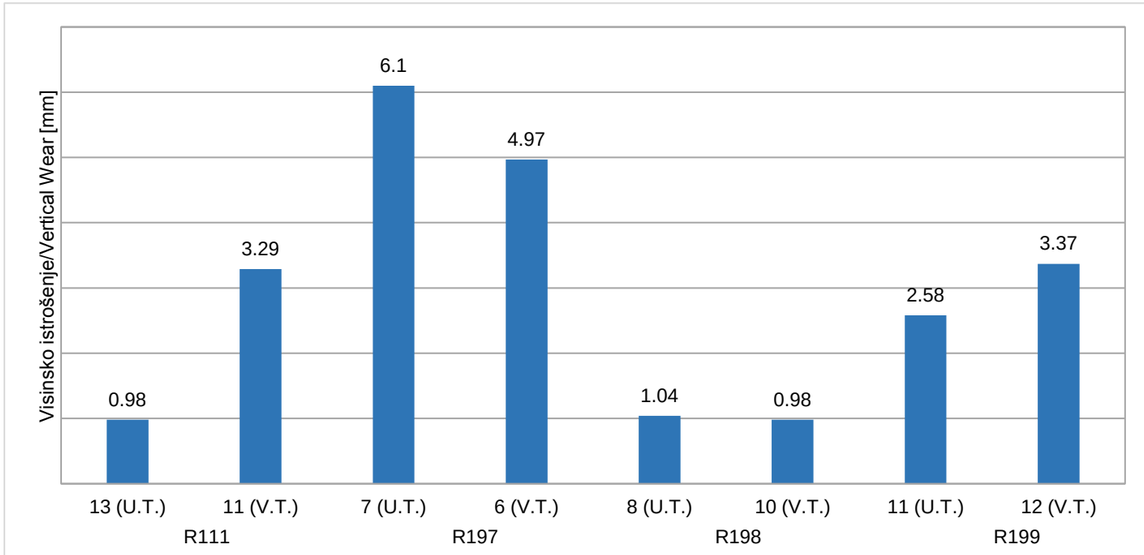
Location 6 (L6)
Terminus and shunting yard Ljubljanica

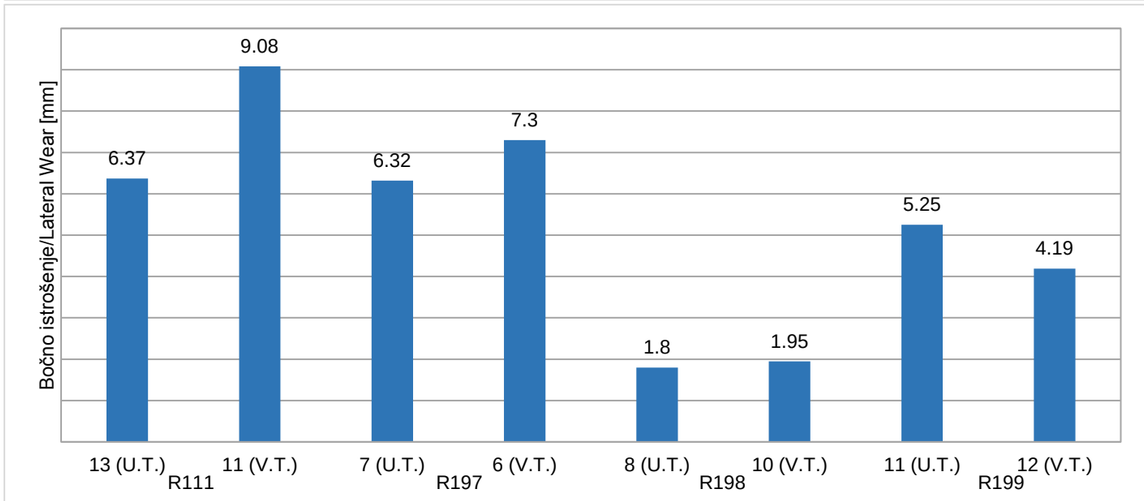


IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija razvoja tramvajskog prometa □rada □agreba Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition
SADRŽAJ PRILOGA: ANNEX: Istrošenje poprečnih presjeka tračnica u krivinama, skretnicama i križalištima na Lokaciji 6 Rail cross section wear in curves, turnouts and crossings at Location 6	
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.6

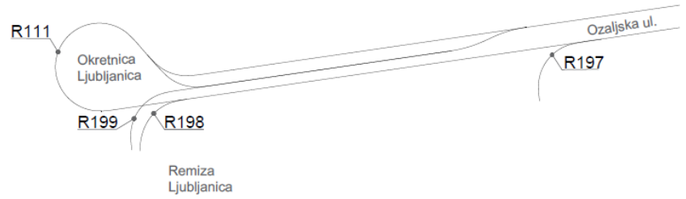
Prilog 6.6.1. Rezultati istrošenja profila tračnica u krivinama na Lokaciji 6
Lokacija 6: Okretnica Ljubljanica, remiza Ljubljanica (ulaz i izlaz u remizu)
Annex 6.6.1. Results of cross section wear in curves at Location 6
Location 6: Terminus and shunting yard Ljubljanica







U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve



Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear				Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
					Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [ ]		
Z-01-02	R111	lijeva left	13	lijeva/left	251.13	0.98	6.37	74.23	18	7
			11	desna/right	367.32	3.29	9.08	69.87		
-	R197	desna right	6	lijeva/left	405.39	4.97	7.3	69.04	18	32
			7	desna/right	488.22	6.1	6.32	76.19		
-	R198	desna right	10	lijeva/left	80.05	0.98	1.95	74.98	18	32
			8	desna/right	105.26	1.04	1.8	76.51		
-	R199	lijeva left	11	lijeva/left	230.27	2.58	5.25	75.23	18	32
			12	desna/right	247.71	3.37	4.19	71.61		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear		
					Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
Z-01-02	R111	lijeva left	13	lijeva/left	251.13	0.98	6.37
			11	desna/right	367.32	3.29	9.08
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					116.19	2.31	2.71
-	R197	desna right	6	lijeva/left	405.39	4.97	7.3
			7	desna/right	488.22	6.1	6.32
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-82.83	-1.13	0.98
-	R198	desna right	10	lijeva/left	80.05	0.98	1.95
			8	desna/right	105.26	1.04	1.8
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-25.21	-0.06	0.15
-	R199	lijeva left	11	lijeva/left	230.27	2.58	5.25
			12	desna/right	247.71	3.37	4.19
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					17.44	0.79	-1.06

Prilog 6.6.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 6

Istrošenje poprečnog presjeka tračnica u krivini R111

Lokacija 6: Okretnica Ljubljanica, remiza Ljubljanica (ulaz i izlaz u remizu)

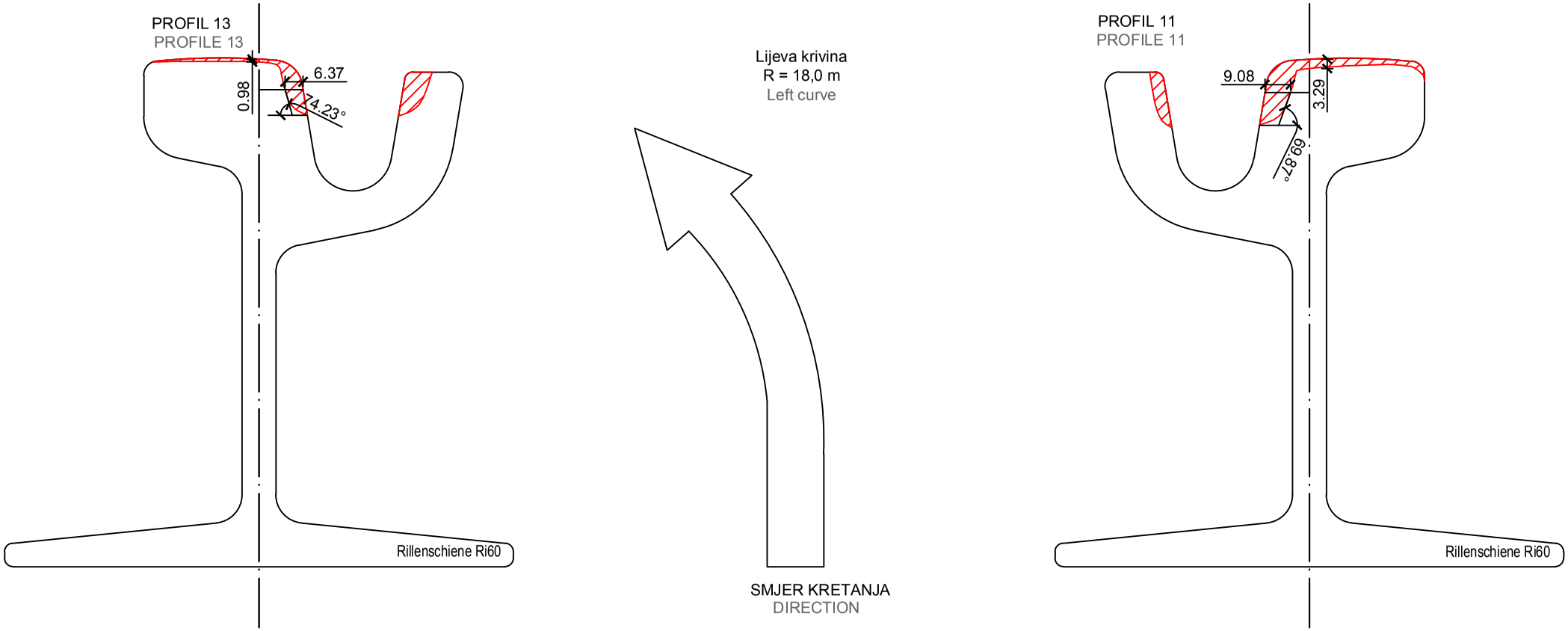
MJ: 1:2

Annex 6.6.1.1. Cross section wear in curves at Location 6

Cross section wear in curve R111

Location 6: Terminus and shunting yard Ljubljanica

Scale: 1:2



Prilog 6.6.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 6

Istrošenje poprečnog presjeka tračnica u krivini R197

Lokacija 6: Okretnica Ljubljanica, remiza Ljubljanica (ulaz i izlaz u remizu)

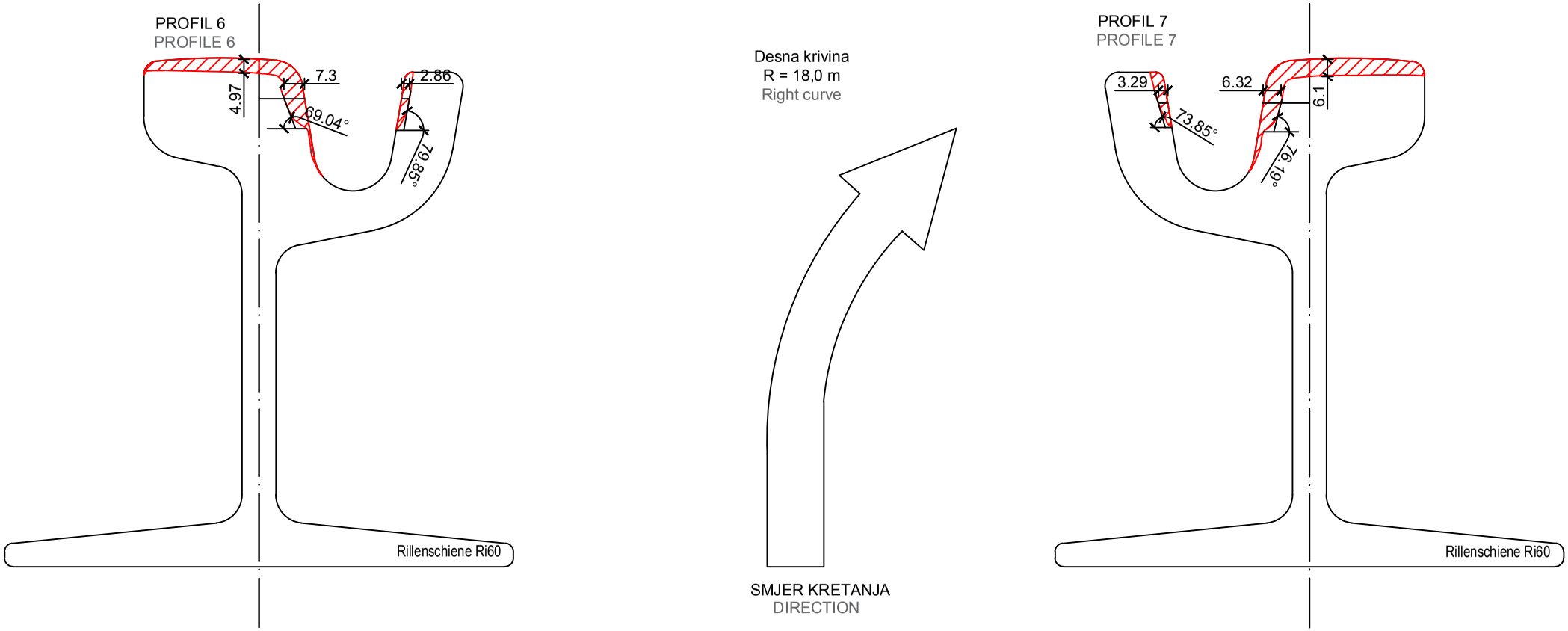
MJ: 1:2

Annex 6.6.1.1. Cross section wear in curves at Location 6

Cross section wear in curve R197

Location 6: Terminus and shunting yard Ljubljanica

Scale: 1:2



Prilog 6.6.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 6

Istrošenje poprečnog presjeka tračnica u krivini R198

Lokacija 6: Okretnica Ljubljanica, remiza Ljubljanica (ulaz i izlaz u remizu)

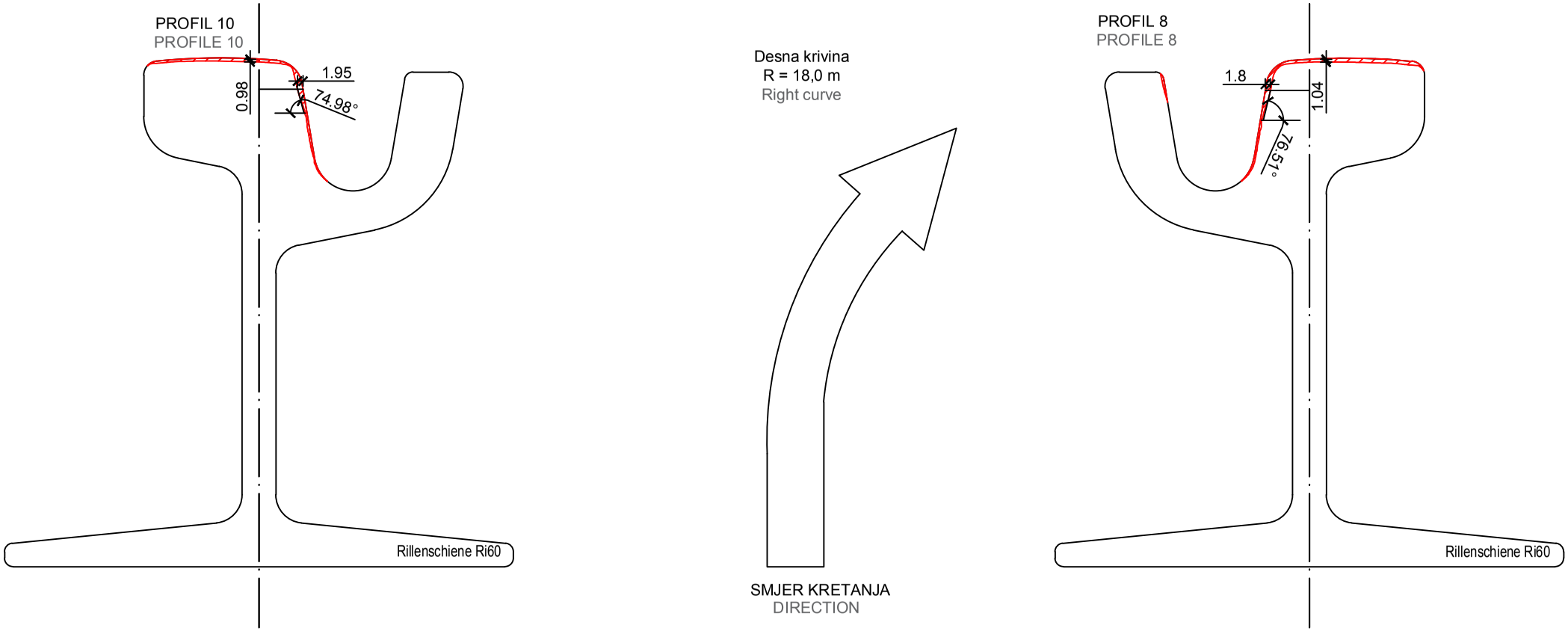
MJ: 1:2

Annex 6.6.1.1. Cross section wear in curves at Location 6

Cross section wear in curve R198

Location 6: Terminus and shunting yard Ljubljanica

Scale: 1:2



Prilog 6.6.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 6

Istrošenje poprečnog presjeka tračnica u krivini R199

Lokacija 6: Okretnica Ljubljanica, remiza Ljubljanica (ulaz i izlaz u remizu)

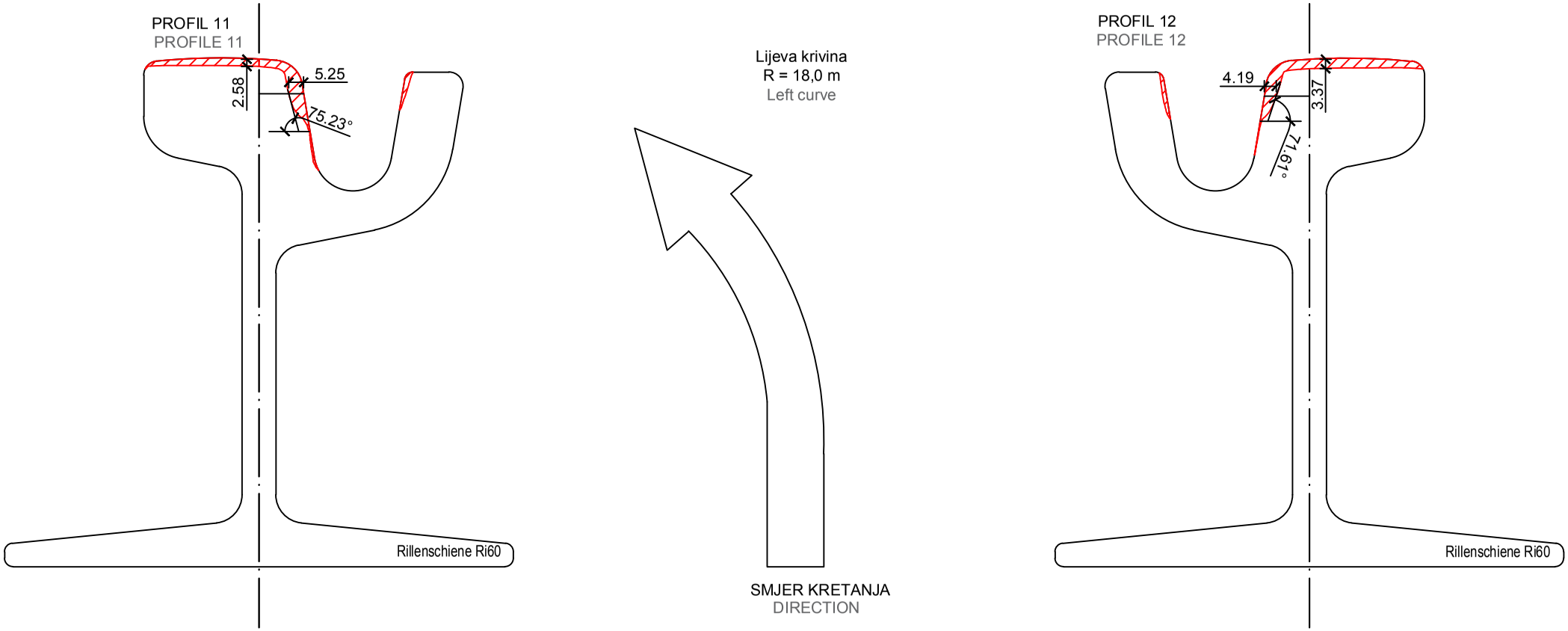
MJ: 1:2

Annex 6.6.1.1. Cross section wear in curves at Location 6

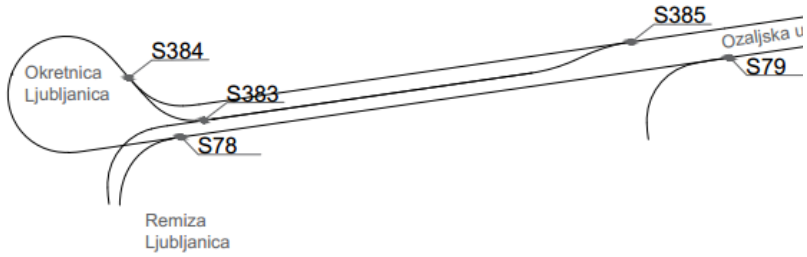
Cross section wear in curve R199

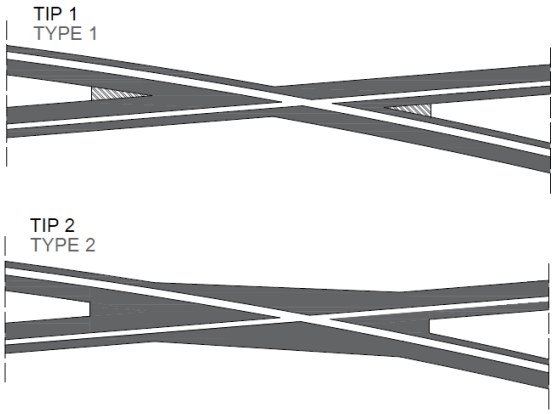
Location 6: Terminus and shunting yard Ljubljanica

Scale: 1:2



Prilog 6.6.2. Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 6
Lokacija 6: Okretnica Ljubljanica, remiza Ljubljanica (ulaz i izlaz u remizu)
Annex 6.6.2. Results of cross section wear in turnouts at Location 6
Location 6: Terminus and shunting yard Ljubljanica





Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
-	S78	1	5L	13	22.83	9.83	24.00	25.95	1.95	32
			5D	13	19.78	6.78	35.55	35.92	0.37	
			6	12	22.09	10.09		32.36		
			7L	13	20.52	7.52	35.55	40.23	4.68	
			7D	13	24.22	11.22	24.00	24.00	0.00	
-	S383	1	13L	13	21.39	8.39	35.59	39.58	3.99	7
			13D	13	22.01	9.01	24.00	26.82	2.82	
			15	12	21.41	9.41	0.0	47.17		
			16L	13	21.08	8.08	24.00	22.99	-1.01	
			16D	13	20.56	7.56	35.83	41.85	6.02	
Z-01-03 Z-01-01	S384	1	17L	13	17.89	4.89	24.00	28.45	4.45	7
			17D	13	18.87	5.87	35.67	44.95	9.28	
			18	12	19.15	7.15		57.47		
			19L	13	17.72	4.72	35.67	49.92	14.25	
			19D	13	17.09	4.09	24.00	29.42	5.42	
D-06-05 D-06-06	S385	1	20L	13	23.68	10.68	30.56	33.11	2.55	15
			20D	13	22.11	9.11	24.00	28.19	4.19	
			21	12	22.34	10.34		45.31		
			23L	13	22.43	9.43	24.00	23.00	-1.00	
			23D	13	23.69	10.69	30.56	30.38	-0.18	
-	S79	2	25L	13	18.16	5.16	24.00	24.04	0.04	32
			25D	13	14.54	1.54	35.54	37.51	1.97	
			26	12	18.79	6.79		38.72		
			27L	13	16.64	3.64	35.54	37.89	2.35	
			27D	13	19.92	6.92	24.00	25.92	1.92	

Prilog 6.6.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 6

Istrošenje poprečnog presjeka srcišta skretnice S78

Lokacija 6: Okretnica Ljubljanica, remiza Ljubljanica (ulaz i izlaz u remizu)

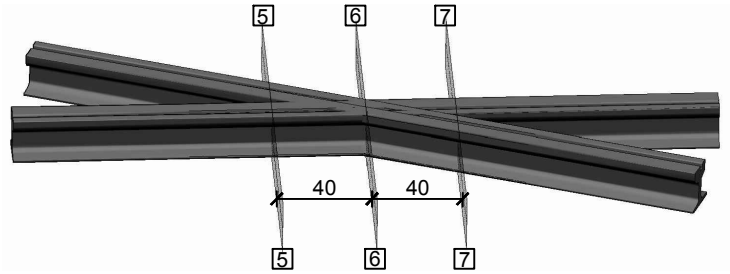
MJ: 1:2

Annex 6.6.2.1. Cross section wear in turnouts at Location 6

Cross section wear in turnout S78

Location 6: Terminus and shunting yard Ljubljanica

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

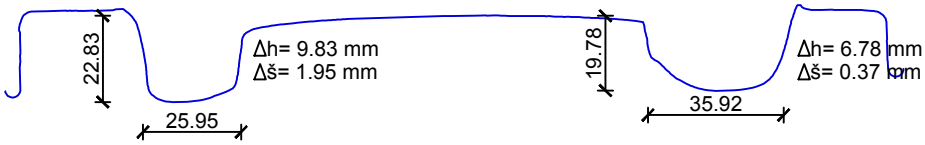
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Tratinska → Ljubljanica

Direction: Tratinska → Ljubljanica

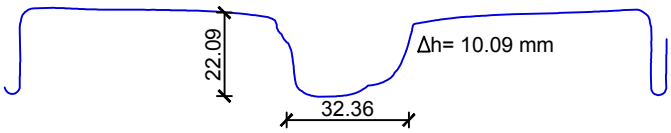
PROFIL 5

PROFILE 5



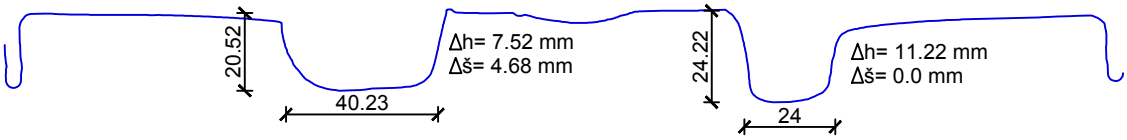
PROFIL 6

PROFILE 6



PROFIL 7

PROFILE 7



Prilog 6.6.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 6

Istrošenje poprečnog presjeka srcišta skretnice S79

Lokacija 6: Okretnica Ljubljanica, remiza Ljubljanica (ulaz i izlaz u remizu)

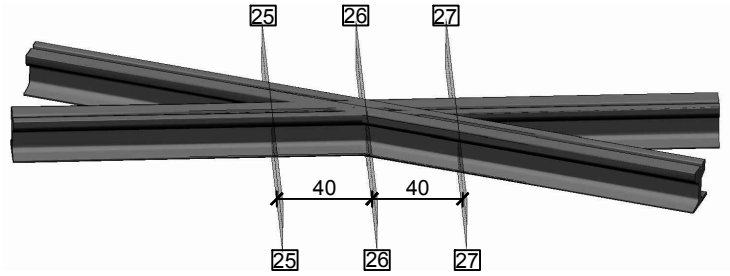
MJ: 1:2

Annex 6.6.2.1. Cross section wear in turnouts at Location 6

Cross section wear in turnout S79

Location 6: Terminus and shunting yard Ljubljanica

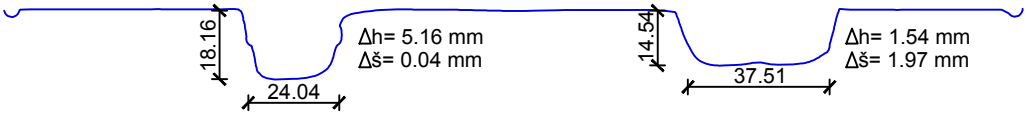
Scale: 1:2



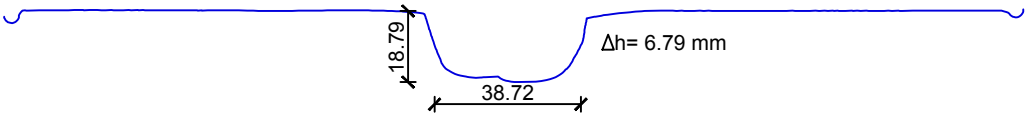
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Tratinska ⟶ Ljubljanica
Direction: Tratinska ⟶ Ljubljanica

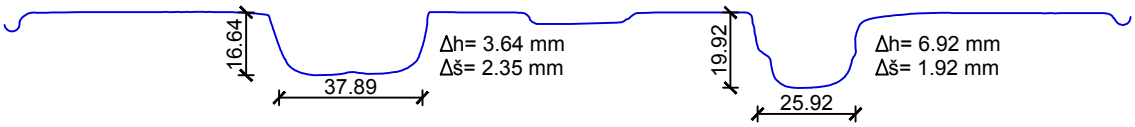
PROFIL 25
PROFILE 25



PROFIL 26
PROFILE 26



PROFIL 27
PROFILE 27



Prilog 6.6.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 6

Istrošenje poprečnog presjeka srcišta skretnice S383

Lokacija 6: Okretnica Ljubljanica, remiza Ljubljanica (ulaz i izlaz u remizu)

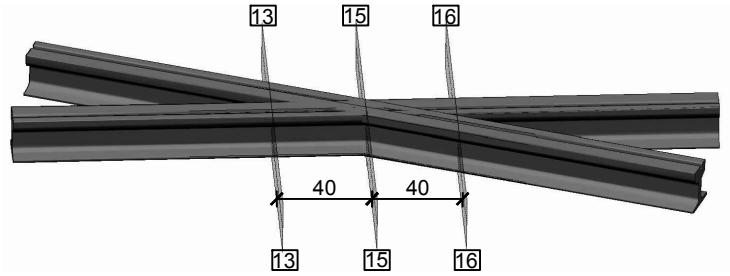
MJ: 1:2

Annex 6.6.2.1. Cross section wear in turnouts at Location 6

Cross section wear in turnout S383

Location 6: Terminus and shunting yard Ljubljanica

Scale: 1:2



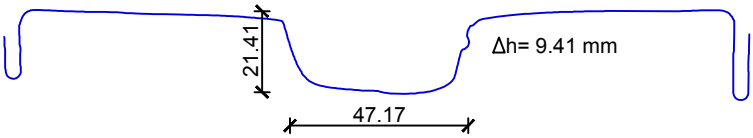
Δh - visinsko istrošenje
Δš - bočno istrošenje

Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Tratinska → Ljubljanica
Direction: Tratinska → Ljubljanica

PROFIL 13
PROFILE 13

PROFIL 15
PROFILE 15



PROFIL 16
PROFILE 16

Prilog 6.6.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 6

Istrošenje poprečnog presjeka srcišta skretnice S384

Lokacija 6: Okretnica Ljubljanica, remiza Ljubljanica (ulaz i izlaz u remizu)

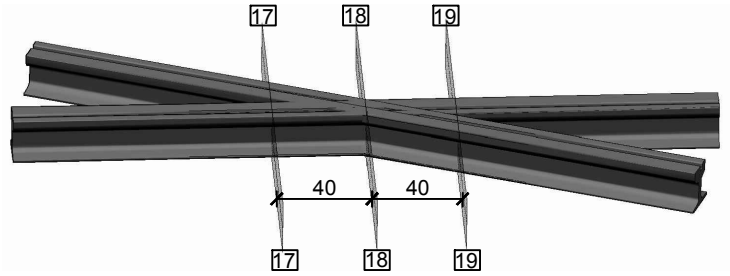
MJ: 1:2

Annex 6.6.2.1. Cross section wear in turnouts at Location 6

Cross section wear in turnout S384

Location 6: Terminus and shunting yard Ljubljanica

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

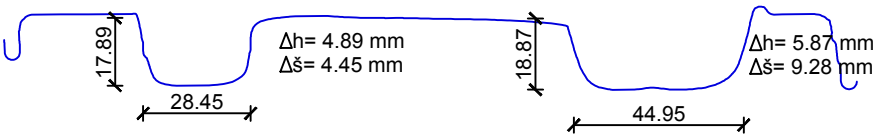
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: Tratinska ⟶ Ljubljanica

Direction: Tratinska ⟶ Ljubljanica

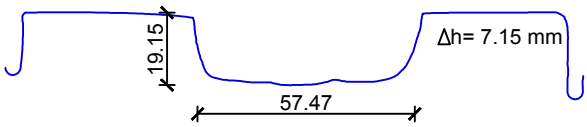
PROFIL 17

PROFILE 17



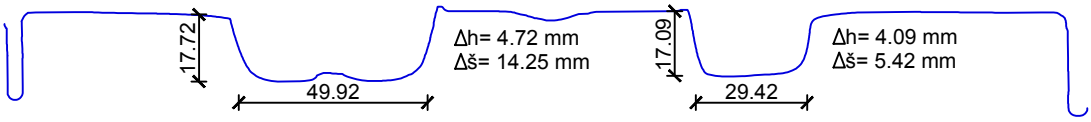
PROFIL 18

PROFILE 18



PROFIL 19

PROFILE 19



Prilog 6.6.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 6

Istrošenje poprečnog presjeka srcišta skretnice S385

Lokacija 6: Okretnica Ljubljanica, remiza Ljubljanica (ulaz i izlaz u remizu)

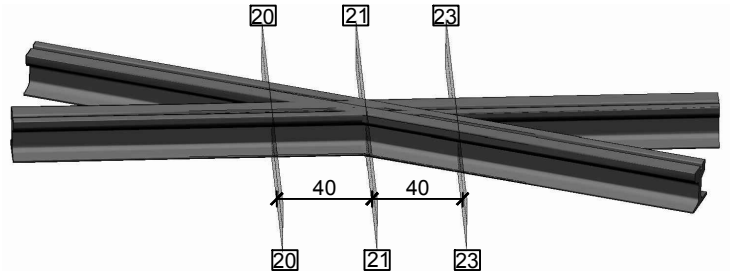
MJ: 1:2

Annex 6.6.2.1. Cross section wear in turnouts at Location 6

Cross section wear in turnout S385

Location 6: Terminus and shunting yard Ljubljanica

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

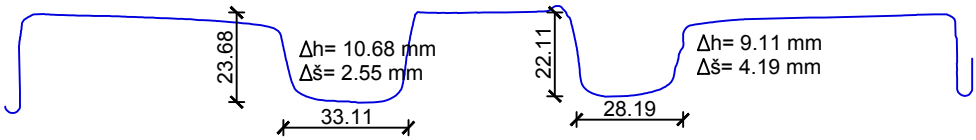
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Tratinska ⟶ Ljubljanica

Direction: Tratinska ⟶ Ljubljanica

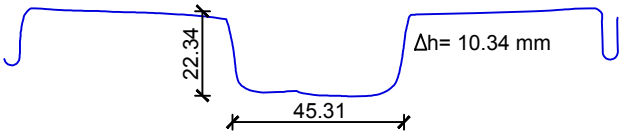
PROFIL 20

PROFILE 20



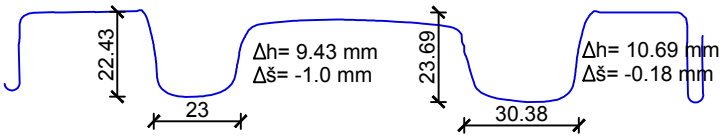
PROFIL 21

PROFILE 21

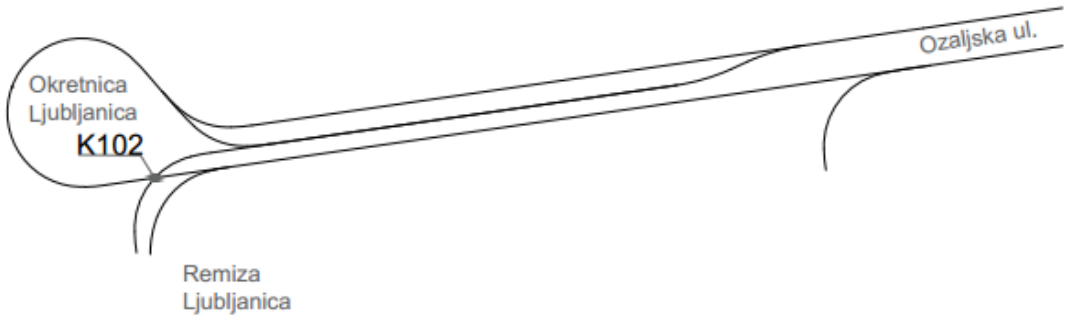


PROFIL 23

PROFILE 23



Prilog 6.6.3. Rezultati istrošenja profila tračnica u križalištima na Lokaciji 6
Lokacija 6: Okretnica Ljubljanica, remiza Ljubljanica (ulaz i izlaz u remizu
Annex 6.6.3. Results of cross section wear in track crossing at Location 6
Location 6: Terminus and shunting yard Ljubljanica



Dionice Sections	**Oznaka križališta** Track crossing mark	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
-	K102	8	12	18,73	6.73	24.00	24.22	0.22	32
		9	12	13,49	1.49	24.00	22.74	-1.26	
		10	12	20,75	8.75	34.00	41.56	7.56	
		11	12	23,07	11.07	34.00	40.59	6.59	

Prilog 6.6.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 6

Istrošenje poprečnog presjeka tračnica u križalištu K102

Lokacija 6: Okretnica Ljubljanica, remiza Ljubljanica (ulaz i izlaz u remizu)

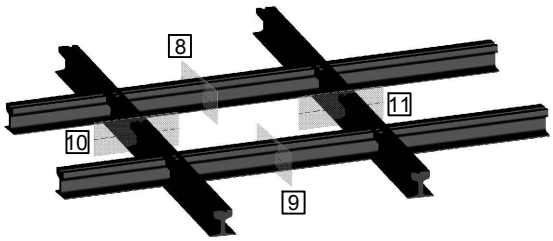
MJ: 1:2

Annex 6.6.3.1. Cross section wear in track crossings at Location 6

Cross section wear in track crossing K102

Location 6: Terminus and shunting yard Ljubljanica

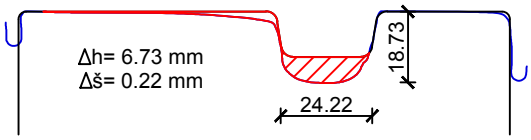
Scale: 1:2



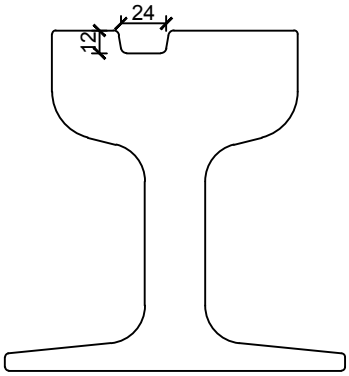
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Tratinska ⟶ Ljubljanica
Direction: Tratinska ⟶ Ljubljanica

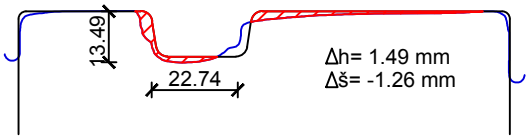
PROFIL 8
PROFILE 8



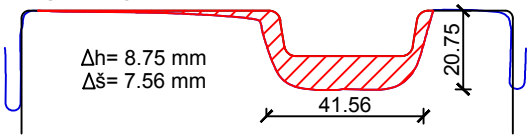
PROFIL 8, 9 PROFILE 8, 9
R = 0 m



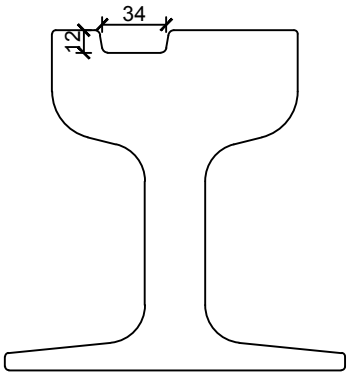
PROFIL 9
PROFILE 9



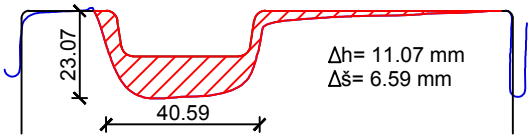
PROFIL 10
PROFILE 10



PROFIL 10, 11 PROFILE 10, 11
R = 18 m

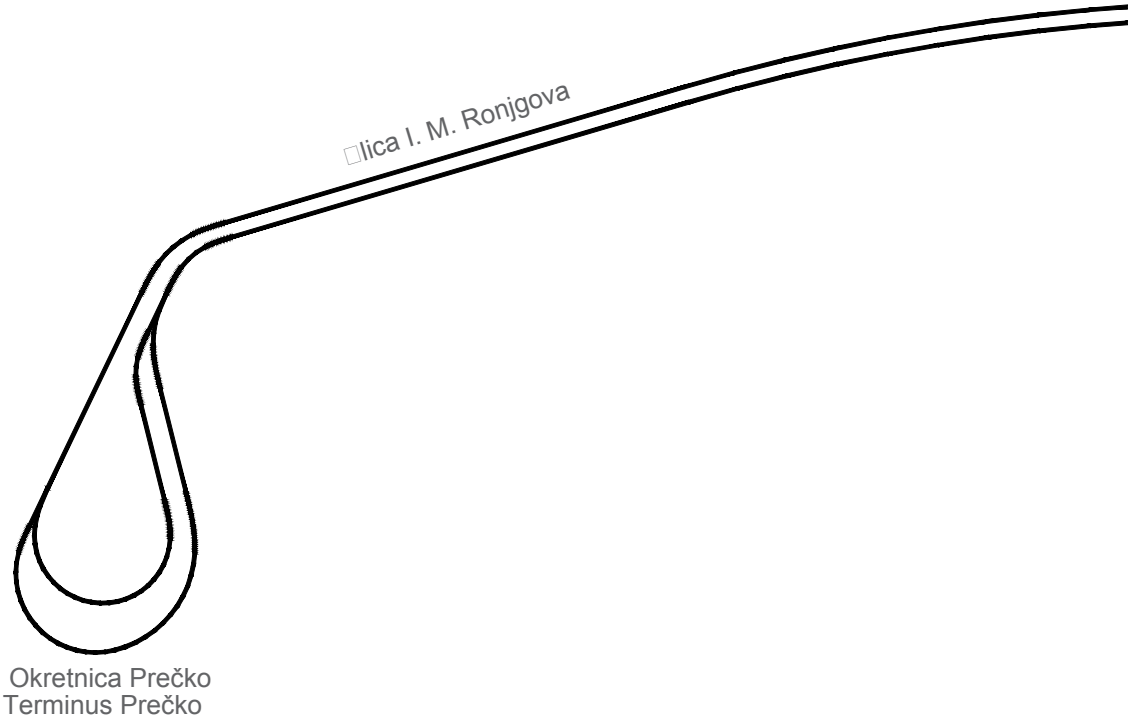


PROFIL 11
PROFILE 11



Lokacija 7 (L7)
Okretnica Prečko

Location 7 (L7)
Terminus Prečko



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija ra voja tramvajskog prometa rada agre a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition

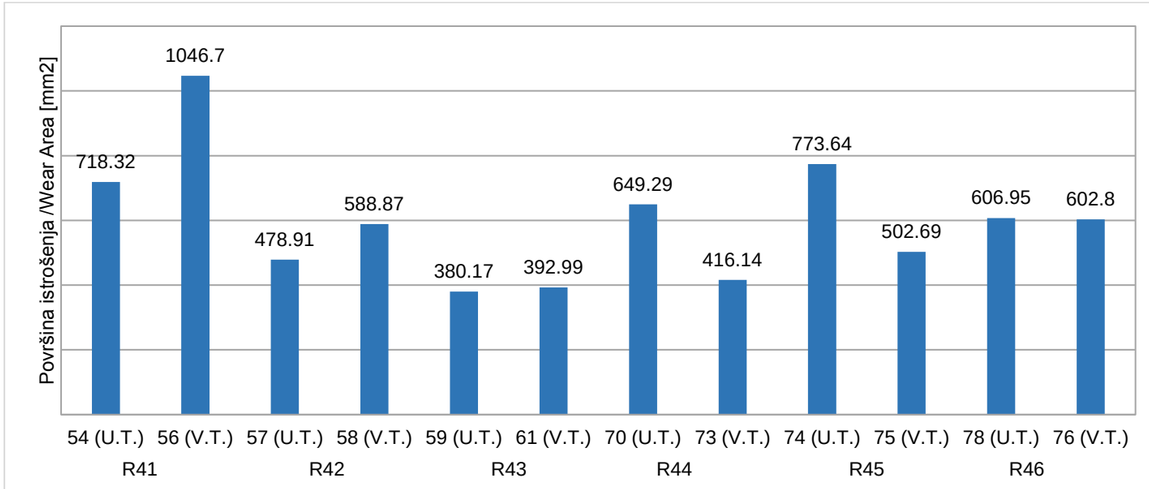
SADRŽAJ PRILOGA:
ANNEX:

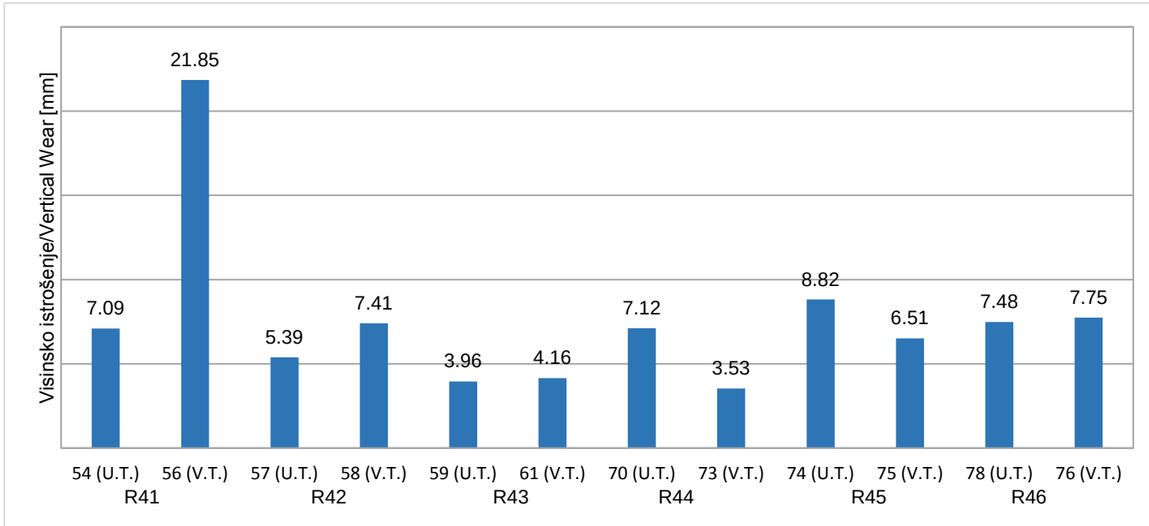
Istrošenje poprečnih presjeka tračnica u krivinama i skretnicama na Lokaciji 7

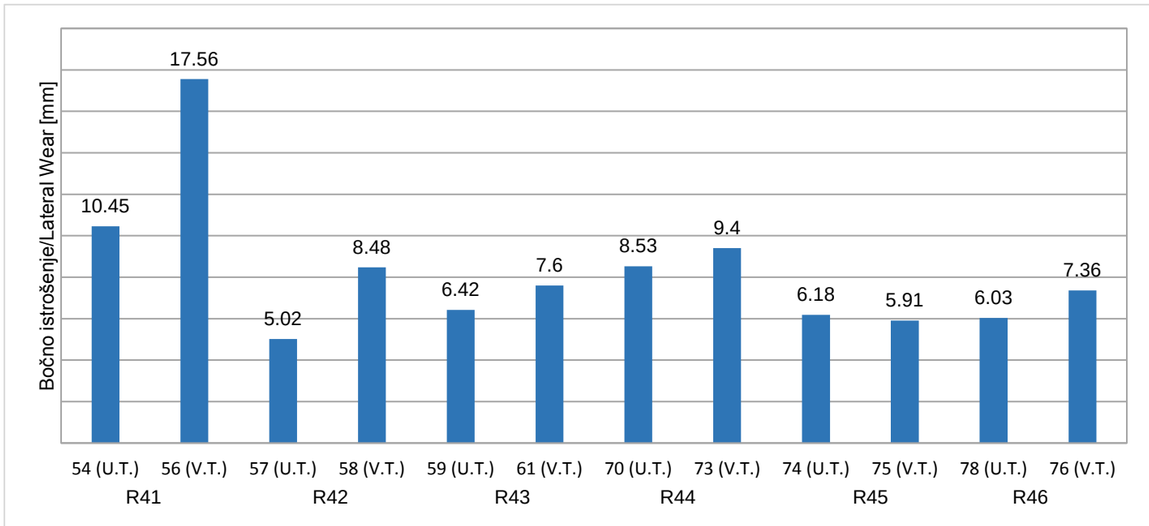
Rail cross section wear in curves and turnouts at Location 7

MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.7

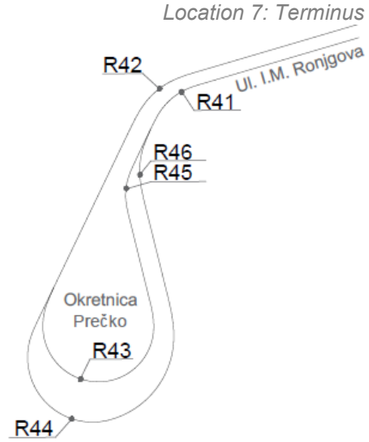
Prilog 6.7.1. Rezultati istrošenja profila tračnica u krivinama na Lokaciji 7
Lokacija 7: Okretnica Prečko
Annex 6.7.1. Results of cross section wear in curves at Location 7
Location 7: Terminus Prečko







U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve



Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [ ]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
D-01-02	R41	desna right	56	lijeva/left	1046.7	21.85	17.56	69.36	19	18
			54	desna/right	718.32	7.09	10.45	77.49		
D-01-01	R42	lijeva left	57	lijeva/left	478.91	5.39	5.02	80.59	25	18
			58	desna/right	588.87	7.41	8.48	71.65		
Z-02-03	R43	lijeva left	59	lijeva/left	380.17	3.96	6.42	73.99	18	18
			61	desna/right	392.99	4.16	7.6	68.69		
Z-02-02	R44	lijeva left	70	lijeva/left	649.29	7.12	8.53	76.17	21	18
			73	desna/right	416.14	3.53	9.4	69.73		
Z-02-03	R45	desna right	75	lijeva/left	502.69	6.51	5.91	74.1	18	18
			74	desna/right	773.64	8.82	6.18	77.36		
Z-02-02	R46	desna right	76	lijeva/left	602.8	7.75	7.36	69.98	25	18
			78	desna/right	606.95	7.48	6.03	78.04		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
D-01-02	R41	desna right	56	lijeva/left	1046.7	21.85	17.56
			54	desna/right	718.32	7.09	10.45
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					328.38	14.76	7.11
D-01-01	R42	lijeva left	57	lijeva/left	478.91	5.39	5.02
			58	desna/right	588.87	7.41	8.48
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					109.96	2.02	3.46
Z-02-03	R43	lijeva left	59	lijeva/left	380.17	3.96	6.42
			61	desna/right	392.99	4.16	7.6
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					12.82	0.2	1.18
Z-02-02	R44	lijeva left	70	lijeva/left	649.29	7.12	8.53
			73	desna/right	416.14	3.53	9.4
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-233.15	-3.59	0.87
Z-02-03	R45	desna right	75	lijeva/left	502.69	6.51	5.91
			74	desna/right	773.64	8.82	6.18
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					270.95	2.31	0.27
Z-02-02	R46	desna right	76	lijeva/left	602.8	7.75	7.36
			78	desna/right	606.95	7.48	6.03
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-4.15	0.27	1.33

Prilog 6.7.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 7

Istrošenje poprečnog presjeka tračnica u krivini R41

Lokacija 7: Okretnica Prečko

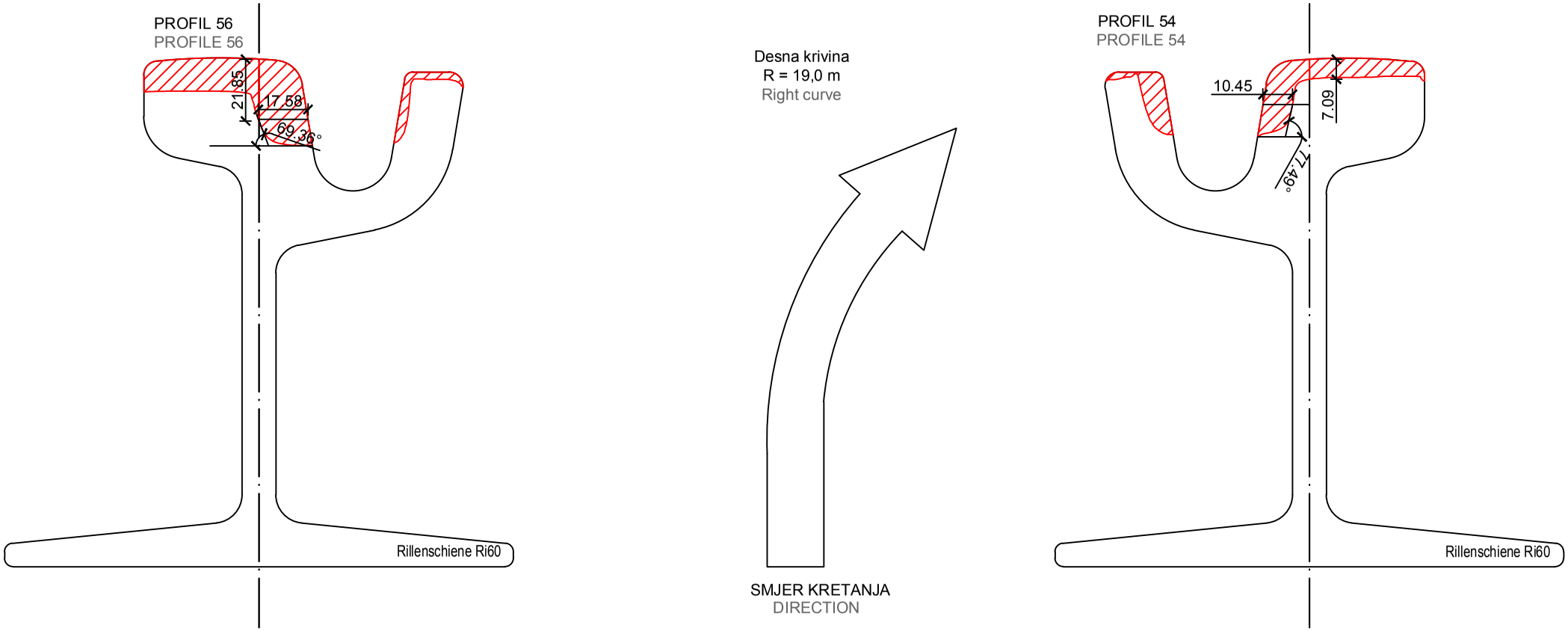
MJ: 1:2

Annex 6.7.1.1. Cross section wear in curves at Location 7

Cross section wear in curve R41

Location 7: Terminus Prečko

Scale: 1:2



Prilog 6.7.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 7

Istrošenje poprečnog presjeka tračnica u krivini R42

Lokacija 7: Okretnica Prečko

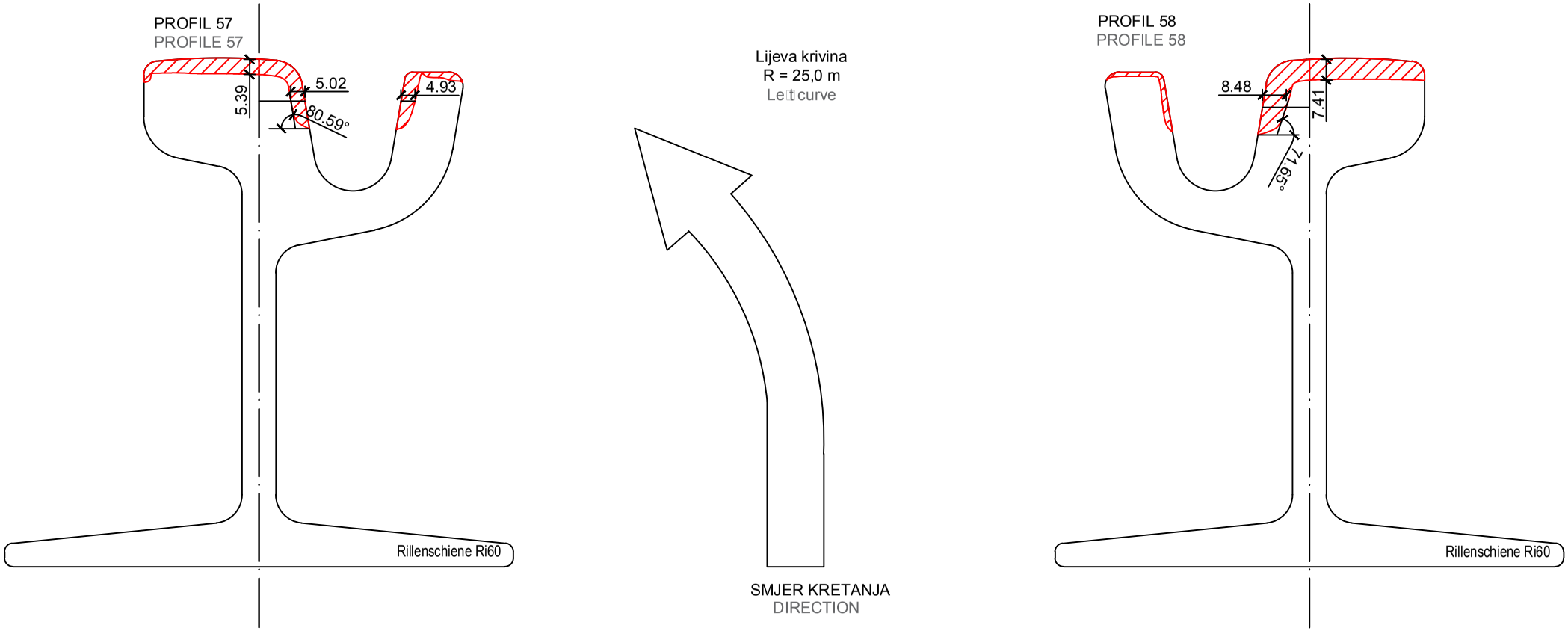
MJ: 1:2

Annex 6.7.1.1. Cross section wear in curves at Location 7

Cross section wear in curve R42

Location 7: Terminus Prečko

Scale: 1:2



Prilog 6.7.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 7

Istrošenje poprečnog presjeka tračnica u krivini R43

Lokacija 7: Okretnica Prečko

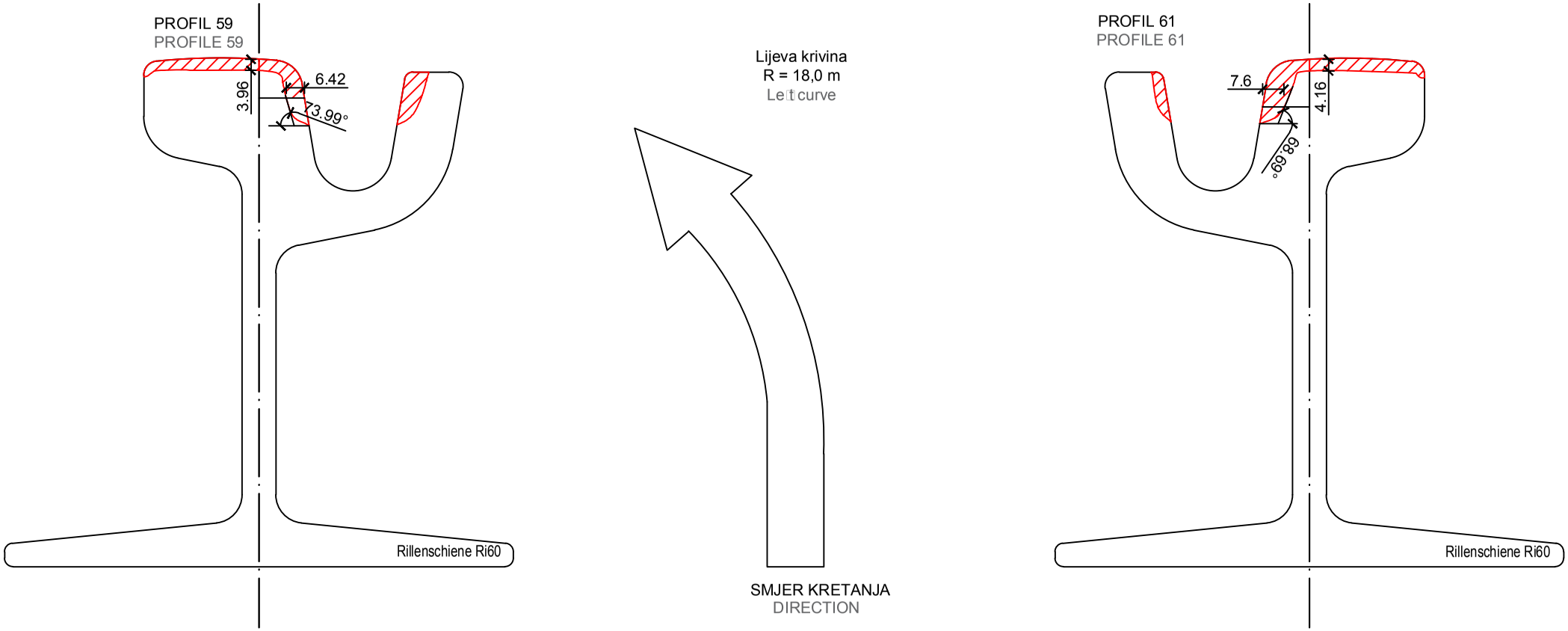
MJ: 1:2

Annex 6.7.1.1. Cross section wear in curves at Location 7

Cross section wear in curve R43

Location 7: Terminus Prečko

Scale: 1:2



Prilog 6.7.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 7

Istrošenje poprečnog presjeka tračnica u krivini R44

Lokacija 7: Okretnica Prečko

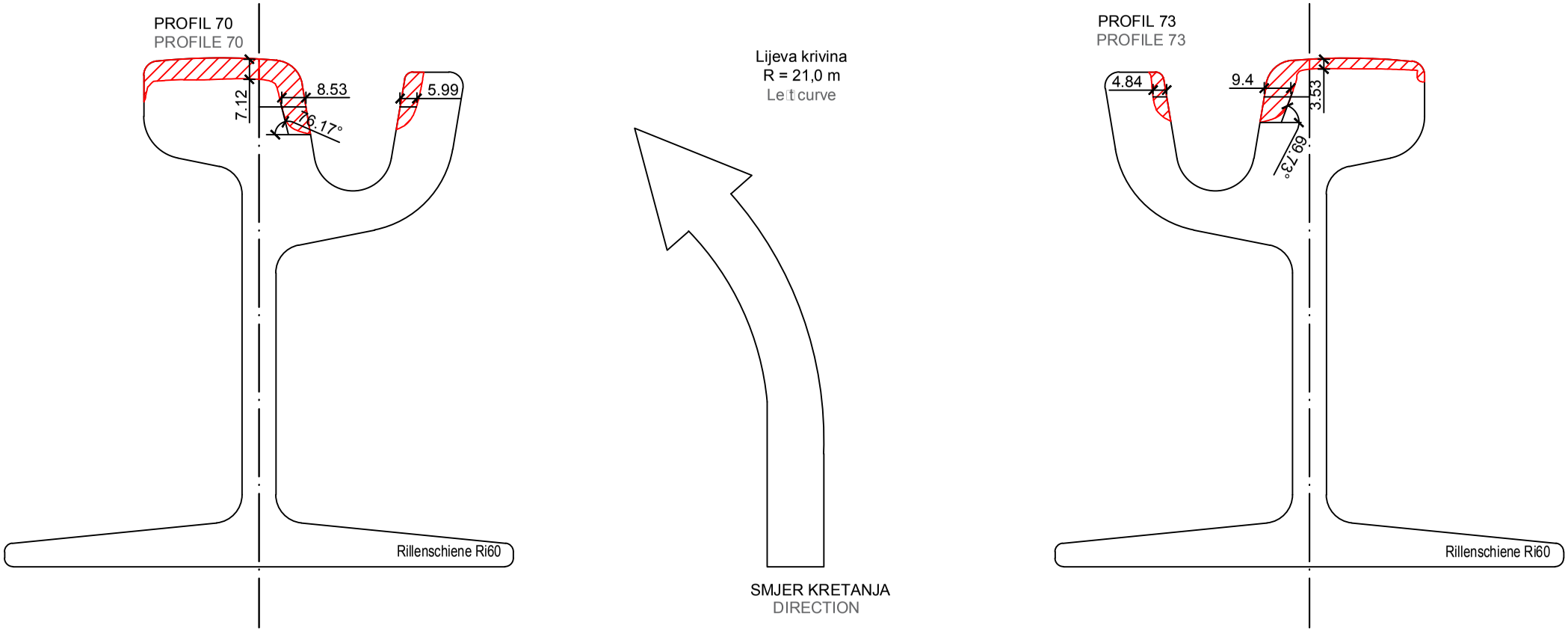
MJ: 1:2

Annex 6.7.1.1. Cross section wear in curves at Location 7

Cross section wear in curve R44

Location 7: Terminus Prečko

Scale: 1:2



Prilog 6.7.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 7

Istrošenje poprečnog presjeka tračnica u krivini R45

Lokacija 7: Okretnica Prečko

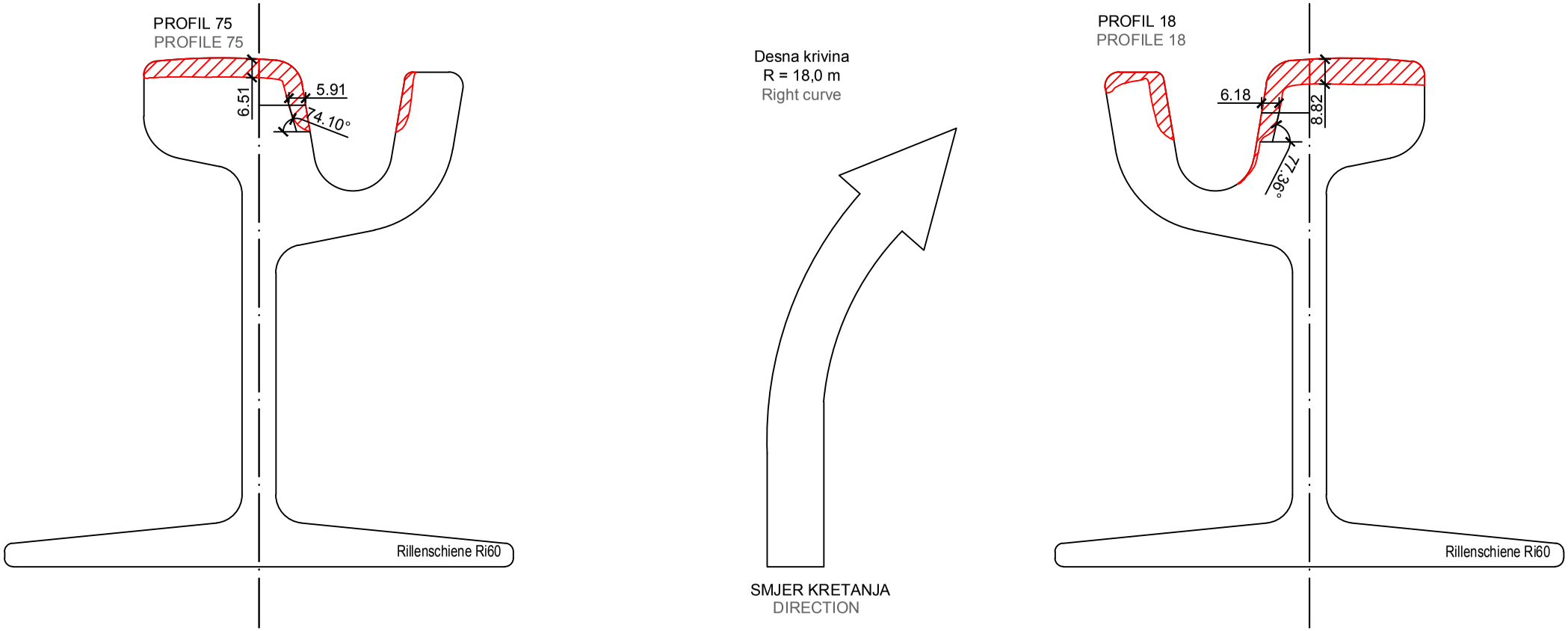
MJ: 1:2

Annex 6.7.1.1. Cross section wear in curves at Location 7

Cross section wear in curve R45

Location 7: Terminus Prečko

Scale: 1:2



Prilog 6.7.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 7

Istrošenje poprečnog presjeka tračnica u krivini R46

Lokacija 7: Okretnica Prečko

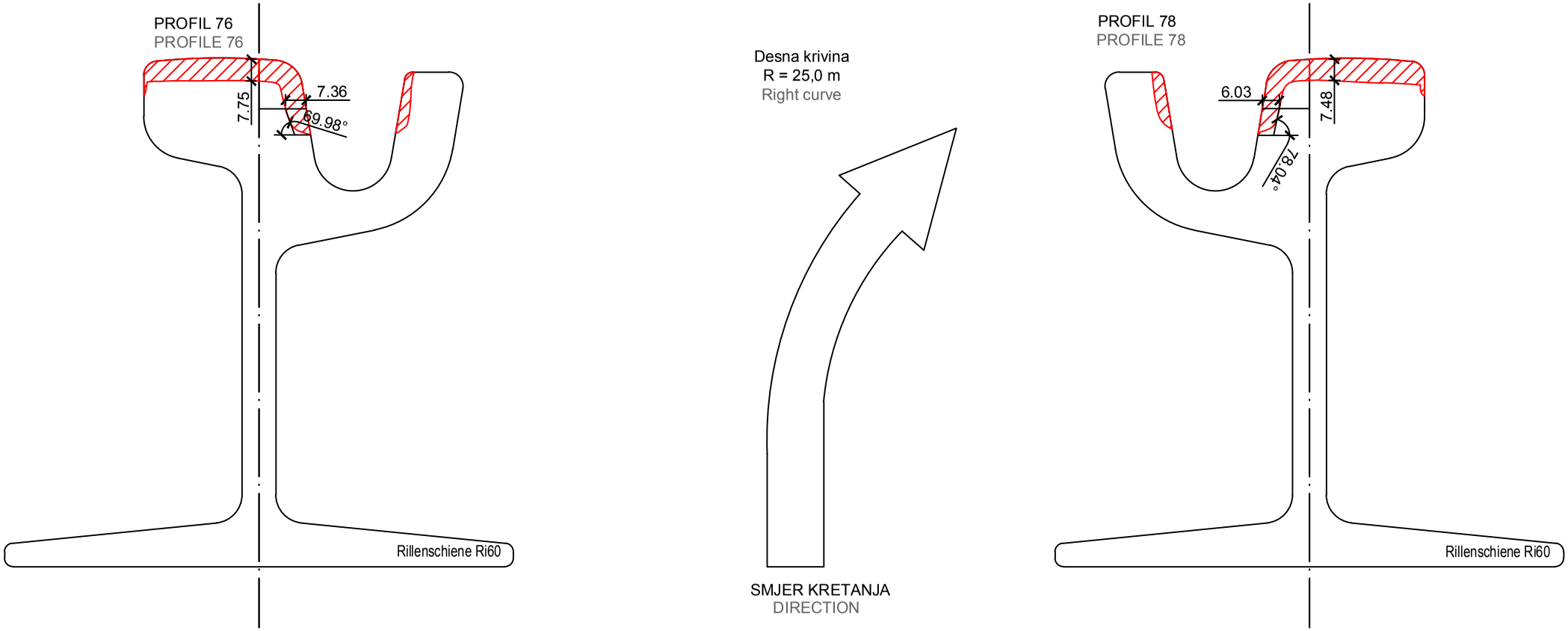
MJ: 1:2

Annex 6.7.1.1. Cross section wear in curves at Location 7

Cross section wear in curve R46

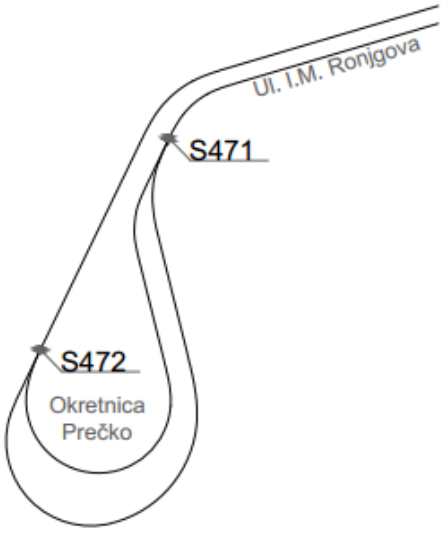
Location 7: Terminus Prečko

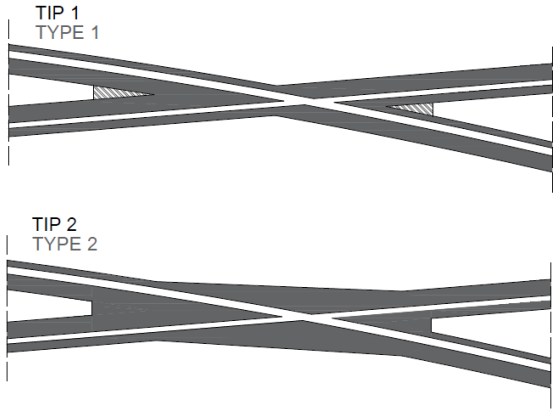
Scale: 1:2



Prilog 6.7.2. Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 7
Lokacija 7: Okretnica Prečko

Annex 6.7.2. Results of cross section wear in turnouts at Location 7
Location 7: Terminus Prečko

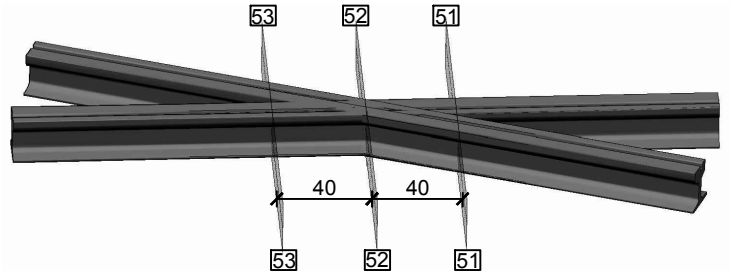




Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
Z-02-03 Z-02-02	S471	1	51L	13	26.16	13.16	34.00	41.62	7.62	18
			51D	13	25.96	12.96	24.82	28.79	3.97	
			52	12	22.48	10.48		40.72		
			53L	13	20.95	7.95	24.82	26.96	2.14	
			53D	13	20.71	7.71	34.00	42.90	8.90	
Z-02-02 Z-02-03	S472	2	66L	13	12.52	-0.48	34.00	34.37	0.37	18
			66D	13	12.72	-0.28	24.88	25.20	0.32	
			68	12	12.85	0.85		43.09		
			69L	13	15.72	2.72	24.88	28.34	3.46	
			69D	13	15.29	2.29	34.00	35.54	1.54	

Prilog 6.7.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 7
Istrošenje poprečnog presjeka srcišta skretnice S471
Lokacija 7: Okretnica Prečko
MJ: 1:2

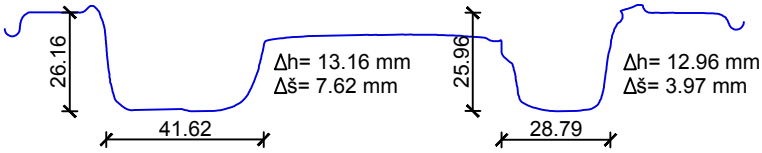
Annex 6.7.2.1. Cross section wear in turnouts at Location 7
Cross section wear in turnout S471
Location 7: Terminus Prečko
Scale: 1:2



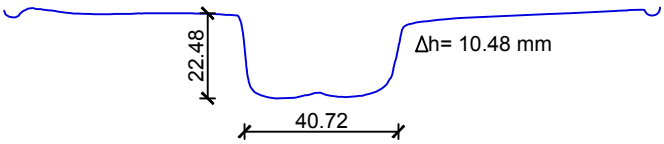
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu
Direction: through terminus

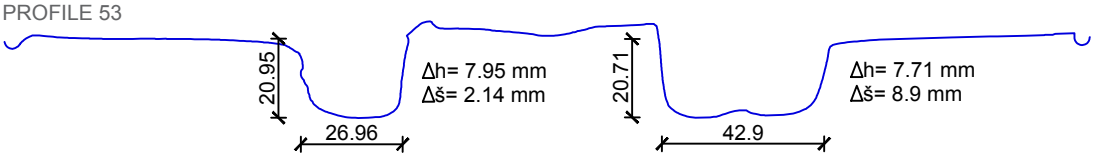
PROFIL 51
PROFILE 51



PROFIL 52
PROFILE 52

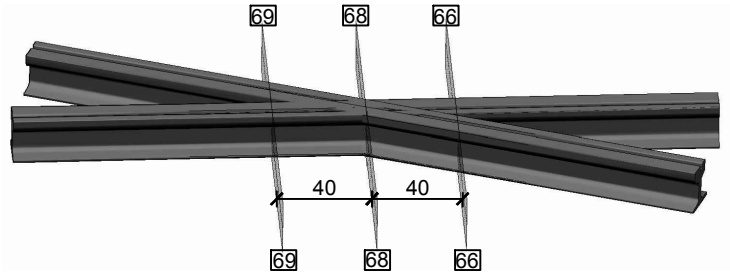


PROFIL 53
PROFILE 53



Prilog 6.7.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 7
Istrošenje poprečnog presjeka srcišta skretnice S472
Lokacija 7: Okretnica Prečko
MJ: 1:2

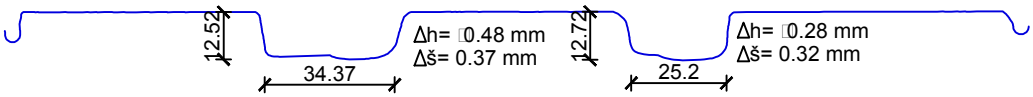
Annex 6.7.2.1. Cross section wear in turnouts at Location 7
Cross section wear in turnout S472
Location 7: Terminus Prečko
Scale: 1:2



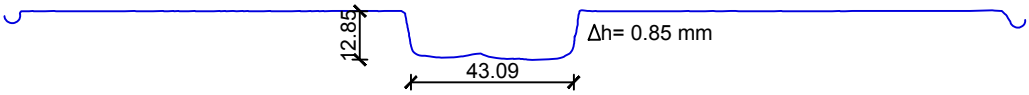
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu
Direction: through terminus

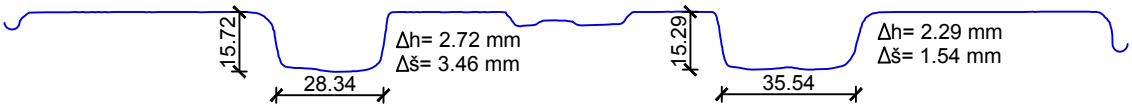
PROFIL 66
PROFILE 66



PROFIL 68
PROFILE 68

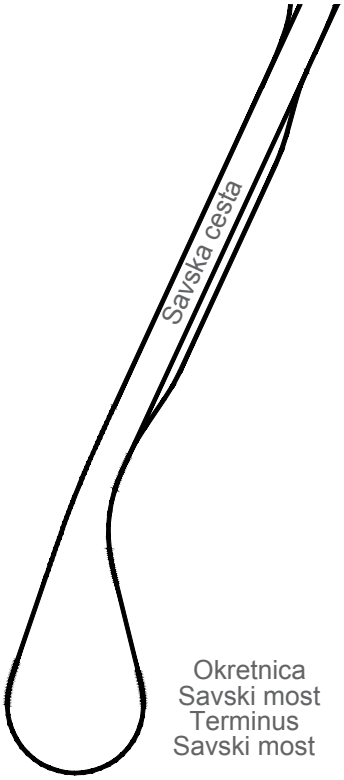


PROFIL 69
PROFILE 69



Lokacija 8 (L8)
Okretnica Savski most

Location 8 (L8)
Terminus Savski most



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija ra□voja tramvajskog prometa □rada □agre□a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition

SADRŽAJ PRILOGA:
ANNEX:

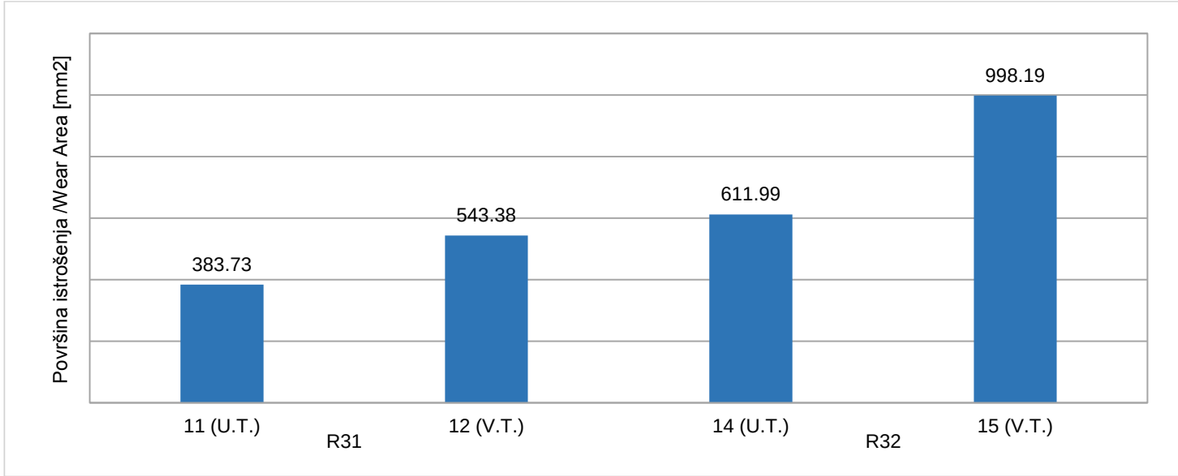
Istrošenje poprečnih presjeka tračnica u krivinama i skretnicama na Lokaciji 8

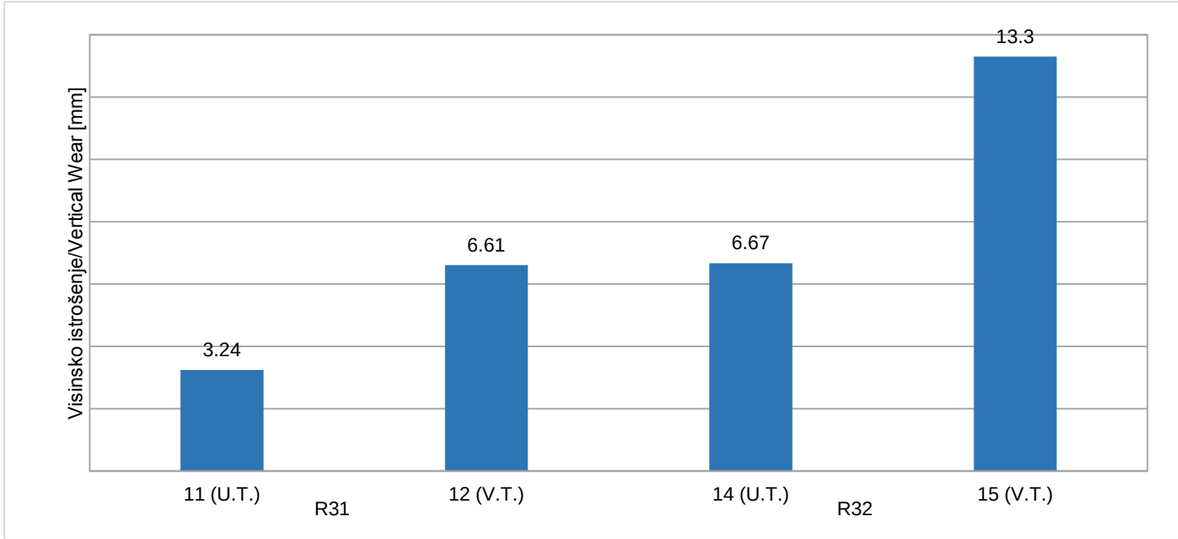
Rail cross section wear in curves and turnouts at Location 8

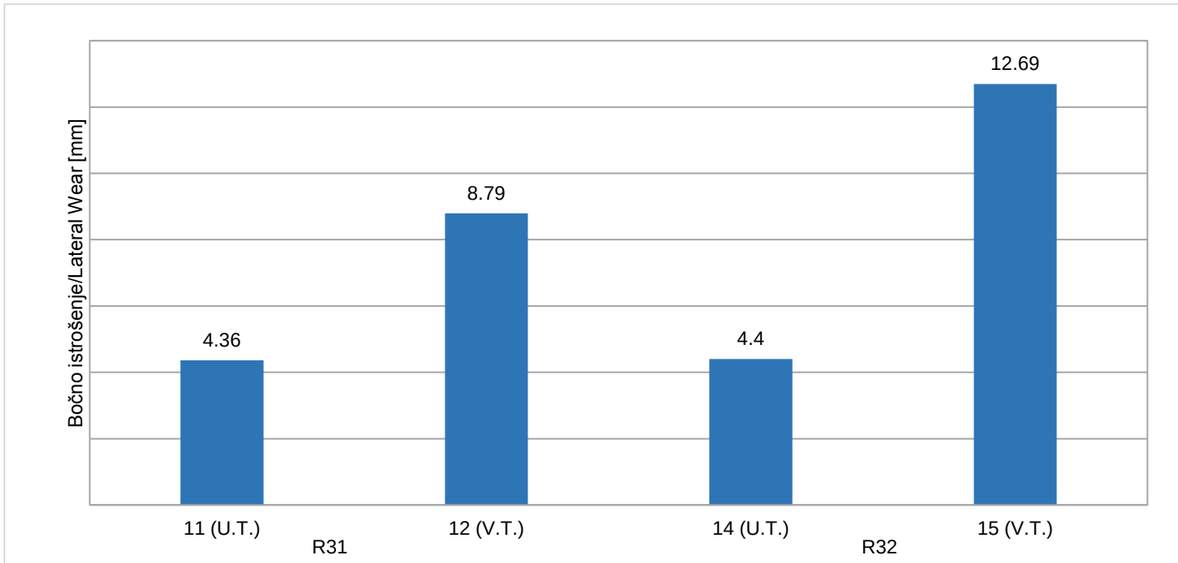
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.8

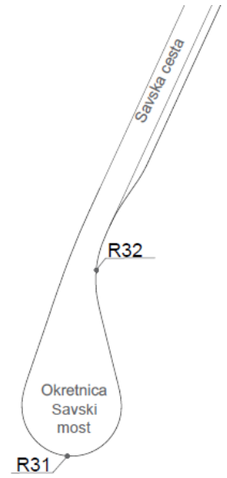
Prilog 6.8.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 8**
Lokacija 8: Okretnica Savski most

Annex 6.8.1. **Results of cross section wear in curves at Location 8**
Location 8: Terminus Savski most









Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [ ]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
Z-04-01	R31	lijeva left	11	lijeva/left	383.73	3.24	4.36	74.96	18	11
			12	desna/right	543.38	6.61	8.79	70.87		
Z-04-1	R32	desna right	15	lijeva/left	998.19	13.3	12.69	73.66	37	11
			14	desna/right	611.99	6.67	4.4	80.63		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
Z-04-01	R31	lijeva left	11	lijeva/left	383.73	3.24	4.36
			12	desna/right	543.38	6.61	8.79
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					159.65	3.37	4.43
Z-04-1	R32	desna right	15	lijeva/left	998.19	13.3	12.69
			14	desna/right	611.99	6.67	4.4
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					386.2	6.63	8.29

U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve

Prilog 6.8.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 8

Istrošenje poprečnog presjeka tračnica u krivini R31

Lokacija 8: Okretnica Savski most

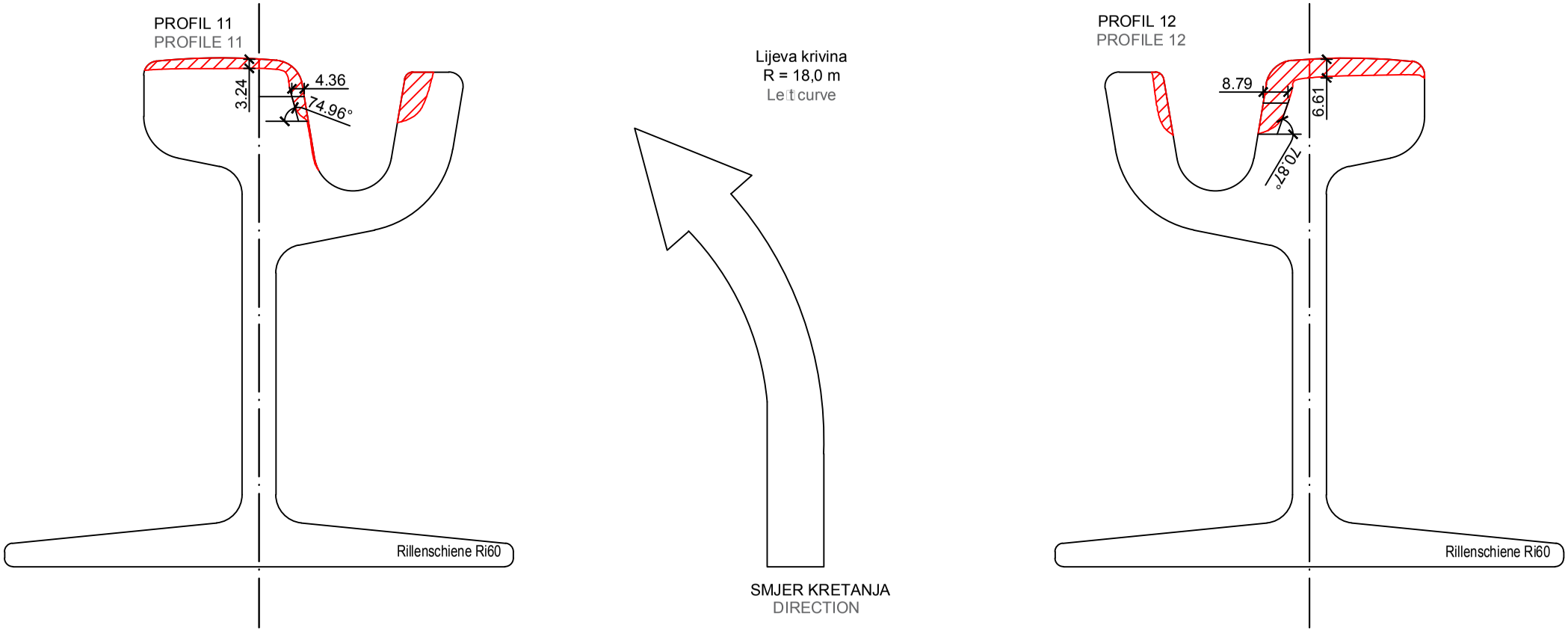
MJ: 1:2

Annex 6.8.1.1. Cross section wear in curves at Location 8

Cross section wear in curve R31

Location 8: Savski most

Scale: 1:2



Prilog 6.8.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 8

Istrošenje poprečnog presjeka tračnica u krivini R32

Lokacija 8: Okretnica Savski most

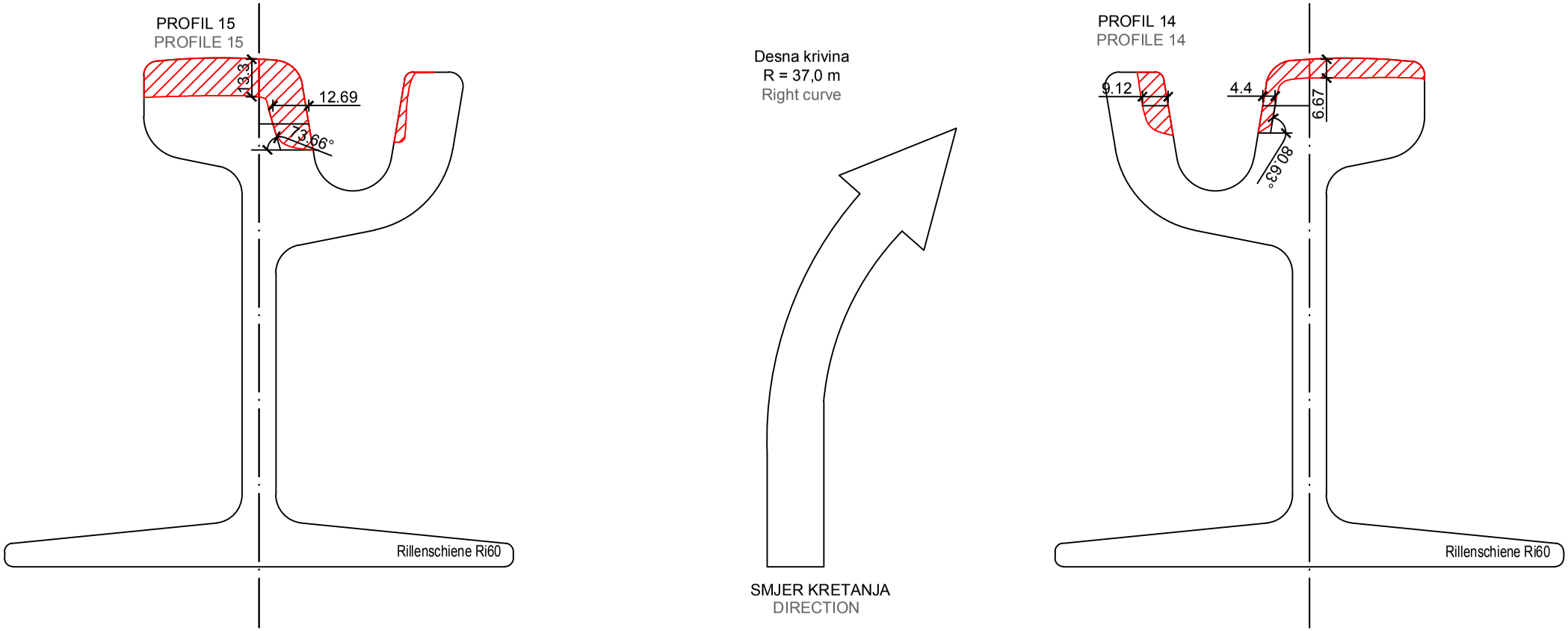
MJ: 1:2

Annex 6.8.1.1. Cross section wear in curves at Location 8

Cross section wear in curve R32

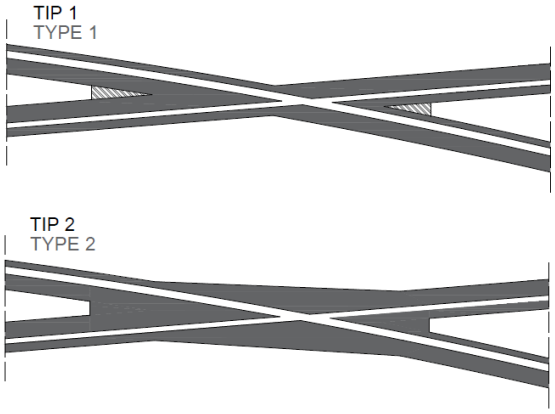
Location 8: Savski most

Scale: 1:2



Prilog 6.8.2. **Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 8**
Lokacija 8: Okretnica Savski most

Annex 6.8.2. **Results of cross section wear in turnouts at Location 8**
Location 8: Savski most



Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
D-04-02 D-04-03	S35	1	16L	13	23.53	10.53	24.34	29.57	5.23	11
			16D	13	22.65	9.65	24.00	25.98	1.98	
			17	12	21.60	9.60		30.62		
			18L	13	22.34	9.34	24.00	23.04	-0.96	
			18D	13	21.86	8.86	24.33	24.77	0.44	
D-04-02 D-04-03	S34	1	19L	13	24.42	11.42	24.00	25.15	1.15	11
			19D	13	24.96	11.96	24.33	25.13	0.80	
			20	12	23.54	11.54		52.37		
			21L	13	23.84	10.84	24.33	25.33	1.00	
			21D	13	24.04	11.04	25.00	26.95	1.95	

Prilog 6.8.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 8

Istrošenje poprečnog presjeka srcišta skretnice S34

Lokacija 8: Savski most

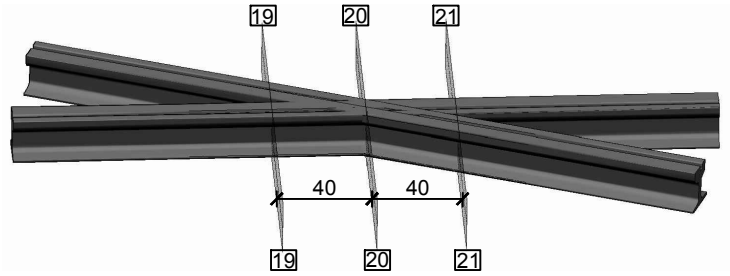
MJ: 1:2

Annex 6.8.2.1. Cross section wear in turnouts at Location 8

Cross section wear in turnout S34

Location 8: Savski most

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

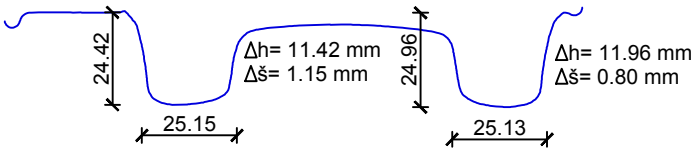
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savski most ⟶ Veslačka

Direction: Savski most ⟶ Veslačka

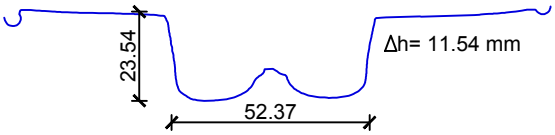
PROFIL 19

PROFILE 19



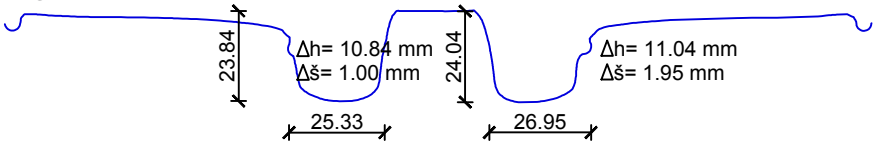
PROFIL 20

PROFILE 20



PROFIL 21

PROFILE 21



Prilog 6.8.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 8

Istrošenje poprečnog presjeka srcišta skretnice S35

Lokacija 8: Savski most

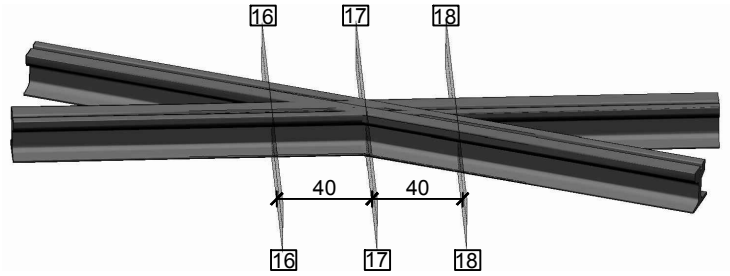
MJ: 1:2

Annex 6.8.2.1. Cross section wear in turnouts at Location 8

Cross section wear in turnout S35

Location 8: Savski most

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

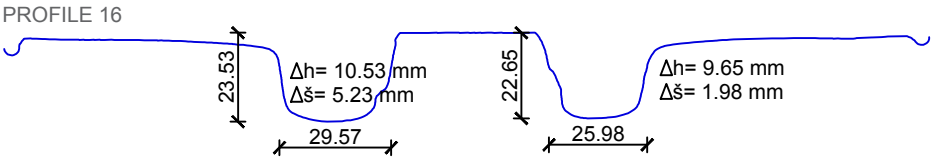
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savski most ⟶ Veslačka

Direction: Savski most ⟶ Veslačka

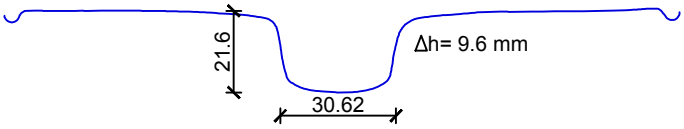
PROFIL 16

PROFILE 16



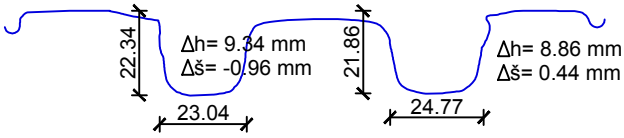
PROFIL 17

PROFILE 17



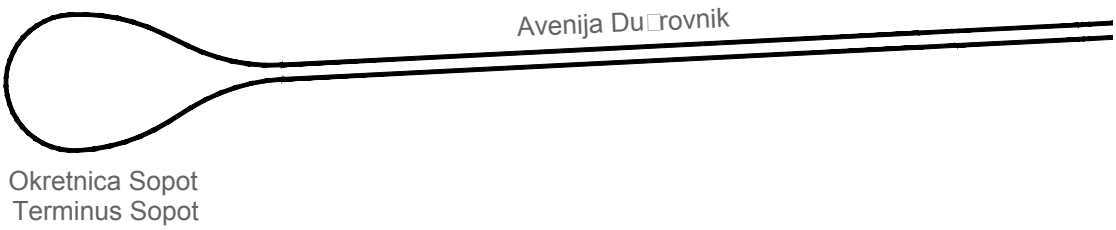
PROFIL 18

PROFILE 18



Lokacija 9 (L9)
Okretnica Sopot

Location 9 (L9)
Terminus Sopot



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija ra□voja tramvajskog prometa □rada □agre□a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition

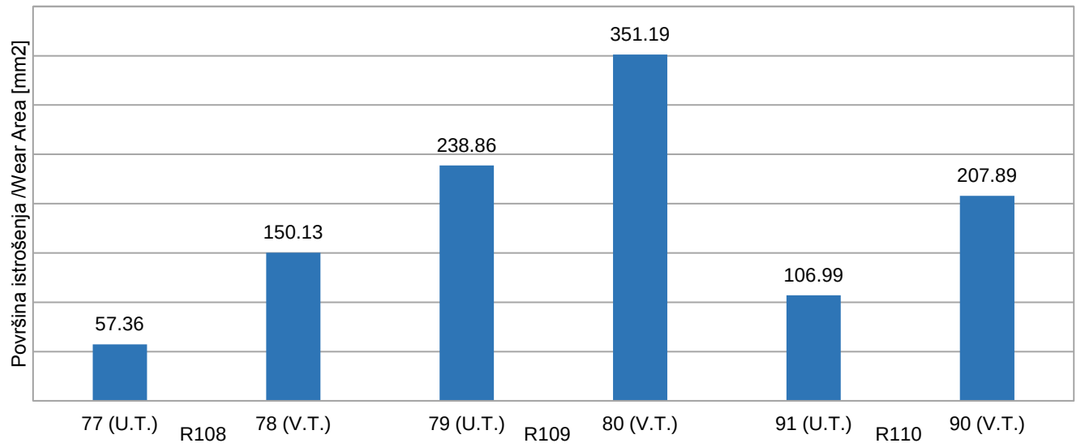
SADRŽAJ PRILOGA:
ANNEX:

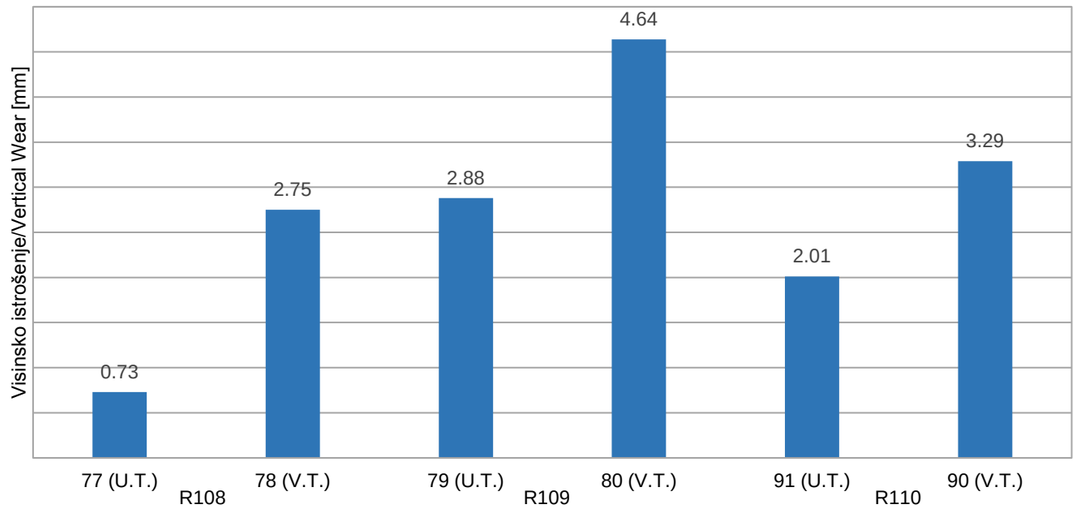
Istrošenje poprečnih presjeka tračnica u krivinama, skretnicama i križalištima na Lokaciji 9

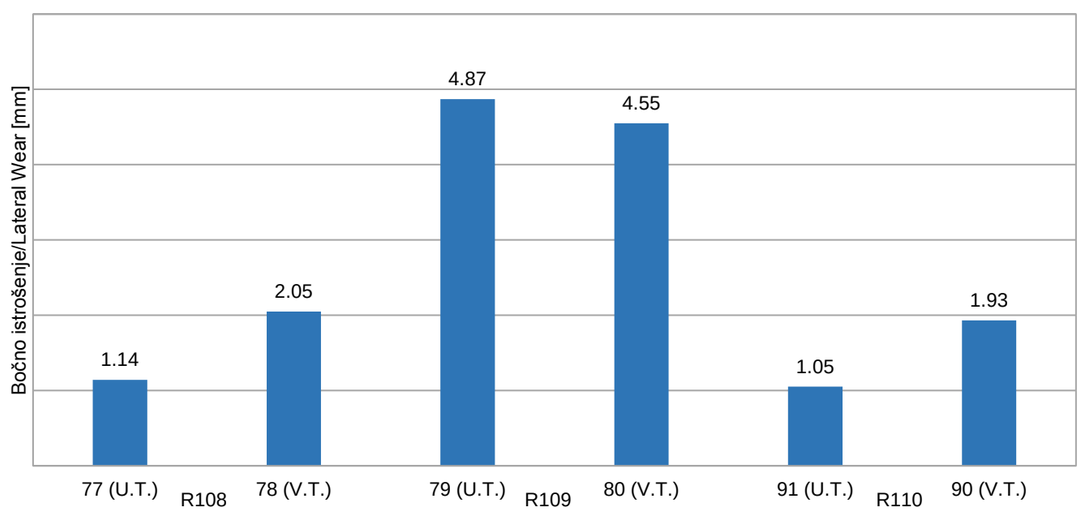
Rail cross section wear in curves, turnouts and crossings at Location 9

MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.9

Prilog 6.9.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 9**
Lokacija 9: Okretnica Sopot
Annex 6.9.1. **Results of cross section wear in curves at Location 9**
Location 9: Terminus Sopot







U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [ ]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
Z-19-01	R108	desna right	78	lijeva/left	150.13	2.75	2.05	77.06	50	7
			77	desna/right	57.36	0.73	1.14	80.42		
Z-19-01	R109	lijeva left	79	lijeva/left	238.86	2.88	4.87	77.71	18	7
			80	desna/right	351.19	4.64	4.55	70.19		
Z-19-01	R110	desna right	90	lijeva/left	207.89	3.29	1.93	77.53	50	7
			91	desna/right	106.99	2.01	1.05	82.72		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
Z-19-01	R108	desna right	78	lijeva/left	150.13	2.75	2.05
			77	desna/right	57.36	0.73	1.14
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					92.77	2.02	0.91
Z-19-01	R109	lijeva left	79	lijeva/left	238.86	2.88	4.87
			80	desna/right	351.19	4.64	4.55
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					112.33	1.76	-0.32
Z-19-01	R110	desna right	90	lijeva/left	207.89	3.29	1.93
			91	desna/right	106.99	2.01	1.05
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					100.9	1.28	0.88

Prilog 6.9.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 9

Istrošenje poprečnog presjeka tračnica u krivini R108

Lokacija 9: Okretnica Sopot

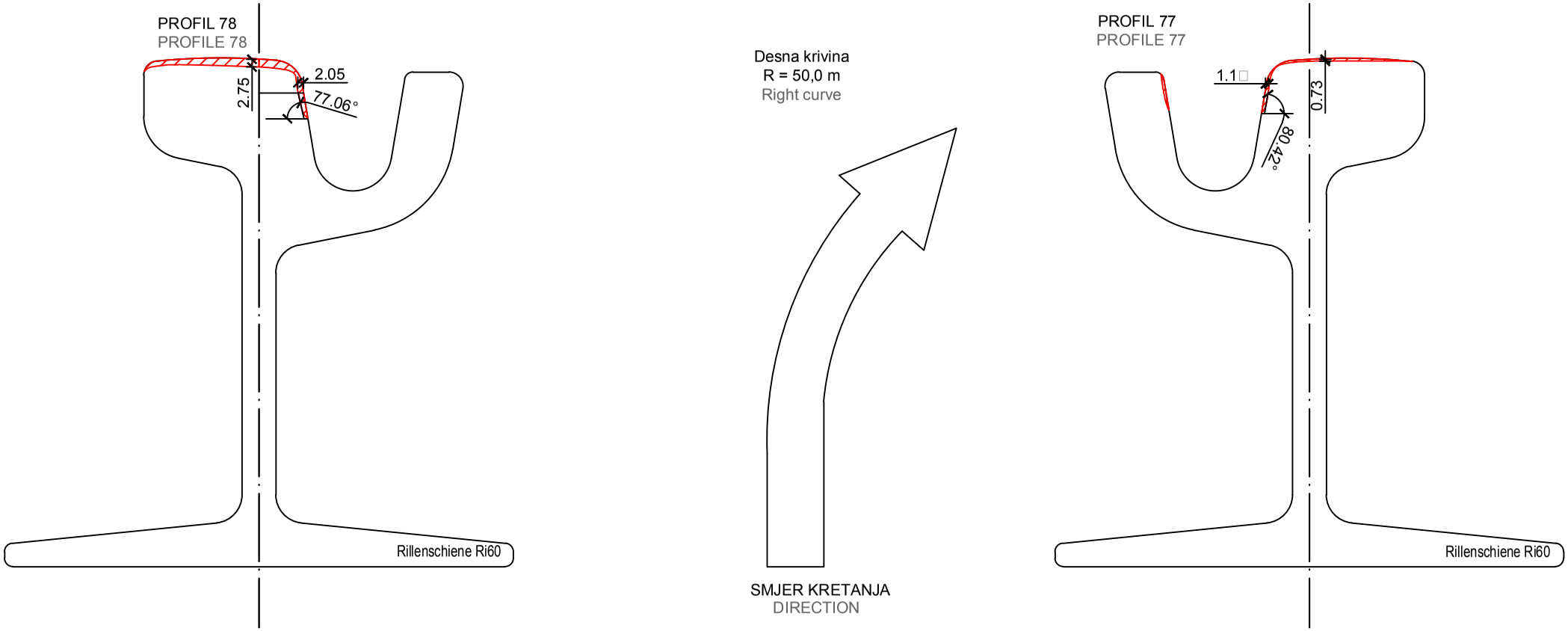
MJ: 1:2

Annex 6.9.1.1. Cross section wear in curves at Location 9

Cross section wear in curve R108

Location 9: Terminus Sopot

Scale: 1:2



Prilog 6.9.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 9

Istrošenje poprečnog presjeka tračnica u krivini R109

Lokacija 9: Okretnica Sopot

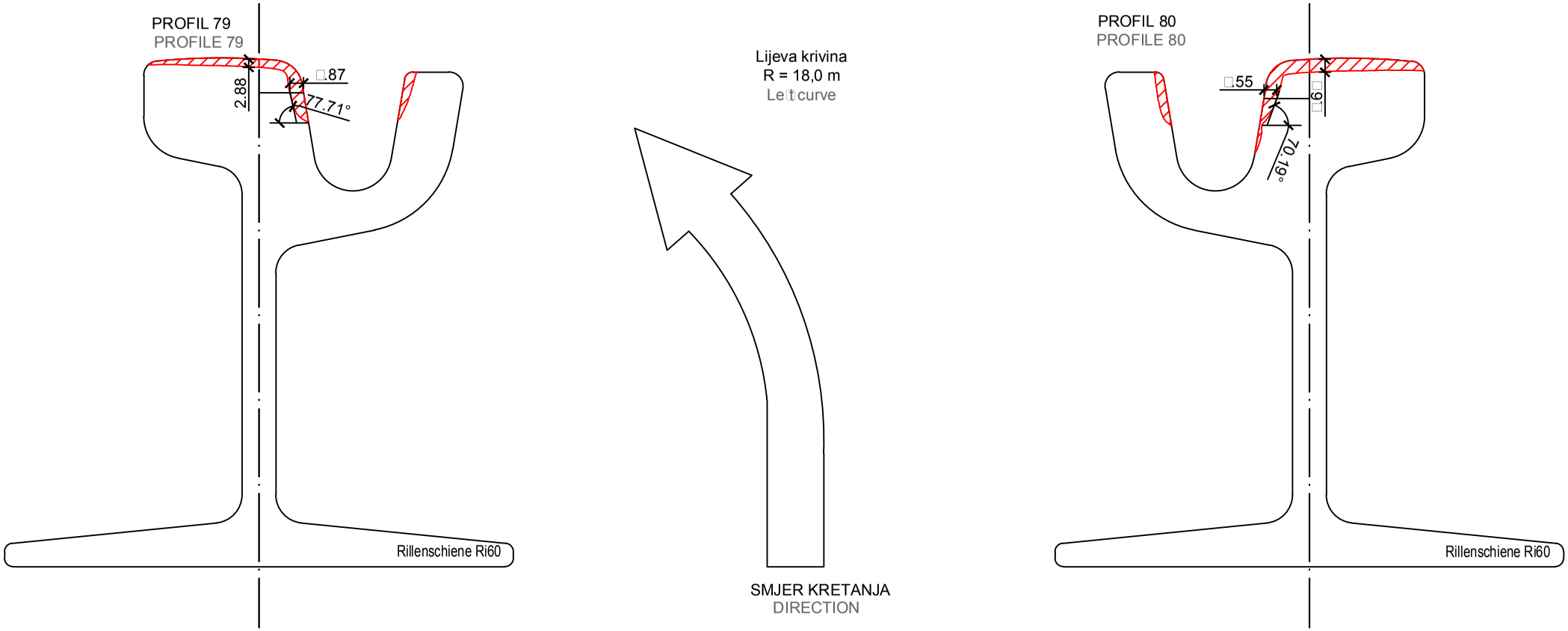
MJ: 1:2

Annex 6.9.1.1. Cross section wear in curves at Location 9

Cross section wear in curve R109

Location 9: Terminus Sopot

Scale: 1:2



Prilog 6.9.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 9

Istrošenje poprečnog presjeka tračnica u krivini R110

Lokacija 9: Okretnica Sopot

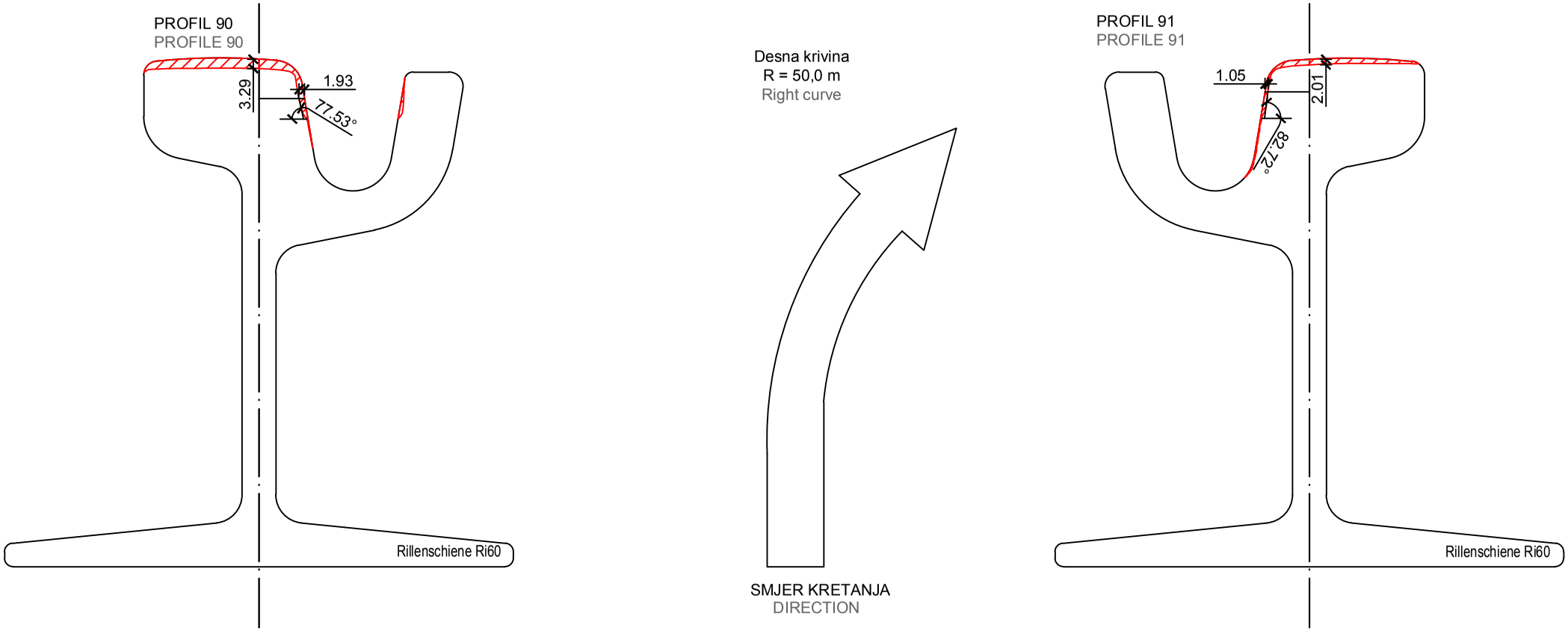
MJ: 1:2

Annex 6.9.1.1. Cross section wear in curves at Location 9

Cross section wear in curve R110

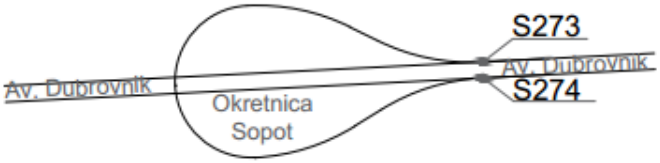
Location 9: Terminus Sopot

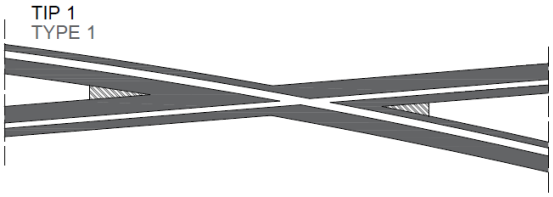
Scale: 1:2

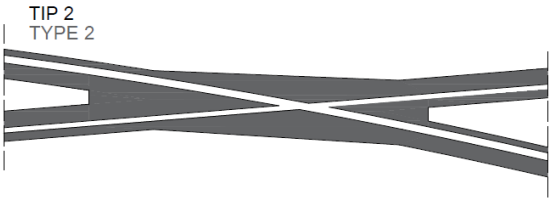


Prilog 6.9.2. Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 9
Lokacija 9: Okretnica Sopot

Annex 6.9.2. Results of cross section wear in turnouts at Location 9
Location 9: Terminus Sopot







Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
Z-19-01	S273	1	70L	13	20.27	7.27	30.58	34.45	3.87	7
			70D	13	21.79	8.79	24.00	25.84	1.84	
			71	12	21.43	9.43		33.43		
			72L	13	20.99	7.99	24.00	22.76	-1.24	
			72D	13	19.29	6.29	30.58	26.48	-4.10	
Z-19-01	S274	2	73L	13	20.22	7.22	24.00	23.51	-0.49	7
			73D	13	18.86	5.86	30.63	33.53	2.90	
			75	12	21.06	9.06		35.47		
			76L	13	19.16	6.16	30.63	33.14	2.51	
			76D	13	20.72	7.72	24.00	24.33	0.33	

Prilog 6.9.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 9

Istrošenje poprečnog presjeka srcišta skretnice S273

Lokacija 9: Okretnica Sopot

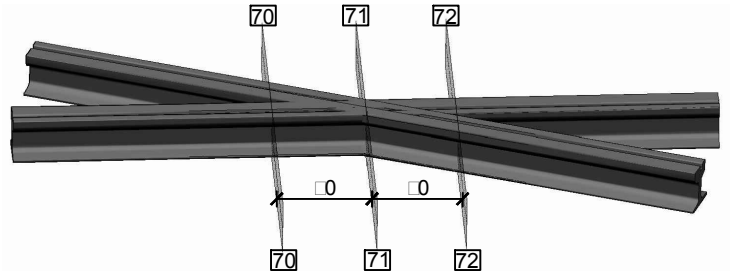
MJ: 1:2

Annex 6.9.2.1. Cross section wear in turnouts at Location 9

Cross section wear in turnout S273

Location 9: Terminus Sopot

Scale: 1:2

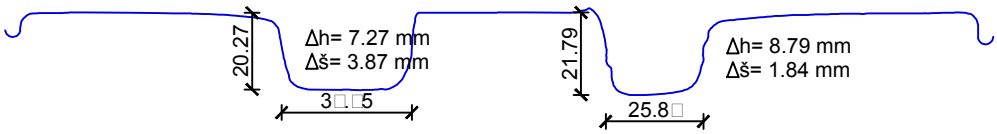


Δh - visinsko istrošenje
Δš - bočno istrošenje

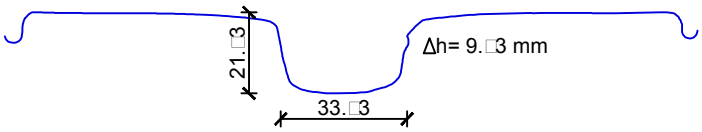
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: Zaprođe → Sopot
Direction: Zaprođe → Sopot

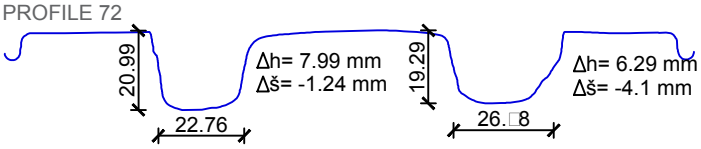
PROFIL 70
PROFILE 70



PROFIL 71
PROFILE 71



PROFIL 72
PROFILE 72



Prilog 6.9.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 9

Istrošenje poprečnog presjeka srcišta skretnice S274

Lokacija 9: Okretnica Sopot

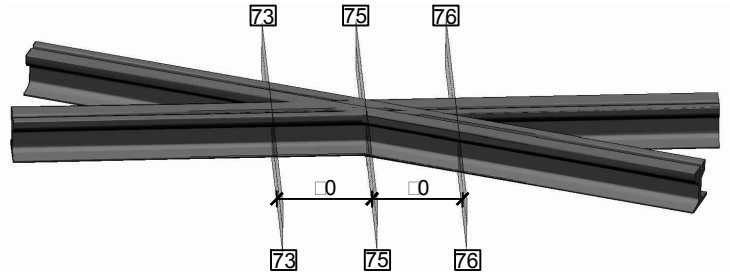
MJ: 1:2

Annex 6.9.2.1. Cross section wear in turnouts at Location 9

Cross section wear in turnout S27□

Location 9: Terminus Sopot

Scale: 1:2

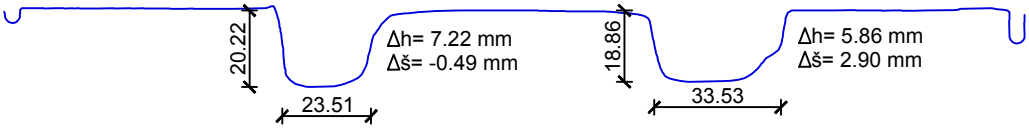


Δh - visinsko istrošenje
Δš - bočno istrošenje

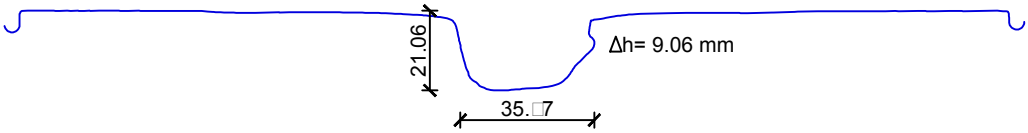
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: Zapruđe → Sopot
Direction: Zapruđe → Sopot

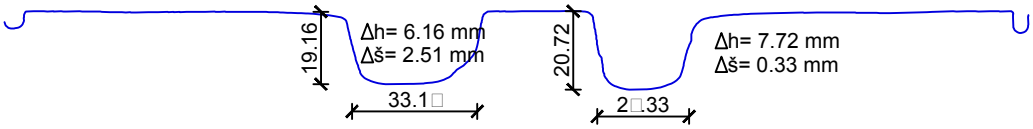
PROFIL 73
PROFILE 73



PROFIL 75
PROFILE 75

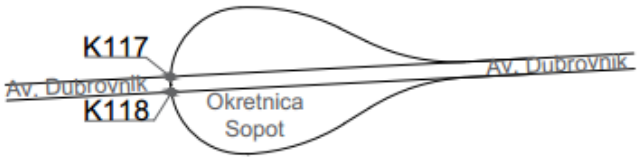


PROFIL 76
PROFILE 76



Prilog 6.9.3. **Rezultati istrošenja profila tračnica u križalištima na Lokaciji 9**
Lokacija 9: Okretnica Sopot

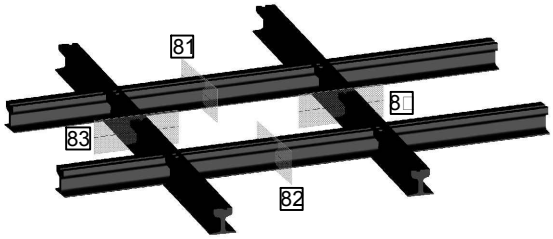
Annex 6.9.3. **Results of cross section wear in track crossing at Location 9**
Location 9: Terminus Sopot



Dionice Sections	**Oznaka križališta** Track crossing mark	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
Z-19-01	K117	81	12	20,74	8.74	34.00	36.04	2.04	7
		82	12	17,69	5.69	34.00	39.52	5.52	
		83	12	18,54	6.54	24.00	24.66	0.66	
		84	12	19,39	7.39	24.00	22.54	-1.46	
Z-19-01	K118	85	12	18,82	6.82	34.00	36.48	2.48	7
		86	12	16,88	4.88	34.00	36.49	2.49	
		87	12	19,73	7.73	24.00	23.28	-0.72	
		88	12	18,72	6.72	24.00	22.82	-1.18	

Prilog 6.9.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 9
Istrošenje poprečnog presjeka tračnica u križalištu K117
Lokacija 9: Okretnica Sopot
MJ: 1:2

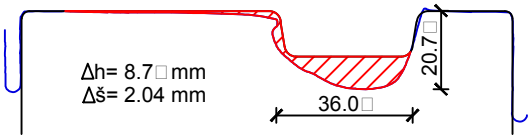
Annex 6.9.3.1. Cross section wear in track crossings at Location 9
Cross section wear in track crossing K117
Location 9: Terminus Sopot
Scale: 1:2



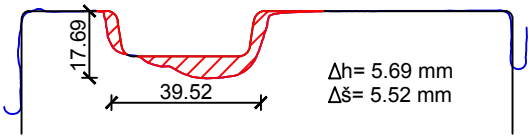
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu
Direction: through terminus

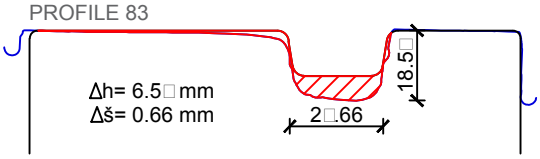
PROFIL 81
PROFILE 81



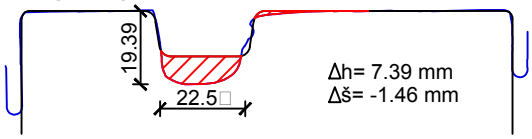
PROFIL 82
PROFILE 82



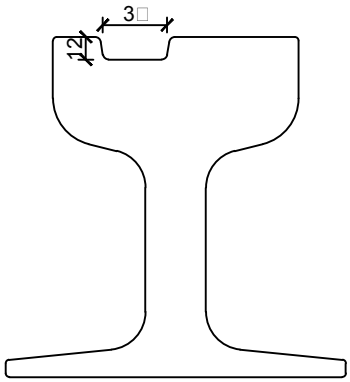
PROFIL 83
PROFILE 83



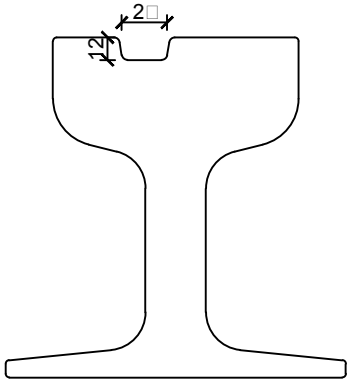
PROFIL 8□
PROFILE 8□



PROFIL 81, 82 □PROFILE 81, 82
R = 18 m

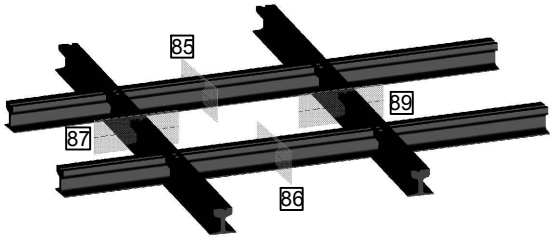


PROFIL 83, 8□ □PROFILE 83, 8□
R = 0 m



Prilog 6.9.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 9
Istrošenje poprečnog presjeka tračnica u križalištu K118
Lokacija 9: Okretnica Sopot
MJ: 1:2

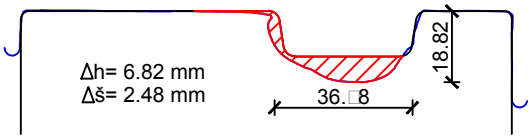
Annex 6.9.3.1. Cross section wear in track crossings at Location 9
Cross section wear in track crossing K118
Location 9: Terminus Sopot
Scale: 1:2



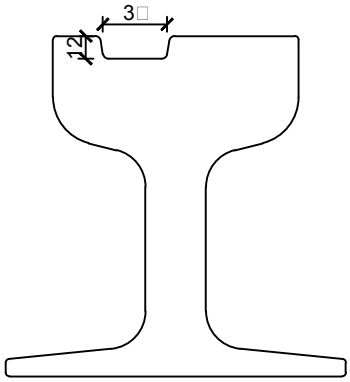
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu
Direction: through terminus

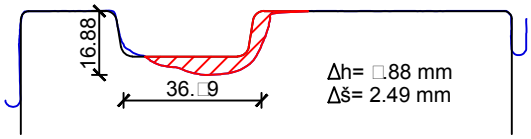
PROFIL 85
PROFILE 85



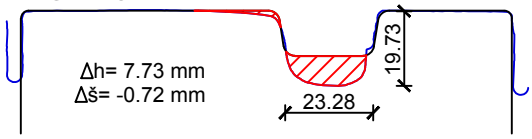
PROFIL 85, 86 □PROFILE 85, 86
R = 18 m



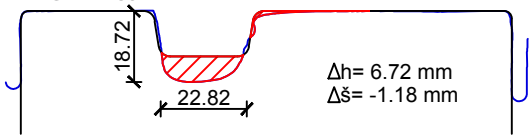
PROFIL 86
PROFILE 86



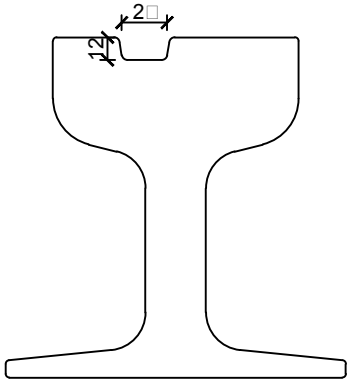
PROFIL 87
PROFILE 87



PROFIL 89
PROFILE 89

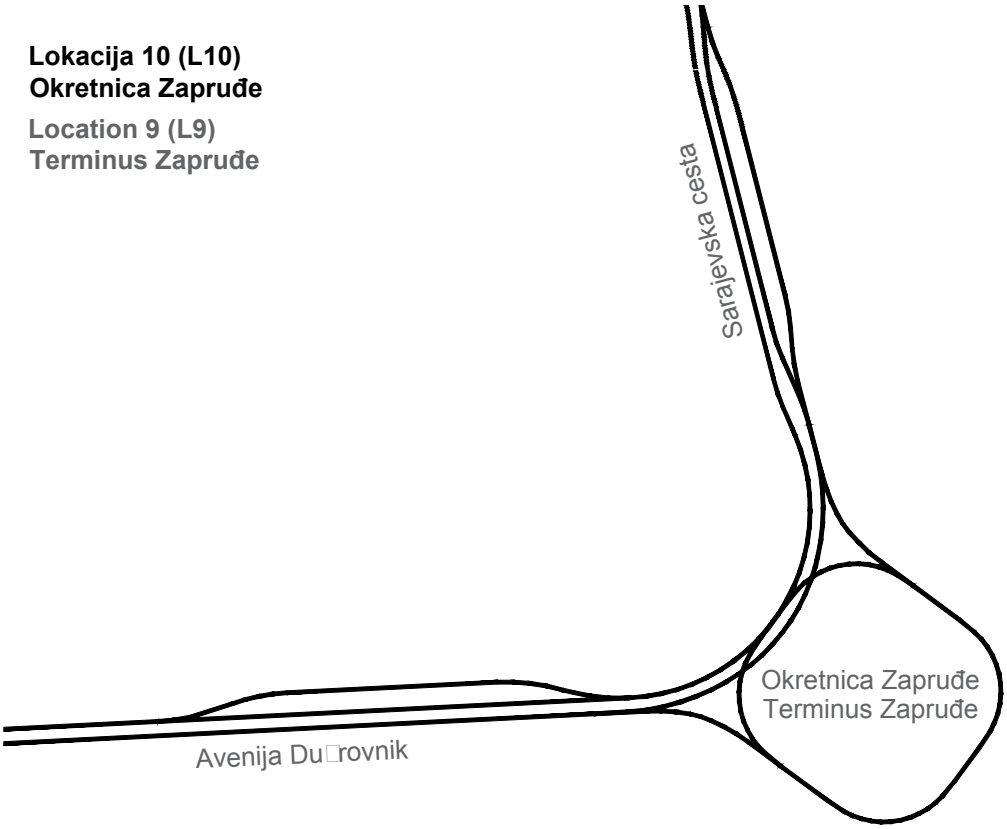


PROFIL 87, 89 □PROFILE 87, 89
R = 0 m



Lokacija 10 (L10)
Okretnica Zaprođe

Location 9 (L9)
Terminus Zaprođe



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija ra□voja tramvajskog prometa □rada Zagre□a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition

SADRŽAJ PRILOGA:
ANNEX:

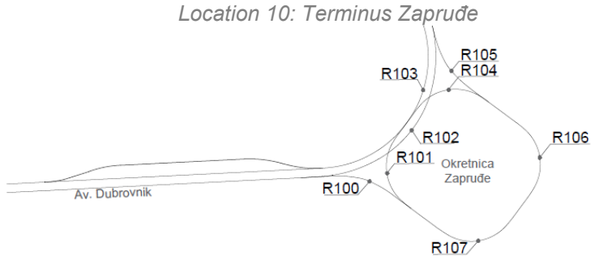
Istrošenje poprečnih presjeka tračnica u krivinama, skretnicama i križalištima na Lokaciji 10

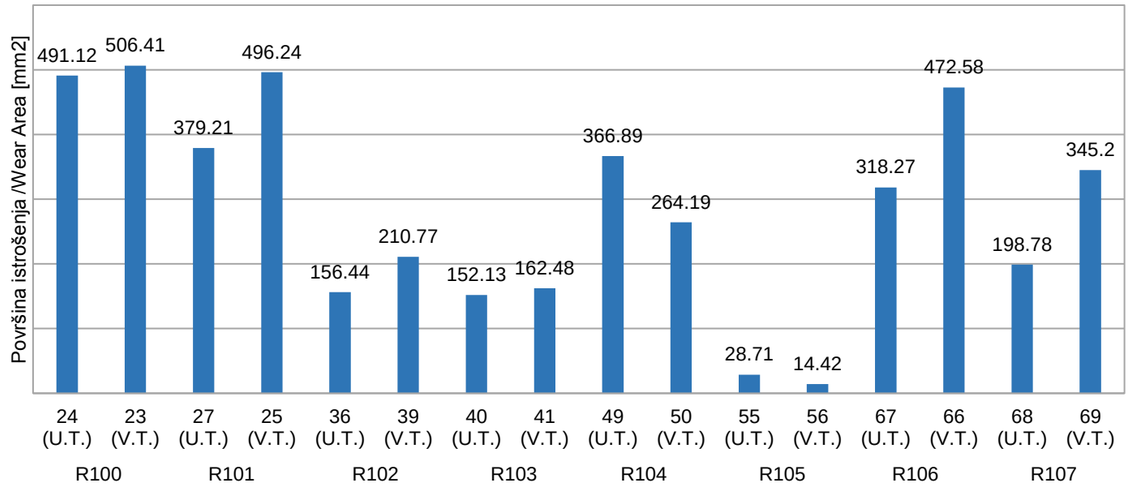
Rail cross section wear in curves, turnouts and crossings at Location 10

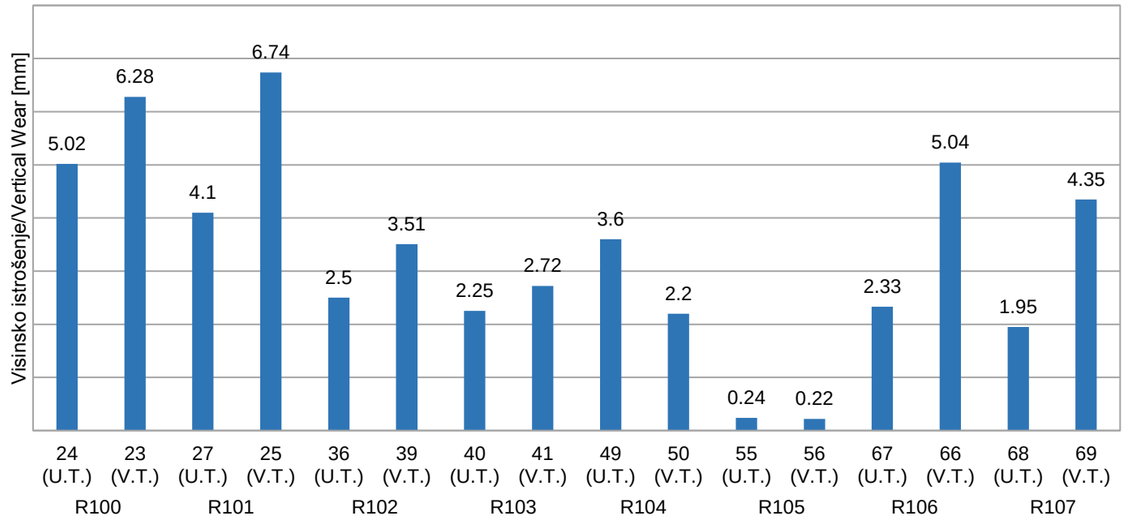
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.10

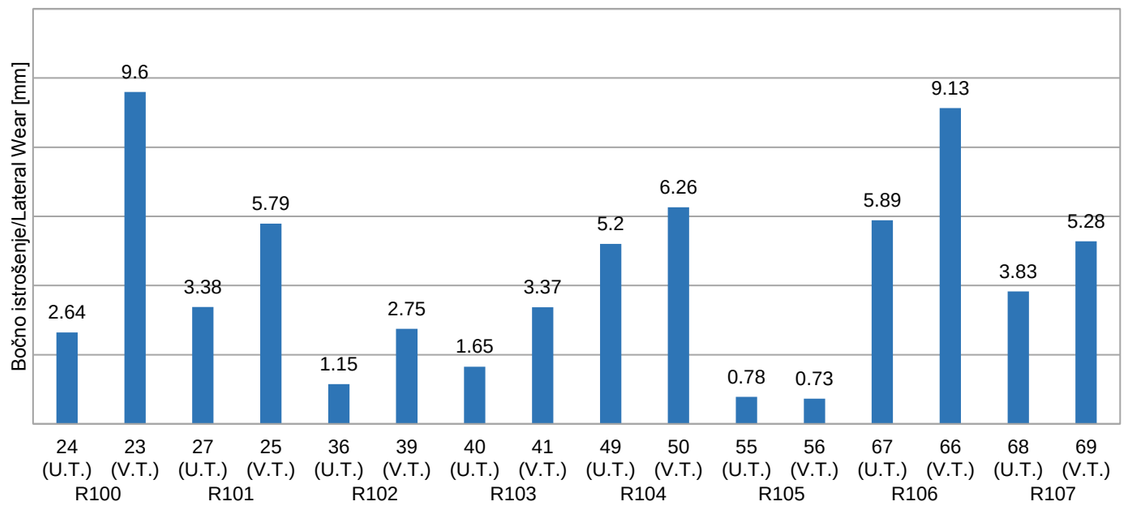
Prilog 6.10.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 10**
Lokacija 10: Okretnica Zapruđe

Annex 6.10.1. **Results of cross section wear in curves at Location 10**
Location 10: Terminus Zapruđe









Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [ ]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
Z-18-03	R100	desna right	23	lijeva/left	506.41	6.28	9.6	77.52	25	8
			24	desna/right	491.12	5.02	2.64	82.17		
Z-18-07	R101	lijeva left	27	lijeva/left	379.21	4.1	3.38	77.32	21	8
			25	desna/right	496.24	6.74	5.79	71.46		
Z-18-06	R102	lijeva left	36	lijeva/left	156.44	2.5	1.15	81.31	50	8
			39	desna/right	210.77	3.51	2.75	76.47		
Z-18-02	R103	desna right	41	lijeva/left	162.48	2.72	3.37	76.47	51	8
			40	desna/right	152.13	2.25	1.65	80.32		
Z-18-06	R104	lijeva left	49	lijeva/left	366.89	3.6	5.2	78.72	21	8
			50	desna/right	264.19	2.2	6.26	71.74		
Z-18-10	R105	desna right	56	lijeva/left	14.42	0.22	0.73	81.47	25	3
			55	desna/right	28.71	0.24	0.78	80.42		
Z-18-04	R106	lijeva left	67	lijeva/left	318.27	2.33	5.89	75.99	21	8
			66	desna/right	472.58	5.04	9.13	70.59		
Z-18-04	R107	lijeva left	68	lijeva/left	198.78	1.95	3.83	77.63	21	8
			69	desna/right	345.2	4.35	5.28	71.27		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
Z-18-03	R100	desna right	23	lijeva/left	506.41	6.28	9.6
			24	desna/right	491.12	5.02	2.64
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					15.29	1.26	6.96
Z-18-07	R101	lijeva left	27	lijeva/left	379.21	4.1	3.38
			25	desna/right	496.24	6.74	5.79
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					117.03	2.64	2.41
Z-18-06	R102	lijeva left	36	lijeva/left	156.44	2.5	1.15
			39	desna/right	210.77	3.51	2.75
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					54.33	1.01	1.6
Z-18-02	R103	desna right	41	lijeva/left	162.48	2.72	3.37
			40	desna/right	152.13	2.25	1.65
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					10.35	0.47	1.72
Z-18-06	R104	lijeva left	49	lijeva/left	366.89	3.6	5.2
			50	desna/right	264.19	2.2	6.26
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-102.7	-1.4	1.06
Z-18-10	R105	desna right	56	lijeva/left	14.42	0.22	0.73
			55	desna/right	28.71	0.24	0.78
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-14.29	-0.02	-0.05
Z-18-04	R106	lijeva left	67	lijeva/left	318.27	2.33	5.89
			66	desna/right	472.58	5.04	9.13
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					154.31	2.71	3.24
Z-18-04	R107	lijeva left	68	lijeva/left	198.78	1.95	3.83
			69	desna/right	345.2	4.35	5.28
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					146.42	2.4	1.45

U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve

Prilog 6.10.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 10

Istrošenje poprečnog presjeka tračnica u krivini R100

Lokacija 10: Okretnica Zapruđe

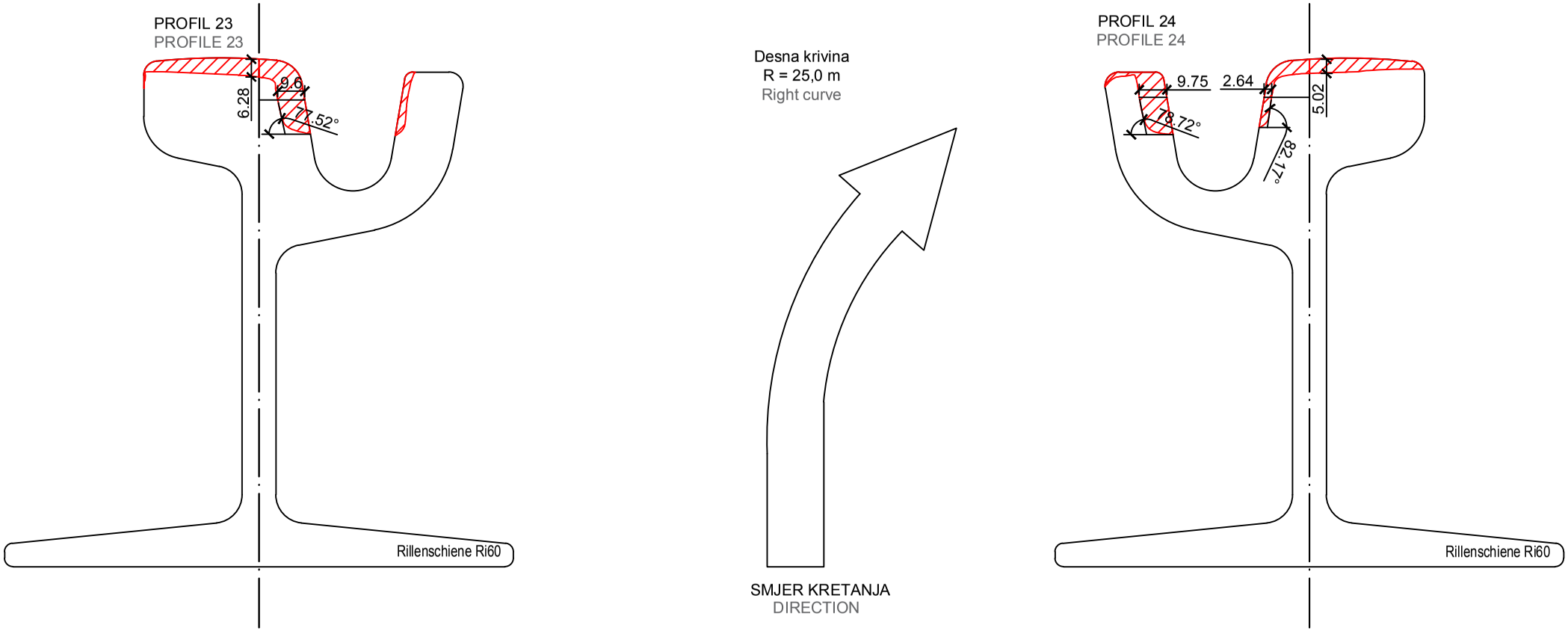
MJ: 1:2

Annex 6.10.1.1. Cross section wear in curves at Location 10

Cross section wear in curve R100

Location 10: Terminus Zapruđe

Scale: 1:2



Prilog 6.10.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 10

Istrošenje poprečnog presjeka tračnica u krivini R101

Lokacija 10: Okretnica Zapruđe

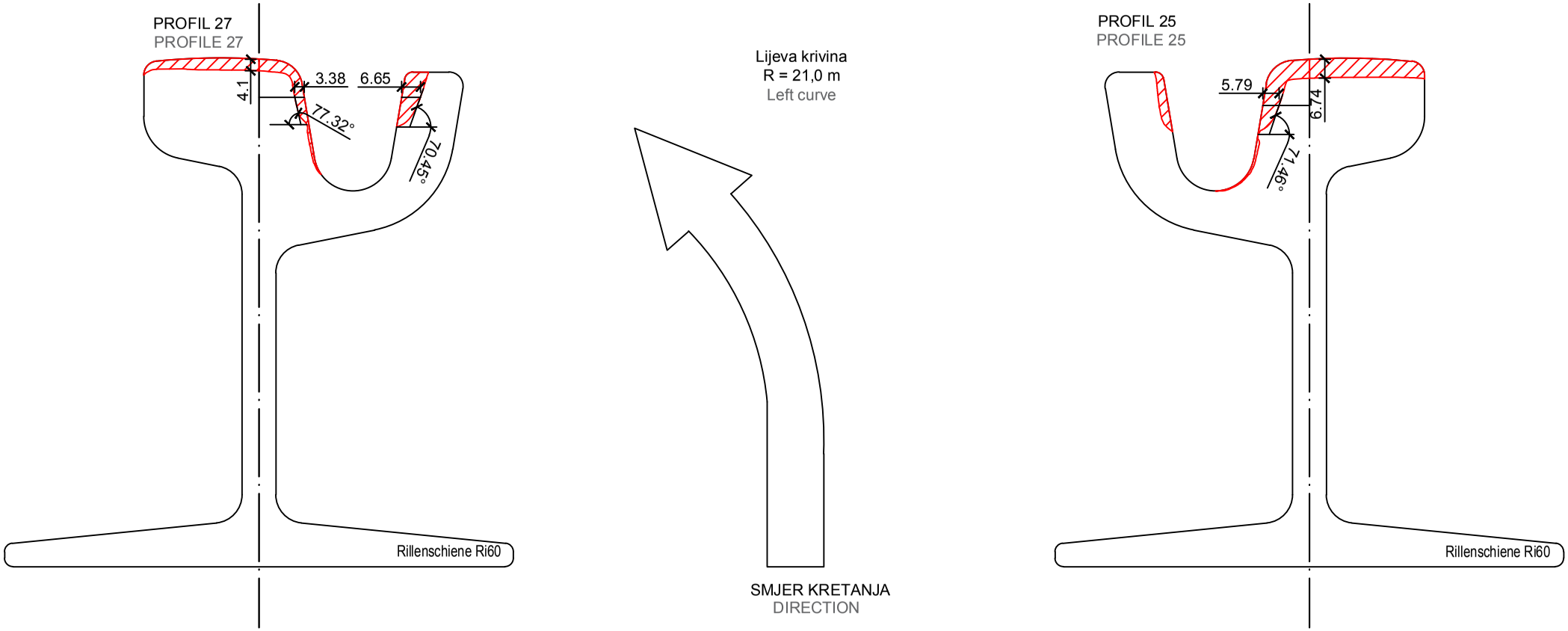
MJ: 1:2

Annex 6.10.1.1. Cross section wear in curves at Location 10

Cross section wear in curve R101

Location 10: Terminus Zapruđe

Scale: 1:2



Prilog 6.10.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 10

Istrošenje poprečnog presjeka tračnica u krivini R102

Lokacija 10: Okretnica Zapruđe

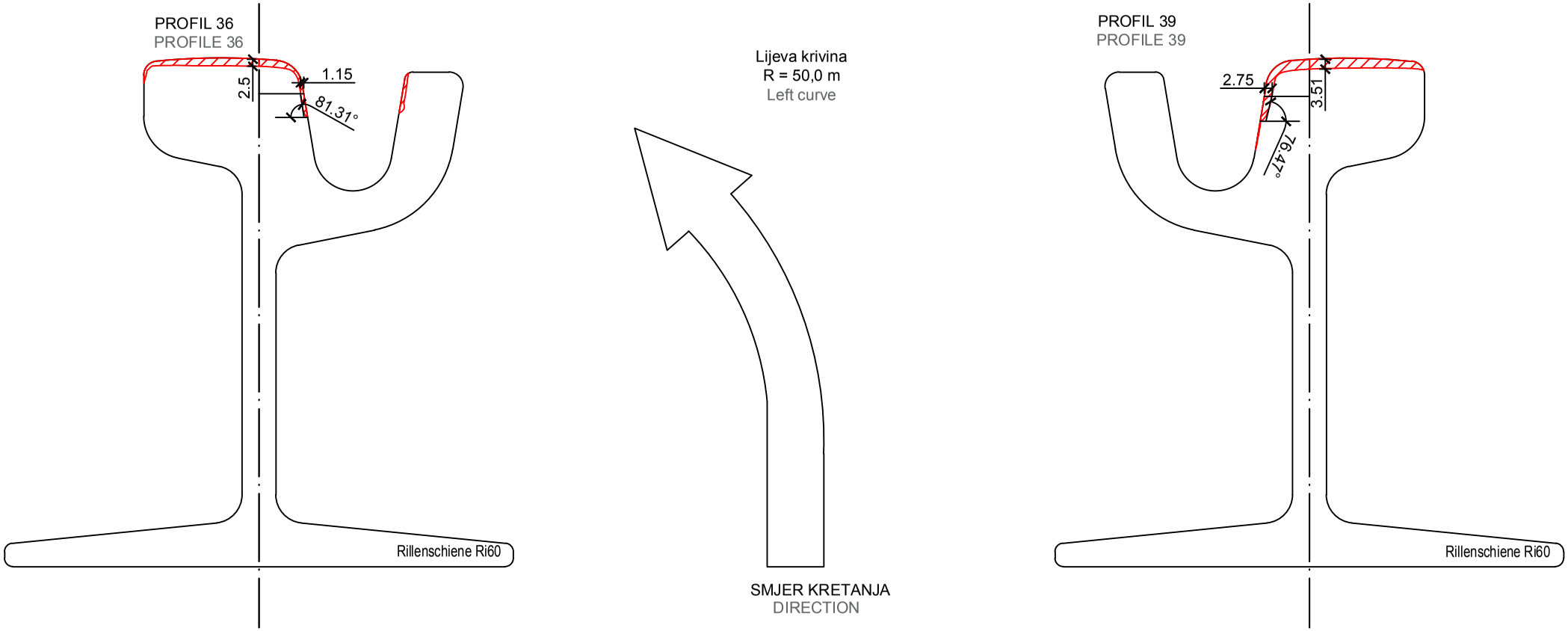
MJ: 1:2

Annex 6.10.1.1. Cross section wear in curves at Location 10

Cross section wear in curve R102

Location 10: Terminus Zapruđe

Scale: 1:2



Prilog 6.10.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 10

Istrošenje poprečnog presjeka tračnica u krivini R103

Lokacija 10: Okretnica Zapruđe

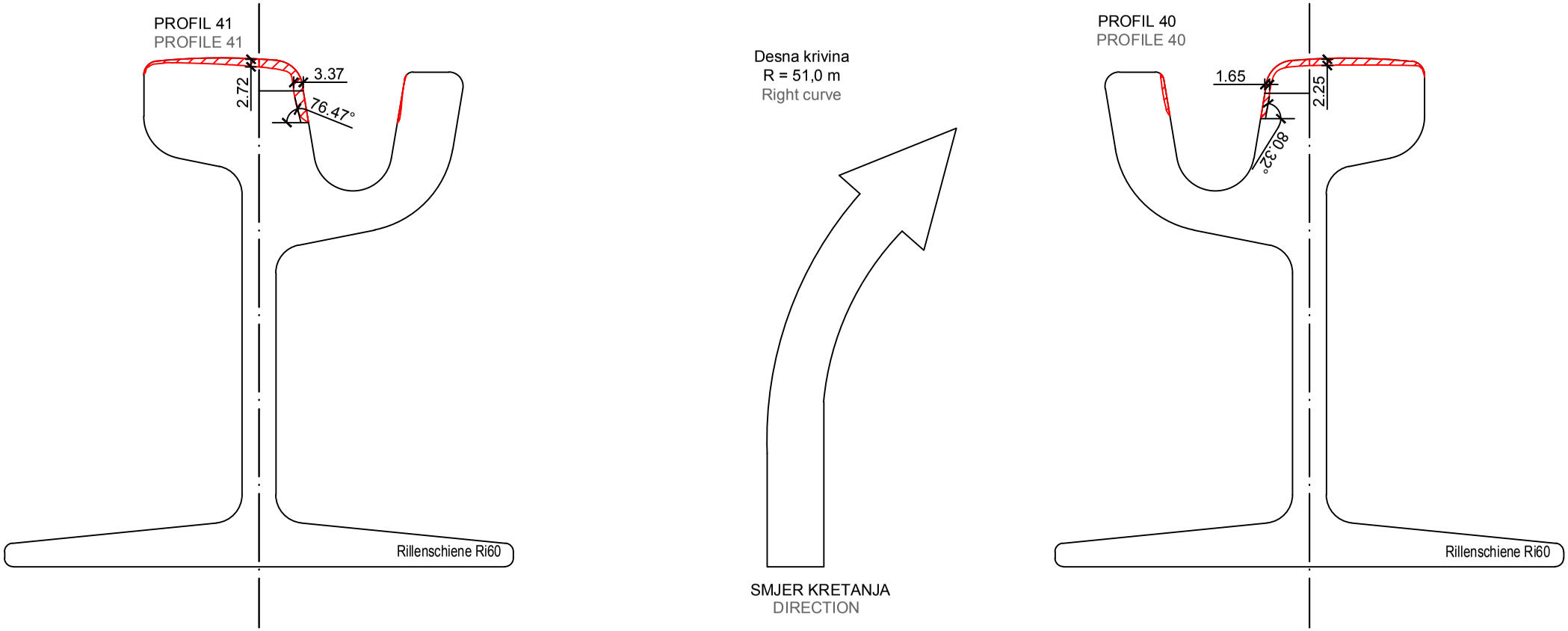
MJ: 1:2

Annex 6.10.1.1. Cross section wear in curves at Location 10

Cross section wear in curve R103

Location 10: Terminus Zapruđe

Scale: 1:2



Prilog 6.10.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 10

Istrošenje poprečnog presjeka tračnica u krivini R104

Lokacija 10: Okretnica Zapruđe

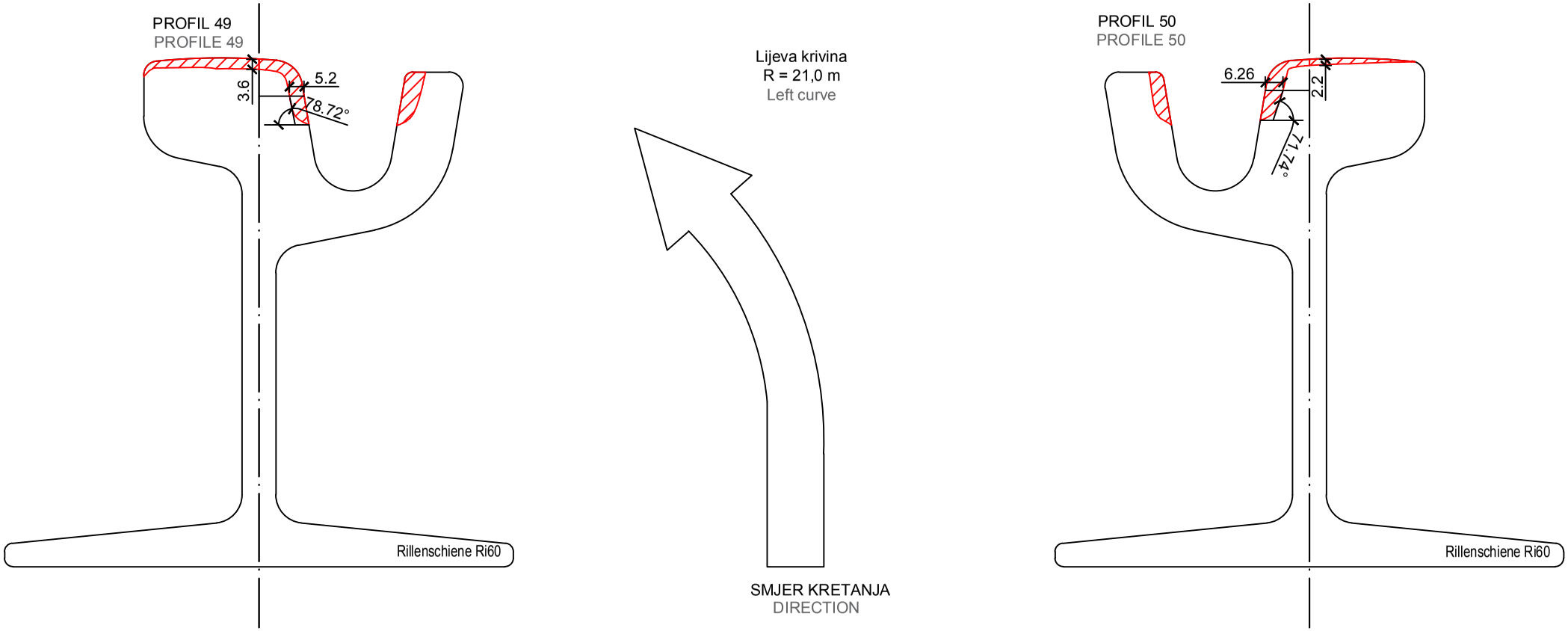
MJ: 1:2

Annex 6.10.1.1. Cross section wear in curves at Location 10

Cross section wear in curve R104

Location 10: Terminus Zapruđe

Scale: 1:2



Prilog 6.10.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 10

Istrošenje poprečnog presjeka tračnica u krivini R105

Lokacija 10: Okretnica Zapruđe

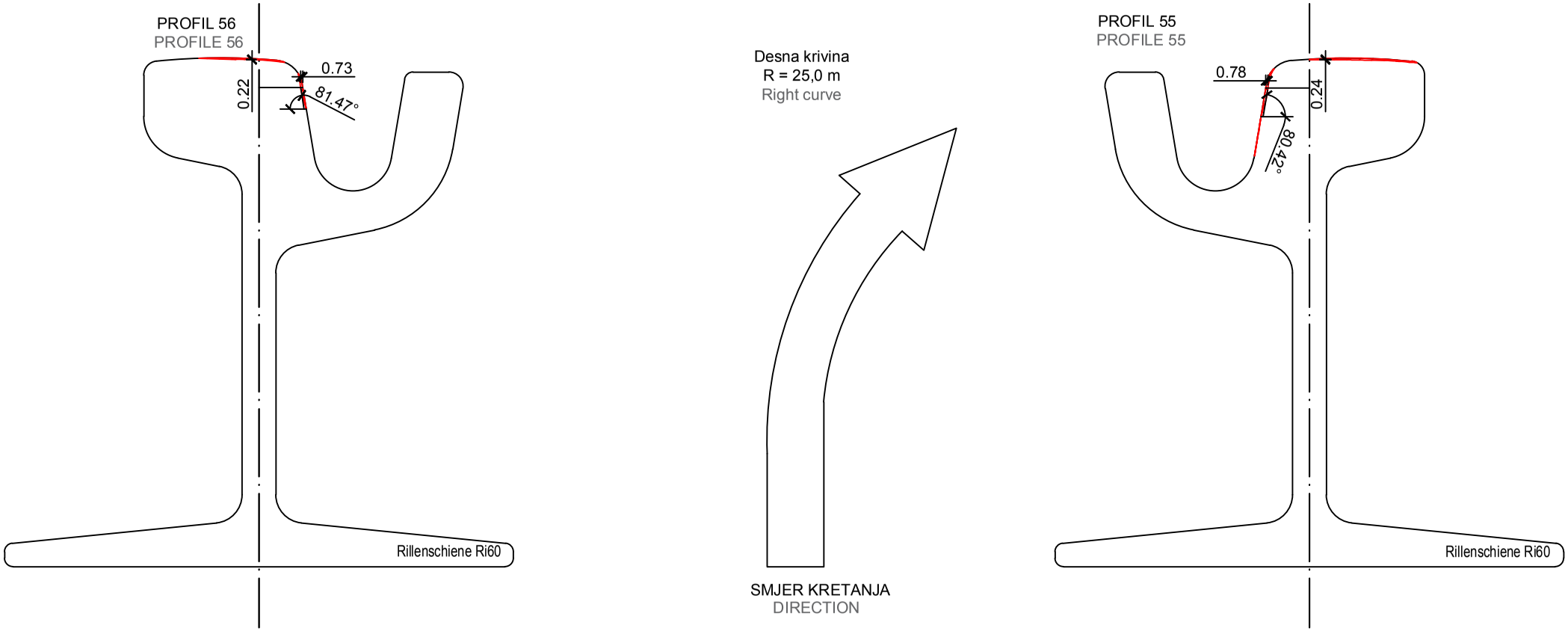
MJ: 1:2

Annex 6.10.1.1. Cross section wear in curves at Location 10

Cross section wear in curve R105

Location 10: Terminus Zapruđe

Scale: 1:2



Prilog 6.10.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 10

Istrošenje poprečnog presjeka tračnica u krivini R106

Lokacija 10: Okretnica Zapruđe

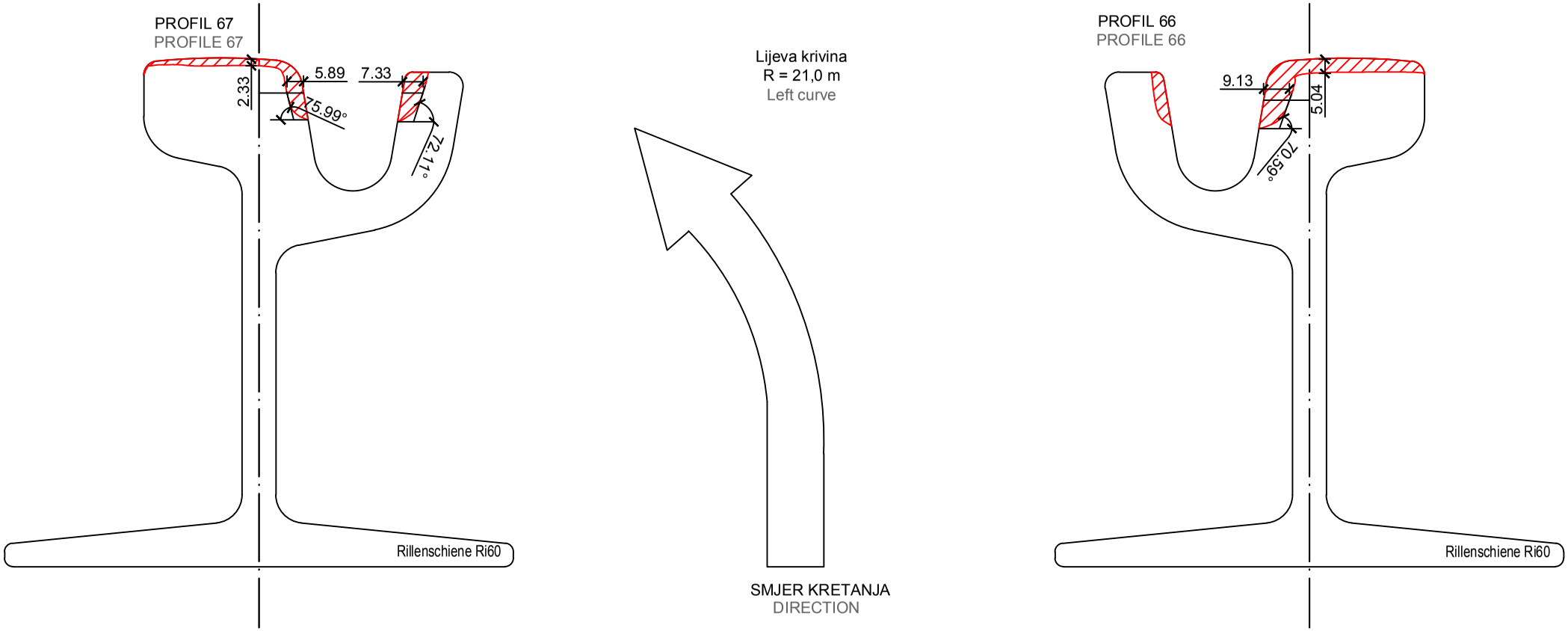
MJ: 1:2

Annex 6.10.1.1. Cross section wear in curves at Location 10

Cross section wear in curve R106

Location 10: Terminus Zapruđe

Scale: 1:2



Prilog 6.10.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 10

Istrošenje poprečnog presjeka tračnica u krivini R107

Lokacija 10: Okretnica Zapruđe

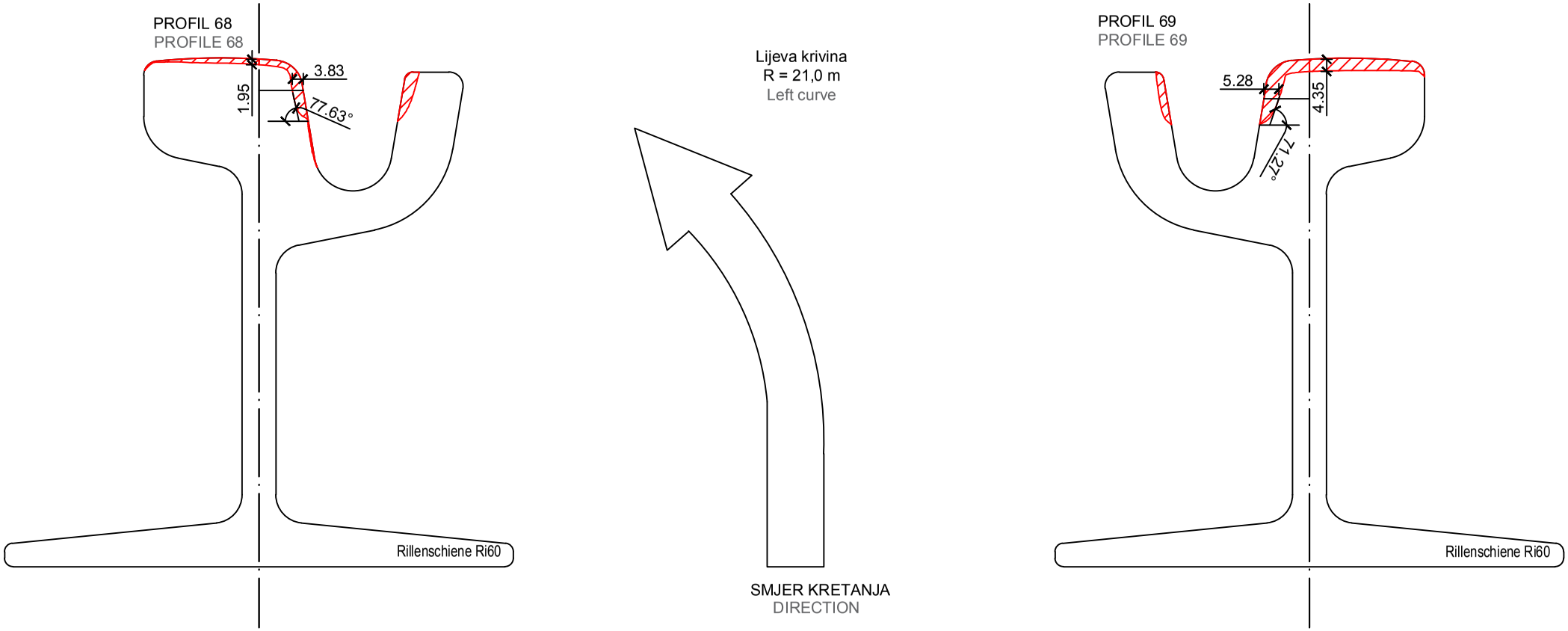
MJ: 1:2

Annex 6.10.1.1. Cross section wear in curves at Location 10

Cross section wear in curve R107

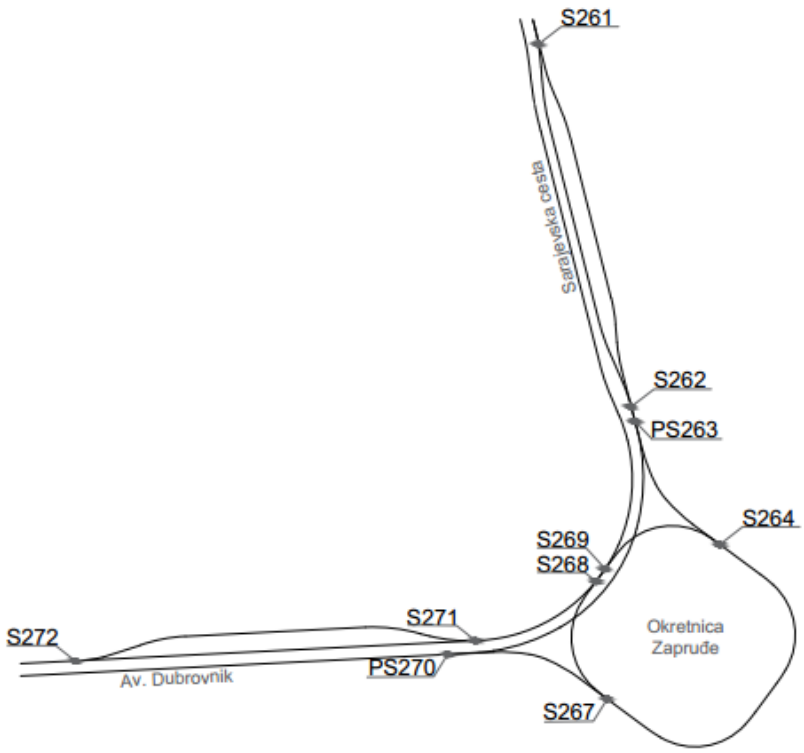
Location 10: Terminus Zapruđe

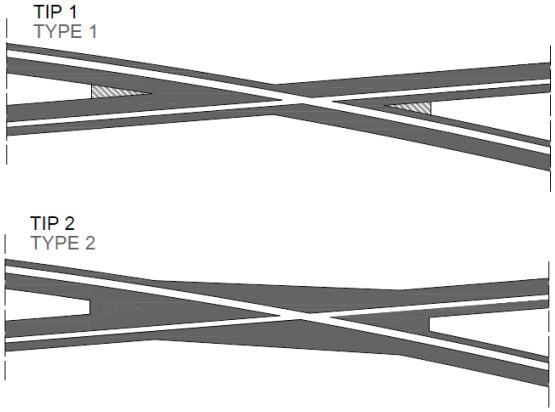
Scale: 1:2



Prilog 6.10.2. **Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 10**
Lokacija 10: Okretnica Zapruđe

Annex 6.10.2. **Results of cross section wear in turnouts at Location 10**
Location 10: Terminus Zapruđe





Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
D-19-02 D-19-01	S272	1	11L	13	21.67	8.67	24.00	23.07	-0.93	7
			11D	13	19.33	6.33	24.33	28.72	4.39	
			12	12	20.76	8.76		34.96		
			13L	13	19.88	6.88	24.33	27.82	3.49	
			13D	13	21.83	8.83	24.00	24.04	0.04	
D-19-02 D-19-01	S271	1	14L	13	20.55	7.55	24.33	33.80	9.47	8
			14D	13	22.01	9.01	24.00	25.34	1.34	
			15	12	21.86	9.86		35.42		
			16L	13	21.64	8.64	24.00	22.49	-1.51	
			16D	13	16.66	3.66	24.33	23.85	-0.48	
Z-18-03 Z-18-02	PS270	1	19L	13	22.79	9.79	30.00	27.45	-2.55	8
			19D	13	19.15	6.15	30.90	29.00	-1.90	
			18	12	21.39	9.39		62.09		
			17L	13	19.00	6.00	30.90	30.15	-0.75	
			17D	13	22.93	9.93	30.00	25.75	-4.25	
Z-18-03 Z-18-07	S267	1	20L	13	18.77	5.77	34.00	42.08	8.08	8
			20D	13	21.88	8.88	24.99	24.55	-0.44	
			21	12	21.77	9.77		38.81		
			22L	13	22.18	9.18	25.04	26.48	1.44	
			22D	13	18.91	5.91	34.00	41.46	7.46	
Z-18-01 Z-18-07	S268	1	33L	13	21.09	8.09	31.10	35.84	4.74	8
			33D	13	16.96	3.96	30.00	31.73	1.73	
			34	12	21.19	9.19		36.87		
			35L	13	13.87	0.87	30.00	30.01	0.01	
			35D	13	22.60	9.60	31.10	29.84	-1.26	
Z-18-01 Z-18-06	S269	1	42L	13	16.33	3.33	30.00	37.70	7.70	8
			42D	13	21.50	8.50	31.10	33.75	2.65	
			43	12	20.45	8.45		53.64		
			44L	13	21.92	8.92	31.10	37.65	6.55	

			44D	13	16.82	3.82	30.00	35.62	5.62	
Z-18-06 Z-18-05	S264	1	52L	13	20.67	7.67	24.95	27.21	2.26	8
			52D	13	20.47	7.47	34.00	41.20	7.20	
			53	12	20.44	8.44		46.06		
			54L	13	20.43	7.43	34.00	39.81	5.81	
			54D	13	19.09	6.09	24.94	22.43	-2.51	
Z-18-09 Z-18-10	PS263	2	57L	13	17.83	4.83	30.00	33.55	3.55	8
			57D	13	14.79	1.79	30.91	31.03	0.12	
			58	12	18,40	6.40		39.37		
			59L	13	15.30	2.30	30.91	31.64	0.73	
			59D	13	18,84	5.84	30.00	35.81	5.81	
D-18-18 D-18-19	S262	1	60L	13	21,10	8.10	29.85	27.09	-2.76	8
			60D	13	16.96	3.96	24.00	28.26	4.26	
			61	12	20.20	8.20		26.02		
			62L	13	13.31	0.31	24.00	20.97	-3.03	
			62D	13	19.98	6.98	24.33	22.00	-2.33	
D-18-15 D-18-16	S261	1	63L	13	22.49	9.49	21.09	22.71	1.62	8
			63D	13	21.91	8.91	24.00	25.68	1.68	
			64	12	21.11	9.11		38.40		
			65L	13	21.88	8.88	24.00	25.83	1.83	
			65D	13	22.08	9.08	21.51	22.92	1.41	

Prilog 6.10.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 10

Istrošenje poprečnog presjeka srcišta skretnice PS263

Lokacija 10: Okretnica Zaprođe

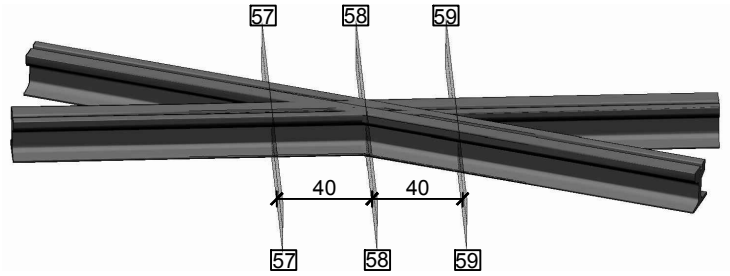
MJ: 1:2

Annex 6.10.2.1. Cross section wear in turnouts at Location 10

Cross section wear in turnout PS263

Location 10: Terminus Zaprođe

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

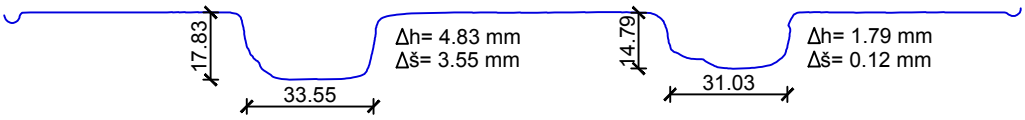
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Sopot ⟶ Most Mladost

Direction: Sopot ⟶ Most Mladost

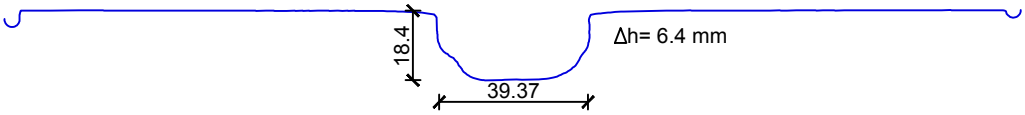
PROFIL 57

PROFILE 57



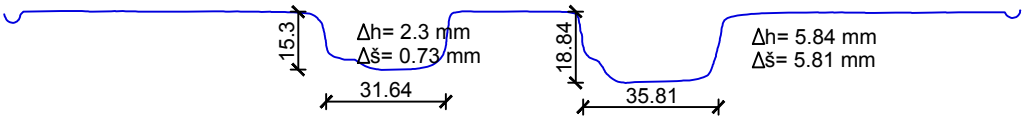
PROFIL 58

PROFILE 58



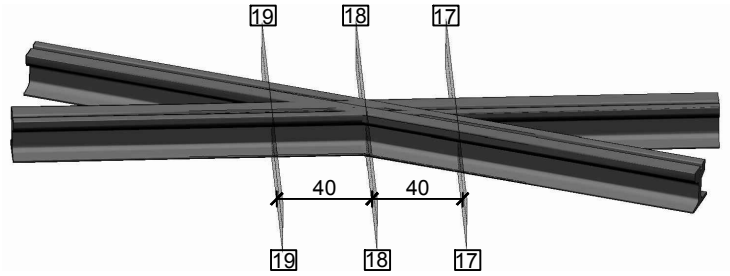
PROFIL 59

PROFILE 59



Prilog 6.10.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 10
Istrošenje poprečnog presjeka srcišta skretnice PS270
Lokacija 10: Okretnica Zaprođe
MJ: 1:2

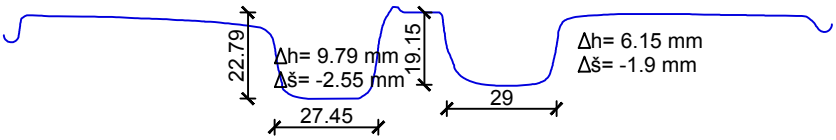
Annex 6.10.2.1. Cross section wear in turnouts at Location 10
Cross section wear in turnout PS270
Location 10: Terminus Zaprođe
Scale: 1:2



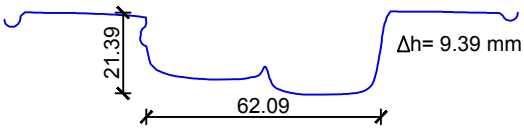
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Sopot → Zaprođe
Direction: Sopot → Zaprođe

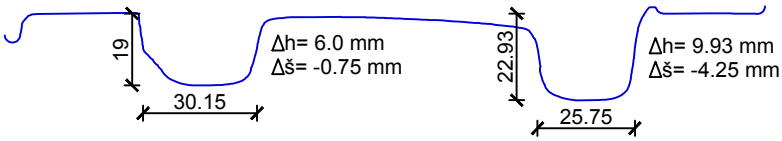
PROFIL 19
PROFILE 19



PROFIL 18
PROFILE 18



PROFIL 17
PROFILE 17



Prilog 6.10.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 10

Istrošenje poprečnog presjeka srcišta skretnice S261

Lokacija 10: Okretnica Zaprođe

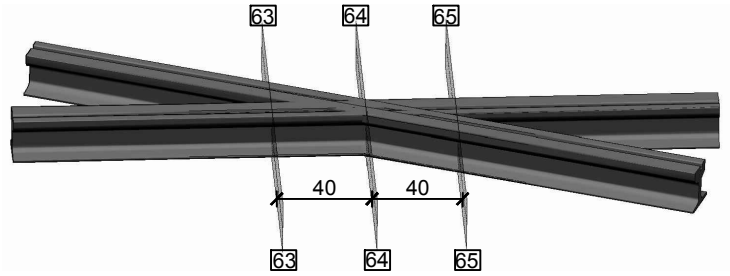
MJ: 1:2

Annex 6.10.2.1. Cross section wear in turnouts at Location 10

Cross section wear in turnout S261

Location 10: Terminus Zaprođe

Scale: 1:2

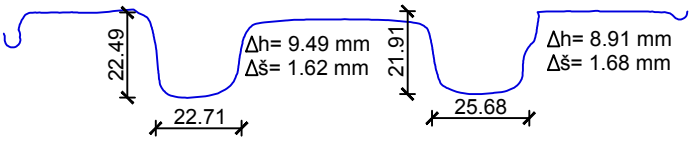


Δh - visinsko istrošenje
Δš - bočno istrošenje

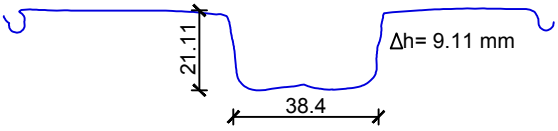
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Sopot ⟶ Most Mladost
Direction: Sopot ⟶ Most Mladost

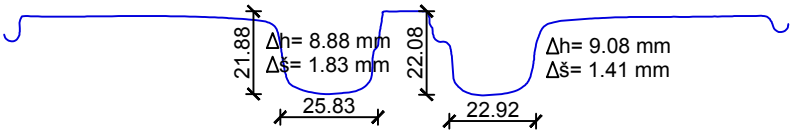
PROFIL 63
PROFILE 63



PROFIL 64
PROFILE 64



PROFIL 65
PROFILE 65



Prilog 6.10.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 10

Istrošenje poprečnog presjeka srcišta skretnice S262

Lokacija 10: Okretnica Zaprođe

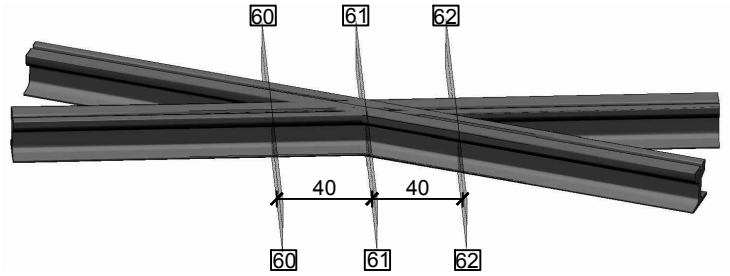
MJ: 1:2

Annex 6.10.2.1. Cross section wear in turnouts at Location 10

Cross section wear in turnout S262

Location 10: Terminus Zaprođe

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

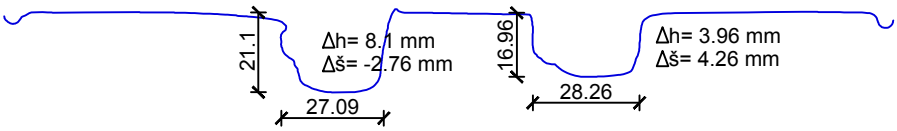
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Sopot → Most Mladost

Direction: Sopot → Most Mladost

PROFIL 60

PROFILE 60

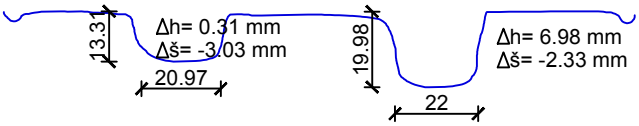


PROFIL 61

PROFILE 61

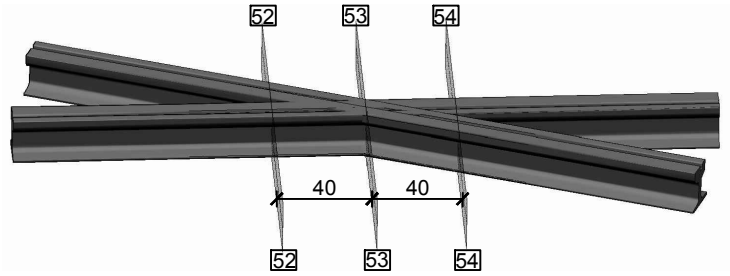
PROFIL 62

PROFILE 62



Prilog 6.10.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 10
Istrošenje poprečnog presjeka srcišta skretnice S264
Lokacija 10: Okretnica Zaprođe
MJ: 1:2

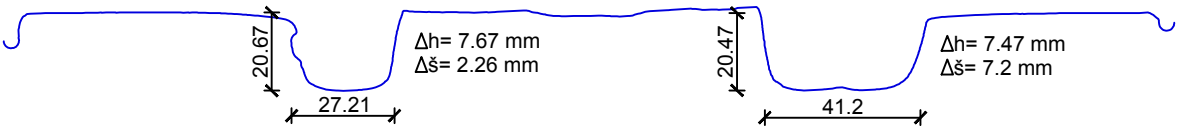
Annex 6.10.2.1. Cross section wear in turnouts at Location 10
Cross section wear in turnout S264
Location 10: Terminus Zaprođe
Scale: 1:2



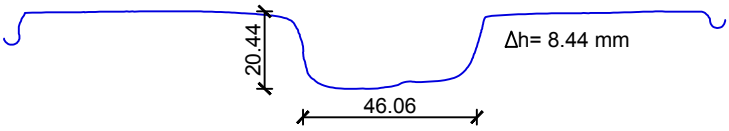
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Sopot ⟶ Most Mladost
Direction: Sopot ⟶ Most Mladost

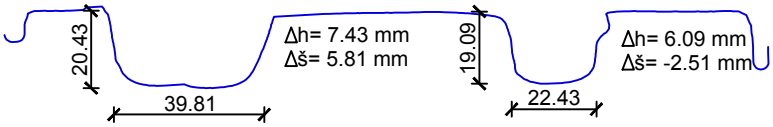
PROFIL 52
PROFILE 52



PROFIL 53
PROFILE 53

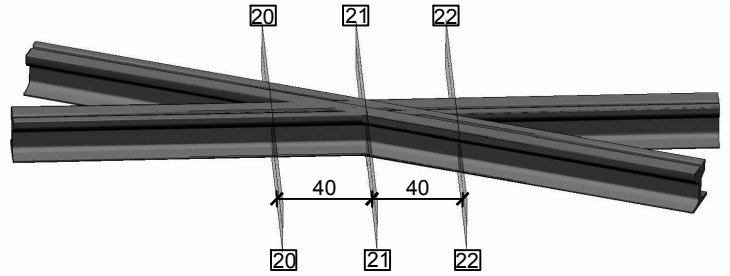


PROFIL 54
PROFILE 54



Prilog 6.10.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 10
Istrošenje poprečnog presjeka srcišta skretnice S267
Lokacija 10: Okretnica Zaprođe
MJ: 1:2

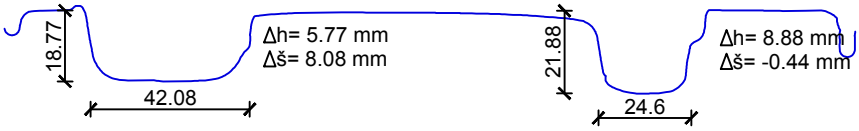
Annex 6.10.2.1. Cross section wear in turnouts at Location 10
Cross section wear in turnout S267
Location 10: Terminus Zaprođe
Scale: 1:2



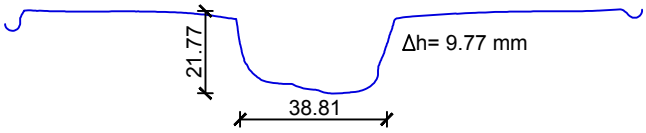
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu
Direction: through terminus

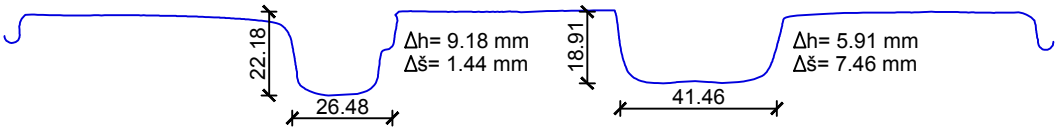
PROFIL 20
PROFILE 20



PROFIL 21
PROFILE 21

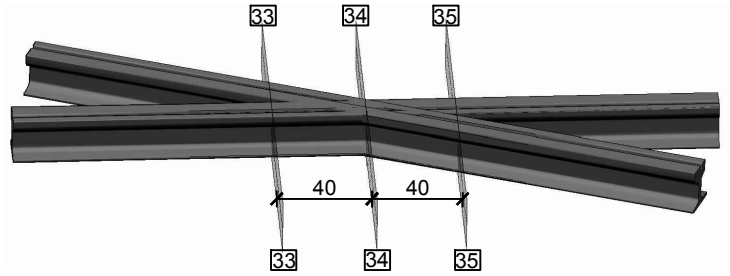


PROFIL 22
PROFILE 22



Prilog 6.10.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 10
Istrošenje poprečnog presjeka srcišta skretnice S268
Lokacija 10: Okretnica Zaprođe
MJ: 1:2

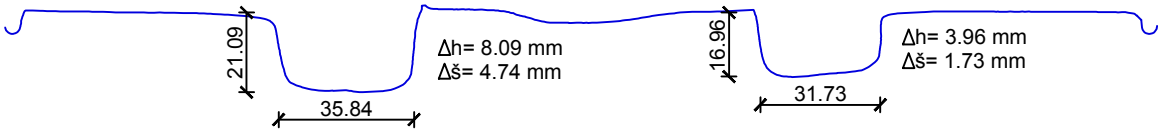
Annex 6.10.2.1. Cross section wear in tournouts at Location 10
Cross section wear in turnout S268
Location 10: Terminus Zaprođe
Scale: 1:2



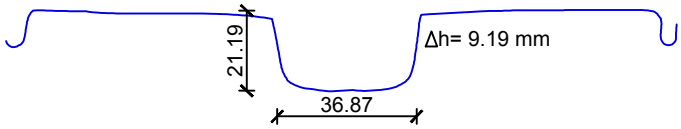
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Most Mladost → Sopot
Direction: Most Mladost → Sopot

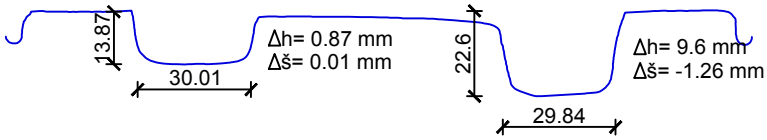
PROFIL 33
PROFILE 33



PROFIL 34
PROFILE 34



PROFIL 35
PROFILE 35



Prilog 6.10.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 10

Istrošenje poprečnog presjeka srcišta skretnice S269

Lokacija 10: Okretnica Zaprođe

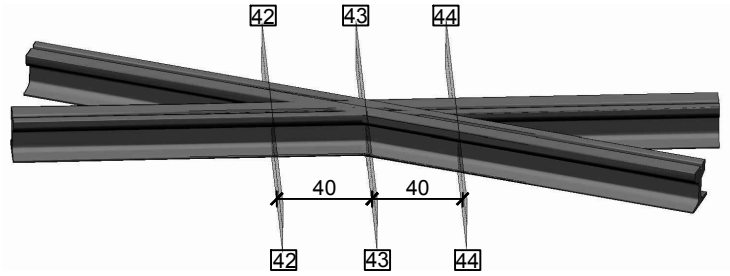
MJ: 1:2

Annex 6.10.2.1. Cross section wear in turnouts at Location 10

Cross section wear in turnout S269

Location 10: Terminus Zaprođe

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

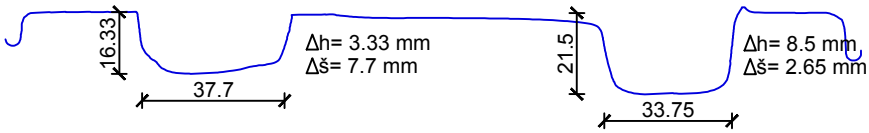
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Most Mladost ⟶ Sopot

Direction: Most Mladost ⟶ Sopot

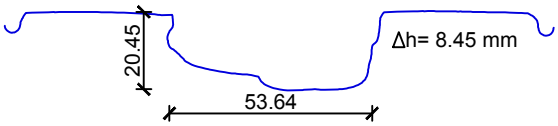
PROFIL 42

PROFILE 42



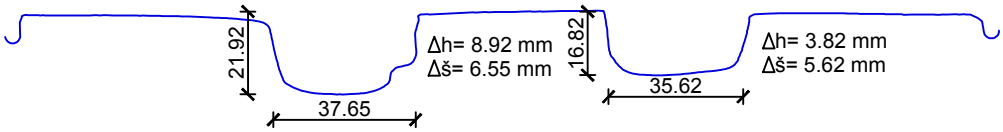
PROFIL 43

PROFILE 43



PROFIL 44

PROFILE 44



Prilog 6.10.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 10

Istrošenje poprečnog presjeka srcišta skretnice S271

Lokacija 10: Okretnica Zapruđe

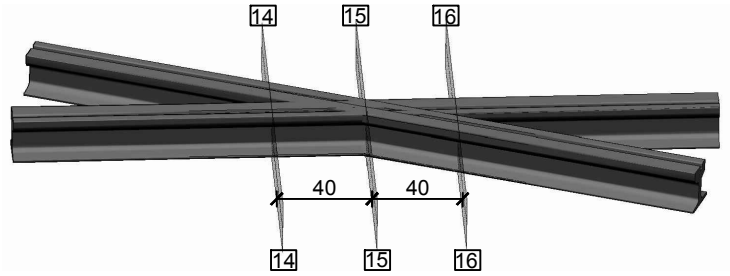
MJ: 1:2

Annex 6.10.2.1. Cross section wear in turnouts at Location 10

Cross section wear in turnout S271

Location 10: Terminus Zapruđe

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

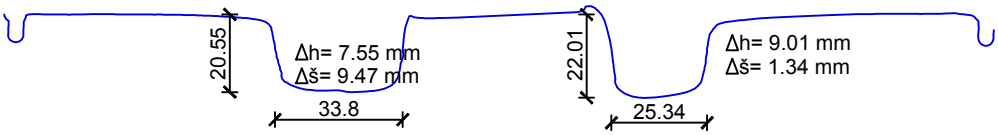
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Zapruđe ⟶ Sopot

Direction: Zapruđe ⟶ Sopot

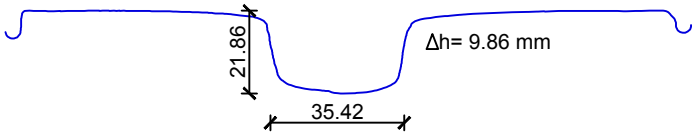
PROFIL 14

PROFILE 14



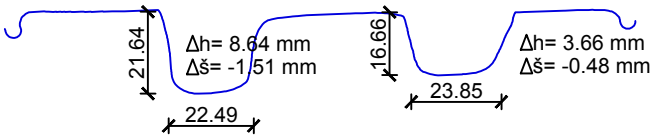
PROFIL 15

PROFILE 15



PROFIL 16

PROFILE 16



Prilog 6.10.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 10

Istrošenje poprečnog presjeka srcišta skretnice S272

Lokacija 10: Okretnica Zapruđe

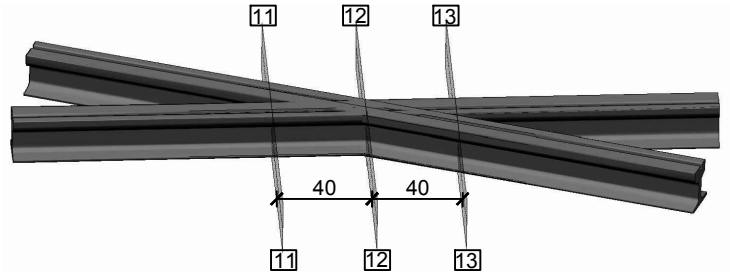
MJ: 1:2

Annex 6.10.2.1. Cross section wear in turnouts at Location 10

Cross section wear in turnout S272

Location 10: Terminus Zapruđe

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

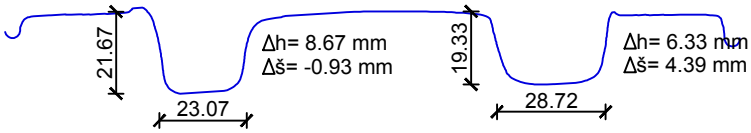
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Zapruđe ⟶ Sopot

Direction: Zapruđe ⟶ Sopot

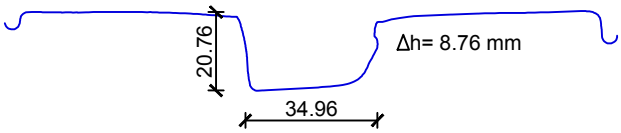
PROFIL 11

PROFILE 11



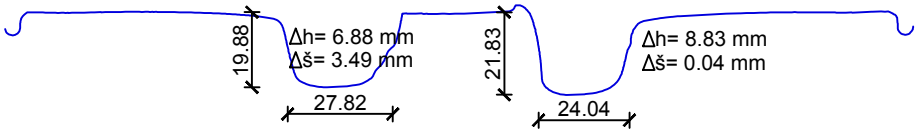
PROFIL 12

PROFILE 12



PROFIL 13

PROFILE 13



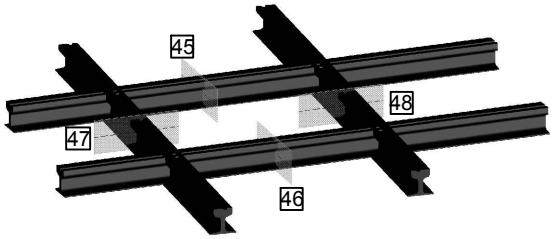
Prilog 6.10.3. **Rezultati istrošenja profila tračnica u križalištima na Lokaciji 10**
Lokacija 10: Okretnica Zapruđe

Annex 6.10.3. **Results of cross section wear in track crossing at Location 10**
Location 10: Terminus Zapruđe

Dionice Sections	**Oznaka križališta** Track crossing mark	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
Z-18-02 Z-18-07	K88	28	12	18,08	6.08	30.00	30.96	0.96	3
		29	12	16,34	4.34	30.00	31.67	1.67	
		30	12	13,16	1.16	34.00	34.69	0.69	
		31	12	13,75	1.75	34.00	34.05	0.05	
Z-18-02 Z-18-06	K87	45	12	22,87	10.87	30.00	30.91	0.91	3
		46	12	20,97	8.97	30.00	33.12	3.12	
		47	12	18,33	6.33	34.00	39.62	5.62	
		48	12	17,28	5.28	34.00	41.79	7.79	

Prilog 6.10.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 10
Istrošenje poprečnog presjeka tračnica u križalištu K87
Lokacija 10: Okretnica Zaprođe
MJ: 1:2

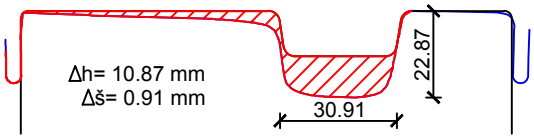
Annex 6.10.3.1. Cross section wear in track crossings at Location 10
Cross section wear in track crossing K87
Location 10: Terminus Zaprođe
Scale: 1:2



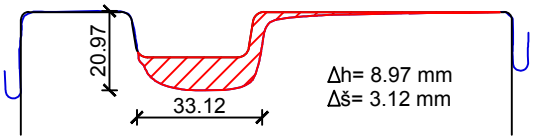
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh vertical wear
Δš - lateral wear

Smjer vožnje: Sopot ⟶ Most Mladost
Direction: Sopot ⟶ Most Mladost

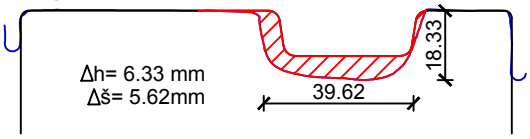
PROFIL 45
PROFILE 45



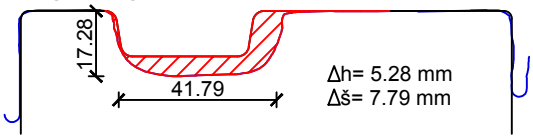
PROFIL 46
PROFILE 46



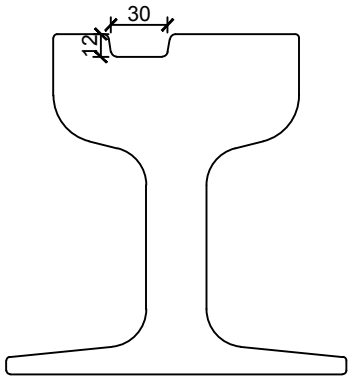
PROFIL 47
PROFILE 47



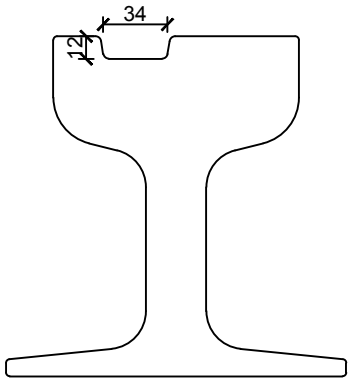
PROFIL 48
PROFILE 48



PROFIL 45, 46 PROFILE 45, 46
R = 51 m

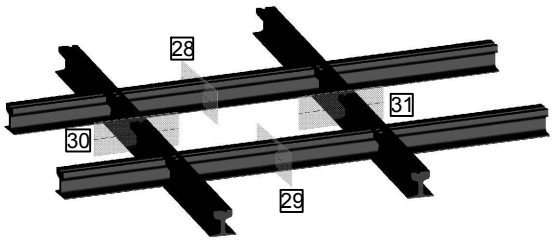


PROFIL 47, 48 PROFILE 47, 48
R = 21 m



Prilog 6.10.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 10
Istrošenje poprečnog presjeka tračnica u križalištu K88
Lokacija 10: Okretnica Zaprođe
MJ: 1:2

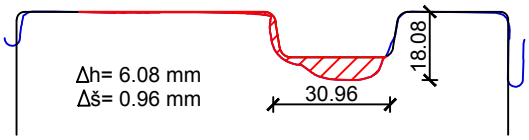
Annex 6.10.3.1. Cross section wear in track crossings at Location 10
Cross section wear in track crossing K88
Location 10: Terminus Zaprođe
Scale: 1:2



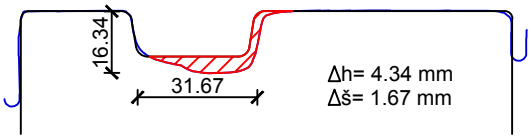
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Sopot ⟶ Most Mladost
Direction: Sopot ⟶ Most Mladost

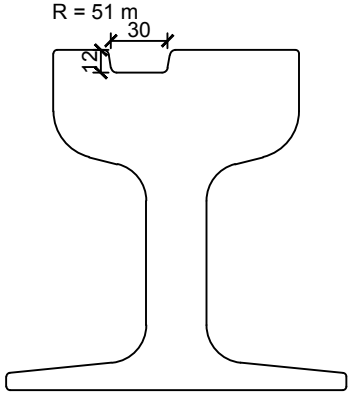
PROFIL 28
PROFILE 28



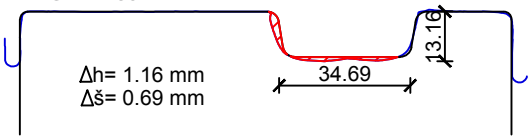
PROFIL 29
PROFILE 29



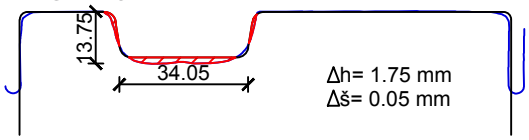
PROFIL 28, 29 PROFILE 28, 29
R = 51 m



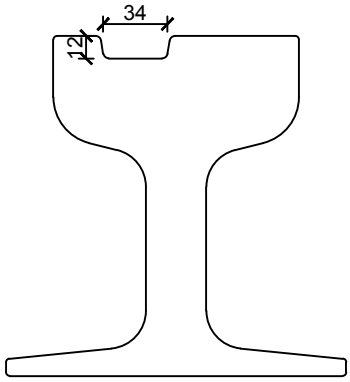
PROFIL 30
PROFILE 30



PROFIL 31
PROFILE 31

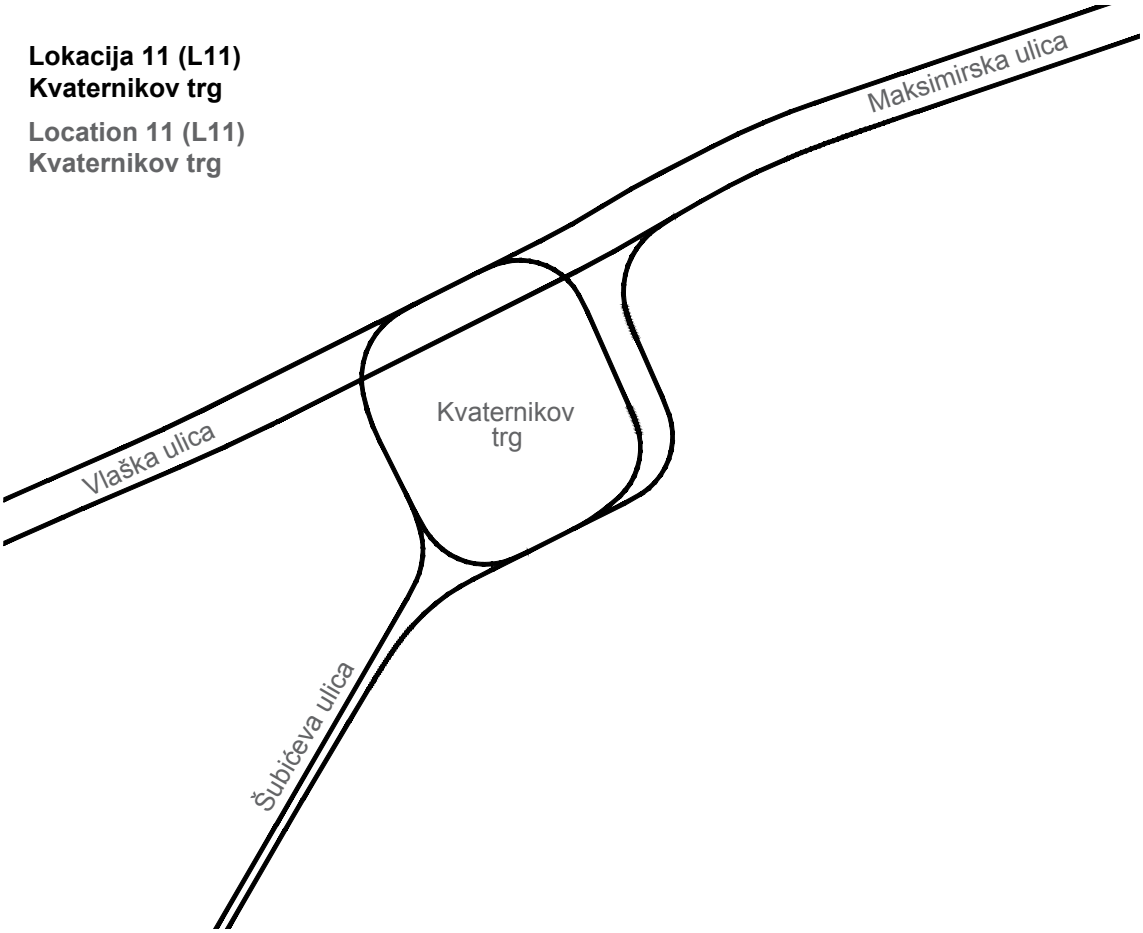


PROFIL 30, 31 PROFILE 30, 31
R = 21 m



Lokacija 11 (L11)
Kvaternikov trg

Location 11 (L11)
Kvaternikov trg



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija ra□voja tramvajskog prometa □rada □agre□a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition

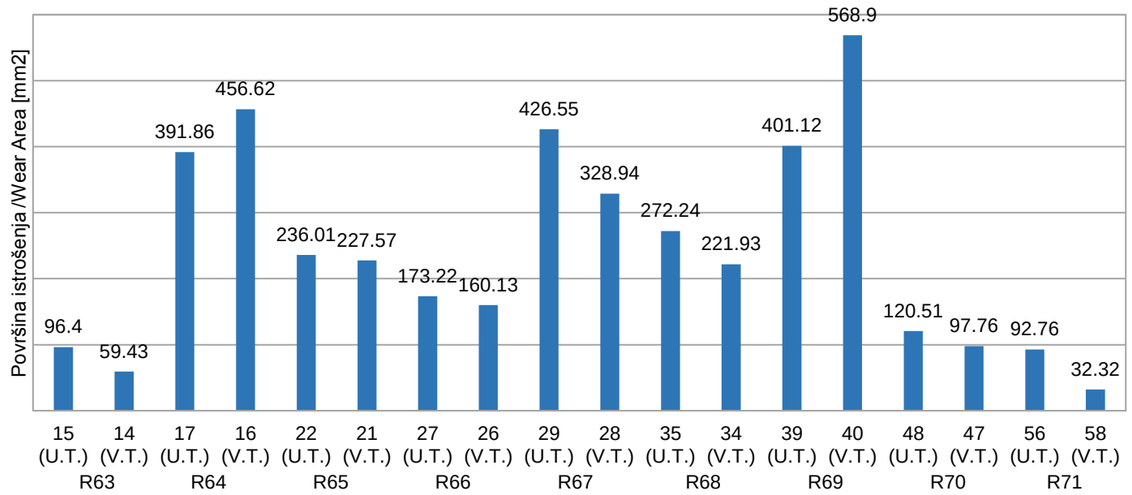
SADRŽAJ PRILOGA:
ANNEX:

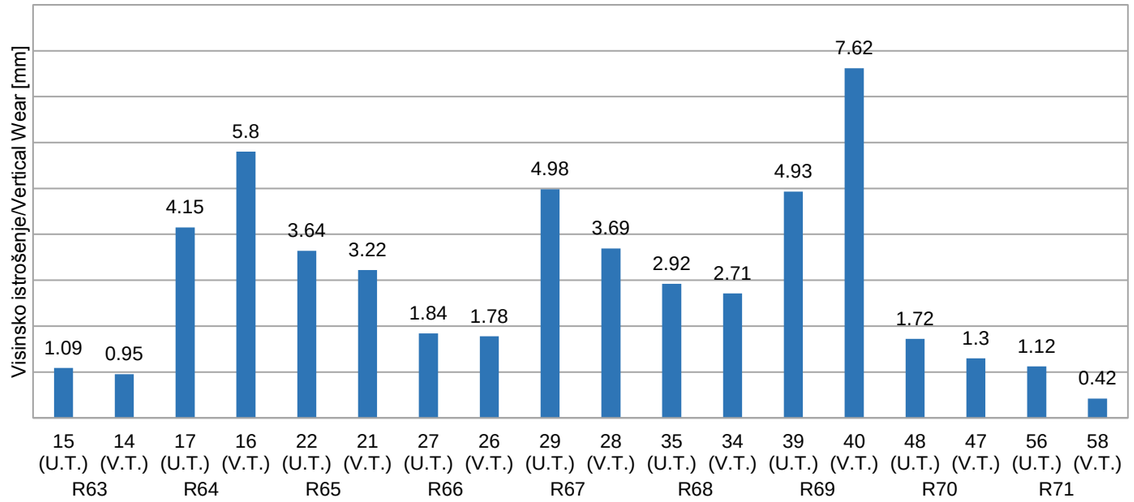
Istrošenje poprečnih presjeka tračnica u krivinama, skretnicama i križalištima na Lokaciji 11

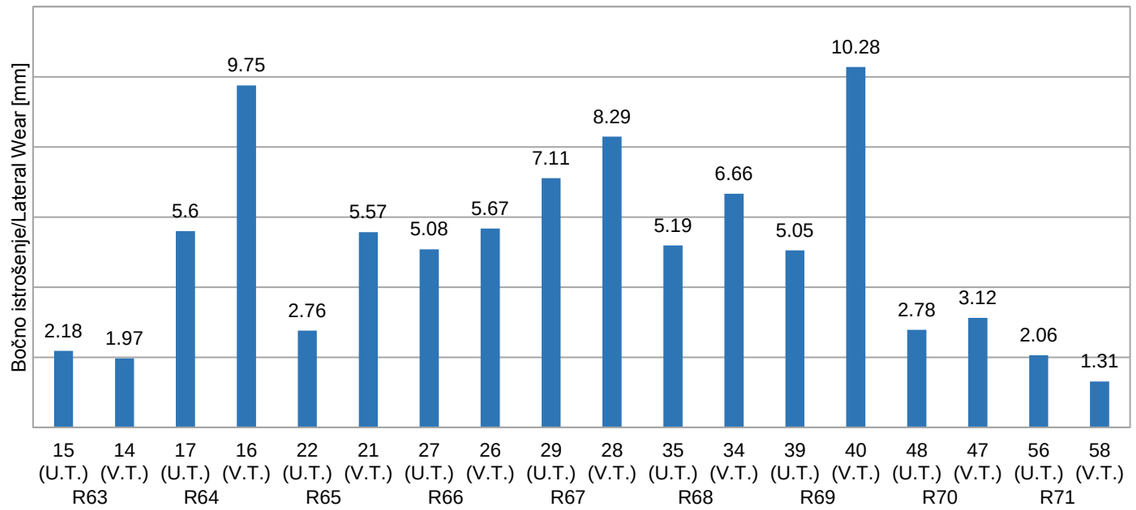
Rail cross section wear in curves, turnouts and crossings at Location 11

MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.11

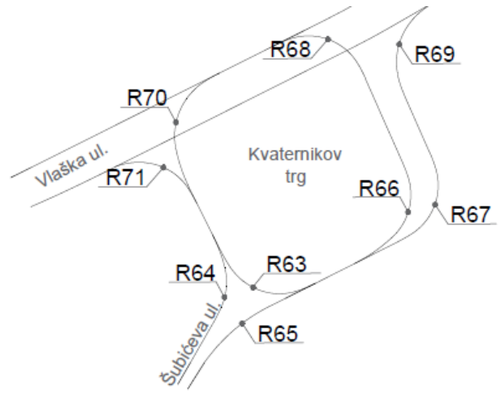
Prilog 6.11.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 11**
Lokacija 11: Kvaternikov trg
Annex 6.11.1. **Results of cross section wear in curves at Location 11**
Location 11: Kvaternikov trg







U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve



Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [ ]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
Z-10-10	R63	lijeva left	15	lijeva/left	96.4	1.09	2.18	76.13	25	11
			14	desna/right	59.43	0.95	1.97	72.74		
D-34-01	R64	desna right	16	lijeva/left	456.62	5.8	9.75	71.84	21	11
			17	desna/right	391.86	4.15	5.6	76.75		
D-34-02	R65	desna right	21	lijeva/left	227.57	3.22	5.57	78.72	54	11
			22	desna/right	236.01	3.64	2.76	82.87		
Z-10-03	R66	lijeva left	27	lijeva/left	173.22	1.84	5.08	75.57	18	11
			26	desna/right	160.13	1.78	5.67	68.62		
Z-10-02	R67	lijeva left	29	lijeva/left	426.55	4.98	7.11	76.17	18	11
			28	desna/right	328.94	3.69	8.29	67.53		
Z-10-03	R68	lijeva left	35	lijeva/left	272.24	2.92	5.19	74.12	18	11
			34	desna/right	221.93	2.71	6.66	70.43		
Z-10-02	R69	desna right	40	lijeva/left	568.9	7.62	10.28	71.75	20	11
			39	desna/right	401.12	4.93	5.05	77.97		
Z-10-04	R70	lijeva left	48	lijeva/left	120.51	1.72	2.78	76.68	20	11
			47	desna/right	97.76	1.3	3.12	75		
-	R71	desna right	58	lijeva/left	32.32	0.42	1.31	71.15	18	
			56	desna/right	92.76	1.12	2.06	76.73		

Prilog 6.11.1. Rezultati istrošenja profila tračnica u krivinama na Lokaciji 11
Lokacija 11: Kvaternikov trg

Annex 6.11.1. Results of cross section wear in curves at Location 11
Location 11: Kvaternikov trg

Dionica Section	**Oznaka krivine** Curve mark	**Krivina** Curve	**Profil** Profile	**Tračnica** Rail	**Istrošenje** / Rail wear		
					Površina Area **P [mm2]**	**Visinsko** Vertical **h [mm]**	**Bočno** Lateral **a [mm]**
Z-10-10	R63	lijeva left	15	lijeva/left	96.4	1.09	2.18
			14	desna/right	59.43	0.95	1.97
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-36.97	-0.14	-0.21
D-34-01	R64	desna right	16	lijeva/left	456.62	5.8	9.75
			17	desna/right	391.86	4.15	5.6
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					64.76	1.65	4.15
D-34-02	R65	desna right	21	lijeva/left	227.57	3.22	5.57
			22	desna/right	236.01	3.64	2.76
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-8.44	-0.42	2.81
Z-10-03	R66	lijeva left	27	lijeva/left	173.22	1.84	5.08
			26	desna/right	160.13	1.78	5.67
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-13.09	-0.06	0.59
Z-10-02	R67	lijeva left	29	lijeva/left	426.55	4.98	7.11
			28	desna/right	328.94	3.69	8.29
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-97.61	-1.29	1.18
Z-10-03	R68	lijeva left	35	lijeva/left	272.24	2.92	5.19
			34	desna/right	221.93	2.71	6.66
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-50.31	-0.21	1.47
Z-10-02	R69	desna right	40	lijeva/left	568.9	7.62	10.28
			39	desna/right	401.12	4.93	5.05
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					167.78	2.69	5.23
Z-10-04	R70	lijeva left	48	lijeva/left	120.51	1.72	2.78
			47	desna/right	97.76	1.3	3.12
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-22.75	-0.42	0.34
-	R71	desna right	58	lijeva/left	32.32	0.42	1.31
			56	desna/right	92.76	1.12	2.06
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-60.44	-0.7	-0.75

Prilog 6.11.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 11

Istrošenje poprečnog presjeka tračnica u krivini R63

Lokacija 11: Kvaternikov trg

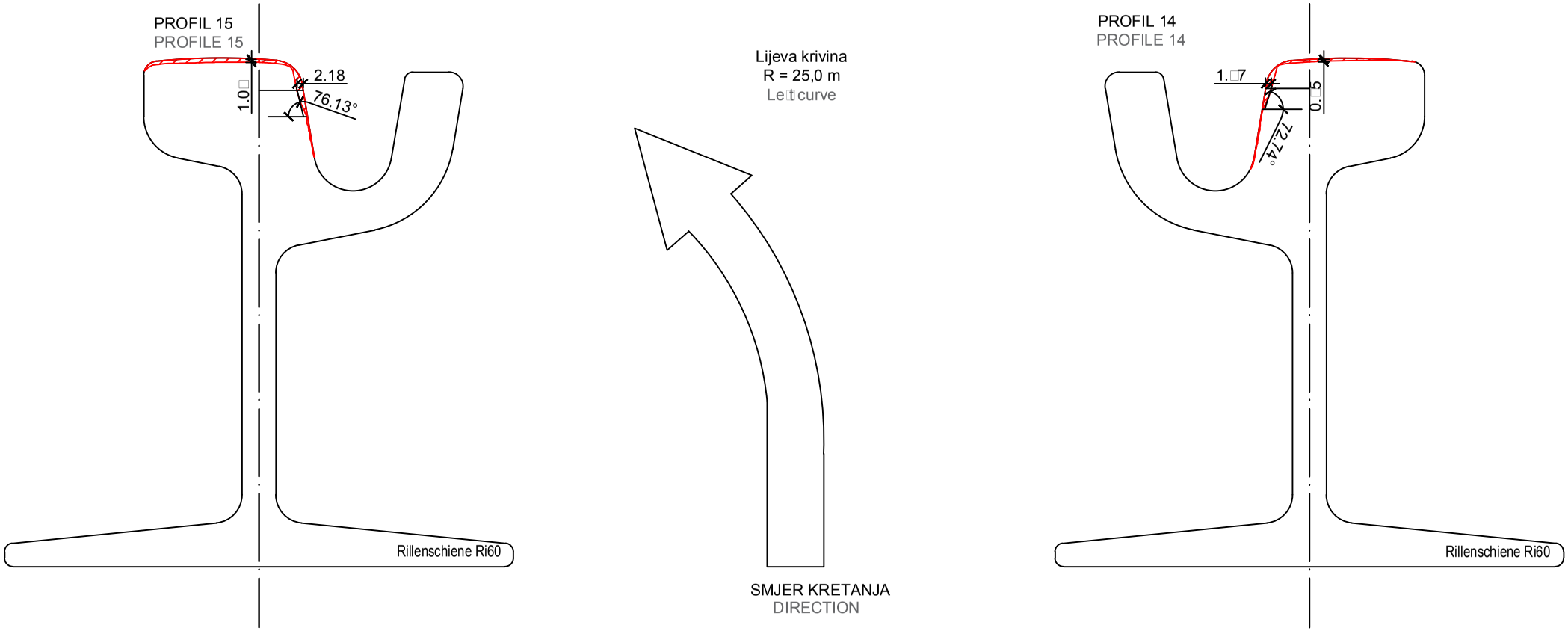
MJ: 1:2

Annex 6.11.1.1. Cross section wear in curves at Location 11

Cross section wear in curve R63

Location 11: Kvaternikov trg

Scale: 1:2



Prilog 6.11.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 11

Istrošenje poprečnog presjeka tračnica u krivini R64

Lokacija 11: Kvaternikov trg

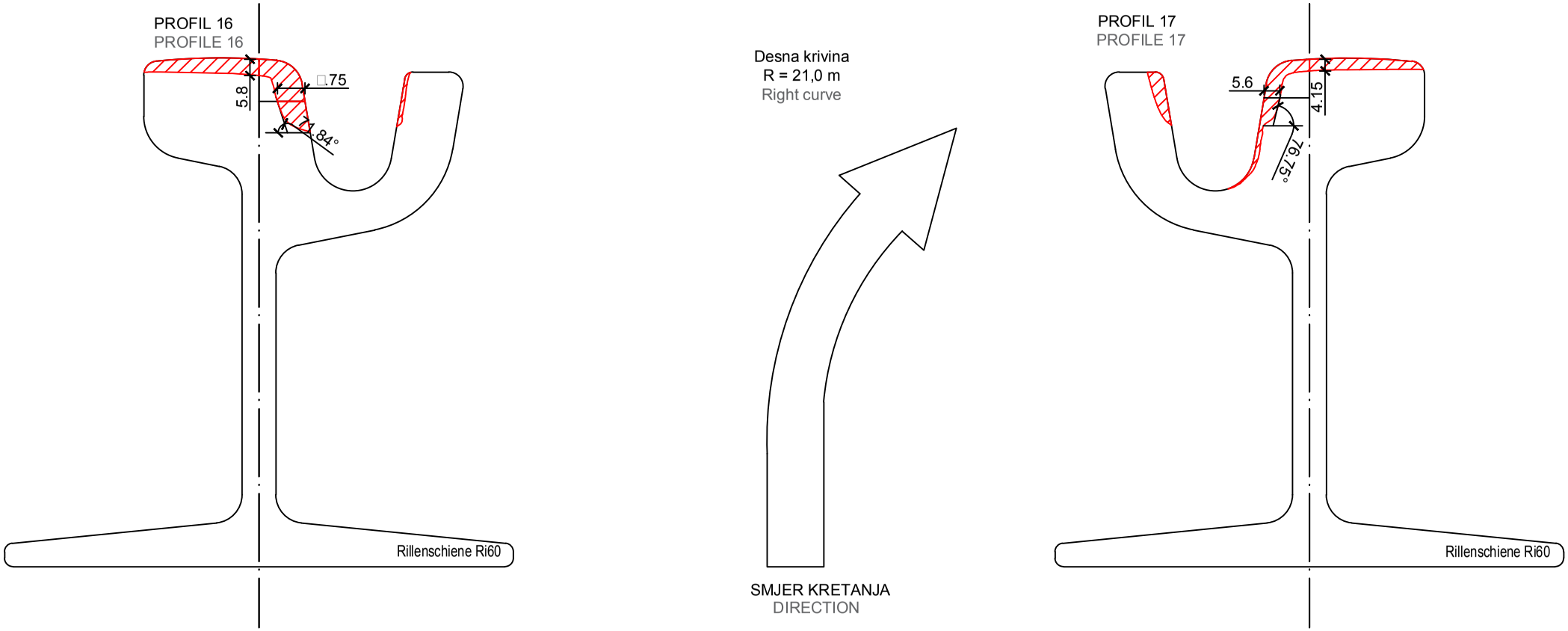
MJ: 1:2

Annex 6.11.1.1. Cross section wear in curves at Location 11

Cross section wear in curve R64

Location 11: Kvaternikov trg

Scale: 1:2



Prilog 6.11.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 11

Istrošenje poprečnog presjeka tračnica u krivini R65

Lokacija 11: Kvaternikov trg

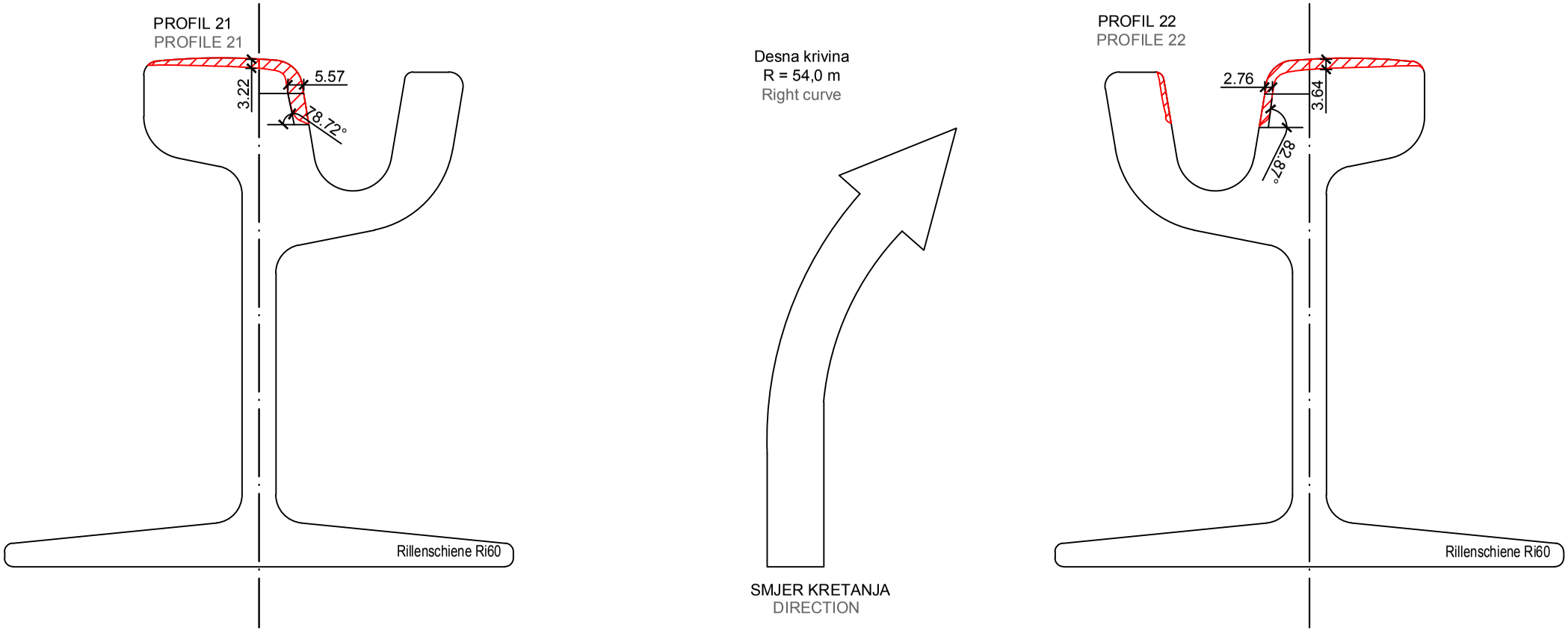
MJ: 1:2

Annex 6.11.1.1. Cross section wear in curves at Location 11

Cross section wear in curve R65

Location 11: Kvaternikov trg

Scale: 1:2



Prilog 6.11.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 11

Istrošenje poprečnog presjeka tračnica u krivini R66

Lokacija 11: Kvaternikov trg

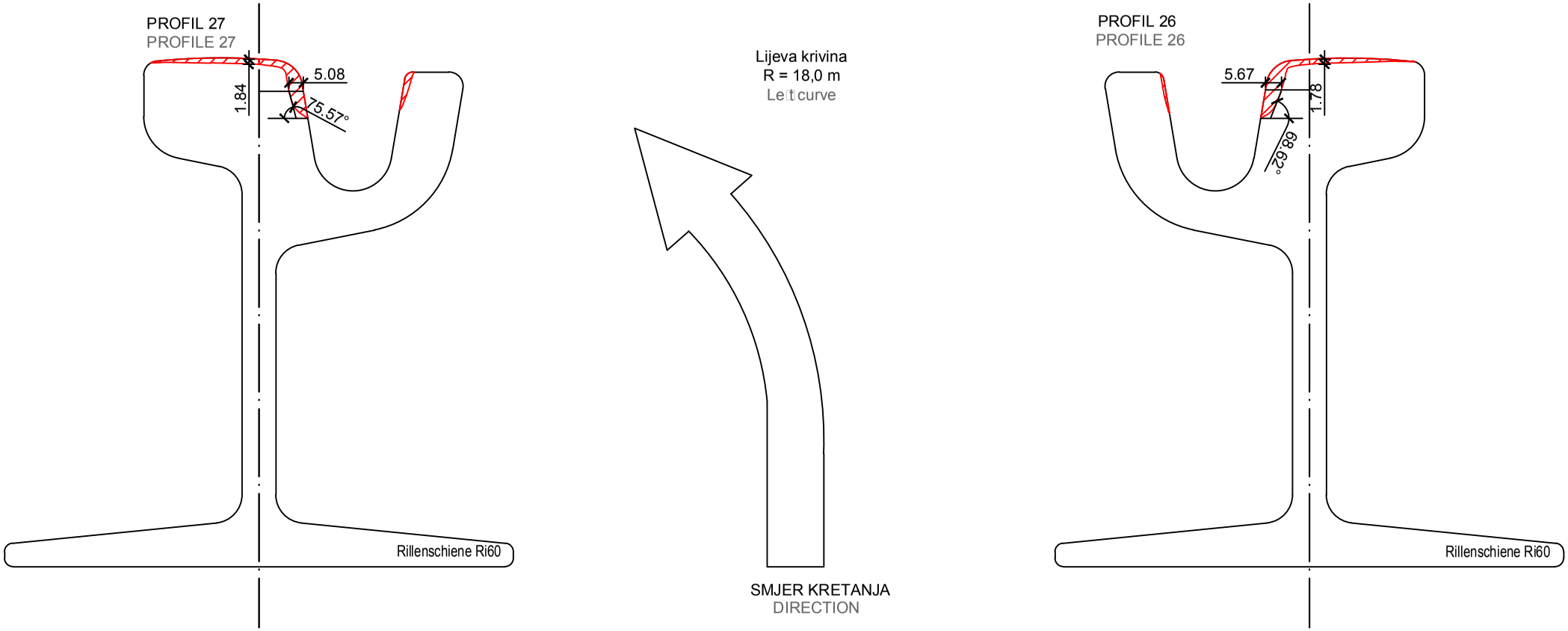
MJ: 1:2

Annex 6.11.1.1. Cross section wear in curves at Location 11

Cross section wear in curve R66

Location 11: Kvaternikov trg

Scale: 1:2



Prilog 6.11.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 11

Istrošenje poprečnog presjeka tračnica u krivini R67

Lokacija 11: Kvaternikov trg

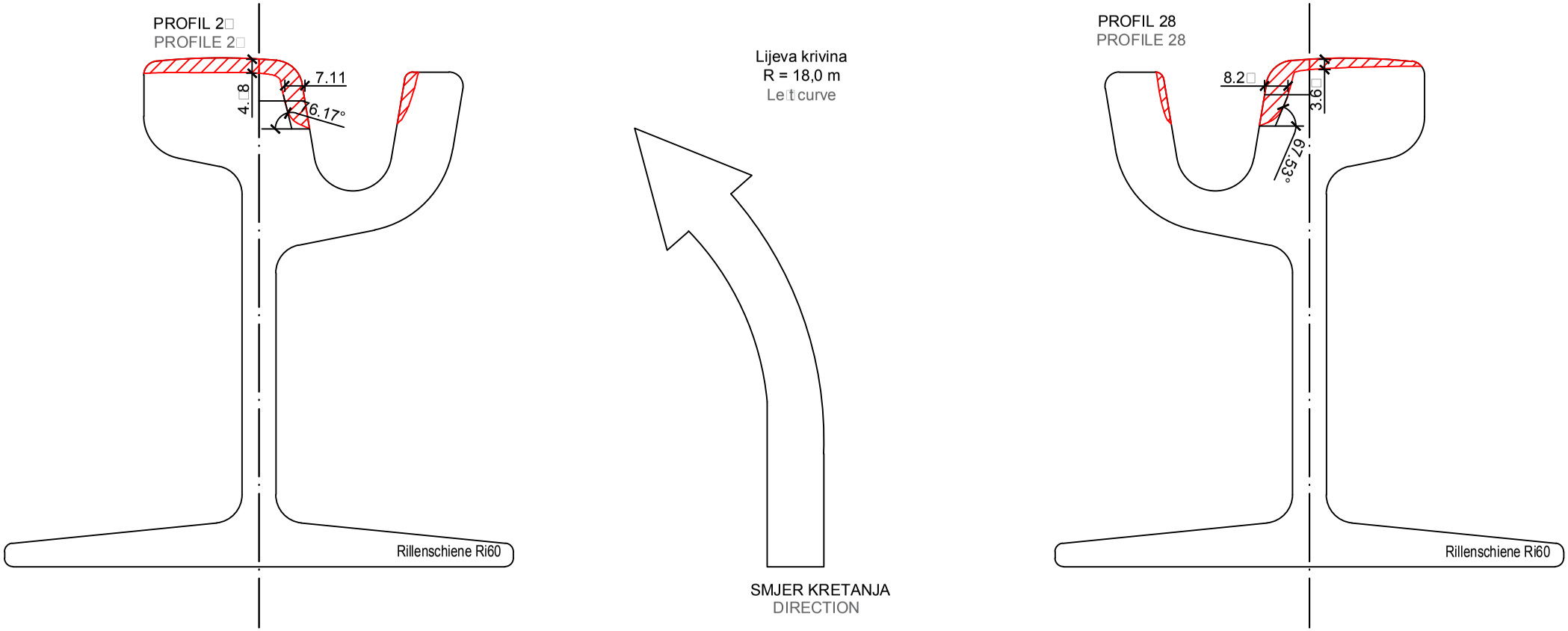
MJ: 1:2

Annex 6.11.1.1. Cross section wear in curves at Location 11

Cross section wear in curve R67

Location 11: Kvaternikov trg

Scale: 1:2



Prilog 6.11.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 11

Istrošenje poprečnog presjeka tračnica u krivini R68

Lokacija 11: Kvaternikov trg

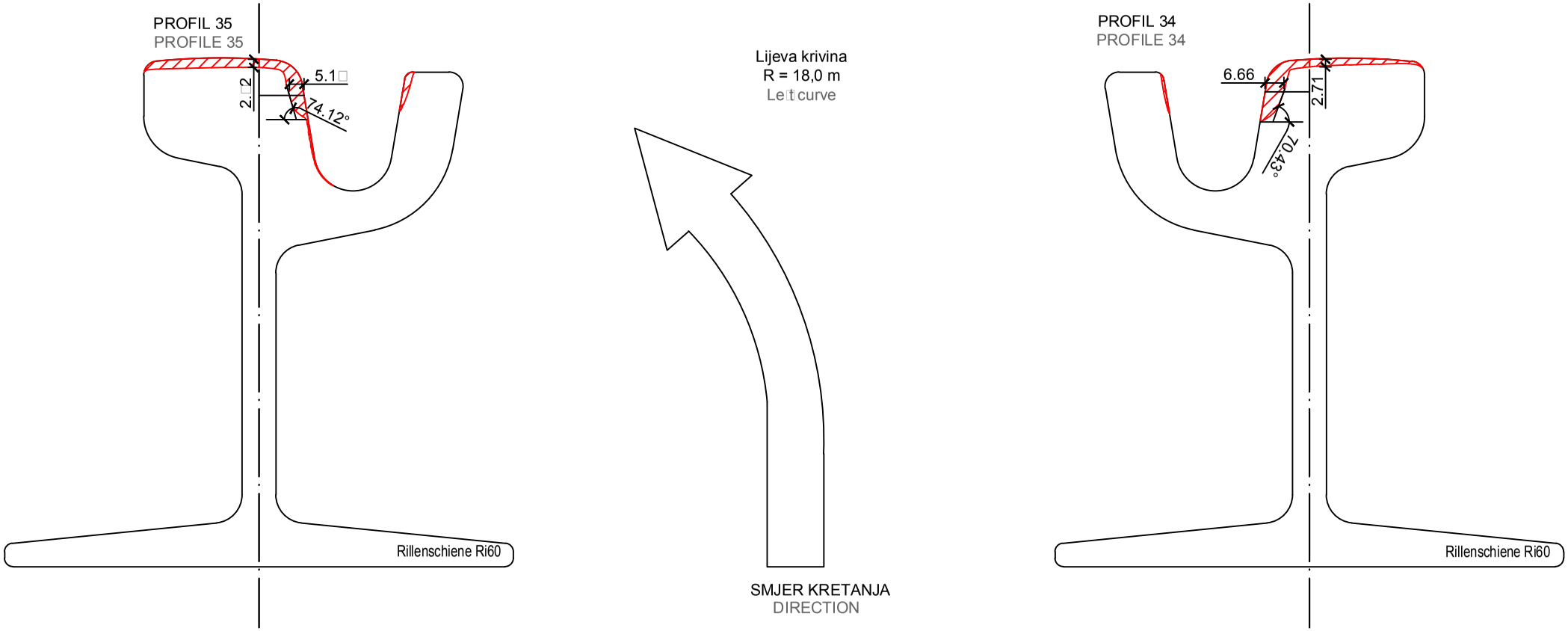
MJ: 1:2

Annex 6.11.1.1. Cross section wear in curves at Location 11

Cross section wear in curve R68

Location 11: Kvaternikov trg

Scale: 1:2



Prilog 6.11.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 11

Istrošenje poprečnog presjeka tračnica u krivini R69

Lokacija 11: Kvaternikov trg

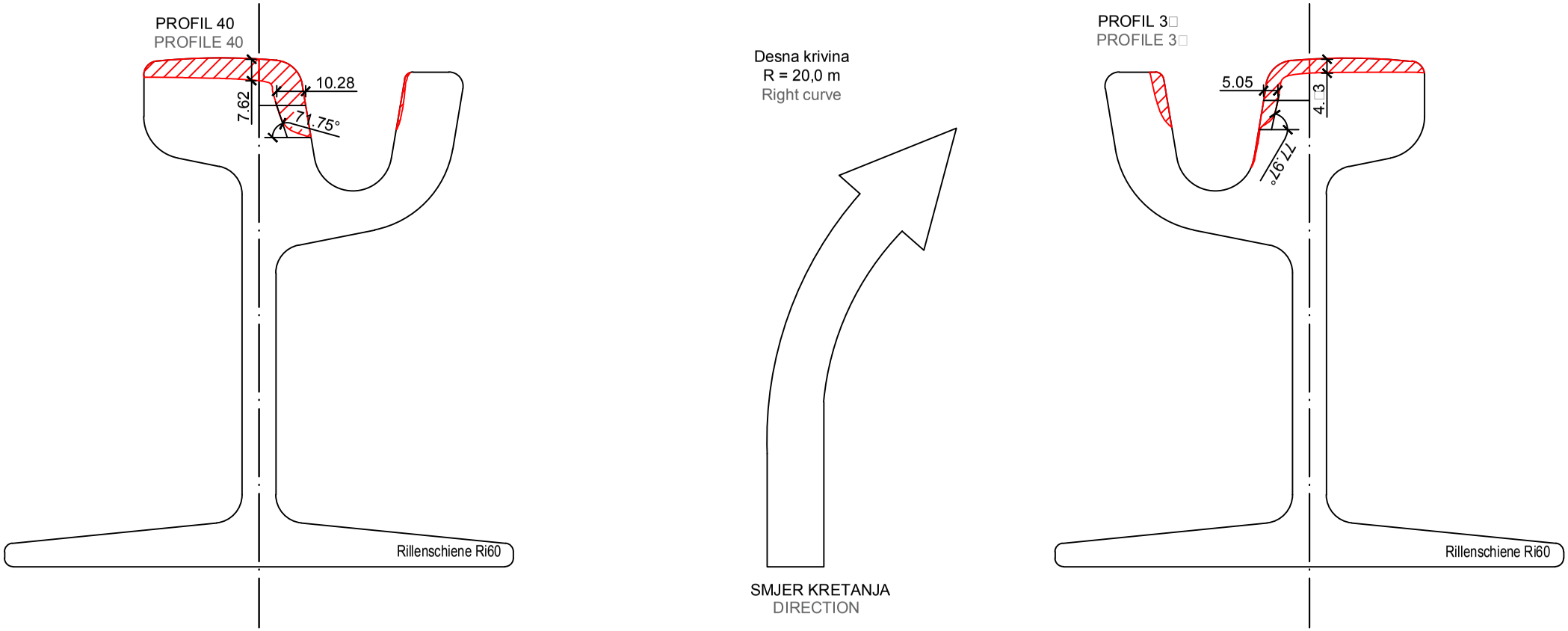
MJ: 1:2

Annex 6.11.1.1. Cross section wear in curves at Location 11

Cross section wear in curve R6

Location 11: Kvaternikov trg

Scale: 1:2



Prilog 6.11.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 11

Istrošenje poprečnog presjeka tračnica u krivini R70

Lokacija 11: Kvaternikov trg

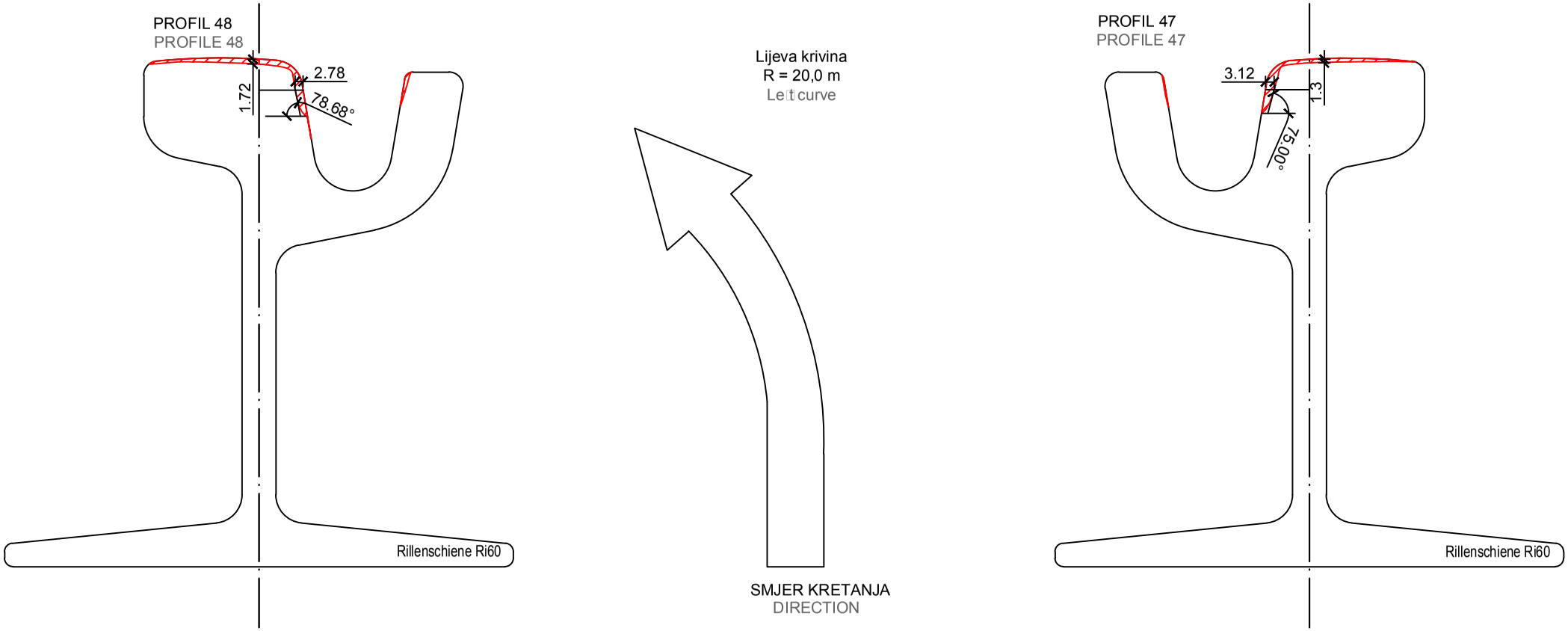
MJ: 1:2

Annex 6.11.1.1. Cross section wear in curves at Location 11

Cross section wear in curve R70

Location 11: Kvaternikov trg

Scale: 1:2



Prilog 6.11.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 11

Istrošenje poprečnog presjeka tračnica u krivini R71

Lokacija 11: Kvaternikov trg

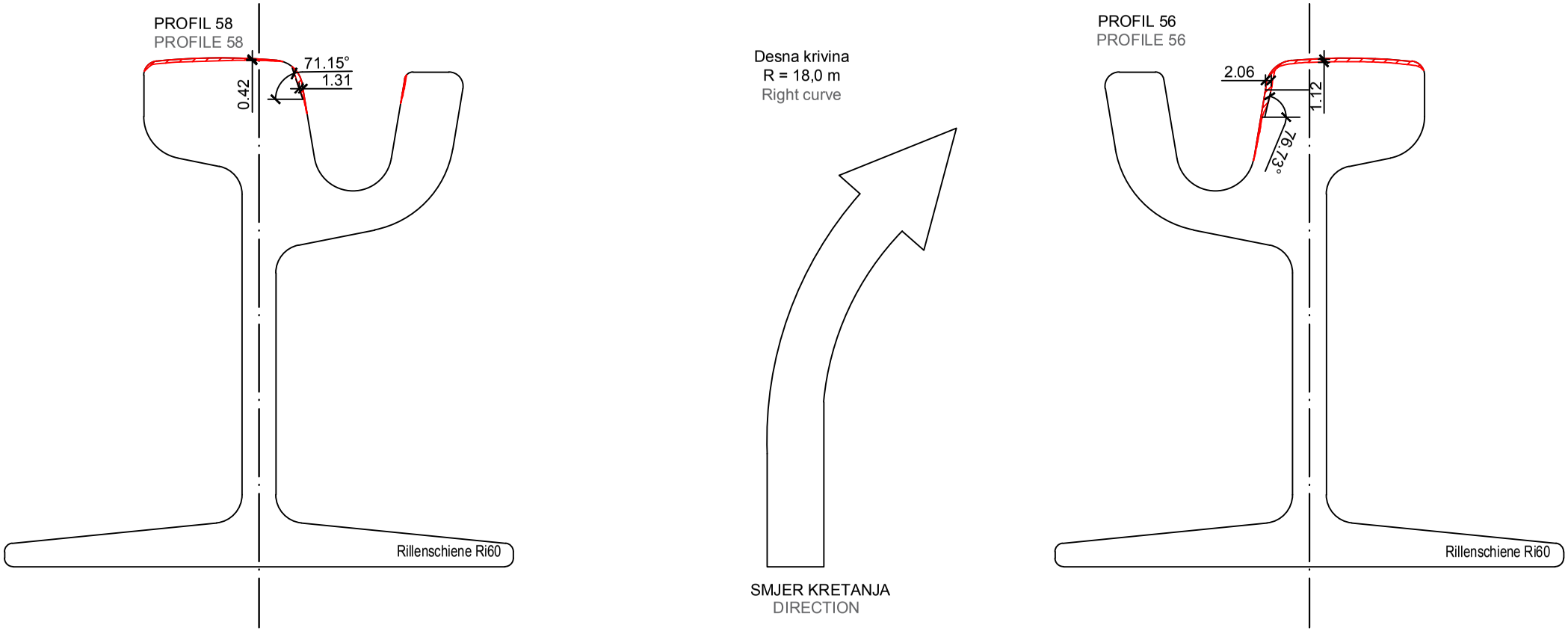
MJ: 1:2

Annex 6.11.1.1. Cross section wear in curves at Location 11

Cross section wear in curve R71

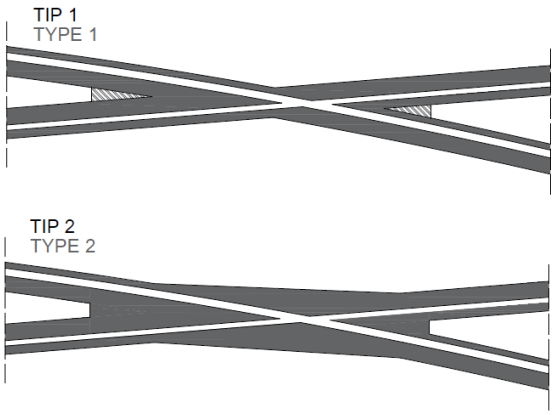
Location 11: Kvaternikov trg

Scale: 1:2



Prilog 6.11.2. **Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 11**
Lokacija 11: Kvaternikov trg

Annex 6.11.2. **Results of cross section wear in turnouts at Location 11**
Location 11: Kvaternikov trg



Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
Z-10-04 Z-10-10	S430	1	11L	13	22.37	9.37	33.64	36.22	2.58	11
			11D	13	16.28	3.28	30.00	29.63	-0.37	
			12	12	22.95	10.95		38.97		
			13L	13	13.87	0.87	30.00	28.16	-1.84	
			13D	13	23.86	10.86	35.63	33.96	-1.67	
Z-10-10 Z-10-09	S165	1	18L	13	15.55	2.55	34.00	33.54	-0.46	11
			18D	13	22.70	9.70	24.88	27.86	2.98	
			19	12	22.92	10.92		42.24		
			20L	13	22.81	9.81	24.89	27.72	2.83	
			20D	13	15.92	2.92	34.00	34.10	0.10	
Z-10-03 Z-10-02	S169	1	23L	13	22.77	9.77	24.51	26.82	2.31	11
			23D	13	17.89	4.89	30.00	29.84	-0.16	
			24	12	21.84	9.84		33.50		
			25L	13	19	6.00	30.00	27.87	-2.13	
			25D	13	22.28	9.28	24.50	25.12	0.62	
Z-10-03 Z-10-07	S25	1	36L	13	14.76	1.76	34.00	34.13	0.13	11
			36D	13	20.75	7.75	25.09	27.44	2.35	
			37	12	21.19	9.19		48.46		
			38L	13	21.01	8.01	25.08	24.45	-0.63	
			38D	13	15.38	2.38	34.00	38.58	4.58	
Z-10-02 Z-10-05	S170	1	41L	13	22.33	9.33	24.00	25.50	1.50	11
			41D	13	20.60	7.60	35.25	45.19	9.94	
			42	12	20.80	8.80		59.25		
			43L	13	20,16	7.16	35.25	48.02	12.77	
			43D	13	21,51	8.51	24.00	26.79	2.79	
Z-10-04 Z-10-08	S168	2	44L	13	20.06	7.06	24.95	22.90	-2.05	11
			44D	13	15.96	2.96	34.00	33.79	-0.21	
			45	12	20.65	8.65		37.18		
			46L	13	15.92	2.92	34.00	38.29	4.29	
			46D	13	20.06	7.06	24.95	23.38	-1.57	
Z-10-05	S24	1	53L	13	13.89	0.89	34.78	33.72	-1.06	11
			53D	13	14.28	1.28	24.00	25.21	1.21	
			54	12	14.98	2.98		37.87		
			55L	13	15.57	2.57	24.00	23.85	-0.15	
			55D	13	14.80	1.80	35.33	33.86	-1.47	
Z-10-04	S429	1	59L	13	23.24	10.24	34.00	34.02	0.02	11
			59D	13	13.09	0.09	31.62	32.68	1.06	
			60	12	24.32	12.32		63.02		
			62L	13	13.21	0.21	31.62	31.78	0.16	
			62D	13	23.14	10.14	34.00	34.17	0.17	

Prilog 6.11.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 11

Istrošenje poprečnog presjeka srcišta skretnice S24

Lokacija 11: Kvaternikov trg

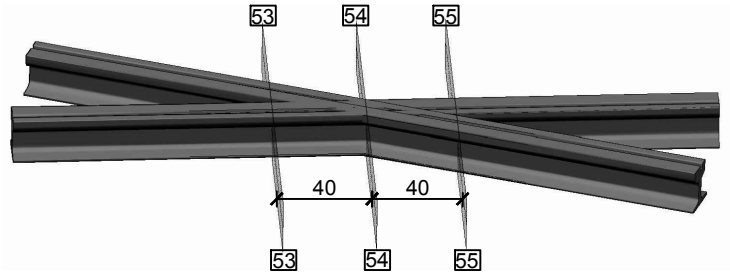
MJ: 1:2

Annex 6.11.2.1. Cross section wear in turnouts at Location 11

Cross section wear in turnout S24

Location 11: Kvaternikov trg

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

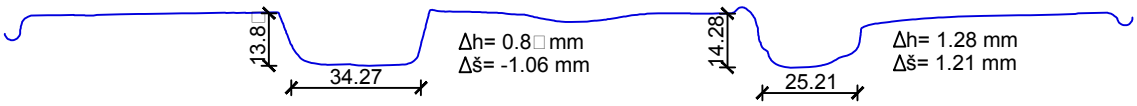
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: Vlaška ⟶ Mašićeva

Direction: Vlaška ⟶ Mašićeva

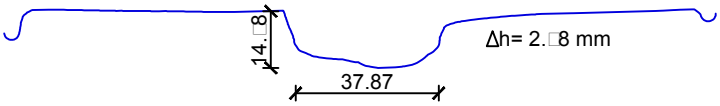
PROFIL 53

PROFILE 53



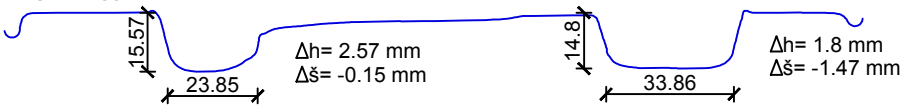
PROFIL 54

PROFILE 54



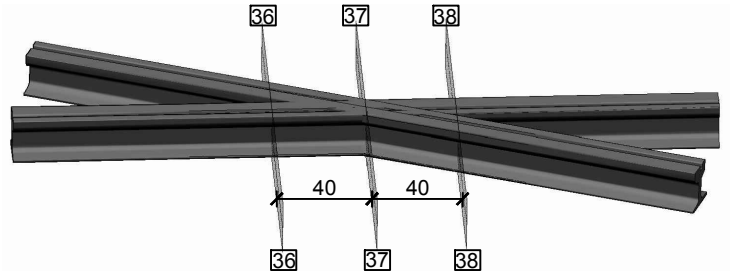
PROFIL 55

PROFILE 55



Prilog 6.11.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 11
Istrošenje poprečnog presjeka srcišta skretnice S25
Lokacija 11: Kvaternikov trg
MJ: 1:2

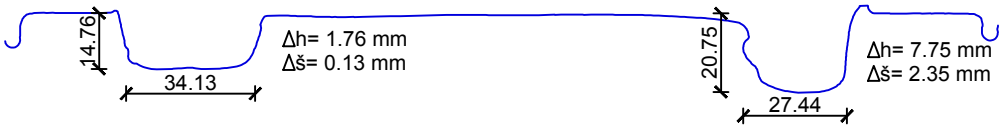
Annex 6.11.2.1. Cross section wear in turnouts at Location 11
Cross section wear in turnout S25
Location 11: Kvaternikov trg
Scale: 1:2



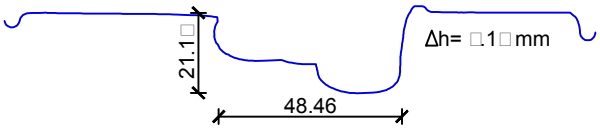
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: Mašićeva ⟶ Vlaška
Direction: Mašićeva ⟶ Vlaška

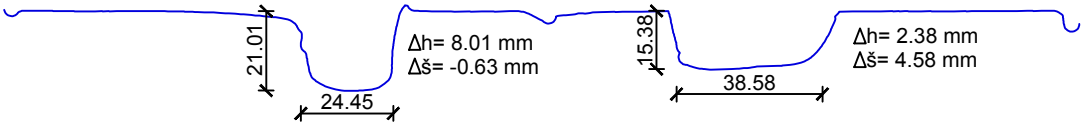
PROFIL 36
PROFILE 36



PROFIL 37
PROFILE 37



PROFIL 38
PROFILE 38



Prilog 6.11.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 11

Istrošenje poprečnog presjeka srcišta skretnice S165

Lokacija 11: Kvaternikov trg

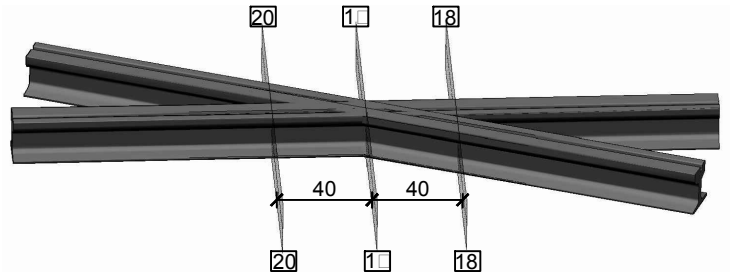
MJ: 1:2

Annex 6.11.2.1. Cross section wear in turnouts at Location 11

Cross section wear in turnout S165

Location 11: Kvaternikov trg

Scale: 1:2



Δh - visinsko istrošenje

Δš - bočno istrošenje

Δh □vertical wear

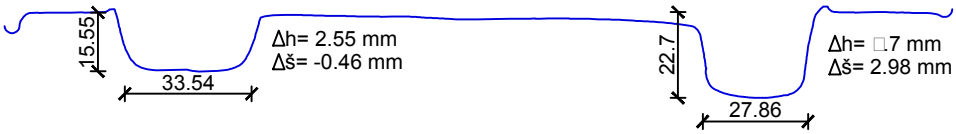
Δš - lateral wear

Smjer vožnje: kroz okretnicu

Direction: through terminus

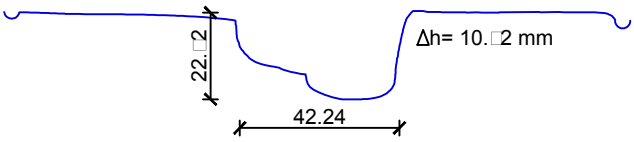
PROFIL 20

PROFILE 20



PROFIL 1□

PROFILE 1□



PROFIL 18

PROFILE 18

Prilog 6.11.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 11

Istrošenje poprečnog presjeka srcišta skretnice S168

Lokacija 11: Kvaternikov trg

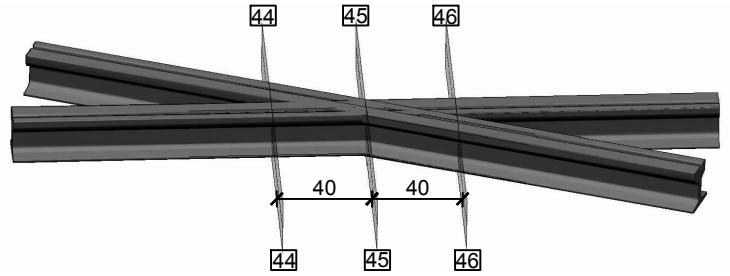
MJ: 1:2

Annex 6.11.2.1. Cross section wear in turnouts at Location 11

Cross section wear in turnout S168

Location 11: Kvaternikov trg

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

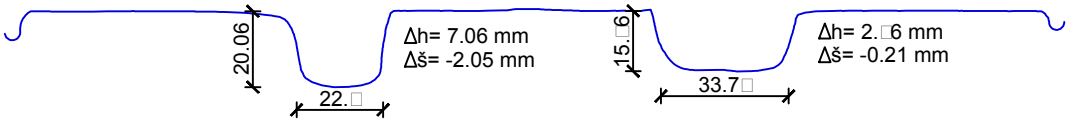
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: Mašićeva ⟶ Vlaška

Direction: Mašićeva ⟶ Vlaška

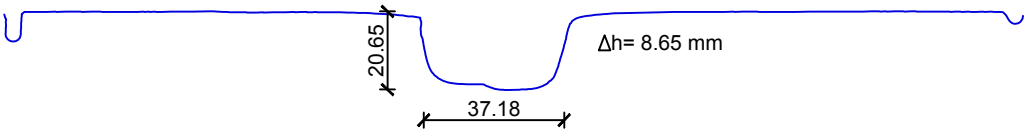
PROFIL 44

PROFILE 44



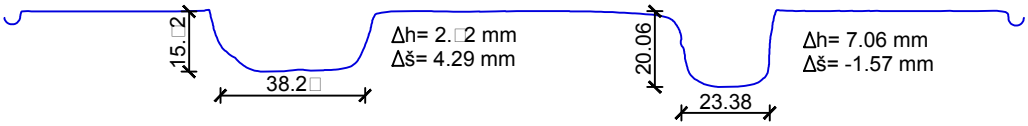
PROFIL 45

PROFILE 45



PROFIL 46

PROFILE 46

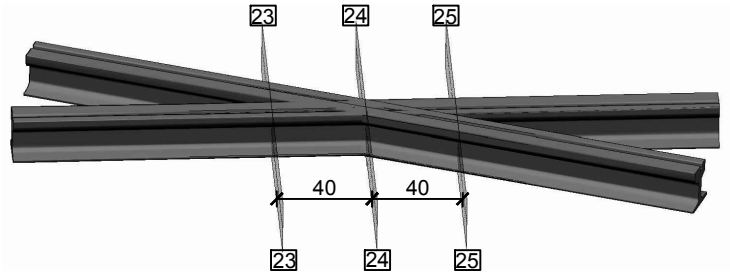


Prilog 6.11.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 11

Istrošenje poprečnog presjeka srcišta skretnice S169
Lokacija 11: Kvaternikov trg
MJ: 1:2

Annex 6.11.2.1. Cross section wear in turnouts at Location 11

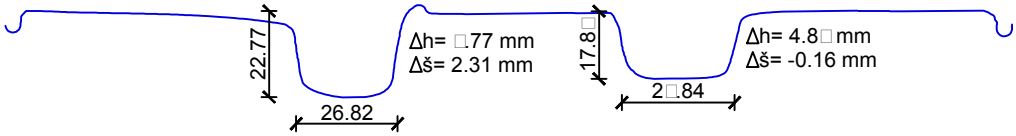
Cross section wear in turnout S16
Location 11: Kvaternikov trg
Scale: 1:2



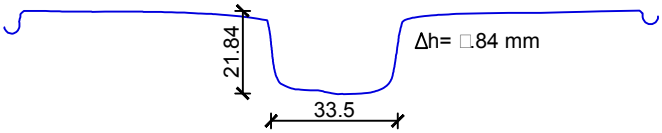
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu
Direction: through terminus

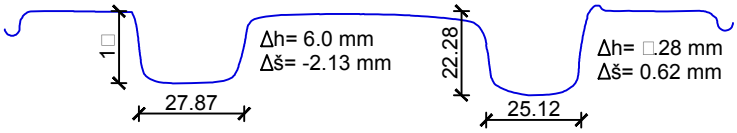
PROFIL 23
PROFILE 23



PROFIL 24
PROFILE 24



PROFIL 25
PROFILE 25



Prilog 6.11.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 11

Istrošenje poprečnog presjeka srcišta skretnice S170

Lokacija 11: Kvaternikov trg

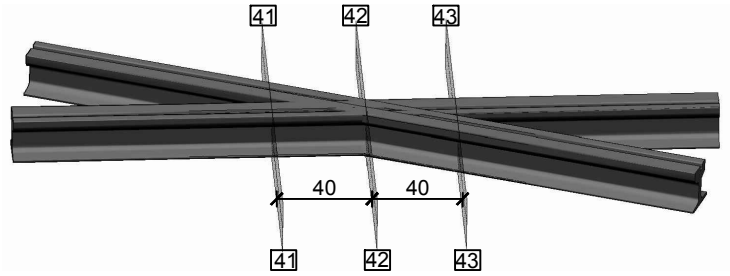
MJ: 1:2

Annex 6.11.2.1. Cross section wear in turnouts at Location 11

Cross section wear in turnout S170

Location 11: Kvaternikov trg

Scale: 1:2

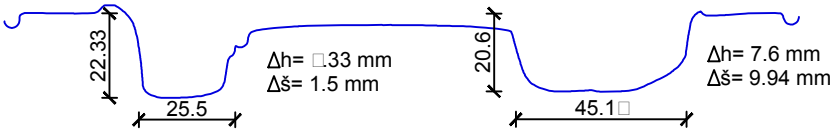


Δh - visinsko istrošenje
Δš - bočno istrošenje

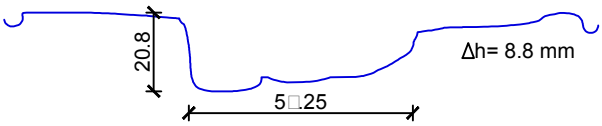
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: Mašićeva ⟶ Vlaška
Direction: Mašićeva ⟶ Vlaška

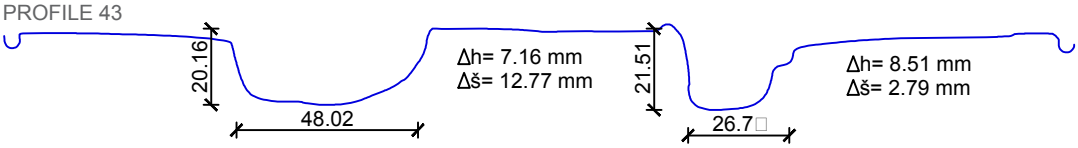
PROFIL 41
PROFILE 41



PROFIL 42
PROFILE 42

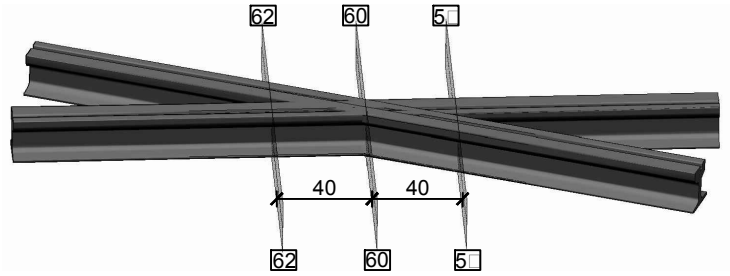


PROFIL 43
PROFILE 43



Prilog 6.11.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 11
Istrošenje poprečnog presjeka srcišta skretnice S429
Lokacija 11: Kvaternikov trg
MJ: 1:2

Annex 6.11.2.1. Cross section wear in turnouts at Location 11
Cross section wear in turnout S42
Location 11: Kvaternikov trg
Scale: 1:2

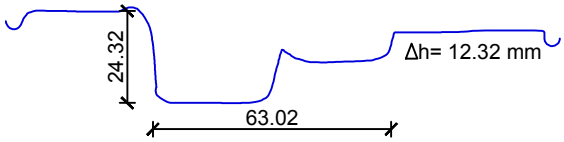


Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh vertical wear
Δš - lateral wear

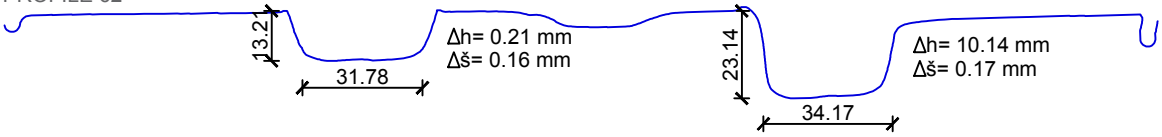
Smjer vožnje: kroz okretnicu
Direction: through terminus

PROFIL 5
PROFILE 5

PROFIL 60
PROFILE 60



PROFIL 62
PROFILE 62

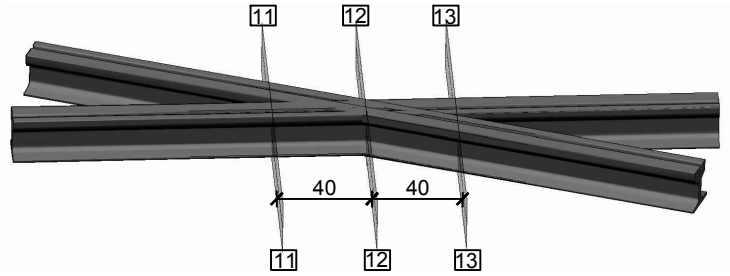


Prilog 6.11.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 11

Istrošenje poprečnog presjeka srcišta skretnice S430
Lokacija 11: Kvaternikov trg
MJ: 1:2

Annex 6.11.2.1. Cross section wear in turnouts at Location 11

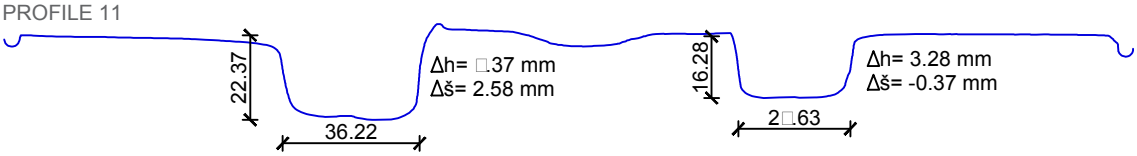
Cross section wear in turnout S430
Location 11: Kvaternikov trg
Scale: 1:2



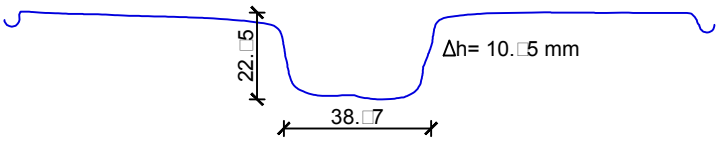
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu
Direction: through terminus

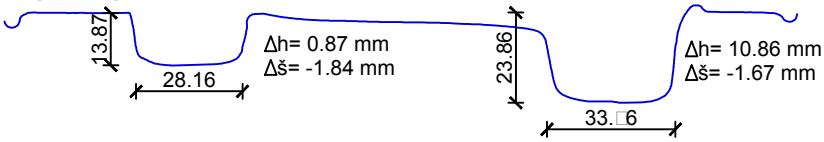
PROFIL 11
PROFILE 11



PROFIL 12
PROFILE 12

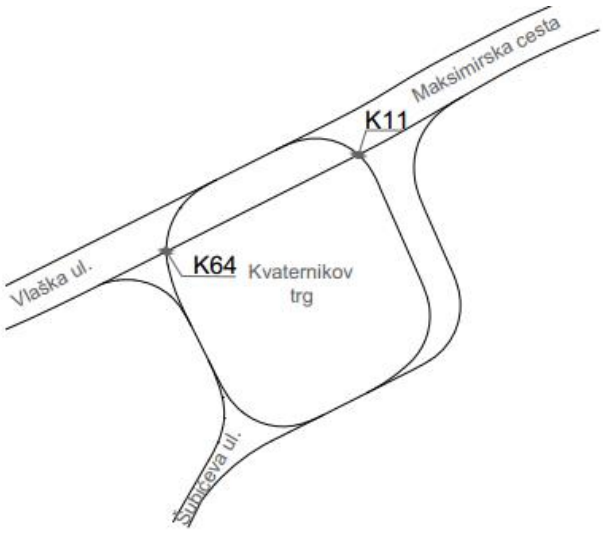


PROFIL 13
PROFILE 13



Prilog 6.11.3. Rezultati istrošenja profila tračnica u križalištima na Lokaciji 11
Lokacija 11: Kvaternikov trg

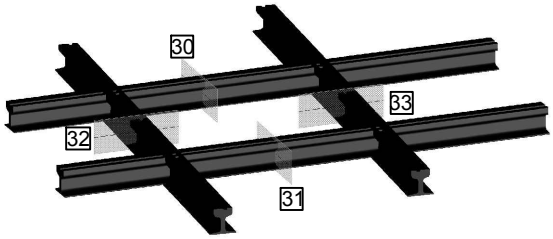
Annex 6.11.3. Results of cross section wear in track crossing at Location 11
Location 11: Kvaternikov trg



Dionice Sections	**Oznaka križališta** Track crossing mark	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
Z-10-05 Z-10-03	K11	30	12	23,51	11.51	24.00	23.65	-0.35	11
		31	12	22,64	10.64	24.00	25.07	1.07	
		32	12	17.50	5.50	34.00	36.18	2.18	
		33	12	17,47	5.47	34.00	36.20	2.20	
Z-10-04 Z-10-05	K64	49	12	13,05	1.05	24.00	22.95	-1.05	11
		50	12	13,52	1.52	24.00	23.57	-0.43	
		51	12	15,32	3.32	34.00	34.88	0.88	
		52	12	15,96	3.96	34.00	34.54	0.54	

Prilog 6.11.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 11
Istrošenje poprečnog presjeka tračnica u križalištu K11
Lokacija 11: Kvaternikov trg
MJ: 1:2

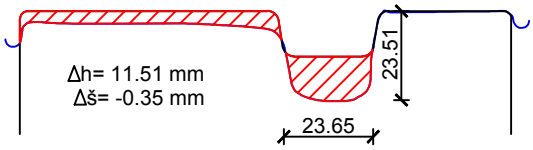
Annex 6.11.3.1. Cross section wear in track crossings at Location 11
Cross section wear in track crossing K11
Location 11: Kvaternikov trg
Scale: 1:2



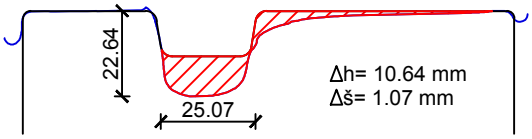
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh vertical wear
Δš - lateral wear

Smjer vožnje: Vlaška ⟶ Mašićeva
Direction: Vlaška ⟶ Mašićeva

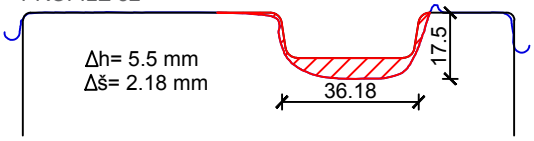
PROFIL 30
PROFILE 30



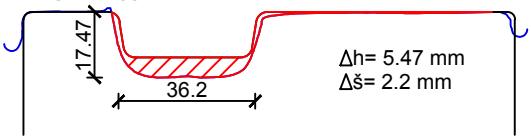
PROFIL 31
PROFILE 31



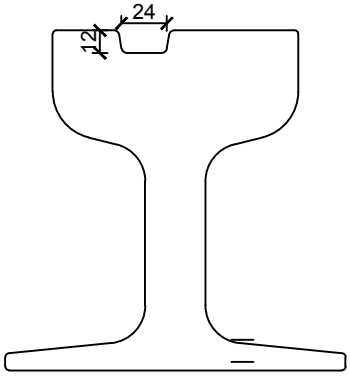
PROFIL 32
PROFILE 32



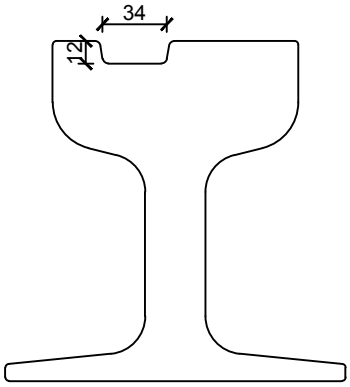
PROFIL 33
PROFILE 33



PROFIL 30, 31 PROFILE 30, 31
R = 0 m

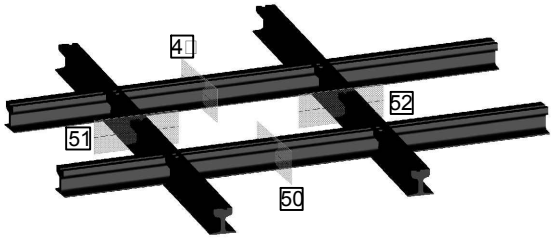


PROFIL 32, 33 PROFILE 32, 33
R = 18 m



Prilog 6.11.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 11
Istrošenje poprečnog presjeka tračnica u križalištu K64
Lokacija 11: Kvaternikov trg
MJ: 1:2

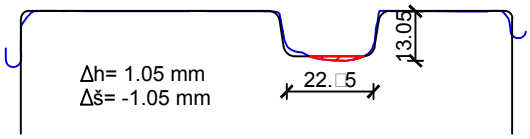
Annex 6.11.3.1. Cross section wear in track crossings at Location 11
Cross section wear in track crossing K64
Location 11: Kvaternikov trg
Scale: 1:2



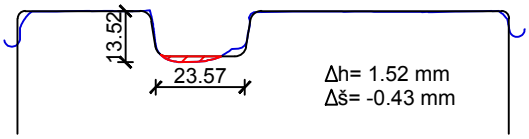
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Vlaška ⟶ Mašićeva
Direction: Vlaška ⟶ Mašićeva

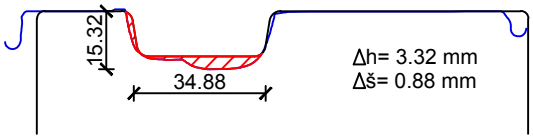
PROFIL 4
PROFILE 4



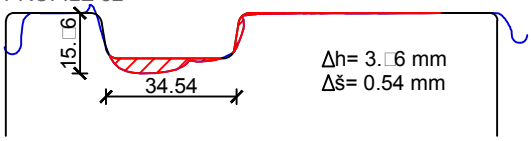
PROFIL 50
PROFILE 50



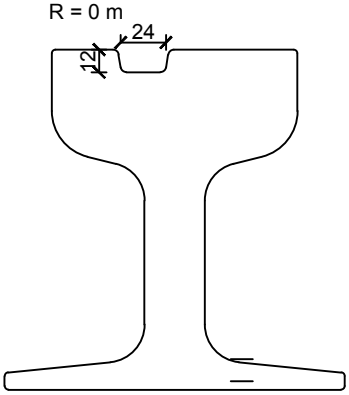
PROFIL 51
PROFILE 51



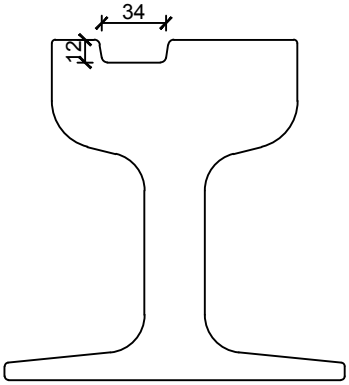
PROFIL 52
PROFILE 52



PROFIL 4, 50 PROFILE 4, 50
R = 0 m

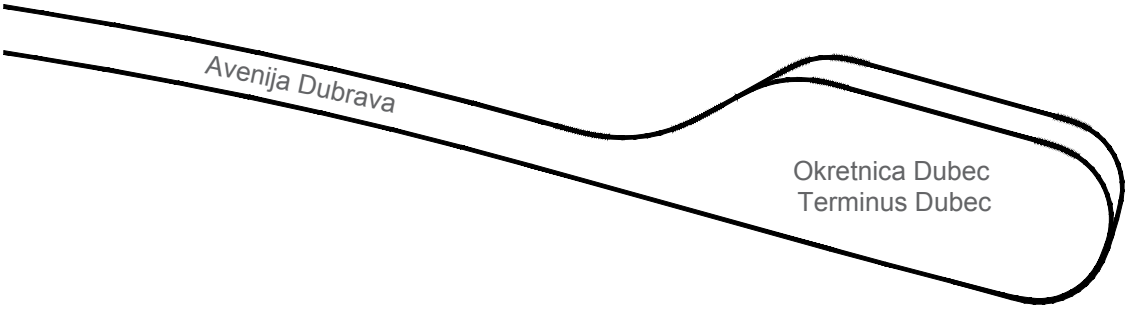


PROFIL 51, 52 PROFILE 51, 52
R = 20 m



Lokacija 12 (L12)
Okretnica Dubec

Location 12 (L12)
Terminus Dubec



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija ra□voja tramvajskog prometa □rada □agreba Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition

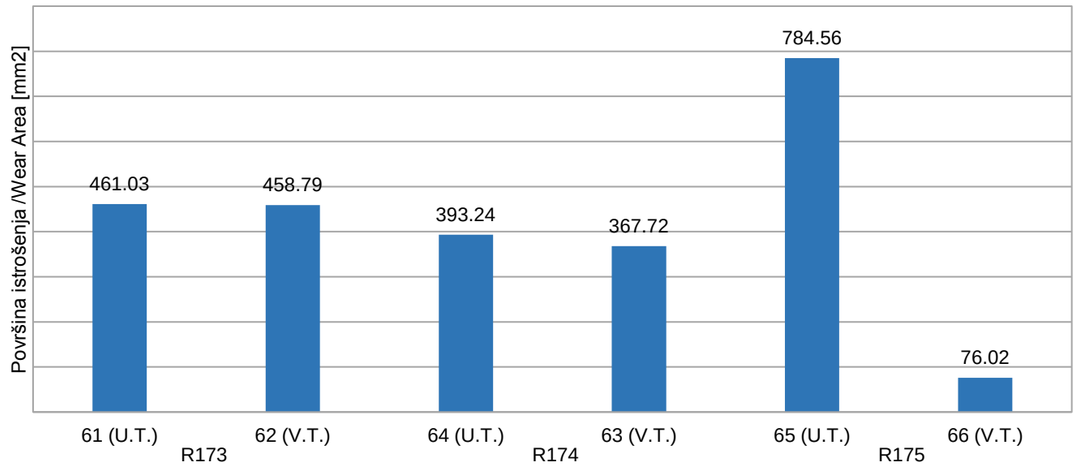
SADRŽAJ PRILOGA:
ANNEX:

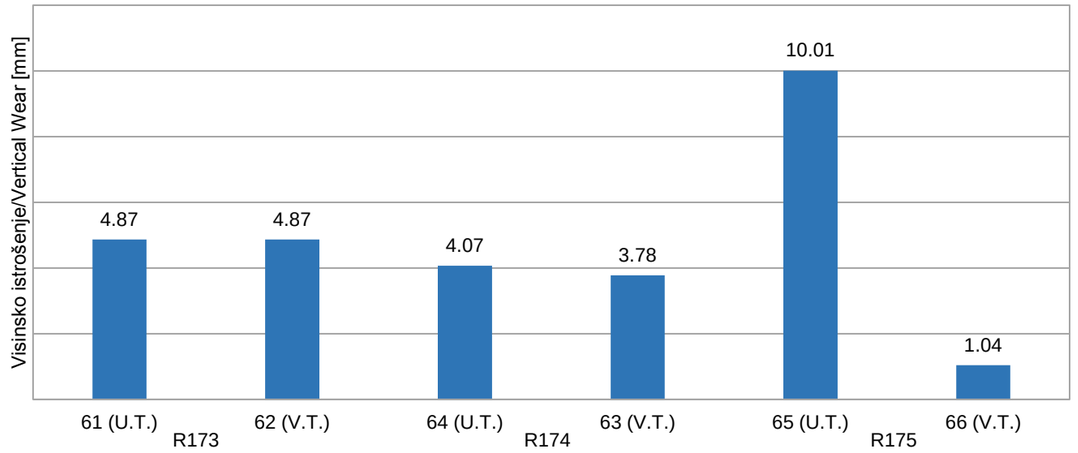
Istrošenje poprečnih presjeka tračnica u krivinama i skretnicama na Lokaciji 12

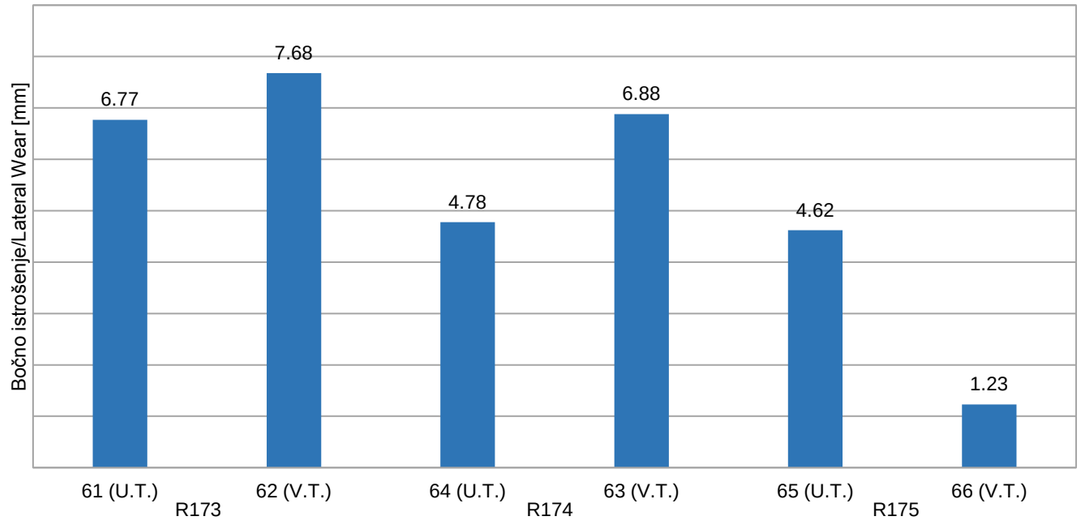
Rail cross section wear in curves and turnouts at Location 12

MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.12

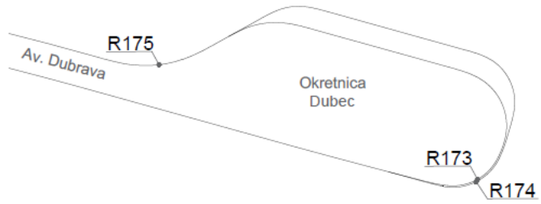
Prilog 6.12.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 12**
Lokacija 12: Okretnica Dubec
Annex 6.12.1. **Results of cross section wear in curves at Location 12**
Location 12: Terminus Dubec







U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve



Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [ ]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
Z-13-02	R173	lijeva left	61	lijeva/left	461.03	4.87	6.77	75.1	18	18
			62	desna/right	458.79	4.87	7.68	70.97		
Z-13-01	R174	lijeva left	64	lijeva/left	393.24	4.07	4.78	79.41	18.5	18
			63	desna/right	367.72	3.78	6.88	69.16		
D-23-05	R175	desna right	66	lijeva/left	76.02	1.04	1.23	77.99	40	18
			65	desna/right	784.56	10.01	4.62	80.74		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
Z-13-02	R173	lijeva left	61	lijeva/left	461.03	4.87	6.77
			62	desna/right	458.79	4.87	7.68
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-2.24	0	0.91
Z-13-01	R174	lijeva left	64	lijeva/left	393.24	4.07	4.78
			63	desna/right	367.72	3.78	6.88
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-25.52	-0.29	2.1
D-23-05	R175	desna right	66	lijeva/left	76.02	1.04	1.23
			65	desna/right	784.56	10.01	4.62
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-708.54	-8.97	-3.39

Prilog 6.12.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 12

Istrošenje poprečnog presjeka tračnica u krivini R173

Lokacija 12: Okretnica Dubec

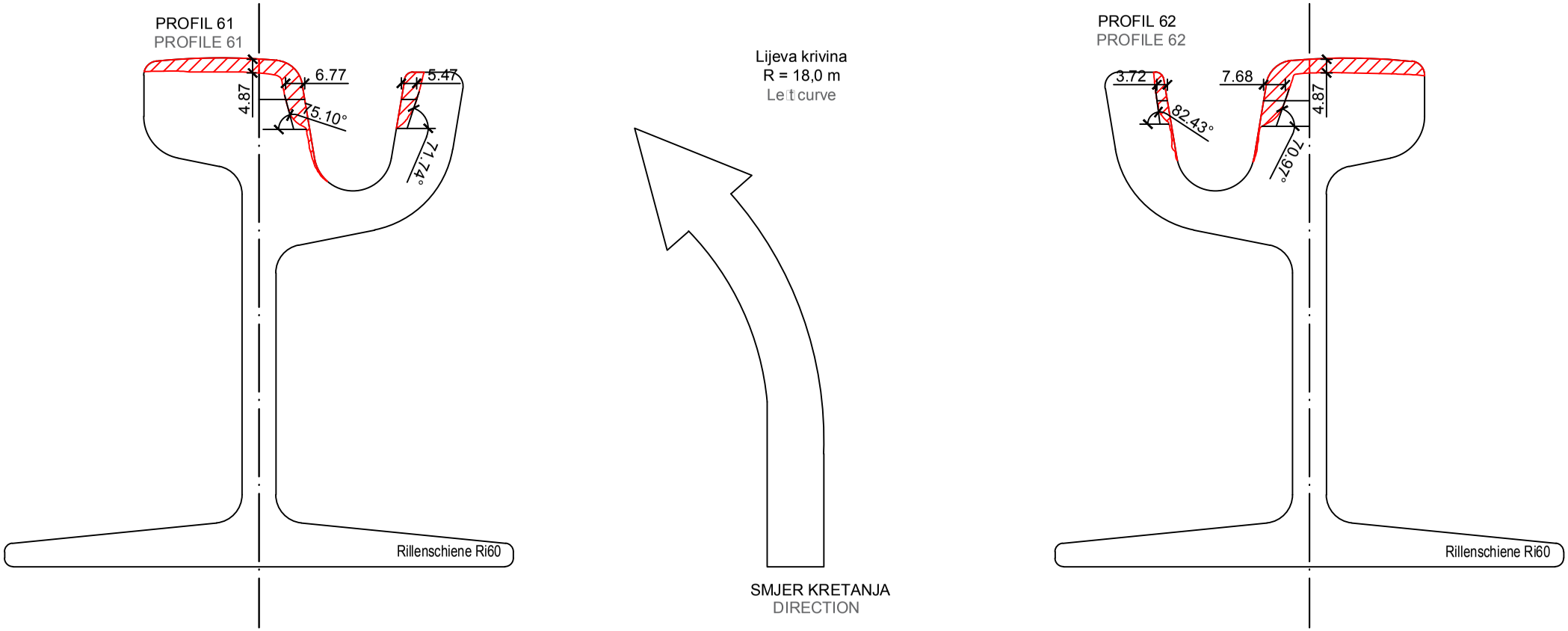
MJ: 1:2

Annex 6.12.1.1. Cross section wear in curves at Location 12

Cross section wear in curve R173

Location 12: Terminus Dubec

Scale: 1:2



Prilog 6.12.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 12

Istrošenje poprečnog presjeka tračnica u krivini R174

Lokacija 12: Okretnica Dubec

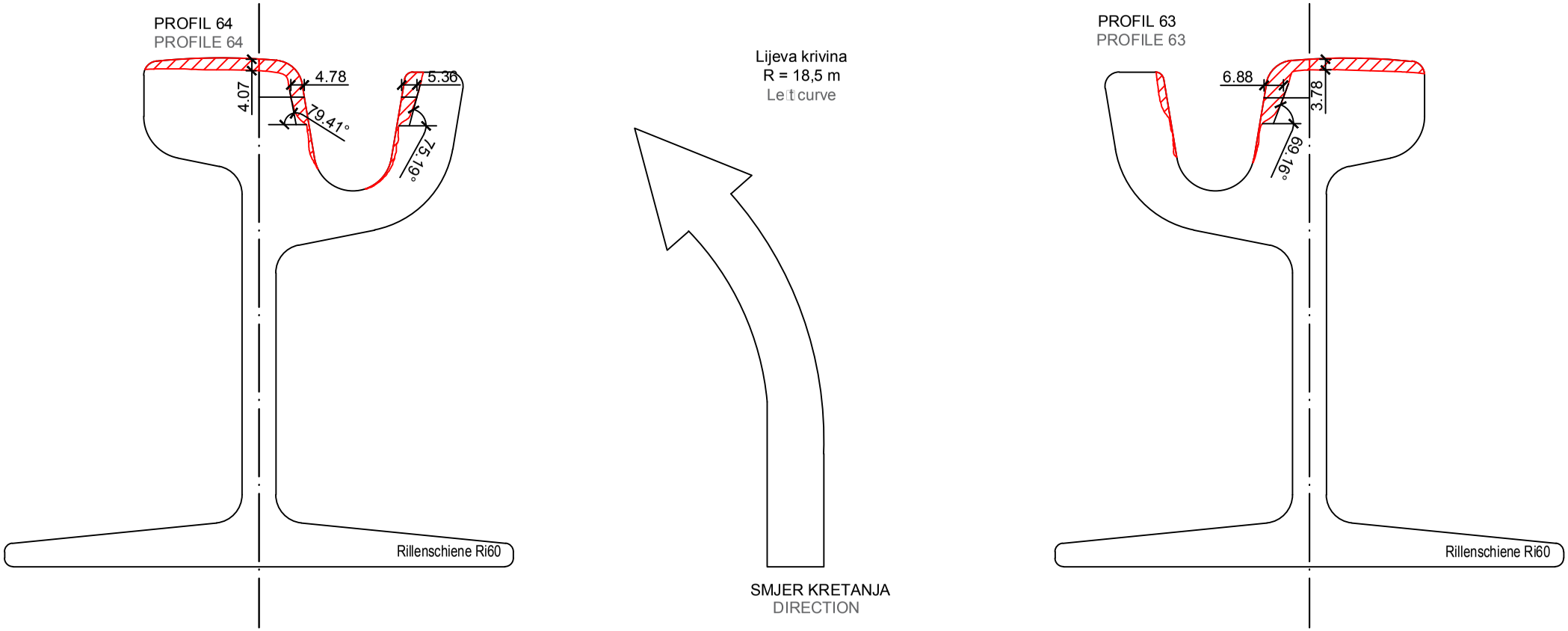
MJ: 1:2

Annex 6.12.1.1. Cross section wear in curves at Location 12

Cross section wear in curve R174

Location 12: Terminus Dubec

Scale: 1:2



Prilog 6.12.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 12

Istrošenje poprečnog presjeka tračnica u krivini R175

Lokacija 12: Okretnica Dubec

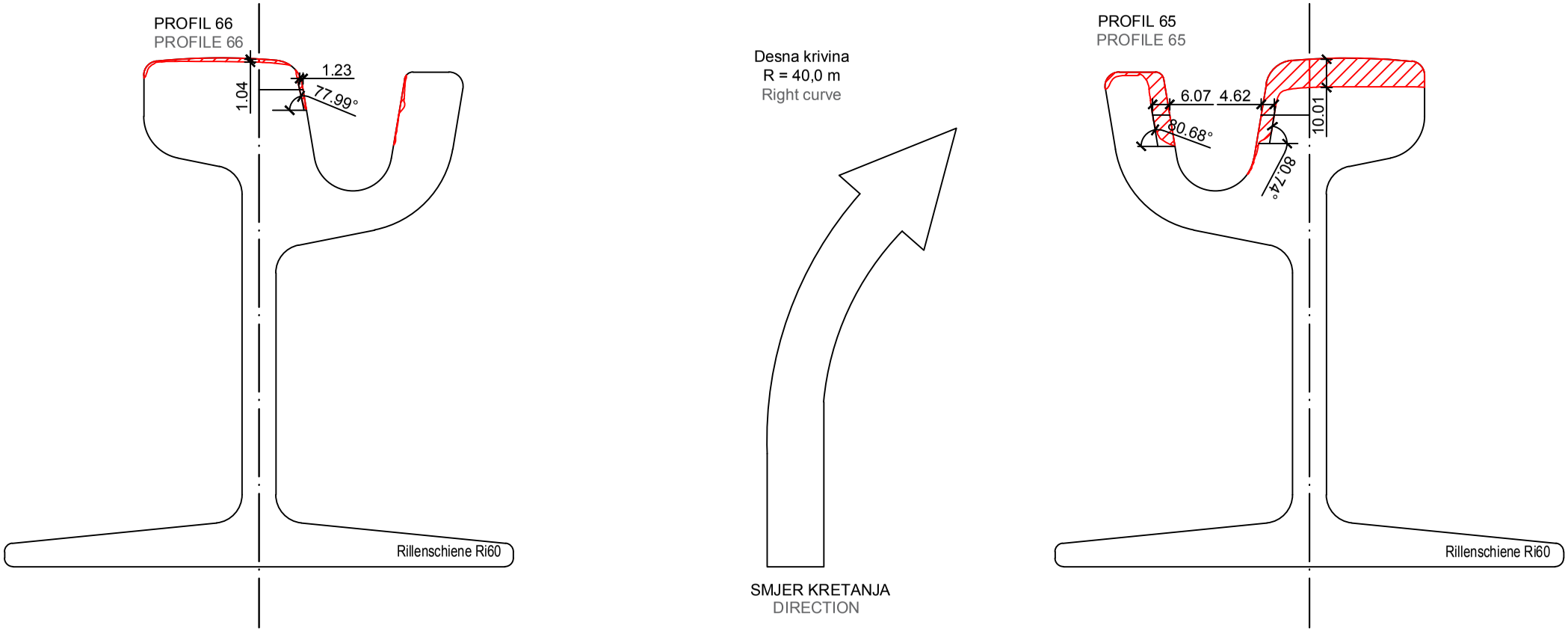
MJ: 1:2

Annex 6.12.1.1. Cross section wear in curves at Location 12

Cross section wear in curve R175

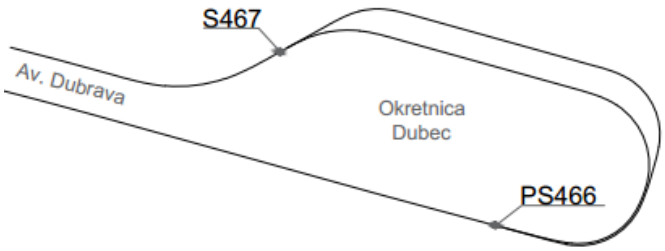
Location 12: Terminus Dubec

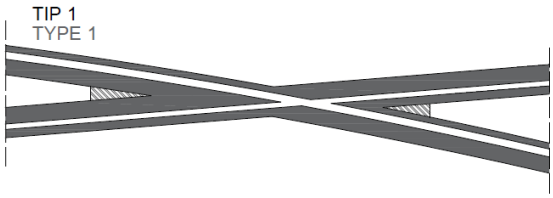
Scale: 1:2

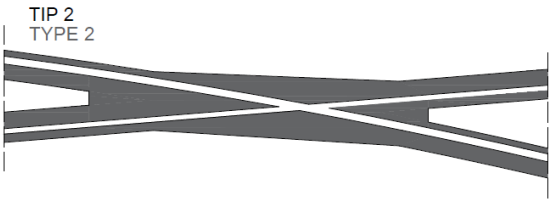


Prilog 6.12.2. **Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 12**
Lokacija 12: Okretnica Dubec

Annex 6.12.2. **Results of cross section wear in turnouts at Location 12**
Location 12: Terminus Dubec



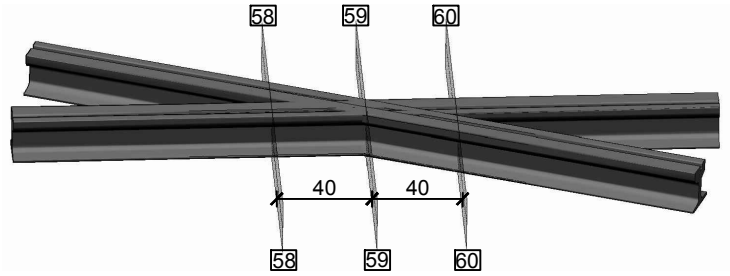




Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
D-23-04 Z-12-01	PS466	1	58L	13	23.58	10.58	24.52	26.13	1.61	18
			58D	13	21.33	8.33	34.00	43.70	9.70	
			59	12	22.15	10.15		50.54		
			60L	13	25.03	12.03	34.00	52.00	18.00	
			60D	13	24.47	11.47	24.52	24.82	0.30	
D-23-01 Z-12-06	S467	1	61L	13	25.00	12.00	34.00	38.15	4.15	18
			61D	13	22.41	9.41	24.69	25.33	0.64	
			62	12	24.11	12.11		49.06		
			64L	13	22.74	9.74	24.70	28.34	3.64	
			64D	13	23.35	10.35	34.00	38.62	4.62	

Prilog 6.12.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 12
Istrošenje poprečnog presjeka srcišta skretnice PS466
Lokacija 12: Okretnica Dubec
MJ: 1:2

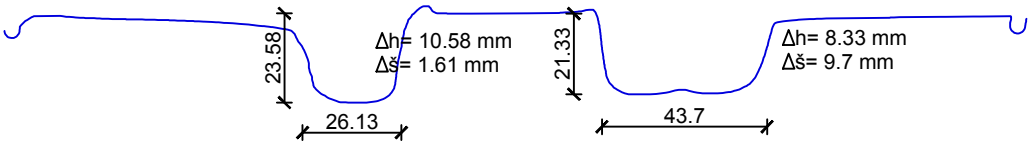
Annex 6.12.2.1. Cross section wear in turnouts at Location 12
Cross section wear in turnout PS466
Location 12: Terminus Dubec
Scale: 1:2



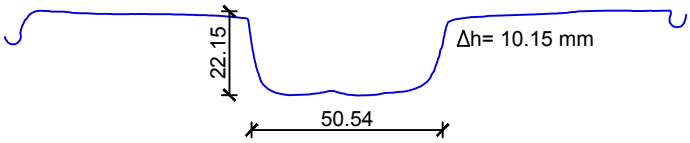
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu
Direction: through terminus

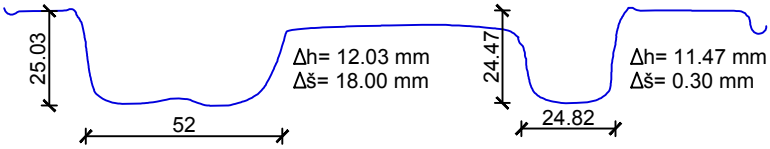
PROFIL 58
PROFILE 58



PROFIL 59
PROFILE 59

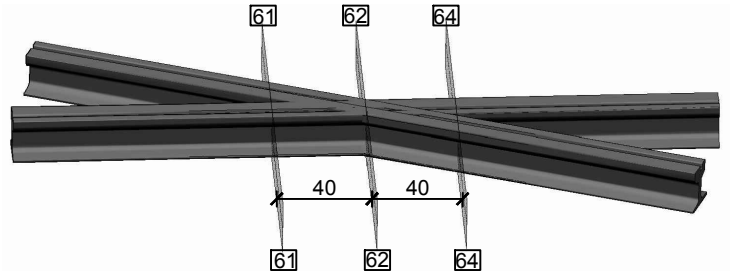


PROFIL 60
PROFILE 60



Prilog 6.12.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 12
Istrošenje poprečnog presjeka srcišta skretnice S467
Lokacija 12: Okretnica Dubec
MJ: 1:2

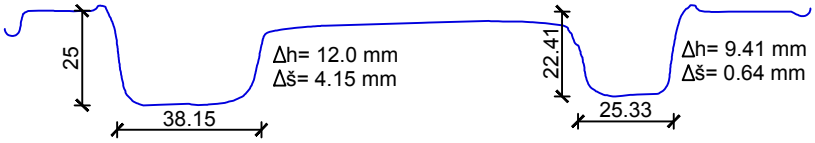
Annex 6.12.2.1. Cross section wear in turnouts at Location 12
Cross section wear in turnout S467
Location 12: Terminus Dubec
Scale: 1:2



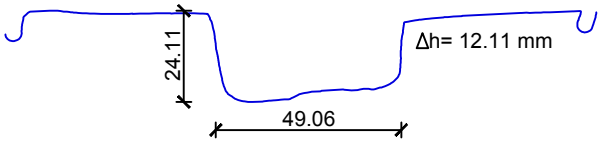
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu
Direction: through terminus

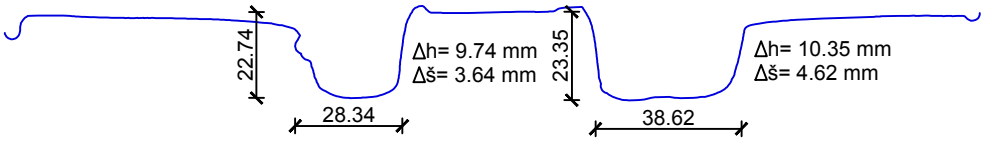
PROFIL 61
PROFILE 61



PROFIL 62
PROFILE 62

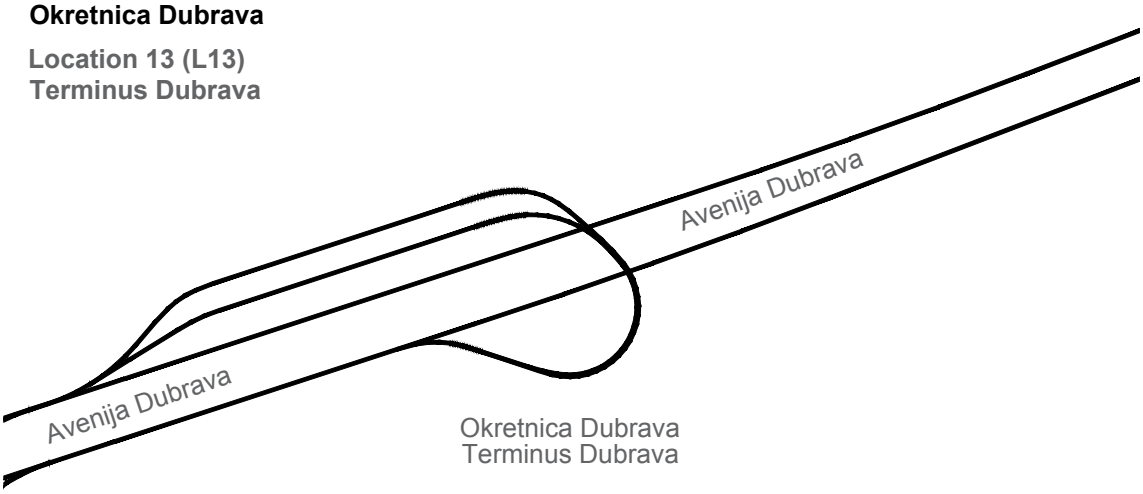


PROFIL 64
PROFILE 64



Lokacija 13 (L13)
Okretnica Dubrava

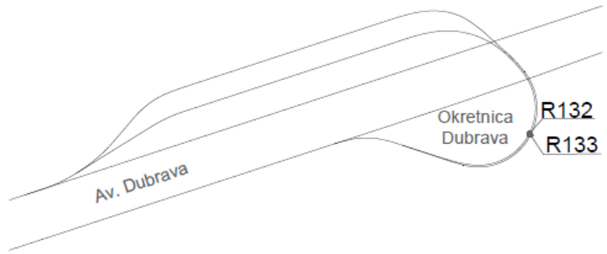
Location 13 (L13)
Terminus Dubrava

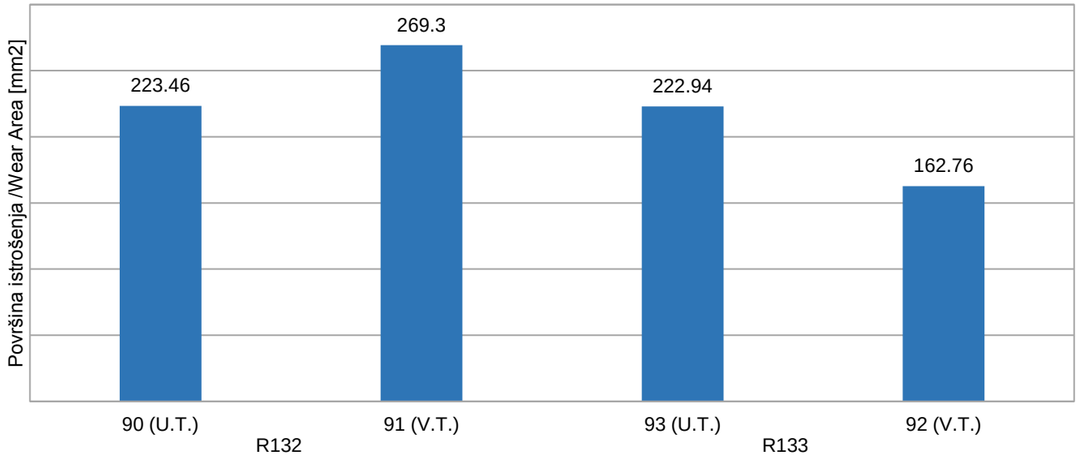


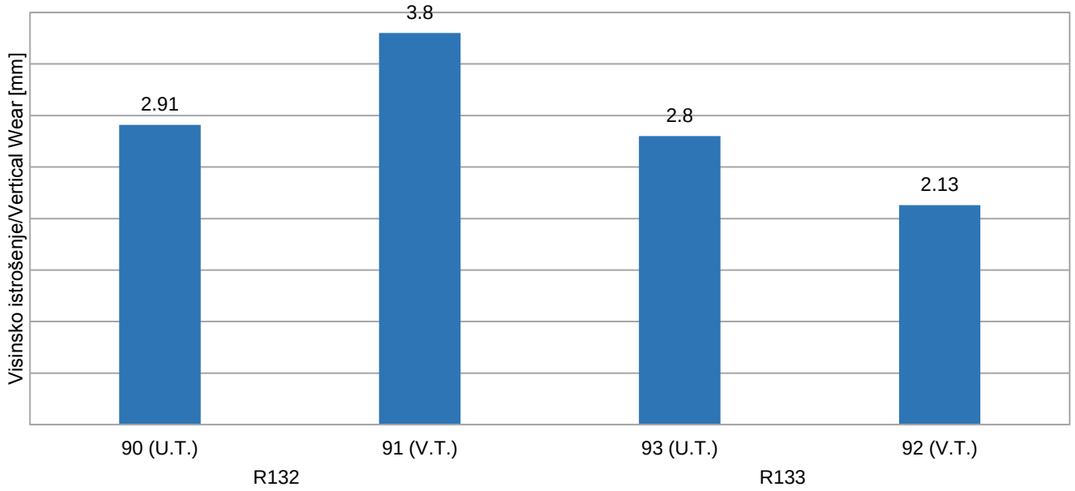
IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija ra□voja tramvajskog prometa □rada □agreba Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition
SADRŽAJ PRILOGA: ANNEX: Istrošenje poprečnih presjeka tračnica u krivinama, skretnicama i križalištima na Lokaciji 13 Rail cross section wear in curves, turnouts and crossings at Location 13	
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.13

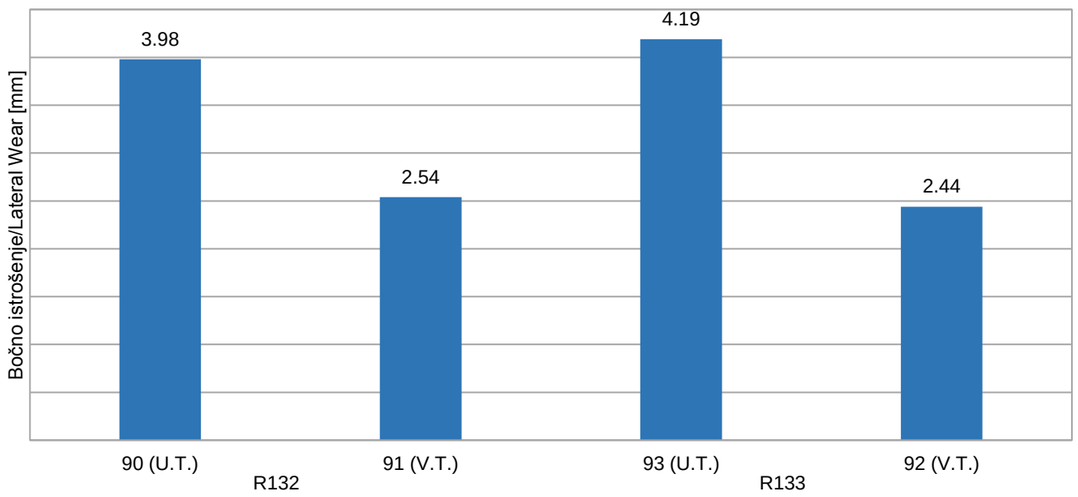
Prilog 6.13.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 13**
Lokacija 13: Okretnica Dubrava

Annex 6.13.1. **Results of cross section wear in curves at Location 13**
Location 13: Terminus Dubrava









Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [˚]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
Z-12-03	R132	lijeva left	90	lijeva/left	223.46	2.91	3.98	78.05	18	9
			91	desna/right	269.3	3.8	2.54	71.7		
Z-12-02	R133	lijeva left	93	lijeva/left	222.94	2.8	4.19	77.09	18.5	9
			92	desna/right	162.76	2.13	2.44	72.04		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
Z-12-03	R132	lijeva left	90	lijeva/left	223.46	2.91	3.98
			91	desna/right	269.3	3.8	2.54
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					45.84	0.89	-1.44
Z-12-02	R133	lijeva left	93	lijeva/left	222.94	2.8	4.19
			92	desna/right	162.76	2.13	2.44
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-60.18	-0.67	-1.75

U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve

Prilog 6.13.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 13

Istrošenje poprečnog presjeka tračnica u krivini R132

Lokacija 13: Okretnica Dubrava

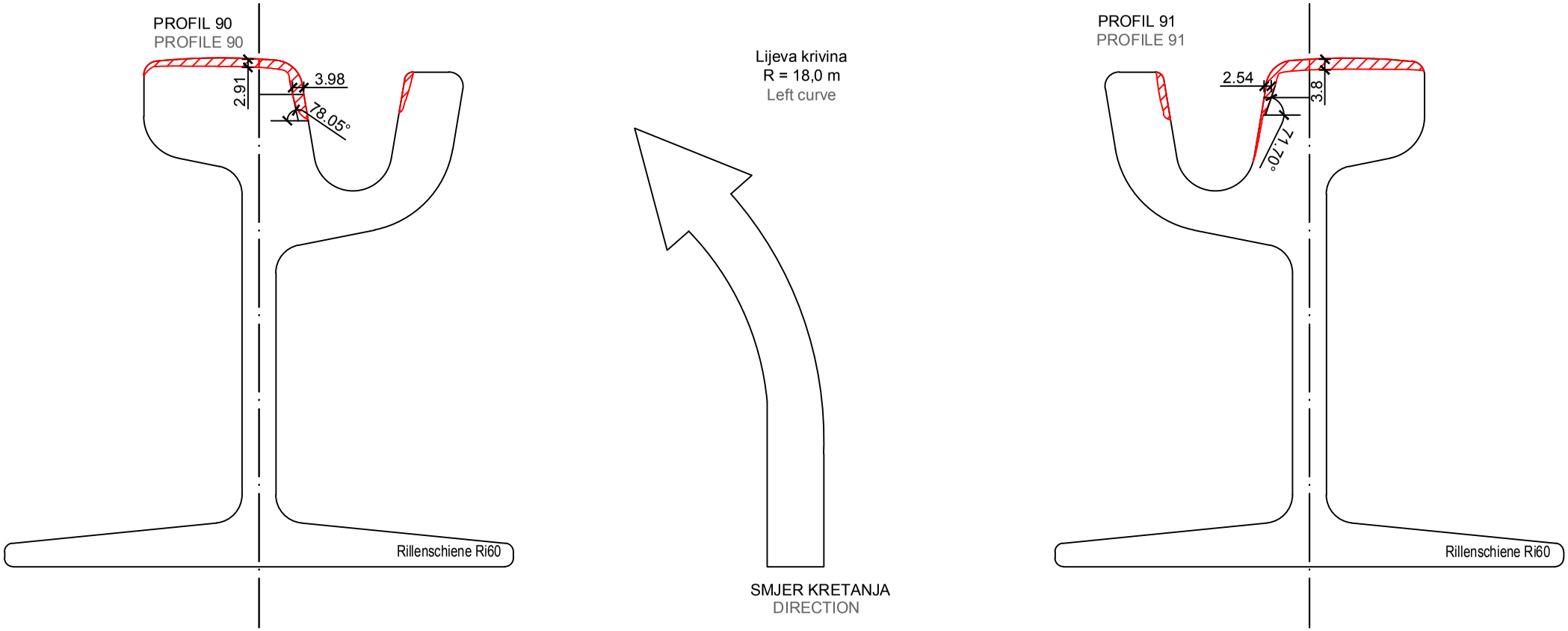
MJ: 1:2

Annex 6.13.1.1. Cross section wear in curves at Location 13

Cross section wear in curve R132

Location 13: Terminus Dubrava

Scale: 1:2



Prilog 6.13.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 13

Istrošenje poprečnog presjeka tračnica u krivini R133

Lokacija 13: Okretnica Dubrava

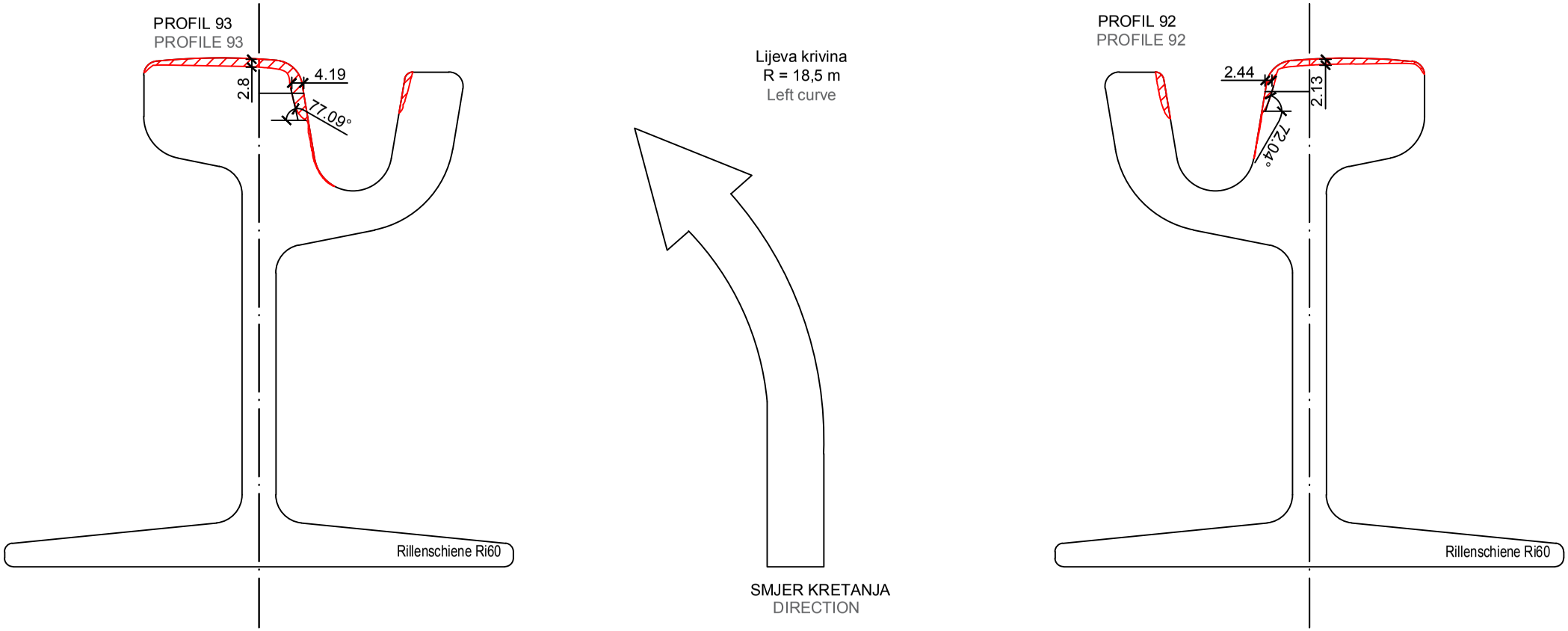
MJ: 1:2

Annex 6.13.1.1. Cross section wear in curves at Location 13

Cross section wear in curve R133

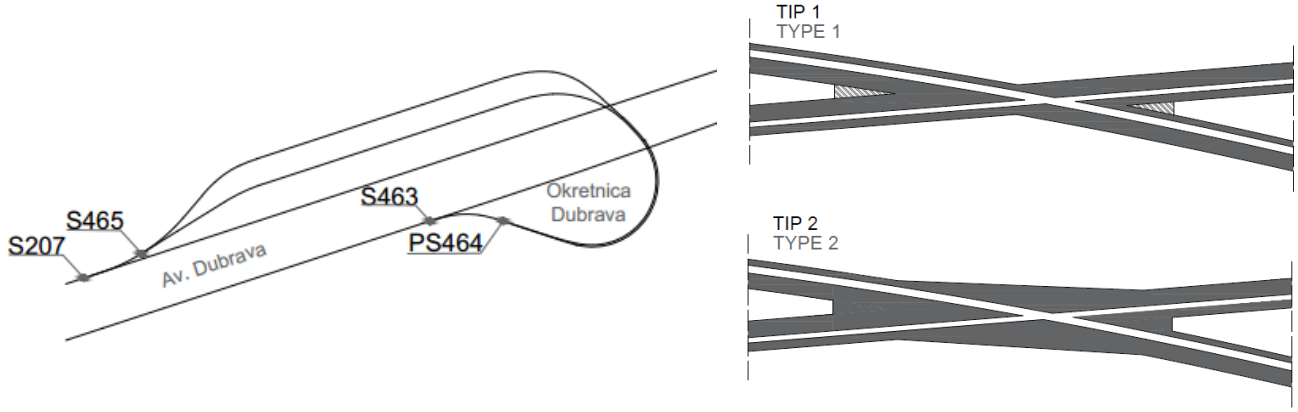
Location 13: Terminus Dubrava

Scale: 1:2



Prilog 6.13.2. **Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 13**
Lokacija 13: Okretnica Dubrava

Annex 6.13.2. **Results of cross section wear in turnouts at Location 13**
Location 13: Terminus Dubrava



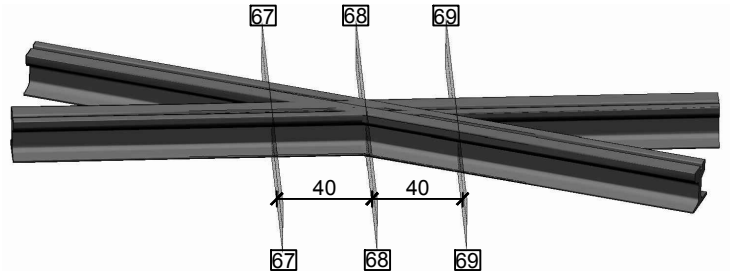
Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
D-23-04 Z-12-01	S463	1	43L	13	22.16	9.16	35.15	39.49	4.34	9
			43D	13	22.59	9.59	24.00	24.17	0.17	
			44	12	22.24	10.24		41.74		
			45L	13	25.83	12.83	24.00	25.19	1.19	
			45D	13	24.64	11.64	35.15	41.59	6.44	
D-23-01 Z-12-06	S207	2	61L	13	20.87	7.87	24.00	22.81	-1.19	4
			61D	13	18.93	5.93	30.59	31.98	1.39	
			62	12	21.50	9.50		43.72		
			63L	13	18.45	5.45	30.59	32.82	2.23	
			63D	13	20.25	7.25	21.16	22.58	1.42	
Z-12-05 Z-12-04	S465	2	94L	13	17.37	4.37	24.00	21.83	-2.17	18
			94D	13	16.26	3.26	30.59	31.54	0.95	
			95	12	19.25	7.25		32.74		
			96L	13	15.98	2.98	30.59	31.22	0.63	
			96D	13	17.52	4.52	24.00	21.74	-2.26	
D-23-04 Z-12-01	PS464	2	67L	13	13.25	0.25	24.41	24.39	0.02	9
			67D	13	13.69	0.69	34.00	37.10	-3.10	
			68	12	14.38	2.38		42.14		
			69L	13	13.48	0.48	34.00	38.26	-4.26	
			69D	13	13.27	0.27	24.41	26.45	-2.04	

Prilog 6.13.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 13

Istrošenje poprečnog presjeka srcišta skretnice PS464
Lokacija 13: Okretnica Dubrava
MJ: 1:2

Annex 6.13.2.1. Cross section wear in turnouts at Location 13

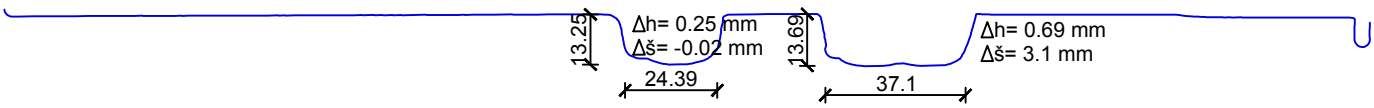
Cross section wear in turnout PS464
Location 13: Terminus Dubrava
Scale: 1:2



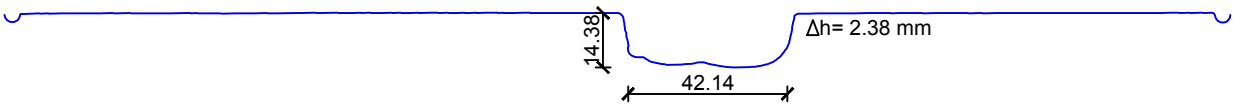
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu
Direction: through terminus

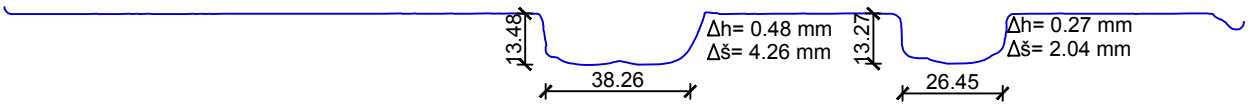
PROFIL 67
PROFILE 67



PROFIL 68
PROFILE 68



PROFIL 69
PROFILE 69



Prilog 6.13.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 13

Istrošenje poprečnog presjeka srcišta skretnice S207

Lokacija 13: Okretnica Dubrava

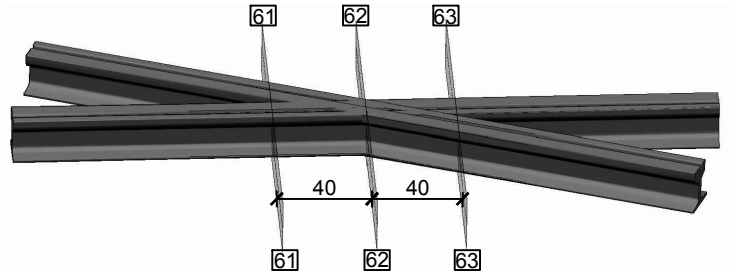
MJ: 1:2

Annex 6.13.2.1. Cross section wear in turnouts at Location 13

Cross section wear in turnout S207

Location 13: Terminus Dubrava

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

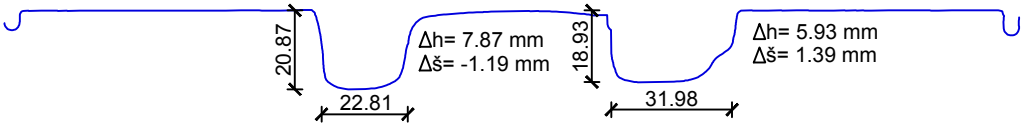
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Dubec → Maksimir

Direction: Dubec → Maksimir

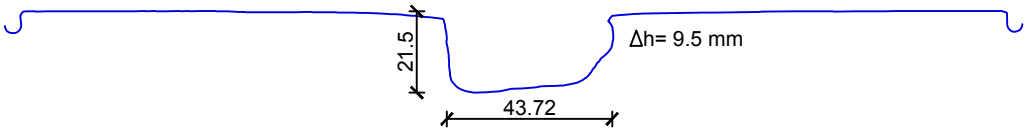
PROFIL 61

PROFILE 61



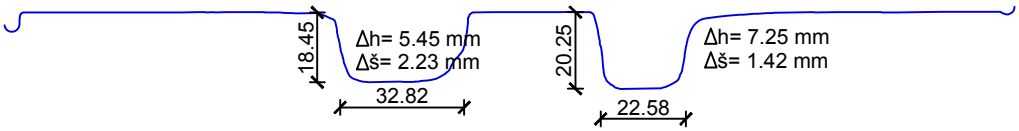
PROFIL 62

PROFILE 62



PROFIL 63

PROFILE 63



Prilog 6.13.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 13

Istrošenje poprečnog presjeka srcišta skretnice S463

Lokacija 13: Okretnica Dubrava

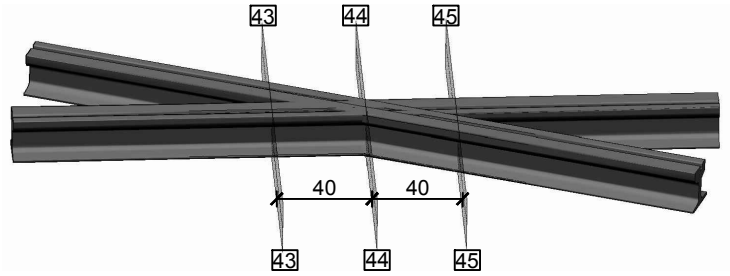
MJ: 1:2

Annex 6.13.2.1. Cross section wear in turnouts at Location 13

Cross section wear in turnout S463

Location 13: Terminus Dubrava

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

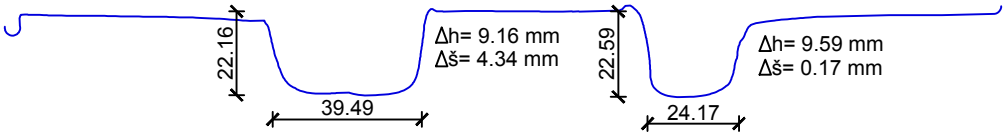
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: Maksimir ⟶ Dubec

Direction: Maksimir ⟶ Dubec

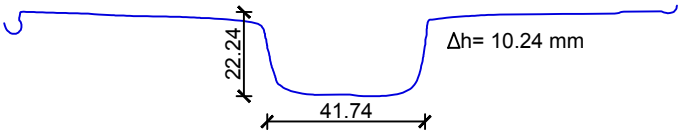
PROFIL 43

PROFILE 43



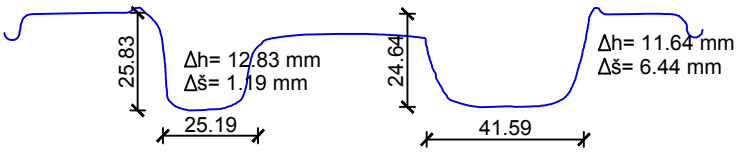
PROFIL 44

PROFILE 44



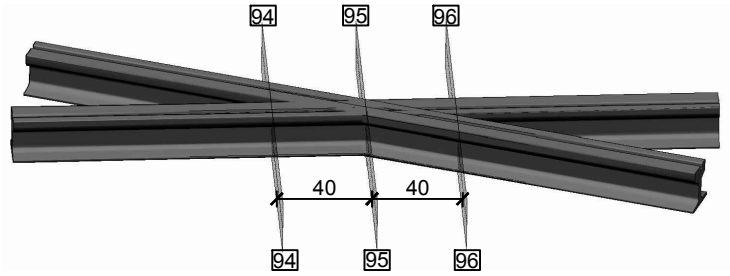
PROFIL 45

PROFILE 45



Prilog 6.13.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 13
Istrošenje poprečnog presjeka srcišta skretnice S465
Lokacija 13: Okretnica Dubrava
MJ: 1:2

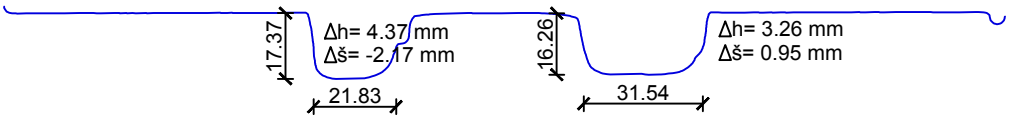
Annex 6.13.2.1. Cross section wear in turnouts at Location 13
Cross section wear in turnout S465
Location 13: Terminus Dubrava
Scale: 1:2



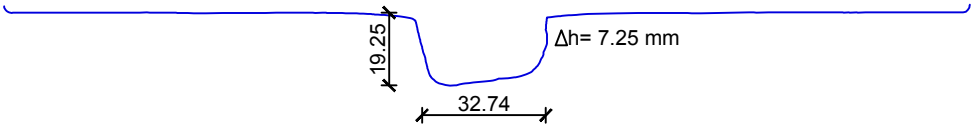
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu
Direction: through terminus

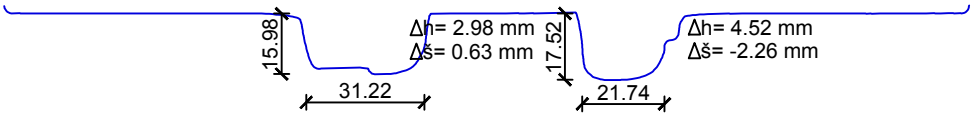
PROFIL 94
PROFILE 94



PROFIL 95
PROFILE 95

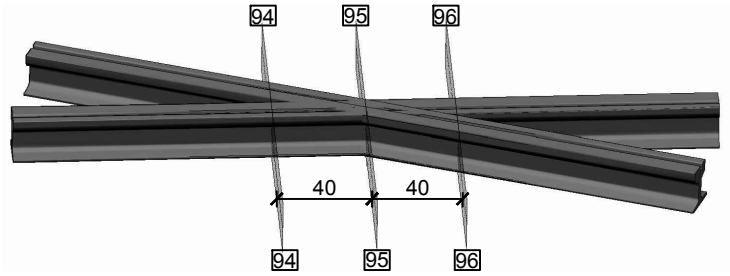


PROFIL 96
PROFILE 96



Prilog 6.13.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 13
Istrošenje poprečnog presjeka srcišta skretnice S465
Lokacija 13: Okretnica Dubrava
MJ: 1:2

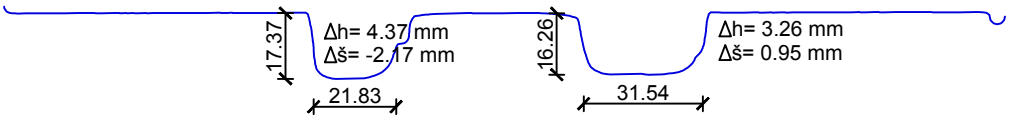
Annex 6.13.2.1. Cross section wear in turnouts at Location 13
Cross section wear in turnout S465
Location 13: Terminus Dubrava
Scale: 1:2



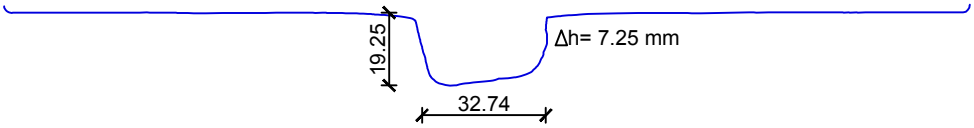
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu
Direction: through terminus

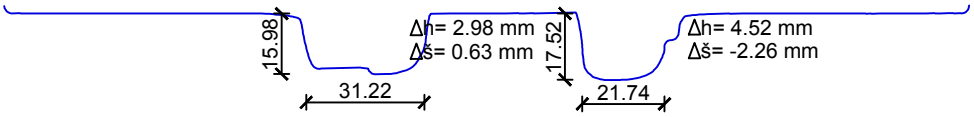
PROFIL 94
PROFILE 94



PROFIL 95
PROFILE 95

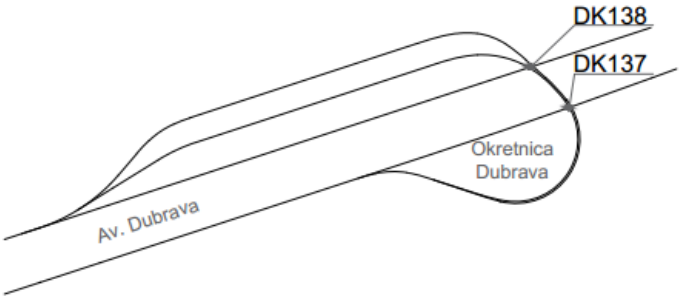


PROFIL 96
PROFILE 96



Prilog 6.13.3. **Rezultati istrošenja profila tračnica u križalištima na Lokaciji 13**
Lokacija 13: Okretnica Dubrava

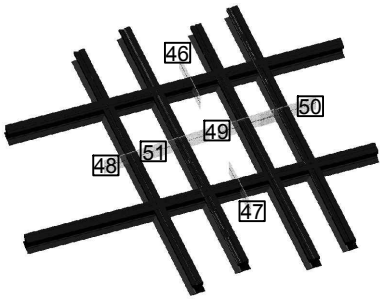
Annex 6.13.3. **Results of cross section wear in track crossing at Location 13**
Location 13: Terminus Dubrava



Dionice Sections	**Oznaka križališta** Track crossing mark	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
D-23-04 Z-12-03 Z-12-02	DK137	46	12	21,08	9.08	24.00	22.83	-1.17	20
		47	12	21,15	9.15	24.00	23.85	-0.15	
		48	12	21.20	9.20	34.00	35.41	1.41	
		49	12	19,78	7.78	34.00	37.29	3.29	
		50	12	19,88	7.88	34.00	36.38	2.38	
		51	12	21,43	9.43	34.00	36.49	2.49	
D-23-03 Z-12-08 Z-12-07	DK138	52	12	14,85	2.85	24.00	24.00	0.00	18
		53	12	15,34	3.34	24.00	23.30	-0.70	
		56	12	13,55	1.55	24.00	26.63	2.63	
		57	12	16,82	4.82	24.00	23.08	-0.92	
		59	12	14,99	2.99	24.00	23.43	-0.57	
		60	12	14,29	2.29	34.00	34.98	0.98	

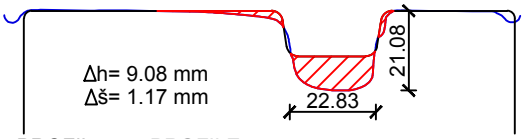
Prilog 6.13.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 13
Istrošenje poprečnog presjeka tračnica u križalištu DK137
Lokacija 13: Okretnica Dubrava
MJ: 1:2

Annex 6.13.3.1. Cross section wear in track crossings at Location 13
Cross section wear in track crossing DK137
Location 13: Terminus Dubrava
Scale: 1:2

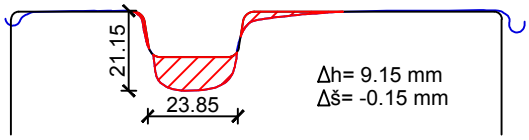


Smjer vožnje: Maksimir → Dubec
Direction: Maksimir → Dubec

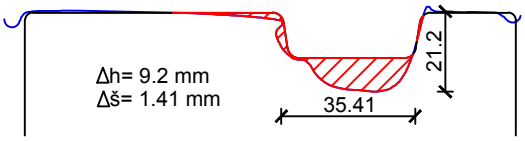
PROFIL 46 PROFILE 46



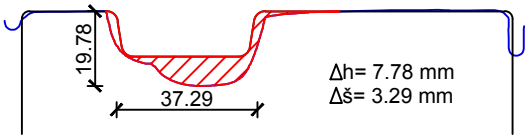
PROFIL 47 PROFILE 47



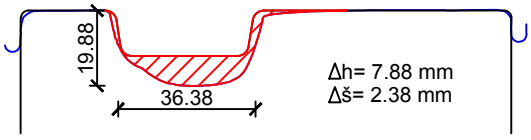
PROFIL 48 PROFILE 48



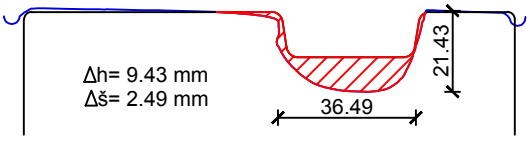
PROFIL 49 PROFILE 49



PROFIL 50 PROFILE 50

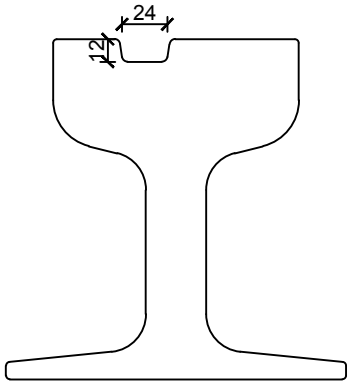


PROFIL 51 PROFILE 51

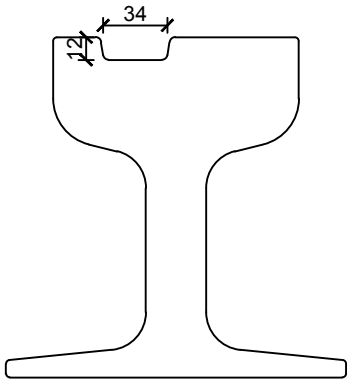


Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh vertical wear
Δš - lateral wear

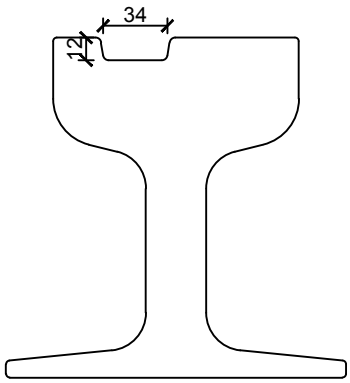
PROFIL 46, 47 PROFILE 46, 47
R = 0 m



PROFIL 48, 49 PROFILE 48, 49
R = 18 m



PROFIL 50, 51 PROFILE 50, 51
R = 18.5 m



Prilog 6.13.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 13

Istrošenje poprečnog presjeka tračnica u križalištu DK138

Lokacija 13: Okretnica Dubrava

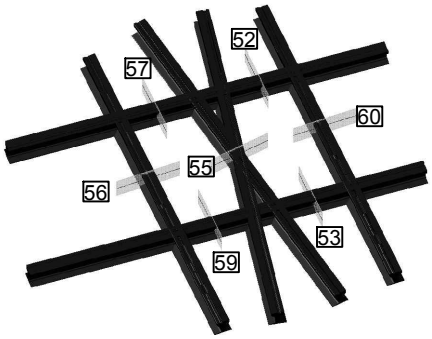
MJ: 1:2

Annex 6.13.3.1. Cross section wear in track crossings at Location 13

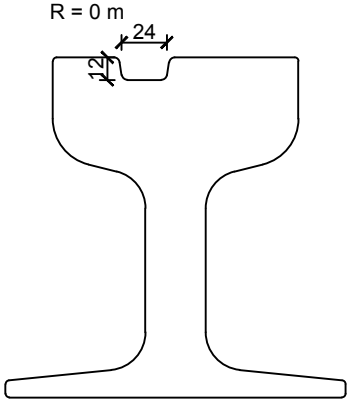
Cross section wear in track crossing DK138

Location 13: Terminus Dubrava

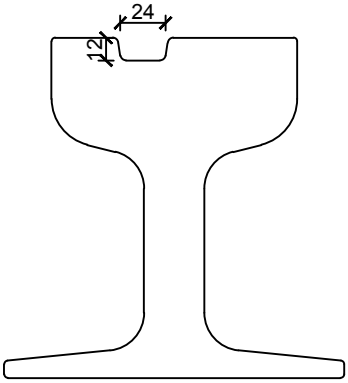
Scale: 1:2



PROFIL 52, 53 PROFILE 52, 53
PROFIL 57, 59 PROFILE 57, 59
R = 0 m



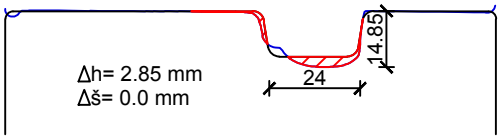
PROFIL 60 PROFILE 60
R = 0 m



Smjer vožnje: Maksimir → Dubec

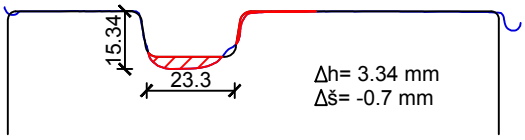
Direction: Maksimir → Dubec

PROFIL 52 PROFILE 52

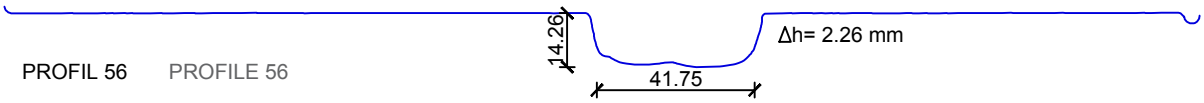


Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh vertical wear
Δš - lateral wear

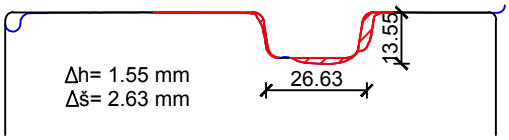
PROFIL 53 PROFILE 53



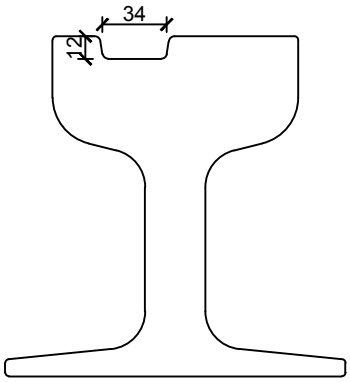
PROFIL 55 PROFILE 55



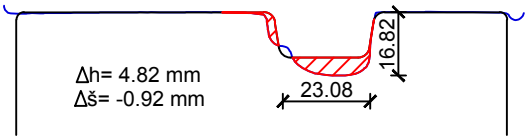
PROFIL 56 PROFILE 56



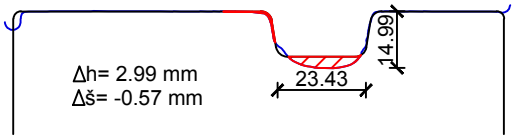
PROFIL 56 PROFILE 56
R = 27 m



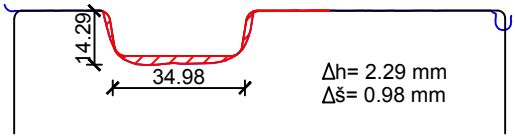
PROFIL 57 PROFILE 57



PROFIL 59 PROFILE 59

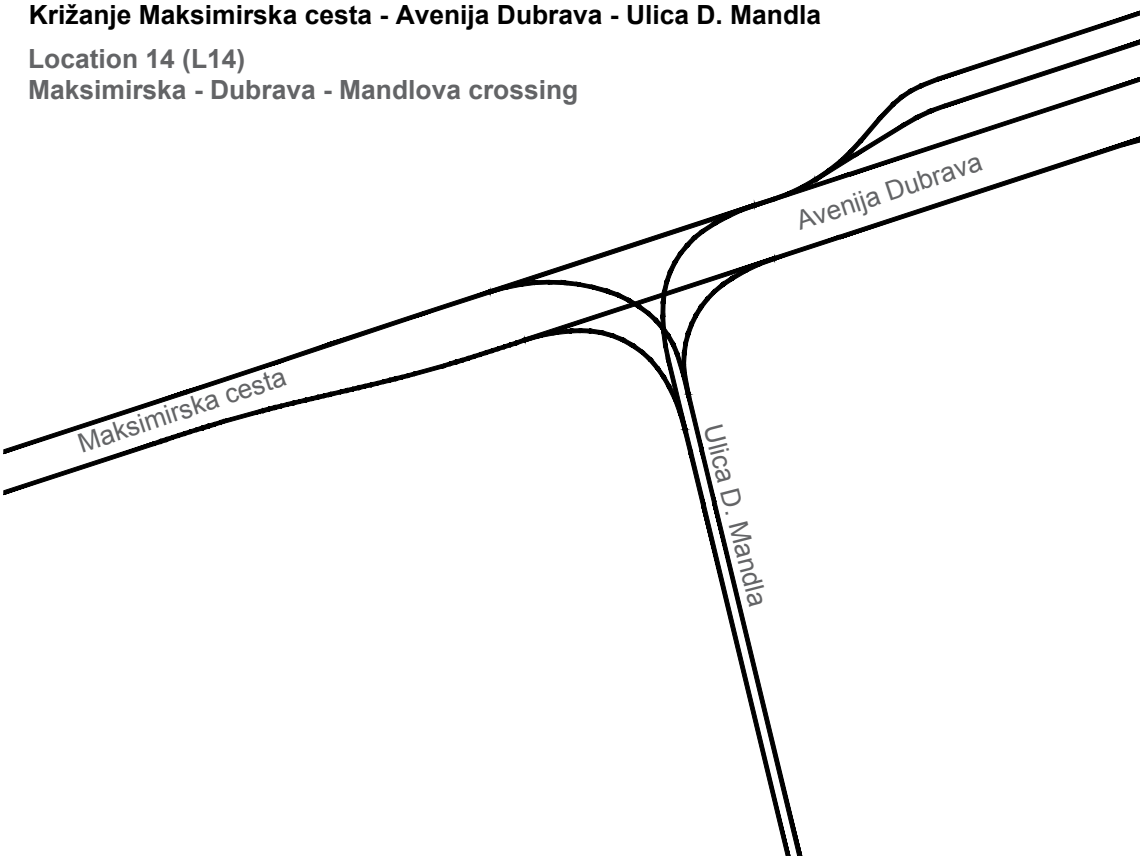


PROFIL 60 PROFILE 60



Lokacija 14 (L14)
Križanje Maksimirska cesta - Avenija Dubrava - Ulica D. Mandla

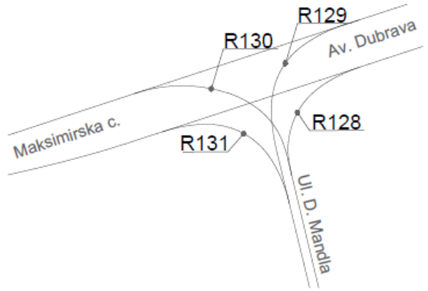
Location 14 (L14)
Maksimirska - Dubrava - Mandlova crossing



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija razvoja tramvajskog prometa □rada □agreba Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition
SADRŽAJ PRILOGA: ANNEX: Istrošenje poprečnih presjeka tračnica u krivinama, skretnicama i križalištima na Lokaciji 14 Rail cross section wear in curves, turnouts and crossings at Location 14	
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.14

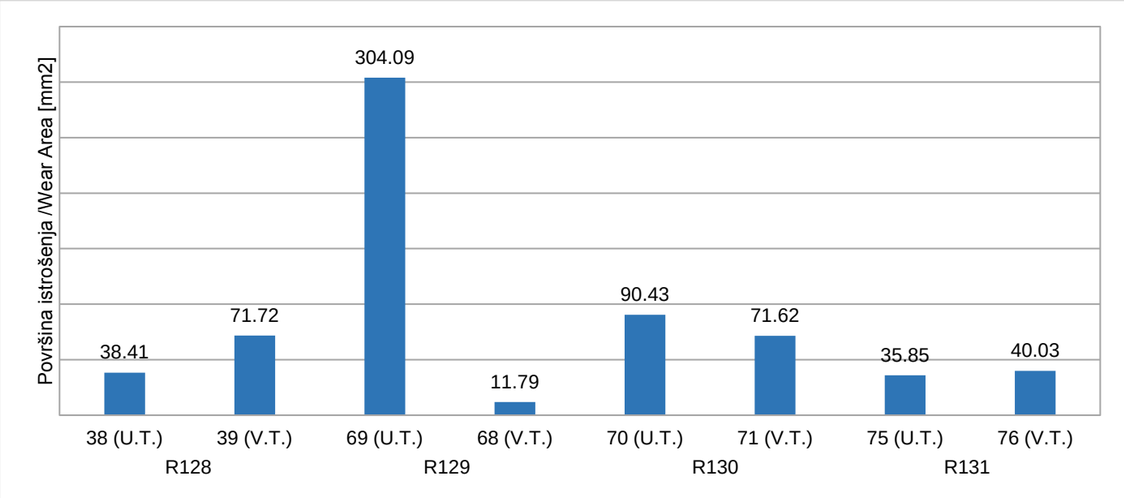
Prilog 6.14.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 14**
Lokacija 14: Križanje Maksimirska cesta.-Avenija Dubrava-Ulica Dragutina Mandlova

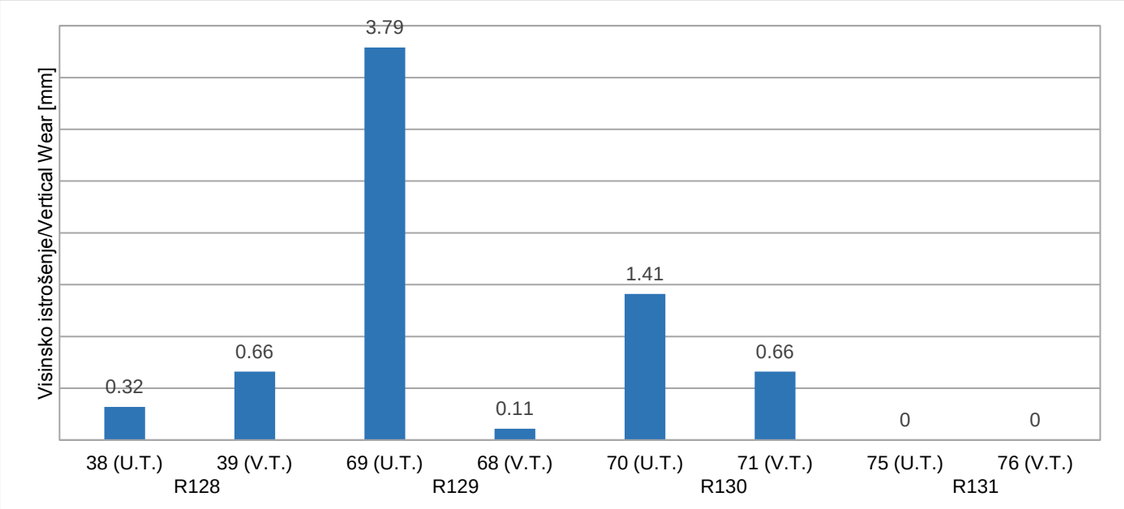
Annex 6.14.1. **Results of cross section wear in curves at Location 14**
Location 14: Maksimirska - Dubrava - Mandlova crossing

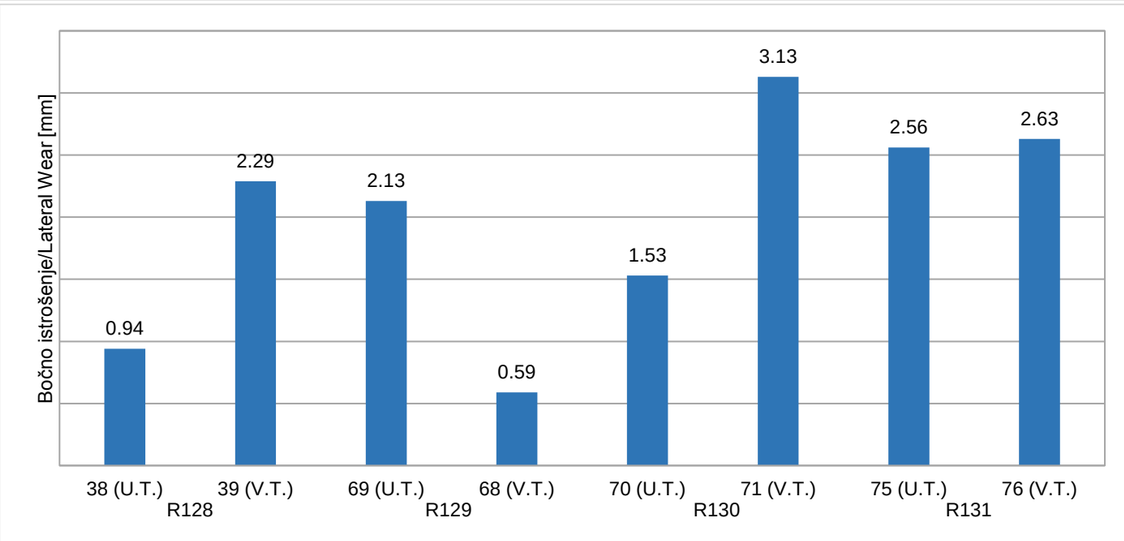


Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [˚]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
K-18-06	R128	desna right	39	lijeva/left	71.72	0.66	2.29	74.61	24	4
			38	desna/right	38.41	0.32	0.94	81.64		
K-18-05	R129	lijeva left	69	lijeva/left	304.09	3.79	2.13	77.86	25	4
			68	desna/right	11.79	0.11	0.59	78.3		
K-18-04	R130	lijeva left	70	lijeva/left	90.43	1.41	1.53	81.14	25	4
			71	desna/right	71.62	0.66	3.13	75.85		
K-18-03	R131	desna right	76	lijeva/left	40.03	0	2.63	73.45	25	4
			75	desna/right	35.85	0	2.56	71.32		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
K-18-06	R128	desna right	39	lijeva/left	71.72	0.66	2.29
			38	desna/right	38.41	0.32	0.94
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					33.31	0.34	1.35
K-18-05	R129	lijeva left	69	lijeva/left	304.09	3.79	2.13
			68	desna/right	11.79	0.11	0.59
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-292.3	-3.68	-1.54
K-18-04	R130	lijeva left	70	lijeva/left	90.43	1.41	1.53
			71	desna/right	71.62	0.66	3.13
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-18.81	-0.75	1.6
K-18-03	R131	desna right	76	lijeva/left	40.03	0	2.63
			75	desna/right	35.85	0	2.56
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					4.18	0	0.07







U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve

Prilog 6.14.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 14

Istrošenje poprečnog presjeka tračnica u krivini R128

Lokacija 14: Križanje Maksimirska c.-Av. Dubrava-Ul. D. Mandlova

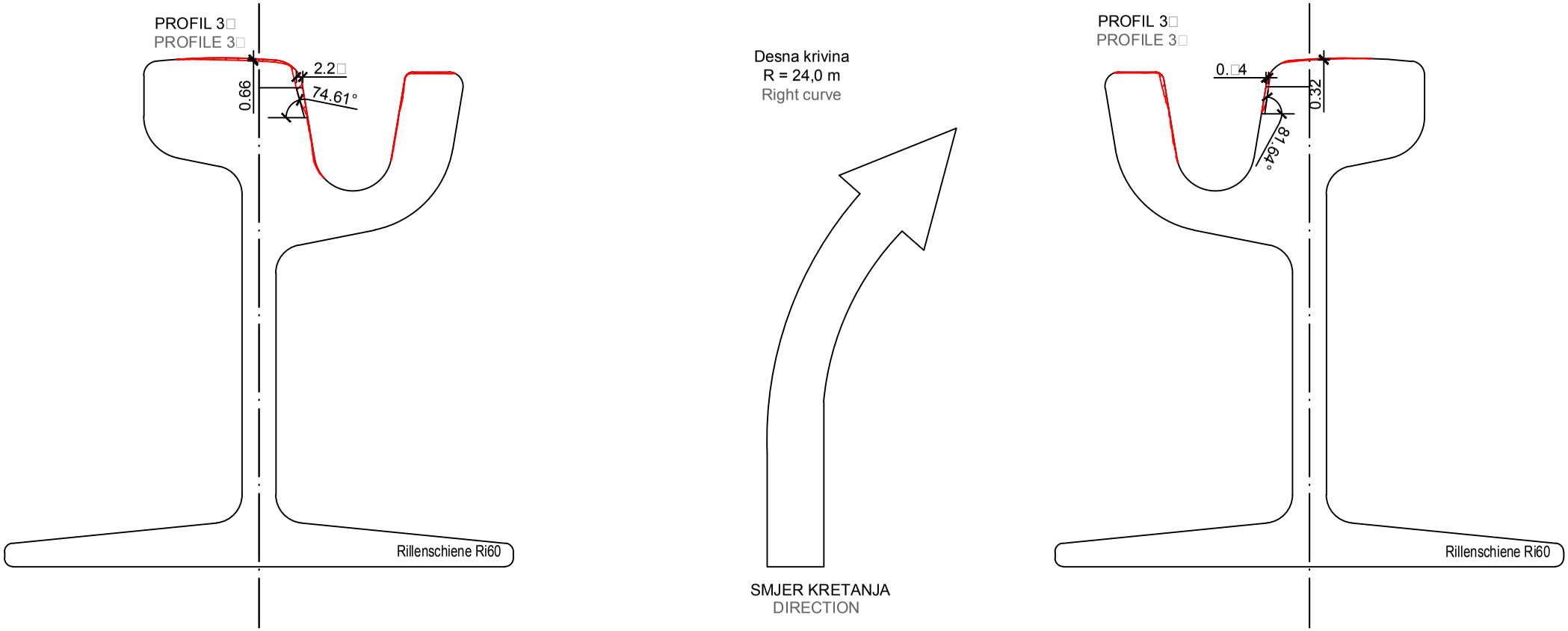
MJ: 1:2

Annex 6.14.1.1. Cross section wear in curves at Location 14

Cross section wear in curve R12

Location 14: Maksimirska - Dubrava - Mandlova crossing

Scale: 1:2



Prilog 6.14.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 14

Istrošenje poprečnog presjeka tračnica u krivini R129

Lokacija 14: Križanje Maksimirska c.-Av. Dubrava-Ul. D. Mandlova

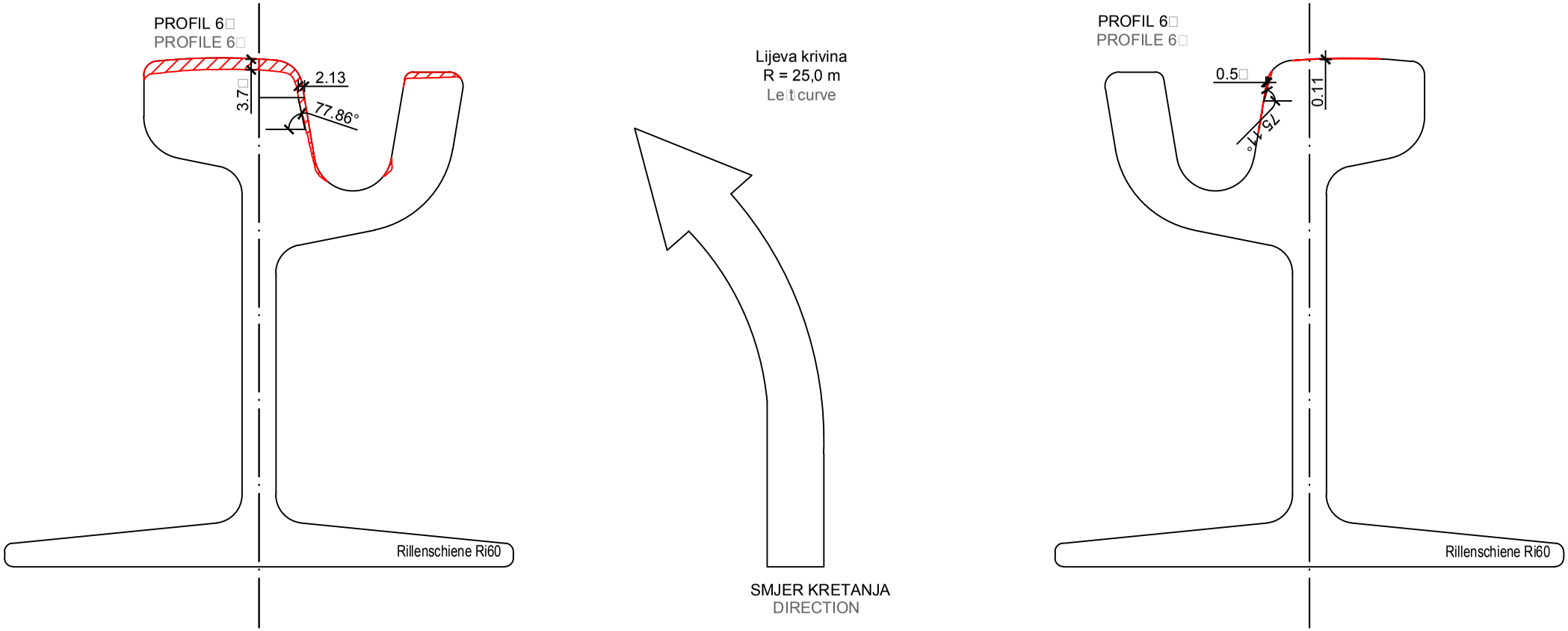
MJ: 1:2

Annex 6.14.1.1. Cross section wear in curves at Location 14

Cross section wear in curve R12

Location 14: Maksimirska - Dubrava - Mandlova crossing

Scale: 1:2



Prilog 6.14.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 14

Istrošenje poprečnog presjeka tračnica u krivini R130

Lokacija 14: Križanje Maksimirska c.-Av. Dubrava-Ul. D. Mandlova

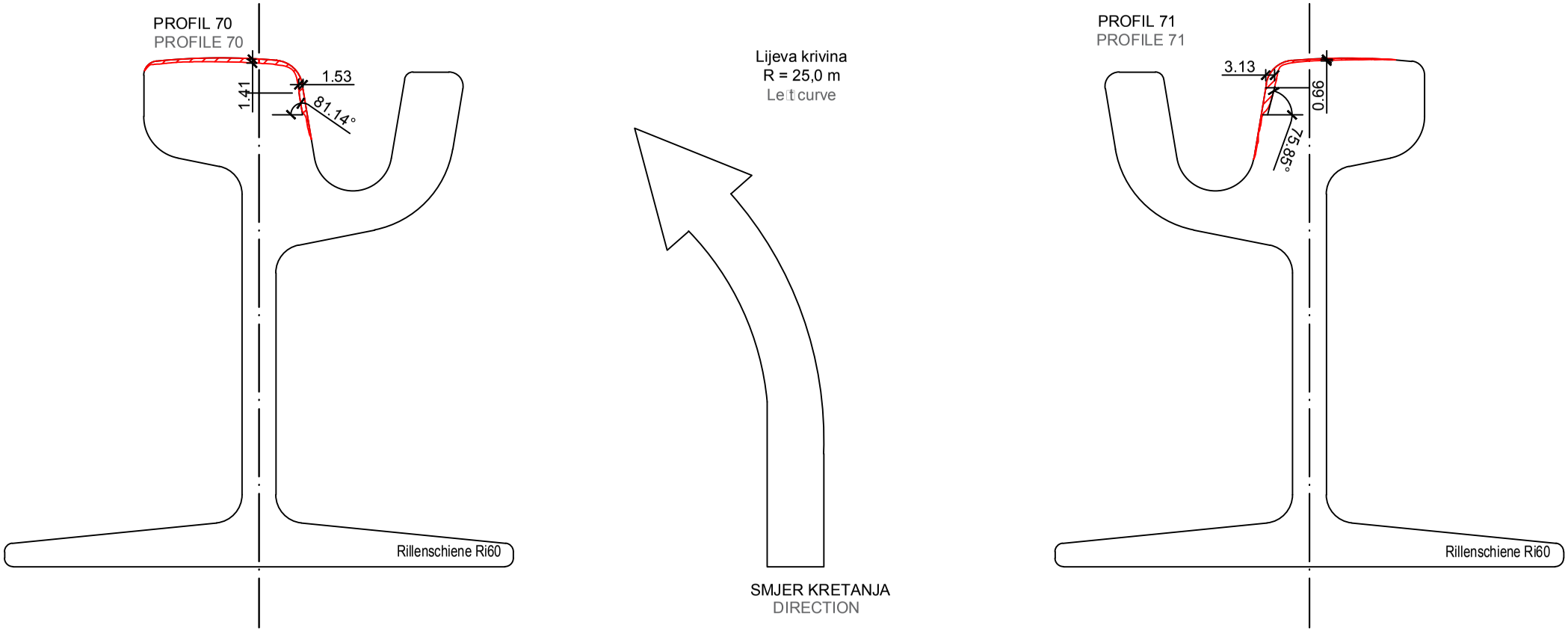
MJ: 1:2

Annex 6.14.1.1. Cross section wear in curves at Location 14

Cross section wear in curve R130

Location 14: Maksimirska - Dubrava - Mandlova crossing

Scale: 1:2



Prilog 6.14.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 14

Istrošenje poprečnog presjeka tračnica u krivini R131

Lokacija 14: Križanje Maksimirska c.-Av. Dubrava-Ul. D. Mandlova

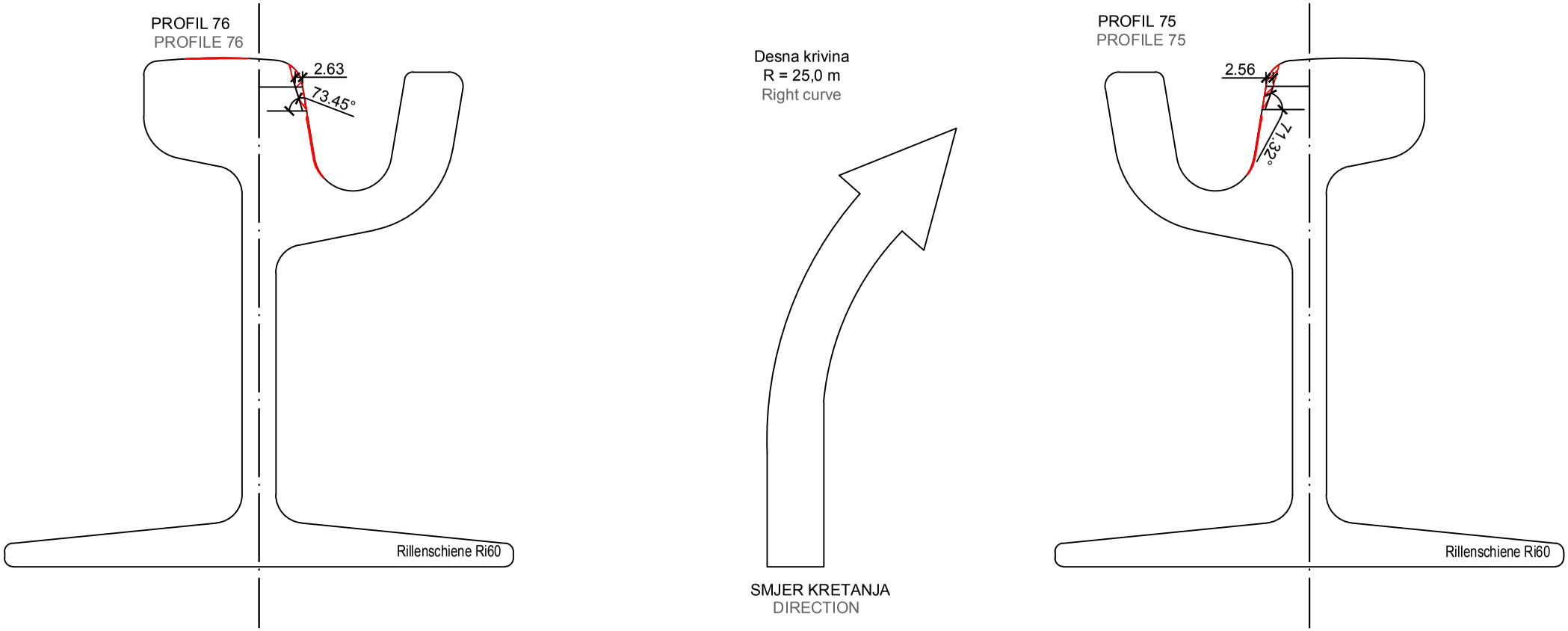
MJ: 1:2

Annex 6.14.1.1. Cross section wear in curves at Location 14

Cross section wear in curve R130

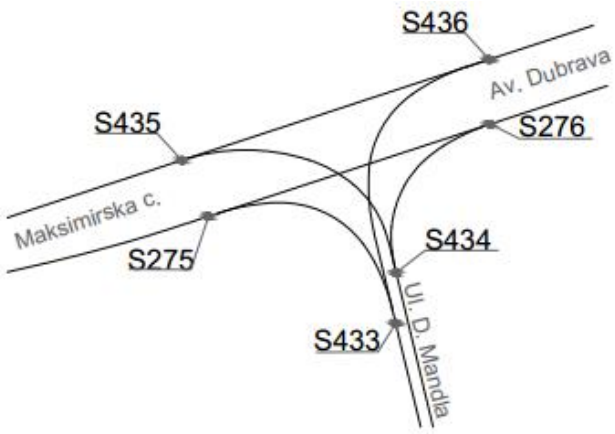
Location 14: Maksimirska - Dubrava - Mandlova crossing

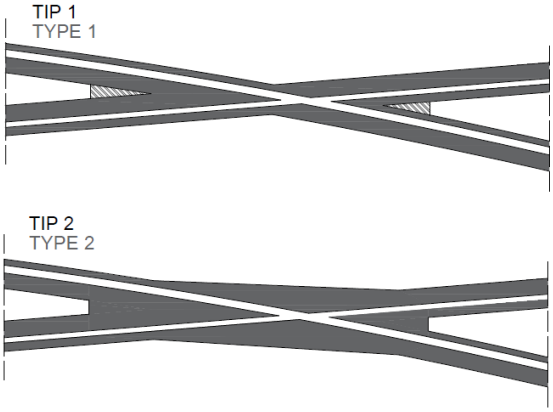
Scale: 1:2



Prilog 6.14.2. **Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 14**
Lokacija 14: Križanje Maksimirska cesta.-Av. Dubrava-Ul. D. Mandlova

Annex 6.14.2. **Results of cross section wear in turnouts at Location 14**
Location 14: Maksimirska - Dubrava - Mandlova crossing





Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-18-06 K-18-02	S276	2	40L	13	21.37	8.37	24.00	23.76	-0.24	4
			40D	13	13.67	0.67	30.63	32.49	1.86	
			41	12	22.37	10.37		55.84		
			42L	13	13.87	0.87	30.63	32.31	1.68	
			42D	13	21.11	8.11	24.00	23.63	-0.37	
K-18-01 K-18-05	S436	2	64L	13	22.12	9.12	24.50	24.21	-0.29	4
			64D	13	13.25	0.25	30.00	30.63	0.63	
			66	12	22.08	10.08		32.67		
			67L	13	12.90	-0.10	30.00	29.63	-0.37	
			67D	13	22.32	9.32	24.50	23.22	-1.28	
K-18-04 K-18-01	S435	2	72L	13	14.66	1.66	30.00	31.56	1.56	4
			72D	13	21.00	8.00	24.46	24.22	-0.24	
			73	12	21.39	9.39		38.67		
			74L	13	20.82	7.82	24.47	24.11	-0.36	
			74D	13	15.15	2.15	30.00	31.54	1.54	
K-18-02 K-18-03	S275	2	77L	13	15.41	2.41	30.58	30.92	0.34	4
			77D	13	20.79	7.79	24.00	24.34	0.34	
			80	12	20.78	8.78		33.55		
			81L	13	20.76	7.76	24.00	23.81	-0.19	
			81D	13	15.05	2.05	30.58	30.46	-0.12	
K-18-03 K-18-05	S433	2	82L	13	13.57	0.57	24.00	24.46	0.46	4
			82D	13	15.01	2.01	30.59	31.07	0.48	
			83	12	15.04	3.04		39.87		
			84L	13	14.83	1.83	30.59	30.77	0.18	
			84D	13	13.51	0.51	24.00	24.26	0.26	
K-18-04 K-18-06	S434	2	86L	13	13.98	0.98	35.64	37.60	1.96	4
			86D	13	15.21	2.21	30.00	31.50	1.50	
			87	12	15.17	3.17		39.82		
			89L	13	14.84	1.84	30.00	31.45	1.45	
			89D	13	13.77	0.77	35.65	37.79	2.14	

Prilog 6.14.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 14

Istrošenje poprečnog presjeka srcišta skretnice S275

Lokacija 14: Križanje Maksimirska cesta.-Av. Dubrava-Ul. D. Mandlova

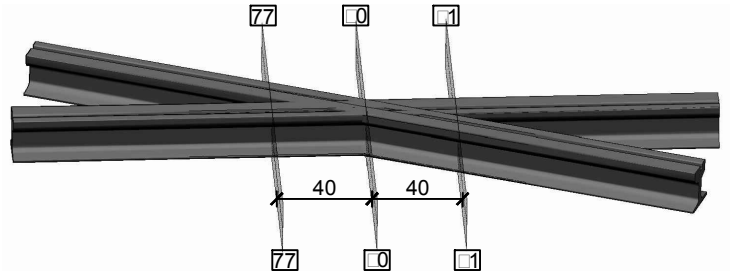
MJ: 1:2

Annex 6.14.2.1. Cross section wear in turnouts at Location 14

Cross section wear in turnout S275

Location 14: Maksimirska - Dubrava - Mandlova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

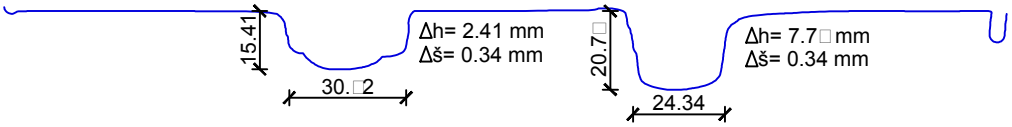
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Maksimir ⟶ Dubec

Direction: Maksimir ⟶ Dubec

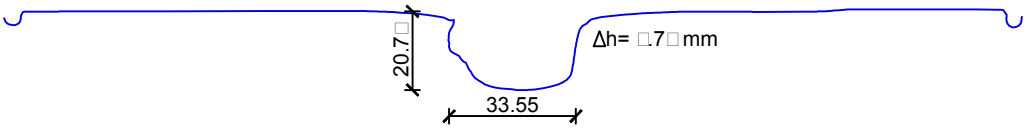
PROFIL 77

PROFILE 77



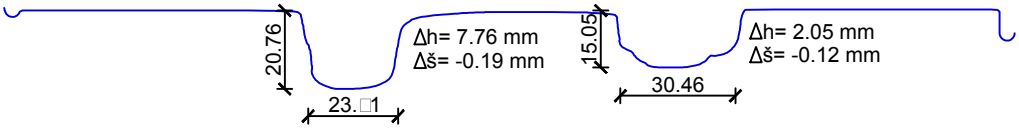
PROFIL □0

PROFILE □0



PROFIL □1

PROFILE □1



Prilog 6.14.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 14

Istrošenje poprečnog presjeka srcišta skretnice S276

Lokacija 14: Križanje Maksimirska cesta.-Av. Dubrava-Ul. D. Mandlova

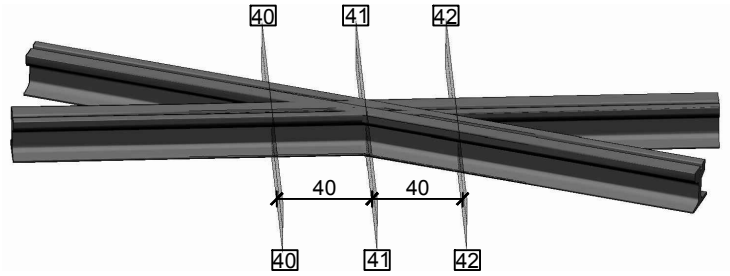
MJ: 1:2

Annex 6.14.2.1. Cross section wear in turnouts at Location 14

Cross section wear in turnout S276

Location 14: Maksimirska - Dubrava - Mandlova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

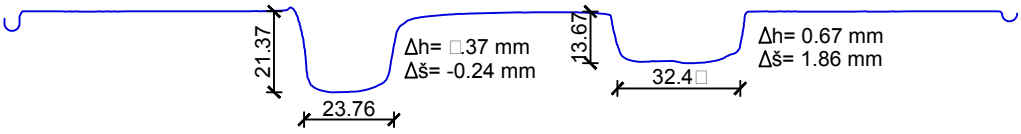
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Maksimir → Dubec

Direction: Maksimir → Dubec

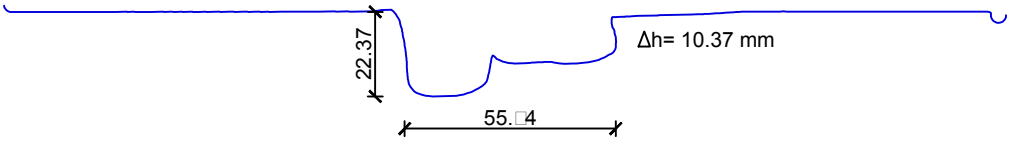
PROFIL 40

PROFILE 40



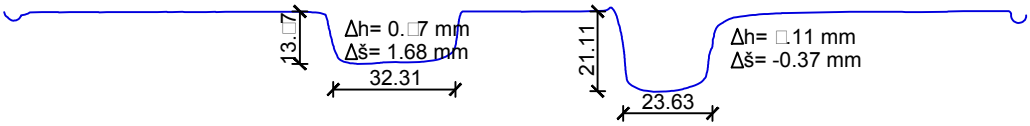
PROFIL 41

PROFILE 41



PROFIL 42

PROFILE 42



Prilog 6.14.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 14

Istrošenje poprečnog presjeka srcišta skretnice S433

Lokacija 14: Križanje Maksimirska cesta.-Av. Dubrava-Ul. D. Mandlova

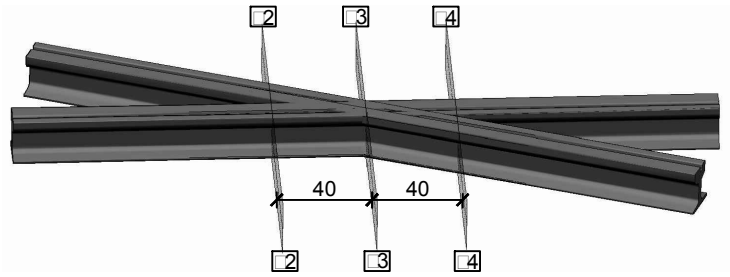
MJ: 1:2

Annex 6.14.2.1. Cross section wear in turnouts at Location 14

Cross section wear in turnout S433

Location 14: Maksimirska - Dubrava - Mandlova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

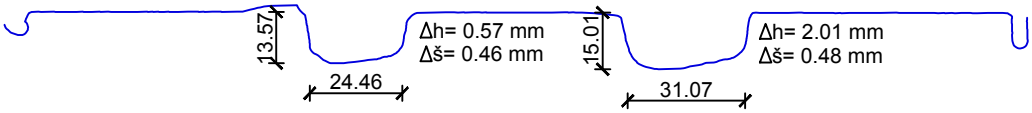
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Maksimir ⟶ Remiza Dubrava

Direction: Maksimir ⟶ Shunting □ard

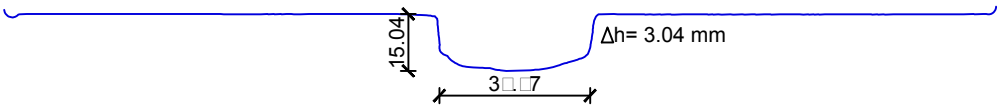
PROFIL □2

PROFILE □2



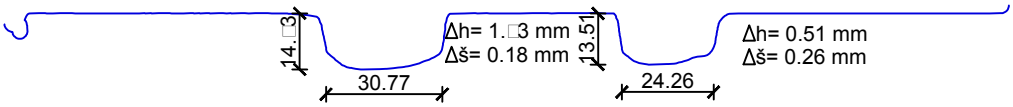
PROFIL □3

PROFILE □3



PROFIL □4

PROFILE □4

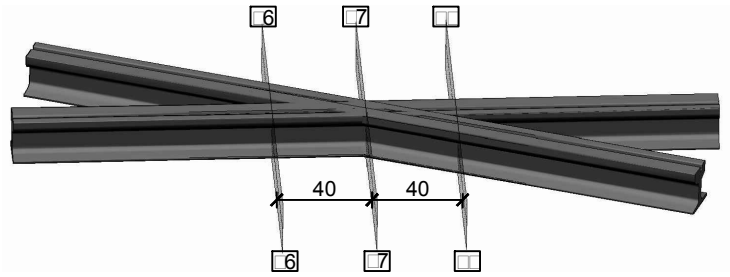


Prilog 6.14.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 14

Istrošenje poprečnog presjeka srcišta skretnice S434
Lokacija 14: Križanje Maksimirska cesta.-Av. Dubrava-Ul. D. Mandlova
MJ: 1:2

Annex 6.14.2.1. Cross section wear in turnouts at Location 14

Cross section wear in turnout S434
Location 14: Maksimirska - Dubrava - Mandlova crossing
Scale: 1:2

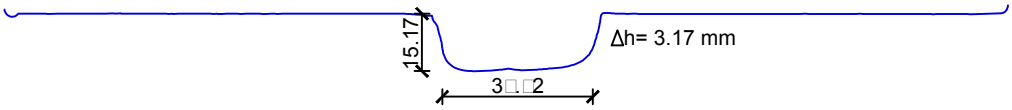


Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

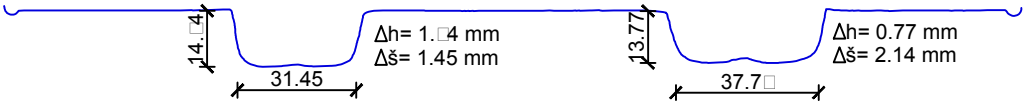
Smjer vožnje: Remiza Dubrava ⟶ Maksimir
Direction: Shunting □ard Dubrava ⟶ Maksimir

PROFIL □6
PROFILE □6

PROFIL □7
PROFILE □7



PROFIL □□
PROFILE □□



Prilog 6.14.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 14

Istrošenje poprečnog presjeka srcišta skretnice S435

Lokacija 14: Križanje Maksimirska cesta.-Av. Dubrava-Ul. D. Mandlova

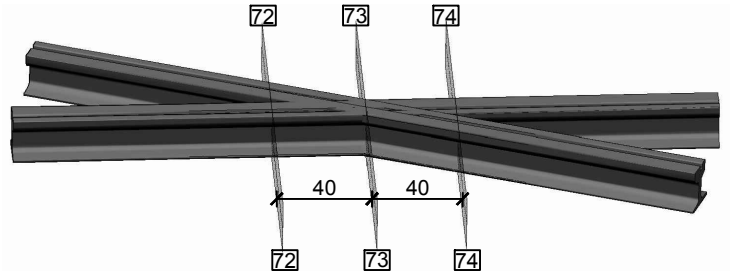
MJ: 1:2

Annex 6.14.2.1. Cross section wear in turnouts at Location 14

Cross section wear in turnout S435

Location 14: Maksimirska - Dubrava - Mandlova crossing

Scale: 1:2

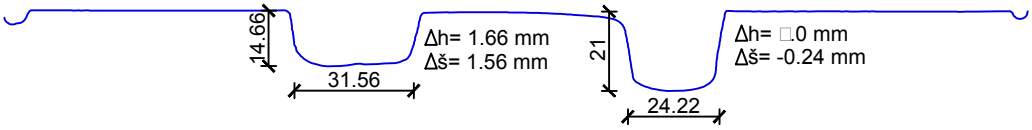


Δh - visinsko istrošenje
Δš - bočno istrošenje

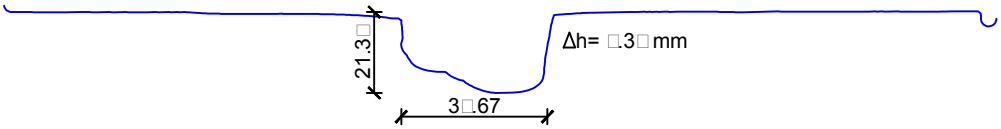
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Dubec ⟶ Maksimir
Direction: Dubec ⟶ Maksimir

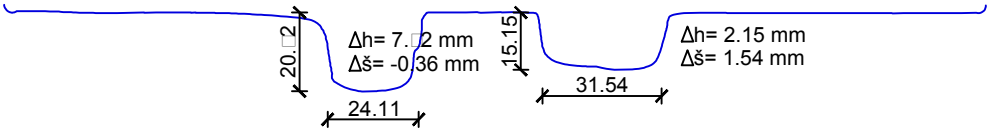
PROFIL 72
PROFILE 72



PROFIL 73
PROFILE 73



PROFIL 74
PROFILE 74

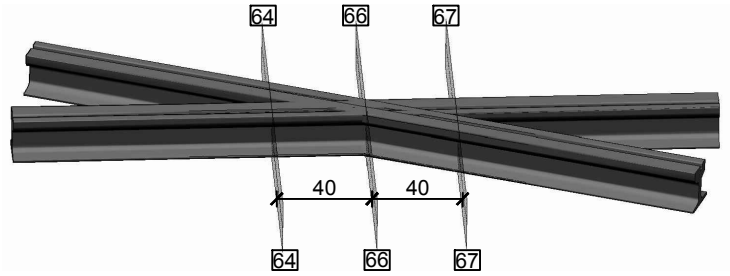


Prilog 6.14.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 14

Istrošenje poprečnog presjeka srcišta skretnice S436
Lokacija 14: Križanje Maksimirska cesta.-Av. Dubrava-Ul. D. Mandlova
MJ: 1:2

Annex 6.14.2.1. Cross section wear in turnouts at Location 14

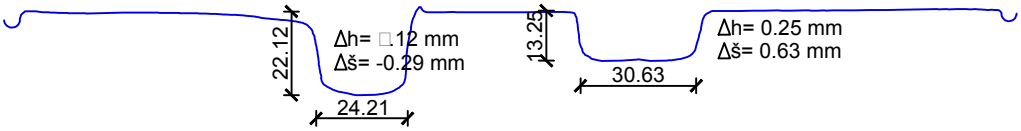
Cross section wear in turnout S436
Location 14: Maksimirska - Dubrava - Mandlova crossing
Scale: 1:2



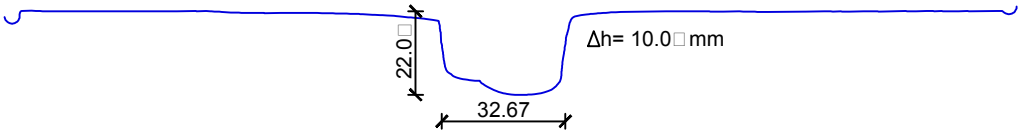
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Dubec → Maksimir
Direction: Dubec → Maksimir

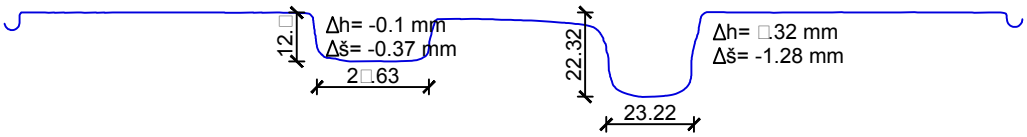
PROFIL 64
PROFILE 64



PROFIL 66
PROFILE 66

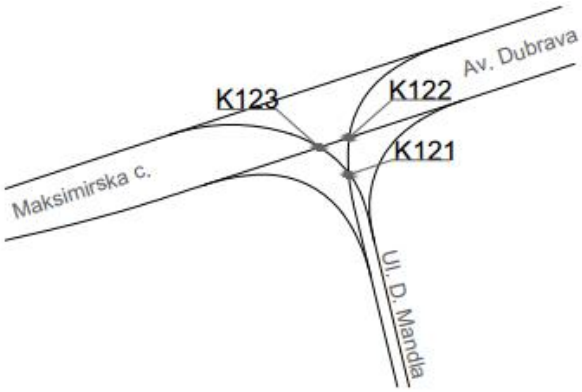


PROFIL 67
PROFILE 67



Prilog 6.14.3. Rezultati istrošenja profila tračnica u križalištima na Lokaciji 14
Lokacija 14: Križanje Maksimirska cesta.-Av. Dubrava-Ul. D. Mandlova

Annex 6.14.3. Results of cross section wear in track crossing at Location 14
Location 14: Maksimirska - Dubrava - Mandlova crossing



Dionice Sections	**Oznaka križališta** Track crossing mark	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-18-05 K-18-02	K122	30	12	18,04	6.04	24.00	23.28	-0.72	4
		31	12	18,25	6.25	24.00	23.84	-0.16	
		32	12	13,11	1.11	34.00	35.49	1.49	
		33	12	13,16	1.16	34.00	35.13	1.13	
K-18-04 K-18-05	K121	34	12	14,04	2.04	34.00	37.64	3.64	4
		35	12	13,81	1.81	34.00	36.59	2.59	
		36	12	12,75	0.75	30.00	30.54	0.54	
		37	12	13,44	1.44	30.00	31.09	1.09	
K-18-02 K-18-04	K123	25	12	18,54	6.54	24.00	22.03	-1.97	4
		27	12	17,62	5.62	24.00	24.20	0.20	
		28	12	13,63	1.63	30.00	31.35	1.35	
		29	12	13,92	1.92	30.00	32.16	2.16	

Prilog 6.14.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 14

Istrošenje poprečnog presjeka tračnica u križalištu K121

Lokacija 14: Križanje Maksimirska cesta. - Av. Dubrava - Ul. D. Mandlova

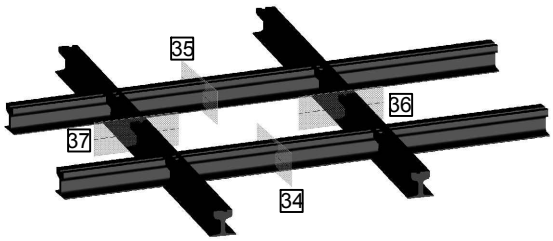
MJ: 1:2

Annex 6.14.3.1. Cross section wear in track crossings at Location 14

Cross section wear in track crossing K121

Location 14: Maksimirska - Dubrava - Mandlova crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

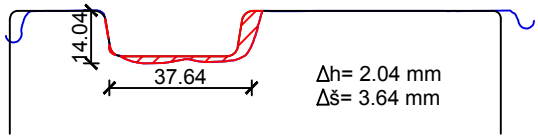
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Remiza Dubrava ⟶ Maksimir

Direction: Shunting □ard Dubrava ⟶ Maksimir

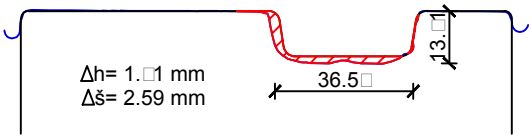
PROFIL 34

PROFILE 34



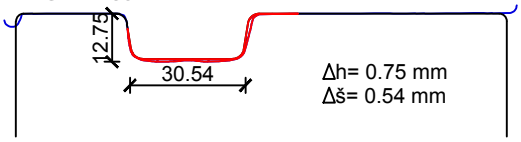
PROFIL 35

PROFILE 35



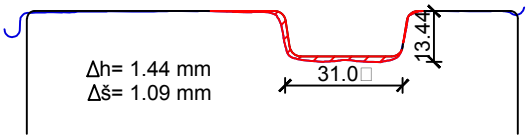
PROFIL 36

PROFILE 36



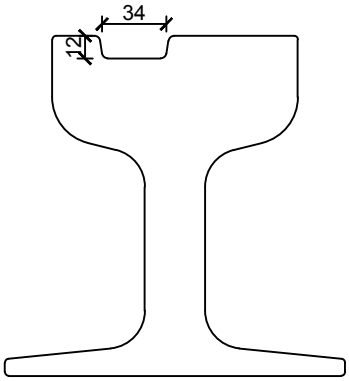
PROFIL 37

PROFILE 37



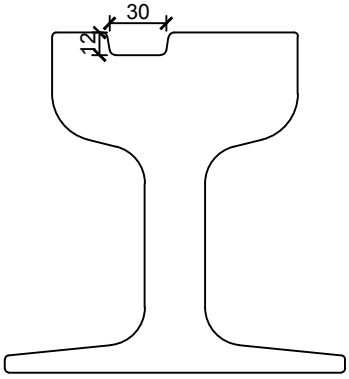
PROFIL 34, 35 □PROFILE 34, 35

R = 25 m



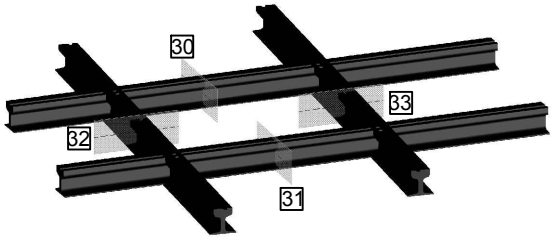
PROFIL 36, 37 □PROFILE 36, 37

R = 50 m



Prilog 6.14.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 14
Istrošenje poprečnog presjeka tračnica u križalištu K122
Lokacija 14: Križanje Maksimirska cesta. - Av. Dubrava - Ul. D. Mandlova
MJ: 1:2

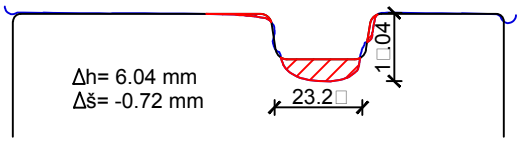
Annex 6.14.3.1. Cross section wear in track crossings at Location 14
Cross section wear in track crossing K122
Location 14: Maksimirska - Dubrava - Mandlova crossing
Scale: 1:2



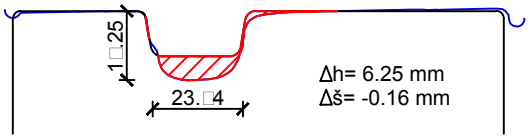
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Maksimir ⟶ Dubec
Direction: Maksimir ⟶ Dubec

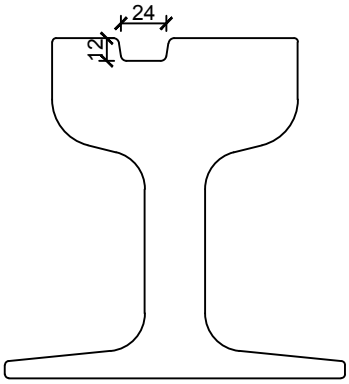
PROFIL 30
PROFILE 30



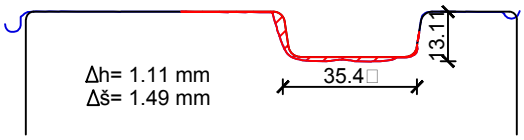
PROFIL 31
PROFILE 31



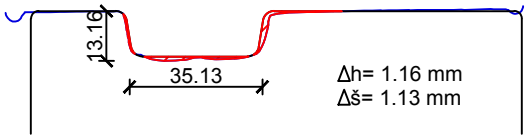
PROFIL 30, 31 PROFIL 30, 31
R = 0 m



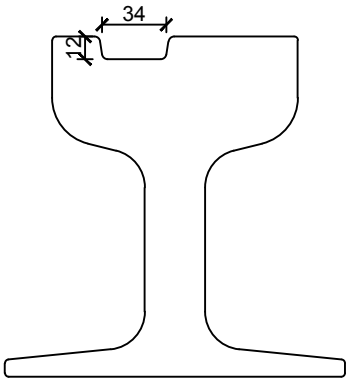
PROFIL 32
PROFILE 32



PROFIL 33
PROFILE 33

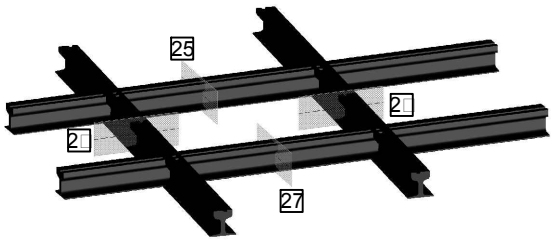


PROFIL 32, 33 PROFILE 32, 33
R = 25 m



Prilog 6.14.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 14
Istrošenje poprečnog presjeka tračnica u križalištu K123
Lokacija 14: Križanje Maksimirska cesta. - Av. Dubrava - Ul. D. Mandlova
MJ: 1:2

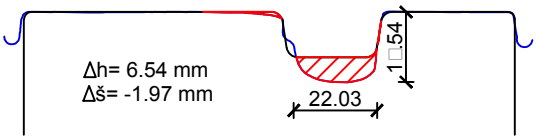
Annex 6.14.3.1. Cross section wear in track crossings at Location 14
Cross section wear in track crossing K123
Location 14: Maksimirska - Dubrava - Mandlova crossing
Scale: 1:2



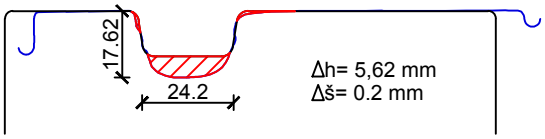
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Maksimir ⟶ Dubec
Direction: Maksimir ⟶ Dubec

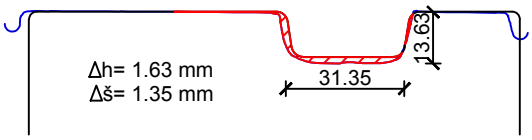
PROFIL 25
PROFILE 25



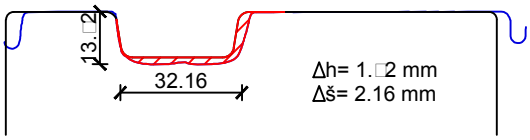
PROFIL 27
PROFILE 27



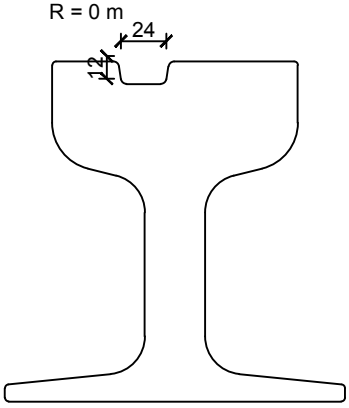
PROFIL 2□
PROFILE 2□



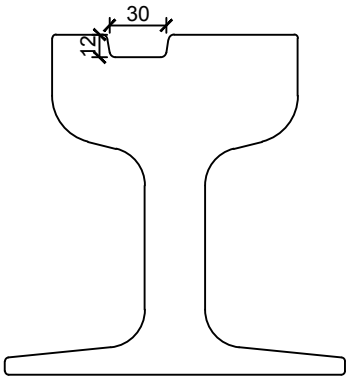
PROFIL 2□
PROFILE 2□



PROFIL 25, 27 □PROFILE 25, 27
R = 0 m

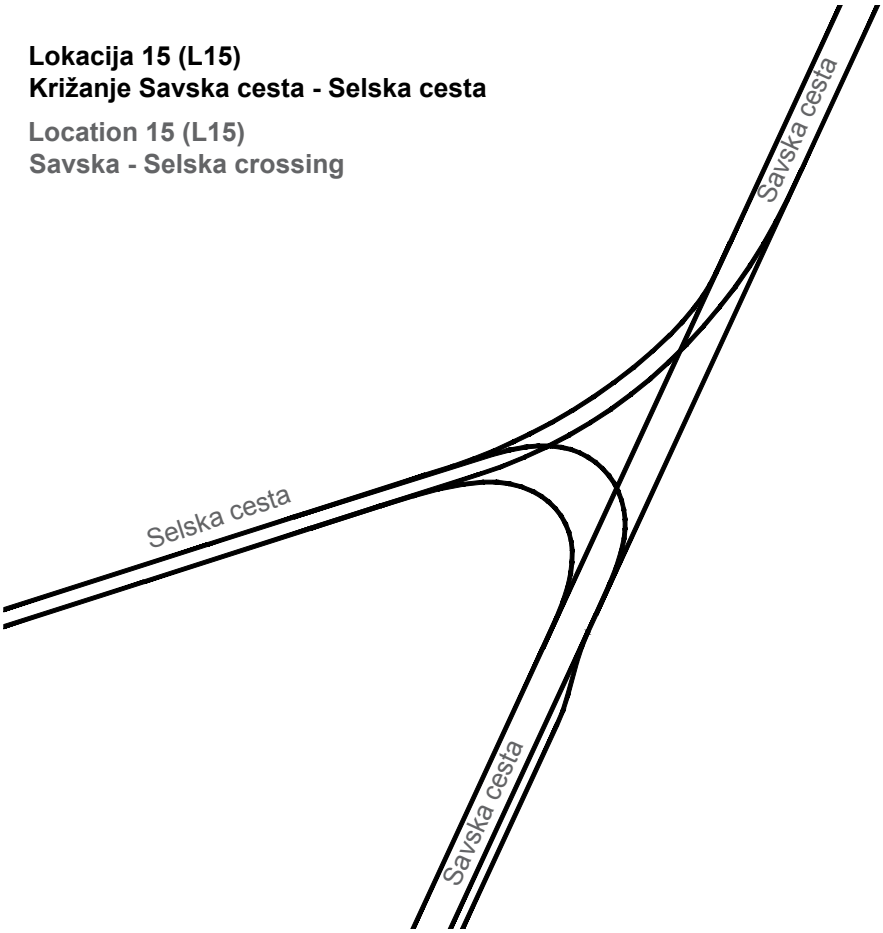


PROFIL 2□, 2□ □PROFILE 2□, 2□
R = 33 m



Lokacija 15 (L15)
Križanje Savska cesta - Selska cesta

Location 15 (L15)
Savska - Selska crossing



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija razvoja tramvajskog prometa □rada □agre□a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition

SADRŽAJ PRILOGA:
ANNEX:

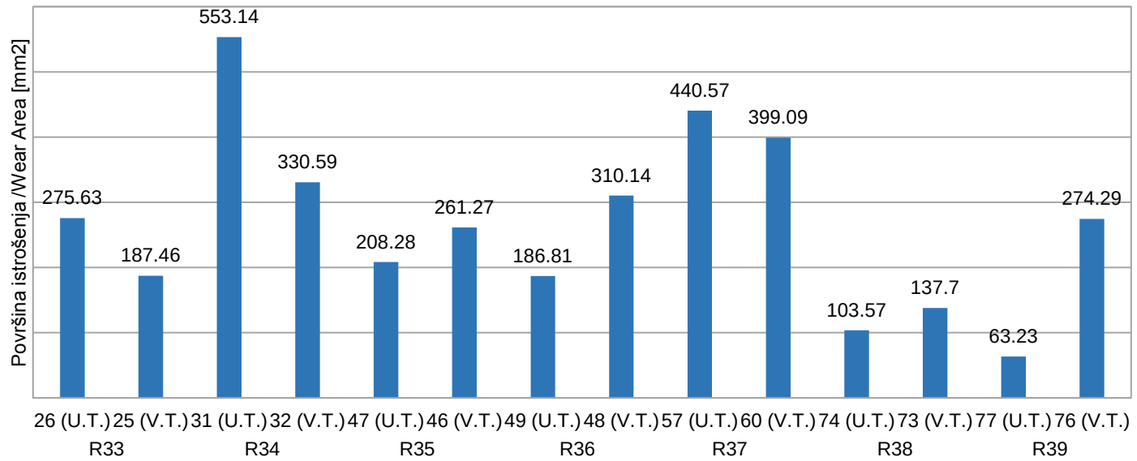
Istrošenje poprečnih presjeka tračnica u krivinama, skretnicama i križalištima na Lokaciji 15

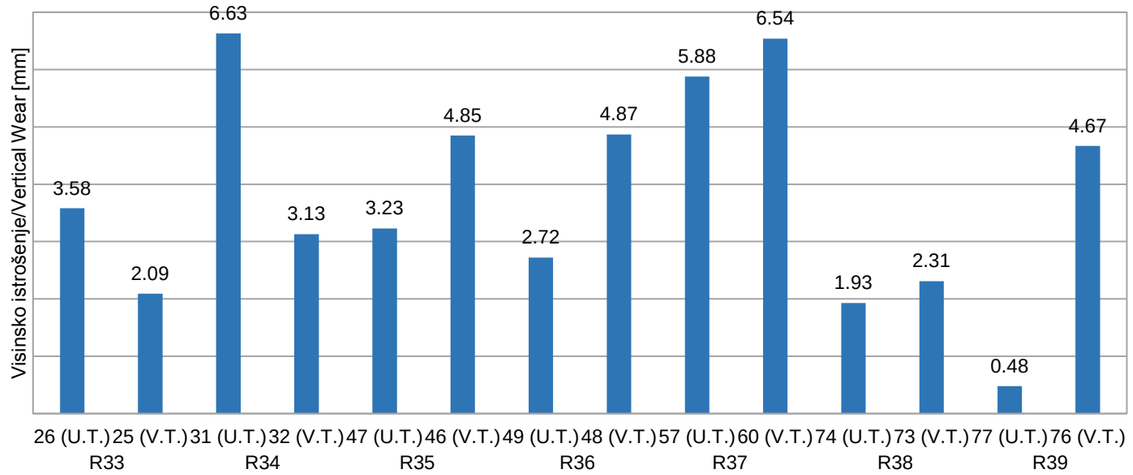
Rail cross section wear in curves, turnouts and crossings at Location 15

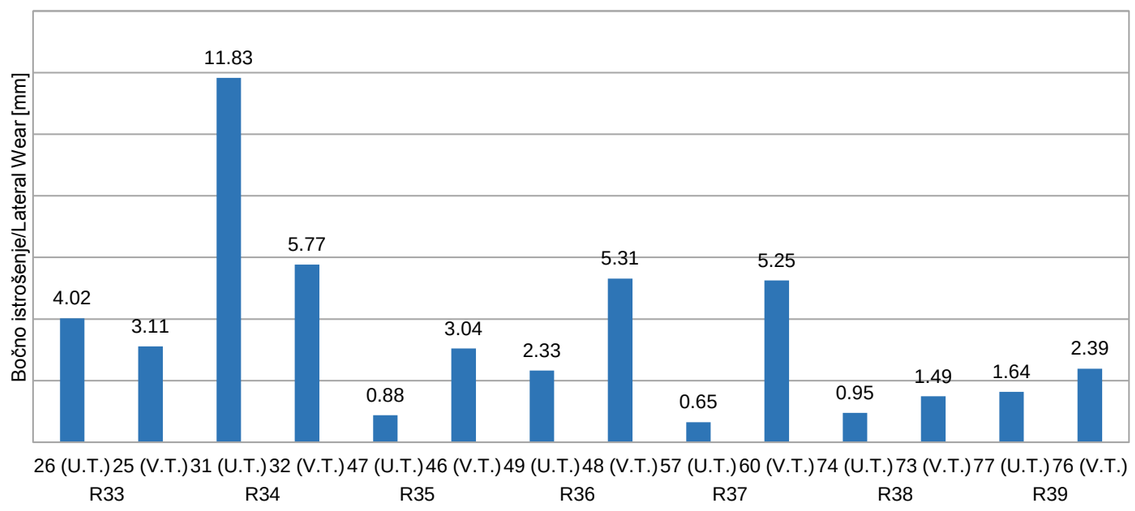
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.15

Prilog 6.15.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 15**
Lokacija 15: Križanje Savska cesta-Selska cesta

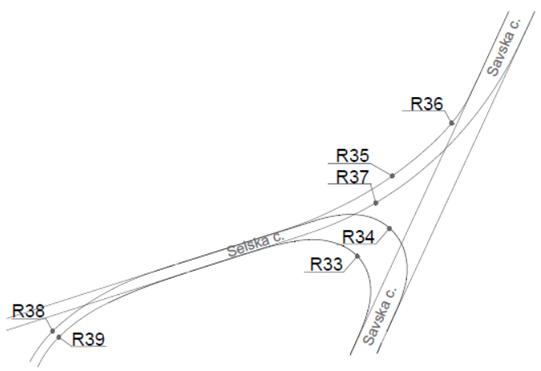
Annex 6.15.1. **Results of cross section wear in curves at Location 15**
Location 15: Savska - Selska crossing







U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve



Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [˚]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
K-02-05	R33	desna right	25	lijeva/left	187.46	2.09	3.11	78.18	20	10
			26	desna/right	275.63	3.58	4.02	72.96		
K-02-06	R34	lijeva left	31	lijeva/left	553.14	6.63	11.83	71.22	18	10
			32	desna/right	330.59	3.13	5.77	75.84		
K-02-01	R35	desna right	46	lijeva/left	261.27	4.85	3.04	82.47	70	10
			47	desna/right	208.28	3.23	0.88	79.71		
K-02-01	R36	desna right	48	lijeva/left	310.14	4.87	5.31	80.42	50	10
			49	desna/right	186.81	2.72	2.33	82.67		
K-02-02	R37	lijeva left	57	lijeva/left	440.57	5.88	0.65	79.28	132	10
			60	desna/right	399.09	6.54	5.25	79.09		
-	R38	lijeva left	74	lijeva/left	103.57	1.93	0.95	80.35	51	10
			73	desna/right	137.7	2.31	1.49	77.55		
-	R39	desna right	76	lijeva/left	274.29	4.67	2.39	80.87	40	10
			77	desna/right	63.23	0.48	1.64	82.21		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
K-02-05	R33	desna right	25	lijeva/left	187.46	2.09	3.11
			26	desna/right	275.63	3.58	4.02
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-88.17	-1.49	-0.91
K-02-06	R34	lijeva left	31	lijeva/left	553.14	6.63	11.83
			32	desna/right	330.59	3.13	5.77
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-222.55	-3.5	-6.06
K-02-01	R35	desna right	46	lijeva/left	261.27	4.85	3.04
			47	desna/right	208.28	3.23	0.88
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					52.99	1.62	2.16
K-02-01	R36	desna right	48	lijeva/left	310.14	4.87	5.31
			49	desna/right	186.81	2.72	2.33
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-123.33	-2.15	-2.98
K-02-02	R37	lijeva left	57	lijeva/left	440.57	5.88	0.65
			60	desna/right	399.09	6.54	5.25
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-41.48	0.66	4.6
-	R38	lijeva left	74	lijeva/left	103.57	1.93	0.95
			73	desna/right	137.7	2.31	1.49
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					34.13	0.38	0.54
-	R39	desna right	76	lijeva/left	274.29	4.67	2.39
			77	desna/right	63.23	0.48	1.64
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-211.06	-4.19	-0.75

Prilog 6.15.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 15

Istrošenje poprečnog presjeka tračnica u krivini R33

Lokacija 15: Križanje Savska-Selska

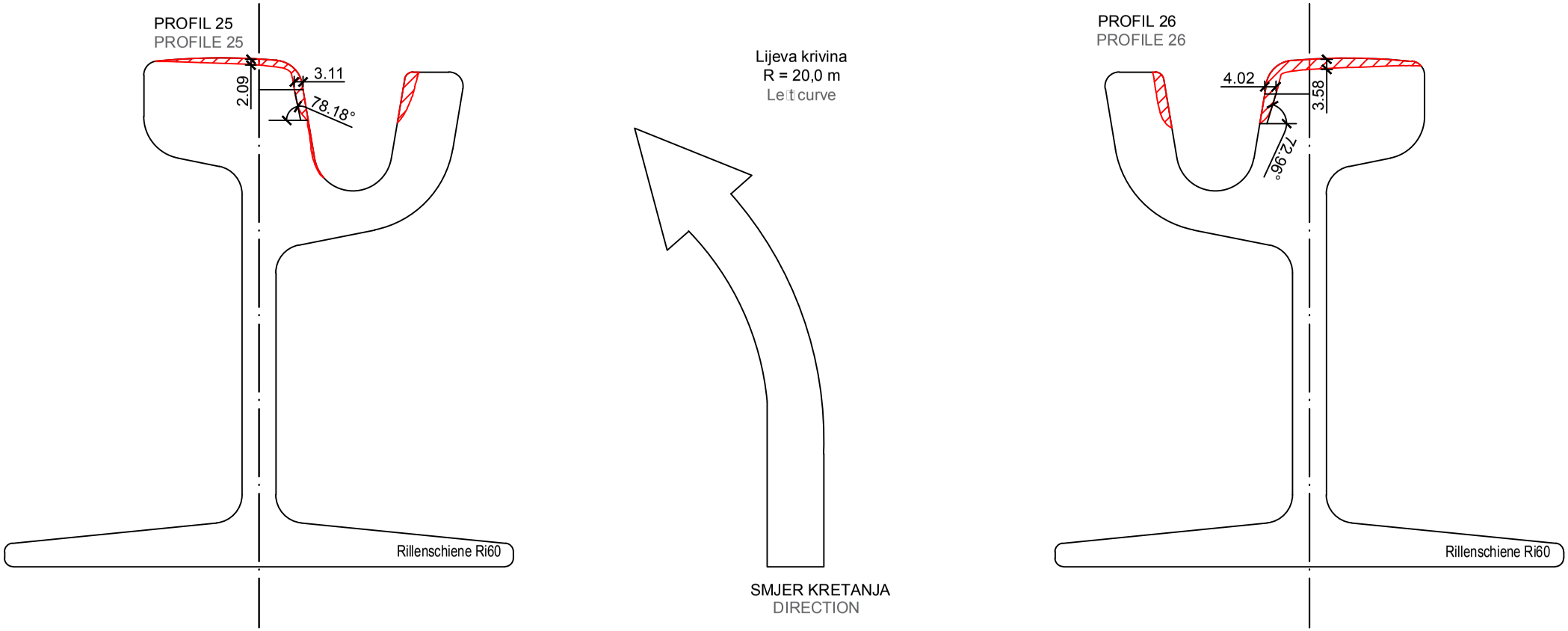
MJ: 1:2

Annex 6.15.1.1. Cross section wear in curves at Location 15

Cross section wear in curve R33

Location 15: Savska - Selska crossing

Scale: 1:2



Prilog 6.15.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 15

Istrošenje poprečnog presjeka tračnica u krivini R34

Lokacija 15: Križanje Savska-Selska

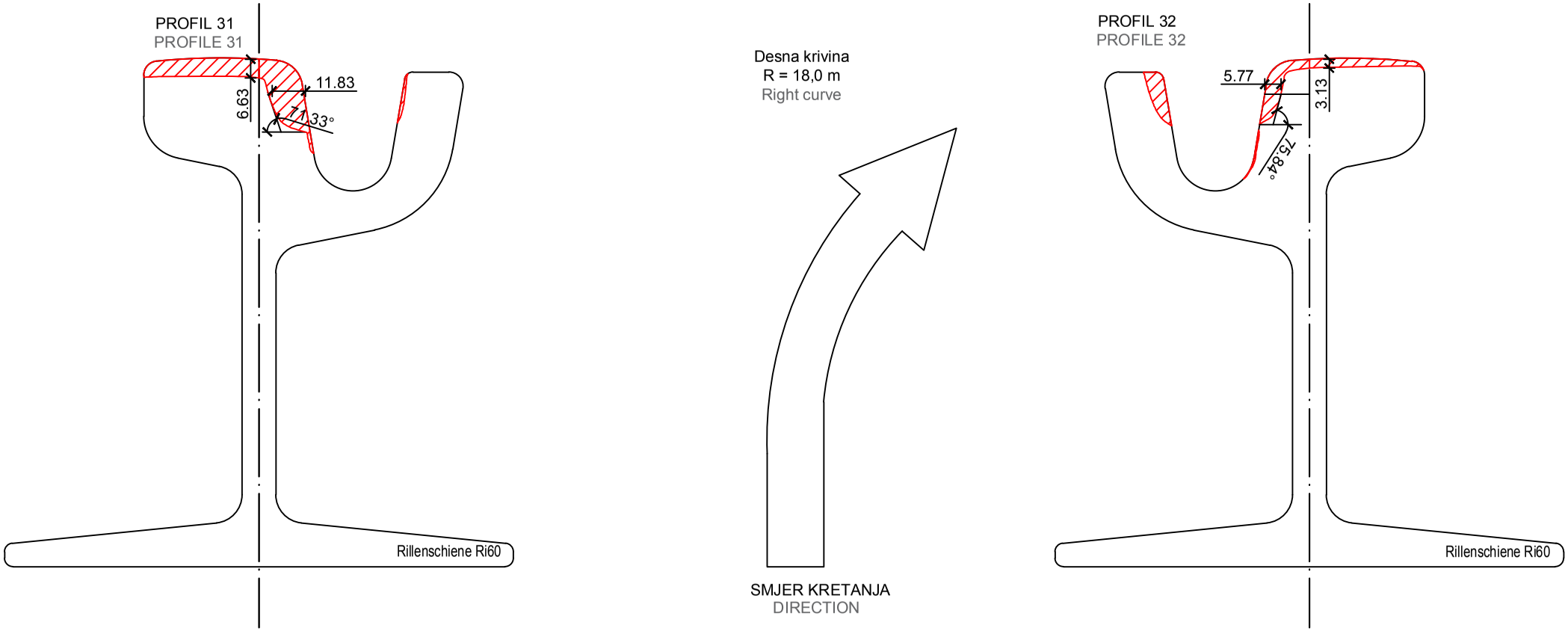
MJ: 1:2

Annex 6.15.1.1. Cross section wear in curves at Location 15

Cross section wear in curve R34

Location 15: Savska - Selska crossing

Scale: 1:2



Prilog 6.15.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 15

Istrošenje poprečnog presjeka tračnica u krivini R35

Lokacija 15: Križanje Savska-Selska

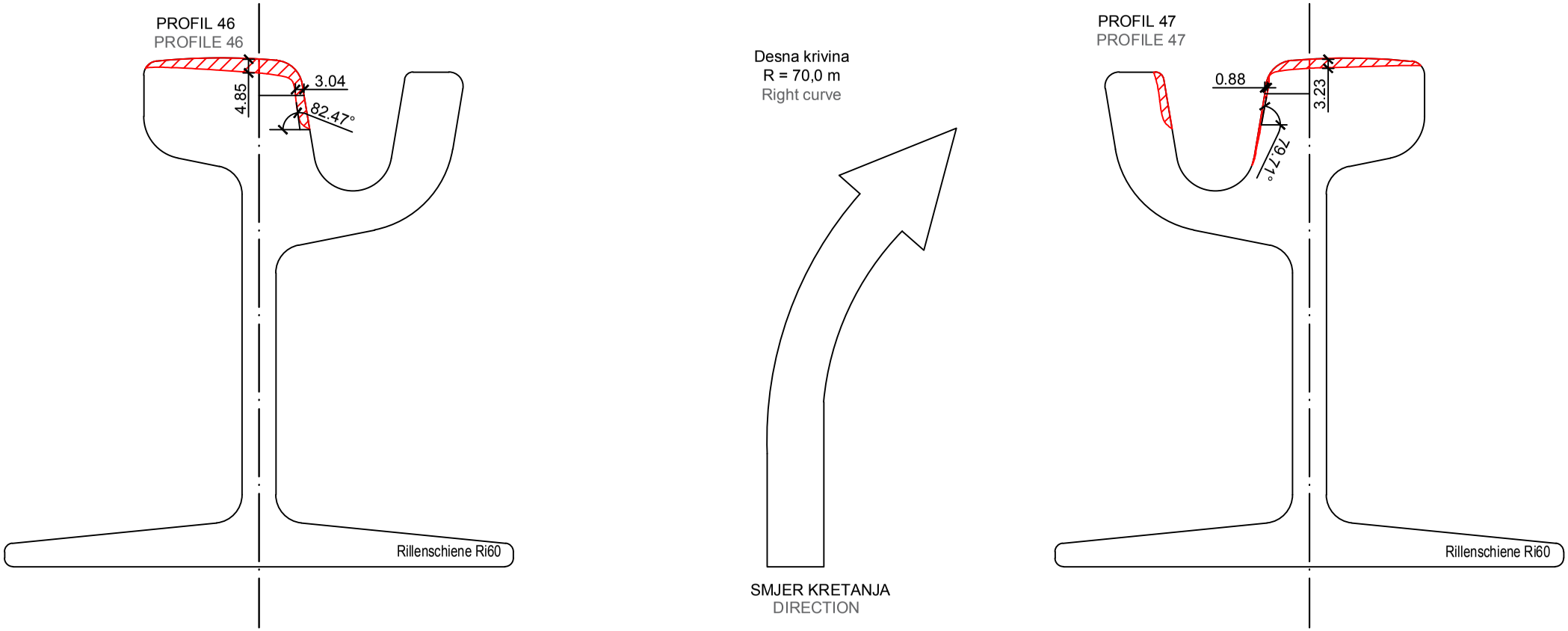
MJ: 1:2

Annex 6.15.1.1. Cross section wear in curves at Location 15

Cross section wear in curve R35

Location 15: Savska - Selska crossing

Scale: 1:2



Prilog 6.15.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 15

Istrošenje poprečnog presjeka tračnica u krivini R36

Lokacija 15: Križanje Savska-Selska

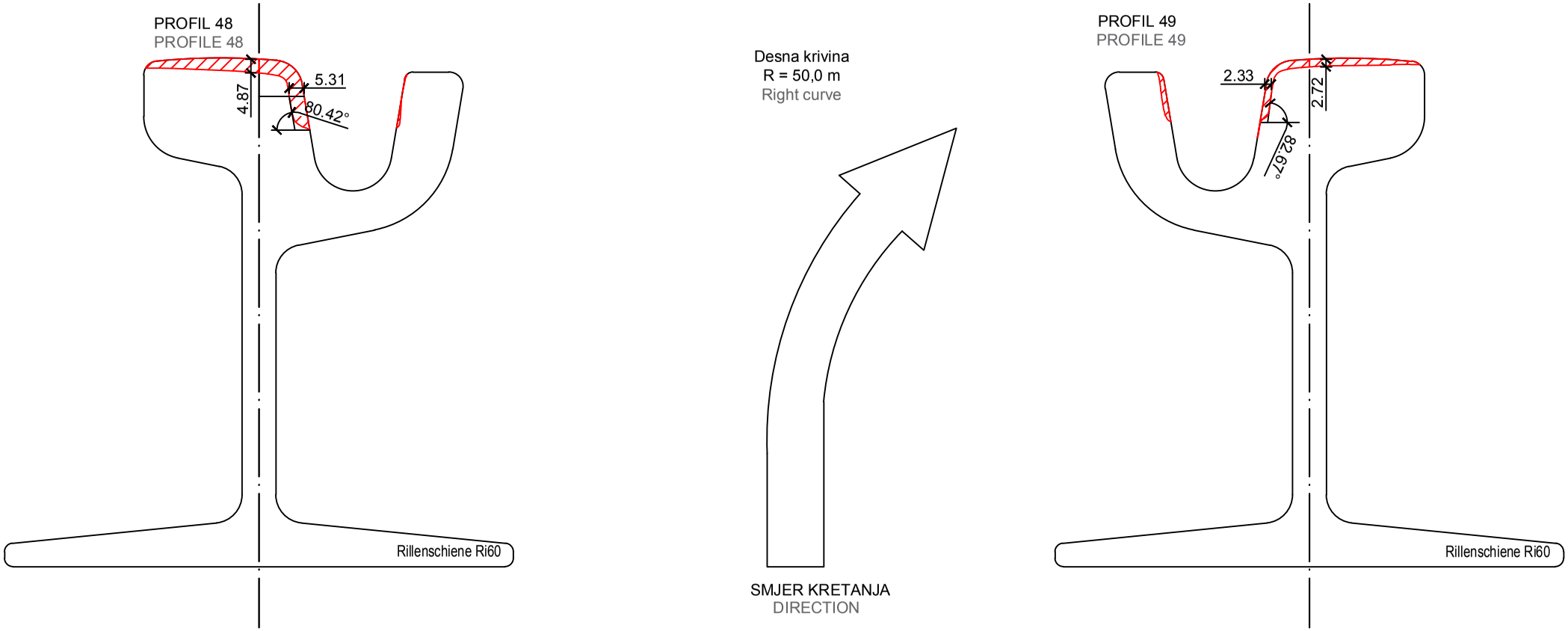
MJ: 1:2

Annex 6.15.1.1. Cross section wear in curves at Location 15

Cross section wear in curve R36

Location 15: Savska - Selska crossing

Scale: 1:2



Prilog 6.15.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 15

Istrošenje poprečnog presjeka tračnica u krivini R37

Lokacija 15: Križanje Savska-Selska

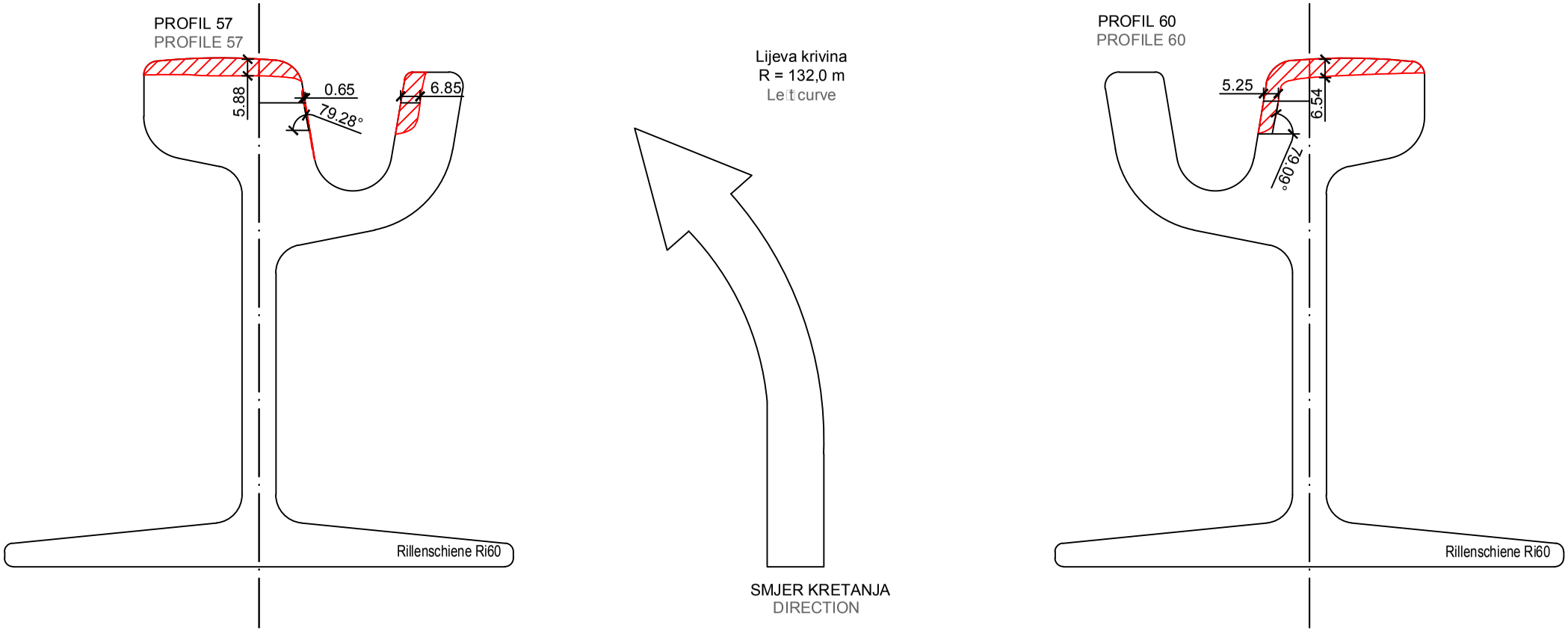
MJ: 1:2

Annex 6.15.1.1. Cross section wear in curves at Location 15

Cross section wear in curve R37

Location 15: Savska - Selska crossing

Scale: 1:2



Prilog 6.15.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 15

Istrošenje poprečnog presjeka tračnica u krivini R38

Lokacija 15: Križanje Savska-Selska

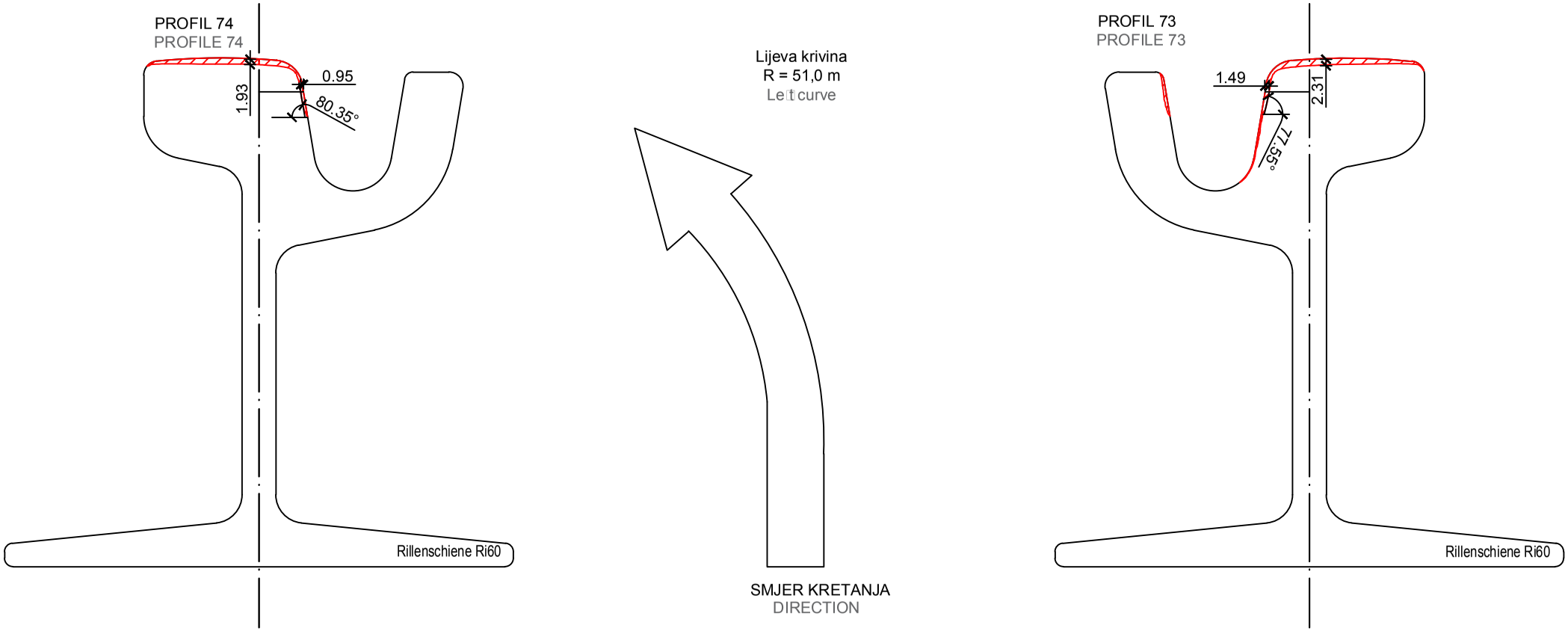
MJ: 1:2

Annex 6.15.1.1. Cross section wear in curves at Location 15

Cross section wear in curve R38

Location 15: Savska - Selska crossing

Scale: 1:2



Prilog 6.15.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 15

Istrošenje poprečnog presjeka tračnica u krivini R39

Lokacija 15: Križanje Savska-Selska

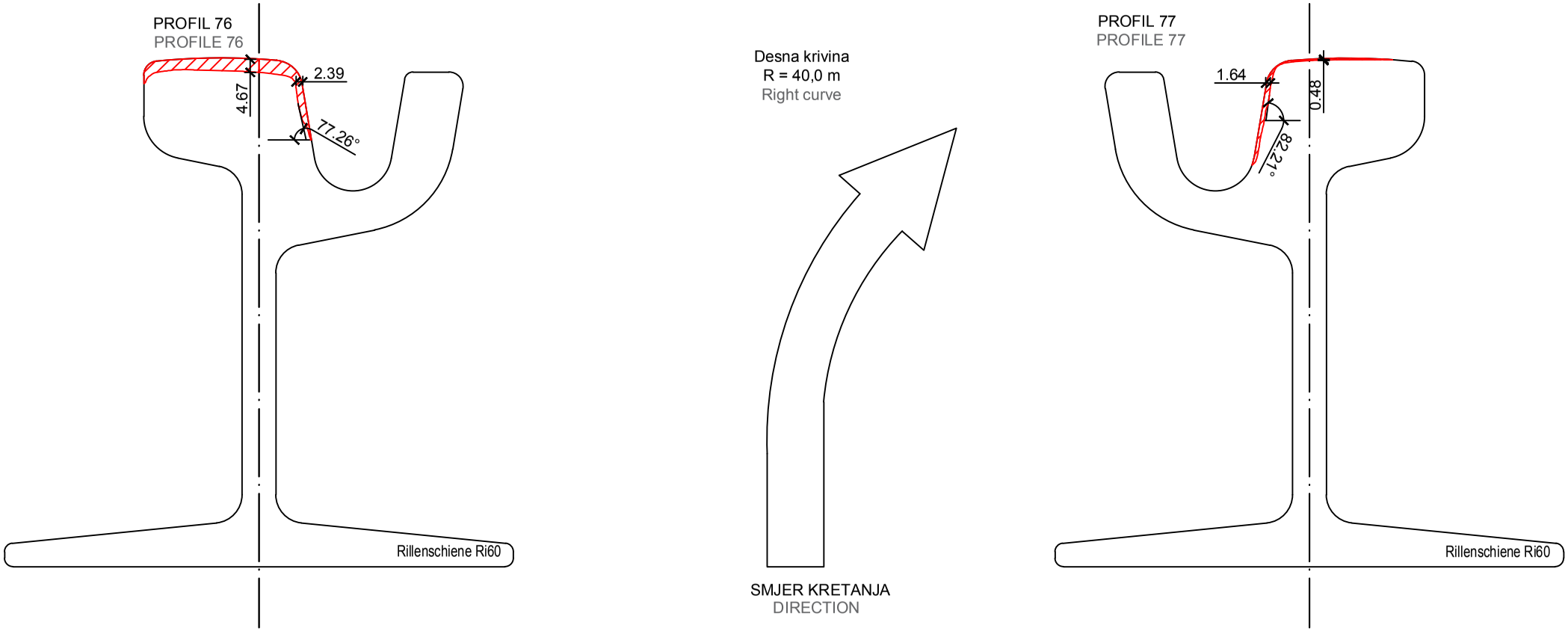
MJ: 1:2

Annex 6.15.1.1. Cross section wear in curves at Location 15

Cross section wear in curve R39

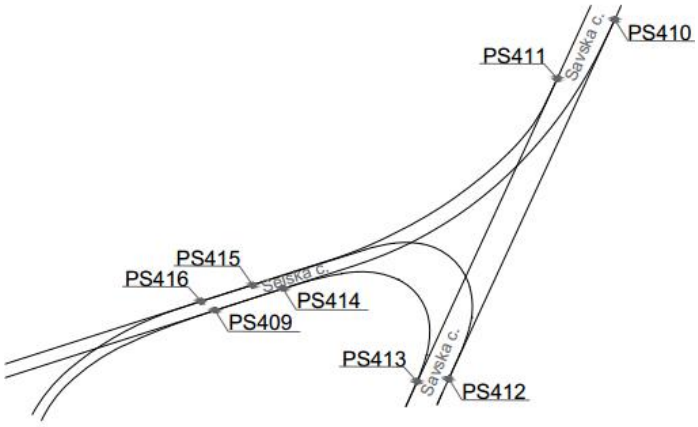
Location 15: Savska - Selska crossing

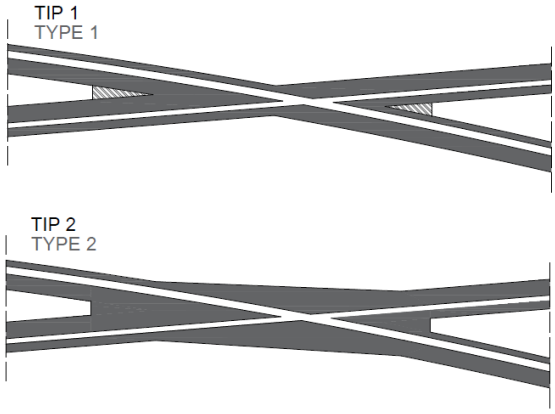
Scale: 1:2



Prilog 6.15.2. **Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 15**
Lokacija 15: Križanje Savska cesta-Selska cesta

Annex 6.15.2. **Results of cross section wear in turnouts at Location 15**
Location 15: Savska - Selska crossing





Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-02-06 K-02-04	PS412	1	22L	13	21.08	8.08	24.41	24.43	0.02	10
			22D	13	20.67	7.67	30.00	32.51	2.51	
			23	12	21.44	9.44		35.41		
			24L	13	22.21	9.21	30.00	37.76	7.76	
			24D	13	22.00	9.00	24.40	23.15	-1.25	
K-02-05 K-02-03	PS413	**1**	33L	13	21.02	8.02	24.00	22.98	-1.02	10
			33D	13	21.98	8.98	30.51	46.19	15.68	
			34	12	21.72	9.72		52.34		
			35L	13	21.74	8.74	30.51	48.63	18.12	
			35D	13	20.56	7.56	24.00	23.06	-0.94	
K-02-01 K-02-06	PS415	1	40L	13	21.64	8.64	30.00	30.50	0.50	10
			40D	13	23.96	10.96	26.19	32.41	6.22	
			41	12	22.51	10.51		44.01		
			42L	13	24.86	11.86	26.30	32.10	5.80	
			42D	13	23.30	10.30	30.00	30.96	0.96	
K-02-02 K-02-05	PS414	1	43L	13	21.53	8.53	26.24	32.58	6.34	10
			43D	13	25.22	12.22	24.00	29.37	5.37	
			44	12	23.52	11.52		35.47		
			45L	13	28.74	15.74	24.00	28.59	4.59	
			45D	13	21.55	8.55	26.24	29.81	3.57	
K-02-01 K-02-03	PS411	1	50L	13	23.61	10.61	30.56	36.04	5.48	10
			50D	13	21.26	8.26	24.00	22.52	-1.48	
			51	12	23.34	11.34		44.70		
			52L	13	24.07	11.07	24.00	24.22	0.22	
			52D	13	26.87	13.87	30.56	36.57	6.01	
K-02-06	PS416	1	61L	13	18.97	5.97	26.21	27.94	1.73	10
			61D	13	22.11	9.11	24.00	26.18	2.18	
			62	12	22.35	10.35		38.69		
			64L	13	25.65	12.65	24.00	25.00	1.00	
			64D	13	25.65	12.65	26.21	25.82	-0.39	
K-02-05	PS409	1	65L	13	29.76	16.76	70.60	86.91	16.31	10
			65D	13	28.29	15.29	0.00	0.00	0.00	
			67	12	21.50	9.50		30.38		
			68L	13	24.12	11.12	26.12	28.93	2.81	
			68D	13	24.42	11.42	24.00	26.16	2.16	
K-02-02 K-02-04	PS410	2	79L	13	20.50	7.50	26.00	25.71	-0.29	10
			79D	13	17.43	4.43	24.12	21.82	-2.30	
			80	12	21.10	9.10		28.69		
			81L	13	17.05	4.05	24.14	22.55	-1.59	
			81D	13	20.18	7.18	26.00	26.20	0.20	

Prilog 6.15.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 15

Istrošenje poprečnog presjeka srcišta skretnice PS409

Lokacija 15: Križanje Savska cesta - Selska cesta

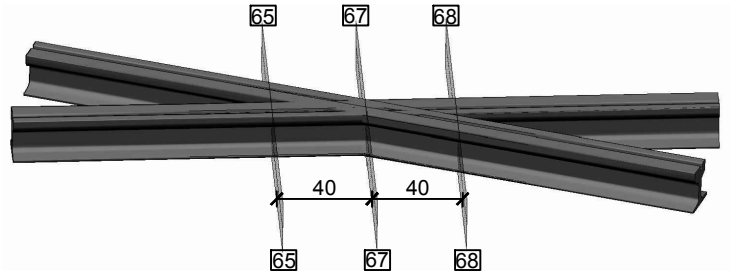
MJ: 1:2

Annex 6.15.2.1. Cross section wear in turnouts at Location 15

Cross section wear in turnout PS409

Location 15: Savska - Selska crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

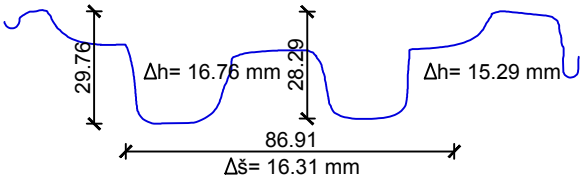
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Knežija ⟶ Savski most

Direction: Knežija ⟶ Savski most

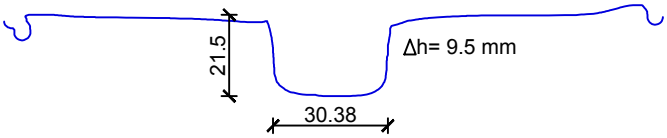
PROFIL 65

PROFILE 65



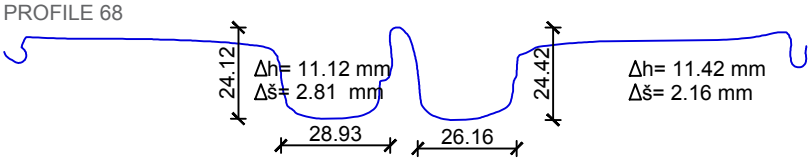
PROFIL 67

PROFILE 67



PROFIL 68

PROFILE 68



Prilog 6.15.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 15

Istrošenje poprečnog presjeka srcišta skretnice PS410

Lokacija 15: Križanje Savska cesta - Selska cesta

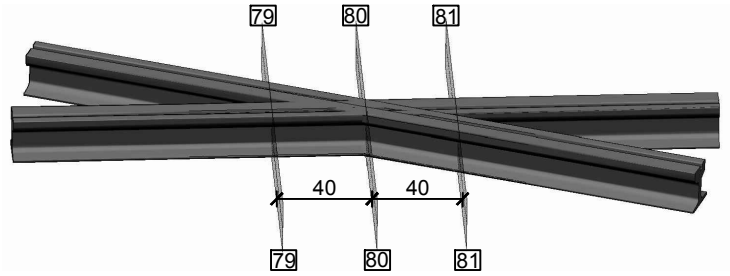
MJ: 1:2

Annex 6.15.2.1. Cross section wear in turnouts at Location 15

Cross section wear in turnout PS410

Location 15: Savska - Selska crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

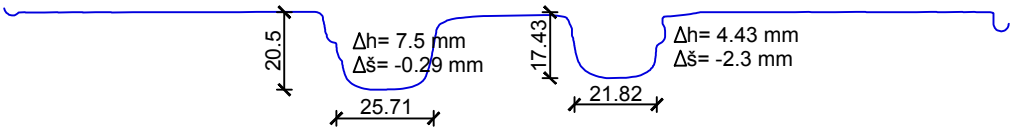
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savski most ⟶ Veslačka

Direction: Savski most ⟶ Veslačka

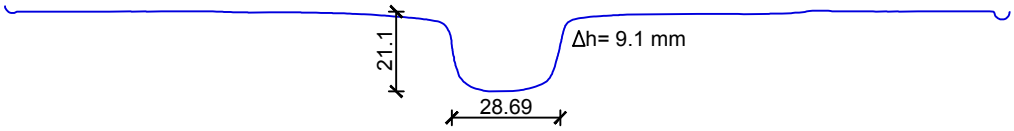
PROFIL 79

PROFILE 79



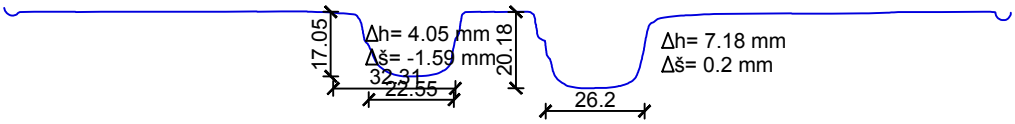
PROFIL 80

PROFILE 80



PROFIL 81

PROFILE 81



Prilog 6.15.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 15

Istrošenje poprečnog presjeka srcišta skretnice PS411

Lokacija 15: Križanje Savska cesta - Selska cesta

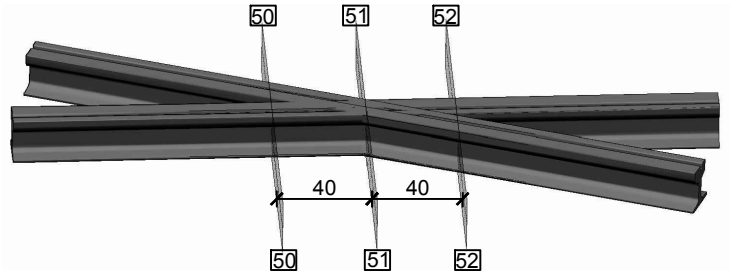
MJ: 1:2

Annex 6.15.2.1. Cross section wear in turnouts at Location 15

Cross section wear in turnout PS411

Location 15: Savska - Selska crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

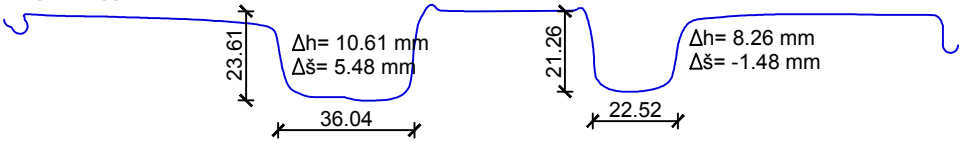
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Veslačka ⟶ Savski most

Direction: Veslačka ⟶ Savski most

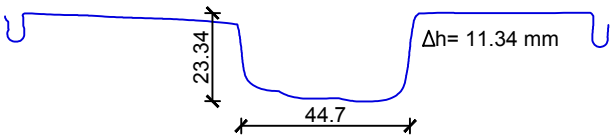
PROFIL 50

PROFILE 50



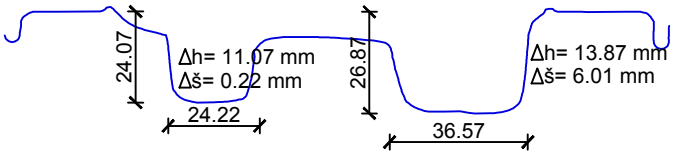
PROFIL 51

PROFILE 51



PROFIL 52

PROFILE 52



Prilog 6.15.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 15

Istrošenje poprečnog presjeka srcišta skretnice PS412

Lokacija 15: Križanje Savska cesta - Selska cesta

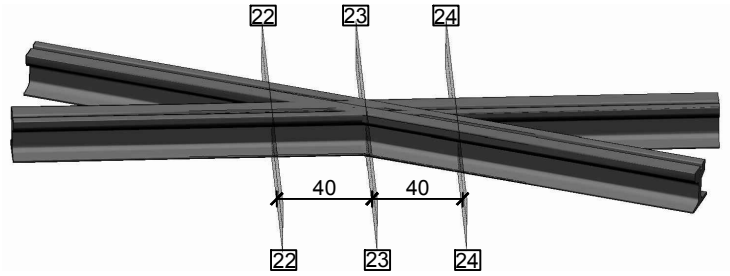
MJ: 1:2

Annex 6.15.2.1. Cross section wear in turnouts at Location 15

Cross section wear in turnout PS412

Location 15: Savska - Selska crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

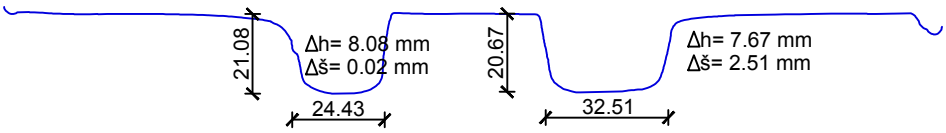
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savski most ⟶ Veslačka

Direction: Savski most ⟶ Veslačka

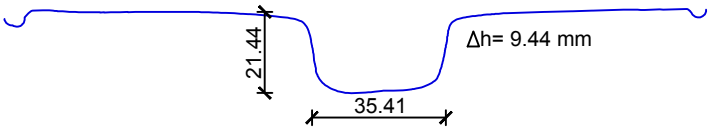
PROFIL 22

PROFILE 22



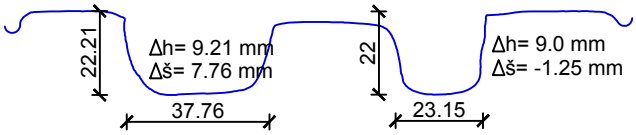
PROFIL 23

PROFILE 23



PROFIL 24

PROFILE 24



Prilog 6.15.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 15

Istrošenje poprečnog presjeka srcišta skretnice PS413

Lokacija 15: Križanje Savska cesta - Selska cesta

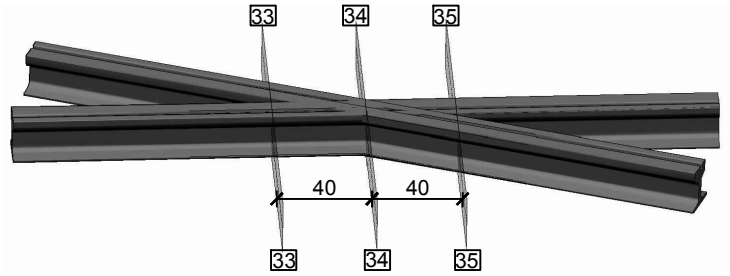
MJ: 1:2

Annex 6.15.2.1. Cross section wear in turnouts at Location 15

Cross section wear in turnout PS413

Location 15: Savska - Selska crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

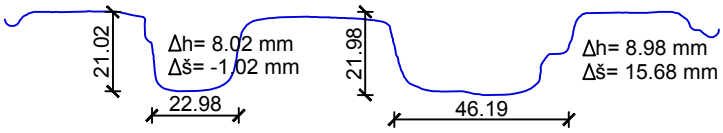
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Veslačka ⟶ Savski most

Direction: Veslačka ⟶ Savski most

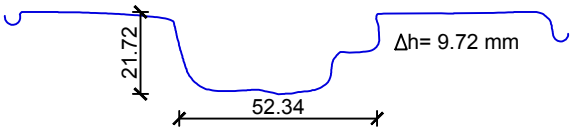
PROFIL 33

PROFILE 33



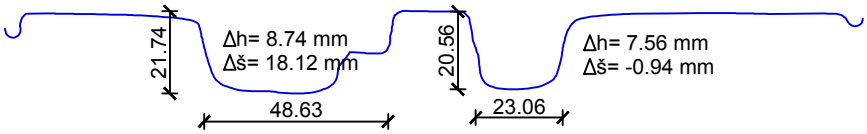
PROFIL 34

PROFILE 34



PROFIL 35

PROFILE 35



Prilog 6.15.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 15

Istrošenje poprečnog presjeka srcišta skretnice PS414

Lokacija 15: Križanje Savska cesta - Selska cesta

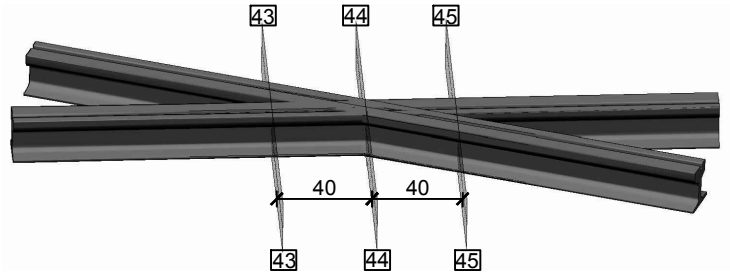
MJ: 1:2

Annex 6.15.2.1. Cross section wear in turnouts at Location 15

Cross section wear in turnout PS414

Location 15: Savska - Selska crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

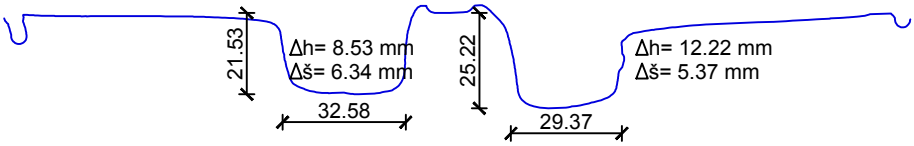
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savski most ⟶ Veslačka

Direction: Savski most ⟶ Veslačka

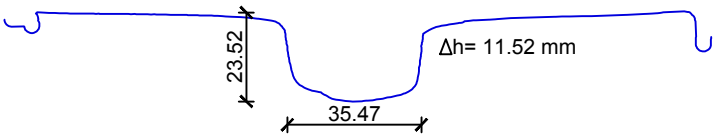
PROFIL 43

PROFILE 43



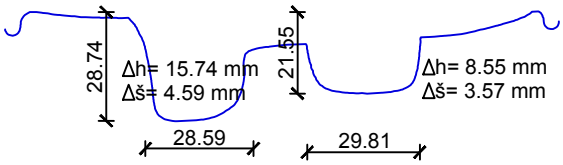
PROFIL 44

PROFILE 44



PROFIL 45

PROFILE 45



Prilog 6.15.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 15

Istrošenje poprečnog presjeka srcišta skretnice PS415

Lokacija 15: Križanje Savska cesta - Selska cesta

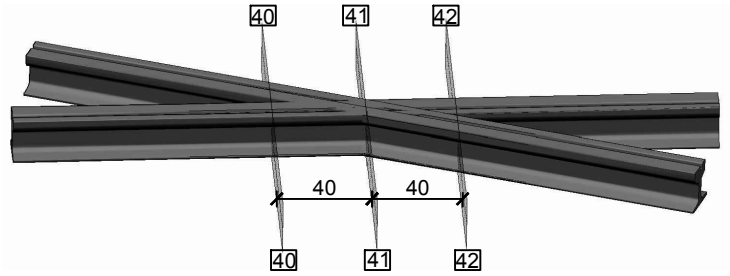
MJ: 1:2

Annex 6.15.2.1. Cross section wear in turnouts at Location 15

Cross section wear in turnout PS415

Location 15: Savska - Selska crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

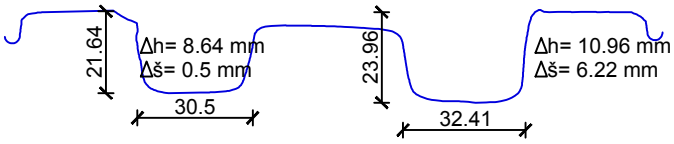
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savski most ⟶ Jarun

Direction: Savski most ⟶ Jarun

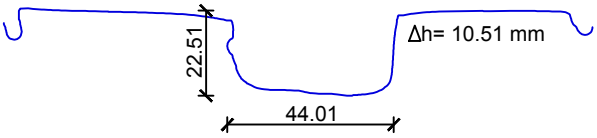
PROFIL 40

PROFILE 40



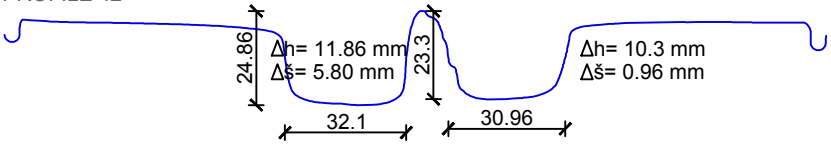
PROFIL 41

PROFILE 41



PROFIL 42

PROFILE 42



Prilog 6.15.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 15

Istrošenje poprečnog presjeka srcišta skretnice PS416

Lokacija 15: Križanje Savska cesta - Selska cesta

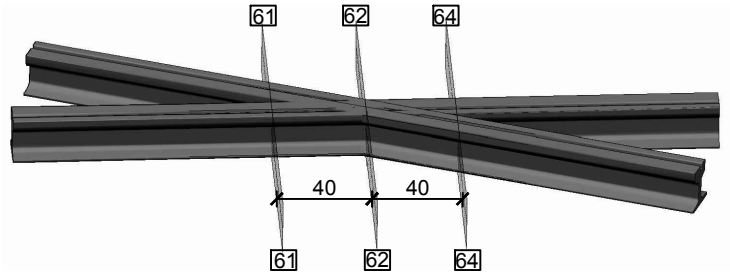
MJ: 1:2

Annex 6.15.2.1. Cross section wear in turnouts at Location 15

Cross section wear in turnout PS416

Location 15: Savska - Selska crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

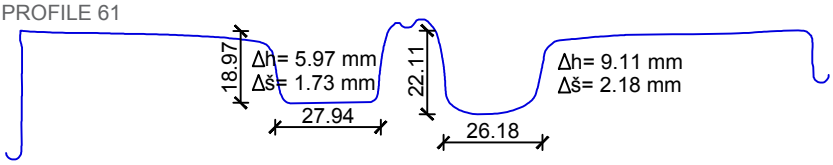
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savski most ⟶ Knežija

Direction: Savski most ⟶ Knežija

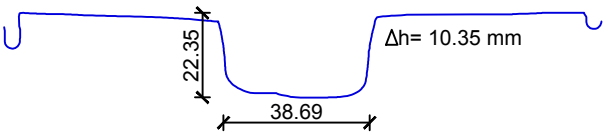
PROFIL 61

PROFILE 61



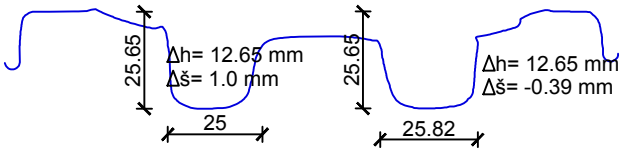
PROFIL 62

PROFILE 62



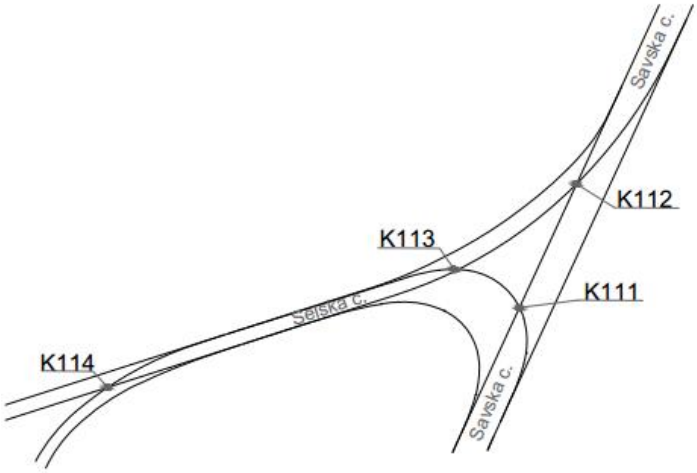
PROFIL 64

PROFILE 64



Prilog 6.15.3. Rezultati istrošenja profila tračnica u križalištima na Lokaciji 15
Lokacija 15: Križanje Savska cesta-Selska cesta

Annex 6.15.3. Results of cross section wear in track crossing at Location 15
Location 15: Savska - Selska crossing



Dionice Sections	**Oznaka križališta** Track crossing mark	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-02-03 K-02-06	K111	27	12	16,82	4.82	24.00	22.15	-1.85	10
		28	12	15,69	3.69	24.00	23.26	-0.74	
		29	12	18,87	6.87	34.00	39.31	5.31	
		30	12	21,79	9.79	34.00	38.13	4.13	
K-02-06 K-02-02	K113	36	12	24,63	12.63	26.00	28.43	2.43	10
		37	12	23,88	11.88	26.00	26.22	0.22	
		38	12	20,47	8.47	30.00	32.15	2.15	
		39	12	19,77	7.77	30.00	30.95	0.95	
K-02-02 K-02-03	K112	53	12	16,59	4.59	24.00	23.28	-0.72	10
		54	12	15,99	3.99	24.00	23.08	-0.92	
		55	12	21,08	9.08	26.00	27.25	1.25	
		56	12	21,17	9.17	26.00	27.25	1.25	
K-01-02	K114	69	12	19,79	7.79	24.00	22.90	-1.10	10
		70	12	18,21	6.21	24.00	23.26	-0.74	
		71	12	23,48	11.48	26.00	27.46	1.46	
		72	12	21,79	9.79	26.00	27.24	1.24	

Prilog 6.15.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 15

Istrošenje poprečnog presjeka tračnica u križalištu K111

Lokacija 15: Križanje Savska cesta - Selska cesta

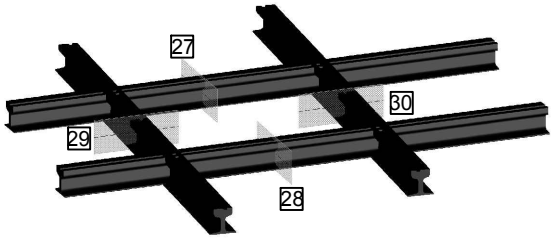
MJ: 1:2

Annex 6.15.3.1. Cross section wear in track crossings at Location 15

Cross section wear in track crossing K111

Location 15: Savska - Selska crossing

Scale: 1:2

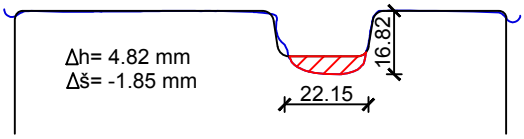


Δh - visinsko istrošenje
Δš - bočno istrošenje

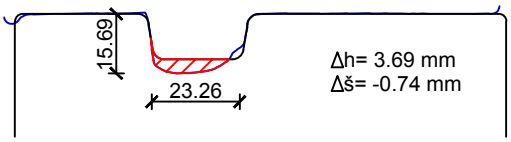
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Veslačka ⟶ Savski most
Direction: Veslačka ⟶ Savski most

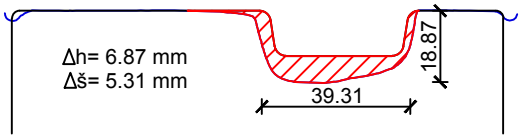
PROFIL 27
PROFILE 27



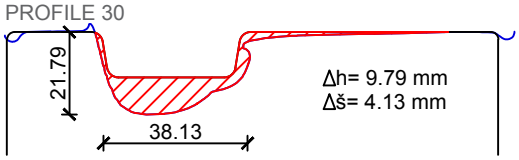
PROFIL 28
PROFILE 28



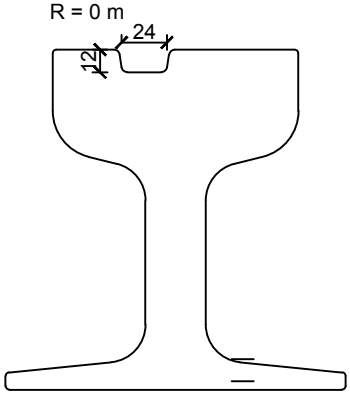
PROFIL 29
PROFILE 29



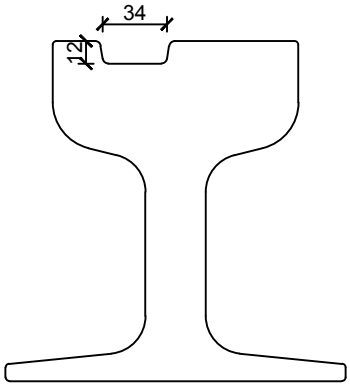
PROFIL 30
PROFILE 30



PROFIL 27, 28 PROFILE 27, 28
R = 0 m

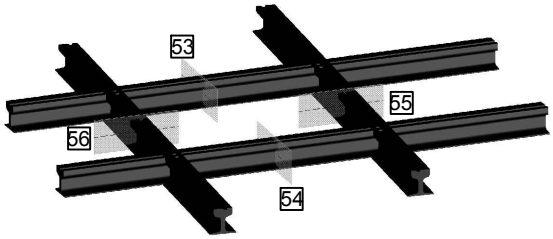


PROFIL 29, 30 PROFIL 29, 30
R = 20 m



Prilog 6.15.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 15
Istrošenje poprečnog presjeka tračnica u križalištu K112
Lokacija 15: Križanje Savska cesta - Selska cesta
MJ: 1:2

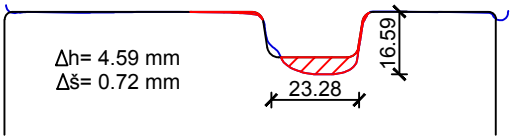
Annex 6.15.3.1. Cross section wear in track crossings at Location 15
Cross section wear in track crossing K112
Location 15: Savska - Selska crossing
Scale: 1:2



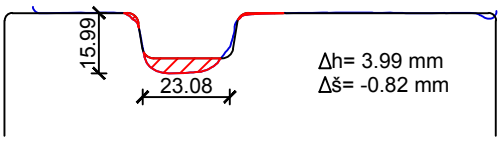
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Veslačka ⟶ Savski most
Direction: Veslačka ⟶ Savski most

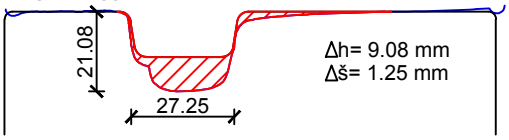
PROFIL 53
PROFILE 53



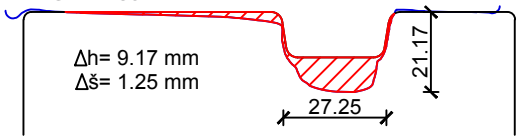
PROFIL 54
PROFILE 54



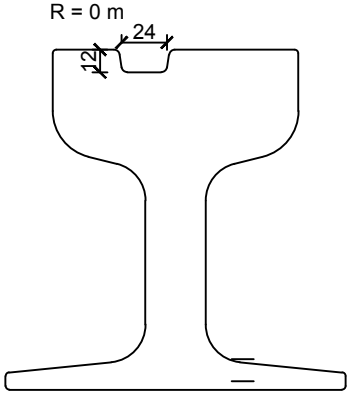
PROFIL 55
PROFILE 55



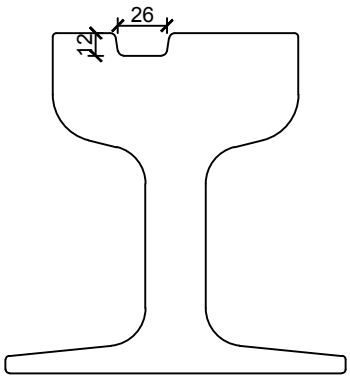
PROFIL 56
PROFILE 56



PROFIL 53, 54 PROFILE 53, 54
R = 0 m

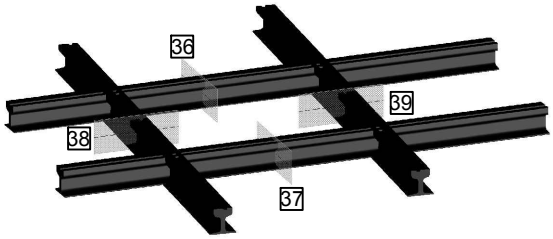


PROFIL 55, 56 PROFILE 55, 56
R = 144 m



Prilog 6.15.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 15
Istrošenje poprečnog presjeka tračnica u križalištu K113
Lokacija 15: Križanje Savska cesta - Selska cesta
MJ: 1:2

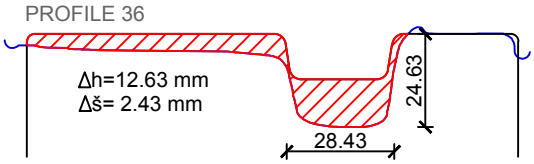
Annex 6.15.3.1. Cross section wear in track crossings at Location 15
Cross section wear in track crossing K113
Location 15: Savska - Selska crossing
Scale: 1:2



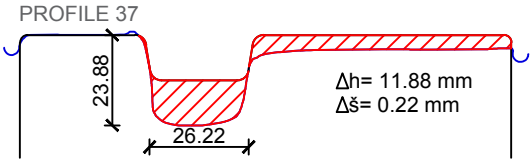
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Knežija ⟶ Veslačka
Direction: Knežija ⟶ Veslačka

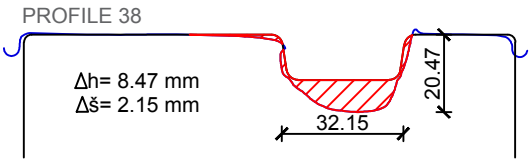
PROFIL 36
PROFILE 36



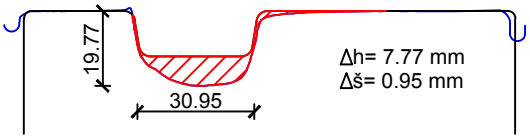
PROFIL 37
PROFILE 37



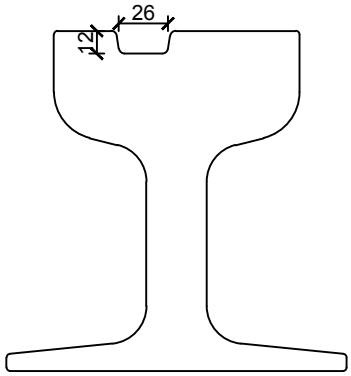
PROFIL 38
PROFILE 38



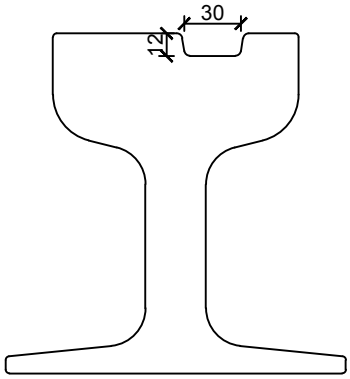
PROFIL 39
PROFILE 39



PROFIL 36, 37 PROFILE 36, 37
R = 132 m

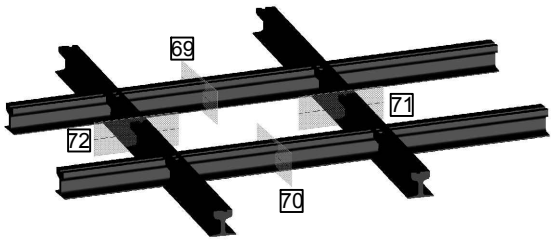


PROFIL 38, 39 PROFILE 38, 39
R = 30 m



Prilog 6.15.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 15
Istrošenje poprečnog presjeka tračnica u križalištu K114
Lokacija 15: Križanje Savska cesta - Selska cesta
MJ: 1:2

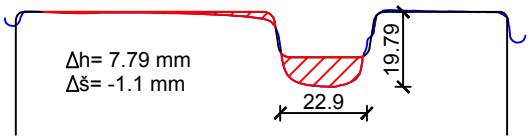
Annex 6.15.3.1. Cross section wear in track crossings at Location 15
Cross section wear in track crossing K114
Location 15: Savska - Selska crossing
Scale: 1:2



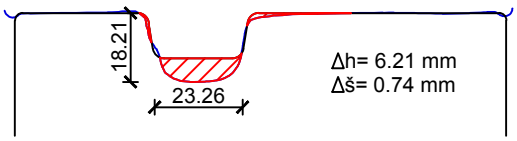
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Knežija ⟶ Savski most
Direction: Knežija ⟶ Savski most

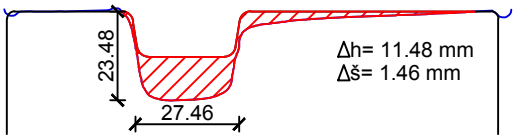
PROFIL 69
PROFILE 69



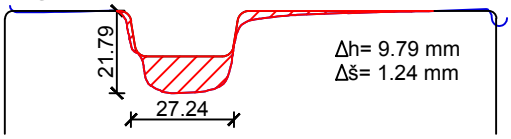
PROFIL 70
PROFILE 70



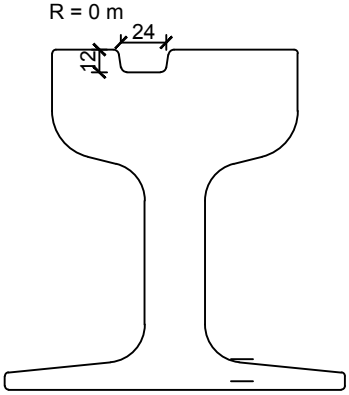
PROFIL 71
PROFILE 71



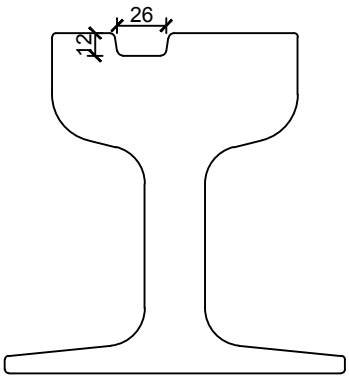
PROFIL 72
PROFILE 72



PROFIL 69, 70 PROFILE 69, 70
R = 0 m

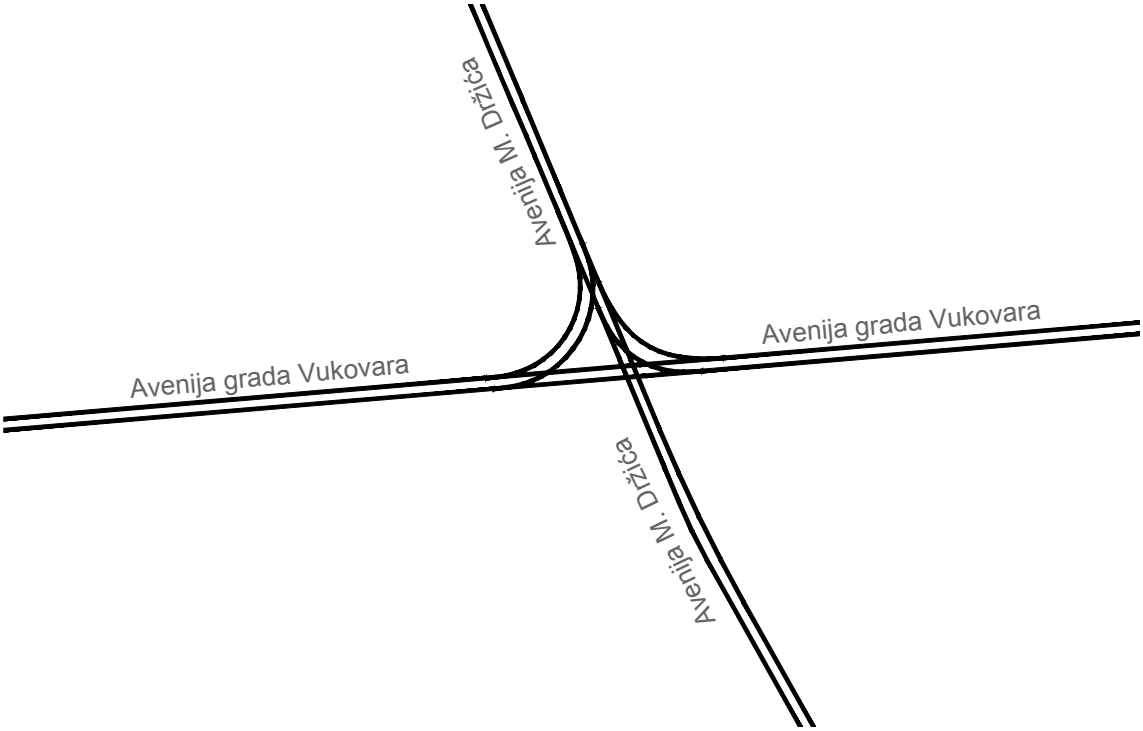


PROFIL 71, 72 PROFILE 71, 72
R = 104 m



Lokacija 16 (L16)
Križanje Avenija grada Vukovara - Avenija Marina Držića

Location 16 (L16)
Vukovarska - Držićeva crossing



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija razvoja tramvajskog prometa □rada □agre□a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition

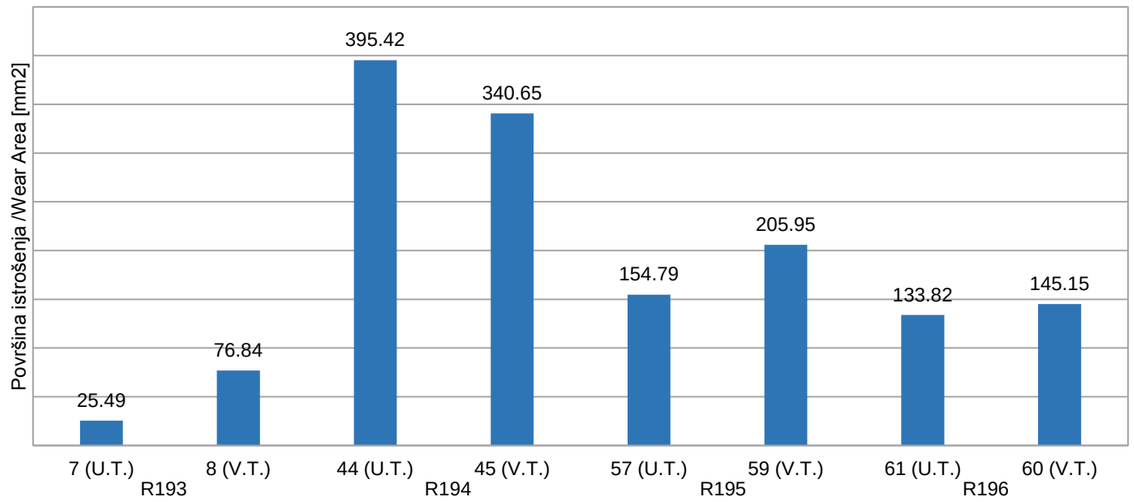
SADRŽAJ PRILOGA:
ANNEX:

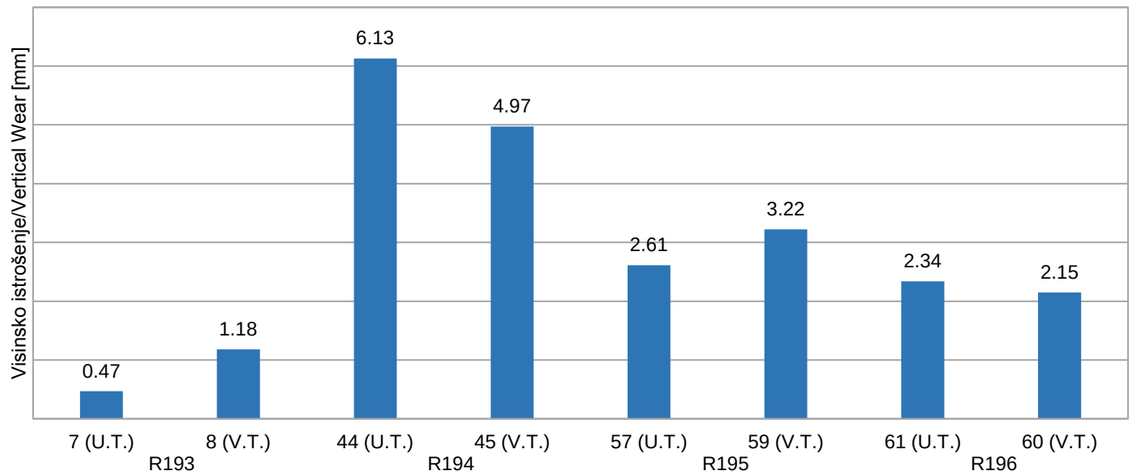
Istrošenje poprečnih presjeka tračnica u krivinama, skretnicama i križalištima na Lokaciji 16

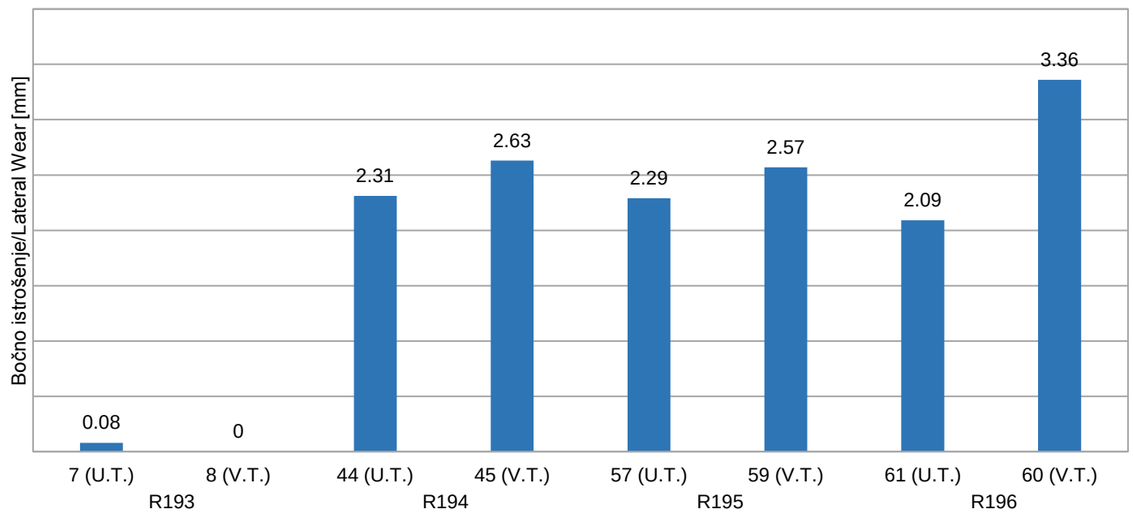
Rail cross section wear in curves, turnouts and crossings at Location 16

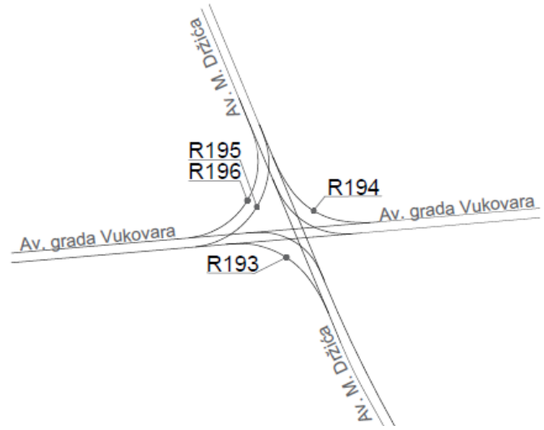
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.16

Prilog 6.16.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 16**
Lokacija 16: Križanje Ulica grada Vukovara - Avenija Marina Držića
Annex 6.16.1. **Results of cross section wear in curves at Location 16**
Location 16: Vukovarska - Držićeva crossing









Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [˚]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
-	R193	desna right	8	lijeva/left	76.84	1.18	0	0	27	9
			7	desna/right	25.49	0.47	0.08	75.91		
K-13-09	R194	desna right	45	lijeva/left	340.65	4.97	2.63	75.08	24	9
			44	desna/right	395.42	6.13	2.31	80.79		
K-13-04	R195	lijeva left	57	lijeva/left	154.79	2.61	2.29	81.98	27	5
			59	desna/right	205.95	3.22	2.57	74.9		
K-13-03	R196	desna right	60	lijeva/left	145.15	2.15	3.36	76.43	24	5
			61	desna/right	133.82	2.34	2.09	82.8		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
-	R193	desna right	8	lijeva/left	76.84	1.18	0
			7	desna/right	25.49	0.47	0.08
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					51.35	0.71	-0.08
K-13-09	R194	desna right	45	lijeva/left	340.65	4.97	2.63
			44	desna/right	395.42	6.13	2.31
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-54.77	-1.16	0.32
K-13-04	R195	lijeva left	57	lijeva/left	154.79	2.61	2.29
			59	desna/right	205.95	3.22	2.57
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					51.16	0.61	0.28
K-13-03	R196	desna right	60	lijeva/left	145.15	2.15	3.36
			61	desna/right	133.82	2.34	2.09
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					11.33	-0.19	1.27

U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve

Prilog 6.16.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 16

Istrošenje poprečnog presjeka tračnica u krivini R193

Lokacija 16: Križanje Ulica grada Vukovara - Avenija Marina Držića

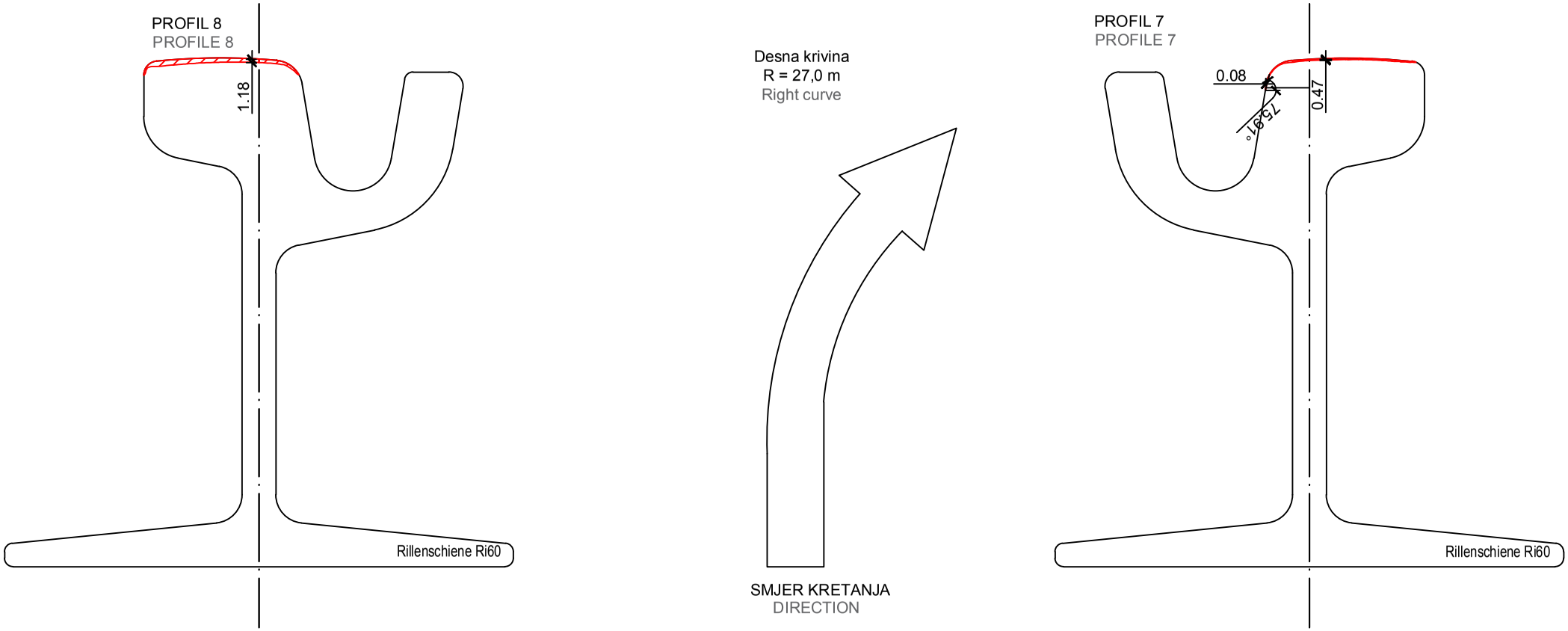
MJ: 1:2

Annex 6.16.1.1. Cross section wear in curves at Location 16

Cross section wear in curve R193

Location 16: Vukovarska - Držićeva crossing

Scale: 1:2



Prilog 6.16.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 16

Istrošenje poprečnog presjeka tračnica u krivini R194

Lokacija 16: Križanje Ulica grada Vukovara - Avenija Marina Držića

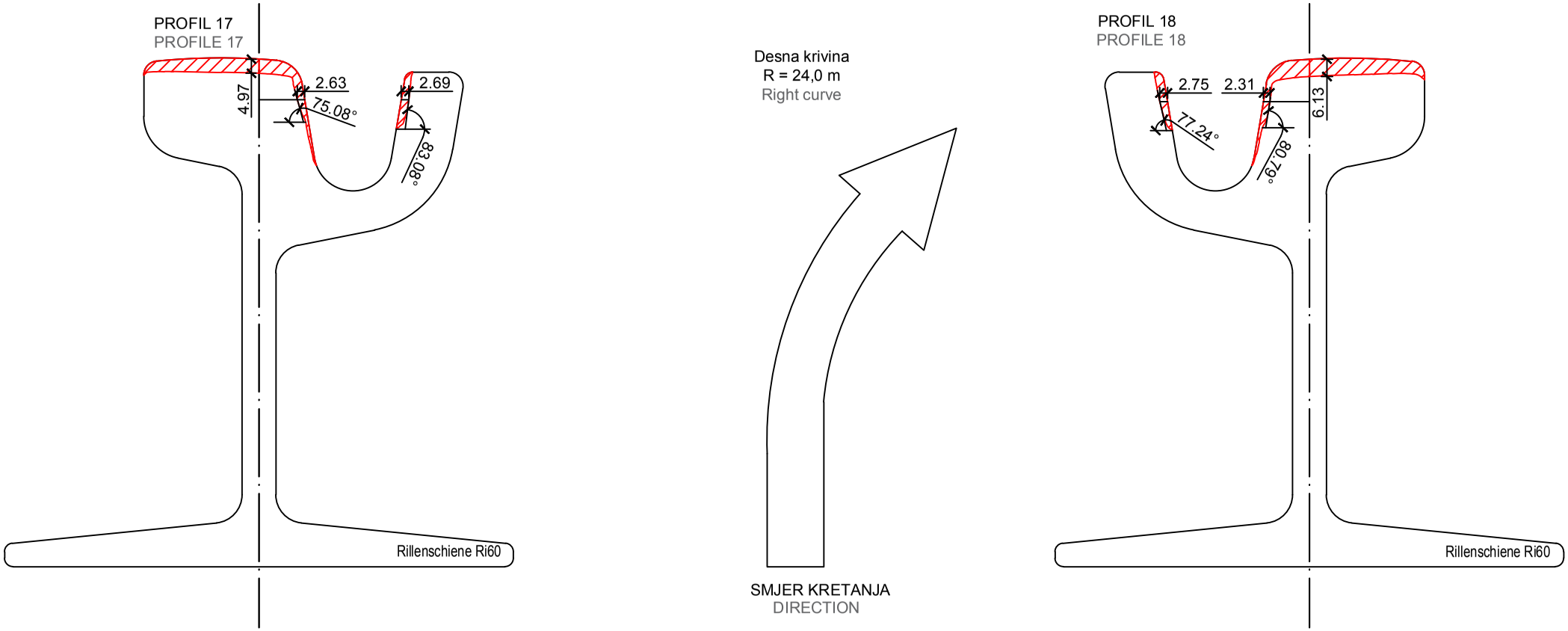
MJ: 1:2

Annex 6.16.1.1. Cross section wear in curves at Location 16

Cross section wear in curve R194

Location 16: Vukovarska - Držićeva crossing

Scale: 1:2



Prilog 6.16.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 16

Istrošenje poprečnog presjeka tračnica u krivini R195

Lokacija 16: Križanje Ulica grada Vukovara - Avenija Marina Držića

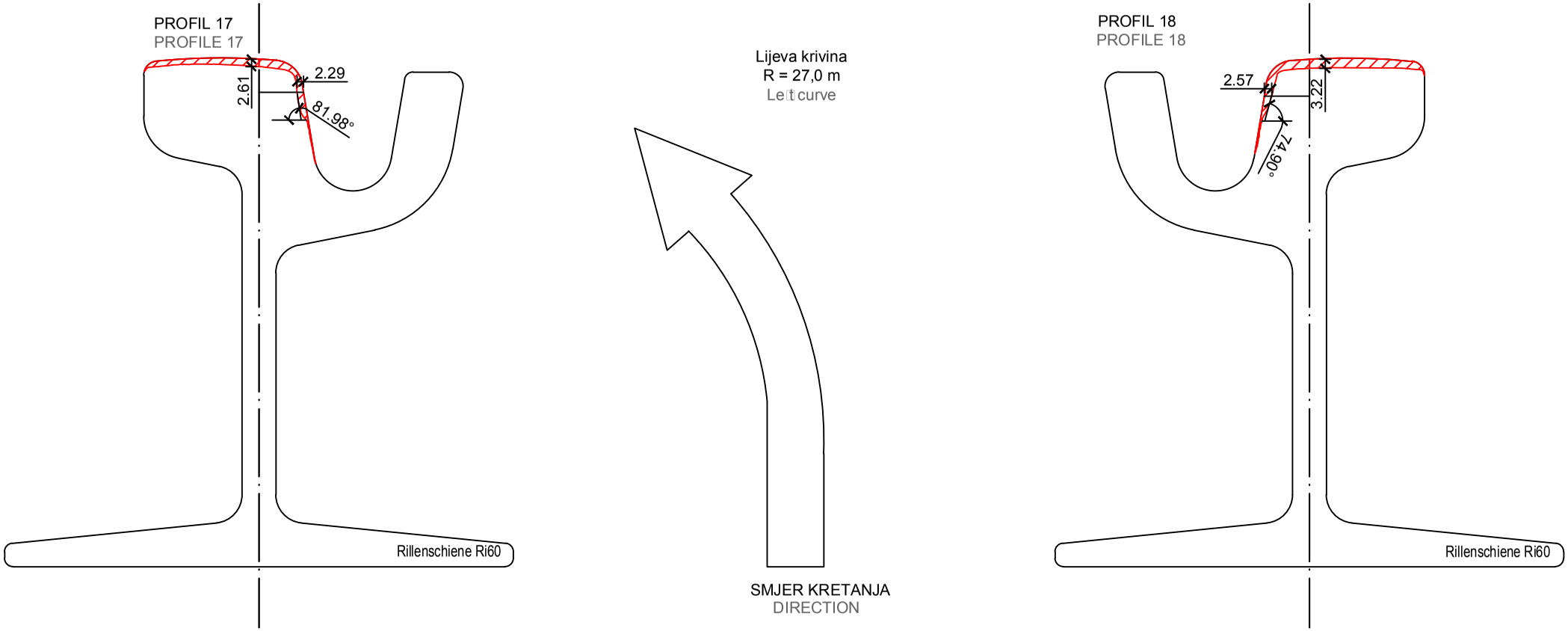
MJ: 1:2

Annex 6.16.1.1. Cross section wear in curves at Location 16

Cross section wear in curve R195

Location 16: Vukovarska - Držićeva crossing

Scale: 1:2



Prilog 6.16.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 16

Istrošenje poprečnog presjeka tračnica u krivini R196

Lokacija 16: Križanje Ulica grada Vukovara - Avenija Marina Držića

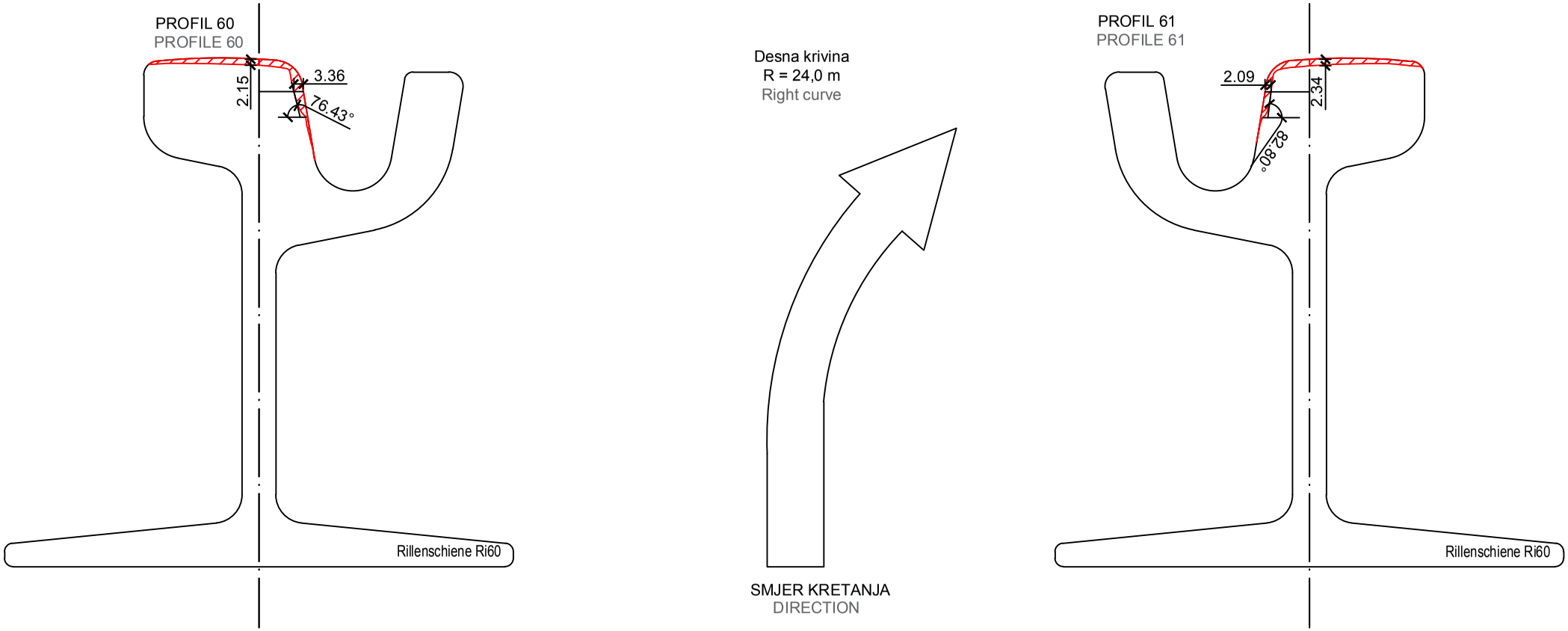
MJ: 1:2

Annex 6.16.1.1. Cross section wear in curves at Location 16

Cross section wear in curve R196

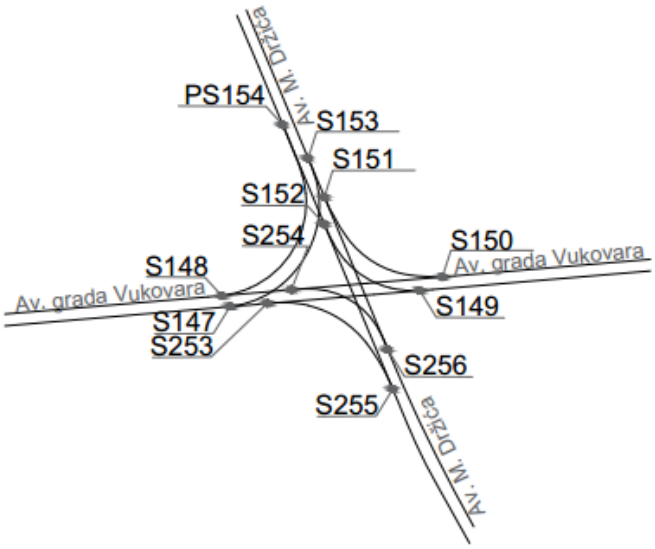
Location 16: Vukovarska - Držićeva crossing

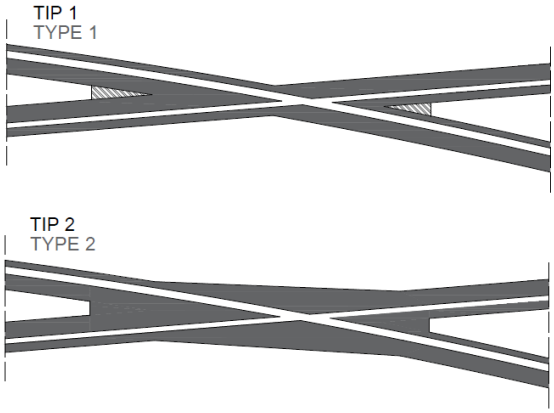
Scale: 1:2



Prilog 6.16.2. **Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 16**
Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića

Annex 6.16.2. **Results of cross section wear in turnouts at Location 16**
Location 16: Vukovarska - Držićeva crossing





Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-13-02	S253	2	3L	13	11.37	-1.63	35.14	34.85	-0.29	11
			3D	13	15.97	2.97	24.00	23.44	-0.56	
			4	12	16.31	4.31		34.97		
			5L	13	16.11	3.11	24.00	22.87	-1.13	
			5D	13	11.54	-1.46	35.15	35.34	0.19	
K-13-12 K-13-10	S149	1	38L	13	21.02	8.02	34.00	35.90	1.90	9
			38D	13	19.40	6.40	24.89	24.03	-0.86	
			39	12	20.17	8.17		32.39		
			40L	13	19.35	6.35	24.89	27.10	2.21	
			40D	13	20.21	7.21	34.00	34.32	0.32	
K-13-11 K-13-09	S150	1	41L	13	22.54	9.54	30.63	35.90	5.27	9
			41D	13	21.37	8.37	24.00	27.59	3.59	
			42	12	22.26	10.26		34.68		
			43L	13	21.17	8.17	24.00	23.89	-0.11	
			43D	13	23.13	10.13	30.62	27.90	-2.72	
K-13-13 K-13-10	S152	2	50L	13	22.22	9.22	24.80	24.56	-0.24	9
			50D	13	17.43	4.43	34.00	40.70	6.70	
			52	12	22.95	10.95		37.88		
			53L	13	19.09	6.09	34.00	38.87	4.87	
			53D	13	22.70	9.70	24.80	28.14	3.34	
K-13-14 K-13-09	S151	2	54L	13	22.42	9.42	31.32	27.66	-3.66	9
			54D	13	20.12	7.12	30.62	27.17	-3.45	
			55	12	22.22	10.22		32.07		
			56L	13	19.59	6.59	22.24	26.43	4.19	
			56D	13	22.14	9.14	29.36	26.68	-2.68	
K-13-06 K-13-04	S153	2	66L	13	14.06	1.06	34.00	36.39	2.39	5
			66D	13	21.53	8.53	24.89	26.90	2.01	
			67	12	22.26	10.26		38.10		
			69L	13	21.35	8.35	24.89	27.24	2.35	
			69D	13	16.30	3.30	34.00	36.73	2.73	
K-13-05 K-13-03	PS154	2	70L	13	17.97	4.97	34.94	38.47	3.53	5
			70D	13	22.89	9.89	24.00	29.17	5.17	
			71	12	23.23	11.23		42.77		

			72L	13	22.63	9.63	24.00	22.89		
			72D	13	16.89	3.89	34.94	39.50	4.56	
K-13-02 K-13-04	S147	2	77L	13	18.39	5.39	24.89	27.18	2.29	5
			77D	13	19.32	6.32	34.00	36.21	2.21	
			78	12	18.56	6.56		35.60		
			80L	13	19.07	6.07	34.00	35.08	1.08	
			80D	13	17.21	4.21	24.89	25.45	0.56	
K-13-01 K-13-03	S148	2	81L	13	16.04	3.04	24.00	22.20	-1.80	5
			81D	13	17.66	4.66	35.27	35.58	0.31	
			82	12	16.54	4.54		50.59		
			82L	13	17.62	4.62	35.27	36.53	1.26	
			82D	13	17.80	4.80	24.00	25.85	1.85	
K-13-01	S254	2	84L	13	12.17	-0.83	35.85	35.02	-0.36	5
			84D	13	17.20	4.20	18.73	22.93	-1,07	
			85	12	18.00	6.00		36.75		
			86L	13	17.58	4.58	24.00	24.39	0.39	
			86D	13	12.11	-0.89	35.38	36.70	1.32	
K-13-08	S256	2	87L	13	20.74	7.74	24.00	22.67	-1.33	5
			87D	13	11.55	-1.45	35.54	34.36	-1.18	
			88	12	20.88	8.88		32.99		
			89L	13	11.63	-1.37	35.54	31.14	-4.40	
			89D	13	20.88	7.88	24.00	23.29	-0.71	
K-13-07	S255	2	90L	13	21.68	8.68	24.00	26.33	2.33	5
			90D	13	16.38	3.38	30.63	25.24	-5.39	
			91	12	21.29	9.29		35.36		
			93L	13	15.59	2.59	30.63	24.47	-6.16	
			93D	13	21.85	8.85	24.00	23.51	-0.49	

Prilog 6.16.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 16

Istrošenje poprečnog presjeka srcišta skretnice PS154

Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića

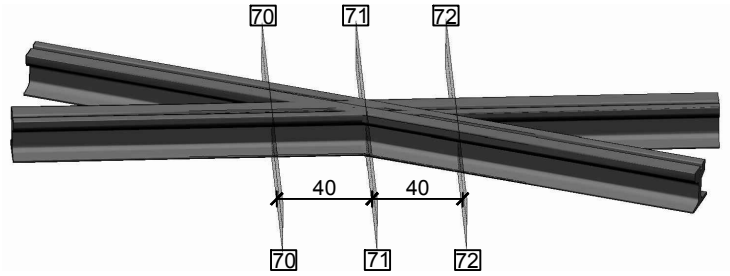
MJ: 1:2

Annex 6.16.2.1. Cross section wear in turnouts at Location 16

Cross section wear in turnout PS154

Location 16: Vukovarska - Držićeva crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

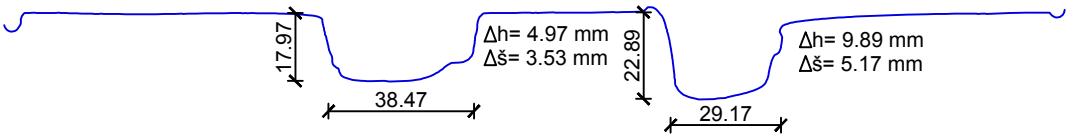
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Slavonska → Auto□usni kolodvor

Direction: Slavonska → □us station

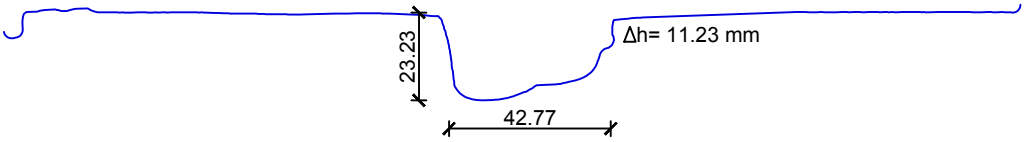
PROFIL 70

PROFILE 70



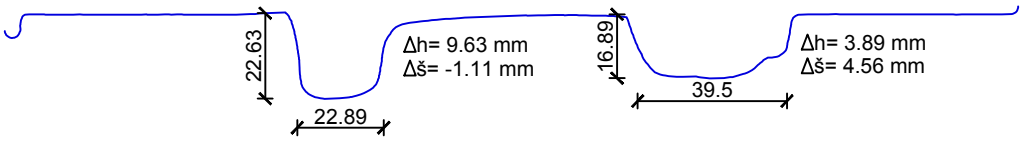
PROFIL 71

PROFILE 71



PROFIL 72

PROFILE 72



Prilog 6.16.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 16

Istrošenje poprečnog presjeka srcišta skretnice S147

Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića

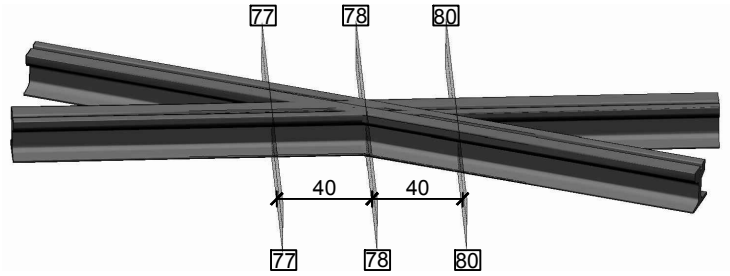
MJ: 1:2

Annex 6.16.2.1. Cross section wear in turnouts at Location 16

Cross section wear in turnout S147

Location 16: Vukovarska - Držićeva crossing

Scale: 1:2

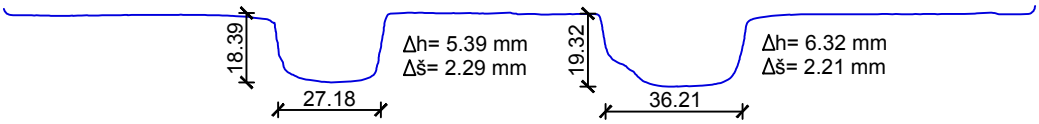


Δh - visinsko istrošenje
Δš - bočno istrošenje

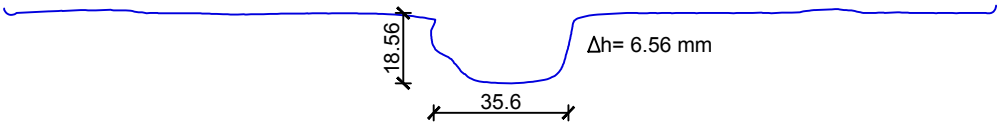
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savska → Žitnjak
Direction: Savska → Žitnjak

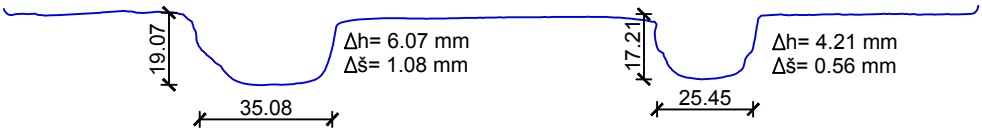
PROFIL 77
PROFILE 77



PROFIL 78
PROFILE 78



PROFIL 80
PROFILE 80



Prilog 6.16.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 16

Istrošenje poprečnog presjeka srcišta skretnice S148

Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića

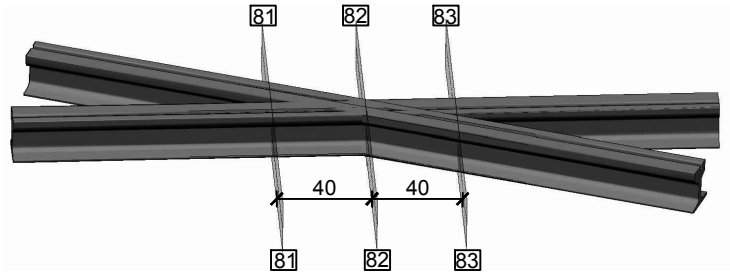
MJ: 1:2

Annex 6.16.2.1. Cross section wear in turnouts at Location 16

Cross section wear in turnout S148

Location 16: Vukovarska - Držićeva crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

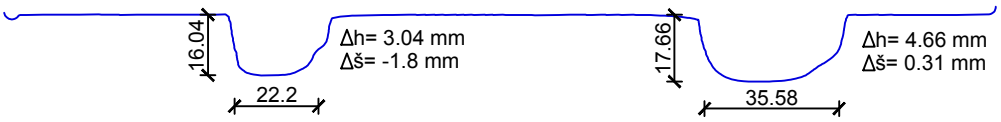
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Žitnjak⟶Savska

Direction: Žitnjak⟶Savska

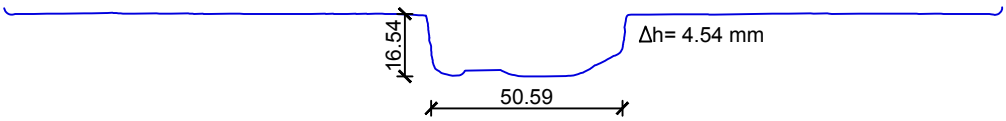
PROFIL 81

PROFILE 81



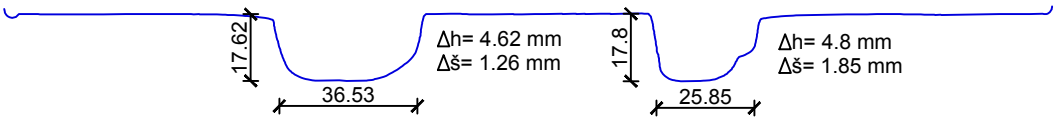
PROFIL 82

PROFILE 82



PROFIL 83

PROFILE 83



Prilog 6.16.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 16

Istrošenje poprečnog presjeka srcišta skretnice S149

Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića

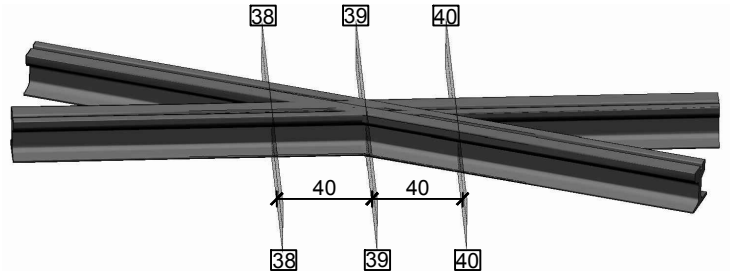
MJ: 1:2

Annex 6.16.2.1. Cross section wear in turnouts at Location 16

Cross section wear in turnout S149

Location 16: Vukovarska - Držićeva crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

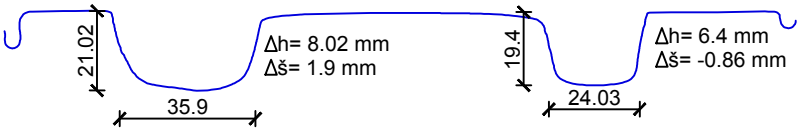
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savska → Žitnjak

Direction: Savska → Žitnjak

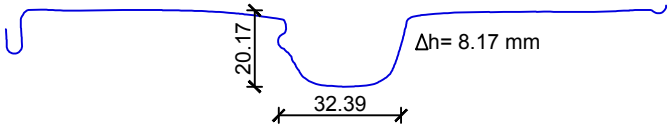
PROFIL 38

PROFILE 38



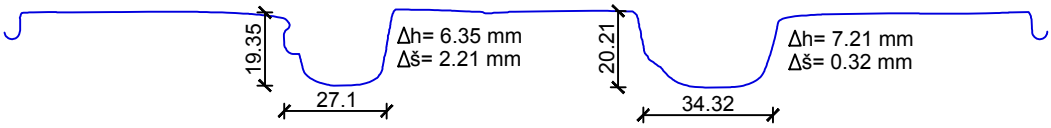
PROFIL 39

PROFILE 39



PROFIL 40

PROFILE 40



Prilog 6.16.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 16

Istrošenje poprečnog presjeka srcišta skretnice S150

Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića

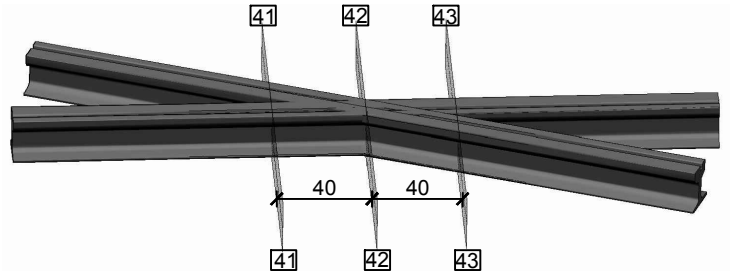
MJ: 1:2

Annex 6.16.2.1. Cross section wear in turnouts at Location 16

Cross section wear in turnout S150

Location 16: Vukovarska - Držićeva crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

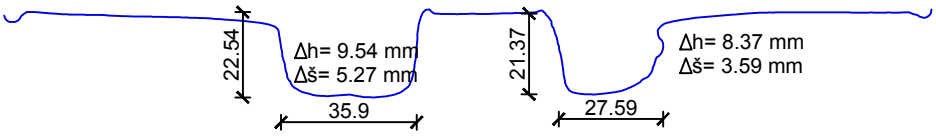
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Žitnjak ⟶ Savska

Direction: Žitnjak ⟶ Savska

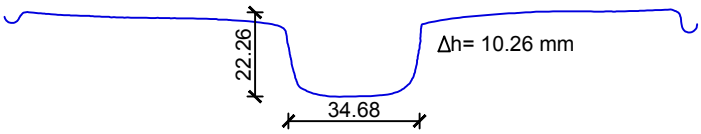
PROFIL 41

PROFILE 41



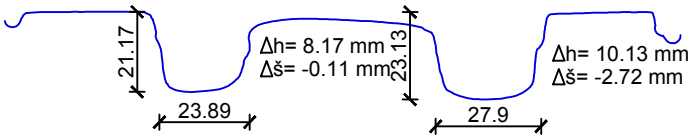
PROFIL 42

PROFILE 42



PROFIL 43

PROFILE 43



Prilog 6.16.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 16

Istrošenje poprečnog presjeka srcišta skretnice S151

Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića

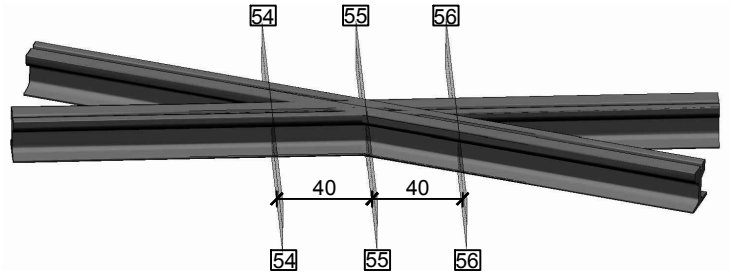
MJ: 1:2

Annex 6.16.2.1. Cross section wear in turnouts at Location 16

Cross section wear in turnout S151

Location 16: Vukovarska - Držićeva crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

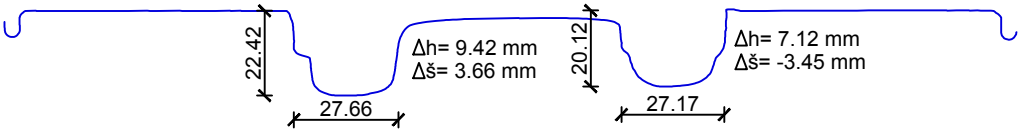
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Slavonska → Auto□usni kolodvor

Direction: Slavonska → □us station

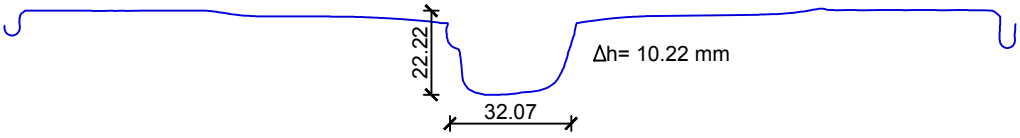
PROFIL 54

PROFILE 54



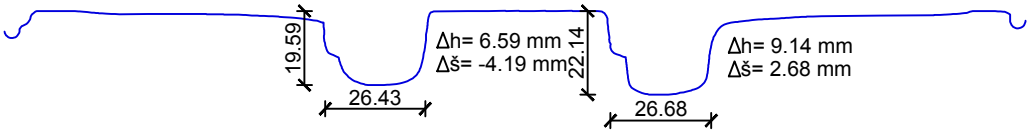
PROFIL 55

PROFILE 55



PROFIL 56

PROFILE 56



Prilog 6.16.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 16

Istrošenje poprečnog presjeka srcišta skretnice S152

Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića

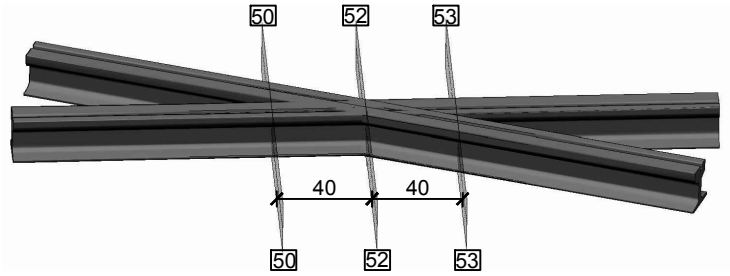
MJ: 1:2

Annex 6.16.2.1. Cross section wear in turnouts at Location 16

Cross section wear in turnout S152

Location 16: Vukovarska - Držićeva crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

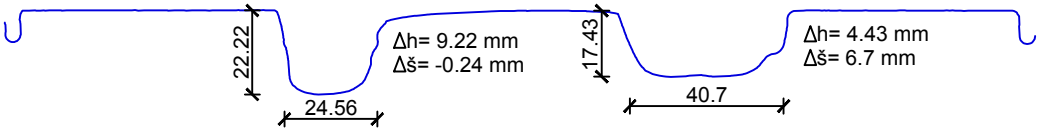
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Autobusni kolodvor ⟶ Slavonska

Direction: Bus station ⟶ Slavonska

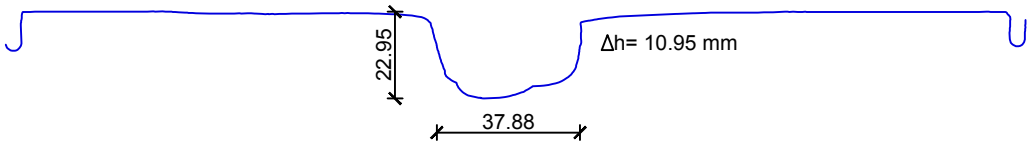
PROFIL 50

PROFILE 50



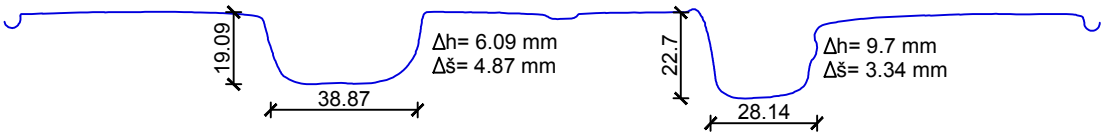
PROFIL 52

PROFILE 52



PROFIL 53

PROFILE 53



Prilog 6.16.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 16

Istrošenje poprečnog presjeka srcišta skretnice S153

Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića

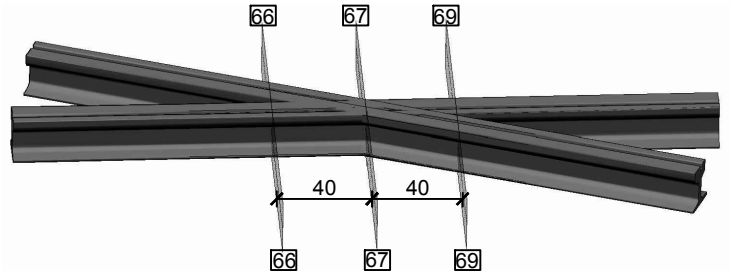
MJ: 1:2

Annex 6.16.2.1. Cross section wear in turnouts at Location 16

Cross section wear in turnout S153

Location 16: Vukovarska - Držićeva crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

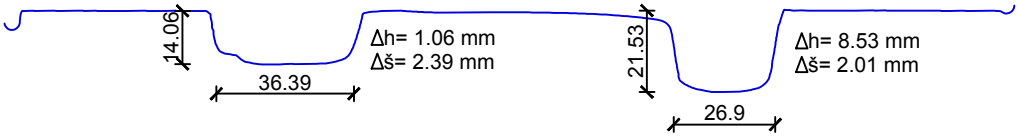
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Slavonska → Auto□usni kolodvor

Direction: Slavonska → □us station

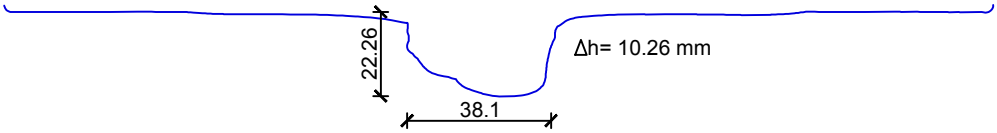
PROFIL 66

PROFILE 66



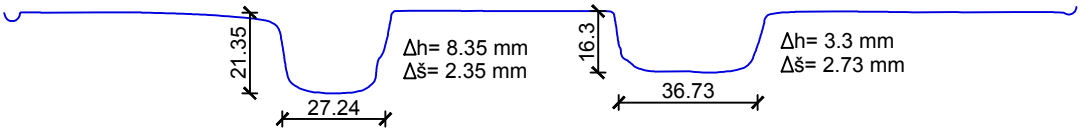
PROFIL 67

PROFILE 67



PROFIL 69

PROFILE 69



Prilog 6.16.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 16

Istrošenje poprečnog presjeka srcišta skretnice S253

Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića

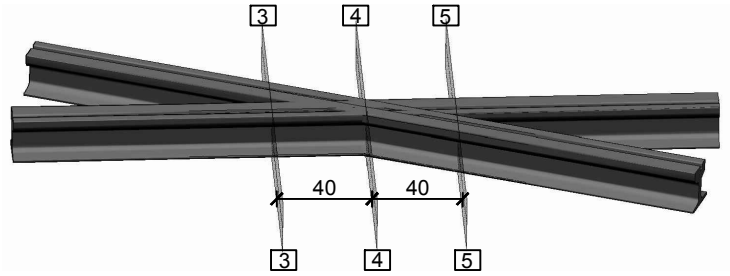
MJ: 1:2

Annex 6.16.2.1. Cross section wear in turnouts at Location 16

Cross section wear in turnout S253

Location 16: Vukovarska - Držićeva crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

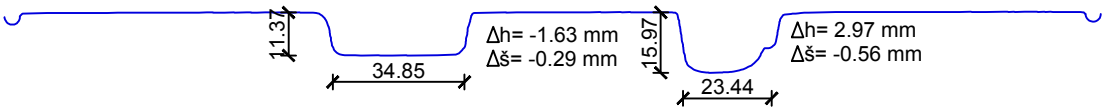
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savska → Žitnjak

Direction: Savska → Žitnjak

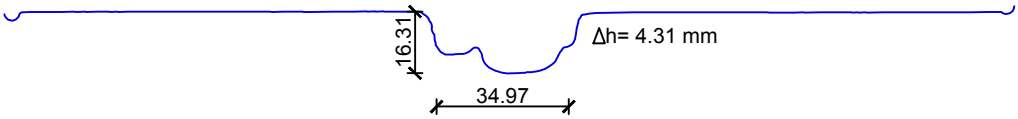
PROFIL 3

PROFILE 3



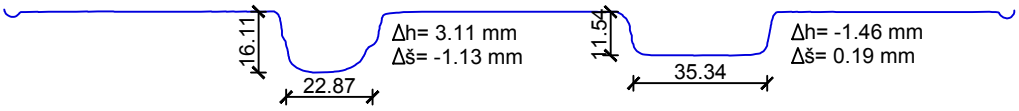
PROFIL 4

PROFILE 4



PROFIL 5

PROFILE 5



Prilog 6.16.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 16

Istrošenje poprečnog presjeka srcišta skretnice S254

Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića

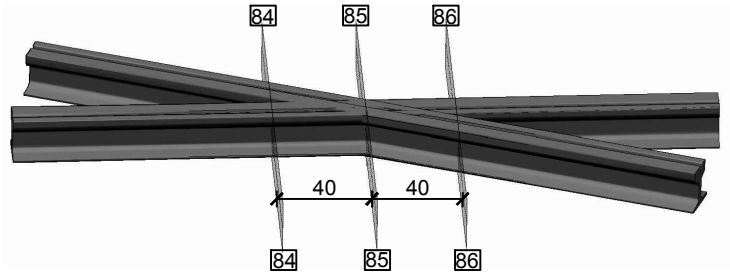
MJ: 1:2

Annex 6.16.2.1. Cross section wear in turnouts at Location 16

Cross section wear in turnout S254

Location 16: Vukovarska - Držićeva crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

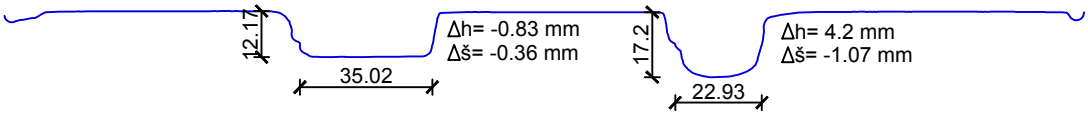
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Žitnjak⟶Savska

Direction: Žitnjak⟶Savska

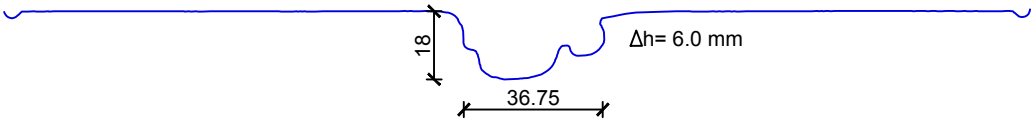
PROFIL 84

PROFILE 84



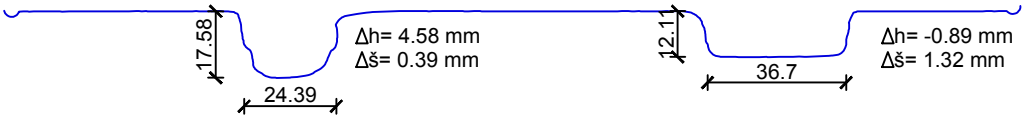
PROFIL 85

PROFILE 85



PROFIL 86

PROFILE 86



Prilog 6.16.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 16

Istrošenje poprečnog presjeka srcišta skretnice S255

Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića

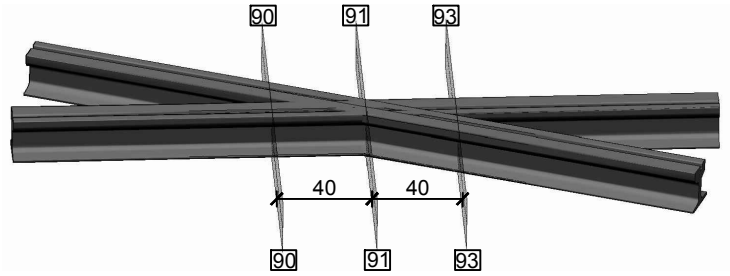
MJ: 1:2

Annex 6.16.2.1. Cross section wear in turnouts at Location 16

Cross section wear in turnout S255

Location 16: Vukovarska - Držićeva crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

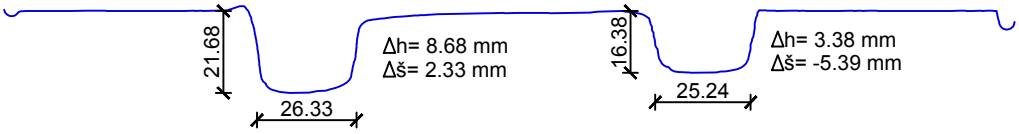
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Autobusni kolodvor ⟶ Slavonska

Direction: us station ⟶ Slavonska

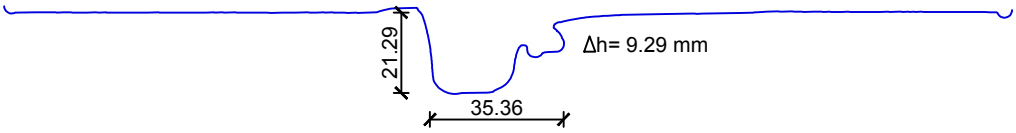
PROFIL 90

PROFILE 90



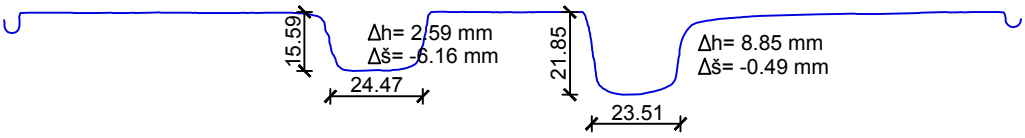
PROFIL 91

PROFILE 91



PROFIL 93

PROFILE 93



Prilog 6.16.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 16

Istrošenje poprečnog presjeka srcišta skretnice S256

Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića

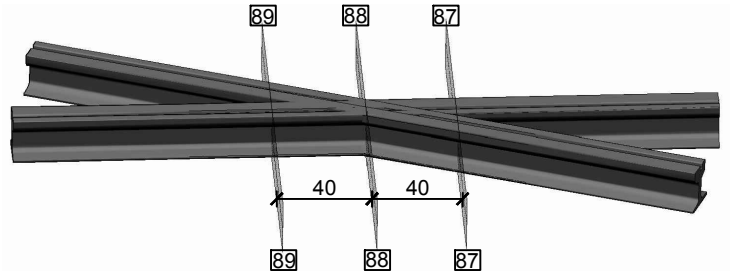
MJ: 1:2

Annex 6.16.2.1. Cross section wear in turnouts at Location 16

Cross section wear in turnout S256

Location 16: Vukovarska - Držićeva crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

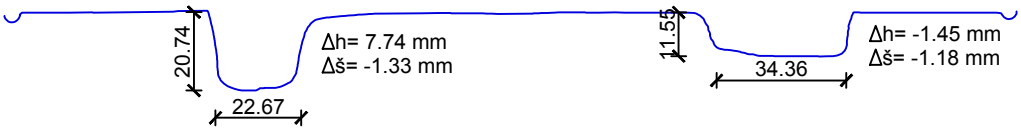
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Slavonska ⟶ Auto□usni kolodvor

Direction: Slavonska ⟶ □us station

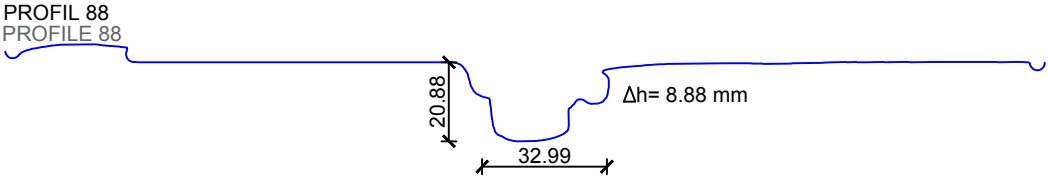
PROFIL 87

PROFILE 87



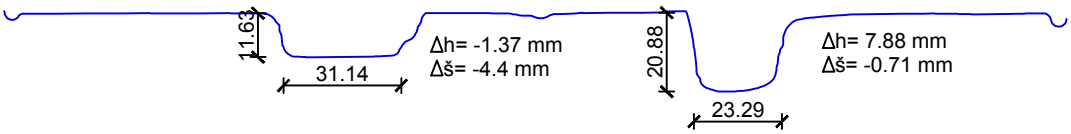
PROFIL 88

PROFILE 88



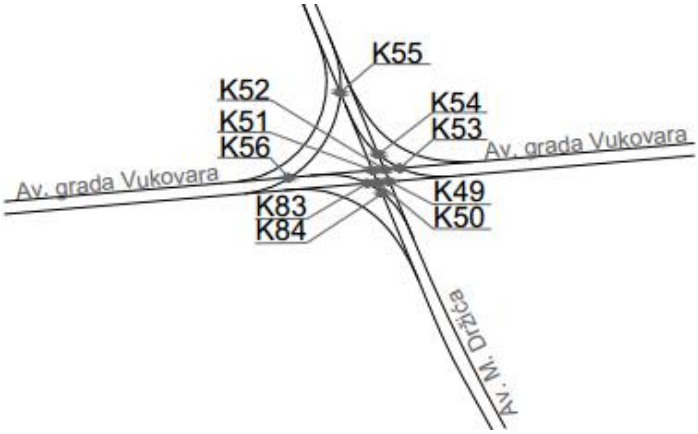
PROFIL 89

PROFILE 89



Prilog 6.16.3. Rezultati istrošenja profila tračnica u križalištima na Lokaciji 16
Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića

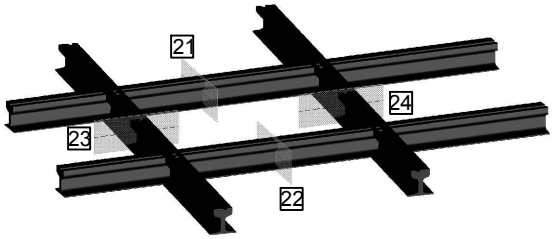
Annex 6.16.3. Results of cross section wear in track crossing at Location 16
Location 16: Vukovarska - Držićeva crossing



Dionice Sections	Oznaka križališta Track crossing mark	Profil Profile	Referentna dubina žlijeba Reference groove depth [mm]	Izmjerena dubina žlijeba Measured groove depth [mm]	Visinsko istrošenje žlijeba Vertical wear [mm]	Referentna širina žlijeba [mm] Reference groove width [mm]	Izmjerena širina žlijeba Measured groove width [mm]	Bočno istrošenje žlijeba Lateral wear [mm]	Period eksploatacije [god] Exploitation Period [years]
K-13-02	K83	9	12	13,96	1.96	24.00	25.20	1.20	5
		10	12	14,79	2.79	24.00	24.90	0.90	
		11	12	12,24	0.24	34.00	35.50	1.50	
		12	12	12,27	0.27	34.00	35.38	1.38	
K-13-02 K-13-07	K50	13	12	13,58	1.58	24.00	24.26	0.26	5
		14	12	13,50	1.50	24.00	24.43	0.43	
		15	12	15,27	3.27	24.00	23.83	-0.17	
		16	12	15,71	3.71	24.00	23.27	-0.73	
K-13-07	K84	17	12	15,94	3.94	24.00	22.77	-1.23	5
		18	12	18,40	6.40	24.00	22.60	-1.40	
		19	12	12,35	0.35	34.00	35.42	1.42	
		20	12	12,07	0.07	34.00	35.00	1.00	
K-13-02 K-13-08	K49	21	12	13,71	1.71	24.00	24.41	0.41	9
		22	12	13,31	1.31	24.00	24.80	0.80	
		23	12	15,74	3.74	24.00	23.62	-0.38	
		24	12	16,06	4.06	24.00	23.73	-0.27	
K-13-01 K-13-07	K51	25	12	13,42	1.42	24.00	24.46	0.46	5
		26	12	13,54	1.54	24.00	23.27	-0.73	
		27	12	16,56	4.56	24.00	23.21	-0.79	
		28	12	17,17	5.17	24.00	22.97	-1.03	
K-13-01 K-13-08	K52	29	12	13,75	1.75	24.00	24.53	0.53	5
		30	12	13,45	1.45	24.00	24.46	0.46	
		31	12	15,57	3.57	24.00	22.46	-1.54	
		32	12	16,30	4.30	24.00	23.12	-0.88	
K-13-10 K-13-11	K53	33	12	14,45	2.45	24.00	26.61	2.61	9
		34	12	14,31	2.31	24.00	24.12	0.12	
		35	12	18,95	6.95	34.00	37.58	3.58	
		36	12	18,29	6.29	34.00	37.08	3.08	
K-13-10 K-13-14	K54	46	12	19,71	7.71	24.00	22.41	-1.59	9
		47	12	19,23	7.23	24.00	22.86	-1.14	
		48	12	19,61	7.61	34.00	37.17	3.17	
		49	12	21,01	9.01	34.00	36.18	2.18	
K-13-04 K-13-05	K55	62	12	20,52	8.52	24.00	23.43	-0.57	5
		63	12	20,73	8.73	24.00	22.79	-1.21	
		64	12	15,01	3.01	34.00	36.14	2.14	
		65	12	15,25	3.25	34.00	36.68	2.68	
K-13-01 K-13-04	K56	73	12	14,11	2.11	24.00	24.56	0.56	5
		74	12	13,56	1.56	24.00	24.70	0.70	
		75	12	15,04	3.04	34.00	36.08	2.08	
		76	12	16,38	4.38	34.00	34.90	0.90	

Prilog 6.16.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 16
Istrošenje poprečnog presjeka tračnica u križalištu K49
Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića
MJ: 1:2

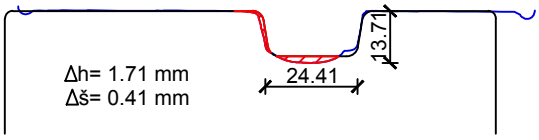
Annex 6.16.3.1. Cross section wear in track crossings at Location 16
Cross section wear in track crossing K49
Location 16: Vukovarska - Držićeva crossing
Scale: 1:2



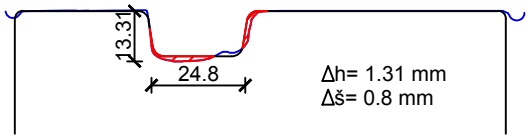
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savska → Žitnjak
Direction: Savska → Žitnjak

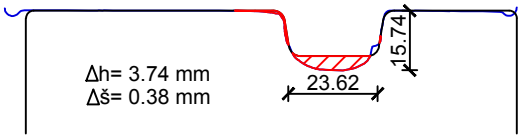
PROFIL 21
PROFILE 21



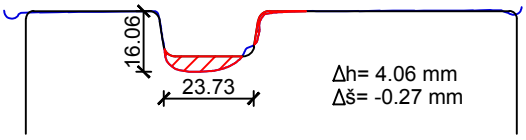
PROFIL 22
PROFILE 22



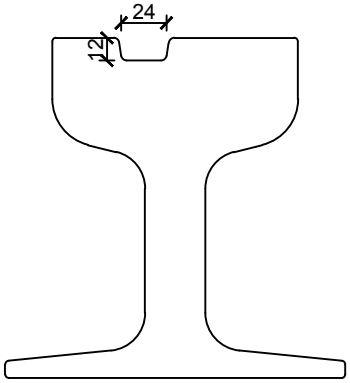
PROFIL 23
PROFILE 23



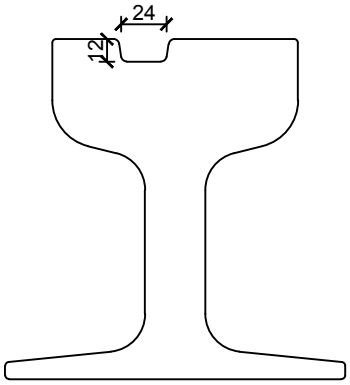
PROFIL 24
PROFILE 24



PROFIL 21, 22 PROFILE 21, 22
R = 0 m

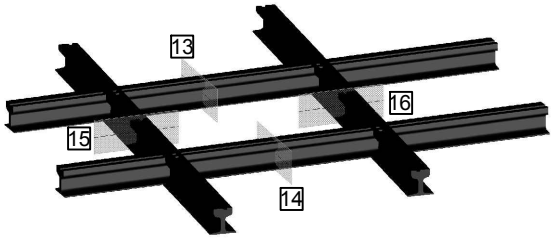


PROFIL 23, 24 PROFILE 23, 24
R = 0 m



Prilog 6.16.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 16
Istrošenje poprečnog presjeka tračnica u križalištu K50
Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića
MJ: 1:2

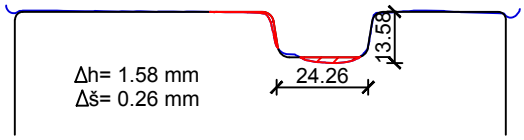
Annex 6.16.3.1. Cross section wear in track crossings at Location 16
Cross section wear in track crossing K50
Location 16: Vukovarska - Držićeva crossing
Scale: 1:2



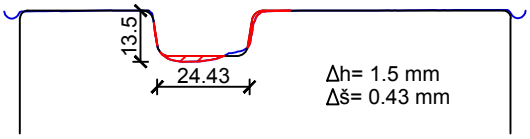
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Savska → Žitnjak
Direction: Savska → Žitnjak

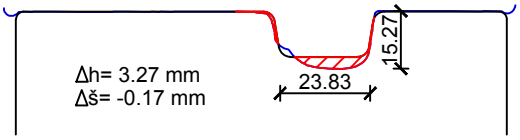
PROFIL 13
PROFILE 13



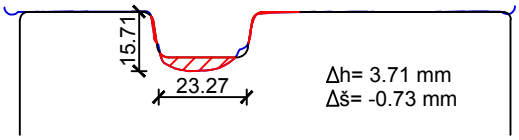
PROFIL 14
PROFILE 14



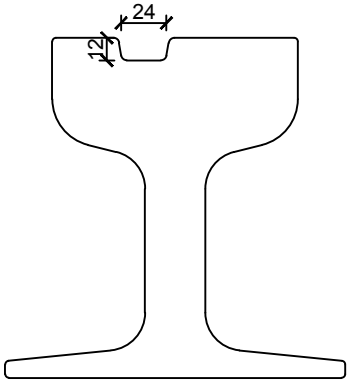
PROFIL 15
PROFILE 15



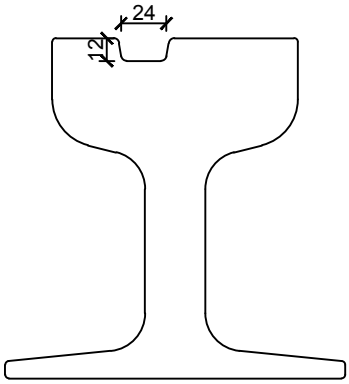
PROFIL 16
PROFILE 16



PROFIL 13, 14 PROFILE 13, 14
R = 0 m

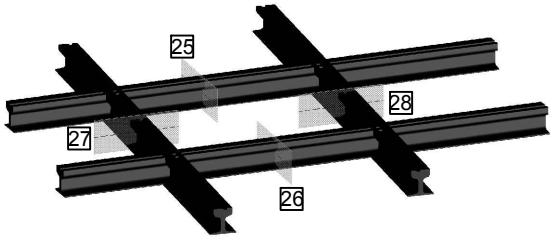


PROFIL 15, 16 PROFILE 15, 16
R = 0 m



Prilog 6.16.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 16
Istrošenje poprečnog presjeka tračnica u križalištu K51
Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića
MJ: 1:2

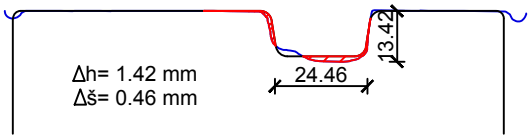
Annex 6.16.3.1. Cross section wear in track crossings at Location 16
Cross section wear in track crossing K51
Location 16: Vukovarska - Držićeva crossing
Scale: 1:2



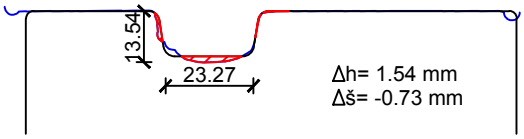
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Žitnjak ⟶ Savska
Direction: Žitnjak⟶Savska

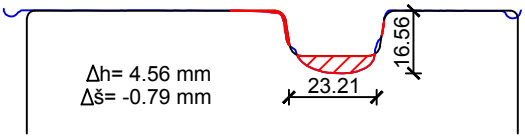
PROFIL 25
PROFILE 25



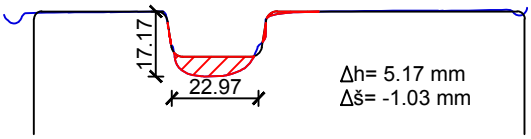
PROFIL 26
PROFILE 26



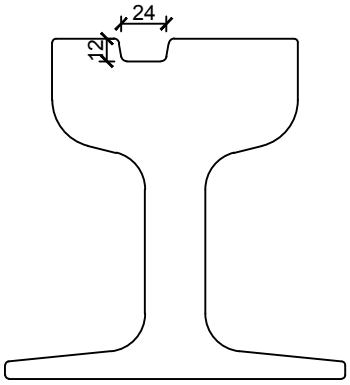
PROFIL 27
PROFILE 27



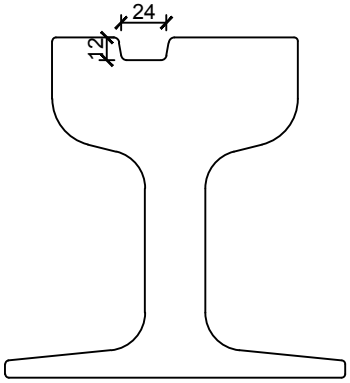
PROFIL 28
PROFILE 28



PROFIL 25, 26 PROFIL 25, 26
R = 0 m

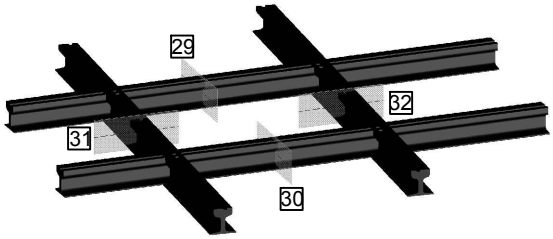


PROFIL 27, 28 PROFILE 27, 28
R = 0 m



Prilog 6.16.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 16
Istrošenje poprečnog presjeka tračnica u križalištu K52
Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića
MJ: 1:2

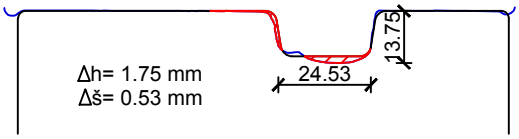
Annex 6.16.3.1. Cross section wear in track crossings at Location 16
Cross section wear in track crossing K52
Location 16: Vukovarska - Držićeva crossing
Scale: 1:2



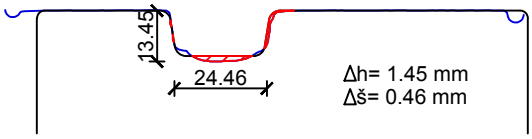
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Žitnjak ⟶ Savska
Direction: Žitnjak⟶Savska

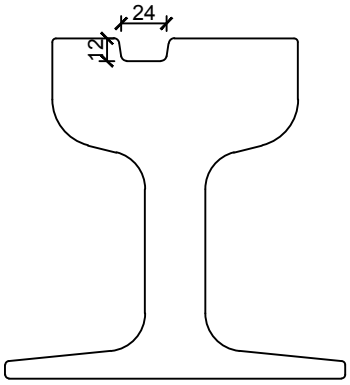
PROFIL 29
PROFILE 29



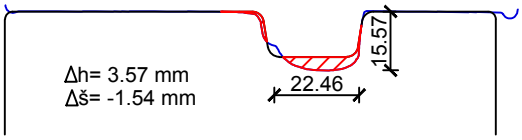
PROFIL 30
PROFILE 30



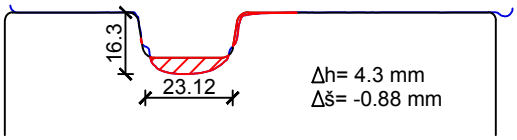
PROFIL 29, 30 PROFILE 29, 30
R = 0 m



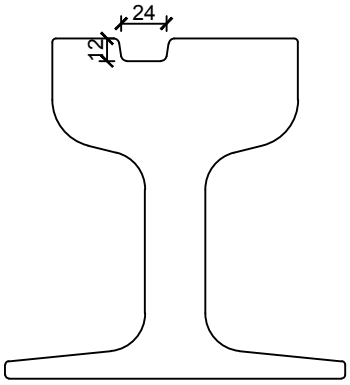
PROFIL 31
PROFILE 31



PROFIL 32
PROFILE 32

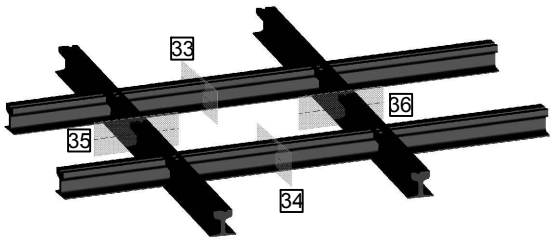


PROFIL 31, 32 PROFILE 31, 32
R = 0 m



Prilog 6.16.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 16
Istrošenje poprečnog presjeka tračnica u križalištu K53
Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića
MJ: 1:2

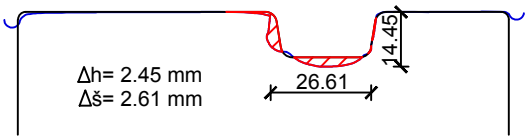
Annex 6.16.3.1. Cross section wear in track crossings at Location 16
Cross section wear in track crossing K53
Location 16: Vukovarska - Držićeva crossing
Scale: 1:2



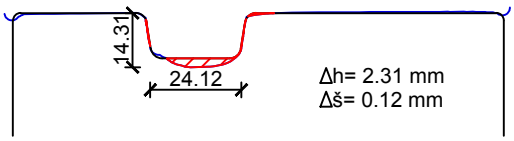
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Žitnjak ⟶ Savska
Direction: Žitnjak⟶Savska

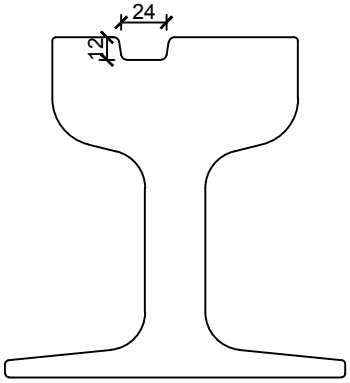
PROFIL 33
PROFILE 33



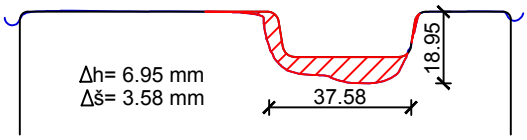
PROFIL 34
PROFILE 34



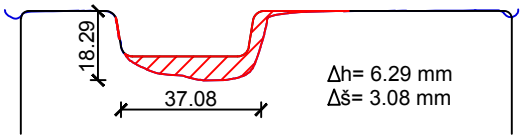
PROFIL 33, 34 PROFILE 33, 34
R = 0 m



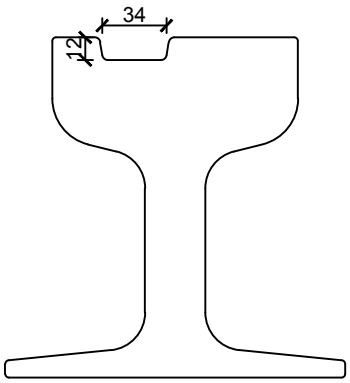
PROFIL 35
PROFILE 35



PROFIL 36
PROFILE 36



PROFIL 35, 36 PROFILE 35, 36
R = 22 m



Prilog 6.16.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 16

Istrošenje poprečnog presjeka tračnica u križalištu K54

Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića

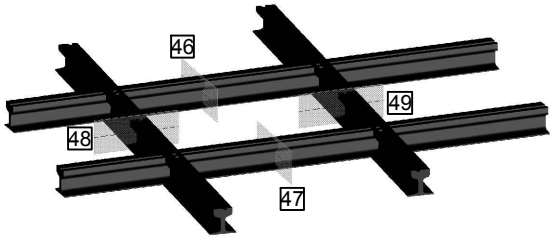
MJ: 1:2

Annex 6.16.3.1. Cross section wear in track crossings at Location 16

Cross section wear in track crossing K54

Location 16: Vukovarska - Držićeva crossing

Scale: 1:2



Δh - visinsko istrošenje

Δš - bočno istrošenje

Δh - vertical wear

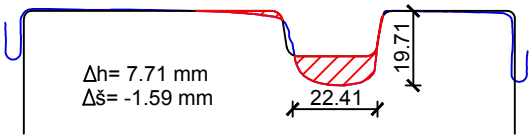
Δš - lateral wear

Smjer vožnje: Slavonska → Auto□usni kolodvor

Direction: Slavonska → □us station

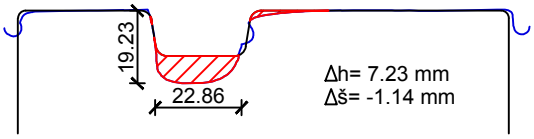
PROFIL 46

PROFILE 46



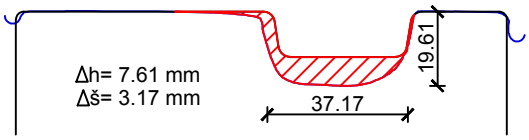
PROFIL 47

PROFILE 47



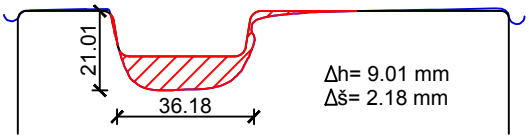
PROFIL 48

PROFILE 48



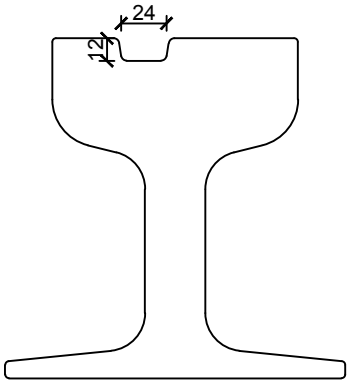
PROFIL 49

PROFILE 49



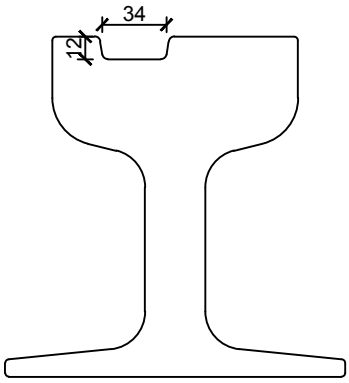
PROFIL 46, 47 □PROFILE 46, 47

R = 0 m



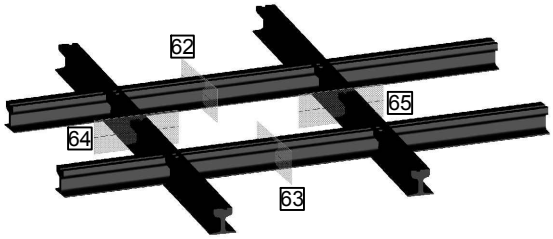
PROFIL 48, 49 □PROFILE 48, 49

R = 22 m



Prilog 6.16.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 16
Istrošenje poprečnog presjeka tračnica u križalištu K55
Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića
MJ: 1:2

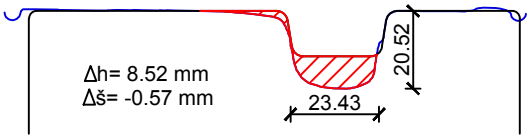
Annex 6.16.3.1. Cross section wear in track crossings at Location 16
Cross section wear in track crossing K55
Location 16: Vukovarska - Držićeva crossing
Scale: 1:2



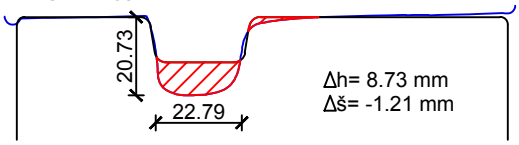
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Autobusni kolodvor ⟶ Slavonska
Direction: Slavonska ⟶ us station

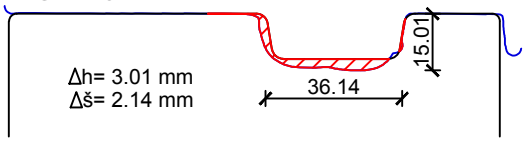
PROFIL 62
PROFILE 62



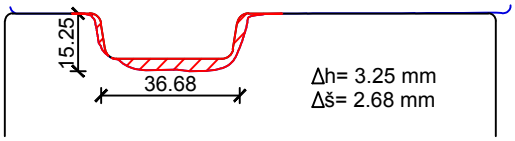
PROFIL 63
PROFILE 63



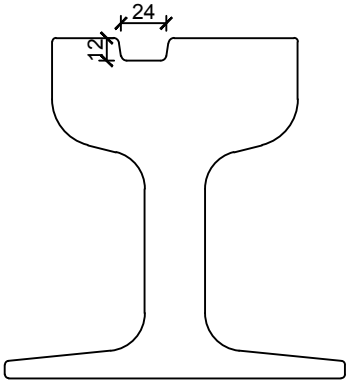
PROFIL 64
PROFILE 64



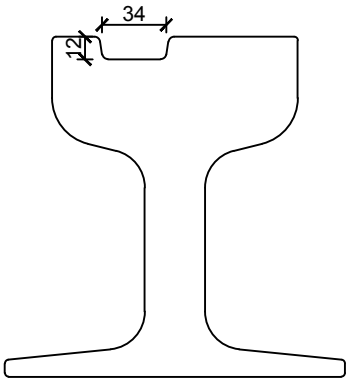
PROFIL 65
PROFILE 65



PROFIL 62, 63 PROFILE 62, 63
R = 0 m

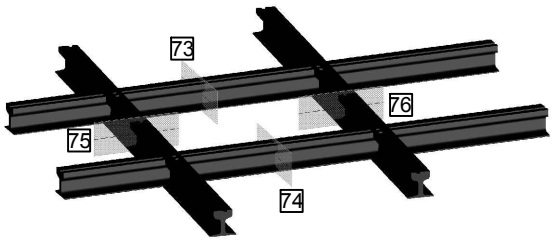


PROFIL 64, 65 PROFILE 64, 65
R = 25 m



Prilog 6.16.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 16
Istrošenje poprečnog presjeka tračnica u križalištu K56
Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića
MJ: 1:2

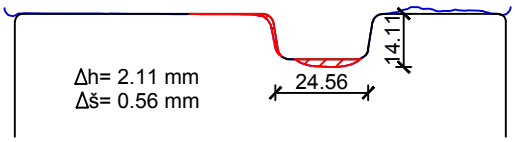
Annex 6.16.3.1. Cross section wear in track crossings at Location 16
Cross section wear in track crossing K56
Location 16: Vukovarska - Držićeva crossing
Scale: 1:2



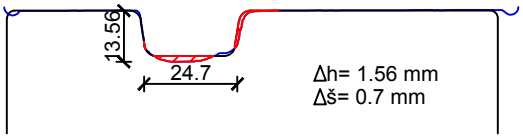
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Žitnjak ⟶ Savska
Direction: Žitnjak⟶Savska

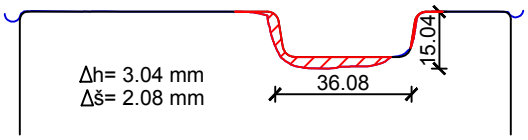
PROFIL 73
PROFILE 73



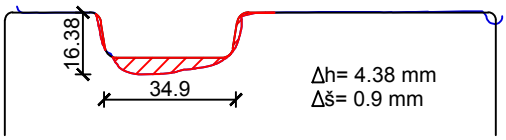
PROFIL 74
PROFILE 74



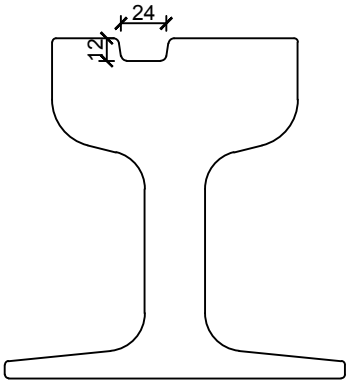
PROFIL 75
PROFILE 75



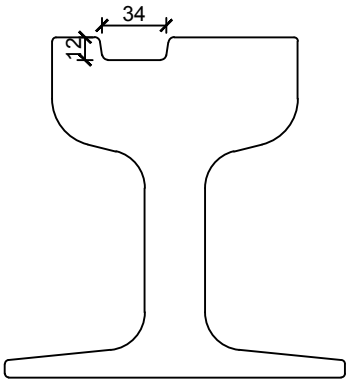
PROFIL 76
PROFILE 76



PROFIL 73, 74 PROFILE 73, 74
R = 0 m



PROFIL 75, 76 PROFILE 75, 76
R = 25 m



Prilog 6.16.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 16

Istrošenje poprečnog presjeka tračnica u križalištu K83

Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića

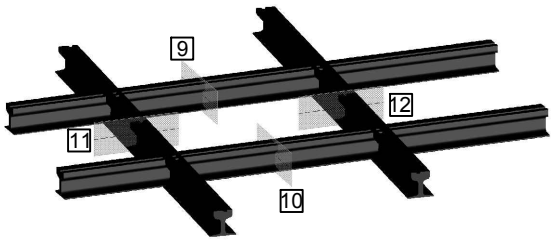
MJ: 1:2

Annex 6.16.3.1. Cross section wear in track crossings at Location 16

Cross section wear in track crossing K83

Location 16: Vukovarska - Držićeva crossing

Scale: 1:2



Δh - visinsko istrošenje

Δš - bočno istrošenje

Δh - vertical wear

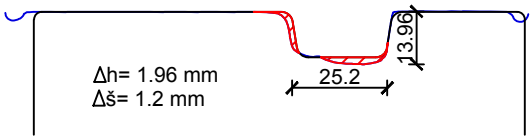
Δš - lateral wear

Smjer vožnje: Savska → Žitnjak

Direction: Savska → Žitnjak

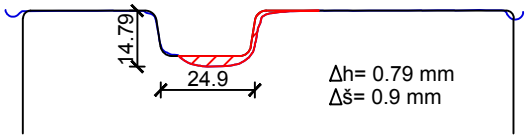
PROFIL 9

PROFILE 9



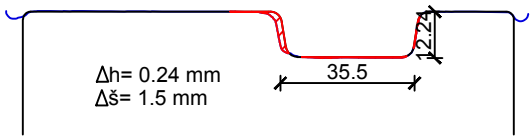
PROFIL 10

PROFILE 10



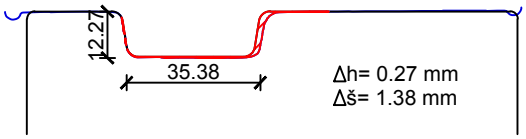
PROFIL 11

PROFILE 11



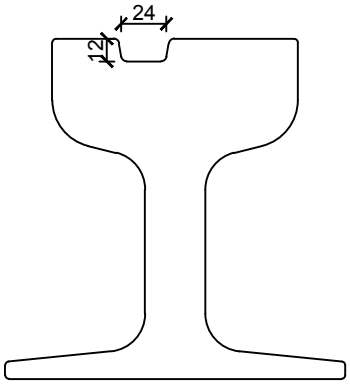
PROFIL 12

PROFILE 12



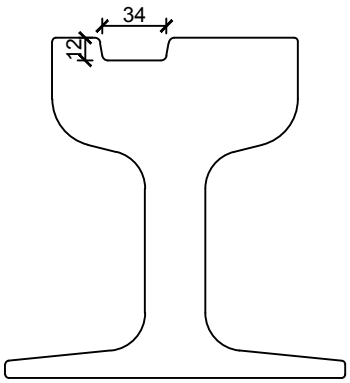
PROFIL 9, 10 PROFILE 9, 10

R = 0 m



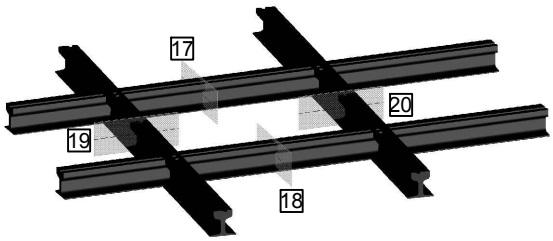
PROFIL 11, 12 PROFILE 11, 12

R = 20 m



Prilog 6.16.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 16
Istrošenje poprečnog presjeka tračnica u križalištu K84
Lokacija 16: Križanje Avenija grada Vukovara - Avenija Marina Držića
MJ: 1:2

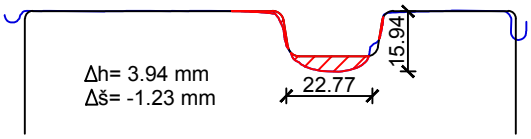
Annex 6.16.3.1. Cross section wear in track crossings at Location 16
Cross section wear in track crossing K84
Location 16: Vukovarska - Držićeva crossing
Scale: 1:2



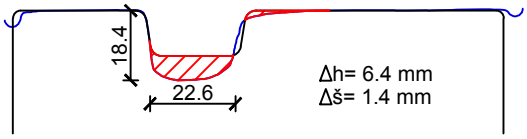
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Autobusni kolodvor ⟶ Slavonska
Direction: us station ⟶ Slavonska

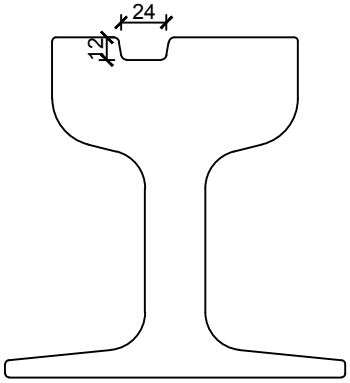
PROFIL 17
PROFILE 17



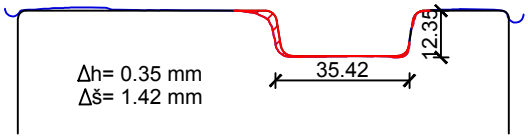
PROFIL 18
PROFILE 18



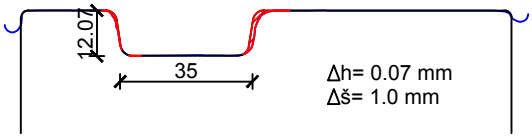
PROFIL 17, 18 PROFILE 17, 18
R = 0 m



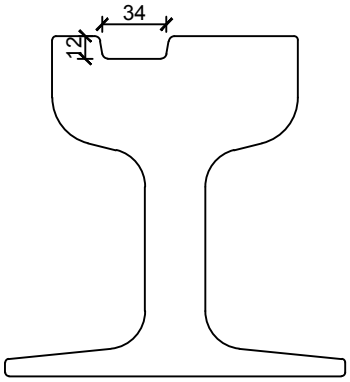
PROFIL 19
PROFILE 19



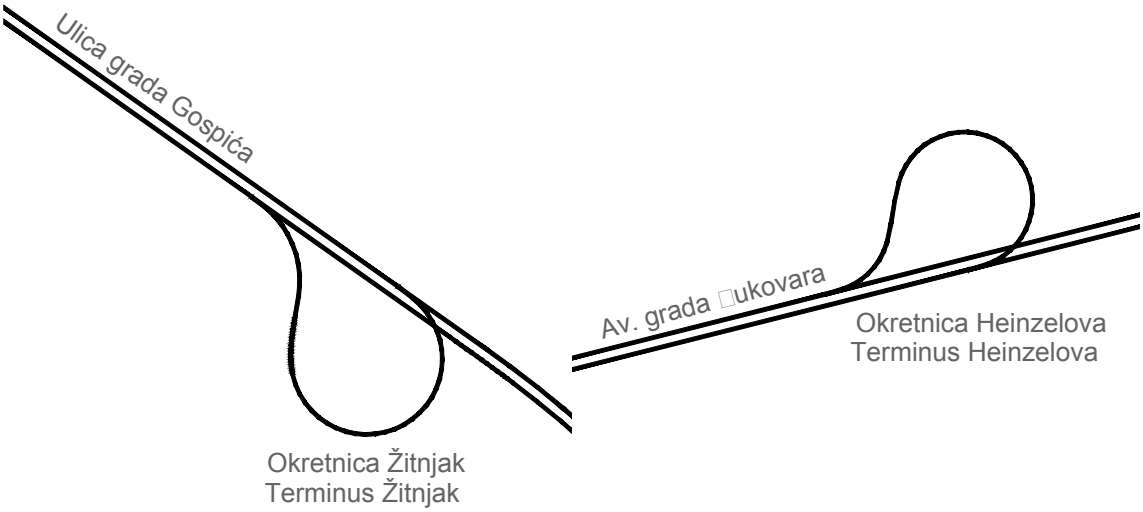
PROFIL 20
PROFILE 20



PROFIL 19, 20 PROFILE 19, 20
R = 20 m



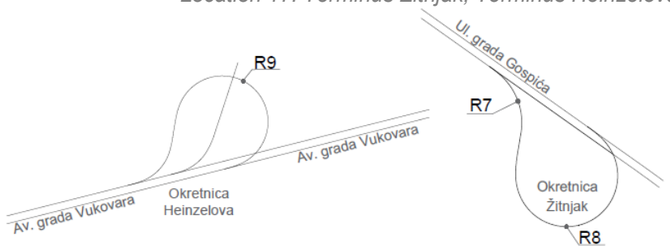
Lokacija 17 (L17)
Okretnice Žitnjak, Heinzelova
Location 17 (L17)
Terminus Žitnjak, Heinzelova



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija razvoja tramvajskog prometa rada Zagre a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition
SADRŽAJ PRILOGA: ANNEX: Istrošenje poprečnih presjeka tračnica u krivinama, skretnicama i križalištima na Lokaciji 17 Rail cross section wear in curves, turnouts and crossings at Location 17	
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.17

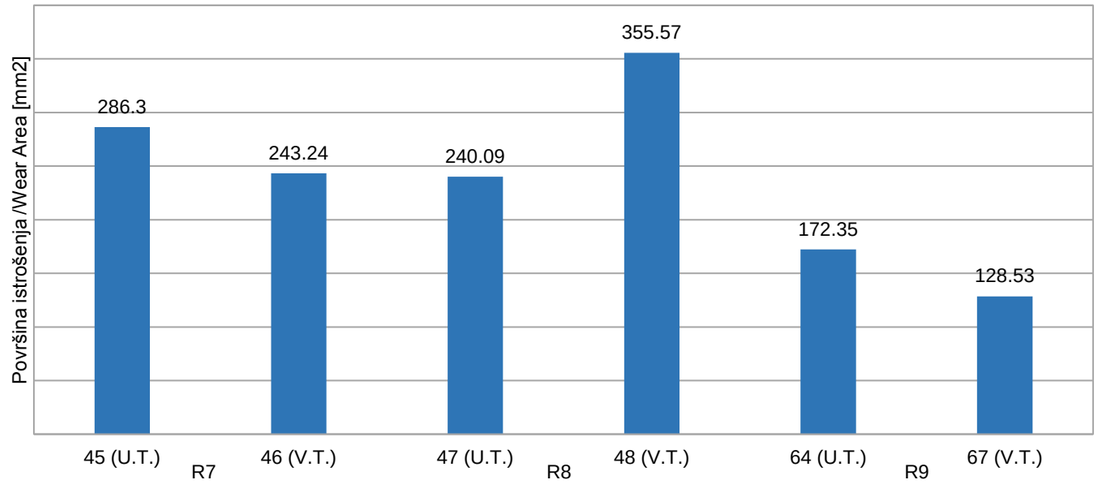
Prilog 6.17.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 17**
Lokacija 17: Okretnice Žitnjak, Heinzelova

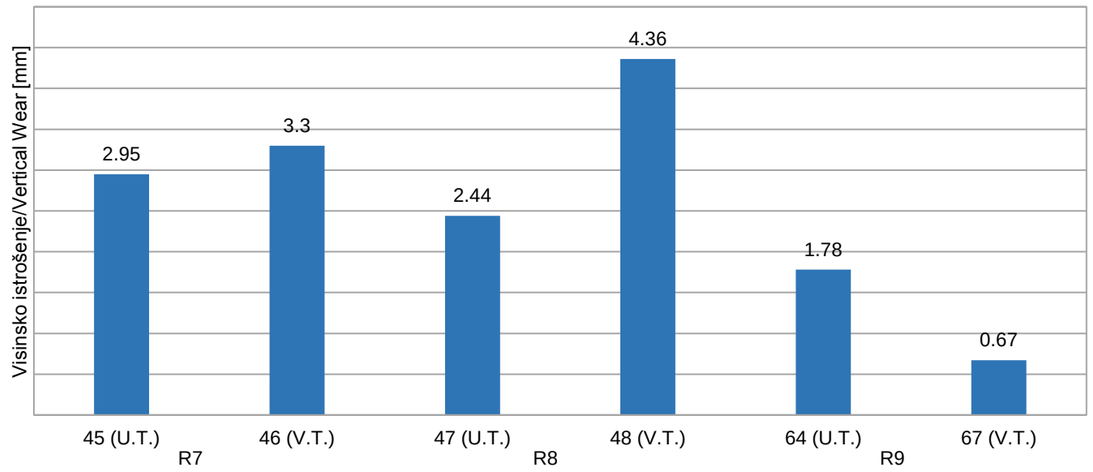
Annex 6.17.1. **Results of cross section wear in curves at Location 17**
Location 17: Terminus Žitnjak, Terminus Heinzelova

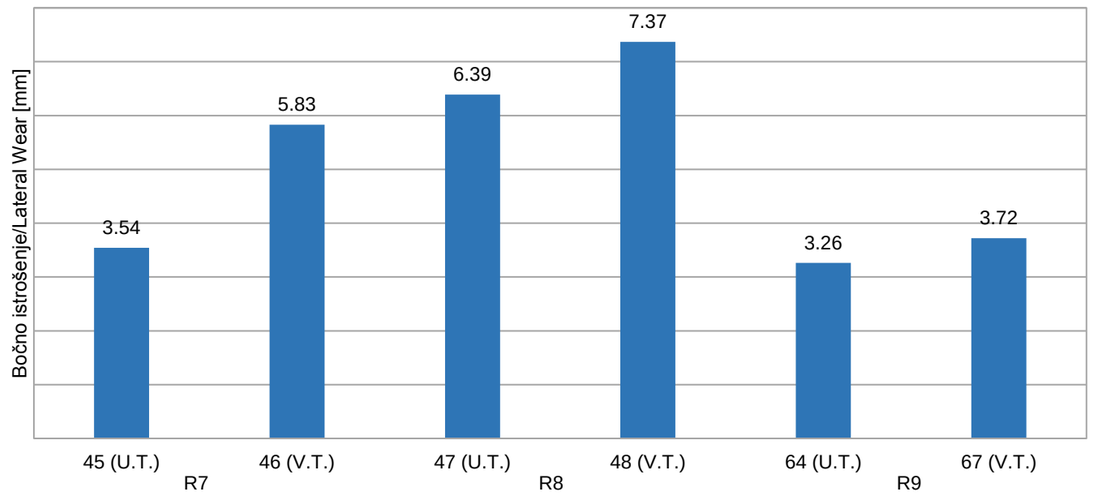


Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [˚]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
Z-16-01	R7	desna right	46	lijeva/left	243.24	3.3	5.83	74.25	25	15
			45	desna/right	286.3	2.95	3.54	79.62		
Z-16-01	R8	lijeva left	47	lijeva/left	240.09	2.44	6.39	74.95	20	15
			48	desna/right	355.57	4.36	7.37	69.96		
Z-15-01	R9	lijeva left	64	lijeva/left	172.35	1.78	3.26	79.23	18	21
			67	desna/right	128.53	0.67	3.72	67.47		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
Z-16-01	R7	desna right	46	lijeva/left	243.24	3.3	5.83
			45	desna/right	286.3	2.95	3.54
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-43.06	0.35	2.29
Z-16-01	R8	lijeva left	47	lijeva/left	240.09	2.44	6.39
			48	desna/right	355.57	4.36	7.37
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					115.48	1.92	0.98
Z-15-01	R9	lijeva left	64	lijeva/left	172.35	1.78	3.26
			67	desna/right	128.53	0.67	3.72
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-43.82	-1.11	0.46







U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve

Prilog 6.17.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 17

Istrošenje poprečnog presjeka tračnica u krivini R7

Lokacija 17: Okretnice Žitnjak, Heinzelova

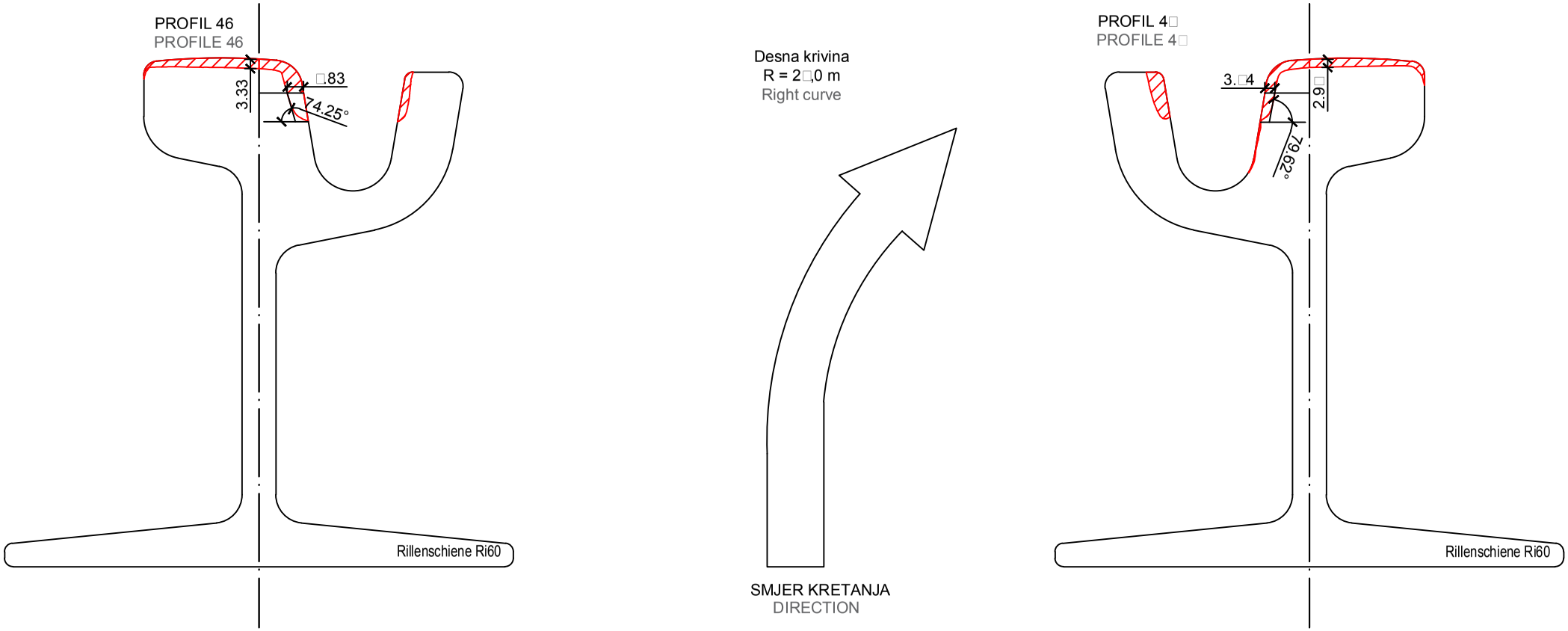
MJ: 1:2

Annex 6.17.1.1. Cross section wear in curves at Location 17

Cross section wear in curve R7

Location 17: Terminus Žitnjak

Scale: 1:2



Prilog 6.17.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 17

Istrošenje poprečnog presjeka tračnica u krivini R8

Lokacija 17: Okretnice Žitnjak, Heinzelova

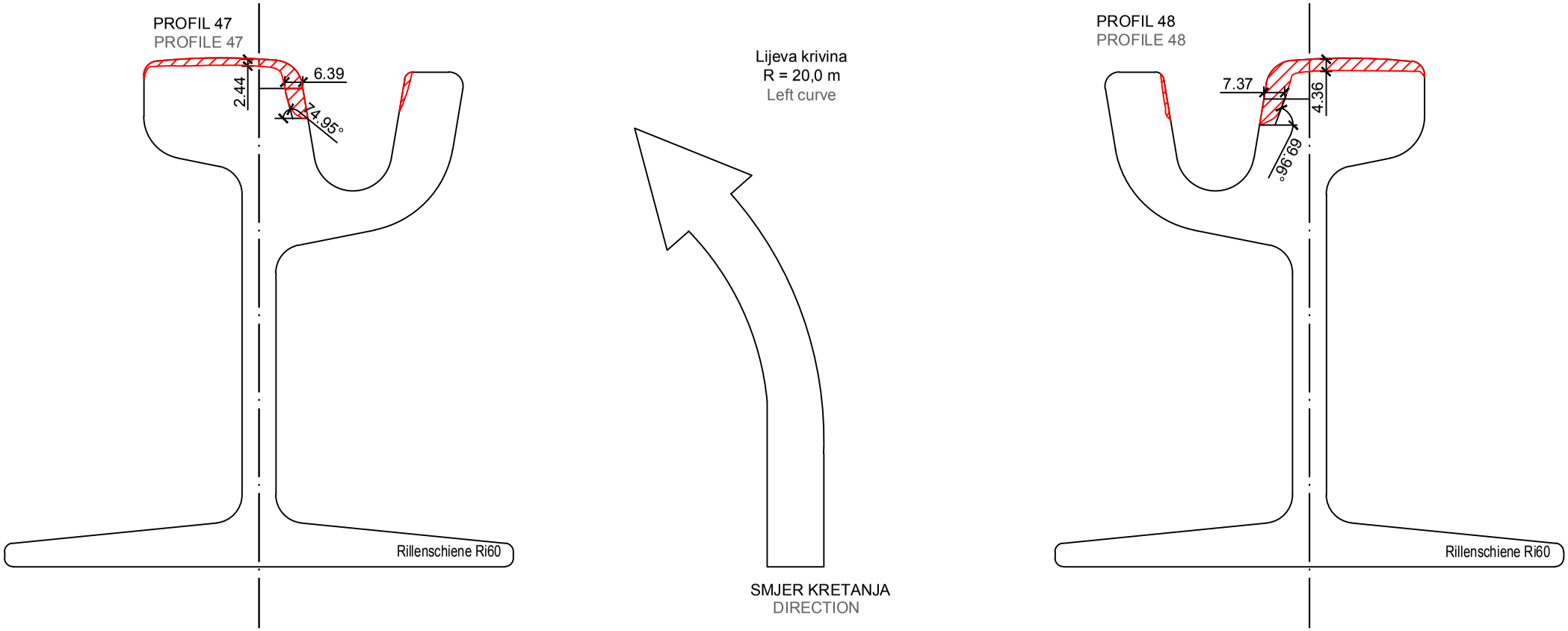
MJ: 1:2

Annex 6.17.1.1. Cross section wear in curves at Location 17

Cross section wear in curve R8

Location 17: Terminus Žitnjak

Scale: 1:2



Prilog 6.17.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 17

Istrošenje poprečnog presjeka tračnica u krivini R9

Lokacija 17: Okretnice Žitnjak, Heinzelova

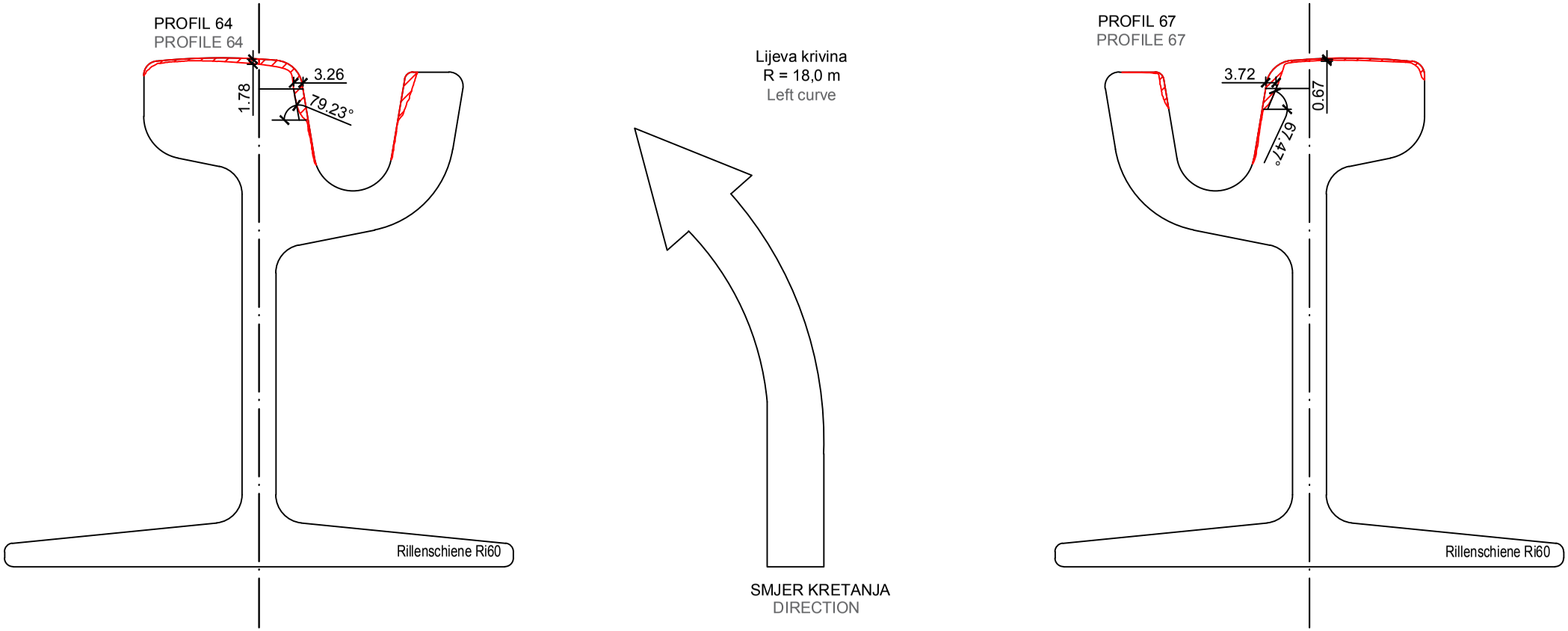
MJ: 1:2

Annex 6.17.1.1. Cross section wear in curves at Location 17

Cross section wear in curve R9

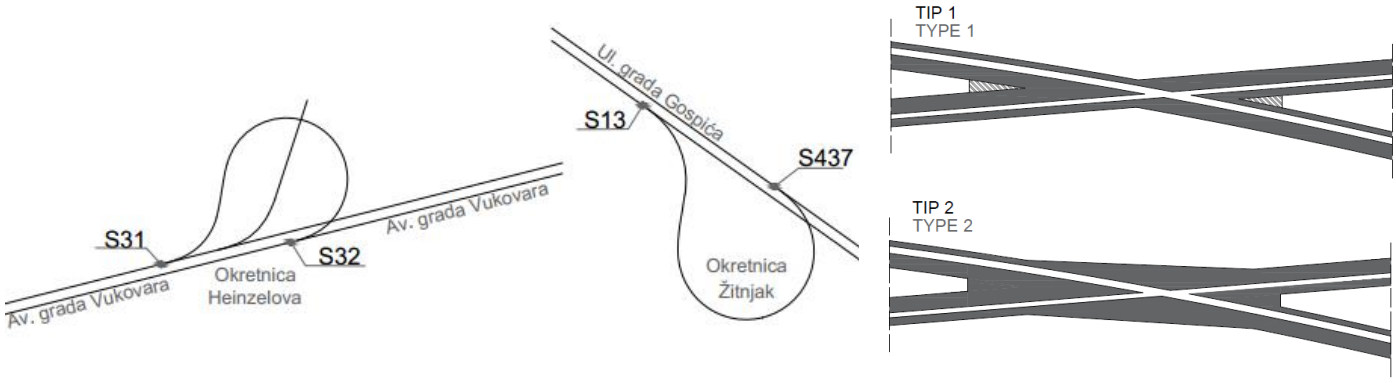
Location 17: Terminus Heinzelova

Scale: 1:2



Prilog 6.17.2. **Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 17**
Lokacija 17: Okretnice Žitnjak, Heinzelova

Annex 6.17.2. **Results of cross section wear in turnouts at Location 17**
Location 17: Terminus Žitnjak, Heinzelova



Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
D-22-02 Z-16-01	S13	1	41L	13	22.41	9.41	35.16	41.82	6.66	15
			41D	13	21.86	8.86	24.00	29.09	5.09	
			42	12	22.45	10.45		70.54		
			43L	13	21.84	8.84	24.00	24.55	0.55	
			43D	13	23.53	10.53	35.15	40.47	5.32	
D-22-01 Z-16-01	S437	2	33L	13	19.10	6.10	24.00	23.84	-0.16	15
			33D	13	14.07	1.07	35.32	40.65	5.33	
			34	12	19.73	7.73		43.94		
			35L	13	15.26	2.26	35.32	40.47	5.15	
			35D	13	19.77	6.77	24.00	26.32	2.32	
D-21-01 Z-15-01	S31	1	53L	13	23.09	10.09	24.00	27.32	3.32	21
			53D	13	15.35	2.35	35.71	35.68	-0.03	
			54L	12	25.11	13.11	24.00	26.34	2.34	
			54D	12	14.38	2.38	35.57	32.35	-3.22	
			55L	13	15.58	2.58	35.70	33.88	-1.82	
			55D	13	23.32	10.32	24.00	25.41	1.41	
D-21-02 Z-15-01	S32	1	56L	13	14.17	1.17	35.75	39.50	3.75	21
			56D	13	22.58	9.58	34.00	36.86	2.86	
			57	12	23.82	11.82		41.60		
			58L	13	24.24	11.24	24.00	25.58	1.58	
			58D	13	14.64	1.64	35.74	36.43	0.69	

Prilog 6.17.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 17

Istrošenje poprečnog presjeka srcišta skretnice S13

Lokacija 17: Okretnice Žitnjak

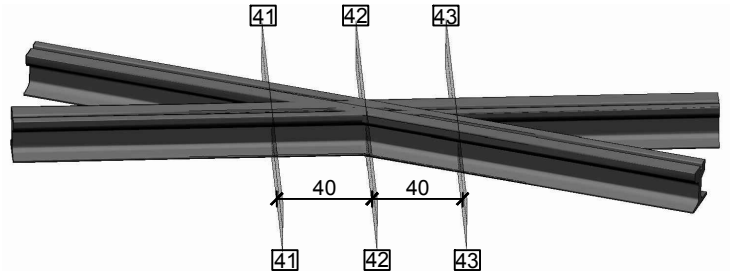
MJ: 1:2

Annex 6.17.2.1. Cross section wear in turnouts at Location 17

Cross section wear in turnout S13

Location 17: Terminus Žitnjak

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

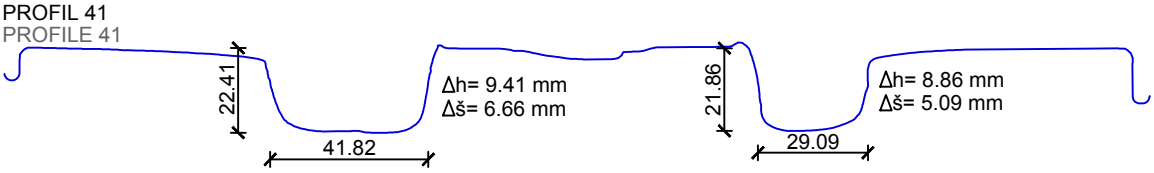
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: Žitnjak ⟶ Savišće

Direction: Žitnjak ⟶ Savišće

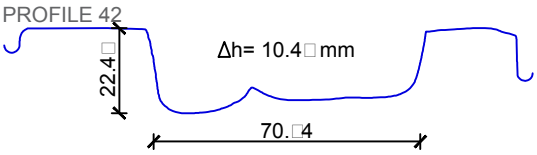
PROFIL 41

PROFILE 41



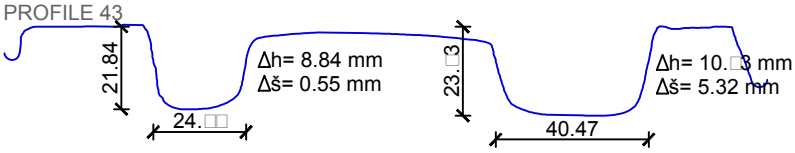
PROFIL 42

PROFILE 42



PROFIL 43

PROFILE 43



Prilog 6.17.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 17

Istrošenje poprečnog presjeka srcišta skretnice S31

Lokacija 17: Okretnice Heinzelova

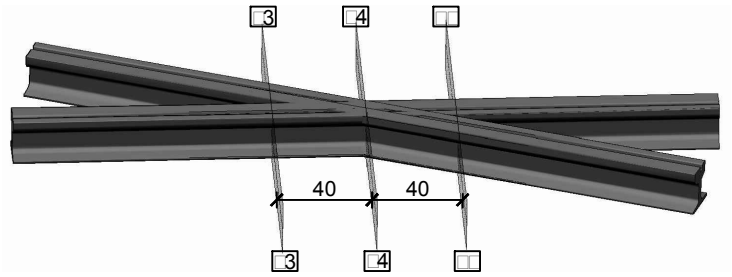
MJ: 1:2

Annex 6.17.2.1. Cross section wear in turnouts at Location 17

Cross section wear in turnout S31

Location 17: Terminus Heinezlova

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

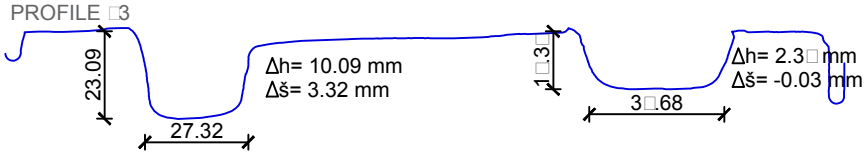
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: Žitnjak ⟶ Heinzelova

Direction: Žitnjak ⟶ Heinzelova

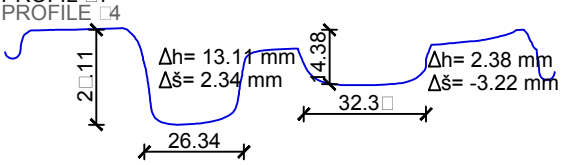
PROFIL □3

PROFILE □3



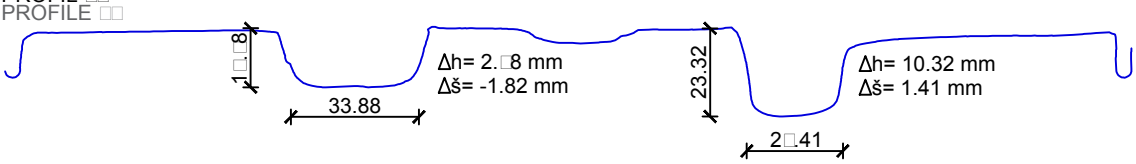
PROFIL □4

PROFILE □4



PROFIL □□

PROFILE □□



Prilog 6.17.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 17

Istrošenje poprečnog presjeka srcišta skretnice S32

Lokacija 17: Okretnice Heinzelova

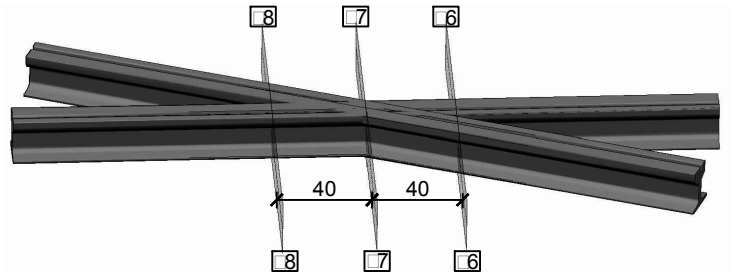
MJ: 1:2

Annex 6.17.2.1. Cross section wear in turnouts at Location 17

Cross section wear in turnout S32

Location 17: Terminus Heinzelova

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

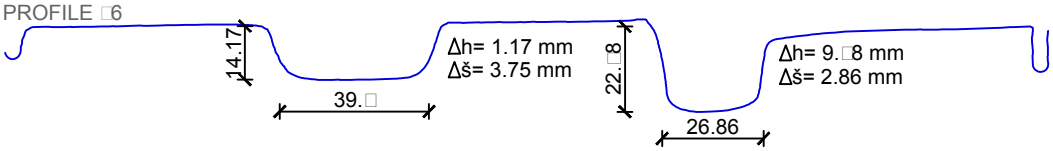
Δh vertical wear
Δš - lateral wear

Smjer vožnje: Heinzelova → Žitnjak

Direction: Heinzelova → Žitnjak

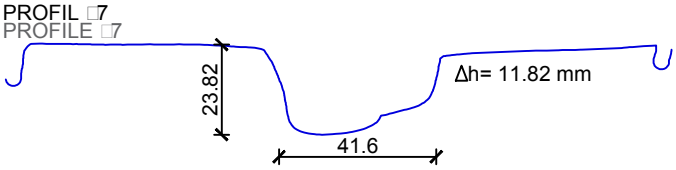
PROFIL 6

PROFILE 6



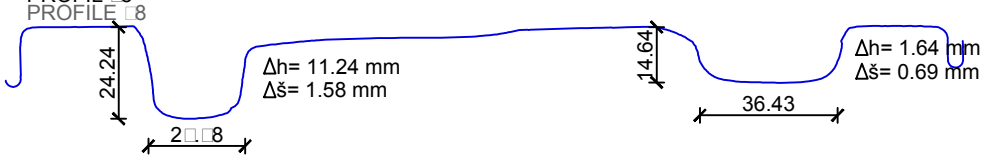
PROFIL 7

PROFILE 7



PROFIL 8

PROFILE 8



Prilog 6.17.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 17

Istrošenje poprečnog presjeka srcišta skretnice S437

Lokacija 17: Okretnice Žitnjak

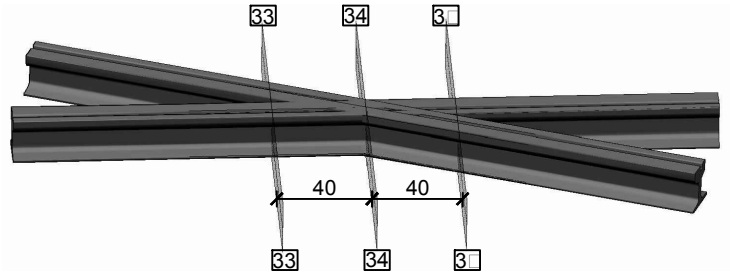
MJ: 1:2

Annex 6.17.2.1. Cross section wear in turnouts at Location 17

Cross section wear in turnout S437

Location 17: Terminus Žitnjak

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

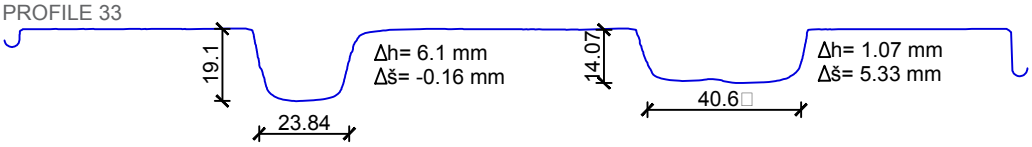
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: Savišće ⟶ Žitnjak

Direction: Savišće ⟶ Žitnjak

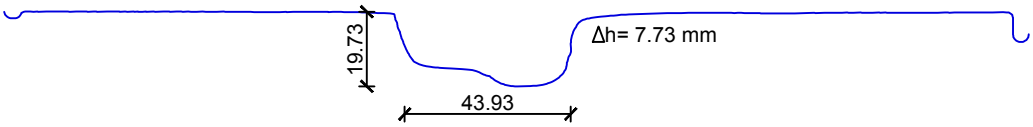
PROFIL 33

PROFILE 33



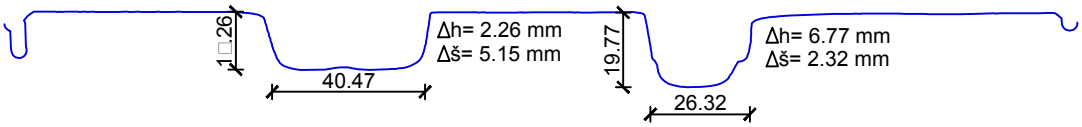
PROFIL 34

PROFILE 34



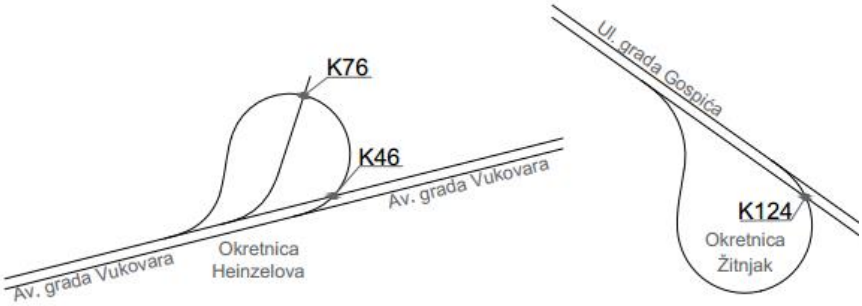
PROFIL 3□

PROFILE 3□



Prilog 6.17.3. Rezultati istrošenja profila tračnica u križalištima na Lokaciji 17
Lokacija 17: Okretnice Žitnjak, Heinzelova

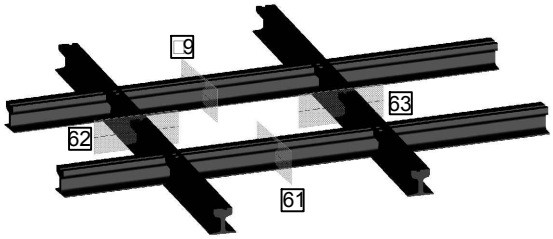
Annex 6.17.3. Results of cross section wear in track crossing at Location 17
Loc Location 17: Terminus Žitnjak, Heinzelova



Dionice Sections	**Oznaka križališta** Track crossing mark	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
D-22-02 Z-16-01	K124	36	12	18,07	6.07	24.00	22.82	-1.18	15
		38	12	17,87	5.87	24.00	24.37	0.37	
		39	12	18,21	6.21	34.00	48.87	14.87	
		40	12	17,78	5.78	34.00	42.26	8.26	
Z-15-01	K76	49	12	15,84	3.84	34.00	35.67	1.67	21
		50	12	15,45	3.45	34.00	35.24	1.24	
		51	12	12,43	0.43	24.00	22.90	-1.10	
		52	12	12,72	0.72	24.00	22.54	-1.46	
7-15-01 D-21-01	K46	59	12	21,72	9.72	24.00	23.03	-0.97	21
		61	12	22.60	10.60	24.00	23.56	-0.44	
		62	12	15,12	3.12	34.00	29.48	-4.52	
		63	12	15,62	3.62	34.00	29.77	-4.23	

Prilog 6.17.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 17
Istrošenje poprečnog presjeka tračnica u križalištu K46
Lokacija 17: Okretnica Heinzelova
MJ: 1:2

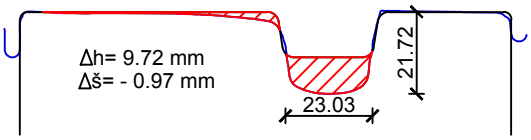
Annex 6.17.3.1. Cross section wear in track crossings at Location 17
Cross section wear in track crossing K46
Location 17: Terminus Heinzelova
Scale: 1:2



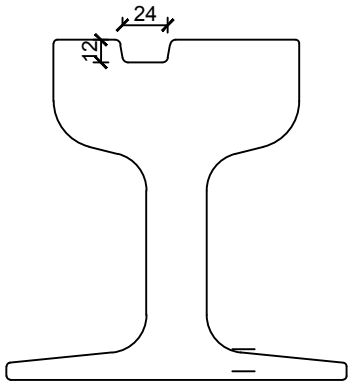
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh vertical wear
Δš - lateral wear

Smjer vožnje: Žitnjak ⟶ Heinzelova
Direction: Žitnjak ⟶ Heinzelova

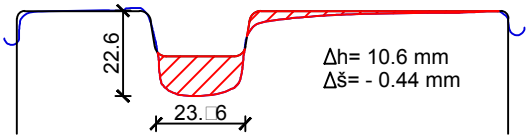
PROFIL 9
PROFILE 9



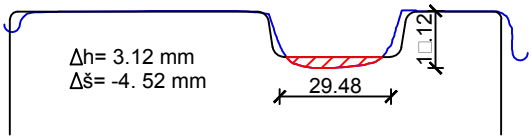
PROFIL 9, 61 PROFILE 9, 61
R = 0 m



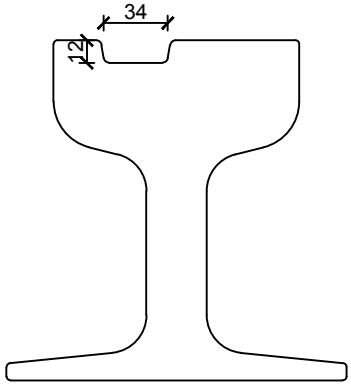
PROFIL 61
PROFILE 61



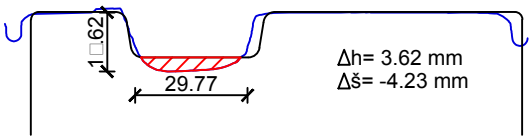
PROFIL 62
PROFILE 62



PROFIL 62, 63 PROFILE 62, 63
R = 18 m



PROFIL 63
PROFILE 63

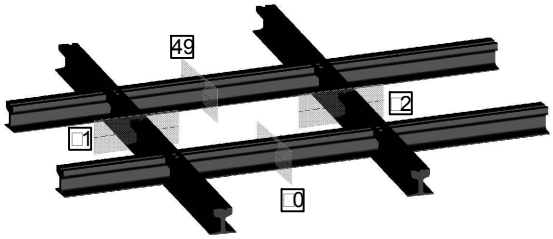


Prilog 6.17.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 17

Istrošenje poprečnog presjeka tračnica u križalištu K76
Lokacija 17: Okretnica Heinzelova
MJ: 1:2

Annex 6.17.3.1. Cross section wear in track crossings at Location 17

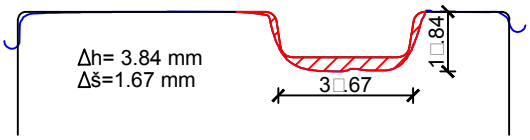
Cross section wear in track crossing K76
Location 17: Terminus Heinzelova
Scale: 1:2



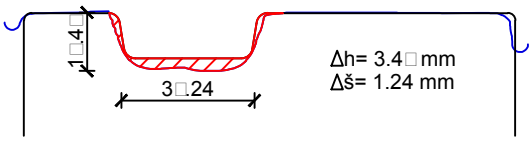
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu
Direction: through terminus

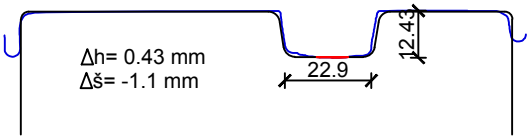
PROFIL 49
PROFILE 49



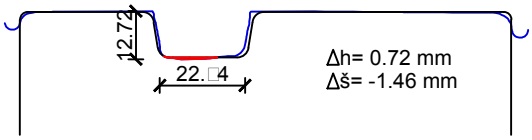
PROFIL □0
PROFILE □0



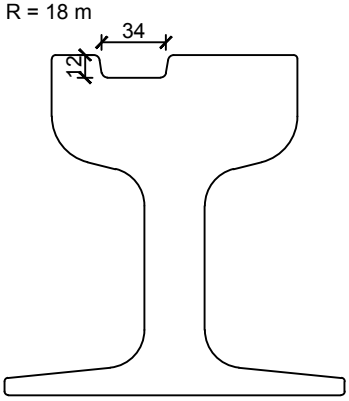
PROFIL □1
PROFILE □1



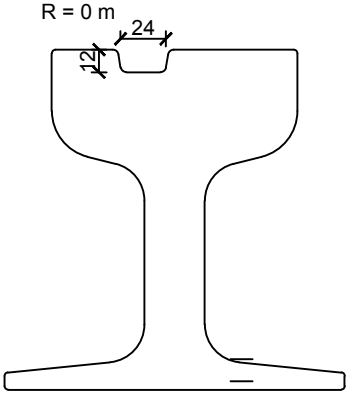
PROFIL □2
PROFILE □2



PROFIL 49, □0 □PROFILE 49, □0
R = 18 m



PROFIL □1, □2 □PROFILE □1, □2
R = 0 m



Prilog 6.17.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 17

Istrošenje poprečnog presjeka tračnica u križalištu K124

Lokacija 17: Okretnica Žitnjak

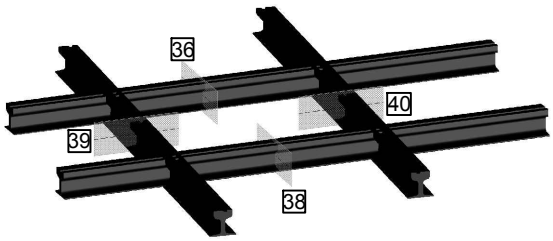
MJ: 1:2

Annex 6.17.3.1. Cross section wear in track crossings at Location 17

Cross section wear in track crossing K124

Location 17: Terminus Žitnjak

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

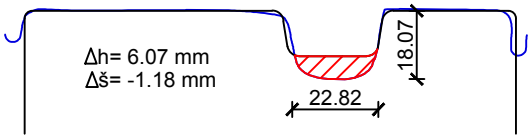
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: Žitnjak ⟶ Savišće

Direction: Žitnjak ⟶ Savišće

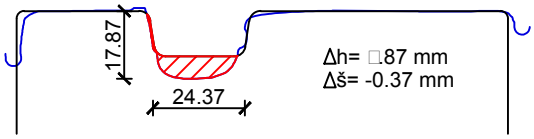
PROFIL 36

PROFILE 36



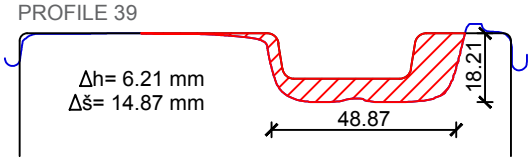
PROFIL 38

PROFILE 38



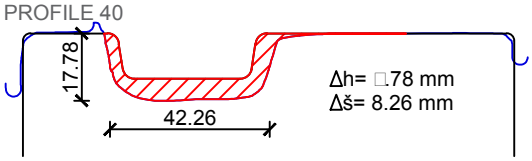
PROFIL 39

PROFILE 39



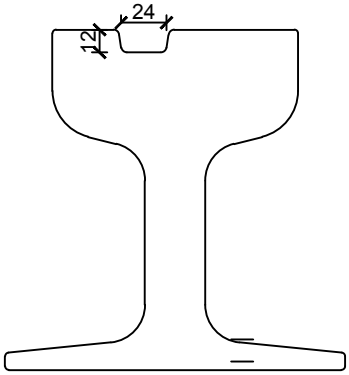
PROFIL 40

PROFILE 40



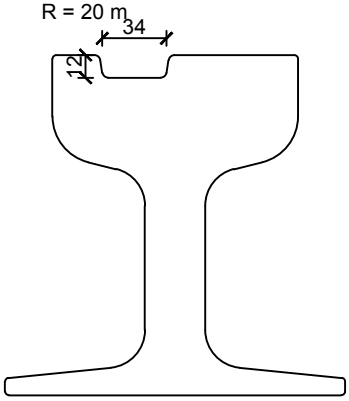
PROFIL 36, 38 □PROFILE 36, 38

R = 0 m



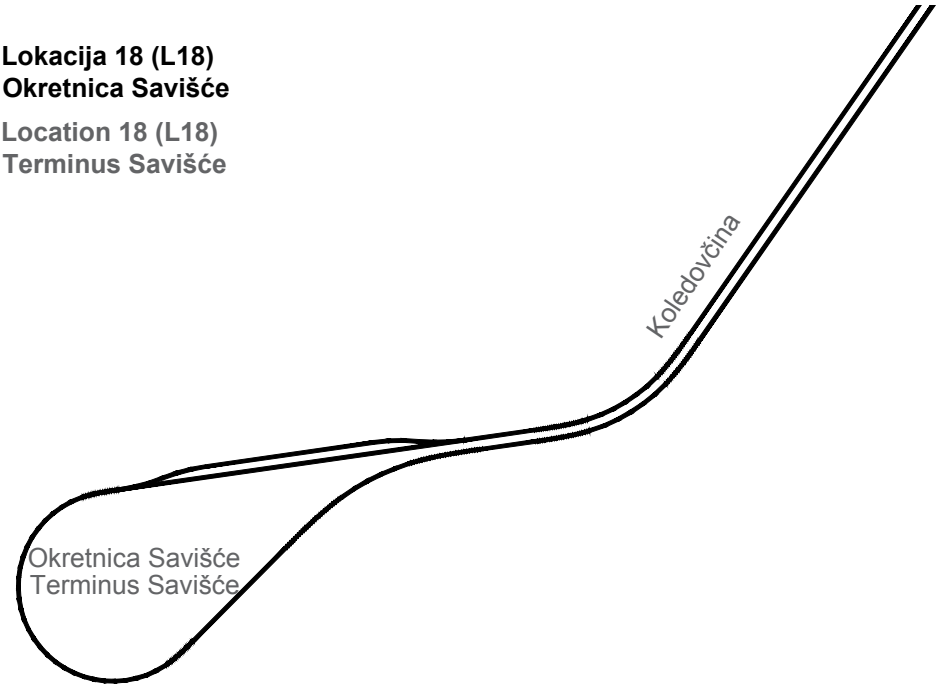
PROFIL 39, 40 □PROFILE 39, 40

R = 20 m



Lokacija 18 (L18)
Okretnica Savišće

Location 18 (L18)
Terminus Savišće



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija ra□voja tramvajskog prometa □rada □agre□a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition

SADRŽAJ PRILOGA:
ANNEX:

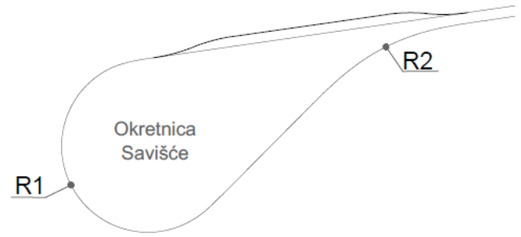
Istrošenje poprečnih presjeka tračnica u krivinama i skretnicama na Lokaciji 18

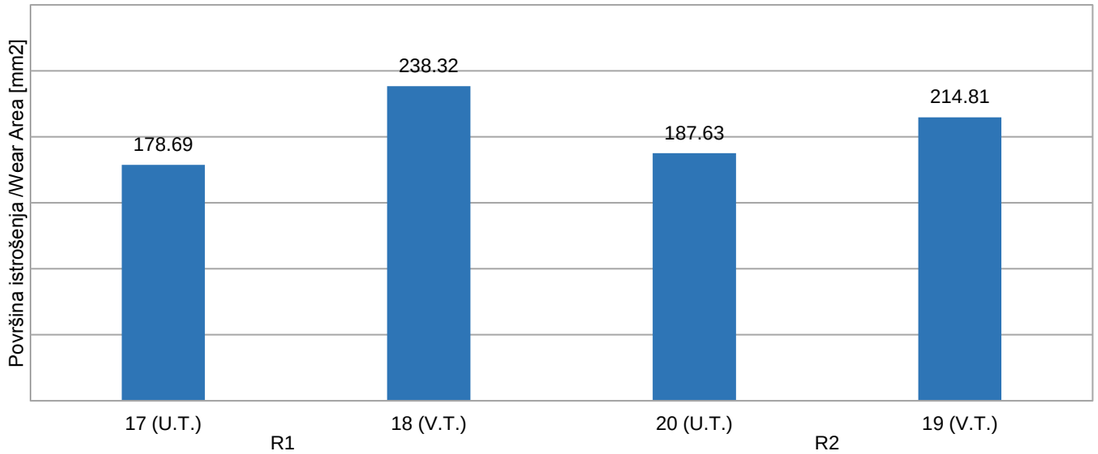
Rail cross section wear in curves and turnouts at Location 18

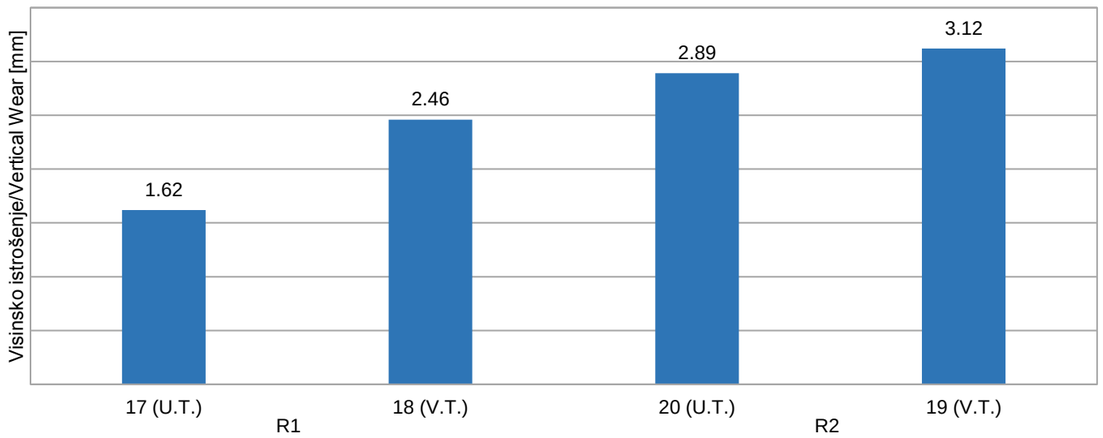
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.18

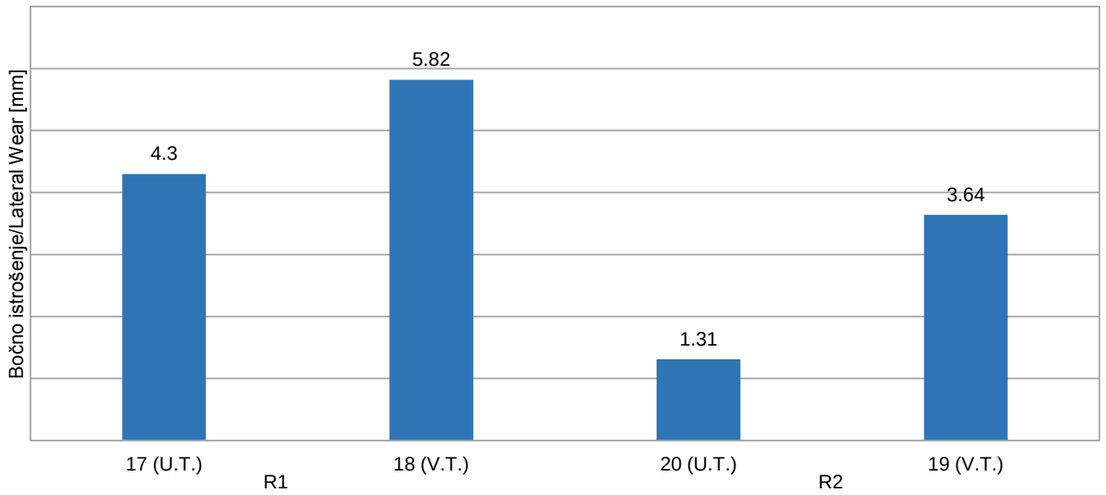
Prilog 6.18.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 18**
Lokacija 18: Okretnica Savišće

Annex 6.18.1. **Results of cross section wear in curves at Location 18**
Location 18: Terminus Savišće









Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [ ]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
Z-17-03	R1	lijeva left	17	lijeva/left	178.69	1.62	4.3	77.5	25	16
			18	desna/right	238.32	2.46	5.82	74.44		
Z-17-03	R2	desna right	20	lijeva/left	214.81	3.12	3.64	79.97	61	16
			19	desna/right	187.63	2.89	1.31	83.69		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
Z-17-03	R1	lijeva left	17	lijeva/left	178.69	1.62	4.3
			18	desna/right	238.32	2.46	5.82
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					59.63	0.84	1.52
Z-17-03	R2	desna right	20	lijeva/left	214.81	3.12	3.64
			19	desna/right	187.63	2.89	1.31
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					27.18	0.23	2.33

U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve

Prilog 6.18.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 18

Istrošenje poprečnog presjeka tračnica u krivini R1

Lokacija 18: Okretnica Savišće

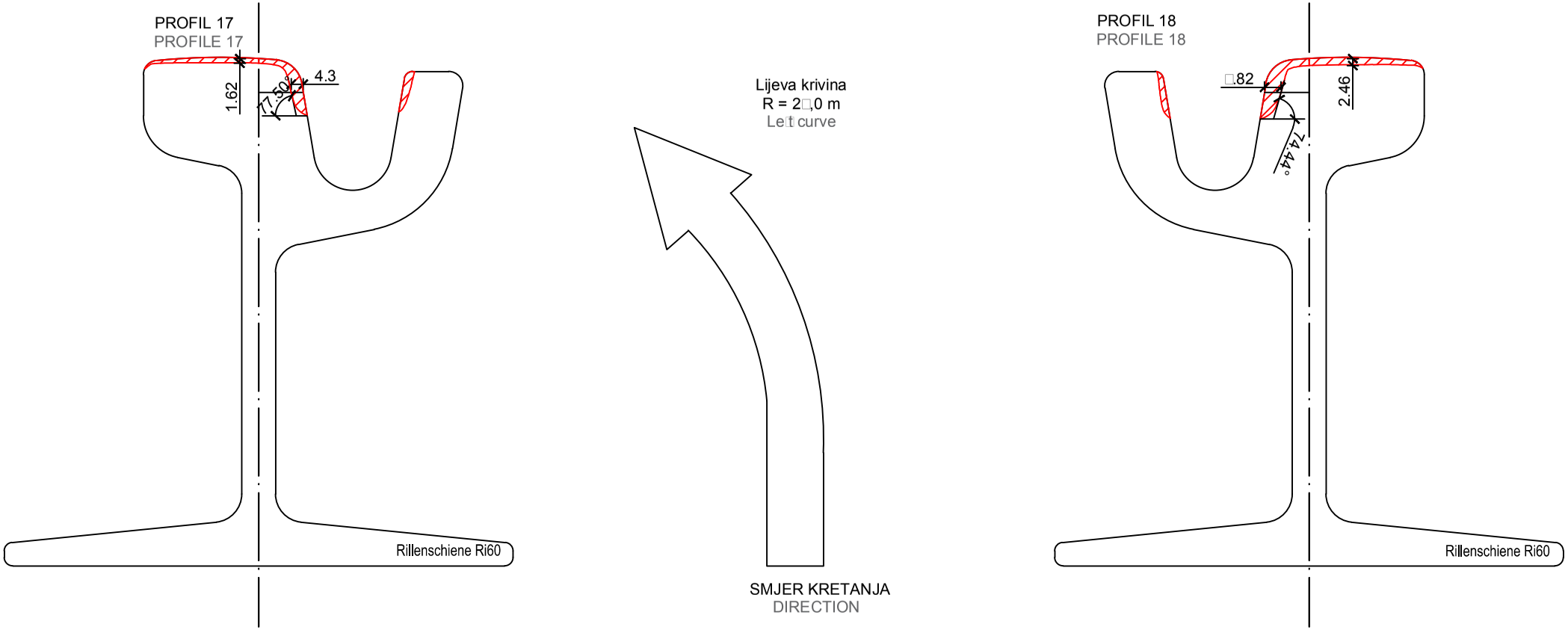
MJ: 1:2

Anex 6.18.1.1. Cross section wear in curves at Location 18

Cross section wear in curve R1

Location 18: Terminus Savišće

Scale: 1:2



Prilog 6.18.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 18

Istrošenje poprečnog presjeka tračnica u krivini R2

Lokacija 18: Okretnica Savišće

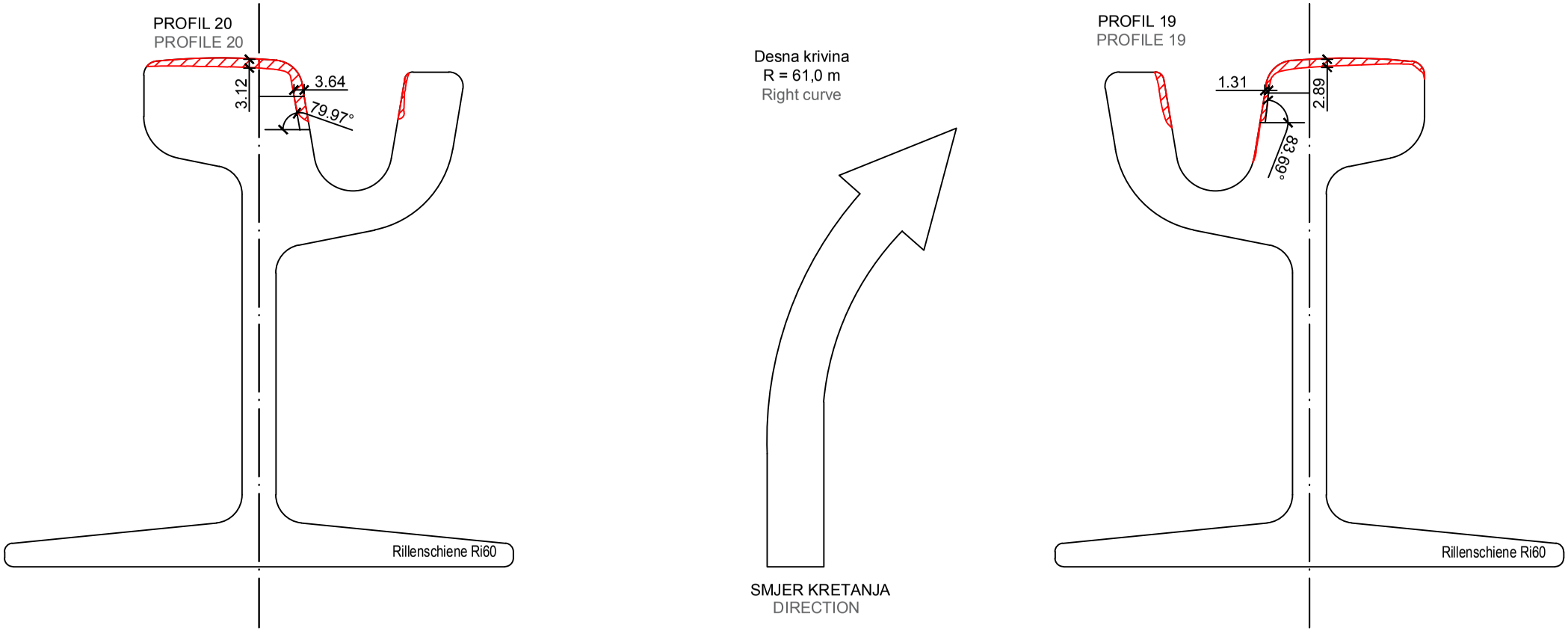
MJ: 1:2

Annex 6.18.1.1. Cross section wear in curves at Location 18

Cross section wear in curve R2

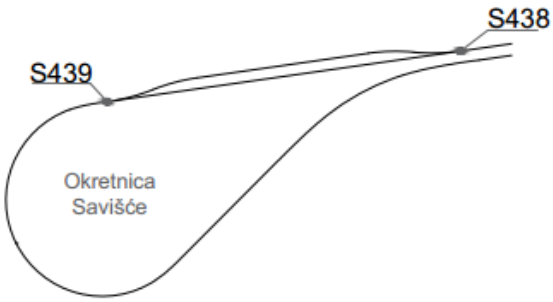
Location 18: Terminus Savišće

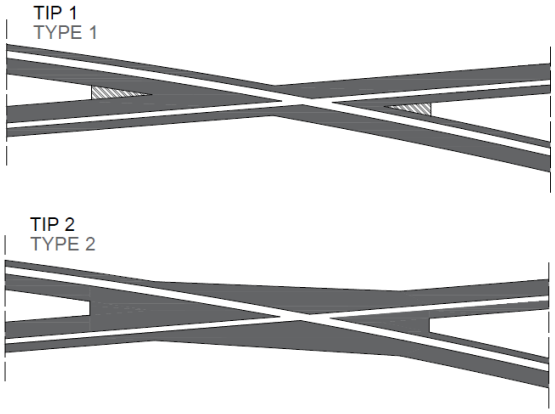
Scale: 1:2



Prilog 6.18.2. **Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 18**
Lokacija 18: Okretnica Savišće

Annex 6.18.2. **Results of cross section wear in turnouts at Location 18**
Location 18: Terminus Savišće





Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
Z-17-01 Z-17-02	S439	2	14L	13	23.07	10.07	24.00	28.04	4.04	11
			14D	13	18.20	5.20	26.54	26.57	0.03	
			15	12	21.35	9.35		49.30		
			16L	13	15.93	2.93	26.54	26.09	-0.45	
			16D	13	21.15	8.15	24.00	24.19	0.19	
Z-17-01 Z-17-02	S438	1	10L	13	17.12	4.12	30.59	34.95	4.36	11
			10D	13	20.25	7.25	24.00	23.00	-1.00	
			11	12	19.89	7.89		33.93		
			12L	13	18.71	5.71	24.00	22.20	-1.80	
			12D	13	14.54	1.54	30.59	33.22	2.63	

Prilog 6.18.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 18

Istrošenje poprečnog presjeka srcišta skretnice S438

Lokacija 18: Okretnica Savišće

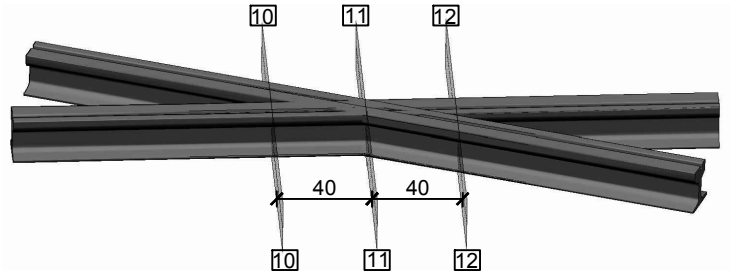
MJ: 1:2

Annex 6.18.2.1. Cross section wear in turnouts at Location 18

Cross section wear in turnout S438

Location 18: Terminus Savišće

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

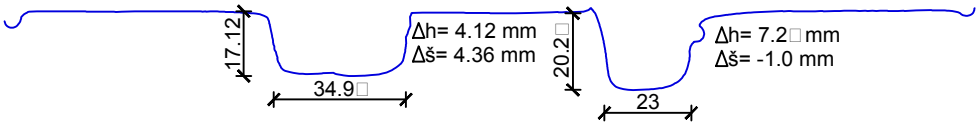
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: Žitnjak ⟶ Savišće

Direction: Žitnjak ⟶ Savišće

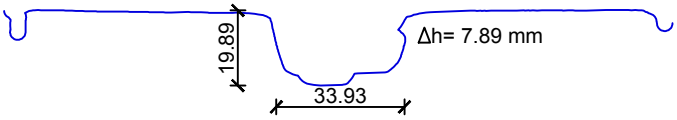
PROFIL 10

PROFILE 10



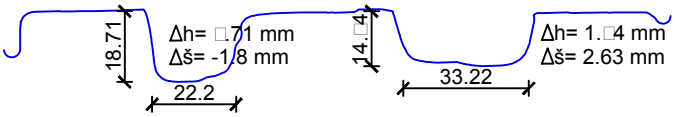
PROFIL 11

PROFILE 11



PROFIL 12

PROFILE 12



Prilog 6.18.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 18

Istrošenje poprečnog presjeka srcišta skretnice S439

Lokacija 18: Okretnica Savišće

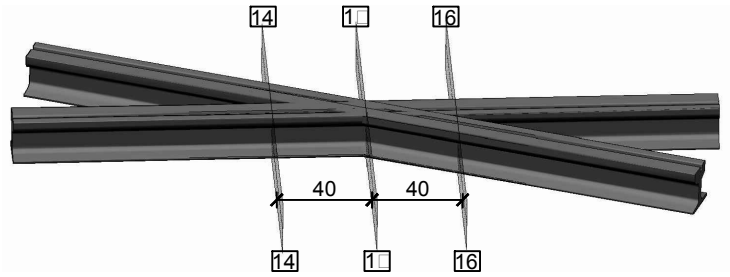
MJ: 1:2

Annex 6.18.2.1. Cross section wear in turnouts at Location 18

Cross section wear in turnout S439

Location 18: Terminus Savišće

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

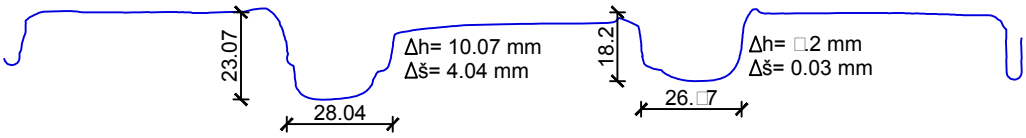
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: Žitnjak ⟶ Savišće

Direction: Žitnjak ⟶ Savišće

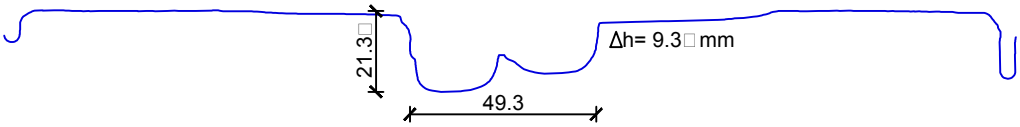
PROFIL 14

PROFILE 14



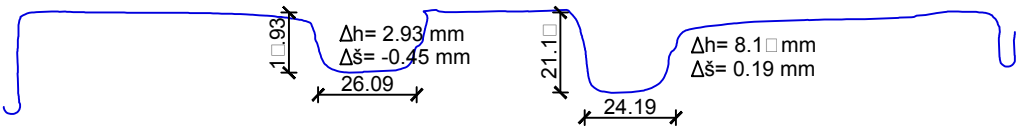
PROFIL 1□

PROFILE 1□



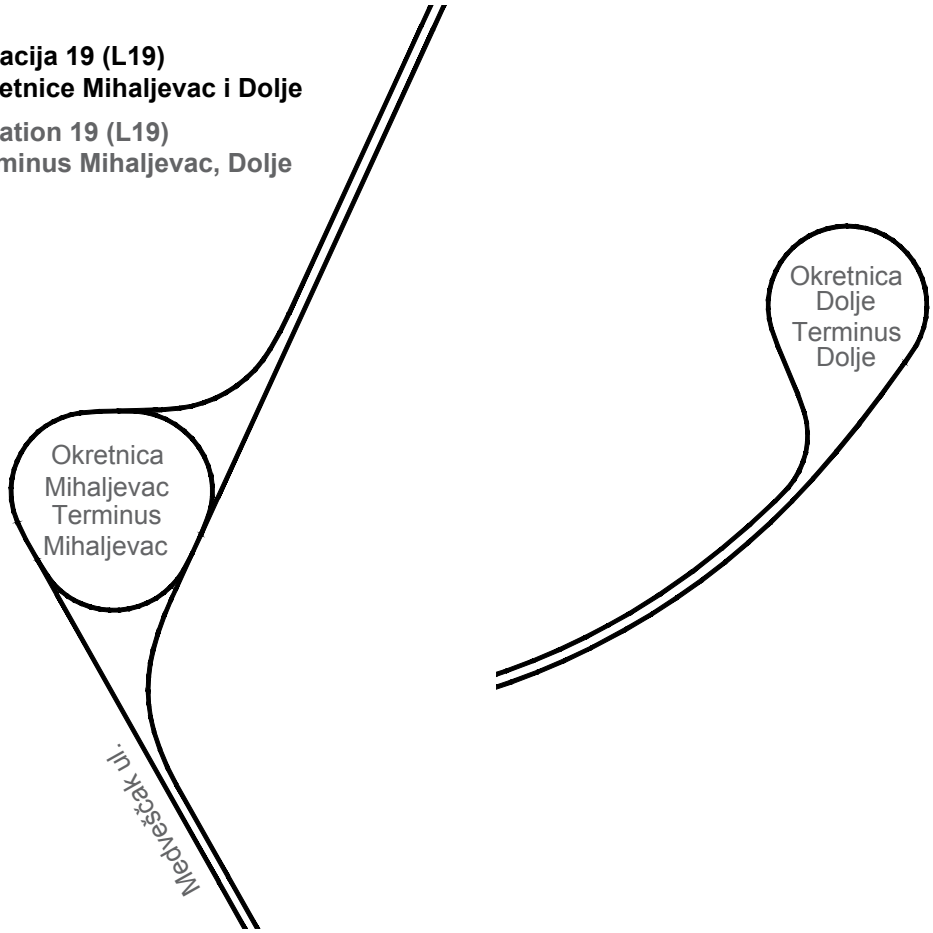
PROFIL 16

PROFILE 16



Lokacija 19 (L19)
Okretnice Mihaljevac i Dolje

Location 19 (L19)
Terminus Mihaljevac, Dolje



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija ra□voja tramvajskog prometa □rada □agre□a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition

SADRŽAJ PRILOGA:
ANNEX:

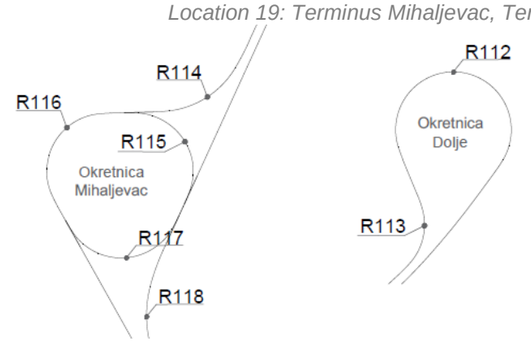
Istrošenje poprečnih presjeka tračnica u krivinama i skretnicama na Lokaciji 19

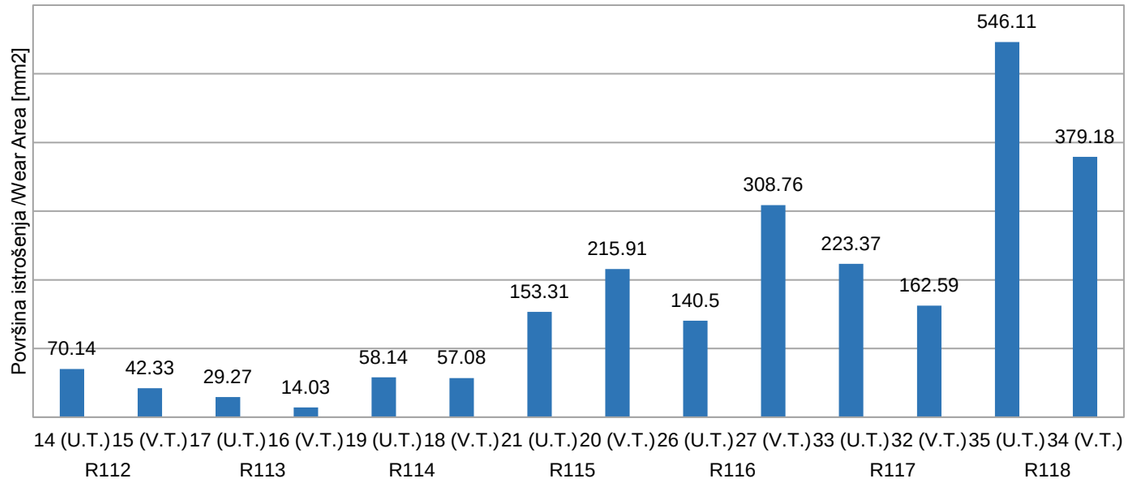
Rail cross section wear in curves and turnouts at Location 19

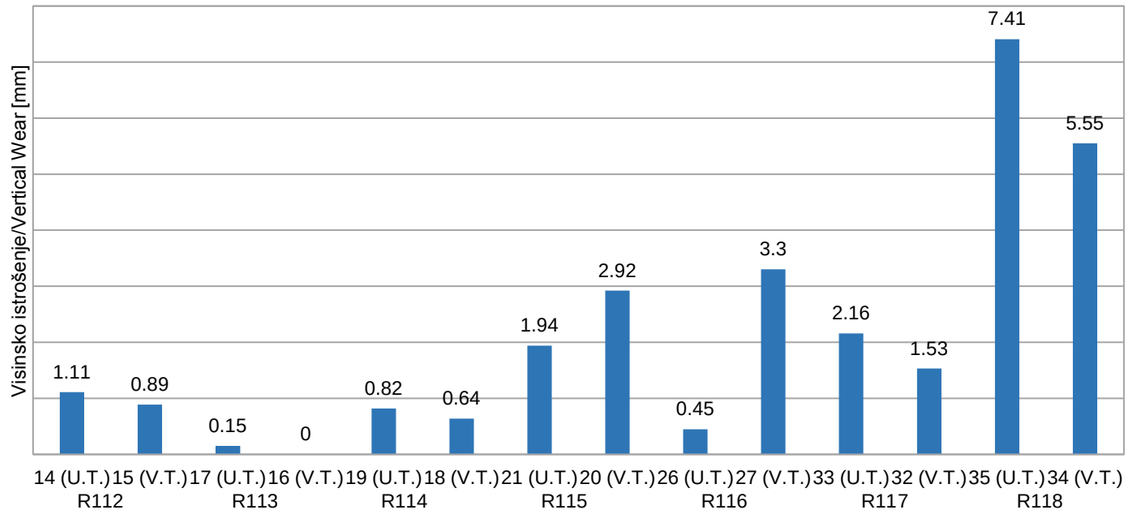
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.19

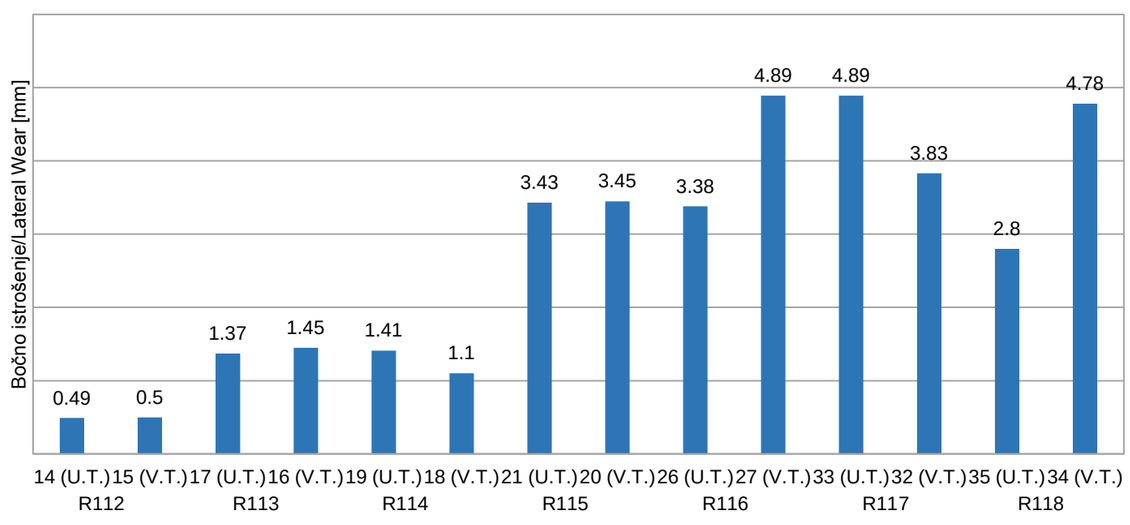
Prilog 6.19.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 19**
Lokacija 19: Okretnice Mihaljevac, Dolje

Annex 6.19.1. **Results of cross section wear in curves at Location 19**
Location 19: Terminus Mihaljevac, Terminus Dolje









U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve

Dionica Section	**Oznaka krivine** Curve mark	**Krivina** Curve	**Profil** Profile	**Tračnica** Rail	**Istrošenje** / Rail Wear				**Radijus** Radius **R [m]**	**Period eksploatacije** Exploitation Period **[god]**
					Površina Area **P [mm2]**	**Visinsko** Vertical **h [mm]**	**Bočno** Lateral **a [mm]**	**Nagib** Slope **α [']**		
Z-07-01	R112	lijeva left	14	lijeva/left	70.14	1.11	0.49	80.28	21	1
			15	desna/right	42.33	0.89	0.5	81.15		
Z-07-01	R113	desna	16	lijeva/left	14.03	0	1.45	75.82	21	1
			17	desna/right	29.27	0.15	1.37	78.4		
D-35-01	R114	lijeva left	19	lijeva/left	58.14	0.82	1.41	73.39	32	1
			18	desna/right	57.08	0.64	1.1	76.5		
Z-08-03	R115	lijeva left	21	lijeva/left	153.31	1.94	3.43	78.04	22	14
			20	desna/right	215.91	2.92	3.45	71.61		
Z-08-01	R116	lijeva left	26	lijeva/left	140.5	0.45	3.38	77.42	21	14
			27	desna/right	308.76	3.3	4.89	72.1		
Z-08-02	R117	lijeva left	33	lijeva/left	223.37	2.16	4.89	75.93	21.5	14
			32	desna/right	162.59	1.53	3.83	72.58		
D-36-20	R118	desna right	34	lijeva/left	379.18	5.55	4.78	79.19	44	14
			35	desna/right	546.11	7.41	2.8	77.87		

Dionica Section	**Oznaka krivine** Curve mark	**Krivina** Curve	**Profil** Profile	**Tračnica** Rail	**Istrošenje** / Rail Wear		
					Površina Area **P [mm2]**	**Visinsko** Vertical **h [mm]**	**Bočno** Lateral **a [mm]**
Z-07-01	R112	lijeva left	14	lijeva/left	70.14	1.11	0.49
			15	desna/right	42.33	0.89	0.5
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-27.81	-0.22	0.01
Z-07-01	R113	desna right	16	lijeva/left	14.03	0	1.45
			17	desna/right	29.27	0.15	1.37
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-15.24	-0.15	0.08
D-35-01	R114	lijeva left	19	lijeva/left	58.14	0.82	1.41
			18	desna/right	57.08	0.64	1.1
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-1.06	-0.18	-0.31
Z-08-03	R115	lijeva left	21	lijeva/left	153.31	1.94	3.43
			20	desna/right	215.91	2.92	3.45
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					62.6	0.98	0.02
Z-08-01	R116	lijeva left	26	lijeva/left	140.5	0.45	3.38
			27	desna/right	308.76	3.3	4.89
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					168.26	2.85	1.51
Z-08-02	R117	lijeva left	33	lijeva/left	223.37	2.16	4.89
			32	desna/right	162.59	1.53	3.83
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-60.78	-0.63	-1.06
D-36-20	R118	desna right	34	lijeva/left	379.18	5.55	4.78
			35	desna/right	546.11	7.41	2.8
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-166.93	-1.86	1.98

Prilog 6.19.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 19

Istrošenje poprečnog presjeka tračnica u krivini R112

Lokacija 19: Okretnica Dolje

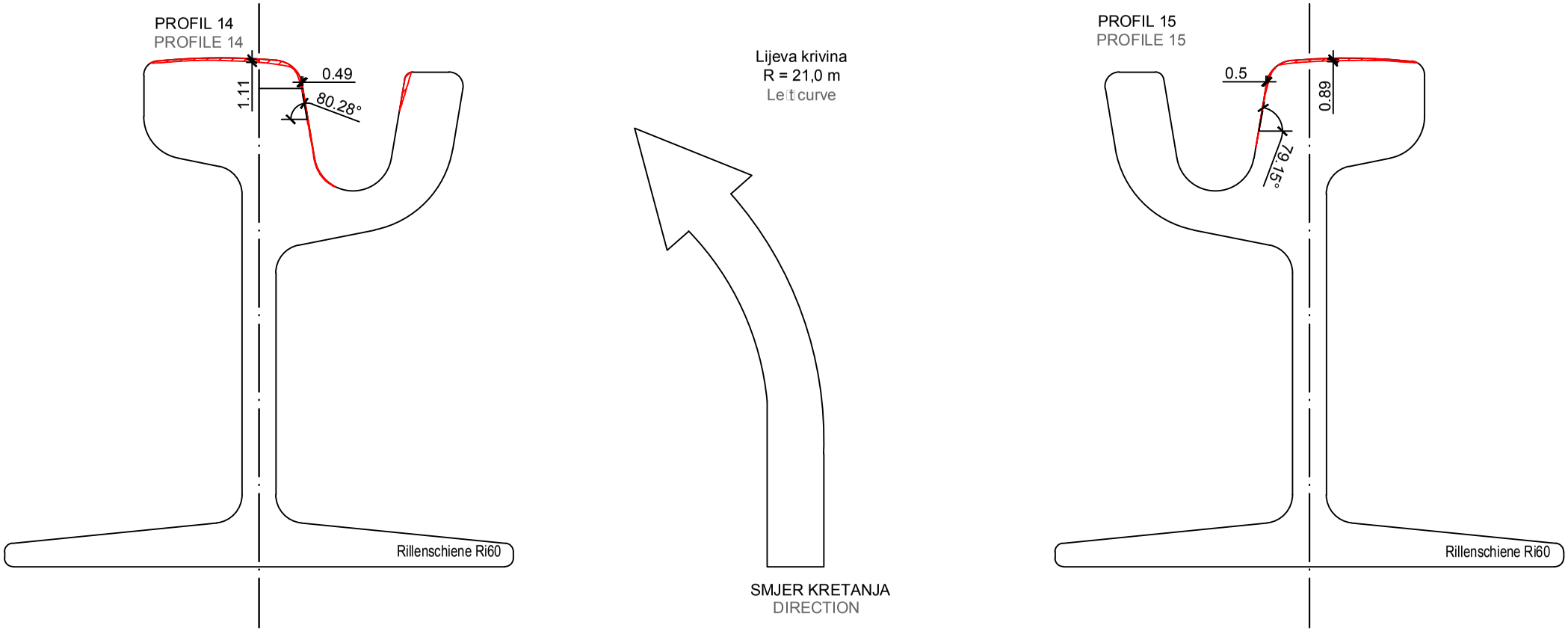
MJ: 1:2

Annex 6.19.1.1. Cross section wear in curves at Location 19

Cross section wear in curve R112

Location 19: Terminus Dolje

Scale: 1:2



Prilog 6.19.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 19

Istrošenje poprečnog presjeka tračnica u krivini R113

Lokacija 19: Okretnica Dolje

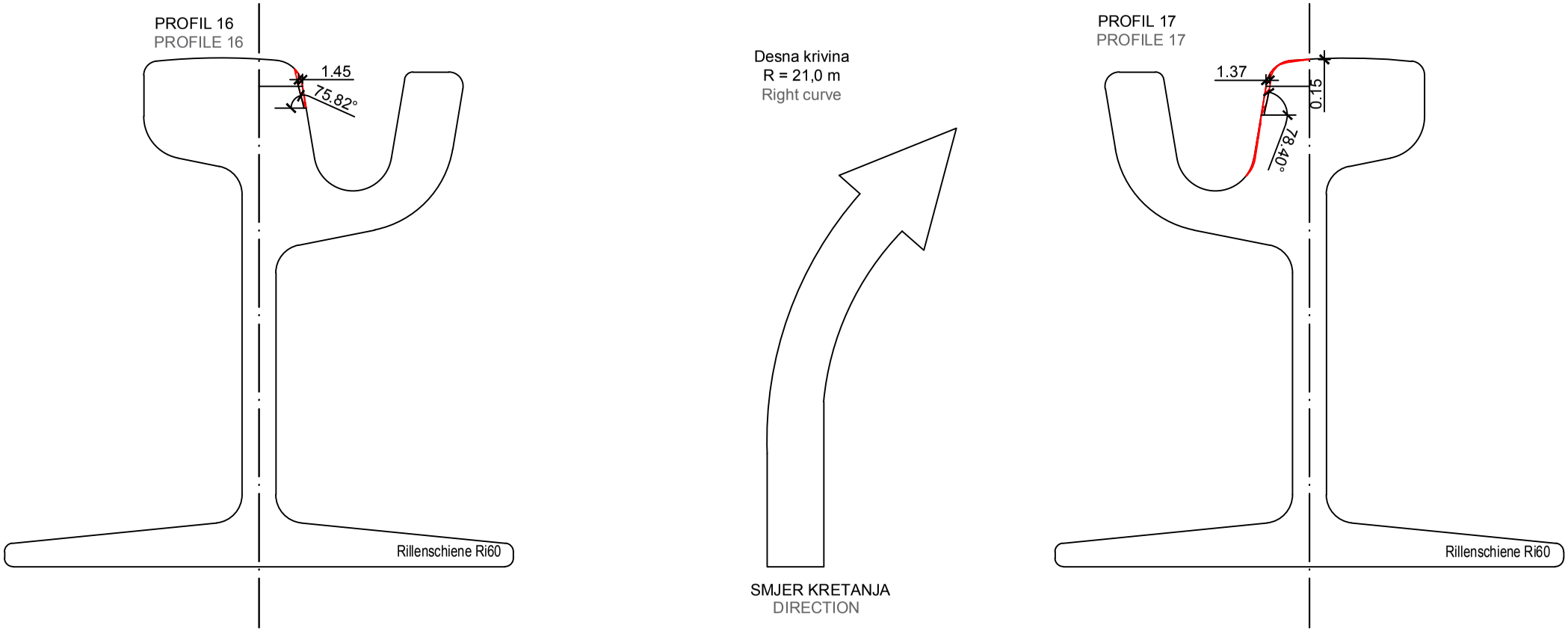
MJ: 1:2

Annex 6.19.1.1. Cross section wear in curves at Location 19

Cross section wear in curve R113

Location 19: Terminus Dolje

Scale: 1:2



Prilog 6.19.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 19

Istrošenje poprečnog presjeka tračnica u krivini R114

Lokacija 19: Okretnica Mihaljevac

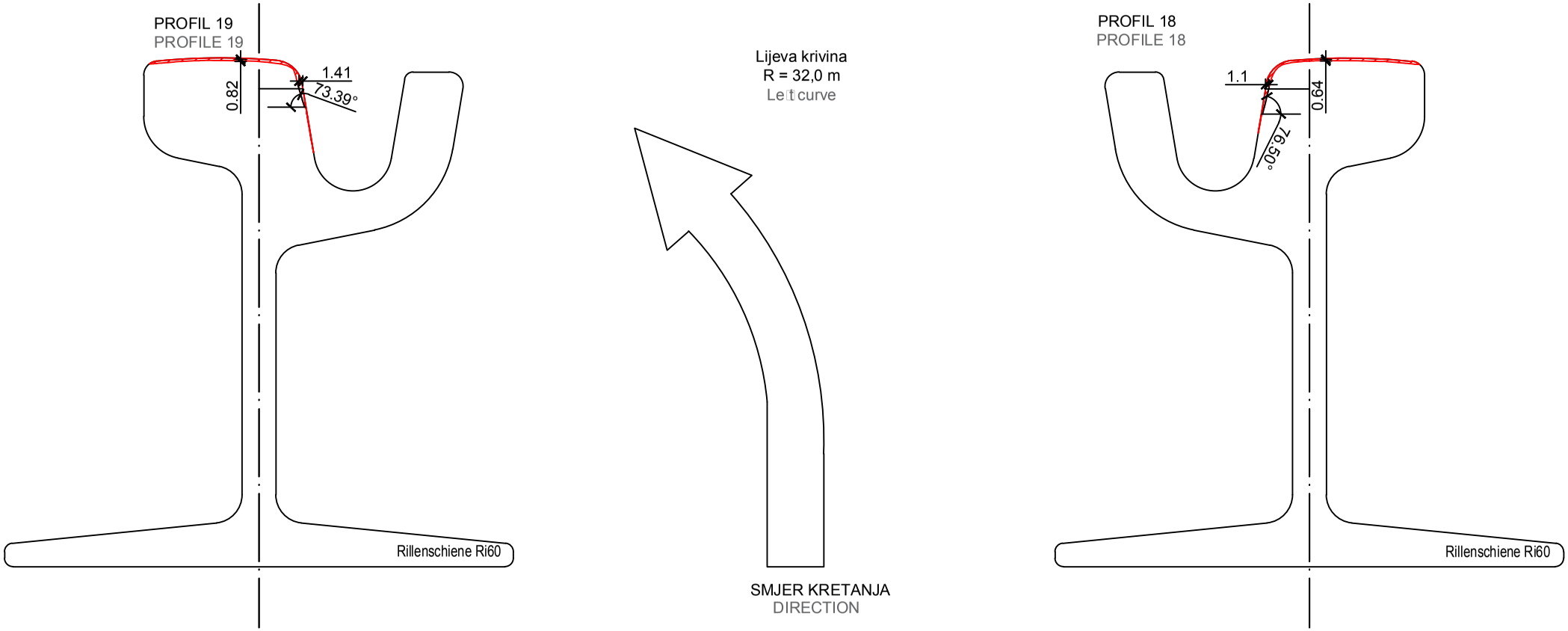
MJ: 1:2

Annex 6.19.1.1. Cross section wear in curves at Location 19

Cross section wear in curve R114

Location 19: Terminus Mihaljevac

Scale: 1:2



Prilog 6.19.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 19

Istrošenje poprečnog presjeka tračnica u krivini R115

Lokacija 19: Okretnica Mihaljevac

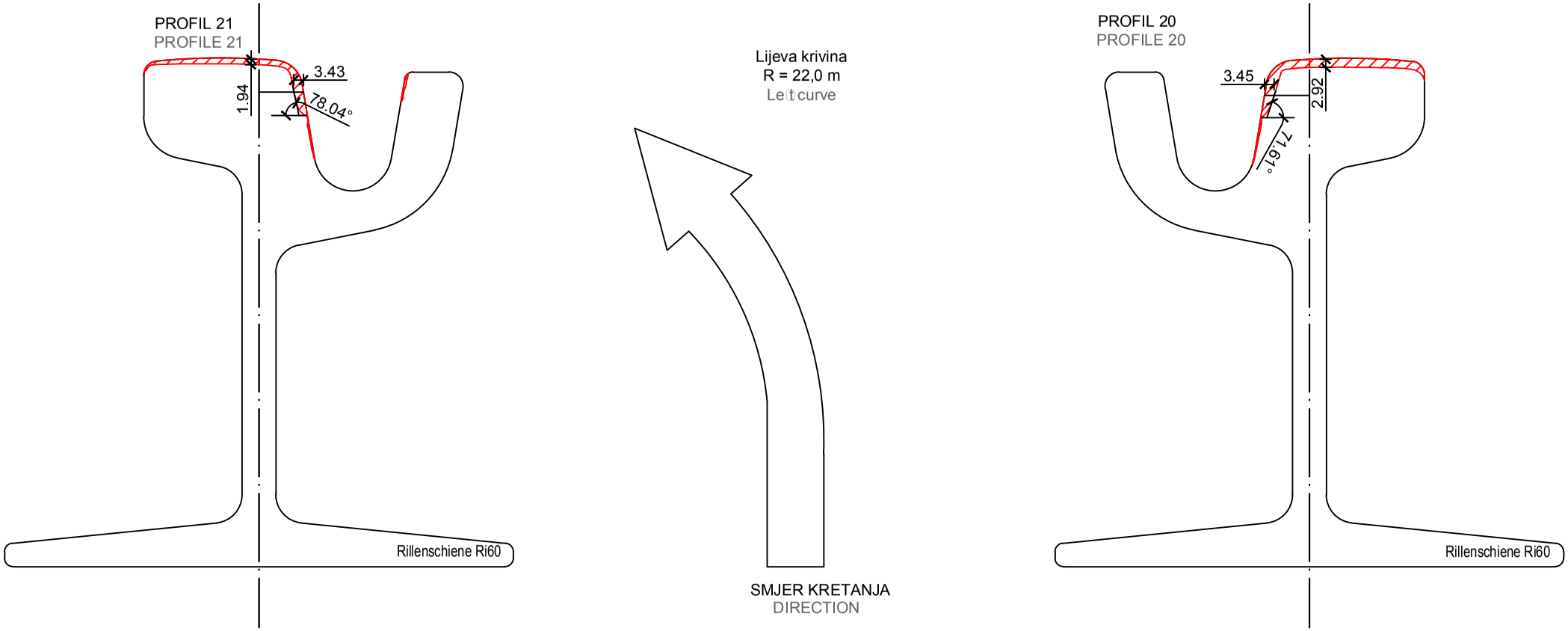
MJ: 1:2

Annex 6.19.1.1. Cross section wear in curves at Location 19

Cross section wear in curve R115

Location 19: Terminus Mihaljevac

Scale: 1:2



Prilog 6.19.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 19

Istrošenje poprečnog presjeka tračnica u krivini R116

Lokacija 19: Okretnica Mihaljevac

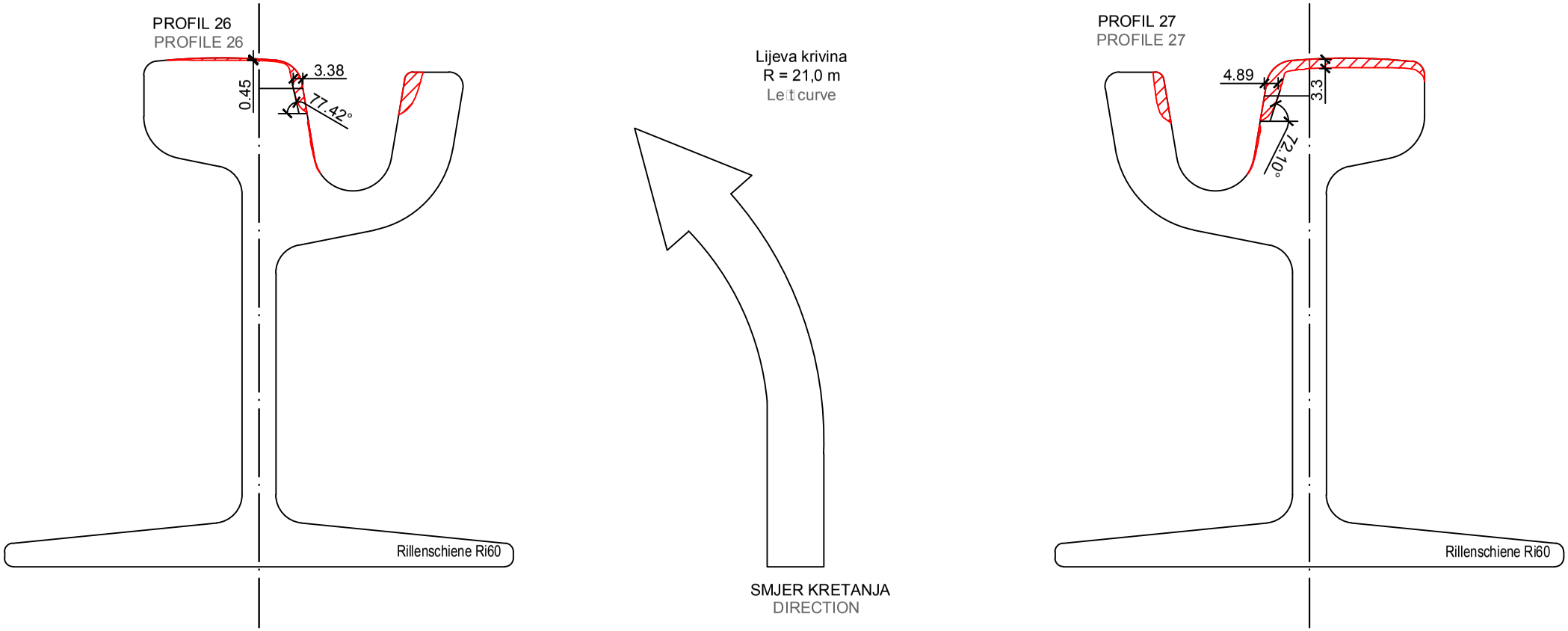
MJ: 1:2

Annex 6.19.1.1. Cross section wear in curves at Location 19

Cross section wear in curve R116

Location 19: Terminus Mihaljevac

Scale: 1:2



Prilog 6.19.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 19

Istrošenje poprečnog presjeka tračnica u krivini R117

Lokacija 19: Okretnica Mihaljevac

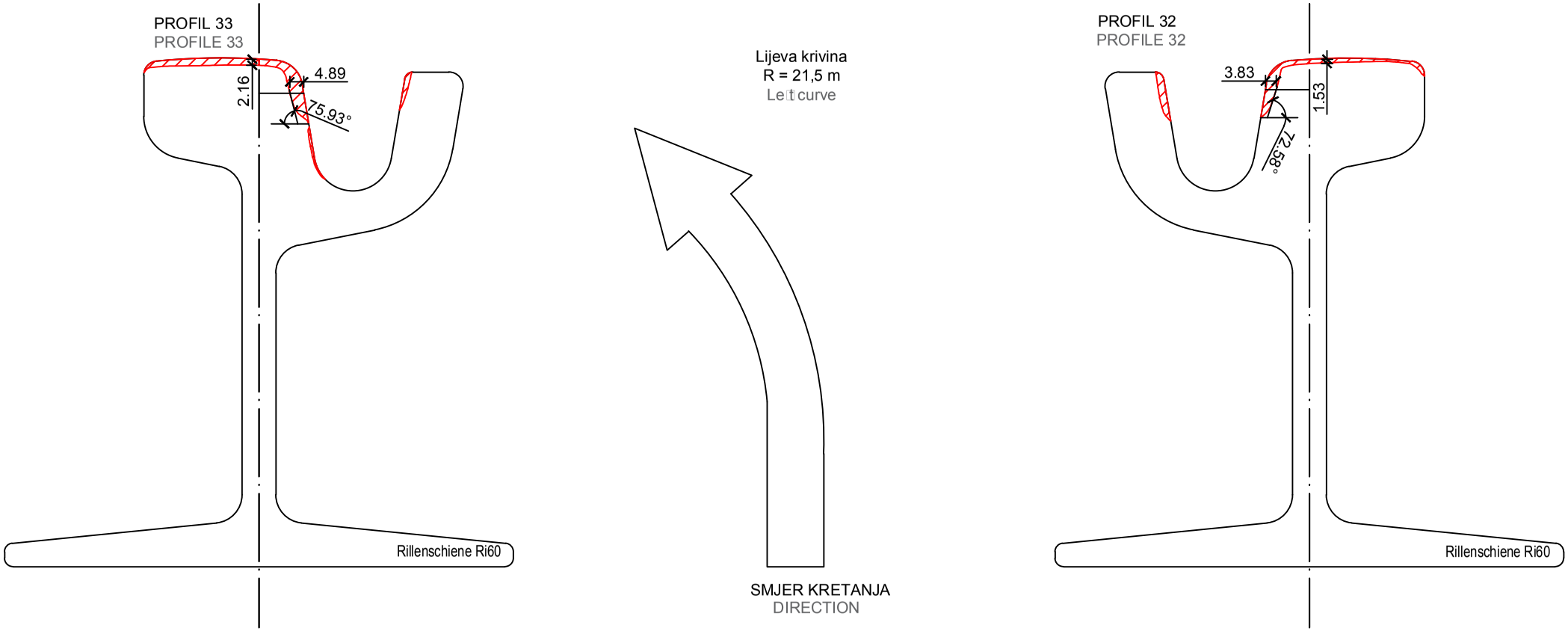
MJ: 1:2

Annex 6.19.1.1. Cross section wear in curves at Location 19

Cross section wear in curve R117

Location 19: Terminus Mihaljevac

Scale: 1:2



Prilog 6.19.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 19

Istrošenje poprečnog presjeka tračnica u krivini R118

Lokacija 19: Okretnica Mihaljevac

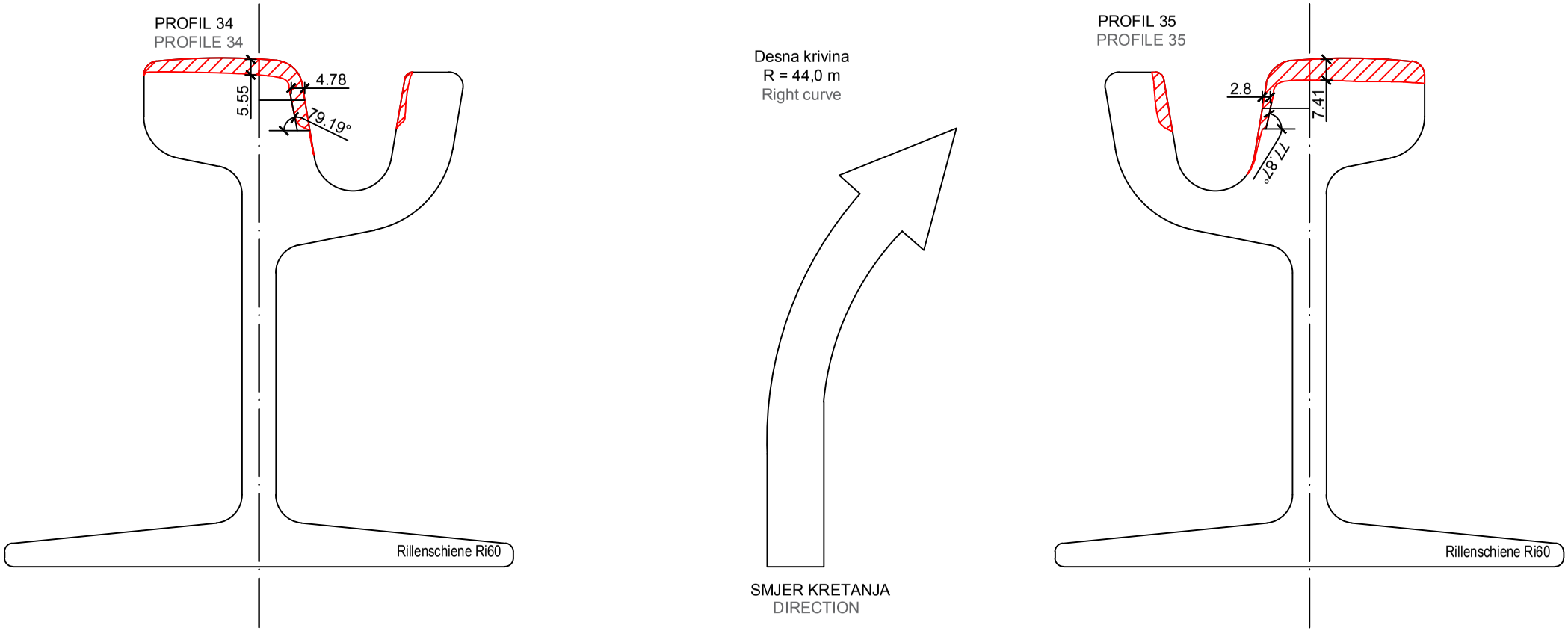
MJ: 1:2

Annex 6.19.1.1. Cross section wear in curves at Location 19

Cross section wear in curve R118

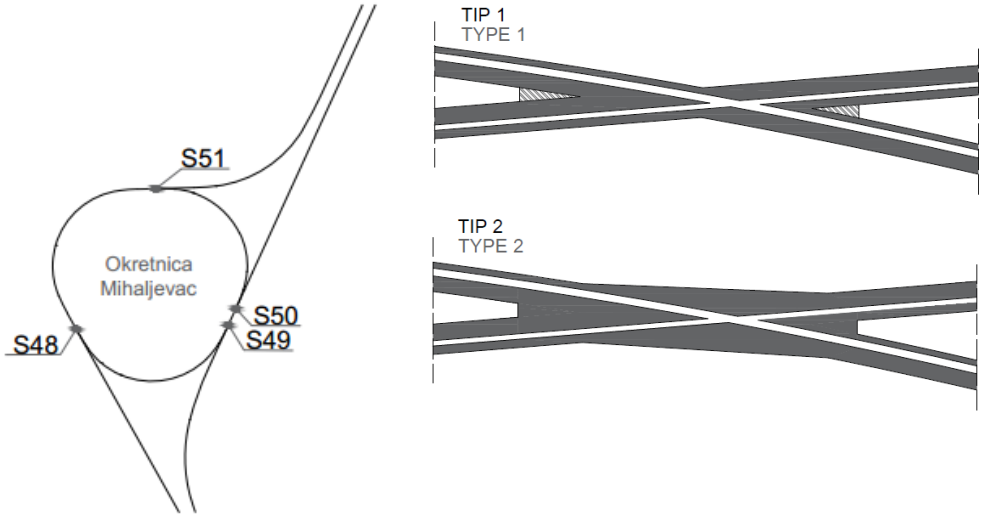
Location 19: Terminus Mihaljevac

Scale: 1:2



Prilog 6.19.2. **Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 19**
Lokacija 19: Okretnica Mihaljevac

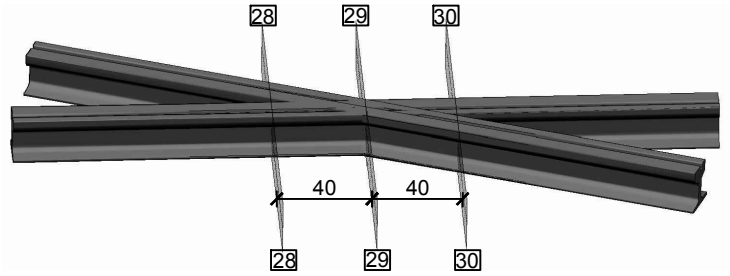
Annex 6.19.2. **Results of cross section wear in turnouts at Location 19**
Location 19: Terminus Mihaljevac



Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
Z-08-04 Z-08-03	S51	2	22L	13	16.30	3.30	34.00	36.91	2.91	14
			22D	13	13.90	0.90	24.94	27.91	2.97	
			23	12	15.61	3.61		38.44		
			24L	13	14.76	1.76	24.95	27.24	2.29	
			24D	13	16.20	3.20	34.00	37.70	3.70	
Z-08-05 Z-08-02	S48	2	28L	13	19.83	6.83	25.03	26.10	1.07	14
			28D	13	15.41	2.41	34.00	39.43	5.43	
			29	12	19.74	7.74		44.44		
			30L	13	14.05	1.05	34.00	39.58	5.58	
			30D	13	19.38	6.38	25.03	22.79	-2.24	
Z-08-02 Z-08-06	S49	2	36L	13	14.48	1.48	34.00	41.83	7.83	14
			36D	13	19.70	6.70	25.05	25.86	0.81	
			37	12	20.47	8.47		50.54		
			38L	13	19.99	6.99	25.05	25.82	0.77	
			38D	13	14.12	1.12	34.00	41.59	7.59	
Z-08-03 Z-08-08	S50	2	39L	13	14.89	1.89	24.94	27.58	2.64	14
			39D	13	17.88	4.88	34.00	38.02	4.02	
			40	12	17.42	5.42		38.66		
			41L	13	17.18	4.18	34.00	36.72	2.72	
			41D	13	13.27	0.27	24.94	26.99	2.05	

Prilog 6.19.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 19
Istrošenje poprečnog presjeka srcišta skretnice S48
Lokacija 19: Okretnica Mihaljevac
MJ: 1:2

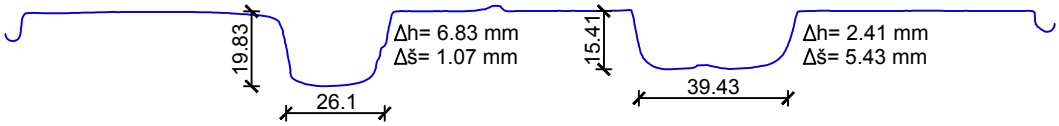
Annex 6.19.2.1. Cross section wear in turnouts at Location 19
Cross section wear in turnout S48
Location 19: Terminus Mihaljevac
Scale: 1:2



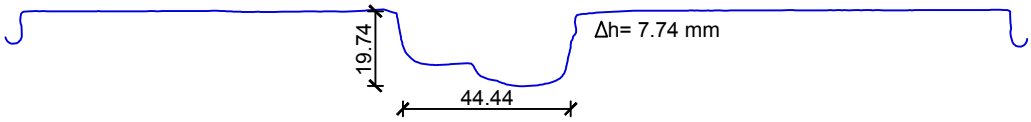
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu
Direction: through terminus

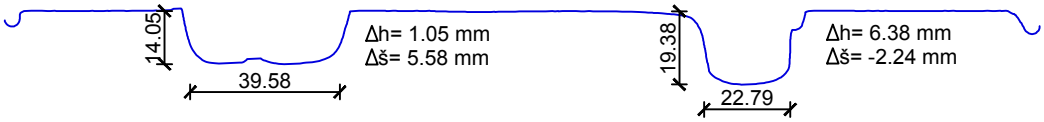
PROFIL 28
PROFILE 28



PROFIL 29
PROFILE 29

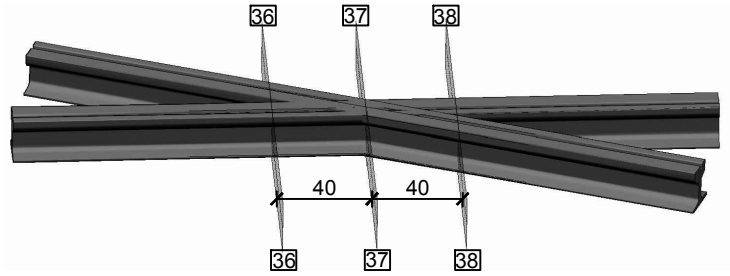


PROFIL 30
PROFILE 30



Prilog 6.19.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 19
Istrošenje poprečnog presjeka srcišta skretnice S49
Lokacija 19: Okretnica Mihaljevac
MJ: 1:2

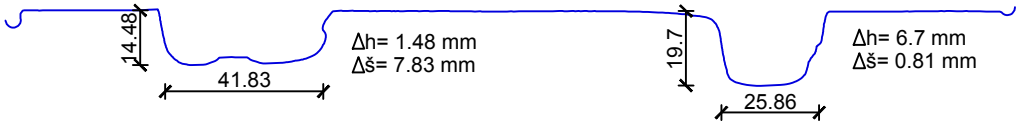
Annex 6.19.2.1. Cross section wear in turnouts at Location 19
Cross section wear in turnout S49
Location 19: Terminus Mihaljevac
Scale: 1:2



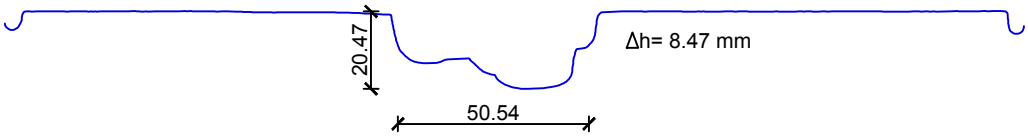
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu
Direction: through terminus

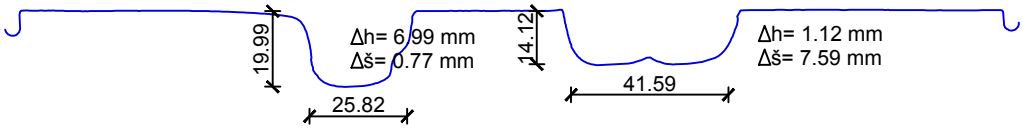
PROFIL 36
PROFILE 36



PROFIL 37
PROFILE 37

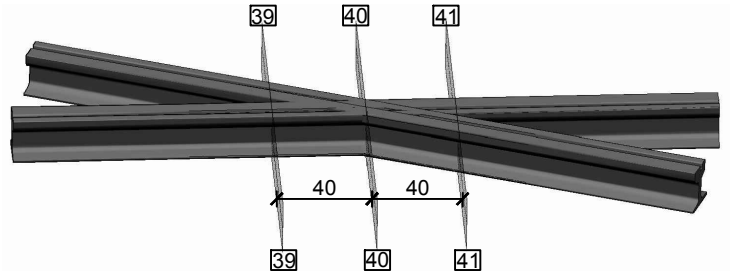


PROFIL 38
PROFILE 38



Prilog 6.19.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 19
Istrošenje poprečnog presjeka srcišta skretnice S50
Lokacija 19: Okretnica Mihaljevac
MJ: 1:2

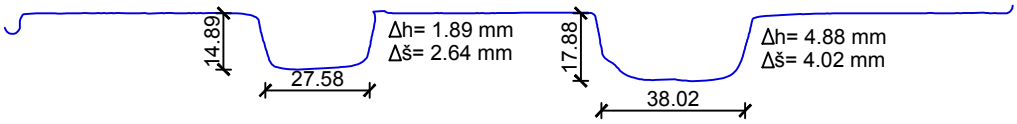
Annex 6.19.2.1. Cross section wear in turnouts at Location 19
Cross section wear in turnout S50
Location 19: Terminus Mihaljevac
Scale: 1:2



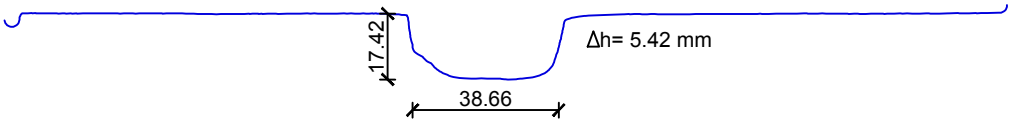
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu
Direction: through terminus

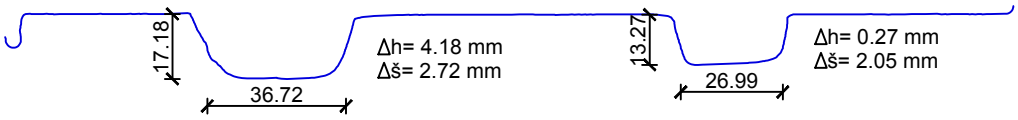
PROFIL 39
PROFILE 39



PROFIL 40
PROFILE 40

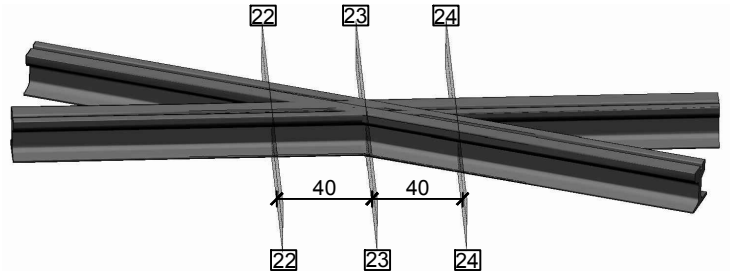


PROFIL 41
PROFILE 41



Prilog 6.19.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 19
Istrošenje poprečnog presjeka srcišta skretnice S51
Lokacija 19: Okretnica Mihaljevac
MJ: 1:2

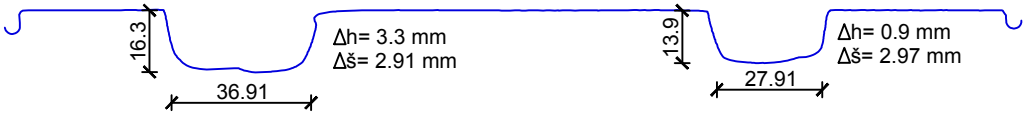
Annex 6.19.2.1. Cross section wear in turnouts at Location 19
Cross section wear in turnout S51
Location 19: Terminus Mihaljevac
Scale: 1:2



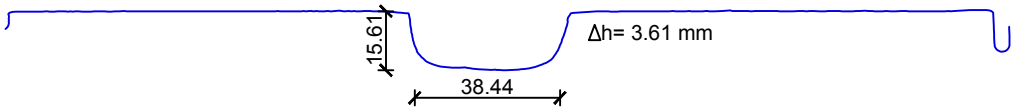
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu
Direction: through terminus

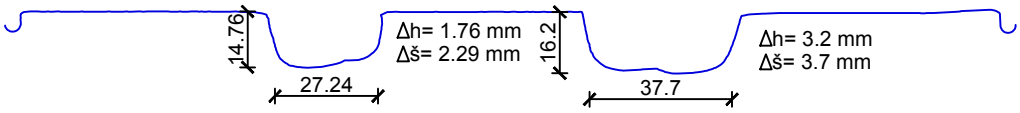
PROFIL 22
PROFILE 22



PROFIL 23
PROFILE 23

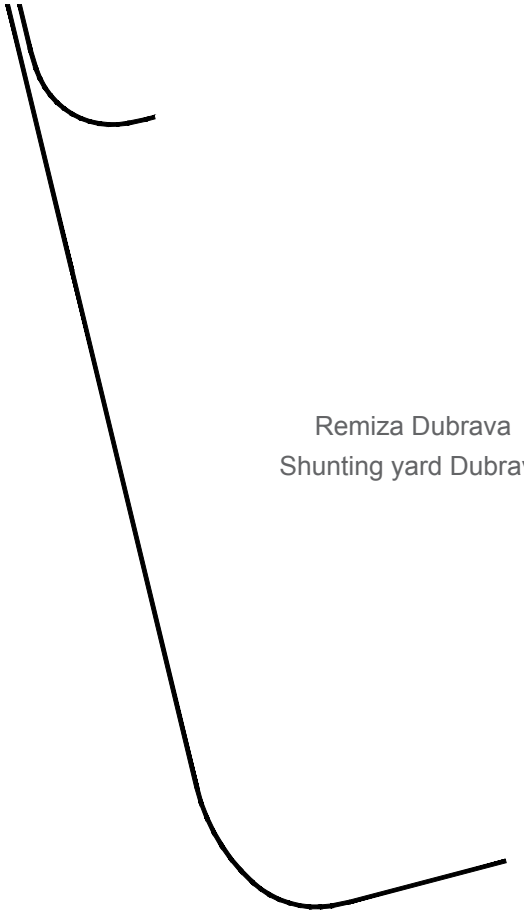


PROFIL 24
PROFILE 24



Lokacija 20 (L20)
Remiza Dubrava (ulaz i izlaz u Remizu)

Location 19 (L19)
Shunting yard Dubrava



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija razvoja tramvajskog prometa □rada □agreba Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition

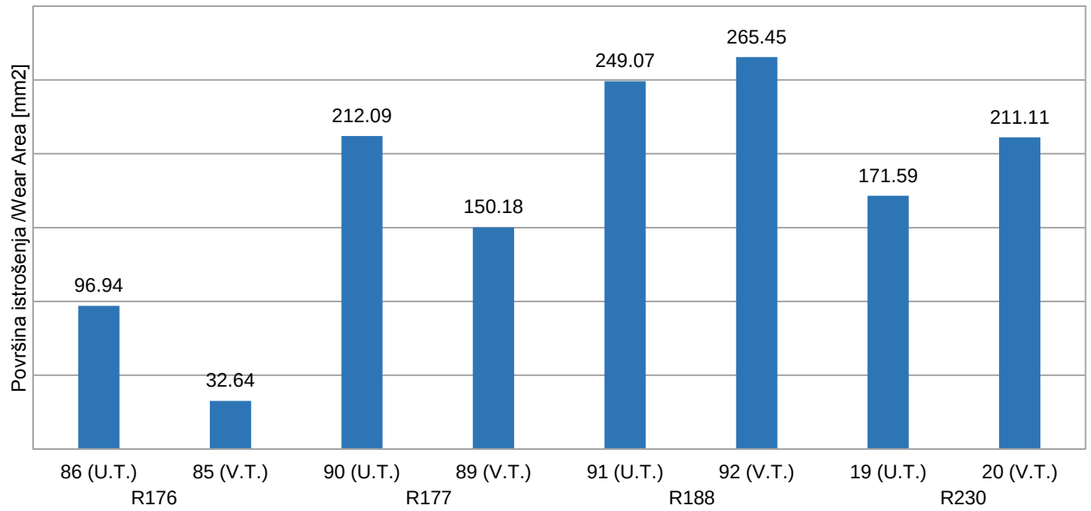
SADRŽAJ PRILOGA:
ANNEX:

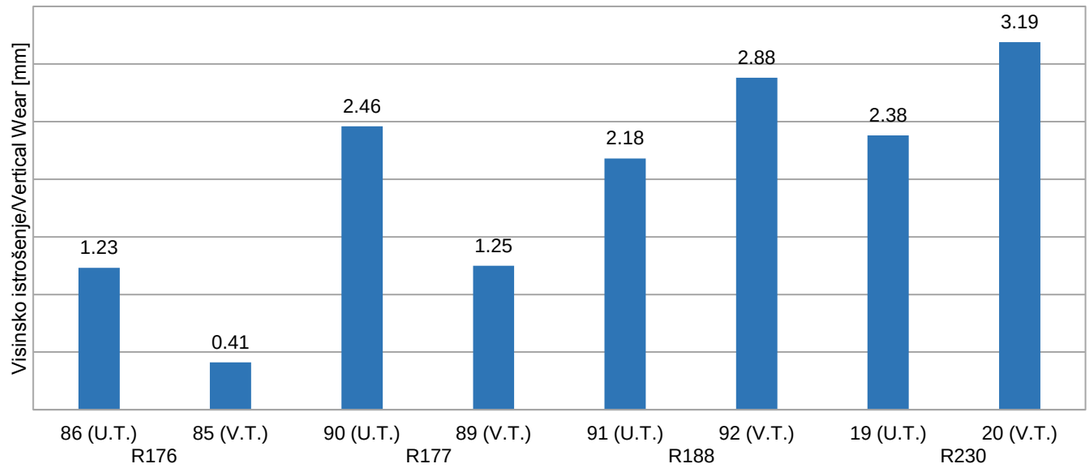
Istrošenje poprečnih presjeka tračnica u krivinama, skretnicama i križalištima na Lokaciji 20

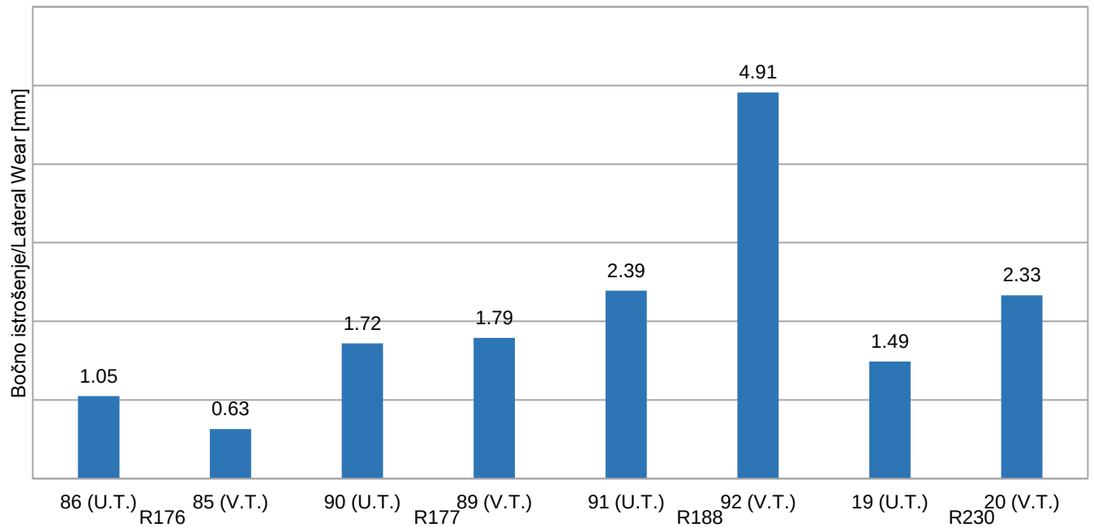
Rail cross section wear in curves, turnouts and crossings at Location 20

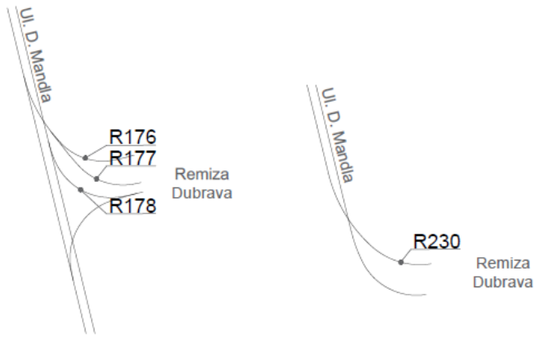
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.20

Prilog 6.20.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 20**
Lokacija 20: Remiza Dubrava
Annex 6.20.1. **Results of cross section wear in curves at Location 20**
Location 20: Shunting yard Dubrava









Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [˙]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
-	R176	lijeva left	86	lijeva/left	96.94	1.23	1.05	72.21	20	38
			85	desna/right	32.64	0.41	0.63	75.07		
-	R177	lijeva left	90	lijeva/left	212.09	2.46	1.72	75.81	21	38
			89	desna/right	150.18	1.25	1.79	79.46		
D-24-08	R178	desna right	92	lijeva/left	265.45	2.88	4.91	74.27	20.7	38
			91	desna/right	249.07	2.18	2.39	78		
D-24-10	R230	lijeva left	19	lijeva/left	171.59	2.38	1.49	77.16	25	38
			20	desna/right	211.11	3.19	2.33	73.29		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
-	R176	lijeva left	86	lijeva/left	96.94	1.23	1.05
			85	desna/right	32.64	0.41	0.63
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-64.3	-0.82	-0.42
-	R177	lijeva left	90	lijeva/left	212.09	2.46	1.72
			89	desna/right	150.18	1.25	1.79
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-61.91	-1.21	0.07
D-24-08	R178	desna right	92	lijeva/left	265.45	2.88	4.91
			91	desna/right	249.07	2.18	2.39
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					16.38	0.7	2.52
D-24-10	R230	lijeva left	19	lijeva/left	171.59	2.38	1.49
			20	desna/right	211.11	3.19	2.33
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					39.52	0.81	0.84

U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve

Prilog 6.20.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 20

Istrošenje poprečnog presjeka tračnica u krivini R176

Lokacija 20: Remiza Dubrava (ulaz i izlaz u Remizu)

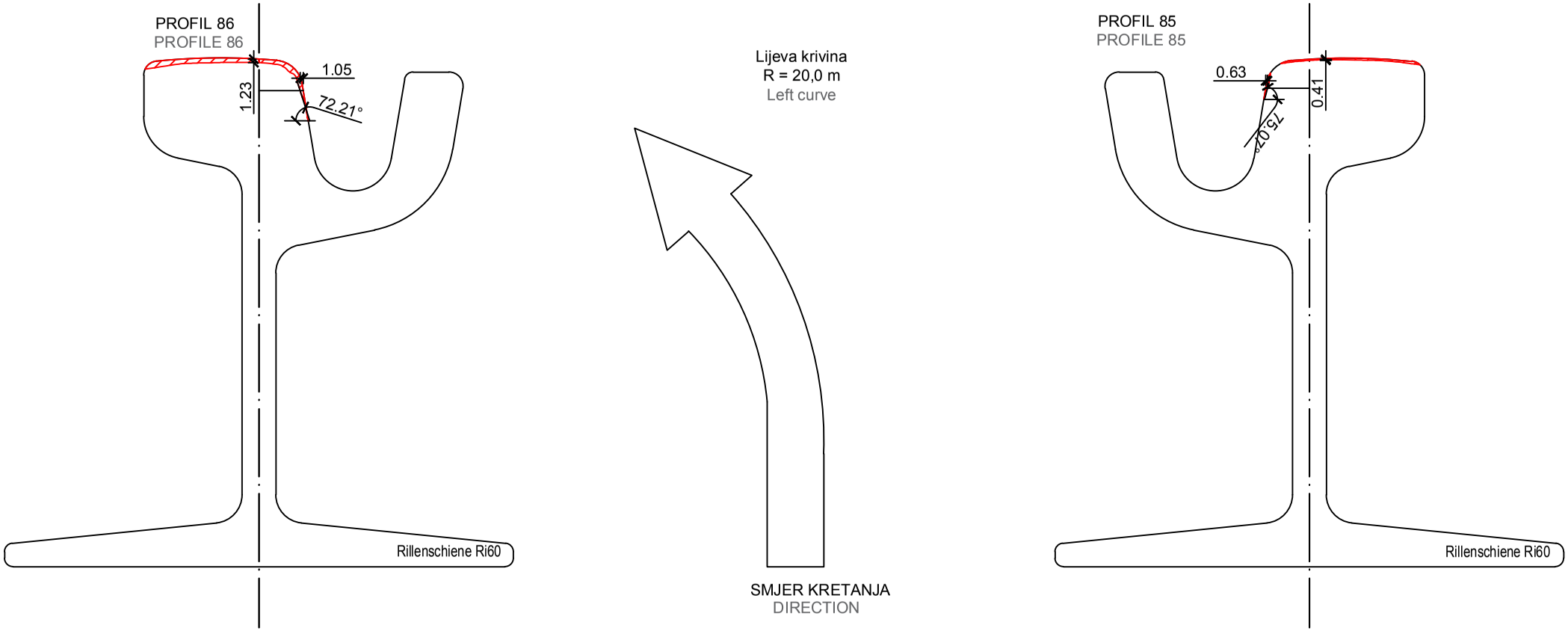
MJ: 1:2

Annex 6.20.1.1. Cross section wear in curves at Location 20

Cross section wear in curve R176

Location 20: Shunting yard Dubrava

Scale: 1:2



Prilog 6.20.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 20

Istrošenje poprečnog presjeka tračnica u krivini R177

Lokacija 20: Remiza Dubrava (ulaz i izlaz u Remizu)

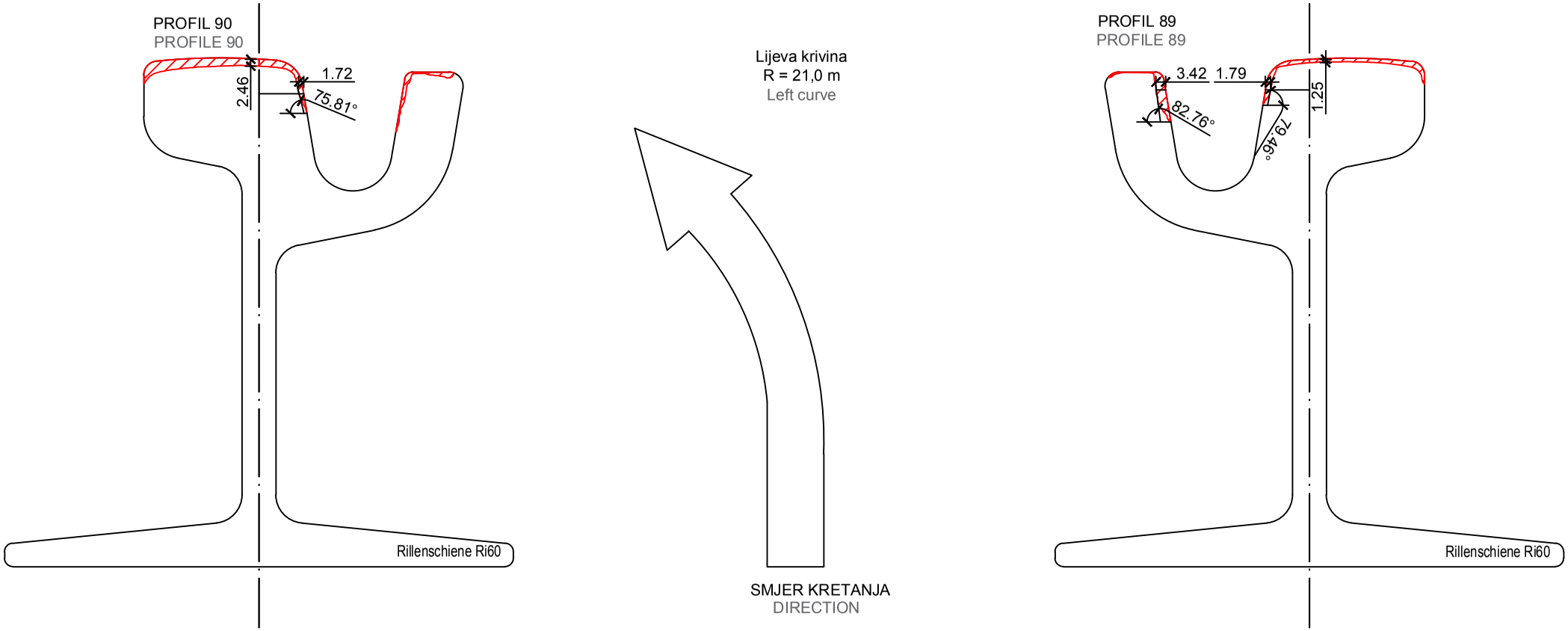
MJ: 1:2

Annex 6.20.1.1. Cross section wear in curves at Location 20

Cross section wear in curve R177

Location 20: Shunting yard Dubrava

Scale: 1:2



Prilog 6.20.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 20

Istrošenje poprečnog presjeka tračnica u krivini R178

Lokacija 20: Remiza Dubrava (ulaz i izlaz u Remizu)

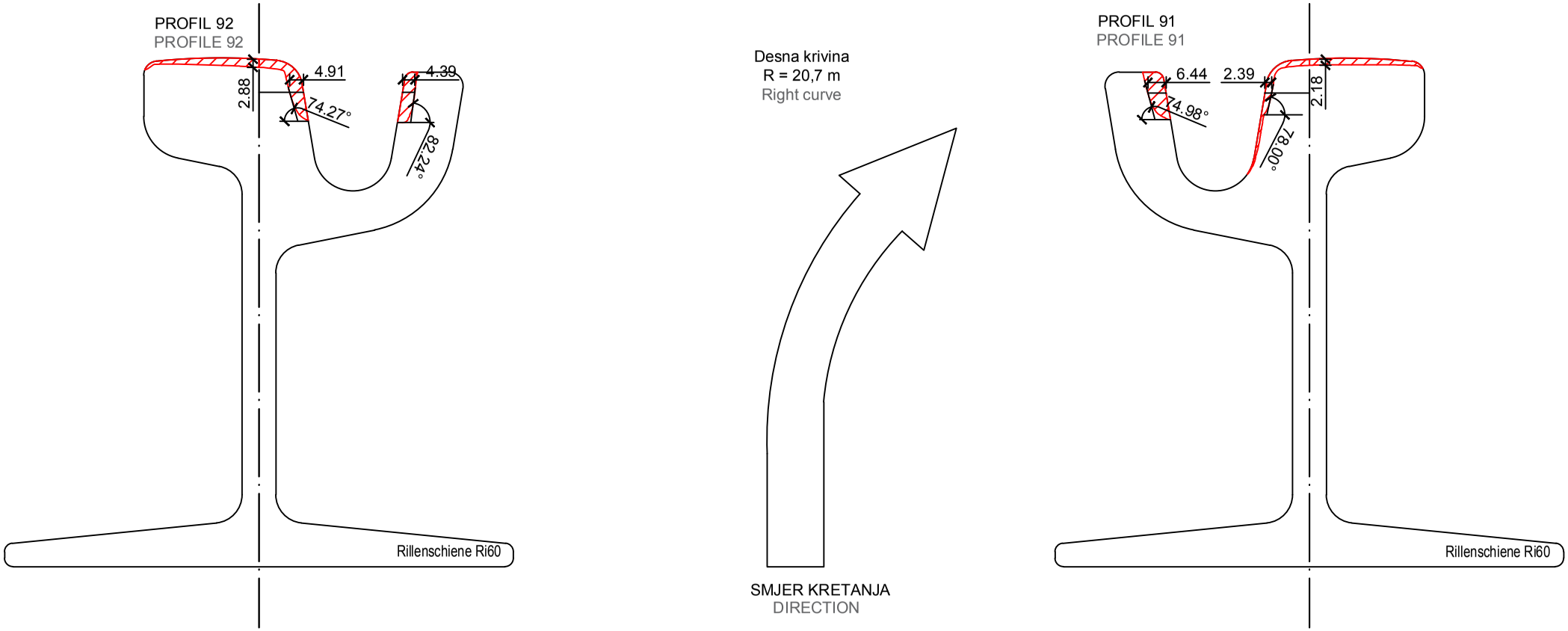
MJ: 1:2

Annex 6.20.1.1. Cross section wear in curves at Location 20

Cross section wear in curve R178

Location 20: Shunting yard Dubrava

Scale: 1:2



Prilog 6.20.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 20

Istrošenje poprečnog presjeka tračnica u krivini R230

Lokacija 20: Remiza Dubrava (ulaz i izlaz u Remizu)

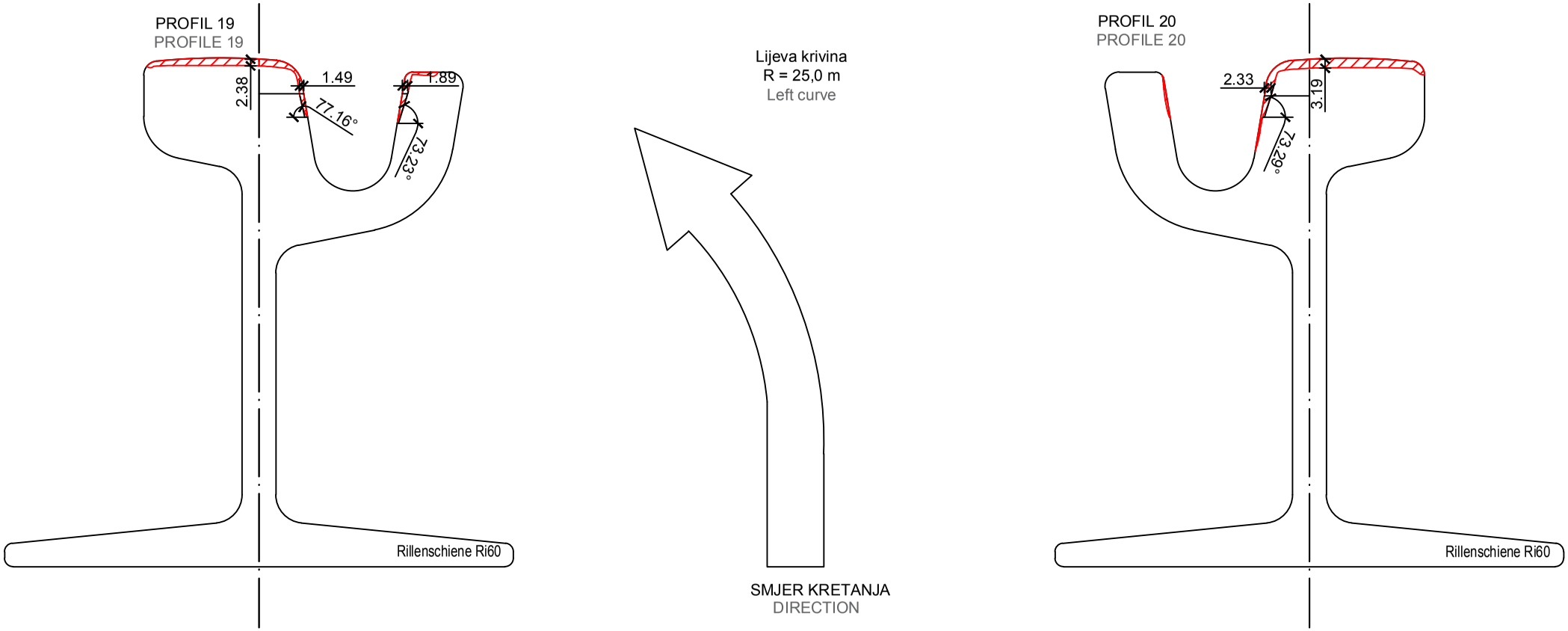
MJ: 1:2

Annex 6.20.1.1. Cross section wear in curves at Location 20

Cross section wear in curve R230

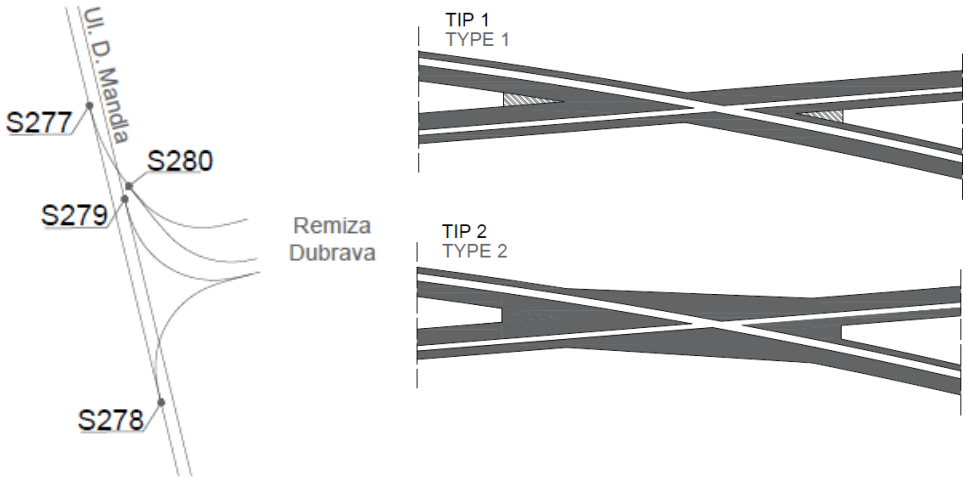
Location 20: Shunting yard Dubrava

Scale: 1:2



Prilog 6.20.2. **Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 20**
Lokacija 20: Remiza Dubrava (ulaz i izlaz u Remizu)

Annex 6.20.2. **Results of cross section wear in turnouts at Location 20**
Location 20: Shunting yard Dubrava



Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
D-24-08	S277	2	70L	13	23.97	10.97	30.00	30.72	0.72	38
			70D	13	16.46	3.46	24.50	25.19	0.69	
			72	12	23.96	11.96		31.10		
			73L	13	12.69	-0.31	24.50	21.43	-3.07	
			73D	13	24.24	11.24	30.00	27.09	-2.91	
-	S279	1	78L	13	14.53	1.53	24.89	25.80	0.91	38
			78D	13	20.42	7.42	34.00	34.52	0.52	
			79	12	20.42	8.42		32.48		
			80L	13	20.31	7.31	34.00	34.23	0.23	
			80D	13	13.83	0.83	24.89	24.57	-0.32	
-	S280	2	81L	13	14.58	1.58	24.94	25.15	-.21	38
			81D	13	14.16	1.16	34.00	28.86	-5.14	
			83	12	10.95	-1.05		24.49		
			84L	13	13.19	0.19	34.00	27.42	-6.58	
			84D	13	13.35	0.35	24.94	24.49	-0.45	
-	S278	2	29L	13	24.12	11.12	24.00	29.57	5.57	38
			29D	13	13.69	0.69	35.34	29.93	-5.41	
			27	12	24.87	12.87		33.13		
			26L	13	18.97	5.97	35.33	31.05	-4.28	
			26D	13	24.37	11.37	24.00	27.69	3.69	

Prilog 6.20.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 20

Istrošenje poprečnog presjeka srcišta skretnice S277

Lokacija 20: Remiza Dubrava (ulaz i izlaz u Remizu)

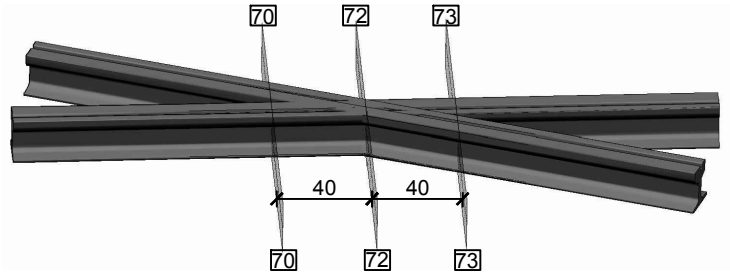
MJ: 1:2

Annex 6.20.2.1. Cross section wear in turnouts at Location 20

Cross section wear in turnout S277

Location 20: Shunting yard Dubrava

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

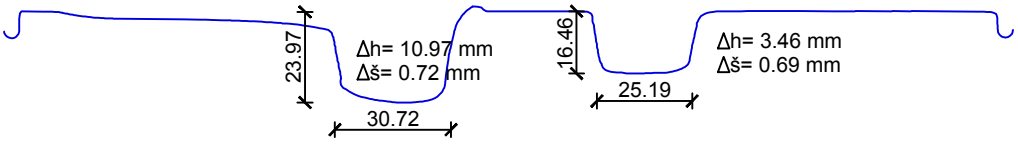
Δh vertical wear
Δš - lateral wear

Smjer vožnje: Mandlova → Spremište Dubrava

Direction: Mandlova → Shunting yard Dubrava

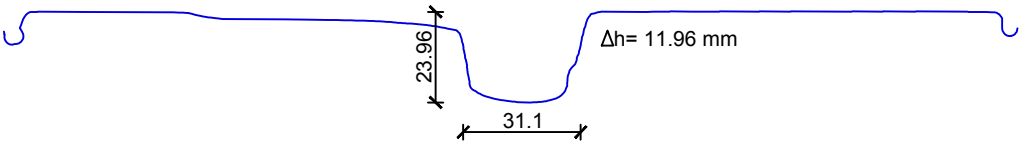
PROFIL 70

PROFILE 70



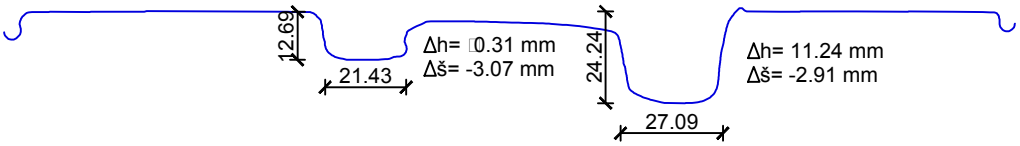
PROFIL 72

PROFILE 72



PROFIL 73

PROFILE 73



Prilog 6.20.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 20

Istrošenje poprečnog presjeka srcišta skretnice S278

Lokacija 20: Remiza Dubrava (ulaz i izlaz u Remizu)

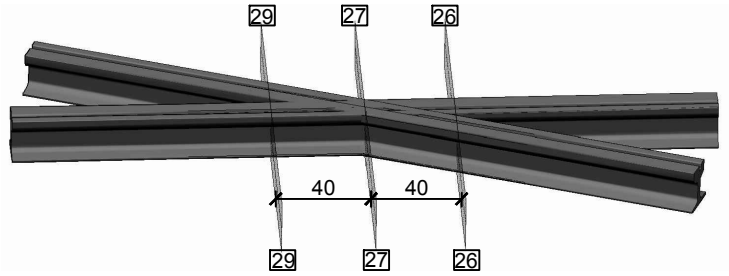
MJ: 1:2

Annex 6.20.2.1. Cross section wear in turnouts at Location 20

Cross section wear in turnout S278

Location 20: Shunting yard Dubrava

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

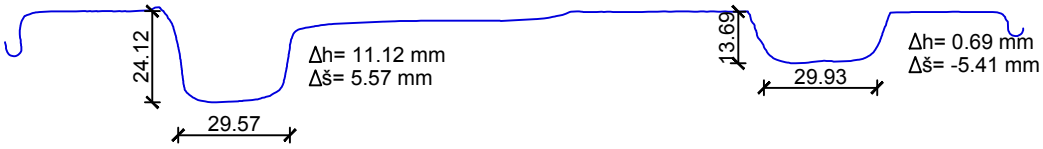
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Mandlova ⟶ Spremište Dubrava

Direction: Mandlova ⟶ Shunting yard Dubrava

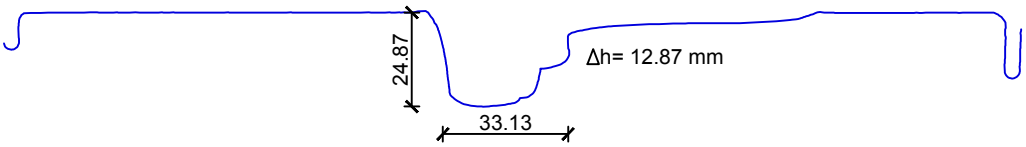
PROFIL 29

PROFILE 29



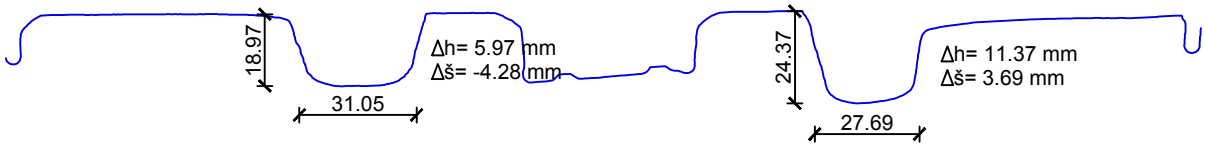
PROFIL 27

PROFILE 27



PROFIL 26

PROFILE 26



Prilog 6.20.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 20

Istrošenje poprečnog presjeka srcišta skretnice S279

Lokacija 20: Remiza Dubrava (ulaz i izlaz u Remizu)

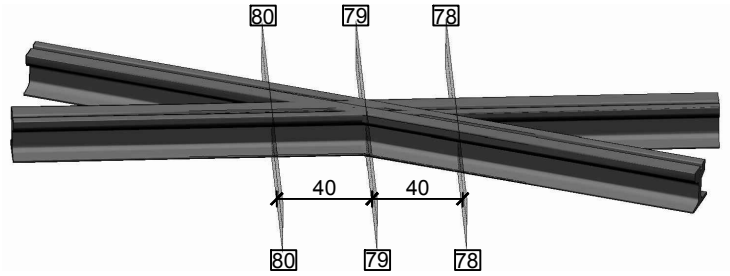
MJ: 1:2

Annex 6.20.2.1. Cross section wear in turnouts at Location 20

Cross section wear in turnout S279

Location 20: Shunting yard Dubrava

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

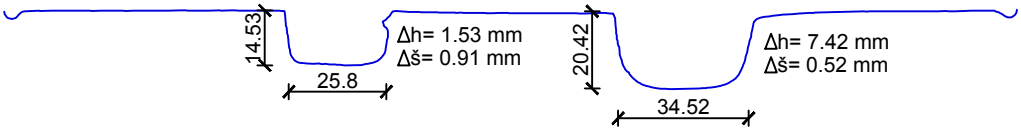
Δh vertical wear
Δš - lateral wear

Smjer vožnje: Spremište Dubrava → Mandlova

Direction: Shunting yard Dubrava → Mandlova

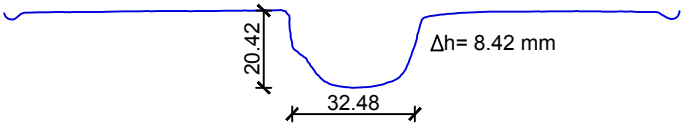
PROFIL 78

PROFILE 78



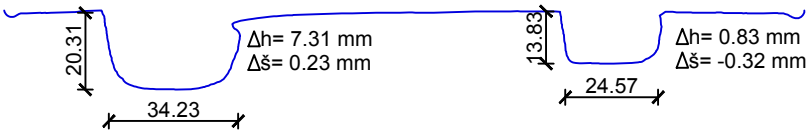
PROFIL 79

PROFILE 79



PROFIL 80

PROFILE 80



Prilog 6.20.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 20

Istrošenje poprečnog presjeka srcišta skretnice S280

Lokacija 20: Remiza Dubrava (ulaz i izlaz u Remizu)

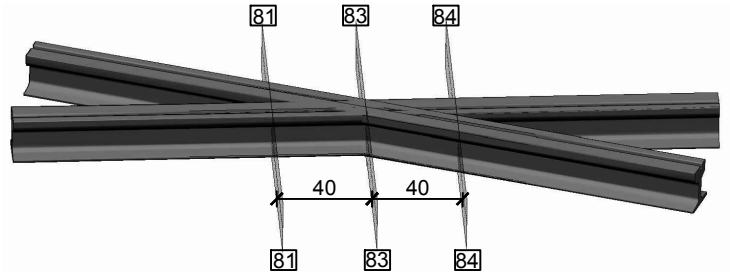
MJ: 1:2

Annex 6.20.2.1. Cross section wear in turnouts at Location 20

Cross section wear in turnout S280

Location 20: Shunting yard Dubrava

Scale: 1:2



Δh - visinsko istrošenje

Δš - bočno istrošenje

Δh vertical wear

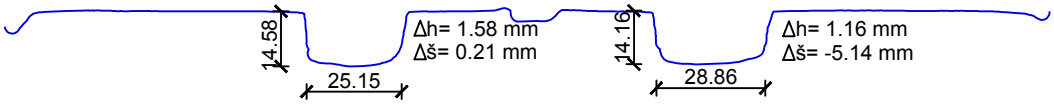
Δš - lateral wear

Smjer vožnje: Mandlova → Spremište Dubrava

Direction: Mandlova → Shunting yard Dubrava

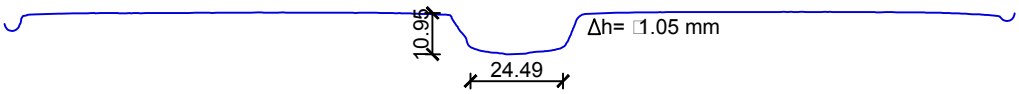
PROFIL 81

PROFILE 81



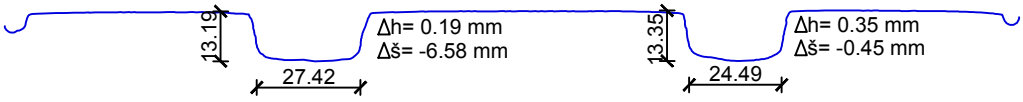
PROFIL 83

PROFILE 83



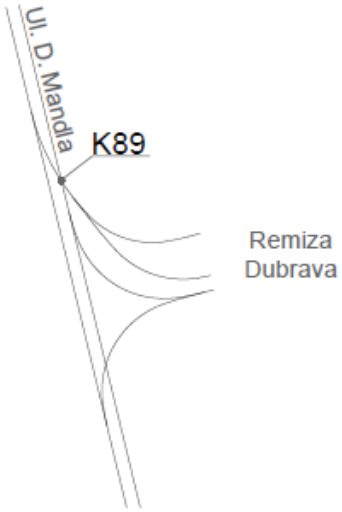
PROFIL 84

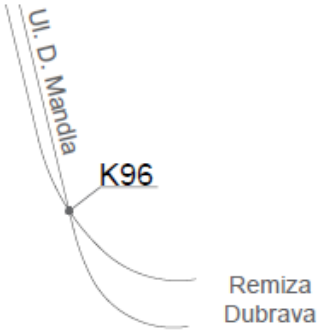
PROFILE 84



Prilog 6.20.3. Rezultati istrošenja profila tračnica u križalištima na Lokaciji 20
Lokacija 20: Remiza Dubrava (ulaz i izlaz u Remizu)

Annex 6.20.3. Results of cross section wear in track crossing at Location 20
Location 20: Shunting yard Dubrava

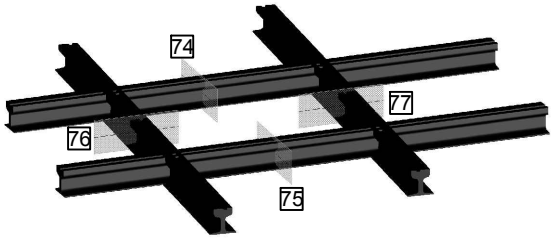




Dionice Sections	**Oznaka križališta** Track crossing mark	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
D-24-08	K89	74	12	24,24	12.24	24.00	25.52	1.52	38
		75	12	24,27	12.27	24.00	25.40	1.40	
		76	12	11,59	-0.41	24.00	21.74	-2.26	
		77	12	12,17	0.17	24.00	22.22	-1.78	
D-24-10	K96	21	12	25,01	13.01	30.00	30.40	0.40	38
		22	12	25,81	13.81	30.00	29.81	-0.19	
		23	12	13,19	1.19	24.00	22.14	-1.86	
		24	12	12,91	0.91	24.00	22.04	-1.96	

Prilog 6.20.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 20
Istrošenje poprečnog presjeka tračnica u križalištu K89
Lokacija 20: Remiza Dubrava (ulaz i izlaz u Remizu)
MJ: 1:2

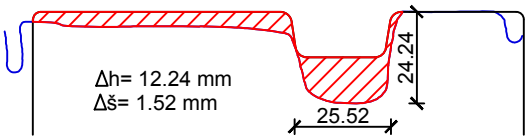
Annex 6.20.3.1. Cross section wear in track crossings at Location 20
Cross section wear in track crossing K89
Location 20: Shunting yard Dubrava
Scale: 1:2



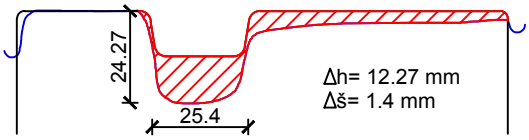
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh vertical wear
Δš - lateral wear

Smjer vožnje: Spremište Dubrava ⟶ Avenija Dubrava
Direction: Shunting yard Dubrava ⟶ Mandlova

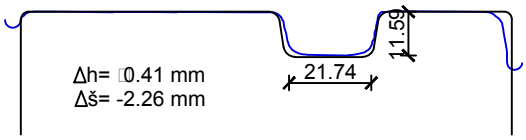
PROFIL 74
PROFILE 74



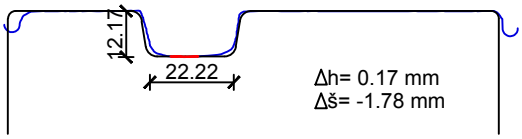
PROFIL 75
PROFILE 75



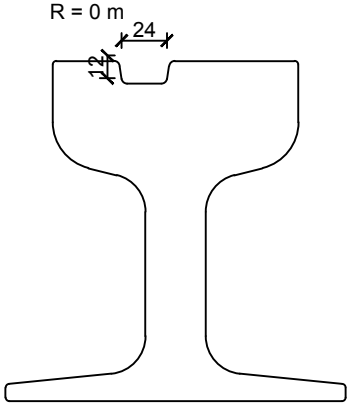
PROFIL 76
PROFILE 76



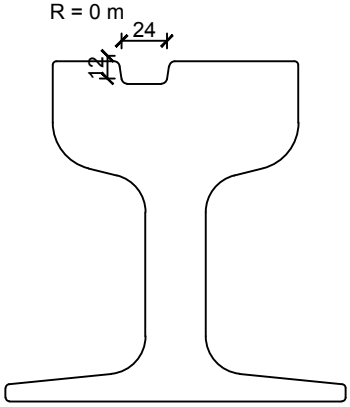
PROFIL 77
PROFILE 77



PROFIL 74, 75 PROFILE 74, 75
R = 0 m

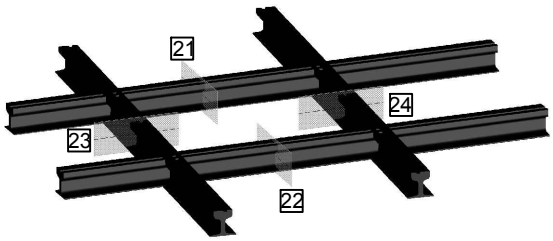


PROFIL 76, 77 PROFILE 76, 77
R = 0 m



Prilog 6.20.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 20
Istrošenje poprečnog presjeka tračnica u križalištu K96
Lokacija 20: Remiza Dubrava (ulaz i izlaz u Remizu)
MJ: 1:2

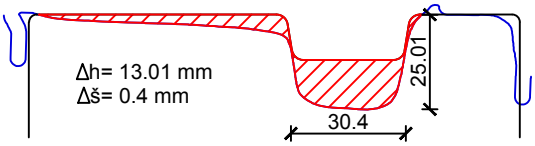
Annex 6.20.3.1. Cross section wear in track crossings at Location 20
Cross section wear in track crossing K96
Location 20: Shunting yard Dubrava
Scale: 1:2



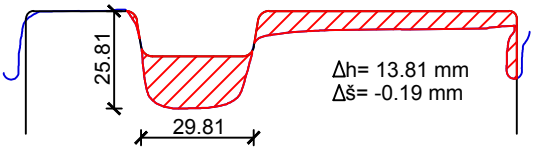
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh vertical wear
Δš - lateral wear

Smjer vožnje: Mandlova → Spremište Dubrava
Direction: Mandlova → Shunting yard Dubrava

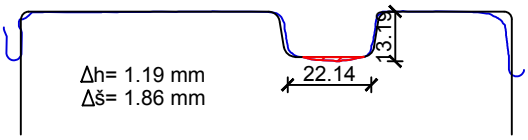
PROFIL 21
PROFILE 21



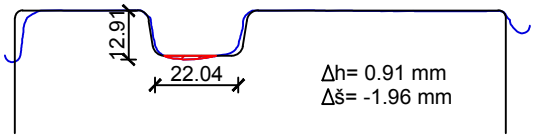
PROFIL 22
PROFILE 22



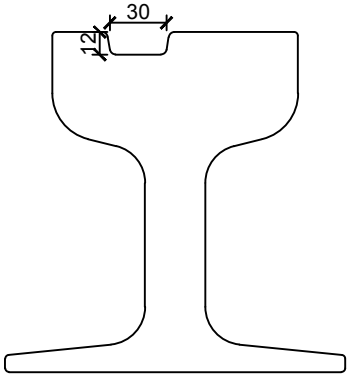
PROFIL 23
PROFILE 23



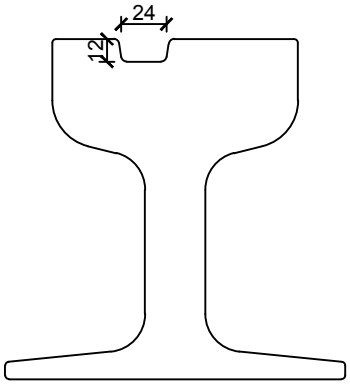
PROFIL 24
PROFILE 24



PROFIL 21, 22 PROFILE 21, 22
R = 50 m

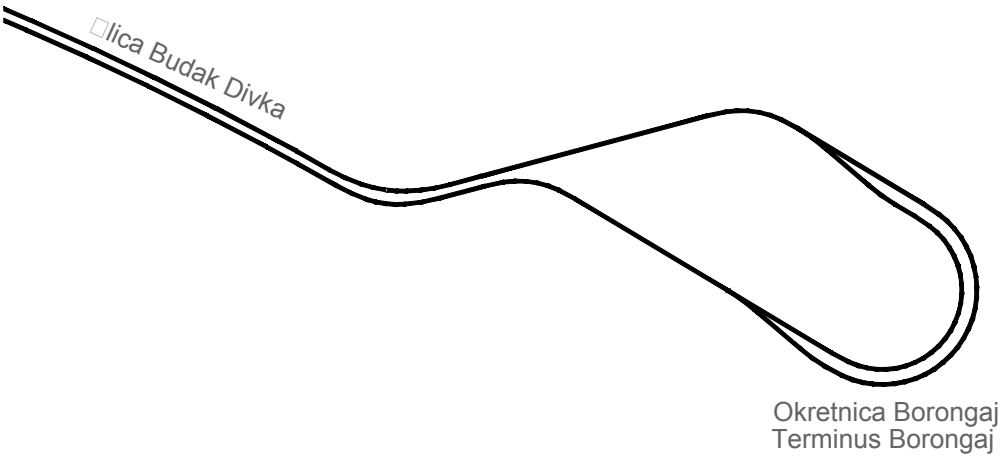


PROFIL 23, 24 PROFILE 23, 24
R = 0 m



Lokacija 21 (L21)
Okretnica Borongaj

Location 21 (L21)
Terminus Borongaj



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija ra□voja tramvajskog prometa □rada □agre□a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition

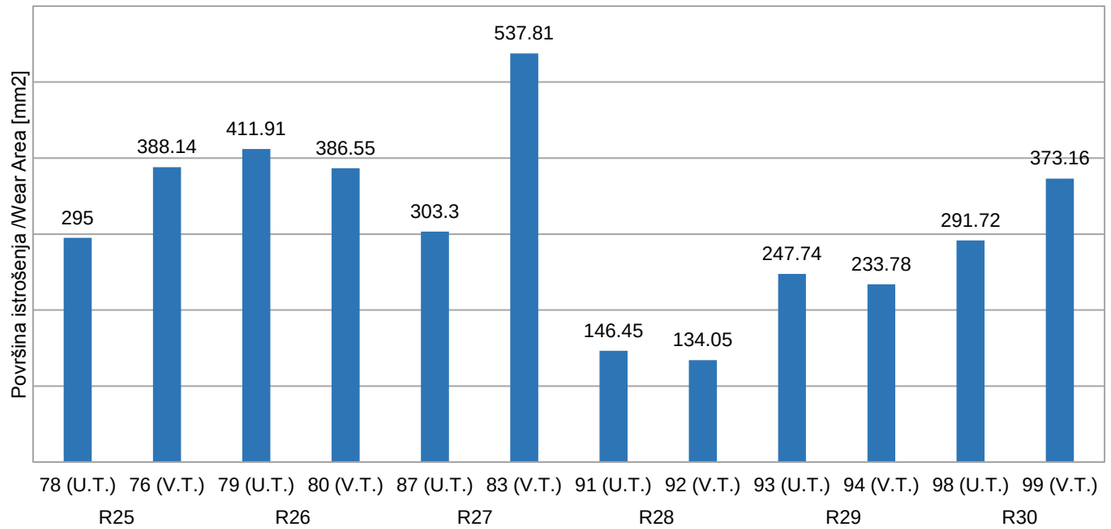
SADRŽAJ PRILOGA:
ANNEX:

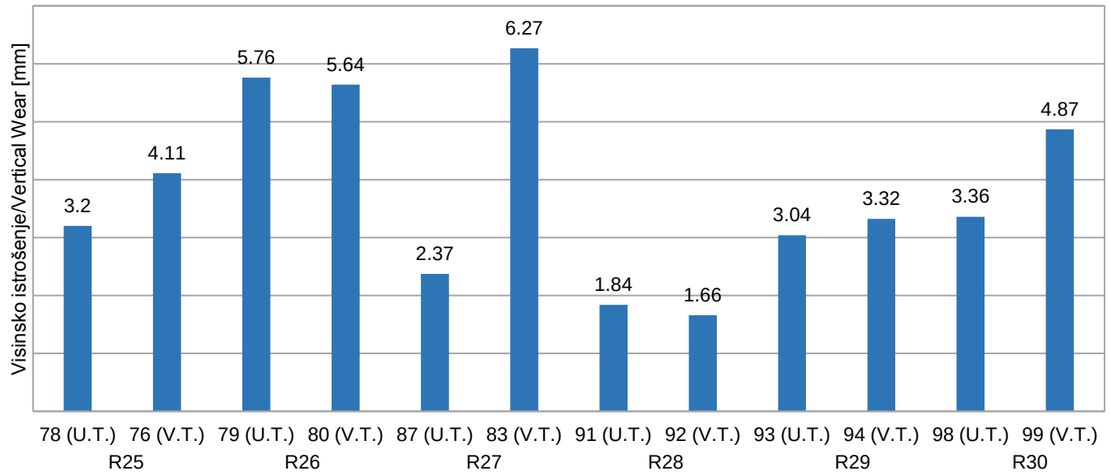
Istrošenje poprečnih presjeka tračnica u krivinama i skretnicama na Lokaciji 21

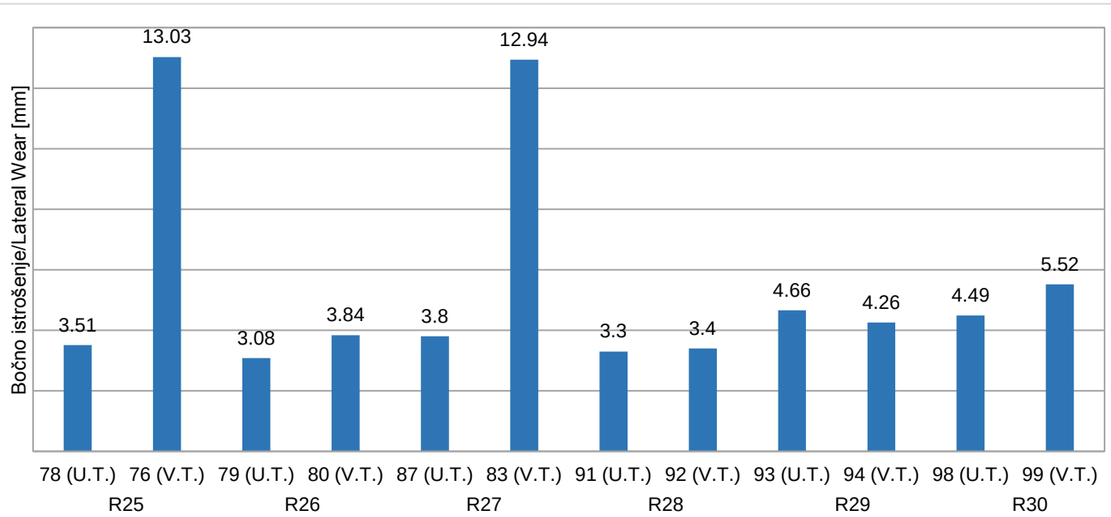
Rail cross section wear in curves and turnouts at Location 21

MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.21

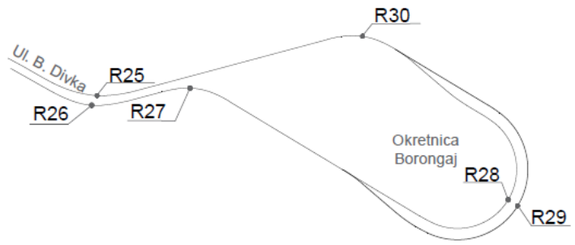
Prilog 6.21.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 21**
Lokacija 21: Okretnica Borongaj
Annex 6.21.1. **Results of cross section wear in curves at Location 21**
Location 21: Terminus Borongaj







U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve



Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [ ]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
D-26-01	R25	desna right	76	lijeva/left	388.14	4.11	13.03	77.52	30	9
			78	desna/right	295	3.2	3.51	80.71		
D-26-02	R26	lijeva left	79	lijeva/left	411.91	5.76	3.08	77.59	24	9
			80	desna/right	386.55	5.64	3.84	72.48		
Z-14-01	R27	desna right	83	lijeva/left	537.81	6.27	12.94	76.86	25	12
			87	desna/right	303.3	2.37	3.8	79.74		
Z-14-03	R28	lijeva left	91	lijeva/left	146.45	1.84	3.3	78.93	21	12
			92	desna/right	134.05	1.66	3.4	73.05		
Z14-02	R29	lijeva left	93	lijeva/left	247.74	3.04	4.66	78.72	25	12
			94	desna/right	233.78	3.32	4.26	74.28		
Z-14-04	R30	lijeva left	98	lijeva/left	291.72	3.36	4.49	79.2	25	9
			99	desna/right	373.16	4.87	5.52	75.89		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
D-26-01	R25	desna right	76	lijeva/left	388.14	4.11	13.03
			78	desna/right	295	3.2	3.51
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					93.14	0.91	9.52
D-26-02	R26	lijeva left	79	lijeva/left	411.91	5.76	3.08
			80	desna/right	386.55	5.64	3.84
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-25.36	-0.12	0.76
Z-14-01	R27	desna right	83	lijeva/left	537.81	6.27	12.94
			87	desna/right	303.3	2.37	3.8
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					234.51	3.9	9.14
Z-14-03	R28	lijeva left	91	lijeva/left	146.45	1.84	3.3
			92	desna/right	134.05	1.66	3.4
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-12.4	-0.18	0.1
Z14-02	R29	lijeva left	93	lijeva/left	247.74	3.04	4.66
			94	desna/right	233.78	3.32	4.26
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-13.96	0.28	-0.4
Z-14-04	R30	lijeva left	98	lijeva/left	291.72	3.36	4.49
			99	desna/right	373.16	4.87	5.52
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					81.44	1.51	1.03

Prilog 6.21.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 21

Istrošenje poprečnog presjeka tračnica u krivini R25

Lokacija 21: Okretnica Borongaj

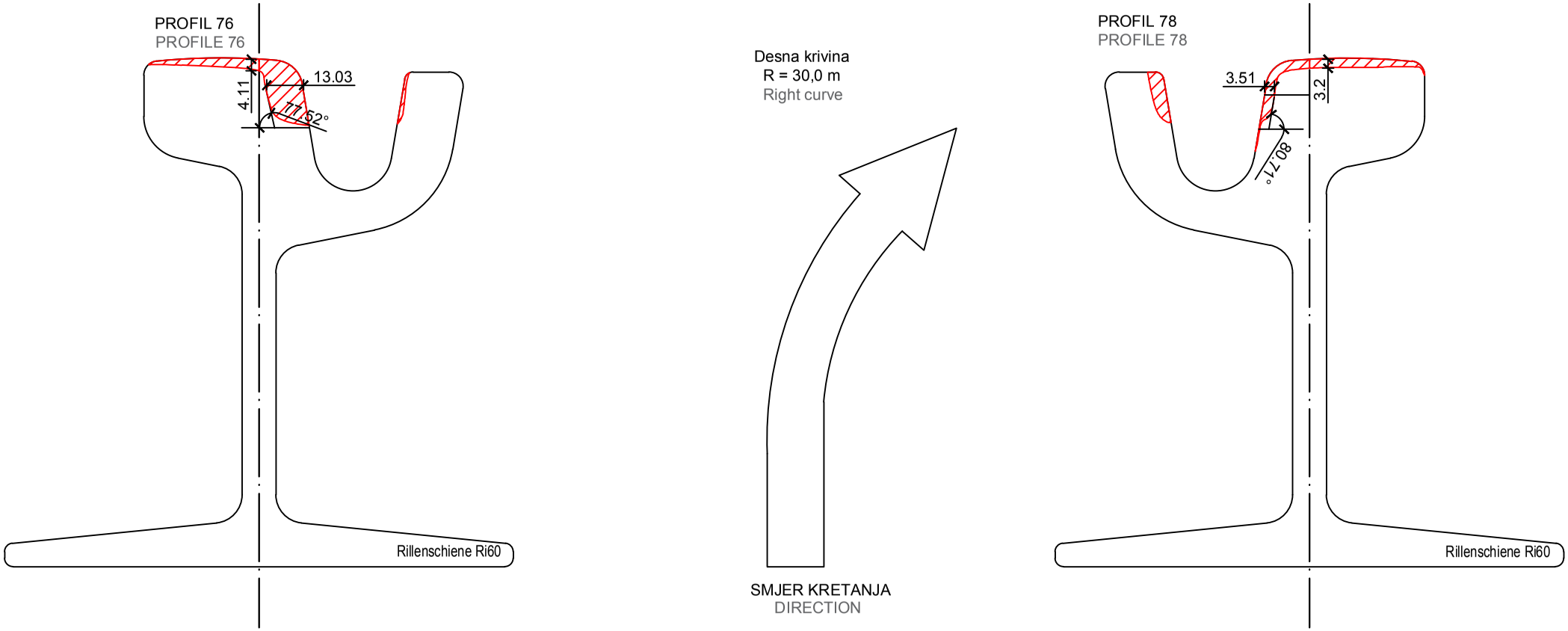
MJ: 1:2

Annex 6.21.1.1. Cross section wear in curves at Location 21

Cross section wear in curve R25

Location 21: Terminus Borongaj

Scale: 1:2



Prilog 6.21.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 21

Istrošenje poprečnog presjeka tračnica u krivini R26

Lokacija 21: Okretnica Borongaj

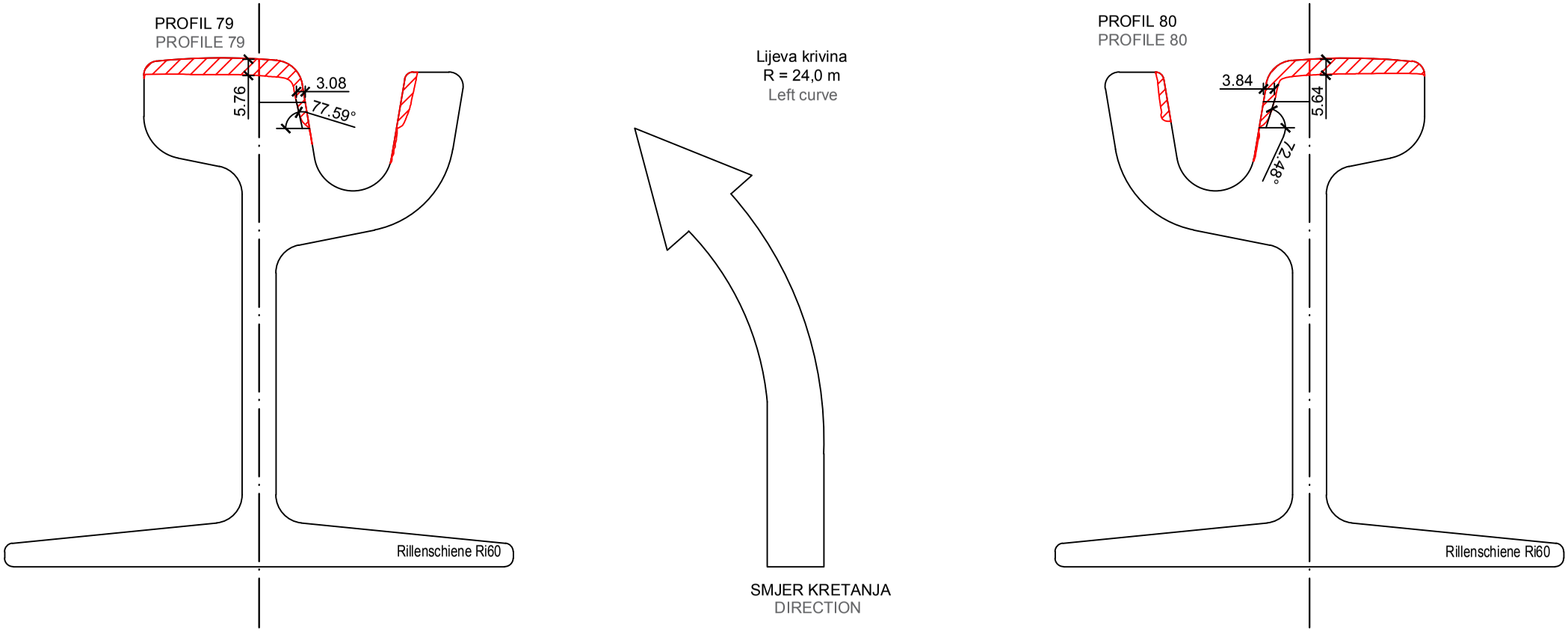
MJ: 1:2

Annex 6.21.1.1. Cross section wear in curves at Location 21

Cross section wear in curve R26

Location 21: Terminus Borongaj

Scale: 1:2



Prilog 6.21.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 21

Istrošenje poprečnog presjeka tračnica u krivini R27

Lokacija 21: Okretnica Borongaj

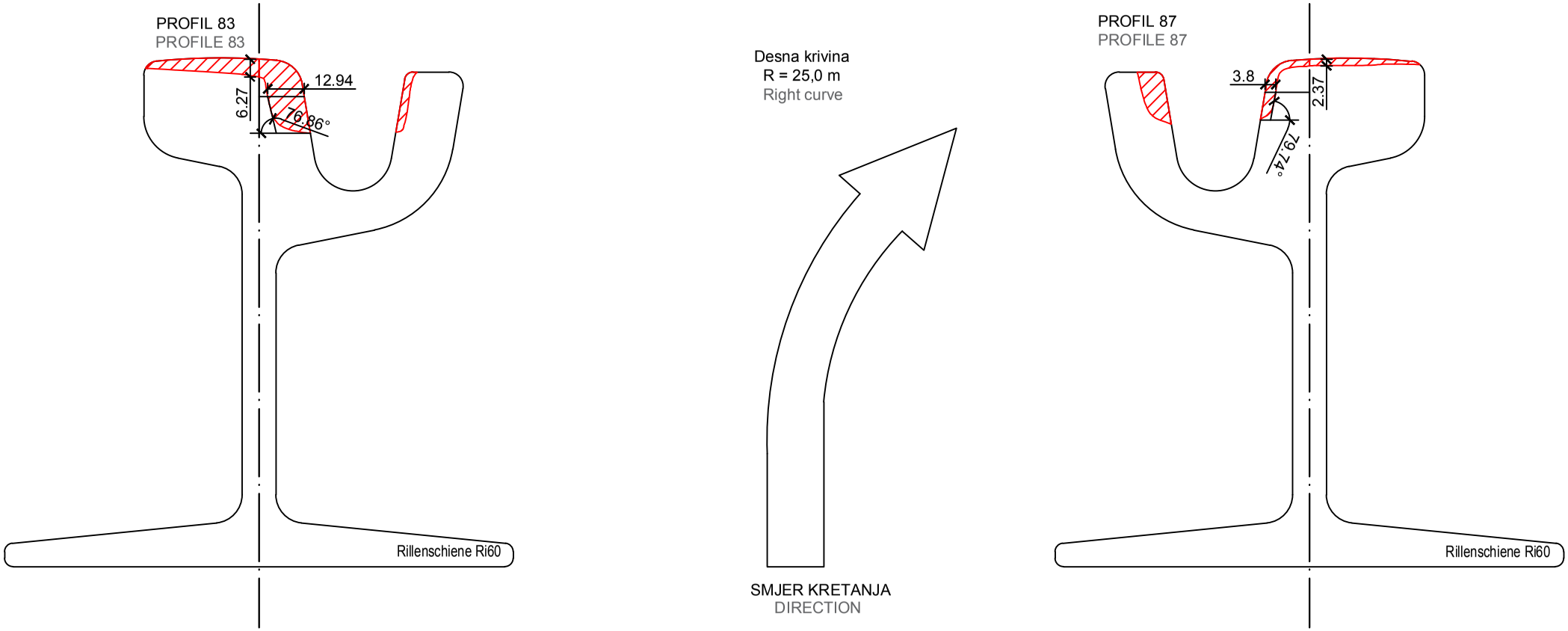
MJ: 1:2

Annex 6.21.1.1. Cross section wear in curves at Location 21

Cross section wear in curve R27

Location 21: Terminus Borongaj

Scale: 1:2



Prilog 6.21.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 21

Istrošenje poprečnog presjeka tračnica u krivini R28

Lokacija 21: Okretnica Borongaj

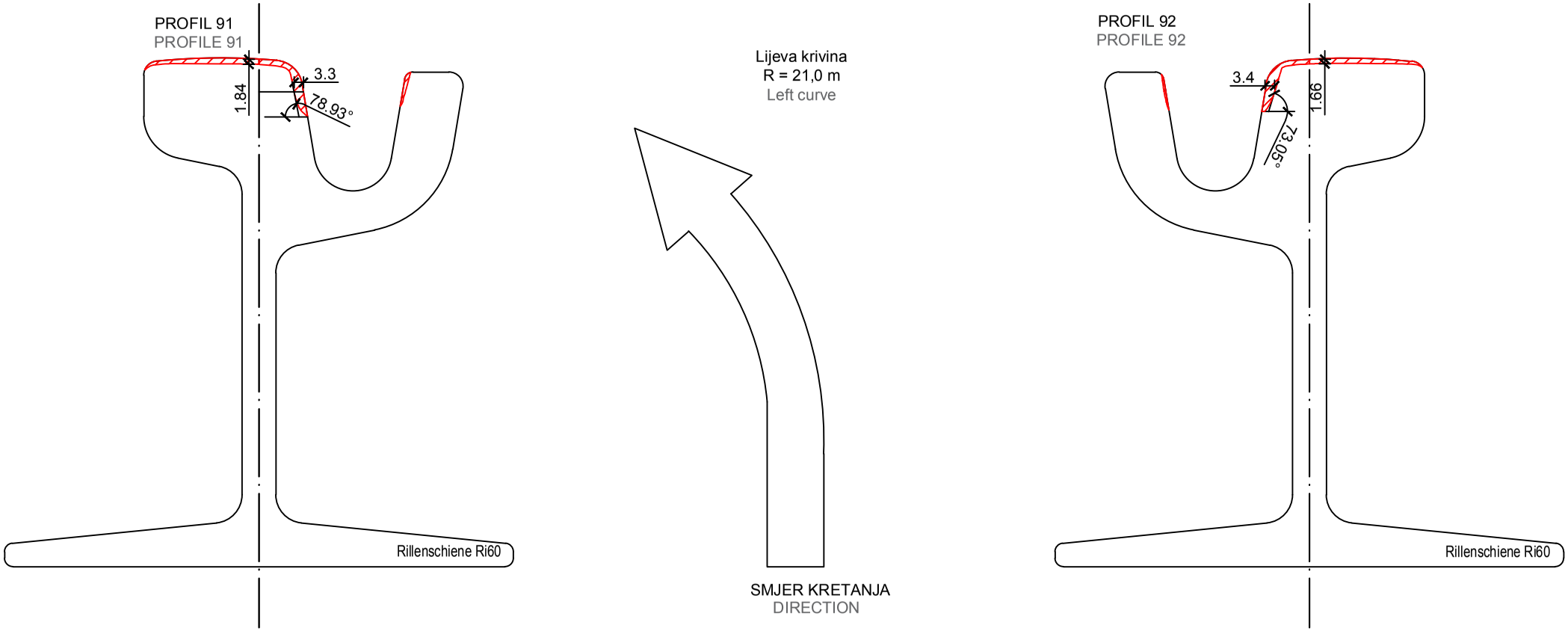
MJ: 1:2

Annex 6.21.1.1. Cross section wear in curves at Location 21

Cross section wear in curve R28

Location 21: Terminus Borongaj

Scale: 1:2



Prilog 6.21.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 21

Istrošenje poprečnog presjeka tračnica u krivini R29

Lokacija 21: Okretnica Borongaj

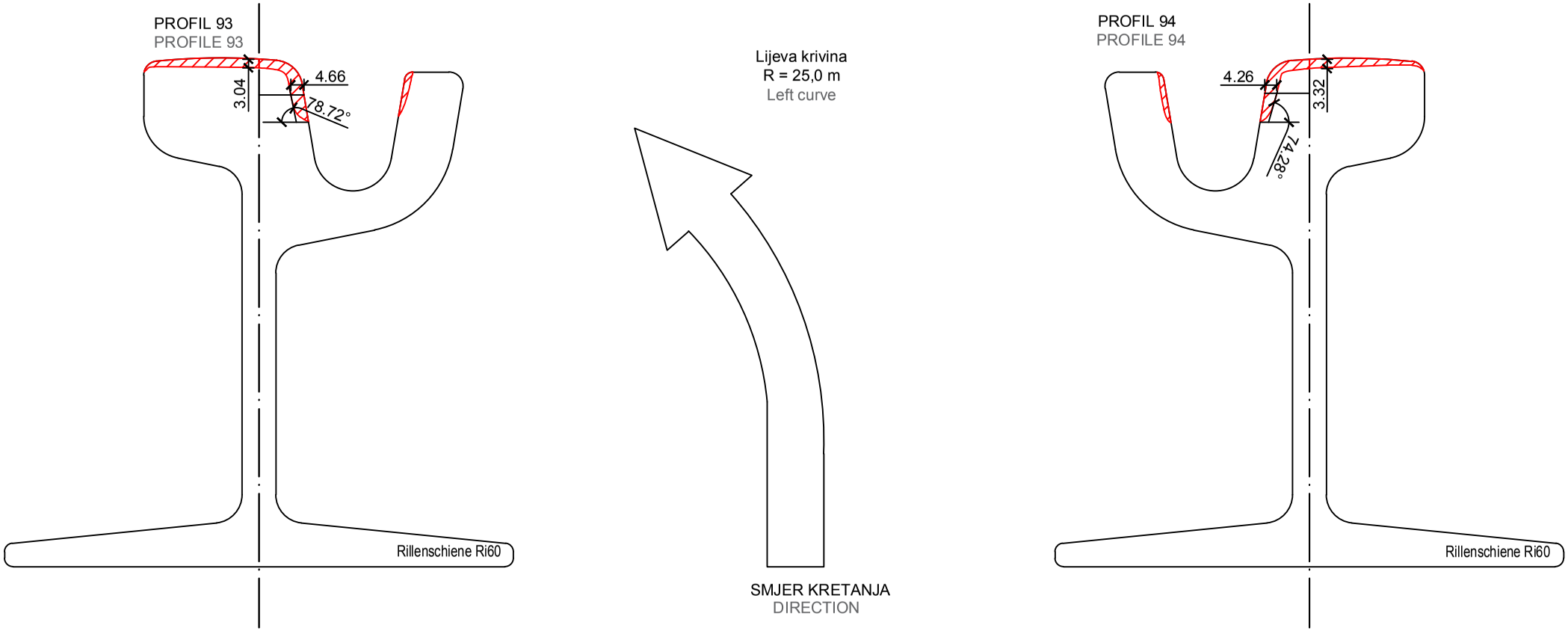
MJ: 1:2

Annex 6.21.1.1. Cross section wear in curves at Location 21

Cross section wear in curve R29

Location 21: Terminus Borongaj

Scale: 1:2



Prilog 6.21.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 21

Istrošenje poprečnog presjeka tračnica u krivini R30

Lokacija 21: Okretnica Borongaj

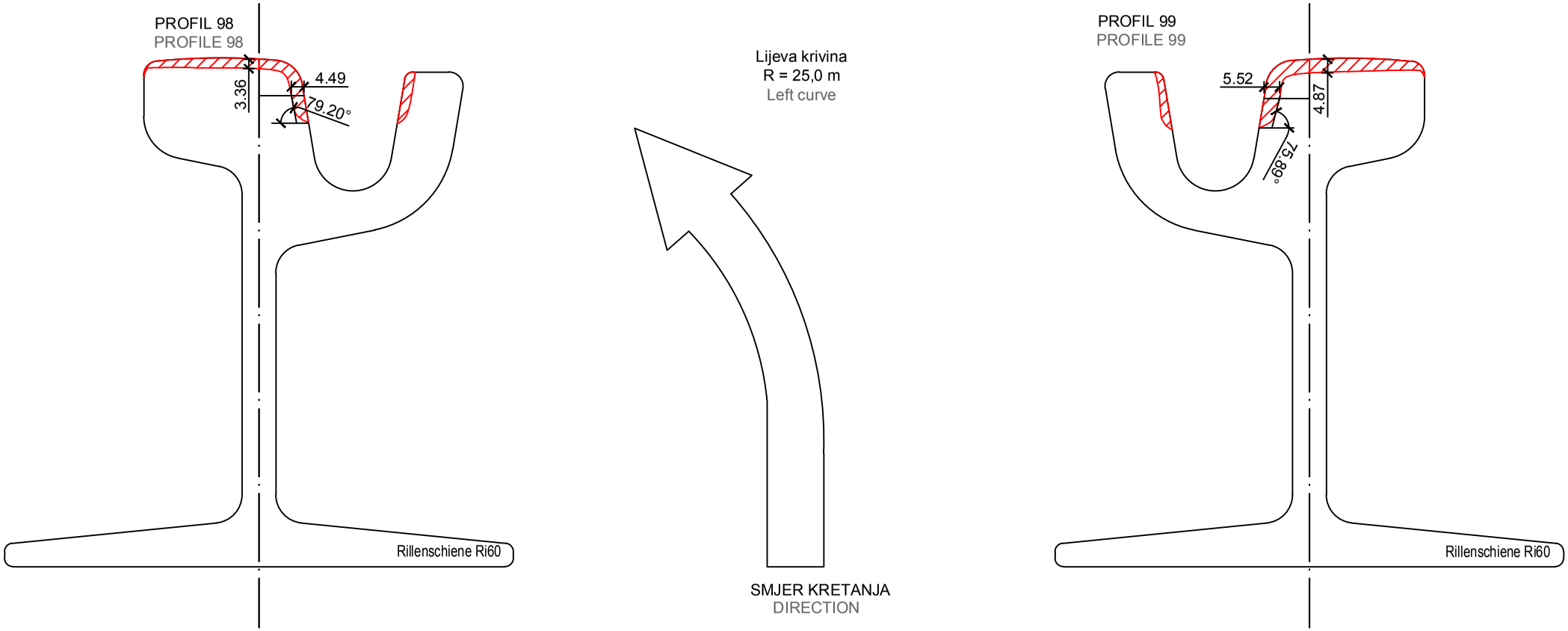
MJ: 1:2

Annex 6.21.1.1. Cross section wear in curves at Location 21

Cross section wear in curve R30

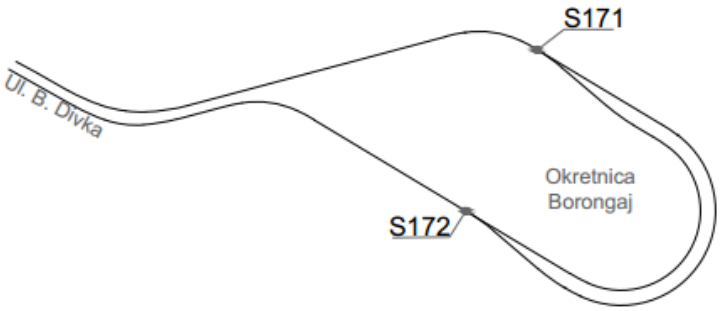
Location 21: Terminus Borongaj

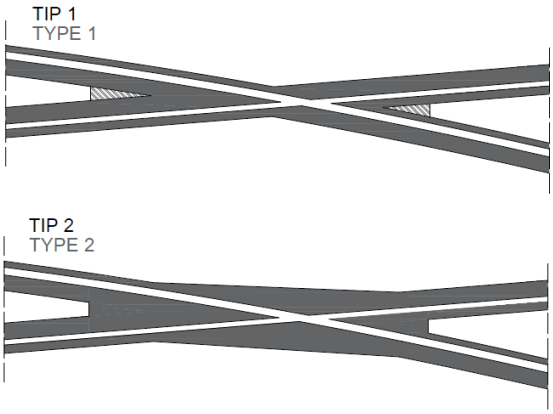
Scale: 1:2



Prilog 6.21.2. **Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 21**
Lokacija 21: Okretnica Borongaj

Annex 6.21.2. **Results of cross section wear in turnouts at Location 21**
Location 21: Terminus Borongaj





Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
Z-14-02 Z-14-03	S172	1	88L	13	21.48	8.48	24.33	27.58	3.25	12
			88D	13	20.14	7.14	24.00	26.30	2.30	
			89	12	21.84	9.84		33.01		
			90L	13	18.41	5.41	24.00	22.46	-1.54	
			90D	13	21.62	8.62	24.33	24.43	0.10	
Z-14-02 Z-14-03	S171	2	95L	13	16.06	3.06	24.33	24.85	0.52	12
			95D	13	20.94	7.94	24.00	24.95	0.95	
			96	12	21.66	9.66		26.81		
			97L	13	21.64	8.64	24.00	26.83	2.83	
			97D	13	17.48	4.48	24.33	26.31	1.98	

Prilog 6.21.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 21

Istrošenje poprečnog presjeka srcišta skretnice S171

Lokacija 21: Okretnica Borongaj

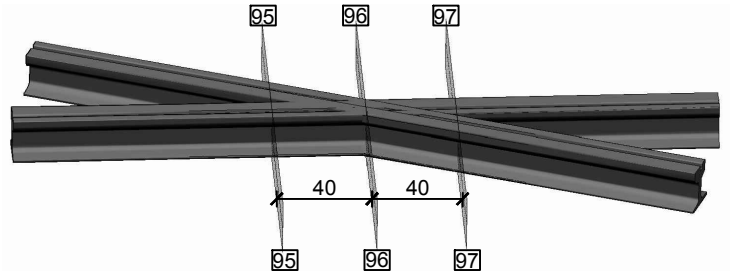
MJ: 1:2

Annex 6.21.2.1. Cross section wear in turnouts at Location 21

Cross section wear in turnout S171

Location 21: Terminus Borongaj

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

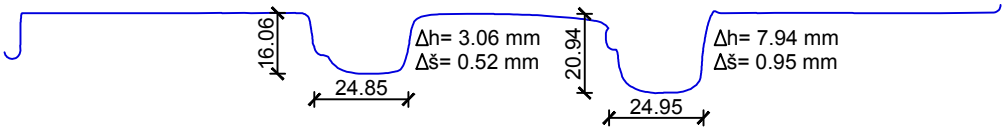
Δh □vertical wear
Δš - lateral wear

Smjer vožnje: u okretnici

Direction: through terminus

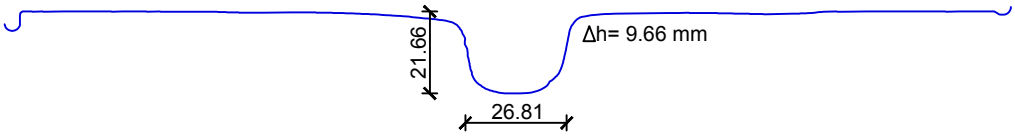
PROFIL 95

PROFILE 95



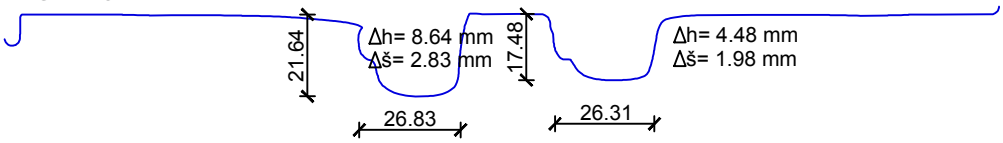
PROFIL 96

PROFILE 96



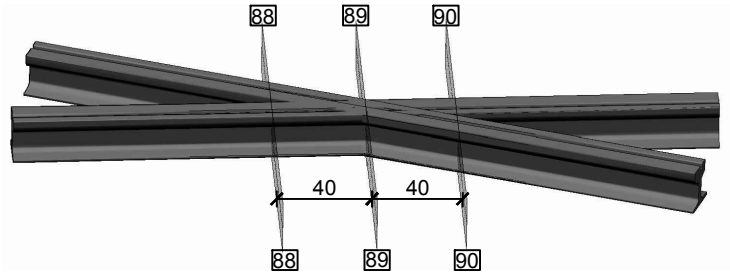
PROFIL 97

PROFILE 97



Prilog 6.21.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 21
Istrošenje poprečnog presjeka srcišta skretnice S172
Lokacija 21: Okretnica Borongaj
MJ: 1:2

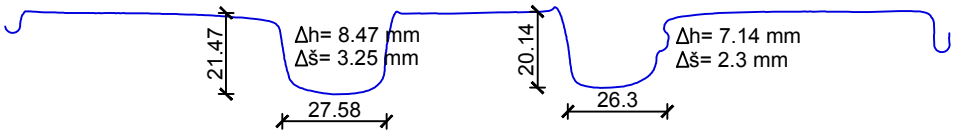
Annex 6.21.2.1. Cross section wear in turnouts at Location 21
Cross section wear in turnout S172
Location 21: Terminus Borongaj
Scale: 1:2



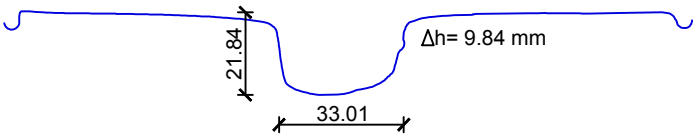
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: u okretnici
Direction: through terminus

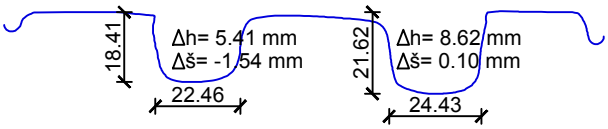
PROFIL 88
PROFILE 88



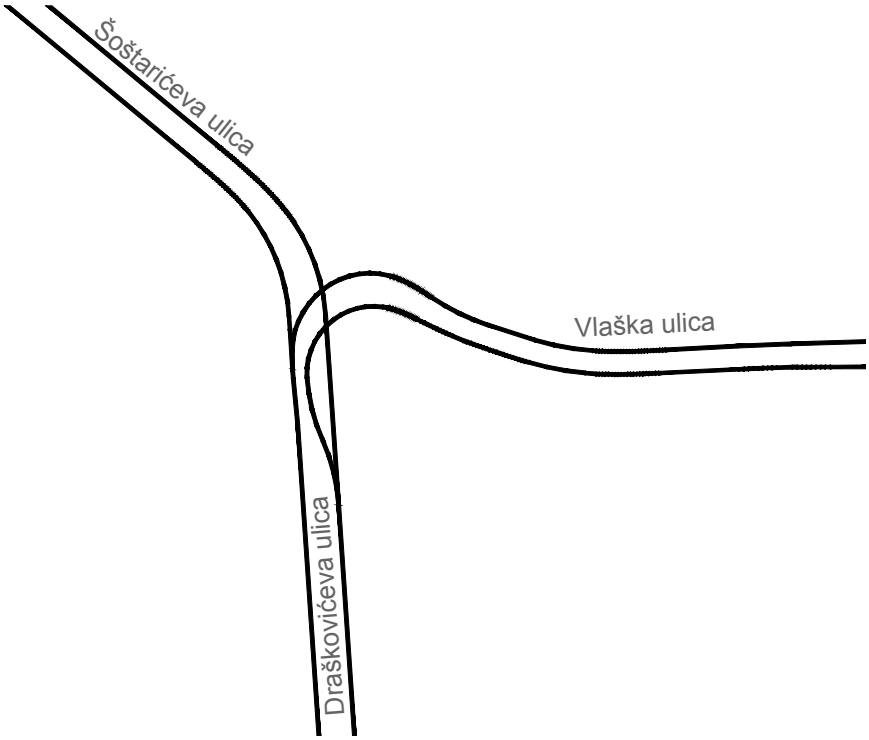
PROFIL 89
PROFILE 89



PROFIL 90
PROFILE 90

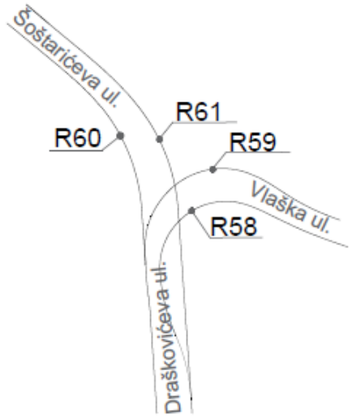


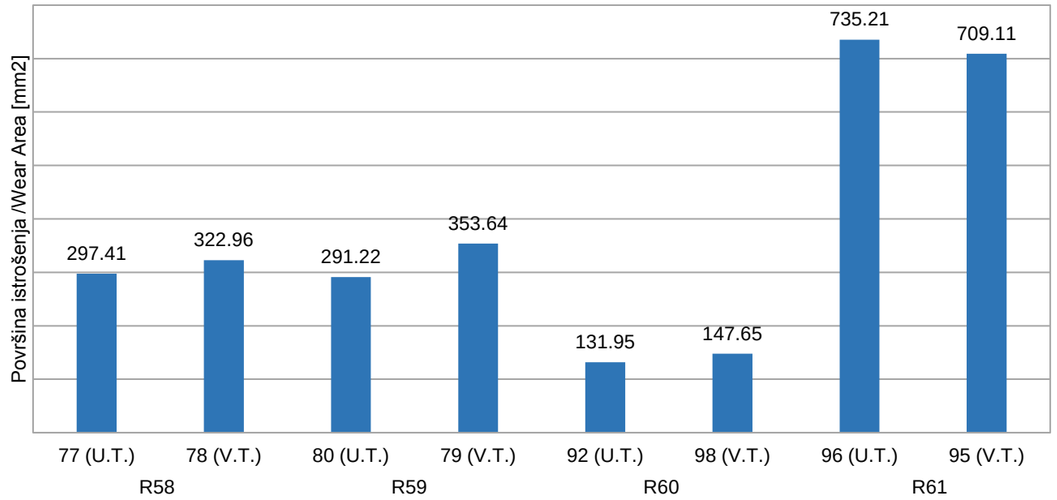
Lokacija 22 (L22)
Križanje Draškovićeva ul.- Vlaška ul. - Šoštarićeva ul.
Location 22 (L22)
Draškovićeva - Vlaška -Šoštarićeva crossing

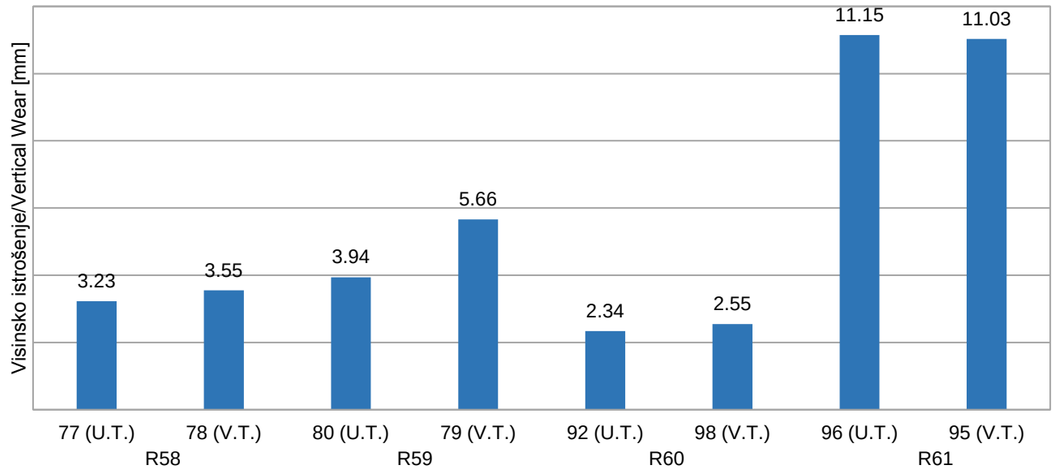


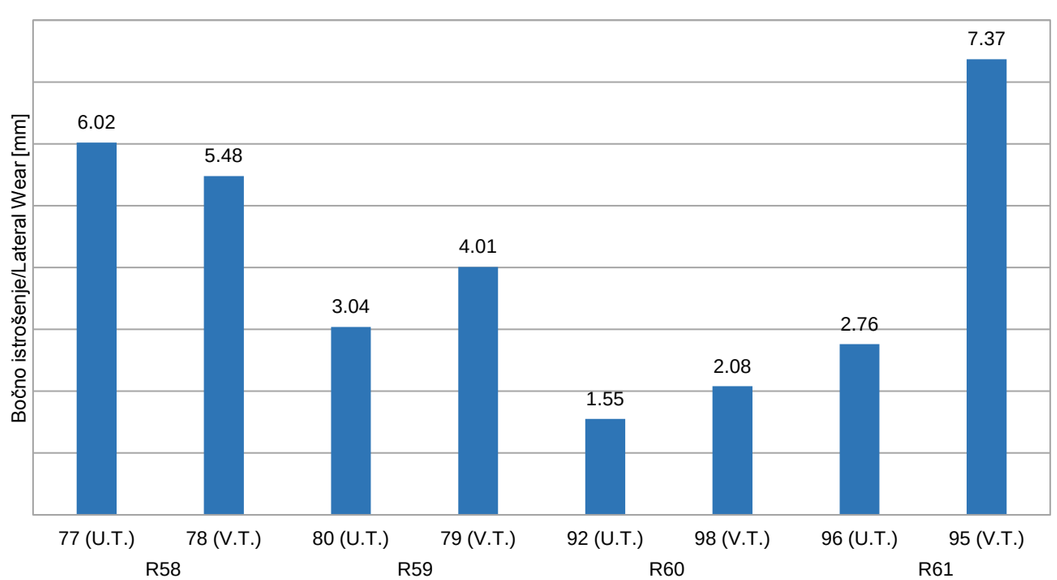
IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija ra□voja tramvajskog prometa □rada □agre□a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition
SADRŽAJ PRILOGA: ANNEX: Istrošenje poprečnih presjeka tračnica u krivinama, skretnicama i križalištima na Lokaciji 22 Rail cross section wear in curves, turnouts and crossings at Location 22	
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.22

Prilog 6.22.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 22**
Lokacija 22: Draškovićeva ulica - Vlaška ulica - Šoštarićeva ulica
Annex 6.22.1. **Results of cross section wear in curves at Location 22**
Location 22: Draškovićeva - Vlaška -Šoštarićeva crossing









U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve

Dionica Section	**Oznaka krivine** Curve mark	**Krivina** Curve	**Profil** Profile	**Tračnica** Rail	**Istrošenje** / Rail Wear				**Radijus** Radius **R [m]**	**Period eksploatacije** Exploitation Period **[god]]**
					Površina Area **P [mm2]**	**Visinsko** Vertical **h [mm]**	**Bočno** Lateral **a [mm]**	**Nagib** Slope **α [ ]**		
D-33-02	R58	desna right	78	lijeva/left	322.96	3.55	5.48	72.83	17.5	13
			77	desna/right	297.41	3.23	6.02	73.29		
D-33-01	R59	lijeva left	80	lijeva/left	291.22	3.94	3.04	74.88	20	13
			79	desna/right	353.64	5.66	4.01	72.82		
D-30-01	R60	desna right	98	lijeva/left	147.65	2.55	2.08	79.04	48	22
			92	desna/right	131.95	2.34	1.55	81.21		
D-30-02	R61	lijeva left	96	lijeva/left	735.21	11.15	2.76	80.31	50	22
			95	desna/right	709.11	11.03	7.37	74.32		

Dionica Section	**Oznaka krivine** Curve mark	**Krivina** Curve	**Profil** Profile	**Tračnica** Rail	**Istrošenje** / Rail Wear		
					Površina Area **P [mm2]**	**Visinsko** Vertical **h [mm]**	**Bočno** Lateral **a [mm]**
D-33-02	R58	desna right	78	lijeva/left	322.96	3.55	5.48
			77	desna/right	297.41	3.23	6.02
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					25.55	0.32	-0.54
D-33-01	R59	lijeva left	80	lijeva/left	291.22	3.94	3.04
			79	desna/right	353.64	5.66	4.01
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					62.42	1.72	0.97
D-30-01	R60	desna right	98	lijeva/left	147.65	2.55	2.08
			92	desna/right	131.95	2.34	1.55
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					15.7	0.21	0.53
D-30-02	R61	lijeva left	96	lijeva/left	735.21	11.15	2.76
			95	desna/right	709.11	11.03	7.37
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-26.1	-0.12	4.61

Prilog 6.22.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 22

Istrošenje poprečnog presjeka tračnica u krivini R58

Lokacija 22: Draškovićeva ul.- Vlaška ul.-Šoštarićeva ul.

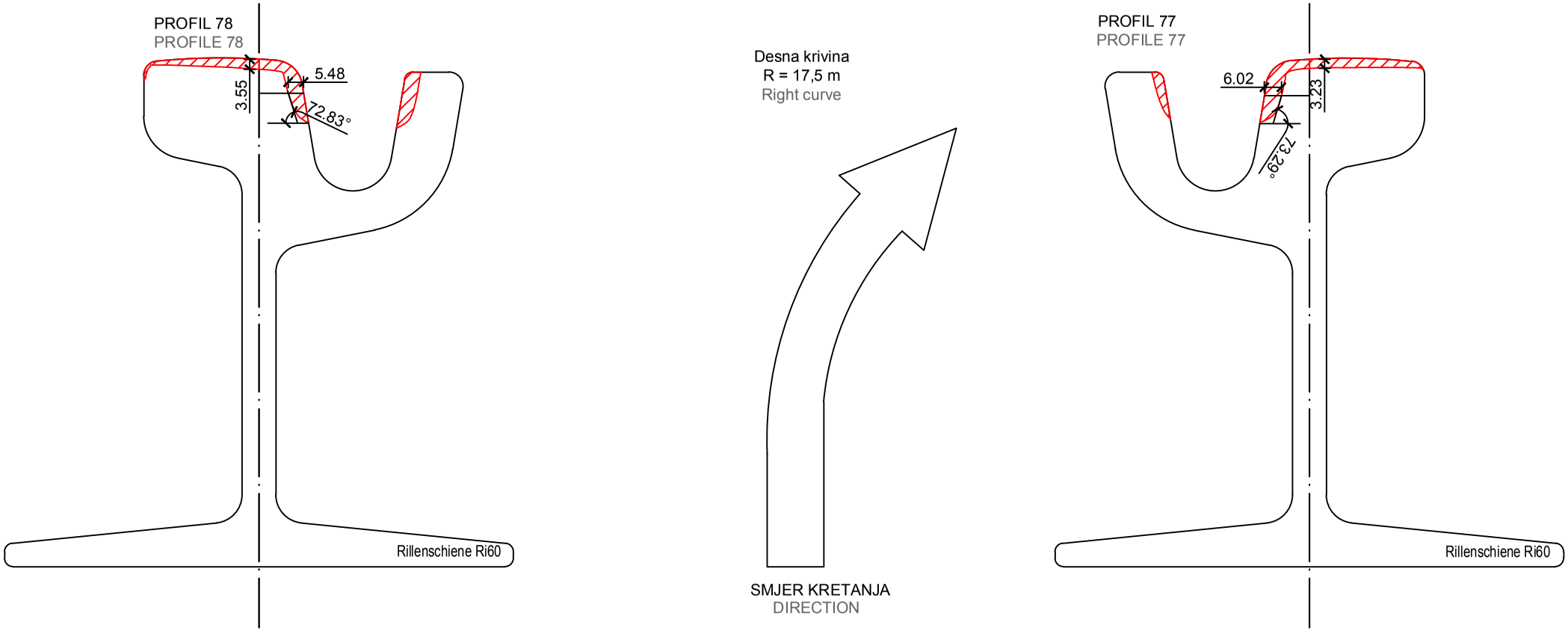
MJ: 1:2

Annex 6.22.1.1. Cross section wear in curves at Location 22

Cross section wear in curve R58

Location 22: Draškovićeva - Vlaška -Šoštarićeva crossing

Scale: 1:2



Prilog 6.22.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 22

Istrošenje poprečnog presjeka tračnica u krivini R59

Lokacija 22: Draškovićeva ul.- Vlaška ul.-Šoštarićeva ul.

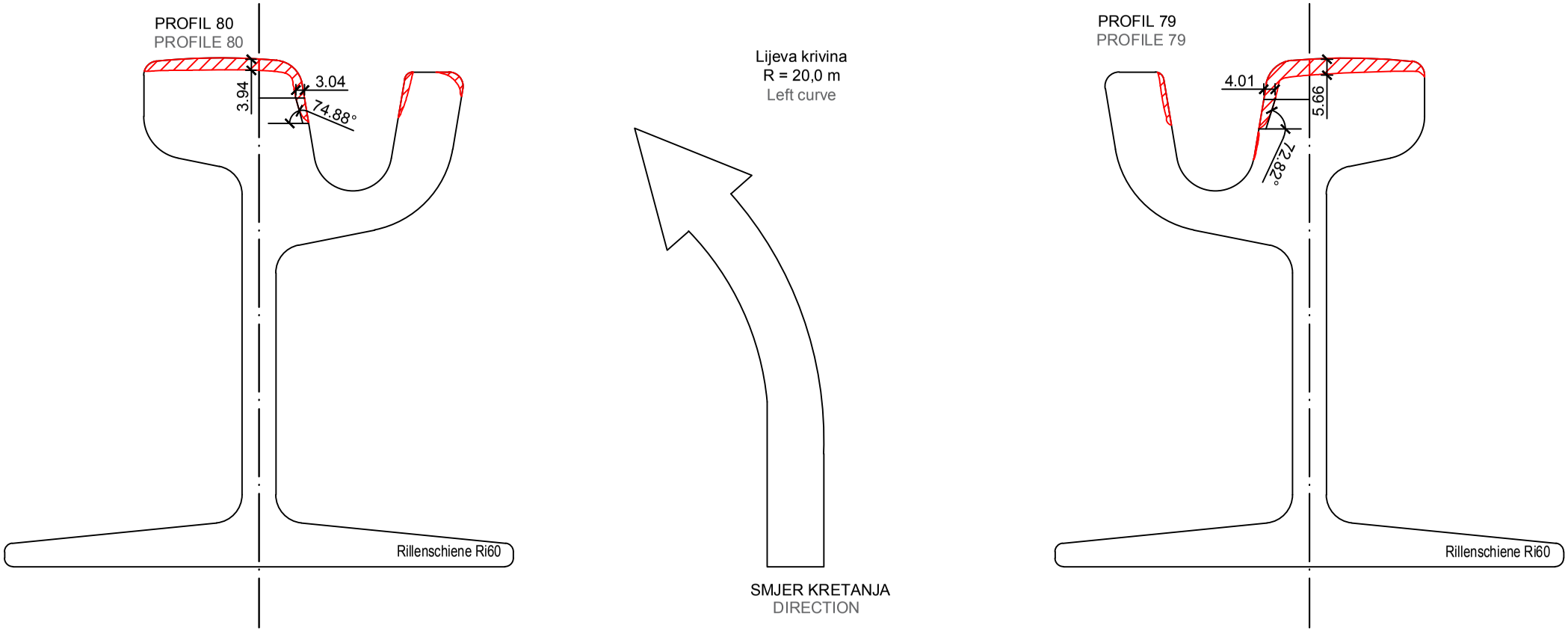
MJ: 1:2

Annex 6.22.1.1. Cross section wear in curves at Location 22

Cross section wear in curve R59

Location 22: Draškovićeva - Vlaška -Šoštarićeva crossing

Scale: 1:2



Prilog 6.22.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 22

Istrošenje poprečnog presjeka tračnica u krivini R60

Lokacija 22: Draškovićeva ul.- Vlaška ul.-Šoštarićeva ul.

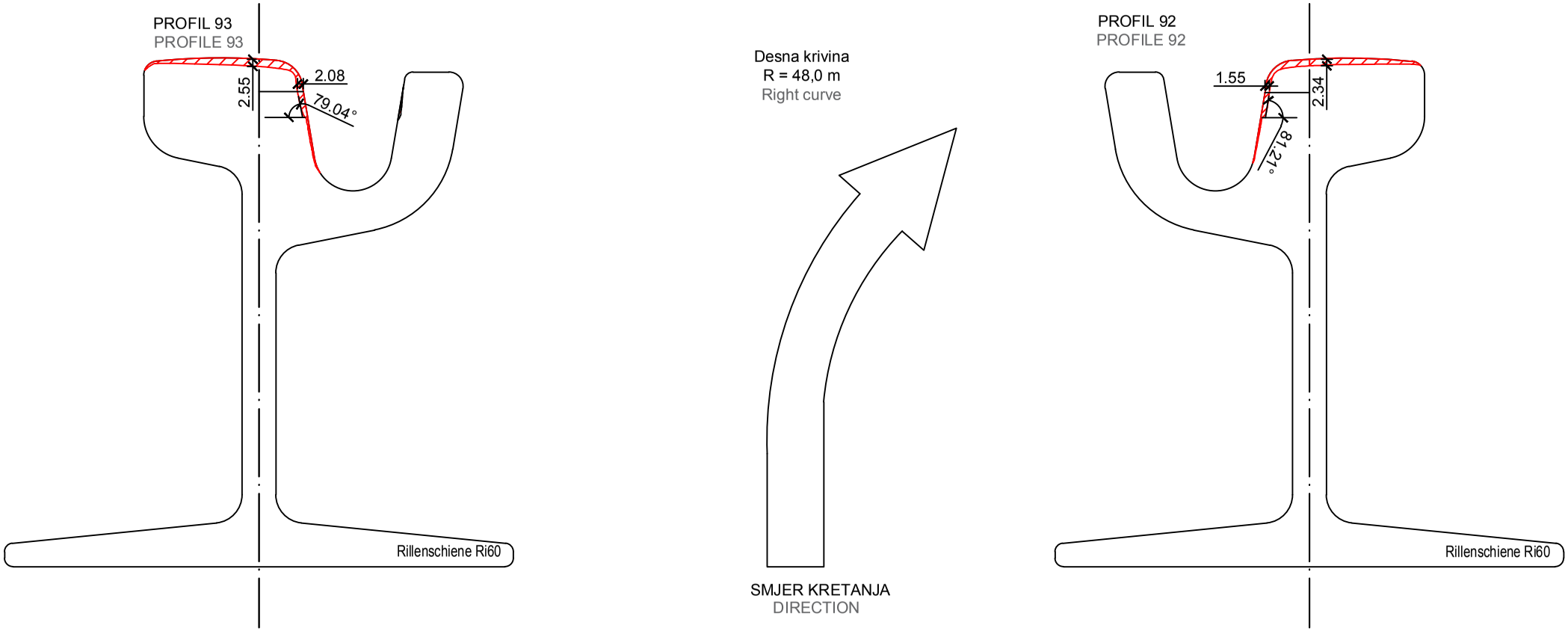
MJ: 1:2

Annex 6.22.1.1. Cross section wear in curves at Location 22

Cross section wear in curve R60

Location 22: Draškovićeva - Vlaška -Šoštarićeva crossing

Scale: 1:2



Prilog 6.22.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 22

Istrošenje poprečnog presjeka tračnica u krivini R61

Lokacija 22: Draškovićeva ul.- Vlaška ul.-Šoštarićeva ul.

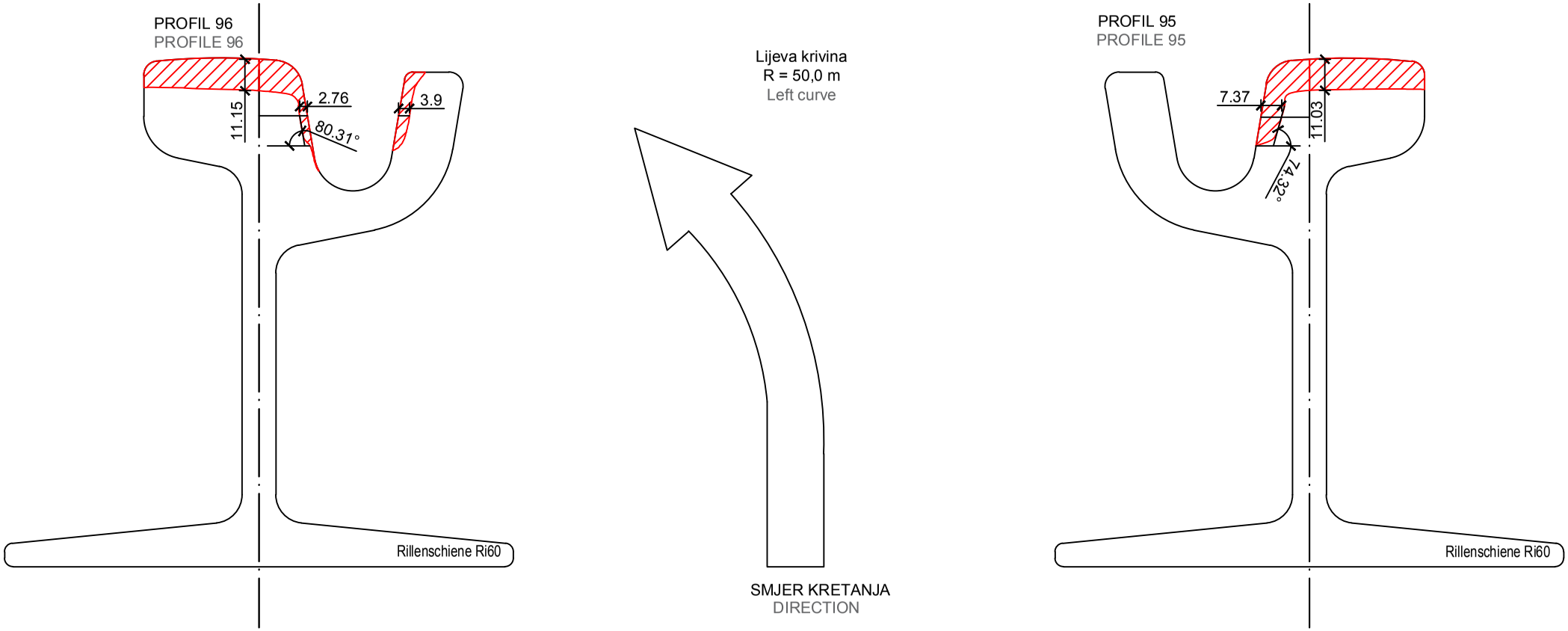
MJ: 1:2

Annex 6.22.1.1. Cross section wear in curves at Location 22

Cross section wear in curve R61

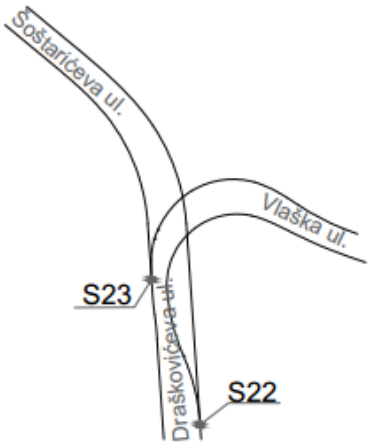
Location 22: Draškovićeva - Vlaška -Šoštarićeva crossing

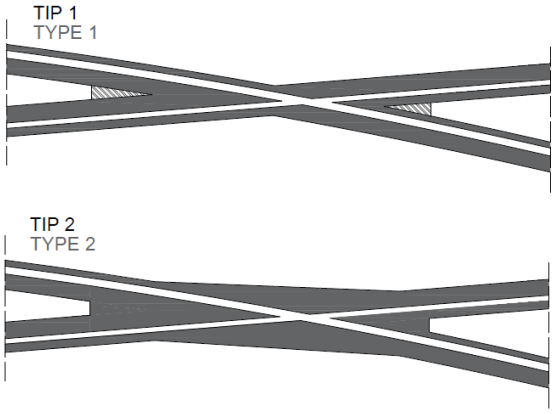
Scale: 1:2



Prilog 6.22.2. **Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 22**
Lokacija 22: Draškovićeva ul.- Vlaška ul.-Šoštarićeva ul.

Annex 6.22.2. **Results of cross section wear in turnouts at Location 22**
Location 22: Draškovićeva - Vlaška -Šoštarićeva crossing





Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-17-02 K-17-04	S22	2	73L	13	19.28	6.28	24.51	26.73	2.22	13
			73D	13	19.62	6.62	30.00	27.44	-2.56	
			75	12	19.25	7.25		28.38		
			76L	13	19.02	6.02	30.00	30.71	0.71	
			76D	13	18.39	5.39	24.50	23.15	-1.35	
K-17-01 K-17-03	S23	2	89L	13	22.04	9.04	34.00	39.11	5.11	13
			89D	13	20.03	7.03	25.03	27.05	2.02	
			90L	12	22.73	10.73	34.00	37.44	3.44	
			90D	12	21.09	9.09	25.03	25.30	0.27	
			91L	13	20.06	7.06	25.03	27.21	2.18	
			91D	13	22.02	9.02	34.00	39.47	5.47	

Prilog 6.22.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 22

Istrošenje poprečnog presjeka srcišta skretnice S22

Lokacija 22: Križanje Draškovićeva ul.- Vlaška ul.-Šoštarićeva ul.

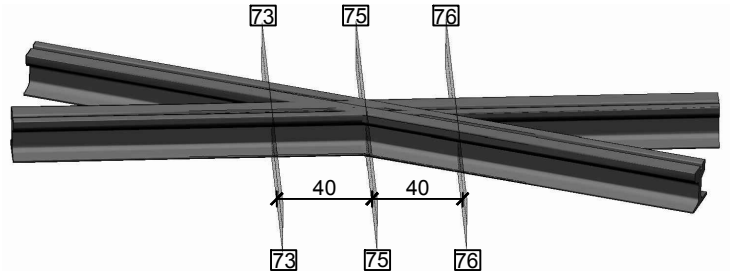
MJ: 1:2

Annex 6.22.2.1. Cross section wear in turnouts at Location 22

Cross section wear in turnout S22

Location 22: Draškovićeva - Vlaška -Šoštarićeva crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

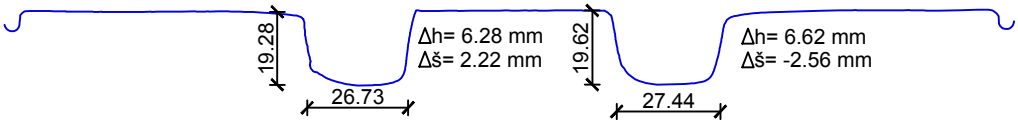
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Draškovićeva ⟶ Vlaška

Direction: Draškovićeva ⟶ Vlaška

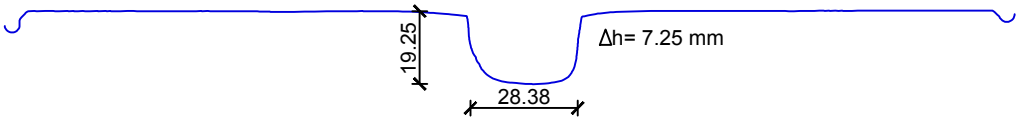
PROFIL 73

PROFILE 73



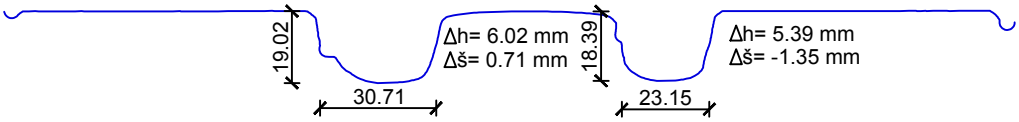
PROFIL 75

PROFILE 75



PROFIL 76

PROFILE 76



Prilog 6.22.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 22

Istrošenje poprečnog presjeka srcišta skretnice S23

Lokacija 22: Križanje Draškovićeva ul.- Vlaška ul.-Šoštarićeva ul.

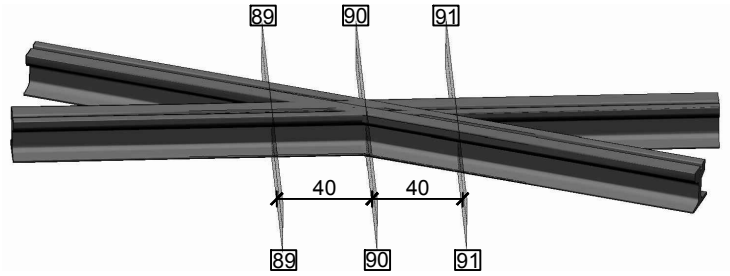
MJ: 1:2

Annex 6.22.2.1. Cross section wear in turnouts at Location 22

Cross section wear in turnout S23

Location 22: Draškovićeva - Vlaška - Šoštarićeva crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

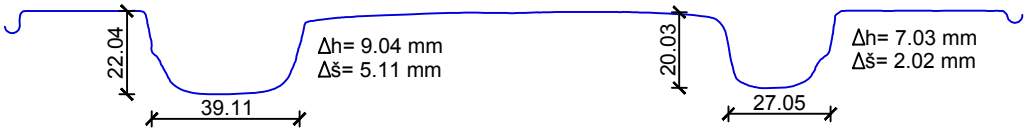
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Vlaška ⟶ Draškovićeva

Direction: Vlaška ⟶ Draškovićeva

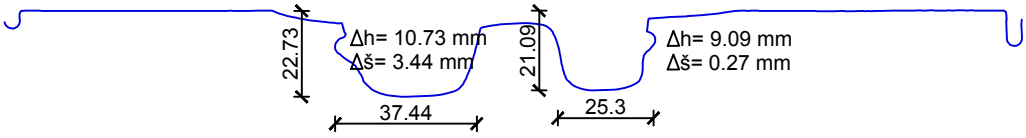
PROFIL 89

PROFILE 89



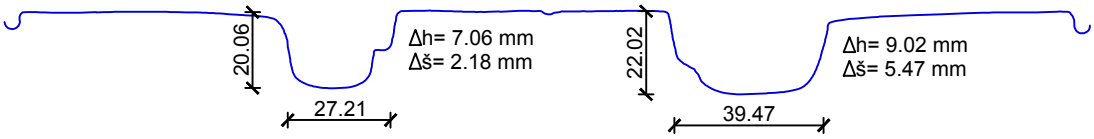
PROFIL 90

PROFILE 90



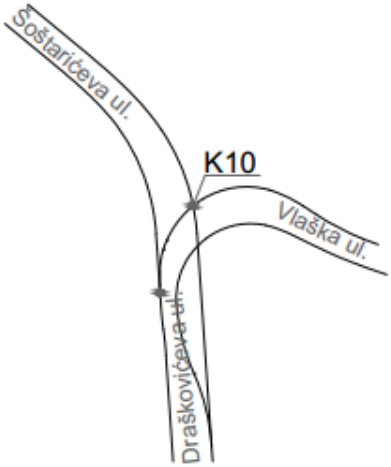
PROFIL 91

PROFILE 91



Prilog 6.22.3. **Rezultati istrošenja profila tračnica u križalištima na Lokaciji 22**
Lokacija 22: Draškovićeva ul.- Vlaška ul.-Šoštarićeva ul.

Annex 6.22.3. **Results of cross section wear in track crossing at Location**
Location 22: Draškovićeva - Vlaška -Šoštarićeva crossing



Dionice Sections	**Oznaka križališta** Track crossing mark	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-17-04 K-17-02	K9	81	12	16,36	4.36	34.00	43.68	9.68	13
		82	12	17,67	5.67	34.00	39.92	5.92	
		83	12	13.50	1.50	24.00	24.43	0.43	
		84	12	12,88	0.88	24.00	24.72	0.72	
K-17-03 K-17-02	K10	85	12	18,58	6.58	34.00	38.99	4.99	13
		86	12	15,63	3.63	34.00	39.23	5.23	
		87	12	14,54	2.54	30.00	32.02	2.02	
		88	12	14,29	2.29	30.00	31.38	1.38	

Prilog 6.22.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 22

Istrošenje poprečnog presjeka tračnica u križalištu K9

Lokacija 22: Križanje Draškovićeva ul.- Vlaška ul.-Šoštarićeva ul.

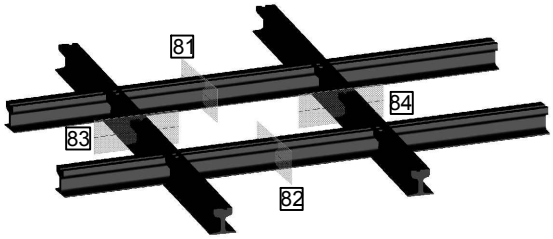
MJ: 1:2

Annex 6.22.3.1. Cross section wear in track crossings at Location 22

Cross section wear in track crossing K9

Location 22: Draškovićeva - Vlaška - Šoštarićeva crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

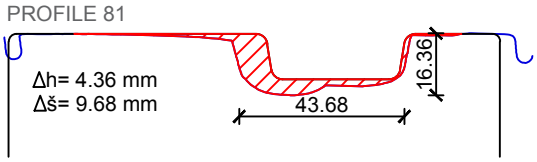
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Draškovićeva ⟶ Vlaška

Direction: Draškovićeva ⟶ Vlaška

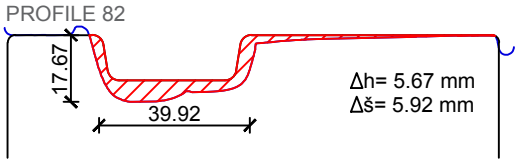
PROFIL 81

PROFILE 81



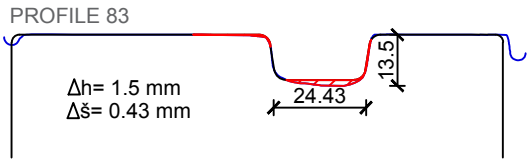
PROFIL 82

PROFILE 82



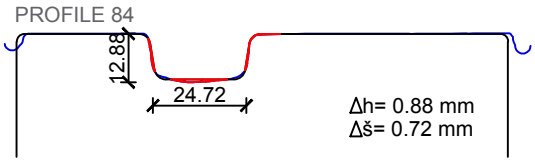
PROFIL 83

PROFILE 83



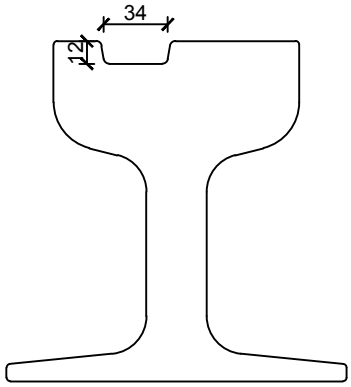
PROFIL 84

PROFILE 84



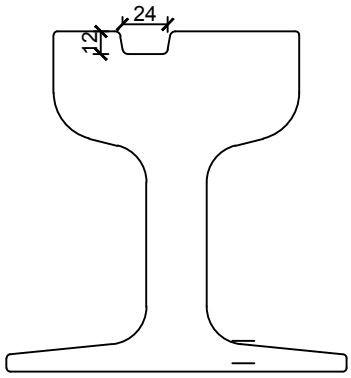
PROFIL 81, 82 PROFILE 81, 82

R = 18 m



PROFIL 83, 84 PROFIL 83, 84

R = 0 m



Prilog 6.22.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 22

Istrošenje poprečnog presjeka tračnica u križalištu K10

Lokacija 22: Križanje Draškovićeva ul.- Vlaška ul.-Šoštarićeva ul.

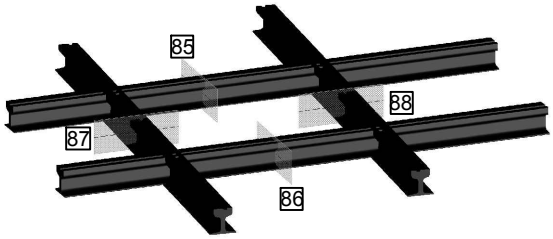
MJ: 1:2

Annex 6.22.3.1. Cross section wear in track crossings at Location 22

Cross section wear in track crossing K10

Location 22: Draškovićeva - Vlaška - Šoštarićeva crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

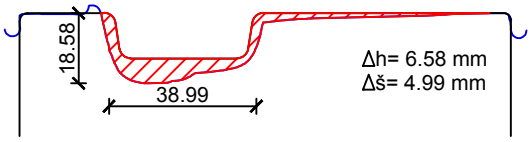
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Vlaška ⟶ Draškovićeva

Direction: Vlaška ⟶ Draškovićeva

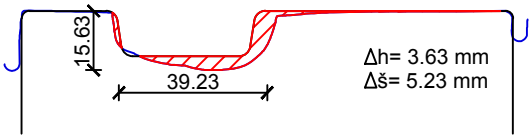
PROFIL 85

PROFILE 85



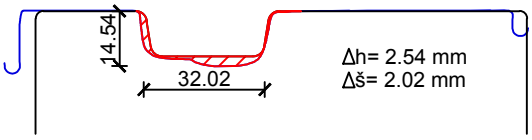
PROFIL 86

PROFILE 86



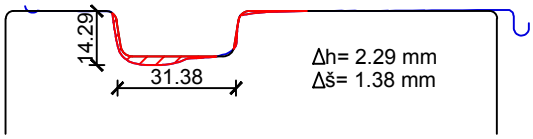
PROFIL 87

PROFILE 87



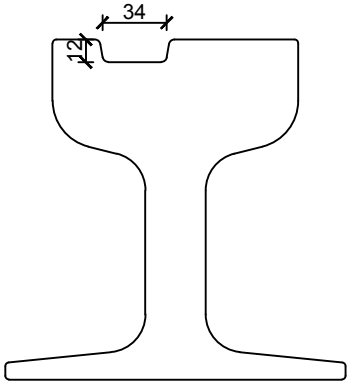
PROFIL 88

PROFILE 88



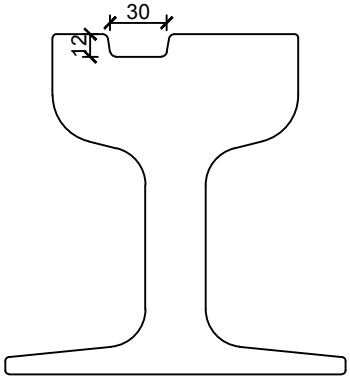
PROFIL 85, 86 PROFILE 85, 86

R = 21 m



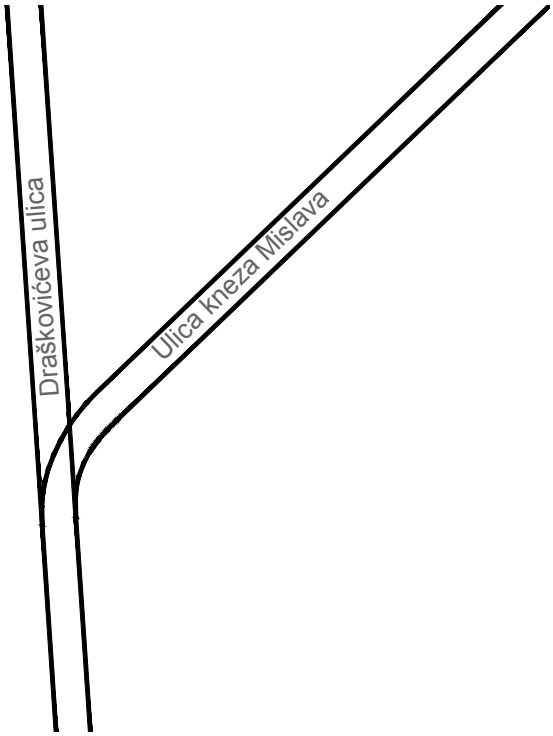
PROFIL 87, 88 PROFILE 87, 88

R = 50 m



Lokacija 23 (L23)
Križanje Ulice kneza Mislava - Draškovićeva

Location 23 (L23)
Kneza Mislava - Draškovićeva crossing



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija razvoja tramvajskog prometa □rada □agre□a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition

SADRŽAJ PRILOGA:
ANNEX:

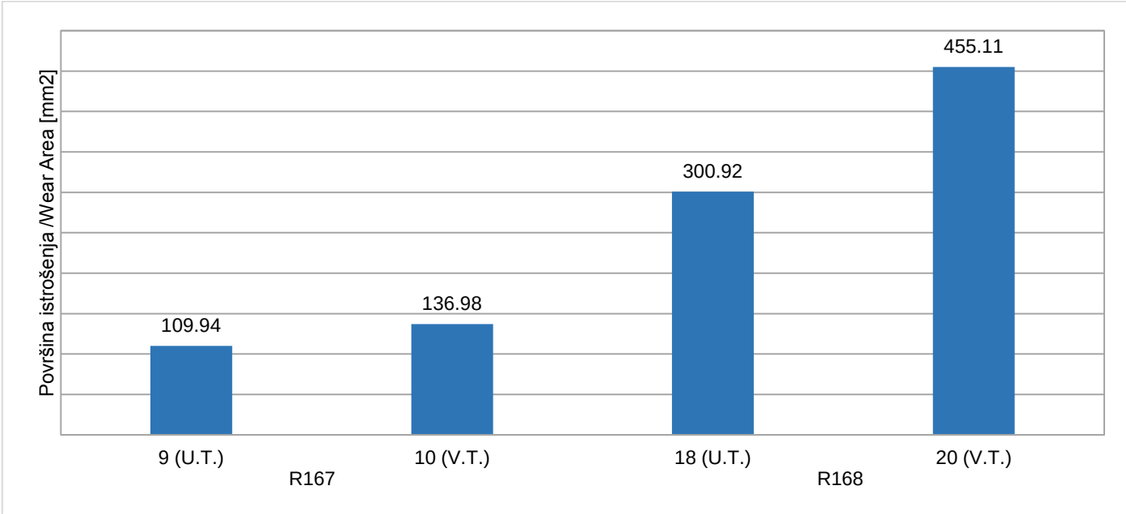
Istrošenje poprečnih presjeka tračnica u krivinama, skretnicama i križalištima na Lokaciji 23

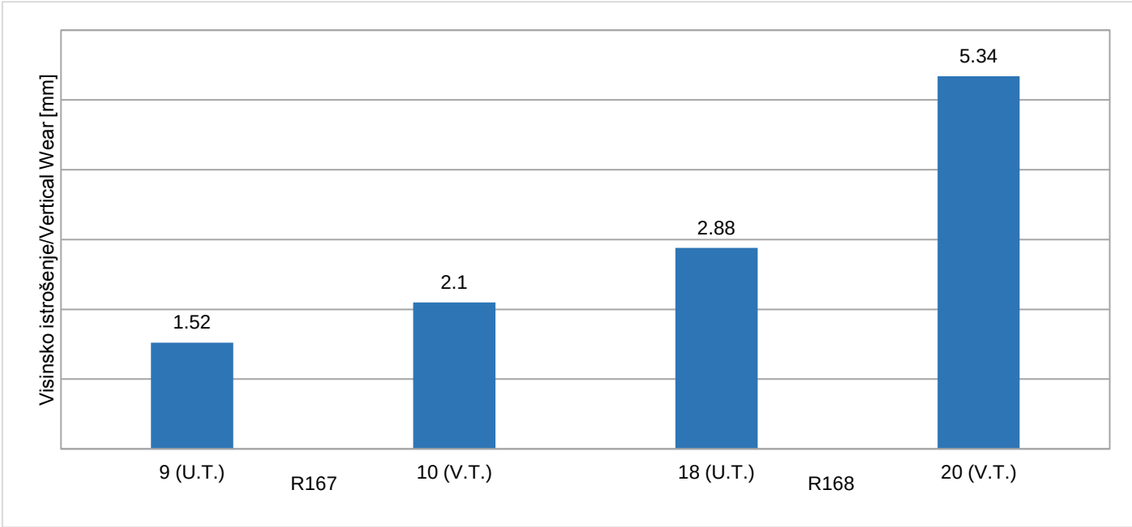
Rail cross section wear in curves, turnouts and crossings at Location 23

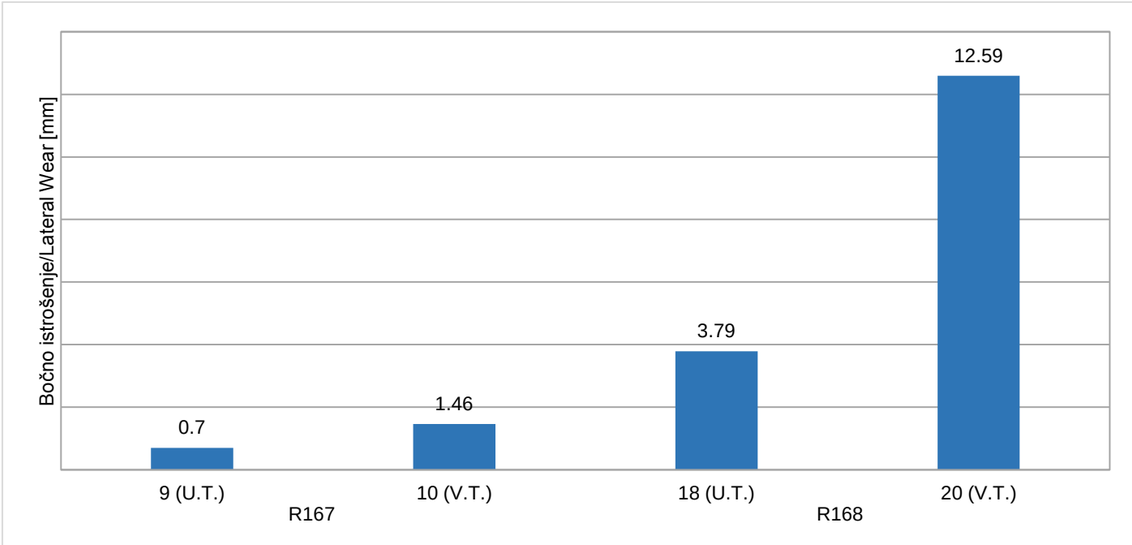
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.23

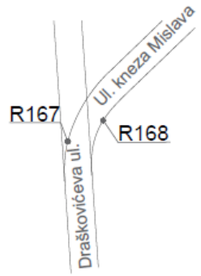
Prilog 6.23.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 23**
Lokacija 23: Križanje Ulica kneza Mislava - Draškovićeva

Annex 6.23.1. **Results of cross section wear in curves at Location 23**
Location 23: Kneza Mislava - Draškovićeva crossing









Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [ ]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
K-15-03	R167	lijeva left	9	lijeva/left	109.94	1.52	0.7	79.1	35	17
			10	desna/right	136.98	2.1	1.46	75.02		
K-15-04	R168	desna right	20	lijeva/left	455.11	5.34	12.59	72.86	25	17
			18	desna/right	300.92	2.88	3.79	78.93		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
K-15-03	R167	lijeva left	9	lijeva/left	109.94	1.52	0.7
			10	desna/right	136.98	2.1	1.46
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					27.04	0.58	0.76
K-15-04	R168	desna right	20	lijeva/left	455.11	5.34	12.59
			18	desna/right	300.92	2.88	3.79
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					154.19	2.46	8.8

U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve

Prilog 6.23.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 23

Istrošenje poprečnog presjeka tračnica u krivini R167

Lokacija 23: Križanje Ulica kneza Mislava - Draškovićeva

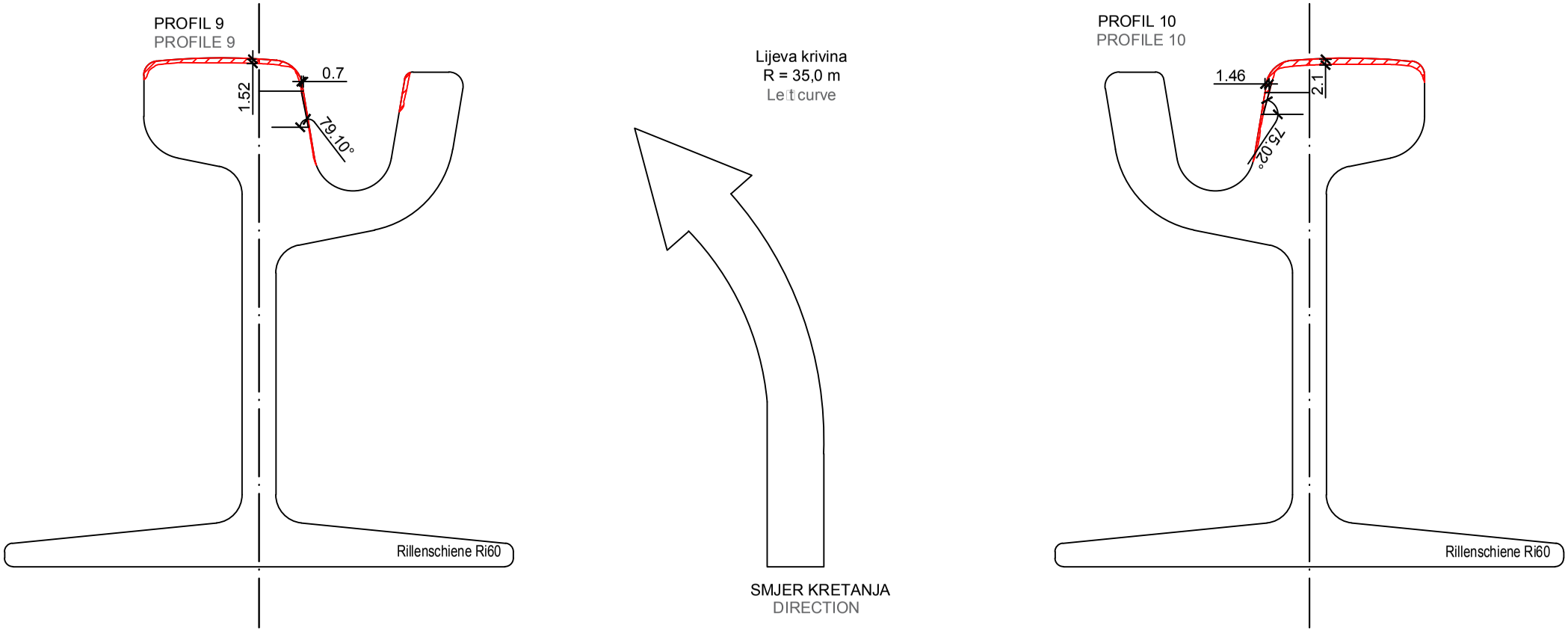
MJ: 1:2

Annex 6.23.1.1. Cross section wear in curves at Location 23

Cross section wear in curve R167

Location 23: Kneza Mislava - Draškovićeva crossing

Scale: 1:2



Prilog 6.23.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 23

Istrošenje poprečnog presjeka tračnica u krivini R168

Lokacija 23: Križanje Ulica kneza Mislava - Draškovićeva

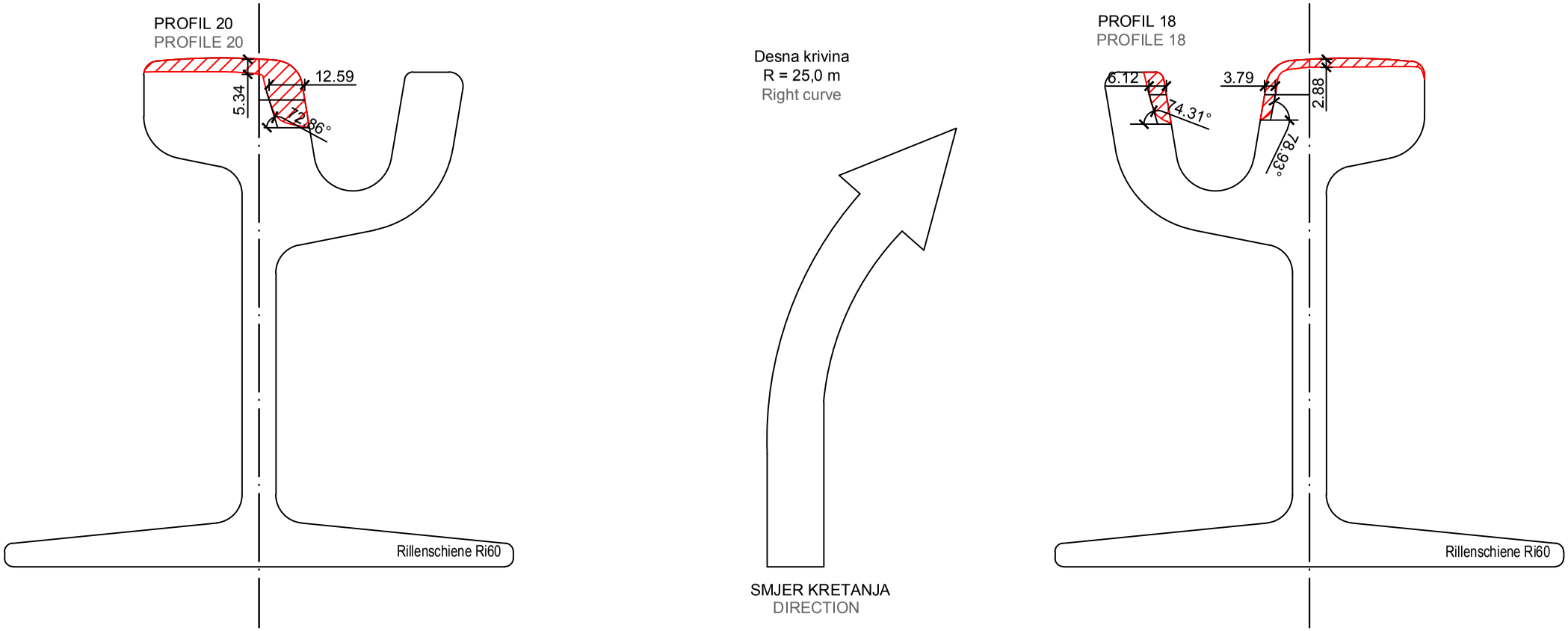
MJ: 1:2

Annex 6.23.1.1. Cross section wear in curves at Location 23

Cross section wear in curve R168

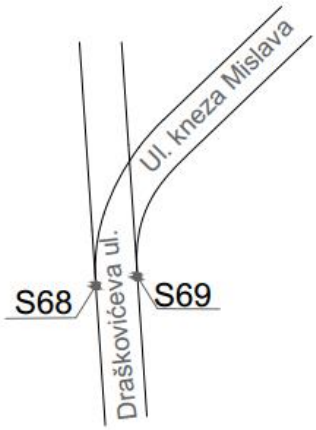
Location 23: Kneza Mislava - Draškovićeva crossing

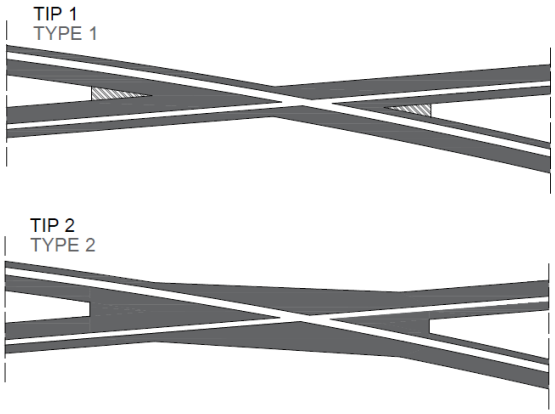
Scale: 1:2



Prilog 6.23.2. **Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 23**
Lokacija 23: Križanje Ulice kneza Mislava - Draškovićeva

Annex 6.23.2. **Results of cross section wear in turnouts at Location 23**
Location 23: Kneza Mislava - Draškovićeva crossing





Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-15-01 K-15-03	S68	2	6L	13	13.74	0.74	30.00	33.07	3.07	17
			6D	13	16.43	3.43	24.61	22.03	-2.58	
			7	12	16.89	4.89		34.82		
			8L	13	16.57	3.57	24.61	21.57	-3.04	
			8D	13	13.87	0.87	30.00	32.80	2.80	
K-15-02 K-15-04	S69	1	15L	13	21.69	8.69	35.15	46.95	11.80	17
			15D	13	21.23	8.23	24.00	25.25	1.25	
			16	12	20.80	8.80		50.61		
			17L	13	24.95	11.95	24.00	25.67	1.67	
			17D	13	24.15	11.15	35.15	50.31	15.16	

Prilog 6.23.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 23

Istrošenje poprečnog presjeka srcišta skretnice S68

Lokacija 23: Križanje Ulice kneza Mislava - Draškovićeva

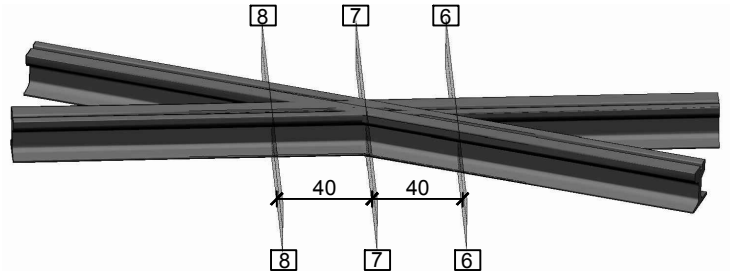
MJ: 1:2

Annex 6.23.2.1. Cross section wear in turnouts at Location 23

Cross section wear in turnout S68

Location 23: Kneza Mislava - Draškovićeva crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

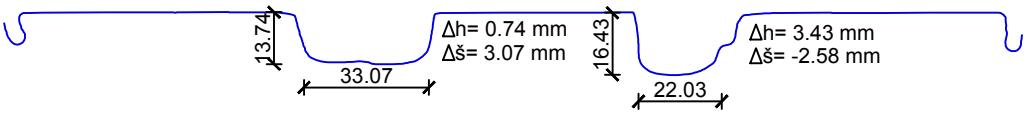
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Vlaška ⟶ ranimirova

Direction: Vlaška ⟶ ranimirova

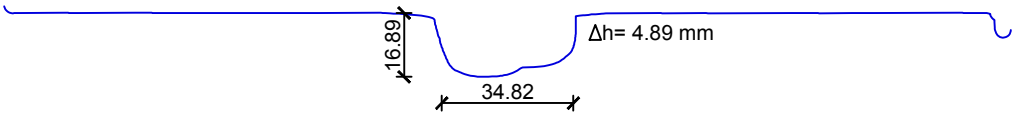
PROFIL 6

PROFILE 6



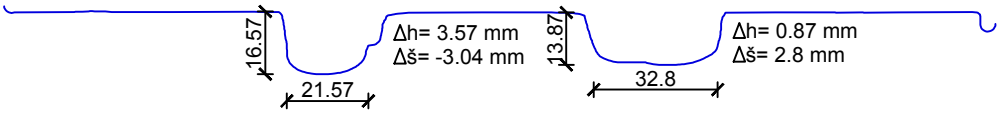
PROFIL 7

PROFILE 7



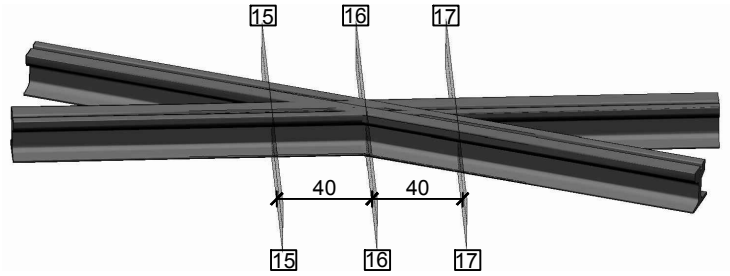
PROFIL 8

PROFILE 8



Prilog 6.23.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 23
Istrošenje poprečnog presjeka srcišta skretnice S69
Lokacija 23: Križanje Ulice kneza Mislava - Draškovićeva
MJ: 1:2

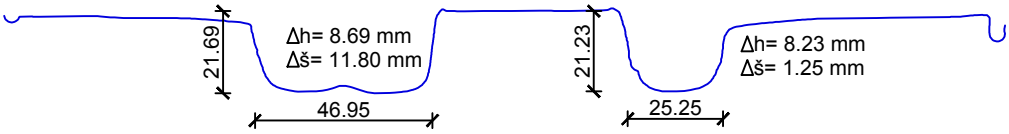
Annex 6.23.2.1. Cross section wear in turnouts at Location 23
Cross section wear in turnout S69
Location 23: Kneza Mislava - Draškovićeva crossing
Scale: 1:2



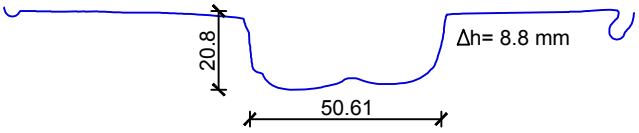
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Branimirova ⟶ Vlaška
Direction: Branimirova ⟶ Vlaška

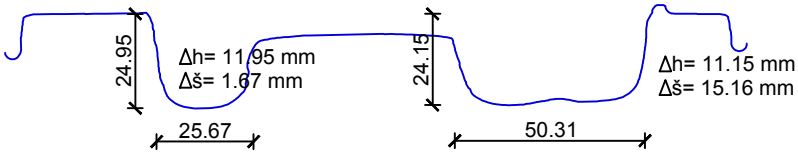
PROFIL 15
PROFILE 15



PROFIL 16
PROFILE 16

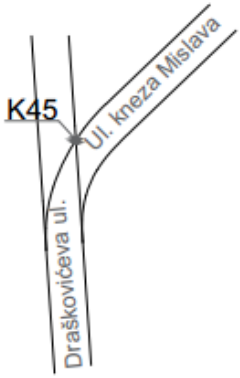


PROFIL 17
PROFILE 17



Prilog 6.23.3. **Rezultati istrošenja profila tračnica u križalištima na Lokaciji 23**
Lokacija 23: Križanje Ulice kneza Mislava - Draškovićeva

Annex 6.23.3. **Results of cross section wear in track crossing at Location 23**
Location 23: Kneza Mislava - Draškovićeva crossing



Dionice Sections	**Oznaka križališta** Track crossing mark	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-15-03 K-15-02	K45	11	12	13,23	1.23	24.00	23.54	-0.46	17
		12	12	13,16	1.16	24.00	23.26	-0.74	
		13	12	13,44	1.44	30.00	30.56	0.56	
		14	12	14,07	2.07	30.00	30.53	0.53	

Prilog 6.23.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 23

Istrošenje poprečnog presjeka tračnica u križalištu K45

Lokacija 23: Križanje Draškovićeva ul.- Vlaška ul.- Šoštarićeva ul.

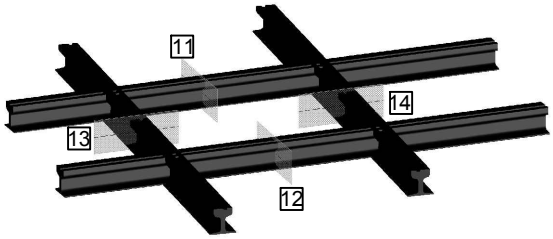
MJ: 1:2

Annex 6.23.3.1. Cross section wear in track crossings at Location 23

Cross section wear in track crossing K45

Location 23: Kneza Mislava - Draškovićeva crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

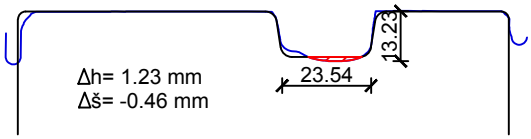
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Branimirova ⟶ Vlaška

Direction: □ranimirova ⟶ Vlaška

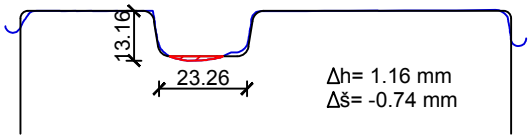
PROFIL 11

PROFILE11



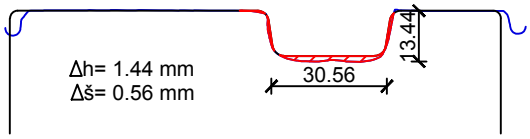
PROFIL 12

PROFILE 12



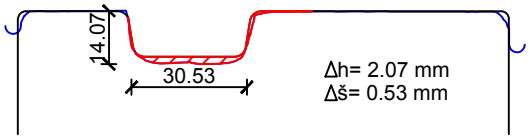
PROFIL 13

PROFILE 13



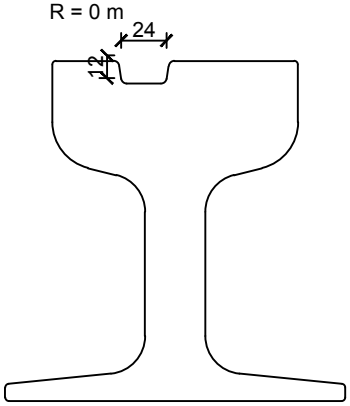
PROFIL 14

PROFILE 14



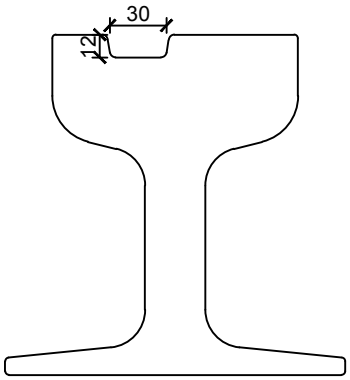
PROFIL 11, 12 □PROFILE 11, 12

R = 0 m

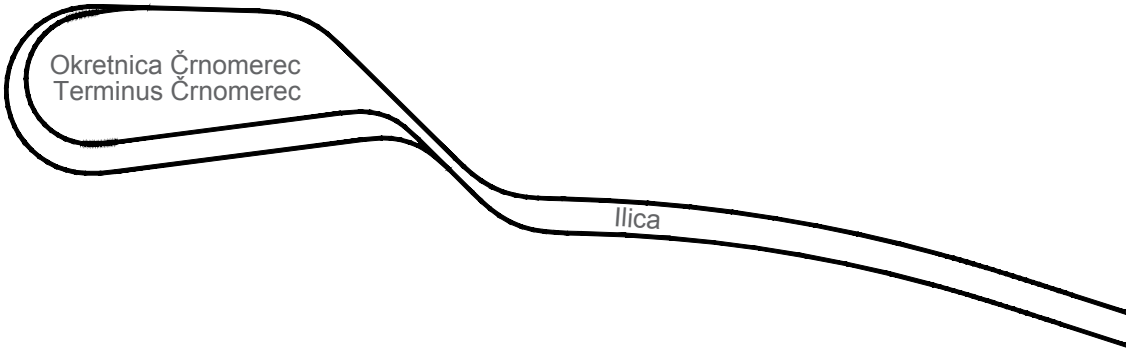


PROFIL 13, 14 □PROFILE 13, 14

R = 50 m



Lokacija 24 (L24)
Okretnica Črnomerec
Location 24 (L24)
Terminus Črnomerec



IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija ra□voja tramvajskog prometa □rada □agre□a Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition

SADRŽAJ PRILOGA:
ANNEX:

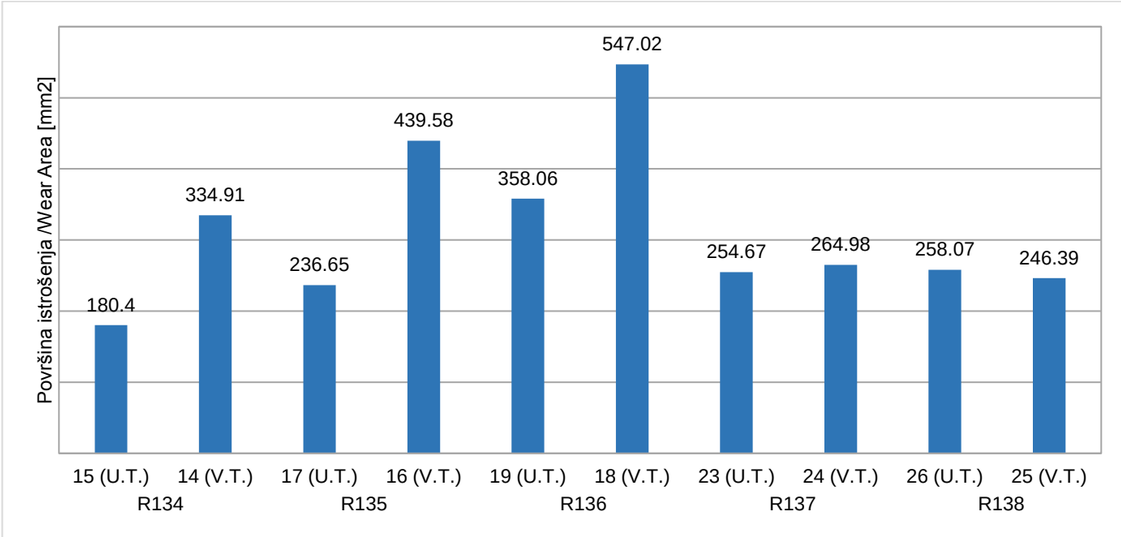
Istrošenje poprečnih presjeka tračnica u krivinama i skretnicama na Lokaciji 24

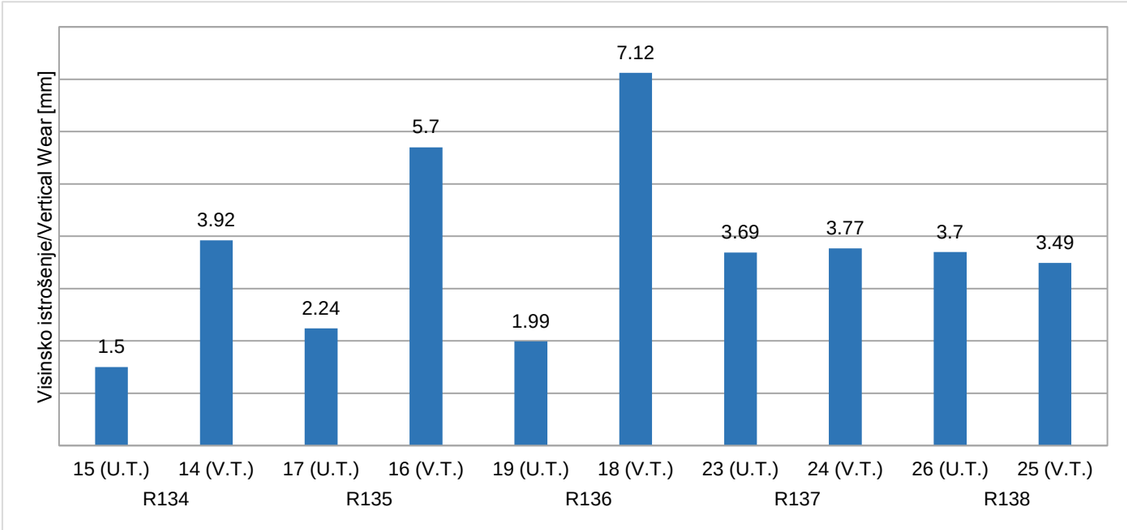
Rail cross section wear in curves and turnouts at Location 24

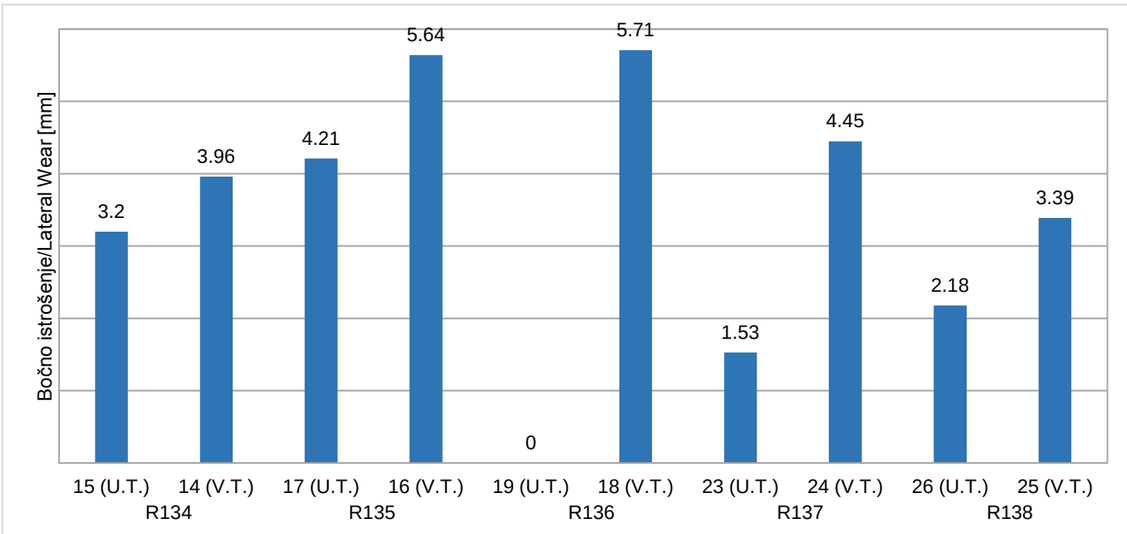
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.24

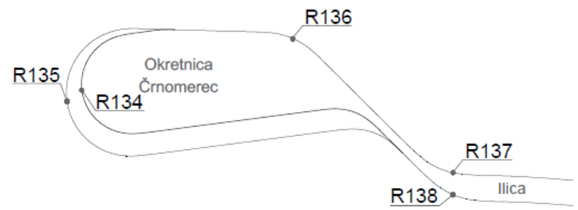
Prilog 6.24.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 24**
Lokacija 24: Okretnica Črnomerec

Annex 6.24.1. **Results of cross section wear in curves at Location 24**
Location 24: Terminus Črnomerec









Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear				Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
					Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [ ]		
Z-06-03	R134	lijeva left	15	lijeva/left	180.4	1.5	3.2	76.07	17	17
			14	desna/right	334.91	3.92	3.96	69.45	17	17
Z-06-02	R135	lijeva left	17	lijeva/left	236.65	2.24	4.21	77.61	22	17
			16	desna/right	439.58	5.7	5.64	74.48	22	17
Z-06-01	R136	lijeva left	19	lijeva/left	358.06	1.99	0	0	26	17
			18	desna/right	547.02	7.12	5.71	78.1	26	17
D-10-13	R137	desna right	24	lijeva/left	264.98	3.77	4.45	74.51	25	17
			23	desna/right	254.67	3.69	1.53	80.93	25	17
D-10-04	R138	lijeva left	26	lijeva/left	258.07	3.7	2.18	78.98	25	17
			25	desna/right	246.39	3.49	3.39	72.32	25	17

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear		
					Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
Z-06-03	R134	lijeva left	15	lijeva/left	180.4	1.5	3.2
			14	desna/right	334.91	334.91	334.91
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					154.51	333.41	331.71
Z-06-02	R135	lijeva left	17	lijeva/left	236.65	2.24	4.21
			16	desna/right	439.58	5.7	5.64
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					202.93	3.46	1.43
Z-06-01	R136	lijeva left	19	lijeva/left	358.06	1.99	0
			18	desna/right	547.02	7.12	5.71
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					188.96	5.13	5.71
D-10-13	R137	desna right	24	lijeva/left	264.98	3.77	4.45
			23	desna/right	254.67	3.69	1.53
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					10.31	0.08	2.92
D-10-04	R138	lijeva left	26	lijeva/left	258.07	3.7	2.18
			25	desna/right	246.39	3.49	3.39
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-11.68	-0.21	1.21

U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve

Prilog 6.24.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 24

Istrošenje poprečnog presjeka tračnica u krivini R134

Lokacija 24: Okretnica Črnomerec

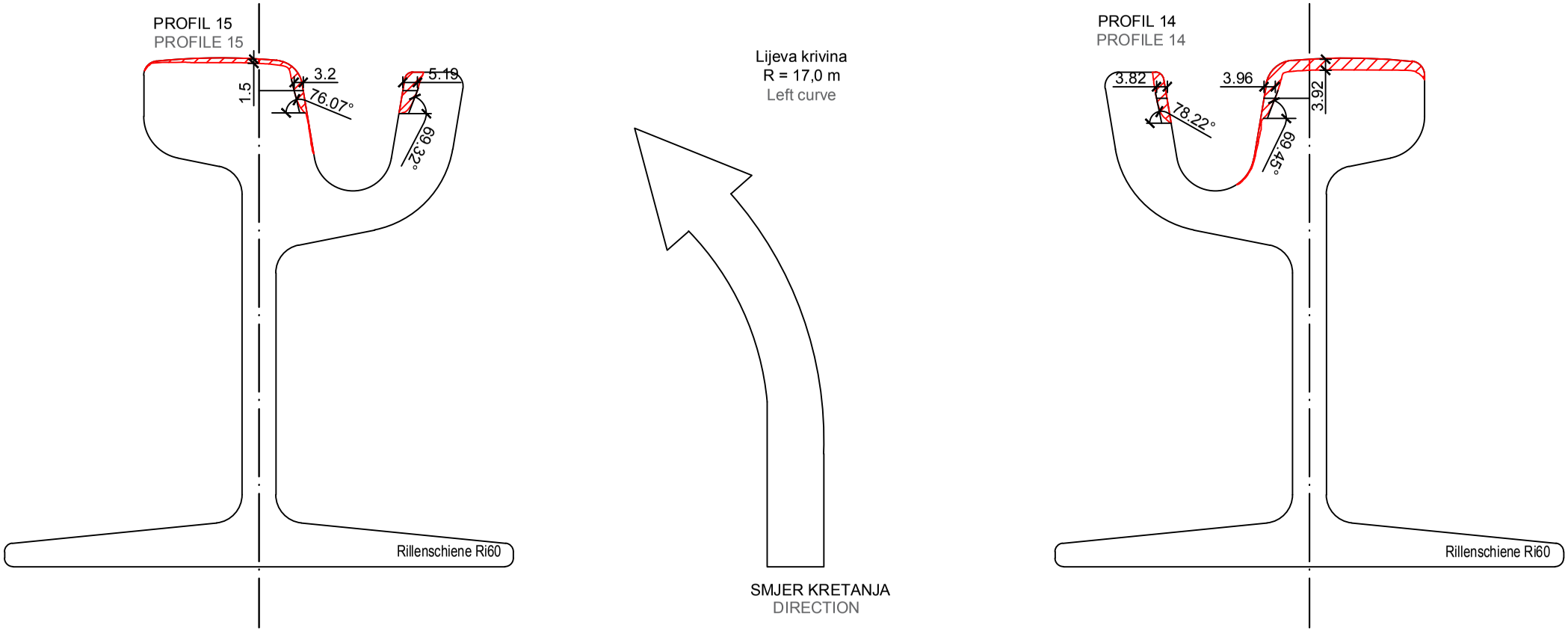
MJ: 1:2

Annex 6.24.1.1. Cross section wear in curves at Location 24

Cross section wear in curve R134

Location 24: Terminus Črnomerec

Scale: 1:2



Prilog 6.24.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 24

Istrošenje poprečnog presjeka tračnica u krivini R135

Lokacija 24: Okretnica Črnomerec

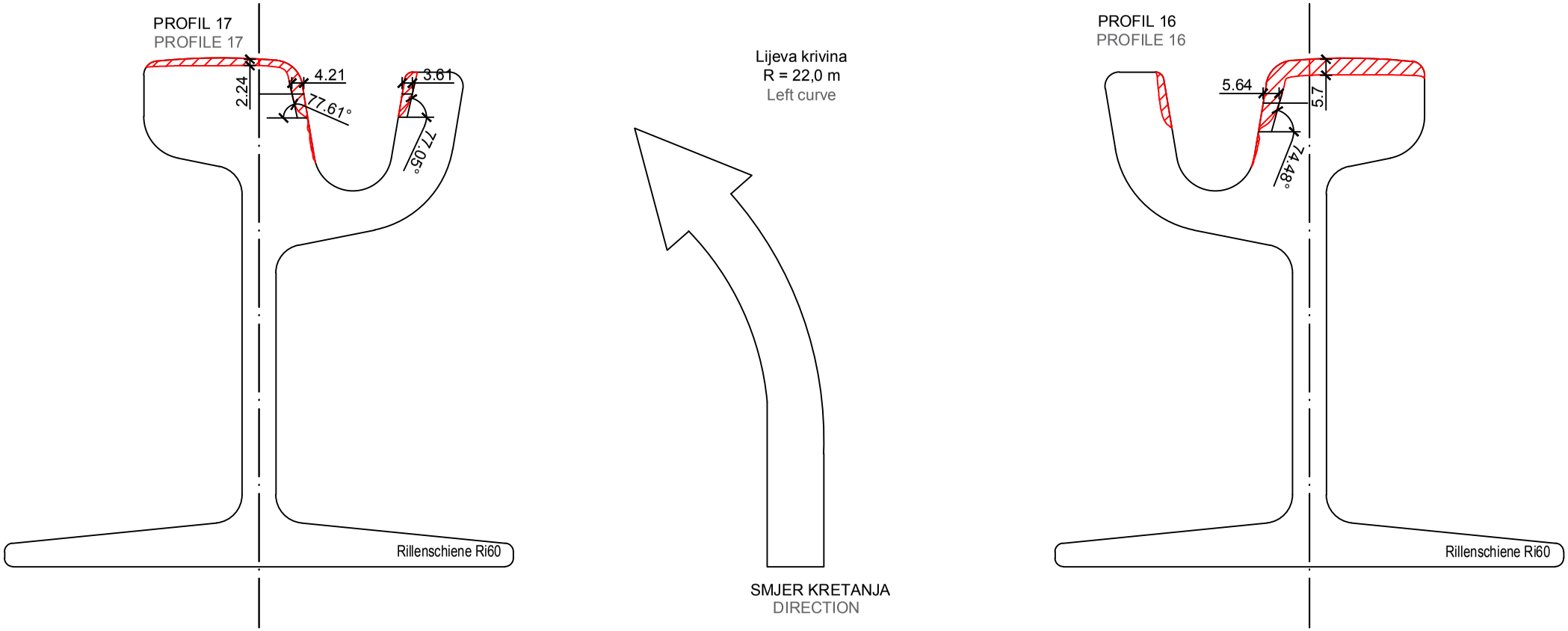
MJ: 1:2

Annex 6.24.1.1. Cross section wear in curves at Location 24

Cross section wear in curve R135

Location 24: Terminus Črnomerec

Scale: 1:2



Prilog 6.24.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 24

Istrošenje poprečnog presjeka tračnica u krivini R136

Lokacija 24: Okretnica Črnomerec

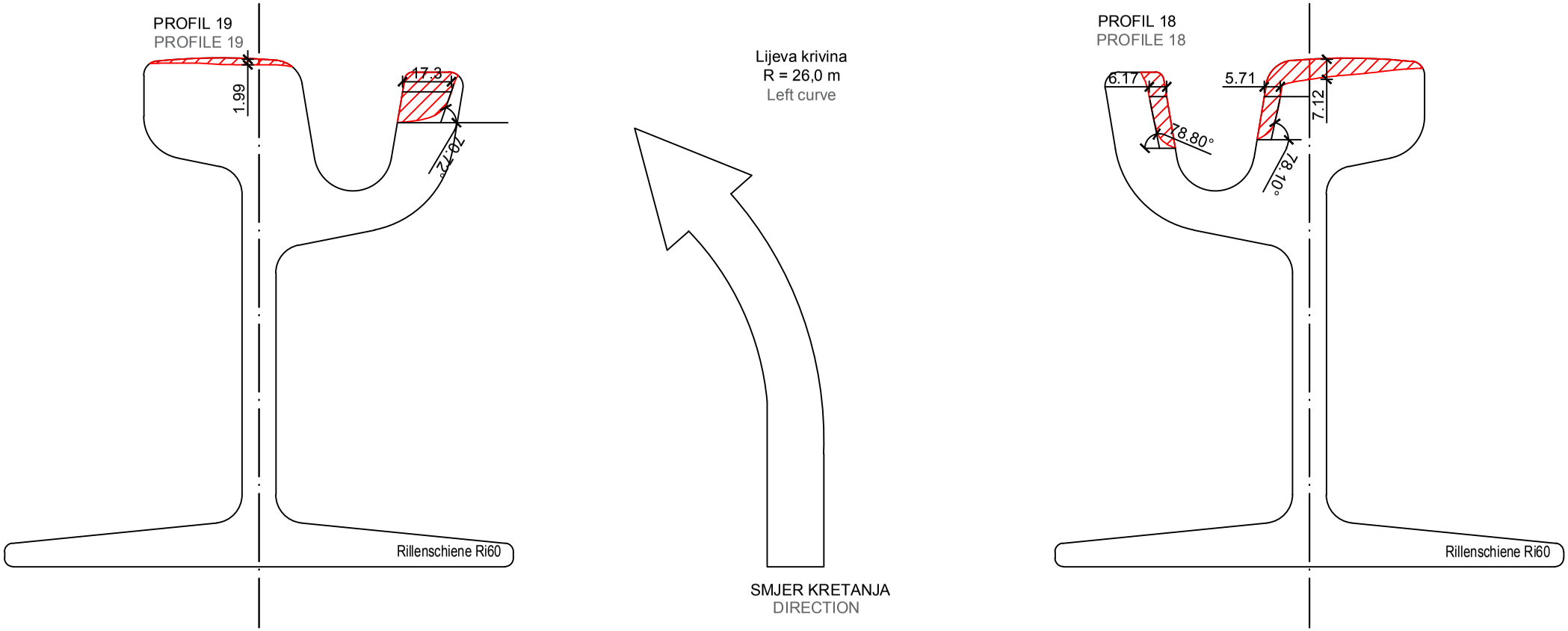
MJ: 1:2

Annex 6.24.1.1. Cross section wear in curves at Location 24

Cross section wear in curve R136

Location 24: Terminus Črnomerec

Scale: 1:2



Prilog 6.24.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 24

Istrošenje poprečnog presjeka tračnica u krivini R137

Lokacija 24: Okretnica Črnomerec

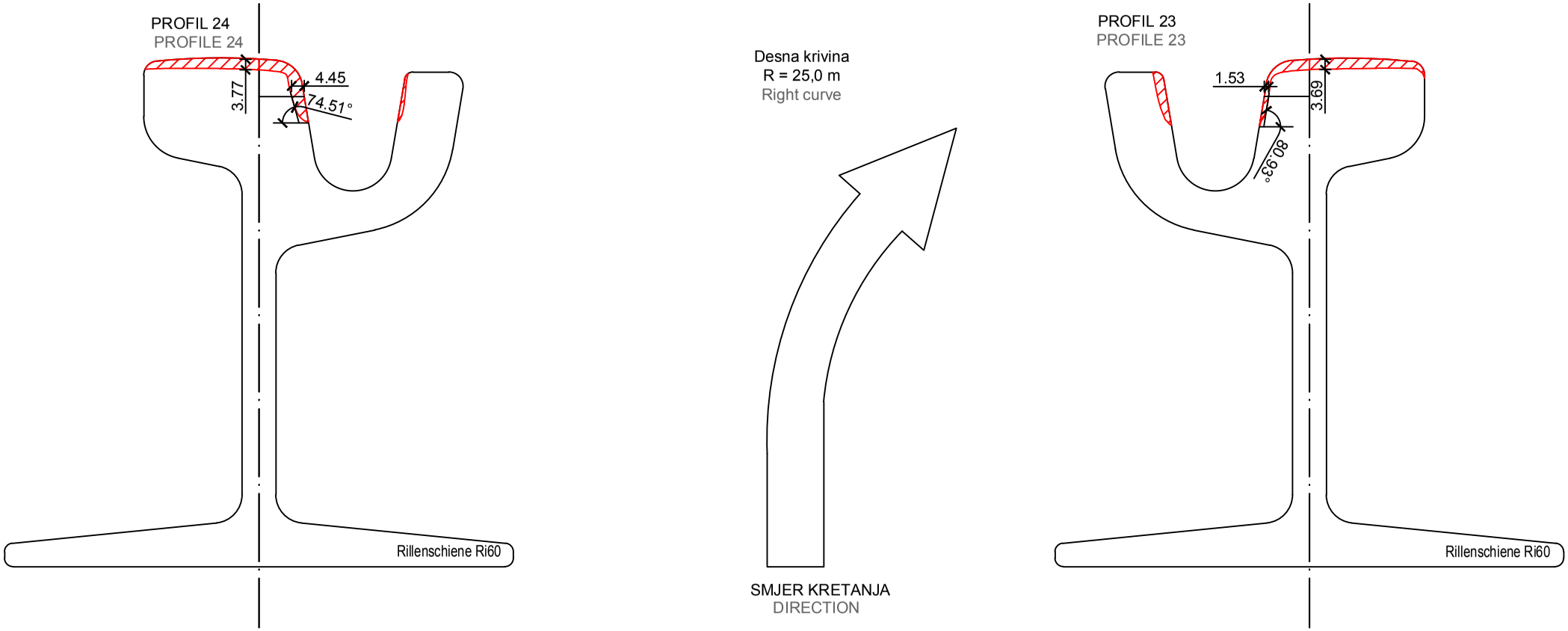
MJ: 1:2

Annex 6.24.1.1. Cross section wear in curves at Location 24

Cross section wear in curve R137

Location 24: Terminus Črnomerec

Scale: 1:2



Prilog 6.24.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 24

Istrošenje poprečnog presjeka tračnica u krivini R138

Lokacija 24: Okretnica Črnomerec

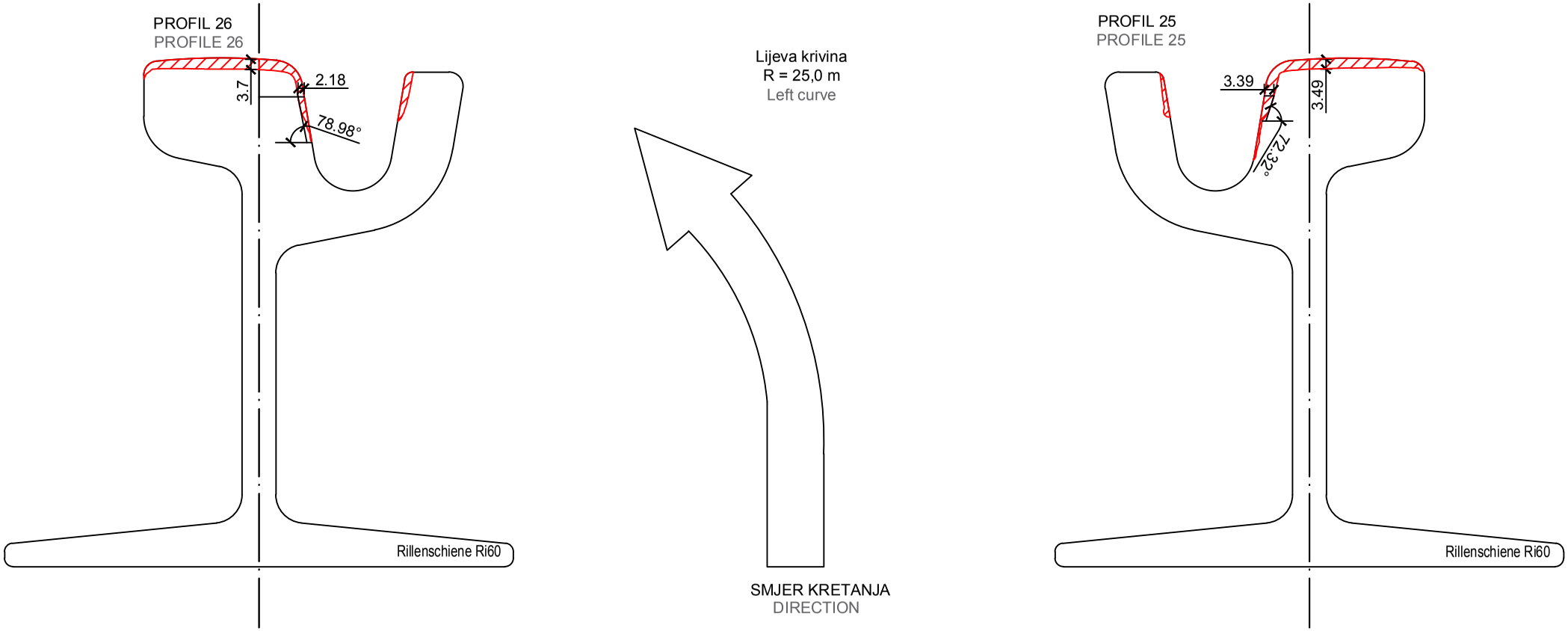
MJ: 1:2

Annex 6.24.1.1. Cross section wear in curves at Location 24

Cross section wear in curve R138

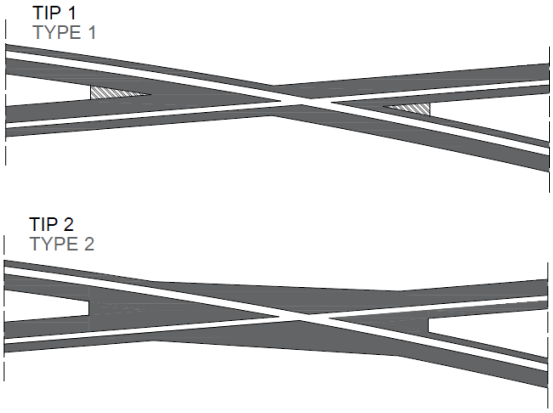
Location 24: Terminus Črnomerec

Scale: 1:2



Prilog 6.24.2. **Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 24**
Lokacija 24: Okretnica Črnomerec

Annex 6.24 2. **Results of cross section wear in turnouts at Location 24**
Location 24: Terminus Črnomerec



Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
Z-06-02 Z-06-03	S400	1	11L	13	24.21	11.21	24.00	29.65	5.65	17
			11D	13	22.20	9.20	24.33	26.31	1.98	
			12	12	22.38	10.38		41.59		
			13L	13	25.51	12.51	24.33	25.04	0.71	
			13D	13	26.02	13.02	24.00	25.52	1.52	
Z-06-02 Z-06-03	S399	2	20L	13	13.67	0.67	24.00	25.27	1.27	17
			20D	13	13.75	0.75	35.48	36.32	0.84	
			21	12	13.25	1.25		47.90		
			22L	13	13.92	0.92	35.48	36.61	1.13	
			22D	13	14.31	1.31	24.00	25.59	1.59	

Prilog 6.24.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 24

Istrošenje poprečnog presjeka srcišta skretnice S399

Lokacija 24: Okretnica Črnomerec

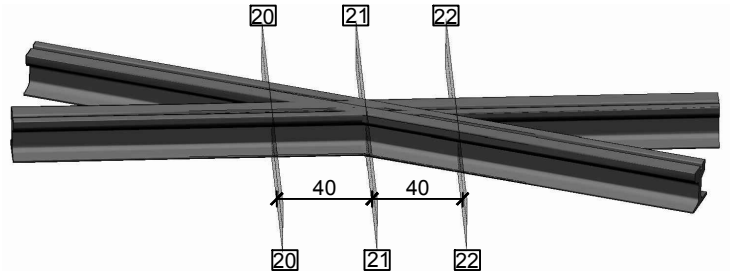
MJ: 1:2

Annex 6.24.2.1. Cross section wear in turnouts at Location 24

Cross section wear in turnout S399

Location 24: Terminus Črnomerec

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

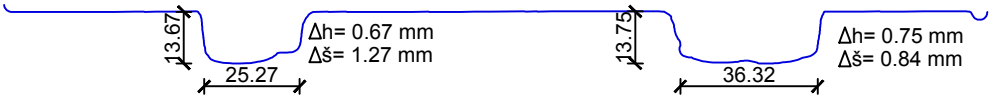
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu

Direction: through terminus

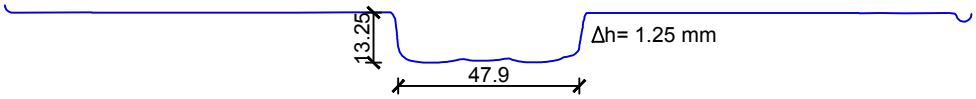
PROFIL 20

PROFILE 20



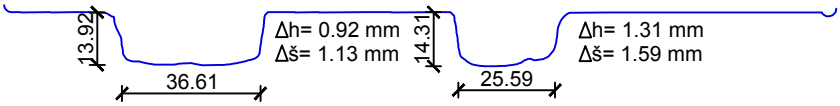
PROFIL 21

PROFILE 21



PROFIL 22

PROFILE 22



Prilog 6.24.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 24

Istrošenje poprečnog presjeka srcišta skretnice S400

Lokacija 24: Okretnica Črnomerec

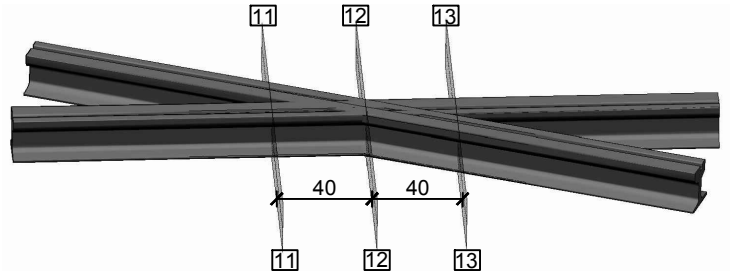
MJ: 1:2

Annex 6.24.2.1. Cross section wear in turnouts at Location 24

Cross section wear in turnout S400

Location 24: Terminus Črnomerec

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

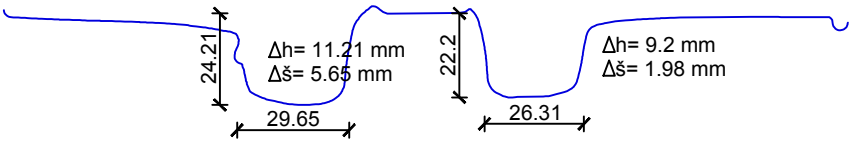
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: kroz okretnicu

Direction: through terminus

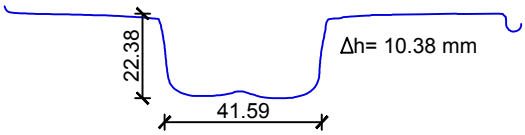
PROFIL 11

PROFILE 11



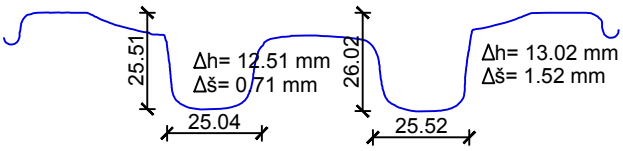
PROFIL 12

PROFILE 12



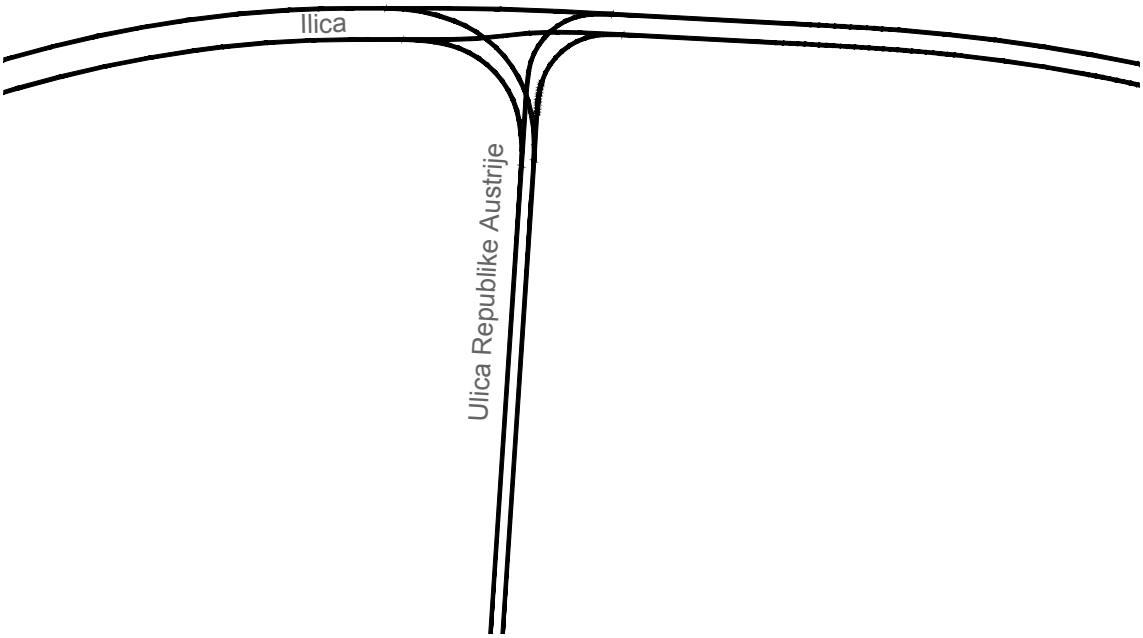
PROFIL 13

PROFILE 13



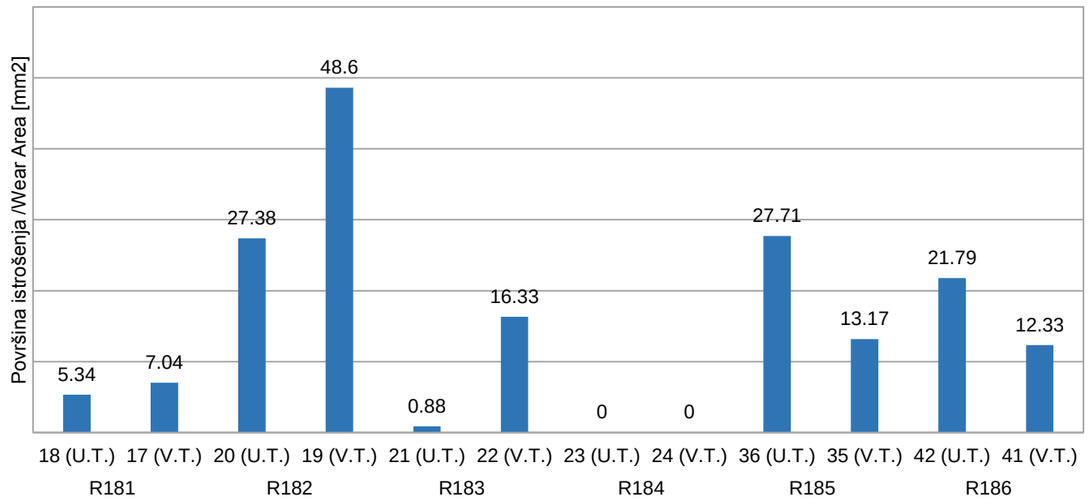
Lokacija 25 (L25)
Križanje Ulica Republike Austrije - Ilica

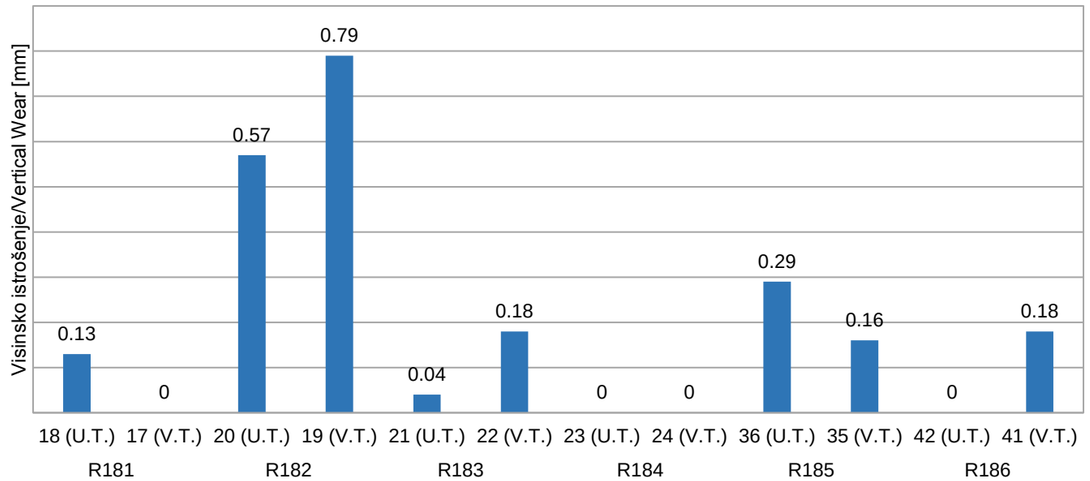
Location 25 (L25)
Republike Austrije - Ilica crossing

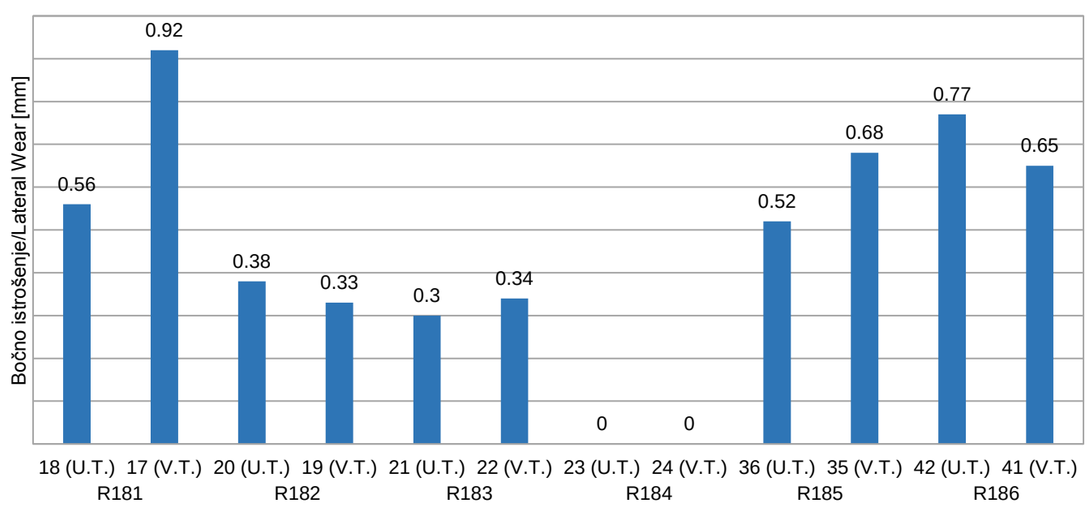


IZVRŠITELJ: CONTRACTOR: SVEUČILIŠTE U ZAGREBU GRAĐEVINSKI FAKULTET Kačićeva 26, 10 000 Zagreb	NARUČITELJ: CLIENT: Zagrebački električni tramvaj d.o.o. Ozaljska 105 10 000 Zagreb
STUDIJA: STUDY: Studija razvoja tramvajskog prometa □rada □agreba Study on the Tram Traffic Development in Zagreb	ELABORAT: REPORT: Analiza stanja tramvajskog kolosijeka The Analysis of Tramway Track Condition
SADRŽAJ PRILOGA: ANNEX: Istrošenje poprečnih presjeka tračnica u krivinama, skretnicama i križalištima na Lokaciji 25 Rail cross section wear in curves, turnouts and crossings at Location 25	
MJESTO I GODINA IZRADE: PLACE AND YEAR: Zagreb, 2019	OZNAKA PRILOGA: ANNEX NUMBER: 6.25

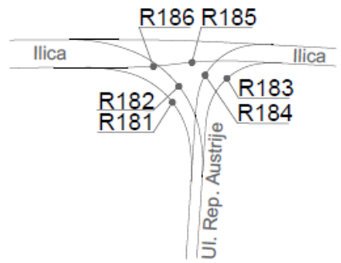
Prilog 6.25.1. **Rezultati istrošenja profila tračnica u krivinama na Lokaciji 25**
Lokacija 25: Križanje Ulica Republike Austrije - Ilica
Annex 6.25.1. **Results of cross section wear in curves at Location 25**
Location 25: Republike Austrije - Ilica crossing







U.T. – unutarnja tračnica u krivini, V.T. – vanjska tračnica u krivini
U.T. – inside rail in curve, V.T. – outside rail in curve



Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]	Nagib Slope α [˚]	Radijus Radius R [m]	Period eksploatacije Exploitation Period [god]
K-07-03	R181	desna right	17	lijeva/left	7.04	0	0.92	73.56	25	0
			18	desna/right	5.34	0.13	0.56	79.85		
K-07-04	R182	lijeva left	20	lijeva/left	27.38	0.57	0.38	81.77	32.5	0
			19	desna/right	48.6	0.79	0.33	76.58		
K-07-05	R183	lijeva left	21	lijeva/left	0.88	0.04	0.3	79.78	18	0
			22	desna/right	16.33	0.18	0.34	80.36		
K-07-06	R184	desna right	24	lijeva/left	0	0	0	0	18	0
			23	desna/right	0	0	0	0		
K-07-02	R185	desna right	35	lijeva/left	13.17	0.16	0.68	77.73	112	0
			36	desna/right	27.71	0.29	0.52	84.84		
K-07-02	R186	lijeva left	42	lijeva/left	21.79	0	0.77	79.4	105	0
			41	desna/right	12.33	0.18	0.65	77.18		

Dionica Section	Oznaka krivine Curve mark	Krivina Curve	Profil Profile	Tračnica Rail	Istrošenje / Rail Wear: Površina Area P [mm2]	Visinsko Vertical h [mm]	Bočno Lateral a [mm]
K-07-03	R181	desna right	17	lijeva/left	7.04	0	0.92
			18	desna/right	5.34	0.13	0.56
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					1.7	-0.13	0.36
K-07-04	R182	lijeva left	20	lijeva/left	27.38	0.57	0.38
			19	desna/right	48.6	0.79	0.33
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					21.22	0.22	-0.05
K-07-05	R183	lijeva left	21	lijeva/left	0.88	0.04	0.3
			22	desna/right	16.33	0.18	0.34
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					15.45	0.14	0.04
K-07-06	R184	desna right	24	lijeva/left	0	0	0
			23	desna/right	0	0	0
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					0	0	0
K-07-02	R185	desna right	35	lijeva/left	13.17	0.16	0.68
			36	desna/right	27.71	0.29	0.52
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-14.54	-0.13	0.16
K-07-02	R186	lijeva left	42	lijeva/left	21.79	0	0.77
			41	desna/right	12.33	0.18	0.65
Razlika u istrošenju vanjske i unutarnje tračnice [mm] Wear difference between inside and outside rail [mm]					-9.46	0.18	-0.12

Prilog 6.25.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 25

Istrošenje poprečnog presjeka tračnica u krivini R181

Lokacija 25: Križanje Ulice Republike Austrije - Ilica

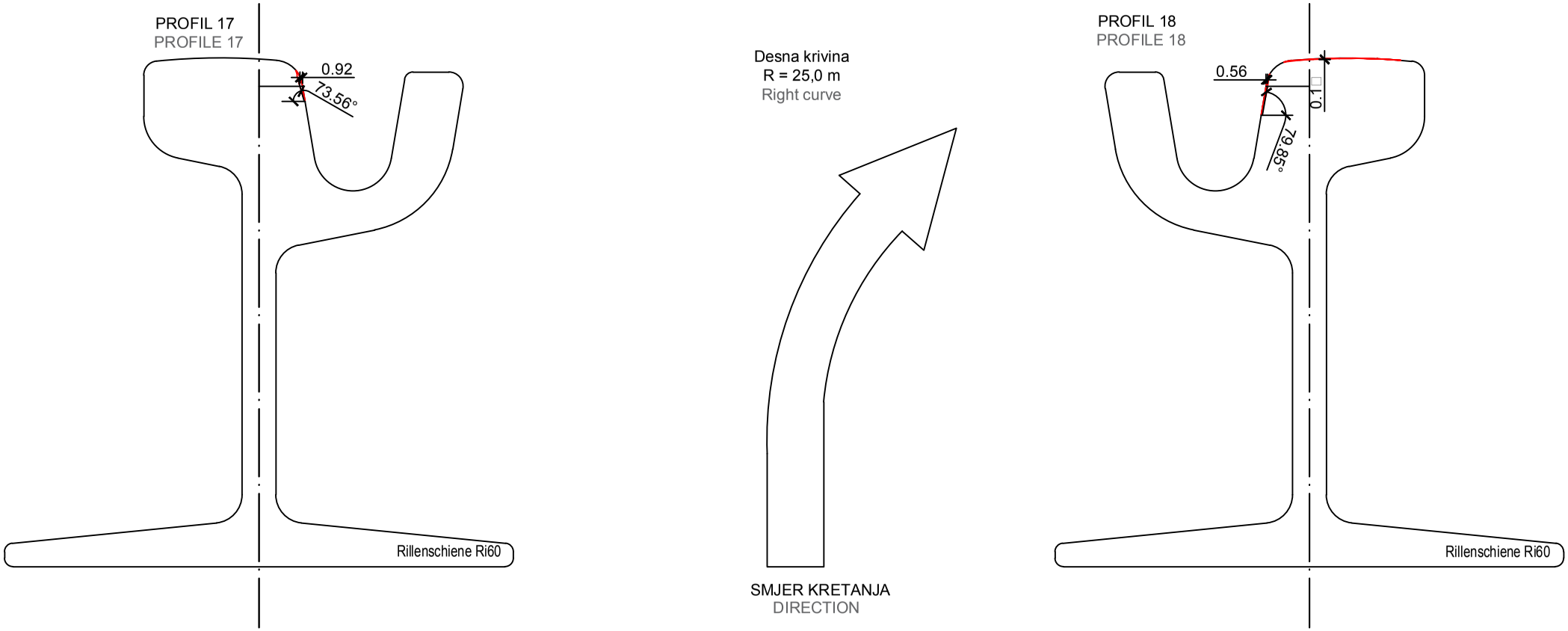
MJ: 1:2

Annex 6.25.1.1. Cross section wear in curves at Location 25

Cross section wear in curve R181

Location 25: Republike Austrije - Ilica crossing

Scale: 1:2



Prilog 6.25.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 25

Istrošenje poprečnog presjeka tračnica u krivini R182

Lokacija 25: Križanje Ulice Republike Austrije - Ilica

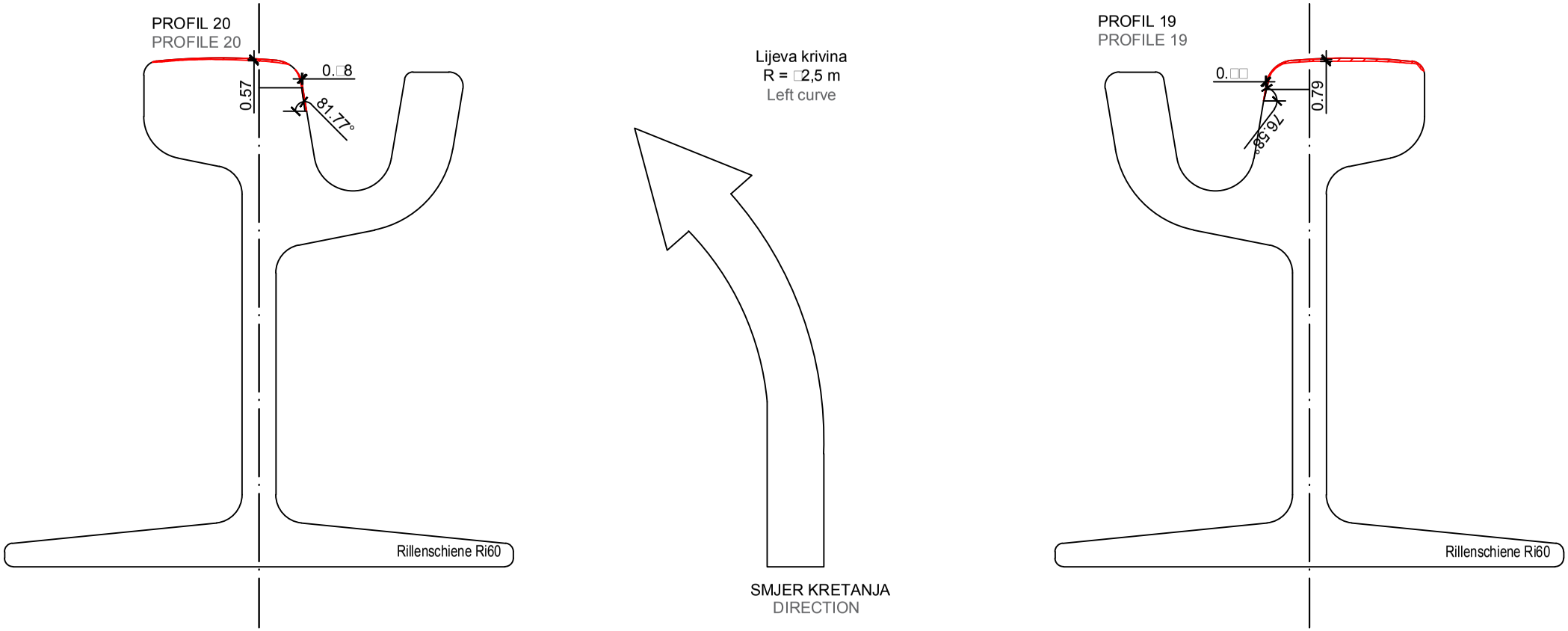
MJ: 1:2

Annex 6.25.1.1. Cross section wear in curves at Location 25

Cross section wear in curve R182

Location 25: Republike Austrije - Ilica crossing

Scale: 1:2



Prilog 6.25.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 25

Istrošenje poprečnog presjeka tračnica u krivini R183

Lokacija 25: Križanje Ulice Republike Austrije - Ilica

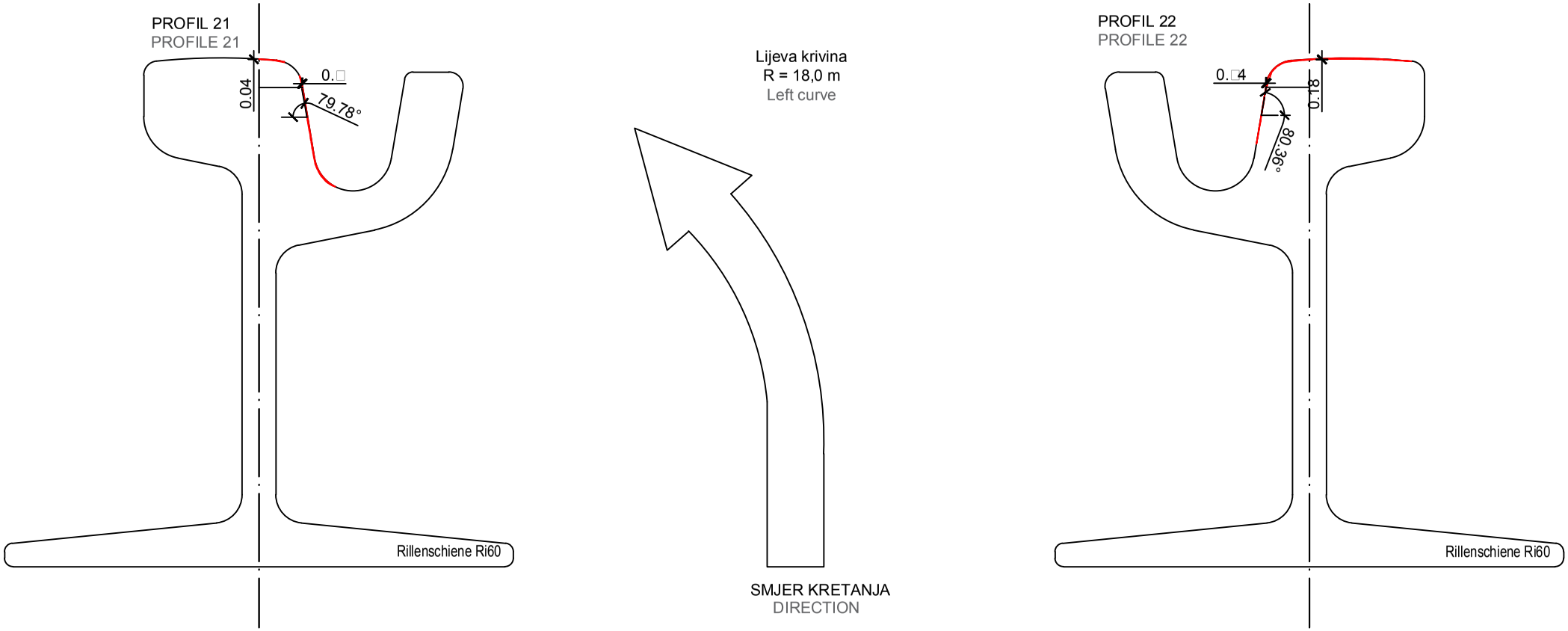
MJ: 1:2

Annex 6.25.1.1. Cross section wear in curves at Location 25

Cross section wear in curve R18

Location 25: Republike Austrije - Ilica crossing

Scale: 1:2



Prilog 6.25.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 25

Istrošenje poprečnog presjeka tračnica u krivini R184

Lokacija 25: Križanje Ulice Republike Austrije - Ilica

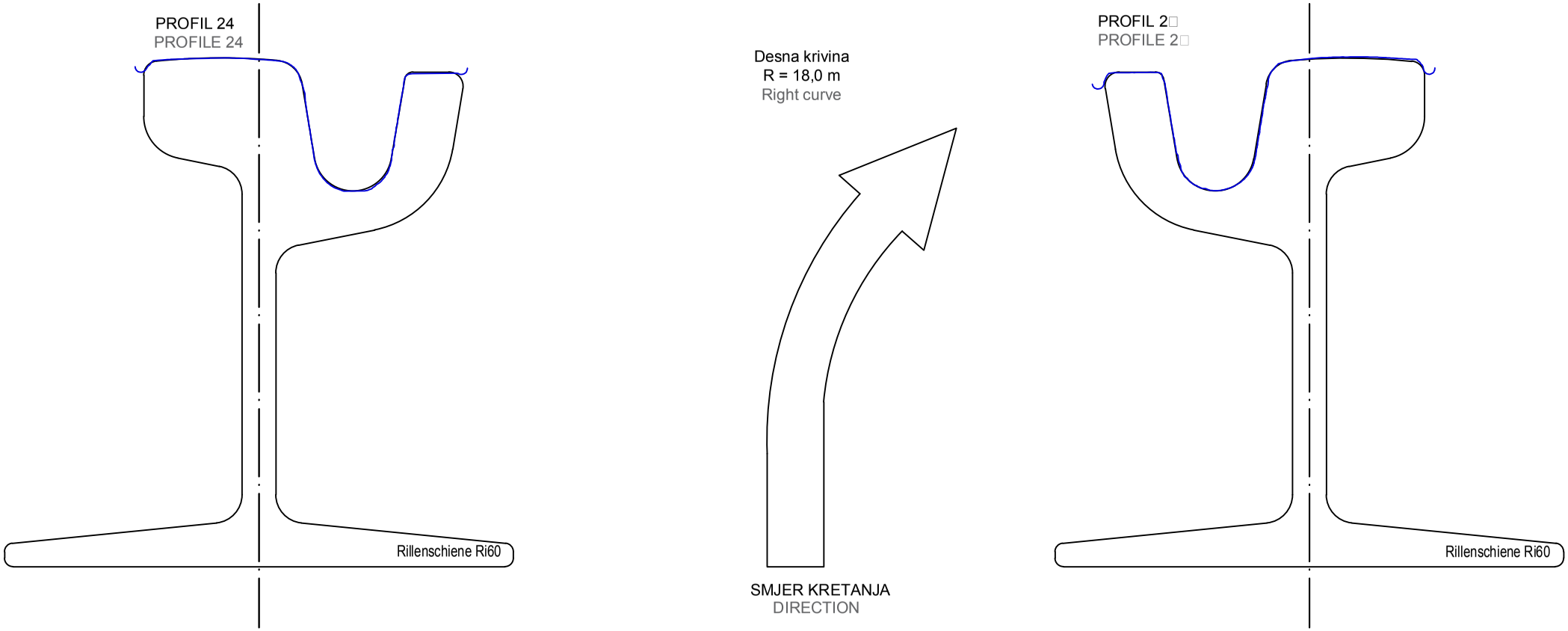
MJ: 1:2

Annex 6.25.1.1. Cross section wear in curves at Location 25

Cross section wear in curve R184

Location 25: Republike Austrije - Ilica crossing

Scale: 1:2



Prilog 6.25.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 25

Istrošenje poprečnog presjeka tračnica u krivini R185

Lokacija 25: Križanje Ulice Republike Austrije - Ilica

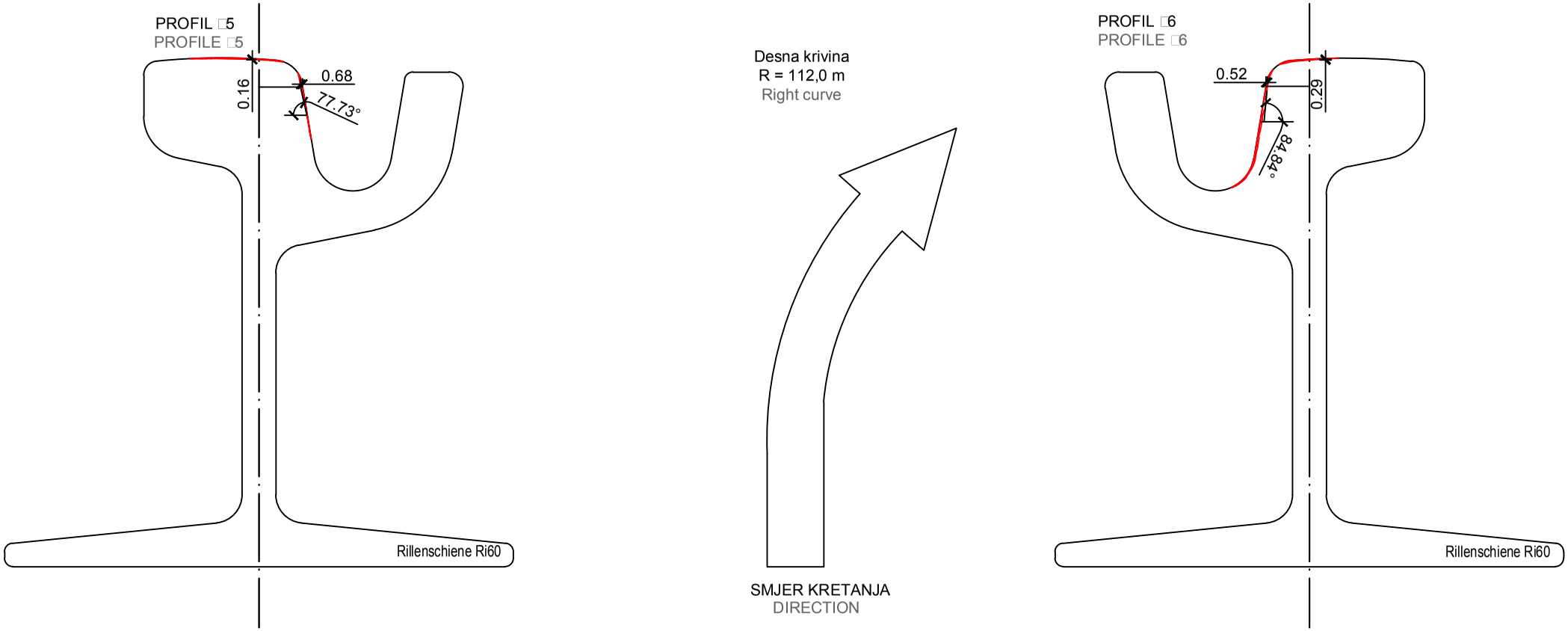
MJ: 1:2

Annex 6.25.1.1. Cross section wear in curves at Location 25

Cross section wear in curve R185

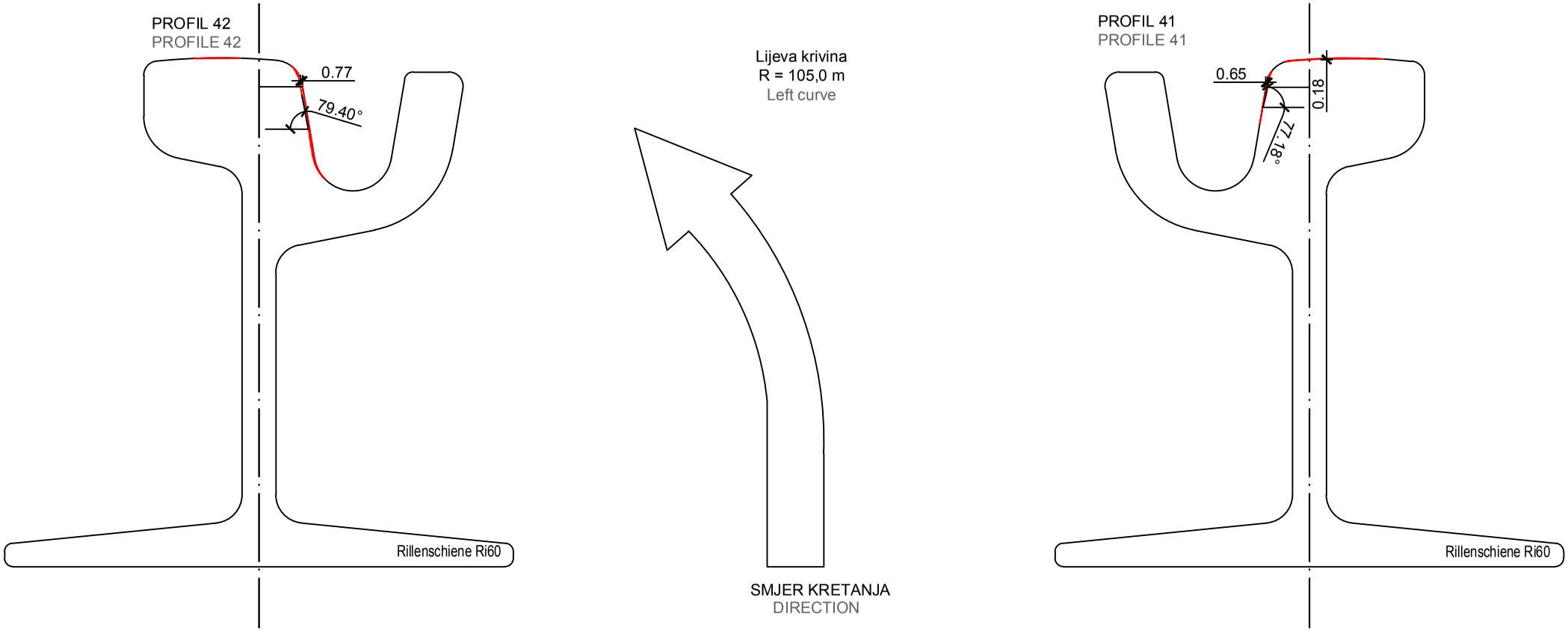
Location 25: Republike Austrije - Ilica crossing

Scale: 1:2



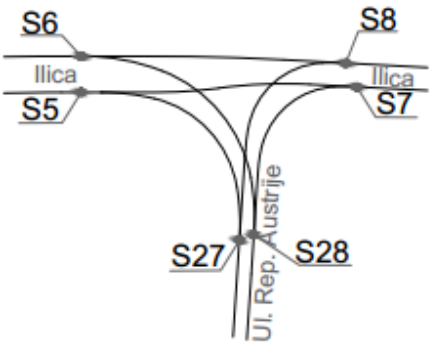
Prilog 6.25.1.1. Istrošenje poprečnih presjeka tračnica u krivinama na lokaciji 25
Istrošenje poprečnog presjeka tračnica u krivini R186
Lokacija 25: Križanje Ulice Republike Austrije - Ilica
MJ: 1:2

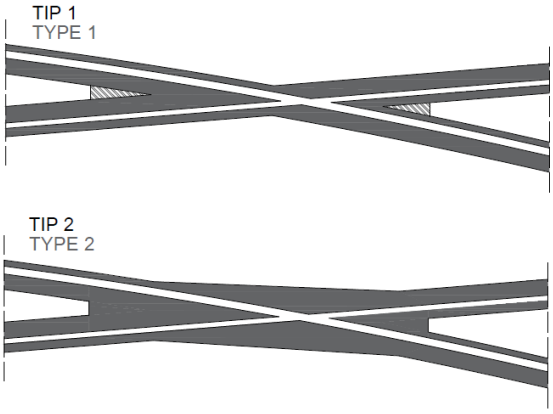
Annex 6.25.1.1. Cross section wear in curves at Location 25
Cross section wear in curve R186
Location 25: Republike Austrije - Ilica crossing
Scale: 1:2



Prilog 6.25.2. **Rezultati istrošenja profila tračnica u skretnicama na Lokaciji 25**
Lokacija 25: Križanje Ulica Republike Austrije - Ilica

Annex 6.25 2. **Results of cross section wear in turnouts at Location 25**
Location 25: Republike Austrije - Ilica crossing





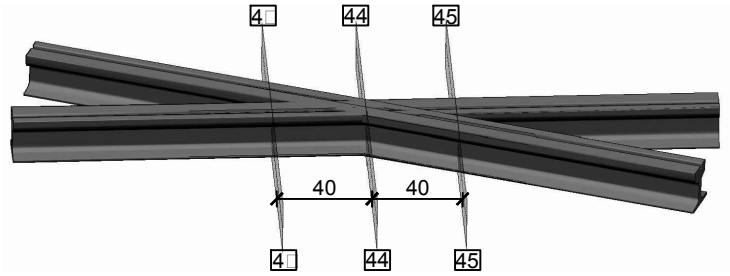
Dionice Sections	**Oznaka skretnice** Turnout mark	**Tip skretnice (TIP 1 ili TIP 2)** Type of Turnout (1 or 2)	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-07-03 K-07-05	S27	2	7L	13	12.33	-0.67	24.00	24.62	0.62	0
			7D	13	12.75	-0.25	30.58	31.44	0.86	
			8	12	12.66	0.66	39.58	39.58		
			9L	13	12.85	-0.15	30.59	31.52	0.93	
			9D	13	12.41	-0.59	24.00	24.63	0.63	
K-07-04 K-07-06	S28	2	10L	13	12.85	-0.15	24.47	25.15	0.68	0
			10D	13	13.49	0.49	30.00	31.08	1.08	
			11	12	12.38	0.38	35.85	35.85		
			12L	13	12.85	-0.15	30.00	30.44	0.44	
			12D	13	12.46	-0.54	24.47	24.89	0.42	
K-07-02 K-07-06	S7	2	25L	13	14.09	1.09	24.00	24.36	0.36	0
			25D	13	12.60	-0.40	35.70	36.55	0.85	
			26	12	13.90	1.90	36.34	36.34		
			27L	13	12.61	-0.39	35.70	35.69	-0.01	
			27D	13	13.97	0.97	24.00	24.65	0.65	
K-07-01 K-07-05	S8	2	28L	13	14.63	1.63	25.19	25.46	0.27	0
			28D	13	12.38	-0.62	34.00	35.28	1.28	
			29	12	15.01	3.01	35.01	35.01		
			30L	13	12.47	-0.53	34.00	35.15	1.15	
			30D	13	14.97	1.97	25.19	25.41	0.22	
K-07-02 K-07-03	S5	2	43L	13	12.64	-0.36	30.00	30.61	0.61	0
			43D	13	14.13	1.13	24.47	24.20	-0.27	
			44	12	14.50	2.50	29.98	29.98		
			45L	13	14.27	1.27	24.46	22.98	-1.48	
			45D	13	12.78	-0.22	30.00	30.97	0.97	
K-07-01 K-07-04	S6	2	46L	13	13.04	0.04	30.00	30.36	0.36	0
			46D	13	13.74	0.74	24.47	24.45	-0.02	
			47	12	13.80	1.80	35.45	35.45		
			48L	13	13.81	0.81	24.47	24.53	0.06	
			48D	13	12.82	-0.18	30.00	30.40	0.40	

Prilog 6.25.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 25

Istrošenje poprečnog presjeka srcišta skretnice S5
Lokacija 25: Križanje Ulica Republike Austrije - Ilica
MJ: 1:2

Annex 6.25.2.1. Cross section wear in turnouts at Location 25

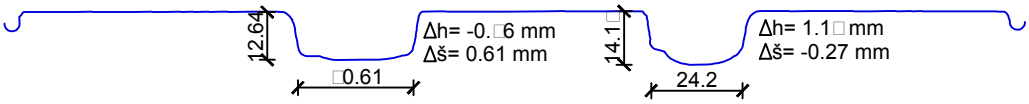
Cross section wear in turnout S5
Location 25: Republike Austrije - Ilica crossing
Scale: 1:2



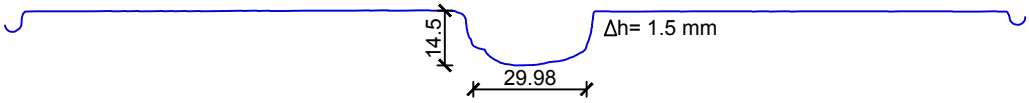
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Črnomerec → □ritanski trg
Direction: Črnomerec → □ritanski trg

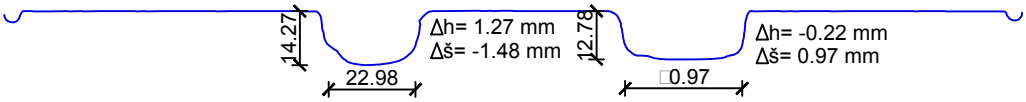
PROFIL 4□
PROFILE 4□



PROFIL 44
PROFILE 44



PROFIL 45
PROFILE 45



Prilog 6.25.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 25

Istrošenje poprečnog presjeka srcišta skretnice S6

Lokacija 25: Križanje Ulica Republike Austrije - Ilica

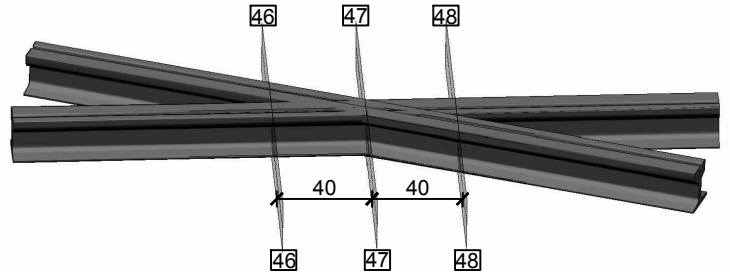
MJ: 1:2

Annex 6.25.2.1. Cross section wear in turnouts at Location 25

Cross section wear in turnout S6

Location 25: Republike Austrije - Ilica crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

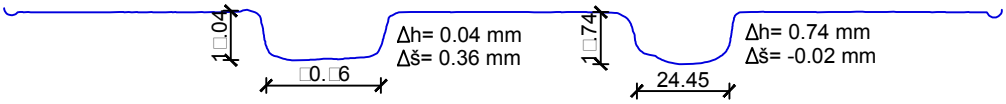
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Britanski trg → Črnomerec

Direction: □ritanski trg → Črnomerec

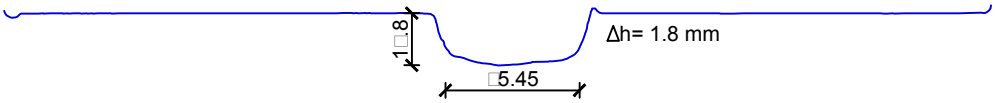
PROFIL 46

PROFILE 46



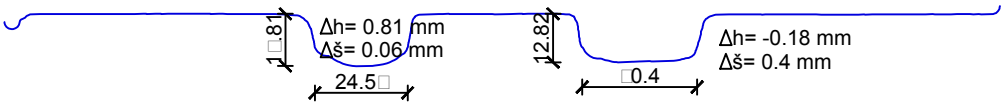
PROFIL 47

PROFILE 47



PROFIL 48

PROFILE 48



Prilog 6.25.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 25

Istrošenje poprečnog presjeka srcišta skretnice S7

Lokacija 25: Križanje Ulica Republike Austrije - Ilica

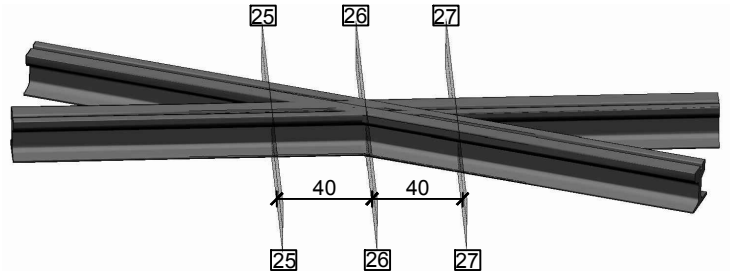
MJ: 1:2

Annex 6.25.2.1. Cross section wear in turnouts at Location 25

Cross section wear in turnout S7

Location 25: Republike Austrije - Ilica crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

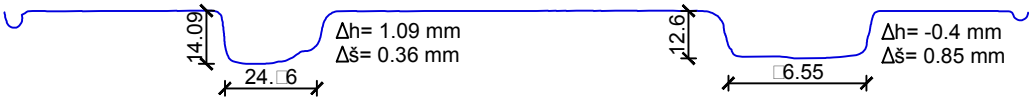
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Zapadni kolodvor → □ritanski trg

Direction: □apadni kolodvor → □ritanski trg

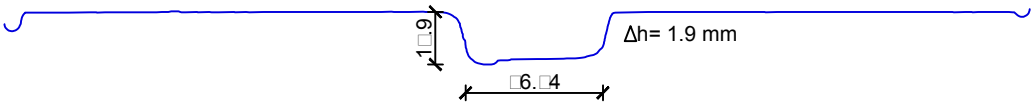
PROFIL 25

PROFILE 25



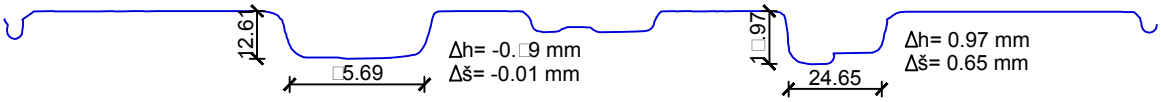
PROFIL 26

PROFILE 26



PROFIL 27

PROFILE 27



Prilog 6.25.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 25

Istrošenje poprečnog presjeka srcišta skretnice S8

Lokacija 25: Križanje Ulica Republike Austrije - Ilica

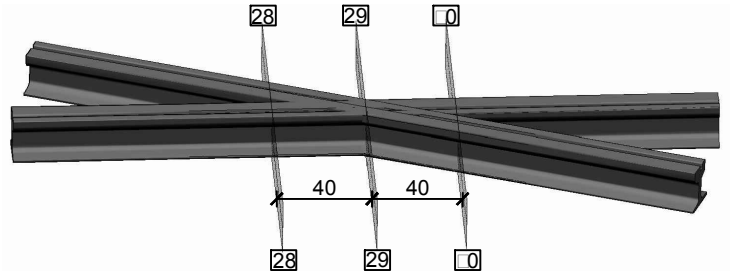
MJ: 1:2

Annex 6.25.2.1. Cross section wear in turnouts at Location 25

Cross section wear in turnout S8

Location 25: Republike Austrije - Ilica crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

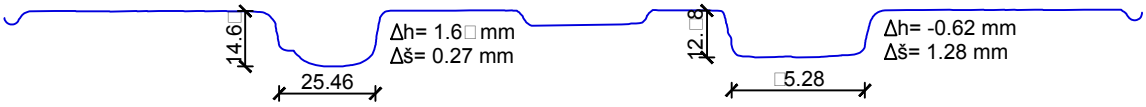
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Britanski trg → apadni kolodvor

Direction: ritanski trg → apadni kolodvor

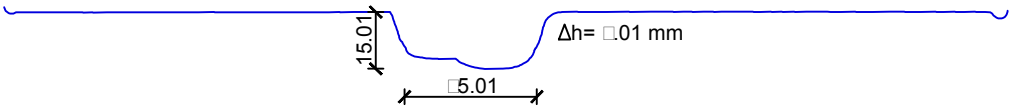
PROFIL 28

PROFILE 28



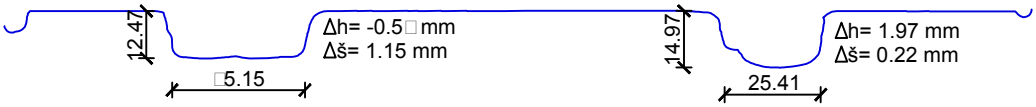
PROFIL 29

PROFILE 29



PROFIL 0

PROFILE 0



Prilog 6.25.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 25

Istrošenje poprečnog presjeka srcišta skretnice S27

Lokacija 25: Križanje Ulica Republike Austrije - Ilica

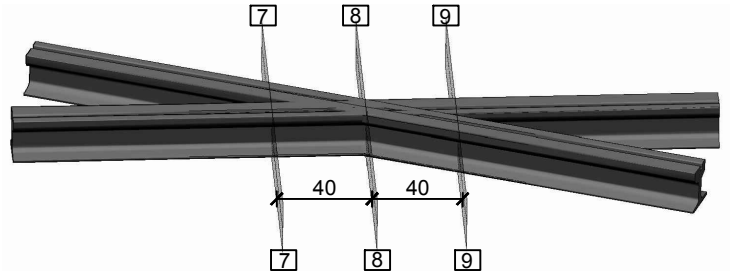
MJ: 1:2

Annex 6.25.2.1. Cross section wear in turnouts at Location 25

Cross section wear in turnout S27

Location 25: Republike Austrije - Ilica crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

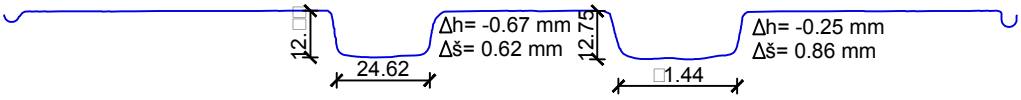
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Črnomerec → □apadni kolodvor

Direction: Črnomerec → □apadni kolodvor

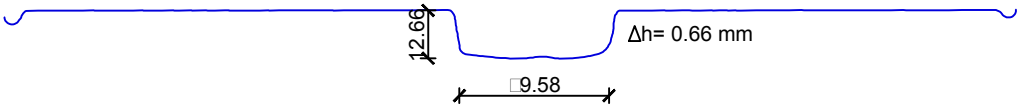
PROFIL 7

PROFILE 7



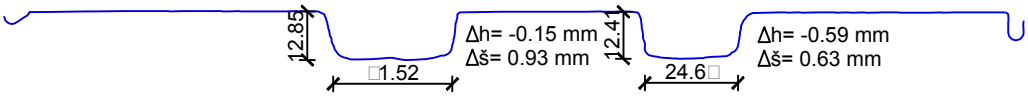
PROFIL 8

PROFILE 8



PROFIL 9

PROFILE 9



Prilog 6.25.2.1. Istrošenje poprečnog presjeka srcišta skretnica na Lokaciji 25

Istrošenje poprečnog presjeka srcišta skretnice S28

Lokacija 25: Križanje Ulica Republike Austrije - Ilica

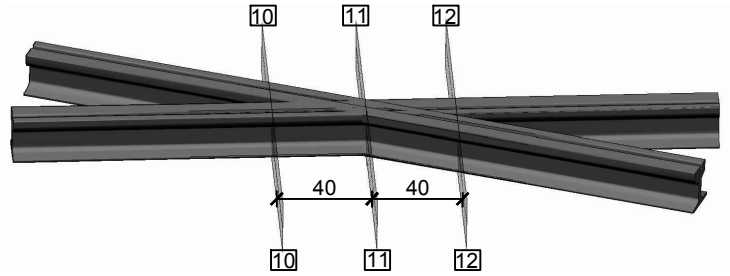
MJ: 1:2

Annex 6.25.2.1. Cross section wear in turnouts at Location 25

Cross section wear in turnout S28

Location 25: Republike Austrije - Ilica crossing

Scale: 1:2



Δh - visinsko istrošenje
Δš - bočno istrošenje

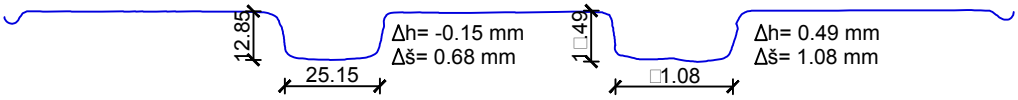
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Zapadni kolodvor → Črnomerec

Direction: Zapadni kolodvor → Črnomerec

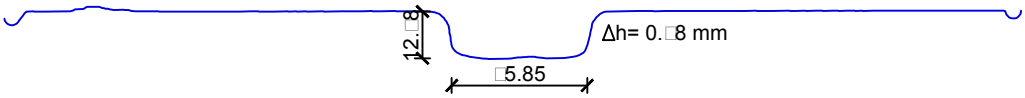
PROFIL 10

PROFILE 10



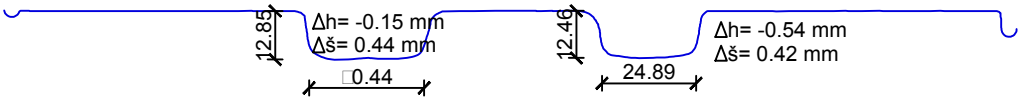
PROFIL 11

PROFILE 11



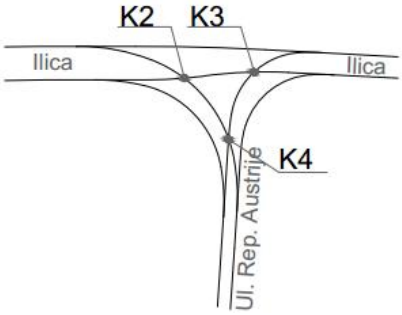
PROFIL 12

PROFILE 12



Prilog 6.25.3. Rezultati istrošenja profila tračnica u križalištima na Lokaciji 25
Lokacija 25: Križanje Ulica Republike Austrije - Ilica

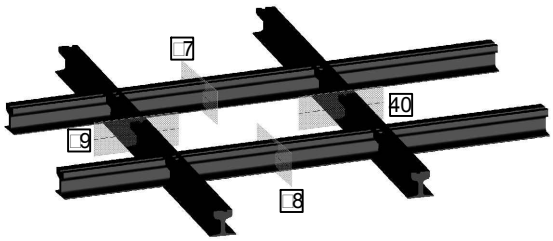
Annex 6.25.3. Results of cross section wear in track crossing at Location 25
Location 25: Republike Austrije - Ilica crossing



Dionice Sections	**Oznaka križališta** Track crossing mark	**Profil** Profile	**Referentna dubina žlijeba** Reference groove depth [mm]	**Izmjerena dubina žlijeba** Measured groove depth [mm]	**Visinsko istrošenje žlijeba** Vertical wear [mm]	**Referentna širina žlijeba [mm]** Reference groove width [mm]	**Izmjerena širina žlijeba** Measured groove width [mm]	**Bočno istrošenje žlijeba** Lateral wear [mm]	**Period eksploatacije [god]** Exploitation Period [years]
K-07-04 K-07-05	K4	13	12	12,20	0.20	24.00	24.43	0.43	0
		14	12	12,00	0.00	24.00	24.36	0.36	
		15	12	13,31	1.31	30.00	31.14	1.14	
		16	12	12,85	0.85	30.00	31.05	1.05	
K-07-02 K-07-05	K3	31	12	13,24	1.24	26.00	27.37	1.37	0
		32	12	13,65	1.65	26.00	27.63	1.63	
		33	12	12,79	0.79	34.00	34.30	0.30	
		34	12	12,98	0.98	34.00	34.00	0.00	
K-07-02 K-07-04	K2	37	12	13,29	1.29	26.00	26.40	0.40	0
		38	12	12,65	0.65	26.00	26.47	0.47	
		39	12	13,71	1.71	30.00	33.35	3.35	
		40	12	12,93	0.93	30.00	30.59	0.59	

Prilog 6.25.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 25
Istrošenje poprečnog presjeka tračnica u križalištu K2
Lokacija 25: Križanje Ulica Republike Austrije - Ilica
MJ: 1:2

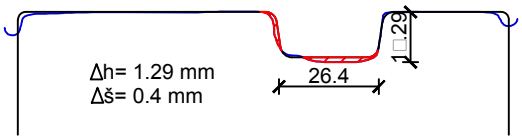
Annex 6.25.□1. Cross section wear in track crossings at Location 25
Cross section wear in track crossing K2
Location 25: Republike Austrije - Ilica crossing
Scale: 1:2



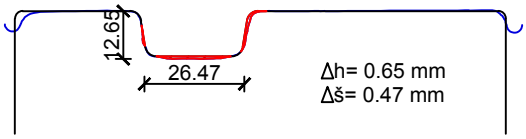
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Črnomerec ⟶ □ritanski trg
Direction: Črnomerec ⟶ □ritanski trg

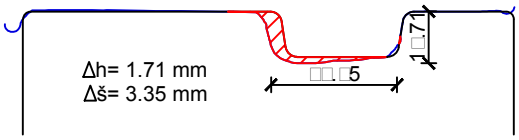
PROFIL □7
PROFILE □7



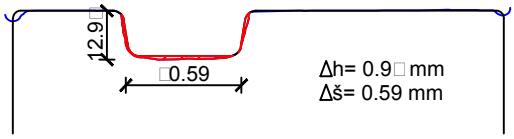
PROFIL □8
PROFILE □8



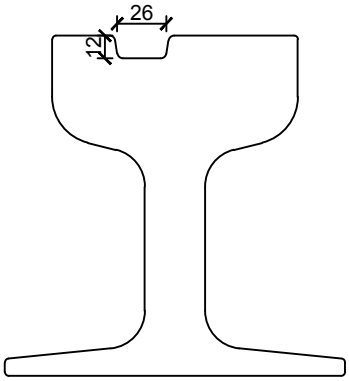
PROFIL □9
PROFILE □9



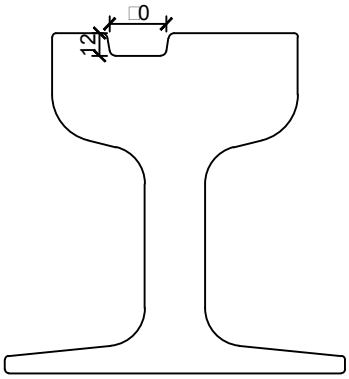
PROFIL 40
PROFILE 40



PROFIL □7, □8 □PROFILE □7, □8
R = 105 m

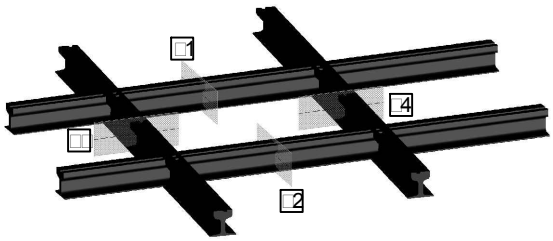


PROFIL □9, 40 □PROFILE □9, 40
R = □2.5 m



Prilog 6.25.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 25
Istrošenje poprečnog presjeka tračnica u križalištu K3
Lokacija 25: Križanje Ulica Republike Austrije - Ilica
MJ: 1:2

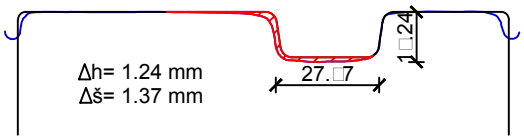
Annex 6.25.□1. Cross section wear in track crossings at Location 25
Cross section wear in track crossing K□
Location 25: Republike Austrije - Ilica crossing
Scale: 1:2



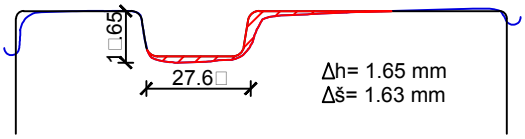
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Črnomerec ⟶ □ritanski trg
Direction: Črnomerec ⟶ □ritanski trg

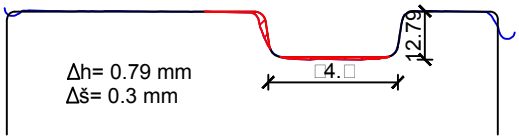
PROFIL □1
PROFILE □1



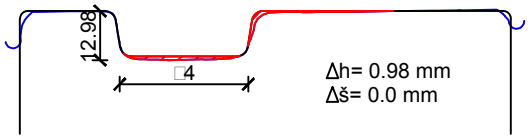
PROFIL □2
PROFILE □2



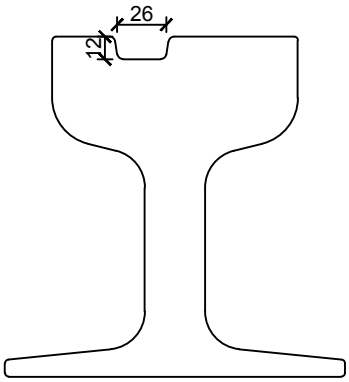
PROFIL □□
PROFILE □□



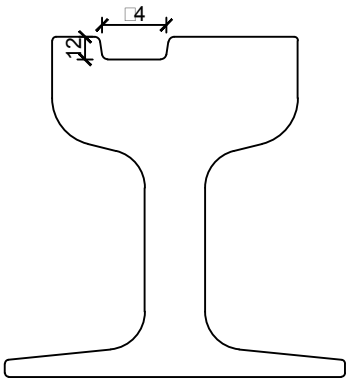
PROFIL □4
PROFILE □4



PROFIL □1, □2 □PROFILE □1, □2
R = 112 m

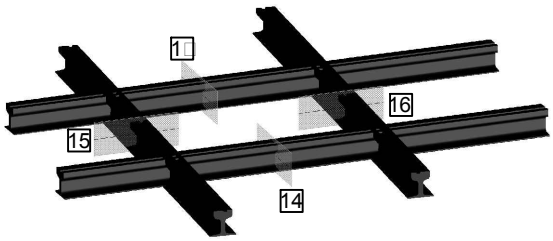


PROFIL □□, □4 □PROFILE □□, □4
R = 18 m



Prilog 6.25.3.1. Istrošenje poprečnog presjeka tračnica u križalištima na Lokaciji 25
Istrošenje poprečnog presjeka tračnica u križalištu K4
Lokacija 25: Križanje Ulica Republike Austrije - Ilica
MJ: 1:2

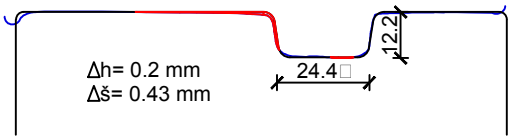
Annex 6.25.□.1. Cross section wear in track crossings at Location 25
Cross section wear in track crossing K4
Location 25: Republike Austrije - Ilica crossing
Scale: 1:2



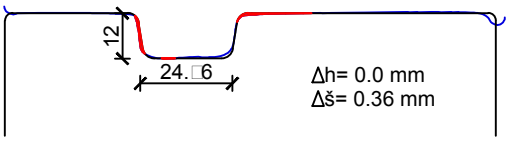
Δh - visinsko istrošenje
Δš - bočno istrošenje
Δh - vertical wear
Δš - lateral wear

Smjer vožnje: Britanski trg ⟶ □apadni kolodvor
Direction: □ritanski trg ⟶ □apadni kolodvor

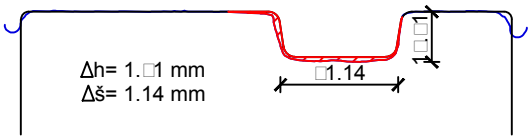
PROFIL 1□
PROFILE 1□



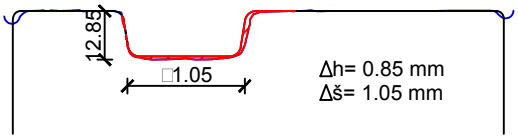
PROFIL 14
PROFILE 14



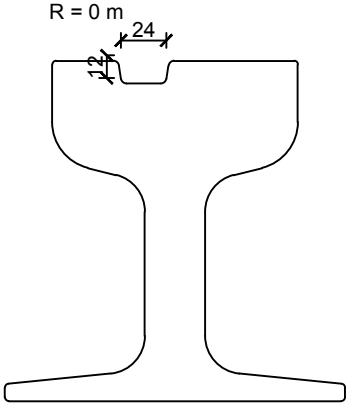
PROFIL 15
PROFILE 15



PROFIL 16
PROFILE 16



PROFIL 1□, 14 □PROFILE 1□, 14
R = 0 m



PROFIL 15, 16 □PROFILE 15, 16
R = □2.5 m