

# Analysis on Construction Technology and Reinforcement Technology of Building Foundation

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**Abstract:** In the field of construction engineering, foundation engineering plays a critical role. In actual construction, we must first effectively regulate the foundation construction to ensure the safety and stability of the entire building in order to improve the overall quality of the project. It's also important to look into the technologies that go into building foundations. The construction technology and reinforcing technology of building foundations are examined in this study as a reference.

**Keywords:** Architecture; Foundation; Construction technology; Reinforcement technology

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## 1. Introduction

One of the most critical links in construction engineering is foundation engineering. Foundation work is a type of work that is hidden from view. Accidents and unforeseeable repercussions may arise if they are not inspected in a timely manner after construction. Many elements influence the foundation's building effect, such as structural deformation, self-instability, and etc. As a result, judicious use of reinforcement technologies is required to assure the safety and stability of foundation construction. As a result, it is critical to examine building foundation construction technology and reinforcing technology.

## 2. Foundation construction

In construction engineering, the foundation is the bottom layer of the building which is located below the building and plays the role of support and stability. It is of great significance in the dispersion of building load. The building foundation is one of the important components of the whole building. Its main function is to transfer the load downward. It is a building structure in direct contact with the foundation. The design work and construction work of foundation need to effectively avoid deformation, instability and other adverse conditions of foundation, so as to ensure the safety of buildings.

## 3. Foundation technology

### 3.1. Complete set of composite foundation technology

The complete set of composite foundation technology can be divided into two aspects, namely “cement - fly ash - stone pile” and “rammed soil-cement pile.” The former needs to use aggregate, fly ash and cement to mix with water to form a pile with high viscosity, and then form a composite foundation with soil layer, cushion layer, pile foundation and pile block. It has good bearing effect, is not prone to deformation and has a wide range of application. The rammed soil-cement pile is made of a single material with reasonable proportion according to relevant regulations. Then, it is perforated by machine, made into cement soil outside the soil pile, and then backfilled into the hole according to corresponding steps to form a soil pile with uniform texture. In this process, the compaction process needs to be applied to improve the density of

cement soil so as to improve its bearing capacity. At present, it is widely used. On the whole, the complete set of composite foundation technology has the advantages of fast construction speed and is not easy to be disturbed by various factors, so the construction efficiency is high and the economic value in use is high <sup>[1]</sup>.

### **3.2. Construction technology of static pressuring pile foundation**

The application of pile driver can produce large noise. If the construction site is close to the residential area, mute technology shall be used to control the noise. The construction technology of static pressuring pile foundation mainly applies the technique of static pressure entering the soil. The basic procedures are as follows:

- (1) Precast piles in sections
- (2) Press-in in sections
- (3) Gradually extend

In fact, the height of pile frame is closely related to the length of soil pile. Generally speaking, it should be about 7m. Anchoring method, welding method and other methods can be used to connect soil piles. In addition, on the whole the construction technology of static pressuring pile foundation is conducive to reduce the use of reinforced concrete, so it can reduce the construction cost to a certain extent and protect the social environment.

### **3.3. Compaction technology**

During the foundation construction, the foundation shall be rolled to effectively discharge the excess water and gas. The technology applied in this process is compaction technology. The main purpose of applying this technology is to promote the mixed arrangement of fillers, reduce the number of gaps as much as possible, and improve the density between objects, which is conducive to improving the construction quality of foundation.

### **3.4. Vibration pile driving technology**

In the implementation of vibration pile driving, the vibrator needs to be placed on the pile top first to ensure that it can carry out a new round of arrangement and combination, and promote the vibration and displacement of soil particles through strong vibration force. The application process of this technology is relatively simple, only ordinary vibration equipment is required, and generally, the equipment has small volume and light weight, which is conducive to transportation and can improve the overall construction efficiency. Therefore, the current vibration pile driving technology has been widely used in the construction of building foundation, and can be applied to various types of foundation such as loose sand and soft soil <sup>[2]</sup>.

## **4. Foundation reinforcement technology**

### **4.1. Foundation widening and strengthening technology**

If the foundation area is insufficient or the foundation bearing capacity does not meet the engineering requirements, it is necessary to appropriately expand the foundation bottom area to alleviate the foundation load pressure, which can also reduce the additional stress of the foundation soil, so as to avoid unnecessary settlement. When the site conditions permit and the foundation buried depth is relatively shallow, the foundation bearing capacity can be improved through foundation widening and reinforcement technology. Foundation widening and reinforcement technology is a mature and simple reinforcement technology, which can be directly applied in reinforced concrete. It can not only increase the bottom of the foundation, but also ensure the connection effectiveness between the old and new foundations. However, in the process of applying this technology, the strength of the original foundation must be fully considered. If the service

life of the original foundation exceeds a certain standard, its strength must be greatly reduced. At this time, it should be properly unloaded according to the actual situation to alleviate the stress of the original foundation.

The main process of application of foundation widening and strengthening technology is as follows:

- (1) Excavation.
- (2) Implement ground pressure construction on both sides of the widened part together with the original foundation, and pave the same thickness of filler on it.
- (3) Improve the chiseling and cleaning of the original foundation, and pave high-strength cement slurry on it to strengthen the bond between the new foundation and the original foundation.
- (4) Configure concrete.
- (5) Pouring Concrete.
- (6) At the position where the new foundation is connected with the original foundation, set anchor rods with fixed height and spacing to provide guarantee for the stability improvement of the foundation connection.
- (7) Carry out quality inspection work <sup>[3]</sup>.

#### **4.2. Strengthening technology of deepening foundation method**

Applying the deepening foundation method, it is necessary to set the pier foundation under the original foundation and ensure that the soil layer at the location of the foundation is good. In simple terms, this means digging a hole under the foundation and placing concrete piers into the hole to reinforce it. Generally speaking, it should be applied when the groundwater level is low or has good gravity holding capacity.

Concrete piers can be divided into two types, namely “continuity” and “stage.” Discontinuous concrete piers shall be applied first in the construction process. If the weight of discontinuous concrete piers cannot be borne, continuous concrete piers shall be applied in time. In general, the process of applying the deepening foundation method reinforcement technology is as follows: First, a 1.3m long and 0.8m wide pilot pit shall be excavated next to the building, with a depth of 1.4m and a concrete pouring height of 70mm. Then, the maintenance work shall be carried out for two consecutive days, the accelerator and expansion agent shall be mixed and poured into the concrete to improve the fullness of the cement slurry.

#### **4.3. Grouting reinforcement technology**

The main process of applying grouting reinforcement technology is as follows: First, the drilling rig is used to drill holes into the foundation up to the soil layer that needs to be reinforced, and then the cement slurry is poured into the soil layer that need to be reinforced through the grouting equipment. With the help of extrusion and splitting, the cement slurry and the soil layer are fully mixed to make corresponding chemical and physical changes, so as to realize the purpose of cementation between the two. Thus, it can strengthen the foundation.

#### **4.4. Reinforcement technology of static bolt-pile**

The anchor bolt technology is combined with the static pressuring pile, the anchor bolt hole and pile pressing hole are drilled for the foundation, and the adhesive is used to make the anchor bolt smoothly embedded in the anchor bolt hole, and then the pile frame installation is completed according to the construction sequence. In this process, it should be noted that the prefabricated pile is pressed into the pile hole with the help of the reaction force generated by the jack and the gravity of the existing building. Generally speaking, the pile needs to be bonded with sulfur mastic. Thus, the application of static bolt-pile

reinforcement technology is completed. When the pile pressing force and depth are consistent with the design requirements, concrete pouring method can be used to connect the pile and foundation, so as to improve the bearing capacity of the foundation and control the settlement <sup>[4]</sup>.

## **5. Conclusion**

According to the above, the foundation is a critical component of the building structure that can have a significant impact on the project's overall quality and safety, and the construction technique and reinforcing technology used can also have a significant impact on the foundation. As a result, it is vital to actively improve the construction scheme in accordance with the current construction site situation. To improve the project's quality, construction technology and reinforcement technology must be used in a reasonable manner.

## **Disclosure statement**

The author declares no conflict of interest.

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