BUILDING CONSTRUCTION, BUILDINGS AND STRUCTURES

CONTROLLED RELIABILITY OF THE PILE FOUNDATION IN THE CHIMNEY RECONSTRUCTION

V. S. Glukhov, M. V. Glukhova

Annotation. The article considers a special reconstruction case of foundations during the 160.0 m chimney metal pipe construction instead of an existing 80.0 m brick pipe of the cement plant in Krasnoyarsk. The geotechnical structure feature is a combination of a vertical load, a horizontal load and a high bending moment. Engineering was complicated by the existing foundation. The foundations grillage is adopted in the ring form with rays extending to the sides (*REDSUN*), combining drill piles with pebble broadening to ensure a reliable perception of such a complex loading. The authors proposed a technology for pre-tensioning piles by pressing to increase the bearing capacity. In the process of indentation, the pebble column expands with the acquisition of a spherical shape. At the same time, indentation of piles leads to pebble and soil compaction. The authors researched the broadening formation process during the piles indentation and obtained testing data on the bearing capacity increase. As a result, the maximum indentation occurs at the design-permissible load. The practical absence of the indentation is very important for this structure, because a characteristic feature is the perception of significant wind loads. There often occurs the unacceptable structure tilt. Along with ensuring required reliable operation of the foundations, the proposed technical solution can significantly reduce the estimated cost of the pipes foundation.

Keywords: piles tension; prestressed piles; prestressed soil; pre-operational indentation; chimney; pipe piles; pipe tilt; piles with broadening..

ENGINEERING SYSTEMS AND COMMUNICATIONS

INNOVATIVE AIR DRYING TECHNOLOGIES IN CLIMATE TECHNOLOGY BASED ON SOLID SORBENTS

A. G. Averkin, A. I. Eremkin, Yu. A. Averkin

Annotation. The authors considered problems of using solid sorbents in ventilation and air conditioning systems associated with the improvement of the methodology for calculating air dryers based on adsorbents. A method for calculating air dehumidification devices based on KSM silica gel using a modified I-d diagram of wet air and a number of transfer units is presented. We give a description of some developed designs for heat recovery units for exhaust air based on granular silica gel: with a fixed sorbent bed, with a «fluidized bed», with a through two-phase air flow, as well as devices for buildings for various purposes - hand and hair dryers. The criterion equations for constructive calculation of the developed devices are

given. A conclusion was drawn concerning the effectiveness and feasibility of introducing these developed devices in the housing and communal complex of the regions of the Russian Federation.

Keywords: dehumidification; silica gel; calculation method; modified diagram; number of transfer units; heat recovery; dryer.

PRACTICAL APPLICATION OF IMPULSE CIRCULATION OF A HEAT CARRIER IN WATER BOILERS

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Annotation. The paper provides a brief overview of ways to improve the efficiency of fuel use in heat generating plants, including a more complete (deep) cooling of flue gases due to the intensification of heat exchange. The results of the study of the pulse technology of heat transfer intensification in heat transfer surfaces and the accumulated experience in the development and practical implementation presented in the works create the grounds for using this method of heat transfer intensification in heat generators. A thermal scheme has been developed for modernization of the boiler house with the creation of conditions for organizing comparable experimental measurements. A measuring system has been created and a program of experimental research has been developed. The results of experimental studies are presented for the flow of the coolant in heat generators in the traditional and pulse modes. Under comparable conditions and constant heat load of the boiler house during the test periods, the specific gas consumption for the heat energy supplied to the network is respectively: with the traditional circulation of the coolant – 159,581 m^3/Gcal; with impulse circulation – 146,605 m^3/Gcal. The decrease is 8,13 %.

Keywords: heat generator; hydraulic shock generator; pulse mode; operating power; heat balance; specific fuel consumption.

THE EFFECTIVENESS OF COMPOSITE SORPTION MATERIALS USE IN THE TECHNOLOGY OF MULTICOMPONENT WASTEWATER ADDITIONAL TREATMENT

D. O. Ignatkina, A. A. Voytyuk, A. V. Moskvicheva, E. A. Kotovchikhina

Annotation. The authors consider the relevant problem associated with the formation of large-capacity industrial waste, which is most often not recycled and further used. Promising ways to achieve positive results in this problem are proposed, namely, to solve two problems simultaneously: the disposal of industrial waste and treatment of industrial wastewater (SW). The main results of laboratory studies on the production of granular composite sorbent (GCS) based on vegetable and mineral raw materials of the Volgograd region are presented. The experimental dependences obtained as a result of experiments with the sorption-filtering material proposed by

the authors in static and dynamic modes are presented on the example of real SW, one of the enterprises of the food industry. The conditions and installations on which laboratory tests were carried out are described. The main results are formulated that allows us to evaluate the effectiveness of using developed GCS in the technologies of sorption post-treatment of SW.

Keywords: production waste; recycling; sorbent; waste water treatment; sorption.

INTENSIFICATION OF THE SEDIMENT COMPACTION PROCESS FOR NATURAL AND WASTE WATERS BY MICROWAVE IRRADIATION

M. V. Obukhova

Annotation. The problems of accumulation and treatment of sewage sediments and sludge formed at the water treatment plants are considered. The reasons preventing use of the traditional methods of sludge processing and disposal at the housing and communal services are shown. The goal of experimentally proving that microwave sediments treatment intensifies the compaction process was set. To achieve it, the experimental studies have been carried out. A conclusion was formulated on the effectiveness of using microwave treatment to intensify the sediments compaction. The obtained experimental data correspond to the available data in domestic and foreign scientific and technical literature.

Keywords: sediments of natural and waste waters; microwave; compaction.

CITY. RECONSTRUCTION, RESTORATION AND LANDSCAPING

ANALYSIS OF THE POPULATION NEEDS TO DEVELOP A MULTIFUNCTIONAL COMMUNITY CENTRE IN A RURAL SETTLEMENT

N. V. Kuznetsova, A. O. Polukhtina

Annotation. This article raises the issue of how to improve the quality of life in rural areas by creating multifunctional community centers. The authors were assigned the task of studying the current needs of the population, discussing with residents their architectural preferences and the need to create a multifunctional community center. To achieve this goal a social survey was conducted among residents of Tambov city and the Tambov region. The process of collecting information included several stages: developing a questionnaire, conducting a survey and processing data. During the analysis of the data obtained, diagrams were compiled that reflect the percentage of responses. The conclusion was drawn about the significance of a multifunctional public center, and the main requirements for the characteristics of a multifunctional public center were identified.

Keywords: rural settlements; architecture of rural settlements; social and cultural sphere in rural areas; multifunctional centers in rural areas.

ECOLOGY AND SAFETY OF THE URBAN ENVIRONMENT

AUTOMATION OF CALCULATIONS FOR ENVIRONMENTAL SAFETY OF URBAN GAS STATIONS

O. V. Kuripta, K. V. Garmonov, Yu. A. Vorobyeva

Annotation. The article provides a comparative analysis and highlights the features of both domestic and foreign existing software products in the field of calculating emissions of pollutants into the atmosphere from various facilities, including gas stations. The task is to develop a proprietary software module that allows assessing impact of gas stations on the environment and choosing measures to improve the class of gas stations. The main factors that take into account the spread of harmful substances from gas stations are considered: the nature and direction of their distribution in the surface layer of the atmosphere, the dynamics of emissions from the source, meteorological parameters, technical characteristics of filling equipment, etc. The description of the multicriteria analysis of gas stations environmental safety allows us to comprehensively assess the impact of all factors and establish the degree of negative impact of not only existing, but also newly designed gas stations on the urban environment. The description of the developed software tools for control and monitoring of the impact of city gas stations on the surrounding urban development is given. A use case diagram has been built that displays the functional structure of software tools based on the unified modeling language UML. The functionality for the user when working with software tools is described.

Keywords: environmental safety; gas stations; software tools; automated calculation.

ON REDUCING ATMOSPHERIC POLLUTION THROUGH INCREASING EFFICIENCY OF CONTROLLING TECHNOLOGICAL TRANSPORT IN THE ROAD-BUILDING COMPLEX IN THE PRESENCE OF RADIO CHANNEL INTERFERENCE

A. D. Kononov, V. K. Marshakov, A. A. Kononov

Annotation. In order to reduce harmful emissions into the atmosphere due to automatic and remote control of technological transport of the road-building complex, the possibilities of improving efficiency of transmitting and receiving information signals and control commands are considered. Taking into account the causes and sources of interference of different nature, capable of affecting useful infor-

mation signals in the radio channel, and based on the analysis of different methodologies, schemes of decoders with frequency and code signals selection are proposed for improving efficiency of the system operating in the mode of remote control of a complex of road-building transport.

Keywords: technological transport; road-building complex; fuel economy; reduction of atmospheric pollution; radio control channel; signal transmission.

USE OF NOISE DOSE MAPS IN DEVELOPMENT OF ORGANIZATIONAL NOISE PROTECTION MEASURES IN INDUSTRIAL SPACES WITH NON-PERMANENT WORKPLACES

I. L. Shubin, V. I. Ledenev, A. I. Antonov, N. P. Merkusheva

Annotation. Currently, enterprises with automated technological lines are widespread. For maintenance and monitoring of technological processes, workers (operators) continuously move around the room in accordance with service schedules. These movements of workers are called intermittent jobs. An important task in this case is the assessment of noise impacts on workers and the development of measures to limit these impacts. The article discusses the methodology for the development of organizational and technological measures for noise protection in industrial premises with non-permanent workplaces. The proposed method uses noise dose maps. It is shown that such maps are more convenient for obtaining reliable information about the effect of noise on the worker's body during a shift. When using them, the spatial position of the worker and the temporary effects of noise of different magnitude on him are simultaneously taken into account. A computer program has been developed for constructing noise dose maps. The possibilities of computer modeling in the design of technological processes with non-permanent workplaces, taking into account the provision of regulatory requirements for the noise factor, are shown. An example of solving a practical problem is given.

Keywords: industrial buildings; non-permanent workplaces; noise mode; noise calculation; noise dose; noise protection.

ROAD TRANSPORT, AGRICULTURE AND CONSTRUCTION MACHINES

ORGANIZATION OF AUTOMOBILE PARKING LOTS IN THE CITY AREA WITH A CALMED TRAFFIC FLOW

S. V. Aleksikov, A. I. Leskin, I. S. Aleksikov, D. I. Hoffman

Annotation. The possibilities of organizing calm traffic flow for vehicles in urban areas by arranging small-sized parking lots on the main and intra-quarter passages are considered. The task of substantiating the dimensions of the parking pockets and the conditions for their effective use to reduce the speed of cars is set. As a

result of the research, the dimensions of the parking pockets, the permissible height of the curb, the conditions for the effective use of small-sized parking lots depending on the width of the carriageway have been statistically substantiated. A conclusion was made on the possibility of using parking pockets to reduce the speed of vehicles in the zone of calmed traffic of urban transport on the main and intra-quarter passages of urban areas.

Keywords: city road; parking lots; carriageway; car speed; parking pocket; calmed traffic flow.

ECONOMICS AND ORGANIZATION OF CONSTRUCTION

DOMESTIC AND FOREIGN EXPERIENCE IN MANAGING FACILITIES OF HOUSING AND COMMUNAL SERVICES

N. M. Lebed, M. E. Dement'eva

Annotation. The authors analyzed the main problems in the management system of residential buildings, typical for the development of the Russian economy at the present stage. The task is to study foreign experience in managing residential buildings and assess the possibility of its use in domestic practice, taking into account the Russian mentality and the specifics of legislation. We as well determined possibilities for solving such problems as dissatisfaction on the part of the owners of residential premises with the quality and tariffs of housing and communal services, imperfection of legislation in terms of insurance of the activities of management companies and a flaw in the mechanism of subsidies in the field of housing and communal services. The authors identified as well such problems as lack of a well-functioning system of education and training of employees of management companies, ineffective selection and appointment of management companies within municipalities. The description of the practice of managing residential buildings in various countries, their features and advantages is given. In order to achieve the set goals for improving the quality of housing management, a number of offers have been made being based on the most effective foreign methods.

Keywords: technical operation; overhaul; management company; privatization.

USING FINANCIAL ANALYSIS TO ASSESS THE CRISIS SITUATION IN A BUILDING COMPANY

O. V. Korobova, E. L. Dmitrieva, K. N. Savin

Annotation. The paper considers the issue of predicting a crisis situation on the example of a building company. The necessity of using methods of financial analysis and methods of diagnosing bankruptcy to identify a possible crisis situation is justified. As sources of information for the assessment of the object of research,

the annual accounting statements of OA «TAMAK», an enterprise located in the Tambov region, are used. The analysis of changes in the cost of property and the main elements of sources of financing of activities is carried out, liquidity and solvency, financial stability are assessed. Conclusions are drawn on the profitability of the organization. To determine whether the company may become bankrupt in the near future, domestic and foreign methods of diagnosing bankruptcy are used. Consistent use of individual elements of financial analysis in conjunction with generally accepted methods of forecasting bankruptcy allowed us to identify «weak points».

Keywords: crisis state; bankruptcy; building company; woodworking enterprise; liquidity; solvency; financial stability.