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

Road and Rail Infrastructure II
Stjepan Lakušić – EDITOR

KEYNOTE LECTURES
EDUCATION
TRAFFIC PLANNING AND MODELLING
INFRASTRUCTURE PROJECTS
INFRASTRUCTURE MANAGEMENT
ROAD INFRASTRUCTURE PLANNING
ROAD PAVEMENT
ROAD MAINTENANCE
STRUCTURES AND STRUCTURAL MONITORING
RAIL INFRASTRUCTURE PLANNING

RAIL TRACK STRUCTURE
INNOVATION AND NEW TECHNOLOGY
ENVIRONMENTAL PROTECTION
GEOTECHNICS
INTEGRATED TIMETABLES
URBAN TRANSPORT PLANNING AND MODELLING
URBAN TRANSPORT INFRASTRUCTURE
VEHICLES
TRAFFIC SAFETY
Proceedings of the
2nd International Conference on Road and Rail Infrastructures – CETRA 2012
7–9 May 2012, Dubrovnik, Croatia

Road and Rail Infrastructure II

EDITOR
Stjepan Lakušić
Department of Transportation
Faculty of Civil Engineering
University of Zagreb
Zagreb, Croatia
ORGANISATION

CHAIRMEN

Prof. Željko Korlaet, University of Zagreb, Faculty of Civil Engineering
Prof. Stjepan Lakušić, University of Zagreb, Faculty of Civil Engineering

ORGANIZING COMMITTEE

Prof. Stjepan Lakušić
Prof. Željko Korlaet
Prof. Vesna Dragčević
Prof. Tatjana Rukavina
Maja Ahac
Ivo Haladin
Saša Ahac
Ivica Stančerić
Josipa Domitrović

All members of CETRA 2012 Conference Organizing Committee are professors and assistants of the Department of Transportation, Faculty of Civil Engineering at University of Zagreb.

INTERNATIONAL ACADEMIC SCIENTIFIC COMMITTEE

Prof. Ronald Blab, Vienna University of Technology, Austria
Prof. Vesna Dragčević, University of Zagreb, Croatia
Prof. Nenad Gucunski, Rutgers University, USA
Prof. Željko Korlaet, University of Zagreb, Croatia
Prof. Zoran Krakutovski, University Sts. Cyril and Methodius, Rep. of Macedonia
Prof. Stjepan Lakušić, University of Zagreb, Croatia
Prof. Dirk Lauwers, Ghent University, Belgium
Prof. Giovanni Longo, University of Trieste, Italy
Prof. Janusz Madejski, Silesian University of Technology, Poland
Prof. Jan Mandula, Technical University of Kosice, Slovakia
Prof. Nencho Nenov, University of Transport in Sofia, Bulgaria
Prof. Athanassios Nikolaides, Aristotle University of Thessaloniki, Greece
Prof. Otto Plašek, Brno University of Technology, Czech Republic
Prof. Christos Pyrgidis, Aristotle University of Thessaloniki, Greece
Prof. Carmen Racanel, Technical University of Bucharest, Romania
Prof. Stefano Ricci, University of Rome, Italy
Prof. Tatjana Rukavina, University of Zagreb, Croatia
Prof. Mirjana Tomićić–Torlaković, University of Belgrade, Serbia
Prof. Brigita Salaiova, Technical University of Kosice, Slovakia
Prof. Peter Veit, Graz University of Technology, Austria
Prof. Marijan Žura, University of Ljubljana, Slovenia
SPECIFICITIES OF PROJECT FOR RAILWAY LINE ON CORRIDOR VIII

Zoran Krakutovski, Darko Moslavac, Zlatko Zafirovski
University sts. Cyril and Methodius, Faculty of Civil Engineering Skopje, Republic of Macedonia

Abstract

The project regarding construction of the new railway line, part of the TEN Corridor viii through the area of r. of Macedonia, is in the advanced stage of study and design preparation. The railway line on Corridor viii starts in Durres (Albania – port in the Adriatic Sea), going by Tirana, Skopje, Sofia, Plovdiv, Burgas and the other endpoint is in Varna (Bulgaria – port on the Black Sea). There are two missing sections for construction of new railway link in r. of Macedonia: the first is on the East (link with the railway network in Bulgaria), and the second is on the West (link with the railway network in Albania). The part on the East has been started with construction in 1994 with proper governmental financial resources, but this manner of investment is abandoned in 2000. The usage of European financial institution is a new approach to find stable financial funds for complete construction of this part of railway line. The starting point for project concerning the part on the West is preparation of general study and tracing of feasible railway line variants and preparation of feasibility study. The feasibility study for the West part is finished and for the East part is going currently. The next step of this project is to complete the Detailed Design and to prepare the tender documentations. The study until now shows some specificities of this railway line and its importance for national and international transport. The construction of missing segments on the railway line is envisaged to start in 2013.

Keywords: railway line, corridor VIII, corridor X, design, pre-feasibility study

1 Introduction

The Republics of Albania, Macedonia and Bulgaria in 1992 agreed on a transport Corridor Durres–Tirana–Gostivar–Skopje–Kumanovo–Gueshevo–Sofia–Burgas in a Memorandum of Understanding (South Balkan Development Initiative, Bechtel Report on East–West Transport Corridor Feasibility Study, 1997). This is the forerunner of Corridor viii, the southernmost among the West–East Pan–European Corridors, linking the Adriatic/Ionian to the Black Sea Pan–European Transport Areas. The main alignment of Corridor viii runs from the southern Italian ports of Bari and Brindisi, the Albanian ports of Durres and Vlora, the cities of Tirana, Skopje, Sofia, Plovdiv, to the Bulgarian ports of Burgas and Varna (Black Sea), thus connecting the Italian Adriatic Transport Corridor, the Adriatic branch of Motorway of the Sea and the Mediterranean Transport Area to the Black Sea Pan–European Transport Area.
2 Rail Corridor VIII description

The Corridor starts from the ports of Bari and Brindisi in Italy, and through the port of Durres and Vlore in Albania reaches the capital Tirana. The rail connection continues on towards the boundary between Albania and Republic of Macedonia. After crossing the border the main route continues northward, passing through the city of Tetovo and ultimately reaching the capital city of Skopje; from there the route continues moving East, running along the main line, which crosses all of northern part of Republic of Macedonia, up to the zone bordering on Bulgaria until it reaches the port of Burgas on the Black Sea.

Rail Corridor VIII forms a network with Rail Corridors X, IV and IX. The interconnection nodes are in Skopje, with Corridor X; in Sofia, with Corridor IV; and in Gorna Oriahovica, with Corridor IX. The entire line, including missing links, is 586 km long, of which 139 km are in Albania, 309 are in Republic of Macedonia and 138 km are in Bulgaria. The line is composed by a single track segment, suitable for diesel traction trains.

The entire line from Durres to Sofia has been divided in 17 sections, identifying 3 main categories: the existing railways on which no immediate intervention has been envisaged, the sections already built which require rehabilitation or upgrading and, finally, the sections where the rail line is completely missing or is currently under construction.
Figure 2  Rail Corridor VIII main alignment and connections with other corridors

Figure 3  Details of Rail Sections Durres–Skopje–Sofia
3 Part of Corridor VIII through the territory on Republic of Macedonian

3.1 Section Lin – Macedonia border (Section n.5)

This section, 2–3 km long, is one of the missing links along the rail Corridor viii alignment.

![Albania – Macedonia cross border rail missing link](image)

**Figure 4** Albania – Macedonia cross border rail missing link

3.2 Macedonia rail sections (from Section n. 6 to Section n. 13)

Eight rail sections have been identified: Albanian border–Struga–Kicevo (Sections n. 6–7 missing link), Kicevo–Kumanovo (Sections n. 8–9–10, existing with minor upgrading between Kicevo and station Gorce Petrov), Kumanovo–Beljakovci–Kriva Palanka (Sections n. 11–12, under construction) and Kriva Palanka–Bulgarian border (Section n.13, missing).
3.3 Albanian border–Struga–Kicevo (Sections n.6 and n.7)

These sections, which are 66 km long, are missing. Section n.6, from the Albanian border to Struga, is 12 km long, while section n.7, Struga–Kicevo, is 54 km long.

Figure 5  Macedonia Rail Sections: Albanian border–Skopje–Bulgarian border

Figure 6  Kicevo Station: terminal of the existing railway line towards Albania
3.4 Kicevo–Gostivar–Gorce Petrov–Skopje–Kumanovo (Sections n. 8–9–10)

This alignment is the existing, 154 km long, central part of rail Corridor viii in Macedonia. West of Skopje, there are the Kicevo–Gostivar (36 Km) and the Gostivar–Skopje (81 km) sections; East of the capital city there is the Skopje–Kumanovo section (37 km). The operating speed is around 60 km/h and only the section Skopje–Kumanovo is electrified, the others are suitable for diesel engines only. The signaling–interlocking system and the telecommunication equipment are twenty years old but still in good shape.

Louis Berger, in its study 'Investment Options in the Transport Sector component 5: Rail Link to Albania', investigated the 103 km West of Skopje (the section Kicevo–Gorce Petrov) for upgrading the line Kicevo–Skopje in order to achieve a sustainable speed of 100 km/h.

3.5 Section Kumanovo–Beljakovci (Section n.11)

This line is under construction. Design parameters are the following:
- Speed: 100 km/h
- Min curve radius: 500 m
- Max axle load: 250 KN
- Max gradient 15 %
- Bridges: 8, total length 224 m
- Rail station: 1

Figure 7  Rehabilitated section Kumanovo – Beljakovci

This section, which is 29 km long, is completed for about 35 %, in terms of financial resources already spent, i.e. 13 million € over a total sum of 37 million € required to reach Kleceve. From this village a 6 km rail track, including a new bridge, must be constructed to reach Beljakovci. The additional investment are needed to complete this section, including signaling and electrification as well as an intermediate rail station.
3.6 Section Beljakovci – km 66 (Kriva Palanka) (Section n.12)

This 37 km long section is also under construction. Basic technical parameters are the following:
- Speed: 100 km/h
- Min curve radius: 500 m
- Max axle load: 250 KN
- Max gradient 15 %
- Bridges: 33, total length 3,985 m
- Rail stations: 3
- Overpasses: 8, total length 273 m
- Tunnels: 15, total length 3,437 m
- Embankments: 12,295 m
- Cuttings: 16,509 m

![Figure 8 Viaduct in construction on the section n.12 Beljakovci–Kriva Palanka](image)

The section Beljakovci–km 66 ends 7 km before reaching the town of Kriva Palanka. This section is completed for about 58 %, in terms of financial resources already spent: 90 million € over 155 million € of total resources required. The last constructed bridge is about 7 km before Kriva Palanka. The additional investment are needed to complete the single electrified line including signaling and telecommunications. Works have stopped two years ago because of lack of funding. Construction materials are nearly entirely produced in Republic of Macedonia.
3.7 Section from Km 66 (Kriva Palanka) to Bulgarian border (Section n. 13)

This section, 23 km long and running through mountains, is missing. The Detailed Design for the alignment and also Preliminary design for structures (bridges and tunnels) is finished. From the available technical documents the following parameters can be derived:

- Speed: 100 km/h
- Min curve radius: 500 m
- Max axle load: 250 KN
- Max gradient 25 ‰
- Bridges: 41, total length 4,544 m
- Rail stations: 2
- Tunnels: 25, total length 8,593 m
- Embankments: 3,056 m
- Cuttings: 6,659 m

The investment costs amount to some of 105 million € for a single electrified line. The main part of the required sum will cover the needed civil works (including the tunnel to reach the Bulgarian border), adding to about 95 million €.

4 Conclusions

The missing sections of railway line on Corridor viii, through the territory of Republic of Macedonia, are in the final stage of preparation of design documentation. The start of the works is envisaged to be in 2013. The financing of this project will be realized from European banks and funds.

References

