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Study on Safety Management Measures for Municipal Infrastructure Demolition Project

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Abstract: With the continuous advancement of the country's urbanization process, many cities are simultaneously carrying out the renovation of old urban areas while building new urban areas, which involves the demolition of many buildings and municipal infrastructures. To ensure the smooth progress of demolition projects, related safety management work is crucial. This article will discuss the safety management measures for demolition projects based on the basic principles of safety management for municipal infrastructure demolition projects, taking the demolition of gas storage tanks as an example.

Keywords: Municipal; Infrastructure; Demolition engineering; Safety management

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1. Basic principles of safety management for demolition projects of housing construction and municipal infrastructure

Demolition enterprises should have the corresponding qualifications. The demolition operations undertaken should be in line with the grade regulations, and they cannot be subcontracted or leapfrogged. Before the demolition project is carried out, the preparation of the construction organization design should be completed. The construction organization design should be scientific, specific, and operable, and at the same time, have strong safety technical measures. If it is necessary to change the construction method and adjust the construction sequence, the construction organization design should be supplemented and the written documents should be revised. In terms of demolition methods, mechanical demolition should be the main method as much as possible to reduce the manpower and material resources consumed by demolition, to ensure the safety of the operation. If large dust is generated during the demolition stage, the wet operation method should be the main one. If the scaffold needs to be used, the scaffold erection needs to be carried out by a professional unit, and a special project construction plan can be prepared, and it can only be used normally after passing the acceptance. In the stage of the demolition process, the scaffold can be removed simultaneously. After the demolition construction is completed, the personnel should fully clean up the site and avoid affecting the safety of the surrounding pipelines and buildings [1].

2. Safety management of infrastructure demolition projects - take the removal of gas storage tanks as an example

2.1. Preparation work

Before dismantling the storage tank, relevant documents should be drawn up, and the demolition plan and construction organization design approval should be applied to the relevant departments. Before construction, relevant personnel should fully read and understand relevant regulations and documents as well as do a good job of technical disclosure. Technicians should take into account the actual situation to increase the effective protection of the site. In terms of site preparation, the power supply and circuit required for demolition construction need to meet national and industry standards. The same is true for the supply and drainage system. The construction site should have a drainage system to avoid a large amount of water accumulation on site. The site should be flat to avoid water accumulation affecting the safety of the foundation. At the same time, various construction facilities used for on-site demolition should be strengthened to strengthen the exemplary management of lifting tools. On-site fire protection facilities also need to be fully implemented, such as warning signs, safety warning signs, etc. [2].

2.2. Tank removal

Before cutting the baseplate, in order to ensure the thoroughness of the baseplate removal, the floor concrete part should be completely removed by a hydraulic hammer, and the tank baseplate should be fully exposed to avoid a large amount of dust during concrete removal. If there is a lot of dust on site, water can be sprayed by a high-pressure water gun, and mist water can be sprayed to achieve the purpose of dust reduction. Through the infrared level scribing, the tank wall is cut along the scribing direction, which can generally be completed by a water knife of an ultra-high pressure water jet cutting machine.

The outer tank wall can be cut by hydraulic hawkbill pliers. When scribing and cutting, it should be avoided to touch the tank column to prevent the column from being disconnected without interruption. Since the shearing is a physical reaction, coupled with the high temperature caused by the metal collision, the shearing position is sprayed by the high-pressure water gun to achieve the cooling effect. Before the shearing of the tank is completed, the site can be divided by a crane, and different parts can be laid down by a crane [3]. Before laying down, the on-site personnel need to hang the sling utensils and traction ropes, etc., and then cut them off by hydraulic shears. All lifting work needs to comply with safety precautions. After the steel plate is removed, the materials should be stacked at the designated location according to the requirements of the construction unit and the actual situation on site. The tank water tower layer should meet the construction requirements of the outer tank layer.

All operations should comply with the demolition construction requirements, and the site environment should be isolated, and special personnel should be arranged for monitoring. During construction, the removal of tank wall panels and tank edge panels is a key process in the demolition project. Circular cutting can be carried out by an automatic high-pressure water cutting machine, and the tank body can be cut by large hydraulic pliers. This removal method does not generate open flame operations, and the safety risk is low. The workload of building scaffolding can be omitted, and cost control can be done well [4].

2.3. Safety management

2.3.1 Safety education

For personnel entering the site construction, the safety person in charge of the project department shall do a good job of safety education and establish a safety education file in a targeted manner. After the personnel receive education, the project department shall conduct an assessment and complete the application of the admission

certificate before they can enter the site for operation. Education belongs to the third-level education. The enterprise, the project department and the team are the main bodies of education respectively. All education processes ultimately need to be signed and written records formed.

For personnel engaged in special work, while doing a good job of safety education, a special operation personnel registration form should be established in a targeted manner, and various types of information of personnel, including the issuing authority, the operation certificate number, the operation project and the operation of machinery and equipment, should be recorded in detail. Safety education should comply with the requirements of the actual situation on site, as well as the post responsibility system and technical operation procedures. The content of safety education includes safety management system, fire prevention and fire protection knowledge, equipment use requirements, safety production overview, emergency treatment measures, etc., and strives to be detailed [5]. If there is a requirement for transfer or resumption of work, the safety education for new positions or new construction requirements should be re-organized, and the personnel will be tested. After passing the assessment, the personnel can be re-employed. During the period when the personnel are on duty, if there is an illegal operation situation, the project department should re-organize the safety education of the personnel, and it also needs to go through the assessment before allowing the personnel to return to work.

During the demolition project stage, the project department also needs to conduct safety education of personnel from time to time, and carry out safety education activities through safety activity days, safety regular meetings, etc. In case of special climate conditions or construction site conditions, additional safety education is required. All learning situations need to form a safety ledger. Personnel need to master the safety rules and regulations, and consciously abide by them. If any operation with hidden risks is found, it should be rejected in a timely manner. Once an accident occurs, it should be reported to the person in charge in a timely manner.

2.3.2. Safety and technical disclosure

Before the start of the tank removal project, technical disclosure should be carried out. The content of the disclosure should be as detailed as possible. Both the disclosure and the person to be disclosed need to sign. On-site construction personnel should sign the bottom and urge the personnel to implement the specific operations. The person in charge of the site should organize random inspections of the safety situation from time to time, and order corrections if it does not meet the requirements.

2.3.3. Safety inspection

The safety officer should strengthen the inspection of the site during the tank removal stage to reduce the unsafe behavior of people and the unsafe state of things. For the safety defects found, the safety officer should supervise the on-site construction personnel and complete the rectification within the specified time limit. The relevant situation of the inspection should be clearly recorded [6]. The content of the inspection is specific, including the implementation of the system, the thinking of personnel, the use of machinery and equipment, the safety of equipment, the implementation of education and training, the use of labor insurance, and the handling of accidents.

For the problems found in the safety inspection, the project department should summarize the solution to the problem through a meeting, and formulate a follow-up rectification tracking plan. The power supply and water source at the demolition site need to be handled by a special person. Safety warning signs should be set up in dangerous locations (additional red lights should be installed at night to serve as a reminder) to strengthen the safety awareness of personnel. If a fire needs to be started, a fire prevention responsibility system should be

established specifically, and an approval system should be used for fire use. A fire prevention management system should be set up on site, and a person should be responsible for the fire approval system. The smoothness and cleanliness of the road on site should meet the requirements.

There should be good drainage conditions in the field, no water accumulation, and garbage should not be piled up at will. Instead, it should be dealt with in a timely manner. The responsibility system for safe production should be implemented on an individual basis, and the implementation of personnel should be supervised. For the machinery and equipment used in the demolition construction, the switch should be equipped with a leakage protector, the rotation position should be equipped with All construction personnel are required to wear a badge, and the badge information should include the name, title and contact number of the personnel [7].

2.3.4. Safety signs and announcements

Switch boxes, distribution boxes, etc. used on site should be carefully inspected. If maintenance is required, the power supply should be disconnected in advance, and the power outage sign should be hung in a conspicuous position. If the construction site work utensils and mechanical equipment do not meet the demolition construction requirements, they cannot enter the construction site and hang the signs on the mechanical equipment. If there is a large noise at the construction site, or there is a painting operation, the on-site personnel should be reminded to wear anti-noise devices. Safety passage positions should prevent signs such as fire hydrants or fire extinguishers. Once personnel encounter a fire, they can organize fire extinguishing as soon as possible.

2.4. Protection of personnel

The personal protection of personnel is of paramount importance. Personnel entering the site for construction should wear safety helmets and puncture-proof safety shoes. If it is necessary to dispose of materials that may harm hands, such as irritating, flammable, corrosive and relatively sharp materials, gloves should be worn. When engaged in crushing, burning and welding, etc., welding masks and protective glasses should be worn to prevent strong light or sparks from harming the eyes [8].

2.5. Mechanical management

Safety protection devices should be set up at the transmission position of construction machinery and equipment. The supervisor should take protective measures and ensure that relevant operations are in place. The safety protection of mechanical protection facilities needs to be implemented by special personnel. If conditions permit, protective facilities should be fixed on the machine, and sharp corners should be replaced by barrier protection facilities.

During the demolition stage, if abnormal phenomena such as heat and noise are found in the construction machinery and equipment, or other faults are found, it should be stopped in time, and the power supply should be cut off for comprehensive maintenance. During the construction stage of machinery and equipment, operators cannot eat on site. At the same time, they should complete the cleaning of waste and garbage as soon as possible, and fulfill the requirements of safe construction and civilized construction.

The construction of machinery and equipment should be guaranteed to be standardized, and no illegal command or construction can be carried out. Night construction should be equipped with adequate lighting, and electricians should have professional qualification certificates. In order to avoid leakage of electricity, a rain shelter should be set up on the site, and various types of machinery and equipment should be scientifically arranged to

prevent the occupation of a large number of work sites. After the demolition is completed, it should be recycled as soon as possible [9].

2.6. Electricity management

Cables should ensure good insulation, correct wiring, and All the dismantling and maintenance of power supply lines need to be completed by electricians. On-site power distribution cabinet doors should be locked, and fire extinguishing equipment and protective supplies should be placed near the site for easy access at any time. Temporary power equipment set up should be well grounded protection. All kinds of portable equipment should also be well protected against leakage. The rated current should not be greater than 30mA, and the response time should not exceed 0.1s [10].

3. Conclusion

To sum up, the safety management of municipal infrastructure demolition projects needs to do a good job in technical management, on-site management and personnel management, etc., and do a good job in safety education for personnel, as well as safety inspection of the site, and establish a strong sense of safety production among personnel, so as to improve the safety of demolition projects and ensure the smooth progress of related work.

Disclosure statement

The author declares no conflict of interest.

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