the mesh dependency is negligible. For the base resistance, one needs at least two or three elements at the pile tip to get rid of the mesh dependency.

2. The best results of load-displacement curve are obtained by using the non linear behavior for both soil and interface elements.

3. The construction simulation has a very limited effect on the load- displacement curve and has a similar effect on the shear stresses, while the number of failed elements is very sensitive to construction simulation, its increase as a result of decreasing the number of stages.

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UDC 666. 97. 031: 693. 542

ON THE USE OF COMPOSITE STRUCTURES IN THE CONTEXT OF NEW CONSTRUCTION AND RECONSTRUCTION

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The relevance of use of composite structures in modern construction is considered. Composite structures are closely connected with the questions of strength and reliability of concrete seams. Concrete seams are formed both in new construction (monolithic construction, precast construction and composite construction) and in reconstruction.

Nowadays all over the world the question of the use of composite structures is of high relevance due to the fact that these constructions are used both in timber construction, and in metal construction, as well as in plastic construction. Moreover they find the application in other fields of science such as medicine, biology, geology, etc. The most significant task to be solved is the contact seams problem. The most popular material in modern construction nowadays is reinforced concrete. Thus we will investigate the problem of the strength and reliability of contact seam regarding current material.

Today composite structures are used both in new construction, and in reconstruction in Belarus. According to the technique of construction modern reinforced concrete constructions are classified into monolithic construction, precast construction and composite construction [1]. Buildings and structures are frequently subjected to monolithing by reinforcements when reconstruction (a build-up, a shoulder, a case) is being held. A very important task combines all of the types of these constructions both in new construction and in reconstruction. The task is to provide constructions with a monolithic character. The task of no small importance is to provide a composite action for layers of reinforced concrete composite structures. In addition the properties of the layers can be initially different. The composite action of construction and its reliability in use depend on contact seam practice and quality, on concreting procedure, on concrete mix of an 'old' and 'new' concrete.

In a general way contact seam of reinforced concrete composite structures in construction can be conditionally classified as follows [1; 2]:

Contact seam classification

Composite construction	Monolithic construction	Reconstruction
– filled with concrete or mortar seams between precast elements	– seams in cast-in-situ elements	– seams in braced with "new" concrete structures
– seams between a "new" concrete and a precast element	– seams with retained form	– seams in the "new" concrete
– seams in cast-in-situ elements	– seams after long-termed break in construction	

From XX century till today reinforced concrete constructions have held a leading position among other materials in construction. There are precast, monolithic and composite reinforced concrete constructions.

Composite reinforced concrete structures (fig. 1) are such structures where precast elements (precast columns, beams, slabs, etc.) are combined with monolithic concrete. Thus such a composite structure should guarantee a combined action of all elements of the structure. These structures are mainly applied to floor and ceiling slabs of multistory buildings, when building envelope construction, etc. A major advantage of composite reinforced concrete structures is less steel spread and high space hardness when compared with precast concrete. To provide composite reinforced concrete structures combined action, the seams and connected elements should be highly attended. The strength of contact seam will be provided by doing that.

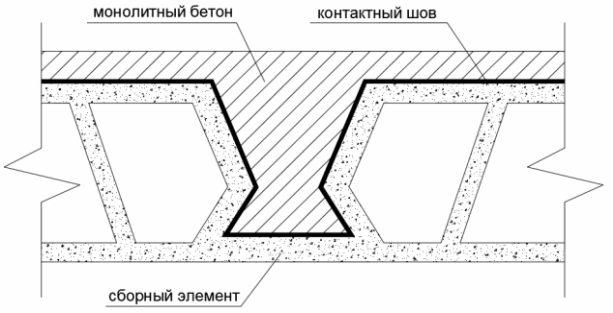

Fig. 1. Contact seam in composite reinforced concrete structure

Monolithic reinforced concrete structures (fig. 2) are raised directly onto the area of building. A field of use of these structures is nonstandard buildings, low element frequency, extreme pressure elements (foundation, industrial building cage and slabs, etc.). The problem of contact seam concerns monolithic construction too [1; 2]. When creating a monolithic construction they tend to cast concrete uninterruptedly wherever possible. Sometimes to cast concrete uninterruptedly is an indispensable technical specification. But in most cases concreting pauses are inevitable for organizing and technological reasons. Besides construction breaks can vary from short-termed break (technological break) to long-termed break (long-delayed construction). This brings up the question about connecting one monolithic structure to another and about the necessity to provide strength of contact seam.

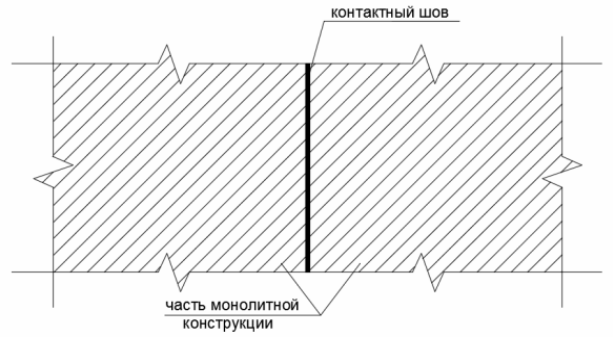

Fig. 2. Contact seam in monolithic construction

For **reconstruction** (fig. 3) the new technologies are introduced, the industry is innovated. These factors bring load changes for an element, operating condition changes, functionality changes. Basic methods of reinforcement are roughly classified as follows: a build-up (concreting on one or two sides), a shoulder (concreting on three sides), a case (concreting on every side) [3]. The necessity to provide a combined action of a bracing structure and to guarantee strength and reliability of contact seam is a relevant task for reconstruction too.

The strength of contact seam provides combined action of composite structures. With the help of engineering and constructional measures a combined action is realized.

Engineering measures provide the grip of layers of concrete. In general engineering measures depend on the type of cement, the fluidity and formability of concrete, the use of adhesive composition, an interlaminar layer between layers, concrete admixtures. Concrete moisture of "old" or "new" concrete, the method of concrete compressing, construction state up to the execution of work, a method of surface preparation are the factors of no small importance to provide the grip of layers of concrete.

Constructional measures are to extend actual acreage of contact seam. Such an extension is accomplished by holes and slots adjustment, tongue of any form (triangular, trapezoidal, rectangular) adjustment.

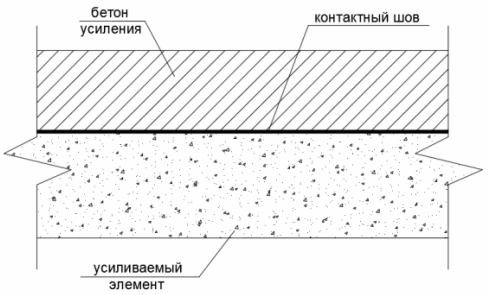

Fig. 3. Contact seam in reconstruction

It is rather problematic to realize constructional measures directly on the area of building. That's why our attention is paid to engineering measures. It is easier to realize engineering measures both at the factory and directly on the area of building. These measures should provide the increase in the strength of contact seam because it is hard to realize a high quality preparation of contact seam (to shower timely, to make each tongue of one size, etc.). That's why all over the world a reach variety of concrete admixtures are used in new construction and reconstruction. It is not only plasticizers, but super plasticizers and hyper plasticizers. But here another point arises. How will admixtures behave? What percentage of admixtures should we add to concrete to provide a combined action of composite structures?

An ideal admixture combination existing in Belarus (particularly in Vitebsk region) is being searched for 20 years at Polotsk state university. Also the effect of admixtures on the strength of contact seam is being investigated. The experiments with such admixtures as S-3, SPB, SPAS, SPS, BTB, UTB were performed at PSU. Complex admixtures are getting an increasing use nowadays due to their characteristics to change several parameters of concrete at once. Such complex admixtures enable to increase fluidity of concrete, to decrease water demand, to increase setting up time and durability of concrete, to get highly moisture-tight, crack resistant, freeze proof "poured" concrete, to increase final strength characteristics. Servicing for the optimum dosage of admixtures is at the exploratory investigation stage in PSU laboratory.

In view of the foregoing considerations the conclusions are as follows:

1. So far reinforced concrete constructions have been the most commonly used material in comparison to metal, timber or plastic in construction.
2. It's composite structures that are relevant in modern construction (composite construction and monolithic construction, also reconstruction). Contact seam plays a key role in composite structures. Contact seam provides combined action of these structures.
3. Engineering and constructional measures are used to provide the strength of contact seam. It is rather problematic to realize constructional measures directly on the area of building. That's why our attention was paid to engineering measures. Currently we pay attention to the optimum dosage of concrete admixtures.

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UDK 697 (075.8)

THEORETICAL ANALYSIS OF TWO-LAYER AND THREE-LAYER VENTILATED GLAZED WINDOWS OF VARIOUS DESIGNS

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Materials of theoretical analysis of two-layer and three-layer ventilated glazed windows are presented in the article for the purpose of optimization heat exchange processes of standard infiltration in the conditions of compelled convection of the external air in interglass space and its heating due to the recuperation of transmission heat.