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Analysis on the Technical Management Countermeasures of Deep Foundation Pit in Construction Engineering

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Abstract: In order to adapt to the process of urbanization construction and meet the needs of urban people's production and life, the construction industry should strengthen the quality and safety control of construction projects. Among them, focus on the deep foundation pit construction, do a good job in technical management. It can not only enhance the stability and seismic resistance of the building, but also protect the life and property safety of the owners, and enhance the reputation of the construction enterprises. In this regard, the paper briefly expounds the construction of deep foundation pit technology management, emphasizing the important value of technical management. Analysis of common technologies, such as steel plate pile support technology, soil nail wall support technology, etc. Based on the current situation of deep foundation pit construction technology management, we will make special control of key technologies and introduce new technologies, strengthen the environmental management on the construction site, increase technical supervision and improve the construction management system, so as to provide corresponding suggestions for the subsequent construction.

1. Introduction

In recent years, multi-storey buildings are very common in modern cities, which can not only improve the quality of life of urban residents, but also solve the office, living and other problems. However, it also improves the difficulty of construction engineering in a disguised way, and it is difficult to take into account the building quality and building function, which brings great challenges. Among them, the deep foundation pit construction technical problems are more common and important. It is necessary to deeply grasp the technical characteristics of deep foundation pit construction, and put forward targeted technical management strategies. We should not only pay attention to the technology itself, but also start from the construction environment, construction supervision and other aspects.

2. Overview of the construction technical management of deep foundation pit in construction engineering

In urban buildings, the deep foundation pit project is mainly composed of two parts. The first part is the design and construction of the deep foundation pit construction and maintenance system,

and the second part is the earthwork excavation. These two parts are very closely connected, through the scientific planning of the earthwork excavation construction organization, can improve the construction and maintenance system design and construction effect. At the same time, if the earthwork excavation method selected by the construction unit does not conform to the local earthwork excavation practice, both the excavation sequence and speed will affect the main structure and pile foundation structure, causing deformation and other problems[1]. Therefore, with the improvement of the construction technology level of deep foundation pit in China, the construction industry has gradually increased the importance of excavation and support. After systematic study, the technical characteristics of deep foundation pit construction are as follows:

First, the emergence of super high-rise buildings has increased the depth of the deep foundation pit. Second, different areas have different soil quality. If the area of soil quality is loose, with the larger area of the deep foundation pit, the risk of soil layer displacement and settlement increases, which will damage the nearby building structures and underground pipelines. Third, the excavation area of the deep foundation pit increases, and the deep foundation pit support system needs to increase the load force. Fourth, the construction period of the deep foundation pit is long and the site area is small. If the special weather such as rainfall or the heavy site burden occurs, the uncertainty of the excavation will be increased. Fifth, the projects closely related to the deep foundation pit, such as concrete pouring and precipitation, mutually influence and restrict each other, which improves the difficulty of construction organization and coordination.

3. Construction technology of deep foundation pit in construction engineering

3.1 Steel plate pile support technology

At present, when the deep foundation pit is constructed, the steel plate pile support technology is very important. If the soil layer in the construction area is relatively deep, the steel plate can enhance the stability of the foundation pit and improve the support effect. When applying this technology, it is necessary to focus on the steel plate material, usually, using more composite steel plate, mainly composed of hot rolled steel in the steel plate pile, with good sealing and waterproof, combined with multiple steel plates to create a steel plate wall, can improve the strength of the foundation pit.

3.2 Soil nail wall support technology

During the construction of the deep foundation pit in the construction engineering, the earth nail wall support technology can also enhance the stability of the deep foundation pit, and use the concrete slab surface to form the support, which can strengthen the main structure of the building. At present, this technology is more common, but the depth of the structure is limited, and it must be combined with cement and soil shape to improve the support effect of deep foundation pit.

In addition, in the application of this technology, it is necessary to master the characteristics of the soil layer, targeted to develop the construction plan. It is mainly suitable for non-soft soil foundation pits within grade 3 or those with a depth of less than 12m[2].

3.3 Bolt rod support technology

In recent years, the anchor bolt support technology is also more common, this technology needs to first decorate the anchor bolt to the ground, in order to enhance the stability of the land and the safety of the construction. When conducting deep foundation pit construction, this technology has significant advantages, requiring small area, clever operation and safe construction. However, when

applying this technology, we should pay attention to choosing high-quality materials, and reserve sufficient time and personnel to carry out fine technical management work. Although this technology has removed the vibration link, it is necessary to carry out geological and geographic exploration in advance to obtain accurate information and data, such as clarifying the location of drilling.

3.4 Pile row support technology

At present, pile support technology can be divided into many categories, such as cement mixing pile support, continuous pile support, etc. Among them, the mixed application of continuous continuous row pile support technology and grouting waterproof technology, can improve the construction quality and safety. However, if the surrounding soil quality is good and the water level is low, the column column row pile support technology can be used. However, it is necessary to reasonably regulate the distance and depth between piles, and play the role of piles correctly. If the water level is high, the cement pile mixing and support technology can be used. In order to improve the support level, the waterproof work should be done well, and the retaining structure should be laid out to prevent and control the construction risks.

4. Current situation of the technical management of deep foundation pit construction in construction engineering

4.1 Construction technology needs to be updated

In recent years, with the orderly and continuous development of deep foundation pit construction, China's deep foundation pit construction technology is becoming more and more diversified, and more requirements are put forward for technical management. Although construction enterprises and construction units strengthen the research on deep foundation pit construction technology, there is a lack of professional talents. Compared with western developed countries, there is still great room for progress, and we need to continuously optimize and innovate deep foundation pit construction technology.

4.2 The depth of the foundation pit continues to increase

Under the background of accelerating urbanization and improving science and technology, the flow of urban and rural population has increased, and outstanding talents are willing to stay in cities to seek their own development, which has increased the number of urban population and increased the burden of urban land. On the one hand, to promote the further development of the construction industry, on the other hand, it is necessary to promote the in-depth development of construction projects, improve the height of buildings, enrich the building functions, and meet the increasingly diverse building needs. Thus, the high-rise buildings came into being. High-rise building construction, we must focus on the construction of deep foundation pit. To improve the quality and safety of high-rise buildings, the depth of deep foundation pit must be regulated. However, with the continuous expansion of deep foundation pit depth, the difficulty of deep foundation pit construction is directly increased. Construction units must constantly optimize the construction technology of deep foundation pit and introduce new technology to promote the development of construction engineering.

4.3 The construction environment is relatively solidified

In the process of deep foundation pit construction, attention to two types of environment. The first type is the complex natural environment. Different construction projects need to face different environments, and different geological and geographical conditions will have different effects on the deep foundation pit construction. For example, when carrying out construction in coastal areas, it is necessary to grasp the geological conditions, but also to consider the Marine conditions. When deep foundation pit excavation, if the problems such as seawater irrigation and irrigation, what means need to be taken? For construction in densely populated areas, if complex traffic conditions and dense construction conditions are encountered, what measures should be taken? The second category is the solidified building environment. Human beings can change the living environment, but it is difficult to change the surrounding solidified environment. For example, when the construction of deep foundation pit exists, if there are ancient buildings on the construction site, how to ensure that the ancient buildings are intact on the basis of smooth construction? In the construction process, some construction units did not do a good job of on-site investigation, and cannot successfully complete the construction task of deep foundation pit on the basis of maintaining the urban environment and protecting the people's daily life.

4.4 Frequent construction accidents

At present, in the construction process of deep foundation pit in construction projects, improper design, site investigation errors and unreasonable calculation methods will cause construction accidents. At the same time, in some construction units to reduce the cost and shorten the construction period, some construction units ignore the design scheme and rely on the construction experience, which reduces the stability and safety of the foundation pit and threatens the life safety of the construction personnel[3].

5. Optimization countermeasures of deep foundation pit in construction engineering

5.1 Special management of key technologies and the introduction of new technological means

First of all, special management should be carried out to master key technologies. For example, it is necessary to strengthen the anchor pile construction technology control, during the construction, according to the construction site environment, to carry out various work. In order to reduce the impact on the life of the surrounding residents and maintain the normal traffic order, it is necessary to investigate the surrounding buildings, grasp the basic situation, and eliminate the noise pollution to the maximum extent. At the same time, in order to ensure the smooth development of deep foundation pit construction and to deal with the complex underground situation, the hydrological situation should be investigated and the construction of pillar piles should be promoted in an orderly manner. When drilling grouting, first use the screw to drill to the pre-set position, and then use the core pipe from bottom to top into the slurry, and the cement slurry into the set position, the layout of reinforcement cage and other materials. After the completion of the above work, high-pressure grouting, to improve the construction quality. Finally, when drilling and forming holes, accurately control the verticality and configure the required cement and stone[4]. In addition, but also to do a good job of nail wall spray anchor support construction technical management work. Secondly, with the development of Internet information technology in China, new technology and means should be introduced to improve the level of construction technology management. First, the introduction of computer numerical analysis of virtual simulation construction technology, the construction process, technology can simulate the construction scheme, three-dimensional, real construction environment,

improve the construction quality. It can not only detect the construction scheme, but also improve the accuracy of geological and geographical environment calculation, and continuously optimize the construction scheme.

Among them, when the deep foundation pit support, the anchor cable scheme can be further defined and improved, so as to avoid deformation and other problems, to ensure the life safety of the construction personnel and the stability of the foundation pit. Second, the capacitance transformer measurement technology can be introduced. In the process of deep foundation pit construction engineering, it is very easy to produce deformation problems. If you can grasp the deformation situation, you can further improve the level of accident handling and reduce the loss. This technology can solve the above problems, predict the possibility of deformation by dynamically monitoring the displacement of deep foundation pit and timely warning.

5.2 Strictly examine the construction plan and improve the construction management system

In order to do a good job in the technical management of deep foundation pit construction, we must strengthen the control of the construction process. If there are more construction problems and hidden dangers, it will increase the difficulty of remediation and increase the cost of remediation. At present, the construction of deep foundation pit mainly depends on the construction scheme, which should be strictly reviewed. First, the construction plan should be prepared according to the results of the field environment investigation, and optimized based on the calculation and research results of the technical personnel. Second, the construction plan should be reviewed by the chief supervision engineer, after the audit, the construction unit and its staff can not be changed. Third, if the construction plan is found to be insufficient or unreasonable, we should study together with the design unit and the supervision unit, and make modifications after verification.

In addition, we should also improve the construction management system. The construction unit shall, according to the design documents and the actual construction conditions, formulate technical management plans and implement the corresponding details, such as protecting the surrounding buildings, reducing pollution and promoting the communication between various departments, so as to ensure the orderly development of the deep foundation pit construction[5].

5.3 Do a good job in the environmental management of the construction site, and strengthen the construction coordination

The construction of deep foundation pit in construction projects is based on the premise of the site environmental investigation. The geological geography and hydrological conditions of the construction area should be investigated and evaluated, and effective construction measures should be formulated. At the same time, we should also focus on the surrounding buildings to reduce the impact of construction vibration on the surrounding buildings and residents' lives[6].

At the same time, but also to strengthen the construction site organization and coordination. The content of technical management of deep foundation pit construction site should be clarified first, including material management, personnel management, construction link management, etc. For material management, it is necessary not only to strengthen the monitoring of the early material procurement link, but also to do a good job in the material management in the construction process, to grasp the material source of materials, review the production date, qualification certificate, etc., and carry out warehousing registration and classification management. According to the construction plan to choose the appropriate mechanical equipment, review its quantity, quality and performance, etc., to ensure that it always maintain a good operating state, timely maintenance and maintenance, reduce the cost of the project. For personnel management, it is necessary to strictly control technical personnel, divide and implement their rights and responsibilities, promote

technical disclosure work, and formulate corresponding post systems, so as to enhance the enthusiasm of technical personnel. We should strictly control the construction personnel, strengthen the awareness of safety and quality, do a good job in technical training, and improve the construction efficiency. For the construction link management, take the foundation pit support technology as an example, to choose the appropriate support technology, such as concrete pile type, manual hole pile type, not only to strengthen the safety protection of construction personnel, but also to promote the active communication of all departments, the orderly cooperation of each link.

5.4 Strengthen construction supervision and improve construction quality

According to the corresponding supervision work, such as material supervision, personnel supervision and construction supervision. At the same time, construction units and supervision units should also strengthen supervision, analyze risk factors, standardize construction behaviors, to ensure the safety of construction personnel and improve the safety of construction projects. To strengthen the awareness of supervision, targeted supervision system, found quality problems or safety risks, timely early warning and shutdown, inspection after the qualified after the resumption of construction[7].

6. Conclusion

To sum up, although the construction industry gradually realize the importance of deep foundation pit construction, there are still certain problems in the construction technology management. It is necessary to strengthen the awareness of technical management, master key technologies, review construction plans, strengthen the organization and coordination of the construction site, strictly supervise and control construction risks, reduce construction losses, maximize construction safety, and safeguard the interests of the owners.

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