11 – 20 41 – 50	Q_y	That is, orthogonal to the axis Y	
11 – 20 41 – 50	RZ	Reactive soil resistance when calculating shell plates on elastic foundation	Positive force acts in the direction of the axis Z (minus sign indicates that the soil is compressed)
c) Nodal reaction			
21 – 30 41 – 50	RX	Horizontal force in the *i*-node finite element coinciding with the direction of the X axis direction	The positive force exerted on the *i*-th node in the direction of the axis X
41 – 50 23, 24, 27	RY	Horizontal force in the *i*-node finite element coinciding with the direction of the Y-axis direction	The positive force exerted on the *i*-th node in the direction of the axis Y
11 – 20 21 – 30 41 – 50	RZ	Horizontal force in the *i*-node finite element coinciding with the direction of the Z-axis direction	The positive force exerted on the *i*-th node in the direction of the axis Z
11 – 20 41 – 50	RUX	The reactive moment in the *i*-node FE relative to the axis X	Positive moment acts on the *i*-th node counterclockwise when viewed from the end of the X axis
11 – 20 41 – 50	RUY	The reactive moment in the *i*-node FE relative to the axis Y	Positive moment acts on the *i*-th node counterclockwise when viewed from the end of the Y axis

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PRECAST BENDING REINFORCED CONCRETE CONSTRUCTIONS

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Currently, precast reinforced concrete constructions are widely used in the building industry of the Republic of Belarus. They are used both in the reconstruction of buildings, structures and in new construction. The advantage of precast structures is associated with the possibility of connection of multiple layers with different properties in one construction. The versatility of precast construction includes the use of positive properties of each layer separately and joint work of layers as a single unit up to structural failure.

So, during the reconstruction of buildings and structures a method of enlargement of the cross section of a construction to reinforce steel bending concrete structures is commonly used. It is a fairly simple way of reinforcement. It allows to increase the structural strength and to reduce the time of strengthening. The use of other ways of strengthening is limited by weight and overall dimensions of structures, as well as the use of large construction equipment.

The efficiency of reinforcing work technique is based on the use of a horizontal surface of a former construction as a fixed formwork. Reinforcement can be carried out under total or partial discharge or under a load. Reinforcement-under-the-load-activities are the most profit-proved. The works are carried out with minimal efforts. So, for example, there is no need to dismantle and then mount back the work equipment which can remain non-removable. Besides it is practically impossible to relieve a fully unloaded structure. The proper weight of an item is a minimum load.

As a result of such reinforcement a precast and cast-in-situ construction, which combines at least two layers of different properties, is made. And the mode of layers' deformation can be various.

The use of precast and cast-in-situ constructions is relevant both to a new low-rise building and laps' replacing under strained conditions of reconstruction. The use of precast and cast-in-situ constructions in this case allows reducing the cost of construction significantly, eliminating the use of hoisting machines and mechanisms during the mounting of structures. As a result a several layer structure is made, and the mode of layers' deformation can be various.

Modern precast and cast-in-situ flexible constructions, such as lap-slabs, are very diverse. They mainly consist of prefabricated beams with reinforcement and block-liners. Large-span slabs of the German system "ALBERT", polish "TERIVA FLOOR" slabs [1], Belarussian "Dakh" [2], the Russian system of prefabricated concrete slabs "Marko" [3] and many other systems are widely known.

In general, precast and cast-in-situ system consists of three parts:

1. Reinforced concrete beams with a spatial reinforcing bar structure in the form of a light truss of a triangular cross-section. The basis of the farm is immersed into concrete. The truss consists of three bars. The diameter of the bars depends on the length of the beams and a required strength of laps.

2. Hollow block-liners that fill spaces between beams and serve as a fixed formwork. Material for hollow blocks can be different: ceramics, haydite concrete, foam concrete, cellular polystyrene concrete, etc.

3. In-situ concrete, after its curing, makes a precast and cast-in-situ construction.

Fig. 1 shows the "Dakh" system developed in PSU.

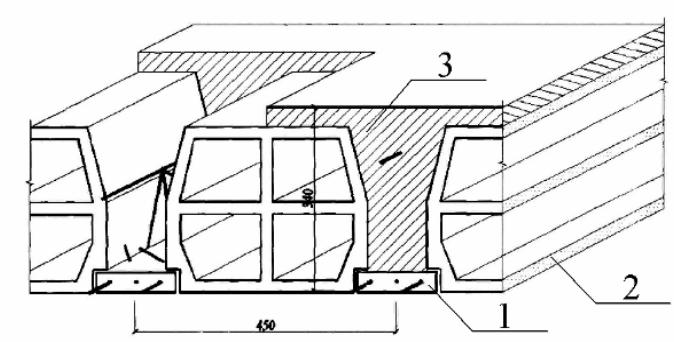

Fig. 1. General arrangement of a composite precast and cast-in-situ slab "Dakh"

Theoretical studies and experimental researches of precast and cast-in-situ constructions are carried out in many countries of the world, such as Germany, Poland, in the CIS countries – Russia, Belarus, Ukraine, and many others. The structural elements are elaborated in all systems; durability, fracture strength, toughness of the whole construction is investigated as well. This clearly proves the relevance of this type of structures. But questions about the influence of initial deflected mode caused by concrete shrinkage of a cast-in-situ unit of a construction on the entire system up to destruction are still in the dark. Besides, there is a question about the influence of the load on the structural strength in reinforced constructions.

Joint work of the precast and cast-in-place concrete in a unit, both in new constructions and renovated ones, makes conditions on a composite deflected mode, which is different from conventional reinforced concrete beams or slabs.

The researches of precast and cast-in-situ systems used in new constructions and renovated ones have already being carried out in PSU for 20 years. The research is carried out by the staff of Department of Constructions. Among them are candidate of technical sciences V.D. Hrinev, candidate of technical sciences A.H. Kremneva [4], Dr. Lazouski D.N. [5], candidate of technical sciences Popkov Y.V., and master of technical sciences Kovalenko A.A. In the labs experimental research of precast and cast-in-situ slabs "Dakh", slab constructions forced under a load or without it, is carried out .

Various deformation models are used for the analysis of experimental data and assessment of the gained results. More than 500 calculations are made using these models. At the same time, for confirmation and a more detailed analysis of precast structures work theoretical calculations, based on the deformation model using the system of lapping "Teriva", Poland, are also proposed.

Today the university staff are carrying out the researches on influence of initial deflection mode of a precast construction on fracture strength of such systems:

– the impact of shrinkage of cast-in-situ concrete, including modified admixtures is being studied;
– the effect of load on the prefabricated structure, in particular reinforced by means of enlargement of the cross section of a construction is being examined.

Theoretical studies and experimental researches allowed assessing the percentage of reinforcement of precast and cast-in-situ constructions and the loading level of a precast unit, which influence the fracture strength of the system as a whole.

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THE DEVICE OF A WINTER GARDEN AND THE GLASS HOUSE

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Ways of building and prominent features of glass houses and winter gardens are considered and analysed. Stages of building of constructions of the given sort are presented.

All people like nature and its unusual "design", but let's think of it a little. If you suddenly wanted to have a slice of this nature at hand at any time you should reflect on such construction as a winter garden (fig. 1).

Fig. 1. A winter garden with a glass roof

It has been noticed that winter gardens, as well as glass houses, are most claimed by people who are interested in the nature and want to be closer to it.

Glass in such house or a garden can be transparent or matte, get effect of an easy misting or be partially decorated stained pattern. Now designers try to use actively glass in an interior. Interroom doors, tables, chairs, cases, regiments and so on are made of glass. Modern production techniques of glass allow