THE NEED FOR IMPROVING METHODS FOR CALCULATING SLAB FOUNDATIONS WITH A BASE IN THE PRESENCE OF SWELLING SOIL LENSES

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The article discusses the problem associated with the need to improve existing methods for calculating foundations with a base in the presence of lenses of swelling soil. The purpose of this article is to analyse, evaluate and summarize the results of research by scientists in this field.
Keywords: swelling soils, force interaction, uneven deformations, lenses of swelling soil, stress-strain state.

Various of clay soils of solid and semi-solid consistency increase in volume when soaked in water. Such soils are considered swelling soils. During the swelling process, the soil surface rises, which leads to deformations, usually uneven, and sometimes to the destruction of buildings and structures. In addition, when soils swell, they can exert additional lateral pressure on enclosing structures.

Research in the field of force interaction of slab foundations with the foundation in the presence of swelling soil lenses will allow us to identify the causes of damage to foundations and buildings and to develop an effective method for calculating bases and foundations in the presence of swelling soil.

Research in the field of studying the processes of swelling of clayey soils was carried out by many domestic and foreign scientists, including: N.M. Gersevanov [2], E.M. Sergeev, E.A. Sorochan [7], A.A. Mustafaev [5], A.M. Samedov [6], R.L. Lytton [4], Z.G. Martirosyan [8] et al.

The purpose of the research is to use the results of experimental and theoretical studies to identify the features of the force action of slab foundations with a base in the presence of lenses of swelling soil with subsequent improvement of the existing methodology for calculating bases and foundations on swelling soils.

As an experimental study, modeling of the foundation slab will be performed with the application of swelling pressure on the soil tray. Simulation of swelling pressure under the foundation slab will be done using a soccer ball with a uniform air supply with a compressor.

The force interaction of building structures with a foundation composed of swelling soils was studied in the scientific works of D.G. Kuznetsova [3], A.A. Mustafaeva [5], A.M. Samedova [6], Alafar Khalil Said [1].

R. Lytton [5] in his work considers two situations of design schemes with different locations of swelling sites. According to his experimental and theoretical studies, the most dangerous combinations of internal forces and deformations arise in the foundation. The first option represents swelling areas located along the edges of the foundation and causing maximum deformations in the center of the foundation (Fig. 1, a). In the second option, the swelling points are located under the central part of the foundation and cause maximum deformations along the edges of the foundation, as in a cantilever beam (Fig. 1, b). When choosing calculation schemes, R. Litton analysed the operation of strip foundations, therefore the applicability of the described calculation schemes for slab foundations requires additional research.

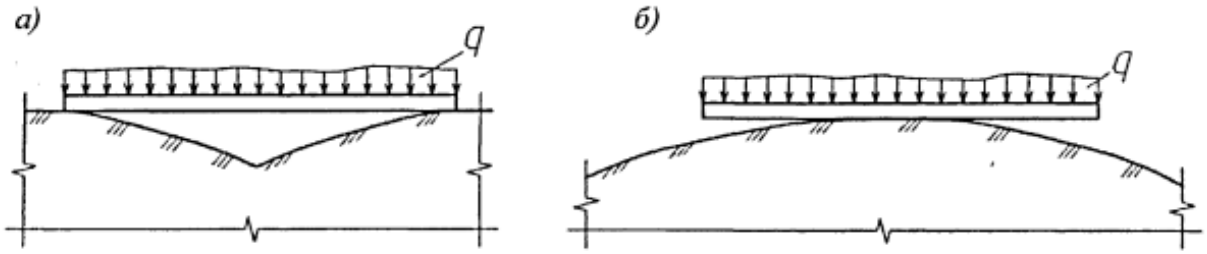

Figure 1. **Design diagram of a strip foundation for cases of swelling of foundation soils under the end sections (a) and under the center (b)**

It should be noted that there are no theoretical and experimental studies with the option of placing a lens of swelling soil on one side of the foundation.

Previously conducted investigations of the deformation of clay swelling soils, studied by other authors, did not address in detail the topic of the influence of swelling soil pressure on the punching of foundation slabs.

A.A. Mustafaev [5] in his work concluded that the currently used «variable bed coefficient» model is not sufficiently substantiated, since it does not take into account the nature of the subsidence of the contact plane of the foundation rigidity and the design features of the structure above it.

In [1], Alafar Khalil Said proposed a structure and classification of methods for controlling geomechanical processes during the development of underground space in conditions of a swelling soil-rock mass, taking into account the specific deformation of a mass of swelling clay soils depending on the influence of weather and climatic factors.

To summarize the above mentioned data, it can be noted that today, research in the field of the operation of bases and foundations in the presence of swelling soil at the base is based on theoretical methods. Experimental studies by previous scientists have a number of significant shortcomings, since they do not take into account the interaction of the foundation structure with a deformed foundation and therefore do not claim to be sufficiently accurate. The number of full-scale experiments using modern scientific equipment is negligible. Consequently, there is a need to improve methods for calculating bases and foundations in the lenses presence in the base of swelling soil.

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НЕОБХОДИМОСТЬ УСОВЕРШЕНСТВОВАНИЯ МЕТОДИК РАСЧЕТА ПЛИТНЫХ ФУНДАМЕНТОВ С ОСНОВАНИЕМ ПРИ НАЛИЧИИ ЛИНЗ НАБУХАЮЩЕГО ГРУНТА

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В статье рассматривается проблема, связанная с необходимостью усовершенствования существующих методик расчета фундаментов с основанием при наличии линз набухающего грунта. Целью данной статьи является анализ, оценка и обобщение результатов исследований ученных в данной области.
Ключевые слова: набухающие грунты, силовое взаимодействие, неравномерные деформации, линзы набухающего грунта, напряженно-деформированное состояние.

ИНФОРМАЦИОННЫЕ ТЕХНОЛОГИИ И ТЕЛЕКОММУНИКАЦИИ

ОБЗОР ПОДХОДОВ К УПРАВЛЕНИЮ ИНФОРМАЦИОННЫМИ РИСКАМИ

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Обзорно рассмотрены различные подходы к управлению информационными рисками, включая традиционные и современные методики. Освещены основные этапы управления информационными рисками, ключевые принципы и рекомендации для повышения защиты информационных ресурсов организации.
Ключевые слова: информационные риски, защита информации, информационная безопасность, риск-менеджмент.

Управление рисками входит в общую систему управления организацией и использует ту же модель процессов, что и другие стандарты управления. Эта модель включает четыре группы процессов: Планирование, Реализация, Проверка и Действие (ПРПД), отражающие стандартный цикл управления. При внедрении информационных технологий