

**ВТОР МАКЕДОНСКИ  
КОНГРЕС ЗА ПАТИШТА  
SECOND MACEDONIAN  
ROAD CONGRESS  
2022**



**3-4**  
ноември  
November  
**2022**  
Скопје, Македонија  
Skopje, Macedonia

# **ЗБОРНИК НА ТРУДОВИ BOOK OF PROCEEDINGS**



[congress.mare.org.mk](http://congress.mare.org.mk)



# **ЗБОРНИК НА ТРУДОВИ**

ВТОР МАКЕДОНСКИ КОНГРЕС ЗА ПАТИШТА 3-4 НОЕМВРИ  
2022

# **BOOK OF PROCEEDINGS**

SECOND MACEDONIAN ROAD CONGRESS 3-4 NOVEMBER  
2022

## **ЗБОРНИК НА ТРУДОВИ**

ВТОР МАКЕДОНСКИ КОНГРЕС ЗА ПАТИШТА 3-4 НОЕМВРИ 2022

## **BOOK OF PROCEEDINGS**

SECOND MACEDONIAN ROAD CONGRESS 3-4 NOVEMBER 2022

Издавач

Друштво за патишта на Република Македонија „Via Vita“

Бул. „Партизански одреди“ бр.24 П.Ф. 560

1000 Скопје, Република Македонија

Publisher

Macedonian Association of Road Engineers „Via Vita“

Blvrd „Partizanski odredi“ 24 P.box 560

1000 Skopje, Republic of Macedonia

За издавачот

Проф. д-р Горан Мијоски, дипл.град.инж. , Претседател на ДПМ

Editor

Dr. sc. Goran Mijoski, Full Professor

Уредник

Проф. д-р Горан Мијоски, дипл.град.инж.

Graphic desing

Polyesterday - Skopje

Printing

Polyesterday

Тираж 350

Number of copies 350

**ISBN 978-608-66946-1-6**

CIP - Каталогизација во публикација  
Национална и универзитетска библиотека "Св. Климент Охридски", Скопје

625.7/.8(062)

МАКЕДОНСКИ конгрес за патишта (2 ; 2022)

Зборник на трудови / Втор македонски конгрес за патишта 3-4 ноември 2022 : [уредник Горан Мијоски] = Book of proceedings / Second macedonian road congress 3-4 november 2022 ; [editor Goran Mijoski]. - Скопје : Друштво за патишта на Република Македонија = Skopje, 2022. - 730 стр. : илустр. ; 30 см

Текст на мак. и англ. јазик. - Фусноти кон текстот. - Библиографија кон трудовите

ISBN 978-608-66946-1-6

а) Патишта -- Проектирање -- Изградба -- Реконструкција -- Собири

COBISS.MK-ID 58441477

## **Втор Македонски конгрес за патишта**

3-4 ноември 2022 год. Скопје – РС Македонија

### **Организатор**

Друштво за патишта на Република Македонија „Via Vita“

### **Коорганизатори**

Градежен Факултет – Скопје

Универзитет „Св. Кирил и Методиј“ – Скопје

ЈП „Македонијат“ - Скопје

Комора на овластени архитекти и овластени инженери на РМ

Републички совет за безбедност на сообраќајот на патиштата

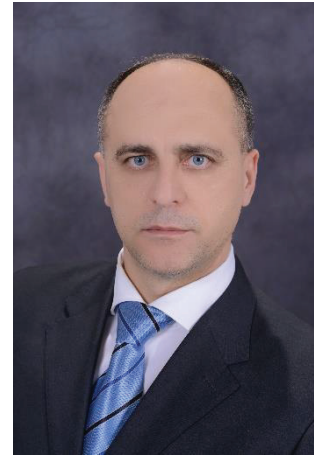
Јавно претпријатие за државни патишта

Инженерска институција на Македонија

## Воведен збор

Изминаа три години од Првиот Македонски конгрес за патишта, а иако вториот беше планиран за 2021, пандемијата го направи своето. Едноставно запре светот, се ресетираше скоро се. Но не и градежништвото. Се забави работата, но не запре како во другите дејности. Се наметнаа нови предизвици.

Оваа година го одбележуваме јубилејот 55 години од основање на Друштвото за патишта на Република Македонија (ДПМ). Друштвото не само што е една од најстарите стручни асоцијации во РС Македонија, туку се повеќе станува активен чинител во нашето општество, изразено преку активностите на своите членови и градежни компании кои придонесуваат за тоа.



Во таа насока е и организацијата на Вториот Македонски конгрес за патишта. Стекнатиот висок рејтинг на Првиот Македонски конгрес за патишта одржан во 2019 истотака има големо влијание на дефинирањето на целите и настојувањата за подобра организација. Всушност, не случајно овој Втор Македонски конгрес за патишта е еден од најзначајите настани во областа на патишта не само кај нас, туку и во поширокиот регион.

Иако во спортот одамна е позната девизата дека „Полесно е да се освои титулата, отколку да се одржи“, според досегашните ангажмани и активности, може да кажеме дека по сите вложени напори, очекуваме дека ќе го постигнеме и надминеме нивото на Првиот Македонски конгрес за патишта. Бројот на објавени научно – стручни трудови, квалитетот на Научниот одбор составен од повеќе од 40-тина врвни научно – стручни професионалци во оваа област, претставуваат најава за тоа.

Инаку, евидентно е дека севкупната економска ситуација не само кај нас, а особено актуелните состојби во градежниот сектор во државата не ни одат во прилог. Но тука треба државата да го препознае градежништвото како еден од најмоќните запчаници кои можат да ја повлечат македонската економија нанапред. Според податоците, градежништвото врзува околу 30 стопански гранки и токму затоа тоа е главен генератор на позитивни економски промени. Ако работи градежниот сектор, ќе функционираат успешно уште 30-тина други стопански дејности. Затоа неопходни се инвестиции во капитални објекти, како што се пред се изградбата на патишта, железници и други капитални објекти, како и поддршка на македонските градежни компании.

Во контекст на искажаното, ќе го цитирам поранешниот премиер на Велика Британија *Винстон Черчил*, кој рекол:

**„Песимистот гледа проблем во секоја прилика,  
а оптимистот гледа прилика во секој проблем“**

Новите цели во оваа област покрај изградбата на патишта треба да бидат насочени и кон веќе изградените патишта, во смисол на нивно одржување и експлоатација, во рамките на системот на управување и одржување, што финално ќе резултира со подобрување на компетитивноста на македонската економија.

Сето ова треба да биде поткрепено и со соодветна поддршка за промени и напредок и во образовниот процес. Едноставно, ваков инвестициски циклус во патиштата, мора да биде поддржан со подобрување на квалитетот во образовниот процес, пред се со опремување на лабораториите на Градежниот факултет, со што ќе може да се одговори на современите барања не само во постојниот инвестициски циклус, туку и во современите тенденции во образовниот процес.

Сето погоре истакнато, ги дефинира главните цели на Вториот Македонски конгрес за патишта а тие се презентирање на досегашните постигнувања на македонските инженери и размена на искуства со колегите од странство.

По завршувањето на конгресот и сумирање на впечатоците од него, ќе ни претстои период на анализа, реална процена на состојбата во нашето градежништво и имплементација на новите сознанија, со цел да ги дефинираме насоките за идниот развој на македонското градежништво.

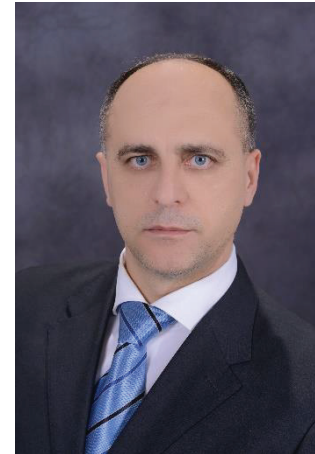


Проф. д-р Горан Мијоски  
Претседател на Друштвото за патишта на Македонија

## Foreword

Three years have passed since the First Macedonian Road Congress, and although the second was planned for 2021, the pandemic has taken its toll. The world simply stopped, almost everything reset. But not the civil engineering. The work slowed down, but it did not stop like in other activities. New challenges arose.

This year we are celebrating the 55<sup>th</sup> anniversary of the foundation of the Macedonian Association of Road Engineers (MARE). The association is not only one of the oldest professional associations in Republic N. Macedonia, but is increasingly becoming an active factor in our society, expressed through the activities of its members and civil engineering companies that contribute to it.



The organization of the Second Macedonian Road Congress is in that direction. The acquired high rating of the First Macedonian Road Congress held in 2019 also has a great impact on the definition of goals and efforts for better organization. In fact, it is no coincidence that this Second Macedonian Road Congress is one of the most important events in the field of roads not only in our country, but also in the wider region.

Although the motto "It is easier to win the title than to keep it" has long been known in sports, according to the engagements and activities so far, we can say that after all the efforts put in, we expect to achieve and exceed the level of the First Macedonian Congress for roads. The number of published scientific and professional papers, the quality of the Scientific Board consisting of more than 40 top scientific and professional professionals in this field, represent an announcement of this.

Otherwise, it is evident that the overall economic situation not only in our country, and especially the current situation in the civil engineering sector in the country is not in our favor. But here the state should recognize civil engineering as one of the most powerful cogs that can pull the Macedonian economy forward. According to the data, civil engineering connects about 30 economic branches and that is precisely why it is the main generator of positive economic changes. If the civil engineering sector works, about 30 other economic activities will function successfully. That is why investments in capital facilities are necessary, such as the civil engineering of roads, railways and other capital facilities, as well as support for Macedonian civil engineering companies.

In the context of what has been said, I will quote the former Prime Minister of Great Britain, *Winston Churchill*, who said:

**"A pessimist sees a problem in every opportunity,  
and an optimist sees an opportunity in every problem"**

The new goals in this area, in addition to the construction of roads, should also be aimed at the already built roads, in terms of their maintenance and exploitation, within the framework of the management and maintenance system, which will ultimately result in improving the competitiveness of the Macedonian economy.

All of this should be supported by adequate support for changes and progress in the educational process as well. Simply, such an investment cycle in roads must be supported by improving the quality of the educational process, primarily by equipping the laboratories of the Faculty of Civil Engineering, which will be able to respond to modern requirements not only in the existing investment cycle, but also in the modern tendencies in the educational process.

All of the above defined the main goals of the Second Macedonian Road Congress, which are the presentation of the achievements of Macedonian engineers and the exchange of experiences with colleagues from abroad.

After the congress and summing up the impressions from it, we will have a period of analysis, real assessment of the situation in our civil engineering and implementation of the new knowledge, in order to define the directions for the future development of Macedonian civil engineering.



Dr. sc. Goran Mijoski, Full Professor

President of the Macedonian Association of Road Engineers



## SCIENTIFIC BOARD

Dr. sc. Goran Mijoski, Full Prof. – Faculty of Civil Engineering – Skopje (Macedonia),  
**President of the Board**

Dr. sc. Andrej Lepavcov – Macedonian Association of Road Engineers – Skopje (Macedonia)  
Dr. sc. Darko Moslavac, Full Prof. – Faculty of Civil Engineering – Skopje (Macedonia)  
Dr. sc. Spasen Gjorgjievski, Full Prof. – Faculty of Civil Engineering – Skopje (Macedonia)  
Dr. sc. Milorad Jovanovski, Full Prof. – Faculty of Civil Engineering – Skopje (Macedonia)  
Dr. sc. Zoran Krakutovski, Full Prof. – Faculty of Civil Engineering – Skopje (Macedonia)  
Dr. sc. Josif Josifovski, Full Prof. – Faculty of Civil Engineering – Skopje (Macedonia)  
Dr. sc. Valentina Z. Pancovska, Full Prof. – Faculty of Civil Engineering – Skopje (Macedonia)  
Dr. sc. Todorka Samardzioska, Full Prof. – Faculty of Civil Engineering – Skopje (Macedonia)  
Dr. sc. Goce Tasevski, Assoc. Prof. – Faculty of Civil Engineering – Skopje (Macedonia)  
Dr. sc. Violeta Gesovska, Assoc. Prof. – Faculty of Civil Engineering – Skopje (Macedonia)  
Dr. sc. Bojan Susinov, Assist. Prof. – Faculty of Civil Engineering – Skopje (Macedonia)  
Dr. sc. Sead Abazi, Assist. Prof. – Faculty of Civil Engineering – Skopje (Macedonia)  
Dr. sc. Carsten Karcher – Secretary General EAPA (Germany)  
Dr. sc. Igor Ruttmar - CEO at TPA Poland (Poland)  
Dr. sc. Stjepan Lakusic, Full Prof. – Faculty of Civil Engineering – Zagreb (Croatia)  
Dr. sc. Tatjana Rukavina, Full Prof. – Faculty of Civil Engineering – Zagreb (Croatia)  
Dr. sc. Vesna Dragcevic, Full Prof. – Faculty of Civil Engineering – Zagreb (Croatia)  
Dr. sc. Tamara Dzambas, – Faculty of Civil Engineering – Zagreb (Croatia)  
Dr. sc. Goran Mladenovic, Assoc. Prof. – Faculty of Civil Engineering – Belgrade (Serbia)  
Dr. sc. Dejan Gavran, Assoc. Prof. – Faculty of Civil Engineering – Belgrade (Serbia)  
Dr. sc. Sanja Fric, Assist. Prof. – Faculty of Civil Engineering – Belgrade (Serbia)  
Dr. sc. Igor Jokanovic, Assoc. Prof. – Faculty of Civil Engineering – Subotica (Serbia).  
Dr. sc. Nikolaj Mihajlov, Full Prof. – UACEG – Sofia (Bulgaria)  
Dr. sc. Petar Stefanov, Full Prof. – UACEG – Sofia (Bulgaria)  
Dr. sc. Rumen A. Milanov, Full Prof. – UACEG – Sofia (Bulgaria)  
Dr. sc. Tomaz Tollazzi, Full Prof. – Faculty of Civil Engineering – Maribor (Slovenia)  
Dr. sc. Peter Lipar, Full Prof. – Faculty of Civil Engineering – Ljubljana (Slovenia)  
Dr. sc. Marko Rencelj, Full Prof. – Faculty of Civil Engineering – Maribor (Slovenia)  
Dr. sc. Biljana Ivanovic, Assist. Prof. – Faculty of Civil Engineering – Podgorica (Montenegro)  
Dr. sc. Katarina Mirkovic, Lecturer – Faculty of Civil Engineering – Podgorica (Montenegro)  
Dr. sc. Kerim Hrapović - Lecturer – Ingolstadt University of Applied Sciences – Viena (Austria)  
Dr. sc. Emeritus Branko Mazic, Full Prof. – Faculty of Civil Engineering of University - Sarajevo (Bosnia & Herzegovina)  
Dr. sc. Mirza Pozder, Assoc. Prof. – Faculty of Civil Engineering of University - Sarajevo (Bosnia & Herzegovina)  
Dr. sc. Osman Lindov, - Full Prof. Faculty of Traffic and Communications - University of Sarajevo (Bosnia & Herzegovina)  
Dr. sc. Dragan Mihajlovic, Faculty of Civil Engineering of University of Banja Luka (Bosnia & Herzegovina)  
Dr. sc. Otokar Vacin, Full Prof. – Czech Technical University – Faculty of Transport Sciences – Prague (Czech Republic)  
Dr. sc. Tomas Hanak, Full Prof. – Faculty of Civil Engineering at the University of Technology – Brno (Czech Republic)  
Dr. sc. Faruk Kaba, Full Prof. – President of Albanian Association of Consulting Engineers - Tirana (Albania)  
Dr. sc. Mentor Balilaj, Full Prof. – Faculty of Civil Engineering – Tirana (Albania)  
Dr. sc. Arian de Bondt, Director of Ooms Productenand Strukton Civiel (Nederland)

## HONORARY BOARD

Dr. sc. Dimitar Kovacevski – Prime Minister of the Government of RN Macedonia –  
**President of the Board**

Blagoj Bocvarski - Minister of Transport and Communications

Dr. sc. Carsten Karcher – Secretary General – EAPA

Full Prof. Pavle Stoimenov – Faculty of Civil Engineering – Skopje

Full Prof. Orhan Avdovic – Faculty of Civil Engineering – Skopje

Dr. sc. Nikola Jankulovski, Full Prof. - Rector at “Ss. Cyril and Methodius” University –  
Skopje

Dr. sc. Stjepan Lakusic, Full Prof. - Rector at University of Zagreb

Dr. sc. Dejan Mirakovski, Full Prof. - Rector at “Goce Delchev” University – Stip

Dr. sc. Igor Nedelkovski, Full Prof. - Rector at “St. Clement of Ohrid” University - Bitola

Dr. sc. Vullnet Ameti, Full Prof. - Rector of the University of Tetovo

Dr. sc. Goran Markovski, Full Prof. - Dean of Faculty of Civil Engineering – Skopje

Dr. sc. Gorgi Dimov - Full Prof. - Dean at FNTS – Stip

Kostadin Acevski - Director of PE “Makedonijapat” - Skopje

Mr. sc. Kristinka Radevski - President at Chamber of Certified Architects and Certified  
Engineers of the Republic of Macedonia

Dr. sc. Hristina Spasevska, Full Prof. - President at EIM

Mr. sc. Gordana Kozuvarovska - President at RCRTS

Stepan Bohus -Business Manager for Europe at Saint Gobain ADFORS

Ilija Radenovic - Head of Sales at HAURATON

Radovan Trajkoski - General Director of "Ilinden" J.S.C. – Struga

Haziz Rusha - Manager of "Eskavatori MK"

Aleksandar Smilkovski - Director of "Pelagonija" J.S.C. – Gostivar

Nikola Pandev – Owner of “Zikol” – Strumica

Žaklina Bojović - Member of the Assembly and company co-owner at Unipromet d.o.o.

Zlate Atanasov - Executive director of “Lendi Group” – Skopje

Nikolay Ivanov - Manager and Legal representative of Jupiter 05 Ltd.

Zlatan Djurdjic - Technical Business Area Manager at "Strabag"

Milancho Dameski - Manager of "Misa-Mg"

Slobodan Ivanovski - Dep. Gen. Dir. and member of the OD "BIM" J.S.C. – Sv. Nikole

Mr. sc. Goce Stojanoski - Manager of "Stanton Construction" Ltd. – Bitola

Demeter Prisljan - Owner of "ICC DEMETER PRISLAN S.P"

Aleksandar Glisic - Sales Manager for Adriatic Region ADFORS

Miroslav Keller - President at CAA

Dr. sc. Igor Pesevski, Assoc. Prof. - President of MAG

Dr. sc. Darko Nakov, Assoc. Prof. - President of MASE

Dr. sc. Ljupco Petkovski, Full Prof. - President of MACOLD

## ORGANIZATIONAL BOARD

Dr. sc. Goran Mijoski, Full Prof. – **President of the Board**  
Stojancho Stojanov – BIM – Sv. Nikole  
Mr. sc. Kiril Lazarov – BITEM - Skopje  
Irena Trajkoska – ILINDEN - Struga  
Dr. sc. Andrej Lepavcov – MFA – RN Macedonia  
Zoran Milkovski – GRANIT - Skopje  
Dr. sc. Zlatko Ilijovski – GIM - Skopje  
Predrag Donevski – PELAGONIJA - Gostivar  
Mr. sc. Goce Stojanovski – STENTON GRADBA - Bitola  
Nikola Pandev – ZIKOL - Strumica  
Aleksandar Janakieski – City of Skopje  
Toni Jovev – PE STIPION - Stip  
Ruska Hadzi Mitrova – PE MAKEDONIJPAT - Skopje  
Vasko Trajkovski – AEC of RN Macedonia  
Toni Lazarov – PE MAKEDONIJPAT - Skopje  
Mr. sc. Toni Jovanovski – Municipality of BITOLA  
Mr. sc. Dejan Metikos – Chamber of Certified Architects and Certified Engineers  
Miloš Cvetić – UNIPROMET – Cacak  
Zlate Anastasov – LENDI GROUP - Skopje  
Demeter Prislán – ICC DEMETER PRISLAN S.P.  
Vladan Vidić - STARBAG  
Aleksandar Glisic - ADFORS  
Davor Miljkovic – ESKAVATORI MK - Skopje  
Magdalena Kukoska – ZIKOL - Strumica  
Nikolay Ivanov – JUPITER 05  
Milancho Dameski – MISA MG  
Mr.sc.Goran Stojanoski – STENTON GRADBA - Bitola

## TECHNICAL ORGANIZERS

Mr.sc. Visar Paloshi

Mr.sc. Monika Tasevska

Dr. sc. Bojan Susinov

Dr. sc. Sead Abazi

Nenad Pavic

Dr. sc. Filip Kasapovski

Mr. sc. Pavle Petrovski

Mr. sc. Bojan Iliovski

Kristina Vasileva

Hristijan Loskoski

Jovana Trajkovska

Nurijan Gjelova

Kristijan Cefiov

Atifet Muaremi

Stojka Kirova

Dragana Gjorgioska

Simona Gjorgjevska

Dimitar Andonov

Stefani Gjorgjevska

Jovana Svacaroska

Nikola Dzabirski



## СОДРЖИНА

<b>Повикани предавања / INVITED LECTURES</b>	стр.1
<b>ГЕОТЕХНИЧКИ УСЛОВИ ЗА ИЗВЕДБА НА ПАТНА ИНФРАСТРУКТУРА-ИСКУСТВА И ПРАКТИКИ</b>	
Милорад Јовановски, Игор Пешевски, Ване Трајановски	стр.10
<b>IMPACT OF CLIMATE CHANGE ON PAVEMENT STRUCTURAL PERFORMANCE</b>	
Goran Mladenovic	стр.20
<b>INNOVATIVE TRIPLE SMA LAYER FOR HEAVY DUTY PAVEMENTS</b>	
Igor Ruttmar, Marcin Hering, Agata Grajewska	стр.27
<b>IMPORTANCE TRAFFIC MANAGEMENT PLAN FOR TRAFFIC SAFETY</b>	
Osman Lindov	стр.37
<b>TRANSVERSE PROFILES OF MOTORWAYS AND EXPRESS ROADS IN EUROPE</b>	
Kerim Hrapovic, Goran Mijoski	стр.53
<b>EXISTING SITUATION OF TRANSPORT, INDUSTRIAL, TECHNOLOGICAL, AND ENERGY INFRASTRUCTURES AND NETWORKS IN BULGARIA</b>	
Nikolaj Mihajlov, Ivan Kacarov	стр.58
<b>EVALUATION OF PAVEMENT BEARING CAPACITY BY FWD - EXAMPLE FROM PRACTICE</b>	
Tatjana Rukavina	стр.59
<b>IN-SITU DETERMINATION OF ACOUSTIC PROPERTIES OF NOISE BARRIERS: RUCONBAR CASE STUDY</b>	
Ivo Haladin, Stjepan Lakušić, Krešimir Burnać, Mate Ivančev	стр.60



**Тема / Topic 1 ПЛАНИРАЊЕ И ПРОЕКТИРАЊЕ / PLANNING AND  
DISIGNING**

стр.61

**ПЛАН ЗА ОДРЖЛИВА УРБАНА МОБИЛНОСТ ЗА ПРИЛЕП**

Бобан Атанасоски, Петер Липар

стр.75

**СТАБИЛИЗАЦИЈА НА КОСИНИ СО АНКЕРИ КАЈ ОБЈЕКТИ ОД ПАТНА  
ИНФРАСТРУКТУРА**

Бојан Сусинов, Сеад Абази, Бојан Стрезовски, Спасен Ѓорѓевски

стр.86

**РЕКОНСТРУКЦИЈА СО ПРОШИРУВАЊЕ НА РЕГИОНАЛНИОТ ПАТ Р1109, ДЕЛНИЦА  
„ПОНОВ МОСТ – ОБИКОЛНИЦА НА БОГДАНЦИ“ ДИМЕНЗИОНИРАЊЕ НА  
КОЛОВОЗНА КОНСТРУКЦИЈА**

Драган Димитриевски, Дарко Илиевски, Катерина Велеска, Душанка Кажлевска

стр.94

**CHARACTERISTICS OF PAVEMENT CONSTRUCTION WITH THE ADDITION OF  
SYNTHETIC FIBERS IN ASPHALT MIXTURES**

Тошковиќ Ђорђе, Стефановиќ Сузана, Стојниќ Драган, Хаџи-Антиќ Сениша

стр.108

**ВЛИЈАНИЕ НА ЕГЗОГЕНИТЕ ПРОЦЕСИ НА СТАБИЛНОСТ НА КОСИНТЕ, АВТОПАТ  
МИЛАДИНОВЦИ-ШТИП**

Ванчо Ангелов, Ласте Ивановски, Орце Петковски, Елена Ангелова

стр.118

**STANDARD VEHICLE IN REAL TRAFFIC CONDITIONS IN MONTENEGRO**

Biljana Ivanović, Katarina Mirković, Dinka Šćepanović, Goran Mijoski

стр.126

**ПРОЦЕНКА НА ЕФЕКТИВНОСТА НА РОВОВИ ЗА ЗАФАЌАЊЕ НА ОРДОНИ СО  
РАЗЛИЧНИ ГЕОМЕРИИ**

Симона Ивановски, Игор Пешевски, Милорад Јовановски, Сеад Абази, Даниел Велинов

стр.136

**LANDSLIDES ON ROAD CUT SLOPES IN WATER – SATURATED PLEOCENE  
SEDIMENTS: A CONCEPT FOR REMEDIATION**

Tamara Jovanovska, Blagica Danova, Matej Berisha

стр.146

**CONSTRUCTION PHASES AT “PONIKVE” AIRPORT**

Mladen Kapetanović, Danijela Pandžić

стр.156

**NEW 3D BIM MODELLING METHODS FOR ROAD AND RAIL INFRASTRUCTURE**

Matjaž Šajn, Petar Dragić, Leon Leban, Klemen Ozimek, Petra Tihole

стр.166



**ДРЖАВЕН ПАТ АЗ ОБИКОЛНИЦА НА РЕСЕН**

Ристе Ристов, Васко Гацевски, Ивона Недевска, Слободан Огњеновиќ, Златко Зафировски,  
Ангел Мицковски стр.175

**ПОДОБРУВАЊЕ НА МЕХАНИЧКИТЕ КАРАКТЕРИСТИКИ НА ПОЧВАТА ПРИ  
ИЗГРАДБА И САНАЦИЈА НА ПАТНИ ИНФРАСТРУКТУРНИ ОБЈЕКТИ СО  
ПРИМЕНА НА ПОЧВЕНИ АНКЕРИ**

Сеад Абази, Павле Петровски, Булент Сулооџа, Спасен Ѓорѓевски стр.184

**МЕРКИ ЗА САНАЦИЈА НА ГЕОТЕХНИЧКИ ХАЗАРДИ КАЈ ПАТНА  
ИНФРАСТРУКТУРА, СТУДИЈА НА СЛУЧАЈ СВЛЕЧИШТЕ МАРКОВА НОГА**

Сеад Абази, Бојан Сусинов, Ардон Шабани, Булент Сулооџа стр.190

**ВОЗНО-ДИНАМИЧКИ АНАЛИЗИ ПРИ РЕКОНСТРУКЦИЈА НА ПАТНИОТ  
ПРАВЕЦ КИЧЕВО – МАКЕДОНСКИ БРОД ОД ДРЖАВНИОТ ПАТ Р1303**

Тодорче Мишевски, Слободан Огњеновиќ стр.198

**MOVEMENT SCHEMES ANALYSIS FOR THE IMPLEMENTATION OF THE  
MOBILITY PLAN IN HISTORICAL AREAS**

Mentor Balili Ph.D., Xhevahir Aliu Ph.D, Megi Xhafaj MsC стр.211

**Варијантни решенија за проширување и стабилизација на пат во сложени  
геотехнички услови**

Сусинов Бојан, Абази Сеад, Ѓорѓевски Спасен, Јовановски Милорад стр.219

**Тема / Topic 2 УПРАВУВАЊЕ, ИЗГРАДБА, И ОДРЖУВАЊЕ /  
MANAGEMENT, CONSTRUCTION, AND MAINTENANCE**

стр.220

**МЕЃУНАРОДЕН ИНДЕКС НА РАМНОСТ И БРАЗДЕЊЕ НА ПАТНА ДЕЛНИЦА ВО  
РС МАКЕДОНИЈА**

Горан Мијоски, Даниел Велинов, Зоран Мисајлески, Неџат Бајрами стр.233

**АНАЛИЗА НА РАЗЛИЧНИ ТИПОВИ НА САНАЦИЈА НА ПУКНАТИНИ ПРИ  
РЕХАБИЛИТАЦИЈА НА КОЛОВОЗНА КОНСТРУКЦИЈА**

Мартин Цеков, Горан Мијоски, Дарко Пешевски стр.243

**THE IMPORTANCE OF WEATHER INFORMATION FOR WINTER ROAD  
MAINTENANCE**

Alenka Šajn Slak, Petar Dragić, Borut Sila, Samo Čarman стр.251





**ПРИМЕНА НА ГНСС ТЕХНОЛОГИЈАТА ПРИ ПРОЕКТИРАЊЕ НА ЛИНИСКА  
ИНФРАСТРУКТУРА**

Златко Богдановски, Златко Србиноски

стр.259

**DURABILITY OF FLEXIBLE PAVMENT REINFORCED WITH ASPHALT THERMOSTABLE  
GLASS GRID**

Stojnić Dragan

стр.272

**DEVELOPMENT AND IMPLEMENTATION OF A BRIDGE MANAGEMENT SYSTEM  
IN NORTH MACEDONIA**

Aleš Žnidarič, Maja Kreslin, Dušan Fajfar, Tomaž Zajc, Rade Hajdin, Nikola Tanasić, Goran Markovski, Aleksandar Bogoevski, Dragan Mihajlović, Andrej Anžlin

стр.281

**DIGITALISATION OF BRIDGE INSPECTION**

Maja Kreslin, Petra Triller, Aleš Žnidarič, Vid Eržen, Dušan Fajfar, Andraž Krivic, Andrej Mesner, Andrej Anžlin

стр.289

**DIGITALIZATION AND SENSOR TECHNOLOGY ... THE KEY TO SUCCESS?**

Ersun Görener

стр.295

**INTELLIGENT ASSET MANAGMENT – PEHKO PROJECT**

Timo Saarenketo, Annele Matintupa, Jan Filipovsky

стр.303

**АСФАЛТНИ (ПОДОЛЖНИ И ПОПРЕЧНИ) И БЕТОНСКИ СПОЕВИ СО ПОЛИМЕР –  
МОДИФИЦИРАНА БИТУМЕНСКА ЛЕНТА**

Стојанче Стојанов, Љубомир Трајчев

стр.317

**THE TEL AVIV FAST LANE – HOT LANE MANAGEMENT IN ISRAEL –**

Thomas Sachse, Harel Hanin, Ezra Levy, Milan Radivojević

стр.327

**SHORTCOMINGS IN THE APPLICATION OF THE FIDIC YELLOW BOOK OF CONTRACT  
TERMS (DESING-BUILD SYSTEM) EXAMPLES OF ROAD CONSTRUCTION IN THE  
REPUBLIC OF SERBIA**

Milovan Ćeranić

стр.333

**INFLUENCE FROM HIGH TEMPERATURES ON THE ASPHALT LAYERS AT THE  
PAVEMENTS CONSTRUCTIONS ON A HIGHWAY SECTION**

Monika T.Madzovski, Goran Mijoski

стр.343

**VULNERABILITY AND RESILIENCE OF BRIDGES TO CLIMATE CHANGE AND  
DISASERS – CURRENT SITUATION IN SERBIA**

Milica Pavić, Igor Jokanović, Draženko Glavić

стр.353



**REAL TIME ROAD CONDITION MONITORING**

Timo Saarenpää, Markus Simonen, Jan Filipovsky

стр.363

**КОМПАРАЦИЈА И ОЦЕНА НА КОЕФИЦИЕНТОТ НА ТРИЕЊЕ НА КОЛОВОЗНИ  
ПОВРШНИ СО РАЗЛИЧЕН КАМЕН АГРЕГАТ**

Тони Јовановски, Горан Мијоски

стр.371

**МЕТОДОЛОГИЈА ЗА УПРАВУВАЊЕ СО РИЗИЦИ ОД ОДРОНИ КАЈ ПОСТОЈАНА  
ПАТНА ИНФРАСТРУКТУРА**

Верче Трајчева, Игор Пешевски, Милорад Јовановски, Горан Мијоски

стр.381

**GUARD – GO SMART WITH FLEXIBLE PROTECTION SYSTEMS AGAINST ROCKFALL  
HAZARDS**

Vjekoslav Budimir, Helene Lanter, Sascha Schultes

стр.391

**Тема / Topic 3 БЕЗБЕДНОСТ НА СООБРАЌАЈОТ НА ПАТИШТАТА /  
ROAD TRAFFIC SAFETY**

стр.392

**РЕВИЗИЈА И ИНСПЕКЦИЈА ЗА БЕЗБЕДНОСТ НА ПАТ – ПРЕДИЗВИЦИ И  
ВИЗИЈА ЗА СЕВЕРНА МАКЕДОНИЈА**

Јасмина Буневска – Талевска, Марија Маленковска Тодорова

стр.401

**ВЕРТИКАЛНА СООБРАЌАЈНА СИГНАЛИЗАЦИЈА – БАРАЊА И ПОТРЕБЕН КВАЛИТЕТ  
НА МАТЕРИЈАЛИ, ЗАКОНСКА РЕГУЛАТИВА И ТЕХНОЛОГИИ ЗА ИЗРАБОТКА**

Јорго Османли, Горан Мијоски,

стр.413

**IMPROVED ROAD PASSIVE SAFETY**

Demeter Prislán

стр.423

**ROAD SAFETY INSPECTION – INCOMPATIBILITY BETWEEN THE FUNCTION OF THE  
ROAD AND THE TYPICAL CROSS SECTION – BELGRADE'S NORTHERN ARTERIAN  
TANGENT**

Sanja Fric, Filip Trpčevski, Dejan Gavran, Vladan Ilić, Stefan Vranjevac, Miloš Lukić

стр.431

**ROAD SAFETY ASSESSMENT PRACTICES AND THEIR IMPLEMENTATION IN  
BULGARIA**

Vanina Katsarova, Ivan Tabakov

стр.441



**Тема / Topic 4 ЗАШТИТА НА ЖИВОТНАТА СРЕДИНА И ОДРЖЛИВ  
РАЗВОЈ / PROTECTING THE ENVIRONMENT AND SUSTAINABLE  
DEVELOPMENT**

стр.442

**MODIFIED BITUMEN ADVANCEMENTS AND PRACTICAL APPLICATIONS ASSOCIATED  
WITH THE NEW EU REGULATIONS**

Borislav Nejkov, Rossen Koleliev, Petko Krastev

стр.450

**PLASTOMERIC POLYMERIC COMPOUNDS FOR ASPHALT CONCRETE  
MODIFICATION: STATE-OF-THE-ART AND CASE STUDIES**

Shahin Eskandarsefat, Zoran Krušić, Loretta Venturini, Matteo Fumagalli

стр.460

**ЦИРКУЛАРНА ЕКОНОМИЈА, ПРАКТИКИ И УПОТРЕБА НА ИНДУСТРИСКИ ОТПАД  
КАКО СЕКУНДАРНА СУРОВИНА ВО ИЗГРАДБА НА ПАТИШТА**

З.Ѓорѓиевски, З.Илијовски, Ѓ.Гошев, Д.Рогожарева-Ставрева, Т.Димитрова-Филкоска

стр.468

**АНАЛИЗА НА ИНТЕНЗИВНИТЕ ВРНЕЖИ И НИВНОТО ВЛИЈАНИЕ ВРЗ  
БЕЗБЕДНОСТА НА СООБРАЌАЈОТ**

Виолета Ѓешовска

стр.480

**СООБРАЌАЈНА БУЧАВА – ЕКОЛОШКИ ПРОБЛЕМ И ВО МАЛИТЕ УРБАНИ СРЕДИНИ**

Марија Хаџи-Николова, Дејан Мираковски, Николинка Донева, Афродита Зенделска

стр.488

**THE IMPORTANCE OF CORROSION AND STRAY CURRENT MONITORING IN URBAN  
TRACKS**

Katarina Vranešić, Stjepan Lakušić

стр.496

**SUSTAINABLE ROAD CONSTRUCTION FUTURE CONCEPTS: ASFALT BINDER  
PRODUCTION FROM SWINE MANURE**

Amarija Andonoska, Blagica Dameva Andonoska, Marko Andonoski

стр.506

**HOW TO SAVE ENERGY, CO2 AND COSTS WITH MODERN TRANSPORT  
TECHNOLOGY IN ASPHALT CONSTRUCTION AND INSTALLATION**

Martin Fliegl, Michaela Hess

стр.516

**SOLAR PANELS AS PROTECTION AGAINST TRANSPORT NOISE**

Monika T.Madzovski, Goran Mijoski

стр.526



**ЕРОЗИЈА НА ПОЧВЕНИ КОСИНИ ПОД ДЕЈСТВО АТМОСФЕРСКИ ДЕЈСТВА И  
СТАБИЛИЗАЦИЈА СО ПРИРОДНИ ПОЛИМЕРНИ РАСТВОРИ**

Александра Н. Атанасовска, Јосиф Јосифовски, Бојан Сусинов, Сеад Абази стр.537

**КОМПАРАТИВНА АНАЛИЗА НА ПРЕСМЕТАНА СО ИЗМЕРЕНА БУЧАВА НА АВТОПАТ  
МИЛАДИНОВЦИ – СВЕТИ НИКОЛЕ**

Ристе Ристов, Милица Јованоска, Тодорка Самарџиоска, Горан Мијоски стр.547

**ОДНОСОТ ПОМЕЃУ УЛИЧНАТА МРЕЖА, СОСТАВОТ И УРЕДУВАЊЕТО НА УЛИЦИТЕ**

Васка Сандева, Катерина Деспот стр.555

**ENVIRONMENTAL PROTECTION IN INFRASTRUCTURE APPLICATIONS WITH  
PASSIVE IN-SITU TREATMENT**

Thomas Hasslacher, Stefan Niewerth стр.561

**СПОРЕДБЕНА АНАЛИЗА НА РЕЗУЛТАТИ ОД МЕРЕЊА ПРЕД И ПО ПРЕЗЕМЕНИТЕ  
МЕРКИ ЗА ЗАШТИТА ОД СООБРАЌАЈНА БУЧАВА НА ДРЖАВЕН ПАТ**

Валентина Јакимовска, Горан Мијоски, Весна Брзачка, Тони Јакимовски стр.571

**Тема / Topic 5 ИНФРАСТРУКТУРНИ ОБЈЕКТИ / INFRASTRUCTURE  
FACILITIES**

стр.572

**КОРИСТЕЊЕ НА SWMM ЗА ДИМЕНЗИОНИРАЊЕ НА СИСТЕМОТ ЗА  
ОДВОДНУВАЊЕ НА ПАТИШТАТА**

Гоце Тасески, Петко Пеливаноски, Никола Крстовски стр.580

**ОЦЕНКА НА СОСТОЈБАТА НА МОСТОВИТЕ НА АВТОПАТОТ “ДЕМИР КАПИЈА-  
СМОКВИЦА“ СО ПРОБНО ТОВАРЕЊЕ**

Горан Марковски, Тони Аранѓеловски, Дарко Наков, Симона Богоевска,  
Марија Доцевска Дејан Јанев стр.590

**НУМЕРИЧКА АНАЛИЗА НА КОНСТРУКЦИЈА СО ПРИМЕНА НА ПОЧВЕНИ АНКЕРИ**

Павле Петровски, Сеад Абази, Булент Сулооџа, Бојан Сусинов стр.599

**Тема / Topic 6 ТРАНСПОРТНА ПОЛИТИКА И ФИНАНСИРАЊЕ /  
TRANSPORT POLICY AND FINANCING**

стр.600

**КОМПАРАТИВНА АНАЛИЗА НА ПЛАНИРАНИ И РЕАЛНИ РОКОВИ И БУЏЕТИ НА  
ПРОЕКТИ ОД ПАТНАТА ИНФРАСТРУКТУРА**

Милена Јосифоска-Милошеска, Валентина Жилеска Панчовска, Горан Мијоски стр.610



**ЗАГУБИ ПРИ РЕАЛИЗАЦИЈА НА ПРОЕКТИТЕ ЗА ПАТНАТА ИНФРАСТРУКТУРА ВО Р.С. МАКЕДОНИЈА**

Томислав Ковачовски, Валентина Жилеска Панчовска, Горан Мијоски стр.622

**DESIGN ASPECTS OF THIN THICKNESS ARCH BRIDGES**

Xhevahir Aliu Ph.D, Mentor Balili Ph.D, Megi Xhafaj MsC стр.673

**Тема / Topic 7 ITS И НОВИ ТЕХНОЛОГИИ ВО СООБРАЌАЈОТ /  
ITS AND NEW TECHNOLOGIES IN TRAFFIC**

стр.674

**BIM IN ROAD INFRASTRUCTURE PROJECTS**

Dragana Stanojević, Mirjana Terzić, Panta Krstić, Milena Senjak Pejić стр.682

**GOOD PRACTICE IN HIGHWAY TRAFFIC MANAGEMENT**

Milan Radivojević, Ivana Đurđević, Marijana Mošić стр.690

**Тема / Topic 8 СЛОБОДНИ И СРОДНИ ТЕМИ ОД ОБЛАСТА НА ПАТИШТАТА  
И ПРЕЗЕНТАЦИЈА НА НОВИ ПРОЕКТИ / FREE AND RELATED TOPICS IN THE  
FIELD OF ROADS AND PRESENTATION OF NEW PROJECTS**

стр.691

**РЕХАБИЛИТАЦИЈА НА ДРЖАВЕН ПАТ А2, ДЕЛНИЦА „МИЛАДИНОВЦИ –  
ХИПОДРОМ“**

Ана Ѓорѓевиќ, Горан Мијоски, Ристе Ристов стр.697

**ROAD INFRASTRUCTURE IMPROVEMENT BY URETEK GEO RESIN**

Tomislav Gregurić, Robert Maros стр.706

**ДЕФОРМАЦИСКИ КАРАКТЕРИСТИКИ НА МАТЕРИЈАЛИ СО МАЛА ТЕЖИНА И  
НИВНА ПРИМЕНА ВО ПАТНАТА ИНФРАСТРУКТУРА**

Мила Смиљановска, Александра Н. Атанасовска, Станислав Ленарт, Бојан Жлендер, Јосиф Јосифовски стр.714

**ФИЗИЧКО – МЕХАНИЧКИ КАРАКТЕРИСТИКИ НА КАРБОНАТИТЕ ОД ЛОКАЛИТЕТОТ  
ВИДОВИШТЕ**

Ѓорѓи Димов, Благоица Донева, Александар Главинов стр.722

**CONTRIBUTION TO ROAD TRAFFIC NOISE WALL PANEL TYPE SELECTION  
PROCESS**

Maja Ahac, Saša Ahac, Stjepan Lakušić стр.730



## **Повикани предавања / INVITED LECTURES**

- 1. ГЕОТЕХНИЧКИ УСЛОВИ ЗА ИЗВЕДБА НА ПАТНА ИНФРАСТРУКТУРА-ИСКУСТВА И ПРАКТИКИ**  
Милорад Јовановски, Игор Пешевски, Ване Трајановски
- 2. EVALUATION OF PAVEMENT BEARING CAPACITY BY FWD - EXAMPLE FROM PRACTICE**  
Tatjana Rukavina
- 3. IMPACT OF CLIMATE CHANGE ON PAVEMENT STRUCTURAL PERFORMANCE**  
Goran Mladenovic
- 4. IN-SITU DETERMINATION OF ACOUSTIC PROPERTIES OF NOISE BARRIERS: RUCONBAR CASE STUDY**  
Ivo Haladin, Stjepan Lakušić, Krešimir Burnać, Mate Ivančev
- 5. INNOVATIVE TRIPLE SMA LAYER FOR HEAVY DUTY PAVEMENTS**  
Igor Ruttmar, Marcin Hering, Agata Grajewska
- 6. IMPORTANCE TRAFFIC MANAGEMENT PLAN FOR TRAFFIC SAFETY**  
Osman Lindov
- 7. TRANSVERSE PROFILES OF MOTORWAYS AND EXPRESS ROADS IN EUROPE**  
Kerim Hrapovic, Goran Mijoski
- 8. EXISTING SITUATION OF TRANSPORT, INDUSTRIAL, TECHNOLOGICAL, AND ENERGY INFRASTRUCTURES AND NETWORKS IN BULGARIA**  
Nikolaj Mihajlov, Ivan Kacarov
- 9. RECONSTRUCTION AND EXTENSION OF THE OPERATING AREAS OF THE DUBROVNIK AIRPORT“**  
Mr. sc. Luka Krnic TPA Zagreb
- 10. „CHALLENGES AND OPPORTUNITIES FOR THE EUROPEAN ASPHALT INDUSTRY?“**  
Dr. sc. Carsten Karcher Secretary General – EAPA



## **Односот помеѓу уличната мрежа, составот и уредувањето на улиците**

### **The relationship between street network, composition and street landscaping**

Vaska Sandeva<sup>1</sup>, Katerina Despot<sup>2</sup>

<sup>1</sup> Professor, Goce Delcev University - Stip, Macedonia, vaska.sandeva@ugd.edu.mk

<sup>2</sup> Professor, Goce Delcev University - Stip, Macedonia, katerina.despot@ugd.edu.mk

#### **Апстракт**

Патиштата треба да се следат не само како погодни патишта, туку и за економична градба. Во споредба со ова важно функционално значење, постои естетски визуелен квалитет на патиштата.

Уличната мрежа како елемент на урбанистичкото планирање на населените места го формира скелетот на населбата и создава услови за ориентација во општиот урбан пејзаж.

Во теоријата на паркската уметност, поимот композиција значи - распоредување на поединечни растенија или комбинирани со мртви материјали за да се формира хармонична целина подредена на уметничката идеја. Главните теоретски дела во паркската уметност се тесно поврзани со принципите на општата теорија на композицијата.

Поврзувањето на плоштадите и улиците со околната природна и урбана средина може да се направи кога теренот, постоечката висока и ниска вегетација, водните површини и карпестите формации се правилно проектирани.

#### **Клучни зборови**

парк, проект, улица, принципи, уметност, зелен систем

#### **Abstract**

Roads should be traced not only as convenient roads but also for economical construction. In comparison to this important functional significance there is aesthetic visual quality of the roads.

The street network as an element of urban planning of settlements forms the skeleton of a settlement and creates conditions for orientation in the general urban landscape.

In the theory of park art, term composition means - arrangement of individual plants or combined with dead materials so as to form a harmonious whole subordinate to the artistic idea. The main theoretical works in park art are closely related to the principles of the general theory of composition.

The connection of squares and streets with the surrounding natural and urban environment can be done when the terrain, the existing high and low vegetation, water surfaces, and rock formations are properly designed.

#### **Key words**

park, design, street, principles, art, green system

## **1. Introduction**

The green system is an important spatial structural and functional part of the settlement and the upland territories, which solve a number of tasks for improving the environment.

The terrain plays a particularly important role in tracing streets and street networks.

"Designing a street according to its likely use is a reasonable but unusual practice," says Plato in 1917. We strongly believe that streets, squares and public spaces are a vital element in every region and city. a component that contributes to the revival of the city.

The organization of places for extra-urban recreation is unthinkable without good transport links at these places in urban areas, i.e., branched rational network of roads.

Suburban roads should be tracked not only as convenient roads but also for economical construction. In comparison to this important functional significance there is aesthetic visual quality of the roads. In order to successfully solve these problems, it is necessary to introduce rational principles and methods of landscape design on the roads, which consists above all in linking the roads with the characteristics of the local landscape environment as well as in the rational use of the natural and artificial components of the landscape, such as existing vegetation or newly formed plantations.

Road vegetation has a major impact on the overall picture of the landscape. Therefore, considerable attention should be paid. Planning and designing it is an integral part of the profession of landscape architects.

In the series of methods for achieving ecological balance in the urban environment, the planning and construction of the green system occupies a certain place. This activity accompanies modern urban planning both as a science and as a practice, but a concrete approach is needed on a case-by-case basis.

## **2. Materials and Methods**

The research is based on our own research, some foreign research, and literature sources.

In order to achieve the main goal and solve the set tasks, they require the application of a system of Mathematical and Statistical Methods - collection, processing, systematization and interpretation of the statistical data from: The National Statistics of the Republic of Macedonia; information about the park structure of the street network of a part of the street network in the Republic of Macedonia; literature sources with data on natural factors and their characteristics and conditions; urban plans and park development projects and methods of field survey - visual analysis of the street network.

## **3. Results and Discussion**

The road from the earliest times to today is a factor that has a significant impact on economic, political and cultural development.

The best indicator of the strength of the state is its infrastructure. So it is said that if you want to find out what economy is in a given country, ask what kind of construction it is, this is your fastest and most reliable indicator.

In recent years, thanks to the continuous improvement of the road system, great attention has been paid to the negative impact of road construction on the natural environment. According to the requirements for sustainable development, road construction should try to reduce the environmental degradation.

Also, the preservation of the environment, landscaping, history, culture and other factors must be thoroughly reviewed to make the road a new bright landscape for the natural landscape.



The composition is one of the most important concepts in all arts originating from the Latin composition, which means the presence and connection of elements or parts of a work of art in a single system.

The main theoretical works in park art are closely related to the principles of the general theory of composition.

The combination of vegetation in landscape design is also subject to the principles of unity, expediency, proportion, balance, and so on.

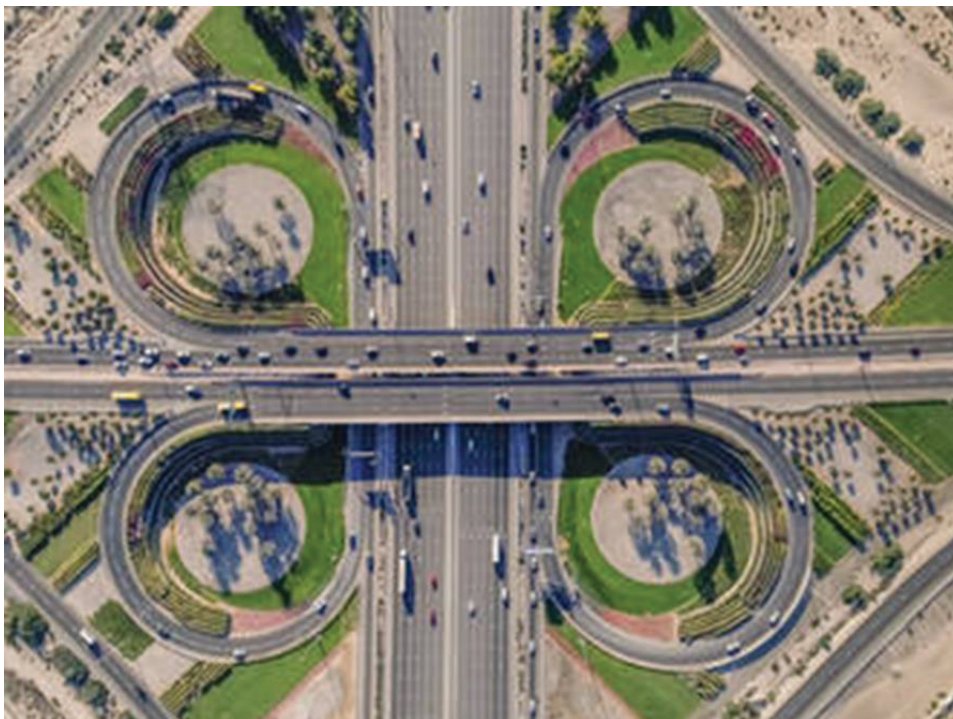
Knowledge of the elements is of great importance for the formation of the road composition (line, offset and shape, color, direction, size) from which artistic principles are established (expediency, color, scale, proportionality, equilibrium, symmetry and asymmetry, contrast, shade, equality, diversity, repetition (rhythm), categorical contrast), and they are the regulators of any project work that defines the interrelation of the elements in it.

The construction of different types of roads of all categories should not cause landscape disturbance; their tracing has to coincide with the natural features such as the existing indigenous or alto tonic plantations - forest massifs, groups as well as individual specimens of decorative tree species.

The rhythmic path of the road must fit harmoniously into the surrounding landscape.

Disagreements about the organic connection between the roads and the natural landscape are in the cases where the track of the road corresponds to the nature of its main natural components - the relief of the surroundings, the outlines of the river, the water surfaces, as well as the edges of the forests and small forests.

The long stretches of roads in Macedonia are not inconsistent with the main components of the area - the shape of the relief, the rectangular fields, the network of agro-protection plants, the irrigation channels, etc. - unlike the others, they are biologically supplemented.



*Fig. 1: The street network, composition and street landscaping in the World*

But if these straight roads are too long, monotonous, they can be annoying and reduce the driver's attention. You have to intervene there with vegetation.

The green system is a spatially connected green area with a certain functional purpose (biological, recreational and aesthetic, etc.) and with a significant role in the macro-structure of the city.

The functional and territorial organization of the green system aims to link all green areas, categorize them according to various signs and normalize them by means of certain indicators. Such an organization is based on several principles:

- All existing and projected green areas should be bound in an overall spatially connected system;
- Territorial organization of the green system should be in tune with other local functions and systems - to separate the incompatible and to connect the compatible ones;
- The park building of the linear objects and the pedestrian zones should be established in directions and connect with the traditional routes and the service areas;
- The green areas for short-term recreation should be arranged near or in the directions of the pedestrian streams and around the public centers;
- Coastal parks and forestry parks should have the opportunity to organize a connection both with the settlement green system and with the natural environment;

The Territorial Organization aims to identify the most appropriate territorial structure of the green system, following the following principles:

- Uniformity in the location of large green fields;
- The territorial link between the existing and the planned green areas in an overall spatially connected system harmonizing with the settlement;
- Continuity of the green system in the settlement and suburban range with penetration into the central city areas;
- Complexity in solving the system of urban and suburban green areas, united in one unit;
- Territorial direction of the park-controlled pedestrian zones along traditional routes;
- Quantitative norms with the development of relevant indicators according to the complex requirements of the housing environment, the market economy and the land restitution.

The green system as an element of the living environment affects the individual local functional systems - labor, living, recreation, transport, public service and others.

The requirements for the transport-communication system are:

- Not to disturb the integrity of the green system of the settlement;
- keep territories with valuable landscapes and vegetation from major transport communications;
- Provide safe-hosted pedestrian access to kindergartens and schools;
- provide the necessary easement for different classes of streets;
- To divide the pedestrian from the traffic with plant towers (rows, planted vegetation and screens).

The green system as an element of the urban landscape includes the aesthetic-compositional requirements in the formation or, more precisely, the criteria for aesthetic assessment of the green areas in the settlement.

The green system as a structuring element in the settlements includes:

- The green system as structuring;
- The green system as a necessary environment for the development of other functional systems;
- The green system as a specific environment for the development of recreational subsystems.

In the formation of the planning structure of a city, a system of main streets, which are the backbone of the overall town-planning solution, are involved. In the process of population development under the influence of a complex of natural geographic conditions and socio-economic factors, the main street network develops and transforms.

The artistic principles and elements are a guide for designers in organizing elements for a visually satisfying landscape.

Knowledge of design elements and principles is essential for designing an open surface (landscape) and working in the road design process.

The elements of the compilation are the visual qualities that people see and react when they look at the space in our case this is the road. Visual effects can forbid many different emotions and feelings and the more positive these feelings are, the more likely people are to enjoy and use space.

Perhaps the most common element in the composition is the line. The line creates all shapes and patterns and can be used in different ways in building the landscape.

Landscape designers use lines to create patterns, create spaces, create forms, control movement, establish dominance, and create a cohesive theme in the landscape.

Line properties determine how people respond to the landscape, emotionally and physically.

The appearance is created by the contour of the enclosed space, and the shape is the three-dimensional mass of appearance. The shape of the structure, the plants and the garden elements also determine the general theme of the space. Formal geometric shapes include circles, squares and polygons.

Form is the most durable quality of plants. Ordinary plant forms are well established and standardized, and the shape is the most conventional and recognizable plant features.

The form can also be created by concentration of plants where the total mass forms a different shape. A strong form that contradicts the rest of the composition will have a greater emphasis on the composition. Strongly opposite forms should be used carefully - one or two works well and as a focal point, but if too much is used, chaos is created.

The texture refers to how rough or fine the surface of the plant feels and / or looks. The texture is used to provide variety, interest and contrast.

The greens, flowers, bark, and the whole structure of the branch have a texture. The shape and size of leaves often determine the perception of the structure of the plant. A plant can be described as rough, medium or fine texture.

Acute textures are dominant and tendencies dominate in color and shape, and the fine texture is finer for other textures and tends to unite the composition.

Coarse-textured plants attract attention and are prone to keep it, because the bright and dark shadow contrasts provide more. The slim texture exaggerates the distance and creates a

feeling for a larger, more open space. Strong texture minimizes the distance that plants look closer to and the space feels less, more radiant.

The bold colors increase the contrast and make the texture ugly, and the reduced colors can smooth the texture. Coarse-textured paper such as coarse rocks and large trees tends to make the plant material look medium-textured.

Paint is the most visible element in the landscape and is often the focal point of most of the Demure fans; however, it is also the most temporary of an element that often lasts only a few weeks a year in individual plants.

The use of colors is determined by the theory of colors (using a color wheel) to create color schemes.

The color theory explains the relationships of the colors to one another and how they should be used in the composition.

Color can also be used to attract attention and direct views. In bright colors a focal point can be created. For example, light yellow, which has the highest intensity, also has the greatest contrast with other colors (often described as "color pop") and should be used moderately. The small amount of intense color has as much visual weight as much weaker or weaker colors. The color scheme of the garden changes as the seasons change. Summer colors are usually different and brighter with more flowers, and winter colors tend to be monochrome and then more leaves. Color is also influenced by the quality of light, which changes from the time of the day and the time of the year. The brighter, more intense summer sun makes the colors more intense and intense, so the filtered winter light makes the colors stranger. When selecting a color scheme it should be different at which time of day the garden will be used. Since color is temporary, it should be used to emphasize more desirable elements such as texture and shape. Studying the color of the target plan is useful for choosing a color.

Physical and psychological comforts are two important principles that have been achieved through the use of these principles. People feel more psychic comfort in a landscape that has order and repetition.

The organized landscape with predictable design (signs of human care) is easier to read and tends to make people feel comfortable. Psychological comfort is also achieved through a sense of satisfaction that a spectator captures from a heterogeneous or harmonious landscape. Consumers feel psychic comfort, work better and feel safer in a landscape that is proportionally compatible with the human dimension.

Proportions. The relative share is the size of an object relative to another object. The absolute proportion is the scale or size of an object. An important absolute percentage is the human scale (the size of the body), since the size of the other objects is considered to be relative to man. Vegetable materials, garden items and ornaments should be related to human scale. Other important relative proportions include the size of the house, the yard and the area where it is to be planted.

Proportions the plants. Proportions can be found in plant material in relation to humans, surrounding plants and the house. When all the trees are proportional, the composition feels balanced and harmonious. Feeling of equilibrium can also be achieved through an even distribution of open space and planted space. The use of significantly different plant sizes can help achieve dominance (accent) by contacting a large plant. Using plants of similar size helps to achieve rhythm by repeating the size.

Balance is a concept of equal visual attraction and weight, usually around a real or represented center axis. The shape, color, size and texture also affect the balance. The balance can be symmetrical, asymmetrical and perspective. Order can also be achieved by massive elements or elements in different groups, located around a central point.

Symmetric balance. Systematic equilibrium is achieved when the same objects (mirror) are placed on both sides of the axis. This kind of balance is used in formal design and one of the oldest and most used concepts of spatial organization.

Asymmetric balance. Asymmetric balance with the same visual weight of uneven forms, colors and textures on both sides of the axis. This equilibrium is informal and is usually achieved by masses of plants that seem to have the same visual weight over the total mass. Mass can be achieved by combining plants, structures and garden ornaments. In order to create a balance, the features of large sizes, thick shapes, bright colors and coarse textures look heavy and should be used moderately, while small sizes, rare shapes, gray or protruding colors and fine textures look easier and need to be used in larger quantities.

Repeat. Repeat is done by reusing elements or features to create patterns or sequences in the landscape. The repetition of lines, shapes, colors and textures creates waves in the landscape. Repetition should be used with caution, too much repetition can create monotony and too little can create confusion. Simply repeating is the use of the same objects in a single line or grouping of geometric shapes such as a square in an organized branch.

Repetition can become more interesting by using a change that is a small change in the sequence of the ordinary, for example, the use of a square shape according to circular shapes of every fifth circle.

Grading, which is a gradual change in some functional features, is another way to make the repetition more interesting. An example may be a square shape that gradually becomes smaller or larger.

Unity. Unity is achieved by linking elements and features to create a limited character in the composition. Unity is sometimes called harmony, a concept of general fit. For comparison, scattered piles of plants and unrelated garden elements are opposed to unity. Unity is accomplished through domination, inner bonding, unity in three (described below), and the simplicity of outlining colors, textures and shapes. Although paper and plants can be delayed by merging similar features, some variety is important for interest creation. The easiest way to create unity is by using a design theme or design style. Design themes and styles have a well-defined set of features that have retained their popularity over time as many of them are visually satisfying.

Application of Design Principles and Elements. Although it is useful to know the elements and principles of design, it is sometimes difficult to understand how to apply them. Each country presents challenges and opportunities for individual projects and expressions and requires a unique implementation of elements and principles.

The research as elements and principles have been applied in an existing design that is attractive to you is a good place to start. The best way to create a good design is to get ideas from projects that are attractive to you and adapt to our specific conditions.

#### **4. Conclusions**

Knowledge of the elements is of great importance for the formation of the road composition (line, offset and shape, value, color, direction, size) from which artistic principles are established (expedience, colour, scale, proportionality, equilibrium, symmetry and asymmetry, contrast, shade, equality, diversity, repetition (rhythm), categorical contrast), and they are the regulators of any project work that defines the interrelation of the elements in it.

Road vegetation has a major impact on the overall picture of the landscape. Therefore, considerable attention should be paid. Planning and maintenance is an integral part of the profession of landscape architects.

The system of green areas and plantations is an important spatial-structural and functional part of urban and rural areas. With the help of the green system, a number of tasks are solved to

improve the environment, the aesthetics of the settlements, the recreation of the population, and the connection with the natural environment.

The street network as an element of town planning of settlements forms the skeleton of the settlement and creates conditions for orientation in the common urban landscape.

The main task of the communication transport system is to provide the best conditions for fast, convenient, safe and economical transport, while respecting environmental protection requirements.

The siting and shaping of the street network are of fundamental importance for the architectural, artistic and aesthetic layout of the settlement.

The construction of roads in our country is in a stage of development; the speed with which we build the infrastructure is also growing rapidly. At the same time, we must protect the environment as an important task and a powerful guarantee

The streets should be designed so that when designing them, a landscape architect will be involved who will articulate the elements and principles of a correct compositional solution.

Streets are one of the cornerstones of the urban landscape, and for the normal functioning of this landscape it is inconceivable that all of its components are in ecological unity.

## 5. References

- [1] Despot, Katerina and Sandeva, Vaska (2018) Ecological and aesthetic parameters of park art as a factor for street landscaping in cities. Innovation and Entrepreneurship, 6 (3). pp. 154-166. ISSN 1314-9253
- [2] Sandeva, Vaska and Despot, Katerina (2017) One line with respect to the industrial design and its psychological representation in green areas. Innovation and Entrepreneurship, 5 (2). ISSN 1314-9253
- [3] Sandeva, Vaska and Despot, Katerina (2019) Art principles in park art as a factor for street landscaping in cities. IXth International scientific conference on architecture and civil engineering ArCivE . ISSN 2367-7252
- [4] Арсовски Т., „Човекот и животната средина“, анализа и мерки за заштита на животната и работната средина во град Скопје. Скопје 1975
- [5] Глухаров И., Проучване на екологическите фактори в малките селища за одних, Техническа мисъл, 1979/ бр.5
- [6] Димитријевик Ј., Животна средина, Скопје 1998
- [7] Каракашев К., Кънчева М., Добрев П., Проблеми и тенденции в организацията на зелените системи при териториално и градоустройствено проектиране с цел създаване на оптимални градоустройствени условия. КНИНИТУГА, София 1988 32.
- [8] Ковачев А., Градоустройство. Част 1. Основи на теорията и практиката на градоустройството. PENSOFT, София – Москва 2003
- [9] Ковачев А., Градоустройство. Част 2. Актуални аспекти на съвременното градоустройство. PENSOFT, София – Москва 2003
- [10] Колева В., Зелените площи покрай градските магистрали и районите артерии. КНИПИТУГА 1986
- [11] Колева П., Михов И., Вакарелов И., Павлов Д., Биологични основи на паркоустройството. Земиздат, София 1980
- [12] Кулелиев Й., Парково устройство на уличната мрежа в населените места в Р. България. реабилитационен труд, София 1994
- [13] Стойчев Л., Парково и ландшафтна архитектура. София 1985
- [14] Щилянгов Г., Строителство на автомобилни пътища. София 1980