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## CARRYING OUT ENGINEERING-GEOLOGICAL STUDIES IN THE DESIGN AND CONSTRUCTION OF BUILDINGS AND STRUCTURES IN THE SALINE SOIL AREAS OF OUR REPUBLIC

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Ushbu maqolada Respublikamizning sho'rlangan gruntli hududlarida bino va inshootlarni loyihalash va qurishda muhandislik-geologik tadqiqotlarni olib boorish bo'yicha ma'lumotlar keltirilgan. Dunyoda sho'rlangan gruntlardan foydalanish vaqtida sodir bo'ladigan bino va inshootlarning avariya holatlarini baholash bilan bog'liq bo'lgan qator ilmiy tadqiqotlar olib borilmoqda. Mamlakatimizda sho'rlangan gruntlar tarqalgan hududlarda bino va inshootlarni xavfsiz, samarali ishlashi uchun muhandislik-geologik va gidrogeologik tadqiqot ishlarini olib borish bo'yicha muayyan yutuqlarga erishilmoqda.

**Kalit so'zlar:** bino va inshootlar, loyihalash, qurish, muhandislik-geologik tadqiqotlar, gidrogeologik tadqiqotlar, gruntlar.

This article provides information on conducting engineering-geological studies in the design and construction of buildings and structures in the saline soil regions of our Republic. A number of scientific studies related to the assessment of emergency situations of buildings and structures that occur during the use of saline soils are being conducted in the world. In our country, certain achievements are being made in conducting engineering-geological and hydrogeological research works for the safe and efficient operation of buildings and structures in the areas where saline soils are spread.

**Key words:** buildings and structures, design, construction, engineering-geological research, hydrogeological research, soils.

В данной статье представлена информация о проведении инженерно-геологических изысканий при проектировании и строительстве зданий и сооружений в засоленных почвенных регионах нашей Республики. В мире проводится ряд научных исследований, связанных с оценкой аварийных ситуаций зданий и сооружений, возникающих при использовании засоленных грунтов. В нашей стране имеются определенные успехи в проведении инженерно-геологических и гидрогеологических изысканий для безопасной и эффективной эксплуатации зданий и сооружений на территориях распространения засоленных почв.

**Ключевые слова:** здания и сооружения, проектирование, строительство, инженерно-геологические исследования, гидрогеологические исследования, грунты.

### Introduction

Nowadays, large-scale construction work is underway in our

country. The projecting and construction of buildings and structures in complex climatic conditions require specific



researches. Engineering-geological surveys on soil-based sections with high humidity are carried out according to a special program specified in the terms of reference. The software and terms of reference are developed jointly by the project and exploration organizations. The materials obtained as a result of the search should, in general, allow you to:

1. Quantitative assessment of the stability of the foundation;
2. Predict the value and duration of the subsidence of the base in the consolidation process.

In general, these materials should be evaluated to ensure that the high-moisture layer can be used as the lifting base material.

The program can be edited after receiving the current information by the project organization during the search. In the projecting and construction of buildings and structures in complex climatic conditions, engineering-geological surveys can include the following types of work:

1. Collection, analysis and summarization of search and previous years materials;
2. Obtaining and decoding aerospace survey materials;
3. Recognition inspection in conjunction with aerial and route observations;
4. Crossing mountain carvings;
5. Geophysical study of the area;
6. Field inspection of soils;
7. Hydrogeological research;
8. Stationary observations;
9. Study of soil and water in the laboratory;
10. Predicting possible changes in engineering-geological conditions;
11. Processing of materials in the room;
12. Preparation of technical report (conclusions) [1].

#### Literature review

During the operation of buildings and structures built on saline soils, man-made levels of underground water are formed under the structure due to natural

and artificial factors. The rise of the underground water level and the wetting of the foundation soils cause the uneven settlement of the structure, which leads to emergency situations, as a result of which excessive costs are incurred. Major researchers of the world and our country engaged in the study of the effect of the amount and type of salts in the saline ground base on its physical and mechanical properties: M.D. Braja, G.P. David, W. Kuhn, B.G. Neal, A.R. Arutyunyan, I.L. Bartolomey, V.M. Bezruk, P.B. Babakhanov, A.A. Glaz, A.I. Grot, R.S. Ziangirov, N.P. Zatenaskaya, M.F. Verusalimskaya, M.O. Karpushko, A.K. Kiyalbaev, A.A. Kirillov, N.A. Klapatovskaya, Y.V. Kuznesov, A.D. Kayumov, T.Kh. Qalandarov, S.S. Mordovich, A.A. Mustafayev, N.S. Naletova, A.E. Oradovskaya, V.P. Petrukhin, B.P. Rakhmanov, Y.D. Rozhdestvensky, A.L. Rubinshtein, Y.M. Sergeev, A.V. Sukhorukov, M.N. Terleskaya, B.T. Teltayev, N.N. Florov, R.M. Khudaikulov, V.P. Shulgina, I.K. Aimbetov, I.A. Agzamova and others[2,3].

#### Research Methodology

In collecting, analyzing and summarizing the research materials of previous years, it is necessary to pay attention to the history of development of geology of the region in the Quaternary period and data on the analogy of the district. Special attention should be paid to the generalization of data on anthropogenic impacts leading to groundwater level rise and swamping in the construction area, as well as the development of swampy, lake, lagoon, alluvial and mixed genesis deposits during route monitoring. It is necessary using different methods of geophysical research in the study of the strength of soils in the maximum volume to study the distribution and thickness of soils in high humidity, as well as in the upper part of the surface. Processing of search materials in the room should be carried out during the field work for timely editing of the survey, as well as in the process of drawing conclusions to obtain



information about the high-moisture soil layer at the base of the projected lift.

Data on the presence of high-moisture soils, their properties, distribution and properties are collected taking into account the data of previous years and the construction experience in the given area. It is necessary to use aerial photography and space survey data. In the absence of sufficient information on the distribution, genesis, thickness, composition, condition and properties of soils, as well as hydrogeological and geomorphological conditions of the study area, a reconnaissance search is established.

The composition and scope of exploration work in the plan and depth according to RST Uz 20522-95 to distinguish engineering-geological elements, normative and calculated values of soil properties, including strength and deformation characteristics; hydrogeological measurements, measurements of the intensity of development of geological processes, as well as the aggressiveness of groundwater should be sufficient to determine.

It is recommended that the scale of engineering-geological surveys be 1: 10000-1: 2000. A scale of 1: 1000 and smaller can be obtained based on the search program, respectively. The results of geophysical studies of soil thickness at high humidity first supplement the data obtained during the reconnaissance study on the inhomogeneity of its structure, the direction and velocity of groundwater, the variability of physical and mechanical characteristics of soils at high humidity.

The main types of work to be carried out at this stage of the project are: engineering-geological survey, route monitoring, geophysical surveys, sampling of wells and drilling of wells on the ground with high humidity.

It is proposed to carry out engineering-geological survey on a scale of 1: 10000-1:5000. Electro-intelligence and seismoacoustic profiling, georadiolocation are proposed as the main method of geophysical research. Drilling

wells will be drilled in the form of a 50x50 m net, depending on the size of the study area, based on aerial photography, at a distance of 150 m on both sides of the route axis. Samples are taken from high-moisture soils every 0.5-1.0 m in depth when passing sounding drilling wells. Materials on the hydrogeological order of the stratum are collected. Salinity often accumulates salts of sulfuric, hydrochloric, and carbonic acids, and in some cases, sodium and potassium salts of nitric acid in the desert. This is very harmful for most species.

### Analysis and results

The main factor in the formation of saline soils is the mineralized groundwater and saline rocks lying close to the surface. Therefore, saline soils are found in impermeable plains, deserts and hilly areas. The description of salinity is directly related to the hydrogeological and geomorphological conditions of the site. The foothills are composed of carbonate rocks, usually unsalted soils. In the soils of the foothills and valleys, water-soluble sulfates and partially chlorides are found. As the areas deepen, the amount of salt in the soil increases, in particular, under conditions of loose drainage and when the groundwater lies nearby. The importance of chlorides in the salt content of the lower reaches of river valleys is significant. As we move away from the mountains, the carbonate rocks are replaced by non-carbonate ones, followed by chloride-sulphate, sulphate-chloride, and finally chloride-type saline areas [4, 5].

The strength and compaction of soils should also be taken into account when projecting and constructing buildings and structures in saline areas. Sedimentary rocks are compressed by external forces, resulting in a decrease in their porosity and volume [5, 7].

The compression process is represented by the compression resistance, the compression coefficient, and the compression modulus.

The compression limit of rocks is equal to the value of the force expended for their maximum compression, expressed



in MPa. When soils are compacted by external forces, their particles condense and their porosity decreases.

Under the influence of external forces of soils, compression without lateral expansion is called compression. Compression is determined by reducing the volume of the soil as a result of the gradual increase of forces in the hydroproject copying device of the sample taken from the soil [8].

### Conclusion

Thus, when the amount of calcium carbonate in the soil is less than 5%, it is not decided as necessity, and when it is between 5% and 25%, the soil is called calcified. Typically, large amounts of carbonates occur in dusty soils of various origins. Ground salts can dissolve under the influence of water and other solutions and spread within the soil. The release of soluble salts from the soil is called quantity or salt leaching or chemical suffocation. When the soil is exposed to certain solutions of salts as well as acids and alkalis, it is possible to completely remove not only weak and moderately soluble, but also difficult-to-dissolve salts from the soil.

In addition, strong and moderately soluble salts (chlorides and sulphates), weakly soluble compounds (carbonates, sandstones, iron oxides) are also released as a result of long-term exposure to saline soils. They are the natural cements of soils, which determine their strength and deformation properties. Therefore, the removal or weakening of such natural cements changes the composition and structure of the soils and determines the change in their properties. In saline dusty soils with a content of easily soluble salts less than 5%, suffocation subsidence is low and of practical importance [11, 12].

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