

Construction Techniques of Road Water Discharge Pipes of Municipal Project

Xia Yang* and Chenglong Xu

Tiexi District Municipal Group Co., Ltd., Shenyang, Liaoning 110023, China

ABSTRACT Municipal drainage ducts construction generally covers a wide land area within the rapid development of city, which apparently causes heavy traffic. In order to ensure the construction is in accordance to the time-frame the construction techniques of both quick and economy, civilization municipal drainage pipeline, and to reduce interference of the urban road, transport and environment of interference are important. The study focuses mainly on the municipal engineering aspect by investigating more on the construction technology of road drainage itself.

KEYWORDS

Municipal engineering
Drainage pipeline
Construction technology

1. Introduction

With the rapid development of cities, the construction of municipal water discharge pipelines would take up large land areas across the urban roads which basically affects the routine of normal traffic. Due to economic factors, it is important to ensure the municipal water discharge projects is constructed at its best and in a timely manner that eventually minimizes the undesired urban road traffics.

At global scale, vigorous efforts are made in order to protect the ground road effectively by improving the construction of municipal road water discharge. pipes As a matter of fact, reasonable designed of water discharge pipes system can drains away excessive rainwater quickly and subsequently prevent damages towards the subgrade, road shoulder and side slope effectively. If the rainwater is accumulated in the road for a long time, it will seep into the road structural layer and dampen the strength of foundation layer; after a certain period of time, the asphalt layer becomes loose or peeled off. If the rainwater can be discharged in a timely manner, the said conditions will never happen and municipal road can be well protected.

Efforts are made to enhance the construction of water

discharge pipes in the municipal road and thus protect subgrade and other structures. In the cities with rather low temperature, the rainwater seeped into the road structural layer will be frozen into ice; the volume is expanded and road structures are damaged; in case of serious conditions, the subgrade may move with the foundation or destructive damage is triggered and negative impact is produced on the road integrity.

2. Importance of municipal water discharge project

The municipal water discharge project constitutes an important part of the urban infrastructure construction and it is closely associated with the daily life of people. The collocation of water discharge facilities in a city directly determines the economic development of this city and living quality of local residents. Complete water discharge facilities create favorable conditions for efficient and high-quality operation of the city. With rapid development of urban construction, the construction pipeline of municipal water discharge pipe is long, land area is wide and crossing of urban roads seriously affects the traffic. Therefore, how to construct the municipal water discharge pipe project in a swift, economical and civilized manner under the condition of construction quality and period and reduce interruption on urban roads, traffic and environment is of vital importance.

3. Construction techniques of road water discharge pipes of municipal project

3.1. Construction preparation

3.1.1. Familiarization with drawings

The construction personnel must become familiar with the

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*Corresponding author: Tiexi District Municipal Group Co., Ltd., Shenyang, Liaoning 110023, China. E-mail: yangxia1155@sina.com

drawing design in order to have a clear consciousness and order in the project construction. The following measures are adopted:

The employer, designer, supervisor and construction party make a frequent joint audit and handover of drawings.

They become familiar with the full view of project; enter into the construction site according to the drawings and inspect the following contents: full length and direction of pipeline; diameter of pipes; quantity of inspection well; typography, land form and ground objects related to excavation of working surface; pay special attention to the position of gas and power crossing pipelines; mark logos and adopt protective measures.

In order to avoid problems, the pile No. and direction confirmed by drawings must be re-measured by level meter; given time difference in the typographical documents provided in the drawing design, typographical difference is produced due to time changes. Therefore, it will have a certain impact on the project budget: Special attention is paid to this.

The elevation reference point enjoys a set distance of about 100 m and the control network of benchmark elevation is established accurately to bring convenience to measuring in the pipe construction. The measuring with closed inspection is correct; it is forbidden to adopt until conformity with the national standard; the network and pile points are firmly set up in obvious areas to prevent missing or damage [1].

3.1.2. Investigation of on-site conditions and removal of faults

Any factor affecting project construction is recorded. Before construction commencement, a written record is formulated for the pipeline direction and excavation apart from assurance of “thee enabling” project. The assistance from related working units and departments is neglected. The crossing factor of pipeline and urban road cannot be neglected: they are settled before construction. Besides, the environmental sanitation is very important as abandoned soil and transported materials are cleaned up in a timely manner. Importance is given to this problem. For instance, the solution is raised for the crossing of other facilities before construction commencement according to the contradiction between construction water and water connection. The water discharge pipe is collocated along the water flow to assure normal construction in case of torrent flow. Given rather large water flow, an adequate consideration is made to the pipe diameter and quantity, water quality and passing safety are assured. The excavation width is within 1m; in the installation of hoisted pipe, collision is avoided; it is best to construct hoisted pipe when water is not flowing [2,3].

3.1.3. Measuring and setting-out

Measuring and setting-out constitute an important work

in the whole water discharge project and play an important role in the project construction. An adequate preparation is made before measuring and setting-out and visible above-ground obstacles are removed. The measuring and setting-out have an instructive significance to subsequent procedures; before setting-out, strict preparation is made, coordinate central line drawing of pile is mapped for the road and CAD software is collocated for treatment. According to the construction period, the road construction party and water discharge project construction party coordinate with the water discharge project; upon delivery of a section of completed water discharge project, the construction party immediately organizes construction under the condition of no delivery of road piles; according to the distance between pipeline and central pile, automatically calculates XY coordinates of various wells on the working surface, sets out well positions by total station and locates them according to the well coordinate. It can not only obtain rather accurate data, but also realize a swift pace. In the pile driving, ash spraying and setting-out, an adequate consideration is made to the side slope factor and central line upon widening, it is limited by excavation, in order to prevent collapse which leads to injuries, and support is collocated in the groove to assure the construction safety. Besides, the urban water discharge pipe project is faced with the following problems such as, long pipelines, long construction period, seriously interrupted and affected traffic, broad construction range and inconvenience is brought to the pedestrians. Construction safety is noticed in the project. In particular, the competent department is coordinated for the crossing between pipe and road; road sealing and red light are adopted to organize continuous construction; competent personnel are designated to take shift around the clock, thus assure construction quality and upgrade working efficiency [4] within the shortest time.

3.2. Pipe construction

3.2.1. Excavation of groove

The groove is excavated according to different excavated soil qualities. A reasonable analysis is made to the side slope project, especially in the respect of safety and economy, the elevation of groove bottom is measured and controlled in the excavation. It is forbidden to excavate the earthwork of groove bottom excessively and excess excavation is backfilled and compacted solid. It is forbidden to store sleeper in the low-lying area of groove bottom and humus soil is abandoned. The rubbish soil and sludge are compacted. The support is collocated in the position with small excavation surface and rather poor soil quality with limited setting-out.

3.2.2. Pipe installation, selection, adoption and inspection of pipes

The eligible manufacturer must provide the usage standard of pipe materials. Upon delivery to the construction site,

the materials engineer must make quality inspection and verification to the products and assure conformity with the required standard; it is difficult to judge the quality by its appearance. The internal and external pressure tests are made and all the on-site pipes must receive batch inspection by professional laboratory with eligible result and obtain the inspection report [5].

3.2.3. Pipe collocation

According to the central line of measuring and setting-out, the side line at one side of the pipe is controlled by a thin rope to prevent collapse of ditch wall and assure the stability of groove; the pipe is collocated by tire crane and crane is driven until with a distance of 1 m from the ditch edge. In the collocation of pipe, special hook and flexible rig are prepared and special personnel is designated for on-site commanding; the operator finds out the gravity to bind up the pipe and hoists up horizontally and collocates carefully to avoid collision against foundation bottom pipes due to interruption. Given the limitation of construction site, it is not suitable to collocate pipes by machinery; instead, the pipe is collocated by controlling the ropes manually. In case of overhead line, a safety distance is kept. In the collocation of pipe joint into the groove, it is forbidden to collide against the groove wall and groove pipe; the horizontal direction is controlled to make pipe installation meet the quality requirements. The pipe is cushioned stably; gradient of pipe bottom can prevent water backflow; an even joint width is maintained to prevent mud, brick, stone and wooden block from entering into the pipe. The pipe foundation concrete is compacted solidly and closely leaning towards the pipe wall; the coarse sand is backfilled to the pipe.

3.2.4. Water closing test of pipe

Upon inspection of pipe and well appearance and quality, the pipe has no backfilled soil and sleeper groove. All the reserved holes are plugged to prevent water leakage, bearing capacity of plugging plate at both ends of the pipe is not larger than the integrated water pressure. The reserved water inlet and outlet pipes are removed and the leftover is plugged to prevent leakage [6].

4. Conclusion

As a concealed project in the urban road project, the water discharge pipe project quality of municipal road directly affects the urban development. Therefore, we have to strictly adhere to the basic construction flow, assure the quality of municipal water discharge pipe project and thus provide assurance for the daily life and urban productive force of general public. In the construction techniques, related construction personnel must launch out scientific analysis and research, develop new construction techniques and processes, not only assure the construction quality, but also upgrade the construction efficiency to a certain degree.

In the urban development, it is hard to estimate the effect of water discharge project of municipal road. The water discharge project enjoys equal importance as the healthy urban development. Therefore, we must adopt effective preventive measures to attain the best construction quality.

Conflicts of interest

These authors have no conflicts of interest to declare.

Authors' contributions

These authors contributed equally to this work.

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