

# Study on Quality Control of Concrete Raw Materials in Road and Bridge Construction

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## ABSTRACT

The main material of concrete is a construction building material composed of water and mineral mixture and cement and chemical additives in the corresponding proportion and below the standard. In the process of making concrete material, slurry and cement are needed to mix, then cement slurry and sand are mixed into mortar according to the corresponding proportion, and aggregate is added to mortar to form concrete building material. In the process of concrete preparation, the most important construction link is mixing, which needs to be fully stirred to make the performance of concrete meet the construction needs. In the process of concrete construction technology development, both mix ratio and production technology have become more and more mature, but there are still some problems, which have an impact on the quality of concrete<sup>[1]</sup>. Therefore, this paper discusses the quality control of concrete raw materials according to the construction process of road and bridge.

## 1. Introduction

Nowadays, in the construction of road survey engineering projects, the proportion of concrete raw materials is more than that of total cost input in the implementation of the project, and in the actual use process, Concrete material itself is the main compression structure, so the quality of concrete will affect the service life and safety of road bridges. Therefore, strengthening quality control and management of concrete raw materials is an effective way to improve the construction quality of highway bridges.

## 2. Importance of Quality Control of Concrete Raw Materials in Road and Bridge Construction

Because for road survey projects, the main purpose of

implementing construction work is to make transportation and transportation have a more stable infrastructure to provide corresponding services. To our country economy development and the development of transportation cause all play the very good promotion function. Therefore, in the actual construction process, it is necessary to perfect and strengthen the quality control measures to ensure the construction quality of concrete, so that the construction quality of road and bridge projects can be guaranteed in essence. In the actual construction process, the proportion of raw materials in the concrete will directly affect the quality of the final concrete, thus affecting the construction quality<sup>[2]</sup>. Therefore, in the process of construction quality control, it is necessary to start from the link of concrete raw materials, and to make the construction quality control by strengthening various quality management measures.

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### 3. Quality of Concrete Raw Materials for Road and Bridge Construction

#### 3.1 Excessive Temperature Change of Raw Materials for Concrete

In the process of concrete allocation, the most important construction link is mixing<sup>[3]</sup>. The change of external temperature and humidity will directly affect the mixing time and the final concrete quality. Therefore, in the process of concrete configuration, if the mixing of concrete raw materials is not completed in accordance with the prescribed time, the quality of raw materials will be greatly reduced compared with the final ideal level. The most common problems in concrete mixing are uneven mixing and material stratification. For road and bridge concrete construction, the temperature change of external environment will make the construction technology of raw materials change to a great extent. In order to ensure the temperature change before and after construction, it is necessary to extend the construction period to ensure the temperature of concrete materials<sup>[4]</sup>.

#### 3.2 Higher Early Strength of Cement

For concrete, one of the most important raw materials in the process of configuration is the cement of cement fiber reinforcement. The most important problem is that the early strength is relatively high, but the later strength growth efficiency is not high. Or there is a stop to growth. In fact, for cement and concrete, in the process of concrete configuration, strength theory is a theory put forward by construction enterprises in order to shorten the period of concrete demoulding, mainly to improve the turnover efficiency of formwork. But in the process of practical use, the early strength of concrete is too pursued, so the wrong idea is transmitted to the concrete enterprise by the construction unit, and then to the cement production enterprise<sup>[5]</sup>. In order to meet the actual requirements of engineering project construction, some cement production enterprises increase the early strength of cement by adding early strength agent and grinding. However, the strength of cement itself can not be significantly improved in the later stage, so the quality of the final concrete is affected, and the main reason for the decrease of concrete durability is that the early cement strength is higher<sup>[6]</sup>.

#### 3.3 Quality Problems of Concrete Admixtures

The so-called admixture refers to the need to add some admixtures in the preparation of concrete raw materials, so that the frost resistance, expansion and ductility of concrete can be improved, but in the actual configuration

process, if the quantity of these admixtures is too large, the quality of concrete structure itself will decline. Therefore, it is necessary to carry out all-round test work in the actual construction process to ensure that the admixture added conforms to the best mix ratio, and to pay attention to the construction details in all aspects in the practical application process. In the actual construction process, some construction workers rely on their own work experience not to explain the use of admixtures, resulting in the addition of admixtures can not improve the performance of concrete, but also reduce the quality of concrete<sup>[7]</sup>.

#### 3.4 Other Issues

In the process of concrete preparation, because of the lack of natural gypsum, many cement manufacturers use desulphurized gypsum instead of natural gypsum, which makes the compatibility of cement and admixture very low. Moreover, because a large amount of cement is needed in the process of concrete preparation, the supply of cement becomes tight, the cement strengthening time produced by some enterprises is relatively short, and the surface temperature is also relatively high<sup>[8]</sup>. For the technical staff of concrete enterprises, it is necessary to select some cement produced in large factories when selecting cement raw materials, and to carry out batch testing. The strength and stability of cement and other related data indicators are determined.

### 4. Quality Control Measures of Concrete Raw Materials for Road and Bridge Construction

#### 4.1 Reasonable Sample Extraction and Testing

For road and bridge engineering projects, there are a lot of materials to be prepared in the actual construction process, so in the process of preparing materials, it is necessary to determine the specifications, categories and batches of different materials<sup>[9]</sup>. In the development of material quality testing, need to rely on sample extraction to complete quality testing. Sample extraction also needs to follow the principle of the same specification, the same category and the same batch, and then scientifically plan the quantity and weight of the sample according to the working efficiency of the experimental site and the staff. In the process of testing, the quality supervision and management staff should take the current industry standard system as the guide, and then combine the construction site situation of the project construction to improve the serious and responsible attitude of the work.

#### 4.2 Increased Emphasis on Data Management

For concrete preparation, the influence of each data on

the final quality of concrete can not be ignored, so it is particularly important for concrete enterprises to strengthen data management. The so-called data is not only the data reflected in the development process of enterprises, but also the data formed in the construction process of road and bridge projects. These data can make the road and bridge construction quality problems appear timely data feedback, and then form the corresponding solutions. Therefore, the formation of data needs to make a good record of the whole process, and can not arbitrarily change the data results<sup>[10]</sup>.

### 4.3 Enhanced Mix Ratio Testing

In the process of concrete preparation, the influence of mix ratio on concrete quality is very important, so the inspection of concrete mix ratio should be strengthened in an all-round way. This is also the most important way to ensure that the bearing capacity of concrete meets the actual construction needs. Taking impermeable concrete as an example, in the process of mix ratio design and testing, it is mainly completed according to the following steps. The first is to discuss the mix ratio configuration of impermeable concrete, the second is to determine the water consumption in the design process of concrete mix ratio, and the third is to calculate and determine the amount of sand and stone used in the process of concrete configuration. Then the mix ratio is preliminarily determined. Finally, based on the mix ratio designed and obtained by the laboratory, the final concrete mix ratio is determined according to the benchmark configuration ratio<sup>[11]</sup>.

### 4.4 Improving Admixture Quality Control

In the process of concrete preparation, quality control technology is carried out for admixture. The staff need to check the production certificate of admixture and the relevant data such as test qualification report. And need to have technical personnel to do admixture review and re-inspection work. Only after all the inspection work is completed and meets the needs of design and construction can the admixture be used as the adding material and applied in the process of concrete mixing.

### 4.5 Control of Fine Aggregate Raw Materials

In the process of concrete preparation, fine aggregate and coarse aggregate are one of the main raw materials for concrete preparation. In the process of practical use, the most commonly used fine aggregate is sand, and sand can be divided into artificial and natural. In natural sand, rock particles with particle size within 5 mm are called natural sand, while artificial sand is a small particle size

sand material made of waste slag powder after crushing. To carry out quality control for selenium aggregate, it is mainly necessary to carry out all-round detection and recording of material gradation, fineness modulus and harmful content, especially the harmful substances contained in the interior. Not only will the strength of concrete itself be affected, but also the safety of construction workers and the users of later buildings will be seriously endangered.

### 4.6 Full Implementation of Construction Requirements

In general, because the construction area and coverage of road and bridge projects are relatively wide, the quality requirements of concrete are higher. In order to meet the higher requirements of concrete in the actual construction process, it is necessary to ensure the strength and durability of concrete by ready-mixed pumping in the actual construction process. Moreover, in the actual construction process, it is necessary to analyze and control the construction environment temperature and humidity of concrete reasonably, so as to ensure that the temperature and humidity of concrete working environment meet the performance requirements of concrete. It will not affect the durability and other properties of concrete itself. Moreover, all the construction processes need to be completed strictly according to the corresponding construction specifications, and the construction links and construction procedures should be strictly controlled. In addition, it is necessary to strengthen the quality supervision system of engineering projects, because in the construction process of engineering projects in China, the phenomenon of imperfect quality supervision system still exists, so in the process of carrying out quality control work, There are still loopholes that some managers will neglect<sup>[12]</sup>.

## 5. Conclusion

To sum up, for the control of concrete raw materials in road and bridge engineering, the main purpose is to ensure the construction quality of road and bridge engineering projects. Therefore, it is necessary to improve and improve the current problems of road and bridge, concrete quality control and raw materials, and make up for the shortcomings in the quality inspection and management of raw materials. Improving the quality inspection level of concrete raw materials is basic engineering.

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