



The Institution of Civil Engineers

Panel for Historical Engineering Works

NEWSLETTER

JUNE 1993 No.58

CONTENTS

Appointment of Royal Commissioner
Bessie Hughes
Spring Meeting - 1993
Kahn Bridges
Research Day-School at Liverpool
Canals 200
The Chairman's Column
HEWs in the News
Thames Tunnel 150th Anniversary
• Exhibition and Lecture •
Record Form Update
Editor's Note

Appointment of Royal Commissioner ... Archivist, ICE

We are pleased to announce that Roland Paxton, Chairman of the Panel for Historical Engineering Works, has been appointed, by Warrant of Her Majesty the Queen, as Member of the Royal Commissioner on the Ancient and Historical Monuments of Scotland.

It is understood that this is the first occasion on which a civil engineer has been appointed to one of the Royal Commissions for Historical Monuments.

Roland Paxton is currently Senior Research Fellow at Heriot-Watt University, and has worked tirelessly to ensure the preservation of excellence (one of the stated objectives of the Panel) by actively promoting the conservation and restoration of the best of the historical engineering structures of the past.

Bessie Hughes ... Paul Dunkerley

Panel Members and guests who have attended the Annual Meetings over the past 15 years will be saddened to hear of the death of Bessie Hughes on 7 April at the age of 80. PHEW visitors were always assured of a warm and hospitable welcome at the home in Cheadle Hulme that she shared with her husband Roy, and her good humour will be missed at future Annual Meetings. In her earlier years, Bessie had been a teacher and also a local councillor, and she had organised the Ladies' visits during the 1980 Liverpool Meeting.

In recent years, Bessie had suffered from gradually increasing lameness, which was partially relieved by a hip replacement operation. The replacement of her other hip placed too great a strain on her heart, and she died peacefully in hospital the day after the operation. Bessie's funeral was held at Stockport Crematorium on 15 April, attended by Anna and Paul Dunkerley on behalf of Panel Members and their guests.

taken and the cost to build the later 19th century railway and the 20th century motorway networks.

The Chairman's Column ... Roland Paxton

During the past year members of the Scottish Group of the Panel have made a considerable effort to persuade Grampian Regional Council to abandon their proposal to replace the cast-iron arch bridge at Carron, Aberlour (NJ 225412, HEW 1823) with a steel arch structure. A direct approach to them proved unsuccessful and the matter is now the subject of a Public Local Inquiry. Historic Scotland and the Architectural Heritage Society of Scotland are to be commended for taking a firm stand on retention of the cast-iron bridge. The Inquiry began on 27 April and, after a few hours, was adjourned for 12 weeks at Grampian Regional Council's request, following consideration of evidence by Babbie, Shaw & Morton on behalf of Historic Scotland supporting the retention of the present structure.

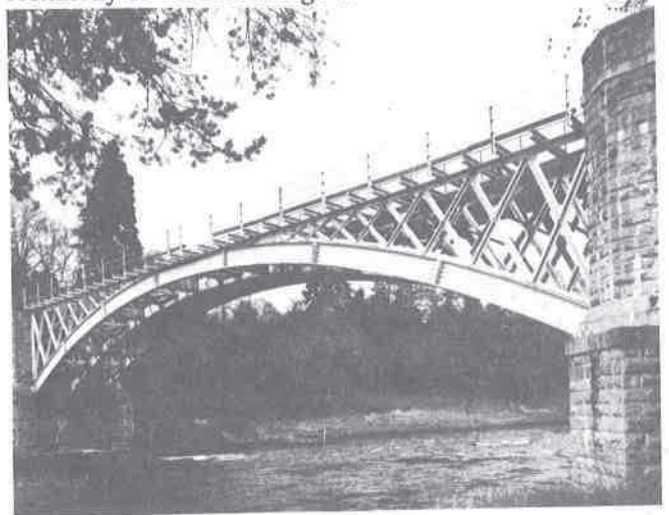
The following statement on behalf of the Panel was submitted to the various parties and is illustrative of our increasingly significant role in the conservation of historical engineering works:-

Introduction

The Panel was created by the Institution in 1968 and its members are Chartered Engineers whose expertise includes recording and promoting knowledge of historical engineering works. It is the leading authority in this field, publishes books and a newsletter, and has representation covering all parts of Britain and the Republic of Ireland. On numerous occasions the Panel has advised central and local government on the gradings of listed structures, particularly bridges. The Scottish Group of the Panel annually nominates the recipient of the Saltire Society's Civil Engineering Award for excellence in the category of conservation.

Carron Bridge consists of a segmental cast-iron arch span of 150ft with a rise above springing of 20ft, flanked on each side by 25ft span masonry arches. The bridge was erected in 1862-1863 as part of the Strathspey Railway and designed by the eminent engineer Alexander Gibb (1804-1867), Engineer to the Great North of Scotland Railway, whose previous experience as a contractor had included construction of major Telford bridges in Lanarkshire, Aberdeen, Edinburgh and Glasgow. The contractor for the bridge was his son Easton Gibb (1841-1926) who also became an eminent engineer. The founders and erectors of the ironwork were William McKinnon & Co of Aberdeen, who considered themselves "unsurpassed in efficiency, durability and workmanship", a motto supported by the

testimony of Carron Bridge as it stands today.



Cast-Iron Bridge, Carron, River Spey
Photo: © by courtesy of the Royal Commission on the
Ancient and Historic Monuments of Scotland

The importance of Carron Bridge in historical terms is, that it is a unique and major example of excellence 130 year-old craftsmanship incorporated into a bridge of outstanding significance. In Scotland the cast-iron arch bridge era, which enabled many bridges to be built more quickly and economically than masonry bridges, was begun by Telford in 1812 with the erection over deep water of a 150ft span with a 20ft rise above springing as part of Bonar Bridge. Two years later it was followed by Craigellachie Bridge, 5 miles downstream of Carron Bridge, with ironwork of the same dimensions and design. In the following decades the art of this type of bridge building developed and many cast-iron arches were erected, mainly on railways. Carron Bridge with its deep ribs, substantial castings and robust cross-bracing, all executed in a masterly manner, represents an outstanding example of this bridge type at the zenith of its development. From the 1890s steel became the principal material used in bridge construction.

At Carron Bridge, Telford's influence of 50 years earlier is still present in its basic form of construction, identical rise and span dimensions with Craigellachie Bridge, which retained its original ribs and cross-bracing when reconstructed in 1963-1964, and in having lattice spandrel elevations, a feature first introduced in cast-iron bridges by Telford. A comparison of Carron Bridge's ironwork details with the slender scantlings of Craigellachie Bridge affords an opportunity unique in Scotland to appreciate the alpha to omega development of this useful bridge type. Even smaller examples, once common, are now rare, many having been scrapped because their spans and headroom became inadequate for later needs. The various elements of the ironwork of this type of bridge, its ribs, spandrels, cross-bracing and deck, gain additional strength from being inter-connected as a complete entity forming a space frame. Any significant loss of this ironwork, such as that proposed for Carron Bridge by Grampian Regional Council and condoned by the planning authorities, who appear to be mainly concerned with facade retention, would result in

a disastrous loss of character.

HEWs in the News ... Brian George

In what is probably the fastest supplement to an existing HEW, the Severn Road Bridge (HEW 201) which was completed in 1966 is due to be relieved in 1996 by a second crossing of the Severn river. On 26 January the *Daily Telegraph* described the £300 million venture by John Laing Construction of Britain and GTM - Europe of France, whose parent companies in turn belong to the concession company Second River Crossing plc. The concession company includes Bank of America and Barclays de Zoete Wedd who have arranged debt finance to fund the project, which will be repaid by revenue from the tolls of both bridges, and both bridges will revert to the Government after a maximum of 30 years.

The new crossing is being built three miles downstream from the suspension bridge which last year carried 3,000 vehicles an hour at peak times on its four traffic lanes. It will comprise a 1,000 yard, cable-stayed construction, known as Shoot's Bridge, 120ft above the river's navigation channel, linking two 2,330 yard viaducts reaching from Gwent to Avon. The H-frame pylons rising 485ft above high-water level will carry the 184 stay cables supporting Shoot's Bridge, which will have a main span of 500 yards. A benefit of the arrangement of the approach roads is that the journey from Wales to the south-west of England will be shortened by some 8 miles.

The British Rail Property offer of Victorian viaducts for sale at £1 each (*Daily Telegraph*, 8 February) included 18 in Scotland. With offers of £70,000 each as a contribution towards maintenance, the list includes the following HEWs:-

• North Water	1189
• Uddingston (Clyde)	401
• Westfield	1009

[Note from Technical Secretary

It appears that we gave an incorrect date in *Newsletter 67* for the issue of the *Daily Telegraph* in which this report appeared and we overlooked a misprint which quoted £7,000 as the maintenance contribution offered. The figure should have been £70,000 as stated here].

The Times (17 March) described an appeal which had been launched the previous day to raise £1.8 million for a new pumping system to ensure year-round navigation on the Kennet and Avon Canal (HEW 1034). The 57 mile waterway was built between 1794 and 1810 by John Rennie to transport goods from the west country to London. It was largely superseded by the construction of Brunel's Great Western Railway and was closed to commercial traffic in 1951.

The canal was rescued from dereliction by the Kennet

Before the mid-19th century, cast-iron was also used extensively in horizontal beam bridges, of which a significant number failed under load from cracking induced by tensile forces. In 1849 this shortcoming was recognised nationally, following investigation by a Parliamentary Commission, and wrought-iron with its greater tensile strength, rapidly superseded cast-iron for use in flat beams, but not when used in the arch mode, where the cast-iron acts in compression, as at Carron Bridge. In compression cast-iron is stronger than wrought-iron and mild steel and it is also more long-lasting, e.g., Shropshire's Iron Bridge is 212 years old. By 1862 these very different properties of cast-iron were more widely appreciated than they are now. For Carron Bridge, the Railway Company's minutes record that the use of wrought-iron was considered and rejected in favour of cast-iron by its experienced engineer. Today Carron Bridge appears free from cracks and significant corrosion and has satisfactorily served all traffic, until the recent arbitrary 7.5t weight restriction, for more than a century and appears capable of continuing to do for many more years. It would not be relevant to conclude that Carron Bridge is inherently weak because of any failure of a cast-iron bridge elsewhere, as there were wide variations in design practice and in the composition and strength of ironwork from different foundries. Carron Bridge's ironwork is of outstanding provenance and has stood the test of time, which is the best indication of its integrity.

Statement

The Scottish Group of the Panel after discussing this matter:-

1. Considers Carron Bridge to be one of Scotland's finest iron bridges and its best surviving large-span cast-iron railway bridge. The Panel also considers the bridge to be a rare and exceptionally fine survivor of an economically significant bridge type at the zenith of its development.
2. Fully endorses Historic Scotland's Class A listing and considers that any alterations made to the bridge should be consistent with maintaining this listing. Grampian Regional Council's proposals to date are not considered to meet this criterion as they involve significant loss of historic ironwork.
3. Accepts the need for safe usage of the bridge and considers that its Class A listing would not be significantly prejudiced by a new deck with single traffic lane, footways and sympathetically designed parapets.
4. Considers that the outstanding historical significance of Carron Bridge is such that every possible option for retaining the present ironwork safely in use and without destroying its character should be fully and properly investigated.