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Participants in the Historic Bridge Awards
 The Marchioness of Douro seated 3rd from left



GARTH WATSON MEDAL AWARDED TO PANEL CHAIRMAN, ROLAND PAXTON by The Editor

Our Chairman, Professor Roland Paxton (above, right) was presented with the Garth Watson Medal at the Institution of Civil Engineers in the beginning of November by outgoing ICE President Roger Sainsbury.

The award was given in recognition of the crucial work Roland Paxton has played in the development of the ICE's work on the history of civil engineering, the preservation of civil engineering heritage and also as Chairman of the ICE's Panel for Historical Engineering Works since 1990.

THE 1999 HISTORIC BRIDGE AWARDS by David Greenfield

All parties involved in organising and funding the 1998 Historic Bridge Awards were keen to keep up the momentum, and so a similar scheme was formulated for 1999. As before, the scheme was open to all repair, strengthening and conservation projects affecting bridges and aqueducts over 30 years old, in England and Wales, which had been completed during the previous two years. By the closing date of 31 March 1999, 18 projects had been nominated.

Professor Roland Paxton again chaired the panel of judges, who were:

- Terry Girdler, Chief Structural Engineer of English Heritage,
- Mike Winney, Editor Emeritus of NCE
- Andrew Leadbeater, ex-Chairman of the County Surveyors' Society Bridges Group.

Following a programme of site visits, the judges decided to give Awards to two outstanding projects, and Commendations to a further five.

The judges stressed that every project receiving an Award or Commendation involved a 'working bridge'. These are not museum pieces, but are still very much part of the local or national infrastructure.

The two projects which received **Awards** are:

- Stratfield Saye Iron Bridge restoration
- Northwich Town Bridge refurbishment

The five projects receiving **Commendations** are:

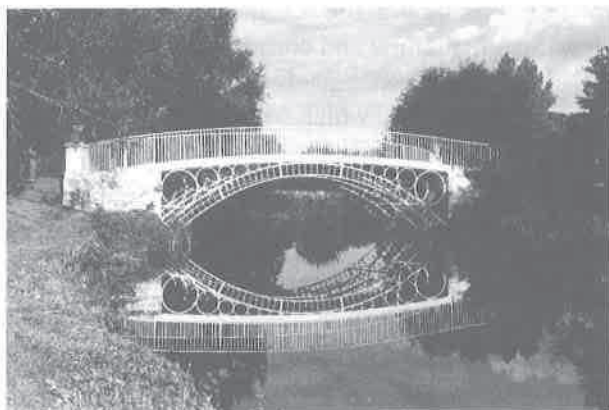
- Underbridge No 194 reconstruction, Irlam
- River Lune Bridge refurbishment, Thirlmere Aqueduct
- Chainbridge refurbishment, Usk
- Horkstow Bridge strengthening, North Lincs
- Radcot Bridge repair, Oxfordshire

Each project is briefly described below.

On 18 November Professor George Fleming, President of the ICE, presented certificates to representatives of all parties directly involved in the seven projects, at a ceremony in the Brunel Room at the ICE in London. The ICE was very pleased to welcome to the ceremony the Marchioness of Douro who received the award on behalf of the Stratfield Saye team.

Grateful thanks are due to English Heritage, Railtrack and British Waterways for their continuing financial support which covered running costs. Support-in-kind was again provided by ICE and the CSS Bridges Group.

Project Descriptions – Awards

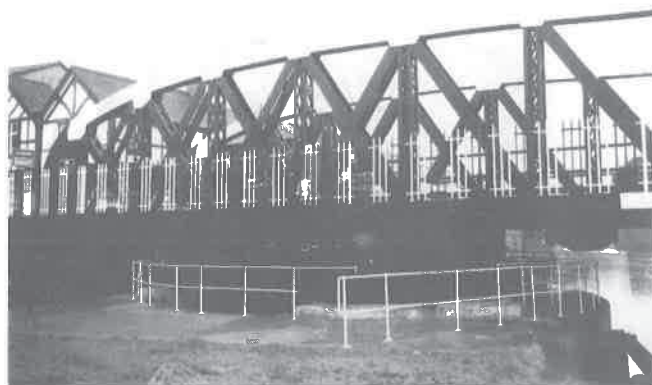


The Iron Bridge, Stratfield Saye, Hampshire
(HEW 1344)

Thomas Wilson designed this neo-classical bridge for George Pitt, Lord Rivers, to span the River Loddon in his re-landscaped park. Completed in 1802, four cast iron arch frames spanning 40ft carry a timber deck and bear on stone-clad brick abutments, built off timber grillages and piles. Decay of the timber substructures had allowed inward rotation of the abutments, causing

extensive damage to the superstructure, and the bridge was closed in 1995. The Trustees of the Wellington Estate commissioned consulting engineer Andrew Smith to design the restoration works, with Makers Industrial as main contractor.

The substructure was repaired and replaced where necessary. Having removed the timber decking, the locked-in forces in the arch frames were released by controlled jacking and wedging. The dismantled arch frames were then repaired and rebuilt by specialist sub-contractor Dorothea Restorations. Fractures in some cast iron sections were repaired by welding. The stone facings were dismantled and rebuilt, using replacement stone where necessary. The bridge once again plays a focal role in the landscape, and reinstates a key link in the Park's infrastructure.



Town Bridge, Northwich, Cheshire (HEW 1282)

Northwich Town Bridge and nearby Hayhurst Bridge were built in 1899 over the Weaver Navigation, and are Britain's first electrically-driven swing bridges. Two thirds of the bridge dead load is supported by the buoyancy effect of submerged pontoons. The load-carrying capacity of Town Bridge was assessed as being substandard, and a need to overhaul the mechanical and electrical elements was also identified by client British Waterways. A strengthening and refurbishment scheme, partly funded by Cheshire County Council, was designed by consultant Parkman and carried out by main contractor Kvaerner.

The most difficult engineering aspect of the scheme was the requirement to repair the pontoon tanks. Kvaerner undertook this by separating and lifting out the deck and pontoons. Europe's biggest mobile crane was used to raise the 300 tonne superstructure and 200 tonne substructure. Heritage considerations dictated that the structural repair and strengthening methods retained the original appearance, and in fact many

original mechanical and electrical features were refurbished and re-used. The careful attention to detail ensured that the character of this ingenious structure has been retained.

Project Descriptions – Commendations



Underbridge No 194, Irlam

Underbridge 194 was constructed in the 1890s to carry the Manchester to Liverpool line over the Ship Canal. It was built as a four track structure, with a 200ft clear span, 75ft above water level. The track was originally fixed to long timbers, creating serious deck maintenance problems which culminated in speed restrictions. As part of the North Trans-Pennine Route Strategy, Railtrack required superstructure strengthening to provide full loading capacity and 85mph line speeds, with potential for 100mph and future electrification. Where possible, the original structure was to be retained.

W S Atkins designed the works, which comprised strengthening and repairing the main span trusses, replacing the deck and the side spans, and freeing the bearings. The massive plating exercise on the trusses was carried out without affecting their outward appearance. Tarmac Civil Engineering, now Carillion, was main contractor.



River Lune Bridge, Lancashire (part of HEW 1022)

The Thirlmere Aqueduct conveys up to 200M l/day of water from the Lake District to Manchester. The valley of the River Lune is crossed by means of a pressure siphon, the aqueduct dissecting into four pipelines of 40", 44", 44" and 54" diameter. The pipes are carried on a 100 year old multi-span bridge, consisting of an elaborate steel superstructure on masonry abutments and piers.

Due in part to access difficulties, no major maintenance had been carried out since its construction, and the metalwork and roller bearings had deteriorated to a dangerous degree.

North West Water commissioned Bechtel Water Technology to design the works, which comprised a thorough refurbishment of the structure and freeing of the bearings. Main contractor was Daniel Contractors Ltd.

The scheme also restored public access across this interesting structure, a benefit much appreciated by the local inhabitants.



Chainbridge, Usk, Monmouthshire

Chainbridge, completed in 1907, carries the B4598 road over the River Usk four miles north of Usk. The bridge consists of two arched steel ribs spanning 150ft from which are suspended cross girders carrying corrugated steel roadway plates. The parapets are a combination of cast and wrought iron sections. A load assessment resulted in a 7.5 tonne restriction in 1990. Single line traffic working would allow an increase to 17 tonnes, but the footway was assessed as incapable of carrying vehicle loading.

Monmouthshire County Council designed a refurbishment scheme which permitted the economic retention of the unique structural character of the bridge. The carriageway was narrowed, and effective kerbing introduced to restrict large vehicles to a single central lane. Repairs were made to the cast iron, wrought iron and steel sections, and the structure

blast-cleaned and repainted. Main contractor was E A Bond Ltd.



Horkstow Suspension Bridge, North Lincs.
(HEW 598)

Horkstow Bridge was built as part of Sir John Rennie's River Ancholme Drainage Scheme in 1836. The 134ft span has double wrought iron suspension chains, one above the other, on either side of the bridge. Square suspension rods support a timber deck, which has a pronounced upward convexity. Current owner the Environment Agency, appointed Posford Duvivier to undertake a feasibility study of possible strengthening schemes, to ensure conformity with the original 1767 River Ancholme Act.

The preferred option, which retained the physical appearance and structural action, entailed replacing the deck with a stronger species of timber, blast-cleaning and painting the ironwork, and jet cleaning the masonry. During the site works, fibre optic techniques were used to inspect those lengths of back stay suspension chains which were sleeved below ground level. A reassessment taking account of section losses resulted in a need to replace the sleeved lengths using high tensile bars. C Spencer Ltd was main contractor.



Radcot Bridge, Oxfordshire (HEW 1913)

The medieval Radcot Bridge carries the A4095 road over the Thames north of Faringdon, and is reputedly

the oldest standing bridge on the Thames. The two side spans are pointed, ribbed arches, while the centre span is of flatter four-centred form of slightly later date.

The repairs involved repointing the elevations and internal faces of the parapets, replacing weathered and damaged stone, and stabilising the outer arches by filling voids with pitched stonework and lime mortar. Retention of the character of this Scheduled Ancient Monument was considered of paramount importance, and the English Heritage requirement of 'minimum intervention' was strictly adhered to.

Wells Masonry Services carried out the work for Oxfordshire County Council.

Other Submissions

The judges were impressed by the quality of design and execution apparent in all the nominated projects, including the following which were not short-listed:

Lanercost Old Bridge refurbishment - Cumbria CC/Storey Construction

Bedminster Bridge reconstruction - Bristol City Council/W S Atkins/John Mowlem & Co

Ambersham Bridge strengthening - West Sussex CC/Cintec International Ltd.

Seven Arch Bridge refurbishment - Hertfordshire CC/Mouchel/Wrekin Construction

Pont Sychoed strengthening - Welsh Office/Powys CC/Alun Griffiths Ltd.

New River Aqueduct refurbishment - London Borough of Enfield

Saltwell Viaduct refurbishment - Bath & NE Somerset Council/Mouchel/John Mowlem & Co.

Slitheroe Bridge strengthening - Calderdale MDC/Parkman/DCT Engineering

Aireworth Bridge strengthening - City of Bradford MDC/C Spencer Ltd.

Manor Farm Bridge strengthening - Somerset CC/W S Atkins/Rail Property Ltd

Otter Geer Clough Bridge refurbishment - North West Water/Bechtel/Daniel Contractors

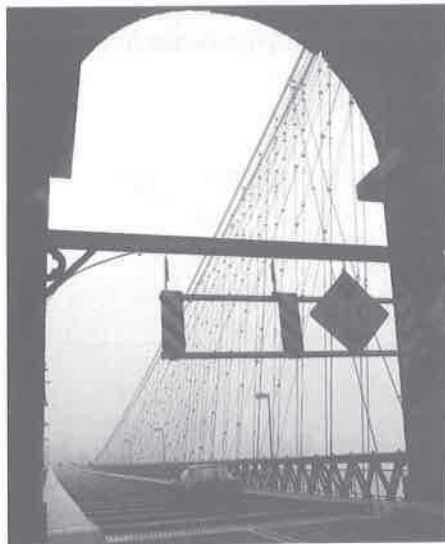
THE CHAIRMAN'S COLUMN by Professor Roland Paxton

Readers of *New Civil Engineer* (14 October and 18 November) will have noticed the progress and outcome of our Historic Bridge Award 1999. Thank you to all contributors to its success.

The Panel's work is held in high regard far beyond the United Kingdom as I discovered when hearing from attendees at the recent historic suspension bridges conference in West Virginia. This was to celebrate the 150th anniversary of the Wheeling Suspension Bridge - the world's longest span from 1849-1851 and the oldest surviving cable bridge with a span exceeding 1,000ft.



Wheeling Bridge, 1849
Author's photograph



Wheeling Bridge, 1999
Each cable contains c.2,200 wires
Traffic weight limit 2 tons
Author's photograph

This conference, to which my contribution was a lecture on the development of the long-span suspension bridge in Britain from 1810-1840, turned out to be tremendous tribute to an expertly-conserved

Wheeling Bridge and the extraordinary talents of its organiser Dr Emory Kemp, Director of the Institute for the History of Technology and Industrial Archaeology, West Virginia University. Dr Kemp also delivered the keynote lecture about the building of the bridge and its engineer Charles Ellet Jr. This was followed by informative accounts of its \$7m rehabilitation by A G Lichenstein and Associates, the French influence from 1822 by Professor Michel Cotte, the evolution of bridge stiffening by Professor Dario Gasparini. Other fascinating papers included one by Ted Ruddock on early blacksmith bridges in Scotland and Ireland.



Dr Emory Kemp at Wheeling Bridge
Author's photograph

The Wheeling Conference *Proceedings**, published in advance (an example to us all!), constitute a compendium of 'state-of-the-art' knowledge of early suspension bridges in an international and local context which will be of value to historians and conservationists for many years. Mention also deserves to be made of another finely produced publication, *The Wheeling Suspension Bridge - A Pictorial Heritage** by Emory Kemp and Beverly Fluty. It contains more than 120 illustrations, including a folding facsimile plan and sections of Ellet's 1847 design.

The conference attracted an attendance of over 150. It augurs well for the future that about half of this number were practising engineers. Additional attractions were a reception in the 1859 United States Custom House, a dinner with six 'works in progress' papers over dessert, and an evening banquet extra-illustrated with highlights from Robert Vogel's 19th century stereo-card collection as a prelude to taking to the night air and inspecting the flood-lit bridge.

After the conference I travelled by car with Dr Bob Kapsch (former Chief of HABS/HAER) through the

Appalachian Mountains from Wheeling to Washington D.C., more or less on the line of 'The National Road'. This was begun in 1811 and completed to Wheeling in 1821 where it connected with the river Ohio to open up the 'western waters' to the eastern seaboard. We visited various sites including an 1835 tollhouse at Searights reminiscent of Telford's earlier two-storey structures on the Holyhead Road. When in Washington, I was taken to see a lock and museum at the Chesapeake and Ohio Canal alongside an unnavigable stretch of its awesome neighbour the Potomac River which has inundated the canal from time to time. Another notable sight was the 220ft span Union Aqueduct Arch which not only carries the aqueduct and MacArthur Boulevard across Cabin John Creek but also now accommodates an interstate highway! The 20ft wide masonry arch built by Captain Montgomery C Meigs from 1857-1861 for \$245,000 has transverse internal cavities.



Union Arch, Washington, D.C., 1861 – 220ft span
Author's photograph

Thanks to the enterprise of Eric DeLony, Chief of HAER, I returned from the USA with an English translation he had commissioned of Bavarian Engineer Karl Culmann's critique on the construction of bridges in the USA and England in 1848-1849. Culmann's findings are of considerable interest and an approach is being made to the Newcomen Society with a view to their possible publication.

*Obtainable from the Institute of Technology and Industrial Archaeology, West Virginia University, Morgantown, WV 26506, USA @ \$38.50 and \$18 respectively, post-free.

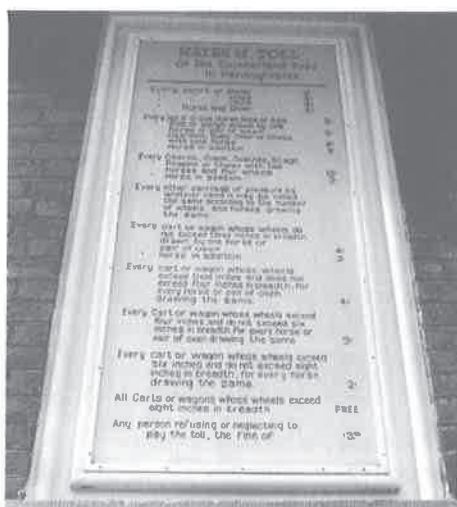


Searights Tollhouse (1835) on the 'Cumberland' or 'National Road', Pennsylvania
Author's photograph

LEAMINGTON SPA PUMP ROOM ROOF by Roger Cragg



Leamington Spa Swimming Pool Roof (HEW 1742)
(detail of main trusses – type M)
Author's photograph



Searights Tollhouse – Rates of Toll
Author's photograph

One of the features of Leamington Spa is its Pump Room where the spa waters were taken. The building has been little used in recent years, but has now been