

BRIDGE OWNERS FORUM

MINUTES OF BOF 68: TUESDAY 18 OCTOBER 2021 THE BEVES ROOM, KINGS COLLEGE, CAMBRIDGE

PRESENT:

Bill Bryce	SSE
Nick Burgess	TfL/LUL
Malcolm Cattermole	Forestry England
Graham Cole	Heritage Railways Infrastructure Group
Andy Featherby	C&RT
Richard Fish	Technical Secretary
Tomas Garcia	HS2
Jim Hall	CSS Wales
Keith Harwood	ADEPT
Nicola Head	TfL
Trish Johnson	Big Bridge Group
Hazel McDonald	Transport Scotland
Campbell Middleton	Cambridge University Engineering Department (Chairman)
Shakil Rahman	Environment Agency
Paul Thomas	Railway Paths Ltd.
Ben Wilkinson	Network Rail
Paul Fidler	CUED

Guests:

Tercia Da Silva Jansen van Vuuren (part)	CUED
Fiona Smith (part)	Historic Rail Estate

1. Welcome

The Chairman welcomed everyone back to Cambridge for the first face-to-face meeting since BOF 63 in January 2020. He noted the excellent turnout but acknowledged that the Covid-19 pandemic was far from over and recognised the need for suitable precautions such as a ventilated room and the wearing of masks during the meeting.

2. Introductions and Apologies

Richard Fish recorded apologies that had been received from the following, some of which had been very recent due to health concerns:

Jasdeep Bhachu	LoBEG
Kevin Dentith	ADEPT
Liam Duffy	TII
Colin Hall	Network Rail (Ben Wilkinson substituting)
Daniel Healy	Infrastructure Northern Ireland
Jason Hibbert	Welsh Government
Neil Loudon	National Highways
Ian Norriss	EA (Shakil Rahman substituting)
Osian Richards	CSS Wales (Jim Hall substituting)
Sue Threader	Rochester Bridge Trust

Richard noted that no replies had been received from Henry Dempsey (SCOTS) nor Gary Kemp (DfT).

The Chairman invited the two substitute attendees, Shakil Rahman and Ben Wilkinson to introduce themselves:

Shakil is seconded from Capita to the EA working on the asset management of bridges. He has over 20 years' experience as an engineer with 15 of those on bridges, including some early work with LoBEG helping to develop the BCI scheme. As well as the EA, he has also been seconded to Network Rail and the Olympic Delivery Authority. His present interest is to improve consistency of inspections and condition scoring.

Ben Wilkinson has worked for Network Rail since graduating from Southampton University and has held a variety of posts involved in structures management. He has recently been appointed as the NR technical lead for bridges.

The Chairman noted that Graham Cole's second membership of BOF had now progressed beyond his "guest" status for Heritage Railways and asked Graham to explain more about the organisation. Graham noted he was hoping to formally represent the Heritage Railway Infrastructure Group which he saw to be part of the Heritage Railway Association (HRA) which had some 200 such railways in its organisation. He agreed to clarify this relationship at the next meeting.

ACTION 1: Graham Cole

Graham noted that HRA's present concerns were Covid (and consequent reduction in income) and Coal (likely to be a significant problem as carbon reduction targets are imposed). Graham also noted that all heritage railways come under the regulation by the ORR who were starting to show an interest in the quality of bridge inspections, including the competence of inspectors.

Lastly by way of introductions, the Chairman congratulated Hazel McDonald on succeeding Liz Kirkham as chair of UKBB and especially welcomed the news that Hazel would continue to be a member of BOF, hence strengthening the link between the two groups.

3. Matters Arising from BOF 67 Minutes

The Chairman referred to the BOF 67 Action Update sheet that had been issued with the BOF 68 agenda.

Action 1: LoBEG Representation on BOF

The Chairman noted that although some progress had been made, some confusion still remained which needed to be resolved.

ACTION 2: Chairman/Richard Fish

Action 3: Ongoing Actions from Previous Meetings

To be considered at a future meeting.

ACTION 3: Richard Fish

Action 5: IABSE Group looking at Bridge Collapses

Richard Fish to review possible BOF input.

ACTION 4: Richard Fish

Action 6: Bridge Inspector Competency Schemes Comparison

To be considered at a future meeting.

ACTION 5: Richard Fish

Actions 9: TII Sustainable Procurement Guidance

To be taken at a future meeting.

ACTION 6: Liam Duffy

Action 10: Transport Scotland Carbon Management Tool for Maintenance

Hazel McDonald spoke to her paper which had been issued ahead of the meeting, explaining that the Scottish Government has carbon reduction for transport and infrastructure high on its agenda. The tool serves to compare maintenance scheme options, with another for major projects, aimed at replacements rather than repair. Hazel expressed an interest in seeing how the TS tool might link to the new SAVI carbon facility.

Action 23: A465 Mutual Investment Procurement Model

The presentation could not be taken at this meeting as Jason Hibbert had been unable to attend and would be deferred to a future meeting.

ACTION 7: Jason Hibbert/Richard Fish

Action 24: BridgeCat

An update on any recent developments would be given at BOF 69.

ACTION 8: Richard Fish

4. Net Zero Carbon Updates

The Chairman began this part of the meeting by reprising the discussions at BOF 67 and thanked those members who had volunteered to sit on the BOF net-zero group: Colin Hall, Jason Hibbert (supported by Nick Trump) and Osian Richards (unrelatedly, all unable to attend this meeting). He also noted the huge number of groups, strategies and policies that were already in existence with consequential overlaps and duplication and explained that one of the objectives of this session was to attempt to start to pull these together.

Richard Fish referred to the paper from Brian Duguid, who was the Chair of the consultants' Net Zero Bridge Group (NZBG), which had been issued with the agenda for this meeting. The Chairman suggested that BOF should closely align itself with the NZBG and Richard Fish agreed to contact Brian accordingly.

ACTION 9: Richard Fish

The Chairman then described some of the work which was underway at Cambridge, including that being led by one of his Research Associates, Tercia Da Silva Jansen van Vuuren, who had also observed part of the BOF 67 Zoom meeting. Tercia had previously had experience of working on a study of off-site manufacturing in conjunction with CIRIA. Other current Cambridge work included various methods for measuring carbon, procurement issues and the technical aspects of reducing embodied carbon in cement.

Although her day off, Tercia had been able to attend the morning session of this meeting and gave a presentation on her work to map the various carbon initiatives across the UK. This covered the widest possible picture of the current carbon landscape and themes, more detail of the current Cambridge work and some specific issues related to bridges. She agreed that her presentation could be uploaded to the BOF website.

ACTION 10: Paul Fidler

Tercia presented her investigation into the work of the various parties literally as a map which clearly showed not only the inter-relationships but also the degree of fragmentation and duplication, even within and between government departments.

Work at Cambridge was under the over-arching umbrella of “Cambridge Zero” below which key departments were focused on specific projects. The Engineering Department included the Concrete Infrastructure Research Group which was working closely with the Cambridge Centre for Smart Infrastructure and Construction (CSIC) on whole life considerations. This in turn had led to the Construction Leadership Council (CLC) report, “Carbon Reduction Code for the Built Environment¹”, produced in June 2021 which sets a target to reduce carbon by 75% by 2030 and will be formally launched at COP 26 in Glasgow in November. The Chairman noted that the CLC seemed to have

¹ [Carbon Reduction Code for the Built Environment | Cambridge Centre for Smart Infrastructure and Construction](#)

an over-arching role in the UK's carbon agenda. Paul Thomas questioned the quantum of a 75% reduction and doubted that this was realistic. Tercia acknowledged the difficult targets but suggested that there were no easy solutions.

Returning to the overall carbon landscape, Tercia painted a complex picture. She highlighted some good work being undertaken by PEIs, most notable by IStructE but also ICE (with their influential State of the Nation report) and RICS. Whilst there were a number of industry groups, those in the Westminster government were neither easy to locate nor clear to follow with a number of disparate and disjointed programmes and initiatives. Similarly, government carbon counting policy seemed to exclude imports.

As for the CLC, Tercia noted that they have a Green Construction Board and, within that, an Infrastructure Working Group. She highlighted a number of reports from the Infrastructure and Projects Authority (IPA), particularly the Transforming Infrastructure Performance (TIP): Roadmap to 2030², which contains links to the UN SDGs. Tercia also noted the Green Building Council report, the Road to COP 26, which was another roadmap to net zero. Lastly, in presenting the bigger picture, she referred to the Carbon Trust's PAS 2080³.

In terms of bridges, Tercia highlighted two recent pieces of work: firstly, by David Collings⁴ of Arcadis, "The Carbon Footprint of Bridges"⁵, published in Structural Engineering International, and secondly a paper in October's edition of The Structural Engineer by Cameron Archer-Jones and Daniel Green⁶, both with COWI, which proposed a SCORS type rating system for bridges, not dissimilar to the efficiency ratings to be seen on electrical appliances.

In the former, David Collings had developed a database of embodied carbon in various bridge types which required a very explicit calculation of carbon on a bridge-by-bridge basis. The latter paper was simpler, setting out relatively easy steps to achievable targets and avoiding the paralysis by analysis syndrome. In terms of benchmarking, Tercia recommended the Built Environment Carbon Database (BECD)⁷ which had some key collaborating organisations.

On the subject of benchmarking, the Chairman suggested that it would be a good idea to have an acceptable, well defined metric for comparing bridges. He considered that the old square meterage of deck area was no longer appropriate and that alternatives, such as numbers of vehicles, or total tonnage of freight, carried might be worth consideration.

² [Policy paper overview: Transforming Infrastructure Performance: Roadmap to 2030 - GOV.UK \(www.gov.uk\)](https://www.gov.uk/government/policies/transforming-infrastructure-performance)

³ [PAS 2080 - carbon management in infrastructure | The Carbon Trust](https://www.carbontrust.com/resources/pas-2080-carbon-management-in-infrastructure)

⁴ David is also a prominent member of the NZBG

⁵ [The Carbon Footprint of Bridges: Structural Engineering International: Vol 0, No 0 \(tandfonline.com\)](https://www.tandfonline.com/doi/abs/10.1080/13698310.2019.1644444)

⁶ [Carbon targets for bridges: a proposed SCORS-style rating scheme - The Institution of Structural Engineers \(istructe.org\)](https://www.istructe.org/2019/10/01/carbon-targets-for-bridges-a-proposed-scors-style-rating-scheme/)

⁷ [Built Environment Carbon Database \(becd.co.uk\)](https://www.becd.co.uk/)

The Chairman thanked Tercia for an excellent presentation and confirmed that her work would be shared with government and industry. He also warned that it was dynamic and fluid, subject to almost daily change, and needed to be updated regularly. He also expressed the wish that there should not have to be the need for a continual re-invention of the wheel but with a primary need to incentivise clients to provide sufficient capacity in this area. Carbon and net zero needed to be central to all clients' workloads and commitments both in terms of planning new works but also looking after existing infrastructure. Tercia agreed, suggesting that not all clients necessarily need to use the same tools but there should be well defined boundaries in which they should work.

The Chairman then invited questions and discussion:

Tomas Garcia noted that HS2 had a project baseline carbon benchmarking scheme for new bridge designs but was not central to the project's procurement. The Chairman agreed that procurement was central to making the necessary step change. Hazel McDonald agreed that changes to procurement had to be top-down, from governments. Jim Hall believed that first capital monetary cost was always going to dictate decisions in local authority projects. Keith Harwood suggested that a carbon tax was needed to ensure carbon was properly addressed in new builds. The Chairman agreed, suggesting that this might take the form of a bespoke carbon cost for each project.

Before concluding this item, the Chairman noted that were some positive examples already in use, citing the work by Anglia Water in reducing carbon and the development of the SAVI carbon work. He also looked forward to working closely with the NZBG and agreed that Tercia could assist in facilitating this.

5. Historic Rail Estate bridges – National Highways

Via a virtual link, the Chairman welcomed Fiona Smith, a senior civil engineer with the Historic Rail Estate (HRE), part of National Highways, formerly known as British Rail Property Board (BRPB) who, in their own right, had previously been a member of BOF. Fiona in turn recalled that she had attended BOF herself about 14 years ago. Paul Thomas questioned whether HRE might consider re-joining BOF?

ACTION 11: Richard Fish

Richard Fish advised that he had put this item on the agenda in response to the controversy and some negative press coverage directed against HRE concerning the infilling of redundant bridges.

Fiona gave a short presentation which she agreed could be uploaded to the BOF website.

ACTION 12: Paul Fidler

Fiona began by describing the origins of the HRE which stemmed from the 1960s and the "Beeching" line closures. The privatisation of British Rail had led to the creation of BRPB charged with looking after the various assets or liabilities which included

3,080 bridges. There are now about 1,300 which carry a public highway and 99 of those are listed. Occasionally, by agreement, HRE transfer ownership to the relevant Highway Authority to promote recreational use (for example, five were recently acquired by Cornwall Council).

All HRE bridges are beset with the same problems as any others of that form and age, including ecology issues as well as routine maintenance and bridge strikes, leading to about 300 repair projects each year. In terms of infilling, current plans were to infill up to 12 bridges per year. Fiona acknowledged, however, the negative press, social media campaigns and questions in Parliament which had initially arisen over the works at Great Musgrave bridge in Cumbria. This was an assessment failure, even though repair works had taken place about ten years ago. HRE had conducted an options appraisal which had concluded that the cost of strengthening and infilling were similar.

The Chairman thanked Fiona for her presentation and for explaining what was clearly a controversial issue. He invited questions.

Paul Thomas empathised with HRE and felt that some of the press coverage had been unfair. Ben Wilkinson agreed, pointing out that many of HRE's problems were similar to those experienced by Network Rail. Paul asked if HRE might have the chance to better present their views in the context of the bigger picture regarding the management of their stock. Fiona replied that she had been in touch with New Civil Engineer and hoped to be given a chance to do this.

Graham Cole challenged the Great Musgrave decision, noting that the infilling had now precluded any future use of the old railway track bed. He also questioned the hyperbole in a statement from HRE that the bridge was a "grave risk to public safety" and wondered if the assessments had been in compliance with CS 454. He also pointed out that the new DMRB also contained a document, CG 304 entitled the Conservation of Highway Structures, and considered that HRE, as part of National Highways, must be obliged to comply with their own standards.

In response, Fiona confirmed that HRE had considered all options but the assessment, albeit to BD21 as it predated the new DMRB, was not the only issue; the arch profile had flattened in recent years with significant mortar loss from the intrados joints.

Hazel McDonald questioned whether a weight restriction could have been applied and suggested that HRE might improve their communication strategy. For the former, Fiona replied that HRE have no legal powers to restrict traffic over their bridges as this was a Highway Authority power. In terms of communications, Fiona acknowledged that improvements were now being implemented, including the establishment of Stakeholder Advisory Fora to better engage with other interested parties.

The Chairman thanked Fiona for her presentation and for answering the questions raised by the meeting.

6. Is there a link between Bridge Failures and Condition?

Richard Fish explained that he had received an enquiry from Fred Hartley of C&RT, asking if he knew of any papers on this topic. The only one that Fred had been able to locate was a US PhD dissertation from Utah University⁸. As Fred's approach had been shortly before this meeting, Richard had offered to put this item on the agenda.

Andy Featherby gave a short presentation which he agreed could be uploaded to the BOF website.

ACTION 13: Paul Fidler

Andy explained that C&RT had been in discussions with DEFRA (their "client") over their wider Asset Management Plans where this question had been posed. He went on to briefly describe the C&RT assets including 2, 970 bridges which are rated A to E in terms of condition and scored from 1 to 5 as a level of consequence of failure.

Andy cited a number of historical failures:

- Elland bridge in West Yorkshire – scour failure in 2015⁹.
- Plank Lane overhead bascule bridge in Leigh – counterweight failure in 2007 (This had been discussed at BOF 23¹⁰ and was a key driver behind the Hidden Defects Research).
- Wykewell bridge – hanger failure in 2019.
- Basford bridge in Leek – impact damage and spandrel movement.

The Chairman thanked Andy and invited questions:

Jim Hall suggested that focusing on the overall bridge condition could be misleading as it was more likely that failure would occur in a critical element, as had been the case in some of Andy's examples. He also asked why C&RT had not adopted the BCI scoring system; Andy replied that this was in order to be consistent in terms of condition monitoring with all other C&RT assets. They were however considering a possible change in their inspection regime to concentrate more on critical element defects. C&RT may also be moving towards bespoke management plans for some of their larger structures.

Hazel McDonald thought that even the BCI scheme was too coarse, especially on larger decks; she gave an example of a localised pothole in an otherwise good road surface which had not been noted and had eventually led to a punching shear failure. Keith Harwood suggested that there should be an emphasis on identifying pre-cursor events such as early signs of localised deterioration or corrosion.

⁸ [Bridge Failure Rates, Consequences, and Predictive Trends \(usu.edu\)](http://usu.edu)

⁹ [Elland's flood-hit bridge reopens after £5m build - BBC News](http://bbc.com/news/uk-12345678)

¹⁰ [Plank Lane Bridge \(bridgeforum.org\)](http://bridgeforum.org)

Shakil Rahman referred to the Elland scour failure and asked why early signs had not been identified during inspections. Andy replied that this had been an exceptional case: canals were generally low velocities, but a breach had occurred leading to an inundation from the nearby river which had dramatically increased the flow.

Nicola Head noted that most “failures” on TfL bridges were on expansion joints which never seemed to last as long as the manufacturers predictions. The Chairman expressed an interest in developing ideas on this, and for bearings, recognising the need to have a realistic life for such elements in order to better plan interventions. He asked for this to be added to a future BOF agenda.

ACTION 14: Richard Fish

Returning to the original question, the Chairman asked if anyone had knowledge of any relevant papers, they should be sent to Richard Fish for onward issue. He thanked Andy for his presentation.

ACTION 15: All

7&8. UKBB Research Proposals – Discussion and Prioritisation

Richard Fish explained the background to the proposal document which had been issued with the agenda for this meeting: UKRLG, via the CIHT secretariat and at very short notice, had asked each Board to provide a three-year programme of research needs. He and Keith Harwood had met with Liz Kirkham and agreed that a proposal based on the Grand Challenges, which was agreed to be the most appropriate approach, with an extra Grand Challenge 0 on Carbon and Net Zero introduced as an over-arching Challenge. The proposal had its limitations, not least in terms of probable timescales and budgets, but it had been well received by UKRLG at its initial review meeting. The next step was to prioritise projects ahead of the next UKRLG meeting.

The Chairman expressed some frustration at the speed at which the process had been instigated, recalling the previous, tried and tested approach which was for a BOF meeting to discuss and agree a list of projects for consideration at UKBB and onwards to UKRLG. That said, he thanked Keith and Richard for what he considered to be an excellent piece of work, especially with the linkage to Grand Challenges.

Hazel McDonald was also surprised by the process of requesting research ideas. She noted that she, Neil Loudon and Jason Hibbert (representing British national governments) had previously met to discuss research and together had recommended moving forward on issues such as overweight vehicles and fatigue-susceptible bridges. Hazel noted, however, that all Boards were in a similar position and, as yet, no-one had been given an indication of the available research budget which was unlikely to be announced until the spending review in the new year.

Keith Harwood thought that it was important to consider the structure of UKRLG and Boards, with the Asset Management Board (UKAMB) being recognised as the over-arching body. One of the things that UKAMB had requested was an easy-to-use

depository for all research and guidance documents. Although such a project could not be considered as “research”, it would be useful to have. It was suggested that this could be set up and managed by CIHT in their secretariat role. The Chairman recalled earlier searches for all Highways England and TRL research project reports which had proved to be fruitless.

Before considering prioritisation, the Chairman reminded the meeting of the process for academic research projects where proposals were presented to EPSRC as applications for funding. Hazel McDonald pointed out the alternative in Scotland which was to use the Scottish Road Research Board (SRRB) which was supported by Transport Scotland.

In terms of prioritisation, Tomas Garcia questioned how costs and benefits were to be measured. Hazel McDonald suggested that this would be the next step for individual projects, once they had been accepted by UKRLG.

Discussion extended into the process for scoring the proposals and also how to identify any others which might be included. It was agreed that both could be achieved by an email poll which Richard Fish would devise after giving the opportunity for other projects to be proposed. The results would be forwarded to Hazel McDonald for her to present to UKRLG.

ACTION 16: Richard Fish

9. Feedback from UKBB on 15th September 2021

This was the meeting at which Liz Kirkham had handed over to Hazel McDonald before standing down as Chair. The minutes had been issued with the agenda for this meeting but there were no issues raised other than under Item 9, Minutes of UKRLG, where Hazel McDonald noted that Gary Sterritt (Chair of the UKAMB) was considering a risk approach to asset management and had drafted a paper, “The Case for Investment”, for the DfT.

10. Ownership of National Bridge Management Guidance

Richard Fish had prepared a short paper that had been issued with the agenda for this meeting. He explained that he had drafted it initially for the UKBB meeting on 17th February 2021 but it had been deferred due to a busy agenda until the meeting on 19th May when it had been debated with a number of actions recorded¹¹.

The Chairman agreed with the sentiments of the paper, recognising the importance of consistency and avoiding fragmentation between organisations, especially road and rail sectors. He invited discussion.

¹¹ [minutes-uk-bridges-board-19-may-2021-v2.pdf \(ciht.org.uk\)](#)

Jim Hall echoed the point about having different standards for road and rail, suggesting that it was impractical to have a single source for all documentation. Referring specifically to BCI documents, Shakil Rahman noted that the original Atkins work and that now being used by LoBEG used similar algorithms. He also noted that work on risk-based prioritisation being undertaken in both road and rail sectors was also similar.

The Chairman hoped that UKBB would continue to lead on this as it seemed the correct body to control bridge documentation.

11. BICS Update

Graham Cole gave a brief update on the Scheme, noting that Steering Group meetings had now resumed. Progress had also been made in that the modular approach had been introduced about two years ago. The Scheme and Assessors' Manuals had also been updated and an Assessors standardisation day was due to be arranged towards the end of November. He noted that about 500 inspectors had registered with the Scheme and were working on their e-portfolios. Graham acknowledged, however, that there was a need for LANTRA to encourage those who had made good progress to complete the process. In terms of capacity, Graham noted that National Highways had commissioned WSP to support LANTRA and to assist with the development of the website.

The Chairman reflected on the genesis of BICS which had followed BOF discussions from over ten years ago. There had been a consensus that a national inspector competency scheme was needed. He went on to emphasise the need for all clients to get behind BICS and asked for updates. Nicola Head noted that the BICS requirement had been included in recent framework contracts and Ben Wilkinson added that new Network Rail contracts to be awarded in May 2022 would also incorporate a BICS requirement. The Chairman then invited further comments.

Trish Johnson asked about Scheme mentors; Graham Cole replied that mentors were encouraged but were not obligatory. Shakil Rahman thought that the general view in the sector was that BICS was over-complicated. Graham responded by stating that the benefits of BICS and the safety outcomes for the travelling public could not be over-estimated. Hazel McDonald confirmed this position and also that the steering group were working with LANTRA to improve their performance. She agreed that the WSP support was very welcome. Hazel also reported that a new BSI document would set out the requirements for competency schemes for high-risk buildings (as a consequence of Grenfell). She noted that BICS is a compliant scheme within the BSI competency framework.

Graham also reported that he had agreed to compare and contrast the details of BICS and the CSS Wales scheme as he believed that they were compatible and could possibly be linked together as a mutual scheme. He agreed to report on progress at a future BOF meeting.

ACTION 17: Graham Cole

Jim Hall reflected on the lack of capacity in smaller local authorities. For example, in North Wales, there are six councils but only three have a bridge engineer in post.

12. MCHW Update

Neil Loudon had been a late apology for this meeting and was therefore unable to give his presentation. It had, however, already been sent to Paul Fidler who would upload it to the BOF website.

ACTION 18: Paul Fidler

Graham Cole recommended a read of the latest ICE Bridge Engineering Journal (Volume 174, Issue 3, September 2021) which contains a number of interesting papers on the thinking behind the new DMRB standards.

ACTION 19: All

13. AustRoads Bridges Task Force Update

The Chairman gave a brief account of the strengthening of relationships between BOF and this group which was composed of members from all Australian State highway authorities and Waka Kotahi, the New Zealand Transport Agency. Both he and Richard Fish had attended parts of their recent meetings and an arrangement was in place to exchange minutes of meetings, although those from AustRoads will only be held on the members only area of the BOF website.

Several Task Groups were working on interesting projects; for example, Vic Roads (Victoria State highway authority) were promoting an Intelligent Access program to track heavy vehicles on key allocated routes on which bridges have been assessed to a known capacity. Hauliers pay a fee but in return are allowed to carry heavier loads, on condition that they remain on those routes. This was soon to be extended through weigh-in-motion sensors and smart on-board mass determination systems.

Hazel McDonald commented that this seemed similar to a scheme presently out for consultation by the DfT, first proposed by a Scottish haulier, to allow 48 tonne intermodal swap body vehicles to be able to use routes to railheads. Hazel also reported that PIARC were about to publish a study on the prevalence of overloaded vehicles across the world. She also noted the already proven consequences of heavier vehicles, in particular the effect of increased loads on carriageway pavement deterioration: a 10% increase in axle weight leads to a 40% reduction in carriageway life expectancy. Lastly on this topic, Hazel also reflected that safety concerns such as stopping distances and parapet containment for heavier vehicles need to be addressed.

The Chairman reminded the meeting of the VicTrack¹² project (fibre optic performance monitoring of bridges) which he had described at previous meetings but also pointed out that another AustRoads Task Group was about to start work on the wider subject

¹² [Home | VicTrack](#)

of bridge technology. He noted that any BOF member wishing to participate would be very welcome to do so.

ACTION 20: All

The Chairman then asked about post-construction monitoring initiatives being run in the UK. Trish Johnson reported that UKCRIC¹³ were undertaking a project on Clifton Bridge. Tomas Garcia, however, noted that no decision had as yet been taken on future monitoring of HS2 bridges. The Chairman suggested that monitoring of existing bridges might be a theme to be picked up on future meeting agendas and might include technology developments in fields such as Lidar and digital twins. It may also be worth considering a specific BOF on this topic with outside presenters being invited.

ACTION 21: Chairman/Richard Fish

Keith Harwood reported that Hertfordshire CC had used LIDAR to check overbridge headrooms but understood that there were significant issues over data storage capacity and the ownership of models. Tomas Garcia noted that he had been given a demonstration of a digital model produced by a UAV flying around a structure. Graham Cole reported that Hampshire CC had used a similar method to quantify concrete repairs on the Redbridge flyover on the outskirts of Southampton.

Before closing this item, the Chairman briefly described research in this area presently being undertaken at Cambridge.

14. Implementation of CIRIA Guide C764 Hidden Defects in Bridges

It had been hoped that Neil Loudon would have been able to have given an update on the publication of the National Highways guidance on the use of C764 but in his absence, was unable to do so. Richard Fish agreed to follow this up with a view to adding it to the BOF 69 agenda.

ACTION 22: Richard Fish/Neil Loudon

15. Performance of Weathering Steel Bridges

Richard Fish referred to an email request from Chris Hendy of the Steel Bridge Group asking for contributions to a survey on weathering steel bridges within 15km of the coast. This in turn was in response to the new DMRB document, CD 361, which discouraged the use of weathering steel within this limit.

ACTION 23: All

Although not specifically related, Tomas Garcia noted that HS2 were proposing to use weathering steel where there were low headroom issues which would prevent temporary access for repainting. Andy Featherby confirmed that C&RT also used the material where there was low clearance above water levels.

¹³ [Home | UKCRIC](#)

16. Updates on Current Bridge Issues and/or Research

The Chairman invited updates from member organisations.

a. TfL

Nick Burgess reported that LUL had no research budget as yet although this was being discussed. Nicola Head noted that her part of the organisation was working on some modifications to the BCI scheme which would be shared with BOF and UKBB in due course.

ACTION 24: Nicola Head

b. Network Rail

Ben Wilkinson reported briefly on the following:

- i. Fatigue testing of half through decks.
- ii. Post tensioned beam testing at BRE.
- iii. LIDAR and machine learning in conjunction with Waldeck and Huddersfield University¹⁴

c. HS2

Tomas Garcia reported the following:

- i. HS2 have been developing some Departures from Standard for precast segmental construction and are hoping to have the present moratorium lifted.
- ii. Precast parapets were being subject to dynamic testing in order to meet Eurocode requirements.
- iii. HS2 were using a bespoke optimisation system of various bridge metrics aimed at minimising materials, with a potential saving of up to 20% for steel composite bridges.
- iv. Another project was considering carbon reduction options by designing to *actual* steel strengths.

d. Transport Scotland

Hazel McDonald briefly reported on monitoring of the new Burnshot bridge in Edinburgh which was being carried out by SRRB in conjunction with Mott MacDonald and James Fisher. She also advised that other locations had been agreed for scour monitoring with Strathclyde University, following that completed on Nith bridge.

e. Railway Paths

Reflecting on the earlier HRE presentation, Paul Thomas reported that RP were about to demolish two bridges but had obtained planning consent and completed Heritage Statements. Paul also noted that he was considering the replacement of timber decks with GRP. He agreed to report on this at a future meeting.

ACTION 25: Paul Thomas

¹⁴ See Colin Hall report at BOF 64.

f. Big Bridge Group

Although there had been no recent meeting of this group, Trish Johnson reported on the following:

- i. Tamar bridge had just completed a resurfacing scheme using Gussasphalt just 42mm thick.
- ii. Humber bridge were introducing free flow tolling and were investigating how best to manage the back-office transactions.
- iii. As mentioned previously, Clifton bridge was being used as a UKCRIC project with a digital twin being modelled.
- iv. Clifton was also being used for research into wind loading by COWI, Leeds University and their Chinese partner.
- v. A carbon study was also underway at Clifton which was hoped to measure the benefits from using local contractors. Trish agreed to share this in due course.

ACTION 26: Trish Johnson

- vi. Lastly, Trish mentioned the ongoing issue of suicide prevention for which most big bridges were being challenged on their policies and implementing measures. For example, following recent cases, Humber bridge were closing footways at night and Clifton were reviewing their responsibilities under their duty of care. Trish suggested that a review of best practice might be beneficial. It was agreed that this should feature on the BOF 69 agenda.

ACTION 27: Richard Fish/All/Trish Johnson

g. ADEPT

Reflecting on the suicide issue above, Keith Harwood noted that suicides were not limited to big bridges and suggested that legal advice on bridge owners' responsibilities and liabilities might be worth considering. Keith also reported that Warwickshire CC were using LIDAR on older bridges for heritage reasons.

h. Forestry England

Malcolm Cattermole reported that he was using FRP as a trial for a replacement bridge that had failed. He also noted that FE's forest roads (used for harvesting timber) had their own carbon issues due to damage to peat deposits.

i. HRIG

Graham Cole reported on a multi-span masonry viaduct which was being assessed under a bespoke loading which was being undertaken by Adrienn Tomor of Brunel University and included both monitoring and analysis.

17. Bridges 2022 Conference and Awards

Richard Fish reported that the 2022 Bridge Conference was to be held at the Coventry Building Society Arena (formerly the Ricoh) on 9th and 10th March¹⁵.

¹⁵ [Bridges - Design and Engineering Conference \(tn-events.co.uk\)](https://www.tn-events.co.uk)

The format would follow that from 2020 with the second day being devoted to workshops. He was liaising with José Sanchez on the detailed programme.

ACTION 28: All

The Awards scheme was also to be repeated and Richard was also discussing categories with José, including another BOF lifetime achievement award. It was suggested that a carbon award might be appropriate.

ACTION 29: Richard Fish

18. BOF Subscriptions

The Chairman reported BOF subscription rates were unchanged and that invoices for 2021/22 would shortly be issued. New accounting procedures, however, now meant that Purchase Orders were required.

ACTION 30: Chairman/All

19. Any Other Business

- a. Andy Featherby asked for a recommendation for suppliers of ultra-sound thickness gauges. Hazel McDonald suggested Cygnus.
- b. Paul Thomas reflected on the email from Bill Harvey which Richard Fish had forwarded after Bill had been awarded the BOF Lifetime Achievement Award, and Bill's illness and fund-raising cycle rides. The meeting concurred that Bill should be congratulated on his achievement.

ACTION 31: Richard Fish

20. Next Meetings

Although BOF 69 had originally been scheduled as a Zoom meeting, the Chairman reflected that returning to face-to-face for BOF 68 had proved to be so successful, not least with the additional benefits of more informal conversations during lunch and coffee breaks, that it would be worth considering face-to-face in the new year. This was generally supported by the meeting. There was also an issue with the 25th January date and it was agreed that Richard Fish should send an email for preferences for virtual versus face-to-face and for either 18th January or 1st February 2022.

ACTION 32: Richard Fish

BOF 70 was confirmed as being hosted by Rochester Bridge Trust on 13th and 14th June 2022.

ACTION 33: All

The exact programme for the two days was yet to be confirmed but, as well as the meeting, would include site visits and a dinner.

ACTION 34: Richard Fish/Sue Threader

21. Close

The Chairman closed the meeting, thanking everyone for their contributions.

Richard Fish,
BOF Technical Secretary,
21st December 2021