

BRIDGE OWNERS FORUM.

Minutes of meeting BOF11: Tuesday 27 January 2004 at Kings College, Cambridge.

PRESENT

Campbell Middleton. (Chairman)	U of Cambridge
Roger Evans	Humber Bridge Board.
Andrew Cook	HA Abnormal Loads Team
Edward Bunting	DfT
Ronnie Wilson	DoRD(NI)
Raymond Johnstone	Scottish Exec.
Graham Cole	CSS
John Collins	Welsh Assembly
Rod Howe	British Waterways
Brian Bell	Network Rail
Awtar Jandu	Highways Agency
Ian Leigh	BRB (Residuary) Ltd
Paul Fidler	U of Cambridge
John Darby. (Technical Secretary)	

APOLOGIES

Martin Basset	Serco Docklands Ltd.
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1. INTRODUCTION

The Chairman welcomed all present, and particularly Roger Evans from the Humber Bridge Board attending for the first time. Roger Evans was representing engineers responsible for major structures who held informal meetings to exchange information and expertise. It was felt that this representation would further enhance the coverage of the Bridge Owners Forum.

The previously circulated agenda was adopted, except for the omission of the presentation by Martin Bassett.

2. MINUTES OF MEETING BOF9: 10 JUNE 2003

The minutes were accepted.

3. INFORMAL DISCUSSION GROUP ON MAJOR STRUCTURES: PRESENTATION BY ROGER EVANS

The discussion group included representatives of the 1st and 2nd Severn crossings, Humber bridge, Forth Bridge, Tamar Bridge, Tay Bridge, and QE2 bridge. Subjects of common interest were discussed, including: -

- Tolls
- Abnormal load movements.
- Load Assessment. (The structures were designed to BS 153)

- Inspection and monitoring.
- Corrosion protection. (The Humber bridge has 20 acres of paint)
- Surfacing.
- Steelwork and concrete.

Special research commissioned for the Humber included computer modelling, monitoring, and hanger oscillation. Commissioned research was too numerous to itemise.

The group was considered to be effective, with the informality encouraging a free exchange of information. Although Roger Evans was retiring in March, he was happy to convey contact details to others on the group.

Cambell Middleton asked if the commissioned research could be accessed, as this was of primary interest to the BOF. Roger Evans responded that most of the data was held by consultants and kept internal, but he was willing to share a list of papers presented with published information. Cambell Middleton welcomed this to include on the proposed BOF database of research.

Cambell Middleton asked what were the key areas of outstanding problems. Roger Evans responded that surfacing and corrosion protection were ongoing problems with wide application. Cables were also a key area, and always failed at the anchorage, although this was a more specialised subject. John Collins agreed that cable technology was particularly complex, and there were examples of use elsewhere on the network. Cambell Middleton emphasised the value of co-operation in such areas, particularly as the large bridge owners were best placed to fund research on such specialised subjects.

Roger Evans indicated that the USA were researching the residual strength of cables by unwrapping and wedging, with a growing use of acoustic monitoring. Loads in cables can also be determined by accelerometer data from the frequency. GPS was used to measure 60 cm deflection to a 1 cm accuracy, and could then be used to measure the natural frequency. Brunel and Nottingham Universities were involved in the research. Roger Evans said that when work commenced static displacements were the objective, but dynamic information gained had been a bonus. Similar work in Scotland was reported by Raymond Johnstone. Brian Bell observed that GPS monitoring was not widely reported at Engineering conferences, but further information will be reported in Nottingham at a geography based conference, ref Gethin Roberts.

Awtar Jandu asked for details of the paint system used. Roger Evans replied that epoxy ester with chlorinated rubber topcoat was still able to be sourced, and would continue to be used until the coat thickness became excessive.

4 JOINT BRIDGE RESEARCHERS & OWNERS FORUM: 27/28 OCTOBER 2004

The Chairman referred to the joint Bridge Researchers and Owners Forum meeting held on 27/28 October 2004, the minutes of which had been circulated together with a summary of the main issues arising.

EPSRC had invited representatives to attend a meeting to discuss means by which bridge research could obtain a higher profile. Edmund Bunting and Graham Cole were to attend. Brian Bell encouraged members of the BOF to encourage their colleagues to nominate bridge engineers to become members of the EPSRC college, as this was the means of increasing influence and members must be nominated by more than one person. The next college was likely to be formed in 2005.

Edmund Bunting offered to speak to Dti to see what can be done to improve the situation for engineering.

Brian Bell pointed out that only universities can apply for EPSRC funding, so the best means of progressing a bridge project through EPSRC was to approach a university.

5 BRIDGES BOARD.

Edmund Bunting reported on the last meeting held by the Bridges Board on 3rd October 2003. The next meeting will be held on 4 February 2004.

The Bridges Board meeting heard a report from SCOSS, which was concerned to advertise its existence more widely. This generated a discussion on the benefits of SCOSS also presenting to the BOF, but this was rejected on the basis that there was a broad overlap of membership.

The Bridges Board meeting approved the award of the contract to develop a code of practice for maintenance management of bridges and other highway structures to a consortium led by WS Atkins, and also including TRL and Kent County Council.

The objective is to produce a code of practice written in plain English. The project was started 2 years ago by the IHT maintenance code of practice for highways aimed at best value. Now being updated is a code of practice on lighting. Bridges and structures are the missing link. Although the project is aimed at Highway Authorities, it will be relevant to other bridge owners. The document will be aimed at core systems and standards, but perhaps not the software, which is considered more relevant for a commercial body. The UK PMS is a well established Pavement Management System, but others have written the software. Advice will be gathered during the project to determine if that is the way to go for bridges. A WS Atkins press release describing the project award was circulated.

Campbell Middleton asked how a framework for minimum standards was tied in with the HA SMIS. The Bridges Board has asked for a quarterly project update, and Edmund Bunting offered to provide this information to the forum. This information will be put onto the web.

6 MASONRY ARCH GUIDE

Brian Bell reported on the CIRIA project to produce a Masonry Arch Guide. CIRIA received 10 expressions of interest before reducing to 4 who made presentations. The contract was awarded to a consortium of Motts and Salford University (Clive Melbourne). Details will be put on the BOF website.

Invitations have been sent out for attendance at a consultation workshop to be held on 6 February. The contract will last for 12 months. There was likely to be some debate over whether or not CIRIA should be entitled to charge for publication of the final report, given the fact that the work had been funded by public bodies.

Raymond Johnstone asked if there would be opportunity to comment on the final report, and suggested that input from the Lime Mortar Trust would be very valuable. They were prepared to give useful advice at nominal cost. Cambell Middleton responded that he would ask Motts to ensure that invitations to comment were extended to all members of the Forum.

Cambell Middleton questioned the format of the final document, and referred to the benefit of a loose leaf that could be updated rather than the standard CIRIA format.

7 OLDER METAL BRIDGES AND DRY STONE WALLS.

Graham Cole and Edward Bunting reported on progress with BOF research projects on older metal bridges and dry stone walls.

These projects were put forward by the Bridge Owners Forum in June 2003, and endorsed by the Bridges Board in September 2003, and hence up to the Roads Liaison Group. They have now been combined with a larger programme including lighting and roads put to the Minister. The outcome is anticipated in 4-6 weeks time. Projects have received a ranking of High, Medium, or Low. Both bridge projects have a 'high' ranking.

If approved, a full specification will be required before the tender process. It is hoped that the work will start soon after April. CIRIA have prepared draft research project specification for the metallic bridges project, which was distributed at the meeting. For the dry stone walls project, it will need to be considered whether appointment of TRL would be appropriate given their experience with the topic.

8 SELF ESCORTING OF ABNORMAL LOADS AND ABNORMAL VEHICLES

Andrew Cook reported on the self escorting of abnormal loads and abnormal vehicles, and distributed the proposed code of practice and consultation documents.

It was explained that the police had been undertaking escorting duties, but wished to withdraw from that activity. Although the documents were entitled consultation, the new arrangements described should be expected to take effect from April 2004.

The Code of Practice covers vehicle requirements, person specification, and operating practices. The overseeing organisation is ACPO the Association of Chief Police Officers. Self escorting cuts in for 4.1m wide or 100t. loads on non-motorway routes, and 4.6m or 130t. on motorway routes. In Scotland there is expected to be less self escorting.

Roger Evans raised the problem of mismatch between declared and actual weights. Andrew Cook agreed this was a problem, and supported this by evidence of a scarcity of declared weights just below critical levels. I.e. 100 – 120 tonnes, and 150-170 tonnes. He suggested random weight testing as the most effective solution, but difficult for the largest vehicles.

A contract is to be let within the next week to progress ESD, Electronic Service Delivery of Abnormal Loads. The tender process has reduced 15 companies to 2, from which one will be chosen. The contract will be overseen by a project board which includes HA and CSS representatives. There are at present no representatives of private bridge owners, and Andrew Cook invited owners such as BWB or Network Rail to consider representation.

9 HIGHWAYS AGENCY RESEARCH UPDATE.

Awtar Jandu presented information on the Highways Agency research programme, speaking as Team Leader in the Structures Design and Management Team. Andrew Jones will be returning to this post in February 2000.

Awtar Jandu's presentation included coverage of the following topics: -

- Research during 2003/4
- New procedures for research proposals
- Value Management Workshops.
- Research proposals for 2004/5 and beyond.

2003/4 Projects:

- Element and system risk consideration in Bridge Management.
- Probability of effective maintenance measures.
- Hinge desk study.
- Dynamic / energy of FRP strengthening of bridge supports.
- Cost 345: procedures for assessment of highway structures.
- Evaluation of new generation paints.
- KPI's for Bridge Maintenance Activities
- Typical use of recycled aggregates for structures concrete.
- Crevice corrosion investigation.
- Footbridge dynamic response properties.

- WIM systems and braking forces for abnormal loads.
- Specialist civil engineering advice on special structures.
- Investigation of orthotropic bridge decks.
- Near surface mounted FRP for bridge strengthening.
- Tunnel emergencies: emergency evacuation.
- Implications of draft EU legislation and road tunnel safety.
- Study of separation of cyclists and pedestrians.
- Human tolerance to vibration on footbridges.
- Use of Mechanical ventilation in tunnel emergencies.
- Inspection of small span cable stayed and suspension bridges.
- Effectiveness of washing bridges.

The chairman requested that reports be made available for placement on the BOF website. Andrew Cook noted that the CORDIS website gives details of European collaboration on research. The chairman will take forward ways of communicating between universities and organisations assembling research needs, given the fact that most of the HA work was placed via contracts with four framework contractors.

Procedures for Research Proposals and Research Value Management Workshops:

Awtar Jandu outlined the development of the R&D programme, commencing with new proposals received in October 2003. Bids were collated and evaluated, prioritised, and reduced to a draft programme put to the HA board in January 2004.

A value management process had been adopted. This was more open, tried and tested, with criteria linked to business and operational needs.

There were four 'Essential Criteria' which were assessed to be YES or NO :-

- Clearly identifiable benefits
- Likelihood of implementation.
- Value for money.
- Business Objectives.

There were then 10 'Desirable Criteria' which received a weighting score of 0 to 10.

60 to 70 proposals for 2004/5 were assessed in this way. Awtar Jandu indicated the likely research projects for 2004/5 arising from this process. Brian Bell noted a degree of overlap between a number of these projects and work in hand elsewhere.

Awtar Jandu illustrated the trend in subject matter of research projects over the years 2002/3 to 2003/4. It was noted that there had been a steady increase in subjects related to Congestion, sustainability and safety, matched by a reduction in projects related to asset use.

Awtar Jandu agreed that a list of projects would be supplied for display on the BOF website.

10 BRIDGE RESEARCH PROJECTS FUNDED UNDER THE EU FRAMEWORK AND NETWORK RAIL.

Brian Bell reported that the most significant research projects related to shear strength of girders and in particular rivet strength by Cass Hayward. This had shown that for rivets γ_m could be reduced from 1.33 to 1.2 under certain conditions. Network Rail were using this conclusion now on railway bridges. The report containing these findings is large, but Brian Bell will try to produce a version suitable for general use. There was general agreement to the comment from Graham Cole that difficulties could arise if conclusions were applied out of context, and the chairman formally asked for a copy of the full report to be made available.

Network Rail had recently completed a project employing laser vibrometry, using a firm Meekon of Cambridge. Results were rather disappointing.

The final report from Bristol is available entitled 'Temperature effects of RRP/Steel. This illustrates potential shear problems.

A Faber Maunsell CIRIA project on prestressed beams/prestressing shear reinforcement is looking at FRP reinforcement.

A PhD project is looking at fatigue in early steel riveted bridges.

Southampton are researching FRP on Wrought Iron, with tests now on a second bridge to check consistency.

DTI funded project TSET with South Bank and partners is looking at polymer paint on bridges.

FRP as a structural material is covered in an IABSE publication which has just become available.

Network Rail is interested in research on Bridge Strikes – CIRIA have two such projects.

SMART network has a meeting on arches 27 February at I Struct. E.

TR55 is due to be published later this year.

Sustainable Bridges – the 6th framework enables research to increase traffic by 30%, and covers analysis, assessment, instrumentation, testing, and novel repair techniques. Brian Bell is on the Management group. Skanska are lead partners with 30 organisations. This is a 4 year project costing 10m euros.

The Chairman asked for details of future meetings so that details could be inserted in the BOF website.

11 MANAGEMENT OF, AND FUNDING FOR RESEARCH PROPOSALS FROM CONSULTANTS AND RESEARCH ORGANISATIONS.

The chairman explained that the Bridge Owners Forum has publicised that it is open to offers of research which it may consider and subsequently put forward to the Bridges Board for approval. There then followed a general discussion on the IPR and financial constraints when such projects were considered. For example, what constraints applied due to EU financial limits requiring OJ advertising.

Edward Bunting responded that there was an exclusion from advertising if the project was not for the exclusive use of the proposers, which would seem to apply to most projects put before the forum.

Brian Bell would be reluctant to fund projects if the IPR was owned by a consultant. The PI Partners in Innovation is an alternative route to the BOF by which the proposers of projects could seek funding. It was also open to organisations to joint together with other parties before seeking funding, such as combining with a university. Only universities can apply for EPSRC funding.

It was agreed that there were a number of routes forward to seek funding for research, and the Chairman was satisfied that he would be able to provide a suitable response when approached by Universities seeking support.

12 RESEARCH UPDATE. – OTHER RESEARCH PROJECTS.

Edward Bunting reported on other research projects including current projects on Bridge Management Systems, Condition Indices and Performance Indicators..

The existing project undertaken by WSA to develop Performance Indicators had been expanded to include Highways Agency and local authority works. The indices were based upon condition. The system can be used on various differing systems of data capture in use. Indices based upon availability and reliability are to be added, and data recorded on SMIS.

John Collins commented that maintenance backlog is difficult to measure. WSA have commissions to assess asset value, Bridge management framework and KPI's. They are key to development, but he is not sure what will result. The results will be applied to four structures. The system under development is applicable to any asset, and is able to talk to other systems.

Awtar Jandu commented that deterioration models will be built into SMIS in 3 to 4 years time.

13 PROPOSAL FOR AN INTERNATIONAL BRIDGE OWNERS FORUM

The Chairman introduced an earlier suggestion that it would be beneficial for major issues to be discussed at a future forum meeting attended by representatives of relevant European bridge owners. There would need to be debate about the availability or need for funding of travel costs. Comments on the proposal were invited.

Brian Bell warned of a potential disparity between stocks of structures and their problems, so one should be careful to ensure that representatives had similar problems. It was generally agreed that the Republic of Ireland was similar, and would be relevant as a permanent member even though some systems differ. Brian Bell noted that the European sustainable bridge project involved a trawl of European R&D projects.

The Chairman offered to investigate the options for further international involvement.

14 PRIORITIES FOR NEXT BOF PROJECT.

The Chairman was pleased to note that previous projects put forward by the Forum had been supported, and requested members to prepare proposals for consideration at the next meeting in June in readiness for October submission. Preliminary submission should be in the half page format.

15 INSPECTION AND TESTING

The Chairman led a discussion on current practice in respect of Inspection and Testing, and questioned in particular whether it was appropriate to undertake routine covermeter and half cell testing. It appears that qualifications of site staff were variable, and much of the information collected was of little use. Was the current inspection regime appropriate? Should reports be audited?

Ronnie Wilson responded that Northern Ireland followed BA35, except that Principal Inspections were at a 10 year interval on non-principal routes.

Raymond Johnstone reported that Scotland has a separate manual dictating the qualifications required of an inspector, and a prescriptive form of report that includes an estimate of works required.

Ian Leigh reported that BRB inspected every 6 years, with reports signed off by a chartered engineer. The report made recommendations, but also referred to earlier reports. 5% of reports were audited by a different engineer within the client organisation.

Brain Bell reported that Network Rail have an audit system. This was essential if an organisation was to be able to defend itself in the event of failure.

Awtar Jandu reported that HA are developing training schemes, such as for Paint Inspectors.

Graham Cole noted that it was inevitable that resources would dictate variable levels of inspection within Counties. It was evident that payment systems varied, from time reimbursement to a lump sum for management.

John Collins commented on recent research which had shown a very large increase in structural capacity of new structures for a small increase in cost. This stimulated much interest, including the possibility of commissioning structures on a different basis.

Awtar Jandu reported on a project entitled "Technical audit of the application of BA79 - The management of sub-standard highway structures". This looked at the % of structures failing assessment. This project originated at the Bridge Owners Forum, and is likely to result in a redraft of BA79. The report will be passed to contributors for comment. The chairman requested a copy of the report and invited feedback. It was agreed that Awtar Jandu would give a presentation on the subject at the next meeting.

16 OTHER BUSINESS, CONFERENCES, EVENTS.

The Chairman reported that the BOF website now contains a searchable database of all the HA research reports. This was a great step forward, and the HA were thanked for their work in collecting together the information.

The Chairman will be giving a presentation on the UK situation at the Austrodes Bridge Conference in Hobart on 17-19 May. This was based on the work of the Bridge Owners Forum, and was approved by the meeting.

Other meetings, conferences, and papers supporting the content of the present meeting will be posted on the Bridge Owners Forum Website.

17 NEXT MEETING.

The next meeting of the Bridge Owners Forum will be either the 8th or 15th June 2004, and details will be circulated when confirmed. The main objective of that meeting will be to review priorities.

18 CLOSE.

The Chairman thanked all present for attending the meeting.

John Darby. 31 January 2004.