Discussion on Construction Technology and Quality Management of Underwater Cast-in-Place Concrete Pile

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Abstract. In the process of construction of underwater concrete pouring pile, it can not only improve the bearing capacity of concrete, but also improve the stability of concrete as a whole. Therefore, in order to ensure the orderly construction technology of construction of underwater concrete pouring pile, relevant construction personnel should improve their professional knowledge, and carry out relevant work mainly by improving the quality of construction of underwater concrete pouring pile technology. Construction personnel should strictly follow the requirements and process of construction of underwater concrete pouring pile technology to ensure the orderly progress of actual work, so as to make the construction of underwater concrete pouring pile technology can play its due value and effect in practice.

Keywords: Underwater Concrete, Construction Technology of Cast-in-place Pile, Quality Management

1. Introduction

In the current era, the construction technology of construction of underwater concrete pouring pile has been widely used, and has achieved good results in practice. Therefore, in order to ensure the orderly construction process of construction of underwater concrete pouring pile, relevant construction personnel should carry out daily work in strict accordance with the construction process and the application requirements of construction of underwater concrete pouring pile technology, so that the strength grade of the construction of underwater concrete pouring pile meets the relevant design requirements and relevant specifications. This can also clarify the quality points of construction of underwater concrete pouring pile technology, and improve the application effect of underwater concrete pouring to construction technology as a whole.

2. Analysis of Factors Influencing the Quality of Cast in Place Pile

In the process of construction of underwater concrete pouring pile, it will be affected by many factors, which seriously affect the quality of the cast-in-place pile. Therefore, in order to ensure the orderly construction, the quality of the cast-in-place pile can meet the predetermined requirements. In the process of practical work, the relevant construction personnel should analyze the influence factors of the quality of cast-in-place pile from various aspects, and put forward targeted solutions.[1]In the process of actual engineering construction, the construction of underwater concrete pouring pile is relatively complex, so the quality of cast-in-place pile is affected more. First of all, the quality of cast-in-place pile is an important factor affecting the construction of underwater concrete pouring pile. If the quality of the pile body is not strong, then the overall use efficiency and strength can not reach the predetermined requirements, such as poor pouring quality and serious necking of pile body. Secondly, in the actual construction process, if the shape of the pile body changes to a certain extent, the stress condition will also change accordingly. For example, poor quality of mud and excessive thickness of sediment may cause changes in the shape of pile body. The last reason is mainly due to the need to improve the construction technology and level of relevant constructors during the construction of underwater concrete cast-in-place piles. Therefore, in the actual construction process, there may also be some human errors, which seriously affect the improvement of application quality of construction of underwater concrete pouring pile technology. For example, some constructors are likely to have deficiencies in the quality of steel bar welding joint in the actual construction process, which seriously affects the subsequent construction of construction of underwater concrete pouring pile.

The above are the influencing factors that affect the construction quality of construction of underwater concrete pouring pile. During the actual work, relevant constructors should effectively avoid these problems, standardize their own construction behavior, carry out daily work strictly according to the construction process, and improve the quality and effect of construction of underwater concrete pouring pile.

3. Preliminary Preparation for Construction of Underwater Concrete Pouring Pile

3.1 Turning Hole Work

In order to ensure the orderly construction of underwater concrete cast-in-place pile, before the construction of underwater concrete bored pile, the relevant construction personnel should make full preparation and carry out drilling work in a scientific and orderly manner, so as to effectively avoid the problems likely to appear in the subsequent construction.[2]In the turning hole work, the relevant construction personnel should carry out the daily work in strict accordance with the requirements and standards of construction of underwater concrete pouring pile. Before commencing construction, equipment numbering drawing should be made and numbering should be very clear. Relevant staff should strengthen survey and understanding of the construction site and do actual measurement according to the plan of the whole construction site. In order to improve the accuracy of setting-out work, the related staff should carry out regular inspection for measuring instruments during setting-out work. In the process of follow-up work, it is necessary to combine the current situation of on-site construction and requirements to do a good job of turning holes. Relevant technical personnel should strengthen the supervision and investigation of turning holes so as to discover problems that may occur in turning holes in time, thus laying a good foundation for the follow-up work.

3.2 Inspection of Construction

Before the application of construction technology of underwater concrete cast-in-place piles, the relevant staff also need to do a good job of construction inspection. The site management personnel shall call the technicians concerned with this project to the site for investigation and inspection [3].In the actual work process, it is necessary to strengthen the inspection of construction materials of underwater concrete cast-in-place piles, mainly considering the quality and types of materials, and to

effectively control the quality of concrete, so as to improve the application effect of construction technology of underwater concrete cast-in-place piles as a whole. For cement materials used in construction, relevant staff should prepare for moisture resistance. If there are some problems in the quality of cement, the subsequent construction can not be carried out orderly. For stone materials, the size of stone particles should be strictly controlled. If the particles are too large, it is easy to block the conduit. For sandstone materials, it is necessary to meet the relevant engineering quality standards. No impurities should be mixed in storage and transportation to ensure the construction effect of construction of underwater concrete pouring pile. During the previous inspection, check whether the density of the mud has met the requirements, and whether the bottom of the hole of the sinking reinforcement cage has settled below 5 cm. If the thickness is too large, then re-hole cleaning should be carried out until the engineering technical standards are met. Before grouting, the mud at the bottom of the hole should be checked in many directions, mainly to check the density and sand content of the mud. Relevant staff also need to prepare the equipment used in the construction of underwater concrete cast-in-place piles, so as to ensure the application of the subsequent construction technology of cast-in-place piles is very continuous. After sufficient preparations have been made, the field staff should strengthen the communication and exchange between technicians and do a good job of technical disclosure work, so that the filed constructors and technicians can clearly identify some key and difficult problems in the construction of underwater concrete cast-in-place piles and carry out their daily work scientifically and orderly in accordance with the requirements and demands of construction. [4]

4. Key Points of Construction Technology of Underwater Concrete Cast-in-Place Pile

4.1 Key Points of Drilling Construction Control

In the process of turning hole work, the relevant construction personnel should make clear the control points in the turning hole construction according to the site construction requirements and demands. First of all, effective inspection and investigation should be carried out on the geological conditions of the site. Due to the difference of the pile diameter on site, the construction personnel should select the correct drilling rig based on the relevant data, fully understand the power and twist moment for the selection of the drilling rig, and make a scientific selection based on the construction status and construction requirements of the site.[5]It is worth noting that when selecting the drill pipe, do not choose the thinner drill pipe. If the drill pipe is too thin, the mud circulation will be limited to a certain extent, and more sediment will appear in the actual construction process. At the same time, the diameter of the drill bit should be combined, the design diameter should be coordinated with each other, and the cone angle should be above 120 degrees, so as to ensure the orderly progress of the follow-up work.[6]In the process of actual work, when turning to a certain depth, the bottom of the hole should be cleaned. When there is no debris at the bottom of the hole, the follow-up work can be carried out. If the rock in the soil layer drilled is relatively large, or when encountering the soil layer with large water content, the relevant construction personnel must ensure the stability of all parts to prevent the orderly progress of follow-up work due to large shaking. After drilling, it is necessary to accurately measure the depth of the borehole and the thickness of the loosened soil. In addition, it is necessary to check the quality of the whole working process, so as to ensure the orderly progress of the drilling work.

4.2 Key Points of Catheter Construction Control

In the construction process of underwater concrete cast-in-place pile, pipe blocking often occurs due to the influence of internal and external factors. In order to effectively solve this problem, the relevant construction personnel should start from the causes of pipe blockage and propose targeted solutions. Some pile foundations are too large in volume, and the grouting time is long. With the passage of time, the residue in the slurry will continuously precipitate, resulting in the occurrence of pipe blockage. At the same time, the quality of concrete also increases the probability of pipe plugging to a certain extent.

Therefore, in order to solve these problems, in the construction of the conduit, the diameter of the water isolating plug used should be coordinated with the diameter of the conduit, and the waterproof performance of the water blocking bolt should be strong, which can effectively remove some excess water.[7] (as shown in the Figure 1)

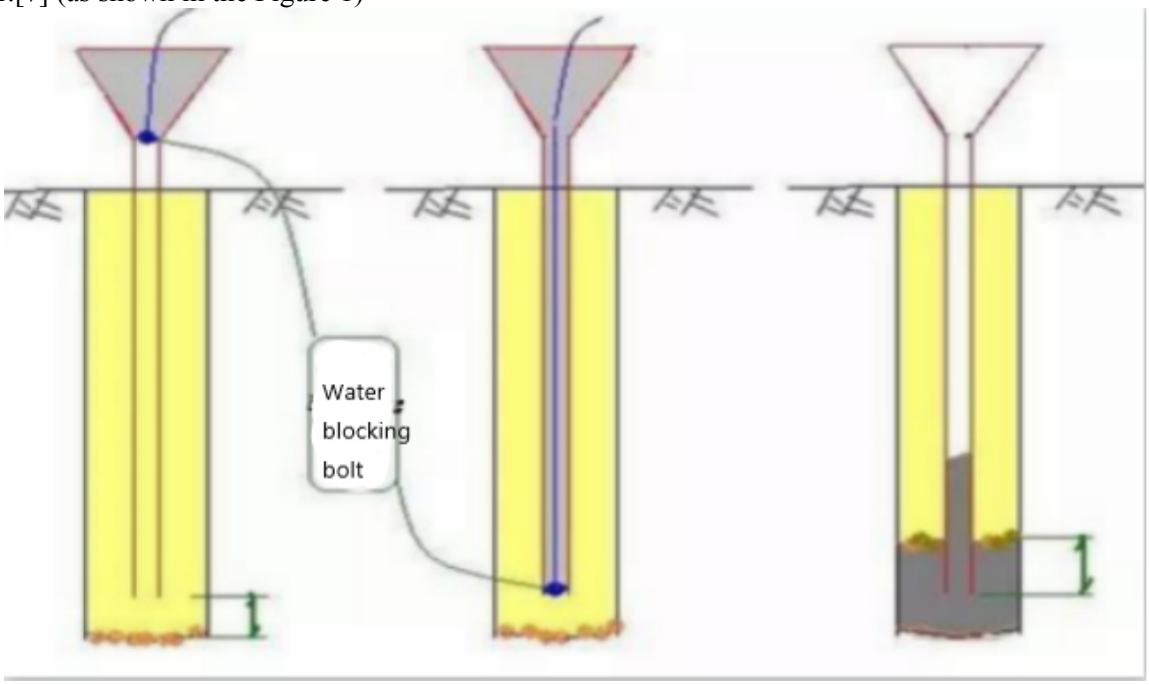

Figure 1. Schematic diagram of conduit drainage

When using concrete for pouring, relevant construction personnel should combine the requirements and standards of site construction to scientifically and reasonably carry out the concrete proportioning work, so as to make underwater concrete have concrete workability.[8]In the construction of the conduit, it is necessary to make sure and ensure the airtightness of the conduit. Before the conduit is used, the relevant construction personnel can carry out some simulation experiments to assemble the conduit, and predict the possible problems in the subsequent use of the conduit. In the process of concrete pouring, the concrete should enter into the pipe slowly to prevent the pipe blocking in the pipe and improve the construction quality of underwater concrete pouring pile.

4.3 Control Points of Concrete

In the drilling stage of cast-in-place pile, slurry is needed to ensure the orderly progress of the actual work. Therefore, in the actual construction process, the relevant construction personnel should strengthen the control and management of concrete quality, so as to ensure that the concrete can play its due value and effect in practice. The relevant staff should strictly follow the construction requirements, strictly carry out the construction of the mud production process and standards to ensure that the mud meets the requirements of viscosity and density in the construction standards, in the process of admixtures participation, the control of water content should be strengthened to ensure that the dilution degree of mud is not too viscous or too thin. If it is too diluted, not only can not play the role of carrying residues, some mud will also stick to the outside of the pile, resulting in a certain change in the diameter of the pile, which seriously affects the orderly progress of follow-up work. Therefore, relevant staff should strictly carry out daily work in accordance with the construction process and construction standards.[9]

4.4 Key Points of Reinforcement Construction Control

During the construction of reinforcement, the work of relevant construction personnel should focus on the floating of the reinforcing cage. The floating of reinforcing cage means that the position of

reinforcing cage is higher than the predetermined position in the design drawing, which is mainly caused by the lower bottom opening of reinforcing cage sawn on the concrete surface and the faster concrete pouring speed.[10]Therefore, in order to solve this problem, relevant construction personnel should solve the problem of reinforcing cage floating according to the construction process and construction standards. When determining the position of the reinforcing cage, it is necessary to measure and judge the position accurately in combination with the construction situation on site. And in the reinforcement construction, to ensure that the location of the hole is fixed and firm. In the follow-up construction process, the relevant construction personnel should appropriately speed up the concrete pouring speed, so as to effectively reduce the pouring time. In the process of practical work, we can also add admixtures to prevent the change of fluidity of the top layer of concrete after entering the reinforcing cage. Secondly, the relevant staff also need to master the elevation of concrete pouring and the buried depth of conduit. When the concrete is at the bottom of the reinforcement cage bottom, and the distance is about two meters, the relevant construction personnel should strictly according to the construction standards and construction process, lift the conduit above the bottom of the reinforcing cage, and keep a relatively safe distance, so as to ensure the orderly progress of reinforcement construction.

5. Conclusion

In the construction process of underwater concrete cast-in-place pile, each construction process and construction link should be carried out in strict accordance with the standards, and the factors affecting the construction of underwater concrete cast-in-place pile should be considered in many aspects, so as to improve the quality and effect of underwater concrete bored pile construction, and carry out daily work. For some possible accidents, preventive measures should be taken in advance, and targeted solutions should be put forward to improve the effect of underwater concrete pile construction.

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