

STUDY on Quality Control of SMW Construction Pile in Foundation Pit Excavation of Soft Soil Foundation

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Abstract: In order to further meet the needs of the development of the time and promote the improvement of the construction efficiency of our country, the construction units in our country have strengthened the application of new technologies and new process in the process of project construction. At present, the construction units generally encounter the construction conditions of soft soil foundation in the process of construction of the project, then the project quality will reduce because of improper operation, which hinders the improvement of construction efficiency and is bad to acquire relevant benefits. So, in order to ensure the steady development of soft soil foundation construction and promote to acquire various benefits, the construction units strengthen the application of technology of SMW construction pile, and thus contribute to steady development of foundation pit excavation work of soft soil foundation, as well as gain the efficiency .

1. Introduction

Based on the development of the time and the progress of society , the economic construction activities of our country have obtained considerable development. Construction industry of our country has also obtained the substantial development under this background. In order to further promote the improvement of the quality of the project construction, the construction team needs to actively carry out foundation pit excavation work of soft soil foundation , and takes various technologies to promote the majorization control of project quality. Based on this, this paper focuses on analyzing the connotation of SMW pile, and the effect on the launch of foundation pit excavation quality control of soft soil foundation, from this, the construction efficiency of our country can steadily improve.

2. The summary of soft soil foundation

2.1 The connotation of soft soil

The soft soil foundation is a kind of foundation which consists of soft soil, organic soil, loose sand and other soil. This type of foundation often has the shortcomings of strong liquidity, high water content and poor water permeability, which leads to poor stability of the construction project in the area. At present, this geological conditions often present in the course of engineering of the road and bridge , which then causes negative impact on the quality and efficiency of the construction, and is not good for the acquisition of relevant benefits. For this purpose, it is necessary for the operating personnel to strengthen the application of soft soil foundation construction technology in the actual operation process.

2.2 The influence of soft soil foundation on the construction

At present, the varying degrees of soft ground conditions often emerge in the process of construction of the construction projects. The soft soil layer with uneven thickness results in its carrying the phenomena of eccentricity in the process of construction, which leads to the emergence of settlement of a large area



of the main body ,and thus damages the function of the building. The foundation as the basis of the project, often leads to varying degrees of settlement and sloping condition, which leads to further reduction in the use of the project and causes negative impact on construction quality and service life.

Based on this, in order to further promote the effective disposal of the construction problems which are caused by soft soil foundation, it is necessary for the operator to analyze the soft soil foundation during the operation and to formulate the scientific treatment plan according to the analysis result to enhance the compaction degree of the foundation , and then promote the development of construction quality and efficiency.

3. The project overview

In the process of quality control of SMW pile in the foundation pit excavation of soft soil foundation, the author takes the construction of a garage in Tianjin as an example. It is reported that the project is reinforced concrete frame box structure, the construction area is up to an area of 22000 m², foundation pit depth is between 2 ~ 13 m.

In the course of the construction of this project, in order to ensure the improvement of excavation of the engineering foundation pit and the supporting operation efficiency, the engineering construction unit mainly works with the SMW pile. In fact, the use of SMW work pile in the course is often able to achieve the impact to groundwater erosion, and has a relatively strong impermeability, which can improve the project construction efficiency and quality.

The SMW pile which is used in the construction of the project, is mainly cement mixing pile. The pile has a diameter of 850 mm, the center distance and lap thickness are respectively 600 mm, 250 mm. In order to enhance the quality of the pile, the pile body is also inserted into H-shaped steel, the size of which is 700mm×300mm×13mm×24mm. In fact, because the type of material in the course of the application can often be recycled, the project cost can reduce at the maximum extent .

In order to facilitate the smooth development of excavation work, the construction unit in the actual operation process also strengthens the construction of the support system for the support. The system consists of four major components, respectively: lumbar beam, horizontal support, tool column, connecting beam. In the process of running the system, the staff carries out elevation work on the layers of the support set according to the design drawings , and finely adjusts 10 cm vertical of the elevation value combining with the actual construction needs . On the project support system diagram, the author conducts a related summary, the specific content is as follows.

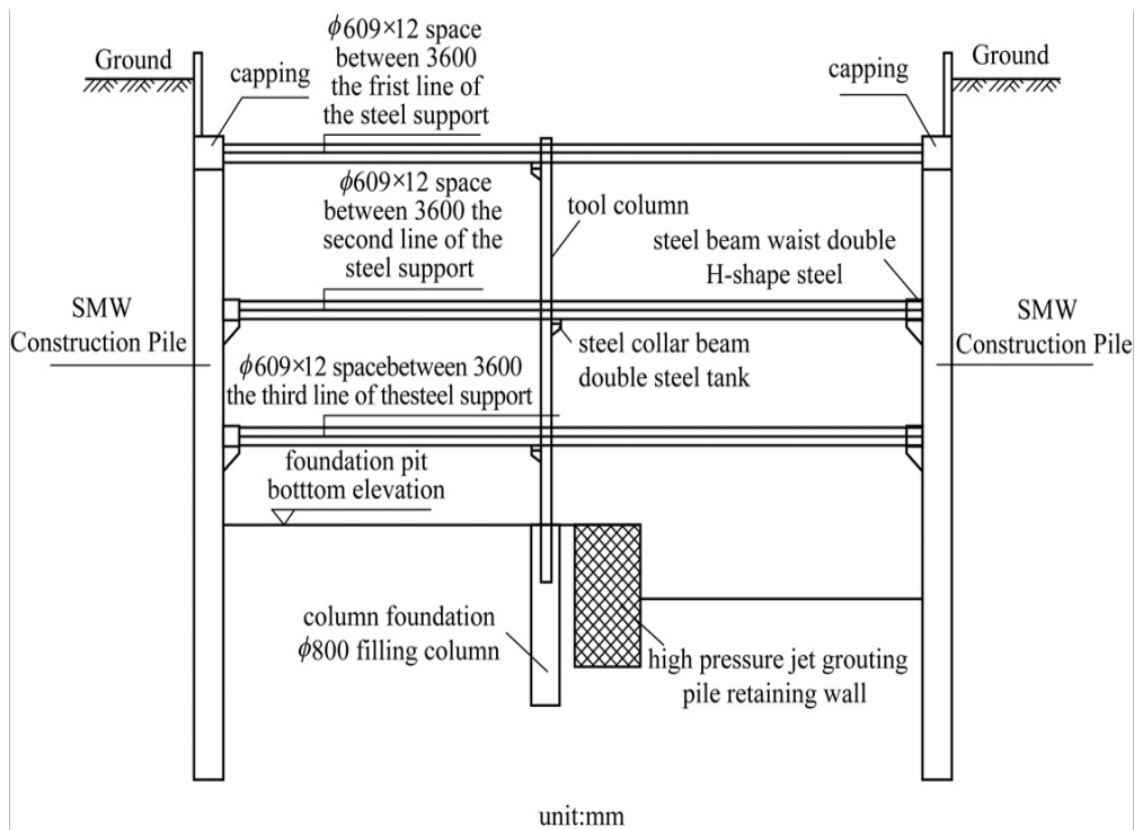


Figure 1 Schematic diagram of the support system

4. The difficulties of the construction of the project

Through the geological exploration work, it can be found that: the soil conditions of the project construction area are mostly marine muddy soft soil. This type of soil is generally rich in water content, has strong compressibility and the small angle of internal friction as well as other characteristics, therefore it has great negative impact on the development of the construction, the difficulty of the construction is great, and it is likely to lead to soil slippage, pile tilt and other issue if the design is unreasonable in the actual operation of the process, which is not conducive to the smooth construction of the project.

Based on this, the project construction unit strengthens to use the SMW piles in the process of building the project. But in fact, because the project is mainly in the underground construction, the depth of its foundation pit excavation and the area were larger, the process of the project generally exists linear changes in the situation, which results in the decline of excavation support operation quality.

Not only that, in the course of the process, it would make the building of the construction area sink because of the improper control of excavation operations, and the pipeline would be leaking conditions, and eventually leads to cracks, bending in the envelope and other bad problems, which ultimately leads to a certain degree of leakage of the pit, water permeability and results in further damage to the construction of foundation pit.

5. The measures to improve the quality control of the SMW pile

In order to further improve the construction quality of SMW pile, enhance the construction efficiency and quality of the foundation pit foundation of the soft soil foundation, the construction team needs to strengthen the rational control of the quality of SMW pile in the process of project construction. The author makes a summary of the measures of the improvement of SMW method of pile quality control, the specific content is as follows.

5.1 Reasonable control of the displacement of the supporting structure

In order to ensure the quality of SMW method of pile to improve significantly, construction workers need to actively carry out the rationalization of support structure displacement control operations. In the actual operation process, the construction workers need to strengthen the analysis of the principle of time and space, and follow the "first deep after the shallow, layered sub-excavation, from top to bottom, first support after digging, layered excavation" principle operation.

In addition, the construction personnel needs to minimize the exposure time of support, under normal circumstances, from the foundation pit excavation to the installation of the support system, the time needs to be controlled within 8 hours. The adoption of this measure is often able to achieve the deformation of the foundation pit control within a reasonable range. In addition, the construction workers need to ensure that the depth of the excavation of the first excavation depth is less than 4m, and then to carry out the excavation of the guide groove according to the support position, so as to achieve the support, waist beam, envelope and other facilities installation work. Under normal circumstances, after the completion of the above operation, the staff needs to use the long arm excavator with a small excavator to dig to the design elevation, controls each step excavation elevation and distance to ensure that the foundation pit deformation and the surrounding settlement are within the limits of safety.

In the deep excavation of the pit, the construction workers often need to operate on the basis of the principle of "short excavation, fast support, strict govern water, diligent measurement, stratified segmentation, first support and later dig", the supporting work is done actively in the process in order to achieve a reasonable application of prestressed to improve the efficiency of supporting work, finally realize the soil for self-stabilization, self-resistance performance of rationalization, and reduce the displacement of the pit, avoid the construction area around the building tilt, cracking, ensure the safety of the construction of the pit to further improve.

After the completion of excavation work, the construction workers need to scientifically control the conditions of the slope and to carry out inspection work according to the slope stability requirements. For those slope which need to keep a long time, the staff needs to use concrete to pour the slope, in general, the thickness of the concrete needs to be maintained at 10cm or more. In addition, the construction workers also need to carry out a reasonable water, precipitation work, so as to further strengthen the stability of the slope and the soil. Finally, the construction personnel needs to carry out the soil backfill work within a day for the foundation pit which is in the excavation process of excavation to the bottom of the tank, and do the closed work with the help of C20 concrete to drive the deformation of the foundation pit effective control.

5.2 The control of instability of supporting structure

There is example of engineering construction showed that deep foundation pit excavation is frequently affected by the stability of support structure. so, in the process of project construction, the construction staff need reasonable control of the stability of the foundation pit with the design requirements. To achieve the efficiency project construction. In general, construction workers need to control the pit side, groundwater pipe burst and other issues reasonably, in order to achieve the project construction efficiency.

5.2.1 Prevention and control measures of structural deformation and instability. The length of the pile H-shaped steel in the process of the construction is 12m, so in the process of docking steel, deformation of steel, lack of quality can often lead to different steel and the envelope because of damage and instability.

Based on this, the construction personnel in the process of building the project need to strengthen the control of steel welding and double-sided groove welding method of steel welding. In general, the welding angle should be 45°, and after the end of the welding operate the interface grinding to ensure that the interface flatness to meet the design requirements.

In order to ensure the improvement of welding efficiency, the construction workers need to slag off, dehumidificate for the double-sided groove before welding, and in accordance with the requirements of the two weld operations, which will help the steel pull out, replace the work.

5.2.2 Prevention of slump and loss of soil. In the process of excavation work, the construction workers often encounter the problem of permeation of the envelope, which often leads to a large amount of sediment flowing into the foundation pit, which leads to the formation of voids outside the envelope. Which is conducive to the stability of structural safeguard, and ultimately lead to support system because of instability and the overturning situation.

In addition, the project is located in the coastal, so the construction area is mostly silty clay, there is the lower quality of the situation of mixing pile. So, the construction workers need to pay strict attention to SMW method of pile of mixing piles, to avoid the emergence of pits through the pit.

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In the process of construction, the construction staff mainly uses ZKD85-3 three-axis mixing pile driver unit for the pile of the mixing work. During the operation, the construction workers need to use the mixing machine scientifically, so as to ensure that the pile driver to run the parameters meets the requirements. In addition, the construction management staff that also needs to grasp the direction of the shift pile driver, and timely remove obstacles to ensure the improvement of the operating efficiency and quality.

6. Concluding remarks:

In order to further improve the efficiency and quality of construction of our country, the construction units of our country can strengthen the application of the new technology in the process of project construction, so as to realize the steady development of the excavation work of the foundation pit of soft soil foundation. Based on this, this paper focuses on the analysis of the soft soil foundation (the connotation of soft soil and the influence of soft soil foundation on the construction), and analyzes the construction and construction of a garage in Tianjin. Then, the difficulties of the construction of the project are discussed, and the measures to improve the quality control of the SMW pile (reasonable control of the displacement of the supporting structure and the control of the structural instability of the supporting structure) are analyzed. The author believes that with the implementation of relevant measures in place and the development of technology, China's deep foundation pit construction efficiency, quality will be developed by leaps and bounds, and thus promote the steady development of China's construction industry.

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