



# BIOSPHERE COMPATIBILITY: HUMAN, REGION, TECHNOLOGIES

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Journal is included into the List of the Higher Examination Board of the Ministry of Education 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

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The edition address: 305040, Kursk,  
str. 50 let Ocyabrya, 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 communications

The certificate of registration: III № ФС77-56639

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E.V. KHOLODOVA

## **GARDEN ARRANGEMENT IN COUNTRY HOUSES OF KURSK REGION**

### **Part 1. THE FARMSTEAD LANDSCAPE. The EMERGENCE of GARDENS and PARKS IN THE FIRST HALF OF THE XVII - XVIII CENTURIES**

The study is based on the identified archival and published sources, field research of the author, which enable to reconstruct a more reasonably shaped, the material structure is lost in the nobility and merchant estates in the area of origin of horticulture and the natural border of Russia. The basis of the study is the study of topography and physical and geographical types of terrain characteristic of the Kursk region.

The scientific novelty of the research is associated with the author's expeditions to identify signs of the existence of manor objects – landscapes and parks, full-scale survey of a number of preserved manor complexes, which did not attract the attention of researchers to a sufficient extent.. Of particular importance is the identification of archival and printed sources that allow more reasonably reconstruct the figurative and material structure of the lost elements of noble and merchant estates.

The contribution to modern knowledge is systematic information about different types of management, their impact on the spatial structure of the estate and its natural environment, as well as about the features of garden and Park techniques that existed in the studied period of the history of the Kursk region.

**Key words:** Kursk region (province), landscape, topography, estates, nature, gardens, parks, ponds, rivers, planning.

T.V. KOPTEVA

## **ARCHITECTURE OF THE FRENCH ENLIGHTENMENT ON A SEARCH OF NATURE**

*J.-J. Rousseau is widely considered to be the greatest influence on the naturalistic theories of architecture at the age of Enlightenment. His own views on architecture, however, were rather negative as he considered it to be the opposite of nature in many ways. In his worldview the fall of society did not just coincide with the development of architecture, but was caused by it. The first temple, a symbol of purest architecture to so many, was to Rousseau a dangerous step towards the societal decline, as it showed that the first man decided to separate the gods from his everyday life and limit them to a special enclosure. In his view, the man later begrudged the beauty of these spaces, and took the temple for himself, thus building the first palace. Even the primitive hut was not at all pure in Rousseau's eyes: it created the first family, which was good, but it also allowed men to have some leisure time, an opportunity to get lazy. To Rousseau the only right architectural order was not the order of ancient Romans or Greeks, but the order consisting of stalactites and stalagmites that one can find in a natural grotto.*

*The society of the Enlightenment could not accept this radical position against the architecture. Even Rousseau's most loyal acolytes, like marquis René Louis de Girardin, didn't follow through. De Girardin replicated on his land the most famous literary garden from Rousseau's books, Julie's garden from «La Nouvelle Héloïse», but unlike its book prototype this garden was filled with architecture. And not just purely functional architecture, we are talking symbolic temples, pillars and altars.*

*Curiously, the rejection of architecture by Rousseau gave the architects and architectural thinkers the freedom from having to build their works on one single truth. Thanks to that, each of them could develop their own ideas about the relations between the nature and architecture.*

**Keywords:** architecture of the French Enlightenment, Ermenonville, Jean-Marie Morel, Charles Batteux

N.A. SAPRYKINA

## **THE PARADIGM OF THE ECOLOGICAL BALANCE WITHIN OF INNOVATIVE CONCEPTS FORMATION SPACE HABITATS**

*The article is devoted to consideration of promising concepts formation of eco-space and the development of sustainable approaches to creating architectural objects with the use of innovative high-tech tools. Identified approaches to building bio-tectonics systems based on renewable energy and photosynthetic cities. Considered concepts: organic farming as the rehabilitation of city space, the formation of autonomous energy efficient facilities as a new paradigm for survival, as well as the concept of sustainable urban metabolism in the context of the formation of mega-cities as environmental reurbanization. Contains examples of the embodiment of the concepts discussed.*

**Keywords:** *eco-space saving concept, photosynthetic town, organic farming, autonomous energy objects recycled materials, environmental reurbanization.*

A.I. ANTONOV, I.V. MATVEEVA, N.V. MERKUSHEVA, M.A. POROZHENKO

## **CONSTRUCTION AND USE OF NOISE CARDS IN DEVELOPING SOUND PROTECTION ACTIVITIES IN INDUSTRIAL SPACES WITH INCONSTANT WORKPLACES**

*Evaluation of the noise regime of non-permanent jobs and the development of noise reduction facilities for such places require a large volume of calculations of sound pressure levels on the workers' movement routes during the shift. The article shows the expediency of using noise maps of premises for this purpose. To calculate the sound pressure levels and build noise maps, it is proposed to use the numerical statistical method and the computer programs implementing it. An example is given of estimating the noise regime of a non-permanent work station and the development of a noise reduction tool that reduces the noise level to regulatory requirements.*

**Keywords:** *noise mode; non-permanent jobs; noise calculations; noise maps; industrial premises.*

A.O. SUBBOTKIN

## **TO THE ISSUE OF OBJECTIVE EVALUATION OF ACTUAL BACKGROUND NOISE OF THE PUBLIC ON OPTIMIZATION OF REGULATORY NOISE REQUIREMENTS IN HALLS**

*In the acoustic design of Halls, the calculation of the optimal sound absorption. Fund  $A_{opt}$  is made for the reasons of achieving the volume. Optima of the standard reverberation time  $RT_{60}$ . However, the sound absorption Fund  $A$  also determines the level of the noise regime in the hall, adjusting the reverberation component, first of all, the noise of the public. Normative document SP 51.13330.2011 [1] establishes the maximum permissible equivalent sound levels for the hall spaces of different functional purposes in the range  $LA_{eq}=30...35$  dBA. Such "strict" requirements can be fulfilled only in the absence of the public and are not applicable to the actual operating conditions of the halls. It should be noted that a significant difference in the noise environment of empty rooms and in the real conditions of their operation was drawn to the attention of acoustic specialists for a long time, however, until now there is relatively little information about this "plug", due to the complexity of experiments of this kind in the conditions of filling the halls by the public.*

*This paper proposes a method for analyzing the noise regime in filled auditoriums in acoustic design and raises the question of the validity of the stringent requirements for the permissible noise background in the halls of different purposes, presented in [1]. To estimate the expected noise regime in the hall rooms it seems correct to use the method of acoustic calculations [2], developed by the authors of this paper to estimate the required sound absorption Fund in noisy rooms. The developed method of calculation [2] and the analysis carried out in this article can be used not only to estimate the expected noise level in the real operating conditions of the halls, but also to act as an additional criterion for choosing the optimal time of standard reverberation in the halls for various purposes.*

**Key words:** architectural acoustics, acoustics of halls, normative noise requirements

T.I. STEPANENKO

## **IMPROVEMENT OF THE SCHEME OF THE TECHNOLOGICAL PROCESS OF WATER PREPARATION TO REDUCE THE RISK INDICATORS OF HUMAN HEALTH HAZARD**

*Currently, there is an acute problem of pollution of surface water bodies. At the same time, the existing sewage treatment plants, their technologies for purifying drinking water do not meet the requirements of the level of safety indicators.*

*The influence of a number of factors on the residual content of aluminum compounds in purified drinking water has been studied. It has been established that such indicators as: pH value, initial concentration of coagulant, concentration of suspended substances, hydrodynamic mode of operation of the cleaning equipment affect the residual concentration of aluminum. The advanced scheme of the water preparation process, which will allow to reduce the residual content of aluminum, is offered. The magnitude of the risk to human health when consuming water containing aluminum compounds for 5-70 years is calculated.*

**Keywords:** drinking water; aluminum; coagulation; hydrolysis; pH.

B.I. SHILIN, A.A. ULIANOV

## **STUDY OF THE EFFECT OF THE STRUCTURAL CHARACTERISTICS OF FILTER MATERIALS ON THE EFFICIENCY OF TREATMENT OF INDUSTRIAL AND SEWAGE AND THEIR LIFESPAN IN TERMS OF THE ENERGY SYSTEMS OF URBAN SETTLEMENTS**

*The article presents the results of an active experiment to study the effect of the structural characteristics of fibrous filter materials on the efficiency and service life, for which the bulk filter materials were chosen, the values of their structural characteristics were determined, the distribution functions by the size of their diameters were calculated according to the model developed by the authors.*

*To determine the law of filtration of the experimental dependences of the fractional drop-out coefficient on the hydraulic bench, the filtration of engine oil was carried out, in which an artificial quartz pollutant was introduced.*

*Processing of the obtained data showed that oil filtration by volumetric filters is carried out according to the law with gradual clogging of pores. This is confirmed by the obtained straight lines constructed by the least squares method with the highest correlation coefficient of 0.997-0.998.*

*The analysis of graphs constructed on the basis of averaging the intermediate and final results of the four experiments at three times the duplication of every experiment, and their appearance confirms that filtering of the oil volume materials is the "standard" law. To check the adequacy between the obtained mathematical dependences and experimental laws, a computational experiment was carried out using random tests. The results of the calculated data on the filtering kinetics were also processed by the least squares method and are also well approximated by a straight line in the  $t - t/V$  coordinates with a correlation coefficient of 0.997 and has discrepancies with the experimental lines of no more than 20%, which allowed us to consider the obtained dependences adequate to the real process and to use the data of the computational experiment to analyze the filtering kinetics by volume filters.*

*Based on the experiment and analysis of the data obtained, it is concluded that for effective cleaning with good hydraulic characteristics and a long service life it is necessary to have a filter material with a changing average pore size in its thickness along the course of the suspension from larger to smaller.*

**Key words:** active experiment; filter material; fractional drop-out coefficient; pore structure; filtration kinetics

N.V. BAKAEVA, O.V. PILIPENKO, K.V. GARMONOV

## **PRACTICAL RECOMMENDATIONS FOR IMPROVING ENVIRONMENTAL SAFETY FILLING STATIONS WITHIN THE CITY LIMITS**

*The location of gas stations in the city, as a rule, is disordered. In connection with the current development of the city, the location of the gas station is a point construction on vacant sites, which leads to a violation of the norms and leads to a deterioration of the environmental condition in the territory of the nearby development. The authors, on the basis of the previously obtained results of theoretical and experimental studies, as well as numerical modeling, systematized factors affecting the environmental safety of gas stations in the city, which allow to characterize the degree of influence of existing or newly built gas stations on the environment. On the basis of the system of the identified set of factors algorithm is proposed for the comprehensive assessment of environmental safety of the gas station. Practical recommendations have been developed to reduce the negative impact of existing gas stations on the nearest construction.*

**Keywords:** ecological safety of the urban economy, autosa-gasoline filling station, residential development, the concentration of harmful substances, the spread of gasoline vapors.

E.V. LEVIN, A.Yu. OKUNEV

## **APPLICATION OF THE MEMBRANE METHOD OF AIR SEPARATION IN THE COMPLEX SOLUTION OF PROBLEMS OF INCREASING THE ECOLOGICAL AND OPERATIONAL SAFETY OF RESIDENTIAL AND PUBLIC BUILDINGS**

*The direction of research considered in the article refers to the integrated use of membrane gas separation systems to improve the environmental and operational safety of residential and public buildings. Gas separation systems for the simultaneous production of air enriched with oxygen and an inert gas based on nitrogen are considered. Generalized data are obtained that establish a relationship between the parameters of the produced gas media and the characteristics of membrane gas separation systems. The criteria allowing to estimate the comparative costs when using membrane air separation are given. Based on the results of calculations, an analysis of the main characteristics of membrane gas separation was carried out. The studies were performed for two membranes with different permeability and selectivity for oxygen and nitrogen. Recommendations are formulated on the practical use of the results obtained in the design of membrane gas separation systems.*

**Keywords:** *membrane gas separation, air separation, ecological safety, operational safety, oxygen, nitrogen*

E. V. GORBENKOVA, E. V. SHCHERBINA

## **MODERN APPROACHES OF URBAN DEVELOPMENT DESIGN OF RURAL SETTLEMENTS AND SMALL CITIES**

*Currently there is a process of revision of municipality's status and borders in Russia, as a result rural settlements became part of urban districts. At the same time, urban planning projects assessment is based on technical and economic indexes that contains quantitative data on urban planning project segments by comparison with standard indicators of urban planning documents. In fact, that does not reflect the rural settlements development level for the base period and future. In the context of the settlement system transformation, the rural areas development is on critical level. The research relevance is the need of developing methods and tools for ensuring the development of territorial and urban planning systems. The research purpose was the development and approbation the integrated evaluation method for rural development on the example of rural settlement Ostashevskoe (Volokolamsky district, Moscow region). The authors developed the criteria system for rural settlements development assessing, including qualitative and quantitative indicators characterizing the main development directions. The basis was the author's «Pentagon model» of a rural settlements development. The model includes five components: environmental, economic, administrative, anthropogenic and social. The methodology provides the possibility of determining the rural settlements development level in general and in the main directions. As a result, the development indices were obtained: for the resident population  $I_r=74,16$ , and taking into account the seasonal population, ceteris paribus,  $I_r=52,9$ . Research results show the lack of social, engineering and transport infrastructure, administrative and economic components. That indicates the need to adjust the technical and economic indicators of rural settlements master plans.*

**Key words:** *rural settlement, sustainable development, settlement system, Pentagon model, rural settlement development index, integrated evaluation.*