

## **Bridge Owners' Forum (BOF)**

### **KEY ISSUES FOR RESEARCH**

*The following is a list of bridge owner's Key Issues for Research. The submission of research proposals relating to these issues is invited from the research community.*

*The order of the list follows the aspects listed in CHALLENGES 2007/8 given on the Bridge Owners' Forum website ([www.bridgeforum.org](http://www.bridgeforum.org)).*

*It is envisaged that for all the topics listed below there will be need for review of current knowledge/practice before any new research starts. Such review might form part of a Research Project Submission which identifies the scope of proposed new research or the review might be included as part of the Research Submission as a first stage of work.*

#### **Aspect (2) Inspection, testing and monitoring processes and techniques**

- 1 - Non intrusive inspection of multi strand parallel wire cables.**  
Currently the only reliable option for the inspection of multi strand parallel wire cables is by visual examination. This is a laborious, inexact, expensive and damaging operation. Electromagnetic inspection of cables up to around 300mm has been developed but its reliability is uncorroborated.
- 2 – Non intrusive monitoring of multi strand wire cables for breaks**  
Acoustic monitoring is the only option for continuous remote monitoring of cables for breaks. Although a relatively mature technology its availability is limited to the few companies that offer it. Alternative or open source options are needed.
- 3 – NDT technique to determine the quantity of deteriorated deck concrete below road surfacing**  
A NDT technique to enable survey over a road surface to map depth of deteriorated concrete underneath would be valuable.
- 4 – A reliable method for monitoring ground anchors**  
The condition of ground anchors and anchor loads are only indicated to a very limited extent by visual inspection. A means of determining more information about anchor condition would be valuable.
- 5 – A NDT technique for measuring the loss of cross-section of reinforcing bar in concrete**  
Loss of cross-section of steel bar in concrete is currently determined by removing the concrete cover. This technique can only be used over limited lengths of bar. A reliable non-destructive technique that measures losses along the lengths of bars and identifies the amount and variability of corrosion depths (including any pitting corrosion) is sought.

6 – **Improved bridge inspection methods using new technology to give greater consistency of results**

Methods that use new technologies to reduce the effects of inconsistencies in manual inspections.

7 – **Risk-based inspection frequencies**

Potentially, determination of inspection frequencies based on the risk of deterioration/damage would provide safety and economic benefits. A methodology for determining risk-based frequencies that can be applied to particular types or populations of bridges is needed.

8 – **Real time recording and indication of loading on fixed and moving bridges**

Economic techniques for real-time recording and load indication.

(4) **Assessment techniques**

9 – **A universal IT application that will give a quick assessment of bridge capacity to carry abnormal loads.**

Refinement of current assessment methods or development of new methods for different types of bridges to give a simple-to-operate IT application.

10 – **Reliable method for assessing concrete hinges**

Review and improvement of current techniques to identify most reliable method.

11 – **Actual loads induced in bridges due to seized bearings**

Strategy and technology for determining induced loads due to seized bearings of bridges prone to bearing seizure.

12 – **Permissible damage/movement in monitored brick structures especially tunnels**

Characterisation of damage/movement in brick-lined tunnels according to type and surrounding ground to identify permissible deterioration.

13 – **Real life assessment of asset values of bridges**

Real life assessment of asset values using the following definition of asset value: {The cost of replacing the structure today with a new one + the net present value of maintaining the new structure over the residual life of the structure being replaced} minus {the net present value of the cost of maintaining the existing structure for its residual life + the cost of its replacement at the expiry of its residual life}

14 – **Integral bridges: assessment of corner moments**

Examine the sensitivities of calculations based on the current BA42 of the Design Manual for Roads and Bridges.

- (5) **Safety, performance, durability and costs of materials and structural systems, including repairs**
- 15 – **Long-life road surfaces for bridges**  
Identification of the best long-life road surfacing solutions for bridges.
  - 16 – **Use of stainless steel rebar in vulnerable structural areas: cost benefit**  
Determination of vulnerable structural areas where the use of stainless steel rebar is value for money.
- (6) **Strategies for maintenance, repair and rehabilitation**
- 17 – **Optimum maintenance strategies for highway structures**  
Development of optimum maintenance for the different types of highway structures.
  - 18 - **Effective and safe herbicides for vegetation control in brick and concrete structures**  
Identification of herbicides for vegetation control in brick and concrete structures and their safe and effective use.
- (7) **Extending service life**
- 19 – **Suspension bridge cables – mitigation of wire corrosion by improved dehumidification or alternative technologies**  
Main suspension bridge cables may suffer from internal corrosion despite their complex outer protection and use of galvanized wire. Internal corrosion may reduce the load carrying capacity in an unacceptable time frame for the expected life of the bridge. Forced air dehumidification is the only technology currently available for mitigation of this corrosion and alternatives, or improvements in dehumidification technology could bring benefits.
- (8) **Methods of construction, repair and rehabilitation**
- 20 – **More rapid delivery of construction and maintenance projects, reducing traffic delays/ improving journey-time reliability**  
Development of techniques that speed up delivery of construction and maintenance projects and/or reduce traffic delays and improve journey-time reliability.
  - 21 – **Graffiti control/remediation on structures with emphasis on paint types and mechanical coating vehicles**  
Methods of reducing risks of graffiti occurring and techniques/coatings for remediation of the different paint types.

*Other topics for research are also listed in BOF CHALLENGES 2007/8.*