

## BRIDGE MANAGEMENT STRATEGIES: CURRENT AND FUTURE TRENDS

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### Abstract

For critical transportation networks, efficient management has become an imperative component to provide optimal and continuous services. This is particularly true for bridge stock which form critical elements as part of rail and road networks and which are experiencing increased vulnerability due to a range of issues, such as aging infrastructure and increased hydro-hazards due to the effects of climate change. The effects of such increased risks to critical infrastructure threaten not only the economic prosperity, but also the social fabric, of the societies they serve. It is therefore necessary to have bridge management strategies and systems that are proactive and dynamic when assessing hazards and risks from an individual to a network bridge level to ensure continuous, efficient operation of a transportation network.

This study investigates current and future trends in bridge management strategies for the effective assessment and management of bridge infrastructure. In this regard, current practices used for the assessment of both the hydraulic and structural hazards associated with bridges over waterways are evaluated to determine their strengths and weakness. For underwater inspections, when considering the effects of scour, this evaluation will consider the criteria, methodologies and assessment methods currently being used worldwide to determine the bridge vulnerability to the influence of scour. Also investigated are the current practices evaluations of the extent of damage due to scour, their overall classification of the health of a structure, as well as their recommendations for action, both present and future. Similarly, the current practices for structural inspections, assessments and classifications are also evaluated and the inclusion of both practices as part of overall bridge management strategies is considered.

Finally, this investigation details future evolutions in bridge management strategies, through which both structural and hydraulic hazards are assessed and controlled by a web-based monitoring platform. The platform provides an advance in bridge management strategies as it contains modules for the assessment, evaluation and prediction of both hydraulic and structural hazards. Also, as the platform is web-based, it allows for more efficient data acquisition, tracking of bridge components degradation over time and automated decision taking in critical cases. This study provides a benchmark through which current bridge management strategies are assessed, as well as guidance on predicted future trends in providing efficient and safe continuous operation of bridge infrastructure.

**Keywords:** Bridges, Asset Management, Hydraulic hazard, Structural hazard, Scour, Climate change

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