

# Application of Prestressed Pipe Pile in Foundation Treatment

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**Abstract:** *Our terrain is very complex, in some coastal areas, soft soil coverage is very high, due to the geological changes, all the physical properties of soft soil will appear great changes. Now it seems that prestressed pipeline technology can effectively prevent this problem, the essence of pipeline pretreatment foundation stack is to rely on its own strength, enhance the bearing capacity of the whole foundation. Because of the fast construction speed, the effect of improving the bearing capacity of the foundation is remarkable, which brings remarkable economic benefits for the construction project.*

**Keywords:** prestressed pipe pile; Foundation treatment; application.

## 1. INTRODUCTION

So far, due to the great difference in forming process and forming process technology, the scope of use of prestressed concrete is constantly expanding compared with molded pile, and prestressed concrete has a higher use advantage. At present, prestressed concrete is mainly produced in factories, so the construction technology and quality must be guaranteed. The prestressed concrete pipe pile formed by high-pressure steam release and atmospheric pressure curing has high structural stability and quality stability.

Prestressed concrete pipe piles are made from a complete factory production line, with different lengths and application specifications, wider space and high adaptability to pile bearing. Moreover, in foundation treatment, the penetration performance is strong, and the external impact resistance is good. In many sandy soil and groundwater environments, factory-produced precast pipe piles are of high quality and highly adaptable in different construction environments. In the production process choose speed centrifugal molding technology, and can be applied to 180 °C, high pressure 106MPa pressure and concrete curing steam pressure, high quality, high density.

## 2. CONSTRUCTION TECHNOLOGY AND EXISTING PROBLEMS OF PIPE PILE IN FOUNDATION PILE TREATMENT

(1) Because the pore pressure is greater than the friction effect, the local soil matrix becomes saturated, which has a great influence on the precast concrete pipe pile.

(2) In the process of treating soft soil foundation, it is necessary to combine the actual situation of soil and test unit to conduct in-depth analysis of special soil such as saturated clay. The main type of pile foundation is designed for the horizontal load problem of concrete pile. Where the horizontal load is concentrated, select the pipe to withstand the horizontal deformation.

(3) In the construction, reasonable layout covering should be carried out on the backing plate, combat force should be configured on the basis of force, and horizontal pile load should be increased.

## 3. COMMON QUALITY PROBLEMS AND CONTROL MEASURES IN THE CONSTRUCTION OF PRESTRESSED PIPE PILE

### 3.1 Compaction effect occurs in the construction process

#### 3.1.1 Performance and causes of soil squeezing effect

In the process of pile driving, the soil structure around the pile changes with the sinking of the pile, which affects the original stress state (Table 1) and damages the relative equilibrium state of the soil. The construction process is not appropriate, the construction method is not appropriate, the construction rate is very fast, the welding speed in the building is slow in the construction will affect the implementation Work efficiency.

#### 3.1.2 Prevention and control methods of soil squeezing effect

(1) Pre-drilling method: First of all, for the construction of the prestressed pipe pile layout pile with dense pile distance, the pre-drilling method can be generally selected for construction. By reducing pile drainage volume, the compression effect on the surrounding soil can be reduced. The depth of the hole is preferred to be 33.3% to 50.0% of the length, and the diameter of the

hole needs to be smaller than the diameter of the pile 50mm to 100mm. Pre-drilled holes may be located in non-pile locations. As the pile sinks, this provides space for the soil around the pile to squeeze into the surrounding area and prevents the soil from rising or displacing horizontally. Reduce the impact on the surrounding environment. The removal of dirt from the pile increases the possibility of pile position deviation and should be strictly checked during construction.

(2) Set anti-extrusion ditch: if the pile foundation is buried underground with communication cables, water supply or important buildings nearby, the installation of anti-extrusion ditch can reduce the influence of soil horizontal displacement, it also reduces the influence on adjacent buildings or underground pipelines, and can also reduce the extrusion of nearby buildings or underground pipelines. The length of the anti-extrusion trench is 2 meters longer than the construction foundation. Depending on the actual situation of the project, the trench will be filled with sand or other loose materials. Since anti-extrusion trench cannot separate stress propagation paths in deep soil, this method has a high effect on reducing soil surface displacement and can usually protect shallow underground pipelines or surrounding sidewalks. When taking this measure, care must be taken to protect the trench from collapsing and causing injury.

(3) Controlling pile sinking rate: Controlling pile sinking rate mainly involves two aspects. The number of piles sunk per day and the number of consecutive piles sunk. The main purpose of controlling the rate of pile descent is to prevent excessive water pressure from rising rapidly, which would disturb the soil and damage the surrounding soil Environment. During pile pressing, the lateral part of each soil layer is compressed, while the vertical part is compressed. When the lateral soil can not be compressed, cracks will appear. In the process of pile sinking, the pore water pressure of the soil increases, and the interference to the soil will increase continuously. When the soil reaches incompressibility, its influence is particularly sensitive, so the pile sinking speed should be carefully controlled.

(4) Reasonable arrangement of pile sinking sequence: Correct pile sinking sequence is very important to minimize the compression of soil to the surrounding area. The theory of soil squeezing assumes that the soil is uniform, but when the pile sinks, the soil will squeeze in the direction of low resistance, and the squeezing effect will be greater in the direction facing the building than in the direction carrying the building. The sequence of pile sinking was also analysed in two ways: to minimise the impact of soil squeezing and to minimise its impact on the surrounding environment. If the emphasis of the two sides is different, the order of pile sinking is also different. It is necessary to understand the basic contradictions in the specific construction process, and choose the appropriate pile sinking sequence according to the current actual situation. By choosing the appropriate pile sinking sequence in pile group construction, the pile position deviation can be reduced. Static pressure pipe pile itself is easy to ensure the quality and bearing capacity of the pile, and its role can not be ignored, so it has been widely used in the current construction. This paper describes the basic expression of the influence of soil pressure, and how to easily control the effect of soil compression in the static pressure pipe, hoping to find and control the influence of soil compression in every stage of the construction process, to ensure the quality of the building.

## 3.2 Inclined pile

### 3.2.1 Causes of inclined piles

The causes of inclined pile include: (1) pile press body (platform) is not levelled; (2) pile press column (platform) is not vertical; (3) The precision is not enough when inserting in position; (4) Influence of adjacent pile feeding holes; (5) Influence of underground obstacles and lower limits of the site; (6) pile rod, pile head, pile body is not on the same axis or pile top uneven only caused by the bias problem; (7) pile tip deflection or pile bending; (8) pile quality is poor, the joint is loose, or the next section pile is not on the same axis; (9) Pile driving sequence is not reasonable; (10) The maintenance of the foundation pit is not scientific, or the method, sequence, time and depth of excavation are not enough.

### 3.2.2 Preventive measures of inclined pile

Corresponding preventive measures: must ensure that the pile press in the horizontal direction (platform) level; Before pile pressing, ensure that the pile machine is in a vertical state; When the pile is inserted, two theodolites are used to fix vertical lines in two directions perpendicular to each other, and the error is controlled at 10 mm; (4) Pile control timely backfill; Before construction, we must understand the building environment, the history of the building, the nature of the soil, the soil of the soil filling and remove obstacles in advance; During construction, please ensure that the pile rod and pile head are on the same axis, and adjust and check in advance during construction; Improve the quality of pile production, strengthen the quality of quality acceptance, prevent pile head and joint surface tilt, pile bending and other adverse phenomena, for unqualified pile, absolutely can not be used; Improve the quality of welding, to ensure that the upper section and the lower section coaxial, and according to the specifications to maintain strict technical acceptance; By designing a proper pile pressing sequence and by pressing as much as possible "on the long line" to maximize the distribution of water pressure, we can prevent cumulative stacking and reduce the impact of soil compression. About 10 days after the pile pressure, the pore water pressure should be completely dissipated, and the excavation should be carried out The structure should be strong to avoid lateral soil displacement. When the mechanical excavation reaches 30 meters, manual excavation will be used to avoid the bucket colliding with the pile head, so as to ensure the integrity of the pile structure.

#### 4. CONCLUSION

In other words, when the prestressed pipe pile is treated as soft soil, it is necessary to improve the bearing capacity of the foundation, so as to make full use of the advantages of the prestressed concrete, prevent the possible problems in the construction process in advance, and take good protective measures. Prestressed concrete construction pipeline scope of the system to control the quality of the project, from various departments to strengthen the quality control, expand the scope of the practical application of prestressed pipeline, to promote the overall development of China's construction industry.

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