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# Faculty of Civil Engineering Department of roads, airports and railways

Scientific field (Frascati Manual)

Civil engineering

Municipal and structural engineering

Transport engineering

### Brief description of expertise

Consulting services in planning, design, construction and maintenance of railway infrastructure; Creation of case studies in the field of railway infrastructure; Professional support in the process of harmonization of bylaws in the field of railway infrastructure; Preparation of professional seminars to improve the knowledge of experts in practice in the field of railway infrastructure; Preparation of professional seminars to improve the knowledge of experts in practice in the field of railway infrastructure; Consulting services in the field of planning, design, construction and maintenance of road and airport infrastructure; Preparation of professional seminars to improve the knowledge of experts in practice in the field of road and airport infrastructure; Preparation of professional seminars to improve the knowledge of experts in practice in the field of road and airport infrastructure; Preparation of professional seminars to improve the knowledge of experts in practice in the field of CAD technology; Improvement of national regulations (policies) in the field of planning and design of roads and airports; Macrosimulation of traffic flows on non-urban road network; Assessment of indirect costs due to interruption of traffic caused by rehabilitation or reconstruction of road infrastructure facilities.

### Keywords

planning, design, construction, maintenance, railway infrastructure, road infrastructure, airports, maintenance management, financing, CAD

### Commercial services

Training through professional seminar courses for the application of the adopted standards "SRPS EN - Railway applications" in the design, construction and maintenance of railway infrastructure. Technical support for the implementation of interoperability requirements in the design, construction and maintenance of railway infrastructure; Technical assistance in the preparation of bylaws in the area of railway infrastructure; Consulting services in the field of planning, design, construction and maintenance of railway infrastructure; Technical control of project documentations for railway infrastructure; Creation of case studies for the railway infrastructure;

Preparation of professional seminars for improvement of civil engineering experts' knowledge in the field of CAD techology.

Control tests (ongoing and supervisory tests) during constructions works related to road infrastructure.

Making of Conceptual, Preliminary and Final designs of road and airport infrastucture projects.

Consulting services in the field of planning and design of road and airport infrastructure.

Consultancy services related to Public-Private Partnerships in transport infrastructure.

Feasibility studise for raod infrastructure.

Technical verification of project documentation for all road and airport civil engineering facilities.

Studies for assessment of indirect cost due to partial or full closure of highway links caused by reahibilitaion or reconstruction work.

# Realized and current projects

#### A) NATIONAL PROJECTS

Title	Project ID	Funding source	Duration		
"The planning and					
anagement of transport and					
communications using the					
methods of computational		Ministry of Education Science			
intelligence", Technological	26002	and Tochnological	2011 2015		
project of the Ministry of	50002		2011-2015		
Science and Technological		Development			
Development of the RS, Head					
of Project: Prof. Dušan					
Teodorović, Ph.D., T.E.					
"The choice of methodology					
for dimensioning and	NIP RZNS br. 5600	Republican Board of Science, Serbia.	1992		
optimization of technical					
solutions for gravitational					
marshalling yards".					
"The choice of typical station					
and connections with double		Republican Board of Science,	1000		
track railway for speeds up to	NIP RZNS 1-183	Serbia.	1988		
160 km/h"					
"Research of the possibilities					
for application of waste and					
recycled materials in concrete		Ministry of Education Colorse	2011-2015		
composites, with the	26017	Ministry of Education, Science			
assessment of environmental	36017				
impacts, in order to promote		Development			
sustainable construction					
industry in Serbia"					

Title	Project ID	Funding source	Duration	
Development and application				
f improved performance				
concrete made with organic				
and inorganic binders for the	16014	Ministry of Science and	2000 2010	
purpose of technical and	16014	the Republic of Sorbia	2008-2010	
technological improvement of				
domestic construction				
industry. B) INTERNATIONAL PROJECTS				
Title	Project ID	Funding source	Duration	
2012 - 2013 Reconstruction and revitalization of railway infrastructure in accordance with regional development, Serbian-Slovak Science and Technology Co-operation,	No. 680-00-140/2012-09/10	Ministry of Science and Technological Development	2012 -2013	
2010 -2012 "Provision of technical assistance to railway authorities in Bosnia and Herzegovina in harmonizing regulations for maintenance of railway infrastructure and rolling stock with the EU Directives", international project funded by EU	2009/218-973 (Ref. EuropeAid/127201/C/SER/BA)	The project was funded by the EU as EC external actions, financed from the budget of the European Commission to Bosnia and Herzegovina	2010 - 2012	
BENEFIT - Business models for Enhancing Funding and Enabling Financing of Infrastructure in Transport (www.benefit4transport.eu)	grant agreement No 635973	HORIZON 2020, invitation: MOBILITY for GROWTH 2014- 2015, Topic: Analysis of funding schemes for transport infrastructure, MG-9.3-2014	2014 - 2016	

Title	Project ID	Funding source	Duration
		CEDR Transnational road	
X-ARA – Cross-Asset Risk	-	research programme, Topic A:	2014 - 2016
Assessment		Ageing Infrastructure	
COST Action TUD 1001 -			
Public Private Partnerships in		COST – European cooperation	
Transport: Trends & Theory	COST TU1001	in Science and Technology	2010 - 2014
РЗТЗ		(www.cost.eu)	
http://www.ppptransport.eu/			
InteMat4PMS - Integration of		Cross-border funded ERANET	
material-science based		ROAD (www.eranetroad.org)	
performance models into life-		joint research programme	2011 2012
cycle-analysis processed in	-	"Design: Rapid and Durable	2011 - 2013
the frame of pavement	ame of pavement Maintenance Met		
management systems		Techniques"	
		Cross-border funded ERANET	
		ROAD (www.eranetroad.org)	
EVITA - Environmental		joint research programme	
Indicators for the Total Road	-	"ENR04 – Effective asset	2010 - 2012
Infrastructure Assets		management meeting future	
		challenges", http://e-	
		kpi.fehrl.org/?m=64	
		COST - European cooperation	
COST 354 - Performance	COST 354	in Science and Technology	2004 - 2008
		(www.cost.eu)	
COST 351 - WATMOVE -		COST - European cooperation	
Water Movements in Road	COST 351	in Science and Technology	2004 - 2008
Pavements and Embankments		(www.cost.eu)	

# Applicable research results

## PROTOTYPE

Title	Basic characteristics	Beneficiary
Strategic study with the medium-term		
plan and program of construction	Work program of construction	
	interventions on the Serbian road	Public Enterprise: "Roads of Serbia"
reconstruction, maintenance and	notwork for the naried 2010 2015	
	network for the period 2010 - 2015.	

**Basic characteristics** 

Guidelines for the implementation of PPP

projects in road infrastructure

Public Enterprise: "Roads of Serbia"

Development of a framework and

guidelines for the implementation of

Public-Private Partnerships in financing

of road infrastructure projects.

TECHNICAL SOLUTION

Title	Basic characteristics	Beneficiary
Database of legal and technical regulations in the field of railway infrastructure	MS Access database for fast searching which contains European directives, TSIs and EN standards, as well as domestic legal and technical regulations in the field of railway infrastructure	Faculty of Civil Engineering, University of Belgrade, Railways of Serbia.
Technical solutions for application of fly ash from silos and landfills of TE JP EPS Title	The use of fly ash and slag in TE JP EPS for construction of railway substructure Basic characteristics	Railways of Serbia, Electric Power Industry of Serbia. Beneficiary
Defining the Cause and Mechanism of Track Widening Phenomenon on Reconstructed Sections Trebaljevo - Kolašin and Mijatovo Kolo - Mojkovac On Rail Line Vrbnica - Bar. 2013; Branch of foreign company Costruzioni Linee Ferroviarie S.p.A. Podgorica	Determining the cause and mechanism of expansion track in curves of small radius of 300-500 m under the influence of a three axle bogie with a large length of the rigid base (2x2,70 m).	Railways of Montenegro for Infrastructure, ZGOP Novi Sad, Branch of foreign company Costruzioni Linee Ferroviarie S.p.A. Podgorica
Regulations for chemical treatment of weeds and bushes on Railways in BiH.	By-law for the maintenance of railway infrastructure	Railways of Bosnia and Herzegovina
Regulations for heat treatment of switch parts and ends of the rail for insulated rail joints, BiH.	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina
Regulations for insulated rail joints in railway superstructure.	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina
Regulations for maintenance of railway superstructure, BiH.	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina
Regulations for maintenance of railway substructure, BiH.	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina

Title	Basic characteristics	Beneficiary
Regulation of technical measures for		
determining vehicle loading and	By-law for the design, construction and	Deilusus of Deenie and Harragening
categories of railway bridges, culverts	maintenance of railway infrastructure.	Railways of Boshia and Herzegovina
and other, BiH		
Regulation of technical norms for the construction of railway bridges, BiH	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina
Regulations of measures for traffic safety and the worker safety during construction works on the railway, BiH.	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina
Regulations of railway level crossing schemes, BiH	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina
Regulations for the categorization of railways, BiH.	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina
Instructions for mechanized maintenance works, maintenance of railway superstructure, BiH.	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina
Instructions for installing and maintainenance of rails and switches for CWR, BiH.	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina
Instructions for the delivery and reception of crushed stone for ballast in BiH.	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina
Instructions for providing safety traffic during the winter, BiH.	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina
Instructions for the production, control and reception of prestressed concrete sleepers on the BiH railway network.	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina
Instructions for reception of wooden sleepers and control of their impregnation, BiH.	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina

Title	Basic characteristics	Beneficiary
Instructions for uniform criterias for control of the state of BiH rail network.	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina
Instructions for calculation and embedding of continuous welded rails on bridges, BiH.	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina
Instructions for the technology for protection against corrosion of rails, switches, bridges, cranes, BiH.	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina
Instructions for the preparation, control and implementation of clamps for rail S- 49 and UIC 60 on the rail network of Bosnia and Herzegovina.	By-law for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina
Lectures at the seminar "Modern construction of superstructure"	Lectures on modern rail fastening systems for different tracks subgrades, electronic material on CD.	Serbian Railways, Institute of Transportation CIP, ZGOP Novi Sad, Railway Transport of Montenegro.
Study of wheel-rail contact and the basis of amendments to regulations BiH railways in that area.	Study of wheel-rail contact as the basis for the drafting of by-laws for the design, construction and maintenance of railway infrastructure.	Railways of Bosnia and Herzegovina
CSC - Cross section constructor, March and May in 2008.	Mass processing of cross sections of road infrastructure facilities.	Road and airports designers from the former Yugoslav republics and users of the GCM software.
GCMx64 - December 2008	Introducing users to the new version of the GCM software package.	Road and airports designers from the former Yugoslav republics and users of the GCM software.
3D Printing in GCM - September 2010	3D printing of models made with GCM software	Road and airports designers from the former Yugoslav republics and users of the GCM software.
GCM++ - July 2012	Introducing users to the new version of the GCM software package.	Road and airports designers from the former Yugoslav republics and users of the GCM software.

## Intellectual property

SOFTWARE

Title	Owner	Inventor	Reg. No
Gavran Civil Modeller, GCM	Assistant Prof. Dejan Gavran, PhD. C.E.	Assistant Prof. Dejan Gavran,	
		PhD. C.E., an Authorized	ADN DECS1525
		Autodesk Developer	

## Licenses

Name	Last name	Type of license	License No
		315 senior designer for roads	
Zdenka	Popović	and railways	315 N755 14
		315 responsible (chief)	
Goran	Mladenović	designer of roads, railways	315 8866 04
		and pavements	
<b>.</b> .		315 responsible (chief)	215 117010
Sanja	Fric	designer of roads and railways	315 J4/810

# Industry group (according to "Gazette RS", No. 54/10)

Construction of roads and railways

Management consultancy activities

Architectural and engineering activities and related technical consultancy

Technical testing and analysis

Research and experimental development on natural sciences and engineering

Higher education

# Accredited laboratories

Title	Contact person
Laboratory for pavements	Goran Mladenović
PhD thesis within the unit done according to the indu	stry needs

Name	Last name	Title	Year	Mentor
		Theoretical and		
		experimental		Dref Corren Miedeneuić
Sanja	Fric	investigation of limit	2014	Prot. Goran Miadenovic,
		trajectories of driving i	n	PhD C.E.
		rural road curves		

Name	Last name	Title	Year	Mentor
		Optimization of		Prof. Aleksandar
Goran	Mladenović	pavement maintenance	2009	Cvetanović, PhD C.E.

## Staff list within the unit

Name	Last name	Teaching/scientific title	
Zdenka	Popović	Associate professor	
Luiz		Research and Teaching Assistant - PhD	
Luka		student	
NATION -		Research and Teaching Assistant - PhD	
Milica	VIIOTIJEVIC	student	
Goran	Mladenović	Associate professor	
		Research and Teaching Assistant - PhD	
Marko	Orešković	student	
Dejan	Gavran	Assistant professor	
		Research and Teaching Assistant - PhD	
Vladan	llic	student	
	- x	Research and Teaching Assistant - PhD	
Filip	Грсеvsкі	student	
Sanja	Fric	Assistant professor	