

Construction Design of Prestressed Cast in place Piles for Transmission Line Engineering in Plateau Areas

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Abstract: With the growth of urban construction, the excavation depth of foundation pit construction is getting deeper and deeper. Adding soil anchor to cast-in-place pile is one of the most effective methods for deep foundation pit support. And the construction quality of cast-in-place pile and soil anchor directly affects the subsequent construction and the safety of buildings. As an important pile type, pile foundation often has some quality problems such as pile position deviation, excessive sediment, concrete segregation, mud inclusion, broken pile and so on. Therefore, in the construction, it is necessary to correctly select the construction technology, strengthen the quality control of the construction process, ensure the integrity of the pile body, and make the static pressure test reach an excellent state. In the construction of electric power engineering, the links between the steps are very close, so only strict quality management of each process can really ensure the quality of transmission line construction. Combined with the engineering practice, this paper analyzes the quality problems of bored piles in plateau area and puts forward the prevention measures, providing suggestions for the construction design of prestressed bored piles in transmission line engineering.

Keywords: Foundation pit construction, Cast-in-place pile, Transmission line, Plateau section.

1. Introduction

As the foundation of building engineering, bored pile foundation construction is the key part of concealed engineering, and the construction quality directly affects the engineering quality and social benefits. Bored pile has many advantages, such as low vibration, low noise, no soil squeezing, adaptability to various strata and different types of building construction, etc. At present, it has been widely used in China [1]. The quality of transmission line construction in plateau area has a consistent relationship with the improvement of power supply efficiency of transmission network in this area. In the process of economic construction in plateau area, it is necessary to provide stable and reliable power supply for its corresponding life and industrial production [2]. There is no doubt about the importance of power transmission and supply in China plateau, but in the process of construction of transmission line network project in plateau, the key points of quality control exist in the whole process of project construction [3]. In the process of economic construction in plateau areas, it is necessary to provide stable and reliable power supply for the corresponding life and industrial production, and the quality of transmission line construction is the guarantee of economic construction in such areas.

At present, bored piles have become the main form of tower foundation in transmission line engineering. Bored piles have mature construction technology, little impact on the environment and surrounding buildings, simple and portable construction equipment, and small occupied area, which can set piles under complex terrain conditions [4]. In areas with poor geological conditions, it is necessary to standardize the construction process according to the requirements and procedures, and make every pile foundation meet the quality standards while trying to control the construction links, so as to realize the bearing capacity [5]. In order to ensure the smooth progress of cast-in-place pile construction, it is necessary to make preparations before

construction. In the construction of electric power engineering, the links between the steps are very close, so only strict quality management of each process can really ensure the quality of transmission line construction [6]. The construction technology of cast-in-place pile is complicated. Combining with the engineering practice, this paper analyzes the quality problems of cast-in-place pile in plateau area and puts forward the prevention measures, providing suggestions for the construction design of prestressed cast-in-place pile in transmission line engineering.

2. Function of Transmission Line Construction Quality Management in Plateau Area

2.1. Improve the quality and safety of transmission line construction in plateau.

In the construction of electric power engineering, the links between the steps are very close, so only strict quality management of each process can really ensure the quality of transmission line construction [7]. At the same time, because the high-voltage transmission lines need to carry out the tower structure construction in the construction, and there are certain operational safety risks in the trial operation after wiring, only by improving the construction quality of transmission lines in plateau can the safety of its construction promotion and use be ensured. Construction preparation mainly includes drilling tools, drilling rigs and site layout. As the main equipment of the whole bored pile construction, the drilling rig must be correctly selected according to the drilling rig and geological conditions. In the installation and positioning of drilling machine, once the foundation is unstable, there will be some bad phenomena such as pile inclination, drilling machine inclination or pile eccentricity. Figure 1 shows the construction process of cast-in-place pile for transmission line in plateau.



Figure 1. Construction process of cast-in-place pile for transmission line in plateau

In the construction of transmission line network, once the quality control of any link is not done well, it will affect the quality of the whole power grid construction, and the quality problem of transmission line is found in the later stage. In the construction of pile foundation, the foundation must be stable. For the sloping or soft foundation, it should be leveled by bulldozers and reinforced by sleepers or steel plates. For industrial and civil construction projects, concrete hardening construction sites can be used if conditions permit. In order to prevent the adverse effects caused by inaccurate pile location, the center position and the drilling rig position must be correctly positioned [8]. In order to ensure the quality of project completion, it is necessary to take measures to remedy or rework directly, which will lead to the decrease of transmission line network construction efficiency and the extension of power system network construction time in plateau areas, which is not conducive to the control of transmission line construction progress. The drilling sequence is based on the engineering arrangement, so that the drilling construction is not affected by the existing pile holes, and the drilling is usually carried out from the center to both sides, thus reducing the impact of the vibration of the drilling pile on the pile body.

2.2. Provide energy guarantee for economic development in plateau areas

Due to the high energy consumption of economic construction in China plateau, this is the result of the natural environment in this area. At the same time, the natural environment in plateau also affects the construction of

transmission line network, which makes the quality of power engineering construction in plateau more difficult to guarantee. Therefore, the construction of high-quality transmission lines in the plateau area is an important part of improving the energy supply system in the plateau area, and it is also an essential facility guarantee for the economic development in the plateau area. In order to ensure the construction quality of bored piles, construction must be carried out in strict accordance with construction standards or specifications [9]. Measure the hole after hole cleaning or final hole, and use accurate instruments to measure the inclination, hole shape and hole diameter, and then report to the engineer for review. In order to keep the pulley groove, chuck and pile center at the top of the drilling rig on the same straight line all the time, the adverse effects caused by excessive swing or displacement of the drilling rig must be avoided during drilling. In the cyclic construction of the drilling rig, once the drilling can't be drilled or the speed is slow, the drill bit must be cleaned and then drilled at a medium speed. During the tamping of the pile casing, it must be backfilled evenly. Then, according to the geological data, the pile casing will pass through the permeable layer or silt, and the joint will be sealed to ensure the construction quality of the pile foundation.

3. Construction Points of Prestressed Cast-in-place Pile in Power Transmission Project

3.1. Optimize the design of transmission line drawings

In any project construction, the construction drawing paper is the foundation of the project construction, and the same is true in the plateau transmission line project construction. Before the construction of transmission lines, it is necessary to optimize the design of the drawings. Especially before the construction work is advanced, it is necessary to find out the deficiencies of the construction design of transmission lines in plateau through the technical joint review and optimization discussion of many participating units, and improve the design quality through technical optimization. The first step in the construction of foundation structure is to investigate and analyze the geological conditions of tower foundation construction, and to optimize the design scheme and change the technology through the analysis of the actual situation, followed by the pouring construction of steel and concrete structure caps. The structure of fuzzy controller for transmission line construction is shown in Figure 2.

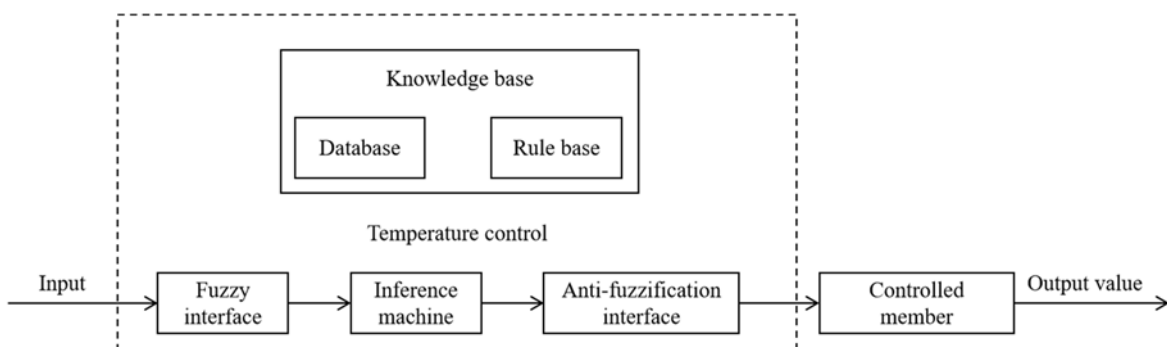


Figure 2. Structure of fuzzy controller for transmission line construction

In the process of foundation pouring, due to the large temperature difference in plateau area, the antifreeze admixture with corresponding dosage after trial should be added to the concrete mortar according to the temperature condition. At the same time, in the process of installation of foundation bolts, the size and position should be checked repeatedly, and then poured after being fixed correctly, and cured according to the requirements of on-site pouring concrete, so as to keep the foundation warm according to the situation. In the construction of transmission lines in China Plateau, the quality of foundation construction is directly related to the safety of line operation. Therefore, in the construction of transmission lines in Plateau, it is necessary to control the quality of foundation construction to ensure that the network construction of transmission lines meets the design requirements. The foundation of transmission lines usually includes concrete pouring construction, which is the key link. Because in Plateau, the bad environmental impact will make the corner tower bear greater uplift force, so reinforced concrete structure is usually selected as the construction foundation.

3.2. Construction quality management of transmission line tower project

In order to ensure the rock-socketed depth, the strength of the pile bottom must be greater than the specified strength.

When all kinds of inspections meet the construction requirements, the corresponding checklist will be filled in. After the engineer confirms it correctly, the next working procedure can be started. The force of transmission tower is mainly divided into two types: linear type and tensile type. The proper selection of towers is closely related to the speed and economy of transmission lines, the reliability of power supply and the convenience of maintenance. Therefore, it is very important to choose the appropriate tower structure and form. Because of the poor climatic conditions in plateau areas and the difficulty in transportation and construction, it is necessary to choose the self-standing tower. In the construction of transmission lines, the quality of raw materials and prefabricated structures meets the engineering requirements, which has a great influence on the construction quality of transmission lines. Therefore, before construction, we must do a good job in the quality management of materials procurement, storage and transportation, so as to ensure that all materials and prefabricated structures used in the construction of transmission lines meet the engineering quality requirements. The construction process of power transmission project management system is shown in Figure 3.

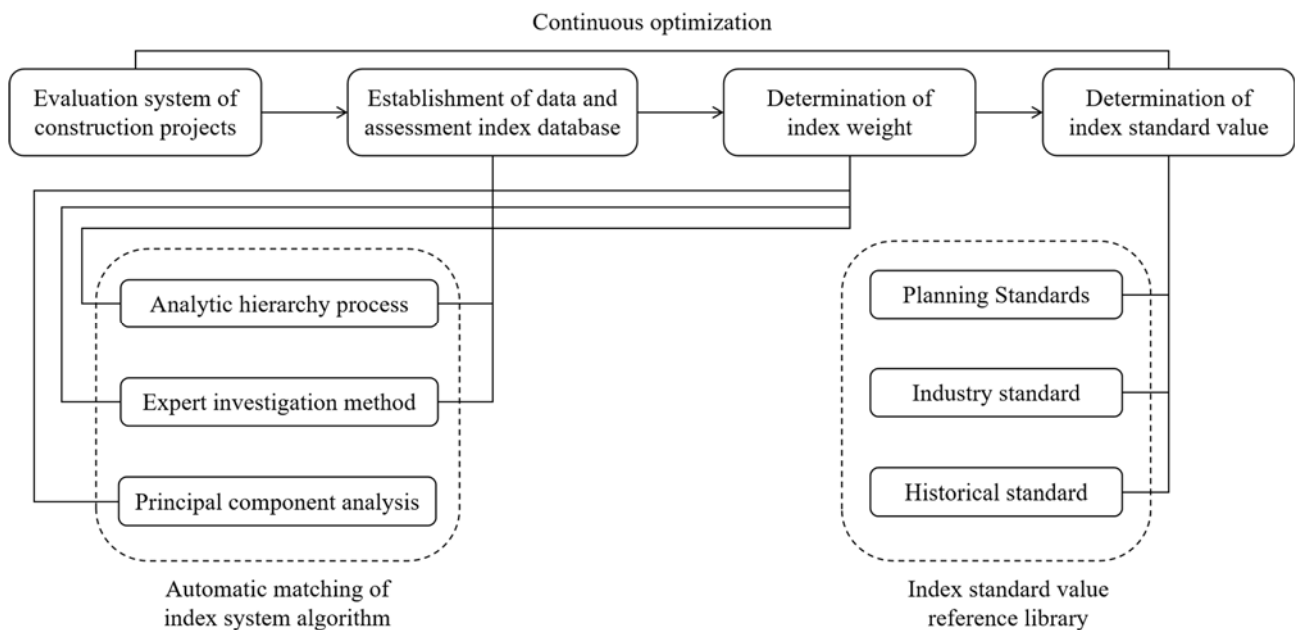


Figure 3. Construction process of transmission line project management system

In order to prevent the adverse impact of the inclination of the bored pile on the project, the construction site must be compacted and leveled, so as to adjust the drilling rig to the working state. Before the drilling rig is in place, through the acceptance and installation process, the platform is always in a horizontal and firm state, and the frame is stable. In the foundation construction of transmission line construction, it is necessary to ensure that the distance between the vibrator and the steel structure and formwork is reasonable, so as to prevent the quality of the foundation cap construction from being affected by excessive vibration or inadequate vibration.

4. Conclusions

With the rapid growth of social economy and the accelerating process of urbanization, the scale and quantity of urban construction projects are increasing rapidly, and the problems of urban construction and management are becoming increasingly prominent. The construction technology of cast-in-place pile in high-voltage transmission line is difficult and demanding, so the construction personnel should be familiar with the key points of each construction process and standardize the construction in strict accordance

with the relevant technical requirements. Before construction, all preparations should be made, according to geological exploration data and design documents, technical disclosure and pile test should be carried out, and appropriate mechanical equipment and construction technology should be selected after mastering the first-hand information. Engineering geological and hydrogeological conditions, foundation types, excavation depth of foundation pit, drainage and drainage conditions, and surrounding environment should be considered comprehensively in the construction of cast-in-place pile and soil anchor. Only by knowing these key points of quality management, and constantly improving the effectiveness of quality management by constantly improving the practicality of quality management in the concrete engineering construction practice, can we optimize the power system network construction in plateau areas and provide assistance for the economic construction in difficult areas of China. If urban construction enterprises want to produce and develop in this highly competitive industry, they must analyze the key points of project management, and strengthen the analysis and research on the key points of urban construction project management, so as to obtain good engineering practice results.

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