



BOF 77 Minutes

Tuesday 5<sup>th</sup> November 2024  
The Beves Room, King's College, Cambridge  
(in-person and online)

## Attendance

### Present, in person

Cam Middleton (Chair)	CUED
Keith Harwood (Tech Sec)	Incoming Technical Secretary
Richard Fish	Outgoing Technical Secretary
Tim Arianpour	Transport for London (LuL)
Kris Campbell	Department for Infrastructure – Northern Ireland
Graham Cole	Heritage Railway Association (HRA)
Paul Fidler	CUED
Tomas Garcia	HS2
Nicola Head	Transport for London
Trish Johnson	Big Bridges Group
Simon Latham	City Bridge Foundation
Ian Norriss	Environment Agency
Osian Richards	CSS Wales
Helen Rowe	ADEPT
Santosh Singh	National Highways
Julian Staden	Network Rail
Sue Threader	Rochester Bridge Trust

### Guests, in person:

Andrew Arundel	Humber/Big Bridge Group
John Bennetts	Welsh Government (seconded from WSP)
Tom Creed	City Bridge Foundation
Nadine Fecht	Sustrans
Anna Harrison	Network Rail
Lucy Hayes	Lower Thames Crossing (Items 8 to 10 only)
Peter Hill	National Highways
Charlotte Hills	HS2 (Items 8 to 11 only)
Jon Knights	HS2 (Items 8 to 11 only)
Rob Kurilov	Kent County Council

### Present, online:

Malcolm Cattermole	Forestry England
Mark Cox	DfT
Henry Dempsey	SCOTS
Andy Featherby	Canal and River Trust
Hazel McDonald	Transport Scotland
Martyn Thomas	SSE Renewables

### Guests, online:

Bob Humphries	CSS Wales
Ramesh Sharma	National Highways (Item 8 only)
Keir Wilson	Transport Infrastructure Ireland

*NB 1: Any statements recorded in these minutes, and attributed to an individual, are their own personal views and not necessarily those of the organization they are representing.*

*NB 2: These minutes are recorded in the agenda order and not necessarily in the order in which the items were taken in the meeting.*

## 1. Welcome

The Chair welcomed everyone to BOF 77, whether in person or online, and highlighted the benefits of guest attendance in sharing information, and in succession planning. He thanked Richard for his many years as an outstanding Technical Secretary and welcomed Keith Harwood who will be taking his place.

## 2. Introductions and Apologies

Apologies were recorded from the following:

Jason Hibbert was not able to attend but Welsh Government was represented by John Bennetts.

Liam Duffy was not able to attend but Keir Wilson represented Transport Infrastructure Ireland.

Paul Thomas was not able to attend but Nadine Fecht represented Sustrans on behalf of Paul.

Jasdeep Bhachu, representing LoBEG, apologized for not being able to attend.

The Chair invited guests to introduce themselves with a brief summary of their role and background. He encouraged everyone to play an active role in the meeting.

**John Bennetts** – John is standing in for Jason Hibbert in representing Welsh Government where he is working on secondment from WSP. His role involves portfolio management, implementing risk management policies and technical approval.

**Tom Creed.** Tom is a guest of the City Bridge Foundation (CBF). He works for the City of London and is an advisor to CBF who have responsibility for several significant London bridges and reservoirs. He was involved with the refurbishment of Blackfriars Bridge and has a strong interest in heritage structures.

**Nadine Fecht.** Nadine is standing in for Paul Thomas. She works for Sustrans who have a portfolio of around 1000 structures, mainly historic. Her background is in structures with a particular focus on asset management and flood management.

**Anna Harrison.** Anna is a guest of Network Rail. She has 12 years' experience of bridges with a background in data management, implementation of Asset Management systems, updating standards, and digital examinations. She is currently involved with managing risk to the railway from mining and mineral extraction.

**Peter Hill.** Peter is Head of Structures for National Highways having been with the organisation for 24 years. National Highways manage some 24,000 highway structures, of which 10,000 are bridges built in the 1970s. He considers National Highways to be a barometer for the rest of the country and is here to share challenges and discuss solutions.

**Rob Kurilov.** Rob is a guest of ADEPT and works for Kent County Council. He has contracting experience on civils work but is now involved with asset management and project management of smaller highway structures.

**Kier Wilson.** Kier is standing in for Liam Duffy of Transport Infrastructure Ireland. Previous experience was with Mouchel on motorway contracts including design and assessment of bridges. He is now Structures Manager for the Ulster region,

implementing a new database and managing the transition to a new consultancy contract.

### 3. Matters arising from BOF 76 Minutes

The Chair noted that the BOF 76 minutes had been agreed by email and that they were now on the [BOF website](#).

**Item 6.** The Chair has written to David Coles at DfT recommending the establishment of an independent body to investigate bridge collapses, and to encourage bridge collapse reporting. No response has been received despite several reminders.

#### **Action 1: Chair to continue to prompt DfT for a response.**

**Items 4 and 38.** Keith Harwood reported that the RACF survey questions have been updated to include retaining walls, CROSS reports, and rail inspection cancellations. The only request from BOF/UKBB that has not been included is a question on the number of BICS accredited inspectors. This was considered by RACF to be outside the scope of the survey.

**Item 9.** Osian Richards reported that non-statutory guidance on collapse reporting has been drafted by CSS Wales, for review by Welsh Government and now includes geotechnical failures. Osian asked whether the BOF website could host the reporting and database systems.

#### **Action 2: Osian/Keith to discuss BOF hosting of collapse database system.**

**Item 12.** Trish Johnson referenced a query that had been circulated asking how the manager of the Francis Scott Key Bridge implemented the road closure following the ship impact. A link to the NTSB website has been added to the BOF website.

**Item 13.** Keith Harwood reported that the BOF website has been updated to include a link to the NTSB page summarizing the investigation into the Key Bridge collapse.

**Item 15.** The Bridge Strike Prevention Group (BSPG) is hosted by network Rail. Minutes of the last meeting have been received, but Andy Featherby reported that he is waiting for confirmation that they can be circulated. Next meeting is in a few weeks.

#### **Action 3: Andy Featherby to circulate BSPG minutes as soon as available.**

**Item 25.** Tim Arianpour offered a colleague who is keen to represent UK Bridges Board, and potentially BOF, on the Net Zero Bridges Group (NZBG). Matt Simmons is a Chartered Engineer and has an MSc in Climate Change. The meeting agreed that he should represent BOF and report back through Tim.

#### **Action 4: Tim Arianpour to report back on Matt Simmons involvement on NZBG.**

**Item 26.** Santosh Singh has stepped down as Chair of the Concrete Bridge Development Group, replaced by Steve Cook of Arup. Richard Day was attending NZBG but has now retired, so there has been little progress on carbon discussions. The aim of CBDG is to support, and not duplicate, the work of NZBG.

**Items 32 and 33.** A LinkedIn page is to be set up and the LinkedIn group to be removed. Santosh, John Bennetts and Helen Rowe are all regular LinkedIn users and are happy to advise or assist with posts on behalf of BOF.

#### **Action 5: Keith Harwood to create LinkedIn page.**

**Item 36.** Keith Harwood thanked Osian Richards for his offer to use his local IT specialists to review the website and assist with maintenance. No feedback has been received yet.

**Action 6: Osian to chase IT specialists regarding website review.**

**Item 37.** Hazel McDonald has raised the importance of BICS with the incoming chair of UKRLG. Sue Threader added that the bursary scheme is in place and ready to start.

The Chair asked for ideas on how to get the attention of DfT. Sue Threader suggested escalating the enquiry to the Minister, but the Chair preferred to continue working at the current level.

#### 4. Update on CROSS VORS initiative (Including BOF 76 Actions 5 & 7)

Hazel McDonald reported on the last meeting of the CROSS VORS group but noted that another meeting is due very soon. She noted that the cross report on defective precast bridge beams is to be published imminently ([link](#)). Quality issues are also being reported in other materials. All are encouraged to submit reports to CROSS.

**Action 7: All to consider reports to CROSS.**

CROSS is working with their US representatives to publish a collective report on the collapse of the Francis Scott Key Bridge in Baltimore using data from NTSB. Hazel asked whether BOF would consider drafting collective reports on particular topical issues.

Hazel and others will be presenting the work of the CROSS VORS group at Bridges Scotland at the end of November.

The Chair asked whether DfT were attending the meetings and whether the letter that he had drafted to David Coles had been discussed. Mark Cox confirmed that he was aware of the letter.

#### 5. Highways Safety Hub

This item was postponed to a future meeting as the presenter had been unable to attend due to technical difficulties.

**Action 8: Keith Harwood to invite Lucy Hayes to present at BOF 78**

#### 6. CS 469

The Chair invited Santosh Singh to present on 'CS 469 Management of scour and other hydraulic actions at highway structures' which was published as part of the DMRB in April 2024. Santosh agreed that the presentation could be uploaded to the BOF website but in the Members Only area.

Santosh introduced the presentation by noting that scour is a priority risk in particular situations where flood conditions can compromise structural integrity over a long period of time and lead to collapse.

The new CS469 builds on BD97/12 which it supersedes. The risk-based approach aims to provide more effective mitigation, and improvement in resilience of the network.

Changes introduced in CS469 include:

- Introduction of the Competent Person to manage the process.
- Type 2 structures added – these are susceptible to scour but not directly over a watercourse.
- Asset register of scour susceptible structures.
- Reference made to latest EA flood risk mapping.
- Include climate change allowance which is location specific.
- Account for woody debris.
- Enhance inspection and risk management.
- Improve general guidance on scour.

The new document is available on the [DMRB website](#). The National Highways implementation note is CHE Memo 491/24 and is accompanied by a spreadsheet asset risk register. There are several webinars offered as training materials. These have already been shared through UK Bridges Board.

Further work on scour includes an update of CD 356 'Design of highway structures for hydraulic action', and to complete the research on foundation factors. CS469 will next be updated as part of RIS3 around 2030.

#### Discussion

John Bennetts noted that two new risk factors, the masonry arch factor and the woody debris factor, push many more structures into the high-risk category which then does not allow differentiation between levels of risk. Whilst welcoming the introduction of the woody debris factor, he asked whether there was an element of double counting with both issues being already considered in quantitative assessment. He mentioned that Welsh Government are adopting a more flexible approach in the Welsh National Annex.

Santosh responded that he is already aware of this concern, and it is being reviewed by National Highways.

Osian Richards added that the difference in approach between National Highways and Welsh Government can be explained by the nature of the bridge stock, with smaller bridges in mountainous areas being quite different to those with piled foundations over larger rivers.

Sue Threader asked for an explanation of the term 'competent person' to which Santosh responded it means a suitable qualified person but not necessarily Chartered.

Ian Norriss asked whether there was advice on the implementation of severe weather action plans. Santosh responded that National Highways were discussing how to implement these.

The Chair highlighted the major concern that many brick structures have shallow foundations. Others agreed that this was a key issue.

Helen Rowe described a case of scour due to a burst water main and expressed her concern that this would become more common with the increasing use of geotechnical design solutions.

Santosh advised that resilience issues should be addressed at optioneering stage, in a similar way to a safety case. Andrew Arundel added that CDM should be considered in terms of the risk during the operational phase. Helen agreed but noted

that it is common for the local authority either to not be adopting the structure, so not have so much control of the design process, or to be adopting a structure that has already been built.

## 7. Network Rail R&D initiatives.

Julian Staden represents Network Rail on the Bridge Owners Forum and had offered to present on Research and Development Projects within Network Rail following a brief presentation at UK Bridges Board. Julian agreed that the slides could be hosted on the public area of the BOF website.

The first project covered was **Panoptic Bridge Examination** which aims to bring examination into the digital era with a particular focus on:

- Photogrammetry and point cloud surveys.
- 3D modelling
- Data hosting with machine learning including an Asset Visualiser tool.

**Modelling of masonry arch viaducts** was the next research project described.

Network Rail manage several hundred masonry arches which are 100 to 200 years old. Working with Imperial College, the projects aims to develop assessment methods using FE models which are more representative than current simplistic models. The models can then be correlated with actual behaviour.

Julian also described the use of Digital Image Correlation (DIC) at Mill Road Viaduct and hopes to issue guidance on its use.

Network Rail wrought iron bridges have an average age of 150 years. **Metallic bridge fatigue** has caused fifteen failures in ten years although it is not clear if the rate is increasing. The deck of Yetminster Bridge has been removed and is being tested at Surrey University who are working with Mott MacDonald. The aim is to study fatigue life, connection integrity, and U-frame performance of this typical U-frame design. The project has already led to an update to the Level 0 assessment tool to identify fatigue susceptible structures, and material testing has confirmed the assumptions used in bridge assessments.

Julian concluded his presentation by outlining the **Network Rail Challenge Statements**. These are published on the [NR website](#) and seek to encourage innovation and research. The challenges outlined were:

- Establishing condition of hidden critical elements.
- Scour prevention and management.
- Road Vehicle Incursion – prevention and detection.
- SHM – triggers that are meaningful.
- Examination – stock wide techniques.
- Vegetation control.
- Preventing Bridge Strikes.

## Discussion

The Chair welcomed the progress made in panoptic bridge examination after many years of discussion of digital techniques. He also suggested the term Videogrammetry rather than DIC.



Trish Johnson suggested use of 3D goggles to allow office-based staff to guide a drone survey, as was done for the Forth Bridge. Julian queried whether this would be appropriate across the entire stock.

Ian Norriss asked whether drone surveys included surveys below water level, and whether the two data sets could be merged. Julian responded that surveys were also conducted below water level but to date the two data sets had not been merged.

Helen Rowe noted merging the above and below scans on port surveys where the survey below water level used sonar techniques, but she mentioned difficulties in specification for underwater surveys. The Chair suggested speaking to the Port of London Authority

Kris Campbell mentioned using GPR below water level and combining results with the above-water survey. He noted that data quantity is a big issue with such surveys, and others confirmed that they faced similar issues.

The Chair asked whether anyone in the meeting was aware of progress with BridgeCat. Hazel McDonald confirmed that the scanning plant is based in Yorkshire and that DfT are considering further funding. Ian Norriss expressed an interest in using BridgeCat.

<b>Action 9: Keith Harwood to introduce Ian to Gary Kemp of DfT</b>
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Peter Hill reported that National Highways see a bright future for digital inspection, but currently it is expensive. The main benefit is safety of inspectors or surveyors, but the downside is lack of touching or hammer tapping. There is potential to use digital for General Inspection with a hands-on Principal Inspection. He expects NH to slowly adopt digital techniques as the technology develops.

Osian Richards was of the view that digital inspection is useful on older structures, for example allowing heatmaps of movement to be produced highlighting issues not visible otherwise. Julian agreed and noted that digital inspection is not a replacement for hands-on inspection but might extend inspection intervals.

Graham Cole commented that the Imperial College work appears to overlap with the Sheffield University work on FE modelling of arch bridges. Julian confirmed that they are aware of each other's work, but that there is indeed an element of duplication.

## 8. National Highways Carbon Estimating Tool

Ramesh Sharma is the Head of Cost Planning at National Highways and leads the development of the Cost and Carbon Calculating tool which is to be used from 2025. The tool is to be used on capital projects by completing the cost estimate which then provides an estimate of capital carbon at individual resource level. It has been used on 40 projects to date and is now being reviewed and assured.

Baseline figures can then be provided to suppliers who can develop a de-carbonisation pathway for the project.

Future development aims for whole life estimating and carbon management and will include operations and maintenance, as well as renewals.

The Chair thanked Ramesh noting the importance of sharing information on carbon calculation as there are several different approaches and invited questions.



## Discussion

Sue Threader explained that Rochester Bridge Trust have had a carbon calculation process in place for three years, but the challenges are quite different when compared to an owner with a large bridge stock. In her opinion action should be taken to reduce carbon emissions wherever possible, rather than waiting for research outcomes before starting to act.

Tomas Garcia expressed concern that the baselines would be based on old designs so are conservative. Design time is consistently being reduced so tools are needed that make carbon saving feasible.

Santosh agreed that baseline calculation is a key process and stated that a database of results could be used to guide designers and contract targets.

Ramesh said that organisations are all on different trajectories with respect to carbon reduction, but we are all moving to a lower carbon way of working. Baselines allow plans to be developed, and pathways defined.

Helen Rowe pointed out that carbon associated with traffic diversions is particularly important on maintenance projects, and that there is a lack of data. Sue concurred, mentioning also the carbon associated with workforce transport. Ramesh confirmed that the model includes temporary traffic management.

Osian Richards encouraged use of such tools saying that it is as easy as producing a Bill of Quantities.

John Bennetts noted that CG300 will require a whole-life carbon assessment and mentioned also that a tool has been developed by Welsh Government that uses the SAVI interventions to calculate carbon in maintenance.

The Chair thanked Ramesh for the presentation. He mentioned a student research project on carbon in foundations where it was observed that the main reason for selecting a particular solution was previous experience rather than a calculated assessment of options.

## 9. Carbon in Procurement (Lower Thames Crossing)

Lucy Hayes was invited to make a presentation on the Lower Thames Crossing and how carbon was an integral part of the procurement. Lucy agreed that the slides could be uploaded to the public area of the BOF website.

Lower Thames Crossing consists of 23 km of highway and a twin bore tunnel to be built east of London, to relieve the Dartford Crossing. The ambition of the projects be a pathfinder project for National Highways and to be the greenest road ever.

Carbon reduction was based on a 2020 baseline. 30% was saved pre-procurement using available technology, increasing to 50% after procurement as an estimate of what the market can deliver. Initiatives during construction will reduce this further.

Lucy outlined the procurement methodology which focused on outcome rather than prescription and set carbon as a high proportion of the scoring model. Tenders offered reductions in carbon by reducing piling, tunnel machinery, and ground treatments and also found savings by reducing carbon intensity in materials.

Lucy explained how the Lower Thames project achieved best practice in carbon management and noted areas for future development. She concluded by highlighting the five client carbon commitments:

- Procure for low carbon construction and provide incentives in our contracts.
- Set phase-out dates for fossil fuel use.
- Eliminate the most carbon intensive concrete products.
- Eliminate the most carbon intensive steel products.
- Adopt PAS 2080, Carbon Management in Infrastructure, as a common standard.

### Discussion

The Chair thanked Lucy for an inspiring presentation and asked about the status of the scheme, and whether anything could have been done differently. Lucy responded that the DCO had now been delayed to May 2025. Regarding challenges she noted that the carbon model was in Excel so management would not be straightforward and noted difficulties in software implementation.

Sue Threader first declared a vested interest in the project as the proposed south approach is on RBT land. She then asked whether the model includes local traffic disruption, workforce travel, and other carbon beyond stages A1-5. Lucy responded that the project model covers whole-life, but that suppliers are only involved with carbon in construction stages. The model includes workforce travel and requirements such as charging points and active travel measures.

Santosh Singh added that options reports included whole-life carbon even though supplier targets were more limited.

Tim Arianpour asked how carbon savings were evaluated in financial terms, and how much extra did the project cost? Lucy responded that there was no definitive value for carbon cost but that £30/tonne was used, effectively as a trial. No additional cost is allowed for carbon saving, but savings in one item can be used to fund a lower carbon solution elsewhere.

Kris Campbell asked about enforcement and the possibility of the formulae being manipulated. Lucy responded that financial penalties could be applied as if any contravention were a defect in construction. The scoring system had been trialled to ensure that manipulation would not occur.

The Chair asked about the form of contract, to which Lucy responded that it was a traditional tender process with carbon being included in tender assessment. Construction will use the NEC4 contract.

Jon Knights was also interested in cost aspects of the process and noted that GGBS would need to be imported and would thus increase the cost of lower carbon concrete. He asked how the decision is made to choose lower carbon at a higher cost. Lucy responded by saying that this was a decision for the Contractor based on the cost balance within the contract.

Ian Norris noted that Environment Agency use high level carbon modelling and have a carbon incentivisation process for suppliers.

## 10. Carbon discussion

This agenda item was absorbed into Item 9 above.

## 11. Sharing Insights and Next Steps for Calcined Clay and Low Carbon Concrete

The Chair introduced Jon Knights and Charlotte Hills of HS2, inviting them to discuss the use of calcined clay with a presentation titled 'Accelerating the UK Adoption of Calcined Clay'. Jon and Charlotte agreed that the slides could be made available on the public part of the BOF website.

Charlotte began the presentation by outlining the challenges: that concrete is a major source of carbon, there are material scarcities, increased construction and development, and costs are spiralling. Calcined clay would address many of these challenges and is recognized as part of the low carbon route-map. Calcined clay meets standards but currently there is no UK production or testing facilities. It would allow reduction in CEM1 from 80% to 50% saving 60m tonnes of embedded CO<sub>2</sub> by 2030.

The initial stages of the project, funded by DfT, identified a market deadlock that required strategic intervention. A position paper has been drafted but is not yet published.

Jon continued the presentation outlining the UK business case. He highlighted the global interest, and 120-year history of usage, but UK lags in adoption. Clay is widely available, with differing levels of reactivity and the concrete performance is comparable while being cheaper to produce and containing 10% of the carbon compared to cement. Issues to address however are workability and colour.

Calcined clay is included in EN197 and BS8500 which cover production of natural pozzolanic clays, and it can be used in all environments except aggressive soils.

The position paper will propose measures to bring forward the use of calcined clay:

- HS2 to import calcined clay – demonstrator projects.
- Advanced Market Commitments – show the demand.
- Business case for pilot kiln – give confidence and knowledge.
- Enabling and adoption drive – identify location of commercial site.

The route-map proposes a commercial plant by 2027, producing 4m tonnes per year by 2030.

### Discussion

The Chair began the discussion by asking who would fund the commercial plant. Jon responded that the plant would be government funded. In France, the government provided around £5m seed funding which then generated private funding.

Martyn Thomas expressed a concern that contractors prefer higher cement content to facilitate quicker curing and thus reduce risk. Jon replied that the requirement for rapid strength gain should be avoided, for example by specifying 56-day strength. The design specification should match the carbon drivers. The Chair added that procurement was key, pointing to Lower Thames Crossing as a successful approach. Martyn noted that SSE Renewables are about to issue a policy on reducing carbon by specification, but decision makers are not keen to impose restrictions on contractors. Jon's response was that there is little risk as all requirements are in standards.

Hazel McDonald expressed the view that evidence of durability would be required for clients to adopt new materials.

The Chair thanked the presenters and challenged them to find convincing evidence of 120 years durability.

## 12. Interlude 1: the importance of inspections

Richard Fish described an issue that arose at the Hernando de Soto bridge which carries the I 40, an Interstate Highway, between Arkansas and Tennessee. A fracture of the lower chord of the truss was observed during an inspection in 2021 and the bridge was immediately closed for repairs. It later transpired that the crack had been photographed by a canoeist in 2016, and that two inspections in the intervening time had failed to report the fracture.

It was fortunate in this instance that the bridge was closed, and repaired, before a collapse occurred. However, the incident highlights the importance of inspection, and the necessity for inspections to be comprehensive and to be conducted by competent staff.

## 13. Inspector competence and BICS

Hazel McDonald reported on the changes to the Bridge Inspector Competence Scheme (BICS) for which the steering group Chair is now Niall McKay. The main changes are:

- The work required within the e-portfolio will be lessened by the reduction in the number of competencies from 135 to 65.
- Associate Inspector level will be introduced, requiring a knowledge test.
- The payment of fees will be changed to a staged process with the overall cost being slightly lower.

Hazel also reported that she is continuing to liaise with David Buttery of UKRLG. The Steering Group is also liaising with ICE and CIHT regarding using inspector competencies to contribute to the required competency attributes of the institutions.

The new e-portfolio will form the subject of a presentation at Bridges Scotland in November 2024.

### Discussion

Sue Threader asked whether the relaunch of BICS could be coordinated with the relaunch of the bursary scheme, which Hazel agreed to.

Sue also mentioned that BICS accreditation had been a requirement in a recent tender, and that three compliant tenders had been received. This was contrary to the view expressed in previous meetings that BICS inspectors were difficult to find, at least for smaller bridge authorities.

Helen stated that, for a tender for a long-term framework, there was to be staged adoption of BICS.

The Chair offered the reflection that there had been a lot of work put into BICS by BOF members, but that implementation was wavering. He invited Peter Hill of National Highways to explain their approach.

Peter explained that, following a review, National Highways (NH) proposed some changes around competency and final interview, but these were rejected by the Steering Group. Hazel added that the final issue was related to grandfather rights.

Peter continued, explaining that NH need to demonstrate competency to ORR so have developed an internal process that, following adoption by two regions, will be rolled out nationally. BICS allows exemption from the NH process, so is fully supported and NH are still playing a role, albeit reduced, on the Steering Group.

The Chair again expressed his disappointment at the missed opportunity and invited the meeting to propose how the issues could be resolved.

Peter expanded on the NH position. BICS had been mandated twice with suppliers failing to comply, and ORR require competency to be shown. There are 29 BICS inspectors against NH requirement for around 250, and nationally a need for 2500+. The NH process would allow an inspector to spend 18 months under temporary accreditation, with 5 years to develop and to undertake a BICS external review.

Nicola Head felt that the gradual training could be never-ending and that such a process would not suit smaller authorities. Hazel considered that the NH proposal was an excellent mentoring scheme.

The Chair invited John Bennetts to comment from a consultant's perspective.

John explained that, within the bigger consultancies, inspections are conducted by early career graduates who then progress to Chartership, although there a few specialist consultants who employ inspectors. Santosh Singh confirmed this view and added that good technicians often move on to a degree and aim for Chartership.

Helen Rowe suggested that a new inspector career path was required, with an inspector apprenticeship through BICS rather than a degree route.

Henry Dempsey was encouraged by the fact that awareness of the need for competency assessment had greatly improved with the introduction of BICS, and several local authority competency schemes have been created.

Nicola stated that the onus is on the BICS Steering Group to implement the proposed improvements to the scheme and demonstrate their success to NH. Peter commented that NH now have an embedded process, and that BICS would need volume of members to be a success.

The Chair concluded by observing that there was agreement that an accreditation scheme was needed, but that there remain issues to resolve. He urged everyone to find a joint way forward for this important initiative.

<b>Action 10: Peter Hill to report on NH Inspector scheme to future BOF.</b>
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#### 14. Interlude 2: Reflections of 100 years

The Chair invited Richard Fish and Graham Cole, both long-standing BOF members with nearly 100 years of experience between them, to reflect on their experiences over the years. Both agreed for the presentation slides to be posted to the public area of the BOF website.

Richard presented highlights of his career – strengthening of the Tamar bridge, meeting Princess Anne, visits to major bridges including the Golden Gate bridge and made reference to his forthcoming publication on bridge collapses. He then noted key events in BOF history starting with BOF 1 where Graham, Paul Fidler and Richard were all present and moving on to BOF 'tours' to Edinburgh in 2014, Hammersmith Flyover 2016, Forth Bridges in 2019, and Rochester in 2022

The presenters then summarized the changes seen since the 1970s. At that time there were Road Construction Units (RCU), County Surveyors and Trunk Road agencies. TRRL and DfT were centres of excellence and contracts followed the ICE conditions with Clerks of Works and Resident Engineers supervising construction.

Through the 1990s, changes included selling off the RCUs, compulsory competitive tendering, externalization of services, and establishment of arms-length organisations including Highways England. The title of County Surveyor has disappeared (who needs experts?) and site supervision has moved towards self-certification.

Today we see fee competition, an ageing stock yet an emphasis on new build, and reduction in capacity, capability, and competence. They asked whether this is a recipe for a fatal collapse?

But moving on to positives they noted the 2005 publication of the Code of Practice, BOF Grand Challenges, BICS scheme and expressed the view that the influence of BOF has been wide.

The Chair thanked Richard and Graham for their long-standing commitment to the profession and for their honest reflections.

## UPDATES

### 15. Suicide Intervention Sub-Group (Including BOF 76 Actions 40 and 41)

Trish Johnson reported that a template has been developed for Case Studies to be incorporated in the proposed guidance on Suicide Intervention. This will be circulated for contributions to the document.

<b>Action 11:</b>	<b>Trish Johnson to circulate template for case studies.</b>
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### 16. TRIB IWG

The Chair reported on a meeting of the Transport Research and Innovation Board (TRIB) Infrastructure Working Group (IWG) held at the Manufacturing and Technology Centre in Coventry. Jon Knights and Charlotte Hills also attended. His presentation on the Bridge Owners Forum had highlighted the Bridge Inspector Certification Scheme, the joint initiative with CROSS on bridge safety reporting, and liaison with DfT.

He noted several interesting topics from the meeting. First amongst these was a study of reinforcement requirements for crack width control being conducted by Arup. It was noted that reinforcement quantities are often determined by crack width control rather than strength requirements and it is hoped a more rational approach can be developed. Cam agreed to update the meeting as the project develops.

<b>Action 12:</b>	<b>Chair to update on TRIB crack width rebar project.</b>
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Also of interest are the Concrete Innovation Landscape Tracker and work to develop an improved rebar scanner. Cam suggested that BOF members should continue to be involved with the TRIB projects, to allow dissemination of awareness and learning, to avoid duplication and to influence the direction of the projects.



The Chair also mentioned the cosmic ray technique which uses muons to create 3D images of concrete structures, revealing their internal composition. This, and other innovative NDT techniques, could be part of a future BOF meeting.

<b>Action 13:            Technical Secretary to consider NDT for future meetings.</b>
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## 17.UKBB

Hazel McDonald, Chair of UK Bridges Board (UKBB), reported on the meeting held on 26<sup>th</sup> September 2024.

Hazel noted that PIARC questionnaires have been circulated on post-tensioned bridges and on structural redundancy. Bridge owners are asked to complete the questionnaires to support the research.

Regarding UKRLG business, Hazel reported that the Chair, David Buttery, is keen to update the Code of Practice which is considered embarrassingly out-of-date. A Consultant is being procured. She also reported her disappointment in the slow progress towards Boards receiving funding for research initiatives, but that a bespoke framework is to be established for procurement as it was not possible to use the TfL framework.

The afternoon of the UKBB meeting consisted of presentations on the theme of carbon reduction. The subjects covered Lower Thames Crossing, Net Zero Bridges Group, Materials, and Reliability based assessments.

## 18.ADEPT

Helen Rowe updated the meeting with a summary of the ADEPT National Bridges Group held on 9<sup>th</sup> October 2024 via Teams. The morning covered liaison with Network Rail. The afternoon was themed around sustainability including two interesting presentations. The first explained the TfL carbon calculation tool, presented by Anil Kumar of TfL. This was followed by a presentation considering how bridge maintenance links with the UN Sustainability Development goals, presented by Jo Saunders of Island Roads.

The ADEPT meeting had agreed to update the Commuted Sums Calculator, and to include retaining walls and geotechnical structures.

The meeting included a discussion on risk-based intervals for General Inspections (GI) with some authorities proposing to increase the inspection interval from two to three years for certain scenarios.

### Discussion

A discussion followed Helen's report with particular concern at the increased risk associated with reducing the frequency of GIs, and differing views were put forward.

Tim Arianpour expressed the view that GIs are the basis for risk management and the inspection interval should not be adjusted. Peter Hill agreed and suggested that this would be a very risky approach that should be signed off at Board level. He quoted an example of spalling concrete, where defects can deteriorate very quickly.

John Bennetts noted that authorities are short of funding, and that some do not do any inspections. This was reported in the annual survey by the RAC Foundation.



Osian Richards considered that three years would be too long an interval for certain structures, such as where scour is a problem, but that it may be acceptable for a newer concrete structure.

Peter Hill offered to circulate a report on the Dresden bridge collapse.

<b>Action 14:</b>	<b>Peter Hill to circulate report on Dresden collapse.</b>
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## 19. Website

Keith Harwood noted that the website has seen around 20% increase in traffic but that this was difficult to evaluate accurately due to occasional spikes in traffic which are assumed to be erroneous but overwhelm the correct data. Apart from the home page, the most visited page is the download of the Inspection Manual.

Keith asked whether there was a need to keep the Twitter/X account as Richard Fish has been posting on behalf of BOF. Richard suggested closing the account as it does not offer significant value to the group. This was agreed as the best way forward.

<b>Action 15:</b>	<b>Richard Fish to close the Twitter/X account. Technical Secretary to remove link from BOF website.</b>
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The Linked In account was discussed under Item 3 above.

## 20. Bridges 2025

Richard Fish reported that the Bridges 2025 Conference will be held at the Coventry Building Society (CBS) Arena in Coventry on 12<sup>th</sup>/13<sup>th</sup> March 2025. There will be two days of presentations and workshops without the usual separate streams on Day 1. The Conference had invited BOF to hold an informal meeting on the day before the conference. It was agreed that the invite be declined as few people would be able to commit to three continuous days out of work.

<b>Action 16:</b>	<b>Technical Secretary to decline Bridges 2025 meeting invite.</b>
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## 21. Other Current Bridge Issues and/or Research

Kris Campbell noted the following research items:

- An EPA grant has been obtained by the University of Galway to carry out research into management of structures and the effects on communities. This is a collaboration with Maria Pregolato of Delft University and Myra Lydon of University of Galway. Kris agreed to report in more detail to a future BOF meeting.

<b>Action 17:</b>	<b>Kris to report to future BOF on University of Galway research.</b>
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- A scour sensor is being developed as part of a PhD at Queen's University, Belfast.
- A bridge is being demolished that previously had a £1m installation of cathodic protection. Cores were taken of the anodes by the original supplier who noted that the waterproofing was in perfect condition and there had been little consumption of the anode material.

Sue Threader reported that Rochester Bridge Trust are working with the University of Sheffield to investigate the strength of a Georgian balustrade against lateral loading. She noted that BOF members were familiar with the balustrade having viewed the

Rochester bridge from an adjacent footway. Sue offered to report back to a future BOF meeting.

<b>Action 18:</b>	<b>Sue to report to future BOF on balustrade research.</b>
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Santosh Singh noted that National Highways are working with Strathclyde University on numerical modelling of foundation scour factors.

John Bennetts added that National Highways are funding Bath University to carry out research into shear capacity of bridge beams.

John also informed the meeting that he had attended the IABMAS conference in Copenhagen over four days. This is the top conference internationally for bridge management, with proceedings available free online here: [IABMAS Proceedings](#)

Trish Johnson has received conflicting advice on requirements for lightning protection. Sue Threader offered to share the advice she had received, and others are asked to do similar.

<b>Action 19:</b>	<b>All to share any advice with Trish on lightning protection.</b>
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The Chair thanked everyone for their valuable contributions and proposed that BOF should reinvigorate its links to university research.

<b>Action 20:</b>	<b>Technical Secretary to reinvigorate links to university research.</b>
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## 22. BOF Invoices

The Chair noted that invoices for BOF Membership 2024/25 are about to be sent out. There is no increase in the level of fees. If any organisation needs to issue a Purchase Order before invoicing, then please inform the Chair.

## 23. Any Other Business

Sue Threader asked for papers on conservation of heritage structures for the ICE Engineering History and Heritage journal which is now 30 years old.

<b>Action 21:</b>	<b>All to consider papers for ICE Eng History and Heritage Journal</b>
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Sue reminded the meeting that the Bridges 2025 Awards are now open for application and include:

- The Bridges Design Award
- The Bridges Construction Award
- The Bridges Award for New Life
- The Bridges Management Award
- The Bridges International Award
- The Bridges Ethos Award
- The Bridges Sustainability Award

<b>Action 22:</b>	<b>All to consider applying for Bridges 2025 awards.</b>
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Graham Cole suggested that BOF should consider a Grand Tour to Wales as the June meeting and had already discussed the possibility with Osian Richards and Jason Hibbert. The Chair added Tower Bridge as a potential future visit. Sue Threader suggested a cycle of three locations to include Cambridge, London, and a site venue. The London meeting would save considerable travel time, and associated carbon. A suggestion was made to trial the London venue in February.

**Action 23: Chair/Tech Sec to consider venues, possibly London Feb 2025.**

**Action 24: Tech Sec to investigate possibility of a meeting at Menai bridge.**

Peter Hill re-iterated his concern that some local authorities may be considering extending General Inspection frequencies to three years, and others may be allocating only £15 annual budget per bridge. He suggested that BOF should consider drafting a technical note that ADEPT could share with authorities to express such concerns. This would reinforce the role of BOF as an influencing body. Hazel McDonald agreed to discuss the proposal at UK Bridges Board.

**Action 25: Hazel to discuss BOF Technical Note proposal at UKBB.**

John Bennetts mentioned the Royal Academy of Engineering project on infrastructure maintenance funding and its impact on society, a study which is about to be tendered.

Osian Richards expressed concern that bridge owners are not hearing quickly enough about issues such as the precast beam and steel fabrication quality concerns that have been aired in this, and previous meetings and asked what could be done to improve dissemination of these lessons. The Chair mentioned the proposal for an investigation board and the process for CROSS reporting. Osian was of the opinion, however, that these processes are far too slow.

Tomas Garcia suggested that BOF should be a forum where sensitive issues can be discussed confidentially.

The topic was not concluded due to time pressures.

**Action 26: BOF 78 – sharing lessons and warnings more quickly.**

## 24.2025 Meeting Dates

The following dates were agreed for BOF meetings in 2025:

BOF 78, Cambridge (& hybrid), 4th February 2025.

BOF 79 had been tentatively planned for 3<sup>rd</sup> June in Cambridge, however Graham Cole had earlier suggested a Grand Tour of Wales including Menai bridge. Further discussion required to confirm details.

**Action 27: Osian Richards/Jason Hibbert to consider a Grand Tour of Wales.**

BOF 80, Cambridge (& hybrid), 4th November 2025.

## 25.Close

The Chair reiterated his thanks to Richard Fish, on behalf of all BOF members, for his long and valued service as Technical Secretary and presented him with a card signed by all present. He mentioned the dinner that had been held the night before the meeting at which a presentation had also been made.

Keith Harwood

BOF Technical Secretary

November 2024