

Protection of pile foundations in seasonally frozen soils

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The territory of Kazakhstan belongs to flat lands by the landscape type. Although there is mountain landscape type in the East and in the South. It is mainly presented by sandy loam and loamy soils which are quite susceptible to the frost heaving. Frost susceptibility of soils is the main group parameters which is very important for determination and construction of foundation beds at a suitable depth. The incorrect laying of foundations bed may lead to the loss of stability or to large non-uniform deformation of the latter ones. The freezing depth is used in order to determine the laying of foundations bed in Kazakhstan, the depth for foundations bed laying is designed due to its determination and groundwater level [1]. The application of chemical agents for frost retreat in the frozen soils appears as a concern of investigation. “BIONORD” agent is one of them. The excavation pit of a building under construction was selected as an object of study. The piled foundation was selected as a foundation type in the design of a building under construction. The ambient air temperature reached -18-20 °C at the time of scientific research activities. The soil frost depth was at 0.8-1.2 meters. The application of chemical agent may be carried out in two methods, dry and wet. Under dry method the chemical agent was spread over the frozen soil surface in its natural state (loose granules) by 1.0-1.5 cm layer. The wet method implied previously prepared aqueous solution: water - agent under 1:1 ratio [2].

Based on the study findings, the wet method for chemical agent application is effective under ambient air temperature over -20°C as this method provides much deeper frost retreat in the soil. Implementation of the proposed method of thawing frozen soil provides high productivity driving reinforced concrete piles without the risk of their destruction. At the same time, there is no need to use more powerful expensive hammers for driving piles to frozen soils. The investigation presented in Figure 1-3.

Источники и литература

- 1) Шахмов Ж.А., Тулебекова А.С. О закономерности промерзания грунтов по глубине // Республиканская научно-практическая конференция, посвященная 15-летию ЕНУ им. Л.Н. Гумилева. 2011 г. Строительство, архитектура и транспорт. Астана, 2011.
- 2) Zhussupbekov A.Zh., Shin E., Ch., Shakhmov Zh., Tleulenova G.T. Estimation of the bearing capacity of pile foundations in seasonally freezing soil ground //The second GI-KGS joint workshop on TC. Orlando, USA, 2018.

Иллюстрации



Рис. 1. Preparatory work for testing reagent



Рис. 2. The application of chemical agent



Рис. 3. Wet method