On Quality Control Measures in the Construction Process of Water Conservancy Projects

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Absrtact: Quality assurance of water conservancy engineering is the most critical link in the process of water conservancy construction. Only by strictly controlling each link and fully implementing it can the quality of the entire water conservancy project be guaranteed. On the basis of studying the factors affecting the construction quality of water conservancy projects, this article explores the quality control measures during the construction process of water conservancy projects, enriching the theory of water conservancy construction.

Keywords: Water conservancy engineering construction process quality control

The construction of water conservancy projects is very complex and requires very strict standards. Every individual water conservancy project must undergo surveying, planning, design, construction, and so on. Water conservancy engineering construction is the process of transforming designed and planned drawings into actual water conservancy projects, and the quality of the conversion directly affects the stability of the water conservancy projects. The quality of water conservancy projects can affect the safety of people´s lives and property. Quality control should be emphasized during the construction process of water conservancy projects, and good quality control measures should be taken to ensure the construction of good water conservancy projects.

1Factors affecting the construction quality of water conservancy projects

The construction of water conservancy projects may affect electricity, agriculture, aquatic products, etc. During the construction process of water conservancy projects, attention should be paid to the safety of the lives and property of downstream people, and efforts should be made to avoid affecting the production and life of upstream and downstream people. The design and planning of water conservancy projects should start from the principle of quality first, and construction should be carried out without affecting the interests of the people, and the quality of water conservancy projects must be given top priority. The quality assurance of water conservancy projects must be based on construction contracts and technical specifications, analyzing various methods, relevant personnel, machinery and equipment, and the upstream and downstream environment during the construction process of water conservancy projects. Analyze the complexity and multifunctionality of water conservancy engineering construction clearly.

2 Quality control measures during the construction process of hydraulic engineering

2.1Quality assurance before construction

Before carrying out construction organization design, it is necessary to obtain accurate survey data near the construction site. Survey work is not only carried out before design, but also needs to be continuously carried out during the design and construction stages to meet the requirements for data during the engineering construction process. Generally speaking, the main data required for the construction organization design of water conservancy projects include: (1) hydro meteorological data, including precipitation (rain, snow, hail, etc.) data, hydrology

(water level, flow rate, ice flow, etc.) data, temperature data, evaporation data, wind speed, direction, and pressure data; (2) force terrain data, including several topographic maps of different scales near the construction site; (3) Geological and hydrogeological data; (4) Information on the quantity, quality, and origin of local building materials (soil, stone, sand and gravel, cement admixtures, grass, etc.); (5) Transportation data: including existing land and water transportation data and planned construction routes; (6) Supply conditions; (7) Living and hygiene conditions; (8) The local industrial conditions and production capacity that can serve engineering construction; (9) Local labor conditions: including quantity, technical level, and professional construction.

2.2 Quality control during the design phase

Due to various reasons, China's construction supervision system only focuses on the supervision and quality control of projects during the construction phase, while neglecting the design phase, which plays a decisive role in investment. As a result, the phenomenon of "three excesses" frequently occurs, but there is no corresponding constraint mechanism for design units. Ultimately, it ends up with a legitimate "adjustment budget", which is unfair to the results of feasibility studies and has also induced many phishing projects to be launched, which has a huge negative impact on the development of the national economy. Therefore, for large-scale water conservancy projects, it is best to implement design supervision to truly save investment by controlling design quality.

2.3Quality control during the construction phase

2.3.1 Construction of basic engineering

There are many methods for foundation treatment, which depend on factors such as geological conditions, building types, grades, usage requirements, structural types, and construction conditions, and are determined through technical and economic comparisons. For example, when the weathered layer is thick, the rock is fragmented and cannot be completely removed, or when the gravel foundation is deep, methods such as using mortar or building concrete anti-seepage walls are often used to improve the foundation strength and increase impermeability. For weak foundations, measures can be taken structurally to apply special loads such as pile foundations, caissons, and sinkholes to the depths of the formation, in order to improve the strength and stability of the foundation.

2.3.2Earthwork and embankment construction

Earthwork engineering includes three basic construction processes: excavation, transportation, and environmental construction. Earth rock dams are water retaining structures that should meet the requirements of stability, impermeability, and minimal settlement, therefore requiring high filling quality.

2.3.3Concrete engineering and concrete dam construction

Concrete is mainly used in hydraulic engineering to construct structures such as dams, water gates, hydropower stations, ship locks, and hydraulic tunnels. Due to working conditions, hydraulic structures have special requirements for concrete. In addition to specific requirements for materials, there are also special requirements for construction processes to ensure the quality of hydraulic concrete. The basic measures are to improve the compactness of reinforced concrete and ensure the integrity of the building. The construction process of concrete engineering is generally divided into: orthopedic mining, processing, and storage; Steel bar preparation, transportation, and binding; Template preparation, transportation, and installation; Concrete mixing, transportation, and construction; Concrete curing and demoulding, temperature control measures and special construction methods for large volume concrete pouring.

2.3.4 Construction of hydraulic tunnels

In water conservancy construction, underground structures such as diversion tunnels, pressure regulating wells, and underground powerhouses are often used in mountainous areas. The main work of tunnel

construction includes two basic sub projects: excavation and support. Support includes temporary support, permanent lining, and grouting. In addition, auxiliary operations such as measurement, ventilation, drainage, and lighting play an important role in ensuring project quality and safe construction.

2.3.5Construction diversion and drainage

The construction diversion plan is related to the overall construction progress of the project, affecting the selection of construction methods, site layout, and project cost, and even affecting the type selection and layout of hydraulic structures. Therefore, construction diversion plays an important role in construction organization design. When designing, data should be carefully analyzed, and diversion methods and procedures should be reasonably selected while ensuring that construction requirements and other economic departments are met. The diversion design flow rate should be determined, and the type and layout of diversion buildings should be selected. Technical and economic comparisons should be made among possible diversion schemes.

2.3.6Quality management during the construction process

Fully implement the responsibility system, clarify the responsibilities of unit leaders, project leaders, engineering and technical personnel, and specific staff, implement the responsibility system at all levels, and strengthen supervision and inspection. Implementing a technical responsibility system: Each engineering and technical personnel is required to clarify their responsibilities and authorities, with clear division of labor and each performing their own duties, in order to facilitate the completion of their respective technical work. All types of materials used on construction sites, such as steel, cement, coarse sand, stones, etc., should be sampled and inspected to meet design requirements before use to ensure construction quality. During the construction process, the person in charge of construction technology must carefully keep a construction diary, detailing and preserving the daily work situation, problems encountered, and their solutions and results, as the basis for completion acceptance and quality assessment. Carrying out good construction supervision work is an important means of managing construction projects effectively. The purpose of construction supervision is to improve the scientific and open management of engineering construction projects, with the aim of proactive control and quality control during the construction phase. In each individual part of the project, especially in concealed works, completion of one acceptance is required before proceeding to the next process or part of the construction. At the same time, complete technical data is provided for the final acceptance.

2.3.7Strengthen the management of construction funds

Engineering investment is an important guarantee for ensuring engineering construction. Firstly, it is necessary to strictly control the use of funds and make installment payments according to contract requirements, project progress, and quality; Secondly, it is recommended that investments should be managed in a unified manner, with dedicated accounts for savings and use for specific purposes. Each individual project should be recorded separately to avoid investment being squeezed or misappropriated; In addition, the contracting of various sub projects adopts the method of sub item bidding and total price contracting, which reduces project costs and improves project quality through open, fair, and just competition; Finally, payment can be refused for any substandard quality or project progress that violates contract terms.

3 Conclusion

In short, it is necessary to strictly control various factors that affect the quality of water conservancy projects. During the construction process of water conservancy projects, it is necessary to establish and improve the preparation work before construction, do a good job in quality control during the design stage, and continuously improve and enhance the construction technology and process level at each stage. Establish

a rigorous quality assurance system and quality responsibility system, and implement comprehensive and effective management for all sub projects and sub projects to ensure project quality.

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