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Civil Engineering Construction Quality and Safety Management

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Abstract

With the acceleration of China's economic development and urbanization, people's demand for convenient transportation is increasing, of which the most representative is highway construction. But the project compared to other projects there are many difficulties and uncertainties, such as long construction period, large investment, complex technical requirements and other external factors. Among them, the construction unit on-site quality management is the top priority of engineering construction, so the construction unit how to comprehensively and accurately control and improve on-site quality management, and various types of quality problems to put forward targeted countermeasures to minimize losses and ensure the smooth implementation of the project.

Keywords

Quality Management; Construction Unit; Construction Site.

1. Introduction

Compared with other projects, the project duration is longer, the technical requirements are complex, the construction process is tedious, the overall requirements are strict, the interference factors are larger, etc. In order to ensure the overall quality of the project, this requires that the quality management of highway projects must be more strict and more accurate. That is, the project construction unit should conscientiously implement the arrangements for the quality management work, resolutely from the aspect of solving quality problems, with specialization, refinement as the standard, innovative, scientific-oriented, information technology, accountability as a means to promote the construction unit in the construction site quality management development and innovation. At the same time, quality management work is the driving force of the vitality of a construction unit, is a construction unit of the development of the foundation and a strong helping hand; construction units only "profit first" concept into "quality only, reasonable profit", quality management work can be a qualitative leap and a qualitative leap. Only by changing the concept of "profit first" to "quality only, reasonable profit", can the quality management work make a qualitative leap and progress, and ensure the steady development and improvement of the construction unit, and truly show our country's rigorous and responsible attitude towards the people's livelihood infrastructure construction and efficient and high-quality guarantee.

In China's rapid social and economic development prospects, followed by an increase in the number of projects, how to improve the economic returns of the project at the same time, but also to ensure the quality of the project, so as to satisfactorily achieve a high degree of coordination of the project cost, quality, progress and goals, in the actual construction of the project highlights the importance of the status. With the maturity of construction technology and management methods at home and abroad, the market competition began to increasingly intensify, China's engineering and construction units only through improving the quality management level, effectively improve the quality management system of the project, from

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multi-level, multi-links and other aspects of standardizing the quality management, explore the potential to improve the safety of the project, and to achieve the interests of the construction unit to reduce costs and increase revenue target.

2. Theoretical Basis

2.1. Characteristics of Engineering Projects

Engineering compared to other general products, has a unique product performance and characteristics, subject to the influence of the external environment, the site construction lasts a long time, complex geological conditions, complex changes in hydrogeological conditions, operating procedures and construction processes directly affect the quality of the highway, such factors can easily cause changes in the quality of the engineering system, which will lead to engineering quality problems, thus affecting the safety and service life of the project. Therefore, the construction personnel of the construction unit must take timely and effective quality management of common quality problems at the construction site, reduce the causes of highway construction quality problems, and reduce the economic losses and social impact caused by quality problems. According to the special nature contained in the project to make the following description:

1) Highway level diversity. China's engineering according to its own requirements of the specific purpose, service life, technical level, construction technology, construction materials, construction machinery and equipment and maintenance level, etc. will be divided into a first-class, second-class, third-class, fourth-class, as well as highway, and so on.

2) The open-air operability of the project site construction. Project site construction site is located far away from the urban area in the natural environment, at the same time, easy to be affected by the climate and other external factors of interference; for example, spring and summer rainfall, autumn and winter winds and frost, etc., so the project's open-air operation by the natural conditions, geographic conditions constraints, the construction site conditions are difficult. This will not only increase the difficulty and danger of construction, but also puts forward high requirements for on-site quality management, increasing the construction difficulty of the project.

3) Construction part is more. The project in the actual construction, including the foundation pavement, culvert, bridge and tunnel, compared with other projects, the construction conditions are more complex, the construction is more difficult, the construction technology content is higher.

2.2. Overview of Engineering Project Quality Management

2.2.1. Concept of Project Quality Management

Project quality management is the main body of management directed at the quality of the project, the product and the quality of work using scientific and rationalized methods for systematic management, to complete the quality management objectives, to achieve the maximization of the use of the value of the product. However, the main body of engineering project quality management is defined as the quality of the project.

Engineering quality management covers the whole process of the project, namely: decision-making, design, construction, completion and acceptance. But the most important stage is in the construction phase of the project, using a series of necessary management systems, means and methods to ensure that the project meets the requirements of the original design and all kinds of laws and regulations, quality standards and so on, to ensure the quality of the project. As the construction project is a one-time activity, it is impossible to carry out destructive tests about daily quality management, so the relevant units of the project must do a good job in the pre-project as well as the construction stage, strict quality assurance and quality management.

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2.2.2. Main Contents of Project Quality Management

Engineering project quality management is an important part of project management, and its main content contains the following aspects: 1) Personnel. Mainly through the construction unit staff quality behavior management, the use of publicity, education, supervision and re-inspection and other means to further improve staff quality management awareness, quality management and quality management.

Further improve staff quality management awareness, quality management behavior initiative, to avoid human error, so as to protect the quality of the project. Because more parties involved in the construction site, the main responsibility of all parties to help better carry out the quality management of personnel.

2) Material. Material quality management content mainly contains: quality standards, comprehensive performance, sampling test, test methods, inspection degree and standards, scope of application and construction requirements. In order to further clarify the goal of construction material quality management, and to meet the goal to achieve qualified, the construction site of the quality management responsibility system division to strengthen. For materials that do not meet the requirements are prohibited to enter the site; if the unqualified materials have been used in construction, the responsibility of the relevant responsible person must be strictly investigated, and rework is done immediately.

3) Mechanical equipment. Mechanical equipment as a construction project from the design into a product of the main tools, its quality management needs to meet the design requirements of models, operating requirements, installation and commissioning and inspection records, etc., at the same time does not meet the requirements of the use of equipment to stop using, refused to enter the field.

4) Construction methods. The main content contains: the main construction process of the sub-projects, the construction of the starting point of the flow, the construction of specific procedures, continuous process sequence, mechanical equipment and other determinations. And combined with the construction organization, construction technology, construction technology, capital accumulation, etc., to ensure that the construction method of engineering construction in many aspects of the unity of cooperation and reasonable science, to promote the overall quality of the project to ensure.

5) Environmental factors. Environment as one of the factors affecting the quality management of the project, covering a wide range of factors that affect more. Includes the natural environment (such as climate, temperature, natural geological conditions, underground hydrological conditions, etc.), the human environment (such as the environmental conditions that exist between two consecutive processes, the environmental impact of cross operations, etc.), technical and economic conditions.

3. Analysis of the Current Situation of Engineering Quality Management and Solution Measures

3.1. Analysis of the Current Situation of Engineering Quality Management

3.1.1. Influence of Engineering Human Factors on Site Quality Management

Comprehensive quality of personnel is the basic quality of managers and organizational impact. In China's provincial trunk lines, mainly on the direct involvement in engineering construction of the commanders, organizers and operators of the management, mobilize their subjective initiative to avoid human error. For engineering construction site activities, the human problem is always the landing point, in the whole engineering site construction stage, people are not only decision makers, managers, or the ultimate practitioner; also contains human technical level, physiological deficiencies, psychological behavior and misbehavior and other aspects.

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The human problem as the most fundamental problem, if the solution is not good human problems, other problems are even more impossible to start.

3.1.2. Engineering Construction Materials Site Quality Management is Not in Place

Engineering construction is a project of great consumption, so it is necessary to strengthen the overall site quality management of the project. However, the construction unit often does not pay attention to the on-site management of materials, the site use of unqualified materials thus affecting the technical quality of the national and provincial trunk highway, especially in the following aspects: procurement of unqualified materials into the field, or the lack of product qualification certificates and quality inspection certificates; in order to speed up the construction progress, in the field and on-site use of the material before the neglect of the material inspection, unqualified materials will be transported to the site of the construction; the construction unit neglects to the on-site materials inspection, the technical quality of national and provincial trunk highways have serious adverse effects.

3.1.3. Influence of Engineering Machinery and Equipment on Site Quality Management

According to statistics, in engineering construction, the total cost of materials and equipment in the construction stage accounts for more than 50% of the total cost. Project construction Xi'an long for the quality management of materials and machinery and equipment, in the final analysis, is the management of people, machinery and equipment in the field of quality management directly affects the progress of the project, the negligence of the quality management of machinery and equipment will cause incalculable losses to the project.

3.1.4. Influence of Engineering Environment on Site Quality Management

The natural environment has many kinds of factors, mainly including geological environment, vegetation environment, river hydrological environment and astronomical meteorological factors, etc. The natural environment is a big obstacle to the on-site construction quality management of the project. For example, heavy rain and wind, water level terrain, etc. inevitably increase the possibility of sudden mudslides, landslides and rockfalls on site, resulting in confusion at the construction site, delaying the schedule and increasing the difficulty of construction. At the same time other sudden natural environment on the construction site, but also need to do a good job in advance of the site to prevent and monitor the quality management, maximize the role of quality management, reduce the damage to the quality of the project.

3.2. Related Problem-solving Measures

3.2.1. Human Factors Control

Project construction time is long, the division (item) project more, construction technology, construction technology level requirements, construction site personnel frequent access to the complexity of the site quality management brings no small challenge. This requires that construction personnel at all levels of the construction site must comply with the relevant quality management system, and according to the actual situation of the site to ensure that the production of quality management program to make adjustments to ensure timeliness and reasonableness. All personnel entering and leaving the site should obey the management and deployment of the construction unit, so as to be traceable.

In full consideration of the comprehensive quality of people on the quality of the impact, but also to strengthen the personnel construction site political education, labor discipline and professional ethics education, to meet the requirements of construction technology. For all the construction personnel involved, do a good job of entrance education, technical briefing, professional and technical knowledge training, improve the technical level, of which special operators must be licensed before they are allowed to operate; no one shall be unauthorized to the construction site of the various equipment, signs, etc. to move or remove. Try to improve

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the labor conditions to meet the requirements and specifications put forward by the quality management on the site activities of the personnel to eliminate the adverse impact of human factors on the quality of the project.

3.2.2. Material Quality Factor Control

Quality management of on-site materials in the project is the main component of the whole process of guaranteeing the quality of the project, by strengthening the quality management of on-site materials, the use of materials can be maximized to play a role in the use of performance and comprehensive role. After the materials enter the site to take reasonable management measures to ensure that the different materials of its management environment, system and personnel of the reasonable requirements, while strengthening the site of the materials custody management, to ensure that the materials are uniform and orderly storage, to avoid damage to the materials, improve the quality of the project. Construction site storage in accordance with different varieties, different specifications and specific uses for storage.

3.2.3. Mechanical Equipment Factor Control

Engineering construction process is complex, construction technology is highly demanding, is a high risk of a project category, so before the construction phase of the project to ensure that the quality management of construction site machinery and equipment to achieve qualified. Whether it is various types of large mechanical equipment, or a variety of small components, to minimize the incidence of accidents, to ensure that the economic benefits of the project to maximize. Therefore, it is necessary to standardize and scientifically manage the mechanical equipment on site to ensure that the mechanical equipment is always in the optimal working condition, starting from the operation, maintenance and repair of mechanical equipment, increase the investment of funds, and carry out regular inspection work.

3.2.4. Environmental Factors Control

1) Strengthen the quality management system for the construction site and its characteristics. Establish a sound quality management system and improve the relevant content, build a time-sensitive, scientific, data-driven and dynamic quality management system, and firmly establish the foundation of project quality management.

2) Enhance the internal quality management level of the site. Strengthen the assessment of internal quality management on the site, effectively reduce the losses and impacts caused by uncontrollable environmental factors on the site, and ensure that the relevant quality status on the site is knowable and controllable.

3) Strengthen the quality control of the construction site. According to the planning allocation of the construction master plan will be various areas (such as living area, construction area), various types of equipment and facilities are arranged properly, in which the construction materials and machinery and equipment in accordance with the relevant norms of the strict code of neatly, and do a good job of marking; to ensure that the site is smooth and free of stagnant water, to ensure that the quality of the site management can be carried out in a uniform and orderly manner.

4. Conclusion

Engineering and other transportation facilities construction of China's infrastructure and economic development has a very important impact, as the construction unit is to actively promote their own construction site quality management system and concept of development and improvement, and constantly improve their own quality of work and level of work, and then promote the construction of the project's rational allocation and utilization of resources; construction units in serious control of quality management of each link, but also need to be on the When the construction unit seriously control every link of quality management, it is also

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necessary to improve and strengthen the comprehensive quality and professional technical level of the personnel involved in the project, set up a good correct scientific concept of quality management, mobilize the subjective initiative in the quality management of the project site, and actively propose and solve the problems and deficiencies in the process; when ensuring the comprehensive performance of on-site construction materials and machinery and equipment, and constantly stabilize and reduce the impact of the two factors on on-site quality management, and continue to promote the progress and enhance the quality management of projects. Promote the progress and enhancement of engineering quality management, but also to ensure the quality of engineering construction. Through the quality of engineering construction site quality, can effectively reduce the construction unit for the cost of investment, for its economic development to provide a safe and reliable material basis and material protection.

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