



THE INSTITUTION OF
CIVIL ENGINEERS

Panel for Historical Engineering Works

NEWSLETTER

SEPTEMBER 1997 no.75

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GLENFINNAN VIADUCT CENTENNIAL

by Sandra Purves

To celebrate the centenary of the start of work on Glenfinnan Viaduct, the greatest of the engineering achievements associated with the development of Scotland's 'Road to the Isles', the Scottish Group of the Panel, with helpful publicity from *New Civil Engineer* (27 March/3 April, 10 April, 22 May), organised a commemorative plaque and steam train event on 12 July for the Scottish Local Associations of the Institution which attracted an attendance of over 320. The 'special', with its ICE crest and 'Glenfinnan Viaduct Centennial' nameplate, was hauled along the West Highland line from Fort William to Mallaig and back by Standard Class Four 4-6-0 locomotive 75014. The sun shone and the views of tunnels, cuttings, bridges and scenery were superb. The train stopped at Glenfinnan Station where, following an introduction to the occasion by Professor Roland Paxton, the highlight of the day was the unveiling of the plaque by Sir William McAlpine. The event attracted coverage in *ITV News*, *Sunday Post*, *Aberdeen Journal*, *Lochaber News*, *Oban Times*, *New Civil Engineer* and specialist journals.

The plaque, in ductile cast iron by the Bo'ness Iron Company, reads:



The Panel's 'Special' on Glenfinnan Viaduct
12 July 1997
(courtesy Railtrack)

GLENFINNAN VIADUCT CENTENARY 1897-1997

THIS OUTSTANDING VIADUCT, A PIONEER WORK IN MASS CONCRETE,
WAS CONSTRUCTED

JULY 1897-OCTOBER 1898 AT A COST OF £18,904

CONTRACTOR - ROBERT MCALPINE & SONS, GLASGOW

ENGINEERS - SIMPSON & WILSON, GLASGOW

PLAQUE UNVEILED 12 JULY 1997

BY

THE HON SIR WILLIAM MCALPINE, BT

SPONSORS: INSTITUTION OF CIVIL ENGINEERS,

SIR ROBERT MCALPINE LIMITED,

RAILTRACK PLC, RAILWAY HERITAGE TRUST

The proceedings were greatly enhanced by the fact that Sir William was a great-grandson of the contractor for the viaduct Robert McAlpine and that he was joined by Jim Shipway, great-grandson of one of the partners of its engineers Simpson & Wilson. Sir William spoke of his great-grandfather's experiences and Jim outlined the history and significance of the structures on the line. Although Glenfinnan was not the first viaduct to be constructed of mass concrete, it

THE INLAND WATERWAYS OF IRELAND

by Ron C Cox

The government announcement that Ireland is to host a World Canal Conference in Dublin Castle (9-11 May 2001) prompted this short note about recent developments in Irish canal restoration. The most recent National Plan earmarked £22 million for waterways.

Following the reconstruction of the Ballconnell Navigation connecting the Upper Shannon with Lough Erne, the Shannon - Erne Waterway is now the longest continuous navigable waterway in these islands. It extends from the estuary of the River Shannon at Limerick to the upper reaches of Lough Erne. The river navigation is being further extended to Boyle by 1km of newly dredged canal. At Limerick, in order to improve access for boats to Limerick City and thence to the sea, it is proposed to dredge about 1.2km of the riverbed, construct a weir across the Abbey River and insert lock gates and floating jetties. The River Suck Navigation is being extended from the Shannon to Ballinrobe with the dredging of a navigable channel. A new section of canal and lock are also under construction.

Work is continuing on the restoration of the Royal Canal between Dublin and the Shannon and 90% of the excavation work has been completed. The existing culverted bridge at Newcomen Junction in Dublin is to be replaced with a lifting bridge. The dry dock at Mullingar is being restored. Seven replacement road bridges are being designed to allow restoration of the navigation between Mullingar and Richmond Harbour. Only nine locks remain to be refurbished, including a new tidal lock to the River Liffey at Dublin. It is hoped to be able to re-open the Royal Canal between Dublin and the Shannon Navigation by the year 2000.

A study is to be undertaken to determine whether or not it will be feasible to restore the largely derelict Ulster Canal. This canal linked the Ballinamore - Ballyconnell Navigation with Lough Neagh. The canal wanders back and forth across the Border and is roughly 50% in Northern Ireland. Plans to run a ring road around Monaghan town have been put on hold until a full engineering study of the route has been considered.

The Newry Canal linking the River Bann and Lough Neagh with the town of Newry in County Down was officially abandoned in 1947 and is mostly derelict. The various sections of the canal were acquired in recent years by the four local authorities concerned and a full technical study commissioned by a Joint

Canal Development Committee. Funding has not as yet been secured for this project.

A decision had been taken to restore the Tralee Ship Canal at Tralee in County Kerry. Maintenance work continues on the Main and Barrow Lines of the Grand Canal and the Barrow Navigation.

Much of the above activity has resulted from a continuation of government policy of restoring the inland waterways of Ireland for tourism, sport and recreational purposes.

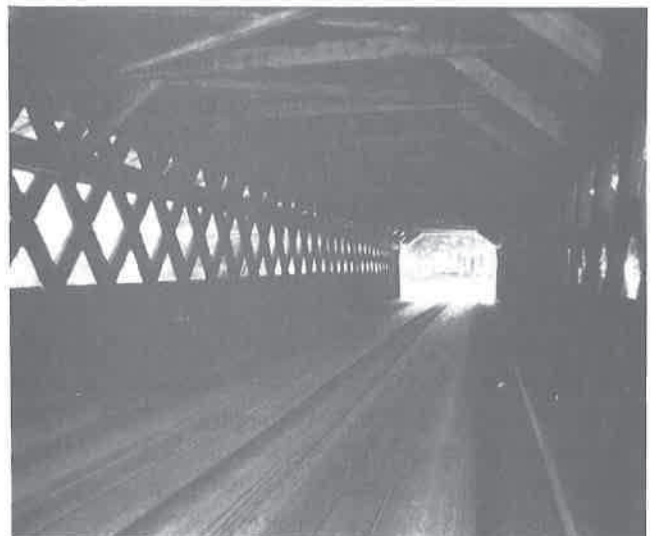
Those interested in keeping in touch with developments in Irish inland waterways, may like to know of the Newsletter of the Inland Waterways Association of Ireland, currently in its 24th volume, and from which the above notes have been abstracted by Ron Cox.

Further information about the association and the newsletter may be obtained from the *Honorary Secretary, Catherine Malone, Station Road, Rosslare Strand, County Wexford (telephone ++353-53-32538)*

THE CHAIRMAN'S COLUMN

by Roland Paxton

Thought provoking HEW's coming to my attention during a recent visit to the USA were ten covered timber bridges in Vermont, with 'Town' lattice side trusses to a design patented c.1820 by Ithiel Town, a Connecticut architect. A fine example, an 1989 replica of a c.1840 structure, is Henry Covered Bridge across the Walloomsac River at North Bennington with a span of about 120ft. These bridges were covered to protect the structural timber from moisture and so help to preserve it.



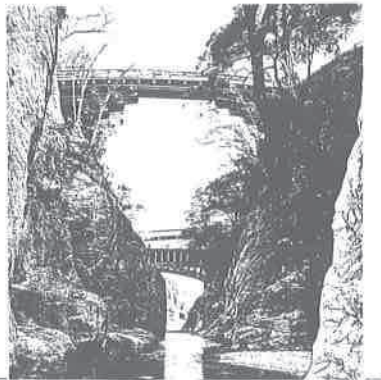
Henry Covered Bridge - June 1997

Writing of replicas reminds me of the cleverly conserved Saruhashi cantilever bridge in a mountainous area near Otsuki City west of Tokyo, which I inspected on my JSCE visit last year. The type of construction of what is thought to have been the earliest bridge at this site c.628 AD is unknown. My understanding is that the earliest specific reference to a cantilever bridge dates from the late 17th century and that the present bridge is a 1984 replica of this design. The overall span is about 100ft and the central suspended span 36ft. The replica closely followed the earlier design, except that square rather than circular cross-sections were adopted for the main timbers. This shape enabled concealed steel T beams to be used thus largely retaining the original appearance, but which added strength and life to the structure. A comparison of the before and after elevations (top and bottom respectively in the figure), indicates the closeness of the reconstruction to the original. Some people in Japan believe that this bridge directly influenced the design of the Forth Bridge through Sir Benjamin Baker's assistant Kaichi Watanabe, but this is most unlikely, and anyway, the bridge was designed before Watanabe left Japan for Britain.

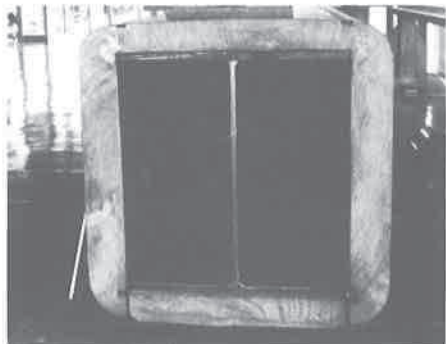


Saruhashi Bridge today

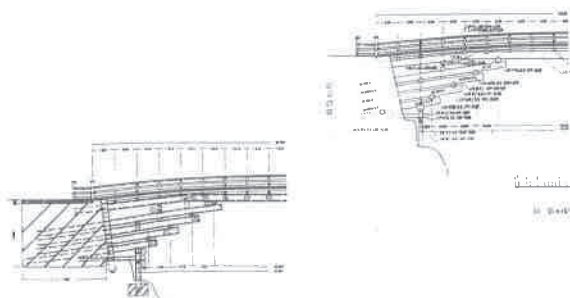
On 7 July I was delighted to receive a visit from my opposite number in the multi-discipline Institution of Engineers of Australia, Mr J W (Bill) Jordan, a Heritage Consultant from Newcastle, New South Wales and Chairman of its ten-member National Committee on Engineering Heritage. Readers will be interested to know that the principal activities of the Committee, which has been in existence for 14 years and has representatives from each State, are to hold a biennial conference attracting about 75 delegates and 25-35 papers, the next, purely Australian, to be held at Ballarat in 1998. The Committee also implements an *Historic Engineering Marker* (a 300 x 400mm bronze plaque) programme for national engineering landmarks, of which 12 have been awarded so far. No attempt has been made to systematically list Australian HEW's, but their proper listing is a long term aim. Committee Headquarters is in Canberra and its members meet twice a year at different locations. A Newsletter is issued, copies of which can be seen on application to our Newsletter Editor.



Saruhashi Bridge Gorge



Section of timber-clad 'I' beam in museum



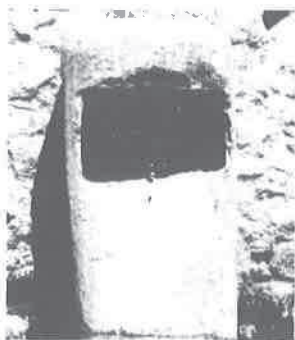
Saruhashi Bridge drawings

Some readers may recall the efforts made nearly 10 years ago by the Scottish Group of the Panel and Mr Norman Miller to promote an improvement in the decaying Westerkirk Library of Telford Bequest fame and its mouldering books. Thank you James Sutherland for first bringing this matter to my attention! Subsequently a Trust was set up under the chairmanship of Mr Arthur Bell of Langholm which has beautifully refurbished both books and building. It was most gratifying to be present at the re-opening of the library on 24 May by the Duke of Buccleugh in the company of most of Eskdale. Congratulations to the Trust on this excellent outcome and in particular to Trustee Kenneth McCrae who has so ably supported the venture and looked after our interest and also to Dr Shirley Roddon for a magnificent job on restoring and cataloguing the books. Visitors are welcome, but please telephone Dr Roddon on 01926 853001 beforehand.

Telford Milestones

Mr Norman Miller, Telford enthusiast and owner of the finest surviving tollhouse on Telford's Glasgow to Carlisle Road at Dinwoodie, was prompted by '*HEWs in the News* - Holyhead Road milestones' in the

Newsletter to look at the stone he knew to be nearby. He was shocked to find that it had vanished! He then looked for others and discovered in a farm yard what may be the last on this road with its iron plate. At our suggestion Mr Miller returned to take a photograph of it and was amazed to find that the farmer, to whom he stressed the milestone's importance, had painted it to preserve it - bright red! "Why did you paint it red" he asked, "because it was the only colour I had" the farmer replied! The mileages shown are Glasgow 65 and Carlisle 29½.



Glasgow to Carlisle Road Milestone
(courtesy Mr N Miller)

Concrete Buildings

Mr George Watson of Thurso saw the reference to Robert McAlpine's use of mass concrete for house building 'as early as 1876' on p.4 of the June Newsletter and thought readers might be interested to know that "Even earlier (1871) Valentine Smith the owner of Ardtorish used concrete to construct his estate buildings (see *Morvern Transformed* by Philip Gaskell, ISBN 1-899863-09-5). The book has photos (plates 10a to 11b) of some of the later cottages, schoolhouse, etc., they are stylish buildings ..."

Thank you Mr Watson for this contribution.

CORRESPONDENCE ...

Tubular Girder Bridges

by John Rapley

Mention of the Torksey Bridge was made in the September 1996, Newsletter, No.71. Recent discoveries have shown that its claim to be the oldest box girder bridge remaining is now no longer valid, although it is the oldest remaining continuous beam girder bridge, probably in the world, so far as present knowledge goes.

Remarkably what now appears to be the oldest Fairbairn wrought iron box girder bridge is to be found in daily use, where the line to Market Rasen and Grimsby crosses the River Witham on the southern outskirts of Lincoln.

Only the main span of 74ft clear (on the skew) is original, and dates back to 1847, the bridge being opened to traffic in December 1848. The two main girders and the cross girders are unaltered, but in 1903 a new steel centre girder was installed, with the cross girders being supported by long bolts. At some more recent date the deck has been renewed and raised on broad flange beams to improve the clearances. The side spans were also rebuilt in 1903. While photographic evidence confirmed the origins of the bridge, Dr Barry Barton has recently obtained access to an early LNER Bridge Book which has provided further confirmation.

This bridge is currently not Listed, and steps are being taken to seek a Listing, although there is no foreseeable threat to the bridge at present. It is hoped that a combined approach to the Department of National Heritage will be made by PHEW, the Newcomen Society, the Science Museum, and English Heritage.

The future of the Torksey Bridge has been a matter of concern in view of the imminent demise of the British Rail Property Board, but Sustrans, the national cycleway organisation, has agreed to acquire the bridge with a view to its eventual restoration. West Lindsay District Council is also preparing a report on the future use of the bridge. The bridge is in very good order for its age, and shows no serious defects, so that much of the work required is cosmetic.

Early Lattice Girder Viaducts

by John Rapley

The reference to Sir John Macneill's pioneering work in Ireland (Newsletter No.71) tells only part of the story of the early wrought iron lattice girder bridge, for in the decade between the Royal Canal Bridge and the Boyne Viaduct there were significant developments in England. It is not widely known that two major viaducts built for the Liverpool & Bury Railway in 1847-1848 are still in existence, although out of use for many years. It has been suggested for one at least to be Listed Grade II* by the Department of National Heritage.

These two viaducts stand between Bolton and Bury. The larger crosses the valley of the Tonge at Darcy Lever and has six spans of 84 feet and two of 54 feet, and a maximum height of 86 feet. The smaller at Burnden, where it crosses the valley of the Croal, has six spans of 73 feet. Both were strengthened in 1881/1883 by the addition of new internal girders and decks, and British Rail installed reinforced concrete decks in more recent years.