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How to Do Well the Construction Quality Control of Highway Bridge Project

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Abstract: At this stage, China's economy develops better and better. The requirement for the construction of urban infrastructure is also getting higher and higher. As the key of the foundation construction, the highway bridge can effectively guarantee the safety of the transportation industry and the development of the future.In the process of highway bridge construction, the construction quality is the key point of the control, high construction quality can maximize the service life of the highway bridge, ensure the safety of the vehicle.Therefore, how to effectively control the construction quality of highway bridges effectively has become the urgent task. In view of this, in this paper, by analyzing the common quality problems of highway bridge, and summed up the reasons affect the construction quality, and find out the corresponding measures to solve the problems, hoping to provide some help for highway and bridge construction.

Key words: Highway bridge, Construction quality, Control measures

Introduction

In the process of modern highway bridge construction, scientific quality management not only can effectively improve the safety performance and cost management of highway bridge engineering construction, but also can extend the service life of highway bridges. Therefore, in the construction process, we must put quality control as the focus of management. According to the current situation of highway bridge construction quality management,there are some construction units do not do quality management work, in the project construction left a lot of security risks. There-fore, in the future management, we must take the quality management of highway bridges as the key point to ensure the smooth progress of highway and bridge construction.

1. Engineering Example

A highway bridge is 818m long main bridge 610m bridge span is $3 * 4\text{ m} + (80\text{ m} + 3 * 150\text{ m} + 80\text{ m}) + 2 * 40\text{ m}$. The bridge is a prestressed concrete continuous rigid structure, 40m long bridge,the prestressed concrete T beam,

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simply supported structure first.Main span length 150m, maximum pier height 105m, bridge width 13m. This paper mainly expounds the highway bridge engineering construction quality problems encountered, and puts forward some prevention measures, and finally achieve the purpose of improving the stability of the bridge and extending the service life of the bridge.

2. Highway Engineering Construction Quality Control Points

2.1 Do the preparatory work

Before the highway construction, first of all, prospect the construction site and understand the actual situation of the construction site. Develop the reasonable construction scheme in accordance with the investigation results, and the construction scheme must be feasibility[1]. Develop a scientific and reasonable construction quality control system in accordance with the importance of quality management. For the construction of each sub project management, follow is its specific structure:

2.2 Sub-grade construction quality control

2.2.1 Quality control of sub-grade excavation technology

When the sub-grade is excavated, the reasonable excavation technique should be chosen according to the actual construction characteristics of the sub-grade. On this project, vertical digging method should be chosen, according to the specific circumstances of the construction.And the road pad width and depth could not be sure according to the cross-section of vertical stratification operation; if the width and depth of the pad road is large, you can choose channel vertical excavation method, if it is a super long road pad, you can select subvertical excavation method. In the excavation of the roadbed, also pay attention to do a good job of roadbed drainage, to ensure that the rainy season will not produce the roadbed water, and timely repair roadbed slope and side ditch, to ensure the stability of the slope.

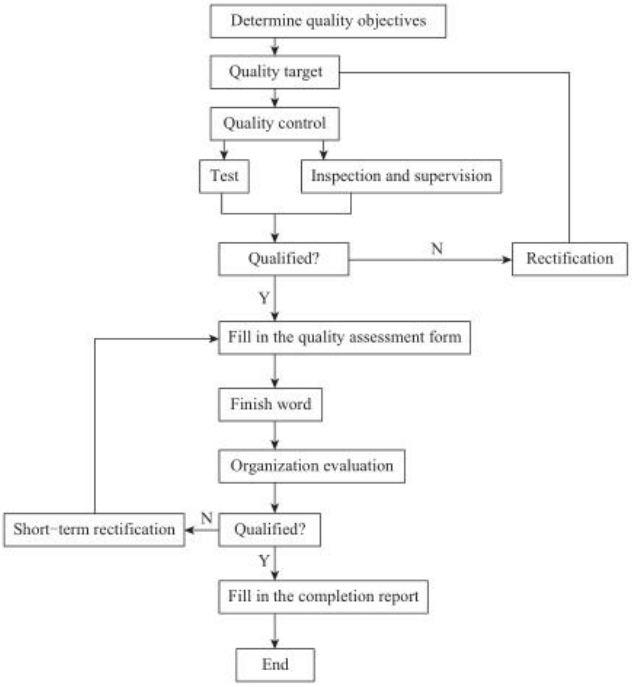

Figure 1 Highway bridge construction quality control system

2.2.2 Roadbed filling material

The quality of sub-grade filling for sub-grade performance is very important. In the construction, we must first select the appropriate roadbed filler[2]. The choice of sub-grade filler can not exceed the range of requirements (the minimum strength and maximum size of embankment fill should be in compliance with the requirements of the following table).Otherwise, it could not be used in the construction. In general,the filling of the sub-grade can meet the requirements of the water content and sand and gravel, also can choose crushed sandstone,usual frozen soil, silt and garbage can not be used. Because of the plasticity of clay often exceeds the requirements of the project, so it is not commonly used, if the construction must be used in clay,then it is necessary to control the water content.

2.2.3 Roadbed side slope control

The quality control of the road bedside slope should not only consider its height and slope, but also pay attention to the terrain condition of the highway. If encountered in soft soil section, it is possible to be happen subsidence phenomenon. In field investigation, should increase the amount of sub-grade height, ensure the roadbed stability, in soft soil section can follow the design height of construction.

2.3 Pavement construction quality control

2.3.1 Quality control of asphalt mixture spreading

In asphalt mixture paving time should be in the beginning as soon as possible to find stalls shop machine speed and amplitude, and according to the speed as a benchmark, later stalls shop, in the process of paving, attention should be paid to not change direction, before compaction,unable to walk[3]. In addition, if the outside temperature is less than 10 degrees Celsius or in rainy weather, can not be spread, this will lead to the rapid solidification of asphalt mixture, which may not be used properly.

2.3.2 Compaction quality control technology

First, it should be selected to meet the actual situation of the construction of the rolling technology, and select the scientific and rational roller compaction machinery, to ensure the smooth progress of the work. Secondly,to ensure the rationality of the mechanical parameters of the roller,especially the rolling speeds, vibration frequency and so on, to en-sure that the best results can be obtained. Third, also pay attention to the temperature of rolling, the paragraph will be rolled to a minimum. If the particle size of the mixture is different, the maximum particle size should be considered to determine the thickness of the rolling stock.

3. Common Quality Problems and Prevention Measures of Highway Engineering Construction

3.1 Roadbed trench, backfill settlement

At this stage, foundation trench and backfill subsidence has be-come a common problem affecting the quality of highway construction, leading to the main reason for this problem is the roadbed compaction quality closes nevertheless, roadbed trench backfill subsidence, roads will sink, this will greatly influenced the road quality and service life, and even a threat to the safety of people's lives and property.

Preventive measures: first of all, the construction unit must do technical clarification and ensure roadbed fill and backfill the laying thickness of construction in strict accordance with the pro-visions of the project. Secondly, within the total width of the sub-grade requirements, the method of horizontal stratification should be used to fill the sub-grade. Finally, when the base surface crosses slope or steep longitudinal slope of 1:5 should be made to step[4].

3.2 Pavement rut

We often see the road set up a limited number of signs, there are some drivers are turning a blind eye, if the vehicle is a serious over-loading of the phenomenon of rutting, this phenomenon is very great for the road. Because of the asphalt material itself to flow in one direction, if the pavement under pressure is greater than the limits of tolerance, and vehicle continuous rolling, deformation of the road will be more and more serious, in the highway construction process, to road looks smooth, some engineering on the part of the compaction degree are not enough, after the opening, no compaction will subsidence and rutting.

Prevention and control measures: the choice of materials and construction, attention should be paid to the selection of crushing value lower material, and strength can not be too high, strength is too high, pavement will be easy to appear crack, high strength materials placed on the surface, if the choice is of asphalt, should choose mixed with fiber or modified asphalt. In road construction,design of material mix proportion, and before using, would also like to do a small scale test and find the best ratio of raw materials and the time of laying, attention should be paid to the uniform paving and rolling position and rolling machine use, should pay attention to each corners to compaction. In addition, ensure the pavement roughness[5].

Table 1 The minimum strength and maximum particle size of embankment fill

Project classification (The depth below the surface of the road)		Packing minimum strength (CBR) (%)		Maximum particle size of filler (mm)
		Highway, first grade highway	Two and two below highway	
subgrade	Road bed (0-0.3m)	8.0	6.0	100
	The road under the bed (0.3-0.8m)	5.0	4.0	100
	Road embankment (0.8-1.5m)	4.0	3.0	150
	Lower embankment (>1.5m)	3.0	2.0	150
Zero filling roadbed and road pad (0-0.3m)		8.0	6.0	100

4. Key Points of Construction Quality Control of Bridge Engineering

4.1 Quality control of bridge superstructure

(1) Bridge the upper part of the body frame arranged the work quality of the process template control, is the most key link is the tight control of the shape and the size of the template component,including space size and sheet thickness to ensure component template category, size and performance can be satisfactorily reaches the bridge upper structure prefabricated beam construction of four standard specification, and on the basis of should be to achieve a successful template settings and remove the required operating conditions.

(2) Bridge on the upper part of the body structure of a tensioned prestressed beam slab and a pull working procedure quality control work can choose the means is varied, which contains the implementation of good performance design processes of the beamand plate material, reinforced material procurement and followup process, do a good job in the prestressed beam and slab storagesite and component forming process, strengthen beams and slabs in tensioning procedure using the link to ensure the quality.

(3) In the upper part of the body of the bridge frame bridge deck laying process quality checks means is refers to the bridge surface structure of all kinds of service in traffic safety components to proper, scientific layout, to ensure the quality of smoothing the surface of the bridge body, to ensure the stability and function of bridge deck structure of all safety parts set play meet the requirements of the project and other.

4.2 Quality control of bridge structure

(1) The main content of the bridge substructure quality control is:do a good job in basic construction survey and setting up the finishing work to ensure the bridge foundation construction data are effective and scientific, and on this basis, guaranteeing the bridge foundation construction quality, mainly on the bridge foundation engineering built in basal spools and ground ultra flat data survey quality checks and a portion of a substrate quality control etc[6].

(2) Bridge construction engineering basement construction of link quality checks focus is complete based geosyncline mining process quality control, which contains the local severe natural climate anticipation and defense, precision control of the base construction and basic part of the basement construction link in concrete pouring quality control etc.

5. Common Quality Problems and Prevention Measures of Bridge Construction

5.1 Paving layer scattered

Due to the construction of pavement construction occupies only a small proportion. Therefore, many people in the construction did not pay attention to this part of the work, not strictly in accordance with the requirements of the project construction, and implement the quality control, there is no guarantee that the quality of bridge construction. Often put into use after the bridge, the pavement cracks, scattered and other phenomena.

Preventive measures: in construction should be seriously control the pavement layer thickness, choose better bending property of pavement materials, but also to ensure the construction quality of the waterproof layer, so after the completion of the construction,it will not appear the phenomenon of water leakage. If the water seepage phenomenon, it will lead to loose paving layer, fall off.Because the northern winter is relatively cold, the use of overlay concrete or asphalt concrete in the bridge pavement layer to a certain thickness, so that it can be a good way to prevent and solve the problem of cracks in the pavement.

5.2 Bump at bridge-head

In bridge construction, bump at bridge head is a common quality problem, and it is more harmful to the traffic and transportation.And rigid structure with both ends of the connecting position of flexible road junction differential settlement, resulting in the repeated action of traffic load, which is caused by Bridge bridgehead jump car is one of the main reasons, but due to the restriction of technology level, the problem of vehicle bumping at bridge head is difficult to fundamentally resolved.

Preventive measures: in construction, soft foundation processing is the prevention of vehicle bump at bridge head is one of the important measures, according to the specific situation of the construction of the soft base, choose the reasonable construction method. If it is not soft soil roadbed, then can be by increasing soil roadbed compaction degree and reduce the weight of sub-grade soil to reduce the abutment back embankment settlement.

Conclusion

In short, highway bridge construction process, do a good job of quality control is very important. Under the background of rapid economic development, more and more advance technology for road and bridge construction, as long as constantly improve the construction means, strengthen exchanges between the world, up-grade the construction personnel own professional quality, in order to ensure the quality of highway and bridge construction, only the excellent construction quality, in order to promote the continuous progress of highway and bridge construction.

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