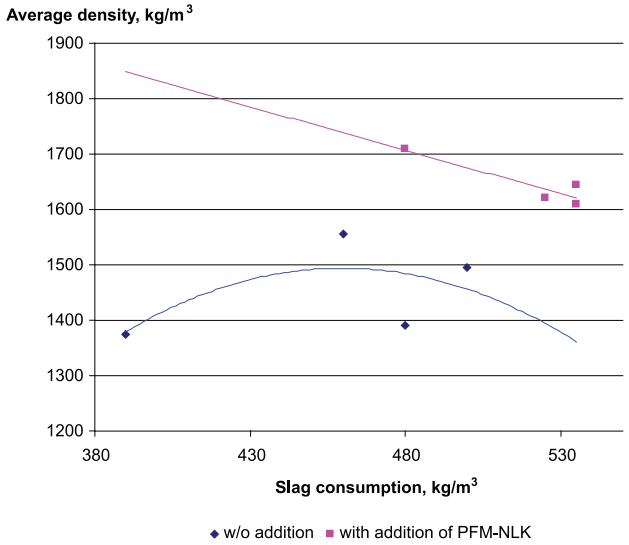

Fig. 2. Dependence of slag concrete solidity on slag consumption and addition of modifier PFM-NLK in dry condition

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FEATURES OF DESIGN AND CONSTRUCTION OF INDIVIDUAL HOUSES ON PERMAFROST SOIL

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Among basic peculiarities of the Extreme North, which should be considered in engineering, are not only severe climate and permafrost condition of soil, but also economical terms that are conditioned by distance and badly developed territories [1]. When projecting and construction of buildings and installations in conditions of severe climate it's specified to choose the type of foundation, which will ensure not only the stability of a building but also reduction of consumption of materials, terms of building and labour costs. As practice of building shows, in the North there are usually used columnar, pile, slabby and frame types of foundation. Advantages and shortcomings of traditional types of foundation, which haven't lost currency nowadays, were described in the work [2].

As a rule, individual developer chose the types of foundation and ways of their arrangement that he is able to use on his lot. That's why foundations for private houses, especially when it comes to wood house building, are simplified without taking into consideration of permafrost-soil conditions of the lot, as a result the house begins to sink unevenly in time.

The cost of foundations in the low-rise house building reaches 40% out of general estimated cost, in addition, individual building in Yakutiya (1–2 floor houses) make up more than 50% out of the house building of the republic. Bed constructions for northern regions have been constantly improved and in short time have gone the way of evolution from ordinary rubble tapes to highly industrial and technological piles, the immersion depth of which sometimes reaches 36 m [1].

One of the perspective areas in the northern foundation engineering is arrangement of foundations at the packed soil, what is successfully used at the regions of moderate climate at the pocket weak soils. It's feature is that at the process of foundation building under the base and around side borders there is created a packed soil with heightened indices of density, stability, bearing capacity. Foundation load at the base and side borders is passed firstly on to the packed soil, and then on to the soils of natural build, owing to that there is reached higher bearing capacity of foundations at the soil base.

In conditions of permafrost the industry of building practices a construction of buildings with cold and ventilated cellars. According to the institution of permafrost study SB RAS, the presence of cellar, the temperature of which will be much higher than the temperature of outer air, allows [3]:

1) to decrease the infiltration of air through the basement floor of building, which cause uncomfortable temperature regimen of the first floors' surface;

2) to improve the thermal resistance of the building;

3) to cut down the costs of heat insulation of building' basement part.

In consideration of all these factors, it's reasonable to revive the experience of construction the buildings with warm cellars at the new, industrial level.

For the preservation of permafrost condition of soil bases, mainly, at the individual building there are used band ferroconcrete foundations with ventilated cellar. But in such houses and in houses at piles the temperature regimen of floor is rarely followed, it is usually cold because of insufficient provision with heat insulation and hermetic encapsulation of floor construction. Therefore by decision of scientifically-technical council of the Russian Federation State Committee for Construction, Architectural and Housing Policy in 1994 there was published «The album of technical decisions of basements and foundations of village and settlement building at permafrost soils» [4].

The ways of arrangement of foundations and technical solution to foundations in work [4] were developed for buildings with width more than 9 m when using permafrost soil bases at permafrost condition during the construction and exploitation (principle I by Construction norms and rules 2.03.04–88), for buildings with width less than 9 m – at thaw out condition (principle II by Construction norms and rules 2.02.04–88). Thereby for relatively homogeneous solid permafrost bases of buildings and constructions of small width (to 9 m) there is admitted the thawing of bases at the process of exploitation subject to use of foundations, which are able to take uneven settling (slab, cross bands etc.).

Technical decisions of basements and foundations can be used for bigger nomenclature of dwelling houses, public and industrial buildings without sufficient completion on conditions that constructions, materials and temperature regimens of overground parts are identical, and the width of object according to plan do not exceed designated limits.

An author of these article has used and studied the technical decisions given at the album [4] when building a number of experimental objects: in 2000 – the individual house out of beam; in 2002 – the village school for 80 seats; 2009–2012 – wooden frame houses [5], with the use of developed multilayer constructions of wall fences and items at the base of power efficient materials out of local raw materials [6–8].

The account methods of buildings' basements and foundations on the permafrost soils at the operating normative documents rely on empirical dependence and do not take into consideration the changes of temperatures and processes of heat-mass exchange in conditions of exploitation. Nowadays the possibility of more accurate account of soils' temperature field in buildings' basements with the use of increased capacities of computer engineering and wide development of mathematical modeling methods has appeared. It has become possible to develop numeral models with great degree of detail and exactness, which take account of the majority of determinative factors of soils basement buildings' heat exchange. Therefore for the explanation of trustworthiness of developed mathematical account models we carry out surveys on location of temperature regimen of experimental houses' soil bases.

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RESOURCES OF PRECIOUS METALS IN TECHNOGENIC OBJECTS OF MINING AND METALLURGICAL COMPLEX OF RUSSIA

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At present, global reserves of platinum group metals (MPG) include over 100 thousand tons. Three large ore areas share about 90% of them: Bushveld (South Africa), Norilsk (Russia) and Great Dayka