

On the Construction Safety Control of Water Conservancy and Hydropower Projects

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Abstract: Water conservancy and hydropower project, as the core part of national infrastructure, has always carried the heavy responsibility of national economic development. With the progress of society and the rapid change of science and technology, water conservancy and hydropower projects have achieved unprecedented development in scale and technology. However, in this development trend, we have to face up to a crucial issue —— construction safety. Construction safety is not only directly related to the life safety of the construction personnel, but also related to the progress and quality of the whole project, and even affect the stability of the surrounding environment and the society. This paper aims to discuss the importance of construction safety control by analyzing the safety risks of water conservancy and hydropower project construction, and put forward a series of feasible control measures.

Keywords: Water conservancy and hydropower; Project construction; Safety control

Introduction

In the construction process of water conservancy and hydropower projects, due to the complexity and variability of the project itself, as well as the uncertainty of the construction environment, the construction safety has become a problem that needs high attention. Once a safety accident occurs in the construction process, it will not only cause casualties and property losses, but also have a serious impact on the smooth progress of the project, and may even cause a series of chain reactions, causing a greater negative impact on the society.

1. Construction safety risk analysis of water conservancy and hydropower projects

In the construction process of water conservancy and hydropower projects, there are various safety risks, which originate from many aspects, including but not limited to the natural environment, construction technology and construction organization. Below is a detailed analysis of these risk factors:

1.1 Safety risks caused by natural and environmental factors

Natural environment is a source of safety risk that cannot be ignored in the construction of water conservancy and hydropower projects. Because this kind of project usually needs to be carried out in various natural environments, such as mountains and rivers, therefore, geological conditions, climatic conditions and hydrological conditions will have an impact on the construction safety^[1]. For example, the unstable geological conditions may lead to foundation instability, which may increase the construction difficulty and safety risk; the harsh climatic conditions, such as heavy rain and strong winds, may also prevent the construction progress and even cause safety accidents.

1.2 Safety risks brought about by the technical operation difficulty

The construction of water conservancy and hydropower projects involves a large number of professional technical operations, including but not limited to excavation, concrete pouring, equipment installation, etc. These technical operations not only require the construction personnel to have professional skills, but also need strict operating procedures and safety protection measures. The difficulty and complexity of the technical operation increase the safety risk in the construction process, and any small error may lead to serious safety accidents.

1.3 Safety risks in the construction organization and management level

Construction organization and management are also an important factor affecting construction safety. If the construction organization is unreasonable, or there are loopholes in the management, it may lead to the occurrence of safety accidents. For example, if the staffing on the construction site is unreasonable, or the safety system is not effectively implemented, it may cause confusion and danger. In addition, if the construction equipment maintenance is improper, or the use of unqualified materials, it will also pose a threat to the construction safety.

2. Safety safety control measures of water conservancy and hydropower projects

2.1 Strengthen safety education and training measures

Improving the safety awareness and operation skills of construction personnel is the basis of preventing safety accidents. Therefore, safety education and training activities should be carried out regularly to ensure that every construction personnel has a deep understanding of the safety norms, and can implement them skillfully and accurately. The training content shall include but not limited to safety operation procedures, identification and response of hazard sources, self-rescue and mutual rescue in emergency, etc. At the same time, the assessment and incentive mechanism should be adopted to ensure the training effect, so that the construction personnel can really internalize the safety awareness in the heart and externalize it in the practice.

2.2 Improve and strictly implement the safety management system

Establishing and improving the construction safety management system is an important guarantee to ensure the construction safety. These systems should include the safety inspection system, the safety reward and punishment system, the accident reporting and handling system, etc. In the process of implementation, we must ensure the rigidity of the system, do not allow any form of violation and slack. At the same time, the system should be constantly revised and improved according to the progress of the project and the actual situation to ensure its adaptability and effectiveness.

2.3 Strengthen the on-site safety inspection and hidden trouble investigation

In the construction process of water conservancy and hydropower projects, on-site safety inspection and hidden trouble investigation is a crucial link. The implementation of this link requires not only in-depth and meticulous, but also continuous, to ensure that the safe state of the construction site is always within a controllable range. For the site safety inspection, the scope shall cover all aspects that may involve safety, including but not limited to the operation state of construction machinery, the safety of temporary power facilities, protective measures for high operations and adjacent operations, etc. Each inspection should follow the established safety standards and norms, not the slightest carelessness and carelessness^[2]. In the process of inspection, once found any situation that does not meet the safety requirements, it must be immediately pointed out and require rectification, until the safety standards are met. At the same time, the hidden trouble investigation is also an indispensable part. Hidden dangers may be hidden in each link of the construction, only through in-depth and comprehensive investigation, can timely find and eliminate these potential dangers. Hidden trouble investigation should pay attention to details, from the layout of the construction site, the use of equipment, to the operation habits of the construction personnel, should be included in the scope of investigation. For the hidden dangers identified, we must establish detailed records, and formulate targeted rectification measures, to ensure that every hidden danger can be dealt with in a timely and effective manner. In addition, in order to improve the effect of safety inspection and hidden dangers screening, some innovative methods can also be adopted. For example, advanced technologies such as UAV and intelligent monitoring can be used to carry out all-round real-time monitoring of the construction site, so as to find and deal with safety problems in time. At the same time, a safety information sharing platform can also be established to encourage construction personnel to take the initiative to report potential safety risks, and form a safety management atmosphere with full participation.

2.4 Introduce and applying advanced safety technology and equipment

In the construction of water conservancy and hydropower projects, the introduction and application of advanced safety technology and equipment is the key measure to improve the construction safety. With the rapid development of science and technology, more and more efficient and intelligent safety technologies and equipment have been developed, which provides a strong safety guarantee for the construction site. In view of the characteristics of water conservancy and hydropower projects and the safety risks in the construction process, it is particularly important to actively introduce advanced safety technology. For example, the use of high-precision sensors and data analysis technology can monitor the construction site parameters in real time, such as temperature, humidity, pressure, etc., so as to find abnormal conditions in time and take corresponding safety measures. In addition, by the application of BIM technology, accurate simulation and planning can be carried out before construction to optimize the construction process and reduce the safety risks in the construction process^[3]. In terms of equipment, attention should be paid to those advanced equipment that can improve the construction efficiency and safety. For example, automated and intelligent construction machinery can greatly reduce the possibility of human error and improve construction accuracy and efficiency. At the same time, some new safety protection equipment, such as intelligent safety helmet and wearable monitoring equipment, can monitor the physiological state and working environment of construction personnel in real time, and timely find and give early warning of potential safety risks. The introduction and application of these advanced safety technologies and equipment can not only improve the safety of the construction, but also improve the overall quality and efficiency of the project. However, this also requires the construction unit to have the corresponding technical strength and management ability, to ensure that these technologies and equipment can be effectively used and maintained.

Therefore, the construction unit should constantly strengthen their own technical and management ability, in order to adapt to the needs of scientific and technological development, to ensure the construction safety of water conservancy and hydropower projects.

2.5 Formulate and implement emergency preplans

Despite various precautions, safety accidents are still possible. Therefore, it is necessary to develop a detailed emergency plan to deal with all kinds of possible safety accidents. The emergency plan should include accident report, on-site disposal, medical rescue, after-treatment and other links to ensure that the accident can be quickly and effectively handled^[4]. At the same time, emergency drills should be organized regularly to improve the emergency response ability and self-rescue and mutual rescue ability of the construction personnel.

3. Tag

The construction safety of water conservancy and hydropower projects is the fundamental guarantee for the smooth progress of the project and the life safety of personnel. Through the thorough analysis of the safety risks in the construction process, this paper puts forward a series of targeted safety control measures. The implementation of these measures requires not only the strict implementation and continuous supervision of the construction unit, but also the joint participation and efforts of every construction personnel.

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