Research on Common Diseases and Construction Treatment Technologies in Bridge Engineering

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Abstract: With the improvement of social and economic levels, the pace of modern life is constantly accelerating, and the number of transportation vehicles is constantly increasing, which puts higher requirements on the quality of bridge engineering.Due to multiple factors, bridge construction may suffer from structural diseases, which can affect normal traffic.This article starts with the stability of bridge structures, smooth traffic flow, and safety of bridge transportation, and elaborates on the necessity of dealing with common diseases in bridge engineering. Targeting common diseases such as uneven settlement, concrete cracks, bridge erosion, and steel bar corrosion, targeted solutions and strategies are proposed to ensure the reliability and stability of bridges and provide convenience for modern people's travel.

Keywords: Bridge engineering;Common diseases;Construction processing technology

Introduction

In transportation facilities, bridge engineering occupies a fundamental position, and the quality of construction and daily maintenance directly affect social and economic development and the safety of people's lives.

I. The necessity of dealing with common diseases in bridge engineering

1. Improving the stability of bridge structures

Bridge engineering construction involves various construction materials, such as coal slag, concrete, asphalt, steel, etc.In long-term use, the concrete or steel of bridge engineering may be affected by rainwater erosion and erosion, leading to disease problems.In sections with concentrated traffic, due to repeated and long-term crushing by large and heavy trucks, bridges may suffer from serious diseases and even pose safety hazards.Only by strictly preventing and monitoring bridge engineering diseases, and formulating and adopting targeted technical solutions, can bridge engineering diseases be repaired, quality defects be compensated, the reliability and stability of bridge engineering structures be improved, and the needs of safe travel and transportation be met within a limited time.Therefore, it is necessary for relevant departments to enhance their awareness of prevention and control, regularly inspect various bridge sections, reasonably screen repair technologies, and improve the stability of bridge structures.

2. Ensure smooth flow of vehicles

With the increase of bridge engineering operation time, the road surface is prone to some deformation or crack diseases. If the road management unit cannot quickly detect and handle it, it will lead to the continuous expansion of road surface diseases, not only unable to ensure the image of the bridge engineering, bringing adverse driving experience to drivers, but also threatening vehicle safety.Therefore, relevant departments should pay attention to the discovery and treatment of bridge diseases, rigorously and scientifically apply treatment techniques to restore the smoothness of bridge pavement and ensure the smooth flow of vehicles.

3. Ensure the safety of bridge transportation

Bridge engineering plays an important role in the development of social economy and logistics industry.In order to promote the logistics industry and urban economic development, many cities have continuously increased the number of elevated bridges, which has to some extent alleviated traffic pressure.However, it should be noted that the flatness and structural issues of bridges can pose a threat to vehicle operation and even lead to safety accidents.Therefore, it is necessary for relevant departments to take a long-term perspective on the maintenance and quality management of bridge engineering, utilize advanced technology, reduce the probability of bridge diseases, and ensure the safety of bridge transportation.

II. Analysis of Common Diseases in Bridge Engineering

During the construction process, bridge engineering is prone to various types of quality risks due to factors such as difficulty in construction technology, narrow construction sites, and high traffic flow. The main diseases are divided into structural diseases and functional diseases.Structural diseases of bridges refer to road surface deformation, structural cracks, and some minor diseases can even cause qualitative changes, leading to changes in the bridge structure and reduced bearing capacity.Functional diseases refer to diseases that occur naturally or artificially, resulting in reduced functionality of bridges, such as erosion, potholes, and cracks, which have adverse effects on the normal passage of vehicles.

1. Uneven settlement

During the normal operation stage, bridge engineering may experience uneven settlement diseases, and even cause bridge head jumping problems.After long-term use, bridge engineering may experience deformation phenomena such as settlement, bulging, and rutting due to the load pressure of large vehicles.When settlement occurs, large pits will appear on the surface of the foundation where the bridge is

located, leading to uplift on both sides.In situations where hydrological conditions do not meet standards, once there are too many vehicles passing by, the bridge will undergo vertical deformation and the road surface will sink.At the same time, in the construction stage of bridge engineering, if the construction personnel fail to reasonably allocate and clarify the proportion of the mixture, it is easy to cause the compaction quality of the bridge surface layer to not meet the standard. In addition, with the heavy load rolling of large vehicles, the position of the bridge wheel marks will experience shear displacement and fixed deformation.Especially in hot weather, under heavy vehicle loads, rutting marks will be left on the bridge pavement.When the vehicle's load exceeds the tensile and shear resistance of the asphalt bridge deck, local "bulges" (bulges) will appear on the bridge deck.In the state where the lime in the semi-rigid base layer is not fully digested, once it encounters water, the bridge deck will form clumps due to chemical reactions, posing a safety hazard to vehicle driving.

2. Concrete cracks

During the construction or operation process, when concrete cracks appear on the bridge, once it encounters rainy weather, the internal structure of the bridge will suffer from corrosion and expansion cracking due to a large amount of water accumulation.Concrete crack diseases in bridge engineering are very common and are influenced by various factors.For example, in order to control costs, some construction units have failed to strictly control the quality of materials, and the materials used in construction do not meet the standards, making it impossible to guarantee the quality of bridge engineering.The formation of concrete cracks is influenced by the configuration ratio and the tensile strength of the raw materials. Once one of the materials in the concrete raw materials does not meet the standard, the concrete components cannot achieve the ideal stability and strength indicators.When the concrete is damp or the hardness of the raw materials is insufficient, the final concrete structure has insufficient stability and is prone to structural cracks.During the construction process, due to the principle of thermal expansion and contraction, the internal structure of concrete is not stable enough. After completing the pouring work, if the construction personnel do not use targeted nursing measures according to temperature and climate changes, the stability of the concrete structure will be insufficient, leading to cracks in the bridge project.The causes of bridge crack diseases have unique characteristics. Before carrying out repair operations, technicians should understand the actual causes of cracks in road sections, and correctly choose and apply repair treatment methods.

3. Bridge erosion

In bridge diseases, erosion diseases have extremely strong harmfulness, usually manifested in peeling and surface pitting phenomena, which not only make the overall image of the bridge unattractive, but also easily corrode the internal structure of the bridge, posing a threat to the safety of the entire bridge project.From the perspective of the causes, due to factors such as wind and sand invasion, high and low temperature changes, and large amounts of rainwater erosion, the antioxidant layer on the surface of the bridge will fall off. At this time, once the rainwater impact force is too strong, the surface of the bridge will experience significant wear, resulting in a decrease in the cross-sectional area of the bridge and an increase in longitudinal stress inside.After the erosion disease reaches a certain limit, the overall structure of the bridge undergoes deformation due to the action of gravity, leading to an increase in the safety risk coefficient of the bridge.Therefore, when there are fewer issues of bridge erosion, relevant departments should promptly detect and handle them to avoid serious deformation of the bridge due to weathering.

4. Corrosion of steel bars

Bridge engineering cannot do without the support of high-strength steel.Steel has high-quality span and prestress, and bridge engineering usually introduces a large amount of steel load structures to improve the mechanical performance and bearing capacity of bridges.Especially for bridge projects with large spans, their bearing capacity requires high requirements for steel reinforcement materials. However, in bridge engineering, if management personnel do not carefully store and store steel reinforcement materials and expose them to outdoor environments for a long time, the steel reinforcement will be corroded due to rain and snow conditions, resulting in mechanical properties of the steel reinforcement not meeting the standards.Under the action of acidic substances, air, and water, the passivation film of steel bars will be corroded, greatly reducing their mechanical properties, resulting in insufficient actual bearing capacity to support the bridge.

III. Construction treatment techniques for common diseases in bridge engineering

1. Uneven settlement treatment technology

To ensure the safety of bridge operation and extend the service life of the bridge, relevant departments should fully utilize processing technology.Firstly, it is necessary to take preventive measures against uneven settlement.The design unit should comprehensively carry out geological survey work, form accurate and detailed survey reports, provide reference for bridge construction and maintenance, and design drainage facilities for bridge engineering, so that accumulated water can be smoothly discharged outside the bridge deck in rainy days, avoiding the impact of accumulated water on foundation stability or the occurrence of water seepage problems.Secondly, for bridges with uneven settlement diseases discovered, technicians can choose treatment techniques based on the actual situation.For soft soil foundation, technicians can choose geogrid reinforcement technology to improve the bearing capacity and tensile strength of the foundation, alleviate the problem of foundation settlement, or other common foundation reinforcement techniques such as consolidation, dewatering, compaction, etc.In addition, technicians can improve the stability of the infrastructure.In the construction operation plan, construction personnel can use piers and wooden piles to build additional supporting structures, transfer the load of the upper structure, and achieve the goal of stabilizing the foundation.Finally, to establish a settlement monitoring system, management personnel should establish monitoring points, track and

understand the data of the foundation in Zhenjiang for a long time, timely detect data anomalies, and carry out settlement treatment work.

2. Concrete crack treatment technology

Firstly, apply surface treatment techniques.For concrete Li Feng in bridge engineering, construction personnel can use surface coating or patching methods according to the actual situation.For large-scale water leakage cracks, construction personnel can use surface patching method when the location of the leakage cannot be determined and the concrete is honeycomb and pitted.For hairline cracks, considering the difficulty of grouting, surface coating method can be used.Secondly, using grouting treatment technology, for cracks with a width of 0.2-0.3mm, construction personnel use grouting treatment methods and professional repair materials to improve the effectiveness of crack repair.In the specific operation process, construction personnel should clean up excess concrete structures, fully understand the strength and structural grade of concrete, prepare targeted concrete strips, mix grout according to specific proportions, and then pour it into cracks to fully blend the original concrete structure with the new grout.After completing the grouting operation, level the surface of the bridge.In addition, use filling and repair techniques.When serious bridge engineering diseases occur, construction personnel need to comprehensively use epoxy mortar, cement mortar, and advanced equipment to seal the cracks and improve the level of crack treatment and repair.

3. Treatment technology for erosion and disease

In addition to preventing erosion diseases during the construction process, management personnel should regularly carry out testing work in the later operation process, timely detect and judge the level of erosion diseases, and take targeted remedial measures.During the construction phase of bridge engineering, management personnel should control the quality and safety of raw materials, strictly follow the standards of bridge construction projects, configure raw materials, emphasize the rationality of construction technology and proportion, fully utilize material performance, and prevent erosion and disease from the source.In bridge maintenance work, road management personnel should attach importance to maintenance work, timely inspect the condition of the bridge, and do a good job in daily inspection and maintenance.Once the erosion disease occurs, special marking method should be used as soon as possible to record the eroded bridge area, and construction personnel should be arranged to carry out cleaning and repair work to avoid further expansion of the disease and reduce safety hazards.

4. Reinforcement Rust Treatment Technology

To reduce the probability of steel bar corrosion, relevant departments should provide various guarantees and maintenance work. In construction projects, procurement personnel should choose high-quality steel according to the actual needs of bridge engineering. The procurement project requires a quantity of stress steel bars and ordinary structural steel bars, and choose steel with strong corrosion resistance.Construction management personnel should adopt reasonable storage methods to avoid long-term exposure of steel bars to outdoor environments, reduce the impact of external environment on the strength of steel bars, and also carry out steel bar corrosion prevention work. The protective layer should be applied to the surface of steel bars to isolate acidic substances, air, and water, and improve the level of steel bar rust prevention.During the construction process, the construction unit should allocate concrete reasonably to reduce the chloride ion content and avoid the decrease in steel bar performance caused by the contact between concrete and steel bars.When discovering corrosion issues with steel bars, construction personnel can use sandblasting or electrochemical methods to thoroughly clean the corroded parts of the steel bars.In the specific operation of sandblasting, construction personnel can use a sand pump to obtain a mixture of water and sand, and use pressure to remove the corroded parts of the steel bars, preventing further diffusion of the rust range.

IV. Conclusion

In summary, in order to promote urban development, relevant departments should attach importance to the role of bridge engineering construction, control the quality of engineering construction, and facilitate the daily maintenance and upkeep of bridges in the future.At the same time, management personnel should do a good job in operation and maintenance, regularly carry out process inspections, identify bridge engineering diseases and problems in the first time, deeply explore the causes of problems, timely develop response technical plans, apply technology and equipment in a targeted manner, carry out prevention and maintenance work, reduce the safety operation risks of bridge engineering, and comprehensively improve the level of transportation services.

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