Maintenance and Repair Strategies for Existing Bridges in China

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Abstract Highway bridges play an essential role in economic development due to their forming major links in the global transportation networks and direct impact on public safety. In China, there are 310,773 highway bridges with a total length of 12,466,143m. Many factors tend to accelerate the deterioration of the existing bridge structures, i.e. increasing of aged bridges, increased traffic volume and excessive truck weights, severity of the environmental conditions, and low-level maintenance decision-making. To control deterioration and extend the service life of aging bridges, the issues on testing the load carrying capacity, accurately assessing damage severity, the effective bridge maintenance, rehabilitation and replacement strategies should be taken into account. The paper first gives a brief introduction on the current condition states and urgent problems of the existing bridges in China. Then, the bridge condition assessment methods for structural safety and durability based on bridge investigation, visual inspection, detail test for material characteristics and structural deformation, structural analysis via FEM, and loading test are proposed. Next, the general maintenance and rehabilitation strategies for the old bridges such as member replacement, stiffness modification, member addition, and poststressing are given detailed demonstrations. For bridge superstructure, the strengthening technologies include:

- Slab surface strengthening layer method
- Additional prestressing method
- Carbon Fiber Reinforced Polymers(CFRP) plate bonding method
- Steel plate bonding method
- Steel-encased strengthening method
- Thicken-up strengthening method
- …

For bridge substructure such as pier, abutment, and foundation, the strengthening technologies include:

- Spreading foundation method
- High-Pressure Rotary Grouting
- Adding bridge piles for foundation strengthening
- Adjusting the horizontal displacement of arch foot
- …

Moreover, the new evolution of the developing China Bridge Management System 2006 (CBMS2006) based on Web-GIS and its perspective is finally presented. The main conclusion derived is that in China an emerging gap is appearing for the increasing needs in bridge assessment, maintenance, and management.

KEYWORDS: old bridge, load carrying capacity, bridge inspection, maintenance strategy, bridge strengthening.

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