

BUILDING CONSTRUCTION, BUILDINGS AND STRUCTURES

ESTIMATION OF THE REMAINING SERVICE LIFE OF A POLAR CRANE CIRCULAR CONSOLE USING THE LIMIT STATE METHOD

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Annotation. The article considers an example of the design justification and prediction of the residual service life of the bearing reinforced concrete console of the polar crane of the reactor compartment 5 of the power unit of the Novovoronezh NUCLEAR PLANT, performed by the author in 2011 as part of the study of the technical condition of the bearing building structures and the substantiation of the residual life of buildings and structures of the 5th power unit of Novovoronezh NUCLEAR PLANT. The work used techniques based on the parametric approach to forecasting and the «load-bearing capacity» forecasting method. The «load-bearing capacity» method is based on the design provisions for the design of load-bearing reinforced concrete structures set out in the regulatory and technical literature. At the same time, for the calculated prediction of the residual service life of the bearing reinforced concrete console, intermediate forecasting data using parametric methods are used, on the basis of which the key control parameters of the structural parts are determined, in particular, the strength properties of concrete and the area of the design section of steel reinforcement, as well as the patterns of their change in time. In the process of performing the design prediction, the calculations of structures were used for the main design sections and acting loads: strength according to the ultimate moment of the section on the support; section strength along an inclined strip between inclined cracks; the strength of the section along an inclined crack for the action of the maximum design shear force. The technique described in the work and an example of its use made it possible to carry out a calculation justification of the residual life of the reinforced concrete bearing console of the polar crane of the reactor compartment 5 of the power unit of the Novovoronezh NUCLEAR PLANT and, accordingly, to extend the service life of the investigated structure.

Keywords: reinforced concrete console; calculated forecasting; justification of the residual service life; parametric method; load-bearing capacity method.

REDUCING THE ENERGY CONSUMPTION OF A BUILDING USING A DOUBLE-SKIN FACADE

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Annotation. The number of high-rise buildings with enclosing structures made of glass is growing rapidly every year. High transparency of buildings is becoming one of the reasons of high-energy consumption. The problem of energy saving in glass structures is becoming more and more urgent. The innovative double-skin

glass facade system has proven to be energy efficient in European countries. In the future, this design will significantly reduce the energy load of the building. There are many data obtained from experiments that need to ranking. The article provides a systematization of reducing energy loads when using this system of constructive energy saving, depending on the type of climate. The paper also presents the dependence of changes in energy loads on the width of the inter-contour space (0,2 m, 0,5 m, 1 m, 2 m) and on the height of the building (8 m, 168 m, 340 m).

Keywords: double-skin facade; translucent structure; enclosing structure; facade system; air gap; energy consumption; climate conditions.

ANALYSIS OF THE SUITABILITY OF MULTI-APARTMENT HOUSES OF MASS SERIES FOR TRAVELERS WITH LIMITED MOBILITY

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Annotation. Currently, a significant share of the housing stock in our country is represented by multi-apartment buildings which are built more than 30 years ago and which do not meet modern requirements for ensuring accessibility for low-mobility groups of the population. To identify existing inconsistencies, an analysis of twenty series of standard projects of residential buildings was carried out. Entrance groups, parameters of sanitary and hygienic units, planning solutions of apartments are analyzed. Quantitative indicators describing the condition of the buildings under study were obtained. The analysis of the applicability of existing design solutions for the adaptation and reconstruction of existing buildings in order to identify the possibility of improving their comfort for people with disabilities was carried out. A 100-point scale has been developed to assess the fitness of public areas for comfortable movement of low-mobility groups of the population. It is proposed to assign classes to public premises that characterize the degree of their fitness for the considered category of residents.

Keywords: people with limited mobility; a barrier-free environment; a residential building; entrance group; reconstruction of the buildings.

ANALYSIS OF THERMAL CONDUCTIVITY OF OUTER WALLS MADE OF AUTOCLAVED AERATED CONCRETE BLOCKS UNDER OPERATING CONDITIONS

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Annotation. Based on the results of tests of a fragment of wall masonry from autoclaved aerated concrete (AAC) blocks in the climatic chamber, it was established that National Standard GOST 31359-2007 data on the thermal conductivity of cellular concrete are not applicable for assessing the thermal state of walls under operational conditions. The discrepancy between the normalized and actual values of the thermal conductivity of materials and products used in the construction of external

enclosing structures leads to an increase in transmission heat losses through the walls and an overspeed of thermal energy for heating. In this regard, a revision of the manufacturer's declared values, as well as the standards on the basis of which the products are produced, is required.

Keywords: thermal conductivity; equilibrium humidity; autoclave aerated concrete (AAC); outer wall; climatic chamber; laboratory analysis; operating conditions; energy saving.

ENGINEERING SYSTEMS AND COMMUNICATIONS

INNOVATIVE TECHNOLOGICAL COMPLEX WASTE CLEANING ON PRINCIPLES NATURAL FACTORS

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Annotation. The study of nature-like technologies for disinfecting substrates, which make it possible to increase the efficiency of production through the complexity of using innovations, are aimed at solving the tasks set by combining the device for generating electro-hydrodynamic effects of different stages of the technological cycle into a single system of the complex. An integrated approach is proposed, based on the requirements of versatility, the capabilities of the complex to carry out the treatment of water in a flow-through mode for all its characteristics, to obtain a purified substance that meets the requirements of SanPiN, regardless of the initial characteristics and properties of substrates.

Keywords: disinfection; complexity; versatility; environmental friendliness; efficiency; cleaning.

CLARIFICATION OF THE DESIGN VALUES OF THE AVERAGE ANNUAL WATER TEMPERATURES IN THE HEATING NETWORK

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Annotation. In engineering practice, it is often necessary to use the recommended values of the average annual temperatures for the supply and return lines of the heating network. In the set of rules for the design of heating networks, similar values for the supply line are indicated depending on the design values of the temperature schedules of quality control. The average annual values of the coolant temperature are calculated as weighted averages by the monthly average values of the coolant temperature in the pipeline, which in turn are determined from the temperature schedule in accordance with the monthly average values of the outside air temperature. Such calculations take time and are often neglected and used by the recommended codes of practice. The article presents the results of calculations of the average annual temperature of the coolant for the supply line of the thermal water

network using the temperature graphs of the central quality control 95/70 – 150/70 in the climatological conditions of the city of Voronezh. The contradictions in modern standards for the recommended values of the average annual temperatures of the coolant used in the calculation of thermal insulation and the standard values of heat losses during the transportation of the coolant to the consumer are revealed. Discrepancies between the recommended and calculated values are found.

Keywords: heating network; temperature graph; average annual temperature of the coolant; energy saving; heat losses.

CITY. RECONSTRUCTION, RESTORATION AND LANDSCAPING

INFLUENCE OF EPIDEMIOLOGICAL FACTOR ON URBAN PLANNING DEVELOPMENT OF BIG CITIES

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Annotation. The urban planning aspect of countering epidemics is considered. Within the framework of a brief historical background it is shown, that there is an obvious similarity in the problems faced by all major cities in the world. It is proposed to use the «tree of problems» to build a typology of the main tasks at various levels: scientific research; space-planning and design solutions for buildings and structures; town planning reconstruction and improvement of buildings. The irrelevance of urgent anti-epidemic measures and large-scale decisions to transform the «rusty belts» of cities and coastal areas is noted. It is emphasized that the solution of design tasks for a balanced reconstruction or renovation of these urban areas should be preceded by a cadastral assessment and analysis of their development potential in relation to the existing urban planning situation.

Keywords: epidemic; urban planning countermeasures; typology of tasks.

ECOLOGY AND SAFETY OF THE URBAN ENVIRONMENT

MODERN PROBLEMS OF INTEGRATED ECOLOGICAL ASSESSMENT OF TERRITORIES FOR URBAN PLANNING

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Annotation. The article discusses the various ways of the negative impact of the city on the environment and humans. The necessity of urban planning, which would take into account the overall influence of all possible negative factors, is determined. The analysis of various factors, including those difficult to take into account, which are often not recorded in generally accepted studies, but have an adverse effect on the environment. The need for an integrated approach to assessing the state of the urban environment, taking into account the comprehensive impact with the help of specialists from various applied fields of knowledge – architects,

ecologists, managers of housing stock and industrial facilities, etc., has been proved. safety and optimization of environmental management in the system of urban cadastral, as well as obtained unique materials necessary to create a GIS of the urban environment.

Keywords: integrated environmental assessment; urban planning; monitoring; urban environment; remote sensing.

ASSESSMENT OF THE QUALITATIVE COMPOSITION OF THE LIVING FENCES OF THE CITY OF YOSHKAR-OLA

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Annotation. The role of hedges in the formation of the ecological frame of the urbanized environment, its planning structure and expressive aesthetic appearance is outlined. The importance of a professional approach to the formation of hedges as an important element of the urban landscape is emphasized. The results of studies of the qualitative composition of hedges in the composition of plantations of general use in the city of Yoshkar-Ola are presented. Molded foliar deciduous hedges prevail, in which the *Acer negundo* is the leader. The length of the *Acer negundo*-free hedges is low: 1 % – from *Juniperus sabina*, 1,2 % – from *Mahonia aquifolium*, 1,8 % – from *Cotoneaster lucidus*, 15,4 % – from *Physocarpus opulifolius*. Degradation of the composition of hedges is associated with their infestation with *Acer negundo*.

Keywords: hedges; Yoshkar-Ola city; green plantations; species composition; weediness; *Acer negundo*.

ROAD TRANSPORT, AGRICULTURE AND CONSTRUCTION MACHINES

DEVELOPMENT OF A SYSTEM OF REMOTE CONTROLLING A GROUP OF CONSTRUCTION AND ROAD VEHICLES

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Annotation. The structural and functional diagrams of an automated system of controlling a group of construction and road vehicles with the possibility of remote control are presented. A detailed description of the schemes is given, indicating the information parameters necessary for optimal control for objects of various levels of the control system. The objective function is given as a criterion for the effectiveness of the operation. The goal is to minimize the sum of squares of deviations of the values of the controlled parameters from the optimal ones. The algorithm of functioning of the control computer for an automated complex of construction and road machines is described.

Keywords: construction and road machinery; automation; remote control; information system.

ECONOMICS AND ORGANIZATION OF CONSTRUCTION

FORECASTING CASH SAVINGS DURING ENERGY-EFFICIENT CAPITAL REPAIRS OF APARTMENT BUILDINGS

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Annotation. The paper considers the issue of calculating the savings of funds during major repairs of apartment buildings. The data on the implementation of the program in 2019 and the calculated savings on the example of residential buildings in Voronezh are provided. The analysis of consumption and projected consumption of energy resources before and after repairs is considered. The article shows a comparison of energy efficiency classes when implementing energy-saving measures in residential buildings. As an effective tool for performing forecast calculations, the «Assistant for energy-efficient capital repairs» developed by the Fund for assistance and reform of housing and communal services of the Russian Federation is used. This program allows you to determine, based on projected savings, the amount of financial assistance to an apartment building that has chosen a special account to generate savings and is implementing energy-saving measures.

Keywords: energy saving; apartment buildings; energy efficiency; major repairs; reconstruction; economic justification.

FORECASTING THE COST PER SQUARE METER OF HOUSING IN THE PERM TERRITORY USING MATHEMATICAL MODELING

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Annotation. This article is about the real estate market, as well as forecasting the cost of one square meter of housing in Perm Territory, Russia. The article analyzes the current state of the real estate market, both primary and secondary. Selected factors that may affect the cost of a square meter of housing, such as: the dollar exchange rate, average wages, the annual volume of housing commissioning, the population, the number of mortgage loans issued, the average mortgage lending rate. The obtained data were normalized to construct the most plausible mathematical models. Using the obtained data, factor and factorless models are constructed: a Linear multi-factor model, an autoregression model, and a model in the state space. With the help of mathematical models were derived predictions for 3 years. Based on the results of the studied models, the model with the best approximation and post-forecast quality was selected. Using the analysis of the source data, a model was obtained for the cost of one unit of area in in the Perm region, after which a forecast for 2020...2022 was made based on it.

Keywords: mathematical modeling; forecasting; Rosstat; RF; housing cost.