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Problems of Construction on Insulated Forest and Weak Soils and Their Solution

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ABSTRACT: The article presents the work of the building in difficult soil conditions, building precipitation, measures to change the rigidity of the building, the main structural measures preventing uneven settlement of buildings and structures. The timing of construction can also affect the process of settlement of a building if its individual parts are erected at different times. The solution to the problem in such cases is to use lighter materials for the later fragments of the building. These can be brick or wood inserts between parts of the building made of reinforced concrete slabs.

I. INTRODUCTION

When building on subsidence loess soils, on weak water-saturated clay and saline soils, as well as in other difficult soil conditions, the subsidence and subsidence of the foundations of industrial and civil buildings turn out to be much larger than allowed for this type of structure. For difficult soil conditions in the construction of residential and industrial buildings, the average settlement value is often less than the allowable value, but the difference in settlement between adjacent columns or panels is much higher than the allowable values. In this case, you can either significantly increase the area and depth of the foundation; in some cases, replace strip and free-standing foundations with pile foundations; to carry out work on strengthening the base soils; or to strengthen the structure of the structure so that it is normally operated at high precipitation and with large differences in the draft.

The experience of using constructive measures has shown that in most cases they can significantly reduce the construction time and reduce the cost of construction and installation work.

Constructive measures can be provided for in projects of newly built structures or applied directly during construction. For example, if during the construction of a building the soils were frozen and frost heaving processes were observed, and after thawing the soils became highly compressible and low-strength, the problem arises of how to construct buildings if the first floor has already been built. You can disassemble the constructed part of the building, remove the foundation cushions, remove the soft soil, fill it with sand and start building the building again. However, in some cases, it is possible not to disassemble the structure, but to arrange monolithic reinforced concrete belts at the level of the floors of a brick building, reinforce the brickwork in the walls and continue the construction of the structure. Constructive measures are also used to restore the design position of individual elements of a structure without stopping the operation of a building or structure. The experience of operating industrial buildings on weak water-saturated clay and sagging soils shows that, as a result of uneven settlement of columns of industrial buildings, it is often necessary to raise (straighten) crane runways, sites for special equipment, etc.

II. PURPOSE OF THE STUDY

To increase the rigidity of a building, such structural schemes are usually used that are not very sensitive to uneven precipitation. So, for example, instead of continuous multi-span beams, split single-span beams are used. The overall rigidity of the building also increases with the use of monolithic reinforced concrete foundations.

Prefabricated foundation blocks are not able to redistribute efforts, therefore, if necessary, to increase the rigidity of the structure, instead of prefabricated strip foundations, monolithic strip foundations are arranged, often with a large

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number of longitudinal working reinforcement. To further increase the rigidity of buildings, a foundation is made of crossed monolithic reinforced concrete foundation beams, and in some cases, a solid reinforced concrete slab under the entire building or within a part of the building bounded by sedimentary joints. It is also possible to use prefabricated monolithic foundations.

Monolithic and prefabricated-monolithic foundations are able to redistribute stresses in structures of structures that arise during uneven settlement of foundations.

The spatial stiffness of buildings increases significantly with the construction of closed reinforced concrete belts, which are laid continuously at the level of all floors along the capital walls. In cases where a significant increase in the rigidity of the building is not required, it is possible to install reinforced concrete belts at the level of the basement floor and at the floor level of the penultimate floor. Interfloor floors should be anchored in reinforced concrete belts, the size of which is established based on the calculation. Usually, reinforced concrete belts are set with a height of 15-40 cm based on structural considerations (the height of a reinforced concrete belt is taken equal to a multiple of the brick size), the width, as a rule, is taken half a brick less than the thickness of a brick wall. In the southern regions of our country, where there is no danger of freezing through the body of a reinforced concrete belt, the width of the belt is taken equal to the width of the wall. Brick buildings with reinforced concrete belts allow a settlement 3-5 times greater than panel or block buildings.

When designing and building multi-storey structures or structures of great length, sedimentary seams should be arranged, which should separate the multi-storey parts of the structure from each other and divide the structures into rigid blocks of small size and simple geometric shape. The distances between the sedimentary joints are taken such that the part of the building located between the sedimentary joints has greater rigidity. Sedimentary joints should be arranged in structures of great length, taking into account the engineering and geological structure of the construction site.
Sedimentary seams are arranged in places where the thickness of the layer of weak water-saturated clay soils changes, in places where one type of soil is replaced by another with different deformative indicators. The part of the building separated by sedimentary seams must have an almost uniform settlement, and the settlement between adjacent sections of structures can differ significantly. The locations of the sedimentary joints are also established taking into account the internal layout of the building and the change in the rigidity of the structure along the length.

The distance between sedimentary seams in structures located on a layer of weak water-saturated clay soils is taken for brick buildings equal to 45-60 m, and for panel buildings - 20-45 m. Sedimentary seams can be removed along the length of the building at different distances.

In industrial structures, settlement joints are positioned in such a way as to highlight the part of the building with a heavier operating crane mode.

When carrying out constructive measures in industrial construction, it is necessary to provide for the creation of a stock in dimensions above the bridge cranes. This is due to the fact that the buildings of industrial workshops often have an uneven settlement, especially in those cases when they are located on weak water-saturated clay soils. At the same time, precipitation increases slowly over several years and decades. For normal operation of an industrial building with overhead cranes, it is necessary to periodically straighten the crane runways on those columns that had a draft. As a result of the lifting of the crane runways, a situation often arises in which the top of the overhead crane touches the floor trusses. In this case, it is necessary to suspend the technological process and reconstruct the workshop. When designing industrial workshops with overhead cranes, it is also necessary to provide devices for quick straightening of crane runways. For particularly critical structures, special structures and devices are required for lifting individual columns or frames of industrial workshops, as well as foundations of highly accurate machine tools.

Foundations for individual supports of high masts of power transmission lines, masts for radio and television on a layer of weak water-saturated clay soils should be connected to each other using prefabricated or monolithic reinforced concrete beams. For such structures, it is best to design pile foundations with wide grillages. In this case, it is necessary to arrange a sand cushion with a thickness of at least 20 cm under the grillage. It is also possible to use screw anchor piles.

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In the body of foundations for automatic lines, it is necessary to provide for the device of brackets or specially designed stops for the possibility of jacking up and restoring the design position of the foundation of this technological equipment, followed by concreting of the raised foundation.

III. CONCLUSION

The main constructive measure in the construction of residential five- and nine-story buildings is the use of reinforced concrete and metal belts. In this case, there is a certain overexpenditure of metal, but operating costs are significantly reduced.

Constructive measures can be assigned during the construction of buildings and structures, if, as a result of various meteorological influences, shrinkage of clay soils occurs, the destruction of weak soils at the base of the foundations as a result of improper pumping of water from the pit, with the dynamic effects of construction machines in the process of movement of mechanisms along the bottom of the pits, etc. Constructive measures should also be carried out if the development of foundation pits within the same structure is carried out to different depths or different degrees of soil destruction are observed in the foundation of buildings. In addition, if during excavation it is established that the base of the foundations is composed of soils with different properties, or a diverse occurrence of various soils is observed in it, or separate layers of weak clay soils wedge out within the contour of the structure, or within a part of the structure between deformation seams, the rigidity of the structure should be increased by constructive measures.

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