

Analysis of Application of Pile Foundation Technology in Construction Engineering

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Abstract: Since the reform and opening up, China has invested a lot of painstaking efforts in the field of science and technology, which has greatly promoted the progress and development of science and technology in China. The rapid development of science and technology has effectively promoted the progress of all walks of life. In terms of construction industry, the application of advanced construction technology lays a technical foundation for the effective improvement of construction quality and construction efficiency. The following is the analysis of the application of pile surrounding construction technology in building engineering, and how to improve the quality of pile foundation construction. It is necessary to ensure that the construction technology of pile foundation can give full play to its advantages in construction engineering and meet the carrying demand of construction projects.

Keywords: Construction engineering; pile foundation; application

Introduction

As an important part of the construction project, pile foundation carries the whole load of construction project. With the construction and development of modern cities, the shortage of urban land resources and the continuous increase of urban population have had a certain impact on the construction industry. At present, the high-rise buildings in the city are very common, and the pressure of pile foundation is increasing as the height of construction projects is increasing. In this case, the construction units and personnel must be through the effective use of pile foundation construction technology, to improve the quality of pile foundation construction, to ensure that meet the requirement of construction load, and ensure the safety and stability of construction engineering.

1. Overview of pile foundation technology

Pile foundation is the foundational project in the construction project, and also the key part of the whole project which is the foundation of the building. Its construction task is mainly to strengthen and strengthen the bearing capacity and strength of the rock strata. To ensure the stability and safety of the foundation foundation of buildings, to improve the bearing capacity and supporting capacity of pile foundation^[1]. The reasonable application of pile foundation construction technology can effectively reduce the occurrence probability of uneven foundation or serious settlement. The stress condition of the pile top and the whole pile foundation is more balanced and stable, thus maintaining its strong supporting capacity and bearing performance, which also lays a good foundation for the construction quality control.

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2. Pile foundation construction technology application analysis

2.1 Analysis of application of prefabricated pile construction technology

When using precast pile construction, shall refer to the basic requirements of practical engineering pile foundation pile, the subsequent to the formation of prefabricated completed homework pile, the structure of engineering pile foundation is more strong. The application of this technique usually adopts concrete or steel pipe to prefabricate the pile and prefabricate the foundation pile with concrete. Its advantage is that pile foundation structure is strong and durable, pile foundation construction is convenient and quick, already obtained very wide application at present. Steel tubular piles are usually used in h-shaped steel piles or steel pipe piles, which are usually suitable for special construction projects^[2]. In the prefabrication and construction of the foundation pile, the precast pile should be poured from the top of the pile when the precast pile is filled according to the direction of pile tip and the order of piling. In the prefabrication and construction of the foundation pile, the precast pile should be poured from the top of the pile when the precast pile is filled according to the direction of pile tip and the order of piling. At the same time, in the concrete construction, it is necessary to choose the technology that is consistent with the actual situation of the project. Fully understand and master the situation of engineering construction site, good control of the pile top height and direction to ensure that the bearing capacity of each pile foundation, including the stability of the pile foundation as a whole, and improve overall capacity building. The general construction process of precast pile technology is: ① After the cleaning of the site, the site will be designed as the main design, and the whole station will be used for lofting and checking, indicating the location of each pile point. ② In the construction site, the gravel is laid with a thickness of about 20cm, and the method of grid control is used to prevent the squeezing effect of pile on soil. ③ Compaction of the finished working face. ④ The pile machine should be placed. After the completion of the preparation of the site, the placement of the pile machine should be carried out, and the working status of each machine should be carefully checked, and the position of the pile machine should be properly adjusted according to the pile sequence. Then the precast pile was hoisted, and the precast pile was suspended by the binding element at 30cm from the hanging ring position above the pile body. Make the pile location of the pile tip in vertical state and accurate for the centre, with small fall away from the hammer, hammer by 1 to 2 times, will slowly into the precast pile soil, after waiting for it to a predetermined depth, to stabilize its pile verticality. Then, the hammer was used to pile the pile lower than 1.0m, and the pile foundation of precast pile was built into the ground gradually, so as to facilitate the subsequent construction^[2].

2.2 Analysis of construction technology of cast-in-place piles

Filling pile technology is the most common pile foundation technology in construction engineering, and it is widely used in road construction and bridge construction. The technique of grouting pile mainly includes sinking pipe filling pile, bored filling pile and digging hole pile technology. Immersed tube pile technology, mostly by the interpolation, after playing or singles method to finish, if adopted the method, it must be in 0.5 m per drawing tube, intubation under 0.3 m, and in the process of pull out pipe, repeat the above operation. If the method is repeated, the same position must be hit continuously. In order to operate the tubule by means of single stroke, it is required to vibrate 5-10 seconds for each 0.5 to 1.0m, and then remove 0.5m, and repeat the above operation in the process of pulling out the pipe. Second, the drilling and filling pile technology, usually through the mechanical equipment to drill, to cast and maintain the pile foundation. In the concrete construction, the protective cover must be kept within the deviation range of 50cm from the pile center, and the backfill density must be guaranteed to ensure the construction quality of the pile foundation. It is particularly important to note that the grouting method is multi-layered, and the thickness of each layer must be between 50 to 60cm^[3]. Third, the technology of digging hole pile includes two ways of manual digging and mechanical digging. In order to adopt the artificial hole digging technology, we should pay attention to the strict safety protection work, and more time will choose the mechanical digging technology to complete the construction project. The technique of sinking pipe filling pile is to use the heavy impact generated by the tamping to complete the opening and settling pipe work. Although this technique is suitable for all kinds of geological pile foundation works, there is a

great noise during the tamping process, and attention should be paid to protecting the surrounding environment during the construction process. Construction process and application of filling pile technology including cleaning up, pay-off, more or less certain pile, pile placement machine, drilling, hole cleaning, check the quality of the pile hole, placement of reinforcing cage, pouring concrete, etc. When determining the position of the pile foundation, it should be based on the plane design drawing of the pile position. By embedding the sheath, the position of the pile hole should be fixed to avoid the collapse of the hole. Pile casing is much by 4 to 8 mm steel plate, the top surface is often higher than the ground 0.4-0.6 m, liners, the buried than clay layer more than 1 m, 1.5 m more than sand layer and the mud surface should be at least 1 m higher than the underground water level. The preparation of mud should be determined according to specific soil conditions^[4]. When the hole is formed, the hole is often drilled in a rotary manner. If the hole is qualified after inspection, the next hole can be cleared to ensure that the mud density is not more than 1.25 g/cm³ within the range of 500 mm near the hole bottom. After the completion of the clearance work, the steel cage can be hoisted into the concrete to be poured, while ensuring that the concrete has a protective thickness of over 35 mm.

2.3 Application of static pressure pile technology

The foundation construction works in the construction will have an impact on the surrounding environment. The static pile technology mainly USES the weight of the pile-pile machine and the weight of the pile frame, and the precast pile is pressed into the soil by using static pressure pile machine to squeeze the soil. Static pile technology not only has low cost but also has no noise in construction process, which can reduce the influence on the surrounding environment. Static pile technology is suitable for soft soil foundation engineering. In the application of static pile technology, it is necessary to expand the prefabricated work to complete the work gradually. At the same time, it is necessary to guarantee the continuity of prefabricated pressure pile and ensure the construction quality. Due to the unique characteristics of static pressure pile technology, it is applied to the construction of clay foundation with high compressibility^[5].

2.4 Application of vibration pile technology

The vibration pile technology mainly relies on the joint action of the fixed vibration device at the top of the pile and its own gravity, and applies the superstrong gravity produced by the motor to the foundation, thus improving the soil density of the foundation and strengthening the bearing capacity of the foundation^[6]. In the construction process, firstly, the motor is started after the vibration device is fixed, so that the vibration is started. Then the vibration generated by the vibrator and the weight of the pile are applied to the pile, so that the precast pile can slowly enter the soil. At the same time, the vibration of the pile influences the displacement and shrinkage of the surrounding soil which can guarantee the stability of the precast pile in the soil^[7].

3. Measures to improve construction quality of piles in construction projects

3.1 Strictly control the quality of cement mortar

The construction techniques of bored piles are frequently used in pile foundation engineering. The quality level of the concrete itself will greatly affect the effect of the whole construction. In the construction process of bored cast-in-place pile, the quality of concrete should be strictly controlled, and the main point of control is the quality of concrete and the ratio of concrete. At the same time to participate in the same control equipment of concrete bored piles, guarantee the construction effect, can meet the expected design scheme, construction task is able to run smoothly, ensure the construction quality can meet the corresponding standards^[8]. In the general construction process, if the proportion of mud is low, the drilling rate of drilling will be greatly increased. The speed improvement of the bored pile will cause the paste rotation in the borehole. Formed in the hole wall of mud thinner toughness is better, to make the most wanted a construction process of the construction effect, this effect could help to improve the pile body concrete contact with the surrounding environment, increase the friction index, to ensure the stability of pile foundation

engineering. In the construction project, for the first time pouring concrete, it is necessary to strictly control the mud quality. The mud resistance of the concrete will be controlled to a minimum. In order to ensure that the bottom of the hole has a strong impact in the process of initial concrete injection, the debris can be washed away to ensure the smooth entry of concrete during the subsequent concrete irrigation and prevent the appearance of the mud. In the process of concrete pouring, if there is an encryption phenomenon, the strength of the concrete pile will be reduced, and the safety factor of the project will be reduced. At the same time, it will have a certain security impact on the smooth progress of the follow-up project, and it will also affect some development and implementation of the follow-up project. In order to clear the mud at the bottom of the hole, the staff often achieve the corresponding construction standards by increasing the specific gravity and viscosity of the mud to ensure that the engineering index in the process of concrete irrigation meets the industry standards and the construction prediction^[9].

3.2 Prepare the concrete for pile foundation

Before conducting the concrete placement process of the pile foundation part, a strict site measurement should be performed on the borehole first, and the final adopted borehole diameter should be confirmed in conjunction with the construction design scheme and the local actual conditions. In the process of measurement, the amount of work produced during the first concrete perfusion is calculated according to the hole diameter and the predetermined depth of the pipe and other calculation elements. The amount of concrete poured for the first time is generally greater than the design number. The purpose of doing so is for the first time in the process of concrete pouring, in addition to the completion of the scheduled construction tasks, it is also necessary to discharge the mud in the nozzle orifice and carry out the nozzle opening. The role of concrete sealing. Therefore, when the corresponding work is done for the first time, the concrete materials are generally more than the engineering materials required for normal use. In the first concrete pouring, the cement mortar should be poured into one or two plates, and the subsequent concrete dosage and perfusion method should be determined according to the actual conditions. If the perfusion effect does not meet the desired effect, the perfusion mode or concrete mix is required^[9]. When the cement mortar is poured in the pouring process, the continuity of the filling should be kept, and the filling amount should be controlled every time, so as to reserve a certain time for the infiltration of the bottom hole concrete. Ensure that it can complete the consolidation, ensure the pile tip resistance, avoid the emergence of pile foundation settlement, and lay a good foundation for the subsequent construction.

3.3 Strictly control the concrete placement of pile foundations

In the pile foundation construction for construction projects, it should also pay attention to the control of the concrete pouring process, the staff should control the depth of the concrete tube, at the same time in the catheter for catheter speed control in the process of ascension. In general, the effective way to control and interfere with the quality of concrete pouring is to control the embedded depth and speed of pipeline. The working effect of the underground part is estimated and judged according to the characteristics of concrete flow diffusion and actual operation^[10]. In construction process, sometimes out of error can lead to effect compared with shallow buried depth of pipe than expected, and it will lead to concrete, mud and mud on the surface of the slag will form and mud mixed in the concrete pile breaking phenomenon. If the embedded depth is too large, it may cause the concrete in the pipe to be not easy to flow out which will affect the further construction. According to the construction experience and actual construction needs, the embedded depth of the common concrete catheters in China is generally controlled at 2 to 3 meters. Both inside and outside the actual casting process to regularly check the catheter depth of concrete, according to the tube inside and outside the ascension of the depth, the degree of master of catheter removal, the whole process to cut the number of pulling, in case of broken pile^[11].

3.4 Pile foundation boring prevention and treatment

In the process of protecting the cylinder, the staff needs to carry out field measurement. In order to ensure the

thickness of the clay about half a meter at the bottom of the tube, and to pay close attention to the backfill and tamping of the clay around the protecting cylinder, it is sure that the protective cylinder is stable. We should pay close attention to the actual construction situation and combine the design scheme to make the reasonable choice of technology and materials^[12]. For example, the position of the protection tube should be in a higher area when the corresponding situation is encountered, and the water head height should be raised, and the function of the connecting pipe and the siphon should be used. To ensure that the head pressure can have strong stability in the construction, ensure that the construction can be carried out normally, without interference from the external environment, and the final construction effect can also meet the expected design.

Conclusion

To sum up, with the rapid development of the construction industry, the requirements for the quality performance of construction projects are constantly improving. This requires that construction units and staff should pay attention to the scientific research and rational application of construction technology to ensure the improvement of construction quality. In this paper, the application of pile foundation construction technology is discussed and analyzed, so as to help the healthy development of the construction industry.

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