



A review of 30 years use of design check procedures for bridges

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Angus Low, born 1947, graduated from Cambridge University and joined Arup in London in 1968 where he has since spent most of his career designing bridges. He is interested in understanding design at a fundamental level, which helps him to find simpler solutions.

Summary

The independent design check procedures as used for highway structures in the UK are described, together with how they operate in practice. The procedures have a beneficial effect on the dissemination of design ideas and design procedures across the profession, as well as giving the client a degree of reassurance.

Keywords: Independent design checks. Design standards.

1. Introduction

For the past 30 years the UK Highways Agency, and its predecessor organisations, has required independent design checks to be performed on the designs of all bridges and other highway structures. The existence of such checks and the procedures for performing them have become entrenched within the culture of bridge design in the UK and the author believes they work well. This paper briefly describes the main requirements. Over this period the author has operated under these procedures for many projects as checker, as a designer whose work is being checked and as an advisor to colleagues caught up in designer/checker disputes. A search on the word "check" in the author's project list has found 32 projects. This paper is principally a personal reflection on how the procedures operate, and what effect they have. The author has discussed this matter with colleagues within Arup, and in other firms, and some alternative views are included.

The author works on bridge designs in different countries, and is used to working both with and without his designs being checked. He is aware that some countries where clients do not currently specify checks are considering the adoption of client specifications for checking, or are considering changes to their procedures. The UK procedures are a matter of record [1] but these records do not indicate how the procedures work in practice. The purpose of this paper is to provide some insights.

The paper relates principally to the permanent works design of bridges. In the UK the checking of building designs is covered by very different procedures and, although the procedures for checking temporary works are similar, the practice can be different.

2. The history

In the early 1970s there were four collapses of steel box girder bridges, in Milford Haven, in Melbourne, in Koblenz and in Vienna (a partial collapse). As a result of these events a large amount of research was commissioned into the behaviour of steel box girders. Also, in the UK, the government authorities were prompted to introduce a procedure for the independent checking of bridge designs. Initially trial procedures were adopted for major projects. From 1973 the author was engaged in the independent checking of the concrete components of the Humber Bridge. By the mid 70s there was a general requirement for all bridges designed for the UK Government to be subjected to independent design checks. Most bridges in the UK are designed for Local Authorities, and other authorities running railways etc. Although these other authorities are autonomous for matters of technical responsibility, they usually adopt the standards published by the UK Government, and checking procedures were soon in place for all bridge designs in the UK. Since