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j1103-001

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FEATURES OF ENGINEERING GEOLOGICAL SURVEY FOR KARST TERRITORIES OF PERM KRAY

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ОСОБЕННОСТИ ИНЖЕНЕРНО-ГЕОЛОГИЧЕСКИХ ИЗЫСКАНИЙ НА КАРСТООПАСНЫХ ТЕРРИТОРИЯХ ПЕРМСКОГО КРАЯ

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Annotation. Different types of surveys and studies of soils with geotechnical investigations are examined. We consider the development of karst in Perm and the Perm region, as well as its influence on agricultural activity.

Keywords: karst processes, engineering survey, soil investigation, karst, Perm kray.

Аннотация. Рассмотрены различные виды наблюдений и исследований грунтов при инженерно-геологических изысканиях на карстоопасных территориях. Рассмотрено развитие карста в Перми и Пермском крае, а также его влияние на хозяйственную деятельность.

Ключевые слова: процессы карстообразования, инженерные изыскания, исследования грунтов, карст, Пермский край.

Perm region territory is considered to be quite complex in terms of the adaptation of engineering-geological conditions of a planning activity, complex soil strata creates additional problems in the construction. Besides, in the Perm region are common exogenous geological processes, including karst. Therefore, buildings and structures in such areas should be given special attention, it must be reliable construction, which can be confirmed by the engineering and geological research.

The main purpose of geological engineering survey is evaluation of geologic factors that affect the engineering of human activity, the process of formation and regularities of these factors, as well as the process of change in the system of "geological environment - engineering structures."

Special attention during geotechnical investigations should be given to the collection of information engineering – survey of karsts, etc [1]. These methods can reduce the volume of engineering research, as well as to make the work more efficient. The collection of information should include the collection of information on the previous geological engineering research, aerospace surveying the territory, engineering mapping, the research literature on the projected area, etc. Based on this knowledge it is possible to estimate the complexity of the engineering-geological conditions, compiled research program for this project, defined methodology, technology and volumes of research works.

One of the basic methods of investigations is geophysical surveys karsts using seismic and electrical methods. Seismic method has already proven itself as the most informative profitable in difficult geological conditions. Addition is a seismic seism-



acoustic monitoring of inhomogeneities in the foundations and bases [2]. These methods are aimed at improving people's health and safety. Seism acoustic control allows not only to reveal the structure of the array of soil, but also to assess the existing violations with respect to the addition of ground facilities of sizes. Consider patent VV Ilchenko, method of resonance-speed seismic survey [3].

The essence of the invention is to combine the excitation and detection in the same place, which increases the accuracy of the study. The main parameter is frequency. Its change is monitored by devices, revealing an array of geomechanical properties of the soil, the propagation velocity of vibrations and structure of the array.

The next of these methods is excavation mining which is the main direct way to determine the extent of karst construction site. Mining production is artificial cavity in the rock mass. The method of penetration should be selected on the basis of geological, economic features and can be mechanized, manual with entrenching tools or drilling and blasting.

With hydrogeological studies it is possible to determine the presence and position of the aquifer, the chemical composition of the water and the water's ability to break down rocks (aggressiveness). The complex of hydrological research includes a variety of works - from the water pumping and finishing geophysical observations.

The main element of the checking the status of species, as well as in determining the karst is stationary observations. Such studies need more time - at least a year or season hydrological process of manifestation. regime geophysical surveys are often used. Their essence is observation the points permanently fixed in the same place through sensors.

Do not forget about the geodetic observations that allow us to determine the state of soil and to find out if they are resistant. The research results are collected and constantly replenished. Later, on the basis of results technical report of substantiating karst areas and possible changes. Is established currently, distribution is received by satellite geodetic measurements. The essence of such measurements is to determine the distance from the receiver a navigation system (GPS / GLONASS) to the satellite. The satellite may conduct studies in which the receivers are in place, their position in space is known. This type of measurement is accurate enough, but it needs a long time. The survey data is more expedient to use in the construction of geodetic networks. In another case, the receiver uses two studies, one of which is fixed in place with given coordinates, and the other moves on the points. This method can be used in surveying and surveying.

Besides all of the given above, the following methods are now actively used: total stations, electronic theodolites, laser scanner, satellite systems, and the use of unmanned aircraft.

All these engineering-geological surveys are used to determine the degree of karst Perm region. In addition, aerokosmofotomaterialy (AKFM) is used in the Perm region. [4] The nearest AKFM holders are JSC "PermNIPIneft" and the Ural branch of the Federal State Unitary Enterprise "Goszemkadastrsyomka" -VISKHAGI. The results of these studies allow us to determine the features and behavior of the relief dynamics, morphodynamics karstoproyavleny, frequency and characteristics of their formation, to identify tectonic shifts. The urban development of the territory from the



results of these studies depends on, i.e., size, economic structure, types of industrial enterprises of the village. For example, Kungur is the karst hazard town in the Perm region. This city is known for 121 karst cave, the total length is over 13 km. Despite the fact that Kungur is so much more dangerous than other settlements of the Perm region due to the presence of karst, karst number of failures increased during 30 years, the number of failed processes has increased more than 2 times. The data obtained in the course of investigations is extremely heterogeneous, but they can be guided in the development of project documentation. Of course, karst Perm region affects the agricultural activity of the Perm region, increases the number of emergency situations, but do not forget about the importance of engineering studies, as well as the need for reference standards for this area. Karst deformation can be provided, and determine the optimal and effective measures to preserve the existing relief and ensure the normal life of the residents [5, 6, 7].

Conclusions: 1. The existing traditional methods of engineering and geological surveys to determine the caverns is not always possible to accurately determine their position and size. 2. It is necessary to use modern additional studies based on new physical principles to improve the reliability of geological engineering survey on the karst areas

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