Westmorland & Furness Council

Half Joint Bridges – Closure of Brigsteer and Underbarrow Road Bridges over the A591

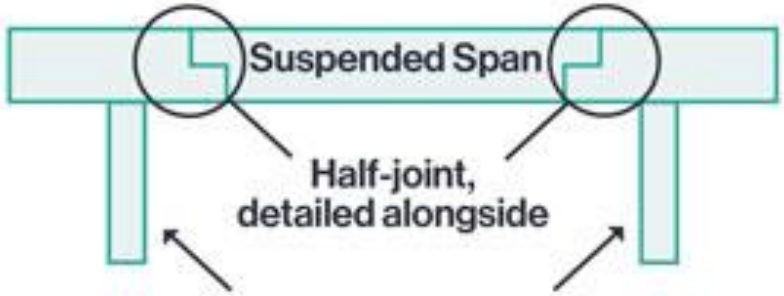
Public Meeting at the Underbarrow Institute

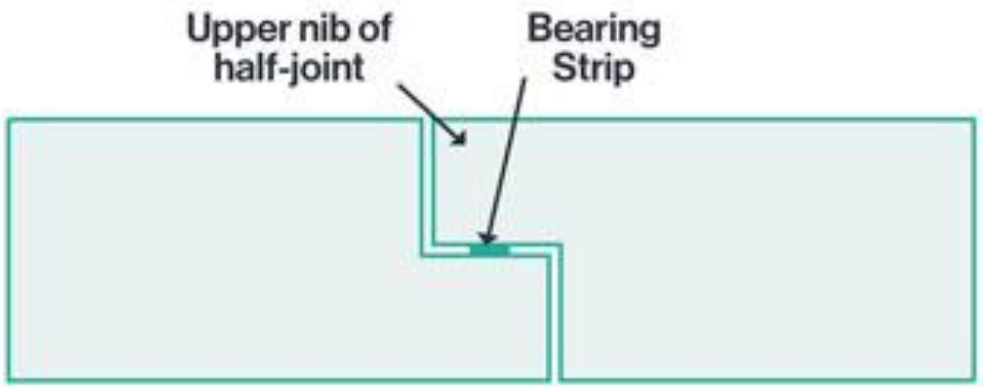
Thursday 11 July from 7pm to 8.30pm

Background to Half-Joint Bridges

Half-joints are used on multi-span bridges where the ends of the adjacent spans do not align with the supports. Typically, a cantilever extension of the side span (or pier crosshead) terminates in a half-joint, providing support to the central “drop-in” span.

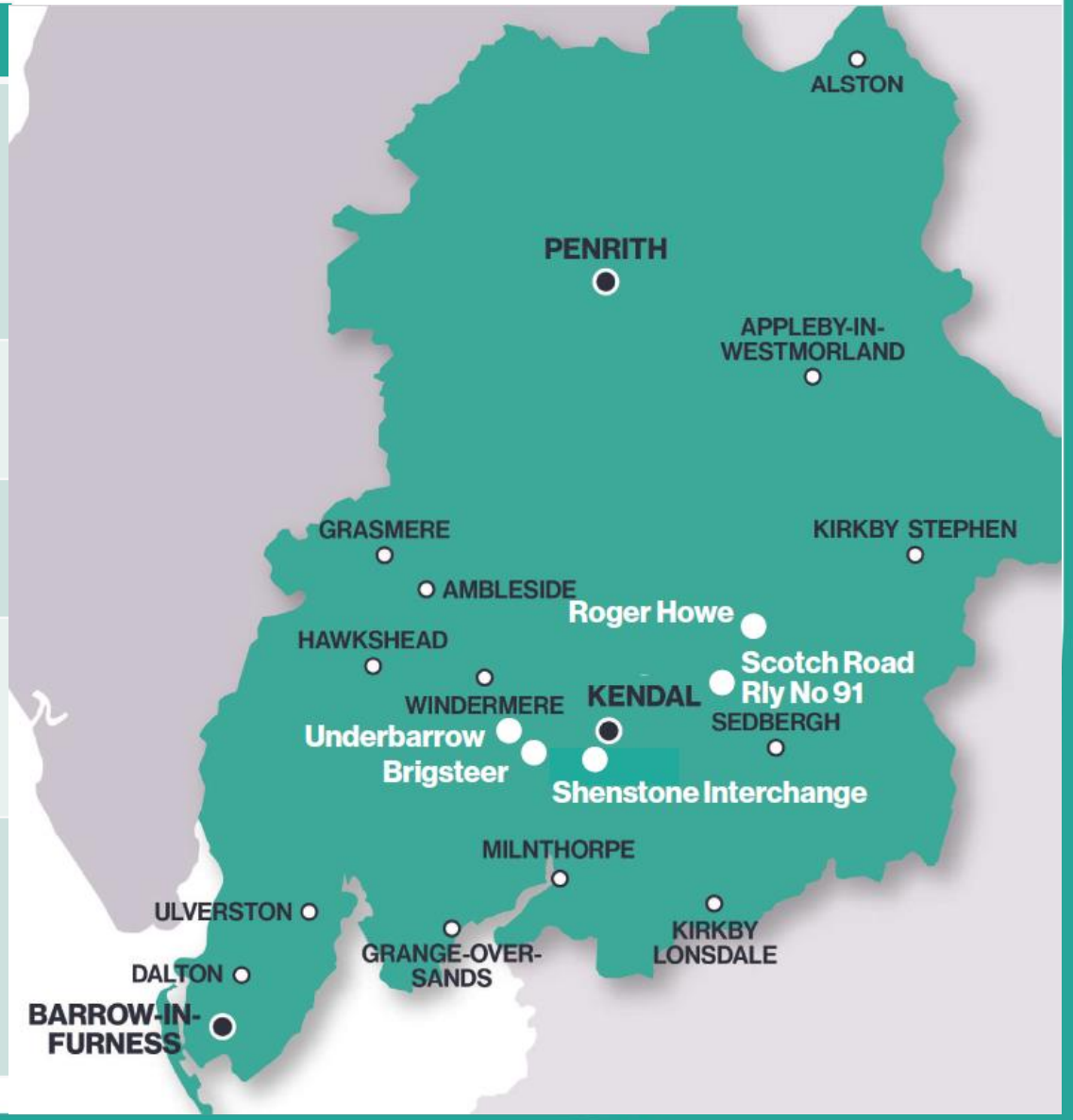
Brigsteer and Underbarrow are reinforced concrete post-tensioned half-joint bridges built from 1970 to 71.





Our five half-joint bridges in Westmorland & Furness

Bridge	Road	Capacity
Shenstone Interchange	A591 Kendal Bypass over A6 Milnthorpe Road	No restriction to normal traffic
Scotch Road Railway No 91	U5290 over River Lune	3 tonnes
Roger House	A685 over River Lune	26 tonnes
Brigsteer	C5062 Brigsteer Road over A591 Kendal Bypass	Zero
Underbarrow	C5048 Underbarrow Road over A591 Kendal Bypass	Zero



Half-joint bridges gone wrong

De la Concorde Overpass, Laval, Canada

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- Built in 1960s
- 30 Sep 2006, half-joint failure caused the central drop-in span to collapse onto the road below
- 5 fatalities, 6 injured

SCOSS
Standing Committee on Structural Safety

TOPIC PAPER

SC/08/009 BRIEFING NOTE

The partial collapse of the 'de la Concorde' overpass bridge: Laval, Canada

Lessons for the UK

The Commission of Inquiry concluded that the fate of the structure[1] was found to be determined by:

- Poor design (although in accordance with contemporary codes)
- Failure on the part of the designers to look beyond the design code
- Poor quality control and supervision during construction
- Deterioration over its life as a consequence of poor quality materials, salt contaminated water and freeze-thaw cycles.
- Poor maintenance and repair procedures
- Inaccessibility of critical elements
- Failure by the maintaining authorities to act decisively

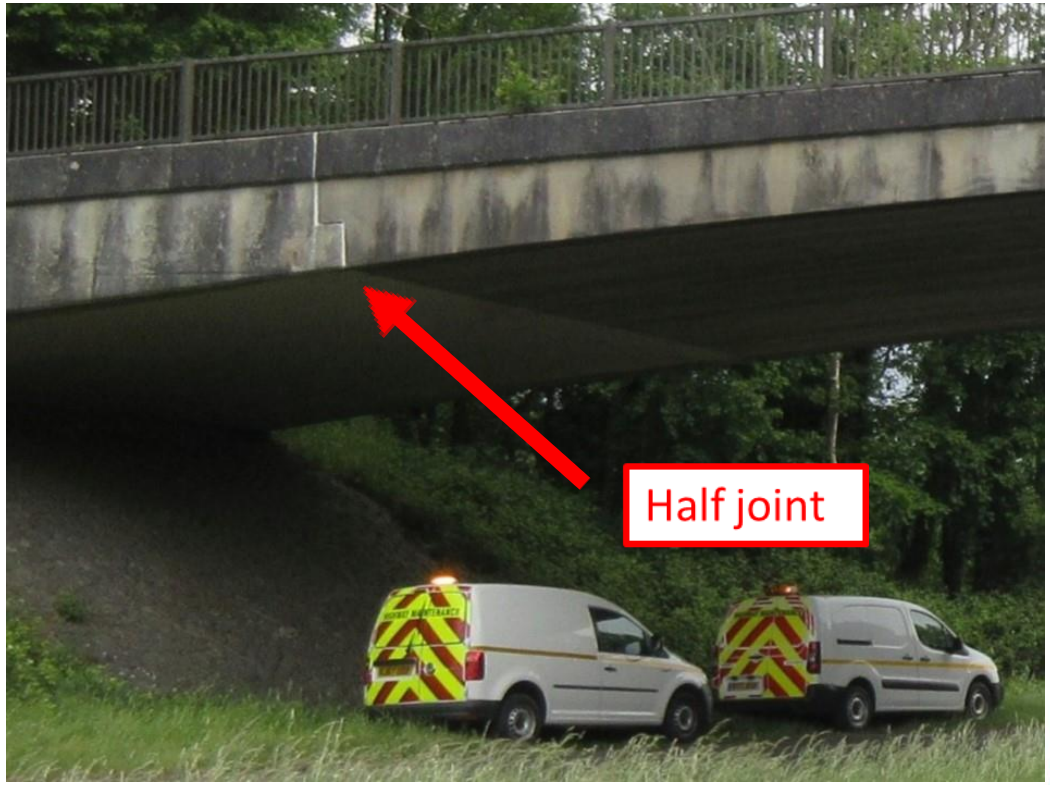
Our assessment process and decision to close the bridges

Brigsteer and Underbarrow bridges have been inspected biennially since construction.

In 2022 we started the process of assessing the half-joints in accordance with National Standard CS 466 ‘Risk management and structural assessment of concrete half-joint deck structures’.

This has 6 parts including:

- Initial Review
- Risk assessment for structural assessment
- Structural Review
- Structural Assessment
- Risk assessment for Management
- Management Plan



In addition we undertook ferro-scanning to try and verify reinforcement details.

We also started the process to check the post-tensioning in accordance with National Highways Standard CS 465 ‘Management of post-tensioned bridges’ At this time we have not undertaken intrusive investigations of the post-tensioning.

Following receipt of the structural assessment of the half-joints we commissioned a report in accordance with National Standard CS470 ‘Management of sub-standard highway structures .’

Key findings from the report

- The bridges have sustained unrestricted highway loading over a period in excess of 50 years
- The CS 470 Management of sub-standard highway structures report was conducted by Jacobs, our independent consultants.
- The report recommended that, to reduce the risk posed by the half-joints in the bridges, both **Brigsteer and Underbarrow bridges should be closed to all traffic and all applied load removed** and that the half-joints should be monitored. This includes use of the bridges by all pedestrians, cyclists and vehicles and that the half-joints should be monitored.
- Taking into account the condition of the bridges and with monitoring in place, the report recommended that **the A591 can safely remain open** whilst a more sophisticated assessment, with intrusive works, is undertaken.
- Our action and decision to close both bridges is based on the findings of this specialist report.

The report is now available to access on our 'Brigsteer and Underbarrow bridge closures, Kendal' webpage on westmorlandandfurness.gov.uk

Works undertaken on the bridge closures to date

- Installation of security fencing, replacement of damaged security fencing, installation of more robust security fencing to keep public safe
- Further scrutiny of Management of Sub-standard highway structures report, particularly with respect to safe use of A591
- Services searches
- Procured a peer review of the structural assessment of half-joints
- Procured sensitivity study assuming better reinforcement quantities - to check likelihood of improved strength of bridges
- Commenced procurement process for topographical surveys
- Commenced traffic assessment to determine impact of proposals on traffic using A591
- Considering bridge monitoring systems and discussions with consultant
- Engaging with supply chain, initially to help with short term fix
- Considering medium term plan and options
- Response to questions and requests for information

Assessment of the diversion route and planned improvements

- The diversion routes were risk assessed before the closure. They are the most suitable option in the area for the traffic that is diverted from the bridges. It avoids the narrowest lanes in and around Brigsteer village and narrow points between Brigsteer and Levens.

- A second risk assessment has been conducted where we have identified the following improvements that we will be making:
    - **Replacing damaged or faded signage** – signs have been ordered and will be erected in the next two to three weeks
    - **Laying new road markings** – this work has been formally sent out to tender and will be conducted once a tender is secured
    - **Clearing vegetation on the verges where necessary to improve visibility** – identified programme has been allocated to our maintenance team who have started works
- Care operators and emergency services have been informed and are still able to access all villages and support residents in need.

Our short-term plan

Our objectives:

- Restore links across A591 at bridge sites
- Minimise disruption to A591

Explore options for a solution:

1. Propping the bridge at half-joint locations
2. Demolition and installation of a temporary bridges
3. Prop the current bridges and install temporary bridges
4. Support structure from above bridge
5. More sophisticated analysis of the bridges

Detailed information on each solution option (short-term plan)

Propping of bridge at half-joint locations

- Requiring support structure on A591, probably limiting to one lane in each direction
- Hardening up central reservation on A591 to form carriageway
- Traffic management on A591 between and under bridges
- Some disruption to A591 during installation of props
- Structural assessment of bridge to determine impact to bridge, including consideration of post tensioning
- Design of temporary propping system and foundations
- Technical approval processes for existing structures and temporary works

Prop and install temporary bridge

- Same issues as for propping option, but would allow existing bridges to be retained

Detailed information on each solution option (short-term plan)

Demolition and installation of temporary bridge (may compromise future options to strengthen the bridges, if further assessments find it is viable to do so)

- Options could include pedestrians/cyclist only, single lane light vehicles, or potentially restore to full highway loading with no restrictions
- Vertical alignment checks on headroom to A591 below and tie-in to side roads
- Structural assessment of existing bridge to support temporary structure, including consideration of post-tensioning
- Consider retaining or demolition of cantilever spans
- Closure of A591 will be necessary during demolition works and installation of temporary bridges
- Technical approval processes with respect to existing structure and temporary structure

Detailed information on each solution option (short-term plan)

Support structure from above bridge

- Options could include pedestrians/cyclist only, single lane light vehicles, or potentially restore to full highway loading with no restrictions
- Structural assessment of existing bridge to allow this system to be implemented, including consideration of post-tensioning
- Partial closure of A591 likely to be necessary during installation works
- Technical approval processes with respect to existing structure and temporary structure

More sophisticated analysis

- This may demonstrate that the bridge can perform better than the current assessment indicates, although it may still not be adequate to support highway landing

Medium term plan

Our initial options study to consider pros and cons of potential options

Option	Re-open bridges, (may require weight limit)	Restrictions to A591 once completed	Restrictions to A591 during works	Ongoing maintenance liability of bridge	Impact on statutory undertaker equipment
Do nothing	x	N/A	N/A	✓	N/A
Propping	✓ Hopefully	✓	✓	✓	x
Demolition only	X	x	✓	x	✓
Strengthening	✓ Hopefully	x	✓	✓	?
Support System	✓ Hopefully	?	✓	✓	?
Temporary bridge	✓ Hopefully	x	✓	✓	?
Deck replacement	✓ Hopefully	x	✓	✓	✓
Roundabout or junction	N/A	x	✓	x	✓

Next Steps

- Complete improvements to diversion routes
- Appointment of Project Manager and supply chain to progress Short Term Plan which includes options and feasibility study and sensitivity analysis
- Develop bridge monitoring system and install
- Complete Peer Review - being conducted by WSP (second opinion of the expert report)
- Regular communications with Parish Council, residents and businesses via future meetings our social media pages, posters on village notice boards
- Continue monitoring, including internal inspection of half-joints
- The economic development and regeneration team will be contacting businesses following this meeting to offer 1-1 sessions to talk about practical help we can offer, to seek to mitigate the impact of the closures.

Timeline

- A Traffic Regulation Order is in place on both bridges for 18 months until 2026 and is the standard duration one can be in place. This is **not** confirmation of the length of closure which has not yet been determined.

- The options and feasibility study that will include structural assessment, highway layouts and tie-ins, outline designs of temporary works, impact on public utility apparatus, cost plans and programming, will inform which solution we will implement. Timescales will vary with each option, we are unable to determine the length of closure at this time.

- The options study, which includes is anticipated to take three to six months.

- The peer review by WSP is anticipated to be completed by early August 2024

- We will keep residents updated every step of the way.

Thank you

We thank you for your attendance this evening and for your patience and support as the bridges remain closed whilst we conduct further assessments, monitoring and establish a short-term solution.

We now welcome any questions via public meeting Chair, MP Tim Farron.