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V.A. ILYICHEV, V.I. KOLCHUNOV, V.A. GORDON, N.V. BAKAEVA, A.A. KORMINA

THE MODEL OF DEMOGRAPHIC GROWTH OF THE REGION'S POPULATION

The method of modeling the relationships between the population and the characteristics of the environment is considered. The mathematical model is based on the Bernoulli differential equation and reflects the interaction of subsystems in the form of population size and atmospheric pollution parameters in urbanized territories. Using the example of a single region, quantitative results of population forecasting are obtained by establishing statistical dependencies between the factors of population growth and air emissions. The procedure of the proposed simulation modeling allows us to assess the demographic situation as the main indicator of the development of the region, depending on environmental factors. The obtained results prove the causal relationship of demographic indicators with environmental factors, which, as it was proved in this study, lead to the negative dynamics of the latter.

The research was carried out at the expense of the state program of the Russian Federation "Scientific and Technological development of the Russian Federation" for the planning period 2021-2022 within the framework of the Plan of Fundamental scientific research of the Ministry of Construction of the Russian Federation and the RAASN for 2021. Topic 3.2.1.1

Keywords: *biosphere-compatible city, demography, population growth, environmental factors, modeling, statistical dependencies, forecasting, nonlinear system*

A.V. ANISIMOV

MODERN ARCHITECTURE OF THEATER. FEATURES OF ITS DEVELOPMENT AT THE 20/21 CENTURIES BORDER

The article provides a brief overview of the development of theatrical architecture from the classical image with order porticoes to the fantastic forms of the last decades. The author considers the Sydney Opera to be one of the main objects that destroyed the classical image of the theater and began a new search for original solutions. The Paris Opéra Bastille adopted a new stage technology and sophisticated planning that many new buildings have emulated, and the Lincoln Center has identified new urban planning possibilities for several performing arts buildings. Opera Bastille radically changed the ratio of the spectator and stage area. At the same time, it introduced into the everyday life of designers movable stage boards of the main stage, pockets and rear scenes. Examples of further changes in the appearance of the theater in the works of great masters from Van de Velde to Sanyago Calatrava and Paul Andre, Zaha Hadid and other authors of Chinese opera houses of unprecedented composition are given. Along with world history, examples of the search for a new image of the theater in the theater architecture of Russia in the 1920s and 1970s are also noted. The article ends with the statement that there is not only the architecture of the theater, but also the theater of architecture, which objectively complicates the relationship between the projecting creator and the creator-producer, that is, the director and theatrical artist.

Keywords: *theater, architecture, technology, planning, spectator, visual part, backstage part, stage.*

K. K. COLIN

BIOSPHERE AND THE CITY: HUMANITARIAN ASPECTS OF THE COMPLEX PROBLEM OF RUSSIA'S DEVELOPMENT

A systematic analysis of the humanitarian and technological aspects of modern problems of Russia's development is carried out. It is shown that the main goal of this development should be the preservation and development of the human potential of the country, which is the most important component of its national wealth. To solve this problem, it is necessary to develop and use such a strategy of urban planning that will ensure the biosphere compatibility of man and nature. A necessary condition for this is the noospheric orientation of the consciousness of the person himself, which, in turn, is determined by the conditions of his living in an urban environment.

The national goals of Russia and the problems of human development are considered. The quality of life is investigated as a factor of national security. The UN system of indicators for assessing the quality of life is presented. The methodology for assessing the quality of life in the regions of Russia, the strategy of spatial development and the urban planning doctrine of Russia are presented. Broadband Internet access is being investigated as a critical technology.

Keywords: *global threats, national goals of Russia, National doctrine of urban planning, breakthrough technologies.*

YU. V. SIDELNIKOV

APRIL THESES IN THE ECOLOGY

The article highlights and presents creative expert methods, which can be useful to non-specialists for solving ecological problems, and also separate provisions on ecological subjects are worked out as theses for discussion with ecologists. It is shown that not being a specialist in ecology and with the help of various types of brainstorming and test question methods it is possible, although not to solve ecological problems, but to create qualitatively different approaches to their solution, as well as new effective settings of ecological targets and (or) their adjustment. At the same time, we proceed from the author's materials, which make desirable the participation of non-relevant task profile specialists at the step of idea production, within the framework of any of the brainstorm varieties, when solving third level complexity problems. In this case, not ecologists. Furthermore, the article proposes a new specialized test question method variation, which allows, with the help of those guiding questions to ecologists, to suggest them a new idea or solution of a complex ecological problem. For the same purpose, thirteen provisions, that we would like to discuss with ecologists, and which are derived from the guiding test questions presented, are examined as theses. At the same time, the answer and the explanation of the answer to such questions are presented briefly and in expressive figurative form. Believing that this is necessary, that those provisions in the future would be as if in the "random access memory" of those professionals who create and (or) propose new ways of solving environmental problems.

Keywords: *the brainstorms; the effective settings of ecological targets; the guiding questions to ecologists*

V.E. RUMYANTSEVA

ON THE PROBLEM OF AMMONIA EMISSION FROM REINFORCED CONCRETE STRUCTURES OF RESIDENTIAL BUILDINGS

The harmful effects of ammonia on the human body include damage to the respiratory tract, the mucous membranes of the eyes, nose and mouth, and the skin. Prolonged exposure to ammonia vapors causes convulsions, dizziness, suffocation, loss of consciousness, circulatory disorders, and muscle weakness. For adults, the potentially dangerous dose of ammonia is higher than for children. "Ammonia houses" were found among new buildings in St. Petersburg, Moscow, Nizhny Novgorod, as well as in China, Japan, Finland and other countries. The article reviews the reasons for the release of ammonia from concrete and reinforced concrete products and structures. The main sources of ammonia are various chemical additives introduced into concrete to improve the properties, which include urea and ammoniated fly ash. Although the requirements do not limit the ammonium content, using such material as an additive for cement composites causes the emission of gaseous ammonium during mixing and from the final product. In general, it takes more than 10 years to completely remove ammonia from a concrete wall containing urea-based antifreeze. Methods for determining the content of ammonia in concrete and indoor air are listed. Ammonia detection is facilitated using filter packs and fabric denuders (a gas separator). An overview of ways to accelerate and prevent the release of ammonia from concrete is given. The most common method of reducing the concentration of ammonia in the indoor air is ventilation. A high rate of air exchange leads to a decrease in the concentration of ammonia, and an increase in temperature causes an increase in the concentration of ammonia and its volatilization rate.

Keywords: ammonia emission, ammonia houses, ammonia poisoning, indoor ammonia, ammonia monitoring, ammonia elimination.

E.S. TSHOVREBOV

CONCEPTUAL MODEL OF ENVIRONMENTALLY SAFE WASTE MANAGEMENT OF THE MUNICIPAL LIFE SUPPORT COMPLEX

A study aimed at the formation and development of a resource – saving mechanism for the life support of settlements in one of the most environmentally dangerous and insufficiently regulated areas of urban economy – the management of production and consumption waste.

The aim of the study is to form the theoretical foundations for the development of the system of environmentally safe life support of municipalities associated with waste management.

The following scientific and practical tasks are implemented in the study:

- a conceptual model of environmentally safe waste management of the municipal life support complex is proposed based on the principles of resource conservation, zeroing the life cycle of hazardous waste, and maximizing the involvement of their resource potential in economic turnover;

- conceptual approaches to the creation of a system for assessing environmentally safe waste management based on the consolidation of resource-saving and environmental indicators of the functioning of the urban life support complex of the urban economy were formed.

Keywords: environmental safety, resource conservation, production and consumption waste, anthropogenic impact, secondary resources, environmental regulation, construction and urban.

A.G. MOROZOV

VORTEX TECHNOLOGIES FOR BURNING NON-STANDARD FUELS

Article describes different applications of vortex (swirl) combustion technologies for burning non-standard types of fuel like pellets, saw dust and RDF, most of which are renewables, for generating thermal energy, primarily for industrial needs.

Described vortex combustion technology is already in use in Ireland, Spain and the Russian Federation. Pellets, sawdust, sorted solid household waste and others are used as fuel.

Keywords: *vortex burner, wastes utilization, RDF*

K.G. PUGIN

USE OF WASTE MOLDED SAND IN ASPHALT CONCRETE

The increase in traffic flow and loads from vehicles creates the need to use asphalt concrete with higher physical, mechanical and operational characteristics for the construction of highways. To reduce the cost of asphalt concrete and achieve high values of physical and mechanical indicators, it is possible to use industrial waste. Waste foundry sand was considered as such an industrial waste. It has a constant granulometric and chemical composition, the volume of education is sufficient to use it as a raw material for the production of building materials.

During the research, the general laws of physical and chemical mechanics were used, as well as scientific developments of foreign and domestic scientists in the field of designing asphalt concrete mixtures. To process the obtained experimental data, mathematical modeling was used using well-known mathematical programs, methods of mathematical statistics. When studying the physical and mechanical properties of the spent molding sand and the obtained asphalt concrete samples, we used standard measuring instruments and methods established by the state standards of Russia.

For laboratory samples of asphalt concrete, mineral materials with different specific surface areas were used, these are natural sand, quartz sand, and waste molding sand. It has been established that a well-developed, rough surface of mineral aggregate particles in asphalt concrete can act as an effective modifier of the structure of asphalt concrete and form conditions for achieving the specified physical and mechanical characteristics. The use of industrial waste in asphalt concrete production technologies makes it possible to simultaneously solve environmental problems arising at enterprises. Development of waste disposal technologies, scientific substantiation of the proposed solutions, allows to reduce the consumption of natural raw materials and to use the material resource of industrial waste with greater efficiency.

Keywords: *asphalt concrete, used molding sand, industrial waste, resource potential, waste disposal technology, structure formation of asphalt concrete.*

T. O. SARVUT

SOCIAL ADAPTATION OF PEDESTRIAN BRIDGES ON THE EXAMPLE OF METRO-MCC

The article touches upon the issue of the architectural, planning and social organization of areas of territories in the areas of transitions of metro stations and the Moscow Central Circle. The stopping points of the MCC turned out to be in the former industrial zones, alienated from vigorous activity, by inconvenient approaches to public transport. The improvement of the Moscow territories has highlighted the problem of uncomfortable movement and being in areas with low security and lack of social control. The study shows the need to revise the approach to their organization on the example of modern trends in the development of such public spaces.

Depending on the saturation of user activity, social behavior, the ratio of distance and type of placement on the ground, the characteristics of the sites are analyzed. On the basis of the included observation, problem areas were identified and the possibilities of their reconstruction and the introduction of pedestrian overpasses of various nature were considered. To increase socialization, it is recommended to combine architectural planning and cognitive techniques. When designing zones with various degrees of user presence, it is proposed to diversify activities, increase social activity, and involve consumers in social processes. To increase socialization, it is recommended to combine architectural planning and cognitive techniques. When designing zones with various degrees of user presence, it is proposed to diversify activities, increase social activity, and involve consumers in social processes. The study shows the need for socialization of public spaces near the metro transport hubs - MCC due to the expansion of housing construction next to them.

Keywords: *Moscow Central Circle, transit transport hubs, social behavior, socialization, public space.*

S.B. SBORSHIKOV, P. A. ZHURAVLEV

INFLUENCE OF SOCIAL AND TERRITORIAL CONVERGENCE ON THE PROCESSES OF TRANSFORMATION OF THE LIFE ENVIRONMENT

The article is devoted to the influence of social and territorial convergence, expressed in the formation of a comfortable and safe living environment, on investment and construction activities. Analyzing the territories and their buildings as objects of management, their interrelated totality is noted, which forms a spatial integration, and has a rather complex and dynamic structure and composition. It is shown that a separate type of spatial integration can be considered the transformation of localities caused by the emerging demands of consumers in improving the comfort and safety of the living environment, and the response to them will be legislative and regulatory-technical regulation in the framework of urban planning and territorial planning. The assessment of territorial convergence, which is the alignment of the level of development of the same name and adjacent zones of one locality, as well as similar territories of different settlements, is given. Changes in the parameters and characteristics of the land plot caused by territorial convergence are established. It is noted that such transformations can be carried out separately in relation to the territory (land plot), development, or in a complex to both of these relevant parts of the urban planning solution, which in turn focuses either on transformation, modernization or radical rethinking and redesign, or on the implementation of new technical solutions in relation to territories and development.

Keywords: *post-industrial society, change of technological structure, social convergence, territorial convergence, investment and construction activities, urban planning solutions, integrated development of territories and buildings, reengineering of territories, reengineering of buildings, reengineering of urban planning solutions, reengineering in construction*

A.V. POPOV, O.I. SYROVA

ISSUES OF THE TYPOLOGY OF OPEN PUBLIC SPACES OF UNIVERSITY CAMPUSES

The purpose of this study is to develop the typology of open public spaces on the campuses of higher educational institutions. The main attention is paid to the features of open public spaces of university campuses, depending on the compositional solution and functional purpose. In general, depending on the functional purpose, three types of open public spaces of university campuses are defined and analyzed: universal, which serve to form an entrance space to the campus and promote its connection with the city, recreational, which serve to create a comfortable atmosphere on the campus and recreation of students and employees, and communication, which provide the shortest connections between objects and promote their unification. Depending on the compositional solution, three types of open public spaces of university campuses are identified and analyzed: the central courtyard / park, around which the university facilities are located, a dispersed park, in which the university facilities are freely located, the "green" axis of the complex, along which the university facilities are located. The history of the emergence and formation of universities is also traced, changes in the organization of their complexes in different historical periods are analyzed. The main attention is paid to the peculiarities of the organization of complexes of medieval secular universities, universities in modern times, universities in modern times. The object of the study is the open public spaces of university campuses (complexes). The subject of the study is the features of the functional purpose and compositional solution of open public spaces of university campuses (complexes). The results of the study can be used both in the creation of new university campuses and in the reconstruction of existing university complexes.

Keywords: *university, campus, public spaces, typology of public spaces, compositional solution, functional purpose, historical types of universities.*