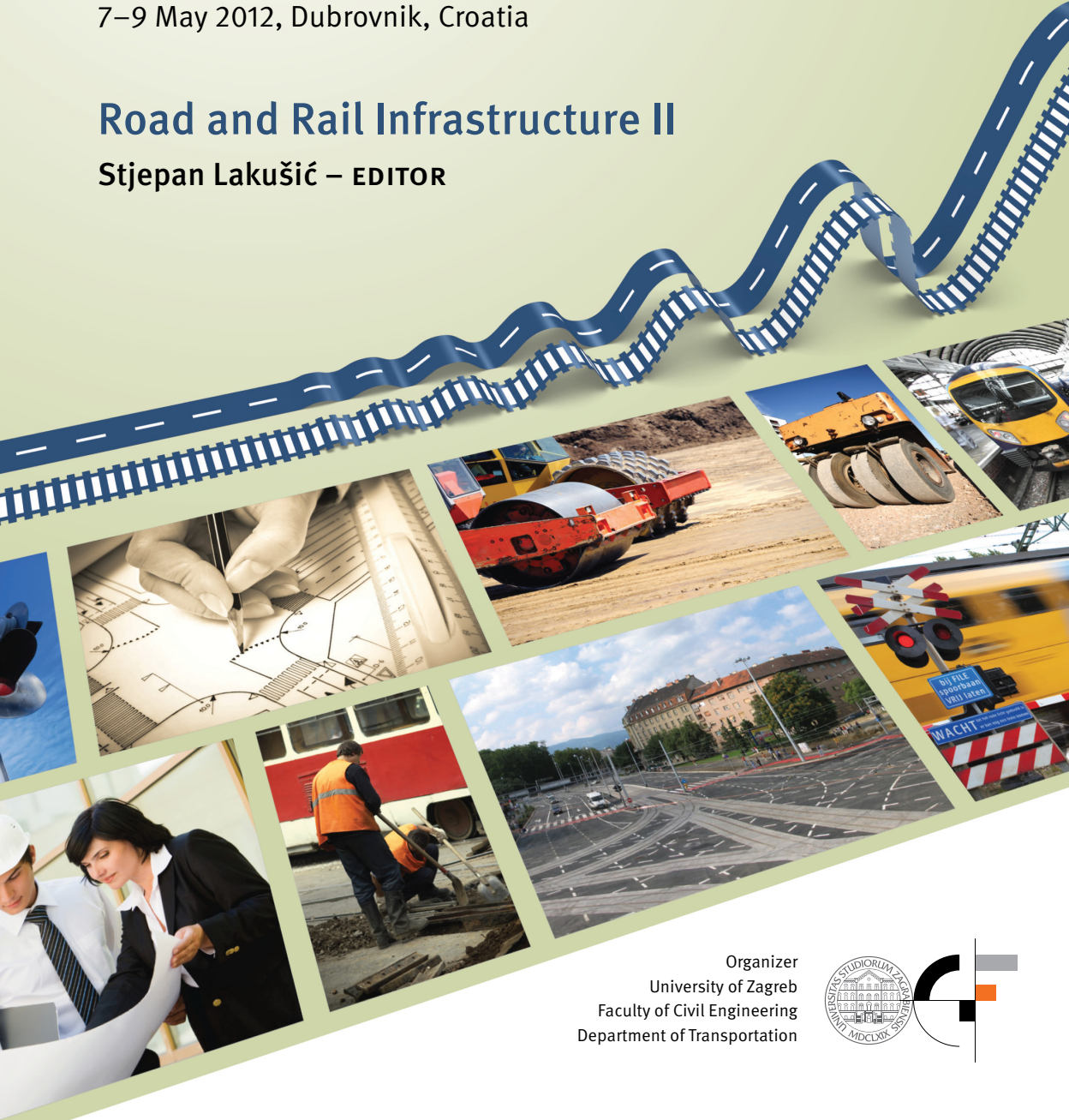


CETRA²⁰¹²

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
Department of Transportation



CETRA²⁰¹²
2nd International Conference on Road and Rail Infrastructure
7–9 May 2012, Dubrovnik, Croatia

TITLE

Road and Rail Infrastructure II, Proceedings of the Conference CETRA 2012

EDITED BY

Stjepan Lakušić

ISBN

978-953-6272-50-1

PUBLISHED BY

Department of Transportation
Faculty of Civil Engineering
University of Zagreb
Kačićeva 26, 10000 Zagreb, Croatia

DESIGN, LAYOUT & COVER PAGE

minimum d.o.o.
Katarina Zlatec · Matej Korlaet

COPIES

600

A CIP catalogue record for this e–book is available from the National and University Library in Zagreb under 805372

Although all care was taken to ensure the integrity and quality of the publication and the information herein, no responsibility is assumed by the publisher, the editor and authors for any damages to property or persons as a result of operation or use of this publication or use the information's, instructions or ideas contained in the material herein.

The papers published in the Proceedings express the opinion of the authors, who also are responsible for their content. Reproduction or transmission of full papers is allowed only with written permission of the Publisher. Short parts may be reproduced only with proper quotation of the source.

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

CETRA²⁰¹²

2nd International Conference on Road and Rail Infrastructure

7–9 May 2012, Dubrovnik, Croatia

ORGANISATION

CHAIRMEN

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

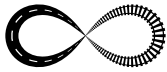
ORGANIZING COMMITTEE

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 Nikolaidis, 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 Tomičić–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



RENAISSANCE OF THE RAILWAY CONNECTION TRSTENA–NOWY TARG

Juraj Muzik, Zuzana Gocálová, Andrej Villim, Janka Šestáková, Ľubomír Pepucha
Faculty of Civil Engineering, University of Žilina, Slovakia

Abstract

Common projects of the crossborder cooperation – Žilina and Silesia counties – exceed the borders of our states. Map as a scaled and generalized image of earth's surface, created on the basis of specific mathematical rules, provides tools for the description of economical and social aspects as well as cultural, natural and social heritage of the regions using map language. As the map shows georeferenced spatial data and their relations, the map becomes the platform for creation of the information systems for regions. On the Polish and Slovak sides the map is created using different cartographic view.

Keywords: track, crossborder cooperation, railways

1 Introduction

In the context of the projects 'Transportowe studium przedolimpijskie – Zakopane 2008' and 'Tatzański system komunikacyjny a ochrona przyrody', a study for renovation of the railroad track Trsten–Suchá Hora, which belongs to the obsolete railroad connection with Poland, Trstená–Nowy Targ, was born.

The objective of the study is to connect the Orava region with the Cracow region and to widen economical relations between regions and states. This objective requires a modernization of the existing traffic structures. The study assumes the load movement from truck traffic to the railroad, which is more economical, energetically safe and is with less influence on the living environment.

Other advantages are the thinning of traffic on the road communications in favour of personal transport, which is more effective in the context of traffic safety and road maintenance. Reactivation of the historical railroad, which integrates from the beginning of the 20th century the regions on both sides of the High Tatras, will create the connection between regions with rich cultural and historical values. A development of conditions, that will intensify tourist traffic and the economical and social development of the regions, will occur.

2 Nature of the railroad space Trstená–Suchá Hora

Cross station railroad space Trstená – Suchá Hora was, as a part of Oravian local railroad 3rd section, opened on 21.12.1899. To Poland the track was extended during the year 1904 (track Nowy Targ – Podczerwone – Suchá Hora).

This rail track was running until 1975, when the traffic deputy cancelled the service on this railroad. The rail track upper structure was destroyed during the eighties, but the earth structure was kept in its original conditions.

The track is connected to the existing rail station Trstená in km 56,930 and it goes to km 70,406 where the track ends on the border with Poland near Suchá Hora village.

The proposal for a new track is using the existing directional conditions of the cancelled track and existing earth structure. Another condition was that the maximal speed is to be 80km/h, and this value was used to derive other base rail structure parameters.

Maximal uphill gradient on the track do not exceed original uphill conditions e.g. 21,803‰. Proposed maximal uphill was determined according to the standard TNŽ 736301 'Design all-state tracks with normal gauge' article 31 'for design speed $V = 80$ km/h and less, the slope could not be more than 20‰.'

Minimal radius is $r = 320$ m, maximal uphill in the track arc $p_{d1} = 150$ mm. Continual transition between the straight track and the arc is designed using a cubic parabola spiral curve.

Objects on the track are fully functional, and during potential renovation they should be cleaned and modified to meet the service conditions. Some bridges were removed and renewal of the service requires creation of new bridges.

The track is designed as a monorack with one level crossing with local communications.

Design of the earth structure is based on the theoretical knowledge and visual findings. After geotechnical survey the structure character might change which may lead to lowering costs. Subsurface layer is designed from gravelous sand with minimal grain diameter of 300mm.

The designed upper part of the railroad embankment is the S49 type using concrete crossties SB8.

The track is designed as a monorack with total length of 13,364 955 km, number of railway bridges – 4, crossings – 15, floodgates with a pipe – 9, slab floodgates – 6, vault floodgates – 2, viaducts – 2 and designed traction – motor.

3 The characteristic design of railway stations

Railway station Suchá Hora is positioned on the 69,869 340th km, station begins on the km 69,468 854 with the rail switch object no. 7 and ends on the km 70,240 339 with the rail switch object no. 1. The total station length is 771,485 m. In the dispatcher building there is waiting room, entrance hall and a cash-desk. Through the entrance it is possible to exit and enter the platform, for continual access between platforms the slab subway is designed. The station building is under reconstruction.

The railway station Suchá Hora is designed for track speed of 80km/h on the main track and track speed of 50km/h on side tracks. The station has 4 tracks. Axial distance between the track no.4 and no. 2, as well as between track no.1 and no.3 is 5m, axial distance between the track no.1 and the track no.2 is 10 m.

Railway tracks are designed using the following rules. Track no.1 of the new state is identified with the track no.1 of the old state. This track is the main entrance and exit track for all trains and its effective length is $l_{uz} = 550$ m. Track no.3 is the side entrance and exit track for all trains and its effective length is $l_{uz} = 518$ m.

The service handling track, track no.4 with the effective length $l_{uz} = 566$ m and track no.2 with effective length $l_{uz} = 566$ m, are used mainly for loading and unloading or as store tracks. Designed rail superstructure is type S49 with gravel bed of thickness min. $hk = 300$ mm on wooden crossties 1A types.

Rail switches no.1, 2, 3, 4, 5, 6, 7 were designed as ratio switches of the S49 type on the wooden crossties. South track head was designed as an arc head with the radius of $r = 600$ m, to keep effective track length $l_{uz} = 550$ m. Rail switches no.7, 5 is transformed to the arc with speed of 50 km/h, the switch no.6 is transformed outside of the arc with speed also 50km/h. To level super elevation on track no.3 the arc was designed with $r = 429,723$ m and a spiral curve, on the track no.4 the arc is designed, with $r = 645,801$. On the northern rail head the arcs with radius $r = 200$ m and $r = 500$ m are designed.

On the rail station Trstená, with the reason of using modern rules of goods transfer and using higher standards of traffic services, the study was counting on combination traffic. Using com-

ination traffic requires reconstruction of the railway station Trstená along with the creation of the combination traffic terminal.

4 Conclusions

Considering the suggested resolution of monorail Trstená–Suchá Hora (state border with Poland) with maximum speed of 80 km/hour and length of 13,365 km the total costs were estimated as 28 672 811 €, which presents 2 145 366 € per 1 km.

The suggested railway connection creates good conditions for economical-commercial trade and social growth of the regions. It gives the opportunity to make closer connections and attract people to the regions as Orava, Spiš, Liptov and Pieniny. These are the areas with huge potential for tourism with architectural, cultural and natural national heritage. Construction of mentioned monorail requires coordinated management of this project. Possible solution is an extensive cooperation with the Polish side where both parties will participate on the management. This management would consist of full project management, plus financial studies impact, commercial and financial affectivity, full preparation stage including the application for sponsorship from the European funds and all planning and executive steps. Project realization could play the key role in strategic forming of the regions as well as subject related to these and their successful presentation within international competitors.

Acknowledgements

This contribution is the result of the project implementation: 'Support of Research and Development for Centre of Excellence in Transport Engineering' (ITMS: 26220120031) supported by the Research & Development Operational Programme funded by the ERDF.



'We support the research activities in Slovakia'.

References

- [1] MALÍČEK, I., a kol. : Projektovanie, stavba a rekonštrukcia tratí, vŠbS Žilina,1993
- [2] KOŤKA, V.,: Digitálne mapy s AutoCADom - 1. diel AutoCAD, cd verzia, 2006, strán 340, ISBN 80-8070-482-1
- [3] IŽVOLTOVÁ, J., KOŤKA, V.,: Kartografická interpretácia niektorých atribútov databázových štruktúr, 17. kartografická konferencia, Bratislava 6. 7.9.2007, ISBN 987-80-89060-11-5
- [4] MASAROVÍČOVÁ, S. - SITÁNYIOVÁ, D.: GIS application for solution of the problems of public transportation system in Žilina, Communications - scientific letters of the University of Žilina. ISSN 1335-4205. - Vol. 6, Nr. 3 (2004), pp. 47-50.
- [5] HODAS, S. - ŠESTAKOVÁ, J.: Railway track modeling in 3D system. In.: xx Polish - Russian - Slovak Seminar Theoretical Foundation of Civil Engineering Warszawa and Wrocław, Poland, 5.-9.9.2011, p. 355-360. - ISBN 978-80-970248-6-4
- [6] KICOVÁ, E.- PALIDEROVÁ, M.: The importance of comparative analysis at appraisal of company's financial health In: Obchod, jakost a finance v podnikách - determinanty konkurencieschopnosti vi : sborník příspěvků z mezinárodní vědecké konference konané ve dnech 16.-17. dubna 2008 na České zemědělské univerzitě v Praze pod garancí katedry obchodu a financí, provozně ekonomické fakulty. - Praha: Česká zemědělská univerzita, 2008. - ISBN 978-80-213-1774-1. - S. 78-81.
- [7] MUŽÍK, J.: Použitie GIS pre určovanie stability svahov. In: Sborník studentské konference GISáček 2005: Ostrava, 2.5.-3.5. 2005. - Ostrava: VŠB - TU, 2005.
- [8] MUŽÍK, J. - SITÁNYIOVÁ, D.: Aplikácie GIS v geotechnickom prieskume zosuvných území. In: Geotechnika v urbanizovanom prostredí = Geotechnics in urban areas : zborník 7. Medzinárodnej geotechnickej konferencie, Bratislava 27. a 28. júna 2005. - v Bratislave: Slovenská technická univerzita, 2005. - ISBN 80-227-2225-1. - S. 117-122.