

Fellows in Action



Professor Roland Paxton MBE

In 1990, Professor Roland Paxton moved from local government to join the staff of Heriot-Watt University in an honorary capacity. Since then, Professor Paxton has represented civil engineering history and conservation disciplines extensively in teaching and research in the UK, as well as in the USA, Scandinavia and Japan. His work has attracted awards from the American Society of Civil Engineers (ASCE), the Institution of Civil Engineers (ICE), an HonDEng from Heriot-Watt University and an MBE; and enabled him to appreciate and promote the engineering significance of historic structures in publications produced in the UK, USA and Japan.

Five years ago, he became particularly concerned at the deteriorating state of the Union Chain Bridge. The following includes extracts from an article Professor Paxton published at the request of Heriot-Watt University's Institute for Infrastructure and Environment.

Recognition and Preservation of the Union Chain Bridge

Completed in 1820, the Union Chain Bridge is a suspension bridge, that crosses the River Tweed between Horncliffe, Northumberland, England and Hutton, Berwickshire, Scotland thus spanning the Scottish-English border.

On 7 November 2018, the ASCE approved a nomination initiated by Professor Paxton on behalf of ICE, and in association with the Japan Society of Civil Engineers (JSCE), that the Union Chain Suspension Bridge be designated an International Historic Civil Engineering Landmark.

More than 200 projects worldwide have earned the designation of ASCE Historical Civil Engineering Landmark, including the Eiffel Tower, Sydney Harbor Bridge, Victoria Falls Bridge, Thames Tunnel, Menai, Wheeling, Brooklyn and Golden Gate bridges, the Forth and Tay Bridges and the Liverpool & Manchester Railway.

In 2014, at an invited lecture as part of the inaugural meeting of The Friends of Union Chain Bridge (now numbering about 700 members), Professor Paxton outlined the case for conserving the bridge and stated his intention of seeking international recognition for it. This has now been achieved and hopefully will help to secure funding for the bridge's ongoing £7.3m conservation, to which the Heritage Lottery Fund (HLF) has made a welcome first-stage contribution of £360,000. A final-stage contribution of £3m is currently being sought from the HLF and it is hoped that international recognition will encourage a positive outcome from this application.

The Union Bridge's main claim for recognition as an international historic engineering landmark is that, from its completion in 1820, until the completion of the Menai Bridge in 1826, it was the world's longest span carrying vehicular traffic; and it is now the longest-serving suspension road bridge. Its type is still of great significance in bridge design as the means of achieving the world's longest spans.

Professor Paxton explained that the technical importance of Union Bridge is that, "by applying long wrought-iron eye-bar cables suspended in catenary, it was possible to erect the bridge in just 12 months, at a fraction of the cost of a stone bridge. Thus it is now more than just a useful bridge on a minor road – it is a unique, readily viewable, exemplification of state-of-the-art experimentally-based bridge technology at the dawn of modern 'strength of materials' design practice".

Professor Paxton went on to describe how the conservation of this significant landmark would be carried out. It had first and crucially been important to establish how the bridge was anchored, as drawings of that detail had been lost. Working with state-of-the-art radar specialist Dr Colin Stove of Scottish-based company, Adrok, a large iron anchor block was discovered about 7.5m vertically under the road approach. This anchor, and its companion on the upstream side are of great historic and general interest and it is proposed that they will be excavated and publicly displayed.

Having discovered how the bridge is anchored, the next stage will be to inspect the main chains before carrying out any necessary refurbishment. It is planned to remove the chains in order to carry out this process off site; this work is expected to take about 18 months. Professor Paxton is confident that although this will mean that the bridge will have to be closed for most of that time, as long as the deck continues to carry light vehicles and derive significant support from the 1820 main chains on completion of the restoration, this will not invalidate its claim to being the longest-serving suspension road bridge.

However, dismantling the bridge will not begin until full funding for the conservation is in place and therefore at present, the main aim is to secure funding for this remarkable and historical feat of engineering, hopefully for a start in December 2019.



On 27 October 2018, Professor Paxton (2nd from right) acted as guide to an ASCE delegation visiting the Berwick-upon-Tweed bridges. Pictured (centre front) is Professor Gordon Masterton FRSE, also a supporter of the bridge's conservation.