

Quality Control Measures in Highway Bridge Construction

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Abstract: Highway bridge engineering is an important part of modern transportation system. It has a great effect on the development of modern society. Therefore, it is very important to ensure the construction quality of highway bridge engineering. At present, there are more and more construction technology quality control issues in the construction of highway bridges should be given enough attention. The problems should be actively found out and effectively solved to improve the quality of life, while promoting China development of infrastructure construction. This paper analyzes the quality control strategies in the highway bridge construction.

Key words: Highway bridge; Quality control; Strategies

1. Significance of quality control of the road bridge construction

Highway bridge construction and other construction have a big differences in the construction quality and the existing traffic level. The development of the transport industry is closely linked to the status quo, and highway bridges in the construction process are generally in a more important area. If there is a quality problem, it can cause extremely bad impact on traffic throughout the region and cause more serious economic losses. Highway bridge construction technology has a certain degree of particularity. It is a targeted construction technology. If the technology has a problem, then the quality of the entire highway bridge is difficult to be guaranteed. Construction problems are not easy to be handled. Before the start of the construction works, the project construction staffs need to have thorough understanding on the entire construction technology to ensure that their implementation of the construction process to meet the construction specific needs. It is the only way to ensure the overall quality of highway bridge construction. If there is no strict control of the quality of the project, it will cause more serious quality problems. For example, waterproof of bridge with serious quality problems will lead to serious problem during raining, vehicles are prone to slip, the direction will be difficult to control, and will seriously affect the entire road safety. After the problem occurs, government can only spend more money to carry out the maintenance of the project. Therefore, it often causes serious economic pressure. The most effective solution is quality control of the construction process.

2. Reasons of emergence of highway bridge quality problems

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doi: <http://dx.doi.org/10.18686/wc.v6i1.100>

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2.1 Management aspects of the problem

The quality of the project should first of all come from the management reasons, mainly as follows: individual leadership quality awareness is weak, poor measures, inspection and guidance work in the form of project management confusion, lack of technical force investment, violation of construction procedures and bidding system is not perfect. In addition, it can be due to the operation is not standardized, lack of engineering supervision system, supervision work problems, lack of relevant functional departments supervision, violation of laws and regulations, illegal subcontracting, and subcontracting projects.

2.2 Problems of construction

Rushing of the construction unit results in the construction is not in accordance with the rules, norms and design requirements of the construction. In order to maximize the pursuit of profits, they might use of substandard materials to reduce the cost and employ large number of low quality construction workers in order to reduce labor costs.

3. Highway bridge construction quality management

3.1 Drawing review

Construction drawing design is reasonable and it determines the construction activities of the latter part of the efficiency. Hence, we must do the drawings of the audit work to ensure the construction of high operability. Design units should be combined with the construction site geological survey report, combined with the previous design experience, and study the construction links to ensure that the design parameters of the rationality. Designers should also do a good job in the construction site investigation, combined with the actual situation of the project to adjust the data to the maximum extent to ensure the operability of the construction program. The supervising engineer should present the problems in the examination of the drawings and the mismatch between the drawings and the site construction conditions at the paper examination meeting. Moreover, the supervising engineer needs to find out the appropriate discussion in the construction unit, the design unit and the parties to the supervision unit to solve the problems and to achieve the purpose of optimizing the construction program. In addition, the supervising engineer should supervise the construction unit to carry out the technical handover to its management personnel, the operating personnel and the labor service personnel, especially to strengthen the familiarity of the construction unit personnel to the drawings and to clarify the key points and points of the construction process control corresponding to the drawings, operating personnel behavior, prevention, and reduce the probability of construction quality problems.

3.2 Material management

Building materials is the basis of construction, if its performance and quality do not meet the requirements of the construction, the quality of the project will be reduced. Therefore, as the source of project quality control, we should focus on strengthening the quality of the material management. Material quality management mainly has the following three aspects:

- (1) Strengthen the management of material suppliers. Looking for local reputable material suppliers, the establishment of material procurement quality management system, and the quality of the material quality. Quality and stability of the suppliers may be considered for the possibility of long-term cooperation. At the same time, construction units should strictly prevent unqualified materials. Unqualified material suppliers should be black-listed for material procurement.
- (2) In accordance with the norms, the contract requires a comprehensive inspection of the material. Good suppliers will inevitably produce nonconforming products. Therefore, in accordance with the norms, the contract requirements for a comprehensive inspection of the approach materials is not only the requirements of the laws and regulations, but also respect for the product itself. The control of the key includes production certificate, factory certificate, and factory

quality inspection report. Inspection of the indicators must be qualified, especially steel, wire and strand. Product certification must be checked and recorded in the factory inspection report. If an indicator failed, it shall not be used for construction.

We should focus on the main construction materials that are susceptible to external factors - steel and cement. Steel and cement are the main construction materials of the bridge structure. Its performance and quality determine the strength and stability of the infrastructure, coupled with the construction of bridges are generally in the water and canyon area, so the corrosion resistance of steel and moisture-proof hardening of cement have become focuses of quality control. Therefore, the supervision engineer should strictly supervise the construction unit in accordance with the requirements of the norms of inspection, storage, use of steel cement and other key construction materials.

3.3 Construction supervision

Highway bridge construction environment is complex. In order to minimize the impact of various factors on the quality of construction, we must do the construction process supervision, improve the construction of normative behavior, reduce or even avoid illegal operations. Construction technology and supervision personnel should take a strong on-site supervision and control measures, especially in the key aspects of the construction process, key processes, key control and supervision, and follow the process of controlling the construction activities, timely detection of quality problems and correct, as far as possible, so that the entire construction process can be effectively controlled. Then, the project quality objectives can be achieved.

4. Highway bridge construction quality control strategies

4.1 Preparation works before construction

Before the construction, construction unit should conduct the road bridge implementation of compaction test, measurement and calculation of the number of bridge construction rolling, filling thickness and compaction thickness and other parameters, and after the completion of the test to implement a comprehensive review and clear process of the trial. It is in accordance with the corresponding norms to reduce the test results and the difference between the real results. At the same time, constructors can use the length of 200 m section of the road to fill the test, according to the results of the test appropriate adjustment parameters, equipped with construction equipment, the bridge surface treatment to ensure the rationality of the bridge compaction construction. The construction department needs to carry out detailed construction preparation work, and keep the construction drawings and the accompanying materials. The project construction plan, the structure drawing, the tool drawing and the traffic guide map must be carried out strictly according to the drawing. In addition, the supervision department also needs to fully understand the contents of the relevant drawings, so that the construction process follows more stringent requirements to maximize the protection of the entire construction quality.

4.2 Improvement of the project management system

As there are many problems in the project management system at this stage, constructors cannot effectively protect the normal construction of highway bridges. Therefore, from the manager and management system, there are three ways to explore and improve the project management system approach: 1. The management ability. The selection of talent, scientific and rational selection method, making the project management staffs are really competent with the management work and assume the responsibility of highway bridge management. 2. Perfect management system. Before the construction of highway and bridge, it is necessary to formulate a scientific and reasonable management system in line with the national safety standards according to the previous construction experience and the actual

situation of the project, so that the management work can be carried out effectively and the quality of the highway bridge with a good control and supervisory role. 3. Strict control of the implementation of the management system. After improving the management system, we must establish the authority of the system for the violation of the system to give strict punishment, the management system to implement the highway bridge construction of each process and to avoid the system lost its effectiveness.

4.3 Implementation of strict construction schedule management

The progress of construction projects and engineering benefits are directly related to the progress of management, which is a very complex process. The field management are obtained a high degree of attention in order to effectively manage the construction progress. The construction site of the project must adopt the corresponding schedule management measures. First, the need for a dedicated person in charge of its specialized management, and the implementation of a reasonable arrangement of construction management to grasp the weather conditions. For example, because of the environmental factors, construction progress is often slowed down during thunderstorm season, so the construction enterprises should avoid construction works in bad weather as protective measures. Secondly, the relevant preparatory work should be carried out, especially the maintenance of construction machinery to ensure that the machines can be put into use at all times to maintain the progress of the project construction.

4.4 Enhance the safe operation awareness of construction

There is a certain risk factors in the highway bridge construction. In order to make the construction of highway bridges can be successfully completed, construction safety is also very important. In the construction of highway bridges, the main operator needs to strengthen the safety awareness of construction workers. Increased of safety awareness of construction workers can effectively reduce the quality of the problem. Besides, it helps timely detection of some of the security risks. Timely measures can be taken, which make sure the highway bridge project successfully completed.

4.5 Construction technology quality management

4.5.1 Repair of cracks of bridge

Many construction processes of bridge are using a very advanced gap repair method, the first of its cracks in the initial statistics, and then use the concrete surface treatment approach, the cracks open into a V-shaped slot, and the use of organic solution to clean and clean. In the process of buried grouting mouth, the high-pressure gas flow from the grouting mouth and found that there are leaks when the gas leaked part of the repair.

4.5.2 Ensure formation of the bridge deck

The construction of the bridge surface used and fixed to the epoxy clay. The use of angular grinding surface ensures that the road surface in a smooth condition. According to the bridge design, the horizontal transmission distance of concrete cannot exceed 2.4 m, to use the concrete with the support of the way to work, the stent test pressure, according to the test data to determine the stent structure system. To make the surface of the bridge road in a very flat state, it is necessary to fill the roadbed before the integration of the actual situation, the location of processing, so as to ensure that the construction of the roadbed thickness of not more than 0.3 m. Then, the asphalt road surface compaction construction takes a layered approach. In addition, in the mixing of materials, we should pay attention to the proportion of different materials, and also to buy quality standards meet the raw materials. In the process of laying the mixed materials, the first base laying, the upper laying, and the bridge road surface height with the road bridge road surface standards consistent.

4.5.3 Processing of the connection

In the construction process, the effective connection of the road surface is important. First of all, to enhance the

grooving road technology to the maximum possible in the top of the jet grouting pile for the construction, at the same time, also need to pile between the debris in timely processing. Second, in the landfill construction process, the gravel to be rolling to ensure that the piles between the mutual landfill. Moreover, in order to be able to better improve the quality of the project, according to the actual needs of the backfill materials for sampling, the sample needs to be tested to ensure that the quality of the material can be filled to achieve the fundamental needs.

4.6 Enhance the overall quality of construction workers

The overall quality of construction workers can be improved from the following aspects: (1) Provide safety education to construction workers in order to effectively enhance their awareness of security, and to minimize the risk factors in the construction, so as to enhance the construction of highway bridge construction quality level. At the same time, the technical staff should also have the construction safety awareness to strictly control the construction of all links, through the implementation of bridge construction of key technologies to reduce the technical problems caused by security risks. (2) The technical level of staff should be improved. As there are more and more highway construction projects currently, the difficulty of quality control is gradually increased. Therefore, enhancement of the technical level of construction workers has great significance. For specific construction process, enterprises can hire experts to focus on solving the construction technology difficulties to reduce the quality problems caused by technical problems.

4.7 Strengthen the construction supervision

Strengthening the technical supervision work in highway bridge construction can ensure smooth progress of the construction project. However, most of the construction units neglect the technical supervision work so as to have a lot of problems in the quality of the project. Therefore, the construction enterprises must pay attention to the supervision of technical quality to improve the technical level of highway bridges. The supervision of construction workers must be enhanced to timely detect the technical problems in the construction. On the other hand, the construction project should be regularly checked through sampling or regular inspection to improve the quality and safety awareness of construction workers. The construction workers should pay attention to the existence of technical problems.

In short, the actual work process should actively explore and apply the relevant effective strategies to strengthen the quality of management and control, so that the construction quality is better guaranteed.

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