



## Strengthening Existing Highway Structures in the Eurocode Environment

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### Summary

Assessment and the design of strengthening are important to ensure that our ageing infrastructure can continue to function. This paper examines the approaches that may be taken to the design of strengthening for a highway structure which does not meet assessment standards in its entirety. Three case studies are described to examine the reasons that different strategies have been applied to the use of loading and design standards. A particular example is given for the Hammersmith Flyover where the change to Eurocode loading would have had significant implications for the design of strengthening of key elements. It is concluded that application of full Eurocode provisions to strengthening projects is not always appropriate and that consideration must be given to the use of standards particular to individual circumstances to ensure that existing structures can be sustained economically and practically.

**Keywords:** Codes of Practice, Assessment, Traffic Models, Strengthening, Economics, Sustainability.

## 1. Introduction

The assessment and strengthening of existing structures is essential to the sustainability of our infrastructure. In mature economies a large number of structures are aging and deteriorating and require upgrading to ensure their continued safe use. In many cases replacement is not practical or economically viable and the efficient use of the existing structure with appropriate modifications must be made. The use of Eurocodes for design is now mandatory for many structures in the UK but their application to assessment and strengthening depends on the application and agreement with the Technical Approval Authority. This paper will examine the particular challenges and opportunities posed by assessing and strengthening structures in the context of moving to the use of Eurocodes for design.

## 2. Background

### 2.1 UK Practise

The UK Highways Agency has been expressing its requirements for the design of new and modification of existing highway structures in terms of Eurocodes since 31 March 2010.

A suite of assessment standards have been developed by the UK Highways Agency to address the particular demands of assessing existing structures and these continue to be used for assessment.

Currently the Agency states that it has no plan to implement Eurocodes for assessments of highway structures. Assessments continue to be undertaken to existing HA standards and this will continue until further notice, unless the TAA is consulted and convinced that there will be sufficient technical information to undertake the assessment, as well as advantages in using Eurocodes instead of the existing standards for the assessment situation concerned.

For modifications to highway structures, such as strengthening, upgrading, widening and replacement of structural elements or components, the Agency specifies Eurocodes as the default