

Application of Foundation Pit Drainage Construction Technology for Water Conservancy Projects

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Abstract:

As an important project in China's public undertakings, water conservancy projects are closely related to people's livelihood. As an important part of the water conservancy project, if there is a problem in a certain technical aspect of the foundation pit drainage, it will cause serious damage to the water conservancy project and hinder the quality and efficiency of the water conservancy project. Therefore, continuously improving the construction technology of foundation pit drainage in China is conducive to the further construction of water conservancy projects in China and improving the quality and efficiency of water conservancy projects in China.

Keywords:

Foundation pit drainage construction technology; hydraulic engineering; application

1. Foundation pit drainage

1.1 Analyze and inspect the foundation soil quality of the actual construction site

In the process of water conservancy building construction, the foundation type is divided into two types, weak permeable foundation and strong permeable foundation, and the main difference is the drainage requirements. Before the construction of water conservancy projects, methods such as hand drilling and manual digging should be used to sample and analyze the soil quality at different positions of the foundation, so as to provide a good working foundation for the excavation of foundation pits. Due to the uneven soil quality of the foundation pit or the difficulty of construction in places along the river, the construction treatment should be carried out in combination with the actual situation during excavation to ensure the quality of the project.

1.2 Specific type of foundation pit drainage

1.2.1 Initial drainage. Before excavating the foundation pit, arrange the preliminary drainage work of the foundation pit in detail, remove the water accumulation layer inside the foundation pit, and intercept the external water. The main types of external water interception work: (1) intercept spring water or stream water around the foundation pit to prevent it from flowing into the foundation pit; (2) set up a water interception ditch 5m away from the foundation pit perimeter to collect rainwater into the water interception ditch to prevent the formation of water accumulation in the foundation pit. The treatment can effectively prevent the phenomenon of slope imbalance in the excavation process and increase the displacement of the foundation pit.

1.2.2 Drain again. After the completion of the excavation of the foundation pit, it is necessary to conscientiously do a good job in drainage. Discharge all the wastewater, foundation seepage, natural precipitation and cofferdam seepage in the construction process, improve the slope stability of the water conservancy project, prevent the phenomenon of quicksand and piping in the fine sand and silt soil layer, prevent the underground water from lifting up the bottom of the cohesive soil foundation pit inside the foundation pit. These provide good conditions for the later dry land construction and the quality of the main body of the water conservancy project is guaranteed to meet the construction design standards.

2 Measures for foundation pit drainage construction

2.1 Excavation and drainage construction of open ditch

2.1.1 When carrying out foundation pit drainage work, it is necessary to make full use of the topography around the foundation pit and apply the principle of high water to low flow. Dig an open trench to ensure that the stagnant water in the

foundation pit is completely discharged and flow into the catchment area, and then use a pump to pump out the collected stagnant water.

2.1.2 In the process of foundation pit drainage, if the area of the foundation pit is larger, the bottom is deeper, the water level is too high, and the soil quality is poor, it is necessary to take advantage of the topography to effectively guide the water to exclude, and the contour line should be scientifically and reasonably used to promote the drainage of pit water.

2.1.3 When draining the foundation pit, if the scope of the foundation pit is small, the longitudinal method can be adopted in the excavation of the drainage ditch, the use of the first up and then down the way of foundation pit drainage. In the process of foundation pit drainage, the horizontal ditch should also be excavated, and the water in the horizontal ditch should be guided to the longitudinal ditch, and the water should be collected and then collectively discharged.

2.2 Use landscape drainage system to reduce groundwater level

Water seepage will occur during foundation pit excavation, which will lead to the rise of water level and affect the dust at high places, and the problems of quicksand or piping will occur, which will seriously affect the quality of water conservancy projects. The pipe gushing is mainly caused by the high groundwater level, and the slope of the foundation pit is greater than the specific standard of dust, resulting in the flow of dust and sand and gravel with water, and the sand and gravel and dust are lighter. Therefore, the uneven flow reduces the slope of seepage and leads to piping. In the concrete construction of water conservancy project, the groundwater level in the foundation pit should be strictly managed, and the well pipe construction technology should be carefully studied. The main tools used in well pipe construction technology are drilling tools and caisson tools, and the more traditional one is the cauldron forging hole. When the diameter of the outside of the well pipe is about 50cm, the diameter of the cauldron forging hole should be 80cm, and the mud of 1.1 ~ 1.2 gravity should be used for wall reinforcement work to effectively control the collapse of the well wall. During the construction of the cauldron forging hole, the well pipe mouth should be higher than the mud position in the hole, and the groundwater level should be lower than the mud surface in the hole. The borehole depth meets the design value to lower the well pipe, put the concrete bottom pipe into the well pipe, and then lower the concrete well pipe. In the process of placing the well pipe, the fine steel wire should be passed through the bottom suspension ring, and the buckle should be set, and the well pipe should be fixed by inserting drill. Apply a cementing agent at 170 ° C to each pipe above the surface. Wrap the pipe connecting points with glass wire or a sack sheet. The exterior is fixed with bamboo or wood, and tied with No. 14 lead wire to ensure the stability of the well pipe. The bottom of the pipe should be filled with yellow sand, gravel and fine gravel, the thickness of 0.5m, and the drill hole and the joint between the pipe should be backfilled with fine gravel and coarse sand, the thickness of more than 10cm.

2.3 Silt and silt foundation

In the construction process of water conservancy project, it is necessary to carefully analyze the silt and silt foundation to ensure the rapid decline of groundwater in foundation pit. Silt and silt foundation are mainly located at the highest point of the water level line, and will be affected by the water seepage force in the excavation process, resulting in piping and quicksand phenomenon, which brings great troubles to the drainage work of the foundation pit. Therefore, in the process of foundation pit drainage, the groundwater level should be reduced, the use of jet drainage, improve the foundation pit structure and other forms to prevent piping problems. However, the measures to improve the gravel filter layer can not be adopted in the form of laying wood tip and slowing down slope. Because the above measures will cause the engineering cost and engineering quantity to increase greatly, and seriously affect the drainage speed of foundation pit, the quality of water conservancy projects also has a great impact.

3 Application of construction technology for pit drainage

3.1 Foundation construction technology

In the actual construction process, there are great differences in the composition of soil in different construction sites, among which silt is the most common. This kind of soil has a low plasticity index, coarser particles, smaller specific surface area, and lower clay or hydrophilic mineral content, resulting in strong water seepage capacity. If the content of silt in the soil is high, it will be affected by the groundwater level, which will increase the probability of quicksand in construction and increase the difficulty of construction. Therefore, when excavating the foundation pit of this type of soil, the construction personnel should pay attention to the above problems and strengthen the monitoring of groundwater. According to the actual situation, reasonable control is carried out to ensure that it is in a normal state, avoid the impact of groundwater on the soil, so that the construction can proceed normally and speed up the construction progress. In addition, when the foundation pit slope is constructed, the slope should be

slowed down appropriately. However, when using this method to deal with foundation pit, it will increase the task amount of the project, increase the input cost, and will have a certain impact on the performance of the foundation pit, which is not conducive to the subsequent construction. Therefore, it is necessary to strengthen the research of this technology and solve its problems thoroughly.

3.2 Well pipe construction technology

When using well pipe construction technology for drainage, mainly through drilling tool construction method. First of all, according to the actual situation of the foundation pit, set a reasonable drilling point, and choose a reasonable drilling tool according to the outer diameter of the well pipe. Under normal circumstances, the outer diameter of the well pipe used in hydraulic engineering is 45cm, and the outer diameter of the drilling tool selected is not less than 75cm. The drilling operation is then completed with the selected drilling tool. In order to avoid collapse during this operation, it is necessary to reinforce with appropriate cement slurry. At the same time, when the mud in the well hole is found to be high during construction, the height of the well pipe should be reduced. After the drilling is complete, all the well pipes are lowered. In this process, the concrete bottom pipe is placed first, and then the non-sand concrete pipe is placed. Finally, the outside of the well pipe is wrapped with glass wire to avoid damage, and the pores are filled with sand and gravel to increase the firmness of the well pipe.

3.3 Open ditch drainage construction technology

When using open ditch drainage construction technology, first of all, the construction personnel should carefully survey the construction site, understand the basic situation such as the terrain and soil quality of the construction site in detail, and choose a reasonable construction plan according to different situations; Secondly, after digging out the foundation pit, according to the principle of "water flows to the low place", making the water flows to the low place. If it is not possible to discharge all the water, the construction personnel should choose the corresponding position in the foundation pit, excavate the drainage ditch reasonably, and discharge the remaining water through the drainage ditch. Construction personnel generally dig out a suitable drainage ditch in the corresponding area, concentrate the residual water in the area, and use the pump to discharge it all. For the difficult location of excavation, it is necessary to use the principle of contour layering, set the foundation pit to different heights, and then use the pump to treat the residual water.

Conclusion

Water conservancy project construction is the foundation of social development, and people's living standards can be improved through water conservancy project construction. The drainage work in the process of water conservancy project construction can guarantee the quality of water conservancy project and improve the construction efficiency. In the excavation drainage work, it is necessary to continuously improve the professional construction technology, master the causes of pit water, understand the soil quality of the foundation pit, use scientific methods to improve the efficiency of pit drainage to ensure the quality of water conservancy projects.

References:

- [1] Xiaowei Han. *Analysis of application and implementation key points of foundation pit drainage technology in hydraulic engineering construction* [J]. *Henan Water Resources and South-to-North Water Diversion*, 2016, (2): 61-62.
- [2] Lianghua Liu, Bing Sun, Aihua Fu. *Research on Application and Implementation of Foundation Pit Drainage Technology in Hydraulic Engineering Construction* [J]. *Housing and Real Estate*, 2016, (21).
- [3] Hu Xing. *Discussion on Existing Problems and Solutions in Hydraulic Engineering Construction Technology* [J]. *Engineering Research*, 2016, (5): 174+185.]