

Risk Based Inspection Method for Cable Supported Bridges

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Abstract

There is recognition that inspecting all elements of a complex bridge at the same set frequency is not suitable for these types of structures and an inspection regime that uses a risk based approach is more appropriate. However, there is no formal method or guidance on how such an approach should be applied to complex bridges. This paper sets out a method of inspecting complex bridges based on the evaluation of risk. An assessment of the criticality, vulnerability and current condition of each bridge component or groups of components is carried out to determine the frequency of inspection based on the risk of failure. This assessment also takes into account the degree of difficulty of detection by inspection. This method reduces the risk of failure, optimizes resources and can help reduce risk to the public. This risk based approach can also be developed for use in maintenance and capital works planning and this will be introduced in this paper.

Keywords: Complex suspension, cable stayed bridges; inspection; risk based approach.

1 Introduction

Bridges are expected to have a service life in excess of 100 years and this expectation of a long service life cannot be fulfilled without an effective, well-funded and comprehensive approach to inspection and maintenance.

However, the need to put new capital assets to use in order to start reducing the debit side of the cost/ benefit analysis equation has historically meant there was a focus and a continual drive to reduce cost in order to do more and very little consideration has been given in the past to routine bridge inspection or preventive maintenance.

Currently, in the USA, the Federal Highways Administration (FHWA) requires all bridges with a span length equal to or greater than 20 ft. to be inspected every 24 months as per the National

Bridge Inspection Standards¹. In addition, the inspection of fracture critical bridges requires 100% hands-on access for the full-length of all fracture critical members. The Standard also states that increased inspection frequency may be required after consideration of factors such as age, traffic characteristics, and known deficiencies. In addition, individual States can establish criteria to determine the need and level of effort required for increased inspection frequency. It is recognized that complex bridges, such as movable bridges and cable supported bridges, may require special inspection procedures but there are no set guidelines for such structures.

In the UK, bridges and other highway structures are, inspected on a two and six year frequency and the inspection regimes are set out in the appropriate standards issued by government for national trunk road structures². A General