

# Contents

## BUILDING AND ARCHITECTURE

### ARCHITECTURE, URBAN PLANNING, DESIGN

*Dakheel Heba.* Identifying of development strategy for the waterfront of small cities in Syria using SWOT analysis.....5

### BUILDING DESIGNS

*V. I. Klevan.* Experimental study of deformability and bearing capacity of composite I-beams with profiled steel sheet wall and laminated veneer lumber belts .....13

*A. S. Korolev, E. S. Sharapov, V. A. Popov.* Assessment of internal condition of wood in inter-floor covering beams by drilling resistance measurement method .....21

*V. M. Popov, S. N. Savin, M. G. Plyusnin, V. V. Belov, M. O. Khagai.* Ensuring the load-bearing capacity of bending reinforced concrete elements .....31

### STRUCTURAL MECHANICS AND CALCULATION OF STRUCTURES

*B. I. Kondakov.* Calculation of opened-through hydraulic structure for tsunami impact using modern computing tools .....37

*V. A. Meleshko, O. V. Golyh, L. N. Kondratieva.* Features of the finite element method forms in the elastic-plastic computation of rod systems .....46

### GEOENGINEERING

*O. O. Denisova.* The influence of indentation piles and deep spacer diaphragm on additional deformations of the surrounding buildings .....52

### BUILDING MATERIALS AND PRODUCTS

*L. Yu. Matveeva, L. G. Kolesnikova, I. S. Parazhinskayte.* Improving the performance of bituminous waterproofing materials through the use of nanocarbon lignin .....64

### SANITARY ENGINEERING AND ECOLOGY

*Yu. A. Feofanov.* Dynamics of biomass development in a biofilter operating in a periodic mode .....71

#### Scientific-technical peer reviewed journal

*The Founder* — the Federal State Budgetary Educational Institution of Higher Education “Saint Petersburg State University of Architecture and Civil Engineering” (SPbGASU)

#### The Editor-in-Chief

*Ye. I. Rybnov*, Dr. Sci. Ec., Professor, Honorary Worker of Higher School of the Russian Federation (SPSUACE)

#### Assistants to the Editor-in-Chief

*Yu. P. Panibratov*, Dr. Sci. Ec., Professor, Winner of the State Award of the Russian Federation and the Award of the Government of the Russian Federation, Honorary Worker of Sciences of the Russian Federation, Academician of RAACS (SPbGASU)

*E. V. Korolev*, Dr. Sci. Tech., Professor, Full member of the Russian Engineering Academy, Winner of the Government of the Russian Federation, Honorary Builder of Russia (SPbGASU)

#### Editorial council

*A. A. Akaev*, Dr., Prof., Foreign Member of the RAS (Lomonosov Moscow State University, Russia)

*L. Ungvari*, Dr. Sci., Professor, (Technical University of Applied Sciences Wildau, Germany)

*N. V. Kazhar*, Dr. Arch., Professor (Częstochowa University of Technology, Poland)

*G. Kipiani*, Dr. Sci. Tech., Professor (Georgian Technical University, Georgia)

*H. V. Tokmajyan*, Dr. of Engineering, Professor, Rector of SUT (Shushi University of Technology, Armenia)

*J. Eberhardsteyner*, Dr. Sci. Tech., Professor (Vienna University of Technology, Austria)

*S. N. Leonovich*, Dr. Sci. Tech., Professor (Belarusian National Technical University, Belarus)

*Y. Iwasaki*, Dr. Sci. Tech. (Geo-Research Institute, Japan)

*T. Tanaka*, Dr. Sci. Tech., Professor (University of Tokyo, Japan)

*A. Zh. Zhusupbekov*, Dr. Sci. Tech., Professor (L. N. Gumilyov Eurasian National University, Astana, Kazakhstan)

#### Editorial Board

*G. V. Yesaulov*, Dr. Arch., Professor, Academician of RAACS

*N. I. Karpenko*, Dr. Sci. Tech., Professor, Winner of the Award of the Government of the Russian Federation, Honorary Worker of Sciences of the Russian Federation, Academician of RAACS (NIISF RAACS)

*L. S. Lyahovich*, Dr. Sci. Tech., Professor, Honorary Worker of Sciences of the Russian Federation, Academician of RAACS (TSUAB)

*V. Sargsyan*, Dr. Sci. Tech., Professor (National University of Architecture and Construction of Armenia)

*V. I. Travush*, Dr. Sci. Tech., Professor, Winner of the State Award of the Russian Federation, Winner of the Award of the Government of the Russian Federation, Academician of RAACS (RAACS)

*V. S. Fedorov*, Dr. Sci. Tech., Professor, Academician of RAACS (MSURE)

*S. V. Fedosov*, Dr. Sci. Tech., Professor, Winner of the Award of the Government of the Russian Federation, Honorary Worker of Sciences of the Russian Federation, Academician of RAACS (IVGPU)

*M. I. Alekseev*, Dr. Sci. Tech., Professor, Winner of the Award of the Government of the Russian Federation, Honorary Worker of Sciences of the Russian Federation, Academician of RAACS

G. I. Belyy, Dr. Sci. Tech., Professor, Honorary Worker of Sciences of the Russian Federation  
 E. R. Vozniak, Dr. Arch., Professor  
 T. A. Datsiuk, Dr. Sci. Tech., Professor  
 B. N. Karpov, Dr. Sci. Tech., Professor  
 L. N. Kondrat'eva, Dr. Sci. Tech., Professor  
 L. P. Lavrov, Dr. Arch., Professor, Honorary Architect of the Russian Federation, Correspondent Member of RAACS  
 R. A. Mangushev, Dr. Sci. Tech., Professor, Honorary Worker of the Higher School of the Russian Federation, Correspondent Member of RAACS  
 A. M. Maslennikov, Dr. Sci. Tech., Professor, Honorary Worker of Sciences of the Russian Federation  
 Yu. V. Puharenko, Dr. Sci. Tech., Professor, Winner of the Award of the Government of the Russian Federation, Correspondent Member of RAACS  
 S. V. Sementsov, Dr. Arch., Professor  
 V. M. Ulyasheva, Dr. Sci. Tech., Professor  
 S. A. Evtukov, Dr. Sci. Tech., Professor, Honorary Worker of Higher School of the Russian Federation  
 P. A. Kravchenko, Dr. Sci. Tech., Professor, Honorary Worker of the Higher School of the Russian Federation  
 V. N. Dobromirov, Dr. Sci. Tech., Professor  
 Ju. G. Kotikov, Dr. Sci. Tech., Professor  
 A. E. Pushkarev, Dr. Sci. Tech., Professor  
 A. A. Kapustin, Dr. Sci. Tech., Professor  
 R. N. Safiullin, Dr. Sci. Tech., Associate Professor (SPbGASU)  
 V. S. Lukinskiy, Dr. Sci. Tech., Professor (HSE in St. Petersburg)  
 V. N. Lozhkin, Dr. Sci. Tech., Professor, Honorary Worker of Sciences of the Russian Federation (Saint-Petersburg University of State Fire Service of EMERCOM of Russia)  
 A. N. Asaul, Dr. Sci. Ec., Professor, Honorary Builder of the Russian Federation, Honorary Worker of Sciences of the Russian Federation  
 I. V. Drozdova, Dr. Sci. Ec., Professor  
 V. A. Koshcheev, Dr. Sci. Ec., Associate Professor  
 G. F. Tokunova, Dr. Sci. Ec., Professor  
 N. G. Pletneva, Dr. Sci. Ec., Professor  
 A. I. Solodkiy, Dr. Sci. Ec., Professor  
 V. V. Asaul, Dr. Sci. Ec., Professor (SPbGASU)  
 G. F. Shcherbina, Dr. Sci. Ec., Associate Professor  
 CEO (AO SSMO "LenSpetsSMU")  
 L. M. Kaplan, Dr. Sci. Ec., Professor (St. Petersburg Union of Construction Companies)  
 A. A. Rudenko, Dr. Sci. Ec., Professor (MAL)

*The address of the Founder and the Editorial Office:*  
 2<sup>nd</sup> Krasnoarmeyskaya St. 4, 190005, St. Petersburg, Russia  
 Ph./ Fax: (812) 316-49-06

*E-mail: vestnikspb@mail.ru*

The contents and abstracts of articles are presented on the site: <http://vestnik.spbgasu.ru>  
 The journal is registered by the Federal Service for Supervision of Communications, Information Technology and Mass Media (Roskomnadzor). The registration certificate of the mass media organization is ПИИ № ФС77-69753, of 05.05.2017.

The journal is included by the Higher Attestation Commission (HAC) of the Russian Federation into the List of leading reviewed scientific journals and editions in which the major scientific results of theses on competition for the academic degree of the Doctor of Science are to be published.

In case of reprinting, the link to the "Vestnik grazhdanskikh inzhenerov – Bulletin of Civil Engineers" is obligatory.

On the cover one can see the monument to Nicholas I, the Emperor, in honour of whom the Institute of Civil Engineers (nowadays SPbGASU) was named on December 17, 1892.

## TRANSPORT

E. V. Pechatnova, I. A. Novikov. Distribution assessment of the number of pedestrian crashes on road segments with different characteristics.....79

I. O. Chernyaev, V. V. Verhorubov. Methodology of substantiating the program on maintenance of motor vehicles in the workability assurance systems accounting for individual correction of the service interval.....88

## ECONOMICS

T. A. Blazhenkova. Development directions of customs and logistics infrastructures in order to form a sustainable development of the transport industry .....97

N. G. Pletneva, G. F. Tokunova, I. D. Evseenko. Approaches to the formation of a strategy for the development of a construction organization in St. Petersburg residential real estate market..... 106

**Abstracts**..... 115

**Submitting materials requirements**..... 122

**Subscription rules** ..... 123