BOF

Bridge Owners' Forum

BOF 62

BOF 61 ACTION UPDATES:

10   Eastham Bridge Collapse

Following BOF 61, an FoI request was sent to Worcestershire CC for the report into the May 2016 collapse and the inspection/assessment history of the bridge.

There is an FoI requirement that information released must be for personal use and not widely shared or publicised unless special permission has been given; this has not been requested. The following is a factual summary of key points in the information received.

The report into the collapse was prepared by CH2M for WCC. The first draft was dated July 2016 but the "First Issue" is dated October 2018.

The original bridge dates from 1793 and taken over by WCC in 1898 when the south arch was rebuilt. It was Grade II listed in 1052.

Span arrangement: 8.38m – 10.36m – 8.38m.

The report suggests that the collapse was triggered by "some form of failure" of the south (right) pier

The report states that there was some loss of masonry on the south pier which had been attributed to scour.

The last PI was in 2011 with GIs in 2013 and 2015 and there had been diving inspections every year from 2010. Scour damage had been identified at the south pier but no undercutting.

The bridge was only ever assessed using MEXE; in 1969 ALL = 11t but in 1995, ALL = 40t, presumably due to improved condition factors.

The bridge was examined by divers after the collapse. No other causal evidence was identified and failure was attributed to scour which had developed during the winter of 2015/16. This inspection also noted a "willow bough" on the river bed in line with the south pier and questions whether this had changed the flow pattern and exacerbated scour. *[NB As proved by the BOF supported Exeter University Research Project].*

The report also considers whether more should be done to better manage WCC's bridges, highlighting the effects of debris, the need for bridge inspectors to be competent (with specific reference to BICS), better management of high-risk scour sites (with reference to CIRIA report C551 – although only the 2002 version is referenced). There is also a commentary on various scour measurement methods.

There are no recommendations as such, other than that asset management "enhancement opportunities" should be considered by WCC.

16   BOF Research Projects

The following list shows research initiatives/projects and their status as noted by BOF members in the last three years:

BOF 50 - November 2016:

No research discussion; meeting dedicated to a Grand Challenges workshop.

BOF 51 – January 2017

BOF initiated research summary
- Bridge Inspector Certification Scheme
- Safety Critical Fixings
- Deterioration Modelling
- Hidden Defects in Critical Bridge Components (CIRIA)

BOF 52 – March 2017:

- CIRIA Flood Impact Research: noted by Wayne Hindshaw.
- Investigation into UK highway bridge collapses: call for a RAIB type body.
- Hidden defects: progress report.

BOF 53 – July 2017

Network Rail:
- Risk based inspection frequency.

TII:
- Settlement behind integral bridges.

BOF 54 – October 2017

Themed meeting on scour.
- Effects of debris: Exeter University
- Detection by changes in natural frequency: CUED
- BridgeCat: Gaist Solutions

Other:

Network Rail:
- Bridge clearance measurement from moving vehicles.
- BIM modelling of existing bridges
- FRP design guidance
- Audio hammers for inspection

BOF 55 – January 2018

General:
- Safety Critical Fixings: HE presentation.
- Utterberry: presentation.

TfL:
- satellite monitoring of Waterloo bridge.
- Laser scanning of tunnels (LUL)

Welsh Government:
- Resilient Materials for Life (M4L); Cardiff and Bath Universities.

Network Rail:
- FRP Bridge Design Guidance: as developed at Warwick University.
- Deterioration Modelling: state-of-the-nation type report on the various methods available.
- Structural Health Monitoring: extension of the CSIC work, including design verification.
- UAVs "in construction": mainly for the use in asset management.
- Grouted Anchors: a best practice guide.
- Culvert Trash Screen Management.
- SEEBridge (Semantic Enrichment Engine for Bridges)
- Data Interpretation of the Staffordshire Alliance Bridges
- Visual Modelling from Video: virtual model of a bridge from video footage.
- Cyberhawk: drone company; the output from such a survey is considered equivalent to a Visual Examination as well as producing a 3-D model.
- CBDG: new guidance.
- In2Rail:
- Masonry Assets: a more granular approach to managing masonry assets.
- UKRRIN: UK Railway Research and Innovation Network

BOF 56 – March 2018

Transport Scotland:
- Overweight vehicles issues.
- Parapet heights.

HS2:
- Derailment impact loads on rail overbridges.

BOF 57 – May 2018 (Arch Bridge Special)

Agreed UKBB Research Proposals:
- Provision of Parapet Systems on Local Roads
- Bridge Deterioration Rates
- Assessment Guidance for masonry arches
- Revamped Structures Toolkit

Transport Scotland:
- Scour probability

Welsh Government:
- Scour Risk Map

Highways England:
- Driving Stability in High Winds

Railway Paths:
- Use of Linseed Oil for Wrought Iron

Network Rail:
- Over-height Lorries campaign
- In2rail Horizon 2020 (digital twins)
- Artificial Intelligence
- Train Mounted Sensors
- Micro-wave Technology
- Environmental (salt based) Deterioration
- Inspection Reliability

BOF 58 – November 2018

Network Rail:
- Loading compatibility with the European loading model.
- Fatigue in metallic bridges.
- Panoptic bridge management.
- Real time SHM.
- Engineering Competencies.
- Machine learning.
- BIM Models from LIDAR.
- Scour sonar techniques.

ADEPT
- Structures Toolkit.

Transport Scotland
- Scour detection appling Bayesian network theory..

CUED
- Scour: Gaist Trial.
- Satellite Monitoring
- Offsite manufacturing

BOF 59 – January 2019

UKBB Research Proposals
- Guidance for Road Restraint Systems on Local Roads.
- Gap analysis for Strategic Bridge Management.
- Human factors in Asset Management Decision Making.
- Research into the extent and consequences of overloaded HGVs.
- Review of state-of-the-art Sensors for corrosion detection in Reinforced Concrete.
- Improved understanding of Deterioration of Concrete Bridges.

BOF 60 – March 2019

No specific bridge research issues discussed.

BOF 61 – May 2109

Transport Scotland:
- Scour detection at Nith Bridge in Ayrshire.
- Wind speed thresholds on the Queensferry Crossing.

Highways England:
- DMRB rewrite and the
- SMIS replacement

Network Rail
- BIM modelling through high resolution imaging.

TfL
- Masonry Arch Assessment Guidance
- Risk Based GI Guidance

Clifton Bridge
- Parapet height trials for suicide prevention

London Underground
- Risk based approach to cast iron structural elements,

HS2
- Bridge support offsets in the context of derailments.

ADEPT
- Structures Toolkit
- Bridge Performance Indicator Guide.

CUED
- Satellite monitoring to identify potential scour problems.

17   Feedback from the 2019 Bridges Conference

After extensive email exchanges, the organisers eventually gave the average score of the presentations as 3.80 out of 5.

The most popular sessions were:

- Bridge strike management and prevention
- Pecha Kucha
- The safeguarding and strengthening of Exe Viaduct
- The conservation of the Iron Bridge in Telford.
- The Bridge Inspector Certification Scheme – dispelling the myths.
- Assuring the whole-life safety of bridge infrastructure.