Application of Pipe Jacking Construction Technology in Municipal Engineering Construction

Fu Jingjing

Shandong Linyi Municipal Engineering Construction Office, Shandong Province, Linyi, Shandong 276000, China

Keywords: Municipal engineering, Pipe jacking construction technology, Application points

Abstract: With the continuous improvement of China's social and economic level, the urbanization process is also faster and faster, and there are higher requirements for urban infrastructure, and the scale of municipal projects is gradually increasing. The indispensable link is closely related to municipal engineering. Therefore, in the process of pipeline construction, scientific and technical means must be adopted to reduce the harm to road traffic as much as possible. It can solve this problem well and is widely used. This paper mainly makes relevant analysis on the application of pipe jacking construction technology in construction engineering construction, hoping to improve the level of municipal engineering construction in China.

1. Introduction

Due to the increase in urban population, the per capita land area is gradually decreasing. In this case, in order to meet people's needs for daily life, urban basic municipal engineering construction has begun to develop into underground space, but the construction of underground projects will be limited by the surrounding environment The difficulty is much higher than that of ground operations. In order to cope with this problem, the relevant departments have also chosen a more appropriate construction technology. Among them, the pipe jacking construction technology is widely used because it has many advantages, which will not only reduce the urban traffic situation. The impact of this can also effectively save various resources and improve work efficiency. Based on this, the author especially conducted an in-depth analysis of the pipe jacking construction technology, and also contributed to the development of China's municipal construction.

2. Pipe Jacking Construction Technology Analysis

2.1 Construction Principle

The pipe jacking construction technology is simply a “trenchless construction method”, which is a pipeline buried construction technology that does not excavate or excavates less, and can ensure the safety of road traffic to the greatest extent without affecting it. The main working principle is to locate the pipeline through the relevant equipment and lower it down. In this process, the slope must be well controlled. Then the tool pipe can be pushed through the soil layer from the working pit to the receiving through the thrust between the pipeline and the relay room Lifted in the pit, the pipeline follows the tool tube to complete the burial work.

2.2 Construction Advantages

In the construction process of municipal engineering, compared with other construction methods, the pipe jacking construction technology has greater advantages, which can be divided into the following aspects. First, the cost of this technology is relatively low and relatively practical; Secondly, trenchless construction can minimize the damage to the road surface and ensure that the ground is not damaged; third, it does not need to occupy too much area during the construction process, which can protect the surrounding environment; finally, it can be effective To achieve resource conservation in line with the development needs of the current era. Can improve the quality and efficiency of the project.

  DOI: 10.25236/ic3ec.2020.014

3. Method of Using Pipe Jacking Technology in Municipal Engineering Construction

3.1 Select Pipeline

In municipal engineering construction, drainage works account for a certain proportion, and drainage pipes are a vital part of drainage works. Therefore, in order to ensure the smooth completion of the project and meet people's living needs, relevant departments must according to the actual situation of the project To select a more scientific and reasonable drainage pipeline, in the selection process, we must ensure the quality as much as possible, improve the service life of the pipeline, and at the same time, we must also do cost control work. As far as the current pipeline material is concerned, it is mainly divided into three types, which are steel pipe, plastic pipe and concrete pipe, but due to different materials, their capabilities are not the same. As for the existence of drainage pipes, it is mainly for the treatment of sewage in people’s lives and wastewater in industrial operations, etc. It is necessary to select the pipeline in accordance with the actual situation, so as to reduce the harm of the discharged wastewater to the pipeline.

In addition to the choice of materials, the length of the pipeline must be determined according to the actual situation of the region. If you are facing a zone with large bends and short lines, you need to use a shorter line to push the pipe. Otherwise, choose a longer line to make judgments based on actual conditions.

3.2 Wall Penetration Technology

In the construction process of real municipal engineering, pipe jacking technology is used to penetrate the wall, ensure that the penetrating front can be used during construction, and ensure that large equipment can work during the pipe jacking construction process. In the process of pipe jacking construction, the operator can fill the installation wall with low-strength concrete to ensure the water blocking effect. However, it should be noted that if you want to ensure that the wear resistance of the additional water stop plate ring can meet the relevant requirements, then you need to use a water stop valve, which can prevent the land agency from being exposed when passing through the wall, thus you can avoid corrosion of the pipeline.

3.3 Pipe Jacking Technology

In the process of pipeline jacking technology, it is necessary to strictly follow the construction standards, and the jacking speed needs to be strictly controlled, not too fast or too slow. During the jacking process, relevant data must be recorded for the progress to lay the foundation for later construction. During the drilling process, if the machine head encounters foreign objects or the machine head is offset, the jacking speed needs to be slowed down and the problem analyzed. In order to improve the accuracy of the pipeline after entering the soil, it is necessary to monitor the jacking of the pipeline after entering the soil, and every one meter of the jacking needs to be recorded. The analysis of the data prevents the pipeline deviation problem. After the pipe is pushed in, it needs to be measured several times to ensure the accuracy of the direction of the pipe jacking machine. If there is a deviation, the measurement data needs to be analyzed to solve the offset problem in a targeted manner. When the pipe jacking machine is nagging about the position of the well sealing door, the pipe jacking can be ended. After confirming that the machine head and the pipe section are separated, send the pipe section to the designated position.

3.4 Work Pit

The excavation receiving well and working well are also called working wells. The main building structure is a reinforced concrete structure, and the construction methods are divided into cast-in-place and assembled pouring. Cast-in-place refers to pouring directly at the construction site and is the main method of modern engineering construction. The prefabricated construction method refers to assembling prestressed concrete slabs in advance. Work well construction requires the use of large-scale load-bearing equipment, and the load-bearing weight needs to bear the weight of supporting objects and mixing piles. In this regard, work well construction is an important procedure for pipe jacking. Lay the foundation for construction.

3.5 Grouting

The main component of grouting is mud. Its main function is to reduce the friction between the pipeline and the surroundings by injecting slurry into the gap of the pipeline, so as to protect the outer layer of the pipeline. Grouting not only plays a role in reducing friction, but after the passage of time, the slurry will become dry and play a role in fixing the pipeline, further deepening the protection of the pipeline.

During the jacking process of the pipeline, the pipeline and the surrounding soil layer will generate a large friction force, and even the problem of increasing the difficulty of jacking will occur. In order to reduce the friction force caused by pipe jacking, the pipe jacking head is depressurized to inject slurry into the gap between the pipe and the soil layer, effectively reducing the friction between the two and reducing the jacking difficulty. At the same time, in order to make up for the obstruction caused by the drying of mud during the jacking process, the middle of the drainage concrete pipe can be replenished to make the jacking of the pipe more moist and reduce the friction of the jacking.

3.6 Reasonable Selection of Pipe Jacking Process Parameters

In the process of municipal engineering construction, it is necessary to strictly control the pipe jacking process, especially the length and diameter parameters of the pipe jacking, to prevent the unqualified parameters and affect the construction quality and progress of the pipe jacking. Generally speaking, there is a certain relationship between the length of the pipe jack and the diameter, and the construction personnel need to choose the appropriate length and diameter of the pipe jack, formulate qualified pipe jacking standards, and ensure the construction quality and progress of the construction project. In selecting the process parameters of the jack pipe, it is necessary to select a jack pipe with a diameter greater than half a meter. Relevant research data shows that too long the pipe jacking length will seriously increase the difficulty of construction and affect the construction progress of municipal projects.

4. Countermeasures to Ensure the Construction Quality of Pipe Jacking in Municipal Engineering

4.1 Check the Construction of Municipal Engineering Pipe Jacking

Although pipe jacking involves many construction joints, in the construction process of municipal engineering, some construction links are not suitable for pipe jacking construction technology. In this regard, before the construction of the pipeline project, the construction site needs to be inspected, and the traffic information and environment must be strictly inspected to play a role in planning the transportation route. At the same time, a warning sign needs to be set up at the intersection around the construction site. , Need to send professional staff to direct traffic at the construction site. Strictly inspect the drainage situation on the construction site and formulate drainage optimization strategies to establish a good route for draining muddy water. If unfavorable drainage occurs during the pipe jacking construction process, temporary drainage pipes need to be established to avoid the situation that the sewage covers the pipe jacking and affects the construction progress. In addition, in order to prevent damage to the pipeline during pipe jacking, the pipeline can be fully analyzed. If there are crossing areas, the pipeline structure needs to be shut down and controlled by construction standards. Finally, it is necessary to strictly inspect the sewage discharge and reserve structure around the pipe jacking construction site to avoid the construction progress due to sewage discharge problems. At the same time, the monitoring of the buried material status lays the foundation for pipe jacking and the foundation for subsequent pipe jacking construction projects.

4.2 Strengthen Quality Control during Jacking Construction

In the pipeline construction process, in order to ensure that the construction quality is not affected, the construction personnel need to analyze the local actual situation, thereby reducing the

probability of construction risks caused by environmental problems, as far as possible to ensure the safety of the construction personnel’s life and property In addition, when carrying out pipeline jacking construction, quality control work must also be done. This requires the construction personnel to pay real-time attention to the pipe jacking equipment. Once the situation occurs, it is better to respond in a timely manner, thereby reducing the loss to Minimize to avoid some major risks. In the process of pipe jacking, abnormal phenomena of pipe jacking equipment occur from time to time, and they should be dealt with. The phenomenon of pipe jacking bit deviating from the track is more common. Once this happens , It requires the construction personnel to decisively shut down the equipment and analyze it as soon as possible to find out the reason as soon as possible and take corresponding measures to solve it, thereby ensuring the quality of the pipe jacking construction and laying the foundation for the construction of municipal projects .

4.3 Standardize Construction Operations and Improve the Professional Quality of Construction Personnel

With the continuous improvement of the level of science and technology, there are also higher requirements for municipal construction. Among them, the quality and safety of municipal construction have become the focus of the general public. Whether the construction staff is professional will directly affect the overall quality of municipal construction. Impact, so the construction unit should continuously improve the professional skills and comprehensive quality of the construction personnel, so that they can strictly follow the construction standards to complete the work, specifically from the following two aspects to achieve this goal, first, in the construction process In the process, the construction personnel should make relevant records according to the actual situation of the project. Once they are in danger, they need to have certain coping ability; second, the manager needs to arrange technical personnel to do related supervision and management to regulate the construction personnel ’s Technical operation, so that it can be carried out according to the standard, in order to reduce the probability of risk, at the same time, it also needs the cooperation between various departments of the construction unit, so that the relevant rules and regulations are implemented, so as to improve the safety of construction.

Pipe jacking construction technology is different from other construction technologies. In order to make it play its due role, the corresponding precision instruments need to be used in the process of use, because the use of precision instruments can improve its own work efficiency, but due to China’s starting late, there is still a lack of equipment. To make up for this defect, managers need to change their inherent thinking, actively introduce advanced equipment to make up for their shortcomings, and increase the development of advanced equipment.

4.4 On-Site Construction Management

In order to ensure the normal operation of the pipeline construction and the normal use of various equipment during the construction of municipal engineering sites, the relevant departments must formulate a scientific management system and do the corresponding management work, which can be carried out from the following points. First, on the eve of pipeline installation, the manager needs to arrange professionals to clean the pipeline to ensure that there are no residues and reduce the subsequent burden; the second is the suppression work after the cleaning work, which is closely related to the seasonal situation, so it is necessary Pay special attention to local weather issues. If the temperature is low and the weather is cold, the pressure is mainly used. In this process, relevant personnel need to formulate a scientific pressure plan to ensure the smooth completion of the work. If you need to use water pressure it is also necessary to do related antifreeze work.

5. Conclusion

All in all, in today's era, in order to meet the needs of social development and people's needs, it is necessary to improve the construction of municipal projects under the traditional model, especially in the pipeline construction process, in order to solve its inconvenience to road traffic, you can Resolve it through pipe jacking construction technology to minimize the impact of the project on

the external environment. At the same time, the use of this technology can also fundamentally improve work efficiency. No harm, can fundamentally improve the level of municipal construction in China, thereby driving social and economic development.

References

[1] Liu Chao (2019), Application Research on Construction Techniques of Long-distance Pipe Jacking in Municipal Water Supply and Drainage Engineering [J]. Building Materials and Decoration, no. 35, pp.29-30.

[2] Zhang Haifeng (2019), Practical application and construction technology of pipe jacking technology in the construction of water supply pipelines [J]. Engineering Construction and Design, no. 22, pp.210-211.

[3] Wang Ting (2019), application research of sinking well construction technology in pipe jacking project [J]. Journal of Xingtai Vocational and Technical College, vol.36, no. 5, pp.84-87.

[4] Jin Nan (2018), Application of mud-water balance mechanical pipe jacking construction technology in municipal sewage interception project [J]. Smart City, vol.4, no. 16, pp.111-112.

[5] Jiang Hao (2017), analysis of the application of pipe jacking construction technology in municipal water supply and drainage construction [J]. Low Carbon World, no. 13, pp.110-112.

[6] Xu Longfu (2019), Discussion on Construction Technology and Management Control of Municipal Engineering Pipe Jacking [J]. Housing and Real Estate, no. 30, pp.124.

[7] Cao Wanjin (2018), Application of pipe jacking construction technology in municipal engineering construction [J]. Engineering Technology Research, no. 3, pp.85-86.

[8] Yuan Fangsheng (2017), Research on Construction Technology of Power Tunnel Jacking in Municipal Engineering [J]. Enterprise Technology Development, no. 1, pp.29-31.