

BRIDGE OWNERS FORUM

MINUTES OF MEETING BOF 51: TUESDAY 17 JANUARY 2017 AT THE SALTMARSH ROOMS, KING'S COLLEGE, CAMBRIDGE

PRESENT

Nick Burgess	London Underground
Graham Cole	ADEPT (Acting Technical Secretary)
Rob Dean	Network Rail (Acting Chairman)
Keith Harwood	ADEPT
Nicola Head	Transport for London
Wayne Hindshaw	Transport Scotland
John McRobert	Transport Northern Ireland
Jacqueline Mynott	CSS Wales
Paul Thomas	Railway Paths Ltd.
Elfyn Williams	Welsh Government
Paul Fidler	CUED
Stephen Pottle	WSP Parsons Brinckerhof (part)

Introduction

The Acting Chairman welcomed everyone to BOF 51 but especially Elfyn Williams who was deputising for Jason Hibbert, Welsh Government. The Acting Chairman explained that Cam Middleton was receiving hospital treatment. Members wished Cam a speedy recovery. It was believed that this was only the second time in the history of BOF that the meeting had not been chaired by Cam. Richard Fish was on leave and Graham Cole would be the Acting Technical Secretary.

1. Apologies

Apologies had been received from the following:

Cam Middleton	CUED
Richard Fish	Technical Secretary
Henry Dempsey	SCOTS
Tomas Garcia	HS2
Paul Monaghan	LoBEG
Neil Loudon	Highways England
Jason Hibbert	Welsh Government
David List	Large Span Bridge Group
Andy Featherby	Canal & River Trust

2. Previous Minutes

a. BOF 49: 17th May 2016

Item 10c ii, page 11: replace “*Lamerton*” with “*Lamington*”.

With this correction it was agreed that the minutes could be uploaded to the BOF website.

ACTION 30: Paul Fidler

b. BOF 50: 1st November 2016

There were no corrections and it was agreed that the minutes could be uploaded to the BOF website

ACTION 31: Paul Fidler

3. Actions from BOF 49 and BOF 50

a. BOF 49: 17th May 2016

References in the text below refer to the numbered actions on the BOF 49 Action Sheet. Boxed reference numbers below relate to the BOF 51 Actions.

NB Although BOF 49 Actions were discussed at different times during the meeting, they are all recorded as one item as part of the minutes.

Action 1, Temporary Bridge AIP Guidance:

Not taken – action deferred to BOF 52

ACTION 1: Neil Loudon

Action 3, Hidden Defects in Bridges: Transport Scotland:

Wayne Hindshaw briefly described Transport Scotland’s review and guidance document. The various documents did not appear to have been passed to Paul Fidler following BOF 49. Wayne Hindshaw to send revised documents to Paul Fidler for upload on the BOF website.

ACTION 2: Wayne Hindshaw

Actions 4, Leadenhall Buiding Bolts:

Not taken – action deferred to BOF 52.

ACTION 3: Paul Monaghan

Action 5, Parapet Research and Testing

Wayne Hindshaw referred to some previous work carried out on the use of vehicle restraint systems in situations other than those prescribed in the Standards. Unfortunately, he did not think that the output was very helpful and it was not worth uploading onto the BOF website. There did appear to be a problem with the risk adverse attitude of some consultants. Wayne Hindshaw referred to some guidance produced by SCOTS and he offered to send to Paul Fidler for upload on the BOF website.

ACTION 4: Wayne Hindshaw

Action 7, Review of Bridge Inspections:

Not taken – action deferred to BOF 52.

ACTION 5: Neil Loudon

Action 8, Unit Costs:

Rob Dean explained that he would be unable to share actual unit cost information. However, he would send the unit cost methodology to Paul Fidler for upload on the BOF website.

ACTION 6: Rob Dean

Action 9, Unit Costs

Wayne Hindshaw reported that he had researched the program called BRIDGIT that had been produced by Babbie in the 1990s. He reported that the program was no longer available and that Transport Scotland now kept its own record of unit rates.

Action 10, Unit Costs

Not taken – action deferred to BOF 52.

ACTION 7: Neil Loudon

Action 11, CIRIA Flood Impact Research:

Not taken – action deferred to BOF 52.

ACTION 8: Neil Loudon/Wayne Hindshaw

Action 12, M4 Diversion:

Not taken – action deferred to BOF 52.

ACTION 9: Chairman/Jason Hibbert

Action 13, CSIC and UKRIC:

Not taken – action deferred to BOF 52.

ACTION 10: Chairman

Action 14, CUED Report on Structural Health Monitoring

Paul Fidler had issued the pdf for comment. TTL had now published their guides and copies had been made available at BOF 50.

Action 15, Scour Detection Projects

There was a comprehensive discussion on various aspects of scour detection and bridge failures that had been carried over from previous meetings that were covered by actions 15 to 17.

John McRobert had previously reported on a technique based on acoustic monitoring. John McRobert to resend his report to Paul Fidler for upload onto the BOF website.

ACTION 11: John McRobert

Wayne Hindshaw referred to a project on embedded scour detection sensors being led by Strathclyde University in the Borders Region of Scotland. Wayne Hindshaw to provide further details.

ACTION 12: Wayne Hindshaw

Action 16, C&RT Underwater Survey

Not taken – action deferred to BOF 52.

ACTION 13: Andy Featherby

Action 17, Scour Research

The Chairman had previously stated that he was still considering options for how BOF should review scour research. The work that was progressing at Exeter and Southampton Universities should be reported. It was agreed that, as a first step Rob Dean should arrange for Steve Roffe, Network Rail, to attend BOF 53.

ACTION 14: Rob Dean

Members noted with concern that there did not appear to have been any published feedback on the river bridge collapses that had occurred at Pooley Bridge, Tadcaster, Eastham (Worcestershire) and elsewhere. Railway bridge incidents are investigated and reported upon by RAIB along with other accidents within the railway sector. This type of independent review and reporting does not occur within the highway sector although there were almost certainly many lessons that could be learned. This concern also applied to concrete structures such as the M20 footbridge which collapsed following an impact from a vehicle. It should be remembered that highway structures carried important services as well as road vehicles. Rob Dean and Richard Fish to recommend to UKBB that independent review of bridge failures, including scour, is carried out in a similar way to RAIB.

ACTION 15: Rob Dean / Richard Fish

Graham Cole to seek ADEPT views on recommendation to UKBB that independent review of bridge failures, including scour, is carried out in a way similar to RAIB.

ACTION 16: Graham Cole

Rob Dean to provide further details of Network Rail report on failure of spandrel wall on an overbridge at Barrow on Soar at BOF 53.

ACTION 17: Rob Dean

Neil Loudon to update on M20 footbridge collapse at BOF 52.

ACTION 18: Neil Loudon

The Chairman will consider a possible half-day BOF on scour. It was agreed to defer a decision until after BOF 53.

ACTION 19: Chairman

Action 20, Ultra High Performance Reinforced Concrete Bridges

Not taken – action deferred to BOF 52.

ACTION 20: Chairman

Action 21, BOF Fact Sheet

Not taken – action deferred to BOF 52.

ACTION 21: Richard Fish

Action 24, Feedback from Bridges Board and UKRLG

Not taken – action deferred to BOF 52.

ACTION 22: Richard Fish

Action 25, Bridge Inspector Certification Scheme

There was now a link to the LANTRA website on the BOF website

Action 26, CIRIA: Hidden Defects in Critical Bridge Components

Not taken – action deferred to BOF 52.

ACTION 23: Neil Loudon

Action 28, TfL Research Update

Nicola Head to arrange for presentation given by Stephen Pottle at BOF 49 to be sent to Paul Fidler for upload to the members’ area of the BOF website.

ACTION 24: Nicola Head

Action 29, Abnormal Loads Liaison Group

Not taken – action deferred to BOF 52.

ACTION 25: Rob Dean / Chairman

Action 31, Lamington Viaduct Scour

Rob Dean had previously offered to give an update at BOF 50. Now proposed for BOF 53 (see action 14). Rob Dean to arrange for Steve Roffe, Network Rail, to attend BOF 53.

ACTION 26: Rob Dean / Chairman

Action 32, Bridge Strikes

Rob Dean offered to see if minutes from the Bridge Strike Prevention Group could be sent to Paul Fidler for upload to the BOF website.

ACTION 27: Rob Dean

Action 33, Network Rail Research Updates

Not taken – action deferred to BOF 52.

ACTION 28: Rob Dean / Paul Fidler

Action 36, Themed BOF on Bridge Failures

Discussion under actions 15 to 17 is relevant to this item. Chairman to consider in conjunction with SCOSS. This also has potential to link to one of the Grand Challenges key objectives. Detailed discussion deferred to BOF 52.

ACTION 29: Chairman

All unrecorded actions from BOF 49 had either been completed or were discussed as part of the BOF 51 agenda.

b. BOF 50: 1st November 2016

References in the text below refer to the numbered actions on the BOF 50 Action Sheet. Boxed reference numbers below relate to the BOF 51 Actions.

Action 2, Grand Challenges

Output from the BOF 50 workshops had been collated and actioned.

All unrecorded actions from BOF 50 had either been completed or were discussed as part of the BOF 51 agenda.

4. Membership & Subscription Update

Stephen Pottle, formerly of Transport for London, had now joined WSP Parsons Brinckerhof and his position at BOF had been taken by Nicola Head. The Chairman had previously suggested that Stephen should attend the BOF sessions whilst the Grand Challenges were being developed. This proposal was adopted by the meeting.

Graham Cole noted that he had been advised by the Chairman that subscriptions could be held at the 2016/17 rate. He advised that the Chairman would shortly be sending out invoices for 2017/18 subscriptions. It was noted that there might be an issue with members who now had an irregular attendance.

ACTION 32: Chairman

Members requested that the BOF accounts be distributed. The Chairman was asked to provide a summary of the accounts for review at BOF 52.

ACTION 33: Chairman

5. Technical presentation: Sustrans & RPL re-opening of viaducts

Rob Dean introduced an illustrated presentation by Paul Thomas on the re-opening to cycle traffic of formerly disused railway viaducts.

Paul explained that Sustrans were the public facing side of cycling developments whereas Railway Paths Ltd (RPL) was the infrastructure owner. RPL are a charity and not a statutory body and have to obtain planning permission for any developments involving existing viaducts. It was noted that RPL are forbidden to carry out any works that would prejudice any future reopening of the railway line.

Paul explained that RPL were responsible for 67 railway viaducts of which 27 were classified as listed buildings. It was pleasing to note that 52 of these viaducts had now been re-opened for public use.

A key part of restoration works was the provision of a tarmac surfacing that gave a smooth surface and was also a good defence against water penetration into the structure. This approach was assisted by the installation of easily maintainable drainage. Other issues included the provision of a parapet restraint system that was fit for purpose.

Paul highlighted the restorations of Torksey Viaduct, which had been designed by John Fowler, and the Lumb Viaduct where an innovative scaffold access system had been used. Both of these projects had benefited from significant funding from the Railway Heritage Trust.

Paul Thomas was to provide Paul Fidler with a copy of his presentation for upload to the BOF website.

ACTION 34: Paul Thomas

6. Technical presentation: Masonry Arch Bridge Assessment

Graham Cole introduced a presentation by Professor Matthew Gilbert of the University of Sheffield about the assessment of masonry arch bridges. Graham explained that BOF had previously discussed this topic in detail as long ago as 2009. A report entitled 'Review of Assessment Methods for Masonry Arch Bridges' had subsequently been prepared for CSS Bridges Group by the Universities of Sheffield and Salford which had been uploaded on the BOF website. A significant amount of research work had been carried out in recent years and it was appropriate to consider how this could be disseminated.

Professor Gilbert noted that he would discuss the research work that had been carried out at the Universities of Sheffield and Salford between 2011 and 2015 with the support of a significant grant from EPSRC.

He explained that the Highways England Standard BD21 did not take into account recent research and developments. The Standard used an approach where ULS/SLS were combined in a single analysis. This resulted in situations where assessment results could be under or over conservative depending on the parameters.

The EPSRC research project consisted of tests on small-scale model bridges, large-scale model bridges, numerical modelling and the development of assessment guidance. The use of cyclic loading on backfilled arches was a significant development. Similarly, the use of PIV cameras photographing displacements that were then used to calibrate numerical modelling was innovative. The basic principle adopted was to fully understand two-dimensional behaviour before considering issues created by the three-dimensional behaviour of masonry arches.

The large-scale model bridges were constructed at Salford University with two ring arches using headers to avoid complications with ring separation. It was observed that bricks started to fall from the arch barrel at about half ULS under cyclic loading.

Professor Gilbert noted that it could be considered that there were four levels of numerical modelling: ‘crude’, ‘simplified’, ‘mid-range’ and ‘complex’. A ‘simplified’ analysis involved modelling the arch plus the effects of soil. A ‘mid-range’ analysis involved the use of discontinuity layout optimization which benefited from the use of a ‘physics engine’ model as used in smartphone games.

The results of the research indicated that below a certain level repeated cyclic loads could seemingly be applied with no limit. However, higher levels of repeated loads would cause damage. The trigger point appeared to be where horizontal soil pressures were needed to be mobilised to restrain the barrel.

Matthew Gilbert and Colin Smith were now drafting the assessment guidance. The topics would include ‘fundamental arch behaviour’, ‘critique of multi-level assessments’ and ‘observational and analysis based assessment’. Matthew warned that the current use of a multi-level assessment approach might give erroneous results as MEXE was not necessarily conservative.

Matthew promoted a move away from the single factor of safety approach used by BD21 to the use of partial safety factors similar to the Eurocode approach. This should be linked to the adoption of a Permissible Limit State (PLS). It was likely that a PLS analysis would use degraded mechanical properties and ignore the passive constraint provided by the backfill material. This was similar to the approach originally promulgated by Heyman.

Professor Gilbert explained that there would be benefits in carrying out further research on the ‘self-healing’ behaviour of arches, the better understanding of three-dimensional behaviour and more robust multi-level methods.

All members to advise Richard Fish and Graham Cole of their interest in joining a steering group to review the University of Sheffield/Salford masonry arch assessment guidance document

ACTION 35: ALL

All members to consider appropriate ways of publishing the masonry arch assessment guidance document.

ACTION 36: ALL

Paul Fidler to upload Professor Gilbert’s presentation on to the BOF website.

ACTION 37: Paul Fidler

7. BOF Grand Challenges

Stephen Pottle, WSP Parsons Brinckerhof, joined the meeting to discuss this and subsequent items.

Stephen Pottle thanked everyone for their hard work at the previous meeting when the 14 themes that support the Grand Challenges were developed. The output from the workshop held at BOF50 had been circulated to members. Since then eight of the themes had been worked up in more detail by various members.

Keith Harwood had suggested that the 14 themes required a more focused introduction that was befitting of the use of the word 'Grand'. A lively discussion ensued and it was provisionally agreed that the three Grand Challenges should be to:

- Prevent bridge failures
- Extend the life of existing structures
- Build bridges that will perform better

BOF would aim to achieve these objectives by setting out ways to:

- Embrace innovation and embed technology
- Secure a competent, diverse workforce
- Share knowledge and best practice

BOF would seek to ensure that the following cross-cutting themes were included in the overall strategy:

- Value
- Safety
- Funding
- Growth
- Sustainability

Stephen Pottle would align the 14 themes developed at BOF 50 with the three new aims and three new objectives.

ACTION 38: Stephen Pottle

It was agreed that it would be necessary to prioritise the themes and action steps on a short to medium term basis but it would be necessary to complete the drafting of the themes as a first step. It would be important to include enough steps to be able to achieve the aspirational goal.

All members were to review their allocated themes and complete any that were not finished and send to Stephen Pottle / Richard Fish by 10 February.

ACTION 39: All

It was agreed that feedback on the draft themes should be encouraged to help share knowledge and best practice. However, it was recognised that it would be impractical for members to review all of the themes in the time available. Stephen Pottle to allocate two additional themes to each member to review and feedback by 3 March.

ACTION 40: Stephen Pottle / All

8. BOF 52 (15 March 2017)

Stephen Pottle explained that the organisers of the Surveyor bridges conference had invited BOF to hold an additional meeting on the day before the conference which was being held at Coventry on 16 March. The reporting of the debate would provide good publicity for BOF and its objectives. The Chairman had also been invited to speak at the conference itself.

Stephen Pottle would contact the Chairman to update him on the developments with the Grand Challenges. Stephen to discuss the contents of Bridges 2017 presentation with the Chairman.

ACTION 41: Stephen Pottle

The format of BOF 52 was discussed. It was considered that a session which included input from various guests could be highly productive as long as the Grand Challenges could be sufficiently developed in time. Guests could be drawn from speakers at the conference who could comparatively easily arrange to be in Coventry on the afternoon of 15 March. It was suggested that Dana Skelley, Chair of the UK Bridges Board, be invited to attend. Stephen Pottle to discuss format of BOF 52 with the Chairman including invitations to guest attendees.

ACTION 42: Stephen Pottle

Graham Cole explained that he had been asked to advise the conference organisers how many people would be attending BOF 52 so that an appropriate sized room could be arranged. Richard Fish had previously suggested that 15 to 18 people might attend. The attendance at BOF 51 was smaller than normal and only eight members indicated that they would attend although this number was likely to be boosted by absentees and invited guests. The reduced rate conference offer had not been widely circulated. Graham Cole to arrange for Anne Debenham to send details of Bridges 2017 special rates and other aspects of BOF 52 to members asking them to confirm their attendance as soon as possible.

ACTION 43: Graham Cole / ALL

9. BOF Initiated Research Projects - Update

9a. Bridge Inspector Certification Scheme

Rob Dean reported that some 260 applications had been received by LANTRA to date. Graham Cole noted that the Highways England Standard BD63 was being revised and the current draft included a strong indication that BICS would be required.

Rob Dean reported that the Network Rail trial of BICS implementation was about to commence.

Wayne Hindshaw thought that it would take longer than the eighteen months proposed by Highways England in IAN 192 for there to be sufficient certified bridge inspectors.

Jacqueline Mynott noted that CSS Wales / SCOTS had commissioned a project to produce a two day training course that focused on defect identification and that would conclude with a test. This could provide valuable knowledge but it was noted that LANTRA did not recognise or accredit individual training schemes. Graham Cole to contact LANTRA to ask them to enhance the message that BICS was not a training scheme.

ACTION 44: Graham Cole

Members also felt that it would be helpful if LANTRA could produce sample portfolios.

9b. Safety Critical Fixings

Neil Loudon was not able to attend the meeting. The item was deferred until BOF 52.

9c. Deterioration Modelling

Keith Harwood reported that the project had been given equal top priority status at the UK Bridges Board in October 2016. However, no indication of likely funding had been received from the UK Roads Liaison Group. Keith had contacted Justin Ward, UKBB Secretariat, before the meeting and had been informed that DfT had a strong willingness to move forward but were checking budgets to see if the project could be completed this financial year. Members recognised that this would leave insufficient time to even secure the services of a contractor. Financial contributions from other parties might not be available if the project were to run into the next financial year. Richard Fish to raise delayed announcement of research funding at next meeting of UKBB.

ACTION 45: Richard Fish

9d. Hidden Defects in Critical Bridge Components (CIRIA)

Neil Loudon was not able to attend the meeting so a full update was unavailable. However, Wayne Hindshaw noted that a further internal meeting at CIRIA was planned before the report could be published. A conference had been organised by BD&E magazine in November 2016 which effectively launched the report although it was unusual that the publication was not actually available at the time of the event.

10. Other Bridge Research Update

10a. Highways England

Neil Loudon was not able to attend the meeting. The item was deferred until BOF 52.

10b. TfL

Nicola Head noted that TfL were doing some work on mapping ground movements and would be able to report back at a future meeting.

10c. Network Rail

Rob Dean briefly reported on work being carried out with CSIC particularly the monitoring of masonry vaults using virtual reality techniques. He hoped to be able to update on this work, including that being carried out by Mott Macdonald on structures evaluation, at BOF 53. Rob Dean would ask the Chairman to arrange to circulate a paper prepared by CSIC on the monitoring of Norton Bridge for Network Rail.

ACTION 46: Rob Dean/Chairman

10d. LUL

Nick Burgess had nothing to report.

10e. Transport Scotland

Wayne Hindshaw reported that Transport Scotland was working on the following topics:

- to re-establish the high load grid in the country.
- use of LIDAR surveys as an educational tool
- development of structural health monitoring at the Queensferry crossing
- integrated risk approach with TRL
- overweight HGV strategy with Traffic Scotland and Police Scotland

10f. HS2

Tomas Garcia was unable to attend the meeting. The item was deferred until BOF 52.

10g. Other

i. ADEPT

Graham Cole reported that the project to provide additional guidance on parapets on local roads had been given equal top priority status at the UK Bridges Board in October 2016. However, no indication of likely funding had been received from the UK Roads Liaison Group. Graham had contacted Justin Ward, UKBB Secretariat, before the meeting and had been informed that further advice should be sought from Steve Berry, DfT. Strong support for the project was received from Wayne Hindshaw and Rob Dean who noted the work being carried out by Mott Macdonald for Network Rail following the RAIB report into the Froxfield incident. Richard Fish to raise delayed announcement of research funding at next meeting of UKBB.

ACTION 47: Richard Fish

ii. Transport NI

John McRobert reported that Transport NI had now acquired a new bridge management system that used the BCI methodology. The process allowed the inspector to highlight an urgent repair.

11. Any Other Business.

11a. Future Agenda Items

i. Self Harming

Wayne Hindshaw provided a comprehensive update on this topic. Richard Fish to propose addition of an item to discuss this subject at a future meeting of the UKBB.

ACTION 48: Richard Fish

ii. Scour

To be considered for discussion at BOF 53

iii. Bridge Collapses

To be considered as part of discussion on the first Grand Challenge.
Chairman to consider adding this item to the agenda for BOF 53 or BOF 54.

ACTION 48: Chairman / Richard Fish

12. Proposed Dates for Future BOF Meetings

BOF 52: 15 March 2017 (Coventry).

BOF 53: 18 July 2017

BOF 54: 31 October 2017

13. Closing/Summing Up

The Chairman thanked everyone for attending and for their contributions to the meeting.

Graham Cole, Acting Technical Secretary
28th January 2017