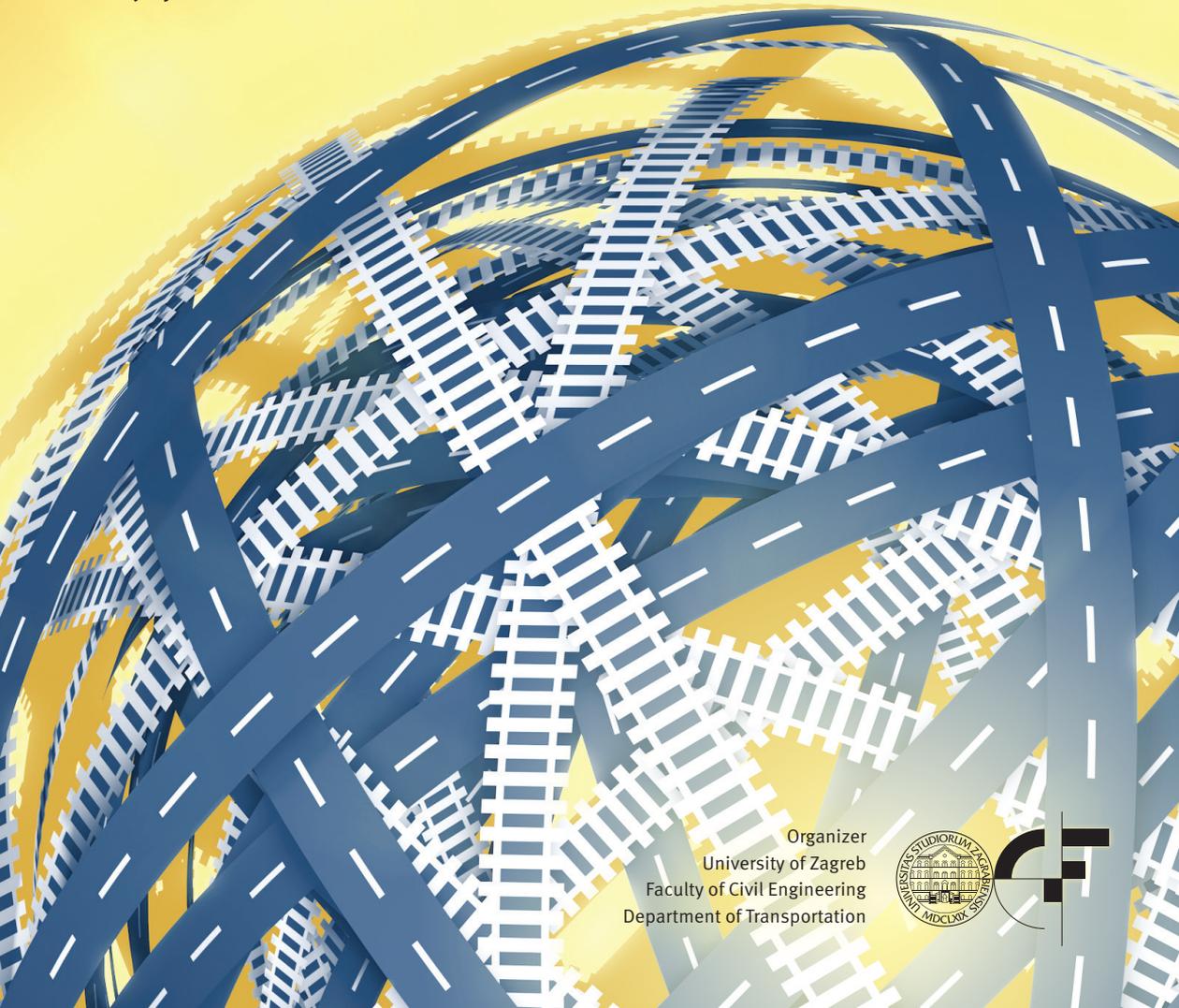


CETRA 2016

4th International Conference on Road and Rail Infrastructure
23-25 May 2016, Šibenik, Croatia

Road and Rail Infrastructure IV

Stjepan Lakušić – EDITOR



Organizer
University of Zagreb
Faculty of Civil Engineering
Department of Transportation



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Zagreb, Croatia

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NEW RAILWAYS IN THE TRIESTE-KOPER AREA

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Abstract

The railway axis Lyon – Trieste – Divača (Koper) – Ljubljana – Budapest – border between Hungary and Ukraine which presents the eastern half of the Mediterranean Corridor as determined by the European Commission with the New EU Transport Infrastructure Policy of 17 October 2013 is to be established. The European Commission highlighted two key railway projects in the Mediterranean Corridor, namely the connection between Lyon and Torino and the railway link Venice – Ljubljana, part of which is also the cross-border section Trieste – Divača between Italy and Slovenia, divided into Italian and Slovenian parts. For the Slovenian part, the company PNZ d.o.o. from Ljubljana created a preliminary design in 2014. The article presents the development of project solutions, starting points for design, and technical solutions of the project. The railway infrastructure, which is the object of this preliminary design, consists of four parts: the first one concerns the basic outline of the Mediterranean Corridor, and the other three provide connection of this section to the existing railway infrastructure in the area of Divača. The first part features a high-function double track for mixed traffic (passenger and freight transport) in the length of 10.9 km. The second part includes the west part of the railway node of Divača enabling connection of trains from the Port of Koper to the basic route. The third part features a presentation of the main railway line No. 50 Ljubljana – Sežana – state border with Italy in the length of 1,224 m. The fourth part presents the 394 m long connecting axis Koper – Sežana. There are many facilities on the route, the biggest of which is the cross-border tunnel Lanaro/Volnik with length of 15,084 m (length of the Slovenian part 3,825 m). Furthermore, a 3D visualisation has been prepared in order to present the project to the general public.

This link represents the first part of a high-function railway line enabling speeds up to 250 km/h in Slovenia. During the design phase, a new comprehensive settlement of the hub of Divača has been considered, which enables a complete connection of freight traffic from the Port of Koper along the railway line Koper – Divača (the first existing track and the planned second track) to the new railway line Venice – Ljubljana. Besides the preliminary design, the article presents also a broader conceptual framework of the possible development of railway infrastructure in the area of Trieste and Koper and in the direction of Ljubljana.

1 Introduction

The railway axis Lyon-Turin-Trieste-Divača (Koper)-Ljubljana-Budapest-border between Hungary and Ukraine which presents the eastern half of the Mediterranean Corridor as determined by the European Commission with the New EU Transport Infrastructure Policy of 17 October 2013 and connects the Iberian Peninsula with the Hungary-Ukraine border is to be established. The Corridor runs along the Adriatic coast of Spain and France, crosses the Alps towards the East across Italy, and heads through Slovenia and Croatia towards Hungary. The European Commission highlighted two key railway projects in this Corridor, namely the connection between Lyon and Torino and the railway link Venice – Ljubljana, part of which is also the cross-border link Trieste – Divača (marked in red on Figure 1).

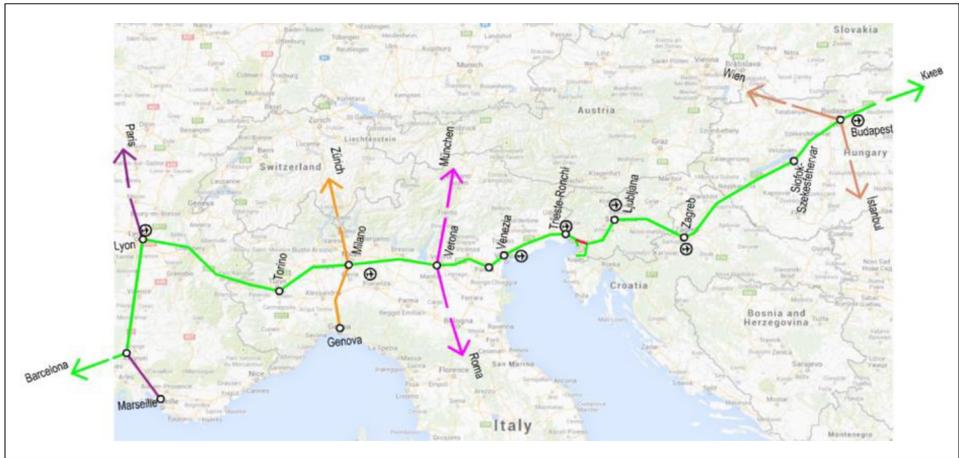


Figure 1 Mediterranean Corridor between Lyon and Budapest and the cross-border part Trieste – Divača (red).

2 New railway line Trieste – Divača

The route of the cross-border section (CBS) of the new railway line (NRL) Trieste – Divača was chosen as the most suitable one from spatial and environmental points of view in cooperation with Italian and Slovenian experts and confirmed at the 6th session of the inter-governmental Slovenian and Italian commission for this railway connection of 3 July 2012.

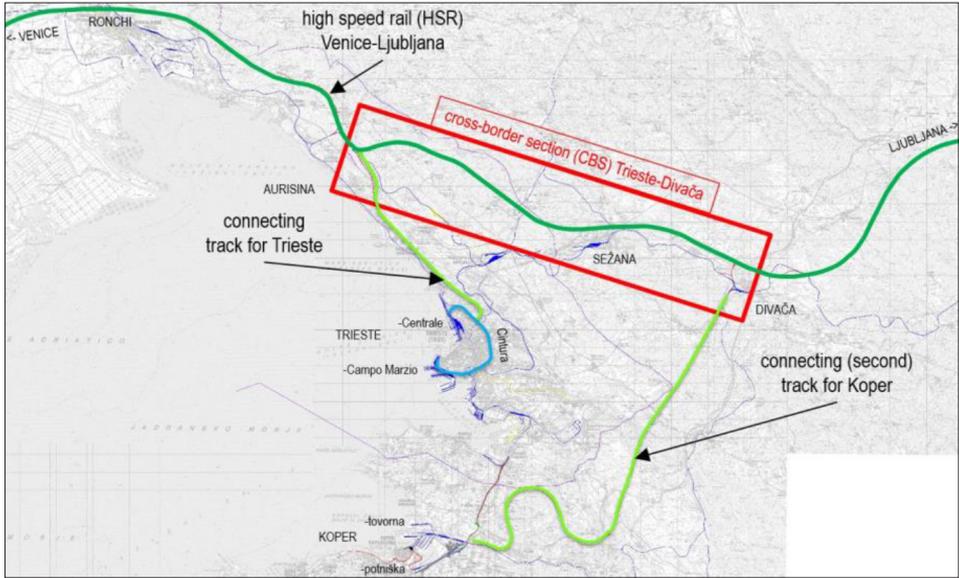


Figure 2 Connection lines to the Mediterranean Corridor in the area of Trieste and Koper.

The CBS starts in Aurisina, Italy, where the connecting track for Trieste is planned and ends in Divača, Slovenia, where the connecting (second) track for Koper is planned. The Italian part of CBS is over 12 km long, great part of which is located in a tunnel. In Aurisina, right after the connection of the linking route for Trieste, the line passes into the over 15 km long tunnel of La-

naro/Volnik. The Slovenian part of the tunnel is 3,825 km long. The Slovenian part of the CBS is 10.9 km long and runs mainly on the surface parallel to the motorway A3 Gabrk-Fernetiči. Last, the form of connection to the existing railway network at Divača was determined by considering the long-term design of the Divača hub as the junction point of the existing (conventional railway line Ljubljana – Sežana and the first track Divača – Koper) and planned railway lines (high speed rail (HSR) Venice – Ljubljana and the second track Divača – Koper). In February 2015, the Ministry of Infrastructure of the Republic of Slovenia ordered the preparation of the preliminary design with the title “New Railway Axis Trieste – Divača (Slovenian part of the section)” by the company PNZ d.o.o. from Ljubljana under the project number 12-1479 co-financed by the EU Fund for Development of Trans-European Transport Networks TEN-T [1].

2.1 Technical characteristics

Technical characteristics were coordinated with designers of the Italian part of the CBS Trieste – Divača. The design speeds on the NRL are 250 km/h for passenger trains and 100 km/h for freight trains and 70 or 80 km/h on the connecting tracks to the existing railway. The distance between track centres is 4.20 m or more (consequence of separating both pipes of the tunnel Lanaro/Volnik and the needs of placing double-track connections). The highest allowed axle load is 25 t or 8.8 t/m.

The NRL route Trieste – Divača starts with a branch line on the new railway Ronchi – Trieste near Aurisina in Italy. The route passes the state border approx. 1.6 km north-west from the existing road border crossing Fernetiči.

At this point, the NRL Trieste – Divača runs in a curve deep under the surface in the tunnel Lanaro/Volnik, which is the biggest facility on the route. Total length of the tunnel stretching in Slovenia and Italy is 14,996 m. Nominal length of the Slovenian part of the tunnel is 3,825 m. It is to be created with two one-track pipes. Both pipes are connected with beams separated 500 m from each other.

The NRL route crosses the motorway A3 Gabrk – Fernetiči, the regional railway Jesenice – Sežana and the regional road R1-204 Šempeter – Sežana under the surface.

Then, the NRL route comes out of the tunnel east of Sežana and runs towards the East on the surface, it crosses the regional road R2-445 Senožeče – Fernetiči and then runs south of the motorway A3 Divača – Sežana – Fernetiči.

Before the village of Žirje, it passes into a deep cut leading to a 260.5 m long cut-cover which protects the village of Žirje from the impacts of the railway traffic. The cut-cover continues to the cut under the hill of Gabričje. After the cut, the NRL – that runs along the motorway at a distance of 20 m and more – moves towards the south to avoid the road service area Povir.

In the area between Gorenje pri Divači and Divača, a connection to the existing railway line No. 50 Ljubljana – Sežana – state border, featuring two tracks outside the level is planned. Both connecting tracks outside the level enable continuation of the NRL in the direction towards Ljubljana.

Rail profile 60 E1 are to be installed. During installation, provisions of the TSI INF HS should be considered. 2.60 m long concrete sleepers are to be installed at distance of 60 cm. Because there are no regulations for railways with speeds of 250 km/h in Slovenia, the minimal thickness of the ballast bed on the NRL is 35 cm in accordance with German guidelines for high speeds (Ril 820.2010). 19 standard 60 E1 switches and 8 track bumpers – two of which (at the end of the route which is to be continued towards Ljubljana) are temporary – are to be installed.

In the area where the tracks will be connected to the existing railway infrastructure, the dimensions of track elements are adapted and some additional appliances are used (for rail lubrication, for increasing the side resistance).

In the cuts, the minimal width of longitudinal ditch is 40 cm and are located at least 1.0 m under the ballast bed. Due to safety regulations, the width of ditches in deep cuttings amounts

to 3.0 m. Water flows into water draining ditches placed especially in the existing Karst sinkholes or karstified areas with a high water sinking coefficient. 23 water sinks are planned. Due to safety regulations for emergency cases and according to the German regulations determining requirements for planning the railway infrastructure for the cases of fire or other disasters, accesses to the NRL are planned – one access on every 1,000 m.

Due to environmental requirements, a wire guard fence preventing driving over animals is planned in the area between the east portal of the tunnel Lanaro/Volnik and the west portal of the cut-cover Žirje.

Because of the NRL, 24 existing roads of various categories in the total length of 7.75 km must be re-located. Due to crossing of the NRL with roads and the splitting track and in order to protect the settlement from negative impacts, 10 construction elements are planned: 5 underpasses, 3 overpasses, 1 cut-cover with the length of 260.5 m (at the village of Žirje) and one 160.5 m long cross facility (crossing of the splitting track with NRL in the direction towards Ljubljana).

In order to protect the environment from noise, several noise barriers and dykes as well as installation of absorption coverings at the portals of the tunnel Lanaro/Volnik and the cut-cover Žirje are planned.

Because of building the NRL and associated infrastructure, public infrastructure lines (electricity power lines, telecommunication lines, water supply lines, waste water lines, the planned pipeline M6 Ajdovščina – Lucija) need to be appropriately protected or rearranged and two housings need to be demolished.

At the NRL route, all stable electric traction devices need to be installed. The system 2 x 25 kV, AC, and the existing 3 kV DC traction system on connecting tracks are selected, respectively. Telecommunication system on NRL is designed to be compatible with the existing system of Slovenske železnice and to meet the inter-operability requirements.

NRL is to be arranged as a double track for mixed traffic with the possibility of reverse traffic on both tracks. The key requirement is the installation of the ERTMS/ETCS for conducting, management, and signalling traffic.

The alignment of such an important route must be coordinated with interests of wider community and interests of local inhabitants and plot owners who are most affected by searching the location for such a route. In order to present the planned arrangements as explicitly as possible, a visualisation has been prepared for this segment.

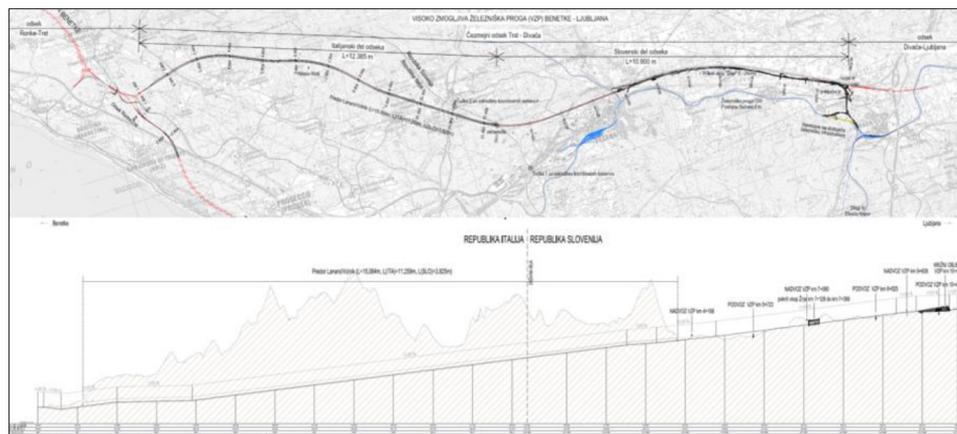


Figure 3 Situation and longitudinal profile of the cross-border section of the NRL Trieste – Divača.

3 New railways in Trieste area

In 2014, the project ADRIA-A, which was included in the operative programme of the cross-border cooperation between Italy and Slovenia was concluded. The project area included Italian provinces from Ferrara to Trieste and West Slovenia. One of the key goals of the ADRIA-A project was the establishment of missing links between the states and, in particular, the establishment of the Trieste rail ring running between Nova Gorica and Koper on two routes (Figure 4), namely:

- 1) east ring part: from Nova Gorica along the existing railways through Štanjel, Sežana, Divača to Koper, and
- 2) west ring part: from Nova Gorica through Gorizia to Ronchi, where an intermodal passenger logistic centre is planned for the area of Udine, Gorizia and Nova Gorica, Trieste, Istria (population over 1 million) connecting the Ronchi International Airport, a railway station on local railways, a station on the HSR Venice – Ljubljana and a bus station. From this logistic centre, the west ring part continues towards Trieste and to Koper. At this point, a connection between Aquilinia and Koper is missing, namely, a CBS of light railway Trieste-Koper.

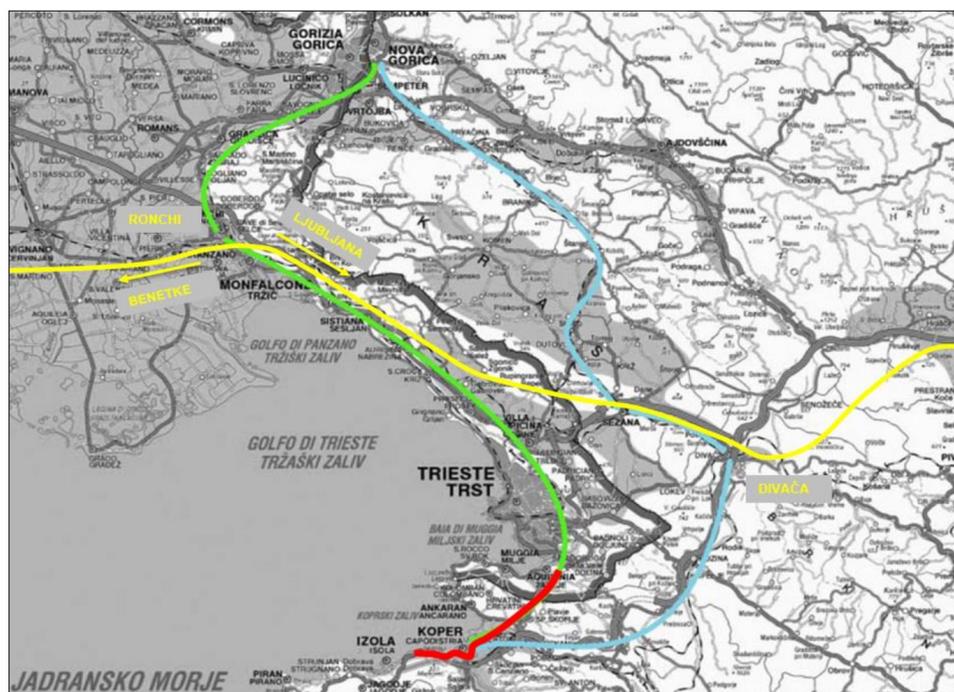


Figure 4 Trieste rail ring (blue and green), high speed rail (HSR) Venice-Ljubljana (yellow) and the missing connection between Trieste/Aquilinia and Koper (red).

In October 2014, the Ministry of Infrastructure of the Republic of Slovenia ordered the preparation of the conceptual design and feasibility study with the title “Light Railway Trieste – Koper” by the company PNZ d.o.o. from Ljubljana under the project number 12-1500 co-financed by the EU Fund for Cross-border Cooperation between Slovenia and Italy [2]. The route is divided into three segments:

- 1) New railway from the state border to Bertoki next to motorway Smin – Škofije (4.75 km)
- 2) Existing infrastructure between Bertoki and Koper – potniška station (length of 2.55 km);
- 3) Tramway town route to the border with the Municipality of Izola (length of 5.75 km).

A tram-train is planned to run along the Trieste rail ring enabling driving along tram lines (R25) and along conventional railways (100 km/h)

4 Conclusion

The article presents the section of the new railway Trieste – Divača and the possible development of the railway infrastructure in the area of Trieste and Koper. The section Trieste – Divača is part of the HSR Venice – Ljubljana determined to be one of the two key railway projects on the Mediterranean Corridor (besides the connection Lyon -Turin) of the European Network TEN-T by the European Commission. In the wider area of Trieste and Koper, the Trieste rail ring, one of the key goals of the ADRIA-A project, is presented.

The establishment of the HSR Venice – Ljubljana is important not only because of bigger freight traffic capacities, but also because of time sparing in passenger traffic – the travelling time would decrease to less than 1/3 of the train travel and to 1/2 of the car travel.

Unfortunately, the latest findings suggest that in the next decades (until 2030 or even 2050) there will not be enough traffic to justify the building of the HSR. The author personally believes that such projects should be implemented in order to create a unified European economic, cultural and social environment and to promote sustainable development, thus drawing nearer other overseas environments in Asia, North and South America and Africa.

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