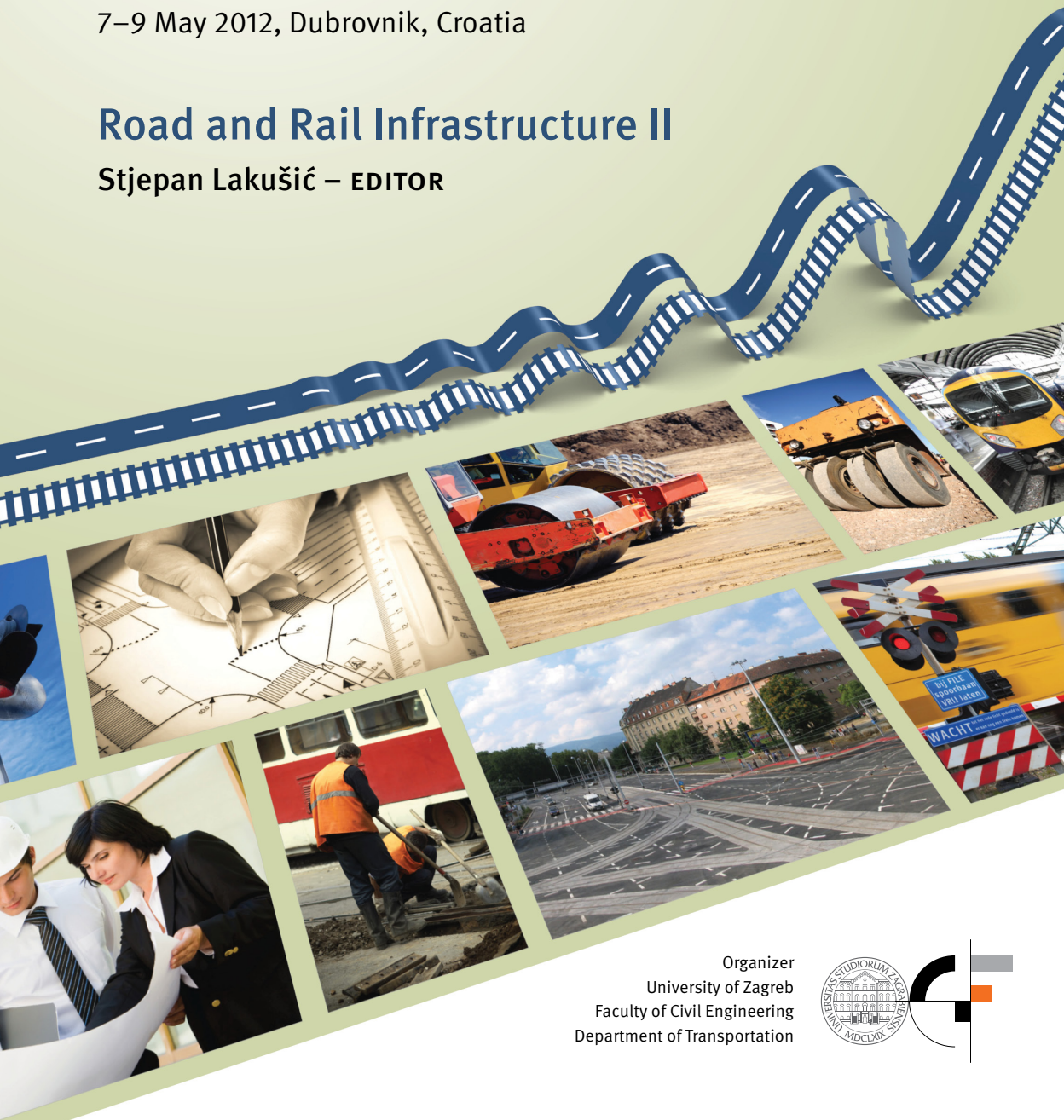


CETRA²⁰¹²

2nd International Conference on Road and Rail Infrastructure
7–9 May 2012, Dubrovnik, Croatia

Road and Rail Infrastructure II

Stjepan Lakušić – EDITOR



Organizer
University of Zagreb
Faculty of Civil Engineering
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HIGHWAY A8, SECTION ROGOVIĆI–MATULJI, INFLUENCE OF GENERAL PUBLIC ON DESIGN SOLUTIONS

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Abstract

Despite the fact that the initiative to build a modern road that will connect Istria with rest of Croatia dates back to 1968, Rogovići–Matulji section was opened much later, in the period from 1981 to 1998, and with only one carriageway. In 2008, simultaneously with the start of construction phase 2A on section from Kanfanar to Rogovići, preparations for construction of dual carriageway road on Rogovići–Matulji section also began.

With some deviations to improve design elements, preliminary solution of this 46.3km long section was designed in accordance with the existing carriageway to avoid devastation of residential buildings in the highway corridor wherever it was possible. Basic design speed is 100km/h, but because of mountain terrain and dense built-up area at some parts of the route it was reduced down to 80km/h. In retrospect, 9 junctions, 8 overpasses, 22 underpasses, 4 tunnels (3 previously constructed, and approx. 5660m long 2nd tube of 'Učka' tunnel designed on the north side of the existing one), 15 viaducts, 2 bridges, 8 pedestrian crossings and 2 B-type service areas are anticipated on Rogovići–Matulji section of highway A8.

Environmental impact study was made on basis of the preliminary solution, and in June 2010 it was submitted to the Ministry for environmental impact assessment. First advisory committee conference was held in November 2010, while the public discussion was carried out in the spring of 2011. Public viewings of the Study in Pazin, Opatija and Matulji had high attendance, with a large number of public complaints.

After consultations with local authority, investor and concessionaire officials, and taking into consideration the complaints from general public, preliminary design changes were made so that the highway can 'serve the public' in genuine sense of the word.

Keywords: highway design, environmental impact assessment, preliminary solution, dual carriageway, improvements

1 Introduction

In 1968 Croatian parliament made a decision that it is of outmost importance to build a modern road to connect Istria with Rijeka and the rest of Croatia. This started the construction of Istrian v, which today, nearly 50 years later, is nearing its end. From the very beginning, emphasis was put on the biggest and most demanding road object, 'Učka' tunnel. The tunnel was opened on September 27th, 1981, and this successfully removed the biggest obstacle to connect Istria and the rest of the country. Along with the construction of the 'Učka' tunnel, 24 km section from Matulji to Lupoglav was completed.

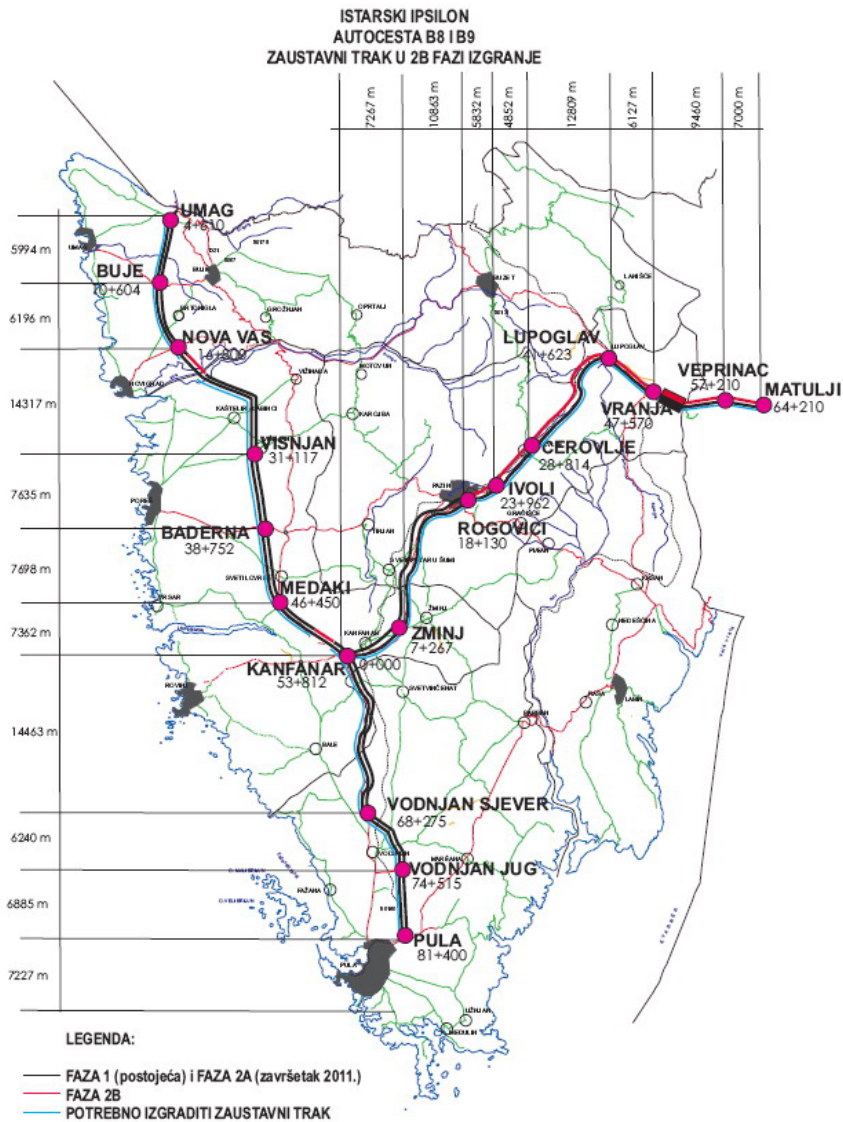


Figure 1 Sections of Istrian Y and construction phases

The final corridor of Istrian Y was set in 1983, when the connection between the eastern and western leg was moved from 'Baderna' to 'Kanfanar' junction. In the first construction phase, Istrian Y was built as a two lane, single carriageway road. Sections of the road were opened from 1981 to 2006. In 1995 Bina-Istra was created, as the first concession company for highways in Croatia. Concession agreement was signed for a period of 32 years. Based on it, final construction of the first carriageway began, and after completing the section to Pula in 2006, second carriageway designing and construction took place. Section Kanfanar–Pula, was opened in 2010, and in 2011 sections Umag–Kanfanar and Kanfanar–Rogovici were also opened as dual carriageway roads. This only left the section from Rogovici to Matulji as a single carriageway road. Its upgrade started with drafting of the preliminary solution in 2008, as a base for Environmental Impact Study.

2 Preliminary solution of Rogovići – Matulji section

2.1 Road

Preliminary solution of this section was designed in accordance with the existing B8 road, which is also the basis for the highway corridor in spatial planning documents. Existing road alignment was reconstructed in some parts of the section to improve design elements and decrease influence on residential areas.

2.1.1 Traffic

Traffic load analysis showed the AADT of 8259 vehicles, and ASDT of 11673 vehicles with stagnation in traffic increase in the last year of monitoring, unlike the previous years. From this data it is clear that traffic increase for the year 2000 predicted in the economic analysis before the first 'Učka' tunnel tube construction (AADT of 13800 vehicles) was incorrect.

2.1.2 Technical elements

Primary design speed on Rogovići–Matulji section of highway A8 is 100 km/h, with some exceptions. On highway section from km 38+000 to km 46+340 ('Matulji 2') design speed is 80 km/h, because of mountain terrain and high concentration of residential buildings in the highway corridor. Because of this, minimum horizontal radius is 250m.

Table 1 Technical elements used during highway A8 design

minimum horizontal radius	350m(exc. 250m)
maximum slope level	4.91%
lane width (traffic/emergency)	3.5/2.5m
median/shoulder width	3.0/2.0m
crossfall (straight/curve)	2.5/max. 7.0%
minimum vertical radius (crest/sag)	5200/5000m

Total length of Rogovići–Matulji section is app. 46.3 km. Future highway is designed in a way to maintain the existing B8 carriageway, where possible. One of the exceptions is where the existing road has design elements for 80 km/h on the Rogovići–Učka section (in the vicinity of Lovrinčiči and Mrzličići viaducts). Underpasses Juršići and Dausi on the Cerovlje–Lupoglav section of A8 must be reconstructed because the existing free profile height is inadequate. Also, cemetery in Dolenja Vas conditioned the layout design on that part of the section, in addition to the close proximity of the Lupoglav–Raša railway corridor and Lupoglav–Vranja local road. The existing 'Vranja' junction will be allocated app. 1500m closer to Lupoglav, and the rest area in front of Istra portal of 'Učka' tunnel will be closed for traffic safety reasons. On Učka–Matulji section of A8 the existing carriageway will be maintained, except in the 'Veprinac' and 'Frančiči' junctions' area, where the layout is reconstructed to minimize the influence on residential buildings. The new carriageway is designed on the north (hillside) of the existing B8 carriageway on this section.

Cross section elements are assessed according to the design speed and road rank. On the parts of the section where the existing carriageway is maintained, emergency lane will be added and the existing road widened to fulfil the cross section width demands. (insufficient lane width on existing Cerovlje–Lupoglav section). There is a possibility of landslides near the Borut and Pazin creek, so retaining walls will have to be constructed. Also, big cuts, more than 30m in height will be necessary on the Učka–Matulji section, so the rock surface must be protected with nets to avoid slides.

2.1.3 Junctions, overpasses, underpasses, pedestrian crossings

Construction of 9 junctions, 8 overpasses and 22 underpasses is expected. Junction position and number is compatible with spatial planning documents.

Table 2 Junctions

junction	chainage	connection road category	junction configuration
Rogovići	0+000	D48/Ž5190	diamond
Ivoli	5+830	Ž5046/NC	diamond
Cerovlje	10+675	Ž5046	combined
Borut	14+670	L50082/NC	diamond
Lupoglav	23+380	D44	half clover
Vranja	28+395	D500	diamond
Veprinac	39+260	Ž5048	half clover
Andeli	41+770	Ž5048/NC	half clover
Frančiči	44+375	Liburnija beltway	trumpet

Highway A8 connects to junction 'Matulji2' at km 46+340 and trough it to highway A7. 'Frančiči' junction requires the construction of Liburnija beltway, which goes around Opatija and Lovran and is currently in design phase.

There are 9 existing pedestrian crossings (overpasses and underpasses) on Rogovići–Matulji section. The existing pedestrian overpasses Slavići, Puhari and Benčinići will be reconstructed into road overpasses to accomplish the connection between residential areas and the public road network. The rest of the pedestrian crossings will be reconstructed to accommodate the construction of the second carriageway. Also, two new ones will be constructed for tourist promotion of the hills over Opatija.

2.1.4 Drainage

Rogovići–Matulji section of highway A8 goes through zones of sanitary protections at some parts of the section. The whole highway section will be constructed with a closed and controlled drainage system, using waterproof collector pipes to transport rainfall to purification stations from which it will be disposed into surrounding terrain. Drainage of the existing B8 carriageway at parts that currently don't have a closed drainage system (Čuleti–Matulji) will be reconstructed into a closed system at parts where the existing carriageway will be preserved.

2.1.5 Rest areas

There will be two type B rest areas on Rogovići–Matulji section of highway A8: 'Lovrinčiči' at km 18+400 and 'Učka' at km 35+800. Each will have a gas station, coffee shop and parking. Rest area 'Lovrinčiči' is placed between Lovrinčiči and Dajčiči viaducts, on the north side of the highway. This layout is chosen because of the terrain configuration and to avoid reconstruction of the Cerovlje–Lupoglav local road. If some new discoveries are made at the later design stages, two–side layout can be used. Rest area 'Učka' is placed right after Kvarner portal of 'Učka' tunnel. It has a two–side layout, with the separation of commercial and maintenance use. The north side will be used for maintenance services, fast–response teams and reception of the vehicles carrying dangerous cargo. The south side overlooking the sea will have a gas station, coffee shop, view platform, and a helipad. Also, a cable car stop is predicted in the spatial plans.

2.1.6 Construction

Construction should be done without traffic stoppages on the existing B8 carriageway, if possible, because no substitute roads for heavy traffic exist on the Vranja–Matulji section, except state road D66 (Rijeka–Opatija–Plomin–Vozilići–Pazin). Second carriageway will be built first, and the reconstruction and widening of the existing carriageway will be executed after switching of traffic to the new one. Highway sections where both carriageways are constructed must be executed with temporary deviations at the connections to the existing carriageways and minimum traffic stoppages.

In the latest official changes of the Primorsko–goranska county spatial plans, a corridor from Veprinac to Jušiči/Jurdani needs to be explored as an alternative connection to A7. Suggested junction at the connection of these two corridors was elaborated in this preliminary solution.

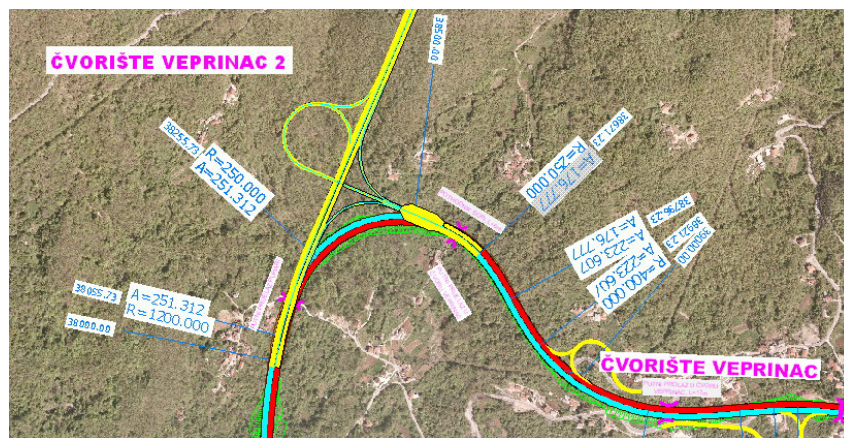


Figure 2 'Veprinac 2' junction

2.2 'Učka' tunnel

'Učka' tunnel is situated inside the borders of Učka Nature park. The second tunnel tube will be constructed north of the existing one, and it will measure approximately 5.660m in length. The tunnel cross section will have two traffic lanes, with total carriageway width of 7,60m. It will be connected to the existing tube by lateral vehicle and pedestrian passages. Axis distance between the tubes ranges from 50 to 100m, with slope level of 0.5% in the second tube (0.4% in the existing). Standard cross section profile area is 56,23m², with a longitudinal ventilation system. The predicted drilling method is the New Austrian Tunnel Method (NATM), which is suitable for the rock type.

Table 3 'Učka' tunnel technical data

2 nd tube	chainage	length (m)	cut profile (m2)
Istria portal	29+770-29+780	10,0	
tunnel tube	29+780-35+440	5.660,0	73,94
Kvarner portal	35+440-35+450	10,0	
lateral connections	number x length	total length (m)	cut profile (m2)
emergency niches	5 x 46,3	232,5	130,05
vehicle conn.	5 x 41,0	205,0	32,00
pedestrian conn.	18 x 41,0	738,0	13,10

Axis distance between the tubes at Istria portal is 100m to preserve the Bina–Istra headquarters and tunnel control centre. At km 31+100, under Pricejak peak, the axis distance gradually shortens to 50m, and stays constant until Kvarner portal and tunnel end.



Figure 3 Visualization – Istria portal of the 2nd tube

3 Environmental impact assessment procedure

Based on the preliminary solution, Environmental impact study was made, and the assessment process began. 1st conference of the Expert advisory commission was held in November of 2010, and the Commission members gave their comments and objections on the EIS and the preliminary solution. 2nd conference of the Expert advisory commission was held in February of 2011, where it was concluded that the revised EIS can be presented to the public. Copies of the EIS were presented in all city and borough centres, with public viewings in Opatija, Matulji and Pazin.

3.1 Design changes based on Commission objections

After visiting the future highway route and reviewing the Study, Expert advisory commission gave its comments and objections on the design solutions and the need for additional hydro–geological and traffic studies. Objections included the setting of the second carriageway north of the existing one at Cerovlje–Lupoglav section. This design solution was done to avoid landslides on the section but for this design solution Pazin and Borut creek must be reconstructed, along with filling of the lakes made by clay exploitation near Cerovlje, which should become a recreation zone. Also, additional explanation for 'Lovrinčići' rest area and 'Vranja' junction had to be given. After additional terrain evaluation more design alternatives were made, and highway route was reconstructed to maintain the lakes around Cerovlje, but rest area and junction positions were proven to be optimal, given the terrain configuration and demands from Ministry of culture and local authorities. Design and Study changes were presented at the 2nd conference along with additional design explanation for the changes that weren't accepted, which the Commission agreed on and concluded that the revised Study can be presented to the public.

3.2 Public discussion and design changes based on public objections

Public discussion was carried out in March and April of 2011. All the public viewings of the Study had good attendance with high tensions, especially in Opatija and Matulji. Problem of highway construction in a high populated area from Učka to Matulji presented itself as the most important, so most of the questions and objections were about residential buildings devastation and owners buyout. In Istria, most of the questions and comments were about noise protection and 'Borut' junction position, since the highway doesn't pass through high populated areas in this county. After the public comments and objections were received from local authorities in written form, they were taken into account for the design changes. Unfortunately, many of the comments weren't taken into account because they referred to areas not covered by this project or to problems that only local and state authority can solve. One of the objections that changed the preliminary solution and showed that the public voice must be heard in large infrastructure projects was moving the position of 'Borut' junction from the one determined by county and borough spatial plans to an alternative one that will move heavy traffic from the towns of Borut and Cerovlje. Also, changes were made to the highway layout to save some of the buildings in the corridor, and additional noise barriers were designed where public suggestions were justified.

Unfortunately, during public discussion we learned that the general public lacks education about phases of the design procedure, or the permits that follow after every phase. This caused unwanted situations and unnecessary frustration. Because of this, we suggest that public should be educated about possibilities of their influence on this kind of projects, along with additional input of public opinion.

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