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THE INFLUENCE OF THE ROLLER MODES ON THE LINKAGES BETWEEN PHYSICAL AND DEFORMATION CHARACTERISTICS OF COMPACTED OVERBURDEN SANDS

It's economically and environmentally advisable to use overburden and their mixtures formed during the extraction of minerals as a material for the construction of massive soil pillows [1]. Determining the mechanical characteristics of compacted rocks for the pillows in a volume sufficient for their design is associated with significant resource costs [2]. However, it has been found that correlation or even functional dependencies can be obtained between mechanical properties and physical condition of rocks under certain conditions [3].

The condition of the linkages between physical (humidity W , porosity coefficient e) and mechanical soil parameters (specific penetration resistance R , internal friction angle φ , specific cohesion c , deformation modulus E) is the accumulation of test data to determine these characteristics with respect to the plasticity and homogeneous genetically [3]. The determination of the coefficients of the correlation equations with each array of experimental data is usually performed by the least squares method, with the calculation of the correlation coefficients, the variations coefficients and measurement errors.

Determination of the correlation equation coefficients for each array of test data is usually performed by the method of least squares with the calculation of the correlation coefficients, variation

coefficients and measurement errors. The imperfection of standards for the design and construction of pillows is the lack of requirements for determining the mechanical properties of compacted rocks. It is possible correlation or functional dependencies between their mechanical and physical properties. These dependencies for small-connecting overburden have hardly been investigated. The effect of rolling technology (parameters and mechanism mode; number of passes per track Δh ; initial layer thickness h) on the mechanical properties of rocks has not been established.

Therefore, for the practice of designing sand pillows it is important to investigate the influence on the mechanical properties of compacted rocks of the parameters of the mechanisms (parameters and mode of the mechanism; the number of passes per track; the initial thickness of the layer). The situation at the site on the Vorskla Steel metallurgical plant was characteristic. It was planned to be built on the basis of modern nature and resource-saving technology of the Austrian company "Voest Alpine Industrienanlagenbau". For artificial mass, the overburden (sandy shallow and medium size) for the quarries of the Yeristovsky and Lavrykovsky iron quartzites deposits near the Horishni Plavni town of Poltava region was used.

Field studies of the influence the technological parameters of rolling of sand pillows layers (static or vibration work mode and roller mass, number of passes in one trace) on regularities of interrelation of physical and deformation properties of compacted overburden, in particular, for fine, homogeneous sand were carried out within such limits: 1) single drum self-propelled vibrating roller NAMM 3520: 12 passes in vibration mode; 8 passes in vibration mode; 6 -in vibration mode; 5 - in vibration mode; 4 - in static mode; 2) single drum self-propelled vibrating roller Vibromax VM132: 4 passes in vibration; 4 -in static mode; 3) single drum self-propelled vibrating roller ATLAS 1140: 8 passes in vibration mode; 4) trailed pneumatic roller DU-16: 4 passes; 5) combined rolling: DU-16 roller for 4 passes and NAMM 3520 rollers for 6 passes in vibration mode or Vibromax VM132 for 6 passes in vibration mode.

A statistically substantiated linkages between the physical and mechanical properties of rocks has been obtained, taking into account the influence of the parameters of the rolling, the volume of soil

characteristics determinations (granulometric composition, w, ρ_d, E) and the technological parameters of rolling ($h, \Delta h$, static or vibration mode) for: shallow sand -humidity - 314; small, homogeneous sand with sandy loam -144; medium size, homogeneous sand - 61; the measurements number of roller passes with one track - 45; the measurements number of the thickness of the deposited layers - 45.

The possible influence the type and mode of rollers operation on the dependence patterns of the modulus of deformation of the soil on its specific volume of the skeleton $\lg E = f(1/\rho_d)$ for fine, homogeneous sand, for the humidity intervals is investigated by drawing on the graphs of the symbols of each of the above technological modes of rolling the sand pillows layers. Similar graphs were obtained for fine, homogeneous sand with impurity of sandy loam and medium uniform sand.

It can be seen from them that for each type of compacted overburden, regardless of the technological regime and the mass of the roller, the the deformation modulus increases linearly at the specific volume of the soil skeleton decreases.

The the coefficients of variation of virtually all the correlation equations beetwen physical and mechanical properties of the sealed, small-connecting overburden do not exceed $v=0,20$ and the correlation coefficients are greater than that $r=0,85$, which proves that the empirical expressions are correct.

Therefore, under whatever rolling technological parameters, a certain value of the density of the skeleton of the soil ρ_d would not be obtained, for a sand of a certain particle size distribution (and for the same pressure interval in the process of compression testing of specimens) a certain value of the modulus of deformation corresponds.

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