

The Maintenance Management Analysis of Municipal Road Bridge Facility

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Abstract: With the continuous expansion of urbanization construction, the problem of traffic congestion has become increasingly prominent. The large-scale three-dimensional transportation system is an inevitable trend of urban development. The increasing number of urban bridges has brought unprecedented pressure on urban road management. How to maintain the management of municipal roads and bridges and what effective measures taken is crucial to ensuring the safe operation of municipal bridge facilities. This paper has conducted in-depth investigation and research on the maintenance and management of municipal road and bridge facilities, and put forward constructive opinions.

1. Introduction

With the development of China's municipal construction, the investigation of safety hazards and the repair and reinforcement of bridges with hidden dangers have become an important task for Chinese municipal bridges. In order to ensure the safety of people's lives and property, relevant departments must increase the maintenance and management of municipal bridges. Only by strengthening the maintenance and management of the bridge municipality, can we ensure the healthy operation of the municipality and prolong the service life, which is of great significance for accelerating the construction of China's transportation infrastructure [1].

2. The characteristics of bridge maintenance

Bridge maintenance involves a wide range of work, flow of work, and is greatly affected by natural conditions. Its effect is more difficult to manage than other industries, and has its own attributes and characteristics [1]:

1) There are many influencing factors. Bridge maintenance is to ensure the effect of bridges, but most of them are exposed to three or four types of bridges and even dangerous bridges. People, equipment, materials, methods and environment will directly affect the maintenance of bridges.

2) Strong chain. Bridge maintenance is divided into 7 major aspects: raising, observing, diagnosis, breaking, repairing, treating, and evaluating.

3) Mistakes occur. Bridge maintenance is mostly mixed operation, involving many types of work, involving technical miscellaneous, uneven maintenance conditions, low level of mechanization, and relying on manual work. A slight accident may cause adverse effects.

4) Limited by time. Bridge maintenance itself is in time race, and the relationship between maintenance effect and progress is difficult to coordinate.

5) Limited by funds. Bridge maintenance funds are not directly proportional to maintenance tasks, and the relationship between maintenance effects and funds is difficult to coordinate.

6) The social impact is great. The bridge effect affects the government image and social stability, and it is necessary to protect this last line of defense.

3. Maintenance content of municipal road bridge

3.1 Bridge deck maintenance.

Bridge decks include bridge deck pavements, sidewalks, railings, bridge deck waterproofing, drainage structures, lampposts and expansion joints, etc., which are generally prone to asphalt

concrete deck pavements, ruts, cracks and breakage of cement concrete decks, and damage to sidewalk railings [2]. Diseases such as exposed ribs, bridge deck waterproofing, drainage structure damage, etc., that can be treated according to specific conditions, such as partial concrete or epoxy concrete repair, addition, replacement, and filling.

3.2 Maintenance of the superstructure beam body.

The beam body includes steel structure, concrete structure, prestressed concrete structure, completed structure, etc. Under normal circumstances, the steel structure diseases include peeling of the paint layer, corrosion of the steel structure, etc.; the concrete structure is cracked, peeled off, exposed, etc.; The prestressed concrete structure diseases also include cracks in the closed concrete, exposure of the prestressed anchors, etc.; the disease of the completed structure is characterized by crack weathering and spalling [2]. It can usually be treated by caulking, repainting after rust removal, concrete or epoxy concrete repair and reinforcement.

3.3 Maintenance and repair of the substructure and ancillary structures.

The lower structure of the bridge includes piers, abutments and foundations, and the auxiliary structures include slope protection, cone slopes and retaining walls. Bridge piers are usually diseased with cracks, surface weathering, spalling, exposed ribs, etc., can be closed by sealing, concrete or epoxy concrete repair method; the basic part usually has erosion, accumulation, uneven settlement, etc., can be backfilled and reinforced [1]. Methods such as dredging and strengthening observation; slope protection, cone slope, and retaining wall usually have deformation, subsidence, damage, cracks, etc., and local adjustment of blocks, replacement of blocks, and re-stitching can be adopted.

4. Basic requirements for the maintenance and management of municipal roads and bridges

Preventive. The purpose of municipal road bridge maintenance management is to prevent premature damage of municipal road bridges. Daily maintenance and maintenance work is indispensable. Preventive work should be done for some possible problems, maintenance logs should be established, and maintenance should be carried out on time [3]. It is necessary to attach great importance to problems that arise frequently and prevent problems before they occur. The primary work of the maintenance and management of municipal roads and bridges is recommended to check the archives of road maintenance and do a good job of prevention.

Timeliness. In the maintenance work of municipal roads and bridges, it is necessary to promptly and quickly deal with the problems or dangerous situations, reduce the impact of problems on the roads of municipal roads and the driving of the vehicles, and ensure the smooth flow of traffic. The bridge maintenance work that can respond quickly [3]. The construction team, this is also an important task for bridge maintenance.

Safe operation. The maintenance of municipal roads and bridges must be carried out under safety regulations, safety measures should be taken, and safe maintenance methods should be used to reduce the impact on vehicles.

5. Problems in the maintenance management of municipal road bridges

5.1 Road bridge railings are incomplete.

In the construction and management of municipal roads and bridges in China, there has always been the concept of attaching importance to highway maintenance and neglecting the maintenance of roads and bridges. Therefore, the traffic departments at all levels do not pay attention to the maintenance and management of roads and bridges. Among the large number of existing bridges in China, especially the bridges on national or provincial roads, there are problems with the lack of railings, and the repair work is not timely. This is likely to cause safety hazards to pedestrians and vehicles, leading to traffic accidents and affecting the comfort level of traffic safety [4].

5.2 The bridge deck is not clean and the drainage holes are not smooth.

The reason for the poor water flow in the bridge hole is mainly due to the combination of natural factors and human factors. The performance is as follows [4]: First, some of China's municipal roads and bridges are built in plain or mountainous areas, and their natural conditions are relatively harsh, especially the soil is relatively loose. Due to the influence of rain and rain, it is easy to cause siltation of nearby riverbeds and block the drainage holes of bridges, affecting the drainage holes. Secondly, China is built on municipal road bridges in crowded areas. Due to the low quality of residents, residents often discard or pile up domestic garbage on the bridge deck of municipal road bridges, affecting the cleanliness of the bridge deck and causing bridge decks. The blockage of the drainage holes causes the bridge area to be water, which is very disadvantageous for the attachments and structures of the bridge. In addition, for the municipal road bridges in rural areas, the surrounding villagers often use the riverbed around the bridge to build dams to facilitate irrigation of the farmland, but it is easy to reduce the cross section of the riverbed and reduce the flood discharge capacity of the bridge.

5.3 Poor construction or repairing results in poor bridge deck flatness.

The bridge deck has poor flatness, which is the biggest manifestation of imperfect road maintenance work. At the same time, this phenomenon is also common in highway pavement. Generally, after the construction of the bridge is completed, the passing of vehicles that have accumulated over a long period will inevitably lead to the phenomenon of potholes [5]. However, after the problem occurred, the area of the bridge and bridge maintenance personnel could not be repaired or repaired, and the area of the bridge surface was enlarged. As a result, the vehicle was in the process of running, causing serious bumps and easily causing traffic accidents. Long-term bridge deck or road pavement is not flat, which makes the accumulated sewage easily cause erosion of bridges and pavement components, affecting the service life of bridges and highways.

5.4 Repairs to damaged bridge structures are not timely.

When the municipal road bridge is put into use for a certain period, subject to objective factors and subjective factors, the bridge deck structure will have certain damage. At this time, the maintenance of the municipal road and bridge maintenance personnel is required to ensure timely maintenance. The ability of vehicles to pass. However, in the maintenance of municipal roads and bridges in China, there is no emphasis on the maintenance of damaged structures of bridges [5]. Over time, it will cause greater damage to bridge structures, such as concrete spalling, steel bars. Exposed rust, etc., easily cause cracks, subsidence and other damage problems on the bridge pavement.

5.5 Lack of bridge signs.

In order to ensure the safety of road bridges and their own life, some municipal road bridges need to set a number of prohibitive signs such as speed limit and weight limit to reduce the traffic of heavy, high, wide and large vehicles, thus reducing the bearing pressure of the bridge and extending it. Its service life. However, in many of the current municipal road bridges, the lack of necessary bridge signs is set, especially for small urban road bridges in rural areas, which lack restrictive signs. Secondly, it is a problem of unclear bridge conditions, mainly in the construction of roads and bridges, the level of load and the unclear structure of bridges [3]. The reason for this problem is that during the bridge construction period, the road and bridge construction units did not hand over the relevant information of the bridge construction to the bridge maintenance department, resulting in unclear bridge conditions, which may easily cause unnecessary bridge damage.

6. The main factors affecting the maintenance management of municipal roads and bridges

Subjective human factors. In the maintenance management and quality control of municipal road and bridge construction, subjective human factors such as project leader and construction team quality directly affect the construction quality. The main reason for the quality of roads and bridges in some cities today is subjective human factors [6]. The responsibility and integrity of the project leader,

as well as the execution force and construction attitude of the construction team have a profound impact on the maintenance management and quality of the municipal road and bridge construction.

Objective environmental factors. The objective factors of maintenance management and quality control in municipal road and bridge construction are mainly reflected in some external natural environment. Mainly reflected in weather and climate factors, seasonal changes and so on. Natural factors cannot have a fundamental impact on the maintenance management and quality of municipal road and bridge construction, but to a certain extent have a direct correlation with bridge engineering.

Other factors. Materials used in municipal road and bridge construction, construction machinery, etc. will also have a certain impact on bridge maintenance management and quality. Material is the basis of construction, and its quality directly determines the service period of the project and the safety of the citizens [7]. If the material is not up to standard, even if it has advanced management methods and a first-class construction team, the quality cannot be discussed. Whether the mechanical equipment factor can play a role in maintenance is not only related to the construction progress, but also related to the quality.

7. Municipal road and bridge facilities maintenance management measures

Preventive maintenance is the mainstay. With the continuous improvement and development of road and bridge construction technology, the maintenance of its later stage has also been put on the agenda. Therefore, the adoption of new processes and technologies in the process of conservation is essential. Preventive maintenance is now a relatively common method of maintenance. This method is mainly to combine the prevention and treatment, and the slurry sealing technology has been widely used [6]. This method requires the use of a sealing machine in the application process, but the cost of such mechanical equipment is relatively high. If it is used in the maintenance of bridges with a small amount of engineering, this method is usually not used, mainly relying on manual mixing. Because the slurry seal preventive maintenance technology is a brand new way of bridge maintenance, the relevant staff are still exploring and researching.

Build a scientific management system. Implementing the principle of “prevention first, safety first”, in the maintenance and management of roads and bridges, special attention should be paid to safety management issues [7]. The demand forecasting of the entire project should be done well, and the science of “strict, real, new, fine and precise” should be constructed. The management system establishes the concept of “people-oriented, car-oriented”. In practical applications, the technical level of bridge maintenance management personnel should be strictly controlled; in the maintenance of highway bridges, management supervision should be strengthened to ensure that road and bridge maintenance workers can carry out maintenance operations according to the prescribed procedures, thus effectively ensuring the quality of road bridge maintenance.

At the same time, the application of refined management establishes and implements file quality system management, and effectively realizes the collation and analysis of the materials in the highway bridge maintenance management archives, to clarify the responsibilities of the leaders in the bridge maintenance management work and the personnel of various departments [7]. Establish a sound maintenance management organization system; realize the good connection between various maintenance management processes and links of China's highway bridge maintenance management; eliminate existing or potential non-conformities; strengthen the intelligent training of highway bridge maintenance personnel, and strengthen the maintenance management work soft and hardware investment.

Form professional road and bridge maintenance personnel. In the maintenance of roads and bridges, we have professional maintenance personnel who can not only solve problems in construction management, but also help maintenance management from experience. The maintenance and management department of roads and bridges should employ some maintenance management talents with professional capabilities and set up full-time post departments to carry out division of labor for different road conditions [8]. In terms of responsibilities, the roads are separated from the maintenance and management of the bridges. On the roads, there are engineers responsible for road maintenance management, and there are special bridge maintenance engineers on the

bridges.

Archives management. The construction of roads and bridges is inseparable from the management of data files. The construction process of the project is reflected in the data. The data content includes design documents, survey documents, construction documents, establishment documents and construction documents [8]. The maintenance management unit must collect static data and dynamic data according to the requirements of the road and bridge management system, build a database, and save the files to the computer so that the data can be passed. Understand the actual road conditions information during construction, and facilitate the smooth progress of maintenance management.

8. Conclusion

Bridges are an important part of highways. For bridges with more serious defects, if they are not repaired and repaired in time, they will not only seriously affect the service life of bridges, but some even cause vicious accidents in which bridges are killed. Therefore, strengthening the maintenance management and repair and reinforcement work of bridges, improving the carrying capacity and driving performance of old bridges and extending the service life have become an urgent problem to be solved.

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