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ANALYSIS OF THE POSSIBILITIES AND LIMITATIONS OF USING BIM - TECHNOLOGIES AS A TOOL FOR MANAGING THE LIFE CYCLE OF CONSTRUCTION FACILITIES

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In the context of digitalization of the construction industry, building information modeling are becoming a key tool for managing the life cycle of construction projects from design to operation and demolition. The relevance of the topic is due to the need to increase the efficiency, transparency and manageability of processes at all stages of the life cycle. The purpose of the article is to analyze the possibilities and limitations of using BIM technologies in managing the lifecycle of construction facilities. Because of the conducted research, the main advantages of using BIM revealed, including increased planning accuracy, cost reduction and improved interaction between project participants, as well as existing barriers, namely the lack of uniform standards, the high cost of implementation and the shortage of qualified personnel. The article is useful for specialists in the field of construction and real estate management, offering recommendations on the effective use of BIM at all stages of the object's life cycle.

Keywords: construction, building, life cycle, BIM technologies, modeling, automation, digitalization.

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METHODOLOGY FOR COMPREHENSIVE ASSESSMENT OF THE TRANSFORMATION OF INEFFICIENTLY USED INDUSTRIAL FACILITIES AT THE FINAL STAGE OF THEIR LIFE CYCLE

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The article is devoted to the development of a comprehensive methodology for diagnosing and evaluating the effectiveness of the transformation of industrial capital construction facilities that are at the final stage of their life cycle. A systematic approach is proposed that integrates economic, spatial, environmental, and social indicators into a single criterion. The methodological basis of the study is the use of weighted integral indices and the Harrington desirability function, which allows for the aggregation of diverse indicators and the quantification of the redevelopment potential. The integrated assessment methodology allows for the identification of critical risks, the justification of management decisions, and the development of strategies for transitioning from the stagnation phase to the revitalization phase of facilities.

Keywords: life cycle, life cycle stage, identification, operation, conversion, redevelopment, revitalization, integral assessment, sustainable development, inefficiently used industrial capital construction facilities.

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LIFE CYCLE COST THE "GREEN" APARTMENT BUILDING

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The study found that the main trend in the global construction practice is sustainable architecture, that is, the construction of facilities based on environmental friendliness, energy efficiency and digital systems. To motivate the practical implementation of new approaches by developers, it is necessary to commercially stimulate the principles used in the construction of apartment buildings that meet "green" standards. This becomes possible when there are immediate benefits from increasing investment attractiveness, accelerating sales, increasing the cost per square meter of housing without reducing demand, and reducing operating costs.
The article discusses the issues of increasing the cost of building "green" houses and operational savings. It has been proven that with effective development, it is even more profitable to build high-quality housing that meets "green" standards than to build an average apartment building. At the same time, the median revenue of developers can show a twofold or even threefold increase.

Keywords: the life cycle of a real estate object, sustainable architecture, the concept of digitalization, "green" standards, apartment building, residential complex, operating costs, life cycle cost.

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ARCHITECTURAL AND STRUCTURAL SOLUTIONS FOR RELIGIOUS STRUCTURES IN THE RUSSIAN NORTH

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The article examines the architectural and structural features of wooden churches in the Russian North, with a brief historical overview of the "triple" of the Vorzogorsk Pogost in the Arkhangelsk Region. The authors' field studies of churches from the 17th to 19th centuries are presented in the form of measured drawings and photographic evidence. The plan shapes and roof tops of the structures under study are identified and classified, and the materials and design solutions are described. This comprehensive information confirms the spiritual value, significance, and necessity of preserving wooden architecture in modern Russia.

Keywords: wooden architecture, temple, log house, completion, quadrangle, octagon, log.

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LANDSCAPE AND RECREATIONAL SPACE AS THE MAIN ELEMENT OF ECOLOGICAL SUSTAINABILITY OF THE LIFE CYCLE OF TERRITORIES OF VARIOUS FUNCTIONAL PURPOSES

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The following issues are considered: the current state of interaction between the city and the environment, i.e. conflict situations related to the degradation of natural urban components; basic principles of the formation of a sustainable urban environment: factors determining the formation of a system of landscape and recreational spaces of the urban environment. The functional essence of landscape and recreational activities as an important component of the ecological sustainability of the infrastructure of the urban agglomerations life cycle is revealed. Examples of recreational areas for various population groups are considered.

Keywords: landscape and recreational spaces, environment, life cycle of territories, ecological sustainability

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USING BCORE-TECHNOLOGY IN CONSTRUCTION

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The BCore construction technology is considered, which creates building structures that are environmentally friendly, highly durable, resistant to external influences, as well as the advantages of using this technology

Keywords: construction, technologies, efficiency, competitiveness, construction processes, speed of construction.

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STUDY OF SUPERPLASTICIZER DOSAGE EFFECT ON STRENGTH INDICES OF CEMENT MIXTURES FOR 3D-PRINT CONSTRUCTIONS

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The aim of the work is to establish the dependence of the compressive strength values of fine-grained cement matrix compositions developed for 3D printing on the type and amount of superplasticizing additive introduced. The results of experimental studies to evaluate the kinetics of strength gain of the mixture for each variant of the matrix composition are presented. The results of mechanical tests of samples using Sika ViscoCrete T100 superplasticizer were used as a basis for comparison. The selection of analogues of this superplasticizing additive was made among products from other manufacturers belonging to the same class of polycarboxylate esters, but differing in chemical composition and form of release (in the form of bulk components). Experimentally, individual optimal dosages for each of the studied brands of superplasticizers were established, which amounted to 0.3%. The effectiveness of the superplasticizer was evaluated according to the criteria of the water cement ratio and mechanical strength. As a result of the comparative analysis, the most effective modifier has been identified, the use of which allows achieving the greatest increase in strength.

Keywords: superplasticizer, polycarboxylate esters, mechanical strength, fine-grained cement matrix, 3D construction printing, additive technologies, water-reducing effect.

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FORMATION OF CLUSTERS OF MULTI-STOREY RESIDENTIAL BUILDINGS FOR MAKING TECHNICAL AND TECHNOLOGICAL DECISIONS ON THEIR RENOVATION

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A significant part of residential buildings on the territory of cities and settlements of the Russian Federation requires the adoption of early decisions on their renovation and adaptation to current standards. One of the approaches to the effective renovation of multi storey residential buildings may be their clustering (grouping of objects) by similarity of characteristics. The formation of clusters of residential multi-storey buildings will allow the use of similar repair and reconstruction technologies for their renovation with the possibility of implementing a flow-based method of work.

Keywords: residential buildings, cluster formation, criteria features, data normalization, distance matrix.

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COLOR AS AN INDICATOR OF THE LIFE CYCLE OF HISTORICAL BUILDINGS (ON THE EXAMPLE OF THE ARCHITECTURE OF THE CENTER OF THE CITY OF VORONEZH)

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The article examines the role of the color scheme of facades in the context of the life cycle of historical buildings. Using the example of architectural monuments in Voronezh from different eras, it is shown that color is not only an aesthetic category, but also a diagnostic feature that reflects the stages of an object's existence: construction, reconstruction, change of functional purpose, restoration, and modern adaptation. The introduction of a quantitative approach to the analysis of color palettes allows for the formalization of visual perception and the establishment of correlations between chromatic characteristics and historical and architectural periods.

Keywords: building life cycle, historical architecture, facade color, polychromy, color analysis.

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INCREASED PROTECTION OF LARGE-SIZED PRODUCTION BUILDINGS AGAINST INTERNAL LOCALIZED EXPLOSIONS WITH THE USE OF BLAST-RELIEF SANDWICH PANELS

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Protecting industrial buildings from local emergency explosions is a complex, multifaceted task. This paper provides an overview of key research in the field of explosion protection and presents a theoretical study aimed at improving the level of protection of industrial large-sized buildings from internal local deflagration explosions. The problem of the influence of wave effects on the structures of industrial large-sized buildings is identified. Mathematical models of quasi-static and wave loading of building structures are analyzed. Based on theoretical research, new recommendations for protecting buildings from wave phenomena of deflagration explosions have been developed, which require further experimental confirmation.

Keywords: compression wave, impulse of the compression wave, explosion venting constructions, resonant waves, deflagration explosion, perforated sandwich panels

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