



Орловский
ГОСУДАРСТВЕННЫЙ
УНИВЕРСИТЕТ
имени И.С.Тургенева

БГИТУ

СТРОИТЕЛЬНЫЙ
УНИВЕРСИТЕТ

Scientific and technical journal.
The journal is published since 2013.
The journal is published 4 times a year.
№4(32), 2020
(October-December)

Editor-in-chief
V. A. Ilyichev *academician of the RAACS,*
Doc. Sc. Tech., Prof.

Editor-in-chief assistants
S. G. Yemelyanov *corresponding member of the RAACS,*
Doc. Sc. Tech., Prof.
V. I. Kolchunov *academician of the RAACS,*
Doc. Sc. Tech., Prof.

Editorial committee
V. N. Azarov *Doc. Sc. Tech., Prof.*
E. M. Akimkin *Candidate. Sc. Socail.*
V. V. Aleksashina *Doc. Arc., Prof.*
L. A. Aseeva *Doc. Sc. Phil., Prof.*
N. V. Bakaeva *Doc. Sc. Tech., Prof.*
T. Bock *Doc. Sc. Tech., Prof. (Germany)*
H. Brandl *Doc. Sc. Tech., Prof. (Austria)*
V. V. Bredihin *Doc. Sc. Econom., assoc. prof.*
W. D. Yu *Doc. Sc. Tech., Prof. (Taiwan)*
A. G. Bulgakov *Doc. Sc. Tech., Prof.*
A. A. Volkov *corresponding member of the RAACS*
Doc. Sc. Tech., Prof.
V. A. Gordon *Doc. Sc. Tech., Prof.*
V. A. Egorushkin *Cand. of agricultural sc., assoc. prof.*
V. S. Yezhov *Doc. Sc. Tech., Prof.*
N. S. Kobelev *Doc. Sc. Tech., Prof.*
V. I. Ledenev *Doc. Sc. Tech., Prof.*
K. I. Liseev *Doc. Sc. Philos., Prof.*
V. V. Nedelin *Prof.*
N. Nikolov *foreign member of RAACS, Doc. Sc. Tech., Prof.*
(Bulgaria)
V. I. Osipov *academician of the RAS, Doc. Sc. Tech., Prof.*
O. V. Pilipenko *Doc. Sc. Tech., Prof.*
O. V. Sergeychuk *Doc. Sc. Tech., Prof. (Ukraine)*
V. I. Telichenko *academician of the RAACS,*
Doc. Sc. Tech., Prof.
V. V. Tur *Doc. Sc. Tech., Prof. (Belarus)*
N. P. Umniakova *Doc. Sc. Tech., Prof.*
V. S. Fyodorov *academician of the RAACS,*
Doc. Sc. Tech., Prof.
N. V. Fyodorova *Doc. Sc. Tech., Prof.*
E. M. Chernyshev *Doc. Sc. Tech., Prof.,*
academician of the RAACS
R. Shah *Doc. Sc. Tech., Prof. (Germany)*
M. V. Shubenkov *academician RAACS, Doc. Arc., Prof.,*
I. L. Shubin *corresponding member of the RAACS,*
Doc. Sc. Tech., Prof.

Responsible for edition
A. G. Kolesnikov *Candidat Sc. Tech, assoc. prof.*

The edition address: 305040, Kursk, str. 50 let Otyabrya, 94
+7 (4712) 22-24-61, www.swsu.ru
E-mail: biosfera_swsu@mail.ru

Journal is registered in Russian federal service for monitoring
communications, information technology and mass commu-
nications
The certificate of registration: **ИИИ № ФС77-56639**

© Southwest State University, 2020
© Orel State University named after
I.S. TURGENEV, 2020
© Bryansk state engineering and technological university, 2020
© Research institution of construction physics under the
RAACS, 2020
© Moscow State University of Civil Engineering
(National research university), 2020
© Volgograd State Technical University, 2020

BIOSPHERE COMPATIBILITY: HUMAN, REGION, TECHNOLOGIES

The founders

- Federal state budget educational institution of higher education
«Southwest State University»
- Federal state budget educational institution of higher education
«Orel State University named after I.S. Turgenev»
- Federal state budget educational institution of higher education
«Bryansk State Engineering and Technological University»
- Research institution of construction physics under the Russian academy
of architecture and construction sciences
- Federal state budget educational institution of higher education
«Moscow State University of Civil Engineering (National Research University)»
- Federal state budget educational institution of higher education
«Volgograd State Technical University»

Journal is included into the List of the Higher Examination Board of the Ministry of Educa-
tion and Science of Russian Federation for the group of scientific specialties 05.23.00 –
Building and architecture: 05.23.04, 05.23.08, 05.23.19, 05.23.21, 05.23.22

Contents

Questions of the theory of biospheric compatibility of the cities and settlements

**Gorokhov Yu. I. Living planet and biospheric civilization. Human biospheric ter-
ritories.....** 3

**Yegoryev P. O. Ecological and green construction as an integral part of chang-
ing technological patterns.....** 17

Enviromental monitoring, humanitarng balance and rationing

**Tshovrebov E.S. Complex research of resource potential of the firm municipal
and building waste as factor of increase of ecological safety of municipal unions.** 27

Biosfere technologies

**Morozov A.G. Results of practical application of coal-water slurry fuel in Ireland
and Kazakhstan for coal wastes utilization.....** 49

Problems and programs of regions development

**Skachkov E.V. Application of the method of formation of the urban environment
quality index on the territory of the historical city of Pskov.....** 57

Ecological safety of construction engineering and municipal services

**Zhuravlev P. A., Sborshikov S.B. Organizational features of the formation of
technical solutions for engineering protection of the territory at the stages of the
life cycle and their reengineering (part 1).....** 63

**Kiryatkova A.V., Kochkin A.A., Shubin I.L., Shashkova L.E. Experimental studies
of sound insulation of double enclosure constructions from laminated elements.** 73

The cities developing the person

**Zabelin A.G., Stepanenko A.A. Restructuring in residential areas and transfor-
mation of the urban space of the metropolis.....** 80

Dear authors! 90

Yu. I. GOROKHOV

LIVING PLANET AND BIOSPHERIC CIVILIZATION. HUMAN BIOSPHERIC TERRITORIES

The article discusses the concept of "Biosphere dome". The technologies and practice of recreating the Nature close to the original state on certain territories of the Earth's surface are given, and also the experience of implementing measures for recreating is analyzed. The concept includes protection from wind and water erosion, a thermos forest, a thermal storage pond, effective restoration of fertility, natural balance and a closed ecosystem, a unique microclimate. The principles of creating settlements of a new type are formulated - the settlements of the Family Homes, in which a collective of associates and like-minded people live in the reconstruction of Nature. Today biosphere planning of territories consists in the renovation of existing places of human residence: villages, townships, cities, megacities. Biosphere parks are renovated areas of environmental and man-made disasters, deserts and river recreation. The concept of "Biosphere dome" is considered as part of the structure of the universe. It is based on the principles of spatial interaction, quantum mechanics and a binder from microcosm to macrocosm. The concept "Biosphere dome" implies, first of all, natural technologies and economics, as well as harmonious social relations. Local or local economy is based on the principle of consumer cooperation. The "Biosphere dome" concept is based on organic and ergonomic architecture, which is reflected in sustainable and energy efficient housing construction. The concepts of "environmental friendliness" and "energy efficiency" of housing construction include environmental engineering support, alternative and renewable energy sources. Home ownership as part of the "Biosphere dome" implies natural innovative farming and the cultivation of organic food. All the diversity of historical, spiritual and cultural traditions is displayed in folk crafts, therefore crafts and crafts are an integral part of the concept of the "Biosphere dome", declaring adherence to the native language, deep (archetypal) cultural tradition, its images and symbols (ethnofuturism). This is the self-sufficiency and independence of the "Biosphere dome" concept. The "Biosphere dome" concept promotes a return to origins, to human values. It means the revival of culture, traditions and knowledge of ancestors and knowledge of the laws of the Universe.

Keywords: living planet, biosphere civilization, biosphere dome, family estates, biosphere planning, alternative and renewable energy sources.

P. O. YEGORYEV

ECOLOGICAL AND GREEN CONSTRUCTION AS AN INTEGRAL PART OF CHANGING TECHNOLOGICAL PATTERNS

A large number of different types of challenges that characterize our time require analysis and assessment of the causes of the latter, the search and understanding of ways to overcome these challenges, requires the formation of the correct vector of development in the field of professional activity, in particular, the development of engineering systems in construction. This paper presents the results of research on the sources and causes of the crisis we are currently observing, shows the relationship between the processes of changing the technological structure with changes in some basic engineering technologies in construction, shows the possibility of radically improving the efficiency of construction using already developed new technologies, shows the possibility of starting the practical formation of the core of a new technological structure, it is already possible to put into practice the construction of new facilities with fundamentally different operational characteristics.

Keywords: modern challenges, technological structure, stages of development of the structure, biosphere compatibility, innovative technologies, cardinal increase in efficiency, reduction of resource intensity, ecological and green construction

E.S. TSHOVREBOV

COMPLEX RESEARCH OF RESOURCE POTENTIAL OF THE FIRM MUNICIPAL AND BUILDING WASTE AS FACTOR OF INCREASE OF ECOLOGICAL SAFETY OF MUNICIPAL UNIONS

The analysis of formation of a waste and secondary resources in building and municipal complexes of municipal economy is carried out.

Research objective is formation of theoretical bases, methodical receptions of carrying out of a complex estimation of a resource component of a firm municipal and building waste, working out of methods and the algorithms realising the greatest possible involving of secondary resources, allocated of such waste in economic circulation.

In the presented research following scientifically-practical problems are realized: an all-round estimation and the analysis of structure, properties, a resource component of a firm municipal and building waste as source of formation of secondary resources; identification and classification of secondary resources from a waste of building and housing and communal services; an estimation of directions of use of a resource component of considered groups of a waste in economy branches, including, a building and municipal complex; working out of algorithm of an estimation of potential possibility, an admissibility and expediency of use of a resource component of a firm municipal and building waste with formation of the organizational-technical scheme of stages of reception from them secondary raw materials; working out of a program complex of an estimation of formation and use of secondary resources in the course of repair-building manufacture.

Conceptual approaches to creation of a translation system formed in building and a municipal services from a category of a dangerous waste - in the safe, secondary raw materials claimed in a business cycle are offered. For the first time within the limits of the system analysis of an investigated problem the research method - the SWOT-analysis is applied.

Keywords: *savings of resources, ecological safety, secondary material and power resources, building and a municipal services, gathering, processing, use of secondary raw materials.*

A.G. MOROZOV

RESULTS OF PRACTICAL APPLICATION OF COAL-WATER SLURRY FUEL IN IRELAND AND KAZAKHSTAN FOR COAL WASTES UTILIZATION

In many EU countries, there are practically no working coal mines or open-pit mines left - Europe has embarked on a course for the complete decarbonization of the energy sector by 2050. However, in a number of regions, coal waste in the form of sludge (filter cake) remained. The filter cake is a clay-like mass consisting of coal particles with a size usually less than 100 microns. Keeping filter cakes as they are causing serious damage and can become a source of lung disease and air pollution. Described practical implementation of Coal Water Slurry Fuel as a method for utilizing coal filter-cakes. Filter-cakes are converted to Coal Water Slurry Fuel and then combusted in a specially designed Vortex Burner. World-wide volume of accumulated sludge is millions of tons and its utilization by storage on the surface of the earth causes contamination of groundwater by chemical reagents that make up its composition and the atmosphere due to the weathering of fine coal particles. Utilization by combustion is considered as the most optimal method.

Energy-efficient wet milling complex is used for converting filter-cakes into a Coal-Water Slurry Fuel. Vortex Burners are used for the efficient combustion.

Keywords: *coal-water slurry, wet milling, wastes utilization, vortex burner*

E.V. SKACHKOV

APPLICATION OF THE METHOD OF FORMATION OF THE URBAN ENVIRONMENT QUALITY INDEX ON THE TERRITORY OF THE HISTORICAL CITY OF PSKOV

The development of an urban comfortable environment, improving its quality, is a topic that is paramount and relevant today for all urban and rural settlements of Russia without exception in the framework of restoring order and maintaining a balance of interests from residents to representatives of various levels of government. An analysis of publications on the formation of the Urban Environment Quality Index was carried out based on 90 cities, on the example of which they tested mechanisms for large-scale monitoring of the real situation of the state of the favorable environment in 1.117 cities of the Russian Federation. When developing the methodology for assessing the quality of the urban environment, international experience in monitoring the state of cities was taken into account. More than 150 different rankings, indices and other assessment systems were analyzed, considered in the context of the current problems of Russian cities and more than 200 indicators were identified, which can be applied in our country and analyzed for the possibility of collecting data. It has been established that at present, current regulations adopted in the era of other economies in the territories of the Soviet or post-Soviet period are subject to constant updating. The existing housing stock, amounting to 77%, did not allow making serious changes in the appearance and improvement of our cities. As a result, a building was created that does not provide comfort and safety for citizens and does not stimulate the development of small and medium-sized businesses. The presented work revealed the feasibility of the early formation of investment sites that contribute to the proposals of potential development investors in zones with the permitted use of land plots. The work provides an approximate procedure and regulations for the work of expert groups that determine promising and planning solutions to increase the comfort of the urban environment in the city district. The results of the work of expert groups on the formation of an urban environment quality index will allow taking into account and determining the size of subsidies from the federal budget to the budgets of the constituent entities of the Russian Federation to support state programs of the constituent entities of the Russian Federation and municipal programs for the formation of a modern urban environment, implemented as part of the national project "Housing and Urban Environment."

Keywords: *Housing and urban environment, Standard of integrated development of territories, assessment of Index of urban environment quality, comfort and safety, set of indicators, Town planning council, expert group on formation of Index, urban environment.*

P. A. ZHURAVLEV, S.B. SBORSHIKOV

ORGANIZATIONAL FEATURES OF THE FORMATION OF TECHNICAL SOLUTIONS FOR ENGINEERING PROTECTION OF THE TERRITORY AT THE STAGES OF THE LIFE CYCLE AND THEIR REENGINEERING (Part 1)

To create a modern comfortable urban environment, it is necessary to develop a comprehensive (spatial) organization of the territory. An important component in the complex (spatial) organization of the territory is the engineering protection of buildings, structures and territories, which ensures the implementation of infrastructure construction, organic placement of construction objects in the ecosystem while preserving its natural relationships, protection of constructed or under construction objects from natural hazards, as well as protection of the population from the risk of possible consequences of introduction into the ecosystem as a result of violation of natural processes during construction. The aim of this work is to formulate principles (the conditions) and making decisions on engineering protection of territory and objects of construction, providing long-term and safe operation, the possibility of realization of reengineering in the spatial organization (development) of the area. Reviewed the legislation on town-planning activity according to which establishes the principle effective use of the territory, taking the form of activities for the preparation and approval of documentation for planning the territory for placing of objects of capital construction, engineering, infrastructure and architectural design, construction, reconstruction of these objects. The structure of measures and structures for engineering protection of territories of buildings and structures at the stage of territorial planning and territory planning, architectural and construction design, as well as preparation of the construction site is defined. The principles (conditions) and requirements for the design of engineering protection of the territory and construction objects are formulated, the implementation of which allows for the implementation of reengineering in the spatial organization (development) of the territory. The necessity of an integrated approach to the engineering protection device at each stage of planning, design and development of the territory, which is based on a variable study of design solutions, design optimization, assessment of prevented damage, justification of investments and preliminary calculation of the enlarged estimated cost, is noted.

Keywords: reengineering; territorial planning and territory planning, architectural and construction design, engineering protection of territories and buildings

A.V. KIRYATKOVA, A.A. KOCHKIN, I.L. SHUBIN, L.E. SHASHKOVA

EXPERIMENTAL STUDIES OF SOUND INSULATION OF DOUBLE ENCLOSURE CONSTRUCTIONS FROM LAMINATED ELEMENTS

The results of experimental studies of sound insulation of double walling using layered elements are presented. It is shown that to improve the sound insulation of double fencing, layered elements consisting of sheets glued together with vibration-absorbing mastic can be used. The performed analysis indicates significant reserves for improving the sound insulation of double fencing due to the rational use of vibration-absorbing and sound-absorbing materials. An increase in the sound insulation of double walling from layered elements is shown depending on the size of the gap without filling and with filling it with sound-absorbing material.

Keywords: sound insulation, vibration absorption, sound absorption.

A.G. ZABELIN, A.A. STEPANENKO

RESTRUCTURING IN RESIDENTIAL AREAS AND TRANSFORMATION OF THE URBAN SPACE OF THE METROPOLIS

The article considers the developed model of the closed-cycle economy, which, along with economic parameters, takes into account pollution and consumption of building materials suitable for recycling. The model reflects the idea that the economic growth of a society alone cannot maintain or improve the existing quality of the environment, and for this it is necessary to increase the recycling rate. The purpose of the study is to reveal the factors influencing the increase in the level of recycling when introducing efficient and environmentally friendly systems for managing construction waste in megacities. The results of the study will affect the improvement of the quality and standards of life of the city population, the creation of favorable conditions for a safe, healthy and the prosperous life of people while ensuring the economic growth of the city. The process of the managing the growing volume of construction waste is reflected, recycling is emphasized.

Keywords: construction waste management, circular economy.