Research on Geotechnical Investigation and Construction Technology of Construction Engineering

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Abstract. This article mainly analyzes the technical practice of construction engineering geotechnical survey and construction treatment. This project describes the practical significance of geotechnical engineering survey for construction engineering. It analyzes the surveying techniques commonly used in current geotechnical surveys, such as geological surveys, surveying and mapping, and prospecting. Take a construction project as an example to illustrate the application of engineering geotechnical survey and processing technology. This study can provide reference and reference for construction engineering geotechnical survey work.

1. Introduction
In recent years, with the continuous advancement of my country's urbanization process, the number of construction projects within the city has gradually increased, which has promoted the development level and quality of the construction industry. The geotechnical survey is a key part of construction inspection of construction projects, and construction units are required to increase their emphasis on geotechnical engineering surveys to provide guarantees for the stability and safety of construction projects.

2. Significance of construction engineering geotechnical survey and construction treatment
Before the design and construction of the construction project, the survey unit needs to perform reasonable geotechnical survey operations on it. If the geotechnical survey of the construction project is not carried out by the standard procedures, it will directly affect the design of the construction project and the quality of subsequent construction.

The construction scale and scope of construction projects are gradually increasing, which will be affected by regional geological conditions. To promote the orderly construction of the project, it is necessary to focus on the characteristics of foundation rock and soil layering, pay attention to the physical properties of foundation rock and soil, understand the surrounding geology and topography of the construction project, and grasp the current distribution of water in the area. As an important foundation of construction engineering, the geotechnical survey is the main component of engineering projects.

At present, the internal geotechnical survey of my country's construction projects has achieved remarkable results, but there is still much room for improvement. Construction companies should rationally optimize the geotechnical survey technology. In the process of construction engineering geotechnical survey, the following key points need to be paid attention to First, before the geotechnical survey begins, you should understand the topography and landform of the area where the
A construction project is located, including the depth of the rock and soil, the actual constituent elements, etc., to ensure the construction stability of the construction project. Second, the location of river channels and hidden air-raid shelters should be determined to reduce the impact of other factors on construction projects. Survey the surrounding environment of the construction project and provide the design unit with more accurate geotechnical parameters.

Explore the factors that affect the stability of construction projects to avoid serious consequences. Finally, to ensure the smooth progress of the construction project, the surveyor must understand the hydrogeological conditions of the site and provide the design unit with more accurate hydrogeological design data.

When analyzing the hydrogeological data, it is necessary to understand the impact of groundwater on the construction project and make a comparative study. Perfect plan. Prospectors need to analyze from the perspective of construction engineering, explore the impact of groundwater on construction projects, improve the accuracy of construction judgments of construction projects, and improve the reliability of building foundations. If there is a silt layer on the surface of the foundation compression layer of a construction project, the survey personnel should pay attention to the phenomenon of quicksand and piping, and implement reasonable operations.

3. Construction technology for defective foundations of construction projects

3.1. Cushion replacement treatment technology
The actual construction of most construction projects needs to be carried out on the basis of soft soil foundations. In order to improve the treatment quality of soft soil foundations, soft soil foundations should be effectively treated. The construction unit can take the way of replacement of cushions for treatment. Cushion replacement is often used in uneven soil layers and shallow soft soil layers. Cushion replacement treatment technology can be divided into mechanical assisted construction and manual construction. In both methods, the shallow soil needs to be excavated first and filled with a certain amount of gravel to improve the stability of the foundation of the construction project. When using the cushion replacement treatment technology, the construction unit should select suitable fillers based on the depth of the landfill. If the project foundation depth is more than 1m, in order to make the building foundation more stable, it is necessary to incorporate some synthetic materials into the cushion, expand the foundation pressure angle, strengthen the foundation bearing capacity of the construction project, reduce the bottom pressure of the cushion, and ensure the rigidity of the foundation. Avoid uneven settlement in construction projects. During the construction of the soft soil foundation of the construction project, the construction unit can drain the water in the soft soil through electroosmosis drainage, put the metal electrode into the soft soil, and use the direct current to convert the internal water of the soft soil from the anode to the cathode to promote water is discharged.

3.2. Drainage consolidation treatment technology
Drainage consolidation construction treatment technology is to use vertical drainage wells to drain all the water existing in the soil voids under a certain bearing capacity, reduce the voids existing in the soil, and increase the stability and strength of the foundation. Under normal circumstances, the pre-compression methods used are mainly stack pre-compression, vacuum pre-compression, and precipitation pre-compression. Stacked preloading can stack appropriate soil and gravel on the foundation of the construction project to improve the preloading effect. If the stacking load exceeds the actual bearing load, it will become over-loaded preloading. Vacuum preloading can use atmospheric pressure to achieve preloading. When the construction engineering foundation soil is pumped, a vacuum can be formed in the soil, so that the difference between the atmospheric pressure and the vacuum force can be drawn out, and the moisture present in the soft soil can be pumped out. Enhance the foundation stability of construction projects. Preloading of precipitation requires the use of a water pump to introduce the foundation water of the building below the groundwater level to enhance the bearing capacity of the soft foundation of the building.
3.3. High-pressure jet grouting treatment technology

The high-pressure jet grouting treatment technology requires construction personnel to implement drilling treatment with the aid of a drill, place the grouting pipe in a reasonable position, and use high-pressure equipment to make the slurry form a high-pressure jet. The grout will damage the surrounding soil when it is sprayed. The paint existing in the soil will gush out with the grout, and the ungesushed part will be mixed with the grout under the combined action of impact and gravity. The original proportions should be arranged in a reasonable manner. After the slurry is solidified, a composite foundation is formed, which enhances the bearing capacity of the foundation of the construction project and avoids deformation of the foundation. When dealing with soft soil foundations for construction projects, construction workers need to choose reasonable construction techniques based on the construction scale and geological conditions of the project, so as to promote the sustainable development of the construction industry while improving the stability of the foundation of the construction project.

4. Examples of engineering geotechnical investigation and construction treatment

4.1. Overview of the project

This construction project adopts detailed survey method. The project includes 6 high-rise buildings and 3 underground garages. The planned area of the project construction land is 32345.23m², and the actual planned construction area is 108543 m².

Topography: The topography of the construction area is relatively flat, with small fluctuations. The actual topography is high in the west and low in the east, high in the south and low in the north. The elevation of the orifice is 11.32-18.06 m. This project is an important first-class project, the surrounding construction sites are relatively complex, and the foundation design level is second-level, combined with the analysis of the geotechnical survey influencing factors of the project, the geotechnical survey level is A-level.

4.2. Layout of geotechnical survey work

The construction project was implemented in multiple stages, with a total of 73 inspection points, including 42 high-rise survey points and 30 commercial survey points. Some high-rise survey points can be shared with garage survey points. In the process of arranging the exploration point, it needs to be close to the corner points around the building. The exploration point of the high-rise residential part can be placed in the center of the building. Combined with some possible pile foundations, the space between the exploration points should be ensured to be 24 m. Within the area, garages and businesses are set up in grids, and the distance between exploration points does not exceed 30 m. Limited by the surrounding site conditions, the layout of the exploration points around the excavation of the foundation pit and the outside needs to be based on basic data.

The layout of the exploration points includes borrow holes, dynamic exploration holes for borrowing, through holes for borrow marks, and wave velocity test holes. For high-rise buildings, the control hole depth and the exploration depth must be higher than the foundation deformation depth. Generally, the hole exploration depth must be greater than the depth of the stressed layer. When using pile foundations, the control hole exploration depth needs to be about 3 times below the pile end plane.

The hole exploration depth should be 3 times deeper than the pile tip plane. In the actual operation process, it is necessary to make the hole 6m into the weathered bedrock and make the control hole not less than 8m. In order to make the exploration points around the underground garage meet the foundation pit specifications, the depth of the exploration points should be greater than the excavation depth of the foundation pit, usually twice the depth of the excavation of the foundation pit. The depth of the exploration point in the middle position should meet the bearing capacity requirements. After the controlled borehole enters the moderately weathered bedrock, its penetration depth should not exceed 7m, and the general borehole must be greater than 5m to enter the weathered bedrock.
4.3. Selection and application of survey methods

The survey unit designs the survey plan, and analyzes the characteristics of the proposed project in combination with the corresponding specifications and exploration standards. To reasonably arrange construction exploration points and formulate reasonable exploration plans, it is necessary to fully grasp the actual project conditions, surrounding geological conditions, and hydrological conditions. After determining the geotechnical survey plan, it can be combined with the reference points provided by the customer for positioning review. After the thickness review is completed, the survey and release work can be carried out to keep the survey points and survey and release accuracy within 10 cm.

Drilling equipment can be used for drilling construction, dry drilling can be used for backfilling and the upper part of the water level, and mud wall protection can be used for construction under the water level and rock layers.

In order to enhance the drilling speed of the rock layer, alloy drill bits can be used, and the depth of each drilling must be kept at about 1 m, and the hole diameter should be kept at 110 mm. When drilling into rock formations, double core pipes can be used to cooperate with a drill bit with a diameter of 75 mm to ensure that the number of times does not exceed 2 m, and the RQD value of the rock is determined to provide data guarantee for rock quality judgment.

After the drilling construction is completed, the borehole can be effectively backfilled, and the original soil can be used for tamping backfill, so that the layer thickness of each layer of backfill is less than 0.5 m, and the density after backfilling should be greater than the original density. Carry out the standard penetration test in the process of geotechnical survey. For the silty soil and sand layer existing in the construction site, reasonable in-situ tests should be taken to lay the foundation for testing the bearing capacity and compactness.

The drill hole is used as the test hole in the field exploration, and the probe rod with a diameter of 42 mm is used to avoid relative bending greater than 0.1%. During the test, an automatic decoupling drop hammer device can be used, and the hammering frequency is 15-30 hits/min. Before the test, the deposit at the bottom of the hole should be less than 5 cm, and the penetration probe should be penetrated according to the test depth set in the previous period to complete the test device.

5. Conclusion

In summary, geotechnical survey construction is an auxiliary link in construction engineering, and the selection and use of geotechnical survey technology will have an impact on the quality and safety of construction engineering. In this regard, the construction unit should improve the management quality of geotechnical survey, strengthen the analysis of geotechnical survey technology, select suitable geotechnical survey technology in combination with the construction geological conditions of the construction project, and adjust measures to local conditions to lay the foundation for the stable construction of the construction project.

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