

Editorial

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This issue of the *Bridge Engineering* journal contains contributions from China, India, the USA and the UK. Topic areas range from research studies through to investigation of performance of existing structures and reflect both the geographic and technological spread of members' interests and activity.

Three papers report the results of studies that support the analysis and design of a range of structural forms encountered in practice. Investigations of this nature are vital to push forward the understanding of particular bridge types and to provide supporting material for future design guidance and, where relevant, codification.

Three papers are presented on design and construction themes. Two of these describe major schemes involving complex construction methods. The third deals with a study of permanent formwork in bridges in the USA.

The last paper illustrates the major challenges faced by many bridge engineers today – that of the continued justification of the capacity of middle-aged bridge stock in the face of steadily increasing traffic loads.

A number of the papers include descriptions of instrumentation and testing undertaken to calibrate the assumptions made in computer analysis of the structure, in one case measuring the effects built in during construction so that the structure can be used as a 'test bed' for future design.

The increasing availability of effective instrumentation and telemetry that is relatively low cost, has low power demands and is small enough to avoid unwanted attention from vandals means that we have excellent opportunities to build these devices into our new structures on a more regular basis. This will build understanding of the differences between our analyses and observed behaviour, lead to refinement of structural design practice and through integration with BIM models of the completed structure provide clients with ongoing feedback of performance.

Lu and Shao (2014) describe an investigation into the behaviour of composite curved box girder beams. The impact of diaphragm spacing, shear connector spacing and span geometry on the dynamic response of the structure is reported.

Dutta and Das (2014) present the result of a study of pier behaviour under earthquake conditions. The study compares how $P-\Delta$ effects are allowed for in current design processes in India and proposes a methodology to assess the effects in future design studies.

Raju and Menon (2014) address a number of issues arising from the analysis of prestressed concrete U-girder bridge decks. Often simplified methods of analysis are used which may lead to conservative estimates of longitudinal forces due to torsional warping under eccentric loading. The authors propose an alternative treatment supported by computer analysis to give better prediction of the effects.

Riad *et al.* (2014) provide a review of the behaviour of permanent ('stay-in-place') corrugated steel formwork used in USA composite steel/concrete bridge practice. The formwork is used to provide protection to the concrete deck and stability to the steel girders. The study shows how the bridge deck stresses are affected by the shape of the form and describes the use of instrumentation built into the bridge to monitor the effects on the slab of replacing concrete in the formwork corrugations with polystyrene foam.

Nicholson (2014) describes the challenges faced by the design and construction team in on-line replacement of a major viaduct on a key road link near Oxford, UK. The paper shows how complex plan geometry and road and rail possession constraints were overcome through careful construction phasing and use of sliding and longitudinal stitching of the bridge decks.

Marples and Richings (2014) provide details of a complex launch scheme for a large bridge over Network Rail and London Underground rail lines in West London. The paper describes the use of self-propelled modular transporter units to achieve the installation. Usefully, the authors include detail of the managerial processes that underpin successful completion of a scheme of this nature and identify lessons learned from this and earlier projects. While the paper refers to procedures and controls applicable in the UK, the underlying principles will be applicable elsewhere.

Hendy and Chakrabarti (2014) report the outcome of a number of investigations related to fatigue endurance of major

steel box girder structures at the heart of the UK strategic road network in Birmingham. The structures were designed and constructed 40 years ago and are now carrying heavier traffic than could have been anticipated then. The balance between ultimate and serviceability limit state considerations are described. The authors report on the range of powerful analysis, instrumentation and in situ load testing techniques that were not available to the original designers but which have now been utilised to good effect to calibrate desk studies, provide reassurance of behaviour and support the continued use of the structure.

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