СЕКЦІЯ 6
СУЧАСНІ ЕФЕКТИВНІ ТЕХНОЛОГІЇ У БУДІВНИЦТВІ, АРХІТЕКТУРІ ТА ДИЗАЙНІ. ГЕОДЕЗІЯ ТА ЗЕМЛЕУСТРІЙ

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FEATURES OF USING SELF-COMPACTING CONCRETE FOR LANDSCAPE STRUCTURES

One of the important elements of the design of the architectural environment of a modern city when creating landscape compositions is monolithic concrete retaining walls of complex formation with a high-quality surface without additional decoration. A retaining wall is a decorative element of a modern landscape for the organization of space on rough terrain in order to increase the aesthetic perception of gardens, parks, squares, parking lots. As well as an engineering structure designed to prevent soil from collapsing and sliding on terrain slopes that have even a small slope (3-8%) and with vertical plot planning to support the artificial relief of the territory. Usually, the construction of such structures requires high-quality materials with a high cost and significant labor costs. The use of self-compacting concrete based on concrete mixtures, capable of densely filling the formwork without vibration and additional energy consumption, is relevant for the creation of such structures. This opens up the possibility of obtaining monolithic structures of any configuration with a uniform structure, various textures and colors, which are characterized by sufficient durability and lack of tendency to crack formation [1]. For vertical elements, structures of complex shapes, highly mobile concrete mixtures with SF3 mobility indicators are used (cone spread 760-850 mm), for structures with high requirements regarding the quality of the surface, which does not require additional processing, concrete mixtures with a viscosity of VS1/VF1 (time T500: less than 2 s) [2]. The possibility of obtaining such concrete mixtures by limiting the grain size of the fine aggregate in its composition to 1.25 mm with a predominance of the fraction of 0.63 mm is shown. The size of coarse fractionated aggregate should not exceed 20 mm. Superplasticizers and stabilizing additives are used to achieve optimal viscosity and ensure a balance between resistance to delamination and mobility. As a superplasticizer, it is advisable to use polycarboxylate ether, as a stabilizing additive - compounds based on an aqueous solution of a high molecular weight polymer, which are developed for Zero Energy system concretes. Such additives, even in small quantities, contribute to the increase in the cost of concrete, but they allow reducing the consumption of cement and filler by a fraction of up to 0.125 mm, which cause an increase in water consumption in the composition of the concrete mixture. At the same time, studies have established the possibility of using recycled aggregates and fillers together with a complex of additives, which contributes to reducing the cost of self-compacting concrete while maintaining their quality and simultaneously solving environmental issues [3]. This opens up an opportunity to reduce material and labor costs for the construction of landscape structures of complex shape based on self-compacting concrete under the conditions of post-war reconstruction of Ukraine.

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THE USE OF RAW MATERIALS FOR THE IMPLEMENTATION OF THE STRATEGY OF LOW CARBON DEVELOPMENT

The Paris Agreement under the UN Framework Convention on Climate Change (UNFCCC) on the regulation of measures to reduce carbon dioxide emissions by 2050 provides for the implementation of a global strategy for low-carbon development to limit the temperature rise on the planet to a level significantly lower than 2°C. On the way to the implementation of the Paris Agreement on global climate mitigation measures, Ukraine must implement a number of foundations and strategies. Among them is the acceleration of the implementation of the principles of low-carbon development, which is foreseen by the state policy in the field of climate change for the period until 2030 [1, 2]. The most effective way to reduce CO_2 emissions in the cement industry is to reduce the clinker content in Portland cement. in EU countries in 2014, the average clinker factor in cement was 80%, and by 2050, according to CEMBUREAU (the European Cement Association), it is assumed that the ratio of clinker to cement will be no more than 70%.

The expansion of the production of composite cements, the need to reduce the clinker factor (the percentage of clinker in cement) to solve the environmental problems associated with the production of Portland cement, and the need to preserve natural resources and use man-made materials for the production of binders attract attention to alkaline binding systems [3]. Fly ash, which can be used as a component of alkaline cements, has a much lower reactivity compared to slags, so ash-alkaline binding systems are characterized by relatively low strength indicators, and their special properties largely depend on the chemical and mineralogical composition of the raw materials, which varies within wide limits for the evils of thermal power plants of Ukraine [3]. The elimination of these shortcomings is possible by adjusting the composition of ash-alkaline binder systems by introducing active mineral additives, which are represented by natural or artificial zeolite phases, which affect not only the activity of ash-alkaline compositions, but also the formation of the micro-, meso- and macrostructure of composite materials.

Researches [3] studied the peculiarities of the formation of micro-, meso- and macrostructure during the modification of ash-alkali binding systems with artificial zeolites and confirmed the positive role of the crystal-chemical similarity of neoplasms and aggregate in the synthesis of the strength of artificial stone. This makes it possible to use the specified binding systems in the implementation of the concept of introducing effective low carbon (low emission) cements and concretes based on them, which are one of the five parallel directions of the road map of the cement and concrete sector in the EU low emission economy until 2050 [4].

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