

Editorial

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In this issue of *Bridge Engineering* we sought to ask the reader to reflect upon the strategic nature of crossings of all types through consideration of the challenges faced by members of the profession when responsible for planning, design, construction and maintenance of such structures in developing countries.

It is sometimes forgotten how strategic even a small structure can be in terms of benefits to a community through providing safe access to isolated locations and a reliable route to markets and health care.

The resulting structures are often small in scale and are not likely to be reported as advances in theory, technology or physical scale. They are, however, vitally important to the communities that the bridges serve and can have a large impact on communications in the surrounding areas.

Successful completion of these schemes represents identification and management of considerable local challenges. For the engineers involved there can be significant benefits in terms of career development and the personal satisfaction of having made a 'real difference' to a community that they have worked closely with.

Readers familiar with a more structured approach, reliant on regular practice, defined standards, modern analytical techniques, reliable and consistent materials, skilled labour and large plant may wish to reflect on how they would adapt their own approach in the context of the challenges described in the papers in this issue.

Realisation of the project will depend upon understanding and making best of locally available appropriate technologies and not utilising those from elsewhere where this is not justified.

Provision of a new crossing (of whatever size) can become a political issue, especially at regional level where promises to meet the needs of the local people can be seen as a vote winner.

Equally, at the other end of the scale, high level political ambition may drive vision and aspiration and promise an overly complex structural solution beyond what is appropriate, affordable or sustainable.

The need for training and technology transfer to the country and often local community is important for the long-term viability of such projects. This may be using local unskilled labour, engagement of local communities in future maintenance or through technology transfer by institutional training of local engineers and managers.

An understanding of the local cultural traditions and hierarchy is important such that the procurement of materials and payment of local labour is not inconsistent with local practice but avoids corruption. The use of local labour and materials provides a more sustainable approach to the project.

Key to the success of the project is a clear understanding of the locally available, plant, materials and labour. Local plant may be very limited and materials are often of uncertain source and quality. Alternatively, the project may need to allow for the importation and transportation to site of plant and materials. The design needs to take account of such issues as material strength and loading, in remote areas achievable concrete quality maybe very low, loading design to international design standards may be inappropriate. Site access may be limited by poor local roads and very weather dependent so the logistics of the transport to site of plant and materials may heavily influence the programme.

For small bridges in remote areas community involvement can be key to successful future maintenance, for more major bridges appropriate training of local engineers will provide the skills necessary; however the availability of funding for future maintenance needs to be also considered.

Morgenthal (2013) provides an overview of the way in which non-government organisations can provide basic enabling

approach to infrastructure development and sets out the key features that typify successful implementation, including the need for excellent local communications use of an appropriate balance of labour, skills and materials. The importance of technology transfer and training is described.

The use of Bailey bridging previously used as temporary works for the Foyle Bridge in Northern Ireland provided the basis for bridge construction in Guinea as described by Donald (2013). The construction in a remote area was challenging due to limited plant, variable concrete quality and difficulties of access and the local climate. It demonstrates what can be achieved with limited facilities to provide bridging to remote areas which provides a key transport link for local communities

Similar constraints on construction are described by Bird and Simon (2013) in their paper on bridge construction in the DR Congo. The design challenges and risk due to errors in construction are reviewed. The management of the project and sourcing materials provided particular challenges. A summary of costs provides a useful guide for others undertaking such projects. The use of experienced engineers allowed the use of scarce and variable local materials and local unskilled labour to successfully construct a range of small bridges which have provided a significant benefit for the local communities.

The maintenance of the local bridge stock poses particular problems for Fiji. Amir – Ansari (2013) provides details of the capability of the Public Works Department, the environmental and geological challenges and a summary of typical bridge types and construction. Construction details and design considerations of three locally significant bridges is given.

Reis *et al.* (2013) provide an interesting contrast of project scale and describe the design and construction of a large river crossing, which, whilst implying the use of a technologically advanced design and construction, still reflected the need to

make best and most appropriate use of locally available resources.

Palmer (2013) provides an overview of the physical, environmental and social challenges to be overcome in providing a complex major crossing in Vietnam. The author describes the issues of planning, finance, engineering design and construction, institutional development and transfer of technology during and after the project. The paper provides an example of what can be achieved at the more complex end of the sector.

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