

The Common hidden Dangers and Countermeasures in Road Bridge Design

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Abstract: Economic development requires a large number of large-scale and multi-functional roads and bridges as the foundation. The construction of roads and bridges has become the premise of the whole development and the fundamental guarantee for social progress. However, various problems have arisen in the design and construction of road and bridge engineering, to a certain extent. It has affected the development of the bridge industry and transportation industry. This paper analyzes the hidden dangers that may occur in the design of road bridges, and proposes corresponding countermeasures, which will better promote the healthy development of the bridge design industry.

1. Introduction

The continuous development of the national economy has brought greater investment in China's infrastructure construction. China's road and bridge engineering has been significantly developed, and most of the bridge design meets the transportation requirements. However, the actual investigation found that some bridges were faced with quality problems such as subgrade settlement, load cracking, and jumping after several years of use. China has already introduced relevant road and bridge design specifications, but due to the rapid development of social economy, related technologies, processes and design concepts are extremely fast, and related design requirements and design standards are difficult to meet the needs of bridges in the field [1]. This requires China's road and bridge design to meet the relevant road and bridge design needs, and actively rely on the professional level and quality of relevant professionals to ensure the quality and safety of bridge engineering. In actual operation, road and bridge designers also need to actively refer to the actual structure of roads and bridges, environmental conditions, transportation needs, and related technical material constraints [2]. Drawing on the relevant bridge cases from abroad, optimizing the design scheme can ensure the quality, safety and durability of the bridge project and ensure the promotion of the bridge project to the local social and economic development.

Roads and bridges are the most important and key projects in transportation infrastructure projects. Especially in the process of traffic system improvement and transportation network construction, road and bridge construction should be listed as the key points. Road and bridge design is the premise and foundation for planning and constructing road and bridge engineering. In reality, it is necessary to improve the rationality and scientificity of road and bridge design links, to avoid problems and hidden dangers in road and bridge design, and to achieve comprehensive quality of roads and bridges. Construction quality assurance [3]. In the actual design of roads and bridges, we must pay attention to the application of theory and practical strategies, clarify the responsibility of road and bridge designers, improve the skills and literacy of road and bridge designers, grasp the road and bridge design system from a macroscopic perspective, and make roads and bridges. Effective maintenance in the later stage of design, explore the roads and ways that are conducive to the era, scientific and systematic development of road and bridge design [1].

2. The design principles for road bridges

1) In the design of roads and bridges, strictly implement the current national design codes and nationally approved technical standards.

2) Try to adopt standardized design in the design, and actively promote the application of modern design methods such as “reliability design method” and “structural optimization design method”.

3) Pay attention to the design principles in the design, pay attention to local conditions, draw materials locally, and save construction funds. While meeting the requirements of the construction function, it will use all possible savings to save investment, save multiple resources, and shorten the construction period.

4) In the design of roads and bridges, new structures and new materials with more advanced technology and rationality that is more economical are actively adopted. The designers of road bridges should consider familiarizing and understanding the basic conditions of hydrology, geology, meteorology and river courses at the construction site, and should investigate or investigate the existing problems in the construction. Therefore, it is possible to effectively avoid safety problems caused by basic data [2].

3. Status of china's road and bridge design

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3.1 The designer failed to grasp the overall situation of the design bridge.

For the performance of the project after it is completed and put into use, it is often not considered too much. For example, traffic flow, temperature factors and environmental factors are not comprehensively considered, and designers often consider the bridge structure in the design stage. The stiffness and strength must be in accordance with the relevant design specifications. The same environmental factors or human factors that may occur during the design and construction phase of the project are not considered. For the structural system of the road and bridge engineering, the corrosion resistance and durability of the materials. Resulting in the quality problems of steel bars that do not meet the requirements, the concrete strength is too low, and the thickness of the protective layer is not up to standard. Appears, but also reduces the safety and durability of the main structure of the road bridge [3].

The road bridge is an artificial structure with large weight and high elevation. In the structure, there will be problems such as many stress points, large stress, and easy interference from external conditions. It is necessary to carry out accurate road and bridge engineering design calculation. If the calculation is wrong, then it will have an impact on the performance and safety of road bridges, and even lead to practical problems such as road bridge collapse and shortened life.

3.2 The development of design schemes and roads and bridges is out of touch.

In the actual design work of road and bridge engineering projects, most cities in China still adopt traditional project design schemes, which obviously cannot be adapted to the actual needs of modern road and bridge construction projects, and may also be The future operation and use leave a certain security risk. At present, society and transportation are becoming more and stricter on the scale, function, quantity, construction, schedule and quality of roads and bridges [4]. In the actual road and bridge design work, many designers adopt simple methods and follow the tradition. The backward

road and bridge design scheme does not only consider the fluctuations of the market and society, but also pay attention to various factors affecting the road, bridge, and the economy, the public, the environment, etc., which leads to the loss of its meaning in the design of road and bridge, and easy to give roads and bridges.

The design plan determined by road and bridge is the most important basis for project construction, and the actual level of design will have a decisive impact on the construction difficulty, construction schedule, and construction quality and construction quantity of the project. The actual situation is that under the Chinese market economic system, all units such as construction units and construction units want to pursue maximum economic benefits, so the design cycle left to the design department is very short, and the investment in design work. The intensity is not enough. With the rapid development of China's bridge industry, the original old road and bridge design scheme under the new situation is too old, even backward, lack of innovation, and cannot keep up with the situation. Some bridge designers are lagging behind in design, and still designing bridge design schemes in the past. The design concept is backward, resulting in a single design and lack of arguments, resulting in waste of resources and safety in design. Such issues affect the design innovation of Chinese bridges [5].

3.3 Safety hazards in road and bridge design.

In some road and bridge design, the design of the construction period is too short-lived, which will lead to the acceleration of the actual construction process of the road and bridge. This will cause serious quality hazards and safety hazards, which will bring various potential problems to the construction of roads and bridges. The construction side effects some road and bridge designs. The cost control is too demanding, resulting in the failure of the normal construction enterprise profits. The construction enterprises can only reduce costs by subcontracting and subcontracting, and the subcontracting units are not normal. In the case of profit, profit can only be achieved by cutting corners and shoddy, which will bring various hidden dangers to the entire road and bridge project, and even cause practical problems such as quality, safety and longevity of road bridges for profit [4]. In the design of roads and bridges, some construction units have no clear regulations on road and bridge materials, and provide opportunities for problem materials and counterfeit and shoddy products to enter the road and bridge sites, making it difficult for supervision units and construction enterprises to strictly control road and bridge materials. Not only does the quality of road bridges become an empty talk, but it also causes safety problems for roads and bridges.

3.4 Insufficient understanding of road and bridge design theory system regulations.

The theoretical system has an effect on the abutments and main beams of the bridge, but it is a hidden design for the layout design of some special bridge members and the design of ignoring the fatigue state. In addition, the support of the bridge and the panel design life of the bridge are inconsistent, and the design and the state of the normal use limit not fully considered in the design [5]. This type of situation makes the bridge support structure lose its stability in whole or in part when the ultimate load carrying capacity is reached; the fatigue of the material under the repeated load causes the fatigue limit of the damage. Although the special design of the bridge abutment and the main beam has been strengthened, the design of the traffic way plate members of the bridge deck has not been paid enough attention, showing the design under fatigue. In the investigation, many of the main structures of the bridges are in good condition, but the damage of the bridges and plates is not serious. These indicate that there is no uncertainty about the design of the traffic lanes.

4. Reasons for hidden dangers in road and bridge design

4.1 The influence of historical factors.

With the continuous improvement of China's economic development level, people's demand for various modes of transportation is gradually increasing. The rapid development of road transportation mode has caused the traffic volume of roads and bridges to become larger and larger. Accordingly, the construction of roads and bridges is proposed. Some new requirements and challenges. However,

from the reality of China, most of the bridges built in the last century. The quality and requirements of the project are very different from the present. The contradiction between the design level of road bridges and the traffic pressure they have to withstand is coming [6]. The more prominent, the potential hazard for the normal use of the bridge.

4.2 Road and bridge design not considered adequately.

Road and bridge design is a very complicated and systematic work. It needs to consider many influencing factors, including natural and humanistic. Designers often do not consider enough in design, and neglect some details [3]. These details are likely to be it will lead to security risks. For example, some designers in the bridge design, the calculation formula used is not accurate, or the line selection is not clear enough, neglecting the grade requirements of steel and concrete, etc., will have a serious impact on the quality and safe use of the bridge.

4.3 Blindly pursue economic benefits and neglect quality requirements.

The construction unit generally completes road and bridge construction, and many unit leaders and construction personnel who are interested in the interests [6]. They purchase the raw materials shoddy, so that the materials with unqualified quality appear on the construction site, or they can reduce the materials. There have been some “tofu slag” projects, which have seriously affected the quality of the bridges and caused some dangerous situations of collapse during the construction process.

5. Countermeasures for the hidden dangers of road and bridge design

In view of the hidden dangers in the design of roads and bridges, we must actively take effective measures to avoid the occurrence of quality problems during construction, ensure that the road and bridge projects can be completed within the prescribed period of delivery, and improve the service life and safety of road bridges.

5.1 Improve the professionalism and sense of responsibility of designers.

The design of roads and bridges is related to people's property and life safety, and it is a work that has attracted people's attention [6]. In order to ensure the scientific and safety of bridge design, it is necessary to strengthen the training and improvement of the professional level and responsibility of designers, and provide them with some opportunities to participate in training and further study, so that their professional knowledge is continuously improved and updated. , to support the bridge design [7]. At the same time, the road and bridge designers must proceed from the overall situation, make overall considerations, boldly innovate based on the actual situation, take the scientific basis as the guideline of all work, and treat every detail in the design with caution.

5.2 Choose a scientific and rational design.

Before the road bridge is the construction, it is necessary to combine the local actual situation, comprehensively consider the influencing factors of various aspects, ensure the durability and safety of the bridge as the guiding goal, and choose a scientific and reasonable design plan. With the rapid development of China's transportation industry, bridges have been built in areas including the western region [7]. Many of them have harsh geographical and climatic conditions. Coupled with other factors, the bridge design faces very many people. In this case, a comprehensive and detailed analysis of the geographical environment is required to design a bridge structure that is compatible with local characteristics.

5.3 Strengthen supervision of road and bridge construction.

Strengthening the quality supervision in the construction of roads and bridges is an effective external means to prevent the occurrence of hidden dangers in design. Relevant departments should organize special personnel to supervise the construction of roads and bridges to ensure that the construction units strictly follow the design drawings and quality requirements, to avoid unqualified equipment and raw materials appearing on the construction site, and to make relevant records of

quality supervision. Convenient for later inquiry. The construction enterprise itself should also set up a supervision team to supervise the construction situation on a regular or irregular basis, mainly to check whether the operation of the construction personnel is standardized, and whether the quality of the concealed part of the project is qualified, etc., to prevent the situation of cutting corners. After completion of the road bridge, it needs to undergo strict acceptance before it can be use. Strengthening quality control can prevent hidden dangers during use [8].

5.4 Strengthen the risk management of bridge projects.

Transportation requires more and more durability and safety for road and bridge design. Relevant designers must take a highly responsible and prudent working attitude, comprehensively consider various influencing factors, and formulate design plans according to the specific requirements of the bridge. For example, the service life of road bridges is not only eroded by some chemical substances, but also needs to withstand the pressure of vehicles and natural disasters such as earthquakes [8]. The materials used in road and bridge engineering will gradually age during use, and designers must Taking these factors into consideration, we will design appropriate preventive measures, reduce the risk management of bridge projects, and prevent them from happening, and minimize potential hazards.

6. Conclusion

With the continuous development of the functional and systemic goals of roads and bridges, the number and quality of roads and bridges have made multiple advances. Scientific and artistic have become the most pursued goals of road and bridge design. Roads and bridges with high quality and high safety foundation have changed. The fundamental starting point for design. At present, road bridges still have various problems in the design process, and it is difficult to adapt to the actual requirements of roads and bridges. From the perspectives of handling safety hazards, improving systemic functions and developing professional quality, we should improve the design and planning level of roads and bridges, and achieve comprehensive protection for road bridge safety, construction and operation.

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