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Design principle of the bridge and the bridge reinforcement technology pathway analysis

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Abstract
For a long time, our country of bridge construction technology maintains a rapid pace of development, but there are still many problems in the bridge reinforcement and maintenance maintenance. This paper expounds the design principles and the reinforce of the bridge technology and provide useful guidance on the actual bridge design and build.

Keywords: Bridge design principles, the bridge reinforcement technology, Analysis

Introduction

Preface

There's been a noticeable improvement in bridge construction technology in our country in the climax period, But because of excessive pursuit of bridge construction speed, and ignored the innovation of design concept and design time, many problems in the design of bridge contrast unfavorably with the outstanding achievement of the bridge construction in China. This is because the bridge design concept already can't keep up with the pace of The Times development and social progress, most of the construction of the bridge is aims to satisfy the internal request, even the blind pursuit of the world or the domestic first.

The design principles of bridge

In highway and city roads and railway Bridges are important parts, especially for medium and large bridge construction for our country's economy, national defense, politics have great significance. So, the construction of bridge must meet the development of the local actual needs, in ensuring safe and reliable, advanced technology, the economy of the bridge, on the basis of reasonable and durable, as well as following the principles of designing environmental friendly and beautiful. At the same time, bridge construction needs to take into account the future maintenance of convenient, local materials in the process of construction and adjust measures to local conditions

Safe and reliable

Design personnel in the process of design of the structure of the bridge, needs to make sure the durability of Bridges, the stability and strength can meet the relevant safety requirements. For the design of bridge anti-collision railing to fully ensure the safety of the traffic flow and traffic. By increasing the intensity of the anti-collision railing and highly railings to prevent vehicle collision or sidewalk traffic accident. Designers need to clear that the good lighting design has an important mean to avoid most of the traffic accidents happening, for bridge traffic is busy, not only need to set up good lighting equipment, also need to perfect the related traffic signs, thereby reducing the occurrence of traffic accidents. If the river section in transition construction, we must first do a good job in construction of the diversion facilities, in order to avoid excessive scouring water base part of the bridge. If Bridges are built in large tonnage of large ship channel, we not only need to increase the holes of the bridge span in accordance with the actual demand, but also need to set up prevention structure, so as to avoid the damage to the bridge construction [1] of the ship. If the earthquake zone of the construction of the bridge, you need to ensure that the construction of the bridge can meet the demand of bridge seismic, by adopting the reliable anti-shock measures to enhance the earthquake-resistant ability of the bridge. For some types of special Bridges, large-span flexible bridge, for example, in the design requires to take the wind vibration effect into consideration.

The durability of the bridge

In the process of designing Bridges needs to fully consider the use of traffic flow and the expected use fixed number of year, which meet the requirements of bridge deck width. In conventional load test in the process of bridge structure are not allowed to appear beyond the prescribed crack and deformation, as long as to ensure the bridge under the standard load is no problem. For the structural design of the bridge collapse, to ensure the easy navigation, flood discharge, or good for pedestrians and vehicles. At the same time, the bridge of entry and exit in an emergency evacuation, to be able to for normal and there will be no traffic jam. Design personnel in the process of designing of Bridges, for its comprehensive utilization has the comprehensive consideration, the design scheme is conducive to communication, electrical and water pipeline laying and pick up.

To ensure economic benefit maximization

Designers in the design process should follow to facilitate the construction of Bridges and construction principles of local materials and adjust measures to local conditions, in order to ensure the maximization of economic benefit. Consider later bridge capital cost and maintenance cost, and then choose the lowest cost of economic Bridges. The design of the bridge and how easy it is to comprehensive maintenance costs money later, maintenance plan of design to make every effort to not interrupt the traffic or to interrupt the traffic time to a minimum. Try to choose the hydrological and geological conditions of the superior location bridge construction, at the same time try to shorten the length of the bridge. By choosing

short distance on both sides, in order to ensure the bridge construction economic efficiency maximization, since this can enhance the appeal of the traffic, in the fastest speed to recover the cost [2].

The bridge reinforcement technology way analysis

Bridge reinforcement is through the deep structure to improve performance and intensity of bridge components or the restoration of capacity to the actual load of the bridge, so as to extend the time, meets the requirements of transportation. At present, for the bridge reconstruction and reinforcement method mainly has the following forms:

Strengthen the weak components

If bridge structure has significant defects or special circumstances that need heavy vehicles, it is necessary to strengthen demand that does not conform to the safety of bridge bearing component, generally USES the new material (steel, glass reinforced plastics, sprayed concrete, steel bar, concrete) to increase the cross section area of main arch ring or girders. Also can use epoxy resin or high grade cement mortar joint of bridge cracks. It can also by setting the external post-tensioned prestressed concrete to increase external prestressing, or use of chemical bonding agent to reinforce the bridge.

Equipped with steel plate can largely improve the bridge resistance, at the same time will not make the cross section of the bridge is too large. In front of this method also has its limitations, reinforcing steel plate processing is difficult, and need to add the necessary supporting equipment, and in use of bridge later, need careful maintenance and maintenance on reinforcing steel plate, which consumes a lot of manpower material resources, therefore has not been widely used. Is set in the surface of the bridge FRP, can have the effect of temporary reinforcement, let the big tonnage vehicles through the bridge, but due to its elastic modulus is much lower than concrete, often after the mechanical deformation and breakage. Add reinforcement can effectively enhance the buckling resistance of the bridge, the bridge, won't make the surface of the fixed steel Bridges overweight, but this way of reinforcing the appearance of the damage to Bridges, also not commonly used in the bridge reinforcement.

The increase of auxiliary components of the bridge

If a bridge for the damage of the bearing capacity is insufficient or other reasons, you can increase the secondary stress component in the bridge structure. For example, adding beams, arch ribs or longitudinal beam and so on. Can also use the new prefabricated to bridge structure in the construction of heavily damaged but difficult to repair. Reliable enough need to apply in the process of construction technology, first set the reasonable temporary support, and then to replace components, in order to ensure that the bridge structure is not damaged.

To abutment, piers and foundation for reinforcement

Most bridge diseases and defects are caused by foundation or pier problems. Bridges for such problems, usually use methods of pushing, bracelet, increasing the pile foundation reinforced concrete or reinforced concrete steel rod and the earth rod is used to family prestressed way to reinforce the foundation and abutment, by changing the force of the foundation or pier, to ensure that the bridge has enough bearing capacity [3].

Reduce the horizontal load

By reducing the dead load of bridge structure can significantly improve the competency of Bridges under load. Especially for the condition of the bridge foundation bearing capacity limited, very suitable for using to reduce the bridge lateral measures to increase the load capacity of the bridge, the reinforcement measures have good economy. Replace arch on materials, for example, to transform solid-web bridge into hollow bridge.

Changing the structure of the bridge system

This method is to use the combination of plate and beam role or beam continuous action to change the force of the bridge structure, so as to improve the load capacity of bridge. Beam body, for example, used to replace the arch type system, or just replace for articulated, with eight hang or auxiliary piers of multi span structure, so as to replace single span beam structure.

Conclusion

The bridge will appear all sorts of problems when we use it, in order to ensure the normal use of the bridge, the relevant personnels need to apply the treatment measures to solve the problem of bridge. In the process of reconstruction and reinforcement of bridge, need to have the innovation spirit and exploring spirit, and use the most advanced, most reliable construction materials and techniques. In the bridge reinforcement and design process, the construction of one pace reach’s the designated position, low failure rate, to ensure the bridge to play the biggest effectiveness of bridge in order to ensure the normal operation of the bridge traffic in our country.

References

1. Hu Ling. Century park landscape bridge design J. Journal of urban roads and flood control. 2014; (1):68-69.
2. Wang Longfu. J. Journal of bridge construction, Beijing: people's traffic press. 2014 (6):97-98.
3. Su Fengling. Prestressed concrete beam arch combination bridge J. Journal of urban roads and flood control. 2014; (2):12-12.