

CETRA<sup>2014</sup>

Final Programme

3<sup>rd</sup> International Conference on Road and Rail Infrastructure

28–30 April 2014, Split, Croatia

[www.grad.unizg.hr/cetra](http://www.grad.unizg.hr/cetra)



Organizer  
University of Zagreb  
Faculty of Civil Engineering  
Department of Transportation



# ORGANISATION AND COMMITTEES

## CHAIRMEN

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

## ORGANIZING COMMITTEE

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

All members of CETRA 2014 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. Vesna Dragčević, University of Zagreb  
Prof. Isfendiyar Egeli, Izmir Institute of Technology  
Prof. Rudolf Eger, RheinMain University  
Prof. Ešref Gačanin, University of Sarajevo  
Prof. Nenad Gucunski, Rutgers University  
Prof. Libor Izvolt, University of Zilina  
Prof. Lajos Kisgyörgy, Budapest University of Technology and Economics  
Prof. Željko Korlaet, University of Zagreb  
Prof. Zoran Krakutovski, University of Skopje  
Prof. Stjepan Lakušić, University of Zagreb  
Prof. Dirk Lauwers, Ghent University  
Prof. Zili Li, Delft University of Technology  
Prof. Janusz Madejski, Silesian University of Technology  
Prof. Goran Mladenović, University of Belgrade  
Prof. Otto Plašek, Brno University of Technology  
Prof. Vassilios A. Profillidis, Democritus University of Thrace  
Prof. Carmen Rucanel, Technical University of Civil Engineering Bucharest  
Prof. Tatjana Rukavina, University of Zagreb  
Prof. Andreas Schoebel, Vienna University of Technology  
Prof. Mirjana Tomičić-Torlaković, University of Belgrade  
Prof. Audrius Vaitkus, Vilnius Gediminas Technical University  
Prof. Nencho Nenov, University of Transport in Sofia  
Prof. Marijan Žura, University of Ljubljana

## WELCOME TO CETRA 2014 AND WELCOME TO SPLIT

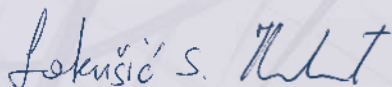
The intention of CETRA 2014 conference is to bring together scientists and experts in the fields of road and railway engineering and give them one more opportunity to present the results of their researches, findings and innovations. Road and railway infrastructures are closely related, but scientific and professional gatherings that include both fields simultaneously have rarely been organized until now. The development of a society, particularly its economic development, at present is unthinkable without a developed road and railway infrastructure.

Great interest of participants in topics from the field of road and rail infrastructure during the CETRA 2010 conference in Opatija, where 124 papers were presented by participants from 29 countries, and CETRA 2012 conference in Dubrovnik, where 130 papers were presented by participants from 39 countries, confirmed the soundness of the Department for Transportation Engineering's decision to once again organize such an international event. Positive comments received from participants in the previous CETRA conferences motivated the Department for Transportation Engineering, Faculty of Civil Engineering - University of Zagreb, to continue with the organization of such event in 2014 also. The Organizing Committee has been working hard to make CETRA 2014 a very interesting conference, which will provide not only fruitful, scientific and professional experience but a chance to meet old friends and make new ones in Split. Split is Split is the largest city in Dalmatia and the second largest city in Croatia and also the "Croatian Tourism Champion in 2012".










We would like to thank the various institutions, scientific committee members, sponsoring and donor companies and of course, the indefatigable staff of the Department of Transportation at Faculty of Civil Engineering in Zagreb, who have helped in the preparation and organization of CETRA 2014 Conference.

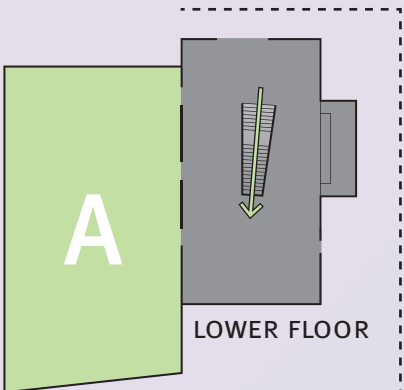
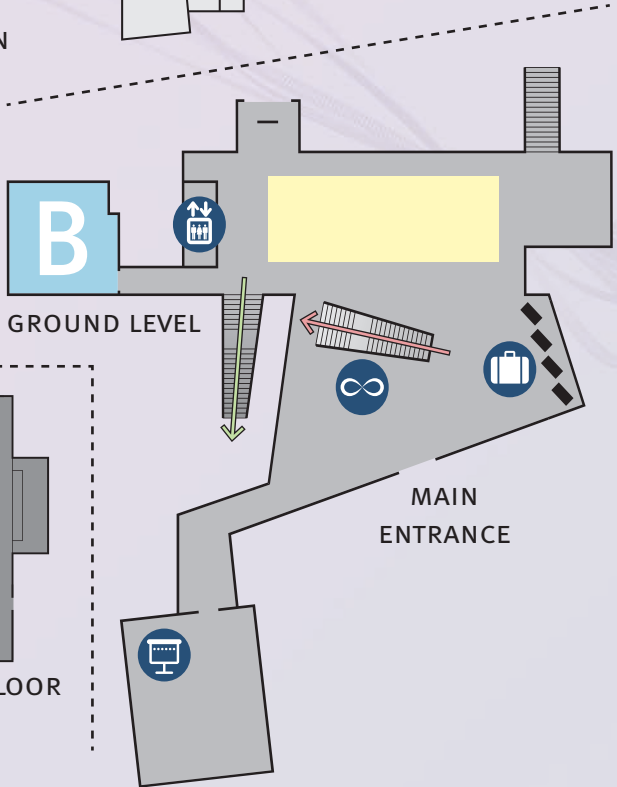
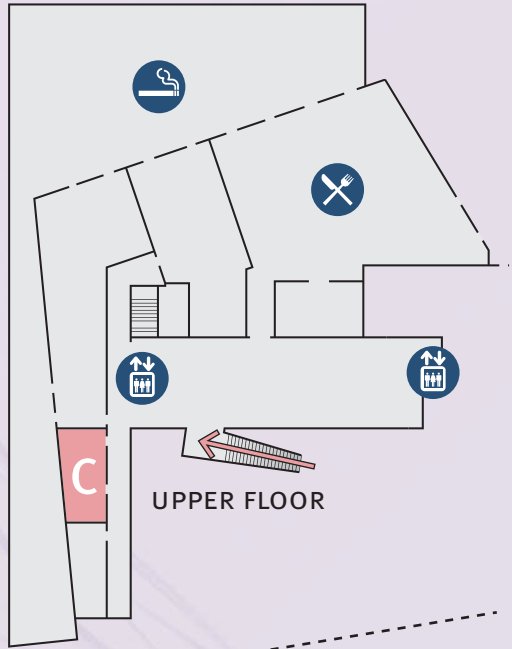
We recognize the significant contribution of more than 250 authors from 37 countries and 51 Universities. More than 142 excellent papers were published in the proceedings Road and Rail Infrastructure III. The full papers are being published by the Department of Transportation, Faculty of Civil Engineering at University of Zagreb in hardcopy and CD-ROM version of the conference proceedings.

We wish you all a pleasant and productive time in Split at CETRA 2014 Conference.



Stjepan Lakušić and Željko Korlaet  
Chairmen of CETRA 2014 Conference

-  CONFERENCE HALL "A"
-  CONFERENCE HALL "B"
-  CONFERENCE HALL "C"
-  EXHIBITION AREA
-  CETRA 2014  
REGISTRATION  
DESK
-  PRESENTATION  
ADMITTANCE  
ROOM
-  RESTAURANT
-  HOTEL RECEPTION
-  TERRACE



# CONFERENCE PROGRAMME – SHORT VERSION

<b>DAY 0 – Sunday, April 27<sup>th</sup></b>		
17:00 – 19:00	Registration of the Participants	HOTEL LOBBY
19:30 – 21:30	A welcome cocktail for participants and guests	HOTEL RESTAURANT
<b>DAY 1 – Monday, April 28<sup>th</sup></b>		
08:00 – 09:30	Registration of the Participants	HOTEL LOBBY
09:30 – 10:00	Opening Ceremony	CONFERENCE HALL “A”
10:00 – 10:30	KEYNOTE LECTURE: “INVESTMENTS IN CROATIAN TRANSPORT INFRASTRUCTURE” dr. Siniša Hajdaš Dončić	CONFERENCE HALL “A”
10:30 – 11:00	Coffe Break	HOTEL LOBBY
11:00 – 12:30	1A Rail Infrastructure Projects Management	CONFERENCE HALL “A”
	1B Pavement Maintenance Management	CONFERENCE HALL “B”
12:30 – 14:00	Lunch Break	HOTEL RESTAURANT
14:00 – 15:30	2A Structural Monitoring and Maintenance	CONFERENCE HALL “A”
	2B Road Infrastructure Projects Construction and Management	CONFERENCE HALL “B”
15:30 – 16:00	Coffee Break	HOTEL LOBBY
16:00 – 17:30	3A Pavement Behaviour	CONFERENCE HALL “A”
	3B Bicycle Traffic	CONFERENCE HALL “B”
18:30 – 22:00	Visit to STELLA CROATICA & Dinner at Ethno Village ZAGORA	
<b>DAY 2 – Tuesday, April 29<sup>th</sup></b>		
09:00 – 11:00	4A Pavement Materials: Bitumen and WMA	CONFERENCE HALL “A”
	4B Road Traffic Planning and Modelling	CONFERENCE HALL “B”
11:00 – 11:30	Coffee Break	HOTEL LOBBY
11:30 – 13:00	5A Rail Infrastructure Projects Design and Construction	CONFERENCE HALL “A”
	5B Geotechnics	CONFERENCE HALL “B”
13:00 – 14:00	Lunch Break	HOTEL RESTAURANT
14:00 – 15:30	6A Pavement Materials: Mixtures	CONFERENCE HALL “A”
	6B Rail Traffic: Planning and Safety	CONFERENCE HALL “B”
	6C Miscellaneous	CONFERENCE HALL “C”
15:30 – 16:00	Coffee Break	HOTEL LOBBY
16:00 – 17:30	7A Environmental Protection	CONFERENCE HALL “A”
	7B Integrated Timetables on Railways	CONFERENCE HALL “B”
	7C Road Traffic Safety	CONFERENCE HALL “C”
20:00 – 23:00	Gala Dinner	
<b>DAY 3 – Wednesday, April 30<sup>th</sup></b>		
09:00 – 11:00	8A Railways - Workshop	CONFERENCE HALL “A”
	8B Rail Track Superstructure	CONFERENCE HALL “B”
11:00 – 11:30	Coffee Break	HOTEL LOBBY
11:30 – 13:15	9A Urban Transport	CONFERENCE HALL “A”
	9B Geotechnics	CONFERENCE HALL “B”
	9C Rail Track Superstructure	CONFERENCE HALL “C”
13:30 – 14:00	Conference Closure	CONFERENCE HALL “A”

# CONFERENCE PROGRAMME – DETAILED VERSION

DAY 1 – Monday, April 28 <sup>th</sup>		
08:00 – 09:30	Registration of the Participants	HOTEL LOBBY
09:30 – 10:00	<b>OPENING CEREMONY</b>	<b>CONFERENCE HALL “A”</b>
10:00 – 10:30	KEYNOTE LECTURE: INVESTMENTS IN CROATIAN TRANSPORT INFRASTRUCTURE dr. Siniša Hajdaš Dončić, Minister of Maritime Affairs, Transport and Infrastructure	CONFERENCE HALL “A”
10:30 – 11:00	Coffe Break	HOTEL LOBBY

Monday, April 28 <sup>th</sup>		Session 1.A	Session room:
11:00 – 12:30		<b>RAIL INFRASTRUCTURE PROJECTS MANAGEMENT</b>	<b>CONFERENCE HALL “A”</b>
<b>Chairmen:</b>	Prof. Zoran Krakutovski & Prof. Tomislav Josip Mlinarić		
<b>Time</b>	<b>Ref. No.</b>	<b>Paper Title / Author(s)</b>	
11:00 – 11:30	∞	KEYNOTE LECTURE: THE INVESTMENT PERSPECTIVES IN CROATIAN RAILWAYS INFRASTRUCTURE SECTOR Darko Peričić, President of Management Board of the Croatian Railways	
11:30 – 12:30	251	TOWARDS MAXIMIZATION OF THE ADDED VALUE OF STRATEGIC INFRASTRUCTURE PROJECTS IN SEE THROUGH IMPROVEMENTS AT BORDER CROSSING POINTS Marios Miltiadou, Efstathios Bouhouras, Christos Taxiltaris & George Mintsis	
	341	EUROPEAN EXISTING RAILWAY TRACKS: OVERVIEW OF TYPICAL PROBLEMS AND CHALLENGES Irina Stipanovic Oslakovic, Xincai Tan & Kenneth Gavin	
	267	RAILWAY INVESTMENT PLANNING USING DYNAMIC PRIORITIES Dragana Macura, Nebojša Bojović, Milica Šelmić & Milutin Milošević	
	420	FINANCING OF RAILWAY CORRIDOR INFRASTRUCTURE IN TRANSIT COUNTRIES Ljubo Žerak	
	450	TECHNOLOGICAL PARAMETERS AS BASIS FOR DETERMINING PRIORITY INVESTMENTS IN RAILWAYS Tomislav Josip Mlinarić, Stjepan Lakušić	
12:30 – 14:00		<b>Lunch Break</b>	<b>HOTEL RESTAURANT</b>



## Remark · Napomena

Official languages of the conference are Croatian and English. We kindly ask the participants to acquire devices for simultaneous translation that will be available in front of each congress hall.

Službeni jezici konferencije su hrvatski i engleski. Ljubazno molimo sudionike konferencije da koriste uređaje za simultano prevodjenje koji će biti dostupni u svakoj konferencijskoj dvorani.

<b>Monday, April 28<sup>th</sup></b>		<b>Session 1.B</b>	<b>Session room:</b>
<b>11:00 – 12:30</b>		<b>PAVEMENT MAINTENANCE MANAGEMENT</b>	<b>CONFERENCE HALL “B”</b>
<b>Chairmen:</b>	Prof. Audrius Vaitkus & Prof. Tatjana Rukavina		
<b>Time</b>	<b>Ref. No.</b>	<b>Paper Title / Author(s)</b>	
11:00 – 12:30	246	PAVEMENT MAINTENANCE PROGRAMMING CONSIDERING THREE OBJECTIVES: MAINTENANCE AND REHABILITATION COSTS, USER COSTS, AND THE RESIDUAL VALUE OF PAVEMENTS Adelino Ferreira, Susana Meneses & Cassio Paiva	
	269	ALTERNATIVE REHABILITATION METHODS FOR LOW-VOLUME ROADS Audrius Vaitkus & Viktoras Vorobjovas	
	275	EXPERIMENTAL SECTIONS IN THE HUNGARIAN ROAD MANAGEMENT László Gáspár & Zsolt Bencze	
	373	LONG TERM PERFORMANCE OF ROAD MARKINGS ON RURAL ROADS: GUIDE-LINES FOR MAINTENANCE MANAGEMENT Marco Pasetto & Stefano Damiano Barbatì	
	416	NEW ROAD MAINTENANCE MODEL IN FINLAND – 2014 PILOT PROJECT Pekka Pakkala & Katja Levola	
	439	APPLICATION OF AN ARTIFICIAL NEURAL NETWORK IN A PAVEMENT MANAGEMENT SYSTEM Hrvoje Dragovan, Tatjana Rukavina & Josipa Domitrović	
12:30 – 14:00	Lunch Break		HOTEL RESTAURANT



<b>Monday, April 28<sup>th</sup></b>		<b>Session 2.A</b>	<b>Session room:</b>
<b>14:00 – 15:30</b>		<b>STRUCTURAL MONITORING AND MAINTENANCE</b>	<b>CONFERENCE HALL “A”</b>
<b>Chairmen:</b>	Prof. Vesna Dragčević & Prof. Irina Stipanović Oslaković		
<b>Time</b>	<b>Ref. No.</b>	<b>Paper Title / Author(s)</b>	
14:00 – 14:30	∞	KEYNOTE LECTURE: USE OF ROBOTICS IN NONDESTRUCTIVE EVALUATION AND MINIMALLY INVASIVE REHABILITATION OF BRIDGE DECKS Prof. Nenad Gucunski, Rutgers University, USA	
14:30 – 15:30	260	BRIDGE EVALUATION METHOD USING METROLOGICAL METHODS IN SHORT AND LONG-TERM MEASUREMENTS Gert Gommola & Peter Kremles	
	282	MOVING LOAD EFFECT ON BRIDGES Luboš Daniel & Ján Kortiš	
	313	EVALUATION AND MANAGEMENT OF SEISMIC ENDANGERMENT OF RING ROAD THESSALONIKI Christos Antoniadis, Alexandros Triantafyllidis, Anastasios Anastasiadis & Magda Pitsiava – Latinopoulou	
	345	REHABILITATION OF STEEL RAILWAY BRIDGES BY IMPLEMENTATION OF UHPFRC DECK Igor Dzajic, Aljosa Sajna & Irina Stipanovic Oslakovic	
	391	BRIDGE SCOUR MONITORING USING ACCELEROMETERS PLACED ON BRIDGE PIERS – A NUMERICAL INVESTIGATION Luke J. Prendergast & Kenneth Gavin	
15:30 – 16:00	445	INFLUENCE OF TRAM INDUCED VIBRATION ON UNDERGROUND GARAGE STRUCTURE Stjepan Lakušić, Ivo Haladin & Marijan Bogut	
	Coffee Break		HOTEL LOBBY



<b>Monday, April 28<sup>th</sup></b>		<b>Session 2.B</b>	<b>Session room:</b>
<b>14:00 – 15:30</b>		<b>ROAD INFRASTRUCTURE PROJECTS CONSTRUCTION AND MANAGEMENT</b>	<b>CONFERENCE HALL “B”</b>
<b>Chairmen:</b>	<b>Prof. Lajos Kisgyörgy &amp; Prof. Sanja Dimter</b>		
<b>Time</b>	<b>Ref. No.</b>	<b>Paper Title / Author(s)</b>	
14:00 – 14:30		SPONSORE LECTURE: CONCRETE PAVEMENTS ON CAR PARKS: GUIDELINES FOR THE DESIGN, CONSTRUCTION AND MAINTENANCE OF CONCRETE PARKING LOTS CEMEX Croatia	
14:30 – 15:30	255	ANDELI INTERCHANGE ON MATULJI-UČKA SECTION OF ADRIATIC HIGWAY (B8) Nebojša Opačić	
	283	INVESTMENT PLAN FOR BAR-BOLJARE MOTORWAY Angelina Živković, Dragana Macura & Rešad Nuhodžić	
	286	REDUCING COST OF INFRASTRUCTURE WORKS USING NEW TECHNOLOGIES Adrian Burlacu & Carmen Racanel	
	322	ROAD NETWORK MANAGEMENT IN THE EUROPEAN COUNTRIES Andrea Stanić, Zlata Dolaček-Alduk & Sanja Dimter	
	324	IMPORTANCE OF TEMPORARY TRAFFIC REGULATION DURING CONSTRUCTION OR RECONSTRUCTION OF ROADS Sanja Dimter, Hrvoje Dragovan, Dalibor Opačak & Vladimir Moser	
	411	PROBLEMS TRACING BYPASS CORRIDOR IN SMALL CITY IN THE EXAMPLE OF DRNIŠ Ana Rigo, Željko Stepan & Igor Majstorović	
15:30 – 16:00		Coffee Break	HOTEL LOBBY



<b>Monday, April 28<sup>th</sup></b>		<b>Session 3.A</b>	<b>Session room:</b>
<b>16:00 – 17:30</b>		<b>PAVEMENT BEHAVIOUR</b>	<b>CONFERENCE HALL “A”</b>
<b>Chairmen:</b>	<b>Prof. Audrius Vaitkus &amp; dr. Miroslav Šimun</b>		
<b>Time</b>	<b>Ref. No.</b>	<b>Paper Title / Author(s)</b>	
16:00 – 17:30	259	INFLUENCE OF TIRE PRESSURE ON THE VERTICAL DYNAMIC LOAD APPLIED ON THE PAVEMENT BY A TRUCK'S FRONT SUSPENSION Pablo Yugo Yoshiura Kubo, Cassio Eduardo Lima de Paiva & Adelino Ferreira	
	266	DESIGN MODEL FOR STATIC AND IMPACT LOAD AFFECTED PAVEMENTS Audrius Vaitkus, Viktoras Vorobjovas, Judita Gražulytė & Rita Kleizienė	
	321	CONSIDERATION REGARDING ASPHALT MIXTURES IN ROAD PAVEMENT AND AIRPORT PAVEMENT Carmen Răcănel & Claudia Petcu	
	336	IMPACT OF HIGH PROCESS TEMPERATURE ON VISCOELASTIC PROPERTIES OF POLYMER MODIFIED BITUMEN IN WATERPROOFING AND BRIDGE PAVEMENTS Michał Sarnowski, Piotr Radziszewski, Karol J. Kowalski & Jan B. Król	
	355	EFFECTS OF CLIMATIC FACTORS ON THE SHAPE OF DEFLECTION BOWL Csaba Tóth & Ibolya Szentpéteri	
	333	INDIRECT TENSILE TEST OF ASPHALT MIXTURE STIFFNESS modulus Miroslav Šimun & Maja Halle	
18:30 – 22:00		Visit to STELLA CROATICA & Dinner at Ethno Village ZAGORA (Busses depart from the hotel at 17:30, 18:00 and 18:30)	





**Monday, April 28<sup>th</sup>**  
**16:00 – 17:30**

**Session 3.B**  
**BICYCLE TRAFFIC**

**Session room:**  
**CONFERENCE HALL “B”**



**Chairmen:** Prof. Davor Brčić & Tadej Brezina

**Time**      **Ref. No. Paper Title / Author(s)**

16:00 – 17:30	270	ASSESSMENT OF THE DEMAND FOR BICYCLE PARKING INFRASTRUCTURE IN VIENNA Paul Pfaffenbichler, Tadej Brezina & Harald Frey
	284	BICYCLE TRAFFIC IN THE CITY OF OSIJEK Martina Zagvozda, Ivana Barišić & Sanja Dimter
	292	STUDENT BICYCLE SHARING SYSTEM IN ZAGREB – STUDOCIKL Ljupko Šimunović, Mario Čosić & Marko Slavulj
	274	TEN YEARS OF BIKE-SHARING IN VIENNA – AN EXPLORATION INTO SUBJECTIVE USER CHOICES Helmut Lemmerer, Takeru Shibayama & Tadej Brezina
	339	ANALYSIS OF PEDESTRIAN AND CYCLIST BEHAVIOUR AT LEVEL CROSSINGS Hrvoje Pilko, Danijela Barić & Dubravka Hozjan
18:30 – 22:00		Visit to STELLA CROATICA & Dinner at Ethno Village ZAGORA (Busses depart from the hotel at 17:30, 18:00 and 18:30)

**Tuesday, April 29<sup>th</sup>**  
**09:00 – 11:00**

**Session 4.A**  
**PAVEMENT MATERIALS: BITUMEN AND WMA**

**Session room:**  
**CONFERENCE HALL “A”**



**Chairmen:** Prof. Audrius Vaitkus & Prof. Tatjana Rukavina

**Time**      **Ref. No. Paper Title / Author(s)**

09:00 – 11:00	371	MOISTURE DAMAGE AND LOW TEMPERATURE CRACKING OF MODIFIED BITUMINOUS MIXTURES FOR ROAD PAVEMENTS Marco Pasetto & Nicola Baldo
	263	THE EFFECTS OF AGEING ON ROAD BITUMEN MODIFIED WITH THE ETHYLENE VINYL ACETATE POLYMER Vesna Očelić Bulatović, Vesna Rek & Emi Govorčin Bajsić
	332	ASSESSMENT OF AN APPROPRIATE MODIFIER CONTENT IN MODIFIED BITUMEN BASED ON MULTIPLE STRESS CREEP RECOVERY TEST Jan B. Król, Piotr Radziszewski, Karol J. Kowalski & Michał Sarnowski
	372	EXPERIMENTAL STUDY ON THE ENHANCEMENT OF MECHANICAL PROPERTIES OF BITUMINOUS MASTICS AT HIGH STRAINS Marco Pasetto, Stefano Damiano Barbatì & Giovanni Giacomello
	379	EFFECT OF BITUMEN ORIGIN ON BEHAVIOR OF COLD RECYCLED MIXES USING FOAMED BITUMEN TECHNIQUE Jan Valentin, Jan Suda, Zuzana Formanová & Tereza Valentová
	380	INFLUENCE OF CHEMICAL CATALYSTS AND SELECTED ADDITIVES ON BEHAVIOR OF CRUMB RUBBER MODIFIED BITUMEN Kristýna Miláčková, Lucie Soukupová & Jan Valentin
	378	IMPACT OF SELECTED CHEMICAL ADDITIVES ON PERFORMANCE BEHAVIOR OF WARM ASPHALT CONCRETE MIX Jan Valentin, Petr Mondschein, Jan Beneš, Lukáš Kášek & Lucie Soukupová
	438	VIASPHALT BT®, THE MASTIC ASPHALT “LOW” AND “VERY LOW” TEMPERATURE Jean-Etienne Urbain
11:00 – 11:30		Coffee Break      HOTEL LOBBY

**Tuesday, April 29<sup>th</sup>****Session 4.B****Session room:****09:00 – 11:00****ROAD TRAFFIC PLANNING AND MODELLING****CONFERENCE HALL "B"****Chairmen: Prof. Rudolf Eger & Prof. Vesna Dragčević****Time Ref. No. Paper Title / Author(s)**

09:00 – 11:00	299	THE USE OF DIFFERENT METHODOLOGIES FOR SATURATION HEADWAYS AND SATURATION FLOW RATES AT SIGNALIZED INTERSECTIONS Sofia Kosmopoulou, Andreas Efthimiou, George Mintsis, Christos Taxiltaris, Socrates Basbas & Marios Miltiadou
	325	COMPARATIVE STUDIES REGARDING TRAFFIC FLOW IMPROVEMENT SCENARIOS USING SOFTWARE MODELLING AND REAL MEASURED DATA Nicolae Ciont, Mihai Iliescu & Rodica Dorina Cadar
	418	DETERMINATION OF THE EFFECT OF INTERSECTION CONTROL MODE ON VEHICLE DELAY TIMES Jan Hradil, Michal Uhlík & Tomas Havlicek
	444	COMPARISON BETWEEN MODELLED AND MEASURED TRAVELLING TIME IN URBAN ROUNDABOUTS Irena Ištoka Otković, Martina Zagvozda & Matjaž Šraml
	388	OFFTRACKING CONTROL REQUIREMENTS FOR QUALITY ROUNDABOUT DESIGN Ivica Stančerić, Tomislav Dobrica, Saša Ahac, Vesna Dragčević & Danijel Tenžera
	414	IDENTIFICATION OF AT-GRADE INTERSECTIONS CHARACTERISTICS FOR DEFINING BASIC INPUTS INTO MCA METHODOLOGY Jan Hradil, Michal Uhlík & Petr Slaby
	329	IMPACTS OF THE CONSTRUCTION OF THE PLANNED RESIDENTIAL AND BUSINESS COMPLEX ON THE ROAD NETWORK OF THE CITY OF MOSTAR Suada Džebo & Mirza Pozder
	327	TRANSPORT DEMAND MODELING FOR NATIONAL PARK MAVROVO Vaska Atanasova, Kristina Hadjipetkova & Dragan Ilievski
	423	SUSTAINABLE MOBILITY OF SMALL TOURIST PLACES Mario Njegovec & Luka Kosmat
<b>11:00 – 11:30</b>	<b>Coffee Break</b>	<b>HOTEL LOBBY</b>

Tuesday, April 29<sup>th</sup>  
11:30 – 13:00

Session 5.A  
RAIL INFRASTRUCTURE PROJECTS  
DESIGN AND CONSTRUCTION

Session room:  
CONFERENCE HALL "A"



Chairmen: Prof. Tomislav Josip Mlinarić & dr. Andreas Schöbel

Time Ref. No. Paper Title / Author(s)

11:30 – 12:00	∞	KEYNOTE LECTURE: GEOTECHNICAL CHALLENGES FOR THE EUROPEAN TEN-T NETWORK dr. Kenneth Gavin, University College Dublin, Ireland
12:00 – 13:00	328	OPTIMIZATION OF GEOTECHNICAL INVESTIGATION WORKS DURING THE RECONSTRUCTION OF THE TRANSITION ZONES ON THE OLD RAILWAY LINES Marko Bišćan, Marko Vajdić, Ivan Matković & Luka Bolfan
	254	RAILWAY M201, SECTION KRIŽEVCI – KOPRIVNICA – STATE BORDER: UPGRADE AND CONSTRUCTION OF SECOND TRACK Nebojša Opačić & Joanna Zboromirska
	344	REHABILITATION OF RAILWAY LINES ŠAMAC-SARAJEVO AND SARAJEVO-ČAPLJINA Saša Džumhur & Amra Zvizdić
	343	TRAFFIC-CONSTRUCTIONAL ASPECTS FOR BUILDING OF BYPASS AROUND NIS IN CORRIDOR X Tatjana Simić & Tatjana Mikić
	446	RAIL TRAFFIC NOISE PROTECTION IN CROATIA – CHALLENGES DURING THE FIRST APPLICATION Stjepan Lakušić, Maja Ahac & Dalibor Bartoš
13:00 – 14:00		Lunch Break HOTEL RESTAURANT

Tuesday, April 29<sup>th</sup>  
11:30 – 13:00

Session 5.B  
GEOTECHNICS

Session room:  
CONFERENCE HALL "B"



Chairmen: Prof. Sanja Dimter & Prof. Meho Saša Kovačević

Time Ref. No. Paper Title / Author(s)

11:30 – 11:45		SPONSORE LECTURE: EUROPEAN TECHNICAL APPROVAL FOR STABILISATION GEOGRIDS AND CONFIRMATION OF STABILISATION FUNCTION David Kneifl, Tensar International s.r.o.
11:45 – 13:00	253	DESIGN OF RAILWAY TRACKBEDS WITH GEOCELLS Moshe Livneh & Noam A. Livneh
	303	APPLICATION OF INDUSTRIAL WASTE MATERIALS IN SUSTAINABLE GROUND IMPROVEMENT Mario Bačić, Danijela Marčić & Tea Peršun
	305	METHODS OF SURVEYING IN ROCKFALL PROTECTION Lovorka Librić, Marijan Car & Meho Saša Kovačević
	377	INFLUENCE OF LAYERED GEOSYNTHETICS ON CBR OF CLAYEY SUBGRADE WITH SOIL-GEOSYNTHETIC INTERACTION Manish V. Shah & Alpa J. Shah
	397	DEFORMATIONAL PROPERTIES OF UNBOUND GRANULAR PAVEMENT MATERIALS Andrea Načinović Margan, Željko Arbanas, Aleksandra Deluka-Tibljaš & Marijana Cuculić
13:00 – 14:00		Lunch Break HOTEL RESTAURANT

Tuesday, April 29 <sup>th</sup> 14:00 – 15:30		Session 6.A PAVEMENT MATERIALS: MIXTURES	Session room: CONFERENCE HALL "A"
Chairmen:	Prof. Tatjana Rukavina & Prof. Lajos Kisgyörgy		
Time	Ref. No.	Paper Title / Author(s)	
14:00 – 15:30	285	ENVIRONMENT PROTECTION BY USING NEW TECHNOLOGIES FOR ASPHALT MIXTURES Carmen Racanel & Adrian Burlacu	
	252	LABORATORY AND FIELD EXPERIENCE WITH PMMA/ATH COMPOSITE DUST IN ASPHALT MIXTURES Marjan Tušar	
	264	NEW SOLUTIONS FOR DISTRESSED PAVEMENT REHABILITATION OF VILNIUS CITY STREETS Audrius Vaitkus, Donatas Čygas, Rita Kleiziene & Laura Žiliūtė	
	281	THE IMPACT OF COMPACTION ENERGY ON THE PROPERTIES OF ASPHALT LAYERS Ivica Androjić, Gordana Kaluder & Mario Komljen	
	385	COMPARISON THE CHARACTERISTICS OF AC 8 SURF AND AC 11 SURF AND RESULTS BETWEEN TREE LABORATORIES AT LOW TEMPERATURES Dejan Hribar, Marjan Tušar & Tomislav Šafran	
437	EXAMPLES OF REUSE OF MATERIALS OF DECONSTRUCTION FOR THE CONSTITUTION OF A ROAD STRUCTURE _ RECVYA® PROCESS Jean-Etienne Urbain & Eric Layerle		
15:30 – 16:00	Coffee Break		HOTEL LOBBY



Tuesday, April 29 <sup>th</sup> 14:00 – 15:30		Session 6.B PLANNING AND SAFETY	Session room: CONFERENCE HALL "B"
Chairmen:	Prof. Janusz Madejski & Prof. Zoran Krakutovski		
Time	Ref. No.	Paper Title / Author(s)	
14:00 – 15:30	365	TESTING A MIXTURE MODEL FOR THE DISTRIBUTION OF ARRIVAL TIME OF URBAN RAILWAY TRAVELLERS Kazuyuki Takada, Yuzo Takanami & Makoto Fujii	
	433	STUDY ON THE AVAILABILITY OF "TWITTER" DATA FOR FORECASTING SUSPENSION TIME OF RAILWAY OPERATION Makoto Fujii & Kazuyuki Takada	
	350	APPROACHES TO SOLVE THE PROBLEM OF PASSIVE SAFETY OF PASSENGER WAGONS Venelin Pavlov, Nencho Nenov & Veselin Stoyanov	
	375	IMPROVING THE RESILIENCE OF THE METRO VEHICLE TO BLAST AND FIRE El miloudi El Koursi, Jean Luc Bruyelle & Amaury Flancquart	
	360	THE IMPLEMENTATION OF INTELLIGENT INFORMATION SYSTEMS TO INCREASE SAFETY IN RAIL LEVEL CROSSINGS Marko Hoić & Ivan Vlašić	
	361	FACTORS INFLUENCING DRIVER'S BEHAVIOUR AT INTERSECTIONS CROSSED BY THE TRAM Fatih Moutchou, Abdelghani Cherkaoui & El Miloudi El Koursi	
	440	THE STRATEGY OF INTRODUCING ECTS INSURANCE ON RAILWAY CORRIDOR VC IN BOSNIA AND HERZEGOVINA Igor Marković	
15:30 – 16:00	Coffee Break		HOTEL LOBBY





Tuesday, April 29 <sup>th</sup> 16:00 – 17:30		Session 7.B INTEGRATED TIMETABLES ON RAILWAYS	Session room: CONFERENCE HALL “B”
<b>Chairmen:</b>	Prof. Tomislav Josip Mlinarić & dr. Andreas Schöbel		
<b>Time</b>	<b>Ref. No.</b>	<b>Paper Title / Author(s)</b>	
16:00 – 17:30	319	REGIONAL RAILWAYS: TIMETABLE-BASED LONG-TERM INFRASTRUCTURE DEVELOPMENT Stefan Walter	
	404	INTEGRATED PERIODIC TIMETABLE BASED CONCEPTS IN HUNGARIAN NATIONAL TRANSPORT STRATEGY Viktor Borza & János Földiák	
	412	A NEW APPROACH FOR DEFINING THE IMPROVEMENT PLANS OF RAIL NETWORKS Giovanni Longo & Giorgio Medeossi	
	268	OPTIMISATION OF RAILWAY OPERATION BY APPLICATION OF KRONECKER ALGEBRA Mark Volcic, Johann Blieberger & Andreas Schöbel	
	291	MICROSCOPIC SIMULATION OF RAILWAY OPERATION FOR DEVELOPING INTEGRATED TIMETABLES Andreas Schöbel & Mark Volcic	
	294	A METAHEURISTIC APPROACH FOR INTEGRATED TIMETABLE BASED DESIGN OF RAILWAY INFRASTRUCTURE Igor Grujičić, Günther Raidl, Andreas Schöbel & Gerhard Besau	
20:00 – 23:00	Gala Dinner		HOTEL RESTAURANT



Tuesday, April 29 <sup>th</sup> 16:00 – 17:30		Session 7.C ROAD TRAFFIC SAFETY	Session room: CONFERENCE HALL “C”
<b>Chairmen:</b>	Prof. Dražen Cvitanić & dr. Ivica Stančerić		
<b>Time</b>	<b>Ref. No.</b>	<b>Paper Title / Author(s)</b>	
16:00 – 17:30	262	RELATION BETWEEN SPEED INCONSISTENCY AND DRIVING SAFETY ON CROATIAN STATE ROAD D-1 Biljana Vukoje, Dražen Cvitanić & Ante Proso	
	279	THE NEED FOR SAFER AND FORGIVING ROADS Alina Burlacu Florentina, Otilia Tarita-Cimpeanu, Mihai Dicu	
	295	RECORDING AND EVALUATION PROCEDURE OF DRIVERS' DISTRACTION IN ACCORDANCE WITH DRIVER'S CHARACTERISTICS IN HIGH SPEED arterials Eleni Misokefalou & Nikolaos Eliou	
	314	AN APPROACH TO ASSESSING DRIVER'S BEHAVIOUR AT ROUNDABOUTS Fatima Moutchou, Abdelghani Cherkaoui & El Miloudi El Koursi	
	400	SAFETY MEASURES IN ROAD TUNNELS Ivana Komić, Ivica Stančerić & Željko Stepan	
20:00 – 23:00	Gala Dinner		HOTEL RESTAURANT



Tuesday, April 30<sup>th</sup>  
09:00 – 11:00

Session 8.A  
RAILWAYS WORKSHOP ON ERTMS IN SEE  
– OPEN ACCESS TO ALL CETRA 2014 PARTICIPANTS

Session room:  
CONFERENCE HALL “A”



Chairmen: Prof. Melita Kovačević & Prof. Tomislav Josip Mlinarić

09:00 – 11:00

ORGANIZER OF WORKSHOP: UNIVERSITY OF ZAGREB

- Faculty of Civil Engineering
- Faculty of Transport and Traffic Sciences
- Faculty of Electrical Engineering and Computing
- Faculty of Mechanical Engineering and Naval Architecture

MULTITEL – ERTMS TESTING SOLUTIONS

Research Centre in Telecommunications, Signal and Image Processing

HŽ INFRASTRUKTURA

Beneficiary for all projects in the Croatian railway infrastructure

OPENING REMARKS

Summary of the workshop, aims & objectives

LECTURE: THE EUROPEAN RAILWAY R&D NETWORK

dr. Alexandre Girardi

LECTURE: IMPLEMENTATION OF EUROPEAN

RAIL TRAFFIC MANAGEMENT SYSTEM (ERTMS) IN SOUTH AND EAST EUROPE

Prof. Tomislav Josip Mlinarić

DISCUSSION

Summarise findings

11:00 – 11:30

Coffee Break

HOTEL LOBBY

Tuesday, April 30<sup>th</sup>  
09:30 – 11:00

Session 8.B  
RAIL TRACK SUPERSTRUCTURE

Session room:  
CONFERENCE HALL “B”



Chairmen: Prof. Zoran Krakutovski & Prof. Zlata Dolaček Alduk

Time

Ref. No. Paper Title / Author(s)

09:30 – 11:00

449 EMBEDDED RAIL SYSTEM ON STEEL BRIDGES  
Miquel Pena

448 INFLUENCES OF CHARACTERISTIC SIZE  
OF ELASTIC CONTACT BODIES ON THE ROLLING CONTACT  
Zhiwei Qian, Xiangyun Deng, Zili Li & Rolf Dollevoet

278 TRACK-STRUCTURE INTERACTION ANALYSIS USING FE MODELLING TECHNIQUES  
Philip Icke & Geoffrey Paice

330 VIBRATION PROBLEMS AT SWITCHES  
Manfred Bauer

342 MEASUREMENT AND ANALYSIS OF THE DYNAMIC EFFECTS ON THE CROSSINGS  
Ivan Vukušič, Daniela Sadleková, Jaroslav Smutný,  
Luboš Pazdera, Vladimír Tomandl & Jan Hajniš

403 ADVANTAGES OF INSTALLATION OF RUBBER-METAL  
ELEMENTS IN SUSPENSION OF RAILWAY VEHICLES  
Dragan Petrović, Dobrinka Atmadzhova, Milan Bižić

11:00 – 11:30

Coffee Break

HOTEL LOBBY

**Tuesday, April 30<sup>th</sup>**  
**11:30 – 13:15**

**Session 9.A**  
**URBAN TRANSPORT**

**Session room:**  
**CONFERENCE HALL "A"**



**Chairmen:** Prof. Vesna Dragčević & dr. Ivica Stančerić

**Time**      **Ref. No. Paper Title / Author(s)**

11:30 – 13:15	290	INNOVATIVE APPROACHES OF PROMOTING NON-MOTORIZED TRANSPORT IN CITIES Ulrich Leth, Harald Frey & Tadej Brezina
	310	PUBLIC PARTICIPATION FOR SUCCESSFUL TRAFFIC AND TRANSPORT PLANNING Volker Blees
	334	THE IMPACT OF PUBLIC TRANSPORT PERFORMANCE IMPROVEMENTS ON SUSTAINABLE URBAN MOBILITY – AN EXAMPLE OF THE CITY OF ZAGREB Davor Brčić, Marko Slavulj & Dino Šojat
	356	EVALUATION OF THE VARIABLE MESSAGE SIGNS (VMS) SYSTEM IN THE CENTRAL AREA OF THESSALONIKI FROM THE USER POINT OF VIEW Socrates Basbas, George Mintsis, Christos Taxiltaris, Alexandros Betos, Dimitris Kyriazopoulos & Miltiadis Nikolaidis
	363	HOMOGENIZATION OF SPEED ON SECONDARY AND LOCAL ROADS IN THE FLANDERS REGION: AN EXPLORATORY STUDY MAKING USE OF A TRAFFIC SIGNS DATABASE Dirk Lauwers, Johan De Mol & Dominique Gillis
	430	STRATEGY OF DEVELOPMENT TRENDS IN THE MODERN CITY – A GREEN TRANSPORT PLAN IN CASE OF ZAGREB Branko Kincl & Stipan Matoš
	431	GENETIC ALGORITHMS TO OPTIMAL DEFINITION OF PEDESTRIAN TERMINAL LAYOUT Cristian Giacomini & Giovanni Longo
13:30 – 14:00		Conference Closure

**CONFERENCE HALL "A"**



<b>Tuesday, April 30<sup>th</sup> 11:30 – 13:15</b>		<b>Session 9.B URBAN TRANSPORT</b>	<b>Session room: CONFERENCE HALL “B”</b>
<b>Chairmen:</b>	<b>Prof. Meho Saša Kovačević &amp; Dr. Kenneth Gavin</b>		
<b>Time</b>	<b>Ref. No.</b>	<b>Paper Title / Author(s)</b>	
11:30 – 13:15	331	APPLICATION OF NEURAL NETWORKS IN ANALYZING OF ROCK MASS PARAMETERS IN TUNNELLING Zlatko Zafirovski, Milorad Jovanovski, Darko Moslavac & Zoran Krakutovski	
	398	DETERMINATION OF BLAST INDUCED DAMAGE ZONE DURING TUNNEL EXCAVATIONS IN CARBONATE ROCKS Hrvoje Antičević & Hrvoje Perković	
	401	MONITORING AND SUPERVISION OF TUNNELS IN CROATIA Katarina Ravnjak, Goran Grget & Mladen Garašić	
	447	SV. ILIJA TUNNELS THROUGH BOKOVO MOUNTAIN Ibrahim Jašarević & Hrvoje Krhen	
	258	STABILISATION OF FORMER TRUNK ROAD EMBANKMENT USING COMBINED STRUCTURAL AND ECO-ENGINEERING STRATEGIES Slobodan B. Mickovski	
	289	POSSIBLE IMPACT OF EUROCODE 7 ON SLOPE DESIGN FOR ROADS AND RAILWAYS J. Br. Papić, R. Ristov, Sl. Ognjenović & I. Peševski	
	382	GEORISK - A RISK MODEL AND DECISION SUPPORT TOOL FOR RAIL AND ROAD SLOPE INFRASTRUCTURE Paul Doherty, Kenneth Gavin, Karlo Martinović & Cormac Reale	
	402	SLOPE REMEDIATION METHODOLOGY ON THE ZAGREB-MACELJ HIGHWAY Goran Grget, Katarina Ravnjak & M. Krpan	
<b>13:30 – 14:00</b>	<b>Conference Closure</b>		<b>CONFERENCE HALL “A”</b>



<b>Tuesday, April 30<sup>th</sup> 11:30 – 13:15</b>		<b>Session 9.C URBAN TRANSPORT</b>	<b>Session room: CONFERENCE HALL “C”</b>
<b>Chairmen:</b>	<b>Prof. Janusz Madejski &amp; Prof. Zili Li</b>		
<b>Time</b>	<b>Ref. No.</b>	<b>Paper Title / Author(s)</b>	
11:30 – 13:15	351	ROLLING CONTACT FATIGUE ON TRAMWAY'S RAIL Vinko Akos	
	390	MAINTENANCE IN THE LIFE CYCLE OF RAILWAY INFRASTRUCTURE Waldemar Alduk & Saša Marenjak	
	393	TRACK GEOMETRY MEASUREMENT AS PREVENTIVE MAINTENANCE DATA SOURCE Janusz Madejski	
	426	PLASTIC SLEEPER ANCHORS IN CZECH REPUBLIC Otto Plášek, Miroslava Hruzíková, Richard Svoboda, Lubomír Malovaný & Milan Valenta	
	434	DEVELOPMENT OF A HEATING SYSTEM FOR HOLLOW SLEEPERS CONTAINING POINTS POSITIONING SYSTEMS Benjamin Kaufmann, Franz Kurzweil, Julian Heger, Robert Adam & Steffen Grossmann	
<b>13:30 – 14:00</b>	<b>Conference Closure</b>		<b>CONFERENCE HALL “A”</b>



# International Conference on Road and Rail Infrastructure – CETRA

<http://master.grad.hr/cetra>



## CETRA<sup>2010</sup>

17 – 18 May 2010, Opatija, Croatia

Participants from 29 countries



## CETRA<sup>2012</sup>

7 – 9 May 2012, Dubrovnik, Croatia

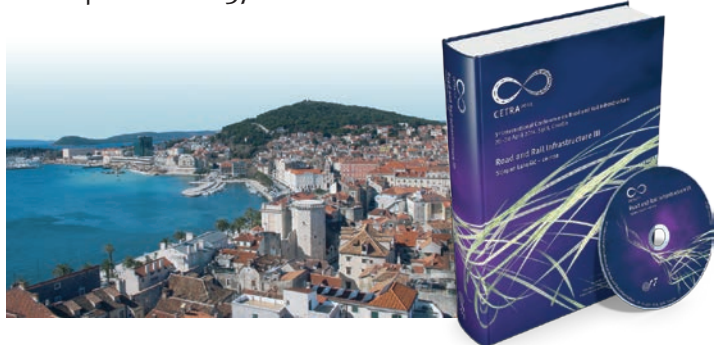
Participants from 39 countries



## CETRA<sup>2014</sup>

28 – 30 April 2014, Split, Croatia

Participants from 37 countries





# CONFERENCE SUPPORT

## Under the Auspices of



UNIVERSITY OF  
**ZAGREB**

University of Zagreb

Trg maršala Tita 14, 10000 ZAGREB, Croatia



Faculty of Civil Engineering

University of Zagreb

Kačićeva 26, 10000 Zagreb, Croatia

[www.grad.hr](http://www.grad.hr)



MINISTRY OF MARITIME  
AFFAIRS, TRANSPORT  
AND INFRASTRUCTURE

Ministry of Maritime Affairs, Transport and Infrastructure

Prisavlje 14, 10000 ZAGREB, Croatia



MINISTRY OF SCIENCE,  
EDUCATION AND SPORTS

Minister of Science, Education and Sports

Donje Svetice 38, 10000 Zagreb, Croatia



HŽ INFRASTRUKTURA

HŽ INFRASTRUKTURA d.o.o.

Mihanovićeve 12, 10000 Zagreb, Croatia

## Golden Sponsor



CEMEX  
[www.cemex.hr](http://www.cemex.hr)

## Silver Sponsor



Department of Transportation Engineering  
Faculty of Civil Engineering  
University of Zagreb  
Kačićeva 26, 10000 Zagreb, Croatia  
[www.grad.hr](http://www.grad.hr)

## Bronze Sponsors



Hottinger Baldwin Messtechnik GmbH  
Lemböckgasse 63/2, A-1230 Wien  
[www.hbm.at](http://www.hbm.at)



Tensar International  
[www.tensar-international.com](http://www.tensar-international.com)

## Media Partners



Journal of Croatian Association of Civil Engineers  
Berislavićeva 6, 10000 Zagreb, Croatia  
[www.casopis-gradjevinar.hr](http://www.casopis-gradjevinar.hr) · [gradjevinar@hsgi.org](mailto:gradjevinar@hsgi.org)



Journal for railway operators and suppliers  
[www.railwaygazette.com](http://www.railwaygazette.com)    [info@railwaygazette.com](mailto:info@railwaygazette.com)



## RESEARCH PROJECTS

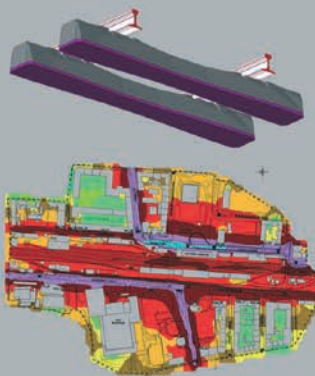
Road Traffic Noise  
Monitoring and Mitigation

No: 082-1102147-2153



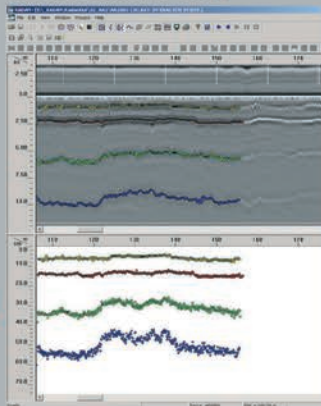
Noise and Vibration of  
Tram and Railway Tracks

No: 082-0000000-2185



Asphalt Pavements  
Performance Modelling

No: 082-1102147-2143



**RUCONBAR**  
Rubberised Concrete Noise Barriers

European Commission  
Eco-innovation

[www.ruconbar.com](http://www.ruconbar.com)

Ballastless concrete track system

# ECOTRACK

**BIORO**  
Business Innovation  
Croatian Agency

## PROFESSIONAL PROJECTS



## EDUCATION

### Undergraduate (Bachelor) courses:

- Roads
- Railways

### Graduate (Masters) courses:

- Traffic Noise
- Traffic Technics
- Road Design
- Railway Design and Construction
- Pavements
- Permanent Way
- Road Intersections
- Earthworks
- Traffic Tunnels
- Airports
- Transportation Facility
- Traffic Systems
- Pavement Management
- Railway Maintenance
- Parking Lots
- Urban Railways

### Postgraduate (Doctoral) courses:

- Theory of Road Alignment
- Flexible Pavements
- Theory of Vehicle Movement on Rails
- Highway Capacity
- Intersection Design
- Concrete Pavements
- High Speed Tracks
- Special Chapters about Traffic Noise
- Pavement Surface Properties
- Theory of Road Vehicles Movement
- Optimalization of Railway Lines



## SEMINARS AND CONFERENCES

### Lifelong education:

- Dani prometnica (Transportation Infrastructure Days)
- held in 2008, 2009, 2010, 2011, 2012, 2013 & 2014
- more than 1500 participants

<http://master.grad.hr/dp>



### International Conference on Road and Rail Infrastructure (CETRA):

- CETRA 2010, Opatija, 17 - 18 May 2010
- CETRA 2012, Dubrovnik, 7 - 9 May 2012
- CETRA 2014, Split, 28 - 30 April 2014
- more than 450 papers from 45 countries

<http://master.grad.hr/cetra>



