The Institution of Civil Engineers

Panel for Historical Engineering Works

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The Ironbridge Gorge Bridges and the Free Bridge ... R Cragg

The Ironbridge Gorge is internationally famous for being the site of the world's first cast-iron bridge, and is today the focus of a World Heritage site. What may be less well known, however, is that within a short distance of the Iron Bridge itself is a remarkable collection of other bridges spanning the River Severn, one of which is to be replaced by a new bridge, which will result in the loss of an Historic Engineering Work.

The first bridge to span the Severn, sited at the north end of the Gorge, was the mediaeval stone arch bridge built by the monks of Buildwas Abbey. This bridge fell victim to the great Severn flood of 1795 which damaged, or swept away, many of the bridges between Shrewsbury and Gloucester. Thomas Telford was engaged to design a new bridge and built a single-span iron arch bridge, completed in 1796. This bridge, in turn, succumbed to the relentless pressure exerted by the inward movement of the sides of the Gorge and the arch fractured. It was replaced in 1905 by the present Pratt truss (HEW 648), using, very largely, the abutments of the Telford bridge. A section of Telford's bridge is mounted in the parapet of the present bridge.

Chronologically the next bridge to span the river was, of course, the Iron Bridge itself, completed in 1779 and replacing the previous ferry (HEW 136). The Iron Bridge is too well known to require a detailed description here. Shortly after the opening of the Iron Bridge another crossing of the river, this time at Coalport two miles downstream, was built. This bridge, opened in 1780, was a two-span timber structure, each of about 60 feet span with a midstream masonry pier. Unfortunately this bridge was one of the victims of the flood of 1795 and Coalport bridge was rebuilt, this time with a single-span iron arch with three ribs, completed in 1799 (HEW 422). In 1818 the bridge was widened by the addition of two extra arch ribs and at this time the original timber deck was replaced in iron. The date of these alterations is cast in the parapet of the bridge and often gives rise to an incorrect date being quoted for the bridge. The bridge is still open to traffic, albeit with a three ton weight restriction, having been taken over by the County Council and freed from tolls in 1922.

After Coalport bridge a period of 65 years elapsed before another bridge spanned the river, and this one was a product of the railway age. Albert Edward Bridge (HEW 350), situated between the Iron Bridge and Buildwas Bridge, is an impressive 150ft span cast-iron arch carrying the railway line which currently serves Buildwas Power Station but which originally formed the

McQuillan, who has been doing some research into them, has discovered evidence for (and indeed the remains of) a fifth bridge, at Castledawson, County Londonderry.

James Dredge erected two bridges on this estate for the Right Honourable George Robert Dawson, great-great-grandfather to the present owner, the Right Honourable Lord Moyola.

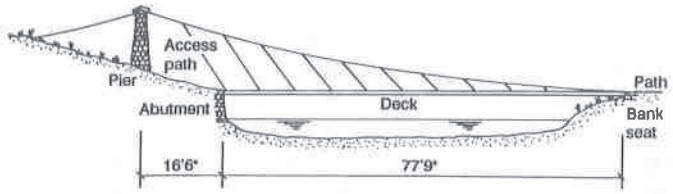
The first was a footbridge, probably erected in the early to mid-1840s, upstream from the weir. Lord Moyola in a letter recollects '... it had a terrific swing in it and as such I much enjoyed it as a child'. The bridge survived for some 83 years but, during an abnormal flood in 1929, was hit by a floating tree and swept away. The river level was reported to have risen more than 15ft in the night and the flood is remembered by local people as the worst this century in that area.

The remains of the masonry support elements can, however, still be seen. These comprise a shallow bankseat on the northeast side, an abutment wall on the southwest bank and a 12ft high main support pier, set further back, also on the southwest side. On the downstream side of this pier, remnants of the wrought iron suspension rods still project on each face. The rod ends have been cut: indicating that part of the downstream chain may have survived the flood. An old Ordnance Survey map which features the bridge also shows that the access path on the southwest side led onto the bridge at an acute angle to the river.

A survey of the existing features was carried out in September 1991. The overall length of the bridge deck was approximately 77ft 9in measured from the face of the abutment wall to the edge of the bankseat. The widths of the main pier and the bankseat indicate the bridge was about 8ft 6in wide. The distance between the centre of the main pier and the face of the abutment wall was 16ft 6in.

This information enabled a sketch drawing to be produced showing how the bridge would have looked. This was subsequently confirmed by Lord Moyola as being a true representation of what existed. The river, at this location, was obviously of insufficient width to warrant anchorage on each side. As such the bridge was a rare, if not unique, example of Dredge's work and demonstrates that he did adapt his basic principle to such local topographical conditions. On looking at the drawing one can readily see that the 5ft freeboard from normal water level to the bridge deck was a design weakness. The fact that the main support pier was situated so far back from the actual deck explains the lack of lateral stiffness to which Lord Moyola referred.

The second bridge, built about one mile downstream of the first, was erected in November/December 1847 and has a well chronicled history. This bridge still survives despite the great flood of 1929 when, as recalled by Lord Moyola, the water level overtopped the deck.



Moyola Park Bridge, Castledawson

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The Chairman's Column ...
Roland Paxton

When the Institution's President, Mr Robin Wilson, visited Edinburgh last November, an opportunity arose to discuss the Panel's work. Whilst appreciating the Panel's recording role, he expressed particular approval of and interest in its increasing activity in advising external agencies and its encouragement of excellence in the conservation of historical engineering works. The President had not been aware of the extent of this involvement and felt it necessary to strengthen the links between Council and the Panel and to give the Panel more power to its elbow. To this end he undertook to arrange for a senior member of Council to attend our April Meeting. We now understand that Mr Michael Cottell, the President-Elect, is expected to attend and we look forward to welcoming him. At the President's invitation I made a contribution to the Institution's Corporate Plan covering the Panel's broad objectives.

In connection with this Corporate Plan submission and the review of our 'Green Folder' currently being co-ordinated and finalised by Paul Dunkerley, I found it useful to state the Panel's broad objectives as:-

> TO IDENTIFY, RECORD, and PROMOTE KNOWLEDGE of CIVIL ENGINEERING HERITAGE and to ENCOURAGE EXCELLENCE in the CONSERVATION of its FINEST EXAMPLES

Recently, I had the opportunity of acquainting HRH The Duke of Edinburgh of the Panel's activities. In a reply from Buckingham Palace, Brigadier Hunt-Davis wrote '... His Royal Highness has also asked me to say that he found it most interesting to read about the work of the Panel for Historical Engineering Works and was

interested to see the photograph of the railway viaduct at Laigh Milton which your Panel proposes to restore'.

HEW 1469
West Gatehead Viaduct looking downstream

On the subject of Laigh Milton Viaduct, (otherwise known as West Gatehead Bridge, HEW 1469) the world's oldest and now barely surviving railway viaduct, Crouch, Hogg, Waterman have now reported on its state. The structure is in imminent danger of collapse and has been closed to the public on safety grounds. The estimated costs of conserving it have more than trebled since 1988 and are now £350,000 for immediate safeguarding and nearly £1M for the complete operation. As a matter of urgency, meetings have been arranged under the Panel's auspices to see if a Trust can be formed to conserve the viaduct.

Arrangements for the celebration of Smeaton's bicentenary are now well in hand. Plans are being made for the Institution's Smeaton Exhibition, which is to be opened at Great George Street in July, to come to Edinburgh in October and to Glasgow in November. Professor Skempton's definitive and very readable *'John Smeaton, FRS'* has been reprinted by Thomas Telford Publications with an attractive new dust-wrapper. The Institution's Smeaton Lecture this year will be given in London on 14 July by myself on 'Smeaton in Scotland' and will be repeated in Local Association programmes in Edinburgh, Glasgow and possibly Yorkshire. I have been in regular communication with Professor Alan Prasuhn, Chairman of CHHACE, regarding the ASCE visit from 11-21 July and the joint ASCE/ICE International Historic Landmark plaque. The wording of this plaque which is to be dedicated at Eddystone Lighthouse by the Presidents of both bodies on 16 July has been agreed and the plaque is being made.

Co-operation with the History Committee of the Japan Society of Civil Engineers is continuing. Recently I had a visit from Mr Hiroshi Isohata who is now busily translating *'100 Years of the Forth Bridge'* into Japanese. Publication is expected by Christmas. The decision to publish was made following the visit to London by Messrs Fujimoto and Kanechika, whom Panel Members met at our 1991 Spring Meeting, when they were making arrangements for the memorable R H Brunton event held last October. The JSCE also intends to publish heritage books covering Japan of a similar nature to the Panel's volumes.

I should like to close with a word to the Chairmen and Secretaries of the Local Associations about Panel representation on their Committees. Most Local Associations invite the Panel Member for their area to attend meetings and, for those that do not, I hope that they will consider doing so in the interest of providing a better service to their members. For example, in Scotland, the Panel has been represented on and has enjoyed an excellent relationship with both Local Associations for many years, its members initiating numerous instructive and invariably well-attended lectures and visits. This has also been the case in the North-West, Midlands and other areas. The usefulness of these events was often enhanced by seeking and welcoming attendance from other appropriate professional and informed public interest groups. We have a great and ubiquitous engineering heritage; let it not remain unsung!

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HEWs in the News ... Brian George

A fine photograph on the cover of *NCE 7 November* depicted the site of the Severn railway bridge under construction in 1879. ICE Librarian Mike Chrimes has published *'Civil Engineering 1839-1889: A Photographic History'* and in an article introducing his book he showed a fascinating photograph of the timber Leven viaduct of the Forth-Clyde railway photographed by A Crowe around 1867. This clearly shows the detail of the construction of the timber raking members so that their thrust was taken by horizontal members in the middle of the span.

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The A102 Blackwall tunnels beneath the river Thames are of different ages, the northbound tunnel being driven between 1891 and 1896 and the southbound tunnel in the 1960's. *NCE* of *14 November* described the £16M refurbishment of the northbound tunnel by engineer Mott MacDonald and contractor J Murphy and Sons where the tunnel lighting, the deteriorated old glazed tunnel lining and the concrete walkways which have been attacked by de-icing salts are all being replaced. The ventilation, power supply, monitoring and control systems and emergency fire and telephone points have all required upgrading. The two year contract commenced last May and the southbound tunnel is being used for two-way traffic on the 5 nights per week when the northbound tunnel is closed.

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In late November the *Daily Telegraph* and the *Exeter Express* and *Echo* carried the news that both the Exeter Maritime Museum and the Starcross Atmospheric