ADEPT ENGINEERING BOARD
NATIONAL BRIDGES GROUP

MEETING NOTES

Venue: Online Video Conference due to Covid 19 Pandemic

Date and Time: 10:30hrs on Wednesday 2 March 2022

Present:

Keith Harwood (Chair) [KH]	Hertfordshire County Council
Kevin Dentith (Vice Chair) [KD]	Devon County Council
James Salmon (Secretary) [JS]	Bedford Borough Council
Jim Hall (Chair Wales) [JiH]	Denbighshire County Council
Mark Watson (Chair Yorks/Humber) [MW]	Doncaster Borough Council
Claire Richardson (Secretary Yorks/Humber) [CR]	Kirklees Council
Chris Wright (Chair West Midlands) [CWr]	Herefordshire County Council/ Balfour Beatty
Chris Plant (Secretary West Midlands) [CP]	Staffordshire County Council/ Amey
Richard Waters (Chair East Midlands) [RiW]	Lincolnshire County Council
Abul Tarafder (Secretary East Midlands) [AT]	Leicester City Council
Donald MacPherson (Chair SCOTS) [DMc]	Aberdeenshire Council
Brian Hill (Chair South East) [BH]	Hampshire County Council
Alan Mclean (Secretary South East) [AMc]	Surrey County Council
Julian Haines (Chair South West) [JuH]	Wiltshire Council
John Burridge (Secretary South West) [JB]	Dorset County Council
Stuart Molyneux (Chair North West) [SM]	Salford City Council
Colin Jenkins (Secretary North West) [CJ]	Warrington Borough Council
Alastair Swann (Chair North) [AS]	Newcastle City Council
Nigel Burn (Secretary North) [NB]	Gateshead Council
Colin Ferris [CF]	Department for Infrastructure Northern Ireland
Clive Woodruff (Chair Eastern) [CWo]	Essex County Council
Philip Gray (PG)	Transport for London

Adam Thomas [ATh]	Geobear
Adrienn Tomor [ATo]	Brunel University
David Parkes [DP]	Intowaste
Adam Baldwin [AB]	Devon County Council
Alistair Dore [AD]	Historical Railways Estate

ITEM		ACTION
1.	**APOLOGIES AND INTRODUCTIONS**	
1.1	**Apologies for Absence** Colin Hall – Network Rail Andy Matthews – WSP Christian Brew – Isle of Man	

1.2	**New Members** Mark Watson – Doncaster Borough Council, Chair Yorks/Humber Claire Richardson – Kirklees Council, Secretary Yorks/Humber	
2.	**GUEST PRESENTATIONS**	
2.1	**Use of geopolymers in stabilising structures/embankments** **Adam Thomas, Geobear**	
2.1.1	Geobear are an international company, formerly known as Uretek.	
2.1.2	Geopolymers are expandable resins injected into the ground for void filling, ground improvement and reducing water pathways. Most cure to 95% strength within about 60 seconds, expand between 5-30 times liquid volume, can be used from -15 degrees C to 60 degrees C, actively repel water, have more than 10MPa strength and a design life of over 120 years. They are typically used on structure approaches or under run on slabs to cover for water damage, voiding, poor compaction or burrowing animals, but can also be used to lift concrete slabs and structures if required. In addition, they can provide foundation/subgrade strengthening and slope stabilisation. They permeate and compact gravels, whereas they create lenses to confine clay soils through fracturing and confining.	
2.1.3	Installation is from a self-contained vehicle through drilled 12/16mm diameter steel tubes, ground movement is checked to 0.25mm readings during installation and the amount of geopolymer inserted is measured. They are safe to install near drinking water sources, have a significantly lower carbon footprint than cement grout and can treat up to 200m^2 of run on slab. There is minimal plant, muck away, vehicle movements or temporary works, plus TM can be removed every shift as they cure very quickly.	
2.1.4	<u>Examples:</u> Swanage Sea Wall – about 30m^3 of void filled to prevent unforeseen collapses over 3 days. A6 bridge approach strengthening – poorly compacted fills/badger presence over 21 shifts. Brougham Old Bridge – partial collapse to pier from scour, injected into weak supporting soils over 5 days A83 Argyll and Bute void filling and ground improvement – partial collapse of sea wall washed out fill – ground improvement works over 3 days. M11 Girton Interchange – ground improvements	
2.1.5	<u>Questions:</u> RiW – An advantage for underpinning historical structures was no requirement for an archaeological watching brief. But how is the material excavated/how is drainage managed? A – Excavation can take place by hand or be jetted out if competed early, a drainage survey and replacement of any required drainage items can be completed beforehand, then the material can be monitored during injection.	
2.1.6	JiH – Does the material have any compressive strength, as it can be excavated? A – yes, the densest products up to about 6MPa, the more standard ones at about 100kPa.	

2.1.7	CR – Where is HAPAS approval/where are these products covered in the DMRB? A – BBA approved, but currently going through HAPAS approval. Covered in Series 1000/2400 in the SHW.	
2.1.8	CR – Can we expect similar cost savings in small projects? A – think so, but depends on application and site. TM costs are reduced significantly.	
2.1.9	CR – Will it cure whilst still moving? A – it will cure whilst in its liquid form, but this varies in different soils. It will form a bulb in granular soils and travel about a metre and a half in a lens in clays. Made ground is more difficult, as it will form pathways. It can work in thin peat, but is not effective in thick peat.	
2.1.10	JS – How does this work for slip failure scenarios? A – would need to model to see if it would work, would also need a decent ground investigation. A follow up presentation on this is planned by KD.	
2.1.11	JS – What should happen to burrows filled with animals during installation? A – would migrate animals (i.e. badgers) first.	
2.1.12	CJ – In a scenario with a boundary wall collapsing, trees behind it and the remaining wall proved as providing simple cladding only (from a ground investigation), can the product be damaged by tree root, be relied upon and would it push the wall over? A – the geopolymers will cut off water supply to the tree roots. Temporary works would still be needed for the wall, but it may be mitigated by the product to some extent. (To be discussed further offline).	
2.1.13	MW – how big a void can be filled with the materials? A – there isn't really a limit, but it depends on the bearing strength needed.	
2.1.14	BH – is it odourless? A – no, there is a smell but only in the curing phase.	
2.1.15	BH – who does any site investigations? A – the client organises them.	
2.1.16	BH – how are utilities managed? A – tend to keep 0.5 metres away from them.	
2.2	**Merits of masonry arch bridges and case studies from Tanzania Adrienn Tomor, Brunel University**	
2.2.1	KD introduced, explaining that far less is spent in maintaining masonry arches than concrete/steel bridges. They typically avoid substandard parapets, waterproofing, post tensioned special inspections, joints and bearings issues. Construction uses local materials/workforces, they last for longer than other forms of structure, have less inspection/disruption during maintenance and look more aesthetic than some other bridge options. Research is currently ongoing into off-site construction and craneage, as this leads to faster builds on site.	
2.2.2	About 40% of bridges in Europe are masonry, but there are few in the US/China. About 70 no. masonry arch bridges, with a mixture of segmental and semi-circular shapes and varying from small culverts up to about 8m spans, are currently being built in north Tanzania. Belgians are	

	delivering the foundations and the centring, which is reusable. These are proving far more cost effective than alternative steel/concrete forms. Feasibility for UK construction has also been investigated, but they are not suitable for long spans or railway bridges with short possession periods.	
2.2.3	CD 376 Unreinforced masonry arch bridges and Chinese JTG D60-2004 and JTG D61-2005 are available, but another guide "Stone arch bridges – A practical manual for local governments" is currently being drafted by Enabel. Digital technology investigations are currently taking place to change from small-scale to large-scale construction. i.e. design software, robotic/digital stone masonry construction, sensor technology, asset management, BIM.	
2.2.4	<u>Pending training events:</u> Masterclass, new stone bridges, 2 March 2022 Bridges 22 Conference, 9 March 4 no. workshops to register for in April – June 2022 Brunel bridge inspection course, May 2022	
2.2.5	<u>Example:</u> Bridge Valley Road, Bristol UK – stone masonry option about 30% more expensive than steel alternative. But as well as reduced maintenance, life expectancy of stone masonry is expected at 300-500 years (cf: 100-200 years for steel), so about 50% more cost effective over its whole life. Carbon emissions about 75% and 65% lower in maintenance than steel and concrete respectively. Environmental impact should also include life expectancy, maintenance and associated traffic delays.	
	<u>Questions:</u>	
2.2.6	JiH – do you have any tools for CO_2 on whole life costs? A – not at present, we are looking for people with the data to assist. KH – people are currently working on this, the Net Zero Bridge group (Brian Duguid), maintenance/whole life a challenging area.	
2.2.7	KH – suggest updating the presentation to measure percentage of arch bridges by area rather than number. KD - will provide this.	KD
2.2.8	KH – future whole life costs should be discounted, so can this be done? A – willing to investigate, please share any tools currently present.	
2.2.9	JS – how do you plan to go about an overall "one-stop shop" service? A – there are plans to produce standardised design processes, but not necessarily construction (due to vehicle movements).	
2.2.10	CJ – what about the use of reinforced masonry, as this allows more pre-casting, with connection then possible at hinges. A – not looking to use this, as it creates hidden elements and future maintenance issues.	
2.2.11	JiH – how can an arch be lifted and kept in compression? A – temporary works need to be resolved, but it is currently thought this would include leaving the centring in place. JiH offered to circulate pictures from an arch constructed about 10 years ago.	JiH

2.3 2.3.1 2.3.2 2.3.3 **2.4**	**Use of recycled tyre bales in retaining walls and embankments – David Parkes, Intowaste and Adam Baldwin, Devon CC** About 45 million recycled tyres per year are available in the UK and these are largely baled for landfill and construction use. Each bale takes about 110 tyres and is held together with galvanised steel wires. PAS 108:2007 is available to specify the production of tyre bales. Typical tyre bales are about 1.3m x 1.55m x 0.8m and weigh about 800kg, hence they will float. They are very permeable, give strength and have a long life. Burying in soil embeds a lot of carbon (about 2.2 tonnes per bale) and a lot of bales can be carried on vehicles due to their light weight. They are substantially cheaper than aggregate backfills and the memory of original tyre shapes is lost over time. There is very little creep when they are loaded up. There is a U2 waste exemption for up to about 100m^3 of tyre bales. <u>Examples:</u> A421 Bedford Bypass – used with Leca lightweight aggregates as infill material A30 Crawley, Devon – using tyre bales to reduce backfill behind cantilever retaining wall (sometimes used in conjunction with ground anchors). Strapped down to prevent any buoyancy effects. Hoping to be on site this financial year. <u>Questions:</u> JB – if they are used in combination with granular fill, how would migration of fill into voids be prevented? A – could consider wrapping in Terram or covering in geogrid. Longevity largely better than shingle. **Future presentation options suggested:** Philip Gray – expansion joints Keith Harwood – achieving social value through active travel and subway maintenance James Salmon – Rights of Way structures	
3.	**MINUTES OF MEETING HELD ON 30 September 2021**	
3.1 3.2 3.3 3.4 3.5	**Accuracy** – agreed, but draft to be taken off the minutes when stored. **Actions/Matters Arising** 3.5 – closed out 3.7 – KD to set up small working group on CSS BCI process 4.13 – closed out 18.1 – ALL to share ABG minutes via the NBG Secretary.	**JS** **KD** **ALL**
4.	**SAFETY ITEM – LONE WORKING**	
4.1	Attendees shared some of their current working practises:	

	RiW – use a small device (Amber Alert) to track location, which has a "man down" feature and can be updated. Response contacts/times and the use of call centres in operation. JiH – wearing of lifejackets in and around watercourses added recently. KD – now replaced lifejackets with portable flotation devices. Have GPS devices. Discussion of working alone near water – not generally done, water awareness training given. Night working – buddy systems in place, sometimes using call in centres. But also consider trip to site. Devon CC/Bedford BC offered to share lone working processes.	**KD/JS**
5.	**ADEPT ENGINEERING BOARD**	
5.1	Last meeting held on 28th January 2022. KH introduced himself and noted that proposed topics at the ADEPT NBG were collaboration with C&RT, HRE, ADEPT Rights of Way groups, and carbon calculation tools were discussed. An issue was discussed where a local authority was not aware of their ownership of a cycleway but were held liable for consequences of an accident. Data can have a safety implication.	
6.	**UK BRIDGES BOARD**	
6.1	Hazel MacDonald is now the chair. DfT are expected to fund the Boards who will prioritise their own research needs. UKBB priority list is complete, but still awaiting funding. HE/LA boundary guidance document about to be published. Richard Fish reintroduced his paper on guidance documentation and the need to have owners and updates. The immediate action, led by KH, is to list all such documents. Highways England are working on the Temporary Bridges Portal, which will be of assistance in procuring temporary bridges in an emergency	
6.2	Parapet height protocol (NR) under development and soon to be published. Brian Duguid presented on Net Zero Bridges, providing a knowledgeable and informative presentation. A particular point is that the operations (extending life) phase of a project can have a significant impact on carbon footprint. Hope to invite Brian, or colleague to a future ADEPT NBG meeting.	**KH**
7.	**BRIDGE OWNERS FORUM (BOF)**	

7.1	Last meeting held on 1st February 2022. KH to circulate a link to the final version of minutes with a summary of the key points Neil Loudon spoke about the hidden defects protocol. This is likely to follow on from previous drives on scour and PTSIs. Neil Loudon also discussed the MCHW and an upcoming section on scour management. BOF are still hopeful that BICS will be widely adopted. Graham Cole discussed the alternatives with CSS Wales and will be passing on his thoughts to LANTRA. Campbell Rose, CEO of Eloque and VicTrack, Victoria, Australia gave a presentation on the use of fibre optic strain sensors combined with artificial intelligence to measure performance and change in response of a structure. With time this could become a viable alternative to existing sensor technology, improve understanding of structural behaviour, reduce risk, and reduce the need for inspection.	**KH**
8.	**NETWORK RAIL ISSUES/LIAISON**	
8.1 8.2 8.3 8.4 8.5	SM met with Colin Hall of Network Rail on 10th February and reported back to the group. No feedback yet given from the letter sent by Hazel MacDonald, where it was suggested Network Rail are allowing the condition of structures to deteriorate to 24 tonnes of capacity. SM will send an email round to confirm those who will contribute to the group working on joint liabilities. RiW advised that HRE appeared to following the same approach. It was queried whether they have the same liabilities as NR, as they are not a transport authority. A question has been left with Network Rail as to whether LAs could share BAPAs for works or PIs. CJ commented that DfT guidance on what capital funds can be used for did not include Network Rail or Rights of Way bridges. CJ to research and confirm whether there is an issue, and then update the group at the next meeting. Network Rail has now launched its Asset Protection Customer Experience (ACE) – a portal that has to be registered for. JB raised concerns with a local Network Rail contact's refusal to install VRS on the approaches to a bridge because its RVI score was only 85. CWo advised that sign offs need to be completed by bridge owners.	**CJ**
9.	**BRIDGE STRIKE PREVENTION GROUP (BSPG)**	
9.1	KH to chase Chris Rook to be come to next meeting.	**KH**
10.	**ABNORMAL LOADS LIAISON GROUP**	
10.1 10.2	No update from group. KH to raise through Hertfordshire, SH and UKBB.	**KH**

10.3	CP, JS and KH all raised concerns in relation to the National Heavy Loads group not being maintained. CJ to pass on presentation on problems with abnormal load routes to the group for circulation. The pressure on local roads to be raised at UKBB	**CJ** **KH**
11.	**EUROCODES – Update**	
11.1	Awaiting issue of CIRIA guide on masonry arches and research from Sheffield University.	
12.	**ASSET MANAGEMENT**	
12.1	"The case for investing in highway maintenance" document has been prepared by Asset Management Board for DfT, to justify investment in highway maintenance to Treasury. KH recommended it as a good read and shared a few slides – link here: https://ukrlg.ciht.org.uk/media/15247/the-case-for-investing-in-highway-maintenance_final.pdf	
12.2	New Chair of Asset Management Board to be announced. Post-meeting note – new Chair is Neill Bennett (Derbyshire) and Vice Chair is Janvi Shah (National Highways)	
12.3	KH – SAVI new version will be updated for asset valuations within next few weeks.	**KH**
13.	**HISTORICAL RAILWAYS ESTATE**	
13.1	AD expects to attend the winter meeting, but not the summer meeting. Initial point of enquiries is the HRE enquiries email account at hreenquiries@nationalhighways.co.uk	
13.2	AD advised that all potential historic bridge demolition or infilling schemes will now be subject to planning and will now require national ministerial approval.	
13.3	KH had taken part in the HRE Stakeholder Advisory Forum, which is considering the processes to manage such works, particularly infilling, and will review any such proposals in future	
13.4	RiW raised concerns around HRE not wishing to undertake investigations to determine the presence of backing behind an arch. AD to ask colleague to contact RiW.	**AD**
	Discussion Items	
14.	**MASONRY ARCH BRIDGE RESEARCH**	
14.1	Nothing further to report at present.	
15.	**CANAL AND RIVER TRUST - UPDATE**	
15.1	The fees/charges document is on the ADEPT website. RiW advised that the new system was working well in his experience, but MW advised	

	difficulties in fixing an electrical cable to a soffit (outside of the agreement). Link to document here: https://www.adeptnet.org.uk/documents/adeptcanal-and-river-trust-guidance-note	
15.2	KH attended a DEFRA stakeholder feedback meeting on 18th January representing all of ADEPT. This is preparation for the next funding which will be awarded in 2027. Highlighted the importance of engineering and asset management, and of collaboration with highway and planning authorities	
15.3	Annual meeting between ADEPT and CRT Leadership is later this week. KH to pass on feedback on guidance document.	**KH**
16.	**RIGHTS OF WAY STRUCTURES**	
16.1	JS advised his current plans to develop national guidance on the management of Rights of Way structures. This would include topics such as ownership, inspections, parapets, maintenance plans, new bridge designs, procurement, access and unauthorised use. This will be discussed locally in Bedfordshire prior to passing on to the Eastern and then national groups for discussion and sign off.	
16.2	KH to advise details of Herts CC PRoW team for consultation. CWr to pass on historic details from Herefordshire on their management.	**KH, CWr**
17.	**BICS ALTERNATIVE SCHEMES**	
17.1	No current updates.	
18.	**KNOWLEDGE HUB SHARING ABG MINUTES**	
18.1	It was agreed that all Area Bridges Groups would share their minutes via the NBG Secretary (to be issued immediately prior to next National meeting), but that they will not be saved on the Knowledge Hub.	**ALL**
19.	**AOB**	
19.1	CR advised she was hoping to report back on surface water attenuation ideas at a future meeting – to be placed on to the next meeting agenda	**CR/JS**
20	**FORTHCOMING CONFERENCES AND EVENTS**	
20.1	9th March – Bridges 2022 conference, Coventry. 8th June – NCE Bridges Conference, virtual event	
21	**DATE AND VENUE FOR NEXT MEETING/S**	
21.1	Wednesday 22nd June 2022, hybrid meeting preferred (if possible). JS to query Westminster Archives facilities.	**JS**

	Meeting closed at 16:05 Hrs	