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COMPRESSION RESISTANCE OF SOILS

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Annotation. In our research, the compressive strength and deformation indicators of the soils were determined through tests. This served to ensure the correct design of foundations by accurately assessing the compressive strength of the soils.

Key words: soil, elasticity, stress, deformation, density, strength, foundation.

The compressibility of soils is a characteristic feature that significantly distinguishes them from massive rocks and other solid bodies. Compression of soils is a property that directly affects the amount of foundation laid. Soil consists of solid particles and pores partially or completely filled with water and gas. Theoretically, when the soil is compressed, the volume of all three components—solid particles, water, and gas—should decrease. Since the pressure stresses (pressures) arising in the foundations of structures are relatively small (usually from 50 to 300 kPa), the deformations of solid particles are insignificant and are not taken into account in calculations. Therefore, we can assume that the change in soil volume during compression occurs only due to the change in pore volume [1]. The decrease in pore volume is primarily due to the rearrangement of particles (compact packaging), both due to some local displacement of particles into soil pores (especially in dispersed water-saturated clayey soils) and changes in the thickness of the water-colloidal shell of mineral particles under the influence of increasing pressure, drying, coagulation, and other factors. It should be noted that for completely water-saturated soils, changes in porosity are possible only due to changes in their moisture content (extrusion and water absorption) and slight volumetric compression of gas inclusions; For water-insaturated soils, it can also occur during moisture retention. Thus, soil compression is the ability of soils to change their structure under external influences to make it more compact due to a decrease in soil porosity [2].

The compressibility of coarse-grained and sandy soils depends on many factors, the most important of which are: mineralogical composition; structural and textural properties of the soil (particle size, shape, nature of their surface, interconnection of particles and their packaging); moisture level; pressure value; deformation conditions (static, dynamic load). The mineralogical composition of sands and coarse soils affects their compressibility through particle shape, surface nature, and particle strength. The strongest impact on the compressibility of sands is the presence of mica particles in them, which significantly increase the compressibility and amount of reversible deformation of sands due to their layered shape and flexibility [3]. A significant portion of compression deformation is inverse-elastic. However, the influence of quartz, feldspar, and particle size on compression. Under load, large fractions deform more than small ones. This is explained by the fact that in soil composed of large particles, the number of contacts per unit volume is lower than in soil composed of small particles. Consequently, the amount of pressure applied to each contact will be higher for larger particles and may be sufficient to separate them, so the deformation is mainly caused by the grinding of particles and the breaking of sharp angles. The number of bonds between particles (in addition to their size) also depends on the size, shape, and degree of surface character of the particles. For the sandy fractions of other minerals, most are irreversible deposits. Crushing of non-sticky soil particles during compression. The movement of sand particles under load is accompanied by their fragmentation [4]. When compressed under various pressures, significant grinding of sand particles occurs.

The intensity of this crushing depends on the mineralogical and granulometric composition of the sands and their moisture. The splitting of the particles is accompanied by a characteristic explosion sound. Influence of the packaging density of non-cohesive soils on their

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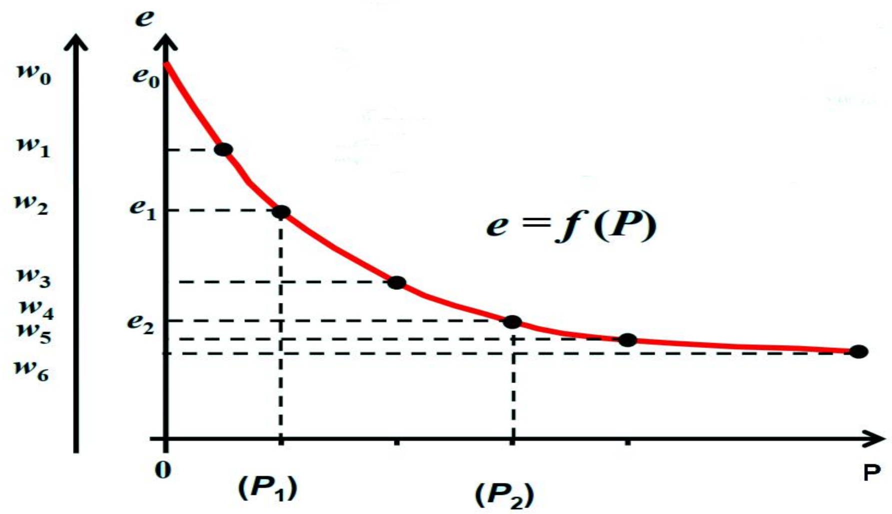
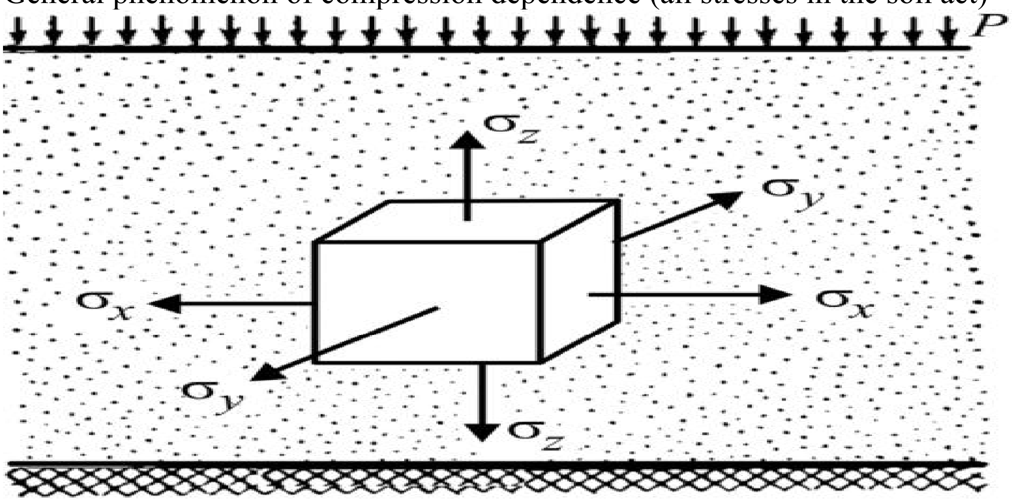
compressibility. The packaging density of sand particles strongly affects its compressibility: the higher the density, the less it is compressed [5].

Soil compression is the compression of soil to the sides without the possibility of expansion. The load on the soil is transferred gradually, maintaining each step until the deformations are completely weakened. Deformation measurements are performed using indicators. The change in the porosity coefficient is determined by changing the height of the soil sample. The dependence between the pressure value P and the soil porosity coefficient e is plotted on a graph. By connecting the experimental points, a compression curve is plotted. Compression curve when soil is compressed. When soil is compressed under load, water is displaced from the pores, and if the pores are additionally filled with air, the air is also displaced. Requirements for conducting compression tests:

- $\frac{d}{h}\leq\frac{3}{4}$samples with the following ratio of diameter to height should be used:;
- before starting the test, compress the sample with pressure from the soil's own weight ("domestic pressure");
- When testing completely water-saturated soils, water must be brought to the sample before starting the test to remove the pressure of the plane from the surface of the capillary sample.



General phenomenon of compression dependence (all stresses in the soil act)



$e_x=e_y$, $\sigma_y=\sigma_y$, $\sigma_z=P\boldsymbol{\varepsilon_x}=\frac{\sigma_x}{E_0}-\left(\frac{V_0}{E_0}\right)*(\boldsymbol{\sigma_y}+\boldsymbol{\sigma_z})$Let's accept. We determine the relative horizontal deformations in the soil as follows:

$\sigma_y=\sigma_x \sigma_z=P e_x=0 \sigma_x=\sigma_y=\mathcal{L}_0 * P \mathcal{L}_0=\frac{v_0}{1-v_0}=\frac{\sigma_x}{\sigma_z} 0< \mathcal{L}_0<1$, Substituting , and into the formula: , where; is the lateral pressure coefficient. for sands

$\mathcal{L}_0=0.25-0.37$; $\mathcal{L}_0=0.11-0.82$ for clayey soils

Poisson's ratio

$v_0=\frac{\varepsilon_x}{\varepsilon_z}<0.5$; $v_0=\frac{L_0}{1+L_0}$;

$v_0=0.30-0.35$ $v_0=0.35-0.40$ $v_0=0.40-0.45$ For sands, for suspended solids **,** for sediments **,** for clays

$v_0=0.30-0.35-0.45-0.50$

Determination of deformation modulus

Relative vertical strain can be determined using Hooke's law:

$\varepsilon_z=\frac{\sigma_z}{E_0}-\frac{v_0}{y_0} *(\sigma_x+\sigma_y) \varepsilon_z=\frac{S_i}{h}=m_v P \sigma_z=P \sigma_x=\sigma_y=\frac{P v_0}{(1-v_0)} m_v P=\frac{P}{E_0} * \left\{\frac{\{1-2 v_0^2\}}{1-v_0}\right\} \beta=\frac{1-2 v_o^2}{1-v_0} \quad \beta<1 \beta$, defined by the compaction law: , where ,; , a coefficient accounting for the impossibility of lateral expansion. For clay - 0.39; for suglinok - 0.62; for loam and sand - 0.74; for large-scale eruptions - 0.80.

$m_v = \beta/E_0$, $E_0=\beta/m_v$ Mpa. The total soil deformation modulus (Eo) is characteristic of the compressive properties (deformation) of the foundations for both elastic and residual deformations. The deformation modulus is always determined by the load on the primary branch of the compression curve. Furthermore, the modulus of strain can be determined by field test methods, such as stamping or pressometry, and in the laboratory by three-axis tests.

Conclusion. Compression resistance of soils is the ability of the soil to withstand external loads without deformation or destruction. This indicator is of great importance in the field of construction and geotechnics, ensuring the strength and long-term service of buildings and structures. The compressive strength of the soil depends on its density, moisture content, composition, grain size, and bond strength. Dense and dry soils usually possess high strength, while increased moisture, especially in clay and clayey soils, reduces compressive resistance.

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