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CONSTRUCTION OF BUILDINGS AND STRUCTURES IN SALINE SOILS

Abstract: *The article is devoted to the study of the composition, structure, physical properties of soils by salinity. When grouping by salinization of soil, attention is paid to the total amount of water-soluble salts and chloride ions. In nature, salts in saline soils are often mixed. They are called sulfate, sulfate-chlorine or sulfate-soda. Agricultural activity. Erosive salts spoil the properties of the soil, it is dangerous to build buildings and structures on such soils.*

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Introduction

Soils are subdivided according to the degree of salinity: unsalted, slightly salted, moderately saline, highly saline and saline. When soil is grouped by salinity, attention is paid to the total amount of water-soluble salts and chlorine ions. In nature, salts in saline soils often mix. They are called sulfate, sulfate-chloride or sulfate-soda. agricultural activities.

It will be necessary to stop the continuous rise of sedimentary saltwater from bottom to top through capillary paths along with the soil profile. By removing the salts accumulated in the soil, it will be possible to remove the salinity of saline soils and improve them. Saline soils cover an area of 240 million hectares, mainly in the arid climatic conditions of the globe.

75% of the country's lands are salinized to varying degrees, including those with low salinity - 1117.7 thousand ha, average salinity - 611.2 thousand ha, and high salinity - 241.6 thousand ha [1].

Materials and methods

Numerous studies and scientific literature have been conducted on the causes of damage to concrete and reinforced concrete structures under the influence of external aggressive environments and the question of their protection. Various types of concrete structures, fillers, binders used in the construction of structures and structures operated in various aggressive environments have been developed.

It is known that damage to building structures under the influence of aggressive media is called corrosion. The corrosion process is complex, and depending on the type of aggressive medium, it is divided into physical, chemical and sulfate corrosion. Three types of corrosion can occur in a structure at the same time [2].

The soils and groundwater of our Republic, including the Ferghana region, are highly mineralized, and the structures used in these zones are characterized by sulfate corrosion [3].

The main reason for sulfate corrosion is sulfate salt (SaSO4) in soil and groundwater, which, when

dissolved in water, is absorbed into the structure through capillaries in concrete and moves to an open surface. During its action, it chemically reacts with three calcium hydroaluminates (3SaO Al2O3 6N2O) in the concrete cement stone to form calcium-3 hydrosulfoaluminate (3CaO Al2O3 3CaSO4 3N2O), the volume of which increases by 2-2.5 times.

This creates large tensile stresses in the porous walls as a result of crystallization in the pores of mineral concrete, which leads to damage to the structure. When repairing structures damaged by sulfate corrosion, concrete is used from sulfate-resistant, foaming, alumina and other types of cement [4].

In recent years, as a result of large-scale irrigation and land reclamation in these areas, low-saline soils have become both water-saturated and high-salt.

As a result, the design, technological and environmental conditions in these areas are not well understood, which creates problems in the construction and operation of buildings and structures. The main factors affecting the technical condition of buildings and structures on sandy soils are:

1) incomplete and high-quality natural engineering and geological research of the project technology;

2) incorrect organization of part "0" of construction;

3) low productivity of construction works (sealing, hardening, anti-corrosion measures);

4) rise or fall of groundwater;

5) the wrong choice of foundation material and construction;

6) artificially obtained large or small sizes of the foundation;

Failure to comply with the standards of wet operation of buildings and structures (in agricultural buildings and structures) can lead to an accident in the building, resulting in great casualties. Also, exposure to external water (rain, snow, water from an irrigation system) can damage building performance. Incorrect anti-corrosion measures can lead to corrosion of the substrate. The constant flow of wastewater from the water supply and sewage systems should also be controlled. Examples of such painful causes are the uneven distribution of highly soluble salts, the absence or failure of drainage networks in the area, and the poor functioning of the drainage system. important. This is due to the fact that as a result of water filtration and absorption, materials become wet as a result of condensation of water vapour, and interaction with liquids occurs through pores [2].

When the water in the pores freezes, erosion of concrete is accelerated. The task of protecting underground structures and foundations is to prevent the connection of reinforced concrete with a negative environment. Therefore, a protective layer is installed between them. Existing regulatory documents recommend the use of hydrophobic, paint, glue, surface coatings and other materials as a protective layer [3]. However, the results of studies on the technical condition of buildings and structures built and repaired in recent years, as well as data collected during their operation, showed that the proposed methods do not give good results[1].

To prevent corrosion of building foundations in saline soils, in our opinion, it is advisable to use sealed waterproofing materials offered by local and foreign companies in recent years.

Conclusion

In conclusion, we can say the following:

The results of theoretical and experimental studies allow us to conclude that it is advisable to process waterproofing materials that leak into concrete surfaces to prevent corrosion of building foundations in saline soils. Currently, dozens of types of waterproofing materials have entered the construction market, such as Penetron, Penecrat, Hydrotex, Aquatron, Hydroxit, Kristallizol. These leaking waterproofing materials applied to concrete create a high chemical potential on a concrete surface.

Saline soils can be divided depending on the salts they contain and their amount. Soils are divided into light, medium and strongly saline soils depending on the number of salts they contain. medium and strongly saline soils are taken into account in the design process. Depending on the salt content, soils can be divided into fast-dissolving saline, gypsum and difficult-to-dissolve saline soils. Determination of the properties of saline soils is carried out mainly in specialized laboratories. In addition to its basic physical and mechanical properties, its aggressiveness to the foundation material is determined. To perform the design calculations, parameters such as the initial suffocation pressure (R_{sw}) of the soil and the relative suffocation coefficient (E_{sf}) are also determined.[11-12]

For saline soils, the design process is the same as for lesser soils. Therefore, the dimensions of the foundation are determined in accordance with the above procedure. The total subsidence value (S) of the foundation is then determined:

$$S = S + S_{sf} + S_{sei} \quad (1)$$

where: S_{sf} is the subsidence of the foundation under the influence of suffocation (leaching of salts from the soil), cm.

Additional (S_{sei}) sediments formed by compaction (S) and wetting of the working layer of the soil are detected as in lessimon soils.

Sedimentation of soils under the influence of suffocation can be determined as follows:

$$S_{sf} = E_{sei} \cdot h_1 \quad (2)$$

where: E_{sei} – (I) is the relative suffocation coefficient for the layer;

h_1 - i - layer thickness, m. The determination of the sinking (S_{sfi}) value is performed in the following order:

a) Natural (τ_{fgi}), additional (τ_{fpi}) and total pressure

($P_{cyT}=\tau_{fgi}+\tau_{fpi}$) diagrams are formed in the working layer of the soil. E_{sfi} values are accepted on the basis of the values of the total pressure corresponding to the carpets.

The calculation is continued to a depth of E_{sf} = 0.01. According to the results of the calculation, the zinc condition S≤ [S] is checked.

Water-saturated soils occupy areas close to groundwater. All types of soils found in nature can be saturated with water. In addition to the calculation of boundary conditions, the process of designing soils and foundations in the above-mentioned soils requires special engineering solutions. soils.

The main reason for the emergence of such soils is the presence of dry and hot climates and the very shallow groundwater. Sandy soils are mainly divided into soils containing highly soluble salts (NaCl, CaCl2, Na2SO4, MgSO4), gypsum (CaSO4, 2H2O, CaSO4) and carbonate soils. [10].

The design of buildings and structures takes into account the specific properties of such soils and the effect of salts on the foundation material. Depending on the composition and amount of salts in the soil and the concentration of the base material, such soils can be light, medium, saline and highly saline. In most cases, sandy soils can be divided into 4 types to facilitate design work.

Round -1 Non-aggressive or less aggressive soils for ordinary cement concrete. In such soils, the residue of water-soluble salts is less than 1.0% and 145 g / l in water, the content of sulfate and chloride ions in water is not less than 0.05% of the residue in the soil of 300 mg / l. Under such conditions, ordinary concrete can be used without corrosion protection.

Round -2 Moderately aggressive soils for ordinary cement concrete. The residue of such water-soluble salts is more than 1.0% and not less than 15 g / l in water, the residue in sulfate and chlorine soils is 0.05-0.6%. It is recommended to use ordinary cement concrete or dense class concrete with anti-corrosion measures.

Round -3 Soils with high aggressive properties compared to ordinary cement dense concretes. The residue of water-soluble salts is higher than 1.0% and 15 g / l in water. The content of sulfate and chloride ions in water is 0.6-1.2% and in water 1200-4000 mg / l. With anti-corrosion measures, it is recommended to use concrete made of dense class concrete or cement resistant to sulfate salts.

Round- 4 Aggressive primers for concrete made from all types of cement. Soils with a sulfate and chloride ion content of 1.2% and water content of more than 3000 mg / l. It is recommended to use anti-corrosion protection on concrete made of cement resistant to sulfate salts.

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